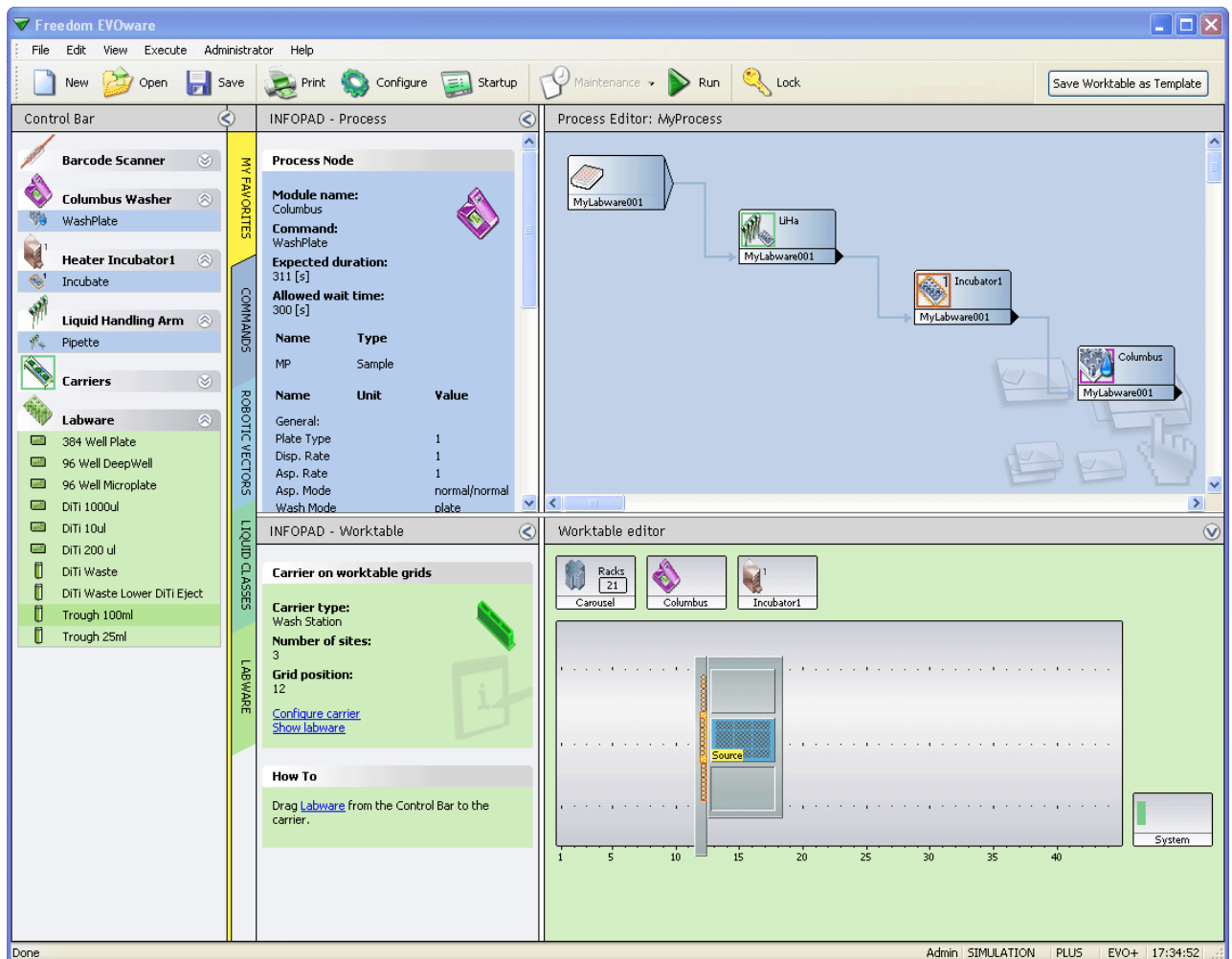


## Software Manual

# Freedom EVOware<sup>®</sup> Standard Freedom EVOware<sup>®</sup> Plus

## Limited Device Support (General Purpose)



The screenshot displays the Freedom EVOware software interface, which is divided into several main sections:

- Control Bar:** Contains icons for File, Edit, View, Execute, Administrator, and Help. Below these are buttons for New, Open, Save, Print, Configure, Startup, Maintenance, Run, and Lock. A "Save Worktable as Template" button is also present.
- Control Bar (Left):** A vertical sidebar with categories: MY FAVORITES (Barcode Scanner, Columbus Washer, Heater Incubator1, Liquid Handling Arm, Carriers), ROBOTIC VECTORS, LIQUID CLASSES, and LABWARE (384 Well Plate, 96 Well DeepWell, 96 Well Microplate, DITI 1000ul, DITI 10ul, DITI 200 ul, DITI Waste, DITI Waste Lower DITI Eject, Trough 100ml, Trough 25ml).
- INFOPAD - Process:** Shows the "Process Node" configuration for "Columbus".
 

Name	Type
MP	Sample

 Below this is a table with columns "Name", "Unit", and "Value":
 

Name	Unit	Value
Plate Type		1
Disp. Rate		1
Asp. Rate		1
Asp. Mode		normal/normal
Wash Mode	plate	
- Process Editor: MyProcess:** A flowchart showing the process flow: MyLabware001 → LfHa → MyLabware001 → Incubator1 → MyLabware001 → Columbus → MyLabware001.
- INFOPAD - Worktable:** Shows "Carrier on worktable grids" configuration:
  - Carrier type: Wash Station
  - Number of sites: 3
  - Grid position: 12
  - Buttons: [Configure carrier](#), [Show labware](#)
- Worktable editor:** A graphical representation of the worktable grid with a "Source" label and a "System" indicator.

The status bar at the bottom indicates "Admin SIMULATION PLUS EVO+ 17:34:52".

**Document Status Sheet**

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2	2	2008-09-05	Updated for Freedom EVOware V2.2	
2	3	2009-04-01	Updated for Freedom EVOware V2.3	
2	4	2011-03-01	Updated for Freedom EVOware V2.4	
2	5	2011-07-20	Updated for Freedom EVOware V2.4 SP1	
2	6	2011-10-25	Change of labelling	
2	7	2012-04-17	Updated for Freedom EVOware V2.5; Air LiHa support	
3	0	2013-03-15	Updated for Freedom EVOware V2.5 SP3	
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3	14	2021-11-18	Updated for Freedom EVOware V2.8 SP5	
3	15	2022-10-21	Updated for Freedom EVOware V2.8 SP6	
3	16	2023-12-12	Changes in Chapter 7.3.2, 8.3.3.1, 8.5.9.3, 15.18, 17.7, A.11 Changes in Table 9-12, 9-20 Chapter A.13 removed	





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
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# 1 About This Manual

<b>Purpose of This Chapter</b>	This chapter points out the purpose of the manual, specifies the product the manual deals with and who the manual is intended for. Furthermore, it explains the symbols, conventions and abbreviations used and offers other general information.
<b>Purpose of This Manual</b>	This manual describes the Freedom EVOware software, provides the information required for proper installation, instructs how to run the software and how to make use of all its features.
<b>Target Group</b>	<p>This manual is intended for application specialists who need to develop programs (laboratory processes and/or pipetting programs) for controlling the Freedom EVO series of pipetting instruments. It is assumed that such specialists are already acquainted with standard laboratory procedures for handling and pipetting liquids as described in standard textbooks on this subject.</p> <p>This manual is also helpful for operators of the Freedom EVO pipetting instrument to give an overview of the wide range of potential applications and instrument options which are available, and to help to understand the function of the processes and/or pipetting scripts which they want to run.</p>
<b>For Your Safety</b>	<b>Please read this manual carefully before installing and running the Freedom EVOware software, in particular Chapter 2, “Safety”.</b>
<b>Scope</b>	This manual applies to Freedom EVOware Standard V2.8 and Freedom EVOware Plus V2.8. For additional information on the Freedom EVOware software, see <a href="#">3.5 “Supported Pipetting Instruments and Tecan Options”</a> ,  3-5.

## 1.1 Conventions Used in This Manual

The following list provides an overview of the conventions as used throughout this manual:

- |                       |   |
|-----------------------|---|
| <b>Names</b>          | <ul style="list-style-type: none"><li>◆ <b>Freedom EVO:</b> To facilitate reading, the term “pipetting instrument” stands for the Freedom EVO series of pipetting instruments.</li></ul>  |
| <b>User Interface</b> | <ul style="list-style-type: none"><li>◆ <b>Names of screens</b> (menus, windows, dialog boxes, message boxes) are printed in italic, e.g.: “The <i>Select Components</i> window appears.”</li><li>◆ <b>Menus and command sequences</b> are printed in bold type and connected with a &gt; sign, e.g., “Start the function with <b>Options &gt; Te-MO &gt; Wash Unit.</b>”</li><li>◆ <b>Names of controls in dialog boxes, windows or message boxes</b> (command buttons, checkboxes, option buttons etc.) are printed in bold type, e.g. “Select the <b>Automatic</b> checkbox.”</li><li>◆ <b>Directory and file names</b> are printed as follows:<ul style="list-style-type: none"><li>– Path and file names are quoted directly, e.g.: C:\Program Files (x86)\Tecan\EVOware\database</li><li>– or a placeholder is given for the directory, e.g: &lt;install_path&gt;, which stands for the “real” directory name (the default installation path for Freedom EVOware is C:\Program Files (x86)\Tecan\EVOware. Also see the next point.</li></ul></li><li>◆ <b>Placeholders</b> (for file names, numbers dates etc.) are set in angle brackets &lt; &gt;, e.g.: TeSonic_&lt;serial_number&gt;_&lt;date&gt;_&lt;time&gt;.any.</li><li>◆ <b>Cross references</b> appear as follows, e.g: “Refer to section 1.1.1,  1-1”<ul style="list-style-type: none"><li>– 1.1.1 refers to the corresponding section number.</li><li>– The symbol  denotes the page number.</li><li>– 1-1 stands for the chapter number followed by the page number.</li></ul></li></ul> |

## 1.2 Reference Documents

This section provides a list of documents which are needed or may be useful in connection with the Freedom EVOware software. They either concern the pipetting instrument itself or the optional devices.

### 1.2.1 Related Documentation and Software

The following Tecan documentation provides additional information which can be useful when using this manual:

#### What Does the Doc. ID Tell You?

The Doc. IDs listed below are root numbers. Therefore, they do not contain information about the language, document version or the medium (data storage medium, hardcopy, downloadable file, etc.) of the document.

Check the scope of the corresponding document to make sure that you are in possession of the correct version.

**Note:** *The Doc. ID does not represent ordering information. For orders refer to the number on the binder, CD casing, etc.*


#### Operating and Software Manuals

- ◆ Introspect Application Software Manual (Doc ID 400733)
- ◆ Freedom EVOware Sample Oriented Add-On (Doc ID 394284 and 394285)
- ◆ Freedom EVOware Sample Tracking Add-On (Doc ID 393933)
- ◆ Freedom EVOware Runtime Controller Manual (Doc ID 394329) <sup>1)</sup>
- ◆ PMP Option Application Manual (Doc ID 395390)
- ◆ Freedom EVO Operating Manual (Doc ID 392886)
- ◆ Te-MagS Operating Manual Doc ID 391237)
- ◆ Te-Shake Operating Manual (Doc ID 391496)
- ◆ Te-VacS Operating Manual (Doc ID 391236)
- ◆ WRC Tower Operating Manual (Doc ID 391865)
- ◆ Columbus Washer (Doc ID 30008658)
- ◆ Magellan Data Reduction Software (Doc ID 30001495)
- ◆ Magellan Data Reduction Software, two manuals (Doc ID I 117519)
- ◆ Sunrise Microplate Reader (Doc ID I 137301 and 1 137302)

The following Tecan documentation describes the **Setup & Service software**, which is one of the components of the Tecan Instrument Software:

- ◆ Instrument Software Manual (Doc ID 392888)

The Setup & Service software is used for calibration, adjustment and commissioning of the pipetting instrument. Setup and service must only be carried out by suitably qualified personnel or by the Tecan Field Service Engineer.

The above manuals can be ordered from your nearest Tecan representative (see [19 "Customer Support"](#),  19-1).

1) *This manual is intended for operators of the pipetting instrument. The same information is also contained in the Freedom EVOware Software Manual.*

## 1.3 Trademarks

The following product names and any registered and unregistered trademarks mentioned in this manual are used for identification purposes only and remain the exclusive property of their respective owners (for simplicity reasons, the symbols for trademarks, such as ® and ™ are not repeated later in the manual):

- ♦ Freedom EVOware®, Freedom EVO® and Genesis Freedom® are registered trademarks of Tecan Group Ltd. in major countries.
- ♦ Windows® is a registered trademark of Microsoft Corporation.
- ♦ Excel® is a registered trademark of Microsoft Corporation.
- ♦ Roboflask® is a registered trademark of Corning Inc.

## 1.4 Abbreviations

See [D.1 “Glossary of Terms and Instrument Options”](#), [D-1](#) for information on common abbreviations. You can also search for abbreviations in the index.

## 1.5 Context-Sensitive Help System

Freedom EVOware is provided with extensive context-sensitive help (more than 900 pages when printed out). When Freedom EVOware is running, press F1 or click the Help button to get help on the current screen, dialog box or operation you are performing. Some of the dialog boxes do not have a Help button. Press F1 in this case. You can also open the help file with the shortcut in Start > All Programs > Tecan > EVOware.

**Note:** *The help system contains all of the information which is provided in the Software Manual PDF file on the Freedom EVOware installation CD. It uses the same numbering scheme for chapter headings, figures and tables as the software manual. Help is not provided for standard Windows operations such as Cut and Paste.*

The *Index* tab has the same entries as the index of the printed manual or PDF file. The *Search* tab (full text search function) lets you use the wild cards ? (one additional character) and \* (zero or more additional characters). For example, *scan\** finds *scan* and *scanner*. The wild cards can also be used at the beginning of the search string. For example, *\*allbarcodes* will find the ReadAllBarcodes command.

If you specify more than one search term, they are treated as alternatives (OR function). The search terms are not case sensitive. Use quotes "" to search for strings which contain space characters (e.g. "file names").

Refer to the standard Microsoft documentation if you need more information on using Microsoft HTML Help.

The Freedom EVOware Software Manual was written using Adobe FrameMaker. The context-sensitive help was created from the FrameMaker files using a special software tool.

### **Glossary**

This manual has an extensive glossary with descriptions of general terms and instrument options (e.g. Te-MagS). The glossary terms are included in the index of the printed manual or PDF file and the Index tab of the online help. They are marked with “overview”, for example “Te-MagS (overview)”.

### **Freedom EVOware commands**

See [13 “Overview of Freedom EVOware Commands”](#), [13-1](#) for an overview of the Freedom EVOware commands in the Control Bar. Also see [5.4 “Overview of the Main Window in Freedom EVOware”](#), [5-9](#).





## 2 Safety

### **Purpose of This Chapter**

This chapter covers only the general introductory safety instructions applicable to the Freedom EVOware. Specific safety instructions of the hardware devices are laid down in the respective hardware manuals.

### **Significance of These Safety Instructions**

The Freedom EVOware is a pure software product and as such it does not contain any hazardous parts. However, the software is used to control hardware devices and options, which may contain parts that can move with great force and at considerable speed.

As a consequence, the safety of users and personnel can only be ensured if the safety instructions in this Software Manual as well as the safety instructions of the hardware devices controlled with the software described here are strictly observed and followed.

Therefore, all relevant manuals must always be available to all users working with the Freedom EVOware.

### 2.1 User Qualification

#### **What Users Must Know**

Users must be qualified and trained to run Freedom EVOware.

In particular, they must fulfill the following qualifications:

- ◆ They must have a basic knowledge of the Windows operating system.
- ◆ They must have read and understood the instructions in this Software Manual.
- ◆ Only users that meet the qualifications prescribed here are authorized to run the program described in this Software Manual.

#### **Training Courses**

**Note:** Tecan recommends that users attend a software training course. Please ask your nearest Tecan representative about the available courses.

## 2.2 Warning Notices Used in the Manuals

The symbols used for safety-related notices have the following significance:

### WARNING Symbols



WARNING notices appear as follows:

#### WARNING

Generally, the triangular warning symbol indicates the possibility of personal injury or even loss of life if the instructions are not followed.

### ATTENTION Symbols



ATTENTION notes appear as follows:

#### ATTENTION

With the general “Read This!” symbol, ATTENTIONs indicate the possibility of equipment damage, malfunctions or incorrect process results, if instructions are not followed.

## 2.3 Use of the Software

### Intended Use

The intended use of the Freedom EVOware software is defined in chapter [3.2 “Intended Use of the Freedom EVOware Software”](#),  3-3.

The software must not be used for applications other than listed there.

## 2.4 Specific Hazards

The following hazards are associated with the use of the Freedom EVOware software:

### Cellular Phones



If you have a cellular phone

#### PROHIBITION

Turn off all cellular phones. Do not use or keep them on standby within the laboratory. The use of cellular phones may cause faulty liquid detection and unreliable results.

### Electrostatic Discharge



Care must be taken when it is unavoidable to touch delicate electronic circuits.

#### ATTENTION

Discharge static electricity from your body. Wear a wrist wrap that is connected to ground when handling delicate electronic circuits.

### Risks Through Contamination



Always make sure that the instrument is not contaminated chemically, biologically or radioactively.

#### WARNING

- ◆ Chemical, biological and radiative hazards can be associated with certain substances used or processed with the instrument.
- ◆ The same applies to waste disposal.
- ◆ Always wear appropriate laboratory safety items such as gloves when working on or operating the pipetting instrument.

Always be aware of possible hazards associated with such substances. Request a filled out and signed Decontamination Declaration before performing any setup and test procedures.

### Movable Parts



Keep in mind that arm and pipetting devices can move at great speed and with considerable force.

#### WARNING

- ◆ Keep your hands off the zone in which pipetting devices move.
- ◆ Never stick your head into the pipetting instrument when the power is switched on.

### Laser

Note that barcode readers such as the PosID or Symbol LS-1220 use laser technology for scanning.



#### WARNING

Laser beam (Laser Class II).  
Radiation may be harmful to your eyes.

- ◆ Do not stare into beam.
- ◆ Always switch instrument off before servicing devices containing a laser source.

## 2.5 Safety of the Overall System

In addition to the safety instructions in this Software Manual, the safety instructions in the manuals of the hardware devices must also be observed and followed.



#### WARNING

Hazards originating from the hardware devices controlled with this software.

- ◆ Mind the safety instructions of all instruments and options which are used in connection with Freedom EVOware.

## 2.6 Safety Features of the Pipetting Instrument

The Access/Status feature for the Freedom EVO pipetting instruments consists of up to four electrically-operated doorlocks for safety hoods or safety doors which prevent access to the instrument when it is operating, a status lamp and acoustic alarm device which is mounted above the instrument at a conspicuous position to ensure that it is visible to the operator from some distance away and an electrically-operated pause/resume button to stop and then continue the pipetting script.

The Freedom EVO pipetting instrument is always fitted with two doorlocks. Two additional doorlocks can be fitted to support special hardware arrangements.

Freedom EVOware controls the status lamp and acoustic alarm device as follows:

- ◆ Green, red and acoustic alarm are off: Freedom EVOware is idle (not executing a script).
- ◆ Green is continuously lit: A script is running and everything is ok.
- ◆ Green is flashing: The script has been paused by clicking the *Pause* button or the script command “User prompt” or “Set Variable” with user query is currently waiting for user input.
- ◆ Red is flashing and the acoustic alarm is on: An error message is being displayed.

### 2.6.1 Safe Operation of the Pipetting Instrument and the Doorlocks

Freedom EVOware supports up to four electrically-operated doorlocks for the pipetting instrument and the doorlocks are arranged in groups. The following mechanisms are used to unlock and lock the doorlocks at the appropriate times. All doorlocks are locked automatically when a pipetting script or process is started. A mechanical interlock ensures that the script or process cannot be started unless the safety hoods are closed and locked. The Doorlock Error is displayed and the script or process will not run if the doorlocks cannot be locked. The doorlocks are unlocked when the script or process is finished, aborted or paused by clicking the *Pause* button.

The doorlocks are locked again when the script or process is continued after being paused by clicking the *Pause* button.

For safety reasons, it is not possible to unlock the doorlocks when the script or process is running.

For additional information on the operation of the doorlocks see [15.33 "User Prompt Command"](#), [15-88](#).

For maximum safety, please observe the following points:

- ♦ If you have fitted additional doorlocks, make sure that they are correctly assigned in the Freedom EVOware configuration (see [8.4.2.5 "Doorlocks"](#), [8-30](#)).
- ♦ Above all when the instrument is put into service for the first time, run a test script to check the correct mechanical and electrical function of the doorlocks. Never unplug the electrical connections to the doorlocks.
- ♦ If an error message causes the script or process to pause, the doorlocks are unlocked to allow operator intervention.



#### WARNING

Risk of injury to operating personnel.

- ♦ Take extra care when designing the script or process if you have programmed operations which could cause parts of the instrument to move even when the script or process is stopped. Asynchronous movements can be carried out e.g. by stacker devices.

## 2.7 General Safety Rules

<b>Legal Regulations</b>	Legal regulations, such as local, state and federal laws which prescribe the use or application as well as the handling of dangerous materials in connection with the Freedom EVOware software must be strictly followed.
<b>Modifications</b>	Modifications to the Freedom EVOware software are not permitted. The manufacturer will decline any claim resulting from unauthorized modifications.

## 2.8 Specific Safety Rules

### 2.8.1 Unintended or Unexpected Movement of Robot Arms and Other Devices

Safety-relevant situations which can cause unintended or unexpected movement of robot arms and other devices include the following:

- ♦ The operator enters an incorrect value when teaching a robot movement vector.

Accordingly:

#### **WARNING**

Risk of injury to operating personnel.

- ♦ Keep your hands off the zone in which pipetting devices move.
- ♦ Never stick your head into the pipetting instrument when the power is switched on.
- ♦ You must not enter the working area of the pipetting instrument when teaching a robot movement vector.



### 2.8.2 General Rules When Using the Pipetting Instrument

The following rules must be observed to ensure operator safety, to ensure valid results from the assays or methods and to avoid damage to the equipment:

- ♦ All persons working with the pipetting instrument and/or the Freedom EVOware software must be suitably trained. See 2.1 “User Qualification”, § 2-1 for more information.
- ♦ Users of the pipetting instrument and/or the Freedom EVOware software should be aware of responsibility they carry to ensure that the results obtained are correct and valid. When running Freedom EVOware scripts and processes, users should remain alert and observant at all times to minimize the risk of operator errors and to check for possible equipment malfunctions, e.g. as a result of hardware failures or incorrect set up of the pipetting instrument. See also C “Validation of Freedom EVOware Applications”, § C-1.
- ♦ If the pipetting instrument will be used with hazardous or contaminating liquids, it is recommended to fit and activate the LICOS option. The LICOS option is a device which monitors the liquid level in the waste liquid and system liquid containers. It outputs a warning if the waste container is nearly full or if the system liquid container is nearly empty.

- ◆ If DITIs are dropped by mistake, the pipetting instrument must be checked for contamination.
- ◆ To avoid contamination when DITIs are dropped on purpose (e.g. to pick up new ones), we recommend you to use the Lower DITI Eject option.
- ◆ Always wear appropriate laboratory safety items such as gloves when working on or operating the pipetting instrument.
- ◆ After setting up the pipetting instrument and installing the Freedom EVOware software, use the Configuration Tool to check that the configured dilutor capacity matches the size of the syringe which is fitted to the pipetting instrument. The syringe size is on a label which is attached to the syringe.
- ◆ All scripts and processes must be validated for correct functioning and for correct results before they are used for pipetting with real samples. See [11.4.2.1 “Checking the Pipetting Script for Errors”](#), ¶ 11-5.
- ◆ Before running a script or process, you must set up the worktable with the carriers, labware and devices which are needed by the application or assay. The administrator or owner of the pipetting instrument must establish standard operating procedures for setting up the worktable and make them available to everyone who carries out pipetting.
- ◆ After setting up the worktable with the carriers, labware and devices which are needed by the application or assay, inspect the paths that the instrument arms (LiHa, RoMa, PnP) will take during the hardware initialization sequence to make sure that there are no obstacles which could obstruct the movements. See also [8.4.2.6 “Arm Initialization”](#), ¶ 8-30.
- ◆ Make sure that the RoMa will not interfere with the tubing and syringes at the back of the pipetting instrument during the hardware initialization sequence (the path that the RoMa will take depends to some extent on its initial position, see [9.6.4 “Defining the Home Position for a RoMa”](#), ¶ 9-53).
- ◆ When programming movement vectors for the RoMa and/or PnP, inspect the paths to make sure that there are no obstacles which could obstruct the movements when the vector is used; make sure that the RoMa will not interfere with the tubing and syringes at the back of the pipetting instrument.
- ◆ Manually initialize the arms of the pipetting instrument (e.g. using the Initialize button in the Freedom EVOware toolbar), make a visual check that the initialization sequence has been carried out correctly and check the log file for initialization errors.
- ◆ Only use barcodes with fixed length and check digits for general purpose pipetting applications in a regulated environment. This ensures that incorrectly scanned barcodes are always detected.
- ◆ If you are using the PosID-3 for general purpose applications in a regulated environment, you must always activate the Double Blind Entry feature if you intend to enter barcodes manually when they cannot be read.
- ◆ When setting up an assay for a liquid which can clot, make sure that clot detection is enabled in the liquid classes which are used to handle the liquid. Refer to the Good Usage information in the Operating Manual for the pipetting instrument for additional recommendations.
- ◆ When setting up an assay which uses a trough (container for a reagent liquid), make sure that the liquid classes which are used for aspirating from the trough are configured to immerse the tips in the liquid by at least 3 mm.
- ◆ If the system pauses for any reason when running a script or process, the duration of the pipetting script, process step or procedure may differ from the intended time. For example, sample incubation time may be outside of the specified limits. Depending on the application, this can make the assay invalid.
  - A system pause can be caused e.g. by clicking the Pause button in Freedom EVOware’s Runtime Controller dialog box, by pressing the

Pause button on the pipetting instrument, by a pipetting error or by an internal timeout if a process step has taken longer than expected or specified.

- System pauses are not shown in the Gantt chart in the Extended View of the Runtime Controller (the Gantt chart is only available in Freedom EVOware Plus).
- ◆ After running a script or process, you must check the log files to make sure that the script or process has completed fully and without errors.
- ◆ The results of an assay are only valid if the entire script or process completed without errors. If this is not the case, the entire script or process must be repeated after rectifying the cause of the error(s).



## 3 Product Description

### Purpose of This Chapter

This chapter provides a brief overview of the Freedom EVOware software and defines its scope of application. In addition, it describes the features and specifies the PC-requirements for running the software.

### 3.1 Overview of Freedom EVOware

Freedom EVOware provides a graphical user interface for controlling Tecan's Freedom EVO series of pipetting instruments that facilitates the liquid handling needs of a wide range of life science applications, including both routine and research activities.

The Freedom EVOware software allows the user to develop pipetting programs (which are called *scripts*) and to quickly visualize how a laboratory process or experiment can be implemented. Commands are provided for a wide range of Tecan hardware options and third-party devices and the scripting system is designed for maximum flexibility when developing complex custom processes. When the script or process is ready, Freedom EVOware controls the pipetting run by sending control signals to the pipetting instrument and optional laboratory devices through a data connection. If operator interaction is necessary, Freedom EVOware can display a dialog box on the display of the workstation which prompts for the information which is needed.

Freedom EVOware's modular device driver concept allows a wide range of Tecan and third-party devices and options to be supported; a plug-in concept allows new or updated drivers to be easily added to existing Freedom EVOware installations. The Freedom EVOware Limited Device Support installer only installs drivers that have been developed under design controls. If other drivers are installed the intended use will change to Research Use Only, and is visible in the About Box.

Freedom EVOware's "Infopads" give useful tips for new users (see [5.4.2 "Infopads"](#), [p 5-14](#)). Click the hyperlinks in the *How To* section of the Infopad area to run short animations (films) which demonstrate various commonly needed tasks. The animations are stored in AVI format and will be shown e.g. in Windows Media Player.

Also see [D.1 "Glossary of Terms and Instrument Options"](#), [p D-1](#).

This manual instructs the user how to:

- ◆ Install the Freedom EVOware software,
- ◆ Set up instrument and configuration data,
- ◆ Define the pipetting worktable,
- ◆ Define the pipetting scheme,
- ◆ Set up pipetting scripts and processes,
- ◆ Run pipetting scripts and processes.

#### 3.1.1 Freedom EVOware Standard and Freedom EVOware Plus

Freedom EVOware Plus groups pipetting scripts and device commands into processes. This concept makes it possible to optimize the efficiency and thus maximize the throughput of the pipetting instrument through the use of multi-

tasking and scheduling. This feature is not available for Freedom EVOware Standard.

In addition, Freedom EVOware Plus allows you to run several processes in parallel. You can run several copies of the same process and/or several different processes in parallel.

The Freedom EVOware installation copies files for both versions of Freedom EVOware to your PC. Activation of the appropriate Freedom EVOware version is done using a hardlock (dongle).

### 3.1.2 Hardlocks for Freedom EVOware Standard and Freedom EVOware Plus

Freedom EVOware is available with two different feature levels - Freedom EVOware Standard and Freedom EVOware Plus. In addition, a special version is available for the Freedom EVO 75 pipetting instrument. Whereas the software on the Freedom EVOware CD is the same in all cases, the additional features provided by Freedom EVOware Plus are enabled by purchasing and fitting the appropriate hardlock (an intelligent USB plug or “dongle”).

Four different hardlocks are available:

- ◆ Freedom EVOware Standard
- ◆ Freedom EVOware Standard for Freedom EVO 75
- ◆ Freedom EVOware Plus
- ◆ Freedom EVOware Plus for Freedom EVO 75

The hardlock version you are currently using is shown in the Freedom EVOware status bar (see [6.7.3 “Status Bar”](#), [6-19](#), *Dongle type*). The Freedom EVOware Plus hardlock also allows you to use Freedom EVOware Standard (but not vice versa).

**Note:** Freedom EVOware will run in offline mode if it cannot detect a hardlock when it starts (see [5.1.4 “Instrument and Hardlock Detection”](#), [5-3](#)). Firmware commands such as movement commands are not sent to the pipetting instrument in offline mode (i.e. pipetting does not take place).

It is not necessary to fit a hardlock if you want to run Freedom EVOware in offline mode or if you are using the 3D simulation program EVOSim.

Several software add-ons are available for Freedom EVOware which must be purchased separately. They extend the functionality with special features (see [3.1.3 “Tecan Software Add-ons for Freedom EVOware”](#), [3-2](#)). To allow the use of the add-ons, the Freedom EVOware hardlock must be upgraded. This is usually done using an activation tool (software). After purchasing the add-on software, the activation tool is normally sent to you by email. The activation tool is specifically coded for the serial number of your hardlock and will not carry out the upgrade if the serial number does not match.

The Dongle communicates via TCP and UDP on port 1947. The firewall must be configured so that communication via this port is not blocked.

### 3.1.3 Tecan Software Add-ons for Freedom EVOware

Several software add-ons are available for Freedom EVOware which extend the functionality with special features. The following add-ons are currently available:

- ◆ Freedom EVOware Sample Oriented Add-On
- ◆ Freedom EVOware Sample Tracking Add-On

See [D “Glossary”](#), [D-1](#) for an overview of these products. See the help files and/or software manuals of these add-ons for full details (see [1.2.1 “Related Documentation and Software”](#), [1-3](#)).

### **3.1.4 3D Simulation Tool for the Pipetting Instrument**

The Freedom EVOware setup program lets you install a 3D simulation tool (EVOSim) which can be used to visualize the movements which are carried out by the arms of the Freedom EVO pipetting instrument (LiHa, RoMa, PnP and MCA) when running Freedom EVOware scripts and processes. It can also be used to visualize several other devices such as the Te-MO and the PosID-3.

EVOSim interprets the firmware (hardware) commands which are sent to the pipetting instrument and sends the appropriate responses to Freedom EVOware. To do this, the RS232 connection to the pipetting instrument is configured to communicate with EVOSim instead.

Using an additional tool, EVOSim can also be used to monitor the communication between Freedom EVOware and the pipetting instrument.

For more information, see [A.13 “Configuring and Using the 3D Simulation Tool EVOSim”](#), [A-82](#).

## **3.2 Intended Use of the Freedom EVOware Software**

Certain hardware options are only intended for research applications. If you install device drivers which are not part of the general purpose configuration, you will see a warning message during the installation that your Freedom EVOware installation is now only suitable for research applications.

Choose About in the Help menu to get information on the current configuration of your Freedom EVOware installation. Refer to [3.5 “Supported Pipetting Instruments and Tecan Options”](#), [3-5](#) for a list of the options which are supported by the current configuration. Refer to the Getting Started Guide for a list of all of the options which are supported by the Freedom EVOware software.

### **3.3 What's New in Freedom EVOware V2.8 SP5**

Besides some detail improvements, the main changes and additions in Freedom EVOware version 2.8 SP5 are as follows:

- ◆ Inclusion of IoT Client 2.5
- ◆ SMTP send email module now supports encryption
- ◆ Move Counts are now written to log files for inclusion in Introspect

### **3.4 What's New in Freedom EVOware V2.8 SP4**

Besides some detail improvements, the main changes and additions in Freedom EVOware version 2.8 SP4 are as follows:

#### **General and Usability**

- ◆ Windows 7 replaced by Windows 10 64-bit (Win 7 is not supported anymore)

Supported operating systems are now as follows:

- ◆ Microsoft Windows 10 64-bit LTSC

#### **3.4.1 Brief Overview of Earlier Versions of the EVOware Software**

##### **3.4.1.1 New in Freedom EVOware V2.8**

Besides some detail improvements, the main changes and additions in Freedom EVOware version 2.8 are as follows:

#### **General and Usability**

- ◆ Windows XP replaced by Windows 10 64-bit (Win XP is not supported anymore)

Supported operating systems are now as follows:

- ◆ Microsoft Windows 7 64-bit
- ◆ Microsoft Windows 10 64-bit LTSC

#### **Labware and Carrier**

- ◆ General corrections of default carrier definitions
- ◆ New default liquid classes

##### **3.4.1.2 New in Freedom EVOware V2.7**

Besides some detail improvements, the main changes and additions in Freedom EVOware version 2.7 are as follows:

#### **General and Usability**

- ◆ Improve general stability and stability of error handling
- ◆ Improvements relating safe pathways
- ◆ Allow FW Command in GP EVOware

#### **Labware and Carrier**

- ◆ Support new Wide Bore Tip
- ◆ New LC for 10µl tips
- ◆ Additional Air LiHa liquid classes
- ◆ Include PMP Easy liquid classes

#### **3.4.1.3 New in Freedom EVOware V2.6**

Besides some detail improvements, the main changes and additions in Freedom EVOware version 2.6 are as follows:

#### **Labware and Carrier**

- ◆ Support for Nested LiHa DiTi
- ◆ Support of Named Pipe functions for the PnP arm

#### **3.4.1.4 New in Freedom EVOware V2.5**

Besides some detail improvements, the main changes and additions in Freedom EVOware version 2.5 are as follows:

#### **Liquid Handling**

- ◆ Support for the Air LiHa

#### **3.4.1.5 New in Freedom EVOware V2.4 SP2**

Besides some detail improvements, the main changes and additions in Freedom EVOware version V2.4 SP2 are as follows:

#### **General & Usability**

- ◆ Windows Vista replaced by Windows 7 64-bit.  
Supported operating systems are now as follows:
  - Microsoft Windows XP Professional (Service Pack 3)
  - Microsoft Windows 7 64-bit
- ◆ Updates in Evoware.opt file

#### **3.4.1.6 New in Freedom EVOware V2.4**

Large number of detail improvements.

## **3.5 Supported Pipetting Instruments and Tecan Options**

Freedom EVOware is intended for the following Tecan pipetting instruments:

- ◆ **Freedom EVO 100, 150, 200**
- ◆ **Freedom EVO 75**

Freedom EVOware in this configuration supports the following optional devices, instrument options and systems:

- ◆ Liquid Handling Arm (LiHa), liquid displacement, with 2, 4 or 8 tips
- ◆ Liquid Handling Arm (Air LiHa), air displacement, with 4 or 8 tips

- ◆ 8 Plus 1 Access option for the Freedom EVO 75 pipetting instrument
- ◆ Tecan Pressure Monitored Pipetting (PMP) function
- ◆ XP dilutor
- ◆ XLP dilutor
- ◆ XMP dilutor (for the Freedom EVO 75 pipetting instrument)
- ◆ Standard tips, low volume tips and disposable tips (DITIs)
- ◆ Lower DITI Tip Eject option
- ◆ Robot Manipulator (RoMa), standard and long version
- ◆ PosID-2 Barcode Scanner
- ◆ PosID-3 Barcode Scanner
- ◆ Fast Wash Option (FWO)
- ◆ Monitored Pump Option (MPO)
- ◆ SPO (Sensored Pump Option)
- ◆ Liquid Container Supervisor (LICOS)
- ◆ Te-MagS (Tecan Magnetic Bead Separator)
- ◆ Te-Shake (Orbital Shaker)
- ◆ Te-VacS
- ◆ Tube Robot (PnP)
- ◆ MIO (Monitored Incubator Option) with or without shaking option
- ◆ Symbol LS-1220 Barcode Scanner
- ◆ Symbol MS-954 Barcode Scanner
- ◆ Mettler WM pooling balance (for the Liquid Arrival Check feature)
- ◆ PW384 Washer (via PW384GP driver)
- ◆ Columbus Plate Washer
- ◆ Tecan Safety features (4 x doorlocks and pause/resume button)
- ◆ Tecan Access/Status feature (status lamp and acoustic alarm device)
- ◆ Tecan Magellan data reduction and analysis software for Tecan microplate readers.
- ◆ Tecan microplate readers (raw data mode).

### 3.5.1 Supported Combinations of Robot Arms

The Freedom EVO 100, 150 and 200 pipetting instruments can be configured with a maximum of three robot arms on the X slide as follows:

- ◆ Up to two liquid handling arms (LiHa)
- ◆ Up to two plate robot (RoMa) arms

The Freedom EVO 75 pipetting instrument can only be fitted with one liquid handling arm.

### 3.5.2 Supported Firmware Versions for the Optional Devices

The *Device Information* tab in the *Devices* section of the Configuration Tool lists the device firmware version for which each of the Freedom EVOware device drivers was originally developed. In many cases, the device driver will control the device correctly even if the stated firmware version and the actual firmware version of the device are not identical. See [8.4.1.1 “Device Information Tab”](#), [8-21](#).

Some devices have a firmware command (e.g. `Get_Version`) which allows you to interrogate their firmware version using the Freedom EVOware Configuration Tool

(see [8.4.3.4 "Test Tab"](#), [8-33](#)). For descriptions of the pre-configured firmware commands which are available for each device, see the section "Firmware commands" for the device (see [8.5 "Device Driver Configuration"](#), [8-35](#)).

## 3.6 Computer Requirements

The PC on which Freedom EVOware will be installed must meet the following minimum requirements:

### Operating System

Freedom EVOware is compatible with the following operating systems:

- ◆ Microsoft Windows 10 64-bit LTSC

### Hardware

- ◆ The validation of a system includes the environment such as the operating system, hence no automatic Windows updates shall be carried out. Unfortunately TECAN cannot guarantee that Windows updates have no influence on results. However we haven't become aware of any complaints about wrong results caused by Windows updates.
- ◆ Win 10: A CPU that is suitable for running the selected operating system<sup>1)</sup>. Recommended minimum specification: Processor or SoC with minimum 1 GHz; optimum dual core or multi processor system running at 2.33 GHz.
- ◆ Win 10: A CPU that is suitable for running the selected operating system<sup>1)</sup>. Recommended minimum size: 2 GB RAM for 64-bit.
- ◆ Virtual memory as required by the operating system.
- ◆ An SVGA monitor with 32,768 colors or more and a minimum resolution of 1024x768 pixels (optimum 1280x1024 or higher). To ensure correct display of the dialog boxes, we recommend you to configure your display settings in the Control Panel for *Small Fonts*.
- ◆ Mouse
- ◆ CD-ROM drive
- ◆ Hard disk with about 5 GB of unused space for the Freedom EVOware software, optional software components, scripts and log files.
- ◆ One serial interface for the data interface to the pipetting instrument (if you intend to connect the pipetting instrument via RS232).
- ◆ Additional serial interfaces are required by some of the instrument options (e.g. the Mettler balance).
- ◆ A hardlock (dongle) for either Freedom EVOware Standard or Freedom EVOware Plus (a hardlock is a copy protection device which is plugged into the USB port of your PC). See 3.1.2 "Hardlocks for Freedom EVOware Standard and Freedom EVOware Plus", 3-2.
- ◆ One USB port for the hardlock
- ◆ One USB port for the data interface to the pipetting instrument (if you intend to connect the pipetting instrument via USB).
- ◆ Printer (optional)



### ATTENTION

Risk of the script or process aborting.

- ◆ The PC must be configured to prevent it from going in to Sleep Mode even if no user inputs take place for an extended period of time.
- ◆ The USB power management in Windows must be switched off to avoid losing the connection to the pipetting instrument, which may otherwise occur in rare cases. See 4.5.1 "USB Power Management Setting", 4-14 for more information.

1) As per the Windows 10 System Requirements from Microsoft



Connect the pipetting instrument via USB directly to the PC. This also applies to USB connections from hardware options, if they have their own cable. The use of an external USB hub should be avoided. If an external USB hub is absolutely necessary, use an active USB hub (i.e. with its own power supply). Data transfer problems may occur if you use a passive USB hub, especially if you are also using the PMP option. Please note that some port replicators for laptops contain a USB hub.

**Security**

The following table shows which permissions are needed for installing and running the Freedom EVOware software.

**Tab. 3-1** *Minimum Security Permissions*

<b>Activity</b>	<b>Windows (10 LTSC 64-bit)</b>
Program installation	MS Windows Local Administrator
Running the program	MS Windows User

Freedom EVOware has four user levels – Administrator, Application Specialist, Power User and Operator. The Freedom EVOware user levels are independent of the MS Windows user levels.

All four Freedom EVOware user levels need read/write access to the Freedom EVOware directory and its subdirectories during program runtime. The Freedom EVOware user level Operator cannot create or modify scripts or processes, but Freedom EVOware still needs read/write access to write log and export files and audit trail data.



## 4 Installation

**Purpose of This Chapter** This chapter describes the installation of the Freedom EVOware software on a target computer. Read it carefully before starting the installation.

### 4.1 Before You Start

**Cross References**

List of cross references to information provided in other sections:

Information	References
Supported pipetting instruments and Tecan options	See section 3.5, <a href="#">3-5</a>
Computer requirements	See section 3.6, <a href="#">3-8</a>

**Target Computers**

Freedom EVOware must be installed on target computers that are or will be connected to the pipetting instrument.

**Other Requirements**

The PW384 Plate Washer driver requires the Tecan WinWash Plus software, which must be installed separately. It is normally provided with the washer. WinWash Plus is not necessary for the PW384GP Plate Washer driver. Drivers for microplate readers (e.g. photometers) require the RdrOLE and XFluor4 software, which must be installed separately. It is normally provided with the reader. Freedom EVOware can also control microplate readers using the Magellan software.

The Magellan driver requires the Tecan Magellan software, which must be installed separately. The Magellan software has built-in drivers for Tecan microplate readers. If you intend to use the Magellan software, it is not necessary to install the driver for your reader when you install Freedom EVOware unless you also want to use the reader in raw data mode.

**Note:** You cannot run the FACTS 5.x dynamic scheduling software and Freedom EVOware on the same computer. Please un-install FACTS before you install Freedom EVOware.

**Who Should Install?**

The Freedom EVOware software must be installed by a properly trained specialist.

**Access Rights**

To install Freedom EVOware on the target computer, you need local administrator access rights for the Microsoft Windows operating system. Refer to the Microsoft documentation for further information on access rights. For information on the access rights which are required to use Freedom EVOware, see [3.6 "Computer Requirements"](#), [3-8](#), Security.

**Saving User Data**

If Freedom EVOware is already installed on your PC, before running the installation program we recommend you to back up your Freedom EVOware data files, scripts and processes to exchangeable media or to a network or temporary directory (not within the Freedom EVOware <install\_path>). See [8.2 "Backing Up](#)

and Restoring Your Configuration”, [Figure 8-3](#). You can also use the Export Import tool to save your scripts and processes and other configuration data (see [A.11.4 “Export/Import Tool”](#), [Figure A-41](#)).

Saving these files is especially recommended in the following cases:

- ◆ Before un-installing (removing) the Freedom EVOware software.
- ◆ Before installing a newer version of Freedom EVOware.
- ◆ Before modifying an existing Freedom EVOware installation.

### Saving Audit Trail Data

If you are required to comply with the FDA regulations, make sure you keep archive copies of all audit trail, trace and log files. These files are located in the <install\_path>\AuditTrail directory. They are not backed up by the Backup function - you should use the Audit Trail Archiving function instead. See [A.11.6 “Audit Trail Archiving tool”](#), [Figure A-51](#) and [B “Appendix B - FDA 21 CFR Part 11 Compliance”](#), [Figure B-1](#).

## 4.2 Installing Freedom EVOware

### Installation Directory

By default, Freedom EVOware will be installed into the <windrive>\Program Files (x86)\Tecan\Freedom EVOware directory. <windrive> is the drive in which the Windows operating system is installed.

We recommend you to accept this directory. However, you may install Freedom EVOware into a different drive/directory if you want.

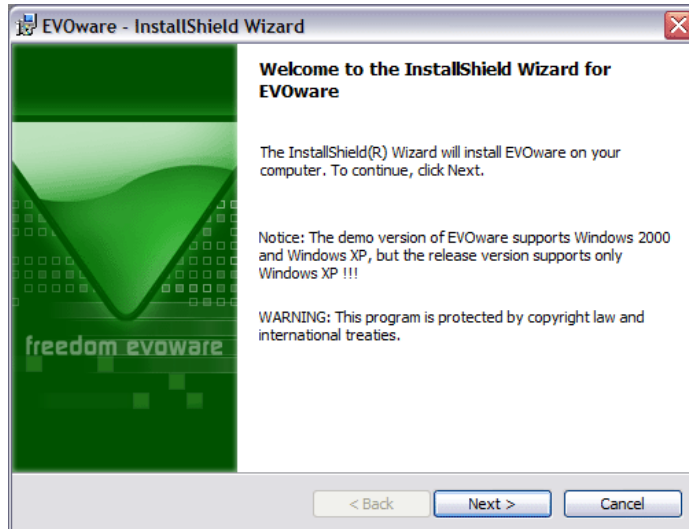
### The First Steps

To install Freedom EVOware:

- 1 Finish all Windows programs that are currently running.
- 2 Make sure that anti-virus programs (if installed) are not running and that all processes associated with anti-virus programs are stopped. Anti-virus programs can cause the installation of Microsoft .NET Framework and .NET Framework components to fail.
- 3 Make sure that you are logged in as the local administrator.
- 4 Insert the installation CD in the computer’s CD-ROM drive.
- 5 In the Windows Explorer, open your CD-ROM drive and change to the Freedom EVOware\Disk1 directory.

Certain hardware options are only intended for research applications. Refer to “Supported pipetting instruments and Tecan options” in the Getting Started Guide for a list of all of the options which are supported by the Freedom EVOware software.

- 6 To install Freedom EVOware with the device drivers which are intended for general purpose applications, run **Setup.exe** in the Disk1 directory.
- 7 To install Freedom EVOware with all available device drivers (including drivers for devices which are only intended for research applications), run **Setup\_ro.exe** in the Disk1 directory.
- 8 The **Welcome** window appears.



**Fig. 4-1** Welcome window

**9** Click **Next** to continue.

*You are then shown a window displaying the license agreement.*

**Note:** *The real window may look slightly different from the one shown below.*

**License Agreement**



**Fig. 4-2** License Agreement window

**10** Read the license agreement and click **I accept the terms ...** if you are in agreement. Continue with **Next**.

**Destination Path**

*A destination path for the application is suggested in the Destination Folder window.*

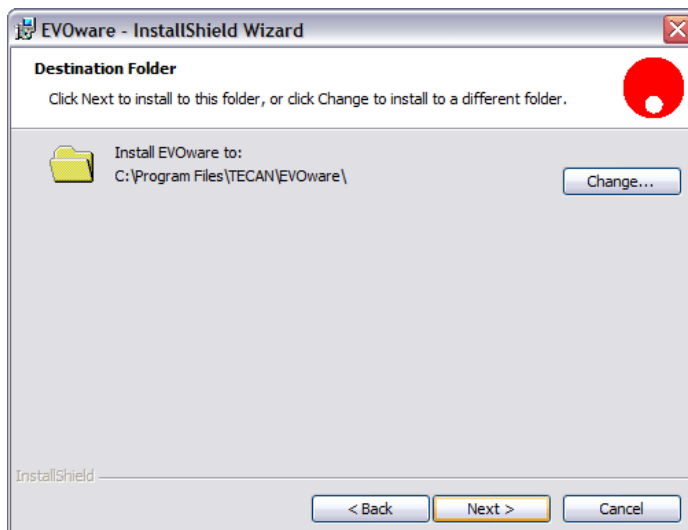


Fig. 4-3 Destination Folder window

11 Do one of the following:

- In most cases, you can accept the suggested destination path. Continue with **Next** in this case.
- If necessary, choose a different destination folder with **Change...**. Continue with **Next** when you are ready.

## Selecting Components

The **Custom Setup** window appears.

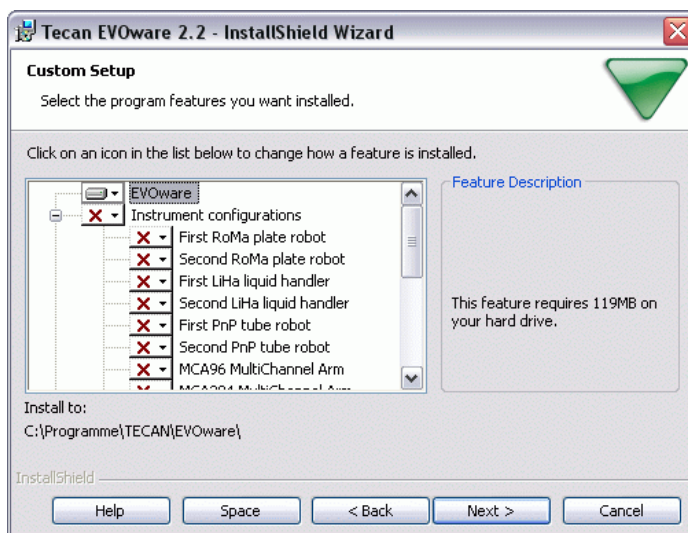


Fig. 4-4 Custom Setup window

The choices you will see in the Custom Setup window depend on whether you are installing the general purpose configuration or the research only configuration. Certain Tecan options are only intended for research applications.

The **Custom Setup** window lets you choose the components you wish to install. You can expand the **Instrument Configurations**, the **Devices and Options** and the **Software Options** groups by clicking on the '+' box on the left side. This

shows the individual components in these groups. Click the '-' box if you want to collapse the group again.

When you highlight a group, additional information about the installation of the group is shown in the **Feature Description** panel on the right side of the window.

- ◆ The **EVOware** group contains components which are always needed.
- ◆ The **Instrument Configurations** group contains the drivers for the robot arms (liquid handling arm, LiHa; plate robots, RoMa; tube robot, PnP; MCA, multi-channel arm; PosID-3, barcode scanner).
- ◆ The **Options** group contains drivers for optional hardware such as the Te-Shake orbital shaker and the Te-MagS magnetic bead separator.
- ◆ The **Storage Devices** group contains drivers for optional hardware such as the Te-Stack plate stacker and the Carousel.
- ◆ The **Incubators** group contains drivers for optional hardware such as the MIO heated incubator.
- ◆ The **Washers** group contains drivers for optional hardware such as the PW384 Power Washer.
- ◆ The **Readers** group contains drivers for optional hardware such as the Sunrise microplate absorbance reader and the interface driver for the Magellan option.
- ◆ The **REMP** group contains drivers for REMF hardware such as the Reatrix 2D barcode scanner for REMF tubes.
- ◆ The **3rd Party** group contains drivers for optional hardware from other manufacturers such as the Hettich centrifuge.
- ◆ The **Software Options** group contains drivers for software options such as Freedom EVOSim 3D Simulation Tool (see 3.1.4 "3D Simulation Tool for the Pipetting Instrument", 3-3).
- ◆ The **Legacy Drivers** group contains drivers for optional legacy hardware which is no longer sold by Tecan, such as the Columbus washer, which is now superseded by other Tecan washers.
- ◆ For more information on the optional hardware see 16 "Device Commands", 16-1.

12 Click on each component you want to install and choose **This feature will be installed on local hard drive:**

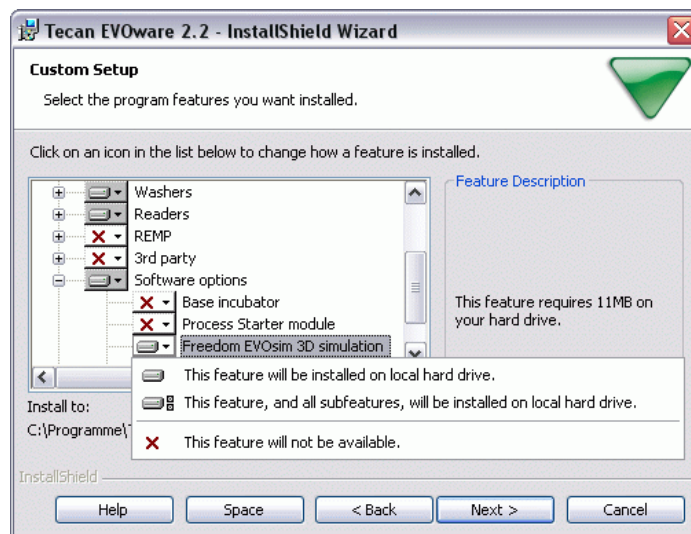


Fig. 4-5 Selecting components

You should select the devices and options that are currently available on your pipetting instrument. In the above example, the first plate robot, the liquid handling arm, the tube robot and the Te-Stack have already been selected for installation. Each pipetting instrument can be configured with a maximum of three robot arms as follows:

- ◆ Up to two liquid handling arms (LiHa)
- ◆ Up to two plate robot (RoMa) arms

Drivers for microplate readers (e.g. photometers) require the RdrOLE and XFluor4 software, which must be installed separately. It is normally provided with the reader. Freedom EVOware can also control microplate readers using the Magellan software.

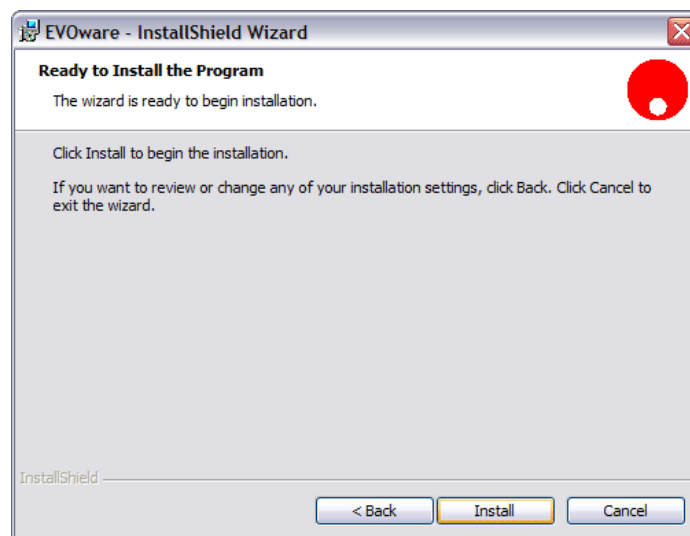
The Magellan driver requires the Tecan Magellan software, which must be installed separately. The Magellan software has built-in drivers for Tecan microplate readers. If you intend to use the Magellan software, it is not necessary to install the driver for your reader when you install Freedom EVOware unless you also want to use the reader in raw data mode.

If necessary, you can run the Freedom EVOware installation program again at a later time and add missing components or remove components you no longer need.

When you highlight a component, additional information about that component is shown in the **Feature Description** panel on the right side of the window.

**13** Click **Next** after you have made your choices.

You will then be asked if you want to begin the installation:



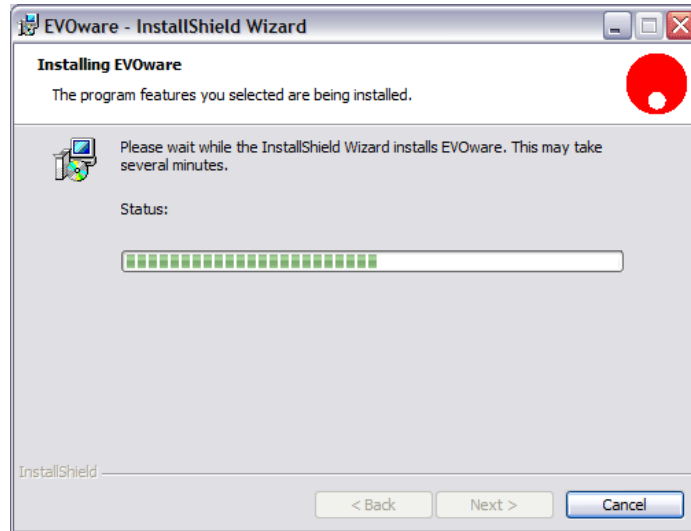
**Fig. 4-6** Ready to Install window

Click **Install** if you want to continue.

If you have previously installed Tecan software components on your PC which use the Tecan User Management System (such as Freedom EVOware or the Tecan Magellan software), the Tecan User Management System needs to be updated too and you will be prompted for the name and password of the Administrator account.

After entering the name and password, you will be shown the following window:

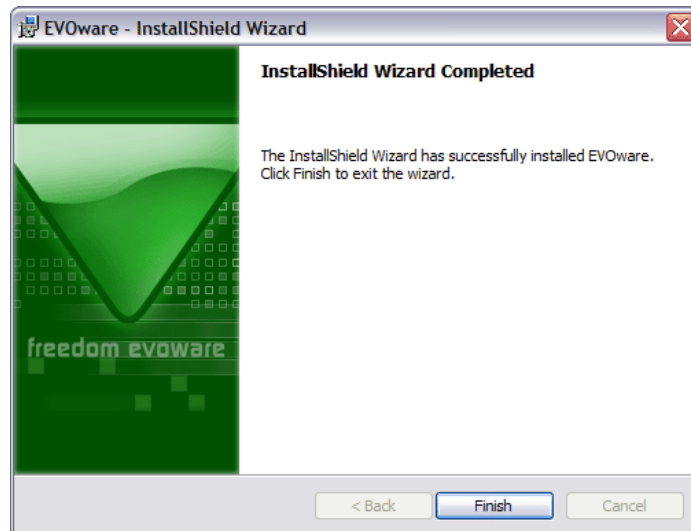




**Fig. 4-7** Installing Freedom EVOware window

**Installation Complete**

When the installation is finished, the **InstallShield Wizard Completed** window is shown:



**Fig. 4-8** InstallShield Wizard Completed window

- 14** Confirm with **Finish**. The installation of the Freedom EVOware software is now complete.
- 15** Start Freedom EVOware as the Tecan administrator and carry out the following checks:
  - Choose *About* in the *Help* menu and check that you have installed the intended software version (version for general purpose applications or version for scientific research applications with extended device support).
  - Check that the correct hardlock (dongle) is fitted to your PC. The hardlock ID number is shown in the About box. If there is no hardlock fitted, “Non upgradable hardlock” is shown. See also 6.7.3 “Status Bar”, 6-19, Dongle type.

- Check that you are running the intended software feature level (Freedom EVOware Standard or Freedom EVOware Plus). This is shown in the status bar and is also dependent on your hardlock (see 6.7.3 “Status Bar”, 6-19, Feature level).

**Note:** If you have made a backup copy of configuration and user data from a previous Freedom EVOware installation, you should now use the Restore function to restore it.

### 4.3 Modifying, Removing or Repairing Your Installation

If you run the Freedom EVOware installation program when Freedom EVOware is already installed, you are given the options of modifying, removing or repairing the installation.

**Note:** You cannot modify, remove or repair Freedom EVOware by choosing **Add or Remove Programs** in the Windows Control Panel.

Insert the Freedom EVOware CD and proceed as described in 4.2 “Installing Freedom EVOware”, 4-2. The installation program automatically detects the software components which you installed previously and will start the Maintenance Program.

After confirming the **Welcome** window by clicking **Next** you are shown the Program Maintenance window:

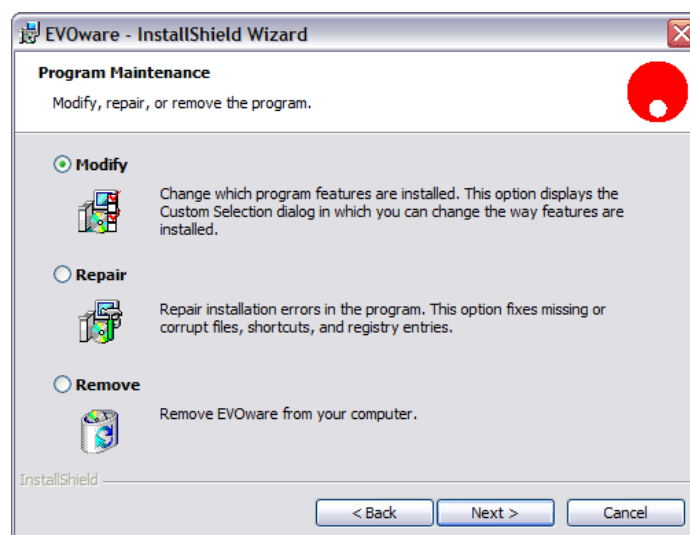


Fig. 4-9 Program Maintenance window

The three options which are provided are as follows:

- ♦ **Modify:** This function allows you to add further software components to the existing Freedom EVOware installation or to remove software components that are no longer needed. Certain software components are only intended for research applications. If you use the installation program **Setup\_ro.exe** to install options which are not included in the general purpose configuration, you will see a warning message during the installation that your Freedom EVOware installation is

now configured for research applications and is no longer intended for general purpose applications.

If you need to switch back to the general purpose configuration, you must uninstall and then re-install Freedom EVOware.

- ◆ **Repair:** This function reinstalls all components of the current software configuration on the target computer. Note that this option does not allow you to add new functions or remove existing functions. Repairing an existing installation may be necessary if the current installation does not run properly (e.g. due to a corrupt file or a file that was deleted unintentionally).
- ◆ **Remove:** Completely uninstalls (removes) the Freedom EVOware software from the target computer.

If you choose to un-install Freedom EVOware completely, you will be asked if you also want to delete the user management data. Click *No* if you want to continue using other Tecan software components such as Magellan (or if you plan to re-install Freedom EVOware again). If you click *Yes*, you will have to set up your Tecan users and groups again (see 7 “[Tecan User Management System](#)”, ¶ 7-1).

**Note:** Before modifying, repairing or removing Freedom EVOware, we recommend you to back up your Freedom EVOware data files, scripts and processes to exchangeable media or to a network or temporary directory (not within the Freedom EVOware <install\_path>). See 8.2 “[Backing Up and Restoring Your Configuration](#)”, ¶ 8-3.

**Decide What to Do**

**16** Click the appropriate option button:

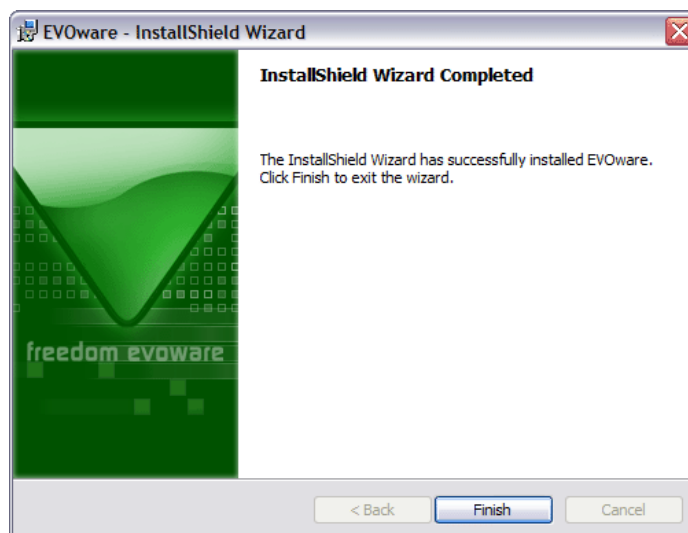
- **Modify** to add or remove components.
- **Repair** to reinstall the program.
- **Remove** to uninstall.

**17** Click **Next** and continue with your section. You should then follow the instructions which are displayed.

If you choose **Modify**, you can choose the Freedom EVOware components which you want to add or remove (see Fig. 4-5 “[Selecting components](#)”, ¶ 4-5). The installation program automatically detects the software components which you installed previously.

**Maintenance Complete**


When the selected operation is finished, the **InstallShield Wizard Completed** window is shown:



**Fig. 4-10** InstallShield Wizard Completed window for an un-install operation


**18** Click **Finish** to end the installation program.

### 4.3.1 Upgrading to the Latest Software Version

To upgrade Freedom EVOware to the latest software version, insert the Freedom EVOware CD and proceed as described in [4.2 “Installing Freedom EVOware”](#),  [4-2](#). The installation program automatically detects the existing installation and will start the upgrade process.


Additional steps which may be required when upgrading are dependent in part on the pipetting instrument and system options which you are already using. For this reason upgrading is normally carried out by a Tecan representative.

Where applicable, please observe your local regulations for re-certification of your pipetting system following a software upgrade.

We recommend you to back up your Freedom EVOware data files, scripts and processes to exchangeable media or to a network or temporary directory before upgrading (see [8.2 “Backing Up and Restoring Your Configuration”](#),  [8-3](#)).

#### 4.3.1.1 Checking the software version which is currently installed

Choose *About Freedom EVOware* in the Help menu if you want to check which version of Freedom EVOware you are currently using. The dialog box shows the Freedom EVOware version, the service pack level and the software build code.

It also shows the intended use of your Freedom EVOware configuration - general purpose applications or research use only. See [3.2 “Intended Use of the Freedom EVOware Software”](#),  [3-3](#) for more information.

Alternatively, click the Windows Start button and choose Control Panel. Then double-click on *Add or Remove Programs*. Navigate in the list to the entry EVOware and choose *Click here for support information*. You need local administrator access rights for the Microsoft Windows operating system to use the Control Panel.

### 4.3.2 Downgrading to a Previous Software Version

Downgrading to a previous version of Freedom EVOware is neither supported by the installer nor do we recommend this.

In case you want to downgrade to a previous version you will have to uninstall the current installation first and then you can install the earlier version. We recommend to make a backup of the system before.

### 4.3.3 Installation of Service Packs and Hotfixes

Service packs are minor upgrades and/or are used to correct small faults in the Freedom EVOware software. To install a service pack, follow the instructions which are provided.

**Note:** *Some types of service pack require Freedom EVOware to be re-installed. Other types of service pack do not require Freedom EVOware to be re-installed. You must backup up your system and data files before un-installing Freedom EVOware (see 8.2 “Backing Up and Restoring Your Configuration”, 8-3). Then use the Restore function after Freedom EVOware has been re-installed.*

Hotfixes are used to correct small faults in the Freedom EVOware software. Hotfixes do not required Freedom EVOware to be re-installed. To install a hotfix, follow the instructions which are provided.

Choose *About Freedom EVOware* in the Help menu if you want to check which version of Freedom EVOware you are currently using. The dialog box shows the Freedom EVOware version, the service pack level and the software build code.

## 4.4 The Freedom EVOware Hardlock

To use the full functionality of the Freedom EVOware software, you must attach a hardlock (dongle) to a USB port on your PC. Freedom EVOware checks for the presence of the hardlock when it starts and will switch to offline mode if the hardlock cannot be found. See 3.1.2 “Hardlocks for Freedom EVOware Standard and Freedom EVOware Plus”, 3-2.

## 4.5 Installing the USB driver for the Freedom EVO pipetting instrument

If you want to connect the Freedom EVO pipetting instrument to the PC which is running Freedom EVOware through USB instead of using the serial (RS232) port, you must carry out the following steps to install the USB driver.

The following steps are only necessary when you connect the pipetting instrument to the PC for the first time.

Please install Freedom EVOware before connecting the USB cable.

Switch on the PC, switch on the pipetting instrument and plug in the USB cable. The following dialog box should appear:



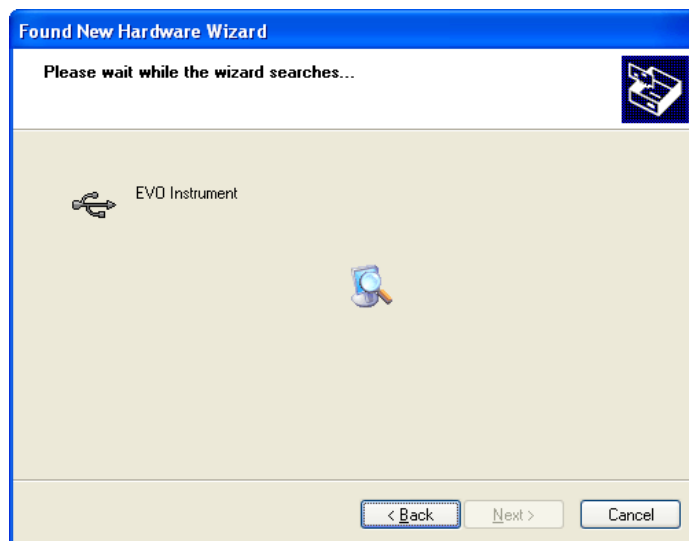
**Fig. 4-11** Installing the USB driver, step 1

Click *No, not this time* and click *Next*. The following dialog box is shown:



**Fig. 4-12** Installing the USB driver, step 2

Click *Install the software automatically (Recommended)* and click *Next*. The following dialog box is shown while the driver is being installed:



**Fig. 4-13** Installing the USB driver, step 3

The following dialog box is shown when installation is nearly finished.:

## 4 - Installation

Installing the USB driver for the Freedom EVO pipetting instrument



Fig. 4-14 Installing the USB driver, step 4

Click *Finish* to complete the installation of the USB driver.

The following figure shows a view of the PC's Device Manager with the USB driver correctly installed (at the bottom of the list).

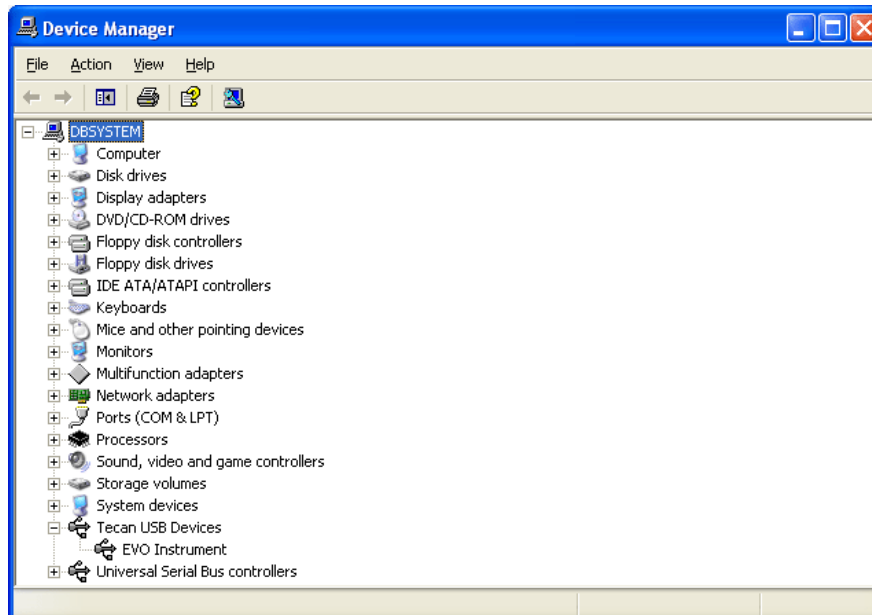


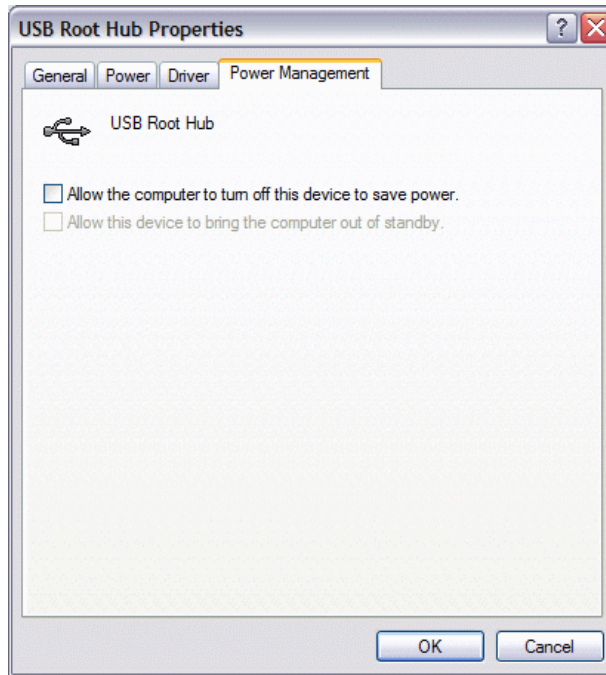
Fig. 4-15 Device Manager showing the correctly installed USB driver

### 4.5.1 USB Power Management Setting

The USB power management in Windows must be switched off to avoid losing the connection to the pipetting instrument, which may otherwise occur in rare cases.



To switch off the USB power management in Windows, choose Start -> Control Panel -> System -> Hardware -> Device Manager -> Universal Serial Bus Controllers -> Power Management tab:



**Fig. 4-16** Device Manager, USB Power Management tab

### 4.5.2 USB Hubs

Connect the pipetting instrument via USB directly to the PC. This also applies to USB connections from hardware options, if they have their own cable. The use of an external USB hub should be avoided. If an external USB hub is absolutely necessary, use an active USB hub (i.e. with its own power supply). Data transfer problems may occur if you use a passive USB hub, especially if you are also using the PMP option. Please note that some port replicators for laptops contain a USB hub.

#### 4 - Installation

Installing the USB driver for the Freedom EVO pipetting instrument



## 5 Starting Freedom EVOware

This chapter describes how to start Freedom EVOware and gives an overview of the main window.



### ATTENTION

Tecan recommends to ensure that virus scanners are not actively scanning hard drives or memory while executing scripts. Please schedule any automatic scans to occur when Freedom EVOware is not running scripts or processes.

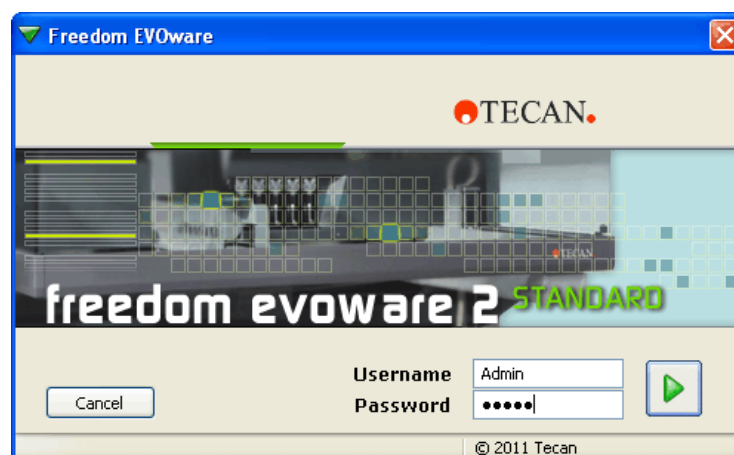
### 5.1 Login Screen

To start Freedom EVOware, click the Start button in the Windows Task Bar and choose All Programs > Tecan > EVOware > EVOware Standard or EVOware Plus, depending on which version you want to run.

When Freedom EVOware is started Freedom EVOware checks, if there are files in the windows user Virtual Store under "[ApplicationProgramData]\TECAN\" and if the user has sufficient rights (read / write), to run Freedom EVOware. If not, Freedom EVOware shows a warning message box and writes this into log file. This feature does not apply, when Freedom EVOware started by API.

To disable the checks at startup, set the value of xml node CheckAccessRightsAtStartup to 0 in the evoware.xml file. For information on the location of this file see [A.7 "Freedom EVOware Directory Structure and Files"](#), [A-28](#).

The parameters in the evoware.xml file should only be changed by specialists. If all checks are succeeded or they are disabled, you will be shown the Login dialog box:



**Fig. 5-1** Login dialog box

Enter your user name and password for Freedom EVOware and click the large green arrow on the right. Contact your Freedom EVOware Administrator if you do not have a user name and password.

**Note:** When Freedom EVOware is started for the first time after installation, you will be prompted to assign a user name and password for the Freedom EVOware Administrator (see 7 “Tecan User Management System”, 7-1).

### 5.1.1 Loading the device drivers

After clicking the large green arrow you will be shown a progress bar as Freedom EVOware loads all of the software components and device drivers:



**Fig. 5-2** Loading the device drivers

### 5.1.2 Driver pre-loading

To ensure that Freedom EVOware starts quickly, above all if you have chosen to install and use a large number of device drivers, the installation program installs a shortcut which automatically loads all of the Tecan drivers each time the PC is started. The drivers remain loaded while the PC is running and it is no longer necessary to load them each time you start Freedom EVOware.

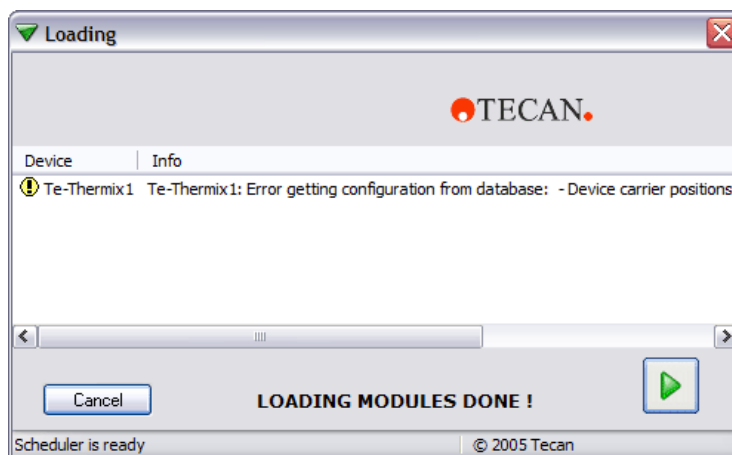
To unload the Tecan drivers when you quit Freedom EVOware, choose *Exit, unload drivers* in the File menu. Alternatively, check the *Unload drivers* checkbox in the Startup Wizard and click *Exit*. Driver pre-loading will be available again when you restart your PC.

Remove the shortcut “EVOware Prelaunch” from the MS Windows Autostart folder if you do not want the drivers to be loaded each time the PC is started. If you do this, Freedom EVOware will take somewhat longer to start in future.

The driver pre-loading feature can be disabled in the Configuration Tool (see 8.4.1.1 “Device Information Tab”, 8-21).

### 5.1.3 Driver loading errors

If errors are detected when loading the device drivers, the following dialog box will show status messages:



**Fig. 5-3** Loading the device drivers - status messages and warnings

Use the scroll bar to inspect last column (Info), which explains the reason for the error.

If one of the error messages is shown truncated because it is too long, lengthen the field in the dialog box and activate the horizontal scroll bar by double-clicking on the divider (short vertical line in the header) at the end of the field.

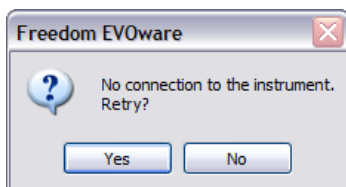
Some of the device drivers will output errors or warnings during loading if Freedom EVOware detects configuration errors.

### 5.1.4 Instrument and Hardlock Detection

Freedom EVOware will run in offline mode if it cannot detect a hardlock (dongle) when it starts. See [3.1.2 "Hardlocks for Freedom EVOware Standard and Freedom EVOware Plus"](#), [3-2](#).

It will also run in offline mode if it cannot detect a pipetting instrument on one of the USB ports or on the configured COM port (it checks the USB ports first).

The following dialog box will be shown if Freedom EVOware cannot communicate with the pipetting instrument:



**Fig. 5-4** Starting Freedom EVOware - no pipetting instrument detected

Click No to continue with offline mode. See also [4.5.1 "USB Power Management Setting"](#), [4-14](#) and [4.5.2 "USB Hubs"](#), [4-15](#).

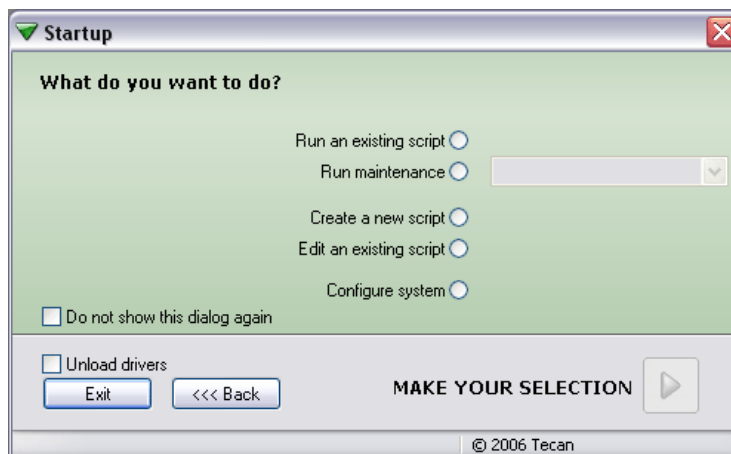
In offline mode, firmware commands such as movement commands are not sent to the pipetting instrument (i.e. pipetting does not take place).

Freedom EVOware's current operating mode is shown in the Status Bar (see [6.7.3 "Status Bar"](#), [6-19](#)).

See [8.4.3.3 "Com Ports Tab"](#), [8-33](#) for information on configuring the pipetting instrument's COM port. The USB ports do not need configuring.

## 5.2 Startup Wizard, Freedom EVOware Standard

After all of the modules and drivers have been loaded and you have logged in as the Freedom EVOware Administrator or Application Specialist, you will be shown the Freedom EVOware Standard startup wizard.



**Fig. 5-5** Freedom EVOware Standard startup wizard

This dialog box is also shown if you choose Startup Wizard from the File menu. The options in the Startup Wizard are as follows:

### Run an existing script

This option opens the Selection dialog box to allow you to choose the script you want to run. After choosing the script you are shown the Runtime Controller dialog box (see [12.1 "Running a Liquid Handling Script"](#), [12-1](#)).

### Run maintenance

This option is used to run instrument maintenance tasks.

### Create a new script

This option opens the Selection dialog box to allow you to choose a template for the new script. The template contains information on e.g. the worktable layout.

### Edit an existing script

This option opens the Selection dialog box to allow you to choose the script you want to edit or view. After loading the script, you can also choose to run it.

### Configure system

This option is used to configure general settings for the Freedom EVOware software (see [8 "Configuration Tool"](#), [8-1](#)).

### Do not show this dialog again

Check this checkbox if you do not want Freedom EVOware to show the Startup Wizard when it starts next time. In this case, Freedom EVOware Standard will start by opening the Script Editor with the pipetting script which was last used. To deactivate this feature again, open the Startup Wizard by choosing Startup Wizard in the File menu or click the Startup button in the Toolbar and uncheck the checkbox.

### Unload drivers

To ensure that Freedom EVOware starts quickly, all of the Tecan drivers you have chosen to use are loaded each time the PC is started and remain loaded while the PC is running (see 5.1.2 “Driver pre-loading”, 5-2). Check this checkbox before you click Exit if you want to unload the drivers when you quit Freedom EVOware. The drivers should be unloaded e.g. if Freedom EVOware reports an internal error. The drivers will be loaded again when you re-start Freedom EVOware.

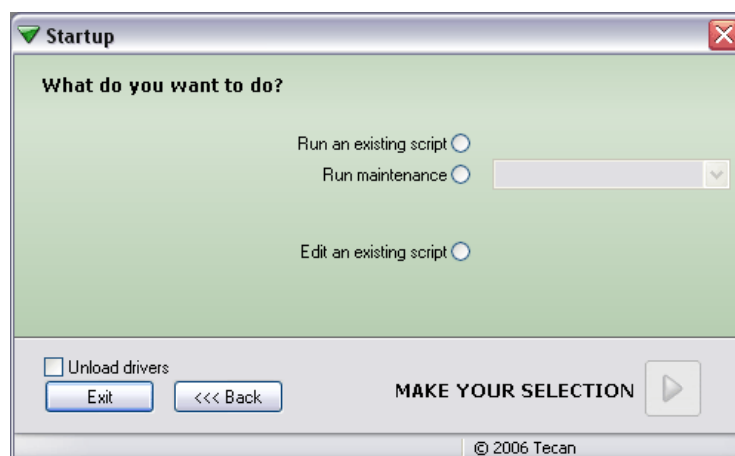
**Note:** If you have made configuration changes using the Configuration Tool, the drivers will be unloaded automatically when you quit Freedom EVOware.

### Exit

Quit Freedom EVOware.

## 5.2.1 Startup Wizard for Freedom EVOware Standard Operators

Operators of Freedom EVOware Standard have less access rights than Administrators or Application Specialists (see 7.2 “Freedom EVOware Access Rights (User Levels)”, 7-3). Accordingly, they are presented with a startup wizard which has less functions:



**Fig. 5-6** Freedom EVOware Standard startup wizard for Operators

See 5.2 “Startup Wizard, Freedom EVOware Standard”, 5-5 for a description of the functions.



### 5.3 Startup Wizard, Freedom EVOware Plus

After all of the modules and drivers have been loaded and you have logged in as the Freedom EVOware Administrator or Application Specialist, you will be shown the Freedom EVOware Plus startup wizard.

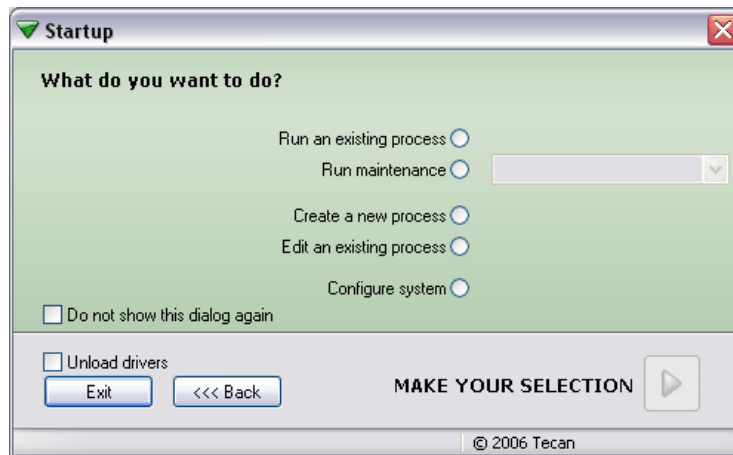


Fig. 5-7 Freedom EVOware Plus startup wizard

This dialog box is also shown if you choose Startup Wizard from the File menu. The options in the Startup Wizard are as follows:

#### Run an existing process

This option is used to run an existing process or method. Click the large green arrow and choose the process or method you want to run in the Selection dialog box which follows. After choosing the process or method, you are shown the Runtime Controller dialog box (see [12.2 “Running and Optimizing a Process \(Freedom EVOware Plus\)”](#), [12-5](#)).

A method is a set of one or more processes to be run together (either sequentially or in parallel). The method file also contains information on the runtime settings. Methods are created and saved in the Runtime Controller.

#### Run maintenance

This option is used to run instrument maintenance tasks. See [6.4.2 “Run Maintenance”](#), [6-10](#).

#### Create a new process

This option opens the Selection dialog box to allow you to choose a template for the new process. The template contains information on e.g. the worktable layout.

#### Edit an existing process

This option opens the Selection dialog box to allow you to choose the process you want to edit or view. After loading the process, you can also choose to run it.

#### Configure system

This option is used to configure general settings for the Freedom EVOware software (see [8 “Configuration Tool”](#), [8-1](#)).

### Do not show this dialog again

Check this checkbox if you do not want Freedom EVOware to show the Startup Wizard when it starts next time. In this case, Freedom EVOware Plus will start by opening the Process Editor with the process which was last used. To deactivate this feature again, open the Startup Wizard by choosing Startup Wizard in the File menu or click the Startup button in the Toolbar and uncheck the checkbox.

### Unload drivers

To ensure that Freedom EVOware starts quickly, all of the Tecan drivers you have chosen to use are loaded each time the PC is started and remain loaded while the PC is running (see 5.1.2 “Driver pre-loading”, 5-2). Check this checkbox before you click Exit if you want to unload the drivers when you quit Freedom EVOware. The drivers should be unloaded e.g. if Freedom EVOware reports an internal error. The drivers will be loaded again when you re-start Freedom EVOware.

**Note:** If you have made configuration changes using the Configuration Tool, the drivers will be unloaded automatically when you quit Freedom EVOware.

### Exit

Quit Freedom EVOware.

## 5.3.1 Startup Wizard for Freedom EVOware Plus Operators

Operators of Freedom EVOware Plus have less access rights than Administrators or Application Specialists (see 7.2 “Freedom EVOware Access Rights (User Levels)”, 7-3). Accordingly, they are presented with a startup wizard which has less functions:

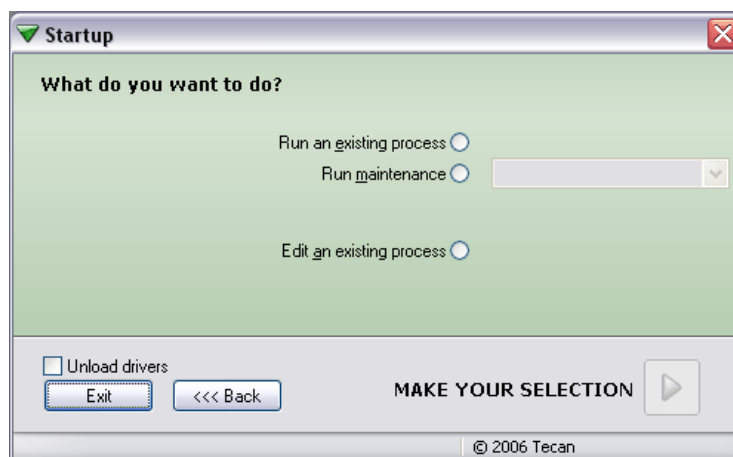


Fig. 5-8 Freedom EVOware Plus startup wizard for Operators

See 5.3 “Startup Wizard, Freedom EVOware Plus”, 5-7 for a description of the functions.


## 5.4 Overview of the Main Window in Freedom EVOware

The following section describes the key features of the Freedom EVOware main window. See also 6 “Menus”, 6-1 and 13 “Overview of Freedom EVOware Commands”, 13-1.

### 5.4.1 Control Bar

The Control Bar is the vertical area at the left of the screen. It is used to select the objects and commands which you need to set up your process or script. It is also used to configure the liquid classes for the liquid you want to pipette and to set up robot vectors.

The Control Bar is only visible for the user levels Administrator, Application Specialist and Power User (not for operators).

Six colored tabs can be seen to the right of the Control Bar. Click on the tabs to select the type of object you want to work with. Each of the tabs contains a list of objects which are arranged in groups. For example, the Labware tab contains groups for Microplates, Tips, Wash and Waste, Troughs, Tubes, Miscellaneous and Allowed Labware. Click  in the group's title bar to collapse the group.

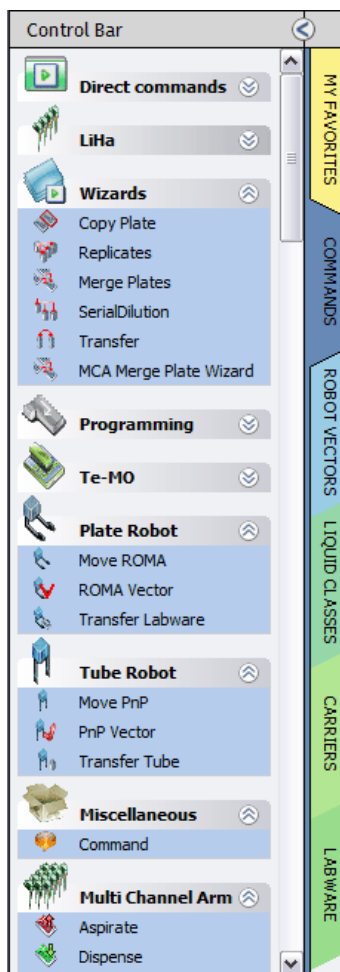


Fig. 5-9 Control Bar showing the Commands tab

If necessary, you can resize the Control Bar by dragging the divider to the left of the colored tabs.

#### 5.4.1.1 My Favorites

Click this tab to view your favorite direct commands, device commands, liquid handling commands, robot vectors and labware. The list already contains a few standard items when Freedom EVOware has just been installed. To add a copy of an object from another Control Bar group to My Favorites, right-click the object and choose *Add to favorites* from the context menu. To remove the object again from My Favorites, right-click the object (in the My Favorites section or in the section where the object belongs) and choose *Remove from favorites*.

If you click My Favorites and select a carrier, you will not see an Allowed Labware section (below the Labware section) if none of your favorite labware items are compatible with this carrier. Click the Labware tab instead to see all of the allowed labware for this carrier.

#### 5.4.1.2 Commands

Click this tab to view the available script commands and device commands. The commands are divided into groups (e.g. Liquid Handling Arm commands).

In addition, the Commands tab also contains up to seven direct commands (see [5.4.1.3 “Direct commands”](#), ¶ 5-10).

In Freedom EVOware Plus, when the Script Editor is open the Commands tab of the Control Bar only shows script commands (commands which are used for writing pipetting scripts, see [13.1 “Overview of Script Commands”](#), ¶ 13-1). When the Process Editor is open, the Commands tab of the Control Bar only shows device commands (commands for the optional devices, see [13.2 “Overview of Device Commands”](#), ¶ 13-8).

In Freedom EVOware Standard, the Control Bar always shows both command types (it does not have a Process Editor).

If you cannot find the device that you want to use in the Control Bar, you must run the installation program again and install the respective device driver (see [4.3 “Modifying, Removing or Repairing Your Installation”](#), ¶ 4-8). Also check whether the driver has been installed but is currently deactivated (see [8.4.1.1 “Device Information Tab”](#), ¶ 8-21, *Start* checkbox).

#### 5.4.1.3 Direct commands

Direct commands are used for service purposes, e.g. for picking up DITIs or flushing the tips. They provide a convenient alternative to creating and running a pipetting or maintenance script which carries out the same function.

The Control Bar only shows direct commands for devices whose device driver is installed and loaded. For example, the direct command “Load the Te-MO” is only shown in the Control Bar if you have installed and have chosen to load the Te-MO driver. The DITI commands are only shown if the LiHa is configured with DITIs.

To run a direct command, right click on the command and choose Run in the context menu.

Direct commands are only meaningful if you are running Freedom EVOware in real mode and the PC is connected to a pipetting instrument. If Freedom EVOware is running in offline mode, in most cases the dialog box of the direct command will not open when you double-click on the command.

Many of the direct commands have an equivalent script command. In these cases, click the cross-reference link and refer to the script command for a description of the parameters which are required:

- ◆ Prime WRC: This direct command is used to prime the wash block of the Te-MO 96, Te-MO 384 or MCA. Choose the required wash block from the pull down list. The list shows all wash blocks which are currently positioned in the Worktable Editor. Then specify the required priming duration and click Start.
- ◆ Flush: This is used to flush the LiHa. See [15.4 “Wash Tips Command”](#), [15-8](#).
- ◆ Drop DITIs: See [15.8 “Drop DITIs Command”](#), [15-14](#). Note: Freedom EVOware automatically opens the dialog box for this command if the Runtime Controller encounters a Get DITIs command when tips are already mounted from a previous pipetting operation.
- ◆ Set DITI Position: See [15.9 “Set DITI Position Command”](#), [15-15](#).
- ◆ Get DITIs: See [15.7 “Get DITIs Command”](#), [15-13](#).
- ◆ LiHa Safe Flush: This direct command is used to discard the contents of the LiHa tips to a specified location (typically into a microplate, tube rack, a trough or the wash station waste). If hazardous liquid is left in the tips after completing a script or process, you can use this command to empty the tips for safety reasons. It can also be used to recover the contents of the tips if the script or process was aborted for some reason before it completed. If your pipetting instrument is fitted with more than one LiHa, choose the one you want to use and select the labware you want to use by clicking on the labware in the Worktable Editor. Then click on the well(s) you want to use. See [15.2 “Dispense Command”](#), [15-3](#) for information on the other parameters you need to specify (e.g. tip selection).
- ◆ Send Firmware Command:
  - **Command:** Specify the firmware command you want to send to the instrument. For example, “A1RPZ0” returns the current Z position of each of the LiHa tips. See the respective instrument manual for a list of firmware commands. Firmware commands are nearly always written uppercase.
  - **Response:** Some firmware commands terminate with one or more return parameters (numeric values) separated by commas. See the respective instrument manual for information on return parameters from firmware commands.
  - **Error Code:** All firmware commands terminate with an error code. The error code is 0 if the command was executed with no errors.



#### WARNING

Risk of injury to operating personnel or damage to the equipment

- ◆ Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

#### 5.4.1.4 Robot Vectors

Click this tab to view the movement vectors which have been defined for the plate robot, the multi channel arm and the tube robot.

This tab only shows home vectors and vectors which were not assigned to carriers or labware items in the Edit Carrier or Edit Labware dialog boxes.

Plate robot vectors specify movements to be carried out by the RoMa (Robot Manipulator). Current Tecan pipetting instruments can be fitted with up to two RoMas. See [9.6 “Creating and Editing Plate Robot Vectors”](#), [9-46](#).

Multi channel arm vectors specify movements to be carried out by the MCA. Current Tecan pipetting instruments can only be fitted with one MCA. MCA vectors are very similar to RoMa vectors.

Tube robot vectors specify movements to be carried out by the PnP (Pick and Place robot). Current Tecan pipetting instruments can be fitted with up to two PnP arms.

Home vectors specify the movements to be carried out by the RoMa and/or PnP in order to move the robot back to its home (parking) position. See [9.6.4 “Defining the Home Position for a RoMa”](#), ¶ 9-53.

To create a new plate robot vector, right-click the group heading *Robot Vectors*, choose *New*, enter a descriptive name of your choice and click OK to open the Teach Plate Robot Vector dialog box (see [9.6.2 “Teach Plate Robot Vector Dialog Box”](#), ¶ 9-50).

If your pipetting instrument is fitted with more than one plate robot, it is recommended to suffix the vector name with “1” or “2”, e.g. “MoveBlock2” to indicate which RoMa was used for teaching (Note: the vector name does not influence which RoMa is used, either in Freedom EVOware Plus or in Freedom EVOware Standard). In Freedom EVOware Standard, user-defined plate robot vectors can be used in Transfer Labware and RoMa Vector commands. See also [17.3 “Site-specific RoMa vectors”](#), ¶ 17-14.

To view and/or edit plate robot and multi channel arm vectors which are associated with carriers, double click on the carrier in the Labware section of the Control Bar and click *Edit*. To view and/or edit tube robot vectors which are associated with labware items, double click on the labware item in the Labware section of the Control Bar and click *Edit*.

#### 5.4.1.5 Liquid Classes

Click this tab to view the available liquid classes. A liquid class is a set of liquid handling parameters. It specifies aspirating and dispensing speeds, airgaps, liquid detection modes, etc. The values of the parameters are dependent on the physical characteristics of the liquid. See [10 “Configuring Liquid Classes”](#), ¶ 10-1 for information on creating and editing liquid classes.

#### 5.4.1.6 Carriers

Click this tab to view the available carriers. A carrier is a removable support on the instrument's worktable (i.e. deck) which holds one or more pieces of labware (e.g. a microplate) in place. The carrier name indicates the type of labware for which it is designed. Optional devices which can be placed on the worktable (e.g. the Te-Shake shaker) are also treated as carriers.

Carriers are normally fitted to the instrument's worktable at pre-defined grid positions (see [Fig. 11-8](#), ¶ 11-18).

The Carriers tab is subdivided into groups for Devices, Hotels, Microplate Carriers, DITI Carriers, Wash Stations, Trough Carriers, Tube Carriers (tube racks) and Miscellaneous Carriers.

See [9.5 “Configuring Carriers”](#), ¶ 9-29 for information on creating and editing carrier templates.

The Freedom EVOware database already contains a large selection of pre-defined carrier types. You only need to create or edit carriers if you cannot find a standard item which is suitable for your needs.


#### 5.4.1.7 Labware

Click this tab to view the available labware. Labware refers to consumable items such as microplates or sample tubes. Microplates have a regular arrangement of

containers or cavities (wells) for holding liquids or samples. To allow pipetting, microplates are normally placed on microplate carriers and tubes are inserted in tube racks.

The Labware tab is subdivided into groups for Microplates, Tips, Wash and Waste, Troughs, Tubes, Miscellaneous and Allowed Labware.

**Allowed Labware** shows the labware types which are compatible with the currently selected carrier. If you have already put a carrier onto the Worktable Editor, click on it to see which labware types are allowed.


See [9.4 "Configuring Labware"](#),  9-9 for information on creating and editing labware templates.

The Freedom EVOware database already contains a large selection of pre-defined labware types. You only need to create or edit labware if you cannot find a standard item which is suitable for your needs.

#### 5.4.1.8 Search

Click this tab to view the Control Bar objects which were found using the search function.

#### 5.4.1.9 Searching for objects in the Control Bar

To search for any object or command in the Control Bar, enter the name or part of the name in the text field at the bottom and click . The search results are shown in the Search tab of the Control Bar.

#### 5.4.1.10 Context Menu for Objects in the Control Bar

Right-click on an object in the Control Bar to open the context menu. The context menu is context sensitive and the options it contains depend on the currently active Control Bar tab and on the object you have selected. The available options in the context menu are as follows:

##### **Edit**

Edit the selected object.

##### **Delete**

Delete the selected object.

##### **New**

Create a new object of the same type.

##### **Duplicate**

Duplicate the selected object. You will be prompted for a new name.

##### **Rename**

Rename the selected object. You will be prompted for a new name.


##### **Add to favorites**

Add the selected object to the My Favorites tab of the Control Bar.

##### **Remove from favorites**

Remove the selected object from the My Favorites tab of the Control Bar.

##### **Hide**

Hides the selected object. Use this feature if you want to hide items which you do not normally use. Depending on the Show/Hide status of the Control Bar, the object will either disappear immediately or it will be shown in gray. See [5.4.1.11 "Context Menu for Group Titles in the Control Bar"](#),  5-14.

### **Show**

Shows the selected object (cancels the hidden status). Before you can do this you must make the hidden objects visible (see 5.4.1.11 “Context Menu for Group Titles in the Control Bar”, 5-14).

### **Run Command**

This option is only available for device commands and is used for service purposes, e.g. to initialize the device manually or to test correct functioning (see 16.1 “Service Functions”, 16-1). See 6.4.2 “Run Maintenance”, 6-10 for information on instrument maintenance functions. Maintenance functions are scripts which are created using the Script Editor.

#### **5.4.1.11 Context Menu for Group Titles in the Control Bar**

Right click on a group title in the in the Control Bar to open the context menu. The context menu is context sensitive and the options it contains depend on the currently active Control Bar tab and on the group title you have selected (e.g. “Carriers”). The available options in the context menu are as follows:

#### **Edit**

Edit the selected object.

#### **New**

Create a new object.

#### **Show hidden items**

Shows all objects you have marked as hidden in gray. This allows you to cancel the hidden status of an object. To cancel the hidden status, right-click on the object and choose Show.

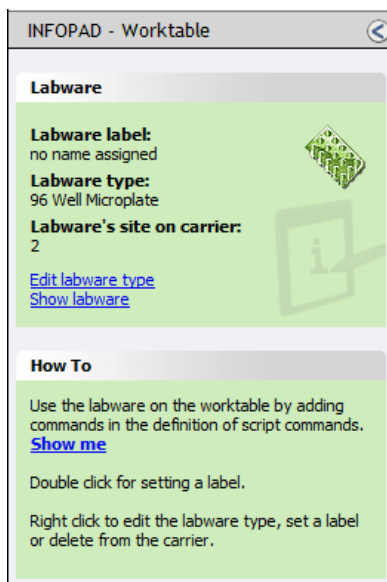
#### **Hide hidden items**

Completely hides all objects you have marked as hidden.

#### **5.4.2 Infopads**


Infopads are small windows which contain prompts, hints or context-related information on the task which is currently being carried out or the object which is currently selected. The Infopads are positioned to the right of the Control Bar.





**Fig. 5-10** Lower infopad with a labware item selected

If your pipetting script contains Comment commands, the comment texts and the corresponding script line numbers are listed as hyperlinks in the upper Infopad. Click on one of the entries to jump to the script line which contains the Comment command (**script navigation feature**). See 15.32 “Comment Command”, 15-87 for more information.

If you need more space for the Process Editor or the Worktable Editor, you can collapse the upper and/or lower Infopad by clicking  in the title bars. You can also resize the windows by dragging the dividers between the windows.

The hyperlinks in the *How To* section of the infopads take you to short animations (films) which demonstrate the currently selected task. The animations are stored in AVI format and will be shown e.g. in Windows Media Player.

#### 5.4.2.1 Hyperlinks in the Infopads

The infopads are provided with hyperlinks (blue underlined text) which are shortcuts to commonly needed actions. The hyperlinks are context sensitive and the available options depend on what you have selected (e.g. a carrier or labware item in the Worktable Editor):

##### **Edit carrier type**

This option is shown when you select a carrier or a carrier which is a device. It opens the Edit Carrier dialog box and is equivalent to double-clicking the selected carrier in the Control Bar.

##### **Edit labware type**

This option is shown when you select a labware item. It opens the Edit Labware dialog box and is equivalent to double-clicking the selected labware item in the Control Bar.

##### **Edit liquid class**

This opens the Liquid Class Editor and is equivalent to double-clicking the selected liquid class in the Control Bar.

### Show labware

This option is shown when you select a carrier or a carrier which is a device. It opens the Labware tab of the Control Panel. Allowed Labware then shows the labware types which are compatible with the selected carrier.

### Show me

This runs a short animation (film) to demonstrate the currently selected task. The animations are stored in AVI format and will be shown e.g. in Windows Media Player.

## 5.4.3 The Process Editor (Freedom EVOware Plus)

In Freedom EVOware Plus, the sequence of steps which are required to carry out a particular application or experiment, for example to extract the substance you are looking for, is called a process. The process specifies the operations you want the pipetting instrument to execute. Processes are set up in the Process Editor, which is shown at the top right of the screen.

In the Process Editor, each process step (such as centrifuging a plate or pipetting to a plate) is shown as an icon, whereby each icon is associated with a single device such as a centrifuge, a storage device or the liquid handling arm.

See 13.2 "Overview of Device Commands", 13-8 for a list of device commands which are provided with the standard Freedom EVOware installation. When installing Freedom EVOware, you normally only install the device drivers which you want to use.

There are four basic types of icon - process steps, labware source icons, final position icons and on-the-fly icons:

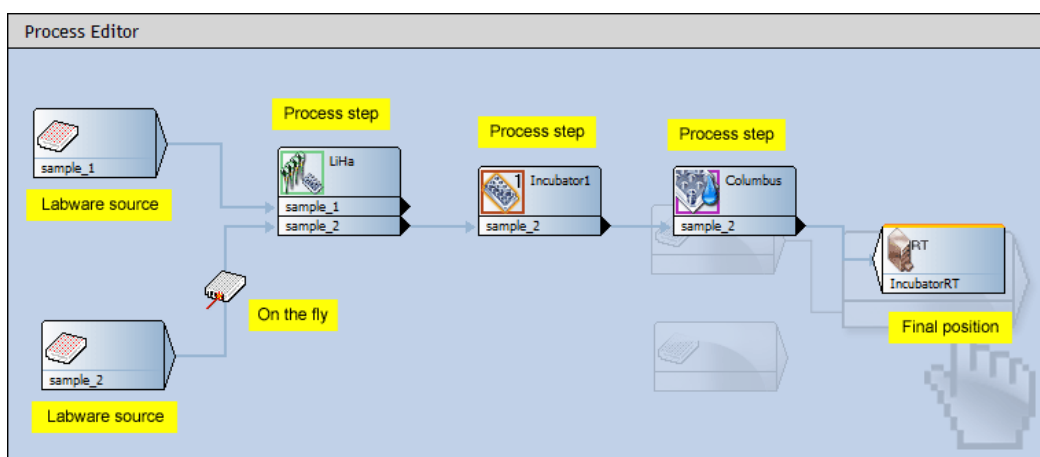


Fig. 5-11 Process Editor showing an example process

If you need more space for the Process Editor, you can collapse the Worktable Editor by clicking in the title bar. In addition, you can collapse the Infopad windows by clicking in the title bars. You can also resize the windows by dragging the dividers between the windows.

Process steps are created by dragging commands from the Control Bar onto the Process Editor. A process is then created by interlinking the process steps to create the workflow which is required by your application or experiment.

The bottom part of each process step icon shows the name or names of the labware items which are involved in the operation (so-called object parameters).

Each process step is associated with a single device, and devices can typically carry out several different functions. For example, a plate washer may have a washing function, a priming function and an initialization function. This is handled by associating the process step with a command. Each device driver contains a pre-configured command for each of the device functions (the available commands are shown in the Commands section of the Control Bar, below the symbol for the device). Many of the commands have one or more execution parameters (such as the duration of the washing operation). When you create a process step by dragging the command onto the Process Editor, you will be prompted to specify the execution parameters.

Each command can be associated with pre-actions and/or post-actions – additional commands which are carried out before and after the main command. For example, if you want to scan a plate in a Tecan Ultra reader with the Measure command, it is necessary to move the plate to the reader using the plate robot (with the RoMa\_MoveObject command) and to open the reader door before the plate gets there (with an Ultra\_Open command). Another RoMa\_MoveObject command and an Ultra\_Close command are needed when the scanning operation is finished. The process diagram is simplified by implementing these standard actions using pre-actions and post-actions which are linked to the Measure command. It avoids having to specify additional process steps. In most cases, Freedom EVOware configures suitable pre-actions and post-actions for you automatically. This applies above all to the plate robot (RoMa\_MoveObject command).

Freedom EVOware keeps track of the location of the labware on your instrument, and - to take the above example - automatically configures a suitable RoMa\_MoveObject command to move the plate from its current location to the reader.

The pipette command for the liquid handling arm has a large number of sub-commands which are used for writing so-called scripts. In Freedom EVOware Plus, if you drag the pipette command onto the Process Editor, this opens scripting mode and the Process Editor is replaced by the Script Editor (see below).

Labware source icons are used at the start of a process to represent the source of the labware items (e.g. microplates or tubes) which are needed by the process. See [11.6 “Labware Generator \(Freedom EVOware Plus\)”](#), [11-14](#) for information on creating labware source icons.

Final position icons are used to specify the final position of the labware after the process has finished. They are often associated with a storage device such as a hotel or with a waste position for discarding used labware. Final position icons are not necessary if you want to return the labware to its original position after the process has finished, for example back to a storage device such as a carousel (the “base” location). Final position icons are created by right-clicking on the background of the Process Editor and choosing Choose Final Position from the context menu.

On-the-fly icons represent on-the-fly devices. Such devices always require the use of a plate robot (RoMa) to carry out their function. A typical example of this type of icon is the Symbol barcode scanner which is rigidly fixed to the instrument's deck and cannot move towards the labware to scan it. Instead, a plate robot is used to move the labware past the barcode scanner “on-the-fly” while carrying out something else, for example when moving the labware from one carrier (or process step) to another. The barcode scanner is then instructed to perform a read operation when the plate robot presents the labware. An on-the-fly icon for the barcode scanner is created by dragging the Barcode scanner command from the Control Bar onto a line which links two process steps.

See [11 “Getting Started - Setting Up a New Script or Process”](#), [11-1](#) for more information.

### 5.4.3.1 Context Menu for the Process Editor

Right-click on the Process Editor to open the context menu. The context menu is context sensitive and the options it contains depend on what you have selected (a process step icon or the background). The available options in the context menu are as follows if you select the background of the Process Editor:

#### Choose Final Position

This option adds a final position icon for labware. Final position icons are used to specify the final position of the labware after the process has finished. Final position icons are not necessary if you want to return the labware to its original position after the process has finished. See the above description of the Process Editor.

#### Paste

This option is available if you have selected a process step and choose Copy.

#### Arrows

This option allows you to choose between Rectangular and Straight arrows for the lines which connect the process steps. The choice you make solely depends on your personal taste.

See 9.8 “Local Settings for Process Steps (Context Menu)”, 9-54 and 9.9 “Local Settings for Labware Source Icons (Context Menu)”, 9-60 for information on the options in the context menu if you select a process step.

### 5.4.4 The Script Editor

The Script Editor, which is shown at the top right of the screen, is used to set up a pipetting (liquid handling) script.

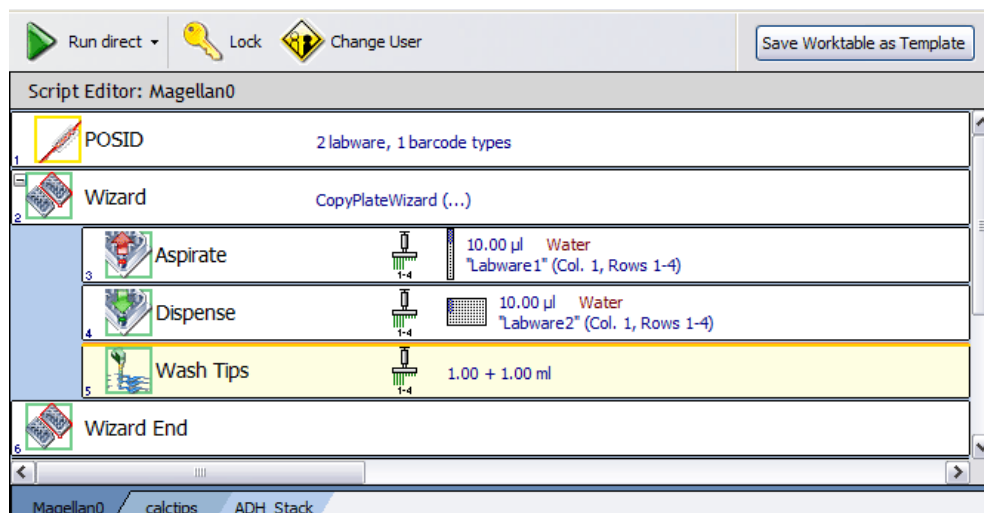
#### Freedom EVOware Plus

To open the Script Editor in Freedom EVOware Plus, select the Pipette command in the Control Bar (Liquid Handling Arm section) and drag it to the Process Editor window.

After creating the script, click the Accept to accept your changes and return to the Process Editor. If you want to edit or view the script later, you can open the Script Editor again by double-clicking on the icon for the Pipette command in the Process Editor.



#### Freedom EVOware Standard

Freedom EVOware Standard does not have a Process Editor, and displays the Script Editor as soon as it has started.



**Fig. 5-12** Script Editor with three scripts open

If you have opened more than one pipetting script, click the tabs below the Script Editor window if you want to view, edit, save or close one of the other scripts.

If you need more space for the Script Editor, you can collapse the Worktable Editor by clicking  in the title bar. In addition, you can collapse the Infopad windows by clicking  in the title bars. You can also resize the windows by dragging the dividers between the windows.

#### 5.4.4.1 Context Menu for the Script Editor

Right-click on the Script Editor to open the context menu. The available options in the context menu are as follows:

##### **Edit**

Edit the selected script line.

##### **Delete**

Delete the selected script line(s).

##### **Cut**

Cut the selected script line(s).

##### **Copy**

Copy the selected script line(s).

##### **Paste**

Paste the script line(s) in the clipboard at the current cursor position.

##### **Search & Replace**

Opens the *Search and Replace* dialog box which allows you to replace strings in the pipetting script (e.g. the string you have specified in the User Prompt command). If you do not specify a string in the *Replace with* field, matching strings are deleted (you cannot carry out a search without replacing).

#### **Context Menu for the Tabs of the Script Editor**

##### **Save**

Save the selected script.

##### **Close**

Close the selected script.

## Open

Open an additional script.

### 5.4.5 Worktable Editor

The Worktable Editor at the bottom right of the screen is a graphical representation of the pipetting instrument's worktable (deck). It shows the carriers and labware that are physically placed on the worktable. It also shows icons for the devices which are installed.

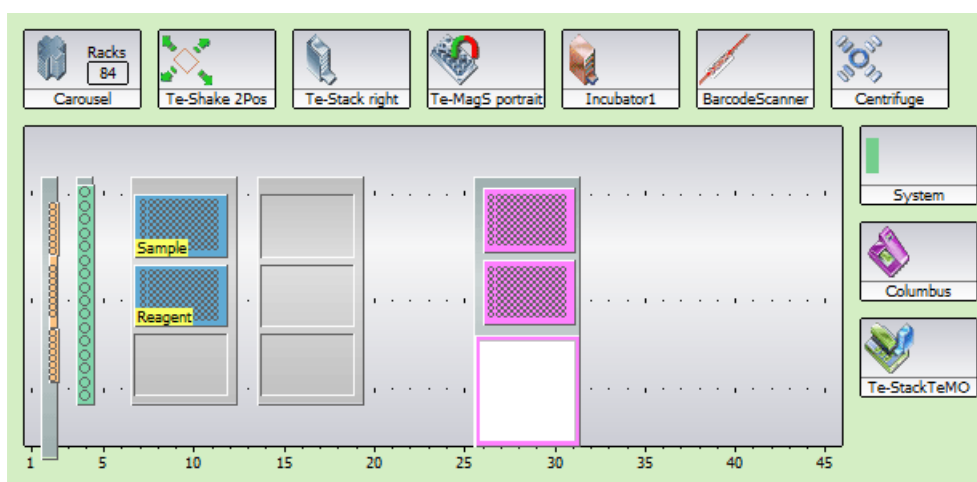



Fig. 5-13 Example worktable showing carriers, labware and labware labels

The gray area in the Worktable Editor represents that part of the worktable which can be accessed by the Liquid Handling Arm. This is called the pipetting area. The real worktable is normally larger than this. For example, hotels (storage shelves for plates) are normally put at the rear of the worktable, behind the pipetting area. The displayed size of the worktable is scaled automatically depending on the size of the Worktable Editor window. The displayed size of the worktable will be very small if the Worktable Editor window is small and/or a large number of device icons are visible (i.e. you have installed a large number of devices).

In the above figure, 84 microplates have been put in the carousel.

If you need more space for the Worktable Editor, you can collapse the Infopad windows by clicking  in the title bars. You can also resize the windows by dragging the dividers between the windows. In addition, you can rearrange the device icons by dragging them to the required position.

Before programming your pipetting operations, you need to place the carriers and labware which you want to use on the worktable.

The worktable layout is stored in the script or process file together with the information on the script or process.

#### 5.4.5.1 Shared worktable layouts

Freedom EVOware detects automatically if scripts, processes, maintenance scripts and templates use an identical worktable layout. If you save one of these file types after changing the worktable layout, you will be asked whether you also want to update the worktable information in the other files which share the same worktable.

If you are saving a pipetting script, you will only be prompted about other pipetting scripts, maintenance scripts or script templates which share the same worktable layout. If you are saving a process, you will only be prompted about other processes or process templates which share the same worktable layout.

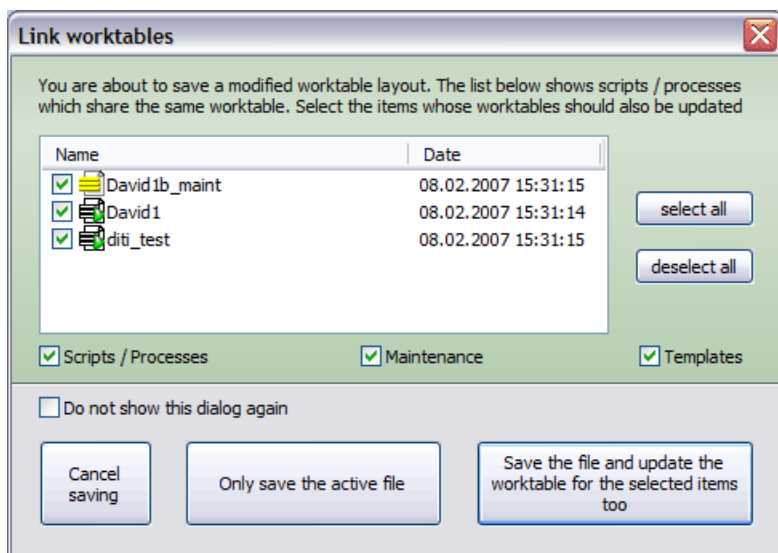


Fig. 5-14 Prompt when saving worktable layouts which are shared

Select the files whose worktable you also want to update or choose *Cancel saving*. The list shows all files of the selected file types (Scripts / Processes), Maintenance and Templates) which share the same worktable layout.

The following options are available:

**Cancel saving**

Cancel the saving operation.

**Only save the active file**

Update the file you are saving but do not update the other files which share this worktable.

**Save the file and update the worktable for the selected items too**

Update the worktable information for the active file and for the files you have selected.

If one of the other scripts which shares the same worktable layout is also currently open in the Script Editor, you will be prompted to save it first before updating.

**Do not show this dialog again**

Check this checkbox to hide this dialog box in future. In this case, Freedom EVOware will only save worktable layout changes for the current file in future. To make this dialog box appear again (i.e. to uncheck the checkbox), press the Shift key when you choose Save.

**5.4.5.2 Context Menu for the Worktable Editor**

Right-click on the Worktable Editor to open the context menu. The context menu is context sensitive and the options it contains depend on what you have selected (a carrier, a labware item or the background). The available options in the context menu are as follows:

### **Set Grid**

This option is used to move a robot-only device (a device which is not accessible to the liquid handling arm) to a new position on the worktable. Choose the required grid position and click OK. Tip: If you click on a device icon in the Worktable Editor, an orange line shows the grid position which is occupied by the device.

To move a carrier to a new position, click the edge of the carrier to select it and drag to the required position.

### **Modify labware**

This option is only available for generated labware (labware in feeder devices or a labware repository on the worktable) and is only for Freedom EVOware Plus. It opens the labware generator to allow you to edit the settings you have made (see [11.6 “Labware Generator \(Freedom EVOware Plus\)”](#), [11-14](#)).

### **Edit labware type**

This option is used to edit labware definitions.

### **Set label**

This option is used to assign a label (i.e. a user-defined name) to the selected labware item.

### **Edit carrier**

This option is used to edit carrier definitions.

### **Delete**

This deletes the selected object. You cannot delete carriers if labware is already positioned on the carrier (you must delete the labware first).

### **Automatic replace**

This activates the automatic DITI handling feature for the selected site. This option is only available for Freedom EVOware Plus and is only available for DITI racks. See [17.1 “Using the Automatic DITI Handling feature”](#), [17-1](#).

### **Waste for DiTi racks**

This activates the automatic DITI rack waste feature for the selected site. This option is only available for Freedom EVOware Plus and is only available for the DITI waste site of a DITI carrier with waste. It is intended for discarding empty stackable DITI racks and spacers. See [17.1 “Using the Automatic DITI Handling feature”](#), [17-1](#).

### **Save worktable as template**

This option is used to save the current worktable layout as a template. The template file which is saved contains configuration settings for Freedom EVOware, for example the positions of the devices and the labware in the Worktable Editor. To choose this option, right click on the worktable (but not on labware items).



## 5.5 Exiting Freedom EVOware

To exit Freedom EVOware, choose *Exit* or *Exit, unload drivers* in the File menu. In the latter case, you will be shown a progress bar as Freedom EVOware unloads all of the software components and device drivers. If errors are detected when unloading the device drivers, a dialog box will appear with status messages. Use the scroll bar to inspect last column (Info), which explains the reason for the error.

In Freedom EVOware Plus, you must first close the Script Editor before you can exit.



## 6 Menus

This chapter describes the menus in the Freedom EVOware software. It also describes the toolbar.

The menus are only available if you have been given Freedom EVOware Administrator or Application Specialist rights in the Tecan User Management system. Freedom EVOware Operators are only allowed to run existing scripts or processes and/or instrument maintenance scripts (see 7.2 “Freedom EVOware Access Rights (User Levels)”, 7-3).

Most of the features and dialog boxes in Freedom EVOware are provided with context-sensitive help. See 1.5 “Context-Sensitive Help System”, 1-4 for more information.

### 6.1 File Menu

Freedom  
EVOware  
Standard,  
Freedom  
EVOware Plus

This menu lets you create a new Freedom EVOware script or process, to open an existing script or process, to save the current script or process, to print the contents of a script or process, to run the Start Up Wizard, to Lock Freedom EVOware if you want to leave the PC unattended and to quit Freedom EVOware.

#### 6.1.1 New

Freedom  
EVOware  
Standard,  
Freedom  
EVOware Plus

This option lets you create a new script or process. A dialog box is opened to allow you to choose an existing script or process template:

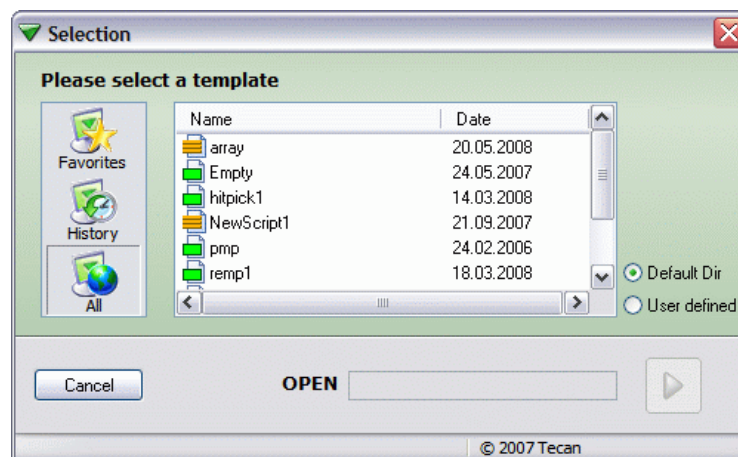


Fig. 6-1 Choosing a template file

Choose the required template and click the green arrow.


Click *Default Dir* to choose a template from the default template directory for scripts or processes. Click *User defined* and navigate to another directory to choose a template from a different location. The currently chosen directory is shown in the dialog box.

If required, click the column headers Name or Date to sort the list by name or date. Type the first letter of the template name to jump to templates starting with that letter.

Template files with a green icon (“worktable templates”) only contain worktable settings for Freedom EVOware, for example the positions of the devices and the labware in the Worktable Editor.

Template files which contain pipetting scripts (“script templates”) have a brown icon.

Template files which contain processes (“process templates”) have a blue icon.

Non-validated files are shown with a gray icon if you have enabled the file validation feature (see [C.2 “Setting the Validation Status of Scripts and Processes”](#),  C-4).

Click *All* if you want to see all of the templates which are available. Click *History* to see the most recently used templates. Click *Favorites* to see your favorite templates.

### Context menus for this dialog box

#### Add to favorites

Right click a template in the All or History view and choose *Add to favorites* from the context menu to add the template to the Favorites view.


#### Remove from favorites

Right click a template in the Favorites view and choose *Remove from favorites* from the context menu to remove the template from the Favorites view.

#### Views

Right click the Favorites, History or All button to open a context menu. You can then choose the view which you prefer to use (Favorites, History or All) the next time you open this dialog box.

#### Validate, Remove validation

These two options are only shown if you have enabled the file validation feature. See [C.2 “Setting the Validation Status of Scripts and Processes”](#),  C-4.

### 6.1.2 Open

Freedom  
EVOware  
Standard

This option opens an existing script. A dialog box is opened to allow you to choose the script you want:

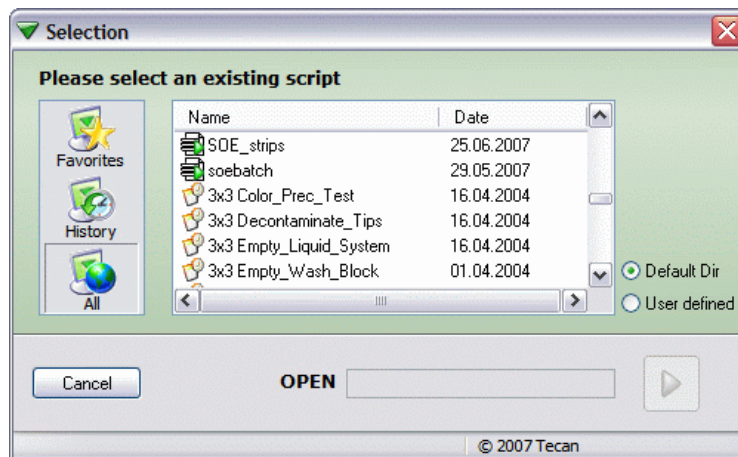


Fig. 6-2 Choosing an existing script

Choose the required script file and click the green arrow.

Click *Default Dir* to choose a script from the default script directory. Click *User defined* and navigate to another directory to choose a script from a different location. The currently chosen directory is shown in the dialog box.

If required, click the column headers *Name* or *Date* to sort the list by name or date. Type the first letter of the script name to jump to scripts starting with that letter.

Click *All* if you want to see all of the scripts which are available. Click *History* to see the most recently used scripts. Click *Favorites* to see your favorite scripts.

Script files have a green icon. Maintenance scripts have a light orange icon and are listed after the normal scripts.

Non-validated files are shown with a gray icon if you have enabled the file validation feature (see C.2 “Setting the Validation Status of Scripts and Processes”, C-4). They are not shown at all if your Freedom EVOware access level is *Operator*.

#### Context menus for this dialog box

##### Add to favorites

Right click a script in the *All* or *History* view and choose *Add to favorites* from the context menu to add the script to the *Favorites* view.

##### Remove from favorites

Right click a script in the *Favorites* view and choose *Remove from favorites* from the context menu to remove the script from the *Favorites* view.

##### Views

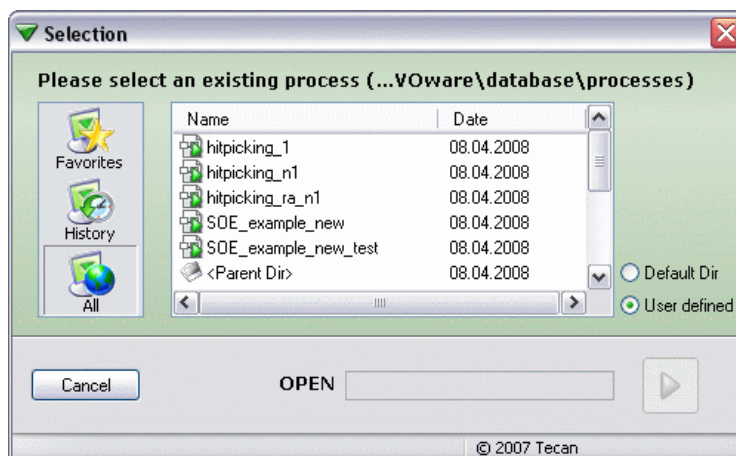
Right click the *Favorites*, *History* or *All* button to open a context menu. You can then choose the view which you prefer to use (*Favorites*, *History* or *All*) the next time you open this dialog box.

### Validate, Remove validation

These two options are only shown if you have enabled the file validation feature. See [C.2 “Setting the Validation Status of Scripts and Processes”](#), [C-4](#).

### Freedom EVOware Plus

This option opens an existing process. A dialog box is opened to allow you to choose the process you want:



**Fig. 6-3** Choosing an existing process

Choose the required process file and click the green arrow. Click *Default Dir* to choose a process from the default process directory. Click *User defined* and navigate to another directory to choose a process from a different location. The currently chosen directory is shown in the dialog box.

**Note:** You must use the *Export/Import Tool* if you want to transfer processes between different Freedom EVOware installations. Do not open and run a process which has been saved on a network drive or USB stick by a different Freedom EVOware installation. The process file may not contain all of the information required to run the process correctly.

If required, click the column headers *Name* or *Date* to sort the list by name or date. Type the first letter of the process name to jump to processes starting with that letter.

Click *All* if you want to see all of the processes which are available. Click *History* to see the most recently used processes. Click *Favorites* to see your favorite processes.

Non-validated files are shown with a gray icon if you have enabled the file validation feature (see [C.2 “Setting the Validation Status of Scripts and Processes”](#), [C-4](#)). They are not shown at all if your Freedom EVOware access level is *Operator*.

### Context menus for this dialog box

#### Add to favorites

Right click a process in the *All* or *History* view and choose *Add to favorites* from the context menu to add the process to the *Favorites* view.

#### Remove from favorites

Right click a process in the *Favorites* view and choose *Remove from favorites* from the context menu to remove the process from the *Favorites* view.

**Views**

Right click the Favorites, History or All button to open a context menu. You can then choose the view which you prefer to use (Favorites, History or All) the next time you open this dialog box.

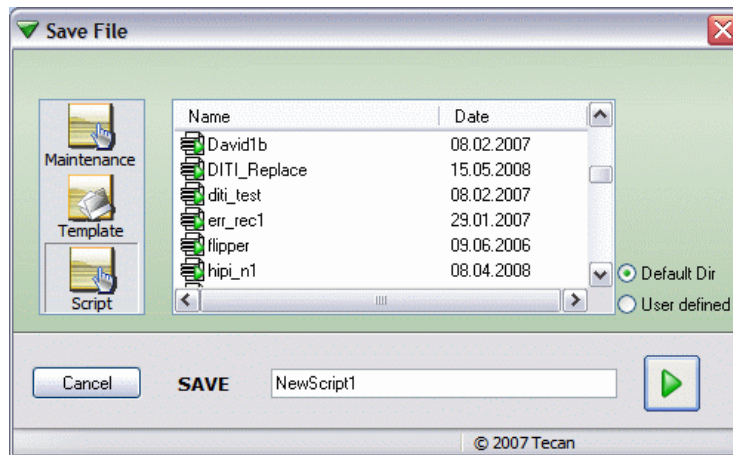
**Validate, Remove validation**

These two options are only shown if you have enabled the file validation feature. See C.2 “Setting the Validation Status of Scripts and Processes”, C-4.

**6.1.3 Save**

**Freedom  
EVOware  
Standard**

This option lets you save the current script. The file which is saved also contains information on the worktable layout which is used:

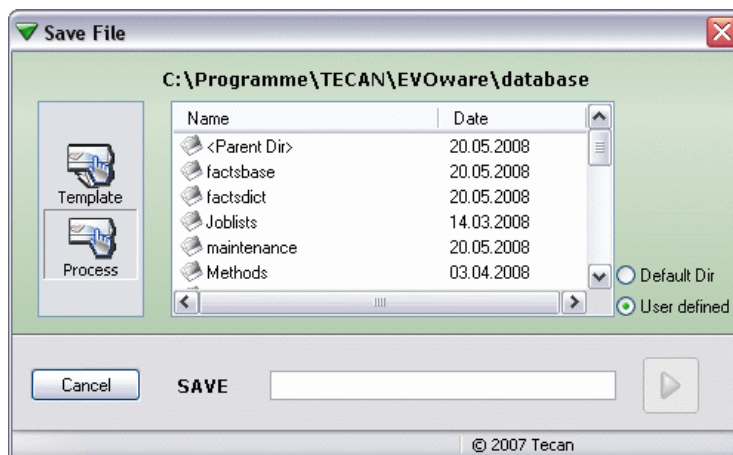


**Fig. 6-4** Saving a script

Enter the required name of the script and click the green arrow. Click *Default Dir* to save the script in the default script directory. Click *User defined* and navigate to another directory to save the script in a different location. The currently chosen directory is shown in the dialog box. Click *Script* to save a normal script. Click *Template* to save a script template. Click *Maintenance* to save a maintenance script (see 6.4.2 “Run Maintenance”, 6-10). Maintenance scripts are normal scripts which are saved in a special directory. You cannot choose a user-defined directory for maintenance scripts.

**Freedom  
EVOware Plus**

This option lets you save the current process. You will be prompted for a file name if you have not already assigned one. The file which is saved also contains information on the worktable layout which is used:



**Fig. 6-5** Saving a process

Enter the required name of the process and click the green arrow.  
 Click *Default Dir* to save the process in the default process directory. Click *User defined* and navigate to another directory to save the process in a different location. The currently chosen directory is shown in the dialog box.  
 Click *Process* to save a normal process. Click *Template* to save a process template.

**Note:** If you save a process on a network drive or USB stick, do not open it using a different Freedom EVOware installation. The process file may not contain all of the information required to run the process correctly on the other PC. You must use the Export/Import to transfer processes between different Freedom EVOware installations.

### 6.1.4 Save As ...

Freedom  
EVOware  
Standard,  
Freedom  
EVOware Plus

This option lets you save the current script or process using a different file name to before. You will be prompted for the file name. See 6.1.3 "Save", 6-5 for additional information.

### 6.1.5 Delete

This option lets you delete a script, process or method.

### 6.1.6 Print

If you have a printer connected to your computer, this option lets you print Freedom EVOware scripts and processes. The following items are printed:



**Freedom  
 EVOware  
 Standard**

- ◆ The script
- ◆ The worktable layout
- ◆ The name of the script
- ◆ The name of the currently logged in user
- ◆ The page number, time and date

**Freedom  
 EVOware Plus**

If the Process Editor is open:

- ◆ The process diagram
- ◆ Information on each of the process steps
- ◆ The worktable layout
- ◆ The name of the currently logged in user
- ◆ The page number, time and date

If the Script Editor is open:

- ◆ The script
- ◆ The worktable layout
- ◆ The name of the script and the name of the process which uses it
- ◆ The name of the currently logged in user
- ◆ The page number, time and date

### 6.1.7 Start Up Wizard

This option runs the Start Up Wizard. See [5.2 “Startup Wizard, Freedom EVOware Standard”](#), [5-5](#) and/or [5.3 “Startup Wizard, Freedom EVOware Plus”](#), [5-7](#).

### 6.1.8 Recent Scripts

This menu item is only shown in Freedom EVOware Standard. Freedom EVOware keeps a list of up to eight of the most recently used scripts. You can open one of the recent scripts by choosing it from the list.

### 6.1.9 Lock EVOware


This option is used to log out the current Freedom EVOware user. To prevent unauthorized use of the software, you should do this if you plan to leave the PC and the pipetting instrument unattended.

You must log in to Freedom EVOware again to regain control of the program.

Another use of the Lock function is to switch Freedom EVOware users when you are handing over to another employee due to a change of laboratory staff (evening shift etc.). In this case, you should log out and immediately log in again with the new user name.

If you log out while a script or process is running, the script or process continues to run. All other Freedom EVOware functions are disabled until you log in again.


**Note:** *In an emergency, you can stop the script or process (i.e. the pipetting) by pressing the Pause button on the pipetting instrument.*

**Note:** Irrespective of the Lock Freedom EVOware feature, users are automatically logged out after a specified time during which no keyboard or mouse-click activities have been detected (see [7 “Tecan User Management System”](#),  7-1).


### 6.1.10 Exit

This option closes all currently open scripts and/or processes, de-initializes the instrument, saves configuration settings and quits Freedom EVOware.

### 6.1.11 Exit, Unload Drivers

To ensure that Freedom EVOware starts quickly, all of the Tecan drivers you have chosen to use are loaded each time the PC is started and remain loaded while the PC is running (see [5.1.2 “Driver pre-loading”](#),  5-2). Choose this option if you want to unload the Tecan drivers when you quit Freedom EVOware. The drivers should be unloaded e.g. if Freedom EVOware reports an internal error. The drivers will be loaded again when you re-start Freedom EVOware.

If you run Freedom EVOware for an extended period without unloading the drivers, this can result in a slight degradation of the performance (throughput of your scripts and processes). Accordingly, we recommend you to unload the drivers using the menu option Exit, Unload Drivers and then to restart Freedom EVOware every six or seven days. Microsoft Windows, too, can suffer from a slight degradation of the performance - independently of Freedom EVOware - if you do not shut down and then restart your PC from time to time.

The driver pre-loading feature can be disabled in the Configuration Tool (see [8.4.1.1 “Device Information Tab”](#),  8-21).

**Note:** If you have made configuration changes using the Configuration Tool, the drivers will be unloaded automatically when you quit Freedom EVOware.

## 6.2 Edit Menu

This menu lets you cut, copy and paste Freedom EVOware script commands and process steps (see [11.4 “Setting Up a Pipetting Script in Freedom EVOware Standard”](#),  11-4) and [11.5 “Setting Up a Process in Freedom EVOware Plus”](#),  11-6).

### 6.2.1 Undo / Redo

The two options in this sub-menu are used to undo and redo changes you have made to a pipetting script in the Script Editor.

### 6.2.2 Undo / Redo Configuration

The two options in this sub-menu are used to undo and redo changes you have made to the Freedom EVOware configuration settings for carriers, labware, liquid classes and robot vectors.

### 6.2.3 Cut / Copy / Paste

Freedom EVOware lets you duplicate and move script commands and process steps using Cut, Copy & Paste. The same options are available if you right-click in the Script Editor or Process Editor.

### 6.2.4 Search & Replace

This menu opens the *Search and Replace* dialog box which allows you to replace strings in the pipetting script (e.g. the string you have specified in the User Prompt command). If you do not specify a string in the *Replace with* field, matching strings are deleted (you cannot carry out a search without replacing).

### 6.2.5 Auto-Validation

Pipetting scripts are normally checked for errors automatically when you add each new command to the script ([11.4.2.1 "Checking the Pipetting Script for Errors", 11-5](#)). Choose this menu item to toggle auto-validation on and off (a check mark alongside this menu item shows that auto-validation is switched on).

If the script contains errors and auto-validation is switched on, the faulty command(s) are marked in red and you cannot click Run in the Toolbar to start the Runtime Controller and run the script.

If the script contains errors and auto-validation is switched off, the faulty command(s) are not marked in red and you can click Run in the Toolbar to start the Runtime Controller. Uncheck the *Run full script* checkbox in the Runtime Controller if you want to run part of the script only, e.g. for testing purposes. If you run the full script, you will get errors. The errors are shown in the Log window.

### 6.2.6 Validate Script

This menu item is used to validate a pipetting script manually (i.e. check for errors). You can only choose this menu item if you have switched off auto-validation. If auto-validation is switched on, the script is validated automatically when you add each new command to the script. See also [11.4.2.1 "Checking the Pipetting Script for Errors", 11-5](#).

## 6.3 View Menu

This menu lets you view or hide the Worktable Editor, Infopads and Log Window.

### 6.3.1 Worktable

This option is used to view or hide the Worktable Editor.

### 6.3.2 Infopads

This option is used to view or hide the Infopads for the Process Editor or the Script Editor (upper infopad) or the Worktable Editor (lower infopad).

### 6.3.3 Log Window

This option is used to view or hide the Log window, a troubleshooting tool that tracks every command sent by the computer to the instrument, every response returned from the instrument to the computer and any user input. The content and format of the log corresponds to a Full log file of type LOG (see [A.1 "Overview of the Log Files"](#), [A-1](#)).

## 6.4 Execute Menu

This menu lets you run scripts and processes, run instrument maintenance functions, run tools and VB scripts and declare variables for use in scripts.

### 6.4.1 Run

This option is used to run scripts and processes. See [12 "Running Scripts and Processes"](#), [12-1](#).

### 6.4.2 Run Maintenance

This option is used to run maintenance scripts for the pipetting instrument and/or optional devices. Maintenance scripts are normal scripts which are saved in a special directory. They are created using the Script Editor. Maintenance scripts can only be created by the Freedom EVOware Administrator or Application Specialist.

A selection of commonly-needed maintenance scripts are provided with the Freedom EVOware installation. The purpose of each of the scripts is explained in a Comment command at the start of the script. The scripts are intended for both Freedom EVOware Plus and Freedom EVOware Standard, but they can only be viewed and modified by loading Freedom EVOware Standard.

#### Freedom EVOware Standard

To create a maintenance script, specify the script in the Script Editor, click Save and click the Maintenance button in the Save File dialog box. The script will then appear automatically in the Run Maintenance menu. Choose the script from the maintenance menu when you want to execute the maintenance function. If you want to make changes to the maintenance script, edit it using the Script Editor and save it again.

#### Freedom EVOware Plus

To create a maintenance script, specify the script in the Script Editor, click Save as Template and click the Maintenance button in the Save File dialog box. The script will then appear automatically in the Run Maintenance menu. Choose the script from the maintenance menu when you want to execute the maintenance function.

Freedom EVOware Plus cannot load a maintenance script to make changes. Instead, Freedom EVOware Plus users should load Freedom EVOware Standard instead, which allows you to edit the script using the Script Editor.

**Note:** *In Freedom EVOware Plus, you cannot use device commands in scripts. To create maintenance scripts which contain device commands, Freedom EVOware Plus users should load Freedom EVOware Standard to create the script. The maintenance scripts you create with Freedom EVOware Standard are also available in Freedom EVOware Plus.*

It is recommended to choose descriptive file names for the maintenance scripts to ensure that their purpose is clear to instrument operators.

### 6.4.3 Clear Recovery Status

Freedom EVOware provides functions for script and process error recovery. This allows aborted pipetting scripts and processes to be restarted where they were stopped (see [17.2 “Script and process recovery function”](#), ¶ 17-6).

Use this menu option to clear the Recovery status if you want the script or process to start again at the beginning, even if it was not fully executed the last time it was run.

### 6.4.4 Tools

This option is used to run tools (external programs) manually, without running an Freedom EVOware script or process.

#### 6.4.4.1 Creating Custom Menu Items for Tools (External Programs)

When it starts, Freedom EVOware scans the <install\_path>\database\Tools directory for executable files with the extensions EXE, COM or BAT. The filenames then appear as custom entries in the Execute > Tools menu and allow the tools to be executed manually, without running a script or process.

See [15.31 “Execute Application Command”](#), ¶ 15-86 if you want to execute a tool from within an Freedom EVOware script.

### 6.4.5 VB Scripts

This option is used to run Visual Basic scripts manually, without running an Freedom EVOware script or process.

#### 6.4.5.1 Creating Custom Menu Items for VB Scripts

When it starts, Freedom EVOware scans the <install\_path>\Database\VBscripts directory for VB scripts. The filenames then appear as custom entries in the Execute > Tools menu and allow the VB scripts to be executed manually, without running a script or process.

### 6.4.6 Declare Variables

This option, which is only available in Freedom EVOware Plus, is used to declare variables which can be shared between different pipetting scripts.

Freedom EVOware Plus processes can contain one or more pipetting scripts. In addition, Freedom EVOware Plus allows you to run several copies of the same process in parallel. Each copy of the process is called an instance. Freedom EVOware Plus also allows you to run different processes in parallel.

All variables (including pre-defined variables) must be declared before use (see also 14.1.1 “Declaring Variables in Scripts”, 14-1).

Variables in Freedom EVOware Plus can have one of three scopes (run, instance and script).

- ◆ **Run:** Variables with this scope are shared globally by all of the pipetting scripts in all instances of all processes.
- ◆ **Instance:** Variables with this scope are shared by all of the pipetting scripts in the same process or process copy.
- ◆ **Script:** Variables with this scope are declared in pipetting scripts with the Set Variable command (see 15.36 “Set Variable Command”, 15-90). They are not shared with other scripts.

If you declare a variable with scope **Run** or **Instance**, do not declare it again within a script. This will cause an error.

**Note:** In Freedom EVOware Standard, all variables have the scope **Script** and are declared with the Set Variable command.

#### 6.4.6.1 Set Process Variables Dialog Box

This dialog box is used to declare variables of scope **Run** and/or **Instance** and is only available in Freedom EVOware Plus:

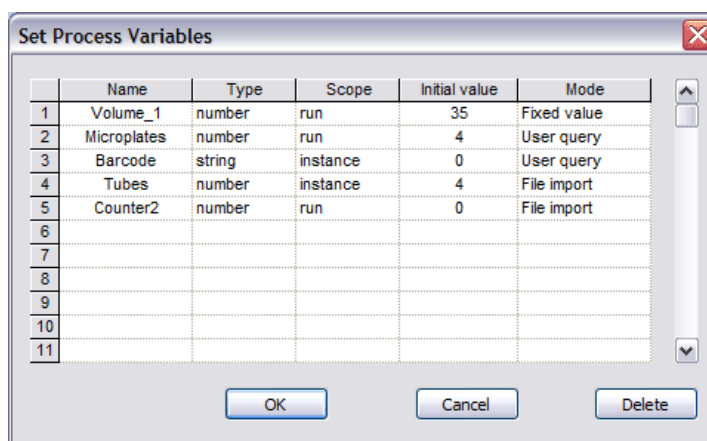


Fig. 6-6 Set Process Variables dialog box

#### Name

Specify the required variable name. Variable names can be 1 to 64 characters in length and must not begin with a digit. Variable names are not case-sensitive. Special characters (except underscore) should be avoided. See also 14.1 “Variables and Expressions in Scripts”, 14-1.

**Note:** You are not allowed to declare pre-defined variables with this dialog box. See 14.1.4 “Pre-Defined Variables”, 14-4 for information on the reserved names for pre-defined variables. Pre-defined variables must be declared before use with the Set Variable command.

**Type**

Choose either number (numeric variable) or string.

**Scope**

Choose either “run” or “instance” (see 6.4.6.4 “Scope of a Variable”, 6-14).

**Initial value**

Specify the required initial value.

**Mode**

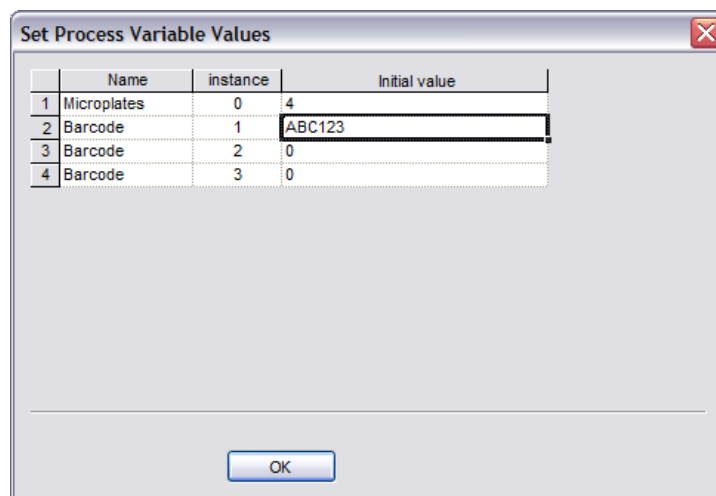
**Fixed value:** The variable will be assigned the specified initial value.

**User Query:** The operator will be prompted for the value of the variable when the process is run (see below).

**File import:** The value of the variable will be imported from a file (see 6.4.6.3 “Import File for the Declare Variables Feature”, 6-14).

**6.4.6.2 Set Process Variable Values Dialog Box**

If you have declared variables with the Declare Variables feature in Freedom EVOware Plus and you chose User Query in the Set Process Variables dialog box, the following dialog box is shown when the process is run:



**Fig. 6-7** Set Process Variable Values dialog box

Entered the required initial value for the variables in the *Initial value* column. In the above example, the variables were declared as shown in Fig. 6-6, 6-12 and the number of process instances (process copies) was set to three in the Runtime Controller when the process was run.

The scope of the *Barcode* variable is **instance** and a different value can be entered for each of the three process instances. The scope of the *Microplates* variable is **run**; the value you specify will be used for all three process instances. This is indicated by the value 0 in the *Instance* column.

### 6.4.6.3 Import File for the Declare Variables Feature

If you choose *File Import* in the Mode column of the Set Process Variables dialog box, you must create a comma-separated text file which contains the required values of the variables. The file name must be <process name>\_var.csv, for example myproc1\_var.csv.

The file must be stored in the sub-directory which contains the process (the .epd file), for example:

C:\Program Files (x86)\Tecan\EVOware\database\processes\myproc1

Each line of the file should have the following syntax:

*variable name,process instance,value*

In the following example, the variables were declared as shown in [Fig. 6-6](#), [Fig. 6-12](#) and the number of process instances (process copies) will be set to three in the Runtime Controller when the process is run:

*Tubes,1,5*

*Tubes,2,7*

*Tubes,3,4*

*Counter2,0,25*

The scope of the *Tubes* variable is **instance** and a different value can be specified for each of the process instances. The scope of the *Counter* variable is **run**; the value you specify will be used for all three process instances. This is indicated by the value 0 in the Instance field.

For variables of scope **instance**, make sure that you specify enough lines for all of the process instances that you will run. If there are not enough entries in the file, Freedom EVOware will use the initial value that you specified in the Set Process Variables dialog box for the missing entries.

### 6.4.6.4 Scope of a Variable

The scope of a variable describes the extent of validity of the variable. For example, variables with the scope *script* only have meaningful values within the script within which they are declared. They are “unknown” to other scripts in the same process. If you re-use a script from another application and the scope of the variables it uses is “script”, you don’t need to check whether other scripts in your process use the same variable names, which could otherwise lead to unexpected results. On the other hand, if you want to exchange parameters with other scripts in the process, the scope of the respective variables must be *instance* or *run*. See also [14.1 “Variables and Expressions in Scripts”](#), [Fig. 14-1](#).

Variable scope is only relevant in Freedom EVOware Plus.

### 6.4.7 Move Arms

This option is used to move the LiHa, the RoMa, the PnP, the MCA, the MCA384, the Te-MO or the PosID to the required position by pressing keys on the numeric keypad. See [9.3 “Moving the Arms and Other Devices”](#), [Fig. 9-3](#).

### 6.4.8 Switch to real mode

This option is used to switch Freedom EVOware from offline mode to real mode (see [6.7.3 “Status Bar”](#), [Fig. 6-19](#)). In addition, the pipetting instrument will be initialized again if necessary.



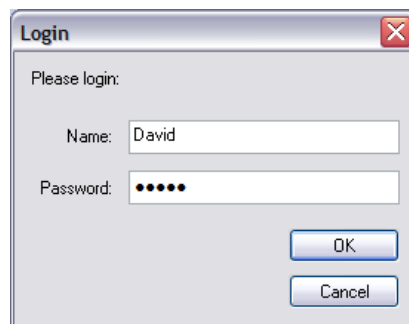
For example, Freedom EVOware will switch to offline mode if an instrument error is detected and you click Abort in the Instrument Error dialog box. After resolving the cause of the error, you can use this option to switch back to real mode without needing to restart Freedom EVOware.

## 6.5 Administrator Menu

This menu is used to start the Configuration Tool, to change the password of the currently logged in user and to log in to Freedom EVOware as a different user without quitting Freedom EVOware.

### 6.5.1 Change User

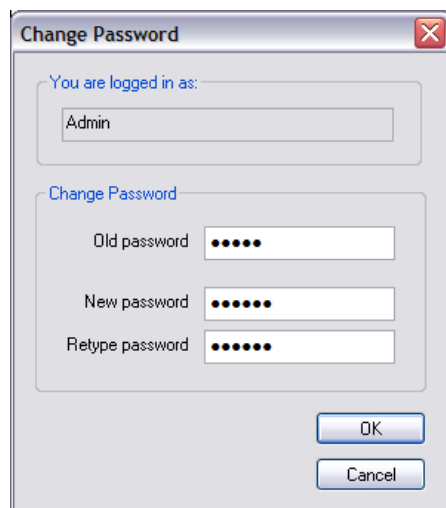
This option is used to log in to Freedom EVOware as a different user without quitting Freedom EVOware first:



**Fig. 6-8** Change User dialog box

### 6.5.2 Change Password

This option is used to change the password of the currently logged in user. You will be prompted to enter your old password and the new password:



*Fig. 6-9* Change Password dialog box

Passwords cannot be reused and must follow certain rules. Password rules are configured in Freedom EVOware's Configuration Tool (see [8.3.3 "User Management Section"](#), [8-16](#)).

### 6.5.3 Configure

This option is used to start the Configuration Tool (see [8 "Configuration Tool"](#), [8-1](#)). The Configuration Tool is used to configure general settings for Freedom EVOware. It also allows you to configure settings for the liquid handling arm, instrument options and optional devices and to set up Freedom EVOware users and groups.

## 6.6 Help Menu

This menu is used to access the context-sensitive online help and identify the Freedom EVOware version that you are using.

### 6.6.1 Contents

This option opens the first page of the context-sensitive help and selects the contents tab. Press F1 instead if you want information on the currently selected item or dialog box.

### 6.6.2 Index

This option opens the first page of the context-sensitive help and selects the index tab. Press F1 instead if you want information on the currently selected item or dialog box.

### 6.6.3 Using Help

This option opens a help page with brief instructions on using the context-sensitive help.

### 6.6.4 Error History

This option opens a dialog box with a list of the last 20 information or error messages which were displayed while using Freedom EVOware. In the case of error messages, the ID column shows the Error ID string (see [18.3 “List of Error Messages”](#), [18-33](#)).

Double-click on an entry in the list to see more details of the message.

If required, users with the user level Administrator or Application Specialist can add more information to each message such as a reason and a possible solution. The user-defined texts are saved in Freedom EVOware and appear in future each time the message is displayed. See [18.2 “Editing Messages in Message Boxes”](#), [18-30](#) for more information.

### 6.6.5 Service Contact

This option opens a window with information on the service engineer who is responsible for supporting your Tecan hardware and software components. The contact information which shown on this page can be entered and/or edited using the IQ Wizard (see [A.11.10 “IQ Wizard”](#), [A-60](#), Customer information).

### 6.6.6 About

This option shows information on the Freedom EVOware version which is installed, the available real memory and hard disk memory, Tecan copyright information and the hardlock (dongle) ID. If there is no hardlock fitted, “Non upgradable hardlock” is shown.

Version information for the currently installed device drivers can be viewed using the Configuration Tool (see [8.4.1.1 “Device Information Tab”](#), [8-21](#)).

It also shows the intended use of your Freedom EVOware configuration - general purpose applications or research use only. See [3.2 “Intended Use of the Freedom EVOware Software”](#), [3-3](#) for more information.

See [3.1 “Overview of Freedom EVOware”](#), [3-1](#) for an introduction to the Freedom EVOware software.

## 6.7 Freedom EVOware Toolbar

The toolbar gives you quick access to commonly used functions:

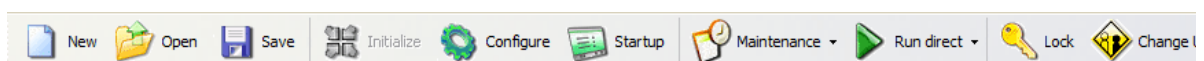


Fig. 6-10 Toolbar

### New

See [6.1.1 “New”](#), [6-1](#).

### Open

See [6.1.2 “Open”](#), [6-3](#)

### Save

See [6.1.3 “Save”](#), [6-5](#).

### Initialize

This function is used to manually initialize the arms of the pipetting instrument. It also initializes all of the optional devices.

Each time Freedom EVOware or an Freedom EVOware script or process is started, the status of the instrument arms (LiHa, RoMa and PnP) and optional devices (e.g. Te-MO or Te-VacS) is checked and they are initialized if necessary. In addition, a full initialization sequence is carried out when Freedom EVOware is started for the first time after powering up the pipetting instrument.

Manual initialization is not normally necessary, but can be used as a quick check that the instrument is responding properly. When you use the Initialize function, Freedom EVOware determines automatically whether it is necessary to carry out a full or a partial initialization sequence.

See [8.4.2.6 “Arm Initialization”](#), [8-30](#) for more information.

### Print

See [6.1.6 “Print”](#), [6-6](#).

### Configure

See [6.5.3 “Configure”](#), [6-16](#).

### Startup

See [6.1.7 “Start Up Wizard”](#), [6-7](#).

### Maintenance

To run a maintenance script, click this button and choose the script from the pull-down list. See [6.4.2 “Run Maintenance”](#), [6-10](#).

### Run

This button is used to run scripts and processes (see [12 “Running Scripts and Processes”](#), [12-1](#)). Click the small black arrow to choose one of the three Run options from the pull-down list:

- **Run:** This option opens the Runtime Controller, where you can choose the required runtime settings before you run the script or process.
- **Run direct:** This option runs the currently loaded script or process immediately using the default settings of the Runtime Controller. In Freedom EVOware Plus, you can also choose from the pull-down list how many process instances (copies of the process) you want to run in parallel. For more information on process instances, see [12.2 “Running and Optimizing a Process \(Freedom EVOware Plus\)”](#), [12-5](#).
- **Recover:** This option is only available if the script or process was interrupted while it was running - for example due to a runtime error or because Pause was clicked - and did not execute completely. See [17.2 “Script and process recovery function”](#), [17-6](#).

### Lock

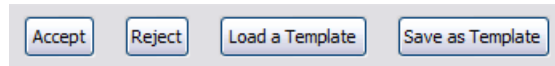
See [6.1.9 “Lock EVOware”](#), [6-7](#).

### Change User

See [6.5.1 “Change User”](#), [6-15](#).

### 6.7.1 Toolbar Buttons for the Script Editor (Freedom EVOware Plus)

The following buttons are shown on the right side of the toolbar if you click on the Script Editor window:



*Fig. 6-11* Toolbar buttons for the Script Editor

#### **Accept**

Accept any changes you have made to the script, close the Script Editor and return to the Process Editor. To permanently save any changes you have made for future Freedom EVOware sessions, you must also choose Save in the File menu.

#### **Reject**

Reject any changes you have made to the script, close the Script Editor and return to the Process Editor.

#### **Load a Template**

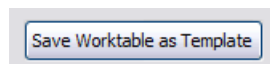
Load an existing script template. Please note that the labware definitions are taken from the currently loaded process, and not from the script template. If you get script validation errors, open each line of the script and select the appropriate labware on the worktable.

#### **Save as Template**

Save the current script as a template. The file which is saved also contains configuration settings for Freedom EVOware, for example the positions of the devices and the labware in the Worktable Editor.

### 6.7.2 Toolbar Buttons for the Worktable Editor

The following button is shown on the right side of the toolbar if you click on the Worktable Editor window.



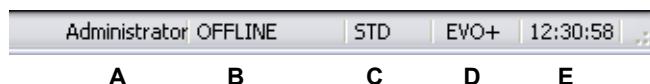
*Fig. 6-12* Toolbar button for the Worktable Editor

#### **Save Worktable as Template**

Save the current worktable layout (the positions of the devices and the labware) as a template.

### 6.7.3 Status Bar

The status bar displays the following information:



**Fig. 6-13** Status bar

<b>A</b>	User level	<b>D</b>	Dongle type
<b>B</b>	Operation mode	<b>E</b>	Clock
<b>C</b>	Feature level		

The fields in the status bar are as follows:

#### User Level

This shows the level of the currently logged in user:

Administrator = Administrator  
Specialist = Application Specialist  
Operator = Power User

The Status Bar is not shown at all if you are logged in as Operator.

#### Operation Mode

This shows the operation mode as follows:

REAL MODE = Real mode (normal operation)  
OFFLINE = Offline mode (previously called simulation mode).  
3D SIMULATION = Freedom EVOware is connected to EVOSim (see [A.13 “Configuring and Using the 3D Simulation Tool EVOSim”](#), ¶ A-82).

Freedom EVOware will run in offline mode if (a) you choose to start in offline mode - see [A.8 “Command Line Parameters \(Freedom EVOware\)”](#), ¶ A-32 - or (b) Freedom EVOware cannot detect a hardlock and/or a pipetting instrument when it starts (see [5.1.4 “Instrument and Hardlock Detection”](#), ¶ 5-3). In offline mode, firmware commands such as movement commands are not sent to the pipetting instrument (i.e. pipetting does not take place).

#### Feature Level

This field shows the Freedom EVOware feature level:

STD = Freedom EVOware Standard  
PLUS = Freedom EVOware Plus

#### Dongle Type

This field shows which type of hardlock (dongle) is fitted to your PC:

DEMO= No hardlock detected  
EVO = Hardlock for Freedom EVOware Standard.  
EVO+ = Hardlock for Freedom EVOware Plus.  
EVO75 = Hardlock for Freedom EVOware Standard and Freedom EVO 75.  
EVO75+ = Hardlock for Freedom EVOware Plus and Freedom EVO 75.  
3D SIM = Freedom EVOware is being used with the 3D simulator EVOSim; a dongle is not required in this case.

The hardlocks EVO and EVO+ can be used for all supported pipetting instruments. The hardlocks EVO75 and EVO75+ can only be used for the Freedom EVO 75 pipetting instrument.

See also [3.1.2 “Hardlocks for Freedom EVOware Standard and Freedom EVOware Plus”](#), ¶ 3-2.

#### Clock

This shows the current time as reported by the PC’s clock.

**Note:** If a blinking message “Your software is not registered yet” is shown in the middle of the status bar, see [A.11.11 “Registration Wizard”](#), [A-67](#) for more information.





## 7 Tecan User Management System

Freedom EVOware is a closed system and access to Freedom EVOware requires you to enter a user name and password. Please note that user names and passwords are case-sensitive. Contact your Freedom EVOware Administrator if you are authorized to use Freedom EVOware but do not have a user name and password. Some of the features in Freedom EVOware are only available if you have been given Freedom EVOware Administrator or Application Specialist access rights.

**Note:** *You can only change the settings for users and groups if you have been given Freedom EVOware Administrator access rights.*

The Tecan User Management system is a central software component which handles user log in and user authorization for all Tecan software components. It also provides facilities to log out users after a specified period of inactivity and to send warnings by email to a specified person (usually the Freedom EVOware Administrator) if an attempt is made to log in to the Tecan software using an invalid user name and password combination. Furthermore, users are disabled automatically after entering the password incorrectly a specified number of times consecutively.

To access the Tecan User Management system, click *Configure* in the toolbar to start the Configuration Tool. Then click the *General* tab and choose either *Users* or *Groups* in the User Management section (see [8.3.3 "User Management Section"](#), ¶ 8-16). You need to have Freedom EVOware Administrator rights to do this.

The Tecan User Management system does not rely on the MS Windows access rights and log in mechanisms which have been configured for your PC and/or for your local network. The Tecan User Management system thus provides an additional security barrier against unauthorized use of the Tecan software.

Freedom EVOware writes log files and audit trails and can create data files. It is important to correctly configure the MS Windows access rights to the respective directories on your PC and/or local network to prevent unauthorized access to and tampering with this data.

There are four different levels of access rights for the Freedom EVOware software: *Administrator*, *Application Specialist*, *Power User* and *Operator*. See [7.2 "Freedom EVOware Access Rights \(User Levels\)"](#), ¶ 7-3 for information on the user levels. After logging in, the user level is shown in the status bar at the bottom of the screen (see [6.7.3 "Status Bar"](#), ¶ 6-19).

When the Freedom EVOware software is started for the first time after being installed, you will be prompted to create a new user with Freedom EVOware Administrator rights. Try to develop a secure and effective way of remembering your password. To prevent access to the system by unauthorized persons, make sure that the Administrator log in is only known to the Freedom EVOware Administrator and to no-one else.

Users, groups and password rules are configured in Freedom EVOware's Configuration Tool (see [8.3.3 "User Management Section"](#), ¶ 8-16).

## 7.1 Main Features of the Tecan User Management System

The Tecan User Management system has the following main features:

- ◆ All changes relating to user management require Freedom EVOware Administrator access rights.
- ◆ All changes relating to user management are recorded in the user management audit trail.
- ◆ User accounts are automatically disabled following a configurable number of consecutive failed attempts to enter the correct user name and password combination. The disabled account can only be reactivated again by the Freedom EVOware Administrator.
- ◆ Freedom EVOware does not allow more than one person to use the software simultaneously.
- ◆ Users can log out without leaving Freedom EVOware or interrupting a running pipetting script or process. The same or a different user can then log in to Freedom EVOware again while the script or process is still running. See [6.1.9 “Lock EVOware”](#), [6-7](#).
- ◆ Users are automatically logged out after a specified time during which no keyboard or mouse-click activities have been detected.
- ◆ User passwords expire after a configurable number of days. The user must then choose another password. The new password must be different from the old password.
- ◆ Passwords must contain a specified minimum number of characters.
- ◆ Passwords can be forced to contain numeric digits.
- ◆ Passwords cannot be reused.
- ◆ User names and user name and password combinations are unique within the system and cannot be assigned more than once.
- ◆ The Freedom EVOware Administrator provides a temporary password when setting up a user. When the new user first logs on to the system, he or she is forced to change the password immediately. This ensures that no one other than the individual user knows the particular user name and password combination.
- ◆ If a user forgets his/her password, the Freedom EVOware Administrator does not have access to the user’s password. The Freedom EVOware Administrator is only able to reset the password and provide a new temporary password.
- ◆ If the Freedom EVOware Administrator forgets his or her password, no one has access to the password.
- ◆ A specified person (typically the Freedom EVOware Administrator) can be automatically notified by email in case of potential security threats (e.g. a user account has been disabled after a configurable number of consecutive failed login attempts).

### 7.1.1 User Management Audit Trail

All changes relating to user management are recorded in the user management audit trail. A new file is written to the <install\_path>\AuditTrail\Configuration directory each time you start and then exit the Freedom EVOware Configuration Tool. The file name is UserTrailYYYYMMDD\_HHMMSS, where YYYYMMDD is the file creation date and HHMMSS is the file creation time.

## 7.2 Freedom EVOware Access Rights (User Levels)

Freedom EVOware provides four user levels with the following rights:

**Tab. 7-1** Access rights for operators, application specialists and administrators

<b>Operator</b>	<p>has rights to:</p> <ul style="list-style-type: none"> <li>• Run a pipetting script (Freedom EVOware Standard) or process (Freedom EVOware Plus)</li> <li>• Run maintenance scripts (see 6.4.2 “Run Maintenance”, 6-10)</li> <li>• View a pipetting script (but not change it)</li> <li>• Handle errors during pipetting (except collision errors)</li> </ul> <p>Since operators are not allowed to create or modify scripts and processes, most of the program interface features are hidden or disabled.</p>
<b>Power user <sup>a)</sup></b>	<p>same as <b>Operator</b> but with additional rights to:</p> <ul style="list-style-type: none"> <li>• Start running pipetting scripts at a specified line number.</li> <li>• Run direct commands (see 5.4.1.3 “Direct commands”, 5-10).</li> </ul>
<b>Application Specialist</b>	<p>same as <b>Operator</b> but with additional rights to:</p> <ul style="list-style-type: none"> <li>• Create, modify and save pipetting scripts (Freedom EVOware Standard and Freedom EVOware Plus) and processes (Freedom EVOware Plus)</li> <li>• Edit the configuration of the pipetting instrument</li> <li>• Edit the configurations of carriers and labware</li> <li>• Edit the liquid classes for pipetting</li> <li>• Change settings in the Freedom EVOware Configuration Tool</li> <li>• Skip pre-programmed timers during pipetting</li> </ul>
<b>Administrator</b>	<p>same as <b>Application Specialist</b> but with additional rights to:</p> <ul style="list-style-type: none"> <li>• Create and disable/re-enable users</li> <li>• Configure the options in the Tecan User Management system</li> <li>• Enable or disable the Electronic Signatures feature</li> </ul>

a) Using the Configuration Tool, you can assign additional rights to the Power User for special applications. In addition, you can create additional user levels (user groups). See 8.3.3.3 “Groups Tab”, 8-19.

All four Freedom EVOware user levels need read/write access to the <install\_path> directory and its subdirectories. The user level Operator cannot create or modify scripts or processes, but Freedom EVOware still needs read/write access to write log and export files and audit trail data.

Other Tecan software components such as Magellan have a different hierarchy of user levels. Please refer to the respective user manual for more information. The Tecan User Management system handles user authorization for all of the Tecan software components.

## 7.3 Special configuration options for the User Management System

The following features are intended for experienced systems administrators.

### 7.3.1 Freedom EVOware login using the Microsoft Windows login name instead of the Tecan user database

The Tecan User Management System can be configured to use the Microsoft Windows user database (with Windows login names) instead of the Tecan user database. This avoids the need to remember two different user names and passwords - one for Microsoft Windows and a different one for Freedom EVOware.

Since Freedom EVOware 2.1 SP2, the User Management System is implemented as a server which runs as a Windows service. The Tecan user management server normally manages users and groups using an encrypted XML database, but can be configured to use the Microsoft Active Directory user and groups database or the Windows local machine user database instead (in read-only mode).

If your company uses Microsoft Active Directory for managing users and groups and you have more than one Freedom EVOware system, this allows you to manage Tecan users and groups centrally for all of your systems.

Use the SwitchProvider tool to switch between using the Tecan user management database (encrypted XML file) and using the Windows user management database:



**Fig. 7-1** SwitchProvider tool

To start the SwitchProvider tool, navigate to the directory C:\Program Files (x86)\Tecan\Tecan User Management\v1.1 using Windows Explorer and double-click on Tecan.UserManagement.SwitchProvider.exe.

Please exit Freedom EVOware before using this tool.

Windows administrator rights are needed to run this application.

The status of the radio buttons shows which of the two user management systems is currently being used by the Tecan software.

After switching to the Windows user database, user accounts for Freedom EVOware must be created, edited and deleted using Microsoft Active Directory or the User Accounts feature in the Windows Control Panel and no longer in the Configuration Tool of Freedom EVOware.

Run the tool again if you want to switch back to using the Tecan user database.

### 7.3.1.1 Required Active Directory Domain Permissions

#### Tecan user groups and user roles


Windows users are assigned to roles (user groups) in Freedom EVOware by assigning them to specially created Windows groups using the following naming conventions:

Tecan\_<evoware\_group\_name>

i.e. the string "Tecan\_" is prefixed to the Freedom EVOware group name.

To run Freedom EVOware using a Windows login, you must be a member of at least one of these Windows groups (depending on the Freedom EVOware rights you require):

- ◆ Tecan\_Administrators
- ◆ Tecan\_Evoware\_Application Specialist
- ◆ Tecan\_Evoware\_Power User
- ◆ Tecan\_Evoware\_Operator

For information on user group names and rights in Freedom EVOware see [8.3.3.3 "Groups Tab"](#),  8-19.

For the Tecan User Management service to work properly with the Active Directory domain, all accounts involved require the proper reading permissions in the domain.

The accounts involved with Tecan User Management are:

- ◆ The account(s) that the User Management service run on (by default the local SYSTEM account)
- ◆ The accounts that shall be able to log into Tecan User Management

These accounts will require reading permissions on all user accounts in the domain that shall be able to log in to Tecan User Management. More specifically, this includes the permissions "Read general information" and "Read group membership".

Correct domain usernames are always "username@FQDN", with FQDN = Fully Qualified Domain Name. To find the FQDN, go to Control Panel > System and Security > System and look for "Full device name". The extension behind the device name is the FQDN.

Alternatively, use a Command Prompt and type "echo %USERNAME%@%USERDNSDOMAIN%" and press enter to get the domain username for EVOware.

#### 7.3.1.2 How the SwitchProvider tool works

SwitchProvider works by modifying the XML configuration file Tecan.UserManagement.Server.exe.config as follows.

- ◆ The line <membership defaultProvider="XmlMembershipProvider"> is changed to  
    <membership defaultProvider="WindowsMembershipProvider">
- ◆ The line <roles defaultProvider="XmlRoleProvider"> is changed to  
    <roles defaultProvider="WindowsRoleProvider">
- ◆ The tool then re-starts the service Tecan.UserManagement.Server.exe.


The default location of Tecan.UserManagement.Server.exe.config is:

- ◆ C:\Program Files (x86)\TECAN\Tecan User Management\v1.1

### 7.3.1.3 Compatibility

This feature is not available for the Tecan User Management System concept which was used prior to Freedom EVOware 2.1 SP2 (former ERES system).

The ERES system is also used by Tecan Magellan software prior to version 6.5. If you want to use Freedom EVOware 2.1 or later and Magellan 6.4 or earlier, Magellan must be installed before you install Freedom EVOware. Magellan will then proceed to use the new user management server instead of ERES. If you install Freedom EVOware before Magellan, Freedom EVOware will revert to using the former ERES system.

This feature cannot be used together with the feature "Sharing the Tecan user management database in a network environment" (see 7.3.2,  7-6).

### 7.3.2 Sharing the Tecan user management database in a network environment

If you are running multiple Freedom EVOware installations which are connected together within the same LAN, you can configure the system to use a central user management database which can be shared by several pipetting instruments. This avoids having to set up Tecan users and groups separately on each of the PCs.

Since Freedom EVOware 2.1 SP2, the User Management System is implemented as a server which runs as a Windows service. The Tecan user management server manages users and groups using an encrypted XML database.

The XML database is normally located in a local directory of each Freedom EVOware installation as follows:

- ◆ C:\ProgramData\Tecan\Tecan User Management\v1.1\

Proceed as follows to share the user management database:

- ◆ Choose the Freedom EVOware installation whose XML database you want to share
- ◆ Copy the UserManagement.xml file to a network folder that is accessible by all machines that are going to share the UMS storage file.
- ◆ Create a domain user and set read/write/modify permissions on that folder and all files contained within (i.e., the permissions shall be inherited) to this account.
- ◆ On every machine, configure the UMS Service to run on that account. To do so open Windows Services and change the properties of the "Tecan User Management Server 1.1" service. In the "Log On" tab enter the credentials of the domain user.

On all of the Freedom EVOware installations reconfigure the Tecan user management server to use the shared directory:

- ◆ Click Start, choose Run, enter cmd and run the Command Prompt with administrator rights.
- ◆ In the console window, navigate to the directory of the Tecan user management server:
  - C:\Program Files (x86)\TECAN\Tecan User Management\v1.1
- ◆ Type in: Tecan.UserManagement.Server.exe /xmlPath:\\YOUR\_SHARED\_NETWORK\_FOLDER\UserManagement.xml
- ◆ The Tecan user management server is then permanently configured to use the shared XML file instead of the local XML file
- ◆ To revert back to using the local file, use the following console string instead: Tecan.UserManagement.Server.exe /xmlPath:"c:\ProgramData\Tecan\Tecan User Management\v1.1\UserManagement.xml"

Contact Tecan if you need further information on implementing this feature.

#### **7.3.2.1 Compatibility**

Users and groups cannot be edited by more than one of the Freedom EVOware installations simultaneously.

This feature cannot be used together with the feature “Freedom EVOware login using the Microsoft Windows login name” (see [7.3.1](#), [7-4](#)).

See also [7.3.1.3 “Compatibility”](#), [7-5](#).





## 8 Configuration Tool

This chapter describes how to use Freedom EVOware's Configuration Tool to configure general settings for Freedom EVOware. The Configuration Tool also allows you to configure settings for the liquid handling arm, instrument options and optional devices and to set up Freedom EVOware users and groups.

The Configuration Tool is started by clicking Configure in the Freedom EVOware toolbar. The Configuration Tool has two main tabs, Instrument and Devices.

You can also start the Configuration Tool by clicking the Start button in the Windows task bar and choosing All Programs > Tecan > EVOware > Configure. You will be prompted to enter your Freedom EVOware user name and password.

**Note:** You can only use the Configuration Tool if you have been given Freedom EVOware Administrator or Application Specialist access rights. You can only change the settings for users and groups if you have been given Freedom EVOware Administrator access rights.

**Note:** Liquid classes are configured with the Liquid Classes Editor, not with the Configuration Tool (see [10 "Configuring Liquid Classes"](#), [10-1](#)).

### 8.1 Toolbar Buttons and Menus

#### 8.1.1 Toolbar Buttons

The toolbar gives you quick access to commonly used functions:



**Fig. 8-1** Toolbar and menus, Configuration Tool

##### Exit

This function is used to exit the Configuration Tool.

##### Save

This function saves the configuration changes you have made.

##### Undo

This function undoes the configuration changes you have made (it resets your changes to the settings which were last saved). It only resets the changes for the currently selected page.

##### Backup

This function is used to back up the Freedom EVOware configuration and data files (including scripts and processes). See [8.2 "Backing Up and Restoring Your Configuration"](#), [8-3](#).

The Backup function is not available when Freedom EVOware is running (start the Configuration Tool on its own with Start > All Programs > Tecan > EVOware > Configure).

### Restore

This function is used to restore a previously made backup of the Freedom EVOware configuration and data files. A dialog box is shown to allow you to choose which backup version you want to restore. All existing configuration and data files will be overwritten.


The Restore function is not available when Freedom EVOware is running (start the Configuration Tool on its own with Start > All Programs > Tecan > EVOware > Configure).

### Help

This function opens the help page for the currently selected tab. You can also get help for the currently selected tab by pressing F1.

## 8.1.2 File Menu

### Backup

This function is used to back up the Freedom EVOware configuration and data files (including scripts and processes). See [8.2 “Backing Up and Restoring Your Configuration”](#),  8-3.

The Backup function is not available when Freedom EVOware is running (start the Configuration Tool on its own with Start > All Programs > Tecan > EVOware > Configure).

### Restore

This function is used to restore a previously made backup of the Freedom EVOware configuration and data files. A dialog box is shown to allow you to choose which backup version you want to restore. Existing configuration and data files will be overwritten.

The Restore function is not available when Freedom EVOware is running (start the Configuration Tool on its own with Start > All Programs > Tecan > EVOware > Configure).

### Save changes

This function saves the configuration changes you have made.

### Exit Configuration Tool

This function is used to exit the Configuration Tool.

## 8.1.3 Edit Menu

### Undo changes on this page

This function undoes the configuration changes you have made (it resets your changes to the settings which were last saved). It only resets the changes for the currently selected page.

## 8.1.4 View Menu

### Status bar

This function is used to show or hide the status bar.

### 8.1.5 Help Menu

#### Show help for this page

This function opens the help page for the currently selected tab. You can also get help for the currently selected tab by pressing F1.

#### About

This function shows information on the Configuration Tool version which is installed, the available real memory and hard disk memory and Tecan copyright information.

## 8.2 Backing Up and Restoring Your Configuration

The Backup function is used to back up the Freedom EVOware configuration and data files (including scripts and processes) to a specified directory.

Freedom EVOware creates a new sub-directory in the specified directory for each backup. The name of the new sub-directory is BACKUP\_YYYYMMDD\_HHMMSS, where YYYYMMDD is the date and HHMMSS is the time of the backup. The default backup directory is <install\_path>\Backup. See [8.3.1.4 "Protocol Options Tab"](#), ¶ 8-8 for information on specifying a different backup directory. You can also choose a network directory.

The Restore function is used to restore a previously made backup of the Freedom EVOware configuration and data files. A dialog box is shown to allow you to choose which backup version you want to restore. Existing configuration and data files will be overwritten.

The backup and restore operations are reported in the Freedom EVOware trace file.

### Saving Audit Trail Data

If you are required to comply with the FDA regulations, make sure you keep archive copies of all audit trail, trace and log files. These files are located in the <install\_path>\AuditTrail directory. They are not backed up by the Backup function - you should use the Audit Trail Archiving function instead. See [A.11.6 "Audit Trail Archiving tool"](#), ¶ A-51 and [B "Appendix B - FDA 21 CFR Part 11 Compliance"](#), ¶ B-1.

### 8.2.1 Making an External Backup

To make an external backup of your configuration and data files, configure Freedom EVOware to use a network directory for backing up. Alternatively, make a local backup and copy the sub-directory containing the backup files to another PC, to your backup device or to a network directory.

### 8.2.2 Copying Scripts and Processes Between Different PCs

Instead of using the backup and restore functions, you can copy scripts and processes between Freedom EVOware installations on different PCs using the Export Import tool (see [A.11.4 "Export/Import Tool"](#), ¶ A-41).

## 8.3 General Settings

Click the *General* tab to view or edit the instrument settings. This group of settings allows you to configure general settings for Freedom EVOware, email notifications and the Tecan User Management system.

### 8.3.1 General Section

This section is used to configure general settings for Freedom EVOware.

#### 8.3.1.1 Timeouts Tab

##### Timeouts panel

The *Initialization* and *Shutdown* fields let you specify the maximum duration of the initialization and shutdown procedures. An error message will be output if initialization and/or shutdown is not completed within the specified times. Specify the times in seconds.

##### Delay panel

When running in offline mode, Freedom EVOware Standard highlights the currently active pipetting command and pauses for a specified time before executing the next command. The pause serves to optimize the visualization effect. Specify the required duration of the pause.

#### 8.3.1.2 Pause Tab

Specify whether you want to globally enable or disable the system pause. You can also specify an interval during which the system is not allowed to pause due to an error. For example, you may want to prevent a system pause during the night when the system cannot be manually restarted.

### 8.3.1.3 Scheduler Tab

The settings in the Scheduler tab are only relevant for Freedom EVOware Plus.

GENERAL, General, Scheduler

**Common**

Timeslice  [s]

Timeout Buffer  [s]

Re-schedule On Macro Feedback

**Optimize Robot Move Times**

Enable Learning Mode

Use Optimized Move Times

**Tool Optimization**

Enable Pre-emptive Tool Operations

Look-Ahead Time  [s]

Show advanced topics

Topic	Scheduler	Simulator
Optimize	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Use pre-planning	<input type="checkbox"/>	<input type="checkbox"/>
Timeout for pre-planning [s]	60	60
Latest start for pre-planning [Tics]	63000	63000
Latest start for execution [Tics]	0	0
Time per process [ms]	1000	300
Maximum time [ms]	2000	300

Fig. 8-2 Configuring the Scheduler

#### Common panel

##### Timeslice

The *Timeslice* field specifies the smallest unit of time (scheduling tick) which the scheduler should use to calculate and optimize processes. With the default setting of 5 seconds, the scheduler checks every 5 seconds whether rescheduling is possible or necessary. Increasing this value will speed up the scheduling process whereas lower values may increase the throughput of the process (e.g. microplates per hour).

### Timeout Buffer

This field lets you specify how many seconds the system should wait before triggering a timeout. A larger value gives the system more time to potentially solve the problem that caused the timeout before stopping the system.

Example: If timeout buffer = 60 seconds and the expected duration of the command is exceeded, a system pause is requested and the timeout buffer of 60s is started. If the command completes within the 60s, the system resumes and the timeout buffer is reset to 60 s. If the command does not complete within 60s, a timeout is triggered and an error message is output. The other actions which are then taken depend on the situation.

Keep in mind that RoMa move times can vary significantly because of interaction with pipetting operations (the arm collision avoidance algorithms give a higher priority to LiHa movements than RoMa movements once pipetting has started and until a wash or drop DiTi command is reached). Especially if you use close-fitting or optimized move times, the timeout buffer setting should be large enough to allow for possible RoMa movement delays.

### Re-schedule on macro feedback

With the default setting of the Timeslice parameter, the scheduler checks every 5 seconds for completion messages from internal Freedom EVOware commands (macros) and will reschedule the macros and the associated process if they have completed faster than expected. Check this checkbox if you want the scheduler to re-schedule as soon as possible without waiting for the timeslice to complete. This can improve the performance (throughput) of the process.

### Optimize Robot Move Times panel

#### Enable learning mode

If you enable this feature, information is stored on the actual times required by robot moves (RoMa moves, MCA96 gripper and MCA384 CGM moves, move times of external robots, pre/post actions but not PnP moves) each time you run a process. If you also check the *Use Optimized Move Times* checkbox, the scheduler interprets the stored information when you run the process again. This allows the scheduler to plan the process more accurately in future and to optimize the throughput.

This is similar to making a calibration run, but you only need to run a single process instance to get meaningful data. The stored information becomes increasingly accurate and thus more beneficial the more times the process is run.

Click *Edit Data* if you want to edit the stored time information manually. In the editing window, each section (e.g. [Hotel\_9Pos\_Microplate]) refers to the starting point of a robot move. The entries within the sections list the destinations of the robot move (e.g. MP\_3Pos). The eight numeric parameters are as follows:

- Move type 1: Time required for normal move (the labware has no lid or the labware is moved together with the lid)
- Move type 2: Time required to remove the lid from the labware
- Move type 3: Time required to put back the lid on the labware
- Move type 4: Time required to move the labware and the lid separately (the labware and the lid are put down at different locations)
- Number of moves recorded for move type 1 (do not edit)
- Number of moves recorded for move type 2 (do not edit)
- Number of moves recorded for move type 3 (do not edit)

- Number of moves recorded for move type 4 (do not edit)  
 All times are in seconds. Both “time required” and “number of moves” are zero if this move type has not taken place during the learning phase. The accuracy of the time measurement increases with an increasing number of moves during the learning phase.

#### **Use optimized move times**

Check this checkbox if you want the scheduler to interpret and use information which has been stored on the actual times required by robot moves. If you activate this option, make sure that the setting for timeout buffer is long enough (see Timeout Buffer, above, for more information).

Click *Clear Data* to delete the stored information. You should do this e.g. if you have edited or optimized a RoMa vector, for example by re-designing it to use less waypoints. You then need to re-enable learning mode again.

#### **Tool Optimization panel**

##### **Enable pre-emptive tool operations**

Check this checkbox if you want Freedom EVOware to check the process for device commands which are soon due for execution (look ahead). Depending on the device type and the command, this allows Freedom EVOware to send preparatory instructions to the device to speed up the execution of the command.

For example, the carousel can be instructed to bring the next labware item to be processed from the carousel tower to the transfer position, where it can wait for a subsequent fetch command (RoMa movement). The RoMa then does not have to wait for the labware to be brought from the tower. This optimizes the movement times for the carousel.


Pre-emptive tool operations are only available for the carousel and some third-party incubators.

##### **Look ahead time**

Specify how far ahead the scheduler should check the process for device commands which can be optimized in this way. The time you specify should be about the same time which is required for the preparatory instructions (e.g. about the same time which is required to bring the labware from the carousel tower to the transfer position).

Very long times can increase the risk of unnecessary unloading of labware from the carousel due to changes in the schedule. This will result in time wastage since the unloaded labware has to be put back in the carousel tower before another labware item can be brought.

If the location is an incubator, keep in mind that pre-emptive tool operations can affect the incubation time specified in the process if the look ahead time is longer than necessary, since the labware could be removed from the controlled environment earlier than necessary.

The look ahead time you specify here is a global setting. See [8.4.4.4 “Pre-emptive Tool tab”](#),  8-35 for information on specifying the look ahead time individually for each optimizable device command.

##### **Show advanced topics**

Check this checkbox if you want to make more detailed settings for the scheduler and the simulator. The first three topics below are always available:

### Optimize

If you enable optimization for the scheduler, the resource reservations for the process will be optimized dynamically if a command finishes earlier than planned. The default setting for the Scheduler is “enabled”. The default setting for the Simulator is “disabled” and should not be changed.

### Use pre-planning

Check the respective checkboxes to enable or disable pre-planning for the scheduler and/or the simulator. If pre-planning is enabled, the system will use more time and schedule more processes during the first scheduling tick before the pipetting instrument starts to operate. This allows more exact forecasting of the process timing but reduces flexibility for dynamic planning. The default setting is “disabled” for both scheduler and simulator.

### Timeout for pre-planning

Specify the maximum amount of time in s which the system will wait before starting process execution, regardless of how many processes have been scheduled so far. This setting is only relevant if you are using pre-planning.

### Latest start for pre-planning / Latest start for execution

These fields specify the maximum amount of time in scheduling ticks between making resource reservations for a process and starting it. The settings affect how much advanced planning will be carried out and are important for rescheduling a process. The scheduling is more dynamic if you choose a lower value. *Latest Start for pre-planning* is used during the pre-planning phase (before scheduling starts) whereas *Latest Start for execution* is used as soon as the execution phase begins.

### Time per Process

Maximum time in ms which is given to the scheduler to make reservations for one process during the current planning tick (timeslice). You should choose a value which is much shorter than one timeslice.

### Maximum Time

Maximum time in ms which is given to the scheduler to make reservations for all processes during the current planning tick (timeslice). You should choose a value which is shorter than one timeslice.

## 8.3.1.4 Protocol Options Tab

This is used to configure the paths which Freedom EVOware uses to store output, backup and log files.

### System path

This non-editable field shows the Freedom EVOware installation path. See [A.7 “Freedom EVOware Directory Structure and Files”](#), [A-28](#) for more information on the Freedom EVOware directory structure and file names.

### Output panel

Specify the directory which should be used for output files from the Export Data and PosID commands. Enter the path directly or click Browse and choose the required directory. You can also choose a network directory.

### Backup panel


Specify the directory which should be used to store backup copies of the Freedom EVOware configuration and data files. Enter the path directly or click Browse and choose the required directory. You can also choose a network directory.

Freedom EVOware creates a new sub-directory in the specified backup directory for each backup. See [8.2 “Backing Up and Restoring Your Configuration”](#), [8-3](#) for more information.




### Log Options panel

Freedom EVOware writes log files to document the pipetting, to record user actions, to help you to check scripts in offline mode and to find errors. In addition, it writes audit trail data and a trace file. The log files and the trace file are written to the c:\Program Files (x86)\Tecan\EVOware\AuditTrail\Log directory.


Freedom EVOware always writes log files of type EVO. The information which is logged can also be viewed in the Tecan/EVOware/Log channel of the LogViewer tool (see [A.12 “LogViewer Tool”](#),  [A-74](#)).

Freedom EVOware users with Administrator or Application Specialist rights can activate two additional log file types (User and/or Error) with different levels of logging detail, either individually or in combination:

- Check the Input checkbox to write log files of type USR. The information which is logged can also be viewed in the Tecan/EVOware/Usr channel of the LogViewer tool.
- Check the Error checkbox to write log files of type ERR. The information which is logged can also be viewed in the Tecan/EVOware/Error channel of the LogViewer tool.

See [A.1 “Overview of the Log Files”](#),  [A-1](#) for more information on these log file types.


You can also view recent log entries by choosing *Log Window* in the *View* menu. The Log Window has the same contents as the log file of type EVO and initially shows the last 1000 log entries.


**Note:** *Freedom EVOware can output a large amount of logging information. It is recommended to back up and then delete the old log files on a regular basis. They are not backed up by the Backup function - you should use the Audit Trail Archiving function instead. See [A.11.6 “Audit Trail Archiving tool”](#),  [A-51](#).*

### Evaluate Checksums

Freedom EVOware uses a checksum system which is based on a CRC algorithm to protect configuration, script, trace and log files. The checksum is a computed value which is used to detect corrupted or otherwise altered data. It is also able to detect whether files have been modified outside of Freedom EVOware by another program or process.

A warning is shown if an attempt is made to load a file with an incorrect or missing checksum. The user can then choose to load the file or cancel. In the latter case, Freedom EVOware aborts with the exception of script files. In this case, the file is not loaded but Freedom EVOware remains running. An entry is written to the log file each time an incorrect or missing checksum is found.

Uncheck the *Evaluate file checksums* checkbox if you want to disable the warning (you need Freedom EVOware Administrator rights to change this setting). You should not disable this feature if you need to comply with the FDA regulations (see [B “Appendix B - FDA 21 CFR Part 11 Compliance”](#),  [B-1](#)).

The Data Explorer can be used to check whether Freedom EVOware configuration and data files have valid checksums (see [A.11.1 “Data Explorer Tool”](#),  [A-37](#)).

### Log Serial Data

Check the *Log serial data* checkbox to include serial data (instrument firmware commands) in the EVOware/Log channel of the LogViewer tool. This will significantly increase the amount of data which is logged. The firmware commands are marked with an “F” in the log files. See [A.1 “Overview of the Log Files”](#), [A-1](#) for more information.

The serial data can be useful when investigating communication errors. The log file also includes firmware commands for devices which are connected to the instrument’s CAN bus (e.g. LiHa, RoMa, PnP, incubator(s), Te-Shake, Te-MagS, Te-VacS and Te-Stack). It does not include firmware commands for devices which have their own RS232 interface.

To avoid logging an excessive amount of data, this logging feature should be disabled when it is not needed.

See [8.4.3.2 “Logging Option”](#), [8-32](#) for information on log files for devices which have their own RS232 interface.

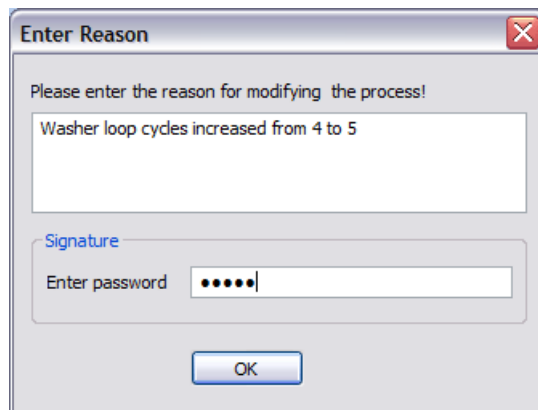
### Electronic signatures

If you check the *Electronic Signatures* checkbox, users will be forced to enter a comment to explain the reason when carrying out one of the following actions:

- Creating, deleting or editing script files and script templates
- Creating, deleting or editing process files and process templates
- Creating, deleting or editing worktable templates
- Creating, deleting or editing carrier definitions
- Creating, deleting or editing labware definitions
- Creating, deleting or editing liquid classes
- Making changes to configuration settings
- Creating, deleting or editing users, groups and password rules

This feature helps to identify why the user performed a specific action. This feature can only be activated or disabled by a user with Freedom EVOware Administrator rights.

The Electronic Signatures feature also requires the currently logged in user to enter his or her Freedom EVOware password each time one of the above actions are carried out:



**Fig. 8-3** Password prompt when the Electronic Signatures feature is active

The user comment for each of the above files can be viewed in the Data Explorer (see [A.11.1 “Data Explorer Tool”](#), [A-37](#)). Only the most recent comment is saved. Earlier comments are stored with earlier versions of these files, which are automatically backed up to the <install\_path>\AuditTrail\Config directory (see [A.7 “Freedom EVOware Directory Structure and Files”](#), [A-28](#)).

If one of the above files has been modified automatically by Freedom EVOware, a comment is inserted which starts with “EVOware:”.

The Electronic Signatures feature also requires the currently logged in user to enter his or her password if errors occur when running a script or process. The user name and the errors will be recorded in the Freedom EVOware log files.

### Audit Trail Archiving panel

The Audit Trail Archiving tool (AuditArch) allows you to archive Freedom EVOware log files and audit trail data either manually or automatically.

#### Start AuditArch at EVOware startup

Check this checkbox if you want AuditArch to archive the log files and the audit trail data automatically. AuditArch will then start in the background each time you start Freedom EVOware and archive the log files if this is required by the currently configured archiving actions.

#### Archiving Settings

Click this button to specify the required archiving actions. This opens the AuditArch dialog box:

See [A.11.6 “Audit Trail Archiving tool”](#), [A-51](#) for more information.

### PMP Data panel

Pressure Monitored Pipetting is a software function which requires the MultiSense hardware option. It monitors the pressure in the airgap between the sample and the system liquid during aspiration and dispensing in order to detect pipetting anomalies such as clot and air aspiration.

PMP evaluation configuration data and pressure curves are stored in the following path:

C:\ProgramData\Tecan\EVOware\PMP

If you wish to change the path, you must copy the content of the original folder to the new folder (curve folder, PMP.ini and .xml files).

### 8.3.1.5 Collision Avoidance Tab

This is used to configure the settings for collision avoidance.

#### Enable parallel movement

Before moving a robot arm (LiHa, RoMa, etc.) to a new position, Freedom EVOware checks whether it could collide with another arm during the movement and moves the other arm aside to make space. Check this checkbox if you want to allow the first arm to start its movement before the other arm has moved fully aside.

#### Movement delay

Specify how long the first arm should wait before starting its movement (default: 200 ms). You should allow enough time for the other arm to move aside before the first arm reaches its destination position.

### 8.3.2 Notifications Section

Freedom EVOware can be configured to send notification messages about system events and error situations to specific groups of users and/or write them to log files. When you configure this feature for the first time, we recommend you to configure the users and log files first, then the groups and finally the notifications. The users and groups for the notification feature are independent of the users and groups that you configure in the User Management section.

The Notifications feature requires either the MAPI service or access to an SMTP server (mail server). MAPI is included with many email programs, e.g. Microsoft Outlook.

The groups which you configure here are also used by the script commands "Notification" (see [15.45 "Notification Command"](#), [15-104](#)) and "Tip Alignment Check".

#### 8.3.2.1 Settings Tab

This tab is used to configure the email settings for the notifications feature.

**Note:** *If you expect to receive replies to the notification emails, make sure that you configure an email program on another PC to receive the replies. Freedom EVOware does not provide facilities to receive emails.*

#### Send User Notifications

Check this checkbox to enable the email notifications feature. If you disable this feature, this does not delete the email settings and you can re-enable them later if required.

#### MAPI, SMTP

Click the radio buttons to choose whether to send the notifications via MAPI or SMTP.

#### MAPI panel

The settings in this panel are only needed if you want to send the notification emails using MAPI.

### MAPI Profile

Specify the MAPI profile you want to use for sending the notification emails. You can get a list of available profiles by double-clicking the Mail button in the Windows Control Panel. The Mail button will only be present in the Control Panel if you have installed the MAPI service. MAPI is included with many email programs such as Microsoft Outlook.

### MAPI Password

Specify the password for the MAPI profile.

### SMTP panel

The settings in this panel are only needed if you want to send the notification emails using SMTP.

#### Server

Specify the address of the SMTP server you want to use for sending the emails. You should normally specify the SMTP server address which is recommended by your email provider or email administrator.

#### Port

Specify the SMTP port number (default 25).

#### Sender Mail

Specify the required email address of the sender. It is recommended to choose an address which allows the Freedom EVOware PC to be easily identified in the email which is sent (e.g. "EVO\_room2@mycompany.com"). Alternatively, you can specify the Windows host name of the PC (e.g. "PC185@mycompany.com").

#### Sender Host

Specify the name of the email domain which you want to use for sending the notification emails. This is normally the host name part of the email address in the Sender Mail field (the part after the "@" character, e.g. "mycompany.com").

#### Timeout

Specify the maximum duration of the SMTP send mail command in ms. An error message will be output if the notification email could not be sent within this time.

#### Authentication

Check this checkbox if the SMTP server (mail server) requires authentication to allow emails to be sent. This is normally the case.

#### User

Specify the user name for SMTP authentication.

#### Password

Specify the password for SMTP authentication.

The user name and password for SMTP authentication depends on the SMTP server. In most cases, it is the same user name and password which is used to collect emails using the POP3 protocol. With some email providers, the user name is the same as the email address.

### 8.3.2.2 Notifications Tab

The following window is used to configure the notifications:

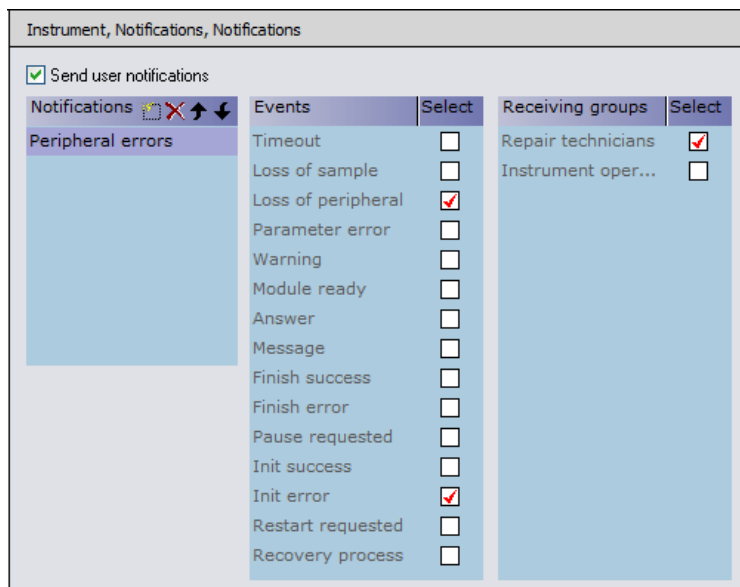


Fig. 8-4 Notifications

Click **+** in the Notifications panel to add a new notification. Then enter a descriptive name for the notification. You can change the name later if required. The Events panel shows all of the system events which are available for the notification feature. Check the events which you want to include in this notification. The Receiving groups panel shows the notification groups which you have defined (see 8.3.2.3 “Groups Tab”, 8-15). Check the groups which should receive this notification.

Click **X** to delete the currently selected entry. Click **↓** or **↑** to change the sort order of the entries in the list.

The E-mail panel is used to configure the e-mail message that you want to send for this notification:

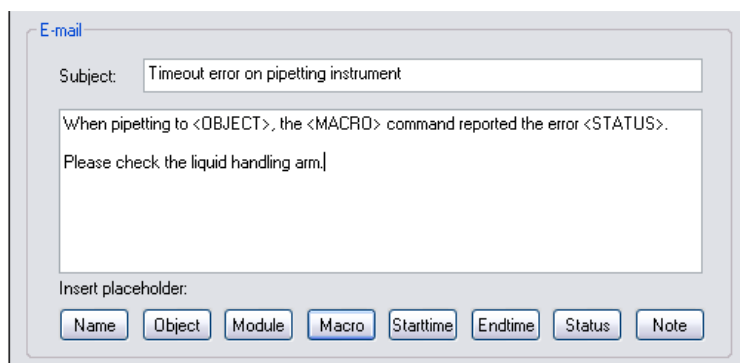


Fig. 8-5 Notification e-mail

Enter a subject for the e-mail that will be created in the Subject field. Then enter the message text for the e-mail. Click the buttons if you want to include placeholders for system variables in the message text. They will be dynamically replaced with their current values when the message is created.

The available placeholders are as follows:

<NAME>

The name of the current action.

<OBJECT>

The current object (normally a labware item)

<MODULE>

The device driver which producing the error.

<MACRO>

The EVOware command currently being executed.

<STARTTIME>

The starting time of the current command.

<ENDTIME>

The finishing time of the current command.

<STATUS>

The status of the current command (i.e. the error message).

<NOTE>

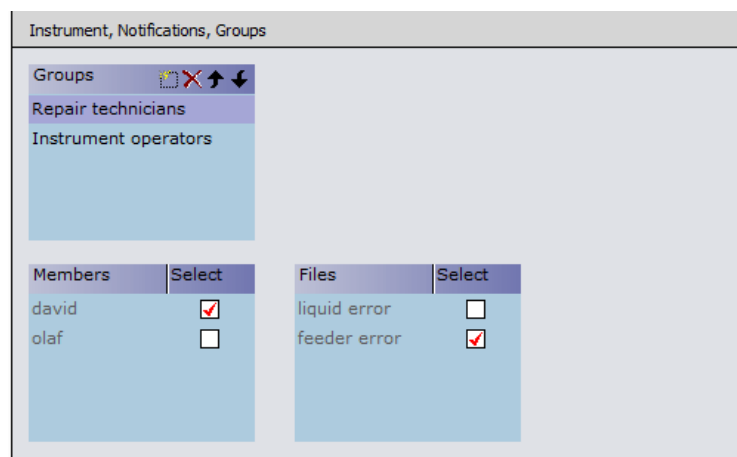
Any notes the command writes to trace files.

**Note:** The placeholders referring to commands will only produce meaningful information if the system event is related to the execution of a command.

If your recipients list for this notification includes a log file, when the notification e-mail is created during system runtime the same message will be written to the log file.

### 8.3.2.3 Groups Tab

Freedom EVOware can be configured to send notification messages about system events and error situations to specific groups of users and/or write them to log files. The following window is used to configure recipient groups for the notification feature:



**Fig. 8-6** Groups for notifications

Click **+** in the Groups panel to add a new group for the notification feature. Then enter a descriptive name for the group. You can change the name later if required. Click **X** to delete the currently selected entry. Click **↓** or **↑** to change the sort order of the entries in the list.

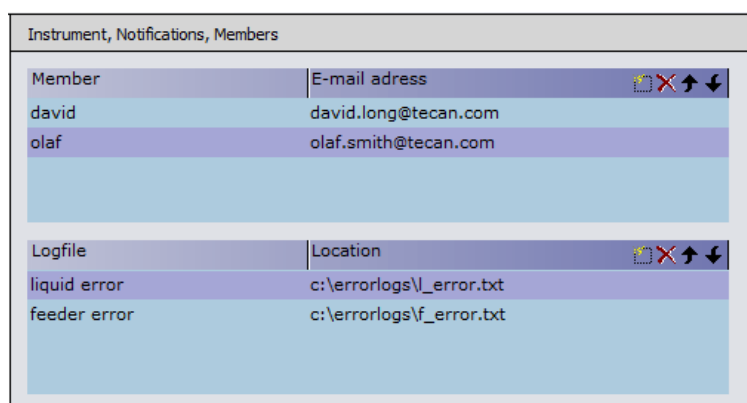
The Users and Files panels show all users and files that you have configured under Recipients. Check the checkboxes alongside the users and files which

should receive notifications for the currently selected group. Repeat this for all of the groups you have defined.

The users and groups for the notification feature are independent of the users and groups that you configure under User Management.

### 8.3.2.4 Recipients Tab

Freedom EVOware can be configured to send notification messages about system events and error situations to specific groups of users and/or to write the notification messages to log files. The following window is used to configure recipients for the notification feature:



**Fig. 8-7** Recipients for notifications

Click **+** in the User panel to add a new e-mail recipient for the notification feature. Then enter the recipient's full name and e-mail address. You can change the entries later if required.

Click **X** to delete the currently selected entry. Click **↓** or **↑** to change the sort order of the entries in the list.

Click **+** in the LogFile panel to add a new log file for the notification feature. Then enter a descriptive name for the file and the filename (including the full path).

Click **X** to delete the currently selected entry. Click **↓** or **↑** to change the sort order of the entries in the list.

The users and groups for the notification feature are independent of the users and groups that you configure under User Management.

### 8.3.3 User Management Section

Freedom EVOware is a closed system and access to Freedom EVOware requires you to enter a user name and password. The Tecan User Management system is a central software component which handles user log in and user authorization for all Tecan software components.

The User Management section in the Configuration Tool is used to set up the users who are authorized to use the Tecan software and to configure user groups. The security features of the User Management system are described in 7 "Tecan User Management System", 7-1.

All changes relating to user management are recorded in the user management audit trail (see B.5.3.1 "User Management Audit Trail", B-8).



**Note:** You can only change the settings for users and groups if you have been given Freedom EVOware Administrator access rights.

When the Freedom EVOware software is started for the first time after being installed, you will be prompted to create a new user with Freedom EVOware Administrator rights. We recommend you to create one additional user with Freedom EVOware Administrator rights in case you need to access the user management and the normal system administrator is not available.

To prevent access to the system by unauthorized persons, make sure that the Freedom EVOware Administrator password is only known to the system administrator of the Tecan software and to no-one else. Try to develop a secure and effective way of remembering your password. Please note that user names and passwords are case-sensitive.

### 8.3.3.1 Settings Tab

This tab is used to configure settings for the user management.

#### Security panel

##### Lock application after x minutes idle time

Users are automatically logged out of Freedom EVOware after a specified time during which no keyboard or mouse-click activities have been detected. Specify the required time interval (range: 1 minute to 24 hours). Logged out users must log in to Freedom EVOware again to regain control of the program.

##### Exit after x unsuccessful logins

User accounts are automatically disabled after a configurable number of consecutive failed attempts to enter the correct user name and password combination. In addition, an optional security alert email can be sent to the Freedom EVOware Administrator (see below). Specify the required maximum number of unsuccessful logins (range: 1 to 10).

##### Enable file validation

All Freedom EVOware scripts and processes must be validated for correct functioning and for correct results and approved by the application specialist before they are used for pipetting with real samples (see [C "Validation of Freedom EVOware Applications"](#), [C-1](#)). Check this checkbox if you want to hide non-validated scripts and processes from users with the access level *Operator* to ensure that they cannot use them.

If you check this checkbox, non-validated scripts, processes and templates are shown to Freedom EVOware Administrators and Application Specialists in the Selection dialog box with a gray icon instead of a green icon (they are not visible at all to Operators).

##### Deactivate user management

Check this checkbox if you want to deactivate user management. You can only change this setting if you have been given Freedom EVOware Administrator access rights.

With user management disabled, it is not necessary to enter a user name or password when Freedom EVOware is started, and all users will be given Freedom EVOware Administrator access rights automatically. Be aware of the security risk if you deactivate user management and make sure this is permitted by the security procedures of your laboratory or company.

##### Validate files on saving

Check this checkbox if you want the file status of the script or process to be automatically set to Approved when the file is saved.

## Password panel

### Minimum size of password x characters

Passwords can be forced to contain a specified minimum number of characters. Specify the required number of characters.

### Passwords must contain numeric characters

Check this checkbox if passwords should contain one or more numeric characters.

### Passwords expire after x days

User passwords expire after a configurable number of days. The user must then choose another password. Specify the required number of days (range: 1 to 36500 days).

## E-mail panel

A specified person (typically the Freedom EVOware Administrator) can be automatically warned by email in case of potential security threats (i.e. a user account has been disabled after a configurable number of consecutive failed login attempts). This panel is used to configure the settings for the email warnings.

**Note:** *If you expect to receive replies to the warning emails, make sure that you configure an email program on another PC to receive the replies. Freedom EVOware does not provide facilities to receive emails.*

### Notification via e-mail

Check this checkbox if you want Freedom EVOware to send security warnings by email. If you disable this feature, this does not delete the email settings and you can re-enable them later if required.

### Address

Specify the email address of the recipient (e.g. the system administrator).

The email warnings can be sent using either SMTP or MAPI:

### Send with SMTP

**Server:** Specify the address of the SMTP server you want to use for sending the emails. You should normally specify the SMTP server address which is recommended by your email provider or email administrator.

### Send with MAPI

**Profile:** Specify the MAPI profile you want to use for sending the warning emails. You can get a list of available profiles by double-clicking the Mail button in the Windows Control Panel. The Mail button will only be present in the Control Panel if you have installed the MAPI service. MAPI is included with many email programs, e.g. Microsoft Outlook.

**Password:** Specify the password for the MAPI profile.

## Language panel

Choose the required user interface language for the runtime controller and other software components which are accessible to the operator of the pipetting instrument. The user interface of the Configuration Tool and parts of the Freedom EVOware software which are only accessible to the application specialist and/or system administrator are always shown in English.

### 8.3.3.2 Users Tab


The top panel on the right lists all users who are currently known to the Tecan software. The bottom panel lists all available user groups and shows the groups to


which the currently selected user belongs. Check or uncheck the *Select* checkboxes to change the group assignments as required. Users inherit the rights of the groups to which they belong.

You do not need to assign users with Administrator rights to any groups since they automatically have all rights for the Tecan software. Accordingly, the bottom panel with the list of groups is hidden if you select a user with Administrator rights.

Check the *Admin* checkbox if you want to assign Administrator rights for Freedom EVOware to the currently selected user. The user is then authorized to use the Tecan User Management system to modify the settings for users and groups (see [7.2 “Freedom EVOware Access Rights \(User Levels\)”](#), ¶ 7-3).

Uncheck the *Enable* checkbox if you want to temporarily disable the log in for the selected user, for example during a holiday period. Never uncheck all of the *Enable* checkboxes because you will not be able to log in to Freedom EVOware again. We do not recommend you to disable the Freedom EVOware Administrator login.

Click in the Password field and then click  if you want to change the password of the currently selected user. This opens the Enter New Password dialog box. The new password is saved as soon as you click OK. You do not need to click the Save button. Passwords cannot be reused and must follow certain rules (see [7.1 “Main Features of the Tecan User Management System”](#), ¶ 7-2).

Click  in the top panel to create a new user. You will be prompted to specify the user name, the user’s full name and the user’s password:

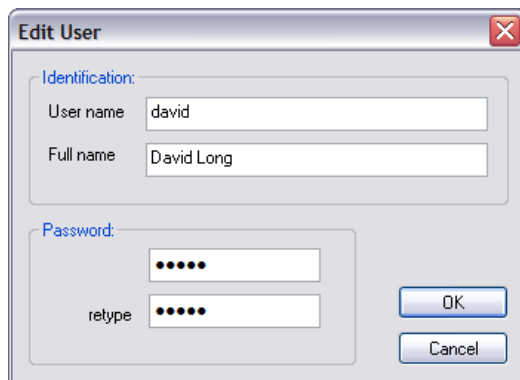



Fig. 8-8 Edit User dialog box

### Password panel

The password which you assign to the new user is a temporary password. The user will be forced to enter a new password of his or her choice when logging in to the Tecan software for the first time. The temporary password is only valid for three days. You must assign a new temporary password if the user does not choose a new password within three days.

After creating a new user, you must log out from Freedom EVOware and log in again if you want to test the new user account (see [6.1.9 “Lock EVOware”](#), ¶ 6-7).

Click  to delete the currently selected user. You cannot delete the user “Administrator”.

### 8.3.3.3 Groups Tab

The Group Name panel lists all of the user groups which are currently available. If you have installed more than one Tecan software component (e.g. Freedom EVOware and Magellan), the list will include default groups for all of the installed

components. The default groups are created automatically when you install and configure the software components.

The panel to the right lists all available access rights for the currently installed Tecan software components and shows the access rights which are assigned to the currently selected user group. Users inherit the rights of the groups to which they belong.

When Freedom EVOware is first installed, the user group (user level) **EvoWare\_Application Specialist** is given the access rights “Application Specialist”. It is not recommended to change this setting since application specialists normally need all rights.

When Freedom EVOware is first installed, the user group (user level) **EvoWare\_Operator** is given the access rights “Operator”. For security reasons it is not recommended to change this setting and/or to assign additional rights.

When Freedom EVOware is first installed, the user group (user level) **EvoWare\_Power User** is given the access rights “Power User”. If necessary, you can give this user group additional rights for special applications. You can also create a new user group and give it a special set of rights to meet your needs.

The available rights are as follows:

**Tab. 8-1** Available rights which can be granted

Rights	Explanation
Application Specialist	Application Specialist has all rights listed in this table.
Operator	Operator has rights to: <ul style="list-style-type: none"> <li>• Run an existing pipetting script or process</li> <li>• Run maintenance scripts (see <a href="#">6.4.2 “Run Maintenance”</a>, <a href="#">6-10</a>)</li> <li>• View a pipetting script (but not change it)</li> <li>• Handle errors during pipetting</li> </ul>
Power User	Same as Operator plus <ul style="list-style-type: none"> <li>• Start running pipetting scripts at a specified line number</li> <li>• Run direct commands</li> </ul>
Change Liquid Classes	Edit and create liquid classes
Edit Scripts	Edit and create pipetting scripts
Partial script running	Start running pipetting scripts at a specified line number
Bypass Timer	Skip pre-programmed timers during pipetting
Edit Carriers	Edit and create carriers
Edit Labware	Edit and create labware
Run direct commands	See <a href="#">5.4.1.3 “Direct commands”</a> , <a href="#">5-10</a> .
Configure System	Use the Freedom EVOware Configuration Tool
Basic User	Basic user has rights to <ul style="list-style-type: none"> <li>• Run an existing pipetting script or process</li> <li>• Run maintenance scripts (see <a href="#">6.4.2 “Run Maintenance”</a>, <a href="#">6-10</a>)</li> <li>• Handle errors during pipetting</li> </ul>

You do not need to (and cannot) assign users with **Administrator** rights to any groups since they automatically have all rights for the Tecan software.

See 7.2 “Freedom EVOware Access Rights (User Levels)”, 7-3 for more information on Freedom EVOware access rights and information on the rights of the System Administrator. Refer to the respective software manual for information on access rights for other Tecan software components (see 1.2 “Reference Documents”, 1-3).

Check or uncheck the *Select* checkboxes to change the access rights assignments as required.

To create a new group, click **+** and enter the name of the group in the new, blank line which appears.

To assign to a user to more than one Tecan software component (e.g. Freedom EVOware and Magellan), it is recommended to create a new, suitably named group instead of modifying the rights of an existing, group such as EVOware\_Operator.

Click **X** to delete the currently selected group. You cannot delete the default groups for the currently installed Tecan software components.

All changes relating to user management are recorded in the user management audit trail (see B.5.3.1 “User Management Audit Trail”, B-8).

## 8.4 Device Settings

Click the *Devices* tab to view or edit the device settings. This group of settings allows you to configure global settings for optional devices which can be attached to your pipetting instrument. It also allows you to configure the liquid handling arm and the instrument options.

**Note:** *Devices are invisible in the Freedom EVOware Control Bar and in the Configuration Tool if the respective device drivers are not installed.*

The global device settings apply to all process steps which use the device.

The usage of the dialog boxes is similar for all devices. Device-specific settings are described in the section on the respective device.

### 8.4.1 General Section

This section is used to configure general settings for the optional devices, the liquid handling arm and the instrument options. In addition, you can choose the colors which are used to display each of the devices in the Gantt chart of the runtime controller:

#### 8.4.1.1 Device Information Tab

Select a device in the list to get general information on the device driver. The list only shows devices which have been installed. The following only describes the fields which are not self-explanatory:

**Call name**

The device name which used by Freedom EVOware internally.

**File name, Version, Build**

The file name, version and build version of the device driver.

### Firmware

The device firmware version for which the driver was originally developed. Some devices do not have firmware. In many cases, the device driver will control the device correctly even if the stated firmware version and the actual firmware version of the device are not identical. However, this field may be useful to support engineers for the purpose of troubleshooting.

### Start checkbox

Select a device in the list and check the *Start* checkbox if you want Freedom EVOware to load the device driver when it starts. The checkbox is shown in gray if the device does not have a loadable driver.

When you install Freedom EVOware, you normally only install the device drivers you want to use. If you later choose to disconnect a device from the pipetting instrument because it is no longer needed for your application or experiment, you can uncheck the *Start* checkbox to prevent the driver from being loaded and thus speed up the startup process.


### Settings button

Select a device in the list and click *Settings* to make global configuration settings for the device (see 8.5 “Device Driver Configuration”, 8-35).

### Unload drivers

To ensure that Freedom EVOware starts quickly, all of the Tecan drivers you have chosen to use are loaded each time the PC is started and remain loaded while the PC is running (see 5.1.2 “Driver pre-loading”, 5-2). Check this checkbox to disable driver pre-loading. In this case, Freedom EVOware will take somewhat longer to start in future.

#### 8.4.1.2 Colors Tab

Select a device in the list, click in the Color column and click  to choose the required color for the device when it is displayed in the Gantt chart of the runtime controller (see 12.2.4 “Runtime Controller, Extended View (Running a Process)”, 12-14).

#### 8.4.2 Instrument Options Tab

This tab is used to configure settings for the liquid handling arm (LiHa), the PosID (movable barcode scanner), the MPO/LICOS system (Monitored Pump Option), system liquids (Chemical System) and the doorlocks. You can also configure settings for initializing the instrument arms.

##### 8.4.2.1 LiHa (Liquid Handling Arm)

The LiHa (Liquid Handling Arm) is a robot arm on the pipetting instrument which is mounted on the X-slide and typically holds four or eight pipetting tips.

#### Initialization panel

Freedom EVOware detects automatically whether the instrument needs to be initialized, and carries out initialization if necessary. If your instrument is equipped with a LiHa, during initialization it is moved above the left-most waste and all dilutors (or plunger drives on the Air LiHa) are initialized. This can cause some liquid to drip from the tips.

**Deep in Waste:** If you check this checkbox, Freedom EVOware lowers the tips into the waste to minimize the risk of contamination due to stray drops of liquid during instrument initialization. See also 8.4.2.6 “Arm Initialization”, 8-30.



### ATTENTION

Risk of the tips colliding with the waste and/or the washer.

- ◆ Please check the coordinates of the waste and/or the washer before activating these options. Otherwise the tips might collide with the labware.

### DITI Handling panel

#### Optimize positions when fetching DITIs

If you check this checkbox, the following method is used to reduce the number of LiHa movements which are needed when getting DITIs (i.e. to speed up the Get DITI commands):

If you choose all of the tips in the Get DITI command, they are picked up starting at the beginning of the DITI rack (for the 8-tip LiHa: positions 1 to 8). The next eight tips are then picked up at positions 9 to 16.

If you do not choose all of the tips in the Get DITI command, they are picked up at the end of the DITI rack (starting at position 96).

This feature ensures that the beginning of the DITI rack always has full rows of fresh DITIs which can be picked up in a single movement.

This optimization feature is permanently activated for the Freedom EVO 75 pipetting instrument with the 2-tip LiHa or 8 PPlus 1 Access option (see [A.9 "Freedom EVO 75 Pipetting Instrument - LiHa Configuration"](#), [A-33](#)).

#### DITI fetch mode

Specify the required DITI fetch mode as follows:

**Sequential:** The DITIs are mounted one after the other sequentially.

**Even/Odd:** All of the even-numbered DITIs are mounted simultaneously (2, 4, 6, 8) followed by all of the odd-numbered DITIs simultaneously (1, 3, 5, 7). This option requires a reinforced DITI support bracket (hardware option).

**All parallel:** All of the DITIs are mounted simultaneously. This option is only allowed for mounting up to four DITIs (maximum). In addition, this option requires a reinforced DITI support bracket (hardware option).

The options Even/Odd and All Parallel reduce the time required to mount the DITIs (increased performance).

### Speed up Movements panel

#### Use fast positioning in XZ

When the LiHa moves across a single labware item in the X direction, for example for reagent distribution, the tips are normally moved upwards (Z direction), then across to the next column of wells and then down again. Check this checkbox to enable smart moves. In this case, the X and Z movements take place simultaneously and the tips follow a curved or parabolic path instead of a rectangular path. This reduces the time required for the movement.

### Optimize Z-travel

To avoid a collision, when the LiHa moves across different types of labware or across the entire worktable, the tips are normally moved upwards to the height you specify with the global parameter Travel Height (see below). The Optimize Z-Travel settings allows Freedom EVOware to make smart moves by analyzing the height of all obstacles along the path of travel and moving the tips up just enough to clear the highest obstacle. This reduces the time required for the movement.

**No Z-travel optimization:** Do not optimize the z movements. The tips will be raised to the specified global Travel Height when moving between different types of labware and across different carriers.

**Optimize Z-travel within carriers:** Raise the tips to clear all obstacles within the same carrier. The tips will be raised to the specified Travel Height when moving between different carriers or across the entire worktable.

**Optimize Z-travel for worktable:** Raise the tips to clear all obstacles when moving across the entire worktable.

### Instrument tab

If Freedom EVOware is running in normal mode and connected to a pipetting instrument, the liquid handling arm configuration (number of tips) and some of the other parameters are determined automatically by interrogating the instrument. Such parameters can only be configured manually on the Offline tab.

**Note:** *The settings on the Offline tab only apply to offline mode.*



Click the *Instrument* tab to see the current settings (you will only see four columns if you only have four tips):

**Initialization:**

 Deep in waste

**DiTi Handling**

 Optimize positions when fetching DiTis  
 DiTi Fetch Mode: sequential

**Speed up movements**

 Use fast positioning in XZ    Optimize z-Travel: No z-Travel optimization

Instrument Offline

Number of tips: 8    Instrument type: 200    Travel height [mm/10]: 0    Copy machine parameters

Topic	1	2	3	4	5	6	7	8
Tip type	Fixed	Fixed	Fixed	Fixed	DITI	DITI	DITI	DITI
Tip is broken	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Low volume	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Te-Fill option	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PMP Option					<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Tip offset [mm/10]	390	390	390	390	-500	-500	-500	-500
Pump type	XP	XP	XP	XP	XP	XP	XP	XP
Resolution	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Dilutor capacity [µl]	1000	1000	1000	1000	1000	1000	1000	1000
System capacity [µl]	3500	3500	3500	3500	3500	3500	3500	3500
Tubing length [mm]	3200	3200	3200	3200	3200	3200	3200	3200
Tubing diameter [mm/100]	100	100	100	100	100	100	100	100
Max pipetting speed [µl/s]	900	900	900	900	900	900	900	900
Max wash speed [µl/s]	900	900	900	900	900	900	900	900

Fig. 8-9 Configuring the LiHa, Offline tab

**Number of tips**

Specify the number of pipetting tips on the liquid handling arm.

**Instrument type**

Choose the width of the instrument’s worktable (measured in grid positions).

**Travel height**

To avoid a collision, Freedom EVOware retracts the tips to a certain height when moving the LiHa across the worktable in the X and Y directions.

When the LiHa moves over a single labware item or between adjacent identical labware items, it retracts the tips to the Z-Travel value which is specified in the labware definition (see 9.4.3 “Labware Coordinates”, 9-19). However, if consecutive commands cause it to move over different types of labware or across the entire worktable, the tips are retracted to the height you specify here. This is done to speed up and optimize LiHa movements (to avoid the need for repeated height changes during the movement). Travel Height (also called Global Z-Travel) is specified in instrument steps (0.1 mm).

Choose the global parameter Travel Height to be higher than all obstacles on the worktable. See also Optimize z-travel, above.

A travel height of 0 is the highest position (tips fully retracted). Specify 200 in this field to lower the tips by 2 cm during global travel.



## ATTENTION

Risk of the tips colliding with the PosID.

- ◆ Set Travel Height to the highest position (0) if your pipetting instrument is equipped with a PosID or PosID-3. Otherwise the tips may collide with the device.

The settings for the LiHa tips are as follows:

### Tip Type

Choose the tip type (Fixed tips, DITs, disposable tips or Air LiHa). Freedom EVOware automatically sets the correct value for the tip offset. If you want to use a combination of fixed tips and DITs, the fixed tips must have lower tip numbers (e.g. fixed tips at positions 1 to 4 and DITI tips at positions 5 to 8).

### Tip is Broken

Check this checkbox to deactivate individual tips (including the corresponding dilutors and valves or plunger drives) if they are broken. Freedom EVOware will deactivate the affected tips/dilutors and check this checkbox automatically if it detects a tip or diluter problem. This is done to prevent them being used for any further pipetting.

**Note:** Freedom EVOware will output an error message if you use a broken tip in a pipetting script. Accordingly, it is also necessary to deselect broken tips in the pipetting commands.

### PMP Option

If Freedom EVOware is running in normal mode and connected to a pipetting instrument, the MultiSense hardware is detected automatically. If working in offline mode, the MultiSense option must be activated by checking the box "PMP option", to allow PMP commands to appear in the control bar.

### Tip Offset

Specify the length of the tip in instrument steps (0.1 mm). Freedom EVOware uses these values to calculate the correct Z-coordinates when using different tips in a pipetting run. The offsets are measured relative to the Reference Tip in increments of 0.1 mm. A positive value indicates that this tip type is longer than the Reference Tip. For example, 390 means that the tip is 3.9 cm longer than the Reference Tip. Tip offsets should be changed with great care and there is normally no need to modify them.

### Pump type

Specify which dilutor pump your pipetting instrument is fitted with (XP or XLP or XMP). The XP dilutor supports syringe sizes from 25 µl to 5 ml. The XLP dilutor supports syringe sizes from 50 µl to 50 ml. In addition it has a high resolution mode which allows more accurate pipetting. The XMP dilutor is used by the Freedom EVO 75 pipetting instrument.

### Air LiHa

By selecting **Air** for Pump type the following parameters are automatically set and cannot be changed by the user:

Tip type: **DITI**

Dilutor capacity: **1250**

**Resolution**

Specify the resolution of your dilutor pump (Normal or High). This parameter is only relevant for XLP dilutors.

Pipetting is more accurate in high resolution mode. However, the maximum pipetting speed is much less in this mode. This may be a disadvantage for viscous liquids and/or very low pipetted volumes, since droplets may remain attached to the tip due to surface tension.

**Diluter Capacity**

Choose the maximum volume in  $\mu\text{l}$  that the dilutor is able to dispense or aspirate with the current syringe size. The syringe size is on a label which is attached to the syringe. The MultiSense option requires a diluter capacity of 1000  $\mu\text{l}$  for each of the 4 or 8 channels equipped with MultiSense

**System Capacity**

Specify the system capacity in  $\mu\text{l}$ . For standard tips, this is the volume of the tubing from the tip to the dilutor valve (typically 3500  $\mu\text{l}$ ).

Freedom EVOware limits the maximum pipetting volume to the System Capacity or the Diluter Capacity, whichever is smaller.

**Tubing Length**

Specify the length of the tubing between the diluter and the liquid handling arm in mm. The MultiSense module (if fitted) uses this information to calculate the volume of the liquid system of the pipetting instrument. Always specify 3200mm for a MultiSense liquid LiHa in any configuration (single MultiSense Liquid LiHa, Left or right MultiSense liquid LiHa).

**Tubing Diameter**

Specify the internal diameter of the tubing between the diluter and the liquid handling arm in 0.01 mm. The MultiSense module (if fitted) uses this information to calculate the volume of the liquid system of the pipetting instrument. The default value of 100 (= 1 mm) should not be changed. The MultiSense module does not currently support other tubing diameters.

**Max. Pipetting Speed**

Specify the maximum flow rate of liquid through the LiHa dilutor when pipetting. Freedom EVOware calculates an appropriate value automatically. You will get a validation error if the liquid class you are using in your pipetting script specifies a higher speed than this. You may need to reduce the max. pipetting speed for viscous liquids.

**Max. Wash Speed**

Specify the maximum flow rate of liquid through the LiHa dilutor when washing the tips. Freedom EVOware calculates an appropriate value automatically. You can reduce the max. wash speed for viscous liquids.

For standard tips or DITs, the maximum dilutor speed (pipetting or washing) depends on the diluter capacity (syringe size) as follows:

**Tab. 8-2** Max. dilutor speeds for the LiHa (pipetting or washing)

Diluter capacity	Max. dilutor speed	Max. breakoff speed
25 $\mu\text{l}$	21 $\mu\text{l/s}$	11 $\mu\text{l/s}$
50 $\mu\text{l}$	42 $\mu\text{l/s}$	23 $\mu\text{l/s}$
100 $\mu\text{l}$	83 $\mu\text{l/s}$	45 $\mu\text{l/s}$
250 $\mu\text{l}$	208 $\mu\text{l/s}$	113 $\mu\text{l/s}$

**Tab. 8-2** Max. dilutor speeds for the LiHa (pipetting or washing) (cont.)

Dilutor capacity	Max. dilutor speed	Max. breakoff speed
500 µl	417 µl/s	225 µl/s
1000 µl	833 µl/s	450 µl/s
2500 µl	2083 µl/s	1125 µl/s
5000 µl	4167 µl/s	2250 µl/s

The breakoff speed is the recommended final dilutor speed when dispensing. See [10.2.2 “LiHa Dispense Parameters \(Fixed Tips and DiTis\)”](#), ¶ 10-13.

If you are using the XLP dilutor pump in high resolution mode, the maximum dilutor speeds are 12.5% of the values given in the above table (Freedom EVOware calculates an appropriate value for the XLP dilutor pump automatically).

### Offline tab

Click the *Offline* tab to specify the required configuration of the liquid handling arm and the tip parameters if Freedom EVOware is running in offline mode. See *Instrument* tab, above, for a description of the parameters.

#### Copy machine parameters





Click this button to copy the current parameters from the *Instrument* tab to the *Offline* tab. This allows you to create processes and scripts in offline mode without having to specify all of the liquid handling settings manually.

### 8.4.2.2 PosID (Moveable Barcode Scanner)

This tab is used to specify custom command strings for the PosID (Positive Identification System). The PosID is a moveable barcode scanner which can be used to read the barcode labels on carriers, labware and tubes. Note: The allowed barcode types are configured with the PosID command (see [16.10.2 “PosID-3 - Scan Command”](#), ¶ 16-36). This tab is not shown if you have installed the driver for the PosID-3 barcode scanner, which supercedes the PosID barcode scanner.

#### Commands for Custom Labware panel

Specify the firmware commands which should be sent to the PosID before each pipetting script is started. This is normally only necessary for custom labware; standard Tecan labware is handled by the PosID automatically.

Click  to add a new entry to the list. Click  to delete the currently selected entry. Click  or  to change the sort order of the entries.

The following example shows the three commands which are required to define a strip rack with carrier code 500, which is similar to a standard strip rack with code 016:

```
SPS1,16,3,0,200,188,7,1
SPC1,1,0,0,1
SPA500,1,1
```

See the manual “Command Set, PosID firmware (Doc ID 391141)” for a list of firmware commands. Firmware commands are nearly always written uppercase.

The above commands only define the custom labware for the PosID. You must also define it as labware in Freedom EVOware to allow it to be used in a script. Only use barcode numbers in the range 500 to 999 for custom labware.

The settings on this tab do not apply to the PosID-3.

### 8.4.2.3 MPO/SPO and LICOS

The MPO (Monitored Pump Option) consists of FWO (Fast Wash Option) and LICOS (Liquid Container Supervisor). The Fast Wash Option is used to pump a large amount of liquid at high speed through the system, normally to rinse the tips. The LICOS option is a device which monitors the liquid level in the waste and system liquid containers. The SPO supersedes the MPO and has improved liquid level sensors for the waste and system liquid containers.

This tab is used to set parameters for the MPO/SPO and for LICOS:

#### **MPO flow rate**

MPO is normally used for washing standard tips. This option allows you to reduce the default flow rate and thus the pressure in the tubing. This can be useful when special (smaller) tips are used. Do not use a flow rate in excess of 80% if you are using the MultiSense hardware option. MultiSense is only available for DITI tips.

#### **LICOS**

Check this checkbox to activate the LICOS option. You can then specify the liquid levels at which an error message will be output and the system will be paused. This option is only relevant if your pipetting instrument is fitted with the LICOS option.

Freedom EVOware checks the liquid levels in the waste and system liquid containers each time the tips are washed. It also checks the liquid level in the system liquid container when the Aspirate script command is executed if you choose to aspirate the system liquid.

You must use the Tecan *Setup & Service* software to calibrate the LICOS. See [1.2 "Reference Documents"](#), [§ 1-3](#) for information on this software.

#### **SPO**

Check the checkbox to activate the SPO liquid level sensors for the waste and system liquid containers. An error message will then be output and the system will be paused if the waste container is full or the system liquid container is empty. This option is only relevant if your pipetting instrument is fitted with the SPO option.

Freedom EVOware checks the liquid levels in the waste and system liquid containers each time the tips are washed. It also checks the liquid level in the system liquid container when the Aspirate script command is executed if you choose to aspirate the system liquid.

### 8.4.2.4 System Liquids

The system liquids option allows you to use up to six different system liquids in the pipetting instrument. It uses a 6-way valve to choose the required liquid.

The system liquids option is not currently available for the Freedom EVO series of pipetting instruments.

### System Liquids panel

Specify the names of the system liquids you want to use in the System Liquids panel. Click **+** to add a new entry to the list. Click **X** to delete the currently selected entry. Click **↓** or **↑** to change the sort order of the entries.

The available system liquids are then shown as green bars in the System icon at the bottom right of the Worktable Editor, one bar for each liquid. See [Fig. 11-8 “Example worktable showing carriers, labware and labware labels”](#), [Fig. 11-18](#) for an example of the System icon. In the example, only one green bar is shown (only one system liquid is available).

When you specify an Aspirate script command and want to aspirate the system liquid, click directly on the green bar in the System icon at the bottom right of the Worktable Editor. If you need to aspirate large volumes of the system liquid, this avoids having to place a trough on the worktable.

After clicking on the green bar, the gray (protected) field in the dialog box of the pipetting command then shows the reserved labware label *Systemliquid*.

At present, the Freedom EVO series of pipetting instruments only allows you to use one system liquid.

#### 8.4.2.5 Doorlocks

Freedom EVOware supports up to four electrically-operated doorlocks which are fitted to the pipetting instrument and the doorlocks are arranged in groups. This function is used to assign each of the doorlocks to one of the four available groups.

The doorlocks of all groups are locked automatically when starting or continuing a script. The doorlocks of all groups are unlocked automatically when finishing, pausing or aborting a script. See [2.6 “Safety Features of the Pipetting Instrument”](#), [Fig. 2-4](#).

#### Doorlock panel

The Freedom EVO pipetting instrument is always fitted with two doorlocks (Doorlock 1 and Doorlock 2) and they are permanently assigned to Doorlock Group 1 (their assignment cannot be changed). A mechanical interlock ensures that scripts and processes cannot be started unless the safety hoods are closed and locked. Two additional doorlocks can be fitted to the pipetting instrument to support special hardware arrangements.

Specify the required doorlock group assignment for doorlocks 3 and 4 by choosing the required group from the list. Choose *none* if the additional doorlocks are not fitted to your instrument.

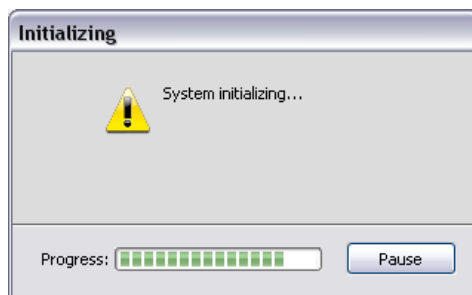
#### 8.4.2.6 Arm Initialization

Each time Freedom EVOware or an Freedom EVOware script or process is started, the status of the instrument arms (LiHa, RoMa and PnP) and optional devices (e.g. Te-VacS) is checked and they are initialized if necessary. In addition, a full initialization sequence is carried out when Freedom EVOware is started for the first time after powering up the instrument.

When the instrument arms are initialized, a sequence of movements is carried out to determine the reference (zero) positions along the X, Y and Z axes. During the full initialization sequence, the arms need to move fully to the rear of the instrument to determine the zero position in the Y direction.

You can also initialize the instrument manually by clicking the Initialize button in the toolbar (see [6.7 “Freedom EVOware Toolbar”](#), [Fig. 6-17](#)).

A progress bar shows the progress of the initialization:



**Fig. 8-10** Initializing the pipetting instrument

Click *Pause* if you want to pause the initialization procedure. This unlocks the doorlocks and switches off the electrical power to the motors which move the instrument arms (LiHa, RoMa, PnP). The arms can then be moved along the slides manually. To speed up initialization if the arms are far away from their home (parking) positions, click *Pause*, move them closer to their home positions and then click *Resume*. The doorlocks will lock again and initialization will continue. If initialization fails, for example because Freedom EVOware is unable to communicate with one of the devices, a dialog box is shown with information on the error(s). If one of the error messages is shown truncated because it is too long, lengthen the field in the dialog box and activate the horizontal scroll bar by double-clicking on the divider (short vertical line in the header) at the end of the field.

The configuration options for the initialization procedure are as follows:

**Initialization mode: Standard**

With the Freedom EVO series of pipetting instruments, during initialization all arms move from their current position to the rear of the worktable to initialize all of the axes. After reaching the rear of the instrument, they then move to the rear left.

The arms then move to their home (i.e. safe or parking) positions if they have been defined (see 9.6.4 “Defining the Home Position for a RoMa”, 9-53).

**Initialization mode: To the front**

If the rear of the worktable is occupied by large (i.e. high) objects such as the Te-MO, choose *To the front* to avoid a collision during full initialization. You must then specify a grid position range in the *From grid* and *To grid* fields.

**Empty space on worktable for Y initialization**

Specify a grid position range in the *From grid* and *To grid* fields to indicate where it is safe to move the arms to the rear of the instrument (i.e. where there are no other objects which could obstruct the arm movements). Since, with this option, the arms move one at a time to the rear, the grid position range only needs to be wide enough to accommodate one arm.

**8.4.2.7 RoMa**

The RoMa is a robot arm equipped with special grippers that can pick up, transport and place objects within the working area of the pipetting instrument.

**Optimize vectors**

Depending on how the RoMa vectors have been created, Freedom EVOware may send consecutive movement commands to the pipetting instrument which command the RoMa to move to identical position coordinates. This can occur e.g. if the waypoints in the RoMa vector uses a



mixture of absolute and relative positions to move to different sites in a hotel. Check this checkbox to suppress the additional (and unnecessary since identical) movement commands. This reduces the time required by the RoMa vector by reducing the number of firmware commands which are sent.

#### Enable round moves

When carrying out a RoMa vector, the RoMa normally moves to each waypoint which is specified in the vector before starting to move to the following waypoint. If you check this checkbox, the RoMa will start to move to the following waypoint before it has fully reached the current waypoint. Depending on the RoMa vector, the RoMa can be seen to cut corners (round off the corners) as it moves, instead of moving in a straight line. This reduces the time required by the RoMa vector. Note: The collision avoidance algorithms have a higher priority and will ensure that no collisions will occur, even when cutting corners.

### 8.4.3 Communication Section

This section is used to configure the data communication between Freedom EVOware, the pipetting instrument and the optional devices.

#### 8.4.3.1 I/O State Tab

Select a device in the list and check or uncheck the *Active* checkbox to enable or disable data communication with the device.

Set the I/O State to ON for all devices which are installed and physically connected to the PC.

For devices with an RS232 interface, if you set the I/O state to ON you must also choose a unique COM port address with the COM Ports tab. This is also necessary if you are running Freedom EVOware in offline mode.

**Note:** After installing Freedom EVOware, data communication is initially set to OFF for all devices with a COM interface. The PC cannot communicate with the device if the I/O status is OFF.

**Note:** Freedom EVOware automatically disables data communication with the LiHa and the RoMa if it cannot detect a hardlock (dongle) when it starts. Pipetting is not possible in this case.

#### 8.4.3.2 Logging Option

Select a device in the list and check the checkbox if you want to log the exchange of firmware commands between the device driver and the device, including commands which are exchanged through an RS232 connection to the device. This can be useful for testing purposes. The information which is logged can be viewed in Tecan/Drivers/<call\_name> channel of the LogViewer tool, where <call\_name> is the device call name in Freedom EVOware (see [A.12 “LogViewer Tool”](#), [A-74](#)).

For devices which are connected to the CAN bus of the pipetting instrument, you can also log the exchange of firmware commands by checking *Log serial data* in the Protocol files tab (Instrument settings, General section). See [8.3.1.4 “Protocol Options Tab”](#), [8-8](#).

To avoid logging an excessive amount of data, this logging feature should be disabled when it is not needed.



### 8.4.3.3 Com Ports Tab

This tab is used to choose the COM port that you want to use for devices which are connected to the PC via a dedicated RS 232 interface (serial interface). You can also choose the COM port for the pipetting instrument.

**Note:** Some of the devices such as the RoMa, the LiHa and the incubators are connected to the data bus (CAN bus) of the pipetting instrument. You cannot (and do not need to) make COM port settings for such devices.

Select a device in the list, click in the Port column and choose the COM port which you want to use for data communication from the pull-down list. The pull-down list shows all of the COM ports which are currently installed in the PC.

The *Port information* panel shows the currently configured interface settings:

#### **Baud rate, Data bits, Stop bits, Parity**

This shows the speed of data transmission, the number of data bits, the number of stop bits and the parity for the data transfer.

#### **Receive Retries, Transmit Timeout**

This shows the number of retries and the transmit timeout for the data connection.

#### **Flow Control**

This shows the flow control method which is used for the data connection ('none', 'X-On/X-Off', 'Hardware' or 'undefined').

With the exception of the COM port, Freedom EVOware automatically sets the parameters to the appropriate values for each of the devices. If the data communication settings of the device's serial interface are configurable, make sure that you set them to the values shown in the *Port information* panel. See the hardware manual for the device for further information (see [1.2 "Reference Documents"](#), [1-3](#)).

If Freedom EVOware is not able to communicate successfully with the device, make sure that the device's serial interface has been configured correctly. Also make sure that you are using the correct serial interface cable. Some devices have firmware commands (such as `Get_Version`) which can be used as a simple test of the data communications (see [8.4.3.4 "Test Tab"](#), [8-33](#)).


For some devices, you must first switch the device to Remote or Slave mode to allow Freedom EVOware to control it remotely through its data interface. Typically, this is done using the buttons on the front panel of the device. See the hardware manual for the device for further information (see [1.2 "Reference Documents"](#), [1-3](#)).

**Note:** The PC cannot communicate with the device if the I/O Status is OFF (see [8.4.3.1 "I/O State Tab"](#), [8-32](#)).

### 8.4.3.4 Test Tab

The Test tab allows you to send firmware commands (command strings) to the selected device and is only intended for specialists. It can be used e.g. to initialize the device, test communications with the device and to move the arms etc. to a specified position.

In many cases, the Command name panel is pre-configured with useful command strings (but some of the devices have no command strings). Select the device, select one of the pre-configured strings and click *Send*. The response string from the device will be displayed in the Response panel.

To send a custom command string, click , specify the command in the Command column and click *Send*. You do not need to specify a command name.

Custom command strings cannot be saved permanently. See the hardware manual for the device for a full list of command strings (see [1.2 “Reference Documents”](#), [1-3](#)). Alphabetic characters in command strings are nearly always written uppercase.

For descriptions of the pre-configured command strings which are available for each device, see the section “Firmware commands” for the device (see [8.5 “Device Driver Configuration”](#), [8-35](#)). The section “Firmware commands” is only available if the device has pre-configured command strings.



#### WARNING

Risk of injury to operating personnel or damage to the equipment

- ♦ Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

### 8.4.4 Scheduling Section

The Scheduling section lets you specify how the driver will react if errors occur during execution of one of its commands. You can also set general scheduling options for the driver.

#### 8.4.4.1 Resource Locking Tab

Check the *Lock* checkbox if you want the device to be unavailable for other actions during execution of its pre-actions and post-actions. You can uncheck this checkbox to improve scheduling efficiency if you are using standard Tecan RoMa's which support automatic collision avoidance. In the case of the LiHa, this allows the RoMa to fetch new labware while the LiHa is still busy.

#### 8.4.4.2 Error Reaction Tab

Check the *Pre-action* and/or *Post action* checkboxes if you want a “Loss of peripheral” error to be triggered for the selected device if an error occurs during execution of its pre-actions and/or post-actions.

If for example the RoMa\_MoveObject command fails when transporting labware to a device, preventing further access to the device, the “Loss of peripheral error” stops Freedom EVOware from trying to use the device in future. For example, if a labware item is physically obstructing the entrance to an incubator, to prevent further errors the incubator will no longer be used, even if the incubator is still fully functional.

#### 8.4.4.3 Pause On Error Tab

The *Pause on error* panel specifies which kinds of device errors will result in a system pause. Check the corresponding boxes if you want the system to halt on all errors, on loss of peripheral errors, on pre-action errors and/or on post-action errors.

The *Pause on error* settings can also be made individually for each process step (see [9.8.2.2 “Pause On Error Tab”](#), [9-56](#)). Check *Enforce these settings* if you want the settings in this tab to override the settings for the process steps.

#### 8.4.4.4 Pre-emptive Tool tab

Freedom EVOware can be instructed to check the process for device commands which are soon due for execution (look ahead). Depending on the device type and the command, this allows Freedom EVOware to send preparatory instructions to the device to speed up the execution of the command.

To activate this feature, you must check the Enable pre-emptive tool operations checkbox on the Scheduler tab (see [8.3.1.3 “Scheduler Tab”](#), [Figure 8-5](#), Tool Optimization panel).

For example, the carousel can be instructed to bring the next labware item to be processed from the carousel tower to the transfer position, where it can wait for a subsequent fetch command (RoMa movement). The RoMa then does not have to wait for the labware to be brought from the tower. This optimizes the movement times for the carousel.

Pre-emptive tool operations are only available for the carousel and some third-party incubators.

The parameters in this panel are as follows:

##### Device

Name of the device which can be optimized by pre-emptive instructions.

##### Macro name

Choose the internal command (macro) to use for the preparatory instructions. The pull-down list shows all of the commands which are available for the selected device. For the carousel and the carousel NT, you should normally choose the internal command PrePresentPlate.

##### Time frame

Specify in seconds how far ahead the scheduler should check the process for the specified internal command (look ahead time). The time you specify should be about the same time which is required for the preparatory instructions (e.g. about the same time which is required to bring the labware from the carousel tower to the transfer position).

Very long times can increase the risk of unnecessary unloading of labware from the carousel due to changes in the schedule. This will result in time wastage since the unloaded labware has to be put back in the carousel tower before another labware item can be brought.

If the location is an incubator, keep in mind that pre-emptive tool operations can affect the incubation time specified in the process if the look ahead time is longer than necessary, since the labware could be removed from the controlled environment earlier than necessary.

## 8.5 Device Driver Configuration

The optional devices which connected to your pipetting instrument each have individual settings that can be adjusted to your needs. To access these settings, start the Configuration Tool, click the *Devices tab*, click *Device Information*, select the required device in the **Devices** panel, click the *Settings* button and click the *Settings* tab of the Configure Device Driver Properties dialog box.

The **Information** panel shows general information on the device and the device driver (see [8.4.1.1 “Device Information Tab”](#), [Figure 8-21](#)).

The usage of the *Driver* tab is the same for all devices and is described in [8.5.17 “Driver Tab of the Configure Device Driver Properties Dialog Box”](#), [Figure 8-67](#).

The usage of the *Conversion* tab is the same for all microplate readers and is described in 8.5.16.3 “Microplate Reader Configuration - Conversion Tab”, 8-66. The *Settings* tab for microplate readers is described in 8.5.16.2 “Microplate Reader Configuration - Settings Tab”, 8-65.

### 8.5.1 Settings for the Barcode Scanner

This is used to configure settings for the Symbol LS-1220 barcode scanner. For general information on this device, see 16.2 “Commands for the Symbol LS-1220 Barcode Scanner”, 16-1.

#### 8.5.1.1 Barcode Scanner Configuration - Settings Tab

The Settings tab is used to make general settings for the Barcode Scanner.

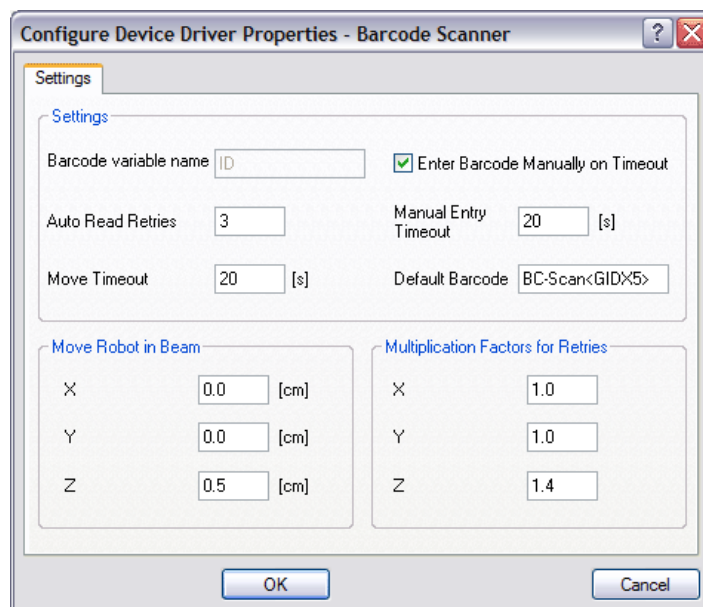


Fig. 8-11 Settings tab of the Barcode Scanner driver

#### Settings panel

##### Barcode variable name

Specify the name of an internal variable which should be used to store the barcode which is scanned. The default variable name for barcodes is “ID”.

##### Enter Barcode Manually on Timeout, Manual Entry Timeout

If you check *Enter Barcode Manually on Timeout*, the operator will be prompted to enter the barcode manually during process runtime if the scanner was unable to read it, despite retries. A default barcode will be used if the operator does not enter the barcode within the specified time (*Manual Entry Timeout* field).

If you do not check *Enter Barcode Manually on Timeout*, a default barcode will always be used if the scanner was unable to read it.

##### Default Barcode

The following placeholders can be used in the *Default Barcode* field:

**Tab. 8-3** Placeholders for use in default barcodes

Placeholder	Example	Description
<IDX> or <GIDX>	123	Counter
<IDXn> or <GIDXn>	004	Counter which is adjusted to a length of n digits using leading zeros

The placeholders are replaced dynamically with their current values during script or process runtime. You can combine the placeholders with plain text.

**Example:** Use the following string to generate default barcodes containing the string "Generated" and a 4-digit counter:

Generated<IDX4>  
(e.g. Generated0003).

**Example:** Use the following string to generate default barcodes containing the string "Unreadable" and a counter:

Unreadable<IDX>  
(e.g. Unreadable2)

#### **Auto Read Retries**

Specify how many times the device should try to read the barcode before considering it unreadable.

#### **Move Timeout**

Specify the timeout for the robot move which is associated with the ReadBarcode command. An error message will be output if the robot takes longer than this to move.

#### **Move Robot in Beam**

Specify the distances in the x, y and z directions that the robot should move the labware in the scanner beam when scanning.

#### **Multiplication Factors for Retries**

Specify multiplication factors for the distances in the *Move Robot in beam* field.

If the labware cannot be scanned on the first try, the distances in Move Robot in Beam are multiplied by the specified multiplication factors for each successive attempt, resulting in larger distances each time. This allows Freedom EVOware to search for the barcode label with the help of the robot in case it is not accurately positioned on the labware.


The barcode scanner can be configured to only accept the barcode types which are expected on your barcode labels. This makes it easier for the scanner to identify incorrect barcodes. This can be done by the Tecan Field Service Engineer using special configuration barcodes. The valid barcode types list is stored in the barcode scanner firmware.

### **8.5.1.2 Barcode Scanner Configuration - Firmware Commands**

The following firmware commands (command strings) are pre-configured for the Barcode Scanner in the Test tab of the Configuration Tool:

#### **Read Barcode <STIE>**

Performs a single read operation of the barcode scanner.

Refer to the firmware documentation for the device for a complete list of firmware commands (see also [1.2.1 "Related Documentation and Software"](#),  1-3).



### WARNING

Risk of injury to operating personnel or damage to the equipment

- ♦ Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

## 8.5.2 Settings for the Columbus Washer

This is used to configure settings for the Columbus Washer. For general information on this device, see [16.3 “Commands for the Columbus Washer”](#), [16-2](#).

### 8.5.2.1 Columbus Washer Configuration - Driver Tab

See [8.5.17 “Driver Tab of the Configure Device Driver Properties Dialog Box”](#), [8-67](#).

### 8.5.2.2 Columbus Washer Configuration - Settings Tab

The Settings tab is used to make general settings for the Columbus washer.

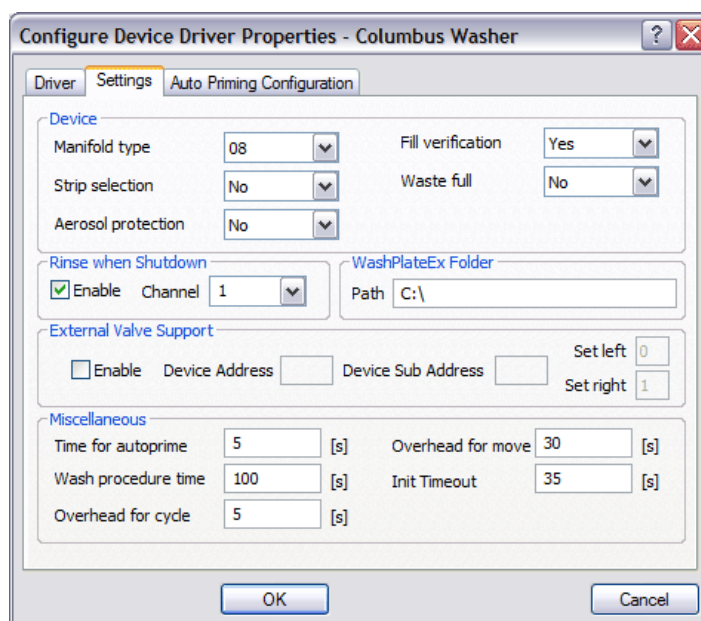


Fig. 8-12 Settings tab of the Columbus Washer driver

### Device panel

#### Manifold type

Choose whether the washer is equipped with an 8, 12 or 16 way manifold.

#### Strip selection

Enable or disable the strip selection feature of the washer. If enabled, the strip of the microplate to be washed can be selected before the wash program is executed. A strip is a row or column of the microplate.

### Aerosol protection

Specify whether the washer is equipped with the aerosol protection option. The aerosol protection option is a special manifold and pump to aspirate any aerosol vapors away from the microplate when it is washed.

### Fill verification

Specify whether the washer is equipped with the fill verification option. The fill verification option checks whether the wash buffer was dispensed into each well during an overflow wash step (special manifold required).

### Waste full detector

Specify whether the washer is equipped with the optional waste full sensor. The waste full sensor detects when the waste bottle becomes full and alerts the user.

### Rinse when shutdown

**Enable:** Check this checkbox if you want the washer to carry out an automatic rinsing procedure when you shut down Freedom EVOware.

**Channel:** Choose the channel (liquid container) which contains the required rinsing liquid.

### WashPlateEx folder

**Path:** Specify the required path for the WashPlateEx configuration file. The WashPlateEx configuration file is used by the WashPlateEx script command.

## External Valve Support panel

### Enable

Check this checkbox if you want to use an external two-way valve for liquid channel 4. This allows you to use five channels (liquid containers) with the washer instead of four. The external valve is intended for special applications.

### Device Address

Specify the hardware address of the external valve. Specify the address as "address on the switch plus 1". Each physical device (regardless of device type) must have a unique hardware address.

### Device Sub Address

Specify the hardware sub-address of the external valve.

### Set left, Set right

These settings control which input of the external valve is connected to which liquid container (4 or 5). Refer to the third-party supplier of the external valve for more information.

## Miscellaneous panel

### Time for autoprime

Specify the amount of time in seconds which is required by the automatic priming procedure. The washer is primed automatically each time you change the channel (liquid container).

### Wash procedure time

Specify the amount of time in seconds which is required by one wash cycle.

### Overhead for cycle

Specify the overhead time in seconds for each wash cycle.

### Overhead for move

Specify the time in seconds which is required to move the washer manifold.



**Note:** The execution time which Freedom EVOware uses for scheduling the wash procedure is calculated from the wash procedure time, overhead for cycle, overhead for move, soak time, final aspiration time and repetitions (the number of wash cycles). The latter three parameters are specified when you add the WashPlate command to your process.

#### Init Timeout

Specify the maximum duration of the device initialization procedure. An error message will be output if initialization is not completed within this time.

### 8.5.2.3 Columbus Washer Configuration - Autopriming Tab

The Autopriming tab is used to configure settings for the auto-priming and auto-rinsing functions.

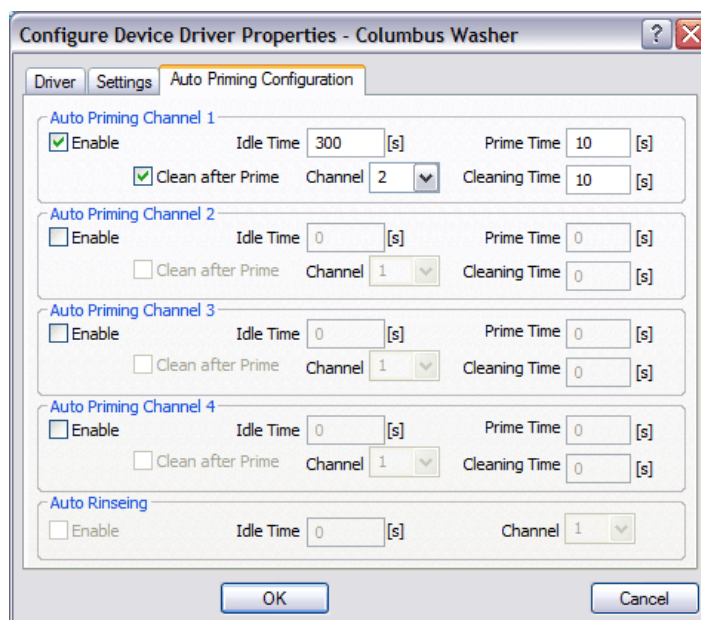


Fig. 8-13 Auto Priming tab of the Columbus Washer driver

#### Auto Priming Channel panels

Auto-priming is used to prime the washer the automatically if it has been left idle for a specified time. This can be done to prevent blockage of the needles, e.g. due to crystallization of the washing liquid.

##### Enable

Check this checkbox if you want to activate the auto-priming procedure using the selected channel (liquid container).

##### Idle Time

Specify how long to wait when the washer is idle before starting the auto-priming procedure.

##### Prime Time

Specify how long to carry out the priming procedure.

##### Clean after prime

Check this checkbox if you want to clean the washer after priming.



**Channel**

Choose the channel (liquid container) which contains the required cleaning liquid.

**Cleaning time**

Specify how long to carry out the cleaning procedure.

**Auto Rinsing Channel panel**

Auto-rinsing is used to rinse the washer the automatically if it has been left idle for a specified time. Rinsing takes place using soak mode (see [16.3.3 “Columbus Washer- Rinse Command”](#), ¶ 16-6).

**Enable**

Check this checkbox if you want to activate the auto-rinsing procedure. You can only activate auto-rinsing if you have not activated auto-priming.

**Idle Time**

Specify how long to wait when the washer is idle before starting the auto-rinsing procedure.

**Channel**

Choose the channel (liquid container) which contains the required rinsing liquid.

**8.5.2.4 Columbus Washer Configuration - Firmware Commands**

The following firmware commands (command strings) are pre-configured for the Columbus washer in the Test tab of the Configuration Tool:

**Remote <Y0>**

This firmware command switches the device from local mode to remote mode. The device can only be controlled remotely by Freedom EVOware (through the interface cable) in remote mode.

**Exit Remote <E>**

This firmware command switches the device from remote mode to local mode. The device can not be controlled remotely by Freedom EVOware (through the interface cable) in local mode.

Refer to the firmware documentation for the device for a complete list of firmware commands (see also [1.2.1 “Related Documentation and Software”](#), ¶ 1-3).



**WARNING**

Risk of injury to operating personnel or damage to the equipment

- ◆ Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

**8.5.3 Settings for Heated Incubators 1 to 3**

An incubator is a device which is used to keep labware containing samples or reagents at a defined temperature for a specified length of time, for example until the desired biological or biochemical reaction has taken place. The heated incubator can be fitted with a shaker option.

Freedom EVOware distinguishes between physical and logical incubators. A physical incubator is the device you place on the worktable of your instrument. A

logical incubator is a group of incubator slots which are configured for the same incubating temperature. The group of slots can all lie within the same physical incubator or can extend over more than one physical incubator. In the latter case, all of the physical incubators must have the same number of slots (4 or 6).

The Settings tab is used to configure the currently selected logical incubator. For each of the logical incubators you want to use (Incubator1, Incubator2 and Incubator3), you must specify the physical incubators (“towers”) which it uses and the first slot of the first tower which is used.

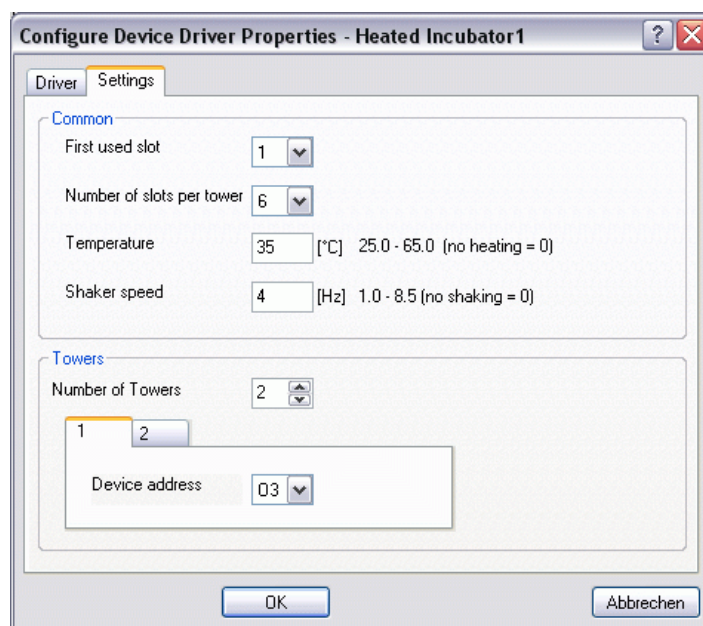
For additional information on this device, see [16.4 “Commands for the Heated Incubator”](#), [16-12](#).

### 8.5.3.1 Heated Incubator Configuration - Driver Tab

See [8.5.17 “Driver Tab of the Configure Device Driver Properties Dialog Box”](#), [8-67](#).

### 8.5.3.2 Heated Incubator Configuration - Settings Tab

The Settings tab is used to make general settings for the currently selected logical incubator (Incubator1, Incubator2 or Incubator3).



**Fig. 8-14** Settings tab of the Incubator driver

#### Common panel

##### First used slot

Choose the first slot that this logical incubator uses. Slots are counted from top to bottom. The first used slot is one of the slots in the first physical incubator which is used by this logical incubator (tower 1 in the Towers panel).

**Note:** Slots are counted from top to bottom. When teaching robot vectors for the incubator, teach slot 1 (the top slot) and then teach the vertical offset of the slots. To ensure the correct assignment of slot numbers to slot temperatures, always teach from slot 1 downwards and not from the bottom slot upwards.

### Number of slots per tower

Choose the number of slots which are available per physical incubator (4 or 6). If the logical incubator extends over more than one physical incubator, all of them must have the same number of slots.

### Temperature

Specify the temperature of the logical incubator (range, model MIO1: 25° to 47°C; range, model MIO2: 25° to 65°C). The same temperature is used for all of the slots of the logical incubator. Specify 0 to disable the heater. To ensure that the incubator reaches and maintains a stable temperature, make sure that the incubator doors are not left open.

**Note:** For special applications, you can use the *SetTemperature* command to assign a different temperature to individual slots during script or process runtime.

### Shaker speed

Specify the speed at which the labware should be shaken during incubation (range, model MIO1: 1 to 10.5 Hz; range, model MIO2: 1 to 8.5 Hz). Specify 0 to disable shaking. Shaking requires the incubator shaker option.

### Towers panel

#### Number of Towers

Choose how many physical incubators are used by this logical incubator (maximum 8). Depending on your choice, additional tabs will appear (1, 2, 3 etc.).

#### Device address

For each of the Towers tabs (physical incubators), choose the device address which is associated with this logical incubator. Choose the address as "hardware address plus 1". On heated incubators, the hardware address is set with the blue address switch at the back. Each physical device (regardless of device type) must have a unique hardware address.

### Examples

Example 1: Two logical incubators (Incubator1, Incubator2) each have three slots and share the same physical incubator (tower 1). Incubator1 starts at slot 1 (the topmost slot) and has a temperature of 35 °C; Incubator2 starts at slot 4 and has a temperature of 40 °C.

Example 2: One logical incubator has 7 slots and starts at slot 4 of tower 1. The last used slot is then slot 3 of tower 2.

### Additional settings in the configuration file for the incubator driver

Two of the parameters in the [Settings] section of the configuration file for the incubator driver allow you to adjust the warning level if the incubator temperature differs from the configured value.

- ◆ The configuration file is located in the Freedom EVOware installation directory and has the name *Te-Incubator1.ini* (for the first heated incubator) to *Te-Incubator3.ini* (for the third heated incubator).
- ◆ The parameter *TempRange* specifies the threshold for the warning. The incubator driver interrogates the actual incubator temperature once per minute and a warning is output if the temperature differs from the configured temperature by more than the specified range (either hotter or colder). *TempRange* is specified as an unsigned integer in °C.
- ◆ The parameter *TempWarnDelay* specifies a time delay after inserting the labware in the incubator and before the first warning is output. This allows

time for the incubator temperature to stabilize. *TempWarnDelay* is specified as an unsigned integer in seconds.

**Note:** *Freedom EVOware* must be re-started (and the drivers unloaded) for the changes to take effect.

Configuration files are protected with checksums. When you re-start Freedom EVOware after editing this file, you will be warned that the checksum is invalid. Proceed as follows to repair the checksum:

- ♦ Quit Freedom EVOware and start the Configuration Tool with Start > All Programs > Tecan > EVOware > Configure. You will be warned again that the checksum is invalid and you will be asked if you want to repair the checksum. Click Yes. Then Click Exit and re-start Freedom EVOware. Alternatively, repair the checksum using the Validate Configuration tool (see [A.11.2 "Validate Configuration Tool"](#), [A-39](#)).

### 8.5.4 Settings for the Base Incubator

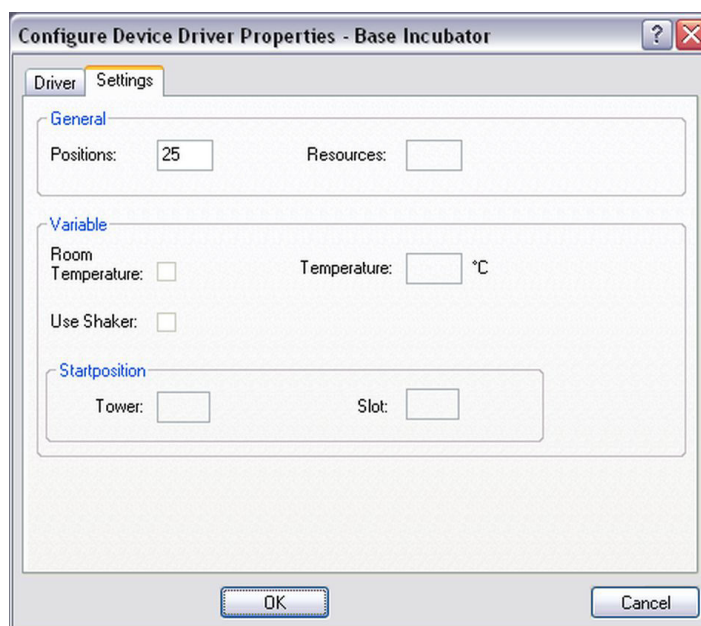
This is used to make settings for the Base Incubator. For general information on this device, see [16.5 "Commands for the Base Incubator"](#), [16-17](#).

#### 8.5.4.1 Base Incubator Configuration - Driver Tab

See [8.5.17 "Driver Tab of the Configure Device Driver Properties Dialog Box"](#), [8-67](#).

#### 8.5.4.2 Base Incubator Configuration - Settings Tab

The Settings tab is used to make general settings for the base incubator:



**Fig. 8-15** Settings tab of the Base Incubator driver

**General panel**

**Positions**

Specify the number of positions available for keeping labware at room temperature.

**Resources**

This parameter is not configurable.

**Variables panel**

There are no configurable parameters in this panel.

**8.5.5 Settings for the Room Temperature Incubator**

This is used to make settings for the Room Temperature Incubator. For general information on this device, see 16.6 “Commands for the Room Temperature Incubator”, 16-18.

**Note:** The same dialog box is used for the Base Incubator settings (see 8.5.4 “Settings for the Base Incubator”, 8-44).

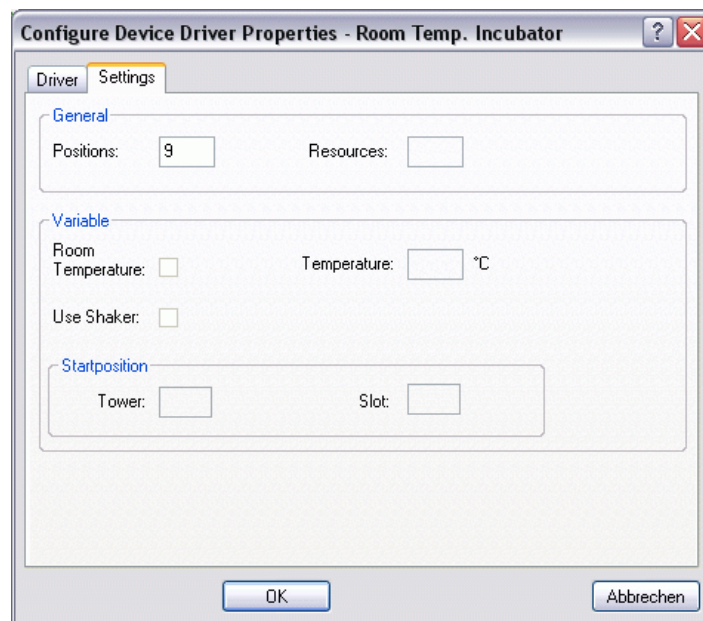
**Note:** See 8.5.15 “Settings for the Transfer Station”, 8-63 for information on configuring the Transfer Station.

**8.5.5.1 Room Temperature Incubator Configuration - Driver Tab**

See 8.5.17 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-67.

**8.5.5.2 Room Temperature Incubator Configuration - Settings Tab**

The Settings tab is used to make general settings for the room temperature incubator:



**Fig. 8-16** Settings tab of the Room Temperature Incubator driver

### General panel

#### Positions

Specify the number of positions available for keeping labware at room temperature.

#### Resources

This parameter is not configurable.

#### Variables panel

There are no configurable parameters in this panel.

## 8.5.6 Settings for the Liquid Handling Arm (LiHa)

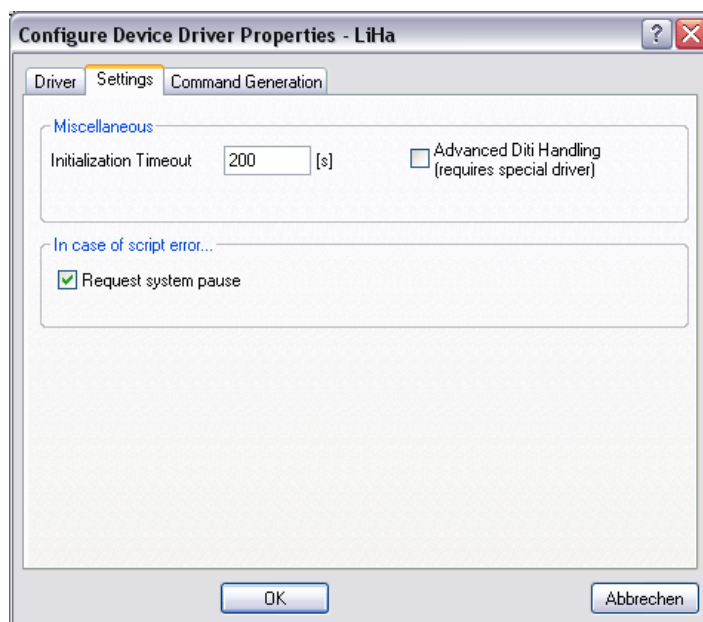
This is used to make settings for the Liquid Handling Arm. For general information on this device, see [16.7 “Commands for the Liquid Handling Arm”](#), [16-19](#).

### 8.5.6.1 Liquid Handling Arm Configuration - Driver Tab

See [8.5.17 “Driver Tab of the Configure Device Driver Properties Dialog Box”](#), [8-67](#).

### 8.5.6.2 Liquid Handling Arm Configuration - Settings Tab

The Settings tab is used to make general settings for the Liquid Handling Arm.



*Fig. 8-17 Settings tab of the Liquid Handling Arm driver*

### Miscellaneous panel

#### Initialization timeout

Specify the maximum duration of the device initialization procedure. An error message will be output if initialization is not completed within this time.

**Advanced DITI handling**

Check this checkbox if you want to use to use a special driver for exchanging DITIs. The special driver is not provided with the standard Freedom EVOware installation.

**In case of script error panel**

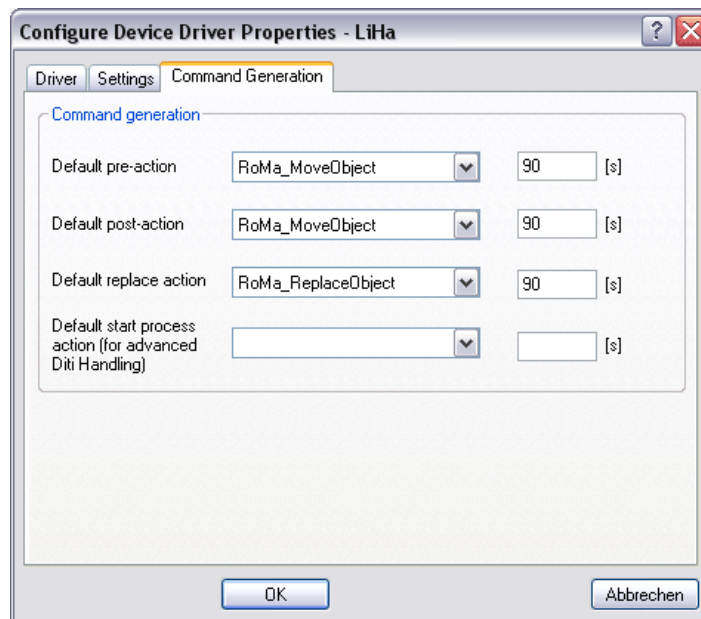
**Request system pause**

Check this checkbox if you want the driver to request a system pause if a script error is detected during command execution.

***Note:** Do not confuse the settings made here with those made in the scheduling/ error handling configuration. The settings in this tab define the reaction of the system if the Liquid Handling Arm outputs an error message during execution of a pipetting command. The settings for error handling take effect if the pipetting command has already been stopped due to an error.*

**8.5.6.3 Liquid Handling Arm Configuration - Command Generation Tab**

The Command Generation tab is used to make settings for the default pre-actions and post-actions to be used when generating commands for the Liquid Handling Arm. The settings are only relevant to Freedom EVOware Plus.



**Fig. 8-18** Command Generation tab of the Liquid Handling Arm driver

**Command Generation panel**

**Default pre-action**

Choose the default pre-action to be used by Liquid Handling Arm commands and specify the execution time to be used when scheduling this operation.

**Default post-action**

Choose the default post-action to be used by Liquid Handling Arm commands and specify the execution time to be used when scheduling this operation.



**Note:** Freedom EVOware compares the initial worktable layout with the worktable layout which is required by the script. For each labware item which needs to be moved, it then uses the specified pre-action and post-action to create and configure the RoMa movements which will be needed.

#### Default replace action

Choose the default action to be used by Liquid Handling Arm commands when replacing DITIs and specify the execution time to be used when scheduling this operation.

**Note:** Freedom EVOware compares the initial worktable layout with the worktable layout which is required by the script. For each DITI rack, it then uses the specified replace action to create and configure the RoMa movements which will be needed when the DITI rack needs to be replaced.

#### Default start process action for advanced DITI handling

If you are using a special driver for exchanging DITIs, specify the execution time to be used when scheduling this operation. The special driver is not provided with the standard Freedom EVOware installation.

### 8.5.6.4 Liquid Handling Arm Configuration - Firmware Commands

The following firmware commands (command strings) are pre-configured for the Liquid Handling Arm in the Test tab of the Configuration Tool:

#### Get RSP <GET\_RSP>

Requests the pipetting instrument type the device is connected to.

#### Get VERSION <GET\_VERSION>

Requests the firmware version of the pipetting instrument. Only the first two positions are shown.

#### Initialize System <INIT\_RSP>

Initializes the pipetting instrument.

Refer to the firmware documentation for the device for a complete list of firmware commands (see also [1.2.1 "Related Documentation and Software"](#), [1-3](#)).



#### WARNING

Risk of injury to operating personnel or damage to the equipment

- ♦ Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

### 8.5.7 Settings for the Magellan Driver

This is used to make settings for the Tecan Magellan software option. The Magellan software is used to control microplate readers (e.g. photometers) and to carry out data analysis using stored procedures. The Magellan software, which has its own installation procedure, has built-in drivers for Tecan microplate readers. If you intend to use the Magellan software, it is not necessary to install the reader driver when you install Freedom EVOware.

For additional information on this device, see [16.8 "Commands for the Magellan option"](#), [16-20](#).



### 8.5.7.1 Magellan Configuration - Driver Tab

See 8.5.17 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-67.

### 8.5.7.2 Magellan Configuration - Settings Tab

The Settings tab is used to make general settings for the Magellan driver.

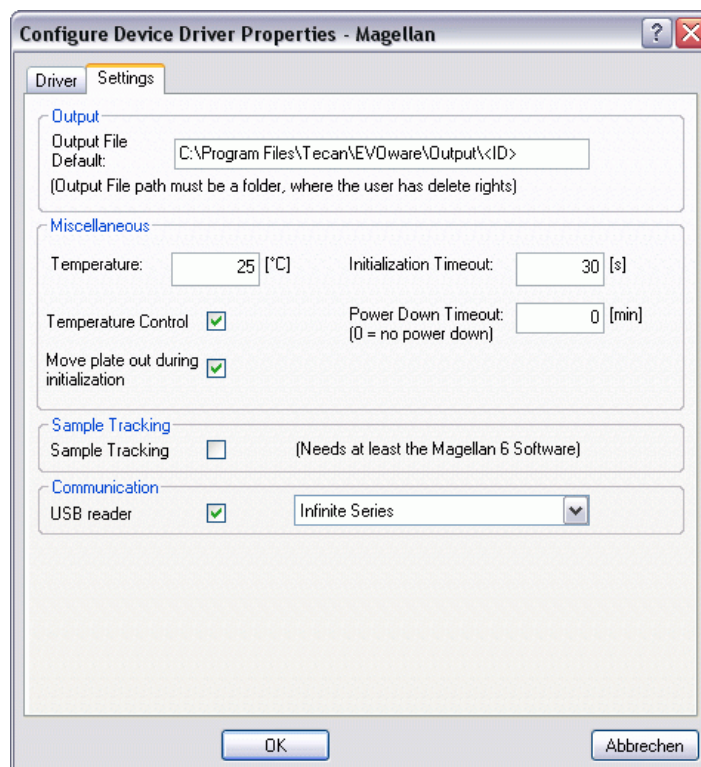


Fig. 8-19 Settings tab of the Magellan driver

#### Output File Default

Specify the required default filename and path for the calculated results (workspace file) from the Magellan software. The default filename and path which you specify here will then be shown in the dialog box of the Magellan Measure command (see 16.8.6 “Magellan - Measure Command”, 16-22).

#### Magellan Standard

**Path:** Specify the path which is configured in Magellan for workspace files. This makes it easier to load the generated workspace files if you run Magellan on its own later on.

**Filename:** If you are using a barcode scanner, you should specify the placeholder <ID>, which will instruct Freedom EVOware and thus Magellan to generate the filename from the labware barcode. It is not necessary to specify the file extension (which is .wsp). Note: The labware must be scanned in advance of the Magellan Measure command.

#### Examples:

C:\ProgramData\Tecan\Magellan\<ID>

or

C:\ProgramData\Tecan\Magellan\wsp\<ID>

**Note:** To check the paths which are configured in Magellan, start the Magellan Wizard, click More and click Options. Then choose the Paths tab.

## Magellan Tracker

**Path:** Magellan Tracker stores the workspace files in the path which is configured in Magellan and ignores the path that you specify here. Accordingly, it is recommended to leave the Output File Default field blank for Magellan Tracker. The filename and path of the workspace file will then be taken from the settings which were made in the Magellan method.

**Filename:** If you are using a barcode scanner, you should specify the placeholder <ID>, which will instruct Freedom EVOware and thus Magellan to generate the filename from the labware barcode. It is not necessary to specify the file extension (which is .wsp). Note: The labware must be scanned in advance of the Magellan Measure command.

### Example:

C:\ProgramData\Tecan\Magellan\wsp\<ID>

**Note:** In both Magellan Standard and Magellan Tracker, if you leave the Output File Default field blank in Freedom EVOware, the filename and path of the workspace file will be taken from the settings which were made in the Magellan method.

**Note:** In Windows Explorer, the directory c:\Documents and Settings\All Users\Documents is shown as "Shared Documents" and not "Documents".

## Miscellaneous panel

### Temperature, Temperature Control

Check the *Temperature Control* checkbox if you want to carry out measurements at a specified temperature. Then specify the required temperature in the *Temperature* field.

### Initialization Timeout

Specify the maximum duration of the reader initialization procedure. An error message will be output if initialization is not completed within this time.

### Power Down Timeout

Specify the delay after which the reader should go into standby (energy saving) mode. Specify 0 if you do not want the reader to go into standby mode. The reader can take several minutes to wake up from standby mode before it is ready for use.

### Move plate out during initialization

Check this checkbox if you want to move out the labware during the initialization procedure.

## Sample Tracking panel

### Sample Tracking

Check the *Sample Tracking* checkbox if you are also using the Tecan software option Freedom EVOware Sample Tracking. This allows Freedom EVOware to exchange labware and sample barcodes and Magellan result data with the Sample Tracking software package. Do not check this checkbox if you are not using Freedom EVOware Sample Tracking.

**Communication panel**

**USB reader**

Check the *USB reader* checkbox and choose the reader type if the reader is connected to the PC via USB.

**8.5.8 Settings for the PW384GP Washer**

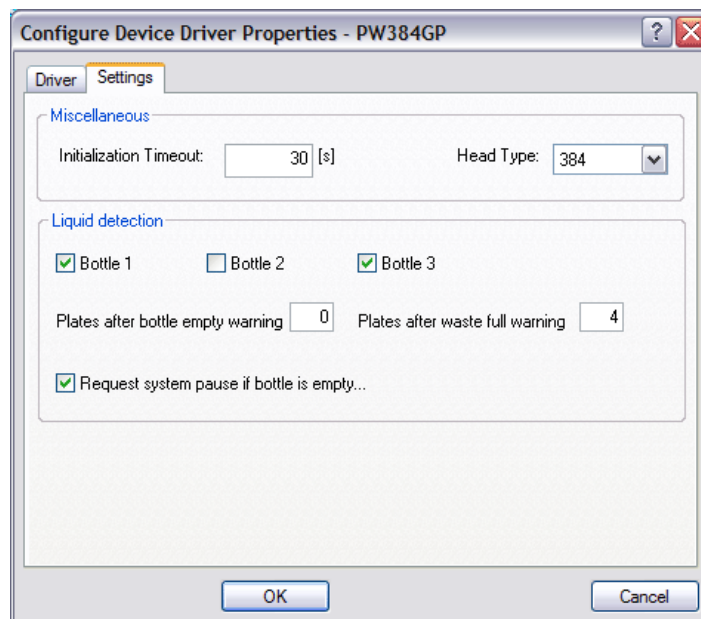
This is used to make settings for the PW384GP microplate washer. For general information on this device, see [16.9 “Commands for the PW384GP Washer”](#), [16-24](#).

**8.5.8.1 PW384GP Washer Configuration - Driver Tab**

See [8.5.17 “Driver Tab of the Configure Device Driver Properties Dialog Box”](#), [8-67](#).

**8.5.8.2 PW384GP Washer Configuration - Settings Tab**

The Settings tab is used to make general settings for the PW384 Plate Washer.



**Fig. 8-20** Settings tab of the PW384GP Washer driver

**Miscellaneous panel**

**Initialization Timeout**

Specify the maximum duration of the device initialization procedure. An error message will be output if initialization is not completed within this time.

**Head type**

Choose the wash head type which is fitted to the washer (96 needle or 384 needle).

### Liquid detection panel

#### Bottle1/2/3

Check the checkboxes if you want to activate liquid detection for the wash liquid bottles.

#### Plates after bottle empty warning

If the liquid detection signals an empty wash liquid bottle, specify how many plates can still be washed before triggering an error.

#### Plates after waste full warning

If the liquid detection signals a full waste bottle, specify how many plates can still be washed before triggering an error.

#### Request system pause if bottle is empty

Check this box if you want the driver to request a system pause if the washer detects a liquid error during command execution.

**Note:** Do not confuse the settings made here with those made in the scheduling/error handling configuration. The settings in this tab define the reaction of the system if the washer outputs an error message during execution of a washer command. The settings for error handling take effect if the washer command has already been stopped due to an error.

## 8.5.9 Settings for the PosID-3

This is used to make settings for the PosID-3 driver. For general information on this device, see [16.10 “Commands for the PosID-3”](#), [16-35](#).

### 8.5.9.1 PosID-3 Configuration - Driver Tab

See [8.5.17 “Driver Tab of the Configure Device Driver Properties Dialog Box”](#), [8-67](#).

### 8.5.9.2 PosID-3 Configuration - Settings Tab

The Settings tab is used to make general settings for the PosID-3:

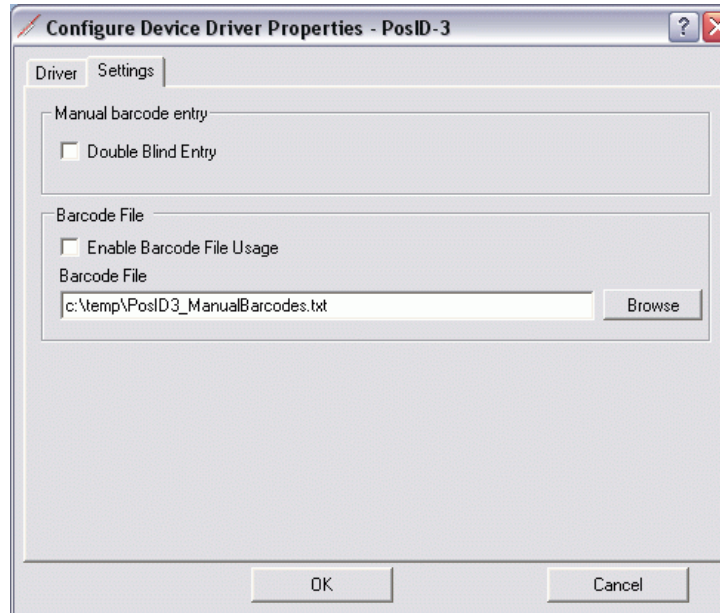


Fig. 8-21 Settings tab of the PosID-3 driver

### Manual Barcode Entry panel

#### Double Blind Entry

Check this checkbox if you want to activate double blind entry. In this case, you will be prompted to enter the barcode twice manually during script or process runtime if the scanner was unable to read it, despite retries. The barcode characters that you enter are hidden using bullet characters.

Freedom EVOware will then try to scan the labware again. If the retry is successful, the scanned barcode will be used. If the retry fails again, the barcode which was entered manually will be used.

If you are using the PosID-3 for general purpose applications in a regulated environment, you must always activate the Double Blind Entry feature if you intend to enter barcodes manually when they cannot be read.

#### Barcode File panel

For the purpose of testing or training, the PosID-3 driver can be configured to read simulated barcodes from a text file and return them to Freedom EVOware through the PosID-3 - Scan command as if the PosID-3 has actually scanned some labware.

Proceed as follows to use this feature:

- ◆ Create a text file with barcodes using the syntax described in [A.2.3 “Barcode File for the PosID-3 Driver”](#), [A-12](#).
- ◆ Set the I/O State of the PosID-3 driver to OFF.
- ◆ In the configuration of the PosID-3 driver (see above figure), check the *Enable barcode file usage* checkbox and specify the path and name of the barcode file. The suggested file name is PosID3\_ManualBarcodes.txt.

#### Enable barcode file usage

Check this checkbox if you want to use the simulated barcodes feature.

### Barcode file

Specify the filename and path of a text file with the simulated barcodes. Specify the filename and path directly or click *Browse* and choose an existing file.

### 8.5.9.3 PosID-3 Configuration in the Ini File

**Tab. 8-4** *te-posid3.ini* parameters, [Settings] section

Parameter string	Description	Range, units
AlarmLightSetting=3	The alarm light setting when the PosID-3 requires user interaction.	STATUSLAMP_OFF = 0 STATUSLAMP_RED_FLASHING = 1 STATUSLAMP_GREEN_STEADY = 2 STATUSLAMP_GREEN_FLASHING = 3 STATUSLAMP_RED_STEADY = 4
LengthCheckInDriver=0	1 = When option is enabled the barcode length check (see 16.10.2.1 PosID-3 Command (Barcode Types Tab)) is done by the driver instead of the PosID-3 firmware.	0 or 1
SmartDoubleBlindRescan=0	1 = When "Double Blind Entry" is enabled (see 8.5.9.2 PosID-3 Configuration - Settings Tab) then a successfully read barcode is not invalidated on a failed rescan.	0 or 1

### 8.5.10 Settings for the Plate Robot (RoMa)

This is used to make settings for the Plate Robot driver. For general information on this device, see [16.13 "Commands for the Plate Robot"](#),  16-39.

#### 8.5.10.1 Plate Robot Configuration - Driver Tab

See [8.5.17 "Driver Tab of the Configure Device Driver Properties Dialog Box"](#),  8-67.

#### 8.5.10.2 Plate Robot Configuration - Settings Tab

The Settings tab is used to make general settings for the Plate Robot:

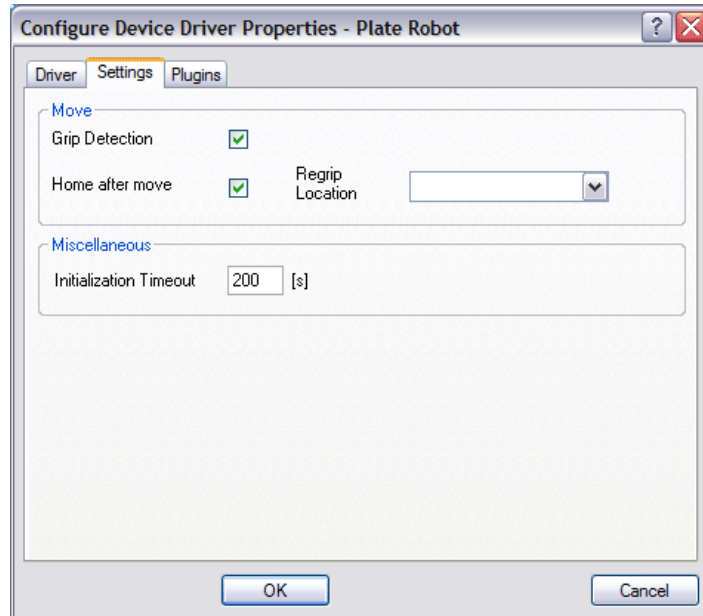


Fig. 8-22 Settings tab of the Plate Robot driver

### Move panel

#### Grip Detection

Specify whether grip detection should be used.

#### Home after move

Specify whether the robot arm should be moved to its home position after each move. This may be necessary for some worktable layouts, but will reduce system performance.

#### Regrip Location

Choose a location where the plate robot can put down the labware temporarily for the purpose of changing the grip mode from wide to narrow and vice versa and/or for changing the grip position (grip height).

Proceed as follows to specify the regrip location (an unused carrier site):

- Right-click the microplate carrier where you want to regrip and choose Edit Carrier from the context menu.
- Assign a group label (e.g. "Regrip") to the site you want to use (see [9.5 "Configuring Carriers"](#), [9-29](#), "Groups").
- Save the process.

- Return to this dialog box and choose the carrier site you have labeled from the pull-down list. The group name you have chosen is shown appended to the end of the carrier name, e.g. MP\_3Pos\_Regrip.

Regrip location is only relevant for Freedom EVOware Plus. The regrip location will be used automatically, e.g. if labware is picked by the RoMa by gripping the narrow side but must be put down on the destination while gripping the wide side. In this case, the labware will be picked up from the source carrier using the Move Narrow RoMa vector, put down on the regrip location, picked up on the wide side using the Move Wide RoMa vector and put down on the destination carrier.

For the regrip location, you must always specify at least two RoMa vector types (Move Narrow and Move Wide). This is usually not necessary for normal carriers. See 9.6.1 “Using RoMa Vectors”, 9-49 for information on RoMa vector types.

The regrip feature is necessary e.g. for some reader and washer types which only allow the RoMa to insert the labware in portrait or landscape orientation for mechanical reasons.

If the Transfer Station driver was installed when you installed Freedom EVOware, regrip location is automatically set to *Transfer* (i.e. use the transfer station for re-gripping). You do not need to create a group label in this case. See 8.5.15 “Settings for the Transfer Station”, 8-63. The Transfer Station driver is only installed if you have installed Freedom EVOware with two RoMas.

This field and the above instructions are only relevant for Freedom EVOware Plus.

### Custom grip position

Some special carrier types and device carriers (e.g. readers) may require you to grip the labware at a non-standard grip height or grip position, for example to avoid a collision with adjacent mechanical components. The non-standard grip position is specified with the special carrier attributes *Maximum grip offset* and *Minimum grip offset*. See 9.5.4 “Carrier Attributes”, 9-38, Custom grip position. In Freedom EVOware Plus, the labware will be regripped automatically using the regrip location if the current grip position is not within the range Minimum grip offset <> Maximum grip offset for the destination carrier.

In Freedom EVOware Standard, you will get a script validation error if the current grip position is not within the range Minimum grip offset <> Maximum grip offset for the destination carrier. In this case, you must use two Transfer Labware commands. The first one moves the labware to an unused carrier and the second one moves the labware from the unused carrier to the destination carrier. This allows the labware to be re-gripped.

**Note:** The labware attributes *Plate Grip Offset Narrow* and *Plate Grip Offset Wide* adjust the grip position globally for this labware type (not just for a specific carrier).

### Miscellaneous panel

#### Initialization Timeout

Specify the maximum duration of the device initialization procedure. An error message will be output if initialization is not completed within this time.



### 8.5.10.3 Plate Robot Configuration - Plugins Tab

Plugins are software tools from third-party suppliers which are used to control special devices. The Plugins tab is used to assign the RoMa commands which are needed by the device.

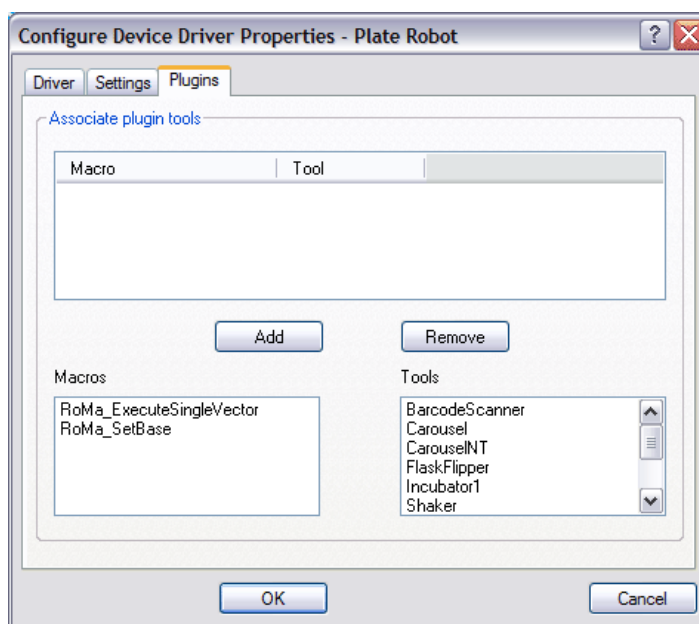


Fig. 8-23 Plugins tab of the Plate Robot driver

#### Associate Plugin Tools panel

Choose the plugin in the Tools panel, choose the RoMa command which the device should use and click Add.

### 8.5.10.4 Plate Robot Configuration - Firmware Commands

The following firmware commands (command strings) are pre-configured for the RoMa in the Test tab of the Configuration Tool:

#### Get RSP <GET\_RSP>

Requests the pipetting instrument type the device is connected to.

#### Get VERSION <GET\_VERSION>

Requests the firmware version of the pipetting instrument. Only the first two positions are shown.

#### Initialize System <INIT\_RSP>

Initializes the pipetting instrument.

Refer to the firmware documentation for the device for a complete list of firmware commands (see also [1.2.1 "Related Documentation and Software"](#), 1-3).



#### WARNING

Risk of injury to operating personnel or damage to the equipment

- ♦ Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

### 8.5.11 Settings for the Te-Shake

This is used to make settings for the Te-Shake. For general information on this device, see [16.14 “Commands for the Te-Shake Shaker”](#), [16-43](#).

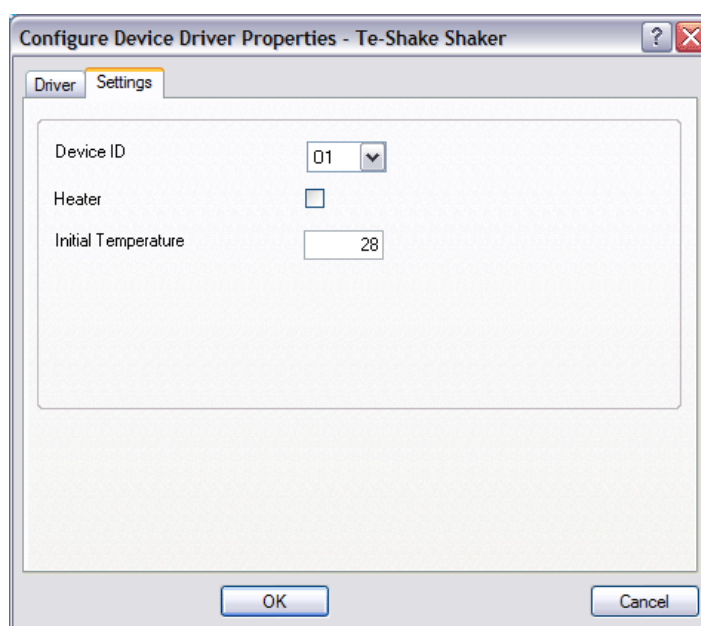
Freedom EVOware is provided with several different types of Te-Shake shaker. If you want to use more than one shaker in your script or process, you must use the Duplicate Device tool to create a separate device driver for each of them. For more information see [16.14 “Commands for the Te-Shake Shaker”](#), [16-43](#).

#### 8.5.11.1 Te-Shake Configuration - Driver Tab

See [8.5.17 “Driver Tab of the Configure Device Driver Properties Dialog Box”](#), [8-67](#).

#### 8.5.11.2 Te-Shake Configuration - Settings Tab

The Settings tab is used to make general settings for the Te-Shake shaker:



**Fig. 8-24** Settings tab of the Te-Shake driver

#### Device ID

Specify the hardware address of the Te-Shake. Specify the address as “address on the switch plus 1”. The address switch of the Te-Shake is on the CC board (inside the device). Each physical device (regardless of device type) must have a unique hardware address.

#### Heater

Check this checkbox if you want to activate the optional heating plate.

#### Initial temperature

Specify the required initial temperature of the heating plate (range: 15 to 90 °C). The heating plate cannot cool, so the minimum temperature of the labware is room temperature. The working temperature can be set with the execution parameters when you add the Te-Shake Shake command to your process.

### 8.5.12 Settings for the Symbol MS-954 Barcode Scanner

This is used to configure settings for the Symbol MS-954 Barcode Scanner. For general information on this device, see [16.2 “Commands for the Symbol LS-1220 Barcode Scanner”](#), [16-1](#).

#### 8.5.12.1 Symbol MS-954 Barcode Scanner Configuration - Settings Tab

The Settings tab is used to make general settings for the Barcode Scanner.

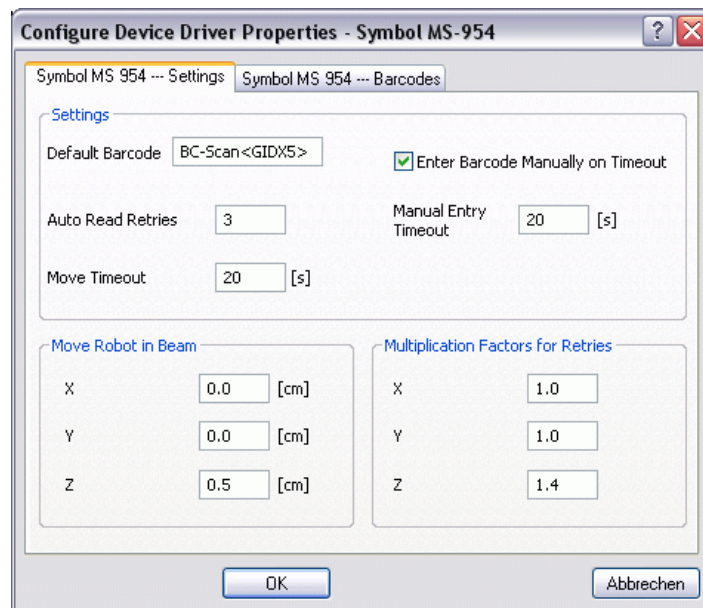


Fig. 8-25 Settings tab of the Symbol MS-954 Barcode Scanner driver

#### Settings panel

##### Default Barcode

The following placeholders can be used in the *Default Barcode* field:

Tab. 8-5 Placeholders for use in default barcodes

Placeholder	Example	Description
<IDX> or <GIDX>	123	Counter
<IDXn> or <GIDXn>	004	Counter which is adjusted to a length of n digits using leading zeros

The placeholders are replaced dynamically with their current values during script or process runtime. You can combine the placeholders with plain text.

**Example:** Use the following string to generate default barcodes containing the string “Generated” and a 4-digit counter:

Generated<IDX4>

(e.g. Generated0003).

**Example:** Use the following string to generate default barcodes containing the string “Unreadable” and a counter:

Unreadable<IDX>  
(e.g. Unreadable2)

#### **Enter Barcode Manually on Timeout, Manual Entry Timeout**

If you check *Enter Barcode Manually on Timeout*, the operator will be prompted to enter the barcode manually during process runtime if the scanner was unable to read it, despite retries. A default barcode will be used if the operator does not enter the barcode within the specified time (*Manual Entry Timeout* field).

If you do not check *Enter Barcode Manually on Timeout*, a default barcode will always be used if the scanner was unable to read it.

#### **Auto Read Retries**

Specify how many times the device should try to read the barcode before considering it unreadable.

#### **Move Timeout**

Specify the timeout for the robot move which is associated with the ReadBarcode command. An error message will be output if the robot takes longer than this to move.

#### **Move Robot in Beam**

Specify the distances in the x, y and z directions that the robot should move the labware in the scanner beam when scanning. This setting is available for EVOware Plus only.

#### **Multiplication Factors for Retries**

Specify multiplication factors for the distances in the *Move Robot in beam* field.

If the labware cannot be scanned on the first try, the distances in Move Robot in Beam are multiplied by the specified multiplication factors for each successive attempt, resulting in larger distances each time. This allows Freedom EVOware to search for the barcode label with the help of the robot in case it is not accurately positioned on the labware.

The barcode scanner can be configured to only accept the barcode types which are expected on your barcode labels. This makes it easier for the scanner to identify incorrect barcodes. This can be done by the Tecan Field Service Engineer using special configuration barcodes. The valid barcode types list is stored in the barcode scanner firmware.

### **8.5.12.2 Symbol MS-954 Barcode Scanner Configuration - Barcodes Tab**

The Barcodes tab is used to configure the barcode types which the Symbol MS-954 barcode scanner will accept:

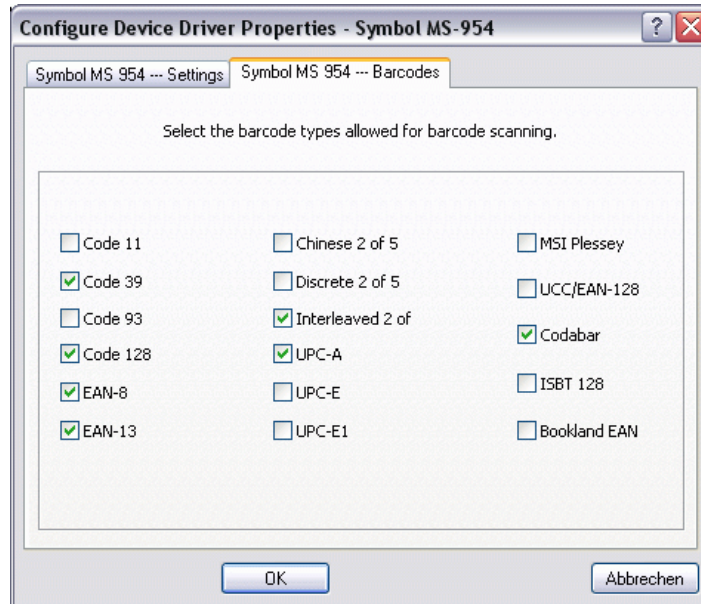


Fig. 8-26 Barcodes tab of the Symbol MS-954 Barcode Scanner driver

### Barcodes panel

Use the checkboxes to choose how many different barcode types you want to read. You should only configure the barcode types which are expected on your barcode labels. This makes it easier for the scanner to identify incorrect barcodes.

#### 8.5.12.3 Symbol MS-954 Barcode Scanner Configuration - Firmware Commands

The following firmware commands (command strings) are pre-configured for the Barcode Scanner in the Test tab of the Configuration Tool:

##### Read Barcode <STIE>

Performs a single read operation of the barcode scanner.

Refer to the firmware documentation for the device for a complete list of firmware commands (see also [1.2.1 "Related Documentation and Software"](#), [1-3](#)).



### WARNING

Risk of injury to operating personnel or damage to the equipment

- ♦ Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

#### 8.5.13 Settings for the Te-MagS

This is used to make settings for the Te-MagS (Magnetic Bead Separator). For general information on this device, see [16.18 "Commands for the Magnetic Bead Separator"](#), [16-60](#).

### 8.5.13.1 Te-MagS Configuration - Driver Tab

See 8.5.17 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-67.

### 8.5.13.2 Te-MagS Configuration - Settings Tab

The Settings tab is used to make general settings for the Te-MagS:

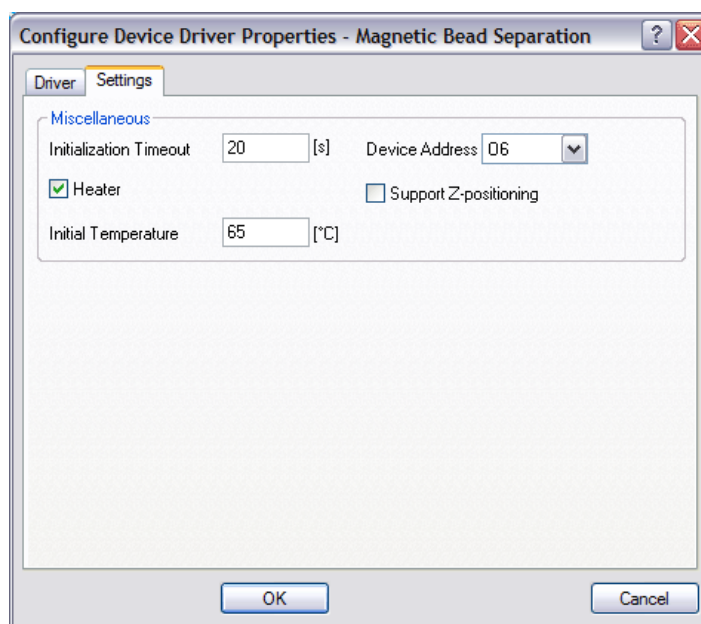


Fig. 8-27 Settings tab of the Te-MagS driver

#### Miscellaneous panel

##### Initialization Timeout

Specify the maximum duration of the device initialization procedure. An error message will be output if initialization is not completed within this time.

##### Device Address

Specify the hardware address of the Te-MagS. Specify the address as “address on the switch plus 1”. The address switch of the Te-MagS is on the CC board (inside the device). Each physical device (regardless of device type) must have a unique hardware address.

##### Support Z-Positioning

If you check this checkbox, you can adjust the height (Z position) of the magnet block in the MoveToPosition and Execute commands to simplify aspiration of the supernatant or wash liquid if there is only a small volume of liquid in the labware. This checkbox should only be checked if your Te-MagS hardware supports this feature.

##### Heater

Check this checkbox if you want to activate the optional heating function.

### Initial Temperature

Specify the required initial temperature of the heating block (range: 15 to 80 °C). The heating block cannot cool, so the minimum temperature of the labware is room temperature. The working temperature can be set with the execution parameters when you add the Te-MagS ActivateHeater command to your process.

#### 8.5.13.3 Te-MagS Configuration - Firmware Commands

The following firmware commands (command strings) are pre-configured for the Te-MagS in the Test tab of the Configuration Tool:

##### Get RSP <GET\_RSP>

Requests the pipetting instrument type the device is connected to.

##### Get VERSION <GET\_VERSION>

Requests the firmware version of the pipetting instrument. Only the first two positions are shown.

##### Initialize System <INIT\_RSP>

Initializes the pipetting instrument.

Refer to the firmware documentation for the device for a complete list of firmware commands (see also [1.2.1 "Related Documentation and Software"](#), ¶ 1-3).



### WARNING

Risk of injury to operating personnel or damage to the equipment

- ♦ Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

#### 8.5.14 Settings for the Pooling Balance

The Liquid Arrival Check (LAC) feature verifies that the correct liquid volumes have been dispensed by weighing the labware before and after pipetting. The labware must be put onto a special balance (pooling balance) for the dispense operation. The LAC feature is only supported by special balance types such as the Mettler WM pooling balance. See [10.1.1 "Global Parameters for Liquid Classes"](#), ¶ 10-4, Liquid Arrival Check panel, for more information.

##### Maximum initial weight

Specify the maximum allowed weight of the objects on the pooling balance before the script or process is started. If the specified maximum is exceeded, an error will be output when the balance is initialized. In addition, you cannot run the script or process until the weight on the balance has been reduced.

To ensure maximum accuracy of the balance, it must not be overloaded. Make sure that the sum of maximum initial weight + weight of the liquids you want to dispense does not exceed the rated maximum weight for the balance.

#### 8.5.15 Settings for the Transfer Station

The Transfer Station is an unused location on the worktable of the pipetting instrument. If your pipetting instrument is fitted with two RoMa arms, it is used to

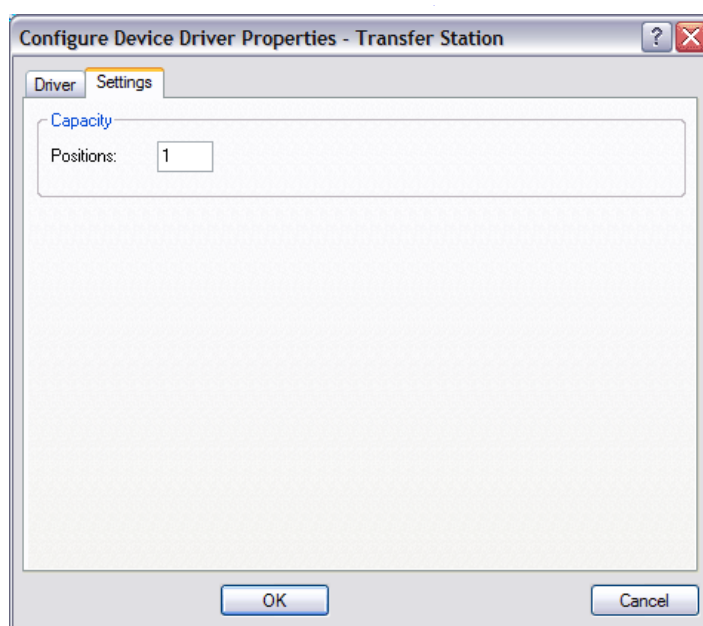
transfer labware from one RoMa to another. The Transfer Station driver is only installed if you have installed Freedom EVOware with two RoMas.

#### 8.5.15.1 Transfer Station Configuration - Driver Tab

See [8.5.17 “Driver Tab of the Configure Device Driver Properties Dialog Box”](#), [8-67](#).

#### 8.5.15.2 Transfer Station Configuration - Settings Tab

The Settings tab is used to make general settings for the Transfer Station driver:



*Fig. 8-28 Settings tab of the Transfer Station driver*

#### Capacity panel

##### Positions

This specifies the number of Transfer Station sites. This field should normally be left at the default value of 1 (one site).

#### 8.5.16 Settings for Microplate Reader Devices

The GENios, GENios Pro, Safire, Spectra, SpectraFluor, Sunrise, Ultra and Ultra Evolution microplate reader devices are controlled by the same driver and have a common configuration dialog. For general information on these devices, see the respective section in [16 “Device Commands”](#), [16-1](#).

#### 8.5.16.1 Microplate Reader Configuration - Driver Tab

See [8.5.17 “Driver Tab of the Configure Device Driver Properties Dialog Box”](#), [8-67](#).



### 8.5.16.2 Microplate Reader Configuration - Settings Tab

The Settings tab is used to make general settings for the microplate reader driver:

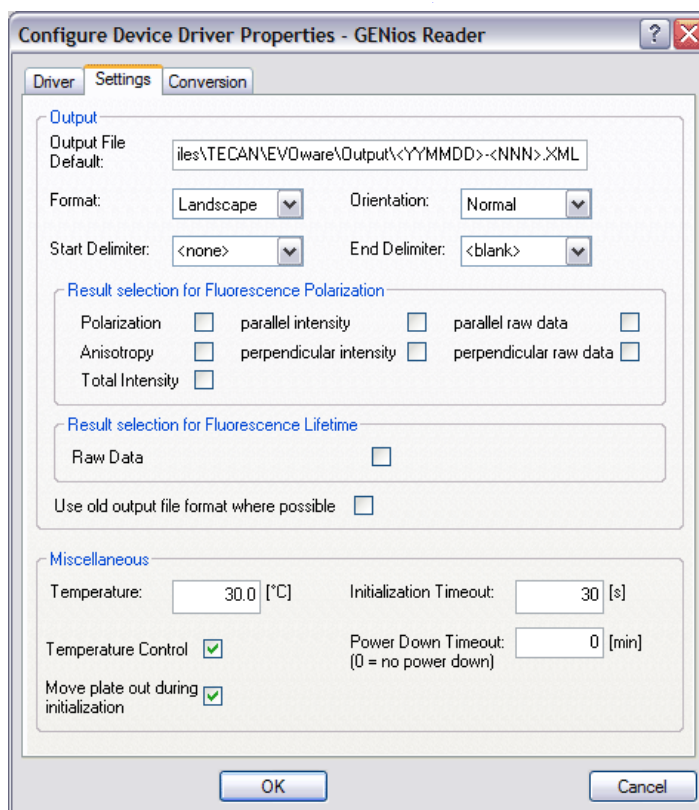


Fig. 8-29 Settings tab of the microplate reader driver

#### Output panel

##### Output File Default

Specify the default file name and path to be used for the output data. If necessary, you can overwrite the file name and path when you add the measurement command to your process. See 16.20 “Specifying Output Filenames for Reader Data”, 16-64 for a description of the placeholders which can be used to generate reader data file names.

##### Format

This setting is used to swap rows and columns in the records of the output file. E.g. for a 96-well microplate, the data is output as 8 rows x 12 columns or 12 rows x 8 columns.

##### Orientation

This setting is used to reverse the row order in the records of the output file. E.g. for a 96-well microplate, the first 12 records contain data for row 1 or for row 8. This can be useful if you want to insert the labware in the reader back to front.

##### Start Delimiter

Choose the delimiter to use at the beginning of each data record in the output file. You can choose none or blank (space character).

### End Delimiter

Choose the delimiter to use at the end of each data record in the output file. You can choose none or blank (space character).

### Result Selection for Fluorescence Polarization panel

Select the types of results you want to be written to the output file when carrying out fluorescence polarization. Each checkbox is only relevant for readers which support the respective measurement mode. The checkbox will be ignored if the reader does not support the respective mode.

### Result Selection for Fluorescence Lifetime panel

Specify whether you want raw data to be written to the output file or not.

### Use old output file format where possible

Check this box if you want the reader to write its output in the file format used before version 4.8.1 of FACTS and not in the XML format used by later versions of FACTS and by Freedom EVOware.

### Miscellaneous panel

#### Temperature, Temperature Control

Check the *Temperature Control* checkbox if you want to carry out reader measurements at a specified temperature. The required temperature is specified in the *Temperature* field. Refer to your reader manual for the allowed temperature range.

#### Move plate out during initialization

Check this checkbox if you want to move out the labware during the initialization procedure.

#### Initialization Timeout

Specify the maximum duration of the reader initialization procedure. An error message will be output if initialization is not completed within this time.

#### Power Down Timeout

Specify the delay after which the reader should go into standby (energy saving) mode. Specify 0 if you do not want the reader to go into standby mode. The reader can take several minutes to wake up from standby mode before it is ready for use.

### 8.5.16.3 Microplate Reader Configuration - Conversion Tab

The Conversion tab is used to make settings for measurement result handling.

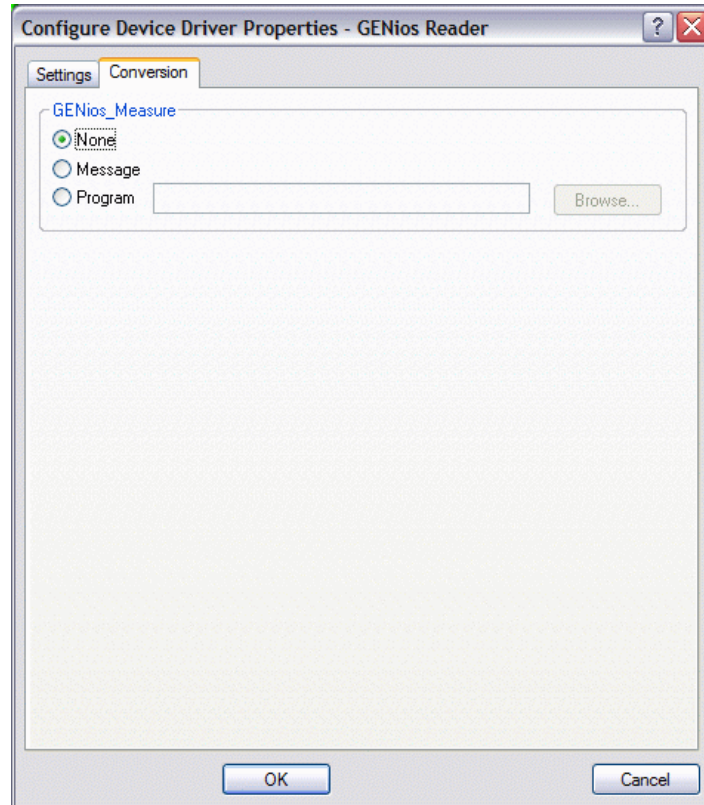


Fig. 8-30 Conversion tab of the microplate reader driver

### Measure panel

In some cases it may be necessary to convert the reader output data to a different data format. Select Message to send a system message to any program configured to listen to the message that the measurement command has been completed and that the output data is ready for conversion. Please refer to the documentation on the Freedom EVOware Programming Interface (API) for information on developing external software which listens to Freedom EVOware system messages.

Alternatively, you can specify an external program to be executed on completion of the measurement command. Specify the path and file name of the external program directly or click Browse and choose the required program. The name of the file to be converted is passed to the external program as a command line parameter.

### 8.5.17 Driver Tab of the Configure Device Driver Properties Dialog Box

The *Driver* tab is used to configure, add and delete device commands. You can also specify the command execution times which should be used by the pre-scheduler during simulation.

The Commands panel lists the device commands which are available for the device you have selected (the example below is for the Ultra Reader):

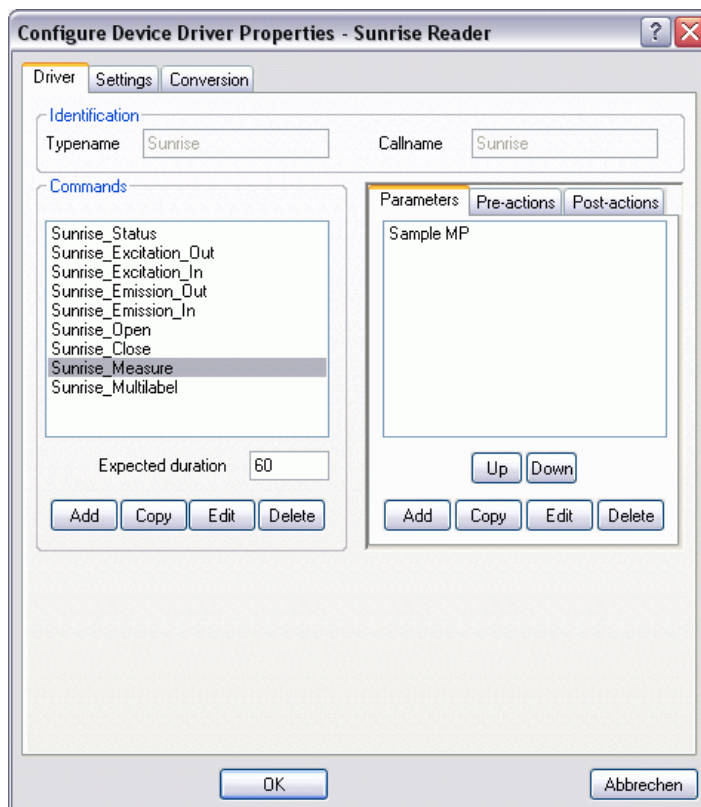


Fig. 8-31 Configuring commands, pre-actions and post-actions

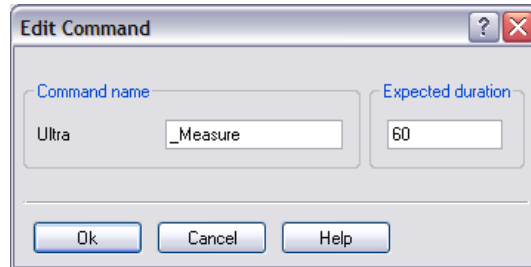
Device commands are used to implement device-specific functions such as washing a microplate in a washer or reading a microplate in a reader. Each device has its own set of commands, whereby each device function has its own command. Please refer to the section on the respective device driver for a description of the device commands which are provided with the Freedom EVOware installation (see 16 “Device Commands”, 16-1).

#### 8.5.17.1 Commands Panel

If you select a command, the currently configured execution time is shown in the *Expected Duration* field. If necessary, correct this value by specifying a better approximation of the command execution time. This is the value which is shown in the *Execution Time* field of the *Edit Parameters* dialog box when you add the command to your process. The execution time does not include the execution times of the pre-actions and post-actions of the command, if any (see below).

If necessary, you can fine tune the execution time for each process step individually when you add the process step to the Process Editor (see 9.8.2.1 “General Tab”, 9-55).

Click *Add* to add a new command. Then enter a name for the command and specify the default execution time in the *Edit Command* dialog box which is then shown.



**Fig. 8-32** Edit Command dialog box

By convention, command names start with the underline character “\_”. Commands are already provided for all standard device functions, so it is normally not necessary or meaningful to create new commands.

Click *Edit* to change the name and or default execution time of the currently selected command. We only recommend you to rename new commands which you have created (and not the standard commands).

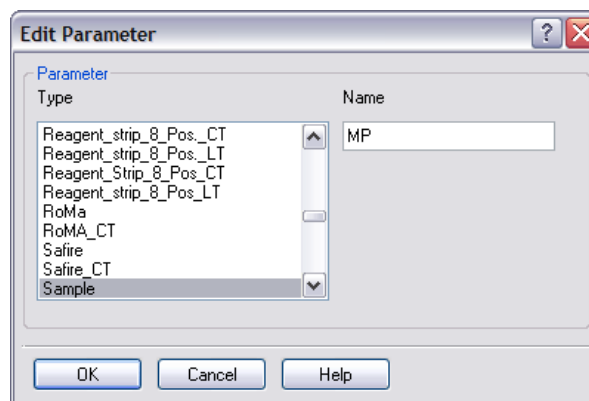
Click *Delete* to delete the currently selected command.

**Note:** You can only delete commands which are not currently used in any process which is stored in the Freedom EVOware database

### 8.5.17.2 Parameters Tab

Some commands perform actions on objects such as microplates. The objects are then defined as parameters of the command (“command parameters”). Click the *Parameters* tab to see the parameters of the command which is selected in the Commands panel (see Fig. 8-31, 8-68).

Click *Add* to add a new parameter to the command. This opens the *Edit Parameter* dialog box:



**Fig. 8-33** Edit Parameter dialog box

The list shows all available parameter types. Choose the required parameter type from the pull-down list, specify the required value of the parameter in the *Name* field and click OK when you have made your entries.

To edit an existing parameter, select it in the Parameters tab and click *Edit* to open the *Edit Parameter* dialog box. Choose a new parameter type from the pull-down list and enter the required value of the parameter in the *Name* field.

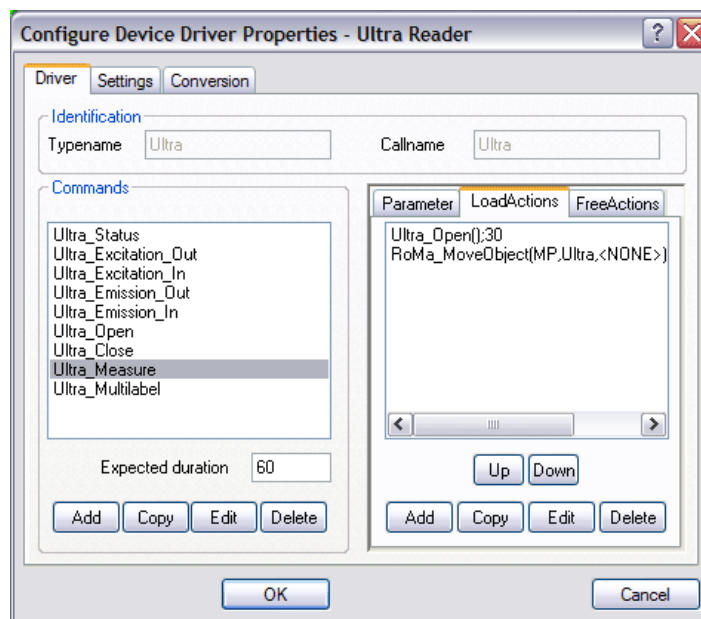
To delete an existing parameter, select it in the Parameters tab and click *Delete*.

### 8.5.17.3 Pre-actions and Post-actions Tabs

In some cases it is necessary to carry out additional actions before and after the command is executed. This done using pre-actions and/or post-actions – commands which are always carried out before and after the main command. For example, if you want to scan labware in a Tecan Ultra reader with the Measure command, it is necessary to open the reader door (with the Ultra\_Open command) and to move the labware to the reader using the plate robot (with the RoMa\_MoveObject command). To make sure that the door is opened in time, the door must be opened before moving the labware. Another RoMa\_MoveObject command and an Ultra\_Close command are needed when the scanning operation is finished. The door must be closed after moving the labware.

The process diagram is simplified by implementing the additional actions as pre-actions and post-actions which are linked to the Measure command. EVOware then adds the pre-actions and post-actions to the Measure command automatically. This avoids having to specify these four additional steps for each Measure command manually.

The pre-actions and post-actions tabs list the pre-actions and post-actions which are configured for the device command which is selected in the Commands panel:



**Fig. 8-34** Configuring pre-actions and post-actions for the device command

With few exceptions (such as Open and Close commands for reader doors), all of the standard pre-actions and post-actions are movement commands for the plate robot (RoMa\_MoveObject commands). See [8.5.17.5 “RoMa\\_MoveObject Command”](#), [8-72](#).

Click *Delete* to delete the currently selected pre-action or post-action. Click *Copy* to copy the currently selected pre-action or post-action. The new pre-action or post-action will have the same settings as the one you copied.

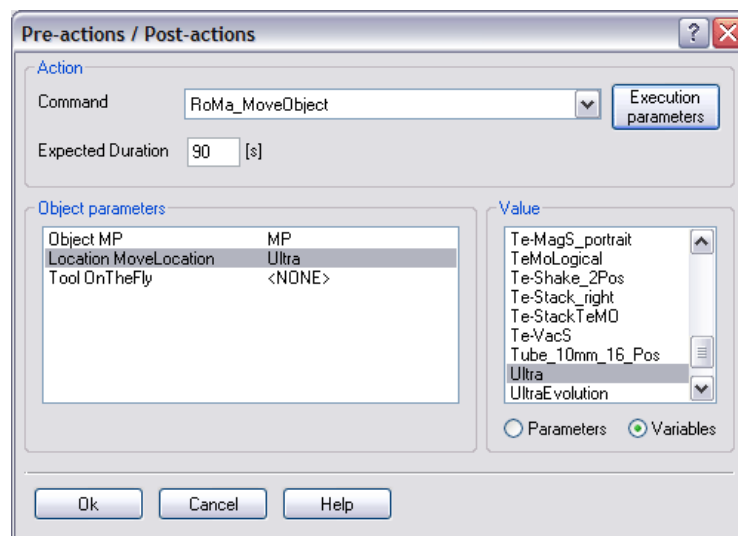
Click the *Up* and *Down* buttons to change the sort order of the pre-actions and post-actions. This changes the sequence with which the pre-actions and post-actions are carried out. Taking the above example of the Measure command for the Ultra reader, the door must be opened before the plate robot brings the labware.

### 8.5.17.4 Editing Pre-actions and Post-actions

To edit a pre-action or post-action, click the *Pre-actions* or the *Post-actions* tab, select the required entry and click *Edit* to display the *Pre-actions / Post-actions* dialog box.

Click the *Execution Parameters* button to edit the execution parameters for the command (the settings you make only apply to the selected pre-action or post action; execution parameters for process steps are configured in the Process Editor). The *Execution Parameters* button has no effect if the command does not have any execution parameters.

To add a pre-action or post-action, click the *Pre Actions* or the *Post Actions* tab and click *Add* to display the *Pre-actions / Post-actions* dialog box:



**Fig. 8-35** Editing pre-actions and post-actions

Then choose the command to be executed as a pre-action or post-action from the pull-down list and specify its default execution time in the *Expected Duration* field. Click the *Execution Parameters* button to specify the execution parameters. If the command has any, a dialog box will appear so you can specify them.

The *Object Parameters* panel lists the parameters which are needed by the selected command. Select an object parameter and choose the required value from the list in the *Value* panel. Click the *Parameters* radio button to show pre-defined constants. Click the *Variables* radio button to show defined instances of objects.

The *Value* panel shows the parameters and variables which can be chosen for the selected object parameter, as follows:



**Tab. 8-6** Parameters and variables versus object parameter types

Object parameter type	Placeholder	Variables
Object	<none> or MP	Labware site on the worktable
Location	<base> or <none>	Device or labware site
Tool	<base> or <none>	On-the-fly tool (e.g. barcode scanner) <sup>a)</sup>

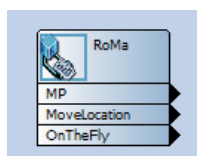
a) This field is normally set to <NONE>. On-the-fly tools are normally specified in the Process Editor using drag and drop.

<base> is a placeholder which represents the original location of the object (the labware source). <none> is a placeholder to indicate that the parameter is unused.

If necessary you can specify custom pre-action and/or post-actions for each process step individually when you add the process step to the Process Editor (see 9.8.3 “Pre-actions / Post-actions (Custom)”, 9-56).

#### 8.5.17.5 RoMa\_MoveObject Command

With the exception of Open and Close commands (e.g. for reader doors), most of the pre-actions and post-actions for device commands are RoMa\_MoveObject commands. They are used to move an object - typically a microplate - to and from the device. The RoMa\_MoveObject command has three command parameters but does not have any pre-actions or post-actions. The three command parameters (Object, Location and Tool) are shown as three fields when you insert the command in the Process Editor:



**Fig. 8-36** Specifying locations

The above figure is shown as an example only. The RoMa\_MoveObject command is normally only used for pre-actions and post-actions and is not normally used directly in the Process Editor.

See also 9.8.4 “Locations”, 9-59.



### 8.5.18 Settings for the Process Script

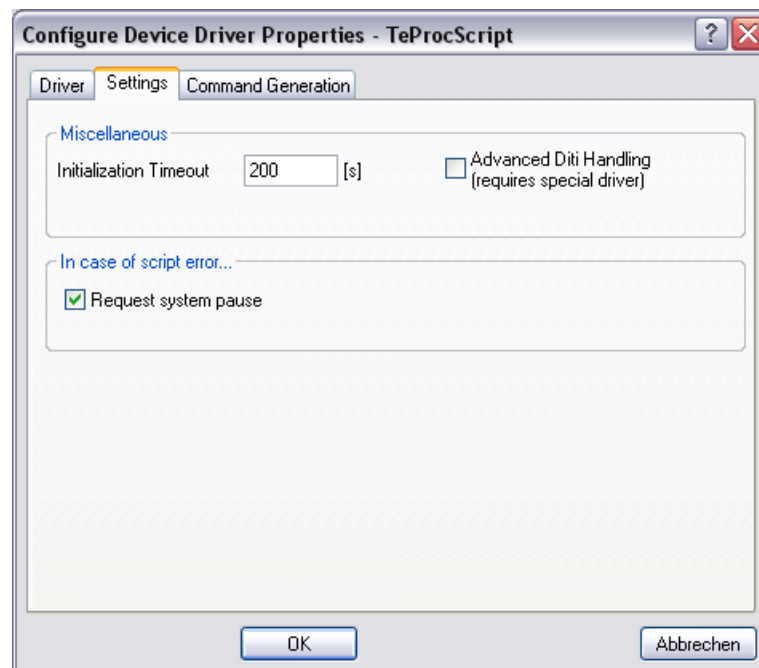
This is used to make settings for the Process Script driver. For general information on this device, see [16.39 “Commands for the Process Script Driver”](#), [16-126](#).

#### 8.5.18.1 Process Script Configuration - Driver Tab

See [8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”](#), [8-116](#).

#### 8.5.18.2 Process Script Configuration - Settings Tab

The Settings tab is used to make general settings for the Process Script driver.



**Fig. 8-37** Settings tab of the Process Script driver

#### Miscellaneous panel

##### Initialization timeout

Specify the maximum duration of the device initialization procedure. An error message will be output if initialization is not completed within this time.

##### Advanced DiTi handling

Check this checkbox if you want to use to use a special driver for exchanging DiTis. The special driver is not provided with the standard Freedom EVOware installation.

#### In case of script error panel

##### Request system pause

Check this checkbox if you want the driver to request a system pause if a script error is detected during command execution.

**Note:** Do not confuse the settings made here with those made in the scheduling/error handling configuration. The settings in this tab define the reaction of the system if the Process Script driver outputs an error message during execution of a pipetting command. The settings for error handling take effect if the pipetting command has already been stopped due to an error.

### 8.5.18.3 Process Script Configuration - Command Generation Tab

The Command Generation tab is used to make settings for the default pre-actions and post-actions to be used when generating commands for the Process Script. The settings are only relevant to Freedom EVOware Plus.

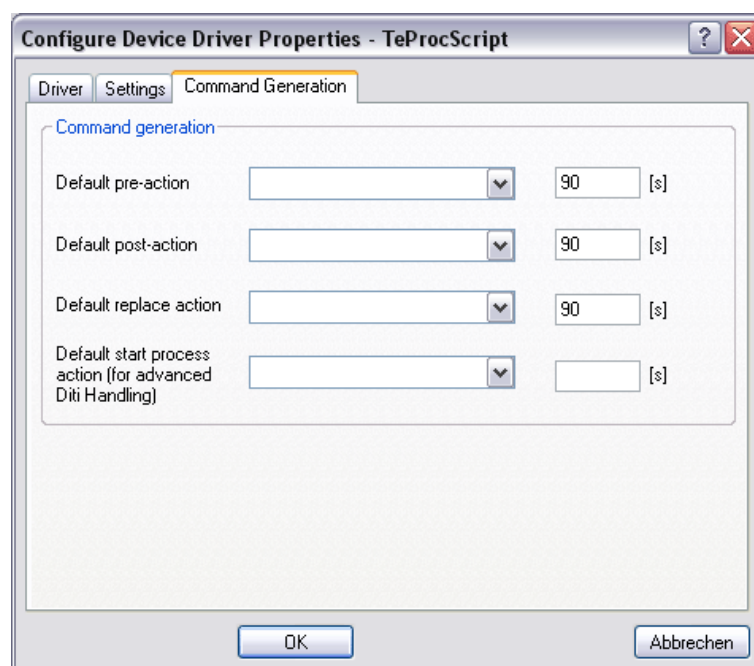


Fig. 8-38 Command Generation tab of the Process Script driver

#### Command Generation panel

##### Default pre-action

This field is not relevant for the Process Script and can be ignored.

##### Default post-action

This field is not relevant for the Process Script and can be ignored.

##### Default replace action

This field is not relevant for the Process Script and can be ignored.

##### Default start process action for advanced DiTi handling

This field is not relevant for the Process Script and can be ignored.

## 9 Specifying Your Instrument Setup

This chapter describes how to specify the setup of your pipetting instrument in Freedom EVOware. Freedom EVOware automatically detects the presence of certain instrument options by interrogating the pipetting instrument. However, it is necessary to provide Freedom EVOware with additional information which cannot be determined by interrogation – such as the dimensions and properties of the carriers and the labware (e.g. microplates) you want to use – and with other details such as the barcode types which should be accepted by the barcode scanner. The latter depend on the design of your barcode labels.

### 9.1 Instrument Configuration

Freedom EVOware stores information on fixed and variable parts of the pipetting instrument in an internal database and a set of configuration files. It also stores information on the dimensions of carriers and labware items and the configuration settings for the optional devices.

**Note:** *If you are setting up a new pipetting instrument, use the Setup & Service software to check and calibrate the reference coordinates of the hardware. This is normally done for you by the Tecan Field Service Engineer when installing the pipetting instrument and the optional devices. See 1.2 “Reference Documents”, ¶ 1-3 for information on this software.*

The following lists the items you need to configure when setting up the pipetting instrument in Freedom EVOware (some of the items refer to options which may not be fitted to your instrument):

#### Carriers

To edit a carrier, double click on the carrier name in the Labware section of the Control Bar (see 9.5 “Configuring Carriers”, ¶ 9-29).

#### Labware

To edit a labware item, double click on the labware name in the Labware section of the Control Bar (see 9.4 “Configuring Labware”, ¶ 9-9).

**Note:** *The Freedom EVOware database already contains a large selection of pre-defined carrier and labware types. You only need to create or edit carriers or labware if you cannot find a standard item which is suitable for your needs.*

#### Vectors for the plate robot(s) and the tube robot(s)

To edit a robot vector double click on the vector name in the Robot Vectors section of the Control Bar (see 9.6 “Creating and Editing Plate Robot Vectors”, ¶ 9-46). Appropriate robot vectors may already be provided with your Freedom EVOware installation.


#### Liquid Handling Arm (LiHa)

The Liquid Handling Arm is configured using the Configuration Tool (see 8.4.2.1, ¶ 8-22).


#### PosID

The PosID barcode scanner is configured using the Configuration Tool (see 8.4.2.2, ¶ 8-28).


### **MPO/SPO LICOS**

The MPO/SPO LICOS system is configured using the Configuration Tool (see [8.4.2.3](#),  [8-29](#)).


### **Chemical System**

The Chemical System is configured using the Configuration Tool (see [8.4.2.4](#),  [8-29](#)).


### **Doorlocks**

The Doorlocks are configured using the Configuration Tool (see [8.4.2.5](#),  [8-30](#)).

### **Liquid Classes**

To edit a liquid class, double click on the liquid class name in the Liquid Classes section of the Control Bar (see [10.1 "Liquid Classes Editor"](#),  [10-1](#)).


### **Device drivers**

Global settings for device drivers are configured using the Configuration Tool (see [8.4 "Device Settings"](#),  [8-21](#)).

## **9.2 Basic Concepts**

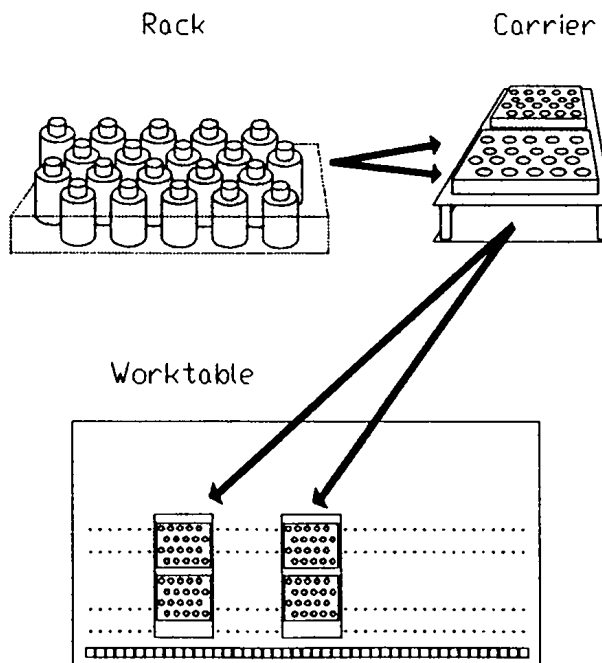
### **9.2.1 Introduction to Carriers and Labware**

Freedom EVOware allows you to define an object (e.g. a microplate) *once only*, and then to use it at any required position on the worktable. This is because Freedom EVOware uses a hierarchical system for the coordinates:

- ◆ The labware coordinates are relative to the site on which the labware is placed.
- ◆ The site coordinates are relative to the carrier.
- ◆ The carrier offsets are relative to the grid position on the worktable (see also [Fig. 9-15 "Carrier dimensions and X/Y offsets"](#),  [9-37](#)).
- ◆ The grid positions on the worktable have a periodic spacing of 25 mm.

This hierarchy allows you to place the labware at any suitable site, carrier and worktable position without having to redefine its coordinates.

The following figure shows the relationship between labware, carriers and the worktable:



**Fig. 9-1** Labware, carrier and worktable

When you set up the worktable for your Freedom EVOware script, you first choose a carrier with the required number of sites (see 9.5 “Configuring Carriers”, § 9-29). Each of the sites can hold labware. If you cannot find the carrier you need in the Freedom EVOware database, you can define a new carrier (see 9.5 “Configuring Carriers”, § 9-29).

You then choose the labware you want to use. If you cannot find the labware you need in the Freedom EVOware database, you can define a new labware item (see 9.4 “Configuring Labware”, § 9-9).

In the third step you position the carriers on the worktable and place the labware onto the carriers (see 11.3.1 “Setting Up Carriers on the Worktable”, § 11-2) and e.g. 11.4.1 “Choosing Labware for a Pipetting Script”, § 11-4).

The procedure to follow to set up a script or process is described in detail in 11.4 “Setting Up a Pipetting Script in Freedom EVOware Standard”, § 11-4 and 11.5 “Setting Up a Process in Freedom EVOware Plus”, § 11-6.

### 9.3 Moving the Arms and Other Devices

Positions in Freedom EVOware are measured and checked by moving the LiHa, the RoMa, the PnP or the PosID to the required position by pressing keys on the numeric keypad. You can then store the current coordinates in the appropriate dialog box for the object. Positions are defined in instrument steps, i.e. the smallest unit of movement of the servo motors (0.1 mm). The pipetting instrument’s coordinate system uses three axes for the LiHa (X, Y, and Z), five axes for the RoMa (X, Y, Z, R, and G), five axes for the PnP (X, Y, Z, R, and G) and three axes for the PosID (X, Y and B).

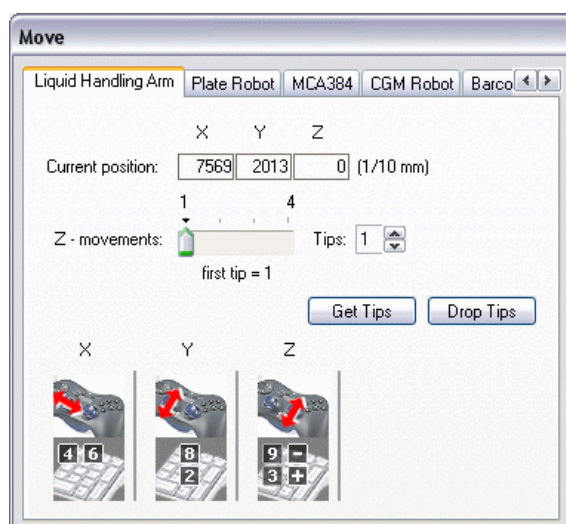
### 9.3.1 Moving the LiHa

The LiHa (Liquid Handling Arm) is mounted on the X-slide and holds the pipetting tips. On the pipetting instrument, the origin of the LiHa coordinate system (X=0, Y=0, Z=0) is the rear left of the worktable with the pipetting tips raised. The three axes of the LiHa are defined as follows:

**Tab. 9-1** Movement axes for the LiHa

X	From left to right
Y	From rear to front
Z	From from top to bottom

When editing an object for which a position has to be specified, an additional dialog box appears which helps you to specify certain movements:



**Fig. 9-2** Move LiHa dialog box

The LIHA tab shows the current position of the LiHa in instrument steps (0.1 mm). If your instrument is not fitted with a LiHa, the LIHA tab is not displayed unless you are running in offline mode.

The Z-movements panel lets you select which tips should be moved in the Z-direction. You can specify the first tip to move and the total number of tips to move.

#### Get Tips, Drop Tips

If you are teaching with DITs, click these buttons if you want to pick up or drop the DITs. They open the direct commands Get DITs and Drop DITs respectively (see [15.7 “Get DITs Command”](#), [15-13](#) and [15.8 “Drop DITs Command”](#), [15-14](#)). The DITs must be fetched using these buttons (or using the direct commands) and not by using any other method such as mounting by hand.

If necessary, e.g. when teaching a position, you can move the LiHa manually using the numeric keypad (make sure that the NUM Lock key is pressed):

**Tab. 9-2** Moving the LiHa using the keys on the numeric keypad

	<b>8</b> : rear (-Y)	<b>9</b> : up (-Z)
<b>4</b> : left (-X)		<b>6</b> : right (+X)
	<b>2</b> : front (+Y)	<b>3</b> : down (+Z)

Each time you press one of these keys, the arm is moved by a single step. Keep the key pressed to move the arm by two steps per second. If you also press the CONTROL key, the arm is accelerated until it reaches a certain maximum speed.

**Note:** You cannot use the cursor keys to move the arm since they have default functions in Windows applications.

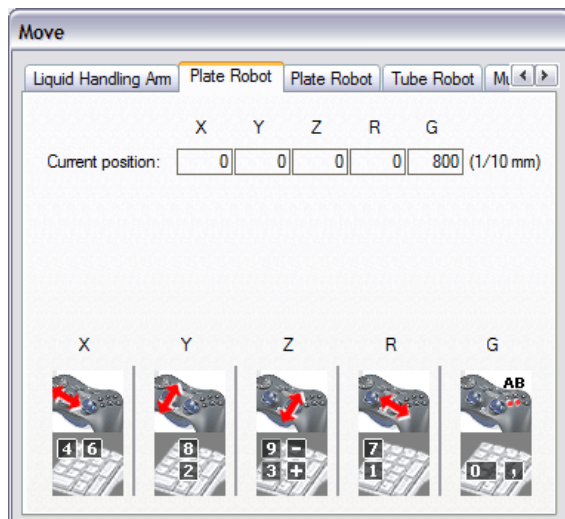
### 9.3.2 Moving the RoMa (Plate Robot)

The RoMa (Robot Manipulator Arm) is a robot arm with gripper fingers that can grip and move objects such as microplates. On the pipetting instrument, the origin of the RoMa coordinate system (X=0, Y=0, Z=0) is the rear left of the worktable with the gripper raised and pointing towards the front of the instrument. The five axes of the RoMa are defined as follows:

**Tab. 9-3** Movement axes for the RoMa

X	From left to right
Y	From rear to front
Z	From top to bottom
R	Clockwise rotation of the gripper when viewed from above
G	From narrow to wide gripper distance

When editing an object for which a position has to be specified, an additional dialog box appears which helps you to specify certain movements:



**Fig. 9-3** Move RoMa dialog box

The Plate Robot tab shows the current position of the RoMa in instrument steps (0.1 mm). The R parameter (gripper rotation) is measured in 0.1° steps. If your instrument is not fitted with a RoMa, the Plate Robot tab is not displayed unless you are running in offline mode.

If necessary, e.g. when teaching a position, you can move the RoMa manually using the numeric keypad (make sure that the NUM Lock key is pressed):

**Tab. 9-4** Moving the RoMa using the keys on the numeric keypad

7 : clockwise (+R)	8 : rear (-Y)	9 : up (-Z)
4 : left (-X)		6 : right (+X)
1 : counterclockwise (-R)	2 : front (+Y)	3 : down (+Z)
0 : narrow (-G)		, : wide (+G)

Each time you press one of these keys, the arm is moved by a single step. Keep the key pressed to move the arm by two steps per second. If you also press the CONTROL key, the arm is accelerated until it reaches a certain maximum speed.

**Note:** You cannot use the cursor keys to move the arm since they have default functions in Windows applications.

### 9.3.3 Moving the PnP (Tube Robot)

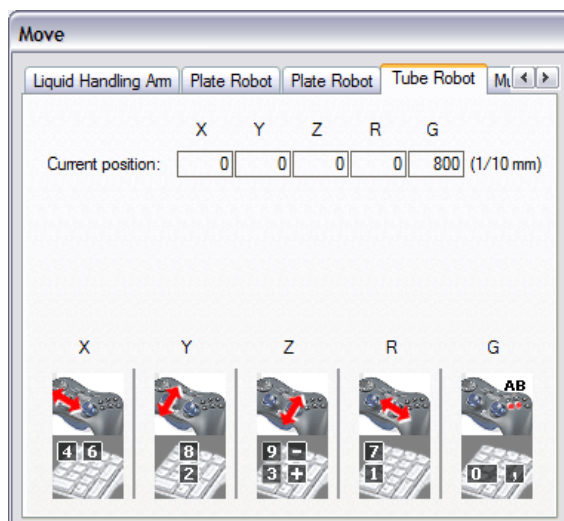
The PnP (Pick and Place) is a robot arm with gripper fingers that can grip and move small objects such as tubes. On the pipetting instrument, the origin of the PnP coordinate system (X=0, Y=0, Z=0) is the rear left of the worktable with the gripper raised. The five axes of the PnP are defined as follows:



**Tab. 9-5** Movement axes for the PnP

X	From left to right
Y	From rear to front
Z	From top to bottom
R	Clockwise rotation of the gripper when viewed from above
G	From narrow to wide gripper distance

When editing an object for which a position has to be specified, an additional dialog box appears which helps you to specify certain movements:



**Fig. 9-4** Move PnP dialog box

The Tube Robot tab shows the current position of the PnP in instrument steps (0.1 mm). If your instrument is not fitted with a PnP, the Tube Robot tab is not displayed unless you are running in offline mode.

If necessary, e.g. when teaching a position, you can move the PnP manually using the numeric keypad (make sure that the NUM Lock key is pressed):

**Tab. 9-6** Moving the PnP using the keys on the numeric keypad

<b>7</b> : clockwise (+R)	<b>8</b> : rear (-Y)	<b>9</b> : up (-Z)
<b>4</b> : left (-X)		<b>6</b> : right (+X)
<b>1</b> : counterclockwise (-R)	<b>2</b> : front (+Y)	<b>3</b> : down (+Z)
<b>0</b> : narrow (-G)		<b>,</b> : wide (+G)

Each time you press one of these keys, the arm is moved by a single step. Keep the key pressed to move the arm by two steps per second. If you also press the CONTROL key, the arm is accelerated until it reaches a certain maximum speed.

**Note:** You cannot use the cursor keys to move the arm since they have default functions in Windows applications.

### 9.3.4 Moving the PosID Barcode Scanner

The PosID (Positive Identification System) is a movable barcode scanner which can be used to read the barcode labels on carriers, labware and tubes. The PosID is installed at the rear of the pipetting instrument and is provided with a gripper which pulls the carrier towards the rear for barcode identification and then slides the carrier back into the pipetting position. The scanning head hinges to read barcodes which are attached to horizontal or vertical surfaces.

Moving the PosID is similar to moving the LiHa or RoMa. On the pipetting instrument, the origin of the PosID coordinate system (X=0, Y=0, B=0) is the rear left of the worktable with the carrier gripper towards the front.

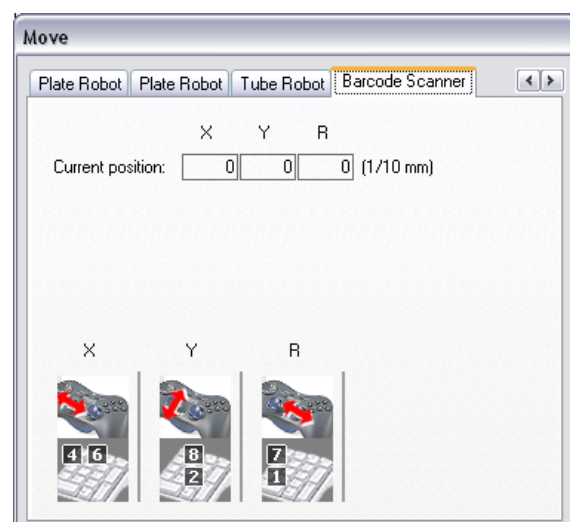
**Note:** The description in this section also applies to the PosID-3.

The three axes of the PosID are defined as follows:

**Tab. 9-7** Movement axes for the PosID

X	PosID, from left to right
Y	PosID carrier gripper, from front to rear
B	PosID scanner head, tilt head from vertical to horizontal

When editing an object for which a position has to be specified, an additional dialog box appears which helps you to specify certain movements:



**Fig. 9-5** Move Barcode Scanner dialog box

The Barcode Scanner tab shows the current position of the PosID in instrument steps (0.1 mm). If your instrument is not fitted with a PosID, the Barcode Scanner tab is not displayed. The Barcode Scanner tab is not displayed either if you are running Freedom EVOware in offline mode. The Move Barcode Scanner dialog box is not intended for the Symbol barcode scanner, which cannot be moved.

If necessary, e.g. when teaching a position, you can move the PosID manually using the numeric keypad (make sure that the NUM Lock key is pressed):

**Tab. 9-8** Moving the PosID using the keys on the numeric keypad

<b>7</b> :	<b>8</b> : front (-Y)	<b>9</b> : tilt to vertical (-B)
<b>4</b> : left (-X)		<b>6</b> : right (+X)
	<b>2</b> : rear (+Y)	<b>3</b> : tilt to horizontal (+B)

Each time you press one of these keys, the arm is moved by a single step. Keep the key pressed to move the arm by two steps per second. If you also press the CONTROL key, the arm is accelerated until it reaches a certain maximum speed.

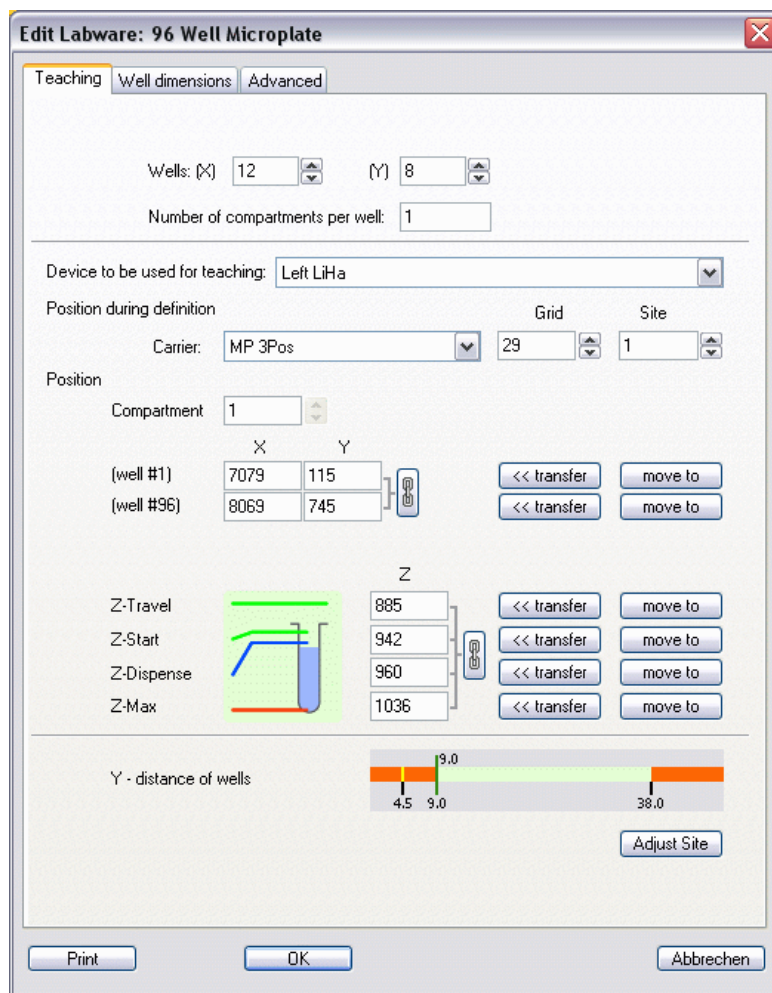
**Note:** You cannot use the cursor keys to move the arm since they have default functions in Windows applications.

## 9.4 Configuring Labware

Labware refers to consumable items such as microplates or sample tubes. Microplates have a regular arrangement of containers or cavities (wells) for holding liquids or samples. During pipetting, microplates are normally placed on carriers and tubes are inserted in tube racks which are placed on carriers. Carriers are fitted to the instrument's worktable at pre-defined grid positions (see [Fig. 9-1](#), [Fig. 9-3](#)).

**Note:** The Freedom EVOware database already contains a large selection of pre-defined carrier and labware types. You only need to create or edit carriers or labware if you cannot find a standard item which is suitable for your needs.

The three tabs of the following dialog box are used to configure labware (to get to this dialog box, double-click on the labware item in the Labware section of the Control Bar):



**Fig. 9-6** Edit Labware dialog box, Teaching tab

It is recommended not to change the properties of the predefined carrier and labware types. Make a copy of the object with a new name if you want to alter any of the properties (see 5.4.1.10 “Context Menu for Objects in the Control Bar”, 5-13).

The parameters in the Teaching tab are as follows:

### Wells (X), (Y)

These two fields specify the well geometry:

**(X):** Specify the total number of wells in the X-direction (max. 128).

**(Y):** Specify the total number of wells in the Y-direction (max. 128).

### Number of compartments per well

Some special labware types (e.g. for protein crystallography) have wells with several compartments (cavities). Freedom EVOware can pipette a different liquid into each of the compartments. Each well typically has one main compartment and one or more satellite compartments which are directly adjacent and are often smaller in size. Specify the number of compartments per well in this field. Specify 1 for normal labware. See also *Compartment*, below.

### Device to be used for teaching

Choose the pipetting arm you want to use for teaching the dimensions of this labware item (Left LiHa, Right LiHa, MCA, MCA384 or Te-MO). The Te-MO option is only available if you have chosen labware on the Te-MO and Freedom EVOware is running in real mode (and attached to a Te-MO) or you are using the 3D simulation tool EVOSim.

If your pipetting instrument is only fitted with DITIs (disposable tips), this pull-down list also shows DiTi types in brackets, for example *LiHa (DiTi 200 µl)*. You must then choose the pipetting arm and DITI type which you want to use for teaching. Freedom EVOware uses the DITI type to determine the tip length. The tip length is specified with Tip Offset in the definition of the DITI rack for this DITI type (see 9.4.1 “Editing Labware, Well Dimensions Tab”, 9-13).

If the LiHa is fitted with a mixture of fixed tips and DITIs, teaching must be carried out with the fixed tips and DITI types are not shown in the pull-down list *Device to be used for teaching*.

### Position during definition

Specify the carrier, grid and site that you want to use to configure the labware: Choose the carrier from the list and then choose the grid position and the site. An easy way to choose the correct carrier, grid, site and labware is to click on the labware in the Worktable Editor. Since you will need to closely observe the movements of the liquid handling arm, you should choose a site which has good accessibility.

### Position

#### Compartment

For special labware types which have wells with several compartments, choose the compartment you want to edit from the pull-down list. Then specify the position coordinates and the area for the selected compartment. Repeat this process for all of the compartments in the well. See *Number of compartments per well*, above, for more information. This pull-down list is inactive (gray) if the well only has one compartment.



### Well positions

Eight fields are provided for you to specify the X, Y and Z positions of the wells in instrument steps (0.1 mm). See [Tab. 9-9](#), [Fig. 9-19](#) for more information. The positions are normally specified by manually moving the LiHa or the Te-MO pipetting head above the first and last wells of the labware and clicking the corresponding **transfer...** buttons (see [9.4.4 “Teaching the Labware Coordinates”](#), [Fig. 9-20](#)).

If you have chosen labware with well offsets on the *Well Dimensions* tab (Well alignment radio buttons), an additional field is shown for the Y position of the first well in column 2. See [9.4.6 “Well Alignment”](#), [Fig. 9-23](#) for more information.

The green, blue and red lines illustrate the four Z positions which you have to specify. After specifying the coordinates, it is recommended to test them on another site (choose another site in the Site field and click *move to* to move the LiHa to the new site).

The “chain” buttons next to the X, Y and Z fields lock the values together:

- **Chain locked** : If a value is changed in one of the fields, the same change is also applied to the other fields in the same column. Example: If the labware is raised or lowered by exchanging a spacer plate, you can adjust all four Z parameters by the same offset in one step.
- **Chain unlocked** : The values in each of the fields can be changed independently of the other fields in the same column.

**Note:** When teaching a DiTi labware the chain symbol always behaves like being locked when transferring coordinates to the X and Y fields. However, you can enter values directly by hand to the fields; the other values are not adjusted then.



### ATTENTION

Risk of the tips moving to the wrong position on the worktable.

- ♦ Choose the correct site before specifying any coordinates. Otherwise the tips might move to the wrong position on the worktable.

### Y-distance of wells

Check that the Y-distance (the spacing between adjacent wells) which is shown graphically by the vertical bar lies within the green area (see [9.4.7 “Y-distance of Wells”](#), [Fig. 9-23](#)). If the vertical bar lies within the red area, you may have specified the coordinates incorrectly or inaccurately.

### Adjust Site button

The *Adjust Site* button is used to adjust the carrier definition for a specified, single site to compensate for small manufacturing inaccuracies in a multi-site carrier without needing to switch to the Edit Carrier dialog box. To use this feature, choose the site you want to adjust and click the *Move to* buttons for Well #1 and for Z-Max to move the LiHa to the teaching position. Then fine tune the LiHa position using the numeric keypad and click *Adjust Site* to modify the carrier definition to match the current X, Y and Z coordinates. After saving your changes, they will also be visible in the Edit Carrier dialog box (the units in the Move dialog box are in 0.1 mm; the units in the Edit Carrier dialog box are in mm).

### 9.4.1 Editing Labware, Well Dimensions Tab

The Well dimensions tab is used to configure additional well parameters for labware:

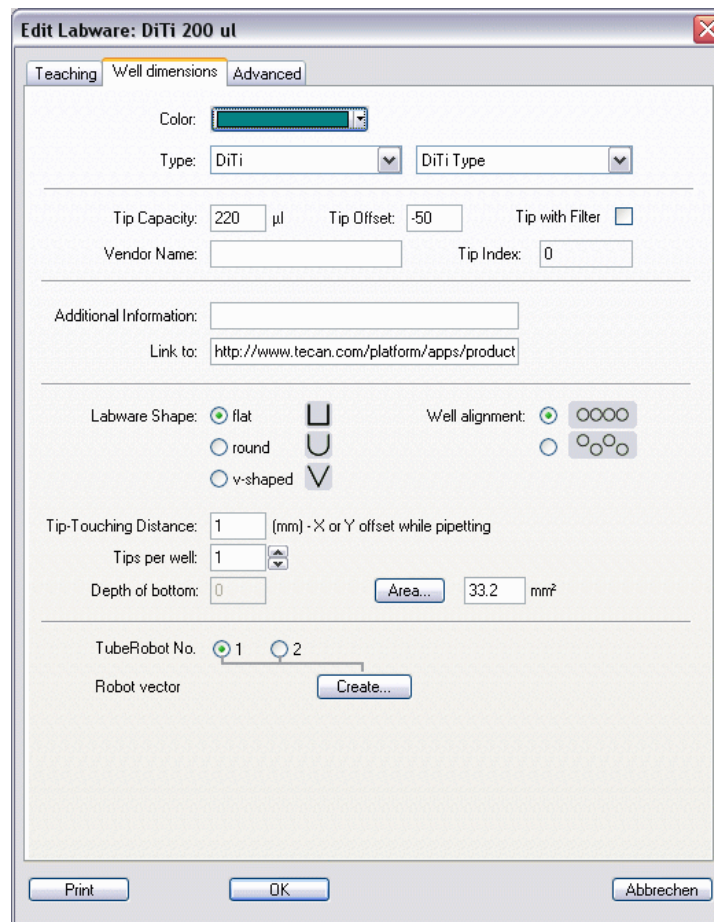


Fig. 9-7 Edit Labware dialog box, Well Dimension tab

The parameters in the Well dimensions tab are as follows:

#### Color

Choose a unique color to make it easier for you to identify this labware type in the Worktable Editor. The default labware colors are as follows:

- ◆ Labware (e.g. microplates): blue
- ◆ Racks for tubes: blue-green
- ◆ DiTi racks: violet
- ◆ Labware for the wash station: orange
- ◆ Default for all other labware types: blue

#### Type

Choose the labware type from the pull-down list. If necessary, choose the sub-type from the second pull-down list. See 9.4.5 "Labware Types and DITI Types", 9-22 for more information.



### Tip Capacity

This field is only shown if you are configuring a LiHa DITI rack, a Te-MO DITI rack or a Te-MO Tipblock. Specify the DITI Capacity (range: 1 to 1000 µl). To prevent contamination, Freedom EVOware limits the total aspirated volume to the specified tip capacity.

### Tip Offset

This field is only shown if you are configuring a LiHa DITI rack, a Te-MO DITI rack or a Te-MO Tipblock. Specify the DITI Offset in 0.1 mm (range: 0 to 1000). The offset is used to compensate for the length differences of different tip and tipblock versions.

### Tip with filter

This field is only shown if you are configuring a LiHa DITI rack, a Te-MO DITI rack or a Te-MO Tipblock. Check this checkbox if the tips are fitted with a filter. The filter serves to minimize the risk of aerosol contamination in the tip adapter or pipetting head.

### Tip Index

Freedom EVOware automatically assigns a unique numeric index to each DITI type. You cannot edit the index manually. The DITI index is used e.g. by the Set DITI Type command in worklists and in advanced worklists. As the DiTi index in worklists is 1-based you have to increase the shown DiTi index by one.

### Vendor Name

Specify the vendor name of the labware. In the case of DITI labware, *Vendor Name* refers to the vendor or manufacturer of the DITI tips, not the DITI rack.

The vendor name is optional and is currently intended for documentation purposes only.

If you are using the pressure-monitored pipetting (PMP) function, the vendor name is stored in the pressure curve files which are created.

### Additional information

This field is for information purposes only and allows you to enter some notes about this labware type.

### Link to

This field is for information purposes only and is intended for the internet address (website URL) of the labware manufacturer.

### Labware shape

Choose the shape of the well bottom.

### Well alignment

Choose between “rectangular labware” or “rectangular labware with offset”. See [9.4.6 “Well Alignment”](#), [9-23](#) for more information.

### Tip-Touching Distance (mm), X or Y offset while pipetting

This parameter is used when you activate tip touching in the liquid class. Tip touching is a special movement when dispensing a liquid. When tip touching is activated, Freedom EVOware dispenses to the destination container in the normal way, but then moves the tips to the side of the well and back before retracting them. This helps to remove any droplets which may be adhering to the tip.

Freedom EVOware also uses this parameter if you select an offset (non-center) X and/or Y position for aspiration or dispensing. This is done on the Aspirate or Dispense tab of the liquid class and is mainly used for the Te-MagS.



**Tips per well**

This parameter specifies the number of tips which can access the well at the same time. Specify "1" for normal wells. Specify the appropriate number for troughs (e.g. "8" for a *Trough 100ml*; specify "96" or "384" for Te-MO troughs). Before Freedom EVOware inserts tips into LiHa troughs, it slides the tips together to the minimum tip-to-tip spacing of 9 mm. Use this value to calculate the number of tips which can access the well at the same time.

**Depth of bottom**

For a well with a v-shaped bottom, specify the vertical distance in mm from the lowest point of the v (Z-max) to the beginning of the cylindrical part of the well. This is used for volume calculations and is important for tracking (keeping the tips immersed when aspirating or dispensing). For wells with a round (hemispherical) bottom, Freedom EVOware calculates the volume of the bottom automatically.

**Area**

Specify the area of the well in mm<sup>2</sup>. Click *Area* to display a dialog box which helps you to calculate the area from the diameter or from the length and the width.

**Note:** *Troughs are normally specified with length and width. In this case, click "Area", click "Length" and enter the length and the width.*

**Robot vector, Create**

Click this button if you want to create or edit a tube robot vector for this labware (the button changes from Create to Edit if the robot vector has already been created). If your pipetting instrument is fitted with two tube robots, first choose the one you want to use (1 or 2). In this case you should create a vector for both tube robots. Tip: the home position for tube robot 1 is at the rear left of the pipetting instrument. Only one tube robot is shown in offline mode.

### 9.4.2 Editing Labware, Advanced Tab

The Advanced tab is used to configure advanced properties for labware:

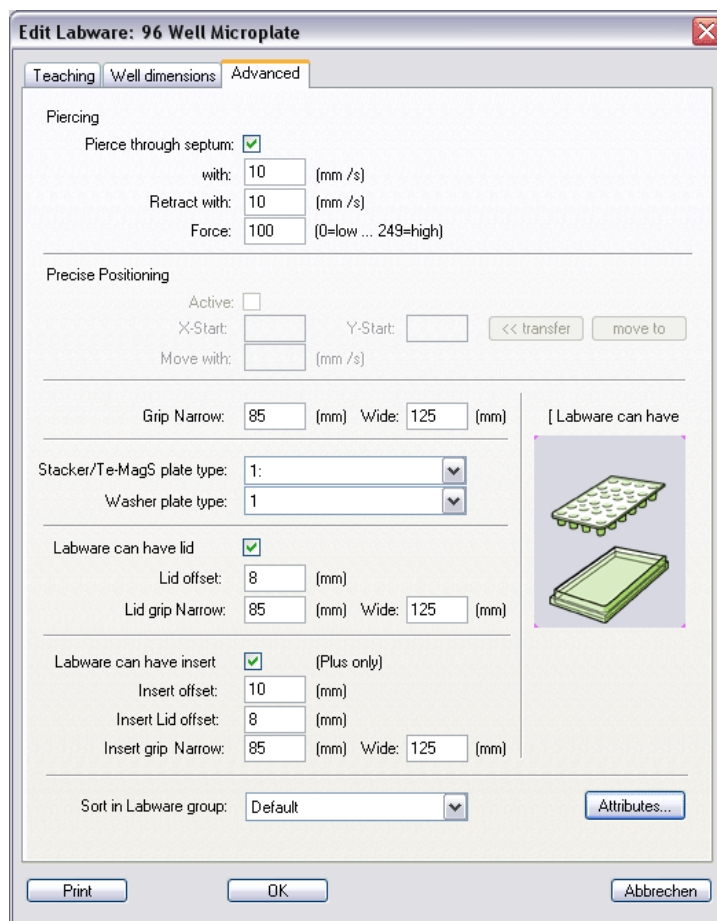


Fig. 9-8 Edit Labware dialog box, Advanced tab

The parameters in the Advanced tab are as follows:

#### Piercing panel

If you activate *Pierce through septum*, Freedom EVOware executes special movements for septum piercing when accessing the labware. It will pierce from Z-Travel to Z-Start and then retract from Z-Start to Z-Travel. Liquid level detection is not available with this option activated.

The Te-MO does not support septum piercing. If you make any entries in this panel, they will be ignored if the labware is used on the Te-MO.

#### Pierce with

Specify the piercing speed in mm/s.

#### Retract with

Specify the retract speed after piercing in mm/s.

#### Piercing force

Specify the required force to use for piercing the septum (range: 0 to 249).

### Precise Positioning panel

This functionality has been disabled.

### Grip Narrow, Wide

Specify the spacing in mm between the RoMa grippers which should be used to grip the labware on the narrow side and on the wide side, respectively. To ensure a firm grip, the grippers will close by an additional 1 cm (this is limited by the specified grip force). To release the labware, the grippers will open by an additional 0.5 cm (default setting). Example: If Grip Narrow = 85 mm, the grippers will move to 90 mm to release the labware or to 75 mm to grip the labware.

### Stacker plate type

Specify the plate type (from 1 to 10). This tells the stacker the plate dimensions and how to handle the plate correctly. Labels (names) can be assigned to plate types to make it easier to choose the correct plate type in the pull-down list. The labels are assigned using the *Setup & Service* software and are stored in the stacker firmware (see [1.2.1 “Related Documentation and Software”](#), [1-3](#) for information on this software).

### Washer plate type

Specify the plate type (from 1 to 10). This tells the washer the plate dimensions and how to handle the plate correctly.

### Labware can have lid

Check this checkbox if the labware can be fitted with a lid. Note: The lid must be removed before pipetting, for example by using the RoMa.

### Lid offset

Specify the vertical distance between the bottom of the labware and the lower edge of the lid.

### Lid grip narrow, wide

Specify the spacing in mm between the RoMa grippers which should be used to grip the lid on the narrow side and on the wide side, respectively. To ensure a firm grip, the grippers will close by an additional 1 cm (this is limited by the specified grip force). To release the lid, the grippers will open by an additional 0.5 cm (default setting). Example: If Grip Narrow = 85 mm, the grippers will move to 90 mm to release the lid or to 75 mm to grip the lid.

### Labware can have insert

Check this checkbox if the labware can contain an insert. For more information on insert plates see [17.7 “Handling inserts in Freedom EVOware Plus”](#), [17-21](#).

### Insert offset

Specify the vertical distance between the bottom of the labware and the lower edge of the insert.

### Insert lid offset

Specify the vertical distance between the bottom of the insert and the lower edge of the lid.

### Insert grip narrow, wide

Specify the spacing in mm between the RoMa grippers which should be used to grip and pick up the insert on the narrow side and on the wide side, respectively.

**Sort in Labware group**

The Labware tab in the Control Bar is subdivided into groups for Microplates, Tips, Wash and Waste, Troughs, Tubes and Miscellaneous. Choose the group where you want this labware item to be shown in the Control Bar. Choose Default to use the default Control Bar group for this labware item.

**Attributes button**

See [9.4.8 "Labware Attributes"](#),  [9-24](#) for information on labware attributes.

### 9.4.3 Labware Coordinates

The following table describes the X, Y and Z coordinates in the Teaching tab of the Edit Labware dialog box:

**Tab. 9-9** X, Y and Z coordinates for labware

Coordinate	Position / Function
X,Y	At this position, the tip is situated above the well/tube of the first/last position on the labware. See <a href="#">Tab. 9-10</a> , <a href="#">Fig. 9-23</a> for additional information on labware with offsets.
Z-Travel	Tip height at which the tips move from one X/Y position to another. Choose Z-Travel to be higher than all obstacles on the carrier. Movements that pass over different pieces of labware use a tip height of Z-Travel (global) instead.
Z-Travel (global)	This parameter is also called Travel Height. When the LiHa moves over a single labware item or between adjacent identical labware items, it retracts all tips to the Z-Travel value which is specified in the labware definition. However, if two consecutive commands cause it to move over different pieces of labware, the tips are retracted to the height you specify with Travel Height in the Configuration Tool (see <a href="#">8.4.2.1 "LiHa (Liquid Handling Arm)"</a> , <a href="#">Fig. 8-22</a> ). This is done to speed up and optimize LiHa movements. Choose this parameter to be higher than all obstacles on the worktable.
Z-Start	Tip height at which the liquid level detection (LLID) is switched on during pipetting. For tubes and containers (troughs), choose Z-Start to be at least 1 mm below the rim but above the liquid surface. For microplates, choose Z-Start to be at least 1 mm above the edge of the well. Z-Start should be chosen as low as possible to ensure fast liquid level detection. At the same time, Z-Start must be above the highest possible liquid level in the well/tube to ensure that the liquid surface is found.
Z-Dispense	Tip height at which liquid is dispensed. It should be low enough to ensure that no liquid drops can get into adjacent wells or tubes.
Z-Max	Tip height which is very slightly above the lowest point of the well, tube or container. It is the lowest position which the tip is allowed to reach without touching the bottom. When searching for the liquid surface, the pipetting instrument will search from Z-Start down to Z-Max. If the tip reaches Z-max without finding liquid, the pipetting instrument reacts according to the configured liquid level detection error mode.

The figure below illustrates the different Z positions:

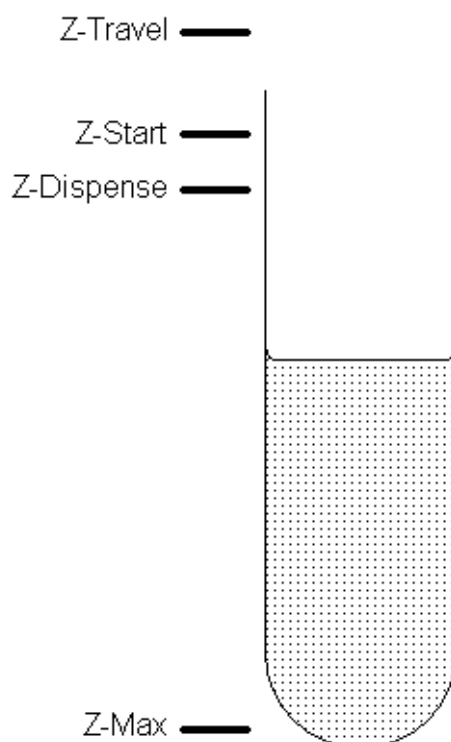


Fig. 9-9 Z positions for a tube (example)

#### 9.4.4 Teaching the Labware Coordinates

Teaching is the process of showing Freedom EVOware the positions on the worktable or the Te-MO by physically moving the LiHa, MCA or the Te-MO pipetting head to the correct position above the labware and then clicking the appropriate buttons in the dialog boxes (see 9.3.1 “Moving the LiHa”, 9-4).

If the labware is intended for use on the worktable, put it on a carrier the worktable and teach it on the worktable. If the labware is intended for use on the Te-MO, put it on the Te-MO and teach it on the Te-MO.

A group of eight Position fields for the labware coordinates are shown in the Edit Labware dialog box. Next to the coordinates you can see buttons labeled with **transfer** and **move to**.

Click the **transfer** buttons to copy the current LiHa, MCA or Te-MO coordinates (as shown in the respective tab of the Move dialog box) to the position fields in the Edit Labware dialog box. Do this when you want to teach the current position.

**Note:** If you click the **move to** buttons instead, this moves the LiHa, MCA or Te-MO to the coordinates shown in the Position fields of the Edit Labware dialog box. The tips first lift as far as possible, then the LiHa, MCA or Te-MO moves to the new position and the tips move back to the previous height. The corresponding tab of the Move dialog box will be updated accordingly.

**Note:** Do not use/select more than one tip when teaching the X and Y coordinates of a LiHa trough, because this can cause a collision with other objects when the trough is used in a script.

Collision avoidance is not available when teaching. Accordingly, take care when using the “Move To” button, which moves the selected arm directly to the destination using the shortest (diagonal) path. Move other arms out of the way to avoid the risk of collisions or use the cursor keys, which are slower but safer.

#### 9.4.4.1 Teaching with the LiHa

Specify the carrier, grid and site that you want to use to teach the labware: Choose the carrier from the list and then choose the grid position and the site. Alternatively, with the Labware Editor closed, put the labware on the worktable at the required position, right click the labware and choose Edit Labware Type from the context menu. This opens the Labware Editor with the correct settings.

In the Edit labware dialog box, choose *LiHa* from the pull-down list *Device to be used for teaching*.

For labware teaching purposes it is required to setup the fixed tips configured for the lower numbered tip/channels. For example, position 1 to 4 for fixed tips and position 5 to 8 for DiTis.

**Note:** If your pipetting instrument is only fitted with DITIs (disposable tips), the pull-down list also shows DiTi types in brackets, for example *LiHa (DiTi 200 µl)*.

#### ☒ Teaching the X and Y coordinates of labware on the worktable:

- ◆ Move one of the LiHa tips above the center of the first well of the labware (at the rear left of the labware) and click the corresponding **transfer** button. This copies the current LiHa X and Y coordinates to the position fields in the Edit Labware dialog box. We recommend you to use one of the middle tips for teaching (e.g. tip 3).
- ◆ Move the same LiHa tip above the center of the last well of the labware (at the front right of the labware) and click the corresponding **transfer** button. This copies the current LiHa X and Y coordinates to the position fields in the Edit Labware dialog box.
- ◆ For labware with offsets, you also need to move the LiHa above the first well of the second column and click the **transfer** button next to the field “Y2 (column 2)”. See [Tab. 9-10](#), [§ 9-23](#).

**Note:** if the LiHa is fitted with DITIs, you must use the direct command “Get DITIs” (or the Get Tips button in the Move dialog box) to fetch the tips you want to teach with and not by using any other method such as mounting by hand. See [9.3.1 “Moving the LiHa”, § 9-4](#).

In addition, you must choose the correct pipetting arm and DiTi type in the pull-down list “Device to be used for teaching”. Freedom EVOware uses the DiTi type to determine the tip length. The tip length is specified with Tip Offset in the labware definition of the DITI rack which is used for this DITI type (see [9.4.1 “Editing Labware, Well Dimensions Tab”, § 9-13](#)).

**Note:** if the LiHa is fitted with a mixture of fixed tips and DITIs, teaching must be carried out with the fixed tips and DITI types are not shown in the drop down list “Device to be used for teaching”.

#### ☒ Teaching the X and Y coordinates of a LiHa Trough:

A LiHa Trough is treated as labware with only one well, whereby several tips can access the well at the same time. LiHa troughs are taught just like labware:

- ♦ Move one of the LiHa tips above the center of the trough and click the corresponding **transfer** button. This copies the current LiHa X and Y coordinates to the position fields in the Edit Labware dialog box. We recommend you to use one of the middle tips for teaching (e.g. tip 3). Do not use select than one tip when teaching the X and Y coordinates of a LiHa trough, because this can cause a collision with other objects when the trough is used in a script. Before Freedom EVOware inserts tips into LiHa troughs, it slides the tips together to the minimum tip-to-tip spacing of 9 mm. In addition, it automatically centers the group of tips above the center of the trough.

#### ☒ Teaching the Z coordinates of labware on the worktable:

- ♦ Move one of the LiHa tips to the Z-Travel position above the first well of the labware (at the rear left of the labware) and click the corresponding **transfer** button. This copies the current LiHa Z coordinate to the Z-Travel field in the Edit Labware dialog box. We recommend you to use one of the middle tips for teaching (e.g. tip 3).
- ♦ Repeat this process for the Z-Dispense, Z-Start and Z-Max positions.

### 9.4.5 Labware Types and DITI Types

When you choose the labware type on the *Well Dimensions* tab of the Edit Labware dialog box, in some cases you also have to select the intended usage of the labware in a second pull-down list. Current Tecan pipetting instruments support the following labware types:

- ♦ Regular
- ♦ DITI:
  - DITI Type or DITI Waste.
- ♦ Washer (wash station):
  - Cleaner Short, Cleaner Long or Waste (all of these items are part of a wash station).
  - Cleaner LowVol (part of a LowVol wash station).
- ♦ System (this labware type is used internally and should not be selected).

#### DITI Types

When you choose a DITI type in a script command, the pull-down list all of the LiHa DITI types which are currently configured in the labware database. When you want to pick up a DiTi, Freedom EVOware searches the worktable for a DITI rack which contains the DITI type you have specified in the script command. To configure Freedom EVOware for a new DITI type, create a new DITI rack or duplicate an existing DITI rack and give the new labware a suitable name (e.g. "ZipTip").

**Note:** DITI racks are also used to store ZipTips.

**Note:** Te-MO DITI racks should be configured with the labware type "Te-MO DITI", not "DITI".



### DiTi Index

Freedom EVOware automatically assigns a unique numeric index to each DITI type. You cannot edit the index manually. The DITI index is used e.g. by the Set DITI Type command in worklists and in advanced worklists. The DITI index is shown in the Edit Labware dialog box for the DITI labware (Well Dimensions tab).



### Te-PS

This labware type Te-PS must only be used for the Te-PS Sensor Plate.

## 9.4.6 Well Alignment

The following table describes the two styles of well alignment supported by Freedom EVOware:

**Tab. 9-10** Well alignment

Type	Name	Comment
	Rectangular labware	This is labware where the wells are arranged in regular rows and columns, e.g. a standard microplate. The first well is rear left; the last well is right front.
	Rectangular labware with offset	This labware is similar to the rectangular type, but every second column is displaced in the +Y direction. The spacing of the wells in the Y direction is the same for all columns. In addition to specifying the X and Y positions of the first and the last well, you must also specify the Y position of the first well in the second row in the field "Y2 (column 2)".

## 9.4.7 Y-distance of Wells

If the pipetting operation specifies the use of more than one tip, Freedom EVOware adjusts the spacing between the tips in the Y direction to allow pipetting to take place on several wells simultaneously if possible. The tips are spread by a servo motor on the LiHa and the spacing is subject to physical limitations. The minimum spacing between adjacent tips is 9 mm and the maximum spacing is 38 mm, as shown by the light green area in the middle of the indicator. Freedom EVOware calculates the Y-distance (the spacing between adjacent wells) from the labware coordinates and the number of wells you have specified. This is shown by a vertical line which is colored either dark green or dark red. To optimize pipetting speed, the vertical line should lie within the green area. If the vertical line lies within the red area, you may have specified the coordinates incorrectly or inaccurately. Alternatively, you are using labware with a non-standard design. The yellow line shows half of the minimum Y-distance (i.e. 4.5 mm). If you are using microplates with 384 wells and choose this Y-distance, pipetting can take place simultaneously to every other well.

### 9.4.8 Labware Attributes

The following table describes the standard attributes (parameters) in the Freedom EVOware database which are available for labware. All attributes are automatically configured with appropriate values when Freedom EVOware is installed. You only need to change the settings for special applications. Labware attributes should only be changed by specialists.

**Tab. 9-11** Labware attributes

Field name	Default value	Description
Lid is allowed	0 (not allowed)	1 = a lid is allowed on this labware type. 0 = a lid is not allowed on this labware type. Read-only field - please set this attribute with the <i>Labware can have lid</i> checkbox in the advanced labware settings.
Location to store lid	<OBJECT>	Read-only field - Freedom EVOware writes the current location of the lid to this field when the script or process is running.
Lid grip offset narrow	0,0,0	Offset (in cm) from the taught position for gripping the lid of this labware type on the narrow side. <sup>a) b)</sup>
Lid grip offset wide	0,0,0	Offset (in cm) from the taught position for gripping the lid of this labware type on the wide side. <sup>a) b)</sup>
Plate grip offset narrow	0,0,0	Offset (in cm) from the taught position for gripping this labware type on the narrow side. <sup>a) b)</sup>
Plate grip offset wide	0,0,0	Offset (in cm) from the taught position for gripping this labware type on the wide side. <sup>a) b)</sup>
Force to grip plate	75	Specify the force to use when gripping plates (range: 0 to 249). A Grip Error message will be output if no resistance is detected when gripping.
Force to grip lid	60	Specify the force to use when gripping lids (range: 0 to 249). A Grip Error message will be output if no resistance is detected when gripping.

a) This allows the RoMa positions which have been taught to be shared by different labware types.

b) RoMa offset in the X, Y and Z direction (see 9.4.8.2 "RoMa Coordinate System", 9-29).

Other lid attributes can be set in the carrier definition. Broadly speaking, the lid attributes in the labware definition specify how to grip the lid; the lid attributes in the carrier definition specify where to store the lid if it is removed.

Labware attributes can also be used as variables in pipetting scripts (see 14.1.11 "Labware Attributes and String Variables", 14-17).

The Attributes dialog box for the Edit Labware dialog box normally shows descriptive names for the attributes. Check the *Show internal names* checkbox to see the internal names which are used.

Click *Add* to activate a **special attribute** for the labware and add it to the *Attributes* list. Special attributes are used to control advanced features in Freedom EVOware which normally dormant (inactive).

Check the *Show hidden attributes* checkbox to see additional, **hidden attributes** which should not normally be changed. They only need to be edited for special applications:

**Tab. 9-12** Labware attributes, hidden

Field name	Default value	Description
Monitoring (obsolete)	1 (shown)	This field is no longer used.
Locking (obsolete)	1	This field is no longer used.
Lid arrival (Plus only)	0,0,1	Movement of the RoMa arm (in cm) to remove the lid. The default moves the arm up by 1 cm. <sup>a)</sup>
Lid grip narrow	8.5	The spacing (in cm) between the RoMa grippers which should be used to grip the lid on the narrow side. To ensure a firm grip, the grippers will try to close by an additional 1 cm (this is limited by the specified grip force).
Lid grip wide	12.5	The spacing (in cm) between the RoMa grippers which should be used to grip the lid on the wide side. To ensure a firm grip, the grippers will try to close by an additional 1 cm (this is limited by the specified grip force).
Lid offset	0,0,0.8	Distance (in cm) from the bottom of the labware to the bottom edge of the lid. <sup>a)</sup>
Lid position	0,0,0	Read-only field - Freedom EVOware writes the current position of the lid within the lid location to this field when the script or process is running.
Barcode (Plus only)		Scanned barcode data is written to this field. It contains <none> if the barcode was not yet scanned; it contains a default barcode if the scanner was unable to read the barcode See Default Barcode in 8.5.1.1, 8-36.
Labware type (obsolete)	0	Labware type (for automatic positioning of the labware on the worktable): 1 = Source 2 = Pre-dilution 4 = Destination 32 = DiTi This field is no longer used.
Well count	96	Number of wells in the labware

**Tab. 9-12** Labware attributes, hidden (cont.)

Field name	Default value	Description
Plate type	1	Read-only field - please set this attribute with the <i>Washer plate type</i> field in the advanced labware settings. This variable is used by the Columbus Washer. It overwrites the plate type specified with the Columbus WashPlate device command.
File (obsolete)	<NONE>	This field is no longer used.
Source barcode (Plus only)		Barcode ID of the mother plate
Base location		Read-only field - Freedom EVOware writes the home location of the labware to this field when the labware is created.
Base position	1,1,1	Read-only field - Freedom EVOware writes the labware position within the base location to this field when the labware is created.
Finger type (obsolete)		This field is no longer used.
Location		Read-only field - Freedom EVOware writes the current location of the labware to this field when the script or process is running.
Position	1,1,1	Read-only field - Freedom EVOware writes the current position of the labware within the current location to this field when the script or process is running.
Grip narrow	8.5	The spacing (in cm) between the RoMa grippers which should be used to grip the labware on the narrow side. To ensure a firm grip, the grippers will try to close by an additional 1 cm (this is limited by the specified grip force).
Grip wide	12.5	The spacing (in cm) between the RoMa grippers which should be used to grip the labware on the wide side. To ensure a firm grip, the grippers will try to close by an additional 1 cm (this is limited by the specified grip force).
Offset between stacked plates (obsolete)	0,0,1	For stacked plates, distance from the bottom of the plate to the bottom of the next plate above <sup>a)</sup> . This field is no longer used.
Stacker type	1	Read-only field - please set this attribute with the <i>Stacker plate type</i> field in the advanced labware settings.

**Tab. 9-12** Labware attributes, hidden (cont.)

Field name	Default value	Description
Grip delta	0.5	Distance which is added to the grip distance when releasing the labware or lid. Example: If Grip_Narrow is 8.5 cm and Grip_delta is 0.5 cm, the grippers will open to 9 cm to release the labware.
StripCount, StripMask		See <a href="#">17.5 "Columbus Washer - Washing a Variable Number of Strips in the Plate"</a> , <a href="#">17-17</a> .
BCZoffset	450	Offset in device steps to adjust the vertical position of the barcode scanner. This setting is related to the distance between the barcode label and the bottom edge of the labware. Be aware that this value might get overwritten if for the CarouselNT device carrier an attribute BCZOffset is set, too.
Run_Parallel (Plus only)	1	Specifies the locking mode of the labware: 0 = If several process iterations want to use the same instance of this labware type, only one of them can run at the same time. The other processes (if any) must wait until the first process has finished. For example, this avoids a second process trying to pipette while the first process is still incubating the same labware. 1 = Labware is never locked; several process iterations can use the same instance of this labware type simultaneously. This is the default setting if the attribute Run_Parallel has not been defined. See also <a href="#">9.9</a> , <a href="#">9-60</a> .

a) RoMa offset in the X, Y and Z direction (see [9.4.8.2 "RoMa Coordinate System"](#), [9-29](#)).

**Table legend:** "Plus only" - only relevant for Freedom EVOware Plus.

### 9.4.8.1 Attributes for MCA384 labware

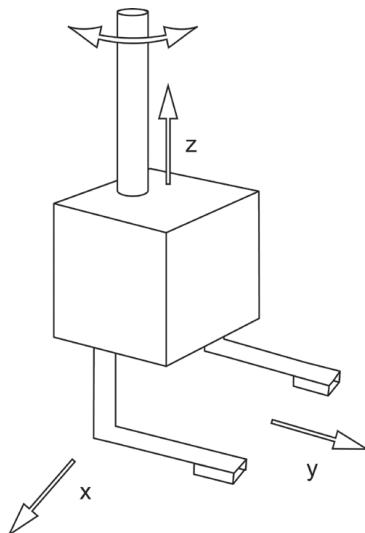
The following attributes are only relevant for labware which is used by the MCA384 (Multi Channel Arm with 96 or 384 tips):

**Tab. 9-13** Attributes for MCA384 labware

Field name	Default value	Description
RelMovesAllowed	-	Only for MCA384 head adapters: 0 = The head adapter can pick up all of the DITIs but not one row or one column. 1 = The head adapter can pick up one row or one column of DITIs in addition to picking up all of the DITIs. This requires a special head adapter (e.g. "Combo") and a relative movement of the pipetting head.
DropOffset	-	This attribute is no longer used and should be set to "0".
TipOffset	0,0	Only for MCA384 head adapters for DITIs: Offset of the tips (in 0.1 mm) compared to the head adapter for fixed tips. For example, with the "MCA Adapter 384 DITIs" the tips are displaced by 0.8 mm in the Y direction (0,8). With the "MCA Adapter 96 DITIs" the tips are displaced by -3.7 mm in the Y direction (0,-37).
YShift	-145	Only for MCA384 head adapters: The pipetting head movement which is required in the Y direction to pick up or put down the head adapter. It is dependent on the gear ratio of the bayonet locking mechanism and is normally -145.
PlateHardwareID	-	Only for MCA384 head adapters: Head adapter ID. All head adapter types have an ID (magnetic bit pattern from 1 to 15) to allow automatic identification by the pipetting head. It is used to check that the correct head adapter has been mounted.
MCA384AbsolutePlungerPosition	-	Only for MCA384 DITI racks: The height of the MCA384 DITI racks depends on the type. This parameter specifies the plunger height which is required to mount the DITIs. Specify 27000 for 50 µl and 125 µl DITIs. Specify 8500 for 15 µl DITIs.

### 9.4.8.2 RoMa Coordinate System

The plate robot (RoMa) has its own coordinate system which rotates with the RoMa:



**Fig. 9-10** RoMa coordinate system

The Y axis is aligned with the current direction of the gripper fingers. The X axis is perpendicular to the current direction of the gripper fingers.

In the dialog box for the Move RoMa command, RoMa coordinate “x” is labelled “A” and “y” is labelled “B” to avoid confusion with the worktable coordinates X, Y and Z.

## 9.5 Configuring Carriers

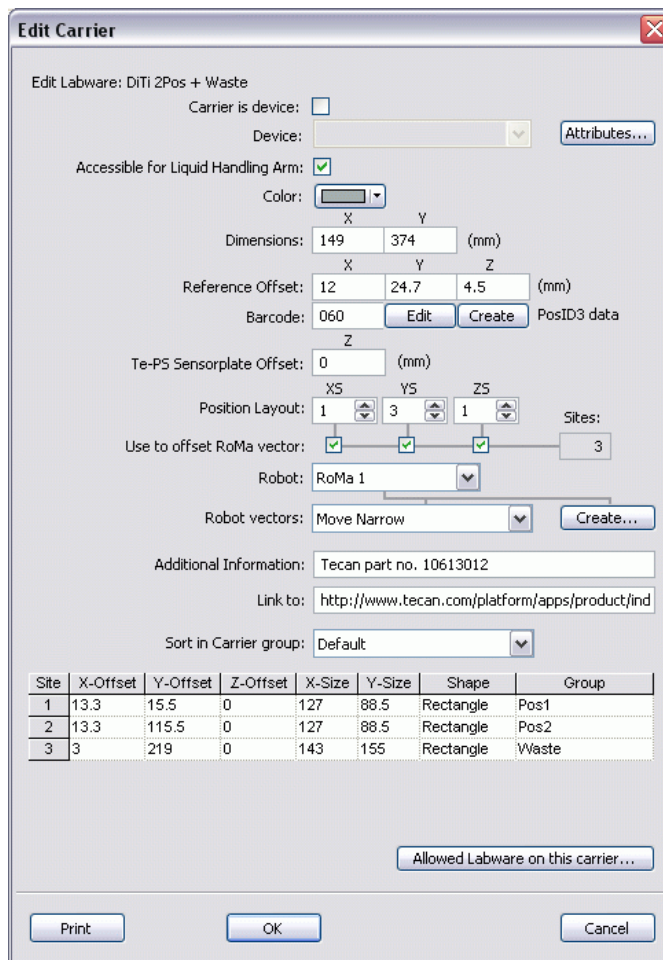
A carrier is a removable support on the instrument's worktable (i.e. deck) which holds one or more pieces of labware in place. Carriers can be fitted to the instrument's worktable at pre-defined grid positions (see Fig. 9-1, 9-3).

In Freedom EVOware, carriers are also used to represent positions on devices which can be accessed by the plate or tube robot. For example, the plate robot can put a microplate onto the shuttle of the Te-Stack stacker when the shuttle is at the transfer position.

The carrier name indicates the labware type for which it is designed (for device carriers, it indicates the device type).

**Note:** The Freedom EVOware database already contains a large selection of pre-defined carrier and labware types. You only need to create or edit carriers or labware if you cannot find a standard item which is suitable for your needs.

The following dialog box is used to configure carriers (to get to this dialog box, double-click on the carrier in the Carrier section of the Control Bar):



**Fig. 9-11** Edit Carrier dialog box

It is recommended not to change the properties of the predefined carrier and labware types. Make a copy of the object with a new name if you want to alter any of the properties (see 5.4.1.10 “Context Menu for Objects in the Control Bar”, 5-13).


The parameters in the Edit Carrier dialog box are as follows:



**Carrier is device**

Check this checkbox and choose the device type (e.g. “Carousel”) from the *Device* pull-down list if the carrier you are configuring represents a device. The device will then appear as an icon in the Worktable Editor, around the edge of the pipetting area (the gray area). Do not check *Carrier is device* if the carrier is not a device.

For devices which are available in several versions (e.g. Te-Shake Shaker), *Carrier is device* must only be checked for the device version which you are actually using. By default, *Carrier is device* is only checked for Te-Shake 2Pos. If instead you are using e.g. Te-Shake 1Pos Front, uncheck this checkbox for Te-Shake 2Pos, check it for Te-Shake 1Pos Front and then choose *Shaker* from the *Device* pull-down list. Tip: The assigned device type is shown in the device icon in the Worktable Editor.

Use the Duplicate Device tool to create copies of the device driver if you want to use more than one Te-Shake Shaker (either the same or different versions). See [A.11.3 “Duplicate Device Tool”](#),  [A-39](#).

**Note:** *If you click on a device icon in the Worktable Editor, an orange line shows the worktable grid position which is occupied by the device. By default, devices are configured for grid position 1, at the left edge of the worktable. Right-click the device icon, choose Set Grid and choose the actual grid position. This is not strictly necessary for devices which are rigidly attached to the pipetting instrument (you must check and/or teach the RoMa movement vectors in this case). For devices which are clipped to the locating pins of the worktable, the supplied RoMa vectors will only work correctly if the actual grid position is set correctly.*

**Attributes**

See [9.5.4 “Carrier Attributes”](#),  [9-38](#) for information on carrier attributes.

**Accessible for liquid handling arm**

Check this checkbox if the carrier can be accessed by the LiHa for pipetting. This allows you to put the carrier on the pipetting area of the worktable (by dragging it from the Control Bar to the gray area in the Worktable Editor).


Uncheck this checkbox if the carrier can only be accessed by a plate or tube robot. This is the case with most devices. Devices are normally positioned on the worktable to the rear of the pipetting area or at the left or right side (some devices such as the centrifuge are mounted below a cutout in the worktable).

Three exceptions are the Te-Shake shaker (the LiHa can pipette onto labware on the shaker), the Te-MO (the LiHa can pipette onto labware on Te-MO slides) and the Te-Stack stacker (the LiHa can pipette onto labware which is placed on the shuttle at the Te-Stack transfer position).

**Color**

Choose a unique color to make it easier for you to identify this carrier type in the Worktable Editor. The default color for carriers is gray.

**Dimensions**

Specify the X and Y dimensions of the carrier outline in millimeters. See [9.5.1 “Carrier Dimensions and X/Y Offsets”](#),  [9-37](#).

**Reference offset**

The X reference offset is the distance in millimeters between the left edge of the carrier and the closest positioning pin on the worktable below the carrier. The Y reference offset is the distance in millimeters between the rear edge of the carrier and the closest positioning pin on the worktable below the carrier.

The Z reference offset is the vertical distance in millimeters between the top surface of the worktable and the bottom edge of the labware on the carrier. See [9.5.1 “Carrier Dimensions and X/Y Offsets”](#), [9-37](#) and [9.5.2 “Z Offsets for Carriers”](#), [9-38](#).

### Barcode

Specify the carrier code for the carrier. This is the first three digits of the barcode at the end of the carrier. All standard Tecan carriers have a unique carrier code. Only use barcode numbers in the range 500 to 999 for custom carriers.

If the PosID cannot scan the carrier or labware on the carrier due to a special carrier design, please set the Barcode field to “000”.

You cannot specify a barcode for a Robot only carrier (see the *Accessible for liquid handling arm* checkbox, above). The Barcode field is inactive (gray) in this case. Carriers which are devices do not have barcodes. Specify “000” if the Barcode field is active (not gray).

Carrier barcodes are not applicable to the Te-MO. The Barcode field should be left blank or specified as “000” in this case.

**Edit and Create buttons:** If your pipetting instrument is fitted with a PosID-3 barcode scanner, for some carrier types you will see Edit and Create buttons next to the Barcode field. These buttons are used to edit and create advanced barcode properties and barcode position information for the carrier. The Freedom EVOware database already contains advanced barcode properties for most common carrier types.

This configuration feature is only intended for specialists. Please contact Tecan for further information.

### Te-PS Sensor Plate Offset (Z)

Standard carriers for microplates normally have a raised plateau which fits into a recess in the bottom of the plate (Te-PS carriers do not have a raised plateau and the Te-PS Sensor plate has a flat bottom without a recess). Accordingly, the Te-PS Sensor plate sits higher on a standard carrier than a microplate. If the carrier has a raised plateau, specify its height with this parameter (range: 0 to 10 mm). This parameter is only used if you place a Te-PS Sensor plate on a standard carrier for the purpose of arm alignment.

### Position layout

Specify the number of positions (sites) which are available for labware in the X, Y and Z directions. The product  $X * Y * Z$  is the total number of sites (the maximum number of labware items that the carrier can accommodate). The total number of sites must not exceed 396.

The position layout for the 3-position microplate carrier is  $X=1, Y=3, Z=1$  (total of 3 sites). The RoMa can access all 3 sites by moving in the Y direction.

The position layout for a common type of incubator is  $X=1, Y=1, Z=6$  (total of 6 sites). The RoMa can access all 6 sites by moving in the Z direction.

The Te-MO 3x5 has 5 sites on each of 3 slides ( $X=3, Y=5, Z=1$ ). To allow the RoMa to access all 15 sites, the slides move automatically to position the required site at the RoMa transfer position.

If you are configuring the carousel carrier, see also [9.5.4.3 “Carousel Carrier Attributes”](#), [9-41](#) and [9.5.4.4 “Carousel NT Carrier Attributes”](#), [9-43](#).

**Use to offset RoMa vector**

Check the checkboxes to indicate how many unique sites the device or carrier has for the RoMa to access. The total number of RoMa sites is shown in the Sites field. The checkboxes determine the directions in which the RoMa needs to move to access the sites (X, Y and/or Z).

For most carrier types, you should check all three checkboxes (X, Y and Z).

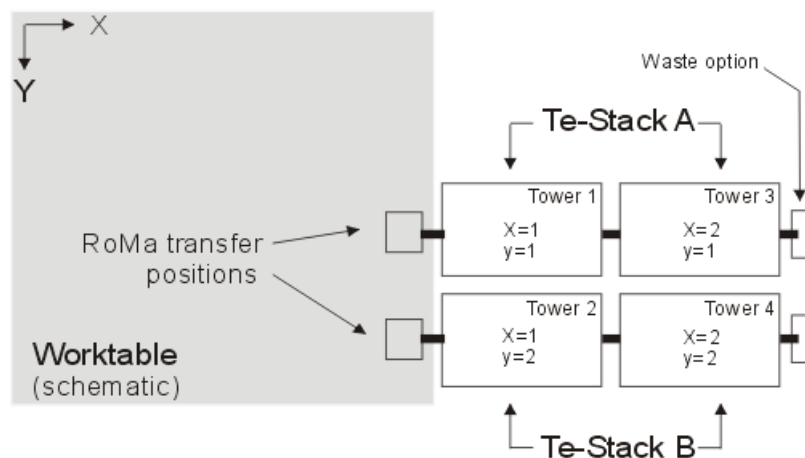
**Special cases:**

A common type of carousel has 9 towers and 21 microplates per tower (X=1, Y=9, Z=21, 189 labware items) but only one site for the RoMa to access (the carousel transfer position). In this case, you should only check the X column.

A single Te-Stack has 1 or 2 towers and 50 microplates per tower (X=1 or 2, Y=1, Z=50) but only one site for the RoMa to access (the Te-Stack transfer position). In this case, you should only check the Y column.

A double Te-Stack has 4 towers, 50 microplates per tower and two sites (transfer positions) for the RoMa to access (X=2, Y=2, Z=50). The RoMa can access both transfer positions by moving in the Y direction, so you should only check the Y column (total of 2 RoMa sites).

Use the Te-Stack Right carrier if the Te-Stack is mounted on the right side of the worktable; use the Te-Stack Left carrier if the Te-Stack is mounted on the left side of the worktable:



**Fig. 9-12** Double Te-Stack Right (with the default tower configuration)

The Te-Stack X and Y coordinates are not the same as the worktable grid coordinates.

**Robot**

The pipetting instrument uses robots to pick up and put down labware on carriers. Movement commands for robots are called “robot vectors”. If you want to create or edit a robot vector for this carrier, you must first choose the robot you want to use (RoMa, MCA96 or CGM for the MCA384).

If your pipetting instrument is fitted with two plate robots (RoMa 1 and RoMa 2), you should create a vector for both plate robots for all carriers which can be accessed by both robots. Tip: the home position for plate robot 1 is at the rear left of the instrument.

### Robot vectors

Choose the required robot vector type from the list and click Create (the button changes to Edit if the robot vector has already been created).

See 9.6.1 “Using RoMa Vectors”,  9-49 for information on robot vector types.

### Additional information

This field is for information purposes only and allows you to enter some notes about this carrier type. When you first install Freedom EVOware, this field shows the Tecan part number of the carrier.

### Link to

This field is for information purposes only and is intended for the internet address (website URL) of the carrier manufacturer.


### Sort in Carrier group

The Carriers tab in the Control Bar is subdivided into groups for Devices, Hotels, Microplate Carriers, DITI Carriers, Wash Stations, Trough Carriers, Tube Carriers (tube racks) and Miscellaneous Carriers. Choose the group where you want this carrier to be shown in the Control Bar. Choose Default to use the default Control Bar group for this carrier.


### Table of sites and offsets

The table is used to configure dimensions for the sites and offsets. All dimensions are in millimeters.


#### X-Offset, Y-Offset

The X offset for sites is the distance between the left edge of the carrier and the left edge of the labware at the respective site. The Y offset for sites is the distance between the rear edge of the carrier and the rear edge of the labware at the respective site. See [Fig. 9-15](#),  [9-37](#).

#### Z-Offset

The Z offset for sites is normally “0” and is only specified non-zero if the sites on the carrier are not at the same height. You can specify either negative or positive values in this case. See [Fig. 9-16](#),  [9-38](#).

#### X-Size, Y-Size

X-Size and Y-Size are the outline dimensions of the site. See [Fig. 9-15](#),  [9-37](#).

#### Shape

Shape must always be *Rectangle*.

#### Groups

For carriers or devices with more than one site, if the sites have different mechanical characteristics you can specify labels (names) in the groups column to group equivalent sites into a single Freedom EVOware location. Freedom EVOware Plus automatically chooses which site it will use from the group when optimizing the schedule.



### ATTENTION

Be careful when assigning groups to a carrier that is already in use in other processes as this can have unpredictable consequences like pipetting to the wrong or an empty site!

For example, the three towers of the Te-Stack Te-MO can only put plates on the front two sites of the respective Te-MO slide. For mechanical reasons, the sites at the rear of the Te-MO are not accessible to the stacker. In this case, assign the front two sites of each Te-MO slide to a separate group. For example, assign the group labels “Stack1” to sites 4 and 5, “StackM” to sites 9 and 10 and “Stack2” to sites 14 and 15. Choose descriptive labels with no space characters.

A group is also needed for the Te-MO if you are using Active Positioning Carriers (APCs) but you have not fitted them to all sites. Assign the group label “APC” to the APC sites and put the labware onto one of the APC sites. If Freedom EVOware decides to use another Te-MO site or slide for pipetting, it will only use the APC sites.

The location groups you have created will be shown in dialog boxes which allow you to choose locations. The group name you have chosen is shown appended to the end of the carrier name, e.g. Te-MO\_3x5\_Stack1.

You can also use a label in the Groups column to identify a single site.

For example, you can assign a group label (e.g. “DITI-Waste”) to the waste site of a DITI carrier if you want Freedom EVOware Plus to use it for discarding racks with used DITIs. You must then specify this site for MoveLocation2 in the respective RoMa\_ReplaceObject command (see [9.8.3.1 “Editing Custom Pre-actions and Post-actions”](#), 9-57, “Usage Example”). If you don’t specify a specific waste site, Freedom EVOware Plus will return DITI racks with used DITIs to their base (labware source) location, e.g. the carousel.

If you want to use group labels, you must assign labels to all sites of the carrier, not just one site.

The numbering of the sites inside a group is different from the normal carriers. The sites are counted from top to bottom and left to right. Only the Y index is increased. For example: there are DITI boxes standing on sites 1/1/1, 1/2/1, 2/1/1 and 3/1/1 of an MP 12Pos carrier. However, as the DITI sites are grouped the numbering is now like this:

Site	X-Offset	Y-Offset	Z-Offset	X-Size	Y-Size	Shape	Group
1	2.4	3	0	127	85.5	Rectangle	DITI
2	2.4	99.6	0	127	85.5	Rectangle	DITI
3	2.4	195.8	0	127	85.5	Rectangle	plate
4	2.4	292.7	0	127	85.5	Rectangle	plate
5	141.4	3	0	127	85.5	Rectangle	DITI
6	141.4	99.6	0	127	85.5	Rectangle	plate

Fig. 9-13 Group definition

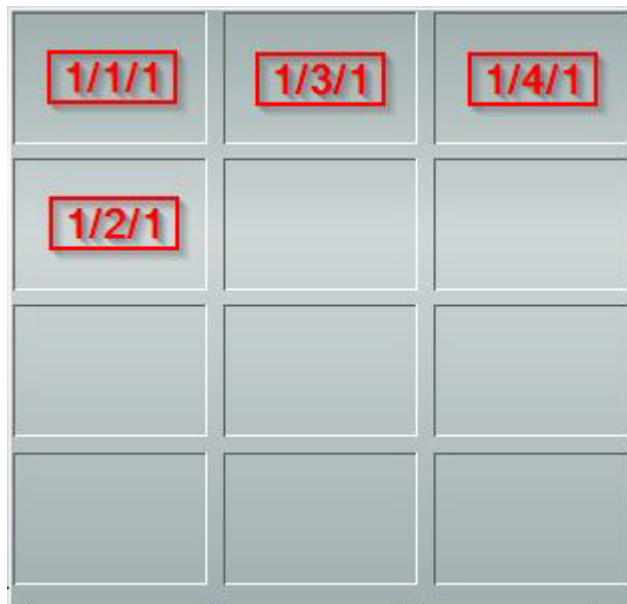


Fig. 9-14 Group carrier

This could be of interest when using the Process Recovery Wizard (see [17.2.2.2 "Process Recovery Wizard, Recovery Settings"](#), 17-11).

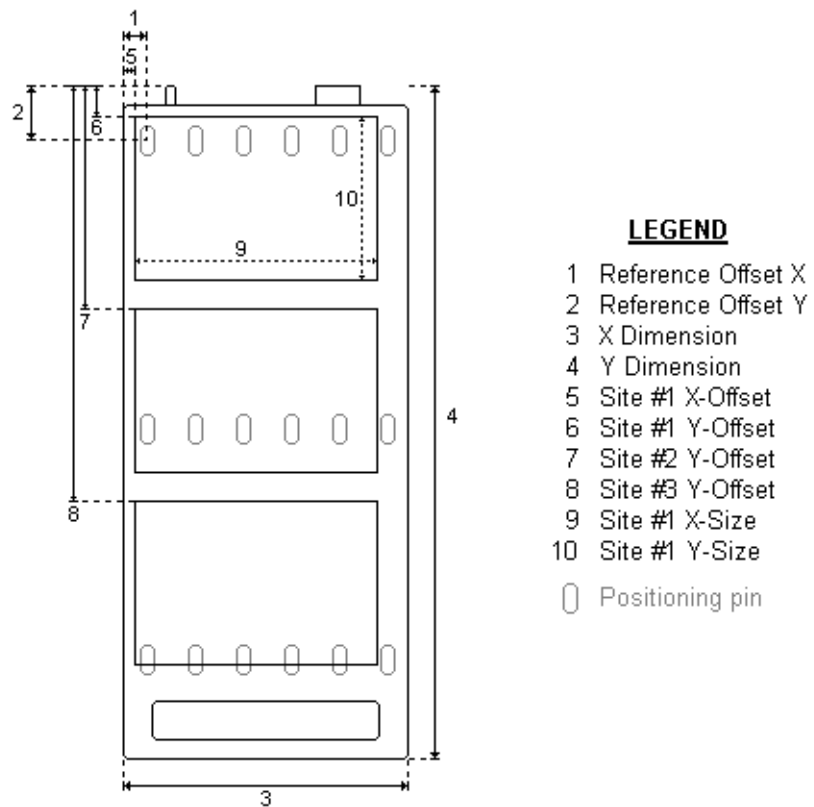
The Groups function is not relevant for Freedom EVOware Standard.

**Allowed Labware on this carrier**

For each of the labware types which can be used with this labware carrier or device carrier, check the checkboxes alongside the allowed sites.

**9.5.1 Carrier Dimensions and X/Y Offsets**

The figure below shows how to define the various dimensions for a carrier. The example is for the standard Tecan carrier *Microplate, 3 Pos., landscape*. The carrier type which is shown has a nose which extends beyond the rear edge. The positioning pins (shown in grey) are clipped to the worktable and are partially hidden from view by the carrier.



**Fig. 9-15** Carrier dimensions and X/Y offsets

### 9.5.2 Z Offsets for Carriers

The figure below shows how to specify the reference offset Z (the vertical distance in millimeters between the top surface of the worktable and the bottom edge of the labware on the carrier). It does not refer to the top edge of the labware:

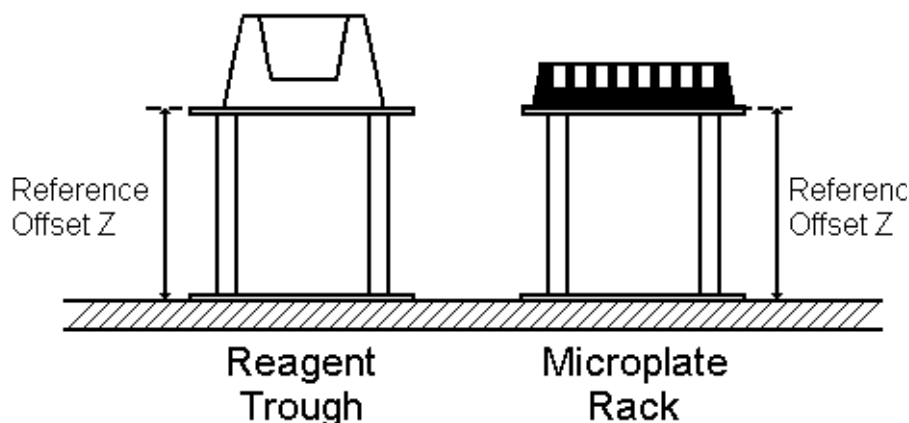


Fig. 9-16 Specifying the Z offset for carriers

### 9.5.3 Custom Objects

Proceed as follows if you want to define a custom object which is neither a carrier nor labware (i.e. it cannot be disassembled into a carrier and one or more pieces of labware). Define it as a new carrier and only specify X and Y dimensions for the carrier and X-Size and Y-Size for the site. Then define a new labware item, assign it to the site, specify the grid position and measure its coordinates as described in 9.4.4 “Teaching the Labware Coordinates”, 9-20. After saving the configuration you can use the custom object on the worktable anywhere where it is required.

### 9.5.4 Carrier Attributes

The following tables describe the standard attributes (parameters) in the Freedom EVOware database which are available for carriers (including carriers which are devices). All attributes are automatically configured with appropriate values when Freedom EVOware is installed. You only need to change the settings for special applications. Carrier attributes should only be changed by specialists.

Carriers which are devices normally require you to specify the server name, as follows (the example is for the centrifuge):

Tab. 9-14 Carrier attributes, centrifuge

Field name	Default value	Description
Server	Centrifuge	Specify the call name for the device (the internal name of the device driver).

Most of the carriers require you to specify Grip orientation, Lid is allowed, Location to store lid and Allowed robots. These attributes are described in 9.5.4.1 “Labware



[Carrier Attributes](#), ¶ 9-40. To save space, these descriptions are not repeated for each of the available carrier types.

The Attributes dialog box for the Edit Carrier dialog box normally shows descriptive names for the attributes. Check the *Show internal names* checkbox to see the internal names which are used.

Click *Add* to activate a special attribute for the carrier and add it to the *Attributes* list. Special attributes are used to control advanced features in Freedom EVOware which normally dormant (inactive).

Check the *Show hidden attributes* checkbox to see additional attributes which should not normally be changed. They only need to be edited for special applications.

### Custom grip position

Some special carrier types and device carriers (e.g. readers) may require you to grip the labware at a non-standard grip height or grip position, for example to avoid a collision with adjacent mechanical components. The non-standard grip position is specified with the special carrier attributes Maximum grip offset and Minimum grip offset:

**Tab. 9-15** Carrier attributes, custom grip position for labware

Field name	Default value	Description
Maximum grip offset	0,0,0	Maximum position (in cm) for gripping labware for use on this carrier. <sup>a)</sup>
Minimum grip offset	0,0,0	Minimum position (in cm) for gripping labware for use on this carrier. <sup>a)</sup>

a) RoMa offset in the X, Y and Z direction (see 9.4.8.2 “RoMa Coordinate System”, ¶ 9-29).

See 8.5.10.2 “Plate Robot Configuration - Settings Tab”, ¶ 8-54, Custom grip position, for more information.

If the above two attributes are not visible in the Attributes list, click *Add* to activate them (the internal names are Grasp\_Location\_max and Grasp\_Location\_min).

**Note:** The labware attributes *Plate Grip Offset Narrow* and *Plate Grip Offset Wide* adjust the grip position globally for this labware type (not just for a specific carrier).

### 9.5.4.1 Labware Carrier Attributes

The attributes which you can configure for labware carriers are as follows:

**Tab. 9-16** Labware carrier attributes

Field name	Default value	Description
Grip orientation	narrow (narrow side)	This field specifies whether the RoMa should grip labware on this carrier on the narrow side or wide side. If you specify “narrow”, make sure that you have created a “Move Narrow” RoMa vector for this carrier (vice versa for “wide”) <sup>a)</sup> .
Lid is allowed	no (not allowed)	Specify “yes” if a lid is allowed on labware which is on this carrier.
Location to store lid	<base> (original position of labware)	If lids are not allowed on labware which is on this carrier, the lid will be removed from the labware and moved to the location specified in this field <sup>b)</sup> (see <a href="#">17.9 “Lidingstation to Remove Lid at a Specified Location in EVOware Plus”</a> , <a href="#">17-36</a> ).
Allowed robots		Comma separated list of all plate robots that can safely access this location (e.g. “RoMa, RoMa2”). The robot names are case sensitive. If this field is left empty, Freedom EVOware assumes that all plate robots can safely access this location. The list may be necessary if e.g. the carrier is positioned at the extreme left or extreme right of the worktable.
SafeMoveOffset	0	X-offset in mm for safe LiHa movement to and from the pipetting position (see <a href="#">17.4 “Safe Pathways Feature”</a> , <a href="#">17-15</a> ).
SafeMoveSpeed		Speed to use for movements along safe paths in mm/s (see <a href="#">17.4 “Safe Pathways Feature”</a> , <a href="#">17-15</a> ).
Safety	1	Only for the MCA384 DITI Carrier: 1 = Close the locking mechanism when mounting DITIs from the MCA384 DITI Carrier. 0 = Do not close the locking mechanism.
ZTravel	-	Only if you choose <i>Positioning with advanced Z-travel</i> in the Configuration Tool. If the ZTravel parameter is non-zero, it is used for Z-travel height instead of the taught Z-travel height.

a) If you specify “narrow” and the physical orientation of the carrier site is landscape (e.g. the “MP 3 Pos” carrier), the RoMa will grip the labware from the side of the worktable (with the grippers pointing in the direction X or -X), not from the front (vice versa for “wide”).

b) Broadly speaking, the lid attributes in the labware definition specify how to grip the lid; the lid attributes in the carrier definition specify where to store the lid if it is removed.

Other lid attributes can be set in the labware definition. Broadly speaking, the lid attributes in the labware definition specify how to grip the lid; the lid attributes in the carrier definition specify where to store the lid if it is removed.

Check the *Show hidden attributes* checkbox to see additional, **hidden attributes** which should not normally be changed. They only need to be edited for special applications:

**Tab. 9-17** Labware carrier attributes, hidden

Field name	Default value	Description
Lid_position	0,0,0	Specify the required position of the lid within the lid location. <sup>a)</sup>
Dimension	-	Read-only field - please set this attribute with the <i>Position Layout</i> pull-down lists in the Edit Carrier dialog box.
Occupation	0	For internal use only.
Speed	-	Allowed maximum speed of RoMa movement in % of full RoMa speed when moving to this location.
Dimension_mask	1,1,1	Read-only field - please set this attribute with the <i>Use to offset RoMa vector</i> checkboxes in the Edit Carrier dialog box. <sup>a)</sup>

a) X, Y and Z RoMa movements in cm (see 9.4.8.2 "RoMa Coordinate System", 9-29).

#### 9.5.4.2 Barcode Scanner Carrier Attributes

The additional attributes which you can configure for the barcode scanner carrier are as follows:

**Tab. 9-18** Carrier attributes, barcode scanner

Field name	Default value	Description
Server	BarcodeScanner	Specify the call name for the device (the internal name of the device driver).
Device requires release of labware	no	With most devices such as the Te-Shake shaker, the RoMa puts the labware onto the device. The barcode scanner is an on-the-fly device - the RoMa presents the labware to the scanner but does not release it. Specify "no" in this field for on-the-fly devices.

See 9.5.4.1 "Labware Carrier Attributes", 9-40 for descriptions of the other attributes.

#### 9.5.4.3 Carousel Carrier Attributes

The additional attributes which you can configure for the Carousel carrier are as follows:

**Tab. 9-19** Carrier attributes, Carousel

Field name	Default value	Description
Slot pitch height	1925	Specify the vertical distance in device steps between the bottoms of adjacent labware items in the same tower. This information is required by the carousel feeder mechanism. The slot pitch height also determines how many labware items will fit in the carousel tower. If you change this setting, you may need to correct the YS setting in the position layout for the carousel carrier (see <a href="#">9.5 "Configuring Carriers"</a> , ¶ 9-29).
Starting cartridge in carousel	1	The carousel must be subdivided into several logical carousels (separate sets of towers) if you want to use it to store a mixture of labware types with different dimensions. To create logical carousels, make copies of the carousel carrier (right-click the carrier in the Control Bar and choose Duplicate) and specify the starting tower, the slot pitch height, the Y dimensions (number of towers) and a new name for each copy. <sup>a)</sup> The settings for starting tower and number of towers must not overlap the settings of other logical carousels for this device. You should not put labware with different dimensions in the same tower.
Server	Carousel	Specify the call name for the device (the internal name of the device driver).
Transfer height	5000	Specify the height of the handler (shuttle) in device steps when it is positioned at the carousel transfer position.

a) You must restart Freedom EVOware after creating the logical carousel(s).

See [9.5.4.1 "Labware Carrier Attributes"](#), ¶ 9-40 for descriptions of the other attributes.

#### 9.5.4.4 Carousel NT Carrier Attributes

The additional attributes which you can configure for the Carousel NT carrier are as follows:

**Tab. 9-20** Carrier attributes, Carousel NT

Field name	Default value	Description
Starting cartridge in carousel	1	The carousel must be subdivided into several logical carousels (separate sets of towers) if you want to use it to store a mixture of labware types with different dimensions. To create logical carousels, make copies of the carousel carrier (right-click the carrier in the Control Bar and choose Duplicate) and specify the starting tower, the slot pitch height, the Y dimensions (number of towers) and a new name for each copy. <sup>a)</sup> The settings for starting tower and number of towers must not overlap the settings of other logical carousels for this device. You should not put labware with different dimensions in the same tower. For the Carousel NT, slot pitch height is configured in the driver.
BCZOffset	450	Offset in device steps to adjust the vertical position of the barcode scanner. This setting is related to the distance between the barcode label and the bottom edge of the labware. Be aware that this value might get overwritten if for the labware on the device carrier an attribute BCZOffset is set (see <a href="#">Tab. 9-12 "Labware attributes, hidden"</a> , <a href="#">9-25</a> ).
Server	CarouselNT	Specify the call name for the device (the internal name of the device driver).

a) You must restart Freedom EVOware after creating the logical carousel(s).

See [9.5.4.1 "Labware Carrier Attributes"](#), [9-40](#) for descriptions of the other attributes.

#### 9.5.4.5 Centrifuge Carrier Attributes

The additional attributes which you can configure for the centrifuge carrier are as follows:

**Tab. 9-21** Carrier attributes, centrifuge

Field name	Default value	Description
Server	Centrifuge	Specify the call name for the device (the internal name of the device driver).

See [9.5.4.1 "Labware Carrier Attributes"](#), [9-40](#) for descriptions of the other attributes.

#### 9.5.4.6 Incubator Carrier Attributes

See 8.5.3 “Settings for Heated Incubators 1 to 3”, 8-41 for information on logical incubators.

#### 9.5.4.7 Pooling Balance Carrier Attributes

The additional attributes which you can configure for the Mettler pooling balance are as follows:

**Tab. 9-22** Carrier attributes, Mettler pooling balance

Field name	Default value	Description
Carrier is a pooling balance	No	Choose <b>Yes</b> if the balance is a pooling balance. See 10.1.1 “Global Parameters for Liquid Classes”, 10-4, Liquid Arrival Check for more information.
Enforce tip-wise dispensing	No	The Liquid Arrival Check feature normally verifies that the correct liquid volumes have been dispensed by weighing the labware after pipetting from all of the tips which are selected in the pipetting command. If a volume discrepancy is detected, it is not possible to identify which tip has pipetted inaccurately. Choose <b>Yes</b> if you want to verify the pipetted volume for each tip separately. The pipetting operation will take significantly longer in this case.

See 9.5.4.1 “Labware Carrier Attributes”, 9-40 for descriptions of the other attributes.

For more information on the pooling balance, see Liquid Arrival Check in 10.1.1 “Global Parameters for Liquid Classes”, 10-4.

#### 9.5.4.8 Te-Shake Carrier Attributes

The additional attributes which you can configure for the Te-Shake carrier are as follows:

**Tab. 9-23** Carrier attributes, Te-Shake

Field name	Default value	Description
Server	Shaker	Specify the call name for the device (the internal name of the device driver).
DeviceIDs <sup>a)</sup>	7	Hardware address of the shaker plus 1. Read-only field - please set this attribute with the Settings tab of the Te-Shake driver in the Configuration Tool.
Has heater <sup>a)</sup>	0	Specify 1 if the shaker is fitted with the heater option.
Init temperature <sup>a)</sup>	0	If the shaker is fitted with the heater option, specify the initial temperature.

*a) Hidden attribute. Click the Show hidden attributes checkbox to make it visible.*

See 9.5.4.1 “Labware Carrier Attributes”, 9-40 for descriptions of the other attributes.

See also 16.14 “Commands for the Te-Shake Shaker”, 16-43 for more information on the Te-Shake carrier.

#### 9.5.4.9 Te-Stack Carrier Attributes

The additional attributes which you can configure for the Te-Stack carrier are as follows:

**Tab. 9-24** Carrier attributes, Te-Stack

Field name	Default value	Description
Allowed robots		Comma separated list of all plate robots that can safely access this location (e.g. “RoMa, RoMa2”). The robot names are case sensitive. If this field is left empty, Freedom EVOware assumes that all plate robots can safely access this location.
PlateStacker	1	Always specify 1 to indicate that this is a last-in first-out stacking device (if a microplate is removed from the stacker, all of the other ones will slide down one position).
Server	Te-Stacker	Specify the call name for the device (the internal name of the device driver).
WasteLocation		0 = Do not use the Te-Stack Waste option. 1 = Use the Te-Stack Waste option. Labware returned to the Te-Stack will then be discarded to the Te-Stack Waste. The Te-Stack Waste hardware option is mainly intended for discarding empty DITI racks. WasteLocation is a hidden attribute.

See 9.5.4.1 “Labware Carrier Attributes”, 9-40 for descriptions of the other attributes.

### 9.5.4.10 Te-Stack Te-MO Carrier Attributes

The additional attributes which you can configure for the Te-Stack Te-MO carrier are as follows:

**Tab. 9-25** Carrier attributes, Te-Stack Te-MO

Field name	Default value	Description
Allowed robots	Te-StackTeMO	Always specify Te-StackTeMO.
PlateStacker	1	Always specify 1 to indicate that this is a last-in first-out stacking device (if a microplate is removed from the stacker, all of the other ones will slide down one position).
Server	Te-StackTeMO	Specify the call name for the device (the internal name of the device driver).

See [9.5.4.1 “Labware Carrier Attributes”](#), [§ 9-40](#) for descriptions of the other attributes.

## 9.6 Creating and Editing Plate Robot Vectors

The plate robot (RoMa, robot manipulator) is a robot arm with gripper fingers that can grip and move objects within the working area of the pipetting instrument. It can be used to transport microplates, reagent blocks, deep well plates, etc. between carriers, incubators and storage positions (e.g. a RoMa shelf or carousel). Current Tecan pipetting instruments can be fitted with up to two RoMas. RoMa actions such as getting a microplate from a RoMa hotel or putting it onto a carrier are stored in the Freedom EVOware configuration. Each RoMa action is called a RoMa vector, which is a predefined sequence of RoMa positions (called waypoints). RoMa vectors are associated with carriers.

Movement vectors for the MCA96 gripper and the CGM of the MCA384 are very similar in principle to RoMa vectors, so they will not be described explicitly in this chapter.

In Freedom EVOware Standard, RoMa actions are specified by adding RoMa commands to your pipetting script. The RoMa Vector and Transfer Labware commands specify the RoMa vector you want to execute (see [15.51 “RoMa Vector Command”](#), [§ 15-111](#), [15.52 “Transfer Labware Command”](#), [§ 15-113](#) and [15.50 “Move RoMa Command”](#), [§ 15-110](#)).

In Freedom EVOware Plus, RoMa movements are carried out automatically when the process is run. Freedom EVOware Plus automatically chooses the carriers and sites which will be used for pipetting to maximize the throughput (efficiency) of the process. It then chooses the RoMa vectors which are needed to move the labware to and from these sites. You only need to make sure that the appropriate RoMa vectors are available for the carrier types you want to use.

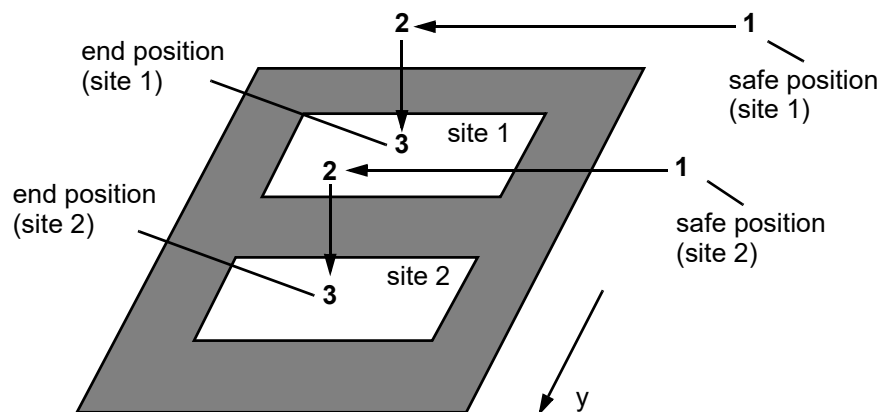
RoMa vectors can have up to 7 waypoints, but must have at least two. The first waypoint is called the safe position and the last waypoint is called the end position.

- ♦ The **safe position** is where the RoMa starts its movement towards the site to pick up or to release the object (e.g. the microplate). It should be chosen such



that the RoMa can move to the safe position of another RoMa vector or to the RoMa home position without colliding with other objects on the worktable.

- ◆ The **end position** is where the RoMa grips or releases the object.
- Each RoMa vector is associated with a carrier. If the carrier is moved on the worktable, the RoMa vector moves along with it and does not need to be redefined. Accordingly, you only have to define a RoMa vector once for each carrier type, and you can then use it for any worktable position of this carrier type. In addition, Freedom EVOware automatically recalculates the RoMa vector for each site of the carrier (it gets information on the spacing between the sites from the carrier definition). So you only need to define a RoMa vector for one of the sites (typically the first site).



**Fig. 9-17** Two site carrier showing two RoMa movements with three waypoints each

The above figure shows two RoMa vectors for a two site carrier. In the example, each Roma vector has three waypoints (1, 2 and 3). Freedom EVOware automatically calculates the RoMa vector for site 2 from the RoMa vector for site 1.

Up to four RoMa vectors can be created for each carrier type:

- ◆ Approach Narrow
- ◆ Move Narrow
- ◆ Approach Wide
- ◆ Move Wide

See [9.6.1 “Using RoMa Vectors”](#), ¶ 9-49 for more information on these vectors. They are associated with carriers and are stored in the carrier definition (see [9.6.2 “Teach Plate Robot Vector Dialog Box”](#), ¶ 9-50).

You also need to create a RoMa vector which moves the RoMa back to the home (parking) position, out of the way of other objects on the worktable (you need to define two home vectors if your instrument is fitted with two RoMas). See [9.6.4 “Defining the Home Position for a RoMa”](#), ¶ 9-53.

When Freedom EVOware moves an object from one position to another, it typically needs to carry out two RoMa vectors. The first one moves the RoMa from its current position to the safe position of site 1 and then to the end position of site 1, grips the plate and moves back to the safe position again using the same vector in reverse. It then moves directly to the safe position of site 2. Using the second

RoMa vector it moves to the end position of site 2, releases the plate and moves back to the safe position again. Depending on the configuration, in Freedom EVOware Plus the RoMa then either waits at this position or moves back to its home (parking) position out of the way of other objects on the worktable. In Freedom EVOware Standard, you should use the Move RoMa command to move the RoMa back to its home position after carrying out a sequence of RoMa movements.

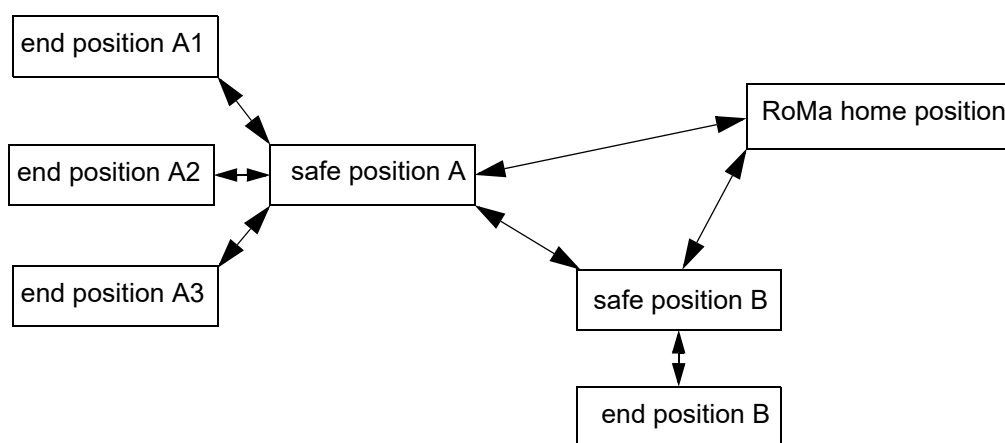


Fig. 9-18 Moving labware from carrier A to carrier B

The above figure shows how the RoMa moves labware between three sites of carrier A and one site of carrier B.

When the RoMa transfers a plate from carrier A to carrier B, it first moves from its current position (not shown in the figure) to the safe position of carrier A, then it moves to the end position of the required site, grips the plate and moves back to the safe position of carrier A again. From this position it moves directly to the safe position of carrier B, moves to its end position, releases the plate and moves back to the safe position of carrier B. Depending on the configuration of the RoMa, the RoMa either waits at this position or moves back to its home (parking) position. See 9.6.4 “Defining the Home Position for a RoMa”, 9-53.

**Note:** The safe positions of the RoMa vectors and the RoMa home position should all be chosen such that the RoMa can move between them without colliding with other objects on the worktable. Also keep in mind that the RoMa needs to rotate if the two sites have a different orientation (landscape or portrait) and that it needs to move without obstruction both with and without a microplate.

A so-called “teach plate” is available from Tecan as an aid when teaching the positions of the labware. The teach plate can be mounted on the RoMa grippers and ensures that the labware is always gripped in the same way.

RoMa vectors can be assigned to regular carriers such as microplate carriers which are used by the liquid handling arm for pipetting operations. They can also be assigned to so-called *Robot only* carriers, which are typically storage devices such as carousels and hotels or other devices such as shakers and incubators. Robot only carriers can be accessed by plate or tube robots but are not used for pipetting operations. See the *Accessible for liquid handling arm* checkbox in 9.5 “Configuring Carriers”, 9-29.

### 9.6.1 Using RoMa Vectors

Movement commands for the robot arms (RoMa, MCA96 gripper and the CGM of the MCA384) are called vectors. You can create them in the Edit Carrier dialog box, in which case they are associated with a specific carrier and are stored in the carrier definition. You can also create “user-defined” vectors. This is done on the Robot Vectors tab of the Control Bar. User-defined vectors are intended e.g. for the Vector command of the respective robot arm.

Movement vectors for the MCA96 gripper and the CGM are very similar in principle to RoMa vectors, so they will not be described explicitly in this chapter.

#### Freedom EVOware Standard

In Freedom EVOware Standard, RoMa vectors are executed using the script commands RoMa Vector and Transfer Labware. Simple RoMa movements are executed with the Move RoMa command, which does not need a vector.

#### Freedom EVOware Plus

In Freedom EVOware Plus, RoMa vectors are mainly used as pre-actions and post-actions of device commands. The pre-actions and post-actions are executed automatically when the process step is executed. If your process involves pipetting to a plate which is initially stored in a carousel, Freedom EVOware first uses the robot vector associated with the carousel to take the plate from the carousel and then uses the robot vector associated with the carrier to put the plate on the carrier. You do not need to specify the RoMa vectors - Freedom EVOware gets them from the carrier and device definitions. You only need to make sure that the RoMa vectors which you want to use are already set up in the Freedom EVOware configuration.

**Note:** An example of a special application which requires you to specify RoMa vectors explicitly is working with insert plates. The sequence of movements which is required to access a certain part of the plate depends on the laboratory process which you want to implement.

Up to four RoMa vectors can be created for each carrier type:

- ◆ Approach Narrow: Vector for picking up plates on the narrow side. The end position of this vector is chosen to be a short distance away from the final position (a few cm).
- ◆ Move Narrow: Vector for picking up plates on the narrow side. It moves from the current position of the robot to the final position where the object is gripped.
- ◆ Approach Wide: Vector for picking up plates on the wide side. The end position of this vector is chosen to be a short distance away from the final position (a few cm).
- ◆ Move Wide: Vector for picking up plates on the wide side. It moves from the current position of the robot to the final position where the object is gripped.

It is normally only necessary to specify the Move vectors and not the Approach vectors. For example, the microplate carrier “MP 3Pos” normally only needs a Move Narrow vector. Although the labware is put on this carrier in landscape orientation, the RoMa is instructed to grip the labware on the narrow side and not from the front (see 9.5.4.1 “Labware Carrier Attributes”, 9-40).

The two Approach vectors can be optionally defined for intelligent devices such as the carousel, and are used together with the Move vectors to optimize the throughput. The carousel may take 20 seconds or so to get a plate out of the specified tower. To save time, the Approach vector can be started while the carousel is still getting the plate.

If you request a plate from a carousel, Freedom EVOware proceeds as follows:

- ◆ A RoMa Approach vector instructs the RoMa to move towards the carousel and stop a few cm away.

- ◆ A Carousel LoadPlate command instructs the carousel to take the plate from the tower and move it to the exchange position, where it can be accessed by the RoMa.
- ◆ To save time, the RoMa Approach movement and the carousel movement take place simultaneously.
- ◆ As soon as the carousel has reached the exchange position, a RoMa Move vector instructs the RoMa to move to the exchange position, where it grips the plate and returns with the plate to its safe position.

If the RoMa Approach vector is not specified, only the RoMa Move vector is used. In this case, throughput optimization is not carried out.

### 9.6.2 Teach Plate Robot Vector Dialog Box

The following dialog box is used to create and edit plate robot (RoMa) vectors. See 9.6 “Creating and Editing Plate Robot Vectors”, 9-46 for more information on plate robot vectors.

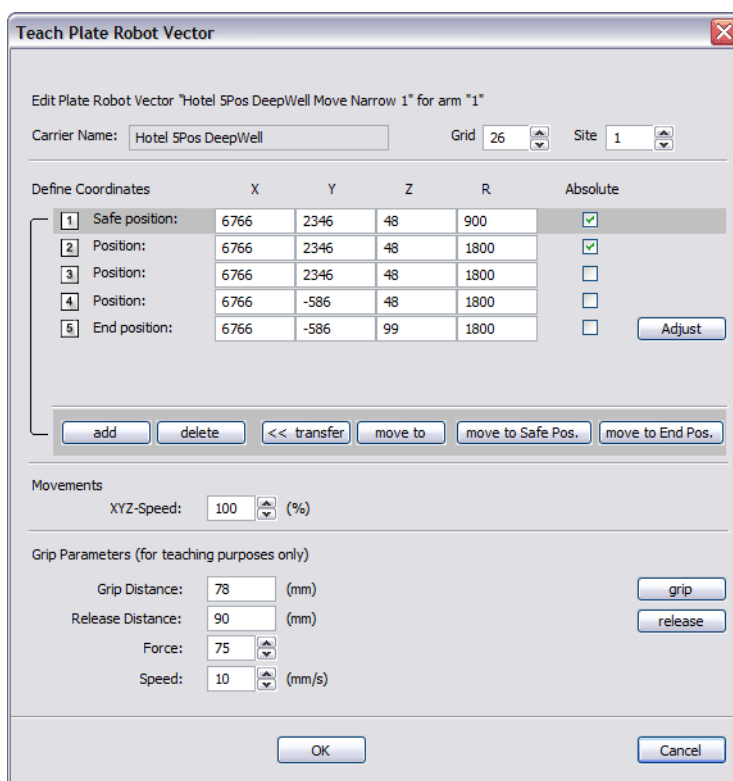


Fig. 9-19 Teach Plate Robot Vector dialog box

To get to this dialog box, open the Edit Carrier dialog box for the carrier you want to use, choose the plate robot you want to use (1 or 2), choose a robot vector from the list and click Create. The button changes to Edit if the respective robot vector has already been created.

You are then prompted to click on the carrier site which you want to use for teaching. You can only click on a carrier of the correct type. Since you will need to carefully observe the plate robot movements, you should choose a site which has good visibility.

The parameters in the Teach Plate Robot Vector dialog box are as follows:

**Carrier name**

Name of the carrier for which the RoMa vector is being defined.

**Grid, Site**

These fields show the grid position and the site which you chose for teaching. The adjustment buttons of the Site field are protected (gray) if the carrier only has one site.



**ATTENTION**

Risk of the RoMa moving to the wrong position on the worktable.

- ◆ Please choose the correct grid position and site before specifying any coordinates or using any of the movement buttons. Otherwise the RoMa might move to the wrong position on the worktable.

**Define Coordinates panel**

This shows the RoMa positions (waypoints) which will be used for the RoMa vector. Each waypoint is specified by its X, Y and Z coordinates in instrument steps (0.1 mm) and a value for the rotation of the gripper arms (R, measured in 0.1° steps).

**Absolute**

Check this checkbox to use absolute positions for the selected waypoint. In this case, when Freedom EVOware automatically recalculates the RoMa vector for each site of the carrier it only changes the X coordinates. This may be necessary if the RoMa could otherwise collide with other objects on the worktable. See [9.6.3 “Absolute Positions in RoMa Vectors”](#), [9-52](#). The Absolute checkbox should not be checked for the End position.

The following buttons can be used to edit, insert and delete waypoints and to move the RoMa along the specified waypoints:

**add pos.**

This button inserts a new entry in the waypoint list above the currently selected entry.

**delete**

This button deletes the currently selected entry in the waypoint list.

**transfer**

This button copies the current RoMa position (as shown in the Plate Robot tab of the Move dialog box) to the selected entry in the waypoint list. Do this when you want to teach the current position of the RoMa.

**Note:** You can move the RoMa using the keys on the numeric keypad (see the Move dialog box and [9.3.2 “Moving the RoMa \(Plate Robot\)”](#), [9-5](#)).

**move to...**

This button moves the RoMa to the coordinates of the selected entry in the waypoint list. The Plate Robot tab of the Move dialog box will be updated accordingly.

**move to Safe Position**

This button moves the RoMa along the defined waypoints from the selected waypoint to the safe position of the RoMa vector (the first waypoint).

### **move to End Position**

This button moves the RoMa along the defined waypoints from the selected waypoint to the end position of the RoMa vector (the last waypoint).

### **Adjust button**

The *Adjust* button is only available if the carrier is not accessible to the liquid handling arm (example: microplate hotel). It is used to adjust the carrier definition for a specified, single site to compensate for small manufacturing inaccuracies in a multi-site carrier without needing to switch to the Edit Carrier dialog box. To use this feature, choose the site you want to adjust and click *Move to End Position* to move the RoMa to the final position of the RoMa vector. Then fine tune the RoMa position using the numeric keypad and click the *Adjust* button to modify the carrier definition to match the current X, Y and Z coordinates. After saving your changes, they will also be visible in the Edit Carrier dialog box (the units in the *Move* dialog box are in 0.1 mm; the units in the Edit Carrier dialog box are in mm).

### **Movements panel**

#### **XYZ Speed**

Specify the required speed for x, y and z movements.

### **Grip Parameters panel**

#### **Grip Distance**

This is the distance in mm that the RoMa gripper closes to when gripping an object with this vector (range: 55 to 140 mm). It should be about 1 to 2 mm less than the width of the object.

#### **Release Distance**

This is the distance in mm that the RoMa gripper opens to when releasing an object with this vector (range: 55 to 140 mm). It should be about 3 to 4 mm more than the width of the object.

#### **Force**

This is the force that the gripper uses when gripping an object. The force is specified by a number between 0 and 249. Higher numbers mean higher force.

#### **Speed**

This is the speed in mm/s with which the gripper tries to grip an object.

#### **grip**

Click this button to close the gripper to the specified gripping distance for testing purposes. The gripper remains at the specified gripping distance until the Release button is clicked.

#### **release**

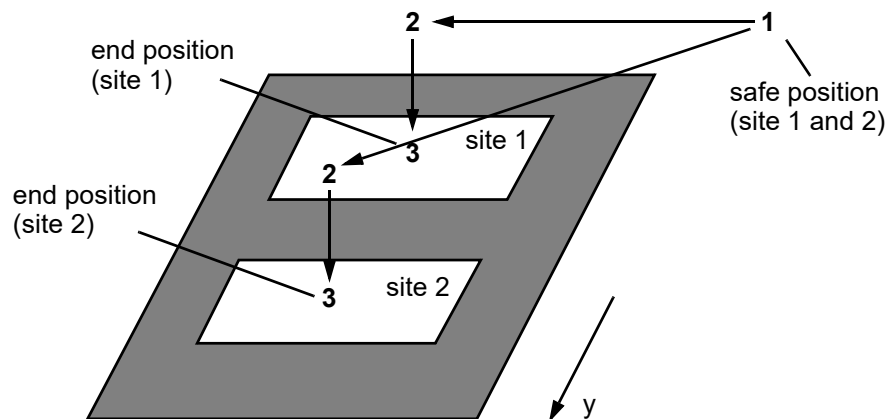
Click this button to open the gripper to the specified release distance for testing purposes.

### **9.6.3 Absolute Positions in RoMa Vectors**

One or more waypoints in a RoMa vector can be configured as absolute positions. For such waypoints, when Freedom EVOware automatically calculates the RoMa vector for each site of the carrier it only changes the X coordinates. You can test this by checking the Absolute checkbox in the Edit Plate Robot Vector dialog box and changing the specified site.

You may need to specify one or more absolute waypoints in your RoMa vector if the RoMa could otherwise collide with other objects on the worktable. The Abs. checkbox should not be checked for the End position.

In the following figure, waypoint 1 is an absolute waypoint (compare this figure with Fig. 9-17, ¶ 9-47).



**Fig. 9-20** Two RoMa vectors with three waypoints each. Waypoint 1 is an absolute waypoint - it is used by both RoMa vectors

The above figure shows two RoMa Vectors for a two site a carrier; the Absolute checkbox has been checked for waypoint 1 (the safe position in this case). Accordingly, EVOware uses the same safe position for both sites. This may be necessary if the RoMa could otherwise collide with other objects on the worktable (not shown in the figure). When Freedom EVOware automatically calculates the RoMa vector for site 2 from the RoMa vector for site 1, it does not change the coordinates for waypoint 1.

### 9.6.4 Defining the Home Position for a RoMa

After completing a sequence of movements with the RoMa, it should be moved back to its home (i.e. parking) position, out of the way of other objects on the worktable. Otherwise it might obstruct the movement of other arms such as the LiHa.

The RoMa moves to the home position when you exit Freedom EVOware. In Freedom EVOware Standard, the RoMa moves to the home position if you specify *Move to home position* with the Move RoMa command. Freedom EVOware Plus moves the RoMa back to the home position automatically (see 8.5.10.2 “Plate Robot Configuration - Settings Tab”, ¶ 8-54).

The home position for a RoMa is normally at the extreme left or right of the worktable, and should be chosen to be out of the way of other objects on the worktable. The home position is specified by creating a special RoMa vector with the name “Home 1”, which moves the RoMa to the chosen safe position.

If your instrument is fitted with two RoMas, the home position for RoMa 1 is normally at the extreme left of the worktable and the home position for RoMa 2 is normally at the extreme right of the worktable. The home position for RoMa 2 is specified by creating a special RoMa vector with the name “Home 2”.

Proceed as follows to define a home vector for the RoMa:



Identify a route across the worktable from right to left (for RoMa 1) or left to right (for RoMa 2) along which the RoMa can safely move without colliding with other objects. Then create a RoMa vector for this route with at least three waypoints, whereby the first waypoint of this vector (the safe position) is the required home position.

To edit an existing home vector, click Robot Vectors in the Control Bar, right-click on the vector and choose Edit. See 9.6.2 “Teach Plate Robot Vector Dialog Box”, 9-50 for further information.

To create a new home vector, click Robot Vectors in the Control Bar, right-click on the Robot Vectors group title and choose New. Name the vector “Home 1” (for RoMa 1) or “Home 2” (for RoMa 2). The new home vector will be shown in the Home Vectors group in the Control Bar (Robot Vectors section).

**Freedom  
EVOware  
Standard**

If you specify *Move to home position* with the Move RoMa command, during script runtime Freedom EVOware automatically determines the closest waypoint of the home vector to the current RoMa position. The RoMa then moves to this waypoint and along the home vector until the home position (the first waypoint) has been reached.

## 9.7 Configuring Device Drivers

Device drivers are configured with Freedom EVOware’s Configuration Tool (see 8.5 “Device Driver Configuration”, 8-35). See 13.2 “Overview of Device Commands”, 13-8 for information on the device drivers which are provided with EVOware together with the icon which is shown in the Worktable Editor.

## 9.8 Local Settings for Process Steps (Context Menu)

In Freedom EVOware Plus, the following settings can be made in the Process Editor for each of the process steps. You can access the settings by right-clicking on the process step icon and choosing the required item from the context menu.

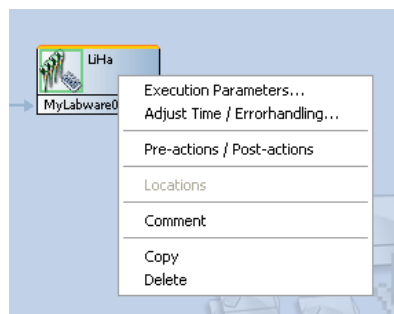


Fig. 9-21 Context menu for a process step

See 9.9 “Local Settings for Labware Source Icons (Context Menu)”, 9-60 for the settings you can make for labware source icons.



### 9.8.1 Execution Parameters

This option is used to edit the execution parameters for the current process step (i.e. device command). The settings only apply to the selected process step. You can also open the Edit Parameters dialog box by double-clicking on the process step. The available settings are described under “Execution Parameters” in the respective section for the device (see [16 “Device Commands”](#), [16-1](#)).

In addition, the Edit Parameters dialog box is opened automatically when you add the command to the Process Editor.

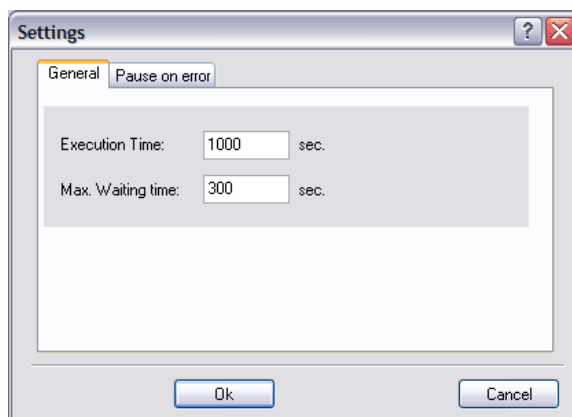
**Note:** *The dialog box will not open if the respective device command does not have any execution parameters.*

### 9.8.2 Adjust Time/Error handling

This option is used to edit the command execution time and the reaction to errors. The settings only apply to the selected process step.

#### 9.8.2.1 General Tab

This tab lets you specify the *execution time* and *waiting time* which should be used by the scheduler for this process step.



**Fig. 9-22** *Configuring the execution time and max. waiting time for a command*

The parameters in this dialog box are as follows:

#### Execution Time

Specify the execution time in seconds that should be assigned to this process step. An error will be output during process runtime if the command is not completed within this time. When you insert the command into your process, this field initially shows the default execution time specified for the command with the Configuration Tool (see [8.5.17 “Driver Tab of the Configure Device Driver Properties Dialog Box”](#), [8-67](#)).

**Note:** *With some device commands, the default execution time is automatically re-calculated when the command is inserted and a more accurate value is put into this field.*

### Max. Waiting Time

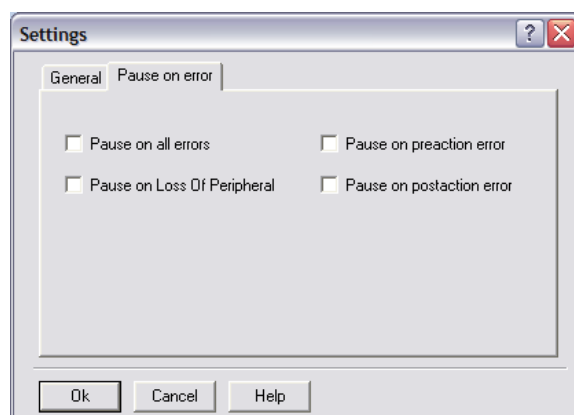
Specify the maximum additional time in seconds the labware can wait before the next action has to be performed. This may be important e.g. if you have heated the samples to a specified temperature and they should not be allowed to cool down too much before the next process step.

*Example* - A pipetting command with an execution time of 500 s must be completed within 500 s or an error message will be generated. If you set *Max. Waiting Time* to 300 s, Freedom EVOware may leave the plate for an additional 300 s at the pipetting position or on the following device if this is advantageous for the scheduling.

**Note:** *Max. Waiting Time* includes the time required to move the labware to the next device. Accordingly, it should always be larger than the time required for the associated *RoMa\_MoveObject* command.

#### 9.8.2.2 Pause On Error Tab

This tab lets you specify which types of errors will trigger a system pause if they occur during execution of this process step.



**Fig. 9-23** Configuring the reaction of the command to errors

Check the corresponding boxes if you want the system to halt on all errors, on loss of peripheral errors, on errors in pre-actions and/or on errors in post-actions.

**Note:** *The settings made in the Error Handling tab section of the Freedom EVOware Configuration Tool can be configured to overwrite the local settings you make here. See 8.4.4.3 “Pause On Error Tab”, 8-34 for details.*

#### 9.8.3 Pre-actions / Post-actions (Custom)

In some cases it is necessary to carry out additional actions before and after the command is executed. This done using pre-actions and/or post-actions – commands which are always carried out before and after the main command. For example, if you want to scan labware in a Tecan Ultra reader with the Measure command, it is necessary to open the reader door (with the Ultra\_Open command) and to move the labware to the reader using the plate robot (with the RoMa\_MoveObject command). To make sure that the door is opened in time, the door must be opened before moving the labware. Another RoMa\_MoveObject

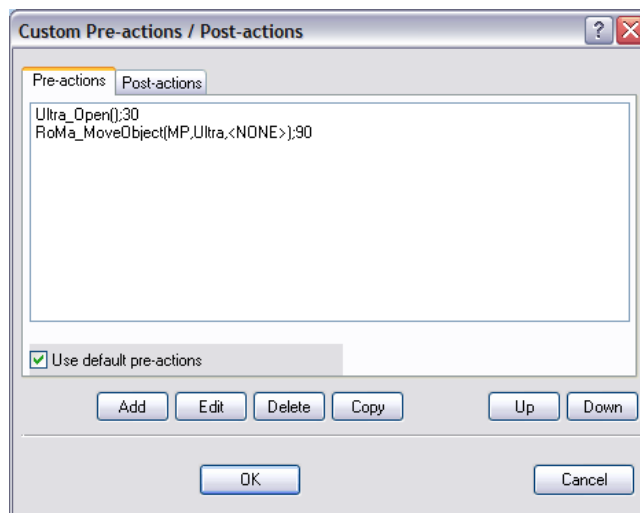
command and an Ultra\_Close command are needed when the scanning operation is finished. The door must be closed after moving the labware.

The process diagram is simplified by implementing the additional actions as pre-actions and post-actions which are linked to the Measure command. EVOware then adds the pre-actions and post-actions to the Measure command automatically. This avoids having to specify these four additional steps for each Measure command manually.

The standard pre-actions and post-actions are specified in the command definition using the Configure Tool (see 8.5.17 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-67).

Choose *Pre-actions & Post-actions* in the context menu to specify **custom pre-actions and post-actions**, which are used for special applications. The settings only apply to the currently selected process step.

In the *Custom Pre-actions / Post-actions* dialog box, the *Pre-actions* and *Post-actions* tabs Initially show the standard pre-actions and post-actions (if any):



**Fig. 9-24** Configuring custom pre-actions and post-actions for the process step

Uncheck *Use default pre-actions* and/or *Use default post-actions* if you want to specify additional pre-actions and/or post-actions or to modify existing ones.

**Note:** If you create any custom pre-actions and post-actions, they will be deleted again if you check *Use default pre-actions* and/or *Use default post-actions*.

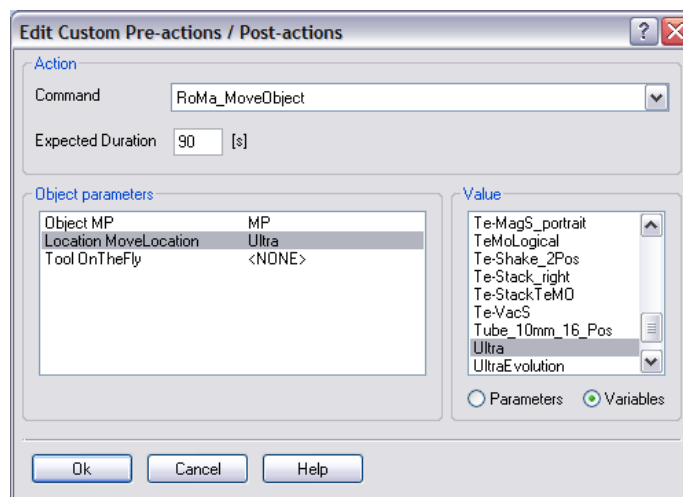
Click *Delete* to delete the currently selected pre-action or post-action. Click *Copy* to copy the currently selected pre-action or post-action. The new pre-action or post-action will have the same settings as the one you copied.

Click the *Up* and *Down* buttons to change the sort order of the pre-actions and post-actions. This changes the sequence with which the pre-actions and post-actions are carried out. Taking the above example of the Measure command for the Ultra reader, the door must be opened before the plate robot brings the labware.

### 9.8.3.1 Editing Custom Pre-actions and Post-actions

To edit a pre-action or post-action, click the *Pre-actions* or the *Post-actions* tab, select the required entry and click *Edit* to display the *Edit Custom Pre-actions / Post-actions* dialog box.

To add a pre-action or post-action, click the *Pre Actions* or the *Post Actions* tab and click *Add* to display the *Edit Custom Pre-actions / Post-actions* dialog box.



**Fig. 9-25** Editing custom pre-actions and post-actions

In the *Edit Custom Pre-actions / Post-actions* dialog box, choose the command to be executed as a pre-action or post-action from the pull-down list and specify its default execution time in the *Expected Duration* field.

The *Object Parameters* panel lists the parameters which are needed by the selected command. Select an object parameter and choose the required value from the list in the *Value* panel. Click the *Parameters* radio button to show pre-defined constants. Click the *Variables* radio button to show defined instances of objects.

The *Value* panel shows the parameters and variables which can be chosen for the selected object parameter type, as follows:

**Tab. 9-26** Parameters and variables versus object parameter types

Object parameter type	Placeholder	Variables
Object	<none> or MP	Labware site on the worktable
Location	<base> or <none>	Device or labware site
Tool	<base> or <none>	On-the-fly tool (e.g. barcode scanner) <sup>a)</sup>

a) This field is normally set to <NONE>. On-the-fly tools are normally specified in the *Process Editor* using drag and drop.

<base> is a placeholder which represents the original location of the object (the labware source). <none> is a placeholder to indicate that the parameter is unused.

### Usage example

You can use a custom pre-action if you want Freedom EVOware Plus to use a specific location for discarding racks with used DITIs. If you don't specify a specific waste site, Freedom EVOware Plus will return racks with used DITIs to their base (labware source) location, e.g. the carousel. Proceed as follows:

- Configure the pipetting instrument to use DITIs and put a DITI carrier (e.g. DITI 2Pos + Waste) on the worktable. Then right-click on the carrier and choose Edit Carrier from the context menu.
- Assign a group label (e.g. "DITI-Waste") to the DITI waste site (site 3). See 9.5 "Configuring Carriers", 9-29, "Groups".
- Put DITI racks in the carousel using the labware generator. Add a LiHa Pipette process step to your process, put a DITI rack on the DITI carrier and add DITI commands to the pipetting script. Exit the Script Editor.
- Save the process.
- Right-click the LiHa Pipette process step, choose *Pre-actions / Post-actions* from the context menu and select the RoMa\_ReplaceObject command. Click Edit, choose MoveLocation2, click *Variables* and choose the carrier site you have labeled from the pull-down list. The group name you have chosen is shown appended to the end of the carrier name, e.g. DiTi\_2Pos+\_Waste\_DITI-Waste. Confirm the dialog boxes with OK.

Pre-actions and post-actions are not relevant for Freedom EVOware Standard.

### 9.8.4 Locations

Process steps can have one or more object parameters, which are shown as "fields" in the bottom half of the icon. The object parameters show the names of the labware and/or devices which are involved in the operation.

The first object parameter is the name of the labware which is involved in the process step.

If the labware needs to be moved in the process step, the second object parameter specifies the required location of the labware when the process step has been completed. For example, the RoMa\_MoveObject command requires you to specify where you want to move the labware item to. Right-click on the second object parameter, choose Locations and choose the required location, typically another device. Choose the placeholder <base> if you want the labware to be returned to the position it had at the beginning of the process (the labware source).

After choosing a location you will see a tick alongside the object parameter field and the object parameter field shows the specified location.

The third object parameter is used to specify an optional on-the-fly device, normally a barcode scanner. Right-click on the second object parameter, choose Locations and choose the required on-the-fly device. Choose the placeholder <none> if you do not want to use an on-the-fly device in this process step.

The following example shows the RoMa\_MoveObject command before you have specified the labware, the location and the on-the-fly-device:

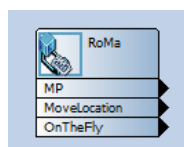
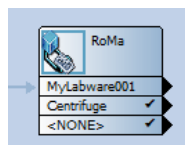


Fig. 9-26 Specifying locations 1

In the following example, the RoMa\_MoveObject command has been configured to move the microplate MyLabware1 to the centrifuge but does not scan the barcode on the way:

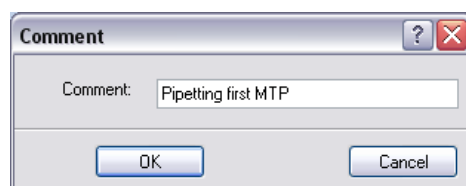


**Fig. 9-27** Specifying locations 2

The above figure is shown as an example only. The RoMa\_MoveObject command is normally only used for pre-actions and post-actions and is not normally used directly in the Process Editor.

### 9.8.5 Comment

Specify an optional comment (or label) for the process step:



**Fig. 9-28** Comment for the process step

When you run the process, the comments are shown in the Gantt chart of the Runtime Controller as tool tips (yellow labels which appear when you move the cursor above the horizontal colored bars). If you choose suitable comments, this can help you to identify different parts of the Gantt chart. See [12.2.4 "Runtime Controller, Extended View \(Running a Process\)"](#), 12-14.

### 9.8.6 Copy

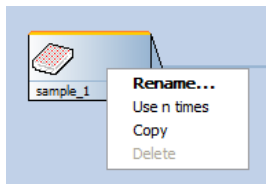
This option is used to copy the selected process step.

### 9.8.7 Delete

This option is used to delete the selected process step.

## 9.9 Local Settings for Labware Source Icons (Context Menu)

In Freedom EVOware Plus, the following settings can be made in the Process Editor for each of the labware source icons. You can access these dialog boxes by right-clicking on the labware source icon and choosing the required item from the context menu.



**Fig. 9-29** Context menu for labware source icons

### Rename

This option is used to enter a new name for the labware source. You can also rename the labware source by double-clicking on the labware source icon.

### Use n times

Specify the required number of times if you want to reuse the labware in another process instance. A typical use of this feature is a serial dilution where you want to use different process instances to handle different columns of the same microplate. Another use is a trough or deep well microplate which contains a sufficient volume of liquid to be used several times. Take care with this feature if the settings in the Runtime Controller allow the process instances to run in parallel. You need to make sure that the labware will still be available for all of the instances when it is needed. See also [Tab. 9-12 "Labware attributes, hidden"](#), [9-25](#), *Run Parallel* attribute.

### Copy

Make a copy of the labware source. A typical use of this feature is a carousel which contains different plate types in different towers. For the first copy of the labware source, use the labware generator to take a set of plates from a specific tower. Then use the copy feature if you need the same plate type somewhere else in your process. This is faster to do than using the labware generator a second time.

### Delete

Press Del or choose Delete to delete the labware source.

See [9.8 "Local Settings for Process Steps \(Context Menu\)"](#), [9-54](#) for the settings you can make for process steps for devices.






## 10 Configuring Liquid Classes

This chapter describes how to create and edit liquid classes for the liquids that you want to aspirate or dispense.

A liquid class is a collection of parameters necessary for pipetting liquids. Each liquid class is divided into subclasses for a certain hardware configuration and volume range. The subclasses are automatically selected at runtime depending on the used hardware and required volume.

The Freedom EVOware database already contains a large selection of pre-defined liquid classes. You only need to create or edit a liquid class if you cannot find a standard liquid class which is suitable for your needs. See [10.8 “Overview of Liquid Classes Supplied With Freedom EVOware”](#),  10-49.

### 10.1 Liquid Classes Editor

A liquid class is a set of liquid handling parameters. It specifies aspirating and dispensing speeds, airgaps, liquid detection modes, etc. The values of the parameters are dependent on the physical characteristics of the liquid. Freedom EVOware contains a large number of pre-defined liquid classes which are based on the extensive experience of the Tecan liquid handling specialists. Freedom EVOware stores the liquid classes in the <install\_path>\Database directory) and has a built-in editor for displaying, creating and deleting liquid classes.

To open the liquid classes editor, click Liquid Classes in the Control Bar and double-click on any of the liquid classes:

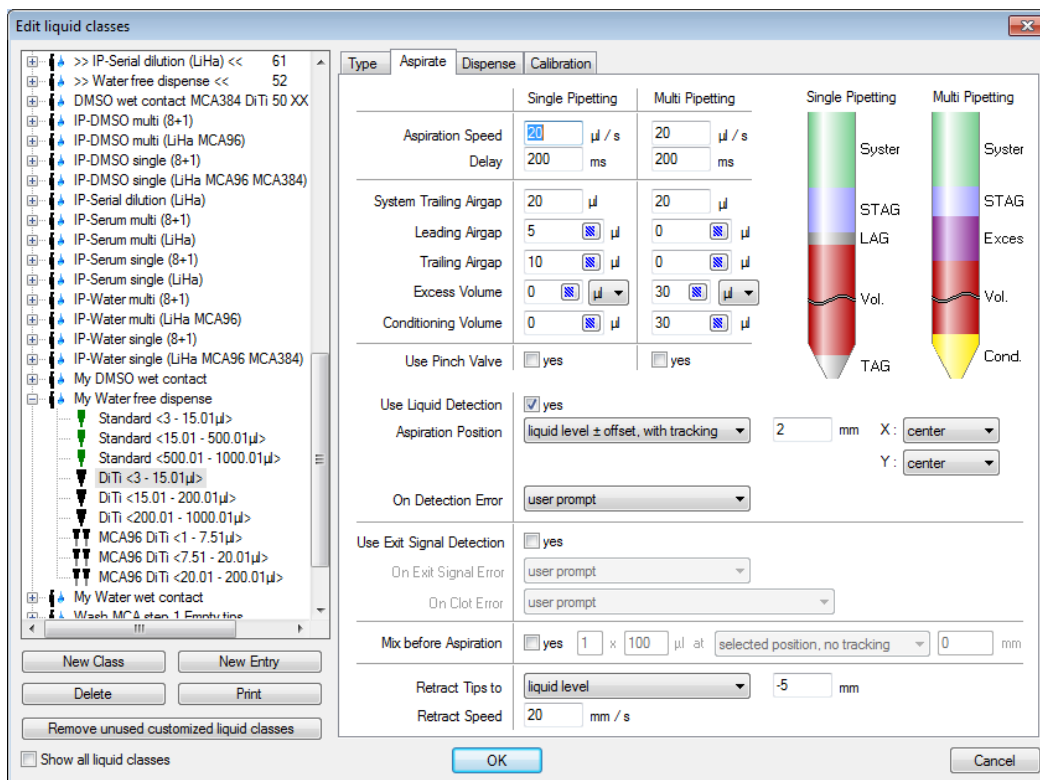


Fig. 10-1 Aspirate tab of the Liquid Classes editor

The left side of the window shows pre-defined liquid classes (🌐) and custom liquid classes (🔧). Custom liquid classes are user-defined liquid classes.

**Note:** You cannot change the properties of the pre-defined (standard) liquid classes. However, you can create a new custom class with the same properties and then change them.

Check the *Show all liquid classes* checkbox to see all available liquid classes. If this checkbox is unchecked, you will only see liquid classes which are compatible with the current tip and device configuration of your pipetting instrument.

If you check the *Show all liquid classes* checkbox and click OK to close the Liquid Classes Editor, the Liquid Classes tab of the Control Bar will also show all liquid classes. If you uncheck the *Show all liquid classes* checkbox and click OK to close the Liquid Classes Editor, the Liquid Classes tab of the Control Bar will only show liquid classes which are compatible with the current tip and device configuration.

For information on the current tip configuration, start the Configuration Tool, click the Devices tab and click Instrument Options in the General group (see Fig. 8-9 “Configuring the LiHa, Offline tab”, 8-25).

Each liquid class is divided into one or more sub-classes. Click the + symbol in front of a liquid class or double-click the liquid class name to show its sub-classes. The + symbol then changes to a - symbol. Click the - symbol to hide the sub-classes again.

A sub-class is characterized by the tip type and volume range for which its parameters are specified. During script runtime, Freedom EVOware selects the liquid class and sub-class that best matches the liquid class name, the currently used tip type and the pipetting volume.

If you choose an item in the liquid classes list, Freedom EVOware displays one or more parameter pages in the right side of the window. The parameter pages are described in more detail in the following chapters.

#### **New Class**

Click this button to create a new liquid class. A dialog box is shown to allow you to choose an existing liquid class as a template for the new liquid class. Choose the entry you want to use as a template and click OK. The template makes it easier to create a new liquid class since you only need to edit the parameters which are different.

Liquid classes must have unique names.

#### **New Entry**

Click this button to create a new sub-class. A dialog box is shown to allow you to choose an existing sub-class as a template for the new sub-class. Choose the entry you want to use as a template and click OK. The template makes it easier to create a new sub-class since you only need to edit the parameters which are different.

If you want to create more than one sub-class with the same name, the pipetting volume ranges must not overlap.

#### **Delete**

Click this button to delete the currently selected liquid class or sub-class.

#### **Print**

Click this button to print information on the currently selected liquid class (including every sub-class) or sub-class (single page) as a report. You are first shown a print preview window. Click the *Printer* button in the menu bar of the print preview window to print the report.

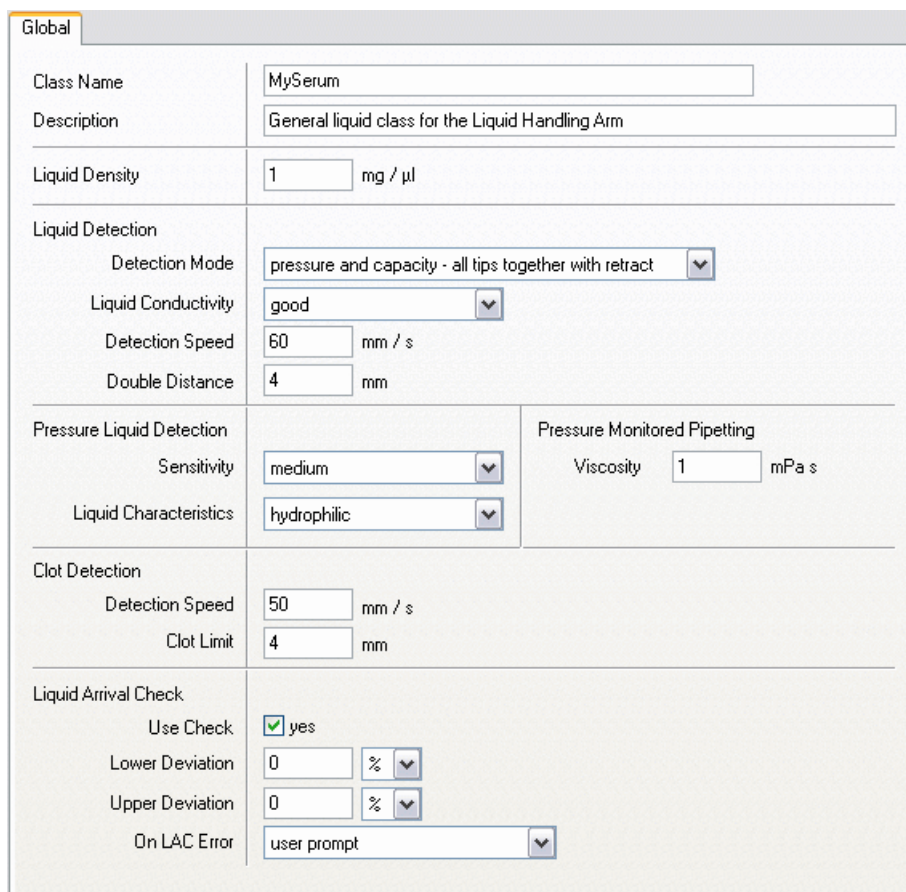
#### **Remove unused customized liquid classes**

Click this button to remove all unused customized liquid classes. This is limited to liquid classes that are customized for specific pipetting commands via the "Customize" button. Custom liquid classes created in the liquid class editor are unaffected by this.

If any user defined (i.e. non default) script or process paths are used, make sure to specify them in the EVOware options file, otherwise customized liquid classes that are still in use may be deleted. See [A.3 "Parameters in the Evoware.opt file"](#), [A-15](#) for details. EVOware will create a backup of the liquid class files in the AuditTrail.

### 10.1.1 Global Parameters for Liquid Classes

Freedom EVOware uses these parameters for all sub-classes of the selected liquid class.



The screenshot shows a software interface for configuring global parameters for a liquid class. The window title is 'Global'. The parameters are organized into several sections:

- Class Name:** MySerum
- Description:** General liquid class for the Liquid Handling Arm
- Liquid Density:** 1 mg /  $\mu$ l
- Liquid Detection:**
  - Detection Mode: pressure and capacity - all tips together with retract
  - Liquid Conductivity: good
  - Detection Speed: 60 mm / s
  - Double Distance: 4 mm
- Pressure Liquid Detection:**
  - Sensitivity: medium
  - Liquid Characteristics: hydrophilic
- Pressure Monitored Pipetting:**
  - Viscosity: 1 mPa s
- Clot Detection:**
  - Detection Speed: 50 mm / s
  - Clot Limit: 4 mm
- Liquid Arrival Check:**
  - Use Check:  yes
  - Lower Deviation: 0 %
  - Upper Deviation: 0 %
  - On LAC Error: user prompt

Fig. 10-2 Global parameters for liquid classes

#### Class Name

Specify a unique name for the liquid class.

#### Description

Enter additional information about this liquid class. The description is optional and is currently intended for documentation purposes only.

If you are using the pressure-monitored pipetting (PMP) function, the description is stored in the pressure curve files which are created.

#### Liquid Density

Specify the density of the liquid (range: 0.1 to 10 mg/ $\mu$ l). The liquid arrival check function of the pooling balance option uses this parameter to calculate the pipetted liquid volume from the measured weight difference. The PMP option uses this parameter to evaluate the quality of the liquid transfer. The pLLD function does not need a viscosity value to operate.

#### Liquid Detection panel

Liquid Level detection can be used e.g. to ensure minimal tip contamination by limiting the tip immersion depth. Specify the liquid level detection parameters as follows:

- Choose the required liquid level detection mode from the pull down list. Pressure-based liquid level detection requires the MultiSense hardware option. Capacitive liquid level detection is always available (with or without MultiSense).
- Choose the liquid conductivity from the pull down list. This setting is not available if you choose the liquid detection mode *pressure only* (pLLD).
- Choose the required detection speed (range: 0.1 to 500 mm/s).
- Choose the required double distance (range: 0.1 to 50 mm). The double distance is the distance by which the tips retract (move upwards) before carrying out liquid level detection for the second time. It is only used when a detection mode with double detection is chosen.

To enable liquid level detection, you also need to activate it on the Aspirate and/or Dispense tabs of the respective sub-class.

If you choose a combination of capacitive and pressure-based liquid level detection, both methods must indicate the same liquid level within a specified tolerance. Error messages will be generated if this is not the case.

If you are using LiHa tips (fixed tips or DITIs) and you choose *Detect with first tip, move others to same position*, 1 mm will be added to the aspiration offset you specify on the Aspirate Parameters page. See [10.2.1 “LiHa Aspirate Parameters \(Fixed Tips and DiTis\)”](#), ¶ 10-8, *Aspiration Position* for more information.

The Te-MO, the MCA96 and the MCA384 do not support liquid level detection. If you want to use a liquid class which specifies liquid level detection, the liquid level must be emulated using a special variable (see [14.1.4.14 “RACK\\_VOLUME\\_x”](#), ¶ 14-7). The values you specify here are ignored in this case. The Te-MO and the MCA96 only use the emulated liquid level detection for aspirating. The MCA384 uses the emulated liquid level detection for aspirating and dispensing.

### Pressure Liquid Detection panel

The settings in this panel are only available if you choose the liquid detection mode *pressure only* or *pressure and capacity*.

#### Sensitivity

Choose the required sensitivity for pressure-based liquid level detection (pLLD) from the pull down list. The sensitivity relates to the expected variation in pressure upon tip contact with the liquid. The *most secure sensitivity is sensitivity LOW (similar to cLLD)*.

#### Liquid Characteristics

Choose the liquid characteristics from the pull down list. You can choose between hydrophilic and hydrophobic.

Hydrophilic in this context means that the pressure change upon tip-liquid contact is negative.

Hydrophobic in this context means that the pressure change upon tip-liquid contact is positive

### Pressure Monitored Pipetting panel

The PMP function operated by the Freedom EVOware software and Sample Tracking Add-on monitors the pressure in the tip during aspiration and dispensing. The settings you make here will be ignored if PMP is not activated. See also [17.6 “Configuring and Using PMP \(Pressure Monitored Pipetting\)”](#), ¶ 17-17.

### Viscosity

Specify the viscosity of the liquid in mPa s.

The PMP function uses this parameter to evaluate the quality of the liquid transfer. The viscosity must be between 0.1 and 10 mPa s.

The pLLD function does not need a viscosity value to operate.

### Clot Detection panel

Specify the global settings for capacitive clot detection (cLLD). You can specify the detection speed and the clot limit. The clot limit is a tolerance factor to compensate for cohesion effects. To enable clot detection, you need to check the *Use exit signal detection* checkbox on the Aspirate tab of the respective sub-class. See the description of this checkbox for more information.

The Te-MO, the MCA96 and the MCA384 do not support clot detection. The values you specify here are ignored in this case.

### Liquid Arrival Check panel

The Liquid Arrival Check (LAC) feature verifies that the correct liquid volumes have been dispensed by weighing the labware before and after pipetting. The labware must be put onto a special balance (pooling balance) for the dispense operation. Freedom EVOware automatically calculates the liquid volume from the weight difference and compares the results with the volume specified in the pipetting command. An LAC error is output if the two values differ by more than the maximum volume deviation which is specified in the liquid class.

The LAC feature is only supported by special balance types such as the Mettler WM pooling balance. This balance has a built-in tube rack for 16 x 13 mm tubes and is commonly used for liquid pooling operations.

See also [9.5.4.7 "Pooling Balance Carrier Attributes"](#), [9-44](#), [15.23.4 "Pooling balance data in report files"](#), [15-51](#), [8.5.14 "Settings for the Pooling Balance"](#), [8-63](#) and [A.3 "Parameters in the Evoware.opt file"](#), [A-15](#), [OPTIONS] section, Poolsafe\_Balances.

#### Use Check

Check the checkbox to activate the LAC feature for this liquid class. The Liquid Arrival Check will then be carried out automatically during dispensing if you dispense this liquid type into containers (e.g. tubes) which have been put onto a pooling balance. You do not need to add a Balance command to your pipetting script to use the Liquid Arrival Check feature.

#### Lower deviation

Specify the required accuracy for the liquid arrival check - how close the calculated volume must be to the volume specified in the pipetting command (range: 0 to 100 µl or 0 to 10%). If the pipetted volume is too small, Freedom EVOware will write a warning message to the log file if the specified deviation is exceeded. In addition, an LAC error code will be contained in the report file output by the Export Data command.

#### Upper deviation

Specify the required accuracy for the liquid arrival check - how close the calculated volume must be to the volume specified in the pipetting command (range: 0 to 100 µl or 0 to 10%). If the pipetted volume is too large, Freedom EVOware will write a warning message to the log file if the specified deviation is exceeded. In addition, an LAC error code will be contained in the report file output by the Export Data command.

### On LAC error

Select the required error handling if an LAC error occurs.

The error handling option *User prompt* shows the Liquid Arrival Check Error dialog (see 18.1.5 “Liquid Arrival Check Error”, 18-6) and pauses the script or process. Alternatively you can choose to ignore the error and continue without pausing. The logging of the LAC error is not affected by your choice.

## 10.1.2 Type Parameters for Liquid Classes

Freedom EVOware uses these parameters to select the best suited sub-class for a specified tip type and pipetting volume.

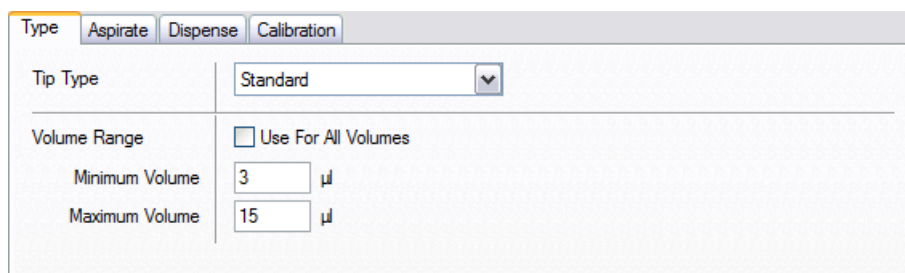


Fig. 10-3 Type parameters for liquid classes

### Tip Type

Select the tip type. The following tip types are available:

Tab. 10-1 Tip types

Tip type	LiHa	Air LiHa	Te-MO	MCA
Standard tips	X			
DITI (disposable tips)	X			
Air LiHa (disposable tips)		X		
Std. & Low Vol. (standard tips with the low volume option)	X			
DITI & Low Vol. (disposable tips with the low volume option)	X			
Te-MO Fixed tips (96 tips)			X	
Te-MO DITI tips (96 tips)			X	
Te-MO 384 (384-tip pipetting head)			X	
MCA96 Fixed (Multi-Channel Arm with fixed tips)				X
MCA96 DITI (Multi-Channel Arm with disposable tips)				X
MCA384 Fixed (Multi-Channel Arm with fixed tips)				X
MCA384 DITI (Multi-Channel Arm with disposable tips)				X

The following options are only intended for research applications:

- Low Volume, Te-MO tips (all types).

### **Volume Range**

If you check the *Use for All Volumes* checkbox, the aspirate, dispense and calibration parameters for this sub-class are valid for all pipetting volumes.

If this box is not checked, you must specify the minimum volume and the maximum volume. Freedom EVOware will then use this sub-class during pipetting if the following expression is true:

Minimum Volume  $\leq$  pipetting volume  $<$  Maximum Volume

## **10.2 LiHa Liquid Classes for Fixed Tips and DiTis**

The LiHa (Liquid Handling Arm) is a robot arm on the pipetting instrument which is mounted on the X-slide and typically holds four or eight pipetting tips.

### **10.2.1 LiHa Aspirate Parameters (Fixed Tips and DiTis)**

Freedom EVOware uses these parameters when aspirating or mixing with LiHa fixed tips or DiTis. The illustrations at the top right of the dialog box show graphically the current settings for single pipetting mode and multi pipetting mode. *Vol.* stands for the pipetted volume.



Type	Aspirate	Dispense	Calibration
	Single Pipetting	Multi Pipetting	
Aspiration Speed	100 $\mu\text{l} / \text{s}$	100 $\mu\text{l} / \text{s}$	
Delay	540 ms	540 ms	
System Trailing Airgap	20 $\mu\text{l}$	20 $\mu\text{l}$	
Leading Airgap	5 $\mu\text{l}$	0 $\mu\text{l}$	
Trailing Airgap	10 $\mu\text{l}$	0 $\mu\text{l}$	
Excess Volume	0 $\mu\text{l}$	30 $\mu\text{l}$	
Conditioning Volume	0 $\mu\text{l}$	30 $\mu\text{l}$	
Use Pinch Valve	<input type="checkbox"/> yes	<input type="checkbox"/> yes	
Use Liquid Detection	<input checked="" type="checkbox"/> yes		
Aspiration Position	liquid level $\pm$ offset, with tracking	2 mm	X: left Y: center
On Detection Error	user prompt		
Use Exit Signal Detection	<input checked="" type="checkbox"/> yes		
On Exit Signal Error	user prompt		
On PMP Clot Error	continue, dispense back and pipette nothing		
Mix before Aspiration	<input checked="" type="checkbox"/> yes	1 x 100 $\mu\text{l}$ at selected position, no tracking	0 mm
Retract Tips to	liquid level	-5 mm	
Retract Speed	20 mm / s		

Single Pipetting

Multi Pipetting

Fig. 10-4 Aspirate parameters for fixed tips and DiTis

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

#### Aspiration Speed

Specify the aspiration speed in  $\mu\text{l}/\text{s}$ . A lower aspiration speed can improve the pipetting accuracy, a higher aspiration speed can improve the speed of operation. See [Tab. 8-2 “Max. dilutor speeds for the LiHa \(pipetting or washing\)”](#), [8-27](#) for related information.

#### Delay

Specify the delay after aspiration.


#### System Trailing Airgap (STAG)

Specify the volume of the system trailing airgap. Freedom EVOware uses the aspiration speed specified for the leading airgap for the system trailing airgap, too. The system trailing airgap is used to prevent contamination by ensuring that the system liquid cannot come into contact with the liquid being aspirated.

#### Leading Airgap (LAG)


Specify the volume of the leading airgap. Click the button to specify aspiration speed and delay after aspiration. The air of the leading airgap is dispensed together with the target volume which you specify in the Dispense command. The resulting tip blowout leads to more accurate pipetting.

### Trailing Airgap (TAG)

Specify the volume of the trailing airgap. Click the  button to specify aspiration speed and delay after aspiration. The trailing airgap is used to prevent liquid dripping from the tips when the arm moves. In addition, it ensures that the liquid meniscus is not dragged away from the end of the tip during fast arm movements.


The trailing airgap is aspirated at the Z-position specified with *Retract tips to*. A Z-position relative to the liquid level requires liquid level detection and must not be used if you are carrying out septum piercing (the septum interferes with the capacitance-based detection system). Otherwise the trailing airgap may be aspirated with the tips still in the liquid.

### Excess Volume

Specify the excess volume (in  $\mu\text{l}$  or %). Click the  button to choose the position to use for discarding the excess volume (*Discard to waste* or *Back to vesse/*). The excess volume is used to reduce contamination of the liquid in the tips with the system liquid to an absolute minimum. The excess volume is discarded after the pipetting cycle (aspiration and dispensing) has been completed.

Specify a digit in the *Replace after* field to discard the excess volume after re-using it several times (e.g. to save costs). This only applies if excess volume > 0 and if you are using multi-pipetting.

### Conditioning Volume

Specify the conditioning volume. Click the  button to choose the position to use for discarding the conditioning volume (*Discard to waste* or *Back to vesse/*). A conditioning volume can be used to maximize pipetting accuracy by ensuring that the liquid meniscus at the end of the tips is the same shape after aspirating as it will be after dispensing. The conditioning volume is discarded directly after aspirating.

### Use Pinch Valve

This is used to activate the Low Volume option if it is fitted to your pipetting instrument.

### Use Liquid Detection

Check this box if you want to use capacitive liquid level detection (cLLD) when aspirating. cLLD detects the liquid surface through a change of the electrical capacitance of the pipetting tip when the tip enters the liquid. It is carried out just before aspirating and can be used e.g. to minimize tip contamination by limiting the tip immersion depth.

cLLD is carried out with the detection mode, liquid conductivity, detection speed and double distance settings which you specified on the Global dialog box for the liquid class.

cLLD must not be used if you are carrying out septum piercing (the septum interferes with the capacitive detection system).

### Aspiration Position

Specify the Z-position and the Z-offset of the tips when aspirating. A positive value for the offset lowers the tips. You can only choose a Z-position relative to the liquid level if you have activated liquid level detection.

If you choose an aspirate position with tracking, the tips will move downwards as the liquid level drops in the wells during aspiration. This option can be used e.g. to ensure minimal tip contamination by limiting the tip immersion depth.

If you choose *Detect twice with separate tips with retract*, on the Global Parameters page (10.1.1, 10-4), 1 mm will be added to the aspiration offset you specify. Example: If you specify an offset of 2 mm, the tips will be submerged by 3 mm.

You can also choose the X-position when aspirating as follows:

- Center: as specified for the labware which is used
- Left: left of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right: right of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Left / Right: left of center for odd columns, right of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right / Left: right of center for odd columns, left of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

You can also choose the Y-position when aspirating as follows:

- Center: as specified for the labware which is used
- Rear: rear of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front: front of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Rear / Front: rear of center for odd columns, front of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front / Rear: front of center for odd columns, rear of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

By combining an X offset and a Y offset, there are nine possible pipetting positions (including the center position with no offsets).

### On Detection Error

Select the required error handling if Freedom EVOware detects no liquid or not enough liquid.

If a liquid detection error occurs, the error handling option *User prompt* shows the Liquid Detection Error dialog (see 18.1.1 “Liquid Detection Error”, 18-1); the other three options carry out the chosen action directly and do not show the Liquid Detection Error dialog.

### Use Exit Signal Detection

Check this box to activate capacitive exit signal detection (dip out signal detection). This detects the liquid surface through a change of the electrical capacitance of the pipetting tip when the tip is retracted and exits the liquid. It is carried out just after aspirating. The measured liquid level is then compared with the liquid level which should have resulted from the aspiration.

You can only activate exit signal detection if you have also enabled liquid level detection.

### On Exit Signal Error

Select the required error handling if the exit signal error does not take place as expected when retracting the tips.

If an exit signal error occurs, the error handling option *User prompt* shows the Clot Error dialog (see 18.1.2 “Clot Error”, 18-2); the other two options carry out the chosen action directly and do not show the Clot Error dialog.

Two error situations are possible:

- The exit signal was detected within the specified “retract tips to” distance but not within the clot limit which you specified in the Global dialog box for the liquid class. This is probably because a clot is attached to one of the tips and has maintained the electrical contact between the tip and the liquid. A “clot error” is reported in the log file in this case.
- The exit signal was not detected at all within the specified “retract tips to” distance. In this case, there is another reason for the tips failing to loose contact with the liquid. A “no exit signal error” is reported in the log file in this case.

**Note:** Both clot error and exit signal error are currently reported in the report file from the Export Data command as “clot was detected”.

### On PMP Clot Error

Select the required error handling if a clot is detected using pressure-based clot detection. Pressure-based clot detection requires the MultiSense hardware option und PMP to be activated in the script. The PMP clot detection is only available for LiHa DiTis.

The operator can choose between the following options:

- User prompt
- Continue pipette nothing
- Continue dispense back and pipette nothing
- Continue, discard DiTi and pipette nothing

If you choose *User Prompt*, the Clot Error (PMP) dialog then allows the instrument operator to choose between the following options:

- Dispense back into vessel and then pipette nothing
- Ignore clot error and continue
- Discard the DiTi and pipette nothing

See 18.1.3 “Clot Error (PMP)”, 18-3 for more information.

See also 17.6.3 “PMP Error and Success Messages”, 17-19 for more information on PMP.

### Mix before Aspiration

Check this box if you want Freedom EVOware to mix the liquid before aspirating it. You can specify the number of mix cycles (range: 1 to 99), the mix volume (range: 1 to 2500 µl), the Z-position and the Z-offset. A positive value for the offset lowers the tips.

### Retract Tips to

Specify the Z-position and the Z-offset to which the tips should retract (move upwards) after aspirating. A positive value for the offset lowers the tips. You can only choose a Z-position relative to the liquid level if you have activated liquid level detection.

### Retract Speed

Specify the required retract speed.

### 10.2.2 LiHa Dispense Parameters (Fixed Tips and DiTis)

Freedom EVOware uses these parameters when dispensing or mixing with LiHa fixed tips or DiTis.

	Single Pipetting	Multi Pipetting
Dispense Speed	600 µl / s	600 µl / s
Breakoff Speed	400 µl / s	400 µl / s
Delay	0 ms	0 ms
Trailing Airgap after each Dispense	<input type="checkbox"/> yes	<input checked="" type="checkbox"/> yes
Use Pinch Valve	<input type="checkbox"/> yes	<input type="checkbox"/> yes
Use Liquid Detection	<input checked="" type="checkbox"/> yes	
Dispense Position	liquid level ± offset, no tracking   0 mm   X: left   Y: center	
Tip Touching	no tip touching	
Speed	10 mm / s	
Delay after touching	100 ms	
Mix after Dispense	<input checked="" type="checkbox"/> yes   1 x 100 µl at selected position, no tracking   0 mm	
Retract Tips to	z-dispense   0 mm	
Retract Speed	50 mm / s	

Fig. 10-5 Dispense parameters for fixed tips and DiTis

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

#### Dispense Speed

Specify the dispense speed in µl/s. The maximum dispense speed is about 80% of the dilutor capacity (syringe size) per second. See [Tab. 8-2 “Max. dilutor speeds for the LiHa \(pipetting or washing\)”](#), 8-27.

A high dispense speed is needed to achieve a proper free dispense. Contact dispense requires a lower speed (in the same range as the aspirate speed).

#### Breakoff Speed

Specify the breakoff speed (final dispense speed) in µl/s. The breakoff speed should normally be about 70% of the actual dispense speed but should not exceed 45% of the dilutor capacity (syringe size) per second. A high breakoff speed is needed to achieve a proper free dispense.

#### Delay

Specify the delay after dispensing.

#### Trailing Airgap after each Dispense

You can automatically aspirate a trailing airgap after each dispense operation to avoid droplets forming on the tips. The trailing airgap parameters for dispensing are specified in the *Aspirate* dialog box.

### Use Pinch Valve

This is used to activate the Low Volume option if it is fitted to your pipetting instrument.

### Use Liquid Detection

Check this box if you want to use capacitive liquid level detection (cLLD) when dispensing. cLLD detects the liquid surface through a change of the electrical capacitance of the pipetting tip when the tip enters the liquid. Liquid level detection when dispensing can be used e.g. to ensure that the tips remain immersed in the liquid during dispensing.

cLLD is carried out with the detection mode, liquid conductivity, detection speed and double distance settings which you specified on the Global dialog box for the liquid class.

cLLD must not be used if you are carrying out septum piercing (the septum interferes with the capacitive detection system).

### Dispense Position

Specify the Z-position and the Z-offset of the tips when dispensing. A positive value for the offset lowers the tips. You can only choose a Z-position relative to the liquid level if you have activated liquid level detection.

If you choose a dispense position with tracking, the tips will move upwards as the liquid level rises in the wells during dispensing. This option can be used e.g. to ensure minimal tip contamination by limiting the tip immersion depth.

You can also choose the X-position when dispensing as follows:

- Center: as specified for the labware which is used
- Left: left of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right: right of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Left / Right: left of center for odd columns, right of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right / Left: right of center for odd columns, left of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

You can also choose the Y-position when dispensing as follows:

- Center: as specified for the labware which is used
- Rear: rear of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front: front of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Rear / Front: rear of center for odd columns, front of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front / Rear: front of center for odd columns, rear of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

By combining an X offset and a Y offset, there are nine possible pipetting positions (including the center position with no offsets).

### **Tip Touching**

Activate the tip touching function if required and specify the direction of the movement. The amount of movement is specified with *Tip-touching distance* for the labware which is used.

Tip touching is a special movement when dispensing a liquid. When tip touching is activated, Freedom EVOware dispenses to the destination container in the normal way, but then moves the tips to the side of the well and back before retracting them. This helps to remove any droplets which may be adhering to the tips.

**Speed:** Specify the tip touching speed.

**Delay after touching:** Specify the delay between the tip touching the well and moving back to the middle of the well.

### **Mix after Dispense**

Check this box if you want to mix the liquid after dispensing it. You can specify the number of mix cycles (range: 1 to 99), the mix volume (range: 1 to 2500  $\mu$ l), the Z-position and the Z-offset. A positive value for the offset lowers the tips.

### **Retract Tips to**

Specify the Z-position and the Z-offset to which the tips should retract (move upwards) after dispensing. A positive value for the offset lowers the tips. You can only choose a Z-position relative to the liquid level if you have activated liquid level detection.

### **Retract Speed**

Specify the required retract speed.



### 10.2.3 LiHa Calibration Parameters (Fixed Tips and DiTis)

Freedom EVOware uses these parameters to ensure that the specified target volumes are dispensed accurately by the LiHa. The two curves in the dialog box show graphically the current settings for single pipetting mode and multi pipetting mode.

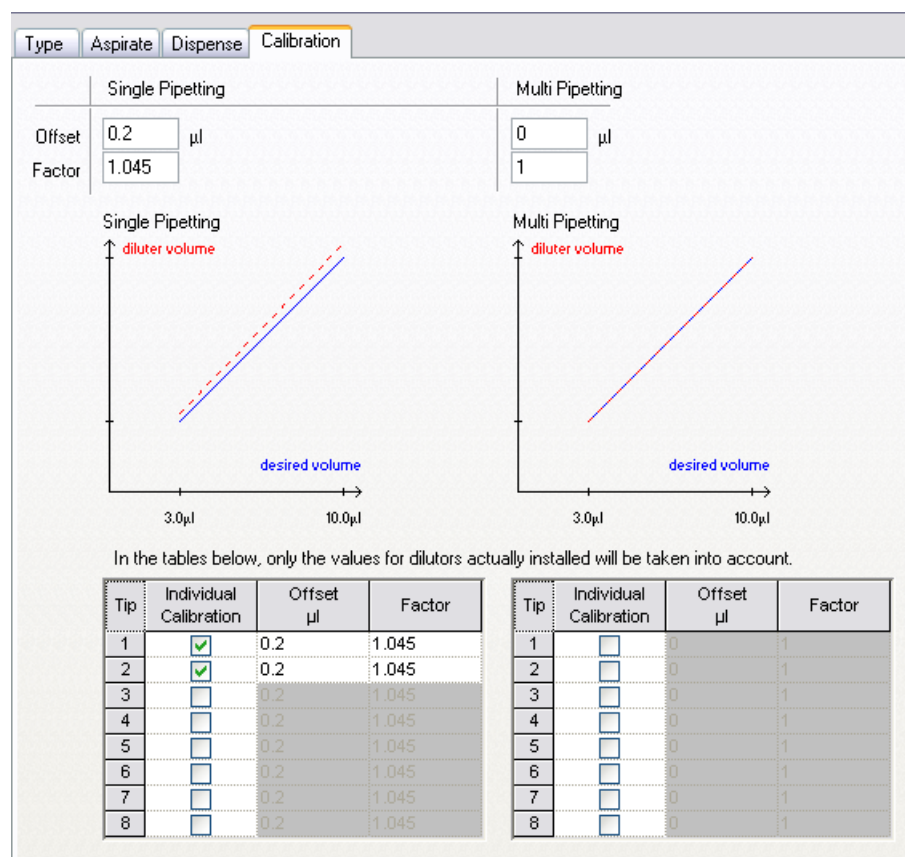


Fig. 10-6 Calibration parameters for fixed tips and DiTis

The parameters of this dialog box are as follows:

#### Offset / Factor

Specify an offset and/or calibration factor to be applied for single pipetting mode and multi pipetting mode.

Freedom EVOware uses the following expression to calculate the dilutor movement from the target volume specified in the pipetting script:

$$\text{Calibrated dilutor movement} = (\text{target volume} * \text{factor}) + \text{offset}$$

#### Individual calibration tables

If necessary you can specify a separate offset and calibration factor for each of the dilutors which overrides the global setting. This can be used to compensate for very small differences in the characteristics of the dilutors due to manufacturing tolerances. It is only needed for special applications which require extreme accuracy and is only available for the LiHa and Air LiHa (the Te-MO, the MCA96 and the MCA384 do not use dilutors or individual plunger drives for each



channel). The individual calibration settings can be made separately for single pipetting and multi pipetting.

Please note the following if you specify an individual dilutor calibration factor or offset:

- The individual calibration settings are only intended for specialists such as Tecan Field Service Engineers.
- Before changing the calibration settings, make sure that the pipetting inaccuracy has been caused by the dilutor and that all other possibilities such as tubing problems or air bubbles have been ruled out.
- The calibration settings must be determined and verified gravimetrically for the liquids and volume ranges in question.
- The calibration settings are only valid for the type of liquid used during testing.
- The calibration settings only apply to Freedom EVOware and do not affect the gravimetric tests using the *Setup & Service* software.
- The values must be reset if you change the dilutor.

### 10.3 Air LiHa Liquid Classes

The liquid handling parameters for Air LiHa disposable tips are the same as for DiTis described in section 10.2 "LiHa Liquid Classes for Fixed Tips and DiTis", [Fig. 10-8](#) with the following exceptions:

- ◆ **System Trailing Airgap (STAG)** deactivated in the Aspiration panel
- ◆ **Use Pinch Valve** deactivated in the Aspiration and Dispense panel
- ◆ Additional tab **Plunger** for definition of diluter profile (similar to MCA384 Plunger tab but **Vol. dependent speed** not available, see [Fig. 10-9](#), [Fig. 10-20](#))

Type	Aspirate	Dispense	Calibration	Plunger
			Single Pipetting	Multi Pipetting
Aspiration Speed	100		100	100
Delay	400		400	400
System Trailing Airgap	0		0	0
Leading Airgap	5		0	0
Trailing Airgap	10		0	0
Excess Volume	0		30	30
Conditioning Volume	0		30	30
Use Pinch Valve	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Use Liquid Detection	<input checked="" type="checkbox"/>			
Aspiration Position	liquid level ± offset, with tracking		2 mm	X: center Y: center
On Detection Error	continue, pipette nothing			
Use Exit Signal Detection	<input type="checkbox"/>			
On Exit Signal Error	user prompt			
On PMP Clot Error	user prompt			
Mix before Aspiration	<input type="checkbox"/>		1 x 100 µl at	selected position, no tracking
Retract Tips to	liquid level		-5 mm	
Retract Speed	20		mm / s	

Fig. 10-7 Aspirate parameters for Air LiHa disposable tips

	Single Pipetting	Multi Pipetting
Dispense Speed	600 $\mu\text{l} / \text{s}$	600 $\mu\text{l} / \text{s}$
Breakoff Speed	400 $\mu\text{l} / \text{s}$	400 $\mu\text{l} / \text{s}$
Delay	400 ms	400 ms
Trailing Airgap after each Dispense	<input type="checkbox"/> yes	<input type="checkbox"/> yes
Use Liquid Detection	<input type="checkbox"/> yes	
Dispense Position	z-dispense $\pm$ offset, no tracking   0 mm   X: center   Y: center	
Tip Touching	no tip touching	
Speed	10 mm / s	
Delay after touching	100 ms	
Mix after Dispense	<input type="checkbox"/> yes   1 x 100 $\mu\text{l}$ at   selected position, no tracking   0 mm	
Retract Tips to	z-dispense   0 mm	
Retract Speed	50 mm / s	

Fig. 10-8 Dispense parameters for Air LiHa disposable tips

**Note:** No parameter "Use Pinch Valve" with check boxes in the Dispense panel.

### 10.3.1 Air LiHa Plunger Parameters

Freedom EVOware uses these parameters for the Air LiHa to control the plunger during dispensing. The graph illustrates the plunger speed versus the time for the specified dispense volume.

Type	Aspirate	Dispense	Calibration	Plunger
Single Pipetting		Aspirate	Dispense	
Accelerate with		3500 $\mu\text{l}/\text{s}^2$	15000 $\mu\text{l}/\text{s}^2$	
Decelerate with		3500 $\mu\text{l}/\text{s}^2$	30000 $\mu\text{l}/\text{s}^2$	
Multi Pipetting		Aspirate	Dispense	
Accelerate with		3500 $\mu\text{l}/\text{s}^2$	15000 $\mu\text{l}/\text{s}^2$	
Decelerate with		3500 $\mu\text{l}/\text{s}^2$	30000 $\mu\text{l}/\text{s}^2$	
Dispense Speed Curve				
Dispense volume <input type="text" value="1.0"/> $\mu\text{l}$				
<input type="text" value="Single Pipetting"/>				
Backlash compensation				
<input checked="" type="checkbox"/> Sample <input type="text" value="2"/> $\mu\text{l}$				
<input type="checkbox"/> Airgap <input type="text" value="2"/> $\mu\text{l}$				

Fig. 10-9 Air LiHa plunger parameters

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

#### Accelerate with / Decelerate with

Specify the required acceleration and deceleration of the Air LiHa plunger for single pipetting mode and multi pipetting mode. For mechanical reasons the Air LiHa plunger cannot accelerate or decelerate instantly. The graph then illustrates the plunger speed versus the time for the specified dispense volume.

#### Vol. dependent speed

Different to the plunger parameters for the MCA384 (see Fig. 10-18, 10-37) there is no Vol. dependent speed setting for the Air LiHa.

**Dispense volume**

Specify the dispense volume for which you want to see a graph (the volume you specify should include the leading and trailing airgaps) and choose the graph you want to see (single pipetting mode or multi pipetting mode). The volume you specify is only used to calculate the graph and is not a dispense command for the Air LiHa (the volume which will be dispensed is specified with the Air LiHa Dispense command).

The graph helps you to identify whether you have chosen suitable settings in this dialog box.

If the graph has a flat top (plateau), the plunger acceleration/deceleration will allow the plunger to reach the dispense speed specified on the Dispense tab of the liquid class for the dispense volume you have chosen.

**Backlash Compensation**

To define a backlash volume for Sample, Leading Airgap (LAG) and Trailing Airgap (TAG).

### 10.3.2 Air LiHa Single Channel Calibration

In order to reach the best precision values over all pipetting channels it could be necessary to adjust the **Offset** (see [Fig. 10-10](#), [10-23](#)) of each individual pipetting channel.

Please note the following if you specify a single channel calibration offset:

- The single channel calibration should only be applied if the application requires a higher precision than the one achieved without calibration.
- The calibration settings are only valid for the type of liquid and the volume used for the calibration.
- A measurement instrument with a resolution of at least 0.01 µl is required to determine the calibration settings.
- Before changing the calibration settings, make sure that the pipetting inaccuracy has been caused by the dilutor and that all other possibilities have been ruled out.

#### Calibration Procedure

The recommended workflow for the calibration of each single channel is the following:

- 1 Dispense four times the target volume using the corresponding liquid class (with default offset).
- 2 Measure the four volumes and calculate the median.
- 3 Evaluate the deviation to the target volume:
  - Deviation = target volume - (median of four measurements).
  - *New calibration offset* = default offset + deviation.
- 4 Enter the *new calibration offset* in the **Offset** field of the appropriate channel at the bottom of the **Calibration page** (refer to [Fig. 10-10](#), [10-23](#)).

#### Verification

- 5 Dispense four times the target volume using the *new calibration offset*.
- 6 Measure the four volumes and calculate the median.
- 7 Verify the deviation to the target volume:
  - Deviation = target volume - (median of four measurements).
  - If the deviation is smaller than 0.03 µl, the new offset is satisfactory; otherwise a new iteration has to be run with an additional volume correction.

#### Final Calibration

Final calibration offset = last calibration offset + last deviation.

- 8 Enter the final calibration offset in the **Offset** field of the appropriate channel at the bottom of the **Calibration page** (refer to [Fig. 10-10](#), [10-23](#)).

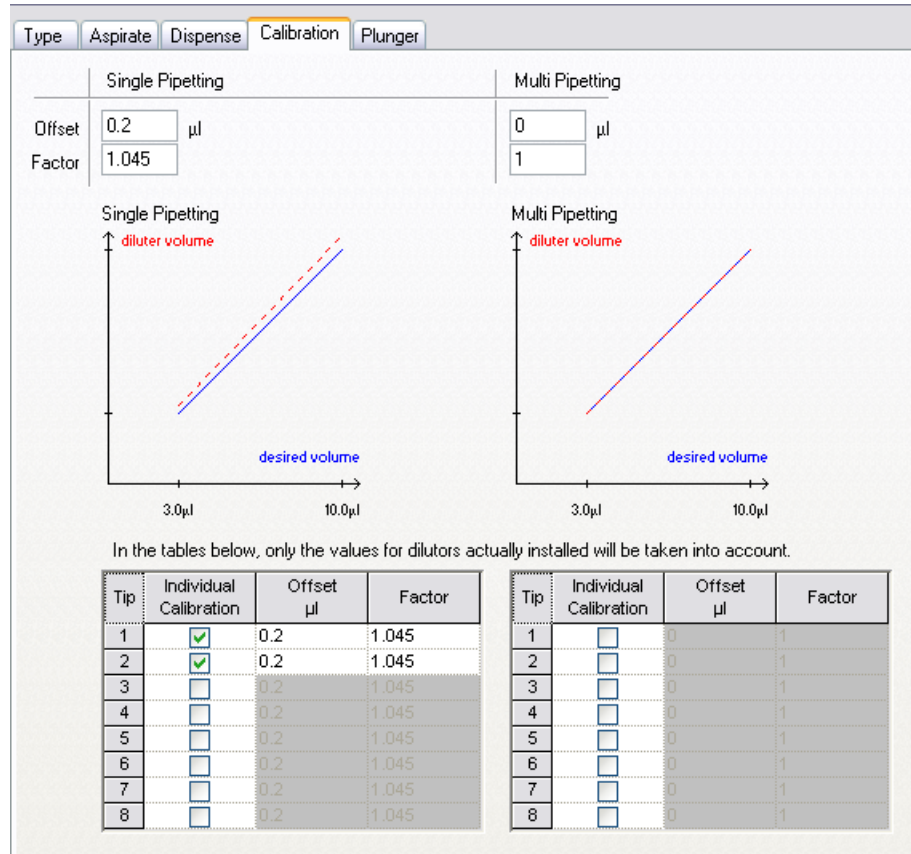


Fig. 10-10 Calibration parameters

The single channel parameters at the bottom of this dialog box are as follows:

**Offset / Factor**

Specifies an offset and/or calibration factor to be applied for single pipetting mode and multi pipetting mode.

Freedom EVOware uses the following expression to calculate the plunger movement from the target volume specified in the pipetting script:

$$\text{Calibrated plunger movement} = (\text{target volume} * \text{factor}) + \text{offset}$$

## 10.4 MCA96 Liquid Classes

The MCA96 (Multi Channel Arm 96) has a 96-tip pipetting head. The 96-tip pipetting head can be fitted with a tipblock (fixed tips) or with disposable tips (DITs).

### 10.4.1 MCA96 Aspirate Parameters

Freedom EVOware uses these parameters for the MCA96 pipetting head when aspirating or mixing. The illustrations at the top right of the dialog box show graphically the current settings for single pipetting mode and multi pipetting mode. Vol. stands for the pipetted volume.

	Single Pipetting	Multi Pipetting
Aspiration Speed	10 $\mu$ / s	10 $\mu$ / s
Delay	1000 ms	1000 ms
System Trailing Airgap	0 $\mu$	0 $\mu$
Leading Airgap	10 $\mu$	10 $\mu$
Trailing Airgap	1 $\mu$	0 $\mu$
Excess Volume	0 $\mu$	5 $\mu$
Conditioning Volume	0 $\mu$	5 $\mu$
Use Pinch Valve	<input type="checkbox"/> yes	<input type="checkbox"/> yes
Use Liquid Detection	<input checked="" type="checkbox"/> yes	
Aspiration Position	z-max $\pm$ offset, no tracking	0 mm X: left Y: center
On Detection Error	user prompt	
Use Exit Signal Detection	<input type="checkbox"/> yes	
On Exit Signal Error	user prompt	
On PMP Clot Error	user prompt	
Mix before Aspiration	<input checked="" type="checkbox"/> yes 1 x 100 $\mu$ at selected position, no tracking	0 mm
Retract Tips to	z-start	0 mm
Retract Speed	5 mm / s	

Fig. 10-11 MCA96 Aspirate parameters

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

#### Aspiration Speed

Specify the aspiration speed in  $\mu$ /s. A lower aspiration speed can improve the pipetting accuracy, a higher aspiration speed can improve the speed of operation.

#### Delay

Specify the delay after aspiration.




### System Trailing Airgap (STAG)


Specify the volume of air to aspirate directly after getting the tip block or DITIs (recommended range: 0 to 50  $\mu$ l). Freedom EVOware uses the aspiration speed specified for the leading airgap for the system trailing airgap, too.

When washing the tips, the air is dispensed during the empty step of the Wash command together with the remaining liquid. The STAG ensures that all of the liquid in the tips is discarded at the start of the wash procedure. This helps to reduce the carryover. In contrast to the leading airgap, the STAG is only relevant for washing the tips and is not dispensed by the Dispense command.


### Leading Airgap (LAG)

Specify the volume of the leading airgap. Click the  button to specify aspiration speed and delay after aspiration. The air of the leading airgap is dispensed together with the target volume which you specify in the Dispense command. The resulting tip blowout leads to more accurate pipetting.

### Trailing Airgap (TAG)


Specify the volume of the trailing airgap. Click the  button to specify aspiration speed and delay after aspiration. The trailing airgap is used to prevent liquid dripping from the tips when the arm moves. In addition, it ensures that the liquid meniscus is not dragged away from the end of the tip during fast arm movements.

### Excess Volume

Specify the excess volume (in  $\mu$ l or %). Click the  button to choose the position to use for discarding the excess volume (*Discard to waste* or *Back to vessel*). The excess volume is used to reduce contamination of the liquid in the tips with previously used liquids to an absolute minimum.

Specify a digit in the *Replace after* field to discard the excess volume after re-using it several times (e.g. to save costs). This only applies if excess volume > 0 and if you are using multi-pipetting. The excess volume is discarded after the pipetting cycle (aspiration and dispensing) has been completed.



### Conditioning Volume

Specify the conditioning volume. Click the  button to choose the position to use for discarding the conditioning volume (*Discard to waste* or *Back to vessel*). A conditioning volume can be used to maximize pipetting accuracy by ensuring that the liquid meniscus at the end of the tips is the same shape after aspirating as it will be after dispensing. The conditioning volume is discarded directly after aspirating.

### Use Pinch Valve

The MCA96 does not have a pinch valve.

### Use Liquid Detection

The MCA96 does not support liquid level detection for aspiration directly. If you want to use a liquid class for the MCA96 which specifies liquid level detection, the liquid level must be emulated using a special variable (see [14.1.4.14 "RACK\\_VOLUME\\_x"](#),  14-7). Check this checkbox if you want to activate the emulated liquid level detection. Liquid level detection can be used e.g. to ensure minimal tip contamination by limiting the tip immersion depth. For Freedom EVOware Plus, see [14.1.4 "Pre-Defined Variables"](#),  14-4 for information on accessing the current value of this pre-defined variable in another script.

### Aspiration Position

Specify the Z-position and the Z-offset of the tips when aspirating. A positive value for the offset lowers the tips. You can only choose a Z-position relative to the liquid level if you have activated liquid level detection emulation.

If you choose an aspirate position with tracking, the tips move downwards as the liquid level drops in the wells during aspiration. This option can be used e.g. to ensure minimal tip contamination by limiting the tip immersion depth.

You can also choose the X-position when aspirating as follows:

- Center: as specified for the labware which is used
- Left: left of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right: right of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Left / Right: left of center for odd columns, right of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right / Left: right of center for odd columns, left of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

You can also choose the Y-position when aspirating as follows:

- Center: as specified for the labware which is used
- Rear: rear of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front: front of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Rear / Front: rear of center for odd columns, front of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front / Rear: front of center for odd columns, rear of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

By combining an X offset and a Y offset, there are nine possible pipetting positions (including the center position with no offsets).

### On Detection Error

Select the required error handling if Freedom EVOware detects no liquid or not enough liquid.

### Use Exit Signal Detection

The MCA96 does not support exit signal detection. The PMP option is not available for the MCA96.

### Mix before Aspiration

Check this box if you want Freedom EVOware to mix the liquid before aspirating it. You can specify the number of mix cycles (range: 1 to 99), the mix volume (max. 2500 µl), the Z-position and the Z-offset. A positive value for the offset lowers the tips.

### Retract Tips to

Specify the Z-position and the Z-offset to which the tips should retract (move upwards) after aspirating. A positive value for the offset lowers the tips.

### Retract Speed

Specify the required retract speed.

### 10.4.2 MCA96 Dispense Parameters

Freedom EVOware uses these parameters for the MCA96 pipetting head when dispensing or mixing.

	Single Pipetting	Multi Pipetting
Dispense Speed	10 µl / s	10 µl / s
Breakoff Speed	µl / s	µl / s
Delay	200 ms	200 ms
Trailing Airgap after each Dispense	<input type="checkbox"/> yes	<input type="checkbox"/> yes
Use Pinch Valve	<input type="checkbox"/> yes	<input type="checkbox"/> yes
Use Liquid Detection	<input type="checkbox"/> yes	
Dispense Position	z-max ± offset, no tracking	
	0 mm	X: center
		Y: center
Tip Touching	no tip touching	
Speed	10 mm / s	
Delay after touching	100 ms	
Mix after Dispense	<input type="checkbox"/> yes	
	1 x 100 µl at selected position, no tracking	
	0 mm	
Retract Tips to	z-start	
	0 mm	
Retract Speed	42 mm / s	

Fig. 10-12 MCA96 Dispense parameters

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

#### Dispense Speed

Specify the dispense speed in µl/s. A high speed (400-600 µl/s) is needed to achieve a proper free dispense. Contact dispense requires a lower speed (in the same range as the aspirate speed).

#### Breakoff Speed

You cannot specify a breakoff speed for the MCA96.

#### Delay

Specify the delay after dispensing.

#### Trailing Airgap after each Dispense

You can automatically aspirate a trailing airgap after each dispense operation in order to avoid droplets forming on the tip. The trailing airgap parameters are specified in the *Aspirate* dialog box.

#### Use Pinch Valve

The MCA96 does not have a pinch valve.

#### Use Liquid Detection

The MCA96 does not support liquid level detection (or emulated liquid level detection) for dispensing.

### Dispense Position

Specify the Z-position and the Z-offset of the tips when dispensing. A positive value for the offset lowers the tips.

If you choose a dispense position with tracking, the tips move upwards as the liquid level rises in the wells during dispensing. This option can be used e.g. to ensure minimal tip contamination by limiting the tip immersion depth.

You can also choose the X-position when dispensing as follows:

- Center: as specified for the labware which is used
- Left: left of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right: right of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Left / Right: left of center for odd columns, right of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right / Left: right of center for odd columns, left of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

You can also choose the Y-position when dispensing as follows:

- Center: as specified for the labware which is used
- Rear: rear of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front: front of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Rear / Front: rear of center for odd columns, front of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front / Rear: front of center for odd columns, rear of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

By combining an X offset and a Y offset, there are nine possible pipetting positions (including the center position with no offsets).

### Tip Touching

Activate the tip touching function if required and specify the direction of the movement. The amount of movement is specified with *Tip-touching distance* for the labware which is used.

Tip touching is a special movement when dispensing a liquid. When tip touching is activated, Freedom EVOware dispenses to the destination container in the normal way, but then moves the tips to the side of the well and back before retracting them. This helps to remove any droplets which may be adhering to the tips.

**Speed:** Specify the tip touching speed.

**Delay after touching:** Specify the delay between the tip touching the well and moving back to the middle of the well.

### Mix after Dispense

Check this box if you want to mix the liquid after dispensing it. You can specify the number of mix cycles (range: 1 to 99), the mix volume (max. 2500 µl), the Z-position and the Z-offset. A positive value for the offset lowers the tips.

### Retract Tips to

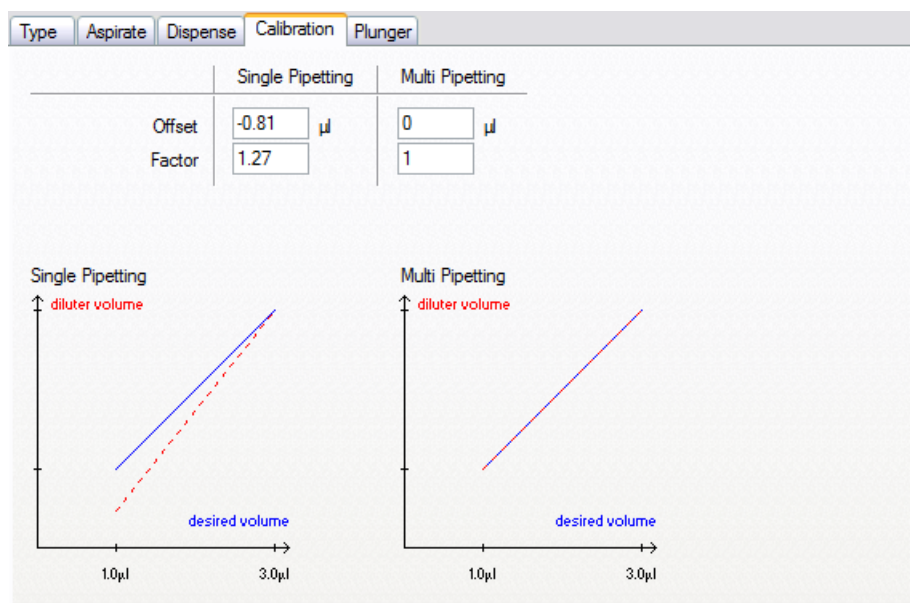
Specify the Z-position and the Z-offset to which the tips should retract (move upwards) after dispensing. A positive value for the offset lowers the tips.

**Retract Speed**

Specify the required retract speed.

**10.4.3 MCA96 Calibration Parameters**

Freedom EVOware uses these parameters for the MCA96 pipetting head to ensure that the specified target volumes are dispensed accurately. The two curves in the dialog box show graphically the current settings for single pipetting mode and multi pipetting mode.



**Fig. 10-13** MCA96 Calibration parameters

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

**Offset / Factor**

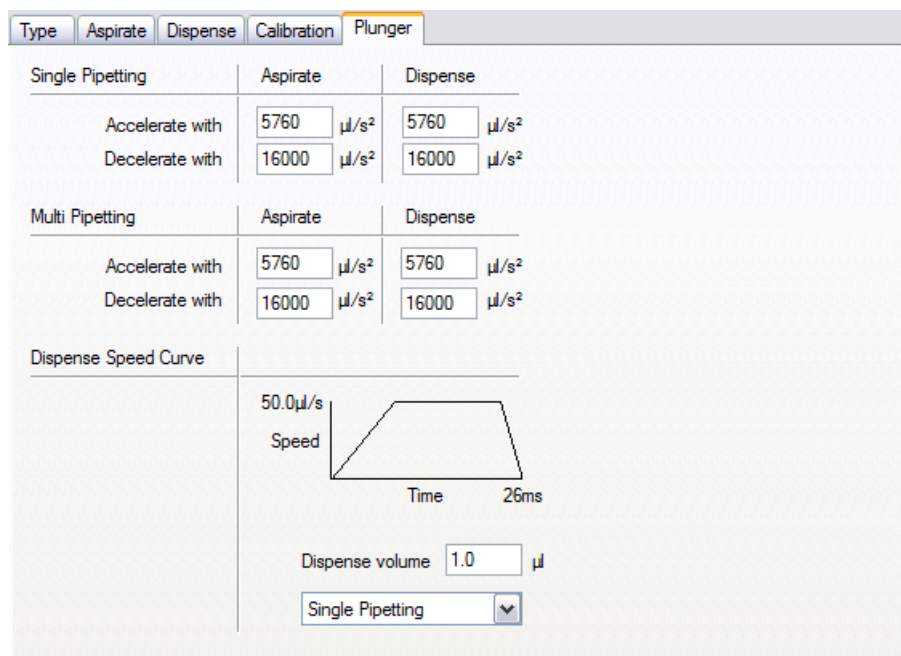
Specify an offset and/or calibration factor to be applied for single pipetting mode and multi pipetting mode.

Freedom EVOware uses the following expression to calculate the MCA96 plunger movement from the target volume specified in the pipetting script:

$$\text{Calibrated MCA96 plunger movement} = (\text{target volume} * \text{factor}) + \text{offset}$$

**10.4.4 MCA96 Plunger Parameters**

Freedom EVOware uses these parameters for the MCA96 pipetting head to control the plunger during dispensing. The graph illustrates the plunger speed versus the time for the specified dispense volume.



**Fig. 10-14** MCA96 Plunger parameters

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

**Accelerate with / Decelerate with**

Specify the required acceleration and deceleration of the MCA96 plunger for single pipetting mode and multi pipetting mode. For mechanical reasons the MCA96 plunger cannot accelerate or decelerate instantly. The graph then illustrates the plunger speed versus the time for the specified dispense volume.

**Dispense volume**

Specify the dispense volume for which you want to see a graph (the volume you specify should include the leading and trailing airgaps) and choose the graph you want to see (single pipetting mode or multi pipetting mode). The volume you specify is only used to calculate the graph and is not a dispense command for the MCA96 (the volume which will be dispensed is specified with the MCA96 Dispense command).

The graph helps you to identify whether you have chosen suitable settings in this dialog box.

If the graph has a flat top (plateau), the plunger acceleration/deceleration will allow the plunger to reach the dispense speed specified on the Dispense tab of the liquid class for the dispense volume you have chosen.



## 10.5 MCA384 Liquid Classes

The MCA384 (Multi Channel Arm) can be fitted with 96 or 384 fixed tips or with 96 or 384 disposable tips (DITIs). So-called head adapters are used to adapt the pipetting head to the different tip types.

### 10.5.1 MCA384 Aspirate Parameters

Freedom EVOware uses these parameters for the MCA384 pipetting head when aspirating or mixing. The illustrations at the top right of the dialog box show graphically the current settings for single pipetting mode and multi pipetting mode. Vol. stands for the pipetted volume.

Type	Aspirate	Dispense	Calibration	Plunger
	Single Pipetting	Multi Pipetting	Single Pipetting	Multi Pipetting
Aspiration Speed	4 $\mu\text{l} / \text{s}$	5 $\mu\text{l} / \text{s}$		
Delay	200 ms	200 ms		
System Trailing Airgap	0 $\mu\text{l}$	0 $\mu\text{l}$		
Leading Airgap	2 $\mu\text{l}$	10 $\mu\text{l}$		
Trailing Airgap	0 $\mu\text{l}$	0 $\mu\text{l}$		
Excess Volume	0 $\mu\text{l}$	5 $\mu\text{l}$		
Conditioning Volume	0 $\mu\text{l}$	5 $\mu\text{l}$		
Use Pinch Valve	<input type="checkbox"/> yes	<input type="checkbox"/> yes		
Use Liquid Detection	<input checked="" type="checkbox"/> yes			
Aspiration Position	z-max $\pm$ offset, no tracking	0 mm	X: center	Y: center
On Detection Error	user prompt			
Use Exit Signal Detection	<input type="checkbox"/> yes			
On Exit Signal Error	user prompt			
On PMP Clot Error	user prompt			
Mix before Aspiration	<input checked="" type="checkbox"/> yes	1 x 100 $\mu\text{l}$ at selected position, no tracking	0 mm	
Retract Tips to	z-start	0 mm		
Retract Speed	5 mm / s			

Fig. 10-15 MCA384 Aspirate parameters

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

#### Aspiration Speed

Specify the aspiration speed in  $\mu\text{l}/\text{s}$ . A lower aspiration speed can improve the pipetting accuracy, a higher aspiration speed can improve the speed of operation.

#### Delay


Specify the delay after aspiration.

### System Trailing Airgap (STAG)


Specify the volume of air to aspirate directly after getting the tip block or DITIs (recommended range: 0 to 50  $\mu$ l). Freedom EVOware uses the aspiration speed specified for the leading airgap for the system trailing airgap, too.

When washing the tips, the air is dispensed during the empty step of the Wash command together with the remaining liquid. The STAG ensures that all of the liquid in the tips is discarded at the start of the wash procedure. This helps to reduce the carryover. In contrast to the leading airgap, the STAG is only relevant for washing the tips and is not dispensed by the Dispense command.


### Leading Airgap (LAG)

Specify the volume of the leading airgap. Click the  button to specify aspiration speed and delay after aspiration. The air of the leading airgap is dispensed together with the target volume which you specify in the Dispense command. The resulting tip blowout leads to more accurate pipetting.

### Trailing Airgap (TAG)


Specify the volume of the trailing airgap. Click the  button to specify aspiration speed and delay after aspiration. The trailing airgap is used to prevent liquid dripping from the tips when the arm moves. In addition, it ensures that the liquid meniscus is not dragged away from the end of the tip during fast arm movements.

### Excess Volume

Specify the excess volume (in  $\mu$ l or %). Click the  button to choose the position to use for discarding the excess volume (*Discard to waste* or *Back to vessel*). The excess volume is used to reduce contamination of the liquid in the tips with previously used liquids to an absolute minimum.

Specify a digit in the *Replace after* field to discard the excess volume after re-using it several times (e.g. to save costs). This only applies if excess volume > 0 and if you are using multi-pipetting. The excess volume is discarded after the pipetting cycle (aspiration and dispensing) has been completed.



### Conditioning Volume

Specify the conditioning volume. Click the  button to choose the position to use for discarding the conditioning volume (*Discard to waste* or *Back to vessel*). A conditioning volume can be used to maximize pipetting accuracy by ensuring that the liquid meniscus at the end of the tips is the same shape after aspirating as it will be after dispensing. The conditioning volume is discarded directly after aspirating.

### Use Pinch Valve

The MCA384 does not have a pinch valve.

### Use Liquid Detection

The MCA384 does not support liquid level detection for aspiration directly. If you want to use a liquid class for the MCA384 which specifies liquid level detection, the liquid level must be emulated using a special variable (see [14.1.4.14 "RACK\\_VOLUME\\_x"](#),  14-7). Check this checkbox if you want to activate the emulated liquid level detection. Liquid level detection can be used e.g. to ensure minimal tip contamination by limiting the tip immersion depth. For Freedom EVOware Plus, see [14.1.4 "Pre-Defined Variables"](#),  14-4 for information on accessing the current value of this pre-defined variable in another script.



### Aspiration Position

Specify the Z-position and the Z-offset of the tips when aspirating. A positive value for the offset lowers the tips. You can only choose a Z-position relative to the liquid level if you have activated liquid level detection emulation.

If you choose an aspirate position with tracking, the tips move downwards as the liquid level drops in the wells during aspiration. This option can be used e.g. to ensure minimal tip contamination by limiting the tip immersion depth.

You can also choose the X-position when aspirating as follows:

- Center: as specified for the labware which is used
- Left: left of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right: right of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Left / Right: left of center for odd columns, right of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right / Left: right of center for odd columns, left of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

You can also choose the Y-position when aspirating as follows:

- Center: as specified for the labware which is used
- Rear: rear of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front: front of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Rear / Front: rear of center for odd columns, front of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front / Rear: front of center for odd columns, rear of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

By combining an X offset and a Y offset, there are nine possible pipetting positions (including the center position with no offsets).

### On Detection Error

Select the required error handling if Freedom EVOware detects no liquid or not enough liquid.

### Use Exit Signal Detection

The MCA384 does not support exit signal detection. The PMP option is not available for the MCA384.

### Mix before Aspiration

Check this box if you want Freedom EVOware to mix the liquid before aspirating it. You can specify the number of mix cycles (range: 1 to 99), the mix volume (max. 2500 µl), the Z-position and the Z-offset. A positive value for the offset lowers the tips.

### Retract Tips to

Specify the Z-position and the Z-offset to which the tips should retract (move upwards) after aspirating. A positive value for the offset lowers the tips.

### Retract Speed

Specify the required retract speed.

### 10.5.2 MCA384 Dispense Parameters

Freedom EVOware uses these parameters for the MCA384 pipetting head when dispensing or mixing.

Fig. 10-16 MCA384 Dispense parameters

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

#### Dispense Speed

Specify the dispense speed in  $\mu\text{l/s}$ . A high speed (400-600  $\mu\text{l/s}$ ) is needed to achieve a proper free dispense. Contact dispense requires a lower speed (in the same range as the aspirate speed).

#### Breakoff Speed

You cannot specify a breakoff speed for the MCA384.

#### Delay

Specify the delay after dispensing.

#### Trailing Airgap after each Dispense

You can automatically aspirate a trailing airgap after each dispense operation in order to avoid droplets forming on the tip. The trailing airgap parameters are specified in the *Aspirate* dialog box.

#### Use Pinch Valve

The MCA384 does not have a pinch valve.

### Use Liquid Detection

The MCA384 does not support liquid level detection for dispensing directly. If you want to use a liquid class for the MCA384 which specifies liquid level detection, the liquid level must be emulated using a special variable (see [14.1.4.14 "RACK\\_VOLUME\\_x"](#), ¶ 14-7). Check this checkbox if you want to activate the emulated liquid level detection. Liquid level detection can be used e.g. to ensure minimal tip contamination by limiting the tip immersion depth. For Freedom EVOware Plus, see [14.1.4 "Pre-Defined Variables"](#), ¶ 14-4 for information on accessing the current value of this pre-defined variable in another script.

### Dispense Position

Specify the Z-position and the Z-offset of the tips when dispensing. A positive value for the offset lowers the tips.

If you choose a dispense position with tracking, the tips move upwards as the liquid level rises in the wells during dispensing. This option can be used e.g. to ensure minimal tip contamination by limiting the tip immersion depth.

You can also choose the X-position when dispensing as follows:

- Center: as specified for the labware which is used
- Left: left of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right: right of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Left / Right: left of center for odd columns, right of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right / Left: right of center for odd columns, left of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

You can also choose the Y-position when dispensing as follows:

- Center: as specified for the labware which is used
- Rear: rear of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front: front of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Rear / Front: rear of center for odd columns, front of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front / Rear: front of center for odd columns, rear of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

By combining an X offset and a Y offset, there are nine possible pipetting positions (including the center position with no offsets).

### Tip Touching

Activate the tip touching function if required and specify the direction of the movement. The amount of movement is specified with *Tip-touching distance* for the labware which is used.

Tip touching is a special movement when dispensing a liquid. When tip touching is activated, Freedom EVOware dispenses to the destination container in the normal way, but then moves the tips to the side of the well and back before retracting them. This helps to remove any droplets which may be adhering to the tips.

**Speed:** Specify the tip touching speed.

**Delay after touching:** Specify the delay between the tip touching the well and moving back to the middle of the well.

### Mix after Dispense

Check this box if you want to mix the liquid after dispensing it. You can specify the number of mix cycles (range: 1 to 99), the mix volume (max. 2500  $\mu$ l), the Z-position and the Z-offset. A positive value for the offset lowers the tips.

### Retract Tips to

Specify the Z-position and the Z-offset to which the tips should retract (move upwards) after dispensing. A positive value for the offset lowers the tips.

### Retract Speed

Specify the required retract speed.

## 10.5.3 MCA384 Calibration Parameters

Freedom EVOware uses these parameters for the MCA384 pipetting head to ensure that the specified target volumes are dispensed accurately. The two curves in the dialog box show graphically the current settings for single pipetting mode and multi pipetting mode.

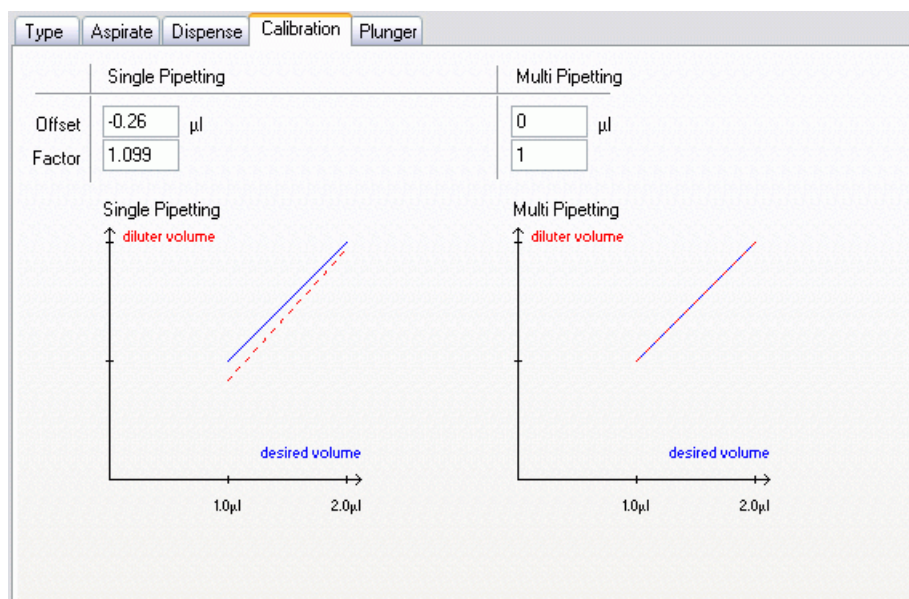


Fig. 10-17 MCA384 Calibration parameters

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

**Offset / Factor**

Specify an offset and/or calibration factor to be applied for single pipetting mode and multi pipetting mode.

Freedom EVOware uses the following expression to calculate the MCA384 plunger movement from the target volume specified in the pipetting script:

$$\text{Calibrated MCA384 plunger movement} = (\text{target volume} * \text{factor}) + \text{offset}$$

**10.5.4 MCA384 Plunger Parameters**

Freedom EVOware uses these parameters for the MCA384 pipetting head to control the plunger during dispensing. The graph illustrates the plunger speed versus the time for the specified dispense volume.

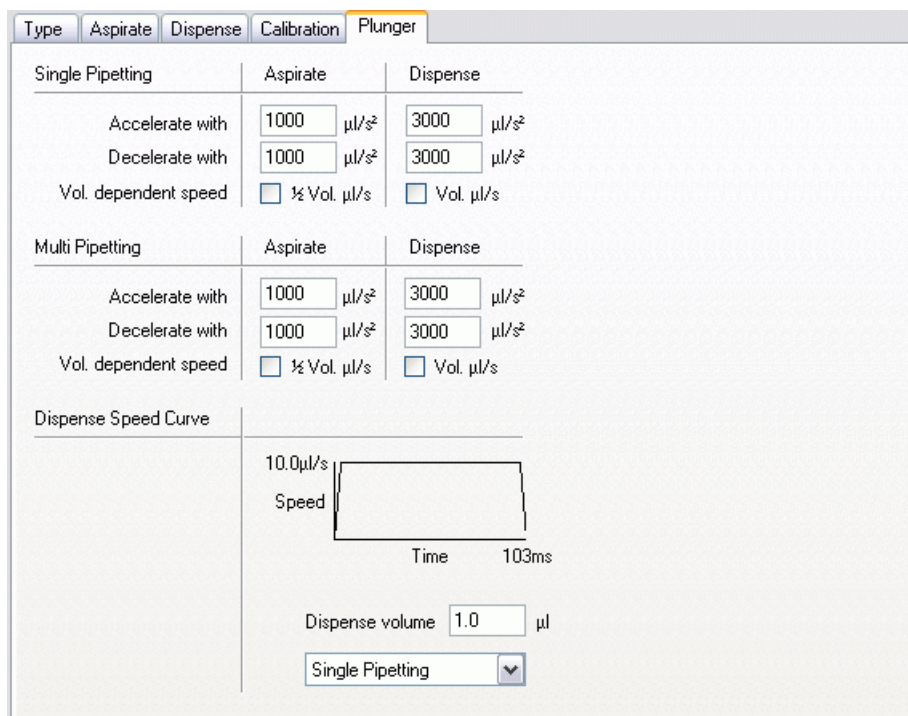


Fig. 10-18 MCA384 Plunger parameters

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

**Accelerate with / Decelerate with**

Specify the required acceleration and deceleration of the MCA384 plunger for single pipetting mode and multi pipetting mode. For mechanical reasons the MCA384 plunger cannot accelerate or decelerate instantly. The graph then illustrates the plunger speed versus the time for the specified dispense volume.

### **Vol. dependent speed**

Check these checkboxes to use a pipetting speed which is dependent on the volume you want to pipette. The aspiration and/or dispense speed which you choose on the aspirate and/or dispense tabs will be ignored and the following pipetting speeds will be used instead:

- ½ Vol. µl/s: The volume you choose in the Aspirate command will be aspirated in 2 seconds.
- Vol. µl/s: The volume you choose in the Dispense command will be dispensed in 1 second.

### **Dispense volume**

Specify the dispense volume for which you want to see a graph (the volume you specify should include the leading and trailing airgaps) and choose the graph you want to see (single pipetting mode or multi pipetting mode). The volume you specify is only used to calculate the graph and is not a dispense command for the MCA384 (the volume which will be dispensed is specified with the MCA384 Dispense command).

The graph helps you to identify whether you have chosen suitable settings in this dialog box.

If the graph has a flat top (plateau), the plunger acceleration/deceleration will allow the plunger to reach the dispense speed specified on the Dispense tab of the liquid class for the dispense volume you have chosen.

## 10.6 Te-MO 96 Liquid Classes

The Te-MO is available with a 96-tip or 384-tip pipetting head. The following settings apply to the 96-tip version. The 96-tip pipetting head can be fitted with a tipblock (fixed tips) or with disposable tips (DITs).

### 10.6.1 Te-MO 96 Aspirate Parameters

Freedom EVOware uses these parameters when aspirating or mixing with the 96-tip Te-MO tip block or DITI pipetting head. The illustrations at the top right of the dialog box show graphically the current settings for single pipetting mode and multi pipetting mode. Vol. stands for the pipetted volume.

	Single Pipetting	Multi Pipetting	Single Pipetting	Multi Pipetting
Aspiration Speed	50 $\mu\text{l} / \text{s}$	50 $\mu\text{l} / \text{s}$	System	System
Delay	1000 ms	1000 ms		
System Trailing Airgap	0 $\mu\text{l}$	0 $\mu\text{l}$	LAG	LAG
Leading Airgap	10 $\mu\text{l}$	10 $\mu\text{l}$	Excess	Excess
Trailing Airgap	1 $\mu\text{l}$	0 $\mu\text{l}$		
Excess Volume	0 $\mu\text{l}$	10 $\mu\text{l}$	Vol.	Vol.
Conditioning Volume	0 $\mu\text{l}$	10 $\mu\text{l}$	TAG	Cond.
Use Pinch Valve	<input type="checkbox"/> yes	<input type="checkbox"/> yes		
Use Liquid Detection	<input checked="" type="checkbox"/> yes			
Aspiration Position	z-max $\pm$ offset, no tracking		0 mm	X: center
On Detection Error	user prompt			
Use Exit Signal Detection	<input type="checkbox"/> yes			
On Exit Signal Error	user prompt			
On PMP Clot Error	user prompt			
Mix before Aspiration	<input checked="" type="checkbox"/> yes		1 x 100 $\mu\text{l}$ at	selected position, no tracking
Retract Tips to	z-start		0 mm	
Retract Speed	5 mm / s			

Fig. 10-19 Te-MO 96 Aspirate parameters for the tip block and DITs

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

#### Aspiration Speed

Specify the aspiration speed in  $\mu\text{l}/\text{s}$ . A lower aspiration speed can improve the pipetting accuracy, a higher aspiration speed can improve the speed of operation.

#### Delay

Specify the delay after aspiration.




### System Trailing Airgap (STAG)


Specify the volume of air to aspirate directly after getting the tip block or DITIs (recommended range: 0 to 50  $\mu$ l). Freedom EVOware uses the aspiration speed specified for the leading airgap for the system trailing airgap, too.

When washing the tips, the air is dispensed during the empty step of the Wash command together with the remaining liquid. The STAG ensures that all of the liquid in the tips is discarded at the start of the wash procedure. This helps to reduce the carryover. In contrast to the leading airgap, the STAG is only relevant for washing the tips and is not dispensed by the Dispense command.


### Leading Airgap (LAG)

Specify the volume of the leading airgap. Click the  button to specify aspiration speed and delay after aspiration. The air of the leading airgap is dispensed together with the target volume which you specify in the Dispense command. The resulting tip blowout leads to more accurate pipetting.

### Trailing Airgap (TAG)


Specify the volume of the trailing airgap. Click the  button to specify aspiration speed and delay after aspiration. The trailing airgap is used to prevent liquid dripping from the tips when the arm moves. In addition, it ensures that the liquid meniscus is not dragged away from the end of the tip during fast arm movements.

### Excess Volume

Specify the excess volume (in  $\mu$ l or %). Click the  button to choose the position to use for discarding the excess volume (*Discard to waste* or *Back to vessel*). The excess volume is used to reduce contamination of the liquid in the tips with previously used liquids to an absolute minimum.

Specify a digit in the *Replace after* field to discard the excess volume after re-using it several times (e.g. to save costs). This only applies if excess volume > 0 and if you are using multi-pipetting. The excess volume is discarded after the pipetting cycle (aspiration and dispensing) has been completed.



### Conditioning Volume

Specify the conditioning volume. Click the  button to choose the position to use for discarding the conditioning volume (*Discard to waste* or *Back to vessel*). A conditioning volume can be used to maximize pipetting accuracy by ensuring that the liquid meniscus at the end of the tips is the same shape after aspirating as it will be after dispensing. The conditioning volume is discarded directly after aspirating.

### Use Pinch Valve

The Te-MO does not have a pinch valve.

### Use Liquid Detection

The Te-MO does not support liquid level detection for aspiration directly. If you want to use a liquid class for the Te-MO which specifies liquid level detection, the liquid level must be emulated using a special variable (see [14.1.4.14 "RACK\\_VOLUME\\_x"](#),  14-7). Check this checkbox if you want to activate the emulated liquid level detection. Liquid level detection can be used e.g. to ensure minimal tip contamination by limiting the tip immersion depth. For Freedom EVOware Plus, see [14.1.4 "Pre-Defined Variables"](#),  14-4 for information on accessing the current value of this pre-defined variable in another script.



### Aspiration Position

Specify the Z-position and the Z-offset of the tips when aspirating. A positive value for the offset lowers the tips. You can only choose a Z-position relative to the liquid level if you have activated liquid level detection emulation.

If you choose an aspirate position with tracking, the tips move downwards as the liquid level drops in the wells during aspiration. This option can be used e.g. to ensure minimal tip contamination by limiting the tip immersion depth.

You can also choose the X-position when aspirating as follows:

- Center: as specified for the labware which is used
- Left: left of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right: right of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Left / Right: left of center for odd columns, right of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right / Left: right of center for odd columns, left of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

You can also choose the Y-position when aspirating as follows:

- Center: as specified for the labware which is used
- Rear: rear of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front: front of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Rear / Front: rear of center for odd columns, front of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front / Rear: front of center for odd columns, rear of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

By combining an X offset and a Y offset, there are nine possible pipetting positions (including the center position with no offsets).

### On Detection Error

Select the required error handling if Freedom EVOware detects no liquid or not enough liquid.

### Use Exit Signal Detection

The Te-MO does not support exit signal detection. The PMP option is not available for the Te-MO.

### Mix before Aspiration

Check this box if you want Freedom EVOware to mix the liquid before aspirating it. You can specify the number of mix cycles (range: 1 to 99), the mix volume (max. 2500 µl), the Z-position and the Z-offset. A positive value for the offset lowers the tips.

### Retract Tips to

Specify the Z-position and the Z-offset to which the tips should retract (move upwards) after aspirating. A positive value for the offset lowers the tips.

### Retract Speed

Specify the required retract speed.

### 10.6.2 Te-MO 96 Dispense Parameters

Freedom EVOware uses these parameters when dispensing or mixing with the 96-tip Te-MO tip block or DITI pipetting head.

Type	Aspirate	Dispense	Calibration
		Single Pipetting	Multi Pipetting
Dispense Speed		10 $\mu\text{l/s}$	10 $\mu\text{l/s}$
Breakoff Speed			
Delay		200 ms	200 ms
Trailing Airgap after each Dispense		<input type="checkbox"/> yes	<input type="checkbox"/> yes
Use Pinch Valve		<input type="checkbox"/> yes	<input type="checkbox"/> yes
Use Liquid Detection		<input type="checkbox"/> yes	
Dispense Position		z-max $\pm$ offset, no tracking	0 mm X: center Y: center
Tip Touching		no tip touching	
Speed		10 mm/s	
Delay after touching		100 ms	
Mix after Dispense		<input checked="" type="checkbox"/> yes 1 x 100 $\mu\text{l}$ at selected position, no tracking	0 mm
Retract Tips to		z-start	0 mm
Retract Speed		42 mm/s	

Fig. 10-20 Te-MO 96 Dispense parameters for the tip block and DITIs

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

#### Dispense Speed

Specify the dispense speed in  $\mu\text{l/s}$ . A high speed (400-600  $\mu\text{l/s}$ ) is needed to achieve a proper free dispense. Contact dispense requires a lower speed (in the same range as the aspirate speed).

#### Breakoff Speed

You cannot specify a breakoff speed for the Te-MO.

#### Delay

Specify the delay after dispensing.

#### Trailing Airgap after each Dispense

You can automatically aspirate a trailing airgap after each dispense operation in order to avoid droplets forming on the tip. The trailing airgap parameters are specified in the *Aspirate* dialog box.

#### Use Pinch Valve

The Te-MO does not have a pinch valve.

#### Use Liquid Detection

The Te-MO does not support liquid level detection (or emulated liquid level detection) for dispensing.

### Dispense Position

Specify the Z-position and the Z-offset of the tips when dispensing. A positive value for the offset lowers the tips.

If you choose a dispense position with tracking, the tips move upwards as the liquid level rises in the wells during dispensing. This option can be used e.g. to ensure minimal tip contamination by limiting the tip immersion depth.

You can also choose the X-position when dispensing as follows:

- Center: as specified for the labware which is used
- Left: left of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right: right of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Left / Right: left of center for odd columns, right of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right / Left: right of center for odd columns, left of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

You can also choose the Y-position when dispensing as follows:

- Center: as specified for the labware which is used
- Rear: rear of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front: front of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Rear / Front: rear of center for odd columns, front of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front / Rear: front of center for odd columns, rear of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

By combining an X offset and a Y offset, there are nine possible pipetting positions (including the center position with no offsets).

### Tip Touching

Activate the tip touching function if required and specify the direction of the movement. The amount of movement is specified with *Tip-touching distance* for the labware which is used.

Tip touching is a special movement when dispensing a liquid. When tip touching is activated, Freedom EVOware dispenses to the destination container in the normal way, but then moves the tips to the side of the well and back before retracting them. This helps to remove any droplets which may be adhering to the tips.

**Speed:** Specify the tip touching speed.

**Delay after touching:** Specify the delay between the tip touching the well and moving back to the middle of the well.

### Mix after Dispense

Check this box if you want to mix the liquid after dispensing it. You can specify the number of mix cycles (range: 1 to 99), the mix volume (max. 2500 µl), the Z-position and the Z-offset. A positive value for the offset lowers the tips.

### Retract Tips to

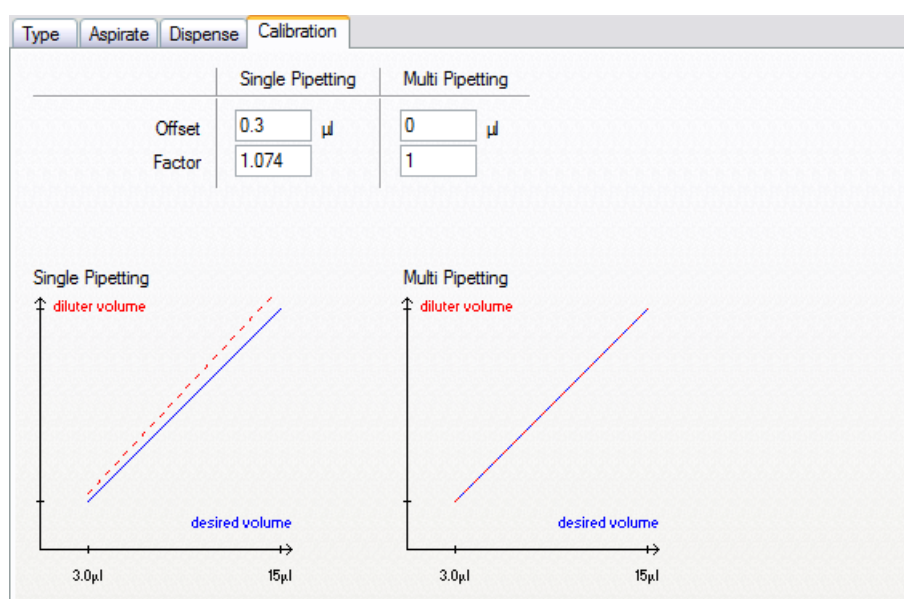
Specify the Z-position and the Z-offset to which the tips should retract (move upwards) after dispensing. A positive value for the offset lowers the tips.

### Retract Speed

Specify the required retract speed.

### 10.6.3 Te-MO 96 Calibration Parameters

Freedom EVOware uses these parameters for the 96-tip Te-MO tip block or DITI pipetting head to ensure that the specified target volumes are dispensed accurately. The two curves in the dialog box show graphically the current settings for single pipetting mode and multi pipetting mode.



**Fig. 10-21** Te-MO 96 Calibrate parameters for the tip block and DITIs

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

#### Offset / Factor

Specify an offset and/or calibration factor to be applied for single pipetting mode and multi pipetting mode.

Freedom EVOware uses the following expression to calculate the Te-MO plunger movement from the target volume specified in the pipetting script:

$$\text{Calibrated Te-MO plunger movement} = (\text{target volume} * \text{factor}) + \text{offset}$$

## 10.7 Te-MO 384 Liquid Classes

The Te-MO is available with a 96-tip or 384-tip pipetting head. The following settings apply to the 384-tip version. The 384-tip pipetting head can be fitted with a tipblock (fixed tips) but not with disposable tips (DITIs).

### 10.7.1 Te-MO 384 Aspirate Parameters

Freedom EVOware uses these parameters for the 384-tip Te-MO pipetting head when aspirating or mixing. The illustrations at the top right of the dialog box show graphically the current settings for single pipetting mode and multi pipetting mode. Vol. stands for the pipetted volume.

Type	Aspirate	Dispense	Calibration	Plunger
			Single Pipetting	Multi Pipetting
Aspiration Speed	50 $\mu$ / s	50 $\mu$ / s	50 $\mu$ / s	50 $\mu$ / s
Delay	1000 ms	1000 ms	1000 ms	1000 ms
System Trailing Airgap	0 $\mu$	0 $\mu$	0 $\mu$	0 $\mu$
Leading Airgap	10 $\mu$	10 $\mu$	10 $\mu$	10 $\mu$
Trailing Airgap	1 $\mu$	0 $\mu$	0 $\mu$	0 $\mu$
Excess Volume	0 $\mu$	10 $\mu$	10 $\mu$	10 $\mu$
Conditioning Volume	0 $\mu$	10 $\mu$	10 $\mu$	10 $\mu$
Use Pinch Valve	<input type="checkbox"/> yes	<input type="checkbox"/> yes	<input type="checkbox"/> yes	<input type="checkbox"/> yes
Use Liquid Detection	<input checked="" type="checkbox"/> yes			
Aspiration Position	z-max $\pm$ offset, no tracking	0 mm	X: center	Y: center
On Detection Error	user prompt			
Use Exit Signal Detection	<input type="checkbox"/> yes			
On Exit Signal Error	user prompt			
On PMP Clot Error	user prompt			
Mix before Aspiration	<input checked="" type="checkbox"/> yes	1 x 100 $\mu$ at	selected position, no tracking	0 mm
Retract Tips to	z-start	0 mm		
Retract Speed	5 mm / s			

Fig. 10-22 Te-MO 384 Aspirate parameters

See 10.6.1 “Te-MO 96 Aspirate Parameters”, 10-39 for details of the parameters.

The Te-MO 384 does not have a pinch valve and does not support exit signal detection. The PMP option is not available for the Te-MO.

### 10.7.2 Te-MO 384 Dispense Parameters

Freedom EVOware uses these parameters for the 384-tip Te-MO pipetting head when dispensing or mixing.

Type	Aspirate	Dispense	Calibration	Plunger
			Single Pipetting	Multi Pipetting
Dispense Speed			55 $\mu\text{l} / \text{s}$	55 $\mu\text{l} / \text{s}$
Breakoff Speed			$\mu\text{l} / \text{s}$	$\mu\text{l} / \text{s}$
Delay			1000 ms	1000 ms
Trailing Airgap after each Dispense			<input checked="" type="checkbox"/> yes	<input checked="" type="checkbox"/> yes
Use Pinch Valve			<input type="checkbox"/> yes	<input type="checkbox"/> yes
Delay before			0 ms	0 ms
Use Liquid Detection			<input type="checkbox"/> yes	
Dispense Position			z-dispense $\pm$ offset, no tracking	0 mm X: center Y: center
Tip Touching			no tip touching	
Speed			10 mm / s	
Delay after touching			100 ms	
Mix after Dispense			<input checked="" type="checkbox"/> yes 1 x 100 $\mu\text{l}$ at selected position, no tracking	0 mm
Retract Tips to			z-start	0 mm
Retract Speed			10 mm / s	

Fig. 10-23 Te-MO 384 Dispense parameters

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

#### Delay before

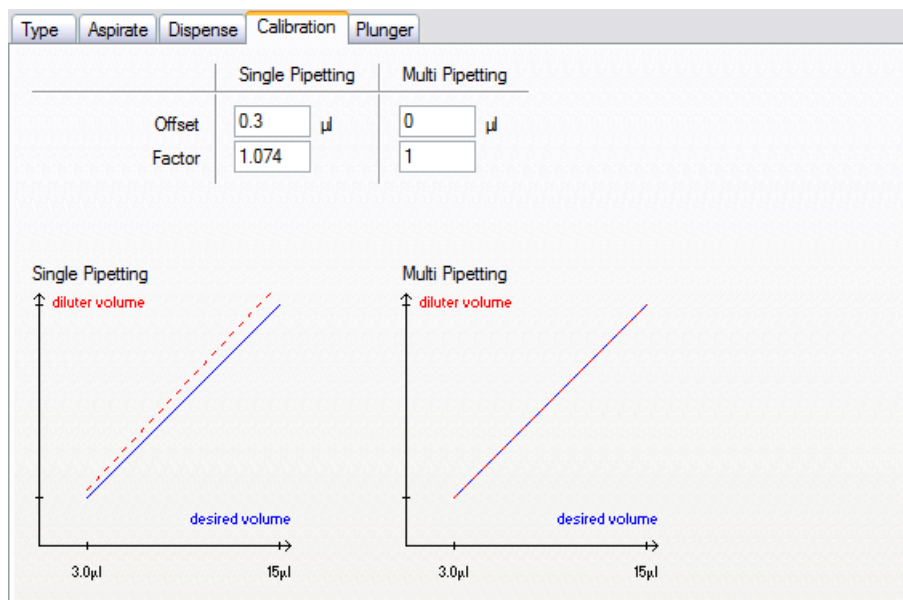
Specify the required settling time for the Te-MO after completing the previous Te-MO command and before starting to dispense (range: 0 to 5000 ms).

The Te-MO 384 does not support liquid level detection or tip touching for dispensing.

See 10.6.2 “Te-MO 96 Dispense Parameters”, 10-42 for details of the other parameters.

### 10.7.3 Te-MO 384 Calibration Parameters

Freedom EVOware uses these parameters for the 384-tip Te-MO pipetting head to ensure that the specified target volumes are dispensed accurately. The two curves in the dialog box show graphically the current settings for single pipetting mode and multi pipetting mode.



**Fig. 10-24** Te-MO 384 Calibration parameters

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

**Offset / Factor**

Specify an offset and/or calibration factor to be applied for single pipetting mode and multi pipetting mode.

Freedom EVOware uses the following expression to calculate the Te-MO plunger movement from the target volume specified in the pipetting script:

$$\text{Calibrated Te-MO plunger movement} = (\text{target volume} * \text{factor}) + \text{offset}$$

### 10.7.4 Te-MO 384 Plunger Parameters

Freedom EVOware uses these parameters for the 384-tip Te-MO pipetting head to control the plunger during dispensing. The graph illustrates the plunger speed versus the time for the specified dispense volume.

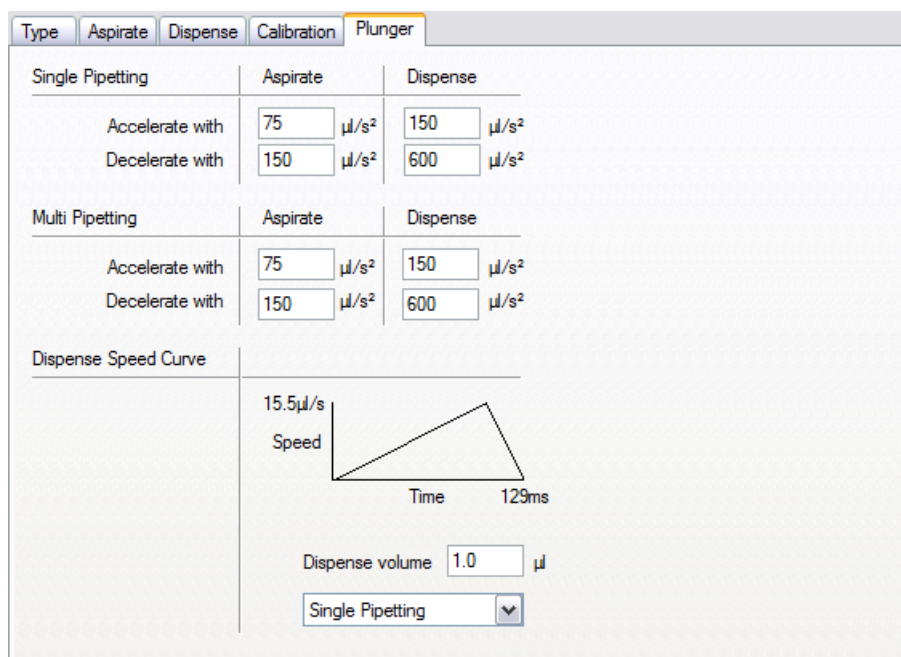


Fig. 10-25 Te-MO 384 Plunger parameters

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

#### Accelerate with / Decelerate with

Specify the required acceleration and deceleration of the Te-MO plunger for single pipetting mode and multi pipetting mode. For mechanical reasons the Te-MO plunger cannot accelerate or decelerate instantly. The graph then illustrates the plunger speed versus the time for the specified dispense volume.

#### Dispense volume

Specify the dispense volume for which you want to see a graph (the volume you specify should include the leading and trailing airgaps) and choose the graph you want to see (single pipetting mode or multi pipetting mode). The volume you specify is only used to calculate the graph and is not a dispense command for the Te-MO (the volume which will be dispensed is specified with the Te-MO Dispense command).

The graph helps you to identify whether you have chosen suitable settings in this dialog box.

If the graph has a flat top (plateau), the plunger acceleration/deceleration will allow the plunger to reach the dispense speed specified on the Dispense tab of the liquid class for the dispense volume you have chosen.



## 10.8 Overview of Liquid Classes Supplied With Freedom EVOware

A liquid class is a collection of parameters necessary for pipetting liquids. Each liquid class is divided into subclasses for a certain hardware configuration and volume range. The subclasses are automatically selected at runtime depending on the used hardware and required volume.

### 10.8.1 General

Tecan provides a default liquid class database for water, DMSO, serum and ethanol, installed with EVOware. Additional liquid classes for special pipetting options can be imported from the EVOware CD.

**Note:** If not specified, all liquid classes are for use with 1000 µl syringes.

Using a standard liquid class assumes that the most suitable tip size is used; for example, when pipetting 150 µl with the Liquid Handling Arm, it is assumed that the 200 µl tip is used. In this case, the standard liquid class "Water free dispense" should be used. However, if it is preferred to use the 1000 µl tip for pipetting 150 µl, a specific liquid class should be used, in this case "Water free dispense DiTi 1000".

The diagram Fig. 10-27, Fig. 10-50 and Fig. 10-26, Fig. 10-49 show the usage for the most common liquid classes in combination of the required volume and tip capacity.

Eg.: Pipetting a volume of 10 µl with a 50 µl tip using the MCA384 would require the liquid class **Water wet contact MCA 384 DiTi 50**.

Liquid class usage for DiTi operated with the LiHa:

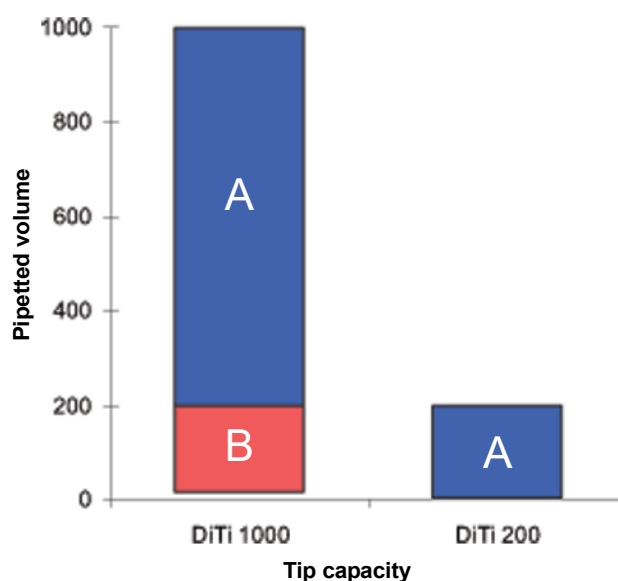


Fig. 10-26 Liquid class usage for Disposable Tips on the LiHa

**A** Water free dispense

**B** Water free dispense DiTi 1000

Liquid class usage for DiTi operated with the MCA384:

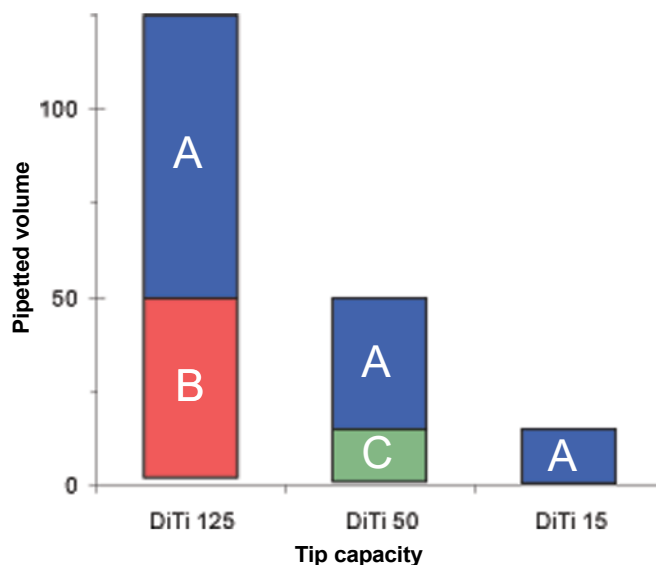


Fig. 10-27 Liquid class usage for Disposable Tips on the MCA 384

A Water wet contact

C Water wet contact MCA 384 DiTi 50

B Water wet contact MCA 384 DiTi 125

### Approach

The liquid class names have been chosen to be self-explanatory containing the liquid type, dispense mode and if necessary the hardware configuration.

Many liquid classes may have similar parameter settings when being compared to each other. The differences are usually found in adaptations of parameter values for certain volumes.

Refer to the respective section for further information:

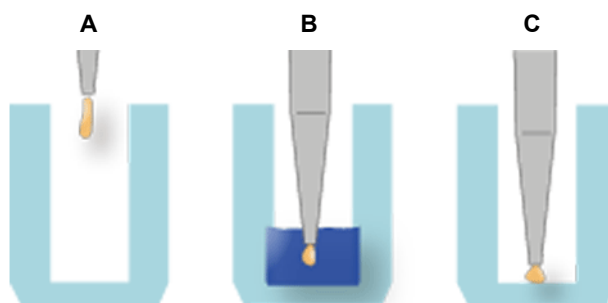
[10.8.3 “Installed Liquid Classes”, 10-51](#)

[10.8.4 “Liquid Classes on the Freedom EVOware CD”, 10-62](#)

### 10.8.2 Dispense Modes

The figures below show how liquids are dispensed into a well.

The dispense modes differ from each other to provide certain features to match the liquid’s attributes and application requirements.



**Fig. 10-28** Dispense modes

- A** Free Dispense (non contact)
- B** Wet Contact (contact with liquid)
- C** Dry Contact (contact with labware)

**Free Dispense (non contact)**

The free dispense mode dispenses the liquid from a defined dispense position, generally at the container top. If liquid is present the dispense position is above the liquid level.

- Medium precision; maximum throughput

**Wet Contact (contact with liquid)**

The wet contact dispense mode dispenses the liquid at Z-Max or below the liquid level of a pre-dispensed liquid (e.g. diluent). Mixing can be added without additional tip movement.

- High precision; low throughput

**Dry Contact (contact with labware)**

The dry contact dispense mode dispenses at or close to Z-Max. High precision; medium throughput

**10.8.3 Installed Liquid Classes**

The default liquid classes listed below are intended for water, DMSO, serum and ethanol.

**DMSO**

<b>Name</b>	<b>DMSO dry contact DiTi 10</b>
<b>Usage</b>	For 10 µl LiHa disposable tips
<b>Devices</b>	Air LiHa with 10µ DiTi
<b>Comment</b>	
<b>Name</b>	<b>DMSO free dispense</b>
<b>Usage</b>	General liquid class
<b>Devices</b>	LiHa, Air LiHa, MCA96 with DiTi
<b>Comment</b>	Can be used for most pipetting devices and tip types

<b>Name</b>	<b>DMSO free dispense DiTi 50</b>
Usage	General liquid class
Devices	Air LiHa
Comment	Can be used for Air LiHa with 50 µl disposable tips

<b>Name</b>	<b>DMSO wet contact</b>
Usage	General liquid class
Devices	MCA96, MCA384, Te-MO96
Comment	For multi channel pipetting heads

<b>Name</b>	<b>DMSO wet contact MC96 HP block</b>
Usage	High Precision fixed tip block on 96-channel pipetting heads
Devices	MCA96, Te-MO96
Comment	

<b>Name</b>	<b>DMSO wet contact MCA 384 DiTi 125</b>
Usage	
Devices	MCA384 with 125 µl DiTi
Comment	Improved accuracy below 50 µl

<b>Name</b>	<b>DMSO wet contact MCA 384 DiTi 15</b>
Usage	
Devices	MCA384 with 15 µl DiTi
Comment	Improve accuracy below 2 µl for 15 µl Disposal Tips

<b>Name</b>	<b>DMSO wet contact MCA 384 DiTi 50</b>
Usage	
Devices	MCA384 with 50 µl DiTi
Comment	Improved accuracy below 15 µl

<b>Name</b>	<b>DMSO wet contact MCA 384 large capacity tip block</b>
Usage	For large capacity fixed tip blocks
Devices	MCA384 with 96 or 384 fixed tip block
Comment	

### Ethanol

<b>Name</b>	<b>Ethanol free dispense</b>
Usage	General liquid class
Devices	LiHa, Air LiHa
Comment	

<b>Name</b>	<b>Ethanol free dispense 5ml DiTi</b>
Usage	
Devices	LiHa with 5ml DiTi
Comment	Liquid class for 5000 µl Disposable Tips

<b>Name</b>	<b>Ethanol free dispense DiTi 50</b>
Usage	For 50µl LiHa disposable tips without filter
Devices	Air LiHa with 50 µl DiTi
Comment	

<b>Name</b>	<b>Ethanol wet contact DiTi 50</b>
Usage	
Devices	Air LiHa with 50 µl DiTi
Comment	For 50 µl LiHa disposable tips without filter

### Master Mix

<b>Name</b>	<b>Master Mix free dispense DiTi 10</b>
Usage	
Devices	Air LiHa
Comment	For 10µl disposable tips

**Serum**

**Name** Serum free dispense

Usage General liquid class

Devices LiHa, Air LiHa

Comment

**Name** Serum free dispense 5ml DiTi

Usage General liquid class

Devices LiHa with 5ml DiTi

Comment Liquid class for 5000 µl Disposable Tips

**Name** Serum free dispense DiTi 1000

Usage

Devices LiHa with 1000 µl DiTi, Air LiHa

Comment Improved accuracy below 200 µl with 1000 µl DiTi

**Name** Serum free dispense DiTi 1000 Wide Bore filter

Usage

Devices Air LiHa

Comment Liquid Class for 1000 µl DiTi wide bore with filter

**Name** Serum free dispense DiTi 350

Usage

Devices LiHa, Air LiHa

Comment For 350 µl disposable tips from nested LiHa stack

**Name** Serum free dispense PMPAir DiTi 1000

Usage

Devices Air LiHa

Comment Pressure Monitored Pipetting for 1000 µl DiTi without filter

<b>Name</b>	<b>Serum free dispense PMPAir DiTi 1000 filter</b>
Usage	
Devices	Air LiHa
Comment	Pressure Monitored Pipetting for 1000 µl DiTi with filter

<b>Name</b>	<b>Serum free dispense PMPAir DiTi 1000 Wide Bore filter</b>
Usage	
Devices	Air LiHa
Comment	Pressure Monitored Pipetting for 1000 µl DiTi wide bore with filter

<b>Name</b>	<b>Serum free dispense PMPAir DiTi 200</b>
Usage	
Devices	Air LiHa
Comment	Pressure Monitored Pipetting for 200 µl DiTi without filter

<b>Name</b>	<b>Serum free dispense PMPAir DiTi 350</b>
Usage	
Devices	Air LiHa
Comment	Pressure Monitored Pipetting using Tecan part no. 10612555

<b>Name</b>	<b>Serum wet contact DiTi 1000 wide bore filter</b>
Usage	
Devices	LiHa
Comment	Liquid class for 1000 µl DiTi wide bore with filter

### System Liquid

<b>Name</b>	<b>System Liquid free dispense</b>
Usage	Aspirate and dispense system liquid with the LiHa
Devices	LiHa
Comment	

**Water**

<b>Name</b>	<b>Water dry contact</b>
Usage	For 10 and 50 µl DiTi in dry microplate
Devices	Air LiHa with 10 or 50 µl DiTi
Comment	

<b>Name</b>	<b>Water dry contact High density plate</b>
Usage	For Te-PS tips and 10 µl Disposable Tips in dry 1536 well plate
Devices	LiHa with Te-PS tips or 10 µl DiTi, Air LiHa
Comment	

<b>Name</b>	<b>Water free dispense</b>
Usage	General liquid class
Devices	LiHa, MCA96, Air LiHa
Comment	For most pipetting devices and tip types

<b>Name</b>	<b>Water free dispense 5ml DiTi</b>
Usage	
Devices	LiHa with 5 ml DiTi
Comment	Liquid class for 5000 µl Disposable Tips

<b>Name</b>	<b>Water free dispense DiTi 1000</b>
Usage	
Devices	LiHa with 1000 µl DiTi, Air LiHa
Comment	Improved accuracy below 200 µl for 1000 µl Disposable Tips

<b>Name</b>	<b>Water free dispense DiTi 1000 Wide Bore filter</b>
Usage	
Devices	LiHa, Air LiHa
Comment	Liquid Class for 1000 µl DiTi wide bore with filter

<b>Name</b>	<b>Water free dispense DiTi 350</b>
Usage	



Devices LiHa, Air LiHa  
Comment For 350 µl disposable tips from nested LiHa stack

Name **Water free dispense DiTi 50**

Usage

Devices LiHa, Air LiHa  
Comment For 50 µl disposable tips without filter using 500 µl syringe

<b>Name</b>	<b>Water free dispense DiTi 10</b>
Usage	
Devices	LiHa DiTi
Comment	For 10 µl disposable tips using 500 µl syringes
<b>Name</b>	<b>Water free dispense DiTi 50 filter</b>
Usage	
Devices	LiHa
Comment	For 50 µl disposable tips with filter using 500 µl syringe
<b>Name</b>	<b>Water free dispense MCA DiTi 500</b>
Usage	
Devices	MCA96
Comment	Water
<b>Name</b>	<b>Water free dispense PMPAir DiTi 1000</b>
Usage	
Devices	Air LiHa
Comment	Pressure Monitored Pipetting for 1000 µl DiTi without filter
<b>Name</b>	<b>Water wet contact</b>
Usage	General liquid class
Devices	LiHa, MCA384, MCA96, Te-MO 96
Comment	For most pipetting devices and tip types

<b>Name</b>	<b>Water wet contact DiTi 50</b>
Usage	General liquid class
Devices	Air LiHa
Comment	For Air LiHa with 50 µl disposable tips

<b>Name</b>	<b>Water wet contact MC96 HP block</b>
Usage	High Precision fixed tip block on 96-channel pipetting heads
Devices	MCA96, Te-MO 96
Comment	

<b>Name</b>	<b>Water wet contact MCA wide-bore</b>
Usage	For wide bore MCA96 Disposable Tips
Devices	MCA96
Comment	

<b>Name</b>	<b>Water wet contact MCA 384 DiTi 125</b>
Usage	
Devices	MCA384 with 125 µl DiTi
Comment	Improved accuracy below 50 µl

<b>Name</b>	<b>Water wet contact MCA 384 DiTi 15</b>
Usage	
Devices	MCA384 with 15 µl DiTi
Comment	Improved accuracy below 5 µl for 15 µl Disposable Tips

<b>Name</b>	<b>Water wet contact MCA 384 large capacity tip block</b>
Usage	For large capacity fixed tip blocks
Devices	MCA384 with 96 or 384 fixed tip block
Comment	

### Wash Refill Center

The WRC wash and refill center has default liquid classes, required for washing tips. The WRC wash and refill center is used for washing the MCA96, MCA384 as well as the Te-MO 96.

#### WRC

Name	<b>WRC step 1 Empty tips</b>
------	------------------------------

Usage	Step 1 of wash command
Devices	MCA384, MCA96, Te-MO 96
Comment	For emptying tips

Name	<b>WRC step 2 Dip in</b>
------	--------------------------

Usage	Step 2 of wash command
Devices	MCA384, MCA96, Te-MO 96
Comment	For dipping into the wash liquid

Name	<b>WRC step 3 Blow out underwater</b>
------	---------------------------------------

Usage	Step 3 of wash command
Devices	MCA384, MCA96, Te-MO 96
Comment	For blowing out air inside the wash liquid

Name	<b>Ethanol free dispense DiTi 1000 Clear</b>
------	--

Usage	General liquid class
Devices	Air LiHa
Comment	Can be used for Air LiHa with 1000 µl disposable tips

Name	<b>Ethanol free dispense DiTi 200 Clear</b>
------	---

Usage	General liquid class
Devices	Air LiHa
Comment	Can be used for Air LiHa with 200 µl disposable tips

Name	<b>Ethanol free dispense DiTi 50 Clear</b>
------	--

Usage	General liquid class
Devices	Air LiHa
Comment	Can be used for Air LiHa with 50 µl disposable tips

<b>Name</b>	<b>Serum free dispense DiTi 1000 Clear</b>
Usage	General liquid class
Devices	Air LiHa
Comment	Can be used for Air LiHa with 1000 µl disposable tips

<b>Name</b>	<b>Serum free dispense DiTi 200 Clear</b>
Usage	General liquid class
Devices	Air LiHa
Comment	Can be used for Air LiHa with 200 µl disposable tips

<b>Name</b>	<b>Water free dispense DiTi 1000 Clear</b>
Usage	General liquid class
Devices	Air LiHa
Comment	Can be used for Air LiHa with 1000 µl disposable tips

<b>Name</b>	<b>Water free dispense DiTi 200 Clear</b>
Usage	General liquid class
Devices	Air LiHa
Comment	Can be used for Air LiHa with 200 µl disposable tips

<b>Name</b>	<b>Water free dispense DiTi 50 Clear</b>
Usage	General liquid class
Devices	Air LiHa
Comment	Can be used for Air LiHa with 50 µl disposable tips

### 10.8.4 Liquid Classes on the Freedom EVOware CD

The liquid classes listed below can be imported from the Freedom EVOware CD.

#### LiHa 50 µl DiTi

Name	<b>Water free dispense DiTi 50</b>
Usage	For 50 µl DiTi without filter
Devices	LiHa with 50 µl DiTi, Air LiHa
Comment	Used with 500 µl syringe

Name	<b>Water free dispense DiTi 50 Filter</b>
Usage	For 50 µl DiTi with filter
Devices	LiHa with 50 µl DiTi
Comment	Used with 500 µl syringe

#### Te-MO 384

Name	<b>384 DMSO contact wet</b>
Usage	
Devices	Te-MO 384
Comment	

Name	<b>384 DMSO free dispense</b>
Usage	
Devices	Te-MO 384
Comment	

Name	<b>384 Dummy</b>
Usage	
Devices	Te-MO 384
Comment	Only used for maintenance scripts

<b>Name</b>	<b>384 Water contact wet</b>
Usage	
Devices	Te-MO 384
Comment	

<b>Name</b>	<b>384 Water free dispense</b>
Usage	
Devices	Te-MO 384
Comment	

## PMP

<b>Name</b>	<b>Water free dispense PMP DiTi 200 filter</b>
Usage	Pressure Monitored Pipetting using Tecan branded DiTis
Devices	PMP LiHa with 200 µl DiTi with filter
Comment	

<b>Name</b>	<b>Water free dispense PMP DiTi 1000 filter</b>
Usage	Pressure Monitored Pipetting using Tecan branded DiTis
Devices	PMP LiHa with 1000 µl DiTi with filter
Comment	

<b>Name</b>	<b>Serum free dispense PMP DiTi 200 filter</b>
Usage	Pressure Monitored Pipetting using Tecan branded DiTis
Devices	PMP LiHa with 200 µl DiTi with filter
Comment	

<b>Name</b>	<b>Serum free dispense PMP DiTi 1000 filter</b>
Usage	Pressure Monitored Pipetting using Tecan branded DiTis
Devices	PMP LiHa with 1000 µl DiTi with filter
Comment	

<b>Name</b>	<b>DMSO free dispense PMP DiTi 200</b>
Usage	Pressure Monitored Pipetting using Tecan branded DiTis
Devices	PMP LiHa with 200 µl DiTi without filter
Comment	

<b>Name</b>	<b>DMSO free dispense PMP DiTi 200 filter</b>
Usage	Pressure Monitored Pipetting using Tecan branded DiTis
Devices	PMP LiHa with 200 µl DiTi with filter
Comment	

<b>Name</b>	<b>DMSO free dispense PMP DiTi 1000 filter</b>
Usage	Pressure Monitored Pipetting using Tecan branded DiTis
Devices	PMP LiHa with 1000 µl DiTi with filter
Comment	

<b>Name</b>	<b>Template free dispense PMP DiTi 200</b>
Usage	Template for creating a customized PMP liquid class
Devices	PMP LiHa with 200 µl DiTi without filter
Comment	



<b>Name</b>	<b>Template free dispense PMP DiTi 200 filter</b>
Usage	Template for creating a customized PMP liquid class
Devices	PMP LiHa with 200 µl DiTi with filter
Comment	

<b>Name</b>	<b>Template free dispense PMP DiTi 1000 filter</b>
Usage	Template for creating a customized PMP liquid class
Devices	PMP LiHa with 1000 µl DiTi with filter
Comment	

**Air LiHa**

<b>Name</b>	<b>Water free dispense Air-LiHa PMP DiTi 1000</b>
Usage	Pressure Monitored Pipetting using Tecan branded DiTis
Devices	PMP Air-LiHa with 1000 µl DiTi without filter
Comment	

<b>Name</b>	<b>Serum free dispense Air-LiHa PMP DiTi 200</b>
Usage	Pressure Monitored Pipetting using Tecan branded DiTis
Devices	PMP Air-LiHa with 200 µl DiTi without filter
Comment	

<b>Name</b>	<b>Serum free dispense Air-LiHa PMP DiTi 1000</b>
Usage	Pressure Monitored Pipetting using Tecan branded DiTis
Devices	PMP Air-LiHa with 1000 µl DiTi without filter
Comment	



# 11 Getting Started - Setting Up a New Script or Process

This chapter describes the steps which are required to set up a new pipetting script (Freedom EVOware Standard) or process (Freedom EVOware Plus). Processes and scripts can only be created and/or modified by users with Freedom EVOware Administrator or Application Specialist rights.

## 11.1 First Steps

### Freedom EVOware Standard

Start Freedom EVOware and choose *Create a new script* in the Startup Wizard (see [5.2 "Startup Wizard, Freedom EVOware Standard"](#), ¶ 5-5). This opens the main window of Freedom EVOware. Initially, the Worktable Editor at the bottom right of the screen will be empty (i.e. it does not contain any carriers or labware etc.). The Script Editor at the top right of the screen will also empty be until you add some pipetting commands. Until you save the script for the first time and assign a name of your choice, the title bar of the Script Editor will show a generic name.

### Freedom EVOware Plus

Start Freedom EVOware and choose *Create a new process* in the Startup Wizard (see [5.3 "Startup Wizard, Freedom EVOware Plus"](#), ¶ 5-7). This opens the main window of Freedom EVOware. Initially, the Worktable Editor at the bottom right of the screen will be empty (i.e. it does not contain any carriers or labware etc.). The Process Editor at the top right of the screen will also empty be empty until you add some process steps. Until you save the script for the first time and assign a name of your choice, the title bar of the Process Editor will show a generic name.

The various elements of the Freedom EVOware main window are described in [5.4 "Overview of the Main Window in Freedom EVOware"](#), ¶ 5-9.

## 11.2 Setting Up a New Pipetting Instrument

Please proceed as follows when setting up a new pipetting instrument:

- ♦ Use the *Setup & Service* software to check and calibrate the reference coordinates of the hardware. This is normally done for you by the Tecan Field Service Engineer when installing the pipetting instrument and the optional devices. See [1.2 "Reference Documents"](#), ¶ 1-3 for information on this software.
- ♦ Edit the settings for the LiHa (see [8.4.2.1 "LiHa \(Liquid Handling Arm\)"](#), ¶ 8-22).
- ♦ If necessary, edit the settings for the PosID barcode scanner (see [8.4.2.2](#), ¶ 8-28), the MPO/LICOS system (see [8.4.2.3](#), ¶ 8-29), the Chemical System (see [8.4.2.4](#), ¶ 8-29) and the doorlocks (see [8.4.2.5](#), ¶ 8-30).

## 11.3 Pre-requirements

Before you can set up a process or script, you have to configure the infrastructure of your system as follows:

- ◆ Check that the optional devices you want to use (such as barcode scanners) are installed on your pipetting instrument and that the devices are present in the Control Bar (Commands section) and/or visible in the Worktable Editor. If the icons are missing, then you need to run the installation program again and install the device drivers which are missing (see [13.2 “Overview of Device Commands”](#), ¶ 13-8 and [4.3 “Modifying, Removing or Repairing Your Installation”](#), ¶ 4-8). In general, the device drivers are pre-configured during installation with appropriate global settings. For information on configuring the global settings see [8.4 “Device Settings”](#), ¶ 8-21.
- ◆ Check that the general settings for the Freedom EVOware software are configured appropriately (see [8 “Configuration Tool”](#), ¶ 8-1). Among other things, check that the COM ports have been configured for the optional devices and that the I/O state is switched ON for the devices that you want to use (this enables the COM interface for the respective device). See [8.4.3.1 “I/O State Tab”](#), ¶ 8-32.
- ◆ Check that the carriers and labware you want to use for your process are visible in Freedom EVOware in the Control Bar (Labware section). If you are using custom carriers and/or labware items which are not in the list, you need to create them in Freedom EVOware before you can set up your process. See [9.5 “Configuring Carriers”](#), ¶ 9-29 and [9.4 “Configuring Labware”](#), ¶ 9-9. In the case of carriers, this involves e.g. specifying the carrier dimensions and how many labware items can be put on the carrier. In the case of labware, this involves e.g. specifying the labware dimensions.
- ◆ Check that liquid classes are available for the liquids you want to pipette (see [10.1 “Liquid Classes Editor”](#), ¶ 10-1). A liquid class is a set of liquid handling parameters. It specifies aspirating and dispensing speeds, airgaps, liquid detection modes, etc.
- ◆ Rectangular labware such as microplates is moved to and from carriers and other devices such as carousels using a plate robot (RoMa; robot manipulator). Tubes are moved to and from tube racks using a tube robot (PnP; Pick and Place arm). Movement commands for the RoMa and PnP are called robot vectors. The robot vectors for the RoMa are associated with the carrier definitions. The robot vectors for the PnP are associated with the labware definitions. Appropriate robot vectors may already be provided with your Freedom EVOware installation. Check in the respective carrier and labware definitions to see whether the robot vectors you want to use are already present. Otherwise you will need to configure a new vector. See [9.6 “Creating and Editing Plate Robot Vectors”](#), ¶ 9-46.
- ◆ Additional RoMa and PnP vectors are needed to move the RoMa or PnP back to a home (or parking) position when not in use. Such vectors can be seen in the Robot Vectors section of the Control Bar. See [9.6.4 “Defining the Home Position for a RoMa”](#), ¶ 9-53.

### 11.3.1 Setting Up Carriers on the Worktable

The Worktable Editor at the bottom right of the screen is a graphical representation of the pipetting instrument's worktable (deck). It shows icons for the devices which are installed and the arrangement of the carriers and labware. See [13.2 “Overview of Device Commands”](#), ¶ 13-8.

Before programming your process or pipetting script, you need to move the carriers and labware etc. which you want to use on to the Worktable Editor to match the real arrangement of these objects on the pipetting instrument.

This section describes how to add carriers; putting labware on the carriers is described in [11.4.1 “Choosing Labware for a Pipetting Script”](#), [11-4](#), [11.5.1 “Choosing Labware for a Process”](#), [11-7](#) and [11.5.4 “Choosing Labware for a Pipette Command”](#), [11-10](#).

**Note:** *Each script or process has its own worktable layout, and the worktable layout is automatically saved with the script or process. Click on the worktable and click Save worktable as template if you want to save the worktable layout as a template for use in another script or process. The worktable template contains information on the carriers you have chosen. If you have already put labware onto the carriers, the template also contains information on the labware you have chosen.*

Carriers can only be placed on the Worktable Editor at specified grid positions which correspond to the positioning pins on the instrument's worktable. One grid unit is 25.0 mm. The choice and the positions of carriers and labware are chosen according to the requirements of your application or experiment.

You can change the carrier positions later by dragging with the mouse without needing to change your script or process, for example if it turns out that the carriers are too close together to position additional objects in between.

You can change the size of the Worktable Editor by moving the mouse over the one of the edges until the double arrow cursor appears. Then click and drag until the required size has been reached.

When required by the script or process, Freedom EVOware uses the RoMa (Robot Manipulator) to move labware during runtime to new positions (carrier sites). However, carriers and devices always stay at the same position. Accordingly, you must set up the initial worktable with all of the carriers you need in the correct positions.

There are two basic types of carrier - normal carriers on which you can place labware for pipetting and carriers which are devices. The latter type are used as placeholders on the worktable for devices such as the orbital shaker or the incubator. Depending on the type of device, such carriers are often not available for pipetting, even though you can place labware on (or into) them. When the carrier is configured, this is specified by unchecking the *Accessible for liquid handling arm* checkbox.

To create the worktable layout, select the required carrier type from the Control Bar (Labware section) and drag it onto the worktable at the required position. Make sure that there is enough space on the worktable for the carrier. If necessary, drag already positioned objects to the left or right to make space. Remember that the final positions you choose must correspond to the actual position of the objects on the pipetting instrument. Large objects such as the TeMO need a lot of space to allow them to be positioned.

Repeat this process to add all of the carriers to the worktable that you need. The choice and the positions of the carriers is based on the requirements of your application or experiment.

To move a carrier to a new position, click the edge of the carrier to select it and drag it to the required position. When dragging the carrier, the current grid position is shown in the small yellow tab at the bottom left. To delete a carrier, click on it and drag it off of the worktable.

To make a copy of a carrier which is already on the worktable, press the Ctrl button, click on the carrier and drag the cursor to the required grid position.

When adding, deleting or moving carriers, a special cursor is shown to indicate the action you are performing (“+”, “del” or “move”).

If you click on a carrier (click on the edge, not on the labware on the carrier), information on the carrier is shown in the lower infopad.

Carrier types can be assigned unique colors in the Freedom EVOware configuration make it easier for you to identify them in the Worktable Editor (see “Color”, [Fig 9-31](#)).

Carriers which are designed for one type of labware only (such as tube racks and the wash station) are put on the worktable with a full complement of labware. For other carrier types, you need to add the labware by hand (see later).

See also [11.7.2 “Example of a Worktable With Several Carriers and Labware Items”](#), [Fig 11-18](#).

## 11.4 Setting Up a Pipetting Script in Freedom EVOware Standard

After setting up the worktable with the carriers and devices you want to use, before you write the pipetting script you must to choose the labware you need.

### 11.4.1 Choosing Labware for a Pipetting Script

Select the required labware type from the Labware section of the Control Bar and drag it onto the required carrier site on the worktable. To help you, Freedom EVOware highlights all carrier sites which are suitable for the chosen labware item.

**Note:** *If you click on the carrier and scroll down to Allowed Labware, Freedom EVOware will show you the labware types which are compatible with the selected carrier.*

Repeat this process to add all of the labware to the worktable that you need. The choice and the positions of the labware is based on the requirements of your application or experiment.

To move labware to a new position, click on the labware to select it and drag to the required carrier site. To delete labware, click on it and drag it off of the worktable.

To make a copy of a labware item which is already on the worktable, press the Ctrl button, click on the labware and drag the cursor to the required carrier site.

When adding, deleting or moving labware, a special cursor is shown to indicate the action you are performing (“+”, “del” or “move”).

Labware types can be assigned unique colors in the Freedom EVOware configuration make it easier for you to identify them in the Worktable Editor (see “Color”, [Fig 9-13](#)).

In addition, labware items can be assigned labels (names) to make it easier to identify them in the Worktable Editor (see [11.7.1 “Assigning a Label \(Name\) to the Labware”](#), [Fig 11-18](#)). Labware labels are shown in yellow.

If you click on a labware item, information on the item is shown in the lower infopad. See [Fig. 11-8](#), [Fig 11-18](#) for an example of a worktable.

## 11.4.2 Creating a Pipetting Script

The pipetting program (or *script*) is created by choosing script commands in the Control Bar and dragging them to the Script Editor window (see 5.4.4 “The Script Editor”, ¶ 5-18). See 13.1 “Overview of Script Commands”, ¶ 13-1.

Because Freedom EVOware normally executes a script in a linear sequence, you should add the commands in the order that you want the script to be executed. Each script is associated with its own worktable layout (carriers, devices and labware), which must be specified before you write the script.

When you drag a script command to the Script Editor, a blue line helps you to choose where the new command should be inserted.

When you drop the command onto the Script Editor, a dialog box is opened where you can specify the command parameters. After making your entries, click *OK* to add the command to the script. To change the command parameters later, double-click the script line to open the dialog box again (or click on the script line and press Enter).

If your script uses device commands, it is also necessary to put labware of the correct type onto the device icon(s). This is shown by a grey rectangle inside the icon. This is not necessary in Freedom EVOware Plus. Tip: If you click on the grey rectangle, the chosen labware type is shown in the lower Infopad.

The currently selected script line is highlighted in orange. The associated object in the Worktable Editor is highlighted using the same color. The cursor keys can be used to move through the script one line at a time.

The *Cut*, *Copy*, and *Paste* functions in the *Edit* menu (and in the Script Editor’s context menu) can also be used when creating a script. Select one or more script lines, choose *Cut* or *Copy*, select where you want to insert the command(s) and then choose *Paste*.

To select several script lines, click on the first line you want to select and shift-click on the last line (click while pressing the Shift key). To clear the selection, click on a line outside of the selected range. To move a line, click on it and drag it to the required position.

See also 17 “Special Features, Example Scripts and Processes”, ¶ 17-1.

### 11.4.2.1 Checking the Pipetting Script for Errors

Each time you insert a new command in your script or edit an existing command, Freedom EVOware validates the entire script to check for errors and shows all commands which have errors in red. If you select a faulty command, the infopad will show information on the error. Double-click on the command in the Script Editor to open a dialog box where you can change the command parameters.

Choose Auto-Validation in the Edit menu if you want to switch off automatic validation of pipetting scripts (see 6.2.5 “Auto-Validation”, ¶ 6-9). You then need to validate the script manually (by choosing Validate Script in the Edit menu).

If your script contains conditional jumps or branches, validation only checks those parts of the script which are executed with the default values of the IF variables in Condition commands. For this reason, it is not recommended to declare variables (e.g. with the Set Variable command) within conditional parts of the script (see 14.1.12 “Validating a Script Which Contains Variables”, ¶ 14-18).

If your script contains conditional jumps or branches, you should separately validate those parts of the script which are not executed with the default values of the IF variables. To do this, temporarily modify the values of the IF variables to ensure that all of the script branches have been tested.

Freedom EVOware chooses multi-dispensing mode automatically if the pipetting script specifies an aspirate command followed by several consecutive dispense commands. In turn, this influences the liquid class parameters which are used.

The decision between single dispensing mode and multi-dispensing mode is made when the script is validated and not when the script is run. Scripts are validated when they are modified and also when they are opened for running without being modified. Validation is done using default values for the variables. If the number of consecutive dispense commands is controlled by a variable whose value can change during runtime, it is recommended to design the script with branches or separate groups of commands for single-pipetting mode (one dispense operation) and multi-pipetting mode (more than one dispense operation). This ensures that the correct pipetting mode and liquid class parameters will be chosen at runtime.

See also [14.3.4 "Validating a Script Which Contains Sub-Routines"](#), ¶ 14-23.

See also [C "Validation of Freedom EVOware Applications"](#), ¶ C-1.

### 11.4.3 Adding Robot Movement Commands to the Script

#### Plate Robot

Movement commands for the plate robot (RoMa vectors) are associated with carriers. They are specified in the carrier definition (see [9.6 "Creating and Editing Plate Robot Vectors"](#), ¶ 9-46).

In Freedom EVOware Standard, RoMa movements are initiated by script commands (see [15.51 "RoMa Vector Command"](#), ¶ 15-111 and [15.52 "Transfer Labware Command"](#), ¶ 15-113). Simple RoMa movements are carried out with the Move RoMa command, which does not need a RoMa vector (see [15.50](#), ¶ 15-110).

For Freedom EVOware Plus see [11.5.3 "Adding Robot Movement Commands to the Process"](#), ¶ 11-9.

### 11.4.4 Saving the Script

Save the script you have created by clicking Save in the toolbar or by choosing Save from the File menu. Then enter a name for the script in the Save File dialog box or select an existing script which you want to overwrite and click the green arrow. You can also save the script as a script template by choosing Save As from the File menu and clicking the Template button in the Save File dialog box.

### 11.4.5 Running the Script

See [12.1 "Running a Liquid Handling Script"](#), ¶ 12-1.

## 11.5 Setting Up a Process in Freedom EVOware Plus

In Freedom EVOware Plus, the sequence of steps which are required to carry out a particular application or experiment, for example to extract the substance you are looking for, is called a process. The process specifies the operations you want the pipetting instrument to execute. Processes are set up in the Process Editor, which is shown at the top right of the screen (see [5.4.3 "The Process Editor \(Freedom EVOware Plus\)"](#), ¶ 5-16).



### 11.5.1 Choosing Labware for a Process

After setting up the worktable with the carriers and devices you want to use, you then need to choose the labware you need. There are several ways to do this depending on the situation:

**☒ The labware will always stay at the same position and does not need to be moved when you run the process**

This option is typically used for reagent troughs.

Select the required labware type in the Control Bar (Labware section) and drag it onto the required carrier site on the worktable. To help you, Freedom EVOware highlights all carrier sites which are suitable for the chosen labware item.

**Note:** *If you click on the carrier and scroll down to Allowed Labware, Freedom EVOware will show you the labware types which are compatible with the selected carrier.*

Repeat this process to add all of the labware to the worktable that you need. The choice and the positions of the labware is based on the requirements of your application or experiment.

To move labware to a new position, click on the labware to select it and drag to the required carrier site. To delete labware, click on it and drag it off of the worktable.

To make a copy of a labware item which is already on the worktable, press the Ctrl button, click on the labware and drag the cursor to the required carrier site.

When adding, deleting or moving labware, a special cursor is shown to indicate the action you are performing (“+”, “del” or “move”).

Labware types can be assigned unique colors in the Freedom EVOware configuration make it easier for you to identify them in the Worktable Editor (see “Color”, 9-13).

In addition, labware can be assigned labels (names) to make them easier to identify in the Worktable Editor (see 11.7.1 “Assigning a Label (Name) to the Labware”, 11-18). The label is shown in yellow.

If you click on a labware item, information on the item is shown in the lower infopad.

**☒ You want to create a repository of labware in a feeder device such as a carousel**

Before you run a process which contains a pipetting script, you must put all of the labware on the worktable that the pipetting script will need. You also need to tell Freedom EVOware how many labware items you will be using. When you run the process, Freedom EVOware will take labware items from the feeder device as and when needed by the pipetting script and move them using the RoMa to the empty carriers which you have put aside for the pipetting operations.

Proceed as follows to create a labware repository in a feeder device: Select the required labware type in the Control Bar (Labware section) and drag it onto the icon for the carousel (or another feeder device or a hotel) in the Worktable Editor.

This opens the Labware Generator dialog box, which allows you specify how many labware items you need. See 11.6 “Labware Generator (Freedom EVOware Plus)”, 11-14.

The Labware Generator will insert a labware source icon in the Process Editor.

Notes:

- ◆ The chosen number of labware items is shown in the carousel device icon (see [Fig. 11-8 “Example worktable showing carriers, labware and labware labels”](#), [p 11-18](#)).
- ◆ Repeat the above procedure to create additional labware source icons if the carousel will be filled with different labware types in different towers.
- ◆ The number of towers and the storage capacity of the feeder device are configured in the Edit Carrier dialog box for the feeder (see [9.5](#), [p 9-29](#)).

#### **☒ You want to create a repository of labware on the worktable**

This option is only used for special applications; labware repositories (storage areas) are normally created in feeder devices.

Before you run a process which contains a pipetting script, you must put all of the labware on the worktable that the pipetting script will need. You may decide to use, say, the left side of the worktable as a storage area for all of the labware which you will need and the right side of the worktable for pipetting. You also need to tell Freedom EVOware how many labware items you will be using. When you run the process, Freedom EVOware will take the required labware items from the storage area when needed by the pipetting script and move them using the RoMa to the carrier sites which you have chosen to use for the pipetting operations.

Proceed as follows to create a labware repository on the worktable: Make sure that you have already put enough carriers in the Worktable Editor, select the required labware type in the Control Bar (Labware section), press Ctrl and drag the labware icon onto one of the carriers in the Worktable Editor.

This opens the Labware Generator dialog box, which allows you specify how many labware items you need and which carriers to place them on. See [11.6 “Labware Generator \(Freedom EVOware Plus\)”](#), [p 11-14](#).

The Labware Generator will insert a labware source icon in the Process Editor.

#### **☒ The labware will be used dynamically by a pipetting script**

When you run a process with a pipetting script, Freedom EVOware Plus will take the required labware items from the storage device or storage area when needed by the pipetting script and move them using the RoMa to the carrier sites which you have chosen to use for the pipetting operations. Labware which is used dynamically by the pipetting script should be positioned in the Worktable Editor when you create the script. See [11.5.4 “Choosing Labware for a Pipette Command”](#), [p 11-10](#).

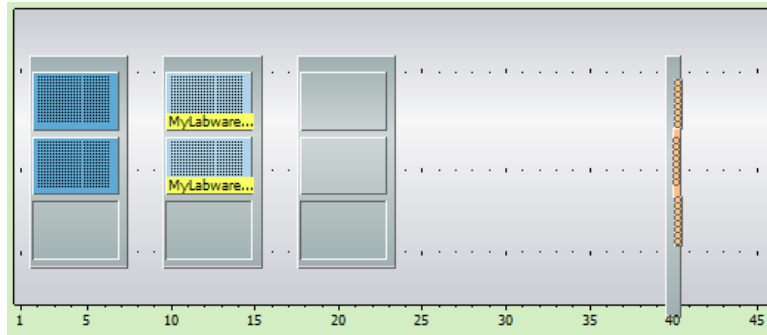
**Note:** Labware which you position when the Script Editor is open is shown in grey when you return to the Process Editor. This is because it is only moved to the pipetting position during process runtime and is initially kept elsewhere (typically in a carousel).

##### **11.5.1.1 Labware in the Worktable Editor of Freedom EVOware Plus**

In the figure below, the labware on sites 1 and 2 of the first carrier (at grid position 2) will always stay at the same position. The labware was dragged from the Control Bar to the carrier directly.

Sites 1 and 2 of the second carrier (at grid position 10) are used as a labware repository. The labware was dragged from the Control Bar to the carrier while pressing the Ctrl button to open the Labware Generator.

Sites 1 and 2 of the third carrier (at grid position 18) show (in grey) labware which will be used dynamically by a pipetting script and will be moved to this position during process runtime. The labware was dragged from the Control Bar to the carrier when the Script Editor was open.



**Fig. 11-1** Labware in the Worktable Editor of Freedom EVOware Plus

See [Fig. 11-8](#), [11-18](#) for a worktable example where the labware is taken from a carousel.

### 11.5.2 Adding Device Commands to the Process

To add a device command to your process, click the Commands tab in the Control Bar, look for the device you want to use and drag the command from the Control Bar onto the Process Editor window. If you need to specify any execution parameters for the command, the Parameters dialog box will open automatically when you do this. For example, the MoveToCartridge command for the Carousel requires you to specify the number of the required tower. The Pipette command of the Liquid Handling Arm requires you to specify a pipetting script.

The device command is then shown as a process step icon in the Process Editor.

You can change the position of a process step icon by dragging it to the required location.

To edit the execution parameters of the command (or the pipetting script) later, double-click on the icon (or right click on the icon and choose Edit Parameters). The Parameters dialog box will only be shown if the command has parameters.

To edit the runtime parameters for the command, right click on the icon and choose Adjust Time/Error handling. See [9.8.2 "Adjust Time/Error handling"](#), [9-55](#). These parameters are set automatically to appropriate values and do not normally need to be changed.

To edit the pre-actions and post-actions for the command, right click on the icon and choose Pre-actions / Post-actions. See [9.8.3 "Pre-actions / Post-actions \(Custom\)"](#), [9-56](#). The pre-actions and post-actions are normally configured through the global settings of the device driver and only need to be changed for special applications.

To delete a process step, select the icon and press Del (or right click on the icon and choose Delete in the context menu).

### 11.5.3 Adding Robot Movement Commands to the Process

#### Plate Robot

Movement commands for the plate robot (RoMa vectors) are associated with carriers. They are specified in the carrier definition (see [9.6 "Creating and Editing Plate Robot Vectors"](#), [9-46](#)).

In Freedom EVOware Plus, RoMa vectors are mainly used by pre-actions and post-actions of device commands. The pre-actions and post-actions and thus the RoMa movements are executed automatically when the process step is executed. If your process involves pipetting to a plate which is initially stored in a carousel, Freedom EVOware first uses the robot vector associated with the carousel to take the plate from the carousel and then uses the robot vector associated with the carrier to put the plate on the carrier. You do not need to specify the RoMa vectors - Freedom EVOware gets them from the carrier and device definitions. You only need to make sure that the RoMa vectors which you want to use are already set up in the Freedom EVOware configuration.

#### 11.5.4 Choosing Labware for a Pipette Command

Script (e.g. pipetting) commands are carried out by the liquid handling arm and are defined in the Script Editor. To open the Script Editor, select the Pipette command in the Control Bar (Liquid Handling Arm group) and drag it to the Process Editor window.

Before you can specify script commands such as Aspirate or Dispense, you must put the labware you want to use onto the carriers. When you run the process, Freedom EVOware Plus will take the specified labware items from the storage device or storage area as and when needed and move them using the RoMa to the carrier sites which you allocated for the pipetting operations.

Select the required labware type from the Labware section of the Control Bar and drag it onto the required carrier site on the worktable (you cannot choose sites which are already occupied by labware). To help you, Freedom EVOware highlights all carrier sites which are suitable for the chosen labware item.

**Note:** If you click on the carrier and scroll down to Allowed Labware, Freedom EVOware will show you the labware types which are compatible with the selected carrier.

Repeat this process to add all of the labware to the worktable that you need. The choice and the positions of the labware is based on the requirements of your application or experiment.

To move labware to a new position, click on the labware to select it and drag to the required carrier site. To delete labware, click on it and drag it off of the worktable.

To make a copy of a labware item which is already on the worktable, press the Ctrl button, click on the labware and drag the cursor to the required carrier site.

When adding, deleting or moving labware, a special cursor is shown to indicate the action you are performing (“+”, “del” or “move”).

Labware can be assigned unique colors in the Freedom EVOware configuration make it easier for you to identify them in the Worktable Editor (see “Color”, 9-13).

In addition, labware can be assigned labels (names) to make them easier to identify in the Worktable Editor (see 11.7.1 “Assigning a Label (Name) to the Labware”, 11-18). The label is shown in yellow.

If you click on a labware item, information on the item is shown in the lower infopad.

**Note:** Labware which you position when the Script Editor is open is shown in grey when you return to the Process Editor. This is because it is only moved to the pipetting position during process runtime and is initially kept elsewhere (typically in a carousel).

Since the labware is only moved to the pipetting position during process runtime, if your process has more than one pipetting script you can specify the same carrier sites for pipetting operations in different scripts. The carrier sites you choose are used as placeholders. When you run the process, Freedom EVOware Plus may decide to use different sites to maximize the throughput (efficiency) of the process.

See [Fig. 11-8](#), [11-18](#) for an example of a worktable.

### 11.5.5 Creating a Script for the Pipette Command

Script (e.g. pipetting) commands are carried out by the liquid handling arm and are defined in the Script Editor (see [5.4.4 “The Script Editor”](#), [11-18](#)). To open the Script Editor, select the Pipette command in the Control Bar (Liquid Handling Arm group) and drag it to the Process Editor window.

The pipetting script is then created by choosing script commands in the Control Bar and dragging them to the Script Editor window.

**Note:** In Freedom EVOware Plus, when the Script Editor is open the Commands tab of the Control Bar only shows script commands (commands which are used for writing pipetting scripts). When the Process Editor is open, the Commands tab of the Control Bar only shows device commands (commands for the optional devices).

The procedure to follow to create a script is the same for Freedom EVOware Plus and Freedom EVOware Standard See [11.4.2 “Creating a Pipetting Script”](#), [11-5](#) for more information.

See also [13.1 “Overview of Script Commands”](#), [13-1](#).

### 11.5.6 Closing the Script Editor

When you have finished adding all of the script commands you need, click Accept at the top right of the Script Editor window to return to the Process Editor. This stores the script in memory and creates a Pipette process step icon. To permanently save the script you must save the process as described in [11.5.10 “Saving the Process”](#), [11-14](#).

Click Reject if you do not want to keep the changes you have made to the script. Click Save as template if you want to save the script as a template for use in another process or process step.

Labware which you positioned when the Script Editor was open is shown in grey when you return to the Process Editor. When you run the process, Freedom EVOware Plus will move the labware to these carrier sites automatically.

If your process uses more than one pipetting script, insert another Pipette command in your process using the procedure described above.

To edit an existing pipetting script, double-click the Pipette process step to open the Script Editor again. Alternatively, select the Pipette process step and click Edit Parameters in the Infopad.

### 11.5.7 Adding Final Position Icons to your Process

Final position icons are used to specify the final position of the labware after the process has finished. They are often associated with a storage device such as a hotel. Final position icons are not necessary if you want Freedom EVOware to

return the labware to its original position after the process has finished, for example back to a storage device such as a carousel (the “base” location). Final position icons are created by right-clicking on the background of the Process Editor and choosing Choose Final Position from the context menu.

### 11.5.8 Linking the Process Steps in the Order of Execution

After adding all of the process steps you need in the Process Editor, you must specify the order in which you want to execute them by linking the icons together. Start by clicking the pointed end of a labware source icon. Then drag and drop the arrow cursor which appears onto the labware field (“object parameter”) of the first process step that will handle this labware. A connecting line will be drawn from the labware source icon to the process step to visualize the connection and the default labware name “MP” in the labware field changes to the labware name of the source labware (e.g. “sample\_1”).

If the process step can handle more than one labware item at a time (for example if the LiHa command needs two microplates), repeat this process to connect more labware source icons to the labware fields.

Then drag the next process step to be adjacent or close to the first process step and link them together in the same way. Click the black arrow on the labware field of the first process step and drag and drop the arrow cursor onto the labware field of the second process step.

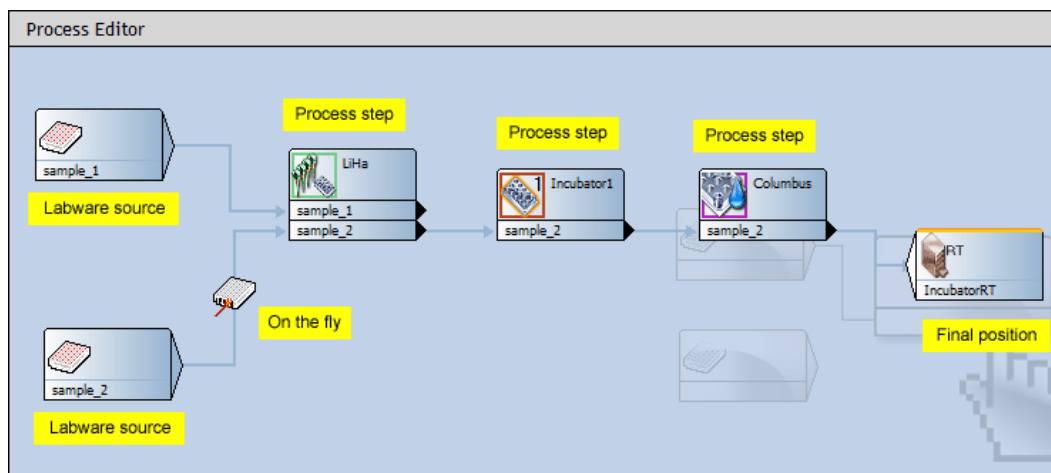


Fig. 11-2 Process Editor showing process icons

Proceed until you have connected all of your process steps in the order you want.

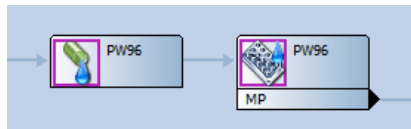
**Note:** You cannot save the process until you have connected all of the process steps (Freedom EVOware will display an error message).

**Note:** If you make a mistake when connecting the process steps or change your mind, right-click on the connecting line and choose Delete.

**Note:** Make sure that the labware source icons and labware fields which you connect together use the same physical labware type. For example, do not connect a labware source icon for a microplate to a labware field for a deep well plate. Freedom EVOware does not check the labware types when you make the connections. However, you are allowed to connect landscape and portrait versions of the same physical labware together (e.g. 96 Well Microplate and 96 Well Microplate portrait). In this case, Freedom EVOware will automatically use the RoMa to rotate the labware by 90° if necessary.

**11.5.8.1 Reserving and Linking Devices**

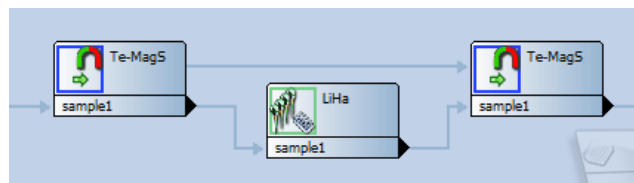
Some process steps, typically initialize or prime commands for devices, do not need labware and do not have labware fields. In such cases, click the right edge of the process step and drag and drop the arrow cursor onto the icon of the following process step:



**Fig. 11-3** Linking a process step which does not have a labware field

In the above example, the connecting line makes sure that priming takes place before the plate washer is used to wash the plate.

This type of connection can also be used to reserve a device. In the following example, a magnetic separation is carried out using the Te-MagS and a pipetting operation is then carried out. The plate is then returned to the Te-MagS for another separation step. The line linking the two Te-MagS process steps makes sure that the Te-MagS is reserved and thus immediately available for use when the pipetting operation has finished:



**Fig. 11-4** Reserving a device

Freedom EVOware Plus lets you run several processes in parallel. If you don't reserve the Te-MagS, it may be occupied by another process when the first process wants to use it. The first process will then have to wait until it becomes free again. Depending on your application or experiment, the waiting may be unacceptable.

When using device reservation make sure to adjust the max. waiting time of the initiating node, e.g. the first Te-MagS node in the above example, to accommodate the duration of all interleaved process nodes as well as their pre- and post-actions. If the max. waiting time is too short you might get an error "Process impossible to schedule!".



### 11.5.9 Adding On-the-fly Actions

Some devices require the use of the RoMa (plate robot) to carry out their function. A typical example of this is the Symbol LS-1220 barcode scanner which is rigidly fixed to the instrument's deck and cannot move towards the labware to scan it. Instead, the RoMa is used to move the labware past the barcode scanner "on-the-fly" while carrying out something else, for example when moving the labware from one carrier to another. The barcode scanner is then instructed to perform a read operation when the RoMa presents the labware. Such devices are called on-the-fly devices.

Add an on-the-fly device to your process by dragging it from the Control Bar onto the line which links two process steps. The corresponding actions will then be executed when the labware moves between the two process steps.

For example, if you want to read the barcodes of your labware items as they move from the washer to the pipetting station, drag the Barcode Scanner device onto the line which links these two process steps.

See [Fig. 11-2 "Process Editor showing process icons"](#),  11-12.

### 11.5.10 Saving the Process

Save the process you have created by clicking Save in the toolbar or by choosing Save from the File menu. Then enter a name for the process in the Save File dialog box or select an existing process which you want to overwrite and click the green arrow. You can also save the process as a process template by choosing Save As from the File menu and clicking the Template button in the Save File dialog box.

### 11.5.11 Running the Process

See [12.2 "Running and Optimizing a Process \(Freedom EVOware Plus\)"](#),  12-5.

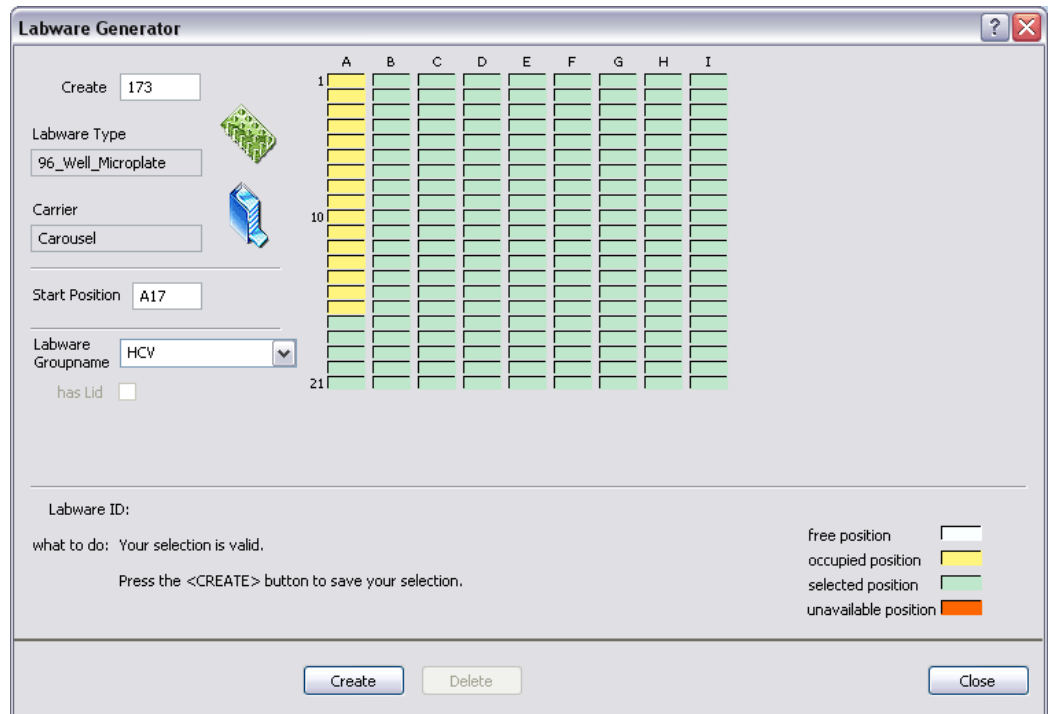
## 11.6 Labware Generator (Freedom EVOware Plus)

The labware generator is used to specify the type and quantity of labware items which you will need for the pipetting script commands in your process (LiHa Pipette process steps).

### 11.6.1 Creating a labware repository in a feeder device

Select the required labware type in the Control Bar (Labware section) and drag it onto the icon for the feeder device (e.g. carousel) in the Worktable Editor. If the chosen labware type is allowed for the feeder device, this opens the labware generator dialog box:





**Fig. 11-5** Labware generator when generating labware for the carousel

The rectangles at the top of the dialog box show all of the labware storage positions (sites) in the feeder device. For the carousel or Te-Stack staker, each column is one tower (cartridge).

The number of towers and the storage capacity of the feeder device are configured in the Edit Carrier dialog box for the feeder (see 9.5, 9-29).

Storage positions which are yellow (occupied) or red (unavailable) cannot be used for generating labware since they are already in use.

Enter the number of labware items you want to create in the Create field and click on the first site you want to use. The message area at the bottom of the labware generator will tell you if sufficient sites are available for the chosen number of items. Adjust your entries until the labware generator indicates that your selection is valid and click Create to create the specified labware. The newly created labware changes color from green (selected position) to yellow (occupied position). This creates a labware group (a set of labware associated with a labware source icon in the Process Editor).

If you move the cursor over the colored rectangles, the Labware ID field shows the ID (internal labware name) of the selected labware item. If you click on a labware item (yellow rectangle), the starting position and the name of the associated labware group are shown. Click Delete if you want to delete all of the labware in the group.

Right click a labware item to open the context menu (see 11.6.3 “Context Menu of the Labware Generator”, 11-17).

Repeat this process if you want to create further labware of a different type or using a different group name (i.e. an additional labware source icon).

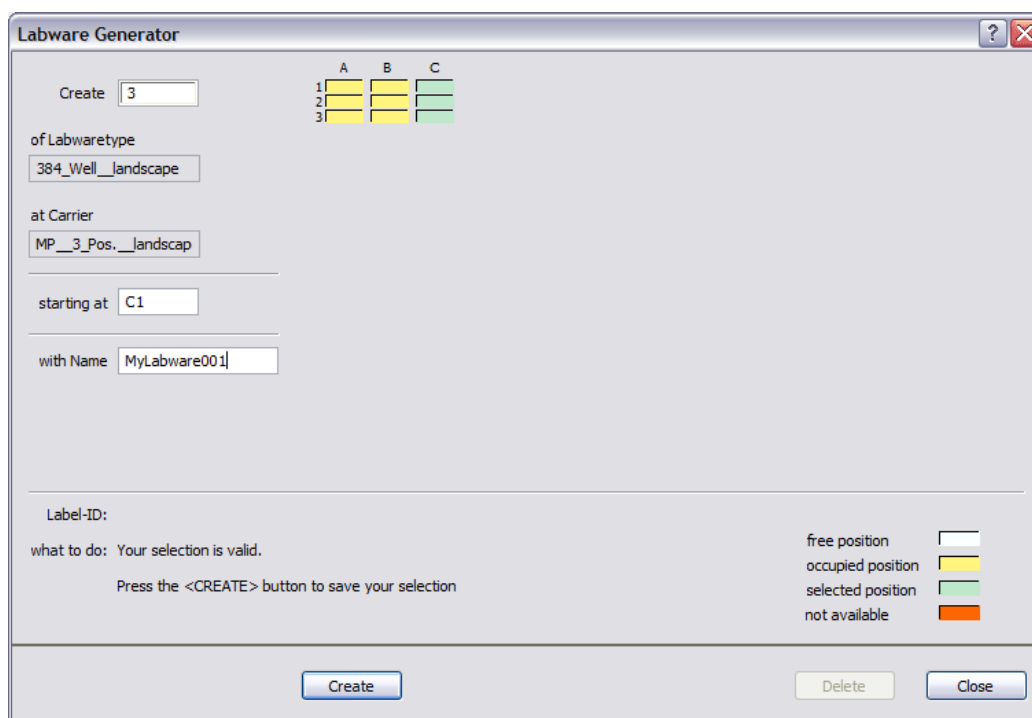
Click Close when you have created all of the labware you need. This closes the labware generator. The labware you have created is shown as one or more labware source icons in the Process Editor and the total number of storage positions containing labware is shown in the icon for the feeder device.

**Note:** When the Process Editor is open, right-click on the icon for the feeder device and choose *Modify Labware* in the context menu if you want to subsequently edit the settings you have made.

### 11.6.2 Creating a labware repository on the worktable

This option is only used for special applications; labware repositories are normally created in feeder devices such as the carousel.

Make sure that you have already put enough carriers in the Worktable Editor, select the required labware type from the Control Bar (Labware section), press Ctrl and drag the labware icon onto a suitable carrier type in the Worktable Editor. This opens the labware generator dialog box:



**Fig. 11-6** Labware generator when generating labware for three microplate carriers on the worktable


The rectangles at the top of the dialog box show the sites of all of the suitable carriers on the worktable. Sites marked *occupied* or *not available* cannot be used for generating labware since they are already in use. If you have already created a pipetting script, sites which are used by the pipetting script must not be used either. Freedom EVOware will put the labware onto these sites during process runtime, and they must not be occupied by a labware repository.

**Note:** Labware which you position when the Script Editor is open is shown in grey when you return to the Process Editor.

**Note:** Carrier sites which are used for a labware repository cannot be used in your script for pipetting. Make sure you have kept enough unused sites for your pipetting script. Put another carrier on the worktable if necessary.

Enter the number of labware items you want to create in the Create field and click on the first site you want to use. The message area at the bottom of the labware generator will tell you if sufficient sites are available for the chosen number of items. Adjust your entries until the labware generator indicates that your selection is valid and click Create to create the specified labware. The newly created labware changes color from green (selected position) to yellow (occupied position). This creates a labware group (a set of labware associated with a labware source icon in the Process Editor).

If you move the cursor over the colored rectangles, the Labware ID field shows the ID (internal labware name) of the selected labware item. If you click on a labware item (yellow rectangle), the starting position and the name of the associated labware group are shown. Click Delete if you want to delete all of the labware in the group.

Right click a labware item to open the context menu (see [11.6.3 "Context Menu of the Labware Generator"](#),  11-17).

Click Close when you have created all of the labware you need. This closes the labware generator. The labware you have created is shown as a labware source icon in the Process Editor and is also visible on the worktable.

**Note:** When the Process Editor is open, right-click on the generated labware and choose *Modify Labware* in the context menu if you want to subsequently edit the settings you have made.

If you use labware barcodes to specify source and/or destination positions in the worklist, do not use a labware repository on the worktable if the labware will be moved during runtime to another worktable position for pipetting. This can lead to pipetting at the wrong worktable position. Use a labware repository in a feeder device (e.g. hotel or carousel) instead.


### 11.6.3 Context Menu of the Labware Generator


Right click a labware item (yellow rectangle) in the labware generator to open the context menu. The menu items are as follows:

#### Enter barcode

Choose this option to enter a barcode manually for the selected labware item. This option is mainly used for testing since it is inflexible in a production environment to store barcodes within the process. You should normally use a barcode scanner instead.

#### Read barcodes from file

Choose this option to import a list of barcodes for the selected labware group. This feature is mainly intended for testing or training. For information on the syntax see [A.2.4 "Barcode File for the Labware Generator"](#),  A-13.

**Note:** When applying barcodes in either of these ways you have to make sure that the option "Preserve barcodes" is checked in the Runtime Controller when starting the run (see [12.2 "Running and Optimizing a Process \(Freedom EVOware Plus\)"](#),  12-5).

#### Rename labware

Choose this option to change the name of the labware group.

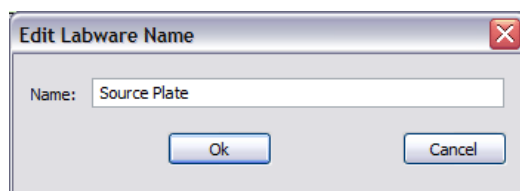
#### Delete labware

Choose this option to delete all of the labware in the group.

## 11.7 Additional Information on Labware and Carriers

### 11.7.1 Assigning a Label (Name) to the Labware

You can assign a label (i.e. a user-defined name) to each labware item by double clicking on the labware in the Worktable Editor and typing the required name in the Name field of the Edit Labware Name dialog box:



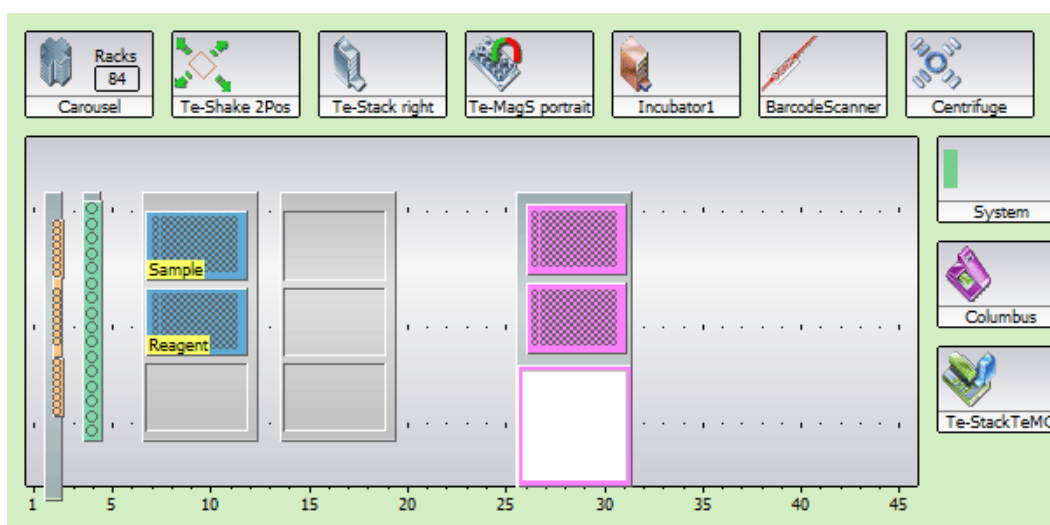
**Fig. 11-7** Specifying labels for objects on the worktable

The label is shown in yellow. The label for the currently selected labware item is also shown in the Infopad together with the other properties.

Labware labels can be used in scripts and worklist files to make them easier to understand for other persons (see [15.21 "Worklist Command"](#), [15-31](#)). They are also used by Freedom EVOware in log files. If you don't specify labware labels, the scripts, worklists and log files contain the generic labware name instead, e.g. *Microplate*, *landscape*.

### 11.7.2 Example of a Worktable With Several Carriers and Labware Items

The following figure shows an example worktable with carriers, labware and labware labels:



**Fig. 11-8** Example worktable showing carriers, labware and labware labels

In this example, the labware generator was used to assign 84 microplates to the carousel.

### 11.7.3 System Liquid Icon

When you specify a script command which involves aspiration, click on the System icon at the bottom right of the Worktable Editor if you want to aspirate the system liquid. If you need to aspirate large volumes of the system liquid, this avoids having to place a trough on the worktable. See [8.4.2.4 "System Liquids"](#), [8-29](#) for further information.



## 12 Running Scripts and Processes

This chapter describes how to run, preview and calibrate a process (Freedom EVOware Plus) and how to run a script (Freedom EVOware Standard).

### 12.1 Running a Liquid Handling Script

This section describes how to run a liquid handling script.

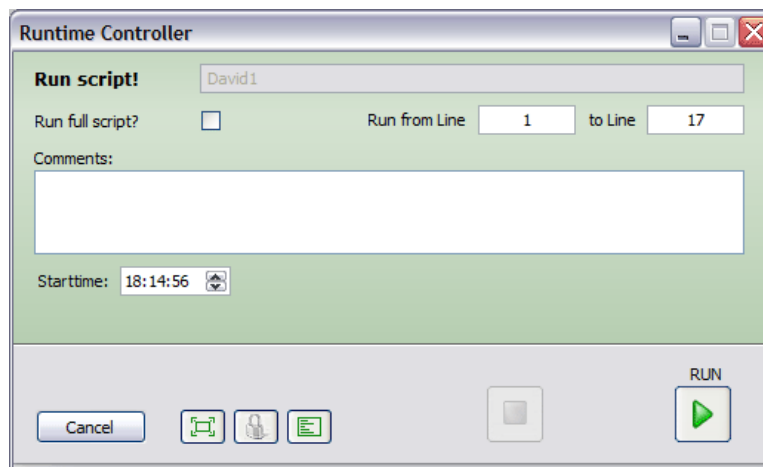
#### Freedom EVOware Standard

To run the currently loaded script, click the Run button in the toolbar or choose Run in the Execute menu. To run another, previously saved script click the Wizard button in the toolbar or choose Startup Wizard in the File menu. Then choose the script you want to run.

#### Freedom EVOware Plus

To run a script which belongs to a process, open the Script Editor by double-clicking the Pipette command which is associated with the script and click the Run button in the toolbar or choose Run in the Execute menu.

After a short delay you are shown the Runtime Controller dialog box:



**Fig. 12-1** Script runtime settings

Click the **Run** button to run the script. Unless you are running Freedom EVOware in offline mode, commands will be sent to the pipetting instrument and pipetting will take place according to the instructions in your script.

The **Run** button will change to **Recover** if the script did not execute completely the last time it was run (see 17.2 “Script and process recovery function”, 17-6).

#### Run full script?

To start running the script at a specified line, e.g. for testing purposes, uncheck this checkbox and specify the script lines which you want to run by entering the first and last script line. Then click the Run button.

This option is not available when running a script in Freedom EVOware Plus.

If you start running the script at a specified line and if the part of the script which you have chosen to run uses variables which have not been defined, you will be prompted to enter the values manually.

### Start time

Specify when you want to start the script. Initially, this field shows the current time (i.e. start the script immediately).

A progress bar shows the progress of the script as it runs:

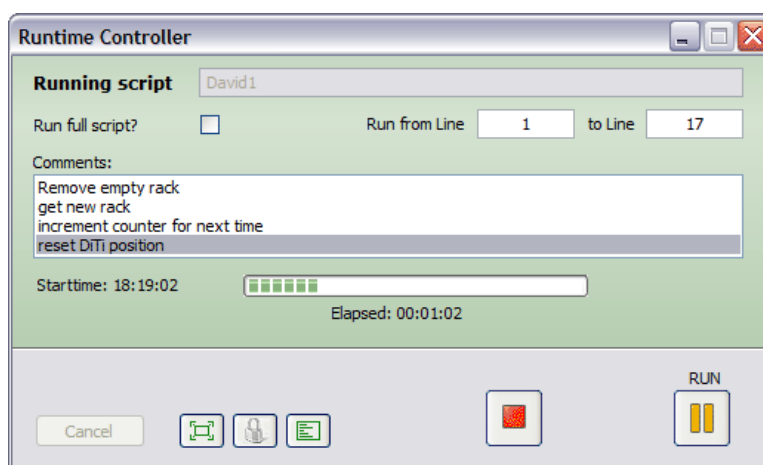


Fig. 12-2 Script runtime showing progress bar

To **pause** a running script, click the *Pause* button (orange parallel bars). The script is paused and the System paused message is shown.

To resume running a script which has been paused, click the *Run* button again.

To **stop** the script from running, click the *Stop* button (red square).

If the pipetting script contains Comment commands, the comments are shown in the Comments panel in the center of the dialog box (example: see figure above). If suitable comments have been chosen, this can help the instrument operator to monitor the progress of the script as it runs.

The other options in this dialog box are as follows:

### Start time

This shows the time when the script was started.

### Elapsed

The amount of time which has elapsed since the script was started.

## 12.1.1 Buttons in Standard View

### Cancel

Return to the Script Editor.



### Extended view

Switch to the extended view of the Runtime Controller where you can get more information on the currently running script.





**Lock Freedom EVOware**

This button logs out the current Freedom EVOware user (see [6.1.9 “Lock EVOware”](#), [6-7](#)). Another use of the Lock button is to switch Freedom EVOware users when you are handing over to another employee, e.g. due to a change of shift.



**Show Log File**

This button displays the Freedom EVOware log file in a new window. The log file tracks every command sent by the computer to the instrument, every response returned from the instrument to the computer and any user input. The content and format of the log corresponds to a log file of type LOG (see [A.1 “Overview of the Log Files”](#), [A-1](#)).

If the script finished with warnings or errors, click this button to get more information from the log file.



**Stop**

This button stops the script.



**Run**

This button runs the script; it is also used to continue the script if it has been paused.



**Pause**

This button pauses the script.

### 12.1.2 Runtime Controller, Extended View (Running a Script)

The Extended View option of the runtime controller gives you more information on the currently running pipetting script:

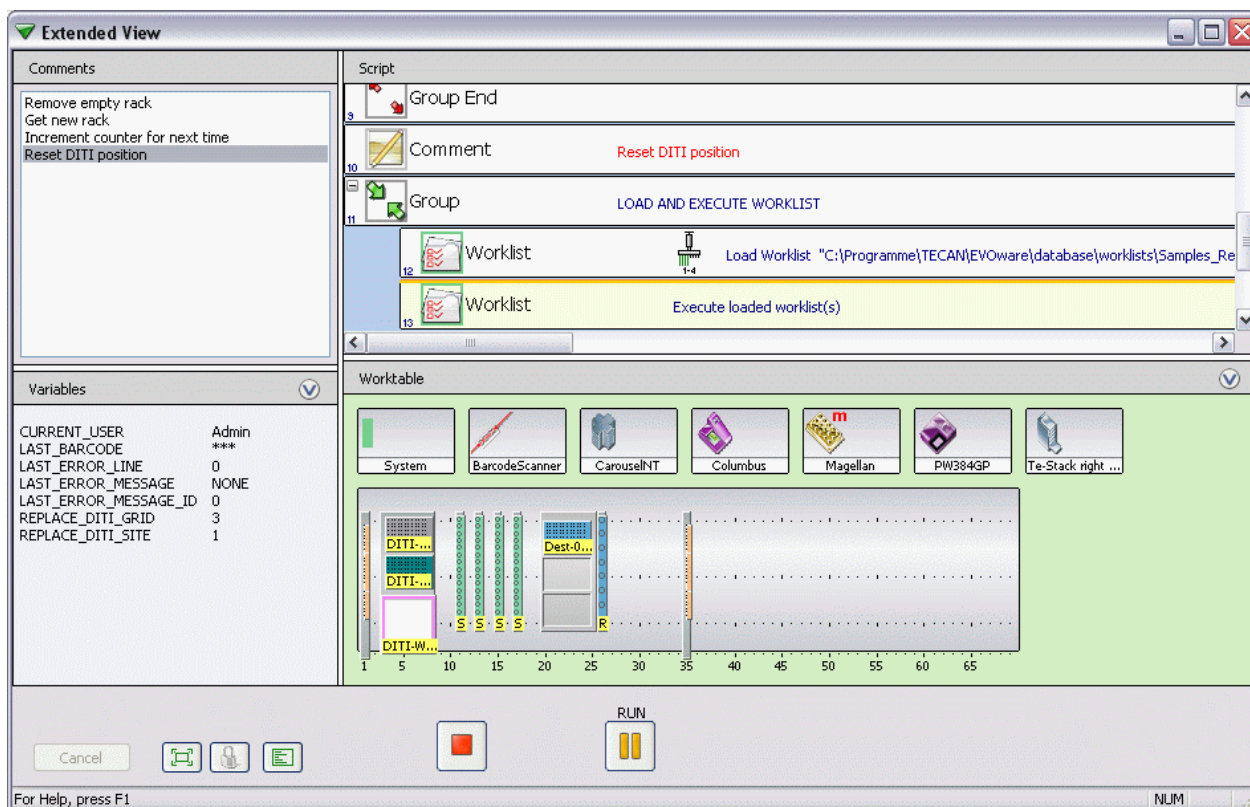



Fig. 12-3 Script runtime - Extended view

The extended view has four windows:

- ♦ The **Comments window** - If the pipetting script contains Comment commands, this window shows the comments. This window is refreshed after executing each script line.
- ♦ The **Variables window** - This shows the value of all defined variables during script runtime. This window is refreshed after executing each script line.
- ♦ The **Script window** - This shows part of the script. When the script is running, the script line which is currently executing is highlighted with a colored line. The default color is orange.
- ♦ The **Worktable window** - This shows the instrument's worktable. When the script is running, the worktable object (e.g. microplate) which is currently being accessed is highlighted with a colored box. The default color is orange.

If you need more space for the Script window, you can collapse the Worktable window by clicking  in the title bar. You can also resize the windows by dragging the dividers between the windows.

### 12.1.3 Buttons in Extended View

#### Cancel

Return to the Script Editor.



#### Standard view

Return to the standard view of the Runtime Controller.



#### Lock Freedom EVOware

This button logs out the current Freedom EVOware user (see [6.1.9 “Lock EVOware”](#), [6-7](#)). Another use of the Lock button is to switch Freedom EVOware users when you are handing over to another employee, e.g. due to a change of shift.



#### Show Log File

This button displays the Freedom EVOware log file in a new window. The log file tracks every command sent by the computer to the instrument, every response returned from the instrument to the computer and any user input. The content and format of the log corresponds to a log file of type LOG (see [A.1 “Overview of the Log Files”](#), [A-1](#)).

If the script finished with warnings or errors, click this button to get more information from the log file.



#### Stop

This button stops the script.



#### Run

This button runs the script; it is also used to continue the script if it has been paused.



#### Pause

This button pauses the script.

## 12.2 Running and Optimizing a Process (Freedom EVOware Plus)

This section describes how to run, preview and calibrate a process.

To run the currently loaded process, click the Run button in the toolbar or choose Run in the Execute menu. To run another, previously-saved process click the Wizard button in the toolbar or choose Startup Wizard in the File menu. Then click *Run an existing process* and choose the process you want to run.

Freedom EVOware allows you to run several processes in parallel or sequentially. You can save all of the runtime settings for one or more processes as a “method”. For information on creating and running methods see the description of the *Save as method* button, below.

After a short delay you are shown the Runtime Controller dialog box:

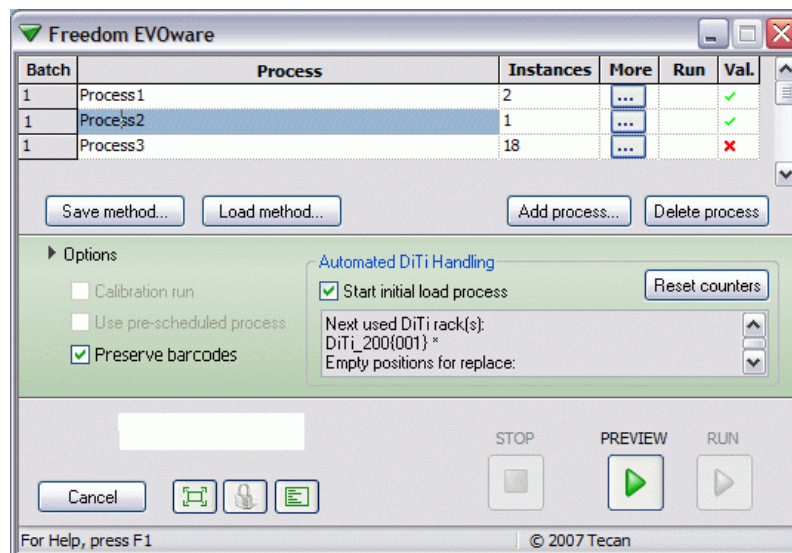


Fig. 12-4 Process runtime settings

To run the process, click the **Run** button at the bottom right of the dialog box. Unless you are running Freedom EVOware in offline mode, commands will be sent to the pipetting instrument and pipetting will take place according to the instructions in your process.

The **Run** button will change to **Recover** if the script did not execute completely the last time it was run (see 17.2 “Script and process recovery function”, 17-6). Click the **Preview** button to run the process for testing without carrying out pipetting. Firmware commands such as movement commands are not sent to the pipetting instrument.

### Process List

Freedom EVOware Plus allows you to run several processes in parallel or sequentially. You can run several copies of the same process and/or several different processes. You can also add new processes to processes which are already running. The process list shows the processes you have set up to run.

#### Batch

Read-only field. If you want to run more than one process type, you can assign batch numbers if you want them to group the processes into batches which run sequentially rather than in parallel. See 12.2.2 “Additional Runtime Settings for Processes”, 12-10 for information on using batches.

#### Process



The name of the process.

### Instances

Specify how many times you want to run the process in parallel. To optimize the throughput (efficiency) of your pipetting instrument (i.e. to maximize the number of samples which are processed per hour), Freedom EVOware Plus allows you to run several copies of the same process in parallel. This allows Freedom EVOware to e.g. to fetch a microplate from the carousel while pipetting is taking place on another microplate. Each copy of the process is called an instance.

The maximum value you should set for this parameter depends e.g. on how much space you have assigned on the worktable for Freedom EVOware to set up multiple sites for pipetting. There is no speed advantage to be gained in fetching a microplate from the carousel if there are currently no unoccupied carrier sites where it can be put down.

### More

Click  to specify additional runtime settings. See [12.2.2 “Additional Runtime Settings for Processes”](#),  12-10.

### Run

Freedom EVOware allows you to start one or more additional processes when other processes are already running. For example, if you have forgotten to start a process which you need. To use this feature, add the process as described in *Add process*, below. If other processes are already running, the Run column in the runtime list will now contain a small Run button for the new process. Click this button when you are ready to start the new process.

### Val.

A green tick (“validated”) shows that enough labware has been assigned to the process. A red cross shows that process validation was not successful, for example because not enough labware is available for the specified number of instances or the same labware has been assigned to two different processes (invalid assignment).

### Buttons

#### Save method


Save all of the settings you have made in the Runtime Controller as a “method”. If you have configured to run several processes, the saved method will contain the runtime settings you have made for all of the processes.

To run a previously-saved method, click the Wizard button in the toolbar or choose Startup Wizard in the File menu. Then click *Run an existing process* and choose the method you want to run (the lists shows both processes and methods).

#### Load method

Load a previously saved method file. You can then run the method and/or edit the method and save it again.

#### Add process

To add another process to the runtime list, click Add process and select the process from the dialog box. The dialog box only lists processes which use the same worktable layout. You cannot add processes which use a different worktable layout. If the original process was saved in a user-defined directory (see [6.1.3 “Save”](#),  6-5, User Defined), the dialog box only lists processes which use the same worktable layout AND have been saved in the same base directory.

### Delete process

Click this button to delete the currently selected process from the runtime list. You can only delete a process with this button if it is not yet running.

### Options

Click **Options** to show additional options:

#### Calibration run

Check this checkbox if you want to run the process and carry out pipetting for the purpose of calibration. You only need to run one process instance for the calibration run. The following options (buttons) are available in the Runtime Controller when the calibration run has finished:

Click **Update Proc** to store information in the process file on the actual times required by device commands. The next time you run the process, the stored information allows the scheduler to plan more accurately and thus optimize the throughput of the process.

Click **Optimize** to optimize the schedule using the real execution times which were recorded during the calibration run. You must then click Save to save the optimized schedule.

Click **Save Schedule** to save a schedule for this process. Schedules can be used to ensure that processes always run the same way and use the same timing.


The calibration run allows Freedom EVOware to get realistic execution times for each of the process steps which are more accurate than the estimated values in the database. This generally results in better optimization (throughput) of the process. The Calibration run option is not available if you run several different processes in parallel.

#### Use pre-scheduled process

Check this checkbox if you want to run the process using a schedule which you saved previously, for example after carrying out a calibration run. A separate schedule can be saved for each of the processes you have run.

If you run the process using a saved schedule, it will always run the same way and use the same timing. If you don't use a saved schedule and you have chosen to run more than one instance of the process, the order of the process steps may change each time you run the process if the time required for certain operations such as robot movements varies slightly from run to run.

#### Preserve Barcodes

With EVOware version lower than V2.4, barcodes are generally preserved between Plus runs. This enables the "Specify Plates by Barcode" functionality (see 12.2.2,  12-10). A run can be started to read barcodes in a carousel followed by another run that can use plates based on the previously scanned barcodes. Furthermore all known barcodes are transmitted to Sample Tracking. The barcodes are preserved between runs only if the worktables are identical; different worktable layouts in the runs cause the barcodes to be deleted. Thus used barcodes can easily be cleared by starting a process with a different worktable layout.

The new checkbox **Preserve Barcodes** can be used to control if barcodes are preserved or not between runs.

When the checkbox is checked, EVOware V2.4 will behave as previous versions; if the worktables are identical, known barcodes will be preserved. If the worktables are different, all barcodes will be deleted.

With the checkbox cleared, known barcodes will always be deleted. Thus no barcodes from previous runs will be transmitted to Sample Tracking, nor can "Specify Plates by Barcode" be used.

**Automated DiTi Handling panel**

The options in this panel are only relevant for the automatic DiTi handling feature. See 17.1.2.1 “Process runtime settings for automatic DiTi handling”, 17-5.

**Start Initial DiTi Load process**

If you check this checkbox, there should not be any DiTi racks on the worktable when you start the process.

**Reset Counters**

If you do not check *Start Initial DiTi Load process*, click this button if you want to re-load the worktable with full DiTi racks before you start the process, for example to re-run the process from the beginning for testing. The *Reset Counters* button resets all of the DiTi-related internal variables to their initial values. The *Reset Counters* button is not relevant if you have checked the *Start Initial DiTi Load process* checkbox (the counters are reset automatically in this case each time the process is run).

**Information box**

For each DiTi type which is used in the process, this text box shows the source position of the full DiTi racks which will be used next. In addition, it shows the position in the DiTi Rack source (e.g. carousel or hotel) which will be used for the empty DiTi racks during the next replacement operation. This position must be empty. Note: The empty DiTi racks are returned to the carousel or hotel before getting the full DiTi racks.

**12.2.1 Process Controller during process runtime**

Additional information is shown during process runtime as follows:

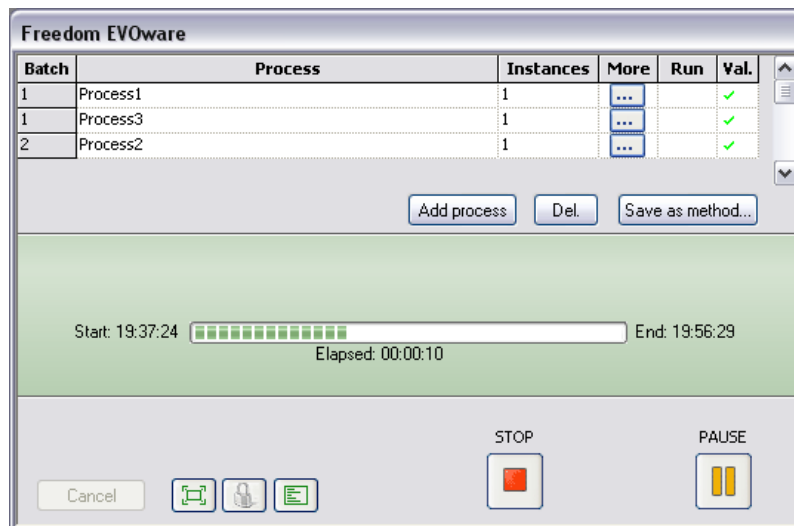


Fig. 12-5 Process runtime showing progress bar

**Start**

The time when the process was started.

**Elapsed**

The amount of time which has elapsed since the process was started.



## End

The time when the process is expected to finish.

### 12.2.2 Additional Runtime Settings for Processes

Click **...** in the More field to make the following additional runtime settings for special applications:

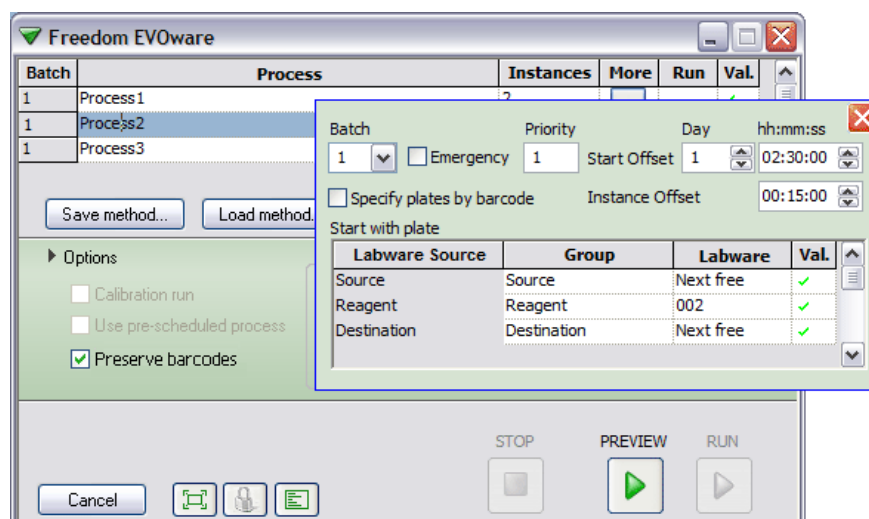


Fig. 12-6 Additional runtime settings

## Batch

If you want to run more than one process type, you can assign batch numbers if you want them to group the processes into batches which run sequentially rather than in parallel. For example, if the processes “preparation” and “assay” are assigned the batch number 1 and the process “cleanup” is assigned the batch number 2, “preparation” and “assay” will run in parallel but “cleanup” will not be scheduled to start until both “preparation” and “assay” have finished. Usage example: The creation of a mother plate for subsequent use in assays. The batch number has a higher priority than the emergency checkbox. See also *Start offset*, below.

### If you have assigned

#### Emergency

The *Emergency* checkbox is used to assign a higher priority to special processes. You can use emergency processes for samples which you want to process first or operations (such as barcode scanning) which you need to carry out first.

The standard (non-emergency) processes will only be started after all of the emergency processes have been started, even if they have a higher value in the *Priority* column. Freedom EVOware always starts emergency processes in the order of their priorities.

#### Priority

Specify the required process priority. Freedom EVOware tries to start processes which have a higher priority first. Note: Smaller numbers correspond to a lower priority (the lowest priority is “1”).



### Start offset

Specify a starting offset in days to delay the starting of the process (range: 0 to 99 days).

Start offset and Time are additive. In the above figure, the process will be started after a delay of 1 day plus 2.5 hours (26.5 hours).

If you have chosen to run more than one instance (copy) of this process, the offset applies to all instances of the process.

### Time

Specify a time in hours, minutes and seconds to delay the starting of the process. If you have configured more than one instance of this process, it applies to all instances of the process.

Start offset and Time are additive. In the above figure, the process will be started after a delay of 1 day plus 2.5 hours (26.5 hours).

If you have chosen to run more than one instance (copy) of this process, the time delay applies to all instances of the process.

### Instance offset

If you have chosen to run more than one instance (copy) of this process, specify an instance offset if you do not want to start all of the instances simultaneously. The starting of the instances will then be staggered by the specified delay. This may be necessary e.g. if the pipetting instrument transfers processed samples to another piece of equipment which cannot handle a large number of samples simultaneously.

### Specify plates by barcode

Check this checkbox if you want to run the process using specific labware items which are identified by their barcodes. A dialog box opens to allow you to choose a .txt or .csv file which contains a list of barcodes. See [A.2.5 "Barcode File for the Freedom EVOware Plus Runtime Controller"](#), [A-14](#) for information on the required syntax of this file.

This feature is only intended for random access storage devices such as the carousel (the stacker is a first-in last-out storage device, not random access). For labware in the carousel, you can use the ReadAllBarcodes or ReadPlatesInCartridge commands to read the barcodes and store them in a file.

### Labware source, Group, Labware, Val.

Click the Group field and choose the required labware if you want to run this process using a specific item of labware. You can choose labware from any of the labware sources which you have configured on your worktable.

Leave the labware fields empty if you do not want to use a specific labware item. In this case, the process will use the next labware item which is available for the configured labware source.

**Val.:** A green tick ("validated") shows that enough labware has been assigned to the process. A red cross shows that process validation was not successful, for example because not enough labware is available for the specified number of instances or the same labware has been assigned to two different processes (invalid assignment).

### 12.2.3 Buttons in Standard View

#### Cancel

Return to the Process Editor.



#### Extended view

Switch to the extended view of the Runtime Controller where you can get more information on the currently running process.



#### Lock Freedom EVOware

This button logs out the current Freedom EVOware user (see [6.1.9 "Lock EVOware"](#), [6-7](#)). Another use of the Lock button is to switch Freedom EVOware users when you are handing over to another employee, e.g. due to a change of shift.



#### Show Log File

This button displays the Freedom EVOware log file in a new window. The log file tracks every command sent by the computer to the instrument, every response returned from the instrument to the computer and any user input. The content and format of the log corresponds to a log file of type LOG (see [A.1 "Overview of the Log Files"](#), [A-1](#)).



#### Stop

This button runs the process; it is also used to continue the process if it has been paused.



#### Preview

This button previews the process; it is also used to continue the process if it has been paused.



#### Run

This button runs the process; it is also used to continue the process if it has been paused.



#### Pause


This button pauses the process.

#### If you have already run the process

Click **Save Schedule** to save a schedule for this process. Schedules can be used to ensure that processes always run the same way and use the same timing.

Click **New Run** to return to the standard view of the Runtime Controller, e.g. to run the process again from the beginning. If you want to save a schedule for this process, do this before you click *New Run*.

### **If the process has stopped before being completed**

Click **Recover** to start the Process Recovery Wizard (see [17.2.2.2 “Process Recovery Wizard, Recovery Settings”](#),  17-11).

Click **New Run** to return to the standard view of the Runtime Controller, e.g. to run the process again from the beginning.

### **If you have just made a calibration run**

Click **Optimize** first if you want to optimize the schedule before saving it.

Click **New Run** to return to the standard view of the Runtime Controller, e.g. to run the process again. If you want to save a schedule for this process, do this before you click **New**.

Click **Update Proc** to store information in the process file on the actual times required by device commands. The next time you run the process, the stored information allows the scheduler to plan more accurately and thus optimize the throughput of the process.

Click **Optimize** to optimize the schedule using the real execution times which were recorded during the calibration run. You must then click **Save** to save the optimized schedule.

Click **Save Schedule** to save a schedule for this process. Schedules can be used to ensure that processes always run the same way and use the same timing.

### 12.2.4 Runtime Controller, Extended View (Running a Process)

The Extended View option of the runtime controller gives you more information on the currently running Freedom EVOware processes:

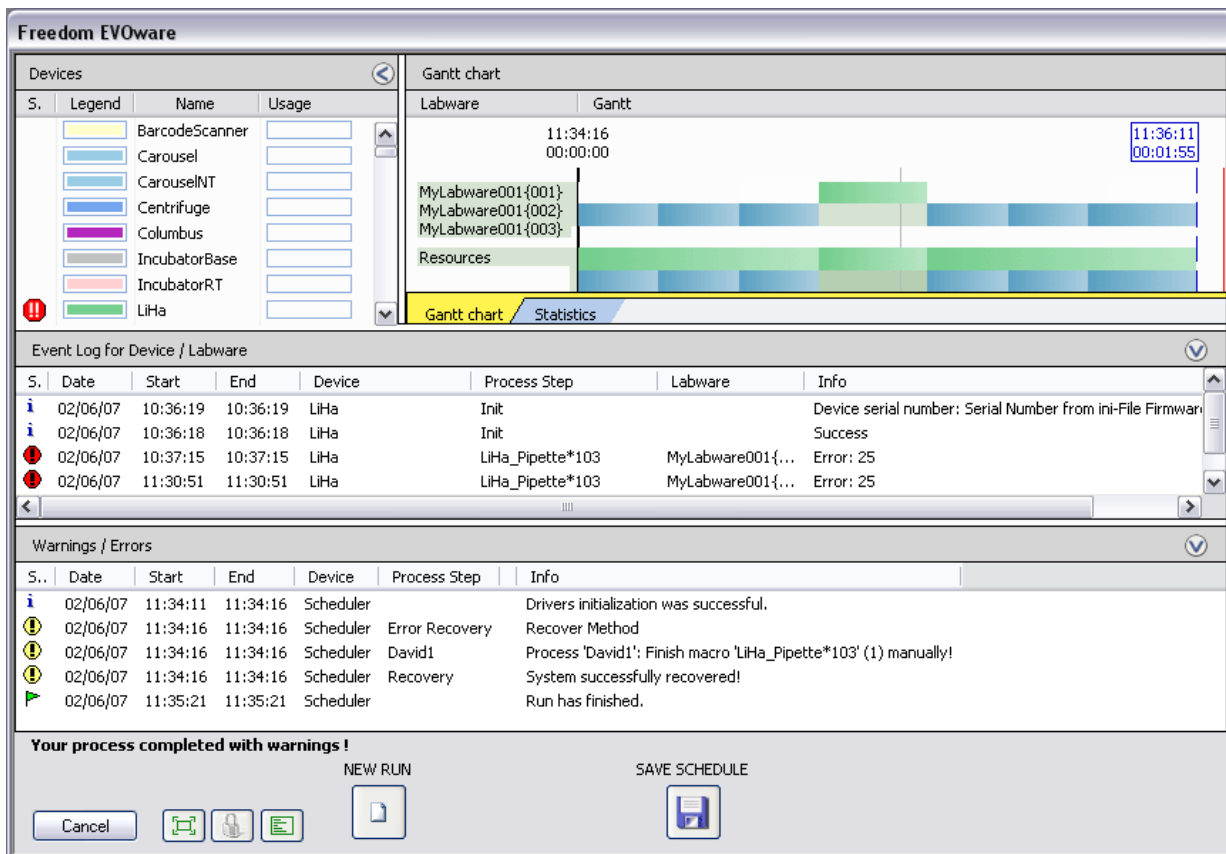


Fig. 12-7 Process runtime - Extended view (showing the Gantt Chart window)

The extended view has four windows:

- The **Devices window** - This shows the colors which are assigned to each of the devices in the Gantt chart and the current device utilization in percent when the process is running. The colors which are assigned to the devices are configurable (see 8.4.1.2 “Colors Tab”, 8-22). Click on a device in the Devices window to see all available messages for the device (the list shows all messages since Freedom EVOware was last started). Colored buttons are shown in the Devices window if device warnings or errors have occurred.
- The **Gantt chart / Statistics window**  
 Click the **Gantt chart** tab to get a graphical representation of the currently running process(es). For each labware item or resource, the process steps or actions which will take place (have already taken place) are shown as horizontal colored bars. When a process is running, the vertical red line indicates the progress of process execution. Click on a horizontal colored bar to get more information on the process step or action. The first line of the Info window shows the process name and the process instance ID. To zoom in to a particular part of the chart, click with the mouse and drag open a rectangle which encloses the part of interest. To reset the zoom, right-click on the chart and choose *Fit to page* from the context

menu.



Click on a labware item in the Labware column to see all available messages for the labware (the list shows all messages since Freedom EVOware was last started).

If you have added comments to the process steps (in the Process Editor), the comments are shown in the Gantt chart as tool tips (yellow labels which appear when you move the cursor above the horizontal colored bars). If you choose suitable comments, this can help you to identify different parts of the Gantt chart. See 9.8.5 “Comment”, 9-60.

Click the **Statistics** tab to get statistics on resource utilization for the process (see figure below). When you run the process, the information becomes available as soon as the process schedule has been calculated. The information which is provided makes it easier to locate resource bottlenecks which could reduce the process performance (throughput).

- ◆ The **Event log window** - This shows information on important events for devices and labware.
- ◆ The **Warnings/Errors window** - This shows process warnings and errors.

If one of the messages is shown truncated because it is too long, lengthen the field in the dialog box and activate the horizontal scroll bar by double-clicking on the divider (short vertical line in the header) at the end of the field.

If you need more space for the Gantt chart, you can collapse the Event log and/or Messages/Error windows by clicking  in the title bar. In addition, you can collapse the Devices windows by clicking  in the title bar. You can also resize the windows by dragging the dividers between the windows.

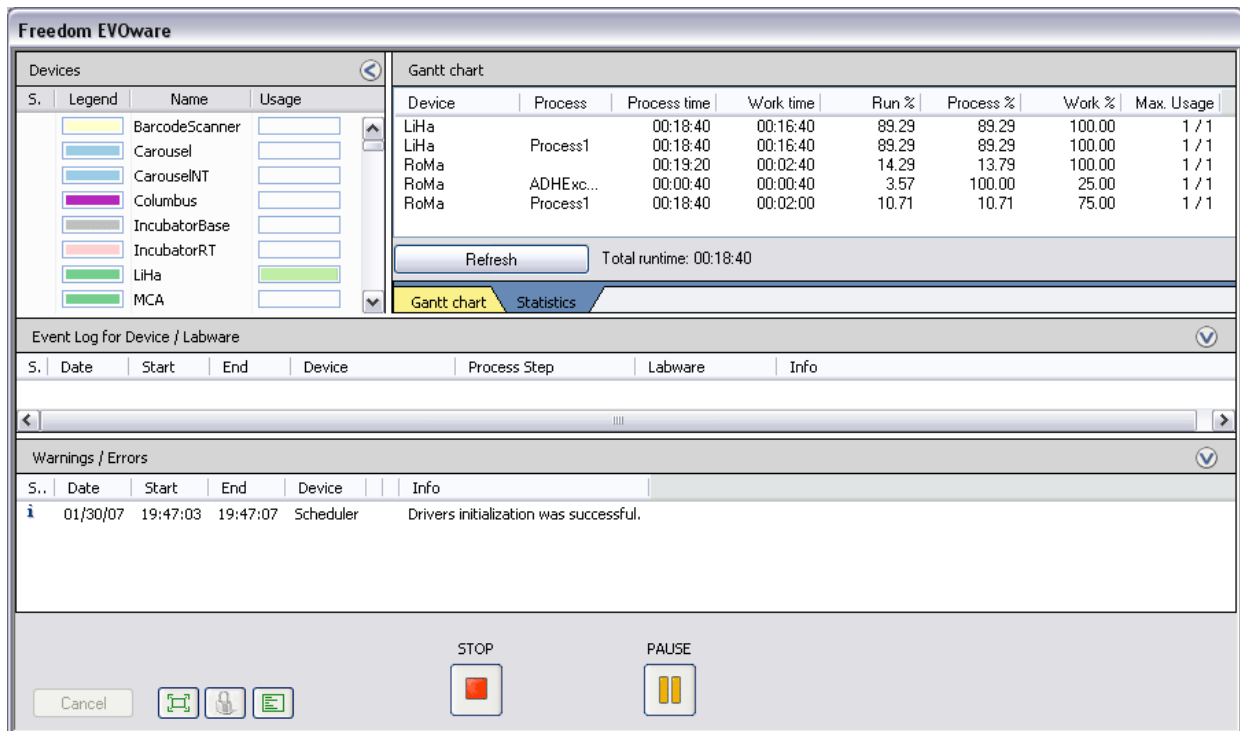


Fig. 12-8 Process runtime - Extended view (showing the Statistics window)

### 12.2.5 Buttons in Extended View

#### Cancel

Return to the Process Editor.



#### Standard view

Return to the standard view of the Runtime Controller.



#### Lock Freedom EVOware

This button logs out the current Freedom EVOware user (see [6.1.9 “Lock EVOware”](#), ¶ 6-7). Another use of the Lock button is to switch Freedom EVOware users when you are handing over to another employee, e.g. due to a change of shift.



#### Show Log File

This button displays the Freedom EVOware log file in a new window.



#### Stop

This button runs the process; it is also used to continue the process if it has been paused.



#### Preview

This button previews the process; it is also used to continue the process if it has been paused.



#### Run

This button runs the process; it is also used to continue the process if it has been paused.



#### Pause

This button pauses the process.

#### If you have already run the process

##### Save schedule

Click **Save schedule** to save a schedule for this process. Schedules can be used to ensure that processes always run the same way and use the same timing.

Click **New Run** to return to the standard view of the Runtime Controller, e.g. to run the process again. If you want to save a schedule for this process, do this before you click *New Run*.

#### If the process has stopped before being completed

Click **Recover** to start the Process Recovery Wizard (see [17.2.2.2 “Process Recovery Wizard, Recovery Settings”](#), ¶ 17-11).

Click **New Run** to return to the standard view of the Runtime Controller, e.g. to run the process again from the beginning.

### **If you have just made a calibration run**

Click **Optimize** first if you want to optimize the schedule before saving it. Click **New Run** to return to the standard view of the Runtime Controller, e.g. to run the process again. If you want to save a schedule for this process, do this before you click **New**.

Click **Update Proc** to store information in the process file on the actual times required by device commands. The next time you run the process, the stored information allows the scheduler to plan more accurately and thus optimize the throughput of the process.

Click **Optimize** to optimize the schedule using the real execution times which were recorded during the calibration run. You must then click **Save** to save the optimized schedule.

Click **Save Schedule** to save a schedule for this process. Schedules can be used to ensure that processes always run the same way and use the same timing.





## 13 Overview of Freedom EVOware Commands

This chapter gives an overview of the commands which are available in Freedom EVOware Standard and Freedom EVOware Plus.

After creating a worktable and choosing/defining the carriers and labware that you want to use, the process or pipetting script is created by selecting commands from the Control Bar (see [11 “Getting Started - Setting Up a New Script or Process”](#), [¶ 11-1](#)).

In this chapter, the commands are divided into two sections - script commands and device commands - and each section is divided into groups (e.g. Liquid Handling Arm commands). The same groups are used in the Control Bar. See *Commands* in the index for an alphabetic list of the commands.

Some of the commands will only be shown in the Control Bar if your pipetting instrument is fitted with the appropriate hardware option.

In addition, you can hide commands which you do not normally use (see [5.4.1.11 “Context Menu for Group Titles in the Control Bar”](#), [¶ 5-14](#)).

Tecan and third party software add-ons for Freedom EVOware may add additional script and/or device commands to the Control Bar which are not described in this manual. In this case, refer to the instruction manual for the respective software add-on for more information.

### 13.1 Overview of Script Commands

In Freedom EVOware Plus, when the Script Editor is open the Commands tab of the Control Bar only shows script commands (commands which are used for writing pipetting scripts). When the Process Editor is open, the Commands tab of the Control Bar only shows device commands (commands for the optional devices, see [13.2 “Overview of Device Commands”](#), [¶ 13-8](#)).

In Freedom EVOware Standard, the Control Bar always shows both command types (it does not have a Process Editor).














Tecan and third party software add-ons for Freedom EVOware may add additional script and/or device commands to the Control Bar which are not described in this manual. In this case, refer to the instruction manual for the respective software add-on for more information.

#### 13.1.1 Liquid Handling Arm (LiHa / Air LiHa) Commands, Overview

The following table lists the commands for the liquid handling arm. To use these commands in Freedom EVOware Plus, add the device command “Liquid Handling Arm - Pipette” to your process; this opens the Script Editor (see [16.7.2](#), [¶ 16-20](#)).

If your pipetting instrument is fitted with two liquid handling arms (and you have installed drivers for both of them), there will be two liquid handling arm groups in the Control Bar (Liquid Handling Arm and Liquid Handling Arm 2). Use the commands in the group “Liquid Handling Arm” if you want to pipette with the first LiHa. Use the commands in the group “Liquid Handling Arm 2” if you want to pipette with the second LiHa. The commands themselves are identical in both groups. The Script Editor window appends a “2” to the commands which are destined for the second LiHa (e.g. “Aspirate 2”).

**Tab. 13-1** Liquid Handling Arm (LiHa) commands

	<b>Aspirate</b> - The Aspirate command is used to pick up liquid from specified positions on the worktable. See <a href="#">15.1 "Aspirate Command"</a> , <a href="#">15-1</a> .
	<b>Dispense</b> - The Dispense command is used to dispense liquid to specified positions on the worktable. See <a href="#">15.2 "Dispense Command"</a> , <a href="#">15-3</a> .
	<b>Mix</b> - The Mix command performs a mix operation by aspirating and then dispensing at the same position. See <a href="#">15.3 "Mix Command"</a> , <a href="#">15-5</a> .
	<b>Wash Tips</b> - The Wash Tips command is used to flush and wash fixed tips or to flush DITI adapters using a wash station. It is not intended for flushing DITI tips. See <a href="#">15.4 "Wash Tips Command"</a> , <a href="#">15-8</a> . Not available for Air LiHa.
	<b>Periodic Wash</b> - The Periodic Wash command is used to flush DITI adapters in a wash station at specified, regular intervals. It is not intended for flushing DITI tips. See <a href="#">15.5 "Periodic Wash Command"</a> , <a href="#">15-10</a> . Periodic Wash has no function with Air LiHa but is available for compatibility reasons.
	<b>Activate DITI Handling</b> - The Activate DITI Handling command activates the automatic DITI handling feature in your pipetting script and specifies the DITI replacement script to use. See <a href="#">15.6 "Activate DITI Handling Command"</a> , <a href="#">15-12</a> .
	<b>Get DITIs</b> - The Get DITIs command is used to pick up DiTis (disposable tips) of the specified capacity from a DITI rack. Freedom EVOware keeps track of their position on the worktable and automatically chooses the next available unused DiTi. This command is only shown in the Control Bar if you are using DiTis on the LiHa. See <a href="#">15.7 "Get DITIs Command"</a> , <a href="#">15-13</a> . Air LiHa: Airgap parameters not available.
	<b>Drop DITIs</b> - The Drop DITIs command is used to discard the specified DITIs into the specified DITI waste. This command is only shown in the Control Bar if you are using DiTis on the LiHa. See <a href="#">15.8 "Drop DITIs Command"</a> , <a href="#">15-14</a> .
	<b>Set DiTi Position</b> - The Set DiTi Position command is used to specify the location of the next DiTi which should be used by the Get DiTis command. This command is only shown in the Control Bar if you are using DiTis on the LiHa. See <a href="#">15.9 "Set DITI Position Command"</a> , <a href="#">15-15</a> .
	<b>Pick Up DITIs</b> - The Pick Up DITIs command is used to pick up DITIs which have already been used and put back into the DiTi rack with the Set DITIs Back command. You must specify the DiTis you want to pick up. This command is only shown in the Control Bar if you are using DiTis on the LiHa. See <a href="#">15.10 "Pick Up DITIs Command"</a> , <a href="#">15-17</a> .
	<b>Set DITIs Back</b> - The Set DITIs Back command is used to return used DITIs to specified positions on a DiTi rack for later use. This command requires the Lower DiTi Eject option. This command is only shown in the Control Bar if you are using DiTis on the LiHa. See <a href="#">15.11 "Set DITIs Back Command"</a> , <a href="#">15-19</a> .
	<b>Pickup ZipTip</b> - The Pickup ZipTip command is used to pick up ZipTips. See <a href="#">15.12 "Pickup ZipTip Command"</a> , <a href="#">15-20</a> . Not available for Air LiHa.
	<b>Detect Liquid</b> - The Detect Liquid command is used to carry out liquid level detection without pipetting and reports the liquid volume for each of the chosen wells in the rack. See <a href="#">15.13 "Detect Liquid Command"</a> , <a href="#">15-21</a> .

**Tab. 13-1** Liquid Handling Arm (LiHa) commands (cont.)

	<p><b>Activate PMP</b> - The Activate PMP command is used to activate the PMP (Pressure Monitored Pipetting) function at the appropriate point in your pipetting script. You must do this before getting (mounting) the PMP-controlled DiTis. See <a href="#">15.14 “Activate PMP Command”</a>, ¶ 15-23.</p>
	<p><b>Deactivate PMP</b> - The Deactivate PMP command is used to deactivate the PMP (Pressure Monitored Pipetting) function at the appropriate point in your pipetting script. You must do this after finishing the pipetting sequence and dropping the DiTis. See <a href="#">15.15 “Deactivate PMP Command”</a>, ¶ 15-23.</p>
	<p><b>Execute Retry Worklist</b> - The Execute Retry Worklist command automatically creates a worklist to retry the pipetting sequence after pipetting was halted due to an error detected by PMP on aspirate or a PMP Instrument Error (pressure out of range). See <a href="#">15.16 “Execute Retry Worklist Command”</a>, ¶ 15-24.</p>
	<p><b>Inline Filter Test</b> - The Inline Filter Test command is used to check the integrity and presence of the inline filter inside the DiTi cone of an Air LiHa pipetting channel. See <a href="#">15.17 “Inline Filter Test Command (Air LiHa)”</a>, ¶ 15-24.</p>
	<p><b>Self diagnostic test</b> - The Self diagnostic test command is used to test for possible leakage. See <a href="#">15.18 “Self diagnostic test”</a>, ¶ 15-25</p>
	<p><b>Move LIHA</b> - The Move LIHA command is used to move the liquid handling arm from one position to another without performing an Aspirate or Dispense operation. See <a href="#">15.19 “Move LiHa Command”</a>, ¶ 15-28.</p>
	<p><b>Waste</b> - The Waste command is used to control the vacuum-assisted waste (instrument option for viscous liquids which creates a partial vacuum in the waste bottles). See <a href="#">15.20 “Waste Command”</a>, ¶ 15-30.</p>
	<p><b>Worklist</b> - The Worklist command is used to load a worklist file or run previously loaded worklist files. A worklist file is a text file containing instructions for the pipetting instrument. It contains information on source and destination positions and the volumes to pipette. See <a href="#">15.21 “Worklist Command”</a>, ¶ 15-31.</p>
	<p><b>Worklist Import</b> - The Worklist Import command is used to create an Freedom EVOware worklist from an Excel file which is stored in CSV format. See <a href="#">15.22 “Worklist Import Command”</a>, ¶ 15-41.</p>
	<p><b>Export Data</b> - The Export Data command is used to create report files for selected labware or for all labware on the worktable or the Te-MO deck. The report files contain information about the pipetting which has been carried out. See <a href="#">15.23 “Export Data Command”</a>, ¶ 15-42.</p>

### 13.1.2 Wizards, Overview

The following table lists advanced commands which are configured using wizards. To use these commands in Freedom EVOware Plus, add the device command “Liquid Handling Arm - Pipette” to your process; this opens the Script Editor (see [16.7.2](#), ¶ 16-20).

Tab. 13-2 Wizards

	<p><b>Copy Plate</b> - The Copy Plate wizard creates a set of script commands which make identical copies of the source plate on one or more destination plates. You can copy the whole plate or a rectangular selection of wells. See <a href="#">15.24 "Copy Plate Wizard"</a>, <a href="#">15-52</a>.</p>
	<p><b>Replicates</b> - The Replicates wizard creates a set of script commands which make one or more repetitions (copies) of selected wells on the source plate on one or more destination plates. All of the destination plates will be identical. You can only create horizontal replicates. See <a href="#">15.25 "Replicates Wizard"</a>, <a href="#">15-57</a>.</p>
	<p><b>Serial Dilution</b> - The Serial Dilution wizard creates a set of script commands which perform a serial dilution in two or more steps. Each dilution step has the same dilution factor. See <a href="#">15.26 "Serial Dilution Wizard"</a>, <a href="#">15-63</a>.</p>
	<p><b>Merge Plates</b> - The Merge Plates wizard creates a set of script commands which make a destination plate (e.g. a 384 well plate) by merging together wells from one or more source plates (e.g. four 96 well plates). See <a href="#">15.27 "Merge Plates Wizard"</a>, <a href="#">15-71</a>.</p>
	<p><b>Transfer</b> - The Transfer wizard creates a set of script commands which aspirate liquid from specified wells on the source plate and transfer it to destination positions See <a href="#">15.28 "Transfer Wizard"</a>, <a href="#">15-79</a>.</p>

### 13.1.3 Programming Commands, Overview

The following table lists the script programming commands. To use these commands in Freedom EVOware Plus, add the device command "Liquid Handling Arm - Pipette" to your process; this opens the Script Editor (see [16.7.2](#), [16-20](#)).

Tab. 13-3 Script programming commands

	<p><b>Start Timer</b> - The Start Timer command re-starts one of the 100 internal timers in Freedom EVOware. See <a href="#">15.29 "Start Timer Command"</a>, <a href="#">15-84</a>.</p>
	<p><b>Wait for Timer</b> - The Wait for Timer command pauses the execution of the script until a specified number of seconds have expired since a specified timer was started. See <a href="#">15.30 "Wait for Timer Command"</a>, <a href="#">15-85</a>.</p>
	<p><b>Execute Application</b> - The Execute Application command instructs Freedom EVOware to run an external program from within a pipetting script. You can run DOS and Windows applications. See <a href="#">15.31 "Execute Application Command"</a>, <a href="#">15-86</a>.</p>
	<p><b>Comment</b> - The Comment command is used to insert a comment for a script command or for some other reason. It is used to annotate the script and is not executable. See <a href="#">15.32 "Comment Command"</a>, <a href="#">15-87</a>. Use the User Prompt command instead if you want to prompt the instrument operator. Comment commands are also used as labels by the Condition command.</p>
	<p><b>User Prompt</b> - The User Prompt command is an informational command that displays a prompt on the screen as a reminder to the operator to execute a function or to perform a special action. See <a href="#">15.33 "User Prompt Command"</a>, <a href="#">15-88</a>.</p>

Tab. 13-3 Script programming commands (cont.)

	<b>Begin Loop</b> - The Begin Loop command instructs Freedom EVOware to repeat a command or a set of commands (i.e. a loop) a specified number of times until the matching End Loop command is encountered in the script. See <a href="#">15.34 "Begin Loop Command"</a> , <a href="#">15-89</a> .
	<b>End Loop</b> - The End Loop command terminates the loop which is initiated by the matching Begin Loop command. The End Loop command is inserted in the script automatically when you add the Begin Loop command. Freedom EVOware uses the same loop name for the Begin Loop command and the End Loop command. See <a href="#">15.35 "End Loop Command"</a> , <a href="#">15-90</a> .
	<b>Set Variable</b> - The Set Variable command is used to declare a numeric or string variable in a pipetting script and to assign an initial value. You can also prompt the operator for the value. See <a href="#">15.36 "Set Variable Command"</a> , <a href="#">15-90</a> .
	<b>Import Variable</b> - The Import Variable command is used to import values for script variables from a file during script runtime. You can import values for variables which are already declared (defined) in the script. You can also use this command to declare new variables for use in the script and assign an initial value which is read from the import file. See <a href="#">15.37 "Import Variable Command"</a> , <a href="#">15-93</a> .
	<b>Export Variable</b> - The Export Variable command is used to export the values of script variables to a file during script runtime. See <a href="#">15.38 "Export Variable Command"</a> , <a href="#">15-97</a> .
	<b>Condition</b> - The Condition command is used to jump to a specified line in the script if a specified condition is met. See <a href="#">15.39 "Condition Command"</a> , <a href="#">15-99</a> .
	<b>If - Then</b> - The If -Then command is used to execute a set of script commands if a specified condition is met and execute a different set of commands if the condition is not met (Else condition). See <a href="#">15.40 "If - Then Command"</a> , <a href="#">15-101</a> .
	<b>Group</b> - The Group command is used to group together script commands to make long scripts easier to understand. When you insert a Group command, a Group End command is also inserted. Click the "-" button in the Group command icon in the Script Editor if you want to collapse and hide all of the script lines in the group. See <a href="#">15.43 "Group Command"</a> , <a href="#">15-102</a> .
	<b>Sub-Routine</b> - The Sub-Routine command executes another script as part of the current script. The Sub-Routine command is not available in Freedom EVOware Plus. See <a href="#">15.44 "Sub-Routine Command"</a> , <a href="#">15-103</a> .
	<b>Notification</b> - The Notification command is used to send an email from within a script (e.g. to inform an operator in another room that a certain process has finished). It can also be used to send an automatic email if an error occurs during script execution. See <a href="#">15.45 "Notification Command"</a> , <a href="#">15-104</a> .

**Tab. 13-3** Script programming commands (cont.)

	<b>Start Script</b> - The Start Script command starts another script from the currently running script, which is terminated. In contrast to sub-routines, the new script can use a different worktable layout to the original script. The Start Script command is not available in Freedom EVOware Plus. See <a href="#">15.46 "Start Script Command"</a> , <a href="#">15-105</a> .
	<b>On Error Goto</b> - The On Error Goto command is used to jump to a specified line in the script if an error occurs during script runtime. Error recovery commands then allow the pipetting script to react automatically to the error. See <a href="#">15.47 "On Error Goto Command"</a> , <a href="#">15-106</a> .
	<b>Resume</b> - The Resume command is used together with the On Error Goto command and specifies where to resume running the script after executing the error recovery commands. See <a href="#">15.48 "Resume Command"</a> , <a href="#">15-108</a> .
	<b>End Script</b> - The End Script command is used to stop the pipetting script prematurely and to specify a return code (error code) for the script. It is typically used together with error recovery commands. See <a href="#">15.49 "End Script Command"</a> , <a href="#">15-109</a> .

### 13.1.4 Commands for the Plate Robot, Overview

The following table lists the commands for the Robot manipulator (RoMa). These commands are only available in Freedom EVOware Standard. In Freedom EVOware Plus, plate robot actions are normally specified as pre-actions and post-actions of device commands (see [8.5.17.3 "Pre-actions and Post-actions Tabs"](#), [8-70](#)).







**Tab. 13-4** Commands for the plate robot

	<b>Move RoMa</b> - The Move RoMa command is used to carry out simple RoMa movements. See <a href="#">15.50 "Move RoMa Command"</a> , <a href="#">15-110</a> .
	<b>RoMa Vector</b> - The RoMa Vector command executes a RoMa vector, which is a pre-defined sequence of RoMa movements. You can also specify gripper actions at the Safe and End positions. See <a href="#">15.51 "RoMa Vector Command"</a> , <a href="#">15-111</a> .
	<b>Transfer Labware</b> - The Transfer Labware command is used to transfer labware (e.g. a microplate) from one position to another with the plate robot (RoMa). The same action can be carried out by defining two RoMa Vector commands and using two RoMa vectors. See <a href="#">15.52 "Transfer Labware Command"</a> , <a href="#">15-113</a> .

### 13.1.5 Commands for the Tube Robot, Overview

The following table lists the commands for the Pick and Place arm (PnP). To use these commands in Freedom EVOware Plus, add the device command "Tube Robot - Execute Script" to your process; this opens the Script Editor.



**Tab. 13-5** *Commands for the tube robot*

	<b>Move PnP</b> - The Move PnP command is used to carry out simple PnP movements. See <a href="#">15.53 "Move PnP Command"</a> ,  15-115.
	<b>PnP Vector</b> - The PnP Vector command executes a PnP vector, which is a predefined sequence of PnP movements. You can also specify gripper actions at the Safe and End positions. See <a href="#">15.54 "PnP Vector Command"</a> ,  15-116.
	<b>Transfer Tube</b> - The Transfer Tube command is used to transfer a tube from one position to another with the tube robot (PnP). The same action can be carried out by defining two PnP Vector commands and using two PnP vectors. See <a href="#">15.55 "Transfer Tube Command"</a> ,  15-118.

### 13.1.6 Commands for Identification Devices, Overview

The following table lists the command for the PosID movable barcode scanner. The PosID-3 (a new, improved version of the PosID hardware) uses device commands instead of script commands. If your pipetting instrument is fitted with the PosID-3 instead of the PosID, the Identification Devices group of the Control Bar will not contain any commands. The PosID-3 device commands can be found in the PosID-3 group of the Control Bar.

**Tab. 13-6** *Commands for identification devices*

	<b>PosID</b> - The PosID command is used to read the barcode labels on one or more pieces of labware using the PosID option. The PosID (Positive Identification System) is a movable barcode scanner which can be used to read the barcode labels on carriers, labware and tubes. See <a href="#">16.10.2 "PosID-3 - Scan Command"</a> ,  16-36.
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## 13.2 Overview of Device Commands

In Freedom EVOware Plus, when the Process Editor is open the Control Bar only shows device commands (commands which are used for controlling optional devices).

Conversely, when the Script Editor is open the Control Bar only shows script commands (commands which are used for writing pipetting scripts). See [11.5.5 “Creating a Script for the Pipette Command”](#), ¶ 11-11).

In Freedom EVOware Standard, both command types are shown in the Control Bar (it does not have a Process Editor).

Tecan and third party software add-ons for Freedom EVOware may add additional script and/or device commands to the Control Bar which are not described in this manual. In this case, refer to the instruction manual for the respective software add-on for more information.

**Note:** Device commands are handled by device drivers. The currently installed devices are shown in the Control Bar. If you cannot find the device command you need even though it is listed in this chapter, you must run the Freedom EVOware installation program again to install it. Also check whether the driver has been installed but is currently deactivated (see [8.4.1.1 “Device Information Tab”](#), ¶ 8-21, Start checkbox).


### 13.2.1 Commands for the Barcode Scanner, Overview

The following table lists the command for the Symbol LS-1220 barcode scanner. In Freedom EVOware Plus, the Barcode Scanner command is an on-the-fly-command – drag the command to the line which connects two process steps (see [5.4.3 “The Process Editor \(Freedom EVOware Plus\)”](#), ¶ 5-16).

In Freedom EVOware Standard, proceed as follows to use the Symbol LS-1220 barcode scanner:

- ◆ Make sure that the labware type has been “allowed” for scanning with the barcode scanner (see [9.5 “Configuring Carriers”](#), ¶ 9-29, “Allowed Labware on this carrier”).
- ◆ Drag labware of the type you want to scan from the Control Bar (Labware section) onto the device icon of the barcode scanner.
- ◆ Use the Transfer Labware command to move the labware to the barcode scanner (the barcode scanner carrier attribute “on-the-fly” instructs Freedom EVOware not to release the labware at this position); see [15.52 “Transfer Labware Command”](#), ¶ 15-113;
- ◆ Add the Barcode Scanner - ReadBarcode command to your script;
- ◆ Use the Transfer Labware command to move the labware from the barcode scanner to the required destination position.

**Tab. 13-7** Commands for the Barcode Scanner













	<b>Read Barcode</b> - The Read Barcode command is used to read barcodes from the labware or tube which is presented to the barcode scanner by the RoMa. See <a href="#">16.2.1 “Barcode Scanner - Read Barcode Command”</a> , ¶ 16-2.
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### 13.2.2 Commands for the Columbus Washer, Overview

The following table lists the commands for the Columbus Washer. The Status command is only available in Freedom EVOware Plus.

**Tab. 13-8** *Commands for the Columbus Washer*

	<b>WashPlate</b> - The WashPlate command performs the washing of a microplate. See <a href="#">16.3.1 "Columbus Washer - WashPlate command"</a> , <a href="#">16-2</a> .
	<b>Prime</b> - Before the washer is used, all dispensing channels needed for the wash step must be primed to fill the liquid system with the required liquid. The Prime command starts the priming procedure. See <a href="#">16.3.2 "Columbus Washer - Prime Command"</a> , <a href="#">16-5</a> .
	<b>Rinse</b> - The Rinse command starts the rinsing procedure of the washer to flush the liquid system and prevent needle blockages. Rinsing should be performed when the device is left in standby or is switched off at the end of use. See <a href="#">16.3.3 "Columbus Washer- Rinse Command"</a> , <a href="#">16-6</a> .
	<b>Remote</b> - The Remote command switches the device from local mode to remote mode. The device can only be controlled remotely by Freedom EVOware (through the interface cable) in remote mode. See <a href="#">16.3.4 "Columbus Washer - Remote Command"</a> , <a href="#">16-7</a> .
	<b>ExitRemote</b> - The ExitRemote command switches the device from remote mode to local mode. The device can not be controlled remotely by Freedom EVOware (through the interface cable) in local mode. See <a href="#">16.3.5 "Columbus Washer - Exit-Remote Command"</a> , <a href="#">16-7</a> .
	<b>Status</b> - The Status command interrogates the status of the Columbus washer. See <a href="#">16.3.6 "Columbus Washer - Status Command"</a> , <a href="#">16-7</a> .
	<b>Init</b> - The Init command initializes the washer. This must be done before the washer is first used in a script or process. See <a href="#">16.3.7 "Columbus Washer - Init Command"</a> , <a href="#">16-7</a> .
	<b>StopRinse</b> - The StopRinse command stops the currently running rinsing procedure. See <a href="#">16.3.8 "Columbus Washer - StopRinse Command"</a> , <a href="#">16-8</a> .
	<b>StartProg</b> - The StartProg command starts a washing program which is stored in the Columbus washer. The washer is capable of storing up to 30 user-definable washing programs. See <a href="#">16.3.9 "Columbus Washer - StartProg Command"</a> , <a href="#">16-8</a> .
	<b>WashPlateEx</b> - The WashPlateEx command performs the washing of a microplate. Information on the channels (liquid containers) to use with this command is read from an external text file. The washer is capable of storing up to 30 user-definable washing programs. See <a href="#">16.3.10 "Columbus Washer - WashPlateEx Command"</a> , <a href="#">16-9</a> .
	<b>DisableAutoPrime</b> - The DisableAutoPrime command disables the auto-priming function for the Columbus washer. Auto-priming is configured in the Columbus driver settings. See <a href="#">16.3.11 "Columbus Washer - DisableAutoPrime Command"</a> , <a href="#">16-12</a> .
	<b>AllowAutoPrime</b> - The AllowAutoPrime command activates the auto-priming function for the Columbus washer. Auto-priming is configured in the Columbus driver settings. See <a href="#">16.3.12 "Columbus Washer - AllowAutoPrime Command"</a> , <a href="#">16-12</a> .

### 13.2.3 Commands for the Heated Incubator, Overview








The following table lists the commands for the Heated Incubator. Freedom EVOware in the standard configuration lets you configure up to three logical incubators, each of them with a different temperature (see 8.5.3 “Settings for Heated Incubators 1 to 3”, 8-41).

Use the Duplicate Device tool if you need more than three (see A.11.3 “Duplicate Device Tool”, A-39).

The commands CloseDoor, StartShaker, StopShaker, InsertPlate and RemovePlate are only available in Freedom EVOware Standard. Plates are loaded into the incubator using RoMa movement commands. Use the Wait For Timer command to control the incubating time.

Use the Incubate command instead in Freedom EVOware Plus (the Incubate command handles all of these actions, including incubating time and plate loading/unloading, automatically).


Tab. 13-9 Commands for the Heated Incubator

	<b>Incubate</b> - The Incubate command incubates the labware inside the incubator for the specified amount of time. See 16.4.1 “Heated Incubator - Incubate Command”, 16-13.
	<b>SetTemperature</b> - The SetTemperature command sets the specified slot of the incubator to the chosen temperature. See 16.4.7 “Heated Incubator - SetTemperature Command”, 16-16.
	<b>CloseDoor</b> - The CloseDoor command closes all of the doors of the incubator. To maintain a constant temperature within the incubator, it is best to close the doors again directly after inserting or removing labware. See 16.4.2 “Heated Incubator - CloseDoor Command”, 16-13.
	<b>StartShaker</b> - The StartShaker command starts the optional shaker of the incubator. See 16.4.3 “Heated Incubator - StartShaker Command”, 16-14.
	<b>StopShaker</b> - The StopShaker command stops the optional shaker of the incubator. See 16.4.4 “Heated Incubator - StopShaker Command”, 16-14.
	<b>InsertPlate</b> - The InsertPlate command must be used each time the RoMa inserts labware into the incubator slot. The InsertPlate command itself does not move the labware. It’s purpose is to regulate the power of the slot’s heater. See 16.4.5 “Heated Incubator - InsertPlate Command”, 16-14.
	<b>RemovePlate</b> - The RemovePlate command must be used each time the RoMa removes labware from the incubator slot. The RemovePlate command itself does not move the labware. It’s purpose is to tell Freedom EVOware to stop recording information on the slot temperature to the log file. See 16.4.6 “Heated Incubator - RemovePlate Command”, 16-15.

### 13.2.4 Commands for the Base Incubator, Overview

The following table lists the command for the Base Incubator. The Base Incubator is a software concept and it is not a device which you can fit to your pipetting instrument. This command is not necessary in Freedom EVOware Standard.

**Tab. 13-10** *Commands for the Base Incubator*


	<p><b>BaselIncubate</b> - The BaselIncubate command moves the labware back to its base (labware source) position (e.g. the carousel) and leaves it there at room temperature for the specified amount of time. The base incubator is a software concept and it is not a device which you can fit to your pipetting instrument. See <a href="#">16.5.1 "Base Incubator - BaselIncubate Command"</a>, ¶ 16-17.</p>
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### 13.2.5 Commands for the Room Temperature Incubator, Overview

The following table lists the command for the Room Temperature Incubator, which is only available in Freedom EVOware Plus. The Incubate command handles incubating time and plate loading/unloading automatically.

This command is not available in Freedom EVOware Standard. The labware is loaded into the room temperature incubator using RoMa movement commands. The incubating time can then be controlled by the Wait For Timer command.



**Tab. 13-11** *Commands for the Room Temperature Incubator*

	<p><b>Incubate</b> - The Incubate command keeps the labware at room temperature for the specified amount of time. See <a href="#">16.6.1 "Room Temperature Incubator - Incubate Command"</a>, ¶ 16-18.</p>
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### 13.2.6 Commands for the Liquid Handling Arm (LiHa / Air LiHa), Overview

The following table lists the device commands for the Liquid Handling Arm (LiHa). These commands are only available in Freedom EVOware Plus. They are not necessary in Freedom EVOware Standard - all of the required functions are provided by the Liquid Handling Arm script commands.

**Tab. 13-12** *Commands for the Liquid Handling Arm (LiHa / Air LiHa)*







	<p><b>Flush RSP</b> - The Flush RSP command uses a wash station to flush the dilutors and the tubing of the pipetting instrument (fill them with system liquid) and to flush and wash the tips on the LiHa. It is mainly intended as a service function. See <a href="#">16.7.1 "Liquid Handling Arm - Flush RSP Command"</a>, ¶ 16-19. Not available for Air LiHa.</p>
	<p><b>Pipette</b> - The Pipette command is used to create a pipetting script. When you drag it to the Process Editor, it opens the Script Editor automatically. See <a href="#">16.7.2 "Liquid Handling Arm - Pipette Command"</a>, ¶ 16-20. See also <a href="#">11.4.2 "Creating a Pipetting Script"</a>, ¶ 11-5.</p>

### 13.2.7 Commands for the Magellan option, Overview

The following table lists the Freedom EVOware commands for the Tecan Magellan option, which must be installed separately. The Magellan software is used to control microplate readers (e.g. photometers) and to carry out data

analysis using stored procedures. The Status command is only available in Freedom EVOware Plus.






**Tab. 13-13** Commands for the Magellan option

	<b>Status</b> - The Status command interrogates the status of the reader. See <a href="#">16.8.1 "Magellan - Status Command"</a> , <a href="#">16-21</a> .
	<b>Excitation Out</b> - The Excitation Out command moves the excitation filter slide out of the reader to allow the filters to be removed or exchanged. See <a href="#">16.8.2 "Magellan - Excitation Out Command"</a> , <a href="#">16-21</a> .
	<b>Emission Out</b> - The Emission Out command moves the emission filter slide out of the reader to allow the filters to be removed or exchanged. See <a href="#">16.8.3 "Magellan - Emission Out Command"</a> , <a href="#">16-21</a> .
	<b>Open</b> - The Open command opens the door of the currently active reader. See <a href="#">16.8.4 "Magellan - Open Command"</a> , <a href="#">16-21</a> .
	<b>Close</b> - The Close command closes the door of the currently active reader. See <a href="#">16.8.5 "Magellan - Close Command"</a> , <a href="#">16-21</a> .
	<b>Measure</b> - The Measure command performs a measurement procedure using the Magellan software. See <a href="#">16.8.6 "Magellan - Measure Command"</a> , <a href="#">16-22</a> .




### 13.2.8 Commands for the PW384 GP Washer, Overview

The following table lists the commands for the PW384 GP Washer.

**Tab. 13-14** Commands for the PW384 GP Washer

	<b>Aspirate</b> - The Aspirate command starts the aspiration procedure of the washer. It is mainly intended for special applications, e.g. to remove sample or reagent liquids from the wells. See <a href="#">16.9.1 "PW384GP Washer - Aspirate Command"</a> , <a href="#">16-24</a> .
	<b>Dispense</b> - The Dispense command starts the liquid dispensing procedure of the washer. It is mainly intended for special applications, e.g. to fill the wells with liquid. See <a href="#">16.9.2 "PW384GP Washer - Dispense Command"</a> , <a href="#">16-25</a> .
	<b>Prime</b> - Before the washer is used, all dispensing channels needed for the wash step must be primed to fill the liquid system with the required liquid. The Prime command starts the priming procedure. See <a href="#">16.9.3 "PW384GP Washer - Prime Command"</a> , <a href="#">16-27</a> .
	<b>Rinse</b> - The Rinse command starts the rinsing procedure of the washer to flush the liquid system. See <a href="#">16.9.4 "PW384GP Washer - Rinse Command"</a> , <a href="#">16-27</a> .
	<b>Stop</b> - The Stop command stops the washing procedure. See <a href="#">16.9.5 "PW384GP Washer - Stop Command"</a> , <a href="#">16-28</a> .



**Tab. 13-14** Commands for the PW384 GP Washer (cont.)

	<b>PrepareEmptyWaste</b> - The PrepareEmptyWaste command collapses the vacuum in the waste bottle to allow it to be emptied. This needs to be done whenever the washer's liquid detection indicates that the waste bottle is full. See <a href="#">16.9.6 "PW384GP Washer - PrepareEmptyWaste Command"</a> , ¶ 16-29.
	<b>DownloadWash</b> - The PW384GP washer can store parameter sets for up to 49 different wash programs. The DownloadWash command is used to configure a wash program and download it to non-volatile memory in the washer. The stored wash program can then be executed with the StartWash command. See <a href="#">16.9.7 "PW384GP Washer - DownloadWash Command"</a> , ¶ 16-29.
	<b>StartWash</b> - The PW384GP washer can store parameter sets for up to 49 different wash programs. The StartWash command is used to execute one of the stored wash programs. See <a href="#">16.9.8 "PW384GP Washer - StartWash Command"</a> , ¶ 16-32.
	<b>Wash</b> - The Wash command performs the washing of a microplate with specified parameters such as wash volume and aspiration time. See <a href="#">16.9.9 "PW384GP Washer - Wash Command"</a> , ¶ 16-32.

### 13.2.9 Commands for the PosID-3, Overview

The following table lists the command for the PosID-3 movable barcode scanner. The PosID (the previous version of the PosID-3 hardware) uses script commands instead of device commands. If your pipetting instrument is fitted with the PosID instead of the PosID-3, the PosID group of the Control Bar will not contain any commands. The PosID script commands can be found in the Identification Devices group.

**Tab. 13-15** Commands for the PosID-3










	<b>Initialize</b> - The Initialize command initializes the PosID-3. This needs to be done before the PosID-3 is first used in a script or process. See <a href="#">16.10.1 "PosID-3 - Initialize Command"</a> , ¶ 16-36.
	<b>Scan</b> - The Scan command is used to read the barcode labels on one or more pieces of labware using the PosID-3 option. The PosID-3 (Positive Identification System) is a movable barcode scanner which can be used to read the barcode labels on carriers, labware and tubes. See <a href="#">16.10.2 "PosID-3 - Scan Command"</a> , ¶ 16-36.

### 13.2.10 Commands for the Plate Robot, Overview

The following table lists the commands for the Plate Robot. These commands are only available in Freedom EVOware Plus and are mainly intended for special applications. Plate Robot (RoMa movement) commands are normally used as pre-actions and/or post-actions of other commands and are not normally used as process steps.

in Freedom EVOware Standard, RoMa movements are specified with the script commands Move RoMa, RoMa Vector and Transfer Labware.

**Tab. 13-16** Commands for the Plate Robot

	<b>ExecuteSingleVector</b> - The ExecuteSingleVector command executes a predefined movement from one position on the worktable to another (a RoMa vector). See <a href="#">16.13.1 "Plate Robot - ExecuteSingleVector Command"</a> , <a href="#">16-40</a> .
	<b>Initialize</b> - The Initialize command initializes the plate robot. This needs to be executed before the robot is first used in a script or process. See <a href="#">16.13.2 "Plate Robot - Initialize Command"</a> , <a href="#">16-41</a> .
	<b>MoveObject</b> - The MoveObject command moves an object (plate) to a specified location. See <a href="#">16.13.3 "Plate Robot - MoveObject Command"</a> , <a href="#">16-41</a> .
	<b>ReplaceObject</b> - The ReplaceObject command moves an object to a specified location. If the destination is occupied, the blocking object will be removed. It is mainly used for moving reagent carriers. See <a href="#">16.13.4 "Plate Robot - ReplaceObject Command"</a> , <a href="#">16-41</a> .
	<b>MoveToBase</b> - The MoveToBase command moves an object (plate) to its base (labware source) position. See <a href="#">16.13.5 "Plate Robot - MoveToBase Command"</a> , <a href="#">16-42</a> .
	<b>ChangeObject</b> - The ChangeObject command moves an object to a specified location. If the destination is occupied, the blocking object will be removed. It is only used for changing DiTi's. See <a href="#">16.13.6 "Plate Robot - ChangeObject Command"</a> , <a href="#">16-42</a> .
	<b>MoveInsert</b> - The MoveInsert command moves the insert of an Insert Plate to the specified location. See <a href="#">16.13.7 "Plate Robot - MoveInsert Command"</a> , <a href="#">16-42</a> .
	<b>SwapInsert</b> - The SwapInsert command moves the insert of an Insert plate to an Insert plate which doesn't have an insert. See <a href="#">16.13.8 "Plate Robot - SwapInsert Command"</a> , <a href="#">16-42</a> .
	<b>ClearLocation</b> - The ClearLocation command moves all objects which are currently at the specified location to a new location. See <a href="#">16.13.9 "Plate Robot - ClearLocation Command"</a> , <a href="#">16-42</a> .

### 13.2.11 Commands for the Te-Shake Shaker, Overview







The following table lists the commands for the Te-Shake Shaker.

The commands Init, Start, Stop, SetTemperature and SetFrequency are only available in Freedom EVOware Standard. Plates are loaded into the Te-Shake using RoMa movement commands. The shaking time can be controlled by the Wait For Timer command.

Use the Shake command instead in Freedom EVOware Plus (the Shake command handles all of these actions, including shaking time and plate loading/unloading, automatically). The Shake command is not available in Freedom EVOware Standard.

Freedom EVOware is provided with several different types of Te-Shake shaker. If you want to use more than one shaker in your script or process, you must use the Duplicate Device tool to create a separate device driver for each of them. For more information see [16.14 "Commands for the Te-Shake Shaker"](#), [16-43](#).

**Tab. 13-17** Commands for the Te-Shake Shaker

	<b>Init</b> - The Init command initializes the shaker. This needs to be done before the shaker is first used in a script or process. See <a href="#">16.14.1 "Te-Shake shaker - Init Command"</a> , ¶ 16-43.
	<b>Shake</b> - The Shake command performs the shaking procedure with the specified direction, frequency and temperature. See <a href="#">16.14.2 "Te-Shake shaker - Shake Command"</a> , ¶ 16-43.
	<b>Start</b> - The Start command starts the shaking procedure. See <a href="#">16.14.3 "Te-Shake shaker - Start Command"</a> , ¶ 16-45.
	<b>Stop</b> - The Stop command stops the shaking procedure. See <a href="#">16.14.4 "Te-Shake shaker - Stop Command"</a> , ¶ 16-45.
	<b>SetTemperature</b> - The SetTemperature command sets the shaker to the specified temperature. See <a href="#">16.14.5 "Te-Shake shaker - SetTemperature Command"</a> , ¶ 16-45.
	<b>SetFrequency</b> - The SetFrequency command set the shaking frequency of the shaker. See <a href="#">16.14.6 "Te-Shake shaker - SetFrequency Command"</a> , ¶ 16-46.


### 13.2.12 Commands for the Symbol MS-954 Barcode Scanner, Overview

The following table lists the command for the Symbol MS-954 barcode scanner. In Freedom EVOware Plus, the Barcode Scanner command is an on-the-fly-command – drag the command to the line which connects two process steps (see [5.4.3 "The Process Editor \(Freedom EVOware Plus\)"](#), ¶ 5-16).

In Freedom EVOware Standard, proceed as follows to use the Symbol MS-954 barcode scanner:

- ◆ Make sure that the labware type has been “allowed” for scanning with the barcode scanner (see [9.5 "Configuring Carriers"](#), ¶ 9-29, “Allowed Labware on this carrier”).
- ◆ Drag labware of the type you want to scan from the Control Bar (Labware section) onto the device icon of the Symbol MS-954 barcode scanner.
- ◆ Use the Transfer Labware command to move the labware to the barcode scanner (the barcode scanner carrier attribute “on-the-fly” instructs Freedom EVOware not to release the labware at this position); see [15.52 "Transfer Labware Command"](#), ¶ 15-113;
- ◆ Add the Barcode Scanner - ReadBarcode command to your script;
- ◆ Use the Transfer Labware command to move the labware from the barcode scanner to the required destination position.

**Tab. 13-18** Commands for the Symbol MS-954 Barcode Scanner






	<b>Read Barcode</b> - The Read Barcode command is used to read barcodes from the labware or tube which is presented to the barcode scanner by the RoMa. See <a href="#">16.16.1 "Symbol MS-954 Barcode Scanner - Read Barcode Command"</a> , ¶ 16-56.
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### 13.2.13 Commands for the Sunrise Reader, Overview

The following table lists the commands for the Sunrise Reader. The Status command is only available in Freedom EVOware Plus.





**Tab. 13-19** *Commands for the Sunrise Reader*

	<b>Status</b> - The Status command interrogates the status of the reader. See <a href="#">16.17.1 "Sunrise Reader - Status Command"</a> , <a href="#">16-57</a> .
	<b>Open</b> - The Open command opens the door of the reader. See <a href="#">16.17.2 "Sunrise Reader - Open Command"</a> , <a href="#">16-57</a> .
	<b>Close</b> - The Close command closes the door of the reader. See <a href="#">16.17.3 "Sunrise Reader - Close Command"</a> , <a href="#">16-57</a> .
	<b>Measure</b> - The Measure command performs a measurement procedure using external software. See <a href="#">16.17.4 "Sunrise Reader - Measure Command"</a> , <a href="#">16-58</a> .
	<b>Multilabel</b> - The Multilabel command performs up to four consecutive measurement steps on the same plate using external software. The plate does not have to leave the reader in between measurements. See <a href="#">16.17.5 "Sunrise Reader - Multilabel Command"</a> , <a href="#">16-58</a> .

### 13.2.14 Commands for the Magnetic Bead Separator (Te-MagS), Overview

The following table lists the commands for the Magnetic Bead Separator.

**Tab. 13-20** *Commands for the Magnetic Bead Separator*


	<b>MoveToPosition</b> - The MoveToPosition command moves the carrier to one of four positions. You must specify the required position. See <a href="#">16.18.1 "Magnetic Bead Separator - MoveToPosition Command"</a> , <a href="#">16-60</a> .
	<b>ActivateHeater</b> - The ActivateHeater command is used to switch on the heater. You must specify the required temperature. See <a href="#">16.18.2 "Magnetic Bead Separator - ActivateHeater Command"</a> , <a href="#">16-61</a> .
	<b>DeactivateHeater</b> - The DeactivateHeater command is used to switch off the heater when you no longer want to use it. See <a href="#">16.18.3 "Magnetic Bead Separator - DeactivateHeater Command"</a> , <a href="#">16-61</a> .
	<b>Execution</b> - The Execution command lets you specify the sequence of operations to be carried out by the Magnetic Bead Separator (Te-MagS) during the separation process. See <a href="#">16.18.4 "Magnetic Bead Separator - Execution Command"</a> , <a href="#">16-62</a> .

### 13.2.15 Commands for the Transfer Station, Overview

The following table lists the command for the Transfer Station. The Transfer Station is an unused location on the worktable of the pipetting instrument. If your pipetting instrument is fitted with two RoMa arms, this location is used to transfer labware from one RoMa to another. The Transfer command is only installed if you have installed Freedom EVOware with two RoMas.



Tab. 13-21 Commands for the Transfer Station








	<p><b>Transfer</b> - The Transfer Station is an unused location on the worktable of the pipetting instrument. If your pipetting instrument is fitted with two RoMa arms, the Transfer command uses the Transfer Station to pass labware from one RoMa to the other if this becomes necessary. See <a href="#">16.19.1 "Transfer Station - Transfer Command"</a>, <a href="#">16-64</a>.</p>
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### 13.2.16 Commands for the Vacuum Separator (Te-VacS), Overview






The following table lists the commands for the vacuum separator. The commands Filtration, CheckWasteLevel and CheckPlateWithBlock are only available in Freedom EVOware Plus.

To carry out vacuum separation in Freedom EVOware Standard you must use a combination of the commands SetPressureDiff, ApplyVacuumRear, ApplyVacuumFront, VentRear, VentFront, PositionPlateRear, PositionPlateFront and OpenDesaltingValve. The Filtration command in Freedom EVOware Plus is a high-level command which combines all of these functions.

Tab. 13-22 Commands for the Te-VacS

	<p><b>SetPressureDiff</b> - The SetPressureDiff command This option starts the vacuum pump. You must specify the required vacuum. The vacuum is not applied to either of the SPE blocks and the script or process does not wait for the vacuum to build up. See <a href="#">16.15.1 "Te-VacS - SetPressureDiff Command"</a>, <a href="#">16-47</a>.</p>
	<p><b>ApplyVacuumRear</b> - The ApplyVacuumRear command applies the vacuum to the rear SPE block (i.e. the SPE block which is connected to vacuum pipe 2). You must specify the required vacuum. See <a href="#">16.15.2 "Te-VacS - ApplyVacuumRear Command"</a>, <a href="#">16-47</a>.</p>
	<p><b>ApplyVacuumFront</b> - The ApplyVacuumFront command applies the vacuum to the front SPE block (i.e. the SPE block which is connected to vacuum pipe 1). You must specify the required vacuum. See <a href="#">16.15.3 "Te-VacS - ApplyVacuumFront Command"</a>, <a href="#">16-48</a>.</p>
	<p><b>VentRear</b> - The VentRear command vents the vacuum from the rear SPE block. It is used to stop the solid phase extraction process. See <a href="#">16.15.4 "Te-VacS - VentRear Command"</a>, <a href="#">16-48</a>.</p>
	<p><b>VentFront</b> - The VentFront command vents the vacuum from the front SPE block. It is used to stop the solid phase extraction process. See <a href="#">16.15.5 "Te-VacS - VentFront Command"</a>, <a href="#">16-48</a>.</p>
	<p><b>DeactivateSystem</b> - The DeactivateSystem command is used to shut down the Te-VacS when you no longer want to use it in your script or process. It switches off the vacuum pump and vents all blocks and the vacuum tank. See <a href="#">16.15.6 "Te-VacS - DeactivateSystem Command"</a>, <a href="#">16-48</a>.</p>
	<p><b>CheckWasteLevel</b> - The CheckWasteLevel command is used to check the liquid level in the waste bottle. The waste level is reported during process runtime in the Messages/Error window of the runtime controller. See <a href="#">16.15.7 "Te-VacS - CheckWasteLevel Command"</a>, <a href="#">16-49</a>.</p>

**Tab. 13-22** *Commands for the Te-VacS (cont.)*

	<p><b>CheckPlateWithBlock</b> - If a plate has been put on the vacuum block and a RoMa movement command has moved the vacuum block, the CheckPlateWithBlock command is used to inform Freedom EVOware that the plate has moved too. See <a href="#">16.15.8 "Te-VacS - CheckPlateWithBlock Command"</a>, 16-49.</p>
	<p><b>Filtration</b> - The Filtration command is used to specify the sequence of operations to be carried out by the Te-VacS during the vacuum separation process. See <a href="#">16.15.9 "Te-VacS - Filtration Command"</a>, 16-49.</p>
	<p><b>PositionPlateRear</b> - The PositionPlateRear command is only relevant if the Te-VacS is fitted with the Repositioner option. It moves the collection plate for the rear vacuum block into one of four positions before you apply the vacuum. See <a href="#">16.15.10 "Te-VacS - PositionPlateRear Command"</a>, 16-54.</p>
	<p><b>PositionPlateFront</b> - The PositionPlateFront command is only relevant if the Te-VacS is fitted with the Repositioner option. It moves the collection plate for the front vacuum block into one of four positions before you apply the vacuum. See <a href="#">16.15.11 "Te-VacS - PositionPlateFront Command"</a>, 16-55.</p>
	<p><b>OpenDesaltingValve</b> - The OpenDesaltingValve command opens the desalter valve to drain the residues. It is only relevant for Te-VacS versions which are equipped with a desalter valve. See <a href="#">16.15.12 "Te-VacS - OpenDesaltingValve Command"</a>, 16-56.</p>



### 13.2.17 Commands for the Process Starter, Overview

The following table lists the commands for the Process Starter device driver. These commands are only available in Freedom EVOware Plus.

The Start command is available in five versions (Start and StartP1 to StartP4) depending on the number of labware items required by the processes you want to start (0 to 4 labware items).

You can only use StartP1 to StartP4 as process steps. The Start command can be used as a process step or in scripts for the Process Script - Script command. The WaitForProcess commands can only be used in scripts for the Process Script - Script command (see 16.39.1 "Process Script - Script Command", 2 16-127).


**Tab. 13-23** *Commands for the Process Starter*

	<p><b>Start</b> - The Start command starts a single instance of a specified process when a set of user-defined conditions are met. You can specify conditions which are based on database locations and/or on the values of variables. See <a href="#">16.21.1 "Process Starter - Start Command"</a>, 16-66.</p>
	<p><b>WaitForProcess</b> - The WaitForProcess script command waits for a specified process to finish before allowing the pipetting script to continue. See <a href="#">16.21.2 "Process Starter - WaitForProcess Command"</a>, 16-70.</p>

### 13.2.18 Commands for the Process Script Overview

The following table lists the command for the Process Script device driver. This command is only available in Freedom EVOware Plus.

**Tab. 13-24** *Commands for the Process Starter*

	<p><b>Script</b> - The Script command is used to create a script for the Process Starter script commands. When you drag it to the Process Editor, it opens the Script Editor automatically. See <a href="#">16.22.1 "Process Script - Script Command"</a>,  16-71.</p>
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# 14 Advanced Programming Features for Scripts

This chapter describes advanced programming features for liquid handling scripts.

## 14.1 Variables and Expressions in Scripts


Freedom EVOware allows you to use variables in scripts instead of constants. Variables let you modify the execution of the script during runtime. You can use variables for pipetting volumes, timers and time durations, strings, names of external applications and loop counters etc. Freedom EVOware also supports expressions, which are a combination of variables and basic mathematical operators such as add or multiply. The following paragraphs discuss the definition and the use of variables.


When you run a script, the Extended View of the runtime controller shows the value of all defined variables during script runtime (see [12.1.2 “Runtime Controller, Extended View \(Running a Script\)”](#),  12-4).

**Note:** To run an individual script in Freedom EVOware Plus, open the Script Editor by double-clicking the Pipette command which is associated with the script and click the Run button in the toolbar or choose Run in the Execute menu.

### 14.1.1 Declaring Variables in Scripts



All variables (including pre-defined variables) must be declared (defined) before use.


**Note:** The purpose of declaring a pre-defined variable is to assign an initial value (see [14.1.4 “Pre-Defined Variables”](#),  14-4). In offline mode, scripts may not run as expected if you do not set appropriate initial values for the pre-defined variables.

In Freedom EVOware Plus, you can also declare variables by choosing Declare Variables in the Execute menu (see [6.4.6 “Declare Variables”](#),  6-12).

Variables are declared in pipetting scripts with the following command:

**Tab. 14-1** Declaring variables in a pipetting script




Icon	Command	Description
	Set Variable	The Set Variable command is used to declare a numeric or string variable and assign an initial value to it. You can also prompt the instrument operator for the value. See <a href="#">15.36 “Set Variable Command”</a> ,  15-90.

If you declare a variable within a script, the variable only has a meaningful value within the same script. It is “unknown” to other scripts (i.e. the “scope” of the variable is “script”). In Freedom EVOware Plus, you can also declare variables which are accessible to other scripts and thus allow parameters to be passed from one script to another (see [6.4.6.4 “Scope of a Variable”](#),  6-14).

Variable names can be 1 to 64 characters in length and must not begin with a digit. Variable names are not case-sensitive and numeric variables are treated as floating point numbers, except when used in a Send Command command (see also 14.1.7 “Script Commands That Accept Numeric Variables and Expressions”, 14-12).

The following commands can also declare variables:

**Tab. 14-2** Commands that can declare variables






Icon	Command	Variable and value used during validation
	Balance	This command lets you write the measured weight to a variable.
	Execute Application	Return value = 0
	Send Command	Answer = "" (empty string), error code = 0

The variable name which you want to use is specified in the dialog box for the command. See also 14.1.12 “Validating a Script Which Contains Variables”, 14-18.





### 14.1.2 Script Commands That Write to Variables

The following table lists all commands that write to variables (see also 14.1.4 “Pre-Defined Variables”, 14-4):

**Tab. 14-3** Commands that write to variables

Icon	Command	Description
	Aspirate	If liquid level detection is used, the LiHa pipetting commands automatically write the detected volumes to a set of pre-defined variables. One variable is provided for each tip. The variable names are as follows: DETECTED_VOLUME_1 ... DETECTED_VOLUME_8. The detected volume is reported in µl for each tip. The value is updated by each subsequent LiHa pipetting command which uses liquid level detection. The value -1 is reported if the tip was used with liquid level detection disabled or was not part of the pipetting command.
	Dispense	
	Mix	
	Balance	This command lets you write the measured weight to a variable. The variable name to use is specified in the command.
	Begin Loop	The Begin Loop command automatically writes to the pre-defined variable LOOP_x, where x is the name of the loop. Freedom EVOware sets this variable to the current cycle number for the loop, e.g. to 1 to 12 for a loop with 12 cycles.

Tab. 14-3 Commands that write to variables (cont.)

Icon	Command	Description
	Detect Liquid	The Detect Liquid command writes the detected volumes to a set of pre-defined variables DETECTED_VOLUME_x, where x is the tip number. The detected volume is reported in µl for each tip.
	Execute Application	This command lets you write the return value of the specified application to a variable. The variable name to use is specified in the command.
	PosID	The PosID command automatically writes to the pre-defined counter variable TUBE_CNT, which is incremented each time a tube is successfully scanned.
	Send Command	This command lets you write the response of the specified firmware command to a variable. The returned error code can also be written to a variable. The variable name to use is specified in the command.

### 14.1.3 Querying the Value of a Variable During Script Runtime

The Set Variable command can be used to prompt the operator for the value of a numeric variable during script runtime (see 15.36 “Set Variable Command”, 15-90). To do this, check the *User Query* checkbox when you specify the command and specify the user prompt which should appear on the screen. You can also specify a default value and check that the value which is entered by the operator lies within a specified range.

The following example prompts the operator for a volume and sets the admissible range to 10 to 100 µl. In addition, a default value of 50 µl is suggested:

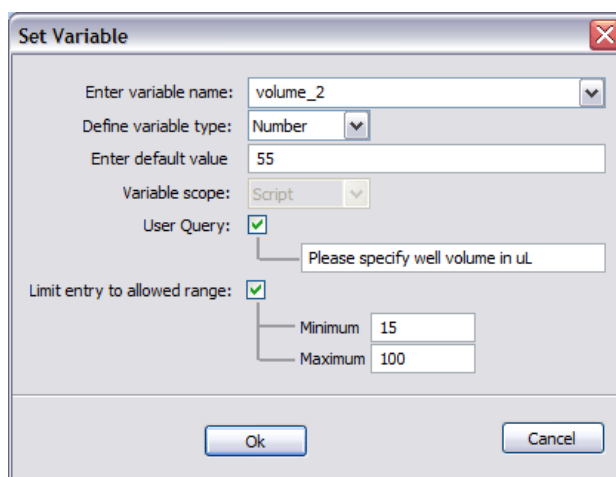


Fig. 14-1 Querying the operator for a value during script runtime

During runtime, the value which is input by the operator is validated and a warning is output if it does not lie within the specified range.

The Set Variable command can also be used to prompt the operator for the value of a string variable (text). To do this, choose *String* in the *Define variable type* pull-down list. String variables can be used to generate file names, barcodes etc.

### 14.1.4 Pre-Defined Variables

Freedom EVOware has a number of pre-defined variables which e.g. provide useful information for use in pipetting scripts and/or allow the same script to be used for different numbers of samples.

**Note:** Even though the variable names are pre-defined, you must still declare them in your script with the Set Variable command before you can use them.

The purpose of declaring a pre-defined variable is to assign an initial value. In offline mode, scripts may not run as expected if you do not set appropriate initial values for the pre-defined variables.

#### Freedom EVOware Plus

Freedom EVOware Plus processes can contain one or more pipetting scripts. In addition, Freedom EVOware Plus allows you to run several copies of the same process in parallel. Each copy of the process is called an instance. Freedom EVOware Plus also allows you to run different processes in parallel.

In Freedom EVOware Plus, the pre-defined variables have the scope “script”. In other words, the current values of the pre-defined variables are not available in other pipetting scripts. See 6.4.6.4 “Scope of a Variable”, 6-14.

If you want to access the current value of a pre-defined variable in another script from the same process or process copy, declare a new variable of scope “instance” and save the value of the pre-defined variable in the new variable using the Set Variable command:

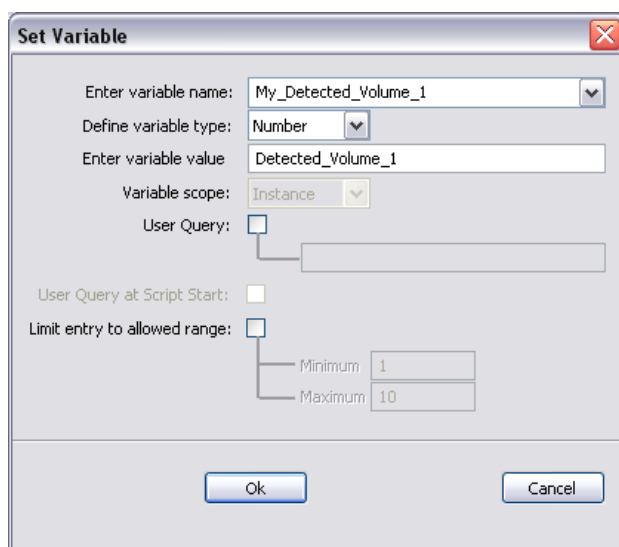


Fig. 14-2 Set Variable command

In the example, the variable My\_Detected\_Volume\_1 was previously declared with scope “instance” using the Declare Variables option in the Execute menu (see 6.4.6 “Declare Variables”, 6-12).

If you want to access the current value of a pre-defined variable in a script from another process or process copy, declare a new variable of scope “run” and save the value of the pre-defined variable in the new variable using the Set Variable command.

#### 14.1.4.1 CURRENT\_USER

This read-only variable contains the name of the currently logged in user.



#### 14.1.4.2 DETECTED\_VOLUME\_x

If liquid level detection is used, the LiHa pipetting commands automatically write the detected volumes to a set of variables. One variable is provided for each tip. The variable names are as follows:

DETECTED\_VOLUME\_1

...

DETECTED\_VOLUME\_8.

The detected volume is reported in  $\mu\text{l}$  for each tip. The value is updated by each subsequent LiHa pipetting command which uses liquid level detection. The value - 1 is reported if the tip was used with liquid level detection disabled or was not part of the pipetting command.

The Detect Liquid command also writes the detected volumes to these variables. In case the EVO is equipped with two LiHas the detected volumes of LiHa2 are stored in separate variables named DETECTED\_VOLUME2\_x.

#### 14.1.4.3 LAST\_BARCODE

This read-only variable contains the barcode which was last read by the Symbol barcode scanner.

#### 14.1.4.4 LAST\_ERROR\_LINE

This read-only variable contains the line number in the pipetting script of the last command which reported an error during script runtime.

#### 14.1.4.5 LAST\_ERROR\_MESSAGE

This read-only variable contains the error message of the last command which reported an error during script runtime (see [18.3 "List of Error Messages"](#), [18-33](#)).

#### 14.1.4.6 LAST\_ERROR\_MESSAGE\_ID

This read-only variable contains the error message ID of the last command which reported an error during script runtime. The error message ID which is returned by this variable is a numeric value which is calculated as follows from the error message ID string (see [18.3 "List of Error Messages"](#), [18-33](#)):

- Ignore all characters except the last seven
- Ignore underscore character
- Ignore the leading zero (if any)

Example:

- Error message ID string: EVO\_EVO\_016\_024
- Error message ID: 16024

#### 14.1.4.7 LIHA\_MOVE\_HEIGHT

This variable lets you specify the Z-Travel height for the Move LiHa command (the tip height which is used during the arm movement). The Z-Travel height you specify with this variable only applies to the tips you select in the Move LiHa command. The Z-Position of the unselected tips remains unchanged.

This variable only takes effect if you choose *Positioning with variable Z-Travel* in the Move LiHa command.

A positive value for LIHA\_MOVE\_HEIGHT means that the tips will be lower during the arm movement. A value of 0 is the highest position (tips fully retracted during the arm movement).

An example application of this feature is for pipetting instruments which have vacuum lines to the tips for the removal of liquids.

In case the EVO is equipped with two LiHas for the LiHa2 there is no separate variable defined. Both LiHas will use the same variable.

#### **14.1.4.8 LOOP\_x**

The Begin Loop command automatically writes to the variable LOOP\_x, where x is the name of the loop. Freedom EVOware sets this variable to the current cycle number for the loop, e.g. to 1 to 12 for a loop with 12 cycles.

#### **14.1.4.9 MCA\_MOVE\_HEIGHT**

This variable lets you specify the Z-Travel height for the MCA96 Move command (the height which is used during the arm movement). This variable only takes effect if you choose Positioning with variable Z-Travel in the MCA96 Move command. A value of 0 is the highest position (tips fully retracted during the arm movement).

#### **14.1.4.10 PROCESS\_ITERATION**

To achieve the maximum throughput (efficiency) of the pipetting instrument, for example the maximum number of processed microplates per hour, Freedom EVOware Plus allows you to run several copies (instances) of the same process in parallel. The number of process copies you want to run is chosen in the Runtime Controller when you run the process.

This read-only variable contains the number of the process which is running the current pipetting script. You can use it e.g. to pipette to a different well column depending on the process copy. Process copies are counted starting with 1. The process number is also shown in the log files. This variable is not relevant for Freedom EVOware Standard.

#### **14.1.4.11 PROCESS\_NAME**

This read-only variable contains the name of the process which is running the current pipetting script (as shown in the title bar of the Process Editor). You can use it e.g. in the User Prompt command. This variable is not relevant for Freedom EVOware Standard.

#### **14.1.4.12 PROCESS\_NODE**

This read-only variable contains the name of the process step which is running the current pipetting script (as shown in the process icon in the Process Editor). You can use it e.g. in the User Prompt command. This variable is not relevant for Freedom EVOware Standard.

#### **14.1.4.13 RACK\_OFFSET**

This variable lets you modify the labware selection for the basic commands Aspirate, Dispense, Mix and Move LIHA. If e.g. RACK\_OFFSET equals 1, Freedom EVOware searches for the next labware of the same type on the worktable. The search direction is from rear to front of the worktable and then from left to right. Negative values in RACK\_OFFSET cause Freedom EVOware to search in the opposite direction.

Set RACK\_OFFSET to 0 to deactivate the offset.

#### 14.1.4.14 RACK\_VOLUME\_x

The Te-MO, the MCA96 and the MCA384 do not support liquid level detection. If you want to use a liquid class for these pipetting arms which specifies liquid level detection, the liquid level must be emulated. To do this, specify the well volume (well capacity) of the labware you are using by assigning a value to this variable. Replace the X in the variable name with the labware label (labware name), e.g. use RACK\_VOLUME\_SOURCE if you named the labware SOURCE. For mechanical reasons, the same volume is pipetted by all of the tips.

Instead of setting this parameter to the well volume (well capacity), you can use the LiHa command Detect Liquid before you aspirate with the Te-MO, MCA96 or MCA384 to detect the actual liquid level in one of the wells. Then copy the value reported in the DETECTED\_VOLUME\_x variable to the RACK\_VOLUME\_x variable (see [14.1.4.2 “DETECTED\\_VOLUME\\_x”](#), ¶ 14-5).

Liquid level detection can be used e.g. to ensure minimal tip contamination by limiting the tip immersion depth. The Te-MO and MCA96 only use the emulated liquid level detection for aspiration. The MCA384 uses it for dispensing, too. The value of the RACK\_VOLUME\_x variable is not updated by subsequent pipetting commands, even if they affect the volume of liquid in the wells.

#### 14.1.4.15 REPLACE\_DITI\_GRID

If you are using DITIs, Freedom EVOware provides special facilities to ensure that sufficient DITIs are present on the worktable for your script or process and to automatically fetch new DITI racks as and when needed.

For each Get DITI command in your pipetting script, Freedom EVOware automatically sets the two variables REPLACE\_DITI\_GRID and REPLACE\_DITI\_SITE to the correct grid and site for the selected DITI type before executing the command.

If your script includes an Activate DITI Handling command and all of the DITIs in the rack have been used, Freedom EVOware calls the DITI replacement script which is specified in the command. The replacement script is normally implemented using one or more Transfer Labware commands

The worktable location of the DITI rack which needs replacing is specified in the replacement script with the variables REPLACE\_DITI\_GRID and REPLACE\_DITI\_SITE.

These two variables are only used by the automatic DITI handling feature in Freedom EVOware Standard. Freedom EVOware Plus uses a different concept for automatic DITI handling.

See [17.1 “Using the Automatic DITI Handling feature”](#), ¶ 17-1) for more information.

#### 14.1.4.16 REPLACE\_DITI\_POSTEXCHANGE

By using this pre-defined variable, the disposal of the tray can be postponed to the next DiTi pickup with the LiHa (see [15.58 “Pick Up Labware command”](#), ¶ 15-126).

#### 14.1.4.17 REPLACE\_DITI\_SITE

If you are using DITIs, Freedom EVOware provides special facilities to ensure that sufficient DITIs are present on the worktable for your script or process and to automatically fetch new DITI racks as and when needed.

For each Get DITI command in your pipetting script, Freedom EVOware automatically sets the two variables REPLACE\_DITI\_GRID and REPLACE\_DITI\_SITE to the correct grid and site for the selected DITI type before executing the command.

If your script includes an Activate DITI Handling command and all of the DITIs in the rack have been used, Freedom EVOware calls the DITI replacement script which is specified in the command. The replacement script is normally implemented using one or more Transfer Labware commands

The worktable location of the DITI rack which needs replacing is specified in the replacement script with the variables REPLACE\_DITI\_GRID and REPLACE\_DITI\_SITE.

These two variables are only used by the automatic DITI handling feature in Freedom EVOware Standard. Freedom EVOware Plus uses a different concept for automatic DITI handling.

See 17.1 “Using the Automatic DITI Handling feature”, ( 17-1) for more information.

#### 14.1.4.18 SAMPLE\_CNT

If you want to write a script which allows a different number of samples in each run, you would normally need to modify the script each time you use it. The SAMPLE\_CNT counter variable allows you to write a script for the maximum number of samples which you expect and to limit the script during runtime according to the actual number of samples. SAMPLE\_CNT is intended for use in loops in combination with basic pipetting commands such as Aspirate, Dispense, Mix, Get DITIs and Drop DITIs.

This feature is activated by assigning a positive value to SAMPLE\_CNT.

If SAMPLE\_CNT is set to a value which is greater than or equal to 0, Freedom EVOware keeps a count of how many different tips are used in each cycle of the following loop(s). The loop is then terminated the next time **End Loop** is executed when the number of tips used reaches SAMPLE\_CNT. If SAMPLE\_CNT is not a multiple of the number of tips used in one cycle of the loop(s), Freedom EVOware modifies the tip selection in the final cycle of the loop.

The following figure shows an example of using the SAMPLE\_CNT variable:

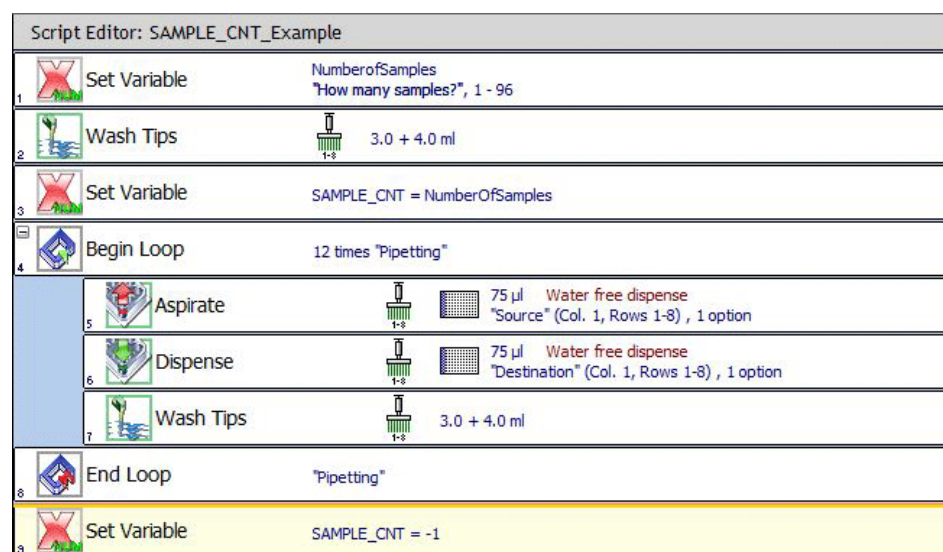


Fig. 14-3 Using the SAMPLE\_CNT variable

The above example script copies 75 µl from the source labware to the destination labware. The loop is programmed for a maximum of 96 samples or wells. If SAMPLE\_CNT is set to 13, the script is executed as follows:

- ◆ Wash tips 1-8,
- ◆ Aspirate with tips 1-8 from column 1 of the source labware,
- ◆ Dispense with tips 1-8 into column 1 of the destination labware,
- ◆ Wash tips 1-8,
- ◆ Aspirate with tips 1-5 from column 1 of the source labware,
- ◆ Dispense with tips 1-5 into column 1 of the destination labware,
- ◆ Wash tips 1-8.

When you are finished using SAMPLE\_CNT always remember to disable this feature again by setting SAMPLE\_CNT to -1.

You can prompt the operator for the value of SAMPLE\_CNT during script runtime with the Set Variable command (see [15.36 “Set Variable Command”](#), ¶ 15-90).

Be aware that the SAMPLE\_CNT variable is only counted down when the "End Loop" command is reached. Even if you have several pipetting commands for each tip in the loop this does only count as one sample as SAMPLE\_CNT tracks only the tips in use but not the pipetting steps!

#### 14.1.4.19 TIP\_MASK

This variable lets you modify the tip selection for the pipetting commands Aspirate, Dispense, Mix, Wash Tips, Periodic Wash, Get DiTis, Drop DiTis, Pick Up DiTis, Set DiTis Back, Detect Liquid, Activate/Deactivate PMP, and Move LiHa. The tip selection is specified as a numeric, bit-coded value (tip1 = 1, tip2 = 2, tip3 = 4, tip4 = 8, tip5 = 16, tip6 = 32, tip7 = 64, tip8 = 128). The tip selection assigned with this variable masks the tip selection specified in the pipetting command (bit-wise AND of the tip selection in the pipetting command and the current TIP\_MASK value). Thus, only tips selected in both masks will be used for pipetting.

Set TIP\_MASK to -1 to deactivate the mask. Freedom EVOware then uses the tip mask which is specified in the pipetting command.

When there are gaps between the tips then there are two modes that can be switched with the parameter CondensedPipetingModeOff in evoware.opt (see [A.3 “Parameters in the Evoware.opt file”](#), ¶ A-15). The default behavior is that during pipetting the gaps will be retained (e.g., you have DiTis on tips 1,3,6, and 8 then it will be pipetted from/to wells 1,3,6, and 8). On the other hand, in condensed mode the gaps will be filled (e.g., you have DiTis on tips 1,3,6, and 8 then it will be pipetted from/to wells 1,2,3, and 4).

In case the EVO is equipped with two LiHas for the LiHa2 there is no separate variable defined. Both LiHas will use the same variable.

#### 14.1.4.20 TIP\_OFFSET

This variable lets you modify the tip selection for the pipetting commands Aspirate, Dispense, Mix and Move LIHA. A positive value increments the tip number(s) which are specified in the pipetting command. For example, if the pipetting command specifies tips 2 and 3 and you set this variable to 1, tips 3 and 4 will be used instead. Negative values of TIP\_OFFSET shift the tip selection in the opposite direction.

Set TIP\_OFFSET to 0 to deactivate the offset. Freedom EVOware then uses the tip selection which is specified in the pipetting command.

In case the EVO is equipped with two LiHas for the LiHa2 there is no separate variable defined. Both LiHas will use the same variable.

#### **14.1.4.21 TIP\_VOLUME\_x**

Liquid level detection can be used e.g. to ensure minimal tip contamination by limiting the tip immersion depth. Liquid level detection is activated with the Aspirate and/or Dispense parameters of the liquid class you are using.

This variable, which only applies to pipetting with the LiHa, can be used to bypass or override the automatic liquid level detection for special applications. For example, you can write a script for pipetting with a variable tip immersion depth.

To bypass automatic liquid level detection, specify the volume of liquid in one of the wells by assigning a non-zero value to this variable. Replace the X in the variable name with the tip number, e.g. use TIP\_VOLUME\_2 for tip 2. The setting you make only applies to the next pipetting operation (aspirate, dispense or mix) and is reset to zero again after this. If necessary, you can specify a value for this variable several times in your script. Tip: You can use the Detect Liquid command before you pipette to detect the actual liquid level in the wells (see [14.1.4.2 “DETECTED\\_VOLUME\\_x”, 14-5](#)).

In case the EVO is equipped with two LiHas for the LiHa2 separate variables are used named TIP\_VOLUME2\_x.

#### **14.1.4.22 TUBE\_CNT**

After executing a PosID command, Freedom EVOware writes the number of tubes scanned in the script so far to TUBE\_CNT.

#### **14.1.4.23 WELL\_OFFSET**













This variable lets you modify the well selection for the pipetting commands Aspirate, Dispense, Mix and Move LIHA. Freedom EVOware shifts the well selection in the labware by the number of wells defined in WELL\_OFFSET. If e.g. A1 to H1 of a microplate have been selected in the script and WELL\_OFFSET is set to 8, Freedom EVOware will pipette in A2 to H2. When applying the offset, Freedom EVOware shifts from rear to front and then from left to right. Negative values of WELL\_OFFSET shift the well selection in the opposite direction.

Set WELL\_OFFSET to 0 to deactivate the offset. Freedom EVOware then uses the well selection which is specified in the pipetting command.


### **14.1.5 Script Commands That Accept String Variables**

The following table lists all commands that accept string variables:

**Tab. 14-4** *Commands that accept string variables*

Icon	Command	Parameter name(s)
	Balance	<b>Store weight in variable</b>
	Condition	<b>If variable</b>
	Execute Application	<b>Path &amp; Name &amp; Command line</b>
	Execute VB Script	<b>Path &amp; Name</b>
	Notification	<b>Receiver Group, Subject and Message</b>
	Send Command	<b>Command</b>
	Set Variable	<b>Value</b>
	Start Script	<b>Script.gem</b>
	Sub-Routine	<b>Path &amp; Name</b>
	User Prompt	<b>Text</b>
	Worklist	<b>Worklist (Path and Name)</b>
	Worklist Import	<b>Import Worklist and Generated Freedom EVOware Worklist</b>

### 14.1.6 Mathematical Expressions

In addition to using variables and constants, certain script commands also allow you to specify a mathematical expression (see [14.1.7 “Script Commands That Accept Numeric Variables and Expressions”](#),  14-12).

An expression is constructed from floating point numbers, variables and operators. The following operators are available:

**Tab. 14-5** *Expressions that can be used with variables*

Operator	Function
+	addition
-	subtraction



**Tab. 14-5** Expressions that can be used with variables (cont.)

Operator	Function
*	multiplication
/	division
%	modulo division (division remainder)
( )	parenthesis, used to specify the evaluation order

Examples of valid expressions:

`volume`

`volume + 10.5`

`volume * 2`

`volume + (samples * 2)`

`3 + 4 * 5`

Spaces in expressions are ignored. Multiplication and division have precedence over addition and subtraction.

Modulo division returns the remainder of a division as an integer.

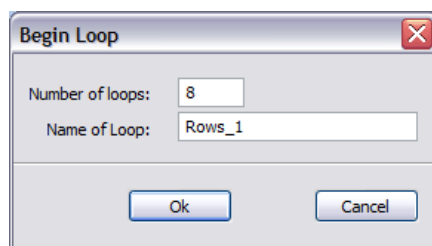
Examples: `13 % 8 = 5`, `49 % 8 = 1`

If e.g. the number of samples in a pipetting operation is not an exact multiple of the number of tips you are using, modulo division can be used to calculate how many samples you need to pipette in the last cycle of a pipetting loop. Take care when using modulo division if one or both of the arguments are negative values. We recommend you to write a small test script to learn how modulo division works in this case.

Numeric variables and expressions can also be converted to strings (see [14.1.8 “Converting Numeric Variables and Expressions to Strings”](#), ¶ 14-14).

### 14.1.7 Script Commands That Accept Numeric Variables and Expressions

Some commands accept numeric variables and expressions instead of integers or floating point values, for example:






















**Fig. 14-4** Using an expression in a command

The following table lists all commands that accept numeric variables and expressions.



**Tab. 14-6** *Commands that accept numeric variables and expressions*

<b>Icon</b>	<b>Command</b>	<b>Parameter name(s)</b>
	Aspirate	<b>Volume</b> or <b>Individual Volumes</b>
	Begin Loop	<b>Number of loops</b>
	Condition	Both sides of the comparison operator
	Dispense	<b>Volume</b> or <b>Individual Volumes</b>
	Import Variable	Line number in <b>Read specified line</b> Column number in <b>Start in specified column</b>
	Mix	<b>Volume</b> or <b>Individual Volumes</b>
	Periodic Wash	<b>Period</b>
	PnP Vector	<b>Grid, Site</b> and <b>Position in labware</b>
	RoMa Vector	<b>Grid</b> and <b>Site</b>
	Set DITI Position	<b>Grid, Site</b> and <b>Position in labware</b>
	Set Variable	<b>Value</b>
	Start Timer	<b>Timer</b>
	Te-MO Relative Movements	<b>Offset</b>
	Te-MO Aspirate	<b>Volume</b>
	Te-MO Dispense	<b>Volume</b>
	Te-MO Mix	<b>Volume</b>
	Tip Alignment Check	<b>Sensorplate position, Script aborts if...</b> and <b>Correct pipetting position if...</b>
	Wait for Timer	<b>Timer</b> and <b>Time span</b>
	Wash Tips	<b>Volume in Waste</b> and <b>Volume in Cleaner</b>

Some of the above parameters (e.g. *Timer*, *Grid* and *Site*) expect integer values. Floating point values are also accepted and do not cause an error, but they will be rounded before being used. In such cases, it is recommended to use integer calculations to avoid unexpected results.

### 14.1.8 Converting Numeric Variables and Expressions to Strings

Some script commands (e.g. User Prompt) allow you to specify a numeric or string variable or a mathematical expression instead of a string, e.g. for displaying the value of the variable during runtime (see 14.1.10 “Script Commands That Accept Variables and Expressions Converted to a String”, 14-16).

The expression or variable is enclosed within tilde characters “~”. Freedom EVOware then replaces the expression with the value of the expression during runtime.

The following shows an example script and the user prompt during script runtime:

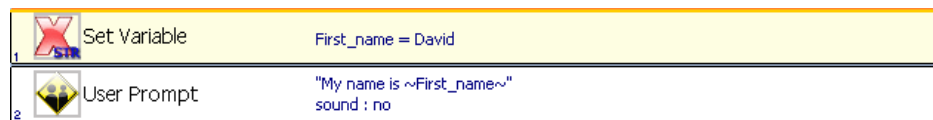


Fig. 14-5 Freedom EVOware script with user prompt

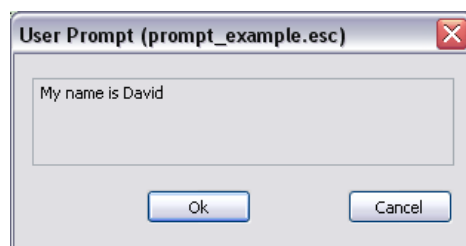


Fig. 14-6 User Prompt during script runtime

See 15.36 “Set Variable Command”, 15-90.

This example has a mathematical expression in the User Prompt command:

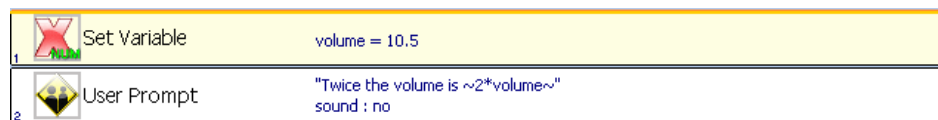


Fig. 14-7 Freedom EVOware script with user prompt

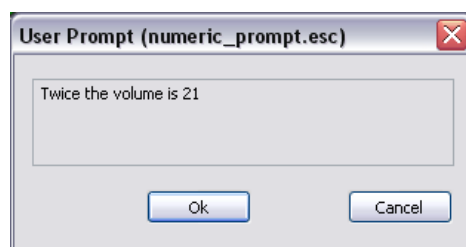


Fig. 14-8 User prompt during script runtime

The next example passes a variable to an external application as a command line parameter:

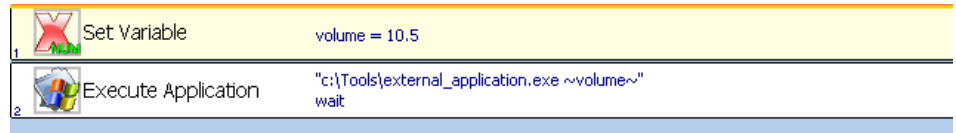


Fig. 14-9 Passing a variable to an external application

The following example shows how to use string variables and numerical variables to generate a worklist file name:

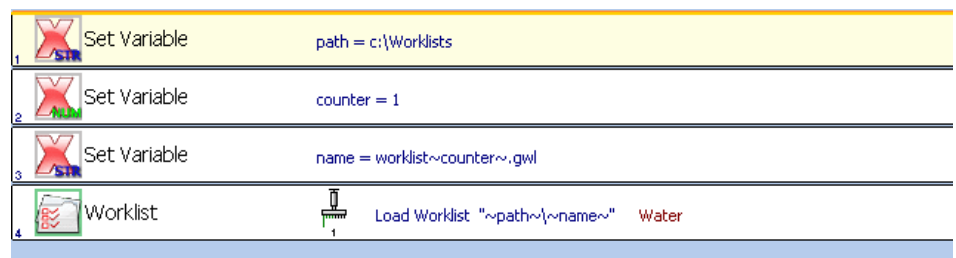


Fig. 14-10 Using string variables to generate worklist file names

In line 3, the numeric variable counter is converted to a string by enclosing it within tilde characters "~". The string variable name is then assigned the value "worklist1".

In line 4, the Worklist command expects a string variable. The string variables path and name must be enclosed within tilde characters, since otherwise they would be interpreted literally.

### 14.1.9 Array Variables

An array of variables can be declared with the Set Variable command by appending a counter variable to the variable name and enclosing the counter variable within brackets [] and tilde characters "~". Freedom EVOware then replaces the counter variable name with the value of the counter during runtime. In the following example script, which creates an array of 8 variables TipVolume[1], TipVolume[2] etc., tilde characters "~" have been used in the user prompt, too:

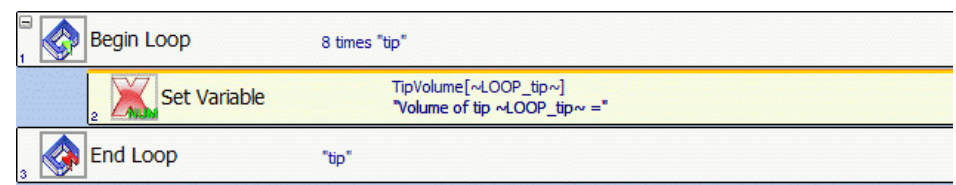


Fig. 14-11 Array of variables

The parameters of the Set Variable command are as follows:

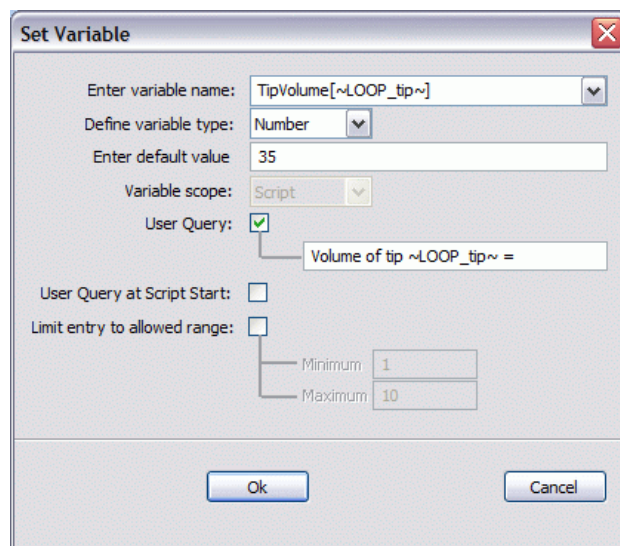


Fig. 14-12 Array of variables - Set Variable command

The user prompt at runtime is as follows:

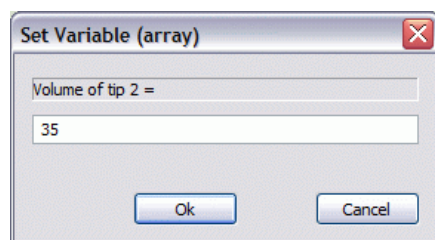


Fig. 14-13 Array of variables - User prompt during script runtime

#### 14.1.10 Script Commands That Accept Variables and Expressions Converted to a String

The following table lists the commands that accept variables and expressions converted to a string (i.e. plain text):

Tab. 14-7 Commands that accept variables and expressions converted to a string

Icon	Command	Parameter name(s)
	Execute Application	<b>Path &amp; Name &amp; Command line</b>
	Send Command	<b>Command</b> (the expression is converted to an integer value before converting it to a string)
	Set Variable	<b>Query</b> ( <b>Value</b> and <b>Default</b> are also accepted if you declare a string variable)
	User Prompt	<b>Text</b>

### 14.1.11 Labware Attributes and String Variables

The Set Variable command allows you to read from and write to the labware attribute “ID” from within pipetting scripts during script runtime. Freedom EVOware uses the attribute “ID” to store the labware barcode. You can use this feature to access scanned barcodes from within pipetting scripts.

You cannot read from or write to carrier attributes or other labware attributes in this way.

This feature is available for both Freedom EVOware Standard and Freedom EVOware Plus and is mainly intended for advanced applications. Take care when modifying labware attributes.

In Freedom EVOware Plus, labware attributes are automatically assigned to string variables, so it is not necessary to use the Set Variable command in this case (see [14.1.11.1 “Labware Attributes and String Variables in Freedom EVOware Plus”](#), [14-18](#)).

Each of the attributes is associated with a script variable using the following syntax:

```
$<labware_label>[index].<internal name of attribute>$
```

[index] is the well number (for microplates) or tube number (for tube racks).

If you omit [index], then the string returns the labware or tube rack barcode instead of the well or tube barcode.

For example:

```
$MyTubeRack2[5].ID$ - barcode of tube 5 in tube rack “MyTubeRack2”
```

```
$MyTubeRack1.ID$ - barcode for the tube rack “MyTubeRack1”
```

See [11.7.1 “Assigning a Label \(Name\) to the Labware”](#), [11-18](#).

An alternative syntax is as follows:

```
$<carrier_type>[site_global][index].<internal name of attribute>$
```

[site\_global] is the site number counted for all sites for this labware type on the worktable, counted from rear to front and then from left to right. It is not the same as the site number on the carrier. For example, if there are two 3-position MP carriers on the worktable at grid position 10 and 20, [site\_global] = 4 for this carrier type refers to site 1 of the carrier at grid position 20.

[index] is the well number (for microplates) or tube number (for tube racks).

If you omit [index], then the string returns the labware or tube rack barcode instead of the well or tube barcode. You must not omit [site\_global].

For example:

```
$Tube 16 mm 16 Pos[2][3].ID$ - barcode of tube 3, second tube rack on the worktable (tube racks only have one site)
```

```
$MP 3Pos[4].ID$ - barcode of the labware at site 1 of the second MP carrier on the worktable
```

```
$MP 3Pos[3][18].ID$ - barcode of well 18 on the labware at site 3 of the first MP carrier on the worktable
```

Microplate wells do not normally have barcode labels. Nonetheless, the internal database of Freedom EVOware provides a barcode attribute field for microplate wells, too. This can be used for special applications, e.g. sample tracking.

#### Script example

The following example assumes that there is only one MP carrier on the worktable.

The label of the labware on site 1 is Labware4.

The label of the labware on site 2 is Labware5.

1		Set Variable	<code>\$Labware4.ID\$ = 567</code>
2		Set Variable	<code>\$Labware5[3].ID\$ = d123</code>
3		Set Variable	<code>BC1 = \$Labware4.ID\$</code>
4		User Prompt	"Barcode is ~BC1~" sound : no
5		Set Variable	<code>BC2 = \$MP 3Pos[2][3].ID\$</code>
6		User Prompt	"Barcode is ~BC2~" sound : no

**Fig. 14-14** Example script

Line 1 sets the labware barcode of site 1 to “567”.

Line 2 sets the well barcode of site 2, well 3 to “d123”.

Line 3 copies the labware barcode of site 1 to string variable BC1.

Line 4 displays the string BC1 (= “567”) on the screen.

Line 5 copies the well barcode of site 2, well 3 to string variable BC2.

Line 6 displays the string BC2 (= “d123”) on the screen.

**Note:** Normally, the barcode attribute is set by a barcode scanning operation such as the `PosID` command, and not by assigning a value as in script line 1. The above script solely serves to demonstrate the features which are available.

#### 14.1.11.1 Labware Attributes and String Variables in Freedom EVOware Plus

Freedom EVOware Plus allows you to read from and write to labware attributes from within pipetting scripts during script runtime. You cannot read from or write to carrier attributes in this way.

Each of the attributes is automatically associated with a script variable using the following syntax:

`<labware_label>.<internal name of attribute>`

For example:

`MyPlate1.Grip_Narrow`

`MyPlate2.ID`

You can use this feature e.g. to access scanned barcodes from within pipetting scripts. This feature is mainly intended for advanced applications. Take care when modifying labware attributes. See also [11.7.1 “Assigning a Label \(Name\) to the Labware”](#), [11-18](#).





The Attributes dialog box for the Edit Labware dialog box normally shows descriptive names for the attributes. Check the *Show internal names* checkbox to see the internal names which are used.


#### 14.1.12 Validating a Script Which Contains Variables

Each time you insert a new command in your script or edit an existing command, Freedom EVOware validates the entire script to check for errors and shows all commands which have errors in red. When validating the script, Freedom EVOware uses default values for variables which are set during run-time, e.g. from operator prompts or return codes.

The following table lists the default values which are used during validation for commands which can declare variables:

**Tab. 14-8** *Commands with default values for variables for use during script validation*

Icon	Command	Variable and value used during validation
	Balance	Store weight in variable = 0
	Execute Application	Return value = 0
 0100101	Send Command	Response = "" (empty string), Error code = 0
	Set Variable	Variable = specified default value or default string

Choose Auto-Validation in the Edit menu if you want to switch off automatic validation of pipetting scripts (see [6.2.5 "Auto-Validation"](#),  6-9). You then need to validate the script manually (by choosing Validate Script in the Edit menu).

If your script contains conditional jumps or branches, validation only checks those parts of the script which are executed with the default values of the IF variables in Condition commands. For this reason, it is not recommended to declare variables (e.g. with the Set Variable command) within conditional parts of the script.

## 14.2 Conditions

See [15.39 "Condition Command"](#),  15-99.

## 14.3 Sub-routines

Sub-routines are Freedom EVOware scripts (\*.esc files) which can be used as parts of another script. They allow you to structure and shorten complex scripts and to build libraries of pipetting procedures (e.g. serial dilutions) which you want to use repeatedly.

The differences between separate scripts and sub-routines are:

- ♦ sub-routines use the same worktable as the main script.
- ♦ sub-routines can share variables and timers with the main script.
- ♦ sub-routines can execute a worklist which is loaded by the main script.

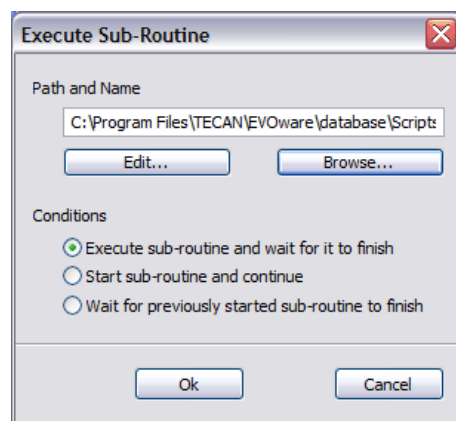
Loop names and line markers for conditions are not shared between sub-routines and the main script.

### 14.3.1 Creating a Sub-Routine

To create a sub-routine, simply write a Freedom EVOware script and then store it. You must use the same worktable layout as in the main script.

### 14.3.2 Sub-Routine Command

The Sub-Routine command executes another script as part of the current script.



*Fig. 14-15 Sub-Routine command*

The parameters of the Sub-Routine command are as follows:

#### **Path & Name**

This edit field shows the filename and location of the Freedom EVOWare script you want to use as a sub-routine.

**Edit:** Click this button if you want to open the specified sub-routine in a new window for editing and/or checking.

**Browse:** Click this button to look for existing Freedom EVOWare scripts and to choose the one you want to use as a sub-routine.

#### **Execute sub-routine and wait for it to finish**

This option causes the main Freedom EVOWare script to wait for the sub-routine to finish before continuing.


#### **Start sub-routine and continue**

With this option, the main pipetting script continues without waiting for the sub-routine to finish (“asynchronous” sub-routine, i.e. asynchronous processing of the main script and the sub-routine). To allow asynchronous processing, the sub-routine must only contain the following commands:

- ◆ LiHa Commands
  - Aspirate
  - Dispense
  - Mix
  - Wash Tips
  - Periodic Wash
  - Activate DITI Handling
  - Get DITIs
  - Drop DITIs
  - Set DITI Position
  - Pick Up DITIs
  - Set DITIs Back
  - Pickup ZipTip
  - Detect Liquid
  - Tip Alignment Check



- Move LiHa
- Waste
- Active WashStation
- Worklist
- Export Data
- Manual Tip Alignment
- ◆ Programming Commands
  - Start Timer
  - Wait for Timer
  - Execute Application
  - Comment
  - User Prompt
  - BeginLoop
  - EndLoop
  - Set Variable
  - ImportVariable
  - ExportVariable
  - Condition
  - If-Then
  - Else
  - End-If
  - Group or Wizard
  - GroupEnd or WizardEnd
  - Sub-routine
  - Execute VB Script
  - On Error Go To
  - Resume
  - End Script
  - Send Command
- ◆ Commands for the Plate and Tube Robot
  - Move ROMA
  - ROMA Vector
  - Transfer Labware
  - Move PnP
  - PnP Vector
  - Transfer Tube
- ◆ MCA96 Commands
  - Aspirate
  - Dispense
  - Mix
  - Wash
  - Get DITIs
  - Drop DITIs
  - Get Tip Block
  - Drop Tip Block
  - Move
  - Vector
  - Relative Movements
  - Transfer Labware

- ◆ MCA384 Commands
  - Aspirate
  - Dispense
  - Mix
  - Wash
  - Get Head Adapter
  - Drop Head Adapter
  - Get DITIs
  - Drop DITIs
  - Get Tip Block
  - Drop Tip Block
  - Move
  - Transfer Labware
  - Vector
  - Dock CGM
  - Undock CGM
- ◆ Te-MO Commands
  - Aspirate
  - Dispense
  - Mix
  - Wash
  - Wash 384 Tip Head
  - Get DITIs
  - Drop DITIs
  - Get Tip Block
  - Drop Tip Block
  - Refill Trough
  - Relative Movements
  - Load the Te-MO
  - Fill System (384 tip head)
- ◆ All device commands (see [13.2 “Overview of Device Commands”](#),  13-8)

**Wait for previously started sub-routine to finish**

This option causes the main Freedom EVOware script to wait for the specified, previously started sub-routine to finish before continuing.

**Note:** You can also start a sub-routine from within another sub-routine by including a Sub-Routine command within the sub-routine.

**Note:** When using asynchronous sub-routines please be aware that in case of an error the system is not halted immediately. If the error happened in the main script then the system is only halted when the sub-routine has finished. If the error happened in the sub-routine then the run is only halted when the main script has finished. Therefore, you should always include a "Wait for previously started sub-routine to finish" command in your script.

### 14.3.3 Exchanging Data With Sub-Routines

Variables are shared between the main script and the sub-routine and can be used to exchange data. To feed in data into the sub-routine, set a variable in the main script and use the same variable in the sub-routine (e.g. for volumes or

loops). To get data back from a sub-routine (e.g. error codes), write the data to a variable in the sub-routine and use the same variable in the main script.

**14.3.4 Validating a Script Which Contains Sub-Routines**

Each time you insert a new command in your script or edit an existing command, Freedom EVOware validates the entire script to check for errors and shows all commands which have errors in red. If a problem is detected in a sub-routine, Freedom EVOware shows the Sub-Routine command in the main script in red. To correct the error, you have to open and correct the sub-routine script manually.

**14.3.5 Log file for a Script Which Contains Sub-Routines**

Freedom EVOware reports the currently executed script line in the log window and in the log file. A typical line in the log file is as follows:

E 11:55:42 Line 1 : Aspirate

When Freedom EVOware executes a sub-routine, it displays the line number in the main script and the line number in the sub-routine, separated by a slash /. A typical line then looks like this (line 2 of the main script, line 1 of the sub-routine, Aspirate command):

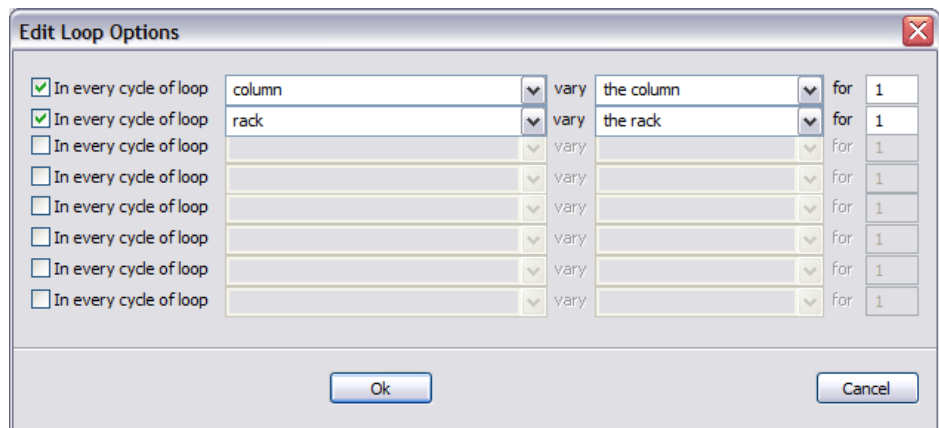
E 11:55:42 Line 2/1 : Aspirate

If you are using sub-routines nested inside of other sub-routines, the log file shows the line numbers of all levels, separated by slashes.

**14.4 Loop Options**

Many of the standard pipetting commands allow you to specify loop options, which let you use a different column, row, well and/or labware for each loop cycle if you are using the command in a script loop.

In the dialog box for the command, click Loop Options to view, define or modify the loop options:



*Fig. 14-16 Loop Options dialog box*

The fields of the Loop Options dialog box are as follows:

**In every cycle of loop ...**

Choose the name of the loop to which the loop options refer. The popup list only shows the loops which are relevant for the script line where you have inserted the pipetting command. Note: Loop names are defined in your script with the Begin Loop command.

**Vary, for**

Specify how to modify the current well selection in each cycle of the loop. Choose column, row, well or labware from the *vary* popup list and specify the increment in the *for* field. A positive value in the *for* field increases the chosen parameter (e.g. use the next column) and a negative value decreases it. Freedom EVOware interprets a positive value in the *for* field as follows:

Column	Left to right
Row	Rear to front
Well	Rear to front, then left to right
Labware	Rear to front on same carrier, then the next carrier to the right

For standard 96-well microplates with 8 wells per column, “In every cycle of loop 'loop1', vary the well for +8” has the same effect as “In every cycle of loop 'loop1', vary the column for +1”.

**Add option**

Click this button to add the current loop settings to the list of defined loop options.

**Defined loop options**

This shows you all of the currently defined loop options for the pipetting command.

**Delete option**

Click this button to delete the currently selected loop option from the list.

## 15 Script Commands

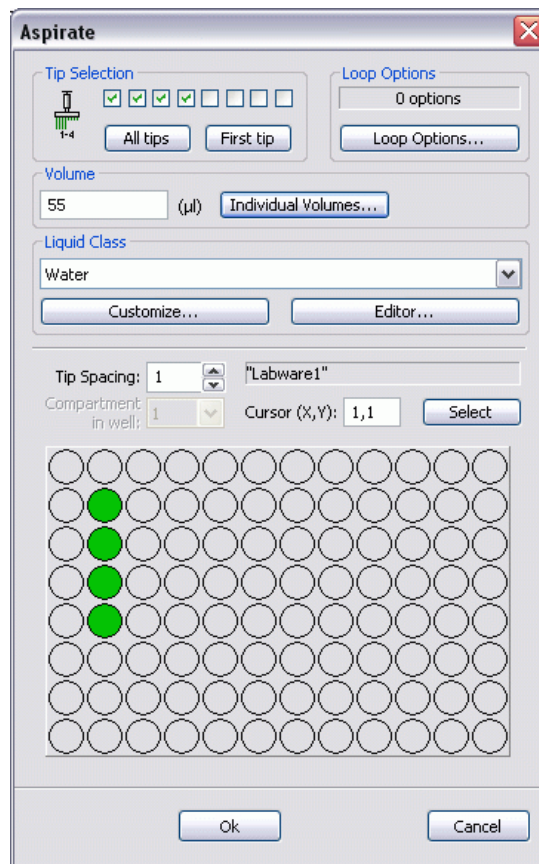
This chapter contains detailed descriptions of the Freedom EVOware script commands.

In Freedom EVOware Plus, when the Script Editor is open the Commands tab of the Control Bar only shows script commands (commands which are used for writing pipetting scripts, see [13.1 “Overview of Script Commands”](#), [13-1](#)). When the Process Editor is open, the Commands tab of the Control Bar only shows device commands (commands for the optional devices, see [13.2 “Overview of Device Commands”](#), [13-8](#)).

In Freedom EVOware Standard, the Control Bar always shows both command types (it does not have a Process Editor).

### 15.1 Aspirate Command

The Aspirate command is used to pick up liquid from specified positions on the worktable.




**Fig. 15-1** Aspirate command

The parameters of the Aspirate command are as follows:

### Tip Selection


Select the tips you want to use.

### Loop options

If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different column, row, well and/or labware item for each cycle of the loop. You can choose different loop options for the source and the destination. The gray (protected) field shows the number of loop options you have chosen. See [14.4 “Loop Options”](#),  [14-23](#).

### Liquid Classes

Choose the required liquid class from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument. For example, you will not see liquid classes for DiTis if the LiHa is not currently configured with DiTis.

Click the *Editor* button to start the liquid classes editor if you want to create a new class or modify an existing class (see [10 “Configuring Liquid Classes”](#),  [10-1](#)). Furthermore you can customize an existing liquid class for use by this command only (click the *Customize* button). If you customize an existing liquid class, the liquid class name is shown in the script command and in the script editor within double angled brackets “>> name <<”.

**Note:** *Instead of customizing a liquid class which is only used by a single instance of this command, it is better practice to create a custom liquid class with the liquid class editor which can then be used by any command and any script.*

### Volume

Specify the volume that you want to aspirate. Click *Individual Volumes* if you want to select a different volume for each tip. The maximum allowed volume is the dilutor or DIT1 capacity (Freedom EVOware does not automatically handle volumes that exceed the dilutor or DIT1 capacity).

### Tip Spacing

The Tip Spacing parameter controls the distance between adjacent pipetting tips for this command. Tip spacing is only relevant if you want to use more than one tip. A tip spacing of 1 means that the tips will be spread to match the distance between adjacent wells of the labware. A tip spacing of 2 will select every other well of the labware. You can only choose values for tip spacing which are meaningful for the labware geometry.

The liquid handling arm achieves the highest mechanical accuracy when the tips are not spread. For high-density labware such as 1536-well microplates, you should choose tip spacing such that the tips are adjacent to one another (physical tip spacing 9 mm). Accordingly, for 1536-well microplates you should set tip spacing to 4 (every fourth well).

### Compartment in well

Some special labware types (e.g. for protein crystallography) have wells with several compartments (cavities). Freedom EVOware can pipette a different liquid into each of the compartments. Each well typically has one main compartment and one or more satellite compartments which are directly adjacent and are often smaller in size. Choose the compartment which you want to use for pipetting (the main compartment is normally compartment 1). Well compartments are specified in the labware configuration. This field is inactive (gray) if the well only has one compartment.

**Location**

Select the labware for the source by clicking on the labware in the Worktable Editor. Then click on the required source well(s). The gray (protected) field then shows the label (name) of the labware that you have selected (it shows a generic name if you have not assigned a label).

**Cursor (x,y)**

You can also select wells by entering the x coordinate (from left to right) and the y coordinate (from top to bottom) of the top left well you want to select. Tip: The x and y coordinates of each well are shown in a tool tip if you move the cursor over the well area in the Location panel.

**Select:** Click this button to select the wells you have specified in the Cursor (x,y) field. This button has no effect if your well selection does not fit within the well area of the labware. For example, if you have chosen to use 8 tips and you are pipetting to a 96-well microplate in landscape orientation, you can only choose the required x coordinate (the y coordinate must be 1).

## 15.2 Dispense Command

The Dispense command is used to dispense liquid to specified positions on the worktable.

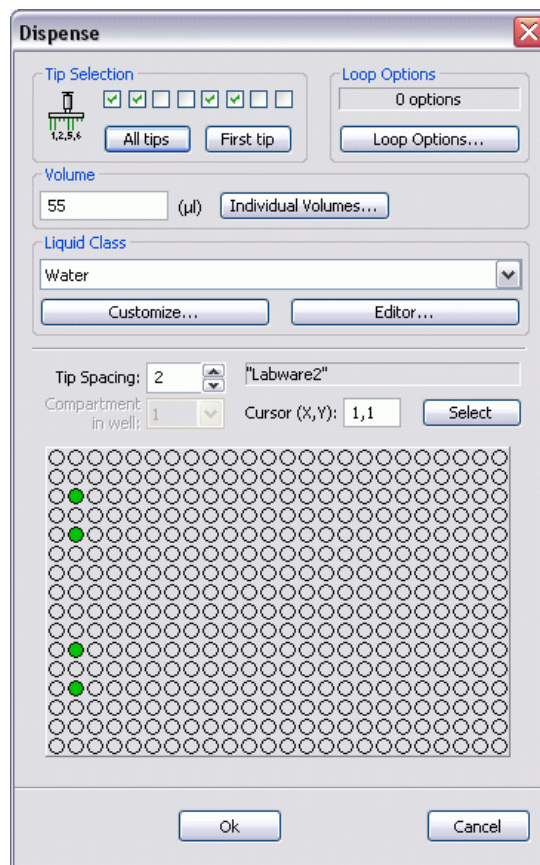


Fig. 15-2 Dispense command

The parameters of the Dispense command are as follows:

#### Tip Selection

Select the tips you want to use.

#### Loop options

If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different column, row, well and/or labware item for each cycle of the loop. You can choose different loop options for the source and the destination. The gray (protected) field shows the number of loop options you have chosen. See [14.4 “Loop Options”](#), [14-23](#).

#### Liquid Classes

Choose the required liquid class from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument. For example, you will not see liquid classes for DiTis if the LiHa is not currently configured with DiTis.

Click the *Editor* button to start the liquid classes editor if you want to create a new class or modify an existing class (see [10 “Configuring Liquid Classes”](#), [10-1](#)). Furthermore you can customize an existing liquid class for use by this command only (click the *Customize* button and click the Dispense tab). If you customize an existing liquid class, the liquid class name is shown in the script command and in the script editor within double angled brackets “>> name <<”.

**Note:** *Instead of customizing a liquid class which is only used by a single instance of this command, it is better practice to create a custom liquid class with the liquid class editor which can then be used by any command and any script.*

#### Volume

Specify the volume that you want to dispense. Click *Individual Volumes* if you want to select a different volume for each tip. The maximum allowed volume is the dilutor or DIT1 capacity (Freedom EVOware does not automatically handle volumes that exceed the dilutor or DIT1 capacity).

#### Tip Spacing

The Tip Spacing parameter controls the distance between adjacent pipetting tips for this command. Tip spacing is only relevant if you want to use more than one tip. A tip spacing of 1 means that the tips will be spread to match the distance between adjacent wells of the labware. A tip spacing of 2 will select every other well of the labware. You can only choose values for tip spacing which are meaningful for the labware geometry.

The liquid handling arm achieves the highest mechanical accuracy when the tips are not spread. For high-density labware such as 1536-well microplates, you should choose tip spacing such that the tips are adjacent to one another (physical tip spacing 9 mm). Accordingly, for 1536-well microplates you should set tip spacing to 4 (every fourth well).

#### Compartment in well

Some special labware types (e.g. for protein crystallography) have wells with several compartments (cavities). Freedom EVOware can pipette a different liquid into each of the compartments. Each well typically has one main compartment and one or more satellite compartments which are directly adjacent and are often smaller in size. Choose the compartment which you want to use for pipetting (the main compartment is normally compartment 1). Well compartments are specified in the labware configuration. This field is inactive (gray) if the well only has one compartment.



**Location**

Select the labware for the destination by clicking on the labware in the Worktable Editor. Then click on the required destination well(s). The gray (protected) field then shows the label (name) of the labware that you have selected (it shows a generic name if you have not assigned a label).

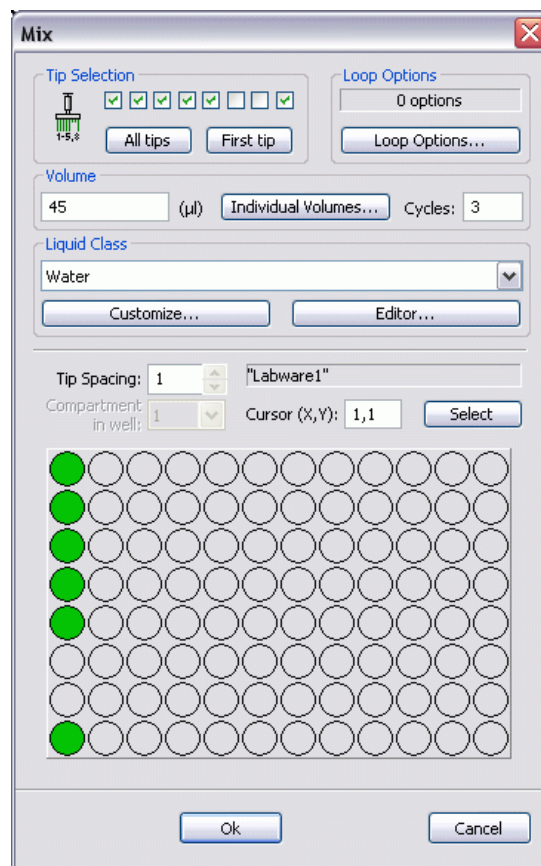
**Cursor (x,y)**

You can also select wells by entering the x coordinate (from left to right) and the y coordinate (from top to bottom) of the top left well you want to select. Tip: The x and y coordinates of each well are shown in a tool tip if you move the cursor over the well area in the Location panel.

**Select:** Click this button to select the wells you have specified in the Cursor (x,y) field. This button has no effect if your well selection does not fit within the well area of the labware. For example, if you have chosen to use 8 tips and you are pipetting to a 96-well microplate in landscape orientation, you can only choose the required x coordinate (the y coordinate must be 1).

**15.3 Mix Command**

The Mix command performs a mix operation by aspirating and then dispensing at the same position.



**Fig. 15-3** Mix command

The parameters of the Mix command are as follows:

#### Tip Selection

Select the tips you want to use.

#### Loop options

If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different column, row, well and/or labware item for each cycle of the loop. You can choose different loop options for the source and the destination. The gray (protected) field shows the number of loop options you have chosen. See [14.4 “Loop Options”](#), [14-23](#).

#### Liquid Classes

Choose the required liquid class from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument. For example, you will not see liquid classes for DiTis if the LiHa is not currently configured with DiTis.

Click the *Editor* button to start the liquid classes editor if you want to create a new class or modify an existing class (see [10 “Configuring Liquid Classes”](#), [10-1](#)). Furthermore you can customize an existing liquid class for use by this command only (click the *Customize* button and click the Aspirate or Dispense tab). If you customize an existing liquid class, the liquid class name is shown in the script command and in the script editor within double angled brackets “>> name <<”.

**Note:** *Instead of customizing a liquid class which is only used by a single instance of this command, it is better practice to create a custom liquid class with the liquid class editor which can then be used by any command and any script.*

#### Volume

Specify the volume that you want to aspirate for the mixing process. Click *Individual Volumes* if you want to select a different volume for each tip. The maximum allowed volume is the dilutor or DITI capacity (Freedom EVOware does not automatically handle volumes that exceed the dilutor or DITI capacity).

#### Cycles

Specify how often you want to repeat the mixing process.

#### Tip Spacing

The Tip Spacing parameter controls the distance between adjacent pipetting tips for this command. Tip spacing is only relevant if you want to use more than one tip. A tip spacing of 1 means that the tips will be spread to match the distance between adjacent wells of the labware. A tip spacing of 2 will select every other well of the labware. You can only choose values for tip spacing which are meaningful for the labware geometry.

The liquid handling arm achieves the highest mechanical accuracy when the tips are not spread. For high-density labware such as 1536-well microplates, you should choose tip spacing such that the tips are adjacent to one another (physical tip spacing 9 mm). Accordingly, for 1536-well microplates you should set tip spacing to 4 (every fourth well).

#### Compartment in well

Some special labware types (e.g. for protein crystallography) have wells with several compartments (cavities). Freedom EVOware can pipette a different liquid into each of the compartments. Each well typically has one main compartment and one or more satellite compartments which are directly

adjacent and are often smaller in size. Choose the compartment which you want to use for pipetting (the main compartment is normally compartment 1). Well compartments are specified in the labware configuration. This field is inactive (gray) if the well only has one compartment.

**Location**

Select the labware for the source and destination by clicking on the labware in the Worktable Editor. Then click on the required well(s). The gray (protected) field then shows the label (name) of the labware that you have selected (it shows a generic name if you have not assigned a label).

**Cursor (x,y)**

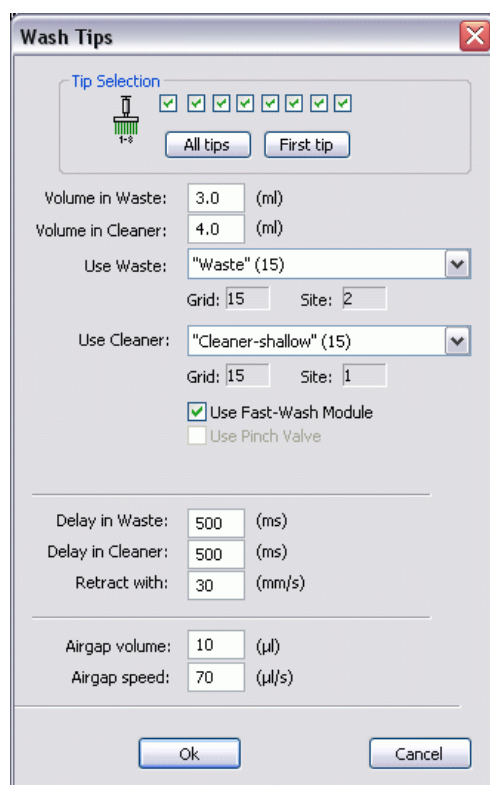
You can also select wells by entering the x coordinate (from left to right) and the y coordinate (from top to bottom) of the top left well you want to select. Tip: The x and y coordinates of each well are shown in a tool tip if you move the cursor over the well area in the Location panel.

**Select:** Click this button to select the wells you have specified in the Cursor (x,y) field. This button has no effect if your well selection does not fit within the well area of the labware. For example, if you have chosen to use 8 tips and you are pipetting to a 96-well microplate in landscape orientation, you can only choose the required x coordinate (the y coordinate must be 1).

## 15.4 Wash Tips Command

The Wash Tips command is used to flush and wash fixed tips or to flush DITI adapters using a wash station. It is not intended for flushing DITI tips (DITI tips should not normally be flushed). If you are using DITIs, make sure in your script that there are none attached when this command is executed.

**Note:** This command is not available for Air LiHa.



**Fig. 15-4** Wash Tips command

Tips should be washed as often as necessary, e.g. after a pipetting sequence and before taking a new sample. DITI adapters should be flushed after replacing the DITIs several times to renew the system liquid column in the DITI adapters. This ensures maximum pipetting accuracy.

The parameters of the Wash Tips command are as follows:

### Tip Selection

Select the tips you want to wash.

### Volume in Waste

Specify the volume of system liquid which should be used to flush the inside of the tips. Flushing takes place with the tips positioned above the waste of the specified wash station (tip height for fixed tips = Z-dispense; tip height for DITI adapters = Z-travel).

### Volume in Cleaner

Specify the volume of system liquid which should be used to wash the outside of the tips. Washing takes place with the tips lowered into the cleaner of the specified wash station (tip height = Z-max). The wash cycle is skipped if you are flushing DITI adapters and *Volume in Cleaner* is ignored in this case.

**Use Waste**

Specify the worktable position for the waste you want to use by clicking on it in the Worktable Editor. You must first put a wash station with waste unit in the Worktable Editor at the required position. Alternatively, choose the required waste position from the pull down list. The list shows all waste units which are currently positioned in the Worktable Editor.

The gray (protected) fields show the worktable coordinates of the selected waste.

**Use Cleaner**

Specify the worktable position for the cleaner you want to use by clicking on it in the Worktable Editor. You must first put a wash station with cleaner unit in the Worktable Editor at the required position. Alternatively, choose the required cleaner position from the pull down list. The list shows all cleaner units which are currently positioned in the Worktable Editor.

The gray (protected) fields show the worktable coordinates of the selected cleaner.

Choose a shallow cleaner if you only need to clean the ends of the tips. Choose a deep cleaner if there is a possibility of contamination along the shaft of the tip. The deep cleaner requires a larger volume of system liquid and cleaning takes somewhat longer.

The wash cycle is skipped if you are flushing DITI adapters and *Use Cleaner* is ignored in this case.

**Use Fast-Wash Module**

If your instrument is fitted with FWO (Fast Wash Option) or MPO (Monitored Pump Option), check this checkbox to use the Fast Wash module instead of the dilutors to wash the tips. If you use the Fast Wash module, the volumes of liquid which are dispensed in the flushing and washing steps may differ significantly from the volumes you specify. This is due to accuracy limitations of the pump.

**Use Pinch Valve**

If your instrument is fitted with the Low Volume Option, check this checkbox to activate the Low Volume Option after washing the tips.

**Delay in Waste**

To reduce the pressure inside the tubing, you can instruct the instrument to keep the valves open somewhat longer after flushing before moving the LiHa away from the waste (range: 0 - 1000 ms).

**Delay in Cleaner**

To reduce the pressure inside the tubing, you can instruct the instrument to keep the valves open somewhat longer after washing before moving the LiHa away from the cleaner (range: 0 - 1000 ms). The wash cycle is skipped if you are flushing DITI adapters and *Delay in Cleaner* is ignored in this case.

**Retract with**

Specify the speed with which you want to retract the tips from the cleaner (range: 0 - 100 mm/s). If the speed is too high, droplets may be dragged out of the cleaner and stick to the outside of the tips.

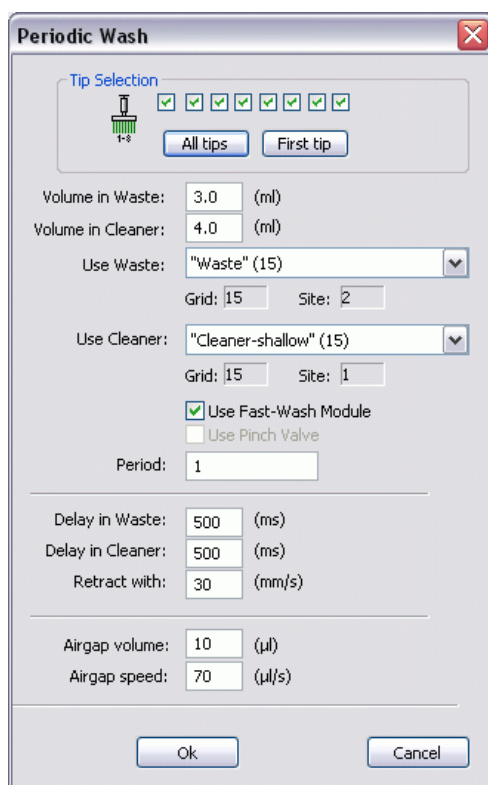
**Airgap volume, Airgap speed**

These settings are used to specify a system trailing airgap (STAG) which will be aspirated after washing the tips. Specify the required size of the airgap in  $\mu\text{l}$  and the aspiration speed for the airgap in  $\mu\text{l/s}$ . The system trailing airgap is used to prevent contamination by ensuring that the system liquid cannot come into contact with the liquid which will be aspirated in a subsequent pipetting command.

## 15.5 Periodic Wash Command

The Periodic Wash command is used to flush DITI adapters in a wash station at specified, regular intervals. It is not intended for flushing DITI tips.

**Note:** *Periodic Wash has no function with Air LiHa but is available for compatibility reasons.*



**Fig. 15-5** Periodic Wash command

This command is used to flush the DITI adapters at specified, regular intervals when DITIs are replaced. The flushing takes place after the DITIs are dropped and before getting new ones. This should be done after replacing the DITIs several times to renew the system liquid column in the DITI adapters. This ensures maximum pipetting accuracy.

The Periodic Wash command is not executed at its line in the script, but affects subsequent Drop DITI and Get DITI commands. It also flushes the DITI adapters with the given interval at DiTi replacement actions in worklists.

You can deactivate a previous Periodic Wash command by specifying another Periodic Wash command with the period set to 0 (zero).

The parameters of the Periodic Wash command are as follows:

### Tip Selection

Select the DITI adapters you want to flush.

**Volume in Waste**

Specify the volume of system liquid which should be used to flush the DITI adapters (range: 0 - 100 ml). Flushing takes place with the tips positioned above the waste of the specified wash station (tip height for fixed tips = Z-dispense; tip height for DITI adapters = Z-travel).

**Volume in Cleaner**

Specify the volume of system liquid which should be used to wash the outside of the tips (range: 0.1 - 100 ml). Washing takes place with the tips lowered into the cleaner of the specified wash station (tip height = Z-max). The wash cycle is skipped if you are flushing DITI adapters and *Volume in Cleaner* is ignored in this case.

**Use Waste**

Specify the worktable position for the waste you want to use by clicking on it in the Worktable Editor. You must first put a wash station with waste unit in the Worktable Editor at the required position. Alternatively, choose the required waste position from the pull down list. The list shows all waste units which are currently positioned in the Worktable Editor.

The gray (protected) fields show the worktable coordinates of the selected waste.

**Use Cleaner**

Specify the worktable position for the cleaner you want to use by clicking on it in the Worktable Editor. You must first put a wash station with cleaner unit in the Worktable Editor at the required position. Alternatively, choose the required cleaner position from the pull down list. The list shows all cleaner units which are currently positioned in the Worktable Editor.

The gray (protected) fields show the worktable coordinates of the selected cleaner.

Choose a shallow cleaner if you only need to clean the ends of the tips. Choose a deep cleaner if there is a possibility of contamination along the shaft of the tip. The deep cleaner requires a larger volume of system liquid and cleaning takes somewhat longer.

The wash cycle is skipped if you are flushing DITI adapters and *Use Cleaner* is ignored in this case.

**Use Fast-Wash Module**

If your instrument is fitted with FWO (Fast Wash Option) or MPO (Monitored Pump Option), check this checkbox to use the Fast Wash module instead of the dilutors to wash the tips.

**Use Pinch Valve**

If your instrument is fitted with the Low Volume Option, check this checkbox to activate the Low Volume Option after washing the tips.

**Period**

Specify the number of DITI replacement actions after which Freedom EVOware should flush the DITI adapters.

**Delay in Waste**

To reduce the pressure inside the tubing, you can instruct the instrument to keep the valves open somewhat longer after flushing before moving the LiHa away from the waste (range: 0 - 1000 ms).

**Delay in Cleaner**

To reduce the pressure inside the tubing, you can instruct the instrument to keep the valves open somewhat longer after washing before moving the LiHa away from the cleaner (range: 0 - 1000 ms). The wash cycle is skipped if you are flushing DITI adapters and *Delay in Cleaner* is ignored in this case.



### Retract with

Specify the speed with which you want to retract the tips from the cleaner. If the speed is too high, droplets may be dragged out of the cleaner and stick to the outside of the tips. *Retract with* is ignored if you are flushing DITI adapters.

### Airgap volume, Airgap speed

These settings are used to specify a system trailing airgap (STAG) which will be aspirated after washing the tips. Specify the required size of the airgap in  $\mu\text{l}$  and the aspiration speed for the airgap in  $\mu\text{l/s}$ . The system trailing airgap is used to prevent contamination by ensuring that the system liquid cannot come into contact with the liquid which will be aspirated in a subsequent pipetting command.

## 15.6 Activate DITI Handling Command

Freedom EVOware provides special facilities to ensure that sufficient DITIs are present on the worktable for your script or process and to fetch new DITI racks as and when needed. In Freedom EVOware Standard, automatic DITI replacement is done using a DITI replacement script (sub-routine).

The *Activate DiTi Handling command*, which is available in Freedom EVOware Standard and Plus, activates the *Automatic DiTi Handling feature* in your pipetting script and specifies the *DiTi replacement script* to use. Additionally, Freedom EVOware Plus can use a different concept for automatic DiTi handling.

Your script must include an *Activate DiTi Handling command* for each DiTi type you want to replace automatically.

When using nested LiHa DiTis it is recommended to use ADH subroutines to remove empty trays.

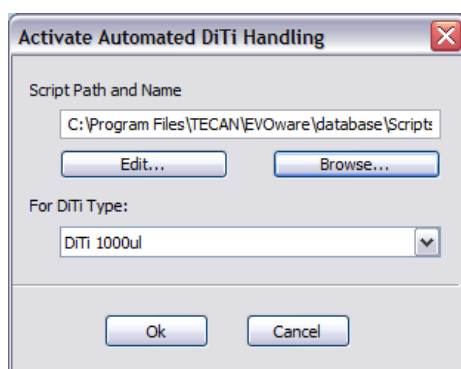


Fig. 15-6 Activate DITI Handling command

The parameters of the Activate DITI Handling command are as follows:

### Script Path and Name

Specify the filename and location of the script (sub-routine) you want to use to replace DITI racks when all of the DITIs have been used. This is normally done using one or more Transfer Labware commands. The worktable location (grid, site) of the DITI racks which will need replacing during runtime is specified in the DITI replacement script using the pre-defined variables *REPLACE\_DITI\_GRID* and *REPLACE\_DITI\_SITE*. For nested LiHa DiTis the



variable REPLACE\_DITI\_SITE can be used to remove empty trays. For each Get DITI command in your pipetting script, Freedom EVOware automatically sets these variables to the correct grid and site for the selected DITI type before executing the command.

**Edit:** Click this button if you want to open the specified script in a new window for editing and/or checking.

**Browse:** Click this button to look for existing scripts and to choose the one you want to use.

#### For DITI type

Choose the DITI type to which this command should apply. The list shows all of the LiHa DITI types which are defined in the labware database.

To de-activate the automatic DITI Handling feature again, use the Activate DITI Handling command and leave the *Script Path and Name* field blank.

See [17.1 “Using the Automatic DITI Handling feature”](#), [17-1](#) for more information.

**Note:** *The Automatic DiTi Handling does not work with the option “Optimize positions when fetching DiTis” that can be set in EVOware Configure (see [8.4.2.1](#), [8-22](#)).*

## 15.7 Get DITIs Command

The Get DITIs command is used to pick up DITIs (disposable tips) of the specified type from a DITI rack. Freedom EVOware keeps track of their position on the worktable and automatically picks up the next available unused DITIs of the chosen type.

**Note:** *DiTi handling is automatic in Freedom EVOware Plus, except for nested LiHa DiTis there must be an ADH subroutine defined.*

This command is only shown in the Control Bar if you are using DiTis on the LiHa or Air LiHa. Freedom EVOware does not detect the LiHa tip type automatically. If you are using DITIs you must configure them manually (see [8.4.2.1 “LiHa \(Liquid Handling Arm\)”](#), [8-22](#)).

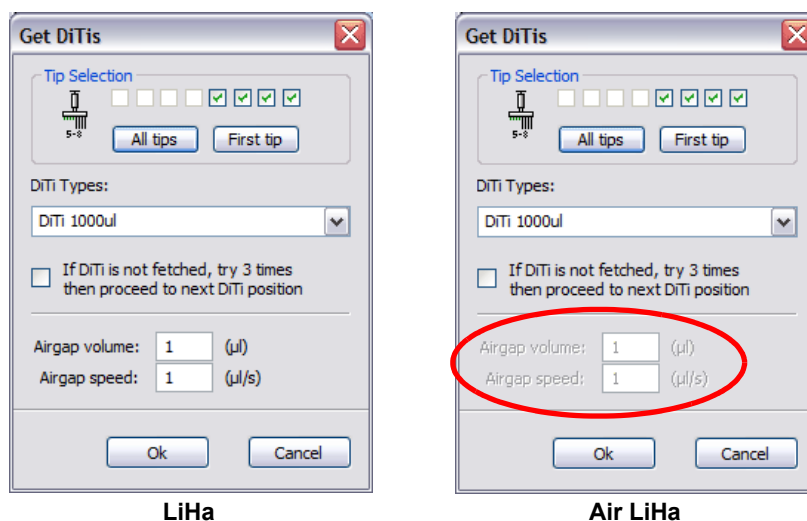


Fig. 15-7 Get DITIs command

The parameters of the Get DITIs command are as follows:

#### Tip Selection

Select the tips you want to pick up. You can only choose tips which are configured with DITIs.

#### DITI Type

Choose the required DITI type from the pull-down list. The list shows all of the LiHa DITI types which are defined in the labware database.

#### If DITI is not fetched, try 3 times and then proceed to next DITI position

If you do not check this checkbox and the DITIs could not be picked up, Freedom EVOware displays an error message and waits for user input.

If you check this checkbox and the DITIs could not be picked up, Freedom EVOware makes three more attempts before proceeding to the next DITI position and trying again.

#### Airgap volume, Airgap speed

These settings are used to specify a system trailing airgap (STAG) which will be aspirated after mounting the DITIs. Specify the required size of the airgap in  $\mu\text{l}$  and the aspiration speed for the airgap in  $\mu\text{l/s}$ . The system trailing airgap is used to prevent contamination by ensuring that the system liquid cannot come into contact with the liquid which will be aspirated in a subsequent pipetting command.

Also see [15.9 "Set DITI Position Command"](#), [15-15](#).

**Note:** *Airgap volume* and *Airgap speed* are deactivated for the Air LiHa (see [Fig. 15-7](#), [15-14](#))

## 15.8 Drop DITIs Command

The Drop DITIs command is used to discard the specified DITIs into the specified DITI waste.

**Note:** DiTi handling is automatic in Freedom EVOware Plus, except for nested LiHa DiTis there must be an ADH subroutine defined.

This command is only shown in the Control Bar if you are using DiTis on the LiHa. Freedom EVOware does not detect the LiHa tip type automatically. If you are using DiTis you must configure them manually (see 8.4.2.1 “LiHa (Liquid Handling Arm)”, 8-22).

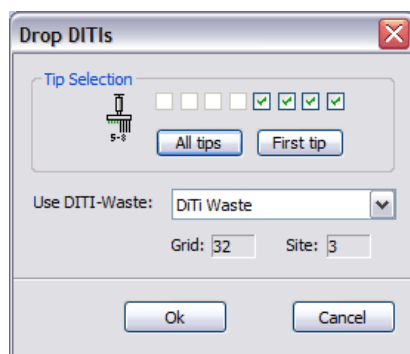


Fig. 15-8 Drop DITIs command

The parameters of the Drop DITIs command are as follows:

**Tip Selection**

Select the tips you want to discard. You can only choose tips which are configured with DITIs.

**Use DITI Waste**

Specify the worktable position for the DITI waste you want to use by clicking on the waste in the Worktable Editor. You must first put a DITI waste in the Worktable Editor at the required position. Alternatively, choose the required DITI waste from the pull down list. The list shows all of the DITI wastes which are currently positioned in the Worktable Editor.

The gray (protected) fields show the worktable coordinates of the selected DITI waste.

## 15.9 Set DITI Position Command

If you are using DITIs, Freedom EVOware remembers the position in the DITI rack of the last DITI which was fetched. When starting a new run, the Get DITIs command starts picking up DITIs at the next available position. After loading a new DITI rack onto the worktable during script runtime (e.g. using the RoMa), you should use the Set DITI Position command in your script to set the DITI Position counter to 1. This ensures that the next DITI is fetched from position 1 rather than from the middle of the new rack.

You can specify the next position separately for each of the available DITI types (i.e. DITI racks on the worktable).

**Note:** If you want to specify the next DITI position manually before the script or process is started, use the direct command Set DITI Position (see 5.4.1.3 “Direct commands”, 5-10) or create a maintenance script which contains the Set DITI Position command (see 6.4.2 “Run Maintenance”, 6-10).

**Note:** DiTi handling is automatic in Freedom EVOware Plus, except for nested LiHa DiTis there must be an ADH subroutine defined.

This command is only shown in the Control Bar if you are using DiTis on the LiHa. Freedom EVOware does not detect the LiHa tip type automatically. If you are using DiTis you must configure them manually (see 8.4.2.1 “LiHa (Liquid Handling Arm)”, 8-22).

If your pipetting instrument is fitted with two liquid handling arms, the Set DITI Position command will be provided in the Control Bar for both arms. However, please note that the same DITI position counter (and the same pool of unused DiTis) is used by both arms.

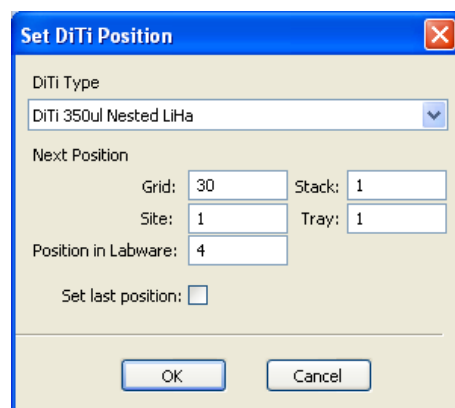


Fig. 15-9 Set DITI Position command

The parameters of the Set DITI Position command are as follows:

#### DITI type

Choose the DITI type whose position you want to set. The list shows all of the LiHa DITI types which are defined in the labware database. DITI types are assigned to DITI racks in the labware definition for the rack (see 9.4.1 “Editing Labware, Well Dimensions Tab”, 9-13).

#### Next DITI position

**Grid, Site:** Specify the worktable position of a DITI rack containing unused DiTis of this type by clicking on the rack in the Worktable Editor. You can also specify numeric constants or variables. The specified grid and site must contain a DITI rack.

**Position in labware:** Specify the labware position in the DITI rack for the next available unused DITI of this type. You can also specify a numeric constant or a variable. Freedom EVOware counts labware positions from rear to front and then from left to right.

**Stack, Tray:** Only visible when nested LiHa DiTis are used. Specify the worktable of a nested LiHa DiTi rack containing unused DiTis of this type by clicking on the rack in the worktable editor. The specified stack and tray must contain a DiTi rack. The trays from the nested LiHa DiTis are counted top down.

#### Set last position

If you have activated the feature *Optimize positions when fetching DiTis*, Freedom EVOware fetches new DiTis either starting from the beginning of the DITI rack or starting from the end of the DITI rack, depending on the situation (see 8.4.2.1 “LiHa (Liquid Handling Arm)”, 8-22, *Optimize positions when fetching DiTis*). In this case, Freedom EVOware maintains two counters for

the last used DITI position (for DITIs which are taken from the beginning of the rack and for DITIs which are taken from the end of the rack). Check this checkbox if you want to set the last used DITI position for the end counter instead of for the beginning counter.

If you have activated the feature *Optimize positions when fetching DITIs*, after loading a new DITI rack onto the worktable during script runtime you should use the Set DITI Position command twice in your script, to set the beginning counter to 1 and the end counter to 96.

The *Set last position checkbox* is inactive (grey) if you have not activated *Optimize positions when fetching DITIs*. If you have previously specified the last used DITI position, it will be ignored during script execution.

## 15.10 Pick Up DITIs Command

The Pick Up DITIs command is used to pick up DITIs which have already been used and put back into a DITI rack with the Set DITIs Back command. You must specify the DITIs you want to pick up.

**Note:** *DiTi handling is automatic in Freedom EVOware Plus, except for nested LiHa DiTis there must be an ADH subroutine defined. The Pick Up DITIs and Set DITIs Back command are not supported for nested LiHa DiTis.*

This command is only shown in the Control Bar if you are using DiTis on the LiHa. Freedom EVOware does not detect the LiHa tip type automatically. If you are using DITIs you must configure them manually (see [8.4.2.1 “LiHa \(Liquid Handling Arm\)”](#), [8-22](#)).

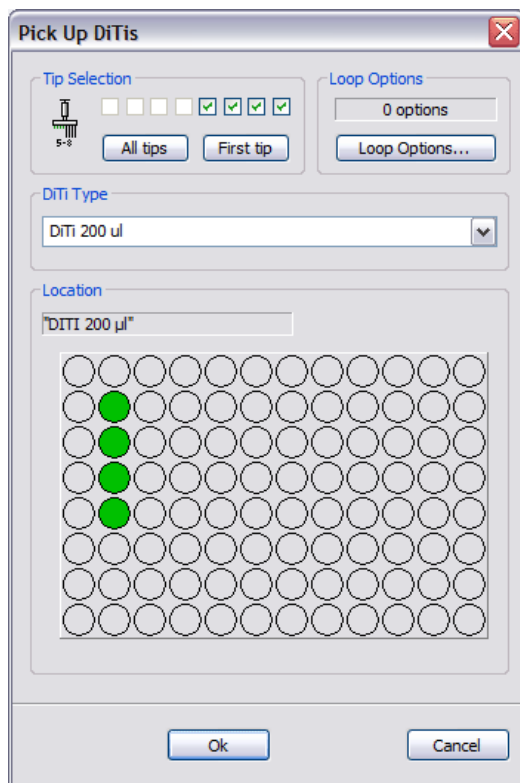


Fig. 15-10 Pick Up DITIs command

The parameters of the Pick Up DITIs command are as follows:

**Tip Selection**

Select the tips you want to pick up. You can only choose tips which are configured with DITIs.

**Loop options**

If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different column, row, well and/or labware item for each cycle of the loop. The gray (protected) field shows the number of loop options you have chosen. See 14.4 “Loop Options”, 14-23.

**DITI Type**

Choose the required DITI type from the pull-down list. The list shows all of the LiHa DITI types which are defined in the labware database.

**Location**

Select the DITI rack where you want to pick up the DITIs by clicking on the rack in the Worktable Editor. The gray (protected) field at the top of the Location panel shows the label (name) of the labware that you have selected (it shows a generic name if you have not assigned a label). Now click on the required well(s).

## 15.11 Set DITIs Back Command

The Set DITIs Back command is used to return used DITIs to specified positions on a DITI rack for later use. This command requires the Lower DITI Eject option.

**Note:** *DiTi handling is automatic in Freedom EVOware Plus, except for nested LiHa DiTis there must be an ADH subroutine defined. The Pick Up DITIs and Set DITIs Back command are not supported for nested LiHa DiTis.*

This command is only shown in the Control Bar if you are using DiTis on the LiHa. Freedom EVOware does not detect the LiHa tip type automatically. If you are using DITIs you must configure them manually (see 8.4.2.1 “LiHa (Liquid Handling Arm)”, 8-22).

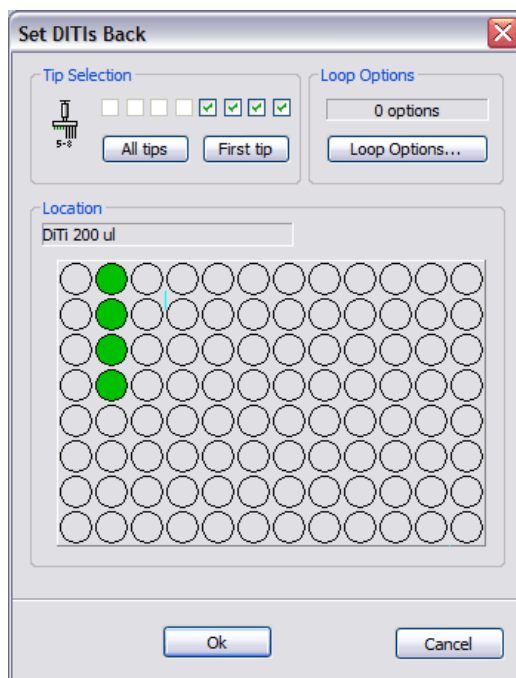


Fig. 15-11 Set DITIs Back command

The parameters of the Set DITIs Back command are as follows:

### Tip Selection

Select the tips you want to put down. You can only choose tips which are configured with DITIs.

### Loop options

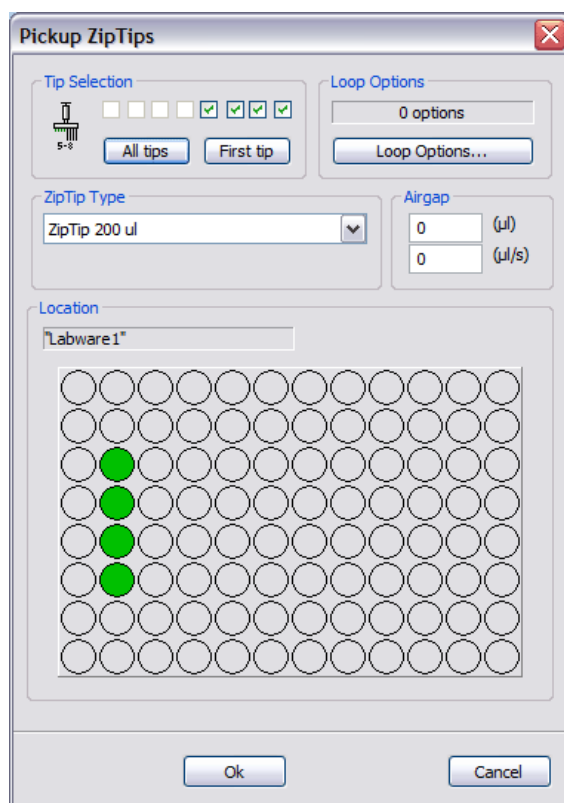
If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different column, row, well and/or labware item for each cycle of the loop. The gray (protected) field shows the number of loop options you have chosen. See 14.4 “Loop Options”, 14-23.

### Location

Select the DITI rack where you want to put down the DITIs by clicking on the rack in the Worktable Editor. Then click on the required well(s). The gray (protected) field at the top of the panel shows the label (name) of the labware that you have selected (it shows a generic name if you have not assigned a label).

## 15.12 Pickup ZipTip Command

The Pickup ZipTip command is used to pick up ZipTips. ZipTips are disposable tips which are pre-filled with liquid and thus do not need an aspirate command. Freedom EVOware keeps track of their position on the worktable and automatically picks up the next available unused ZipTips of the chosen type. The Pick Up ZipTip command automatically aspirates a specified volume of air before picking up the tips. The same volume should be chosen in the subsequent Dispense command, which then ejects the pre-filled liquid into the well.



**Fig. 15-12** Pickup ZipTip command

The parameters of the Pickup ZipTip command are as follows:

### Tip Selection

Select the tips you want to pick up. You can only choose tips which are configured with DITs or ZipTips.

### Loop options

If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different column, row, well and/or labware item for each cycle of the loop. The gray (protected) field shows the number of loop options you have chosen. See [14.4 "Loop Options"](#), [14-23](#).

### ZipTip Type

Choose the required ZipTip type from the pull-down list. ZipTips are stored in DITI racks. The list shows all of the LiHa DITI and ZipTip types which are defined in the labware database.



**Airgap**

Choose the required size of the airgap in  $\mu\text{l}$  and the aspiration speed for the airgap in  $\mu\text{l/s}$ .

**Location**

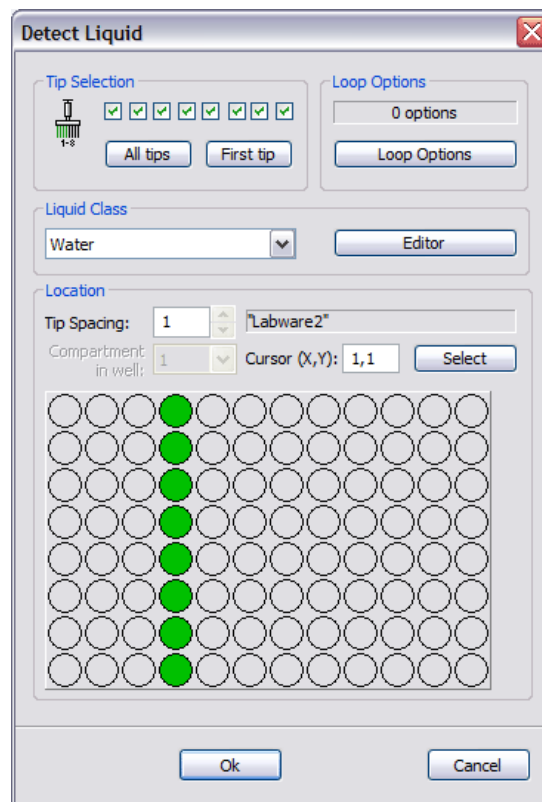
Select the DITI rack where you want to pick up the ZipTips by clicking on the rack in the Worktable Editor. The gray (protected) field at the top of the Location panel shows the label (name) of the labware that you have selected (it shows a generic name if you have not assigned a label). Now click on the required well(s).

Also see [15.9 "Set DITI Position Command"](#), 15-15.

### 15.13 Detect Liquid Command

Liquid level detection is one of the options available for aspirating and dispensing and can be individually defined for each liquid class. The Detect Liquid command is used to carry out liquid level detection without pipetting and reports the liquid volume for each of the chosen wells in the labware.

The volumes are returned in a set of variables `DETECTED_VOLUME_x`, where x is the tip number.




*Fig. 15-13 Detect Liquid command*

The parameters of the Detect Liquid command are as follows:

**Tip Selection**


Select the tips you want to use.

### Loop options

If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different column, row, well and/or labware item for each cycle of the loop. The gray (protected) field shows the number of loop options you have chosen. See [14.4 “Loop Options”](#),  [14-23](#).

### Liquid Class

Choose the required liquid class from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument. For example, you will not see liquid classes for DiTis if the LiHa is not currently configured with DiTis.

Click the *Editor* button to start the liquid classes editor if you want to create a new class or modify an existing class (see [10 “Configuring Liquid Classes”](#),  [10-1](#)).

### Location

Select the labware which you want to check by clicking on the labware in the Worktable Editor. The gray (protected) field at the top right of the Location panel shows the label (name) of the labware that you have selected (it shows a generic name if you have not assigned a label). Now click on the required well(s).

### Tip Spacing

The Tip Spacing parameter controls the distance between adjacent pipetting tips for this command. You can choose a different tip spacing for the source labware and the destination labware. Tip spacing is only relevant if you want to use more than one tip. A tip spacing of 1 means that the tips will be spread to match the distance between adjacent wells of the labware. A tip spacing of 2 will select every other well of the labware. You can only choose values for tip spacing which are meaningful for the labware geometry.

The liquid handling arm achieves the highest mechanical accuracy when the tips are not spread. For high-density labware such as 1536-well microplates, you should choose tip spacing such that the tips are adjacent to one another (physical tip spacing 9 mm). Accordingly, for 1536-well microplates you should set tip spacing to 4 (every fourth well).

### Compartment in well

Some special labware types (e.g. for protein crystallography) have wells with several compartments (cavities). Freedom EVOware can pipette a different liquid into each of the compartments. Each well typically has one main compartment and one or more satellite compartments which are directly adjacent and are often smaller in size. Choose the compartment which you want to use for pipetting (the main compartment is normally compartment 1). Well compartments are specified in the labware configuration. This field is inactive (gray) if the well only has one compartment.

### Cursor (x,y)

You can also select wells by entering the x coordinate (from left to right) and the y coordinate (from top to bottom) of the top left well you want to select. Tip: The x and y coordinates of each well are shown in a tool tip if you move the cursor over the well area in the Location panel.

**Select:** Click this button to select the wells you have specified in the Cursor (x,y) field. This button has no effect if your well selection does not fit within the well area of the labware. For example, if you have chosen to use 8 tips and you are pipetting to a 96-well microplate in landscape orientation, you can only choose the required x coordinate (the y coordinate must be 1).

## 15.14 Activate PMP Command

The Activate PMP command is used to activate the PMP (Pressure Monitored Pipetting) function at the appropriate point in your pipetting script. You must do this before getting (mounting) the PMP-controlled DiTis.

This command is only shown in the Control Bar if you are using DiTis with PMP option enabled or Air LiHa tips (see [17.6.1 “Activating the PMP and pLLD Option”](#), [17-18](#)).

Certain restrictions apply to the pipetting commands which are allowed between the Activate PMP command and a subsequent Deactivate PMP command (see [17.6.2 “Permissible sequence of script commands for the PMP option”](#), [17-19](#)).

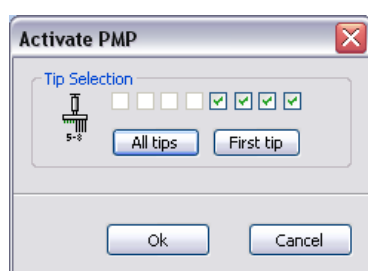


Fig. 15-14 Activate PMP command

The parameters of the Activate PMP command are as follows:

### Tip Selection

Select the tip or tips whose PMP function you want to activate. You can only choose tips which are configured with DITI channels equipped with a MultiSense adapter.

## 15.15 Deactivate PMP Command

The Deactivate PMP command is used to deactivate the PMP (Pressure Monitored Pipetting) function at the appropriate point in your pipetting script. You must do this after finishing the pipetting sequence and dropping the DiTis. All PMP-controlled DiTis must be dropped before deactivating PMP.

This command is only shown in the Control Bar if the PMP option box is checked in the configuration tool (see [17.6.1 “Activating the PMP and pLLD Option”](#), [17-18](#)).

Certain restrictions apply to the pipetting commands which are allowed between the Activate PMP command and a subsequent Deactivate PMP command (see [17.6.2 “Permissible sequence of script commands for the PMP option”](#), [17-19](#)).

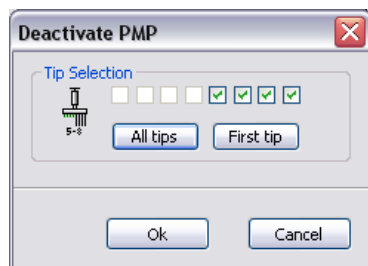


Fig. 15-15 Deactivate PMP command

The parameters of the Deactivate PMP command are as follows:

**Tip Selection**

Select the tip or tips whose PMP function you want to deactivate. You can only choose tips which are configured with DiTi channels equipped with MultiSense adapter. You will get a script error if you select a tip position whose PMP function was not previously activated with the Activate PMP command.

## 15.16 Execute Retry Worklist Command

The Execute Retry Worklist command automatically creates a worklist to retry the pipetting sequence after pipetting was halted due to an error detected by PMP on aspirate or a PMP Instrument Error (pressure out of range).

Refer to the “PMP Option Application Manual” (see 1.2 “Reference Documents”, 1-3)

## 15.17 Inline Filter Test Command (Air LiHa)

In order to protect the Air LiHa pipetting channels against over-aspiration of liquid (if a DiTi with smaller capacity than intended is used) a control system is installed on each channel. The control system combines a filter inside the DiTi cone and the pressure monitoring of the PMP board.

The Inline Filter Test script command allows to check the inline filter inside the DiTi cone of an Air LiHa pipetting channel. With this command the user can check the presence and integrity of the filters in the selected channels at the beginning of a script or periodically.

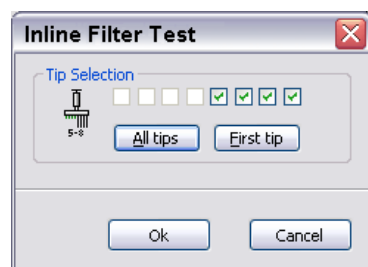


Fig. 15-16 Inline Filter Test command

The parameters of the Inline Filter Test command are as follows:

**Tip Selection**

Select the tips (channels) for which you want to test the inline filter.

**Note:** Before processing the command make sure that there are no DiTis mounted on the selected channels.

**Failures detected by the test**

- Wetted filter (due to over-aspiration of liquid)
- Damaged filter (A)
- Wrong positioned filter (B)
- Absence of filter
- Channel clogged with particles

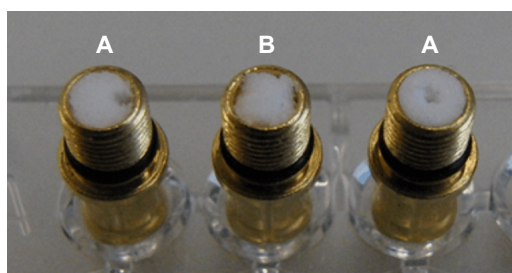


Fig. 15-17 Inline filter failures

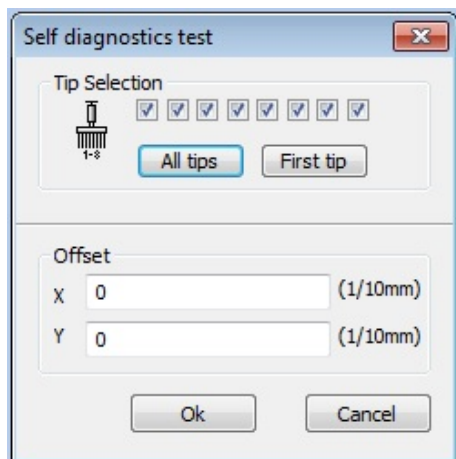
## 15.18 Self diagnostic test

A self diagnostic test based on the PMP leakage test of S&S is also available in the application SW. Similar to the Inline Filter Test a channel should be inactivated if the test fails. X and Y offset (in 1/10mm) allow the tips to change their position on the sealing pad.



**ATTENTION**

However, self diagnostic test and Inline Filter Test both change the enabled status of tips, meaning that one test can enable tips that are disabled by the other.



**Fig. 15-18** Self diagnostic test

First, the height above mean sea level has to be set in EVOware.opt as described in [A.3 "Parameters in the EVOware.opt file"](#), [A-15](#), [SelfDiagnosticsTest] section.

From the Import Library on the EVOware Master CD in subfolder "2 - Extended" the file "Sealing block.exd" needs to be imported (in chapter [A.11.4 "Export/Import Tool"](#), [A-41](#) it is explained how an EXD file is imported).

Place the sealing block on the worktable. Do the same in the worktable editor in EVOware. For the "self diagnostics test" to work DiTis need to be fetched first. Only DiTis with the sizes 200  $\mu$ l, 1000  $\mu$ l without filter, and 1000  $\mu$ l with filter are supported for the test.  
Do the test with all channels at once.

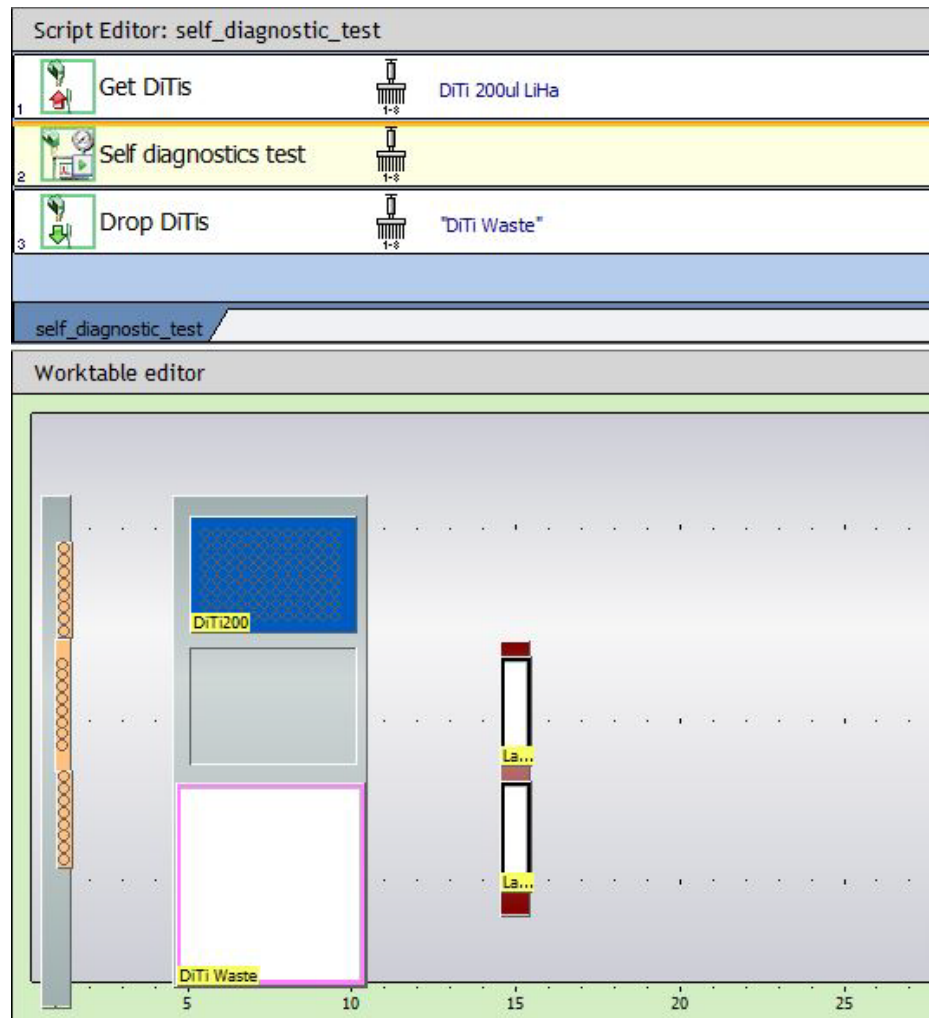


Fig. 15-19 Basic example for a self diagnostics test

## 15.19 Move LiHa Command

The Move LiHa command is used to move the liquid handling arm (LiHa, Air LiHa) from one position to another without performing an Aspirate or Dispense operation.

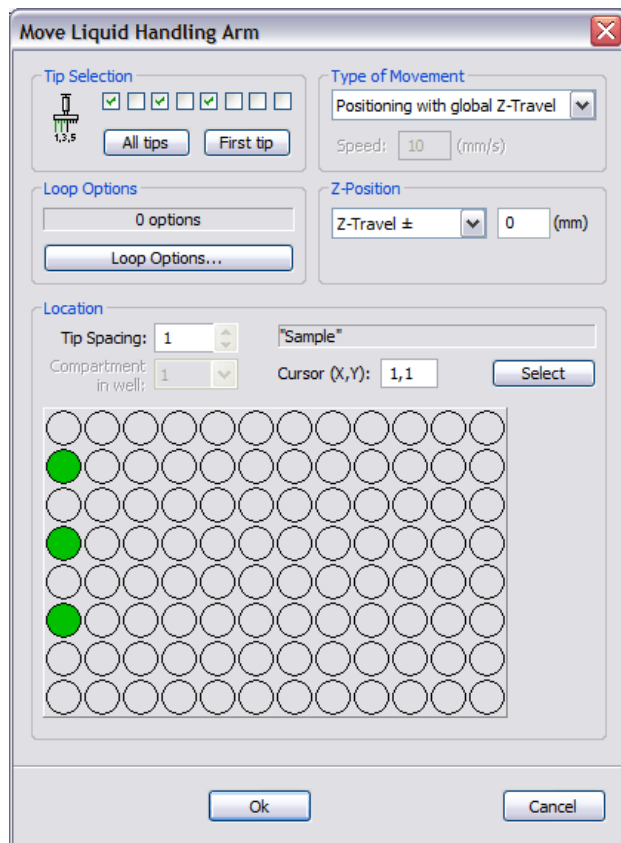


Fig. 15-20 Move LiHa command

The parameters of the Move LiHa command are as follows:

### Tip Selection

Select the tips you want to use.

### Loop options

If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different column, row, well and/or labware item for each cycle of the loop. The gray (protected) field shows the number of loop options you have chosen. See [14.4 "Loop Options"](#), [14-23](#).



### Type of movement

Choose X-Move, Y-Move or Z-Move to move only one axis of the LiHa. You can then specify the speed of the movement. Z-Move only moves the selected tips.

The options *Positioning with global Z-travel*, *Positioning with local Z-travel* and *Positioning with variable Z-travel* move the LiHa to the labware at maximum speed. The chosen height for Z-Travel (the tip height which is used during the arm movement) only applies to the selected tips. The Z position of the unselected tips remains unchanged.

If you choose *Positioning with variable Z-travel*, the required Z-Travel height is specified using the pre-defined variable LIHA\_MOVE\_HEIGHT (see 14.1.4.7 "LIHA\_MOVE\_HEIGHT", 14-5).

### Z-Position

Unless you have chosen X-Move or Y-Move in the *Type of Movement* field, you can specify the Z-Position to which the selected tips should be lowered at the end of the LiHa movement. The Z position of the unselected tips remains unchanged. Choose the required Z-position and then specify a Z offset in mm if required. A positive value for the offset lowers the tips.

### Tip Spacing

The Tip Spacing parameter controls the distance between adjacent pipetting tips for this command. You can choose a different tip spacing for the source labware and the destination labware. Tip spacing is only relevant if you want to use more than one tip. A tip spacing of 1 means that the tips will be spread to match the distance between adjacent wells in the labware. A tip spacing of 2 will select every other well in the labware. You can only choose values for tip spacing which are meaningful for the labware geometry.

The liquid handling arm achieves the highest mechanical accuracy when the tips are not spread. For high-density labware such as 1536-well microplates, you should choose tip spacing such that the tips are adjacent to one another (physical tip spacing 9 mm). Accordingly, for 1536-well microplates you should set tip spacing to 4 (every fourth well).

### Compartment in well

Some special labware types (e.g. for protein crystallography) have wells with several compartments (cavities). Freedom EVOware can pipette a different liquid into each of the compartments. Each well typically has one main compartment and one or more satellite compartments which are directly adjacent and are often smaller in size. Choose the compartment which you want to use for pipetting (the main compartment is normally compartment 1). Well compartments are specified in the labware configuration. This field is inactive (gray) if the well only has one compartment.

### Location

Select the labware which you want to use by clicking on the labware in the Worktable Editor. Then click on the required well(s). The gray (protected) field at the top right of the Location panel shows the label (name) of the labware that you have selected (it shows a generic name if you have not assigned a label). If you have chosen a movement which changes the Z position of the tips, this only applies to the selected tips. The Z position of the unselected tips remains unchanged (see *Type of movement* and *Z-Position*, above).

### Cursor (x,y)

You can also select wells by entering the x coordinate (from left to right) and the y coordinate (from top to bottom) of the top left well you want to select. Tip: The x and y coordinates of each well are shown in a tool tip if you move the cursor over the well area in the Location panel.

**Select:** Click this button to select the wells you have specified in the Cursor (x,y) field. This button has no effect if your well selection does not fit within the well area of the labware. For example, if you have chosen to use 8 tips and you are pipetting to a 96-well microplate in landscape orientation, you can only choose the required x coordinate (the y coordinate must be 1).

## 15.20 Waste Command

The Waste command is used to control the vacuum-assisted waste (instrument option for viscous liquids which creates a partial vacuum in the waste bottles).

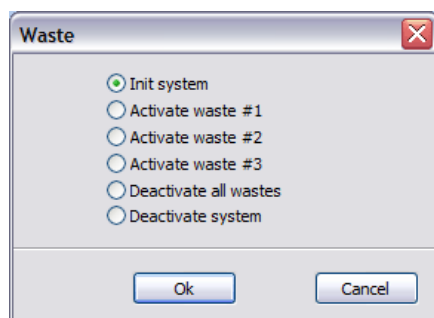


Fig. 15-21 Waste command

In contrast to the standard instrument waste, the vacuum-assisted waste lets you use up to three waste bottles which are operated with a partial vacuum (suction). This allows you to discard different waste liquids into different containers if they should not be allowed to mix. The waste command is typically used before a Wash tips command.

The parameters of the Waste command are as follows:

#### Init system

This command starts the vacuum pump. Due to the time needed to build up the vacuum, you can specify this command at an earlier stage in your script to ensure that the vacuum is present when you want to apply it with the *Activate waste* command.

#### Activate waste #1

This command applies the vacuum to waste # 1. If no previous *Init system* command was specified, *Activate waste #1* also starts the vacuum pump.

#### Activate waste #2

This command applies the vacuum to waste # 2. If no previous *Init system* command was specified, *Activate waste #2* also starts the vacuum pump.

#### Activate waste #3

This command applies the vacuum to waste # 3. If no previous *Init system* command was specified, *Activate waste #3* also starts the vacuum pump.

**Deactivate all wastes**

This command disconnects all wastes from the vacuum supply.

**Deactivate system**

This command switches off the vacuum pump. If you do not specify a *Deactivate system* command in your script, the vacuum pump will be switched off automatically when you quit Freedom EVOware.

**15.21 Worklist Command**

The Worklist command is used to load a worklist file or run previously loaded worklist files. A worklist file is a text file containing pipetting instructions. It contains information on source and destination positions and the volumes to pipette. Worklists can be created using a plain text editor (see 15.21.2 “Worklist File Format”, 15-34). They can also be created automatically by the Worklist Import command (see 15.22 “Worklist Import Command”, 15-41).

If your pipetting instrument is fitted with two liquid handling arms (and you have installed drivers for both of them), there will be two Worklist commands in the Control Bar. Use the “Worklist” command if you want the worklist to use the first LiHa. Use the “Worklist 2” command if you want the worklist to use the second LiHa. The commands are otherwise identical.

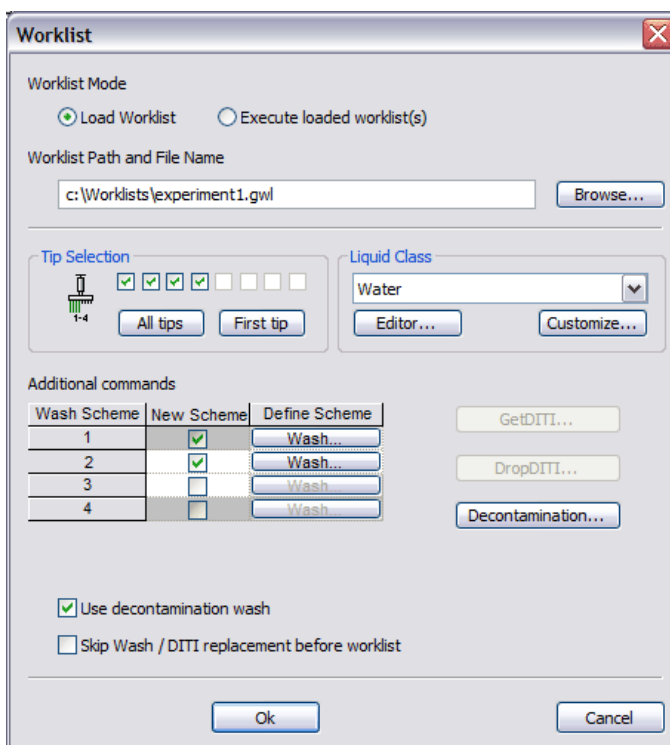


Fig. 15-22 Worklist command

The parameters of the Worklist command are as follows:

### Worklist Mode

If you want to execute a worklist in an Freedom EVOware script, you must first load it in the script. Insert a Worklist command and click *Load Worklist* to load the worklist file and specify additional parameters for the pipetting operations.

Then insert another Worklist command in a later line of your script and click *Execute loaded worklist(s)* to run the worklist file. In this mode, all other parameters in the command are disabled and cannot be modified.

You can load several worklists by inserting several *Load Worklist* commands in your script. In this case, a single *Execute loaded worklist(s)* command runs all of the worklists which you have loaded. They will be executed in chronological order of loading. Freedom EVOware keeps a track of the worklists which have been run, and a second *Execute loaded worklist(s)* command will not run them again unless you have reloaded them.

### Worklist (Path and Name)

Specify the file name and location of the worklist file (\*.gwl). Enter the path and file name directly or click Browse and choose an existing file.

### Tip Selection

Select the tips you want to use. If the worklist file specifies the tip selection (with the TipMask parameter) it overrides the settings you make here.

**Note:** *You cannot use a mixture of tip types (fixed tips and DITIs) in the same worklist. As soon as you choose a fixed tip, you can no longer choose any DITIs and vice versa. If the LiHa is fitted with a mixture of tip types, uncheck all of the checkboxes to switch from using fixed tips to DITIs, or vice versa.*

### Liquid Class

You can choose a different liquid class for each source labware and for the destination labware. Click the *Editor* button to start the liquid classes editor if you want to create a new class or modify an existing class (see [10 “Configuring Liquid Classes”, 10-1](#)). Furthermore you can customize an existing liquid class for use by this command only (click the *Customize* button and click the Aspirate or Dispense tab). If you customize an existing liquid class, the liquid class name is shown in the script command and in the script editor within double angled brackets “>> name <<”.

**Note:** *Instead of customizing a liquid class which is only used by a single instance of this command, it is better practice to create a custom liquid class with the liquid class editor which can then be used by any command and any script.*

If the worklist file specifies the liquid class (with the LiquidClass parameter) it overrides the settings you make here.

### Additional Commands

If you want to use standard tips in the worklist, the Worklist command lets you specify up to four wash schemes which are executed sequentially.

Check the first checkbox in the New Scheme column and click the Wash button to configure the settings to use for washing the tips. The tips should be washed between aspirations from different source wells. Tip washing is specified in the worklist file with the W record.

If required, click additional checkboxes in the New Scheme column to configure additional wash schemes. The wash schemes are selected in the worklist using the worklist records W1, W2, W3 or W4. To ensure compatibility with existing worklists, W also selects the first wash scheme.

If you want to use DITIs in the worklist, click the **Get DITI** and **Drop DITI** buttons to configure the settings to use for replacing the DiTIs. The DITIs should be replaced between aspirations from different source wells. DITI replacement is specified in the worklist file with the W record. Insert a Periodic Wash command in your script before the Worklist command if you want to flush the DITI adapters when the DITIs are replaced (see [15.5 “Periodic Wash Command”](#), ¶ 15-10).

You cannot use a mixture of tip types (fixed tips and DITIs) in the same worklist. The Get DITI and Drop DITI buttons will be inactive (grey) as soon as you choose a fixed tip with the Tip Selection checkboxes. Conversely, the Wash button will be inactive (grey) as soon as you choose a DITI with the Tip Selection checkboxes.

**Use decontamination wash:** Check this checkbox if you want to carry out a decontamination wash before the main wash procedure. Then click the **Decontamination** button to specify the settings (see [15.21.1 “Decontamination Wash Settings”](#), ¶ 15-33).

**Skip Wash / DITI replacement before worklist:** When you execute a worklist, Freedom EVOware normally washes the tips (if you are using fixed tips) or replaces the DITIs (if you are using DITIs) before starting to execute the worklist commands (this initial wash is done using the first wash scheme which you configured in the Worklist command). Check this checkbox if you do not want to wash the tips or replace the DITIs before executing the worklist commands (for example because you have already washed the tips in a previous script command).

#### 15.21.1 Decontamination Wash Settings

The decontamination wash operation soaks the tips in the specified liquid for a specified time. It can be used e.g. to remove traces of sticky liquids from the tips and is carried out before the main wash procedure:

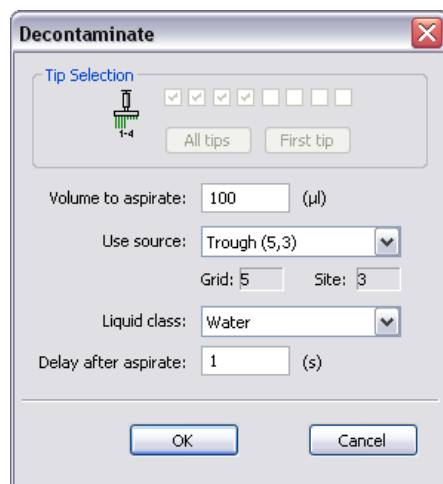


Fig. 15-23 Worklist command - Decontamination Wash parameters

Decontamination Wash is specified in the worklist file with the WD record. The parameters of the decontamination wash operation are as follows:

**Tip Selection**

The tip selection is shown for information only and cannot be changed. The decontamination wash uses the same tip selection as the main wash procedure.

**Volume to aspirate**

Specify the volume of wash liquid you want to aspirate (range: 1 to 1000 µl).

**Use source**

The wash liquid for the decontamination wash is aspirated from a trough (liquid container). Choose the required trough from the pull down list. The list shows all troughs which are currently positioned in the Worktable Editor.

**Liquid Class**

Choose the required liquid class from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument. For example, you will not see liquid classes for DiTis if the LiHa is not currently configured with DiTis.

**Delay after aspirate**

Specify how long you want to soak the tips (range: 1 to 1800 s).

**15.21.2 Worklist File Format**

A worklist file is a text file containing pipetting instructions. The worklist commands consist of individual lines (or *records*). Seven different record types are available: Aspirate, Dispense, Wash Tips / Replace DITIs, Flush, Break, Set DITI Type and Comment. Each record starts with a single character indicating the type and is followed by one or more parameters. The parameters are separated by semicolons. Some of the parameters are optional (see later) and some record types have no parameters.

The **Aspirate** record has the following structure:

**A**;*RackLabel*;*RackID*;*RackType*;*Position*;*TubeID*;*Volume*;*LiquidClass*;*TipType*  
;*TipMask*;*ForcedRackType*

Each Aspirate record specifies the aspiration parameters for a single tip (the next unused tip from the tip selection you have specified).

The **Dispense** record has the following structure:

**D**;*RackLabel*;*RackID*;*RackType*;*Position*;*TubeID*;*Volume*;*LiquidClass*;*TipType*  
 ;*TipMask*;*ForcedRackType*

Each Dispense record specifies the dispensing parameters for a single tip. It uses the same tip which was used by the preceding Aspirate record.

See [15.21.2.1 “Parameters for Aspirate and Dispense records”](#), [15-36](#) for details of the parameters.

The **Wash Tip / Replace DITI** record has the following structure:

**W**; (to use the first wash scheme in the worklist command), or  
**W1**; (to use the first wash scheme in the worklist command), or  
**W2**; (to use the second wash scheme in the worklist command), or  
**W3**; (to use the third wash scheme in the worklist command), or  
**W4**; (to use the fourth wash scheme in the worklist command).

The Wash Tip / Replace DITI record washes the tip (or replaces the DITI) which was used by the preceding Aspirate record. There are no parameters (the wash position, wash parameters and/or drop DITIs position are specified in the Worklist command).

The **Decontamination Wash** record has the following structure:

**WD**;

Decontamination wash consists of a decontamination wash operation followed by the normal wash procedure. There are no parameters (the parameters are specified in the Worklist command).

The **Flush** record has the following structure:

**F**;

It discards the contents of the tips without washing them or dropping DITIs.

The **Break** record forces the execution of previously specified aspirate, dispense or wash actions which have not yet been executed. It has the following structure:

**B**;

If you don't specify a Break record, Freedom EVOware normally executes pipetting commands in groups to optimize the efficiency. For example, if you have specified four tips in the Worklist command, Freedom EVOware will queue Aspirate records until four of them are ready for execution. This allows pipetting to take place using all four tips at the same time. Specify the Break record if you want to execute all of the currently queued commands without waiting. You can use the Break record e.g. to create a worklist which pipettes using only one tip at a time (even if you chose more than one tip in the tip selection).

The **Set DITI Type** record has the following structure:

**S**;*DITL\_Index*

When using DITIs, it is used to switch DITI types from within a worklist. Choose the required DITI type by specifying the DiTi index. Freedom EVOware automatically assigns a unique index to each DITI type. The DiTi index is shown in the Edit Labware dialog box for the DITI labware (Well dimensions tab). See [9.4.1 “Editing Labware, Well Dimensions Tab”](#), [9-13](#).

The worklist normally uses the DITI type which you select with the *Get DITI* button in the Worklist command. As the DiTi index in worklists is 1-based you have to increase the shown DiTi index by one.

The **Set DITI Type** record can only be used at the very beginning of the worklist or directly after a **Break** record. A **Break** record always resets the DITI type to the type selected in the Worklist command. Accordingly, if your worklist contains a **Break** record, you may need to specify the **Set DITI Type** record again.

The **Comment** record (ignored by Freedom EVOware) has the following structure:

**C**; *Comment*

The **Reagent Distribution** record has the following structure:

**R**; *AspirateParameters*; *DispenseParameters*; *Volume*; *LiquidClass*; *NoOfDitiReuses*; *NoOfMultiDisp*; *Direction*[:*ExcludeDestWell*]\*

where:

AspirateParameters =

*SrcRackLabel*; *SrcRackID*; *SrcRackType*; *SrcPosStart*; *SrcPosEnd*;

and

DispenseParameters =

*DestRackLabel*; *DestRackID*; *DestRackType*; *DestPosStart*; *DestPosEnd*;

See 15.21.2.2 “Parameters for Reagent Distribution records”, 15-37 for details of the parameters.

The Reagent Distribution record specifies the aspiration and dispensing parameters for all of the tips you have chosen (and dispenses the same volume in all of the chosen wells in the destination labware).

The Reagent Distribution record has the following advantages when compared to separate Aspirate and Dispense records:

- ♦ Pipetting is automatically optimized during script runtime for the number of tips which are actually fitted to the LiHa.
- ♦ Pipetting is automatically adapted to special LiHa configurations such as the 8 Plus 1 Access option of the Freedom EVO 75 pipetting instrument - it is not necessary to create a custom, LiHa-specific worklist.
- ♦ Worklists are shorter and easier to set up manually using an editor - less risk of programming errors.

For some examples, see 15.21.6 “Worklist Examples for the Reagent Distribution Record”, 15-40.

### 15.21.2.1 Parameters for Aspirate and Dispense records

The parameters for Aspirate and Dispense records are as follows:

**Tab. 15-1** Parameters for Aspirate and Dispense records in a worklist file

Parameter	Range	Explanation
RackLabel	Max. 32 characters	User-defined label (name) which is assigned to the labware.
RackID	Max. 32 characters	Labware barcode.
RackType	Max. 32 characters	Labware type (configuration name), e.g. “384 Well, landscape”.
Position	1 .. number of wells	Well position in the labware. The position starts with 1 and increases from rear to front and left to right.
TubeID	Max. 32 characters	Tube barcode.
Volume	0 .. +7158278	Pipetting volume in µl.
LiquidClass	Max. 32 characters	This optional parameter overwrites the liquid class specified in the Worklist command.



**Tab. 15-1** Parameters for Aspirate and Dispense records in a worklist file (cont.)

Parameter	Range	Explanation
TipType		Reserved, must be omitted.
TipMask	1 .. 128	This optional parameter specifies the tip you want to use. The tip number is bit-coded, i.e. Tip 1 = 1, Tip 2 = 2, Tip 3 = 4; Tip 4 = 8 and so on. Please note that you can only use a tip which has been enabled with Tip Selection in the Worklist command. If you do not specify TipMask, Freedom EVOware uses one of the tips specified with Tip Selection in the Worklist command.
ForcedRack-Type	Max. 32 characters	This optional parameter is the configuration name of the labware. If specified, it is used instead of the labware type which is found on the Freedom EVOware worktable.
MinDetected-Volume	0 .. +7158278	Liquid volume in $\mu\text{l}$ . If this optional parameter is specified and Liquid Level Detection is enabled in the selected liquid class, it is used by the LiHa to determine the minimum liquid height which must be available in the well. Otherwise a liquid detection error (not enough liquid) will be triggered. MinDetectedVolume specifies the <i>usable volume</i> of liquid. If the aspiration position in the liquid class specifies tip immersion (tip submerging), the actual liquid height in the well must be higher to allow immersion (i.e. the volume of liquid in the well must be more than MinDetectedVolume).

### 15.21.2.2 Parameters for Reagent Distribution records

The aspirate parameters for Reagent Distribution records are as follows:

**Tab. 15-2** Aspirate Parameters for the Reagent Distribution command

Parameter	Range	Explanation
SrcRackLabel	Max. 32 characters	User-defined label (name) which is assigned to the source labware.
SrcRackID	Max. 32 characters	Source labware barcode.
SrcRackType	Max. 32 characters	Source labware type (configuration name), e.g. "384 Well, landscape".
SrcPosStart	1 .. number of wells	First well to be used in the source labware.
SrcPosEnd	1 .. number of wells	Last well to be used in the source labware.

The dispense parameters for Reagent Distribution records are as follows:

**Tab. 15-3** Dispense Parameters for the Reagent Distribution command

Parameter	Range	Explanation
DestRackLabel	Max. 32 characters	User-defined label (name) which is assigned to the destination labware.
DestRackID	Max. 32 characters	Destination labware barcode.
DestRackType	Max. 32 characters	Destination labware type (configuration name), e.g. "384 Well, landscape".
DestPosStart	1 .. number of wells	First well to be used in the destination labware.
DestPosEnd	1 .. number of wells	Last well to be used in the destination labware.

The following parameters must also be specified for Reagent Distribution records:

**Tab. 15-4** Additional Parameters for the Reagent Distribution command

Parameter	Range	Explanation
Volume	0 .. +7158278	Dispense volume in the destination labware in µl.
LiquidClass	Max. 32 characters	This optional parameter overwrites the liquid class specified in the Worklist command.
NoOfDiTiReuses	-	Optional maximum number of DiTi reuses allowed (default 1 = no DiTi reuse).
NoOfMulti-Disp	-	Optional maximum number of dispenses in a multi-dispense sequence (default 1 = no multi-dispense).
Direction	-	Optional pipetting direction (0 = left to right, 1 = right to left; default = 0).
[ExcludeDestWell]*]		Optional list of wells in destination labware to be excluded from pipetting

The following sections describe how to create files for three different types of worklist with Aspirate and Dispense records.

### 15.21.3 Worklist Examples Using Labware Labels

Use this worklist format if you want to use labware labels to specify source and/or destination positions in the worklist. This is necessary if your instrument does not have a PosID barcode scanner or your labware does not carry barcodes.

In this case, you only need to define the following parameters in an Aspirate or Dispense record:

**A;**RackLabel;;RackType;Position;;Volume  
**D;**RackLabel;;RackType;Position;;Volume

Parameter *RackType* is optional. If specified, Freedom EVOware checks whether the labware specified with *RackLabel* has the configuration name specified with *RackType*. An error message is displayed if an incorrect labware type is found on the Freedom EVOware worktable.

Parameter *ForcedRackType* is optional. If specified, Freedom EVOware does not use the labware type of the labware specified with *RackLabel*, but uses *ForcedRackType* instead. The following worklist example illustrates the use of *ForcedRackType* in an Aspirate and a Dispense command:

```
A;S1;;;9;;10;;;Microplate, landscape
D;D1;;;1;;10;;;Deepwell, landscape
```

If you specify the *ForcedRackType* parameter, you must make sure that labware of the required types have been placed in the right positions on the instrument's worktable before the worklist is executed.

The system liquid is associated with a "virtual" labware item of type *System* and labware label *Systemliquid*. The following worklist command can be used to aspirate the system liquid:

```
A;Systemliquid;;System;1;;500:Water
```

The following worklist example aspirates 10.1 µl from well A2 in labware "S1", dispenses 6 µl into well A1 in labware "D1", dispenses 4 µl into well B1 in labware "D1" and then washes the tip / changes the DITI:

```
A;S1;;Microplate, landscape;9;;10.1
D;D1;;Microplate, landscape;1;;6
D;D1;;Microplate, landscape;2;;4
W;
```

Note that Freedom EVOware counts wells from rear to front and then from left to right and a *Microplate, landscape* labware has eight wells in each column. Accordingly, well A2 is specified in the above worklist as "9".

#### 15.21.4 Worklist Examples Using Labware Barcodes

Use this worklist format if you want to use labware barcodes to specify source and/or destination positions in the worklist. To use this worklist format, your instrument must be equipped with a PosID option and you must scan the labware (with a PosID command) in advance of the Execute Worklist command.

In this case, you only need to define the following parameters in an Aspirate or Dispense record:

```
A;;RackID;RackType;Position;;Volume
A;;RackID;RackType;Position;;Volume
```

The following worklist example aspirates 10 µl from well H12 in the labware with barcode "1234", dispenses 10 µl into well A12 into the labware with barcode "5678" and then washes the tip / changes the DITI:

```
A;;1234;Microplate, landscape;96;;10
D;;5678;Microplate, landscape;89;;10
W;
```

#### Freedom EVOware Plus

If you use labware barcodes to specify source and/or destination positions in the worklist, do not use a labware repository on the worktable if the labware will be moved during runtime to another worktable position for pipetting. This will lead to pipetting at the wrong worktable position. Use a labware repository in a feeder device (e.g. hotel or carousel) instead. See [11.6 "Labware Generator \(Freedom EVOware Plus\)"](#), [11-14](#).

### 15.21.5 Worklist Examples Using Tube Barcodes

Use this worklist format if you want to use tube barcodes to specify source and/or destination positions in the worklist. To use this worklist format, your instrument must be equipped with a PosID option and you must scan the labware (with a PosID command) in advance of the Execute Worklist command.

In this case, you only need to define the following parameters in an Aspirate or Dispense record:

```
A;;;RackType;;TubeID;Volume
A;;;RackType;;TubeID;Volume
```

The following worklist example aspirates 10 µl from the tube with barcode "S0001", dispenses 10 µl into the tube with barcode "D0002" and then washes the tip / changes the DITI:

```
A;;;Tube 10*100mm, 16 Pos.;;S0001;10
D;;;Tube 16*100mm, 16 Pos.;;D0002;10
W;
```

#### Freedom EVOware Plus

If you use tube barcodes to specify source and/or destination positions in the worklist, do not use a labware repository on the worktable if the tube rack will be moved during runtime to another worktable position for pipetting. This will lead to pipetting at the wrong worktable position. Use a labware repository in a feeder device (e.g. hotel or carousel) instead. See [11.6 "Labware Generator \(Freedom EVOware Plus\)"](#), ¶ 11-14.

### 15.21.6 Worklist Examples for the Reagent Distribution Record

The worklist example below is configured as follows:

- ◆ Source labware: Trough 100ml, labeled 'T3', use wells 1 - 8
- ◆ Destination labware: 96 Well Microplate, labeled 'MTP96-3', use wells 1 - 96
- ◆ Liquid class 'Water'
- ◆ DiTi Reuse = 1 (use only once), Multi-dispense = max. 6
- ◆ Pipetting direction 0 = left to right
- ◆ Exclude wells 27, 46, 51, 69, 82 => Well positions (column,well) 4,3 / 6,6 / 7,3 / 9,5 / 11,2

```
R;T3;;Trough 100ml;1;8;MTP96-3;;96 Well Microplate;1;96;100;Water;
1;6;0;27;46;51;69;82
```

The worklist example below is configured as follows:

- ◆ Source labware: Trough 100ml, labeled 'T2', use wells 1 - 8
- ◆ Destination labware: 96 Well Microplate, labeled 'MTP96-2', use wells 1 - 96
- ◆ Liquid class 'Water'
- ◆ DiTi Reuse = 2 (use 2 times), Multi-dispense = max. 5
- ◆ Pipetting direction 0 = left to right
- ◆ No wells to be excluded

```
R;T2;;Trough 100ml;1;8;MTP96-2;;96 Well Microplate;1;96;100;Water;
2;5;0
```

## 15.22 Worklist Import Command

The Worklist Import command is used to create a Freedom EVOware worklist from an Excel file which is stored in CSV format. See 15.21 “Worklist Command”, 15-31 for more information on worklists.

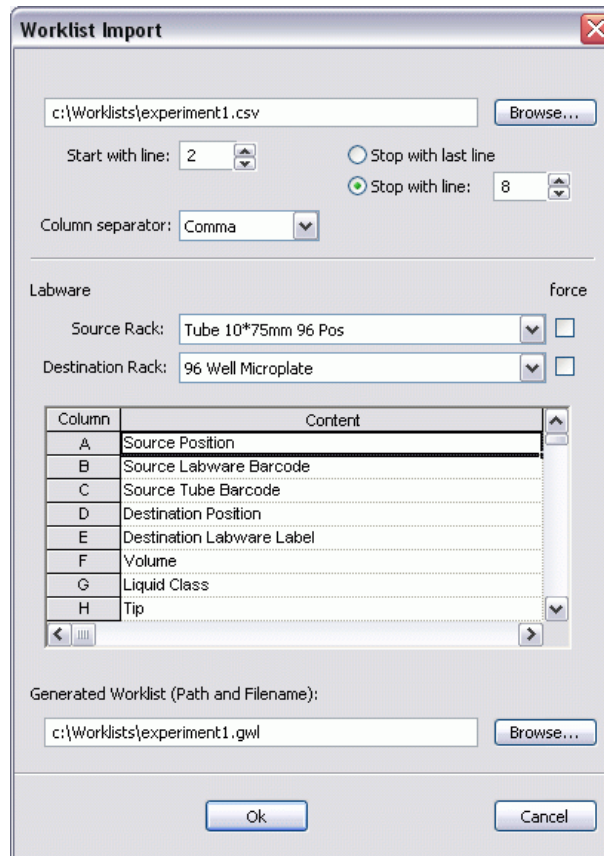


Fig. 15-24 Worklist Import command

The parameters of the Worklist Import command are as follows:

### Import Worklist (Path and Name)

Specify the file name and location of the CSV file to import. Enter the path and file name directly or click Browse and choose an existing file.

### Column Separator

Choose the separator which is used between the fields (columns) in each of the records (i.e. lines) of the import file. The default is Comma.

### Start with line

Conversion normally starts with the first line of the import file. Specify a line number which is higher than 1 to skip one or more lines at the beginning of the file.

### Stop with last line

Stop conversion with the last line of the import file.

### Stop with line

Conversion normally stops with the last line of the import file. Specify the line number where you want the conversion to stop. The remaining lines in the import file are skipped.

### Source Labware

Choose the source labware type for which the generated worklist will be used.

**Force:** Check this checkbox to create a worklist for the chosen source labware type instead of the labware type which is found on the Freedom EVOware worktable. This is done by including the `ForcedRackType` parameter in the A and D records of the worklist (see [15.21.2 “Worklist File Format”](#), [15-34](#)).

### Destination Labware

Choose the destination labware type for which the generated worklist will be used.

**Force:** Check this checkbox to create a worklist for the chosen destination labware type instead of the labware type which is found on the Freedom EVOware worktable. This is done by including the `ForcedRackType` parameter in the A and D records of the worklist (see [15.21.2 “Worklist File Format”](#), [15-34](#)).

### Content

The Worklist Import command can handle up to 11 different input parameters in the import file (labware name, labware barcode, tube barcode, worktable position for both source and destination carrier; volume, liquid class, and tip). For each column (field) of the import file, specify the assignment to one of the 11 parameters by choosing from the drop-down list. Alternatively, leave the Content field empty to skip the field because it is empty or contains irrelevant data. An error message is output if you assign the same parameter to more than one column of the input file or make a meaningless or contradictory assignment.

### Generated Worklist (Path and Filename)

Specify the file name and location of the worklist file (\*.gwl) which should be created. Enter the path and file name directly or click **Browse** and choose an existing worklist file. The Import Worklist command overwrites the previous contents of the file each time it is executed.

### OK

Click *OK* to insert the Worklist Import command in your script.

### Cancel

Click *Cancel* to close the dialog box without inserting the command.

Each time you insert a new command in your script or edit an existing command, Freedom EVOware validates the entire script to check for errors and shows all commands which have errors in red. The Worklist Import command creates the worklist file when you run the script or process. However, the worklist file does not exist yet when validation takes place. Accordingly, Freedom EVOware will indicate an error in the Worklist command which is to receive the worklist file (Error opening worklist file). To avoid the validation error, we recommend you to create an empty (dummy) worklist file using an editor such as Notepad.

## 15.23 Export Data Command

The Export Data command is used to create report files for selected labware or for all labware on the worktable or the Te-MO deck. The report files contain

information about the pipetting which has been carried out. The report files are written to the Output directory which is specified in Freedom EVOware's Configuration Tool (see 8.3.1.4 "Protocol Options Tab", 8-8). The default Output directory is <install\_path>\Output.

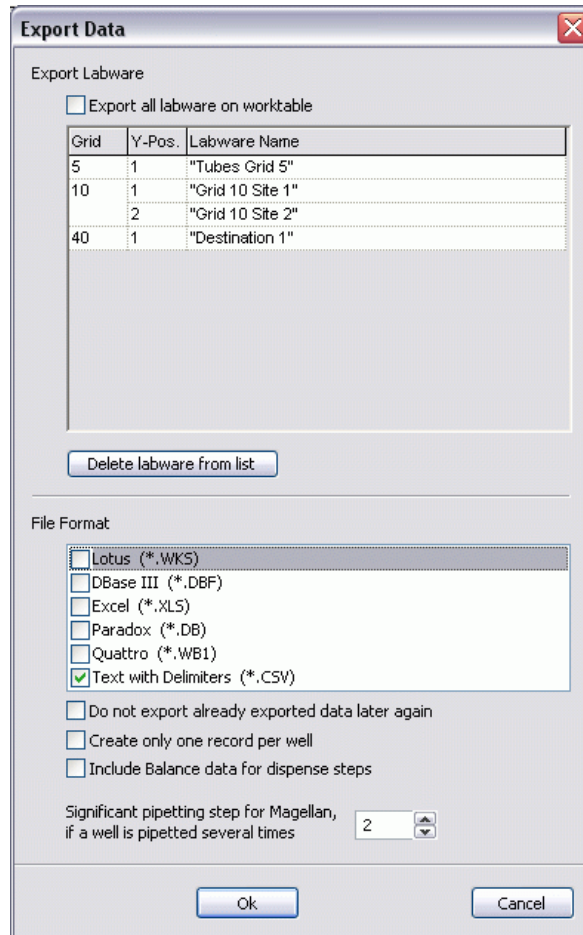


Fig. 15-25 Export Data command

The parameters of the Export Data command are as follows:

**Labware to be exported**

This panel shows the labware for which Freedom EVOware will create output files. A separate report file is created for each labware (see 15.23.1 "File Names for Labware Report Files", 15-45). Add labware to the list by clicking on the labware in the Worktable Editor. To remove an entry, select the line in the list and click *Delete labware from list*.

Check the *Export all labware on worktable* checkbox to creates reports for all labware on the worktable. In this case, the list of labware you have specified is ignored.

**File Formats**

This panel is used to select one or more file formats for the report. Freedom EVOware creates the file(s) in the directory you have specified in Setup > Settings > Output.



### Significant pipetting step for Magellan ...

If you plan to use a Tecan Microplate Reader (photometer) in your script or process, specify which pipetting step is relevant to the Magellan data reduction software if the same well will be pipetted several times. For example, if you pipette the sample and then pipette a reagent, Magellan needs to know which step pipettes the sample. Information on the significant pipetting step will be included in the labware report file which the Export Data command creates for the Magellan software. See [16.8.6 “Magellan - Measure Command”](#), [16-22](#) for further information.

### Do not export already exported data later again

If you use the Export Data command more than once in the same script, check this option if you don't want to export pipetting data again which has already been exported. This setting deletes the internal pipetting records for all prior pipetting operations, not only for the labware specified in the Export Data command.

### Create only one record per well

Freedom EVOware normally outputs one record for each Aspirate or Dispense command for each well. If you check this checkbox, Freedom EVOware only writes one record for each well. The record will then contain information on the accumulated errors (bitwise addition of all error codes), the accumulated total pipetting volume (the sum of dispense volumes, i.e. positive values and aspirate volumes, i.e. negative values) and the maximum detected volume. It will not contain any information about the various source labwares.

### Include balance data for dispense steps

The Liquid Arrival Check (LAC) feature verifies that the correct liquid volumes have been dispensed by weighing the labware before and after pipetting. The labware must be put onto a special balance (pooling balance) for the dispense operation. Check this checkbox if you want to include the weight measurements in the report file. In this case, the report file will include four extra columns if a Liquid Arrival Check was carried out when dispensing. See [15.23.4 “Pooling balance data in report files”](#), [15-51](#) for more information.

### Export Data and Transfer Labware commands

If your script uses the Transfer Labware or Transfer Tube command to move labware which you have specified in the Export Data command, the Export Data command must be used before the labware is moved. Otherwise, positional information in the report file may be misleading or incorrect.

If your script uses the Transfer Labware or Transfer Tube command to move labware which you have specified in the Export Data command and you want to use the Export Data command again in the same script, you must check the Do not export already exported data later again checkboxes in the Export Data commands. Otherwise, the positional information in the report files may be misleading or incorrect.

**Note:** This behavior was different until EVOware 2.5 SP4. Until then, the pipetting information was remembered even if the labware was moved away. To switch back to the old behavior set the parameter `Delete_Rack_At_Source = 0` in [Options] section of `Evoware.opt`. But be careful: when a different labware is moved to this position and is pipetted there this could lead to data mess-up. See also: [A.3 Parameters in the Evoware.opt file](#).



### 15.23.1 File Names for Labware Report Files

The file names for the labware report files are created automatically and contain the labware barcodes as follows:

*labware barcode + extension for selected file format* (e.g. 9900001.xls)

The file name for a tube rack report file (e.g. Tube 13\*75mm, 16 Pos.) is:

*tube rack barcode + extension for selected file format* (e.g. 013\_000064.xls)

Slash “/” characters in tube rack barcodes are replaced in file names by underscore “\_”. The barcodes are also reported in the *SRCRackID* field of each labware report file.

If a labware or tube rack barcode was not scanned in advance of the Export Data command, the labware label is used to create the file name instead, for example:

*labware label + extension for selected file format* (e.g. MyLabware1.xls)

Labware labels are unique within the same worktable layout. See also [15.23.2 “Simulated Barcodes for the Export Data Command”](#), ¶ 15-45.

### 15.23.2 Simulated Barcodes for the Export Data Command

If a labware or tube rack barcode was not scanned in advance of the Export Data command, the labware label is used for the barcode instead (“simulated barcode”). Labware labels are unique within the same worktable layout.

Missing tube barcodes are not simulated; they are left blank in the report file.

### 15.23.3 Report File Format

The following is an example of an output file in Excel format (example file name 9900001.xls).

Depending on the version and configuration of your instrument, some of the fields may not be applicable and will be left blank, but – to preserve the file structure – the fields will not be omitted completely. Fields which are intended for labware barcodes contain simulated barcodes if the barcode was not scanned (see [15.23.2 “Simulated Barcodes for the Export Data Command”](#), ¶ 15-45). Fields which are intended for tube barcodes contain three stars (\*\*\*) if the barcode could not be read.

If you checked *Include balance data for dispense steps* in the Export Data command and a Liquid Arrival Check was carried out when dispensing, the report file includes four additional columns for the pooling balance data. These four columns are described in [15.23.4 “Pooling balance data in report files”](#), ¶ 15-51 but are not shown in the following table due to lack of space:

Tab. 15-5 Sample Excel file produced with the Export Data command

Pos.	Tube ID	Scan Error	SRCrack	SRC Pos	SRC Tube ID	Volume	Error	SRCrackID	Grid Pos	SiteOnGrid	Tip Number	Detect Vol	Time
	Version 1.20	3091	96 Well Microplate	12	8	1	0	9900001	18	2	FB28		3.8.2005
1		0	Tube 13*85mm	1	0001	10	0	013_000064	4	1	1		11:55:42
3		0	Tube 13*85mm	2	0002	20	0	013_000064	4	1	2		11:55:42
5		0	Tube 13*85mm	3	0003	30	0	013_000064	4	1	3		11:55:42
7		0	Tube 13*85mm	4	0004	40	0	013_000064	4	1	4		11:55:42

In the example, liquid was pipetted from four tubes into a microplate. The first line contains the column headers, which are the same for all file formats (except that some file formats only support upper-case characters for column headers). The second line contains information on the labware or tube rack for which the report was created and the date that the report was created. The second line also contains information which is relevant to the Magellan (data reduction) option. The third and subsequent lines contain information on the wells in the labware or the tubes in the tube rack. Dispense commands are indicated by a positive value in the volume column and aspirate commands are indicated by a negative value. The columns contain the following information:

**Tab. 15-6** Parameters in the report file output by the Export Data command

Column	Range	Explanation
Position	1 .. number of wells	Destination well number or tube number. The numbering sequence is rear to front and then left to right.
TubeID	Max. 32 characters	Barcode of destination tube. This column is only used if the destination is a tube rack (i.e. you are pipetting into tubes).  In line 2, this column shows the Freedom EVOware software version.
ScanError	0 .. 4294967295	This column shows barcode scanning errors (if any) of the actual tube. See <a href="#">Tab. 15-7</a> , <a href="#">¶ 15-49</a> , below.  In line 2, this column shows the serial number of pipetting instrument. If you chose to include pooling balance data in the report file and a Liquid Arrival Check was carried out when dispensing, the serial number of the balance is also included in line 2 (see <a href="#">15.23.4 "Pooling balance data in report files"</a> , <a href="#">¶ 15-51</a> ). The two serial numbers are separated by "/".
SRCRack	Max. 32 characters	For dispense commands, this column shows the configuration name of the source labware.  In line 2, this column shows the configuration name of the labware for which the report file was created (the configuration name of the destination labware).
SRCPos	1 .. number of wells	For dispense commands, this column shows the position in the source labware where the liquid came from.  In line 2, this column shows the total number of wells in the labware in the x direction.
SRCTubeID	Max. 32 characters	If the source for a dispense command was a tube rack, this column shows the barcode of the source tube.  In line 2, this column shows the total number of wells in the labware in the y direction.
Volume	-7158278 .. +7158278	This column contains the volume in µl which was dispensed (positive value) or aspirated (negative value). dest  In line 2, this column shows which pipetting step is relevant to the Tecan Magellan software if more than one has been carried out on the same well; see <a href="#">"Significant pipetting step for Magellan ..."</a> , <a href="#">¶ 15-44</a> for further information.

**Tab. 15-6** Parameters in the report file output by the Export Data command (cont.)

Column	Range	Explanation
Error	0 .. 4294967295	<p>This column shows inherited barcode and pipetting errors (if any). See <a href="#">Tab. 15-8</a>, <a href="#">15-49</a>, below.</p> <p>In line 2, this column shows scanning errors for the labware for which the report file was created.</p>
SRCRackID	max. 32 characters	<p>For dispense commands, this column shows the barcode of the source labware. If the source for the dispense command was a tube rack, this column shows the barcode of the source tube rack.</p> <p>In line 2, this column shows the barcode of the labware for which the report file was created. For labware on the Te-MO, it shows the simulated barcode (see <a href="#">15.23.1 "File Names for Labware Report Files"</a>, <a href="#">15-45</a>).</p>
GridPos	1 .. 67	<p>For dispense commands, this column shows the grid position of the source labware.</p> <p>In line 2, this column shows the grid position of the labware for which the report file was created.</p>
SiteOnGrid	1 .. 128	<p>For dispense commands, this column shows the carrier site of the source labware. It is always 1 when dispensing from tube racks (because they only have one site).</p> <p>In line 2, this column shows the carrier site of the labware for which the report file was created. It is always 1 when dispensing into tube racks (because they only have one site).</p>
TipNumber	1 .. 8	<p>This column shows the tip number which was used for pipetting into / from this well.</p> <p>In line 2, this column contains the 4-character checksum for the file. This is used to check whether the file is corrupted or has been modified outside of Freedom EVOware (see <a href="#">A.11.1 "Data Explorer Tool"</a>, <a href="#">A-37</a>).</p>
DetectVol	0 .. +7158278	<p>If liquid level detection was used, this column shows the detected volume in the well before the aspirate / dispense command.</p>
Time		<p>This is the time (hh:mm:ss) when the pipetting was carried out on the well.</p> <p>In line 2, this column shows the date that the report was created.</p>

The following table shows possible codes in the ScanError column. The value is bit-coded. If several errors occurred, the value shown is the bit-wise addition of

the separate error codes. The Te-MO does not have a barcode scanner and does not generate barcode scanning errors.

**Tab. 15-7** Barcode scanning error codes in the report file output by the Export Data command

Code (decimal)	Code (hex)	Caused by	Explanation
0	0	-	No error.
16	10	Instrument	A barcode could not be read by the PosID or the PosID-3 scanner.
32	20	Instrument	The same labware was scanned again (at the same grid position or at a new worktable position of the same labware) and the scanned barcode did not match the previously scanned barcode. If this error occurs, Freedom EVOware updates the stored information for the labware with the newer barcode.
64	40	Instrument	An identical barcode was scanned at an unexpected grid position. Either (a) two labware items have identical barcodes or (b) the labware was moved to a different grid position manually. If this error occurs, Freedom EVOware assumes that (b) has taken place and updates the stored information for the labware with the new position.
4096	1000	User	The user entered the barcode manually after a scanning error.
8192	2000	User	The user chose <i>Retry</i> after a barcode scanning error.
16384	4000	User	The user chose <i>Ignore</i> after a barcode scanning error.

The following table shows possible codes in the Error column. The value is bit-coded. If several errors occurred, the value shown is the bit-wise addition of the separate error codes.

**Tab. 15-8** Pipetting error codes in the report file output by the Export Data command

Code (decimal)	Code (hex)	Caused by	Explanation
0	0	-	No error.
1	1	Instrument	No liquid was detected.
2	2	Instrument	Not enough liquid was detected.
4	4	Instrument	Clot was detected.
8	8	Instrument	A dilutor error occurred during pipetting.

**Tab. 15-8** Pipetting error codes in the report file output by the Export Data command (cont.)

Code (decimal)	Code (hex)	Caused by	Explanation
256	100	Instrument	Liquid Arrival Check, liquid error: The dispensed volume was outside of the tolerance specified in the liquid class. This error is generated by the LAC (pooling balance) feature (see 15.23.4 "Pooling balance data in report files", ¶ 15-51).
512	200	Instrument	Liquid Arrival Check, technical error: timeout or hardware malfunction such as balance overload. This error is generated by the LAC (pooling balance) feature.
1,024	400	Instrument	The PMP option detected a tip orifice occlusion (e.g. clot aspirated). This error also results in error code 4 (clot detected).
2,048	800	Instrument	The PMP option detected pipetting anomaly which could result in a wrong dispense volume.
65,536	10000	User	The dilutor was initialized after a dilutor error.
131,072	20000	User	The dilutor was deactivated after a dilutor error.
262,144	40000	User	The user chose <i>Retry</i> after a clot-detection error.
524,288	80000	User	The user chose <i>Ignore</i> after a clot-detection error.
1,048,576	100000	User	The user chose <i>Continue</i> after a clot-detection error.
2,097,152	200000	User	The user chose <i>Retry</i> after a liquid-detection error.
4,194,304	400000	User	The user chose <i>Aspirate air</i> after a liquid-detection error.
8,388,608	800000	User	The user chose <i>Move tips to Z-Max</i> after a liquid-detection error.
16,777,216	1000000	User	The user chose <i>Pipette nothing</i> after a liquid error.
33,554,432	2000000	Instrument	The PMP option detected an instrument error (e.g. a leakage from the air gap or a blocked pressure channel). <sup>a)</sup>
67,108,864	4000000	Instrument	The PMP option detected an unspecified error. If this occurs more than three times in a row for the same tip, this can also indicate an instrument error. <sup>a)</sup>

a) In the case of an instrument error, you can use the Instrument software (PMP panel) to get more detailed information on the error. The Instrument software is provided by Tecan to service engineers. See 17.6.3 "PMP Error and Success Messages", ¶ 17-19 for more information on PMP errors and error handling.

**Note:** If a liquid from a container or tube which returns a barcode error is pipetted to another labware item, the error is inherited in the destination well as a pipetting error (not a barcode error). The value of the error code is unchanged (see Tab. 15-7, ¶ 15-49 for a list of the applicable error codes).

**Note:** If “Pipette Nothing” was chosen after a liquid level detection error or clot error, the affected well(s) will not be reported any more in the output files.

### 15.23.4 Pooling balance data in report files

The Liquid Arrival Check (LAC) feature verifies that the correct liquid volumes have been dispensed by weighing the labware before and after pipetting. The labware must be put onto a special balance (pooling balance) for the dispense operation.

The Liquid Arrival Check is only carried out if the labware is put onto a pooling balance for the dispense operation and LAC is activated for the liquid class which is used. See 10.1.1 “Global Parameters for Liquid Classes”, 10-4, Liquid Arrival Check panel.

If you checked the *Include balance data for dispense steps* checkbox in the Export Data command and a Liquid Arrival Check was carried out, the report file will include the following four additional columns for the pooling balance data:

**Tab. 15-9** Additional columns in the report file for pooling balance data

Expected Weight	ActualWeight	ActualVolume	SampleDensity
150.00	149.00	135.45	
50.00	52.00	47.27	1.10
25.00	22.00	20.00	1.10
50.00	51.00	46.36	1.10
25.00	24.00	21.81	1.10

The columns contain the following information:

**Tab. 15-10** Parameters in the report file for pooling balance data

Column	Explanation
Expected Weight	Expected weight difference calculated from the expected volume and the sample density. <sup>a)</sup>  Line 2: Total expected weight (sum of all dispense steps).
ActualWeight	Actual weight difference indicated by the pooling balance by measuring before and after the dispense step.  Line 2: Total actual weight difference (sum of all dispense steps).
ActualVolume	Actual dispensed volume calculated from the actual weight difference and the sample density. <sup>a)</sup>  Line 2: Total actual dispensed volume (sum of all dispense steps).
SampleDensity	Density of the dispensed liquid. <sup>a)</sup>  Line 2: Empty.

a) As specified in the liquid class used for the dispense step.

## 15.24 Copy Plate Wizard

The Copy Plate wizard creates a set of script commands which make identical copies of the source plate on one or more destination plates. You can copy the whole plate or a rectangular selection of wells.

After you have completed all of the steps in the wizard, it creates script commands which carry out the required actions and inserts them in the Script Editor window at the currently selected position. If necessary, the script commands can then be edited if you want to include some special features.

### 15.24.1 Copy Plate Wizard, Step 1 of 4

Select the source plate parameters:





Fig. 15-26 Copy Plate wizard, step 1 of 4

**Click on the source plate you want to use**

Select the source plate by clicking on the labware in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item.

**Select the tips you want to use**

Check the appropriate checkboxes.

*Note: The Copy Plate wizard does not allow you to use a mixture of standard tips and DITIs. If your pipetting instrument has both standard tips and DITIs, you must uncheck all standard tips before you can choose any DITIs (and vice versa).*

**Click on the DITI rack you want to use**

This option only appears if you are using DITIs (disposable tips). Select the DITI rack by clicking on it in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item.

**Select the liquid class**

Choose the required liquid class for the source plate from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument. See also 10 “Configuring Liquid Classes”, 10-1.

**Do you want to mix before aspirating**

Click the appropriate radio button. If you choose Yes, you must also specify how many times to mix and the volume to mix with.

**How many plates do you want to copy**

Select the number of copies you want to make from the source labware. The allowed range is from 1 to 16.

**Do you want to use multi-pipetting mode**

This option only appears if you have chosen to make more than one copy. With multi-pipetting mode, the liquid which is aspirated is dispensed in portions into several destination positions. With single pipetting mode, the liquid which is aspirated is dispensed into a single destination position in one step.

### 15.24.2 Copy Plate Wizard, Step 2 of 4

Select the destination plate parameters:

Fig. 15-27 Copy Plate wizard, step 2 of 4

#### Click on the first destination plate you want to use

Select the destination plate by clicking on the labware in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item.

If you have chosen to make more than one copy, Freedom EVOware will choose additional labware of the same type automatically by searching the worktable from rear to front and then from left to right (you cannot select it yourself). Make sure there is enough labware on the worktable for all of the copies and choose the left-most and top-most plate for the first copy. Otherwise the script which is created will contain errors (faulty script lines are marked in red).

#### Select the liquid class

Choose the required liquid class for the destination plate(s) from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument.

#### Wash tips after x aspiration(s)

This option only appears if you are using fixed tips. Enter a non-zero value if you want to wash the tips after aspirating. If you specify “1”, washing will be carried out after each aspiration.

#### Change DiTis after x aspirations

This option only appears if you are using DiTIs (disposable tips). Enter a non-zero value if you want to replace the DiTIs after aspirating. If you specify “1”, the DiTIs will be replaced after each aspiration.

The following settings for the waste and the cleaner do not appear if you have chosen “0” (i.e. “wash is not necessary” or “DiTI change is not necessary”).

**Select the waste site**

Choose the waste unit you want to use from the pull down list. The list shows all waste units which are currently positioned in the Worktable Editor. The worktable grid position is shown in brackets. You must first put a wash station with waste unit in the Worktable Editor. Alternatively, specify the worktable position for the waste by clicking on it in the Worktable Editor. If only one waste unit is present, it is chosen automatically.

When using multi-pipetting mode, Freedom EVOware uses the chosen waste for discarding the excess volume before aspirating again from the same source. See also [15.5 "Periodic Wash Command"](#), ¶ 15-10.

**Select the cleaner site**

This option only appears if you are using fixed tips. Choose the cleaner unit you want to use from the pull down list. The list shows all cleaner units which are currently positioned in the Worktable Editor. You must first put a wash station with cleaner unit in the Worktable Editor. If only one cleaner unit is present, it is chosen automatically. Alternatively, specify the worktable position for the cleaner by clicking on it in the Worktable Editor.

Choose a shallow cleaner if you only need to clean the ends of the tips. Choose a deep cleaner if there is a possibility of contamination along the shaft of the tip. The deep cleaner requires a larger volume of system liquid and cleaning takes somewhat longer.

**Volumes in cleaner and in waste**

These options only appear if you are using fixed tips. Specify the volume of system liquid which should be used to wash the outside of the tips (volume in cleaner) and to flush the inside of the tips (volume in waste). Appropriate settings are chosen automatically. For more information on washing see [15.4 "Wash Tips Command"](#), ¶ 15-8.

**Use Fast-Wash Module**

If your instrument is fitted with FWO (Fast Wash Option) or MPO (Monitored Pump Option), check this checkbox to use the Fast Wash module instead of the dilutors to wash the tips.

**Use Pinch Valve**

If your instrument is fitted with the Low Volume Option, check this checkbox to activate the Low Volume Option after washing the tips.

**Volume in destination wells**

Specify the required volume of liquid in the destination wells (the same volume will be dispensed to all wells of all copies). Freedom EVOware automatically calculates the necessary aspiration volume for the source labware. However, Freedom EVOware does not automatically handle volumes that exceed the dilutor or DITI capacity.

**Do you want to mix after dispensing**

Click the appropriate radio button. If you choose Yes, you must also specify how many times to mix and the volume to mix with.

**15.24.3 Copy Plate Wizard, Step 3 of 4**

Select the source wells to be copied:

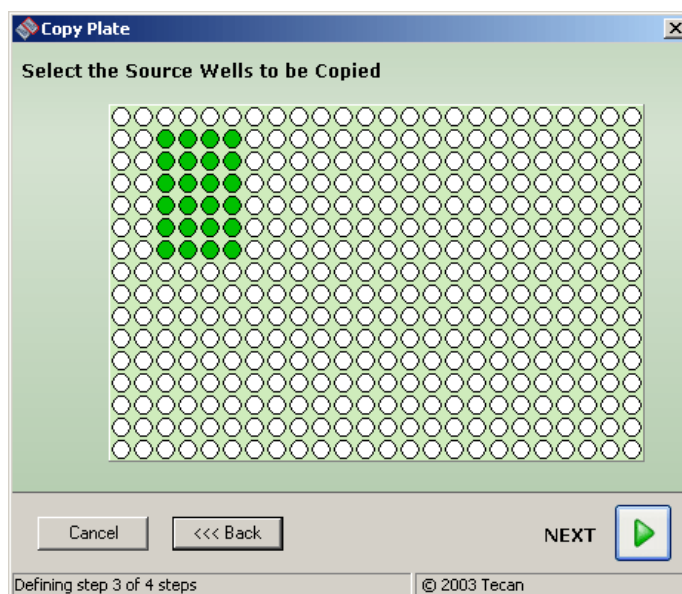


Fig. 15-28 Copy Plate wizard, step 3 of 4

#### Select the source wells to be copied

Select one or more rows and columns of wells by clicking with the mouse and dragging. Tip: the cursor shows the x and y coordinates for each well as it moves over the labware.

#### 15.24.4 Copy Plate Wizard, Step 4 of 4

Select the start position (top left) of the destination wells:

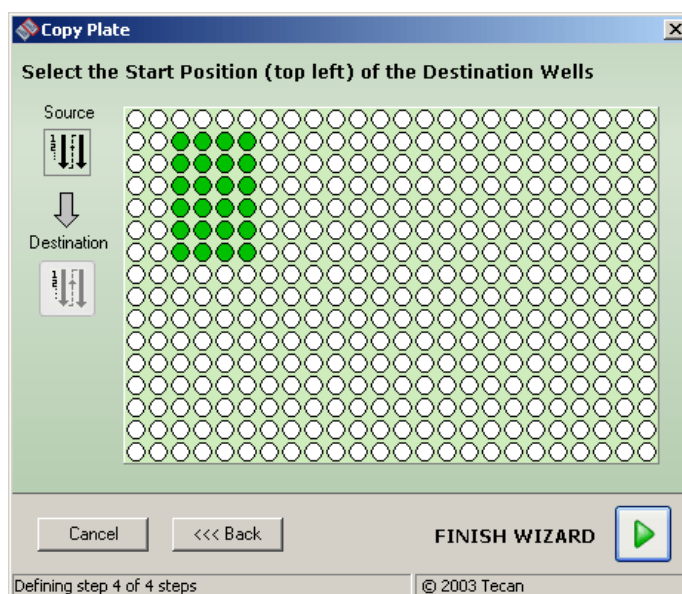


Fig. 15-29 Copy Plate wizard, step 4 of 4

**Select the start position (top left) of the destination wells**

Select the required position of the destination wells by clicking with the mouse. The same selection of wells will be used for all destination plates. An error message will be displayed if the position you choose does not allow all of the source wells to fit on the destination plate (to avoid this, choose a start position towards the top left of the plate).

Click *Finish Wizard* when you have made all of your entries. This creates a set of script commands which carry out the required actions.

**Note:** Click the “-” button in the Wizard command icon in the Script Editor if you want to collapse and hide all of the script lines between Wizard and Wizard End. The “-” button changes to “+”. Click the “+” button to show the script lines again.

## 15.25 Replicates Wizard

The Replicates wizard creates a set of script commands which make one or more repetitions (copies) of selected wells on the source plate on one or more destination plates. All of the destination plates will be identical. You can only create horizontal replicates.

After you have completed all of the steps in the wizard, it creates script commands which carry out the required actions and inserts them in the Script Editor window at the currently selected position. If necessary, the script commands can then be edited if you want to include some special features.

### 15.25.1 Replicates Wizard, Step 1 of 5

Select the source plate parameters:

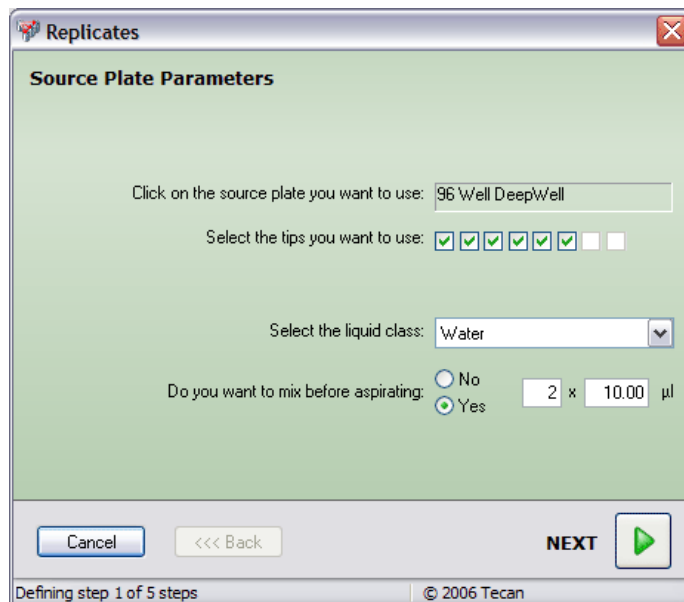


Fig. 15-30 Replicates wizard, step 1 of 5

#### Click on the source plate you want to use

Select the source plate by clicking on the labware in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item.

#### Select the tips you want to use

Check the appropriate checkboxes.

**Note:** The Replicates wizard does not allow you to use a mixture of standard tips and DITIs. If your pipetting instrument has both standard tips and DITIs, you must uncheck all standard tips before you can choose any DITIs (and vice versa).

#### Click on the DITI rack you want to use

This option only appears if you are using DITIs (disposable tips). Select the DITI rack by clicking on it in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item.

#### Select the liquid class

Choose the required liquid class for the source plate from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument. See also 10 “Configuring Liquid Classes”, 10-1.

#### Do you want to mix before aspirating

Click the appropriate radio button. If you choose Yes, you must also specify how many times to mix and the volume to mix with.

### 15.25.2 Replicates Wizard, Step 2 of 5

Select the destination plate parameters:

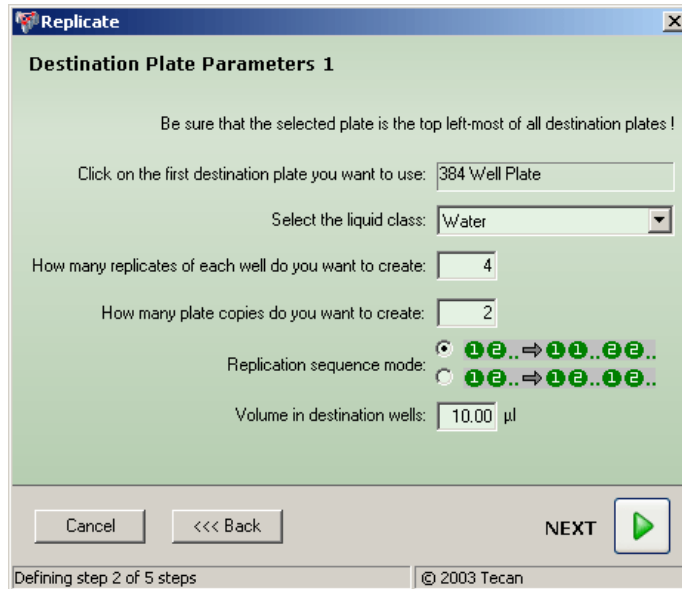


Fig. 15-31 Replicates wizard, step 2 of 5

#### Click on the first destination plate you want to use

Select the destination plate by clicking on the labware in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item.

If you have chosen to make more than one replicate, Freedom EVOware will choose additional labware of the same type automatically by searching the worktable from rear to front and then from left to right (you cannot select it yourself). Make sure there is enough labware on the worktable for all of the copies and choose the left-most and top-most plate for the first copy. Otherwise the script which is created will contain errors (faulty script lines are marked in red).

#### Select the liquid class

Choose the required liquid class for the destination plate(s) from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument.

#### How many replicates of each well do you want to create

Select how many replications of the source plate wells you want to make (range: 1 to 24). The maximum number of replications also depends on how many wells are available on the destination plate. For example, if you want to replicate four wells three times, the replications will occupy 12 wells on each of the destination plates.

#### How many plate copies do you want to create

Select how many copies of the replications you want (range: 1 to 16). All of the destination plates will be identical.

#### Replication sequence mode

This is used to select the placement on the destination wells:

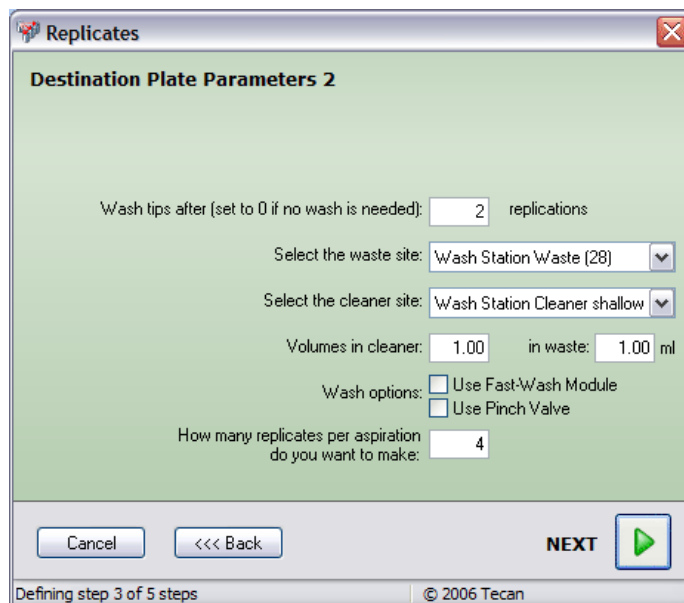
- With 12 to 1122, Freedom EVOware pipettes all replicates of the first source column onto the destination plate, and then proceeds with the replicates of the second source column. For example, if you want to replicate columns B, C and D of the source labware and you choose three replications per plate, the destination columns will be as follows: BBBCCDDDD.
- With 12 to 1212, Freedom EVOware pipettes a single replicate of the first column and then a single replicate of the second column, and so on. For example, if you want to replicate columns B, C and D of the source plate and you choose three replications per plate, the destination columns will be as follows: BCDBCDBC.

**Volume in destination wells**

Specify the required volume of liquid in the destination wells (the same volume will be dispensed to all wells of all replicates). Freedom EVOware automatically calculates the necessary aspiration volume for the source labware. However, Freedom EVOware does not automatically handle volumes that exceed the dilutor or DITI capacity.

**15.25.3 Replicates Wizard, Step 3 of 5**

Select the destination plate parameters:



**Fig. 15-32** Replicates wizard, step 3 of 5

**Do you want to mix after dispensing**

Click the appropriate radio button. If you choose Yes, you must also specify how many times to mix and the volume to mix with.

**Wash tips after x replications**

This option only appears if you are using fixed tips. Enter a non-zero value if you want to wash the tips after replicating. If you specify “1”, washing will be carried out after each replication.



**Change DiTis after x replications**

This option only appears if you are using DITIs (disposable tips). Enter a non-zero value if you want to replace the DITIs after replicating. If you specify “1”, the DITIs will be replaced after each replication.

The following settings for the waste and the cleaner do not appear if you have chosen “0” (i.e. “wash is not necessary” or “DITI change is not necessary”).

**Select the waste site**

Choose the waste unit you want to use from the pull down list. The list shows all waste units which are currently positioned in the Worktable Editor. The worktable grid position is shown in brackets. You must first put a wash station with waste unit in the Worktable Editor. Alternatively, specify the worktable position for the waste by clicking on it in the Worktable Editor. If only one waste unit is present, it is chosen automatically.

When using multi-pipetting mode, Freedom EVOware uses the chosen waste for discarding the excess volume before aspirating again from the same source. See also [15.5 “Periodic Wash Command”](#), ¶ 15-10.

**Select the cleaner site**

This option only appears if you are using fixed tips. Choose the cleaner unit you want to use from the pull down list. The list shows all cleaner units which are currently positioned in the Worktable Editor. You must first put a wash station with cleaner unit in the Worktable Editor. Alternatively, specify the worktable position for the cleaner by clicking on it in the Worktable Editor. If only one cleaner unit is present, it is chosen automatically.

Choose a shallow cleaner if you only need to clean the ends of the tips. Choose a deep cleaner if there is a possibility of contamination along the shaft of the tip. The deep cleaner requires a larger volume of system liquid and cleaning takes somewhat longer.

**Volumes in cleaner and in waste**

These options only appear if you are using fixed tips. Specify the volume of system liquid which should be used to wash the outside of the tips (volume in cleaner) and to flush the inside of the tips (volume in waste). Appropriate settings are chosen automatically. For more information on washing see [15.4 “Wash Tips Command”](#), ¶ 15-8.

**Use Fast-Wash Module**

If your instrument is fitted with FWO (Fast Wash Option) or MPO (Monitored Pump Option), check this checkbox to use the Fast Wash module instead of the dilutors to wash the tips.

**Use Pinch Valve**

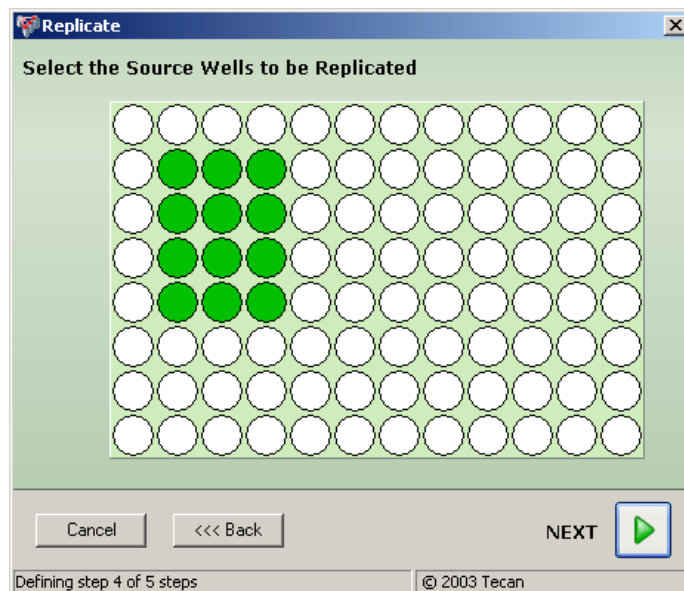
If your instrument is fitted with the Low Volume Option, check this checkbox to activate the Low Volume Option after washing the tips.

**How many replicates per aspiration do you want to make**

This option only appears if you chose to make more than one replicate of each well in the previous step. Specify a value greater than one to use multi-pipetting mode. With multi-pipetting mode, the liquid which is aspirated is dispensed in portions into several destination positions. With single pipetting mode, the liquid which is aspirated is dispensed into a single destination position in one step.

### 15.25.4 Replicates Wizard, Step 4 of 5

Select the source wells to be replicated:



*Fig. 15-33 Replicates wizard, step 4 of 5*

#### Select the source wells to be replicated

Select one or more rows and columns of wells by clicking with the mouse and dragging. Tip: the cursor shows the x and y coordinates for each well as it moves over the labware.

### 15.25.5 Replicates Wizard, Step 5 of 5

Select the start position (top left) of the destination wells:

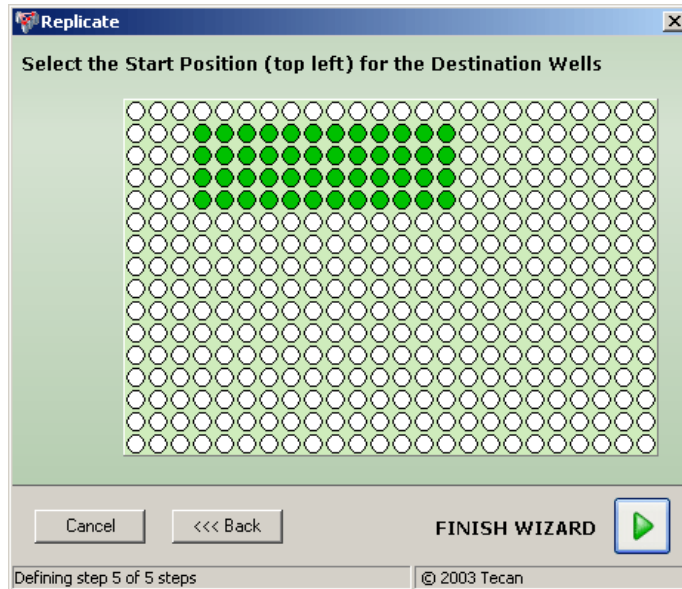


Fig. 15-34 Replicates wizard, step 5 of 5

#### Select the start position (top left) of the destination wells

Select the required position of the destination wells by clicking with the mouse. The same selection of wells will be used for all destination plates. An error message will be displayed if the position you choose does not allow all of the replicated wells to fit on the destination plate (to avoid this, choose a start position towards the top left of the plate).

Click *Finish Wizard* when you have made all of your entries. This creates a set of script commands which carry out the required actions.

**Note:** Click the “-” button in the Wizard command icon in the Script Editor if you want to collapse and hide all of the script lines between Wizard and Wizard End. The “-” button changes to “+”. Click the “+” button to show the script lines again.

## 15.26 Serial Dilution Wizard

The Serial Dilution wizard creates a set of script commands which perform a serial dilution in two or more steps. Each dilution step has the same dilution factor.

After you have completed all of the steps in the wizard, it creates script commands which carry out the required actions and inserts them in the Script Editor window at the currently selected position. If necessary, the script commands can then be edited if you want to include some special features.

### 15.26.1 Serial Dilution Wizard, Step 1 of 6

Select the dilution parameters:

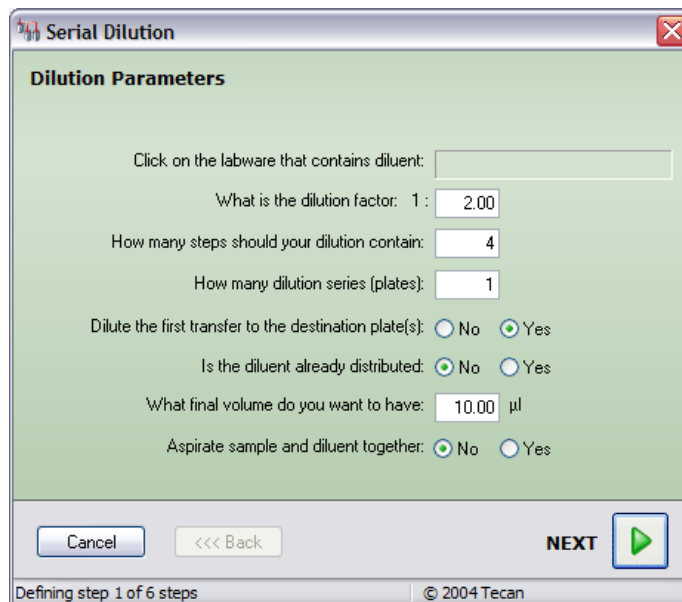


Fig. 15-35 Serial Dilution wizard, step 1 of 6

#### Click on the labware that contains the diluent

Select the plate which contains the diluent by clicking on the labware in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item.

#### What is the dilution factor

Specify the required dilution factor per step (range: 1.1 to 1000). Each dilution step has the same dilution factor. The following table lists the dilution in percent for six different dilution factors:

Tab. 15-11 Dilution in percent for six different dilution factors

Dilution factor	Sample % : Diluent %
1:2	50% : 50%
1:4	25% : 75%
1:8	12.5% : 87.5%
1:16	6.25% : 93.75%
1:32	3.125% : 96.875%
1:64	1.5625% : 98.4375%

**How many steps should your dilution contain**

Specify the required number of steps (range: 2 to 24). Example: if you specify a dilution of 1:2 per step and a total of 3 steps, the destination plate(s) will all have three columns of wells with dilution factors of 1:2, 1:4 and 1:8. See also “Is the source concentration equal to the first step”.

**How many dilution series (plates)**

Specify how many destination plates you want to make (range: 1 to 16). All of the destination plates will be identical.

**Dilute the first transfer to the destination plate(s)**

Click *No* if you want the first column in the destination plate(s) to contain the undiluted sample. Example: if you choose *No* and specify a dilution of 1:2 per step and a total of 3 steps, the destination plate(s) will all have three columns of wells with dilution factors of “undiluted”, 1:2 and 1:4.

**Is the diluent already distributed**

Click *Yes* if the destination wells in the destination plate(s) already contain diluent. In this case, you must specify how much diluent is contained in each well, and the Serial Dilution wizard only needs to aspirate and dispense the appropriate quantities of the sample liquid. Tip: You can dispense diluent to the destination wells using the Replicates wizard.

**How much diluent is dispensed in each well:** Specify how much diluent is already contained in each destination well.

**What final volume do you want to have**

Specify the required total volume (sample plus diluent) in each of the destination wells.

**Aspirate sample and diluent together**

Click *Yes* if you want to aspirate the sample directly after aspirating the diluent. Click *No* if you want to dispense the diluent into the destination wells before aspirating and dispensing the sample. Be aware of the risk of contamination if you choose *Yes*.

## 15.26.2 Serial Dilution Wizard, Step 2 of 6

Select the source parameters:

Fig. 15-36 Serial Dilution wizard, step 2 of 6

### Click on the source plate you want to use

Select the source plate by clicking on the labware in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item.

### Select the tips you want to use

Check the appropriate checkboxes.

**Note:** The Serial Dilution wizard does not allow you to use a mixture of standard tips and DITIs. If your pipetting instrument has both standard tips and DITIs, you must uncheck all standard tips before you can choose any DITIs (and vice versa).

### Click on the DITI rack you want to use

This option only appears if you are using DITIs (disposable tips). Select the DITI rack by clicking on it in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item.

### Select the sample liquid class

Choose the required liquid class for the sample from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument. See also [10 "Configuring Liquid Classes"](#), [10-1](#).

### Select the diluent liquid class

Choose the required liquid class for the diluent from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument.

### Do you want to mix before aspirating

Click the appropriate radio button. If you choose Yes, you must also specify how many times to mix and the volume to mix with.

### 15.26.3 Serial Dilution Wizard, Step 3 of 6

Select the destination parameters:

Fig. 15-37 Serial Dilution wizard, step 3 of 6

#### Click on the destination plate you want to use

Select the destination plate by clicking on the labware in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item.

If you have chosen to make more than one curve (destination plate), Freedom EVOware will choose additional labware of the same type automatically by searching the worktable from rear to front and then from left to right (you cannot select it yourself). Make sure there is enough labware on the worktable for all of the copies and choose the left-most and top-most plate for the first copy. Otherwise the script which is created will contain errors (faulty script lines are marked in red).

#### Select the liquid class

Choose the required liquid class for the destination plate(s) from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument.

#### Wash tips after each dilution step

This option only appears if you are using fixed tips. Click Yes if you want to wash the tips after each dilution step.

#### Change DiTis after each dilution step

This option only appears if you are using DITs (disposable tips). Click Yes if you want to replace the DITs after each dilution step.

The following settings for the waste and the cleaner do not appear if you have chosen No (i.e. “wash is not necessary” or “DITI change is not necessary”):

### Select the waste site

Choose the waste unit you want to use from the pull down list. The list shows all waste units which are currently positioned in the Worktable Editor. The worktable grid position is shown in brackets. You must first put a wash station with waste unit in the Worktable Editor. Alternatively, specify the worktable position for the waste by clicking on it in the Worktable Editor. If only one waste unit is present, it is chosen automatically.

When using multi-pipetting mode, Freedom EVOware uses the chosen waste for discarding the excess volume before aspirating again from the same source. See also [15.5 "Periodic Wash Command"](#), ¶ 15-10.

### Select the cleaner site

This option only appears if you have if you are using fixed tips. Choose the cleaner unit you want to use from the pull down list. The list shows all cleaner units which are currently positioned in the Worktable Editor. You must first put a wash station with cleaner unit in the Worktable Editor. If only one cleaner unit is present, it is chosen automatically. Alternatively, specify the worktable position for the cleaner by clicking on it in the Worktable Editor.

Choose a shallow cleaner if you only need to clean the ends of the tips. Choose a deep cleaner if there is a possibility of contamination along the shaft of the tip. The deep cleaner requires a larger volume of system liquid and cleaning takes somewhat longer.

### Volumes in cleaner and in waste

These options only appear if you are using fixed tips. Specify the volume of system liquid which should be used to wash the outside of the tips (volume in cleaner) and to flush the inside of the tips (volume in waste). Appropriate settings are chosen automatically. For more information on washing see [15.4 "Wash Tips Command"](#), ¶ 15-8.

### Use Fast-Wash Module

If your instrument is fitted with FWO (Fast Wash Option) or MPO (Monitored Pump Option), check this checkbox to use the Fast Wash module instead of the dilutors to wash the tips.

### Use Pinch Valve

If your instrument is fitted with the Low Volume Option, check this checkbox to activate the Low Volume Option after washing the tips.

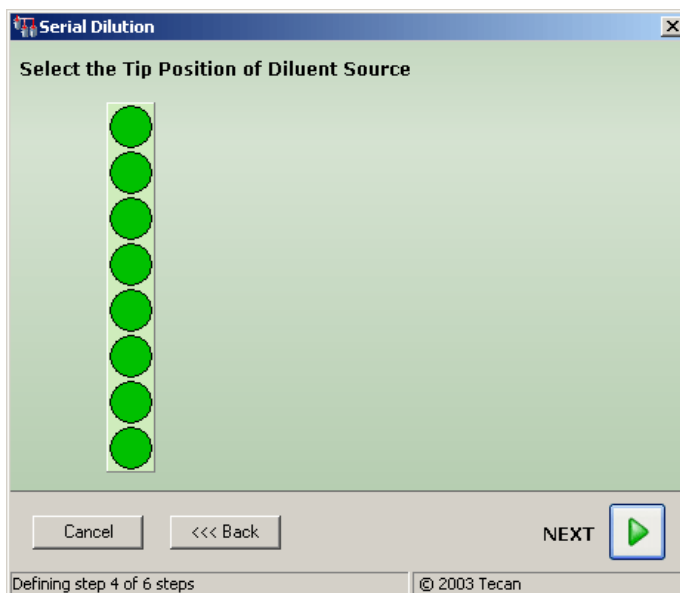
### Do you want to mix after dispensing

Click the appropriate radio button. If you choose Yes, you must also specify how many times to mix and the volume to mix with.



### 15.26.4 Serial Dilution Wizard, Step 4 of 6

Select the tip position of the diluent source:



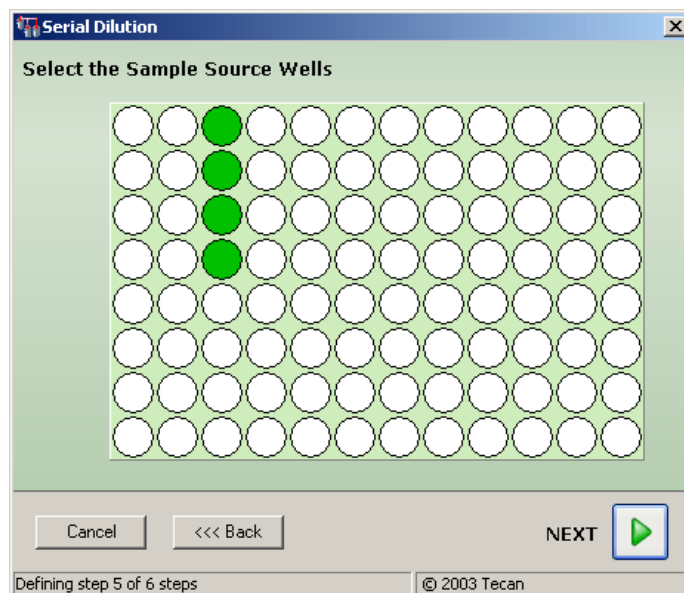
**Fig. 15-38** Serial Dilution wizard, step 4 of 6

#### Select the tip position of the diluent source

Select the tip position of the diluent source by clicking with the mouse. In the above example, the diluent will be taken from a trough (troughs only have one column).

### 15.26.5 Serial Dilution Wizard, Step 5 of 6

Select the sample source wells:



**Fig. 15-39** Serial Dilution wizard, step 5 of 6

#### Select the sample source wells

Select the required number of source wells by clicking with the mouse and dragging. All of the wells are in the same column. Tip: the cursor shows the x and y coordinates for each well as it moves over the labware.

### 15.26.6 Serial Dilution Wizard, Step 6 of 6

Select the start position (top left) of the destination wells:

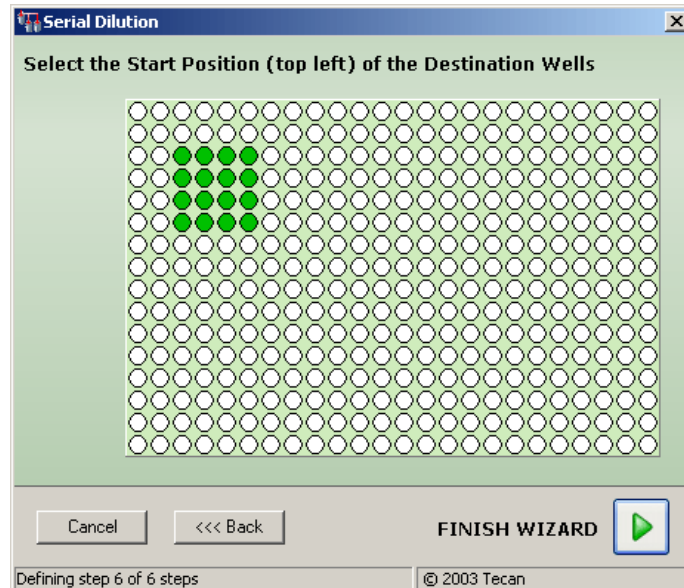


Fig. 15-40 Serial Dilution wizard, step 6 of 6

#### Select the start position (top left) of the destination wells

Select the required position of the destination wells by clicking with the mouse. The same selection of wells will be used for all destination plates. An error message will be displayed if the position you choose does not allow all of the destination wells to fit on the destination plate (to avoid this, choose a start position towards the top left of the plate).

Click *Finish Wizard* when you have made all of your entries. This creates a set of script commands which carry out the required actions.

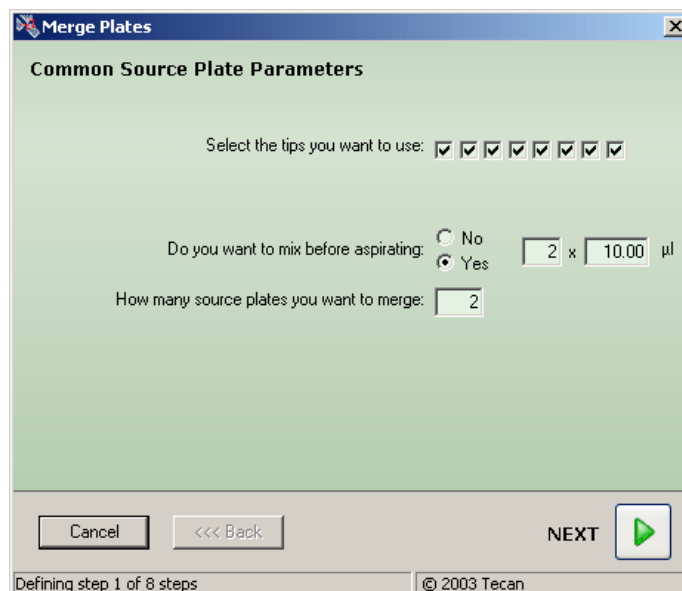
**Note:** Click the “-” button in the Wizard command icon in the Script Editor if you want to collapse and hide all of the script lines between Wizard and Wizard End. The “-” button changes to “+”. Click the “+” button to show the script lines again.

## 15.27 Merge Plates Wizard

The Merge Plates wizard creates a set of script commands which make a destination plate (e.g. a 384 well plate) by merging together wells from one or more source plates (e.g. four 96 well plates). When merging plates, Freedom EVOware always proceeds from rear to front and then from left to right. The number of steps which are required for the wizard depends on how many source plates you want to merge.

### 15.27.1 Merge Plates Wizard, Step 1 of 7

Select the common source plate parameters:



**Fig. 15-41** Merge Plates wizard, step 1 of 7

#### Select the tips you want to use

Check the appropriate checkboxes.

**Note:** The Merge Plates wizard does not allow you to use a mixture of standard tips and DITIs. If your pipetting instrument has both standard tips and DITIs, you must uncheck all standard tips before you can choose any DITIs (and vice versa).

#### Click on the DITI rack you want to use

This option only appears if you are using DITIs (disposable tips). Select the DITI rack by clicking on it in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item.

#### Do you want to mix before aspirating

Click the appropriate radio button. If you choose Yes, you must also specify how many times to mix and the volume to mix with.

#### How many source plates do you want to merge

Specify the number of source plates you want to merge (range: 2 to 16).

### 15.27.2 Merge Plates Wizard, Step 2 of 7

Select the parameters for the first source plate:

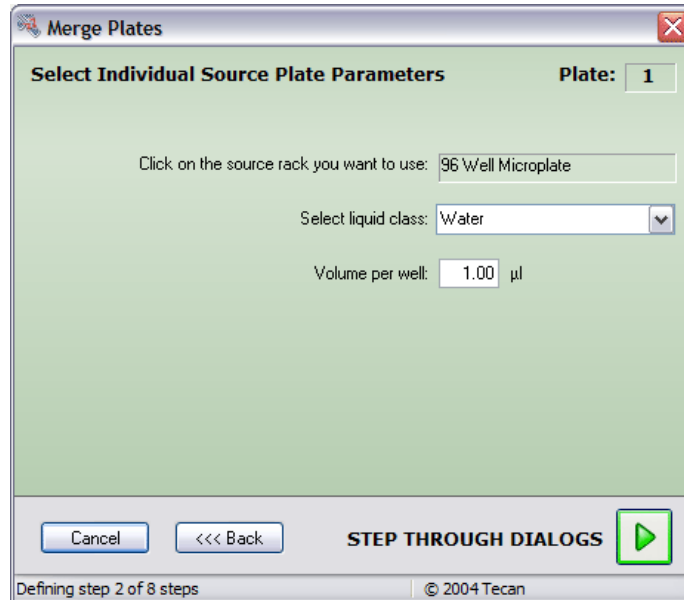


Fig. 15-42 Merge Plates wizard, step 2 of 7

#### Click on the source plate you want to use

Select the first source plate by clicking on the labware in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item. The plate number is shown at the top right.

#### Select the liquid class

Choose the required liquid class for this source plate from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument. See also [10 "Configuring Liquid Classes"](#), [10-1](#).

#### Volume in well

Specify the volume of liquid you want to aspirate (the same volume will be aspirated from all wells).

### 15.27.3 Merge Plates Wizard, Step 3 of 7

Select the parameters for the second source plate:

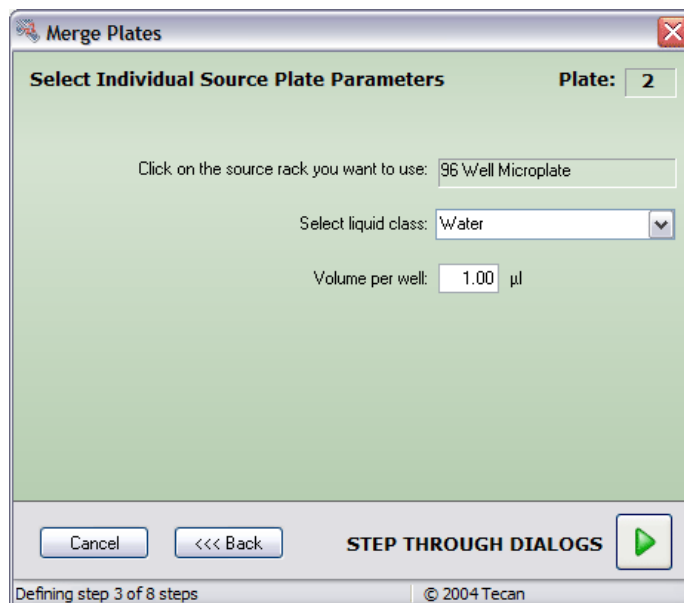


Fig. 15-43 Merge Plates wizard, step 3 of 7

#### Click on the source plate you want to use

Select the second source plate by clicking on the labware in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item. The plate number is shown at the top right. If required, you can aspirate from the same source plate again (e.g. if you want to create a destination plate with the same samples but in different well positions).

#### Select the liquid class

Choose the required liquid class for this source plate from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument.

#### Volume in well

Specify the volume of liquid you want to aspirate (the same volume will be aspirated from all wells).

### 15.27.4 Merge Plates Wizard, Step 4 of 7

Select the destination plate parameters:

Fig. 15-44 Merge Plates wizard, step 4 of 7

#### Click on the destination plate you want to use

Select the destination plate by clicking on the labware in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item.

#### Select the liquid class

Choose the required liquid class for the destination plate(s) from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument.

#### Wash tips

This option only appears if you are using fixed tips. Choose the required washing method.

#### Change DiTis

This option only appears if you are using DiTIs (disposable tips). Choose the required method for replacing the DiTIs.

#### Select the waste site

Choose the waste unit you want to use from the pull down list. The list shows all waste units which are currently positioned in the Worktable Editor. The worktable grid position is shown in brackets. You must first put a wash station with waste unit in the Worktable Editor. Alternatively, specify the worktable position for the waste by clicking on it in the Worktable Editor. If only one waste unit is present, it is chosen automatically.


When using multi-pipetting mode, Freedom EVOware uses the chosen waste for discarding the excess volume before aspirating again from the same source. See also [15.5 "Periodic Wash Command"](#), [15-10](#).

### Select the cleaner site

This option only appears if you are using fixed tips. Choose the cleaner unit you want to use from the pull down list. The list shows all cleaner units which are currently positioned in the Worktable Editor. You must first put a wash station with cleaner unit in the Worktable Editor. If only one cleaner unit is present, it is chosen automatically. Alternatively, specify the worktable position for the cleaner by clicking on it in the Worktable Editor.

Choose a shallow cleaner if you only need to clean the ends of the tips. Choose a deep cleaner if there is a possibility of contamination along the shaft of the tip. The deep cleaner requires a larger volume of system liquid and cleaning takes somewhat longer.

### Volumes in cleaner and in waste

These options only appear if you are using fixed tips. Specify the volume of system liquid which should be used to wash the outside of the tips (volume in cleaner) and to flush the inside of the tips (volume in waste). Appropriate settings are chosen automatically. For more information on washing see [15.4 "Wash Tips Command"](#),  15-8.

### Use Fast-Wash Module

If your instrument is fitted with FWO (Fast Wash Option) or MPO (Monitored Pump Option), check this checkbox to use the Fast Wash module instead of the dilutors to wash the tips.

### Use Pinch Valve

If your instrument is fitted with the Low Volume Option, check this checkbox to activate the Low Volume Option after washing the tips.

### Do you want to mix after dispensing

Click the appropriate radio button. If you choose Yes, you must also specify how many times to mix and the volume to mix with.



### 15.27.5 Merge Plates Wizard, Step 5 of 7

Select the wells to be copied from the first source plate:

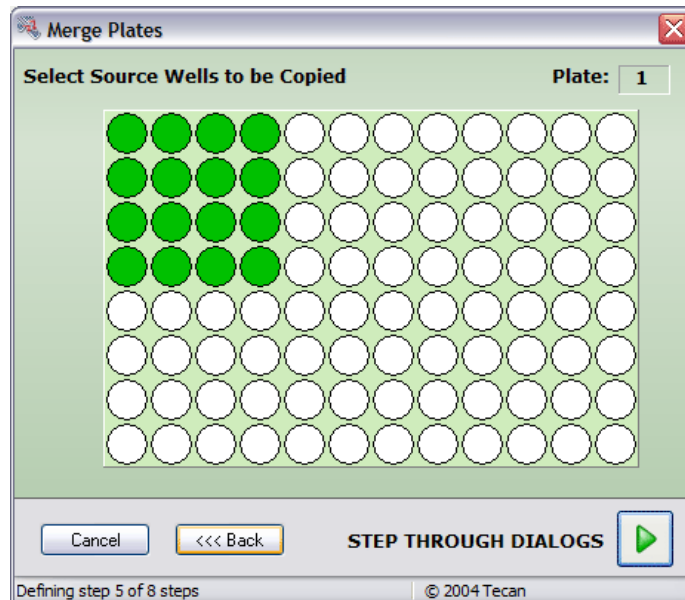


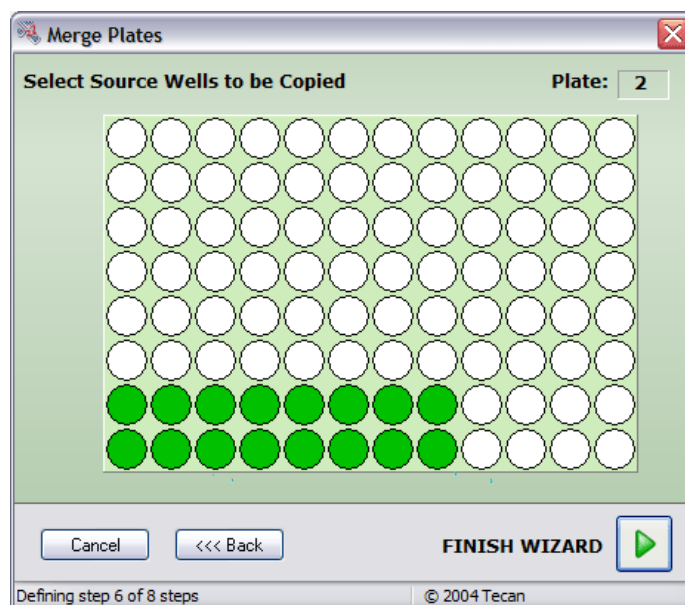
Fig. 15-45 Merge Plates wizard, step 5 of 7

#### Select the source wells to be copied

Select one or more rows and columns of wells by clicking with the mouse and dragging. Tip: the cursor shows the x and y coordinates for each well as it moves over the labware. The plate number is shown at the top right.

### 15.27.6 Merge Plates Wizard, Step 6 of 7

Select the wells to be copied from the second source plate:



*Fig. 15-46 Merge Plates wizard, step 6 of 7*

#### Select the source wells to be copied

Select one or more rows and columns of wells by clicking with the mouse and dragging. Tip: the cursor shows the x and y coordinates for each well as it moves over the labware. The plate number is shown at the top right.

### 15.27.7 Merge Plates Wizard, Step 7 of 7

Select the destination for each source block:

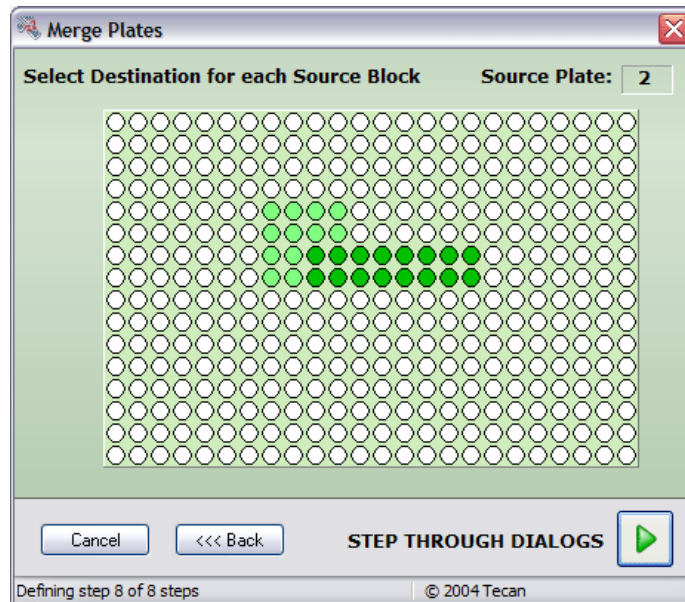


Fig. 15-47 Merge Plates wizard, step 7 of 7

#### Select the destination for each source block

Select the required position of the destination wells from the first source plate by clicking with the mouse. Click the green arrow to confirm and repeat this step until you have selected the required positions of the destination wells for all source plates. The plate number is shown at the top right. If required, you can position the wells so they overlap (e.g. if you want to mix a reagent with the samples on the destination plate).

Click *Finish Wizard* when you have made all of your entries. This creates a set of script commands which carry out the required actions.

**Note:** Click the “-” button in the Wizard command icon in the Script Editor if you want to collapse and hide all of the script lines between Wizard and Wizard End. The “-” button changes to “+”. Click the “+” button to show the script lines again.

## 15.28 Transfer Wizard

The Transfer wizard creates a set of script commands which aspirate liquid from specified wells on the source plate and transfer it to destination positions.

After you have completed all of the steps in the wizard, it creates script commands which carry out the required actions and inserts them in the Script Editor window at the currently selected position. If necessary, the script commands can then be edited if you want to include some special features.

### 15.28.1 Transfer Wizard, Step 1 of 4

Select the source plate parameters:

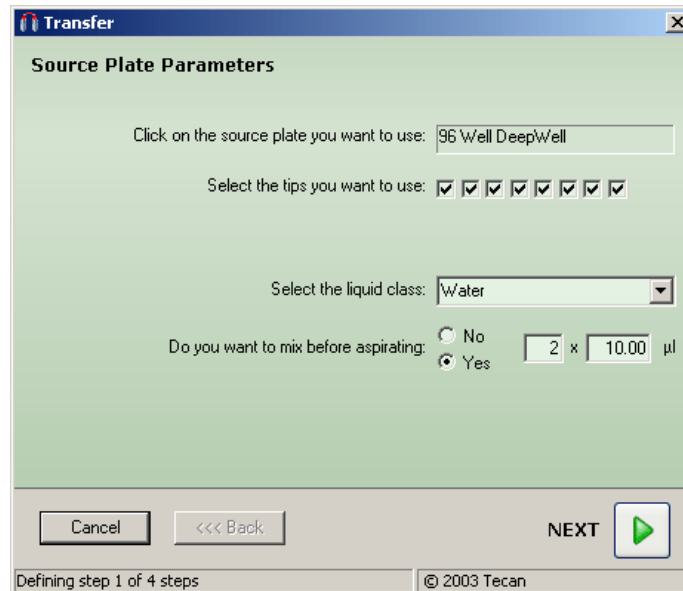


Fig. 15-48 Transfer wizard, step 1 of 4

#### Click on the source plate you want to use

Select the source plate by clicking on the labware in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item.

#### Select the tips you want to use

Check the appropriate checkboxes.

**Note:** The Transfer wizard does not allow you to use a mixture of standard tips and DITIs. If your pipetting instrument has both standard tips and DITIs, you must uncheck all standard tips before you can choose any DITIs (and vice versa).

#### Click on the DITI rack you want to use

This option only appears if you are using DITIs (disposable tips). Select the DITI rack by clicking on it in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item.

#### Select the liquid class

Choose the required liquid class for the source plate from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument. See also [10 "Configuring Liquid Classes"](#), [10-1](#).

#### Do you want to mix before aspirating

Click the appropriate radio button. If you choose Yes, you must also specify how many times to mix and the volume to mix with.

### 15.28.2 Transfer Wizard, Step 2 of 4

Select the destination plate parameters:

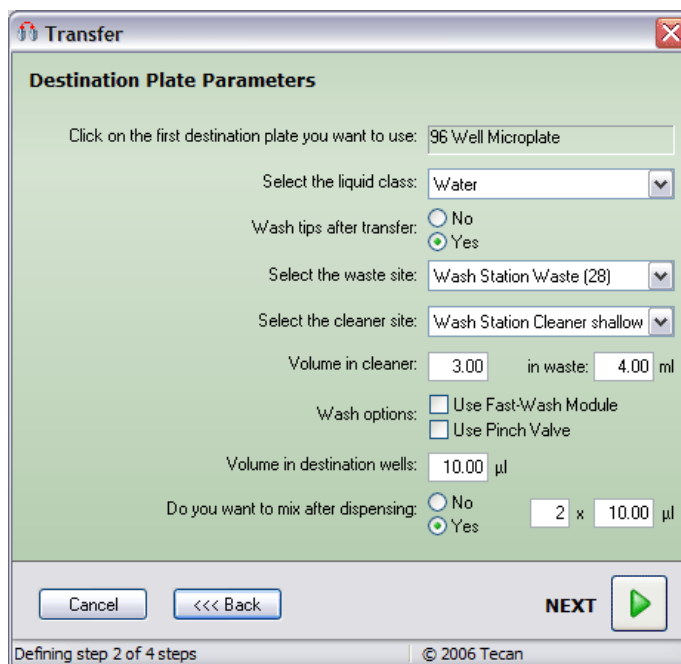


Fig. 15-49 Transfer wizard, step 2 of 4

#### Click on the first destination plate you want to use

Select the destination plate by clicking on the labware in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item.

If you have chosen to make more than one copy, Freedom EVOware will choose additional labware of the same type automatically by searching the worktable from rear to front and then from left to right (you cannot select it yourself). Make sure there is enough labware on the worktable for all of the copies and choose the left-most and top-most plate for the first copy. Otherwise the script which is created will contain errors (faulty script lines are marked in red).

#### Select the liquid class

Choose the required liquid class for the destination plate(s) from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument.

#### Wash tips after the transfer

This option only appears if you are using fixed tips. Click Yes if you want to wash the tips after the transfer.

#### Drop DiTis after the transfer

This option only appears if you are using DITIs (disposable tips). Click Yes if you want to drop the DITIs after the transfer.

The following settings for the waste and the cleaner do not appear if you have chosen No (i.e. “wash is not necessary” or “DITI change is not necessary”):

### Select the waste site

Choose the waste unit you want to use from the pull down list. The list shows all waste units which are currently positioned in the Worktable Editor. The worktable grid position is shown in brackets. You must first put a wash station with waste unit in the Worktable Editor. Alternatively, specify the worktable position for the waste by clicking on it in the Worktable Editor. If only one waste unit is present, it is chosen automatically.

When using multi-pipetting mode, Freedom EVOware uses the chosen waste for discarding the excess volume before aspirating again from the same source. See also [15.5 "Periodic Wash Command"](#), ¶ 15-10.

### Select the cleaner site

This option only appears if you are using fixed tips. Choose the cleaner unit you want to use from the pull down list. The list shows all cleaner units which are currently positioned in the Worktable Editor. You must first put a wash station with cleaner unit in the Worktable Editor. Alternatively, specify the worktable position for the cleaner by clicking on it in the Worktable Editor. If only one cleaner unit is present, it is chosen automatically.

Choose a shallow cleaner if you only need to clean the ends of the tips. Choose a deep cleaner if there is a possibility of contamination along the shaft of the tip. The deep cleaner requires a larger volume of system liquid and cleaning takes somewhat longer.

### Volumes in cleaner and in waste

These options only appear if you are using fixed tips. Specify the volume of system liquid which should be used to wash the outside of the tips (volume in cleaner) and to flush the inside of the tips (volume in waste). Appropriate settings are chosen automatically. For more information on washing see [15.4 "Wash Tips Command"](#), ¶ 15-8.

### Use Fast-Wash Module

If your instrument is fitted with FWO (Fast Wash Option) or MPO (Monitored Pump Option), check this checkbox to use the Fast Wash module instead of the dilutors to wash the tips.

### Use Pinch Valve

If your instrument is fitted with the Low Volume Option, check this checkbox to activate the Low Volume Option after washing the tips.

### Volume in destination wells

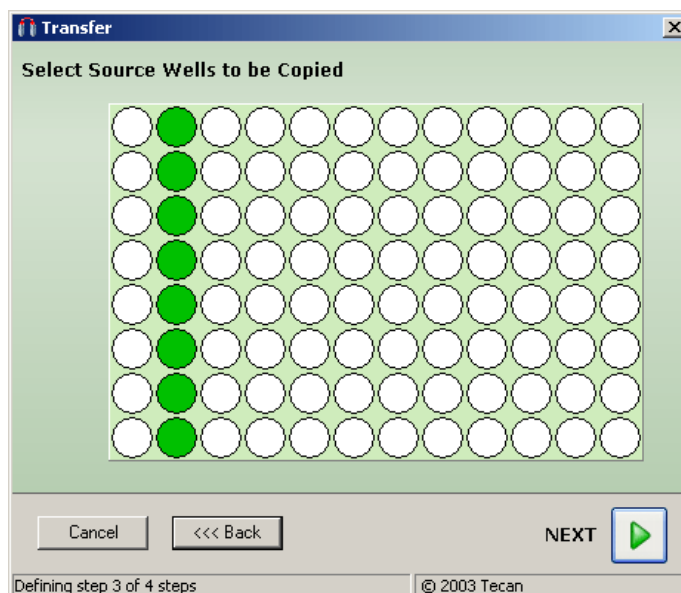
Specify the required volume of liquid in the destination wells (the same volume will be dispensed to all wells).

### Do you want to mix after dispensing

Click the appropriate radio button. If you choose Yes, you must also specify how many times to mix and the volume to mix with.

### 15.28.3 Transfer Wizard, Step 3 of 4

Select the source wells to be copied:



*Fig. 15-50 Transfer wizard, step 3 of 4*

#### Select the source wells to be copied

Select the position of the source wells by clicking with the mouse. All of the wells are in the same column.

### 15.28.4 Transfer Wizard, Step 4 of 4

Select the position of the destination wells:

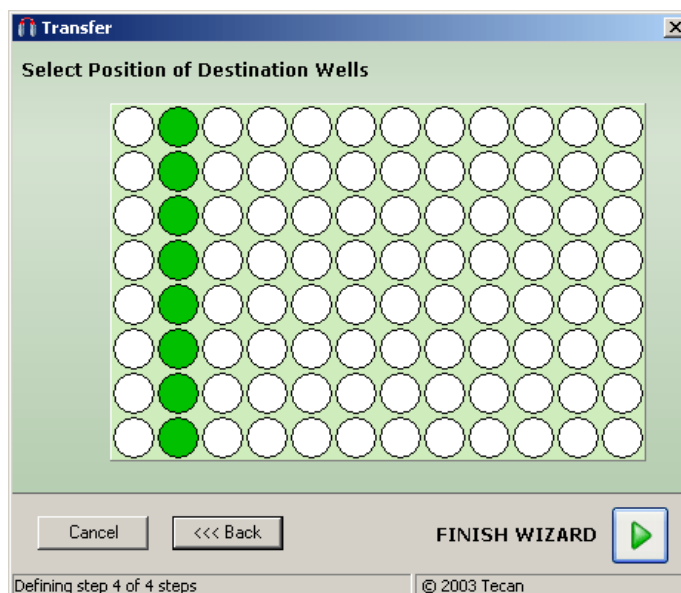


Fig. 15-51 Transfer wizard, step 4 of 4

#### Select the position of the destination wells

Select the position of the destination wells by clicking with the mouse. All of the wells are in the same column.

Click *Finish Wizard* when you have made all of your entries. This creates a set of script commands which carry out the required actions.

**Note:** Click the “-” button in the Wizard command icon in the Script Editor if you want to collapse and hide all of the script lines between Wizard and Wizard End. The “-” button changes to “+”. Click the “+” button to show the script lines again.

## 15.29 Start Timer Command

The Start Timer command re-starts one of the 100 internal timers in Freedom EVOware. If required, you can use this command to re-start a specified timer several times in the same script.

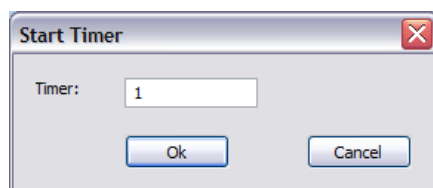


Fig. 15-52 Start Timer command

The parameter of the Start Timer command is as follows:



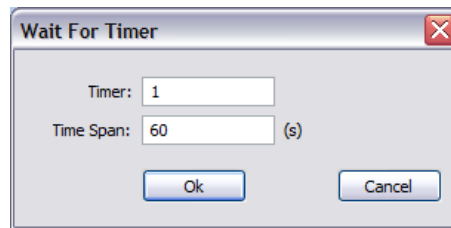
**Timer**

Specify the number of the timer you want to re-start or specify a numeric variable (range: 1 - 100).

*Note: Freedom EVOware automatically starts all timers when the script is started.*

**15.30 Wait for Timer Command**

The Wait for Timer command pauses the execution of the script until a specified number of seconds have expired since a specified timer was reset.



*Fig. 15-53 Wait for Timer command*

The parameters of the Wait for Timer command are as follows:

**Timer**

Specify the number of the timer you want to use or specify a numeric variable (range: 1 - 100).

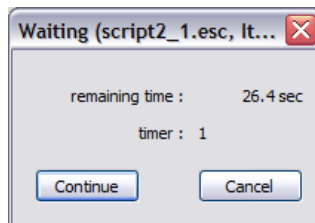
**Time Span**

Specify the time duration which has to expire since the selected timer was started or reset or specify a numeric variable (range: 0.02 - 86400 seconds). The script will be paused until the specified time duration has been reached.

*Note: Please be aware that the timer is not working in real time. Though in most cases the elapsed time will be exact, the timer might get slower when there is a heavy load on the system.*

**15.30.1 Wait for Timer Message Box**

If the Freedom EVOware script contains a Wait for Timer command, the following message box is shown on the screen while the script waits for the specified time span to expire:



*Fig. 15-54 Wait for Timer message box, example from Freedom EVOware Plus*

The script continues automatically when the time span has expired.

The operator can click *Continue* to continue the script immediately without waiting for the specified time span to expire. This option is only available to users with Freedom EVOware Administrator or Application Specialist rights and could have an adverse effect on pipetting, depending on the purpose of the Wait for Timer command in the script.

The operator can click *Cancel* to abort the script.

The title bar shows the name of the pipetting script which displayed the prompt. In Freedom EVOware Plus, the title bar shows the process name, script ID (normally counting from 1) and the number of the process copy which is running the script (process instance ID, counting from 1).

## 15.31 Execute Application Command

The Execute Application command instructs Freedom EVOware to run an external program from within a pipetting script. You can run DOS and Windows applications.

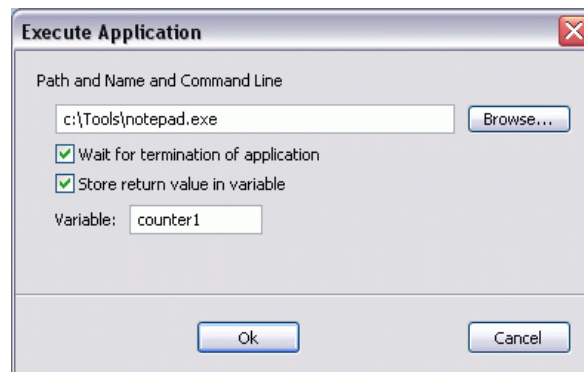


Fig. 15-55 Execute Application command

The parameters of the Execute Application command are as follows:

### Path & Name & Command Line

Specify the filename and location of the application you want to execute. You can also specify command line parameters if required. See [Fig. 14-9](#), [14-15](#) for an example of passing a variable to an external program as a command line parameter.

### Wait for termination of application

If you check this checkbox, the pipetting script will wait for the external application to finish before continuing; otherwise, the pipetting script will be continued immediately.

### Store return value in variable

Some external applications return an integer value when terminating (error level). Check this checkbox if you want to store the return value in a variable.

**Variable:** Specify the variable name. Variable names in scripts can be 1 - 64 characters in length, are not case-sensitive and must not begin with a digit.

## 15.32 Comment Command

The Comment command is used to insert a comment for a script command or for some other reason. It is used to annotate the script and is not executable. Use the User Prompt command instead (see 15.33 “User Prompt Command”, 15-88) if you want to prompt the instrument operator.

When you run the script, the comments are shown in the Runtime Controller of Freedom EVOware Standard. If you choose suitable comments, this can help the instrument operator to monitor the progress of the script as it runs.

Comment commands are also used as labels (jump destinations) by the Condition command (see 15.39 “Condition Command”, 15-99). Accordingly, you cannot have two Comment commands in the same script which have the same comment text.

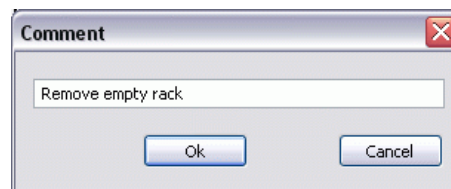


Fig. 15-56 Comment command

The parameter of the Comment command is as follows:

### Comment

Specify the text of the comment.

The texts of the Comment commands and the corresponding script line numbers are listed as hyperlinks in the upper Infopad. Click on one of the entries to jump to the script line which contains the Comment command (**script navigation feature**).

**Note:** Since the Infopads are based on XML technology, avoid using special characters which are reserved for XML tags. Above all, do not use the “<” character in your comment texts. This will cause a syntax error which is visible in the Infopad.

The comment texts are also shown in the 3D simulation tool EVOSim. Comment texts which start with underscore (“\_”) or “-end” are not shown in EVOSim:

- ◆ If you are using the Comment command as a label (jump destination) for the Condition command, you can prefix the label with “\_” if you want to prevent the display of the label in EVOSim (e.g. “\_Label 1”). This avoids the display of comments in EVOSim which are not relevant to the operator or demonstration.
- ◆ EVOSim displays the comment texts until the next Comment command is executed in the script. In addition, it displays the last comment in the script until you start a new script or process. Use a Comment command with the special comment text “-end” if you want to clear the display of the previous comment in EVOSim. This can be useful if the previous comment refers to a pipetting operation which is only relevant temporarily (e.g. “Now getting fresh DITs”).

## 15.33 User Prompt Command

The User Prompt command is an informational command that displays a prompt on the screen as a reminder to the operator to execute a function or to perform a special action. The script is paused until the operator acknowledges the prompt (see 15.33.1 “User Prompt Message Box”, 15-89).

In addition, in Freedom EVOware Standard the doorlocks are unlocked when the user prompt is shown. The doorlocks are locked again and the script continues when the operator clicks OK in the User Prompt Message Box.

**Note:** If the doorlocks cannot be locked again, the Doorlock Error is displayed and the script will not continue.

**Note:** The user prompt does not unlock the doorlocks in Freedom EVOware Standard if the script contains an asynchronous subroutine which is still running.

**Note:** The user prompt does not unlock the doorlocks in Freedom EVOware Plus since other processes may still be running.

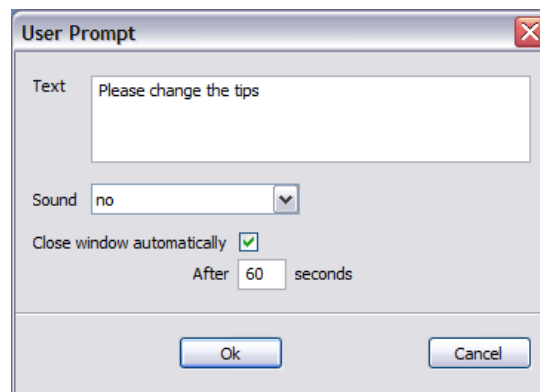


Fig. 15-57 User Prompt command

The parameters of the User Prompt command are as follows:

### Text

Specify the required text of the prompt. If you press the ENTER key, this will insert a new line in the prompt and does not close the dialog box.

### Sound

Choose one of the four available sound options:

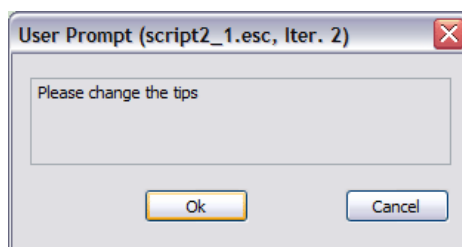
- No sound
- Beep once
- Beep three times
- Beep every 3 seconds

### Close window automatically

If you check this checkbox, Freedom EVOware automatically closes the user prompt window after the specified time and then continues with the script. Otherwise, the script will pause until the user acknowledges the prompt by clicking OK in the User Prompt message box during script runtime.

### 15.33.1 User Prompt Message Box

The User Prompt command pauses the script and displays the following message box during script run-time:

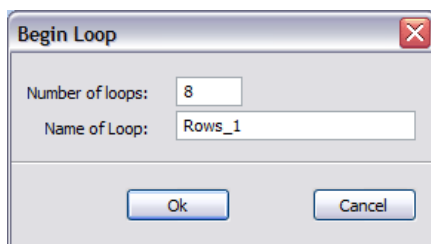


**Fig. 15-58** User Prompt message box, example from Freedom EVOware Plus

The operator can click *OK* to acknowledge the prompt and continue the script. The operator can click *Cancel* to abort the script. The title bar shows the name of the pipetting script which displayed the prompt. In Freedom EVOware Plus, the title bar shows the process name, script ID (normally counting from 1) and the number of the process copy which is running the script (process instance ID, counting from 1).

## 15.34 Begin Loop Command

The Begin Loop command instructs Freedom EVOware to repeat a command or a set of commands (i.e. a loop) a specified number of times until the matching End Loop command is encountered in the script.



**Fig. 15-59** Begin Loop command

The parameters of the Begin Loop command are as follows:

**Number of loops**

Specify the required number of times the loop should be repeated (range: 1 - 999).

**Name of Loop**

Specify a unique name for the loop (max. 32 characters).

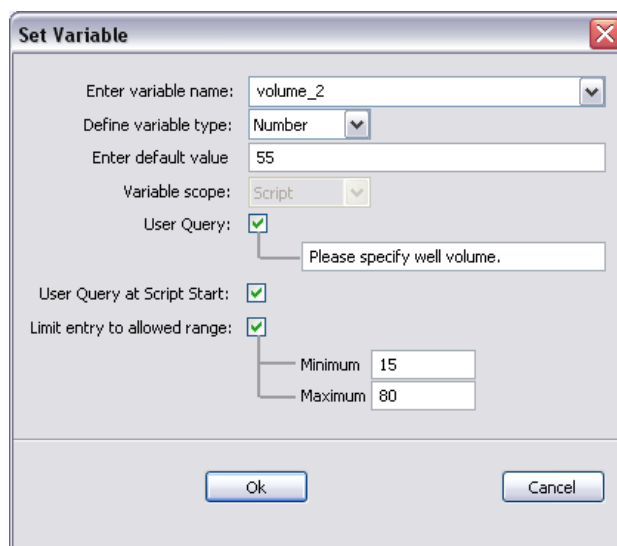
## 15.35 End Loop Command

The End Loop command terminates the loop which is initiated by the matching Begin Loop command. The End Loop command is inserted in the script automatically when you add the Begin Loop command. Freedom EVOware uses the same loop name for the Begin Loop command and the End Loop command. You must put the End Loop command after the last command which you want in the loop. To move the End Loop command, click on it and drag it to the required position. All of the commands within the loop will then be indented. If necessary, you can add more script commands later between the Begin Loop and End Loop commands.

The End Loop command has no parameters to configure.

## 15.36 Set Variable Command

The Set Variable command is used to declare (define) a numeric or string variable in a pipetting script and to assign an initial value. You can also prompt the instrument operator for the value. See [14.1 “Variables and Expressions in Scripts”](#), [14-1](#) for more information. In Freedom EVOware Plus, you can also declare variables by choosing Declare Variables in the Execute menu (see [6.4.6 “Declare Variables”](#), [6-12](#)).



**Fig. 15-60** Set Variable command

The parameters of the Set Variable command are as follows:

### Variable name

Specify the name of the variable. Variable names in scripts can be 1 - 64 characters in length, are not case-sensitive and must not begin with a digit. Special characters (except underscore) should be avoided.

Alternatively, choose the variable from the pull-down list. The pull-down list shows all of the variables which you have used (declared) so far in your script and all of the commonly used, writable pre-defined variables which are available. See [14.1.4 "Pre-Defined Variables"](#), [14-4](#) for a complete list of pre-defined variables.

### Variable type

Choose Number or String depending on the variable type you want to declare.

### Variable value

Specify the integer, floating point value or string you want to assign as the initial value. The name of the *Enter variable value* field changes to *Enter default value* if you check the *User Query* checkbox (see below).

### Variable scope

This setting cannot be changed and is shown for information purposes only. The scope of a variable describes the extent of validity of the variable. If you declare a variable in a script, the variable only has a meaningful value within the same script (the "scope" of the variable is "script"). In Freedom EVOware Plus, you can also declare variables which are accessible to other scripts and thus allow parameters to be passed from one script to another (see [6.4.6 "Declare Variables"](#), [6-12](#)).

### User Query

Check this checkbox if you want to prompt the operator for the value during script runtime instead of assigning a fixed initial value or string to the variable. The text field allows you to specify the operator prompt which should be displayed. The operator prompt also displays the default value you specified in *Enter default value*. The script will be interrupted until the required value has been entered by the operator.

See also [15.36.1 "Set Variable, Operator Prompt"](#), [15-92](#).

### User Query at Script Start

Check this checkbox if you want to prompt the operator for the value of the variable when the script is first started. If you check *User Query* but do not check *User Query at Script Start*, the operator will be prompted for the value later, when the Set Variable command is executed.

If your script has several *Set Variable* commands and you check *User Query at Script Start* for all of them, the operator will be prompted for the value of all of the variables when the script is first started (see [15.36.2 "Set Variable - User Query At Script Start"](#), [15-92](#)).

This is equivalent to including several *Set Variable* commands at the start of your script, but has the advantage that all of the values can be entered in a single dialog box. In addition, your script is easier to read if the *Set Variable* commands directly precede the script lines which use the variables.

This option is only available in Freedom EVOware Standard. In Freedom EVOware Plus, a similar functionality is provided by the *Declare Variables* feature in User Query mode (see [6.4.6 "Declare Variables"](#), [6-12](#)).

### Limit entry to allowed range

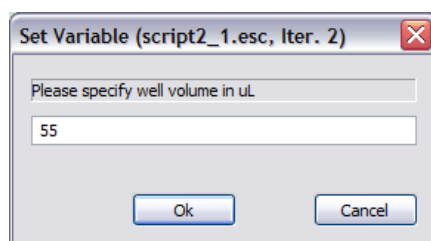
If you are prompting the operator for a numeric value, check this checkbox to limit the values which are entered to a specified range.

**Minimum, Maximum:** Specify the minimum and maximum values for the numeric variable. During runtime, the value which is input by the operator is validated and a warning is output if it does not lie within the specified range.

See 14.1.8 “Converting Numeric Variables and Expressions to Strings”, 14-14 and 14.1.11 “Labware Attributes and String Variables”, 14-17 for usage examples of the Set Variable command. See 14.1 “Variables and Expressions in Scripts”, 14-1 for more information on variables.

## 15.36.1 Set Variable, Operator Prompt

The Set Variable command displays the following operator prompt during script run-time if you have checked the *User Query* checkbox to prompt the operator for a value:



**Fig. 15-61** Set Variable operator prompt, example from Freedom EVOware Plus

The operator should enter the requested value and click OK

The operator can click *Cancel* to abort the script.

The title bar shows the name of the pipetting script which displayed the prompt.

In Freedom EVOware Plus, the title bar shows the process name, script ID (normally counting from 1) and the number of the process copy which is running the script (process instance ID, counting from 1).

## 15.36.2 Set Variable - User Query At Script Start

The Set Variable command displays the following operator prompt when the script starts if you have checked the *User Query at Script Start* checkbox to prompt the operator for a value:



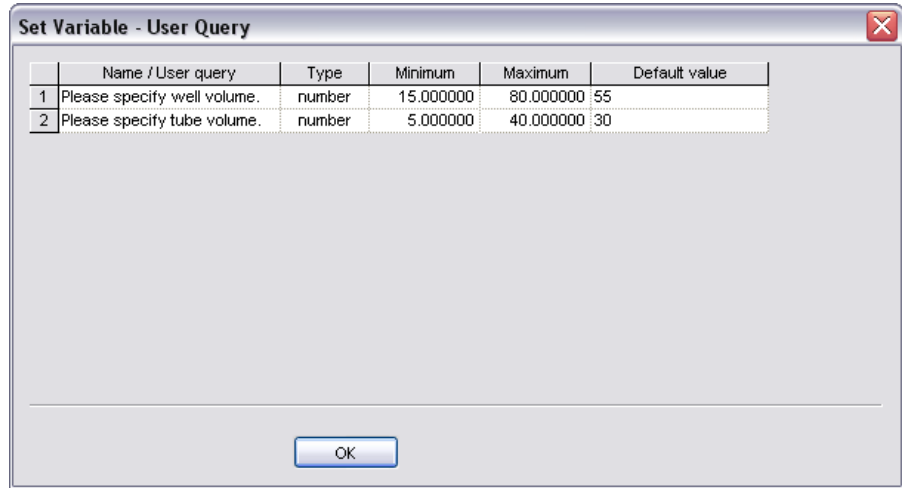


Fig. 15-62 Set Variable - User Query operator prompt

In the above example, the script contains two Set Variable commands with the *User Query at Script Start* feature enabled.

### 15.37 Import Variable Command

The Import Variable command is used to import values for script variables from a file during script runtime. You can import values for variables which are already declared (defined) in the script. You can also use this command to declare new variables for use in the script and assign an initial value which is read from the import file. The import file can be either a comma-separated text file (.txt or .csv) or an Excel file (.xls).

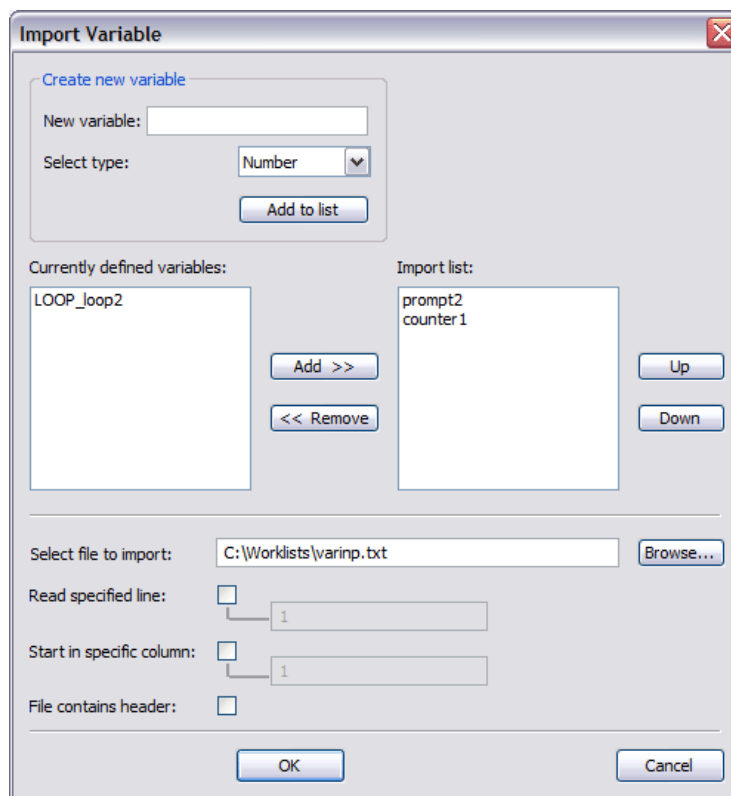


Fig. 15-63 Import Variable command

The parameters of the Import Variable command are as follows:

### Create new variable panel

#### New variable

To create (declare) a new variable, enter the variable name in the *New variable* field, choose the variable type (number or string) and click *Add to list*. The new variable will be added to the Import list. The new variable will be created when the script is run. Variable names in Freedom EVOware are not case-sensitive.

#### Currently defined variables

This list initially shows all of the variables which are already declared in the script. It also shows the pre-defined variables which the script uses. In the above example, the pre-defined variable LOOP\_loop2 was automatically declared by a Begin Loop command.

If your script contains conditional jumps or branches, the Import Variable command only lists variables in those parts of the script which are executed with the default values of the IF variables in Condition commands. It is not recommended to declare variables (e.g. with the Set Variable command) within conditional parts of the script (see [14.1.12 "Validating a Script Which Contains Variables"](#), [14-18](#)).

To read a value for one of these variables from the import file, select the variable and click *Add*. This moves the variable to the Import list. Repeat this process to import more variables.

### Import list

This list shows all of the variables whose values you want to import. Make sure that the import file contains values for all of the variables which you want to import. Select an entry and click *Up* or *Down* to re-arrange the order of the variables in the list. The order of the variables in the list must match the order of the fields in the import file (see below).

To remove a variable from the import list, select the variable and click *Remove*. If the variable is a pre-defined variable, it is moved back to the *Currently defined variables* list. If the variable is a newly created variable, it is deleted.

### Select file to import

Specify the name and full path of the import file or click *Browse* and choose an existing file. The import file can be either a comma-separated text file (.txt or .csv) or an Excel file (.xls). The import file type is determined automatically from the filename extension which you specify.

### Read specified line

Check this checkbox and specify a line number to import the values from a specified line of the import file. By default, the values will be imported from line 1. If the import file has a header, the header is not included in the line count.

### Start in specified column

Check this checkbox and specify a column number to import the values starting at a specified column of the import file. By default, the values will be imported starting at column 1.

### File contains header

Check this checkbox if the file contains a header with the names of the variables to import.

### Import file examples with and without header

Text file without header and values for one string variable and one numeric variable:

```
"myprompt",2
```

Text file with header and values for one string variable and two numeric variables:

```
prompt2,counter1,counter_2
```

```
"myprompt",2,50
```

Text file with header and three sets of values for one string variable and one numeric variable:

```
prompt2,counter1
```


```
"myprompt",2
```

```
"hello",25
```

```
"goodbye",42
```

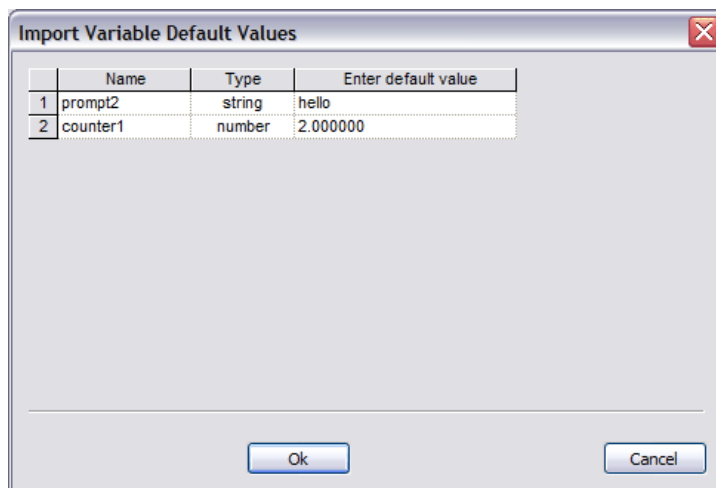
If the import file has a header, it is used to determine which value should be imported to which variable. An error message will be output during script runtime if any of the variable names in the import list cannot be found in the header.

If the import file does not have a header, the values are processed from left to right. The value in the first field (Excel: column) is written to the first variable in the import list and the value in the second field is written to the second variable in the import list, etc.

If you are importing from a text file, see [15.37.2 "Field Separator for the Import Variable and Export Variable Commands"](#),  15-97.

### 15.37.1 Import Variable Default Values Dialog Box

When you click OK to insert the Import Variable command in your script, you are prompted to enter default values for the variables which you want to import:



**Fig. 15-64** *Import Variable Default Values dialog box*

This list shows all of the variables whose values you want to import. Variables which are already declared in the script are shown with their existing default values. Variables which will be created by the Import Variable command are shown without a default value. Make sure that a default value has been specified for all of the variables.

During script runtime, the Import Variable command reads values for the chosen variables from the specified import file. If the import file does not contain values for all of the variables which you want to import, Freedom EVOware will use the default values in the above dialog box instead if the value is missing.

### 15.37.2 Field Separator for the Import Variable and Export Variable Commands

The field (i.e. column) separator which is used in the import file of the Import Variable command and the export file of the Export Variable command can be configured with the parameter `Csv_With_Semicolon` in the `Evoware.opt` file (see [A.3 "Parameters in the Evoware.opt file"](#), [A-15](#)):

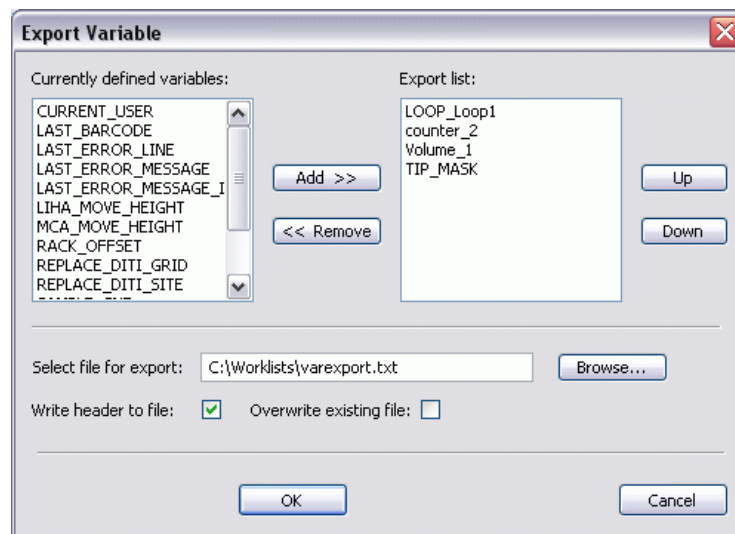
*Tab. 15-12 Field separator for the Import Variable and Output Variable commands*

	field separator in the input file	field separator in the export file
<b>csv_with_semicolon parameter not present in evoware.opt</b>	comma	comma
<b>csv_with_semicolon=0</b>	comma	comma
<b>csv_with_semicolon=1</b>	semicolon	semicolon

If you set this parameter to 1, this simplifies opening the export file and/or creating a suitable input file using Microsoft Excel (Excel normally uses a semicolon as the field separator in csv files - depending on the MS Windows regional settings). This parameter also affects the field separator which is used by the Export Data command.

### 15.38 Export Variable Command

The Export Variable command is used to export the values of script variables to a file during script runtime. The export file can be either a comma-separated text file (.txt or .csv) or an Excel file (.xls).



*Fig. 15-65 Export Variable command*

The parameters of the Export Variable command are as follows:

### Currently defined variables

This list initially shows all of the variables which are declared in the script. It also shows the pre-defined variables which the script uses. In the above example, the pre-defined variable LOOP\_loop2 was automatically declared by a Begin Loop command.

If your script contains conditional jumps or branches, the Export Variable command only lists variables in those parts of the script which are executed with the default values of the IF variables in Condition commands. It is not recommended to declare variables (e.g. with the Set Variable command) within conditional parts of the script (see [14.1.12 “Validating a Script Which Contains Variables”](#), [14-18](#)).

To include a variable value in the export file, select the variable and click *Add*. This moves it to the Export list. Repeat this process to export more variables.

### Export list

This list shows all of the variables whose values you want to export. Select an entry and click *Up* or *Down* to re-arrange the order of the variables in the list. The order of the variables in the list affects the order of the fields in the export file which is written (see below).

To remove a variable from the export list, select the variable and click *Remove*. This moves it back to the *Currently defined variables* list.

### Select file for export

Specify the name and full path of the export file or click *Browse* and choose an existing file. The export file can be either a comma-separated text file (.txt or .csv) or an Excel file (.xls). The export file type is determined automatically from the filename extension which you specify.

### Write header to file

Check this checkbox if you want the Export Variable command to write a header to the file with the names of the variables which have been exported. See also *Multiple Export Variable commands*, below.

### Overwrite existing file

Check this checkbox if you want to overwrite an existing export file of the same name. If you do not check this checkbox and the export file already exists, new lines are appended to the existing file. See *Multiple Export Variable commands*, below.

### Export file examples with and without header

Text file without header and values for one string variable and one numeric variable:

```
"myprompt",2
```

Text file with header and values for one string variable and two numeric variables:

```
prompt2,counter1,counter_2
```

```
"myprompt",2,50
```

Text file with header and three sets of values for one string variable and one numeric variable:

```
prompt2,counter1
```

```
"myprompt",2
```

```
"hello",25
```

```
"goodbye",42
```

The Export Variable command processes the variables in the export list from top to bottom. The value of the first variable in the export list is written to the first field (Excel: column) and the value of the second variable in the export list is written to the second field, etc.

If you are exporting to a text file, see [15.37.2 “Field Separator for the Import Variable and Export Variable Commands”](#), 15-97.

### Multiple Export Variable commands

If your script contains more than one Export Variable command which writes to the same export file (or the same Export Variable command is called several times), and you did not check the *Overwrite existing file* checkbox, each subsequent Export Variable command appends a new line to the export file.

If your script contains more than one Export Variable command which writes to the same export file and you have checked the *Write header to file* checkbox, subsequent Export Variable commands check whether a valid header is present in the export file before appending new lines to the export file. Valid means that the existing header is identical to the header that would be written if the command was executed on its own. Variable names in Freedom EVOware are not case-sensitive.

The following conditions must be met in this case:

- ♦ All of the Export Variable commands must specify the same variable list in the same order;
- ♦ The *Write header to file* checkbox must be checked for the first Export Variable command in the script (but does not need to be checked for all of the subsequent ones).

## 15.39 Condition Command

The Condition command is used to jump to a specified line in the script if a specified condition is met. You can specify a value, variable or expression on both sides of the comparison operator. If the comparison is true, Freedom EVOware continues the script at the line specified with *then goto line*.

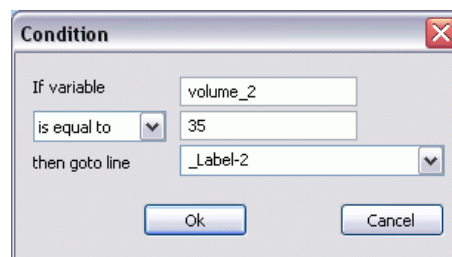


Fig. 15-66 Condition command

The parameters of the Condition command are as follows:

#### If Variable

Specify the value, numeric variable, string variable or expression to be used on the left of the comparison operator. Then specify the value, numeric variable, string or expression to be used on the right of the comparison operator in the field below the *If Variable* field.

### Comparison operator

Choose one of the four comparison operators from the pull-down list:

- is equal to
- is not equal to
- is bigger than
- is less than

### then goto line

Freedom EVOware uses Comment commands as labels (jump destinations) for the Condition command. Choose the required jump destination from the pull-down list. The list shows all comments which are currently defined in the script. Freedom EVOware will continue script execution at the specified line if the condition is met. Otherwise it will continue script execution at the next line in the script.

In the Comment command, it is recommended to prefix the label (jump destination) with underscore (“\_”), see the above figure for an example. See [15.32 “Comment Command”](#), ¶ 15-87 for an explanation of this recommendation.

You can also specify a name for the jump destination in advance and add the corresponding Comment command to the script later.

**Note:** Each time you insert a new command in your script or edit an existing command, Freedom EVOware validates the entire script to check for errors. During validation, Freedom EVOware uses default values for the variables (see [14.1.12 “Validating a Script Which Contains Variables”](#), ¶ 14-18). For this reason, the script might run incorrectly even if no errors are detected during validation.



## 15.40 If - Then Command

The If -Then command is used to execute a set of script commands if a specified condition is met and execute a different set of commands if the condition is not met (Else condition).

The If -Then command is part of an If - Then - Else control structure. A control structure is a set of related commands which are used to control the sequence actions in your script. When you add the If - Then command to your script, an Else command and an End If command are added automatically.

If you want to execute any script commands when If -Then is true, you must put them between the If -Then command and the Else command. If you want to execute any script commands when If -Then is not true, you must put them between the Else command and the End If command.

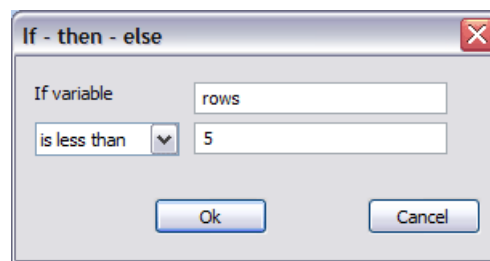


Fig. 15-67 If - Then command

The parameters of the If - Then command are as follows:

### If Variable

Specify the value, numeric variable, string variable or expression to be used on the left of the comparison operator. Then specify the value, numeric variable, string or expression to be used on the right of the comparison operator in the field below the *If Variable* field.

### Comparison operator

Choose one of the four comparison operators from the pull-down list:

- is equal to
- is not equal to
- is bigger than
- is less than

**Note:** Each time you insert a new command in your script or edit an existing command, Freedom EVOware validates the entire script to check for errors. During validation, Freedom EVOware uses default values for the variables (see [14.1.12 "Validating a Script Which Contains Variables"](#), 14-18). For this reason, the script might run incorrectly even if no errors are detected during validation.

## 15.41 Else Command

The Else command of an If - Then - Else control structure. A control structure is a set of related commands which is used to control the sequence actions in your script. The Else command is inserted in the script automatically when you add the If - Then command.

If you want to execute any script commands when Else is true, you must put them between the Else command and the End If command.

The Else command itself has no parameters to configure.

## 15.42 End If Command

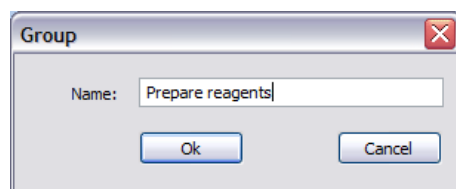
The End If command is the last command of an If - Then - Else control structure. A control structure is a set of related commands which is used to control the sequence actions in your script. The End If command is inserted in the script automatically when you add the If - Then command.

You must put the End If command after the last command which you want to execute when Else is true.

The End If command itself has no parameters to configure.

## 15.43 Group Command

The Group command is used to group together script lines to make long scripts easier to read. When you insert a Group command, a Group End command is also inserted.



*Fig. 15-68 Group command*

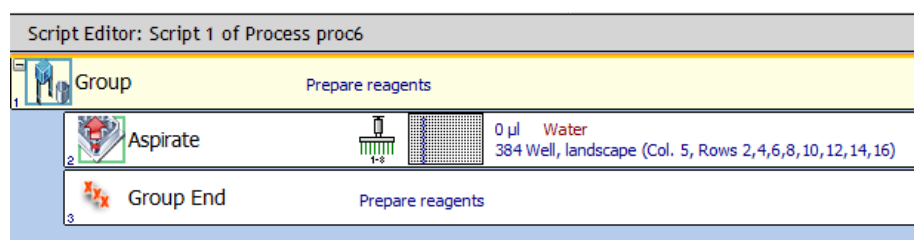
After inserting the Group command in your script, put all of the script lines which belong to the group between the Group command and the Group End command. Then click the “-” button in the Group command icon in the Script Editor if you want to hide all of the script lines in the group. The “-” button changes to “+”. Click the “+” button to show the script lines again.

The parameters of the Group command are as follows

### Name

Specify a descriptive name of your choice for the group.

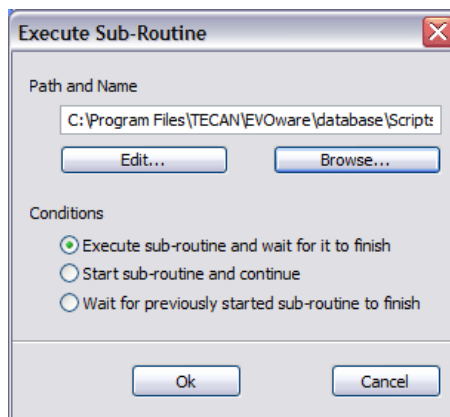
Example of using the group command:



*Fig. 15-69 Group command, example*

## 15.44 Sub-Routine Command

The Sub-Routine command executes another script as part of the current script. See 14.3 “Sub-routines”, 14-19 for more information. The Sub-Routine command is not available in Freedom EVOware Plus.



**Fig. 15-70** Sub-Routine command

The parameters of the Sub-Routine command are as follows:

### Path & Name

Specify the filename and location of the pipetting script you want to use as a sub-routine.

**Edit:** Click this button if you want to open the specified sub-routine in a new window for editing and/or checking.

**Browse:** Click this button to look for existing pipetting scripts and to choose the one you want to use as a sub-routine.

### Execute sub-routine and wait for it to finish

This option causes the main pipetting script to wait for the sub-routine to finish before continuing.

### Start sub-routine and continue

With this option, the main pipetting script continues without waiting for the sub-routine to finish (“asynchronous” sub-routine, i.e. asynchronous processing of the main script and the sub-routine). To allow asynchronous processing, the sub-routine must only contain the following commands:

- Aspirate
- Dispense
- Mix
- Wash Tips
- Periodic Wash
- Get DITIs
- Drop DITIs
- Set DITI Position
- Pick Up DITIs
- Set DITIs Back
- Pickup ZipTip
- Detect Liquid
- Tip Alignment Check

- Move LiHa
- Waste
- Active WashStation
- Export Data
- Manual Tip Alignment
- Start Timer
- Wait for Timer
- Execute Application
- Comment
- User Prompt
- BeginLoop
- EndLoop
- Set Variable
- ImportVariable
- ExportVariable
- Move ROMA
- ROMA Vector
- Transfer Labware
- Move PnP
- PnP Vector
- Transfer Tube
- All device commands (see [13.2 “Overview of Device Commands”](#), ¶ 13-8)

**Wait for previously started sub-routine to finish**

This option causes the main pipetting script to wait for the specified, previously started sub-routine to finish before continuing.

**Note:** You can also start a sub-routine from within another sub-routine by including a Sub-Routine command within the sub-routine.

See [14.3 “Sub-routines”](#), ¶ 14-19 for more information.

## 15.45 Notification Command

The Notification command is used to send an email from within a script (e.g. to inform an operator in another room that a certain process has finished). It can also be used to send an automatic email if an error occurs during script execution.

The Notification command sends the email using the notification feature in Freedom EVOware. The notification feature requires either the MAPI service to be installed or access to an SMTP server (mail server). See [8.3.2 “Notifications Section”](#), ¶ 8-12.

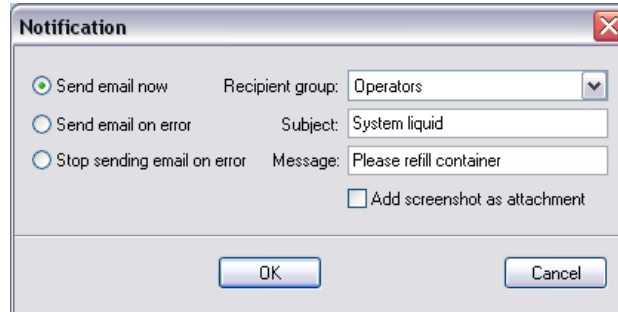


Fig. 15-71 Notification command

The parameters of the Notification command are as follows:

**Recipient group**

Freedom EVOware can be configured to send messages about system events and error situations to specific groups of users. The groups are configured with the Configuration Tool (see 8.3.2 “Notifications Section”, 8-12, Groups tab). Choose the user group which should be notified from the pull-down list. You must configure the groups first.

**Subject**

Specify the subject of the email.

**Message**

Specify the message you want to send.

**Send email now**

Sends an email immediately.

**Send email on error**

An email will be send to the specified address each time Freedom EVOware displays an error dialog box.

**Stop sending email on error**

No emails will be sent any more when errors occur. This option is used to disable a previous *Send email on error* command.

**Address**

Specify the recipient’s email address.

**Add screenshot as attachment**

If you check this checkbox, a screenshot of the current screen will be attached to the email which is sent.

## 15.46 Start Script Command

The Start Script command starts another script from the currently running script. In contrast to sub-routines, the new script can use a different worktable layout to the original script. The Start Script command is not available in Freedom EVOware Plus.

The Start Script command terminates the currently executing script, closes it, loads and validates another script and starts it if there were no errors. If errors are found, the faulty script lines are marked in red and the new script is not executed.

When executing the Start Script command, Freedom EVOware reacts as if the first script has terminated normally and the user manually loaded and started the new script.

This means that the new script is not validated during validation of the first script, worklists which have been loaded in the first script are not available in the new script and variables and timers cannot be passed from the first script to the new script.

**Note:** Freedom EVOware Plus allows you to declare variables which can be shared between different scripts (see 6.4.6 “Declare Variables”, 6-12).

If the new script uses a different worktable layout to the original script, you must make sure that objects (e.g. labware) of the required types have been placed in the right positions on the instrument’s worktable before the new script is executed. The Start Script command is not allowed in sub-routines and advanced worklists.

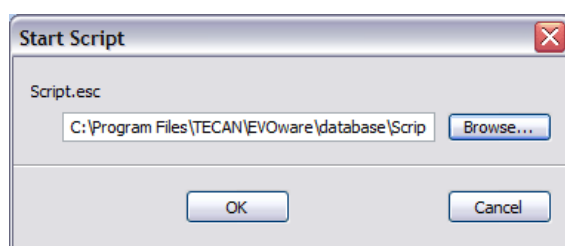


Fig. 15-72 Start Script command

The parameters of the Start Script command are as follows:

**Edit field**

Specify the filename and location of the Freedom EVOware script you want to start.

**Browse:** Click this button to look for existing Freedom EVOware scripts and to choose the one you want to start.

## 15.47 On Error Goto Command

The On Error Goto command is used to jump to a specified line in the script if an error occurs during script runtime. Error recovery commands then allow the pipetting script to react automatically to the error.

For example, to recover from a liquid error due to insufficient liquid, use the pre-defined variable RACK\_OFFSET in the Aspirate command to specify the labware location and use the On Error Goto command to jump to error recovery commands. The error recovery commands then modify the value of RACK\_OFFSET to aspirate from another container which has enough liquid. An elegant way to program this uses the On Error Goto command together with the Resume command (see 15.48 “Resume Command”, 15-108).

If you do not use the On Error Goto command, many of the runtime errors would otherwise pause the pipetting script and display a dialog box for operator intervention (see 18.1 “Error Dialogs”, 18-1).

The On Error Goto command will only respond to the error if the error would otherwise result in an error dialog. For example, if you have configured the error reaction in the Aspirate tab of the liquid class as “pipette air” or “go to z-max” instead of “user prompt”, a liquid detection error would not otherwise cause an error dialog to appear and will be ignored by the On Error Goto command.

Specifically, the On Error Goto command responds to the following error dialogs:

- ◆ Liquid Detection Error
- ◆ Clot Error
- ◆ Clot Error (PMP)
- ◆ PMP Instrument Error
- ◆ Liquid Arrival Check Error
- ◆ Volume Monitoring Error
- ◆ Diluter Error
- ◆ Error Fetching DITIs
- ◆ Error Mounting DITIs
- ◆ Lost DITI Error
- ◆ DITI Already Mounted Error
- ◆ Grip Error
- ◆ Te-MO DITI Error
- ◆ WRC / Te-MO Error
- ◆ WRC Errors

In the case of Diluter Error, the affected diluters are automatically switched off and the tip status is set to “broken” to prevent them from being used for any further pipetting (as if the user had clicked the “Deactivate” button in the Diluter Error dialog box).

Of course, some types of error cannot be resolved automatically. In this case, the On Error Goto command could for example call the Notification command to send an email which alerts someone to the problem.

The On Error Goto command must precede the script command which could generate an error.



**Fig. 15-73** On Error Goto command

The parameters of the On Error Goto command are as follows:

**then goto line**

Specify the jump destination for the On Error Goto command as a line number in the script. Freedom EVOware will continue script execution at the specified line if an error is detected. Otherwise it will continue script execution at the next line in the script. The jump destination can also be specified using a variable or expression, for example Err\_Recovery+1.

The line number you specify in this command is automatically adjusted if you add or remove lines from the script.

**Deactivate error handling**

Choose this option if you want to switch off automatic error handling again if it was enabled earlier on in the pipetting script.

You can use the On Error Goto command several times in the same script. For example, you could use an On Error Goto command prior to a Get DITis command to handle a problem with getting DITis and a second On Error Goto command prior to a pipetting operation to handle a liquid detection error. The On Error Goto command should be in the same script as the command to be handled. If you want to handle an error in a sub-routine then the error handling should completely be included in the sub-routine.

**Note:** *last\_error\_line* is a read-only, pre-defined variable which contains the line number in the pipetting script of the last command which reported an error during script runtime. Information on the last script error which was reported is contained in the pre-defined variables *last\_error\_message* and *last\_error\_message\_id*. See 14.1.4 “Pre-Defined Variables”, 14-4.

## 15.48 Resume Command

The Resume command is used together with the On Error Goto command and specifies where to resume running the script after executing the error recovery commands.

The On Error Goto command is used to jump to a specified line in the script if an error occurs during script runtime. Error recovery commands then allow the pipetting script to react automatically to the error (see 15.47 “On Error Goto Command”, 15-106).

Use a Resume command in the last line of the error recovery section if you want script execution to return to the main part of the script or to another, specified place in the script.

For example, to recover from a liquid error due to insufficient liquid, use the pre-defined variable *RACK\_OFFSET* in the Aspirate command to specify the labware location and use the On Error Goto command to jump to error recovery commands. The error recovery commands then modify the value of *RACK\_OFFSET* to aspirate from another container which has enough liquid and the Resume command returns program control to the Aspirate command again.

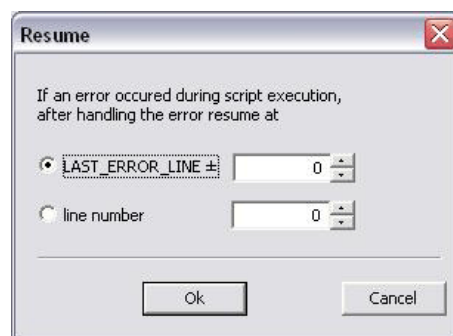


Fig. 15-74 Resume command

The parameters of the On Error Goto command are as follows:

### Last\_Error\_Line ±

Choose this option if you want to return to the script line which caused the error. You can also specify an offset if required. For example, if you specify -1, script execution will return to the line which directly preceded the script line which caused the error:



**Line number**

Choose this option and specify a line number in the script if you want to go to an absolute position in the script after handling the error.

You can use the On Error Goto command several times in the same script. For example, you could use an On Error Goto command prior to a Get DITs command to handle a problem with getting DITs and a second On Error Goto command prior to a pipetting operation to handle a liquid detection error. The Resume command always applies to the last script runtime error and the last On Error Goto command which was executed.

**Note:** *Last\_Error\_Line* is a read-only, pre-defined variable which contains the line number in the pipetting script of the last command which reported an error during script runtime. See 14.1.4 “Pre-Defined Variables”, 14-4.

**15.49 End Script Command**

The End Script command is used to stop the pipetting script prematurely and to specify a return code (error code) for the script. It is typically used together with error recovery commands.

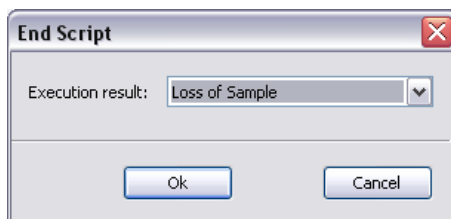


Fig. 15-75 End Script command

The parameters of the End Script command are as follows:

**Execution code**

Choose the required return code (error code) for the script. You can choose between No Error, Loss of Sample and Loss of Peripheral. The return code is reported in the log files.

**Note:** Information on the last script error which was reported is contained in the pre-defined variables *last\_error\_message* and *last\_error\_message\_id*. If you put several End Script commands in the script, if runtime errors occur you can jump to an End Script command which has the appropriate return code. See 14.1.4 “Pre-Defined Variables”, 14-4.

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If the return code for the script is Loss of Sample, the labware will not be used any more (because the pipetting was not carried out correctly) and it will be returned to the base position, e.g. the carousel. If more labware is available, the process will continue with the new labware. The process will be stopped if the return code is Loss of Peripheral.

## 15.50 Move RoMa Command

This command is used to carry out simple RoMa movements without using a RoMa vector:

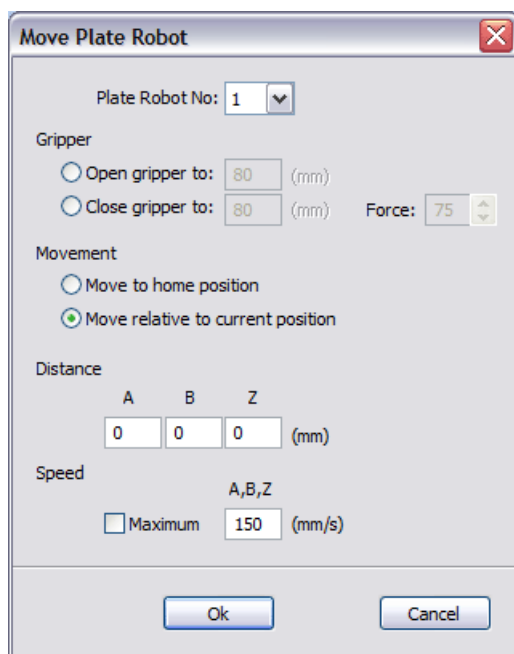


Fig. 15-76 Move RoMa command

The parameters of the Move RoMa command are as follows:

### **ROMA-No.**

Choose the RoMa you want to use (1 or 2) if your instrument is fitted with more than one.

### **Open Gripper**

This opens the gripper to the specified width (range: 55 to 140 mm).

### **Close Gripper**

This closes the gripper to the specified width (range: 55 to 140 mm) using the specified force (range: 0 to 249). A Grip Error message will be output if no resistance is detected when gripping.

### **Move to home position**

This moves the RoMa to the specified home position.  
After completing a sequence of movements with the RoMa, you should move it back to its home (parking) position, out of the way of other objects on the worktable (see 9.6.4 “Defining the Home Position for a RoMa”, 9-53).

**Move relative to current position**

This moves the RoMa relative to its current position. You must then specify the relative distances (range: -400 to 400 mm) and whether the RoMa should move at a particular speed (range: 0.1 to 400 mm/s) or at maximum speed.

The movements in A and B are not aligned with the instrument axes, but with the current rotator position (angle).

The movement in A is perpendicular to the gripper. Example #1: If the gripper points to the front (angle = 0°) and the A value is positive, then the RoMA will move to the left. Example #2: If the gripper points to the left (angle = 90°) and the A value is positive, then the RoMA will move to the back.

The movement in B is in line with the gripper. Example #1: If the gripper points to the front (angle = 0°) and the B value is positive, then the RoMA will move to the front. Example #2: If the gripper points to the left (angle = 90°) and the B value is positive, then the RoMA will move to the left.

See also 9.4.8.2 “RoMa Coordinate System”, 9-29.

**15.51 RoMa Vector Command**

This command executes a RoMa vector, which is a predefined sequence of RoMa movements. You can also specify gripper actions at the Safe and End positions. See 9.6.1 “Using RoMa Vectors”, 9-49 for more information.

The RoMa Vector command is intended for special RoMa movements and not for moving labware from one position to another - you should use the Transfer Labware command instead for this purpose. See also 15.51.1 “Moving labware with the RoMa Vector command”, 15-112.

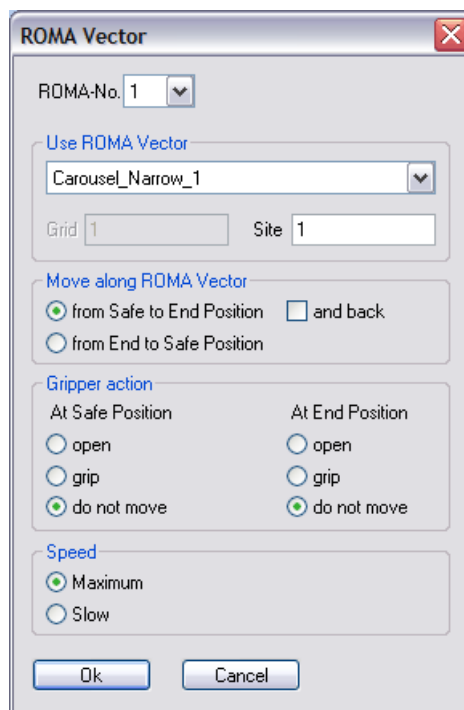


Fig. 15-77 RoMa Vector command

The parameters of the RoMa Vector command are as follows:

**RoMa-No.**

Choose the RoMa you want to use (1 or 2) if your instrument is fitted with more than one.

**Use RoMa Vector**

Choose the RoMa vector you want to use for the RoMa movement. The popup list shows the RoMa vectors which are currently defined in the Freedom EVOware database.

The digit at the end of the vector name (e.g. Carousel\_Narrow\_1) indicates the RoMa for which the vector was defined (1 or 2). See also [9.6.1 “Using RoMa Vectors”](#), ¶ 9-49.

You can also choose a user-defined vector. User-defined vectors are created in the Control Bar (Robot Vectors section).

Then specify the grid position and carrier site for which the vector is intended. The Grid field is protected (gray) if you have chosen a vector for a device which is not positioned on the worktable (see Carrier is Device checkbox in the carrier definition).

Tip: If you click on a carrier, the current grid position is shown in the small yellow tab at the bottom left.

**Move along RoMa Vector**

Choose the required direction of the RoMa movement. Click *And back* if you want the RoMa to return to the Safe position after reaching the End position.

**Gripper action**

Choose the gripper action which should be executed at the Safe position and at the End position. The required gripper spacing to pick up and release the labware is taken from the Grip Width and Release Width parameters in the chosen RoMa vector.

**Speed**

Choose *Maximum* if you want the RoMa to move at maximum speed. Choose *Slow* if you want the RoMa to move at the speed specified in the RoMa vector.

### 15.51.1 Moving labware with the RoMa Vector command

If you have scanned the labware barcode and you move the labware with the Transfer Labware command, the barcode remains assigned to the labware (i.e. the labware data record) at the new location. In addition, pipetting information, if any, remains assigned to the labware (see [15.23 “Export Data Command”](#), ¶ 15-42).

This is not the case with the RoMa Vector command. The barcode and the pipetting information are no longer available at the new location.

This also applies analogously to the MCA96 Vector command and the MCA384 Vector command.

Proceed as follows if you want to use a Vector command to move barcoded labware in special situations:

- ♦ After scanning the barcode, assign it to a temporary variable (see [14.1.11 “Labware Attributes and String Variables”](#), ¶ 14-17).
- ♦ Move the labware.
- ♦ Re-assign the barcode from the temporary variable to the labware.

This workaround transfers the barcode but not the pipetting information.

## 15.52 Transfer Labware Command

This command is used to transfer labware (e.g. a microplate) from one position to another with the plate robot (RoMa).

If you have scanned the labware barcode and you move the labware with the Transfer Labware command, the barcode remains assigned to the labware (i.e. the labware data record) at the new location. In addition, pipetting information, if any, remains assigned to the labware (see 15.23 “Export Data Command”, 15-42).

Grip and release commands for the RoMa (used to pick up and put down the labware) are handled automatically. The required gripper spacing is taken from the advanced properties for the respective labware type (see 9.4.2 “Editing Labware, Advanced Tab”, 9-16):

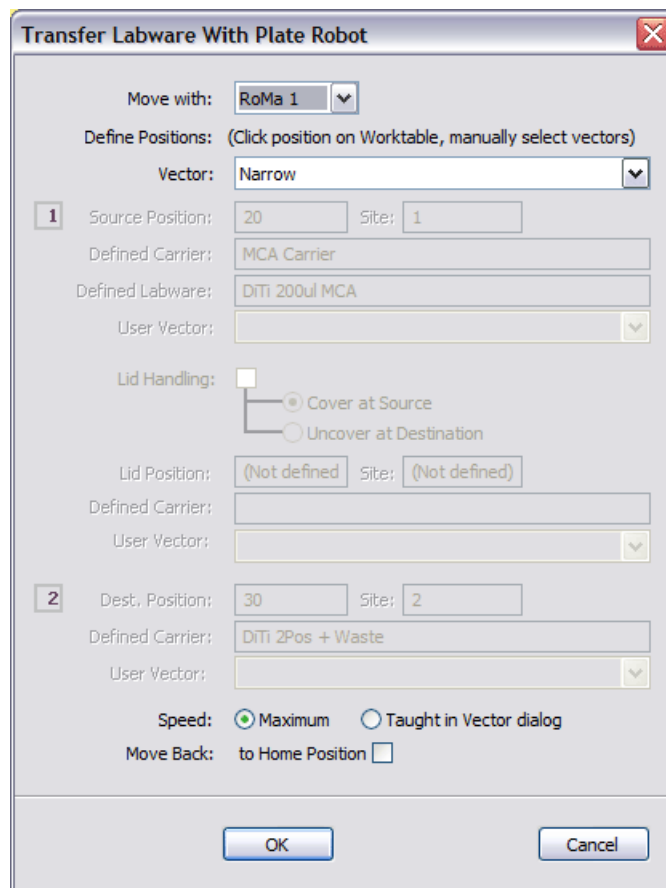


Fig. 15-78 Transfer Labware command

The parameters of the Transfer Labware command are as follows:


### Move with

Choose the RoMa you want to use (1 or 2) if your instrument is fitted with more than one.


### Vector

Choose the RoMa vector that you want to use to pick up the labware.

Choose Narrow to pick up the labware on the narrow side; choose Wide to pick up the labware on the wide side.

Choose User defined (Narrow) or (Wide) to pick up the labware on the narrow or wide side with a **user-defined vector**. In this case, you must choose the user-defined vector to use for picking up the labware at the source position and putting down it at the destination position in the two *User Vector* pull-down lists. User-defined vectors are created in the Control Bar (Robot Vectors section). See [5.4.1.4 “Robot Vectors”](#),  5-11.

Above all if you did not create the user-defined vector yourself, we recommend you to check carefully that the vector moves the RoMa to the correct (i.e. intended) source and destination carrier positions before using it for pipetting. Tip: Test the RoMa vector in a script using the 3D simulation program EVOSim.

Freedom EVOware will report an error when you complete the Transfer Labware command if the narrow or wide RoMa vector has not yet been created for the chosen labware type. It is best to create the required RoMa vectors in advance (see [9.6.2 “Teach Plate Robot Vector Dialog Box”](#),  9-50).


### Transfer Labware command, Step 1

Specify the parameters for the source position:

#### Source position

Select the current position of the labware by clicking on it in the Worktable Editor.

Grid and Site then show the position you have chosen. The gray (protected) field *Defined Carrier* then shows the type of carrier at the chosen site and the gray (protected) field *Defined Labware* shows the type of labware at the chosen site.

If you want to fetch the labware from a device such as a hotel or barcode scanner, click on the device icon. You then need to choose the site and the labware type. The list shows labware types which are allowed for the device (see [9.5 “Configuring Carriers”](#),  9-29, “Allowed Labware on this carrier”).

### Transfer Labware command, Step 2

Specify the parameters for the labware lid. These parameters are only available for labware types which can be fitted with a lid:

#### Lid handling

Check this checkbox if the labware has a lid. Choose *Cover at source* if you want to put on the lid before moving the labware. Choose *Uncover at destination* if you want to remove the lid after moving the labware to the destination position (i.e. the lid was already present). In either case, select the position for fetching or putting aside the lid by clicking on the site in the Worktable Editor. Grid and Site then show the position you have chosen. The gray (protected) field *Defined Carrier* shows the type of carrier on which the lid is placed/will be placed. You can only put aside lids on unused carrier sites.

### Transfer Labware command, Step 3

Specify the parameters for the destination position:

**Destination Position**

Select the required destination position of the labware by clicking on the site in the Worktable Editor.

The destination site must be suitable for the labware type you are moving (see 9.5 “Configuring Carriers”, 9-29, “Allowed labware on this carrier”).

Grid and Site then show the position you have chosen. The gray (protected) field *Defined Carrier* then shows the type of carrier at the chosen site.

If you want to move the labware to a device such as a hotel or barcode scanner, click on the device icon. You then need to choose the site and the labware type. The list shows labware types which are allowed for the device (see 9.5 “Configuring Carriers”, 9-29, “Allowed Labware on this carrier”).

**Speed**

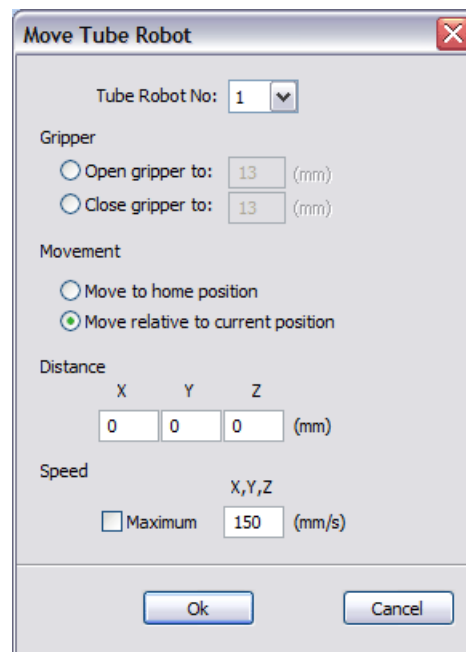
Choose *Maximum* if you want the RoMa to move at maximum speed. Choose *Taught in vector dialog* if you want the RoMa to move at the speed specified in the RoMa vector.

**Move back to Home Position**

Check this checkbox if you want the RoMa to move back to its home (parking) position after transferring the labware. See 9.6.4 “Defining the Home Position for a RoMa”, 9-53.

**15.53 Move PnP Command**

This command is used to carry out simple PnP movements without using a PnP vector:



**Fig. 15-79** Move PnP command

The parameters of the Move PnP command are as follows:

**PnP-No.**

Choose the PnP you want to use (1 or 2) if your instrument is fitted with more than one.

**Open Gripper**

This opens the gripper to the specified width (range: 7 to 28 mm).

**Close Gripper**

This closes the gripper to the specified width (range: 7 to 28 mm) using the specified force (range: 0 to 249). A Grip Error message is output if no resistance is detected when gripping.

**Move to home position**


This moves the PnP to the specified home position.

After completing a sequence of movements with the PnP, you should move it back to its home (parking) position, out of the way of other objects on the worktable.

**Move relative to current position**

This moves the PnP relative to its current position. You must then specify the relative distances (range: -400 to 400 mm) and whether the PnP should move at a particular speed (range: 0.1 to 400 mm/s) or at maximum speed.

## 15.54 PnP Vector Command

This command executes a PnP vector, which is a predefined sequence of PnP movements. You can also specify gripper actions at the Safe and End positions. The PnP Vector command is intended for special PnP movements and not for moving tubes from one position to another - you should use the Transfer Tube command instead for this purpose. See also [15.54.1 "Moving tubes with the PnP Vector command"](#),  15-118.



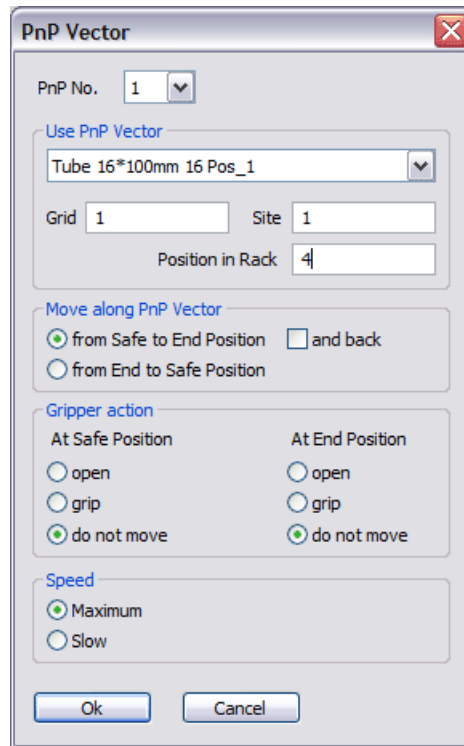


Fig. 15-80 PnP Vector command

The parameters of the PnP Vector command are as follows:

**PnP-No.**

Choose the PnP you want to use (1 or 2) if your instrument is fitted with more than one.

**Use PnP Vector**

Choose the PnP vector you want to use for the PnP movement. The popup list shows the PnP vectors which are currently defined in the Freedom EVOware database.

The digit at the end of the vector name (e.g. Tube 16\*100mm 16 Pos\_1) indicates the PnP for which the vector was defined (1 or 2).

Then specify the grid position, the carrier site and the tube position for which the vector is intended.

Tip: If you click on carrier, the current grid position is shown in the small yellow tab at the bottom left.

**Move along PnP Vector**

Choose the required direction of the PnP movement. Click *And back* if you want the PnP to return to the Safe position after reaching the End position.

**Gripper action**

Choose the gripper action which should be executed at the Safe position and at the End position. The required gripper spacing to pick up and release the tube is taken from the Grip Distance and Release Distance parameters in the chosen PnP vector.

**Speed**

Choose *Maximum* if you want the PnP to move at maximum speed. Choose *Slow* if you want the PnP to move at the speed specified in the PnP vector.

### 15.54.1 Moving tubes with the PnP Vector command

If you have scanned the tube barcode and you move the tube with the Transfer Tube command, the barcode remains assigned to the tube (i.e. the tube data record) at the new location. In addition, pipetting information, if any, remains assigned to the tube (see [15.23 “Export Data Command”](#), ¶ 15-42).

This is not the case with the PnP Vector command. The barcode and the pipetting information are no longer available at the new location.

Proceed as follows if you want to use the PnP Vector command to move barcoded tubes in special situations:

- ◆ After scanning the barcode, assign it to a temporary variable (see [14.1.11 “Labware Attributes and String Variables”](#), ¶ 14-17).
- ◆ Move the tube.
- ◆ Re-assign the barcode from the temporary variable to the tube.  
This workaround transfers the barcode but not the pipetting information.

## 15.55 Transfer Tube Command

This command is used to transfer a tube from one position to another with the tube robot (PnP).

If you have scanned the tube barcode and you move the tube with the Transfer Tube command, the barcode remains assigned to the tube (i.e. the tube data record) at the new location. In addition, pipetting information, if any, remains assigned to the tube (see [15.23 “Export Data Command”](#), ¶ 15-42).

You do not need to specify a PnP vector with this command because each labware type (e.g. tube rack) is associated with only one PnP vector for each PnP arm, so there is no choice to make.

Grip and release commands for the PnP (to pick up and put down the tube) are handled automatically. The required gripper spacing is taken from the Grip Distance and Release Distance parameters in the PnP vector for the selected labware type.

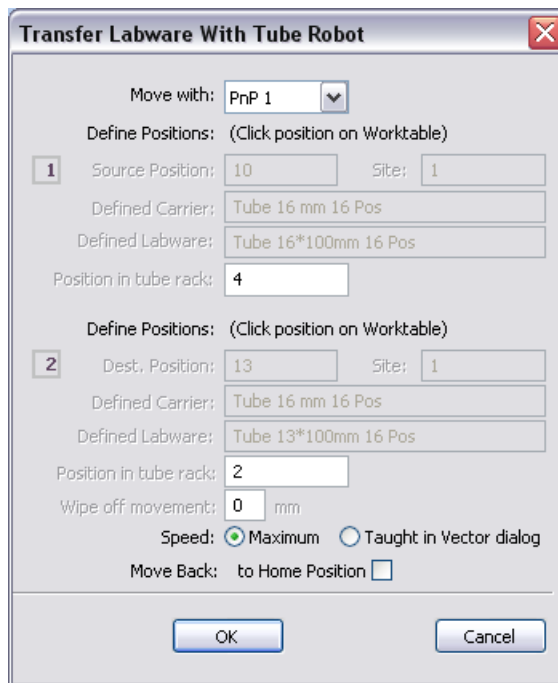


Fig. 15-81 Transfer Tube command

The parameters of the Transfer Tube command are as follows:

**Move with**

Choose the PnP you want to use (1 or 2) if your instrument is fitted with more than one.

The Transfer Tube command will use the PnP vector (PnP movement command) which is associated with the chosen tube type. Freedom EVOware will report an error when you complete the Transfer Tube command if a PnP vector has not yet been created for this tube type. It is best to create the required PnP vector in advance.

☒ **Transfer Tube command, Step 1**

Specify the parameters for the source position:

**Source position**

Select the position of the source tube rack by clicking on it in the Worktable Editor. Grid and Site then show the position you have chosen. The gray (protected) field *Defined Carrier* shows the type of carrier at the chosen site. The gray (protected) field *Defined Labware* then shows the type of labware at the chosen site.

**Position in tube rack**

Specify the current position of the tube in the source tube rack. Freedom EVOware counts tubes from rear to front and then from left to right.

☒ **Transfer Tube command, Step 2**

Specify the parameters for the destination position:

### Destination Position

Select the position of the destination tube rack by clicking on the site in the Worktable Editor. Grid and Site then show the position you have chosen. The gray (protected) field *Defined Carrier* then shows the type of carrier at the chosen site.

### Position in tube rack

Specify the required position of the tube in the destination tube rack. Freedom EVOware counts tubes from rear to front and then from left to right.

### Wipe off movement

If the tubes you use carry adhesive labels, in unusual cases they may stick to the PnP fingers due to incorrectly applied labels or adhesive residues. In such cases, you can activate an optional downwards movement of the PnP directly after releasing the tube. Specify the required downwards movement in mm (range: 0 to 10 mm).

### Speed

Choose *Maximum* if you want the PnP to move at maximum speed. Choose *Taught in vector dialog* if you want the PnP to move at the speed specified in the PnP vector.

### Move back to Home Position

Check this checkbox if you want the PnP to move back to its home (parking) position after transferring the tube.

## 15.56 PosID Command

The PosID command is used to read the barcode labels on one or more pieces of labware using the PosID option. The corresponding carrier or tube rack barcodes will also be scanned.

The PosID (Positive Identification System) is a movable barcode scanner which can be used to read the barcode labels on carriers, labware and tubes. Unlike fixed barcode scanners, it does not need a robot to bring the labware to it. The PosID is installed at the rear of the pipetting instrument and is provided with a gripper which pulls the carrier towards the rear for barcode identification and then slides the carrier back into the pipetting position. The scanning head hinges to read barcodes which are attached to horizontal or vertical surfaces. Barcodes can be read on both the primary side (e.g. sample tube) and the secondary side (e.g. microplates).

Freedom EVOware stores each scanned barcode in the internal database in the ID field of the labware record. The barcode information can also be included in report files (see [15.23 "Export Data Command"](#), [15-42](#)).

The Scan tab lets you choose the labware you want to scan and the Barcode types tab is used to configure the barcode types which the PosID scanner will accept for the chosen labware:

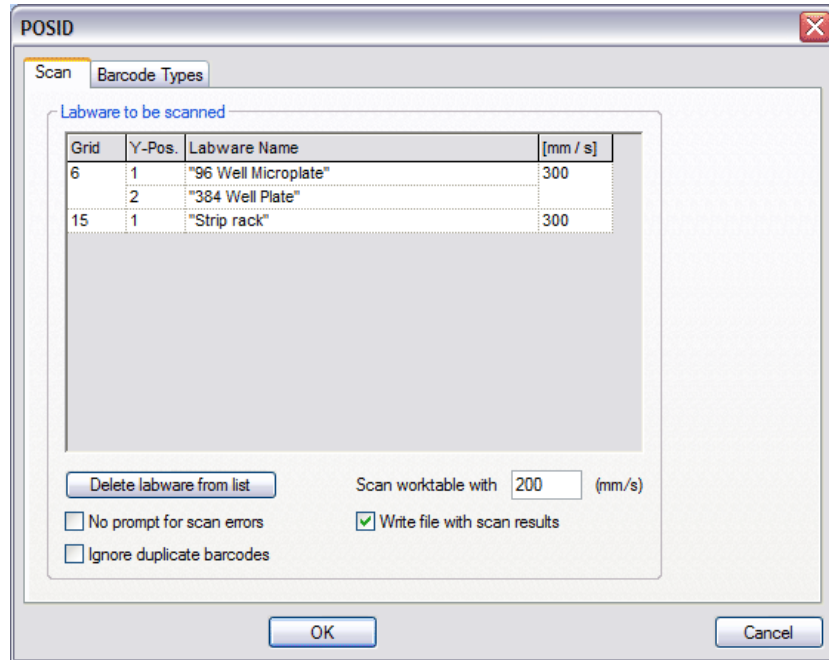


Fig. 15-82 PosID command (Scan tab)

The parameters of the PosID command are as follows (Scan tab):

**Labware to be scanned**

This shows the labware which Freedom EVOware will scan with this command. Click on a labware item in the Worktable Editor to add it to the list. If necessary, adjust the speed with which the labware barcode should be scanned (range 30 to 400 mm/s). The corresponding carrier or tube rack barcodes will also be scanned and do not need to be specified.

**Delete labware from list**

To remove labware from the list, select the corresponding line and click this button.

**Scan worktable with**

Specify the speed with which the carrier or tube rack barcodes should be scanned (range: 30 to 300 mm/s). Choose slower speeds if the barcodes are difficult to read or very small and to prevent spilling of the liquid in the wells as the scanner carrier is positioned.

### No prompt for scan errors

If this option is enabled, Freedom EVOware does not display an error message if a barcode could not be read.

If the carrier barcode cannot be read, the tubes or labware on this carrier won't be scanned either and are assigned default barcodes. The default barcode for labware is the grid position followed by an underscore ( \_ ) and the site number. The default barcode for tubes is the grid position followed by an underscore ( \_ ) and the tube number.

The default barcode for carriers or tube racks is the carrier code followed by an underscore ( \_ ) and the grid position. The grid position is padded to 6 digits with leading zeros. The carrier code is a 3-digit code which indicates the carrier type. Example: 013\_000015.

If the carrier barcode can be read but a tube barcode cannot be read, Freedom EVOware assigns a default barcode which consists of three stars ( \*\*\* ). If the tube is missing, Freedom EVOware assigns a default barcode which consists of \$\$\$.


### Ignore duplicate barcodes

Freedom EVOware will display an error message if the barcode scanner finds the same barcode on two different carriers or labware items.

Check the *Ignore duplicate barcodes* checkbox to switch off this security feature and disable the error message.

### Write file with scan results

If this option is enabled, a report file is created with the scanned barcodes. The filename is scan.csv and it is written to the configured Output directory (default path <install\_path>\Output). Existing files with the same name are overwritten. The file contains one line per scanned labware or tube barcode.

For information on the syntax of this file see [A.2.2 "Barcode file written by the PosID and PosID-3 commands"](#),  [A-11](#).

### 15.56.1 PosID Command (Barcode Types Tab)

The Barcode Types tab of the PosID command is used to configure the barcode types which the PosID scanner will accept for the chosen labware:

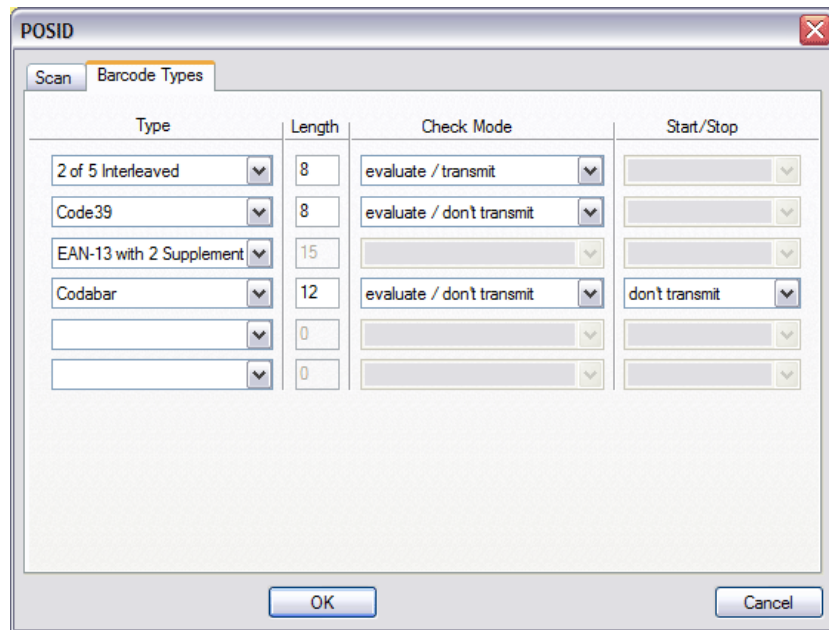


Fig. 15-83 PosID command (Barcode types tab)

The parameters of the PosID command are as follows (Barcode Types tab):

#### Type

Choose the barcodes types which will be accepted by the PosID scanner from the popup lists. You should only choose the barcode types which are being used on the barcode labels. This makes it easier for the scanner to identify incorrect barcodes. The PosID will report an error if it finds a barcode type which you have not chosen.

Some of the barcode types have additional settings as follows:

**Length**

- |       |  |
|-------|--|
| 0     | Do not check the length of the barcode.  |
| 1..30 | The length of the barcode must match this value (the checksum and start/stop code are also counted).<br>Barcodes with different lengths will be ignored. |

**Check Mode**

- |                           |  |
|---------------------------|--|
| empty                     | Do not check the checksum.   |
| evaluate / transmit       | The checksum is checked and is reported to Freedom EVOware as part of the barcode. |
| evaluate / don't transmit | The checksum is checked but not reported.  |

**Start/Stop**

- |                |  |
|----------------|--|
| empty          | A start/stop code is not required.   |
| transmit       | A start/stop code is required and is reported to Freedom EVOware as part of the barcode. |
| don't transmit | A start/stop code is required but not reported.  |



## 15.57 Send Command Command

The Send Command command allows you to send a firmware command directly to the pipetting instrument. This command is only intended for specialists.

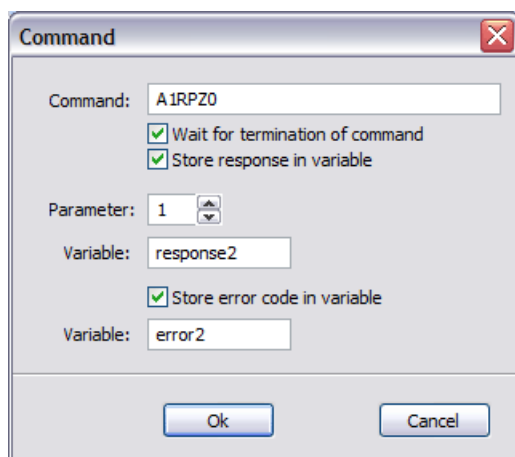


Fig. 15-84 Send Command command

The parameters of the Send Command command are as follows:

### Command

Specify the firmware command you want to send to the instrument. For example, "A1RPZ0" returns the current Z position of each of the LiHa tips. See the respective instrument manual for a list of firmware commands. Firmware commands are nearly always written uppercase.

### Wait for termination of command

If you check this checkbox, the pipetting script will wait for the firmware command to finish before continuing; otherwise the pipetting script will be continued immediately.

### Store response in variable

Some firmware commands terminate with one or more return parameters (numeric values) separated by commas. Check this checkbox if you want to store one of the return codes in a variable. See the respective instrument manual for information on return parameters from firmware commands.

**Parameter:** Specify which one of the return parameters you want to store.

**Variable:** Specify the name of the variable you want to use.

### Store error code in variable

All firmware commands terminate with an error code. The error code is 0 if the command was executed with no errors. Check this checkbox if you want to store the error code in a variable.

**Variable:** Specify the name of the variable you want to use.

### WARNING

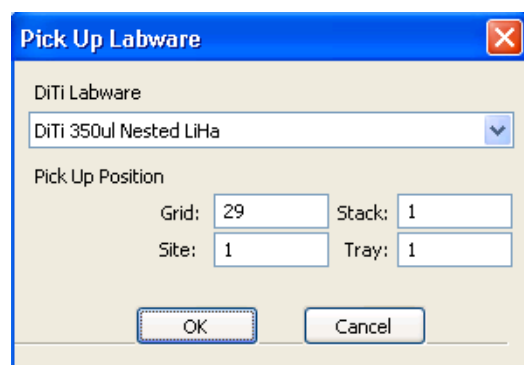


Risk of injury to operating personnel or damage to the equipment

Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

## 15.58 Pick Up Labware command

The Pick Up Labware command is used to transfer an empty tray from a nested LiHa stack in order to enable access to the next layer. This command is not supported for LiHas with mixed tip configuration. To carry out the transfer, the command requires a transfer tool mounted on the last DiTi of the LiHa. By setting the desired grid and site, the operator can choose the labware to be exchanged.



**Fig. 15-85** Pick Up Labware command

The workflow for the exchange is to first mount a transfer tool, then pick up the desired labware and drop the labware with the transfer tool in the provided waste. When the command is used in an ADH script it has to be ensured that no DiTi is mounted before mounting a transfer tool. When a DiTi is already mounted it is possible to delay ADH by setting the variable `REPLACE_DITI_POSTEXCHANGE` in the ADH script. Then the ADH will be re-executed before the next pick up of the empty DiTi type with the current values for the variables `REPLACE_DITI_GRID` and `REPLACE_DITI_SITE`. Tecan recommends to set this variable in the ADH subroutine to one in case the last TIP is used for a DiTi and cannot be used for the transfer tool. Once set this variable will automatically be reset to zero.

If the hardware is a LiHa with less than eight tips it is required to configure the servo address of the LiHa motors. Therefore a field engineer should be consulted.

The servo address can be configured in the `evoware.opt` file with `DC_SERVO_ADDRESS` under the section `[LIHA]` and `[LIHA2]`.

If there are two LiHas installed and the transfer tool is being used in an ADH script during a synchronous move, the operator has to ensure that the intended LiHa for the Pick Up Labware command is not executing a subscript or a process.

To avoid this situation it is recommended to define separate DiTi types and stacks for each LiHa. Then it can be guaranteed that the LiHa resource is not in use elsewhere.

The parameters of the Pick Up Labware command are as follows:

### DiTi Labware

Choose the DiTi Labware whose empty tray you want to pick up. The list shows all of the LiHa DiTi types which are defined in the labware database. DiTi types are assigned to DiTi racks in the labware definition for the rack (see [9.4.1 "Editing Labware, Well Dimensions Tab"](#), [9-13](#)).

**Pick Up Position**

**Grid, Site:** Specify the worktable position of a desired DiTi rack to pick up. You can also specify numeric constants or variables. The specified grid and site must contain a DiTi rack.

**Stack, Tray:** Only visible when nested LiHa DiTis are used. Specifies the worktable position of a desired nested LiHa DiTi rack to pick up by clicking on the rack in the worktable editor. The specified stack and tray must contain a DiTi rack. The trays from the nested LiHa DiTis are counted top down.



# 16 Device Commands

This chapter contains detailed descriptions of the Freedom EVOware device commands.

## Freedom EVOware Plus

In Freedom EVOware Plus, when the Script Editor is open the Commands tab only shows script commands (commands which are used for writing pipetting scripts, see [13.1 “Overview of Script Commands”](#), ¶ 13-1). When the Process Editor is open, the Commands tab of the Control Bar only shows device commands (commands for the optional devices, see [13.2 “Overview of Device Commands”](#), ¶ 13-8).

## Freedom EVOware Standard

In Freedom EVOware Standard, the Control Bar always shows both command types (it does not have a Process Editor).

If you cannot find the device that you want to use in the Control Bar, you must run the installation program again and install the respective device driver (see [4.3 “Modifying, Removing or Repairing Your Installation”](#), ¶ 4-8). Also check whether the driver has been installed but is currently deactivated (see [8.4.1.1 “Device Information Tab”](#), ¶ 8-21, *Start* checkbox).

**Note:** *Some of the device commands which are described in this chapter are not shown at all in the Control Bar. Such commands are used internally, e.g. for configuring pre-actions and post-actions.*

## 16.1 Service Functions

Some or all of the commands for each device can be executed manually from the Control Bar (without running a process) for service purposes, e.g. to initialize the device manually or to test correct functioning. To run a device command manually, right-click on the command name in the Commands section of the Control Bar and choose **Run Command** from the context menu.

Before executing a command for service purposes, make sure that the pipetting instrument and/or the device is set up appropriately. For example, some of the commands require you to put a microplate onto one or more carriers and/or into the device.

See [6.4.2 “Run Maintenance”](#), ¶ 6-10 for information on instrument maintenance functions. Maintenance functions are scripts which are created using the Script Editor.

## 16.2 Commands for the Symbol LS-1220 Barcode Scanner

The Symbol LS-1220 barcode scanner option allows you to read barcodes on plates or tubes which are presented to the scanner by a plate or tube robot. It can perform several reading attempts and tell the robot to increase its range of motion in front of the laser beam each time to detect barcodes even if they are not precisely positioned in front of the laser beam at the first try.

In Freedom EVOware Plus, the Barcode Scanner - Read Barcode command is an on-the-fly-command – drag the command to the line which connects two process steps (see 5.4.3 “The Process Editor (Freedom EVOware Plus)”, 5-16).

### 16.2.1 Barcode Scanner - Read Barcode Command

The Read Barcode command is used to read barcodes from the labware or tube which is presented to the barcode scanner by the RoMa. The RoMa moves the labware or tube in front of the scanner in x, y and z direction according to the driver settings you have made. The scanner driver can be configured to re-scan several times if the labware or tube barcode cannot be read on the first attempt. It increases the distance of movement of the labware or tube along the three axes each time to increase the likelihood of finding the barcode. If a timeout occurs, the user will either be prompted to specify a barcode manually or a default barcode will be constructed, again depending on the driver configuration. See 8.5.1 “Settings for the Barcode Scanner”, 8-36 for details.

See 13.2.1 “Commands for the Barcode Scanner, Overview”, 13-8 for general information on using the Read Barcode command.

Freedom EVOware stores each scanned barcode in the internal database in the ID field of the labware record. The barcode information can also be included in report files (see 15.23 “Export Data Command”, 15-42).

This command has no execution parameters or objects, pre-actions or post-actions.

## 16.3 Commands for the Columbus Washer

The Columbus Washer is used for strip-wise washing of 96-well microplates (optional: 384-well microplates). It can be equipped with either a 8, 12 or 16 way manifold or a 384 way manifold, each of which are provided with one aspirating and one dispensing needle per well. It can store up to 9 user-defined labware types that define the dispensing and aspirating positions for round or flat bottomed plates. The dispensing and aspirating speeds can be selected from 5 pre-defined speed settings. For dispensing, an additional drip mode setting is available which allows a wash liquid to be added drop by drop. In the soaking phase, you can also activate a microplate shaking mechanism. These features allow the device to be used for all ELISA microplate washing applications including cell washing.

### 16.3.1 Columbus Washer - WashPlate command

The WashPlate command performs the washing of a microplate.

The washing parameters you specify with this command are used to create a washing program which is copied to the first program position in the Columbus washer and then executed. If the first program position in the washer already contains a user-defined washing program, it is overwritten.

#### Execution parameters

You are prompted to specify the execution parameters when you add this command to your script or process. The dialog box has three tabs.

### 16.3.1.1 General Tab of the Columbus Washer - WashPlate Command

The General tab is used to set the general washing parameters.

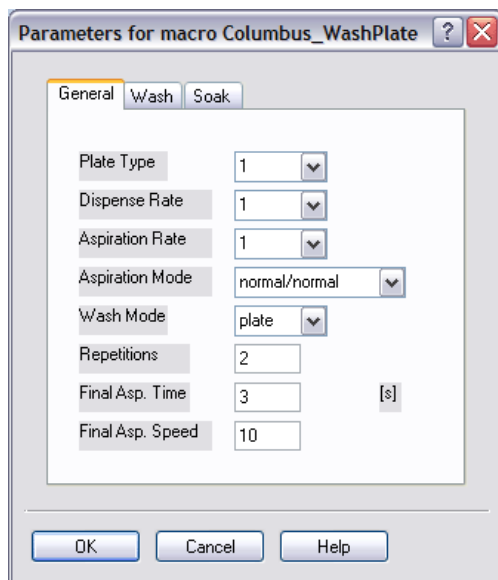


Fig. 16-1 Columbus WashPlate command - General tab

#### Plate type

The Columbus washer can store parameter sets for up to nine different labware types. The parameter sets are created using the menus on the washer's LCD panel. Choose the parameter set you want to use for washing. For information on parameter sets please refer to the corresponding section in the operating manual of your washer.

#### Dispense Rate, Aspiration Rate

Choose the required speed of the dispensing and aspirating pump.

#### Aspiration Mode

Choose the required aspiration mode. The available options are normal/normal, crosswise/crosswise, normal/crosswise and crosswise/normal. Crosswise aspiration should only be used for 96-well plates with flat bottomed wells. In this case, aspiration is carried out with the needles at two positions in each well (front edge and back edge). This minimizes the volume of residual liquids. For more information, please refer to the corresponding section in the operating manual of your washer.

#### Wash mode

Choose whether you want to use plate mode or strip mode. In plate mode, each process step is performed on all of the strips sequentially before proceeding to the next process step. The entire microplate is processed for the defined soaking time. In strip mode, the entire wash program is performed on a single strip (i.e. one column or row of the microplate, depending on wash orientation) before proceeding to the next strip. Each strip is processed for the defined soaking time before proceeding to the next strip. See also [17.5 "Columbus Washer - Washing a Variable Number of Strips in the Plate", 17-17.](#)

#### Repetitions

Specify the required number of repetitions of the washing procedure.

### Final Asp. Time

Specify the required final aspiration time (range: 1 to 20 seconds). Final aspiration is used to remove remaining liquid from the wells after the washing procedure.

### Final Asp. Speed

Specify the required final aspiration speed (range: 1 to 20 mm/s). This is the speed at which the needles are lowered into the wells as the liquid level drops.

## 16.3.1.2 Wash Tab of the Columbus Washer - WashPlate Command

The Wash tab is used to set additional washing parameters.

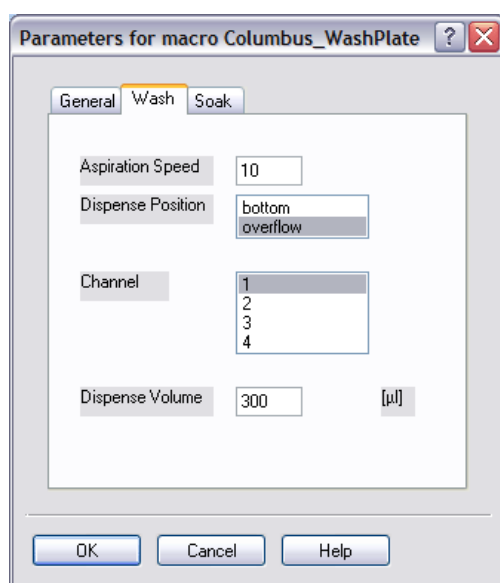


Fig. 16-2 Columbus WashPlate command - Wash tab

### Aspiration Speed

Specify the required aspiration speed (range: 1 to 20 mm/s). This is the speed at which the needles are lowered into the wells as the liquid level drops.

### Dispense Position

Choose the required washing mode (overflow or bottom washing). Overflow washing consists of a simultaneous aspiration and dispensing step. It creates a circular flow of the washing liquid in the well.

### Channel

Choose the channel (liquid container) which contains the required washing liquid.

### Dispense Volume

Specify the required dispense volume (in  $\mu\text{l}$ ).

## 16.3.1.3 Soak Tab of the Columbus Washer - WashPlate Command

If you want to soak the microplate, the corresponding parameters are set in the Soak tab.



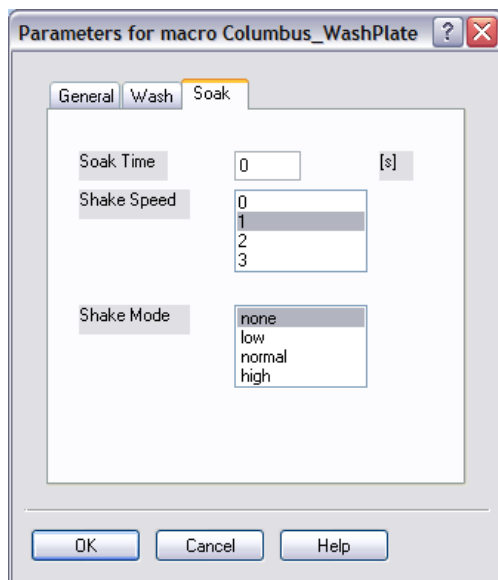


Fig. 16-3 Columbus WashPlate command - Soak tab

**Soak Time, Shake Speed, Shake Mode**

If you want to soak the microplate, set the soaking time to a value greater than 0 seconds. To shake the microplate while soaking, choose one of the shaking modes (low, normal or high) and set soak time and shake speed to values greater than 0.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

**Objects**

The WashPlate command operates on an object of type *Sample* or a derived type with default name *MP*.

**Pre-actions and Post-actions**

The labware is brought to the *Columbus* location with a RoMa MoveObject command and brought back to its *Base* location with another RoMa MoveObject command.

**16.3.2 Columbus Washer - Prime Command**

Before the washer is used, all dispensing channels needed for the wash step must be primed to fill the liquid system with the required liquid. The Prime command starts the priming procedure.

Priming can take several minutes, so you should start priming with this command at an early stage in your script or process to make sure that the washer is ready when you want to use it.

**Execution parameters**

You are prompted to specify the following execution parameters when you add this command to your script or process:

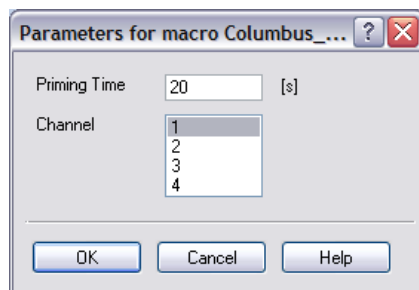


Fig. 16-4 Columbus Washer Prime command

### Priming time

Specify the required priming time.

### Channel

Choose the channel which contains the required priming liquid.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

## 16.3.3 Columbus Washer- Rinse Command

The Rinse command starts the rinsing procedure of the washer to flush the liquid system and prevent needle blockages. Rinsing should be performed when the device is left in standby or is switched off at the end of use. Four different rinse modes are available.

### Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

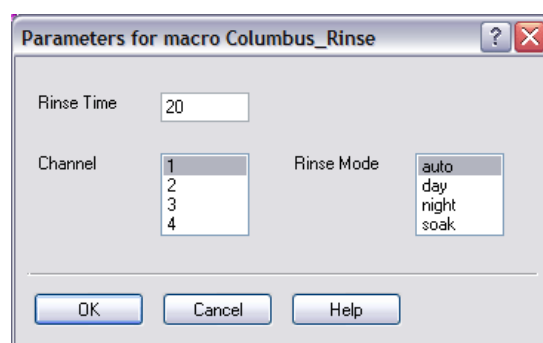


Fig. 16-5 Columbus Washer Rinse command

### Rinse Time

Specify the required rinsing time.

### Channel

Choose the channel which contains the required rinsing liquid.

### **Rinse Mode**

Specify the mode to be used for rinsing. Four modes are available:

Soak mode should be used if the washer will be left standing for a short time only (less than one hour). You can rinse the system with either distilled water or wash solution.

Day mode should be used if the washer will be or has been left standing for a least one hour. Day mode rinsing is normally carried out with wash liquid. Use distilled water instead if the washer has been unused for longer than two hours.

Night mode should be used at the end of the day to thoroughly rinse the liquid system and leave the manifold (wash head) soaking in the waste sink. Night mode rinsing is normally carried out with distilled water.

Auto mode is the same as day mode except that rinsing is automatically repeated after a specified amount of time (1 to 24 hours). The auto-rinse repeat time is configured using the washer's LCD panel.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

### **16.3.4 Columbus Washer - Remote Command**

The Remote command switches the device from local mode to remote mode. The device can only be controlled remotely by Freedom EVOware (through the interface cable) in remote mode.

This command has no execution parameters or objects, pre-actions or post-actions.

### **16.3.5 Columbus Washer - ExitRemote Command**

The ExitRemote command switches the device from remote mode to local mode. The device can not be controlled remotely by Freedom EVOware (through the interface cable) in local mode. Using this command will disconnect the device from the Freedom EVOware software.

This command has no execution parameters or objects, pre-actions or post-actions.

### **16.3.6 Columbus Washer - Status Command**

The Status command interrogates the status of the Columbus washer. The device status is reported during process runtime in the Messages/Error window of the runtime controller (see [12.2.4 "Runtime Controller, Extended View \(Running a Process\)"](#), [12-14](#)).

This command has no execution parameters or objects, pre-actions or post-actions.

### **16.3.7 Columbus Washer - Init Command**

The Init command initializes the washer. You must initialize the hardware with this command before you use the other commands for this device.

This command has no execution parameters or objects, pre-actions or post-actions.

### 16.3.8 Columbus Washer - StopRinse Command

The StopRinse command stops the currently running rinsing procedure. This command has no execution parameters or objects, pre-actions or post-actions.

### 16.3.9 Columbus Washer - StartProg Command

The StartProg command starts a washing program which is stored in the Columbus washer. The washer is capable of storing up to 30 user-definable washing programs which are identified by a number. For information on creating and storing washing programs please refer to the corresponding section in the operating manual of your washer.

#### Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

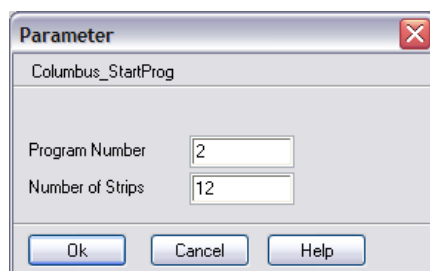


Fig. 16-6 Columbus StartProg command

#### Program Number, Number of Strips

Specify the number of the wash program you want to run.

#### Number of Strips

Specify the number of strips (i.e. rows or columns of the microplate) to be washed (range: 1 to 32).

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

#### Objects

The StartProg command operates on an object of type *Sample* or a derived type with default name *MP*.

#### Pre-actions and Post-actions

The labware is brought to the *Columbus* location with a RoMa MoveObject command and brought back to its *Base* location with another RoMa MoveObject command.

### 16.3.10 Columbus Washer - WashPlateEx Command

The WashPlateEx command performs the washing of a microplate. Information on the channels (liquid containers) to use with this command is read from an external text file.

The washing parameters you specify with this command are used to create a washing program which is copied to the first program position in the Columbus washer and then executed. If the first program position in the washer already contains a user-defined washing program, it is overwritten.

#### Execution parameters

You are prompted to specify the execution parameters when you add this command to your script or process. The dialog box has three tabs.

#### 16.3.10.1 General Tab of the Columbus Washer - WashPlateEx Command

The General tab is used to set the general washing parameters.

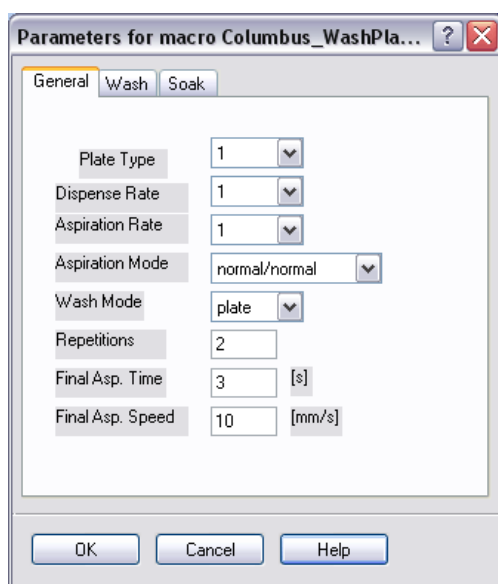


Fig. 16-7 Columbus WashPlateEx command - General tab

#### Plate type

The Columbus washer can store parameter sets for up to nine different labware types. The parameter sets are created using the menus on the washer's LCD panel. Choose the parameter set you want to use for washing. For information on parameter sets please refer to the corresponding section in the operating manual of your washer.

#### Dispense Rate, Aspiration Rate

Choose the required speed of the dispensing and aspirating pump.

### Aspiration Mode

Choose the required aspiration mode. The available options are normal/normal, crosswise/crosswise, normal/crosswise and crosswise/normal. Crosswise aspiration should only be used for 96-well plates with flat bottomed wells. In this case, aspiration is carried out with the needles at two positions in each well (front edge and back edge). This minimizes the volume of residual liquids. For more information, please refer to the corresponding section in the operating manual of your washer.

### Wash mode

Choose whether you want to use plate mode or strip mode. In plate mode, each process step is performed on all of the strips sequentially before proceeding to the next process step. The entire microplate is processed for the defined soaking time. In strip mode, the entire wash program is performed on a single strip (i.e. one column or row of the microplate, depending on wash orientation) before proceeding to the next strip. Each strip is processed for the defined soaking time before proceeding to the next strip. See also [17.5 "Columbus Washer - Washing a Variable Number of Strips in the Plate"](#), [17-17](#).

### Repetitions

Specify the required number of repetitions of the washing procedure.

### Final Asp. Time

Specify the required final aspiration time (range: 1 to 20 seconds). Final aspiration is used to remove remaining liquid from the wells after the washing procedure.

### Final Asp. Speed

Specify the required final aspiration speed (range: 1 to 20 mm/s). This is the speed at which the needles are lowered into the wells as the liquid level drops.

## 16.3.10.2 Wash Tab of the Columbus Washer - WashPlateEx Command

The Wash tab is used to set additional washing parameters.

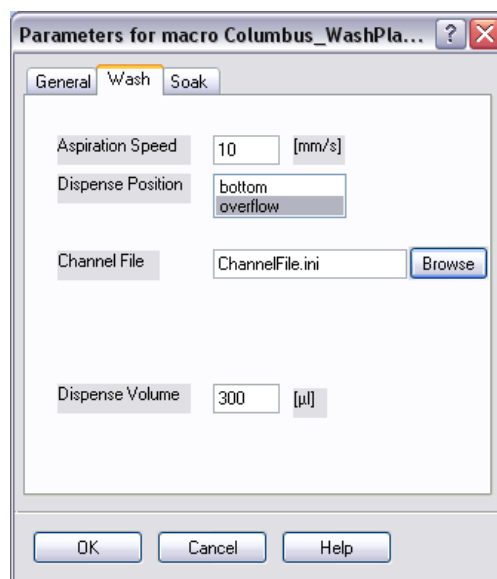


Fig. 16-8 Columbus WashPlateEx command - Wash tab

**Aspiration Speed**

Specify the required aspiration speed (range: 1 to 20 mm/s). This is the speed at which the needles are lowered into the wells as the liquid level drops.

**Dispense Position**

Choose the required washing mode (overflow or bottom washing). Overflow washing consists of a simultaneous aspiration and dispensing step. It creates a circular flow of the washing liquid in the well.

**Channel File**

Specify the required channel file. Enter the file name directly or click Browse and choose an existing file. The channel file specifies the channel (liquid container) which contains the required washing liquid. The syntax of the file is as follows:

```
[Wash]
Channel=<channel_number>
```

For example:

```
[Wash]
Channel=1
```

The folder (directory) which contains the channel files is configured in the Columbus driver settings (see 8.5.2.2 “Columbus Washer Configuration - Settings Tab”, 8-38).

**Dispense Volume**

Specify the required dispense volume (in µl).

**16.3.10.3 Soak Tab of the Columbus Washer - WashPlateEx Command**

If you want to soak the microplate, the corresponding parameters are set in the Soak tab.

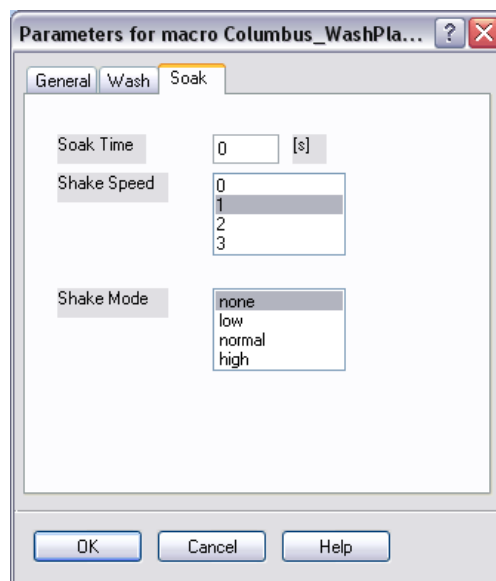


Fig. 16-9 Columbus WashPlateEx command - Soak tab

### Soak Time, Shake Speed, Shake Mode

If you want to soak the microplate, set the soaking time to a value greater than 0 seconds. To shake the microplate while soaking, choose one of the shaking modes (low, normal or high) and set soak time and shake speed to values greater than 0.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

### Objects

The WashPlate command operates on an object of type *Sample* or a derived type with default name *MP*.

### Pre-actions and Post-actions

The labware is brought to the *Columbus* location with a RoMa MoveObject command and brought back to its *Base* location with another RoMa MoveObject command.

## 16.3.11 Columbus Washer - DisableAutoPrime Command

The DisableAutoPrime command disables the auto-priming function for the Columbus washer. Auto-priming is configured in the Columbus driver settings (see 8.5.2.3 “Columbus Washer Configuration - Autopriming Tab”, 8-40). This command has no execution parameters or objects, pre-actions or post-actions.

## 16.3.12 Columbus Washer - AllowAutoPrime Command

The AllowAutoPrime command activates the auto-priming function for the Columbus washer. Auto-priming is configured in the Columbus driver settings (see 8.5.2.3 “Columbus Washer Configuration - Autopriming Tab”, 8-40). This command has no execution parameters or objects, pre-actions or post-actions.

## 16.4 Commands for the Heated Incubator

An incubator is a device which is used to keep labware containing samples or reagents at a defined temperature for a specified length of time, for example until the desired biological or biochemical reaction has taken place. The heated incubator can be fitted with a shaker option.

Freedom EVOware distinguishes between physical and logical incubators. A physical incubator is the device you place on the worktable of your instrument. A logical incubator is a group of incubator slots which are configured for the same incubating temperature. The group of slots can all lie within one physical incubator or can extend over more than one physical incubator. In the latter case, all of the physical incubators must have the same number of slots (4 or 6). Freedom EVOware installs three logical incubators (Heated Incubator 1 to 3). The temperature of the slots in the logical incubator is set in the Configuration Tool (see 8.5.3.2 “Heated Incubator Configuration - Settings Tab”, 8-42).



### 16.4.1 Heated Incubator - Incubate Command

The Incubate command incubates the labware inside the incubator for the specified amount of time. The temperature of the incubator slots is set in the Configuration Tool (8.5.3.2 “Heated Incubator Configuration - Settings Tab”, 8-42). All of the slots of the logical incubator are set to the same temperature. Freedom EVOware Plus automatically chooses the next free slot to use for incubating.

To ensure that the incubator reaches and maintains a stable temperature, make sure that the incubator doors are not left open for extended periods.

#### Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

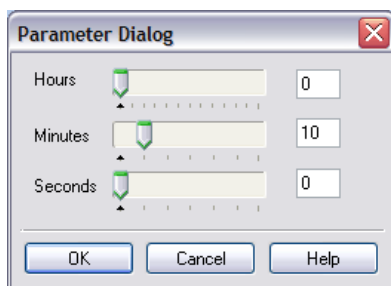


Fig. 16-10 Heated Incubator Incubate command

#### Hours, Minutes, Seconds

Specify the amount of time the labware should be kept at the chosen temperature. Click on the sliders to move them or enter the required time in the numeric fields.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

#### Objects

The Incubate command operates on an object of type *Sample* or a derived type with default name *MP*.

#### Pre-actions and Post-actions

The labware is brought to the *Incubator* location with a RoMa MoveObject command and brought back to its *Base* location with another RoMa MoveObject command.

### 16.4.2 Heated Incubator - CloseDoor Command

The slot doors of the incubator open automatically when the RoMa inserts or removes the labware. The doors then stay in the open position. This command releases the latches to close all of the doors. To maintain a constant temperature within the incubator, it is best to close the doors again directly after inserting or removing labware.

This command has no execution parameters or objects, pre-actions or post-actions.

### 16.4.3 Heated Incubator - StartShaker Command

The StartShaker command starts the optional shaker of the incubator.

#### Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

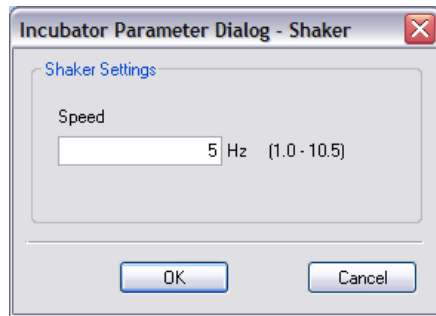


Fig. 16-11 Heated Incubator StartShaker command

#### Speed

Specify the shaking speed (range: 1 to 10.5 Hz).

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

### 16.4.4 Heated Incubator - StopShaker Command

The StopShaker command stops the optional shaker of the incubator.

This command has no execution parameters or objects, pre-actions or post-actions.

### 16.4.5 Heated Incubator - InsertPlate Command

The InsertPlate command must be used each time the RoMa inserts labware into the incubator slot. The InsertPlate command itself does not move the labware. Its purpose is to regulate the power of the slot's heater. In addition, it tells Freedom EVOware to start recording information on the slot temperature to the log file.

Your script must also include a plate robot command to move the labware into the incubator slot; the plate robot command should precede the InsertPlate command. Typical sequence of commands: plate robot command, CloseDoor command, Insert Plate command (the slot door opens automatically when the RoMa inserts the labware).

#### Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

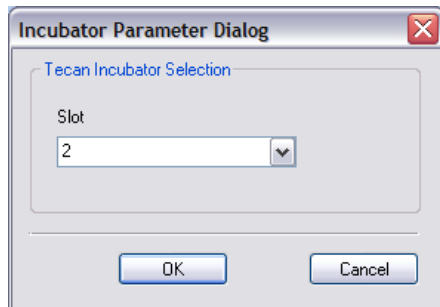


Fig. 16-12 Heated Incubator InsertPlate command

**Slot**

Choose the incubator slot into which the labware will be inserted. Incubator slots are counted from top to bottom.

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

**16.4.6 Heated Incubator - RemovePlate Command**

The RemovePlate command must be used each time the RoMa removes labware from the incubator slot. The RemovePlate command itself does not move the labware. It's purpose is to tell Freedom EVOware to stop recording information on the slot temperature to the log file.

Your script must also include a plate robot command to move the labware out of the incubator slot; the plate robot command should follow the RemovePlate command. Typical sequence of commands: RemovePlate command, plate robot command, CloseDoor command (the slot door opens automatically when the RoMa removes the labware).

**Execution parameters**

You are prompted to specify the following execution parameters when you add this command to your script or process:

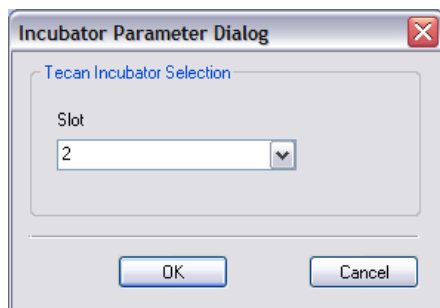


Fig. 16-13 Heated Incubator RemovePlate command

**Slot**

Choose the incubator slot from which the labware will be removed. Incubator slots are counted from top to bottom.

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

### 16.4.7 Heated Incubator - SetTemperature Command

The SetTemperature command sets the specified slot of the incubator to the chosen temperature.

Changes in temperature are not instantaneous. Make sure you specify the SetTemperature command early enough in your script to ensure that the slot has sufficient time to heat up or cool down before you want to incubate.

To ensure that the slot reaches and maintains a stable temperature, make sure that the slot door is not left open (see CloseDoor command).

**Note:** The default slot temperature is set in the Configuration Tool (see 8.5.3.2 “Heated Incubator Configuration - Settings Tab”, 8-42). Unless you use the SetTemperature command, all slots of the logical incubator are set to the same temperature.

#### Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

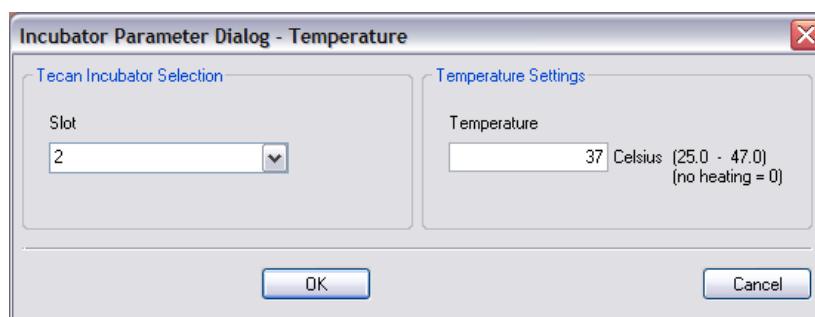


Fig. 16-14 Heated Incubator SetTemperature command

#### Tecan Incubator Selection panel

##### Slot

Choose the incubator slot whose temperature you want to set. You can also choose all slots. Incubator slots are counted from top to bottom.

#### Temperature Settings panel

##### Temperature

Specify the working temperature of the specified slot (range: 25 to 47°C).

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

## 16.5 Commands for the Base Incubator

An incubator is a device which is used to keep labware containing samples or reagents at a defined temperature for a specified length of time, for example until the desired biological or biochemical reaction has taken place.

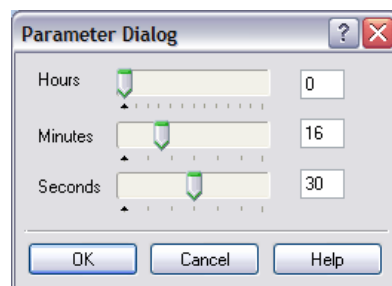
The Base Incubator treats the base (labware source) location of a piece of labware as a room temperature incubator. The labware is taken back to its base position and left there for a specified length of time. In Freedom EVOware, the base incubator is a software concept. It is not a device which you can fit to your pipetting instrument.

### 16.5.1 Base Incubator - BaseIncubate Command

The BaseIncubate command moves the labware back to its base (labware source) position (e.g. the carousel) and leaves it there at room temperature for the specified amount of time.

#### Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:



**Fig. 16-15** Base Incubator BaseIncubate command

Specify the amount of time the labware should be kept at room temperature at its base position.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

#### Objects

The BaseIncubate command operates on an object of type *Sample* or a derived type with default name *MP*.

#### Pre-actions and Post-actions

The labware is brought to its *Base* location with a RoMa MoveObject command if necessary.

## 16.6 Commands for the Room Temperature Incubator

An incubator is a device which is used to keep labware containing samples or reagents at a defined temperature for a specified length of time, for example until the desired biological or biochemical reaction has taken place.

The Room Temperature Incubator is a storage location such as a hotel where labware can be kept at room temperature for a specified length of time.

**Note:** The same driver is used for the Base Incubator (see 16.5 “Commands for the Base Incubator”, 16-17).

### 16.6.1 Room Temperature Incubator - Incubate Command

The Incubate command keeps the labware at room temperature for the specified amount of time.

#### Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

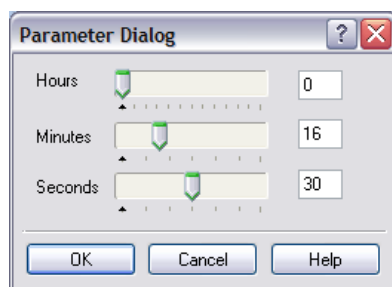


Fig. 16-16 Room Temperature Incubator Incubate command

Specify the amount of time the labware should be kept at room temperature. To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

#### Objects

The Incubate command operates on an object of type *Sample* or a derived type with default name *MP*.

#### Pre-actions and Post-actions

The labware is brought to the *IncubatorRT* location with a RoMa MoveObject command and brought back to its *Base* location with another RoMa MoveObject command.

## 16.7 Commands for the Liquid Handling Arm

The Liquid Handling Arm (also called the LiHa) is a robot arm on the pipetting instrument which is mounted on the X-slide and typically holds four or eight pipetting tips. It is used for pipetting samples in different volume ranges, depending on the tip types used and the features of the liquid system.

### 16.7.1 Liquid Handling Arm - Flush RSP Command

The Flush RSP command uses a wash station to flush the dilutors and the tubing of the pipetting instrument (fill them with system liquid) and to flush and wash the tips on the LiHa. It is mainly intended as a service function (see 5.4.1.10 “Context Menu for Objects in the Control Bar”, 5-13). It does not flush the Te-MO.



Fig. 16-17 Flush RSP command

Flushing is carried out to clean the system and remove trapped air. Flushing should be carried out daily before using the LiHa for the first time or if several hours have elapsed since the LiHa was last used. The parameters of this dialog box are as follows:

#### Volume in Waste

Specify the volume of system liquid which should be used to flush the inside of the tips (range: 0.01 - 100 ml). Flushing takes place with the tips positioned above the waste of the specified wash station (tip height = Z-dispense).

#### Wait time in Waste

To reduce the pressure inside the tubing, you can instruct the instrument to keep the valves open somewhat longer after flushing before moving the LiHa away from the waste (range: 0 - 1000 ms).

#### **Volume in Cleaner**

Specify the volume of system liquid which should be used to wash the outside of the tips (range: 0.01 - 100 ml). Washing takes place with the tips lowered into the cleaner of the specified wash station (tip height = Z-max).

#### **Wait time in Cleaner**

To reduce the pressure inside the tubing, you can instruct the instrument to keep the valves open somewhat longer after cleaning before moving the LiHa away from the cleaner (range: 0 - 1000 ms).

#### **Waste Grid, Waste Site**

Specify the worktable position for the waste you want to use (grid and site). You must put a wash station with waste unit in the Worktable Editor at the required position.

#### **Cleaner Grid, Cleaner Site**

Specify the worktable position for the cleaner you want to use (grid and site). You must put a wash station with waste unit in the Worktable Editor at the required position.

Choose a shallow cleaner if you only need to clean the ends of the tips. Choose a deep cleaner if there is a possibility of contamination along the shaft of the tip. The deep cleaner requires a larger volume of system liquid and cleaning takes somewhat longer.

#### **Airgap after Washing**

To avoid droplets of liquid on the worktable, you can instruct the instrument to aspirate an airgap after washing the tips. Specify the required airgap or specify 0 to deactivate this feature.

#### **Airgap Speed**

Specify the required speed for aspirating the airgap after washing the tips.


#### **Retract Speed**

Specify the speed with which you want to retract the tips from the cleaner. If the speed is too high, droplets may be dragged out of the cleaner and stick to the outside of the tips.

#### **Use Fast Wash**

If your instrument is fitted with the FWO (Fast Wash Option) or the MPO (Monitored Pump Option), check this checkbox to use the Fast Wash module instead of the dilutors to wash the tips.

### **16.7.2 Liquid Handling Arm - Pipette Command**

The Pipette command is used to create a pipetting script for the LiHa. When you drag it to the Process Editor, it opens the Script Editor. See [11.4.2 "Creating a Pipetting Script"](#),  11-5.

If you want to use this command, make sure that you have set the I/O Status for the Liquid Handling Arm to ON in the Configuration Tool.

## **16.8 Commands for the Magellan option**

The Magellan commands are used to initiate actions to be performed by the Tecan Magellan software, which must be installed separately. The Magellan software is used to control microplate readers (e.g. photometers) and to carry out



data analysis using stored procedures. Please refer to the documentation of the Magellan software for more information.

The Magellan software has built-in drivers for Tecan microplate readers. If you intend to use the Magellan software, it is not necessary to install the driver for your reader when you install Freedom EVOware.

If you use the Magellan commands to control your reader, the Magellan software pre-processes and analyzes the reader data according to a specified, stored procedure ("Magellan method"). If you use the Freedom EVOware commands for your reader directly without using the Magellan software, the reader data in the output file will be unprocessed (raw data).

### **16.8.1 Magellan - Status Command**

The Status command interrogates the status of the reader. The device status is reported during process runtime in the Messages/Error window of the runtime controller (see [12.2.4 "Runtime Controller, Extended View \(Running a Process\)"](#), [12-14](#)).

This command has no execution parameters or objects, pre-actions or post-actions.

### **16.8.2 Magellan - Excitation Out Command**

On some readers, the excitation light source can be filtered with an interference filter. The Excitation Out command is used to move the excitation filter slide out of the reader to allow the filters to be removed or exchanged.

After removing, inserting or exchanging the filter, the slide should be pushed back in to the reader manually.

This command has no execution parameters or objects, pre or post actions

### **16.8.3 Magellan - Emission Out Command**

On some readers, the light emission detector of the reader can be filtered with an interference filter. The Emission Out command is used to move the emission filter slide out of the reader to allow the filters to be removed or exchanged.

After removing, inserting or exchanging the filter, the slide should be pushed back in to the reader manually.

This command has no execution parameters or objects, pre-actions or post-actions.

### **16.8.4 Magellan - Open Command**

The Open command opens the door of the respective reader.

This command has no execution parameters or objects, pre-actions or post-actions.

### **16.8.5 Magellan - Close Command**

The Close command closes the door of the respective reader.

This command has no execution parameters or objects, pre-actions or post-actions.

### 16.8.6 Magellan - Measure Command

The Measure command initiates a measurement procedure to be performed by the Magellan software, which must be installed separately. The Magellan software is used to control microplate readers (e.g. photometers) and to carry out data analysis using stored procedures. The procedures to be used are specified in the Magellan software as so-called "methods". Please refer to the documentation of the Magellan software for more information.

See [17.8 "Using Freedom EVOware with the Tecan Magellan Software"](#), [17-25](#) for more information on using the Magellan Measure command.

#### Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

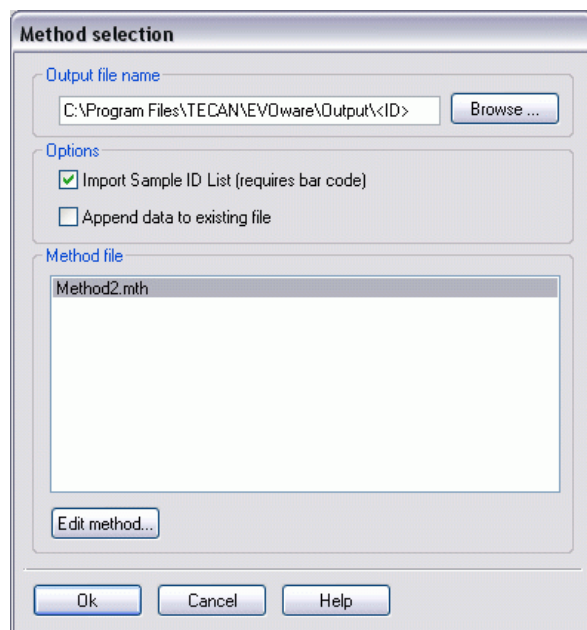


Fig. 16-18 Magellan Measure command

#### Output file name

Specify the required filename and path of the output file (workspace file). The default filename and path which is shown is the one you specified in Freedom EVOware's Configuration Tool (see [17.8.3.1 "Magellan Output File \(Workspace File\)"](#), [17-26](#)).

If you are using a barcode scanner, you should specify the filename as the placeholder <ID>, which will instruct Freedom EVOware and thus Magellan to generate the filename from the labware barcode. The labware must be scanned in advance of the Magellan Measure command.

**Note:** In both *Magellan Standard* and *Magellan Tracker*, if you leave the *Output File Name* field blank in *Freedom EVOware*, the filename and path of the workspace file will be taken from the settings which were made in the *Magellan method*.

### Import Sample ID list

Check the Import sample ID list checkbox if you have scanned the tube barcodes in advance of the *Magellan Measure* command. This instructs the *Magellan* software to extract the tube barcodes from a labware report file and assign them to the samples. The barcode information will then be contained in the *Magellan* output file (workspace file) which is produced. The workspace file will also contain information from *Freedom EVOware* on pipetting errors (if any). The barcodes and pipetting errors can then be viewed by loading the generated workspace file in *Magellan*.

To create a labware report file, you must use the script command *Export Data* before using the *Measure* command for the *Magellan* software. See [17.8 "Using Freedom EVOware with the Tecan Magellan Software"](#), ¶ 17-25 for more information.

**Freedom EVOware Standard:** The labware must be brought to the reader using the *Transfer Labware* command and not using another *RoMa* command. Otherwise, the barcodes and the pipetting information will not be transferred with the labware.

**Freedom EVOware Plus:** The *PosID* and *Export Data* commands must be in the same pipetting script since the tube barcodes are not normally available globally (see the description of *Scope* in the *Freedom EVOware* software manual).

### Append data to existing file

Check this checkbox if you want to append the measurement data to an existing output file (workspace file). This option is mainly intended for kinetic measurements (frequent or repeated measurement of the reaction to determine the rate or progress). This option must be activated in all *Magellan Measure* commands in the kinetic series except for the first one. This option requires labware with barcodes (you must also check the checkbox *Import sample ID list*).

### Edit method

Click this button to edit the selected method using the *Edit Method* wizard of the *Magellan* software.

### Method file panel

The *Method File* panel only shows methods which are compatible with the currently configured reader type and *Magellan* version (*Standard* or *Tracker*). See [17.8.3.3 "Specifying the Reader Type in Freedom EVOware"](#), ¶ 17-27.

You can only edit the method if you have *Application Specialist* rights in *Magellan*.

### Objects

The *Measure* command operates on an object of type *Sample* or a derived type with default name *MP*.

### Pre-actions and Post-actions

The labware is brought to the *Magellan* location with a *RoMa MoveObject* command and the door of the reader is opened with the reader's *Open* command. After the measurement the labware is brought back to its *Base* location with

another RoMa MoveObject command the door is closed with the reader's Close command.

## 16.9 Commands for the PW384GP Washer

The Tecan PW384 Washer is a fully automated microplate washer for all types of 96-well microplates. The device is fitted with a 96-well wash head, which has one aspirating and one dispensing needle per well. The plate carrier is adjustable to enable the use types of round and flat bottom microplates. The device is also equipped with a mirror so that visual quality control can be performed during the washing procedure. By treating all 96 wells of the microplate simultaneously, the washer is able to achieve very short wash times.

The PW384GP driver communicates with the PW 384 washer using native firmware commands. When compared to the PW384 driver, which communicates with the PW 384 through the Tecan WinWash Plus software, this leads to more efficient control of the hardware. WinWash Plus is not necessary for the PW384GP driver. The PW384GP driver can be used for both research applications and general purpose applications.

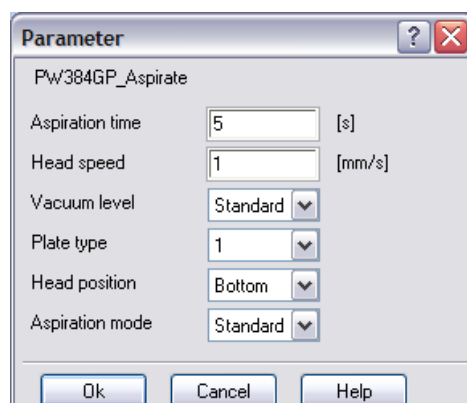
See [18.1.28 "Liquid Error \(PW384GP\)"](#), [18-29](#) for information on liquid error handling when the script or process is run.

### 16.9.1 PW384GP Washer - Aspirate Command

The Aspirate command starts the aspiration procedure of the washer. This command is mainly intended for special applications, e.g. to remove sample or reagent liquids from the wells.

#### Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:



**Fig. 16-19** PW384GP Washer Aspirate command

#### Aspiration time

Specify how long the vacuum valve remains open once the aspiration bottom position has been reached.

**Head speed**

Specify the required head speed (range: 1 to 20 mm/s). This is the speed at which the needles are lowered into the wells as the liquid level drops.

**Vacuum level**

Specify the required vacuum level. The vacuum level determines the aspiration speed.

**Plate Type**

The PW384GP washer can store parameter sets for up to 15 different type of labware. The parameter sets are created using the menus on the washer's LCD panel. Select the parameter set you want to use for aspirating. For information on parameter sets please refer to the corresponding section in the operating manual of your washer.

**Head position**

Choose the required head position when aspirating.:

**Bottom:** The aspiration step is performed down to the bottom of the wells to ensure the minimum volume of residual liquid.

**Cell:** The aspiration step is only performed down to a predefined height to leave a small amount of liquid in the wells. This setting is useful for cell washing. Note: The needle positions "Bottom" and "Cell" are configured in the washer with the plate parameters.

**Aspiration mode**

Select the required aspiration mode (standard or crosswise). Crosswise aspiration should only be used for 96-well plates with flat bottomed wells. In this case, aspiration is carried out with the needles at two positions in each well (front edge and back edge). This ensures the minimum volume of residual liquid. For more information, please refer to the corresponding section in the operating manual of your washer.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

**Objects**

The Aspirate command operates on an object of type *Sample* or a derived type with default name *MP*.

**Pre-actions and Post-actions**

The labware is brought to the *PW384GP* location with a RoMa MoveObject command and brought back to its *Base* location with another RoMa MoveObject command.

**16.9.2 PW384GP Washer - Dispense Command**

The Dispense command starts the liquid dispensing procedure of the washer. This command is mainly intended for special applications, e.g. to fill the wells with liquid.

**Execution parameters**

You are prompted to specify the following execution parameters when you add this command to your script or process:

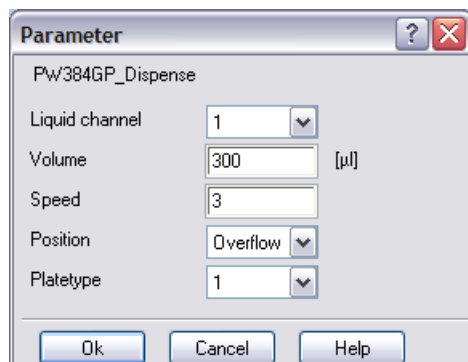


Fig. 16-20 PW384GP Washer Dispense command

### Liquid channel

Choose the channel (liquid container) which contains the required washing liquid. Choose Rinse if you want to use the rinsing liquid (normally distilled water).

### Volume

Specify the volume (in µl) to be dispensed. The volume depends on the labware type.

### Speed

Specify the required dispense speed (range: 1 to 5). Choose “1” for drip mode.

### Head position

Choose the required head position when dispensing:

**Overflow:** The aspiration needles are slightly below the shoulder (top edge) of the wells.

**Cell:** The aspiration needles are slightly above the bottom of the wells. Note: The needle positions “Overflow” and “Cell” are configured in the washer with the plate parameters.

### Plate Type

The PW384GP washer can store parameter sets for up to 15 different type of labware. The parameter sets are created using the menus on the washer’s LCD panel. Select the parameter set you want to use for washing. For information on parameter sets please refer to the corresponding section in the operating manual of your washer.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

### Objects

The Dispense command operates on an object of type *Sample* or a derived type with default name *MP*.

### Pre-actions and Post-actions

The labware is brought to the *PW384GP* location with a RoMa MoveObject command and brought back to its *Base* location with another RoMa MoveObject command.

### 16.9.3 PW384GP Washer - Prime Command

Before the washer is used, all dispensing channels needed for the wash step must be primed to fill the liquid system with the required liquid. The Prime command starts the priming procedure.

Priming can take several minutes so you should start priming with this command at an early stage in your script or process to make sure that the washer is ready when you want to use it.

#### Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

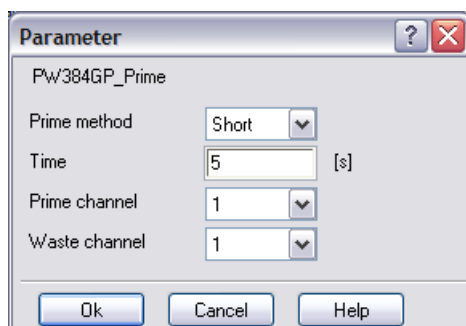


Fig. 16-21 PW384GP Washer Prime command

#### Prime method

Choose the required prime method:

**Full:** In this mode, first the dispense needles are flushed. Then the waste tub is filled with liquid. After that the head is lowered into the liquid and the aspirate needles are flushed.

**Short:** In this mode, only the dispense needles are flushed. Short priming is normally carried out using the same liquid which will be used in the wash or dispense command which follows the prime command.

#### Time

Specify how long to prime in seconds.

#### Prime channel

Choose the channel (liquid container) which contains the required priming liquid. Choose Rinse if you want to use the rinsing liquid (normally distilled water).

#### Waste channel

Choose the channel (liquid container) you want to use for the waste liquids.

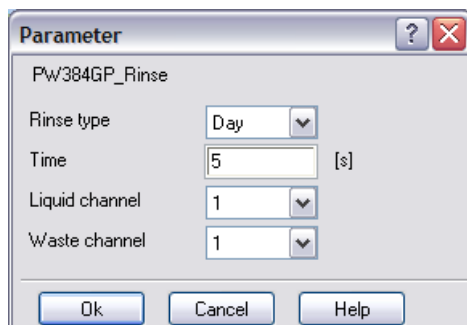
This command has no objects, pre-actions or post-actions.

### 16.9.4 PW384GP Washer - Rinse Command

The Rinse command starts the rinsing procedure of the washer to flush the liquid system.

### Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:



**Fig. 16-22** PW384GP Washer Rinse command

### Rinse mode

Choose the required rinsing mode:

Day mode should be used if the washer will be or has been left standing for a least one hour. Day mode rinsing is normally carried out with wash liquid. Use distilled water instead if the washer has been unused for longer than two hours.

Night mode should be used at the end of the day to thoroughly rinse the liquid system and leave the manifold (wash head) soaking in the waste sink. Rinsing is then repeated automatically after one hour. Thereafter, the liquid level is topped up every 6 hours to compensate for evaporation. Night mode rinsing is normally carried out with distilled water.

### Time

Specify how long to rinse in seconds (day mode rinsing only). This setting is ignored for night mode rinsing. Night mode rinsing is carried out indefinitely until you re-start Freedom EVOware (which initializes the washer) or use a Stop command (see [16.9.5 "PW384GP Washer - Stop Command"](#), [16-28](#)). If you plan to leave Freedom EVOware and the washer running overnight, the first washer command in your script or process on the following day should be a Stop command. Note: Night mode rinsing is not interrupted if you exit Freedom EVOware and/or switch off the PC.

### Liquid channel

Choose the channel (liquid container) which contains the required washing liquid. Choose Rinse if you want to use the rinsing liquid (normally distilled water).

### Waste channel

Choose the channel (liquid container) you want to use for the waste liquids.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

This command has no objects, pre-actions or post-actions.

## 16.9.5 PW384GP Washer - Stop Command

The Stop command stops the washing or rinsing procedure.



This command has no execution parameters or objects, pre-actions or post-actions.

### 16.9.6 PW384GP Washer - PrepareEmptyWaste Command

The PrepareEmptyWaste command collapses the vacuum in the waste bottle to allow it to be emptied. This needs to be done whenever the washer's liquid detection indicates that the waste bottle is full.

This command has no execution parameters or objects, pre-actions or post-actions.

### 16.9.7 PW384GP Washer - DownloadWash Command

The PW384GP washer can store parameter sets for up to 49 different wash programs. The DownloadWash command is used to configure a wash program and download it to non-volatile memory in the washer. The stored wash program can then be executed with the StartWash command. All of the wash programs downloaded with this command have the name "generic" (the name can be displayed on the LCD panel of the washer).

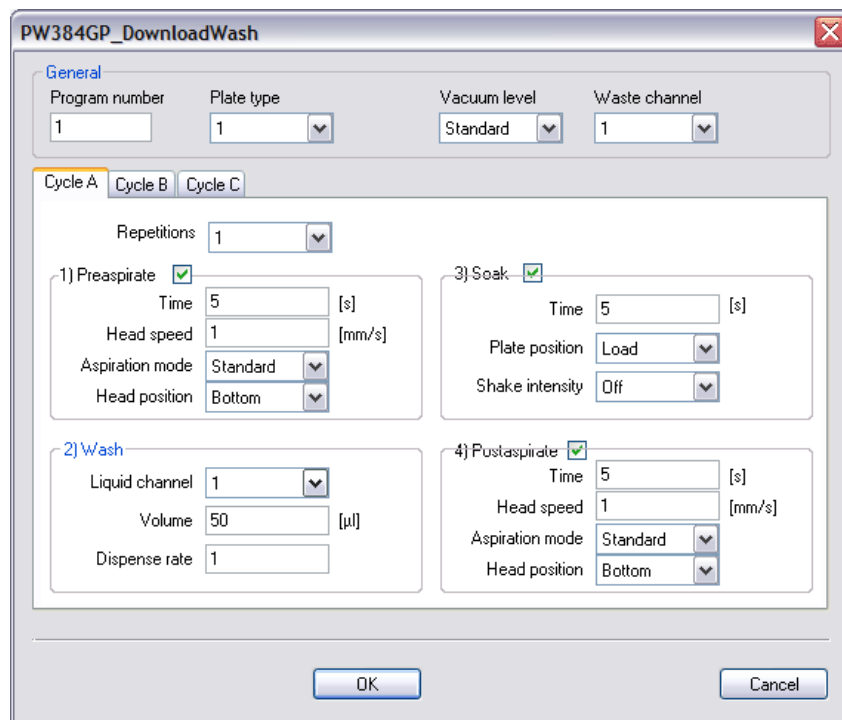


Fig. 16-23 PW384GP Washer DownloadWash command

#### General panel

#### Storage address

Specify the required address of the wash program (range: 1 to 49). If you specify the address of a wash program which already exists in the washer, it will be overwritten by the new wash program.

### **Plate Type**

The PW384GP washer can store parameter sets for up to 15 different type of labware. The parameter sets are created using the menus on the washer's LCD panel. Select the parameter set you want to use for washing. For information on parameter sets please refer to the corresponding section in the operating manual of your washer.

### **Vacuum level**

Specify the required vacuum level. The vacuum level determines the aspiration speed.

### **Waste channel**

Choose the channel (liquid container) you want to use for the waste liquids from the aspiration steps.

### **Cycle A/B/C**

The following parameters can be set separately for each of three washing cycles A, B and C. Click the corresponding tab to configure the settings for each cycle. Each cycle consists of a wash operation and optional pre-aspirate, soak and post-aspirate steps.

### **Repetitions**

Specify the number of repetitions for the selected cycle. Cycle A must be executed at least once. Set Repetitions to zero in cycle B and C if you only want Cycle A to be executed.

### **Pre-aspirate panel**

Check the pre-aspirate checkbox if you want to aspirate before washing. This can be done to remove sample or reagent liquids from the wells before starting the wash procedure.

### **Aspiration time**

Specify how long to aspirate before the wash cycle starts.

### **Head speed**

Specify the required head speed (range: 1 to 20 mm/s). This is the speed at which the needles are lowered into the wells as the liquid level drops.

### **Aspiration mode**

Select the required aspiration mode (standard or crosswise). Crosswise aspiration should only be used for 96-well plates with flat bottomed wells. In this case, aspiration is carried out with the needles at two positions in each well (front edge and back edge). This ensures the minimum volume of residual liquid. For more information, please refer to the corresponding section in the operating manual of your washer.

### **Head position**

Choose the required head position when aspirating:

**Bottom:** The aspiration step is performed down to the bottom of the wells to ensure the minimum volume of residual liquid.

**Cell:** The aspiration step is only performed down to a predefined height to leave a small amount of liquid in the wells. This setting is useful for cell washing. Note: The needle positions "Bottom" and "Cell" are configured in the washer with the plate parameters.

### Wash panel

During the wash step, the aspiration needles are slightly below the shoulder (top edge) of the wells (overflow position). The needle position “Overflow” is configured in the washer with the plate parameters.

#### Wash channel

Choose the channel (liquid container) which contains the required washing liquid. Choose Rinse if you want to use the rinsing liquid (normally distilled water).

#### Wash volume

Specify the volume (in  $\mu\text{l}$ ) of liquid to be used for the wash process.

#### Dispense rate

Specify the required speed of the dispensing pump.

### Soak panel

Check the *Soak* checkbox if you want to soak the microplate after dispensing the wash liquid. You can also shake the microplate while soaking.

#### Soak time

Specify the required soak time in seconds.

#### Plate position

Choose the required plate position while soaking:

**Load:** The transport sledge is in the home position during soaking.

**Wash:** The transport sledge is under the wash head during soaking.

#### Shake intensity

Choose the required intensity of shaking while soaking. Choose Off to disable shaking.

### Post-aspirate panel

Check the *Post-aspirate* checkbox if you want to aspirate after washing. This can be done to remove remaining liquid from the wells after the washing procedure.

#### Time

Specify how long to aspirate after the wash cycle has finished.

#### Head speed

Specify the required head speed (range: 1 to 20 mm/s). This is the speed at which the needles are lowered into the wells as the liquid level drops.

#### Aspiration mode

Select the required aspiration mode (standard or crosswise). Crosswise aspiration should only be used for 96-well plates with flat bottomed wells. In this case, aspiration is carried out with the needles at two positions in each well (front edge and back edge). This ensures the minimum volume of residual liquid. For more information, please refer to the corresponding section in the operating manual of your washer.

#### Head position

Choose the required head position when aspirating:

**Bottom:** The aspiration step is performed down to the bottom of the wells to ensure the minimum volume of residual liquid.

**Cell:** The aspiration step is only performed down to a predefined height to leave a small amount of liquid in the wells. This setting is useful for cell washing. Note: The needle positions “Bottom” and “Cell” are configured in the washer with the plate parameters.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu. This command has no objects, pre-actions or post-actions.

### 16.9.8 PW384GP Washer - StartWash Command

The PW384GP washer can store parameter sets for up to 49 different wash programs. The StartWash command is used to execute one of the stored wash programs.

#### Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:



Fig. 16-24 PW384GP Washer StartWash command

#### Download address

Specify the address of the wash program (range: 1 to 49). You must store the wash program in the washer (e.g. with the DownloadWash command) before using the StartWash command. Wash programs are stored in the washer in non-volatile memory.

#### Objects

The StartWash command operates on an object of type *Sample* or a derived type with default name *MP*.

#### Pre-actions and Post-actions

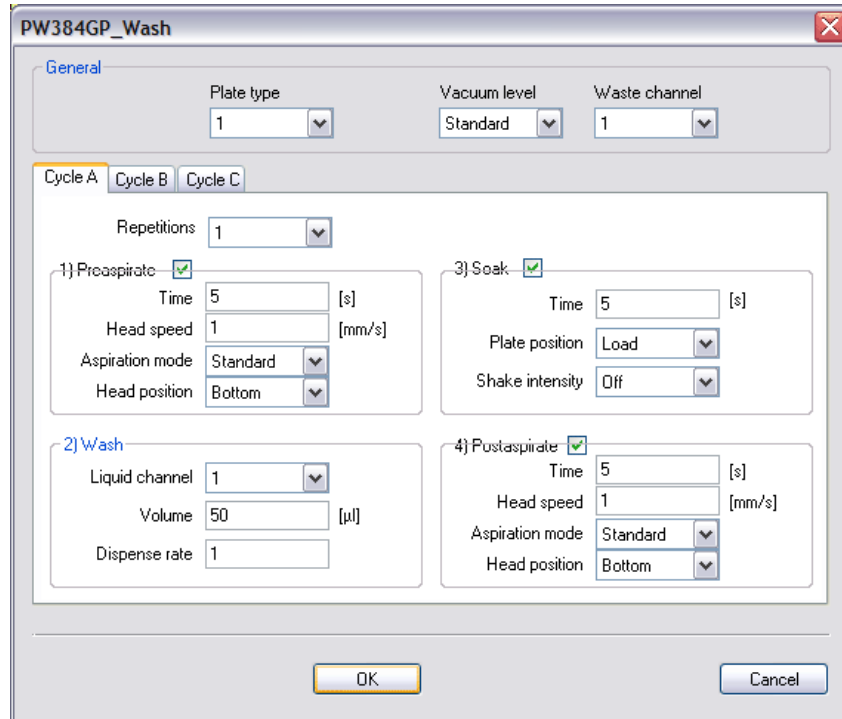
The labware is brought to the *PW384GP* location with a RoMa MoveObject command and brought back to its *Base* location with another RoMa MoveObject command.

### 16.9.9 PW384GP Washer - Wash Command

The WashPlate command performs the washing of a microplate with specified parameters such as wash volume and aspiration time.

#### Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:



**Fig. 16-25** PW384GP Washer Wash command

**General panel**

**Plate Type**

The PW384GP washer can store parameter sets for up to 15 different type of labware. The parameter sets are created using the menus on the washer’s LCD panel. Select the parameter set you want to use for washing. For information on parameter sets please refer to the corresponding section in the operating manual of your washer.

**Vacuum level**

Specify the required vacuum level. The vacuum level determines the aspiration speed.

**Waste channel**

Choose the channel (liquid container) you want to use for the waste liquids.

**Cycle A/B/C**

The following parameters can be set separately for each of three washing cycles A, B and C. Click the corresponding tab to configure the settings for each cycle. Each cycle consists of a wash operation and optional pre-aspirate, soak and post-aspirate steps.

**Repetitions**

Specify the number of repetitions for the selected cycle. Cycle A must executed at least once. Set Repetitions to zero in cycle B and C if you only want Cycle A to be executed.

### Pre-aspirate panel

Check the pre-aspirate checkbox if you want to aspirate before washing. This can be done to remove sample or reagent liquids from the wells before starting the wash procedure.

#### Aspiration time

Specify how long to aspirate before the wash cycle starts.

#### Head speed

Specify the required head speed (range: 1 to 20 mm/s). This is the speed at which the needles are lowered into the wells as the liquid level drops.

#### Aspiration mode

Select the required aspiration mode (standard or crosswise). Crosswise aspiration should only be used for 96-well plates with flat bottomed wells. In this case, aspiration is carried out with the needles at two positions in each well (front edge and back edge). This ensures the minimum volume of residual liquid. For more information, please refer to the corresponding section in the operating manual of your washer.

#### Head position

Choose the required head position when aspirating:

**Bottom:** The aspiration step is performed down to the bottom of the wells to ensure the minimum volume of residual liquid.

**Cell:** The aspiration step is only performed down to a predefined height to leave a small amount of liquid in the wells. This setting is useful for cell washing. Note: The needle positions "Bottom" and "Cell" are configured in the washer with the plate parameters.

### Wash panel

During the wash step, the aspiration needles are slightly below the shoulder (top edge) of the wells (overflow position). The needle position "Overflow" is configured in the washer with the plate parameters.

#### Wash channel

Choose the channel (liquid container) which contains the required washing liquid. Choose Rinse if you want to use the rinsing liquid (normally distilled water).

#### Wash volume

Specify the volume (in  $\mu\text{l}$ ) of liquid to be used for the wash process.

#### Dispense rate

Specify the required speed of the dispensing pump.

### Soak panel

Check the *Soak* checkbox if you want to soak the microplate after dispensing the wash liquid. You can also shake the microplate while soaking.

#### Soak time

Specify the required soak time in seconds.

#### Plate position

Choose the required plate position while soaking:

**Load:** The transport sledge is in the home position during soaking.

**Wash:** The transport sledge is under the wash head during soaking.

#### Shake intensity

Choose the required intensity of shaking while soaking. Choose Off to disable shaking.

### Post-aspirate panel

Check the *Post-aspirate* checkbox if you want to aspirate after washing. This can be done to remove remaining liquid from the wells after the washing procedure.

#### Time

Specify how long to aspirate after the wash cycle has finished.

#### Head speed

Specify the required head speed (range: 1 to 20 mm/s). This is the speed at which the needles are lowered into the wells as the liquid level drops.

#### Aspiration mode

Select the required aspiration mode (standard or crosswise). Crosswise aspiration should only be used for 96-well plates with flat bottomed wells. In this case, aspiration is carried out with the needles at two positions in each well (front edge and back edge). This ensures the minimum volume of residual liquid. For more information, please refer to the corresponding section in the operating manual of your washer.

#### Head position

Choose the required head position when aspirating:

**Bottom:** The aspiration step is performed down to the bottom of the wells to ensure the minimum volume of residual liquid.

**Cell:** The aspiration step is only performed down to a predefined height to leave a small amount of liquid in the wells. This setting is useful for cell washing. Note: The needle positions "Bottom" and "Cell" are configured in the washer with the plate parameters.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

### Objects

The WashPlate command operates on an object of type *Sample* or a derived type with default name *MP*.

### Pre-actions and Post-actions

The labware is brought to the *PW384GP* location with a RoMa MoveObject command and brought back to its *Base* location with another RoMa MoveObject command.

## 16.10 Commands for the PosID-3

The PosID-3 (Positive Identification System) is a movable barcode scanner which can be used to read the barcode labels on carriers, labware and tubes. The PosID-3 supersedes the PosID and has configurable features which allow it to scan a wider range of custom carrier and labware types. Unlike fixed barcode scanners, it does not need a robot to bring the labware to it. The PosID-3 is installed at the rear of the pipetting instrument and is provided with a gripper which pulls the carrier towards the rear for barcode identification and then slides the carrier back into the pipetting position. The scanning head hinges to read barcodes which are attached to horizontal or vertical surfaces. Barcodes can be read on both the primary side (e.g. sample tube) and the secondary side (e.g. microplates).

Freedom EVOware stores each scanned barcode in the internal database in the ID field of the labware record. The barcode information can also be included in report files (see [15.23 “Export Data Command”](#), [15-42](#)).

### 16.10.1 PosID-3 - Initialize Command

The Initialize command initializes the PosID-3. You must initialize the hardware with this command before you use the other commands for this device.

This command has no execution parameters or objects, pre-actions or post-actions.

### 16.10.2 PosID-3 - Scan Command

The Scan command is used to read the barcode labels on one or more pieces of labware using the PosID-3 option. The corresponding carrier or tube rack barcodes will also be scanned.

If you are using the PosID-3 for general purpose applications in a regulated environment, you must activate the Double Blind Entry feature in the PosID-3 configuration (see [8.5.9.2 “PosID-3 Configuration - Settings Tab”](#), [8-52](#)).

#### Execution parameters

The Scan tab lets you choose the labware you want to scan and the Barcode types tab is used to configure the barcode types which the PosID-3 scanner will accept for the chosen labware:

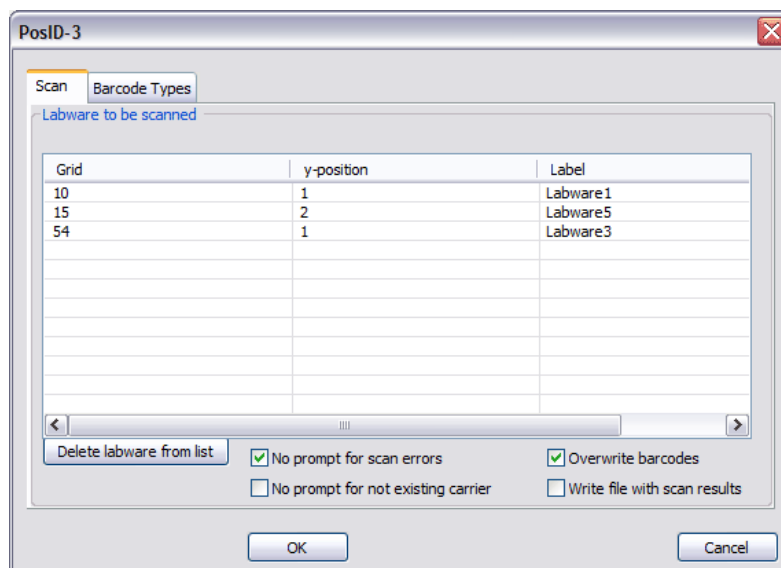


Fig. 16-26 PosID-3 command (Scan tab)

The parameters of the PosID-3 command are as follows (Scan tab):

#### Labware to be scanned

This shows the labware which Freedom EVOware will scan with this command. Click on a labware item in the Worktable Editor to add it to the list. The corresponding carrier or tube rack barcodes will also be scanned and do not need to be specified.



### Delete labware from list

To remove labware from the list, select the corresponding line and click this button.

### No prompt for scan errors

If this option is enabled, Freedom EVOware does not display an error message if a barcode could not be read.

If the carrier barcode cannot be read, the tubes or labware on this carrier won't be scanned either and are assigned default barcodes. The default barcode for labware is the grid position followed by an underscore ( \_ ) and the site number. The default barcode for tubes is the grid position followed by an underscore ( \_ ) and the tube number.

The default barcode for carriers or tube racks is the carrier code followed by an underscore ( \_ ) and the grid position. The grid position is padded to 6 digits with leading zeros. The carrier code is a 3-digit code which indicates the carrier type. Example: 013\_000015.

If the carrier barcode can be read but a tube barcode cannot be read, Freedom EVOware assigns a default barcode which consists of three stars (\*\*\*). If the tube is missing, Freedom EVOware assigns a default barcode which consists of \$\$\$.

### No prompt for not existing carrier

If this option is enabled, Freedom EVOware does not display an error message if the carrier specified in the PosID-3 command was not found on the worktable at the specified grid position.


### Overwrite barcodes

If the same labware item is scanned twice, Freedom EVOware will display an error message if the two scanned barcodes differ. It is not normally necessary to scan same labware item twice, but you may want to do this as a security check (by specifying the PosID-3 command twice) to make sure that the same labware item or tube is still present on the worktable. Depending on the settings you have made, Freedom EVOware also scans the same labware twice. If a barcode could not be read.

Check the *Overwrite barcodes* checkbox to switch off this security feature. In this case, if the two barcodes differ, the first barcode will be overwritten by the second barcode without displaying an error.

### Write file with scan results

If this option is enabled, a report file is created with the scanned barcodes. The filename is scan.csv and it is written to the configured Output directory (default path <install\_path>\Output). Existing files with the same name are overwritten. The file contains one line per scanned labware or tube barcode.

For information on the syntax of this file see [A.2.2 "Barcode file written by the PosID and PosID-3 commands"](#),  [A-11](#).

#### 16.10.2.1 PosID-3 Command (Barcode Types Tab)

The Barcode Types tab of the PosID-3 command is used to configure the barcode types which the PosID-3 scanner will accept for the chosen labware:

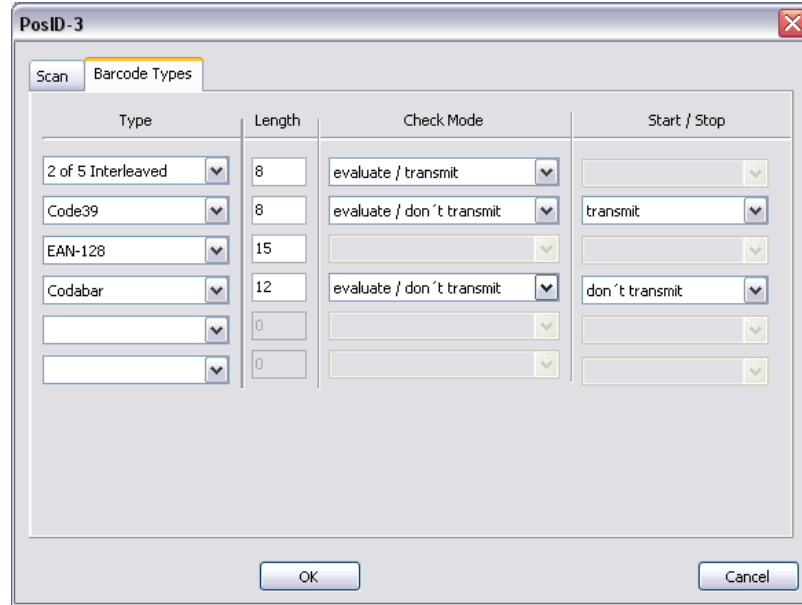


Fig. 16-27 PosID-3 command (Barcode types tab)

The parameters of the PosID-3 command are as follows (Barcode Types tab):

**Type**

Choose the barcodes types which will be accepted by the PosID-3 scanner from the popup lists. You should only choose the barcode types which are being used on the barcode labels. This makes it easier for the scanner to identify incorrect barcodes. The PosID-3 will report an error if it finds a barcode type which you have not chosen.

Some of the barcode types have additional settings as follows:

**Length**

- 0 Do not check the length of the barcode.
- 1..30 The length of the barcode must match this value (the checksum and start/stop code are also counted).  
 Barcodes with different lengths will be ignored.

**Check Mode**

- empty Do not check the checksum.
- evaluate / transmit The checksum is checked and is reported to Freedom EVOware as part of the barcode.
- evaluate / don't transmit The checksum is checked but not reported.

**Start/Stop**

- empty A start/stop code is not required.
- transmit A start/stop code is required and is reported to Freedom EVOware as part of the barcode.
- don't transmit A start/stop code is required but not reported.

## 16.11 Commands for the Tube Robot

The tube robot (also called PnP) is a robot arm equipped with special grippers that can pick up, transport and place small objects within the working area of the pipetting instrument. It is typically used to transport tubes with samples. Current Tecan pipetting instruments can be fitted with up to two PnP arms. Movements of the robot arms between different positions are called vectors.

### 16.11.1 Tube Robot - ExecuteScript Command

The ExecuteScript command is used to create a script for tube handling. When you drag it to the Process Editor, it opens the Script Editor. It does not allow you to use pipetting commands. The pipetting commands are specified in another script in the same process. You can exchange variables such as the tube counter or tube position with other scripts by declaring them with the scope *instance* or *run*. See [6.4.6 "Declare Variables"](#), [6-12](#) and [11.4.2 "Creating a Pipetting Script"](#), [11-5](#).

If you want to use this command, make sure that you have set the I/O Status for the Tube Robot to ON in the Configuration Tool.

## 16.12 Commands for the Tube Robot

The tube robot (also called PnP) is a robot arm equipped with special grippers that can pick up, transport and place small objects within the working area of the pipetting instrument. It is typically used to transport tubes with samples. Current Tecan pipetting instruments can be fitted with up to two PnP arms. Movements of the robot arms between different positions are called vectors.

### 16.12.1 Tube Robot - ExecuteScript Command

The ExecuteScript command is used to create a script for tube handling. When you drag it to the Process Editor, it opens the Script Editor. It does not allow you to use pipetting commands. The pipetting commands are specified in another script in the same process. You can exchange variables such as the tube counter or tube position with other scripts by declaring them with the scope *instance* or *run*. See [6.4.6 "Declare Variables"](#), [6-12](#) and [11.4.2 "Creating a Pipetting Script"](#), [11-5](#).

If you want to use this command, make sure that you have set the I/O Status for the Tube Robot to ON in the Configuration Tool.

## 16.13 Commands for the Plate Robot

The Plate Robot (also called the RoMa) is a robot arm equipped with special grippers that can pick up, transport and place objects within the working area of the pipetting instrument. It is typically used to transport microplates, reagent

blocks, deep well plates, etc. between carriers, incubators and storage positions (e.g. a RoMa shelf or Carousel).

Current Tecan pipetting instruments can be fitted with up to two RoMas. Standard arm versions can handle objects on or above the worktable. Long arm (long z) versions can also access objects which are positioned lower than the worktable, for example the Hettich Centrifuge. Movements of the robot arms between different positions are called vectors.

RoMa versions are available with offset gripper fingers (RoMa eccentric) and symmetrical gripper fingers (RoMa centric). The type to use is chosen according to the accessibility of the object to be gripped.

You do not need to (and cannot) specify the RoMa type in the Freedom EVOware configuration. However, you must re-teach the robot movement commands (RoMa vectors) if you exchange the robot arm for a different type. The RoMa vectors supplied with Freedom EVOware have been designed for RoMa eccentric.

### 16.13.1 Plate Robot - ExecuteSingleVector Command

The ExecuteSingleVector command executes a predefined movement from one position on the worktable to another (a RoMa vector). The vector can also be executed in reverse and the grippers can be opened or closed before and/or after the move.

This command is intended for RoMa vectors which are not used to move labware. In Freedom EVOware Plus, RoMa vectors which are used to move labware are normally carried out automatically. In Freedom EVOware Standard, use the RoMa Vector script command if you want to execute a robot vector (see [15.51 "RoMa Vector Command"](#), [15-111](#)).

#### Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

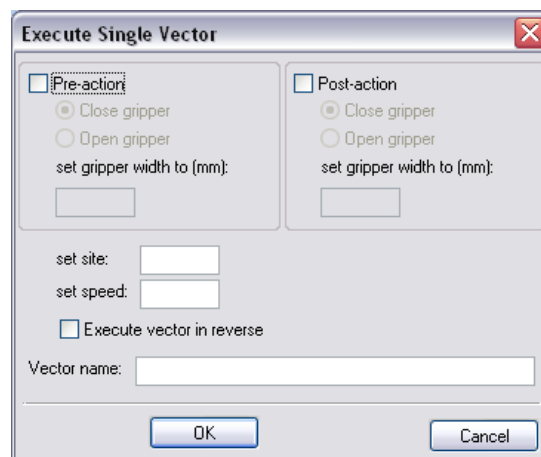


Fig. 16-28 Plate Robot ExecuteSingleVector command

**Pre-action / Post-action**

Check the Pre-action checkbox if you want to close or open the gripper before execution of the movement vector. Check the Post-action checkbox if you want to close or open the gripper after execution of the movement vector. Then click *Close gripper* or *Open gripper* as required.

**Set gripper width to**

Specify the width to which the gripper should be closed or opened (range: 60 to 140 mm).

**Set site**

Specify the site to execute the vector on. Specify this as “carrier site - 1”. For example, specify “0” to execute the vector on carrier site 1.

**Set speed**

Specify the plate robot movement speed with which to execute the vector (range 1 to 400 mm/s).

**Execute vector in reverse**

Check this checkbox if you want to execute the vector in reverse (from its end point to its start point).

**Vector Name**

Specify the name of the vector to execute. The vector must already be defined. Click the Robot Vectors tab in the Control Bar to see a list of the robot vectors which are not associated with carriers or labware items. If your pipetting instrument is fitted with two plate robots, specify a vector which has been created for the plate robot (1 or 2) that you want to use with this command.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

**Note:** *The ExecuteSingleVector command does not work very well in combination with Sample Tracking. It can result in errors in Sample Tracking because it cannot be distinguished if a plate or a lid was moved.*

**16.13.2 Plate Robot - Initialize Command**

The Initialize command initializes the plate robot. You must initialize the hardware with this command before you use the other commands for this device.

This command is normally used as a pre-action and/or post-action of another command. It is not normally used as a process step.

**16.13.3 Plate Robot - MoveObject Command**

The MoveObject command moves an object (e.g. labware) to a specified location. This command is normally used as a pre-action and/or post-action of another command. It is not normally used as a process step.

**16.13.4 Plate Robot - ReplaceObject Command**

The ReplaceObject command moves an object (e.g. labware) to a specified location. If the destination is occupied, the blocking object will be removed. It is

mainly used for moving reagent carriers. The ReplaceObject command must not have a corresponding post-action.

This command is normally used as a pre-action and/or post-action of another command. It is not normally used as a process step.

#### **16.13.5 Plate Robot - MoveToBase Command**

The MoveToBase command moves an object (plate) to its base (labware source) position.

This command is normally used as a pre-action and/or post-action of another command. It is not normally used as a process step.

#### **16.13.6 Plate Robot - ChangeObject Command**

The ChangeObject command moves an object to a specified location. If the destination is occupied, the blocking object will be removed. The ChangeObject command must not have a corresponding post-action. It is only used for changing DiTi's and is normally used as a pre-action and/or post-action of another command. It is not normally used as a process step.


#### **16.13.7 Plate Robot - MoveInsert Command**

The MoveInsert command moves the insert of an Insert Plate to the specified location.

This command is normally used as a pre-action and/or post-action of another command. It is not normally used as a process step.

#### **16.13.8 Plate Robot - SwapInsert Command**

The SwapInsert command moves the insert of an Insert plate to another Insert plate which doesn't currently have an insert. After performing the operation, the Insert attribute of the source plate is set to 0 (= insert not fitted), and the Insert attribute of the destination plate is set to 1 (= insert is fitted).

This command is normally used as a pre-action and/or post-action of another command. It is not normally used as a process step (see [17.7 "Handling inserts in Freedom EVOware Plus"](#),  17-21).

#### **16.13.9 Plate Robot - ClearLocation Command**

The ClearLocation command moves all objects which are currently at the specified location to a new location.

This command is normally used as a pre-action and/or post-action of another command. It is not normally used as a process step.

## 16.14 Commands for the Te-Shake Shaker

The Te-Shake Shaker commands are used to control the Tecan orbital shaker for microplates or microplate-like racks. The shaker is used for mixing functions and can be equipped with an optional heating plate. The shaker plate is placed on an eccentric. Rotation of the rotor causes an orbital movement of the shaker plate. The orbit of the movement can be varied by changing the eccentric.

Freedom EVOware is provided with carrier definitions for several different types of Te-Shake shaker. Initially, only one of them is configured for use on the worktable (normally Te-Shake 2Pos).

If you want to use more than one shaker in your script or process or a shaker with more than one rotor, first use the Duplicate Device tool to create additional shaker drivers (see [A.11.3 "Duplicate Device Tool"](#), ¶ A-39). A separate driver is needed for each shaker. Then assign the drivers to the shakers you want to use (see [9.5 "Configuring Carriers"](#), ¶ 9-29, "Carrier is device"). The shaker carriers will then appear as icons on the worktable.

Finally, check that the carrier location is correctly assigned for each of the drivers. To do this, start the Configuration Tool, click Device Information, select the respective shaker driver in the Devices list and click Settings. Then click the Driver tab, select the Shaker\_Shake command, click Pre-actions and edit the pre-action. Location MoveLocation must specify the carrier location for the shaker which you are configuring. See [8.5.11.1 "Te-Shake Configuration - Driver Tab"](#), ¶ 8-58.

It is also necessary to check the assignment of the carrier location if you are only using one shaker but you have changed the shaker type by unchecking "Carrier is device" for Te-Shake 2Pos and checking it for another shaker type.

You can configure the execution parameters (shaking time etc.) for each of the shakers separately when you add the shaker commands to your script or process.

**Note:** Freedom EVOware treats a double shaker (with two rotors) as two separate shakers (labeled Te-Shake Front and Rear in the Control Bar, Labware section). You need two shaker drivers for the double shaker.

**Note:** A multiple site shaker (one rotor but two microplate sites which shake in parallel) is called "Te-Shake 2Pos" in the Control Bar. It only needs one shaker driver.

### 16.14.1 Te-Shake shaker - Init Command

The Init command initializes the shaker. You must initialize the hardware with this command before you use the other commands for this device.

This command has no execution parameters or objects, pre-actions or post-actions.

### 16.14.2 Te-Shake shaker - Shake Command

The Shake command performs the shaking procedure with the specified direction, frequency and temperature.

## Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

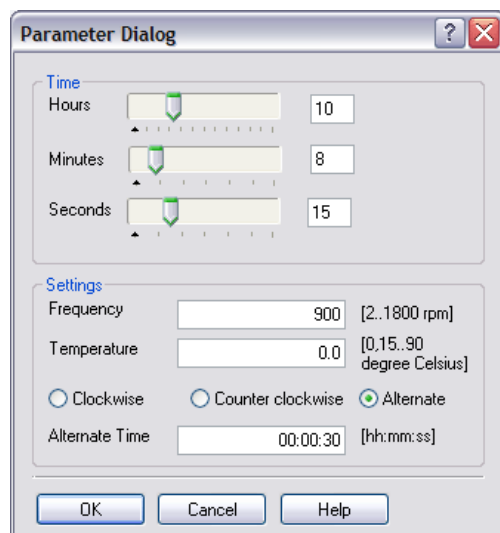


Fig. 16-29 Te-Shake Shaker Shake command

### Time panel

#### Hours, minutes, seconds

Specify the required duration of the shaking process.

### Settings panel

#### Frequency

Specify the required shaking frequency (range: 2 to 1800 rpm).

#### Temperature

Specify the working temperature of the heating plate option (range: 15 to 90 °C). The heating plate cannot cool, so the minimum temperature of the labware is room temperature. Specify 0 to switch off the heating plate (or uncheck the *Heater* checkbox in the device configuration).

#### Direction of rotation

Select the required direction of shaking. If you choose *Alternate*, you must also specify the time period after which the rotation switches from clockwise to counter clockwise and vice versa.

**Note:** Changes in the temperature of the heating plate are not instantaneous. If the shaker is used twice in rapid succession with different temperature settings, the required temperature of the heating plate might not be reached in time and the shaking process will be performed at the wrong temperature. To avoid this, install two shakers which are configured for different temperatures.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.



### Objects

The Shake command operates on an object of type *Sample* or a derived type with default name *MP*.

### Pre-actions and Post-actions

The labware is brought to the *Shaker* location with a RoMa MoveObject command and brought back to its *Base* location with another RoMa MoveObject command.

## 16.14.3 Te-Shake shaker - Start Command

The Start command starts the shaking procedure.

### Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

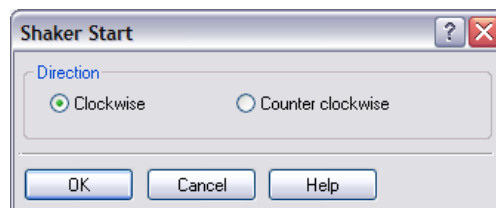


Fig. 16-30 Te-Shake Shaker Start command

### Direction

Specify whether you want the shaker to shake clockwise or counter clockwise.

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

## 16.14.4 Te-Shake shaker - Stop Command

The Stop command stops the shaking procedure.

This command has no execution parameters or objects, pre-actions or post-actions.

## 16.14.5 Te-Shake shaker - SetTemperature Command

The SetTemperature command sets the shaker to the specified temperature. Changes in temperature are not instantaneous. Make sure you specify the SetTemperature command early enough in your process or script to ensure that the shaker has sufficient time to heat up or cool down before using the Shake command.

### Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

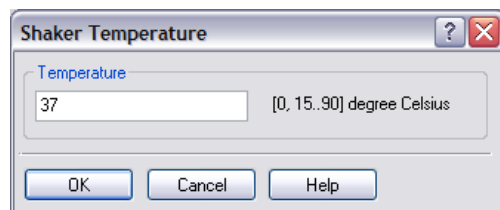


Fig. 16-31 Te-Shake Shaker SetTemperature command

### Temperature

Specify the working temperature of the heating plate option (15 to 90 °C). The heating plate cannot cool, so the minimum temperature of the labware is room temperature. Specify 0 to switch off the heating plate (or uncheck the *Heater* checkbox in the device configuration).

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

## 16.14.6 Te-Shake shaker - SetFrequency Command

The SetFrequency command sets the shaking frequency of the shaker.

### Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

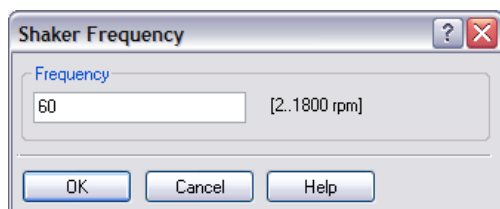


Fig. 16-32 Te-Shake Shaker SetFrequency command

### Frequency

Specify the required shaking frequency (range: 2 to 1800 rpm).

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

## 16.15 Commands for the Te-VacS

The Te-VacS is an SPE (Solid Phase Extraction) vacuum filtration system which is used for vacuum separation of biological molecules and chemical compounds.

### 16.15.1 Te-VacS - SetPressureDiff Command

The SetPressureDiff command starts the vacuum pump. You must specify the required vacuum. The vacuum is not applied to either of the SPE blocks and the script or process does not wait for the vacuum to build up. Due to the time needed to build up the vacuum, you should specify this command at an earlier stage in your script to ensure that the instrument does not have to wait when you want to apply the vacuum with the ApplyVacuumRear or ApplyVacuumFront commands.

#### Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

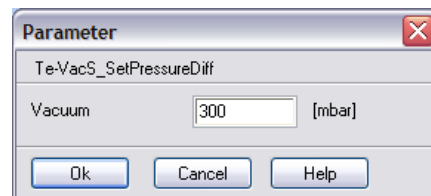


Fig. 16-33 Te-VacS - SetPressureDiff command

#### Vacuum

Specify the required vacuum (range: 30 – 700 mBar).

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

### 16.15.2 Te-VacS - ApplyVacuumRear Command

The ApplyVacuumRear command opens a valve which applies the vacuum to the rear SPE block (i.e. the SPE block which is connected to vacuum pipe 2). You must specify the required vacuum. If you did not specify a previous SetPressureDiff command, the vacuum pump is then started and pumps the entire vacuum path (“soft pumping”, see Te-VacS operating manual). The vacuum will be applied until a subsequent VentRear command is executed.

#### Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

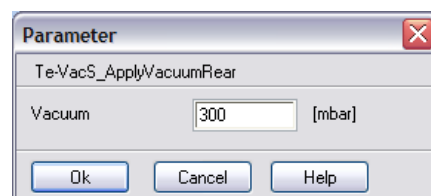


Fig. 16-34 Te-VacS - ApplyVacuumRear command

#### Vacuum

Specify the required vacuum (range: 30 – 700 mBar).

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

### 16.15.3 Te-VacS - ApplyVacuumFront Command

The ApplyVacuumFront command opens a valve which applies the vacuum to the front SPE block (i.e. the SPE block which is connected to vacuum pipe 1). You must specify the required vacuum. If you did not specify a previous SetPressureDiff command, the vacuum pump is then started and pumps the entire vacuum path ("soft pumping", see Te-VacS operating manual). The vacuum will be applied until a subsequent VentFront command is executed.

#### Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

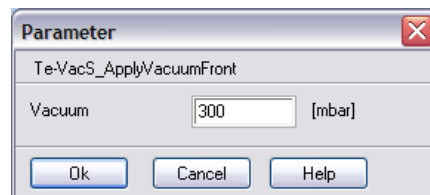


Fig. 16-35 Te-VacS - ApplyVacuumFront command

#### Vacuum

Specify the required vacuum (range: 30 – 700 mBar).

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

### 16.15.4 Te-VacS - VentRear Command

The VentRear command vents the vacuum from the rear SPE block. It is used to stop the vacuum separation process.


### 16.15.5 Te-VacS - VentFront Command

The VentFront command vents the vacuum from the front SPE block. It is used to stop the vacuum separation process.

### 16.15.6 Te-VacS - DeactivateSystem Command

The DeactivateSystem command is used to shut down the Te-VacS when you no longer want to use it in your script or process. It switches off the vacuum pump and vents all blocks and the vacuum tank. If you do not specify a DeactivateSystem command, the Te-VacS will be deactivated automatically when you quit Freedom EVOware.

### 16.15.7 Te-VacS - CheckWasteLevel Command

The CheckWasteLevel command is used to check the liquid level in the waste bottle. The waste level is reported during process runtime in the Messages/Error window of the runtime controller (see [12.2.4 “Runtime Controller, Extended View \(Running a Process\)”](#),  12-14).

### 16.15.8 Te-VacS - CheckPlateWithBlock Command

If labware is positioned on the vacuum block and the vacuum block is moved with the RoMa, the CheckPlateWithBlock command is used to inform Freedom EVOware that the labware has moved too.

This command is normally used as a pre-action and/or post-action of another command. It is not normally used as a process step.

### 16.15.9 Te-VacS - Filtration Command

The Filtration command, which is only available in Freedom EVOware Plus, is used to specify the sequence of operations to be carried out by the Te-VacS during the vacuum separation process. Three of the tabs are used to make general settings. The fourth tab is used to specify the filtration parameters.

To carry out vacuum separation in Freedom EVOware Standard you must use a combination of the commands SetPressureDiff, ApplyVacuumRear, ApplyVacuumFront, VentRear, VentFront, PositionPlateRear, PositionPlateFront and OpenDesaltingValve. The Filtration command in Freedom EVOware Plus is a high-level command which combines all of these functions.

When setting up your worktable for the Filtration command, you must assign the labware labels FiltrationPlate and CollectionPlate to the filtration plate and the collection plate (see [11.7.1 “Assigning a Label \(Name\) to the Labware”](#),  11-18).

#### Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

#### 16.15.9.1 General Tab

This tab is used to make general settings.

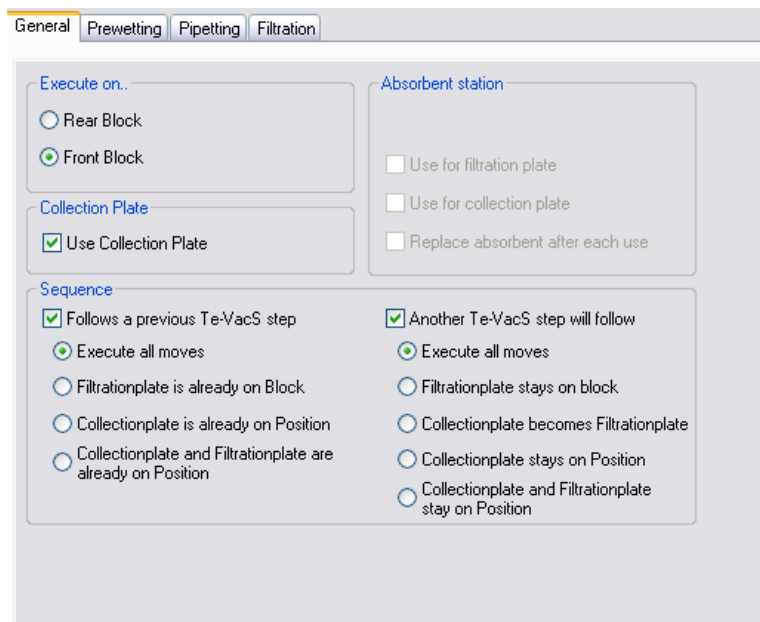


Fig. 16-36 Te-VacS Filtration command - General tab

### Execute on panel

Specify whether you want to use the front SPE block or the rear SPE block.

### Collection plate panel

#### Use collection plate

Check this checkbox if you want to use a collection plate. A collection plate is used to collect the liquid which is extracted from the filtration plate.

### Absorbent station panel

The absorbent station uses a blotting pad to remove drops of liquid from the bottom of the filtration and/or collection plate after each filtration step. It usually consists of a stand or carrier that contains a piece of fabric or absorbent material. It can also be programmed to be a replaceable item. The filtration or collection plate is put on to the absorbent station using the RoMa.

The settings in this panel are only available if you have specified a location for the absorbent station in the device configuration.

#### Use for filtration plate

Check this checkbox if you want to blot the filtration plate on the absorbent station.

#### Use for collection plate

Check this checkbox if you want to blot the collection plate on the absorbent station. This option is only available if you are using a collection plate.

#### Replace absorbent after each use

Check this checkbox if you want to replace the absorbent station each time it is used. The necessary replacement intervals depend on your application or experiment.

**Freedom  
EVOware Plus**
**Sequence panel**

The sequence panel is used to configure the sequence of plate robot (RoMa) movements if the Te-VacS process step follows and/or precedes another Te-VacS process step. In this case, some of the RoMa movements can be omitted because the labware item(s) have been left at the required position by the preceding step and/or can be left at the required position for the following step.

If your Freedom EVOware Plus process has several Te-VacS process steps which are not directly connected, you must reserve the Te-VacS in the Process Editor (see [11.5.8.1 "Reserving and Linking Devices"](#), [11-13](#)). If you don't make a reservation and the Te-VacS is used by several processes, the Te-VacS vacuum block and the plates may not be positioned as expected.

**Follows a previous Te-VacS step**

Check this checkbox if the Te-VacS process step follows a previous Te-VacS process step.

**Execute all moves**

Carry out all of the RoMa movements which are normally required by this step.

**Filtration plate is already on block**

The filtration plate is already on the vacuum block. The associated RoMa movement is not necessary.

**Collection plate is already on position**

The collection plate is already at the correct position. The associated RoMa movement is not necessary.

**Collection plate and filtration plate are already on position**

The collection and filtration plates are already at the correct positions. The associated RoMa movements are not necessary.

**Another Te-VacS step will follow**

Check this checkbox if the Te-VacS process step will be followed by another Te-VacS process step.

**Execute all moves**

Carry out all of the RoMa movements which are normally required by this step.

**Filtration plate stays on block**

The filtration plate can be left on the vacuum block at the end of the step. The associated RoMa movement is not necessary.

**Collection plate becomes filtration plate**

The collection plate will be used as the filtration plate in the following Te-VacS step.

**Collection plate stays on position**

The collection plate can be left at the same position for the following Te-VacS step. The associated RoMa movement is not necessary.

**Collection plate and filtration plate stay on position**

The collection and filtration plates can be left at the same positions for the following Te-VacS step. The associated RoMa movements are not necessary.

**16.15.9.2 Prewetting Tab**

This tab is used to specify optional prewetting of the collection plate.

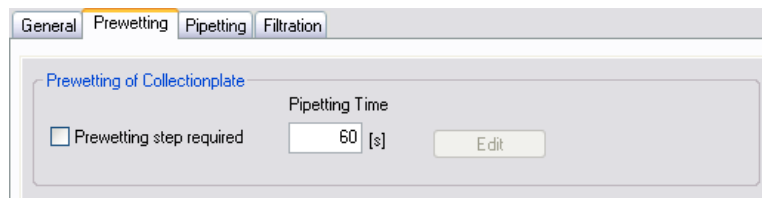


Fig. 16-37 Te-VacS Filtration command - Pre-wetting tab

### Pre-wetting of collection plate panel

#### Pre-wetting step required

Check this checkbox if you want to pre-wet the collection plate before the filtration plate is put on top of it. This opens the Script Editor to allow you to create a script for pre-wetting.

#### Pipetting time

Specify the expected execution time of the pipetting operation.

#### Edit button

If you have already specified a pre-wetting script for the Filtration command, click this button to edit the script.

### 16.15.9.3 Pipetting Tab

This tab is used to specify optional pipetting to the filtration plate.

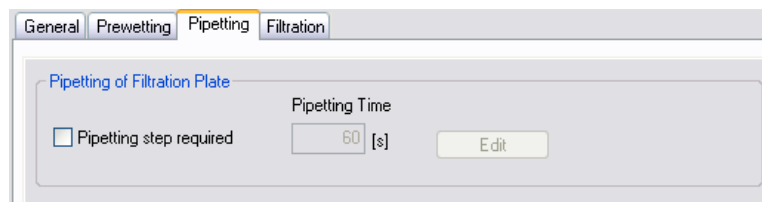


Fig. 16-38 Te-VacS Filtration command - Pipetting tab

### Pipetting of filtration plate panel

#### Pipetting step required

Check this checkbox if you want to pipette to the filtration plate before filtration starts. This opens the Script Editor to allow you to create a script for pipetting.

#### Pipetting time

Specify the expected execution time of the pipetting operation.

#### Edit button

If you have already specified a pipetting script for the Filtration command, click this button to edit the script.



### 16.15.9.4 Filtration Tab

This tab is used to specify the separation script for the vacuum separation process.

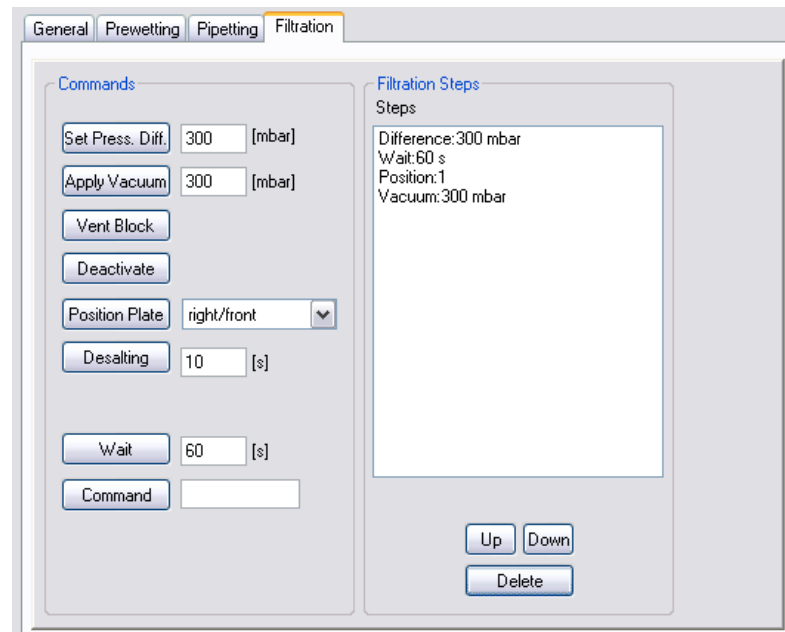


Fig. 16-39 Te-VacS Filtration command - Filtration tab

To add a command to the separation script, click one of the *Commands* buttons after specifying the command parameters to the right of the button. To change the order of execution of the commands, select a command from the list and click the **Up** or **Down** buttons. To delete a command from the list, select the command and click **Delete**.

The following commands are available

#### Set Pressure Difference

This command starts the vacuum pump. You must specify the required vacuum (range: 30 – 700 mBar). This does not apply vacuum to either of the SPE blocks. If you want to use the fast pumping procedure (see Operating Manual, Te-VacS), you should use this command in advance of the Apply Vacuum command. Due to the time needed to build up the vacuum, you should follow this command with a Wait command.

#### Apply Vacuum

This command applies the vacuum to the SPE block specified on the General tab. You must specify the required vacuum (range: 30 – 700 mBar). The vacuum will be applied until a subsequent Vent Block command is executed.

The vacuum builds up slowly unless you precede this command with a Set Pressure Difference command. This is equivalent to the soft pumping procedure (see Operating Manual, Te-VacS - see [1.2.1 “Related Documentation and Software”](#), 1-3).

#### Vent Block

This command vents the vacuum from the SPE block specified on the General tab. It is used to stop the vacuum separation process.

### Deactivate

This command is used to shut down the Te-VacS when you no longer want to use it in your script or process. It switches off the vacuum pump and vents all blocks and the internal vacuum container. If you do not specify a Deactivate command, the Te-VacS will be deactivated automatically when you quit Freedom EVOware.

### Position plate

This command is only relevant if the Te-VacS is fitted with the Repositioner option. It moves the collection plate for the rear vacuum block into one of four positions before you apply the vacuum. For more information on this feature, see [16.15.10 "Te-VacS - PositionPlateRear Command"](#), [16-54](#).

### Desalting

This command opens the desalter valve to drain the residues. It is only relevant for Te-VacS versions which are equipped with a desalter valve. Specify how long you want to open the desalting valve (range: 1 - 60 seconds).

### Wait

This causes the separation script to wait for the specified duration.

### Command

Sends a firmware command to the Te-VacS. Refer to the firmware documentation for the device for a complete list of firmware commands (see also [1.2.1 "Related Documentation and Software"](#), [1-3](#)).



### WARNING

Risk of injury to operating personnel or damage to the equipment

- ♦ Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

## 16.15.10 Te-VacS - PositionPlateRear Command

The PositionPlateRear command is only relevant if the Te-VacS is fitted with the Repositioner option. This option allows the contents of four subsequent 96-well SPE plates (e.g. TecPrep 96 microplates) to be extracted to one 384-well collection plate (e.g. a MALDI target). The collection plate is placed on a movable carrier.

The PositionPlateRear command moves the collection plate for the rear vacuum block into one of four positions before you apply the vacuum. After extracting liquid from one of the 96-well microplates, it is replaced by another microplate and the collection plate is moved by 4.5 mm in the X and/or Y direction to the new position.

The collection plate can be moved to the following positions:

- ♦ left/rear
- ♦ left/front
- ♦ right/rear
- ♦ right/front.

**Execution parameters**

You are prompted to specify the following execution parameters when you add this command to your script or process:



*Fig. 16-40 Te-VacS - PositionPlateRear command*

**Position**

Choose the required position of the collection plate.

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

**16.15.11 Te-VacS - PositionPlateFront Command**

The PositionPlateFront command is only relevant if the Te-VacS is fitted with the Repositioner option. This option allows the contents of four subsequent 96-well SPE plates (e.g. TecPrep 96 microplates) to be extracted to one 384-well collection plate (e.g. a MALDI target). The collection plate is placed on a movable carrier.

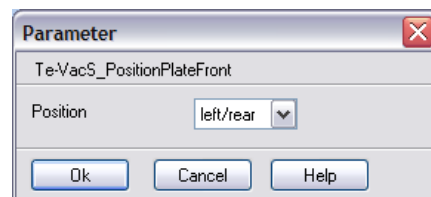
The PositionPlateFront command moves the collection plate for the front vacuum block into one of four positions before you apply the vacuum. After extracting liquid from one of the 96-well microplates, it is replaced by another plate and the collection plate is moved by 4.5 mm in the X and/or Y direction to the new position.

The collection plate can be moved to the following positions:

- ◆ left/rear
- ◆ left/front
- ◆ right/rear
- ◆ right/front.

**Execution parameters**

You are prompted to specify the following execution parameters when you add this command to your script or process:



*Fig. 16-41 Te-VacS - PositionPlateFront command*

**Position**

Choose the required position of the collection plate.

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

### 16.15.12 Te-VacS - OpenDesaltingValve Command

The OpenDesaltingValve command opens the desalter valve to drain the residues. It is only relevant for Te-VacS versions which are equipped with a desalter valve.

#### Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

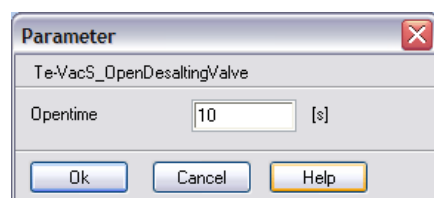


Fig. 16-42 Te-VacS - OpenDesaltingValve command

#### Open time

Specify how long you want to open the desalting valve (range: 1 - 60 seconds).

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

## 16.16 Commands for the Symbol MS-954 Barcode Scanner

The Symbol LS-954 barcode scanner option allows you to read barcodes on plates or tubes which are presented to the scanner by a plate or tube robot. It can perform several reading attempts and tell the robot to increase its range of motion in front of the laser beam each time to detect barcodes even if they are not precisely positioned in front of the laser beam at the first try.

In Freedom EVOware Plus, the Barcode Scanner - Read Barcode command is an on-the-fly-command – drag the command to the line which connects two process steps (see 5.4.3 “The Process Editor (Freedom EVOware Plus)”, 5-16).

### 16.16.1 Symbol MS-954 Barcode Scanner - Read Barcode Command

The Read Barcode command is used to read barcodes from the labware or tube which is presented to the barcode scanner by the RoMa. The RoMa moves the labware or tube in front of the scanner in x, y and z direction according to the driver settings you have made. The scanner driver can be configured to re-scan several times if the labware or tube barcode cannot be read on the first attempt. It increases the distance of movement of the labware or tube along the three axes each time to increase the likelihood of finding the barcode. If a timeout occurs, the user will either be prompted to specify a barcode manually or a default barcode

will be constructed, again depending on the driver configuration. See [8.5.12 “Settings for the Symbol MS-954 Barcode Scanner”](#), ¶ 8-59 for details. See [13.2.12 “Commands for the Symbol MS-954 Barcode Scanner, Overview”](#), ¶ 13-15 for general information on using the Read Barcode command. Freedom EVOware stores each scanned barcode in the internal database in the ID field of the labware record. The barcode information can also be included in report files (see [15.23 “Export Data Command”](#), ¶ 15-42). This command has no execution parameters or objects, pre-actions or post-actions.

## 16.17 Commands for the Sunrise Reader

The Sunrise reader is a fully automatic, microplate absorbance reader designed for professional use, enabling the user to measure the light absorbency (optical density) of samples in 96-well microplates. By reading twelve wells simultaneously, the instrument is able to measure a microplate in approximately six seconds. With an innovative range of options, this versatile MTP reader provides a wide range of features for numerous applications.

The commands for this reader require the RdrOLE and XFluor4 software, which must be installed separately. Freedom EVOware can also control this reader using the Magellan software (see [16.8 “Commands for the Magellan option”](#), ¶ 16-20).

### 16.17.1 Sunrise Reader - Status Command

The Status command interrogates the status of the reader. The device status is reported during process runtime in the Messages/Error window of the runtime controller (see [12.2.4 “Runtime Controller, Extended View \(Running a Process\)”](#), ¶ 12-14).

This command has no execution parameters or objects, pre-actions or post-actions.

### 16.17.2 Sunrise Reader - Open Command

The Open command opens the door of the reader.

This command has no execution parameters or objects, pre-actions or post-actions.

### 16.17.3 Sunrise Reader - Close Command

The Close command closes the door of the reader.

This command has no execution parameters or objects, pre-actions or post-actions.

### 16.17.4 Sunrise Reader - Measure Command

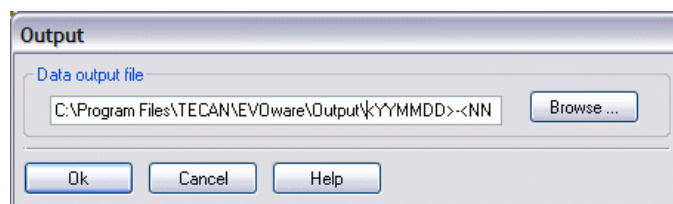
The Measure command performs a measurement procedure using external software. For a detailed description of the parameters of this command please consult the documentation for RdrOLE and XFluor4.

#### Execution parameters

The RdrOLE reader interface software prompts you to specify the measurement parameters when you add this command to your script or process. Refer to the RdrOLE online help and manual for more information.

**Note:** *RdrOLE must be configured to connect to the chosen reader. In Freedom EVOware's offline mode, you must start RdrOLE and choose the reader manually.*

After making your entries in the Measurement Parameters dialog box and clicking **Ok**, the Output dialog box is shown where you must specify the name of the output file for the measurements. Alternatively, click Browse and choose an existing file. A default file name will be suggested automatically:



**Fig. 16-43** Specifying the output file of the Sunrise Reader Measure command

See [16.20 "Specifying Output Filenames for Reader Data"](#), [16-64](#) for a description of the placeholders which can be used to generate reader data file names.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

#### Objects

The Measure command operates on an object of type *Sample* or a derived type with default name *MP*.

#### Pre-actions and post-actions

The labware is brought to the *Sunrise* location with a RoMa MoveObject command and the door of the reader is opened with the Open command. After the measurement, the labware is brought back to its *Base* location with another RoMa MoveObject command and the door is closed with the Close command.

**Note:** *The unit of the measurement data is 10<sup>-4</sup> OD.*

### 16.17.5 Sunrise Reader - Multilabel Command

The Multilabel command performs up to four consecutive measurement steps on the same labware using external software. The labware does not have to leave the reader in between measurements. Multi labeling allows different components (labelled with different fluorophores) to be detected in one operation.

### Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

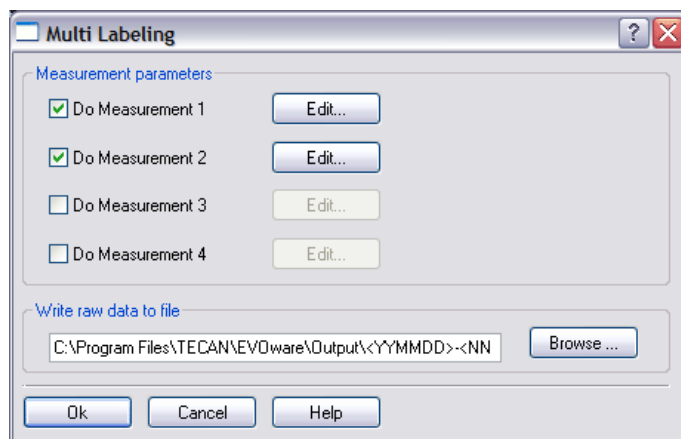


Fig. 16-44 Sunrise Reader Multilabel command

### Measurement parameters

For each measurement step you want to perform, check the corresponding checkbox and click **Edit**. The RdrOLE reader interface software then prompts you to specify the measurement parameters. Refer to the RdrOLE online help and manual for more information.

**Note:** RdrOLE must be configured to connect to the chosen reader. In Freedom EVOware's offline mode, you must start RdrOLE and choose the reader manually.

### Write raw data to file

Enter the path and name of the raw data file or click Browse and choose an existing file. A default file name will be suggested automatically. See [16.20 "Specifying Output Filenames for Reader Data"](#), [16-64](#) for a description of the placeholders which can be used to generate reader data file names.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

### Objects

The Multilabel command operates on an object of type *Sample* or a derived type with default name *MP*.

### Pre-actions and Post-actions

The labware is brought to the *Sunrise* location with a RoMa MoveObject command and the door of the reader is opened with the Open command. After the measurement, the labware is brought back to its *Base* location with another RoMa MoveObject command and the door is closed with the Close command.

## 16.18 Commands for the Magnetic Bead Separator

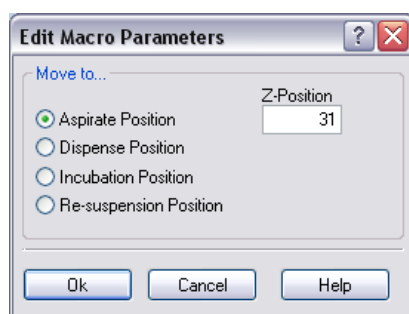
The Magnetic Bead Separator option (also called Te-MagS) is a magnetic bead separator with an optional heating function. It uses a commercially-available liquid containing microscopic magnetic beads to rapidly isolate bio-molecules (e.g. DNA, RNA, proteins etc.) or whole cells from various crude mixtures by means of magnetic forces. The magnetic beads are pulled through the liquid in the tubes using magnets and collect the required substance as they move.

### 16.18.1 Magnetic Bead Separator - MoveToPosition Command

The MoveToPosition command moves the carrier to one of four positions. You must specify the required position.

#### Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:



*Fig. 16-45 Magnetic Bead Separation MoveToPosition command*

Specify the position the carrier should be moved to. The four positions are:

#### **Aspirate Position**

Carrier above the magnet block, magnet block raised.

#### **Dispense Position**

Carrier above the magnet block, magnet block lowered.

#### **Incubation Position**

Carrier above the heating block, heating block raised.

#### **Re-suspension Position**

Carrier above the heating block, heating block lowered. Use this position to carry out re-suspension by mixing the liquid with the pipetting tips (e.g. with the LiHa - Mix script command).



### Z-Position

Specify the required Z-position (height) of the magnet block for the Aspirate position (range: 1 to 31 movement steps).

z = 31 is the highest possible position. z = 1 is the lowest possible position and corresponds to the Dispense position. For more information on this feature see *Z-position* in 16.18.4 “Magnetic Bead Separator - Execution Command”, 16-62.

This field is only shown if you have checked *Support Z-positioning* in the configuration of the Te-MagS driver. This feature requires special Te-MagS hardware. This parameter can only be specified for the Aspirate position.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

## 16.18.2 Magnetic Bead Separator - ActivateHeater Command

The ActivateHeater command is used to switch on the heater. You must specify the required temperature. Due to the time required to heat up the heating block, you should specify this command at an early stage in your script or process to ensure that the instrument does not have to wait if you want to heat the samples during the separation process.

### Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:



Fig. 16-46 Magnetic Bead Separation ActivateHeater command

Specify the working temperature of the heating block (range: 15 to 80 °C). The heating block cannot cool, so the minimum temperature of the labware is room temperature. Specify 0 to switch off the heating block, use the DeactivateHeater command or uncheck the *Heater* checkbox in the device configuration.

**Note:** Changes in the temperature of the heating block are not instantaneous.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

## 16.18.3 Magnetic Bead Separator - DeactivateHeater Command

The DeactivateHeater command is used to switch off the heater when you no longer want to use it. If you do not specify a Deactivate heater command in your script or process, the heater will be switched off automatically when you quit Freedom EVOware. The heater can also be switched off by unchecking the *Heater* checkbox in the device configuration.

This command has no execution parameters or objects, pre-actions or post-actions.

### 16.18.4 Magnetic Bead Separator - Execution Command

The Execution command is used to specify the sequence of operations to be carried out by the Magnetic Bead Separator (Te-MagS) during the magnetic separation process. The sequence of operations is called a "separation script".

#### Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

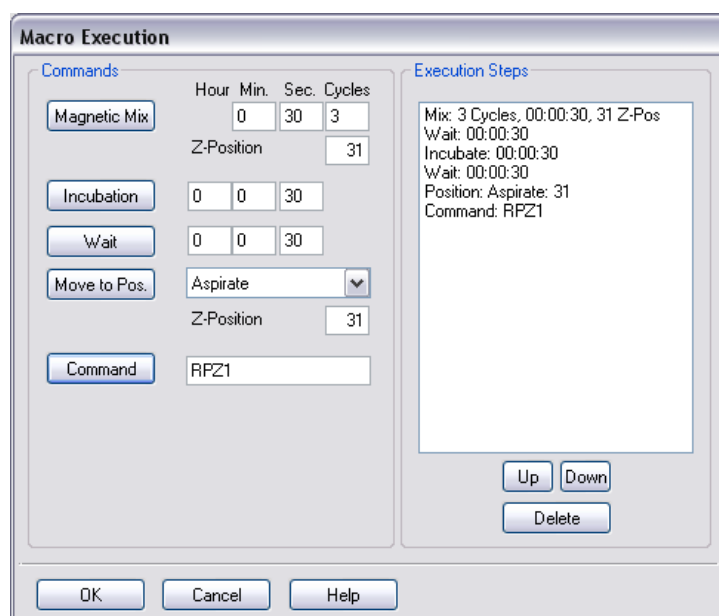


Fig. 16-47 Magnetic Bead Separation Execution command

To add a command to the separation script, click one of the *Commands* buttons after specifying the command parameters to the right of the button. To change the order of execution of the commands, select a command from the list and click the **Up** or **Down** buttons. To delete a command from the list, select the command and click **Delete**.

The following commands are available:

#### Magnetic Mix

This command mixes the magnetic beads with the sample liquid by applying the magnet block to alternate sides of the carrier the specified number of times (*Cycles*) with the specified waiting time at each of the two positions. In addition to moving from left to right and back, the magnet block also moves up and down to follow an approximately rectangular path.

**Z-Position**

Specify the required Z-position (highest position) of the magnet block for the Magnetic Mix command (range: 1 to 31 movement steps).

z = 31 is the highest possible position and results in the maximum up and down movement of the magnet block during the Magnetic Mix command. z = 1 is the lowest possible position and corresponds to the Dispense position. In this case, the Magnetic Mix command will only move the magnet block from left to right and back and not up and down.

Specify a smaller value for Z-position if you only have a small volume of liquid in the labware. This ensures that the upwards movement of the magnet block will not drag the magnetic beads above the liquid surface. This makes it easier to aspirate the supernatant or wash liquid with the LiHa in a following step.

This field is only shown if you have checked *Support Z-positioning* in the configuration of the Te-MagS driver. This feature requires special Te-MagS hardware.

**Incubation**

This command incubates the labware on the heater for the specified time.

**Wait**

This command causes the device to wait for the specified time without performing any actions.

**Move to Pos.**

This command moves the carrier to one of four positions. The four positions are:

**Aspirate Position:** Carrier above the magnet block, magnet block raised.

**Dispense Position:** Carrier above the magnet block, magnet block lowered.

**Incubation Position:** Carrier above the heating block, heating block raised.

**Re-suspension Position:** Carrier above the heating block, heating block lowered. Use this position to carry out re-suspension by mixing the liquid with the pipetting tips (e.g. with the LiHa - Mix script command).

**Z-Position**

Specify the required Z-position (height) of the magnet block for the Aspirate position (range: 1 to 31 movement steps).

z = 31 is the highest possible position. z = 1 is the lowest possible position and corresponds to the Dispense position.

This field is only shown if you have checked *Support Z-positioning* in the configuration of the Te-MagS driver. This feature requires special Te-MagS hardware. This parameter can only be specified for the Aspirate position.

**Command**

Sends a firmware command to the Te-MagS. Refer to the firmware documentation for the device for a complete list of firmware commands (see also [1.2.1 "Related Documentation and Software"](#), [1-3](#)).

**WARNING**

Risk of injury to operating personnel or damage to the equipment

- ♦ Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

### Objects

The Execution command operates on an object of type *Sample* or a derived type with default name *MP*.

### Pre-actions and Post-actions

The labware is brought to the *Te-MagS* location with a RoMa MoveObject command and brought back to its *Base* location with another RoMa MoveObject command.

## 16.19 Commands for the Transfer Station

The Transfer Station is an unused location on the worktable of the pipetting instrument. If your pipetting instrument is fitted with two RoMa arms, it is used to transfer labware from one RoMa to another. The Transfer command is only available if you have installed Freedom EVOware with two RoMas.

### 16.19.1 Transfer Station - Transfer Command

The Transfer Station is an unused location on the worktable of the pipetting instrument. If your pipetting instrument is fitted with two RoMa arms, the Transfer command uses the Transfer Station to pass labware from one RoMa to the other if this becomes necessary. Freedom EVOware instructs the first RoMa to put down the labware on the Transfer Station, where the second RoMa can pick it up again. In most cases, both RoMas can access all locations on the pipetting instrument. This command is only needed if - for mechanical reasons - labware which has been picked up by one of the RoMas must be moved to a location which is only accessible to the other one. This situation is detected automatically when you preview your process. If the Runtime Controller reports a RoMa access problem, insert the Transfer command between the two relevant process steps. Freedom EVOware then uses the Transfer Station automatically when it is needed.

## 16.20 Specifying Output Filenames for Reader Data

The Measure commands of microplate readers such as the GENios or Ultra family allow you to specify an output file for the results of the measurement steps. The file name of this file can either be specified explicitly or it can be generated during script or process runtime. The following placeholders are available for generating the file name:

**Tab. 16-1** Filename placeholders for reader data output files

Placeholder	Example	Description
<YYMMDD>	000912	The current date
<YYYYMMDD>	20000912	The current date
<DDMMYY>	120900	The current date
<DDMMYYYY>	12092000	The current date
<YYMMDD.NNN>	000912.003	The current date and a sequence number (counter)
<YYYYMMDD.NNN>	20000912.003	The current date and a sequence number (counter)
<DDMMYY.NNN>	120900.003	The current date and a sequence number (counter)
<DDMMYY-NNN>	120900-003	The current date and a sequence number (counter)
<DDMMYYYY.NNN>	12092000.003	The current date and a sequence number (counter)
<NNN>	003	A sequence number (counter)
<variable_name>	12345	The contents of a variable in the Freedom EVOware database
<ID>	12345	The labware barcode. After scanning the labware with the barcode reader or the PosID, the barcode is stored in this database variable

The placeholders are replaced dynamically with their current values during script or process runtime. You can combine the placeholders with plain text, e.g. to specify the filename extension.

**Examples**

- ♦ Use the following string to generate filenames containing the date and a sequence number (counter):  
 <YYMMDD><NNN>.rdr  
 (e.g. 0411301234.rdr)
- ♦ Use the following string to generate the file name from the labware barcode:  
 <ID>.rdr  
 (e.g. 783898936.rdr)

## 16.21 Commands for the Process Starter

The Process Starter device driver starts a specified process when a set of user-defined conditions are met. You can specify conditions which are based on database locations and/or on the values of variables. Alternatively, you can start a specified process unconditionally.

The Process Starter is only available for Freedom EVOware Plus. It can also start Freedom EVOware processes on remote computers.

### 16.21.1 Process Starter - Start Command

The Start command starts a single instance of a specified process when a set of user-defined conditions are met. You can specify conditions which are based on database locations (labware attributes) and/or on the values of variables. Alternatively, you can start a specified process unconditionally.

The Start command can be used as a process step or as a script command in a Process Script process step. It is only available for Freedom EVOware Plus. It can also be used to start Freedom EVOware processes on a remote computer.

The Start command is available in five versions (Start and StartP1 to StartP4), depending on the number of labware items required by the processes you want to start (0 to 4 labware items). The Start command has no labware parameters and the StartP1 to StartP4 commands have from one to four labware parameters. If you assign labware sources to the StartP1 to StartP4 commands in the Process Editor, you can configure the command to pass the labware parameters to the processes you want to start. See Plate Mapping panel, below.

You can only use StartP1 to StartP4 as process steps. The Start command can be used as a process step or in scripts for the Process Script - Script command.

The five Start commands do not wait for the started processes to finish. If necessary, you can use the script command WaitForProcess to pause the execution of a pipetting script until a specified process has finished (see 16.24.2 *Process Starter - WaitForProcess Command*, *fig 16-82*). The WaitForProcess commands can only be used in scripts for the Process Script - Script command.

The dialog box of the Start commands is as follows (the example shows StartP2):

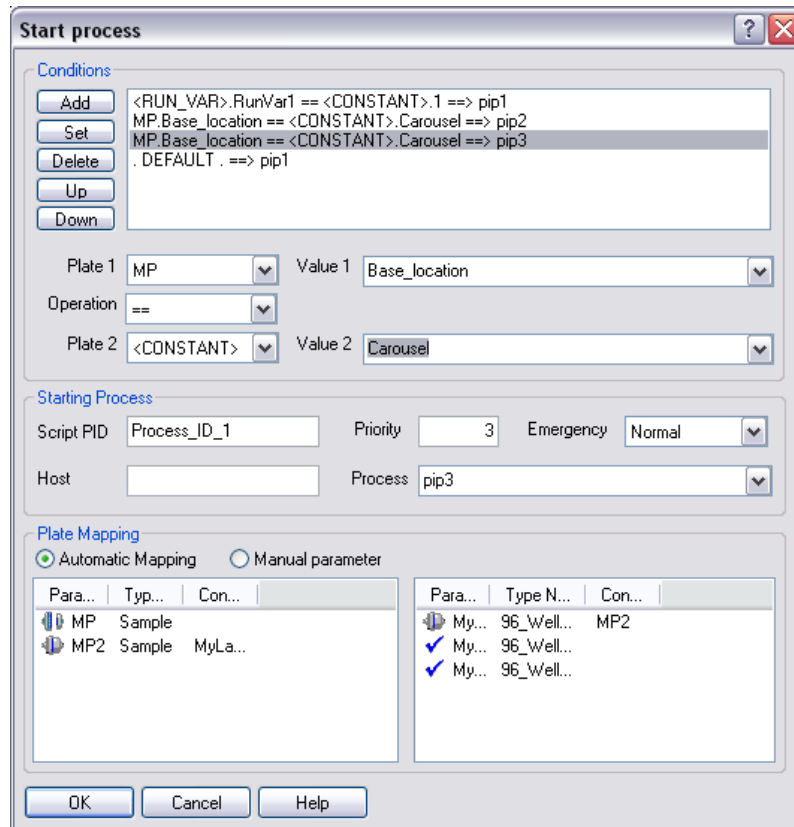


Fig. 16-48 Process Starter - StartP2 command

The parameters of the Start command are as follows:

**Conditions panel**

Specify the conditions which must be met to start the process or processes. You can specify a single condition to start a single specified process or several different conditions, each of which starts a different process. If you do not specify any conditions, the process specified in the Starting Process panel will be started unconditionally.

When you run the process which contains the Start command, the conditions in the list are tested from the top downwards. The first true condition which is found is executed and the remaining conditions in the list are skipped.

Select a condition in the list to view and/or edit the settings for the condition in the pull-down lists and text fields.

The buttons and pull-down lists in the Conditions panel are as follows:

**Add**

Add a condition.

**Set**

If you have edited a condition, click Set to apply the changes.

**Delete**

Delete the selected condition.

**Up, Down**

Move the selected condition up or down in the list.

The available options for Plate 1/2 and Value 1/2 are as follows

**Tab. 16-2** Options for Plate 1/2 and Value 1/2

Plate1 / Plate 2	Value 1 / Value 2	Description
Labware name	Name of a labware attribute	The current date
<SCRIPT_VAR>	Name of an existing variable of scope "script" <sup>a)</sup>	The current date
<RUN_VAR>	120900	The current date
<INST_VAR>	12092000	The current date
<CONSTANT>	000912.003	The current date and a sequence number (counter)

a) See 6.4.6 "Declare Variables", 6-12

The available options for Operator are as follows:

**Tab. 16-3** Expressions that can be used in the Start command

Operator	Description
==	String is the same
!=	String is not the same
<	Numeric value is less than
>	Numeric value is greater than
DEFAULT	Always true

## Starting Process panel

### Script PID

This field is only required if you want to use the Process Starter - WaitForProcess command. Specify the name of a string variable of scope script, instance or run (as required).

When the Start command (or StartP1 to StartP4) starts a process, it will write the unique process ID of the process into this variable. If you have started a process on a remote PC, the process ID will be followed by the name of the remote host (e.g. 42:RemoteHost\_2).

You must specify the same variable name in the Process ID field of the WaitForProcess command. The WaitForProcess command will then pause the execution of the pipetting script until the specified process has finished.

### Priority

Required priority of the process to be started.

### Emergency

Required emergency level of the process to be started.



### Host

If you want to start a process on a remote PC, specify the name of the remote host.

### Process

The name of the process to be started.

The pull-down list only shows processes from the local computer. If you choose a local process, the labware parameters of the process are shown in the right hand list of the Plate Mapping panel.

If you want to start a process on a remote computer, you must enter the process name and the plate mapping manually. The process must exist on the remote computer.

### Plate Mapping panel

The list on the left side shows the labware parameters of the Start command. It will not contain any entries if you have chosen the Start command with no labware parameters; it will show 1 to 4 labware items if you have chosen StartP1 to StartP4.

The list on the right side shows the labware parameters of the process to be started.

Click a labware item in the right-hand list to connect it to the currently selected labware item in the left-hand list. Click a labware item in the right-hand list again to disconnect it.

If you connect a labware parameter in the right-hand list to a labware parameter in the left-hand list, the Start command will pass information on the labware to the called process (the process you want to start). The called process will then use the labware you assign to the Start command in the Process Editor instead of its own labware source.

For labware parameters in the called process which are not connected in this way, the called process will use the labware from its own labware source (the labware you assign to the called process in the Process Editor).

Different icons are used in the dialog box for the Start command to show how the labware is connected. In the above figure (Fig. 16-57, 16-79), the labware MP2

in the left-hand list is connected to the first entry in the right-hand list. The other two entries are not connected (blue tick). The labware MP in the left-hand list is also not connected.

Click the *Manual parameters* radio button to enter a labware assignment string instead of using the graphical interface in the Plate Mapping panel. The string you enter is passed to the called process without change. So the string must be in the correct format. A typically example is:

```
MyLabware001 MyLabware001{001}, MoreLabware_1 MyLabware001{002}
```

This string assigns the labware item MyLabware001{001} in the main process to labware source MyLabware001 in the called process and MyLabware001{002} in the main process to labware source MoreLabware\_1 in the called process.

You need to do this if the called process is on a remote computer. The Process Starter cannot determine the labware requirements of a Freedom EVOware process on a remote computer automatically.

The Start command starts a single instance of the called process. If you want to

start more than one instance you can use variables in the labware assignment string.

### Using the Start command as a script command

The Start command can also be used in the pipetting script of a Process Script process step (see [16.22 “Commands for the Process Script Driver”](#), [16-71](#)). In this case, the Plate 1 and Plate 2 pull-down lists only allow you to choose variables and constants for use in the conditions and not labware parameters.

### Remote Processes

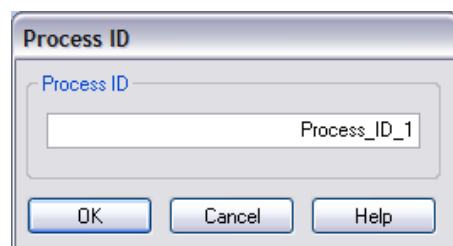
Please note the following limitations and conventions if the called process is on a remote computer:

- ◆ To start processes remotely, the correct permissions must be set for the DCOM component EvoApi. This is done in Control Panel > Administrative Tools > Component Services. Please contact Tecan support for additional information.
- ◆ The same user name and password combination which you are using on the local Freedom EVOware installation must be available on the remote Freedom EVOware installation.
- ◆ The locations which you use to transfer labware between the two Freedom EVOware systems must have the same type or name (e.g. Hotel 4Pos) and dimension (e.g. four sites).
- ◆ The labware you want to transfer to the remote computer must have the same name on both the local and the remote system (the names shown in the labware generator, see [11.6](#), [11-14](#) must be identical).
- ◆ The location of the labware is passed to the remote process without change (it is set to the same value as on the local system). Accordingly, the labware location on the remote system must be empty and the labware must not be in use. This must be ensured by the operator before starting the process. The Process Starter cannot check the availability of the labware and labware location on the remote computer automatically.
- ◆ To start and initialize the remote system correctly, It is recommended to create and run a simple dummy remote process such as an incubation.

## 16.21.2 Process Starter - WaitForProcess Command

The WaitForProcess script command waits for a specified process to finish before allowing the pipetting script to continue.

The WaitForProcess command is only available for Freedom EVOware Plus. You can only use it in a Process Script -Script process step.



**Fig. 16-49** Process Starter - WaitForProcess command

**Process ID**

Specify the name of an existing string variable which contains the process ID of a process to be started by the Process Starter - Start command. The WaitForProcess command will then pause the execution of the pipetting script until the specified process has finished.

The variable name must be identical to the variable name you specified in the Script PID field of the Process Starter - Start command.

## 16.22 Commands for the Process Script Driver

The Process Starter device driver starts a specified process when a set of user-defined conditions are met. You can specify conditions which are based on database locations and/or on the values of variables. Alternatively, you can start a specified process unconditionally.

The Process Starter - Start command can be used as a process step or as a script command in a Process Script process step (see [16.21.1 "Process Starter - Start Command"](#), [16-66](#)).

The Process Starter and Process Script device drivers are only relevant for Freedom EVOware Plus.

### 16.22.1 Process Script - Script Command

The Process Starter device driver starts a specified process when a set of user-defined conditions are met. You can specify conditions which are based on database locations and/or on the values of variables. Alternatively, you can start a specified process unconditionally.

The ProcStart - Start command can be used as a process step or as a script command in a Process Script process step (see [16.21.1 "Process Starter - Start Command"](#), [16-66](#)).

The Process Script - Script command is used to create a script for the Process Starter script commands. When you drag it to the Process Editor, it opens the Script Editor automatically. See [11.4.2 "Creating a Pipetting Script"](#), [11-5](#).



## 17 Special Features, Example Scripts and Processes,

This chapter introduces the example scripts and processes and describes the usage and configuration of special features in Freedom EVOware.

### 17.1 Using the Automatic DITI Handling feature

If you are using DITIs on the liquid handling arm (LiHa, Air LiHa), Freedom EVOware provides special facilities to ensure that sufficient DITIs are present on the worktable for your script or process and to automatically fetch new DITI racks as and when needed.

The automatic DITI handling feature is also compatible with stackable DITI racks. However, this feature is not available and not meaningful for the Te-MO and the MCA.

A **stackable DITI rack** is a special DITI rack design which can be stacked using plastic spacers to form a pile of racks. The pile can be put on the worktable. This avoids the need for a carousel if the number of DITIs required by your script or process is not too high. The Get DITIs command picks up DITIs from the DITI rack which is on the top of the pile. When the DITI rack is empty, it is removed from the pile together with the spacer to reveal the next DITI rack in the pile. Stackable DITI racks can only be used with the LiHa.

Freedom EVOware is provided with a sample carrier definition for a stackable DITI rack. Since the dimensions of stackable DITI racks are not currently standardized and can vary between models and manufacturers, you must re-teach the coordinates using the actual DITI carrier and labware type which you plan to use.

The automatic DITI handling feature is only intended for automatic replacement of DITIs on the LiHa or Air LiHa. It cannot be used to replace DITIs on the MCA, MCA384 or Te-MO.

Proceed as follows to use automatic DITI handling feature:

#### 17.1.1 Automatic DITI handling in Freedom EVOware Standard

In Freedom EVOware Standard, automatic LiHa DITI replacement is done using a DITI replacement script (sub-routine).

Set up the worktable to include DiTi carriers and DiTi labware to meet the requirements of your script. Unless you are using stackable DITI racks, you also need to configure a labware source for the DITI racks (typically a carousel or hotel). Stackable DITI racks are normally put on the worktable.

Add an *Activate DITI Handling* command to your script for each DITI type which is used. The *Activate DITI Handling* command specifies the DITI type and also a DITI replacement script (sub-routine) which replaces the DITI racks when all of the DITIs have been used (see [15.6 "Activate DITI Handling Command"](#), [15-12](#)).

For **standard DITI racks**, the replacement script is normally programmed using two Transfer Labware commands (one to remove the empty DITI racks and one to get fresh DITI racks). Depending on the application, it can also contain a Set DITI Position command. For **stackable DiTi racks**, the replacement script only needs

to remove the empty DITI racks and the spacers (and thus only needs one Transfer Labware command). Don't remove the last rack of the stack. The worktable locations (grid, site) of the DITI racks which will need replacing or removing during runtime is specified in the Transfer Labware command(s) of the DITI replacement script using the pre-defined variables REPLACE\_DITI\_GRID and REPLACE\_DITI\_SITE. For each Get DITI command in your pipetting script, Freedom EVOware automatically sets these variables to the correct grid and site for the selected DITI type before executing the command.

### Script Runtime

During script runtime, the DITI replacement script is called whenever DITIs need to be replaced. When using stackable DITI racks, the replacement script only needs to remove the empty DiTi racks along with the spacers to reveal the next DITI rack in the pile. Note: stackable DITI racks and spacers cannot be stacked when they are empty, you must discard them to a suitable location.

**Note:** The used DITIs are discarded to the DITI waste which is specified in the Drop DITIs command(s).

### Before running the script

For **standard DITI racks**: Make sure that the source of DITI racks (e.g. carousel or hotel) contains full DITI racks.

For **stackable DITI racks**: Make sure the stack contains enough DITI racks for your script. Provided that you set the DITI position correctly using the Set DITI Position command, the topmost DITI rack in the stack does not need to be full.

For **standard DITI racks** and **stackable DITI racks**: Freedom EVOware remembers the position in the DITI rack where the last DITI was fetched. When starting a new run, the Get DITIs command starts picking up DITIs at the next available position.

#### 17.1.1.1 Example of Automatic DITI handling in Freedom EVOware Standard

The first three lines of the main script are as follows:

Script Editor: Auto_DITI_Handling		
1	Set DITI position	DITI 200 ul Grid : 35, Site : 1, Position in labware : 89
2	Set Variable	NewDitiSite = 2
3	Activate DITI Handling	DITI 200 ul C:\Program Files\TECAN\EVOware\database\Scripts\DITI_Replace.esc

Fig. 17-1 Automatic DITI handling - Main script

The variable NewDitiSite, which is declared in line 2, specifies a hotel site which contains the next full DITI rack to be used. The rest of the main script contains pipetting commands, Get DITI and Drop DITI commands etc.

The initial worktable setup in this example is as follows:

A carrier "DiTi 3Pos" is positioned at worktable grid 35:









- ◆ Site 1 of this carrier contains a full DITI Rack.
- ◆ The first DITI will be taken from position 89 of this DITI rack.

A hotel is positioned at worktable grid 43:

- ♦ Hotel site 1 is empty. The DITI rack at grid 35, site 1 will be put here when all of the DITIs have been used for pipetting.
- ♦ All other hotel sites contain full DITI racks.
- ♦ Hotel site 2 contains a full DITI rack which will be used for the first replace operation.

**First replace operation**

When all of the DITIs have been used from the DITI rack at grid 35, it will be moved to site 1 of the hotel. A fresh DITI rack will be taken from site 2 of the hotel. The replace script in this example is as follows:

Script Editor: DITI_Replace		
1		Comment      put empty DITI rack in hotel
2		Transfer Labware      Source: Grid 'REPLACE_DITI_GRID', Site 'REPLACE_DITI_SITE'; Destination: Grid '43', Site 'NewDITISite-1'; Narrow (ROMA 1)
3		Comment      get new DITI rack from hotel
4		Transfer Labware      Source: Grid '43', Site 'NewDITISite'; Destination: Grid 'REPLACE_DITI_GRID', Site 'REPLACE_DITI_SITE'; Narrow (ROMA 1)
5		Comment      increment counter for next time
6		Set Variable      NewDITISite = NewDITISite+1
7		Comment      reset DITI position to beginning of new DTI rack
8		Set DITI position      DITI 200 ul Grid : 35, Site : 1, First position in labware : 1

**Fig. 17-2** Automatic DITI handling - Replace script

The replace script is specified in the Activate DITI Handling command in line 3 of the main script.

**Second replace operation**

When all of the DITIs have been used from the DITI rack at grid 35, it will be moved to site 2 of the hotel. A fresh DITI rack will be taken from site 3 of the hotel. The replace operations will be repeated until all of the DITIs in the hotel have been used.

### More than one rack on worktable

When there is more than one rack on the worktable the user has to ensure that the ADH script will set the next DiTi position correctly when the last position has been reached.

This can be ensured using the REPLACE\_DITI\_SITE variable.

The Set DiTi Position script in this example is as follows:

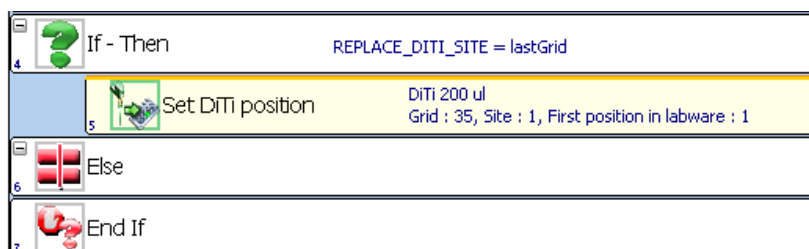


Fig. 17-3 Set DiTi Position

### 17.1.2 Automatic DiTi handling in Freedom EVOware Plus

With the process editor open, set up the worktable to include DiTi carriers and DiTi labware to meet the requirements of your process. Unless you are using stackable DiTi racks, you also need to configure a labware source for the DiTi racks (typically a carousel or hotel). Stackable DiTi racks are normally put on the worktable.

Specify the worktable location(s) of the DiTi racks which will need replacing during runtime. To do this, right click on the DiTi rack on the worktable and choose *Automatic replace* from the context menu. A tick alongside this context menu item shows that automatic DiTi Handling is enabled for this site. Repeat this operation for each DiTi type (DiTi rack) which you want to replace automatically. This feature is not suitable for nested LiHa DiTis. Use Method C.

When using **stackable DiTi racks**, you must choose a special DiTi waste location for discarding the empty DiTi racks and the spacers. This is because stackable DiTi racks and spacers cannot be stacked when they are empty.

To enable the automatic DiTi rack waste feature, right click on a DiTi waste on the worktable and choose *Waste for DiTi racks* from the context menu. A tick alongside this context menu item shows that this location will then be used for the empty DiTi racks and spacers. This option is only available for the DiTi waste site of a DiTi carrier with waste and is only intended for discarding empty DiTi racks and spacers. The automatic DiTi handling can be activated in the same way as with standard.

**Note:** The used DiTis are discarded to the DiTi waste which is specified in the *Drop DiTis command(s)*.

There are two approaches to automatic DiTi handling in Freedom EVOware Plus:

- ♦ **Method A:** The labware source for the DiTi racks (e.g. carousel or hotel) is full and there are no DiTi racks on the worktable.
- ♦ **Method B:** DiTi racks are present on the worktable, some of them are only partly full. For this approach, Freedom EVOware needs to have up to date information on the DiTi positions of all DiTi types used in the process.
- ♦ **Method C:** Use an ADH subroutine script in the same way as with standard.



### 17.1.2.1 Process runtime settings for automatic DITI handling

There are two basic approaches to automatic DITI handling in Freedom EVOware Plus:

- ♦ **Method A:** The labware source for the DITI racks (e.g. carousel or hotel) is full and there are no DITI racks on the worktable.
- ♦ **Method B:** DITI racks are present on the worktable, some of them are only partly full. For this approach, Freedom EVOware needs to have up to date information on the DITI positions of all DITI types used in the process.

Depending on the chosen approach, the following settings should be made in the Runtime Controller of Freedom EVOware Plus:

#### Method A:

Check the *Start initial load process* checkbox in the Runtime Controller to load the worktable automatically with DITI racks before you start the main process.

In addition:

- Make sure that the source of the DITIs (e.g. carousel) contains full DITI racks at all positions.
- Make sure that there are no DITI racks already on the worktable.
- Freedom EVOware will clear away all used and partly used DITI racks when the process is finished.

Before starting the main process, one Initial Load process will be started for each DiTi type which is configured for automatic handling. When the main process is finished, one clear-away process will be started for all DiTi types which are configured for automatic handling.

#### Method B:

Do not check the *Start initial load process* checkbox in the Runtime Controller if you want to load the worktable manually with full DITI racks before you start the main process or if you are carrying on from a previous process which used DITIs.

In addition:

- For each DITI type on the worktable, Freedom EVOware remembers the position in the DITI Rack of the last DITI which was fetched. This information is still available even if you restart Freedom EVOware or your PC. If you have made manual changes to the DITI racks in the meantime, for example by replacing empty racks on the worktable with full ones, you must use the direct command Set DITI Position to inform Freedom EVOware of the current situation.
- For each DITI type used in the process, make sure there is at least one empty position in the DITI rack source (e.g. carousel or hotel). This position will be used for empty DITI racks during the replacement operation. Note: The empty DITI racks are returned to the carousel or hotel before getting the full DITI racks.
- Partly used DITI labware will be left on the worktable when the process is finished. If you then want to run another process, do not check the *Start Initial DiTi Load Processes* checkbox in the follow-up process.

## 17.2 Script and process recovery function

Freedom EVOware provides functions for script and process error recovery. This allows aborted pipetting scripts and processes to be restarted where they were stopped.

Freedom EVOware Standard: When the script is open in the Script Editor (or you open the same script again) the Run button in the Freedom EVOware toolbar changes to Recover. In addition, the last script line which was successfully executed is highlighted in orange.

Freedom EVOware Plus: The Process Recovery Wizard takes you directly to the Runtime Controller; the Run button in the Runtime Controller changes to Recover. Script or process recovery is still available if you have restarted your PC and/or Freedom EVOware in the meantime.

When you recover a script, information on barcodes which were previously scanned is no longer available. If barcodes were scanned, make sure that recovery starts at or prior to the barcode scanning operation. When you recover a process, information on barcodes which were scanned and stored in the internal database does not get lost.

### 17.2.1 Script Recovery Function

When running a pipetting script, Freedom EVOware monitors the progress and stores information on the current line number, the current values of the variables which are used, etc. If the script was stopped while it was running and did not execute completely, for example due to a runtime error or because you clicked Stop, you are given the option of running the script at the point where it was interrupted.

If the script is open in the Script Editor (or you open the same script again), the **Run** button in the Freedom EVOware toolbar changes to **Recover**. In addition, the last script line which was successfully executed is highlighted in orange.

Click the Recover button to start the Recovery Wizard if you want to continue the interrupted script. Choose Run instead from the pull-down list in the toolbar if you want to run the entire script again.

**Note:** *If required, you can edit the script to make some changes or corrections before you click Recover.*

The following dialog box is shown if you click the Recover button:

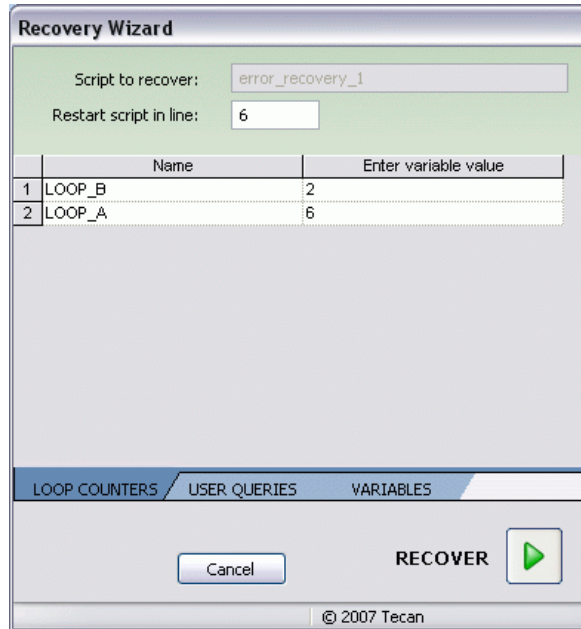


Fig. 17-4 Recovery Wizard for Scripts - Loop counters tab

The three tabs of the above dialog box lists the loop counters, variables queried during runtime with an operator prompt (via the Set Variable command with the option *User Query at Script Start*) and other script variables and shows the values which were current when the script was interrupted.

The following figure shows an example of the Variables tab:

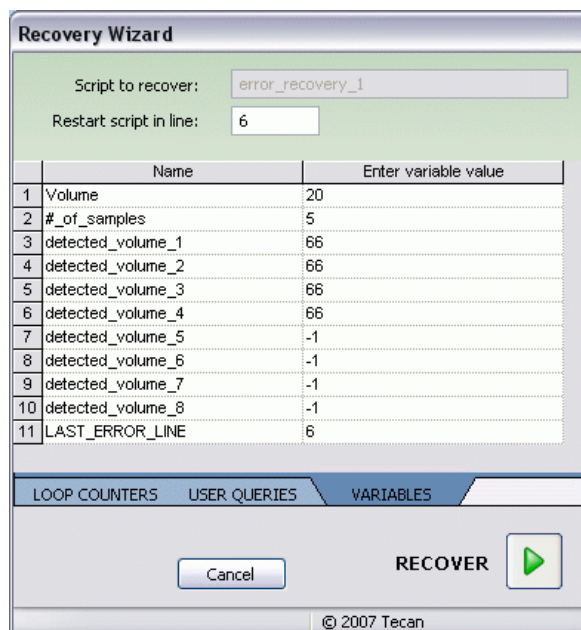



Fig. 17-5 Recovery Wizard for scripts - Variables tab

### Restart script in line

Specify the line number of the script command where you want to resume running. Alternatively, In the Script Editor, click the line where you want to resume running the script before you click the Recover button.

If the script uses a worklist and you specify the line number of the Execute Worklist command, a new dialog box is shown where you can make settings for recovering the execution of the worklist. See [17.2.1.1 "Recovery Wizard for Worklists"](#),  17-8.


Then adjust the values of the loop counters and variables in the above dialog box to appropriate values (if necessary) and click *Recover* to continue executing the script. For example, if you want to completely repeat a program loop which was interrupted, you should adjust the loop counters correspondingly.

**Note:** *Clicking the required line in the Script Editor or choosing a line number in the above dialog box does not roll back the values of the variables and loop counters automatically. You must specify the required values of the loop counters and variables manually in the dialog box.*

Click Recover after you have made the required settings. Freedom EVOware will then re-initialize the pipetting instrument, run the script in offline mode until the specified line has been reached and then switch to real mode before continuing.

**Note:** *If the script was stopped while incubation was taking place, the incubation times will be lengthened by the time that the script was stopped.*


In order to choose appropriate values for the variables and loop counters, you need to know how the script functions.

The script recovery function can recover scripts which use synchronous sub-routines but cannot recover scripts which use asynchronous sub-routines (see [15.44 "Sub-Routine Command"](#),  15-103). The script recovery feature is only available for Freedom EVOware Standard.

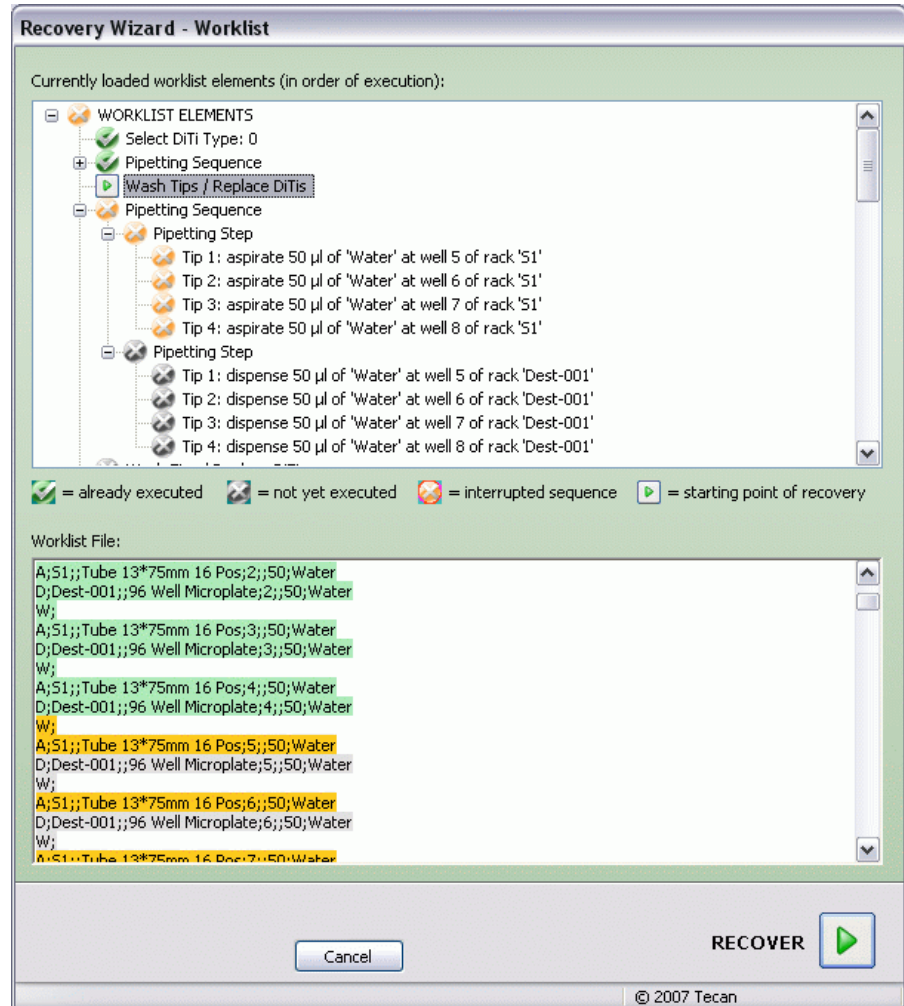
#### 17.2.1.1 Recovery Wizard for Worklists

When running a pipetting script, Freedom EVOware monitors the progress and stores information on the current line number, the current values of the variables which are used, etc. If the script was stopped while it was running and did not execute completely, for example due to a runtime error or because you clicked Stop, you are given the option of running the script at the point where it was interrupted.

If the script is open in the Script Editor (or you open the same script again), the **Run** button in the Freedom EVOware toolbar changes to **Recover**. In addition, the last script line which was successfully executed is highlighted in orange.

Click the Recover button to start the Recovery Wizard if you want to continue the interrupted script (see [17.2.1 "Script Recovery Function"](#),  17-6). Choose Run instead from the pull-down list in the toolbar if you want to run the entire script again.

If the script uses a worklist and you specify the line number of the Execute Worklist command in the Recovery Wizard, when you click Recover Freedom EVOware will then show the Worklist Recovery Wizard:



**Fig. 17-6** Worklist Recovery Wizard

The Worklist Recovery Wizard visualizes the currently loaded worklist in two different views:

- The tree view at the top lists all of the operations in the worklist in their order of execution. Click “+” to expand the view to get more details of the operation.
- The view at the bottom lists the lines (records) of the worklist file (GWL file).

Both views use colors to indicate the progress of execution (green = already executed, orange = operation was interrupted, grey = not yet executed).

The two views are synchronized - if you select an entry in the tree view, this scrolls the worklist file view to the corresponding line, and vice versa.

**How to proceed**

Choose the worklist operation/line where you want to resume running. In the top view, the selected line is shown as a small square button containing a green arrow.

Click Recover when you have made your choice. Freedom EVOware will then re-initialize the pipetting instrument, run the script in offline mode until the chosen worklist line has been reached and then switch to real mode before continuing.

**Note:** The worklist recovery feature is only available for Freedom EVOware Standard.

## 17.2.2 Process Recovery Function

When running processes or methods, Freedom EVOware monitors the progresses and stores information on the process instances, the current values of the variables which are used, etc. If a process (or set of processes) was stopped while it was running and did not execute completely, for example due to a runtime error or because you clicked Stop, you are given the option of running the process (or processes) at the point where it was (they were) interrupted.

To recover the process, click the Recover button which is now shown in the Runtime Controller to start the Process Recovery Wizard (see 17.2.2.2 “Process Recovery Wizard, Recovery Settings”, 17-11).

Alternatively, click Cancel if you want to restart Freedom EVOware before recovering the process. This may be necessary e.g. if a mechanical or labware problem has occurred which you need to rectify before continuing the process. The following dialog box is shown if you click Cancel:

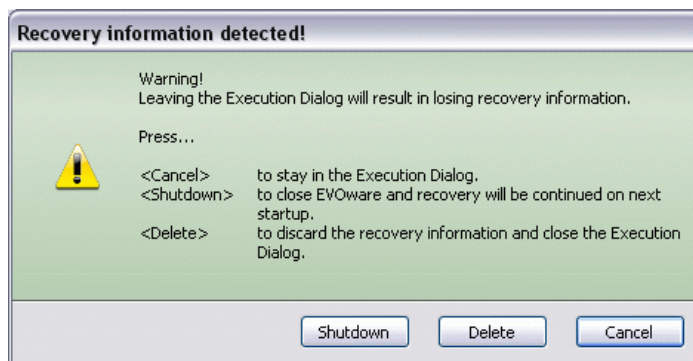


Fig. 17-7 Error recovery warning

### Shutdown

Close Freedom EVOware. You can then carry out recovery when you restart Freedom EVOware.

### Cancel

Return to the Runtime Controller. Use this option if the process was paused and you clicked Cancel in the Runtime Controller by mistake.

### Delete

Ignore the incomplete process, delete the recovery information and return to the Runtime Controller.

### 17.2.2.1 Process Recovery Wizard

The following dialog box is shown if the last process (or set of processes) that you run was stopped while it was running and did not execute completely and you Freedom EVOware was restarted:





Fig. 17-8 Process recovery wizard

**Recover last executed method / process**

Go to the Runtime Controller to recover (continue) the incomplete process or processes. In the Runtime Controller, click *Recover* to adjust the recovery settings or click *Continue* to restart and continue the process at the last executed timeslice using the default recovery settings.

*Note: If the process was stopped while incubation was taking place, the incubation times will be lengthened by the time that the process was stopped.*

**Proceed to startup screen**

Ignore the incomplete process, delete the recovery information and go to the Startup Wizard.

**17.2.2.2 Process Recovery Wizard, Recovery Settings**

The following dialog box is shown if the last process that you run was interrupted while it was running and did not execute completely and you clicked *Recover* in the Runtime Controller or you chose *Recover last executed method / process* in the Process Recovery Wizard dialog box:

Concerning the positions of the labware following an interruption to the process: Before continuing the process it is important to ensure that the physical position of the labware on the worktable of the pipetting instrument matches the position information in the Freedom EVOware database (the “database location”). The procedure to follow is described below.

**Modify Labware tab**

This tab is used to edit labware attributes and/or to move labware to a new database location before continuing with recovery:

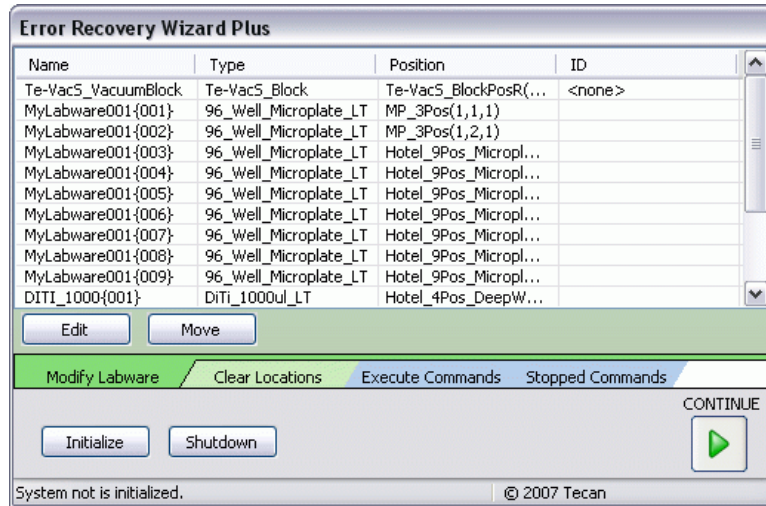


Fig. 17-9 Process recovery wizard - Modify Labware tab

Click Edit to edit the attributes of the selected labware item. Click Move to change the position information for the labware in the database (the “database location”). This is necessary if the current physical position of the labware does not match the database location, e.g. due to a mechanical malfunction or because you moved the labware manually to a new position while the process was stopped. See 9.4.8 “Labware Attributes”, 9-24 for information on labware attributes.

### Clear Locations tab

This tab is used to clear database locations which refer to faulty labware. Remove the faulty labware from the worktable of the pipetting instrument manually and click *Clear Selected Location* to tell Freedom EVOware that the database location is no longer occupied. The position information in the database for the labware is then updated to <base position>. This is important above all for locations which are needed for other labware when you continue the process.

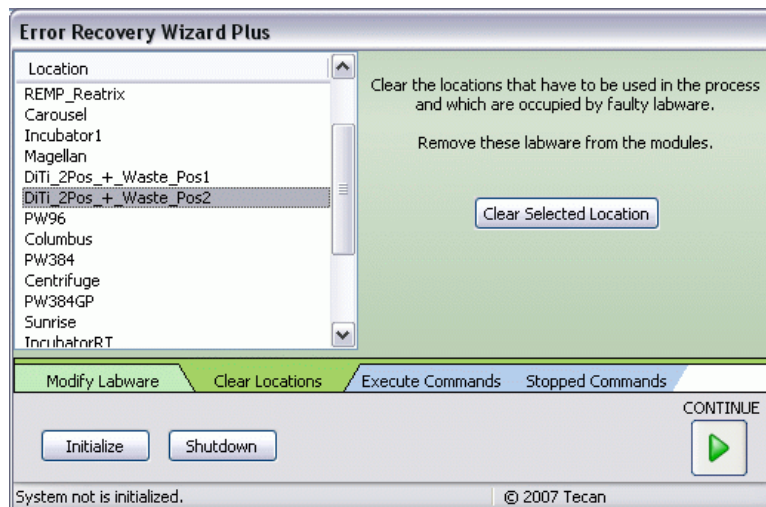
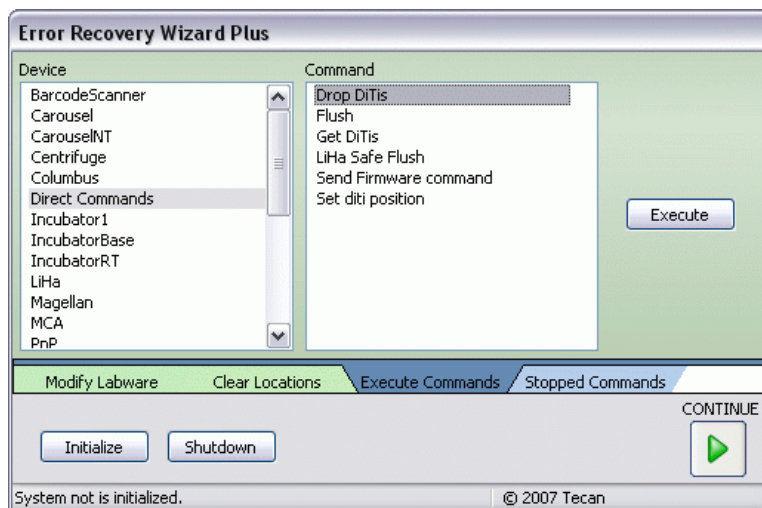


Fig. 17-10 Process recovery wizard - Clear Locations tab



**Execute Commands tab**

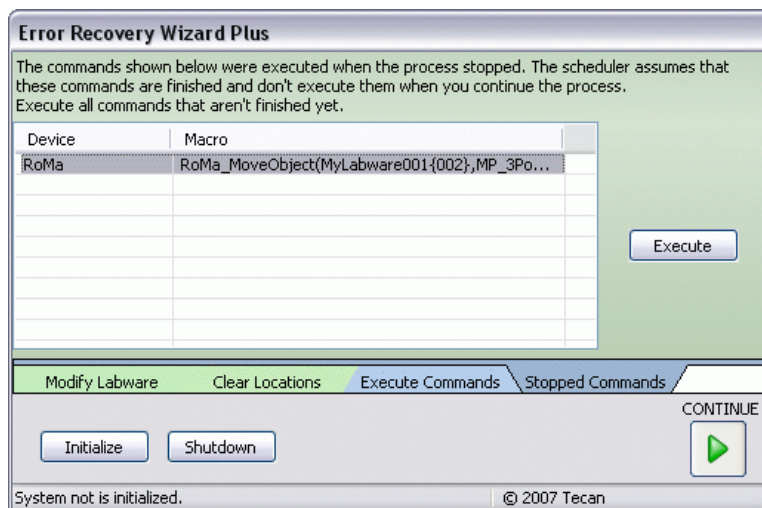
This tab is used to execute device commands manually before continuing with recovery. For example, click Direct Command, choose Drop DITIs and click Execute to drop the DITIs.



*Fig. 17-11 Process recovery wizard - Execute Commands tab*

**Stopped Commands tab**

This tab shows the last commands which were executed before the process stopped. The scheduler assumes that the commands in the list were completed correctly before the process stopped. If an inspection of the pipetting instrument shows that a command did not execute properly, choose the incomplete command and click Execute:



*Fig. 17-12 Process recovery wizard - Stopped Commands tab*

Concerning incomplete movement commands (RoMa commands): if labware was not moved to the correct position when the process stopped, you can either choose the RoMa command in the list and click Execute to move the labware with the RoMa or ignore the incomplete RoMa command and put the labware manually

at the correct position before you continue with recovery. In the latter case, you must update the database location accordingly with the Modify Labware tab. Click *Continue* to recover (finish running) the process when you have made all of the required settings.

### 17.3 Site-specific RoMa vectors

Site-specific RoMa vectors are needed e.g. for special carrier types with different physical characteristics for different sites (e.g. site 1 is lower than site 2). Site-specific RoMa vectors are also needed for the MP 2Pos carrier if you want to grip the labware on the narrow side. Due to the limited space, labware on the rear site must be gripped from the front (RoMa fingers to the rear) and labware on the front site must be gripped from the rear (RoMa fingers to the front).

Proceed as follows to create a site-specific RoMa vector:

- 1 In the Robot Vectors section of the Control Bar, right-click Robot Vectors and choose New in the context menu.
- 2 To assign the RoMa vector to a specific carrier type and site, use the following naming conventions for the new vector:

For gripping the labware on the narrow side:

<CarrierName> Narrow POS<SiteNo> for the Move Narrow vector

<CarrierName> DriveIN Narrow POS<SiteNo> for the Approach Narrow vector

For gripping the labware on the wide side:

<CarrierName> Wide POS<SiteNo> for the Move Wide vector

<CarrierName> DriveIN Wide POS<SiteNo> for the Approach Wide vector

SiteNo is 0-based (specify 0 for site 1).

For example: Hotel 9pos Microplate Narrow POS0.

- 3 Teach the new vector in the Teach Plate Robot Vector dialog box. If you have specified the carrier name correctly, the Teach Plate Robot Vector dialog box will already show the correct carrier type in the Carrier Name field.

In Freedom EVOware Plus, the new RoMa vector will be used automatically when moving labware to the specified site of this carrier type.

In Freedom EVOware Standard, the name of the RoMa vector is not important (it has no influence on the Transfer Labware and RoMa Vector commands). Despite this, it is a good idea (good practice) to follow the same naming conventions for site-specific vectors in Freedom EVOware Standard, too.

See [9.6.1 "Using RoMa Vectors"](#), ¶ 9-49 for information on the RoMa vector types Move and Approach.

See [15.52 "Transfer Labware Command"](#), ¶ 15-113 for information on using user-defined vectors in Freedom EVOware Standard in the Transfer Labware command. User-defined vectors can also be used in RoMa Vector commands.

## 17.4 Safe Pathways Feature

With appropriate design of the pipetting script and the correct choice of the liquid classes and airgaps for the pipetting, the risk of contamination due to aerosols or drops of liquid falling when the LiHa moves across labware on the worktable is extremely low.

The safe pathways feature is intended for extremely critical applications such as those which are very sensitive to cross contamination. It allows you to specify safe movement paths for the LiHa to prevent it from moving above certain areas of the labware unless they are directly involved in the pipetting operation.

By default, the safe pathways feature is only available in case of a pipetting error. To enable it for all movements the parameter `SAFEMOVE_ON_ERROR_ONLY=0` must be set in `EvoWare.opt` (see [A.3 “Parameters in the EvoWare.opt file”](#), ¶ [A-15](#)). In case you also want to move on safe pathways while fetching a DiTi you have to specify `SAFEMOVE_ON_GETDITI` there as well.

The safe pathways feature is enabled by specifying values for two carrier attributes for the labware which is involved in the pipetting (see [9.5.4.1 “Labware Carrier Attributes”](#), ¶ [9-40](#)):

- ♦ The carrier attribute `SafeMoveOffset` specifies an X-offset in mm for safe LiHa movement to and from the pipetting position.
- ♦ The carrier attribute `SafeMoveSpeed` specifies the speed to use for movements along the safe paths in mm/s.

Safe pathways are enabled by setting the carrier attribute `SafeMoveOffset` to a non-zero value. Negative values specify an offset to the left of the pipetting position; positive values specify an offset to the right of the pipetting position.

Safe pathways can be disabled again by setting the carrier attribute `SafeMoveOffset` to zero.

**Note:** To allow you to enable safe pathways for specific scripts and processes only, it is recommended to create copies of the carrier configurations you intend to modify and to specify the two carrier attributes for the copies but not for the original versions.

Suggested offset for tube racks: If there is enough space on the worktable, allow one unused grid position between adjacent tube racks and set `SafeMoveOffset` to 25 mm or -25 mm.

Suggested offset for microplates: Set `SafeMoveOffset` to half the distance between adjacent columns of wells (e.g. 4.5 mm).

The `SafeMoveSpeed` attribute is optional; if it is not set, the LiHa uses the default speeds when moving along the safe paths.

The following rules are applied to safe pathways:

- ♦ If `SafeMoveOffset` is non-zero for the source carrier (Aspirate step), safe pathways are activated for the pipetting sequence.
- ♦ If `SafeMoveOffset` is zero for the source carrier, normal movements are used, even if `SafeMoveOffset` is non-zero for the destination carrier.
- ♦ For multi-dispense sequences within the same labware, the safe movement is only performed for the first dispense position; there are no safe moves within the labware for the remaining dispense operations.
- ♦ When executing multiple Aspirate steps or an Aspirate-Dispense sequence within the same labware, the LiHa moves out along the safe path after the first step and uses the same path to move in again for the next step.
- ♦ If safe pathways are used for the pipetting sequence and you are using DiTIs, the subsequent DiTi discard operation also uses a safe movement as follows:

- The LiHa moves in the Y direction to behind the worktable and then in the X direction along the back of the worktable to the grid position of the DITI waste. It then moves forward to the DITI waste and discards the DITIs. It then moves back to the original pipetting position by retracing the same path.

The safe movements are carried out as follows:

After an Aspirate command:

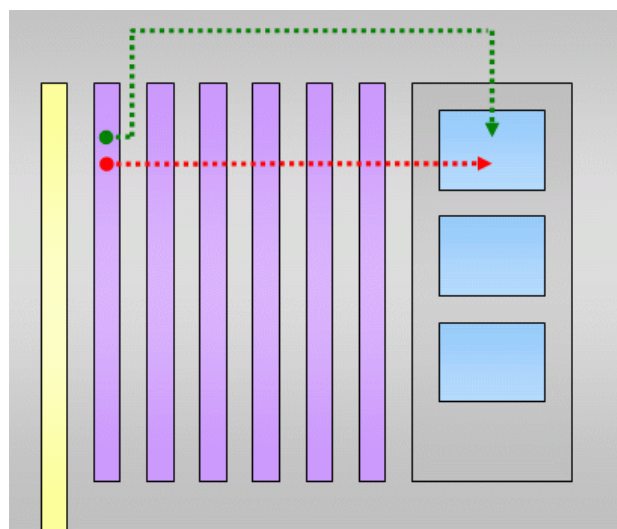
- 1 If the tips are currently lower than the specified z-Travel height for the labware, they are raised to that height.
- 2 The LiHa moves with the safe movement speed along the X-axis by the offset defined for the carrier.
- 3 To prevent damage to the tubing, the tip adapters are moved to the same height, as low as possible (but not lower than z-Travel of step 1).
- 4 The LiHa moves with the safe movement speed along the Y-axis to the rear of the worktable and raises the tips to maximum height (to avoid a collision with the PosID-3, if fitted).

Before a Dispense command:

- 1 The LiHa moves at normal speed along the rear of the worktable to the position “dispense position + SafeMoveOffset” for the destination carrier.
- 2 The tips are lowered to the lowest z-Travel height which clears all obstacles within the destination carrier.
- 3 The LiHa moves with the safe movement speed along the Y-axis to the pipetting position.
- 4 The LiHa moves with the safe movement speed along the X-axis by the negative SafeMoveOffset distance to reach the actual pipetting position.

In the following example:

- ♦ The red line shows the default movement of the LiHa.
- ♦ The green dotted line shows the LiHa movement with the safe pathways feature enabled.



**Fig. 17-13** Safe pathways feature

## 17.5 Columbus Washer - Washing a Variable Number of Strips in the Plate

In Freedom EVOware Plus, the Columbus - WashPlate command can be configured to wash a variable number of strips (columns or rows) of the labware. This is done by assigning a non-zero value to one of the two following special attributes of the labware you want to wash:

- The labware attribute *StripCount* is used to wash a specified number of strips, starting at strip 1. Specify 0 to wash all of the strips. With the default wash head configuration of the Columbus Washer, microplates are washed in portrait orientation (there are 12 strips with 8 wells per strip; strip 1 is towards the rear of the washer).
- The labware attribute *StripMask* is used to wash a specified mixture of strips. The required strips are specified as a bit-mapped value:

1 = Strip 1  
 2 = Strip 2  
 4 = Strip 3  
 ...  
 5 = Strip 1 and Strip 3  
 0 = Wash all of the strips

Proceed as follows:

- Activate either or both of the above special attributes for the labware (Edit Labware > Advanced tab > Click Attributes > Click Add). See 9.4.8 “Labware Attributes”, 9-24.
- Assign a value to either StripCount or StripMask as required using the Set Variable command. The Set Variable command is needed twice, the first Set Variable command initializes the special attribute:

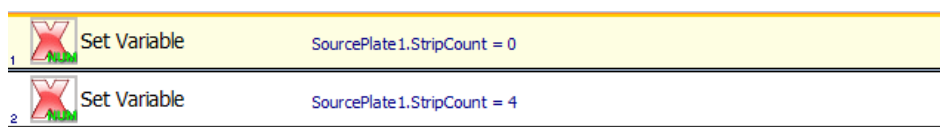


Fig. 17-14 Assigning a value to StripCount

- Specify the variable name as <labware\_label>.<internal name of attribute> (see 14.1.11.1 “Labware Attributes and String Variables in Freedom EVOware Plus”, 14-18).
- In the Columbus - Wash Plate command, choose Wash Mode = strip on the General tab (see 16.3.1.1 “General Tab of the Columbus Washer - WashPlate Command”, 16-3).

**Note:** If you specify values for both parameters, StripCount has priority over StripMask.

## 17.6 Configuring and Using PMP (Pressure Monitored Pipetting)

Pressure Monitored Pipetting is a Freedom EVO function operated by the Freedom EVOware software and the Sample Tracking Add-on. It is designed and

verified to monitor the pressure in the tip during aspiration and dispensing. The pressure curves are evaluated to detect pipetting anomalies such as clot and air aspiration.

The MultiSense hardware allows Pressure Monitored Pipetting (PMP) and liquid level detection (pLLD).

**Note:** MultiSense comes with small diameter tubing. For this reason, if your pipetting instrument is fitted with the MPO option, do not use a Fast Wash flow rate in excess of 80% (see 8.4.2.3 “MPO/SPO and LICOS”, 8-29).

### 17.6.1 Activating the PMP and pLLD Option

The PMP and pLLD features shown are only available if the PMP option box is checked in the Configuration Tool (see 8.4.1.1 “Device Information Tab”, 8-21). The MultiSense hardware option is used for two separate software activated functions:

- ◆ Pressure-based liquid level detection (pLLD),
- ◆ Pressure monitored pipetting (PMP) = detection of pipetting anomalies during aspiration and dispensing.

#### Enabling pLLD

Pressure-based liquid level detection (pLLD) is selected with the Detection Mode pull-down list on the Global tab of the respective liquid class. You can configure to use pLLD, cLLD or both systems in parallel. pLLD requires the MultiSense hardware option.

#### Enabling PMP

PMP must be activated in your pipetting script with the Activate PMP script command before getting (mounting) the PMP-controlled DiTis.

PMP requires special liquid class settings. Default PMP liquid classes are provided on the Freedom EVOware installation CD as an .exd file for the Export/Import tool (see A.11.4 “Export/Import Tool”, A-41). See the PMP Option Application Manual (DocID 395390) for more details. See also 10.8.4 “Liquid Classes on the Freedom EVOware CD”, 10-62, PMP section.

Error handling for PMP clot detection is configured on the Aspirate tab of the liquid sub-class. Liquid level detection should always be enabled for aspiration when using PMP.

#### Working offline with pLLD and PMP

If you want to test a script or process with Freedom EVOware running in offline mode, you must check the PMP option checkbox in the Configuration Tool for each of the tip positions which are fitted with a MultiSense tip adapter (see 8.4.2.1 “LiHa (Liquid Handling Arm)”, 8-22). MultiSense is only available for tip types “DiTi and Air LiHa” (the checkboxes are only shown in the Configuration Tool if Tip Type is set to DiTi or Air LiHa).

Offline mode does not simulate the PMP and pLLD functions, so the presence of the MultiSense hardware is ignored in this case. In addition, PMP is not supported by the 3D simulation tool EVOSim. If you are using EVOSim, Freedom EVOware will display an error message when it starts and PMP will be ignored.

### 17.6.2 Permissible sequence of script commands for the PMP option

PMP must be activated in your pipetting script with the Activate PMP script command before getting (mounting) the PMP-controlled DiTis.

PMP must be deactivated again with the Deactivate PMP script command after finishing the pipetting sequence and dropping the DiTis. All PMP-controlled DiTis must be dropped before deactivating PMP.

Monitoring of the pressure in the tip is started when the Activate PMP command is executed in the pipetting script and stops again when the Deactivate PMP command is executed.

The default directory which PMP uses to store evaluation configuration data and pressure curves (the PMP data directory) is as follows:

C:\ProgramData\Tecan\EVOware\PMP\Curves

The file names are XXXX\_C\_YYMMDD\_HHMMSS.pmd.zip, where XXXX is a sequence number, C is the channel (tip) number, YYMMDD is the creation date (year, month day) and HHMMSS is the creation time (hours, minutes and seconds), for example:

0106\_4\_080924\_170619.pmd.zip.

The following restrictions apply to each PMP-controlled pipetting sequence (the pipetting commands between an Activate PMP command and a Deactivate PMP command):

- ◆ The PMP-controlled pipetting sequence must consist of one Aspirate command followed by one or more Dispense commands (i.e. single or multi dispensing).
- ◆ With the default configuration settings, the aspirate and (multi-)dispense sequence must not be followed by any more pipetting steps which use the same tips. This will result in a script validation error.
- ◆ Use the special configuration parameter `Allow_Reuse_PMP` if you need to carry out additional pipetting steps with the same tips after finishing the PMP-controlled aspirate and dispense sequence. The additional pipetting steps will be carried out using standard pipetting and not using PMP. See [A.3 "Parameters in the Evoware.opt file"](#), [A-15](#), [DITI] section.
  - Although a pressure curve is generated from the Activate PMP command (before DiTi pick-up) to the Deactivate PMP command (after multiple aspirate/dispense cycles and after finally dropping the DiTis), only the first aspirate/dispense cycle is evaluated for PMP errors.
- ◆ pLLD is only allowed for the first aspirate command in a pipetting sequence.
- ◆ The Liquid Class option *Mix before Aspiration* is not allowed within the PMP-controlled pipetting sequence.

### 17.6.3 PMP Error and Success Messages

The PMP option can output the following error and success messages:

Aspiration messages:

- ◆ Correct (success message)
- ◆ Clot
- ◆ Clogged
- ◆ Nullcurve
- ◆ ShortBubblesCorrect (success message)
- ◆ MediumLeakageShort



- ◆ LeakageCorrect (success message)
- ◆ AspirationError
- ◆ PlausibilityCheckFailed
- ◆ Default (used if the error message did not contain any of the above strings)

Dispense messages:

- ◆ Correct (success message)
- ◆ UnderDispense
- ◆ AspirateRejection

The messages are shown as strings in the Freedom EVOware log file. See also [A.12 “LogViewer Tool”](#), [¶ A-74](#). Refer to the PMP Option Application Manual (Doc ID 395390) for descriptions of these messages and for information on when they can occur.

The PMP error mapping defines for the above error messages the action to be taken by Freedom EVOware if the errors occur and (b) internal PMP error flags. The PMP error flags are associated with pipetting error codes in the report file which is created by the Export Data command (see [15.23 “Export Data Command”](#), [¶ 15-42](#)).

**Note:** The error mapping is specified in the configuration file for the PMP driver and should only be changed by a trained Tecan application specialist.

The Clot error is normally configured to display the Clot Error (PMP) dialog. See [18.1.3 “Clot Error \(PMP\)”](#), [¶ 18-3](#) for more information.

The following table shows the default error handling which takes place if a PMP error is detected during aspiration:

**Tab. 17-1** Default actions for PMP aspiration errors

Error message <sup>a)</sup>	Action taken with the default PMP configuration
Clot	• Use PMP clot error handling defined in liquid class
Clogged	• Continue, dispense back and pipette nothing
NullCurve	• Continue, dispense back and pipette nothing
MediumLeakageShort	• Continue, dispense back and pipette nothing
Default <sup>b)</sup>	• Ignore, continue pipetting
AspirationError	• Continue, dispense back and pipette nothing
PlausibilityCheckFailed	• Ignore, continue pipetting

a) These strings are also shown in the Freedom EVOware log file

b) This error is output if the PMP result is not available or none of the other errors are applicable

Clot error is the only PMP error which allows operator intervention (see [18.1.3 “Clot Error \(PMP\)”](#), [¶ 18-3](#)). See also [10.2.1 “LiHa Aspirate Parameters \(Fixed Tips and DiTis\)”](#), [¶ 10-8](#), ON PMP Clot Error).

The following table shows the default error mapping to internal PMP error flags if a PMP error is detected during aspiration:



**Tab. 17-2** Default error mapping for PMP aspiration errors

PMP Error Message	Default mapping to internal PMP error flags
Clot	• E_PMPDetectedTipOcclusion
Clogged	• E_PMPInstrumentError
NullCurve	• E_PMPInstrumentError
MediumLeakageShort	• E_PMPUnspecifiedError
Default	• E_PMPUnspecifiedError
AspirationError	• E_PMPDeficientVolume
PlausibilityCheckFailed	• E_PMPUnspecifiedError

The following table shows the resulting pipetting error codes in the report file of the Export Data command for the four internal PMP error flags:

**Tab. 17-3** Mapping between PMP error flags and pipetting error codes

PMP Error Flag	Pipetting error code
• E_PMPDetectedTipOcclusion	400 (hex)
• E_PMPDeficientVolume	800 (hex)
• E_PMPInstrumentError	2000000 (hex)
• E_PMPUnspecifiedError	4000000 (hex)

See [Tab. 15-8 “Pipetting error codes in the report file output by the Export Data command”](#), [15-49](#) for more information.

The PMP output messages can be exported and reviewed in various different ways:


- ◆ Freedom EVOware Sample Tracking report (pdf printed or CSV)
- ◆ Sample Tracking QuickViewer for real time review
- ◆ Freedom EVOware Sample Oriented

For more information see the PMP Option Application Manual chapter "Exporting PMP Data".

## 17.7 Handling inserts in Freedom EVOware Plus

The following information about insert handling is only relevant to Freedom EVOware Plus.

An insert is not an independent labware item, but is part of a special labware type (“insert plate”) and is similar to a lid. The insert can be removed from the insert plate using the RoMa or another robot arm. The part that remains after removing the insert is sometimes called a base plate.

To specify that labware can have an insert, check the “Labware can have insert” checkbox in the Edit Labware dialog box (Advanced tab). In the example below, this checkbox must be checked for both source and destination labware items. When you put an insert plate on the worktable, Freedom EVOware automatically assumes that it already contains an insert (the insert attribute of the labware is set to “1”). The RoMa command SwapInsert (16.13.8,  16-42) moves the insert of an Insert plate to another Insert plate. However, you can only do this if the destination plate does not currently contain an insert.


The following lines must be added to the Te-LiHa.ini file to specify that the destination plate does not contain an insert:

```
[Class2]
Name=labware_type_LT
Parent=LabwareInsertType
Slot1=Insert:Integer:0
```

Replace “labware\_type” by the labware type of the destination plate (replace space characters by underscores “\_”) and append the string “\_LT”.

For example Name=caco\_baseplate\_LT

Save the file after making your changes. Configuration files are protected with checksums. Accordingly, you must now repair the checksum as follows:

- ◆ Quit Freedom EVOware and start the Configuration Tool with Start > All Programs > Tecan > EVOware > Configure. You will be warned that the checksum is invalid and you will be asked if you want to repair the checksum. Click Yes. Then Click Exit and re-start Freedom EVOware. Alternatively, repair the checksum using the Validate Configuration tool (see A.11.2 “Validate Configuration Tool”,  A-39).
- ◆ You must then quit Freedom EVOware, un-load the drivers and restart Freedom EVOware. To do this, choose *Exit, unload drivers* in the File menu. This ensures that the driver configuration files (ini files) will be read again when Freedom EVOware is re-started.

**Note:** You must also restart Freedom EVOware and the drivers each time you edit the insert plate labware, since the process of editing sets the insert attribute of the labware to “1” again.

**Note:** When you have more than one labware type with inserts then you have to add a new class to the Te-LiHa.ini file for each labware type and enumerate the classes [Class2], [Class3] etc.

### Moving the insert with the RoMa\_SwapInsert command

The following example shows how to use the RoMa\_SwapInsert command to move an insert from the insert plate caco-1 (labware type caco) to the insert plate base-2 (labware type caco\_baseplate) before pipetting. This is done by adding the RoMa\_SwapInsert command as a custom pre-action to the LiHa process step. For this example, the type of the source and destination labware must be different.

The following figure shows the worktable and the lower Infopad with the destination plate selected:

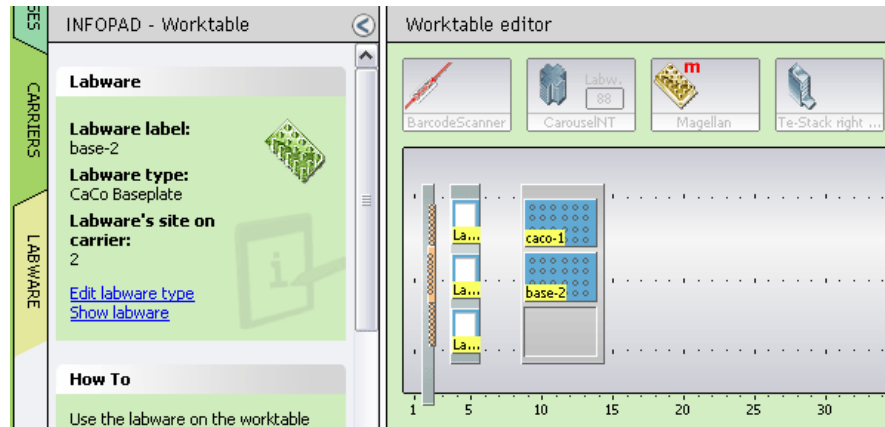


Fig. 17-15 Example process - Worktable and infopad

The following figure shows the example process and the default pre-actions for the LiHa process step:

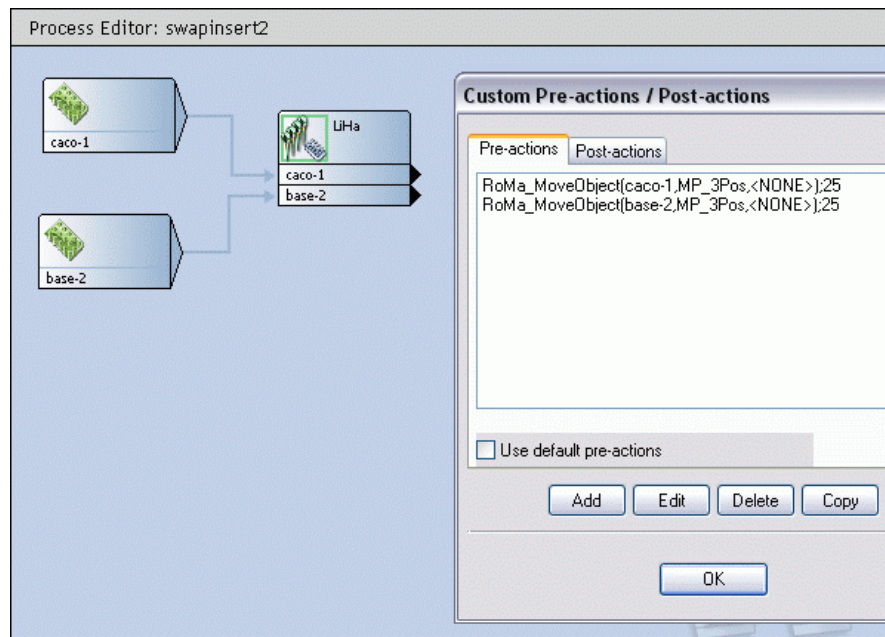
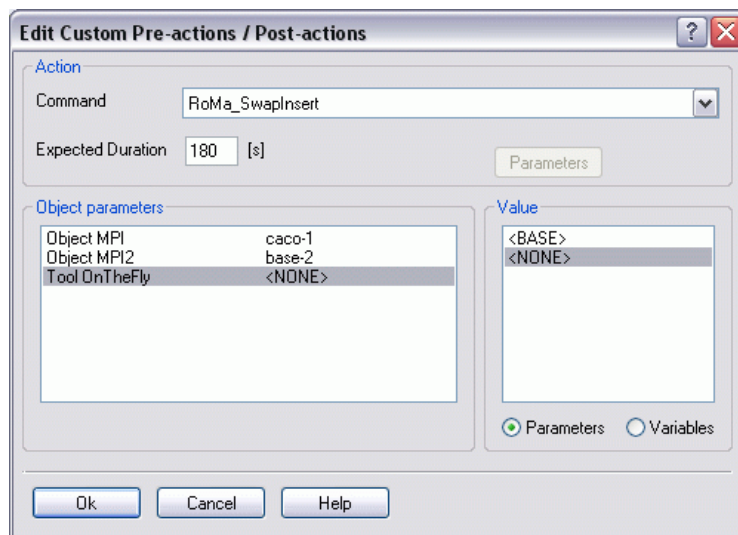


Fig. 17-16 Example process and default pre-actions

Proceed as follows to add the RoMa\_SwapInsert command as an additional pre-action:

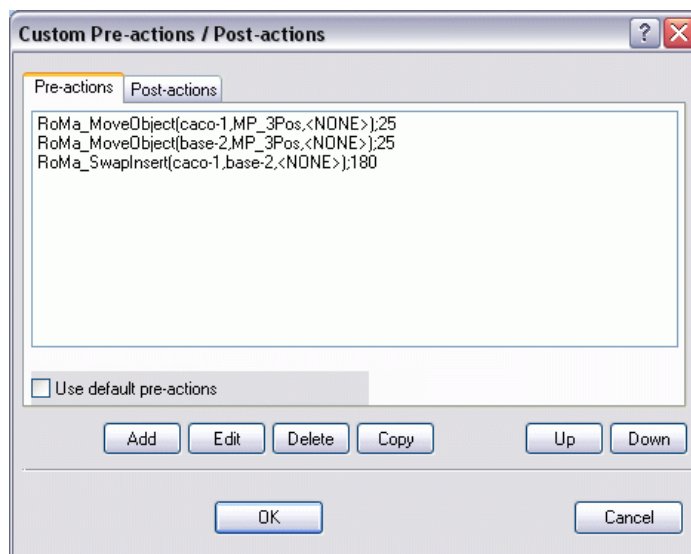
Right click the LiHa process step and choose Pre-Actions / Post actions. This opens the Custom Pre-Actions / Post actions dialog box.

Click Add and choose the RoMa\_SwapInsert command from the drop-down list. Choose caco-1 as the value of the Object MPI parameter, base-2 as the value of the Object MPI2 parameter and NONE as the value of the ToolOnTheFly parameter.



**Fig. 17-17** Example process - Adding the RoMa\_SwapInsert command

Click OK when you have done this. The following figure shows the pre-actions with the RoMa\_SwapInsert command you have just added:



**Fig. 17-18** Example process - Custom pre-actions

Click OK again when you are finished.

## 17.8 Using Freedom EVOware with the Tecan Magellan Software

This chapter describes how to set up Freedom EVOware (either Freedom EVOware Standard or Freedom EVOware Plus) for use with the Tecan Magellan data reduction software.

The Tecan Magellan software is used to control microplate readers (e.g. photometers) and to carry out data analysis using stored procedures. The Magellan software must be installed separately.

### 17.8.1 Compatibility

This chapter describes the configuration steps which are necessary for Magellan Standard 6.5 and Magellan Tracker 6.5. To check your Magellan version, check the splash screen when Magellan starts or refer to the Magellan help file.

The Tracker version of Magellan contains special tracking features which are required for compliance with the FDA regulations.

***Note:** The splash screen which is shown when Magellan starts tells you if you have installed Magellan Standard or Magellan Tracker. Magellan Tracker uses the Tecan User Management system and requires you to enter a user name and password.*

### 17.8.2 Preparing the Magellan Software

Make sure that Magellan is correctly installed and is configured for the microplate reader and the COM port that you want to use. To check this, start the Magellan Wizard, click Instrument Control and Click Change Instrument.

If you don't have a reader connected to the PC and want Magellan to simulate a reader, choose the reader you want to simulate, choose Demo mode in the Port panel and None in the Stacker Port panel. Refer to the Magellan manual for more information.

Magellan is also provided with a tool (MagellanIQ) to check that the software has been correctly installed and configured. MagellanIQ can be started with the shortcut in Start > All Programs > Tecan.

#### 17.8.2.1 Methods and Workspace Files in Magellan

Method files contain all of the necessary parameters for the measurement, evaluation and data handling of an assay. Workspace files are created when a method is run and contain measured and calculated data as well as all of the method settings.

Methods and workspace files are reader-specific. For example, a method file for the Sunrise reader can only be used with this reader type. Accordingly, when you want to open a method or workspace file in the Magellan wizard, the *Select a file* dialog box will initially only show methods and workspace files which are compatible with the currently configured reader type.

Choose *All files* instead of *Files from this instrument* in the *Select a file* dialog box to see files which were created for other reader types, too. If the reader has equivalent measurement modes to the currently configured reader type, Magellan will ask you whether you want to convert the file.

Furthermore, methods and workspace files which were created with Magellan Standard cannot be used in Magellan Tracker, and will not be shown in the *Select a file* dialog box. This is because Magellan Tracker methods and workspace files contain additional tracking information which is needed for regulated environments.

**Note:** *The sample methods and workspace files which are provided with Magellan Tracker were created using Magellan Standard and are not shown in the Select a file dialog box of Magellan Tracker. Magellan includes a conversion tool which lets you convert Magellan Standard files to Magellan Tracker files.*

In Freedom EVOware too, the Method Selection dialog box of the Magellan Measure device command only shows methods which are compatible with the currently configured reader type and Magellan version (Standard or Tracker). See [17.8.3.3 “Specifying the Reader Type in Freedom EVOware”](#), [17-27](#).

### 17.8.3 Configuring Freedom EVOware for the Magellan software

Start Freedom EVOware’s Configuration Tool, click the Devices tab, click Device Information and look for the Magellan device driver in the list.

If the Magellan driver is missing, then it is not installed. Refer to the Installation chapter in the Freedom EVOware manual for information on installing software components which are missing.

Select the Magellan driver and check that the version is correct (see [17.8.1 “Compatibility”](#), [17-25](#)).

Check the Start checkbox for the Magellan driver to make sure that it will be loaded when Freedom EVOware starts.

**Note:** *If you change configuration settings in Freedom EVOware’s Configuration Tool, in most cases Freedom EVOware must be restarted for the changes to take effect.*

#### 17.8.3.1 Magellan Output File (Workspace File)

In Freedom EVOware’s Configuration Tool, select the Magellan driver, click Settings and choose the Settings tab in the Configure Device Driver Properties dialog box.

In the *Output File Default* field, specify the required default filename and path for the calculated results (workspace file) from the Magellan software. The default filename and path which you specify here will then be shown in the dialog box of the Magellan Measure command (see [Fig. 17-22](#), [17-32](#)).

#### Magellan Standard

**Path:** Specify the path which is configured in Magellan for workspace files. This makes it easier to load the generated workspace files if you run Magellan on its own later on.

**Filename:** If you are using a barcode scanner, you should specify the placeholder <ID>, which will instruct Freedom EVOware and thus Magellan to generate the filename from the labware barcode. It is not necessary to specify the file extension (which is .wsp). Note: The labware must be scanned in advance of the Magellan Measure command.

**Examples:**

c:\Program Files (x86)\Tecan\EVOware\Output\<ID>

**Note:** *To check the paths which are configured in Magellan, start the Magellan Wizard, click More and click Options. Then choose the Paths tab.*



## Magellan Tracker

**Path:** Magellan Tracker stores the workspace files in the path which is configured in Magellan and ignores the path that you specify here. Accordingly, it is recommended to leave the Output File Default field blank for Magellan Tracker. The filename and path of the workspace file will then be taken from the settings which were made in the Magellan method.

**Filename:** If you are using a barcode scanner, you should specify the placeholder <ID>, which will instruct Freedom EVOware and thus Magellan to generate the filename from the labware barcode. It is not necessary to specify the file extension (which is .wsp). Note: The labware must be scanned in advance of the Magellan Measure command.

### Example:

c:\Documents and Settings\All Users\Documents\Tecan\Magellan\wsp<ID>

**Note:** In both Magellan Standard and Magellan Tracker, if you leave the Output File Default field blank in Freedom EVOware, the filename and path of the workspace file will be taken from the settings which were made in the Magellan method.

**Note:** In Windows Explorer, the directory c:\Documents and Settings\All Users\Documents is shown as “Shared Documents” and not “Documents”.

### 17.8.3.2 Specifying the Reader COM port in Freedom EVOware

Start Freedom EVOware’s Configuration Tool, click the Devices tab, click Com Ports and select the COM port for the Magellan driver (the COM port to which the reader is attached). The same COM port should be configured in the Magellan software (see 17.8.2 “Preparing the Magellan Software”, 17-25).

Then click the I/O State tab and make sure that the COM port for the Magellan driver is enabled (active).

If you do not have a reader connected to your PC, disable the COM port by unchecking the checkbox. Nonetheless, you should still specify a valid COM port as described above.

**Note:** Unlike using the Magellan software on its own, Freedom EVOware cannot currently simulate a missing reader. If you do not have a reader connected to your PC, the Magellan Measure command in the Freedom EVOware pipetting script should execute without errors but will not create an output file (workspace file).

### 17.8.3.3 Specifying the Reader Type in Freedom EVOware

If there is a reader connected to your PC, the Magellan Measure command in the Freedom EVOware pipetting script will use the reader type which is attached to the COM port which you have specified.

**Note:** Freedom EVOware gets the reader type by asking the reader driver to interrogate the reader. Accordingly, the reader must be connected up and switched on when you create the pipetting script.

If you do not have a reader connected to your PC, the Magellan Measure command in the Freedom EVOware pipetting script will use the reader type which is configured in the Te-Magellan.ini file in Freedom EVOware’s installation directory (default path c:\Program Files (x86)\Tecan\EVOware. The reader type is configured in the [Settings] section with the switch Simulation=. The available reader types are listed in the [DemoInstruments] section.

If you do not have a reader connected to your PC, you must disable the COM port as described in 17.8.3.2 “Specifying the Reader COM port in Freedom EVOware”, 17-27.

**Note:** Method files are reader-specific. In Freedom EVOware, the Method Selection dialog box of the Magellan Measure command only shows methods which are compatible with the currently configured reader type.

### 17.8.4 Freedom EVOware Standard Script for the Magellan software

The following figure shows a simple example script for Freedom EVOware Standard which uses the Magellan Measure script command:

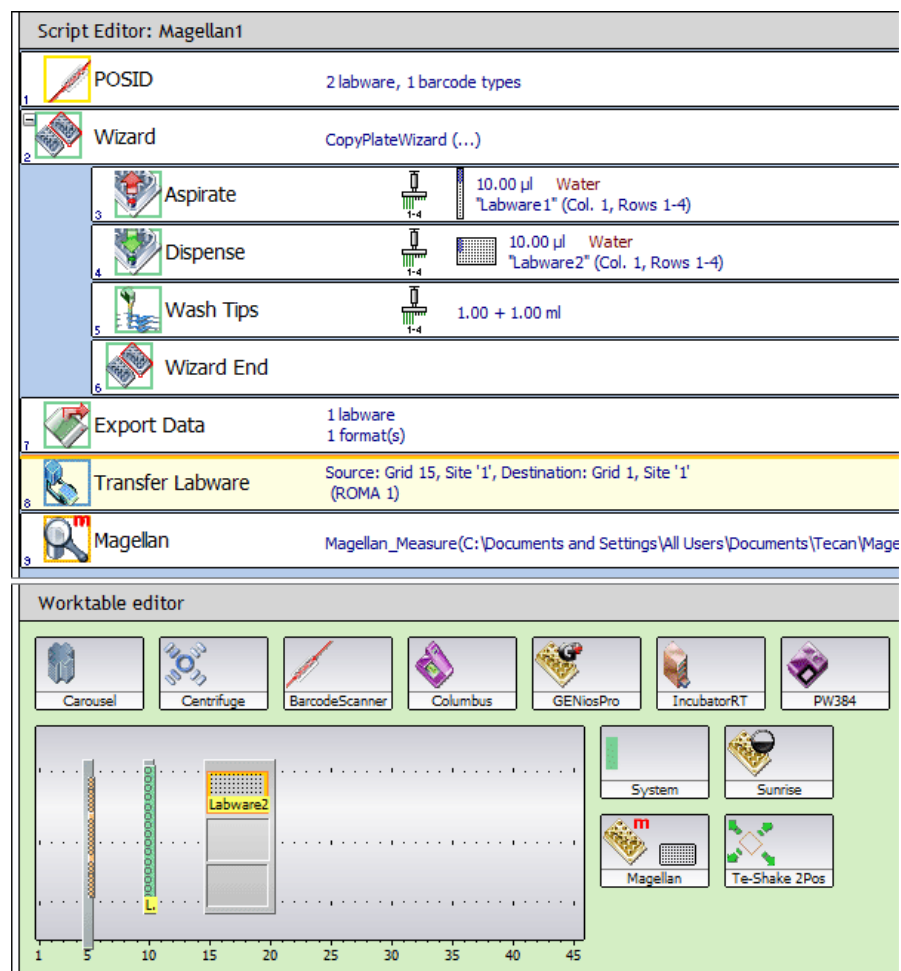


Fig. 17-19 Example pipetting script and worktable for Freedom EVOware Standard

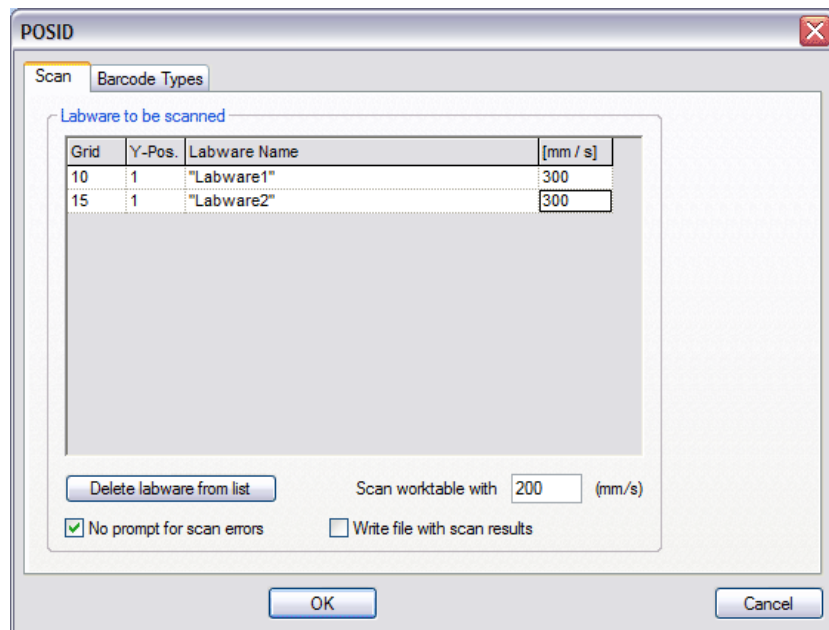
In the example, the worktable has been configured with a wash station at grid position 5, a tube rack at grid position 10 (labware name: Labware1) and a microplate carrier at grid position 15 (labware name: Labware2). A microplate has been put on site 1 of the carrier.

In Freedom EVOware Standard, it is also necessary to put a microplate of the correct type onto the Magellan device icon. This is shown by the grey rectangle inside the icon. This is not necessary in Freedom EVOware Plus.



**Note:** Make sure you have chosen the same microplate type which you want to use in the script. Refer to the hardware manual for your reader for information on the microplate types which are supported (96-well, 384-well etc.).

Please refer to the Freedom EVOware software manual or the context-sensitive help for detailed information on each of the script commands. The following only describes special points to note when setting up scripts for the Magellan software. In the example, the labware and tube (sample) barcodes are scanned in script line 1 using the PosID barcode scanner. The following figure shows the Scan tab of the PosID command:



**Fig. 17-20** PosID command

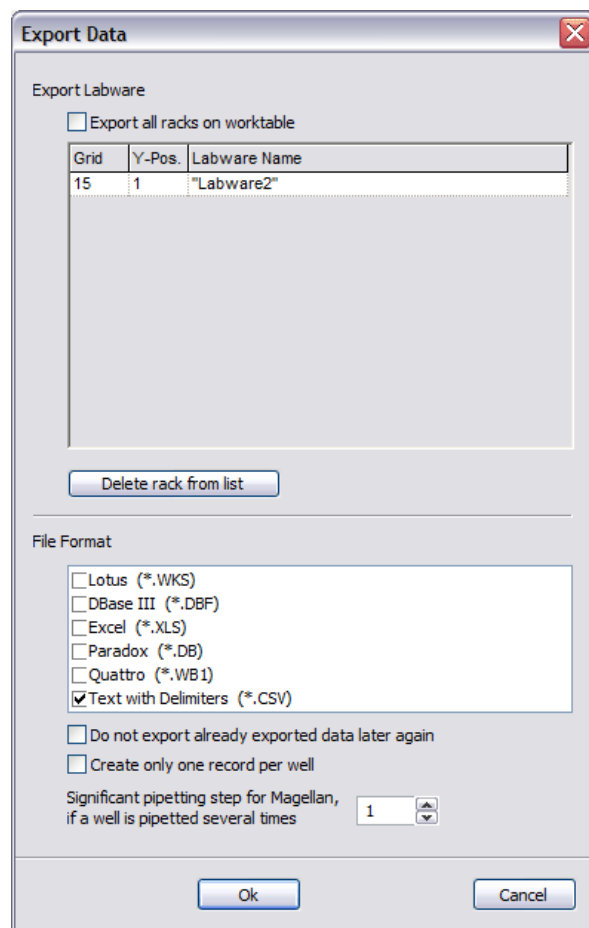
The Barcode Types tab is used to configure the barcode types which the PosID scanner will accept for the chosen labware.

The labware and tube barcodes must be scanned in advance of the Export Data and Magellan Measure commands. In Freedom EVOware Plus, the PosID and Export Data commands must be in the same pipetting script since the tube barcodes are not normally available globally (see the description of Scope in the Freedom EVOware software manual). See also [17.8.6 "Freedom EVOware Plus Process for the Magellan software"](#), [17-34](#).

With the above settings, the barcodes will be scanned for Labware1 (the tube rack) and Labware2 (the microplate).

In script lines 2 to 6, the sample liquids are transferred from the tube rack to the microplate using the Copy Plate wizard.

The Magellan Measure command in script line 9 gets important information it needs from a labware report file in CSV format which is output by the Export Data command in line 7. The following figure shows the dialog box for the Export Data command:




**Fig. 17-21** Export Data command

The labware report file will contain pipetting information for Labware2 (the microplate). It will also contain the microplate and tube (sample) barcodes which were scanned by the PosID command. The labware report file is written to the Output directory which is specified in Freedom EVOware's Configuration Tool. Freedom EVOware sends the name and location of this file to the Magellan driver automatically (you do not need to configure the Freedom EVOware Output directory in the Magellan software).

*Significant pipetting step for Magellan* is set to "1" since only one pipetting step was carried out on Labware2 (the Dispense command in script line 4). See the Freedom EVOware manual for more information on this option.

The Transfer Labware command in script line 8 moves the microplate from the worktable to the microplate reader. If you want to use the Magellan software to control the reader, when you configure the Transfer Labware command you must choose the Magellan device icon in the worktable editor as the destination position of the microplate, not the device icon for the reader itself.

**Note:** *The labware must be brought to the reader using the Transfer Labware command and not using another RoMa command. Otherwise the barcodes and the pipetting information will not be transferred with the labware.*

The Transfer Labware command is not available in Freedom EVOware Plus. See [17.8.6 "Freedom EVOware Plus Process for the Magellan software"](#),  17-34 for more information.

The following figure shows the dialog box for the Magellan Measure command in script line 9:

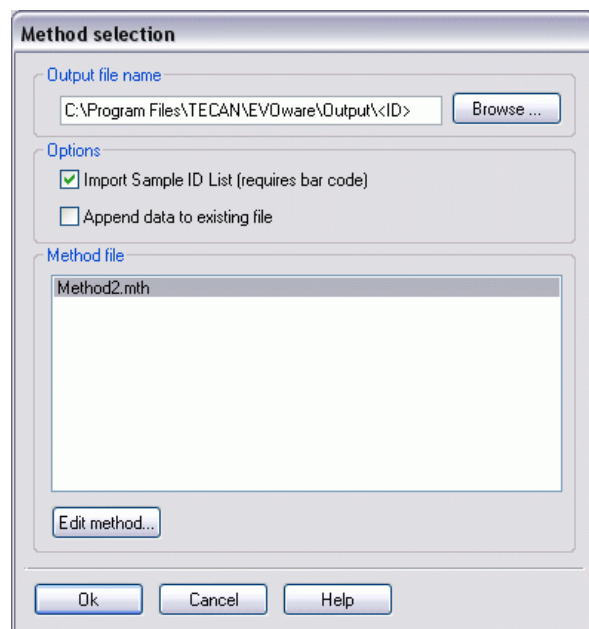


Fig. 17-22 Magellan Measure command

### Output file name

Specify the required filename and path of the output file (workspace file). The default filename and path which is shown is the one you specified in Freedom EVOware's Configuration Tool (see 17.8.3.1 "Magellan Output File (Workspace File)", 17-26).

If you are using a barcode scanner, you should specify the filename as the placeholder <ID>, which will instruct Freedom EVOware and thus Magellan to generate the filename from the labware barcode. The labware must be scanned in advance of the Magellan Measure command.

**Note:** In both *Magellan Standard* and *Magellan Tracker*, if you leave the *Output File Name* field blank in Freedom EVOware, the filename and path of the workspace file will be taken from the settings which were made in the *Magellan method*.

### Import Sample ID list

Check the *Import sample ID list* checkbox if you have scanned the tube barcodes in advance of the Magellan Measure command. This instructs the Magellan software to extract the tube barcodes from a labware report file and assign them to the samples. The barcode information will then be contained in

the Magellan output file (workspace file) which is produced. The workspace file will also contain information from Freedom EVOware on pipetting errors (if any). The barcodes and pipetting errors can then be viewed by loading the generated workspace file in Magellan.

To create a labware report file, you must use the script command Export Data before using the Measure command for the Magellan software.

**Freedom EVOware Standard:** The labware must be brought to the reader using the Transfer Labware command and not using another RoMa command. Otherwise, the barcodes and the pipetting information will not be transferred with the labware.

**Freedom EVOware Plus:** The PosID and Export Data commands must be in the same pipetting script since the tube barcodes are not normally available globally (see the description of Scope in the Freedom EVOware software manual).

#### Append data to existing file

Check this checkbox if you want to append the measurement data to an existing output file (workspace file). This option is mainly intended for kinetic measurements (frequent measurement of the reaction to determine the rate or progress). This option must be activated in all Magellan Measure commands in the kinetic series except for the first one. This option requires labware with barcodes (you must also check the checkbox *Import sample ID list*).

#### Edit method

Click this button to edit the selected method using the Edit Method wizard of the Magellan software. See [17.8.5 “Additional Settings for the Magellan Method”](#), [17-33](#) for more information.

#### Method file panel

The Method File panel only shows methods which are compatible with the currently configured reader type and Magellan version (Standard or Tracker). See [17.8.3.3 “Specifying the Reader Type in Freedom EVOware”](#), [17-27](#).

You can only edit the method if you have Application Specialist rights in Magellan.

### 17.8.5 Additional Settings for the Magellan Method

If you are using a barcode scanner and a labware report file, additional settings are needed for the Magellan method. To make these settings, select the required method file in the Magellan Measure command and click Edit Method. This opens the Magellan wizard. Select and open the method, choose the required measurement type and click the large green arrow. Then click *Automated data handling* in the *Data Handling* group of the Magellan Control Bar and make the following settings:

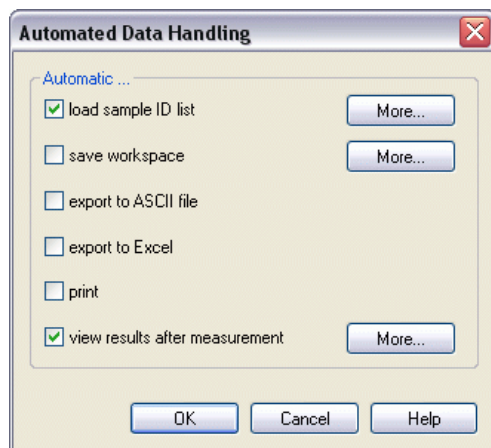


Fig. 17-23 Magellan settings - Automated data handling

Note: The checkbox *Save workspace* is not available in Magellan Tracker. The checkboxes for data export may not be available either depending on other settings you make in Magellan.

Now click the *More* button next to *Load sample ID List* and make the following settings:

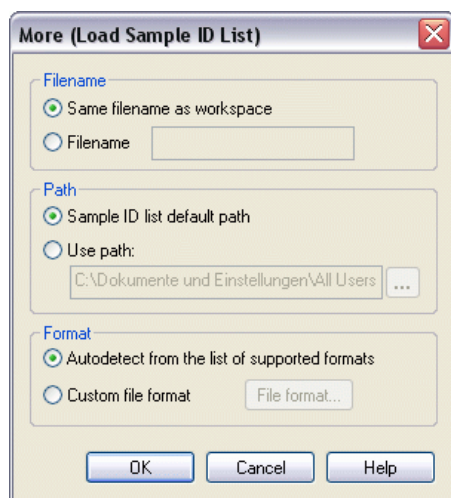


Fig. 17-24 Magellan settings - Load Sample ID List

Click OK twice when you are finished.

### 17.8.6 Freedom EVOware Plus Process for the Magellan software

The following figure shows a simple example process for Freedom EVOware Plus which uses the Magellan Measure device command:

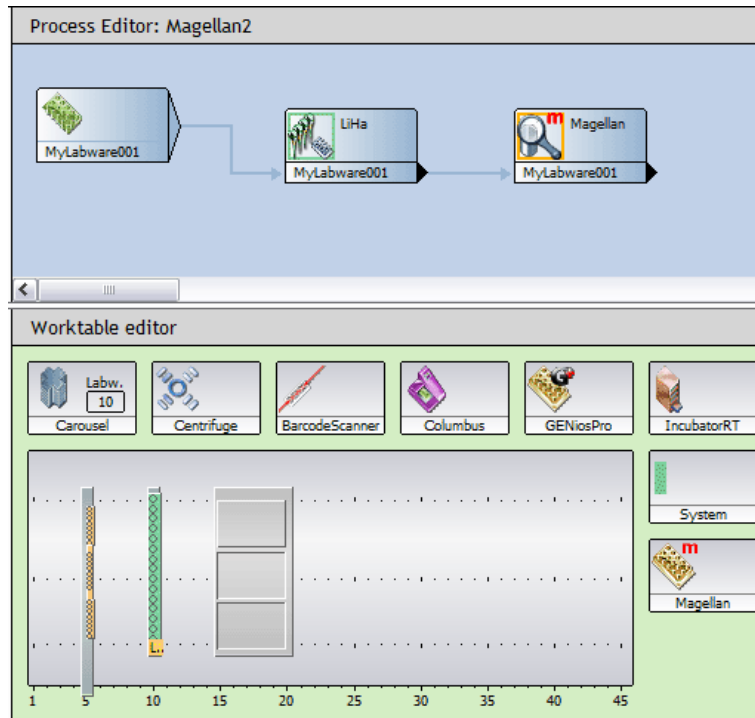


Fig. 17-25 Example process and worktable for Freedom EVOware Plus

In the example, the worktable has been configured with a wash station at grid position 5, a tube rack at grid position 10 (labware name: Labware1) and a microplate carrier at grid position 15. The carousel has been set up with 10 microplates.

In the Script Editor, a microplate was put on site 1 of the carrier and given the name Labware2. Since the microplate will be taken to this site dynamically during process run time, it is shown in grey in the Process Editor.

After pipetting, the microplate is transferred automatically to the microplate reader and scanned using a Magellan Measure command in the Magellan process step. The Transfer Labware command from the Freedom EVOware Standard example is not necessary (and not available in Freedom EVOware Plus). After scanning, the microplate will be returned to the carousel automatically.

The pipetting script in the LiHa Pipette process step is identical to lines 1 to 7 of the example script for Freedom EVOware Standard:

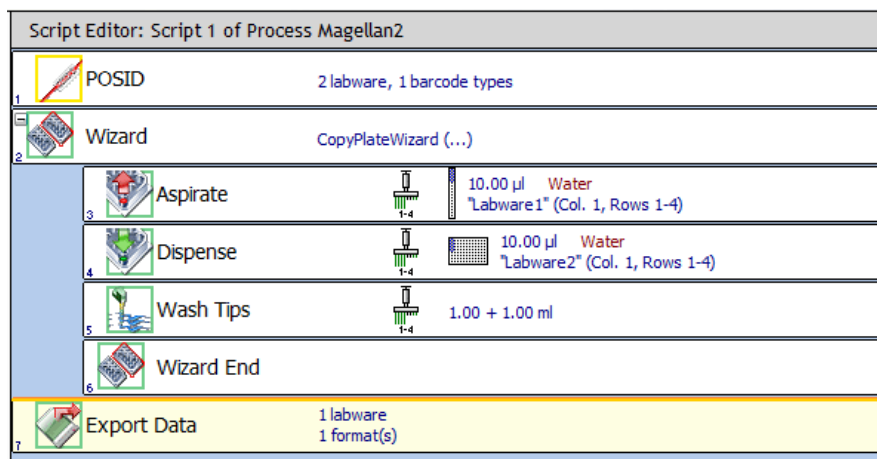


Fig. 17-26 Example pipetting script for Freedom EVOware Plus

See the example for Freedom EVOware Standard for more details on setting up the Magellan Measure, PosID and Export Data commands.

Configuration of the Magellan driver and the exchange of information between Freedom EVOware and the Magellan software takes place in the same way as in Freedom EVOware Standard.

**Note:** The PosID and Export Data must be in the same pipetting script, as in the example, since the tube barcodes are not normally available globally (see the description of Scope in the Freedom EVOware software manual).

## 17.9 Lidingstation to Remove Lid at a Specified Location in EVOware Plus

Plates are always moved to the target location before the lid is removed. However, it can happen that it is not possible to remove the lid there; for instance it is geometrically not possible to remove lids from the plates inside an incubator. So if for some reason the lid has to be removed first, you have to include an intermediate position where the lid can be removed. You have to make sure to transport the plates to a location where no lids are allowed before transporting them to the incubator. When transporting the plate back to the base location you also have to use this intermediate position, since it is of course also not possible to put a lid on a plate in an incubator. One can avoid this problem by specifying the location at which the lid is to be removed. In EVOware Plus this is done with the Lidingstation attribute that can optionally be added in the carrier definition of the destination carrier.



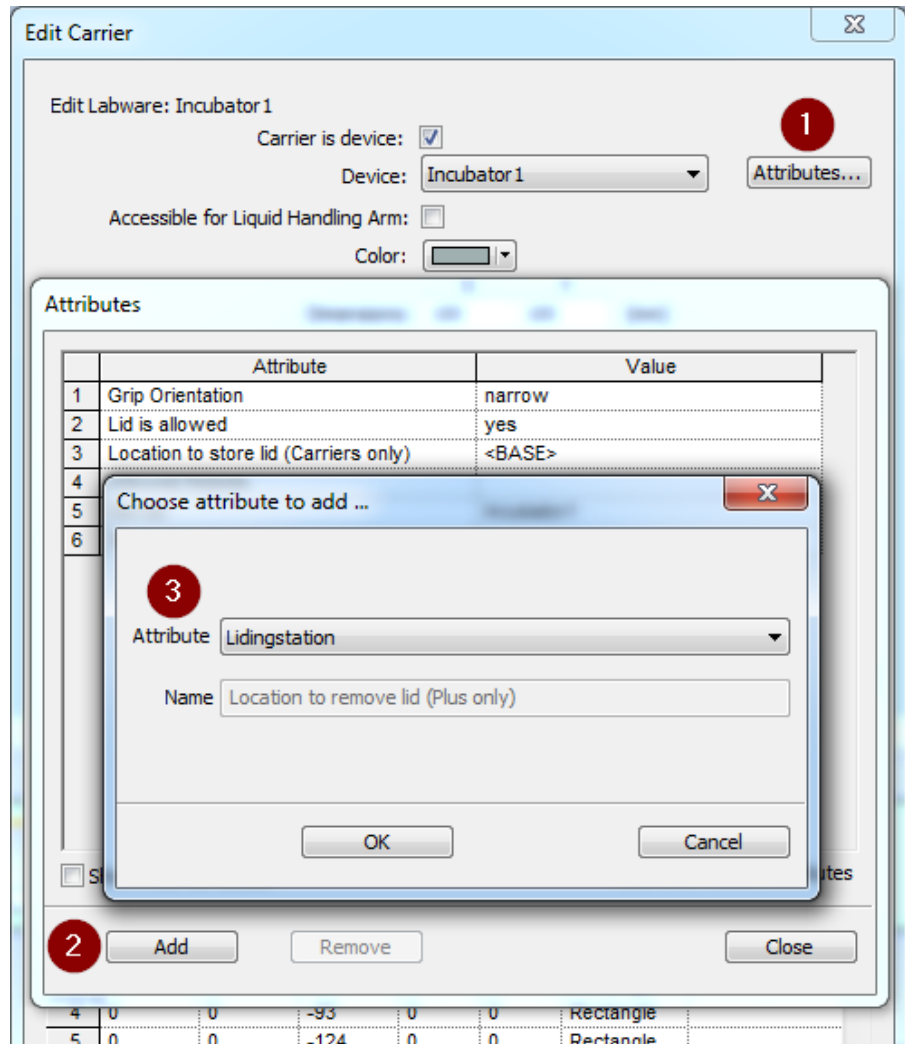
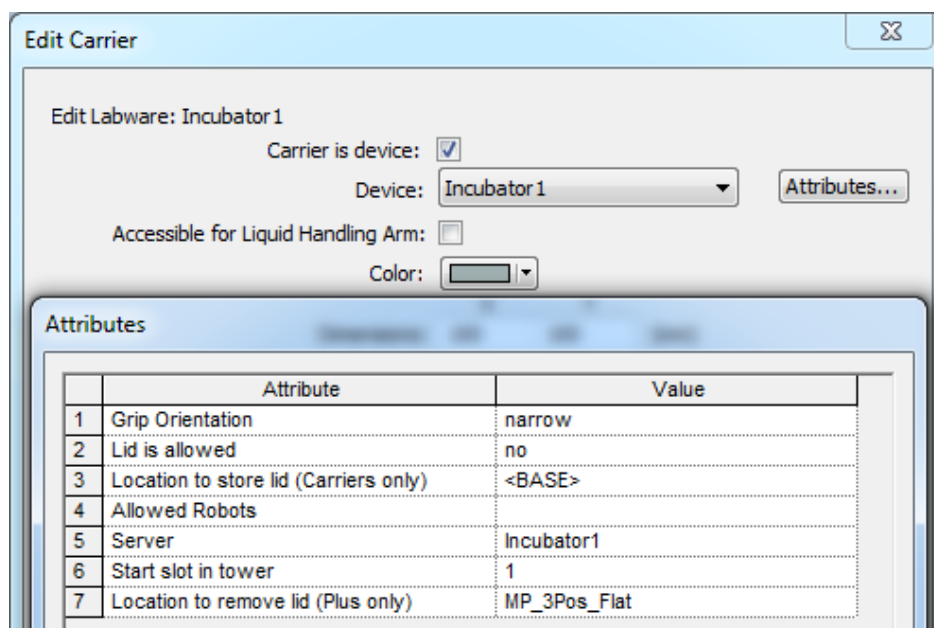


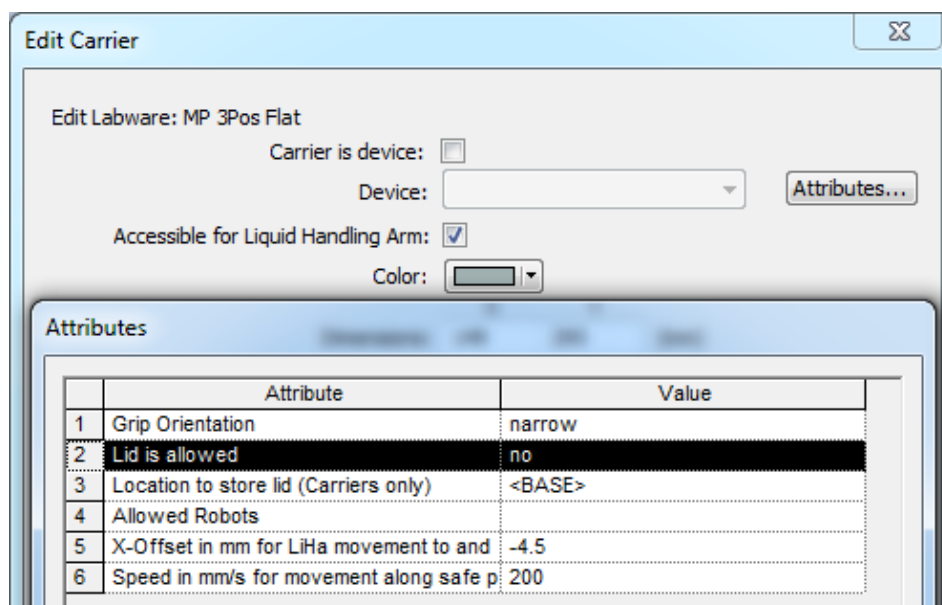
Fig. 17-27 The Lidingstation attribute must be set for the destination carrier

When a plate covered with a lid is transported from its <BASE> position to the MIO incubator where it shall be incubated without the lid it is first transferred to the location specified in the Lidingstation attribute of the incubator. Then the lid is brought back to <BASE> before the plate without lid is transported to the incubator.

**Note:** The carrier specified in the Lidingstation attribute must have set the attribute "Lid is allowed" to "no".



**Fig. 17-28** Example: On the destination carrier the Lidingstation attribute (i.e., “Location to remove lid”) is set to the carrier “MP\_3Pos\_Flat”.



**Fig. 17-29** Example: On the Lidingstation carrier the attribute “Lid is allowed” must be set to “no”.

Alternatively, you can insert a room-temperature incubation step on a workstation rack before or after your actual incubation step, or add Pre- or Post-Actions using the RoMa\_MoveLid macro.

## 17.10 Example Scripts and Processes

Freedom EVOware is provided with a number of example scripts which illustrate various aspects of script programming. It is instructive for new users of Freedom EVOware to load the scripts which are provided and to study each command while looking at the on-line help. For learning purposes, some of the scripts can also be run in offline mode. The scripts are stored as script templates. To load them, click New and select the required template. Script templates have a yellow icon.

Note that scripts will indicate errors (marked in red in the Script Editor) if the configuration of the pipetting instrument is unsuitable. For example, if the script uses DITIs, errors will be shown if the liquid handling arm is not configured with DITIs. Conversely, if the liquid handling arm is configured with DITIs, Aspirate commands must be preceded by Get DITI commands. Errors will also be shown if the script uses liquid classes or volume ranges which are not currently available. In many cases, the purpose of each of the scripts is explained in a Comment command at the start of the script.

The Freedom EVOware installation contains a number of maintenance scripts (see [6.4.2 "Run Maintenance"](#), [6-10](#)). Maintenance scripts can be run by both Freedom EVOware versions but can only be created and edited with Freedom EVOware Standard. Script files and maintenance scripts have a green icon.

Freedom EVOware Plus is also provided with an example process template, which is for the ELISA test (Enzyme immunoassay). Process templates have a blue icon.



# 18 Error Handling

**Purpose of This Chapter**

This chapter describes runtime error messages and the associated dialog boxes that can be issued by the software. It gives information on the cause of the error and instructs how to correct the error, where applicable.

## 18.1 Error Dialogs

**Errors Requiring User Interaction**

This section describes pipetting and hardware device error messages which require user interaction. Please see the description of the output file format from the Export Data command for information on the pipetting error codes which are reported. Errors are also reported in the Freedom EVOware log files.

### 18.1.1 Liquid Detection Error

The following dialog box is shown when the pipetting instrument reports a liquid detection error.

The dialog box shows the respective tip or tips with errors and the tip status. The last column display the detected volume:

**Detection Error (DiTiScriptSimple)**

Tip	Status	Volume [µl]
1	OK / automatic handling	325
2	<b>not enough liquid</b>	164
3	OK / automatic handling	327
4	OK / automatic handling	328
5	OK / automatic handling	331
6	OK / automatic handling	330
7	<b>no liquid</b>	
8	OK / automatic handling	320

Please note: The reported volumes do not account for the submerge depth defined in the liquid class.

Retract all tips to global Z (Travel)

Retry detection

Move tips to Z (Max)

Pipette nothing

Aspirate air instead of the liquid

Abort

**Fig. 18-1** Liquid Detection Error dialog box

The buttons in the dialog box are as follows. The actions described only apply to the affected tip positions - if the pipetting script is allowed to continue, the other tips will be handled in the normal way.

**Retract all tips to global Z (Travel)**

Click this button to move all tips up to global Z (Travel) so that you can easily handle the error on the worktable.

**Retry detection**

Click this button to retry the liquid level detection.

**Move tips to Z (Max)**

If you click this button, Freedom EVOware will move the tips to Z-Max and will try to aspirate the specified volume again.

**Pipette nothing**

If you click this button, Freedom EVOware will not use the affected tip(s) until the next Wash Tips or Get DITs operation.

The affected wells won't be reported any more in the output files.

**Aspirate air instead of the liquid**

If you click this button, Freedom EVOware will pipette air instead of the liquid and will continue with the pipetting script.

**Abort**

Click Abort if you want to stop the pipetting script.

See also [10.2.1 "LiHa Aspirate Parameters \(Fixed Tips and DiTis\)"](#), [10-8](#), *On Detection Error*.

**Note:** *Liquid Level detection is not supported by the Te-MO. However, it can be emulated using the pre-defined variable RACK\_VOLUME\_x. Accordingly, if this error is reported by the Te-MO, this indicates that an unsuitable or incorrect value has been assigned to the RACK\_VOLUME\_x variable.*

### 18.1.2 Clot Error

The following dialog box is shown if the pipetting instrument reports a clot error or an exit signal error during pipetting. The dialog box shows the respective tip or tips and the tip status:

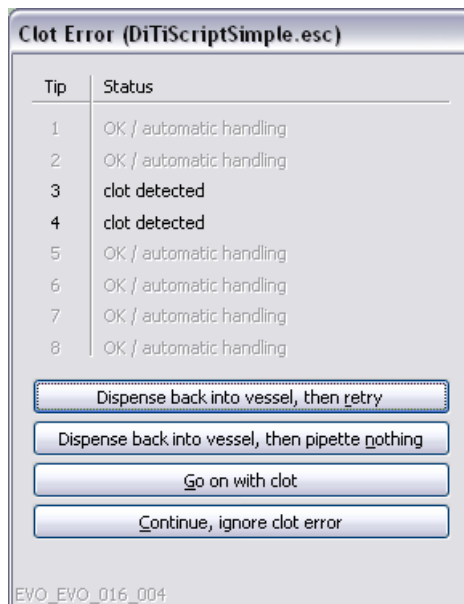


Fig. 18-2 Clot Error dialog box

The buttons in the dialog box are as follows. The actions described only apply to the affected tip positions - if the pipetting script is allowed to continue, the other tips will be handled in the normal way.

**Dispense back into vessel, then retry**

If you click this button, Freedom EVOware will dispense the aspirated volume back into the vessel and will retry the liquid level detection, aspiration, and clot detection.

**Dispense back into vessel, then pipette nothing**

If you click this button, Freedom EVOware will dispense the aspirated volume back into the vessel and will not use the affected tip(s) until the next Wash Tips or Get DITIs operation.

The affected wells won't be reported any more in the output files.

**Go on with clot**

If you click this button, Freedom EVOware will continue with the pipetting script and report the clot error in the output file(s).

**Continue, ignore clot error**

If you click this button, Freedom EVOware will continue with the pipetting script and report "clot error ignored" in the output file(s).

See also [10.2.1 "LiHa Aspirate Parameters \(Fixed Tips and DiTis\)"](#), [10-8](#), *On Exit Signal Error*.

**18.1.3 Clot Error (PMP)**

The following dialog box is shown if the PMP (Pressure Monitored Pipetting) function detects a clot during pipetting.

The dialog box shows the respective tip or tips and the tip status:

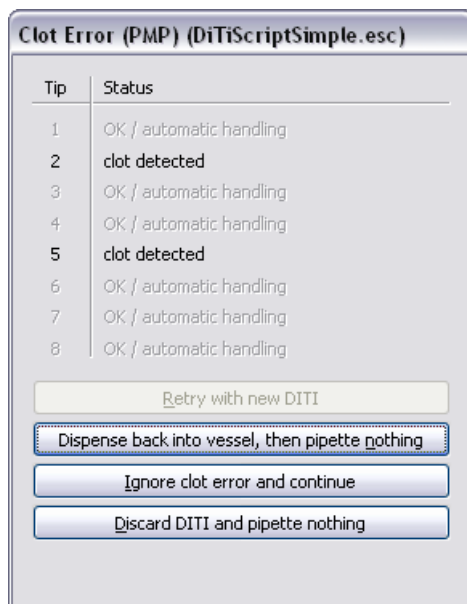


Fig. 18-3 Clot Error (PMP) dialog box

The buttons in the dialog box are as follows. The actions described only apply to the affected tip positions - if the pipetting script is allowed to continue, the other tips will be handled in the normal way.

**Retry with new DITI**

This option is not available for PMP.

**Dispense back into vessel, then pipette nothing**

If you click this button, Freedom EVOware will dispense the aspirated volume back into the vessel and will not use the affected tip(s) until the next Get DITIs operation.

The affected wells won't be reported any more in the output files.

**Ignore clot error and continue**

If you click this button, Freedom EVOware will continue with the pipetting script and report "clot error ignored" in the output file(s).

**Discard DITI and pipette nothing**

If you click this button, Freedom EVOware will discard the affected DITI(s) and will not use these tip positions until the next Get DITIs operation.

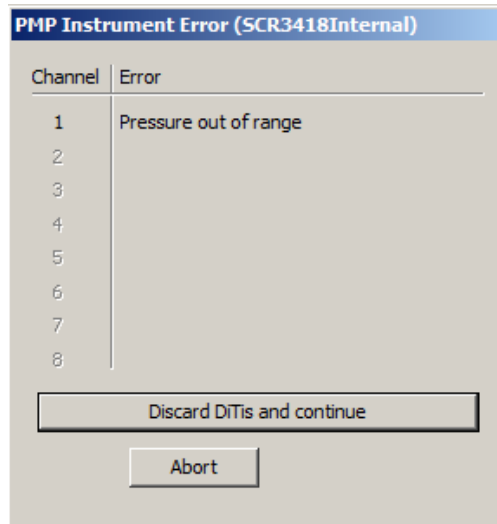
The affected wells won't be reported any more in the output files.

PMP errors are shown in the report file of the Export Data command (see [Tab. 15-8](#), [15-49](#)). See also [17.6.3 "PMP Error and Success Messages"](#), [17-19](#) and [10.2.1 "LiHa Aspirate Parameters \(Fixed Tips and DiTis\)"](#), [10-8](#), *On PMP Clot Error*.

**18.1.4 PMP Instrument Error**

If, during pipetting, the pressure change measured in the tip falls under the predefined under-pressure threshold or raises above the predefined over-pressure threshold, the MultiSense firmware reports "pressure out of range" during pipetting.





**Fig. 18-4** PMP Instrument Error dialog box (during the aspiration of an air-gap or during sample dispense)

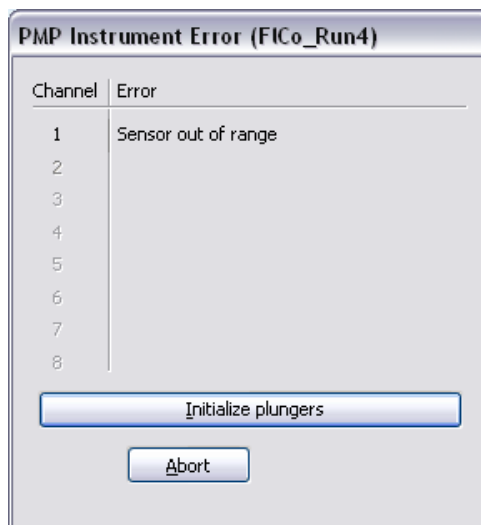
The buttons in the dialog box are as follows. The actions described only apply to the affected tip positions.

**Discard DiTis and continue**

If you click this button, Freedom EVOware will discard the affected DiTi(s) and perform an inline filter test with those channels. If the inline filter test is passed then those channels will continue pipetting after the next Get DiTis operation. In case of a Mix operation the remaining mix cycles will be finished on the remaining channels before this dialog is shown. The channels affected by the PMP error will not finish the remaining mix cycles even if the inline filter test has been passed.

**Abort**

See [18.1.3 "Clot Error \(PMP\)"](#), 18-3



**Fig. 18-5** PMP Instrument Error dialog box (after DiTi discard)

The buttons in the dialog box are as follows. The actions described only apply to the affected tip positions.

#### Initialize plungers

If you click this button, Freedom EVOware will discard the affected DITI(s) and will not use these tip positions until the next Get DITIs operation. In addition, the respective plungers of the PMP option will be initialized.

The affected wells will be flagged with “Diluter Error” in the output files.

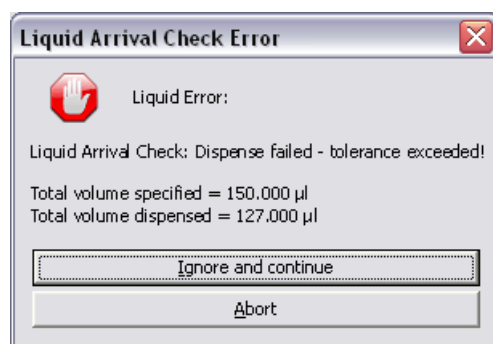
#### Abort

Click Abort if you want to stop the pipetting script.

PMP Instrument Errors are shown in the report file of the Export Data command (see [Tab. 15-8](#), [15-49](#)). See also [17.6.3 “PMP Error and Success Messages”](#), [17-19](#).

### 18.1.5 Liquid Arrival Check Error

The Liquid Arrival Check (LAC) feature verifies that the correct liquid volumes have been dispensed by weighing the labware before and after pipetting. The labware must be put onto a special balance (pooling balance) for the dispense operation. Freedom EVOware automatically calculates the liquid volume from the weight difference and compares the results with the volume specified in the pipetting command. The following dialog box is shown if the two values differ by more than the maximum volume deviation which is specified in the liquid class which was used for pipetting:



**Fig. 18-6** Liquid Arrival Check error

The same dialog box is also used to display technical errors from the LAC hardware.

The buttons in the dialog box are as follows:

#### Ignore and continue

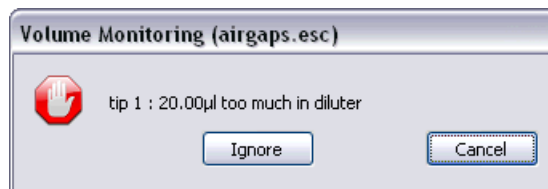
If you click this button, Freedom EVOware will ignore the error and continue with the pipetting script. Please be careful with this option. Ignoring errors can lead to further errors.

#### Abort

Click Abort if you want to stop the pipetting script.

### 18.1.6 Volume Monitoring Error (Diluter Overflow)

The following dialog box is shown when the liquid amount you want to aspirate exceeds the diluter capacity:



**Fig. 18-7** Volume Monitoring dialog box

The buttons in the dialog box are as follows:

#### Cancel

Click Cancel if you want to stop the pipetting script.

#### Ignore

If you click this button, Freedom EVOware will ignore the error and continue with the pipetting script. Please be careful with this option. Ignoring errors can lead to further errors.

**Note:** Check the pipetting script or adapt the liquid class with regard to air gaps and excess/conditioning volume.

### 18.1.7 Diluter Error

The following dialog box is shown when the pipetting instrument reports a diluter error. The dialog box shows the respective diluter or diluters and the error(s):



**Fig. 18-8** Diluter Error dialog box

The buttons in the dialog box are as follows:

### Initialise

If you click this button, Freedom EVOware will move the LiHa above the left-most waste position and will try to initialize the diluter(s). If an error occurs again, this dialog box will be displayed again.

**With Standard Tips:** If the initialization is successful, the pipetting script will continue, but Freedom EVOware will not use the affected tips until the next Wash Tips operation.

**With DITIs:** If you click this button, Freedom EVOware will discard the affected DITI(s) and will not use these tip positions until the next Get DITIs operation.

In both cases, the affected wells will be flagged with “Diluter Error” in the output files.

### Deactivate

Click this button to switch off the affected diluter. It will not be used any more for pipetting and the tip position will be marked as “broken” in the configuration of the LiHa.

### Notes on specific error messages

#### Plunger Overload

Too much force is needed to move the plunger.

Possible causes are:

- The tip is blocked.
- The pipes are blocked.
- The 3-way valve is faulty.
- The plunger or plunger cap has jammed.

#### Invalid Operand

Possible causes are:

- Aspirate or dispense speed has been configured too high.
- Check the log file to see which liquid class has been used. Make sure that the single pipetting and multi-pipetting is configured appropriately.
- The script has tried to aspirate a liquid volume which exceeds the diluter capacity. The total aspirated volume also includes the airgaps.

### 18.1.8 Error Fetching DITIs

The following dialog box is shown if a DITI was not fetched correctly (as reported by the electrical DITI sensors in the pipetting head). A common cause of this error is a missing DITI in the DITI rack. The dialog box shows the respective tip or tips and the tip status:



**Fig. 18-9** Error Fetching DITIs dialog box

The buttons in the dialog box are as follows:

**Retry at same position**

If you click this button, Freedom EVOware will try to fetch the affected DITI(s) again.

**Try at next position**

If you click this button, Freedom EVOware will try to fetch DITIs for the affected position(s) at the next available location(s) in the DITI rack.

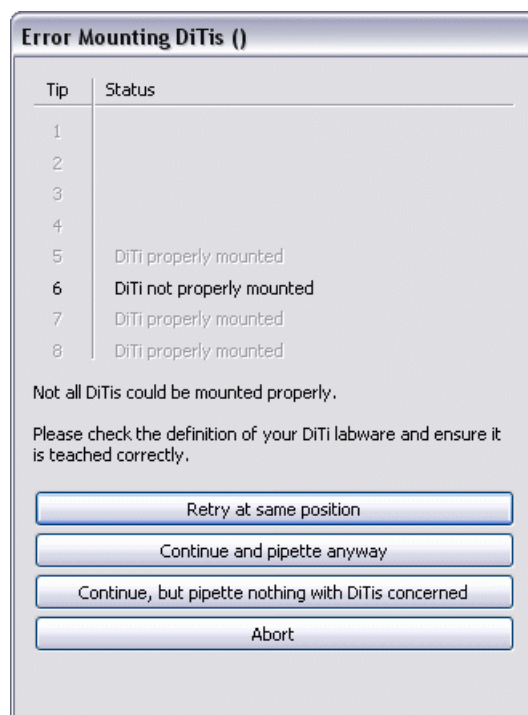
**Abort**

Click Abort if you want to stop the pipetting script.

### 18.1.9 Error Mounting DITIs

The following dialog box is shown if a DITi was fetched (as reported by the electrical DITi sensors in the pipetting head) but was not mounted correctly (as reported by the force feedback sensors). A common cause of this error is inaccurate or incorrect teaching of the DITi labware.

The dialog box shows the respective tip or tips and the tip status:



**Fig. 18-10** Error Mounting DITIs dialog box

The buttons in the dialog box are as follows:

#### **Retry at same position**

If you click this button, Freedom EVOware will try to fetch the affected DITi(s) again. Before you do this, make sure that DITIs are available at all of the required well positions.

#### **Continue and pipette anyway**

If you click this button, Freedom EVOware will ignore the error and continue with the pipetting script.

Choose this option if visual inspection shows that the DITIs are correctly mounted and you decide that it is safe to continue with the script.

#### **Continue, but pipette nothing with DITIs concerned**

If you click this button, Freedom EVOware will continue with the pipetting script, but will not use the affected tip(s) until the next Get DITIs operation. The affected tip(s) will move upwards as far as possible to be out of the way of other objects.

Choose this option to avoid the risk of losing the DITIs during pipetting if they are not tightly or correctly attached to the DITi adapters.

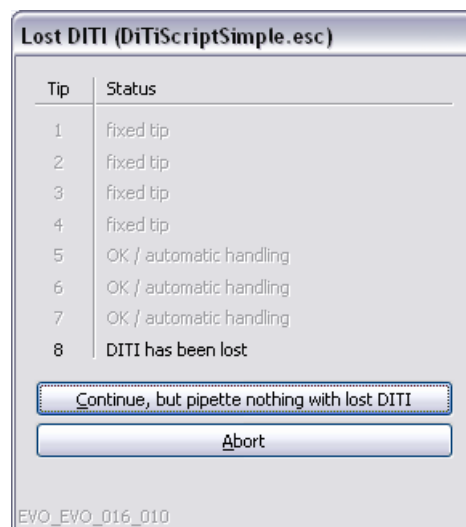
The affected wells won't be reported any more in the output files.

**Abort**

Click Abort if you want to stop the pipetting script.

**18.1.10 Lost DITI Error**

The following dialog box is shown if a DITI has been lost directly before or after a pipetting command (as reported by the electrical DITI sensors in the pipetting head). The dialog box shows the respective tip or tips and the tip status:



**Fig. 18-11** Lost DITI Error dialog box

The buttons in the dialog box are as follows:

**Continue, but pipette nothing with lost DITI**

If you click this button, Freedom EVOware will continue with the pipetting script, but will not use the affected tip(s) until the next Get DITIs operation. The affected tip(s) will move upwards as far as possible to be out of the way of other objects.

The affected wells won't be reported any more in the output files.

**Abort**

Click Abort if you want to stop the pipetting script.

### 18.1.11 DITI Already Mounted Error

The following dialog box is shown if a DITI is detected on the DITI adapter directly before a Get DITI or Pickup DITI command is executed. The dialog box shows the respective tip or tips and the tip status:

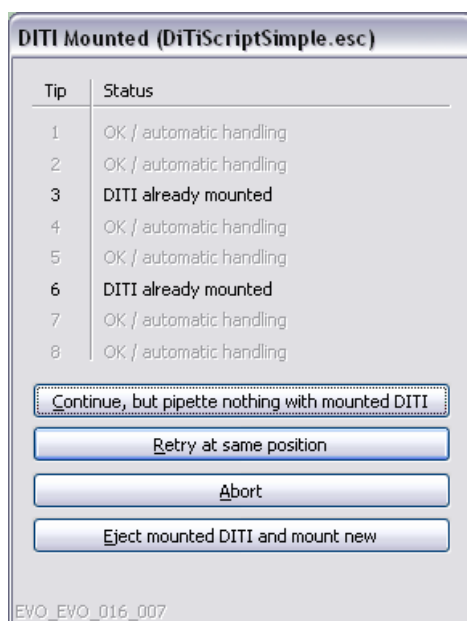


Fig. 18-12 DITI Already Mounted error dialog box

The buttons in the dialog box are as follows:

#### **Continue, but pipette nothing with mounted DITI**

If you click this button, Freedom EVOware will continue with the pipetting script, but will not use the affected tip(s) until the next Get DITIs operation. The affected tip(s) will move upwards as far as possible to be out of the way of other objects.

The affected wells won't be reported any more in the output files.

#### **Retry at same position**

If you click this button, Freedom EVOware will try again to get or pick up a DITI after checking again whether a DITI is already mounted.

#### **Abort**

Click Abort if you want to stop the pipetting script.

#### **Eject mounted DITI and mount new**

If you click this button, Freedom EVOware will eject the DITI which is mounted and get another DITI for this tip position.



### 18.1.12 Error Reading Barcodes

The following dialog box is shown if the pipetting instrument reports an error when scanning a carrier, labware or tube barcode with the PosID barcode scanner (the example below shows a labware barcode error). The dialog box shows the error which was returned:

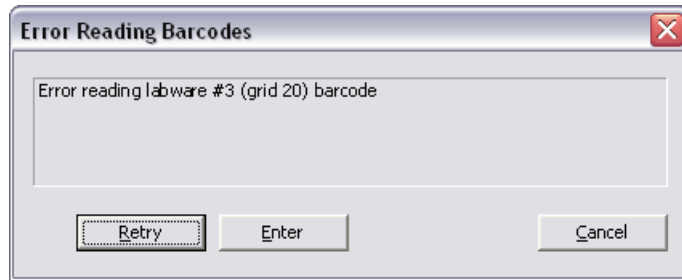


Fig. 18-13 Error Reading Barcodes dialog box

The buttons in the dialog box are as follows:

**Retry**

Click this button to scan the barcode again.

**Enter**

If you click this button, the *Enter Barcode* dialog box is displayed to let you enter the barcode manually.

**Cancel**

Click Cancel if you want to stop the pipetting script.

**Notes on specific error messages**

**Unexpected carrier barcode on grid {}**

The carrier code of the scanned barcode does not match the carrier code of the carrier in the Worktable Editor (i.e. the incorrect carrier type is specified in Freedom EVOware or has been loaded on the worktable). All standard Tecan carriers have a unique carrier code (the carrier code is shown in the first three digits of the barcode; it is configured in the carrier definition).

### 18.1.13 Carrier Barcode Error

The following dialog box is shown if the pipetting instrument reports an error when scanning a carrier barcode with the PosID-3 barcode scanner. The dialog box shows the error which was returned:

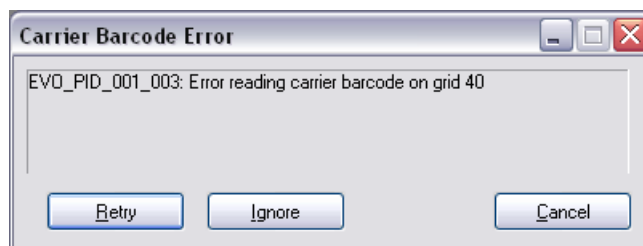


Fig. 18-14 Carrier Barcode Error dialog box

The buttons in the dialog box are as follows:

**Retry**

Click this button to scan the barcode again.

**Ignore**

Click this button to ignore the error and continue with the pipetting script. Please be careful with this option. Ignoring errors can lead to further errors.

**Cancel**

Click Cancel if you want to stop the pipetting script.

**Notes on specific error messages**

**Carrier Barcode Error: Unexpected carrier barcode on grid {}**

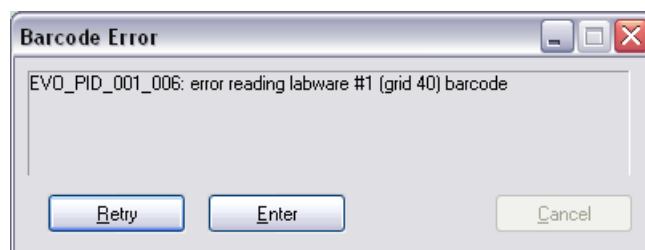
The carrier code of the scanned barcode does not match the carrier code of the carrier in the Worktable Editor (i.e. the incorrect carrier type is specified in Freedom EVOware or has been loaded on the worktable). All standard Tecan carriers have a unique carrier code (the carrier code is shown in the first three digits of the barcode; it is configured in the carrier definition).

**Error reading carrier barcode on grid {}**

Each carrier or tube rack is fitted with two barcodes. This is done to enhance scanning accuracy. The two barcodes only differ in the separator character between the carrier code and the barcode (“\” or “/”). This error occurs if the separator characters are incorrect.

**18.1.14 Barcode Error**

The following dialog box is shown if the pipetting instrument reports an error when scanning a labware or tube barcode with the PosID-3 barcode scanner (the example below shows a labware barcode error). The dialog box shows the error which was returned:



*Fig. 18-15 Barcode Error dialog box*

The buttons in the dialog box are as follows:

**Retry**

Click this button to scan the barcode again.

**Enter**

If you click this button, the *Enter Barcode* dialog box is displayed to let you enter the barcode manually.

**Cancel**

Click Cancel if you want to stop the pipetting script.

### Notes on specific error messages

#### Barcode Error: Mismatching barcode for position grid ... site ...

The barcodes of all of the labware on the worktable must be unique. This error occurs if the same barcode has been scanned on more than one tube or labware item.

#### 18.1.15 Labware or Tube Barcode Error

The barcodes of all of the labware on the worktable must be unique. This error occurs if the same barcode has been scanned on more than one tube or labware item.

The duplicate barcode has either been read by a barcode scanner (e.g. PosID, PosID-3 or Symbol barcode scanner) or has resulted from an incorrect or inappropriate assignment of a barcode variable in a pipetting script (e.g. using the Set Variable command).



*Fig. 18-16 Barcode Error dialog box*

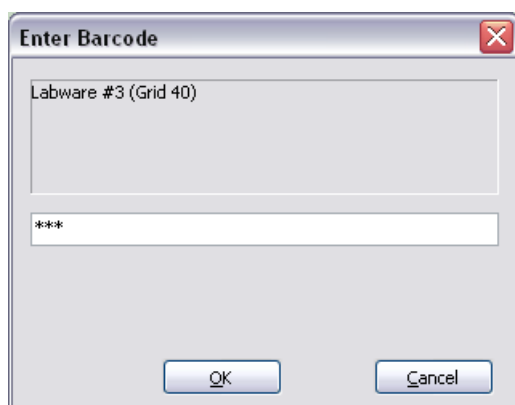
The buttons in the dialog box are as follows:

#### **OK**

Click this button to continue with the script.

### 18.1.16 Enter Barcode

The following dialog box is shown if an error is detected when scanning a labware barcode with the PosID or PosID-3 barcode scanner and the operator clicks *Enter* in the *Barcode Error* dialog box:



**Fig. 18-17** Enter Barcode dialog box

The buttons in the dialog box are as follows:

**OK**

Click OK after you have entered the correct barcode in the field provided.

**Cancel**

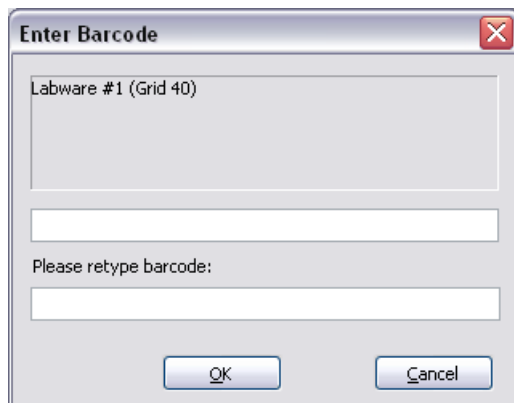
Click Cancel if you want to stop the pipetting script.

This dialog box is also shown if your script contains a PosID command and you are running Freedom EVOware in offline mode. In this case, the dialog box will be shown with a default barcode.

For the PosID, the default barcode for labware is the grid position followed by an underscore ( `_` ) and the site number. The default barcode for tubes is the grid position followed by an underscore ( `_` ) and the tube number.

### 18.1.17 Enter Barcode (Double Blind Entry)

The following dialog box is shown if an error is detected when scanning a labware barcode with the PosID-3 barcode scanner and the operator clicks *Enter* in the *Barcode Error* dialog box. The *Double Blind Entry* feature has been activated in the configuration of the PosID-3. With *Double Blind Entry*, you are prompted to enter the missing barcode twice.



**Fig. 18-18** Enter Barcode dialog box

The buttons in the dialog box are as follows:

**OK**

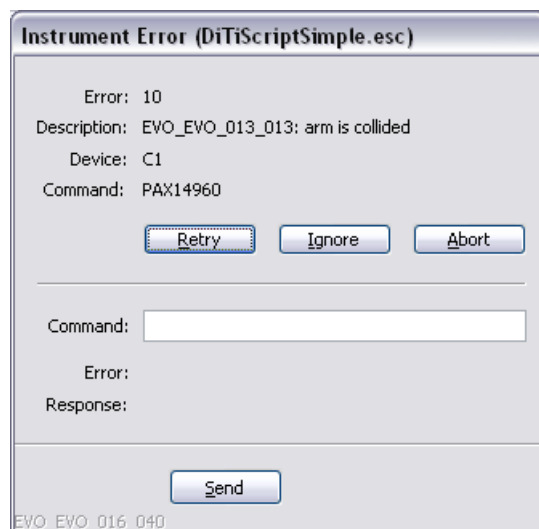
Click OK after you have entered the correct barcode in both of the fields which are provided.

**Cancel**

Click Cancel if you want to stop the pipetting script.

### 18.1.18 Instrument Error

The following dialog box is shown if the pipetting instrument reports an error that is not handled automatically by Freedom EVOware. The dialog box shows the error number, a brief description of the error, and the device (hardware component or option) and firmware command that caused the error.



**Fig. 18-19** Instrument Error dialog box

The buttons in the dialog box are as follows (not all buttons available at all times, refer to the note below):

#### Retry

Click this button to re-send the firmware command to the pipetting instrument. This option is not allowed for users with the user level Operator. If you click the Retry button, you will be prompted to log in again as an Application Specialist or Freedom EVOware Administrator <sup>1)</sup>. You will not be able to proceed with Retry if you do not have the appropriate user name and password.

#### Ignore

Click this button to ignore the error and continue with the pipetting script. Please be careful with this option. Ignoring errors can lead to further errors. This option is not allowed for users with the user level Operator. If you click the Retry button, you will be prompted to log in again as an Application Specialist or Freedom EVOware Administrator <sup>1)</sup>. You will not be able to proceed with Ignore if you do not have the appropriate user name and password.

#### Abort

If you click this button, the current command is completed without sending any more firmware commands (e.g. movement commands) to the pipetting instrument and the script is stopped. Freedom EVOware then switches to offline mode. To cancel offline mode and resume normal pipetting, choose *Switch to real mode* in the Execute menu or restart Freedom EVOware.

1) Or a Power User with the rights "Start running pipetting scripts at a specified line number". See 8.3.3.3 "Groups Tab", 8-19.

**Send**

This button is used to send a firmware command directly to the pipetting instrument and is only intended for specialists. Specify the required command in the *Command* field and click *Send*. For example, "A1RPZ0" returns the current Z position of each of the LiHa tips. Refer to the firmware documentation for the device for a complete list of firmware commands. Firmware commands are nearly always written uppercase.

**Error:** All firmware commands terminate with an error code. After clicking the *Send* button, the error code is shown in this (protected) field. The error code is 0 if the command was executed with no errors.

**Response:** Some firmware commands terminate with one or more return parameters (numeric values) separated by commas. After clicking the *Send* button, the return parameters are shown in this (protected) field.



**WARNING**

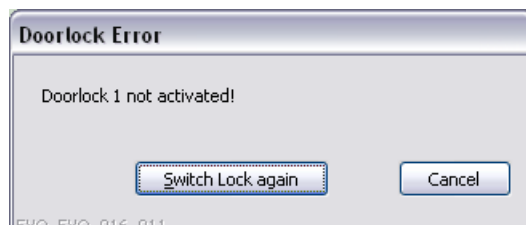
Risk of injury to operating personnel or damage to the equipment

- ♦ Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

**Note:** The buttons *Retry*, *Ignore* and *Send* are not available (inactive) if you are logged in to Freedom EVOware as an operator. In this case, only the *Abort* button is available.

**18.1.19 Doorlock Error**

The following dialog box is shown if an error is reported by the doorlock hardware when locking or unlocking the doorlocks. When locking the doorlocks, a doorlock error normally indicates that the respective safety door has not been closed properly, but it can also be caused by a mechanical or electrical malfunction of the doorlock mechanism. The dialog box shows which doorlock has reported the error.



**Fig. 18-20** Doorlock Error dialog box

The buttons in the dialog box are as follows:

**Switch Lock again**

Click this button to try to lock or unlock the doorlocks in the doorlock group again. The Doorlock Error dialog box will displayed again if the operation is not successful.

### Cancel

When the doorlock error is shown at script or process start or during initialization, pressing the Cancel button will stop the start of the run or initialization.

When the doorlock error is shown during a run after one of the other error windows described in this chapter, then pressing the Cancel button will bring you back to the previous error window.



### WARNING

Risk of injury to operating personnel

- ♦ Be aware of the safety risk if the doors are not properly locked. In doubt, cancel the script and contact the maintenance personnel before using the pipetting instrument again.

## 18.1.20 Grip Error

The following dialog box is shown in EVOware Standard for a Grip Error during a Transfer Labware or ROMA Vector command or if the PnP could not grip a tube. It is also shown if a MCA96 or MCA384 Gripper could not grip a rack:

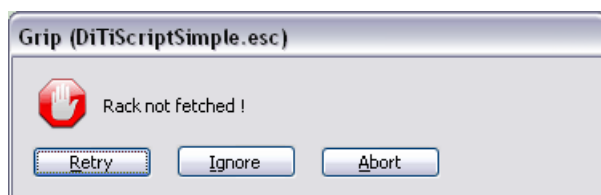


Fig. 18-21 Grip Error dialog box

The buttons in the dialog box are as follows:

#### Retry

If you click this button, Freedom EVOware will try to grip the labware item or tube again.

#### Ignore

If you click this button, Freedom EVOware will ignore the error and continue with the pipetting script. Please be careful with this option. Ignoring errors can lead to further errors.

#### Abort

Click Abort if you want to stop the pipetting script.

In EVOware PLUS if the NamedPipe Command ROMA\_GRIP could not grip a rack the following dialog is shown:



Fig. 18-22 Grip Retry dialog box



The buttons in the dialog box are as follows:

**Retry**

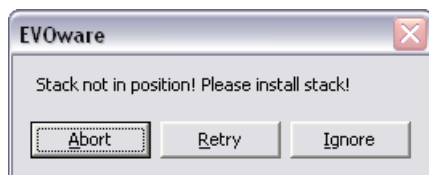
If you click this button, Freedom EVOware will try to grip the labware item or tube again.

**Abort**

Click Abort if you want to stop the pipetting script.

**18.1.21 Te-Stack Errors**

The following dialog box is shown if the Te-Stack (stand-alone stacker) or the Te-Stack Te-MO reports an error.



*Fig. 18-23 -Te-Stack Errors message box*

The following errors can be displayed in this dialog box:

**Stack not in position**

You must insert a stack into the stacker (error from Te-Stack or Te-Stack Te-MO).

**Stack empty**

The stack is empty, you must put labware into the stack (error from Te-Stack or Te-Stack Te-MO).

**Carrier position not empty**

The transfer position is already occupied, you must remove the labware from the transfer position (error from Te-Stack only).

**Carrier position empty**

The transfer position is empty, you must place labware onto the carrier at the transfer position (error from Te-Stack only).

**No barcode detected**

The labware barcode could not be scanned, e.g. damaged barcode, or wrong barcode format (error from Te-Stack only). You should check the barcode and/or the scanner.

**18.1.21.1 Other Te-Stack Errors**

The following dialog box is shown if the Te-Stack reports an error which is not listed in [18.1.21 “Te-Stack Errors”](#), [Fig. 18-21](#). The dialog box shows the pipetting instrument error number and a brief description of the error, such as “Te-Stack collided with an obstacle” or “time-out error”.

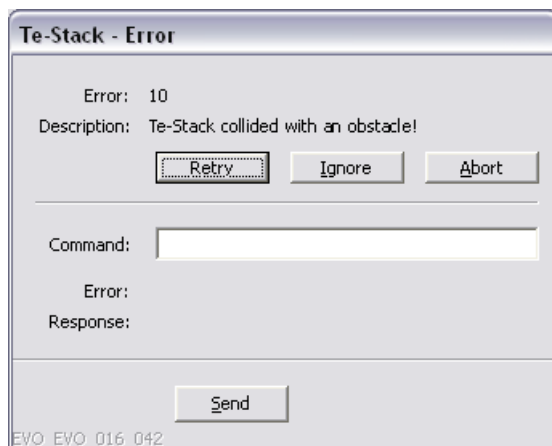


Fig. 18-24 Te-Stack Error dialog box

**Note:** The pipetting instrument error number is not the same as the Freedom EVOware error message ID.

The buttons in the dialog box are as follows:

**Retry**

If you click this button, Freedom EVOware will resend the command to the pipetting instrument.

**Ignore**

If you click this button, Freedom EVOware will ignore the error and continue with the pipetting script. Please be careful with this option. Ignoring errors can lead to further errors.

**Abort**

Click Abort if you want to stop the pipetting script.

**Send**

This button lets you send a firmware command directly to the instrument and is only intended for specialists. Specify the required command in the *Command* field and click *Send*. For example, "A1RPZ0" returns the current Z position of each of the LiHa tips. See the respective instrument manual for a list of firmware commands. Firmware commands are nearly always written uppercase.

**Error:** All firmware commands terminate with an error code. After clicking the *Send* button, the error code is shown in this (protected) field. The error code is 0 if the command was executed with no errors.

**Answer:** Some firmware commands terminate with one or more return parameters (numeric values) separated by commas. After clicking the *Send* button, the return parameters are shown in this (protected) field.



**WARNING**

Risk of injury to operating personnel or damage to the equipment

- ♦ Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

### 18.1.22 Te-MO DITI Error

The following dialog box is shown if a Te-MO DITI could not be fetched:



*Fig. 18-25 Te-MO DITI error dialog box*

A similar dialog box is shown if the Te-MO tipblock could not be fetched.

The buttons in the dialog box are as follows:

**Retry**

If you click this button, Freedom EVOware will try to fetch the Te-MO DITI or Te-MO tipblock again.

**Ignore and continue**

If you click this button, Freedom EVOware will ignore the error and continue with the pipetting script. Please be careful with this option. Ignoring errors can lead to further errors.

**Abort**

Click Abort if you want to stop the pipetting script.

### 18.1.23 WRC/Te-MO Error

The Wash & Refill Center is a supporting device for the Te-MO which is connected to the Te-MO wash block through tubing. The following dialog box is shown if the Te-MO or the WRC reports an error, with the exception of the errors WRC empty and WRC overflow, which are described in [18.1.24 "WRC Errors"](#), [18-25](#).

The dialog box shows the pipetting instrument error number and a brief description of the error, such as "Waste bottle 1 empty":

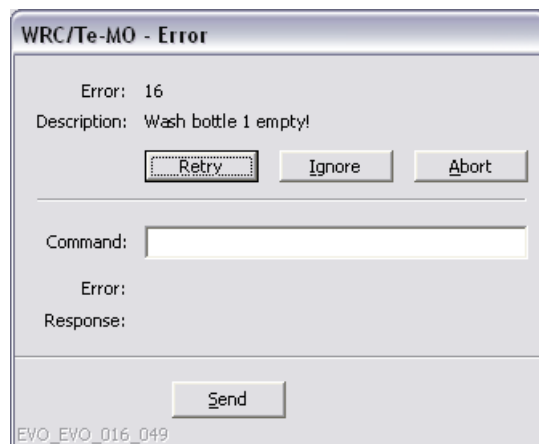


Fig. 18-26 WRC/Te-MO Error dialog box

**Note:** The pipetting instrument error number is not the same as the Freedom EVOware error message ID.

The buttons in the dialog box are as follows:

**Retry**

If you click this button, Freedom EVOware will resend the command to the pipetting instrument.

**Ignore**

If you click this button, Freedom EVOware will ignore the error and continue with the pipetting script. Please be careful with this option. Ignoring errors can lead to further errors.

**Abort**

If you click this button, the current command is completed without sending any more firmware commands (e.g. movement commands) to the pipetting instrument and the script is stopped. Freedom EVOware then switches to offline mode. To cancel offline mode and resume normal pipetting, choose *Switch to real mode* in the Execute menu or restart Freedom EVOware.

**Send**

This button lets you send a firmware command directly to the instrument and is only intended for specialists. Specify the required command in the *Command* field and click *Send*. For example, "A1RPZ0" returns the current Z position of each of the LiHa tips. See the respective instrument manual for a list of firmware commands. Firmware commands are nearly always written uppercase.

**Error:** All firmware commands terminate with an error code. After clicking the *Send* button, the error code is shown in this (protected) field. The error code is 0 if the command was executed with no errors.

**Answer:** Some firmware commands terminate with one or more return parameters (numeric values) separated by commas. After clicking the *Send* button, the return parameters are shown in this (protected) field.

**WARNING**



Risk of injury to operating personnel or damage to the equipment

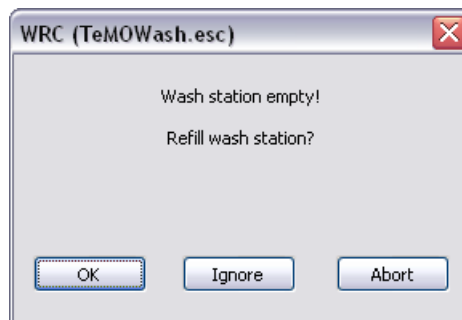
- ♦ Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

### 18.1.24 WRC Errors

The Wash & Refill Center is a supporting device for the Te-MO which is connected to the Te-MO wash block through tubing. The following two errors can be output by the Wash and Refill Center. See [18.1.23 "WRC/Te-MO Error"](#), [18-23](#) for information on additional Te-MO WRC errors.

#### 18.1.24.1 WRC Empty Error

The following dialog box is shown during a Te-MO wash cycle if the wash block of the Wash & Refill Center (WRC) is empty. You will be prompted to refill the wash block:



*Fig. 18-27 Wash & Refill Center error dialog box*

The buttons in the dialog box are as follows:

#### **OK**

The pumps will be started and will continue to run until the liquid reaches the specified upper level or the user stops the pumps.

#### **Ignore**

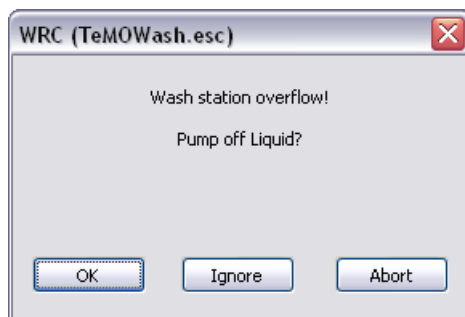
If you click this button, Freedom EVOware will ignore the error and continue with the pipetting script. Please be careful with this option. Ignoring errors can lead to further errors.

#### **Abort**

Click Abort if you want to stop the pipetting script.

#### 18.1.24.2 WRC Overflow Error

The following dialog box is shown during a Te-MO wash cycle if the wash block of the Wash & Refill Center (WRC) is full. You will be prompted to empty the wash block:



**Fig. 18-28** Wash & Refill Center error dialog box

The buttons in the dialog box are as follows:

**OK**

The vacuum pump will be started and will continue to run until the liquid reaches the specified lower level or the user stops the pump.

**Ignore**

If you click this button, Freedom EVOware will ignore the error and continue with the pipetting script. Please be careful with this option. Ignoring errors can lead to further errors.

**Abort**

Click Abort if you want to stop the pipetting script.

### 18.1.25 WinWash Liquid Error

WinWash Plus is an MS Windows-based program which is supplied with Tecan Plate Washers. It functions as the software interface between the PW384 driver in Freedom EVOware and the hardware of the PW384 Plate Washer. WinWash Plus is not used by the PW384GP driver.

Freedom EVOware displays the following dialog box when executing a script containing WinWash commands if one or more of the bottles is empty:



*Fig. 18-29 WinWash Liquid Error dialog box*

The buttons in the dialog box are as follows:

#### **OK**

If you click this button, Freedom EVOware will resend the command to the pipetting instrument.

#### **Ignore**

If you click this button, Freedom EVOware will ignore the error and continue with the pipetting script. Please be careful with this option. Ignoring errors can lead to further errors.

#### **Cancel**

The pipetting script is stopped.

#### 18.1.25.1 Other WinWash Errors

The following general errors can also occur:

##### **COM-Library could not be initialized!**

Possible reason: WinWash Plus is not installed.

##### **WinWash server could not be created!**

Possible reason: WinWash Plus is not installed.

##### **The washer could not be connected!**

Possible reason: Washer not switched on or washer not connected to the PC.

The following error can occur when defining the WinWash command in your script:

##### **Error during wash program selection!**

Internal WinWash error. A problem occurred when choosing the WinWash program.

### 18.1.26 Vacuum Waste Container Error

The following dialog box is shown by the Te-VacS option if the waste container is full:



Fig. 18-30 Vacuum Waste Container error dialog box

The buttons in the dialog box are as follows:

#### Ignore

To continue with the pipetting script, empty the waste container and click the *Ignore* button.

#### Abort

Click Abort if you want to stop the pipetting script.

### 18.1.27 Liquid Error (PW384)

The liquid error dialog box is shown if the waste bottle is not emptied after the configured number of warnings. The liquid error dialog box is also shown if the wash liquid bottle is not re-filled after the configured number of warnings.

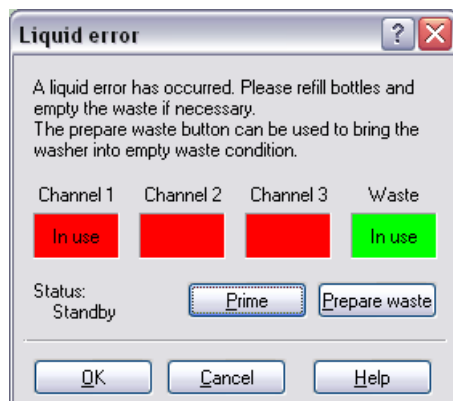


Fig. 18-31 Liquid error dialog box of the PW384 Plate Washer driver

The liquid levels of the wash liquid channel and the waste bottle are checked before each wash step. Warning levels and liquid detection are configured in the settings for the PW384 driver.

In the above example dialog box, all three liquid bottles are empty. The error dialog has been shown because the channel 1 liquid bottle is empty (the other two channels are not used by the wash command so their empty status is ignored). The waste bottle is not full.

The buttons in the dialog box are as follows:



**Prime**

If one of the liquid bottles is empty, the “Channel” icon will be red. In this case, refill the bottle and click the *Prime* button to execute the washer’s priming procedure. The *Prime* button is not available until the bottle has been refilled.

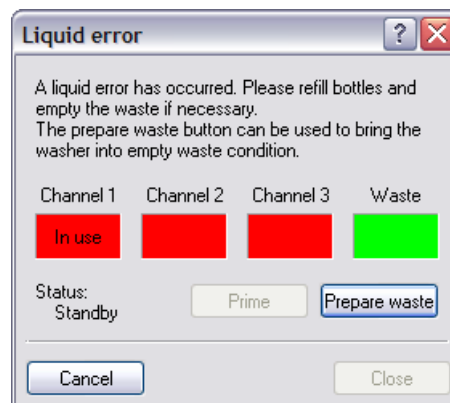
Note: The *Prime* button is not available if you have clicked the *Prepare Waste* button.

**Prepare Waste**

If the waste bottle is full, the “Waste” icon will be red. In this case, click the *Prepare Waste* button to collapse the vacuum in the waste bottle to allow it to be emptied. When you have emptied the waste bottle, the “Waste” icon will turn to green and the *Prepare Waste* button will be replaced by a *Stop* button. Click the *Stop* button to activate the vacuum pump again.

**18.1.28 Liquid Error (PW384GP)**

The liquid error dialog box is shown if the waste bottle is not emptied after the configured number of warnings. The liquid error dialog box is also shown if the wash liquid bottle is not re-filled after the configured number of warnings.



**Fig. 18-32** Liquid error dialog box of the PW384GP Plate Washer driver

The liquid levels of the wash liquid channel and the waste bottle are checked before each wash step. Warning levels and liquid detection are configured in the settings for the PW384GP driver.

In the above example dialog box, all three liquid bottles are empty. The error dialog has been shown because the channel 1 liquid bottle is empty (the other two channels are not used by the wash command so their empty status is ignored). The waste bottle is not full.

The buttons in the dialog box are as follows:

**Prime**

If one of the liquid bottles is empty, the “Channel” icon will be red. In this case, refill the bottle and click the *Prime* button to execute the washer’s priming procedure. The *Prime* button is not available until the bottle has been refilled.

Note: The *Prime* button is not available if you have clicked the *Prepare Waste* button.

### Prepare Waste

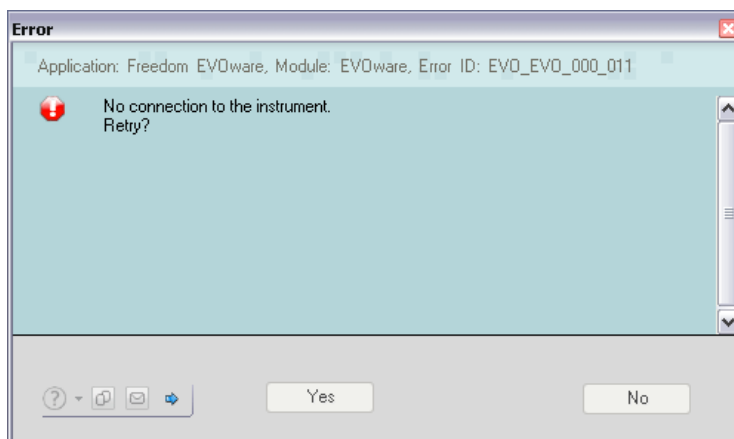
If the waste bottle is full, the “Waste” icon will be red. In this case, click the *Prepare Waste* button to collapse the vacuum in the waste bottle to allow it to be emptied. When you have emptied the waste bottle, the “Waste” icon will turn to green and the *Prepare Waste* button will be replaced by a *Stop* button. Click the *Stop* button to activate the vacuum pump again.

### Close

Click this button to close the dialog box. The *Close* button is only active if the error condition has been resolved by following the procedure described above.

## 18.2 Editing Messages in Message Boxes

Messages in Freedom EVOware which are displayed in a message box use a standard layout as follows:




**Fig. 18-33** Freedom EVOware message box - Normal view

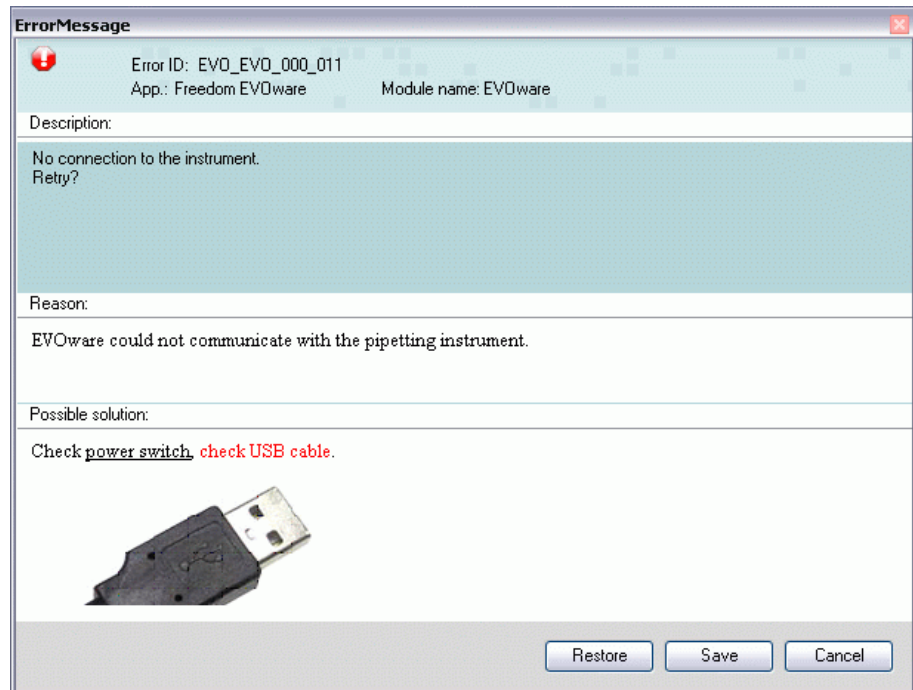
In the case of error messages, the Error ID is shown at the top of the message box. For a list of Error IDs see [18.3 “List of Error Messages”](#), [18-33](#).

If required, you can add more information to each message, such as a reason for the message and a possible solution. The user-defined texts are saved in Freedom EVOware and appear each time the message is displayed. For example, the additional information can refer to procedures which are specific to the laboratory’s standard workflow.

**Note:** Choose *Error History* in the *Help* menu to see a list of the last 20 information or error messages which were displayed while using Freedom EVOware. Double-click on an entry in the list to see the details of the message.

- If you open the message from the *Error History* menu item, the buttons at the bottom of the message are inactivate (grey) because the script or process is no longer running (see *Yes* and *No* buttons in above screen shot).

To edit the message texts, click  in the message box to switch to edit view:

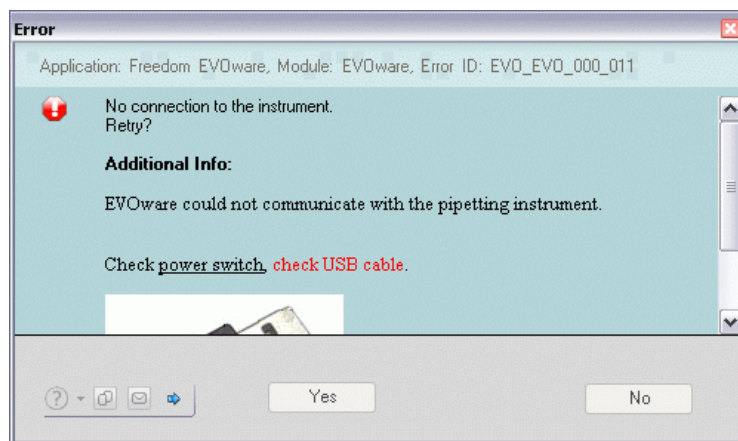


**Fig. 18-34** Freedom EVOware message box - Edit view

Click in the *Reason* or *Possible solution* fields to add your own texts. Use the keyboard shortcut Ctrl+V to paste in text which you have copied to the clipboard. You can also paste in bitmap graphics such as screenshots. The paste-from-clipboard function also supports text which has been formatted using Microsoft RTF (Rich Text Format) formatting codes. An easy way to include RTF formatting in the message such as bold, colored or underlined text, is to pre-format the text in Microsoft Word and to transfer the text from Word to the message box using cut and paste.

Click Save to save your changes. Click Restore to restore the message text to the standard text which was shown when Freedom EVOware was first installed. Click Cancel to discard your changes. Click Close to return to the normal view of the message box.

After editing, the error message shown in Fig. 18-33, 18-30 will appear in future as follows:




**Fig. 18-35** Freedom EVOware message box - Standard view with user-defined texts

The user-defined texts are shared between all of the Freedom EVOware scripts and/or processes which could display this message. Accordingly, you should choose texts which are generally applicable to the message - they should not refer to a specific situation in a specific script or process.

#### Other buttons in the message box

Click  in the message box to copy the message text to the clipboard.

Click  in the message box to send a copy of the message via email. The message will be sent via MAPI or SMTP using the settings configured in Freedom EVOware for the notifications feature (Configuration Tool > General tab > Notifications section). If an email account has not (yet) been configured in Freedom EVOware, the email will be sent instead using the default email client which is installed on the PC (if available).

## 18.3 List of Error Messages

The table below lists all messages from Freedom EVOware which are visible to the user.

Runtime error messages from Freedom EVOware are recorded in log files and can also be viewed in the LogViewer tool (see [A.1 "Overview of the Log Files"](#), [A-1](#) and [A.12 "LogViewer Tool"](#), [A-74](#)).

### Error Messages

In case of error messages, this gives instructions on how to handle the error, if applicable.

If there is no cause or corrective measure associated with the message (e.g. if the message is for information purposes only), the table cell is marked with n.a. for "not applicable".

### Variables

If the message text shown in the table contains variables, such as numbers or names, the variable is shown below in angle brackets, e.g. <name>.

The text in the Freedom EVOware message or error message will show the corresponding value of the variable.

**Tab. 18-1** List of error messages

Error ID	Message Text	Reason	Corrective Measure
<b>Carousel</b>			
EVO_BCC_000_000	Module successfully executed its COM registration.	n.a.	n.a.
EVO_BCC_000_001	Module is unable to prepare its COM registration.	<ul style="list-style-type: none"> <li>• Call name is missing</li> <li>• No right to write to registry</li> </ul>	<ul style="list-style-type: none"> <li>• Check driver INI file</li> <li>• Check user rights</li> </ul>
EVO_BCC_000_002	An unhandled exception has occurred.	Exception occurred during registration	<ul style="list-style-type: none"> <li>• Check INI file</li> <li>• Check user rights</li> </ul>
EVO_BCC_001_000	No communication to device available. Device will be simulated.	COM port could not be opened	<ul style="list-style-type: none"> <li>• Check device configuration</li> </ul>
EVO_BCC_002_000	Error <error number> while initializing Communication!	Windows responded with an error while opening COM	<ul style="list-style-type: none"> <li>• Check configuration</li> </ul>
EVO_BCC_003_000	Could not connect to Message Server.	Could not connect to MCS	<ul style="list-style-type: none"> <li>• Check registration of MCS</li> </ul>
EVO_BCC_003_001	Message thread could not be stopped.	(in debug mode only)	n.a.
EVO_BCC_004_000	General error during database registration!	Problem during connection to database	<ul style="list-style-type: none"> <li>• Restart EVOware</li> <li>• Restore backup</li> <li>• Reinstall EVOware</li> </ul>
EVO_BCC_004_001	Scheduler could not be reached!	Could not connect the scheduler	<ul style="list-style-type: none"> <li>• Restart EVOware</li> <li>• Reinstall EVOware</li> </ul>
EVO_BCC_005_000	Cannot read variables from database.	Error when reading variables from the database	<ul style="list-style-type: none"> <li>• Restart EVOware</li> <li>• Restore backup</li> <li>• Reinstall EVOware</li> </ul>

**Tab. 18-1** List of error messages (cont.)

<b>Error ID</b>	<b>Message Text</b>	<b>Reason</b>	<b>Corrective Measure</b>
EVO_BCC_005_001	Cannot read instances from database.	Error when reading instances from the database	<ul style="list-style-type: none"> <li>• Restart EVOware</li> <li>• Restore backup</li> <li>• Reinstall EVOware</li> </ul>
EVO_BCC_006_000	Initialization was successful	n.a.	n.a.
EVO_BCC_006_001	Initialization was NOT successful	An error was reported from the carousel	<ul style="list-style-type: none"> <li>• Re-initialize</li> <li>• Restart EVOware</li> <li>• Restart instrument and EVOware</li> </ul>
EVO_BCC_006_002	ERROR: EndAccess command expected!	EndAccess command missing	<ul style="list-style-type: none"> <li>• Add EndAccess command</li> </ul>
EVO_BCC_006_003	ERROR: ReturnPlateByBarcode command expected!	ReturnPlate command missing	<ul style="list-style-type: none"> <li>• Add ReturnPlate command</li> </ul>
EVO_BCC_006_004	Timeout occurred while synchronizing with tool thread	Timeout	<ul style="list-style-type: none"> <li>• Check log files for more information</li> </ul>
EVO_BCC_006_005	Execution was successful	n.a.	n.a.
EVO_BCC_006_006	Error occurred during execution	See error message	<ul style="list-style-type: none"> <li>• Check log files</li> </ul>
EVO_BCC_006_007	Carousel timed out.	An action took too long	<ul style="list-style-type: none"> <li>• Restart process</li> <li>• Restart EVOware</li> </ul>
EVO_BCC_006_008	Emergency Stop	n.a.	n.a.
EVO_BCC_007_000	Generated ID <name>	n.a.	n.a.
EVO_BCC_007_001	Barcode <name>	n.a.	n.a.
<b>Carousel NT</b>			
EVO_CNT_000_000	Error initializing device.	<ul style="list-style-type: none"> <li>• Device initialization failed</li> <li>• Instrument or device switched off</li> <li>• Incorrect address settings</li> <li>• Bad connections to device</li> </ul>	<ul style="list-style-type: none"> <li>• Check if device is powered</li> <li>• Check address settings</li> <li>• Check connections</li> </ul>
EVO_CNT_000_001	Execution was successful	n.a.	n.a.
EVO_CNT_000_002	Error occurred during execution	See error message	<ul style="list-style-type: none"> <li>• Check log files</li> </ul>
EVO_CNT_000_003	ERROR: Barcode File Index is greater than number of lines in barcode file!	n.a.	<ul style="list-style-type: none"> <li>• Check number of lines in barcode file, check the barcode index</li> </ul>
EVO_CNT_000_004	Cannot find position for specified barcode: <barcode>	Plate with specified barcode not known to the carousel.	<ul style="list-style-type: none"> <li>• Check barcode</li> <li>• Refer to the description of the commands PresentPlateByBC and ReturnPlateByBC</li> </ul>

**Tab. 18-1** List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_CNT_000_005	Makro_ReadPlatesInCartridge: A database error was reported by function GetAllPlatesInHotel():	Internal error	Contact your local service organization
EVO_CNT_000_006	Makro_ReadPlatesInCartridge: No logical hotel found for cartridge {}	Configuration error	<ul style="list-style-type: none"> <li>• Check the configuration of the logical carousel</li> <li>• Restart Freedom EVOware</li> </ul>
EVO_CNT_000_007	Cannot find position for specified barcode: <barcode>	Plate with specified barcode not known to the carousel.	<ul style="list-style-type: none"> <li>• Check barcode</li> <li>• Refer to the description of the commands PresentPlateByBC and ReturnPlateByBC</li> </ul>
EVO_CNT_000_008	Could not read the Slot 'ID' of: {}	Configuration error	<ul style="list-style-type: none"> <li>• Check the configuration</li> </ul>
EVO_CNT_000_009	Error: Exception thrown while communicating with robot driver. Unable to update labware: {}	Internal error	Contact your local service organization
EVO_CNT_000_010	Cartridge position <cartridge number>: Barcode unreadable	Damaged barcode	<ul style="list-style-type: none"> <li>• Check barcode label on cartridge</li> </ul>
EVO_CNT_000_011	ERROR: Timeout occurred while synchronizing with tool thread	Timeout	<ul style="list-style-type: none"> <li>• Check log files for more information</li> </ul>
EVO_CNT_000_012	Error: Doorlock is open.	Doors not closed	<ul style="list-style-type: none"> <li>• Check correct operation of door lock</li> <li>• Make sure safety doors are closed</li> </ul>
EVO_CNT_000_013	Unable to update barcode for labware <{}> Barcode-ID: {}, cartridge: {}, slot: {} Reason: {}	Internal error	Contact your local service organization
EVO_CNT_000_014	Error: Firmware version is too old! Required version: {}	Incorrect firmware version.	Contact your local service organization
EVO_CNT_000_015	Hotel Error: Door or door lock is open!	Doors not closed	<ul style="list-style-type: none"> <li>• Check correct operation of door lock</li> <li>• Make sure safety doors are closed</li> </ul>
EVO_CNT_000_016	Cannot read variables from database.	Internal error or incorrect device configuration.	<ul style="list-style-type: none"> <li>• Check configuration</li> </ul>
EVO_CNT_000_017	Cannot read instances from database.	Internal error or incorrect device configuration.	<ul style="list-style-type: none"> <li>• Check configuration</li> </ul>
EVO_CNT_000_018	Cartridge position <cartridge number>: No cartridge detected	Cartridge is missing	<ul style="list-style-type: none"> <li>• Check cartridge</li> </ul>
EVO_CNT_001_000	ERROR: No Plate detected on the transfer station!	Plate was expected but not found on the transfer station	<ul style="list-style-type: none"> <li>• Check configuration</li> <li>• Check for mechanical malfunction</li> </ul>

**Tab. 18-1** List of error messages (cont.)

<b>Error ID</b>	<b>Message Text</b>	<b>Reason</b>	<b>Corrective Measure</b>
EVO_CNT_001_001	ERROR: Plate detected on the transfer station!	Plate not expected but was found on the transfer station	<ul style="list-style-type: none"> <li>• Check configuration</li> <li>• Check for mechanical malfunction</li> </ul>
EVO_CNT_002_001	Temperature: {}°C / {}°F	Message with information on the temperature inside the carousel	n.a.
EVO_CNT_002_002	Humidity: {}%rH	Message with information on the humidity inside the carousel	n.a.
EVO_CNT_003_000	ERROR: Barcodes doesn't match for: {} scanned BC: ' {} ' expected BC: ' {}'	The carousel has re-scanned the barcode for confirmation but the new ID does not match the old one	<ul style="list-style-type: none"> <li>• Check the barcode</li> </ul>
EVO_CNT_003_001	ERROR: Instance {} locked, unable to update ID slot.	Failed to read barcode because the plate is currently being accessed by another device; internal error	Contact your local service organization
EVO_CNT_003_002	ERROR: Unable to update Instance <{}>, DCOM error: {}	Internal error	Contact your local service organization
EVO_CNT_003_003	ERROR: Unable to update Instance <{}>, unknown exception caught	Internal error	Contact your local service organization
EVO_CNT_004_000	Hotel Error: {} Unknown Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_001	Hotel Error: {} General Handling Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_007	Hotel Error: {} Gate Open Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_008	Hotel Error: {} Gate Close Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_009	Hotel Error: {} General Lift Positioning Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_010	Hotel Error: {} User Access Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_011	Hotel Error: {} Stacker Slot Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_012	Hotel Error: {} Undefined stacker level has been requested	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_013	Hotel Error: {} Plate Transfer Detection Error	Carousel NT firmware command error	Contact your local service organization



**Tab. 18-1** List of error messages (cont.)

<b>Error ID</b>	<b>Message Text</b>	<b>Reason</b>	<b>Corrective Measure</b>
EVO_CNT_004_014	Hotel Error: {} Lift Initialization Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_015	Hotel Error: {} Plate on Shovel Detection	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_016	Hotel Error: {} No Plate on Shovel Detection	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_017	Hotel Error: {} No recovery	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_019	Hotel Error: {} Shovel timeout	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_100	Hotel Error: {} Import Plate Stacker Positioning Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_101	Hotel Error: {} Import Plate Handler Transfer Turn out Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_102	Hotel Error: {} Import Plate shovel Transfer Outer Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_103	Hotel Error: {} Import Plate Lift Transfer Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_104	Hotel Error: {} Import Plate Shovel Transfer Inner Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_105	Hotel Error: {} Import Plate Handler Transfer Turn in Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_106	Hotel Error: {} Import Plate Lift Stacker Travel Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_107	Hotel Error: {} Import Plate Shovel Stacker Front Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_108	Hotel Error: {} Import Plate Lift Stacker Place Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_109	Hotel Error: {} Import Plate shovel Stacker Inner Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_110	Hotel Error: {} Import Plate Lift Travel Back Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_111	Hotel Error: {} Import Plate Lift Init Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_200	Hotel Error: {} Export Plate Lift Stacker Travel Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_201	Hotel Error: {} Export Plate Shovel Stacker Front Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_202	Hotel Error: {} Export Plate Lift Stacker Import Error	Carousel NT firmware command error	Contact your local service organization

Tab. 18-1 List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_CNT_004_203	Hotel Error: {} Export Plate Shovel Stacker Inner Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_204	Hotel Error: {} Export Plate Lift Transfer Positioning Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_205	Hotel Error: {} Export Plate Handler Transfer Turn out Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_206	Hotel Error: {} Export Plate Shovel Transfer Outer Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_207	Hotel Error: {} Export Plate Lift Transfer Place Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_208	Hotel Error: {} Export Plate Shovel Transfer Inner Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_209	Hotel Error: {} Export Plate Handler Transfer Turn in Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_210	Hotel Error: {} Export Plate Lift Travel Back Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_211	Hotel Error: {} Export Plate Lift Initializing Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_005_000	Cartridge position {}: SAP-ID: {} S/N: {} Type: {} --- OK	Internal command has reported that the correct cartridge is present	n.a.
EVO_CNT_005_001	Cartridge position {}: SAP-ID: {} S/N: {} Type: {} --- Wrong cartridge detected	Internal command has reported that the wrong cartridge is present	<ul style="list-style-type: none"> <li>• Check if correct cartridge is present</li> </ul>
<b>Columbus Washer</b>			
EVO_COL_000_000	Max. time for Auto Rinse is 24h	n.a.	n.a.
EVO_COL_000_001	Module successfully executed its COM registration.	n.a.	n.a.
EVO_COL_000_002	Module is unable to prepare its COM registration.	<ul style="list-style-type: none"> <li>• Call name is missing</li> <li>• No right to write to registry</li> </ul>	<ul style="list-style-type: none"> <li>• Check driver INI file</li> <li>• Check user rights</li> </ul>
EVO_COL_000_003	An unhandled exception has occurred.	Exception occurred during registration	<ul style="list-style-type: none"> <li>• Check INI file</li> <li>• Check user rights</li> </ul>
EVO_COL_000_004	No communication to device available. Device will be simulated.	Could not open COM port	Check configuration
EVO_COL_000_005	Error <error number> while initializing Communication!	Could not initialize COM port	<ul style="list-style-type: none"> <li>• Check configuration</li> </ul>
EVO_COL_000_006	Init Error	Washer firmware command error	Contact your local service organization

**Tab. 18-1** List of error messages (cont.)

<b>Error ID</b>	<b>Message Text</b>	<b>Reason</b>	<b>Corrective Measure</b>
EVO_COL_000_007	Invalid Command	Washer firmware command error	Contact your local service organization
EVO_COL_000_008	Invalid Operand	Washer firmware command error	Contact your local service organization
EVO_COL_000_009	Invalid Command Sequence	Washer firmware command error	Contact your local service organization
EVO_COL_000_010	System Error	Washer firmware command error	Contact your local service organization
EVO_COL_000_011	Time-out Error	Washer firmware command error	Contact your local service organization
EVO_COL_000_012	Plate Mismatch	Washer firmware command error	Contact your local service organization
EVO_COL_000_013	Plate Transport Error	Washer firmware command error	Contact your local service organization
EVO_COL_000_014	Manifold Transport Error	Washer firmware command error	Contact your local service organization
EVO_COL_000_015	Dispense Pump Error	Washer firmware command error	Contact your local service organization
EVO_COL_000_016	Fill Verification Dispense Error	Washer firmware command error	Contact your local service organization
EVO_COL_000_017	Manifold Error	Washer firmware command error	Contact your local service organization
EVO_COL_000_018	Waste Full Error	Washer firmware command error	Contact your local service organization
EVO_COL_000_019	No Test defined	Washer firmware command error	Contact your local service organization
EVO_COL_000_020	Command Overflow	Washer firmware command error	Contact your local service organization
EVO_COL_000_021	Fill Verification Function Error	Washer firmware command error	Contact your local service organization
EVO_COL_000_022	Fill Verification Aspiration Error	Washer firmware command error	Contact your local service organization
EVO_COL_000_023	Unknown error reported by device	Washer firmware command error	Contact your local service organization
EVO_COL_000_024	Well row <number>: following manifold needles failed:	n.a.	n.a.
EVO_COL_000_025	Timeout	Washer firmware command error	Contact your local service organization
EVO_COL_000_026	WaitForReadyFlag timed out!	Timeout while waiting for device	• Check communication with device

**Tab. 18-1** List of error messages (cont.)

<b>Error ID</b>	<b>Message Text</b>	<b>Reason</b>	<b>Corrective Measure</b>
EVO_COL_000_027	ERROR: No wash channel specified or channel file missing	-	<ul style="list-style-type: none"> <li>• Choose different channel file</li> <li>• Choose different channel file</li> </ul>
EVO_COL_000_028	ERROR: Invalid Dispense Rate specified	-	<ul style="list-style-type: none"> <li>• Choose other dispense rate</li> </ul>
EVO_COL_000_029	ERROR: Invalid Aspiration Rate specified	-	<ul style="list-style-type: none"> <li>• Choose other aspiration rate</li> </ul>
EVO_COL_000_030	ERROR: Invalid Aspirate Mode specified	-	<ul style="list-style-type: none"> <li>• Choose other aspiration mode</li> </ul>
EVO_COL_000_031	ERROR: Invalid Wash Mode specified	-	<ul style="list-style-type: none"> <li>• Choose other wash mode</li> </ul>
EVO_COL_000_032	ERROR: Invalid Dispense Position specified	-	<ul style="list-style-type: none"> <li>• Choose other dispense position</li> </ul>
EVO_COL_000_033	ERROR: Invalid Channel specified	-	<ul style="list-style-type: none"> <li>• Choose different channel</li> </ul>
EVO_COL_000_034	ERROR: Invalid Dispense Volume specified	-	<ul style="list-style-type: none"> <li>• Choose other dispense volume</li> </ul>
EVO_COL_000_035	ERROR: Invalid Soak Time specified	-	<ul style="list-style-type: none"> <li>• Choose other soak time</li> </ul>
EVO_COL_000_036	ERROR: Invalid Shaking Mode specified	-	<ul style="list-style-type: none"> <li>• Choose different shaking mode</li> </ul>
EVO_COL_000_037	ERROR: Invalid StripCount specified by labware	-	<ul style="list-style-type: none"> <li>• Check number of strips</li> </ul>
EVO_COL_000_038	ERROR: Invalid Prime Time specified	-	<ul style="list-style-type: none"> <li>• Choose other priming time</li> </ul>
EVO_COL_000_039	ERROR: Invalid Prime Channel specified	-	<ul style="list-style-type: none"> <li>• Choose different priming channel</li> </ul>
EVO_COL_000_040	ERROR: Invalid Rinse Time specified	-	<ul style="list-style-type: none"> <li>• Choose other rinse time</li> </ul>
EVO_COL_000_041	ERROR: Invalid Rinse Channel specified	-	<ul style="list-style-type: none"> <li>• Choose different rinse channel</li> </ul>
EVO_COL_000_042	ERROR: Invalid Rinse Mode specified	-	<ul style="list-style-type: none"> <li>• Choose different rinse mode</li> </ul>
<b>Freedom EVO</b>			
EVO_EVO_000_000	Evoware is already running	Multisession is not permissible for EVOware	<ul style="list-style-type: none"> <li>• Start EVOware only once</li> </ul>
EVO_EVO_000_001	Error reading settings file <file name>. Evoware uses defaults!	One of the configuration files is not accessible for reading	<ul style="list-style-type: none"> <li>• Reinstall EVOware</li> <li>• Restore backup</li> </ul>

**Tab. 18-1** List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_000_002	Error writing settings file <file name>.	One of the configuration files is not accessible for writing	<ul style="list-style-type: none"> <li>• Reinstall EVOware</li> <li>• Restore backup</li> </ul>
EVO_EVO_000_003	Wrong version of settings file <file name>. Evoaware uses defaults!	Inconsistent configuration	<ul style="list-style-type: none"> <li>• Reinstall EVOware</li> <li>• Restore backup</li> </ul>
EVO_EVO_000_004	Error creating log-file	Harddisk full	<ul style="list-style-type: none"> <li>• Check harddisk</li> <li>• Reinstall EVOware</li> </ul>
EVO_EVO_000_005	The instrument does not respond. Retry?	Instrument switched off Instrument not connected properly	<ul style="list-style-type: none"> <li>• Switch instrument on</li> <li>• Check connections</li> </ul>
EVO_EVO_000_006	Error writing <file name>	One of the configuration files is not accessible for writing	<ul style="list-style-type: none"> <li>• Reinstall EVOware</li> <li>• Restore backup</li> </ul>
EVO_EVO_000_007	Error reading liquid classes file <file name>	One of the configuration files is not accessible for reading	<ul style="list-style-type: none"> <li>• Reinstall EVOware</li> <li>• Restore backup</li> </ul>
EVO_EVO_000_008	Error writing liquid classes file <file name>	One of the configuration files is not accessible for writing	<ul style="list-style-type: none"> <li>• Reinstall EVOware</li> <li>• Restore backup</li> </ul>
EVO_EVO_000_009	Are you sure?	n.a.	n.a.
EVO_EVO_000_010	Error reading <file name>	One of the configuration files is not accessible	<ul style="list-style-type: none"> <li>• Reinstall EVOware</li> <li>• Restore backup</li> </ul>
EVO_EVO_000_011	No connection to the instrument. Retry?	Pipetting instrument not connected properly	Check connections.
EVO_EVO_000_012	Error loading device drivers: <file name>	Installation corrupt	• Reinstall EVOware
EVO_EVO_000_013	PMP - Connection Error: <error text> PMP will not continue.	<ul style="list-style-type: none"> <li>• PMP driver loaded, but there is no PMP option installed</li> <li>• PMP option defective</li> </ul>	<ul style="list-style-type: none"> <li>• Disable driver in configuration</li> <li>• Field Service Engineer: Replace defective parts</li> </ul>
EVO_EVO_000_014	PMP - Initialize Error: <error text> PMP will not continue.	PMP-related error	Contact your local service organization
EVO_EVO_000_015	PMP - Stop Error: <error text> PMP will not continue.	PMP-related error	Contact your local service organization
EVO_EVO_000_016	PMP - Drop Tips Error: <error text> PMP will not continue.	PMP-related error	Contact your local service organization
EVO_EVO_000_017	PMP - Drop Tips Error: <error text> PMP continues.	PMP-related error	Contact your local service organization
EVO_EVO_000_018	PMP - Pickup Tips Error: <error text> PMP will not continue.	PMP-related error	Contact your local service organization

**Tab. 18-1** List of error messages (cont.)

<b>Error ID</b>	<b>Message Text</b>	<b>Reason</b>	<b>Corrective Measure</b>
EVO_EVO_000_019	PMP - Pickup Tips Error: <error text> PMP continues.	PMP-related error	Contact your local service organization
EVO_EVO_000_020	PMP - Set DiTis Back Error: <error text> PMP will not continue.	PMP-related error	Contact your local service organization
EVO_EVO_000_021	PMP - Set DiTis Back Error: <error text> PMP continues.	PMP-related error	Contact your local service organization
EVO_EVO_000_022	PMP - Aspirate Error: <error text> PMP will not continue.	PMP-related error	Contact your local service organization
EVO_EVO_000_023	PMP - Dispense Error: <error text> PMP will not continue.	PMP-related error	Contact your local service organization
EVO_EVO_000_024	PMP - Mix Error: <error text> PMP will not continue.	PMP-related error	Contact your local service organization
EVO_EVO_000_025	PMP - LClass Mix Error: <error text> PMP will not continue.	PMP-related error	Contact your local service organization
EVO_EVO_000_026	PMP - Detect Liquid Error: <error text> PMP will not continue.	PMP-related error	Contact your local service organization
EVO_EVO_000_027	PMP Result for tip <number> : <result text>	n.a.	n.a.
EVO_EVO_000_028	Cannot create temporary file to initialize OPT file	One of the configuration files is not accessible for writing	<ul style="list-style-type: none"> <li>• Reinstall EVOware</li> <li>• Restore backup</li> </ul>
EVO_EVO_000_029	PMP driver shutdown error: <error text>	PMP-related error	Contact your local service organization
EVO_EVO_000_030	Checksum of <name> is missing or incorrect. Do you want to use it? Evoware will terminate if you answer with no.	File has been edited individually (not by means of EVOware)	<ul style="list-style-type: none"> <li>• Do not edit file</li> <li>• Restore backup</li> <li>• Accept change (if you are aware of the consequences of the change)</li> </ul>
EVO_EVO_000_031	Checksum of <name> is missing or incorrect. Do you want to use it?	File has been edited individually (not by means of EVOware)	<ul style="list-style-type: none"> <li>• Do not edit file</li> <li>• Restore backup</li> <li>• Accept change (if you are aware of the consequences of the change)</li> </ul>
EVO_EVO_000_032	Cannot load trace component!	n.a.	n.a.
EVO_EVO_000_033	Cannot instantiate LiquidClass control	n.a.	n.a.
EVO_EVO_000_034	PMP is activated in the configuration but no PMP hardware can be found. No PMP evaluation will be performed.	PMP-related error	<ul style="list-style-type: none"> <li>• Check PMP settings</li> </ul>

**Tab. 18-1** List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_001_000	Error reading configurations file	One of the configuration files is not accessible for reading	<ul style="list-style-type: none"> <li>• Reinstall EVOware</li> <li>• Restore backup</li> </ul>
EVO_EVO_001_001	Error in configuration file in line <number>	One of the configuration files is not accessible for reading	<ul style="list-style-type: none"> <li>• Reinstall EVOware</li> <li>• Restore backup</li> </ul>
EVO_EVO_001_002	Error writing configuration file	One of the configuration files is not accessible for writing	<ul style="list-style-type: none"> <li>• Reinstall EVOware</li> <li>• Restore backup</li> </ul>
EVO_EVO_001_003	Incompatible CFG File	A configuration file is corrupt	<ul style="list-style-type: none"> <li>• Reinstall EVOware</li> </ul>
EVO_EVO_001_004	Old version of configuration file! Please define all elements new.	A configuration file stems from an older version of EVOware	<ul style="list-style-type: none"> <li>• Reinstall EVOware</li> <li>• Use current version of file</li> </ul>
EVO_EVO_001_005	LIHA not defined	A configuration file is corrupt	<ul style="list-style-type: none"> <li>• Configure LiHa in Configuration</li> <li>• Reinstall EVOware</li> </ul>
EVO_EVO_001_006	PMP configuration file <file> not found!	-	<ul style="list-style-type: none"> <li>• Configure PMP in Configuration</li> <li>• Reinstall EVOware</li> </ul>
EVO_EVO_002_000	Diluter <number> broken! Switching Diluter off!	Diluter error/defective	<ul style="list-style-type: none"> <li>• Check/replace diluter</li> </ul>
EVO_EVO_002_001	DiTi not dropped for tip<number>. Retry?	Problem with DiTi DiTi drop mechanism defective	<ul style="list-style-type: none"> <li>• User new DiTi</li> <li>• Check DiTi drop mechanism</li> </ul>
EVO_EVO_002_002	Internal error. Different pressure sensitivities used in one liquid detection action	Software error	Contact your local service organization
EVO_EVO_002_003	Internal error. Different liquid characteristics used in one liquid detection action	Software error	Contact your local service organization
EVO_EVO_002_004	No MPO found LICOS not installed	No MPO installed MPO defective	<ul style="list-style-type: none"> <li>• Check/replace MPO</li> <li>• Install LICOS</li> </ul>
EVO_EVO_002_005	No way to LiHa target found!\Evo-ware switches into offline mode.	Inconsistent process definition	<ul style="list-style-type: none"> <li>• Check process definition</li> </ul>
EVO_EVO_002_006	Internal Error: Illegal Move	Software error	Contact your local service organization
EVO_EVO_003_001	Error unloading device drivers: <file name>	Inconsistent installation	<ul style="list-style-type: none"> <li>• Reinstall EVOware</li> </ul>
EVO_EVO_003_002	Error shutting down devices: <name>	Inconsistent installation	<ul style="list-style-type: none"> <li>• Reinstall EVOware</li> </ul>

**Tab. 18-1** List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_004_000	Maximum tip-misalignment exceeded ! Script execution will be aborted.	Tips misaligned/bent	• Align/replace tips
EVO_EVO_005_000	Error starting processes: <name>	Process not executable	• Modify process
EVO_EVO_005_001	Your process completed successfully !	n.a.	n.a.
EVO_EVO_005_002	Your process completed with errors !	n.a.	n.a.
EVO_EVO_005_003	Your process completed with warnings !	n.a.	n.a.
EVO_EVO_005_004	Error reading barcode file. File: <file name>	Barcode file corrupted	• Check barcode file
EVO_EVO_005_005	Too many barcodes in line <number>.	Wrong file format	• Check barcode file
EVO_EVO_005_006	Barcode '<number>' not found in database.	Inconsistent barcode information	• Check barcode file
EVO_EVO_005_007	The following barcodes could not be found in the database	Inconsistent barcode information	• Check barcode file
EVO_EVO_005_008	The process does not contain labware '<name>'.	Inconsistent process definition	• Check process definition
EVO_EVO_005_009	The selected script is empty! It cannot be executed!	Inconsistent script definition	• Check script definition
EVO_EVO_005_010	This command is not allowed in EVOware plus!	Command not permissible	• Modify process definition
EVO_EVO_005_011	This run was not done as calibration run. Using the timing data for future runs will most likely result in time-outs. Do you still want to save?	n.a.	n.a.
EVO_EVO_005_012	Preparation of database failed!	Inconsistent database contents	• Modify labware and carriers
EVO_EVO_005_013	Preparation of database failed! Details:	Inconsistent database contents	• Modify labware and carriers
EVO_EVO_005_014	Number of iterations is too high for the available schedule files. Please create a fitting schedule file first or reduce the number of iterations. Valid range is 1 to <number>.	n.a.	n.a.
EVO_EVO_005_015	Please select a priority value between 1 and 999	n.a.	n.a.
EVO_EVO_005_016	Please select a valid process name	n.a.	n.a.



**Tab. 18-1** List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_006_000	Error initializing devices: <name>	<ul style="list-style-type: none"> <li>• Device initialization failed</li> <li>• Instrument or device switched off</li> <li>• Incorrect address settings</li> <li>• Bad connections to device</li> </ul>	<ul style="list-style-type: none"> <li>• Check if device is powered</li> <li>• Check address settings</li> <li>• Check connections</li> </ul>
EVO_EVO_007_000	Error while connecting to scheduler server: <name>	Scheduler not present, not registered or files missing	<ul style="list-style-type: none"> <li>• Register Scheduler.exe/Schedulerps.dll</li> <li>• Reinstall EVOware</li> </ul>
EVO_EVO_007_001	Error opening <file name>	One of the configuration files is not accessible for reading	<ul style="list-style-type: none"> <li>• Reinstall EVOware</li> <li>• Restore backup</li> </ul>
EVO_EVO_007_002	Command not allowed in worklist	n.a.	• Modify worklist
EVO_EVO_007_003	The variable '<name>' in process '<name>' already exists with a different scope.	n.a.	• Rename variable
EVO_EVO_007_004	The variable '<name>' in process '<name>' already exists with a different type.	n.a.	• Rename variable
EVO_EVO_007_005	The variable '<name>' in process '<name>' already exists with a different value. The value will not be changed.	n.a.	n.a.
EVO_EVO_007_006	File import for process variables failed! Possible causes: File does not exist or file access was denied.	n.a.	<ul style="list-style-type: none"> <li>• Make sure file is available</li> <li>• Check access rights to file and folder</li> </ul>
EVO_EVO_007_007	Operator query for process variables failed! The operator cancelled the query dialog.	n.a.	n.a.
EVO_EVO_007_008	Run finished	n.a.	n.a.
EVO_EVO_007_009	Run finished with errors	There were errors during the run	• Check log files for errors
EVO_EVO_007_010	Labware information overwritten. This may lead to incorrect results! Please check if you have multiple carriers or device buttons connected to the same grid!	n.a.	n.a.
EVO_EVO_008_000	Your script completed successfully!	n.a.	n.a.
EVO_EVO_008_001	Your script completed with errors!	n.a.	n.a.
EVO_EVO_008_002	Please define the script lines to execute.	n.a.	n.a.

**Tab. 18-1** List of error messages (cont.)

<b>Error ID</b>	<b>Message Text</b>	<b>Reason</b>	<b>Corrective Measure</b>
EVO_EVO_008_003	Selected last line is larger than the line number of the actual script!	n.a.	n.a.
EVO_EVO_008_004	Running script	n.a.	n.a.
EVO_EVO_008_005	Run script!	n.a.	n.a.
EVO_EVO_008_006	Script contains errors! For more information see the log file.	Various	• Check script definition
EVO_EVO_008_007	Script has been stopped!	n.a.	n.a.
EVO_EVO_009_000	This command is not allowed in Evo-ware plus!	Command not permissible	• Modify process definition
EVO_EVO_009_001	Invalid command for asynchronous sub-routine	n.a.	• Modify process definition
EVO_EVO_009_002	Could not start asynchronous sub-routine	Subroutine already running	• Wait for completion of subroutine
EVO_EVO_009_003	Unknown operation mode for sub-routine	Undefined subroutine operation mode used	• Use one of the defined operation modes in the subroutine command
EVO_EVO_009_004	Invalid command for sub-routine.	Command not permissible	• Modify process definition
EVO_EVO_010_000	Pipetting was aborted	n.a.	n.a.
EVO_EVO_011_000	The value for Grid has to be between <number> and <number>.	Inconsistent grid position number	• Correct grid position number
EVO_EVO_011_001	The value for Site has to be between <number> and <number>.	Inconsistent site position number	• Correct grid position number
EVO_EVO_011_002	The value for Position in labware has to be between <number> and <number>.	Inconsistent position number on labware	• Correct position number on labware
EVO_EVO_011_003	The value for Stack has to be between <number> and <number>	Inconsistent position number in stack	• Correct position number
EVO_EVO_011_004	The value for Tray has to be between <number> and <number>	Inconsistent position number for tray	• Correct position number
EVO_EVO_012_000	Initialization error	RoMa firmware command error	Contact your local service organization
EVO_EVO_012_001	Invalid command	RoMa firmware command error	Contact your local service organization
EVO_EVO_012_002	Invalid operand	RoMa firmware command error	Contact your local service organization
EVO_EVO_012_003	Invalid command sequence	RoMa firmware command error	Contact your local service organization

**Tab. 18-1** List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_012_004	Device not implemented	RoMa firmware command error	Contact your local service organization
EVO_EVO_012_005	Time-Out	RoMa firmware command error	Contact your local service organization
EVO_EVO_012_006	Device not initialized	RoMa firmware command error	Contact your local service organization
EVO_EVO_012_007	Command Overflow	RoMa firmware command error	Contact your local service organization
EVO_EVO_013_000	No access to EEPROM	Te-CU firmware command error	Contact your local service organization
EVO_EVO_013_001	Error in power control circuit	Te-CU firmware command error	Contact your local service organization
EVO_EVO_013_002	Error in door lock #1	Door lock cannot lock/unlock	• Check door lock/latch
EVO_EVO_013_003	Error in door lock #2	Door lock cannot lock/unlock	• Check door lock/latch
EVO_EVO_013_004	Arm is collided	Crash has occurred	• Check worktable layout • Check process definition
EVO_EVO_013_005	No FLASH / EEPROM access	LiHa firmware command error	Contact your local service organization
EVO_EVO_013_006	Error in power control circuit	LiHa firmware command error	Contact your local service organization
EVO_EVO_013_007	Measurement failed	LiHa firmware command error	Contact your local service organization
EVO_EVO_013_008	No liquid exit detected	LiHa firmware command error	Contact your local service organization
EVO_EVO_013_009	Error in liquid sensor	LiHa firmware command error	Contact your local service organization
EVO_EVO_013_010	Application switch and axes mismatch	Incorrect replacement of instrument/parts	Field Service Engineer: Set application switch on PCB correctly
EVO_EVO_013_011	Wrong DC_Servo Type	Incorrect replacement of parts	Field Service Engineer: Use correct DC servo type
EVO_EVO_013_012	Labware not gripped	Labware not present Bad gripper alignment. Gripper defective.	• Check worktable/process definition • Align/repair gripper
EVO_EVO_013_013	Arm is collided	Crash has occurred See <a href="#">18.1.18</a> , <a href="#">18-18</a> .	• Check worktable layout • Check process definition
EVO_EVO_013_014	Error in power control circuit	RoMa firmware command error	Contact your local service organization

**Tab. 18-1** List of error messages (cont.)

<b>Error ID</b>	<b>Message Text</b>	<b>Reason</b>	<b>Corrective Measure</b>
EVO_EVO_013_015	ROMA collision with LIHA avoided	n.a.	n.a.
EVO_EVO_013_016	Error in EEPROM	PosID firmware command error	Contact your local service organization
EVO_EVO_013_017	No access to EEPROM	PosID firmware command error	Contact your local service organization
EVO_EVO_013_018	Invalid data in EEPROM	PosID firmware command error	Contact your local service organization
EVO_EVO_013_019	Special error in EEPROM	PosID firmware command error	Contact your local service organization
EVO_EVO_013_020	Invalid command	PosID firmware command error	Contact your local service organization
EVO_EVO_013_021	Invalid operand	PosID firmware command error	Contact your local service organization
EVO_EVO_013_022	Invalid number of operands	PosID firmware command error	Contact your local service organization
EVO_EVO_013_023	Invalid device address	PosID firmware command error	Contact your local service organization
EVO_EVO_013_024	Door already open	n.a.	n.a.
EVO_EVO_013_025	Hall sensors not calibrated	n.a.	Field Service Engineer: Calibrate hall sensors
EVO_EVO_013_026	Pump not defined	MPO/SPO firmware command error	Contact your local service organization
EVO_EVO_013_027	LICOS not calibrated	n.a.	Field Service Engineer: Calibrate LICOS
EVO_EVO_013_028	No access to EEPROM	MPO/SPO firmware command error	Contact your local service organization
EVO_EVO_013_029	Pressure sensor not calibrated	n.a.	Field Service Engineer: Calibrate pressure sensor
EVO_EVO_013_030	Command overflow of sub device	MPO/SPO firmware command error	Contact your local service organization
EVO_EVO_013_031	Pump stalled	MPO/SPO firmware command error	Contact your local service organization
EVO_EVO_013_032	no access to Flash EEPROM	Firmware command error	Contact your local service organization
EVO_EVO_013_033	command overflow	n.a.	n.a.
EVO_EVO_013_034	channel not calibrated	n.a.	n.a.
EVO_EVO_013_035	U/I calibration mode on	n.a.	n.a.
EVO_EVO_013_036	calibration out of range	n.a.	n.a.

**Tab. 18-1** List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_013_037	Initialization error	Diluter firmware command error	Contact your local service organization
EVO_EVO_013_038	Invalid command	Diluter firmware command error	Contact your local service organization
EVO_EVO_013_039	Invalid operand	Diluter firmware command error See <a href="#">18.1.7</a> , <a href="#">18-7</a>	Contact your local service organization
EVO_EVO_013_040	Invalid command sequence	Diluter firmware command error	Contact your local service organization
EVO_EVO_013_041	Dilutor not connected.	Diluter firmware command error	Contact your local service organization
EVO_EVO_013_042	Error in EEPROM	Diluter firmware command error	Contact your local service organization
EVO_EVO_013_043	Device not initialized	Diluter firmware command error	Contact your local service organization
EVO_EVO_013_044	Plunger overload	Defective valve Clogged liquid system See <a href="#">18.1.7</a> , <a href="#">18-7</a>	<ul style="list-style-type: none"> <li>• Check diluter</li> <li>• Check liquid system</li> </ul>
EVO_EVO_013_045	Valve blocked	Defective valve	<ul style="list-style-type: none"> <li>• Replace valve</li> </ul>
EVO_EVO_013_046	Movement not possible	Diluter firmware command error	Contact your local service organization
EVO_EVO_013_047	No access to EEPROM	Diluter firmware command error	Contact your local service organization
EVO_EVO_013_048	Command Overflow	Diluter firmware command error	Contact your local service organization
EVO_EVO_013_049	Piezo communication error	Diluter firmware command error	Contact your local service organization
EVO_EVO_013_050	Piezo module busy	Diluter firmware command error	Contact your local service organization
EVO_EVO_013_051	Piezo parameter out of range	Diluter firmware command error	Contact your local service organization
EVO_EVO_013_052	ADV param out of range	Diluter firmware command error	Contact your local service organization
EVO_EVO_013_053	No Low Volume installed	Low Volume firmware command error	Contact your local service organization
EVO_EVO_013_054	Pinch valve not installed	Low Volume firmware command error	Contact your local service organization
EVO_EVO_013_055	Endless mode not possible	Low Volume firmware command error	Contact your local service organization

**Tab. 18-1** List of error messages (cont.)

<b>Error ID</b>	<b>Message Text</b>	<b>Reason</b>	<b>Corrective Measure</b>
EVO_EVO_013_056	Wrong node address	Low Volume firmware command error	Contact your local service organization
EVO_EVO_013_057	Picture not usable	n.a.	n.a.
EVO_EVO_013_058	Invalid operand	n.a.	n.a.
EVO_EVO_013_059	Picture is still processed	n.a.	n.a.
EVO_EVO_013_060	Error writing file	n.a.	n.a.
EVO_EVO_013_061	Error accessing file	n.a.	n.a.
EVO_EVO_013_062	Error reading file	n.a.	n.a.
EVO_EVO_013_063	Number is already used	n.a.	n.a.
EVO_EVO_013_064	Harddisk full	Storage capacity of hard-disk exceeded	• Perform data management on harddisk
EVO_EVO_013_065	Picture memory full	n.a.	n.a.
EVO_EVO_013_066	Error grabbing picture	n.a.	n.a.
EVO_EVO_013_067	X drive overload	Axis blocked	• Check mechanics
EVO_EVO_013_068	Y drive overload	Axis blocked	• Check mechanics
EVO_EVO_013_069	Z drive overload	Axis blocked	• Check mechanics
EVO_EVO_013_070	No access to flash eeprom	Te-MagS firmware command error	Contact your local service organization
EVO_EVO_013_071	Command overflow	Te-MagS firmware command error	Contact your local service organization
EVO_EVO_013_072	Temperature overrun	Te-MagS firmware command error	Contact your local service organization
EVO_EVO_013_073	Temperature sensor short or open circuit	Te-MagS firmware command error	Contact your local service organization
EVO_EVO_013_074	Drive overload	Te-Shake firmware command error	Contact your local service organization
EVO_EVO_013_075	Drive already running	Te-Shake firmware command error	Contact your local service organization
EVO_EVO_013_076	No access to EEPROM	Te-Shake firmware command error	Contact your local service organization
EVO_EVO_013_077	Command overflow	Te-Shake firmware command error	Contact your local service organization
EVO_EVO_013_078	LICOS not calibrated	n.a.	Field Service Engineer: Calibrate LICOS
EVO_EVO_013_079	No access to EEPROM	Supervisor firmware command error	Contact your local service organization

**Tab. 18-1** List of error messages (cont.)

<b>Error ID</b>	<b>Message Text</b>	<b>Reason</b>	<b>Corrective Measure</b>
EVO_EVO_013_080	Command overflow	Supervisor firmware command error	Contact your local service organization
EVO_EVO_013_081	Option not installed	MIO firmware command error	Contact your local service organization
EVO_EVO_013_082	Shaker position initialization error	MIO firmware command error	Contact your local service organization
EVO_EVO_013_083	Close door solenoid short or open circuit	MIO firmware command error	Contact your local service organization
EVO_EVO_013_084	EEPROM checksum error	MIO firmware command error	Contact your local service organization
EVO_EVO_013_085	EEPROM access error	MIO firmware command error	Contact your local service organization
EVO_EVO_013_086	Command overflow	MIO firmware command error	Contact your local service organization
EVO_EVO_013_087	Slot temperature overrun	MIO firmware command error	Contact your local service organization
EVO_EVO_013_088	Temperature sensor short or open circuit	MIO firmware command error	Contact your local service organization
EVO_EVO_013_089	Shaker Fail (motor not turning)	MIO firmware command error	Contact your local service organization
EVO_EVO_013_090	Temperature overrun	Te-Shake firmware command error	Contact your local service organization
EVO_EVO_013_091	Temperature sensor short or open circuit	Te-Shake firmware command error	Contact your local service organization
EVO_EVO_013_093	Initialization Error	Te-MO firmware command error	Contact your local service organization
EVO_EVO_013_094	Invalid Command	Te-MO firmware command error	Contact your local service organization
EVO_EVO_013_095	Invalid Operand	Te-MO firmware command error	Contact your local service organization
EVO_EVO_013_096	Invalid Command Sequence	Te-MO firmware command error	Contact your local service organization
EVO_EVO_013_097	Device not implemented	Te-MO firmware command error	Contact your local service organization
EVO_EVO_013_098	Timeout error	Te-MO firmware command error	Contact your local service organization
EVO_EVO_013_099	Device not initialized	Te-MO firmware command error	Contact your local service organization
EVO_EVO_013_100	No liquid detected.	Te-MO firmware command error	Contact your local service organization

**Tab. 18-1** List of error messages (cont.)

<b>Error ID</b>	<b>Message Text</b>	<b>Reason</b>	<b>Corrective Measure</b>
EVO_EVO_013_101	Collision detected	Te-MO firmware command error	Contact your local service organization
EVO_EVO_013_102	No access to parameter pages	Te-MO firmware command error	Contact your local service organization
EVO_EVO_013_103	Command overflow	Te-MO firmware command error	Contact your local service organization
EVO_EVO_013_104	Power fail	Te-MO firmware command error	Contact your local service organization
EVO_EVO_013_105	No Communication to Sub-Device.	Te-MO firmware command error	Contact your local service organization
EVO_EVO_013_106	Tips not fetched.	DiTiS not picked up properly	• Check DiTi pick up mechanism
EVO_EVO_013_107	Invalid Command	WRC firmware command error	Contact your local service organization
EVO_EVO_013_108	Invalid Operand	WRC firmware command error	Contact your local service organization
EVO_EVO_013_109	Device not implemented	WRC firmware command error	Contact your local service organization
EVO_EVO_013_110	Timeout Error	WRC firmware command error	Contact your local service organization
EVO_EVO_013_111	Reagent sensor not calibrated	n.a.	Field Service Engineer: Calibrate reagent sensor
EVO_EVO_013_112	EEPROM access error	WRC firmware command error	Contact your local service organization
EVO_EVO_013_113	Command overflow	WRC firmware command error	Contact your local service organization
EVO_EVO_013_114	Wash bottle 1 empty	n.a.	n.a.
EVO_EVO_013_115	Waste bottle full	n.a.	n.a.
EVO_EVO_013_116	Pump 1 low level	n.a.	n.a.
EVO_EVO_013_117	Pump 2 low level	n.a.	n.a.
EVO_EVO_013_118	Pump 3 low level	n.a.	n.a.
EVO_EVO_013_119	Pump 4 low level	n.a.	n.a.
EVO_EVO_013_120	Wash station empty	n.a.	n.a.
EVO_EVO_013_121	Wash station overflow	Clogged waste tubing	• Check waste tubing
EVO_EVO_013_122	Sub-device not implemented	WRC firmware command error	Contact your local service organization
EVO_EVO_013_123	Wash bottle 2 empty	n.a.	n.a.



**Tab. 18-1** List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_013_124	Sensor out of range	WRC firmware command error	Contact your local service organization
EVO_EVO_013_125	Initialization Error	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_126	Invalid Command	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_127	Invalid Operand	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_128	Invalid Command Sequence	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_129	Device not implemented	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_130	Timeout Error	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_131	Device not initialized	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_132	Command overflow by CU	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_133	No liquid level measured	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_134	Device collided with an obstacle	Obstruction on worktable	<ul style="list-style-type: none"> <li>• Check worktable layout</li> <li>• Check process definition</li> </ul>
EVO_EVO_013_135	Wrong checksum in flash parameter block	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_136	No access to flash parameter block	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_137	Collision avoided	n.a.	n.a.
EVO_EVO_013_138	No carrier detected	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_139	Command overflow in device	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_140	Power fail	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_141	Tube not detected	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_142	Invalid axis combination	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_143	Ultrasonic Transducer error	LAC Option firmware command error	Contact your local service organization

**Tab. 18-1** List of error messages (cont.)

<b>Error ID</b>	<b>Message Text</b>	<b>Reason</b>	<b>Corrective Measure</b>
EVO_EVO_013_144	Temperature sensor error	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_145	Requested memory block size was not allocable	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_146	CreateTask() called too late	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_147	CkStackOV() didn't find NIL at end of RTX.DefTcbs	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_148	CkStackOV() found min task stack	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_149	CkStackOV() found task stack overflow	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_150	No error	n.a.	n.a.
EVO_EVO_013_151	Invalid command	n.a.	n.a.
EVO_EVO_013_152	Unexpected error	n.a.	n.a.
EVO_EVO_013_153	Invalid number of operands	n.a.	n.a.
EVO_EVO_013_154	Invalid operand	n.a.	n.a.
EVO_EVO_013_155	RSP error reported in answer string	n.a.	n.a.
EVO_EVO_013_156	RSP not initialized	n.a.	n.a.
EVO_EVO_013_157	ROMA-vector not defined	n.a.	n.a.
EVO_EVO_013_158	ROMA-vector for this site is not defined	n.a.	n.a.
EVO_EVO_013_159	RSP still active	n.a.	n.a.
EVO_EVO_013_160	RSP not active	n.a.	n.a.
EVO_EVO_013_161	RSP not active	n.a.	n.a.
EVO_EVO_013_162	Cancel was pressed	n.a.	n.a.
EVO_EVO_013_163	Script could not be loaded / saved	n.a.	n.a.
EVO_EVO_013_164	Variable not defined	n.a.	n.a.
EVO_EVO_013_165	Advanced version of Evoware required	n.a.	n.a.
EVO_EVO_013_166	No labware gripped by ROMA	Labware not present Bad gripper alignment. Gripper defective.	<ul style="list-style-type: none"> <li>• Check worktable/process definition</li> <li>• Align/repair gripper</li> </ul>
EVO_EVO_013_167	Device not found	n.a.	n.a.
EVO_EVO_013_168	Timeout	n.a.	n.a.
EVO_EVO_013_169	Worklist already loaded	n.a.	n.a.

**Tab. 18-1** List of error messages (cont.)

<b>Error ID</b>	<b>Message Text</b>	<b>Reason</b>	<b>Corrective Measure</b>
EVO_EVO_013_170	Initialization failed	PnP firmware command error	Contact your local service organization
EVO_EVO_013_171	Invalid command	PnP firmware command error	Contact your local service organization
EVO_EVO_013_172	Invalid operand	PnP firmware command error	Contact your local service organization
EVO_EVO_013_173	CAN acknowledge problems	PnP firmware command error	Contact your local service organization
EVO_EVO_013_174	Device not implemented	PnP firmware command error	Contact your local service organization
EVO_EVO_013_175	CAN answer timeout	PnP firmware command error	Contact your local service organization
EVO_EVO_013_176	Device not initialized	PnP firmware command error	Contact your local service organization
EVO_EVO_013_177	Command overflow of Freedom EVO control unit	PnP firmware command error	Contact your local service organization
EVO_EVO_013_178	Plate not fetched	PnP firmware command error	Contact your local service organization
EVO_EVO_013_179	Collision detected	PnP firmware command error	Contact your local service organization
EVO_EVO_013_180	No access to Flash-EEPROM	PnP firmware command error	Contact your local service organization
EVO_EVO_013_181	Command overflow of this device	PnP firmware command error	Contact your local service organization
EVO_EVO_013_182	Tube left in gripper	Tube sticks to gripper	Clean gripper
EVO_EVO_013_183	Tube not fetched	Tube not present Bad gripper alignment. Gripper defective.	<ul style="list-style-type: none"> <li>• Check worktable/process definition</li> <li>• Align/repair gripper</li> </ul>
EVO_EVO_013_184	Invalid axes combination	PnP firmware command error	Contact your local service organization
EVO_EVO_013_185	Initialization error	Te-Stack firmware command error	Contact your local service organization
EVO_EVO_013_186	Invalid command	Te-Stack firmware command error	Contact your local service organization
EVO_EVO_013_187	Invalid operand	Te-Stack firmware command error	Contact your local service organization
EVO_EVO_013_188	Invalid command sequence	Te-Stack firmware command error	Contact your local service organization
EVO_EVO_013_189	Device not implemented	Te-Stack firmware command error	Contact your local service organization

**Tab. 18-1** List of error messages (cont.)

<b>Error ID</b>	<b>Message Text</b>	<b>Reason</b>	<b>Corrective Measure</b>
EVO_EVO_013_190	Timeout error	Te-Stack firmware command error	Contact your local service organization
EVO_EVO_013_191	Device not initialized	Te-Stack firmware command error	Contact your local service organization
EVO_EVO_013_192	Command overflow of Freedom EVO control unit	Te-Stack firmware command error	Contact your local service organization
EVO_EVO_013_193	Te-Stack collided with an obstacle	Obstruction on worktable See 18.1.21, 18-21	<ul style="list-style-type: none"> <li>• Check worktable layout</li> <li>• Check process definition</li> </ul>
EVO_EVO_013_194	No access to Flash-EEPROM	Te-Stack firmware command error	Contact your local service organization
EVO_EVO_013_195	Command overflow of the Te-Stack	Te-Stack firmware command error	Contact your local service organization
EVO_EVO_013_196	Slide not in position!	Te-Stack firmware command error	Contact your local service organization
EVO_EVO_013_197	Stack not in position! Please install stack!	n.a.	<ul style="list-style-type: none"> <li>• Install stack</li> </ul>
EVO_EVO_013_198	Carrier position empty!	There is no plate on stacker carrier for picking up	<ul style="list-style-type: none"> <li>• Put plate on stacker carrier</li> </ul>
EVO_EVO_013_199	Carrier position not empty! Please remove labware!	n.a.	<ul style="list-style-type: none"> <li>• Remove labware</li> </ul>
EVO_EVO_013_200	Stack empty! Please insert labware!	n.a.	<ul style="list-style-type: none"> <li>• Insert labware</li> </ul>
EVO_EVO_013_201	Gripper not in zero position	Te-Stack command error	Contact your local service organization
EVO_EVO_013_202	Move does not cross BCR or CarSens window.	Te-Stack command error	Contact your local service organization
EVO_EVO_013_203	Cmd not possible now (ADP/ASP sequence error)	Te-Stack command error	Contact your local service organization
EVO_EVO_013_204	Barcode-Reader general error	Stacker barcode scanner defective	<ul style="list-style-type: none"> <li>• Check barcode scanner</li> </ul>
EVO_EVO_013_205	Digital output(s) overloaded	Te-MO servo control firmware error (error 21)	<ul style="list-style-type: none"> <li>• Reset servo control and retry</li> <li>• Contact your local service organization</li> </ul>
EVO_EVO_013_206	Home position not found	Te-MO servo control firmware error (error 23)	<ul style="list-style-type: none"> <li>• Reset servo control and retry</li> <li>• Contact your local service organization</li> </ul>

**Tab. 18-1** List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_013_207	Current limit exceeded	Te-MO servo control firmware error (error 41)	<ul style="list-style-type: none"> <li>• Reset servo control and retry</li> <li>• Contact your local service organization</li> </ul>
EVO_EVO_013_208	Current limit exceeded	Te-MO servo control firmware error (error 44)	<ul style="list-style-type: none"> <li>• Reset servo control and retry</li> <li>• Contact your local service organization</li> </ul>
EVO_EVO_013_209	Initialization error	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_210	Invalid command	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_211	Invalid operand	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_212	Invalid command sequence	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_213	Device not implemented	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_214	Timeout error	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_215	Device not initialized	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_216	Command overflow of Freedom EVO control unit	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_217	Plunger collided	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_218	No access to Flash-EPROM	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_219	Missing configuration	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_220	Command overflow of the Te-Servo	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_221	Out of physical range	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_222	Multiple run curve error	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_223	Command not possible	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_224	End position not reached	Te-Servo firmware command error	Contact your local service organization

**Tab. 18-1** List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_013_225	Drive overheated	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_226	No move detected	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_227	Move was interrupted	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_228	Internal calculation error	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_229	Emergency break	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_230	Te-Motion error	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_014_000	Instrument has been switched off or disconnected! Evoaware switches to offline mode and aborts script!	Instrument not connected properly	<ul style="list-style-type: none"> <li>• Switch instrument on</li> <li>• Check connections</li> </ul>
EVO_EVO_014_001	The process is not executable. Action aborted.	Process not executable, e.g. labware nodes not connected	<ul style="list-style-type: none"> <li>• Modify process</li> </ul>
EVO_EVO_014_002	The script contains errors and is not executable. Action aborted.	Script validation failed	<ul style="list-style-type: none"> <li>• Load script into editor and correct errors</li> </ul>
EVO_EVO_014_003	Auto-validation of scripts has been switched on!	n.a.	n.a.
EVO_EVO_014_004	Auto-validation of scripts has been switched off!	n.a.	n.a.
EVO_EVO_014_005	On-demand validation of current script has been started.	n.a.	n.a.
EVO_EVO_014_006	There are schedules stored for this process. If the process is changed these schedules will be lost. To keep the original version with it's schedules please use 'Save As' to store the changed process under a new name. Save process under same name and loose schedules?	n.a.	n.a.
EVO_EVO_015_000	Error opening Named Pipe	Named Pipe could not be opened in "Command" command	<ul style="list-style-type: none"> <li>• Check pipe name provided in command</li> <li>• Wait until pipe is available</li> </ul>
EVO_EVO_016_002	Enter Barcode (PosID-2)	Refer to <a href="#">18.1.16</a> , <a href="#">18-16</a>	
EVO_EVO_016_003	Barcode Error (PosID-2)	Refer to <a href="#">18.1.12</a> , <a href="#">18-13</a>	

**Tab. 18-1** List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_016_004	Clot Error		Refer to <a href="#">18.1.2</a> , <a href="#">18-2</a>
EVO_EVO_016_005	Dilutor Overflow		Refer to <a href="#">18.1.6</a> , <a href="#">18-7</a>
EVO_EVO_016_006	Dilutor Error		Refer to <a href="#">18.1.7</a> , <a href="#">18-7</a>
EVO_EVO_016_007	DiTi Already Mounted		Refer to <a href="#">18.1.11</a> , <a href="#">18-12</a>
EVO_EVO_016_008	Error Fetching DiTis		Refer to <a href="#">18.1.8</a> , <a href="#">18-8</a>
EVO_EVO_016_009	Te-MO DiTi Error		Refer to <a href="#">18.1.22</a> , <a href="#">18-23</a>
EVO_EVO_016_010	Lost DiTi		Refer to <a href="#">18.1.10</a> , <a href="#">18-11</a>
EVO_EVO_016_011	Doorlock Error		Refer to <a href="#">18.1.19</a> , <a href="#">18-19</a>
EVO_EVO_016_023	Liquid Arrival Check Error		Refer to <a href="#">18.1.5</a> , <a href="#">18-6</a>
EVO_EVO_016_024	Liquid Detection Error		Refer to <a href="#">18.1.1</a> , <a href="#">18-1</a>
EVO_EVO_016_036	Grip Error		Refer to <a href="#">18.1.20</a> , <a href="#">18-20</a>
EVO_EVO_016_040	Instrument Error dialog box		Refer to <a href="#">18.1.18</a> , <a href="#">18-18</a>
EVO_EVO_016_042	Te-Stack Error		Refer to <a href="#">18.1.21.1</a> , <a href="#">18-21</a>
EVO_EVO_016_043	Vacuum Waste Container		Refer to <a href="#">18.1.26</a> , <a href="#">18-28</a>
EVO_EVO_016_048	WinWash Liquid Error		Refer to <a href="#">18.1.25</a> , <a href="#">18-27</a>
EVO_EVO_016_049	WRC/Te-MO Error		Refer to <a href="#">18.1.23</a> , <a href="#">18-23</a>
EVO_EVO_016_052	Clot Error (PMP)		Refer to <a href="#">18.1.3</a> , <a href="#">18-3</a>
EVO_EVO_016_053	PMP Instrument Error		Refer to <a href="#">18.1.4</a> , <a href="#">18-4</a>
EVO_EVO_017_000	A Te-MO has been detected but is not on the worktable. Evoware now prohibits LiHa access to the rear of the instrument.	n.a.	n.a.
EVO_EVO_017_001	"To the front" initialization is only available on Freedom instruments. Evoware will perform standard initialization.	n.a.	n.a.
EVO_EVO_017_002	Roma <number> not found!	RoMa command in script, but there is no RoMa	• Modify script
EVO_EVO_017_003	PnP <number> not found!	PnP command in script, but there is no PnP	• Modify script
EVO_EVO_017_004	LiHa <number> cannot move aside (Wash or DiTi command might be missing or another arm is not on a Safe Position). EVOware switches to offline mode and aborts all running scripts	-	• Insert wash or DiTi command in script

**Tab. 18-1** List of error messages (cont.)

<b>Error ID</b>	<b>Message Text</b>	<b>Reason</b>	<b>Corrective Measure</b>
EVO_EVO_017_005	RoMA <number> cannot move aside (not at a Safe or Home position)	There may be a problem with the worktable setup RoMa tries to move aside, but another device is in his way	• Check log files for errors
EVO_EVO_017_006	PnP <number> cannot move aside (not at a Safe or Home position)	There may be a problem with the worktable setup PnP tries to move aside, but another device is in his way	• Check log files for errors
EVO_EVO_018_000	Barcode could not be detected!	Stacker barcode scanner could not read barcode	• Check barcode label on labware
EVO_EVO_019_000	TeMO x-coordinate too low!	n.a.	n.a.
EVO_EVO_019_001	Airgap speed of <number> exceeds maximum plunger speed	Airgap speed in liquid class too high	• Adjust liquid class
EVO_EVO_019_002	Aspiration speed of <number> exceeds maximum plunger speed	Aspiration speed in liquid class too high	• Adjust liquid class
EVO_EVO_019_003	Dispense speed of <number> exceeds maximum plunger speed	Dispense speed in liquid class too high	• Adjust liquid class
EVO_EVO_020_000	Carrier <name> not found on grid <number>	• Barcode not readable • Carrier not present	• Check barcode • Check worktable
EVO_EVO_020_001	Carrier ID <number> not found in configuration	There is no carrier definition for this item	• Check worktable
EVO_EVO_020_002	<axis>-coordinate of ROMA vector <value> point <value> is outside of allowed range	(Home) vector coordinate out of range	• Teach RoMa (home) vector properly
EVO_EVO_021_000	PnP vector <name> not defined	Vector not found in Carrier.cfg	• Teach vector with given name
EVO_EVO_022_000	Instrument has no LiHA <number>	LiHa command in script, but there is no LiHa	• Modify script
EVO_EVO_023_000	Instrument error <error number> (<error text>), device <name>, command <name>	n.a.	n.a.
EVO_EVO_024_000	The resulting script contains invalid groups or loops. The action is canceled.	n.a.	• Check script definition
EVO_EVO_024_001	EVOware switches to offline mode!	-	• Switch back to real mode in Execute menu
EVO_EVO_025_000	Balance: Reset could not be performed. Device was busy! Retry?	n.a.	n.a.



**Tab. 18-1** List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_025_001	Balance: Zeroing currently not executable; Device is busy! Retry?	n.a.	n.a.
EVO_EVO_025_002	Balance: Balance data inquiry could not be performed. Device was busy! Retry?	n.a.	n.a.
EVO_EVO_025_003	Balance is not responding! Retry?	Balance switched off Bad connection	<ul style="list-style-type: none"> <li>• Switch balance on</li> <li>• Check connections</li> </ul>
EVO_EVO_025_004	Balance: Taring was not performed; Device was busy! Retry?	n.a.	n.a.
EVO_EVO_025_005	Balance: Weighing currently not executable; Device is busy! Retry?	n.a.	n.a.
EVO_EVO_025_006	Balance: Weighing operation failed!	n.a.	n.a.
EVO_EVO_025_007	Liquid Arrival Check: Tolerance exceeded!	n.a.	n.a.
EVO_EVO_025_008	Initial weight limit exceeded! Weight limit: <number> mg. Measured weight:<number> mg. Please reduce weight before proceeding!	Weight on balance is too high	<ul style="list-style-type: none"> <li>• Reduce weight</li> </ul>
EVO_EVO_025_009	Checking weight limit failed!	n.a.	n.a.
EVO_EVO_026_000	<axis>-coordinate of PnP vector "<value>" outside of allowed range	(Home) vector coordinate out of range	<ul style="list-style-type: none"> <li>• Teach PnP (home) vector properly</li> </ul>
EVO_EVO_027_000	Waterbath <name> not connected!	n.a.	<ul style="list-style-type: none"> <li>• Check waterbath connections</li> </ul>
EVO_EVO_027_001	Communication error with waterbath! Retry?	-	<ul style="list-style-type: none"> <li>• Check waterbath connection</li> </ul>
EVO_EVO_028_000	No column offset (relative move in x) possible on right TeMO slide.	Te-MO relative move of tips on left side of Te-MO head, pipetting on the right slide	<ul style="list-style-type: none"> <li>• Mount tips on the right side of the Te-MO head to pipette on the right slide</li> </ul>
EVO_EVO_028_001	No column offset (relative move in x) possible on left TeMO slide.	Te-MO relative move of tips on right side of Te-MO head, pipetting on the left slide	<ul style="list-style-type: none"> <li>• Mount tips on the left side of the Te-MO head to pipette on the left slide</li> </ul>
EVO_EVO_029_000	Error opening barcode output file.	<ul style="list-style-type: none"> <li>• Barcode file of obsolete PosID</li> <li>• File not accessible</li> </ul>	<ul style="list-style-type: none"> <li>• Check output path in configuration</li> <li>• Check access rights to file and folder</li> </ul>

Tab. 18-1 List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_029_001	Reinitialization of POSID reported critical error Check instrument for blocking objects EVOware switches to offline mode	-	• Check instrument for blocking objects
EVO_EVO_029_002	Detected duplicate barcodes! EVOware switches to offline mode	Two or more items have the same barcode	• Check for duplicate barcodes
EVO_EVO_029_003	Mismatching barcode for position	n.a.	n.a.
EVO_EVO_030_000	Unable to write header to file: Header must be written by first export command accessing the file.	Previous "Export Variable" command did not write header	• First "Export Variable" command must write header, correct script
EVO_EVO_030_001	Unable to write variables to file: Conflicts in header strings - variable order or variable count do not match.	Variable not found in header of export file	• Choose correct file or change variable selection
EVO_EVO_031_000	Illegal line number <number> specified for Import Variable command: Legal range is 1 to <number>!	Line number exceeded range, using "Read specified line" option	• Check script definition
EVO_EVO_032_000	The response for message <message> timed out	-	• Check log files for errors
EVO_EVO_032_001	Response message <message> has an invalid content	-	• Check log files for errors
EVO_EVO_032_002	Message <message> failed	n.a.	n.a.
EVO_EVO_032_003	Response message has an invalid content	-	• Check log files for errors
EVO_EVO_032_004	Message has an unknown message type	-	• Check log files for errors
EVO_EVO_032_005	Unspecified error after sending message <message> via MCS	n.a.	n.a.
EVO_EVO_033_000	Cannot place labware <name> on grid <grid>, site <site>	-	• Check if specified site is empty
EVO_EVO_034_000	Internal error: Selected object could not be found	n.a.	n.a.
EVO_EVO_034_001	Internal error: Internal tip fetch failed	n.a.	n.a.
EVO_EVO_034_002	Firmware error: Command failed	-	• Check log files for errors
<b>Global messages</b>			
EVO_GLO_000_000	The response for message {} timed out.	Internal communication error. E.g. a hardware option failed or did not respond while a pipetting script was running.	

**Tab. 18-1** List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_GLO_000_001	Response message <message> has an invalid content	-	• Check log files for errors
EVO_GLO_000_002	Message <message> failed	n.a.	n.a.
EVO_GLO_000_003	Response message <message> has an invalid content	-	• Check log files for errors
EVO_GLO_000_004	Message <message> has an unknown message type	n.a.	n.a.
EVO_GLO_000_005	Unspecified error after sending message <message> via MCS	-	Check log files for errors
<b>IVD Incubator</b>			
EVO_IVD_000_000	Error getting configuration from database:	No carrier definition in database	• Create carrier definition
EVO_IVD_000_001	Error getting number of sites from database:	n.a.	n.a.
EVO_IVD_000_002	Device carrier configuration read from database: Position layout [<number>/<number>/<number>] = <number> available sites.	n.a.	n.a.
EVO_IVD_000_003	Configuration error	Error in carrier definition	• Check carrier definition
EVO_IVD_000_004	Number of carrier sites does not match number of modules in configuration.	Carrier definition does not correspond with driver INI file	• Modify carrier definition or driver configuration
EVO_IVD_000_005	CloseDrawer for slot <number> failed: Return value = <number>.	Drawer malfunction	• Check drawer
EVO_IVD_000_006	Slot number is out of range!	Selected slot does not exist	• Check script definition
EVO_IVD_000_007	Current temperature of slot <number> is <value> °C.	n.a.	n.a.
EVO_IVD_000_008	Current temperature of slot <number> could not be determined. Device reported Error <error number>.	Washer firmware command error	Contact your local service organization
EVO_IVD_000_009	Successfully initialized.	n.a.	n.a.
EVO_IVD_000_010	Initialization failed.	Error during initialization	• Restart EVOware • Restart EVOware and instrument • Check configuration Contact your local service organization
<b>LiHa</b>			

Tab. 18-1 List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_LIH_000_000	Module successfully executed its COM registration.	n.a.	n.a.
EVO_LIH_000_001	Module is unable to prepare its COM registration.	<ul style="list-style-type: none"> <li>• Call name is missing</li> <li>• No right to write to registry</li> </ul>	<ul style="list-style-type: none"> <li>• Check driver INI file</li> <li>• Check user rights</li> </ul>
EVO_LIH_000_002	An unhandled exception has occurred.	Exception occurred during registration	<ul style="list-style-type: none"> <li>• Check INI file</li> <li>• Check user rights</li> </ul>
EVO_LIH_000_003	No communication to device available. Device will be simulated.	COM port could not be opened	<ul style="list-style-type: none"> <li>• Check device configuration</li> </ul>
EVO_LIH_000_004	Error <error number> while initializing Communication!	Windows responded with an error while opening COM	<ul style="list-style-type: none"> <li>• Check configuration</li> </ul>
EVO_LIH_001_013	Initialization of instrument failed. Please make sure that you have a washstation on your worktable.	LiHa initialization failed. Wash station may be missing.	<ul style="list-style-type: none"> <li>• Make sure there is a wash station in reach of the LiHa</li> </ul>
EVO_LIH_003_000	Could not connect to Message Server.	Could not connect to MCS	<ul style="list-style-type: none"> <li>• Check registration of MCS</li> </ul>
EVO_LIH_003_001	Message thread could not be stopped.	(in debug mode only)	n.a.
EVO_LIH_004_000	General error during database registration!	Problem during connection to database	<ul style="list-style-type: none"> <li>• Restart EVOware</li> <li>• Restore backup</li> <li>• Reinstall EVOware</li> </ul>
EVO_LIH_004_001	Scheduler could not be reached!	Could not connect the scheduler	<ul style="list-style-type: none"> <li>• Restart EVOware</li> <li>• Reinstall EVOware</li> </ul>
EVO_LIH_005_000	Cannot read variables from database.	Error when reading variables from the database	<ul style="list-style-type: none"> <li>• Restart EVOware</li> <li>• Restore backup</li> <li>• Reinstall EVOware</li> </ul>
EVO_LIH_005_001	Cannot read instances from database.	Error when reading instances from the database	<ul style="list-style-type: none"> <li>• Restart EVOware</li> <li>• Restore backup</li> <li>• Reinstall EVOware</li> </ul>
<b>PosID-3</b>			
EVO_PID_001_001	Error while initializing PosID device: Collision avoidance request has timed out.	Internal error	<ul style="list-style-type: none"> <li>• Restart Freedom EVOware.</li> </ul> <p>If this does not help, contact your local service organization.</p>
EVO_PID_001_002	Error while getting initialization status from PosID device. PosID3 error: {} - {} Severity: {}	Internal error	Contact your local service organization
EVO_PID_001_003	Error reading carrier barcode on grid {0}	Refer to <a href="#">18.1.13</a> , <a href="#">18-13</a>	

**Tab. 18-1** List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_PID_001_005	Error while getting initialization status from PosID device: {}	Internal error	Contact your local service organization
EVO_PID_001_006	Error reading labware {} (grid {}) barcode	Refer to <a href="#">18.1.14</a> , <a href="#">18-14</a>	
EVO_PID_001_007	Unexpected carrier barcode on grid {} . Expected{} . Scanned{}	Refer to <a href="#">18.1.13</a> , <a href="#">18-13</a>	
EVO_PID_001_008	Carrier or tube rack re-scan required	Carrier or tube rack re-scan required for double-blind check	<ul style="list-style-type: none"> <li>• Make sure the carrier / tube rack is inserted correctly and click OK</li> </ul>
EVO_PID_001_009	Error while initializing PosID device: {}	Internal error	Contact your local service organization
EVO_PID_001_010	Aborted by user.	User aborted the operation (e.g. by clicking Cancel in a barcode error prompt).	n.a.
EVO_PID_001_011	Error getting carrier definition for carrier type '{0}'.	Internal error or carrier code unknown to Freedom EVOware	<ul style="list-style-type: none"> <li>• Check barcode on carrier</li> <li>• Check the carrier code (barcode prefix) in the carrier editor</li> </ul>
EVO_PID_001_013	Error while setting the barcode definitions. PosID3 error: {} - {}	Internal error	Contact your local service organization
EVO_PID_001_014	Error while setting the barcode definitions: {}	Internal error	Contact your local service organization
EVO_PID_001_015	An error occurred while storing scanned barcodes.	Internal error	Contact your local service organization
EVO_PID_001_016	Error writing barcode file	File not accessible	<ul style="list-style-type: none"> <li>• Check output path in configuration</li> <li>• Check access rights to file and folder</li> </ul>
EVO_PID_001_017	IOState will be set to off because connection to instrument could not be established	<ul style="list-style-type: none"> <li>• Device initialization failed</li> <li>• Instrument or device switched off</li> <li>• Incorrect communication settings</li> <li>• Bad connections to device</li> </ul>	<ul style="list-style-type: none"> <li>• Restart Freedom EVOware</li> <li>• Check if device is powered</li> <li>• Check communication settings</li> <li>• Check connections</li> </ul>
EVO_PID_001_018	Cannot connect to PosID-3 communication driver	Internal error	Contact your local service organization
EVO_PID_001_019	Cannot connect to PosID-3 communication driver	Internal error	Contact your local service organization

Tab. 18-1 List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_PID_001_020	Cannot connect to collision avoidance system	Internal error	<ul style="list-style-type: none"> <li>Restart Freedom EVOware.</li> </ul> If this does not help, contact your local service organization
EVO_PID_001_021	Error retrieving communication channel name.	Internal error	<ul style="list-style-type: none"> <li>Restart Freedom EVOware.</li> </ul> If this does not help, contact your local service organization
EVO_PID_001_022	Collision avoidance request has timed out.	Internal error	<ul style="list-style-type: none"> <li>Restart Freedom EVOware.</li> </ul> If this does not help, contact your local service organization
EVO_PID_001_023	Collision avoidance error.	Internal error	<ul style="list-style-type: none"> <li>Restart Freedom EVOware.</li> </ul> If this does not help, contact your local service organization
EVO_PID_001_024	Error while scanning carrier {}: {}	Internal error	Contact your local service organization
EVO_PID_001_025	Error while scanning carrier {}: {}	Internal error	Contact your local service organization
EVO_PID_001_026	Error while scanning carrier {}. PosID3 error: {} - {}	Each carrier or tube rack is fitted with two barcodes. This is done to enhance scanning accuracy. The two barcodes only differ in the separator character between the carrier code and the barcode (“\” or “/”). This error occurs if the barcode characters which follow the separator do not match.	<ul style="list-style-type: none"> <li>Check the barcode.</li> </ul>
EVO_PID_001_027	Error closing doorlocks!	The doors could not be closed and the user clicked Cancel	n.a.
EVO_PID_001_028	Driver is not initialized!	The PosID-3 driver must be initialized before running the script	<ul style="list-style-type: none"> <li>Freedom EVOware Plus: Go to the process editor and click Initialize before you open the script editor and run the script</li> </ul>

**Tab. 18-1** List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_PID_001_029	Aborted by system	User aborted the operation	n.a.
EVO_PID_001_030	Tube Barcode Error (PosID-3)	Refer to <a href="#">18.1.14</a> , <a href="#">18-14</a>	
EVO_PID_001_031	Enter Barcode (PosID-3)	Refer to <a href="#">18.1.16</a> , <a href="#">18-16</a>	
EVO_PID_001_032	Enter Barcode (PosID-3, Double Blind Entry)	Refer to <a href="#">18.1.17</a> , <a href="#">18-17</a>	
EVO_PID_001_033	No carrier detected on grid <grid position>	The carrier barcode has been scanned (carrier is present) but the PosID-3 cannot grip it	<ul style="list-style-type: none"> <li>• Make sure the carrier / tube rack is inserted correctly</li> <li>• Check for mechanical malfunction</li> </ul>
EVO_PID_001_034	User selected to ignore carrier on grid <grid position> Carrier was not scanned	A scanning error was reported and the user clicked ignore in the Carrier Barcode Error dialog box.	n.a.
EVO_PID_001_035	Switching off barcode file usage because configured file does not exist. Please check configuration	n.a.	n.a.
EVO_PID_001_036	Manual barcode failed length check	-	• Check entered barcode
EVO_PID_002_002	Error while archiving old scan.csv file.	File not accessible.	<ul style="list-style-type: none"> <li>• Check access rights to file</li> <li>• and folder</li> </ul>
EVO_PID_003_001	Barcodes are not identical	Double Blind Entry is enabled and the two barcodes you entered are not the same.	• Enter the same barcode in both fields
<b>Symbol BC Scanner</b>			
EVO_SBC_000_000	Generated ID <name>	n.a.	n.a.
EVO_SBC_000_001	Barcode <name>	n.a.	n.a.
EVO_SBC_000_002	Generated ID <name> could not be saved in DB	Labware not found in the database or labware locked	<ul style="list-style-type: none"> <li>• Restart EVOware</li> <li>• Restore backup</li> <li>• Reinstall EVOware</li> </ul>
EVO_SBC_000_003	Error accessing labware '<name>' in the database	Labware not found in the database	<ul style="list-style-type: none"> <li>• Restart EVOware</li> <li>• Restore backup</li> <li>• Reinstall EVOware</li> </ul>
EVO_SBC_000_004	Execution was successful	n.a.	n.a.
EVO_SBC_000_005	Error occurred during execution	n.a. (protocol message)	n.a.
EVO_SBC_000_006	Error occurred during execution	n.a. (protocol message)	n.a.
EVO_SBC_000_007	Duplicate Barcode <barcode>	Two or more items have the same barcode	• Check for duplicate barcodes

**Tab. 18-1** List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
<b>Scheduler</b>			
EVO_SCH_000_000	Halt pressed, system Interrupted!	n.a.	n.a.
EVO_SCH_000_001	Module <name> registered.	n.a.	n.a.
EVO_SCH_000_002	Instrument <name> is ready.	n.a.	n.a.
EVO_SCH_000_003	Loading module	n.a.	n.a.
EVO_SCH_000_004	GetInstrument: Index out of range.	GetInstrument requested with wrong index	Contact your local service organization
EVO_SCH_000_005	GetInstrument: Bad index.	GetInstrument requested with wrong index	Contact your local service organization
EVO_SCH_000_006	LoadInstruments is currently not allowed.	Internal error	Contact your local service organization
EVO_SCH_000_007	LoadAllInstruments is currently not allowed.	Internal error	Contact your local service organization
EVO_SCH_000_008	UnloadInstruments is already running.	Internal error	Contact your local service organization
EVO_SCH_000_009	UnloadInstruments can not be run at this time.	Internal error	Contact your local service organization
EVO_SCH_000_010	Initialization currently not allowed.	Internal error	Contact your local service organization
EVO_SCH_000_011	Configuration file has been changed. Initialization aborted.	Trac.ini has been modified	<ul style="list-style-type: none"> <li>• Restore original file or open configuration and accept changes</li> </ul>
EVO_SCH_000_012	Error initializing instrument drivers. Instrument driver '<name>' unreachable!: <error text>	Communication to driver failed	<ul style="list-style-type: none"> <li>• Restart EVOware</li> <li>• Reboot computer</li> <li>• Reinstall EVOware</li> </ul>
EVO_SCH_000_013	Could not start scheduler	Scheduler could not be connected or shut down	<ul style="list-style-type: none"> <li>• Restart EVOware</li> </ul>
EVO_SCH_000_014	Error shutting down instruments. Instrument driver '<name>' unreachable!: <error text>	Communication to driver failed	If error recurs contact your local service organization
EVO_SCH_000_015	Instrument driver '<name>' unreachable!: <error text>	Communication to driver failed	If error recurs contact your local service organization
EVO_SCH_000_016	Instrument driver '<name>' unreachable!: unknown error	Communication to driver failed	If error recurs contact your local service organization
EVO_SCH_000_017	Resource Missing!	Process contains resource but driver is not installed	<ul style="list-style-type: none"> <li>• Add/activate driver or change process</li> </ul>
EVO_SCH_000_018	Unknown	n.a.	n.a.



**Tab. 18-1** List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_SCH_000_019	Cannot initialize Module	n.a.	<ul style="list-style-type: none"> <li>• Check hardware connections and driver configuration</li> </ul>
EVO_SCH_000_020	Cannot shut down Module	n.a.	<ul style="list-style-type: none"> <li>• Check hardware connections and driver configuration</li> </ul>
EVO_SCH_001_000	Scheduler Error: cannot allocate memory!	Insufficient memory	<ul style="list-style-type: none"> <li>• Increase page file size</li> <li>• Increase RAM resources</li> </ul>
EVO_SCH_002_000	Revision <revision number> of process '<name>' was requested but the current revision is <revision number>.	A schedule will be started but a contained process was changed	<ul style="list-style-type: none"> <li>• Update saved schedule or restore original process file</li> </ul>
EVO_SCH_002_001	Create not called.	Internal error	Contact your local service organization
EVO_SCH_002_002	No software license found or evaluation period expired. Program will unload.	n.a.	<ul style="list-style-type: none"> <li>• Check your licence agreement</li> </ul>
EVO_SCH_002_003	There is no valid schedule available for saving.	n.a.	n.a.
EVO_SCH_002_004	Failure while loading schedule information from disk	Schedule file not accessible	<ul style="list-style-type: none"> <li>• Check access rights to schedule file/process folder</li> </ul>
EVO_SCH_002_005	The schedule file is not valid.	File is corrupt	<ul style="list-style-type: none"> <li>• Check schedule file</li> </ul>
EVO_SCH_002_006	Scheduler is running.	n.a.	n.a.
EVO_SCH_002_007	Process is not executable.	Process saved is invalid	<ul style="list-style-type: none"> <li>• Check process definition</li> </ul>
EVO_SCH_002_008	Error: Configuration file is invalid / has been changed. Protocols cannot be executed.	Trac.ini has been modified	<ul style="list-style-type: none"> <li>• Restore original file or open configuration and accept changes</li> </ul>
EVO_SCH_002_009	Cannot open File for Simulation Output!	File not accessible	<ul style="list-style-type: none"> <li>• Check access rights to file and folder</li> </ul>
EVO_SCH_002_010	Could not connect to MCS server.	Connection to MCS server failed	<ul style="list-style-type: none"> <li>• Call up "MCS -reg-server" in command prompt</li> </ul>
EVO_SCH_002_011	System successfully recovered! Please check Labware and finish all canceled steps manually!	n.a.	n.a.
EVO_SCH_002_012	System Recovery	n.a.	n.a.
EVO_SCH_002_013	System pause requested by user. Waiting for pending requests to finish...	n.a.	n.a.

**Tab. 18-1** List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_SCH_002_014	Recover Method	n.a.	n.a.
EVO_SCH_002_015	System successfully recovered!	n.a.	n.a.
EVO_SCH_002_016	Can not open Recoveryfile	File not accessible	<ul style="list-style-type: none"> <li>• Check access rights to file and folder</li> </ul>
EVO_SCH_002_017	Impossible to schedule due to insufficient resource capacity. Add resources or increase allowed waiting times to allow sequential use of resource.	n.a.	n.a.
EVO_SCH_002_018	System pause requested by module '<name>'. Waiting for pending requests to finish...	n.a.	n.a.
EVO_SCH_002_019	The macro '<name>'is still active.	n.a.	n.a.
EVO_SCH_002_020	Module timeout caused by <name>. Timeout buffer started...	n.a.	n.a.
EVO_SCH_002_021	System resumes...	n.a.	n.a.
EVO_SCH_002_022	Error opening schedule file '<file name>'.	Save schedule failed	<ul style="list-style-type: none"> <li>• Check access rights to file and folder</li> </ul>
EVO_SCH_002_023	Error writing schedule file '<file name>'.	<ul style="list-style-type: none"> <li>• Save schedule failed</li> <li>• Storage capacity of harddisk exceeded</li> </ul>	<ul style="list-style-type: none"> <li>• Perform data management on harddisk</li> <li>• Contact your local service organization</li> </ul>
EVO_SCH_002_024	Could not set simulation mode. System is running or paused	n.a.	n.a.
EVO_SCH_003_000	SetReservation <macro name> (<macro ID>) Start <start time> (<duration>)	Internal error	Contact your local service organization
EVO_SCH_003_001	CheckResources failed <macro name> (<macro ID>) Start <start time> (<duration>)	Internal error	Contact your local service organization
EVO_SCH_003_002	SetReservation	n.a. (window title)	n.a.
EVO_SCH_003_003	Macro <name> <macro ID> could not be restored! (Start=<start time> Duration=<duration> Module=<name>)!)	Internal error	Contact your local service organization
EVO_SCH_003_004	Macro <name> <macro ID> could not be restored! (Start=<start time> Duration=<duration> Module=?)!)	Internal error	Contact your local service organization
EVO_SCH_003_005	Action <name>(ID) is not reserved! (Start= <earliest start time> - <latest start time> Modul=<name>)	Internal error	Contact your local service organization

**Tab. 18-1** List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_SCH_004_000	Process impossible to schedule!	Inconsistent process	• Check process definition/time settings
EVO_SCH_004_001	Robot access for Source and Destination location in Process is incompatible!	No robot is allowed for both carriers/locations	• Reconfigure carriers or change process
EVO_SCH_004_002	Process Restored! Time <duration>	n.a.	n.a.
EVO_SCH_004_003	Error backup reservation <ID>! Time=<duration>	Internal error	Contact your local service organization
EVO_SCH_004_004	Process <name> stopped!	n.a.	n.a.
EVO_SCH_004_005	Process <name> cancelled!	n.a.	n.a.
EVO_SCH_004_006	Check Resources failed! Time=<duration>	Internal error	Contact your local service organization
EVO_SCH_004_007	Process <name> can not be restored! Time=<duration>	Internal error	Contact your local service organization
EVO_SCH_004_008	CheckResources failed after restore Process! <name> Time=<duration>	Internal error	Contact your local service organization
EVO_SCH_004_009	Macro <macro name> (<macro ID>) could not be restored Start=<start time> Duration=<duration> Modul=<name> !	Internal error	Contact your local service organization
EVO_SCH_004_010	Macro <macro name> (<macro ID>) could not be restored Start= <start time> Duration= <duration> Modul=?!	Internal error	Contact your local service organization
EVO_SCH_004_011	Start Recovery Process for Process <name> (ID)!	n.a.	n.a.
EVO_SCH_004_012	Process impossible to load!	n.a.	n.a.
EVO_SCH_004_013	Process <name> has been modified	-	• Save process first
EVO_SCH_004_014	Process <name> can not be started because of missing parameter <parameter>	n.a.	n.a.
EVO_SCH_004_015	Process <name> can not be started: Object <object> is missing for SAMPLE connection	n.a.	n.a.
EVO_SCH_004_016	Number of items in Labware group <group> is insufficient for process <name>. Please define more Labware or reduce number of iterations for run!	More labware is needed than specified on the worktable	• Add labware to the worktable

**Tab. 18-1** List of error messages (cont.)

<b>Error ID</b>	<b>Message Text</b>	<b>Reason</b>	<b>Corrective Measure</b>
EVO_SCH_004_017	Process <name> can not be started: Object <object> is missing for ABSTRACT connection	n.a.	n.a.
EVO_SCH_004_018	Process <name> can not be started: Missing parameter <parameter> of type ABSTRACT cannot be calculated because no sample plated or multiple sample plates exist	n.a.	n.a.
EVO_SCH_004_019	Process <name> can not be started: Impossible to get database information for involved plate(s)	n.a.	n.a.
EVO_SCH_004_020	Process <name> Finish Macro <macro> manually!	n.a.	n.a.
EVO_SCH_004_021	Process <name> finished successfully!	n.a.	n.a.
EVO_SCH_004_022	Process <name> finished with errors!	There were errors during the run	• Check log files for errors
EVO_SCH_005_000	Allowed waiting time of macro <macro name> (<macro ID>) must be increased to <waiting time> for macro <macro name> (<macro ID>)!	Scheduling of process impossible due to timing problems	• Increase permissible waiting time as suggested
EVO_SCH_005_001	CheckOccupation failed <macro name> (<macro ID>)	Internal error	Contact your local service organization
EVO_SCH_005_002	Ressources missing for Macro <macro>!	n.a.	n.a.
EVO_SCH_005_003	Not enough positions available for Macro <macro>!	n.a.	n.a.
EVO_SCH_006_000	Ressource of Mainaction <name>(<ID>) for <name>(<ID>) not available! Time=<duration>	Internal error	Contact your local service organization
EVO_SCH_006_001	Error in Pre-/Post-action of command <command> with ID <ID>! Device <device> not accessible!	Problems in the Pre- or Post-Action	• Check log files for errors
EVO_SCH_006_002	Error in Pre-/Post-action of commands <command> and <command>! Locations <loc> and <loc> are not compatible! Please insert Transfer Station	Problems in the Pre- or Post-Action	• Check log files for errors
EVO_SCH_006_003	Error in Pre-/Post-action of command <command> with ID <ID>! <item> and <item> are not compatible! Please insert Transfer Station	Problems in the Pre- or Post-Action	• Check log files for errors
EVO_SCH_006_004	Loss of Device error because of error in Pre-/Post-Action!	Problems in the Pre- or Post-Action	• Check log files for errors

**Tab. 18-1** List of error messages (cont.)

<b>Error ID</b>	<b>Message Text</b>	<b>Reason</b>	<b>Corrective Measure</b>
EVO_SCH_006_005	Device lost because of error in Pre-/ Post-Action!	Problems in the Pre- or Post-Action	• Check log files for errors
EVO_SCH_007_000	No instruments.	n.a.	n.a.
EVO_SCH_007_001	Loading device drivers timed out while waiting for feedback from driver '	Driver did not register with scheduler	• Restart device and system Contact your local service organization
EVO_SCH_008_000	Can not allocate memory for Time file. Time fit will not work properly.	Insufficient memory	• Increase page file size • Increase RAM resources
<b>Startup wizard</b>			
EVO_TIN_001_000	No error	n.a.	n.a.
EVO_TIN_001_001	Administrator rights necessary	n.a.	n.a.
EVO_TIN_001_002	Read only property	n.a.	n.a.
EVO_TIN_001_003	Write only property	n.a.	n.a.
EVO_TIN_001_004	Language not supported	n.a.	n.a.
EVO_TIN_001_005	Wrong parameter	n.a.	n.a.
EVO_TIN_001_006	Not logged in	n.a.	n.a.
EVO_TIN_001_007	Login	n.a.	n.a.
EVO_TIN_001_008	Wrong password	n.a.	n.a.
EVO_TIN_001_009	Password not compliant	n.a.	n.a.
EVO_TIN_001_010	Passwords identical	n.a.	n.a.
EVO_TIN_001_011	Passwords already used	n.a.	n.a.
EVO_TIN_001_012	Could not access user database	n.a.	n.a.
EVO_TIN_001_013	User does not exist	User not defined	Call administrator to have user properly defined
EVO_TIN_001_014	User is disabled	n.a.	n.a.
EVO_TIN_001_015	Login failed	n.a.	n.a.
EVO_TIN_001_016	Initial password expired	n.a.	n.a.
EVO_TIN_001_017	Password expired	n.a.	n.a.
EVO_TIN_001_018	Wrong login	n.a.	n.a.
EVO_TIN_001_019	Administrator right needed	n.a.	n.a.

**Tab. 18-1** List of error messages (cont.)

<b>Error ID</b>	<b>Message Text</b>	<b>Reason</b>	<b>Corrective Measure</b>
EVO_TIN_001_020	Evoware Application Specialist needed	n.a.	n.a.
EVO_TIN_001_021	This user has no rights in Evoware	User not properly defined	Call administrator to have user properly defined
EVO_TIN_001_022	First time initialization needed! Please login as administrator	n.a.	n.a.
EVO_TIN_001_023	Unspecified user management error	n.a.	n.a.

# 19 Customer Support

<b>Purpose of This Chapter</b>	This chapter informs you how to contact us in case help is needed. It lists addresses and telephone numbers of the manufacturer's representatives.
<b>How to get Help</b>	Tecan and its representatives maintain a fully trained staff of technical specialists around the world. For any technical question, contact the nearest Tecan representative.
<b>Feedback on This Manual</b>	If you have any comments on this Software Manual or suggestions for improvement, please send them by e-mail to <a href="mailto:docfeedback@tecan.com">docfeedback@tecan.com</a> . In your e-mail, please specify the manual name, the document ID and the manual version. This information is shown at the bottom of each printed page and on the first page of the help file (context-sensitive help of software products).

## 19.1 Contacts

**Addresses** Contact your local distributor or one of the addresses below. Also see our homepage on the web: [www.tecan.com](http://www.tecan.com)

Country/Region	Address	Telephone/Telefax/E-mail	
Asia	Tecan Asia Pte Ltd. 18 Boon Lay Way, #10-106 TradeHub 21 Singapore 609966 Singapore	Phone	+65 6444 1886
		Fax	+65 6444 1836
		E-mail	tecan@tecan.com.sg
Australia New Zealand Pacific Islands	Tecan Australia Pty Ltd 21 / 3 Westside Avenue Port Melbourne Vic 3207 Australia	Phone	Toll Free: 1300 808 403
		Phone	+61 3 9647 4100
		Fax	+61 3 9647 4199
		E-mail	helpdesk-us@tecan.com
Austria	Tecan Austria GmbH Untersbergstrasse 1a 5082 Grödig Austria	Phone	+43 6246 8933 256
		Fax	+43 6246 72770
		E-mail	helpdesk-at@tecan.com
Belgium	Tecan Benelux B.V.B.A. Mechelen Campus Schaliënhoevedreef 20A 2800 Mechelen Belgium	Phone	+32 15 42 13 19
		Fax	+32 15 42 16 12
		E-mail	tecan-be@tecan.com
China	Tecan (Shanghai) Trading Co., Ltd. Room 1802-1804 and Room 205, No. 388, Fushan Road, Pudong New Area, 200122 Shanghai, P.R.China	Phone	+86 21 2206 32 06
			+86 40 0821 38 88
		Fax	+86 21 2206 52 60
		E-mail	helpdesk-cn@tecan.com

France	Tecan France S.A.S.U 6, Avenue du Château de Gerland F-69007 Lyon France	Phone Fax E-mail	+33 820 88 77 36 +33 4 72 76 04 99 helpdesk-fr@tecan.com
Germany	Tecan Deutschland GmbH Werner-von-Siemens-Straße 23 74564 Crailsheim Germany	Phone Fax E-mail	+49 1805 8322 633 or +49 1805 TECAN DE +49 7951 9417 92 helpdesk-de@tecan.com
Italy	Tecan Italia, S.r.l. Via Brescia, 39 20063 Cernusco Sul Naviglio (MI) Italy	Phone Fax E-mail	+39 800 11 22 91 +39 (02) 92 72 90 47 helpdesk-it@tecan.com
Japan	Tecan Japan Co., Ltd. Kawasaki Tech Center 580-16, Horikawa-cho, Saiwai-ku Kawasaki, Kanagawa 212-0013 Japan	Phone Fax Phone E-mail	+81 44 556 7311 (Kawasaki) +81 44 556 7312 (Kawasaki) +81(0) 6305 8511 (Osaka) helpdesk-jp@tecan.com
Netherlands	Tecan Benelux B.V.B.A. Industrieweg 30 NL-4283 GZ Giessen Netherlands	Phone Fax E-mail	+31 20 708 4773 +31 183 44 80 67 helpdesk.benelux@tecan.com
Scandinavia	Tecan Nordic AB Sveavägen 159, 1tr SE-113 46 Stockholm Sweden	Phone Fax E-mail	+46 8 750 39 40 +46 8 750 39 56 info@tecan.se
Spain Portugal	Tecan Ibérica Instrumentación S.L. Edificio Mapfre C/ de la Marina 16 - 18, Planta 11a C-1 E-08005 Barcelona Spain	Phone Fax E-mail	+34 93 40 91 237 +34 93 330 87 00 helpdesk-sp@tecan.com
Switzerland	Tecan Schweiz AG Seestrasse 103 8708 Männedorf Switzerland	Phone Fax E-mail	+41 44 922 82 82 +41 44 922 89 23 helpdesk-ch@tecan.com
United Kingdom	Tecan UK Ltd. Theale Court 11-13 High Street Theale, Reading, RG7 5AH United Kingdom	Phone Fax E-mail	+44 118 930 0300 +44 118 930 5671 helpdesk-uk@tecan.com
USA	Tecan US, Inc. 9401 Globe Center Drive, Suite 140, Morrisville, NC 27560 USA	Phone Fax Phone E-mail	+1 919 361 5200 +1 919 361 5201 Toll Free in the US: +1 800 TECAN US or +1 800 832 2687 helpdesk-us@tecan.com



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## 19.2 Remote Support

Tecan uses GoToMeeting to facilitate remote support.

### Prerequisites

To establish a remote support session, you need the following:

- ◆ Internet access
- ◆ Voice over IP (VoIP) with a suitable headset or a normal telephone connection

### Starting a Support Session

Once you have arranged a remote support session with your local Tecan Helpdesk, you will receive a GoToMeeting meeting ID.

To start the session, do the following:

- 1 Select **Start > All Programs > Tecan > Remote Support**
- 2 After the most up to date GoToMeeting component has been installed, enter the meeting ID.

The remote session will be established.

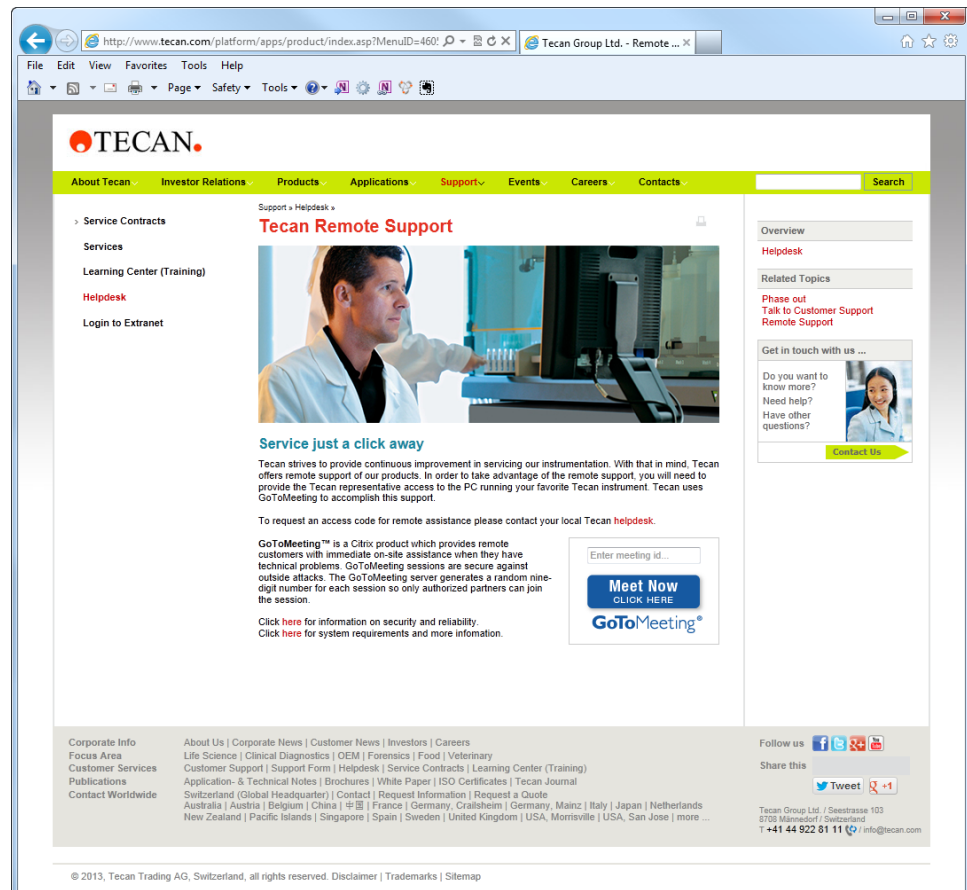


Fig. 19-1 Tecan Remote Support

## A Appendix A

This chapter contains background information on file and directory structures, system tools for Freedom EVOware and advanced worklist commands.

### A.1 Overview of the Log Files

Freedom EVOware writes log files to document the pipetting, to record user actions and changes to parameter values, to help you to check scripts in offline mode and to find errors. The log files are written to a specified directory (default <install\_path>\AuditTrail\Log).

- ♦ A new log file of **type EVO** is created each time Freedom EVOware is started. It contains initialization information from the Freedom EVOware software, the Freedom EVOware version number and the serial number of the pipetting instrument. It also contains information on the hardware options and external devices which are currently connected to the pipetting instrument, including their firmware versions.
- ♦ A new log file of **type EVO** is also created each time a pipetting script or process is started. It contains information about the script, the position of the instrument arms and the instrument settings.
- ♦ Each time the pipetting instrument is initialized, Freedom EVOware writes information on the positions of arms, the connected external devices and the COM ports into a new log file of **type EVO**.
- ♦ Freedom EVOware always creates log files of type EVO. Using the Configuration Tool, users with Administrator or Application Specialist rights can activate additional log files of **type USR** and **type ERR** with different levels of logging detail. See [A.1.2 “Structure of Log Files of Type USR”](#), [A-9](#) and [A.1.3 “Structure of Log Files of Type ERR”](#), [A-9](#) for more information.
- ♦ Log files of **type MACRO** (file name MACRO\*.log) contain messages from internal Freedom EVOware commands (macros). The information which is logged can also be viewed in the EVOware/Macro channel of the LogViewer tool. See also [A.1.4 “Log Files of Type MACRO”](#), [A-10](#).
- ♦ Log files of **type DB** (file name DB\*.log) contain messages from Freedom EVOware’s internal database. See also [A.1.5 “Log Files of Type DB”](#), [A-10](#).
- ♦ Log files of **type MCS** (file name MCS\*.log) contain messages from the Message Control Server. The MCS does not normally create log files. To activate logging for the MCS, see [A.1.6 “Log Files of Type MCS”](#), [A-10](#).
- ♦ In addition, the **Export Data** command can be included in pipetting scripts to create report files on pipetting operations (see [15.23 “Export Data Command”](#), [15-42](#)).

You can also view recent log entries by choosing *Log Window* in the *View* menu. The Log Window has the same contents as the log file of type EVO and initially shows the last 1000 log entries.

**Note:** *Freedom EVOware can output a large amount of logging information. It is recommended to back up and then delete the old log files on a regular basis. They are not backed up by the Backup function - you should use the Audit Trail Archiving function instead. See [A.11.6 “Audit Trail Archiving tool”](#), [A-51](#).*

### A.1.1 Structure of Log Files of Type EVO

A log file of type EVO has the highest level of logging detail. The file names are EVO\_YYYYMMDD\_HHMMSS.log, where YYYYMMDD is the creation date and HHMMSS is the creation time. Each log file of type EVO is protected with a checksum which is stored in the first line of the file.

Freedom EVOware always creates log files of type EVO. The information which is logged can also be viewed in the Tecan/EVOware/Log channel of the LogViewer tool (see A.12 “LogViewer Tool”, ¶ A-74).

Each time Freedom EVOware is started, a new log file of type EVO is created in the specified log files directory (default <install\_path>\AuditTrail\Log). It contains initialization information from the Freedom EVOware software, the Freedom EVOware version number and the serial number of the pipetting instrument. It also contains information on the hardware options and external devices which are currently connected to the pipetting instrument, including their firmware versions.

A new log file of type EVO is also created each time you run a script or process. It contains the record types A to E and G from Tab. A-1, ¶ A-8 and includes information on pipetting commands, user inputs and errors/warnings. If a device error is reported in a log file of type EVO, the log file of type MACRO may contain additional information on the error. This depends on the type of error.

Check the *Log serial data* checkbox in the Configuration Tool if you want to include the record type F (instrument firmware commands) too. See 8.3.1.4 “Protocol Options Tab”, ¶ 8-8. This will significantly increase the size of the log files.

The serial data can be useful when investigating communication errors. The log file also includes firmware commands for devices which are connected to the instrument’s CAN bus (e.g. LiHa, RoMa, PnP, incubator(s), Te-Shake, Te-MagS, Te-VacS and Te-Stack). It does not include firmware commands from devices which have their own RS232 interface.

See 8.4.3.2 “Logging Option”, ¶ 8-32 for information on log files for devices which have their own RS232 interface.

The following example shows part of a log file of type EVO\*.log (the record types are described in Tab. A-1, ¶ A-8):

```
7BEFBDC6
20040721_103529 admin
      Freedom EVOware, Version 1.2.28.301
D 10:35:29   Starting program "Aspirate.esc" (lines 1 to 2)
F 10:35:29   > P1,SGO0
              - P1,0
              > P1,LAA0,0,4
              - P1,0
              > P1,PIG
              - P1,0

E 10:35:29   0 Line    1 : Aspirate
F 10:35:29   > W2,RPX0
              - W2,0,-100
              > C2,RPX0
              - C2,0,9680
              > C2,RPR0
              - C2,0,0

E 10:35:29   0
      tip 1 : aspirate 52.06µl  1, 1 Tube 13*75mm 16 Pos [9,1]
              50.00µl "Water" Standard <15 - 500µl> Single
      tip 2 : aspirate 52.06µl  1, 2 Tube 13*75mm 16 Pos [9,1]
```

```

                    50.00µl "Water" Standard <15 - 500µl> Single
F 10:35:29      > C5,SHZ2080,2080,2080,2080,2080,2080,2080,2080
                - C5,0
                > C5,RPX0
                - C5,0,1295
                > C5,RPY0
                - C5,0,1031,90
                > W2,RPX0
                - W2,0,-100
                > C2,RPX0
                - C2,0,9680
                > C2,RPR0
                - C2,0,0
                > C5,PAA2000,-32,188,1225,1225,2080,2080,2080,2080,2080,2080
F 10:35:31      - C5,0
                > C5,RTS
                - C5,0,227
                > C5,SDM7,1
                - C5,0
                > C5,SSL600,600,,,,,,,,
                - C5,0
                > C5,SDL40,40,,,,,,,,
                - C5,0
                > C5,STL1225,1225,,,,,,,,
                - C5,0
                > C5,SML490,490,2100,2100,2100,2100,2100,2100
                - C5,0
                > C5,SBL20,20,,,,,,,,
                - C5,0
                > C5,MDT3,,,,,19,19,0,0,0,0,0,0
F 10:35:37      * C5,11
                > C5,REE
                - C5,0,@@@K@@@@@
                > C5,RVZ1
                - C5,0,544,502,0,0,0,0,0,0
C 10:35:37      0 tip 1 : OK / automatic handling
                tip 2 : not enough liquid
F 10:35:37      > O1,ALO1,0
                - O1,0
                > O1,RSL1
                - O1,0,1
                > O1,ALO2,0
                - O1,0
                > O1,SSL1,0
                - O1,0
                > O1,SSL2,2
                - O1,0
D 10:36:42      0 button "pipette air" has been pressed
F 10:36:42      > O1,ALO1,1
                - O1,0
F 10:36:43      > O1,ALO2,1
                - O1,0
                > C5,RPZ0
                > O1,RSL2
                - O1,0,2
                > O1,SSL2,0
                - C5,0,513,2080,2080,2080,2080,2080,2080,2080
                - O1,0

```

```

> C5,SSZ21,,,,,,,,
> O1,SSL1,1
- C5,0
> C5,SEP900,900,,,,,,,,
- O1,0
- C5,0
> C5,STZ-7,0,,,,,,,,
- C5,0
> C5,MTR156,156,,,,,,,,
F 10:36:44 - C5,0
> C5,RPZ0
- C5,0,506,2080,2080,2080,2080,2080,2080,2080
> C5,SSZ200,,,,,,,,
- C5,0
> C5,MAZ583,,,,,,,,
F 10:36:45 - C5,0
> C5,PVL0,0,,,,,,,,
- C5,0
> C5,SEP420,420,,,,,,,,
- C5,0
> C5,PPR30,30,,,,,,,,
- C5,0
> C5,RTS
- C5,0,227

E 10:36:45 0 detected_volume_1 = 207
detected_volume_2 = 20
detected_volume_3 = -1
detected_volume_4 = -1
detected_volume_5 = -1
detected_volume_6 = -1
detected_volume_7 = -1
detected_volume_8 = -1
Line 2 : Dispense
F 10:36:45 > W2,RPX0
- W2,0,-100
> C2,RPX0
- C2,0,9680
> C2,RPRO
- C2,0,0

E 10:36:45 0
tip 1 : dispense 62.06µl 1, 1 Wash Station Waste [6,2]
50.00µl "Water" Standard <15 - 500µl> Single
tip 2 : dispense 62.06µl 1, 2 Wash Station Waste [6,2]
50.00µl "Water" Standard <15 - 500µl> Single
F 10:36:45 > C5,SHZ2080,2080,2080,2080,2080,2080,2080,2080
- C5,0
> C5,RPX0
- C5,0,2000
> C5,RPY0
- C5,0,-32,188
> W2,RPX0
- W2,0,-100
> C2,RPX0
- C2,0,9680
> C2,RPRO
- C2,0,0
> C5,PAA1295,1031,90,1200,1200,2080,2080,2080,2080,2080

```

```

F 10:36:47 - C5,0
            > C5,RTS
F 10:36:48 - C5,0,227
            > C5,RPP0
            - C5,0,246,246,120,120,120,120,120,0
            > C5,RPZ0
            - C5,0,1200,1200,2080,2080,2080,2080,2080,2080
            > C5,SEP3600,3600,,,,,,
            - C5,0
            > C5,SPP900,900,,,,,,
            - C5,0
            > C5,STZ0,0,,,,,,
            - C5,0
            > C5,MTR-186,-186,,,,,,
            - C5,0
            > C5,RPZ0
            - C5,0,1200,1200,2080,2080,2080,2080,2080,2080
            > C5,RTS
            - C5,0,227

E 10:36:48 0 detected_volume_1 = -1
            detected_volume_2 = -1
            detected_volume_3 = -1
            detected_volume_4 = -1
            detected_volume_5 = -1
            detected_volume_6 = -1
            detected_volume_7 = -1
            detected_volume_8 = -1

F 10:36:48 > P1,SG00
            - P1,0
            > P1,LAA0,0,4
            - P1,0
            > O1,ALO1,0
            - O1,0
            > O1,ALO2,0
            - O1,0
            > O1,RSL1
            - O1,0,1
            > O1,SSL1,0
            - O1,0
            > O1,RSL2
            - O1,0,0
            > O1,SPS0
            - O1,0

F 10:37:02 > O1,RSL1
            - O1,0,0
            > O1,RSL2
            - O1,0,0

C 10:37:24 Should Evoware move all arms to their home position?
D 10:37:31 button Yes has been pressed
A 10:37:31 SHUTTING DOWN DEVICES
A 10:37:32 UNLOADING DEVICE DRIVERS
            Named Pipe 3 closed
            Named Pipe 2 closed
            Named Pipe 1 closed
            SHUTTING DOWN INSTRUMENTS

F 10:37:32 > O1,ALO1,1
            - O1,0

```

```
F 10:37:33 > O1,ALO2,1
             - O1,0
             > C1,SRA
             - C1,0
             > C1,REE
             - C1,0,@@@@
             > C1,RPR0
             - C1,0,0
             > C1,RPG0
             - C1,0,900
             > C1,PAG900
             - C1,0
             > C2,RPX0
             - C2,0,9680
             > C2,RPY0
             - C2,0,1059
             > C2,RPZ0
             - C2,0,2548
             > C2,RPR0
             - C2,0,0
             > C2,RPG0
             - C2,0,900
             > C2,RPR0
             - C2,0,0
             > C1,SAA1,9680,1059,2548,0,,1
             - C1,0
             > C1,RPR0
             - C1,0,0
             > C1,RPG0
             - C1,0,900
             > C6,RPX0
             - C6,0,1295
             > C1,AAA
             - C1,0
             > C2,RPX0
             - C2,0,9680
             > C2,RPY0
             - C2,0,1059
             > C2,RPZ0
             - C2,0,2548
             > C2,RPR0
             - C2,0,0
             > C2,RPG0
             - C2,0,900
             > W2,RPX0
             - W2,0,-100
             > C2,RPX0
             - C2,0,9680
             > C2,RPR0
             - C2,0,0
             > C5,RPX0
             - C5,0,1295
             > C5,RPY0
             - C5,0,1031,90
             > W2,RPX0
             - W2,0,-100
             > C2,RPX0
             - C2,0,9680
```



```

> C2,RPR0
- C2,0,0
> C5,SHZ2080,2080,2080,2080,2080,2080,2080,2080
- C5,0
> C5,PAA1295,1031,90,1200,1200,450,450,450,540,540,860
F 10:37:34 - C5,0
> W1,PAG280
- W1,0
> W2,RPX0
- W2,0,-100
> W2,RPY0
- W2,0,-700
> W2,RPZ0
- W2,0,2600
> W2,RPR0
- W2,0,0
> W2,RPG0
- W2,0,280
> C6,RPX0
- C6,0,1295
> W1,PAA-100,-700,2600,0
F 10:37:35 - W1,0
> W2,RPX0
- W2,0,-100
> W2,RPY0
- W2,0,-700
> W2,RPZ0
- W2,0,2600
> W2,RPR0
- W2,0,0
> W2,RPG0
- W2,0,280
> O6,STT0
- O6,0
> O6,RLC
- O6,0,1
> O1,ALO1,0
- O1,0
> O1,ALO2,0
- O1,0
> C5,SDZ390,390,-500,-500,-500,-270,-270,50
- C5,0
A 10:37:35 setting baudrate 38400
F 10:37:35 > M1,SHB5
- M1,0
A 10:37:38 quitting Genesis driver
quitting Evoware
closing log-file

```

Each line has the following structure:

**Tab. A-1** Structure of the log files

Column	Explanation
1	Alpha character which indicates the type of logged information: A = internal event B = dialog was opened C = message appeared on the screen D = user action E = pipetting command F = serial data (instrument firmware command): command prefix ">" = command sent to the instrument command prefix "-" = response from the instrument command prefix "***" = response from the instrument reports an error G = named pipe command or response
2	Space character
3 .. 10	The time in the format <i>hh:mm:ss</i>
11 - 12	Space characters
13	Freedom EVOware Plus: Process copy ID (process instance ID) minus 1. Freedom EVOware Standard: always 0.
14	Space character
15 .. End of Line	Additional information depending on the type of record

**Note:** Some of the columns 1 to 10 are filled with space characters if the type of information or the time has not changed since the previous line.

Line 1 of each log file contains the file checksum. Line 2 contains the creation date and time of the log file and the name of the currently logged in user. Line 3 contains the Freedom EVOware software build code (this is not the same as the Freedom EVOware version).

The log file entries for a pipetting command, taken from the above log file example, are as follows:

```
D 10:35:29      Starting program "Aspirate.esc" (lines 1 to 2)
F 10:35:29      > P1,SG00
                - P1,0
                > P1,LAA0,0,4
                - P1,0
                > P1,PIG
                - P1,0
E 10:35:29  0 Line    1 : Aspirate
F 10:35:29      > W2,RPX0
                - W2,0,-100
                > C2,RPX0
                - C2,0,9680
                > C2,RPR0
                - C2,0,0
E 10:35:29  0
  tip 1 : aspirate 52.06µl  1, 1 Tube 13*75mm 16 Pos [9,1]
                50.00µl "Water" Standard <15 - 500µl> Single
  tip 2 : aspirate 52.06µl  1, 2 Tube 13*75mm 16 Pos [9,1]
```

50.00µl "Water" Standard <15 - 500µl> Single

**"Starting program "Aspirate.esc" ...**  
Freedom EVOware started to process the pipetting script "Aspirate.esc" at 10:35:29. The following six lines show firmware commands which were sent to and received from the pipetting instrument.

**"Line 1 : Aspirate" ...**  
**Line 1** of the Freedom EVOware script was executed by process copy "0". It contains an Aspirate command. The following six lines show firmware commands which were sent to and received from the pipetting instrument.

**"tip 1 : aspirate 52.06µl 1, 1 Tube 13\*75mm 16 Pos [9,1]"**  
Tip 1 executes an Aspirate command which aspirated 52.06 µl (the target volume of liquid after applying the calibration factor and offset from the liquid class) from well 1,1 (X and Y position) of the labware *Tube 13\*75mm, 16 Pos.* (the configuration name of the labware). The labware was positioned at [9,1] (grid 9, carrier site 1).


**"50.00µl "Water" Standard <15 - 500µl> Single"**  
The target volume (without calibration) was 50.00 µl. The liquid class *Water* and sub-class *Standard <15 - 500µl>* was used. The command is a single pipetting command.

**"tip 2 : aspirate 52.06µl 1, 1 Tube 13\*75mm 16 Pos [9,1]"**  
Tip 2 executes an Aspirate command which aspirated 52.06 µl (the target volume of liquid after applying the calibration factor and offset from the liquid class) from well 1,2 (X and Y position) of the labware *Tube 13\*75mm, 16 Pos.* (the configuration name of the labware). The labware was positioned at [9,1] (grid 9, carrier site 1).


**"50.00µl "Water" Standard <15 - 500µl> Single"**  
The target volume (without calibration) was 50.00 µl. The liquid class *Water* and sub-class *Standard <15 - 500µl>* was used. The command is a single pipetting command.

### A.1.2 Structure of Log Files of Type USR

A log file of type USR contains information on pipetting commands and user inputs. The file names are USR\_YYYYMMDD\_HHMMSS.log, where YYYYMMDD is the creation date and HHMMSS is the creation time. Each log file of type USR is protected with a checksum which is stored in the first line of the file.

If you activate this log file type (see [8.3.1.4 "Protocol Options Tab"](#),  8-8), a new log file of type USR is created in the specified log files directory (default <install\_path>\AuditTrail\Log) each time you start Freedom EVOware or run a script.

It contains the record types D and E from [Tab. A-1](#),  A-8.

The information which is logged can also be viewed in the Tecan/EVOware/Usr channel of the LogViewer tool (see [A.12 "LogViewer Tool"](#),  A-74).

### A.1.3 Structure of Log Files of Type ERR

A log file of type ERR contains information on pipetting commands, user inputs and errors/warnings. The file names are ERR\_YYYYMMDD\_HHMMSS.log, where YYYYMMDD is the creation date and HHMMSS is the creation time. Each

log file of type ERR is protected with a checksum which is stored in the first line of the file.

If you activate this log file type (see [8.3.1.4 “Protocol Options Tab”](#), [# 8-8](#)), a new log file of type ERR is created in the specified log files directory (default <install\_path>\AuditTrail\Log) each time you start Freedom EVOware or run a script. The error file is empty (except for the checksum at the beginning) if no errors took place.

It contains the record types C, D and E from [Tab. A-1](#), [# A-8](#).

The information which is logged can also be viewed in the Tecan/EVOware/Error channel of the LogViewer tool (see [A.12 “LogViewer Tool”](#), [# A-74](#)).

#### A.1.4 Log Files of Type MACRO

Log files of type MACRO contain messages from internal Freedom EVOware commands (macros). The file names are MACRO\_YYYYMMDD\_HHMMSS.log, where YYYYMMDD is the creation date and HHMMSS is the creation time. If a device error is reported in a log file of type EVO, the log file of type MACRO may contain additional information on the error. This depends on the type of error.

The information which is logged can also be viewed in the Tecan/EVOware/Macro channel of the LogViewer tool (see [A.12 “LogViewer Tool”](#), [# A-74](#)).

#### A.1.5 Log Files of Type DB

Log files of type DB contain messages from Freedom EVOware’s internal database. The log files are created in c:\Program Files (x86)\Tecan\AuditTrail\log. The file names are DB\_YYYYMMDD\_HHMMSS.log, where YYYYMMDD is the creation date and HHMMSS is the creation time.

The information which is logged can also be viewed in the Tecan/Database channel of the LogViewer tool (see [A.12 “LogViewer Tool”](#), [# A-74](#)).

#### A.1.6 Log Files of Type MCS

Log Files of type MCS contain messages from the Message Control Server (MCS) in Freedom EVOware. The log files are created in the same directory as the mcs.exe executable file (default c:\Program Files (x86)\common files\Tecan\MCS). The file names are MCS\_YYYYMMDD\_HHMMSS.log, where YYYYMMDD is the creation date and HHMMSS is the creation time.

The MCS does not normally output logging information. Proceed as follows to activate the logging function for the MCS:

- ♦ Edit mcs.ini in the same directory as the mcs.exe executable file and set the required logging level.
- ♦ The mcs.exe process must be re-started after editing the mcs.ini file. To do this, exit Freedom EVOware, stop the mcs.exe process in the Windows Task Manager and re-start Freedom EVOware. This re-starts mcs.exe.
- ♦ Alternatively, use the Zip & Send tool to set the logging level (see [A.11.5 “Zip & Send Tool”](#), [# A-45](#)).

To avoid logging an excessive amount of data, this logging feature should be disabled when it is not needed.

The information which is logged can also be viewed in the Tecan/MCS channel of the LogViewer tool (see [A.12 “LogViewer Tool”](#), [# A-74](#)).

### A.1.7 Structure of the Trace File (Audit Trail)

The trace file contains information on configuration, data and log files which have been created, edited or saved. The default location for the trace file is <install\_path>\AuditTrail\Log.

Each time a configuration, data or log file is created or modified, a CRC checksum is stored in the file and an entry is made in the trace file.

Each entry in the trace file specifies the date and time, the name of the currently logged in user and the file name. Log files are created by Freedom EVOware automatically and a user name is not included in the trace file entry in this case. The trace file can be viewed with a plain text editor.

Each time a configuration or data file is modified and saved, the previous version is archived in the <install\_path>\AuditTrail\Configuration sub-directory. The date and time is appended to the original filename. The archive copy includes the user-specified reason for the change if “Electronic Signatures” is enabled in the Freedom EVOware Configuration Tool (see [B.5.5 “Electronic Signatures”](#), [B-9](#)).

All changes relating to user management are recorded in the user management audit trail (see [B.5.3.1 “User Management Audit Trail”](#), [B-8](#)).

## A.2 Structure of the Barcode Files

The following sections describe the syntax of the barcode files which Freedom EVOware creates. It also describes the syntax of the barcode files which are required by the Carousel and Carousel NT commands LoadBCFromFile and by the *Specify plates by barcodes* option in the Freedom EVOware Plus Runtime Controller.

### A.2.1 Barcode files written by the Carousel commands

The Carousel commands ReadAllBarcodes and ReadPlatesInCartridge and the Carousel NT commands ScanAllCartridges, ScanCartridge and ScanLocation read the barcodes of the labware in the carousel and create a text file which contains the barcodes.

### A.2.2 Barcode file written by the PosID and PosID-3 commands

The PosID and PosID-3 commands can be configured to write a report file with the scanned barcodes. The filename is scan.csv and it is written to the configured Output directory (default path <install\_path>\Output). Existing files with the same name are overwritten.

Each line in the file contains the following parameters, separated by semicolons: Grid;site on carrier (always 1 for tube racks);tube position in tube rack (missing or 0 for other labware types);configuration name of labware or tube;labware or tube rack name (yellow label on the worktable);carrier or tube rack barcode;labware or tube barcode.

The file contains one line per scanned labware or tube barcode. The first line of the file contains a CRC checksum. Starting with line 2, the structure of the file is as follows:

GridPos, SiteOnGrid, TipNumber, ConfigName, RackLabel, CarrierBarcode, SRCRackID

The parameters are as follows:

**GridPos**

Worktable grid position of the labware.

**SiteOnGrid**

Carrier site (always 1 for tube racks).

**TipNumber**

Tube position in tube rack (missing or 0 for other labware types).

**ConfigName**

Configuration name of labware or tube rack.

**RackLabel**

Name (label) of labware or tube rack (yellow label on the worktable).

**CarrierBarcode**

Carrier or tube rack barcode.

**SRCRackID**

Labware or tube barcode.

The labware or tube barcode field contains three stars (\*\*\*) if the barcode cannot be read. For tubes, it contains \$\$\$ if the tube is missing.

The file does not include column headers.

### A.2.3 Barcode File for the PosID-3 Driver

For the purpose of testing or training, the PosID-3 driver can be configured to read simulated barcodes from a text file and return them to Freedom EVOware through the PosID-3 - Scan command as if the PosID-3 has actually scanned some labware.

Proceed as follows to use this feature:

- ♦ Create a text file with barcodes using the syntax described below.
- ♦ Set the I/O State of the PosID-3 driver to OFF.
- ♦ In the configuration of the PosID-3 driver, check the *Enable barcode file usage* checkbox and specify the path and name of the barcode file (see [8.5.9.2 "PosID-3 Configuration - Settings Tab"](#), ¶ 8-52). The suggested file name is PosID3\_ManualBarcodes.txt.

The .txt file should have the following structure:

Create a section "[Grid<grid number>]" for each grid position to be scanned, where <grid number> is the number of the grid where the carrier is located.

Create a new line <position\_number>=<barcode> for each tube or labware item at the specified grid position, where <position\_number> is the tube number or site number.

Use "\*\*\*\*" to simulate positions with scan errors and "\$\$\$" to simulate positions with missing tubes.

Example file:

```
[Grid12]
1=10001
```

```
2=***
3=10003
4=10004
[Grid14]
1=20001
2=$$$
3=20003
4=20004
```

### A.2.4 Barcode File for the Labware Generator

For the purpose of testing or training, the context menu of the labware generator lets you import a list of labware barcodes from a file and assign them to labware on the worktable or in a labware feeder such as the carousel (see [11.6.3 “Context Menu of the Labware Generator”](#), [11-17](#)). Tube barcodes cannot be imported in this way.

#### File syntax

Line 1 of the file contains the column headers (field names) as follows:

##### **GridPos**

Column number in the labware generator.

##### **SiteOnGrid**

Row number in the labware generator.

##### **SRCRackID**

Labware barcode.

Line 2 of the file contains a dummy string consisting of at least one alphanumeric character. The dummy string is ignored but line 2 must not be empty or omitted.

The data lines start at line 3. The last data line must end with <CR><LF> (press Return in the text editor when you create the file).

The barcodes are assigned to the currently selected labware group in the labware generator. To select a group, click on one of the labware items in the group. The selected labware items are shown with a shaded yellow color.

When you create the labware group in the labware generator, you must do this in a single step. If you create the labware group using several steps and choose non-adjacent wells, you will not be able to select the entire group to assign the barcodes.

Data lines in the barcode file for column number(s) which are not included in the currently selected labware group will be ignored. For example, if the first labware group extends over columns 1 and 2 in the labware generator and you select this labware group when you import the barcode list, data lines for column 3 (GridPos=3) will be ignored.

Example file:

```
GridPos,SiteOnGrid,SRCRackID
dummy_string
1,1,ABB123
1,2,BAB321
1,3,DCC123
```

### A.2.5 Barcode File for the Freedom EVOware Plus Runtime Controller

The *Specify plates by barcodes* option in the Freedom EVOware Plus Runtime Controller allows you to run processes using specific labware items which are identified by their barcodes.

If you check the *Specify plates by barcodes* checkbox, you will be prompted to choose a .txt or .csv file which contains a list of barcodes.

The .txt file should have the following structure:

```
MyLabware001,MyLabware002,Sample1,Reagent1  
ABB123,BAB321,DCC123,AAA123,BBA321  
DED123,BAB321,BCD123,BBB123,CDA321
```

...

The first line of the file is a comma-separated list of the labware source icon names (as shown in the Process Editor). You do not need to include all of the source icon names which are used in your process. You only need to include the source icon names whose barcodes are relevant.

Subsequent lines list the barcodes of the labware which should be used. Freedom EVOware Plus lets you run several processes in parallel, and each line lists the barcodes for one process copy. Make sure that there are enough lines for the number of process copies you want to run. Each line should include the same number of barcodes as the number of labware source icon names in the first line. Empty lines in the file are ignored. You can use semicolons “;” or pipe characters “|” as the separator character instead of commas. The barcodes must not include any of these three separator characters.

The structure of the .csv file is as follows:

Put the labware source icon names in the first row of the table, each of them in a separate table cell. Subsequent rows of the table contain the barcodes of the labware which should be used.

**Note:** *This feature is only intended for random access storage devices such as the carousel (the stacker is a first-in last-out storage device, not random access). For labware in the carousel, you can use the ReadAllBarcodes or ReadPlatesInCartridge commands to read the barcodes and store them in a text file.*



## A.3 Parameters in the Evoware.opt file

The following tables list user-configurable parameters in six different sections of the evoware.opt file. evoware.opt is in the <install\_path>/Database directory. These settings should only be changed by specialists.

**Note:** *The parameters in evoware.opt are already configured with suitable values. The values should only be changed for special applications. Do not change the values of parameters which are not listed in the following tables. If you change entries in the evoware.opt, carefully validate your application according C “Validation of Freedom EVOware Applications”, § C-1.*

Add a new line to the respective section of the evoware.opt file if the parameter is missing.

**Default values:** Each parameter string is shown below with the default value of the parameter (some parameters do not have a default value). The parameter string is not case sensitive.

**Note:** *Freedom EVOware must be re-started for the changes to take effect.*

Configuration files are protected with checksums. When you re-start Freedom EVOware after editing this file, you will be warned that the checksum is invalid. Proceed as follows to repair the checksum:

- ♦ Quit Freedom EVOware and start the Configuration Tool with Start > All Programs > Tecan > EVOware > Configure. You will be warned again that the checksum is invalid and you will be asked if you want to repair the checksum. Click Yes. Then Click Exit and re-start Freedom EVOware. Alternatively, repair the checksum using the Validate Configuration tool (see A.11.2 “Validate Configuration Tool”, § A-39).

**Tab. A-2** Evoware.opt parameters, [OPTIONS] section

Parameter string	Description	Range, units
Lauda_Pump_Speed=3	Speed of pump for Lauda water-bath.	1 to 5
Csv_With_Semicolon=0	1= Use “;” instead of “,” as the field separator in the CSV file created by the Export Data command. This parameter also controls the field separator for the Import Variable and Export Variable commands (see 15.37.2, § 15-97). It has no influence on the scan.csv file exported by the PosID command, which always uses “;” as the field separator.	0 or 1
Posid_Allocation_Timeout=60000	Time-out for collision avoidance.	0 to ∞, in ms
LiHa_Allocation_Timeout=60000	Time-out for collision avoidance.	0 to ∞, in ms
RoMa_Allocation_Timeout=60000	Time-out for collision avoidance.	0 to ∞, in ms
PnP_Allocation_Timeout=60000	Time-out for collision avoidance.	0 to ∞, in ms
Diluter_OFF=tipMask	Turns the diluter off for the specified tip(s).	0 to 255, bit-mapped

**Tab. A-2** EvoWare.opt parameters, [OPTIONS] section (cont.)

Parameter string	Description	Range, units
NOT_ENOUGH_LIQUID_ERROR_NO_TRACKING=0	0 and no tracking is set = "Not enough liquid" error prompt is not shown even if the error is defined in the Liquid Class. This is the default behavior. 1=The error prompt is shown	0 or 1
Optimize_Ztravel=0	1=When moving above a carrier, retract to Z-travel for the highest labware on the carrier instead of to global Z-travel. This can reduce the time required for the move.	0 or 1
Outrigger_Distance=0	Length of the RoMa grippers (overrides value in the firmware).	in 0.1 mm
Reduce_CPU_Usage=0	1=Allocate less cpu priority to EVOware tasks. Allows other software to run faster.	0 or 1
Disable_CA=0	1=Disable collision avoidance globally. This setting is only needed for special applications and is only intended for specialists. Use with care!!	0 or 1
Poolsafe_Balances	Specify how many pooling balances are fitted to your system. Omit this parameter or specify 0 if none are fitted.	-
LIHA_CheckForDeadlocks MCA_CheckForDeadlocks MCA384_CheckForDeadlocks	If the pipetting instrument is fitted with two liquid handling, MCA96 or MCA384 arms, rare situations can lead to a deadlock situation, e.g. if both arms are pipetting simultaneously on opposite ends of the same labware and both of them move towards the middle of the labware. 0 = Do not check for arm deadlocks; use the normal collision avoidance routines. 1 = Check for arm deadlocks and resolve them if necessary.	0 or 1
Runtime_Preservebarcodes=1	Represents the setting of the checkbox "Preserve barcodes" in the Freedom EVOware Plus Run dialog	0 or 1
RoMa_Smooth_Move_On_Short_Distance=2000	Allow suppressing a wobbling of the RoMa when moving short distances by switching to smooth move mode overriding other move options	1 step = 1/10 mm

**Tab. A-2** EVOware.opt parameters, [OPTIONS] section (cont.)

Parameter string	Description	Range, units
LABWARE_OFFSET_ON_SAFEPOS_IN_STD=1	0=there is no labware offset set for the safepos of a vector in EVOware Standard. 1=the labware offset is also added to the safepos, harmonizing RoMa movements between EVOware Standard and EVOware Plus	0 or 1
LIHA_STOP_AT_ZMAX=0	z-max is not defined as a "z-bottom". Basically the LiHa can reach positions lower than z-max. When this parameter is set to 1 the tips stop wherever z-max is defined.	0 or 1
LIHA_TIPSPACING_MIN_1=90 LIHA_TIPSPACING_MIN_2=90	Minimal allowed spreading for the channels of the LiHa (overrides value in the firmware). <b>Note:</b> If a 5000 µl DiTi is mounted using the GetDiti-Command, the value will be set to 18 mm and the values configured here will not be used.	in 0.1 mm
SAFEMOVE_ON_ERROR_ONLY=1	Performing safe move in error case only with (1) or every time (0)	0 or 1
SAFEMOVE_ON_GETDITI	Start using safe paths when DiTis are picked up during a "Get DiTi" command when set to 1. So if for example an "Aspirate" command is executed after a "Get DiTi" command with this feature being active, the LiHa will move on a safe path from the DiTi labware to the aspirate position. This only works if SAFEMOVE_ON_ERROR_ONLY is set to 0. By default, this feature is disabled.	0 or 1
DISPENSE_EXCESS_INTOLIQUIDWASTE=0	When 1 excess volume is dispensed to liquid waste by default (if no liquid waste available an error appears). When 0 excess volume is discarded to DiTi waste according to the DISCARD_DITIS_WITHLIQUID option	0 or 1

**Tab. A-2** Evoxare.opt parameters, [OPTIONS] section (cont.)

Parameter string	Description	Range, units
DISCARD_DITIS_WITH_LIQUID=0	When 0 excess volume is dispensed to DiTi waste before dropping DiTis. When 1 excess volume is discarded by dropping DiTis to DiTi waste	0 or 1
REPLACE_EXCESS_BEFORE_ASPIRATE=0	When set to 1 checks whether the Excess Volume should be replaced before aspirating again. This takes place in conjunction with the advanced replace after settings in the Liquid Class. Prior to aspirating, the excess volume will be dispensed to waste. Note: this parameter is only valid for the LiHa.	0 or 1
LOG_TIP_CONTENT=0	Activates extended liquid handling logging.	0 or 1
DROP_TAG_SPEED=60	Speed used to drop the TAG	40 to 80 in µl/s
PIPETTE_SYSTEMLIQUID_WITHOUT_DITI=0	When 1 it is allowed to pipette System Liquid without any DiTi mounted.	0 or 1
NO_SUBCLASS_SEARCH_FOR_CONDITIONING_AND_EXCESS=0	When excess volume is dispensed to waste or to source, EVOxare now looks for the appropriate sub-class for the volume being dispense. This can cause an appropriate sub-class not to be found for the volume to be dispensed. The Tecan QC Kit wizard liquid classes are like this, and you can either set up the sub-class in the liquid class or set this entry to 1 for compatibility	0 or 1
SHOW_PMP_INSTRUMENT_ERROR=1	Allows deactivation of the PMPInstrumentError Dialog during Dispense and Mix operations. The default value "Discard DiTis and continue" will be used.	0,1
STAG_VOLUME_AFTER_DROPDITI	Allows configuration of the volume of the system trailing airgap. This is used by the DropDiTi command because no LiquidClass is available.  Default is 10 ul	in µl

**Tab. A-2** Evoware.opt parameters, [OPTIONS] section (cont.)

Parameter string	Description	Range, units
DLG_CLOSE_TIME	Allows to configure the dialog closing time for the Grip Error dialog. default = 60s	s
NO_HIGH_BAUDRATE	Allows to prevent the use of a baud rate of 57600 that is supported by TECU firmware from version 1.1.  Setting this option to 1 is recommended for systems connections using RS 232.	0 or 1
ALLOW_DUPLICATE_BARCODES	Duplicate barcodes are ignored when the option is enabled.	0 or 1
Delete_Rack_At_Source	Changes the behavior of the Export Data command. Default is 1. Setting this option to 0 will remember the pipetting information even if the labware was transferred away. See also <a href="#">15.23 "Export Data Command"</a> , ¶ 15-42.	0 or 1
GENERATE_FULL_CRASH_DUMP	If set to 1, EVOware will generate a crash dump that contains a complete snapshot of the memory used by EVOware. This provides more data for debugging but also increases the size of the crash dump significantly. If set to 0, EVOware will still generate a crash dump but a much smaller one. Default value is 1.	0 or 1
ReduceDBActions	Default 0 - database is recreated in EVOware Standard, when PrepareScript is called. When 1 the database is only newly created when the worktable of the currently prepared script is different from the worktable of the previously prepared script.	0, 1
CondensedPipetingModeOff	Default 1 - when set to 0 the variable TIP_MASK will be used in condensed mode (see <a href="#">14.1.4.19 "TIP_MASK"</a> , ¶ 14-9)	0 or 1

**Tab. A-2** Evoware.opt parameters, [OPTIONS] section (cont.)

Parameter string	Description	Range, units
WARNING_ON_REDUCED_MIX_VOLUME	When mix after dispense is configured in a liquid class with liquid level detection & tracking activated for mix, the mixing volume is capped at the detected volume, even if the specified mixing volume is larger than the detected volume. If this setting is set to 1, the script will finish with a warning if the mixing volume is reduced. Otherwise, the script will finish without warnings. Either way, the fact that the mixing volume was reduced is written to the log. By default, this setting is activated.	0 or 1
USER_DEFINED_SCRIPT_PATHS	Before using the 'Remove unused customized liquid classes' function in the liquid class editor, this setting must be used if there are any user defined / non-default script or process paths on the system. If so, they need to be specified with this setting as a sequence of semicolon separated paths (e.g. USER_DEFINED_SCRIPT_PATHS=C:\temp;C:\temp2).	-
FREE_SUBROUTINE_MEMORY_IMMEDIATELY	When validating or running a script with a large number of subroutines, memory usage may increase so far that the process runs out of memory before the validation/run is finished. If so, this setting can be set to 1, so EVOware will clear any finished subroutines from memory while the validation/run is still active. This will reduce memory consumption but also may cause EVOware to crash in rare cases, so only use this setting if absolutely necessary. By default, this setting is deactivated.	0 or 1

**Tab. A-2** EVOware.opt parameters, [OPTIONS] section (cont.)

Parameter string	Description	Range, units
SUBROUTINE_MEM_LOGGING	This setting can be used to collect additional logging information in case crashes occur due to usage of the FREE_SUBROUTINE_MEMORY_IMMEDIATELY setting. Note that activating this setting will create large amounts of logging data and may slow down validation & execution of subroutines. By default, this setting is deactivated.	0 or 1
DISABLE_INFO_PAD	When DISABLE_INFO_PAD is set to 1, the infopad views in the EVOware editor (both the script and worktable infopads) are disabled to reduce memory consumption during editing of scripts and processes. However, script validation errors are still shown in the infopad, even when this setting is activated. This setting can be used if EVOware slows down over time while editing scripts/processes. By default, this setting is deactivated.	
STATUSLAMP_AT_USER_ABORT	Defines the status lamp state (alarm sound) when the user pressed the stop button. The default is RED_STEADY. Possible values are: STATUSLAMP_OFF = 0 STATUSLAMP_RED_FLASHING = 1 STATUSLAMP_GREEN_STEADY = 2 STATUSLAMP_GREEN_FLASHING = 3 STATUSLAMP_RED_STEADY = 4	0-4

**Tab. A-3** Evoware.opt parameters, [OBSTACLES] section

Parameter string	Description	Range, units
No_Temo_Obstacle=0	Specify 1 if the Te-MO is not on the worktable (i.e. it is not an obstacle for LiHa, RoMa or PnP movements).	0 or 1
Obstacle1=xLeft,yRear,xRight,yFront	You can specify up to 10 worktable obstacles for LiHa, MCA96 or MCA384 movements which are not otherwise known to EVOware. Specify the obstacle position with the coordinates of its left/rear and front/right edges.	in 0.1 mm

**Tab. A-4** Evoware.opt parameters, [DITI] section

Parameter string	Description	Range, units
Lower_Eject_OFF=0	1=Disable Lower DITI Eject. Changing one of the both following options below will only perform an additional movement prior to the lower DiTi eject. The lower DiTi eject position is fix and cannot be changed here.	0 or 1
Lower_Eject_200=700	Specifies Lower DITI Eject height for DITI 200 tips; this parameter is normally configured with the Setup & Service software.	0 to 2100 steps
Lower_Eject_1000=1075	Specifies Lower DITI Eject height for DITI 1000 tips; this parameter is normally configured with the Setup & Service software.	0 to 2100 steps
Subroutine=pathname	Specify the path and name of subroutine (script file) to be executed after getting the last DITI from the rack. Use it e.g. to fetch new DITI racks. This parameter is only intended for Freedom EVOware Standard. The following internal variables can be used in the script: __diti_grid, __diti_site and __diti_index (see 9.4.5 “Labware Types and DITI Types”, 9-22, DITI Index).	-



**Tab. A-4** EVOware.opt parameters, [DIT] section (cont.)

Parameter string	Description	Range, units
Allow_Reuse_PMP=0	The PMP option does not normally allow you re-use DITs after an aspirate-dispense sequence. Specify 1 if you want to allow the DITs to be reused. PMP will only be used for the first aspirate-dispense sequence and subsequent aspirate-dispense sequences will use normal pipetting.	
Aspirate_On_Discard_NoPMP=1	Advanced DiTi Eject introduces a small dilutor movement during DiTi eject to reduce the risk of cross contamination. <b>Note:</b> Tecan always recommends to use filter DiTis where the risk of contamination could affect performance or assay results. Nevertheless the risk of cross contamination can be reduced at the expense of throughput by enabling this feature.	0 or 1
CHANGE_MSG_IN_PLUS=1	0=there is no message displayed in EVOware Plus when DiTi labware needs to be exchanged. This setting should be set when using ADH. 1=there is a message displayed in EVOware Plus when DiTi labware needs to be exchanged. This setting should be set when not using ADH.	0 or 1

**Tab. A-5** EVOware.opt parameters, [NANO] section

Parameter string	Description	Range, units
Accel_X=500 Accel_Y=500 Accel_Z=500	Specify the acceleration of LiHa movements for nano-pipetting. Reduced acceleration can improve pipetting accuracy due to reduced vibration.	in 0.1 mm/s <sup>2</sup>

**Tab. A-6** EVOware.opt parameters, [PRINT] section

Parameter string	Description	Range, units
Left=50 Right=50 Top=50 Bottom=50	Specify the required print border for printed reports.	printer dots

**Tab. A-7** Evoreware.opt parameters, [LIHA]/[LIHA2] section

Parameter string	Description	Range, units
LIHA_PICKUP_LABWARE_PWM_LIMIT	This setting can be used to set the PWM limit (max force) used to pick up labware with the LiHa using the Pick up Labware command. If the setting is not used or the specified value is invalid, a default value of 30 is used.	Integers > 0
LIHA_PICKUP_LABWARE_ZRANGE_FACTOR	This setting can be used to influence the z-range used to pick up labware with the LiHa using the Pick up Labware command. The z-range is calculated as the distance between Z-Start and Z-Max for the labware to be picked up multiplied by the z-range factor. If the setting is not used or the specified value is invalid, a default value of 1.0 is used.	Decimal numbers > 0

**Tab. A-8** Evoreware.opt parameters, [SelfDiagnosticsTest] section

Parameter string	Description	Range, units
Altitude	Enter here the local height above mean sea level	
AltitudeUnit=1	Set the unit of the altitude; 1=meter, 2=feet	1 or 2

## A.4 Parameters in the Evoware.inf file

The following tables list user-configurable parameters in the evoware.inf file. evoware.inf is in the <install\_path>/Database directory. These settings should only be changed by specialists.


**Note:** *The parameters in evoware.inf are already configured with suitable values. The values should only be changed for special applications. Do not change the values of parameters which are not listed in the following tables.*

Add a new line to the respective section of the evoware.inf file if the parameter is missing.

**Default values:** Each parameter string is shown below with the default value of the parameter (some parameters do not have a default value). The parameter string is not case sensitive.

**Note:** *Freedom EVOware must be re-started for the changes to take effect.*

Configuration files are protected with checksums. When you re-start Freedom EVOware after editing this file, you will be warned that the checksum is invalid. Proceed as follows to repair the checksum:

- ◆ Quit Freedom EVOware and start the Configuration Tool with Start > All Programs > Tecan > EVOware > Configure. You will be warned again that the checksum is invalid and you will be asked if you want to repair the checksum. Click Yes. Then Click Exit and re-start Freedom EVOware. Alternatively, repair the checksum using the Validate Configuration tool (see [A.11.2 "Validate Configuration Tool"](#),  [A-39](#)).

### Timeout for Communication

The Timeout for Communication is configurable. It defaults to 6 minutes. In case of very slow pipetting steps this value may be increased.

The value is stored in evoware.inf under

[Communication]

AnswerTimeOut={number of milliseconds}

### Security Distance

It is possible to define the size of the security distance. When an arm has to move another arm aside it will add its security distance to its destination x coordinate.

It is set in the respective arm section ([LihaMachine], [Liha2Machine], [ROMA], [ROMA2], [PNP], [PNP2] section) in evoware.inf.

SecurityDistance={distance} (1 step = 1/10 mm)

## A.5 Parameters in the Intro.ini file

The following tables list user-configurable parameters in several section of the intro.ini file. Intro.ini is in the <install\_path> directory.

These settings should only be changed by specialists.

**Note:** *The parameters in intro.ini are already configured with suitable values. Do not change the values of parameters which are not listed in the following table. If you change entries in the intro.ini, carefully validate your application according C “Validation of Freedom EVOware Applications”, § C-1*

Add the respective section to the end of the intro.ini file if the section is missing. Add a new line to the respective section of the intro.ini file if the parameter is missing.

**Default values:** Each parameter string is shown below with the default value of the parameter (some parameters do not have a default value). The parameter string is not case sensitive.

**Note:** *Freedom EVOware must be re-started for the changes to take effect.*

Configuration files are protected with checksums. When you re-start Freedom EVOware after editing this file, you will be warned that the checksum is invalid.

Proceed as follows to repair the checksum:

- ◆ Quit Freedom EVOware and start the Configuration Tool with Start > All Programs > Tecan > EVOware > Configure. You will be warned again that the checksum is invalid and you will be asked if you want to repair the checksum. Click Yes. Then Click Exit and re-start Freedom EVOware. Alternatively, repair the checksum using the Validate Configuration tool (see A.11.2 “Validate Configuration Tool”, § A-39).

**Tab. A-9** *Intro.ini parameters, [options] section*

Parameter string	Description	Range, units
HIDE_SCRIPT_EXECUTION_FOR_OPERATORS=0	Configurable option to prevent operators from starting scripts/processes or maintenance scripts/processes in EVOware Std and Plus. This intention of this option is to force Operator working with a Touch Tools Application to start scripts and processes over the GUI Application. For an Administrator, an Application Specialist or an Power User this have no effect.	0 or 1

## A.6 Parameters in the TRAC.INI file

The following tables list user-configurable parameters in several section of the TRAC.INI file. TRAC.INI is in the <install\_path> directory.

These settings should only be changed by specialists.

**Note:** *The parameters in TRAC.INI are already configured with suitable values. Do not change the values of parameters which are not listed in the following table. If you change entries in the TRAC.INI, carefully validate your application according C “Validation of Freedom EVOware Applications”, [C-1](#)*

Add the respective section to the end of the TRAC.INI file if the section is missing. Add a new line to the respective section of the TRAC.INI file if the parameter is missing.

**Default values:** Each parameter string is shown below with the default value of the parameter (some parameters do not have a default value). The parameter string is not case sensitive.

**Note:** *Freedom EVOware must be re-started for the changes to take effect.*

Configuration files are protected with checksums. When you re-start Freedom EVOware after editing this file, you will be warned that the checksum is invalid.

Proceed as follows to repair the checksum:

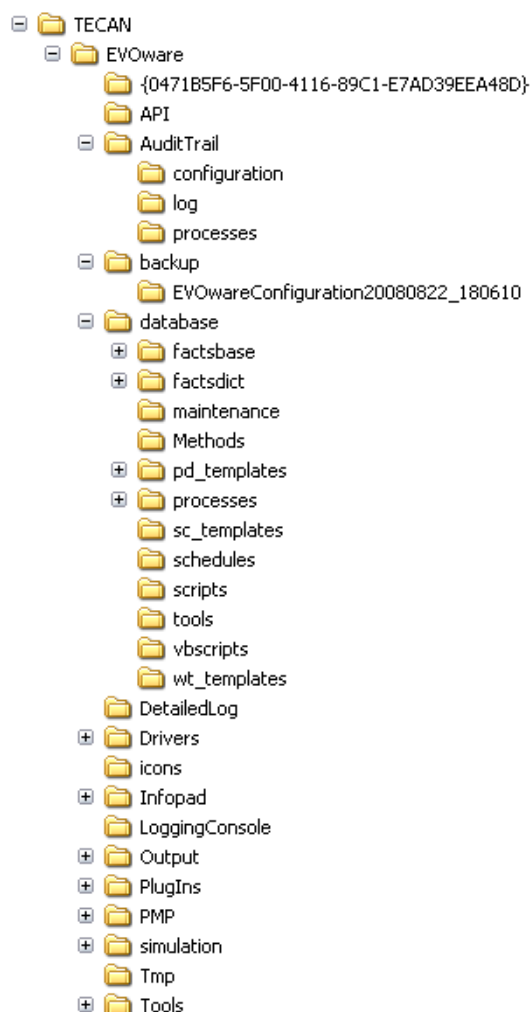
- ♦ Quit Freedom EVOware and start the Configuration Tool with Start > All Programs > Tecan > EVOware > Configure. You will be warned again that the checksum is invalid and you will be asked if you want to repair the checksum. Click Yes. Then Click Exit and re-start Freedom EVOware. Alternatively, repair the checksum using the Validate Configuration tool (see [A.11.2 “Validate Configuration Tool”, \[A-39\]\(#\)](#)).

**Tab. A-10** TRAC.INI parameters, [scheduler] section

Parameter string	Description	Range, units
IgnoreCheckOccupationFail	In some rare cases, a "CheckOccupation failed" error may occur during a process run in EVOware, even though the process is set up correctly. In this case, the "IgnoreCheckOccupationFail" setting can be set to 1, to suppress that error and keep the process running. By default, this setting is deactivated.	0 or 1
PauseInScriptNode	When the instrument needs to be paused (e.g., liquid level detection error or a TouchTools Rich User Prompt inside a LiHa_Pipette node), but there is another macro running in parallel (e.g., an MCA_Pipette node): - value 0 (default): the instrument is paused only when the second macro has finished - value 1: the instrument is paused immediately	0 or 1

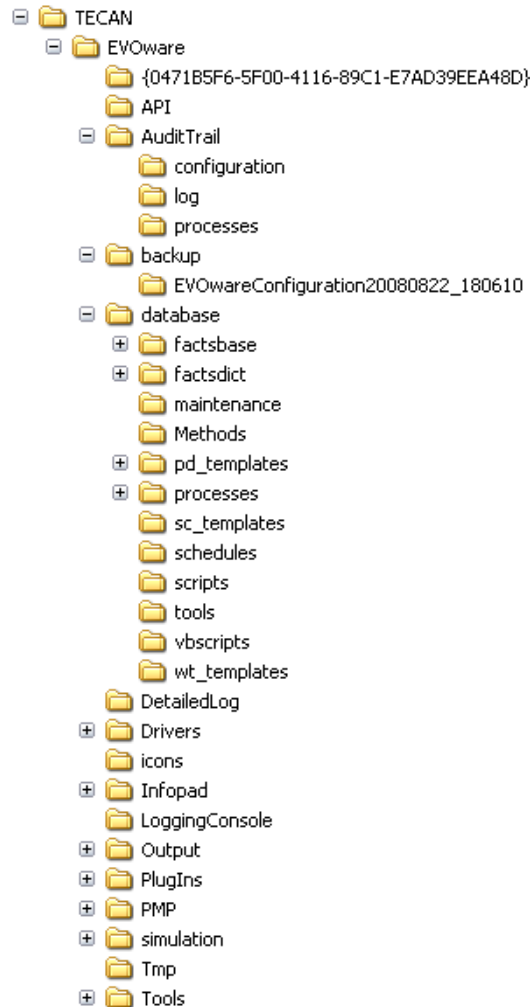
## A.7 Freedom EVOware Directory Structure and Files

This section describes the Freedom EVOware directory structure and its files. The following structure is used if you choose the installation defaults (with the English version of Microsoft Windows, the ..\EVOware directory is normally located in C:\Program Files (x86)\Tecan):



**Fig. A-1** Directory structure of c:\Program Files (x86)

Freedom EVOware stores all files whose contents can change during program runtime in the c:\ProgramData directory using the directory structure shown in the following figure. Examples of files whose contents can change includes configuration files (.ini and .xml), database files, scripts and processes.



**Fig. A-2** Directory structure of c:\ProgramData

The **C:\Program Files (x86)\Tecan\EVOware** directory contains executable files, device drivers, help files and configuration files (.ini and .xml). Evoware\_gp.chm is the help file for the general purpose configuration. Evoware\_ro.chm is the help file for the research only configuration.

The configuration files (.ini and .xml) are stored in C:\ProgramData\Tecan\EVOware instead.

The **C:\Program Files (x86)\Tecan\EVOware\API** directory contains executable files for the Application Programming Interface.

### **AuditTrail directory**

The **..\EVOware\AuditTrail\Configuration** directory contains earlier versions of configuration and data files. It also contains copies of the user management audit trail (see [B.5.3.1 "User Management Audit Trail"](#), [B-8](#)).

Each time a configuration or data file is modified and saved, the previous version is stored in this directory. The date and time is appended to the original filename as follows:

name.extension.YYMMDD.HHMMSS, where YYMMDD is the date and HHMMSS is the time of the backup, e.g.: Carrier.cfg.020531.084612

If you have used the Export/Import tool to import Freedom EVOware configuration and data files, the **..\EVOware\AuditTrail** directory contains backup copies of the files which have been replaced. Freedom EVOware creates a new sub-directory for each backup. The name of the new sub-directory is `ExpImpBU_YYYYMMDD_HHMMSS`, where YYYYMMDD is the date and HHMMSS is the time of the backup. See [A.11.4 “Export/Import Tool”](#), [A-41](#).

The **..\EVOware\AuditTrail\Log** directory contains log files (see [A.1 “Overview of the Log Files”](#), [A-1](#)). It also contains the trace file (see [A.1.7 “Structure of the Trace File \(Audit Trail\)”](#), [A-11](#)). For each file except the trace file, the date and the time is included in the file name. If required, you can configure an alternative location for this directory (see [8.3.1.4 “Protocol Options Tab”](#), [8-8](#)).

**Note:** Freedom EVOware can output a large amount of logging information. It is recommended to back up and then delete the old log files on a regular basis. They are not backed up by the Backup function - you should use the Audit Trail Archiving function instead. See [A.11.6 “Audit Trail Archiving tool”](#), [A-51](#).

**Note:** If you are required to comply with the FDA regulations, make sure you keep archive copies of all audit trail, trace and log files.

The **..\EVOware\AuditTrail\Processes** directory contains backup copies of all Freedom EVOware Plus process files which have been changed. For each file, the date and the time is included in the file name.

The AuditTrail directory is stored in `C:\ProgramData\Tecan\EVOware` instead.

The **..\EVOware\Backup** directory contains backup copies of the Freedom EVOware configuration and data files (see [8.2 “Backing Up and Restoring Your Configuration”](#), [8-3](#)). Freedom EVOware creates a new sub-directory for each backup. The name of the new sub-directory is `BACKUP_YYYYMMDD_HHMMSS`, where YYYYMMDD is the date and HHMMSS is the time of the backup. If required, you can configure an alternative location for this directory (see [8.3.1.4 “Protocol Options Tab”](#), [8-8](#)).

The default location for the Backup directory is `C:\ProgramData\Tecan\EVOware\Backup`.

## Database directory

The **..\EVOware\Database** directory contains files which are used by Freedom EVOware internally.

The **..\EVOware\Database\factsbase** directory contains files which are used by Freedom EVOware internally.

The **..\EVOware\Database\factsdict** directory contains files which are used by Freedom EVOware internally.

The **..\EVOware\Database\Maintenance** directory contains maintenance scripts (see [6.4.2 “Run Maintenance”](#), [6-10](#)).

The **..\EVOware\Database\PD\_Templates** directory contains Freedom EVOware Plus process templates. Each template is contained in a separate sub-directory.

The **..\EVOware\Database\Processes** directory contains Freedom EVOware Plus processes. Each process is contained in a separate sub-directory.



The **..\EVOware\Database\SC\_Templates** directory contains script templates.

The **..\EVOware\Database\Schedules** directory contains Freedom EVOware Plus schedules which you have saved.

The **..\EVOware\Database\Scripts** directory contains pipetting scripts.

The **..\EVOware\Database\Tools** directory is used to store user-created tools (executable files). The tools are assigned automatically to the Tools menu in Freedom EVOware. See [6.4.4 “Tools”](#), ¶ 6-11.

The **..\EVOware\Database\VBScripts** directory is used to store user-created Visual Basic scripts. The Visual Basic scripts are assigned automatically to the VB Scripts menu in Freedom EVOware. See [6.4.5 “VB Scripts”](#), ¶ 6-11.

The **..\EVOware\Database\wt\_Templates** directory contains worktable templates.

The Database directory is stored in C:\ProgramData\Tecan\EVOware\Database instead.

The **..\EVOware\Drivers** directory contains components for drivers such as the PosID-3 driver and for software add-ons such as the hit-picking wizard (see [3.1.3 “Tecan Software Add-ons for Freedom EVOware”](#), ¶ 3-2).

Configuration files from this directory are stored in C:\ProgramData\Tecan\EVOware\Drivers instead.

The **..\EVOware\Infopad** directory contains components for the Infopads (see [5.4.2 “Infopads”](#), ¶ 5-14).

Configuration files from this directory are stored in C:\ProgramData\Tecan\EVOware\Infopad instead.

The **..\EVOware\Icons** directory contains icons (graphic symbols).

The **..\EVOware\Output** directory is used for storing the files which are generated by the Export Data command. See [15.23 “Export Data Command”](#), ¶ 15-42 for information on the files which are created by this command. If required, you can specify an alternative location for this directory (see [8.3.1.4 “Protocol Options Tab”](#), ¶ 8-8).

The default location for the Output directory is C:\ProgramData\Tecan\EVOware\Output.

The **..\EVOware\Plugins** directory contains components for software plugins such as wizards.

Configuration files from this directory are stored in C:\ProgramData\Tecan\EVOware\Plugins instead.

The **..\EVOware\PMP** directory contains configuration files for the Pressure Monitored Pipetting software function (see [17.6 “Configuring and Using PMP \(Pressure Monitored Pipetting\)”](#), ¶ 17-17).

The PMP directory is stored in C:\ProgramData\Tecan\EVOware\PMP instead.

The **..\EVOware\Simulation** directory contains the 3D Simulation Tool EVOSim (if you chose to install this feature when you installed Freedom EVOware). See [3.1.4 “3D Simulation Tool for the Pipetting Instrument”](#), [# 3-3](#).

Configuration files from this directory are stored in C:\ProgramData\Tecan\EVOware\Simulation instead.

The **..\EVOware\Tmp** directory is used by Freedom EVOware internally. The Tmp directory is stored in C:\ProgramData\Tecan\EVOware\Tmp instead.

The **..\EVOware\Tools** directory contains components for system tools (see [A.11 “System Tools for Freedom EVOware”](#), [# A-35](#)).

Configuration files from this directory are stored in C:\ProgramData\Tecan\EVOware\Tools instead.

## A.8 Command Line Parameters (Freedom EVOware)

Freedom EVOware supports the following command line parameters:

**Tab. A-11** Command Line Parameters (Freedom EVOware)

Switch	Explanation
-u <user name> -w <password>	Specify -u <user name> -w <password> to start Freedom EVOware without requiring the user name and password to be entered manually in the Login dialog box.
-sim	Start Freedom EVOware in offline mode. In offline mode, firmware commands such as movement commands are not sent to the pipetting instrument (i.e. pipetting does not take place). <sup>a)</sup>
-b	Start Freedom EVOware Standard instead of Freedom EVOware Plus.
-e <script_file>	Start Freedom EVOware and open an existing script (e.g. script.esc) for editing.
-r <script_file>	Start Freedom EVOware and run an existing script (e.g. script1.esc).
-e <proc_name>	Start Freedom EVOware and open an existing process for editing.
-r <proc_name>	Start Freedom EVOware and run an existing process.
-m <maint_script>	Start Freedom EVOware and run an existing maintenance script (e.g. maint1.esc).
-b -n <templ_file>	Start Freedom EVOware Standard and open the Script Editor with an empty script using the specified worktable template file (e.g. templ2.ewt).
-n <templ_file>	Start Freedom EVOware Plus and open the Script Editor with an empty script using the specified worktable template file (e.g. templ2.ewt).
-c	Start the Configuration Tool instead of starting Freedom EVOware.

a) Freedom EVOware will switch to offline mode automatically if it cannot detect a hardlock (dongle) when it starts (see [5.1.4 “Instrument and Hardlock Detection”](#), [# 5-3](#)).

### Example

The following command line starts Freedom EVOware with the user name David and password Long and runs the maintenance script maintscript.esc:

```
evoware.exe -m maintscript.esc -u David -w Long
```

Tip: In Windows, right-click on a shortcut and choose Properties > Shortcut to assign command line parameters to the shortcut.

## A.9 Freedom EVO 75 Pipetting Instrument - LiHa Configuration

The Freedom EVO 75 pipetting instrument now supports the following LiHa configurations:

- ◆ One tip.
- ◆ Two tips.
- ◆ 8 Plus 1 Access option.

Please note the following:

### Two-tip LiHa

You can select either or both tips in the pipetting commands. The two tips can be used for pipetting (raised or lowered) independently. The tip spacing is fixed at 18 mm (every second well of a 96-well microplate).

### 8 Plus 1 Access option

You can select either tip 1 or all 8 tips in the pipetting commands. Tip 1 can be used for pipetting (raised or lowered) independently of the other 7 tips. If you select all 8 tips, they are all used (raised or lowered) together. The tip spacing is fixed at 9 mm (adjacent wells of a 96-well microplate).

In addition, liquid detection hardware is only provided for tip 1. If you want to use liquid detection, you must choose the detection mode *Detect liquid with first, tip, move others to same position* in the Global settings of the liquid class.

The 8 Plus 1 Access option is currently only intended for disposable tips (not fixed tips). In addition, you must fit the same DITI type (DITI size) to all 8 positions on the LiHa.

### Tip spacing

Tip spreading is not available for the Freedom EVO 75 pipetting instrument (the tips have a fixed spacing of 9 or 18 mm depending on LiHa type). Accordingly, in the pipetting commands, you can only change the tip spacing setting for the 2-tip LiHa configuration. If the spacing between the wells you want to pipette is not 18 mm, pipetting is carried out twice using one tip at a time.

This is not possible with the 8 Plus 1 Access option. If you select all 8 tips, they are all used (raised or lowered) together. Accordingly, you cannot change the setting for tip spacing because you cannot use one tip at a time.

Tip spacing is not relevant for the 1-tip LiHa configuration.

### Enhanced DITI logistics for the Get DITI command

The following method is used to minimize LiHa movements when getting DITIs (to speed up the Get DITI commands).

### 2-tip LiHa

If you choose both tips in the Get DITI command, they are picked up in a single movement from non-adjacent DITI rack positions. If the DITI rack is full, the first pair of tips is picked up at positions 1 and 3. The second Get DITI command picks up the tips from positions 2 and 4.

If you choose only one tip in the Get DITI command, it is picked up starting at the last position in the DITI rack (position 96) and the next single tip from position 95.

### 8 Plus 1 Access option

If you choose all 8 tips in the Get DITI command, they are picked up starting at the beginning of the DITI rack (positions 1 to 8). The next eight tips are then picked up at positions 9 to 16.

If you choose only one tip in the Get DITI command, it is picked up starting at the last position in the DITI rack (position 96) and the next single tip from position 95.

This method ensures that the beginning of the DITI rack always has full rows of fresh DITIs which can be picked up in a single movement.

See also [15.9 "Set DITI Position Command"](#), [15-15](#), Set Rear Counter checkbox.

## A.10 Frequently Asked Questions (FAQ)

### **The Freedom EVOware Administrator password has been lost. Can the password be recovered or reset?**

No. Freedom EVOware must be re-installed. You must backup your data before you do this.

### **The pipetting instrument does not react any more after an error or a robot arm crash.**

Freedom EVOware has switched to offline mode (the Freedom EVOware mode is shown in the status bar). In offline mode, firmware commands such as movement commands are not sent to the instrument (i.e. pipetting does not take place). You must switch off the instrument, move the arms and devices manually to an appropriate position, switch on the instrument again, restart Freedom EVOware and initialize the instrument with the Initialize button in the toolbar.

### **Freedom EVOware will only start in offline mode.**

The hardlock (dongle) must be attached to a USB port. The pipetting instrument must be connected to a USB or COM port on the PC. In the latter case, make sure you have correctly configured the same COM port in Freedom EVOware (see [8.4.3.3 "Com Ports Tab"](#), [8-33](#)). The pipetting instrument must be switched on when you start Freedom EVOware. Note: The Freedom EVOware mode is shown in the status bar.

### **The script or process runs fine in offline mode and Freedom EVOware has not indicated any errors. However, the Invalid Operand error is displayed for an arm or device when the script runs in real mode.**

The respective arm or device cannot carry out the required movement of one or more axes because it exceeds the mechanical limits. Check the definition of the respective carrier or labware in the Freedom EVOware configuration. Check your worktable layout to see if arm movement is obstructed by another device.

**The script or process runs in offline mode and Freedom EVOware reports errors but errors are not listed in the log window or the log file.**

If your script uses a barcode scanner, in offline mode you will be prompted to enter the barcode manually. Manual barcode entry is reported in the log file and is considered to be an error in this case because the barcode scanner is missing.

**A Get DITIs or Te-MO Get DITIs command causes a DITIs already mounted error even though you haven't yet mounted any DITIs in the script.**

Freedom EVOware remembers whether you still have DITIs mounted from a previous pipetting script, even if the PC has been re-started in the meantime.

**The Freedom EVOware worklist specifies all eight tips but Freedom EVOware only uses the first tip.**

Freedom EVOware automatically optimizes script execution by grouping together aspirate and dispense commands etc. where possible. The worklist should be written as follows if you want to use multiple tips:

```
A; ... (for tip 1)
D; ... (for tip 1)
W; ... (for tip 1)
A; ... (for tip 2)
D; ... (for tip 2)
W; ... (for tip 2)
etc.
```

**It is possible to write a Freedom EVOware worklist for four standard tips and four Ditis?**

No, you can only write a worklist for the same tip type. Load several worklists in your script and execute them using the *Worklist - Execute loaded worklists* command. They will be executed in chronological order of loading.

**The pipetted volumes are completely wrong (too much or not enough liquid).**

Check the LiHa configuration. The configured dilutor capacity must be appropriate for the tips which are mounted.

**The LiHa moves to the required position but ignores aspirate and dispense commands.**

In the LiHa configuration, check whether *Tip is broken* is activated (the checkbox is activated if you click the *Deactivate* button in the Diluter Error dialog box). Check the checkbox(es) to enable the pipetting channel(s) again.

**The trailing airgap (TAG) is aspirated with the tips still in the liquid.**

The trailing airgap is aspirated at the Z-position specified in the liquid class with *Retract tips to*. A Z-position relative to the liquid level requires liquid level detection and can not be used if you are carrying out septum piercing (the septum interferes with the capacitance-based detection system).

## A.11 System Tools for Freedom EVOware

The Freedom EVOware installation program also installs the following system tools:

**Tab. A-12** Tools for system configuration and export/import

<b>Tool</b>	<b>Purpose</b>
Configure	Freedom EVOware Configuration Tool (see <a href="#">8 “Configuration Tool”</a> , <a href="#">§ 8-1</a> ). This tool can also be accessed from the Freedom EVOware toolbar.
Data Explorer	This tool is used to check whether Freedom EVOware configuration and data files have valid checksums, to display user comments (electronic signatures feature) and to show information on modifications to these files (see <a href="#">A.11.1 “Data Explorer Tool”</a> , <a href="#">§ A-37</a> ).
Validate Configuration	This tool is used to check whether the Freedom EVOware configuration files have valid checksums and to repair the checksums if necessary (see <a href="#">A.11.2 “Validate Configuration Tool”</a> , <a href="#">§ A-39</a> ).
Duplicate Device	This tool is used to create additional copies of the Freedom EVOware device drivers if you want to connect more than one device of the same type to your pipetting instrument. See <a href="#">A.11.3 “Duplicate Device Tool”</a> , <a href="#">§ A-39</a> .
EVOSim	3D simulation tool for visualizing the movements which are carried out by the arms of the Freedom EVO pipetting instrument (see <a href="#">A.13 “Configuring and Using the 3D Simulation Tool EVOSim”</a> , <a href="#">§ A-82</a> ).
Export/Import	This tool is used to exchange processes and scripts, robot vectors and liquid class, carrier and labware definitions with other Freedom EVOware installations (see <a href="#">A.11.4 “Export/Import Tool”</a> , <a href="#">§ A-41</a> ).
Zip & Send tool	This tool allows you to select one or more Freedom EVOware log files and/or INI files containing configuration settings and to send them by email to a specified recipient (see <a href="#">A.11.5 “Zip &amp; Send Tool”</a> , <a href="#">§ A-45</a> ).
Audit Trail Archiving tool	This tool is used to archive Freedom EVOware log files and audit trail data either manually or automatically (see <a href="#">A.11.6 “Audit Trail Archiving tool”</a> , <a href="#">§ A-51</a> ).
EVOTransfer tool	This tool allows you to package up and compress an entire EVOware installation into a single, special transfer file (image file). You can then send it by email or ftp and install it on another PC (see <a href="#">A.11.7 “EVOTransfer”</a> , <a href="#">§ A-53</a> ).
Gemini Migration	This tool is used to import carrier, labware and liquid class definitions from the Gemini software. It also imports the Gemini worktable, Gemini pipetting scripts and VBScripts (see <a href="#">A.11.8 “Gemini Migration Tool”</a> , <a href="#">§ A-58</a> ). The imported configuration data replaces all existing Freedom EVOware configuration data, which is no longer available.
Shutdown EVOware drivers	This tool is used to unload the Tecan drivers when Freedom EVOware is no longer running (see <a href="#">A.11.9 “Shutdown EVOware drivers”</a> , <a href="#">§ A-60</a> ).

**Tab. A-12** Tools for system configuration and export/import (cont.)

Tool	Purpose
IQ Wizard	This tool checks that the Tecan software components are correctly installed and guides you through the initial setup of your pipetting instrument in Freedom EVOware (see <a href="#">A.11.10 "IQ Wizard"</a> , ¶ A-60).
Registration Wizard	This tool collects information on all of the Tecan software components which are installed on your PC and sends it to Tecan using one of three methods (direct online, email or file (see <a href="#">A.11.11 "Registration Wizard"</a> , ¶ A-67).
Version Checker	This tool is used to check the versions of the installed device drivers (see <a href="#">A.11.12 "Version Checker Tool"</a> , ¶ A-72).
LogViewer	This tool is used to view, filter and search for messages which have been received by the Tecan Logging Server (see <a href="#">A.12 "LogViewer Tool"</a> , ¶ A-74).

Most of the above tools are provided with shortcuts in Start > All Programs > Tecan > EVOware > Tools. Refer to the description of each tool for further information. The Audit Trail Archiving tool can also be started from the Configuration Tool.

When you start these tools, you will be prompted to enter your Freedom EVOware user name and password.

**Note:** You can only use these tools if you have been given Freedom EVOware Administrator or Application Specialist access rights.

### A.11.1 Data Explorer Tool

This tool is used to check whether Freedom EVOware configuration and data files have valid checksums, to display user comments (electronic signatures feature) to show information on modifications to these files and to print the selected files in pdf format.

An incorrect checksum indicates that the file may be corrupted or has been modified outside of Freedom EVOware by another program or process. Invalid checksums of Freedom EVOware configuration files can be repaired with the Validate Configuration tool (see [A.11.2 "Validate Configuration Tool"](#), ¶ A-39).

Start this tool with the shortcut in Start > All Programs > Tecan > EVOware > Tools:

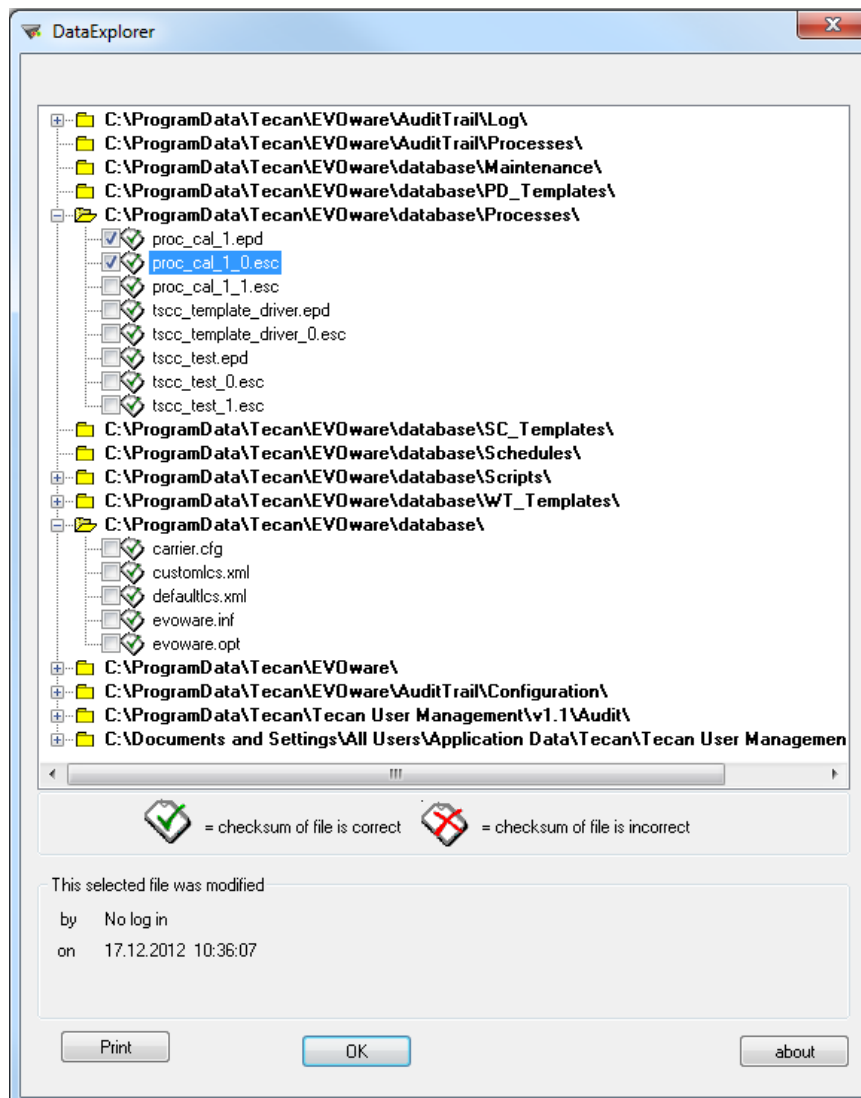


Fig. A-3 Data Explorer tool

In Freedom EVOware, a warning is shown if an attempt is made to load a file with an incorrect or missing checksum. The user can then choose to load the file or cancel. In the latter case, Freedom EVOware aborts with the exception of script files. In this case, the file is not loaded but Freedom EVOware remains running. The incorrect checksum warning can be disabled in the Settings dialog box by a user with Administrator rights (see 8.3.1.4 “Protocol Options Tab”, 8-8). An entry is written to the log file each time an incorrect or missing checksum is found.

If you select a configuration or data file in the Data Explorer, the date and time of the last modification to the file will be shown alongside the name of the user who modified it.

The Data Explorer also shows a user-specified reason for the change (if the Electronic Signatures feature is enabled in the Freedom EVOware Configuration Tool). See B.5.5 “Electronic Signatures”, B-9 for additional information on this feature.

If one of the above changes has been made automatically by Freedom EVOware, a comment is inserted which starts with “EVOware:”



### A.11.2 Validate Configuration Tool

This tool is used to check whether the Freedom EVOware configuration files have valid checksums and to repair the checksums if necessary.

Some of the advanced configuration settings for Freedom EVOware can only be made by editing the evoware.opt or evoware.inf files. If you edit these files manually, it will be necessary to repair the checksums afterwards.


Start this tool with the shortcut in Start > All Programs > Tecan > EVOware > Tools.

You will be shown a list of configuration files. A green icon indicates that the checksum is correct. A red icon indicates that the checksum is not correct and needs to be repaired.


To repair the checksum or checksums click the large green arrow at the bottom right. You will be presented with the Login dialog box. Enter your user name and password and click OK. You can only repair the checksum(s) if you have been given Freedom EVOware Administrator or Application Specialist access rights. If you repair checksums, this is logged to the trace.txt file.

### A.11.3 Duplicate Device Tool

if you want to use more than one physical device of the same type on your pipetting instrument, you must use the Duplicate Device tool to create one or more copies of the Freedom EVOware device driver and device configuration settings. Please exit Freedom EVOware before using this tool.

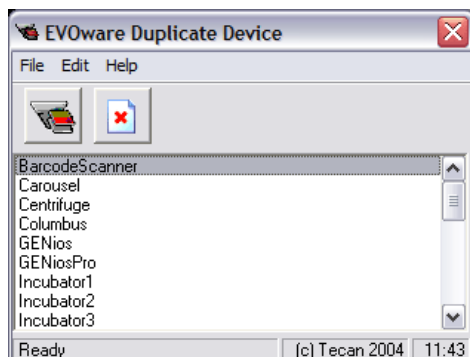
The additional device should then appear in the Control Bar (Commands section) when you re-start Freedom EVOware. If it doesn't, make sure that the Start checkbox is checked for the device in the Configuration Tool (see [8.4.1.1 "Device Information Tab"](#),  8-21).

After duplicating the device driver, you must create a carrier for the new device. To do this, right-click on the carrier for the original device in the Labware section of the Control Bar and choose Duplicate from the context menu.

The new device must then be assigned to the new carrier. To do this, choose the new device (e.g. Shaker2) from the *Device* pull-down list in the Edit Carrier dialog box (see [9.5 "Configuring Carriers"](#),  9-29). Each device must only be assigned to one carrier.

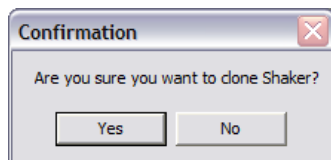
**Note:** *Freedom EVOware allows you to sub-divide the carousel, incubator and Te-Stack into several logical devices. You do not need to use the Duplicate Device tool to do this (see Logical Devices in the Index for more information).*

Start this tool with the shortcut in Start > All Programs > Tecan > EVOware > Tools. You are prompted to choose the device you want to duplicate:



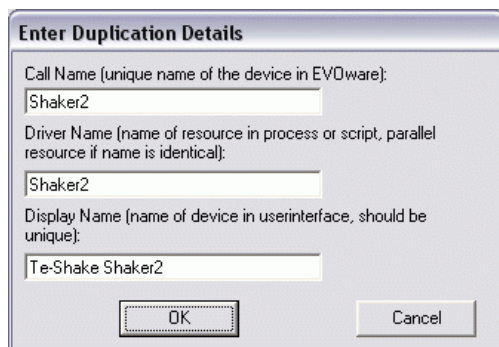
**Fig. A-4** Duplicate Device tool

Click the *Clone* button in the toolbar. You will be prompted to confirm your choice:



**Fig. A-5** Confirmation dialog box

If you click Yes, you must then make the following settings for the new device driver:



**Fig. A-6** Enter Duplicate Details dialog box

### Call name

This field specifies the device name which used by Freedom EVOware internally. The call name is also used for labeling the process step in the Process Editor. A suitable name will be suggested. You can specify a different name if required. Call names must be unique.

### **Driver Name**

This field specifies the name of the device driver. A suitable name will be suggested. You can specify a different name if required.

If you specify the same driver name as the one you copied, Freedom EVOware Plus treats them as a parallel resource, and the scheduler will automatically choose one of the physical devices during process runtime, depending on which one is free. The parallel resources should normally be configured to function identically (e.g. same washing liquid or same incubation temperature).

Parallel resources are not relevant in Freedom EVOware Standard.

### **Display Name**

Specify the required name for the device in the Control Bar. It is recommended to choose a unique, descriptive display name (e.g. Te-Shake 2 or Te-Shake 90 degrees).

If you want to delete a device driver, select the driver in the list and click the *Delete* button in the toolbar. You will be prompted to confirm the deletion.

**Note:** *If you delete all copies of the device driver, you must re-install the device with the installation program if you want to use the device again later.*

## **A.11.4 Export/Import Tool**

This tool is used to exchange processes and scripts, robot vectors and liquid class, carrier and labware definitions with other Freedom EVOware installations.

In contrast to earlier Tecan pipetting software products such as Gemini, you must not simply copy the carrier database file carrier.cfg from one Freedom EVOware installation to another. You must use the Export/Import tool instead.

Start this tool with the shortcut in Start > All Programs > Tecan > EVOware > Tools (please exit Freedom EVOware first):

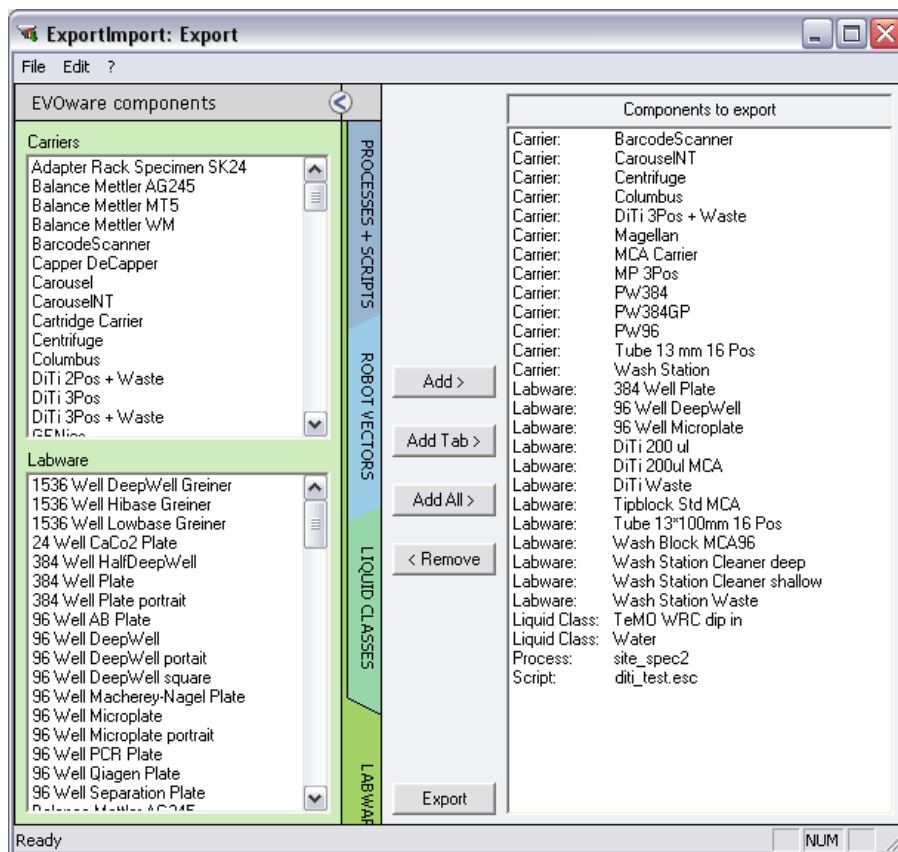


Fig. A-7 Export/Import tool

When you start it, the Export/Import tool is initially in export mode, as shown by the *Export* button at the bottom.

#### A.11.4.1 Exporting

Choose individual items you want to export using the *Add* and *Remove* buttons and the four colored tabs. Click *Add Tab* to export all of the items on the currently selected tab. Click *Add All* to export all of the items on all of the tabs.

The chosen items will be shown in the right hand panel.

If you choose to export a script or process, the Export/Import tool will automatically add all of the labware, carriers and liquid classes which are used to the right hand panel. Use the *Remove* button to remove un-needed items from the right hand panel if required.

The icons in the left hand panel of the Liquid Classes tab indicate whether the liquid classes are pre-defined (🌐) or custom (🔧).

When you have made your choices, click the *Export* button to create an export file (\*.exd) which contains the chosen items. The export file will also contain the xml data which is needed by the PMP (Pressure Monitored Pipetting) software function.

To switch to import mode, choose *Load import file* in the File menu and choose a previously created export file (\*.exd). The *Export* button at the bottom changes to *Import*. A dialog box will be shown if script and process files with the same names already exist. You can then choose to skip the file(s) or overwrite the existing file(s). Click the *Import* button when you are ready to import.

Please exit Freedom EVOware before using this tool.

#### **A.11.4.2 Importing**

Choose *Load import file* in the File menu to load a previously created export file (\*.exd) which contains the processes and scripts, robot vectors and liquid class, carrier and labware definitions you want to import.

Alternatively, if the Export/Import tool is not already running, double-click on the required \*.exd file to start the tool and switch to import mode. You will be prompted to enter your user name and password.


A dialog box will appear if one or more items already exist in your Freedom EVOware installation with the same name. The dialog box shows the name of the offending item and lets you choose how to treat existing items:

- ◆ Skip this item: Do not import this item.
- ◆ Skip all items: Do not import any of the items in the export file.
- ◆ Include this item: Add the item to the list in the right hand panel even though it already exists.
- ◆ Include all items: Add all items in the export file to the list in the right hand panel even though some of them already exist.

After processing the export file, the right hand panel shows all of the items you have chosen to import. Click Import all to import all of the items in the list. Items which already exist in your Freedom EVOware installation (if any) will be overwritten. Alternatively, select an item and click Import to import the selected item only.


#### **A.11.4.3 File menu**

##### **Load import file**

Choose a previously created export file which contains the processes and scripts, robot vectors and liquid class, carrier and labware definitions you want to import. See [A.11.4.2 "Importing"](#),  [A-43](#).

##### **Undo previous import...**

If you have used the Export/Import tool to import Freedom EVOware configuration and data files, backup copies of the files which have been replaced are made in the <install\_path>/AuditTrail/Configuration directory.

Choose *Undo previous import* if you decide to restore the earlier versions of the configuration and data files. A dialog box is shown to allow you to choose the backup copy to restore. This function only restores backups made by the Export/Import tool, not those made by the Backup feature. See also [8.2 "Backing Up and Restoring Your Configuration"](#),  [8-3](#).

#### **A.11.4.4 Edit menu**

##### **Switch to export**

Unload a previously loaded import file, cancel import mode and switch to export mode. Use this option if you have started to import but change your mind and want to export instead. This menu item is only available in import mode.

### Add files to export list

Choose a file of any required type which you want to include in the export file. For example, you can include a worklist file, a VB script or a text document with instructions on using the export file. This menu item is only available in export mode.

During the subsequent import operation, the file will be put in a directory of the same name from where it was exported. The user will be prompted if the file already exists on the destination PC or if the directory does not exist.

#### A.11.4.5 Command Line Parameters (Export/Import Tool)

The Export/Import Tool supports the following command line parameters:

**Tab. A-13** Command Line Parameters (Export/Import Tool)

Switch	Explanation
-u <user name> -w <password>	Specify -u <user name> -w <password> to start Freedom EVOware without requiring the user name and password to be entered manually in the Login dialog box. <sup>a)</sup>
-a	Automated mode (no user interaction, no GUI)
-e	Export mode
-s	Skip existing items on import (in automated mode only)
-o	Overwrite existing items on import (in automated mode only)
-k <Secret Key>	Secret key allowing login without user name and password (e.g. for Installer)
-v	Verbose mode (extended logging)
-p	<SaveMode> Flags imported processes to be saved automatically on next EVOware start with an optional parameter to select SaveModes for linked worktables: <b>s</b> : only save the active file <b>d</b> : show the dialog for linked worktables
<Import file>	Full path and filename of export/import file (EXD file). In import mode, this file is loaded; in export mode, it is generated.
<Item> *	List of items to be exported, separated by spaces (in export mode only).

a) The login dialog box is also skipped if the User Management has been disabled in the EVOware Configuration Tool.

The command line parameters are evaluated and handled as follows:

- ◆ If both user name and password are specified, the login is performed automatically.
- ◆ If the correct secret key is specified, the login dialog is skipped.
- ◆ If the automated mode option is specified, the options -s and -o are accepted. If none of the latter two is specified, existing items are skipped on import (i.e. -s is default behavior).
- ◆ If the automated mode option is specified, an import file has to be specified as well; otherwise the tool starts in normal mode.
- ◆ If the export mode switch has been specified, a list of items to be exported has to be provided as well as the export file name.

- ◆ In import mode, the list of items - if provided - is ignored.
- The tool returns an exit code after executing the command line. The exit code can have one of the following values for different kinds of errors/cases:

**Tab. A-14** Exit error codes (Export/Import Tool)

Errors/Cases	Exit error codes	
	Admin	NotAdmin
Passed exd file is valid	0	4
No File Param. passed	1	1
Passed File does not exist	2	2
Passed File is not an exd file and export mode is disabled	3	3
Passed File is an invalid exd file (corrupted)	3	4
Others	4	4

Note:

- ◆ To get the exit error codes from the ExportImport.exe in the command line (without using a batch), the ExportImport.exe has to be executed with command start /wait.  
ex.: start /wait ExportImport.exe -u Admin -w myPass "file.exd"  
Afterwards, you have to run: %ERRORLEVEL% to get the returned exit code.
- ◆ When using a batch, you do not have to run the ExportImport.exe using the start command.
- ◆ [Tab. A-14](#), [A-45](#) illustrates only exit codes for command lines with No GUI parameter. Exit error code for running the application with GUI is -1.

### A.11.5 Zip & Send Tool

To help with diagnosing problems with your Freedom EVOware installation, the Tecan pipetting instrument and optional hardware such as the Carousel, the Customer Support hotline at Tecan may ask you to send them a set of log files from the core software, the Message Control Server and/or the device drivers. The Zip & Send tool allows you to configure Freedom EVOware to create the required log files and to send them by email to a specified recipient.

Some of the log file types are always created by Freedom EVOware, other log file types (such as log files from device drivers) need to be explicitly activated. In addition, the Zip & Send can configure the Message Control Server (MCS) to output log files with five different levels of logging detail, according to requirements.

Proceed as follows to use Zip & Send:

- ◆ Start this tool with the shortcut in Start > All Programs > Tecan > EVOware > Tools.
- ◆ Choose the log files which are needed and the required level of detail for the MCS log.
- ◆ Click the large green arrow in the “[Activate Logging window](#)”. This configures Freedom EVOware to start recording the chosen log files. In addition, Zip & Send is minimized to an icon the system tray area at the bottom right edge of the screen.

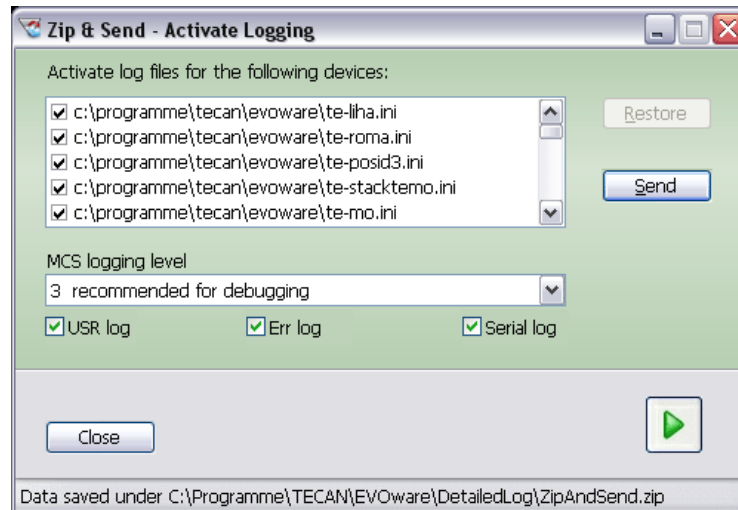
- ◆ Use Freedom EVOware in the normal way, at least until the event or error which you want to record has occurred. Zip & Send must remain running (in the background or foreground) during this time.
- ◆ Maximize the Zip & Send window (right-click the Zip & Send icon in the system tray and choose Show application).
- ◆ Click Send to proceed to the [“Send Log Files window”](#). The buttons in the Send Log Files window allow you to reach the [“Mail Setup window”](#), the [“Choose Data To Send window”](#) and the [“Edit Recipients window”](#).
- ◆ In the Send Log Files window, choose the required recipient(s) and click the large green arrow on the right to send the log files via email. The selected logging information is compressed to a zip file and sent as an email attachment.
  - The name of the zip file which is created is ZipAndSend.zip. It is created in the ..\EVOware\DetailedLog directory. It is overwritten each time you use Zip & Send.
  - If you do not specify any email recipients, ZipAndSend.zip will be created but not sent. If the Freedom EVOware PC does not have an internet connection, transfer the zip file to another PC with an internet connection (e.g. using a USB stick) and send the zip file using an email package such as MS Outlook.
  - The zip file will be large if you have chosen to send lots of data (e.g. if you include Freedom EVOware database directory). In this case, sending the email may take several minutes. Zip & Send does not react to user input while the email is being sent.
  - Zip & Send writes a log file of its actions to the ..\EVOware\AuditTrail directory. The last line of this file indicates whether the email was sent successfully.
  - All settings for Zip & Send (e.g. email recipients) are stored in the ZipAndSend.ini file in the ..\EVOware directory.
- ◆ In the Send Log Files window, click Close to return to the Activate Logging window.
- ◆ In the Activate Logging window, click Close to exit Zip & Send. This restores all of the log file settings to the settings which were present before you ran Zip & Send. Alternatively, click Restore to restore the log file settings without exiting Zip & Send.

**Note:** *If Freedom EVOware did not shut down properly the last time it was used, you will be asked if you want to run Zip & Send when you restart Freedom EVOware again. The log files which are sent in this case can be useful to the Customer Support hotline when diagnosing problems, for example if the incorrect shutdown was caused by an internal error in Freedom EVOware and not by an external event such as loss of mains power to the PC.*

#### A.11.5.1 Activate Logging window

This window is used to choose the log files which are needed and the level of detail for the MCS log:





**Fig. A-8** Zip & Send - Activate Logging window

When you first start Zip & Send, all available driver log files and EVOware log files are selected. Uncheck the checkboxes for the files which you don't want or need to send.

Freedom EVOware always creates log files of type EVO. See [A.1.2 "Structure of Log Files of Type USR"](#), [A-9](#) and [A.1.3 "Structure of Log Files of Type ERR"](#), [A-9](#) for information on activating the other two log file types.

Check the *Serial log* checkbox to include serial data (instrument firmware commands) in the EVO log file type.

Choose the required logging level for the Message Control Server (MCS) from the pull-down list. A logging level of "3" is normally sufficient. Levels higher than "3" can result in very large MCS log files in a short period of time.

If you activate log files for devices, you must also check the *Driver log files* checkbox in the Choose Data To Send window. Otherwise, the log files will be recorded but not included in the zip file and not sent. This applies analogously to the other log file types.

Click the large green arrow to start recording the chosen log files. This minimizes Zip & Send to an icon in the system tray area at the bottom right edge of the screen.

Alternatively, click Send to proceed to the "[Send Log Files window](#)".

Click Restore to restore all of the log file settings to the settings which were present before you started Zip & Send.

### Context menu in the system tray

When Zip & Send is minimized, right-click the Zip & Send icon in the system tray area at the bottom right edge of the screen to open the context menu. The available options are as follows:

**Restore settings:** Restore all of the log file settings to the settings which were present before you started Zip & Send.

**Activate logging:** Activate the log file settings which you configured in the Activate Logging window. This option only appears if you previously chose Restore Settings. Activate logging and Restore Settings can be used to switch logging on and off and thus record and send only the log file information which is relevant. This reduces the size of the data which is sent.

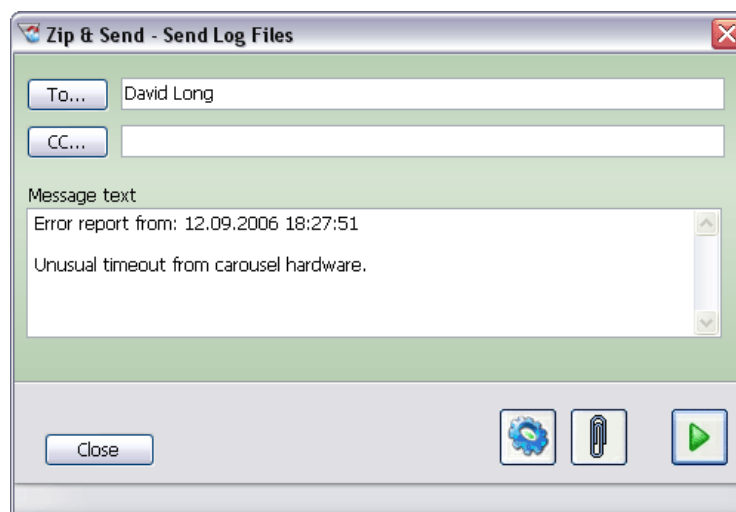
**Send all:** This opens the Send Log Files window and selects all available items in the Choose Data To Send window (ignoring a previous selection which you made).

**Close application:** Exit Zip & Send.

**Show application:** This opens the Activate Logging window again.

### A.11.5.2 Send Log Files window

The Send Log Files window is used to send the log files via email:




**Fig. A-9** Zip & Send - Send Log Files window

Click **To...** to open the [“Edit Recipients window”](#), which allows you to choose recipients from the Zip & Send email Address Book. Alternatively, you can enter an email address in the field provided. Use semicolons “;” to separate multiple recipients.

Click **CC...** (carbon copy) to open the [“Edit Recipients window”](#), which allows you to choose recipients from the Zip & Send email Address Book. Alternatively, you can enter an email address in the field provided. Use semicolons “;” to separate multiple recipients.

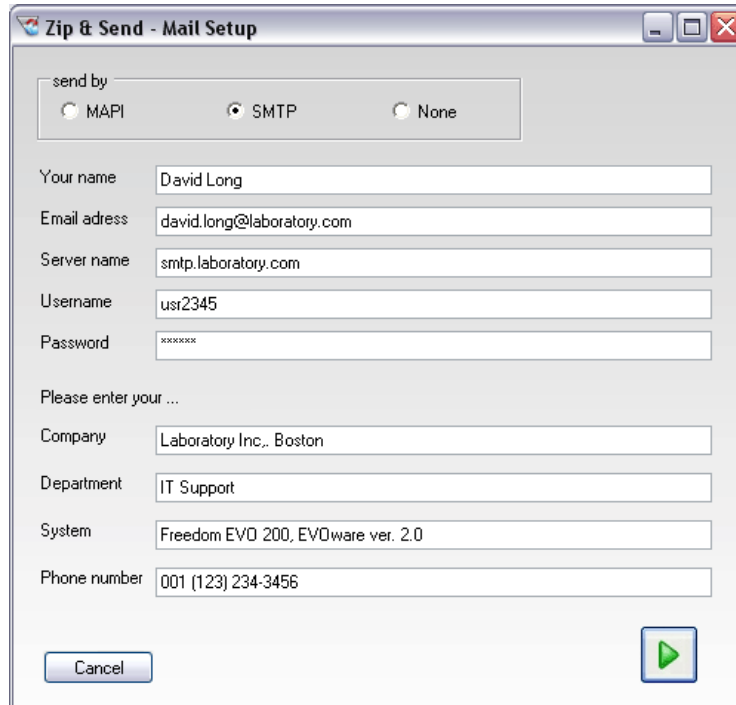
If you do not specify any email recipients, ZipAndSend.zip will be created in the ..\EVOware\DetailedLog directory but not sent. If the Freedom EVOware PC does not have an internet connection, transfer the zip file to another PC with an internet connection (e.g. using a USB stick) and send the zip file using an email package such as MS Outlook.

Click  to open the [“Mail Setup window”](#).

Click  to open the [“Choose Data To Send window”](#).

### A.11.5.3 Mail Setup window

The email Setup window is used to configure the settings for your email account:



**Fig. A-10** Zip & Send - email Setup window

The settings you make are stored in the Zip & Send configuration. This dialog box is only needed when you use Zip & Send for the first time, or if your email settings have changed.

### Send By panel

Specify your name and email address, your company name, department name and phone number. Provide information on your Freedom EVOware system in the System field.

#### MAPI

Click this radio button to send the email via MAPI. When you send the mail, you will be prompted to enter the MAPI profile you want to use and the MAPI password. You can get a list of available MAPI profiles by double-clicking the Mail button in the Windows Control Panel. The Mail button will only be present in the Control Panel if you have installed the MAPI service. MAPI is included with many email programs, e.g. Microsoft Outlook.

#### SMTP

Click this radio button to send the email via SMTP. The following fields are also required in this case.

**Server name:** Specify the address of the SMTP server you want to use for sending the emails.

**User name:** Specify the user name for SMTP authentication.

**Password:** Specify the password for SMTP authentication

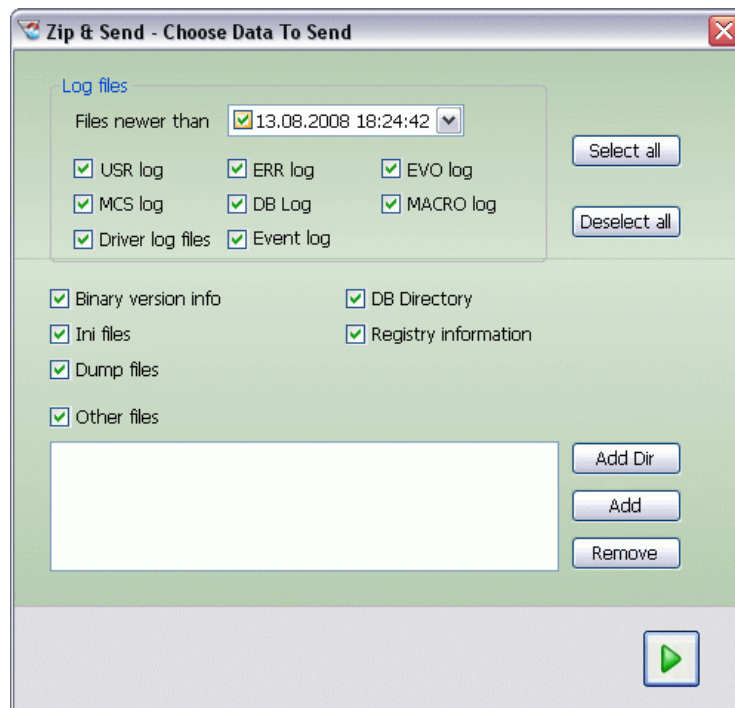
The user name and password for SMTP authentication depends on the SMTP server. In many cases, it is the same user name and password which is used to collect emails using the POP3 protocol.

**None**

Click this radio button if you want to collect the data but do not want to send it by email. You can then transfer the zip file to another PC manually, e.g. using a USB stick or through a network connection.

**A.11.5.4 Choose Data To Send window**

The Choose Data To Send window is used to choose the files and other data which you want to send:



**Fig. A-11** Zip & Send - Choose Data To Send window

When you first use Zip & Send, all available driver log files, EVOware log files and other data items are selected (the checkboxes for USR and ERR log will be unchecked if you did not select them in the Activate Logging window).

Uncheck the checkboxes for the data which you don't want or need to send.

Use the Files newer than pull-down list to only send files which are newer than a specified date.

See [A.1 "Overview of the Log Files"](#), [A-1](#) for information on the log file types USR, ERR and EVO.

Check the Binary version info checkbox to send version info on EVOware software components and drivers.

Check the DB checkbox to send the EVOware database directory. This directory can be quite large. If you select this item, sending the email may take longer than expected.

Check the INI checkbox to send INI files. INI files contain configuration settings for EVOware software components and drivers.

Check the Registry checkbox to send that part of the Windows registry which is used by EVOware. The registry contains configuration settings for EVOware software components and drivers.

Check the Other files checkbox and choose the file(s) using the buttons to send other files such as descriptions of the problem which you made using a text editor program.

The settings you make are stored in the Zip & Send configuration.

#### A.11.5.5 Edit Recipients window

The Edit Recipients window is used to configure recipients for the Zip & Send email Address Book:

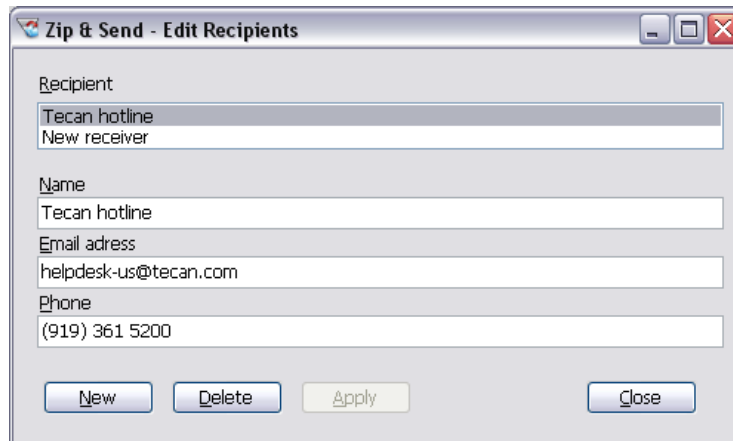


Fig. A-12 Zip & Send - Edit Recipients window

Click New to add a new recipient to the Zip & Send address book. Then fill in the fields and click Apply. Phone is the recipient's phone number; this field is for information purposes only.

Double-click on an entry in the Recipient list to add it to the **To...** or **CC...** field in the Send Log Files window.

#### A.11.6 Audit Trail Archiving tool

Freedom EVOware can output a large amount of logging information. It is recommended to back up and then delete the old log files on a regular basis. The Audit Trail Archiving tool (AuditArch) allows you to archive Freedom EVOware log files and audit trail data either manually or automatically.

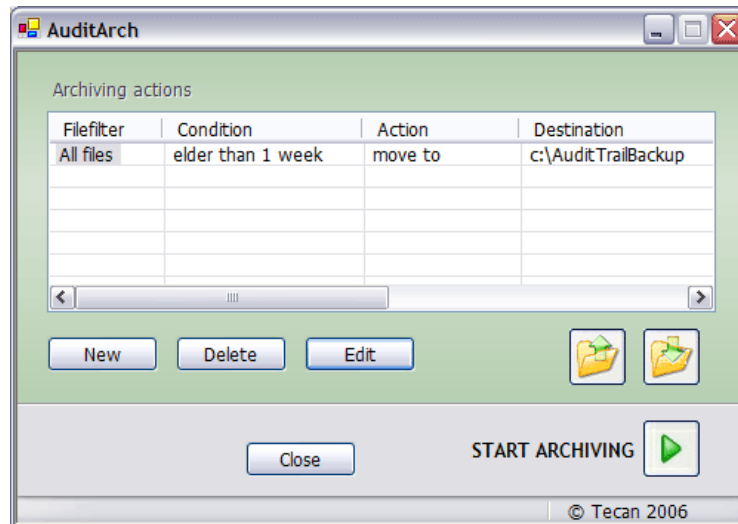
Start this tool with the shortcut in Start > All Programs > Tecan > EVOware > Tools. Windows administrator rights are needed to run this application. The Audit Trail Archiving tool can also be started from the Configuration Tool.

If you checked the *Start AuditArch at EVOware startup* checkbox in the Configuration Tool, AuditArch will start in the background each time you start Freedom EVOware and archive the log files if this is required by the currently configured archiving actions (see 8.3.1.4 "Protocol Options Tab", 8-8, Audit Trail Archiving panel).

**Note:** If you are required to comply with the FDA regulations, make sure you keep archive copies of all audit trail, trace and log files.

The log files and audit trail data are located in the <install\_path>\AuditTrail directory and its sub-directories. These directories are protected against unauthorized access. AuditArch allows you to copy or move the log files and audit trail data files to another directory of your choice.

The AuditArch dialog box is as follows:



**Fig. A-13** Audit Trail Archiving tool

Click *New* to create a new archiving action. Click *Delete* to delete an existing archiving action.

Click the yellow buttons on the right to:

- ◆ Save the current set of archiving actions in a .aal file, and
- ◆ Open a previously stored set of archiving actions.

Click the large green arrow on the right to start the archiving procedure manually using the currently configured archiving actions.

Click *Edit* to configure the selected archiving action. This opens the Edit Archiving Action dialog box:



**Fig. A-14** Editing an archiving action

Choose the files you want to archive with this archiving action by choosing a file filter from the FileFilter pull-down list. Choose *All files* to archive all log files and audit trail data. Click *Filter* to create or edit a file name filter in the *Edit Filter* dialog box (see below).

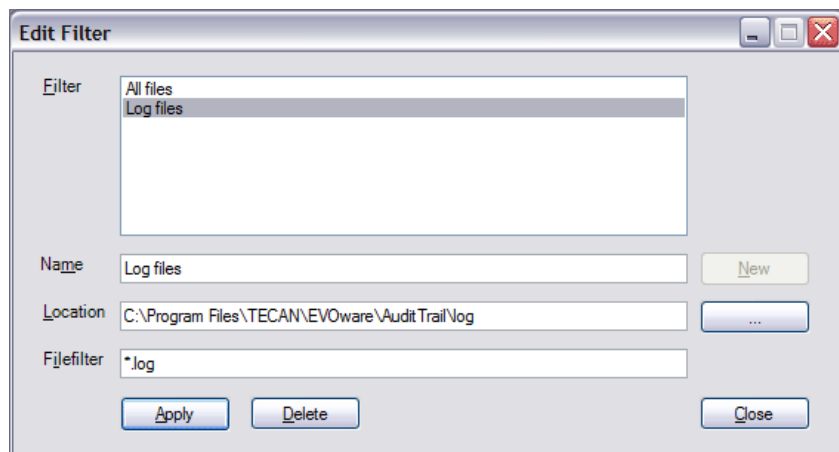
Check the *Include sub-directories* checkbox if you want the file name filter to apply to log files in sub-directories of the ../AuditTrail directory as well.

You can also choose when you want to archive the files (e.g. when they have reached a specified age) and the action to take (move or copy them to the specified destination directory or delete them).

**Note:** *If you are required to comply with the FDA regulations, make sure you keep archive copies of all audit trail, trace and log files. Do not delete them from the ../AuditTrail directory without making an archive copy, which should be kept as a permanent record.*

### Edit Filter dialog box

The Edit Filter dialog box lets you specify the files to archive using wildcards:



**Fig. A-15** Edit Filter dialog box

To create a new filter, enter a name for the filter in the Name field, click New, specify the filter settings and click Apply. Click Close when you are finished.

The new filter can then be chosen from the FileFilter pull-down list in the *Edit archiving action* dialog box.

### A.11.7 EVOTransfer

This tool allows you to package up and compress an entire EVOware installation into a single, special transfer file (image file). You can then send it by email or ftp and install it on another PC. You can also use EVOTransfer to make an image of several different EVOware installations. If you copy several image files to the same PC, you can then use EVOTransfer to switch between different configuration scenarios or even different EVOware versions for the purpose of demonstration, testing or technical support.

**Note:** *You cannot use EVOTransfer to transfer an EVOware installation from a PC running Windows 10 to a PC running Windows 7 or vice versa.*

**Note:** *To use the EVOware installation for pipetting, the recipient also needs to have a suitable Freedom EVOware dongle.*

To install EVOTransfer on a PC which is running an older Freedom EVOware version (e.g. v 1.4), copy the following files from the EVOware\Tools\EVOTransfer

directory in the Freedom EVOware installation to a local directory of your choice on the other PC: EVOtransfer.exe, EVOtransfer.ini, ICSharpCode.SharpZipLib.dll and Win32Security.dll (or copy the whole directory). It is not necessary to run a setup program.

Start this tool with the shortcut in Start > All Programs > Tecan > EVOware > Tools:

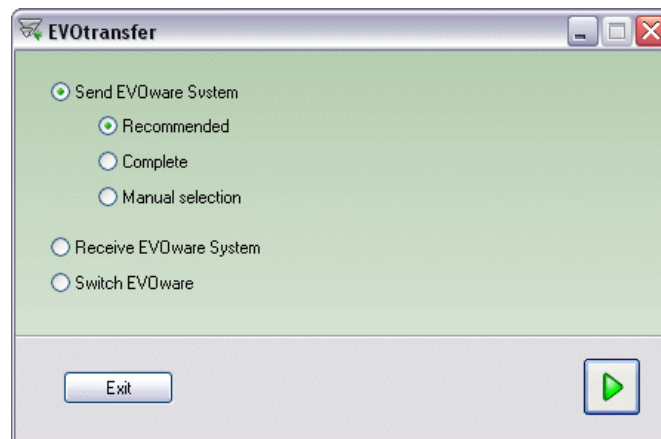


Fig. A-16 EVOtransfer - Main window

The options in this dialog box are as follows:

#### Send EVOware System

This option collects the files to send from your Freedom EVOware installation and packs them into a single compressed transfer file (.etz) in the EVOware installation directory:

**Recommended:** Only collect and compress the files which are normally required to recreate your Freedom EVOware installation on the remote system.

**Complete:** collect and compress all of the files from your Freedom EVOware installation

**Manual selection:** Choose the files manually which you want to send.

#### Receive EVOware System

Prepare to install a Freedom EVOware installation from a transfer file which is on your hard disk. You also have the option of getting a transfer file from an ftp server.

#### Switch EVOware

Replace the currently installed Freedom EVOware installation on your PC with another Freedom EVOware installation which is contained in a transfer file.

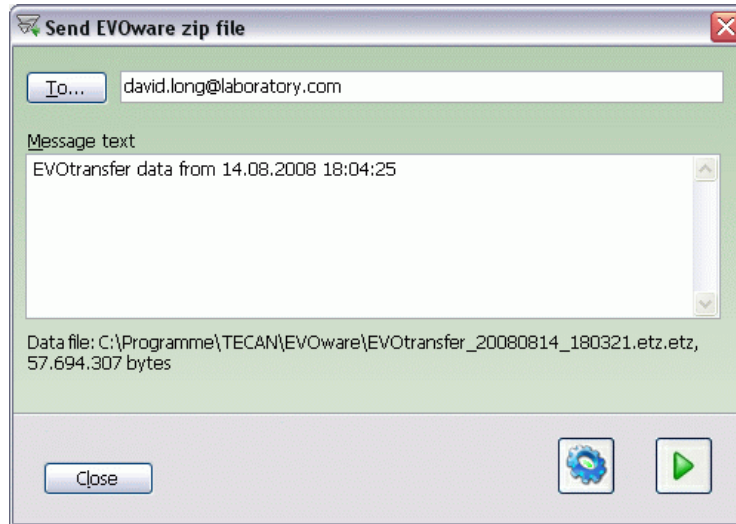
Click the green arrow when you have made your choice.

#### A.11.7.1 Send EVOware System

If you choose Send EVOware System, a progress bar is shown while collecting and compressing the files.

You are then shown the following dialog box:






**Fig. A-17** EVOTransfer - Send EVOware Zip File window

Specify the message you want to send with the transfer file and specify the email address of the recipient. Click **To...** to open the Edit Recipients window. This window is your email Address Book and works just like the Edit Recipients window in the Zip & Send tool (see [A.11.5.5](#), [A-51](#)).

**Note:** The **To...** field is gray (inactive) and shows <FTP> if you have configured an ftp server instead of an email address in the Mail Setup window.

Click  to open the Mail Setup window.

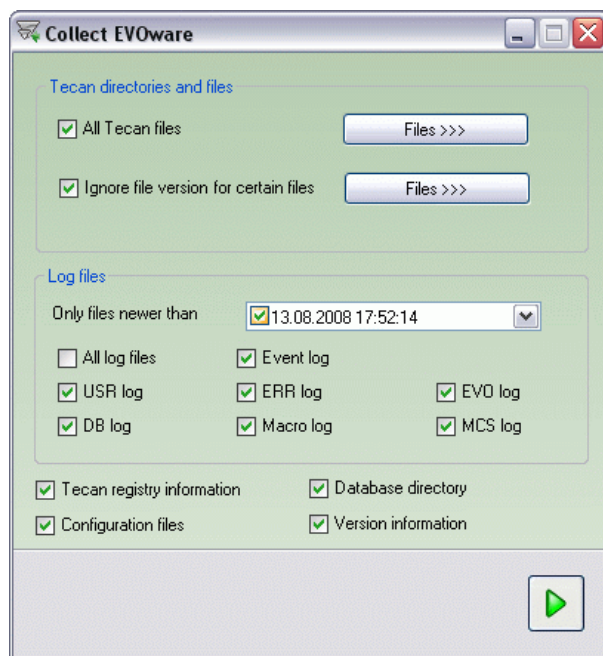
This window is used to set up your email account and works just like the Mail Setup window in the Zip & Send tool (see [A.11.5.3](#), [A-48](#)).

The only differences are:

- ◆ You can send the file to an ftp server instead of an email address.
- ◆ You can encrypt the file before sending it. EVOTransfer on the remote computer will then un-encrypt the file again when the file is received.
- ◆ Choose None in the Mail Setup window if you want to create the transfer file (image file) but do not want to send it by email or ftp. You can then transfer the zip file to another PC manually, e.g. using a USB stick or through a network connection. The transfer file is created in the Freedom EVOware installation directory.

The settings you make are stored in the EVOTransfer configuration. You only need the Mail Setup window when you use EVOTransfer for the first time, or if your email settings have changed.

The following dialog box is shown if you chose *Manual Selection* in *Send EVOware System*:

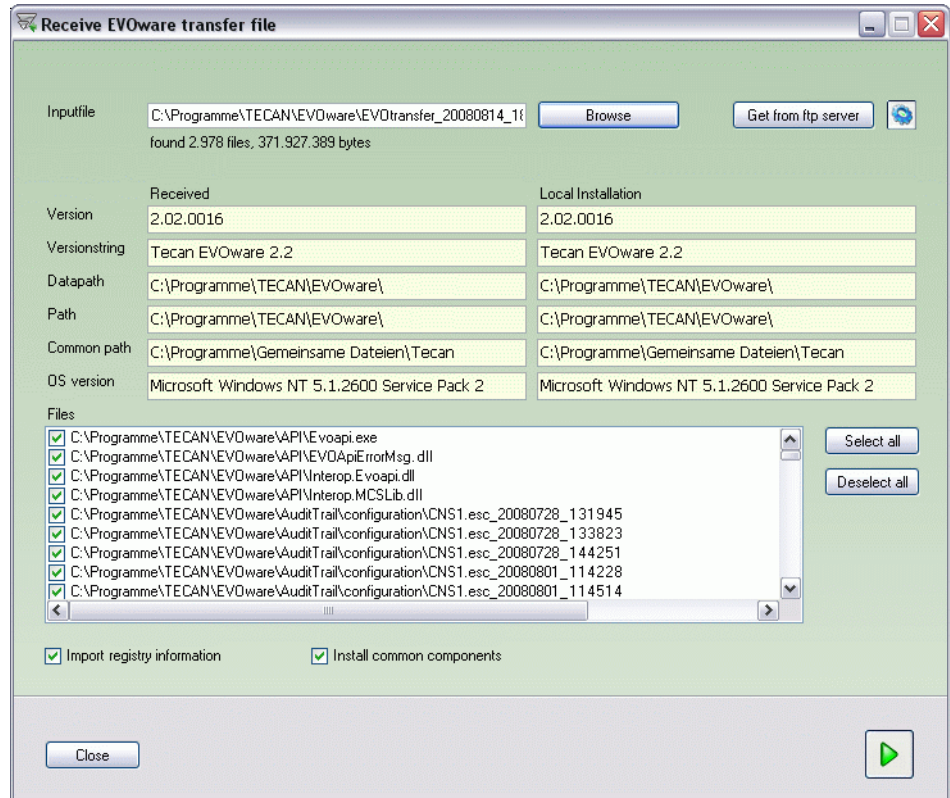


**Fig. A-18** EVOTransfer - Collect EVOware window

Choose the files you want to send and click the green arrow to continue.

#### A.11.7.2 Receive EVOware System

The following dialog box is shown if you choose Receive EVOware System in the main window of EVOTransfer:



**Fig. A-19** EVOTransfer - Receive EVOware Transfer File window

The options in this dialog box are as follows:

Click Browse to look for a transfer file from EVOTransfer which is already on your hard disk or a network drive. Alternatively, click Get from ftp server to download the transfer file from a ftp server.

The account information for the ftp server is specified in the Mail Setup window (the blue button in the Send Detailed Information window, see [A.11.7.1](#), [A-54](#)).

In the *Receive EVOware transfer file* window, the yellow fields at the top right show information on the Freedom EVOware version which is currently installed on your PC and the yellow fields at the top left show information on the Freedom EVOware version contained in the transfer file.

Choose the Freedom EVOware files you want to install and click the green arrow to continue with the installation.

**Note:** If you want to keep a copy of your current EVOware installation, back it up by making a transfer file with EVOTransfer before switching to another EVOware installation. Otherwise, you will not be able to switch back to your current system. Above all, take care to back up your the configuration and data files and your audit trail. You can either do this with EVOTransfer or with the Backup function (see [8.2 "Backing Up and Restoring Your Configuration"](#), [8-3](#)).

### A.11.7.3 Switch EVOware

You can use EVOTransfer to make an image of several different EVOware installations. This allows you to switch between different configuration scenarios or even different EVOware versions for the purpose of demonstration, testing or technical support.

**Note:** If you want to keep a copy of your current EVOware installation, back it up by making a transfer file with EVOTransfer before switching to another EVOware installation. Otherwise, you will not be able to switch back to your current system. Above all, take care to back up your the configuration and data files and your audit trail. You can either do this with EVOTransfer or with the Backup function (see 8.2 “Backing Up and Restoring Your Configuration”, 8-3).

#### A.11.7.4 Command Line Parameters (EVOTransfer)

The EVOTransfer tool supports the following command line parameters:

**Tab. A-15** Command Line Parameters (EVOTransfer)

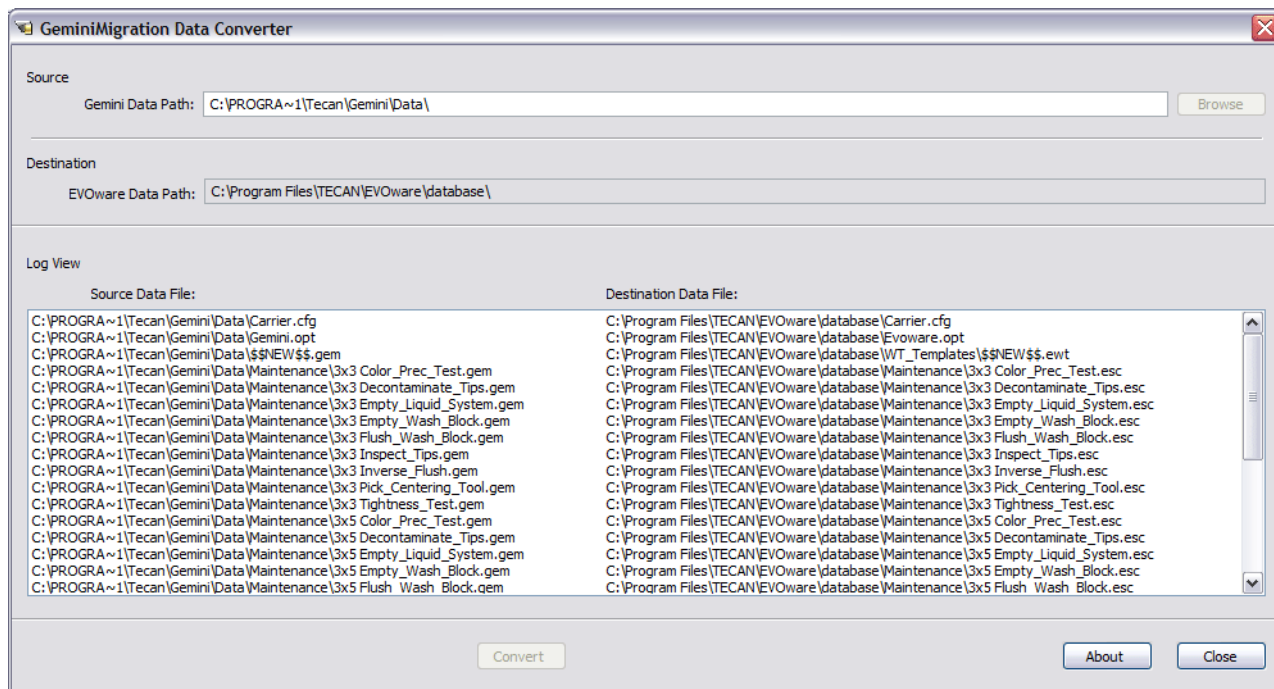
Switch	Explanation
-r	Run EVOTransfer automatically with recommended settings
-f	Run EVOTransfer automatically with full settings
-o <output file>	Specify output file

#### A.11.8 Gemini Migration Tool

This tool is used to import carrier, labware and liquid class definitions from the Gemini software. It also imports the Gemini worktable, Gemini pipetting scripts and VBScripts.

The imported configuration data replaces all existing Freedom EVOware configuration data, which is no longer available.

To start this tool, navigate to the directory C:\Program Files (x86)\Tecan\EVOware using Windows Explorer and double-click on GeminiMigration.exe. Please exit Freedom EVOware first.



**Fig. A-20 Gemini Migration tool**

**Source**

Enter the directory containing the Gemini installation or click Browse and choose the directory.

**Destination**

The Gemini Migration tool determines the directory containing the Freedom EVOware installation automatically.

**Log view**

This panel reports the Gemini files which were imported into Freedom EVOware and the Freedom EVOware files which were created or replaced.

**Note:** Each time changes are made to the configuration files, Freedom EVOware creates backup copies of the original files in the <install\_path>/AuditTrail/Configuration directory.

**A.11.8.1 Importing Liquid Classes From Gemini**

The Gemini Migration Tool also imports all of the Gemini liquid classes.

In Freedom EVOware, pipetting commands only let you choose liquid classes which are suitable for the current configuration of the pipetting instrument. For example, you will not see liquid classes for DiTis if the LiHa is not currently configured with DiTis.

If you import Gemini scripts which uses DiTis and the LiHa in Freedom EVOware is not configured with DiTis, you will not be able to find the DITI liquid class which was originally intended if you edit the pipetting commands in Freedom EVOware. This also applies to liquid classes for Active Tips and for the Te-MO. Note: Active Tips are no longer supported by Freedom EVOware.

After importing Gemini scripts with the Gemini Migration Tool, make sure that the pipetting instrument in Freedom EVOware is configured with all of the options that

are needed by the scripts. Also see the description of the *Show all liquid classes* checkbox in 10.1 “Liquid Classes Editor”, 10-1.

### A.11.9 Shutdown EVOware drivers

To ensure that Freedom EVOware starts quickly, all of the Tecan drivers you have chosen to use are loaded each time the PC is started and remain loaded while the PC is running (see 6.1.11 “Exit, Unload Drivers”, 6-8). This tool is used to unload the Tecan drivers when Freedom EVOware is no longer running. The drivers should be unloaded e.g. if Freedom EVOware reports an internal error. The drivers will be loaded again when you re-start Freedom EVOware. Start this tool with the shortcut in Start > All Programs > Tecan > EVOware > Tools. This tool has no effect if Freedom EVOware is currently running.

### A.11.10 IQ Wizard

The IQ (Installation Qualification) Wizard helps you to check that the Tecan software components are correctly installed and guides you through the initial setup of your pipetting instrument in Freedom EVOware.

Start this tool with the shortcut in Start > All Programs > Tecan > EVOware > Tools:

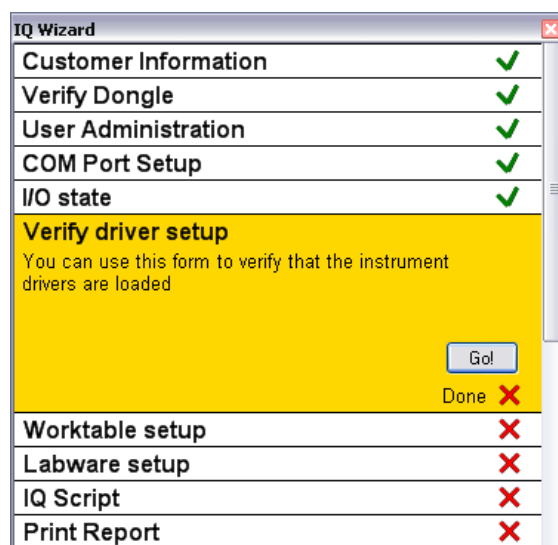


Fig. A-21 IQ Wizard - Main screen

The IQ Wizard is sub-divided into 10 steps. Move the mouse over one of the steps to get a short description of the step. Click on a step and click Go if you want to carry out the operation associated with the step.

Some of the steps are provided with a hyperlink to a page in the Freedom EVOware help file. It is normally recommended to proceed through all of the steps in chronological order.

The steps User Administration, COM Port Setup, I/O State, Worktable Setup and Labware Setup can also be carried out directly using Freedom EVOware and/or the Configuration Tool (you do not need to use the IQ wizard for this purpose if you do not want to). However, the IQ Wizard makes it easier and faster to carry

out these tasks and is recommended above all to users who are new to Freedom EVOware.

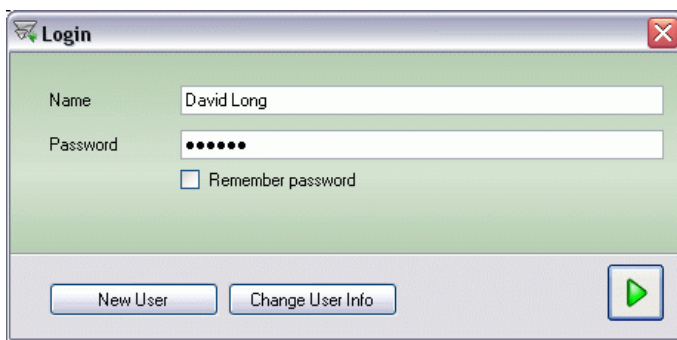
The other steps (Customer Information, Verify Dongle, Verify Driver Setup, IQ Script and Print Report) can only be carried out with the IQ Wizard.

Many of the steps need a Freedom EVOware hardlock (USB dongle) and must be carried out with the pipetting instrument and optional hardware devices connected up and switched on.

**A.11.10.1 Customer information**

To carry out this step, click on the step and then click Go.

If you have already used the IQ Wizard or the Registration Wizard, you will be prompted to enter your existing user name and password:



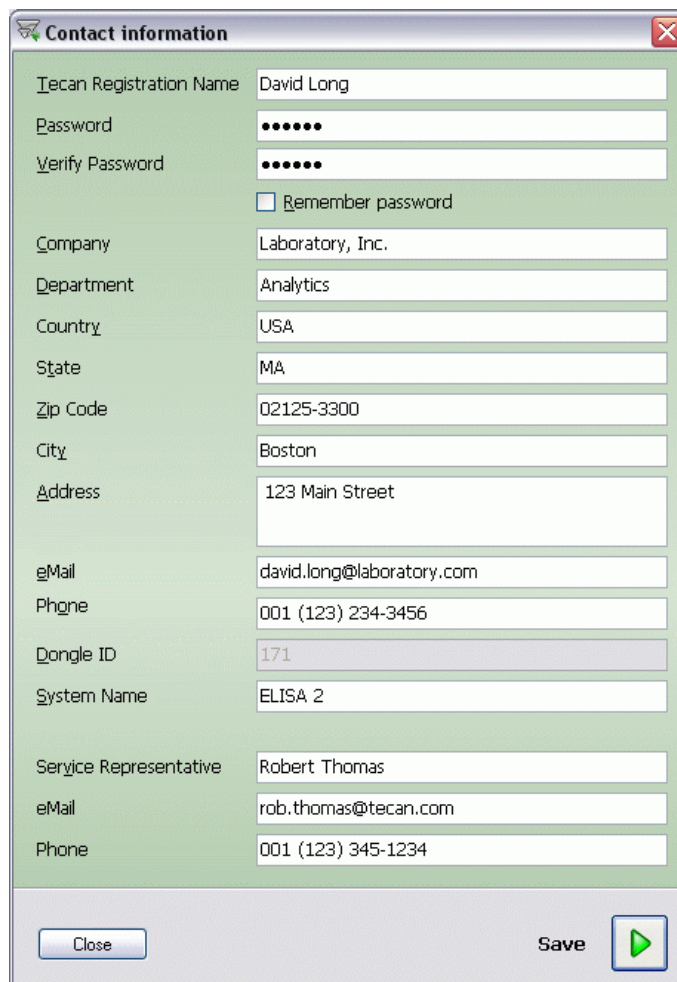
**Fig. A-22** IQ Wizard - Wizard user login

The user name and password is used to identify the contact information record in the IQ Wizard and the Registration Wizard and is not related to the user name and password which is used to log in to Freedom EVOware.

Click “Change User Info” if you want to edit your user information. Click the green arrow on the right to log in and to proceed to the next step without changing your user information.

If you are using the IQ Wizard for the first time, the wizard will proceed directly to the Contact Information dialog box. You must then enter a new user name and password and some information about your company:





Tecan Registration Name	David Long
Password	••••••
Verify Password	••••••
	<input type="checkbox"/> Remember password
Company	Laboratory, Inc.
Department	Analytics
Country	USA
State	MA
Zip Code	02125-3300
City	Boston
Address	123 Main Street
eMail	david.long@laboratory.com
Phone	001 (123) 234-3456
Dongle ID	171
System Name	ELISA 2
Service Representative	Robert Thomas
eMail	rob.thomas@tecan.com
Phone	001 (123) 345-1234

Close Save

Fig. A-23 IQ Wizard - Contact information

The user name and password is used to identify the contact information record in the IQ Wizard and the Registration Wizard and is not related to the user name and password which is used to log in to Freedom EVOware.

The **Dongle ID field** will be filled in automatically after carrying out the Verify Dongle step if the Tecan hardlock (USB dongle) is fitted to your PC.

The **System Name field** makes it easier to identify the Freedom EVOware installation if you have more than one. For example, you can specify the host name of your PC.

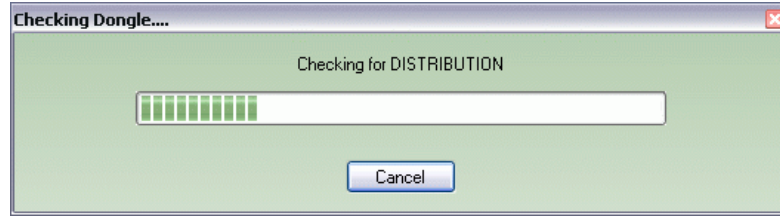
The **Service Representative field** and the next two fields are intended for information on the service engineer who is responsible for supporting your Tecan hardware and software components. The information you enter can be viewed in Freedom EVOware by choosing *Service Contact* in the *Help* menu.

**Note:** The customer information you enter is also used by the Registration Wizard (see A.11.11, A-67). If you have already entered this information in the Registration Wizard, you do not need to enter it again.

#### A.11.10.2 Verify Dongle

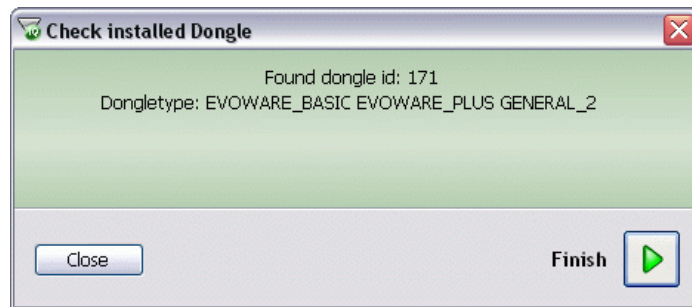
This step is used to verify the hardlock (USB dongle) which is fitted to your PC:





**Fig. A-24** IQ Wizard - Hardlock check

The following screen shows information on the hardlock type which is fitted:



**Fig. A-25** IQ Wizard - Hardlock check finished

See [3.1.2 "Hardlocks for Freedom EVOware Standard and Freedom EVOware Plus"](#), [3-2](#) for more information.

### A.11.10.3 User Administration

This step takes you to the Tecan User Management system where you can create additional users for your Freedom EVOware software.

You will be prompted to set up a new account for the Freedom EVOware Administrator or to enter an existing user name and password if the Administrator account has already been created:



**Fig. A-26** IQ Wizard - Login to the user management system

The user name and password is not related to the name and password which is used to identify the support information record in the IQ Wizard. See [7 "Tecan User Management System"](#), [7-1](#) for more information.

Some of the following steps also require you to enter the user name and password of the Freedom EVOware Administrator.

#### A.11.10.4 COM Port Setup

This step is used to configure the COM ports for hardware devices which are connected to the PC through an RS232 interface. It starts the Freedom EVOware Configuration Tool. See 8.4.3.3 “Com Ports Tab”, 8-33 for more information.

#### A.11.10.5 I/O State

This step is used to configure the I/O state for communication with the hardware devices. It starts the Freedom EVOware Configuration Tool. See 8.4.3.1 “I/O State Tab”, 8-32 for more information.

#### A.11.10.6 Verify Driver Setup

This step is used to check the communication with the device drivers and devices and to interrogate driver versions and device firmware versions. The dialog box lists all of the Freedom EVOware drivers which have been installed and have been configured to load. Initially, a question mark “?” is shown alongside all entries.

Click *Ping* to interrogate the driver versions and the device firmware versions:

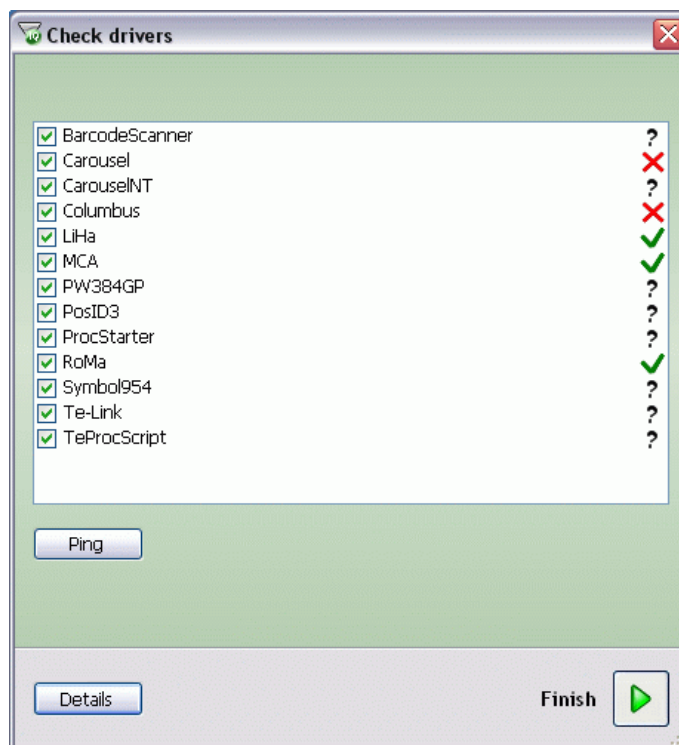
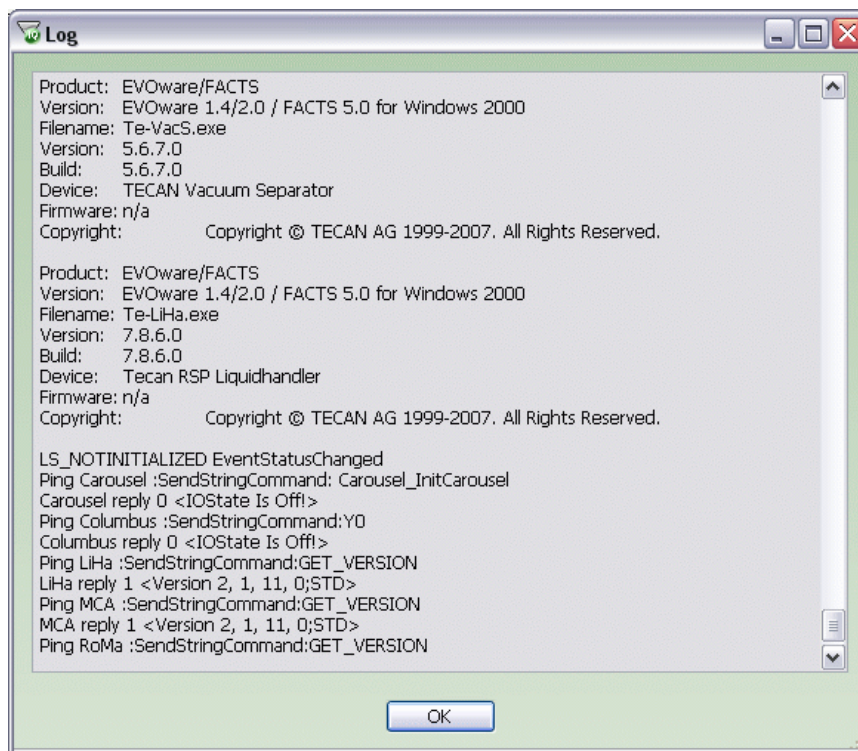


Fig. A-27 IQ Wizard - Checking the drivers

A green tick indicates that a response was received from the device, indicating that the drivers are correctly installed and the hardware is correctly connected. A red cross indicates that a response was not received. Make sure that the devices are correctly connected and switched on. Make sure, too that the I/O state has been switched on. Communication with the device will not be possible if the I/O state is switched off. Click Ping again after resolving the communication problem.

A question mark “?” indicates that the device cannot be checked, for example because a test routine is not currently available for this device.

After carrying out the Ping test, click *Details* to view a report of the test:



**Fig. A-28** IQ Wizard - Driver report file

The report includes information on driver versions and device firmware versions.

**A.11.10.7 Worktable Setup**

This step is used to configure the worktable with the carriers which are needed by your application. It starts Freedom EVOware to allow you to use the Worktable Editor. See 11.3.1 “Setting Up Carriers on the Worktable”, 11-2 for more information.

After setting up the worktable, to return to the IQ Wizard you must save the worktable layout as the worktable template Empty (template file Empty.ewt). To do this, click in the Worktable Editor and click *Save worktable as template*. After returning to the IQ Wizard, it will list all of the carriers you have chosen to use:

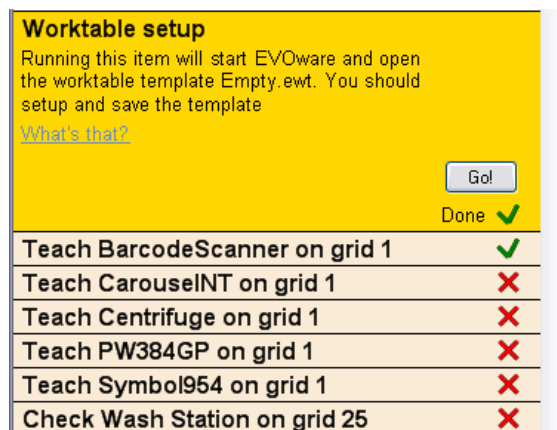


Fig. A-29 Registration Wizard - Collecting information

The next step is to configure all of the carriers you have chosen. In the list, carriers which can be accessed by the LiHa are labelled Check ... Carriers which can only be accessed by the RoMa are labelled Teach ... For each of the carriers in turn, click on the entry and click Go. This opens the Edit Carrier dialog box in Freedom EVOware (see 9.5 “Configuring Carriers”, 9-29). Check that the dimensions in the dialog box match the dimensions of your carriers and check and/or teach the RoMa vectors that you need (see 9.6 “Creating and Editing Plate Robot Vectors”, 9-46).

#### A.11.10.8 Labware Setup

This step is used to configure the worktable with the labware which is needed by your application. It starts Freedom EVOware to allow you to use the Worktable Editor. See 11.4.1 “Choosing Labware for a Pipetting Script”, 11-4 for more information.

After setting up the worktable, to return to the IQ Wizard you must save the results as a pipetting script (which does not yet contain any script commands). To do this, chose Save in the File menu. After returning to the IQ Wizard, it will list all of the labware items you have chosen to use:

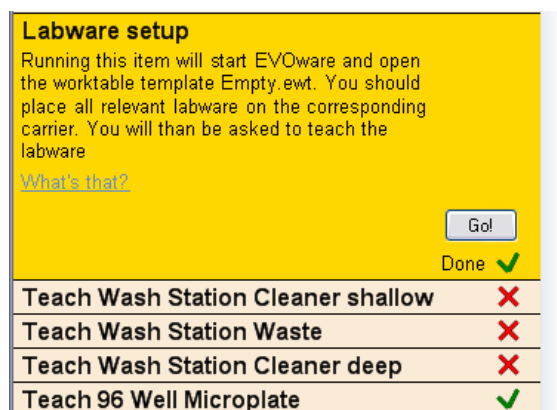


Fig. A-30 Registration Wizard - Collecting information

The next step is to configure all of the labware you have chosen.

For each of the labware items in turn, click on the entry and click Go. This opens the Edit Labware dialog box in Freedom EVOware (see 9.4 “Configuring Labware”, ¶ 9-9). Check that the dimensions in the dialog box match the dimensions of your labware and check and/or teach the labware coordinates using the LiHa (see 9.4.4 “Teaching the Labware Coordinates”, ¶ 9-20).

**A.11.10.9 IQ Script**

This step creates a simple pipetting script for Freedom EVOware which includes commands for all of the devices which you have set up. The script allows you to check that all of the devices are functioning correctly. Please refer to the comment lines in the script for additional information on how to use the script.

**A.11.10.10 Print IQ Report**

This step prints a report of all of the configuration steps which have been completed. You can use the report for documenting the work you have carried out.

**A.11.11 Registration Wizard**

The Registration Wizard is intended to simplify the update of hardware and software and the support of your Tecan products.

It collects information on the computer where the Tecan product is installed and the versions and/or serial numbers of the installed Tecan software and hardware components. This information, which is useful to Tecan support technicians, is sent to Tecan using one of three methods (directly online, email or file).

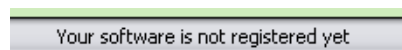
The personal and company data which is entered in the Registration Wizard is used by Tecan to identify the appropriate contact person at your company if a support issue requires clarification.

The data is encrypted before sending and stored securely on a server operated by Tecan in Switzerland. All data will be deleted automatically after a duration of at most 20 years. You can request the correction or premature deletion of this data by contacting Tecan at registration@tecan.com. The data is not used for marketing purposes and will not be handed over to third parties.

Click on the link *What information will be transferred?* in the Select Registration Method dialog box (Fig. A-37, ¶ A-71) to view details of the information which will be sent.

The registration process is not a substitute for the Tecan hardlock (dongle).

A blinking message will be shown in the Freedom EVOware status bar if your software is not yet registered or if you have made some changes to the installed software components:



**Fig. A-31** Message in the Freedom EVOware status bar

Double-click on the message to start the Registration Wizard.

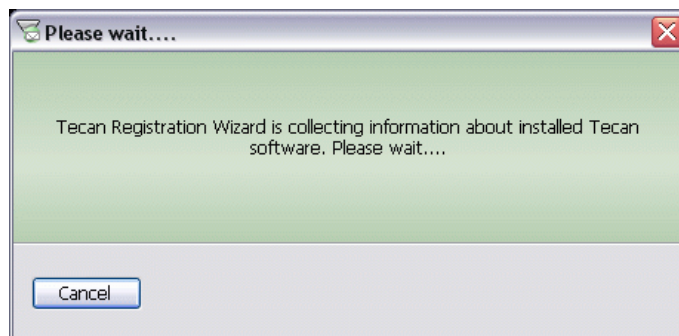
You should use the Registration Wizard in the following situations:

- ◆ Freedom EVOware has just been installed and Tecan has not yet received any details of your installation, or
- ◆ You have made some changes to your Freedom EVOware installation, such as installing new drivers or updating existing drivers.

**Note:** You can only complete the registration process if the Tecan hardlock (USB dongle) is fitted to your PC.

**Note:** Provided that the hardlock is fitted, all of the purchased functions of Freedom EVOware can be used, even if the software is not registered.

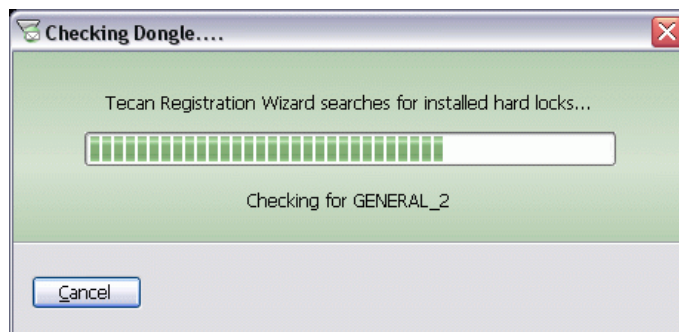
The following dialog box is shown at the start of the registration process:



**Fig. A-32** Registration Wizard - Collecting information

Click *Cancel* if you want to start using Freedom EVOware without delay and you do not want to register at this stage.

Unless you click *Cancel*, the Registration Wizard will then check the type and serial number of your hardlock:



**Fig. A-33** Registration Wizard - Checking the hardlock

The following dialog box is shown when checking is finished:

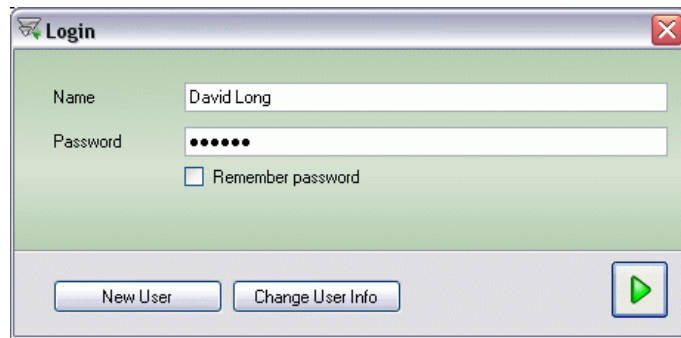


**Fig. A-34** Registration Wizard - Register



Click Register to proceed with the registration (see later for information on how to obtain and enter the registration code).

If you have already used the IQ Wizard or the Registration Wizard, you will be prompted to enter your existing user name and password:



**Fig. A-35** Registration Wizard - Wizard user login

The user name and password is used to identify the contact information record in the Registration Wizard and the IQ Wizard and is not related to the user name and password which is used to log in to Freedom EVOware.

Click “Change User Info” if you want to edit your user information. Click the green arrow on the right to log in and to proceed to the next step without changing your user information.

If you are using the Registration Wizard for the first time, the wizard will proceed directly to the Contact Information dialog box. You must then enter a new user name and password and some information about your company:

Tecan Registration Name	David Long
Password	••••••
Verify Password	••••••
	<input type="checkbox"/> Remember password
Company	Laboratory, Inc.
Department	Analytics
Country	USA
State	MA
Zip Code	02125-3300
City	Boston
Address	123 Main Street
eMail	david.long@laboratory.com
Phone	001 (123) 234-3456
Dongle ID	171
System Name	ELISA 2
Service Representative	Robert Thomas
eMail	rob.thomas@tecan.com
Phone	001 (123) 345-1234

**Fig. A-36** Registration Wizard - Customer information

The user name and password is used to identify the contact information record in the Registration Wizard and the IQ Wizard and is not related to the user name and password which is used to log in to Freedom EVOware.

The **Dongle ID field** will be filled in automatically if the Tecan hardlock (USB dongle) is fitted to your PC.

The **System Name field** makes it easier to identify the Freedom EVOware installation if you have more than one. For example, you can specify the host name of your PC.

The **Service Representative field** and the next two fields are intended for information on the service engineer who is responsible for supporting your Tecan hardware and software components. The information you enter can be viewed in Freedom EVOware by choosing *Service Contact* in the *Help* menu.

**Note:** The customer information you enter is also used by the IQ Wizard (see [A.11.10](#), [A-60](#)). If you have already entered this information in the IQ Wizard before you use the Registration Wizard, you do not need to enter it again.

You will then be asked about the method you want to use to send the support information to Tecan:



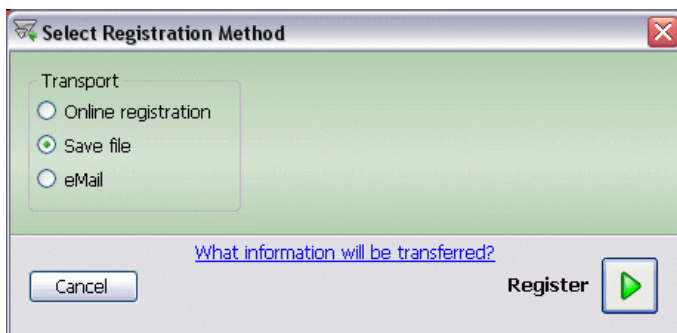


Fig. A-37 Registration Wizard - Registration Method

The available methods are as follows:

- ♦ Choose **Online registration** if your PC has a direct connection to the Internet.
- ♦ Choose **Save file** if you want to save the information in a file and send it to Tecan manually using a standard email client such as Microsoft Outlook which is installed on this PC or on another PC.
- ♦ Choose **eMail** if your PC is connected to the Internet and a standard email client such as Microsoft Outlook is installed.
- ♦ You must send the registration file to registration@tecan.com.

The following information will be sent to Tecan:

- ♦ Information on the computer where the Tecan product is installed and the versions and/or serial numbers of the installed Tecan software and hardware components.
- ♦ Your name, company name, address and telephone number.

The information is encrypted before sending. Click on the link *What information will be transferred?* to view details of the information which will be sent.

The following dialog box is shown if you choose *eMail* under *Registration Method*:

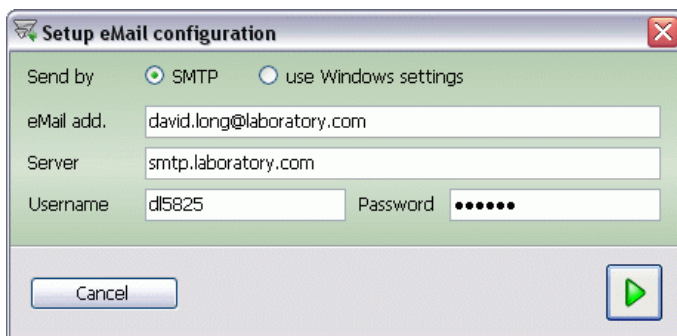


Fig. A-38 Registration Wizard - email setup

### SMTP, Use Windows Settings

Click the radio buttons to choose whether to send the registration information via SMTP or using the Windows settings for an existing email client such as Microsoft Outlook.

### SMTP

#### Email address

Specify your email address. The registration information from Tecan will be sent to this address.

### Server

Specify the address of the SMTP server you want to use for sending the registration information. You should normally specify the SMTP server address which is recommended by your email provider or email administrator.

### User

Specify the user name for SMTP authentication.

### Password

Specify the password for SMTP authentication.

The user name and password for SMTP authentication depends on the SMTP server. In most cases, it is the same user name and password which is used to collect emails using the POP3 protocol. With some email providers, the user name is the same as the email address.

### Use Windows Settings

If you choose this option, the Registration Wizard will use the default email sending method and/or local email client which is configured with Internet Options in the Windows Control Panel.

#### A.11.11.1 Finishing the registration

If you send the registration information online (you chose *Online registration* in the Registration method dialog box - see [Fig. A-37](#), [Fig. A-71](#)), the registration code is normally sent to your PC within a few minutes. The registration process will then be completed automatically - no further user actions are required.

If you send the registration information by email (you chose *Save file* or *eMail* in the Registration method dialog box), after processing the details Tecan will send a software registration code to your email address.

After you have received the registration code by email, start the Registration Wizard again by clicking on the registration message in the status bar of Freedom EVOware. Then step through the wizard until you reach the *Register* dialog box. Then click *Enter code* and enter the code. The software is now registered.

In either case (online registration or email), creating the registration code takes place at Tecan using an automatic process.

#### A.11.12 Version Checker Tool

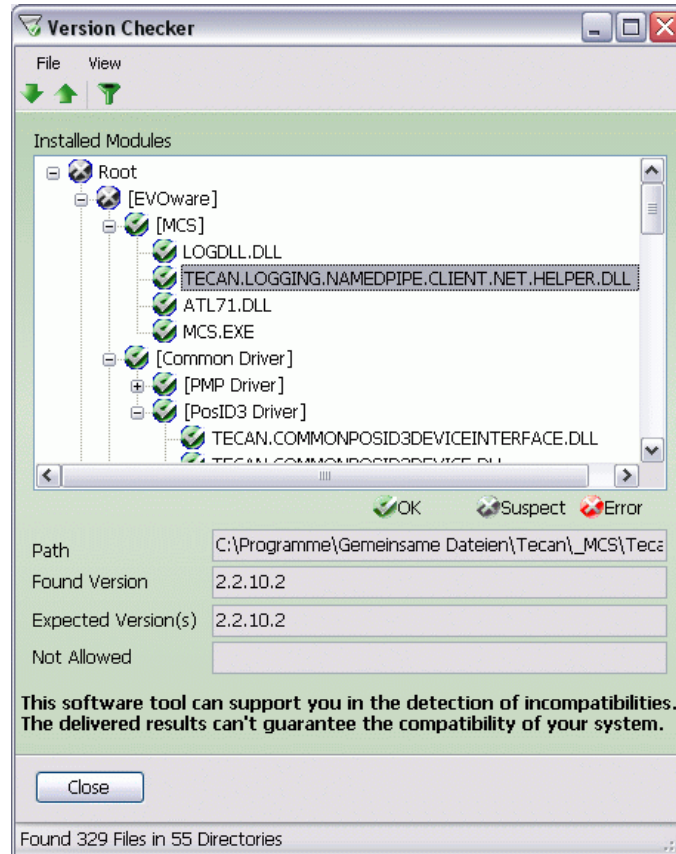
This tool is used to check the versions of the installed device drivers, other software components such as DLL files and device firmware. It is mainly intended for Tecan Field Service Engineers.

The version information which is collected from the files and/or retrieved from the devices (by sending firmware commands) is compared against a list of expected versions which is stored in several text files in csv format. These files also specify which of the software components and/or devices should be checked.

To check device firmware versions, the devices and the pipetting instrument must be connected to the PC and switched on.

Start this tool with the shortcut in Start > All Programs > Tecan > Version Checker > Version Checker.

The results of the version checking is shown as a collapsible tree structure. Entries with non-expected versions are shown in red. Entries with the correct version are shown in green:



**Fig. A-39** Version Checker tool

The menus in this tool are as follows:

**File menu**

**Save result:** Saves a list of non-expected versions in a text file.

**Print result:** Prints a list of non-expected versions.

**View menu**

**Collapse all/Expand all:** Collapse or expand the tree structure.

**Show Errors / Warnings only:** Only show entries with errors or warnings. You can also toggle this function by clicking the green button below the View menu.

**Next error / Previous error:** Skip to the next or previous error. You can also skip to the next or previous error by clicking the green arrows below the File menu.

The Version Checker tool does not report on software components which are missing, even if they are non-optional and thus necessary for the correct functioning of Freedom EVOware or one of its features.

## A.12 LogViewer Tool

The Tecan Logging Server is a central software module which handles the logging of system and error messages for all Tecan software components. The LogViewer tool is used to view, filter and search for messages which have been received by the Tecan Logging Server.

To start LogViewer choose Start > All Programs > Tecan > Logging > V2.1 > LogViewer. The Tecan Logging Server is normally configured to start automatically when the PC is started.

The LogViewer has three main windows:

- ♦ The Channels window (normally on the left side).
- ♦ The Message List window (normally on the right side).
- ♦ The Message Detail window (normally below the other windows). The Message Detail window shows full details of the message which is currently selected in the Message List window.

The windows can be docked and undocked and their positions can be configured by the user (see [A.12.4 “Configuring the user interface”](#), [A-76](#)). Use the View menu to show or hide the Message Detail and Channels windows as required (see [A.12.5.2 “View Menu”](#), [A-77](#)).

The Tecan Logging Server stores log files in xml format in the directory Documents and Settings > All Users > Application Data > Tecan > LoggingServer> LogFiles. A new log file is automatically created when the log file size exceeds 10 MB.

The log file currently in use is named Current <date> <time>.xml, where <date> and <time> are the creation date and time of the file. Files no longer in use are named Logfile <date> <time>.xml. The log files are protected against unauthorized manipulation and contain a checksum.

### A.12.1 Using the Channels window

The Channels window is used to pre-select or filter messages of a particular type. For example, the Drivers channel refers to messages from hardware device drivers such as the RoMa driver.

If you check the Drivers checkbox in the Channels window and uncheck all other checkboxes, the Message List window will only show messages which have come from device drivers.

The channels have a hierarchical (tree) structure and some of the channels contain sub-channels. For example, in log files from Freedom EVOware, the Drivers channel normally has a RoMa sub-channel:

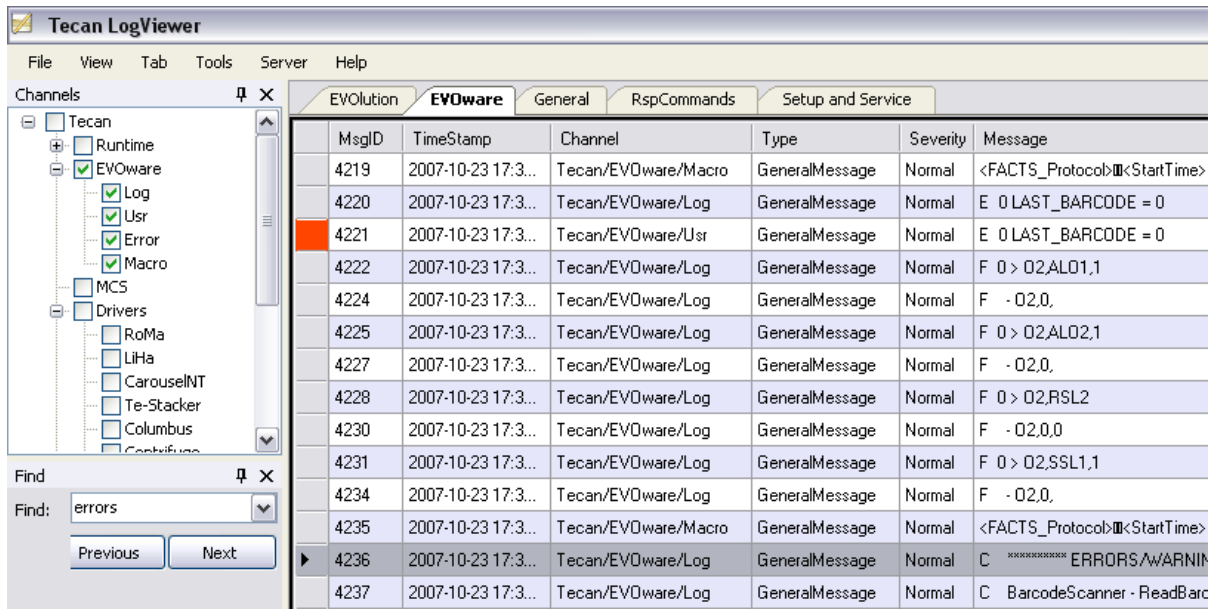


Fig. A-40 LogViewer, showing the Find window and a bookmark (Message Details window not shown)

The tree structure of the Channels window is automatically adjusted to match the contents of the currently open log file. Some of the sub-channels may be missing if the log file does not contain any messages for these sub-channels.

You can expand the Drivers channel to view the sub-channels it contains by clicking on the '+' box on the left side. Click the '-' box if you want to collapse the Drivers channel again.

If you expand the Drivers channel, check the RoMa checkbox and uncheck all other checkboxes in the Channels window, the Message List window will only show messages which have come from the RoMa device driver (if there are any to show) and not from the other device drivers.

When investigating a particular event or problem, it can be helpful to select only those channels (message types) which are directly relevant and to uncheck the checkboxes of all other channels.

You can also select channels as follows:

**Left click on a check box**

Selects / deselects only this channel.

**Right click on the label (name) of a check box**

Opens a drop down list which allows you to choose between select all and deselect all.

**Right click on a check box**

Selects / deselects this channel and all of its subchannels.

When the LogViewer has just been installed, the channel selections of the five tabs in the Message List window (EVOlution, EVOware, General, RspCommands and Setup & Service) are pre-configured to filter and display only those messages which are relevant for that tab. The channel selection can be adjusted by the user and is automatically saved in a user profile which is associated with the MS Windows user name. When you start the LogViewer again later, the last used channel selection is automatically re-activated. A separate channel selection is saved for each user for each of the five tabs. See also A.12.2 "Using the Message List window", A-76.

## A.12.2 Using the Message List window

The Message List window shows messages which are contained in the currently open log file(s). Warning messages are shown in blue and error messages are shown in red. Other messages are shown in black (default text color). Note that the red color appears slightly darker if the message line has a blue background. Messages from Tecan software components and hardware devices have several different structures which depend on the type of message. For example, messages sent by the Tecan Communication Server can be acknowledged using a response code. Other types of message do not have response codes and do not need a Response column.

The tabs at the top of the Message List window are used to adjust the view (e.g. column headings) of the message list to be suitable for a particular message structure, message type or message source. For example, the RspCommands tab is the appropriate tab to choose if you want to view messages from the Tecan Communication Server.

See [A.12.5.3 "Tab Menu"](#), [A-78](#) for information on the intended usage of the other tabs.

When you choose a particular tab, you are also choosing a configurable selection of channels in the Channels window. See also [A.12.1 "Using the Channels window"](#), [A-74](#).

The message ID shown in the MsgID column is unique across all tabs. Depending on your channel selection, the same message may appear in several tabs but with a different view and different column headings.

## A.12.3 Using the Message Detail window

The Message Detail window shows full details of the message which is currently selected in the Message List window.

Messages from Tecan software components and hardware devices have several different structures which depend on the type of message. The tabs at the bottom of the Message Detail window are used to adjust the formatting (layout) of the detailed view of the message. It is generally appropriate (but not obligatory) to choose the same tab that you choose in the Message List window. The same tab is chosen by default, but you can choose another tab if required.

## A.12.4 Configuring the user interface

Most of the windows in the LogViewer tool have the following two icons on the right side of the title bar:

### Close

Click the "X" icon to close the window.

### Autohide

Click this icon to switch the window to autohide mode. In autohide mode, the window will automatically collapse to a tab at the edge of the main window when you click in another window (after a short delay).

Move the mouse over the tab to expand the window again. Click on the Autohide icon again to switch back to normal mode.

When working with several windows, Autohide mode hides currently unused windows to make more space on the screen.

### Docking and undocking the windows

To change the position of one of the windows, click on the title bar of the window and drag it to another part of the screen. Docking anchors are shown as soon as you start to drag. Drag and drop the window onto a docking anchor to dock the window at the chosen position. If you do not drop the window onto a docking anchor, the new window position will be undocked (floating). Double click on the window title to switch between docked and undocked mode.

## A.12.5 LogViewer Menus

### A.12.5.1 File menu

#### Open

This menu item is used to open a log file in xml format. When the LogViewer is first started, it automatically opens the most recent log file (the log file which is currently being used to record messages). New messages which arrive from Tecan software components and drivers are appended to the end of the log file and the Message List window is continuously updated (Online mode). Choose File > Open to open an older (historical) log file. The LogViewer then switches to Offline mode, and recently received messages are no longer shown.

In Offline mode, you can sort the messages in the Message List window by clicking on the column headers. In Online mode, the messages are always sorted chronologically.

When you choose File > Open, use the Shift and Ctrl buttons on the keyboard if you want to select several log files in the file browser window and open them simultaneously. Alternatively, select the files you want to open in Windows Explorer and drag them onto the LogViewer window.

**Note:** *Alternatively, clear the Message List window with Shift+Del, select one or more log files in Windows Explorer and drag them onto the Message List window.*

The total number of messages and the filtered number of messages in the currently open log file(s) is shown at the bottom of the main window (see also [A.12.5 “LogViewer Menus”](#), [A-77](#), Filter).

To switch back to online mode, choose Online in the View menu or click the light green Offline tab at the bottom right of the main window. Then press F5 to refresh the view.

#### Exit

This menu item is used to exit the Log Viewer.

**Note:** *The Logging Server continues to log Tecan messages independently of the chosen mode in the LogViewer tool (Online mode, Offline mode or currently not running).*

### A.12.5.2 View Menu

#### Channels

This menu item is used to show or hide the Channels window.

#### Message Detail

This menu item is used to show or hide the Message Details window.

**Note:** *Press F5 if you need to refresh the view of the Message List window.*



### **Clear (Shift + Del)**

This menu item is used to clear all of the messages in the Message List window.

## **A.12.5.3 Tab Menu**

### **Online / Offline**

These menu items are used to switch between Online and Offline mode.

### **Follow Tail**

Activate this option if you want the Message List window to scroll automatically in Online mode so that the latest messages are always visible at the bottom of the screen. If you want to study a specific message while the Tecan software is still running (i.e. messages are still arriving), you can switch off Follow Tail mode to prevent the message from scrolling off the top of the screen.

### **EVOLution**

This menu item switches to the EVOLution tab of the Message List window. This tab is intended for viewing messages from the Freedom EVOLution software package. The initial default channel selection for this tab is Tecan/Runtime, Tecan/MCS and Tecan/Drivers.

### **EVOware**

This menu item switches to the EVOware tab of the Message List window. This tab is intended for viewing messages from the Freedom EVOware software package. The initial default channel selection for this tab is Tecan/EVOware. See also [A.12.6 "LogViewer Channel assignments for Freedom EVOware"](#), [A-81](#).

### **General**

This menu item switches to the General tab of the Message List window. This tab shows all mandatory fields (the fields which are mandatory for all message types).

### **RspCommands**

This menu item switches to the RspCommands tab of the Message List window. This tab is intended for viewing messages from the Tecan Communication Server. The initial default channel selection for this tab is Tecan/Communication.

### **Setup and Service**

This menu item switches to the RspCommands tab of the Message List window. This tab is intended for messages from the Instrument Software package, which contains the Setup & Service software. The initial default channel selection for this tab is Tecan/Setup and Service.

## **A.12.5.4 Tools Menu**

### **Find**

This option is used to search for a particular string in the messages. Click Next or Previous to jump to the next or previous message which contains the string. If the string is found, it is shown highlighted in yellow in the Message Detail window.



### Filter

This option is used to filter the messages which are shown in the Message List window according to several different criteria. For example, you can choose to show only those messages which have a specified string in the channel name or the message text or have a specified range of message IDs. Filtering by channel name has a similar effect to de-selecting channels in the Channels window.

After specifying a new filter, check the checkbox to activate it and click Apply to apply the filter to the Message List window. Click Clear to clear the filter again.

You can specify several filters and activate the one you want to use. If you activate more than one filter simultaneously, the filter settings are combined using the AND function. The filter settings are automatically saved in a user profile which is associated with your MS Windows user name.

### Bookmarks

To use the Bookmarks option, right click on a message in the Message List window and choose Add from the context menu. Alternatively, click in the margin column, to the left of the MsgID column. The margin column is then marked red, so you can easily find the message again later. In addition, the message is added to the Bookmarks window. To go to the same message again later, select the bookmark in the Bookmarks window and click *Jump To*.

If the same message (the same message ID) is also present in another tab of the Message List window, it will be bookmarked there too (the margin column will be marked in red). To go to a bookmarked message in another tab, switch to the other tab, select the bookmark in the Bookmarks window and click *Jump To*. If the bookmarked message is not present in the other tab, the next closest message (closest message ID) will be highlighted instead.

To remove the bookmark again, select the message in the Bookmarks window and click Remove. Alternatively, right click on the bookmarked message in the Message List window and choose *Remove* from the context menu.

### Highlighting

To use the Highlighting option, click Add, check the checkbox and enter the string you want to highlight in the colored field. Use the pull-down list to choose the color you want to use for this string. When you scroll through the messages in the Message List window, if the specified string is found it will be highlighted in color in the Message Detail window.

Click Add again to specify another string that you want to highlight. It is normally helpful but not obligatory to choose a different highlighting color for each string you want to highlight.

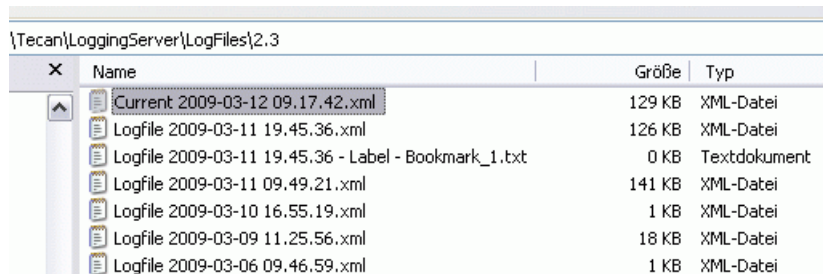
## A.12.5.5 Server Menu

### Options

This menu item shows the directory which the Logging Server uses to store the log files. Click the right arrow button to jump to the configured log files directory in Windows Explorer. This menu item also shows whether the Tecan Logging Server is installed on your PC and is currently running.

### Create Bookmark File

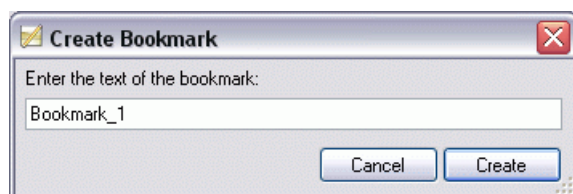
This menu item creates an empty text file in the log files directory which acts as a bookmark (visible separator) when viewing the contents of the directory in Windows Explorer. This helps you to identify the right files if you want to drag a group of log files to another directory for archiving or to the Message List window of the LogViewer tool for analysis:



**Fig. A-41** Log files and a bookmark file in Windows Explorer

If you plan to analyze the log files it can be helpful to create a bookmark file before you start a new pipetting run.

To create a bookmark file, select Create Bookmark File in the Server menu. Specify a label for the bookmark file in the Create Bookmark dialog box and click Create:



**Fig. A-42** Create Bookmark dialog box

This closes the currently open log file, creates the bookmark file and starts a new log file.

The filename of the bookmark file which is created is Logfile <date> <time> Label - <mylabel>.txt, where <mylabel> is the label you specify in the above dialog box.

#### A.12.5.6 Help Menu

##### About Tecan LogViewer

This menu item shows information on the LogViewer version which is installed and Tecan copyright information.

## A.12.6 LogViewer Channel assignments for Freedom EVOware

When you are investigating a pipetting script or process which you have run under Freedom EVOware, the following logging channels in the LogViewer tool are of particular interest:

### **Tecan/EVOware/Log**

This channel contains all message types in [Tab. A-1 “Structure of the log files”](#), [# A-8](#) (including firmware commands sent to the pipetting instrument) and information on user logins.

### **Tecan/EVOware/Usr**

This channel contains message types D and E in [Tab. A-1 “Structure of the log files”](#), [# A-8](#) and information on user logins. To activate logging information for this channel, see [8.3.1.4 “Protocol Options Tab”](#), [# 8-8](#), Log Options panel.

### **Tecan/EVOware/Error**

This channel contains message types C to E in [Tab. A-1 “Structure of the log files”](#), [# A-8](#) and information on user logins. To activate logging information for this channel, see [8.3.1.4 “Protocol Options Tab”](#), [# 8-8](#), Log Options panel.

### **Tecan/EVOware/Macro**

This channel contains messages from internal Freedom EVOware commands (macros). This includes messages from the scheduler, the kernel and device drivers.

### **Tecan/Drivers (including sub-channels)**

The sub-channels of the Drivers channel contain messages which are related to hardware devices. The sub-channels are named according to the device call name in Freedom EVOware. If required, e.g. for testing purposes, you can configure Freedom EVOware to output more detailed logging information which includes device firmware commands (see [8.4.3.2 “Logging Option”](#), [# 8-32](#)). Messages to and from device drivers are also contained in the Tecan/EVOware/Macro channel.

### **Tecan/MCS**

This channel contains messages from the Message Control Server (MCS) in Freedom EVOware. The MCS does not normally output logging information. To activate logging for the MCS, see [A.1.6 “Log Files of Type MCS”](#), [# A-10](#).

### **Tecan/Database**

This channel contains messages from Freedom EVOware's internal database.

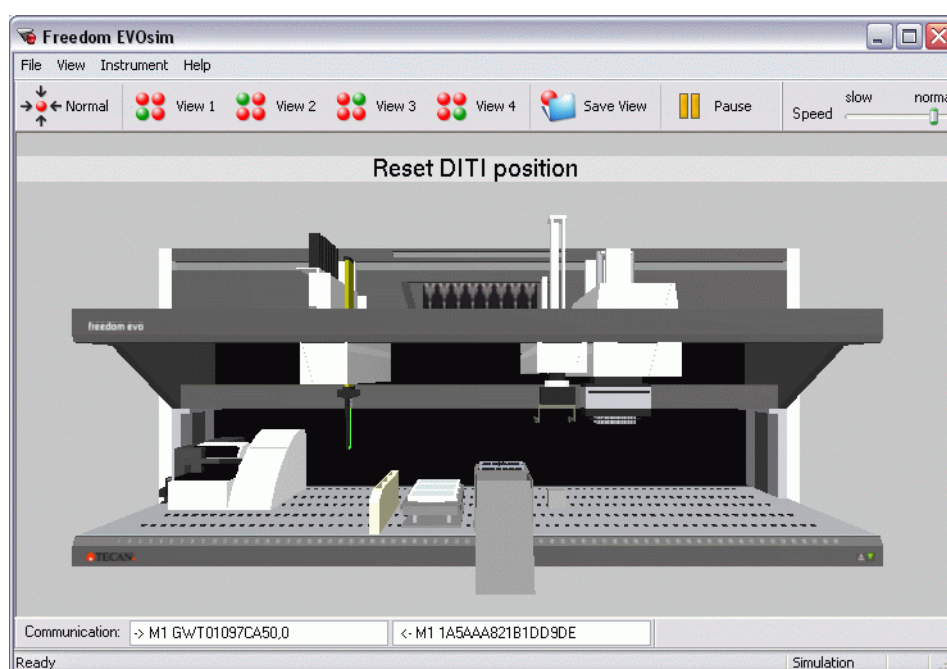
### **Tecan/EVOware/Addons**

The sub-channels of this channel are used for messages from software add-ons for Freedom EVOware such as Sample Oriented EVOware.

## A.13 Configuring and Using the 3D Simulation Tool EVOSim

The Freedom EVOware setup program lets you install a 3D simulation tool (EVOSim) which can be used to visualize the movements which are carried out by the arms of the Freedom EVO pipetting instrument (LiHa, RoMa, PnP and MCA) when running Freedom EVOware scripts and processes. It can also be used to visualize several other devices such as the Te-MO and the PosID-3.

Start EVOSim with the shortcut in Start > All Programs > Tecan > EVOware:



**Fig. A-43** EVOSim - Main window

EVOSim interprets the firmware (hardware) commands which are sent to the pipetting instrument and sends the appropriate responses to Freedom EVOware. To do this, the RS232 connection to the pipetting instrument is configured to communicate with EVOSim instead. This is called “3D simulation mode”.

Using an additional tool (EVOSim Splitter, see below), EVOSim can also be used to monitor the communication between Freedom EVOware and the pipetting instrument. This is called “monitoring mode”.

When the script or process is running, EVOSim displays the texts from Comment commands in a bar across the top of the screen (see example in the above figure, “Reset DITI position”). The comment texts remain on the screen until the next Comment command is executed. A special syntax of the Comment command can be used to clear the last message which is shown (see [15.32 “Comment Command”](#), [15-87](#) for more information).

You can configure EVOSim to run on the same PC which normally controls the pipetting instrument or on another PC.

To install EVOSim, activate the corresponding item in the Software Options group when you install Freedom EVOware. This adds a shortcut for EVOSim and EVOSim Splitter to the EVOware program group of the PC’s Start menu.

To install it on another PC, copy the directory c:\Program Files (x86)\Tecan\EVOware\Simulation with all of the files and sub-directories to the other PC. In this case, EVOSim and EVOSim Splitter are started by double-clicking on the respective .exe files in the chosen target directory.

Please note the following points:

- ◆ EVOSim can be used to simulate a Freedom EVO pipetting instrument.
- ◆ Freedom EVOware does not require a hardlock (dongle) when EVOSim is simulating the pipetting instrument.
- ◆ You must start Freedom EVOware in real mode to use EVOSim (firmware commands such as movement commands are not sent to the RS232 port in Freedom EVOware's offline mode).
- ◆ Freedom EVOware will run in offline mode if it can not detect either a pipetting instrument or EVOSim, which simulates the data communication with a pipetting instrument. If you are using Freedom EVOware with EVOSim, this normally indicates that there is a problem with the EVOSim configuration or the data connection(s). Note: the Freedom EVOware operation mode is shown in the Status Bar (see 6.7.3 "Status Bar", ¶ 6-19).
- ◆ EVOSim does not currently simulate the following optional devices: Te-Shake, Te-MagS, Te-Stack, Te-Stack Te-MO and Te-VacS. If you want to use EVOSim, you must first deactivate these devices in the Freedom EVOware Configuration Tool (see 8.4.1.1 "Device Information Tab", ¶ 8-21). If you don't do this, Freedom EVOware will report errors when it tries to communicate with these devices.
- ◆ EVOSim does not support the Pressure Monitored Pipetting (PMP) hardware option. If PMP is activated in your Freedom EVOware configuration, Freedom EVOware will display an error message when it starts and PMP will be disabled for the current Freedom EVOware session.
- ◆ When using EVOSim, you must always start it before you start Freedom EVOware. If you also use EVOSim Splitter, start EVOSim Splitter first, then EVOSim and finally Freedom EVOware.
- ◆ If you have been using EVOSim, you must always exit Freedom EVOware before you exit EVOSim (Freedom EVOware sends firmware commands during the shut-down procedure and expects RS232 communications to remain functional during this time).
- ◆ EVOSim does not report pipetting errors to Freedom EVOware (such as *DITI already mounted*). The only errors it reports are incorrect positioning commands ("movement out of range"). Out of range movements are also indicated by displaying the respective arm (LiHa, RoMa, PnP) in red. Note: For mechanical reasons, Freedom EVOware purposely sends movement commands which are out of range during pipetting instrument initialization.
- ◆ If you want to run two copies of EVOSim on the same PC (not normally meaningful), first make a duplicate copy of the directory c:\Program Files (x86)\Tecan\EVOware\Simulation with all of the files and sub-directories. Do not start two copies of EVOSim from the same directory (conflicts are caused by the shared configuration file).

### A.13.1 Communication Between EVOSim and Freedom EVOware

Depending on requirements, the simulation tool can communicate with Freedom EVOware in several different ways:

**A):** EVOSim runs on the same PC as Freedom EVOware. The PC must have two unused RS232 ports. Connect the two ports using a null-modem cable. Configure Freedom EVOware to use one of the ports and configure EVOSim to use the other port.

**B):** EVOSim runs on the same PC as Freedom EVOware. Configure EVOSim to provide a virtual RS232 port. EVOSim then temporarily re-configures Freedom EVOware to use the same port.

**C):** EVOSim runs on a different PC to Freedom EVOware. Each of the PCs must have one unused RS232 port. Connect the two PCs using a null-modem cable. Configure the ports appropriately. You must also provide a network connection between the two PCs.

**D):** EVOSim is used in monitoring mode (see [A.13.2 "Data Splitter Tool EVOSim Splitter"](#), [A-84](#)).

See [A.13.4.1 "Communication Between EVOSim and Freedom EVOware"](#), [A-87](#) for more information.

### A.13.2 Data Splitter Tool EVOSim Splitter

EVOSim is also provided with a data splitter tool (EVOSim Splitter) which duplicates the RS232 data stream over a network connection:



**Fig. A-44** Principle of the data splitter tool EVOSim Splitter

The RS/232 connection is bi-directional. The splitter tool only provides a uni-directional TCP/IP connection. The EVOSim which is connected to the splitter connection cannot be used to simulate a pipetting instrument - it can only be used for monitoring (Freedom EVOware requires a bi-directional data connection). So EVOSim Splitter can only be used **in addition to** a physical pipetting instrument or another copy of EVOSim running in 3D simulation mode.

EVOSim Splitter can be used in several different scenarios. The two most common are as follows:

**E):** Freedom EVOware is connected to a pipetting instrument using an RS232 cable. EVOSim is used to monitor the progress of the pipetting on another PC (which may be in a different room).

**F):** One copy of EVOSim runs on the same PC as Freedom EVOware, configured as in case A) or B), above. A second copy of EVOSim running on another PC is connected to the first PC through EVOSim Splitter. Both copies of EVOSim show the same simulation. The EVOSim copy on the first PC can be minimized to allow the whole screen to be used for Freedom EVOware. This arrangement can be useful for demonstration purposes in cases where an RS232 cable connection between the two PCs is not possible or should be avoided.

**Note:** If you use EVOSim Splitter, you must always provide a network connection between the two PCs.

See [A.13.4.1 "Communication Between EVOSim and Freedom EVOware"](#), [A-87](#) for more information.



### A.13.3 Using EVOSim Splitter

EVOSim Splitter is only needed if you plan to use EVOSim in monitoring mode and should only be run on the PC where Freedom EVOware is installed. Start EVOSim Splitter before you start EVOSim. This displays the SplitterCtrl dialog box which shows you the host name of the PC where EVOSim Splitter is running. Specify the same host name in the Communication dialog box in EVOSim. EVOSim Splitter does not have any configuration settings.

Click Accept in the SplitterCtrl dialog box to minimize EVOSim Splitter to the system tray. It will then be shown as a small round icon at the bottom right of the screen.

Right click the EVOSim Splitter icon to show a context menu with the following items:

**Exit**

Quit EVOSim Splitter.

**Info**

Show the info screen for EVOSim Splitter.

**About**

Show the About box for EVOSim Splitter.

### A.13.4 EVOSim Configuration Wizard

The EVOSim Configuration Wizard is used to specify the required configuration of the simulated pipetting instrument. The configuration must be chosen to match the requirements of the scripts and/or processes which you want to run in Freedom EVOware. For example, if your script uses a PnP, you must also configure a PnP in EVOSim.

You must specify the instrument configuration before you connect to Freedom EVOware for the first time during the current EVOSim session. You cannot change the instrument configuration after the connection to Freedom EVOware has been established.

The starting screen of the EVOSim Configuration Wizard is as follows:



**Fig. A-45** Starting screen of the Configuration Wizard

The options in the starting screen are as follows:

### Run last configuration

This option runs EVOSim with the configuration settings you chose last time EVOSim was run. This option is only shown if EVOSim has already been run.

### Run existing configuration

When you click Next you will be prompted to chose a previously saved configuration file. Choose the configuration file you want to use and click Next. You are then prompted to choose the communication mode you want to use.

Note: EVOSim configuration files are stored in the Config sub-directory of the EVOSim installation path (normally ..\simulation\Config).

### Create a new configuration

This starts a wizard which helps you to specify the required configuration settings for EVOSim. You will be prompted to choose the Freedom EVO (pipetting instrument) version, specify the cutouts in the worktable of the pipetting instrument, make settings for simulation of the loading interface hardware option (see [A.13.5 "Simulating the Loading Interface"](#), [A-88](#)), specify the instrument arms which you want to simulate (LiHa RoMa PnP MCA) and specify additional devices (Te-MO and PosID-3).

Uncheck the corresponding checkboxes if you want to skip the configuration steps for the worktable cutouts and the loading interface.

If you configure a LiHa, you must specify the tips which are fitted.

The LiHa configuration 8 Plus 1 Access for the Freedom EVO 75 pipetting instrument is currently only intended for disposable tips (not fixed tips). In addition, the same DiTi type (DiTi size) must be fitted to all 8 positions of the LiHa (see [A.9 "Freedom EVO 75 Pipetting Instrument - LiHa Configuration"](#), [A-33](#)).

If you configure a RoMa, you will be prompted to specify the arm length, the home (parking) position and the type of gripper you want to use.

If you configure the Te-MO, you will be prompted to specify the Te-MO sites that you want to reserve for the Wash Block, the DiTi rack and for putting down the Tipblock (these objects can only be put on the middle slide of the Te-MO).

If you configure the MCA, you must specify whether it is fitted with the gripper option or not.

You will be prompted to save a configuration file when you have made your settings. EVOSim configuration files are saved in the Config sub-directory of the EVOSim installation path (normally ..\simulation\Config). After saving the file, you will be prompted to choose the communication mode you want to use (see [A.13.4.1 "Communication Between EVOSim and Freedom EVOware"](#), [A-87](#)).

### Edit an existing configuration

When you click Next you will be prompted to chose a previously saved configuration file. You can then edit and run the existing configuration settings.

### Begin with configuration wizard at program start

Check this checkbox if you want EVOSim to start with the wizard when you run it next time. If this checkbox is not checked, you can start the wizard again later by choosing Configuration in the Machine menu.

**Note:** You cannot change the configuration settings after the connection to Freedom EVOware has been established.



### A.13.4.1 Communication Between EVOSim and Freedom EVOware

The last step of the configuration wizard - regardless of the options you choose on the starting screen - is to configure the communication mode you want to use:

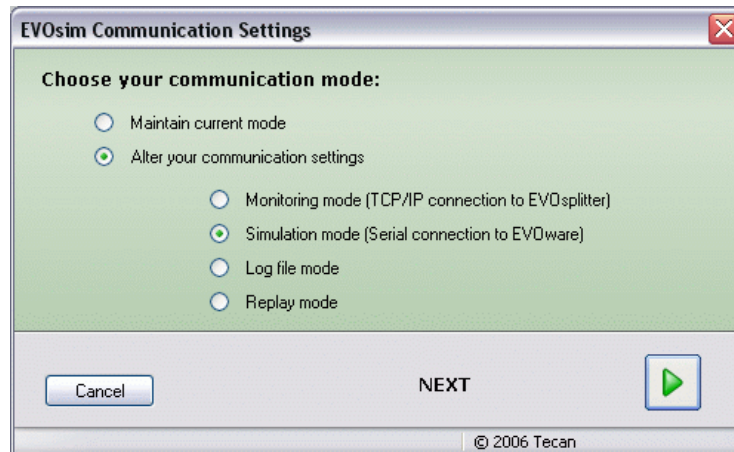


Fig. A-46 EVOSim - Communication settings

The available options are as follows:

#### Maintain current mode

This starts EVOSim with the communication mode which was last used.

#### Alter your communication settings

Choose this option if you want to choose a different communication mode. Click Next when you have made your choices.

#### Monitoring mode (TCP/IP connection to EVOSim Splitter)

Choose this option if you are using EVOSim Splitter (see A.13.2 “Data Splitter Tool EVOSim Splitter”, A-84). In the next wizard screen, you are prompted to choose the computer which is running Freedom EVOware and EVOSim Splitter, as follows:

**Location:** Choose the PC where Freedom EVOware is installed from the pull-down list. The *Host name or TCP/IP address* field then shows the host name or the TCP/IP address of the chosen PC. The list shows the entries which you previously stored in the EVOSim configuration.

**Add Location:** Click this button to add a new entry to the *Choose location* pull-down list. Specify a descriptive name for the PC (e.g. EVOware PC) and specify the PC’s host name or TCP/IP address. Tip: If you are also using EVOSim Splitter, EVOSim Splitter’s dialog box tells you the host name of the PC.

If you want to use EVOSim together with EVOSim Splitter, start EVOSim Splitter before you start EVOSim (see A.13.3 “Using EVOSim Splitter”, A-85).

#### Simulation mode (serial connection to Freedom EVOware)

Choose this option if EVOSim communicates with Freedom EVOware through an RS232 cable or a virtual RS232 port.

**Simulator connects to a physical port:** Specify the RS232 port to use. The list shows the addresses of all physical RS232 interfaces which are installed in your PC.

This option also requires a network connection between the two PCs (the network connection is used to exchange information on the current worktable layout). In the next wizard screen, you are prompted to choose the computer which is running Freedom EVOware, as follows:

**Location:** Choose the PC where Freedom EVOware is installed from the pull-down list. The *Host name or TCP/IP address* field then shows the host name or the TCP/IP address of the chosen PC. The list shows the entries which you previously stored in the EVOSim configuration.

**Add Location:** Click this button to add a new entry to the *Choose location* pull-down list. Specify a descriptive name for the PC (e.g. EVOware PC) and specify the PC's host name or TCP/IP address. Tip: If you are also using EVOSim Splitter, EVOSim Splitter's dialog box tells you the host name of the PC.

**Simulator connects to a virtual port:** Specify the virtual RS232 port which you want to use. The list only shows ports which are not assigned to physical RS232 interfaces. EVOSim then temporarily re-configures Freedom EVOware to use the same port.

### Log File mode

In this mode, EVOSim, parses and then simulates the pipetting operations and robot arm movements which are contained in a Freedom EVOware log file (see [A.1.1 "Structure of Log Files of Type EVO"](#), [A-2](#)). Log File mode can be used e.g. for demonstration or diagnostic purposes.

In log file mode, the EVOSim main window has an additional area on the left (the "Log File Bar") which is divided into two panels, *Files* and *Commands*. Choose *Log file bar* in the *View* menu to show or hide the Log File Bar.

To use this feature, proceed as follows:

- ◆ Create a log file of type EVO by running a pipetting script. You can also use a log file from a colleague which has been sent to you e.g. by email.
- ◆ Drag the log file from Windows Explorer onto the *Files* panel of the Log File Bar. The file will be parsed and the *Commands* panel will list the instrument firmware commands in the log file which are relevant to EVOSim.
- ◆ If required, you can drag and drop several log files onto the *Files* panel of the Log File Bar. In the *Files* panel, the files will be sorted in alphabetical order of the file names (this is normally equivalent to the chronological order of the log files).
- ◆ Click *Run* to run the simulation. Click *Stop* to pause the simulation. You can then click *Step* to run the simulation one firmware command at a time.
- ◆ Click *Restart* to move all of the arms (LiHa, RoMa, PnP, Te-MO and/or MCA) and the PosID-3 back to the starting position at the left side of the EVOSim worktable.

**Note:** For meaningful results in Log File mode, make sure that EVOSim is configured with the same worktable layout, optional devices and pipetting instrument configuration which were used by the script or process which was logged.

### Replay mode

See [A.13.9 "Replay Package feature"](#), [A-91](#).

## A.13.5 Simulating the Loading Interface

The Loading Interface is a hardware option for the pipetting instrument which detects when labware items (typically tube racks) are put onto the worktable (or

removed again). It requires special labware which is fitted with a small magnet which activates a proximity switch.

The presence or absence of the labware is reported to Freedom EVOware. In addition, Freedom EVOware can control LEDs fitted to the front edge of each grid position to indicate to the operator that labware should be exchanged and/or should not be exchanged. The Loading Interface is normally controlled by the Sample Oriented EVOware software add-on. Sample Oriented EVOware provides special script commands which allow you to specify which grid positions are significant and should be monitored by the Loading Interface hardware.

Activate the Loading Interface simulation with the checkbox and click Configure to choose the grid positions which will be monitored by Freedom EVOware. The selected grid positions are marked with a short black bar (only visible if you zoom in and tilt your view of the pipetting instrument). During (simulated) script or process run time, choose Loading Ports in EVOSim's Settings menu and click a grid position checkbox to indicate that labware has been put on the worktable (or removed).

### A.13.6 EVOSim Views

Click and drag the simulation with the left mouse to change the perceived viewing angle of the user (above or below the simulation, to the left or the right of the simulation). Alternatively, use the Left, Right, Up and Down cursor keys on the numeric keypad.

Click and drag the simulation with the right mouse to tilt and rotate the simulation. Alternatively, press <Ctrl> on the keyboard and use the Left, Right, Up and Down cursor keys on the numeric keypad.

Use the scrolling wheel of the mouse to change the perceived distance of the user from the simulation (zoom effect). Alternatively, press <Shift> on the keyboard and use the Up and Down cursor keys on the numeric keypad.

### A.13.7 EVOSim Toolbar

Click **Normal** to switch to normal view of the simulation.

Click **View 1, 2, 3** or **4** to switch to one of four stored views of the simulation.

Click **Save View** and then View 1, 2, 3 or 4 to store the current view as view 1, 2, 3 or 4.

Click **Pause** to pause the running simulation. Click this button again to resume the simulation.

**Speed:** This slider lets you choose the required speed of the simulation. You can also use it to change the speed when the script or process is already running.

### A.13.8 EVOSim Menus

#### A.13.8.1 File Menu

##### Export configuration

This menu item saves the current EVOSim configuration as an EVOSim configuration file. EVOSim configuration files should be saved in the Config sub-directory of the EVOSim installation path (normally ..\simulation\Config). You can then run or edit the saved configuration using the EVOSim

configuration wizard (see [A.13.4 “EVOSim Configuration Wizard”](#), [A-85](#)). If EVOSim is currently displaying a worktable from the last simulation run, this menu item also saves the EVOSim worktable (the wizard option *Create a new configuration* does not save an EVOSim worktable).

This feature is above all useful for log file mode. The simulation in log file mode is more instructive if you can also see the worktable which was used when creating the log files. If you plan to send the log files to someone else for discussion or analysis, it is helpful to send the saved EVOSim configuration file, too.

#### **Create Replay Package**

See [A.13.9 “Replay Package feature”](#), [A-91](#).

#### **Exit**

This menu item is used to exit EVOSim. Always exit Freedom EVOware before you exit EVOSim (Freedom EVOware sends firmware commands during the shut-down procedure and expects RS232 communications to remain functional during this time).

### **A.13.8.2 View Menu**

#### **Communication Bar**

This menu item is used to show or hide the Communication Bar.

#### **Speed Bar**

This menu item is used to show or hide the Speed Bar.

#### **View Bar**

This menu item is used to show or hide the View Bar.

#### **Log File Bar**

This menu item is used to show or hide the Log File Bar (two panels *Files* and *Commands* at the left edge of the EVOSim main window). You can only choose this menu item if you have chosen Log File Mode (see Log File Mode in [A.13.4.1 “Communication Between EVOSim and Freedom EVOware”](#), [A-87](#)).

#### **Window always on top**

Select this menu item if you want the EVOSim window to always be on top of the other windows.

#### **Perspective**


This menu item is used to configure advanced features for the 3D visualization. Appropriate settings are dependent on your graphics card and graphics driver. If you change the settings to extremely large or small values, this can slow down simulation considerably due to the increased time required for graphics rendering.

### **A.13.8.3 Instrument Menu**

#### **Restart**

Move all of the arms (LiHa, RoMa, PnP, Te-MO and/or MCA) and the PosID-3 back to the starting position at the left side of the EVOSim worktable. This option is mainly intended for log file mode (see [A.13.4.1 “Communication Between EVOSim and Freedom EVOware”](#), [A-87](#), Log File Mode). You should not choose Restart when the simulation is running - this can lead to unexpected results.

### Configuration

This menu item is used to specify the required configuration of the simulated pipetting instrument. See [A.13.4 “EVOSim Configuration Wizard”](#),  [A-85](#) for more information.

### Loading ports

During (simulated) script or process run time, choose this menu item and click a grid position checkbox in the *Loading Ports* dialog box which is shown to indicate that labware has been put on the worktable (or removed). Freedom EVOware only monitors the grid positions (ports) which you have selected in Instrument Config in EVOSim’s EVOware menu.



### Link Labware to Graphics

The database in EVOSim includes graphics templates for most common types of labware, carriers and device carriers. EVOSim’s list of labware, carriers and device carriers is updated automatically if a new, unknown object is used on the worktable in Freedom EVOware. If the object you want to use is not already assigned to a graphics template, it is initially shown as an empty box. Use this menu item to assign it to the template of another object which has a similar appearance.

**Hide element:** Do not show the chosen object.

**Show box:** Show the chosen object as an empty box. Use this option if you cannot find a graphics template with a similar appearance.

**Link to template:** Assign the chosen object to the graphics template which is selected in the right hand panel.

See also [Fig. A-47](#),  [A-96](#) and [A.13.11 “Adding custom labware to EVOSim”](#),  [A-94](#).

### Show safety shield / Hide safety shield

This menu item shows and hides the safety shield of the Freedom EVO pipetting instrument in the simulation window.

### Open Door / Close Door

This menu item opens and closes the safety door of the Freedom EVO pipetting instrument in the simulation window.

## A.13.8.4 Help Menu

### Error Logging

This menu item opens the Error Messages dialog box which shows internal messages from EVOSim. The Error Messages dialog box is only intended for internal use.

### Show Help

This menu item opens the online help for EVOSim. You can also get the online help for EVOSim by pressing F1.

### About EVOSim

This menu item shows information on the Freedom EVOware version which is installed and Tecan copyright information.

## A.13.9 Replay Package feature

The Replay Package feature is used to create a pre-configured installation package for EVOSim which can be sent to customers or Tecan sales personnel for the purpose of demonstration. The package includes a special configuration file (replay file) which allows EVOSim to simulate pre-recorded pipetting operations and robot arm movements without needing to install Freedom

EVOware on the destination PC. The replay file also contains information on the worktable layout, optional devices and pipetting instrument configuration. The installation package is a small self-extracting, self-installing ZIP file (size ca. 1.5 MB) which you can send e.g. by email.

**Compatibility:**

- ◆ The replay package feature has been tested on the destination PC with the same Windows versions which are supported by Freedom EVOware.
- ◆ The replay package may also run correctly on the destination PC with other Windows versions.

**To use the replay package feature**, proceed as follows:

- ◆ Start EVOSim, start Freedom EVOware and run the pipetting script or process which you want to record.
- ◆ In EVOSim, choose *Create Replay Package* in the *File* menu, browse to a suitable directory and specify the required name of the replay package.
- ◆ It is recommended to choose a name which gives some indication of the script or process which has been recorded, e.g. "EVO150WithLiHa".
- ◆ You can save the replay package in any directory except the EVOSim installation directory.
- ◆ EVOSim then creates a self-extracting ZIP file containing the pre-configured EVOSim installation package, the replay file and all of the settings which are needed.
- ◆ If required, you can create the replay package while the script or process is still running, or create several replay packages which illustrate different stages of the same script or process. All of the replay packages will start running from the beginning of the script or process.
- ◆ Send the replay package file to the customer, e.g. via email.

**On the destination PC**

- ◆ Double-click the replay package file on the destination PC to extract the files, install EVOSim and start the replay automatically.
  - The customer will be prompted for the required installation directory.
  - The customer will be asked whether a desktop shortcut to the replay package should be created.

When the replay has finished running, double-click the desktop shortcut to run it again (or click Run in EVOSim). If required, you can install more than one replay package on the same destination PC (in different directories) and run them simultaneously.

**Note:** *Installing the replay package does not make any changes to the registry of the destination PC and is not shown in the Start menu of the PC.*

**Note:** *The replay package does not include a help file. The replay package feature of EVOSim is described in the Freedom EVOware help file and manual.*

Proceed as follows to entirely remove the EVOSim replay installation from the destination PC:

- ◆ Delete the chosen installation directory and all of the files inside.
- ◆ Delete the desktop shortcut.

**Note:** *When installing the replay package, the customer's anti-virus package may report a potentially unsafe program "hidden install". This program is part of the replay package and the message can be ignored.*



### Testing the replay package

Proceed as follows if you want to test the replay package before sending it to the customer:

- ♦ Create the replay package file in a temporary directory on the source PC as described above and install and run it from the temporary directory. This will not interfere with any other EVOSim installations on the same PC.

Alternatively:

- ♦ Create the replay package as described above
- ♦ Switch the communication mode of EVOSim to Replay Mode (see [A.13.4.1 “Communication Between EVOSim and Freedom EVOware”](#), [A-87](#)).

In replay mode, the EVOSim main window has an additional area on the left (the “Replay Bar”) which contains a *Commands* panel.

- ♦ Using Windows Explorer, drag the replay file onto the *Commands* panel of the Replay Bar. Replay files are created in the Replay sub-directory of the EVOSim installation path (normally ..\simulation\Replay). The replay file has the same (chosen) name as the replay package, but has the extension .erp instead of .exe.
- ♦ The file will be parsed and the *Commands* panel will list the instrument firmware commands in the log file which are relevant to EVOSim. The replay will start automatically.
- ♦ Click *Run* to run the replay again. Click *Stop* to pause the replay. You can then click *Step* to run the replay one firmware command at a time.
- ♦ Click *Restart* to move all of the arms (LiHa, RoMa, PnP, Te-MO and/or MCA) and the PosID-3 back to the starting position at the left side of the EVOSim worktable.

**Note:** For meaningful results when testing the replay file, make sure that EVOSim is configured with the same worktable layout, optional devices and pipetting instrument configuration which were used by the script or process which was recorded. See also [A.13.10 “Command Line Parameters \(EVOSim\)”](#), [A-94](#).

**Note:** In replay mode, some of the EVOSim menu items (such as Configuration in the Instrument menu) are not available. If Freedom EVOware is installed on the same PC, restart EVOSim if you want to switch to another mode. If Freedom EVOware is not installed on the same PC, after switching to replay mode you cannot switch back to another mode.

### Tips when creating the replay package

Proceed as follows if you want to ensure that the replay package you create will start with the intended worktable layout (instead of starting with an empty worktable which is replaced by the intended worktable after a short initialization delay):

- ♦ Start EVOSim, start Freedom EVOware and load the pipetting script or process which you want to record. EVOSim should now show the worktable layout which is intended for the script or process.
- ♦ In EVOSim, choose *Export Configuration* in the File menu to create a configuration file which contains the worktable layout (see [A.13.8.1 “File Menu”](#), [A-89](#), *Export Configuration*).
- ♦ Quit Freedom EVOware and quit EVOSim.
- ♦ Restart EVOSim, choose *Configuration* in the Instrument menu, choose *Run existing configuration* and choose the configuration file which you saved

- previously. EVOSim should now show the worktable layout which is intended for the script or process.
- ◆ Restart Freedom EVOware and run the pipetting script or process which you want to record.
  - ◆ In EVOSim, choose *Create Replay Package* in the File menu, browse to a temporary directory and specify the required name of the replay package.

### A.13.10 Command Line Parameters (EVOSim)

EVOSim supports the following command line parameters:

**Tab. A-16** Command Line Parameters (EVOSim)

Switch	Explanation
-c <config_file>	Start EVOSim with the specified configuration file using the communication mode which was last used (see <a href="#">A.13.4 "EVOSim Configuration Wizard"</a> , <a href="#">A-85</a> ). By creating several desktop shortcuts to EVOSim.exe with different parameters, this feature makes it easy to switch between different worktable layouts, simulated hardware devices and Freedom EVO versions. <sup>a)</sup>
-c <replay_file>	Start EVOSim with the specified replay file using the EVOSim configuration settings which were last used. <sup>b)</sup>

- a) EVOSim configuration files are stored in the Config sub-directory of the EVOSim installation path (normally `..\simulation\Config`).
- b) By default, EVOSim creates replay files in the Replay sub-directory of the EVOSim installation path (normally `..\simulation\Replay`). See [A.13.9 "Replay Package feature"](#), [A-91](#) for more information.

For meaningful results, it is recommended to run the replay using the same EVOSim configuration settings (worktable layout, simulated hardware devices and Freedom EVO version) with which the replay file was recorded. You can specify the -c parameter as well to make sure that the correct settings are used, e.g.

EVOSim -c ConfigFile -r ReplayFile.

You do not need to specify the file extension for the configuration file or the replay file. You should not specify the path to the file(s) - only specify the file name(s).

The above command line parameters can be included in desktop shortcuts to EVOSim.exe. Use Windows Explorer to create a desktop shortcut and edit the properties of the shortcut to specify the parameters.

### A.13.11 Adding custom labware to EVOSim

If required, you can extend the EVOSim labware library with CAD drawings of custom labware, carriers and devices (device carriers) which have been saved in VRML 2.0 (Virtual Reality Modelling Language) format. This format can be created using popular CAD programs such as TurboCAD Version 9 or 10, AutoCAD and ProE.

#### Installing a dynamically linked device

Dynamically linked devices are devices whose position in EVOSim is updated according to the worktable layout (grid position) in Freedom EVOware.



- 1 Export the drawing from your CAD program in VRML 2.0 format.
- 2 Copy the VMRL file to the \layout\vrml sub-directory of your EVOSim installation (e.g. ..\EVOware\simulation\layout\vrml). The file extension must be wrl.
- 3 Edit the file VRMLDevice.tab in the \layout sub-directory of your EVOSim installation to add a new section for the new device as follows (the example shows the PW384 Device Carrier):

```

Design {
  Header {
    Name          ; PW384DeviceCarrier //display name
    Type          ; DeviceCarrier // parameter no longer used
  }
  SubDesign {
    Design       ; PW384Design
  }
}
Design {
  Header {
    Name          ; PW384Design
  }
  VRML {
    Name          ; PW384 //device carrier name
    File          ; PowerWasher384.wrl
    Scale         ; 1
    Position      ; 4475,-4500,0
    Rotation      ; 0,0,2700
    VRMLOrigin   ; Corner
  }
}

```

whereby *Scale* is a scaling factor for the size of the object in EVOSim, *Position* is an offset for the x, y and z axis (in 0.1 mm) and *Rotation* specifies a rotation of the x, y and z axis (in 0.1° steps). You should normally only specify rotation for the z axis. On each line, everything following “//” is an optional comment.

- 4 Edit the file VRMLDevice.ini in the \layout sub-directory of your EVOSim installation to add a new section for the new device as follows:

```

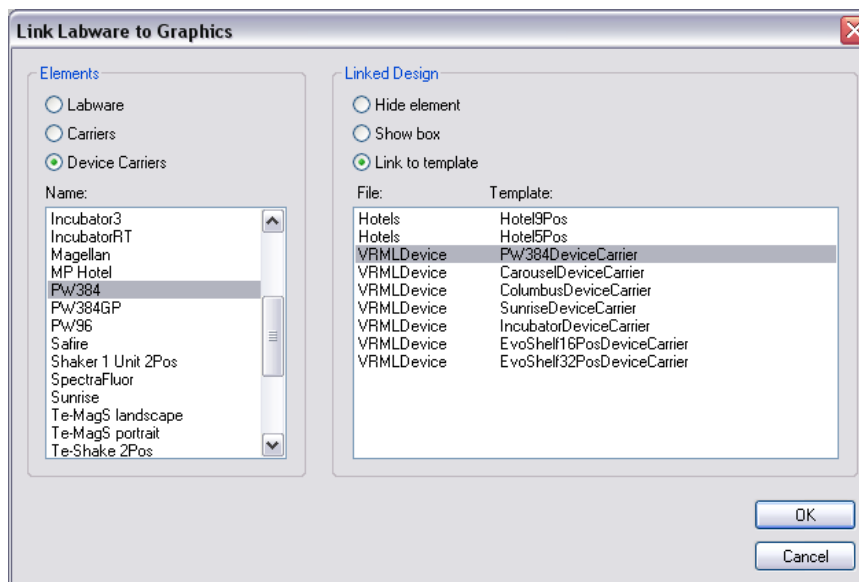
[PW384DeviceCarrier]
Type=DeviceCarrier
Element0Design=VRMLDevice.tab;PW384DeviceCarrier

```

**Note:**

*For VRML carriers, specify Type=Carrier*  
*For VRML labware, specify Type=Labware*

- 5 In EVOSim, choose *Link Labware to Graphics...* in the Instrument menu to link the newly added CAD drawing to a device carrier as follows:



**Fig. A-47** Assigning labware to graphics objects

- 6 Proceed as follows if the required device carrier is not shown in the Device Carriers list on the left hand side of the dialog box:
  - a) Return to the EVOSim main window and start Freedom EVOware.
  - b) Create a worktable which includes the required device carrier.
  - c) EVOSim will be notified about the new device carrier, and will add a new entry to the [DeviceCarrierLinks] section of the EVOSim.ini file automatically. The new device carrier should now be visible on the EVOSim worktable and also in the Device Carriers list in the above figure. To avoid the risk of typing mistakes, we do not recommend adding the new entry to EVOSim.ini manually.
  - d) Return to step 5.

*Use the same procedure for new labware and carriers.*
- 7 Restart EVOSim.

### Installing a fixed device

Fixed devices are devices which are always displayed in EVOSim at the same worktable position. The position is not dependent on the worktable layout in Freedom EVOware.

- 1 Export the drawing from your CAD program in VRML format.
- 2 Copy the VMRL file to the \layout\vrml sub-directory of your EVOSim installation (e.g. ..\EVOware\simulation\layout\vrml). The file extension must be wrl.
- 3 Edit the file ExternalDevices.tab in the \layout sub-directory of your EVOSim installation to add a new section for the new device with the following syntax:

```
Design {
  Header {
    Name                ; Devices
  }
  VRML {
    Name                ; PW384
    File                ; PowerWasher384.wrl
    Scale               ; 0.5
    Position            ; 8000,-5000,3000
    Rotation            ; 0,0,2700
    VRMLOrigin         ; Corner
  }
}
```

whereby *Scale* is a scaling factor for the size of the object in EVOSim, *Position* is an offset for the x, y and z axis (in 0.1 mm) and *Rotation* specifies a rotation of the x, y and z axis (in 0.1° steps). You should normally only specify rotation for the z axis. On each line, everything following “//” is an optional comment.

- 4 Restart EVOSim.

**Note:** *Your changes will be lost if you update or re-install EVOSim - keep a backup of your work. Be aware that the structure and syntax of the .tab and .ini files may change in future EVOSim versions.*



## B Appendix B - FDA 21 CFR Part 11 Compliance

The United States Food and Drug Administration (FDA) issued a set of regulations in 1997 that outlines its criteria for acceptance of electronic records, electronic signatures and handwritten signatures (referred to as 21 CFR Part 11). The regulations state the conditions under which the FDA considers electronic signatures and electronic records to be trustworthy, reliable and equivalent to traditional handwritten signatures on paper. The criteria were provided in response to industry requests. In this manner, it defines the conditions under which an organization must operate to meet its record keeping and record submission requirements when it uses electronic records and signatures rather than paper records and handwritten signatures.

The preamble to the 21 CFR Part 11 rule states that “the use of electronic records as well as their submission to the FDA is voluntary”. However, where an organization does decide to use electronic records and electronic signatures, the requirements must be met in full for all relevant electronic records. Organizations that wish to operate under 21 CFR Part 11 must take the steps described in this appendix to ensure complete compliance.

### B.1 Related Documentation

The following publications from the FDA contain useful information on the 21 CFR Part 11 regulations:

*21 CFR Part 11, Electronic Records; Electronic Signatures; Final Rule;*  
Department of Health and Human Services, Food and Drug Administration, March 20, 1997;

*Guidance for Industry – 21 CFR Part 11 – Electronic Records & Electronic Signatures – Maintenance of Electronic Records;*

*Guidance for Industry – 21 CFR Part 11 – Electronic Records & Electronic Signatures – Glossary of Terms.*

### B.2 Purpose of this Appendix

This appendix discusses the major requirements of the 21 CFR Part 11 regulations and details the technical features which have been implemented in the Tecan Freedom EVOware software to help Tecan customers to reach compliance. It also indicates which steps the Tecan customers must carry out to achieve compliance.

The main part of this appendix discusses the relevant issues in the 21 CFR Part 11 regulations rule by rule and identifies how Freedom EVOware helps to ensure compliance with the regulations and what Tecan customers must do to achieve compliance. Refer to the FDA website and FDA publications for the full text of the regulations.

The regulations primarily require analytical laboratories to consider the following points:

- ◆ The use of validated equipment and computer systems,
- ◆ Secure retention of electronic records to instantly reconstruct analyses,
- ◆ Computer-generated, time-stamped audit trails,

- ◆ System and data security, data integrity and confidentiality through limited authorized system access,
- ◆ Secure electronic signatures for closed and open systems,
- ◆ Digital signatures for open systems.

Implementing the new regulations will significantly affect the instrumentation, work processes and people in laboratories that set out to be compliant. The current process of generating signatures must be evaluated (Who has to sign what, why and when?). New procedures must be developed within companies and laboratories to limit the access to systems and data (Who can do what?). Computer systems used for implementation may need to be updated or replaced to ensure correct functionality. Finally, the manner of using and handling user names and passwords for legally binding signatures may have to change.

Key topics covered by the regulations are:

**Validation:** Validation of the system that creates and maintains electronic records to ensure accuracy, reliability, consistent intended performance and the ability to discern invalid or altered records.

**Controlled system access:** Limiting system access to authorized individuals only.

**Audit trails:** The usage of secure, computer-generated, time-stamped trails (older process data and log files must be archived and must not be deleted).

**System controls:** Operational system procedures (to enforce the correct sequencing of steps and events).

**Accurate and complete copies:** Procedures to ensure that only authorized individuals can use the system, electronically sign a record, access the operation or computer system, input or output device, alter a record or perform the operation at hand.

Protected systems and records:

- ◆ The ability to create accurate and complete copies of records – the system must allow the creation of accurate and complete copies of the electronic records in human-readable as well as in electronic form for inspection and review by the FDA.
- ◆ The protection of records, for example by an appropriately applied system of access privileges or rights in the Microsoft Windows file system and/or network directories to enable accurate and ready
- ◆ The ability to retrieve process data, log files and audit trails data throughout the required retention period of the records.

**Adequate training:** Sufficient education, training and experience for persons who develop, maintain and use the electronic systems.

## **B.3 Definitions and Acronyms**

The following explains key terms which are used in this section of the manual and/or are used in the FDA documentation on the CFR Part 11 regulations.

### **ASCII**

American Standard Code for Information Interchange. A standard for assigning numerical values to the set of letters in the Roman alphabet and typographic characters.

### **Audit trail**

A computer-generated and time stamped record of who did what and when. In the context of Freedom EVOware, audit trails are the sets of process data and log files which are automatically generated by the software

**Authenticated access, authority checks**

Systems used to establish and verify as conclusively as possible that a person logging in to the network is who he or she claims to be. According to the FDA, “*authority checks*” should be designed to “*ensure that only authorized individuals can use the system, electronically sign a record, access the operation or computer system input or output device, alter a record or perform operations*”.

**Biometrics**

In the context of computer security, this refers to authentication techniques that rely on measurable physical characteristics that can be automatically checked, such as fingerprints, speech or retinal patterns. Freedom EVOware does not support biometric methods to verify an individual’s identity.

**Checksum**

A checksum is a computed value which depends on the contents of a block of data. The checksum is re-computed for the received data and compared with the checksum sent with the data. If the two values are the same, the recipient of the data can be confident that the data was received correctly. Freedom EVOware uses a checksum system which is based on the CRC algorithm to protect important files. The checksum is used to detect corrupted or otherwise altered data. It is also able to detect whether files have been modified outside of Freedom EVOware by another program or process.

**Closed system**

An environment in which system access is controlled by persons who are responsible for the content of electronic records that are on the system. Freedom EVOware is a closed system.

**CRC**

A Cyclic Redundancy Check is a computed value which is used to detect corrupted or otherwise altered data.

**Data integrity**

Validity of data and its relationships. In order for electronic records to be trustworthy and reliable, the links between raw data, meta-data and results must not be compromised or broken. Without data integrity, it is not possible to reliably regenerate a previous result.

**Digital signature**

An electronic signature based upon cryptographic methods of originator authentication, computed by using a set of rules and a set of parameters such that the identity of the signer and the integrity of the data can be verified.

**Disabled account**

A user account that has its access turned off so that it is not usable until such time as access is granted again.

**Electronic record**

Any combination of text, graphics, data, audio, pictorial or other information representation in digital form that is created, modified, maintained, archived, retrieved or distributed by a computer system.

**Electronic signature**

A computer data compilation of any symbol or series of symbols executed, adopted or authorized by an individual to be the legally binding equivalent of the individual’s handwritten signature.

**Encryption**

Translation of data into a secret code in order to make the data secure.

**FDA**

Food and Drug Administration (US regulatory authority).

**File**

A collection of data records stored as a unit with a single name.

**Handwritten signature**

The scripted name or legal mark of an individual handwritten by that individual and executed or adopted with the present intention to authenticate writing in a permanent form. The act of signing with a writing or marking instrument such as a pen or stylus is preserved. The scripted name or legal mark, while conventionally applied to paper, may also be applied to other devices that capture the name or mark.

**Inactivity disconnect or locked session**

This is a computer session that freezes or logs off automatically when no data has been input for a period of time.

**Integrated data organization system, logical security or internal logic**

Data management planning and configuring that combines the diverse applications used by a company with the operating system in such a way that authentication and authorization are achieved most efficiently and effectively.

**Login or login credentials (user name or user ID)**

Identification methods that make a computer system recognize users so they can begin computer sessions, usually based on user names and passwords.

**Meta Data**

Important for reconstructing a final report from raw data. Meta data includes integration parameters and calibration tables.

**Open system**

An environment in which system access is not controlled by persons who are responsible for the content of electronic records that are on the system. This is not applicable to Freedom EVOware. Freedom EVOware is a closed system and is not designed for an open system.

**Operating system**

The operating system is the most important program that runs on a computer. It performs basic tasks such as recognizing input from the keyboard, sending output to display screens, keeping track of files and directories, controlling access to files and directories and controlling peripherals such as printers.

**Passwords**

Ideally, a password is something nobody can guess.

**Permissions or privileges**

These are security codes that define or restrict which users can read, write and execute the associated files, directories or programs. Some departments only need to look at data, some need to input data or run programs and others may not need to look at the data at all.

**Private data**

Personal directories on a file server which are only accessible by the owner of the data.

**Programs**

An organized list of instructions that causes a computer to behave in certain predetermined ways.

**Raw Data**

Data which has not yet been analyzed.



**Security mechanisms**

This refers to techniques for ensuring that data stored in a computer cannot be read or compromised. Most security measures involve encryption or passwords.

**Server**

A computer or device on a network that manages network resources. A *file server* stores files, a *print server* manages printers, a *network server* manages network traffic and a *database server* processes database inquiries.

**Service release or service pack**

Defect-fix releases of an operating system that address serious issues or defects reported against a previous release. Service releases need to be installed on top of the original software. Service releases often address security issues which have arisen during the use of the software. Generally speaking, you should install the operating system service release specified for the Freedom EVOware software to ensure maximum system security.

**Shared desktop, account or login**

Shared desktops, accounts or logins can violate the principle of no repudiation. If the audit trail is not able to distinguish between individuals using such shared network resources, an electronic signature is not valid.

**Tecan customer**

Company or organization which uses pipetting instruments and/or other equipment which is manufactured by Tecan.

**User name, User ID**

A unique code used together with a password to identify a user.

**Validation of a computer system**

Confirmation by examination and provision of objective evidence that computer system specifications conform to user needs and intended uses, and that all requirements can be consistently fulfilled.

**B.4 Recommendations**

The following lists points to be considered to ensure compliance with 21 CFR Part 11.

**Access security** determines who is allowed to log in to a system locally or from a network and puts mechanisms in place that prevent unauthorized persons from gaining access to the computer system. For example, the Microsoft operating systems Windows 7 and Windows 10 provide several different types of access privileges or rights that can be granted or denied to specific users or groups of users.

**System administrator:** The person responsible for maintaining a multi-user computer system and managing the security of the computer network.

**Audit trails:** 21 CFR Part 11 requires audit trails to be generated independently of the equipment operator. They must record all activities related to creating, modifying and deleting records on the system. The user organization must develop procedures for the data integrity and long-term archiving of audit trails with data retrieval throughout the legally required retention period.

**Configuration settings:** An overall organizational structure defining how permissions or privileges are configured for the computer system, with settings which may e.g. allow one user to only read a file while another person can execute the file and a third person can write new data into it.

**Consider** whether all signatures which are used now are really needed from a regulatory point of view.

**Create** an infrastructure which will allow smooth implementation of the regulations.

**Create** awareness of the regulations among all employees, especially regarding their accountability for electronic signatures.

**Decide** whether to use full electronic records and signatures or hybrid systems (records in electronic and paper format). Report all decisions in your process records.

**Develop** an implementation plan for the user organization and the laboratory.

**Develop** procedures for limiting system access to authorized individuals.

**Form** a task group with members from the information technology department (if existing), quality assurance personnel and laboratory staff.

**Establish** procedures for limiting system access to authorized individuals.

**Identify** all work or activities in the organization or laboratory that will fall under 21 CFR Part 11.

**Look** at all of the equipment in the laboratory and develop a plan for making it comply with CFR 21 Part 11.

**Provide** functional specifications for computerized systems in the laboratory.

**Train** personnel in the user organization and in the laboratory on the application and consequences of the regulations.

**Validate** new computer systems. Follow the equipment qualification approach with design qualification, installation qualification, operational qualification and performance qualification.

#### **B.4.1 Assigning and Using Freedom EVOware User Names**

User names in Freedom EVOware are unique. To allow laboratory personnel to be uniquely identified by auditors, Tecan customers must provide each of them with his or her own Freedom EVOware user name. The same user name must not be used by groups of users. In addition, Tecan customers must not reassign user names for use by different employees, for example if a change of staff takes place or if an employee leaves the company. In such cases, the user name should be disabled and no longer used.

Tecan customers must instruct their employees not to reveal their user name and password combinations or to share them with other employees, and to log out before allowing another employee to use Freedom EVOware or if they plan to leave the running system unattended (see 6.1.9 “Lock EVOware”, 6-7).

For user names we recommend to use only the alphanumeric characters A-Z, a-z and 0-9 as well as the hyphen and underscore. The apostrophe is forbidden!

### **B.5 Security Features in the Software Which Assist 21 CFR Part 11 Compliance**

#### **B.5.1 Closed Systems**

Freedom EVOware is a closed system and access to Freedom EVOware requires a combination of user name and password for unique identification. Freedom EVOware cannot be used without a valid user name and password. The Tecan

User Management system also require the user's full name to be specified when the user account is created.

This mechanism provides both the ability to carry out authority checks and the ability to sign and/or authorize electronic records. Each user is traceable and accountable for his or her actions, process data and configuration changes.

To maximize security, the Freedom EVOware access control mechanisms are independent of the access control mechanisms in the Microsoft operating system. Accordingly, user accounts and passwords for the operating system and for the Freedom EVOware system are managed separately. Freedom EVOware user accounts are managed with the Tecan User Management system. User accounts for the Microsoft operating system are managed using standard Microsoft tools and procedures.

### **B.5.2 Freedom EVOware User Levels**

There are four user levels in Freedom EVOware:

Operator, Power User, Application Specialist and Administrator.

**Operator** has rights to:

- ♦ Run a pipetting script (Freedom EVOware Standard) or process (Freedom EVOware Plus)
- ♦ Run maintenance scripts (see [6.4.2 "Run Maintenance"](#), ¶ 6-10)
- ♦ Handle errors during pipetting

**Power User:** Same rights as Operator but with additional rights to:

- ♦ View a pipetting script (but not change it)
- ♦ Start running pipetting scripts at a specified line number.
- ♦ Run direct commands (see [5.4.1.3 "Direct commands"](#), ¶ 5-10)

**Application Specialist:** Same rights as Operator but with additional rights to:

- ♦ Create, modify and save pipetting scripts (Freedom EVOware Standard and Freedom EVOware Plus) and processes (Freedom EVOware Plus)
- ♦ Edit the configuration of the pipetting instrument
- ♦ Edit the configurations of carriers and labware
- ♦ Edit the liquid classes for pipetting
- ♦ Change settings in the Freedom EVOware Configuration Tool
- ♦ Skip pre-programmed timers during pipetting,

**Administrator:** Same rights as Application Specialist but with additional rights to:

- ♦ Create and disable/re-enable users
- ♦ Configure the options in the Tecan User Management system
- ♦ Enable or disable the Electronic Signatures feature

### **B.5.3 Tecan User Management System**

The Tecan User Management system, which is used by Freedom EVOware and other Tecan software components, has the following main features:

- ♦ All changes relating to user management require Freedom EVOware Administrator access rights.
- ♦ All changes relating to user management are recorded in the user management audit trail.
- ♦ User accounts are automatically disabled following a configurable number of consecutive failed attempts to enter the correct user name and password

- combination. The disabled account can only be reactivated again by the Freedom EVOware Administrator.
- ◆ Freedom EVOware does not allow more than one person to use the software simultaneously.
  - ◆ Users can log out without leaving Freedom EVOware or interrupting a running pipetting script or process. The same or a different user can then log in to Freedom EVOware again while the script or process is still running. See [6.1.9 “Lock EVOware”](#), ¶ 6-7.
  - ◆ Users are automatically logged out after a specified time during which no keyboard or mouse-click activities have been detected.
  - ◆ User passwords expire after a configurable number of days. The user must then choose another password. The new password must be different from the old password.
  - ◆ Passwords must contain a specified minimum number of characters.
  - ◆ Passwords can be forced to contain numeric digits.
  - ◆ Passwords cannot be reused.
  - ◆ User names and user name and password combinations are unique within the system and cannot be assigned more than once.
  - ◆ The Freedom EVOware Administrator provides a temporary password when setting up a user. When the new user first logs on to the system, he or she is forced to change the password immediately. This ensures that no one other than the individual user knows the particular user name and password combination.
  - ◆ If a user forgets his/her password, the Freedom EVOware Administrator does not have access to the user's password. The Freedom EVOware Administrator is only able to reset the password and provide a new temporary password.
  - ◆ If the Freedom EVOware Administrator forgets his or her password, no one has access to the password.
  - ◆ A specified person (typically the Freedom EVOware Administrator) can be automatically notified by email in case of potential security threats (e.g. a user account has been disabled after a configurable number of consecutive failed login attempts).

#### **B.5.3.1 User Management Audit Trail**

All changes relating to user management are recorded in the user management audit trail. A new file is written to the <install\_path>\AuditTrail\Configuration directory each time you start and then exit the Freedom EVOware Configuration Tool. The file name is UserTrailYYYYMMDD\_HHMMSS, where YYYYMMDD is the file creation date and HHMMSS is the file creation time.

#### **B.5.4 Checksums**

Freedom EVOware uses a checksum system which is based on a CRC algorithm to protect configuration, script, trace and log files. The checksum is a computed value which is used to detect corrupted or otherwise altered data. It is also able to detect whether files have been modified outside of Freedom EVOware by another program or process. The checksum is stored in the file header.

The Data Explorer can be used to check whether Freedom EVOware configuration and data files have valid checksums (see [A.11.1 “Data Explorer Tool”](#), ¶ A-37).

The plain text header of each file can also be viewed independently of Freedom EVOware using a suitable editor. The following information is stored in the header:

- ◆ CRC checksum
- ◆ Date and time of creation or modification
- ◆ User name
- ◆ User-specified reason for the change (if the Electronic Signatures feature is enabled in the Freedom EVOware Configuration Tool) See [B.5.5 “Electronic Signatures”](#), ¶ B-9.
- ◆ User’s full name

A warning is shown if an attempt is made to load a file with an incorrect or missing checksum. The user can then choose to load the file or cancel. In the latter case, Freedom EVOware aborts with the exception of script files. In this case, the file is not loaded but Freedom EVOware remains running. An entry is written to the log file each time an incorrect or missing checksum is found.

**Note:** A user with Freedom EVOware Administrator rights can enable or disable the incorrect checksum warning using the Freedom EVOware Configuration Tool (see [8.3.1.4 “Protocol Options Tab”](#), ¶ 8-8). To comply with the FDA regulations, this feature must not be disabled.

### **B.5.5 Electronic Signatures**

The Freedom EVOware security features ensure that the currently logged in user can be uniquely identified. Furthermore, Freedom EVOware users should be instructed never to leave the running system unattended without first logging out. To ensure full compliance with 21 CFR Part 11, the Freedom EVOware Administrator must also activate Freedom EVOware’s Electronic Signatures feature, which provides support for a series of signings in one session.

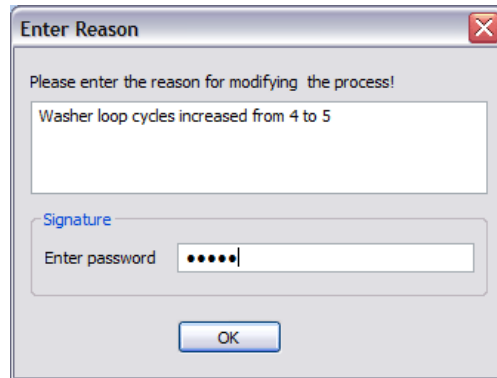
The Electronic Signatures feature records user input on the reason for creating or changing configuration files, data files and user management settings. It helps to identify why the user performed a specific action.

**Note:** A user with Freedom EVOware Administrator rights can enable or disable the electronic signatures feature using the Freedom EVOware Configuration Tool (see [8.3.1.4 “Protocol Options Tab”](#), ¶ 8-8). To comply with the FDA regulations, this feature must not be disabled.

If the Electronic Signatures feature is activated, a dialog box is shown when carrying out one of the following actions:

- ◆ Creating, deleting or editing script files and script templates
- ◆ Creating, deleting or editing process files and process templates
- ◆ Creating, deleting or editing worktable templates
- ◆ Creating, deleting or editing carrier definitions
- ◆ Creating, deleting or editing labware definitions
- ◆ Creating, deleting or editing liquid classes
- ◆ Making changes to configuration settings
- ◆ Creating, deleting or editing users, groups and password rules

The currently logged in user must re-enter his or her password and specify the reason for the change:



**Fig. B-1** Password prompt with the Electronic Signatures feature active

After confirming the entries by clicking OK, an electronic signature is executed and an entry is made in Freedom EVOware's trace file.

The Data Explorer can be used to view the user comment for each of these files (see [A.11.1 "Data Explorer Tool"](#), [A-37](#)). Only the most recent comment is saved in the file. Earlier comments are stored with previous versions of these files, which are automatically backed up to the <install\_path>\AuditTrail\Configuration directory (see [A.7 "Freedom EVOware Directory Structure and Files"](#), [A-28](#)).

The plain text header of each file can also be viewed independently of Freedom EVOware using a suitable editor. The following information is stored in the header:

- ◆ CRC checksum
- ◆ Date and time of creation or modification
- ◆ User name
- ◆ User-specified reason for the change (if the Electronic Signatures feature is enabled in the Freedom EVOware Configuration Tool)
- ◆ User's full name

A user comment is required by 21 CFR Part 58 (GLP) but not by 21 CFR Part 11, although some customers want to record this type of information anyway.

If one of the above changes has been made automatically by Freedom EVOware, a comment is inserted which starts with "EVOware:"

### **B.5.6 Trace File (Audit Trail)**

The trace file contains information on configuration, data and log files which have been created, edited or saved. The default location for the trace file is <install\_path>\AuditTrail\Log.

Each time a configuration, data or log file is created or modified, a CRC checksum is stored in the file and an entry is made in the trace file.

Each entry in the trace file specifies the date and time, the name of the currently logged in user and the file name. Log files are created by Freedom EVOware automatically and a user name is not included in the trace file entry in this case. The trace file can be viewed with a plain text editor.

Each time a configuration or data file is modified and saved, the previous version is archived in the <install\_path>\AuditTrail\Configuration sub-directory. The date and time is appended to the original filename. The archive copy includes the user-specified reason for the change if "Electronic Signatures" is enabled in the Freedom EVOware Configuration Tool (see [B.5.5 "Electronic Signatures"](#), [B-9](#)).

All changes relating to user management are recorded in the user management audit trail (see [B.5.3.1 “User Management Audit Trail”](#), [B-8](#)).

### **B.5.7 Log Files**

Freedom EVOware creates log files to document the pipetting and to record user actions and changes to parameter values, etc. (see [A.1 “Overview of the Log Files”](#), [A-1](#)).

The log files are written to the directory <install\_path>\AuditTrail\Log and are protected with checksums which are stored in each file.

Freedom EVOware users with Administrator or Application Specialist rights can activate several log file types with different levels of logging detail, either individually or in combination. See [A.1 “Overview of the Log Files”](#), [A-1](#) for more information.

- ♦ A new log file of type EVO (file name EVO\*.log) is created each time Freedom EVOware is started. It contains initialization information from the Freedom EVOware software, the Freedom EVOware version number and the serial number of the pipetting instrument. It also contains information on the hardware options and external devices which are currently connected to the pipetting instrument, including their firmware versions.
- ♦ A new log file of type EVO is also created each time a pipetting script is started. It contains information about the script, the position of the instrument arms and the instrument settings.
- ♦ Each time the pipetting instrument is initialized, Freedom EVOware writes information on the positions of arms, the connected external devices and the COM ports into a new log file of type EVO.
- ♦ In addition, the Export Data command can be included in pipetting scripts to create report files on pipetting operations (see [15.23 “Export Data Command”](#), [15-42](#)).

### **B.5.8 Backing Up Files**

Freedom EVOware’s Configuration Tool provides functions for backing up and restoring important files. Backup and restore operations are reported in the Freedom EVOware trace file. See [8.2 “Backing Up and Restoring Your Configuration”](#), [8-3](#) for a list of the files which are backed up.

## **B.6 Part A - General Provisions**

### **B.6.1 § 11.1 Scope**

The structure of this section of the manual is based on *21 CFR Part 11, Electronic Records; Electronic Signatures; Final Rule*; Department of Health and Human Services, Food and Drug Administration, March 20, 1997 and discusses the key points in each of the relevant sections, giving information on the steps which are required to attain FDA compliance.



### **B.6.1.1 § 11.1(a) Criteria**

#### **Compliance Freedom EVOware**

The features implemented in Freedom EVOware that deal with electronic records and electronic signatures are described in detail in the following sections and in [B.5.5 “Electronic Signatures”](#), ¶ B-9.

#### **Compliance Tecan Customer**

Tecan customers must develop a procedure to establish criteria under which electronic records, electronic signatures and handwritten signatures executed on electronic records are considered to be trustworthy, reliable and generally equivalent to paper records and handwritten signatures.

### **B.6.1.2 § 11.1(b) Records In Electronic Form**

#### **Compliance Freedom EVOware**

Freedom EVOware uses specified directories to store process data, the trace file (audit trail) and the log files. A default directory structure is created for these files when Freedom EVOware is first installed. See [A.7 “Freedom EVOware Directory Structure and Files”](#), ¶ A-28 for a list of the files and directories which are used. See also [B.5.6 “Trace File \(Audit Trail\)”](#), ¶ B-10.

If required, users with Freedom EVOware Administrator or Application Specialist rights can configure Freedom EVOware to use other directories (including network directories) for storing data, log and output files. See [8.3.1.4 “Protocol Options Tab”](#), ¶ 8-8.

#### **Compliance Tecan Customer**

Tecan customers must develop a procedure to document which records in electronic form are created, modified, maintained, archived, retrieved or transmitted and where the records are stored on the computer system. This does not apply to paper records that are transmitted by electronic means.

### **B.6.1.3 § 11.1(c) Electronic Signatures**

#### **Compliance Freedom EVOware**

Freedom EVOware uses electronic signatures on data and configuration files. See [B.5.5 “Electronic Signatures”](#), ¶ B-9 for more information.

#### **Compliance Tecan Customer**

Tecan customers must develop a procedure to identify where electronic signatures and their associated electronic records are equivalent to handwritten signatures.

### **B.6.1.4 § 11.1(d) Electronic Records**

#### **Compliance Freedom EVOware**

Freedom EVOware uses specified directories to store process data, the trace file (audit trail) and the log files. A default directory structure is created for these files when Freedom EVOware is first installed. See [A.7 “Freedom EVOware Directory Structure and Files”](#), ¶ A-28 for a list of the files and directories which are used. See also [B.5.6 “Trace File \(Audit Trail\)”](#), ¶ B-10.

If required, users with Freedom EVOware Administrator or Application Specialist rights can configure Freedom EVOware to use other directories (including network directories) for storing data, log and output files. See [8.3.1.4 “Protocol Options Tab”](#), ¶ 8-8.



### **Compliance Tecan Customer**

Tecan customers must specify where electronic records are used instead of paper records.

### **B.6.1.5 § 11.1(e) Computer Systems**

#### **Compliance Freedom EVOware**

As an important tool for quality assurance, Tecan has developed detailed guidelines and rules for all phases of hardware and software development and testing.

#### **Compliance Tecan Customer**

Tecan customers must name the computer systems (hardware and software) and the documents which will be made available for FDA inspections.

## **B.6.2 § 11.2 Implementation**

### **B.6.2.1 § 11.2(a) Required Records**

#### **Compliance Freedom EVOware**

Freedom EVOware uses specified directories to store process data, the trace file (audit trail) and the log files. A default directory structure is created for these files when Freedom EVOware is first installed. See [A.7 “Freedom EVOware Directory Structure and Files”](#), [B-A-28](#) for a list of the files and directories which are used. See also [B.5.6 “Trace File \(Audit Trail\)”](#), [B-B-10](#).

If required, users with Freedom EVOware Administrator or Application Specialist rights can configure Freedom EVOware to use other directories (including network directories) for storing data, log and output files. [8.3.1.4 “Protocol Options Tab”](#), [B-8-8](#).

#### **Compliance Tecan Customer**

Tecan customers must keep copies of all records which are required for FDA inspections and establish reliable procedures to make all technical processes comprehensible and understandable.

### **B.6.2.2 § 11.2(b) Submitted Records**

#### **Compliance Freedom EVOware**

Freedom EVOware uses specified directories to store process data, the trace file (audit trail) and the log files. A default directory structure is created for these files when Freedom EVOware is first installed. See [A.7 “Freedom EVOware Directory Structure and Files”](#), [B-A-28](#) for a list of the files and directories which are used. See also [B.5.6 “Trace File \(Audit Trail\)”](#), [B-B-10](#).

If required, users with Freedom EVOware Administrator or Application Specialist rights can configure Freedom EVOware to use other directories (including network directories) for storing data, log and output files. See [8.3.1.4 “Protocol Options Tab”](#), [B-8-8](#).

#### **Compliance Tecan Customer**

Tecan customers must keep copies of all records which are required for FDA inspections and provide reliable procedures to make all technical processes comprehensible and understandable.

### **B.6.2.3 § 11.2(b) Requirements**

#### **Compliance Freedom EVOware**

As an important tool for quality assurance, Tecan has developed detailed guidelines and rules for all phases of hardware and software development and testing.

#### **Compliance Tecan Customer**

Tecan customers must develop a procedure to ensure compliance with all FDA requirements.

### **B.6.2.4 § 11.2(b) Identification**

#### **Compliance Freedom EVOware**

Freedom EVOware uses specified directories to store process data, the trace file (audit trail) and the log files. A default directory structure is created for these files when Freedom EVOware is first installed. See [A.7 “Freedom EVOware Directory Structure and Files”](#), [B-A-28](#) for a list of the files and directories which are used. See also [B.5.6 “Trace File \(Audit Trail\)”](#), [B-B-10](#).

#### **Compliance Tecan Customer**

Tecan customers must specify the records which will be made available for FDA inspections.

## **B.7 Part B - Electronic Records**

### **B.7.1 § 11.10 Control of Closed Systems**

§ 11.10 describes controls for closed systems (systems to which access is controlled by persons responsible for the content of the electronic records on that system). These controls include measures designed to ensure the integrity of system operations and information stored in the system. It also addresses the security of closed systems.

### B.7.1.1 § 11.10(a) Validation of System

#### ☒ Hardware and software

##### Compliance Freedom EVOware

###### Software verification

Tecan provides objective evidence that the design outputs of a particular phase of the software development life cycle meet all of the specified requirements for that phase. Software verification looks for consistency, completeness and correctness of the software and its supporting documentation as it is being developed and provides support for a subsequent conclusion that the software is validated.

As an important tool for quality assurance, Tecan has developed detailed guidelines and rules for all phases of hardware and software development and testing.

Software testing is one of many verification activities which are carried out to confirm that software development output meets its input requirements. Other verification activities include various static and dynamic analyses, code and document inspections, walkthroughs and other techniques.

###### Supported hardware

See [3.6 “Computer Requirements”](#), [§ 3-8](#) for a list of supported hardware.

##### Compliance Tecan Customer

Tecan customers must develop and implement a procedure for validating the system. The purpose of validation is “... *to ensure accuracy, reliability, consistent intended performance and the ability to discern invalid or altered records*”. This applies to both new and existing systems.

#### ☒ Database

##### Compliance Freedom EVOware

Tecan does not use a database in its Freedom EVOware software.

##### Compliance Tecan Customer

Tecan customers must develop and implement a validation procedure if they want to make a connection between the Tecan software and a database.

#### ☒ Network

##### Compliance Freedom EVOware

Freedom EVOware uses specified directories to store process data, the trace file (audit trail) and the log files. A default directory structure is created for these files when Freedom EVOware is first installed. See [A.7 “Freedom EVOware Directory Structure and Files”](#), [§ A-28](#) for a list of the files and directories which are used. See also [B.5.6 “Trace File \(Audit Trail\)”](#), [§ B-10](#).

If required, users with Freedom EVOware Administrator or Application Specialist rights can configure Freedom EVOware to use other directories (including network directories) for storing data, log and output files. See [8.3.1.4 “Protocol Options Tab”](#), [§ 8-8](#).

##### Compliance Tecan Customer

Tecan customers must develop and implement a validation procedure for their computer network. This includes managing user access and other security aspects, data backups and archiving.

**☒ Validation master plan**

**Compliance Freedom EVOware**

As an important tool for quality assurance, Tecan has developed detailed guidelines and rules for all phases of hardware and software development and testing. The guidelines also cover validation and verification of product requirements.

21 CFR Part 11 contains rules for both closed and open computer systems.

Freedom EVOware is a closed system and is not designed for an open system.

**Compliance Tecan Customer**

Tecan customers must develop and implement a master plan to validate the complete system with all instruments and instrument connections.

**☒ Installation qualification**

**Compliance Freedom EVOware**

This does not lie in the scope of the Freedom EVOware software.

**Compliance Tecan Customer**

Tecan customers must develop and implement a procedure for installation qualification. This can be done e.g. by setting up and then validating a Freedom EVOware script.

Installation qualification may also be connected with user management and rules on who can install what, when and where.

**☒ Operational qualification**

**Compliance Freedom EVOware**

This does not lie in the scope of the Freedom EVOware software.

**Compliance Tecan Customer**

Tecan customers must develop and implement a procedure for routine operational qualification for all persons using the Tecan equipment.

This can be done e.g. by using a “control” or “standard” during pipetting or by performing dedicated validation runs.

**☒ Control procedures**

**Compliance Freedom EVOware**

Freedom EVOware does not provide direct support for control procedures.

**Compliance Tecan Customer**

Tecan customers must develop and implement control procedures.

**☒ Detecting invalid and/or altered records**

**Compliance Freedom EVOware**

See [B.5.4 “Checksums”](#), [B-8](#).

**Compliance Tecan Customer**

Tecan customers must develop and implement a procedure for documenting invalid and/or altered records.

**B.7.1.2 § 11.10 (b) Ability to Generate Accurate and Complete Copies of Records.**

**☒ Storage of instrument control, pipetting sequence, data acquisition and data evaluation parameters together with audit trails and raw data**

**Compliance Freedom EVOware**

See [B.5.7 “Log Files”](#), [B-11](#).

See [B.5.6 “Trace File \(Audit Trail\)”](#), [B-10](#).

See [B.5.5 “Electronic Signatures”](#), [B-9](#).

**Compliance Tecan customer**

Tecan customers must develop and implement a procedure to store and archive the process data, the trace file (audit trail) and the log files created by Freedom EVOware and protect them against accidental or intentional modification, falsification or deletion. This is a pre-requirement for reliable and trustworthy records that withstand scrutiny from regulators. The audit trail associated with the records must also be retained.

Tecan customers must establish rigorous and systematic archiving and backup procedures to ensure that electronic records generated by Freedom EVOware are stored in such a manner that they can be retrieved and used over an extended period of time.

In some cases, the records must be kept for 10 years or longer. Due to the expected technical changes in hardware and software over such time spans, this requires consideration of issues such as the appropriate choice of storage media, file formats, etc.

The regulations refer to the use of electronic records and signatures, not to which records need to be retained or for how long.

**☒ Versioning of data and all associated meta data (including automatic versioning of re-integrated results)**

**Compliance Freedom EVOware**

See [B.5.7 “Log Files”](#), [B-11](#).

See [B.5.6 “Trace File \(Audit Trail\)”](#), [B-10](#).

**Compliance Tecan Customer**

Tecan customers must develop and implement a procedure to store and archive the process data, the trace file (audit trail) and the log files created by Freedom EVOware and protect them against accidental or intentional modification, falsification or deletion.

**☒ Audit trail of all data**

**Compliance Freedom EVOware**

See [B.5.7 “Log Files”](#), [B-11](#).

See [B.5.6 “Trace File \(Audit Trail\)”](#), [B-10](#).

**Compliance Tecan Customer**

The integrity and completeness of the electronic records relies on the customer's assignment of Microsoft Windows access rights for the PC and the computer network and on data backup and archiving procedures.

Tecan customers must set appropriate access privileges for the local and network files and directories to ensure that records can only be deleted or modified by authorized persons.

**☒ Protection of data with checksums**

**Compliance Freedom EVOware**

See [B.5.4 “Checksums”](#), [B-8](#).

**Compliance Tecan Customer**

No action required.

**B.7.1.3 § 11.10 (c) Protection of records**

**☒ Data Archiving Processes and Procedures for Long-term Data Storage**

**Compliance Freedom EVOware**

See [B.5.8 “Backing Up Files”](#), [B-11](#).

**Compliance Tecan Customer**

Tecan customers must develop and implement a procedure to store and archive the process data, the trace file (audit trail) and the log files created by Freedom EVOware and protect them against accidental or intentional modification, falsification or deletion.

In some cases, the records must be kept for 10 years or longer. Due to the expected technical changes in hardware and software over such time spans, this requires consideration of issues such as the appropriate choice of storage media, file formats, etc.

**☒ Protection of directories used to store process data and log files to ensure that they are only accessible to authorized persons**

**Compliance Freedom EVOware**

Freedom EVOware uses specified directories to store process data, the trace file (audit trail) and the log files. A default directory structure is created for these files when Freedom EVOware is first installed. See [A.7 “Freedom EVOware Directory Structure and Files”](#), [A-28](#) for a list of the files and directories which are used. See also [B.5.6 “Trace File \(Audit Trail\)”](#), [B-10](#).

If required, users with Freedom EVOware Administrator or Application Specialist rights can configure Freedom EVOware to use other directories (including network directories) for storing data, log and output files. See [8.3.1.4 “Protocol Options Tab”](#), [8-8](#).

**Compliance Tecan Customer**

The integrity and completeness of the electronic records relies on the customer’s assignment of Microsoft Windows access rights for the PC and the computer network and on data backup and archiving procedures.

Tecan customers must set appropriate access privileges for the local and network files and directories to ensure that records can only be deleted or modified by authorized persons.

**☒ Access to process data and log files after a number of years**

**Compliance Freedom EVOware**

No action required.

### **Compliance Tecan Customer**

Tecan customers must establish rigorous and systematic archiving and backup procedures to ensure that electronic records generated by Freedom EVOware are stored in such a manner that they can be retrieved and used over an extended period of time.

In some cases, the records must be kept for 10 years or longer. Due to the expected technical changes in hardware and software over such time spans, this requires consideration of issues such as the appropriate choice of storage media, file formats, etc.

## **B.7.1.4 § 11.10 (d) Limiting System Access to Authorized Individuals**

### **☒ Microsoft operating system**

#### **Compliance Freedom EVOware**

See [B.5.1 “Closed Systems”](#),  [B-6](#).

See [B.5.3 “Tecan User Management System”](#),  [B-7](#).

#### **Compliance Tecan Customer**

Tecan customers must develop and implement user management procedures for their employees to control access to the Freedom EVOware software and the Microsoft operating system.

The access control mechanisms should be designed to prevent unauthorized persons from gaining access to, altering or deleting records in the system or carrying out unauthorized functions within the system.

Access security is typically ensured with a number of behavioral controls or policies that are backed up and enforced by appropriate security mechanisms implemented on the company’s information systems.

Access control determines who is allowed to log on to a system locally or from the network. The Microsoft operating systems offers several different types of access privileges that can be granted or denied to specific users or groups of users.

Under consideration of typical work practices in analytical laboratories, we recommend a system of access privileges on a task basis - not only to ensure confidentiality, but also to eliminate human mistakes or accidental loss of data.

It is insufficient to only restrict system access to a group of individuals without differentiating their responsibilities, knowledge or position. In this case, users could inadvertently modify system settings in a way that affects the integrity or security of the records.

### **☒ Different Levels of Access Based On User Responsibilities**

#### **Compliance Freedom EVOware**

See [B.5.2 “Freedom EVOware User Levels”](#),  [B-7](#).

#### **Compliance Tecan Customer**

See [B.4.1 “Assigning and Using Freedom EVOware User Names”](#),  [B-6](#).

### B.7.1.5 § 11.10 (e) Use of Computer-generated, Time-stamped Audit Trails

☒ **Audit trails are used to record the activities of Freedom EVOware users as well as data transfers (who, what, when)**

#### **Compliance Freedom EVOware**

See [B.5.7 “Log Files”](#),  [B-11](#).

See [B.5.6 “Trace File \(Audit Trail\)”](#),  [B-10](#).

See [B.5.3.1 “User Management Audit Trail”](#),  [B-8](#).

See [B.5.5 “Electronic Signatures”](#),  [B-9](#).

See [B.5.8 “Backing Up Files”](#),  [B-11](#).

#### **Compliance Tecan Customer**

The integrity and completeness of the electronic records relies on the customer’s assignment of Microsoft Windows access rights for the PC and the computer network and on data backup and archiving procedures.

Tecan customers must set appropriate access privileges for the local and network files and directories to ensure that records can only be deleted or modified by authorized persons.

Tecan customers must develop and implement a procedure to store and archive the process data, the trace file (audit trail) and the log files created by Freedom EVOware and protect them against accidental or intentional modification, falsification or deletion.

☒ **Audit trail of all integration and re-integration processes**

#### **Compliance Freedom EVOware**

See [B.5.7 “Log Files”](#),  [B-11](#).

See [B.5.6 “Trace File \(Audit Trail\)”](#),  [B-10](#).

#### **Compliance Tecan Customer**

Tecan customers must develop and implement a procedure to store and archive the process data, the trace file (audit trail) and the log files created by Freedom EVOware and protect them against accidental or intentional modification, falsification or deletion.

☒ **Audit trail information includes the instrument’s serial number**

#### **Compliance Freedom EVOware**

See [B.5.7 “Log Files”](#),  [B-11](#).

#### **Compliance Tecan Customer**

No action required.

☒ **Audit trail when data is transferred to and from a database**

#### **Compliance Freedom EVOware**

Tecan does not use a database in its Freedom EVOware software.

#### **Compliance Tecan Customer**

Tecan customers must develop and implement a procedure for recording data transfer from and to the database if they make a connection between the Tecan software and a database.



**☒ Audit trail data must be protected from accidental or intentional modification or deletion**

**Compliance Freedom EVOware**

See [B.5.4 "Checksums"](#), [B-8](#).

**Compliance Tecan Customer**

The integrity and completeness of the electronic records relies on the customer's assignment of Microsoft Windows access rights for the PC and the computer network and on data backup and archiving procedures.

Tecan customers must set appropriate access privileges for the local and network files and directories to ensure that records can only be deleted or modified by authorized persons.

**☒ Audit trail aspects of data migration to new Freedom EVOware version or operating system version**

**Compliance Freedom EVOware**

Although Freedom EVOware software migration does not delete existing process data, audit trails and log files, Tecan customers are recommended to use the Backup function and then to archive this information before migration see [B.5.8 "Backing Up Files"](#), [B-11](#)).

After archiving, the files can be deleted from the Freedom EVOware directories.

**Compliance Tecan Customer**

Tecan customers must develop and implement a procedure for storing and transferring data from one operating system to another when operating system versions are changed.

**B.7.1.6 § 11.10 (f) Use of Operational System Checks to Enforce Permitted Sequencing of Steps and Events**

**☒ Correct sequential operation of the system**

**Compliance Freedom EVOware**

Each Freedom EVOware script is executed using the sequence defined in the script. Each time you insert a new command in the script, Freedom EVOware checks whether the data required by the script (such as information on labware and liquid classes) has already been defined. It validates the entire script to check for errors and shows all commands which have errors in red.

**Compliance Tecan Customer**

Tecan customers must develop and implement a procedure to verify the correct sequential operation of the system (pipetting sequences and scripts, appropriate instrument operating procedures for each of the tasks which will be carried out).

#### B.7.1.7 § 11.10 (g) Use of Authority Checks

☒ **Ensure that only authorized individuals can use the system, electronically sign a record, access the operation or computer system, input or output device, alter records or perform other operations**

##### **Compliance Freedom EVOware**

See [B.5.1 “Closed Systems”](#), [B-6](#).

See [B.5.3 “Tecan User Management System”](#), [B-7](#).

##### **Compliance Tecan Customer**

Tecan customers must develop and implement user management procedures for their employees to control access to the Freedom EVOware software and the Microsoft operating system.

21 CFR part 11 rules require the use of procedures and controls to limit access to the system to authorized individuals and the use of authority checks to ensure that only authorized individuals can use the system and carry out specified functions within the system.

#### B.7.1.8 § 11.10 (h) Use of Device Checks to Determine the Validity of the Source of Data Input

☒ **Device checks**

##### **Compliance Freedom EVOware**

See [B.5.7 “Log Files”](#), [B-11](#).

##### **Compliance Tecan Customer**

Tecan customers must develop and implement a procedure for keeping records of device checks from Freedom EVOware and all of the laboratory equipment involved in the respective activity or process. They must store records of serial numbers, instrument numbers and version numbers of all devices and record any device changes and replacements.

#### B.7.1.9 § 11.10 (i) Determine that Employees have the Education, Training and Experience to Perform the Assigned Tasks

☒ **Provide evidence that persons who develop, maintain or use electronic record/electronic signature systems have the education, training and experience to perform their assigned tasks**

##### **Compliance Freedom EVOware**

Tecan ensures that all staff is suitably qualified with respect to their education, job training and experience to perform their assigned tasks.

##### **Compliance Tecan Customer**

Tecan customers must ensure that their employees have the necessary education, training and experience to perform the assigned tasks.

For computer security measures to be effective, the users involved in implementing and using them must be trained. This training will need to cover full-time, temporary/part-time and contract staff that use the computers in your organization. It may also need to cover service and maintenance engineers undertaking repairs or modifications to computerized equipment or software.

Furthermore, since technology can provide the means to access applications remotely via a modem or a remote connection, special arrangements may be necessary to minimize the impact that this can have, especially in a regulated environment.

The training should involve using the security measures such as passwords and their maintenance, but also general awareness of computer security issues.

**☒ Job descriptions, training plans, documented training on computerized systems**

**Compliance Freedom EVOware**

Tecan ensures that all Tecan staff is suitably qualified with respect to their education, job training and experience to perform their assigned tasks.

**Compliance Tecan Customer**

Tecan customers must implement procedures to provide regular user training.

**B.7.1.10 § 11.10 (j) Written Policy that Holds Individuals Accountable and Responsible for Their Actions**

**☒ Written policy that holds individuals accountable and responsible for actions initiated using their electronic signatures in order to deter record and signature falsification:**

**Compliance Freedom EVOware**

No action required.

**Compliance Tecan Customer**

Tecan customers must develop and implement a set of policies on employee responsibility and reliability.

**B.7.1.11 § 11.10 (k) Use of Appropriate Controls Over Systems Documentation**

**☒ Control distribution of, access to and use of system operation and maintenance documentation**

**Compliance Freedom EVOware**

Tecan provides extensive documentation with each software version.

**Compliance Tecan Customer**

Tecan customers must distribute the supplied software documentation and make it available to all Freedom EVOware users. Tecan customers must implement procedures to provide regular user training.

**B.7.2 § 11.30 Controls for Open Systems**

§ 11.30 specifies controls for open systems, including the controls required for closed systems in Sec. 11.10 and additional measures such as document encryption and the use of appropriate digital signature standards to ensure record authenticity, integrity and confidentiality.

### **B.7.2.1 § 11.30 Controls for Open Systems**

#### **☒ Open systems**

##### **Compliance Freedom EVOware**

This is not applicable to Freedom EVOware. Freedom EVOware is intended for a closed system and not designed for an open system.

##### **Compliance Tecan Customer**

No action required.

### **B.7.3 § 11.50 Signature Manifestations**

§ 11.50 requires signature manifestations to contain information associated with the signing of electronic records. This information must include the printed name of the signer, the date and time when the signature was executed and the meaning (such as review, approval, responsibility and authorship) associated with the signature. In addition, this information is subject to the same controls as electronic records and must be included in any human readable forms of the electronic record (such as electronic display or printout).

#### **B.7.3.1 § 11.50 (a) Signature Manifestation**

##### **☒ Signed electronic records**

##### **Compliance Freedom EVOware**

See [B.5.1 “Closed Systems”](#),  [B-6](#).

See [B.5.5 “Electronic Signatures”](#),  [B-9](#).

##### **Compliance Tecan Customer**

See [B.4.1 “Assigning and Using Freedom EVOware User Names”](#),  [B-6](#).

#### **B.7.3.2 § 11.50 (a) Printed Name of Signer**

##### **Compliance Freedom EVOware**

See [B.5.1 “Closed Systems”](#),  [B-6](#).

See [B.5.5 “Electronic Signatures”](#),  [B-9](#).

##### **Compliance Tecan Customer**

See [B.4.1 “Assigning and Using Freedom EVOware User Names”](#),  [B-6](#).

#### **B.7.3.3 § 11.50 (a) Date and Time of Signature**

##### **Compliance Freedom EVOware**

See [B.5.1 “Closed Systems”](#),  [B-6](#).

See [B.5.5 “Electronic Signatures”](#),  [B-9](#).

##### **Compliance Tecan Customer**

No action required.

#### **B.7.3.4 § 11.50(a) Meaning Associated with Signature**

##### **Compliance Freedom EVOware**

See [B.5.5 “Electronic Signatures”](#),  [B-9](#).

**Compliance Tecan Customer**

No action required.

**B.7.4 § 11.70 Signature/ Record Linking**

§ 11.70 requires that electronic signatures and handwritten signatures executed on electronic records must be linked to their respective records to ensure that signatures cannot be excised, copied or otherwise transferred to falsify an electronic record by ordinary means.

**☒ User-specific log on in case more than one person works on a system**

**Compliance Freedom EVOware**

Freedom EVOware does not allow more than one person to use the software simultaneously.

Users can log out without leaving Freedom EVOware or interrupting a running pipetting script. The same or a different user can then log in to Freedom EVOware again while the script is still running. See [6.1.9 “Lock EVOware”](#), [B-7](#).

Users are automatically logged out after a specified time during which no keyboard or mouse-click activities have been detected.

**Compliance Tecan Customer**

Tecan customers must instruct their employees not to share their user name and password combinations with other employees, and to log out before allowing another employee to use Freedom EVOware or if they plan to leave the running system unattended (see [6.1.9 “Lock EVOware”](#), [B-7](#)).

**☒ Specify measures to prevent violation of the signature uniqueness**

**Compliance Freedom EVOware**

Freedom EVOware is a closed system and access to Freedom EVOware uses a combination of user name and password for unique identification. Freedom EVOware cannot be used without a valid user name and password.

Freedom EVOware does not allow more than one person to use the software simultaneously.

If an attempt is made to copy a signature from one file to another, this is detected by Freedom EVOware’s CRC checksum feature.

See [B.5.1 “Closed Systems”](#), [B-6](#).

See [B.5.5 “Electronic Signatures”](#), [B-9](#).

**Compliance Tecan Customer**

See [B.4.1 “Assigning and Using Freedom EVOware User Names”](#), [B-6](#).

**☒ User-specific automated inactivity time out in case more than one person works on a single system**

**Compliance Freedom EVOware**

Freedom EVOware does not allow more than one person to use the software simultaneously.

Users are automatically logged out after a specified time during which no keyboard or mouse-click activities have been detected.

**Compliance Tecan Customer**

No action required.

## **B.8 Part C - Electronic Signatures**

### **B.8.1 § 11.100 General Requirements**

§ 11.100 requires that each electronic signature must be unique to one individual and must not be reused by or reassigned to anyone else. Before an organization establishes, assigns, certifies or otherwise sanctions an individual's electronic signature, the organization must verify the identity of the individual.

#### **B.8.1.1 § 11.100 (a) Uniqueness**

**☒ Uniqueness of electronic signatures**

**Compliance Freedom EVOware**

See [B.5.1 "Closed Systems"](#),  [B-6](#).

See [B.5.5 "Electronic Signatures"](#),  [B-9](#).

**Compliance Tecan Customer**

See [B.4.1 "Assigning and Using Freedom EVOware User Names"](#),  [B-6](#).

**☒ Procedures and controls to make sure that electronic signatures are never reassigned to anyone else**

**Compliance Freedom EVOware**

See [B.5.3 "Tecan User Management System"](#),  [B-7](#).


**Compliance Tecan Customer**

See [B.4.1 "Assigning and Using Freedom EVOware User Names"](#),  [B-6](#).

#### **B.8.1.2 § 11.100 (b) Verify Identity**

**☒ Verify the identity of an individual**

**Compliance Freedom EVOware**

Freedom EVOware is a closed system and access to Freedom EVOware uses a combination of user name and password for unique identification. Freedom EVOware cannot be used without a valid user name and password. Also see [B.5.3 "Tecan User Management System"](#),  [B-7](#).

**Compliance Tecan Customer**

See [B.4.1 "Assigning and Using Freedom EVOware User Names"](#),  [B-6](#).

### **B.8.1.3 § 11.100 (c) Legally Binding Signature**

**☒ Persons using electronic signatures verify it as the legally binding equivalent of the handwritten signature**

#### **Compliance Freedom EVOware**

Freedom EVOware is a closed system and access to Freedom EVOware uses a combination of user name and password for unique identification. Freedom EVOware cannot be used without a valid user name and password. Also see [B.5.3 “Tecan User Management System”](#), [B-7](#).

#### **Compliance Tecan Customer**

See [B.4.1 “Assigning and Using Freedom EVOware User Names”](#), [B-6](#).

## **B.8.2 § 11.200 Electronic Signature Components and Controls**

§ 11.200 requires that electronic signatures not based on biometrics must employ at least two distinct identification components such as a name and password. In addition, when an individual executes a series of signings during a single period of controlled system access, the first signing must be executed using all electronic signature components and the subsequent signings must be executed using at least one component designed to be used only by that individual. When an individual executes one or more signings not performed during a single period of controlled system access, each signing must be executed using all of the electronic signature components. Electronic signatures not based on biometrics are also required to be used only by their genuine owners and administered and executed to ensure that attempted use of an individual's electronic signature by anyone else requires the collaboration of two or more individuals. This would make it more difficult for anyone to forge an electronic signature. Electronic signatures based upon biometrics must be designed to ensure that such signatures cannot be used by anyone other than the genuine owners.

### **B.8.2.1 § 11.200(a) Non-biometric Signatures**

#### **Compliance Freedom EVOware**

See [B.5.1 “Closed Systems”](#), [B-6](#).

#### **Compliance Tecan Customer**

Tecan customers must follow their company rules for using non-biometric signatures.

### **B.8.2.2 § 11.200(a) Employ At Least Two Distinct Identifications**

#### **Compliance Freedom EVOware**

See [B.5.1 “Closed Systems”](#), [B-6](#).

#### **Compliance Tecan Customer**

No action required.

### **B.8.2.3 § 11.200(a) Series of Signings During Continuous System Access**

#### **Compliance Freedom EVOware**

Freedom EVOware requires the user to log in with name and password at startup (first signing). For each following signing only entry of the user's password is required.

See [B.5.5 “Electronic Signatures”](#), [B-9](#).

**Compliance Tecan Customer**

No action required.

**B.8.2.4 § 11.200(a) Signing During Non-continuous System Access**

**Compliance Freedom EVOware**

Freedom EVOware requires the user to login with user name and password when signings are performed during non-continuous system access.

- ◆ When closing Freedom EVOware and starting the software again.
- ◆ When actively logging out of Freedom EVOware without closing the program.
- ◆ When automatically being logged out of Freedom EVOware after the defined idle time.

**Compliance Tecan Customer**

No action required.

**B.8.2.5 § 11.200(a) Genuine Owner of Signature**

**Compliance Freedom EVOware**

See [B.5.1 "Closed Systems"](#),  [B-6](#).

**Compliance Tecan Customer**

See [B.4.1 "Assigning and Using Freedom EVOware User Names"](#),  [B-6](#).

**B.8.2.6 § 11.200(a) Administered Signature**

**Compliance Freedom EVOware**

See [B.5.1 "Closed Systems"](#),  [B-6](#).

**Compliance Tecan Customer**

See [B.4.1 "Assigning and Using Freedom EVOware User Names"](#),  [B-6](#).

**B.8.2.7 § 11.200(b) Biometric Signatures**

**Compliance Freedom EVOware**

Freedom EVOware does not use biometric signatures.

**Compliance Tecan Customer**

Not applicable.

**B.8.3 § 11.300 Controls for Identification Codes and Passwords**

§ 11.300 describe that electronic signatures based upon the use of identification codes in combination with passwords must use controls to ensure security and integrity.

**B.8.3.1 § 11.300(a) Maintaining Uniqueness**

**Compliance Freedom EVOware**

See [B.5.1 "Closed Systems"](#),  [B-6](#).

See [B.5.3 "Tecan User Management System"](#),  [B-7](#).

**Compliance Tecan Customer**

See [B.4.1 "Assigning and Using Freedom EVOware User Names"](#),  [B-6](#).



### **B.8.3.2 § 11.300(b) Check Identification**

#### **Compliance Freedom EVOware**

See [B.5.1 “Closed Systems”](#),  B-6.

See [B.5.3 “Tecan User Management System”](#),  B-7.

#### **Compliance Tecan Customer**

See [B.4.1 “Assigning and Using Freedom EVOware User Names”](#),  B-6.

### **B.8.3.3 § 11.300(c) Loss Management**

#### **Compliance Freedom EVOware**

This section is not applicable to Freedom EVOware since the Tecan User Management system does not use tokens, cards or other devices to bear or generate identification codes.

#### **Compliance Tecan Customer**

No action required.

### **B.8.3.4 § 11.300(d) Prevent Unauthorized Use**

#### **Compliance Freedom EVOware**

See [B.5.1 “Closed Systems”](#),  B-6.

See [B.5.3 “Tecan User Management System”](#),  B-7.

#### **Compliance Tecan Customer**

Tecan customers must develop and implement procedures to disable the user name and password when an employee leaves the company.

Tecan customers must name an authority that should be notified if an attempt is made to get unauthorized access to the system.

As part of the regular system maintenance activities, the Freedom EVOware Administrator should routinely and regularly check the Freedom EVOware log files for attempts get unauthorized access to the system. In addition, it is recommended to enable the feature in the Tecan User Management system to automatically notify a specified person by email if an attempt is made to get unauthorized access.

### **B.8.3.5 § 11.300(e) Periodic Testing**

#### **Compliance Freedom EVOware**

This section is not applicable to Freedom EVOware since the Tecan User Management system does not use tokens, cards or other devices to bear or generate identification codes.

#### **Compliance Tecan Customer**

Not applicable.

## **B.9 Freedom EVOware Installation Checklist**

This section contains a checklist of the major tasks that need to be carried out to help the system to become compliant with the 21 CFR Part 11 regulations. It is divided into things that need to be done before, during and after installation of the software.

### **B.9.1 Before Installing Freedom EVOware**

Designate an experienced system administrator to set up the PC and the PC network.

The system administrator must develop a secure and effective way of remembering his or her password.

If you plan to install Freedom EVOware in a network environment (LAN), take appropriate configuration steps when installing the Microsoft operating system and the network server(s).

If you plan to store Freedom EVOware data on a network, you must assign appropriate access privileges to the network directories.

Archive and clear existing Microsoft Application, Security and System logs.

For network domain servers, disable the Guest account.

For network domain users, set the same account policies as on the local PCs:

- ◆ Set the “Enforce password history” password policy to “12 passwords remembered”.
- ◆ Set the “Maximum password age” password policy to 30 days.
- ◆ Set the “Minimum password age” password policy to 5 days.
- ◆ Set the “Minimum password length” password policy to 5 characters.
- ◆ Set the “Account lockout threshold” account lockout policy to 3 invalid logon attempts.

Activate password-protected screen savers.

### **B.9.2 Installing Freedom EVOware**

Install the Freedom EVOware software according to the installation instructions supplied with the software. In some countries, the Freedom EVOware software must be installed by an authorized Tecan Field Service Engineer. Contact your local Tecan distributor for more information.

### **B.9.3 After Installing Freedom EVOware**

Ensure that the Microsoft Application, Security and System logs are set to “Do not overwrite events (clear log manually)”.

Increase the default size for the Microsoft Application, Security and System logs.

Ensure that the following procedures are implemented to address sections of the 21 CFR Part 11 regulations, including (but not necessarily limited to):

- ◆ Provide suitable education, training and practical experience to personnel.
- ◆ Ensure that individuals are held accountable and responsible for their actions when using the pipetting system and the Freedom EVOware software.
- ◆ Verify the identity of each individual who is permitted to work with Freedom EVOware.
- ◆ Create separate Freedom EVOware user accounts using the Tecan User Management system for all persons who are authorized to use Freedom EVOware.
- ◆ Create separate PC and/or PC network user accounts using standard Microsoft tools and procedures for all persons who are authorized to use Freedom EVOware.
- ◆ Implement appropriate controls over distribution, use of and access to data and log files.

- ◆ Configure the log file functions in the Freedom EVOware settings to document the pipetting and to record user inputs.
- ◆ Implement systems to prevent and detect unauthorized modification of data and log files.
- ◆ Notify the FDA that electronic signatures are intended to be equivalent to handwritten signatures.

Ensure that the following steps are also carried out:

- ◆ Regularly archive and clear the Microsoft Application, Security and System logs.
- ◆ Regularly check the Microsoft Security log to detect unauthorized access to the PC.
- ◆ Ensure that users are logged out from Freedom EVOware when the PC is unattended.



## C Validation of Freedom EVOware Applications

All Freedom EVOware scripts and processes must be validated for correct functioning and for correct results before they are used for pipetting with real samples. It is recommended to test run the script or process to make sure that it operates as intended. This chapter gives an overview of some of the more important points which must be checked. See also [2.8.2 “General Rules When Using the Pipetting Instrument”](#), ¶ 2-6.

The following list of points to check when validating is not intended to be exhaustive and does not replace any local laws or statutes that apply.

### C.1 Important Points to Check When Validating Freedom EVOware Applications

- ◆ When Freedom EVOware is first started, check the log file for errors. If error messages are found, the cause of the error must be remedied before you start pipetting.
- ◆ If you intend to use Freedom EVOware to control a pipetting instrument, make sure that the operation mode which is shown in the status bar is REAL MODE. If you intend to use Freedom EVOware to simulate a script or process, e.g. for the purpose of testing, make sure that the operation mode which is shown in the status bar is OFFLINE. Pipetting does not take place in offline mode. See [6.7.3 “Status Bar”](#), ¶ 6-19.
- ◆ Make sure that you have loaded the correct script or process for the assigned pipetting task.
- ◆ Check the script editor window for errors (commands which have errors are shown in red). In Freedom EVOware Plus, check all of the scripts in your process for errors. For example, script errors will be shown if:
  - The hardware configuration or the LiHa configuration of the pipetting instrument does not meet the requirements of the script or process.
  - Liquid classes required by the script or process are missing.
  - RoMa or PnP movement vectors required by the script or process are missing.
  - See also [11.4.2.1 “Checking the Pipetting Script for Errors”](#), ¶ 11-5.
- ◆ Check the liquid containers and system liquid of the pipetting instrument for the correct liquid types and concentrations which are required by the script or process.
- ◆ Before running the script or process, you must set up the worktable with the carriers, labware and devices which are needed by the application or assay. The administrator or owner of the pipetting instrument must establish standard operating procedures for setting up the worktable and make them available to everyone who carries out pipetting.
- ◆ After setting up the worktable with the carriers, labware and devices which are needed by the application or assay, inspect the paths that the instrument arms (LiHa, RoMa, PnP) will take during the hardware initialization sequence to make sure that there are no obstacles which could obstruct the movements. See also [8.4.2.6 “Arm Initialization”](#), ¶ 8-30.
- ◆ Manually initialize the arms of the pipetting instrument (e.g. using the Initialize button in the Freedom EVOware toolbar), make a visual check that the initialization sequence has been carried out correctly and check the log file for

initialization errors. If error messages are found, the cause of the error must be remedied before you start pipetting.

- ◆ Before you pipette using real samples, test run the script or process to make sure that:
  - Pipetting takes place at the intended positions on the worktable (e.g. correct microplate, correct well).
  - The correct volumes of liquid are pipetted.
  - Pipetting takes place in the correct sequence as required by the application.
- ◆ Freedom EVOware chooses multi-dispensing mode automatically if the pipetting script specifies an aspirate command followed by several consecutive dispense commands. In turn, this influences the liquid class parameters which are used. The decision between single dispensing mode and multi-dispensing mode is made when the script is validated and not when the script is run. Scripts are validated when they are modified and also when they are opened for running without being modified. Validation is done using default values for the variables (see [11.4.2.1 “Checking the Pipetting Script for Errors”](#), [11-5](#)).

If the number of consecutive dispense commands is controlled by a variable whose value can change during runtime, it is recommended to design the script with branches or separate groups of commands for single-pipetting mode (one dispense operation) and multi-pipetting mode (more than one dispense operation). This ensures that the correct pipetting mode and liquid class parameters will be chosen at runtime.
- ◆ If your script or process uses liquid level detection (e.g. the chosen liquid class uses liquid level detection or the script or process uses the Detect Liquid command), make sure that liquid detection is working correctly. The capacitive detection system is not suitable for all liquid types (e.g. liquids with foam, non-conductive liquids). Liquid detection can not be used if you are using septum piercing. To ensure accurate liquid detection, make sure that the labware is correctly seated on the carriers.
- ◆ If your script or process sends firmware commands to the pipetting instrument or to other devices, make sure that the correct firmware commands have been specified and that they initiate the intended actions. Sending the wrong commands can cause invalid results, damage the instrument or objects in its workspace, hurt yourself or other people and can cause the script or process to produce invalid results.
- ◆ If your script or process uses a microplate reader, check the results (output data) from the reader to make sure that they are plausible.
- ◆ When setting up an assay for a liquid which can clot, make sure that clot detection is enabled in the liquid classes which are used to handle the liquid. Refer to the Good Usage information in the Operating Manual for the pipetting instrument for additional recommendations.
- ◆ When setting up an assay which uses a trough (container for a reagent liquid), make sure that the liquid classes which are used for aspirating from the trough are configured to immerse the tips in the liquid by at least 3 mm.
- ◆ Appropriate tip washing actions must be provided in the script or process to avoid cross-contamination of samples and/or reagents. Disposable tips can also be used to avoid cross-contamination of samples and/or reagents. Design and test run the script or process to make sure that cross-contamination will not take place.
- ◆ If your script or process uses a shaker, make sure that the shaker parameters (e.g. shaking time, shaking frequency) have been configured correctly and that the shaker operates as intended.

- ◆ If your script or process uses an incubator, make sure that the incubator parameters (e.g. incubating time and temperature) have been configured correctly and that the incubator operates as intended.
- ◆ If your script or process uses devices with heating elements (e.g. shaker, heated incubator, some microplate readers), make sure that the script or process allows enough time for the heater to heat up to or cool down to the intended temperature before it is used. Test run the script or process and measure the temperature which has been achieved.
- ◆ If your script or process uses operations where timing is critical (e.g. incubator, shaker), make sure that the timing and delays have been configured correctly and work as intended:
  - Check the time specified in the respective device command.
  - Check the time specified in Wait For Timer commands.
  - In Freedom EVOware Plus, check that the sum of execution time and maximum waiting time (as specified in the process step) meets the requirements of the script or process. For example, if an incubation process step needs to wait for another operation to finish, the incubation time must still lie within the limits which are acceptable to the application. If necessary, adjust the specified maximum waiting time and test the application again.
- ◆ If the system pauses for any reason when running a script or process, the duration of the pipetting script, process step or procedure may differ from the intended time. For example, sample incubation time may be outside of the specified limits. Depending on the application, this can make the assay invalid.
  - A system pause can be caused e.g. by clicking the Pause button in Freedom EVOware's Runtime Controller dialog box, by pressing the Pause button on the pipetting instrument, by a pipetting error or by an internal timeout if a process step has taken longer than expected or specified.
  - System pauses are not shown in the Gantt chart in the Extended View of the Runtime Controller (the Gantt chart is only available in Freedom EVOware Plus).
- ◆ If your script or process uses email for notification of important events, the notification function must be used to send a test email to make sure that the email is sent correctly and is received by the intended recipient.
- ◆ If your script or process imports required information from external files (barcode lists, lists of values for variables etc.):
  - Make sure that the correct filename has been specified in the script or process.
  - Make sure that the import file exists and contains the intended data.
- ◆ Check that the script or process starts to run as intended when you click the Start button in the Runtime Controller
- ◆ When the script or process has completed, check the status information and the Warnings / Errors window in the extended view of the Runtime Controller and check all log files to make sure that the entire script or process has completed and that there are no error messages.
- ◆ The results of an assay are only valid if the entire script or process completed without errors. If this is not the case, the entire script or process must be repeated after rectifying the cause of the error(s).

## C.2 Setting the Validation Status of Scripts and Processes

Freedom EVOware allows you to hide non-validated scripts and processes from users with the access level *Operator* to ensure that they cannot use them. This optional feature must be activated in the Configuration Tool (see 8.3.3.1 “Settings Tab”, 8-17, Enable file validation).

If you activate this feature, non-validated scripts, processes and templates are shown to Freedom EVOware Administrators and Application Specialists in the Selection dialog box with a gray icon instead of a colored icon (they are not visible at all to Operators).

After validating a script or process (see C.1 “Important Points to Check When Validating Freedom EVOware Applications”, C-1), proceed as follows to set its file status to Approved (you need Administrator or Application Specialist access rights to do this):

- ◆ In the main window of Freedom EVOware, click Open in the Toolbar or choose Open in the File menu.
- ◆ In the Selection dialog box, right click the script (Freedom EVOware Standard) or process (Freedom EVOware Plus) and choose *Validate* from the context menu.

Proceed as follows to revoke the Validated status (you need Administrator or Application Specialist access rights to do this).

- ◆ Right click a validated script or process and choose *Remove Validation* from the context menu.

## C.3 Recommendations when using barcodes

If your script or process uses a barcode scanner:

- ◆ Check the results (output data) from the barcode scanner to make sure that they are plausible.
- ◆ Make a visual check of the barcode scanning process to make sure that the correct barcode label is scanned (if the labware, carrier or tube has more than one label) and that the barcode scanner scans across the center of the label (physical alignment).
- ◆ The barcodes must be accurately aligned - both horizontally and vertically - on all labware, tubes and containers. For more information see the Operating Manual of the pipetting instrument (refer to the section on Barcode Positioning).

To ensure good reading results, pay attention to the following recommendations:

- ◆ The quality of the barcode labels should be grade A according to ANSI X3.182 and DIN EN 1635. The identification of grade B and C barcode labels is possible but the barcode scanner manufacturer's performance specifications cannot be guaranteed in this case.
- ◆ Do not use yellowed, stained, creased, wet or damaged barcode labels.
- ◆ The adhesive labels must be flat and not peeling off at the edges.
- ◆ Use barcodes printed by a thermal-transfer or photographic quality printer (not a dot-matrix printer).
- ◆ Use a barcode testing device to verify the barcode quality.
- ◆ The barcode label surface must be clean.
- ◆ We recommend you to ensure the quality of the barcodes by implementing a local SOP (Standard Operating Procedure).



**Note:** For more information see the *Operating Manual of the pipetting instrument* (refer to the sections on *Barcode Quality and Barcode Positioning*).

- ◆ Barcodes for carriers (e.g. microplate carriers and tube racks) contain information on the carrier type. The carrier type is coded in the first three digits of the barcode and is also shown in the Edit Carrier dialog box. Freedom EVOware will output an error during script or process runtime if the carrier type indicated by the PosID/PosID-3 barcode scanner does not match the type which you have used in the worktable definition.
- ◆ For (custom) tube racks, make sure that the barcode which is fitted is appropriate for the tube rack type. The carrier (tube rack) type is coded in the first three digits of the barcode and is also shown in the Edit Carrier dialog box. Do not use the wrong tube size in the tube rack (e.g. do not use 13 mm tubes in a tube rack which is intended for 16 mm tubes). This will cause scanning and pipetting errors. The PosID/PosID-3 calculates the expected position of the tube barcodes according to the tube rack type which is shown on the tube rack barcode.

In the settings for the PosID (or PosID-3) command:

- ◆ Only choose the barcode types which are used on the barcode labels. This makes it easier for the scanner to identify incorrect barcodes.
- ◆ If the barcode type you are using has start and stop characters, they must be activated in the settings.
- ◆ If the barcode type you are using has a checksum (check digit), it must be activated in the settings.
- ◆ If the barcode type you are using does not have a checksum, you must always specify the actual number of barcode characters used (do not specify 0).

Notes on specific barcode types:

- ◆ **Codabar:** You must always specify the actual number of barcode characters used (do not specify 0) and you must always use a check digit (modulo 16). This barcode type is not recommended due to reading security.
- ◆ **Code 128:** This barcode type always has a check digit - you do not need to activate the checksum in the PosID/PosID-3 command explicitly. This barcode type is widely used and has good reading security (and used by Tecan for carrier barcodes).
- ◆ **Interleaved 2 of 5:** You must always specify the actual number of barcode characters used (do not specify 0) and you must always use a check digit (modulo 10). The number of characters is always even for this barcode type. The barcode should have at least 6 characters. This barcode type should not be used due to reading security.
- ◆ **Code 39 Full ASCII:** Only use with a check digit (modulo 43).
- ◆ **Code 39:** Only use with a check digit (modulo 43).
- ◆ **EAN-128:** This barcode type is a special version of Code 128 which is often used for commercial and industrial applications. It always has a check digit - you do not need to activate the checksum in the PosID/PosID-3 command explicitly. It is limited to numeric data and has good reading security.

Only use barcodes with a specified length and a checksum (check digits) for general purpose pipetting applications. This ensures that incorrectly scanned barcodes are always detected.

**Note:** The following special characters must not be used in barcodes: ! % & ~ ( ) = | as well as carriage return and line feed



## D Glossary

### Purpose of This Chapter

This chapter consists of two parts:

- ♦ The first part (section [D.1 “Glossary of Terms and Instrument Options”](#), [D-1](#)) explains a number of important terms which are used in this manual. The terms are listed in alphabetical order.
- ♦ The second part (section [D.2 “Important GUI features in MS Windows Applications”](#), [D-27](#)) explains the most common Windows controls you will encounter in many screens, dialog boxes, message boxes and forms shown in this manual.

### D.1 Glossary of Terms and Instrument Options

This section provides an explanation of important terms which are used in this manual and describes some of the more common options for Tecan pipetting instruments. Contact Tecan for information on the options which are available for the pipetting instrument version and pipetting software version that you are using.

#### **3-way valve box**

The 3-way valve box is a component of the Te-Flow option, which provides support for the In Situ Hybridization method.

#### **6-way valve**

The ChemSystem option includes a 6-way valve to allow you to switch between six different system liquids. A 6-way valve is also available for the → **Te-Fill option**. It allows you to switch between six different liquid containers.

#### **<base>**

Placeholder which represents the original location of the object (the labware source).

#### **<install\_path>**

Placeholder which is used in this manual to represent the installation path of the Freedom EVOware software. The default installation directory of Freedom EVOware is C:\Program Files (x86)\Tecan\EVOware. You may decide to choose another directory when you install the software. The installation path is also dependent on the language version of your operating system.

#### **<none>**

Placeholder to indicate that the parameter is unused (e.g. if you want to execute a plate robot movement command without using the barcode scanner).

#### **<object>**

Placeholder to indicate an object (typically a plate lid or plate insert).

#### **Active Positioning Carrier (APC)**

Carrier fitted with an electromagnetic clamping device which is used to hold microplates and align them precisely.

#### **Active WashStation**

The Active WashStation is an instrument option which is used for washing Active Tips and ZipTips. It is provided with a pressure pump and a waste container. Note: Active Tips are no longer supported by Freedom EVOware.

### **ActiveTip**

An Active Tip is an electrically activated tip which dispenses very small quantities of liquid down to 0.5 nl (nano liters). Active tips are equipped with a micro pump and a piezo-actuated pump chamber.

With Active Tips, dispensing is metered by the micropump rather than by the dilutor. The droplet volume depends on the electrical drive parameters (voltage, frequency and pulse width). Each Active Tip is individually tested and is supplied with its own drive parameters which are required for proper functioning.

Active Tips are a component of the Tecan Nanopipetting System (NPS). Active Tips are no longer supported by Freedom EVOware. For other tip types → **Tip**.

### **Air (displacement) liquid handling arm (Air LiHa)**

Robotic arm with multiple tips for general pipetting tasks. The Air LiHa picks up disposable tips to aspirate / dispense liquids. Its working principle is based on air displacement technology (variation of an air chamber); a → **Plunger Drive**, directly mounted on top of each Z-rod (pipetting channel), varies the volume of an air chamber for aspiration and dispensing (compare: Liquid handling arm).

### **Airgaps**

Airgaps are necessary for separation of different liquid segments inside tubing and tips. In order to avoid disintegration, airgaps should be kept below 30 µl. For the same reason, the airgap aspiration speed should not exceed 70 µl/second.

### **Air LiHa**

→ **Air (displacement) liquid handling arm (Air LiHa)**

### **Aquarius**

The Aquarius is a compact robot pipetting instrument which is supplied with its own pipetting software. Many of the Aquarius functions are similar to those of the Te-MO 3/3 (Tecan Multi-Pipetting Option), which is an option for the Freedom EVO series of pipetting instruments. Aquarius is equipped with a specially designed pipetting system which can pipette up to 384 wells simultaneously, resulting in an extremely high throughput and efficiency. With the Aquarius instrument, the same volume is pipetted by all of the tips.

### **Aspiration speed**

In general, a decrease of the aspiration speed will increase precision and accuracy. Very low aspiration speeds (30-70 µl/second) are required when pipetting small volumes (< 25 µl) or when pipetting liquids with high viscosity or low boiling point. Liquids with a viscosity higher than that of water may also require an aspiration delay.

### **Autoloader**

The Autoloader is an optional plate feeder and storage system for → **Aquarius** pipetting instruments. The Autoloader, which is installed on the right side of the Aquarius, is provided with six stacker columns. Each stacker column can accommodate up to 50 pieces of labware.

### **Calibration volume**

Use of the Calibration tool requires knowledge of the actual absolute pipetting volume error.

### **CAN bus (Controller Area Network)**

High-speed data bus which is used internally by Tecan pipetting instruments for interconnecting devices such as the → **Liquid Handling Arm**.

### **Carousel**

The carousel is a motor-driven magazine system which is used to store microplates, tube racks or DITl racks and to present them to the instrument for pipetting operations. Each carousel can have 1 to 9 towers. The labware is removed from the carousel and re-inserted using the → **RoMa**. The carousel can be fitted with a barcode scanner which can read barcode labels on plates when they are inserted and removed. The carousel can be used like any other microplate hotel on your pipetting instrument.

The Carousel NT supersedes the standard carousel and features a number of electrical and mechanical improvements, including faster operation and safety doors which can be fitted with doorlocks.

### **Carrier**

A carrier is a removable support or mount on the instrument's worktable (i.e. deck) which holds one or more pieces of labware in place. Carriers can be fitted to the instrument's worktable at pre-defined grid positions (see [Fig. 11-8](#), [Fig. 11-18](#)).

In Freedom EVOware, carriers are also used to represent positions on devices which can be accessed by the plate or tube robot. For example, the plate robot can put a microplate onto the shuttle of the Te-Stack stacker when the shuttle is at the transfer position.

The carrier name indicates the labware type for which it is designed (for device carriers, it indicates the device type).

### **Carrier code**

Code which indicates the carrier type. This is the first three digits of the barcode at the end of the carrier. All standard Tecan carriers and tube racks have a unique carrier code.

### **Carrier unit**

→ **Grid Unit**.

### **Carry over**

Residue of sample liquid that remains in a tip after rinsing at the end of a pipetting cycle. Such residue is "carried over" to the next cycle and could cause contamination. Where no carry over is admissible, → **DiTis (Disposable tips)** must be used.

### **Cellerity, CellGEM**

Tecan Cellerity is a modular system based on the Freedom EVO series of pipetting instruments which allows you to automate typical cell biology processes for adherent cell lines such as cell feeding, harvesting and passaging. CellGEM is the Tecan application software for the Cellerity system.

### **CGM (Common Gripper Module)**

The CGM is a robot arm with gripper fingers that can grip and move objects such as microplates. It is a hardware option for the → **MCA384** (Multi Channel Arm 384).

### **ChemSystem**

An option which allows you to use up to 6 different system liquids in the pipetting instrument. It consists of a 6-way valve to select the required system liquid, a nitrogen valve and the vacuum assisted waste option.

### **Cleaner position**

Part of a wash station into which the tips are placed to wash the outside of the tips using the system liquid. The used liquid then flows off through the waste tubing into the waste container. → **Waste position**.

### Clot detection

Two different technologies are available for the Freedom EVO pipetting instrument series to detect clots which have been aspirated by the pipetting tips: capacitive and pressure-based. The capacitive method is always available and the pressure-based method is optional.

With **capacitive clot detection**, a message is output if the difference between the liquid levels measured before and after sample aspiration does not correspond to the calculated level difference, indicating that clots are attached to the tip. Capacitive clot detection is only available if capacitive liquid level detection has been activated in the liquid class.

Capacitive liquid level detection (cLLD) works in both directions, i.e. when the tip is moved into a liquid and when it is retracted again. This allows detection of aspirated clots, e.g. blood clots. The software stores the height at which the tip enters the liquid. The volume aspirated and the container or tube diameter are known. The software can then calculate the height at which the tip should leave the liquid again when it is retracted. If the exit height is too high, it can be assumed that a clot is hanging from the tip. See also [10.2.1 “LiHa Aspirate Parameters \(Fixed Tips and DiTis\)”](#), [10-8](#), *Use exit signal detection*.

With **PMP clot detection**, a message is output if abnormal pressure values are detected in the pipetting tip when aspirating, indicating the presence of a clot or tip blockage. PMP clot detection requires the → **MultiSense** hardware option. MultiSense is available by default for the Air-LiHa and as an option for the liquid LiHa. It is compatible only with LiHa DiTis.

### Compartment (of well)

Some special labware types (e.g. for protein crystallography) have wells with several compartments (cavities). Freedom EVOware can pipette a different liquid into each of the compartments. Each well typically has one main compartment and one or more satellite compartments which are directly adjacent and are often smaller in size.

### Columbus washer

The Columbus Washer is used for stripwise washing of 96-well microplates (optional: 384-well microplates). It can be equipped with either a 8, 12 or 16 way manifold or a 384 way manifold, each of which are provided with one aspirating and one dispensing needle per well. It can store up to 9 user-defined labware types that define the dispensing and aspirating positions for round or flat bottomed plates. The dispensing and aspirating speeds can be selected from 5 pre-defined speed settings. For dispensing, an additional drip mode setting is available which allows a wash liquid to be added drop by drop. In the soaking phase, you can also activate a microplate shaking mechanism. These features allow the device to be used for all ELISA microplate washing applications including cell washing.

### Command

In Freedom EVOware, script commands are used to specify pipetting operations. A collection of script commands is called a pipetting script. Device commands are used to implement device-specific functions such as washing a microplate in a plate washer. Each device has its own set of commands.

### Conditioning volume

Volume of excess liquid that is aspirated together with the liquid to be distributed and immediately discarded (usually in the source container) before the dispense process starts. It serves to create a controlled state of the system. The use of a conditioning volume will help to dispense the first portion of a multi-pipetting distribution under conditions most similar to those of the subsequent portions. This is because the mechanical backlash of the dilutor drive is eliminated after dispensing the conditioning volume.

**Configuration**

Freedom EVOware stores information on fixed and variable parts of the pipetting instrument in an internal database and a set of configuration files. It also stores information on the dimensions of carriers and labware items and the configuration settings for the optional devices. The Configuration is edited with the Configuration Tool, which is started by clicking *Configure* in Freedom EVOware's toolbar.

**Connection box (Te-Flow)**

Valve box for use with the Te-Flow option.

**Container**

Individual well or tube which is used to contain liquid (see [Fig. 11-8](#), [Fig. 11-18](#)).

**CRC (checksum)**

Cyclic redundancy check. A method which used to calculate a checksum for files or data. Freedom EVOware uses a CRC checksum to check whether configuration files have been corrupted or modified outside of Freedom EVOware.

**CRC Editor**

Carrier/Rack/Container editor (part of the Tecan Instrument Software). It is used to edit the CRC database. See [1.2 "Reference Documents"](#), [Fig. 1-3](#) for more information.

**Deep-well plate**

A type of microplate with a capacity of more than 400 µl for each well. Mainly used for pre-dilution and/or for storage of serum.

**Detection speed**

Speed at which the liquid level is detected. Because liquid level detection is based on measurement of the capacitance, the correct detection speed is dependent on the conductivity of the liquid used as well as on the well geometry. The normally used liquid level detection speed (500-800 mm/s) must be reduced when pipetting small volumes of distilled water or organic solvents.

**Device**

Single intelligent piece of hardware (such as a plate washer or a robot pipetting arm). It is controlled by Freedom EVOware using a device driver. The device drivers which were chosen during the Freedom EVOware installation are visible in the Worktable Editor and/or in the Control Bar.

**Dilutor**

Precision pump that aspirates and dispenses exactly defined volumes of liquid by means of motor-driven syringes. The XP 3000 dilutor consists of a syringe pump and a 3-way valve that is connected through flexible tubing to the pipetting tip and a system liquid reservoir. Each tip has its own dilutor.

The XP dilutor supports syringe sizes from 25 µl to 5 ml. The XLP dilutor supports syringe sizes from 50 µl to 50 ml. In addition it has a high resolution mode which allows more accurate pipetting. The XMP dilutor is used by the Freedom EVO 75 pipetting instrument.

**Dispense speed/breakoff**

The dispense speed never should be set below 250 µl/second to guarantee laminar liquid flow at the tip face and to avoid droplets forming on the tip when dispensing from above the liquid surface. The maximum dispense speed may be limited by foam formation as well as by the shape and size of the destination container. When pipetting very small volumes, the speed of the liquid flow often is limited by the dilutor drive's maximum acceleration.



### **DiTi (Disposable tip)**

Disposable pipetting tip, often made of plastic. DiTis are normally only used for a single aspirate/dispense cycle and are discarded after use. DiTis are used when it is essential that no residues from one sample are carried over to the next → **Carry over**, → **DiTi waste**.

**LiHa DiTis** are DiTis which are fitted to the liquid handling arm (as opposed to the → **MCA** or → **Te-MO**).

### **DiTi rack**

Rack (also called DITI tray or box) containing disposable tips which can be placed on the worktable to allow the DiTis to be picked up by the → **LiHa**.

**Stackable DITI rack:** Special DITI rack design which can be stacked using plastic spacers to form a pile of racks. The pile can be put on the worktable. This avoids the need for a carousel if the number of DITIs required by your script or process is not too high. The Get DITIs command picks up DITIs from the DITI rack which is on the top of the stack. When the DITI rack is empty, it is removed from the pile together with the spacer to reveal the next DITI rack in the stack. Stackable DITI racks can only be used with the LiHa.

**Nested DITIs:** Special DITI rack design with 96 DITIs which can be stacked to form a pile of racks. The pile can be put on the worktable or stored in the Te-Stack. When the racks are stacked, the DITI tips slide inside the DITIs on the layer below to save space. Each layer of DITIs has its own rack. Nested DITIs can only be used with the MCA96 or MCA384.

### **DiTi Waste**

Waste chute for collecting used DiTis. → **Lower DITI Eject**.

### **DMSO**

Dimethyl sulfur oxide (reagent).

### **Dongle**

→ **Hardlock**.

### **Dynamic Link Library (DLL)**

A Dynamic Link Library (DLL) is a collection of programs that can be loaded and used while the executable application program (exe) is running. One DLL can be shared by several application programs at the same time.

### **EEPROM**

(Electrically Erasable Programmable Read-Only Memory). Memory chip for non-volatile storage of parameters and/or executable software instructions. Non-volatile means that the data is not lost when the power supply is switched off. An EEPROM behaves like an ordinary → **ROM (Read-Only Memory)** during normal operation. However, an EEPROM can be erased electrically and then re-programmed. For some applications, EEPROMs are now being replaced by → **Flash memory**.

### **Error handling mode**

Identifies the system reaction (e.g., stop instrument and call operator, or aspirate at Z-max, or skip sample, etc.) which is triggered by an error condition.

### **EVOware**

Tecan control and automation software for the Freedom EVO series of pipetting instruments.



**Exit signal detection**

Exit signal detection (also called dip out signal detection) detects the liquid surface through a change of the electrical capacitance of the pipetting tip when the tip is retracted and exits the liquid. It is carried out just after aspirating. The measured liquid level is then compared with the liquid level which should have resulted from the aspiration. → **Clot detection**.

See also [10.2.1 “LiHa Aspirate Parameters \(Fixed Tips and DiTis\)”](#),  10-8, *Use exit signal detection*.

**Freedom EVOware Administrator**

System administrator for the Freedom EVOware software.

**Excess volume**

Used for multi-pipetting mode. Volume of excess liquid that is aspirated together (not separated by an airgap) with the liquid to be distributed. It is not dispensed anywhere, but is discarded to waste (or to a special position) after use. Use of an excess volume ensures that the volume of the last portion of a multi-pipetting distribution is the same as previous portions. To a certain extent, excess volume can also help to prevent the pipetted sample from being diluted by the system liquid.

**Exchange position**

→ **Transfer position**.

**Execution parameters**

Device-specific parameters which are used when a device command is executed. They can be configured individually for each process step or script line. To view or edit the execution parameters in Freedom EVOware Plus, double-click on the process step in the Process Editor. To view or edit the execution parameters in Freedom EVOware Standard, double-click on the script command for the device in the Script Editor.

**FACTS**

Flexible Assay Controller and Task Scheduler. Tecan advanced dynamic scheduling software.

**Fast Wash Option (FWO)**

The FWO is used to pump a large amount of liquid at high speed through the system, normally to flush the tips. The Fast Wash Option (formerly called FaWa) is included with the → **MPO** (Monitored Pump Option) and the → **SPO** (Sensored Pump Option).

**Firmware**

Control software residing semi-permanently in an → **EEPROM** or Flash memory. In Tecan pipetting Instruments, firmware is used to control hardware components (motors, pumps, syringes etc.) via the respective control boards. In certain cases it is necessary to download a firmware file from the hard disk to the respective EEPROM. Optional devices such as the PosID barcode scanner are also controlled by firmware.

**Firmware command**

Combination of machine parameters which instructs the pipetting instrument to perform a specific action such as moving one of the robot arms in a specified direction. The commands must follow the rules and syntax of the instrument’s firmware command set. Firmware commands can also be sent to optional devices such as the PosID barcode scanner. See the respective instrument manual for a list of firmware commands. Also called **Command string**.

**Fixed tip**

General term for a tip that can be screwed to a pipetting device (e.g. → **LiHa**). Unlike a → **Disposable tip (DiTi)** it is rinsed after each pipetting cycle and can be used again.

**FlaskFlipper**

The FlaskFlipper hardware option is one of the components of the Tecan Cellerity system. It is mounted on the worktable of the pipetting instrument and is used to load, unload, hold, shake and knock the cell culture flasks.

**Flash memory**

Memory chip for non-volatile storage of parameters and/or executable software instructions. Non-volatile means that the data is not lost when the power supply is switched off. Flash memory can be erased electrically and then re-programmed.

**Flushing the instrument**

Procedure that rinses the entire liquid system of the pipetting instrument for the purpose of removing air pockets or exchanging the system liquid. The liquid flows through the dilutors and tubing and exits through the tips into the waste position of the wash station.

**Free air dispensing**

Dispensing liquid without the tip touching the liquid surface. Free air dispensing is sometimes called jet dispensing. The opposite of free air dispensing is → **Submerged dispensing**.

**Freedom**

Tecan Freedom pipetting instrument.

**Freedom EVO**

Tecan pipetting instrument series. Depending on the model, the Freedom EVO can be fitted with up to three robot arms (up to two liquid handling arms, two plate robots and/or two tube robots). It can be interfaced to a wide range of Tecan and third-party laboratory devices such as centrifuges and a laser scanners.

**FSE**

Tecan Field Service Engineer. The FSE is a specially trained and authorized person who is responsible for installation and initial set up of the Tecan instrument. He or she is also responsible for service and maintenance and should be contacted if there are any problems with the system.

**Gemini**

Control and automation software for the Tecan Genesis and Genesis Freedom series of pipetting instruments.

**Genesis**

A series of Tecan pipetting instruments. The Genesis series is fitted with a liquid handling arm (LiHa) and plate and tube robots (RoMa and PnP). It can be interfaced to a wide range of Tecan and third-party laboratory devices such as a centrifuge and a laser scanner.

**GENios reader**

The Tecan GENios is a fully automatic computer-controlled microplate reader for measuring samples in microplates. It fulfills the requirements for numerous fluorescence, absorbance and glow type luminescence applications in research and routine investigations. It can be used with 384, 96, 24, 12 or 6 well microplates. The filters are arranged in filter slides which allow up to four excitation filters and four emission filters.

### **GENios Pro reader**

The Tecan GENios Pro is a multifunctional microplate reader with injector option. The GENios Pro provides high performance for the vast majority of today's microplate applications and research and is robotic compatible. It supports several measurement techniques such as Fluorescence Intensity (FI), Fluorescence Time Resolved (FTR), Fluorescence Polarization (FP), Flash Fluorescence, Absorbance, Absorbance with Injectors, Glow Type Chemi- or Bioluminescence, Bioluminescence Resonance Energy Transfer (BRET) and Flash Luminescence.

Any common microplate ranging from 6 to 384 well format maybe measured with any of the above measurement techniques. Switching between measurement techniques or labware formats is fully automated via software. It is designed for optimum sensitivity and speed of measurement.

### **Grid unit**

Unit of measurement (25.0 mm, **not** 1 inch) on the worktable of the pipetting instrument. Corresponds to the spacing between the positioning pins in the X direction. Also called → **Carrier unit**.


### **Grid, grid position**

Objects such as carriers are held in place on the instrument's worktable by a grid of positioning pins (clips). This ensures that they are accurately fixed at discrete positions. The positioning pins are spaced 25.0 mm apart in the X direction. Grid position 1 is on the left of the worktable. In Freedom EVOware's Worktable Editor, you can only position objects at grid positions and not in between.

### **GUI**

Graphical User Interface (of a computer program).

### **Hardlock**

Software copy protection device (dongle) which is plugged into the USB port of your PC. Different hardlock versions enable different Freedom EVOware software feature levels (see [3.1.2 "Hardlocks for Freedom EVOware Standard and Freedom EVOware Plus"](#),  3-2).

### **Heating block**

Component incorporated in options like Te-MagS, Te-Shake or the Incubation Device that is used to heat up samples and to keep them at a defined temperature.

### **Hettich centrifuge**

Centrifuging device from the Hettich company which is fitted below the worktable and secured to the floor. It can be loaded and unloaded by reaching through a hole in the worktable with a robot. It can perform centrifuging of samples at configurable speeds and temperatures.

### **Hit-Picking Wizard**

The Hit-Picking Wizard is a software add-on for Freedom EVOware. It creates a pipetting script which picks samples from source labware and dispenses them into destination plates according to a configurable destination plate layout (dispense map). A "sample list" file (input file) specifies the location of the samples you want to process.

### **Hotel (RoMa hotel)**

Device (e.g. arrangement of shelves) which is used to store (i.e. park) objects such as labware which can then be picked up by the RoMa for placing on carriers. Hotels are normally put at the rear of the worktable.

### **Hydroflex Software**

Tecan control software and driver system which is used by certain Tecan plate washer models. The Hydroflex software, which must be installed separately, installs its own commands for the washer in the Freedom EVOware Control Bar. Refer to the Hydroflex and/or washer documentation for information on using the commands within Freedom EVOware scripts and processes.

### **ILID**

**I**ntegrated **L**iquid **D**etector. Electronic device mounted on the liquid handling (LiHa) arm. The ILID monitors the capacitance between the pipetting tip and electrical ground (worktable) and generates a signal when there is a sudden change in capacitance caused by the pipetting tip coming in and out of contact with an ionic solution. The signal is used for liquid and clot detection.

### **Incubator**

An incubator is a device which is used to keep labware containing samples or reagents at a defined temperature for a specified length of time, for example until the desired biological or biochemical reaction has taken place.

A heated incubator incorporates a → **Heating Block** and a control circuit and can be fitted with a shaker option.

A Room Temperature Incubator provides a location where labware can be kept at room temperature.

The Base Incubator treats the base (labware source) location of a piece of labware as a room temperature incubator. The labware is taken back to its base position and left there for a specified length of time. In Freedom EVOware, the base incubator is a software concept. It is not a device which you can fit to your pipetting instrument.

See also → **Te-Thermix**.

### **Initialization**

Term used to describe the calibration of one or more axes of the pipetting instrument. This is done by moving the instrument arms etc. to predefined positions. When initializing the dilutors, the LiHa is moved over the Wash Station (if it is defined on the worktable) to avoid liquid dripping onto the instrument deck. The pipetting instrument uses an absolute coordinate system that requires X/Y/Z calibration.

### **Instance of a process**

To achieve the maximum throughput (efficiency) of the pipetting instrument, for example the maximum number of processed microplates per hour, Freedom EVOware Plus allows you to run several copies of the same process in parallel. This allows Freedom EVOware Plus e.g. to fetch a microplate from the carousel while pipetting is taking place on another microplate. Each copy of the process is called an instance (or "iteration"). The number of process copies you want to run is chosen in the Runtime Controller when you run the process. Each process instance is given a unique number (the process instance ID, counting from 1).

### **Instrument (pipetting instrument)**

A number of devices which work together. One of the devices is normally a robot pipetting arm. Other devices can be e.g. a centrifuge, a plate washer or a barcode scanner, depending on the requirements of your application or experiment. Pipetting instrument are normally provided with a → **Worktable** (deck).

### **Instrument step**

Smallest unit of movement for the servo motors of the pipetting instrument (0.1 mm).

### **ISH**

In Situ Hybridization method, requires the Te-Flow option.

### **Labware**

Disposable item such as a microplate or a sample tube. Microplates have a regular arrangement of containers or cavities (wells) for holding liquid samples or reagents (see Fig. 11-8, 11-18). During pipetting, microplates are normally placed on carriers. Tubes are inserted into tube racks or strip racks. The carriers and racks are placed on the worktable of the pipetting instrument at pre-defined positions.

### **LICOS**

Liquid Container Supervisor. The LICOS option is a device which monitors the liquid level in the waste liquid and system liquid containers. It outputs a warning if the waste container is nearly full or if the system liquid container is nearly empty. LICOS is included with the Monitored Pump Option (MPO).

### **LiHa (Liquid handling arm)**

Robot arm on the pipetting instrument which is mounted on the X-slide and typically holds four or eight pipetting tips. It is used for pipetting samples in different volume ranges, depending on the tip types used and the features of the liquid system [compare: Air (displacement) liquid handling arm].

### **Liquid arrival check**

The Liquid Arrival Check (LAC) feature verifies that the correct liquid volumes have been dispensed by weighing the labware before and after pipetting. The labware must be put onto a special balance (pooling balance) for the dispense operation. Freedom EVOware automatically calculates the liquid volume from the weight difference and compares the results with the volume specified in the pipetting command. An LAC error is output if the two values differ by more than the maximum volume deviation which is specified in the liquid class.

The LAC feature is only supported by special balance types such as the Mettler WM pooling balance. This balance has a built-in tube rack for 16 x 13 mm tubes and is commonly used for liquid pooling operations. In Freedom EVOware, the LAC feature is configured in the settings for the liquid class.

### **Liquid class**

Set of properties defining a theoretical model for a particular type of liquid. Liquid classes are identified by a generic name (e.g., *Serum*, *Buffer*, *Ethanol*, etc.) and include all liquid handling parameters required to process liquids of that type. The liquid classes can be edited with the Liquid Class Editor.

### **Liquid distributor**

A liquid distributor is a device which is used to distribute liquid. For example, the Liquid Distributor 1-to-4 distributes liquid from a (main) tube to four smaller tubes. The Liquid Distributor 1-to-3, which is used by the Nano-Pipetting System, also contains a valve system to route system liquid between the Fast Wash pump, the Active WashStation and the dilutors/Active Tips according to the function being performed. Note: Active Tips are no longer supported by Freedom EVOware.

### **Liquid handling parameters**

Set of parameters that influence the liquid distribution process (e.g., aspirate and dispense speeds, delays, liquid level detection, tracking, etc.).

### Liquid level detection (LLD)

Two different liquid level detection technologies are available for the Freedom EVO pipetting instrument series: capacitive and pressure-based. The capacitive method is always available and the pressure-based method is optional.

Capacitive liquid level detection (cLLD) detects the liquid surface through a change of the electrical capacitance of the pipetting tip when the tip enters or exits the liquid.

Pressure-based liquid level detection (pLLD) detects the liquid surface through a change of pressure in the airgap between the sample and the system liquid when the pipetting tip enters or exits the liquid. pLLD requires the → **MultiSense** hardware option. MultiSense is available by default for the Air-LiHA and as an option for the liquid LiHA. It is compatible only with DITIs. In contrast to cLLD, pLLD is also suitable for detecting non-conductive liquids.

The LLD settings can be configured individually for each liquid class (liquid type). The liquid class can be configured to use cLLD, pLLD or both systems in parallel.

### Liquid system

All instrument modules and parts that contain or directly influence liquid (tubing, dilutors, valves, tips, etc.).

### LIMS

Laboratory Information Management System. Also called Laboratory Information System (LIS). Overlying software which is used to control the operations to be carried out in a laboratory and to store the results of the tests or assays, normally in a database.

### Loading Interface

The Loading Interface is a hardware option for the pipetting instrument which detects when labware items (typically tube racks) are put onto the worktable (or removed again). It requires special labware which is fitted with a small magnet which activates a proximity switch.

The presence or absence of the labware is reported to Freedom EVOware. In addition, Freedom EVOware can control LEDs fitted to the front edge of each grid position to indicate to the operator that labware should be exchanged and/or should not be exchanged. The Loading Interface is normally controlled by the Sample Oriented EVOware software add-on. Sample Oriented EVOware provides special script commands for specifying which grid positions contain labware which needs to be exchanged and should be monitored by the Loading Interface hardware.

### Low volume option

The Low Volume option allows the LiHa to pipette small volumes as low as 0.5 µl with free dispensing, i.e. the tips are not touching the liquid. Even smaller volumes can be dispensed if tip touching is used. The main components of the Low Volume option are the pinch valve, the low volume pipetting tubing, the thinner low volume tips, and the pressure relief valve, which reduces the pressure in the tubing system. Impulses in the pinch valve drive tiny droplets out of the tip. The Low Volume option can only be used with a system liquid of water.

### Lower DITI Eject

Hardware option to discard DITIs at a lower height, e.g. to minimize contamination due to aerosols which could arise when the DiTis drop down into the → **DiTi Waste**. This option is required by the Set DiTis Back command.

### **Magellan**

The Magellan software is a Tecan option which is used to control microplate readers (e.g. photometers) and to carry out data analysis using stored procedures. The Magellan software, which has its own installation procedure, has built-in drivers for Tecan microplate readers.

### **Matrix Assisted Laser Desorption Ionization (MALDI)**

Technique in which the sample is in a state where it is evenly mixed with a mass matrix. The matrix absorbs a nitrogen laser and converts it into thermal energy. At the same time, a minute amount of the matrix rapidly heats (within several nanoseconds) and vaporizes with the sample.

### **MCA (Multi Channel Arm)**

The **MCA96** is a special liquid handling arm which is fitted with a 96-tip pipetting head. The pipetting head can be fitted with a tipblock (a replaceable block with 96 tips) or with DITIs. The spacing between the tips is fixed (9 mm). The MCA96 can be optionally fitted with gripper fingers to allow it to pick up and move labware. In contrast to the RoMa, the gripper fingers cannot be rotated (they are always parallel to the X axis of the pipetting instrument).

The MCA96 has important performance advantages when pipetting to a large number of wells simultaneously. For mechanical reasons, the same volume is pipetted by all of the tips.

The **MCA384** is a special liquid handling arm which can be fitted with a 96 or 384 fixed tips or disposable tips (DITIs). The spacing between the tips is fixed (9 mm and/or 4.5 mm). So-called head adapters are used to adapt the pipetting head to the different tip types. The MCA384 can be optionally fitted with a gripper system (**CGM**, common gripper module) which can be used to pick up and move labware. The gripper module can be rotated.

### **Method**

In Freedom EVOware, a method is a set of one or more processes to be run together (either sequentially or in parallel). The method file also contains information on the runtime settings. Methods are created and saved in the Runtime Controller. Methods are only supported by Freedom EVOware Plus.

### **Microplate**

Disposable component with standardized dimensions which has a regular arrangement of containers or cavities (wells) for holding liquids or samples. Common microplate types are provided with 96 or 384 wells.

### **MIO**

Monitored Incubator Option. Consists of a heated incubator with optional shaker device.

### **Movement axes**

The various arms with which an instrument can be equipped can move in several axes. The most important axes are listed below. Note that not all arms can move in all of the listed axes.

- X-axis, left/right movement along the worktable front
- Y-axis, front/rear movement
- Z-axis, vertical up/down movement
- R-axis, for rotational movements (e.g. of RoMa gripper head)
- G-axis, for opening/closing grippers (RoMa, PnP)

### **MPO**

Monitored Pump Option (consists of FWO and LICOS). The MPO is used to pump a larger amount of liquid at higher speed through the system, normally to flush the tips. → **SPO**.



### **MTP**

Abbreviation for microtiter plate. → **Microplate**.

### **Multi Pipetting Option**

→ **Te-MO**.

### **Multi Channel Arm**

→ **MCA**.

### **Multi-pipetting mode**

With multi-pipetting mode (also called multi-dispensing mode), a quantity of liquid is aspirated and the liquid is then dispensed in portions into several destination wells. → **Single Pipetting mode**.

### **MultiSense**

MultiSense is a hardware module available per default on the Air-LiHA and as an option on the liquid LiHA.

MultiSense is only compatible with 200 µl and 1000 µl LiHA DITs. It requires a pressure sensor, i.e. a MultiSense adapter. Either four or eight tip positions can be fitted with the MultiSense option.

The MultiSense hardware allows Pressure Monitored Pipetting (PMP) and liquid level detection (pLLD). In contrast to the capacitive liquid level detection (cLLD), pLLD is also suitable for detecting non-conductive liquids. The PMP and LLD settings can be configured individually for each liquid class (liquid type). The liquid class can be configured to use cLLD, pLLD or both systems in parallel.

### **Normalization Software**

The Normalization Software is an add-on for Freedom EVOware. The Normalization Wizard creates a pipetting script which dilutes samples of varying concentration so that the concentration of each sample is uniform across the destination labware.

The Quantitation Wizard is an option that works in conjunction with Freedom EVOware and the Magellan software to determine the initial concentration of the samples. The Quantitation Wizard can also be used to dilute highly concentrated samples prior to measurement and normalization. The Normalization Wizard imports the concentration data from the Quantitation Wizard or from a data file. The samples are then normalized into a single piece of labware, with all samples having the same concentration.

### **NPS**

Tecan Nanopipetting System. It uses piezo-controlled → **ActiveTips** for dispensing very small quantities of liquid.

### **Nucleic Acid Testing (NAT)**

Method of testing blood that is potentially more sensitive than conventional tests that require the presence of **antibodies** to trigger a positive test result.

### **Object parameters**

In the Process Editor, the bottom half of each process step icon shows the name or names of the labware and/or devices which are involved in the operation. They are called object parameters. The RoMa\_MoveObject command has three object parameters:



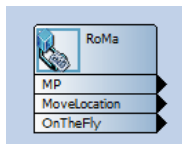


Fig. D-1 Object parameters of the RoMa\_MoveObject command

See also 9.8.4 “Locations”, 9-59.

### On the fly device

Some devices require the use of the RoMa (plate robot) to carry out their function. A typical example of this is the Symbol LS-1220 barcode scanner which is rigidly fixed to the instrument's deck and cannot move towards the labware to scan it. Instead, the RoMa is used to move the labware past the barcode scanner “on-the-fly” while carrying out something else, for example when moving the labware from one carrier to another. The barcode scanner is then instructed to perform a read operation when the RoMa presents the labware. Such devices are called on-the-fly devices.

### PCR Block

Heating block which can be fitted to the Te-MagS or Te-Shake. It is used for → **Polymerase chain reaction** sample preparation.

### Pinch valve

Used by the Low Volume option. Allows small quantities of liquid to be dispensed accurately.

### Pipetting script

Sequence of pipetting commands. → **Script**

### Plate

→ **Labware**, → **Microplate**.

### Plate robot

→ **RoMa**

### Plunger

The piston  
 - in a → **Syringe** or  
 - in a pipetting channel of a → **Multichannel pipetting head (MCA,Te-MO)** or  
 - in an air chamber of an → **Air LiHa** pipetting channel.  
 It aspirates liquid by moving upwards and dispenses it by moving downwards.

### Plunger Drive

Drive module on the Air LiHa which moves a → **Plunger** upwards and downwards within an air chamber located just above the tip in order to aspirate and dispense.

### PnP (Pick and Place arm) or tube robot

Robot arm equipped with special grippers that can pick up, transport and place small objects within the working area of the pipetting instrument. It is typically used to transport tubes with samples. Current Tecan pipetting instruments can be fitted with up to two PnP arms. Movements of the robot arms between different positions are called vectors.

### PnP vector

A predefined sequence of PnP movements which define an action like getting a tube from a tube rack. Also called Tube Robot Vector.

### **Polymerase Chain Reaction (PCR)**

An in vitro technique for rapidly synthesizing large quantities of a given DNA segment. It involves separating the DNA into its two complementary strands and synthesizing two-stranded DNA from each single strand, and repeating the process.

### **PosID (Positive Identification System)**

The PosID (Positive Identification System) is a movable barcode scanner which can be used to read the barcode labels on carriers, labware and tubes. Unlike fixed barcode scanners, it does not need a robot to bring the labware to it. The PosID is installed at the rear of the pipetting instrument and is provided with a gripper which pulls the carrier towards the rear for barcode identification and then slides the carrier back into the pipetting position. The scanning head hinges to read barcodes which are attached to horizontal or vertical surfaces. Barcodes can be read on both the primary side (e.g. sample tube) and the secondary side (e.g. microplates).

The PosID-3 is a new, improved version of the PosID hardware.

Bar codes can also be scanned by the → **Symbol LS-1220**.

### **PosID-3**

The PosID-3 (Positive Identification System) is a movable barcode scanner which can be used to read the barcode labels on carriers, labware and tubes. The PosID-3 supersedes the → **PosID** and has configurable features which allow it to scan a wider range of custom carrier and labware types.

### **Position**

Physical coordinates of the pipetting tip which define a location on the worktable. The position is expressed as X, Y, and Z in mm from the initialization position.

### **Positioning pin**

Objects such as carriers are held in place by a grid of positioning pins (clips). This ensures that they are accurately positioned at discrete positions on the worktable. The positioning pins are spaced 25.0 mm apart in the X direction.  
→ **Grid position**.

### **Pre-action/Post-action**

Pre-actions and post-actions are additional commands which are associated with a device command and are carried out before and after the device command. They are configured with the Freedom EVOware Configuration Tool. Examples are moving labware to a microplate reader and opening the door of a reader (the main function of the reader is to scan the labware). In many cases, Freedom EVOware configures suitable pre-actions and post-actions for you automatically. This applies above all to actions which move objects using the plate robot (RoMa\_MoveObject command).

### **Pre-dilution**

Technique in which a liquid (e.g., sample, control) is first diluted with additive or system liquid. Some of the resulting mixture is processed further in a follow-up distribution. The remainder of the mixture is usually discarded.

### **Pressure Monitored Pipetting (PMP)**

Pressure Monitored pipetting is a software function that monitors the pressure in the air-gap in the tip during aspirating and dispensing in order to detect anomalies such as clot and air aspiration.

The pressure Monitored Pipetting requires the MultiSense option and can be used only with 200 µl and 1000 µl DiTis.

### Process

In Freedom EVOware, a process is a sequence of commands (process steps). Processes are only supported by Freedom EVOware Plus.  
→ **Scheduling**, → **Method**.

### Process step

In the Process Editor in Freedom EVOware Plus, a process step is the graphical representation of an operation such as centrifuging a microplate or pipetting to a microplate. Each process step is shown as an icon and is associated with a single device such as a centrifuge, a carousel or the liquid handling arm (LiHa). A process step is the smallest execution unit when scheduling and optimizing a process. In Freedom EVOware Plus, a pipetting script is normally associated with the LiHa Pipette process step. See [13.2 “Overview of Device Commands”](#), § 13-8.

Each process step is associated with a single command (such as Carousel - ReturnPlate). Each command can also have → **Pre-actions** and → **Post-actions**.

### PW (Plate washer)

The Tecan 96PW Washer is a fully automated microplate washer for all types of 96-well microplates. The device is fitted with a 96-well wash head, which has one aspirating and one dispensing needle per well. The plate carrier is adjustable to enable the use types of round and flat bottom microplates. The device is also equipped with a mirror so that visual quality control can be performed during the washing procedure. By treating all 96 wells of the microplate simultaneously, the washer is able to achieve very short wash times.

The PW384 is a microplate washer which performs ultra-fast washing of both 384-well and 96-well microplates. The PW384 not only processes all 384 wells simultaneously, but uses “Overflow” washing to further boost wash performance. This wash procedure combines high wash efficiency with short wash times, since no transport steps are required to index the wash head.

The Freedom EVOware plate washer driver is based on Tecan’s → **WinWash Plus** software.

### Rack

→ **Labware**, → **Microplate**, → **Strip Rack**, → **Tube Rack**.

### Random Access Memory (RAM)

A read-write memory that is used by the software for storing intermediate results. Each memory cell can be addressed individually. Note that the RAM is volatile, i.e. stored information becomes lost when the RAM is not supplied with electricity.

### Read-Only Memory (ROM)

Memory chip for non-volatile storage of parameters and/or executable software instructions. Non-volatile means that the data is not lost when the power supply is switched off. The parameters and/or executable software instructions are permanently programmed into the chip during manufacture and cannot be changed later.

### Reader

Sample detection or scanning system which uses one or more measurement techniques (e.g. fluorescence, luminescence or absorbance) to analyze the samples. Readers are typically controlled by the Magellan software option using Freedom EVOware’s Magellan driver.

### **Reference Tip**

Alignment tool that can be fixed to a pipetting arm (e.g. LiHa or Te-MO). It is used to exactly adjust the arm in the various axes. Reference tips cannot be used for pipetting.

### **REMP devices**

The REM company develops and produces devices, consumables, software and fully automated sample processing and storage systems which are mainly used for laboratory applications. REM is part of the Tecan Group of companies. Freedom EVOware currently provides drivers for the following REM devices: Portrait Heat Sealer, Reatrix barcode scanner for 96-format REM tubes and cap/decap device for tubes in a REM Storage Tube Rack.

### **Replicates**

Replicates are repetitions (copies) of the same liquid(s) at different well positions.

### **Retract the tips**

Retract the tips = raise the tips.

### **Retract Speed**

The retract speed can be critical if you want to pipette liquids with a high viscosity. You must make certain that the tips retract slowly enough to prevent any subsequent droplet formation.

### **RMP**

GENESIS Robot Microplate Processor (pipetting instrument).

### **Robot only carrier**

A robot only carrier is a carrier which can only be accessed by a plate or tube robot and not by the liquid handling arm. It cannot be used for pipetting operations. It is typically a storage device such as a carousel or labware hotel or a device such as a shaker or incubator. The plate or tube robot must be used to move the labware to a "normal" carrier before it can be used for pipetting.

### **RoMa (Robot Manipulator) or plate robot**

Robot arm equipped with special grippers that can pick up, transport and place objects within the working area of the pipetting instrument. It is typically used to transport microplates, reagent blocks, deep well plates, etc. between carriers, incubators and storage positions (e.g. a → **RoMa shelf** or → **Carousel**).

Current Tecan pipetting instruments can be fitted with up to two RoMas. Standard arm versions can handle objects on or above the worktable. Long arm (long z) versions can also access objects which are positioned lower than the worktable, for example the Hettich Centrifuge. Movements of the robot arms between different positions are called vectors.

RoMa versions are available with offset gripper fingers (RoMa eccentric) and symmetrical gripper fingers (RoMa centric). The type to use is chosen according to the accessibility of the object to be gripped. You do not need to (and cannot) specify the RoMa type in the Freedom EVOware configuration. However, you must re-teach the robot movement commands (RoMa vectors) if you exchange the robot arm for a different type. The RoMa vectors supplied with Freedom EVOware have been designed for RoMa eccentric.

### **RoMa vector**

A predefined sequence of RoMa movements which define an action like getting labware from a carrier. Also called Plate Robot Vector.

### **RSP**

GENESIS Robot Sample Processor (pipetting instrument).

### **RWS**

GENESIS Robot WorkStation (pipetting instrument).

### **Safire reader**

The Tecan Safire is a multi-functional monochromator-based microplate reader. It provides high performance for the vast majority of today's microplate applications and research.

Safire provides you with the following measurement techniques:

- Fluorescence Intensity (FI) top/bottom
- Fluorescence Time Resolved (TRF) top/bottom
- Absorbance
- Quick Absorbance Scanning (optional)

Any standard microplates from 6-well to 384-well format can be measured with any of the above measurement techniques. Fluorescence measurement can be made with up to 1536-well microplates (max. labware height 24.5 mm). Switching between measurement techniques and labware formats is fully automated.

### **Sample**

Substance (blood, urine etc.) to be analyzed in a test or experiment.

### **Sample Oriented EVOware**

Sample Oriented EVOware is a software add-on for Freedom EVOware. Conventional pipetting scripts specify which pipetting operations should be carried out on which wells or tubes, regardless of whether the wells or tubes actually contain samples. With Sample Oriented EVOware, the actions of the pipetting script can be controlled by a so-called joblist which contains information on the locations and/or barcodes of the samples in the source labware. The joblist also lets you specify which test or tests should be carried out on each of the samples. It is not necessary to modify the script or process if the number and/or location of the samples changes with each run.

Built-in intelligent algorithms automatically optimize the movements of the liquid handling arm depending on the location of the samples, provide support for random controls and - if insufficient samples are available for all wells - ensure that reagents are not pipetted to wells which are empty. Support is also provided for laboratory information systems (LIMS).

### **Sample Tracking**

Sample Tracking is a software add-on for Freedom EVOware. It allows you to record sample and labware identities, track samples and labware through pipetting and robotic steps and to store process-related information, raw data and reduced data. In a network (LAN) environment, it can be used to collect and store data from several Freedom EVOware installations. The recorded data is stored centrally in an SQL database. The data can be exported in various formats and can be accessed by third-party software using an API. A web-based reporting tool is also provided.

### **Scheduling**

Parallel execution of a number of process steps (commands). Scheduling is only supported by Freedom EVOware Plus and can increase the throughput of your pipetting instrument dramatically.

### **Script**

A (pipetting) script is a sequence of pipetting commands. A pipetting script is created with the Script Editor. The commands in a script are normally performed in a sequential manner. In Freedom EVOware Plus, each script within the process is given a unique number (the script ID, normally counting from 1). In Freedom EVOware Standard, you can choose the name of the script when you save it.

### **Sealer**

The Tecan Plate Sealer is used to protect stored samples from oxidative degradation and contamination. A heat-sealed plastic film is applied to the labware to facilitate subsequent transport and/or long term storage. The sealing film is resistant to DMSO and shrinkage and is compatible with temperatures down to -70° C. The Plate Sealer is compatible with a wide variety of labware types.

### **Serial Dilution**

Technique in which a fraction of the liquid dispensed into a destination position is re-aspirated and then dispensed together with additive or system liquid into a further destination position. This can be repeated several times if necessary.

### **Shaker**

→ **Te-Shake** (Tecan Orbital Shaker).

### **Shuttle (Te-Stack) or handler (Carousel)**

Sliding carrier which brings labware from the tower or cartridge to the  
→ **Transfer position**, where it can be picked up by the plate robot.

### **Single-Pipetting mode**

With single-pipetting mode (also called single-dispensing mode), a quantity of liquid is aspirated and all of the liquid is dispensed into a single destination well in one step. → **Multi-pipetting mode**.

### **Site**

Position on a carrier which can hold an object such as labware. For example a *Microplate 3 pos. landscape* carrier can hold three *384 well landscape* plates.

### **Source Labware**

Labware holding container(s) out of which liquid is aspirated.

### **SPE**

Solid Phase Extraction (sample preparation technique). The Tecan vacuum filtration option is based on this method. → **Te-VacS**.

### **Spectra reader**

Tecan microplate reader which can perform both single-wavelength and dual-wavelength measurements. Dual-wavelength has the advantage that it eliminates any influence on the results due to either the microplate itself or due to non-specific absorbance of samples, finger prints, scratches, dust etc. on the microplate. It can store up to 20 programmable tests in its internal memory.

### **SpectraFluor reader**

A fully automatic, computer controlled fluorometer for measuring samples in a microplate. It fulfills the requirements for numerous fluorescence and absorbance applications in research and routine investigations. The filters are arranged in filter slides which allow up to four excitation filters and four emission filters.

**SPO**

Sensored Pump Option (includes FWO). The SPO is used to pump a larger amount of liquid at higher speed through the system, normally to flush the tips. The SPO supersedes the → **MPO** and has improved liquid level sensors for the waste and system liquid containers.

**Stacker**

Stackers are used to store a stack of labware and to present them to the instrument for pipetting operations. The labware can then be returned to the stacker for subsequent actions. Tecan pipetting instruments support several types of stacker, e.g. the Te-MO stacker (which is installed above the Te-MO 3/5) and the Stand-alone stacker (which is attached to the side of the instrument alongside the worktable).

**Stand-alone stacker option**

Stackers are used to store a stack of labware and to present them to the instrument for pipetting operations. The labware can then be returned to the stacker for subsequent actions. The Stand-alone stacker (or Te-Stack) is attached to the side of the instrument alongside the worktable.

**Standard**

Liquid containing a defined concentration of the substance to be tested. It is used to create a standard curve allowing the concentration of the analyte in the samples to be determined. The properties of the standard are well known and stable.

**Standard tip**

A Tecan “Standard Tip” is a special type of → **Fixed tip** that has predefined characteristics. There are various models of standard tips (with/without coating, various volumes).

**Strip Rack**

A rack which holds a single row of sample tubes (i.e. it has a single column of wells). → **Tube Rack**.

**Structured Query Language (SQL)**

A standard language used to communicate with databases to perform tasks such as update data on a database, or to retrieve data from a database.

**Submerged dispensing**

Dispensing liquid where the tip is submerged in the liquid. The opposite of submerged dispensing is → **Free air dispensing**. Submerged dispensing is sometimes called contact or surface dispensing.

**Sunrise reader**

Fully automatic, microprocessor controlled reader designed for professional use, enabling the user to measure the light absorbency (optical density) of samples in 96-well microplates. By reading twelve wells simultaneously, the instrument is able to measure a microplate in approximately six seconds. With an innovative range of options, this versatile MTP reader provides a wide range of features for numerous applications.

**Symbol LS-1220**

Fixed barcode scanner option which requires a RoMa or PnP to bring the plates or tubes to the scanner. Barcodes can also be scanned by the → **PosID**.

**Syringe**

Part of the → **Dilutor**. A glass cylinder with a motor-driven → **Plunger** that aspirates/dispenses the required quantity of liquid.



### **System liquid**

Liquid (e.g. water) that fills the liquid system of the pipetting instrument. The use of a system liquid (and the absence of air bubbles) is important for pipetting accuracy. The system liquid can also be used as a washing fluid and/or can be added to selected samples, analogously to an additive. The system liquids option for the pipetting instrument (formerly called the ChemSystem option) allows you to switch between up to 6 different system liquids.

### **TCP/IP**

TCP/IP stands for Transmission Control Protocol/Internet Protocol. It is a collection of protocols, or rules, that govern the way in which data travels from one computer to another across networks. The Internet is based on TCP/IP.

### **Te-Fill option**

The Te-Fill option uses a bi-directional pump instead of the diluter to aspirate and dispense large volumes of liquid, for example buffer solutions. The Te-Fill can be optionally provided with a 6-way valve, which allows you to switch between six different liquid containers. The combination of Te-Fill and 6-way valve is called the Tecan DynamicFill system.

### **Te-Flow option**

The Te-Flow option provides support for the In Situ Hybridization method.

### **Te-Lidder**

Tecan device for removing or replacing lids from plates.

### **Te-Link**

The Te-Link is a transfer rail (conveyor) option that allows the transport of labware such as microplates from one pipetting instrument to another or to another device. Labware to be moved is placed by the RoMa on a shuttle carrier at one end of the Te-Link. It is then moved to the other end of the Te-Link where it can be picked up by another RoMa for further processing.

### **Te-MagS (Magnetic Bead Separator)**

The Te-MagS is a magnetic bead separator with an optional heating function. It uses a commercially-available liquid containing microscopic magnetic beads to rapidly isolate bio-molecules (e.g. DNA, RNA, proteins etc.) or whole cells from various crude mixtures by means of magnetic forces. The magnetic beads are pulled through the liquid in the tubes using magnets and collect the required substance as they move:

### **Te-MO (Multi-Pipetting Option)**

Tecan Multi-Pipetting Option (not to be confused with multi-pipetting mode). The Te-MO is a robot pipetting device which can be mounted on the worktable of the pipetting instrument. It is equipped with a specially designed multi-pipetting head which can pipette to 96 or 384 wells simultaneously, resulting in an extremely high throughput and efficiency. For mechanical reasons, the same volume is pipetted by all of the tips. The Te-MO is available as the Te-MO 3/5 (3 slides, 5 carriers per slide) and the Te-MO 3/3 (3 slides, 3 carriers per slide). The Te-MO 3/5 can be fitted with the → **Te-Stack Te-MO** (Te-MO stacker option). The Te-Stack Te-MO cannot be fitted to the smaller Te-MO 3/3 version.

### **Te-Poolsafe**

Tecan pooling balance. → **Liquid arrival check** and see *Pooling balance* in the index.



**Te-PS (Tecan Positioning System)**

The Tecan Positioning System is a feature of the Freedom EVO pipetting instrument which allows the alignment of the Liquid Handling Arm (LiHa) to be checked and re-adjusted by the Freedom EVOware software.

Arm alignment, which is only necessary for labware with 1536 wells, is done using the Te-PS Sensor Plate, which is placed on the Te-PS Carrier. The tip alignment process moves each of the pipetting tips past the sensor plate, and lasers are used to accurately measure the position.

**Te-Shake**

Tecan orbital shaker for microplates or microplate-like containers. The shaker is used for mixing functions and can be equipped with an optional heating plate. The shaker plate is placed on an eccentric. Rotation of the rotor causes an orbital movement of the shaker plate. The orbit of the movement can be varied by changing the eccentric.

**Te-Sonic**

Device which is used to verify whether tubes contain samples. The Te-Sonic can be equipped with up to four ultrasonic transducers (USTs) that move over one or more rows of tubes to check the presence or absence of samples in them. Each UST can check up to 16 tubes in a tube rack.

**Te-Stack (Tecan Microplate Stacker option)**

The Te-Stack is used to store a stack of microplates, tube racks or DITI racks and to present them to the instrument for pipetting operations. It fetches the labware from a specified stack and places it onto a moveable carrier where it can be accessed by the liquid handling device or a robot arm. It also lets you put the rack back into the stack. The Te-Stack can be fitted with a barcode scanner which can read barcode labels on plates when they are inserted and removed. The Te-Stack is fitted to the side of the pipetting instrument alongside the worktable.

**Te-Stack Te-MO**

The Te-Stack Te-MO is used to store a stack of microplates or DITI racks and to present them to the Te-MO for pipetting operations. The microplates can be returned to the stacker for subsequent actions. The Te-MO Stacker is fitted above the Te-MO. It is only available for the Te-MO 3/5 (it cannot be fitted to the smaller Te-MO 3/3 version). Freedom EVOware uses the same driver to control the Te-Stack and the Te-Stack Te-MO. The barcode scanner option is not available for the Te-Stack Te-MO.

**Te-Thermix**

The Te-Thermix is a modular incubator/cooler system. An incubator is a device which is used to keep labware containing samples or reagents at a defined temperature for a specified length of time, for example until the desired biological or biochemical reaction has taken place.

Te-Thermix modules are available with heating or cooling elements. They are also available with built-in orbital shakers. In addition, some models are provided with a sliding drawer and are loaded with labware from the front. Other models are loaded from above and do not have a drawer.

**Te-VacS**

Tecan SPE (Solid Phase Extraction) vacuum filtration system which is used for vacuum separation of biological molecules and chemical compounds.

**Te-VacS-P**

Tecan SPE Vacuum Separator for the ProTeam Digest workstation.

### Teaching block

Alignment tool equipped with four pseudo tips. It is used instead of a → **Tip block** and serves for aligning a 96-channel pipetting head with carriers. A teaching block is also available for teaching the Te-MO 96 Wash Block.

### Teaching pin

Pin that can be attached to a 384-channel pipetting head. Used for aligning the head precisely with the carriers.

### Teaching plate

Special microplate which is used by Tecan technicians to align the pipetting instrument and adjust the plate robot etc.

### Tip

A needle-like device that can be mounted to a pipetting device for aspirating or dispensing liquids. The following tip types are used with Tecan instruments:

- **Standard tip**
- **DITI (disposable tip)**
- **ActiveTip**
- **Fixed tip**
- **Tip block** (for multipipetting heads)

### Tip block

Set of 96 pipetting tips for use with the → **Te-MO**.

### Tip Touching

Tip touching is a special movement when dispensing a liquid. When tip touching is activated, Freedom EVOware dispenses to the destination container in the normal way, but moves the tips to the side of the well and back before retracting them. This helps to remove any drops which may be adhering to the tips. Tip touching is sometimes called touch-off dispensing.

### Tracking speed

Refers to the speed at which the tip moves up or down to follow the liquid level during aspiration and dispensing operations.

### Transfer position or exchange position

Position to which the Te-MO slide moves to allow the robot arm to fetch or return labware on a specified site. For mechanical reasons, the robot arm cannot access all of the sites unless the slide is moved. → **Active Positioning Carriers** are automatically opened at the transfer position.

For the Te-Stack, Te-Stack Te-MO or carousel, the transfer position is the position which is used by the robot arm for fetching or returning labware. For special applications, the transfer position can also be used for pipetting.

### Transfer tool

The disposable transfer tool can be picked up by a LiHa. With this device mounted the LiHa can pick up an empty layer (tray and spacer) and throw it into the waste. This makes the use of Nested LiHa DiTi possible even without a RoMa.

### Trough

Special carrier on the worktable or the Te-MO which is used as a container for a reagent liquid. The reagent liquid can be aspirated using the normal pipetting commands. The Te-MO trough is refilled by the Te-MO Wash & Refill Center using the Te-MO Refill Trough command. The worktable trough is refilled manually. Troughs are available with capacities of up to 1000 ml.

**Tube**

Small round container for holding liquid samples or reagents. Tubes are often marked with a barcode label so that they can be distinguished from one another.

**Tube Rack**

A rack which holds a collection of sample tubes (typically 8 or 16 per row). A strip rack holds a single row of tubes.

**Tube robot**

→ **PnP**

**Ultra reader**

The Tecan Ultra reader is a fully automated software-controlled fluorometer for both normal and polarized fluorescence as well as absorbance measurements. It provides unrivaled performance in luminescence mode.

**Ultra Evolution reader**

The Tecan Ultra Evolution is a multi-functional microplate reader which provides high performance for the vast majority of today's microplate applications and research. Being sensitive while fast, the Ultra Evolution fulfills the special demands of Ultra High Throughput Screening (UHTS). It provides the following measurement techniques: Fluorescence Intensity (FI), Fluorescence Time Resolved (FTR), Fluorescence Polarization (FP), Fluorescence Lifetime (FL), Absorbance, Luminescence and Dual Color Luminescence (Bioluminescence Resonance Energy Transfer). Measurement results can be optimized for different assay types (cell based or homogeneous), for different microplate types and for different dispensed volumes per well.

**Vacuum assisted waste**

Option for viscous liquids which creates a partial vacuum in the waste bottle.

**Variomag**

H+P Variomag. Device from the H+P company consisting of magnetic stirrers for tubes and a thermostatically-controlled heater.

**Vector (as in RoMa or PnP vector)**

A vector is a sequence of movements of the RoMa or PnP. → **Waypoint**.

**Volume Calibration Function**

Software function by which the volumes actually pipetted can be calibrated in order to correspond exactly to the intended volume.

**Wash**

Technique of aspirating system liquid from the system reservoir and dispensing it through the pipetting tips into a wash station in order to clean the tips. → **Waste position**, → **Cleaner position**.

**Wash & Refill Center (WRC)**

The Wash & Refill Center is a supporting device for the Te-MO which is connected to the Te-MO wash block through tubing. The wash block is a special carrier for the Te-MO which used to clean the Te-MO tips or DITIs and/or for discarding liquid which is no longer needed. The Te-MO 96 and Te-MO 384 have different pipetting heads and use a different wash block design. The Wash & Refill Center is also used to refill the Te-MO reagent troughs.

**Wash Block**

The wash block is a special carrier for the Te-MO which used to clean the Te-MO tips or DITIs and/or for discarding liquid which is no longer needed. The Te-MO 96 and Te-MO 384 have different pipetting heads and use a different wash block design.

### **Wash Station**

Refers to a special carrier on the worktable which consists of a waste position and one or more cleaner positions. The wash station is used to clean the tips and/or to discard liquid which is no longer needed. → **Waste position**, → **Cleaner position**.

### **WashStation NPS**

→ **Active WashStation**.

### **Waste position**

Part of a wash station above which the tips are positioned to discard liquid which is no longer needed and/or to flush the inside of the tips using the system liquid. The system liquid is dispensed through the tips and then into the cavity of the wash station. The used liquid then flows off through the waste tubing into the waste container.

### **Waypoint (in RoMa or PnP vectors)**

A vector is a sequence of movements of the RoMa or PnP. Each of the intermediate positions is called a waypoint.

### **Well**

One of the containers in a microplate.

### **WinWash Plus**

WinWash Plus is an MS Windows-based program which is supplied with Tecan Plate Washers. It lets you create wash programs and download and upload them to/from the plate washer via the RS232 interface. It also functions as the software interface between Freedom EVOware and the plate washer hardware. Since the WinWash Plus Software uses an OLE Interface, the implementation is transparent to the user.

### **Worktable**

Working surface (or deck) of the pipetting instrument where objects (such as microplates) are placed for access by the liquid handling arm (LiHa) or the plate robot (RoMa).

### **Worktable Editor**

Graphical representation of the pipetting instrument's worktable (deck). It shows icons for the devices which are installed and the arrangement of the carriers and labware.

The gray area in the Worktable Editor represents that part of the worktable which can be accessed by the Liquid Handling Arm. This is called the pipetting area. The real worktable is normally larger than this.

See [Fig. 11-8 "Example worktable showing carriers, labware and labware labels"](#), [Fig. 11-18](#).

### **Worktable, initial**

Graphical representation of the initial layout of the pipetting instrument's working surface (deck). When required by the script or process, Freedom EVOware uses the plate robot (RoMa) to move labware during runtime to new positions (carrier sites). However, carriers and devices always stay at the same position.

### **XP and XLP dilutor**

→ **Dilutor**

### **X slide**

Rail across the top of the pipetting instrument which supports the robot arms (→ **LiHa**, → **MCA**, → **RoMa**, → **PnP**). The robot arms move along the rail to reach all of the X positions on the worktable.

**Y-distance of wells**

The spacing between adjacent wells in the rack in the Y direction (front to back).

**Z-Dispense**

Tip height at which liquid is dispensed. It should be low enough to ensure that no liquid drops can get into adjacent wells or tubes. See [Fig. 9-9](#), [Fig. 9-20](#).

**Z-Max**

Tip height which is very slightly above the lowest point of the well, tube or container. It is the lowest position which the tip is allowed to reach without touching the bottom. When searching for the liquid surface, the pipetting instrument will search from Z-Start down to Z-Max. If the tip reaches Z-max without finding liquid, the pipetting instrument reacts according to the configured liquid level detection error mode. See [Fig. 9-9](#), [Fig. 9-20](#).

**Z-Start**

Tip height at which the liquid level detection (ILID) is switched on during pipetting. For tubes and containers (troughs), choose Z-Start to be at least 1 mm below the rim but above the liquid surface. For microplates, choose Z-Start to be at least 1 mm above the edge of the well.

Z-Start should be chosen as low as possible to ensure fast liquid level detection. At the same time, Z-Start must be above the highest possible liquid level in the well/tube to ensure that the liquid surface is found. See [Fig. 9-9](#), [Fig. 9-20](#).

**Z-Travel**

Tip height at which the tips move from one X/Y position to another. Choose Z-Travel to be higher than all obstacles on the carrier. Movements that pass over different pieces of labware use a tip height of Z-Travel (global) instead. See [Fig. 9-9](#), [Fig. 9-20](#).

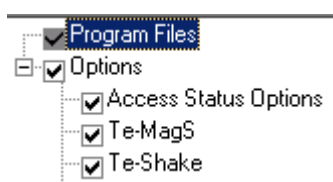
**Z-Travel (global)**

This parameter is also called Travel Height. When the LiHa moves over a single labware item or between adjacent identical labware items, it retracts all tips to the Z-Travel value which is specified in the labware definition. However, if two consecutive commands cause it to move over different pieces of labware, the tips are retracted to the height you specify with Travel Height in the Configuration Tool (see [8.4.2.1 "LiHa \(Liquid Handling Arm\)"](#), [Fig. 8-22](#)). This is done to speed up and optimize LiHa movements. Choose this parameter to be higher than all obstacles on the worktable.

**ZipTips**

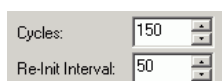
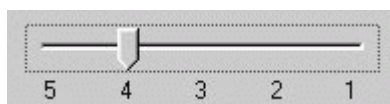
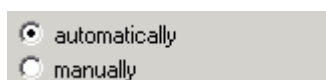
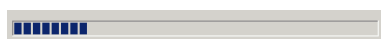
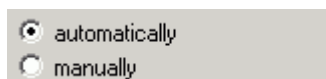
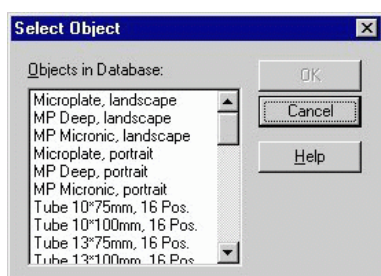
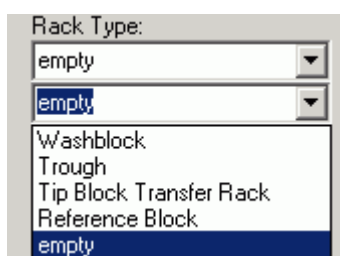
ZipTips are disposable tips which are pre-filled with liquid and thus do not need an aspirate command.

**D.2 Important GUI features in MS Windows Applications**



**Checkbox**

Square box that is selected or cleared to turn on or off an option. It is possible to select zero, one or more options at a time. Selected check boxes are marked with a tick ✓ or a similar check mark.



**Combo box**

Very similar to the → **Drop down list box**. In principle, a combo box is a text box with an attached list box. Users can either type a valid name in the text box or select an item from the list.

**Command button**

Button that initiates an action when clicked.

**Drop down list box**

When you click on the arrow on the right side a drop down list appears that lets you select one of the listed items. It is not possible to type a selection in the box as you can do with a → **Combo box**.

**List box**

A box containing a list of items the user can select. It is not possible to type a selection in a list box.

**Option button**

Round button used to select one of a group of mutually exclusive options. Option buttons are also called → **Radio buttons**.

**Progress bar**

A control that displays how many per cent of a particular process have been completed so far.

**Radio button**

See → **Option buttons**.

**Slider**

Indicator that can be moved to display and set a value from a number of values or from a continuous range.

**Spin box**

Text box with up and down arrows which the user can click to move through a set of fixed values. It is also possible to type a valid value in the box.

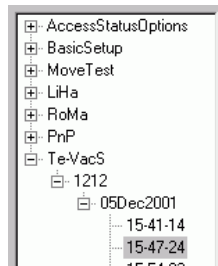
**Tab**

Labeled group of page tops that can be selected to display the related page.



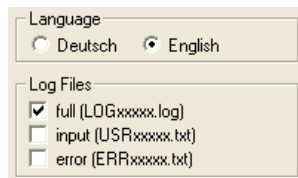
**Text box**

Rectangular box in which the user can type text or numeric values.



**Tree view**

Tree view controls are similar to list boxes, except that they display information in a tree-like structure. Tree view controls are especially suitable for representing hierarchical data structures. The small square boxes with a + or - sign in them are called "nodes". These nodes can be expanded or collapsed to show or hide elements on a lower hierarchical level.



**Panel**

A panel is part of a dialog box which groups together related items. A panel is normally surrounded by a box.





# IX Index

**Purpose of This Chapter** This chapter contains an alphabetical index which offers you help in finding information more quickly.

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