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Instructions for Use for  
**HYDROSPEED**



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**WARNING**  
**CAREFULLY READ AND FOLLOW THE INSTRUCTIONS**  
**PROVIDED IN THIS DOCUMENT BEFORE OPERATING THE**  
**INSTRUMENT.**

### **Notice**

Every effort has been made to avoid errors in text and diagrams; however, Tecan Austria GmbH assumes no responsibility for any errors that may appear in this publication.

It is the policy of Tecan Austria GmbH to improve products as new techniques and components become available. Tecan Austria GmbH therefore reserves the right to change specifications at any time with appropriate validation, verification, and approvals.

We would appreciate any comments on this publication.



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### **Declaration for EU Certificate**

See the last page of these Instructions for Use.

### **Intended Use of Instrument**

See chapter 2.2 HYDROSPEED Intended Use.

### **About the Instructions for Use (IFU)**

Original instructions. This document describes the HYDROSPEED, which is designed to wash microplates. It contains instruction for the use of the instrument and is intended as a reference for the user.

It contains information about:

- Installing the instrument
- Operating the instrument
- Programming of wash procedures
- Cleaning and maintenance procedures
- Trouble shooting and error messages

### **Remarks on Screenshots**

The “screenshots” of the HYDROSPEED’s touchscreen, which appear in this document, are only simulations and therefore their appearance is not identical to those of the actual touchscreen. However, although the check boxes, fields, buttons, etc., may not be the exact size and shape of the features on the actual touchscreen, their contents and general locations are the same.

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## Warnings, Cautions and Notes

The following types of notices are used in this publication to highlight important information or to warn the user of a potentially dangerous situation:



**Note**  
Gives helpful information.



**CAUTION**  
INDICATES A POSSIBILITY OF INSTRUMENT DAMAGE OR DATA LOSS IF INSTRUCTIONS ARE NOT FOLLOWED.



**WARNING**  
INDICATES THE POSSIBILITY OF SEVERE PERSONAL INJURY, LOSS OF LIFE OR EQUIPMENT DAMAGE IF THE INSTRUCTIONS ARE NOT FOLLOWED.



**WARNING**  
THIS SYMBOL INDICATES THE POSSIBLE PRESENCE OF BIOLOGICALLY HAZARDOUS MATERIAL. PROPER LABORATORY SAFETY PRECAUTIONS MUST BE OBSERVED.



**WARNING**  
THIS SYMBOL INDICATES THE POSSIBLE PRESENCE OF FLAMMABLE MATERIALS AND A RISK OF FIRE. PROPER LABORATORY SAFETY PRECAUTIONS MUST BE OBSERVED.



**WARNING**  
THIS SYMBOL INDICATES THE POSSIBLE PRESENCE OF A HIGH VOLTAGE SHOCK HAZARD.



**WARNING**  
MAGNETIC FIELDS CAN INTERFERE WITH THE PROPER FUNCTIONING OF CARDIAC PACEMAKERS OR SURGICALLY IMPLANTED MEDICAL DEVICES. ALL PERSONS ENTERING MAGNETIC FIELD ENVIRONMENTS SHOULD BE SCREENED CAREFULLY AND, IF NECESSARY, PROHIBITED FROM ACCESS. KEEP ALL MAGNETIC OR FERROUS OBJECTS, WATCHES, CREDIT CARDS OR OTHER CARDS WITH MAGNETIC STRIPS AWAY FROM INSTRUMENT.



**ATTENTION**

**DIRECTIVE 2012/19/EU ON WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE)**

**NEGATIVE ENVIRONMENTAL IMPACTS ARE ASSOCIATED WITH THE TREATMENT OF ELECTRICAL AND ELECTRONIC EQUIPMENT WASTE.**

- **DO NOT TREAT ELECTRICAL AND ELECTRONIC EQUIPMENT AS UNSORTED MUNICIPAL WASTE.**
- **COLLECT WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT SEPARATELY.**


















**FOR CALIFORNIA RESIDENTS ONLY:**

**WARNING**

**THIS PRODUCT CAN EXPOSE YOU TO CHEMICALS SUCH AS LEAD WHICH IS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER AND BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM. FOR MORE INFORMATION GO TO: [WWW.P65WARNINGS.CA.GOV/PRODUCT](http://WWW.P65WARNINGS.CA.GOV/PRODUCT).**

## Symbols

	Manufacturer
	Date of Manufacturing
	CE conformity marking
	United Kingdom Conformity Assessed marking shows that the labeled product is following the applicable regulation in Great Britain.
	Catalogue number
	Serial Number
	Unique Device Identification The UDI symbol identifies the data carrier on the label.
	Biological risks
	Possible presence of a strong magnetic field
	Possibility of personal injury. Do not touch moving parts!
	Consult instructions for use
	China RoHS symbol
	TÜV SÜD MARK
	USB label
	WEEE symbol

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# 1. Safety

## 1.1 Safety Precautions

1. Always follow basic safety precautions when using this product to reduce the risk of injury, fire, or electrical shock.
2. Read and understand all information in the Instructions for Use (IFU). Failure to read, understand, and follow the instructions may result in damage to the product, injury to operating personnel or poor instrument performance.
3. Observe all WARNING and CAUTION notices in the IFU (see Warnings, Cautions and Notes on page 4 for a description of the notices used in this document).
4. Observe proper laboratory safety precautions, such as wearing protective clothing and using approved laboratory safety procedures.

## 1.2 Instrument Safety

The instrument covers protect the user from the high voltage of the instrument electronics. Therefore, do not remove any of the instrument covers or perform any maintenance tasks other than those described in this document.

Do not try to modify the instrument in any way or use unapproved spare parts for maintenance. Replace fuses with only the same type and rating. Using an incorrect fuse is a fire hazard.

The working area must be dry before switching the instrument on. Always work with dry hands while standing on a dry insulated surface capable of withstanding the voltage used. Ensure that the instrument is plugged into a power outlet that is properly grounded. Inspect the power cable and the serial interface cable before each use for any damage.



### WARNING

**THE USE OF OPTIONS THAT HAVE NOT BEEN APPROVED BY TECAN OR UNAUTHORIZED MODIFICATIONS OF THE INSTRUMENT, ANY OF ITS OPTIONS AND/OR COMPONENTS, ANY CORRESPONDING SOFTWARE, OR SPARE PARTS WILL RESULT IN A LOSS OF WARRANTY AND POTENTIALLY IMPAIR PERFORMANCE OR CAUSE DAMAGE TO THE INSTRUMENT.**



### CAUTION

**BE CAREFUL WHEN USING STRIP PLATES THAT ALL STRIPS ARE POSITIONED IN THE MICROPLATE USED FOR WASHING, OTHERWISE SPILLING CAN OCCUR AND THE INSTRUMENT MAY BECOME CONTAMINATED.**

**WARNING**

TO ENSURE PROPER WASH PERFORMANCE IT IS MANDATORY TO ADJUST THE HYDROSPEED TO THE TYPE / MANUFACTURER OF MICROPLATE USED. THIS ALSO APPLIES FOR ANY PRE-DEFINED PLATE FILE, THAT WILL ALWAYS CONTAIN AVERAGE PLATE PARAMETERS ONLY, WHICH MUST BE VERIFIED WITH THE CORRESPONDING PLATE TYPE AND IF NECESSARY CORRECTED BEFORE PUTTING THE HYDROSPEED INTO USE. IF THIS ADJUSTMENT PROCEDURE IS NOT PERFORMED PROPERLY, THIS MIGHT RESULT IN HIGH LEVELS OF RESIDUAL VOLUME PER WELL, AS WELL AS INSUFFICIENT WASHING EFFICIENCY AND MAY SERIOUSLY AFFECT ASSAY PERFORMANCE. FOR DETAILS ON HOW TO ADJUST THE HYDROSPEED TO THE TYPE OF MICROPLATE USED, SEE CHAPTER 5.5.3 PLATE MENU.

**WARNING****WASTE BOTTLE – LIQUID LEVEL**

MAKE SURE THAT THE LIQUID LEVEL OF THE WASTE BOTTLE IS ALWAYS KEPT BELOW THE MAXIMUM LEVEL INDICATED ON THE BOTTLE TO AVOID POTENTIAL OVERFLOW OF WASTE LIQUID INTO THE FOAM TRAP BOTTLE.

THE CONTENTS OF THE WASTE BOTTLE ARE POTENTIALLY INFECTIOUS; WEAR DISPOSABLE POWDER-FREE GLOVES, SAFETY GLASSES AND PROTECTIVE CLOTHING WHEN EMPTYING/HANDLING A WASTE BOTTLE.

INQUIRE ABOUT APPROPRIATE COLLECTING POINTS AND APPROVED METHODS OF DISPOSAL IN YOUR COUNTRY, STATE OR REGION.

**WARNING**

WHEN USING WASH BUFFERS THAT SHOW A STRONG TENDENCY OF FOAMING, EMPTY THE WASTE BOTTLE AS SOON AS THE FOAM-LEVEL HAS REACHED THE MAXIMUM FILLING LEVEL INDICATED ON THE WASTE BOTTLE. ADDITIONALLY, ADD A COMMERCIALY AVAILABLE ANTI-FOAMING AGENT (SUCH AS SILICONE OIL) TO THE EMPTY WASTE BOTTLE TO REDUCE FOAMING.

IF FOAMING CONTINUES TO BE A PROBLEM, WE RECOMMEND USING A LARGER WASTE BOTTLE (OPTIONALLY PROVIDED WITH THE HYDROSPEED) AND ADDITIONALLY INCREASE THE CONCENTRATION OF ANTI-FOAMING AGENT IN THE WASTE BOTTLE. TO HELP FACILITATE BREAKDOWN OF THE FOAM IN THE WASTE BOTTLE, CAREFULLY SWIRL THE WASTE BOTTLE FROM TIME-TO-TIME TO IMPROVE MIXING BETWEEN FOAM LAYER AND ANTI-FOAMING AGENT.

REFILL ANTI-FOAMING AGENT AFTER EMPTYING WASTE BOTTLE. FOR EXAMPLE, WHEN USING THE WACKER ANTI-FOAM EMULSION, SILFOAM SE47, THE RECOMMENDED CONCENTRATION IS 1 ML OF ANTIFOAMING AGENT FOR 1 LITER OF WASTE SOLUTION.

FOR ANTIFOAMING AGENTS FROM OTHER MANUFACTURERS, USE CONCENTRATIONS AS RECOMMENDED BY THE MANUFACTURER.

**WARNING**

THE INSTRUMENT COMPLIES WITH THE EMISSION AND IMMUNITY REQUIREMENTS DESCRIBED IN IEC 61326-2-6; HOWEVER, THE ELECTROMAGNETIC ENVIRONMENT SHOULD BE EVALUATED PRIOR TO THE OPERATION OF THE INSTRUMENT.

IT IS THE OPERATOR'S RESPONSIBILITY TO ENSURE THAT A COMPATIBLE ELECTROMAGNETIC ENVIRONMENT FOR THE INSTRUMENT IS MAINTAINED, SO THAT THE INSTRUMENT PERFORMS AS INTENDED.

DO NOT OPERATE THE INSTRUMENT IN CLOSE PROXIMITY TO SOURCES OF STRONG ELECTROMAGNETIC RADIATION (E.G. UNSHIELDED INTENTIONAL RF SOURCES) AS THIS MAY INTERFERE WITH THE PROPER FUNCTION OF THE INSTRUMENT AND MAY ALSO LEAD TO INCORRECT RESULTS.

### 1.2.1 Hazardous Materials

Work in a well-ventilated laboratory.

If the instrument is used with hazardous biological, chemical, or radioactive materials, all users must be trained to work with these materials and all procedures must comply with national, regional, and local safety regulations. Use the laboratory procedures and follow the manufacturer's precautions when working with dangerous chemicals. Tecan is not responsible or liable for any damages caused by or as a consequence of the use of hazardous materials.

Wear safety glasses when using compressed gasses outside of the instrument or when the instrument is open.

Take care when working with flammable liquids in the instrument, especially when working above the liquid flash point. The waste bottles should be pre-loaded with water to prevent the formation of any flammable vapor.



#### **WARNING**

**ALL PARTS OF THE INSTRUMENT THAT COME INTO CONTACT WITH POTENTIALLY INFECTIOUS MATERIAL MUST BE TREATED AS POTENTIALLY INFECTIOUS AREAS.**

**IT IS ADVISABLE TO ADHERE TO APPLICABLE SAFETY PRECAUTIONS, (INCLUDING THE WEARING OF POWDER-FREE GLOVES, SAFETY GLASSES AND PROTECTIVE CLOTHING) TO AVOID POTENTIAL INFECTIOUS DISEASE CONTAMINATION WHEN WORKING WITH HAZARDOUS MATERIALS.**



#### **WARNING**

**TOXIC AND BIOHAZARDOUS WASTES CAN BE ASSOCIATED WITH THE WASTE MATERIAL FROM PROCESSES RUN ON THE INSTRUMENT.**

**TREAT THESE SUBSTANCES AND DISPOSABLES, SYSTEM LIQUID, ETC. IN ACCORDANCE WITH GOOD LABORATORY PRACTICE GUIDELINES.**

**INQUIRE ABOUT APPROPRIATE COLLECTING POINTS AND APPROVED METHODS OF DISPOSAL IN YOUR COUNTRY, STATE OR REGION.**

## 2. General

### 2.1 Introduction

The HYDROSPEED is a plate washer for processing 96 and 384-well microplates. The instrument is designed for professional use only and should only be operated by trained personnel.



#### CAUTION

**THE WASH RESULTS OBTAINED WITH THE HYDROSPEED ARE INFLUENCED BY THE CORRECT USE OF THE INSTRUMENT, ACCORDING TO THE INSTRUCTIONS GIVEN IN THIS DOCUMENT, AS WELL AS THE LIQUID COMPOUNDS USED (REAGENTS, WASH BUFFER, CHEMICAL COMPONENTS – PH RANGE 5 - 9). THE INSTRUCTIONS FOR USE, STORAGE, AND OTHER HANDLING IN CONNECTION WITH SAMPLES OR REAGENTS MUST BE STRICTLY FOLLOWED.**



#### CAUTION

**BEFORE THE INSTRUMENT IS INSTALLED AND SWITCHED ON IT SHOULD BE LEFT TO STAND FOR AT LEAST THREE HOURS, SO THERE IS NO POSSIBILITY OF CONDENSATION CAUSING A SHORT CIRCUIT.**



#### CAUTION

**BEFORE WASHING PROCEDURES ARE STARTED, MAKE SURE THAT THE MICROPLATE POSITION A1 IS INSERTED CORRECTLY.**

The instrument provides a touchscreen interface for on-board operation and typically does not require an external PC. For running the HYDROSPEED together with the connect stacker batch runs up to 50 plates the HydroControl software has been designed to meet FDA's 21 CFR Part 11 directive, which provides electronic records and signatures as well as a user administration and audit trail functionality. Furthermore, the HydroControl software serves as a standardized interface for robotic integration.

### 2.2 HYDROSPEED Intended Use

The HYDROSPEED is a plate washer for 96- and 384-well microplates. The instrument has been designed as a general purpose laboratory instrument for professional use. Software and instrument have been validated for processing of qualitative and quantitative Enzyme-linked Immunosorbent Assays (ELISA).

**CAUTION**

**MANDATORY SYSTEM VALIDATION BY OPERATING AUTHORITY. THE HYDROSPEED HAS BEEN VALIDATED ON REPRESENTATIVE ENZYME IMMUNO ASSAYS (EIA) ONLY IN EUROPE. IT IS THEREFORE THE RESPONSIBILITY OF ANY OPERATING AUTHORITY TO ENSURE THAT THE HYDROSPEED HAS BEEN VALIDATED ACCORDING TO APPLICABLE REGULATIONS FOR EACH SPECIFIC ASSAY USED ON THE INSTRUMENT.**

**Info**

***Application and function of HYDROSPEED correlated with 384-well microplates are not used for Clinical Diagnostics in China.***

**Note**

***If the HYDROSPEED plate washer or the software is modified in any way, the warranty will no longer be valid, and the instrument will lose regulatory conformity.***

**Note**

***Results obtained using the HYDROSPEED are influenced by the proper use of the instrument and microplates, according to the instructions given in this document, as well as the liquid compounds used (reagents, chemistry). The instructions for use, storage, and applications involving samples or reagents must be followed strictly.***



## 2.3 User Profile

### 2.3.1 Professional User - Administrator Level

The administrator is a person who has suitable technical training and corresponding skills and experiences. If the product is used as intended, the person is able to recognize and avoid dangers.

The administrator has extensive skills and is able to instruct the end user or the routine user in assay protocols in connection with a Tecan product within the bounds of the intended use.

Computer application skills and good English skills are required.

### 2.3.2 End User or Routine User

The end user or routine user is a person who has suitable technical training and corresponding skills and experiences. If the product is used as intended, the person is able to recognize and avoid dangers.

Computer application skills and good language skills for the respective national language at the installation site and English are required.

### 2.3.3 Service Technician

The service technician is a person who has suitable technical training and corresponding skills and experiences. If the product needs to be serviced or maintained, the person is able to recognize and avoid dangers.

Computer application skills and good English skills are required



**Note**

***Training dates, their duration and frequency are available at your customer support.***

***Address and phone number can be found in the Internet:  
<http://www.tecan.com/customersupport>***

## 2.4 Instrument Specifications



### Note

*Instrument specifications have been defined using Greiner flat-bottom compact 96-well and 384-well microplates and may vary using other 96-well microplates.*

The table below lists the specifications for the instrument.

PARAMETERS	CHARACTERISTICS
<b>General</b>	
Number of dispensing channels	1 – 4 (depending on the instrument configuration)
Wash head types	96HT, 384HT and 96indexing (see 2.11 Types of Wash Heads)
USB Interface	All connected devices must be approved and listed as per IEC 60950-1 Information Technology Equipment – Safety or equivalent local standards.
<b>96-well microplates</b>	
Wash Volume	50 – 3000 µl in increments of 50 µl
Wash Time	15 seconds for 1-cycle wash incl. crosswise asp. step 25 seconds for 3-cycle wash incl. crosswise asp. step (disp. vol.: 300µl/well, disp. rate: 5, asp. rate: 5, 96HT head)
Dispense Volume	50 – 400 µl in increments of 50 µl
Dispensing Accuracy with 96HT wash head	<i>Greiner 96-well, flat bottom plate</i> Dispense accuracy: 5 % (avg. weight over plate [lab balance]) Dispense volume: 300 µl, Dispense rate: 5 (see 4.5.1 Dispense and Wash Rates and 6 Quality Control)
Dispensing Uniformity with 96HT wash head	<i>Greiner 96-well, flat bottom plate</i> Dispense uniformity: 3 % across the plate Dispense volume: 300 µl, Dispense rate: 5 (see 4.5.1 Dispense and Wash Rates and 6 Quality Control)
Residual volume for full plates	The residual volume after an aspiration step is: <i>Greiner 96-well, flat bottom plate</i> Residual volume: less than 2 µl per well. Aspiration mode: crosswise, Aspiration rate: 5, Aspiration time: 5 s, Liquid: Wash buffer or deionized water + 0.1% Tween 20 <i>Greiner 96-well, round bottom and v-shaped bottom plates</i> Residual volume is less than 5 µl per well. Aspiration mode: single aspiration point, Aspiration rate: 5, Aspiration time: 5 s, Liquid: Wash buffer or deionized water + 0.1% Tween 20
Carry Over	Less than 1 ppm (parts per million) between plates

PARAMETERS	CHARACTERISTICS
<b>384-well microplates</b>	
Wash Volume	10 – 1000 µl in increments of 10 µl
Wash Time	15 seconds for 1-cycle wash incl. asp. step 25 seconds for 3-cycle wash incl. asp. step (disp. vol.: 100µl/well, disp. rate: 5, asp. rate: 5, 384HT head)
Dispense Volume	10 – 120 µl in increments of 10 µl
Dispensing Accuracy with 384HT wash head	<i>Greiner 384-well, flat bottom plate</i> Dispense accuracy: 5 % (avg. weight over plate [lab balance]) Dispense volume: 100 µl, Dispense rate: 5 (see 4.5.1 Dispense and Wash Rates and 6 Quality Control)
Dispensing Uniformity with 384HT wash head	<i>Greiner 384-well, flat bottom plate</i> Dispense accuracy: 4 % across the plate Dispense volume: 100 µl, Dispense rate: 5 (see 4.5.1 Dispense and Wash Rates and 6 Quality Control)
Residual Volume	<i>Greiner 384-well flat bottom plate</i> Residual volume is less than 2 µl per well. Aspiration mode: single aspiration point, Aspiration rate: 5, Aspiration time: 5 s, Liquid: Wash buffer or deionized water + 0.1% Tween 20
Carry Over	Less than 1 ppm (parts per million) between plates, respectively between plate quadrants when working with the indexing wash head.
<b>Power</b>	
Power Supply	115 V / 60 Hz 230 V / 50 Hz
Consumption	< 300 VA
Main fuse	115 Volt requires 2 x T 3.15 A / 250 V fuse (slow blow). 230 Volt requires 2 x T 1.6 A / 250 V fuse (slow blow).
<b>Physical</b>	
Outside dimensions	Width: 38.8 cm, Depth: 43 cm, Height: 28.8 cm Max. height of loading position: 10.15 cm (Width: 15.3 inches, Depth: 16.9 inches, Height: 11.3 inches) Greater depth and height in service position
Weight	15 kg
<b>Environmental</b>	
Ambient temperature	
Operation	15 °C to 35 °C (59 °F to 95 °F)
Storage	-30 °C to 60 °C (-32 °F to 140 °F)
Relative Humidity	

PARAMETERS	CHARACTERISTICS
Operation	20 % to 80 % non condensing
Storage	20 % to 80 % non condensing
<b>Others</b>	
Overvoltage category	II
Pollution degree	2
Method of disposal	Electronic waste (infectious waste)

## 2.5 Transport and Storage

### 2.5.1 Transport

The instrument must be shipped using the original packing. Before shipping the instrument, it must be thoroughly disinfected (see 7.7 Instrument Decontamination/Disinfection).

### 2.5.2 Storage

Before storing the instrument, it must be primed with air (see 4.10.3 Instrument left standing for a longer period of time).

Select a location to store the instrument that is flat, level, vibration free, away from direct sunlight, and free from dust, solvents and acid vapors

Storage Specifications

Temperature	-30 °C to 60 °C (-32 °F to 140 °F)
Relative Humidity	20 % to 80 % non condensing

### Wash Head Storage

When a wash head is not in use, it is recommended to store it in the original packaging (see 4.2.2 Removing the Wash Head).

## 2.6 Power Requirements

The instrument is auto-sensing, and it is therefore not necessary to make any changes to the voltage range.

Check the voltage specification label and fuse rating label on the rear panel of the instrument to ensure that the voltage supplied to the instrument is correct to this specification.

The correct voltage ranges and fuse ratings are as follows:

AC 115V / 60Hz (Fuse: 115V 2 x T 3.15A)

AC 230V / 50Hz (Fuse: 230V 2 x T 1.6A)

If the above-mentioned voltage is not available in your country, please contact your local Tecan customer support.

Different voltage ranges require different fuses, see 7.5 Replacing the Main Fuses.

The instrument must be disconnected from the main power supply by removing the main power supply plug from the back of the instrument.

The main power supply plug on the back of the instrument must be always easily accessible.



Main power supply plug



**CAUTION**  
DO NOT REPLACE DETACHABLE MAIN POWER SUPPLY CORDS WITH INADEQUATELY RATED CORDS.



**WARNING**  
DO NOT USE THE INSTRUMENT IF THE VOLTAGE SETTING IS NOT CORRECT. IF THE INSTRUMENT IS SWITCHED ON WITH AN INCORRECT VOLTAGE SETTING IT WILL BE DAMAGED.



**WARNING**  
THE VACUUM PUMP IS NOT AUTO-SENSING AND COMES IN VERSIONS FOR 230 VOLTS OR 115 VOLTS. A LABEL WHICH SHOWS THE VOLTAGE RATING CAN BE FOUND ON THE BOTTOM OF THE PUMP.



**WARNING**  
CONNECT THE EQUIPMENT ONLY TO A POWER SUPPLY SYSTEM WITH A PROTECTIVE EARTH CONNECTION.

## 2.7 Microplate Requirements

96-well (flat, round and v-shaped bottom) and 384-well microplates (flat bottom only) can be used with the HYDROSPEED.



**Note**  
**Suitable Compact Microplates**

*The HYDROSPEED supports the processing of flat, round, or v-shaped bottom 96-well microplates typically used for EIA and flat bottom 384-well microplates, which conform to the standard defined by the Society of Biomolecular Screening. Other plate types in 96-well format such as PCR-plates cannot be used with the HYDROSPEED.*

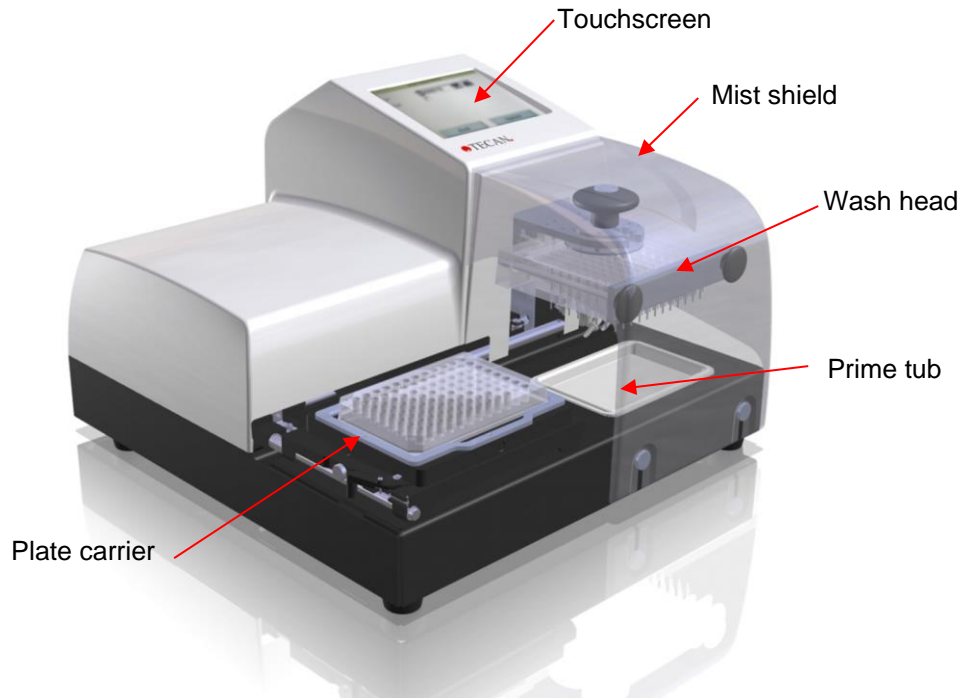
PARAMETERS	CHARACTERISTICS
Max. overall plate height	max. 43 mm (1.6929 inches)
Footprint (ANSI/SBS 1-2004)	127.76 mm x 85.48 mm (5.0299 in x 3.3654 in)
Pitch size (center to center)	9.0 mm (0.3543 inches)
Bottom shape	Flat, round and v-shaped



**Note**  
*It is recommended to use compact microplates.  
If strip plates are used, all strips must be inserted and positioned correctly.*

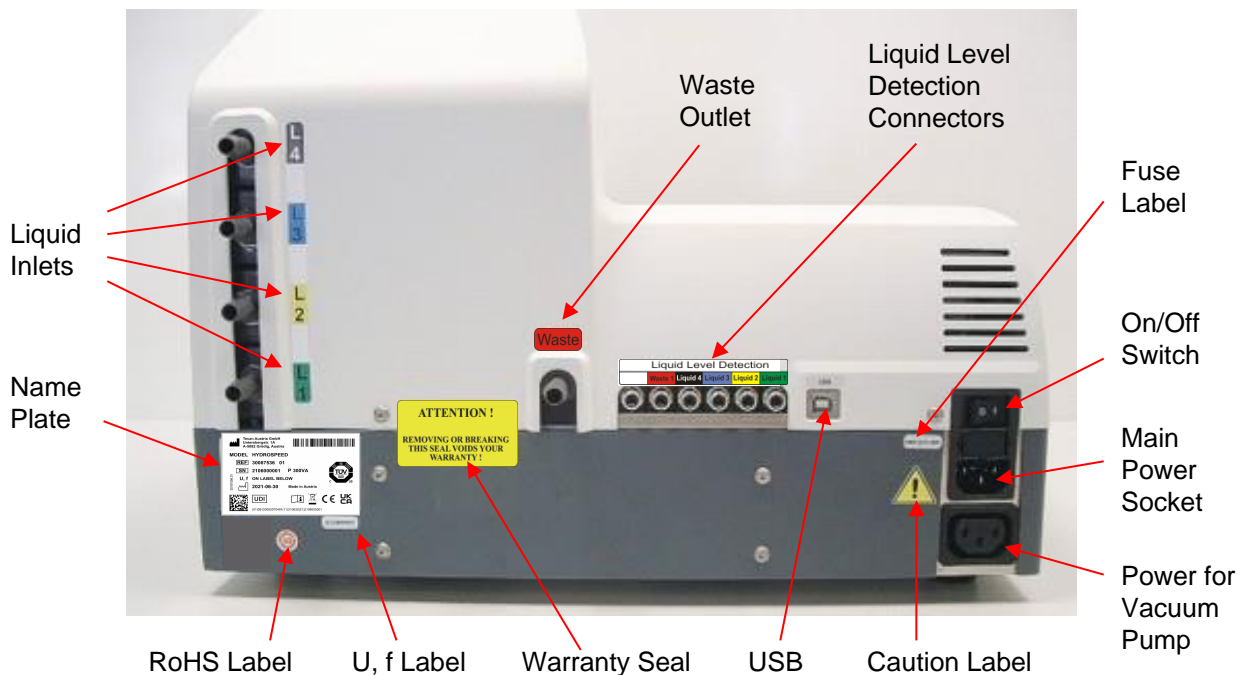
## 2.8 Instrument Description

The diagram below shows the main components of the instrument:



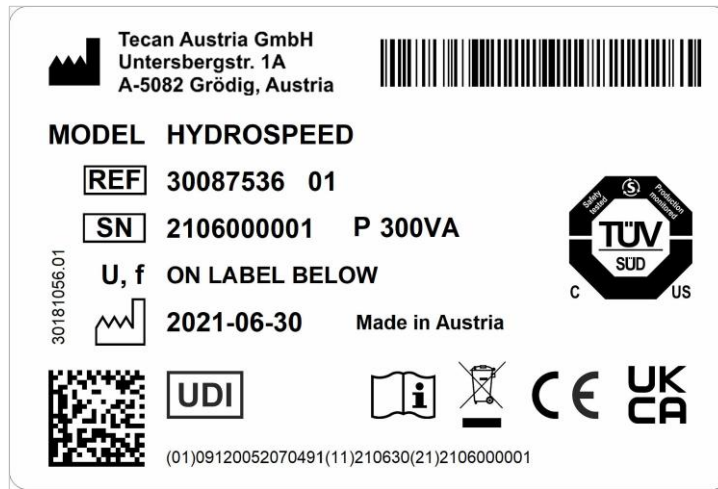
### 2.8.1 Rear Panel Connections

The instrument has the following connections on the rear panel:



### HYDROSPEED Name Plate

Example name plate



Contents of the name plate (e.g., model name and article number) may vary depending on the specific model.

For an overview of the various instruments for which these Instructions for Use are valid, see the Declaration of Conformity on the last page of this document.



**CAUTION**  
**ONLY TECAN AUTHORIZED SERVICE TECHNICIANS ARE ALLOWED TO OPEN THE INSTRUMENT. REMOVING OR BREAKING THE WARRANTY SEAL VOIDS THE WARRANTY.**

All connected devices must be approved and listed as per IEC 60950-1 Information Technology Equipment – Safety or equivalent local standards



## 2.9 Instrument Features

In combination with a set of adjustable wash parameters; incl. an extra gentle dropwise dispense speed, controllable aspiration rate and adjustable aspiration positions; the HYDROSPEED is suitable for gentle washing of loosely adherent cells.

The onboard touchscreen can be used for defining, editing or deleting wash programs and for editing plate parameters. Furthermore, it can be used for starting cleaning and maintenance procedures.

Following features are available:

- Up to 80 programs can be stored on the instrument
- Plate library of predefined 96-well and 384-well plate definitions (with HydroControl software)
- Audio signal if program is finished or if errors occur during a run
- Cleaning and maintenance procedures: Rinse, Prime, Anti-clog and Tip Prime
- Quality control procedures
- Automatic microplate centering mechanism for securing the plate
- pLLD (automated pressure based liquid level detection)
- plate assistant (helps to set bottom z-position for new plates)

### 2.9.1 Pre-defined Plate Types

The instrument is ready for use and delivered with plate definitions that contain pre-set wash head positions (plate parameters) for 96-well and 384-well plate types.

Plate Type	Shape of Wells
96-Well Plates	Side view of the bottom: flat, round or V-shaped
384-Well Plates	Top View: square, rectangular or circular

Following plate types are stored on the instrument:

GRE96ft.pdfx	(Greiner 96)
GRE384ft.pdfx	(Greiner 384)
MAG_GRE96ft.pdfx	(Greiner 96 $\mu$ -clear) e.g. for MBS application*
MAG_GRE384ft.pdfx	(Greiner 384 $\mu$ -clear) e.g. for MBS application*
VAC_Mill96.pdfx	(Vacuum Filtration plate 96 wells)*
VAC_Mill384ft.pdfx	(Vacuum Filtration plate 384 wells) *

\* Can only be used with the corresponding option.

A **plate library** with more plate definitions can be installed using the HydroControl software.

Use the Manage Plates Menu (in HydroControl) to download the desired plates to the instrument.



#### Note

**The plate parameters included in the library are default values that should be fine tuned to suit application needs. For further information on setting the Plate Parameters, refer to the HydroControl IFU.**

## 2.10 HYDROSPEED Options/ Variations

- Wash Head Types (96, 384, 96i)
- Number of Liquid Channels 1 - 4
- Bottles (standard or large)
- External vacuum pump (when connected with the HYDROSPEED main unit, and when used for aspiration only)



### CAUTION

**UNAUTHORIZED MODIFICATION OF THE HYDROSPEED, ANY OF ITS OPTIONS AND/OR COMPONENTS AS WELL AS ON ANY CORRESPONDING SOFTWARE OR SPARE PARTS WILL RESULT IN A LOSS OF WARRANTY AND A POTENTIAL LOSS IN INSTRUMENT PERFORMANCE.**

### 2.10.1 Liquid Level Detection (LLD)

The HYDROSPEED can be equipped with liquid level sensors which are built into the covers of the bottles. The use of LLD avoids overflow of waste bottles and warns the user on the touchscreen when the liquid bottles are almost empty.

L1: ● L2: ● L3: ● L4: ● W: ●

Option large volume bottle set:

- 4 bottles (10 liter) with LLD for wash liquids
- 1 bottle (20 liter) with LLD for waste
- 1 bottle (4 liter) as foam trap

Option waste bottle with LLD:

- 1 bottle (10 liter) with LLD for waste

### 2.10.2 Hydrophobic Filter for Sterile Venting

The hydrophobic filter in waste tubing microfilters the air from waste system.

If fluid is trapped in the filter, remove the filter and allow the fluid to drain from the small white fitting on the filter. Relock the small white fitting and reinstall the filter. Or replace the filter.



### WARNING

**THE CONTENTS OF THE WASTE BOTTLE AND TUBING ARE POTENTIALLY INFECTIOUS.**

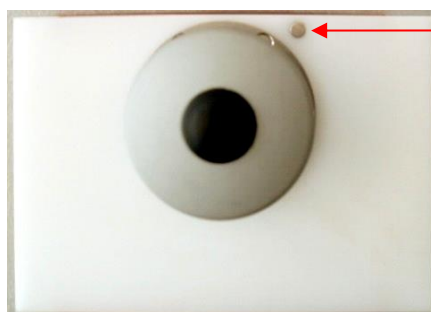
**WHEN HANDLING WASTE, IT IS ADVISABLE TO ADHERE TO APPLICABLE SAFETY PRECAUTIONS (INCLUDING THE WEARING OF POWDER-FREE GLOVES, SAFETY GLASSES AND PROTECTIVE CLOTHING) TO AVOID POTENTIAL INFECTIOUS DISEASE CONTAMINATION.**

## 2.11 Types of Wash Heads

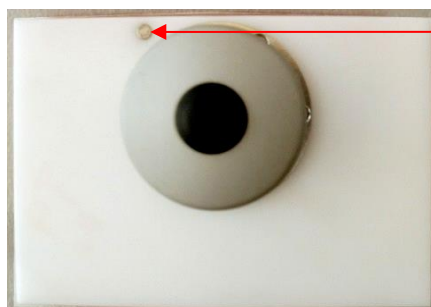
The following wash heads can be used with the instrument:

- **96HT** wash head: for high throughput processing 96-well microplates
- **384HT** wash head: for high throughput processing 384-well microplates
- **96i** wash head: for processing 96-well and 384-well microplates (indexing option required)

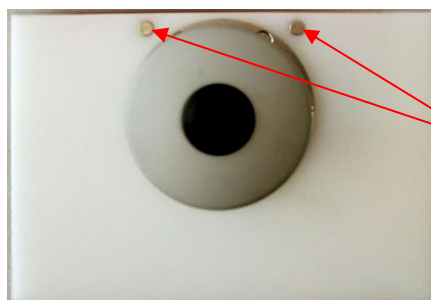
(384HT and 96i wash heads are not used for clinical diagnostics in China.)



**96HT Wash Head** has one magnet on the right



**384HT Wash Head** has one magnet on the left



**96i Wash Head** has two magnets

*Colors of items in the images may not match those of your HYDROSPEED.*

All three of the wash heads available for the HYDROSPEED are easily exchanged by the user. They are easily removable for cleaning in an external ultrasonic bath, as necessary. The wash heads are self-aligning, and no tools are needed for installing/uninstalling.



## 3. Installation

### 3.1 Introduction

When installing, moving, or connecting the instrument, follow the instructions in this document. Tecan does not accept the responsibility for injury suffered by anyone attempting these operations without following the instructions in this document, nor for damage incurred to the instrument.

Make sure the laboratory meets all requirements and conditions described in this document.

### 3.2 Installation Requirements

#### 3.2.1 *Required Working Area*

Select a location to place the instrument that is flat, vibration free, away from direct sunlight, and free from dust, solvents and acid or alkaline vapors.

Allow at least 10 cm (4 inches) between the back of the instrument and the wall or any other equipment. Do not place any items close to the instrument that could obstruct airflow.

The instrument must be disconnected from the main power supply by removing the main power supply plug from the back of the instrument.

The main power supply plug on the back of the instrument must be always easily accessible.



Main power supply plug

The liquid bottles should be positioned at the same height as the instrument.

The waste bottle should be placed on the floor. A maximum height difference of 1.5 m between the instrument and liquid or waste bottles is allowed.

For information regarding outer dimensions and weight of the instrument, see chapter 2.4 Instrument Specifications.

The pump must be installed in such a way that the intake and exhaust air of the motor can circulate well and that the pump is prevented from moving, e.g. by vibration. Keep the ventilation slots on the housing absolutely free and clean.

The pump must not be operated in a closed cabinet unless it is sufficiently cooled or ventilated by a fan. (Possible consequences: engine damage, reduced service life.)

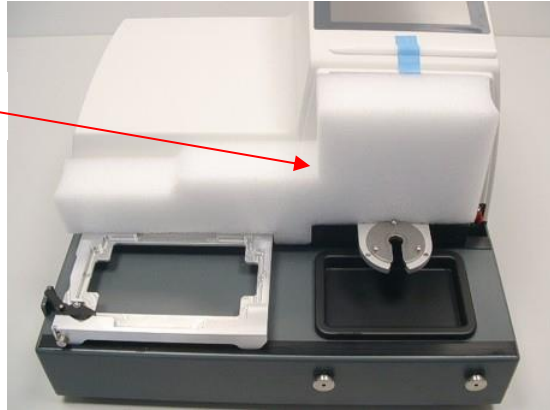
#### 3.2.2 *Power Requirements*

See 2.6 Power Requirements.

### 3.3 Unpacking and Inspection

1. Visually inspect the container(s) for damage before opening.  
Report any damage immediately.
2. Place the carton in an upright position and open it.
3. Remove the protective packaging material.
4. Lift the instrument out of the carton and place it in the selected location.
5. Remove the transport protection from the instrument.

Transport protection



6. Visually inspect the instrument for loose, bent or broken parts.  
Report any damage immediately.
7. Compare the serial number on the rear panel of the instrument with the serial number on the packing slip.  
Report any discrepancy immediately.
8. Check the instrument accessories against the packing list.
9. Save packing materials for further transportation purposes. The HYDROSPEED must be shipped in the original packaging.
10. See 4.1 Installation Procedure for further instruction regarding the installation of the instrument and wash head.

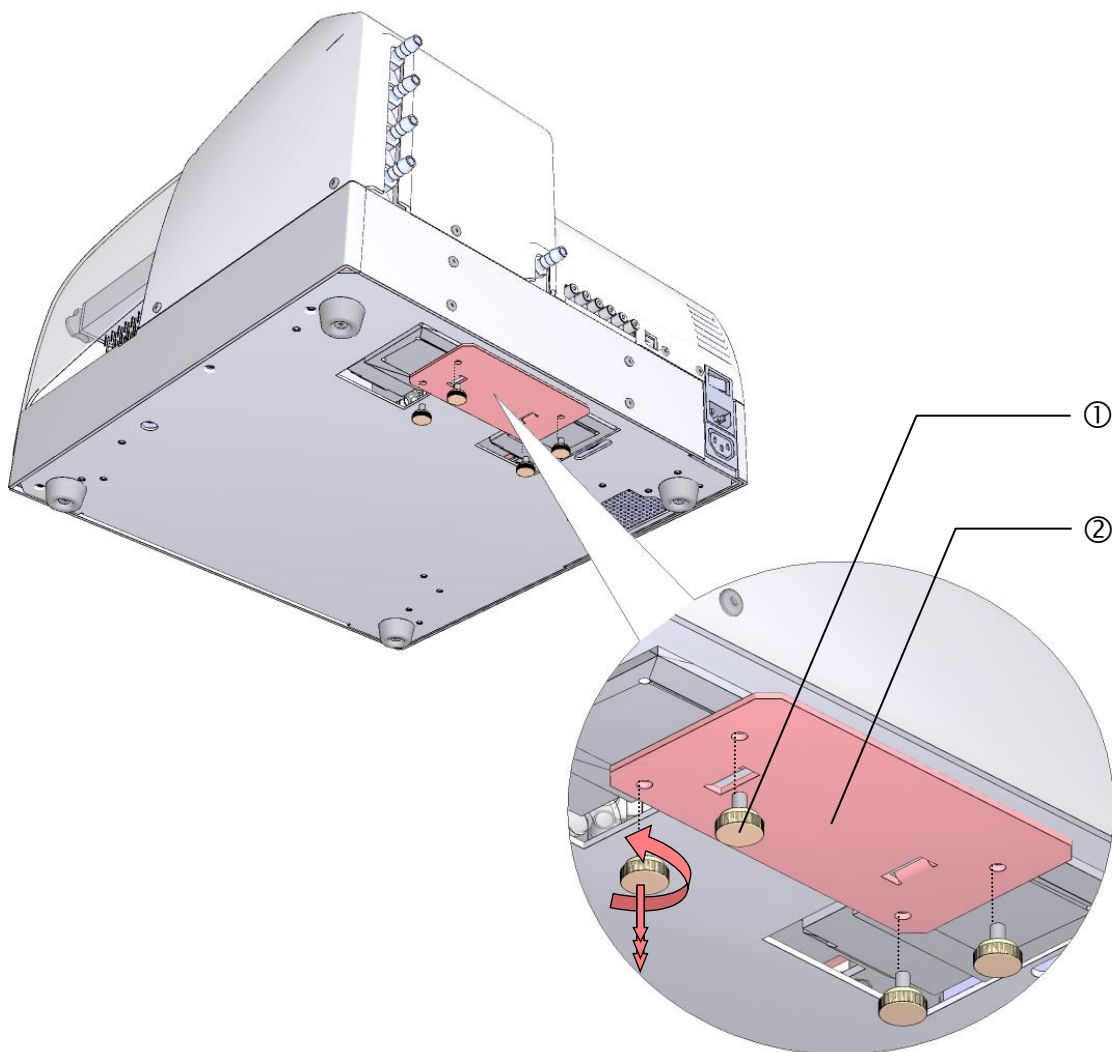
### 3.4 Removal of the Pump's Transport Lock



**CAUTION**  
**REMOVE THE TRANSPORT LOCK BEFORE OPERATING THE INSTRUMENT.**

The instrument comes delivered with a dispensing pump held in place with a transport lock that protects the instrument from damage during transit. Make sure to remove the transport lock before operating the instrument.

- ① Remove the four orange thumbscrews from the bottom of the instrument.
- ② Remove the transport lock.



**CAUTION**  
**SAVE THE TRANSPORT LOCK FOR FURTHER TRANSPORTATION PURPOSES.**  
**THE HYDROSPEED MUST BE SHIPPED ONLY WITH THE ORIGINAL PACKING AND INSTALLED TRANSPORT LOCK.**

### 3.5 Instrument Packaging Diagram

The HYDROSPEED is shipped in two transport boxes:

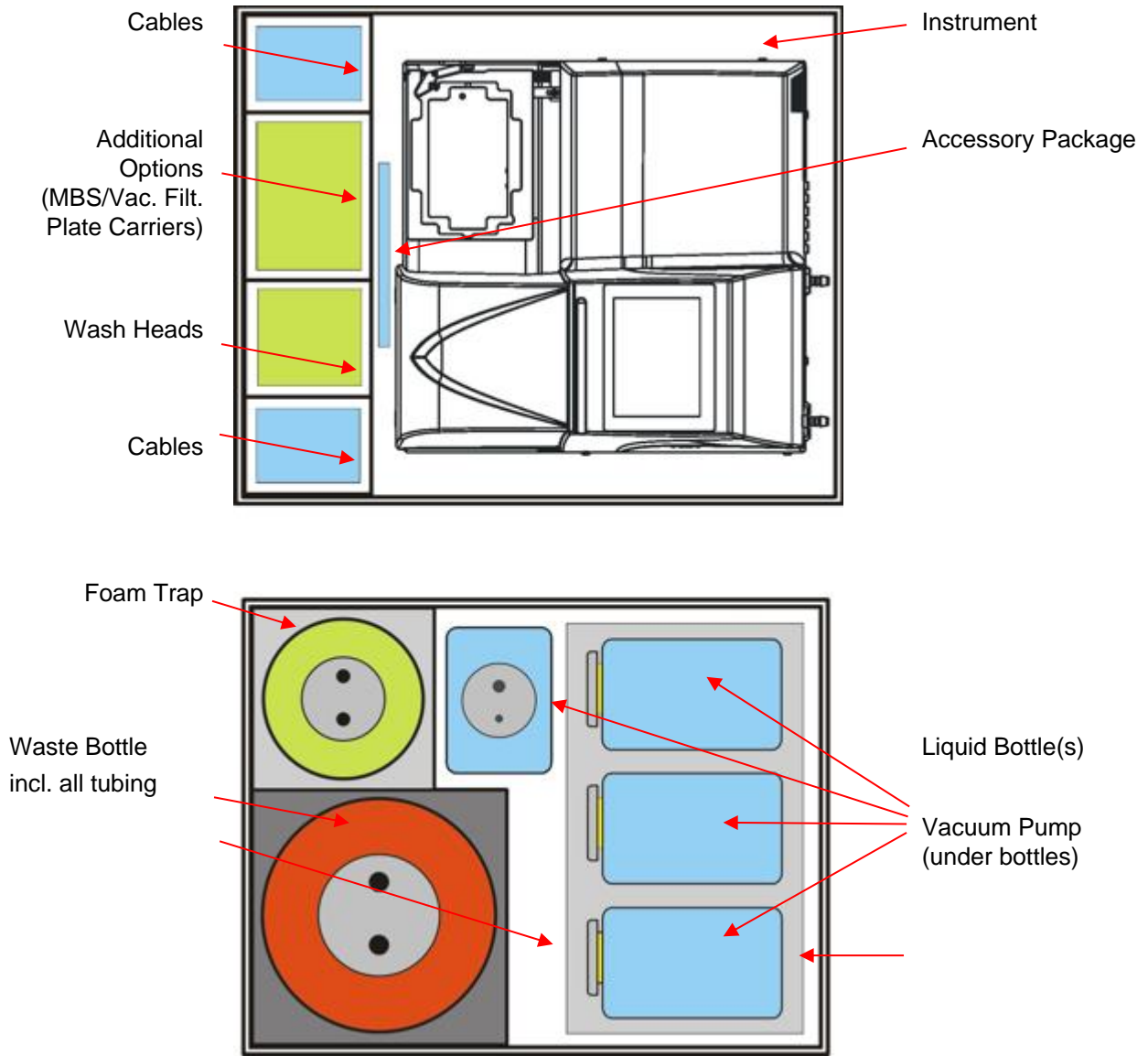


Fig. 1 The packaging for HYDROSPEED

For details regarding the exact contents of the package, see the enclosed packing list. Contents depend on the instrument configuration.



### 3.6 Connection Diagram

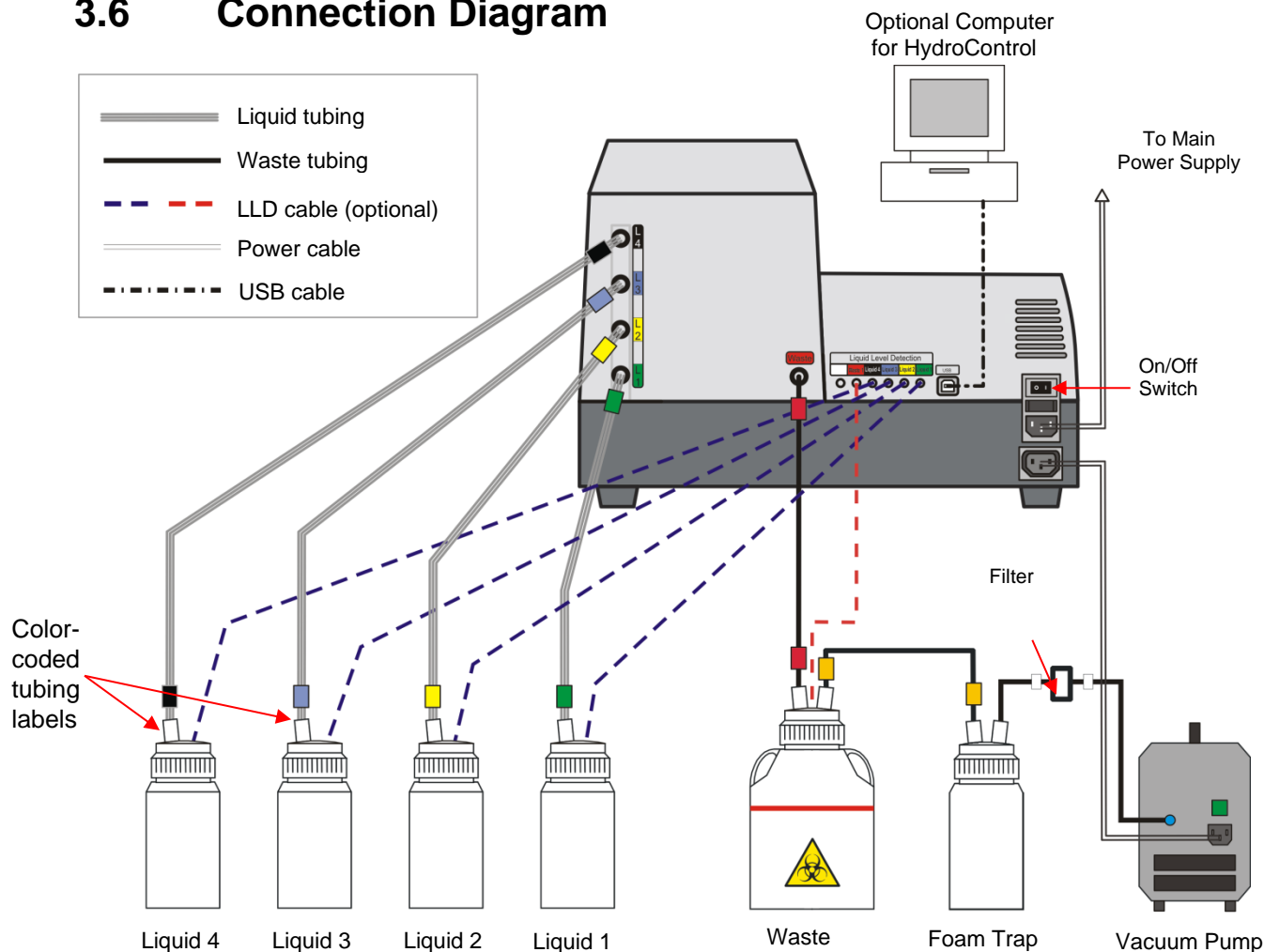


Fig. 2 Connection Diagram

Liquid and waste tubes are color-coded for easy installation:

Tubing	Label
Liquid/Buffer 1	Green
Liquid/Buffer 2	Yellow
Liquid/Buffer 3	Blue
Liquid/Buffer 4	Black
Waste	Red
Waste to Foam Trap	Yellow
Foam Trap to Vacuum Pump	None (built-in filter)

All connected devices must be approved and listed as per IEC 60950-1 Information Technology Equipment – Safety and equivalent local standards.



**CAUTION**

**THE INSTRUMENT HAS BEEN TESTED WITH THE SUPPLIED USB CABLE. IF A DIFFERENT USB CABLE IS USED, TECAN AUSTRIA CANNOT GUARANTEE THE CORRECT PERFORMANCE OF THE INSTRUMENT.**



## 4. Operating Instructions

### 4.1 Installation Procedure



#### CAUTION

NEVER USE A SHARP OBJECT ON THE TOUCHSCREEN, OTHERWISE IT WILL BECOME QUICKLY DAMAGED.



#### CAUTION

BEFORE THE INSTRUMENT IS SWITCHED ON FOR THE FIRST TIME AFTER INSTALLATION, IT SHOULD BE LEFT TO STAND FOR AT LEAST 3 HOURS, SO THERE IS NO POSSIBILITY OF CONDENSATION CAUSING A SHORT CIRCUIT.



#### CAUTION

LIQUID AND WASTE TUBES ARE COLOR-CODED FOR EASY INSTALLATION; HOWEVER IF THE LIQUID BOTTLES ARE ATTACHED IMPROPERLY OR TO THE WRONG CONNECTOR ON THE BACK PANEL OF THE INSTRUMENT, THE WASH PERFORMANCE CAN BE SERIOUSLY AFFECTED.

1. Ensure transport lock is removed, see 3.3 Unpacking and Inspection.
2. Ensure that the instrument's main power switch on the back panel of the instrument is in the OFF position.
3. Insert the power cable into the main power socket (with protective ground connection) on the back panel of the instrument.
4. Connect the color-coded liquid tubes (L1 – L4 depending on instrument configuration) to the corresponding inlet connectors on the rear panel of the instrument (see 3.6 Connection Diagram). The instrument is supplied with 1 – 4 color-coded liquid tubes (1.5 m). Connect the liquid tubes to the corresponding liquid bottles (be careful not to kink the tubes!) Rinse the liquid bottles before connecting.
5. Connect the color-coded waste tube (2 m) to the waste outlet on the rear panel of the instrument and then to the waste bottle (be careful not to kink the tube!)  
The instrument with option **large volume bottle set** includes a color-coded waste tube with a length of 4m. When positioning/laying the waste tube, take care to avoid kinks or loops to avoid liquid remaining in the tubing. This can cause a potential Timeout error.
6. Connect the waste bottle to the foam trap using the color-coded tube provided (see Fig. 2 Connection Diagram).
7. Connect the foam trap to the vacuum pump using the tube with the built-in filter (see (see Fig. 2 Connection Diagram)).
8. Switch ON the instrument, using the on/off switch in the rear panel of the instrument.
9. The initialization procedure is performed and, depending on the instrument type, an initialization message is displayed, and the **Program Favorites** menu appears.

10. Select **Procedures** and then press **Replace Wash Head** to place the instrument in stand-by mode.  
Install a wash head (see chapter 4.2 Installing/Replacing the Wash Head).
11. Ensure that the mist shield is in place. See 4.3 Attaching/Removing the Mist Shield.
12. The instrument is now ready to be used.

**CAUTION**

**AT THE END OF EACH WORKING DAY, PERFORM A RINSE PROCEDURE WITH DISTILLED OR DEIONIZED WATER TO ENSURE THE PROPER PERFORMANCE OF THE HYDROSPEED AND TO PREVENT NEEDLES FROM BECOMING BLOCKED, FOR DETAILS SEE CHAPTER 4.7.4 RINSE.**

**CAUTION**

**PLEASE ENSURE THAT THE DISPENSING AND ASPIRATION PUMPS ARE NOT RUN FOR LONGER THAN A FEW MINUTES WITHOUT LIQUID, OTHERWISE THEY WILL BECOME DAMAGED.**

**Note**

***It is recommended to use the anti-clog function to periodically flush the liquid system automatically with the buffer in use whenever the instrument sits idle for more than the specified time (10 – 360 minutes) after a wash program has run. See 5.5.2 Instrument Settings: Anti-clog Menu.***

## 4.2 Installing/Replacing the Wash Head

The wash head is delivered in a separate package.

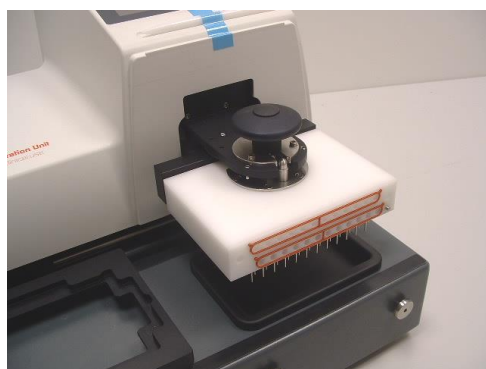
When replacing the wash head, perform the steps in “Removing the Wash Head” first, then perform the steps in “Installing the Wash Head”, see chapters below.

### 4.2.1 Installing the Wash Head

1. Ensure that the instrument is switched on and the “Replace Wash Head” procedure is running.
2. Check that the wash head seals (on the front and back of the wash head) are in place and are not kinked or twisted.



Check  
the seals!



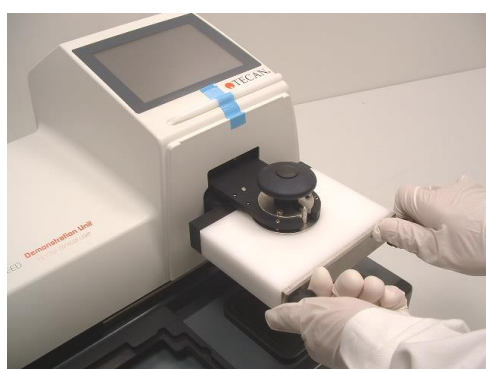
3. Pre-wet the installed gaskets on wash head with distilled /deionized water.



4. Slide wash head onto wash head arm until it makes contact with black bar which carries the tubing.
5. Lift the wash head upwards together with the black bar to bring them to the same level.



6. Carefully tighten knob on top of wash head while holding the wash head and black bar in place. Re-check alignment between wash head and black bar (gasket should not be visible).



7. Install and hand-tighten front plate to secure the wash head into place.



**Note**

**Ensure no seals are lost and that the seals remain within the seal channels on the wash head. Failure to do this can result in leakage from the wash head. When screwing the metal plate to the wash head, tighten each screw one after the other by a small amount, continue until both screws are securely fitted.**

8. Attach the mist shield (see 4.3 Attaching/Removing the Mist Shield).
9. The message, "When wash head is replaced, press OK to continue." appears on the Touchscreen. Press **OK**.  
Be sure that the replacement of the wash head is completed and that the mist shield is attached before pressing the **OK** button.
10. Switch the instrument off and on again. The instrument will automatically recognize the new wash head.
11. The Program Favorites screen appears, and the instrument is ready for use.

*Colors of items in the images may not match those of your HYDROSPEED.*

## 4.2.2 Removing the Wash Head



### WARNING

AFTER THE INSTRUMENT HAS BEEN USED, THE WASH HEAD MAY BE INFECTIOUS! BEFORE THE WASH HEAD IS REMOVED, IT MUST BE THOROUGHLY DISINFECTED.

IT IS ADVISABLE TO ADHERE TO APPLICABLE SAFETY PRECAUTIONS, (INCLUDING THE WEARING OF POWDER-FREE GLOVES, SAFETY GLASSES AND PROTECTIVE CLOTHING) TO AVOID POTENTIAL INFECTIOUS DISEASE CONTAMINATION.



### WARNING

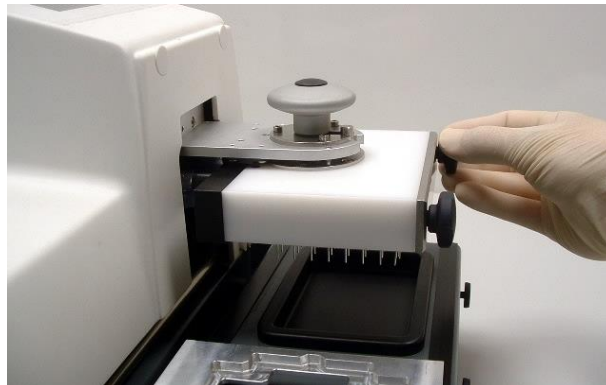
BEFORE REPLACING/REMOVING THE WASH HEAD, THE LIQUID SYSTEM HAS TO BE PRIMED WITH DISTILLED/DEIONIZED WATER AND AFTERWARDS PRIMED WITH AIR TO REMOVE LIQUID FROM THE WASH HEAD.



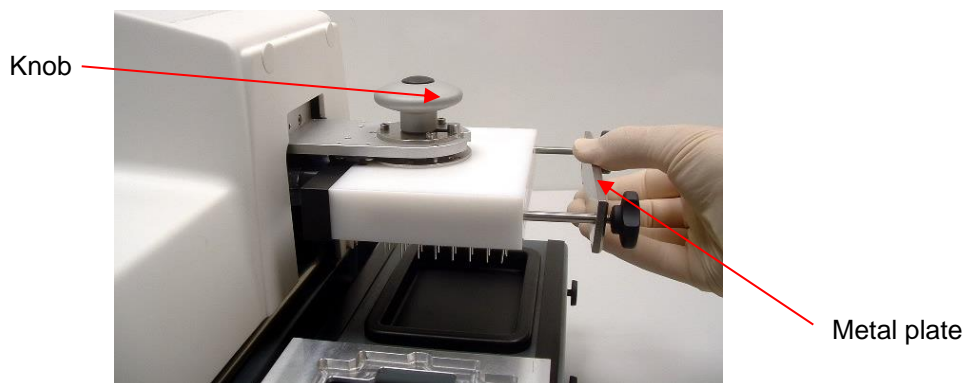
### WARNING

THE “REPLACE WASH HEAD” FUNCTION MUST BE USED WHEN REMOVING OR REPLACING THE WASH HEAD. OTHERWISE, THERE IS A RISK OF INJURY DUE TO MOVEMENT OF THE WASH HEAD.

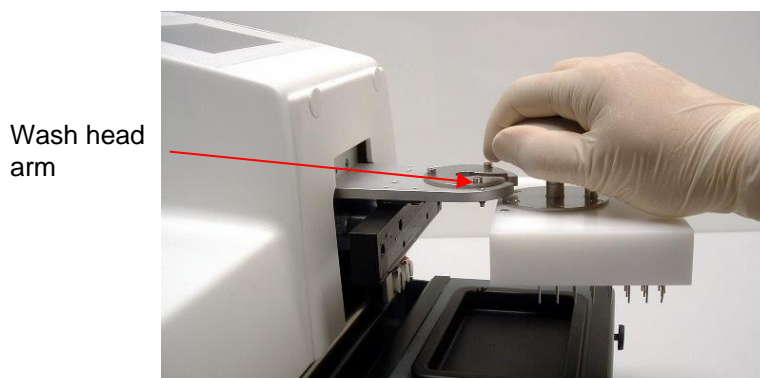
1. The instrument must be switched on before removing the wash head.
2. Connect a liquid tube to a bottle with distilled/deionized water.
3. Prime with distilled/deionized water. Repeat as necessary.
4. Repeat prime with distilled/deionized water for each channel used to remove the wash buffer.
5. Connect the liquid tube from the channel with distilled/deionized water to an empty liquid bottle.
6. Prime the channel with air until the tubes are empty.
7. Press **Replace Wash Head** in the **Procedures** menu.
8. Remove the mist shield.
9. A message appears “The wash head is ready to be replaced.” Press **OK** to start the procedure.



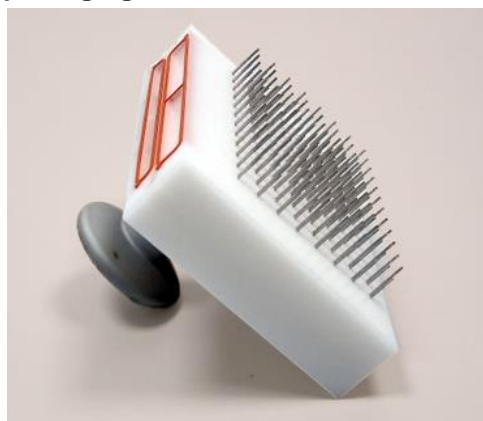
10. Remove the screws and the metal plate from the front of the wash head.



- 11. Loosen the knob on the top of the wash head.
- 12. Slide the wash head off of the wash head arm.



- 13. Before storing the wash head, dry it with oil-free pressurized air.
- 14. **It is recommended to store the removed wash head in the original packaging.**



**If you need to set the wash head down for a short time, make sure to set it down as shown in the picture above, otherwise it can fall over and the needles can become damaged.**



**CAUTION**  
**DO NOT SET THE WASH HEAD DOWN ON ITS NEEDLES, OTHERWISE THE NEEDLES WILL BECOME DAMAGED.**

*Colors of items in the images may not match those of your HYDROSPEED.*



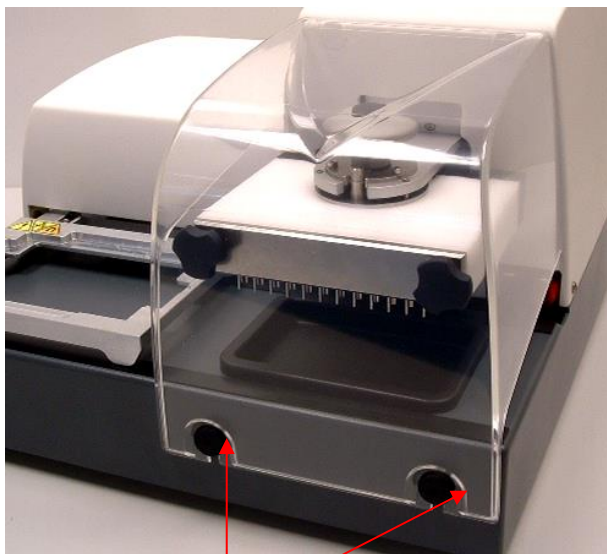
### 4.3 Attaching/Removing the Mist Shield

Carefully slide the mist shield into place onto the pins.



#### CAUTION

**WHEN REMOVING THE MIST SHIELD, IT IS IMPORTANT TO LIFT THE COVER VERTICALLY (NOT TOWARDS YOU), OTHERWISE THE COVER CAN BECOME DAMAGED.**



Pins



#### WARNING

**THE INSTRUMENT MUST NOT BE OPERATED WITHOUT THE MIST SHIELD IN PLACE.**

*Colors of items in the image may not match those of your HYDROSPEED.*

## 4.4 Wash/Dispense/Aspirate Positions

These positions are adjustable in the Dispense, Aspirate and Wash steps (for adjustments see 5.5.3 Plate Menu).

### 4.4.1 Wash/Dispense/Aspirate Positions Z-direction (up/down)

<b>Bottom</b>	The <b>bottom z-position</b> is usually the lowest position in the well. The lower the bottom z-position, the lower the residual volume; however, the needles must not touch the bottom of the well.
<b>Custom</b>	The <b>custom z-position</b> can be set in mm (measured from the top surface of the plate carrier to tip of the aspiration needle). The custom position can be adjusted individually for each wash/dispense/aspiration step when a specific height is required, e.g. cell or magnetic bead applications* (a specified amount of liquid remains in the well).  The custom z-position is only stored in the corresponding program and not in the plate definition file (compared to the overflow and the bottom z-positions).
<b>Overflow</b>	This position is used for wash/dispense/aspirate steps. The aspiration needles should be set at the height of the rim of the wells.  During <b>overflow washing</b> dispense and aspiration are performed simultaneously.  The <b>overflow z-position</b> in a wash step is selected to generate a circular flow of liquid in the well (e.g., volume > 350 µl for 96-well plates), which improves the wash efficiency. Overflow washing is recommended for ELISA assays.  Make sure that the aspiration needles in overflow z-position are positioned so that the surface of the liquid can be reached at the selected volume, otherwise a circular flow will not be achieved, and the procedure will not be performed properly.

\* Depending on available options.

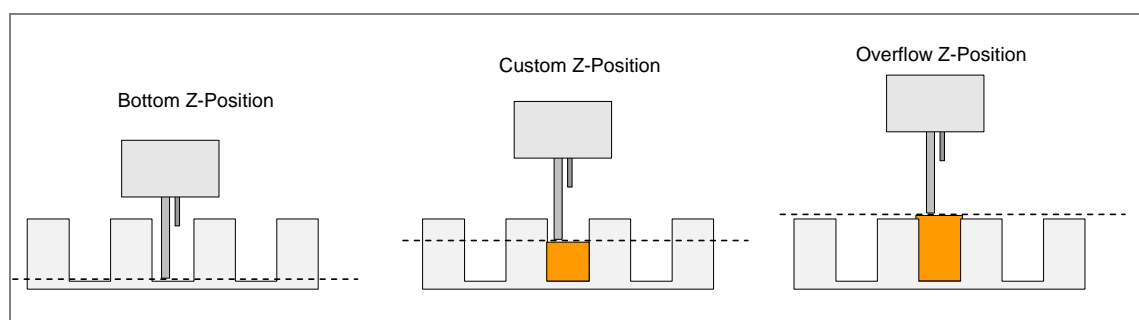


Fig. 3 Diagrams of wash head z-positions

#### 4.4.2 Dispense Positions X-direction (left/right)

These positions are stored in the plate parameters, for adjustment see 5.5.3 Plate Menu.

A dispense position must be selected for the dispensing and the wash steps.

The dispensing needles are positioned in the x-direction (left/right). Ensure that the dispensing needles are as close to the center of the wells as possible. Their movement is limited by the aspirating needles.

##### Flat Bottom Wells

##### Round and V- Bottom Wells

① Dispense needles

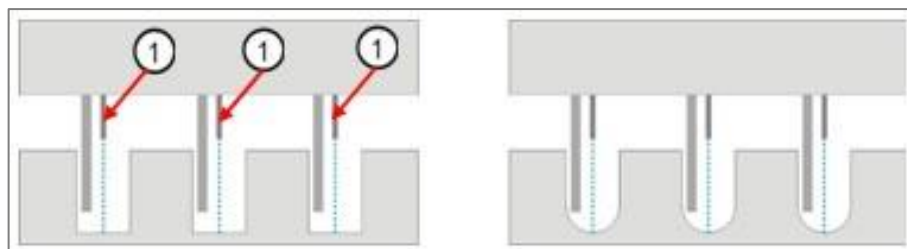


Fig. 4 Dispense positions for flat, round and v-bottom wells

#### Move Function Z-direction (up)

The **Move** function can be selected for the wash/dispense step (recommended when a low dispense rate or a buffer without detergent is used or when using 384 well microplates). During **Move** the wash head moves slowly upwards in the z-direction (along with the rising liquid level in the well). Used for gentle applications such as cell-based assays, magnetic bead applications, etc. (see 5.3.2 Dispense Step/Wash Step).



**Note**  
When using 384-well microplates, it is recommended to use the Move function.



**Note**  
When it is required that a specified amount of liquid remains in the wells, e.g. for cell or magnetic bead applications, and the dispense function Move Custom is selected, check that the custom position is selected so that the aspiration needles do not touch the surface of the liquid.

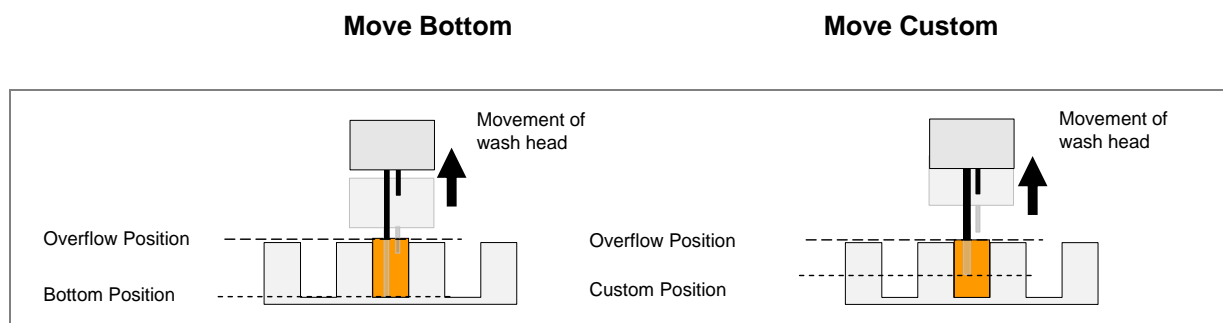


Fig. 5 Movement diagrams for Move z-positions

### 4.4.3 Aspirate Positions

These positions are stored in the plate parameters, for adjustment see 5.5.3 Plate Menu.

The position of the aspiration needles influences the wash results.

To improve wash efficiency and to reduce the residual volume, the aspiration needles must be positioned according to the bottom form (flat-, round- or v-bottom shaped) of the microplates.

For a low residual volume, the aspiration needles should be positioned as deep as possible in the well without touching the bottom. Crosswise aspiration additionally reduces the residual volume (only possible with 96-well flat-bottom microplates).

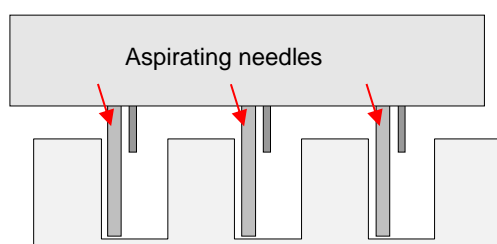
#### Normal Aspiration: positioning in X-direction (left/right)

For normal aspiration of flat bottom wells, the needles are positioned typically on the left side of the wells in flat bottom 96-well plates (positioning is restricted by dispense needles).

For round-bottom or v-shaped bottom wells, the aspirating needles are placed in the middle of the wells. Only one aspiration position can be selected (ASP 1).

For aspiration of 384-wells, the needles must be positioned on the left side of the wells.

#### Flat Bottom Wells (96 and 384-wells)



#### Round and V- Bottom Wells

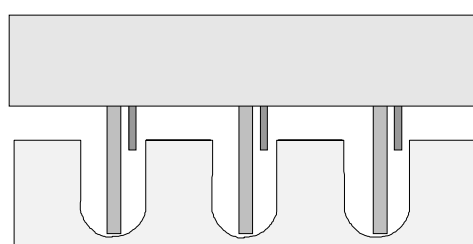


Fig. 6 Normal aspiration positions for flat bottom and 384-well plates, round and v-bottom well plates

### Crosswise Aspiration (2x): positioning in X-direction

When using flat bottom 96-well microplates, two aspiration points are available for performing “Crosswise Aspiration”.

The first aspiration position (ASP 1) is typically close to the wall on the left side of the well and the second position (ASP 2) is typically close to the center of the well (positioning is restricted by dispense needles).

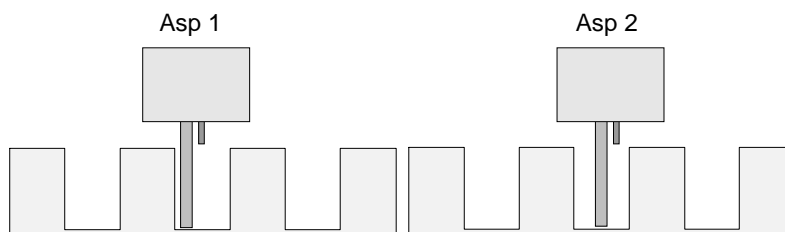


Fig. 7 Crosswise Aspiration for Flat Bottom 96 Well Plates



#### Note

***If the aspiration needles are too close to the wall, liquid can adhere between aspiration needles and wall, which can lead to weaker assay results.***

### 4x Aspiration: positioning in X (left/right) and Y-directions (front/back)

If the instrument is equipped with an indexing mechanism, 4 aspiration positions can be selected when working with a 96HT or a 96i wash head using 96-well microplates. “4x Aspiration” positions are not available for the 384HT wash head or 384-well microplates.

The third and the fourth aspiration positions should be set according to the assay requirements, see 5.5.3 Plate Menu: Y-Movement..

When 4x Asp is selected, a minimum of 4 seconds of aspiration time is recommended (e.g., for viscous liquids).

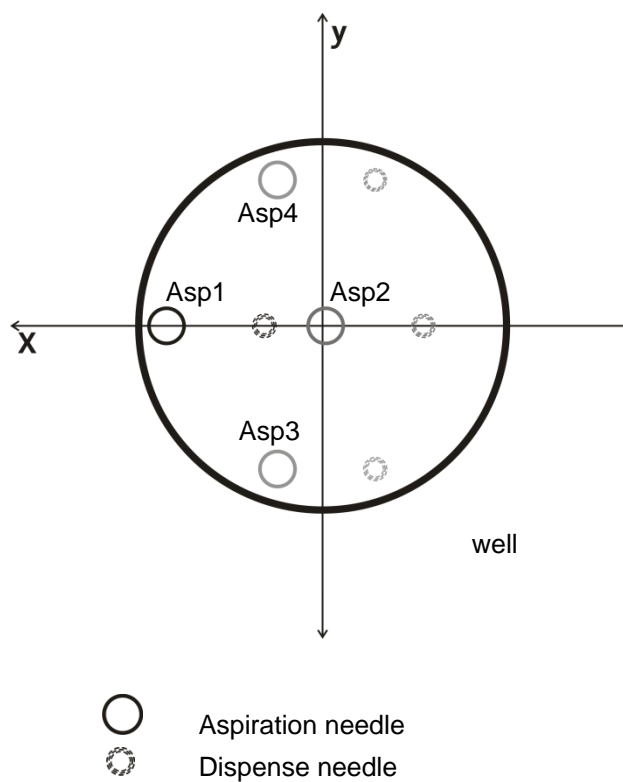


Fig. 8 4x aspiration for 96-well flat-bottom microplates, instrument equipped with indexing mechanism

## 4.5 Wash Rates

### 4.5.1 Dispense and Wash Rates

#### Dispense and Wash Rates

	96 wash head	96i wash head	384 wash head
Rate 1	70 µl/s	70 µl/s	50 µl/s
Rate 2	90 µl/s	90 µl/s	60 µl/s
Rate 3	140 µl/s	130 µl/s	70 µl/s
Rate 4	280 µl/s	180 µl/s	80 µl/s
Rate 5	350 µl/s	225 µl/s	100 µl/s



#### Note

*Dispense rate settings 1 – 3 (drip-mode) are used when washing cells or sensitive assays such as using magnetic beads. Dispense rate settings 4 and 5 are recommended for ELISA assays.*

#### Dispense and Wash Volumes

	96HT and 96i wash head	384HT wash head
Dispense	50 – 400 µl in 50 µl steps	10 – 120 µl in 10 µl steps
Wash	50 – 3000 µl in 50 µl steps	10 – 1000 µl in 10 µl steps

When a 384HT wash head and buffer without detergent are used (e.g. cell-based assay) select wash volume < 300 µl and aspiration rate 2 or higher. Set the overflow position about 1 mm lower than the rim of the well.

### 4.5.2 Aspiration Rates

	mBar
Rate 1	-200 mBar
Rate 2	-300 mBar
Rate 3	-400 mBar
Rate 4	-500 mBar
Rate 5	-600 mBar

(Aspiration is provided by external vacuum pump.)



#### Note

*Aspiration rate settings 1 – 3 are recommended when washing cells or sensitive assays such as using magnetic beads. Aspiration rate settings 4 and 5 are recommended for ELISA assays.*



**CAUTION**  
TO AVOID LIQUID SPILLS, DO NOT COMBINE  
HIGH WASH RATE WITH A LOW ASP. RATE.

## 4.6 Wash Modes

### 4.6.1 Overflow Wash

During **overflow washing** dispense and aspiration are performed simultaneously.

The typical wash head position for overflow washing sets the aspiration needles close to the rim of the well creating a small meniscus on top of each well (see below).

Overflow washing is used for ELISA assays as well as cellular assays.

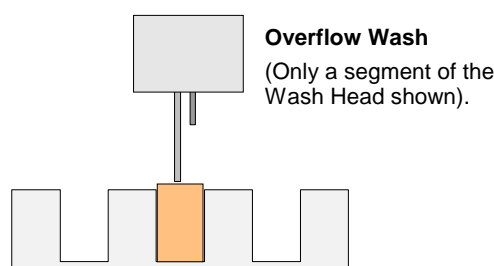


Fig. 9 Typical Wash head position for Overflow Washing

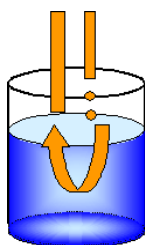


Fig. 10 Circular flow of liquid in the well during overflow washing

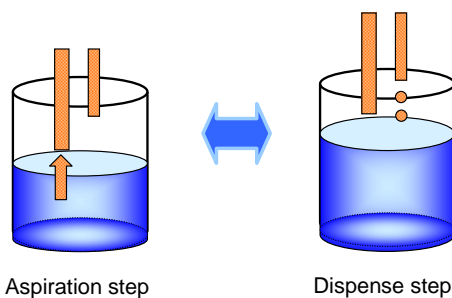
**Overflow** washing creates a circular flow of wash buffer in the well. The advantage of this procedure is a high wash efficiency combined with a short wash time, as no transport steps of the wash head are required.

Tuning of both the vacuum level (aspiration speed), the dispense speed and the dispense volume are essential to adjust **Overflow** washing to different application needs, such as for ELISA washing or cell washing.



### 4.6.2 Dilution Wash

Dilution washing is characterized by a sequence of alternative aspiration and dispense steps. The cycle starts with an aspiration step that is immediately followed by a dispense step. Depending on the wash protocol used, this cycle is repeated 2 - 5 times. Dilution washing is used, for example, for magnetic bead separation applications or cellular assays in 384-well format or with 96i wash head (buffer without detergent).



### 4.6.3 Drip Mode Dispensing for Sensitive Applications

The HYDROSPEED can dispense liquids at a very slow rate, which is important when working with cells or sensitive assays. Such “drip mode” dispensing minimizes the detachment of loosely adherent cells. The choice of the dispensing rate depends on the cell type used. Dispense rate settings 1 – 3 are recommended when washing cells or sensitive assays (see 4.5.1 Dispense and Wash Rates).

The dispensing accuracy defined in the specifications is not valid for “drip-mode” dispensing.

## 4.7 Performing Wash Procedures

Insert the 96-well microplate to be washed into the plate transport.  
The operating procedure is dependent on the instrument options and the program settings.



### CAUTION

**BEFORE WASHING PROCEDURES ARE STARTED, MAKE SURE THAT THE MICROPLATE POSITION A1 IS INSERTED CORRECTLY.**



### WARNING

**WHEN THE INSTRUMENT IS BUSY, DO NOT TOUCH THE WASH HEAD!  
AFTER THE INSTRUMENT HAS BEEN USED, THE WASH HEAD AND PRIME TUB MAY BE INFECTIOUS!**



### WARNING

**TO ENSURE PROPER WASH PERFORMANCE IT IS NECESSARY TO ADJUST THE HYDROSPEED TO THE MICROPLATE TYPE USED. THIS ALSO APPLIES TO ANY PRE-DEFINED PLATE FILES, WHICH CONTAIN ONLY AVERAGE PLATE PARAMETERS AND THUS MUST BE VERIFIED WITH THE CORRESPONDING PLATE TYPE AND CORRECTED IF NECESSARY, BEFORE PUTTING INTO USE WITH THE INSTRUMENT.**

**IF THIS ADJUSTMENT IS NOT PERFORMED PROPERLY, THIS CAN RESULT IN A HIGHER RESIDUAL VOLUME PER WELL, AS WELL AS POOR WASHING EFFICIENCY AND CAN SERIOUSLY AFFECT ASSAY PERFORMANCE.**

**SEE CHAPTER 4.2 INSTALLING/REPLACING THE WASH HEAD AND 5.5.3 PLATE MENU.**



### CAUTION

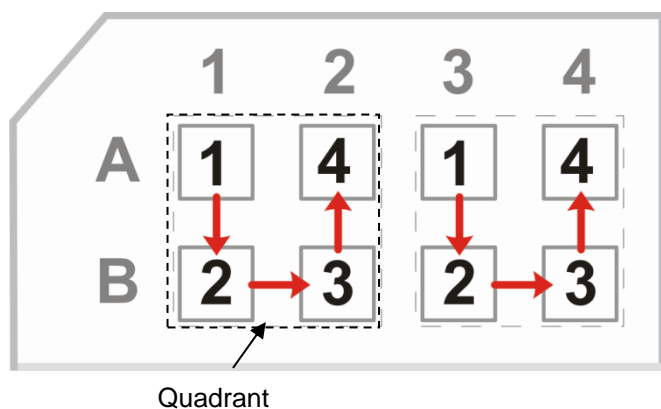
**BE CAREFUL WHEN USING STRIP-PLATES THAT ALL STRIPS ARE INSERTED AND POSITIONED CORRECTLY, OTHERWISE SPILLING CAN OCCUR AND THE INSTRUMENT MAY BECOME CONTAMINATED.**

**4.7.1 Plate Mode**

When 96HT or 96i (indexing) wash heads are used with 96-well plates, or when a 384HT wash head is used with a 384-well microplate, each program step is performed on all the wells of a microplate simultaneously, before proceeding to the next step.

**4.7.2 Indexing Mode**

When a 96i wash head (with indexing option) is used with a 384-well plate, each program step is performed on well 1 in each of the quadrants simultaneously across the entire plate, then for each of the wells 2, 3 and 4 in the quadrants, before performing the next step in the program.



### 4.7.3 Prime

Priming is performed to fill the liquid system of the HYDROSPEED.  
Check that the waste bottle is not full before starting a prime procedure.  
The (default) prime time is different for each wash head (due to associated dispense rates, see 4.5.1 Dispense and Wash Rates).



**Note**

***When using the instrument for the first time, or after priming with air has been performed (see 4.10.3 Instrument left standing for a longer period of time), or when the liquid tubing becomes empty, all inlet channels not used in the program must be primed with distilled water (or buffer) to remove air from the system.***



**Note**

***Make sure that prime volume is large enough to ensure that the wash head is primed completely (free from foam and air bubbles).***

***The wash buffer has to be in a pH range of 5 - 9.***

### Prime Times and Volumes

The following prime times or volumes are typically used:

Wash Head Type	Prime Time	Prime Volume
96HT	15 s	400 ml
96i	18 s	400 ml
384HT	15 s	450 ml

When tubes are empty, the default prime volume should be increased to guarantee that all air is removed.

If liquid tubes are empty, or if the wash head is filled with foam: for saving buffer it is possible to prime first with distilled water, before priming with buffer.

To reduce prime time/volume, it is possible to shorten the liquid tubing.



**CAUTION**

**EACH CHANNEL USED IN THE PROGRAM MUST BE PRIMED BEFORE STARTING A PROGRAM TO FILL THE LIQUID SYSTEM WITH THE REQUIRED LIQUID. THE FIRST CHANNEL USED IN THE PROGRAM MUST BE PRIMED LAST.**

**IF DIFFERENT WASH BUFFERS ARE USED IN A WASH PROGRAM, THE INSTRUMENT AUTOMATICALLY PERFORMS A PRIME STEP BEFORE SWITCHING TO THE NEXT LIQUID.**

If different wash buffers are used in a wash program, the instrument automatically performs a prime step before switching to the next liquid (using approx. 300 ml).

The volume used for automatic priming, when switching buffers during a program run, is set to a low volume. It fills the liquid system only from the inlet valve to the wash head, and therefore the tubing must be primed separately.

When repeatedly running programs, which use more than one channel, buffer switch prime is performed automatically between programs.

See also 5.4 Procedures Menu: Priming Procedure.

**WARNING**

**IF THE PRIMING PROCEDURE IS NOT PERFORMED PROPERLY, THIS CAN RESULT IN INSUFFICIENT WASHING OF THE WELLS AND CAN SERIOUSLY AFFECT ASSAY PERFORMANCE.**

**ENSURE THAT THE BOTTLE OF THE PRIMING SOLUTION IS ALWAYS FULL AT THE BEGINNING OF THE PRIMING PROCEDURE AND CHECK THAT THE INLET FILTERS IN THE LIQUID TUBES ARE CLEAN.**

**CAUTION**

**ENSURE THAT THE DISPENSING PUMP IS NOT RUN FOR LONGER THAN A FEW MINUTES WITHOUT LIQUID OR THEY WILL BE DAMAGED.**

**CAUTION**

**DO NOT USE THE INSTRUMENT TO ASPIRATE OR DISPENSE ANY ACIDIC OR ALKALINE SOLUTIONS AS THIS COULD DAMAGE THE INSTRUMENT.**

**Note**

***If the liquid bottles are placed close to the instrument it is possible to shorten the tubing to minimize the amount of wash buffer used.***

## Priming with Air

Whenever the instrument will be left to stand for a longer period of time or when replacing the wash head, the liquid system should be primed with air to remove all liquid from the tubes in order to prevent blockages in the system.

For this purpose, all tubes must be removed from the liquid bottles before starting the priming procedure.

See chapter 4.10.3 Instrument left standing for a longer period of time for more information.

#### 4.7.4 Rinse



**Note**

***Rinsing is the most important daily cleaning procedure for the instrument performed at the end of a working day.***

Rinsing is performed to flush the liquid system and to prevent needle blockages. Distilled or deionized water is used for the procedure (approx. 400 ml).

Check that the waste bottle is not full before starting a rinse procedure.

When the rinse procedure is performed, the liquid system including the wash head are flushed. The prime tub is filled, and the needles are submerged in the prime tub.

The instrument can be left switched on. Rinse stops automatically when starting a program or procedure (the prime tub is emptied automatically, and the wash head moves to the home position).

The instrument can also be switched off; the prime tub will be emptied automatically when the instrument is switched on again.

If the rinse procedure is interrupted by power outage, the prime tub will be emptied automatically when the power returns.

See also 4.10 End of Operation and 5.3.3 Process Steps: Dispense Step.

#### 4.7.5 Anti-clog

The anti-clog procedure is used to prevent blockage of the dispense needles between program runs.

The buffer/liquid (approx. 10 ml for 96 wash head and 40 ml for the 384 wash head) used in the last program run is dispensed into the prime tub. An aspiration step empties the tub automatically and the wash head returns to home position.

When anti-clog is switched on the instrument dispenses the buffer/liquid periodically according to the defined time interval whenever the instrument is idle after a program run.

The first time interval **will not start until a program with a dispense or wash step** has been run. The Anti-clog procedure is not active during any procedures or while a program is running.

When **Soak** is also selected, the liquid system is flushed once after the selected time interval (approx. 80 ml). The wash head is lowered into the prime tub until a new program or procedure is started by the user.

Anti-clog stops automatically: when a program or another procedure is started, the prime tub is emptied automatically, and the wash head moves to the home position.

See also 5.5.2 Instrument Settings: Anti-clog Menu.

### 4.7.6 pLLD

The pLLD function (pressure based liquid level detection) detects when the waste bottle becomes full. The status of the waste bottle is checked:

- after priming step
- after anti-clogging soak at start of next program
- after vacuum release
- periodically (depending on volume of dispensed liquid) before and after a program to check the current status
- after rinsing procedure at start of next program

When the pLLD measurement detects that the waste bottle is full, an error message appears like "Error pLLD: Waste bottle full". Empty the waste bottle (empty foam trap if necessary).

When the waste bottle is nearly full, it is recommended to empty the waste bottle before starting a program which uses a larger amount of liquid (1 - 2 liters of buffer/liquid).



**Note**

***A program that is already running will NOT be stopped via pLLD during a program run; an error message will appear after the run.***

## 4.8 Starting a Program

1. Place a microplate onto the plate transport and ensure that the plate is positioned correctly (position A1 of the plate corresponds to position A1 marked on the plate transport).
2. Check that the liquid bottles have enough liquid and the waste bottle is not full.
3. Start a prime procedure for each channel used in the protocol. If different wash buffers are used in a wash program, the instrument automatically performs a prime step before switching to the next liquid.



**CAUTION**

**EACH CHANNEL USED IN THE PROGRAM MUST BE PRIMED BEFORE STARTING A PROGRAM.**

**THE FIRST CHANNEL USED IN THE PROGRAM MUST BE PRIMED LAST. IF DIFFERENT WASH BUFFERS ARE USED IN A WASH PROGRAM, THE INSTRUMENT AUTOMATICALLY PERFORMS A PRIME STEP BEFORE SWITCHING TO THE NEXT LIQUID.**

4. Select a program from the program list and press **Start**.



**WARNING**

**DO NOT TOUCH MOVING PARTS!**

## 4.9 Wash Procedure Examples

### 4.9.1 Cell-Based Assays in 96-well Plates

Cell washing is a very gentle wash procedure. Principally overflow or dilution wash can be used for cell applications in 96 well plates (see 4.6 Wash Modes).

Dilution wash is a defined sequence of single aspiration and dispense steps. During overflow wash the well is aspirated first and then liquid is dispensed and aspirated simultaneously. When working with cells, a higher aspiration position must be selected (e.g., z-position custom at approx. 8 mm) to minimize the detachment of the cells. Set Aspiration position to center of well.

- Higher aspiration position: “z-position custom” for aspirate and wash step leaving a higher volume of liquid in the well which minimizes detachment of cells (e.g. for weakly adherent cells).
- Set Aspiration position 1 to center of well
- Short aspiration time: 1 – 2 s with aspiration mode normal
- Low aspiration rate: 1 – 3 (see 4.5.2 Aspiration Rates)
- Low head speed setting: 1 – 5 mm/s
- Dispense rate 1 – 3 (drip mode) for 96HT wash head, dispense rate 2 or higher for 96i wash head (see 4.5.1 Dispense and Wash Rates)
- Move function: for dispense or wash step

Wash results are also influenced by the cell type (adherent/non-adherent) used, the cell culture conditions (with serum/without serum), additional treatment of the wells (coating) or the type of culture dishes or plates.



#### Note

***The following example programs must not be used as a standard wash procedure as it is necessary to adjust the wash parameters according to the cell type used and in reference to the appropriate kit description.***

Example program for cell based assay in 96-well format using dilution wash procedure:

- **Program:** Aspiration rate: 1
- **Cycle:** Number of cycles: 1
- **Aspirate:** Mode: normal, Z-position: Custom: 8 mm, Time: 1 s; Head Speed: 1 mm/s;
- **Dispense:** Move; Z-position: Custom: 8 mm, Volume: 200 µl, Dispense rate: 90 µl/s
- **Aspirate:** Mode: normal, Z-position: Custom: 8 mm, Time: 1 s; Head Speed: 1 mm/s;



## 4.9.2 Cell-Based Assays in 384-well Plates (384 and 96i Wash Heads)

Dilution wash should be selected due to the small diameter of the wells of the 384 plates.

Dilution wash is a defined sequence of single aspiration and dispense steps. When working with cells a higher aspiration position must be selected (e.g., z-position custom at approx. 8 mm). This minimizes the detachment of the cells and increases the remaining number of cells in the wells.

The following typically used parameters can influence the wash performance:

- Dispense rate 2 – 4: when using liquids without detergent (higher surface tension and smaller needles slows the drip rate). See 4.5.1 Dispense and Wash Rates.
- Move function: for dispense or wash step
- If wash in overflow position has to be performed use a max. volume of 300 µl (when using a buffer without detergent) and set the overflow position about 1 mm lower than the rim of the well.

When using 384HT wash head for cell applications, prime wash head first with water and detergent before working the first time with liquid without detergent.



### Note

***The following example program must not be used as a standard wash procedure as it is necessary to adjust the wash parameters according to the cell type used and in reference to the appropriate kit description.***

Example program for cell-based assay in 384-well format using dilution wash procedure:

**Program:** Aspiration rate: 3

**Cycle:** Number of cycles: 1

- **Aspirate:** Mode: normal, Z-position: Custom: 8 mm, Time: 1 s;  
Head Speed: 5 mm/s;
- **Dispense:** Move; Z-position: Custom: 8 mm, Volume: 50 µl, Dispense rate:  
80 µl/s
- **Aspirate:** Mode: normal, Z-position: Custom: 8 mm, Time: 1 s;  
Head Speed: 5 mm/s;

### 4.9.3 ELISA Wash

For ELISA wash procedures either overflow or dilution wash can be selected.

The following typically used parameters can influence the wash performance:

- Aspiration position bottom
- Aspiration mode: crosswise (2 aspiration points per well) or 4x asp (4 asp. points per well in combination with 96HT or 96i wash head)
- Aspiration rate: 3 – 5
- Head speed setting: 10 mm/s or higher
- Dispense rate: 4 – 5 (see 4.5.1 Dispense and Wash Rates)



**Note**

***The following example program must not be used as a standard wash procedure as it is necessary to adjust the wash parameters according to the appropriate kit description.***

Example program for ELISA protocol in 96 well plates using overflow wash

**Program:** Aspiration rate: 4

**Cycle 1:** 5x

- **Wash:** Mode: crosswise; Z-pos. aspiration: Bottom; Z-pos. wash: Overflow; Volume: 800 µl; Head Speed: 10 mm/s; Wash rate: 350 µl/s; Time: 2 s

**Cycle 2:** 1x

- **Wash:** Mode: crosswise; Z-pos. aspiration: Bottom; Z-pos. wash: Overflow; Volume: 800 µl; Head Speed: 10 mm/s; Wash rate: 350 µl/s; Time: 2 s

**Final Asp:** Mode: crosswise; Z-position: Bottom, Time: 4 s, Head speed: 10 mm/s

## 4.10 End of Operation

### 4.10.1 Instrument left standing during the day

If the instrument is to be **left standing during the day (break between programs)**, activate Anti-clog to prevent blockage of needles (see 5.5.2 Instrument Settings: Anti-clog).

or

Start a rinse procedure with distilled/deionized water (see 4.7.4 Rinse)

Ensure that there is a sufficient volume of distilled water in the rinse bottle (liquid bottle of selected channel) and that the waste bottle is emptied before starting the rinse procedure.

Then start the rinse procedure. This procedure is used to thoroughly rinse the aspiration and dispense system with distilled/deionized water. After this process the wash head is soaked in distilled water in prime tub.

When a procedure or program is started the instrument automatically ends the rinse procedure. The liquid in prime tub is aspirated and wash head moves to the home position.

The procedure can be started with the **Rinse** button on the Program Favorites screen or from the Procedures menu.

1. Connect the liquid tube to a bottle with distilled/deionized water.
2. Start a rinse procedure.
3. The Rinse screen appears. Select the corresponding channel.
4. When starting a new program, make sure that the tubing is primed with the correct buffer.

### 4.10.2 Instrument left standing overnight

At the end of a working day, if the instrument is to be **left standing overnight**, a rinse procedure must be performed (see 4.7.4 Rinse).



#### CAUTION

**THE RINSE PROCEDURE IS THE MOST IMPORTANT DAILY CLEANING STEP FOR THE WASHER.**

**FAILURE TO PERFORM A RINSE PROCEDURE CAN RESULT IN THE CLOGGING OF DISPENSE NEEDLES DUE TO CRYSTALLIZATION OF THE WASH BUFFER OR THE GROWTH OF BACTERIA, ETC., IN THE TUBING.**

**IF THE NEEDLES BECOME CLOGGED, SEE 7.2 CLEANING THE WASH HEAD.**

Ensure that there is a sufficient volume of distilled water in the rinse bottle and that the waste bottle is emptied before starting the Rinse Procedure.

Before starting the rinse procedure, perform a prime step with distilled water for the channels used in the program to remove/drain the wash buffer from the tubing/dispensing system, (prevents growth of bacteria, etc.). See 4.7.3 Prime.

Start the rinse procedure. This procedure is used to thoroughly rinse the aspiration and dispense system with distilled/deionized water. After this process the wash head is soaked the prime tub in the liquid.

When a procedure or program is started the instrument automatically ends the rinse procedure. The liquid in prime tub is aspirated and wash head moves to the home position.

If you want to switch off the instrument during rinse procedure, switch the instrument off when the wash head is soaking in the prime tub.

When the instrument is switched on again, the rinse procedure will automatically end. The liquid in prime tub is aspirated and wash head moves to the home position.

1. Connect a liquid tube to a bottle with distilled/deionized water is connected.
2. Prime with distilled/deionized water. (The procedure can be started with the Prime button on the Program Favorites screen or from the Procedures menu).
3. Repeat prime with distilled/deionized water for each used channel to remove the wash buffer.
4. Start a rinse procedure with distilled/deionized water. (The procedure can be started with the Rinse button on the Program Favorites screen or from the Procedures menu).
5. The Rinse screen appears. Select the corresponding channel.
6. Empty the waste bottle (empty the foam trap if necessary) after rinse procedure is finished (wash head soaking in prime tub)

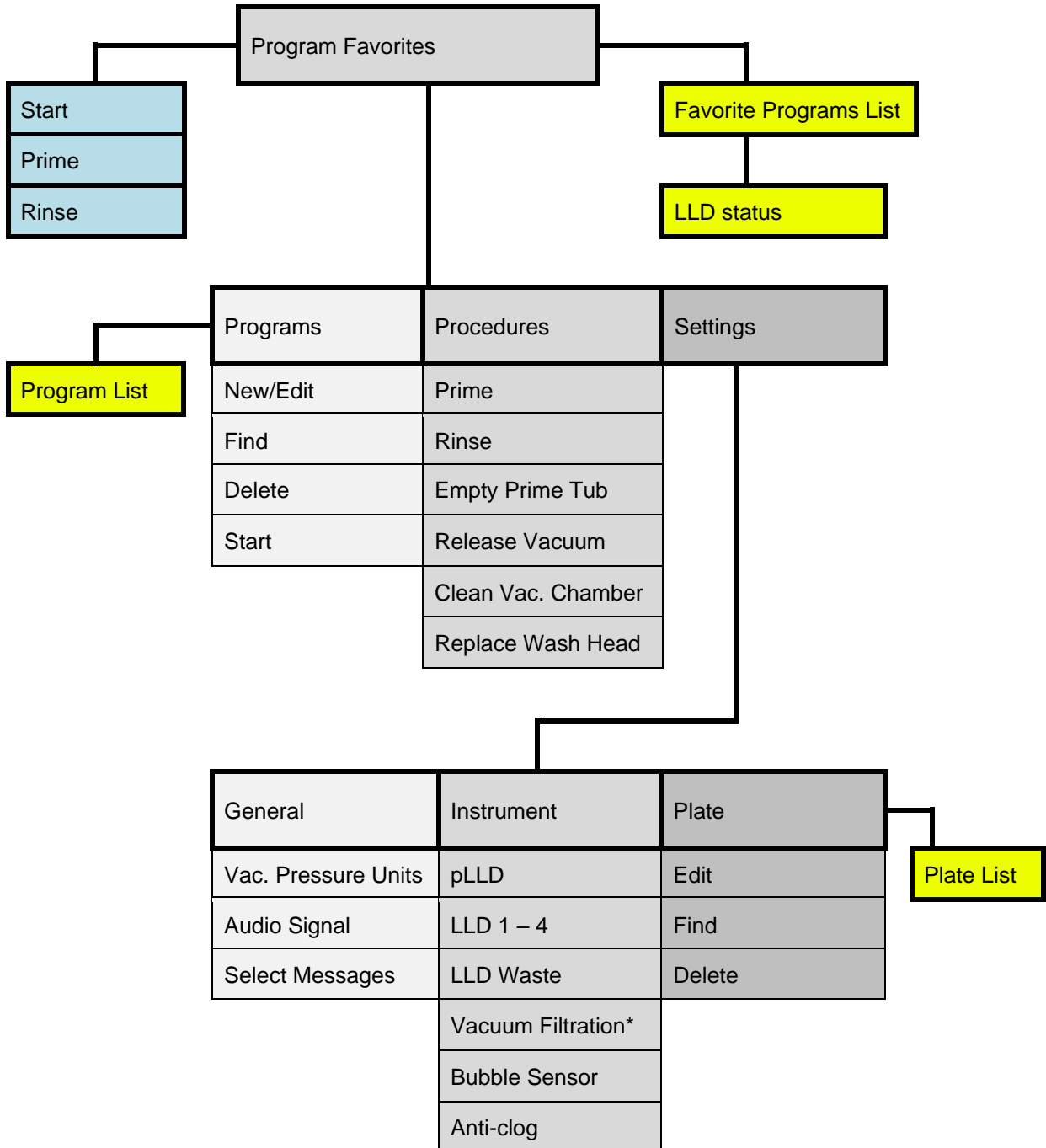
#### **4.10.3 Instrument left standing for a longer period of time**

If the instrument is to be **left standing over the weekend or for a longer period of time**, the liquid system has to be rinsed and afterwards primed with air to remove liquid from the tubing /liquid system (prevents growth of bacteria, etc.). See 4.7.3 Prime.

1. Connect a liquid tube to a bottle with distilled/deionized water.
2. Prime with distilled/deionized water. Repeat as necessary.
3. Repeat prime with distilled/deionized water for each channel used to remove the wash buffer.
4. Connect the liquid tube from the channel with distilled/deionized water to an empty liquid bottle.
5. Prime the channel with air until the tubes are empty.
6. Repeat prime with air until tubes are empty for each channel. (Connect the liquid tube of the corresponding channel to an empty liquid bottle).
7. Now the instrument can be switched off.
8. Empty the waste bottle (empty foam trap if necessary).

# 5. Touchscreen Menu Structure

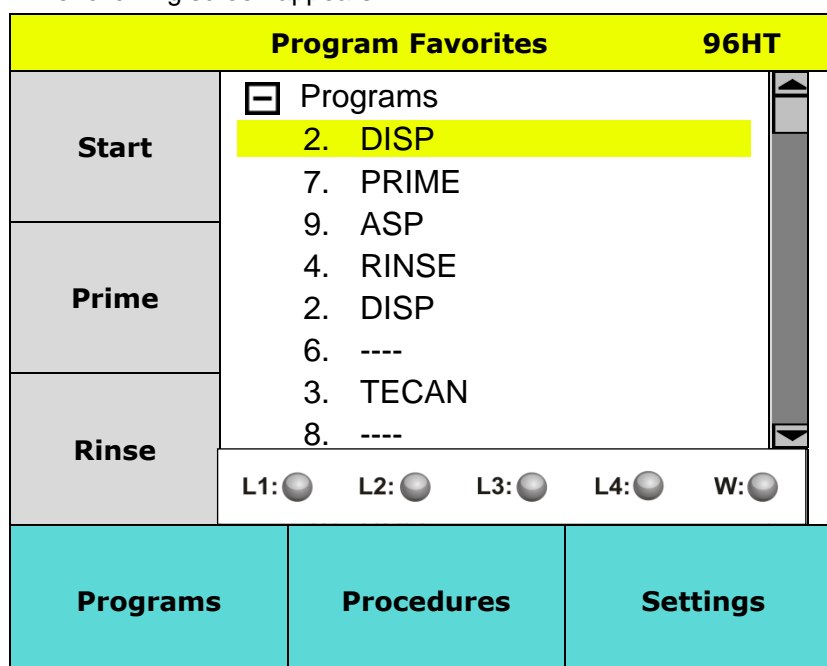
## 5.1 Overview of Touchscreen Menus



\* Depending on available options.

## 5.2 Program Favorites Menu

The following screen appears:



A dotted line “----” at the program position means that the program is not compatible with the installed wash head.

In the upper right corner of the display the currently mounted wash head is shown.

<b>Start</b>	Shortcut button to start a program
<b>Prime</b>	Shortcut button to start a prime procedure
<b>Rinse</b>	Shortcut button to start a rinse procedure
<b>LLD Status</b>	Shows the status of the liquid in the bottles, including the waste bottle
<b>Programs</b>	Menu containing <b>New/Edit</b> , <b>Find</b> , <b>Delete</b> and <b>Start</b> buttons
<b>Procedures</b>	Menu containing <b>Prime</b> , <b>Rinse</b> , <b>Empty Prime Tub</b> , <b>Release Vacuum</b> , <b>Clean Vac. Chamber</b> and <b>Replace Wash Head</b>
<b>Settings</b>	Menu for defining <b>General</b> , <b>Instrument</b> and <b>Plate</b> settings

### Screensaver on Display

After 30 minutes of inactivity a screensaver showing the Tecan logo will appear on the display. Touch the display to stop the screensaver.

## 5.3 Program Menu

Menu	Submenu
Programs	<p><b>New/Edit:</b> define a new program or edit the selected program</p> <p><b>Find:</b> search for defined programs with a filter mode</p> <p><b>Delete:</b> delete the selected program</p> <p><b>Start:</b> start the selected program</p>

### New/Edit a Program (New/Edit Menu)

#### Program Parameters

- A program can contain up to 50 program steps
- Each program must contain at least 1 cycle. (A cycle must contain at least 1 program step; a cycle counts as two program steps).
- Each cycle can be repeated up to ten times

The following program items are available:

<b>CYCLE</b>	A cycle consists of program steps. A cycle must contain a minimum of one program step. Each cycle can be repeated up to 10 times.
<b>ASP</b>	Aspirate: the wells are emptied.
<b>DISP</b>	Dispense: the wells are filled with liquid.
<b>WASH</b>	First the well is aspirated. Then liquid is dispensed and aspirated simultaneously creating a circular flow, which increases the wash efficiency.
<b>SOAK</b>	Liquid remains in the wells for the selected time (with or without shaking).
<b>VAC</b>	Vacuum filtration: collects desired substances in filtration plates.
<b>USER PROMPT</b>	Messages can be selected, which require user interaction before the program can continue.
<b>FINAL ASPIRATE</b>	Inserted at the end of a program to ensure that wells are emptied. Final Aspirate is performed only once. Before final aspirate starts, the vacuum is built up to the set aspiration rate.

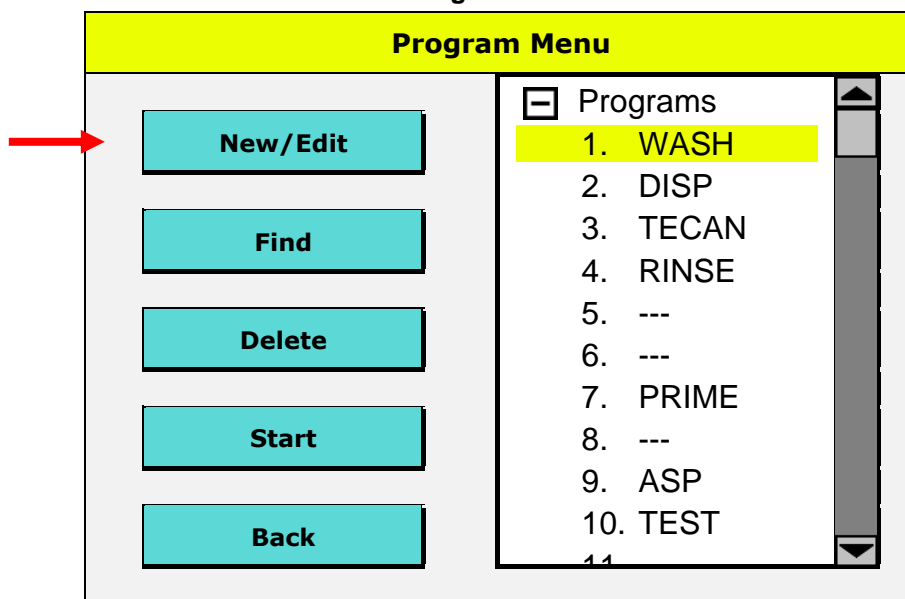


**Note**

***After having defined a new program or edited a program, check that the program steps of all programs stored on the instrument are working as defined.***

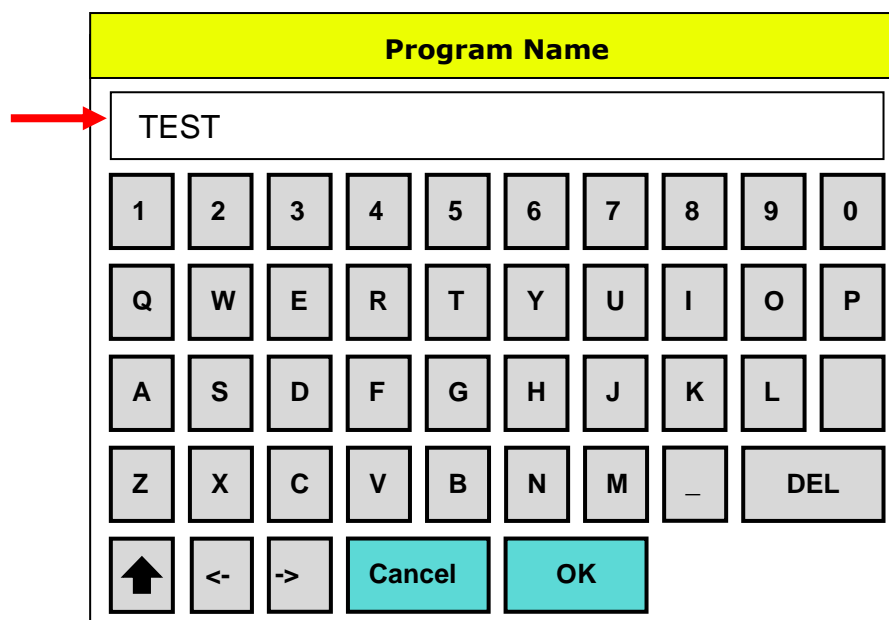
### 5.3.1 Defining a New Program

1. Press **New/Edit** in the **Program** menu.



A dotted line “---“ at the program position means that the program is not compatible with the installed wash head.

2. Enter a program name. No special characters are allowed, except for the underline “\_”.





3. Select the **Asp. Rate** (1 – 5) from the drop-down list. 5 different aspiration rates are available, 1 is the lowest, 5 is the highest. The aspiration rate is set once for the program. This aspiration rate will be valid for all aspiration and wash steps as well as for the final aspiration step in the program. See 4.5.2 Aspiration Rates.



**CAUTION**  
**TO AVOID LIQUID SPILLS, DO NOT COMBINE HIGH WASH RATE WITH LOW ASPIRATION RATE.**

4. Select **Tip Prime** to prime the needles before starting the program (volume: 10 ml). After Tip Prime is performed the prime tub will be emptied automatically after program run.
5. Press **OK** to continue.

**TEST**

Tip Prime

Asp. Rate:

Cancel

OK

6. Select the **Plate Type** according to the installed wash head.
7. Press **OK** to continue.

**Plate Definition**

Plate Type:

Cancel

OK

8. The first cycle is inserted automatically. Additional cycles must be inserted in the same way as other program steps. A maximum of 10 repetitions of each cycle is possible.
9. To edit a program step double-click the step or select the step and press **Edit** and a dialog box appears in which the parameters can be edited.

Define Steps

Select Step: <div style="border: 1px solid black; padding: 2px; display: flex; justify-content: space-between; align-items: center;"> <span>Cycle</span> <span>▼</span> </div> <div style="text-align: center; margin-top: 10px;"> <div style="background-color: cyan; padding: 5px; width: 100%; margin-bottom: 10px;">Edit</div> <div style="background-color: cyan; padding: 5px; width: 100%; margin-bottom: 10px;">Delete</div> <div style="background-color: cyan; padding: 5px; width: 100%;">Save</div> </div>	<div style="border: 1px solid black; padding: 5px;"> <div style="display: flex; justify-content: space-between; align-items: flex-start;"> <span>[-] [Program Name]</span> </div> <div style="margin-left: 20px;">                     Plate:[Plate name]                      Aspiration Rate  <div style="background-color: yellow; padding: 2px;">Cycle: 1</div> </div> </div>
---	---

10. Select the desired program step from the drop-down list. One program can contain up to 50 program steps (a cycle counts as 2 program steps). Press **Delete** to remove a selected step (close the list by pressing the down arrow button to see the delete button).

Define Steps

Select Step: <div style="border: 1px solid black; padding: 2px; display: flex; justify-content: space-between; align-items: center;"> <span>Cycle</span> <span>▼</span> </div> <div style="margin-top: 5px;"> <div style="background-color: yellow; padding: 2px;">Cycle</div> <div style="padding: 2px;">Asp</div> <div style="padding: 2px;">Disp</div> <div style="padding: 2px;">Wash</div> <div style="padding: 2px;">Soak</div> <div style="padding: 2px;">Final Asp</div> <div style="padding: 2px;">Prompt</div> <div style="padding: 2px; background-color: #cccccc;">Vac Filt</div> </div>	<div style="border: 1px solid black; padding: 5px;"> <div style="display: flex; justify-content: space-between; align-items: flex-start;"> <span>[-] TEST</span> </div> <div style="margin-left: 20px;">                     Plate:GR9                      Aspiration Rate                      Cycle:1  <div style="background-color: yellow; padding: 2px;">Dispense</div> </div> </div>
---	---

11. When the program is finished, close the list by pressing the down arrow button. Press **Save** and a message appears, "Would you like to save your changes?", press **OK** and the program is saved to the instrument at the selected position.

### 5.3.2 Edit a Program – Save and Save As

Press **Save** to save the changes to this program. The original program will be overwritten at the current position.

Press **Save as** to save the changes as a new program, which will be saved to the next open position in the program list. The original program will not be changed.

### 5.3.3 Process Steps

#### Aspirate Step

**Aspirate**

Z-position

Time  [s]

Head speed  [mm/s]

Mode:

normal

crosswise

4x Asp

#### Aspiration Parameters

<b>Z-Position</b>	<b>Bottom, Custom, Overflow</b> See 4.4.1 Wash/Dispense/Aspirate Positions Z-direction (up/down)
<b>Set (Custom Position)</b>	When <b>Custom</b> z-position is selected the <b>Set</b> button becomes available for defining the height of the aspiration needles. A new dialog box opens, enter the desired height and press <b>OK</b> . The height is measured in mm from the top surface of the plate carrier to tip of the aspiration needle.
<b>Mode</b>	<b>Normal, Crosswise or 4x Asp</b> (according to the instrument configuration) See 4.4 Wash/Dispense/Aspirate Positions
<b>Time</b>	1 – 20 s The length of time the wash head stays at the aspiration position. (When 4x Asp is selected, a minimum of 4 seconds of aspiration time is recommended).
<b>Head Speed</b>	1 – 20 mm/s The lowering speed of the wash head during aspiration. (When the 384 wash head is installed, the recommended head speed is at least 5 mm/s).

Press **OK** to set the aspiration parameters and insert the aspiration step into the program at the selected location.

### Dispense Step

**Dispense**

Dispense Rate  [µl/s]

Z-position  Move:

Set

00000.0

[mm]

Channel  µl

Volume  [µl]

Cancel

OK

### Dispense Parameters

<b>Dispense Rate</b>	The dispense rate is the volume of liquid dispensed in time (µl/s). 5 different dispense rates are available, 1 is the lowest (1 – 3 drip mode), 5 is the highest. The dispense rates [µl/s] are different depending on the type of installed wash head. (See 4.5.1 Dispense and Wash Rates).
<b>Z-Position</b>	<b>Bottom, Custom, Overflow</b> See 4.4.1 Wash/Dispense/Aspirate Positions Z-direction (up/down)
<b>Move</b>	When z-position <b>Custom</b> or <b>Bottom</b> is selected, the <b>Move</b> button becomes available. Move is not available for z-position Overflow. Recommended for cell applications, MBS applications and 384-well microplates.
<b>Set (Custom Position)</b>	When <b>Custom</b> z-position is selected the <b>Set</b> button becomes available for defining the height of the aspiration needles. A new dialog box opens, enter the desired height and press <b>OK</b> . The height is measured in mm from the top surface of the plate carrier to tip of the aspiration needle.
<b>Channel</b>	1 – 4 (according to instrument configuration)
<b>Volume</b>	50 – 400 µl for 96-well microplates (in increments of 50 µl)
	10 – 120 µl for 384-well microplates (in increments of 10 µl)

### Wash Step

During a wash step, the liquid is first aspirated from the wells, then dispensed and aspirated simultaneously creating a circular flow.

**Wash (1/1)**

Z-position Asp

Aspiration time  [s]

Head speed  [mm/s]

Mode:  normal  
 crosswise  
 4x Asp

### Wash Parameters

The wash parameters have to be selected on two screens. Select **More** to continue to the next page.

<b>Z-Position</b>	<b>Bottom, Custom, Overflow</b> See 4.4.1 Wash/Dispense/Aspirate Positions Z-direction (up/down)
<b>Set (Custom Position)</b>	When <b>Custom</b> z-position is selected the <b>Set</b> button becomes available for defining the height of the aspiration needles. A new dialog box opens, enter the desired height and press <b>OK</b> . The height is measured in mm from the top surface of the plate carrier to tip of the aspiration needle.
<b>Mode</b>	<b>Normal, Crosswise or 4x Asp</b> (according to the instrument configuration) See 4.4 Wash/Dispense/Aspirate Positions
<b>Time</b>	1 – 20 s The length of time the wash head stays at the aspiration position. (when 4x Asp is selected, a minimum of 4 seconds of aspiration time is recommended).
<b>Head Speed</b>	1 – 20 mm/s The lowering speed of the wash head during aspiration. (When the 384 wash head is installed, the recommended head speed is at least 5 mm/s).



**CAUTION**  
**TO AVOID LIQUID SPILLS, DO NOT COMBINE A LOW ASP. RATE WITH HIGH WASH RATE.**

**Wash (2/2)**

Z-position Wash	Overflow	▼	Move	<input type="checkbox"/>
	00000.0			
	<input type="button" value="Set"/>			
Wash rate	40	▼	[µl/s]	
Channel	1	▼		
Volume	100		[µl]	
<input type="button" value="Cancel"/>		<input type="button" value="OK"/>		

<b>Z-Position</b>	<b>Bottom, Custom, Overflow</b> See 4.4.1 Wash/Dispense/Aspirate Positions Z-direction (up/down)
<b>Move</b>	When z-position <b>Custom</b> or <b>Overflow</b> is selected, the <b>Move</b> button becomes available. Move is not available for z-position bottom.
<b>Set (Custom Position)</b>	When <b>Custom</b> z-position is selected the <b>Set</b> button becomes available for defining the height of the aspiration needles. A new dialog box opens, enter the desired height and press <b>OK</b> . The height is measured in mm from the top surface of the plate carrier to tip of the aspiration needle.
<b>Wash Rate</b>	The wash rate is the volume of liquid dispensed in time (µl/s). 5 different wash rates are available, 1 is the lowest (1 – 3 drip mode), 5 is the highest wash rate. The wash rates are different depending on the type of installed wash head. (See 4.5.1 Dispense and Wash Rates).
<b>Channel</b>	1 – 4 (according to instrument configuration)
<b>Volume</b>	50 – 3000 µl for 96-well microplates (in increments of 50 µl) 10 – 1000 µl for 384-well microplates (in increments of 10 µl) A typical dispense volume for a dispense step (wash head at overflow position) is 200 – 400 µl. For cellular assays a sequence of two wash steps with smaller volumes (200 µl each) has shown to give better results than one wash step with a larger volume.

### Soak Step

### Soak Parameters

<b>Intensity</b>	Shake intensity: <b>Off, Low, Medium</b> or <b>High</b> :		
	<b>Shake intensity</b>	<b>Amplitude</b>	<b>Frequency</b>
	HIGH	1.0 mm	25.0 Hz
	MEDIUM	2.0 mm	10.0 Hz
	LOW	3.0 mm	5.0 Hz
<b>Time</b>	Incubation time of the wash buffer in the wells. Enter the time in minutes and seconds (max. 15 minutes and 59 seconds). Be careful, there are two separate fields for entering the time.		

The soak time-counter starts when reagent is dispensed into the wells of a microplate (program step **Dispense** or **Wash**) before the **Soak** step.  
When using a 96i wash head together with 384 well plates, the soak time should be more than 20 seconds; otherwise, the soak step is not shown on the display as soak time is past during dispensing the quadrants.

### Final Aspirate Step

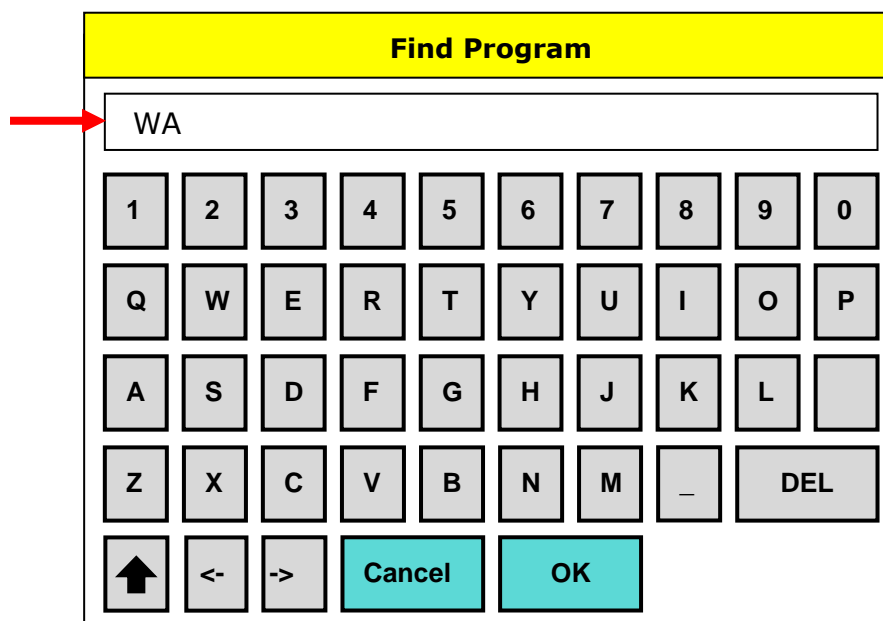
The parameters for the final aspirate step are identical to the normal aspirate step, except that final aspirate is performed only one time at the end of the program. Before final aspirate starts, the vacuum is built up to the set aspiration rate.

### User Prompt Step

Select **User Prompt** to enter text to be displayed at the selected position in the program. When the message appears the user must press **OK** to continue the program.

### 5.3.4 Find a Program

The instrument has a filter function to find programs easier. Press **Find** and the following screen appears:



Find Program									
WA									
1	2	3	4	5	6	7	8	9	0
Q	W	E	R	T	Y	U	I	O	P
A	S	D	F	G	H	J	K	L	
Z	X	C	V	B	N	M	_	DEL	
↑	<-	->	Cancel	OK					

Enter the initial letters of the program's name and press **OK**.  
The corresponding programs will appear.

### 5.3.5 Delete a Program

Select a program and press **Delete** to remove it from the program list.  
"Would you like to delete your program?"  
Press **OK** to delete the program.

### Locked Programs

If the program is locked it cannot be deleted and the following message is displayed: "Program is locked."

Programs can only be locked and unlocked in the HydroControl software by users with the appropriate rights. (See HydroControl software IFU).

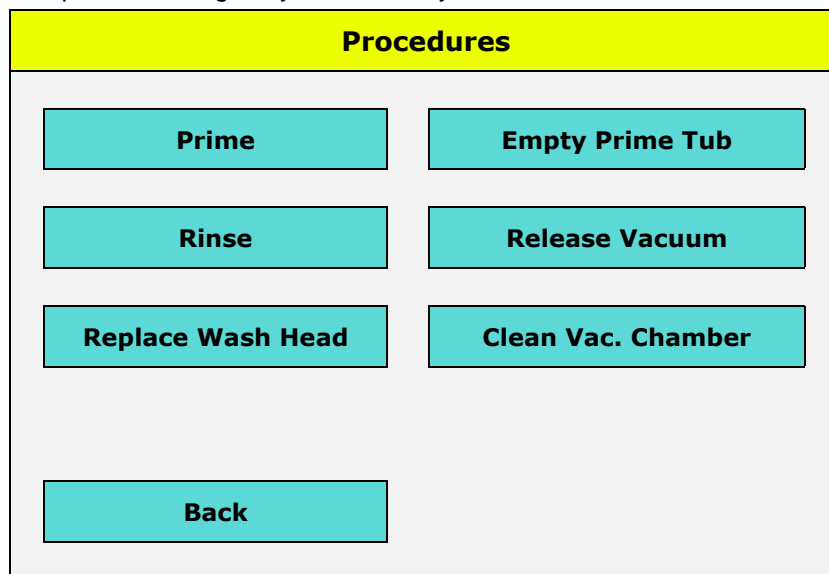
### 5.3.6 Starting a Program

Press **Start** to start a program, for more information see 4.8 Starting a Program.



## 5.4 Procedures Menu

To ensure stable instrument performance, rinsing and priming procedures must be performed regularly and carefully.



The **Procedures** menu consists of the following buttons:

Item	Description
<b>Prime</b>	The system is filled with the distilled water, buffer or air.
<b>Rinse</b>	The system is flushed, and the wash head moves down into the full prime tray to prevent needle blockages.
<b>Empty Prime Tub</b>	Liquid is aspirated out of the prime tub.
<b>Release Vacuum</b>	The vacuum must be released before emptying the waste bottle.
<b>Clean Vac. Chamber</b>	A special cleaning procedure for the vacuum plate carrier.
<b>Replace Wash Head</b>	To safely replace the wash head, the instrument is placed into standby mode.

### Priming Procedure

1. Select the **Channel** for priming.
2. Select either **Time** or **Volume** and press **Start** to start the procedure.

**Prime**

Channel  ▼

Time  [s] ↓ ↑

Volume  [ml] ↓ ↑

Back

Start

### Priming Parameters

Item	Description
<b>Channel</b>	Selectable from 1 – 4
<b>Time</b>	Selectable from 1 – 99 s (default 15 s)
<b>Volume</b>	Selectable from 100 – 800 ml (default 300 ml)



**Note**

***Make sure that prime volume is large enough to ensure that the wash head is primed completely.***

***To minimize the amount of wash buffer used, it is recommended to prime the HYDROSPEED with de-ionized water (or distilled water) first – to remove all air (or foam) out of the dispense system. Afterwards, prime the HYDROSPEED using the wash buffer (pH 5 - 9).***

If the liquid bottles are placed close to the instrument it is possible to shorten the tubing to minimize the amount of wash buffer used.

### Rinsing Procedure

1. Select the **Channel**.
2. Press **Start** to start the procedure.

### Rinsing Parameters

Item	Description
Channel	Selectable from 1 – 4

#### 5.4.1 Empty Prime Tub

Press the **Empty Prime Tub** button to remove liquid from the prime tub.

#### 5.4.2 Release Vacuum

Before emptying the waste bottle press the **Release Vacuum** button to automatically release the vacuum before opening the waste bottle. This makes it easier to remove the lid.

#### 5.4.3 Replace Wash Head

Press **Replace Wash Head** and the instrument is placed in standby mode. Remove the wash head. Be sure that the replacement of the wash head is completed and that the mist shield is attached before pressing the OK button. Press **OK** when the new wash head has been installed.

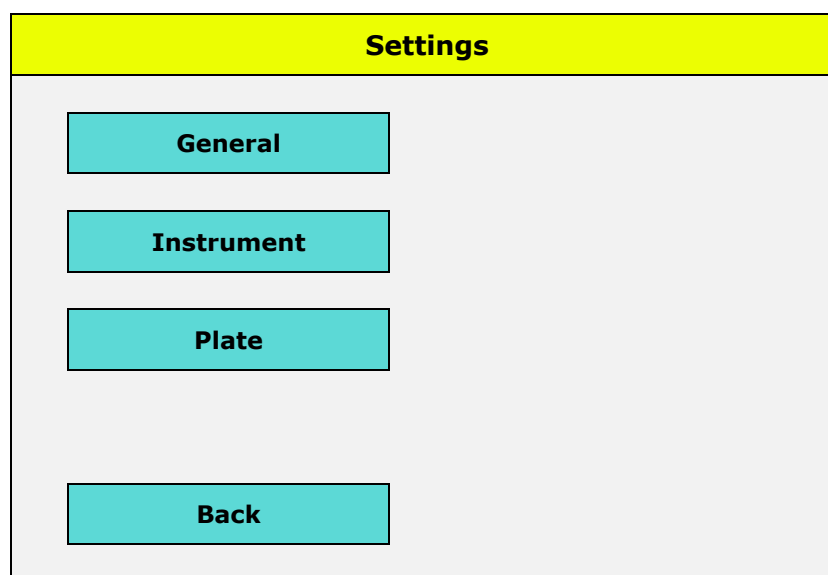


**WARNING**

**THE “REPLACE WASH HEAD” FUNCTION MUST BE USED WHEN REMOVING OR REPLACING THE WASH HEAD. OTHERWISE, THERE IS A RISK OF INJURY DUE TO MOVEMENT OF THE WASH HEAD.**

**SEE 4.2 INSTALLING/REPLACING THE WASH HEAD.**

## 5.5 Settings Menu



### **General** (see 5.5.1 General Settings)

- Unit of Vacuum Filtration in mBar, hPa, torr, psi or InHg
- Audio signal
- Select Messages

### **Instrument** (5.5.2 Instrument Settings)

- LLD 1 – 4 (according to the instrument configuration): enable/disable
- LLD Waste: enable/disable
- pLLD: enable/disable (either LLD Waste - if option is installed - or pLLD can be selected; both options cannot be selected at the same time)
- Vacuum Filtration enable/disable
- Bubble Sensor: on/off
- Anti-clog: on/off

### **Plates** (5.5.3 Plate Menu)

- Edit
- Find
- Delete

### 5.5.1 General Settings

**General Settings**

Units Vac. Filt.

Audio Signal

Item	Description
Units Vac. Filt	Units of vacuum filtration. Select the desired units: mBar, in Hg, psi, torr, hPa
Audio signal	The instrument beeps when a program is finished, or an error occurs
Select Messages	Select messages, which require user interaction to continue the program.

Any changes to the settings must be confirmed by pressing the **Update** button.

### Select Messages

The user can select messages, which require user interaction to continue the program.



**Note**  
*It is recommended to select all messages, so that no important actions are forgotten!*

<b>Messages</b>	
Channel X Primed?	<input checked="" type="checkbox"/>
Plate Inserted?	<input checked="" type="checkbox"/>
Waste Bottle OK?	<input checked="" type="checkbox"/>
Rinse Solution?	<input checked="" type="checkbox"/>
Prime Solution?	<input checked="" type="checkbox"/>
You should rinse!	<input checked="" type="checkbox"/>
VF Carrier installed?	<input checked="" type="checkbox"/>
<div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="background-color: #00b0c0; color: white; padding: 10px 20px; border: 1px solid black; border-radius: 5px;"><b>Back</b></div> <div style="background-color: #00b0c0; color: white; padding: 10px 20px; border: 1px solid black; border-radius: 5px;"><b>Update</b></div> </div>	

Message	Description
<b>Channel X Primed?</b>	Reminder to check that the specified channel is primed.
<b>Plate Inserted?</b>	Reminder to check that the microplate is on the plate carrier.
<b>Waste Bottle OK?</b>	Reminder to check that the waste bottle is empty.
<b>Rinse Solution?</b>	Reminder to check that the rinse bottle has enough liquid.
<b>Prime Solution?</b>	Reminder to check that the prime bottle has enough liquid.
<b>You should rinse!</b>	Reminder to rinse the liquid system.
<b>VF Carrier installed?</b>	Reminder to check that the vacuum filtration carrier is installed.

Any changes to the settings must be confirmed by pressing the **Update** button.

5.5.2 Instrument Settings

**Instrument Settings**

LLD 1	LLD 2	LLD 3	LLD 4	LLD Waste
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
pLLD	<input type="checkbox"/>			
Vac Filtration	<input type="checkbox"/>			
Bubble Sensor	<input type="checkbox"/>			
Anti-clog	<input checked="" type="checkbox"/>		<input type="button" value="Anti-clog"/>	
<input type="button" value="Back"/>		<input type="button" value="Update"/>		

Item	Description
<b>LLD 1 – 4 and Waste</b>	Switch on/off the liquid level sensors for liquid (L1 – L4) and waste bottles
<b>pLLD</b>	Switch on/off the pLLD (pressure based liquid level detection)
<b>Vacuum Filtration</b>	Switch on/off the vacuum filtration option
<b>Bubble Sensor</b>	Switch on/off the bubble sensor
<b>Anti-clog</b>	<p>The anti-clog procedure is used to prevent blockage of the dispense needles between program runs.</p> <p>When the Anti-clog checkbox is selected, the Anti-clog button becomes available. Press the Anti-clog button to open the Anti-clog dialog box, on which the desired repetition interval and soak can be selected.</p> <p>See also 4.7.5 Anti-clog.</p>

Any changes to the settings must be confirmed by pressing the **Update** button.

### Anti-clog Menu

**Anti-clog menu**

Time   min

Soak

Back

Update

Item	Description
<b>Time</b>	10 – 360 min (6 hours) in increments of 10 minutes (recommended 20 min.)
<b>Soak</b>	Liquid system is flushed once after the selected time interval.

Any changes to the settings must be confirmed by pressing the **Update** button.  
See also 4.7.5 Anti-clog.



**WARNING**  
**DO NOT REMOVE MIST SHIELD, INSTALL THE VACUUM FILTRATION CARRIER, OR REPLACE THE WASH HEAD WHILE ANTI-CLOG IS ACTIVATED.**



### 5.5.3 Plate Menu

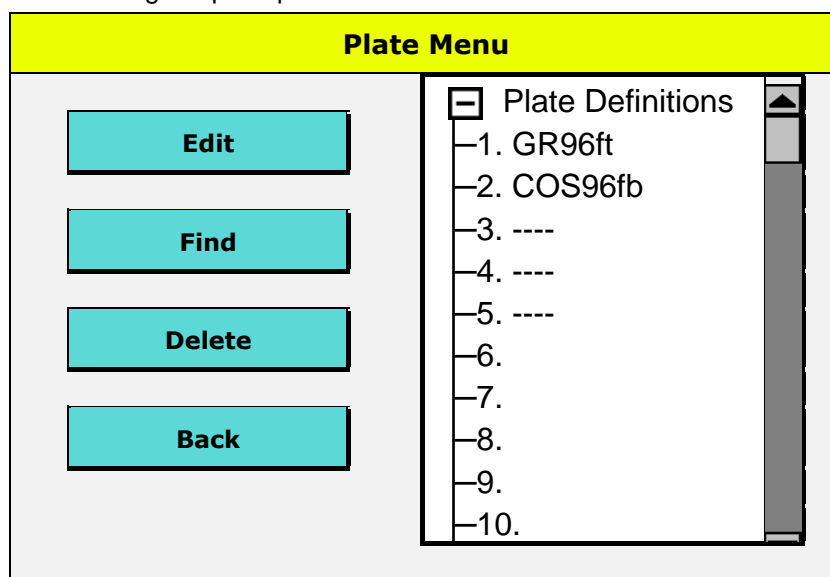
The plate menu shows all plate definitions stored on the instrument. The instrument is delivered with a plate library installed. Onboard plate definitions can be edited.


New plates cannot be defined; however, existing plates can be edited and saved under a new name. Up to 80 plate definitions can be stored on the instrument.

Plates are shown according to the mounted wash head. A horizontal line ---- indicates that this microplate is not available for the installed wash head.

Plates can be locked for editing and can only be unlocked via the HydroControl software.

When microplates from a test kit are used, be careful not to damage the coating when editing the plate parameters.



Item	Description
<b>Edit</b>	<p>Change parameters of an existing plate. The selected plate must be inserted into the plate carrier before pressing the Edit button. As soon as the Edit button is pressed the plate moves into position underneath the wash head. The wash head also moves down in preparation for the adjustments. During the editing of plate parameters, the wash head and plate carrier move in real time as the settings are made to allow the positioning to be checked visually.</p> <div style="display: flex; align-items: center;">  <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>WARNING: DO NOT TOUCH MOVING PARTS!</b></p> </div> </div>
<b>Find</b>	<p>Enter the initial letters of the microplate's name and press <b>OK</b>. The corresponding microplates will appear.</p>
<b>Delete</b>	<p>Select a plate from the list and press Delete to remove it.</p>
<b>Plate Definitions</b>	<p>List of onboard saved plate definitions according to the mounted wash head.</p>



**Note**  
*After having defined a new plate or edited a plate, check that the program steps of all programs stored on the instrument are working as defined.*

### X-Movement

**Edit Plate**

Select X Movement ▼

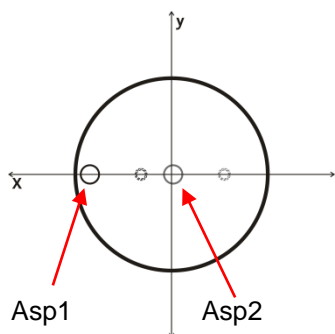
Asp1  1.500 mm ← →

Asp2  0.000 mm ← →

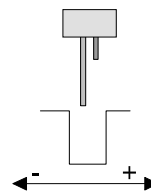
Disp  1.000 mm ← →

Back
Save As
Save

Item	Description
<b>Select</b>	X-movement is the movement of the plate carrier in relation to the aspiration needles from the left to the right side of the well. The Asp1, Asp2 and Dispense positions are defined here (distance of the needle from the center of the well).
<b>Asp1</b>	<p>The first aspiration position is available for all plate types. For Asp1, the needles are positioned typically on the left side of the wells in flat bottom 96-well plates (positioning is restricted by dispense needles).</p> <p>For round-bottom or v-shaped bottom wells, the aspirating needles are placed in the middle of the wells. Only one aspiration position can be selected (ASP 1).</p> <p>For aspiration of 384-wells, the needles must be positioned on the left side of the wells.</p> <p>Set value is the distance of the aspiration needle from the center of the well in mm. See 4.4 Wash/Dispense/Aspirate Positions.</p>
<b>Asp2</b>	<p>The second aspiration position for aspirating in “crosswise” mode. Asp2 should be set close to the center of the well (distance of the aspiration needle from the center of the well in mm - position restricted by the dispense needles).</p> <p>See 4.4 Wash/Dispense/Aspirate Positions. Asp2 is not available for round or v-bottomed and 384-well plates.</p>
<b>Disp</b>	The dispense position is available for all plate types. The dispense needles should be set approximately at the center of the well (distance of the <u>aspiration</u> needle from the center of the well in mm). See 4.4.2 Dispense Positions.



○ Aspiration needle  
 ⊙ Dispense needle



X-movement (left/right)  
 Distance of the aspiration needle from the center of the well in mm

Y-Movement



**Note**

*Y-movement (Asp3 and Asp4) is only available when the instrument is equipped with an indexing mechanism and an 96i or 96 wash head!*

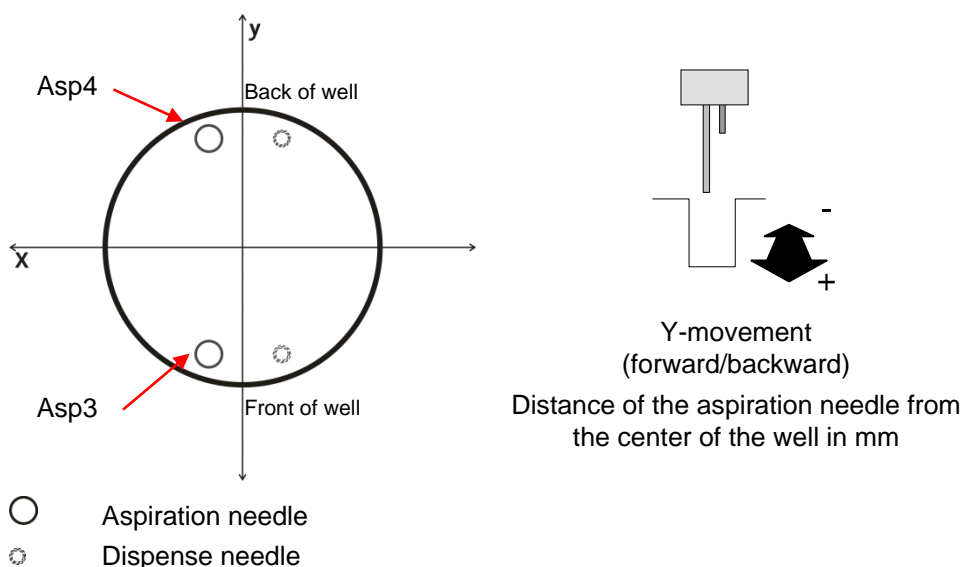
**Edit Plate**

Select  ▼

Asp3   mm

Asp4   mm

Item	Description
<b>Select</b>	Y-movement is the movement of the plate carrier in relation to the aspiration needles from the back to the front of the wells in 96-well microplates. Not available for round bottom, v-shaped bottom wells or 384-well plates
<b>Asp3 /Asp4</b>	Third and fourth aspiration positions are available only for instruments equipped with an indexing mechanism and an 96i or 96 wash head. The Asp3 should be set at the front of and Asp4 at the back of the well without touching the walls (distance of the aspiration needle from the center of the well in mm). See 4.4 Wash/Dispense/Aspirate Positions.



### Z-Movement

**Edit Plate**

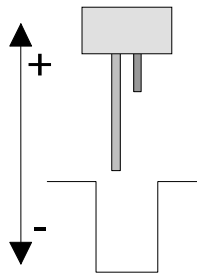
Select

Overflow   mm

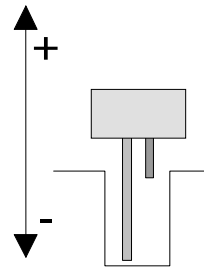
Bottom   mm

Item	Description
<b>Select</b>	Z-movement is the up and down positioning of the aspiration needles. Overflow and Bottom positions of the aspiration needles are defined here.
<b>Overflow</b>	Select the height of the aspiration needles (measured in mm from the top surface of the plate carrier to tip of the aspiration needle).
<b>Bottom</b>	Select the height of the aspiration needles (measured in mm from the top surface of the plate carrier).

See chapter 4.4 Wash/Dispense/Aspirate Positions for more information.



Z-position Overflow



Z-position Bottom

**Plate Assistant**

**Edit Plate**

Select  ▼

Overflow   mm ↓ ↑

Bottom   mm ↓ ↑

Plate Assistant

Back
Save As
Save

The plate assistant function helps the user to find the z-position bottom of a new microplate automatically. The plate assistant is available when the user is editing the z-position bottom. Automatically found z-position bottom has to be verified by the user. If necessary (e.g., residual volume too high) the user has to perform a fine adjustment manually.

Plate settings edited on the instrument's display are saved to the instrument. When working with the HydroControl Software the edited plate file (.pdfx) must be saved to the computer, otherwise the plate settings on instrument and computer may be different. (See IFU HydroControl chapter 4.17 Editing Plate Parameters for details.)



## 6. Quality Control

### 6.1 Introduction

This chapter describes a QC-procedure for the HYDROSPEED. It is a performance test using the gravimetric method, which checks the residual volume and dispense accuracy of the instrument by weighing a microplate on a calibrated lab balance.

### 6.2 Performance Testing with 96-well Microplate

#### Required Tools

- Calibrated lab-balance capable of reading milligrams with a wind-protection cover
- Greiner F 96-well, flat-bottom, compact microplate
- Small plastic syringe/pipette to aliquot Tween 20 solution
- Clean liquid bottle supplied with HYDROSPEED
- Waste bottle supplied with HYDROSPEED

#### Preparation of Solution for QC-Procedure

1. Prepare a 0.1% Tween 20 solution (e.g., 1 liter of distilled or deionized water and 1 ml Tween 20).
2. Fill an empty liquid bottle supplied with the HYDROSPEED with the Tween solution and connect the tubes to the appropriate channel on the rear panel of the instrument.



**Note**

***The solution for the QC-procedure can be stored for a maximum of 1 month under refrigeration. If the solution becomes turbid, it must be disposed of and replaced with a fresh solution.***



**Note**

***All channels must be primed.  
The channel used for the QC-procedure must be primed last.  
Perform the QC-procedure with clean filters only!***

## Programs Necessary for QC-Procedure

Define the following programs to perform QC-procedures:

### QC\_DISP

- Plate Type: Greiner 96-well flat bottom
- One Cycle
- One Dispense step with the following parameters:
  - POS: OVERFLOW
  - VOLUME: 300  $\mu$ l
  - CHANNEL: 1
  - DISPENSE RATE: 5 (see 4.5.1 Dispense and Wash Rates)

### QC\_ASP

- Plate Type: Greiner 96-well flat bottom
- One Cycle
- ASPIRATION RATE: 5
- One Aspiration step with the following parameters:
  - Crosswise ASP
  - POS: BOTTOM
  - TIME: 5 s
  - HEAD SPEED: 10 mm/s

## Dispense Accuracy/Residual Volume Check



### Note

**Ensure that lab balance is calibrated. Ensure that the HYDROSPEED and liquid bottles are placed at the same height on a vibration-free surface according to the manufacturer's guidelines.**

**Prime all installed channels.**

1. Record the serial number of the lab balance and the HYDROSPEED used, as well as the name of the operator for documentation purposes.
2. Connect the HYDROSPEED to the waste bottle, see 2.8.1 Rear Panel Connections.
3. Connect the liquid bottle containing the solution for the QC-procedure to channel 1. If the instrument is equipped with more than one inlet channel, fill the solution for QC-procedure in all washbuffer bottles. See 2.8.1 Rear Panel Connections.
4. Prime all installed channels with default prime time (if more than one is available) making sure to prime channel 1 last. Prime channel 1 for default prime time (15 seconds) with the solution for QC-procedure.
5. Weigh the empty and dry microplate specified above on the lab-balance and record TARE.

### Dispense Accuracy

6. Place the microplate into the HYDROSPEED to be checked and start the QC\_DISP program to dispense 300  $\mu$ l of liquid into each well.
7. Weigh the filled microplate and record the weight. See Interpretation of Results for Dispense Accuracy.



**Residual Volume Check**

8. Start the QC\_ASP program to remove the dispensed liquid from the wells.
9. Place the microplate onto the lab balance and record the weight of the remaining liquid. See Interpretation of Results for Residual Volume.

**Interpretation of Results for Dispense Accuracy**

**Pass:** dispense accuracy per plate must be  $\geq 27.30$  grams and  $\leq 30.17$  grams.

**Fail:** dispense accuracy is outside of the above-mentioned range.

**Interpretation of Results for Residual Volume Check**

**Pass:** average residual volume per plate must be  $< 0.192$  grams.

**Fail:** average residual volume per plate is  $\geq 0.192$  grams.

**Troubleshooting the QC-Procedure**

If the HYDROSPEED has failed the above test:

1. Prime the instrument thoroughly (see 4.7.3 Prime).
2. Clean the wash head using the provided cleaning-tool for aspiration needles if blockages in the needles are visible.
3. Otherwise, clean the wash head in an ultrasonic bath according to the procedure described in 7.2 Cleaning the Wash Head.
4. Check plate parameter settings, vacuum pump (e.g., switched on, leaks in the tubing), check that filter is not blocked.
5. Repeat QC-procedure.
6. If results still do not meet the above criteria, contact your local service technician.

**WARNING**

**ALL PARTS OF THE INSTRUMENT THAT COME INTO CONTACT WITH POTENTIALLY INFECTIOUS MATERIAL MUST BE TREATED AS POTENTIALLY INFECTIOUS AREAS.**

**IT IS ADVISABLE TO ADHERE TO APPLICABLE SAFETY PRECAUTIONS, (INCLUDING THE WEARING OF POWDER-FREE GLOVES, SAFETY GLASSES AND PROTECTIVE CLOTHING) TO AVOID POTENTIAL INFECTIOUS DISEASE CONTAMINATION WHEN PERFORMING CLEANING PROCEDURES AND ALSO WHEN MAKING ADJUSTMENTS TO THE INSTRUMENT.**

## 6.3 Performance Testing with 384-well Microplates

### Required Tools

- Calibrated lab-balance capable of reading milligrams with a wind-protection cover
- Greiner F 384-well, flat-bottom, compact microplate
- Small plastic syringe to aliquot Tween 20 solution
- Clean liquid bottle supplied with HYDROSPEED
- Waste bottle supplied with HYDROSPEED

### Preparation of Solution for QC-Procedure

1. Prepare a 0.1% Tween 20 solution (e.g. 1 liter of distilled or deionized water and 1 ml Tween 20).
2. Fill an empty liquid bottle supplied with the HYDROSPEED with the Tween solution and connect the tubes to the appropriate channel on the rear panel of the instrument.



#### Note

*The solution for the QC-procedure can be stored for a maximum of 1 month under refrigeration. If the solution becomes turbid, it must be disposed of and replaced with a fresh solution.*

### Programs Necessary for QC-Procedure

Define the following programs to perform QC-procedures:

#### QC\_DISP

- Plate Type: Greiner 384-well flat bottom
- One Cycle
- One Dispense step with the following parameters:
  - POS: OVERFLOW
  - VOLUME: 100  $\mu$ l
  - CHANNEL: 1
  - DISPENSE RATE: 5 (see 4.5.1 Dispense and Wash Rates)

#### QC\_ASP

- Plate Type: Greiner 384-well flat bottom
- One Cycle
- ASPIRATION RATE 5
- One Aspiration step with the following parameters:
  - ASP
  - POS: BOTTOM
  - TIME: 5 s
  - HEAD SPEED 10 mm/s

## Dispense Accuracy/Residual Volume Check



### Note

**Ensure that lab balance is calibrated. Ensure that the HYDROSPEED and liquid bottles are placed at the same height on a vibration-free surface according to the manufacturer's guidelines.**

**Prime all installed channels.**

1. Record the serial number of the lab balance and the HYDROSPEED used, as well as the name of the operator for documentation purposes.
2. Connect the HYDROSPEED to the waste bottle, see 2.8.1 Rear Panel Connections.
3. Connect the liquid bottle containing the solution for the QC-procedure to channel 1. If the instrument is equipped with more than one inlet channel, fill the solution for QC-procedure in all washbuffer bottles. See 2.8.1 Rear Panel Connections.
4. Prime all installed channels with default prime time (if more than one is available) making sure to prime channel 1 last. Prime channel 1 for default prime time (15 seconds) with the solution for QC-procedure.
5. Weigh the empty and dry microplate specified above on the lab-balance and record TARE.

### Dispense Accuracy

6. Place the microplate into HYDROSPEED to be checked and start the QC\_DISP program to dispense 100 µl of liquid into each well.
7. Weigh the filled microplate and record the weight. See Interpretation of Results for Dispense Accuracy.

### Residual Volume

8. Start the QC\_ASP program to remove the dispensed liquid from the wells.
9. Place the microplate onto a lab balance and record the weight of the remaining liquid. See Interpretation of Results for Residual Volume.

## Interpretation of Results for Dispense Accuracy

**Pass:** dispense accuracy per plate must be  $\geq 36.40$  grams and  $\leq 40.23$  grams.

**Fail:** dispense accuracy is outside of the above-mentioned range.

## Interpretation of Results for Residual Volume Check

**Pass:** average residual volume per plate must be  $< 0.766$  grams.

**Fail:** average residual volume per plate is  $\geq 0.766$  grams.

## Troubleshooting the QC-Procedure

If the HYDROSPEED has failed the above test:

1. Prime the instrument thoroughly (see 4.7.3 Prime).
2. Clean the wash head using the provided cleaning-tool for aspiration needles, if blockages in the needles are visible.
3. Otherwise, clean the wash head in an ultrasonic bath according to the procedure described in 7.2 Cleaning the Wash Head.
4. Check plate parameter settings, vacuum pump (e.g. switched on, leaks in the tubing), check that filter is not blocked.
5. Repeat QC-procedure.

6. If results still do not meet the above criteria, contact your local service technician.



**WARNING**

**ALL PARTS OF THE INSTRUMENT THAT COME INTO CONTACT WITH POTENTIALLY INFECTIOUS MATERIAL MUST BE TREATED AS POTENTIALLY INFECTIOUS AREAS.**

**IT IS ADVISABLE TO ADHERE TO APPLICABLE SAFETY PRECAUTIONS, (INCLUDING THE WEARING OF POWDER-FREE GLOVES, SAFETY GLASSES AND PROTECTIVE CLOTHING) TO AVOID POTENTIAL INFECTIOUS DISEASE CONTAMINATION WHEN PERFORMING CLEANING PROCEDURES AND ALSO WHEN MAKING ADJUSTMENTS TO THE INSTRUMENT.**

# 7. Maintenance and Cleaning

## 7.1 Cleaning Procedures



**WARNING**

**ALL PARTS OF THE INSTRUMENT THAT COME INTO CONTACT WITH POTENTIALLY INFECTIOUS MATERIAL MUST BE TREATED AS POTENTIALLY INFECTIOUS AREAS.**

**IT IS ADVISABLE TO ADHERE TO APPLICABLE SAFETY PRECAUTIONS, (INCLUDING THE WEARING OF POWDER-FREE GLOVES, SAFETY GLASSES AND PROTECTIVE CLOTHING) TO AVOID POTENTIAL INFECTIOUS DISEASE CONTAMINATION WHEN PERFORMING CLEANING PROCEDURES AND ALSO WHEN MAKING ADJUSTMENTS TO THE INSTRUMENT.**

The most important cleaning procedure is the rinsing of the liquid system with distilled water before the instrument is left to stand or switched off at the end of each day.

The wash head should be removed and thoroughly cleaned at least once every six months or whenever one or more of the needles are blocked.

### 7.1.1 *Cleaning the Cover and Touchscreen*

The outer surface of the instrument and the touchscreen may be cleaned periodically using a tissue moistened with a mild detergent solution (see chapter 7.6 Preventive Maintenance Plan).



**CAUTION**

**NEVER USE ACETONE AS IT WILL DAMAGE THE COVERS.**



**CAUTION**

**DO NOT SPRAY LIQUID ONTO THE INSTRUMENT. BE CAREFUL THAT NO LIQUID SPLASHES OR FLOWS INTO THE INSIDE OF THE INSTRUMENT. IF A SPILL OCCURS INSIDE THE INSTRUMENT, A SERVICE TECHNICIAN IS REQUIRED.**



**WARNING**

**RISK OF FIRE AND ELECTRICAL SHOCK!**

**PRIOR TO CLEANING THE OUTER SURFACE OF THE INSTRUMENT AND THE TOUCHSCREEN, SWITCH OFF THE INSTRUMENT AND DISCONNECT IT FROM THE MAIN POWER SUPPLY!**

## 7.2 Cleaning the Wash Head



### CAUTION

THE **RINSE PROCEDURE IS THE MOST IMPORTANT DAILY CLEANING STEP FOR THE INSTRUMENT. IF THE WASH HEAD IS NOT RINSED DAILY, BLOCKAGES CAN OCCUR. IF THIS OCCURS, THE WASH HEAD WILL NEED EXPENSIVE REPAIRS OR WILL HAVE TO BE REPLACED.**



### WARNING

THE INSTRUMENT MUST NOT BE OPERATED WITHOUT THE MIST SHIELD IN PLACE. ALWAYS WEAR DISPOSABLE POWDER-FREE GLOVES, SAFETY GLASSES AND PROTECTIVE CLOTHING WHEN REMOVING, INSTALLING OR CLEANING THE WASH HEAD.



### Note

See also 4.2 *Installing/Replacing the Wash Head*, 4.7.3 *Prime* and 4.7.4 *Rinse*.

The following steps must be followed to successfully remove blockages in the dispense needles.

1. Switch ON the instrument.
2. Perform the procedure found in chapter 4.10.3 Instrument left standing for a longer period of time to prime the wash head with air to remove all liquid.
3. Remove the wash head as described in chapter 4.2 Installing/Replacing the Wash Head. The wash head must be carefully removed from the instrument (take care not to lose the seals).
4. Immerse the wash head in an **ultrasonic bath** filled with warm distilled water (50°C max) for typically 5 - 10 minutes. This procedure will remove most of the salt crystals blocking the needles.



Remove the wash head from the ultrasonic bath and carefully use **compressed air (oil free)** to remove any remaining particles from the needles.

5. Ensure that all four seals (on the front and the back of the wash head) are in place.
6. Repeat steps 4 and 5 until all needles of the wash head dispense correctly.
7. Install the wash head again (see chapter 4.2 Installing/Replacing the Wash Head).
8. Prime the instrument using distilled water.

If some of the needles remain blocked, the wash head can be cleaned using the **cleaning needles** from the accessory box (if single needles are blocked).

- a. Carefully push the cleaning needles into the blocked aspirating or dispensing needles.
- b. Rinse the wash head with distilled water to ensure that all particles have been removed.

### 7.3 Cleaning Waste Bottles

Before cleaning the waste bottles, empty them according to disposal regulations (see 7.8.3 Disposal of Operating Material).

Empty the waste bottle (and foam trap if necessary) at least daily to prevent growth of bacteria, etc.

The bottles must be cleaned regularly (depending on the applications) using a mild detergent.



#### **WARNING**

**THE CONTENTS OF THE WASTE BOTTLE ARE POTENTIALLY INFECTIOUS.**

**WHEN HANDLING WASTE BOTTLES, IT IS ADVISABLE TO ADHERE TO APPLICABLE SAFETY PRECAUTIONS (INCLUDING THE WEARING OF POWDER-FREE GLOVES, SAFETY GLASSES AND PROTECTIVE CLOTHING) TO AVOID POTENTIAL INFECTIOUS DISEASE CONTAMINATION.**



#### **WARNING**

##### **WASTE BOTTLE – LIQUID LEVEL**

**MAKE SURE THAT THE LIQUID LEVEL OF THE WASTE BOTTLE IS ALWAYS KEPT BELOW THE MAXIMUM LEVEL INDICATED ON THE BOTTLE TO AVOID POTENTIAL OVERFLOW OF WASTE LIQUID INTO THE FOAM TRAP BOTTLE.**

**INQUIRE ABOUT APPROPRIATE COLLECTING POINTS AND APPROVED METHODS OF DISPOSAL IN YOUR COUNTRY, STATE OR REGION.**

## 7.4 Liquid or Foam Spills



### WARNING

**ALWAYS SWITCH-OFF AND DISCONNECT THE POWER CABLE FROM THE HYDROSPEED BEFORE REMOVING ANY KIND OF SPILLS ON THE INSTRUMENT.**

**ALL SPILLS (LIQUID OR FOAM) MUST BE TREATED AS POTENTIALLY INFECTIOUS. THEREFORE, ALWAYS ADHERE TO APPLICABLE SAFETY PRECAUTIONS (INCLUDING THE WEARING OF POWDER-FREE GLOVES, SAFETY GLASSES AND PROTECTIVE CLOTHING) TO AVOID POTENTIAL INFECTIOUS DISEASE CONTAMINATION.**

**ADDITIONALLY, ALL RESULTING WASTE FROM THE CLEAN-UP MUST BE TREATED AS POTENTIALLY INFECTIOUS AND THE DISPOSAL MUST BE PERFORMED ACCORDING TO THE INFORMATION GIVEN IN 7.8.3 DISPOSAL OF OPERATING MATERIAL.**

**IF THE SPILL OCCURS INSIDE THE INSTRUMENT, A SERVICE TECHNICIAN IS REQUIRED.**

Spilling of liquid or foam may occur when the HYDROSPEED is operated improperly such as:

1. Microplate used does not match installed wash head.
2. Plate parameters not properly adjusted or strip plate used without all strips inserted.
3. Waste bottle not emptied when liquid level or foam level reaches maximum filling level.
4. No anti-foaming agent used with liquids showing a strong tendency to foam.

Always remove spills immediately after they have occurred.

1. Switch OFF the instrument.
2. Wipe up the spill immediately with absorbent material.
3. Dispose of contaminated material appropriately.
4. Clean the instrument surfaces with a mild detergent.
5. For biohazardous spills clean with a disinfection solution (see 7.7.2 Decontamination/Disinfection Solutions).
6. Wipe cleaned areas dry.



**WARNING****WASTE BOTTLE – LIQUID LEVEL**

MAKE SURE THAT THE LIQUID LEVEL OF THE WASTE BOTTLE IS ALWAYS KEPT BELOW THE MAXIMUM LEVEL INDICATED ON THE BOTTLE TO AVOID POTENTIAL OVERFLOW OF WASTE LIQUID INTO THE FOAM TRAP BOTTLE.

THE CONTENTS OF THE WASTE BOTTLE ARE POTENTIALLY INFECTIOUS; WEAR PROTECTIVE CLOTHING (DISPOSABLE POWDER-FREE GLOVES, SAFETY GLASSES AND PROTECTIVE CLOTHING) WHEN EMPTYING/HANDLING A WASTE BOTTLE. INQUIRE ABOUT APPROPRIATE COLLECTING POINTS AND APPROVED METHODS OF DISPOSAL IN YOUR COUNTRY, STATE OR REGION.

## 7.5 Replacing the Main Fuses

**WARNING****RISK OF FIRE**

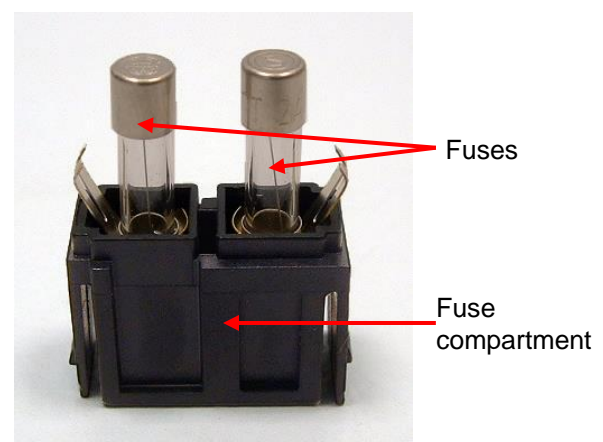
THE MAIN FUSES SHOULD BE REPLACED ONLY WITH FUSES OF THE SAME TYPE AND RATING.

The following steps must be performed to replace the main fuses, which are located by the power cable connection, in the rear panel of the instrument.

1. Switch off the instrument and unplug the power cord.
2. Open the fuse compartment on the rear of the instrument, by pushing in the clasps with a screwdriver on the outside edges of the compartment and pulling the compartment straight out.



Fuse compartment



Fuses

Fuse compartment

3. Remove the fuses and replace them.

4. Ensure that the fuses have the correct rating.  
**115 Volt requires 2 x T 3.15 A / 250 V fuse (slow blow).**  
**230 Volt requires 2 x T 1.6 A / 250 V fuse (slow blow).**
5. Replace the fuse compartment.
6. Reconnect the power cable and switch on the instrument.



**WARNING**  
**IF THE FUSE CONTINUES TO BLOW, PLEASE CALL FOR SERVICE.**

## 7.6 Preventive Maintenance Plan



**WARNING**  
**ALL PARTS OF THE INSTRUMENT THAT COME INTO CONTACT WITH POTENTIALLY INFECTIOUS MATERIAL MUST BE TREATED AS POTENTIALLY INFECTIOUS AREAS.**  
**IT IS ADVISABLE TO ADHERE TO APPLICABLE SAFETY PRECAUTIONS, (INCLUDING THE WEARING OF POWDER-FREE GLOVES, SAFETY GLASSES AND PROTECTIVE CLOTHING) TO AVOID POTENTIAL INFECTIOUS DISEASE CONTAMINATION WHEN PERFORMING CLEANING PROCEDURES AND ALSO WHEN MAKING ADJUSTMENTS TO THE INSTRUMENT.**



**CAUTION**  
**WASH HEAD IS NOT AUTOCLAVEABLE.**  
**DO NOT SUBMERGE THE WASH HEAD IN ETHANOL (ALCOHOL).**

### 7.6.1 Daily

Daily maintenance of the instrument:

- Perform the procedure 4.10.2 Instrument left standing overnight or 4.10.3 Instrument left standing for a longer period of time depending on how long the instrument will be left to stand.

### 7.6.2 Weekly

1. Perform Daily Maintenance.
2. Check the filter(s) in the liquid bottle(s) for particles and clean liquid filter(s) with distilled water or a mild detergent.
3. If necessary, clean the plate carrier.
4. If necessary, clean the wash head using the provided cleaning needles, if blockages in the needles are visible. 7.2 Cleaning the Wash Head
5. If necessary, clean the wash head in an ultrasonic bath according to the procedure described in 7.2 Cleaning the Wash Head.
6. If necessary, clean the outer surface of the instrument with distilled water or a mild detergent.

### 7.6.3 Every Six Months

1. If necessary, clean the plate carrier.
2. Check the centering mechanism of the plate carrier and clean if necessary, with 70 % ethanol.
3. Clean the wash head, see 7.2 Cleaning the Wash Head.
4. Perform decontamination/disinfection procedure.



**Note**

***Clean the aspirating and dispensing needles periodically or immediately if they become clogged with particles or crystals.***



**WARNING**

**RISK OF FIRE AND EXPLOSION!**

**ETHANOL IS FLAMMABLE AND WHEN IMPROPERLY HANDLED CAN LEAD TO EXPLOSIONS. PROPER LABORATORY SAFETY PRECAUTIONS MUST BE OBSERVED.**

### 7.6.4 Yearly

The yearly maintenance is performed by the service engineer. By difficulties, please contact your local customer support representative, see the last page of this document.

1. Clean the filters in the bottles and replace if necessary.
2. Check the quick-release connectors on the external tubes and bottles and replace if necessary.
3. Check the bottle for damage and replace if necessary.
4. Check the filters between the foam bottle and the vacuum pump and replace if necessary.
5. Decontaminate and disinfect the instrument, see 7.7 Instrument Decontamination/Disinfection.
6. Clean the wash head (see 7.2 Cleaning the Wash Head) and replace the seals if necessary.
7. Clean the plate carrier.
8. Clean the prime tub, check and replace if necessary.
9. Check the dispensing pump using the QC-procedure described in chapter 6. Quality Control.
10. Check the residual volume using the QC-procedure described in chapter 6. Quality Control.



**CAUTION**

**ONLY TECAN AUTHORIZED SERVICE TECHNICIANS ARE ALLOWED TO OPEN THE INSTRUMENT. REMOVING OR BREAKING THE WARRANTY SEAL VOIDS THE WARRANTY.**

## 7.7 Instrument Decontamination/Disinfection



### WARNING

THE DISINFECTION PROCEDURE SHOULD BE PERFORMED ACCORDING TO NATIONAL, REGIONAL, AND LOCAL REGULATIONS.



### WARNING

ALL PARTS OF THE INSTRUMENT THAT COME INTO CONTACT WITH POTENTIALLY INFECTIOUS MATERIAL MUST BE TREATED AS POTENTIALLY INFECTIOUS AREAS.

IT IS ADVISABLE TO ADHERE TO APPLICABLE SAFETY PRECAUTIONS, (INCLUDING THE WEARING OF POWDER-FREE GLOVES, SAFETY GLASSES AND PROTECTIVE CLOTHING) TO AVOID POTENTIAL INFECTIOUS DISEASE CONTAMINATION WHEN PERFORMING THE DISINFECTION PROCEDURE.

### 7.7.1 *Moving or Shipping the Instrument*

It is very important that the instrument is thoroughly decontaminated and disinfected before it is removed from the laboratory, or any servicing is performed on it.

Before the instrument is returned to the service center for service or repair, it must be disinfected, and a safety certificate completed by the operating authority. If a safety certificate is not supplied, the instrument may not be accepted by the service center, or it may be held by the customs authorities.

### 7.7.2 *Decontamination/Disinfection Solutions*

-We recommend using decontamination/disinfection solutions as listed below and methods for the decontamination/disinfection procedure.

- Decon 90 (Decon Laboratories Limited)
- Decon Neutracon (Decon Laboratories Limited)
- Microcide SQ (Global Biotechnologies)
- 70 % ethanol
- Spor-Klenz (Ready to Use)
- 0.1 % sodiumhypochloride  
(Be careful not to use a higher concentration of sodiumhypochloride, because it is very corrosive.)

For decontamination/disinfection of instrument surface:

- B33 Surface Disinfection (Orochemie)

Prepare the concentration of the decontamination/disinfection solution according to the manufacturer's documentation. Pay careful attention to the manufacturer's safety datasheet.



**CAUTION**  
WE DO NOT ASSUME ANY LIABILITY FOR THE ADEQUACY OF THE SOLUTIONS OR METHODS.

EACH LABORATORY MUST ENSURE THAT THE DECONTAMINATION AND DISINFECTION PROCEDURES ARE ADEQUATE FOR THE BIOHAZARDS THEY HANDLE.



**WARNING**

**RISK OF FIRE AND EXPLOSION!**

ETHANOL IS FLAMMABLE AND WHEN IMPROPERLY HANDLED CAN LEAD TO EXPLOSIONS. PROPER LABORATORY SAFETY PRECAUTIONS MUST BE OBSERVED.

### 7.7.3 *Decontamination/Disinfection Procedure*

The instrument should be decontaminated and disinfected using one of the solutions mentioned in the previous chapter.



**CAUTION**

BEFORE STARTING THE DECONTAMINATION AND DISINFECTION PROCEDURE USE A RINSE PROCEDURE WITH DISTILLED OR DEIONIZED WATER (LAB QUALITY) TO FLUSH THE SYSTEM.



**WARNING**

THE DECONTAMINATION AND DISINFECTION PROCEDURE SHOULD BE PERFORMED IN A WELL-VENTILATED ROOM BY AUTHORIZED PERSONNEL WEARING DISPOSABLE POWDER-FREE GLOVES, SAFETY GLASSES AND PROTECTIVE CLOTHING.

Please note that disinfectants and decontamination solutions can influence the performance of your instrument if they come in contact e. g. with the electronics! The following procedure should be used to disinfect and decontaminate the instrument and accessories:

1. Wear protective powder-free gloves, safety glasses and protective clothing.
2. Prepare a bag (e.g., autoclave bag labeled with autoclave tape) for all disposables used during disinfection and decontamination.
3. Prime the liquid system with distilled/deionized water before using a decontamination/disinfection solution.
4. Prime the liquid system or perform a rinse procedure with disinfectant/decontamination solution and allow a contact time according to the manufacturer's specifications.  
Rinse stops automatically when the subsequent prime procedure is started.
5. To remove disinfectant, prime the liquid system with distilled/deionized water with at least 800 ml. Repeat at least 4 times.
6. Connect the liquid tube of the corresponding channel to an empty liquid bottle. Prime the instrument with air until tubes are empty for each channel.

**WARNING****RISK OF FIRE AND EXPLOSION!**

**PRIOR TO CLEANING THE OUTER SURFACE OF THE INSTRUMENT AND THE TOUCHSCREEN, SWITCH OFF THE INSTRUMENT AND DISCONNECT IT FROM THE MAIN POWER SUPPLY!**

7. Switch off the instrument and disconnect the instrument from the main power supply.
8. Disconnect the instrument from any accessories that are used for example: liquid level detection system, vacuum filtration plate carrier, computer, etc. Accessories that should be shipped together with the instrument have to be included in the disinfection/ decontamination procedure.
9. Use a disposable soft tissue paper towel soaked in the surface disinfectant/decontamination solution to wipe all outer surfaces of the instrument.
10. After a contact time according to manufacturer recommendations, e. g. 10 minutes, repeat step 9 (previous step) of this procedure once and then wipe dry the outer surfaces of the instrument.
11. Pack the instrument and its accessories.
12. Dispose the used gloves and wash your hands with a mild detergent and then disinfect them.
13. Dispose collected disposables used during disinfection and decontamination according to approved methods of disposal (e.g. autoclave) in your country, state or region.
14. Complete a safety certificate and attach it to the outside of the box so that it is clearly visible.

**CAUTION**

**MAKE SURE THAT ALL DISINFECTANT IS THOROUGHLY REMOVED.**

**RESIDUAL DISINFECTANT CAN NEGATIVELY INFLUENCE RESULTS OR INSTRUMENT PERFORMANCE.**

**CAUTION**

**WE DO NOT ASSUME ANY LIABILITY FOR THE ADEQUACY OF THE SOLUTIONS OR METHODS.**

**EACH LABORATORY MUST ENSURE THAT THE DECONTAMINATION AND DISINFECTION PROCEDURES ARE ADEQUATE FOR THE BIOHAZARDS THEY HANDLE.**

### 7.7.4 *Safety Certificate*

To ensure the safety and health of personnel, our customers are kindly asked to complete two copies of the **Safety Certificate** (which was delivered with the instrument) and attach one copy to the top of the container in which the instrument is returned (visible from the outside of the shipping container!) and the other copy to the shipping documents before shipping it to the service center for service or repair.

The instrument must be decontaminated and disinfected at the operating authority's site before shipping (see 7.7.3 Decontamination/Disinfection Procedure).

The decontamination and disinfection procedure must be performed in a well-ventilated room by authorized and trained personnel wearing disposable powder-free gloves, safety glasses and protective clothing.

The decontamination and disinfection procedure should be performed according to national, regional, and local regulations.

If a Safety Certificate is not supplied, the instrument may not be accepted by the service center.

Your local Tecan customer support can send you a new copy of the Safety Certificate, if required.

## 7.8 Disposal of Instrument

### 7.8.1 Introduction

This chapter gives instructions on how to lawfully dispose of waste material accumulating in connection with the instrument.



**CAUTION**  
OBSERVE ALL FEDERAL, STATE AND LOCAL ENVIRONMENTAL REGULATIONS.



**ATTENTION**  
**DIRECTIVE 2012/19/EU ON WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE)**  
**NEGATIVE ENVIRONMENTAL IMPACTS ARE ASSOCIATED WITH THE TREATMENT OF ELECTRICAL AND ELECTRONIC EQUIPMENT WASTE**

- DO NOT TREAT ELECTRICAL AND ELECTRONIC EQUIPMENT AS UNSORTED MUNICIPAL WASTE.
- COLLECT WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT SEPARATELY.

### 7.8.2 Disposal of Packing Material

According to Packaging and Packaging Waste Directive 94/62/EC on , the manufacturer is responsible for the disposal of packing material.

#### Returning Packing Material

If you do not intend to keep the packing material for future use, e.g. for transport and storage purposes:

Return the packaging of the product, spare parts and options via the field service engineer to the manufacturer.

### 7.8.3 Disposal of Operating Material



#### WARNING

CHEMICAL AND BIOLOGICAL HAZARDS CAN BE ASSOCIATED WITH WASTE MATERIAL (MICROPLATE) OF PROCESSES RUN ON THE HYDROSPEED.

TREAT THE USED MICROPLATE, WASTE BOTTLE, PRIME TUB, PLATE CARRIER, DISPOSABLES AND ALL SUBSTANCES USED, IN ACCORDANCE WITH GOOD LABORATORY PRACTICE GUIDELINES.

INQUIRE ABOUT APPROPRIATE COLLECTING POINTS AND APPROVED METHODS OF DISPOSAL IN YOUR COUNTRY, STATE OR REGION.

### 7.8.4 Disposal of the Instrument

Please contact your local Tecan service representative before disposing of the instrument.



#### CAUTION

ALWAYS DECONTAMINATE AND DISINFECT THE INSTRUMENT BEFORE DISPOSAL.

Pollution degree	2 (IEC/EN 61010-1)
Method of Disposal	Contaminated Waste



#### WARNING

DEPENDING ON THE APPLICATIONS, PARTS OF THE HYDROSPEED MAY HAVE BEEN IN CONTACT WITH BIOHAZARDOUS MATERIAL.

- MAKE SURE TO TREAT THIS MATERIAL ACCORDING TO THE APPLICABLE SAFETY STANDARDS AND REGULATIONS.
- ALWAYS DECONTAMINATE AND DISINFECT ALL PARTS BEFORE DISPOSAL.



## 8. Trouble Shooting

### 8.1 Technical Support

The proper performance of maintenance procedures will typically prevent problems; however, hardware problems may still occur. Please contact your local Tecan representative for technical assistance.

For proper operation and to protect the warranty, only authorized service representatives should service the instrument.

**Technical Support is provided by your local Help Desk.** See last page of this document: Tecan Customer Support

Before contacting the Help Desk for further assistance, please be prepared to provide the following information so that it will be easier to help solve a problem:

- **Product/Instrument type and serial number**
- **Contact data:** your name, phone number, organization name and e-mail address
- The **exact nature of the problem** and the sequence of events leading to the problem (software controls, keystrokes, error messages, etc.)  
If you can produce the error more than once and confirm the exact circumstances, this will make answering your query considerably easier.
- The **firmware version** of instrument and display – where to find:  
Firmware version is shown on Display for some seconds when instrument is switched on:  
Version firmware display (first number) and Version firmware instrument/main (second number)  
or  
Firmware version is displayed in HydroControl software menu Help / 'About'/ Component: Main CPU and Display
- The **software version number** - where to find:  
Software version is displayed in HydroControl Software menu Help / **About**  
Component: WinWash.App
- For detailed information about status of instrument (if required) perform **Instrument Self-Test** in HydroControl Software, menu Tools/Instrument Self-Test. After this test is finished, a report file is generated with information about firmware version, options, and a list of checked functions. This file can be sent to Tecan Customer Support for information about the status of instrument.
- The error code, message, and additional information (if applicable)
- The name of the standard protocol being used (if applicable) and the step at which the problem occurred or the software/hardware operation you were trying to perform.
- The brand or model of the computer and any other software installed on the computer.

### 8.1.1 Remounting of Plate Carrier, Option INDEXING

Please consider the following hints when remounting the plate carrier:



Positioning element



Slit on rear side of plate carrier for positioning.

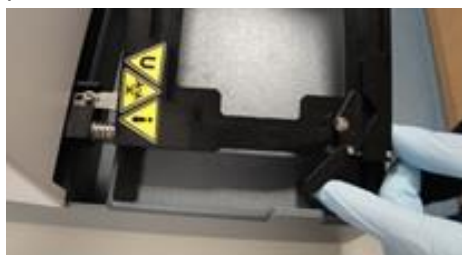
Carefully lift the guiding bar (not more than 1 cm).  
Be sure that the spring is located on the guiding bar.



Put the plate carrier on the guiding bar.  
Lift the right hand side of the plate carrier to slide it over the positioning element.



Push the plate carrier carefully against the spring until the leading edge of the plate carrier is in line with the black Teflon gliding strip.



Carefully lower down the plate carrier.

Do not push down the plate carrier with force to avoid damage of the positioning element.

When the positioning element is in correct position, within the slit of the plate carrier, the plate carrier easily falls in position.

## 8.2 Errors

The following errors can occur, which will not yield an error message on the instrument's touchscreen:

Error Description	Possible Causes	Solution
Incorrect Plate Position	Plate parameters are not adjusted properly.	Adjust the plate parameters in the Plate menu.
Touchscreen dark	Power supply board broken Defective fuse	Contact your local Service Technician.
No or incorrect dispensing	Dispensing needles blocked Dispensing valve broken Dispensing pump broken	If the needles are blocked, perform weekly maintenance as described in chapter 7.6.2 Weekly, otherwise contact your local Service Technician.
No or incorrect aspirating	Aspirating needles blocked Aspirating pump broken	If the needles are blocked, perform weekly maintenance as described in chapter 7.6.2 Weekly, otherwise contact your local Service Technician.
No or incorrect aspirating	Fluid has come to hydrophobic filter in waste tubing. Trapped fluid will reduce the airflow – Vacuum can not be built up in the needed time. Instrument will show an error message 'vacuum build up time expired'.	If fluid is trapped in the filter, remove the filter and allow the fluid to drain from the small white fitting on the filter. Relock the small white fitting and reinstall the filter. Or replace the filter. See chapter 2.10.2 Hydrophobic Filter for Sterile Venting .
A button is not translated to the set language	Correct language file has not been transferred to the instrument	Check with Tecan Customer Support about the compatibility of firmware and language file.
Vacuum pump noisy	Contact between vacuum pump cover and waste bottle or foam trap bottle – possible amplification of noise.	Position the waste bottle and foam trap bottle so that there is no contact between vacuum pump cover and between bottles.
Function pLLD cannot be activated in Instrument Settings.	LLD option is activated (LLD and pLLD cannot be activated at the same time) or Main firmware < V1.61 or display firmware < V1.55.	Deactivate LLD Contact your Tecan Customer Support for correct firmware versions.

Error Description	Possible Causes	Solution
Vacuum build up time is expired ('timeout')	<p>Cover or fitting to waste bottle and foam trap bottle not connected tightly.</p> <p>Waste tubing with kinks or loops, causing liquid remaining in the tubing.</p>	<p>Be sure that cover and fitting to waste bottle and foam trap bottle are connected tightly.</p> <p>Instrument with option 'large volume bottle set' includes color-coded waste tube with length of 4m. When position/laying of waste tube, take care to avoid kinks or loops.</p> <p>Waste tube can be shortened if required.</p>
Connecting of HydroControl software to instrument not performed.	When connecting the HydroControl software with the instrument the touchscreen does not show the main window.	Be sure that the touchscreen of the instrument displays the main menu (e.g., Program Favorites) before connecting the HydroControl software with the instrument.

## 8.3 Error Messages

### No Plate Inserted

1. If the plate detection sensor does not recognize the plate or no plate is inserted on the plate carrier, the following message appears:  
**"No Plate Inserted"**
2. Insert the plate correctly onto the plate carrier.
3. Press **OK** to close the message and restart the program.

### No Plate Found

1. If there is no plate definition stored on the instrument, the following message appears: **"No Plate Found"**.
2. Save a plate definition to the instrument.
3. Press **OK** to close the message and restart the program.

### Maximum Number of Steps Reached

1. If a program with  $\geq 51$  steps is started, the following message appears:  
**"Maximum Number of Steps Reached"**.
2. Modify the program so that it has a maximum of 50 steps (1 cycle = 2 steps).
3. Press **OK** to close the message and restart the program.

### Initialization Error

1. If the plate transport (X or Y) or the wash head transport (Z) cannot find the home position, one of the following messages appears:  
**"X-Drive Init Error", "Y-Init Error" or "Z-Init Error"**.
2. Check that the transport is not obstructed (cable or tubes, etc.).
3. Switch the instrument off and on again.
4. Press **OK** to close the message and restart the program.
5. If the error continues, contact your local service technician.

### Head Up Error

1. If the needles touch the microplate, due to wrong plate inserted, wrong wash head installed or X/Y/Z transport error, the following message appears: **“Head Up”**.
2. Check that the correct microplate is inserted and the plate definition is correctly defined.
3. Check that the correct wash head is installed.
4. Check that transports are not obstructed.
5. Press **OK** to close the message and restart the program.
6. If the error continues, contact your local service technician.

### No Program Found

1. If no programs are stored on the instrument, the following message appears: **“No Program Found”**.
2. Define a program.
3. Press **OK** to close the message and restart the program.

### Steploss Error

1. If the one of the transport motors becomes obstructed (cable or tubes, etc.), the following message appears: **“Steploss”**.
2. Check that the transport is not obstructed (cable or tubes, etc.).
3. Switch the instrument off and on again.
4. Press **OK** to close the message and restart the program.
5. If the error continues, contact your local service technician.

### No Wash Head

1. If a program is started and a wash head is not installed the following message appears: **“No wash head mounted”**.
2. Install a wash head.
3. Press **OK** to close the message and restart the program.

### Program Parameter Mismatch

1. If a program is started and the wash head defined in the program does not match the installed wash head the following message appears: **“Program parameter mismatch”**.
2. Install a compatible wash head.
3. Press **OK** to close the message and restart the program.

### Power Fail Error

1. If there is a power outage when a program is running, the following message appears when the power returns: **“Power Fail Error”**.
2. Press **OK** to close the error message and restart the program.

### Waste Bottle Full

1. If the waste bottle is full at the start of a program or becomes full while a program is running, the following message appears: **“Error LLD: Bottle Waste 1 full”**.
2. Empty the waste bottle.
3. Press **OK** to close the message and restart the program.

### Error pLLD : Waste Bottle Full

If pLLD function is activated (see 4.7.6 pLLD).

1. If the waste bottle is full at the start of a program/procedure or becomes full while a program/procedure is running, the following message appears: **“Error pLLD: Waste bottle full”**.
2. Empty the waste bottle (empty foam trap if necessary).
3. When starting a program/procedure again the check if waste bottle has enough space is repeated.

### Liquid Bottle Empty

1. If the liquid bottle is empty before a program is started or becomes empty while a program is running, the following message appears: **“Error LLD: Bottle inlet 1 empty”**.
2. Fill the liquid bottle, press **OK** to close the message and start the program again.

### Bubble Detected

1. If bubbles are detected during a program, the following message appears: **“Bubble Detected”**.
2. Check that the tubes are securely attached.
3. Press **OK** to close the message and start the program again.

### Dispense Pump Time Out

1. When the dispense pump stops working during a dispense procedure, the following message appears: **“Dispense Pump Time Out”**.
2. Switch the instrument off and on again.
3. Press **OK** to close the message and restart the program.
4. If the error continues, contact your local service technician.

### Vacuum Not Prepared

1. If the vacuum pressure is not prepared, the following error message appears: **“Vacuum build up time has expired”**.
2. Check the vacuum connections.
3. Check that the pump is switched on.
4. Press **OK** to remove the error message and restart the program.
5. If the error continues, contact your local service technician.

### Wash head mismatch

1. If a program is started and the installed wash head differs from the wash head type defined in the program (mismatch between program and instrument), the following message appears: **“Wash head mismatch”**.
2. Select a program with the currently installed wash head type.
3. Install the wash head type defined in program.
4. Press **OK** to close the message.

### Wash head 96i mounted, but no indexing available

1. It is not possible to connect with the HydroControl software or to run a program if installed wash head type does not match the installed configuration of instrument.
2. The following message appears: **“96i wash head but no indexing module”**.

3. Install wash head type corresponding to configuration of instrument.
4. Press **OK** to close the message

**Wash head – Configuration Mismatch**

1. It is not possible to connect with HydroControl software or to run a program if installed wash head type does not fit to the installed configuration of instrument.
2. The following message appears: **“Wash head – Configuration mismatch”**.
3. Install wash head type corresponding to configuration of instrument.
4. Press **OK** to close the message.





# Abbreviations

Abbreviation	
A	Ampere
ANSI	American National Standards Institute, Inc.
°C	Degrees Celsius
CE	CE conformity marking
cm	Centimeter
CV	Coefficient of Variation
ELISA	Enzyme-Linked ImmunoSorbent Assay
EN	European Norm: a voluntary European standard of the European Committee for Standardization or Comité Européen de Normalisation (CEN)
°F	Degrees Fahrenheit
hPa	Hectopascal
HT	High throughput
Hz	Hertz
IEC	International Electrotechnical Commission
IFU	Instructions for Use
in.	Inch
inHg	Inches of mercury
kg	Kilogram
l; L	Liter
LLD	liquid level detection
pLLD	pressure based liquid level detection
m	Meter
mBar	Millibar
MBS	Magnetic Bead Separation
MBS-96	Magnetic Bead Separation in 96-well microplates
MBS-384	Magnetic Bead Separation in 384-well microplates
ml	Milliliter
mm	Millimeter
µl	Microliter
PCR	Polymerase Chain Reaction
ppm	Parts per million
pLLD	Pressure based Liquid Level Detection
psi	Pressure per square inch
QC	Quality Control
REF	Reference number/ Order number

Abbreviation	
s	Second
SBS	Society for Biomolecular Screening
Smart 2 MBS-96	Smart 2 Magnetic Bead Separation in 96-well microplates
SN	Serial number
T	Träge (Slow Blow Fuse)
torr	Torr – millimeter of mercury (mmHg)
TÜV	Technischer Überwachungsverein (Technical Inspection Agency of Germany)
TYPE	Name and type of instrument
USB	Universal Serial Bus
V	Volt
VA	Volt ampere
VF	Vacuum Filtration
WEEE	Waste electrical and electronic equipment

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# Tecan Customer Support

If you have any questions or need technical support for your Tecan product, contact your local Tecan Customer Support organization. Go to <http://www.tecan.com/> for contact information.

Prior to contacting Tecan for product support, prepare the following information for the best possible technical support (see name plate):

- Model name of your product
- Serial number (SN) of your product
- Software and software version (if applicable)
- Description of the problem and contact person
- Date and time when the problem occurred
- Steps that you have already taken to correct the problem
- Your contact information (phone number, fax number, e-mail address, etc.)



## Declaration of Conformity

We, TECAN Austria GmbH herewith declare under our sole responsibility that the product identified as:

**Product Type:** Microplate Washer

**Model Designation:** *HYDROSPEED*

**Article Numbers:** 30087536

**Address:** Tecan Austria GmbH  
Untersbergstr. 1A  
A-5082 Grödig, Austria

is in conformity with the provisions of the following European Directive(s) when installed in accordance with the installation instructions contained in the product documentation:

- **EMC Directive**
- **Machinery Directive**
- **RoHS Directive**

is in conformity with the relevant U.K. legislation for UKCA-marking when installed in accordance with the installation instructions contained in the product documentation:

- **Electromagnetic Compatibility (EMC) Regulations**
- **Supply of Machinery (Safety) Regulations**
- **The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations**

The current applicable versions of the directives and regulations as well as the list of applied standards which were taken in consideration can be found in separate CE & UK declarations of conformity.

*These Instructions for Use and the included Declaration of Conformity are valid for all HYDROSPEED instruments with the article numbers listed above. The model designation varies depending on the specific model with different article number.*