Reference Manual

Fluent®

Document Status Sheet

Title:	Fluent Reference Manual		**Part number:**	30134931.07
ID:	399937, en, Version 1.7		**Translated from:**	n.a.
Version	**Revision**	**Issue**	**Document History**	
1	0	2017-08-30	First Edition	
1	1	2018-08-20	FCA gripper added	
1	2	2020-10-20	Information on Mix &Pierce added: 6.3.12 Section 3.3.5 added	
1	3	2021-02-16	Information on Frida Reader added: 2.4.10 Moved: Section FCA gripper to 3.1.2.7 Updated: 6.2.1 Hotels	
1	4	2021-03-26	Minor correction: Fig. 6-35 and 6-36	
1	5	2022-04-21	Sections 2.2.1, 2.2.3.1, 2.4.2.3–4, 2.4.3.4, 2.4.5, 2.4.9, 2.5.1, 2.6.1, 3.1.1, 3.1.2.6, 6.2.3, 6.3.4, and 6.6.3–4 updated Sections 3.5.5–7 and 2.4.11–12 added	
1	6	2023-03-17	Sections 3.3, 3.8.8 and 3.8.9 updated Sections 3.4.1 and 3.5.8 added	
1	7	2023-04-21	Sections 2.4.13, 4.1.6, 4.2.5, 6.1.5 and 6.6.5	

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Table of Contents

1 About This Manual

Purpose of This Manual

This manual describes the Fluent and provides detailed information not required for its daily operation. It contains additional information to the Operating Manual like shutdown, storage, shipping and disposal, as well as a description of functions or possible options, accessories and consumables that are available and may be needed for reordering or upgrading the system.

Target Group

This manual is intended for key operators who have read and understood the Fluent Operating Manual (Doc ID 399706).

Before performing any work on or with the Fluent, first read the Operating Manual carefully, in particular chapter 2 “Safety”.

Scope

This manual applies to:

- Fluent 480; Part No. 30042011
- Fluent 780; Part No. 30042021
- Fluent 1080; Part No. 30042031

1.1 Reference Documents

Additional reference documents are listed below but are not enclosed or linked.

What Does the Doc. ID Tell You?

The Doc. IDs listed below are root numbers. Therefore, they do not contain information about the language, document version or the medium (data storage medium, hardcopy, downloadable file, etc.) of the document.
Check the scope of the corresponding document to make sure that you are in possession of the correct version.

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

Documents for Fluent

The following manuals contain relevant information about the Fluent:

- Fluent® Operating Manual (Doc ID 399706)
- FluentControl™ Software Manual (Doc ID 399935)
- Certificate of Decontamination Form (Doc. ID 40205TMt01)
- Module Specification MCA384 Liquid Handling (Doc. ID 397990)

Any individual or separate operating manuals for optional equipment according to your order configuration can be applicable.

1.2 Trademarks

The product names, whether registered or unregistered trademarks, mentioned in this manual are reproduced solely for identification purposes and remain the exclusive property of their respective owners. For simplicity reasons, the trademark symbols such as ® and ™ are not repeated in the manual.

1.3 Abbreviations

Air FCA	FCA with air displacement system
cLLD	Capacitive liquid level detection
CV	Coefficient of variance or variation
cXP	Centris XP diluter
DiTi	Disposable tip
DMSO	Dimethyl sulfoxide
EN	European Norm
ETFE	Ethylene/Tetrafluoroethylene-copolymer
EVA	Extended Volume Adapter
FCA	Flexible Channel Arm
FEP	Tetrafluoroethylene/Perfluoropropylene-copolymer
FES	Finger Exchange System
FFPM	Perfluoroelastomer
FSE	Field service engineer
HDPE	High-density polyethylene
LCP	Liquid crystal polymer
LH	Liquid handling
Liquid FCA	FCA with liquid displacement system
LLD	Liquid level detection (also see cLLD)
MCA384	Multiple channel arm with 384-channel pipetting head
MP	Microplate
PC	Personal Computer
PCTFE	Polychlorotrifluoroethylene
PE	Polyethylene
PP	Polypropylene
PS	Polystyrene

PVC	Polyvinylchloride
PVDF	Polyvinylidenefluoride
RF	Radio frequency
RGA	Robotic gripper arm
RWP	RapidWash pump
SBS	Society for Biomolecular Screening
TES	Disposable tip ejection system
TR	Tube Rotator
UPS	Uninterruptable power supply
USB	Universal serial bus

2 Technical Data

Purpose of This Chapter

This chapter introduces the reader to the Fluent and its main components. It contains technical data, requirements and performance data.

2.1 Software Requirements

It is strongly recommended to use the latest software versions.

2.2 Technical Data

2.2.1 Dimensions and Weights

Instrument Dimensions

The figure shows a Fluent 1080 instrument with closed front safety panel. Other instrument types differ in length and may have a different front safety panel.

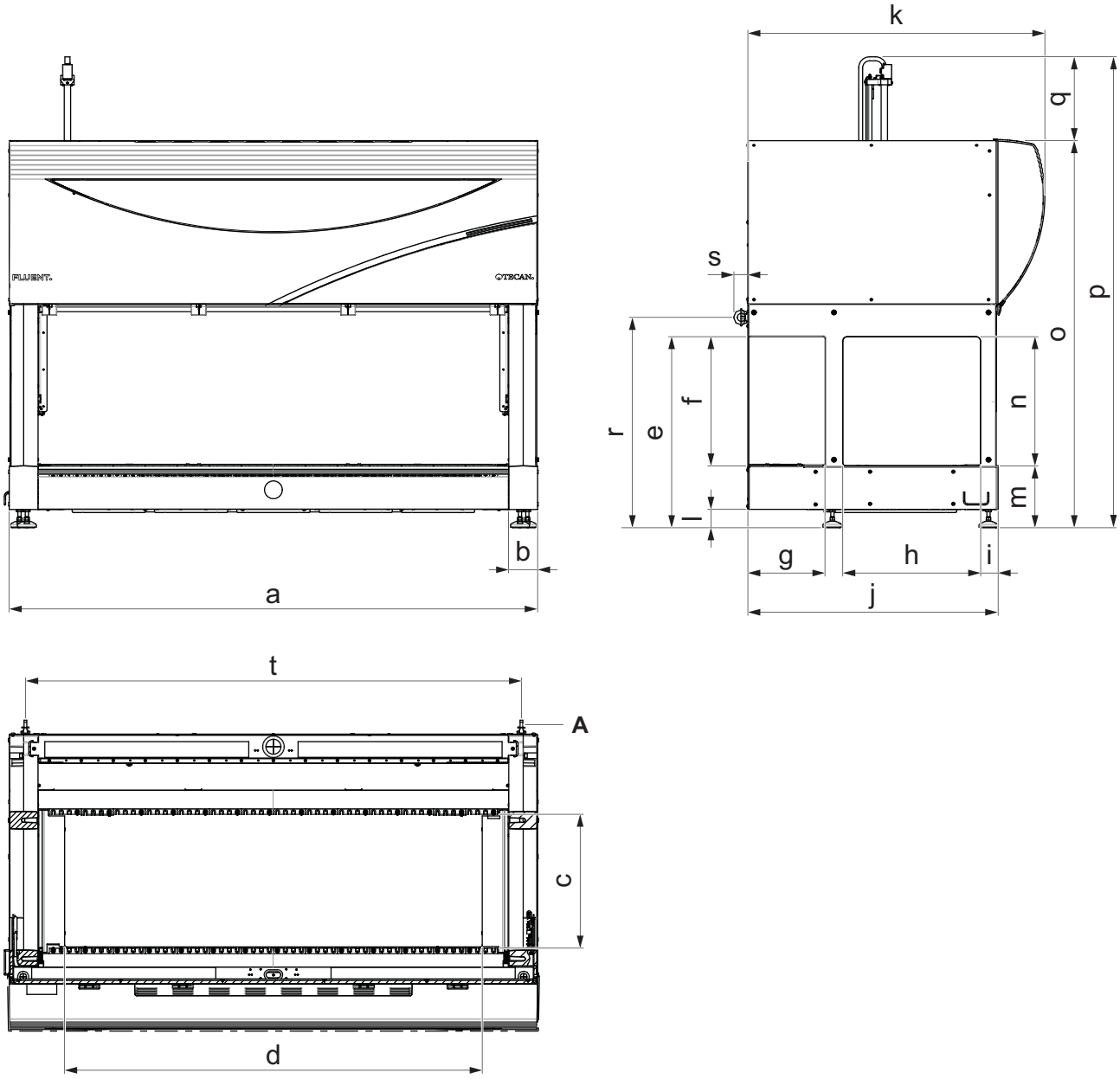


Fig. 2-1 *Fluent outer dimensions*

A *Earth quake protection kit*

The table lists the outer dimensions of all instrument sizes:

Tab. 2-1 *Outer dimensions*

Dimension		Fluent 480	Fluent 780	Fluent 1080
a	Overall length[a)]	1155 mm (45.47 in.)	1656 mm (65.19 in.)	2155 mm (84.84 in.)
b		93 mm (3.66 in.)		
c		418 mm (16.4 in.)		
d		801 mm (31.53 in.)	1301 mm (51.22 in.)	1801 mm (70.90 in.)
e		540 mm (21.26 in.)		
f		402 mm (15.83 in.)		
g		244.5 mm (9.62 in.)		
h	Width of lateral opening	430 mm (16.93 in.)		
i		56 mm (2.20 in.)		
j	Footprint depth	785 mm (30.90 in.)		
k	Overall depth	926 mm (36.45 in.)		
l	Height of feet	57 $^{\pm 10}$ mm (2.24 $^{\pm 0.39}$ in.)		
m		135 $^{\pm 10\ mm}$ (5.31 $^{\pm 0.39}$ in.)		
n	Height of lateral opening	402 mm (15.83 in.)		
o	Instrument body height	1210 $^{\pm 10}$ mm (47.63 $^{\pm 0.39}$ in.)		
	Instrument body height with dust cover, standard Z		1265 $^{\pm 10}$ mm (49.80 $^{\pm 0.39}$ in.)	
	Instrument body height with dust cover, long Z		1575 $^{\pm 10}$ mm (62.00 $^{\pm 0.39}$ in.)	
p	Overall height[b)]	1473 $^{\pm 10}$ mm (58.00 $^{\pm 0.39}$ in.)		
q	RGA long Z	264 mm (10.40 in.)		
r			657 $^{\pm 10}$ mm (25.86 $^{\pm 0.39}$ in.)	
s			41 mm (1.61 in.)	
t		1050 mm (41.33 in.)	1550 mm (61.02 in.)	2050 mm (80.70 in.)

a) Deck Extension 300 mounted on left and/or right side wall adds 511 mm (20.1 in) to length (540 mm (21.3 in) depth)
b) Instruments equipped with Robotic Gripper Arm long: The RGA-Z increases the overall height, when the Z-axis is in its upper position

The figure shows a Fluent 780 instrument on the optional cabinet:

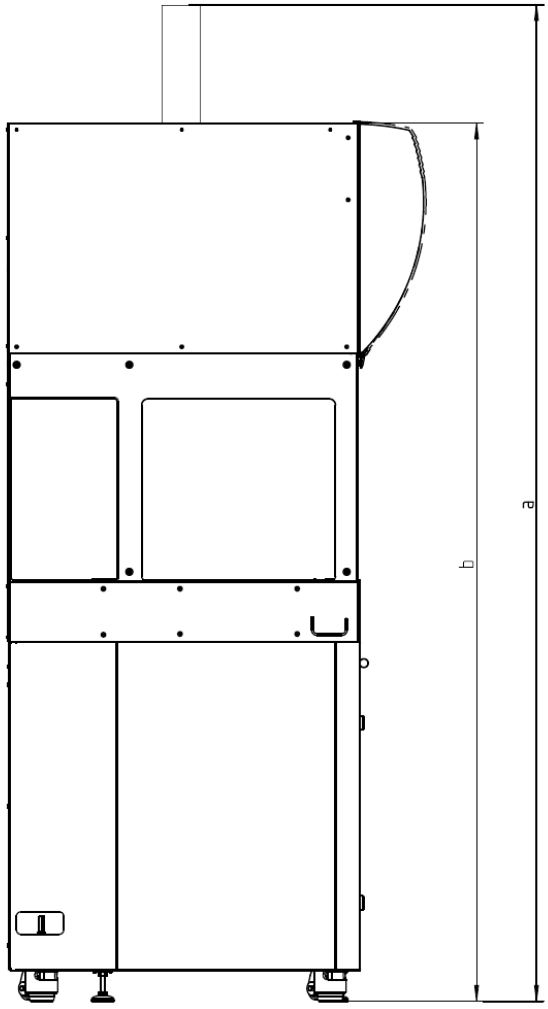


Fig. 2-2 *Fluent 780 outer dimensions*

The table lists the outer dimensions of all instrument sizes:

Tab. 2-2 *Outer dimensions*

Dimension		Fluent 480	Fluent 780	Fluent 1080
a	Overall height RGA long Z	2216 $^{+5/-0}$ mm (87.17 $^{+0.19/-0}$ in.)		
b	Overall height on cabinet[a)]	1953 $^{+5/-0}$ mm (76.77 $^{+0.19/-0}$ in.)		

a) Instruments equipped with Robotic Gripper Arm long: The RGA-Z increases the overall height, when the Z-axis is in its upper position

The figure shows a Fluent with a HEPA hood long:

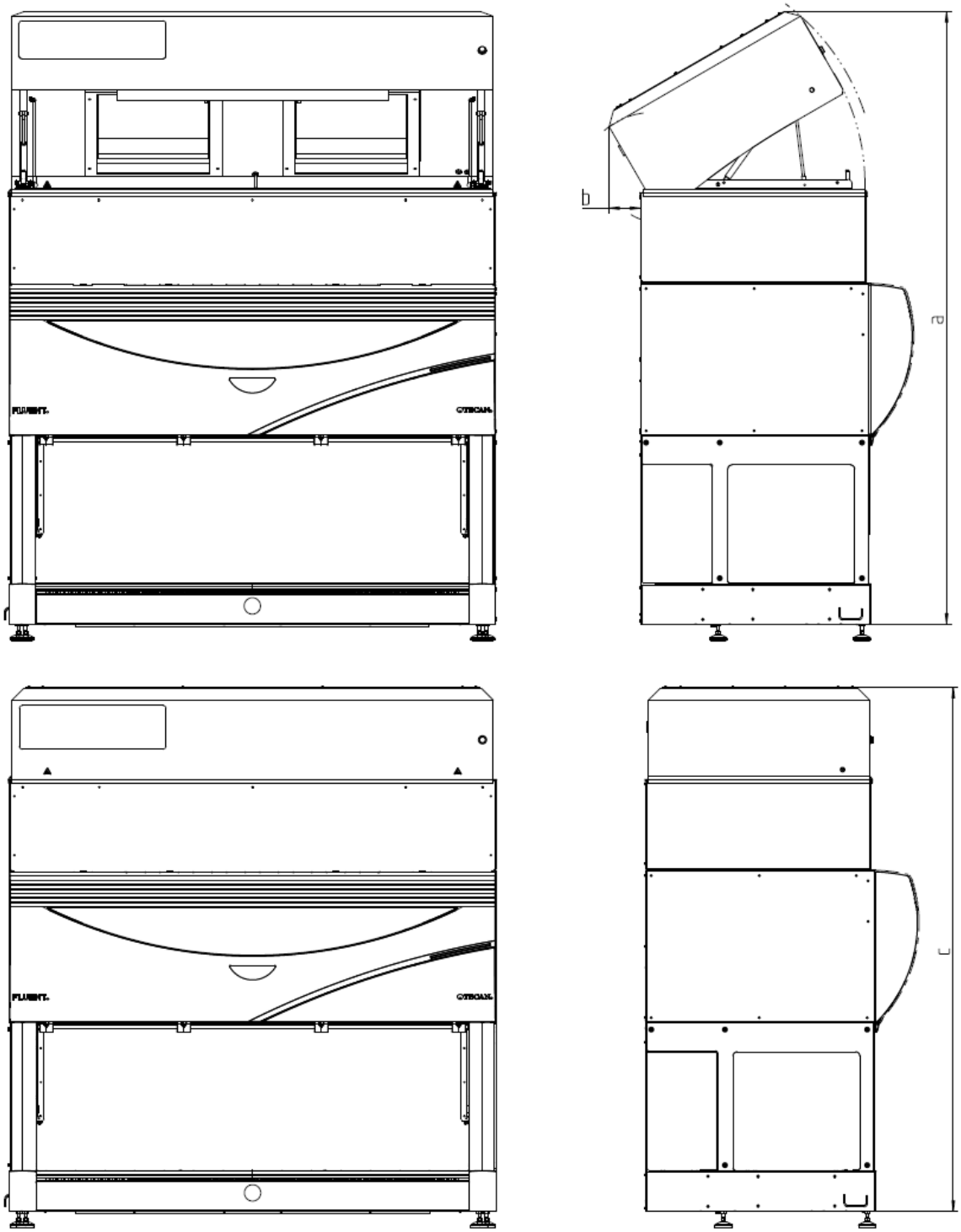


Fig. 2-3 *Fluent with HEPA hood long*

The table lists the outer dimensions of all instrument sizes:

Tab. 2-3 *Outer dimensions*

Dimension		Fluent 480	Fluent 780	Fluent 1080
a	HEPA hood overall height (open)	2077 mm (81.8 in.)		
b	Clearance	108 mm (4.25 in.)		
c	HEPA hood overall height (closed)	1778 mm (70 in.)		

The figure shows a Fluent with a HEPA hood standard:

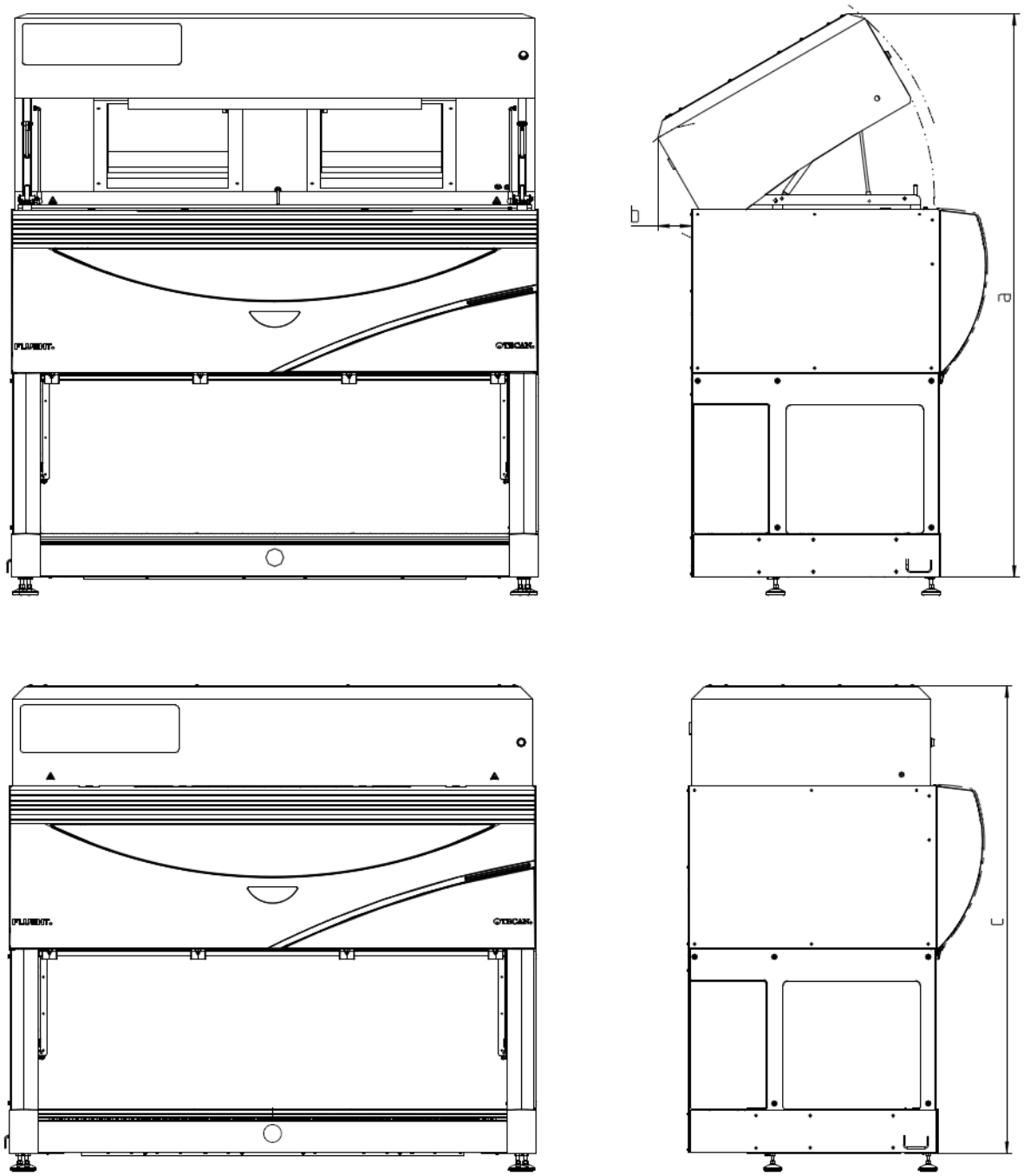


Fig. 2-4 *Fluent with HEPA hood standard*

The table lists the outer dimensions of all instrument sizes:

Tab. 2-4 *Outer dimensions*

Dimension		Fluent 480	Fluent 780	Fluent 1080
a	HEPA hood overall height (open)	1767 mm (69.60 in.)		
	Clearance	108 mm (4.25 in.)		
b	HEPA hood overall height (closed)	1469 mm (57.80 in.)		

Required Floor Space

In the rear and on both sides a minimum clearance of the instrument or its options to walls or other objects must be provided.

Heat convection of power supply must be guaranteed.

Depending on the used options, access from the side may be necessary.

In the front enough room for operation and system care must be kept free.

There are instruments with different types of front safety panels.

The figure shows the space needed for opening the panels and the minimum distance to adjacent objects.

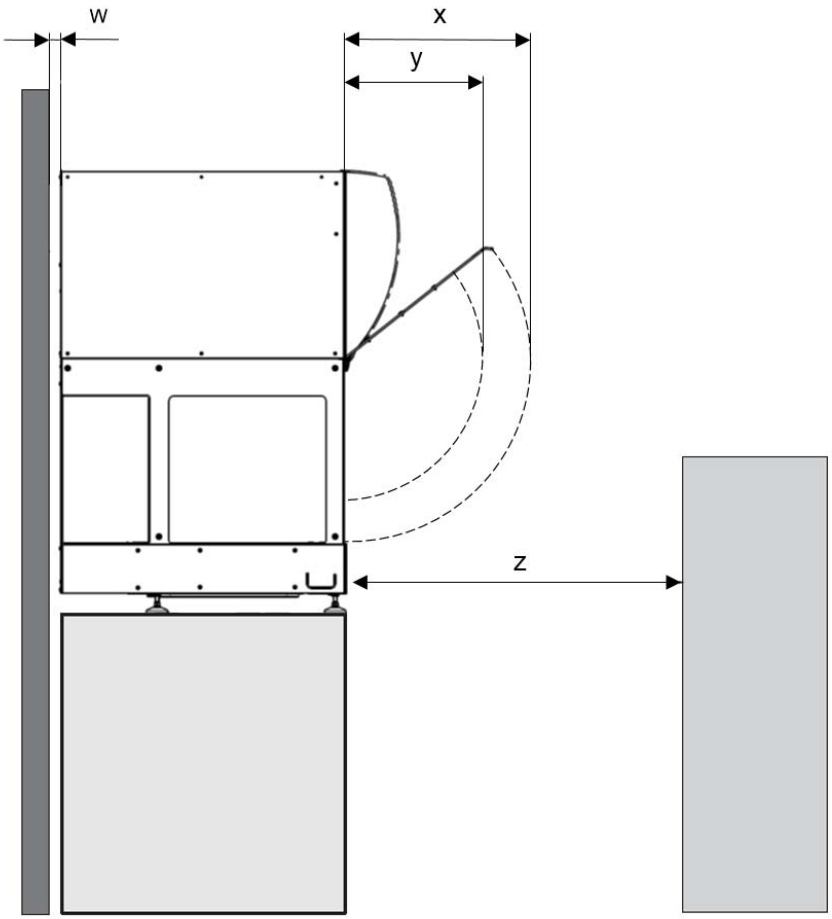


Fig. 2-5 *Required space*

Tab. 2-5 *Space around Fluent instrument*

Dimension		Fluent environment
w	Clearance to object in the rear of the instrument	Min. 100 mm (4 in.)
x	Outreach of the full front safety panel	460 mm (18.11 in.)
y	Outreach of the half front safety panel	285 mm (11.22 in.)
z	Minimum clearance to object in front of the instrument	Min. 1000 mm (40.00 in.)

Cabinet Weight and Dimensions

Tab. 2-6 Cabinet weight and dimensions

	Cabinet 340[a)]	Cabinet 480	Cabinet 780	Cabinet 1080
Length	700 mm (27.55 in.)	1150 mm (45.27 in.)	1650 mm (64.96 in.)	2150 mm (84.64 in.)
Depth	801 mm (31.53 in.) with door mounted 783 mm (30.82 in.) without door			
Height[b)]	800 $^{+5/-0}$ mm (31.49 $^{+0.19/-0}$ in.)			
Weight	34 kg (75.0 lb. lb.)	40 kg (88.2 lb.)	50 kg (110.3 lb.)	60 kg (132.3 lb.)

a) For Fluent Carousel
b) Feet adjustable to max. cabinet height 800–805 mm (31.49–31.69 in.)

Weights

Tab. 2-7 Instrument/modules weights

	Fluent 480	Fluent 780	Fluent 1080
Base unit	120 kg (264.5 lb.)	140 kg (308.6 lb.)	190 kg (418.9 lb.)
Packaging	61 kg (135 lb.)	83 kg (183 lb.)	106 kg (234 lb.)
FCA	10.4 kg (22.9 lb.)		
MCA384[a)]	12.6 kg (27.8 lb.)		
384-channel head	7.2 kg (15.9 lb.)		
RGA	10.2 kg (22.4 lb.)		
RGA-Z	10.6 kg (23.4 lb.)		
cXP[b) c)]	1.2 kg (2.6 lb.)		
TR[d)]		23.5 kg (51.8 lb.)	
HEPA hood	46 kg (101.4 lb)	57 kg (125.6 lb)	69.5 kg (153.2 lb)
Carousel	120 kg (264.5 lb)		
Stacker Base unit	5.6 kg (13 lb)		
Stacker Front/ Rear	16 kg (35.5 lb) / 20 kg (44 lb)		
Deck Extension 340	16.7 kg (37 lb)		

a) Without multiple channel head
b) Four or eight diluters, according to instrument configuration
c) Up to 16 diluters for instrument with 2 Liquid FCA
d) Without runners and tubes

WARNING

Personal injury and/or damage to material.
Take the weights and dimensions of the instrument and modules into account when using a table or bench instead of a cabinet. A table or bench must have a minimum height of 750 mm (29.5 in.).

Floor Bearing Capacity

The floor bearing capacity must be at least 200 kg/m^2.

2.2.2 Deck Access Range

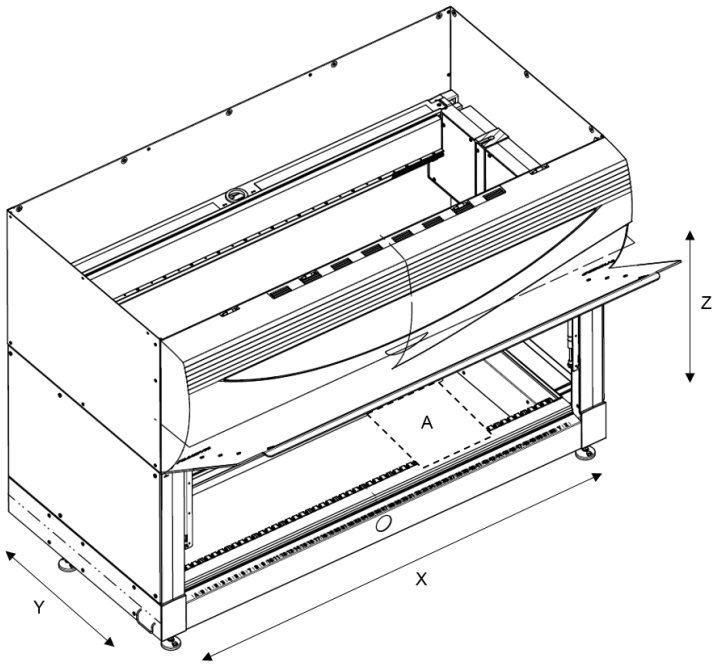


Fig. 2-6 *Deck access range*

Deck Dimensions

In X-direction the deck is divided in partitions of 25 mm (.984 in.). This corresponds to the narrowest segment that can be placed on the grid (e.g., a tube runner with one row of sample tubes).

Different segments (A), which spread over a number of grid positions, make the deck a versatile site for microplates, tube racks and other elements used for liquid handling.

For options with 61 mm height there is a segment that can be placed at a lower level in the deck area.

Tab. 2-8 Deck dimensions in X-direction

	Fluent 480	Fluent 780	Fluent 1080
Number of grid positions	32	52	72
Dimensions [mm]	800	1300	1800
Dimensions [in.]	31.5	51.2	70.9
Number of grids with A,B, Y,Z	36	56	76

In Y-direction the deck extends to 600 mm (23.6 in.).
The max. height of the items present on the deck (Z-direction) depends on the configuration. Check the “tip clearance” for the corresponding robotic arm.

2.2.3 Deck Components (Segments)

Definition

"Segment" is the generic term for the components placed on the instrument deck in order to hold labware, such as microplates, sample tubes, reagent troughs, etc. According to the instrument deck's grid the segments have a width of 25 mm (0.98 in.) or a multiple thereof.

2.2.3.1 Standard Segments

The following segments can be ordered as standard items:

- Microplate nest segments
  - These segments hold microplates. They differ in the number and orientation of the microplate nests. Furthermore, different nest heights are available.
- DiTi nest segments
  - These segments hold disposable tip trays for FCA.
- Deck segments
  - These segments have positioning pins. They differ in the number of grid positions occupied Special deck segments with cutout allow Robotic Gripper Arm access to options underneath the instrument, whilst affording location options front and behind the cutout section.
- Runners
  - The runners are intended to allow the loading of samples and reagents onto the deck. The sliding of the runners while loading is guided by the grid pins of the deck segment. The tube runners for tubes differ in the number of tubes they can hold and in the tube size.
- Combo segments
  - A number of segments combine different functions, such as wash station, disposable tip waste station, reagent trough holder, disposable tip rack nests, etc.

For all standard segments, data exists in the FluentControl Software to allow teach-free usage on the chosen deck position.

For more information about the available standard segments refer to 6.3 "Deck Components", 2 6-13.

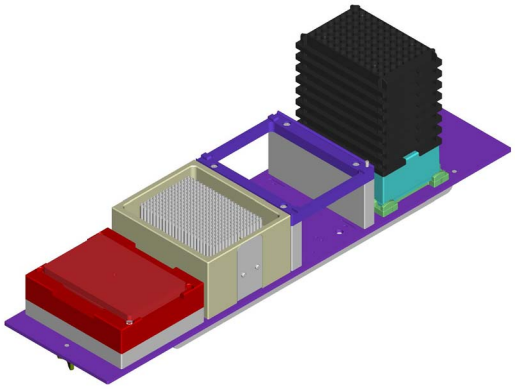
2.2.3.2 Customized Segments

What Is a Customized Segment?

For special applications the user can assemble a customized segment, using standard elements, which can be ordered separately.
For more information about the available elements to build a customized segment refer to 6.3.5 “Customized Segments”, 2 6-25.

Note: *The images below show examples for customized segments. Next to the image the segment’s main characteristics are listed.*

Customized Segments



MCA384 base segment.

Main characteristics:

- Full access for MCA384
- Includes wash station
- Includes tip adapter park position

Fig. 2-7 *Example for MCA384 base segment*

Note: *Since these are not standard elements, applicable segment definitions are not available in the FluentControl software. The user needs to define these segments, accordingly.*

The figure shows an example of standard elements, which can be assembled to a customized nest segment:

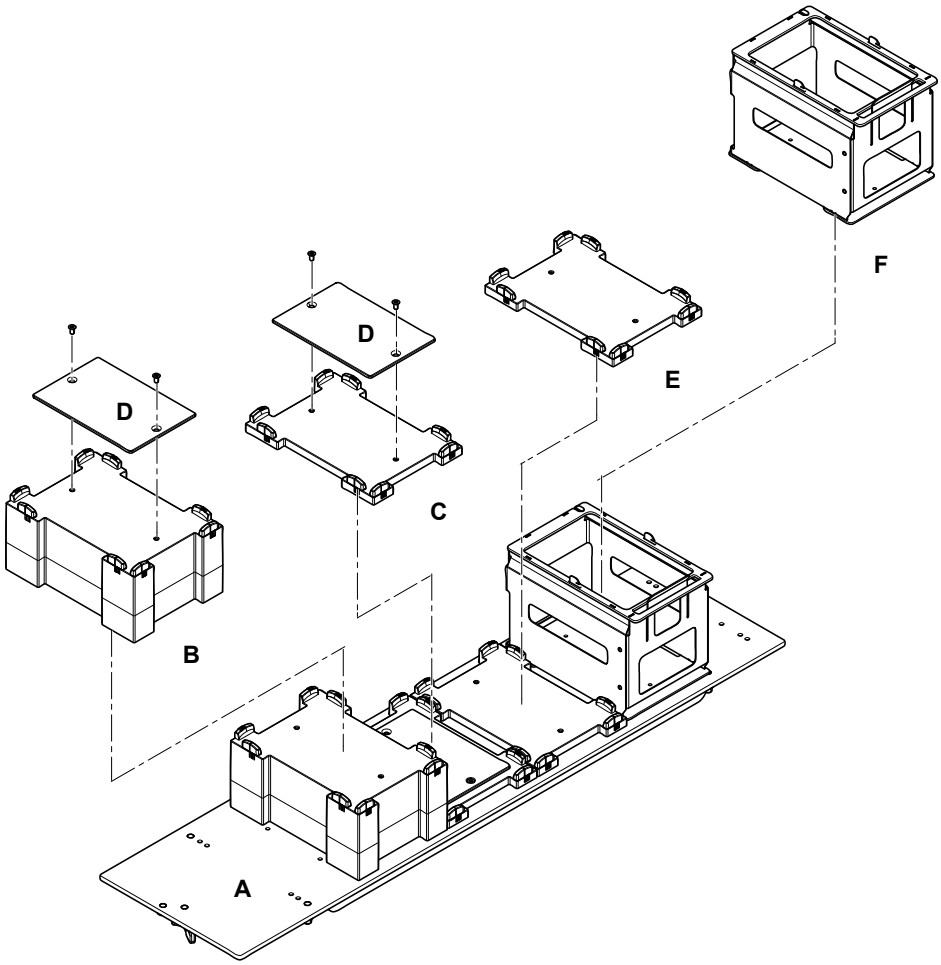


Fig. 2-8 *Customized nest segment elements (example)*

A	*Base plate*	***D***	*Adapter plate (necessary for cLLD)*
B	*High microplate nest*	***E***	*Microplate nest without adapter plate*
C	*Low microplate nest*	***F***	*Nest for disposable tip tray*

There are different base plates available, for example, with waste cutout (for integrated DiTi waste) or different orientation of the microplates.

For information on how to assemble and set up a customized segment refer to the Operating Manual.

2.2.3.3 Active segments

Active segments have an electronic connection to the Fluent. Deck layouts should be constructed such that these segments do not need to be routinely moved.

- Fluent ID left or middle – it is not recommended to remove these segments
- MCA 384 Active DiTi segment
- Tube Rotator
- Frida Reader

Exercise caution if moving these segments for cleaning or deck layout change carriers to avoid damage to the cable connections below the deck (refer to Operating Manual).

Note: *Do not remove or shift these segments as they can cause harm (collisions with other arms).*

2.2.4 Supplies

Power Supply Unit

The external power supply unit delivered with the Fluent is rated as follows:

Tab. 2-9 *Power supply unit ratings*

Fluent Power Supply		Rating
Input	Line voltage (single phase)	100–240 V AC (-15% / +10%)
	Input current[a)]	9.8–4 A
	Frequency	50–60 Hz
Output	Output voltage	24–28 V⎓ Factory set: 25.2 V
	Continuous power (at temperature range)	500 W 0–40°C
	Continuous power (at temperature range)	465 W 0–45°C
	Peak power (time limit)	1200 W for 3 seconds

a) depending on input voltage (higher value at lower voltage)

Max. mains supply voltage fluctuation: ±10% of the nominal voltage.

Power Consumption

Internal power ratings of the instrument:

Tab. 2-10 *Instrument power ratings*

Fluent Instrument	Rating
Supply voltage	24 V⎓
Max. power consumption[a)]—single power supply configuration	750 W
Max. power consumption[b)]—dual power supply configuration	1500 W

a) The average power consumption depends on the instrument configuration and is usually only a fraction of the max power consumption

b) The power rating corresponds to the maximum configuration with dual power supply.

Electrical Safety

Classification with regard to electrical safety according to EN/IEC standards:

Tab. 2-11 *Electrical specifications (safety)*

Pollution degree	(EN) IEC 61010-1

Uninterruptible Power Supply (UPS)

To improve method security, Tecan recommends connecting the instrument via an uninterruptible power supply (UPS) that backs up the mains power line.
For further assistance contact your nearest Tecan representative.

2.2.5 Internal Fuses

The internal fuses of the electronics of the Fluent are not user serviceable.

Note: *A blown fuse requires the equipment to be checked for the reason of this condition.*

- *In case of a blown fuse contact your local service organization.*

2.2.6 Manufacturer's Liquid-Handling-Precision Guarantee

For liquid handling, the coefficient of variation (CV) across and within channels is taken as the pass/fail criteria.
Only two volumes for the FCA and only one volume for the MCA are required to indicate performance of the entire pipetting system in its usable volume range. Possible failures in the liquid path can be detected by testing in the lower volume range efficiently.

The pass/fail criteria of the individual quality control tests are:

Liquid FCA

Tab. 2-12 *Standard tubing and 1250 µl syringe configuration: DiTis without filter*

Tested volume	Pipetting mode	Tip type	Test method	Pass/fail criteria
100 µl	Single, free dispense	DiTi 200 or Standard fixed tip	Gravimetric	CV ≤ 0.5%
10 µl	Single, free dispense	DiTi 200 or Standard fixed tip	Gravimetric	CV ≤ 3.0%

Tab. 2-13 *Low volume tubing and 250 µl syringe configuration*

Tested volume	Pipetting mode	Tip type	Test method	Pass/fail criteria
10 µl	Single, free dispense	Low volume tip or Te-PS tip	Gravimetric	CV ≤ 1.5%
1 µl	Single, free dispense	Low volume tip or Te-PS tip	Gravimetric	CV ≤ 8.0%

Tab. 2-14 Standard tubing and 1250 µl syringe configuration

Tested volume	Pipetting mode	Tip type	Test method	Pass/fail criteria
10 µl	Single, free dispense	Piercing tip	Gravimetric	CV ≤ 5.0%
100 µl	Single, free dispense	Piercing tip	Gravimetric	CV ≤ 2.0%

Piercing tips have also been verified for the use with the Tecan QC Kit as alternative to the gravimetric test method. The same pass/fail criteria apply.

Tab. 2-15 Standard tubing and 5000 µl syringe configuration

Tested volume	Pipetting mode	Tip type	Test method	Pass/fail criteria
25 µl	Single, free dispense	Piercing tip	Gravimetric	CV ≤ 5.0%
200 µl	Single, free dispense	Piercing tip	Gravimetric	CV ≤ 2.0%

Piercing tips have also been verified for the use with the Tecan QC Kit as alternative to the gravimetric test method. The same pass/fail criteria apply.

Air FCA

Tab. 2-16 DiTis without filter

Tested volume	Pipetting mode	Tip type	Test method	Pass/fail criteria
10 µl	Single, free dispense	DiTi 10	Gravimetric	CV ≤ 2.0%
1 µl	Single, free dispense	DiTi 10	Gravimetric	CV ≤ 8.0%

MCA 384

Tab. 2-17 DiTis without filter

Tested volume	Pipetting mode	Tip type	Test method	Pass/fail criteria
1 µl	Single, free dispense	DiTi 50	Colorimetric	CV ≤ 4.0%

MCA 96

Tab. 2-18 DiTis without filter

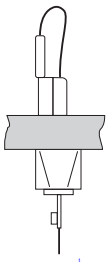
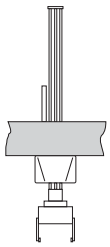
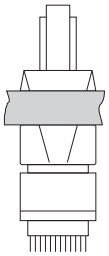
Tested volume	Pipetting mode	Tip type	Test method	Pass/fail criteria
1 µl	Single, free dispense	DiTi 10	Colorimetric	CV ≤ 4.0%

2.3 Configuration Data

2.3.1 Arm Configuration

Robotic Arms

The Fluent can be equipped with each of the following robotic arms:

	**FCA (Liquid or Air)**	Flexible Channel Arm	For pipetting tasks • 8 individual pipetting channels • 6 grids wide / 130 mm Two FCA allowed on 780 and 1080 only
	**RGA**	Robotic Gripper Arm	For handling of labware • 6 grids wide / 130 mm Maximum one RGA per instrument
	**MCA384/96**	Multiple Channel Arm	For simultaneous pipetting with 384 channels • Automatically changes head adapters between 384 and 96 format • Row and column operation • 9 grids wide / 223 mm Maximum one MCA384/96 per instrument

Possible Arm Configurations

The following restrictions apply:

Fluent 480

The Fluent 480 can be equipped with up to two arms in any order. Maximum only one Flexible Channel Arm.

Fluent 780 and 1080

The Fluent 780 and 1080 can be equipped with up to three arms in any order.

Upgradeability

An used Fluent instrument can be upgraded on site with any arm according to the arm configurations above.

Field upgrades can be performed by Tecan authorized field service engineers, FSEs, only.

2.4 System Modules

The following sections briefly explain the system modules and provide their relevant data. These modules are installed according to your order configuration.

2.4.1 Flexible Channel Arm (FCA)

The FCA pipettes liquids between various labware such as tubes, troughs and microplates with 8 independent pipetting channels.

The Fluent 780 and 1080 instruments can be equipped with one or up to two FCAs.

Two types of FCAs are available on the Fluent instrument:

- Liquid FCA
- Air FCA

2.4.2 Liquid Flexible Channel Arm (Liquid FCA)

The Liquid FCA is able to pipette liquids within different volume ranges, depending on the tips used and the syringe size.

2.4.2.1 Mechanical Specifications

Liquid FCA Positioning Accuracy

Tab. 2-19 *Liquid FCA accuracy at 9 mm spacing, with all tips simultaneously*

Axis	Accuracy on axis
X	± 0.1 mm (0.004 in.)
Y	± 0.1 mm (0.004 in.)
Z	± 0.2 mm (0.008 in.)
Y-spacing	± 0.1 mm (0.004 in.)

Liquid FCA Operating Ranges

Tab. 2-20 *Liquid FCA Y- and Z-ranges*

Axis	Moveable range
Y-range	≥ 505 mm
Z-range	≥ 228.5 mm

Plate Access

The following microplate types can be accessed by eight Tecan branded FCA tips (Disposable or fixed tips) together in minimal spacing with the below listed carrier type.

Tab. 2-21 *Microplates suitable for a FCA with Tecan disposable tips*

Microplate type	Tips	Carrier type
Microplate 96[a)]	DiTi10, DiTi50, DiTi200, DiTi350, DiTi1000, fixed tip low volume adj, standard fix tip, Te-PS tip	MP Carrier
Microplate 384[b)]	DiTi10, DiTi50, DiTi200, fixed tip low volume adj, Te-PS tip	MP Carrier
Microplate 1536[c)]	Te-PS tip	MP Carrier

a) 96 well microplate e.g. from Greiner or equivalent
b) 384 well microplate Greiner REF781101 (PS-MP, 384 Well, Clear, 128.0/85MM, 10STK/BTL) with DiTi 200
c) Access to 1536 microplate e.g. from Greiner or equivalent with adjusted Te-PS tips. Teaching might be necessary for accessing the MP 1536

Microplates on 4 position carrier (carrier on worktable position 43; refer to figure below)
Each tip (channel 1 to 8) has full access to each well in a 96, 384 or 1536 well microplate positioned on each carrier position.

Microplates on 5 position carrier with 1. position at the back (carrier on worktable position 3; refer to figure below)
Each tip (channel 1 to 8) has full access to each well in a 96, 384 or 1536 well microplate on carrier position 2., 3., 4. and 5.
On posititon 1. every well in a 96, 384 or 1536 well microplate[1)] is accessible with at least one of the eight tips (semi access).

Microplates on 5 position carrier with 5. position at the front (carrier on worktable position 31; refer to figure below)
Each tip (channel 1 to 8) has full access to each well in a 96, 384 or 1536 well microplate on carrier position 1., 2., 3. and 4.
On posititon 5. every well in a 96, 384 or 1536 well microplate[1)] s accessible with at least one of the eight tips (semi access).

Microplates on 6 position carrier (carrier on worktable position 25; refer to figure below)
Each tip (channel 1 to 8) has full access to each well in a 96, 384 or 1536 well microplate on carrier position 2., 3., 4. and 5.
On position 1. and 6. every well in a 96, 384 or 1536 well microplate[1)] is accesible with at least one of the eight tips (semi access)

[1)] e.g. channel 1 can access row A, channel 2 can access row B, etc. for 96 well microplate

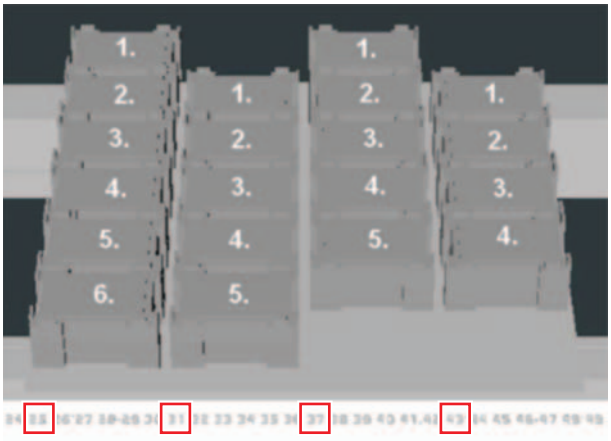


Fig. 2-9 Carriers on worktable positions

Carrier positions

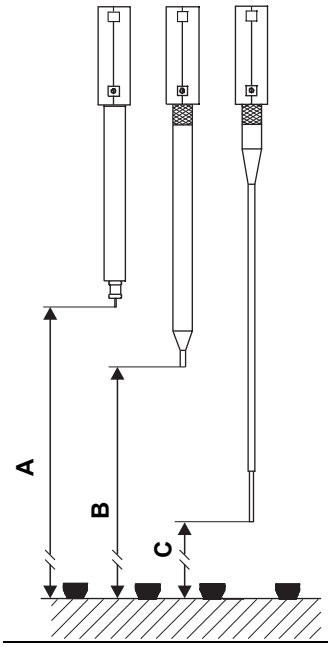
Tab. 2-22 *Liquid FCA X-range*

		Single Arm Liquid FCA	Dual Arm Liquid FCA +RGA	Dual Arm Liquid FCA +MCA	Triple Arm Liquid FCA +RGA+MCA
Liquid FCA X-range	Fluent 480	≥ 802 mm	≥ 672 mm	≥ 579 mm	≥ 449 mm
	Fluent 780	≥ 1302 mm	≥ 1172 mm	≥ 1079 mm	≥ 949 mm
	Fluent 1080	≥ 1802 mm	≥ 1672 mm	≥ 1579 mm	≥ 1449 mm

Liquid FCA Tip Clearance

The tip clearance is the maximum space between the deck surface and the mounted tip.

Tab. 2-23 *Tip clearance*

Distance tip to deck[a)]	Tip type	Tip clearance
	Reference tip (B)	217 mm (8.27 in.)
	DiTi adapter (A)	267 mm (10.24 in.)
	DiTi mounted	
	Standard tip (C) Piercing tip	178 mm
	Low volume fix tip Pipetting tip	178 mm
	Te-PS Fix pipetting tip	244 mm

a) Illustration not to scale, tip clearance shortened

Liquid FCA Tip Spreading

The Liquid FCA allows equidistant spreading of the tips in Y-direction from 9 mm to 38 mm.

Note: *If using 5000 µl DiTis, the minimum spacing between tips is 18 mm.*

Note: *DiTis tend to move down slightly after being picked up.*

- *Therefore, they may "get longer" than their theoretical value, typically for 0.25 mm (0.01 in.).*
- *Also manufacturing tolerances of the DiTis account for deviations in length.*

2.4.2.2 Pipetting Tips

Liquid FCA Tip Types

The following table lists the available tip types for the Liquid FCA.

Tab. 2-24 *Tip types*

Choice of filter or no filter	Usage	Capacity	
		Tip without filter	Tip with filter
Disposable tips DiTi 5000 DiTi 1000 DiTi 350 nested DiTi 200 DiTi 50 DiTi 10 DiTi 10 nested	Single use	 5130 µl 1100 µl 385 µl 220 µl 55 µl 23 µl 23 µl	 5130 µl 1050 µl – 210 µl 55 µl 12 µl 12 µl
Standard volume fixed tip	Multiple use/ washable	235 µl	–
Low volume fixed tip		16 µl	–
Te-PS fixed tip		85 µl	–
Piercing tip		76 µl	–

Note: *If no carry-over is tolerable, use disposable tips with filters.*

2.4.2.3 Pipetting Performance

Pipetting Tubing

The pipetting tubing dimensions are optimized for the general volume range:

Tab. 2-25 *Pipetting tubing features*

Tubing Type	Features
Standard volume tubing	For disposable tips, standard fixed tips and piercing tips Compatible with 1250 and 5000 µl syringes
Low volume tubing	For low volume fixed tip and Te-PS volume fixed tip Compatible with 250 µl syringes

Syringe Sizes

The size of the syringe dictates the largest volume that can be used in a single aspiration or dispense action on a single channel. Syringe sizes can be mixed on an instrument to offer a wide optimized liquid handling range. The following syringe sizes are available:

- 5000 µl
- 1250 µl
- 250 µl

Pipetting Performance

The values below have been measured according to the following protocol.

- Measurements obtained on standard Fluent instruments operated within the specified liquid handling environmental conditions and maintained according to system care instructions.
- Minimum of 96 measurements
- The specified CV and average accuracy are the maximum values obtained overall and per channel.

Calibration may be required for volumes of 5 µl or below.

Note: *Only Tecan disposable tips guarantee the achievement of the performance specified for the Tecan pipetting instruments.*

Tab. 2-26 *Liquid FCA pipetting precision for aqueous single free dispense with 1250 µl syringe.*

Tip type	Volume	CV	Accuracy
Disposable tips - aqueous - single free dispense			
DiTi 10	0.5 µl 10 µl	≤ 8.0% ≤ 1.0%	± 10.0% ± 1.0%
DiTi 50	1 µl 50 µl	≤ 6.0% ≤ 0.5%	± 8.0% ± 1.5%
DiTi 200	10 µl 200 µl	≤ 1.8% ≤ 0.2%	± 2.5% ± 0.75%
DiTi 350	10 µl 100 µl	≤ 2.0% ≤ 0.4%	± 2.0% ± 1.5%
DiTi 1000	10 µl 1000 µl	≤ 2.0% ≤ 0.2%	± 3.0% ± 0.5%
DiTi 1000 wide bore	20 µl 900 µl	≤ 2.5% ≤ 0.5%	± 5.0% ± 2.0%
Fixed tips - aqueous - single free dispense			
Std Fixed tip	5 µl 1000 µl	≤ 3.0% ≤ 0.3%	± 3.0% ± 0.75%
Piercing tip	200 µl	≤ 1.5%	± 3.0%

Tab. 2-27 *Liquid FCA pipetting precision for aqueous single free dispense with 250 µl syringe unless otherwise specified.*

Tip type	Volume	CV	Accuracy
Fixed tips - aqueous - single free dispense			
Te-PS tip	0.2 µl[a)] 0.5 µl 10 µl	≤ 10.0% ≤ 6.0% ≤ 0.8%	± 15.0% ± 10.0% ± 1.0%

a) contact wet dispense, orange G

Tab. 2-28 *Liquid FCA pipetting precision for aqueous multi free dispense with 1250* µl *syringe*

Tip type	Volume	Number of Aliquots	CV	Accuracy
Disposable tips - aqueous - multi free dispense				
DiTi 50	5 µl	6	≤ 4.0%	± 3.0%
DiTi 200	10 µl	12	≤ 3.5%	± 2.0%
DiTi 1000	50 µl	12	≤ 2.0%	± 2.0%
DiTi 1000 wide bore	100 µl 200 µl	6 4	≤ 6.5% ≤ 3.5%	± 5.0% ± 5.0%
Fixed tips - aqueous - multi free dispense				
Low volume tip	5 µl	12	≤ 2.5%	± 5.0%
Std Fixed tip	50 µl	12	≤ 2.0%	± 2.0%

Tab. 2-29 *Liquid FCA pipetting precision for serum single free dispense with 1250 µl syringe*

Tip type	Volume	CV	Accuracy
Disposable tips - serum - single free dispense			
DiTi 1000 wide bore	20 µl	≤ 5.5%	± 8.0%
DiTi 1000 wide bore	900 µl	≤ 0.5%	± 1.0%

Tab. 2-30 *Liquid FCA pipetting precision for serum multi free dispense with 1250* µl *syringe*

Tip type	Volume	Number of Aliquots	CV	Accuracy
Disposable tips - serum - multi free dispense				
DiTi 1000 wide bore	50 µl 200 µl	12 4	≤ 5.5% ≤ 3.5%	± 5.0% ± 5.0%

Tab. 2-31 *Liquid FCA pipetting precision for ethanol single free dispense with 1250* µl *syringe*

Tip type	Volume	CV	Accuracy
Disposable tips - ethanol - single free dispense			
DiTi 50	30 µl	≤ 0.75%	± 2.0%

Tab. 2-32 *Liquid FCA pipetting precision for ethanol multi free dispense with 1250* µl *syringe*

Tip type	Volume	Number of Aliquots	CV	Accuracy
Disposable tips - Ethanol - multi free dispense				
DiTi 200	10 µl	6	≤ 6.0%	± 4.0%

Tab. 2-33 *Liquid FCA pipetting precision for DMSO* single free dispense with 1250* µl *syringe*

Tip type	Volume	CV	Accuracy
Disposable tips - DMSO - single free dispense			
DiTi 10	1 µl 10 µl	≤ 8.0% ≤ 2.0%	± 10.0% ± 2.0%
DiTi 50	1 µl 50 µl	≤ 8.0% ≤ 0.75%	± 10.0% ± 2.0%
DiTi 200	10 µl 200 µl	≤ 2.0% ≤ 0.4%	± 2.0% ± 1.0%
DiTi 1000	10 µl 100 µl	≤ 2.5% ≤ 0.5%	± 3.0% ± 1.5%
Fixed tips - DMSO - single free dispense			
Standrard fixed tip	5 µl 1000 µl	≤ 3.0% ≤ 0.25%	± 6.0% ± 0.75%

Tab. 2-34 *Liquid FCA pipetting precision for DMSO* single free dispense with 250* µl *syringe*

Tip type	Volume	CV	Accuracy
Fixed tips - DMSO - single free dispense			
Low volume tip	1 µl	≤ 4.0%	± 5.0%

Tab. 2-35 *Liquid FCA pipetting precision for DMSO* multi free dispense with 1250* µl *syringe*

Tip type	Volume	Number of Aliquots	CV	Accuracy
Disposable tips - DMSO - multi free dispense				
DiTi 50	5 µl	6	≤ 5.0%	± 5.0%
DiTi 200	10 µl	12	≤ 6.0%	± 4.0%
DiTi 1000	50 µl	12	≤ 2.5%	± 3.0%
Fixed tips - DMSO - multi free dispense				
Standard fixed tip	50 µl	12	≤ 1.0%	± 2.0%

Tab. 2-36 *Liquid FCA pipetting precision for DMSO* multi free dispense with 250* µl *syringe*

Tip type	Volume	Number of Aliquots	CV	Accuracy
Fixed tips - DMSO - multi free dispense				
Low volume tip	5 µl	12	≤ 3.5%	± 5.0%

***Note:** DMSO pipetting values performed with water as system liquid.*

Tab. 2-37 *Liquid FCA pipetting precision for whole blood single dispense in septum with 1250 µl syringe*

Tip type	Volume	Number of Aliquots	CV	Accuracy
Piercing tip - whole blood - single dispense in septum				
Piercing tip	200 µl		≤ 2.0%	± 3.0%

Tab. 2-38 *Liquid FCA pipetting precision for whole blood multi dispense in septum with 5000 µl syringe*

Tip type	Volume	Number of Aliquots	CV	Accuracy
Piercing tip - whole blood - single dispense in septum				
Piercing tip	1000 µl	4	≤ 1.5%	± 2.0%

Tab. 2-39 *Liquid FCA pipetting precision for QC Kit using 5000 µl syringe*

Tip type	Volume	Special condition	Dispense volume	CV
Standard fixed tip	5000 µl	none	25 µl	≤ 5.0%
		none	200 µl	≤ 2.0%
		Syringe pre-filled with 4500 µl system liquid	200 µl	≤ 2.0%
DiTi 1000 µl without filter		none	25 µl	≤ 8.0%
		none	200 µl	≤ 3.0%
		Syringe pre-filled with 4500 µl system liquid	200 µl	≤ 3.0%

2.4.2.4 Liquid FCA Parts and Their Resistance

Wetted Materials

The standard liquid system components that come into direct contact with either system or sample liquid are of the following materials:

Tab. 2-40 *Liquid system components: materials*

Component	Material
System liquid bottle 10 l, 20 l, 30 l	HDPE / PP
Waste bottle 10 l, 20 l, 30 l	HDPE / PP
Pipetting tubing	FEP
Tubing (including waste)	FEP
Splitter 1:8	PP
Wash station	PP
RapidWash pump	PP (body, connector fittings), FEP (tubing), FFPM (membrane)
Pressure relief valve	PP
Valve (diluter)	PCTFE (Kel-F)
Syringe	Borosilicate glass
Needle insert of disposable tip adapter	LCP
Disposable tip	PP
Fixed pipetting tip	Stainless steel 1.4305, PFA (coating)
Piercing tip	Stainless steel 316L: 1.4404, diamond-like carbon (DLC - Tribond 43) (coating)

The standard liquid system parts that come into indirect contact with pipetting liquids through vapor or aerosols:

Tab. 2-41 *Liquid system parts: materials*

Component	Material
DiTi cone	Gold-plated brass

2.4.3 Air Flexible Channel Arm

This pipetting arm has 8 channels powered by the air displacement technology. The Air FCA pipets liquids within 0.5 to 1000 µl volume range using various tip sizes.

2.4.3.1 Mechanical Specifications

Air FCA Positioning Accuracy

Tab. 2-42 *Air FCA positioning accuracy*

Axis	Accuracy on axis
X	± 0.1 mm (0.004 in.)
Y	± 0.1 mm (0.004 in.)
Z	± 0.2 mm (0.008 in.)
Y-spacing	± 0.2 mm (0.008 in.)

Air FCA Operating Ranges

Tab. 2-43 *Air FCA Y- and Z-ranges*

Axis	Moveable range
Y-range	≥ 500 mm
Z-range	≥ 212 mm

Air FCA Plate Access

The following microplate types can be accessed by all channels simultaneuosly with Tecan branded disposable FCA tips together with the listed carrier types below. This ensures that the pipetting into and out of these carriers can be performed.Air FCA Operating Ranges

Tab. 2-44 *Microplate access parameters*

Microplate Type	Tips	Carrier type
MP96 [a)]	DiTi10, DiTi50, DiTi200, DiTi350, DiTi1000,	MP carrier
MP384 [b)]	DiTi10, DiTi50, DiTi200 (for free dispense only)	MP carrier

a) 96 well microplate e.g. from Greiner or equivalent
b) 384 well microplate e.g. from Greiner or equivalent

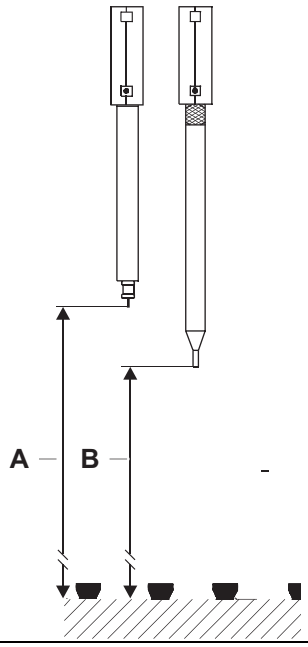
Tab. 2-45 *Air FCA X-range*

		Single Arm Air FCA	Dual Arm Air FCA +RGA	Dual Arm Air FCA +MCA	Triple Arm Air FCA +RGA+MCA
Air FCA X-range	Fluent 480	≥ 802 mm	≥ 672 mm	≥ 579 mm	≥ 449 mm
	Fluent 780	≥ 1302 mm	≥ 1172 mm	≥ 1079 mm	≥ 949 mm
	Fluent 1080	≥ 1802 mm	≥ 1672 mm	≥ 1579 mm	≥ 1449 mm

Air FCA Tip Clearance

The tip clearance is the maximum space between the deck surface and the mounted tip.

Tab. 2-46 *Tip clearance*

Distance tip to deck[a)]	Tip type	Tip clearance
	Reference tip (B)	197 mm
	DiTi adapter (A)	267 mm
	DiTi mounted	According to DiTi length
	DiTi 10	244 mm
	DiTi 50	217.7 mm
	DiTi 200	217.2 mm
	DiTi 350	217.2 mm
	DiTi 1000	179.4 mm

a) Illustration not to scale, tip clearance shortened

Note: *DiTis tend to move down slightly after being picked up.*

- *– Therefore, they may "get longer" than their theoretical value, typically for 0.25 mm (0.01 in.).*
- *– Also manufacturing tolerances of the DiTis account for deviations in length.*

Air FCA Tip Configuration

The Air FCA is only available in a disposable tip configuration.

Air FCA Tip Spreading

The Air FCA allows equidistant spreading of the tips in Y-direction from 9 mm to 38 mm.

2.4.3.2 Pipetting Tips

FCA Tip Types

The following table lists the available tip types for the Air FCA:

Tab. 2-47 *Tip types*

Choice of filter or no filter	Usage	Capacity	
		Tip without filter	Tip with filter
Disposable tips	Single use		
DiTi 1000		1100 µl	1050 µl
DiTi 350 nested		385 µl	-
DiTi 200		220 µl	210 µl
DiTi 50		55 µl	55 µl
DiTi 10		23 µl	12 µl
DiTi 10 nested		23 µl	12 µl

2.4.3.3 Pipetting Performance

The values below have been measured according to the following protocol.

- Measurements obtained on standard Fluent instruments operated within the specified liquid handling environmental conditions and maintained according to system care instructions.
- Minimum of 96 measurements
- The specified CV and average accuracy are the maximum values obtained overall and per channel.

Calibration may be required for volumes of 5 µl or below.

Note: *Only Tecan disposable tips guarantee the achievement of the performance specified for the Tecan pipetting instruments.*

Tab. 2-48 *Air FCA pipetting precision for aqueous single free dispense*

Tip type	Volume	CV	Accuracy
Disposable tips - aqueous - single free dispense			
DiTi 10	0.5 µl 10 µl	≤ 6.0% ≤ 1.0%	± 9.5% ± 2.0%
DiTi 50	1 µl 50 µl	≤ 4.0% ≤ 0.3%	± 8.0% ± 0.5%
DiTi 200	10 µl 200 µl	≤ 2.0% ≤ 0.2%	± 2.0% ± 0.5%
DiTi 350	10 µl 200 µl	≤ 2.0% ≤ 0.2%	± 2.0% ± 0.5%
DiTi 1000	10 µl	≤ 2.0%	± 3.0%
DiTi 1000 wide bore	20 µl 900 µl	≤ 2.0% ≤ 0.5%	± 5.0% ± 2.0%

Tab. 2-49 *Air FCA pipetting precision for aqueous multi free dispense*

Tip type	Volume	Aliquots	CV	Accuracy
Disposable tips - aqueous - multi free dispense				
DiTi 50	5 µl	6	≤ 6.0%	± 10.0%
DiTi 200	10 µl	12	≤ 4.0%	± 5.0%
DiTi 1000	50 µl	12	≤ 2.5%	± 3.0%
DiTi 1000 wide bore	100 µl 200 µl	6 4	≤ 6.0% ≤ 3.0%	± 5.0% ± 5.0%

Tab. 2-50 *Air FCA pipetting precision for serum single free dispense*

Tip type	Volume	CV	Accuracy
Disposable tips - serum - single free dispense			
DiTi 50	5 µl 10 µl	≤ 3.5% ≤ 1.0%	± 5.0% ± 2.0%
DiTi 200	100 µl	≤ 0.3%	± 0.5%
DiTi 1000 wide bore	20 µl 900 µl	≤ 5.0% ≤ 0.5%	± 5.0% ± 1.0%

Tab. 2-51 *Air FCA pipetting precision for serum multi free dispense*

Tip type	Volume	Aliquots	CV	Accuracy
Disposable tips - serum - multi free dispense				
DiTi 50	5 µl	6	≤ 8.0%	± 10.0%
DiTi 200	25 µl	6	≤ 3.0%	± 3.0%
DiTi 1000	100 µl	6	≤ 2.0%	± 1.0%
DiTi 1000 wide bore	100 µl	6	≤ 3.0%	± 5.0%

Tab. 2-52 *Air FCA pipetting precision for ethanol single free dispense*

Tip type	Volume	CV	Accuracy
Disposable tips - ethanol- single free dispense			
DiTi 50	40 µl	≤ 1.0%	± 1.0%

Tab. 2-53 *Air FCA pipetting precision for ethanol multi free dispense*

Tip type	Volume	Aliquots	CV	Accuracy
Disposable tips - ethanol - multi free dispense				
DiTi 200	10 µl	6	≤ 3.0%	± 4.0%

Tab. 2-54 *Air FCA pipetting precision for master mix[a)] single free dispense*

Tip type	Volume	Aliquots	CV	Accuracy
Disposable tips - Master mix - single free dispense				
DiTi 50	10 µl	6	≤ 3.0%	± 5.0%

a) formulation containing 50% glycerol

Tab. 2-55 Air FCA pipetting precision for master mix[a] multi free dispense

Tip type	Volume	Aliquots	CV	Accuracy
Disposable tips - Master mix - multi free dispense				
DiTi 50	5 µl	6	≤ 5.0%	± 5.0%
DiTi 50	10 µl	4	≤ 3.0%	± 5.0%

a) formulation containing 50% glycerol

2.4.3.4 Air FCA Parts and Their Resistance

In normal operation, the disposable tips are the only wetted parts. Other parts do not come into direct contact with the pipetted liquids except in case of a malfunction (too much liquid aspirated). However, other parts may be exposed to aerosols or vapor from the liquid.
The critical parts of the Air FCA are made of the following materials:

Tab. 2-56 Parts that come into contact with sample liquid

Component	Material
Disposable tip	PP

Tab. 2-57 Parts that may be moistened with aerosols

Component	Material
Tip cone	Gold-plated brass
Tip cone inner tip	LCP
Inline filter	PE

Tab. 2-58 Parts that may be reached by vapor:

Component	Material
Plunger and pipetting channel	Stainless steel
Plunger seal	PE

Refer to 2.6 “Chemical Resistance”, 2 2-73

2.4.4 FCA and Air FCA Liquid Level Detection

Liquid Level Detection (cLLD)

Each tip can individually detect the surface of a conductive liquid by capacitance change measurement. Each channel detects the liquid level individually.

- When using cLLD in conjunction with piercing applications for FCA and Air FCA, use nonconductive foils only.
- cLLD in conjunction with piercing applications for FCA and Air FCA must be validated.

The lower limit of liquid level detection with cLLD depends on the labware, the carrier and tip type. The following data is given as example of the cLLD capabilities:

Tab. 2-59 *cLLD capabilities for DiTi 50, DiTi 200, DiTi 1000 and standard fixed tip*

Labware	Tip type	Tap water	Ethanol	DMSO with 10% DI water
Tube Ø 13 mm round bottom in strip rack	Standard volume tip	100 µl	150 µl	100 µl
Plate: 96 well U-shape on a plate carrier	Standard volume tip	10 µl	40 µl	10 µl
Tube: Eppendorf 1.5 ml	Standard volume tip	10 µl	40 µl	10 µl

Tab. 2-60 *cLLD capabilities for DiTi 10, Te-PS tip and low volume tip*

Labware	Tip type	Tap water	Ethanol	DMSO with 10% DI water
Plate: PCR96 well plate with PCR adapter on plate carrier	Low volume tip	2 µl	10 µl	3 µl

2.4.5 Multiple Channel Arm (MCA384)

What is MCA384?

The MCA384 is a robotic multichannel pipetting arm designed for high-speed, high-precision liquid pipetting between standard microplates (MP) with 96, 384 or 1536 wells. The MCA384 has the ability to exchange head adapters to use tips in 384-well format or 96-well format as well as row, column and quadrant for some adapter types.

Configuration

The table shows the possible variants of the MCA384 configuration:

Tab. 2-61 *Basic components and consumables for MCA384*

Components/Disposables	Configuration/Variants
Pipetting head	384 channels Pipetting volume: 0.5–125 µl (in 384-well format) 1–500 µl (in 96-well format)
Fixed tips	Mounted as fixed tip adapters Short or long washable tips, pipetting range 0.5–125 µl for 96-, 384- and 1536-well microplates and 96-deep-well microplates Minimum diameter of the wells: 1.7 mm (0.067 in.)
Disposable tips (DiTis)	Mounted with DiTi adapters **Variants:** • 15 µl, 50 µl, and 125 µl are available in 384 format (16x24 tips). These tips can be used in 384- or 96-well format and as rows or columns depending on the adapter in use. • 50 µl, 100 µl, 200 µl and 500 µl tips are available in 96 format (8x12 tips). These tips can be used in 96-well format or as rows or columns depending on the adapter in use.
Deck components	Deck segment MP nest segments (landscape oriented, 61 mm high) MP nest segments (landscape oriented, 7 mm high, usable for nested DiTis) Microplate runners (landscape oriented) MCA384 active DiTi nest segment, active lock MCA base segment DiTi nest segments (only for 96 tips) DiTi nest runner (only for 96 tips)

2.4.5.1 Adapter Types

Tab. 2-62 Fixed tip adapter types for 384 channel head

Adapter type	Min. volume	Max. volume	Tip length [1/10 mm]	Tip orifice Inner diameter
Adapter Fixed 125 µl MCA384	3 µl	125 µl	280	0.58 mm (0.023 in.)
Adapter Fixed 15 µl MCA384	1 µl	15 µl	280	0.43 mm (0.017 in.)
Adapter 96 Fixed 125 µl MCA384	5 µl	125 µl	440	0.58 mm (0.023 in.)
Adapter 96 Fixed 15 µl MCA384	1 µl	15 µl	280	0.43 mm (0.017 in.)

Tab. 2-63 DiTi Adapter types for 384 channel head

MCA384 head adapter type	MCA384 tip type	MCA96 tip type
Adapter Combo 384 DITI MCA 384	x	-
Adapter 384 DiTi MCA384	x	-
Adapter Combo 96 DiTi MCA384	-	x
ADAPTER 96 MCA96 DITI MCA384	-	x
ADAPTER EXT VOL 96 MCA96 DITI MCA384	-	x

Note: *For part numbers of adapters see: Tab. 6-3 “Multiple channel Arm (MCA384), adapters”, 2 6-3*

Note: *For description of function for each adapter see: 3.1.2.2 “Adapters”, 2 3-8*

DiTi Type MCA384

Tab. 2-64 MCA384 disposable tip types

DiTi type	Min. volume	Max. volume	Tip length	Tip orifice
15 µl DiTi w/o filter	0.5 µl	19 µl	$36.05^{\pm 0.15}$ mm	Ø $0.25^{\pm 0.03}$ mm
50 µl DiTi w/o filter	1.0 µl	53 µl	$48.95^{\pm 0.2}$ mm	Ø $0.32^{\pm 0.03}$ mm
125 µl DiTi w/o filter	2.0 µl	129 µl	$54.79^{\pm 0.2}$ mm	Ø $0.47^{\pm 0.03}$ mm

Note: *For pipetting performance data see: 2.4.5.4 “MCA384 Performance Data”, 2 2-50*

2.4.5.2 Tip dimensions

Tip Length MCA384 Tips

The figure shows the MCA384 pipetting head equipped with the different MCA384 tip types and their lengths (mm / in.):

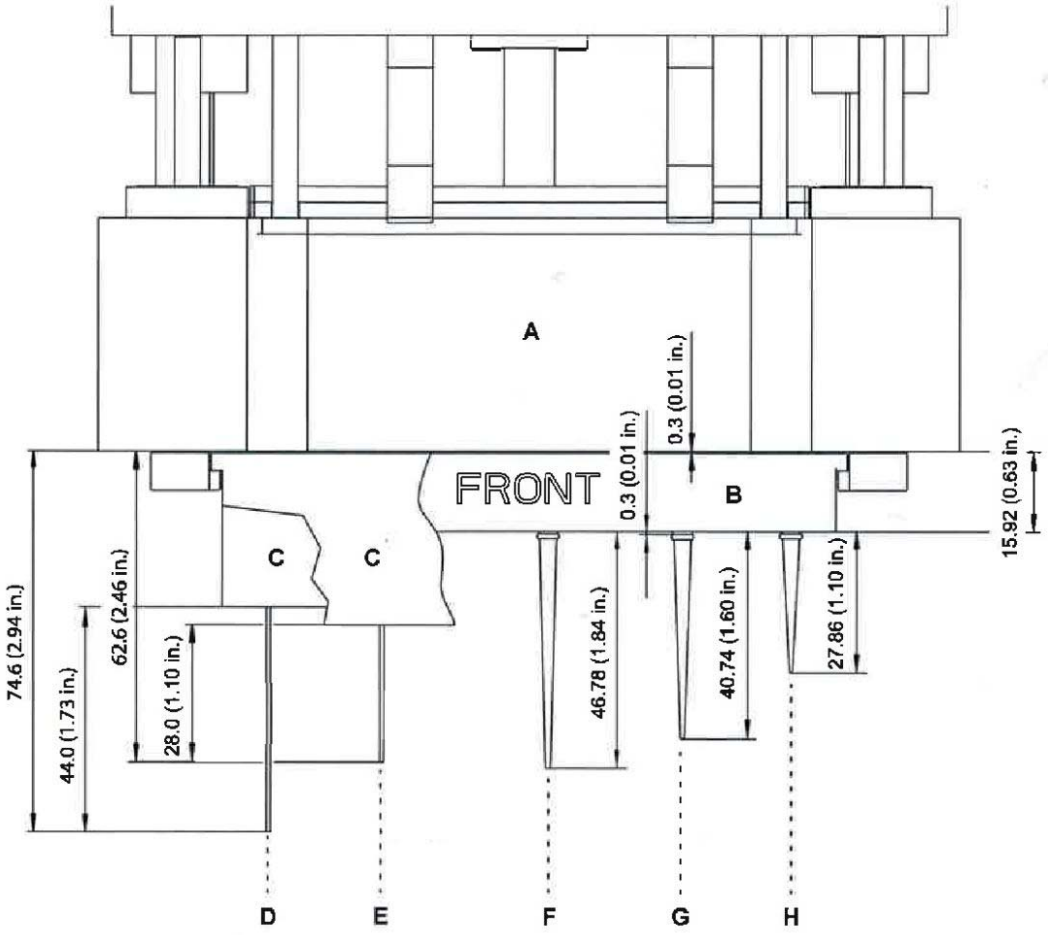


Fig. 2-10 *MCA384 pipetting head / tip length*

A *384 channel head*
B *DiTi adapter*
C *Fixed tip adapter*
D *Fixed tip long: 96 tips 125 µl*
E *Fixed tip short: 96 tips 15 µl, 384 tips 15 & 125 µl*
F *125 µl DiTi*
G *50 µl DiTi*
H *15 µl DiTi*

Note: *DiTis tend to move down slightly after being picked up.*

- Therefore, they may “get longer” than their theoretical value, typically for 0.25 mm (0.01 in.).
- Also manufacturing tolerances of the DiTis account for deviations in length.

Tip Clearance MCA384 Tips

The figure shows the tip clearance for the different MCA384 tip types:

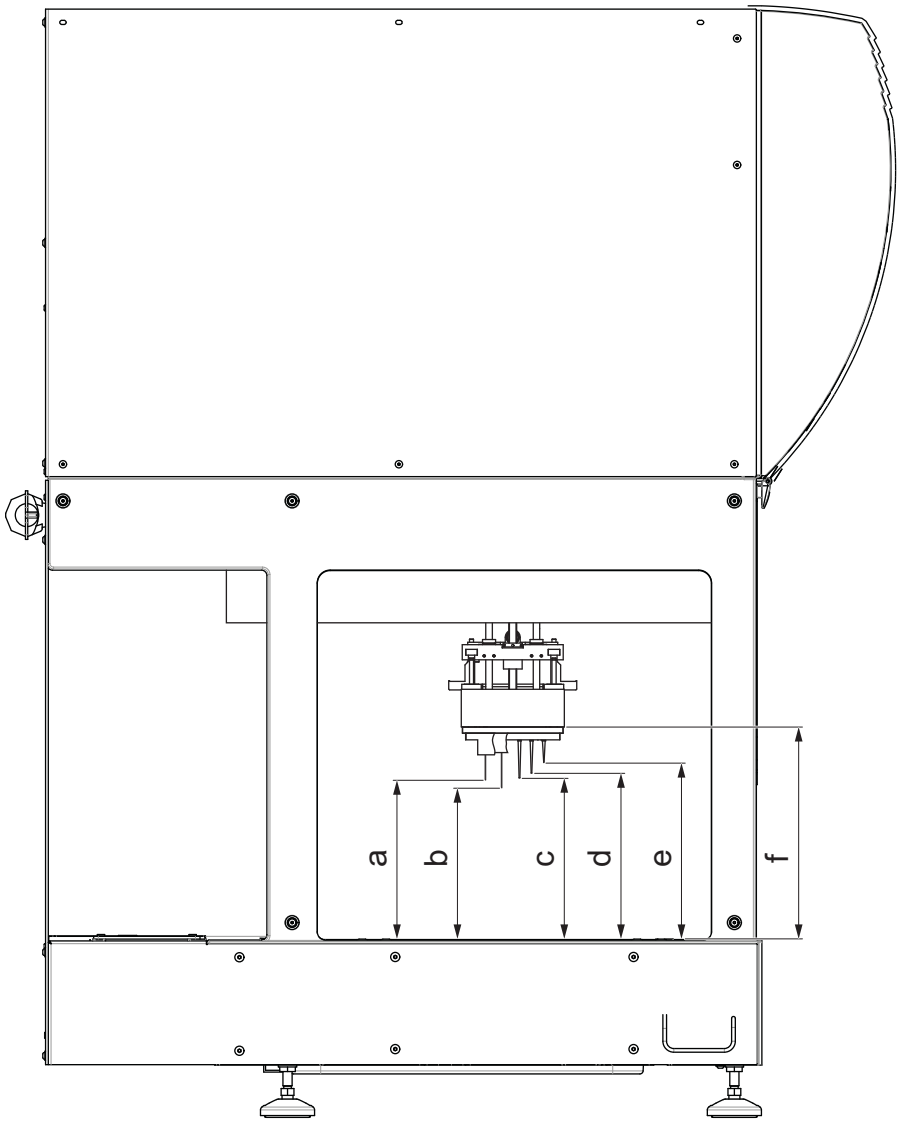


Fig. 2-11 *MCA384 tip clearance (distance to deck surface)*

Tab. 2-65 *MCA384 tip clearance values*

Clearance to deck surface		Item
a	174.2 mm (6.86 in.)	Fixed tip short
b	162.2 mm (6.39 in.)	Fixed tip long
c	174.1 mm (6.85 in.)	Disposable tip 125 µl
d	180.1 mm (7.09 in.)	Disposable tip 50 µl
e	193 mm (7.60 in.)	Disposable tip 15 µl
f	236.8 mm (9.32 in.)	Pipetting head body zero line

Tip Length MCA96 DiTis

The figure shows the MCA384 pipetting head equipped with the different MCA96 DiTi types and their lengths (mm / in.):

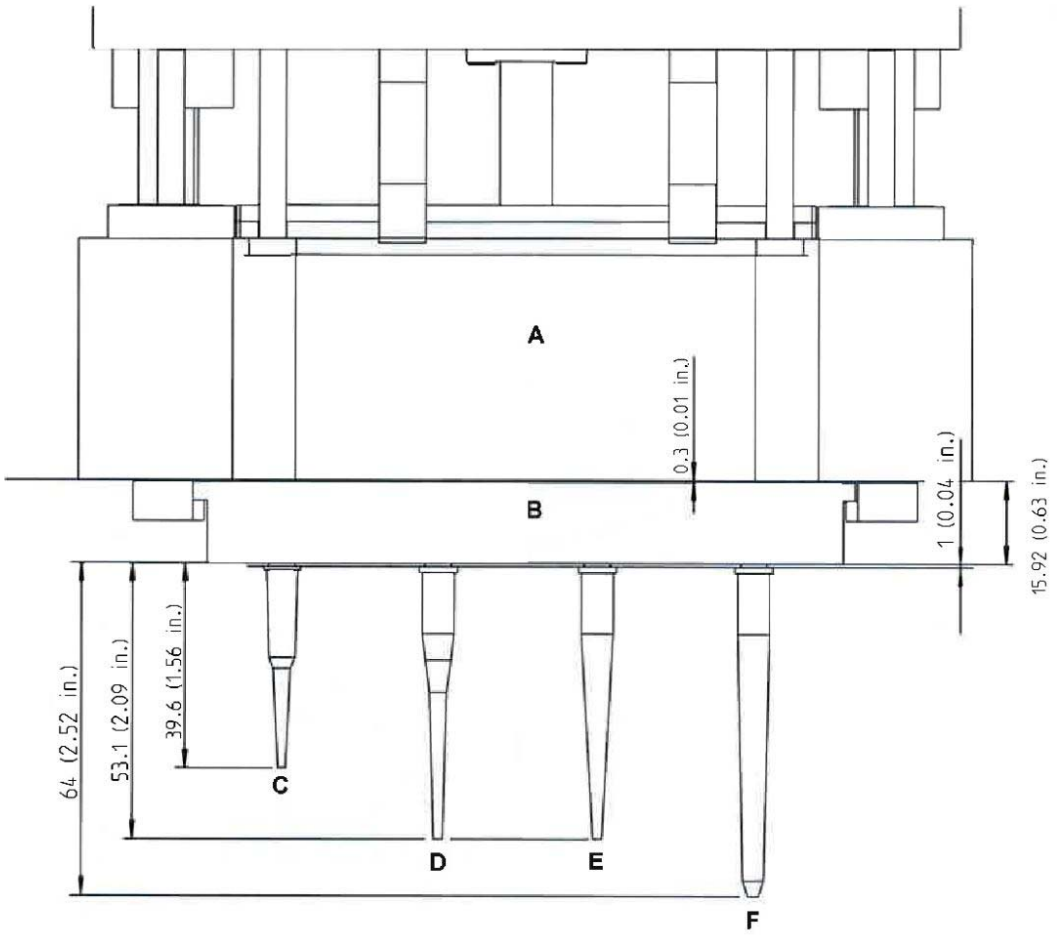


Fig. 2-12 *MCA384 pipetting head / MCA96 DiTi length*

A	*384 channel head*	***D***	*100 µl DiTi*
B	*DiTi adapter (1to1 or 4to1)*	***E***	*200 µl DiTi*
C	*50 µl DiTi*	***F***	*500 µl DiTi*

Note: *DiTis tend to move down slightly after being picked up.*

- Therefore, they may “get longer” than their theoretical value, typically for 0.5 mm (0.02 in.).
- Also manufacturing tolerances of the DiTis account for deviations in length.

Multi Channel Head 384

The following microplate types can be accessed by an MCA equipped with an MCH384 and Tecan branded MCA tips as specified in the “Module Specification MCA384 Liquid Handling” with the below listed carrier types.

Tab. 2-66 *Microplates suitable for an MCA equipped with an MCH384*

Microplate type [a]	Tips	Carrier type
Microplate 96	DiTi15, DiTi 50, DiTi 125, DiTi 500 Adaptor Fixed 96 125 µl Adaptor Fixed 96 15 µl	MP Carrier
Microplate 384	DiTi15, DiTi 50, DiTi 125 Adaptor Fixed 384 125 µl Adaptor Fixed 384 15 µl Adaptor Fixed 96 125 µl Adaptor Fixed 96 15 µl	MP Carrier
Microplate 1536 [b]	DiTi15 Adaptor Fixed 384 15 µl	MP Carrier

a) Meets ANSI/SBS 1-2004, ANSI/SBS 2-2004, ANSI/SBS 3-2004, ANSI/SBS 4-2004
b) 1536-well microplates must have a minimum diameter of round wells or side of square wells of 1.7 mm (0.067 in.)

Repeatability and Accuracy

Tab. 2-67 *MCA positioning accuracy*

Axis	Repeatability	Accuracy
X	± 0.1 mm (0.004 in.)	± 0.5 mm (0.019 in.)
Y	± 0.1 mm (0.004 in.)	± 0.5 mm (0.019 in.)
Z	± 0.1 mm (0.004 in.)	± 0.3 mm (0.011 in.)

Note: *Repeatability and accuracy are specified for the working positions of the MCA, whereby working positions are defined as the positions the MCA can access microplates on the worktable in combination with a MCH384.*

Tip Clearance MCA 384/ 96-DiTis

The figure shows the tip clearance for the different 96-DiTi types used on the MCA384:

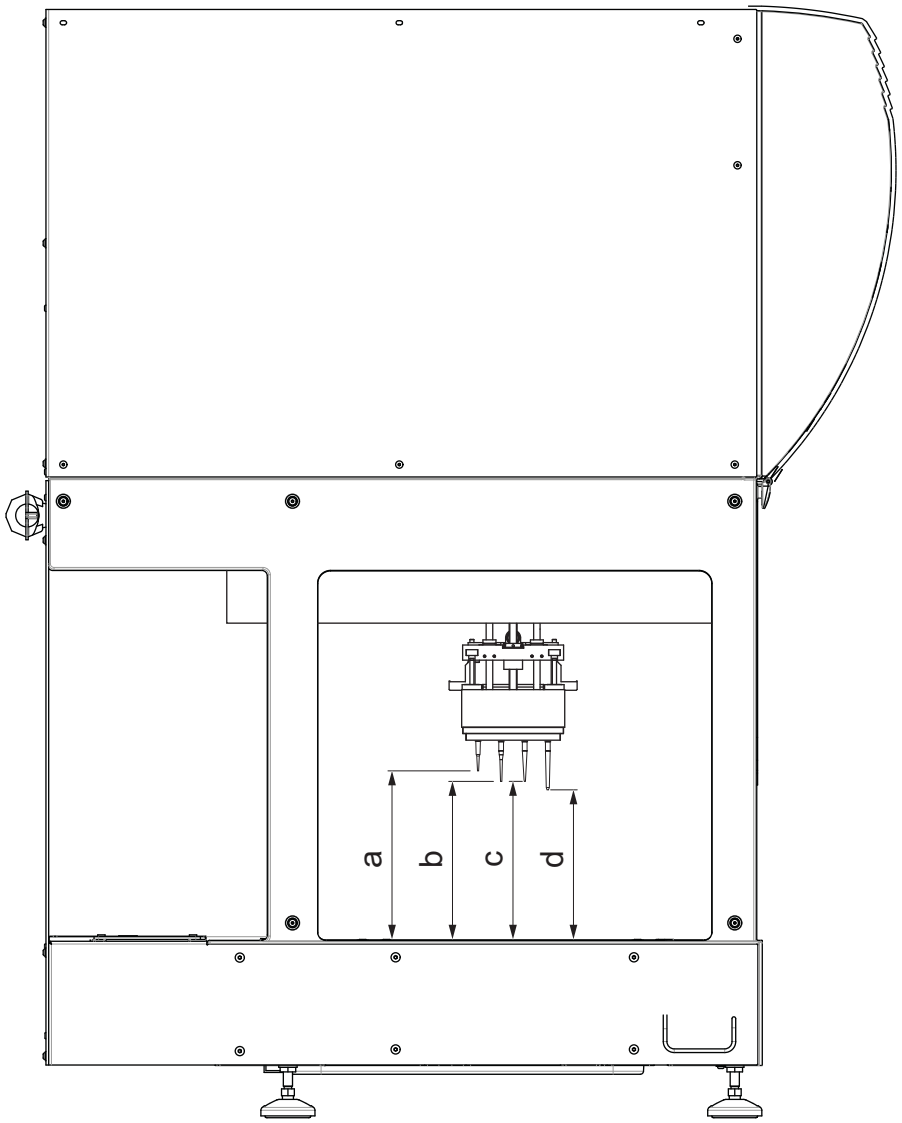


Fig. 2-13 *MCA384 tip clearance with 96-DiTis (distance to deck surface)*

Tab. 2-68 *MCA384 (96-DiTis) tip clearance values*

Clearance to deck surface		Item
a	181.3 mm (7.14 in.)	Disposable tip 50 µl
b	167.8 mm (6.61 in. in.)	Disposable tip 100 µl
c	167.8 mm (6.61 in.)	Disposable tip 200 µl
d	156.9 mm (6.18 in.)	Disposable tip 500 µl

2.4.5.3 Options and Accessories

Several options and accessories are available for the MCA384:

Tab. 2-69 *Options and accessories*

Option / Accessory	Configuration / Variants
MCA384 active DiTi nest segment	Holds 2 DiTi boxes (required for picking up MCA384 DiTis) 6 grid positions wide. May require additional one grid to left and one to right for unhindered MCA Head access (total 8 grids)
System segment	4 positions, freely configurable for: • Head adapters • Washable tip adapters • Wash station • Adapter nest – can be used for picking <32 MCA 384 DiTi, e.g. row, column or quadrant pickup • DiTi box (e.g., for row/column of tips) 6 grid positions wide (+ 1 grid for tubing if wash station is installed)
MCA384 adapters	• Adapter DiTi MCA384 • Adapter DiTi Combo MCA384 (for fetching 384 DiTis or rows of 24 DiTis or columns of 16 DiTis) • Adapter 96 DiTi MCA384 (for fetching 96 DiTis or rows of 12 DiTis or columns of 8 DiTis) • Adapter DiTi 1to1 MCA384 for MCA96 disposable tips only (volume range: 0.5 to 125 µl) • Adapter DiTi 4to1 MCA384 (EVA) for MCA96 disposable tips only (volume range: 1 to 500 µl) • Adapter Fixed 125 µl MCA384 • Adapter Fixed 15 µl MCA384 • Adapter 96 Fixed 125 µl MCA384 • Adapter 96 Fixed 15 µl MCA384 • QC adapter

Tab. 2-69 Options and accessories

Option / Accessory	Configuration / Variants
Reagent trough	Various volumes (e.g., 300ml, 60 ml, etc.) as available from appropriate suppliers
Racks (meeting the standards of the Society of Bio-molecular Screening)	Microplates (MP): 96, 384, 1536 wells Deep Well Plates (DWP): 96, 384 wells
Wash system	Consisting of: – Wash center – Wash station, tubing, fittings and filter
MCA Waste Guide Cover	Cover with metal guides to keep MCA 384 tips straight during ejection to open waste. Required for MCA 384 tip ejection direct to waste chute. Supported for FluentControl V2.8; compatible with MCA tips in the same waste from FluentControl V3.1. Not compatible with MCA 96 tips in the same waste.

2.4.5.4 MCA384 Performance Data

Capacity and Throughput

The table below specifies the performance in terms of theoretical throughput:

Tab. 2-70 Throughput

Theoretical throughput (depending on the application)	Approx. 30[a)] 384-well microplates per hour (pipetting a 1 to 1 copy)

a) Assumption per 384 plate: Pick up MCA384 fixed tip Adapter, cycles: 1 wash, 1 aspirate, 1 dispense, 1 wash, drop MCA384 fixed tip Adapter.

Speed / Timings

The table below shows the timings of some frequently used method steps:

Tab. 2-71 Timings

Liquid transfer	15–20 s
Disposable tip mounting	8–12 s
Disposable tip dropping	6–10 s
Adapter mounting / exchanging	8–10 s

Precision (LH)

The values below have been measured according to the following protocol.

- Measurements obtained on standard Fluent instruments operated within the specified liquid handling environmental conditions and maintained according to system care instructions.
- Measurements obtained on a total of three instruments with two plates each (either 96 or 384 wells according to the tip array)
- The specified CV and average accuracy are the maximum values obtained overall and per channel.

Calibration may be required for volumes of 5 µl or below.

Note: *Only Tecan disposable tips guarantee the achievement of the performance specified for the Tecan pipetting instruments.*

Tab. 2-72 *MCA pipetting precision for aqueous single dispense*

Tip type	Volume Range	CV	Accuracy
Disposable tips - aqueous - contact wet - single dispense			
DiTi 15 (MCA384)	0.5 µl 1 µl 10 µl	≤ 4.0% ≤ 3.0% ≤ 2.0%	± 10.0% ± 5.0% ± 5.0%
DiTi 50 (MCA384)	1 µl 2 µl 10 µl	≤ 4.0% ≤ 1.5% ≤ 1.0%	± 5.0% ± 5.0% ± 5.0%
DiTi 125 (MCA384)	2 µl 10 µl 100 µl	≤ 1.75% ≤ 1.0% ≤ 1.0%	± 5.0% ± 5.0% ± 5.0%
Tip block 15 µl	1 µl 5 µl 10 µl	≤ 8.0% ≤ 3.0% ≤ 2.0%	± 10.0% ± 5.0% ± 5.0%
Tip block 125 µl	3 µl 10 µl 100 µl	≤ 6.0% ≤ 4.0% ≤ 2.0%	± 5.0% ± 5.0% ± 3.0%
DiTi 50 (96 format non-EVA)	1 µl 10 µl	≤ 3.0% ≤ 1.0%	± 10.0% ± 5.0%
DiTi 200 (96 format non-EVA)	3 µl 10 µl	≤ 2.5% ≤ 1.0%	± 10.0% ± 5.0%
Disposable tips - aqueous - free dispense			
DiTi 15 (MCA384)	2 µl	≤ 4.0%	± 5.0%
DiTi 50 (MCA384)	10 µl	≤ 1.0%	± 2.0%
DiTi 500	25 µl 200 µl	≤ 5.0% ≤ 2.0%	NA NA

Tab. 2-73 *Fluent pipetting precision, typical values for multi dispense*

Tip type	Volume	Aliquots	CV	Accuracy
Disposable tips -aqueous - multi contact dry dispense				
DiTi 50	5 µl	4	≤ 4.0%	± 5.0%

MCA384 Options

Wash System

The table specifies the weight and dimensions of the wash system components:

Tab. 2-74

	Weight (kg / lb.)	Dimensions [mm / in.] (Width x Depth x Height)
Wash Center	approx. 12 kg (26.5 lb.)	285 x 480 x 610 mm (11.2 x 18.9 x 24 in.)
Wash Station MCA384	approx. 457 g (1.01 lb.)	140 x 120 x 71 mm (5.5 x 4.7 x 2.8 in.)

2.4.5.5 MCA384 Materials

Parts and Their Resistance

In normal operation, the tips are the only wetted parts. Other parts do not come into direct contact with the pipetted liquids except in case of a malfunction (too much liquid aspirated). However, other parts may be exposed to aerosols or vapor from the liquid.

Tab. 2-75 *Exposed parts, used materials*

Part	Material	Exposure
Fixed tip	Stainless steel	Sample liquid
Disposable tip	PP	Sample liquid
Gasket	Silicone	No direct exposure due to air gap Aerosol or vapor exposure possible
Adapter plates 384 combo and 96 of 384	Nickel PTFE coated stainless steel	No direct exposure to liquid. Aerosol or vapor exposure possible
Other adapter plates	Stainless steel	No direct exposure to liquid. Aerosol or vapor exposure possible
MCA head plunger block	Aluminium	No direct exposure to liquid. Aerosol or vapor exposure possible
MCA plunger	Stainless steel	No direct exposure to liquid. Aerosol or vapor exposure possible
DiTi cone Seals EVA and non-EVO adapters	EPDM	No direct exposure to liquid due to air gap. Aerosol or vapor exposure possible

Also refer to section 2.6 “Chemical Resistance”, 2 2-73.

Microplates

Microplates

Microplates with 96, 384 or 1536[1)] wells can be used with the MCA. They must meet the standards of the Society of Bio-molecular Screening (SBS).

1) with 15 µl DiTis

2.4.6 Robotic Gripper Arm

The Fluent instrument can be equipped with one Robotic Gripper Arm. This robotic arm can transfer a variety of labware from and to the deck, storage positions, and devices, such as a shaker or a plate reader.

Gripper Heads

An RGA can be fitted with either a regular gripper head for fixed gripper fingers or with a Finger Exchange System head for exchangeable fingers. The RGA's technical data and work ranges are identical for both types of gripper heads.

When not in use exchangeable fingers are stored on a docking station—namely, the finger exchange station—where they can be picked up and set down automatically by the Finger Exchange System head.

Gripper Fingers

Different gripper fingers are used for different applications—namely:

- Eccentric, eccentric long fingers or centric fingers for plates, deep-well plates and lids
- Tube fingers for tubes or vials

Below-Deck Access

An RGA with Standard-Z can reach the lower deck level even with eccentric fingers.

An RGA with Long-Z is required for accessing a position below the lower deck level.

Tab. 2-76 *RGA technical data*

Force in Z-direction	Up: Max. 45 N Down: Max. 100 N
Z-range	RGA: Min. 335 mm (13.19 in.) RGA Long-Z: Min. 645 mm (25.39 in.)
Z-access below deck	RGA standard Centric finger : 137.5 mm (5.41 in.) RGA standard Eccentric finger: 80.0 mm (3.15 in.) RGA Long-Z Centric finger: 385.1 mm (15.15 in.) RGA Long-Z Eccentric finger: 438.1 mm (17.25 in.)
Y-range	478 mm (18.82 in.) with eccentric fingers, extended by 152.5 mm(6.00 in.) in Y or X
Gripper finger types	Eccentric Eccentric long Tube Finger exchange Centric Finger exchange Eccentric long Finger exchange Tube
Transportable mass (eccentric gripper fingers)	Max. 0.45 kg (1.00 lb.)

Tab. 2-76 RGA technical data

Gripper force	3–15 N (controlled by the software)
Gripper space range • eccentric fingers • tube fingers	 74–135 mm (2.91–5.35 in.) 8–60 mm (0.32–2.36 in.)
Rotation angle of gripper head	360° (not limited)
Positioning accuracy (all axes, at gripping point)	Repeatability ±0.4 mm (0.016 in.) Accuracy ±0.7 mm (0.028 in.)

ATTENTION

Improper transport of labware (microplates, etc.)
Use only labware that is rigid enough not to be deformed by the gripper force.

2.4.7 Barcode Scanning Options

2.4.7.1 Supported Barcode Symbology

The barcode scanning options recognize several barcode types. However, reading security varies between barcode types.
Therefore, the following considerations must be taken into account when selecting a barcode type:

Tab. 2-77 Recommendations for optimal reading security

Symbology	Recommendation
Code 128	Recommended. Widely used. Good reading security.
Code 39 Standard	Not recommended. Only use with defined length and check digit (modulo 43).
Codabar	Do not use. Reading security is insufficient—even with defined length and check digit (modulo 16)
Interleaved 2 of 5	Do not use. Reading security is insufficient—even with defined length and check digit (modulo 10)

Note: *For barcode types “Code 39” and “Interleaved 2 of 5”, barcodes with a narrow bar width (NBW) of less than 0.020 in. (0.508 mm), the wide-versus-narrow bar-width ratio must be at least 2.5.*

2.4.7.2 Plate Barcode Scanner

The optional barcode scanner reads horizontal barcodes on labware, such as microplates. A barcode scanner is mounted stationarily either on a microplate hotel or on the Robotic Gripper Arm.

Barcode Specifications

Barcode Label Specifications

The barcode labels must fulfill the following specifications:

Tab. 2-78 *Plate barcode specifications*

Density	≥ 3 mils
Quiet zone	10 times the narrow bar width or 2.5 mm, whichever is greater
Barcode height	≥ 5 mm
Barcode length	≤ 80 mm (including quiet zone)
Number of characters	≤ 148 for Code 128 ≤ 74 for other symbologies
Grade	Code 128 grades A, B, and C

Barcode Label Positioning

Barcode Label on Microplate

The barcode label can be affixed to the front or to the side of the plate.

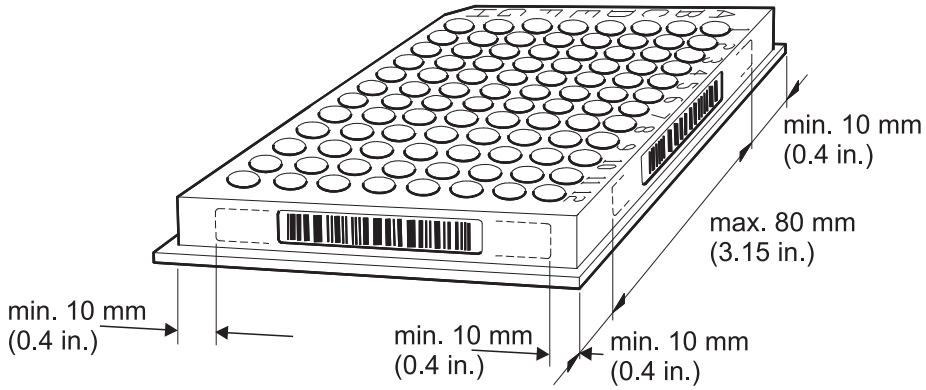


Fig. 2-14 *Barcode label on microplate*

2.4.8 Fluent ID

The optional Fluent ID scans barcodes on tubes while they are being loaded onto the instrument deck.

The following specifications apply to the barcode labels; for example, barcode height (A), barcode length (B), and quiet zone (C).

Tab. 2-79 *Tube barcode specifications*

Density	≥ 6.6 mils
Barcode height (A)	≥ 8 mm
Barcode length (B)	≤ 80 mm (including quiet zone)
Quiet zone (C)	10 times the narrow bar width or 2.5 mm, whichever is greater
Number of characters	≤ 64
Grade	A, B, and C for Code 128

Barcode Label on Tube

When putting a barcode label on a tube, the clearance (D) between the bottom of the tube and the barcode, which includes the quiet zone (C), has to be at least 20 mm (0.79 in.).

Furthermore, a distance (E) of at least 14 mm (0.55 in.) between the barcode, which includes the quiet zone, and the top of the tube is recommended for 100 mm (3.94 in.) tall tubes and increasing to 34 mm (1.34 in.) for 120 mm (4.72 in.) tall tubes i.e. code length is restricted to points between D and E.

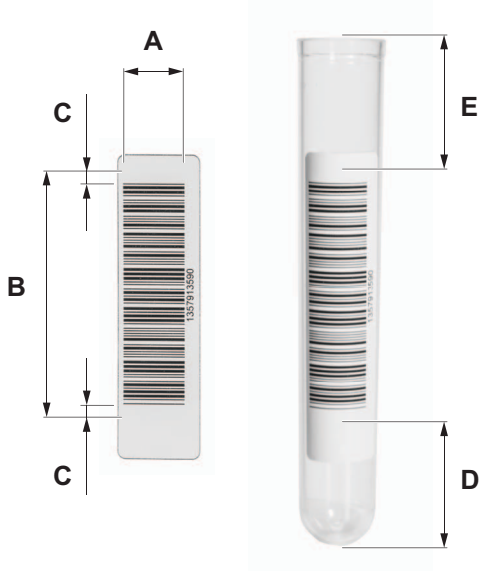


Fig. 2-15 *Barcode-label position on tube*

Micro Tube or Safe Lock Tube

When putting a barcode label on a micro tube or safe lock tube, the clearance (D) between the bottom of the tube and the barcode, which includes the quiet zone (C), has to be at least 11 mm (0.79 in.).
Furthermore, a distance (F) of at least the size of the quiet zone (C) between the barcode symbol and the rim of the tube is recommended.

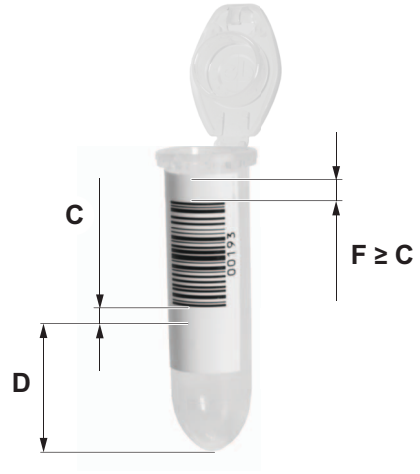


Fig. 2-16 *Barcode-label position on micro tube and safe lock tube*

Note: *Many barcode labels are brittle. Therefore, avoid kinking them, especially during labeling.*

Fig. 2-17 *Labeling the tube*

2.4.9 Tube Rotator

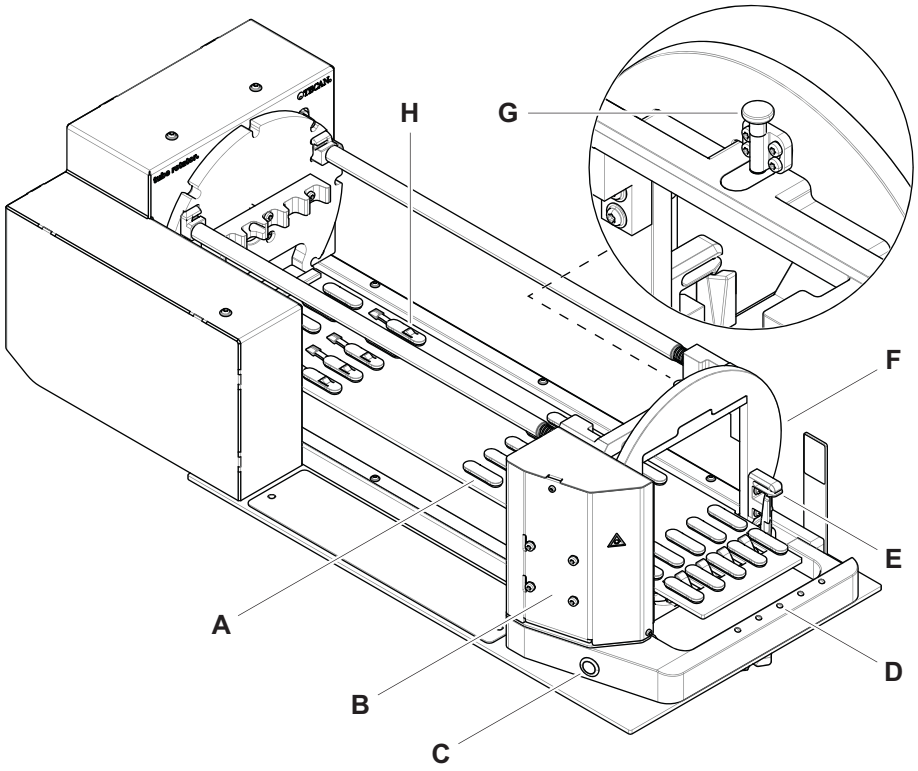


Fig. 2-18 *Tube Rotator*

A	*Guide pins*	***E***	*TR runner locking lever*
B	*1D Tube barcode scanner*	***F***	*Rotating drum*
C	*Drum unlock button*	***G***	*TR cover locking bolt*
D	*Status LEDs*	***H***	*Lock pins*

The primary purpose of this module is to mix the liquid inside the tubes and to serve as a carrier for piercing and pipetting actions.

The device contains the following subcomponents:

- A rotating drum unit that accommodates up to five TR runners, actively performs the sample mixing movement (fully rotational or oscillating) and supports the piercing process.
- An integrated Tube Barcode Scanner in order to scan the sample barcodes during loading onto the TR
- A deep wash station with two troughs for washing and decontamination of piercing tips. A tube holder with space for four tubes to collect liquid(s) in case of piercing problems.
- Four different covers, configured for different tube heights (refer to 6.3.12 “Mix and Pierce”, 2 6-44).
- Five different tube rotator runners. The runners can also be used on standard Fluent IDs, but are required for the use on TR (refer to 6.3.9 “Tube Rotator Runners”, 2 6-41). Based on the selected cover, tubes of different heights can be loaded onto a single TR (refer to 6.3.12 “Mix and Pierce”, 2 6-44).

Up to three TRs are supported by a 480 instrument and four TRs by a 780 or 1080 instrument.

Tab. 2-80 *Specifications*

Instrument	No. of supported TRs
Fluent 480	up to 3
Fluent 780	up to 4
Fluent 1080	up to 4

2.4.10 Frida Reader

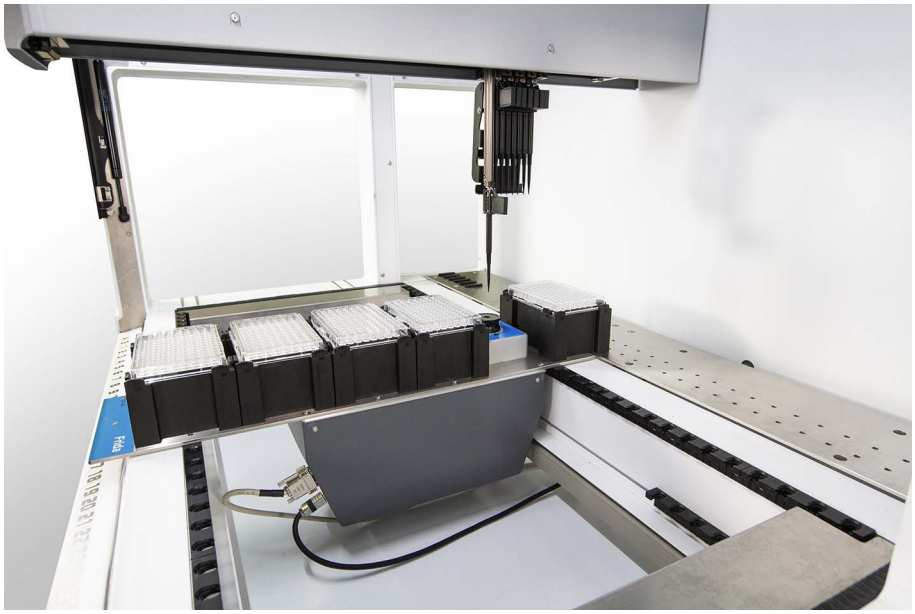


Fig. 2-19 *Frida Reader*

The Frida Reader is an add-on module for the Fluent Automation Workstation that offers UV-based concentration and purity measurements of nucleic acids in a hanging drop. It is designed to work in combination with the platform's Air Flexible Channel Arm using 50 µl filtered disposable tips, it is compatible with all Fluent platform sizes, in both benchtop and cabinet-based configurations, offering flexible integration.

This unique, patented method completely avoids sample loss, as the hanging drop is aspirated back into the tip and can be used for further processing (e.g. normalization). No additional preparation steps, labware or reagents are required for the measurement, which offers precision and accuracy comparable to a reference reader over a range of 2 to 1’000 ng/µl.

Nucleic acid quantification by comparison of sample optical density (OD) at 260 and 320 nm is typically performed at the end of nucleic acid purification (NAP) workflows to determine the yield and allow normalization between samples for downstream processing, such as genotyping and NGS. In addition, evaluation of the A260/280 and A260/230 ratios can be used to identify the presence of protein or salt contamination in samples.

Measurement Principles

The Frida Reader measures the UV absorbance of a liquid through a hanging drop at the end of a pipette tip. As the amount of light absorbed depends on the optical path length through the drop, it is vital that drops are consistently sized and accurately positioned within the optical path.

The reader uses the optical set-up shown in the figure below (yellow lines) to accurately determine the position and diameter of sample drops. Prior to nucleic acid measurement, each drop is illuminated by two orthogonallY-positioned LEDs, and two mirrors (M1 and M2) are used in combination with a beam splitter (BS) and objective to generate two separate images using the built-in CMOS camera. Automated comparison of these images allows drop size and position to be rapidly assessed and adjusted via closed loop feedback to the Fluent workstation's Air FCA.

Sample measurement

Following hanging drop assessment and positioning, UV light from a monochromator equipped with a xenon flash lamp is used to measure the OD of the sample (red lines in figure below). The UV light is guided with a quartz fiber and focused on the drop with an elliptical mirror (M elliptical). After passing through the drop, the light is focused with a lens and detected with a photodiode (M-PD). In addition, a small part of the light beam is split directly after the fiber output, and used to provide a reference with another photodiode (R-PD).

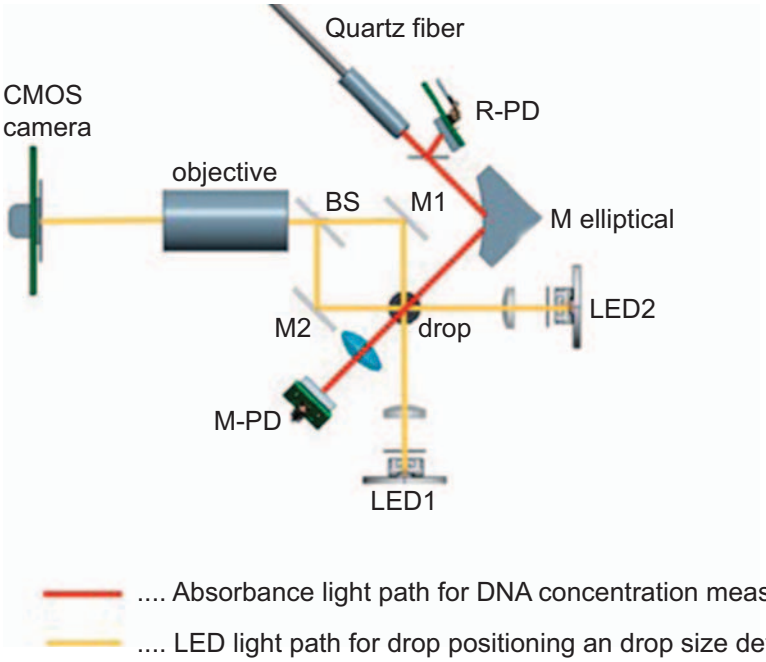


Fig. 2-20 *Frida Reader's optical set-up for both hanging drop size and position assessment (yellow lines) and nucleic acid quantification/purity assessment (red lines).*

Quantification and Purity Assessment

The OD values at 260 and 320 nm are compared to a DNA-free control (blank) drop to determine the DNA concentration (C) in the sample. The DNA concentration can be determined using the known extinction coefficient (ε) of nucleic acids, and the diameter of the drop (d):

$$C = \frac{OD_{260,corr}}{d \cdot \varepsilon}$$

$$OD_{260,corr} = (OD_{260,sample} - OD_{260,blank}) - (OD_{320,sample} - OD_{320,blank})$$

In addition, OD values at 230 and 280 nm are used to provide an idea of sample purity. This fully automated process, including droplet assessment and nucleic acid quantification and purity assessment, takes around 10 seconds for a single sample (without blank measurement)

Specifications for Absorbance Measurement

Tab. 2-81 *Specifications*

Light source	Dedicated xenon flash lamp
Operating wavelengths	230, 260, 280 and 320 nm
OD range	6 mOD to 3.2 OD
Corresponding to a concentration range	2 to 1000 ng/µl for dsDNA 2 to 800 ng/µl for RNA
Limit of detection (nucleic acids)	≤ 2 ng/µl
Wavelength accuracy	≤ 8 nm
OD accuracy (260 nm) @ 1 OD	≤ 2.5%
OD precision (260 nm) @ 1 OD	≤ 2.0%

Reproducibility Values in Single Hanging Drop (measured)

Tab. 2-82 *Specifications*

dsDNA concentration	Equivalent RNA concentration	CV limit
5–10 ng/µl	4–8 ng/µl	≤ 10 %
> 10–30 ng/µl	> 8–24 ng/µl	≤ 6 %
> 30–1000 ng/µl	> 24–800 ng/µl	≤ 2 %

The CV value reflects the reproducibility of the measurement:

- Determined in absorbance measurements
- On fluid drop samples with 1.5 to 1.6 mm diameter
- With Tecan 50 µl filtered disposable tips
- Nucleic acid dissolved either in TE buffer or water
- Assuming a 2-sigma confidence interval

Nominal reproducibility compared to a 10 mm cuvette

Measurement reproducibility within a 1.5 to 1.6 mm drop size, calculated to an OD 10 mm (i.e. path length = 10 mm) value:

≤ 100 ng/µl dsDNA (80 ng/µl RNA) measurement range: ±2.0 ng/µl

> 100 ng/µl dsDNA (80 ng/µl RNA) measurement range: ±1.5ng/µ?l

2.4.11 UVC Light

This option is a UVC light that irradiates the interior of the Fluent instrument. It is mounted into the optional top cover of the Fluent.

Note: *UVC light option is only compatible with instrument fitted with TGIO-2 board. UVC light option is currently not available as a field upgrade.*

Tab. 2-83 *Specifications*

Instrument	UVC Lights
Fluent 480	one 36 W lamp
Fluent 780	one 36 W lamp
Fluent 1080	two 36 W lamps

Lamp lifetime: 10,000 hours

The irradiation intensity reduces over the lifetime of the UVC light. After 10,000 hours 60% of the initial irradiation intensity remains. For this reason validation of the effectiveness of the irradiation duration should be made at 60% of the lamp intensity for a new lamp. Furthermore, each on/off-switch cycle reduces lifetime by 30–60 minutes.

The arm position will cast a shadow on the deck. Ensure the arms are moved to different positions to ensure irradiation of the entire deck area.

Tecan recommends that any chemicals or labware that are not part of the validated irradiation process, be removed from the deck.

The use of the UVC light requires Fluent UVC base panel and door sets.

2.4.12 DeckCheck

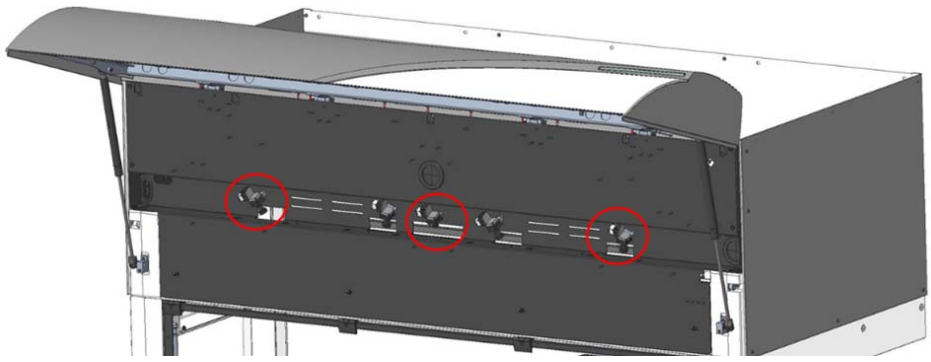


Fig. 2-21 *DeckCheck*

DeckCheck is a camera-based system built inside the front, top profile that is focused on the Deck area. There is a single, central overview camera on the Fluent 480 and three cameras on the Fluent 780 and 1080—i.e., a central overview camera with additional left and right cameras.

There are two LED light strips in the interior. The rear LED strip will only be illuminated when the DeckCheck is running. The front LED can be switched separately.

The cameras are activated by use of the DeckCheck command in a FluentControl script.

The DeckCheck command setup allows a reference picture to be taken for each camera. The reference picture will reflect the expected layout status of the deck at that point in the script.

While the script is running the DeckCheck will take pictures of the actual or live layout status of the deck at that point in the run.

The DeckCheck will compare the reference and live pictures and alert the user to any discrepancies (differences) found between the two layouts and display the reference (expected layout) and the live (actual) layout alternatively on the touchscreen to emphasize the source of the differences and allow correction.

The user can open the door and make corrections. The DeckCheck will continually update the live picture during this process. Closing the door or, selecting the **Check** button reactivates the DeckCheck and a new display with remaining discrepancies will appear if needed, or, in **show always** mode, a green **continue** button appears if no discrepancies have been found, and the script can progress.

If not all discrepancies need to be resolved—e.g., varying tip numbers which is tracked and handled within the script—then **Ignore and continue** can be selected.

Note: *The **Ignore and continue** option allows an operator (login level in user management) to ignore any discrepancies highlighted by the DeckCheck. This option can be enabled/ disabled in each DeckCheck command. If disabled, an operator cannot ignore the DeckCheck errors and **Ignore and continue** must be clarified by a key operator.*

Notes

- DeckCheck must be delivered with the Fluent. DeckCheck is not field upgradeable on older Fluents.
- Requires minimum FluentControl V3.1.
- Requires a computer configuration as outlined in the FluentControl Application Software Manual to ensure best performance.

Fig. 2-22 *DeckCheck*

- The DeckCheck takes approximately 20 seconds for a three arm/ three camera system and approximately 12 seconds for one or two-arm/ single-camera system to take pictures of the deck and display the comparison of the live and reference layouts (assuming that the PC configuration is appropriate). During this time the rear LED will be switched on. On three-arm Fluent

systems the middle arm needs to move between left and right positions (on one- or two-arm systems, the left and right arms will be positioned on the far left and right sides respectively.)

- During the DeckCheck process the touchscreen displays moving shapes **Taking Images** followed by **Checking**. After 12–20 seconds depending on the instrument size and configuration the images will be displayed in alternating mode.

Usage hints

- Due to the initialization of the cameras, the first DeckCheck command executed after starting FluentControl may take longer than usual (up to several minutes).
  - Run a maintenance method prior to running assays using only the DeckCheck command with a single insignificant (non-changing) region of interest selected.
- The DeckCheck is not a liquid detection device. However, varying levels of liquid relative to the reference picture may be identified as discrepancies.
  - Take the reference picture when the method is fully developed and ready to run so the picture includes labware and liquids.
- For methods that run each day with different source and destination labware capacities, the DeckCheck could identify low capacity as missing labware or high capacity as additional misplace labware.
  - Repeat the DeckCheck command in the script. Take reference pictures of the correct deck at each required deck capacity. Select and run the appropriate DeckCheck command based on the actual user input prompted at run time.
- Fluent ID controls the presence or absence of tubes automatically
  - Exclude Fluent ID from a region of Interest
- If disposable tips are not re-filled before each method but run using the tip counter in the method, limit the region of interest to only the final column(s) of tips box/tray.
- If different colored microplates may be used spontaneously, either handle the variance with a user prompt for the color and run DeckCheck reference picture for each color. Or allow any cited discrepancy based on color to be ignored.
- For programming information refer to Application Software Manual. For run parameter limits refer to Operating Manual.

2.4.13 Multiple Channel Arm (MCA 96)

The MCA 96 is a robotic multichannel pipetting arm designed for highspeed, high-precision liquid pipetting between standard microplates with 96 or 384 wells.

Tab. 2-84 *MCA 96 Configuration*

Pipetting head	96 channels Pipetting volume: 1 – 1000ul Liquid level detection
Disposable tips (DiTis)	Compatible with conductive FCA DiTi portfolio up to and including 1000ul. Full list and restrictions, please refer to section 6.6.5 for more details.
Gripper	Optional gripper for simple labware handling tasks. Please refer to section 4.2.5 for details.

2.4.13.1 Tip Dimensions

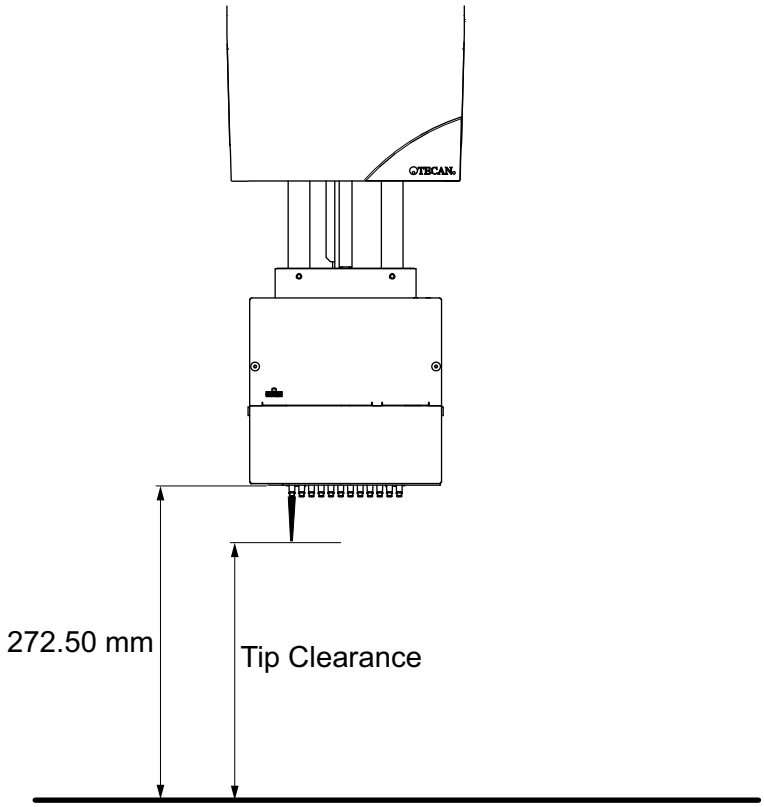


Fig. 2-23 *MCA 96 Tip Clearance.*

Tab. 2-85 DiTi Clearance

DiTi Type	DiTi Lenght [mm]	Clearance [mm]
10 µl	35.3	237.2
10 µl nested	35.3	237.2
50 µl	58.0	214.5
50 µl nested	35.0	237.5
200 µl	58.5	214.0
350 µl nested	58.3	214.2
1000 µl	96.1	176.4

2.4.13.2 Options and Accessories

Please refer to Chapter 6.1.5 for an extensive list of sales articles

Tab. 2-86 MCA 96 Options/Accessoires

MCA 96 gripper	For simple labware handling tasks. See section 2.4.13.5
Reagent trough	Various volumes (e.g. 300ml, 60ml, etc.) as available for appropriate suppliers.
Racks	Microplates: 96, 384 wells Deep well plates: 96, 384 wells.
Waste chutes	Through deck waste Front waste chute

2.4.13.3 Performance Data

Tab. 2-87 *MCA 96 Performance Data*

Throughput	Approx. 120 96 well plates per hour (pipetting a 1 to 1 copy). Assumption of cycle: Get DiTis, aspirate 50ul, dispense 50ul, drop DiTis
Timings	The information below shows the timings of some frequently used method steps: Liquid transfer 15 – 50 s. Get DiTi 5 – 10 s Drop DiTi 5 – 10 s
Liquid handling precision	The values below are obtained on standard Fluent instruments operated within the specified liquid handling environmental conditions and maintained according to system care instructions. **Liquid class, DiTi, Volume tested, CV [%]** Water free single, DiTi 1000, 1000ul, 1.5 Water free single, DiTi 10, 1ul, 4.0 DMSO free single, DiTi 1000, 1000ul, 1.5 DMSO free single, DiTi, 10, 1ul, 9.0

2.4.13.4 MCA 96 Materials

In normal operation, the tips are the only wetted parts. Other parts do not come into direct contact with the pipetted liquids except in case of a malfunction (too much liquid aspirated). However, other parts may be exposed to aerosols or vapor from the liquid.

Tab. 2-88 *Materials*

Part	Material	Exposure
Disposable tip	PP	Sample liquid
Gasket	Silicon	No direct exposure to liquid due to air gap. Aerosol or vapor exposure possible
MCA head plunger block	Aluminium	No direct exposure to liquid. Aerosol or vapor exposure possible
MCA plunger	Stainless steel	No direct exposure to liquid. Aerosol or vapor exposure possible
DiTi cone seals	EPDM	No direct exposure to liquid due to air gap. Aerosol or vapor exposure possible

2.4.13.5 MCA 96 Gripper

The MCA 96 can be equipped with a robotic gripper, which is mounted on the back side of the MCA 96 head. This robotic arm can transfer a variety of labware from and to the deck, storage positions, and devices, such as a shaker or a heater. This gripper can only access labware within the worktable; for gripping of labware behind//below/left/right of the worktable as well as for labware rotation, a robotic gripping arm (RGA) is required.

When not in use, exchangeable fingers are stored on a docking station—namely, the finger exchange station—where they can be picked up and set down automatically by the Finger Exchange System (FES).

Tab. 2-89 *MCA 96 Gipper technical data*

Gripper finger type	Finger eccentric MCA
Transportable mass	Max. 0.45 kg (1.00 lb.)
Gripper force	3–15 N (controlled by the software)
Gripper space range	74.5mm - 136mm (2.95–5.35 in.)
Rotation angle of gripper head	Gripping of labware only in landscape orientation; no rotation

2.5 Optional Modules

2.5.1 Tecan Options

The following further options are available for the Fluent:

Tab. 2-90 *Options*

Designation	field upgradeable	Description
Fluent Carousel	yes	Tecan carousel for plates and DiTis
Fluent Stacker	yes	Tecan stacker for plates and DiTis
Hotel	yes	Hotel for plates
HydroSpeed	yes	Tecan washer
HydroFlex	yes	Tecan washer
Spark	yes	Tecan reader
Infinite	yes	Tecan reader
Sunrise	yes	Tecan reader
Passive Stack	yes	Passive stacker for plates
Tecan monitored incubator option (Te-MIO)	yes	-
Tecan shaker (Te-Shake)	yes	-
Tecan vacuum separation module (Te-VacS)	yes	-
Wash and refill system (WRS)	yes	-
FCA gripper	yes	FCA gripper docking station and a pair of FCA gripper fingers

Tab. 2-90 *Options*

Designation	field upgradeable	Description
Front Door Locks	no	A pair of door locks can be added optionally to the instrument
Cabinet Door Locks with sensor	no	Cabinet door locks include a door sensor and lock a specific cabinet door during a run
External Door Locks	no	External door locks transfer the door sensor and door lock concept of both the instrument and the cabinet to an external door system such as the doors on a biological safety enclosure or other housing
Earthquake protection kit	yes	Set of fittings to secure instrument to a wall, floor or bench. Fittings take weight of Instrument. User is responsible for attachment in laboratory.

Note: *Refer to the separate documentation of these options.*

Note: *Field upgrades may require update of software version and other parts.*

2.5.2 Third Party Options

The following options from original equipment manufacturers are available:

Tab. 2-91 *OEM options*

Designation	Manufacturer
Mettler balance	Mettler Toledo GmbH
HEPA hood	Bigneat Ltd.
ODTC Thermocycler	Inheco GmbH
Heater/Cooler	Inheco GmbH

Note: *For detailed information refer to the documentation of the respective manufacturer.*

2.6 Chemical Resistance

2.6.1 Standard Materials Resistance Table

Chemical Resistance

In the following the chemical resistance of the used (standard) materials is specified:

Tab. 2-92 *Chemical resistance table*

Material	FEP	PVC	Silicone	PVDF	PP	FFPM	PCTFE[a)]	ETFE
Acetone	o	/	o	/	o	o	o	o
Acetonitrile (C_2H_3N)	o	/	/	x	o	nd	nd	o
Formic acid 100%	o	x	x	x	o	x	o	o
Ammonium hydroxide 25%	o	x	o	o	o	nd	o	o
Chloroform	o	/	/	o	x	x	x	/
Dimethyl-formamide	o	/	/	/	o	o	o	/
DMSO	o	/	x	/	o	nd	nd	o
Acetic acid 96%	o	/	x	o	x	o	o	x
Acetic acid ethylester	o	/	/	/	x	nd	nd	x
Ethanol 96%	o	x	x	o	o	o	o	o
Formaldehyde 40%	o	x	x	o	o	x	o	o
Sulfuric acid 40%	o	x	/	o	o	o	o	o
Sulfuric acid 96%	o	/	/	/	x	o	o	o
Isopropanol	o	/	x	o	o	o	o	o
Diluted bleach, NaOCl	o	x	x	o	x	o	o	o
Methanol	o	x	o	o	o	o	o	o
Methylene chloride	o	/	/	/	/	o	o	/
Sodium hydroxide 10M	o	x	o	x	o	nd	nd	o

Tab. 2-92 Chemical resistance table (cont.)

Material	FEP	PVC	Silicone	PVDF	PP	FFPM	PCTFE[a)]	ETFE
Perchloric acid 60%	o	/	/	o	x	x	x	/
Petroleum ether 30/50	o	x	/	o	/	nd	nd	x
Hydrochloric acid 32%	o	x	/	o	o	o	o	o
Trichloroacetic acid 40%	o	/	/	o	/	o	o	x

a) Kel-F and PFA

Tab. 2-93 Chemical resistance table for Mix & Pierce materials

Material	AISI-304 (X5CrNi18-10; 1.4301)	AISI-316L (X2CrNiMo17-12-2 Stainless Steel; 1.4404)	TribondTM 43 ADLC-R
1M NaOH	o	o	o
2% Sodium Hypochlorite	o	o	o

Legend

o	resistant
x	partly resistant, use is possible with more frequent replacement of affected parts
/	not resistant, unsuitable for use
nd	not determined

Note: *If a material is not specified or before using a chemical not listed in the table – please check the resistance with commercially available compatibility information.*

Note: *Cleaning agents and system care frequencies are listed in the Operating Manual. Each cleaning agent may only be used as specified in the system care tables.*

2.6.2 Resistance of Special Materials

2.6.2.1 Silicone Gaskets

The gaskets of the MCA384 pipetting head are made of silicone. They never get into contact with any liquid except by a malfunction.

ATTENTION

Damage to the gaskets (leaking DiTis or fixed tips)

- If you use Acetonitrile with the Fluent, make sure that the gaskets are not moistened.
- Also vapors may corrode the gaskets. Check the condition of the gaskets more frequently, if you use Acetonitrile.

2.6.3 Hydrogen Peroxide Vapor Treatment

The Fluent has been tested using a Hydrogen Peroxide Vapor treatment (HPV). HPV is commonly used in laboratories as a surface decontaminant, according to manufacturer's claims.

Testing was conducted according to the manufacturer's instructions for use as follows:

- Product: Diosol-19 from Simml GmbH, CH-8273 Triboltingen
- Room concentration: 590–730 ppm.
- Total number of HPV cycles: 120 gassings (Equivalent to 1 cycle per month over 10 years).
- Single HPV cycle duration: 90 minutes
- The instrument arms were moving during the gassing cycles.

Source of the vapor 50 cm from instrument and not directly towards instrument

Gassing with HPV as described above maintains the expected performance of the Fluent measured at intervals between the HPV cycles.

Certain cosmetic changes such as color or texture change may occur—these changes do not contribute to loss of performance and are not covered by the instrument warranty.

Examples of parts that may be affected by HPV (but not limited to):

- Anodized surfaces such as the diluter frontage or tip ejection bar may discolor or change from gloss to matt.
- Silver chassis color may become tinted
- Lubricants may color
- Some plastic parts may appear matt such as the Tip adapter housing.
- Texture changes on the controlling computer screen

It cannot be excluded that conditions surpassing the test parameters stated above, might contribute to

additional wear and tear such as,

- If the total number of gassings is exceeded
- If the room vapor concentration and, or duration is exceeded for individual gassing cycles
- If any additive, e.g. to enhance vapor dispersion is used
- If any local reaction occurs between the HPV treatment and chemicals in use on the system.

Under those conditions Tecan cannot take responsibility for any accelerated wear and tear or ordinary abrasion or deposits that may occur and potentially shorten the life time of some parts. Such deviations may however be handled with your local Tecan Support organization under an increase in preventative maintenance intervals for parts such as, but not limited to, tubings, syringes and gaskets.

Tecan allows performance of the HPV process as described above, also using similar products from other manufacturers at comparable room concentrations and duration.

Tecan recommends following all safety instructions outlined by the manufacturer for usage of the product.

Tecan makes no claims on the effectiveness of these products in support of the manufacturer’s claims, and does not undertake sterility testing.

Tecan cannot take responsibility for the use of alternative chemical formulations such as chlorine dioxide treatment.

3 Description of Function

Purpose of This Chapter

This chapter explains the basic principle of the Fluent, shows how it is structured and gives a functional description of the assemblies.

3.1 Robotic Arms

3.1.1 Liquid Flexible Channel Arm (Liquid FCA)

Purpose

The Liquid FCA is used for pipetting tasks. It can aspirate from and dispense to various containers, such as sample tubes or microplates. Liquid aspiration and dispense is accomplished by the diluter syringe piston movement, transmitted by the system liquid to the tip end.

Overview

The figure shows an overview of the flexible channel arm and illustrates the direction of movement of the corresponding axes.7

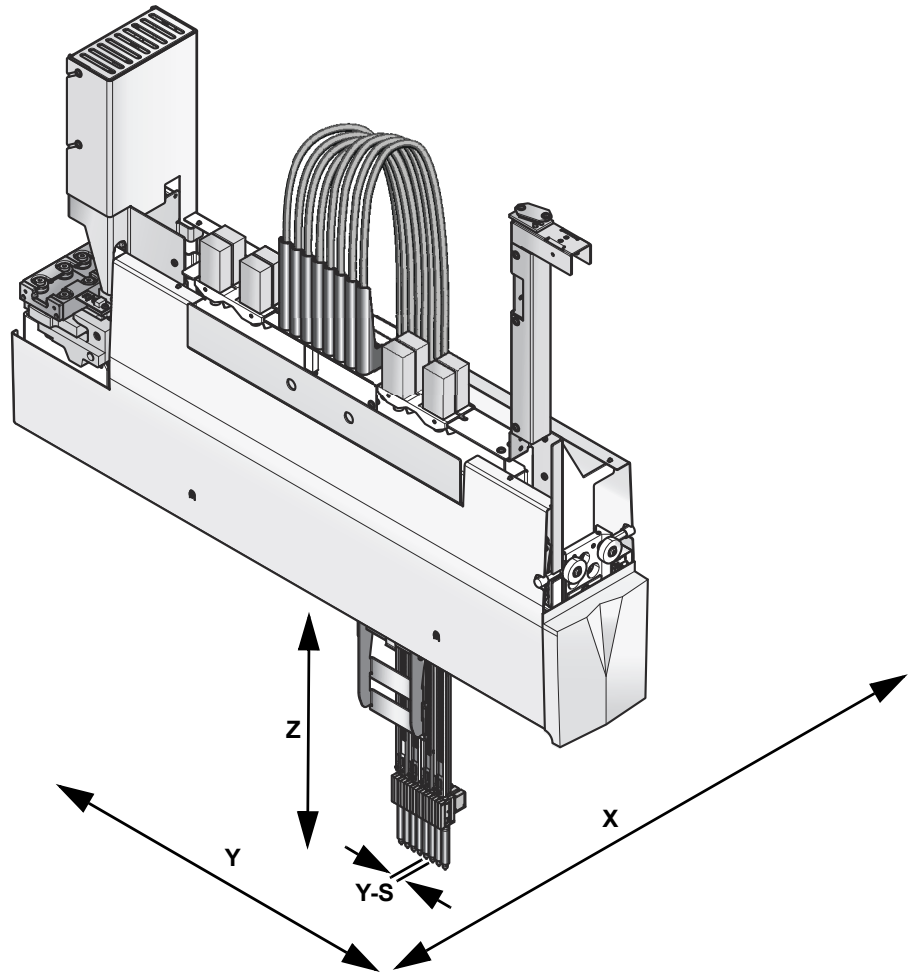


Fig. 3-1 *Flexible channel arm*

X *Flexible channel arm movement left and right*

Y *Tip movement and tip spacing front and rear*

Y-S *Tip spacing in Y axis: 9 - 38 mm*

Z *Tip movement up and down*

Function

How Does It Work?

Drives move the flexible channel arm to the left and to the right (X-axis) as well as to the front and to the rear (Y-axis) to position the arm over the corresponding element. The drives in Y-direction also control the spacing of the tips Y-S.

Eight pipetting tips are arranged on one flexible channel arm. Individual drives raise or lower (Z-axis) each pipetting tip separately.

Tip Types

The pipetting tips are used to aspirate and dispense liquids in different volume ranges.

Diluters

Aspiration and dispense actions are performed by the diluters. Each liquid handling channel has its own diluter, which consists of a drive and a syringe. The system liquid conveys the plunger movement in the syringe to the pipetting tips. For details on the liquid system, refer to section 3.2 “Liquid System (Liquid FCA)”, 2 3-38.

Disposable Tips

Disposable tips are intended for one single transfer cycle—i.e., one aspiration and one or more dispense steps. They can be equipped with a filter.

Disposable tips are automatically picked up from a disposable tip tray. After use, DiTis are discarded into a waste bag via the optional disposable tip waste slide.

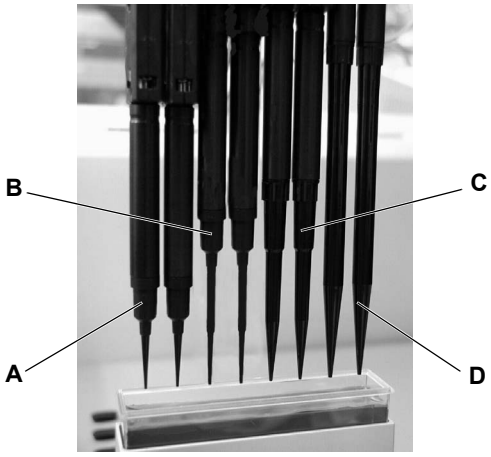


Fig. 3-2 *Disposable tips*

A *Disposable tip 10 µl*
B *Disposable tip 50 µl*
C *Disposable tip 200 µl*
D *Disposable tip 1000 µl*

Disposable tip 5000 µl is also available (not shown).

Fixed Tips

Fixed tips are intended for multiple transfer cycle.The tips are made of stainless steel, in standard and low volume size, and are quite hydrophilic and porous.

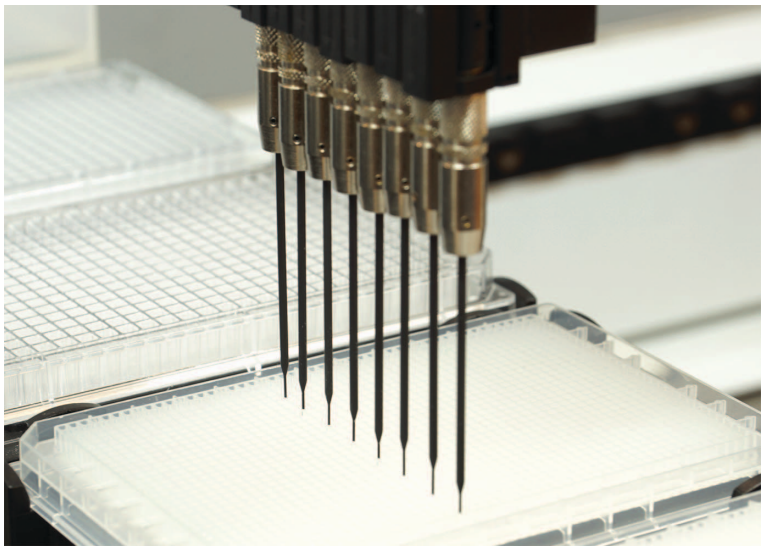


Fig. 3-3 *Fixed tips*

3.1.2 Multiple Channel Arm (MCA384)

Purpose

The Multiple Channel Arm MCA384 is used for high-speed, high-precision pipetting tasks and offers higher productivity to automated liquid handling methods. With its 384 simultaneously actuated channels, it can pipette from and into 384-well microplates. It increases the efficiency and speed of pipetting methods for higher throughput and it features a greater level of flexibility.

Overview

The figure shows an overview of the Multiple Channel Arm 384 and illustrates the direction of movement of the corresponding axes:

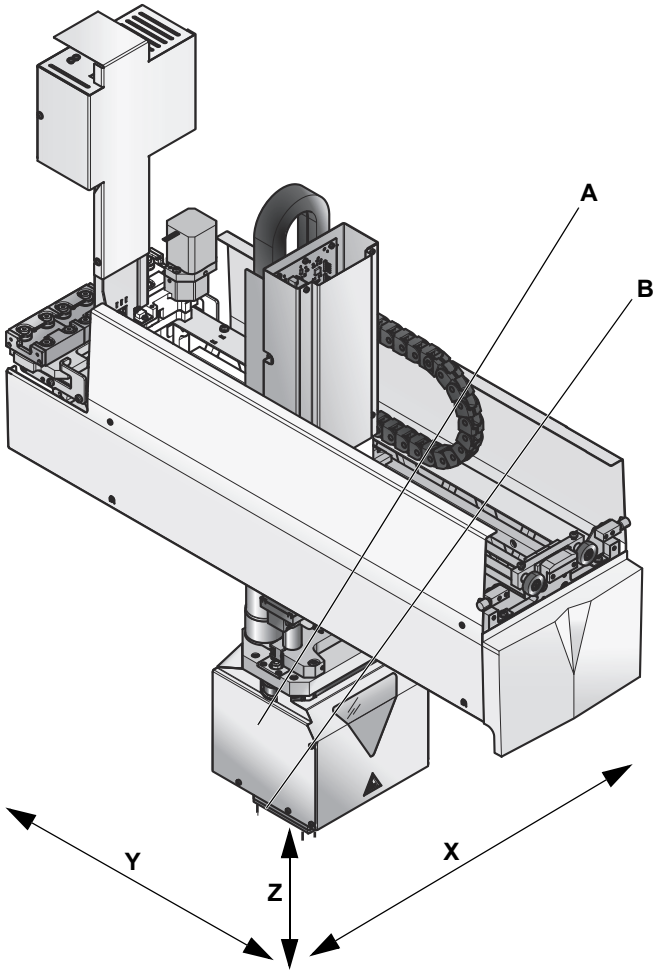


Fig. 3-4 *Multiple Channel Arm 384*

A	*384 channel pipetting head*	***X***	*Arm movement left and right*
B	*Head adapter for DiTis or fixed tips*	***Y***	*Axis front to back across deck*
		Z	*Vertical axis above deck*

Function

Pipetting System

The MCA384 is an air displacement pipetting system.

The 384-channel pipetting head features a broad volume range with disposable or fixed tips:

- 0.25 µl to 125 µl in the 384-well format
- 0.5 µl to 500 µl in the 96-well format

The washable fixed tips and the disposable tips can be interchanged during a run. The 384-channel pipetting head can be used to pipette with 384, 96, 32, 24, 16, 12 or 8 disposable tips.

384 plungers, which are moved simultaneously, are used to vary the volume of the cylinders. When the volume expands causing an underpressure, the liquid is aspirated into the tips. By decreasing the volume causing an overpressure, the liquid can be dispensed all at once or in steps. By means of a control software, the movement of the plungers is controlled very accurately. The channels which are used for pipetting are defined by the type of adapter and / or the DiTis picked up (384, 96, 32, 24, 16, 12 or 8). Only the tips and the inner part of the fixed tip adapter are in contact with the liquid. Other parts of the pipetting head are not exposed to possible contamination.

Z-Brake

The implemented brake in Z-direction prevents the MCA head from running down uncontrolled in case of a power outage. The brake can be released manually to move the head up and down in power-off state of the instrument. To do so take hold of the head and press the Z-brake button of the MCA.

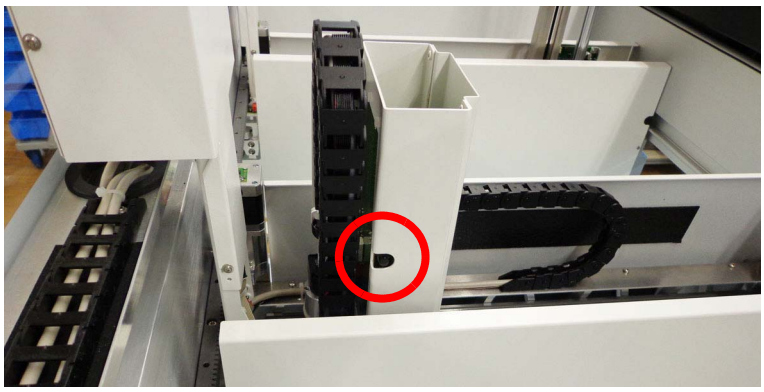


Fig. 3-5 *Z-brake button of MCA*

3.1.2.1 Pipetting Head

The pipetting head incorporates the P-(plunger) drive, which actuates all 384 plungers simultaneously when pipetting. The plungers are also used for dropping DiTis. Controlled by the FluentControl software, the head can be equipped with appropriate adapter plates for pipetting with fixed tips or DiTis.

Fixed tips:

- The head fetches the appropriate fixed tip adapter.

DiTis:

- The head fetches in a first step the appropriate DiTi adapter and picks up the DiTis in a second step or
- The head fetches in one step an appropriate DiTi adapter with already mounted DiTis (see also "System Segment MCA", 2 3-23).

(for the various adapter plates refer to section 6 "Spare Parts and Accessories", 2 6-1)

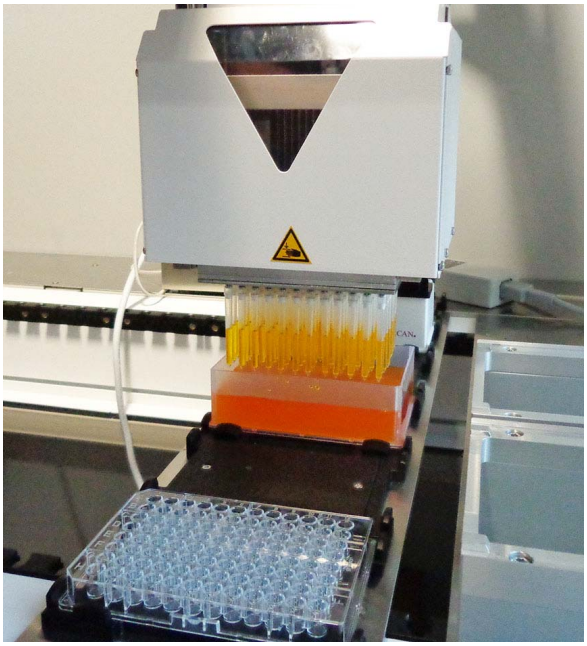


Fig. 3-6 *384 channel pipetting head*

Principle

The pipetting head employs the air displacement technique as a working principle.

Note: *Liquid level detection is not possible with the pipetting head of the MCA384.*

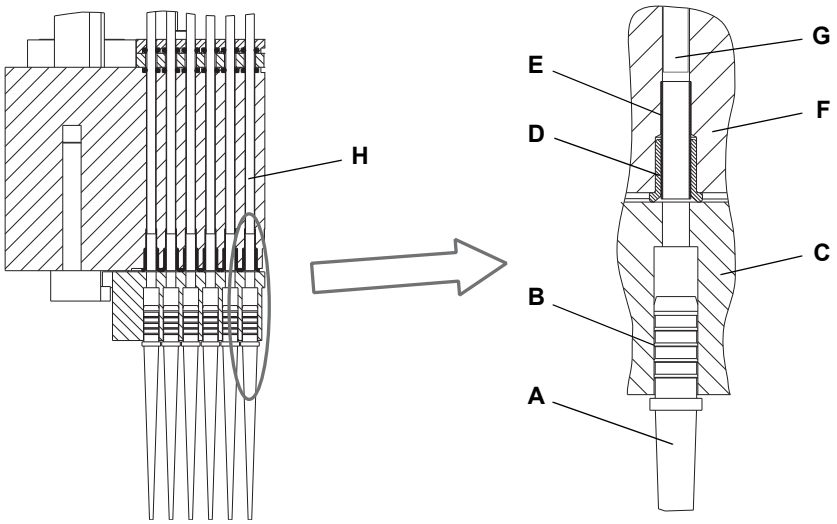


Fig. 3-7 *Cross section DiTis / gaskets*

A	*DiTi*	***E***	*Blunt tube*
B	*Self sealing DiTi shaft*	***F***	*Pipetting head*
C	*DiTi adapter plate*	***G***	*Plunger*
D	*Gasket*	***H***	*Cylinder*

Plunger / Tip

A computer-controlled drive moves the plungers (P-axis). The tips are inserted into appropriate holes in the adapter which are aligned with the 384 cylinders in the pipetting head. When the plungers move up, liquid can be aspirated into the tips. There is always an air gap between the liquid and the plunger, therefore the plunger room remains dry. To dispense the liquid the plunger moves down.

Sealing

The plungers are sealed against the cylinder and adapter with special gaskets. The DiTis have a special shaped shaft which is self sealing when inserted into the adapter. Fixed tips are liquid-tight mounted in the adapter.

3.1.2.2 Adapters

MCA384 Adapters

The 384 channel head can be configured with various MCA384 adapters. The head can pick up and replace automatically an MCA384 adapter from an adapter rack mounted on the system segment during a pipetting run.

Note: *MCA adapters should not be left permanently mounted on the MCA head. The Adapter should be placed on adapter rack periodically.*

The following MCA384 adapter types are available:

- Adapter DiTi MCA384
- Adapter DiTi Combo MCA384
- Adapter 96 DiTi MCA384
- Adapter 96 DiTi 1to1 MCA384
- Adapter 96 DiTi 4to1 MCA384
  (EVA=Extended Volume Adapter)
- Adapter Fixed 15 µl MCA384
- Adapter Fixed 125 µl MCA384
- Adapter 96 Fixed 15 µl MCA384

- Adapter 96 Fixed 125 µl MCA384
- Adapter QC MCA384

Adapter Types

Adapter DiTi MCA384

Features and application:

- Allows to pick up 384 DiTis from a DiTi box placed on the DiTi nest.
- Used to pipette into 384 or 1536 well microplates.
- No row- or column-wise DiTi picking possible

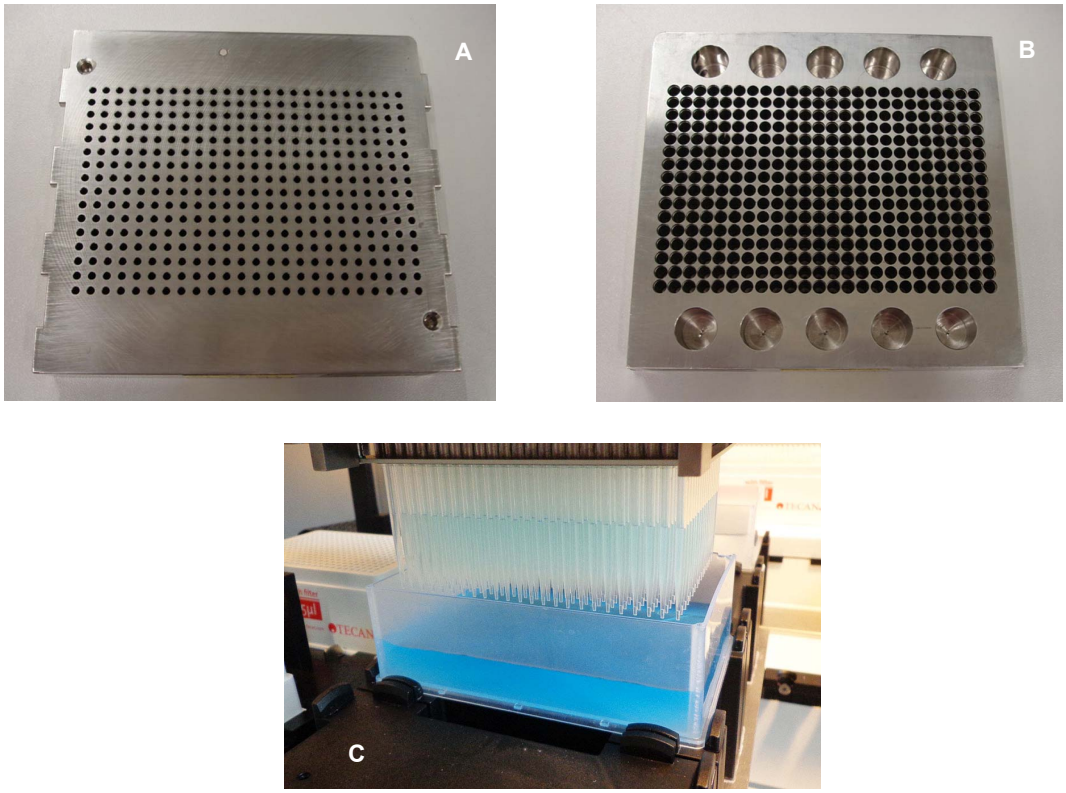


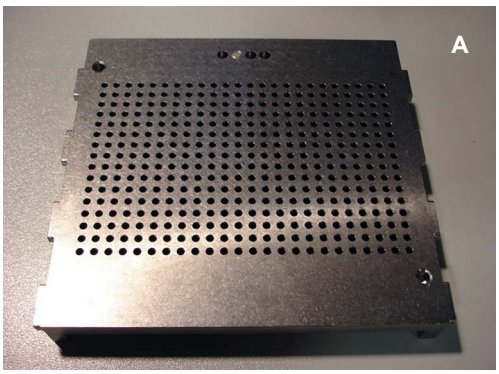
Fig. 3-8 *Adapter DiTi MCA384*

A *Top view*
B *Bottom view*
C *Operational*

Adapter DiTi Combo MCA384

Features and application:

- Allows to pick up 384 DiTis or one or two columns of 16 or 32 DiTis or one row of 24 DiTis from a 384 DiTi box placed on the DiTi nest.
- Allows to pick up one row of 24 DiTis or one or two columns of 16 or 32 DiTis from a 384 DiTi box placed on the system segment.
- Used to pipette into 384 or 1536 well microplates.



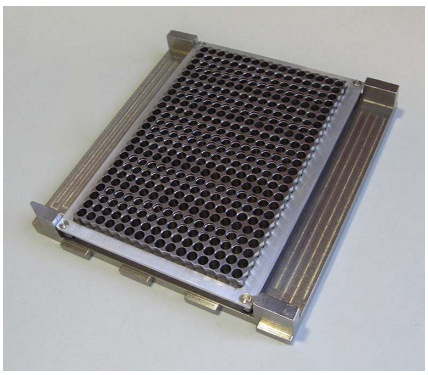


Fig. 3-9 *Adapter DiTi Combo MCA384*

A *Top view*
B *Bottom view*
C *Operational*

Adapter 96 DiTi MCA384

Features and application:

- Allows to pick up 96 DiTis from a 384 DiTi box placed on the DiTi nest. *Picks up 4 times 96 DiTis from the same 384 DiTi box (X- and Y-position indexed)*
- Allows to pick up one or two rows of 12 or 24 DiTis or one or two columns of 8 or 16 DiTis from a 384 DiTi box placed on the system segment.
- Used to pipette into 96, 384 or 1536 well microplates.

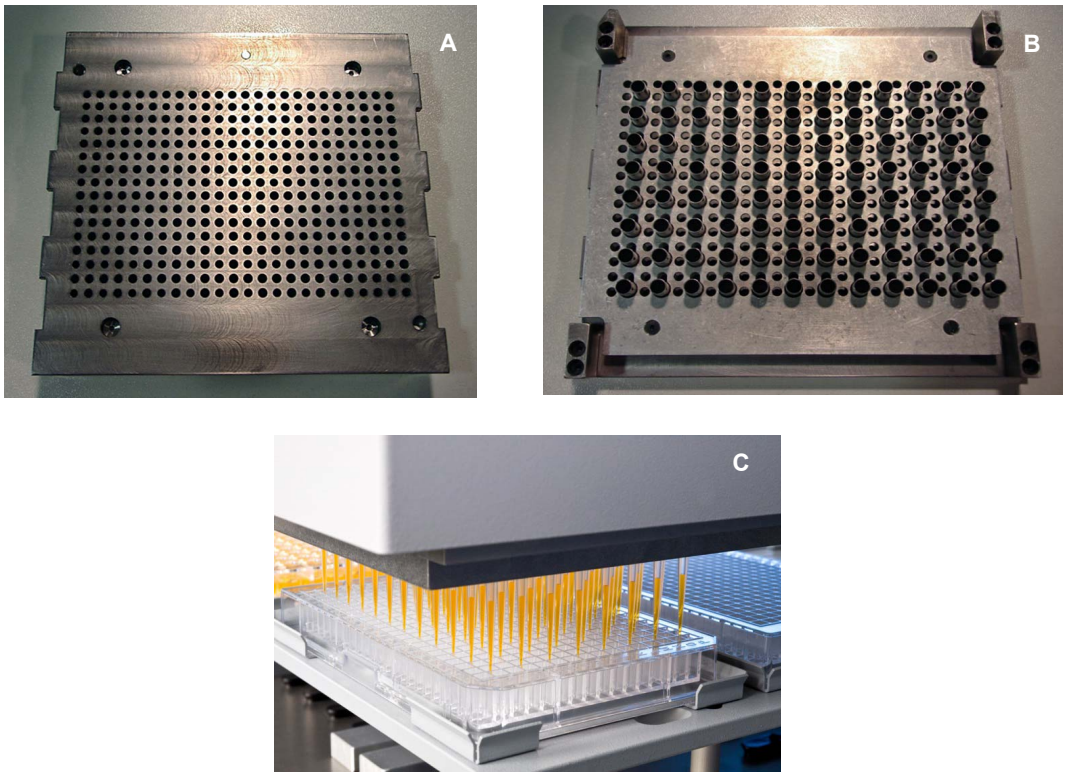


Fig. 3-10 *Adapter 96 DiTi MCA384*

A *Top view*
B *Bottom view*
C *Operational*

Adapter 96 DiTi 1 to 1 MCA384

Features and application:

- Works only with MCA96 DiTis in SBS format.
- Allows to pick up DiTis from an MCA96 SBS DiTi box placed on the system segment or standard nest segment in one of the following ways:
  - All (96) DiTis together
  - one or two rows of 12 DiTis
  - one to four columns of 8 DiTis
- Used to pipette into 96 well microplates.
- Volume range: 0.5 to 125 µl

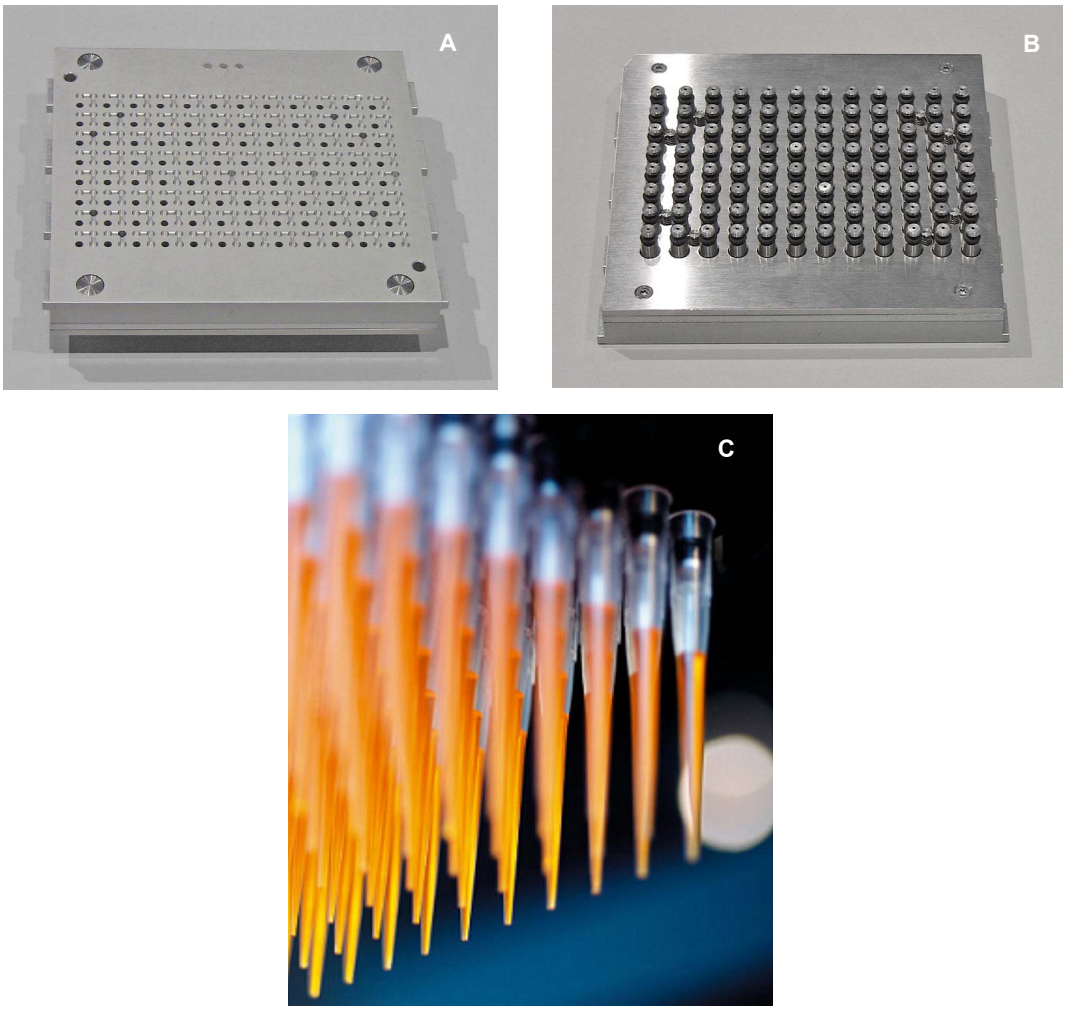


Fig. 3-11 *Adapter DiTi 1to1 MCA384*

A *Top view*
B *Bottom view*
C *Operational*

Adapter 96 DiTi 4 to 1 MCA384 (EVA)

Features and application:

- Works only with MCA96 DiTis in SBS format.
- Allows to pick up DiTis from an MCA96 SBS DiTi box placed on the system segment or standard nest segment in one of the following ways:
  - All (96) DiTis together
  - one or two rows of 12 DiTis
  - one to four columns of 8 DiTis
- Used to pipette into 96 well microplates.
- Four input channels are mapped into one output channel which allows to pipette in a volume range of 1 to 4x125 µl.

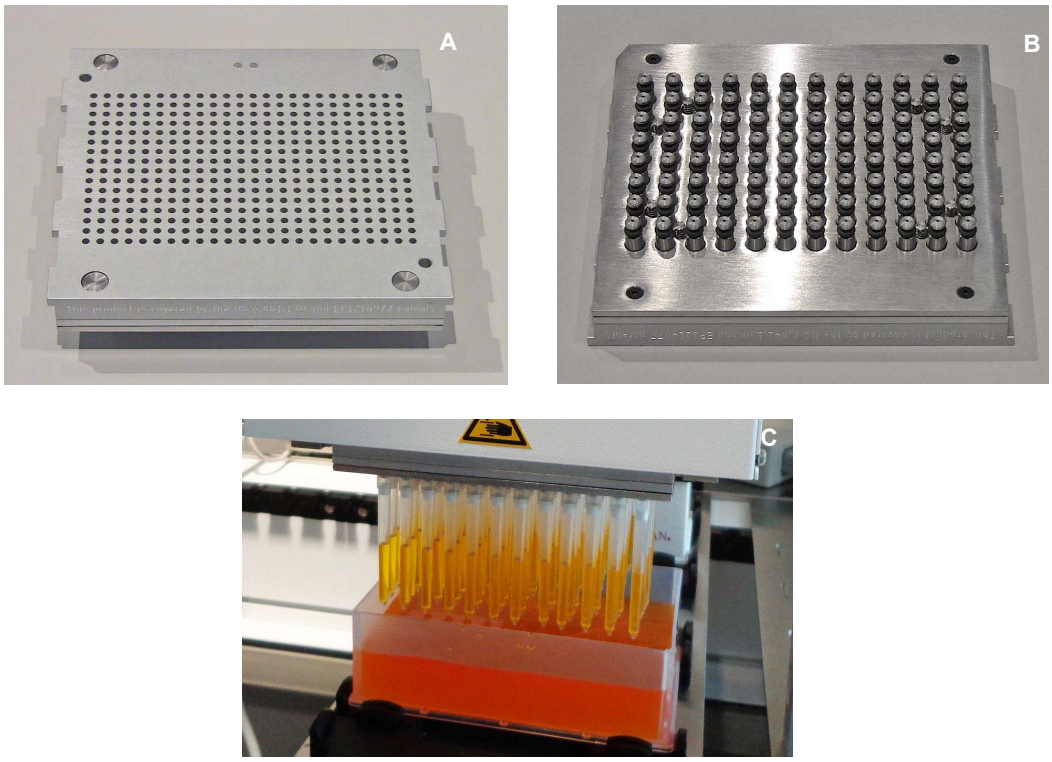


Fig. 3-12 *Adapter DiTi 4 to 1 MCA384*

A *Top view*
B *Bottom view*
C *Operational*

Adapter Fixed 15 µl MCA384

Fixed Tip Adapters

Features and application:

- Incorporates 384 fixed tips, stainless steel, washable.
- Tip length 28 mm
- Volume range: 0.5 - 15 µl (DMSO)
- Volume range: 1.0 - 15 µl (water)
- Used to pipette into 384, 96 or 1536 well microplates.

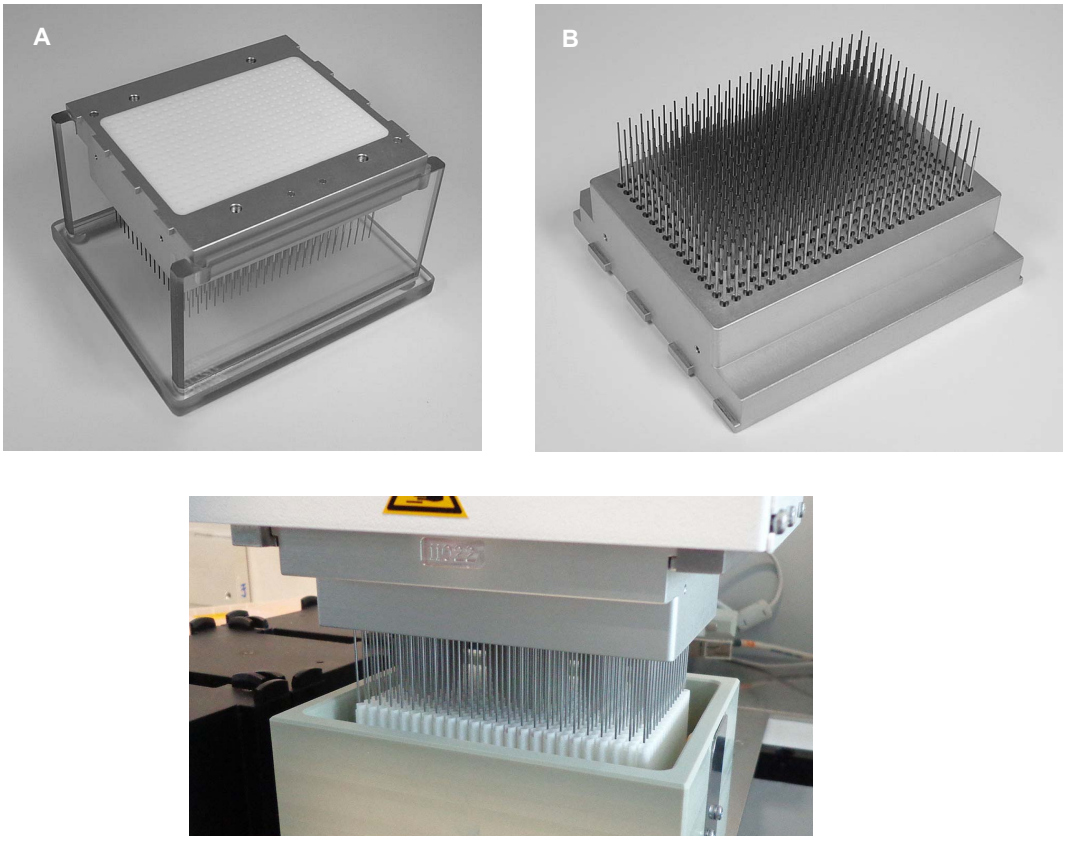


Fig. 3-13 *Adapter Fixed 15 µl MCA384*

A *Adapter top view*
B *Adapter bottom view*
C *Operational*

Adapter Fixed 125 µl MCA384

Fixed Tip Adapters

Features and application:

- Incorporates 384 fixed tips, stainless steel, washable.
- Tip length 28 mm
- Volume range: 2 - 125 µl (DMSO)
- Volume range: 3 - 125 µl (water)
- Used to pipette into 384 or 96 well microplates.

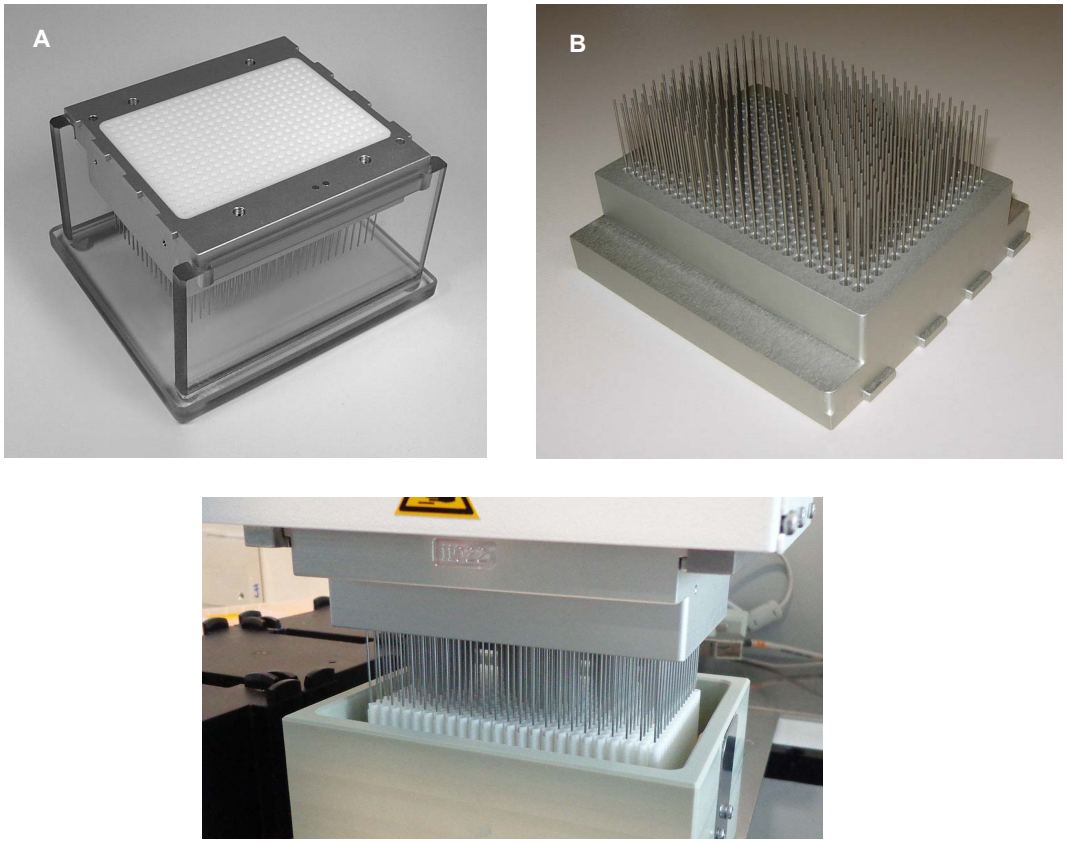


Fig. 3-14 *Adapter Fixed 125 µl MCA384*

A *Adapter top view*
B *Adapter bottom view*
C *Operational*

Adapter 96 Fixed 15 µl MCA384

Fixed Tip Adapters

Features and application:

- Incorporates 96 fixed tips, stainless steel, washable.
- Tip length 28 mm
- Volume range: 0.5 - 15 µl (DMSO)
- Volume range: 1.0 - 15 µl (water)
- Used to pipette into 384, 96 or 1536 well microplates.

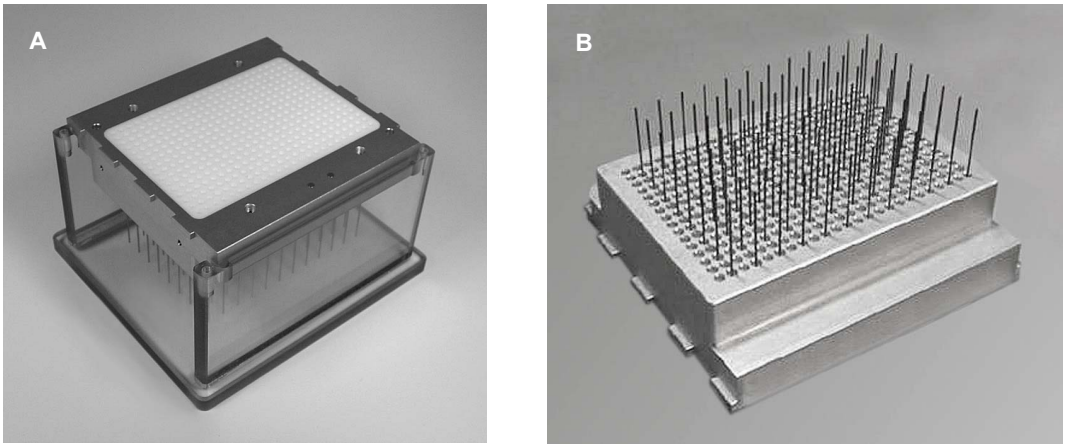


Fig. 3-15 *Adapter 96 Fixed 15 µl MCA384*

A *Adapter top view*

B *Adapter bottom view*

Adapter 96 Fixed 125 µl MCA384

Fixed Tip Adapters

Features and application:

- Incorporates 96 fixed tips, stainless steel, washable.
- Tip length 44 mm
- Volume range: 5–125 µl (DMSO and water)
- Used to pipette into 384 or 96 well microplates.

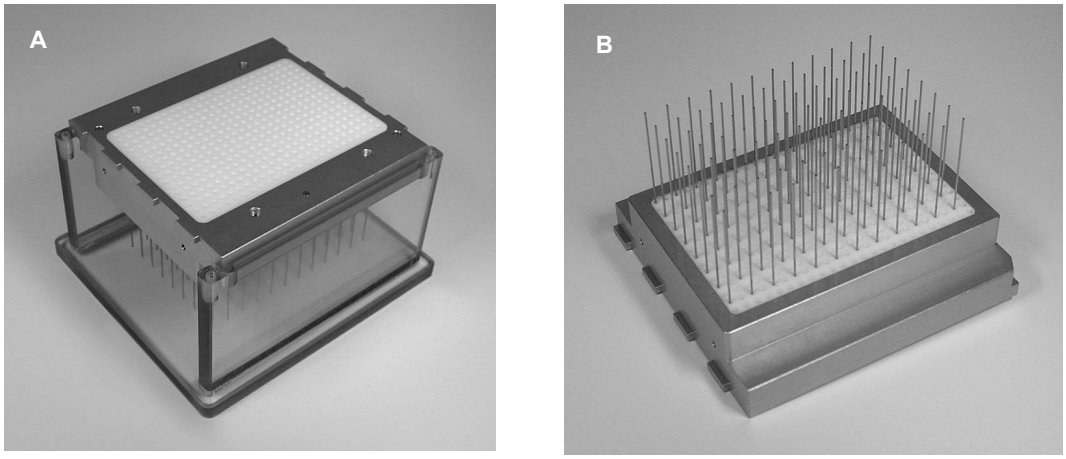


Fig. 3-16 *Adapter 96 Fixed 125 µl MCA384*

A *Adapter top view* ***B*** *Adapter bottom view*

Adapter QC MCA384

Features and application:

- Has a cutout on the top side in the area of the plunger seals and four holes (C) on the bottom side to take up reference pins (corresponding to positions A1, P1, A24, P24 on a 384-well MP).
- Used for setups with reference pins and for covering the gaskets area when the pipetting head is not in use or during transportation.

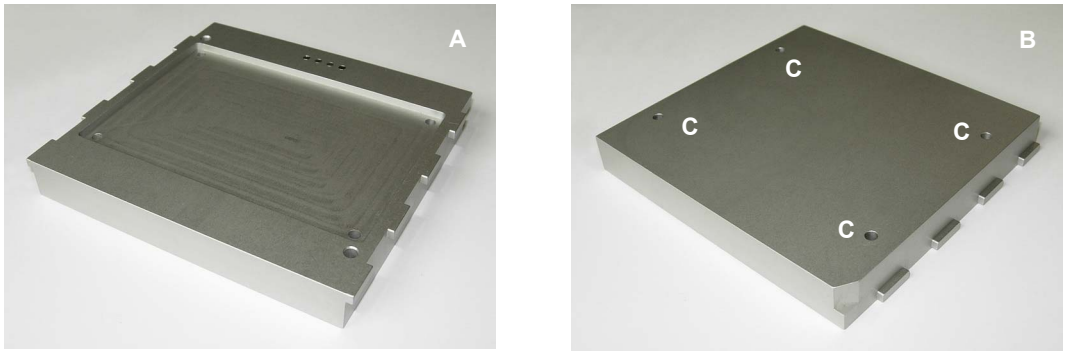


Fig. 3-17 *Adapter QC MCA384*

A *Top view* ***B*** *Bottom view*

3.1.2.3 Tips

Fixed Tips

Corresponding adapters:

- See Fig. 3-13 “Adapter Fixed 15 µl MCA384”, 2 3-15
- See Fig. 3-14 “Adapter Fixed 125 µl MCA384”, 2 3-16
- See Fig. 3-15 “Adapter 96 Fixed 15 µl MCA384”, 2 3-17
- See Fig. 3-16 “Adapter 96 Fixed 125 µl MCA384”, 2 3-18

Disposable Tips (DiTis)

Note: *For easy distinction SBS boxes are color coded.*

MCA384 DiTis

DiTis are available in SBS boxes with 384 DiTis of the following volumes: 15 µl[1)], 50 µl, 125 µl

Fig. 3-18 *DiTi boxes with 15 µl, 50 µl and 125 µl DiTis*

MCA96 DiTis

With special adapters MCA96 DiTis can be used on the MCA384 pipetting head. The DiTis are available in SBS boxes with 96 DiTis of the following volumes: 50 µl, 100 µl, 200 µl and 500 µl.

Fig. 3-19 *DiTi boxes with 50 µl, 100 µl, 200 µl and 500 µl DiTis*

1) *For availability see section “”, 2 6-61*

Picking up MCA96 DiTis

The MCA96 DiTis are picked up by the MCA384 pipetting head from the system segment or standard nest segments.

3.1.2.4 Consumables

Troughs

Troughs from individual suppliers can be placed on standard microplate nests. Volumes: 65 ml and 300 ml.

3.1.2.5 MCA384-Specific Segments

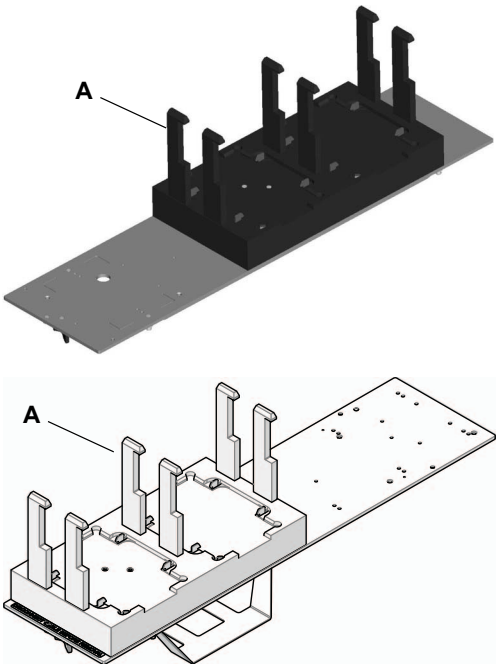
In addition to the standard MP nest segments/runners and the DiTi nest segments the MCA384 makes use of the system segment and an active DiTi nest segment especially designed for the MCA384.

Note: *The active carriers are connected to the Fluent electronics with a cable. Avoid damage to the cable or connector by proceeding slowly if relocating or removing the active carrier. Disconnect the cable if carrier is to be removed. Refer to the Fluent Operating Manual.*

Removing the carrier on frequent (daily or weekly basis) is not recommended. Ensure the active carrier is placed in a worktable layout that does not require the Active Carrier to be moved regularly.

Note: *Active carrier with front position mounting only allowed with full front door.*

MCA384 Active DiTi Nest Segment



Features and application:

- Dedicated segment for picking up 384 DiTis with the MCA384 pipetting head.
- The segment can hold two DiTi boxes.
- Latches (A) on the segment allow the head to engage mechanically during the DiTi pick up procedure.
- Retainers activated by a built-in solenoid keep the DiTi boxes in place during the DiTi pick up procedure.
- The MCA active carrier is required for picking up more than 32 MCA384 tips.
- The MCA active carrier is not required to pick up MCA96 tip types or 32 or less MCA 384 tips

Fig. 3-20 *MCA active DiTi nest segment*

Picking up MCA384 DiTis

The MCA384 DiTis are picked up from the MCA384 active DiTi nest segment. The special mechanical design ensures that the flow of forces for taking up the DiTis remains within the head and the MCA384 active DiTi nest segment (instrument deck and robotic arm are not under tension when picking up DiTis).

The sequence explains the DiTi pick up procedure:

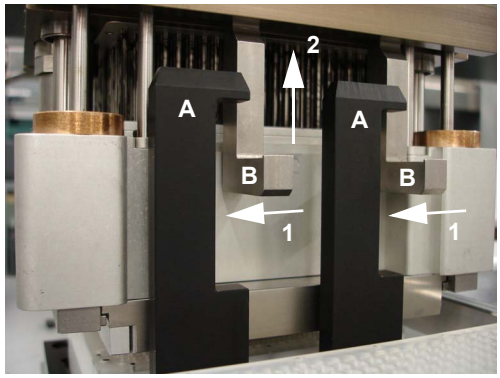


Fig. 3-21 DiTi pickup mechanism

1. The head moves its hooks (B) to the left under the latches (A) of the MCA384 active DiTi nest segment.
2. The plunger plate moves up, engages the hooks/latches and then presses the **Adapter DiTi MCA384** down to pick up the DiTis.

DiTi Rows and Columns

Depending on the adapter type it is possible to pick up single rows or columns of DiTis from a DiTi box. In this case the DiTi box is placed on a special DiTi nest (MCA384 MP/DiTi nest) on the system segment (see Fig. 3-26 “MCA384 MP/DiTi nest”, 2 3-24) or on a standard DiTi nest segment but not the active DiTi nest segment.

DiTi Ejection

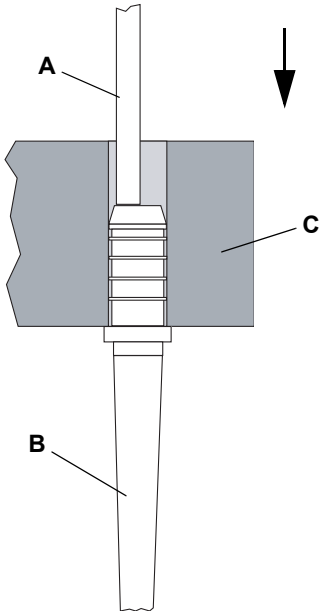


Fig. 3-22 *DiTi eject*

DiTis are ejected by an excentric plunger movement where the plunger presses on the rim of the DiTi shaft.

A *Plunger*
B *DiTi*
C *DiTi adapter*

System Segment MCA

The system segment is a special customized segment for the MCA384 to access a wash station, an adapter plate or DiTi boxes.

It consists of a base plate on which specific components can be placed.

Apart from these components, standard MP or DiTi nests can be placed on the system segment.

It is also possible to mount a front DiTi waste station.

To identify the available parts to assemble an MCA384 system segment refer to section 6.3.5 “Customized Segments”, 2 6-25.

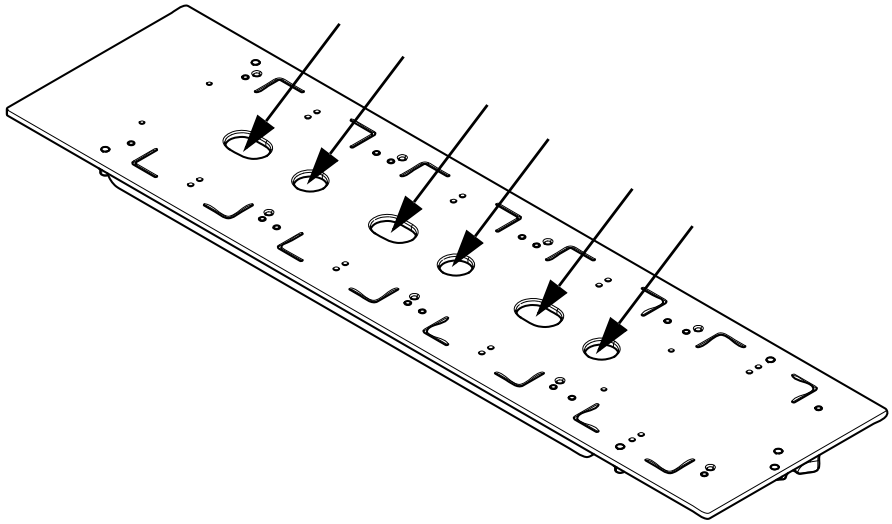


Fig. 3-23 *System segment MCA*

The holes (see arrows) in the base plate are intended to lead through the tubes to and from the wash station.

The system segment offers four positions.

MCA384 Components

The following MCA384-specific components can be placed on the system segment:

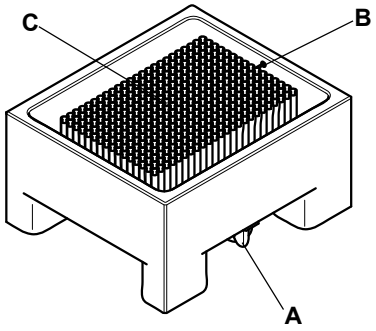


Fig. 3-24 *MCA384 wash station*

The MCA384 wash station can be placed onto the system segment base plate.

The wash station is part of the optional wash system.

A *Tube connectors*
B *Level sensor*
C *Cleaner tube*

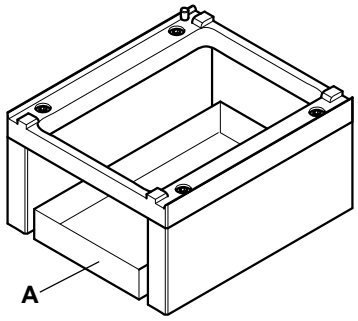


Fig. 3-25 *Head adapter station*

The head adapter station is placed onto the system segment base plate.

It is used for parking one of the MCA384 adapters:

- A fixed tip adapter
- A DiTi adapter without DiTis
- A DiTi adapters with mounted DiTis (for repeated use of the DiTis)

A cover of a DiTi box used as drip tray (A) can be placed under the tip block to protect the segment base plate from aggressive liquids.

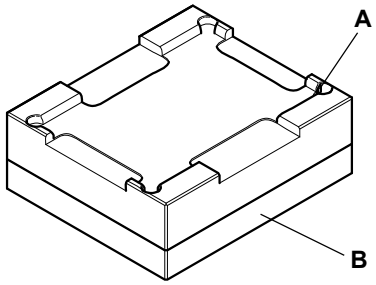


Fig. 3-26 *MCA384 MP/DiTi nest*

The MCA384 MP/DiTi nest can be placed onto the system segment base plate.

It is used to place DiTi boxes at the correct height. Depending on the presence of the intermediate plate (B), two different heights of the nest can be realized (see Fig. 3-27 “MCA384 MP/DiTi nest for different DiTi boxes”, 2 3-25).

The nest has a spring-loaded positioning lock for the labware.

The figure illustrates the application of the MCA384 MP/DiTi nest with or without intermediate plate for different DiTi boxes or microplates:

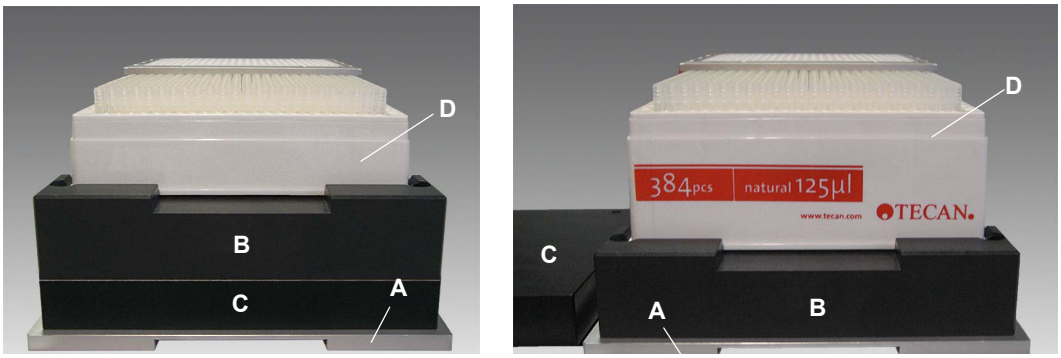


Fig. 3-27 *MCA384 MP/DiTi nest for different DiTi boxes*

A	*System segment*	***C***	*Intermediate plate*
B	*MCA384 MP/DiTi nest*	***D***	*DiTi boxes of different heights*

The figure shows an example for an assembled MCA384 system segment:

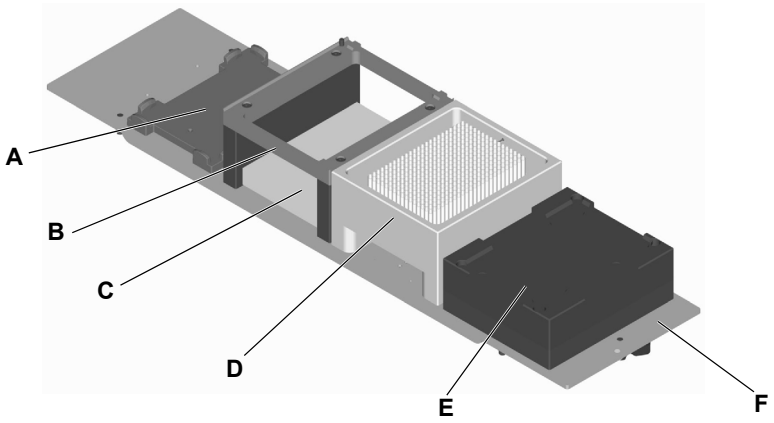


Fig. 3-28 *Example of an MCA384 base segment*

A	*Microplate nest*	***D***	*Wash station*
B	*Head adapter station*	***E***	*MCA384 MP/DiTi nest*
C	*Drip tray (cover of a DiTi box)*	***F***	*System segment base plate*

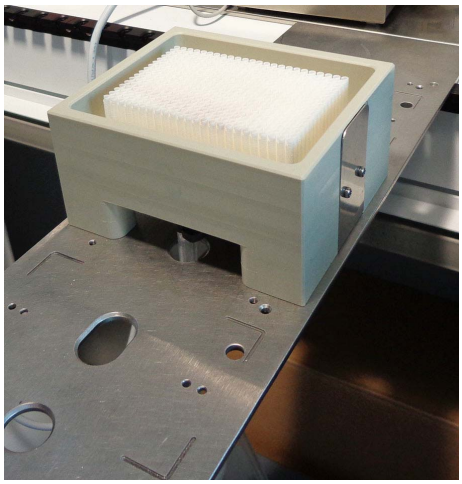
When defining an MCA384 system segment, consider the following:

- Do not place the wash station in the front or rear position, because there is no space for the tubing due to the presence of the instrument frame.
- If a front DiTi waste is mounted on the system segment the positions next to the waste (left and right) are not accessible for the MCA.

3.1.2.6 Wash System

A wash station, installed on a system segment, serves to wash the tips of a fixed tip adapter after each pipetting cycle. The wash cycles in the wash station are controlled by the Control Unit MCA of the wash system. The Wash Unit MCA holds the appropriate electronics and pumps and is connected with tubings to the wash station, wash liquid container and waste container.

Note: *Disposable tips are intended for one single pipetting cycle, i.e., one aspiration step followed by one dispense step. DiTis are usually not washed but disposed after the pipetting cycle.*



Wash Station

Wash System MCA

Fig. 3-29 *Wash Station and Wash System MCA*

A *Wash unit MCA* ***B*** *Control unit MCA*

Diagram

The figure shows a diagram of the MCA384 wash system and its components:

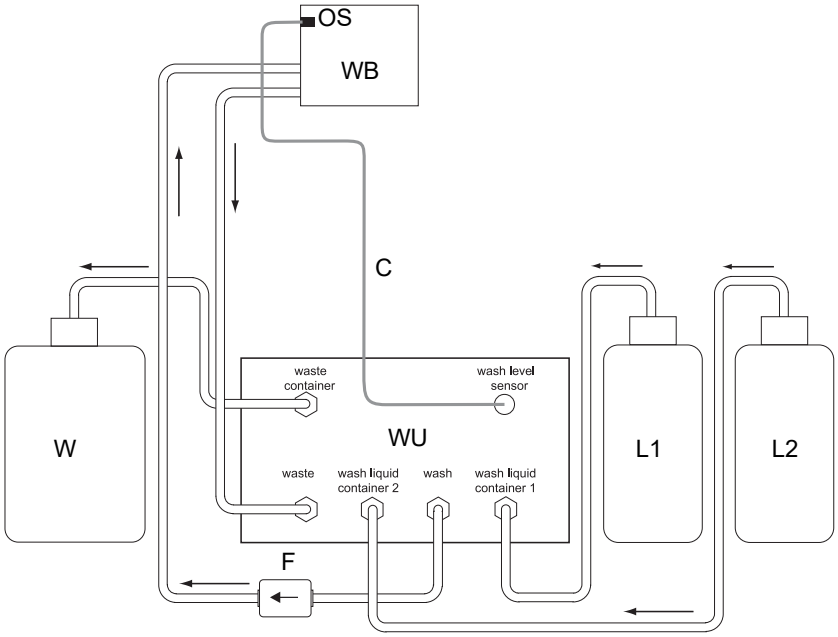


Fig. 3-30 *MCA384 wash system diagram*

WB *Wash Station MCA384*
OS *Overflow sensor*
WU *Wash unit*
→ *Liquid flow direction*
L1 *Wash liquid container 1*
L2 *Wash liquid container 2*
W *Waste container*
C *Connection cable for overflow sensor*
F *Filter for wash liquid*

The heart of the wash system is the wash unit (WU) which is equipped with the valves and pumps that pump wash liquid from the wash bottles (L1) or (L2) through the wash liquid tubes into the wash station (WB). The wash station (WB) is equipped with an overflow sensor (OS), which prevents overflowing. Liquid that flows from the wash station back to the wash unit is pumped into the waste container (W).

MCA 384 Waste Guide

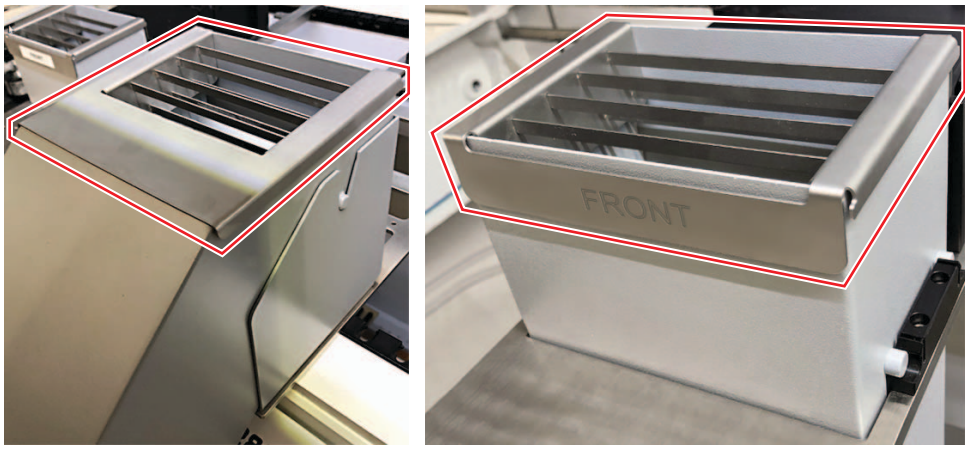


Fig. 3-31 *Waste guides*

The waste guide is needed to correctly dispose MCA384 tips directly to waste.

The waste chute for the vertical, thru waste chute must be placed with the label "FRONT" facing the front of the instrument, toward the user.

The waste guides have a default definition in FluentControl (supported from V 2.8 onward) however the waste guide must be taught accurately for each waste chute/waste guide combination.

The waste guide is compatible with MCA 96 tips in the same waste from FluentControl V3.1.

Note: *Mount thru waste guide with front forward!*

3.1.2.7 FCA Gripper

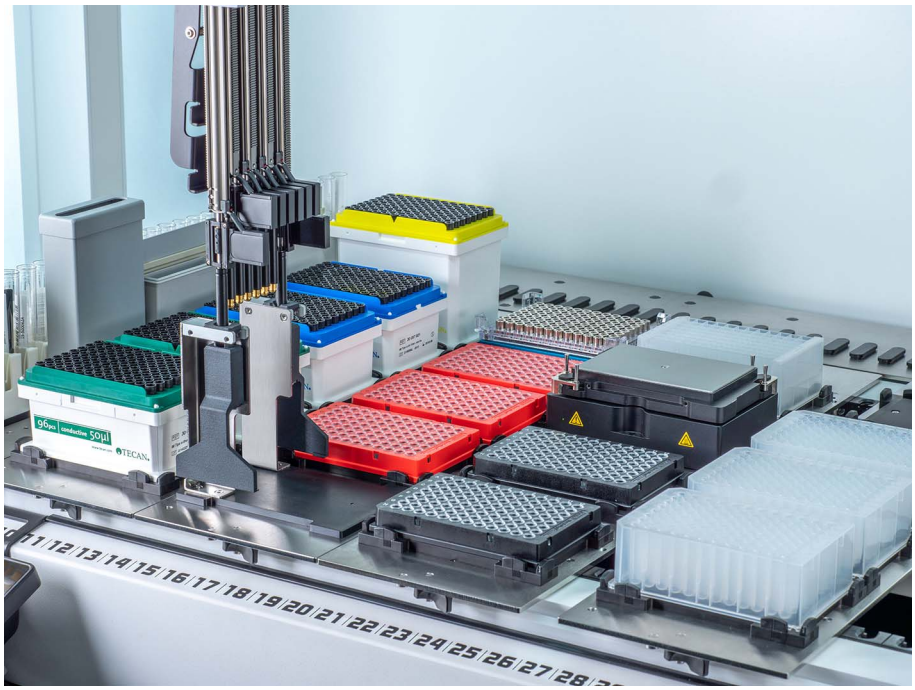


Fig. 3-32 *FCA gripper*

Note: *The FCA gripper does not have the full functionality of an RGA. Mechanical accessibility is limited to standard microplate nests and certain devices. (Devices include Alpaqua Magnet from Alpaqua LLC, MA, USA and Bioshake models with Electric Locking Mechanism (ELM) only from Q-Instruments 07749 Jena, Germany)*

The FCA gripper can lift and move labware (i.e., microplates, deepwell plates, and FCA DiTi boxes) in SBS format (gripping on the long side) with a weight up to 400 g.

Note: *The FCA gripper finger tabs must be inserted below the plate prior to lifting.*

Note: *The MP nest positions should be of similar type on a segment. Do not place 61 mm high microplate nests or DiTi tray nests adjacent to 7 mm high microplate nests positions on a single segment if the channel gripper is to access labware on the lower 7 mm nests.*

Access within FCA range is possible for a full deck segment with six microplate nests. Accessible third party modules are QInstruments shakers and heaters, and Alpaqua magnet plates (without spring). Inheco shakers and heaters are partially accessible depending on the individual configuration of used mounting plate and adapter.

3.1.3 Robotic Gripper Arm (RGA)

Purpose

The Robotic Gripper Arm is used to transport labware, such as microplates, deep well plates, reagent blocks and sample tubes from and to different positions on the deck.

Overview

The figure shows an overview of the Robotic Gripper Arm with excentric gripper fingers and illustrates the direction of movement of the corresponding axes. The gripper (G-axis) can open and close.

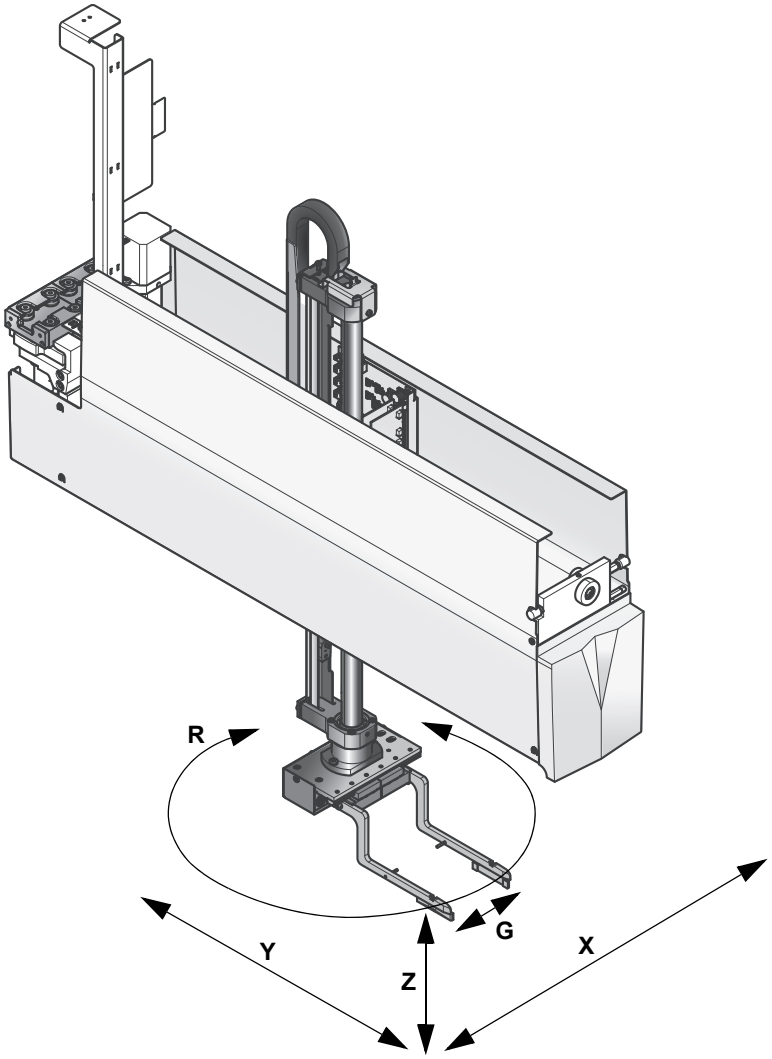


Fig. 3-33 *Robotic Gripper Arm*

G	*Gripper open and close*	***X***	*Arm movement left and right*
R	*Rotational movement of gripper head*	***Y***	*Gripper movement front and rear*
		Z	*Gripper movement up and down*

Function

How Does It Work?

The Robotic Gripper Arm is equipped with individual drives to exactly position the arm and the gripper fingers.

The axes in X, Y and Z-direction are linear movements, whereas the R-axis performs a rotational movement.

The implemented Z-brake prevents the gripper head from moving down in case of a power outage.

Gripper Head

The gripper head can rotate all the way round (360°). Apart from positioning the objects to be transported, this function is also used to rotate sample tubes, which can be placed in front of a barcode reader, to identify the barcode label on the tube.

The gripper (G-axis) can open and close while the grip force is variable and controlled by the electronics.

Z-Brake

The implemented gripper brake prevents the gripper from opening in case of a power outage so that held objects are not released unintentionally. The brake can be released manually to remove a held object in a power-off state of the instrument.To do so press the Z-brake button and move the RGA a little up. You can hear a click tone, if the brake gets released.

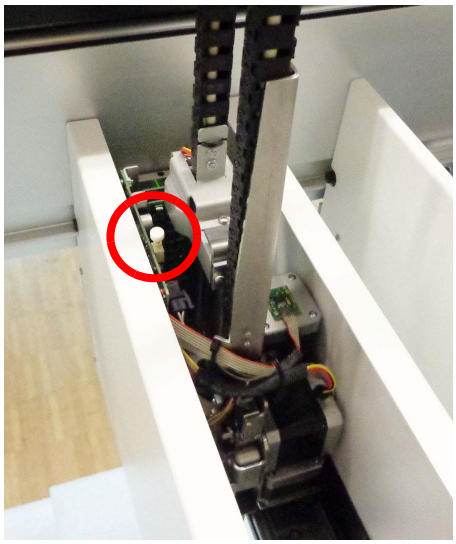


Fig. 3-34 *Z-brake button of RGA*

Gripper Finger Types

Depending on the type of objects to be handled, different gripper finger types are available.

Refer to section 3.1.3.3 “Gripper Finger Types”, 2 3-32.

3.1.3.1 Robotic Gripper Arm Long (RGA-Z)

Purpose

The Robotic Gripper Arm with long Z-axis is used to transport labware, such as microplates, deep well plates, reagent blocks and sample tubes from and to different positions on the deck and underneath the deck.

Depending on the type of labware and the handling position (e.g., on a to P-loading device, such as a centrifuge), different gripper fingers can be attached to the gripper head.

How Does It Work?

The function of the RGA-Z is basically identical with the RGA. The RGA-Z can be equipped with the same options as the RGA.
Refer to section 3.1.3 “Robotic Gripper Arm (RGA)”, 2 3-30.

3.1.3.2 Gripper Head Types

Head with Regular Gripper Fingers:

Fingers fixed with screws, can be manually exchanged.

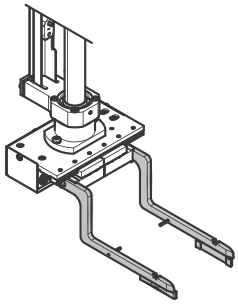
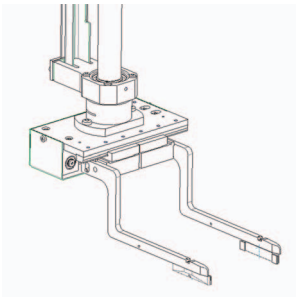
Head with Finger Exchange System:

Fingers designed to be exchanged automatically. For automatic exchange each finger set must have a docking station. Finger Exchange System gripper fingers can also be mounted manually. For manually mounted fingers no docking station is needed.

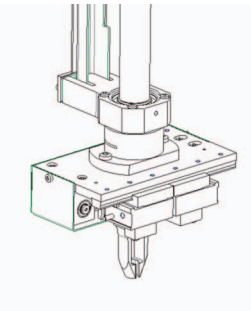
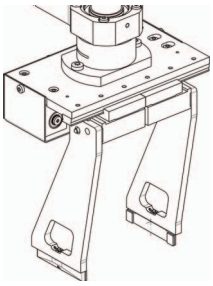
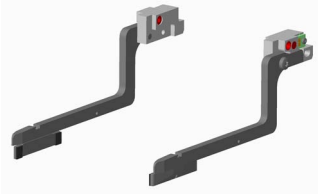
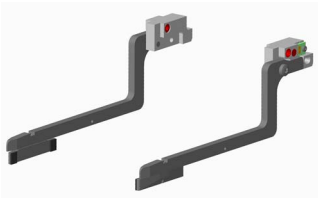
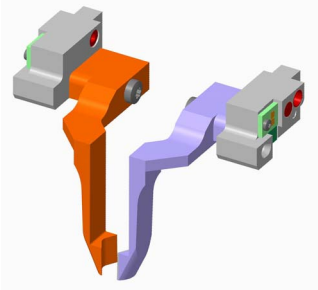
3.1.3.3 Gripper Finger Types

The gripper head of the Robotic Gripper Arm can be equipped with different types of gripper fingers.

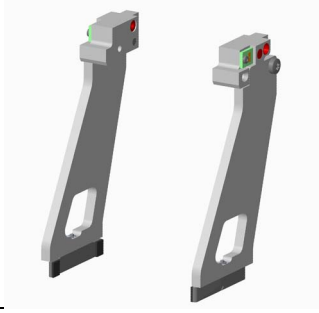
Tab. 3-1 *Gripper fingers*

Gripper Finger Shape	Characteristics
	**Eccentric gripper fingers** This gripper finger type is normally used by the Robotic Gripper Arm for accessing standard micro-plate sites and stacked configurations, such as hotels and incubators, which require a horizontal loading movement.
	**Eccentric long gripper fingers** The eccentric gripper finger type is normally used by the Robotic Gripper Arm for accessing the monitored incubation option with 4 slots.

Tab. 3-1 Gripper fingers

Gripper Finger Shape	Characteristics
	**Tube fingers** The tube finger type is normally used by the Robotic Gripper Arm to transport tube type labware on the Fluent deck.
	**Centric gripper fingers** The centric gripper finger is normally used for accessing microplate based sites from above where access from the side may be limited. It also extends the vertical downward reach for loading devices.
	**FES: eccentric standard fingers** For access of standard microplate sites and stacked sites such as hotels and incubators, which require a horizontal loading movement.
	**FES: eccentric long fingers** For access of microplate sites in the monitored incubation option with 4 slots.
	**FES: tube fingers** For tube transport.

Tab. 3-1 Gripper fingers

Gripper Finger Shape	Characteristics
	**FES: centric fingers** For access of microplates from above, where access from the side may be limited (e.g., reader, washer or centrifuge located under the deck level). Extends the vertical downward reach.

3.1.4 Multiple Channel Arm 96 (MCA 96)

Purpose

The Multiple Channel Arm (MCA) 96 is used for high-speed, high-precision pipetting tasks and offers higher productivity to automated liquid handling methods. With its 96 simultaneously actuated channels, it can pipette from and into 96- and 384-well microplates. It increases the efficiency and speed of pipetting methods for higher throughput and it features a greater level of flexibility.

The optionally attached gripper is used to transport labware, such as microplates, deep well plates, lids, empty tip trays from stacks and reagent blocks from and to different positions on the deck.

Overview

Figure 3-35 shows an overview of the Multiple Channel Arm 96 and illustrates the direction of movement of the corresponding axes:

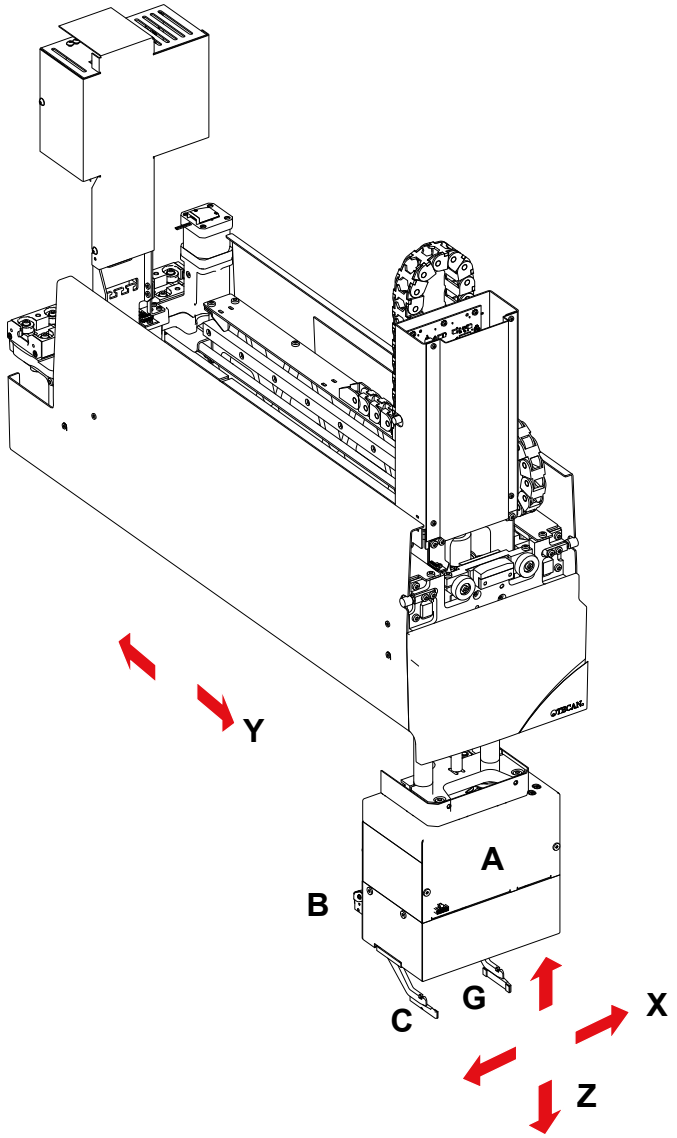


Fig. 3-35 *MCA 96 with Gripper)*

A	*MCA 96 pipetting head*	***Y***	*MCA 96 head movement rear and front (Y-axis)*
B	*Gripper*	***Z***	*MCA 96 head vertical movement (Z-axis)*
C	*Gripper finger*	***G***	*Gripper open and close (G-axis)*
X	*Arm movement left and right (X-axis)*		

Function

The MCA 96 is an air displacement pipetting system. The 96-channel pipetting head features a volume range from 1 µl to 1000 µl with disposable tips. The 96-channel pipetting head can be used to pipette with multiples of 8 (column-wise) or 12 (row-wise) disposable tips when using offset pickup.

For details on the supported disposable tips, please check section 6.6.5

Z-Brake

The implemented brake in Z-direction prevents the MCA 96 head from running down uncontrolled in case of a power outage. The brake can be released manually to move the head up and down in power-off state of the instrument. To do so take hold of the head and press the Z-brake button of the MCA 96.

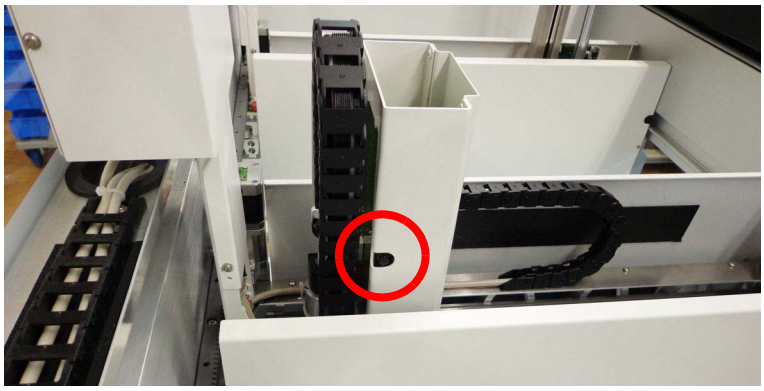


Fig. 3-36 *Z-brake button of MCA 96*

Gripper (optional)

The gripper (G-axis) is optionally mounted on the back side of the MCA 96. The G-axis moves two attached gripper fingers inwards or outwards, while the grip force is variable and controlled by the electronics.

The gripper fingers are designed to be automatically exchangeable by the Finger Exchange System (FES). For automatic exchange, each finger set must have a FES nest, namely the docking station ‘wide’ (see section 6.1.5 and Fig. 6-52).

Note: Mounting DiTis on the MCA 96 is only possible when there are no FES fingers on the gripper, so the fingers have to be parked on the docking station before liquid handling. Vice versa, mounting the fingers is only possible when there are no DiTis on the MCA 96.

Gripper Brake

The implemented gripper (G-axis) brake prevents the gripper from opening in case of a power outage, so that held objects are not released unintentionally. The brake can be released manually to remove a held object in a power-off state of the instrument. To do so, push the slider on top of the gripper slightly towards the left as shown below.

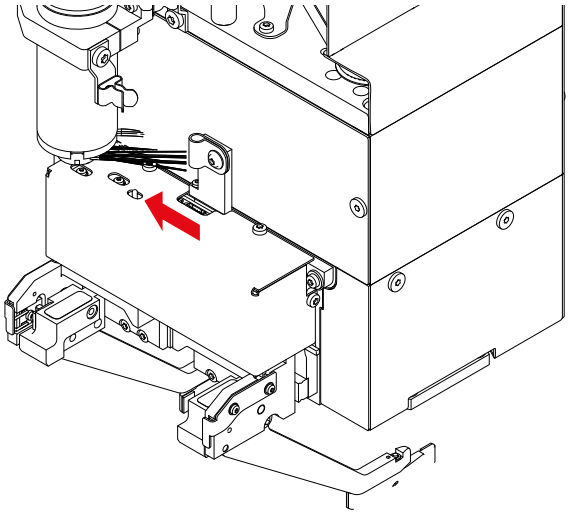


Fig. 3-37 *Gripper Brake*

Gripper Fingers

The MCA 96 gripper is only compatible with its own, dedicated FES finger type as shown in Figure 3-38 and listed in section 6.1.5.

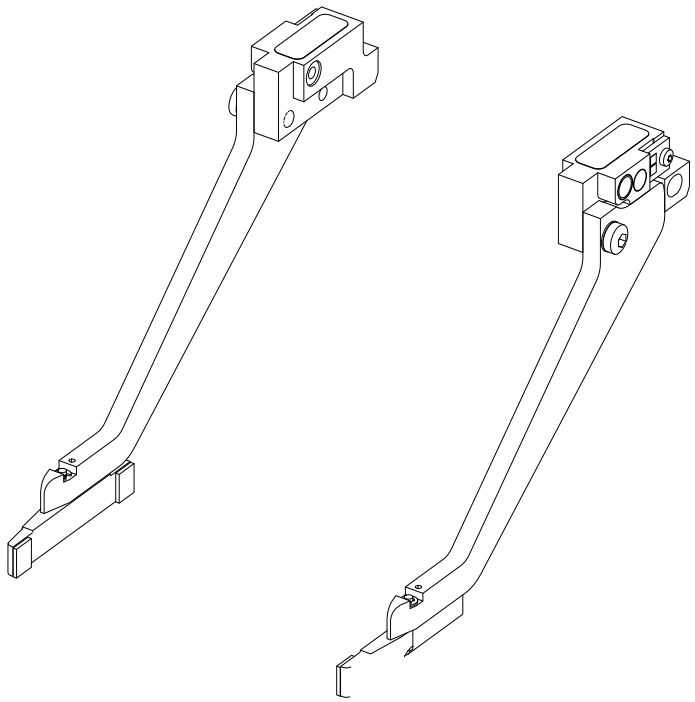


Fig. 3-38 *Gripper Fingers*

3.1.4.1 Gripper Head Types

Head with Regular Gripper Fingers

Fingers fixed with screws, can be manually exchanged.

Head with Finger Exchange System

Fingers designed to be exchanged automatically. For automatic exchange each finger set must have a docking station. Finger Exchange System gripper fingers can also be mounted manually. For manually mounted fingers no docking station is needed.

3.1.4.2 MCA 96-Specific Segments

In addition to the standard MP nest segments / runners and the DiTi nest segments, the MCA 96 makes use of an especially designed segment (see Fig. 6-9) with 4 nests, which are spaced with high distances in Y-direction. This spacing allows the MCA 96 with attached gripper to reach labware on all 4 nests without collisions between the MCA 96 with attached gripper and high labware (e.g. nested DiTi stacks) on the neighboring nest in front / behind.

3.2 Liquid System (Liquid FCA)

Purpose

The liquid system is the central component of the pipetting function. By means of the diluters, the liquid system aspirates or dispenses the sample liquids. Apart from pipetting and diluting, the liquid system is used for washing the tips and for collecting the waste liquid.

Overview

The figure shows a schematic diagram of the liquid system:

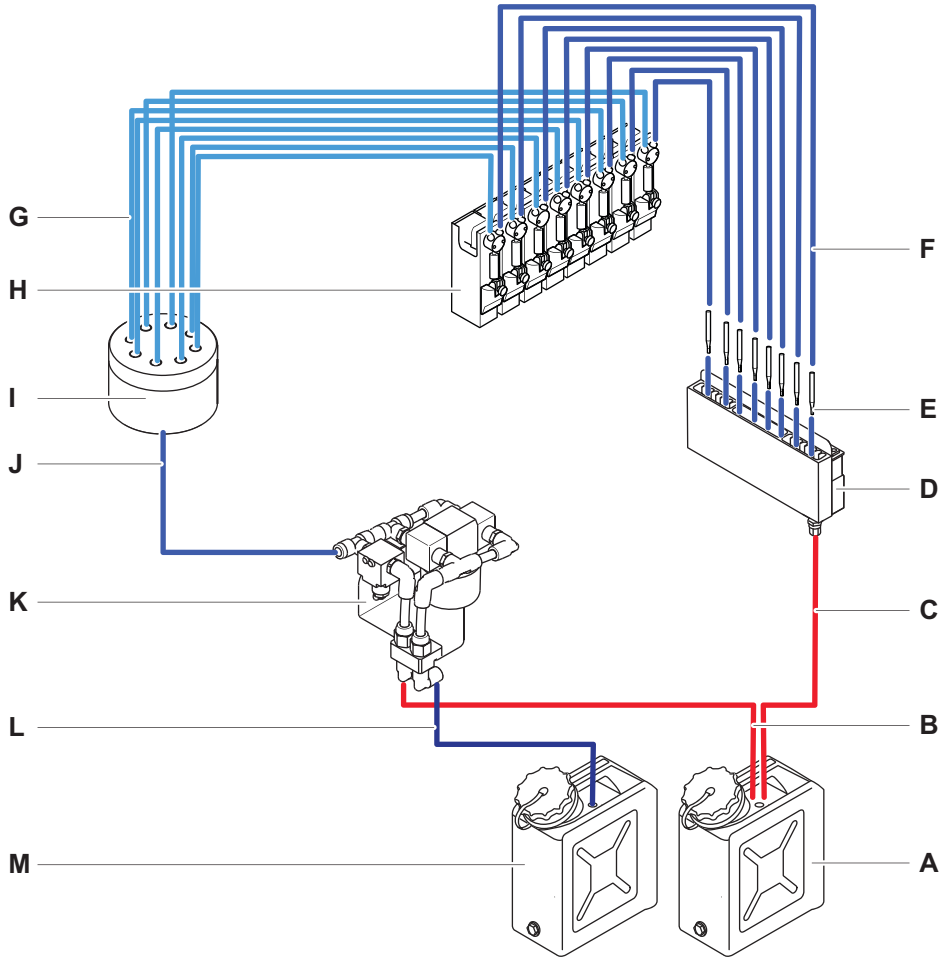


Fig. 3-39 *Liquid system diagram (example for 8-tip instrument)*

A	*Waste container*	***G***	*Interconnecting tubing*
B	*Waste tubing from pressure relief valve*	***H***	*Diluters*
		I	*Distributor 1:8*
C	*Waste tubing from wash station*	***J***	*Aspirating tubing*
D	*Wash station*	***K***	*RapidWash pump*
E	*Pipetting tips*	***L***	*System liquid tubing*
F	*Pipetting tubing*	***M***	*System liquid container*

Function

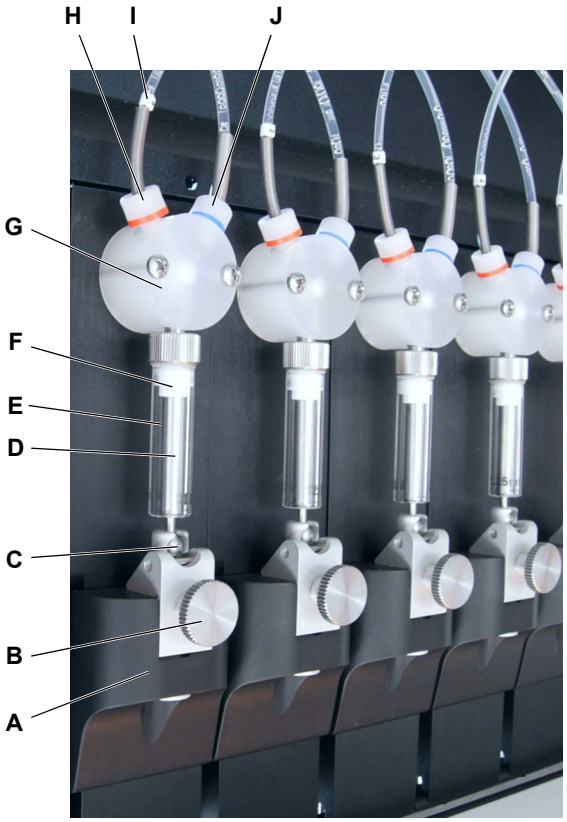
How Does It Work?

The liquid system is filled with a liquid—namely, the system liquid, which is delivered to the system in a container. The system aspirates and distributes the liquid in the whole system via tubes, distributors and valves. The RapidWash pump effects the distribution of the system liquid.

During pipetting, the liquid column conveys the volume change in the diluters to the pipetting tips.

Diluters

The plunger movement in the diluter's syringe performs the liquid displacement or aspiration. The diluters accurately aspirate and dispense liquids and handle air gaps.



A diluter is a precision pump that consists of a glass barrel and a plunger, which is connected to a controlled drive. A 3-way valve directs the liquid flow effected by the plunger movement to the tip or connects to the system liquid supply.

A	*Plunger drive*
B	*Plunger lock screw*
C	*Ball end of plunger*
D	*Plunger*
E	*Syringe barrel (glass)*
F	*Syringe cap (seal)*
G	*3-way valve*
H	*System liquid intake (marked red)*
I	*Tubing label (channel number)*
J	*System liquid outlet (marked blue)*

Fig. 3-40 *Diluters*

Liquid Classes

Depending on the characteristics of the liquid to be handled, specific settings are used during pipetting (e.g., aspiration and dispense speed, air gap size, etc.). These settings are represented by predefined liquid classes in the FluentControl software.

RapidWash Function

The RapidWash pump considerably accelerates the liquid flow to the tips. This function is used for rinsing the system and for resetting liquid column in tubing.

The two pump heads (positive displacement design) are inversely arranged to minimize pulsation in the liquid flow.

During pump actions the 3-way valves of the diluters enable direct flow to the tips.

Pressure Relief Valve

The pressure relief valve serves to limit the pressure in the liquid system. To avoid overpressure, for example, in case of clogged tips, the valve bypasses excessive liquid to the waste container.

Note: *To minimize the contamination risk, Tecan recommends to connect the waste tubing from the pressure relief valve to the waste container as shown in the figure.*

In exceptional cases—for example, if very expensive system liquids are used—the bypass tubing from the pressure relief valve may be directed back to the system liquid container.

Waste Liquid

The wash station collects waste liquid (e.g., excess sample liquid or waste from tip wash procedure) and leads it to the waste container.

3.3 System Liquid

System liquid refers to a liquid which fills the liquid system (Liquid FCA) and is used as a wash fluid and/or diluent.

System Liquid Prerequisites

- The system liquid must be free of particles.
- Make sure that the system liquid container is clean.
- The system liquid must be free of air bubbles and must be room temperature.
- To reach the pipetting performance we recommend degassing the system liquid. For further information on this issue, please contact your responsible application specialist.
- In order to ensure that during operation no air bubbles form in the pipetting tubing, a sufficient quantity of system liquid must circulate in the system. We recommend at least 60 ml per hour.
  Any additives to the system liquid must be validated to evaluate the influence on the pipetting performance and the overall analytical process.

Standard liquid

Deionized or distilled water with a conductivity between 0.5 µS/cm and 10 µS/cm

Special system liquid

DMSO

Pass-fail criteria for standard Operational Qualification (OQ) procedures are based on a water-filled system. Either the liquid system must be returned to water for those service qualifications, or a test must be created and approved for such use by the lab.

3.4 Sample Requirements

The instrument is validated for pipetting deionized water. Other liquids are only allowed after validation according to laboratory practice and state-of -the art by the kit manufacturer or operator of the system.

3.4.1 Preparation of Samples

Visually inspect the samples before pipetting. They must be free of:

- Clots
- Foam
- Droplets on the tube wall

For this purpose we strongly recommend that you centrifuge the samples before pipetting. After the sample collection wait for at least 10 minutes before centrifuging the sample.

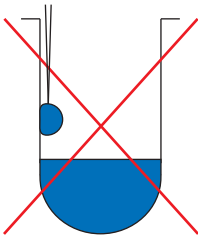


Fig. 3-41 *Droplet on wall*

- Maximally fill the sample tubes to 80%.
- The sample tubes must not contain any additional (non-conductive) inserts or have covers.
- When using monovettes with plunger, the plunger must first be retracted fully and only then be broken off. This method ensures a good contact to the worktable (liquid detection).
- If pipetting from gel monovettes is intended, make sure you use only sample tubes with a sufficient amount of supernatant.

Note: *For further information on sample preparation, please refer also to the recommendations given by your manufacturer and by the WHO.*

3.5 Labware Requirements

Ensure that the tip type (fixed tips or disposable tips) in use, cannot become stuck in the labware in use as the tip moves down into the vessel. Check the tip clearance in the width and height before defining use of a labware or limit the range of access of the tip in the labware definition. Users are responsible for validating the use of different labwares during their process.

3.6 Liquid Level Detection

3.6.1 Introduction

What Is LLD?

Tecan's Adaptive Signal (AST) and MultiSense liquid level detection platforms provide multiple process security functions, leveraging both capacitive and pressure sensing technologies. All flexible channel arms offer liquid level detection and provide1 multiple process security functions:

Captive Liquid Level Detection (cLLD)

The Fluent flexible channel arms pick up conductive tips that are

- able to sense the presence or absence of liquid in a container,
- verify that enough liquid is present in a container to complete the required aspiration
- and minimize the submerge depth of the tip during the aspiration—hence, reducing the risk of carry-over by contamination of the outer surface of the tip and improving the liquid handling precision and accuracy.

Optional Aspiration Supervision

monitors the capacitance during aspiration. A liquid-air boundary crossing could indicate air aspiration.

Optional Tip Retract Supervision

monitors the capacitance during the retraction of the tip out of the liquid after aspiration. A discrepancy of liquid levels during the retraction could indicate a tip occlusion.

Each of the eight channels of the FCA has independent liquid level detection capability.

3.6.2 How Does cLLD Work?

The liquid level detection function is turned on at Z-start, as the tip moves down towards the liquid.

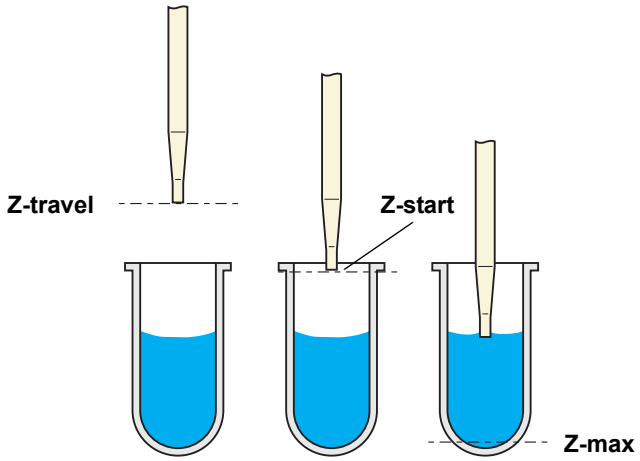


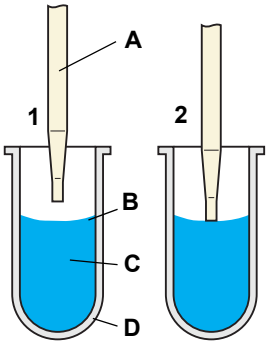
Fig. 3-42 Relevant positions for cLLD

If no liquid is detected when the tip reaches Z-max, an exception message is reported.
Refer to section 3.6.3 “Exception Messages”, 2 3-45.

The capacitive liquid level sensor of the pipetting channel detects the liquid level in a container by measuring the capacitance change between the conductive tip and the grounded deck of the instrument while the tip moves downwards from the reference environment (air) to the liquid.

Detection Signal

A threshold value for the change in measured capacitance is defined in order to trigger a positive feedback when the tip comes in contact with the liquid surface.



1 The tip moves down towards the liquid.

2 The tip reaches the liquid surface, which triggers the detection signal.

A *Tip*
B *Liquid level*
C *(Sample) liquid*
D *Container*

Fig. 3-43 Liquid level detection

Suitable Pipetting Tips

cLLD works with conductive disposable tips.

Tracking during Aspiration

At the time the liquid level detection signal is generated the tip does not stop but moves on to the predefined submerge depth to start aspiration of liquid.
The example shows a typical workflow:

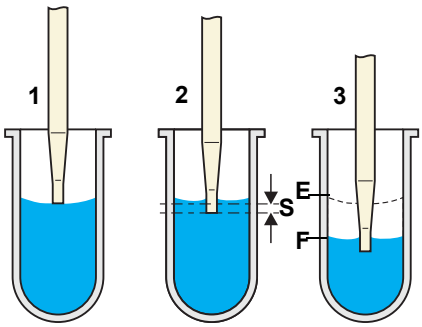


Fig. 3-44 *Liquid aspiration with tracking*

1 The tip detects and reports the liquid level and keeps moving down without stopping.

2 The tip stops at the specified submerge depth.

3 During aspiration of liquid the tip moves down to keep the submerge depth constant (this is called “tracking”).

E *Original liquid level*

F *Liquid level after aspiration*

S *Submerge depth*

LLD in Tubes, Vials and Plates

Each tip is sent down to a separate container. The liquid detection function is turned on simultaneously for all tips participating in the aspiration command. Liquid level detection occurs for all tips in parallel.

LLD in Troughs

All tips are sent down to Z-start in the same well. A central tip moves down from Z-start alone, detects the liquid and moves on to the submerge depth. The remaining tips move down from Z-start to the submerge depth determined by the central tip.

3.6.3 Exception Messages

The FluentControl software generates exception messages if detection and aspiration do not behave as expected.

The messages have the following significance:

- **No liquid detected**
  - No liquid is detected, either because the well is empty or the liquid cannot be detected with the selected level detection method or settings.
- **Not enough liquid**
  - The volume of liquid available (calculated from the detected liquid level, the submerge depth, Z-max and well geometry) is smaller than the requested aspiration volume.

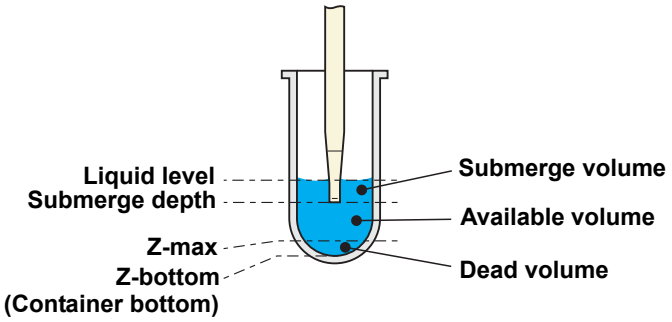


Fig. 3-45 *Situation “Not enough liquid”*

Note: The dead volume cannot be aspirated; it depends on the geometry of the container.

- **Failed level detection**
  - This exception message is generated when
    - the labware, the carrier or the tip is not suitable for capacitive liquid level detection.
    - droplets have formed on the tip orifice before the tip has reached the actual liquid level.
    - the cLLD signal is persistently disturbed by electrostatic or electromagnetic interferences or by the presence of bubbles on the liquid surface.
    - the wrong sensitivity group has been selected for the liquid (AST only).

The following exception messages are generated by the special features of the cLLD:

- **Aspiration supervision failed**
  - This exception message is generated when an unexpected detection or exit signal during aspiration occurs. This is possible when
    - there are bubbles on the liquid surface and air has been aspirated.
    - the wrong labware dimensions are defined, which results in erroneous tracking.
- **Tip occlusion**
  - This exception message relates to the tip retract supervision and is generated when
    - the tip is occluded.
    - there are bubbles on the liquid surface and air has been aspirated.
    - the wrong labware dimensions are defined, which results in erroneous tracking.
- **No exit**
  - This exception message relates to the tip retract supervision and is generated when there was no exit signal during tip retraction. This may be due to
    - complete foam aspiration
    - complete or partial air aspiration

Signal Evaluation and System Response

The Fluent uses a cLLD technology with real time signal evaluation. In case of troubled liquid level detection conditions, such as electrostatic interference, incorrect sensitivity settings (AST only) or a sample integrity issue, the system will trigger an immediate stop and will automatically perform a liquid level detection retry.

This advanced signal evaluation offers several advantages:

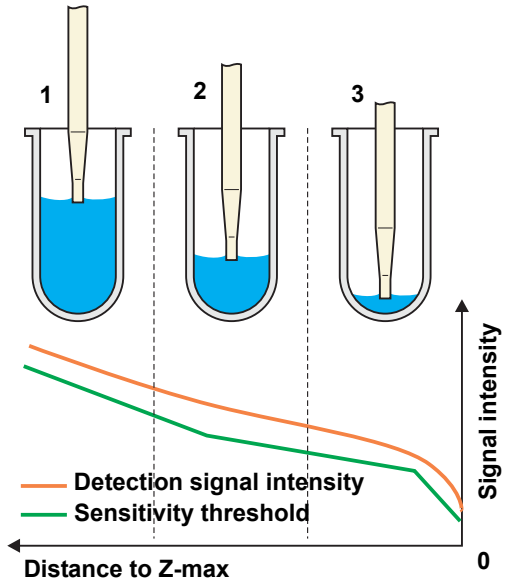
- Immediate stop of the Z-movement in case of failed liquid level detection due to troubled detection conditions.
  - The tip will stop before reaching Z-max, as a protection to avoid overflow of the well.
- Protection against electrostatic discharge and electromagnetic interference caused by, for example, other instruments in the laboratory
  - The cLLD signal evaluation allows the system to discriminate between liquid level detection and external interferences which cause a change of capacitance over the defined threshold. This prevents air aspiration due to a false signal trigger.
- Automatic liquid level detection retry action in case of signal evaluation discrepancies.
  - If the exception persists after two or three automatic retry attempts depending on the signal evaluation discrepancy, an exception message is generated and the exception is subsequently handled as predefined in the FluentControl software by default or as chosen by the application specialist.

Dynamic Threshold Setting

For all liquid flexible channel arms and older air flexible channel arms, using AST technolgy, the cLLD requires requires the liquid to be assigned to one of three sensitivity groups according to its conductivity and relative static permittivity. Each group has a specific sensitivity profile, which is a function of the tip distance to Z-max.

For new (2023) Air FCAs with MultiSense technolgy,setting the sensitivity groups 1, 2 or 3 is not needed and the sensitivity threshold and intensity shown below is a single parameter.

The FluentControl sofware from version 3.3 onwards will automatically detect the arm type and offer either the sensitivity groups or MultiSense.



1 The tip starts moving down; if the liquid was detected in this height range, the relatively large volume would generate a relatively strong signal.

2 The tip keeps moving down; if the liquid was detected in this height range the signal would have a lower intensity than at height 1.

3 The tip approaches the bottom of the well; if the liquid was detected in this height range, the relatively small volume would generate a relatively weak signal.

Fig. 3-46 *cLLD sensitivity profile for conductive liquids*

The sensitivity profile reflects the signal variation expected in case of contact with the conductive liquid, as the tip moves downwards:

- The closer the liquid level is to Z-max, the smaller is the liquid volume and, as a result, the weaker the expected signal.
- This dynamic threshold setting allows the system to detect even the smallest volumes while simultaneously minimizing the susceptibility to interference.

Sensitivity Groups (for Liquid FCA and Air FCA with AST)

Air FCA with MultiSense does not need these sensitivity group settings.The MultiSense automatically distinguishes the same example liquids listed below. There are different sensitivity groups for cLLD. The liquid to be handled must be classified, accordingly. Correct sensitivity group assignment of the pipetted liquid is critical for the reliability and the sensitivity of the capacitive liquid level detection.

How to Define the Group?

The FluentControl software provides two different means to determine the sensitivity group assignment of a liquid:

1 The liquids database contains a large variety of liquids commonly used in laboratories and their respective cLLD sensitivity group assignment.
Refer to the FluentControl Software Manual.

Tab. 3-2 *cLLD sensitivity group definition*

Liquids/Groups	Conductivity and relative static permittivity characteristics	Example liquids that represent the group
Group 1	< 10 µS/cm and relative static permittivity ≥ 24 and < 80	Ethanol 96%
Group 2	10 to 100 µS/cm or < 10 µS/cm and relative static permittivity > 80	Deionized water
Group 3	> 100 µS/cm	Tap water, physiological salt solutions (0.9% NaCl)
Group 7	> 100 µS/cm (in combination with piercing septum)	whole blood, serum, physiological salt solutions

Note: *Non-conductive liquids with a relative static permittivity lower than 24 (e.g., octanol, ε_r = 10.3) may be detected with cLLD under certain conditions. If your liquid falls into this category, please contact your Tecan application specialist to determine how cLLD can be used for your specific labware configuration and application needs.*

2 If the conductivity and the relative static permittivity are not known for a liquid, an automatic method for assignment of the liquid to one of the three groups is available.
Refer to the FluentControl Software Manual.

Other Considerations

(Deck) segments

The Fluent (deck) segments and runners are designed for optimal cLLD performance. If customized carriers are intended to be used with cLLD, they must be designed in accordance with the design guidelines for setting up segments.
Refer to the Fluent Operating Manual.

Labware

The cLLD is compatible with common labware used in laboratories such as microplates, plastic or glass tubes, and troughs. For cLLD compatibility, the labware material must be non-conductive and the bottom of the containers must touch the conductive grounded base of an appropriate segment, or at least be no more than 2 mm (0.08 in.) away from it.

System liquid

In general, deionized water is recommended as system liquid. DMSO is also allowed as a system liquid. Solvents (other than cleaning agents listed and used as described under system care have not been tested and are not supported. Refer to the Fluent Operating Manual.

Any aqueous liquid used as system liquid must have a conductivity between 0.5 µS/cm and 10 µS/cm for cLLD compatibility.

3.6.4 Special Features

The special features “aspiration supervision” and “tip retract supervision” can be enabled or disabled individually.

Aspiration Supervision

Concept

If cLLD is selected as liquid level detection method, the aspiration supervision offers additional method security.

Precondition

For the proper function of the aspiration supervision the following precondition applies:

- The aspiration supervision is only guaranteed if the tip is ≥ 4 mm above Z-max after aspiration (the software handles this condition automatically and makes a corresponding entry in the log file).

How Does it Work?

During aspiration, the FluentControl software monitors the capacitance between the tip and the instrument deck.

A change in capacitance reveals one of two possible circumstances:

- The liquid is no longer surrounding the tip orifice; the tip exited the liquid (exit signal detected). This can occur if the geometry of the well is incorrectly defined causing wrong tracking and air aspiration.
- The liquid conductivity or relative static permittivity is not homogenous. This can occur if
  - the liquid level detection signal has been triggered through contact with foam. The tip subsequently comes into contact with the actual liquid surface during aspiration
  - the tip comes into contact with a second liquid layer with different conductivity and permittivity during aspiration.

Tip Retract Supervision

Concept

If cLLD is selected as liquid level detection method, the tip retract supervision function offers additional method security.

Preconditions

For the proper function of the tip retract supervision the following preconditions apply:

- The tip retract supervision is only effective if the tip is ≥ 4 mm above Z-max (position of calculated liquid level after aspiration + submerge). The software handles this condition automatically and makes a corresponding entry in the log file.
- For optimum liquid level detection reliability the tip retract speed should be no slower than 20 mm/s. If a slower retract speed is chosen, the exit signal may fail to trigger.

How Does it Work?

After aspiration the FluentControl software monitors the capacitance between the tip and the instrument deck while the tip is retracting from the liquid to ensure that an exit signal occurs at the expected height.

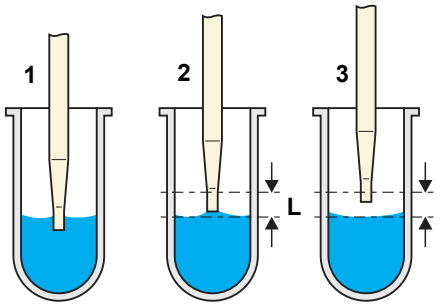


Fig. 3-47 Exit signal at expected height

1 The tip retracts from the sample.

Normally, the exit signal is detected shortly after passing the level of the calculated liquid surface.

This delay is caused by adhesive forces that make the liquid stick to the tip.

2 The retract supervision checks if the exit signal is within a predefined limit (L).

3 The tip is still within the limit after detection of the exit signal.

An exception message is generated if the exit signal is above the expected level, or if there is no exit signal at all.
Refer to section 3.6.3 “Exception Messages”, 2 3-45.

This exception can stem from:

- A tip occlusion during aspiration causing insufficient volume aspiration (see Fig. 3-48 “Tip occlusion during aspiration”, 2 3-51).
- A filament hanging from the tip, causing a risk of contamination of the work area when the tip moves on to dispense the liquid into the destination container (see Fig. 3-49 “Filament hanging from the tip”, 2 3-51).
- An incorrect geometry definition for a custom labware leading to wrong tracking, and, thus, excessive tip submerge affecting the pipetting precision and causing a risk of contamination.

The example shows a situation with an occluded tip (compare with tip retraction after normal aspiration Fig. 3-47 “Exit signal at expected height”, 2 3-50):

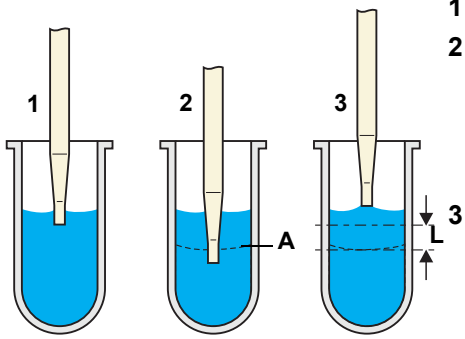


Fig. 3-48 Tip occlusion during aspiration

1 There is an attempt to aspirate liquid.

2 However, the liquid level remains the same (e.g., because the tip is occluded).

The liquid surface is expected to be at level (A) after aspiration.

3 The tip retracts and there is no exit signal within the limit (L).

An exception message is generated and the predefined handling is started.

A *Theoretical liquid level after aspiration*

L *Predefined accepted limit*

The example shows a situation with a filament hanging from the tip (compare with tip retraction after normal aspiration Fig. 3-47 “Exit signal at expected height”, 2 3-50):

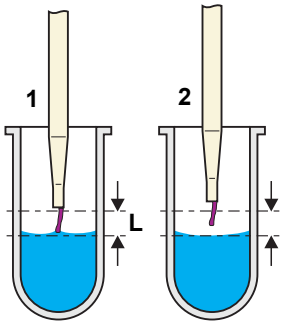


Fig. 3-49 Filament hanging from the tip

1 The tip is beyond the limit (L) and there is still no exit signal.

2 When the exit signal appears the tip is out of the limit.

An exception message is generated and the predefined handling is started.

Undetected Tip Occlusion

The following critical situation (tip retract supervision could not generate an exception message) may occur if the sample has not been centrifuged properly.

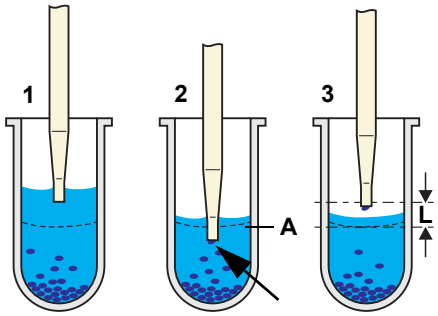


Fig. 3-50 *Liquid not completely aspirated*

1 There are floating particles in the sample. The tip aspirates liquid.

2 During aspiration—in the worst case shortly before the end of the aspiration step—a particle occludes the tip (see arrow).

The liquid surface is expected to be at level (A) after aspiration.

3 The tip retracts and the exit signal appears within the limit (L).

No exception message is generated though the tip is occluded.

Though a certain amount of liquid has been aspirated, the expected difference of the liquid surface level before and after aspiration is too small for detecting the exception.

Note: *For that reason it is very important that the samples are properly centrifuged and handled carefully to avoid floating particles.*

3.6.5 cLLD with Septum Piercing

If cLLD is used in conjunction with septum piercing the following must be considered:

- Use of correct software commands ("pierce with liquid level detection" or "liquid level check")
- Enable cLLD only when tip is already inside the tube (pierce first to any position above the liquid level inside the tube and then in a second movement into the liquid)
- Use an optimized sensitivity group (e.g., 7 for highly conductive liquids)
- Due to the force on the arm during piercing the detection position of the liquid level (Z-level) can deviate from the actual liquid level position.
- Go to section "Custom Attribute" and adjust the variable called *PiercingDetectionHeightCompensation*. This variable will directly be added to the liquid level detection position (Z-level).

This deviation can be adjusted with a correction factor in the labware definition of the labware to be pierced in the FluentControl software.

Note: *This offset can vary between different instruments, arms, tube rotators and labware types. Therefore a validation of the application is recommended.*

3.7 Deck Components

3.7.1 Nest Segments

There are different nest segments for microplates and disposable tip boxes.

Microplate Nests

The microplate nests are made of conductive plastics to enable liquid level detection (cLLD) in microplates.

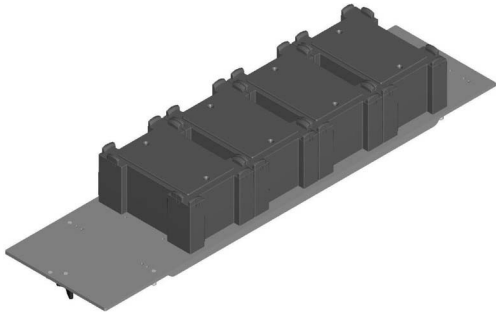


Fig. 3-51 *Microplate nest segment*

There are nest segments with different heights of the microplate nests. This improves the accessibility of elements having different heights:

- The 7 mm high nests are used for higher elements (e.g., DiTi boxes or deepwell plates)
- The 61 mm high nests are preferably used for low microplates.

Liquid Level Detection

Standard microplates are often “hollow” on the bottom side. This results in a distance of the liquid in the MP wells to the surface of the MP nest that is too large for the function of the liquid level detection (cLLD). For this reason a microplate nest adapter (B) made of conductive plastics is screwed on the MP nest (A).

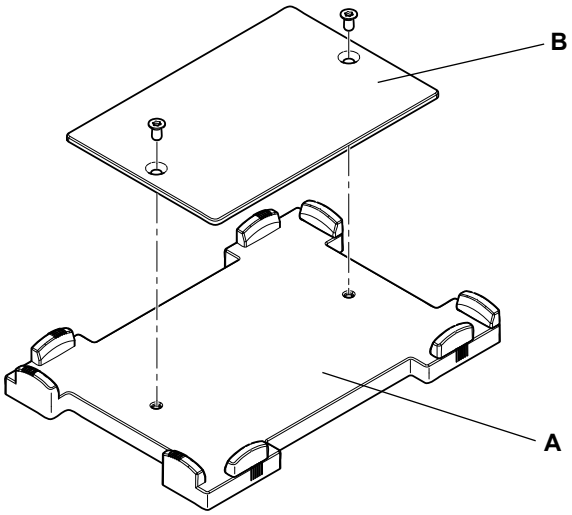


Fig. 3-52 *MP nest with/without microplate nest adapter*

It may be necessary to remove the microplate nest adapter from the MP nest for specific labware (e.g., microplates with flat bottom or DiTi racks, which are placed directly on the MP nest). Keep in mind that in this case cLLD performance cannot be guaranteed.

Note: *For a list of nest adapters, refer to section 6.3.5 “Customized Segments”, 2 6-25.*

Adjustment to MP Size

The microplate nests are equipped with adjustable positioners. This enables the user to compensate for mechanical tolerances of different microplates.
The figure explains how the adjustable positioners work:

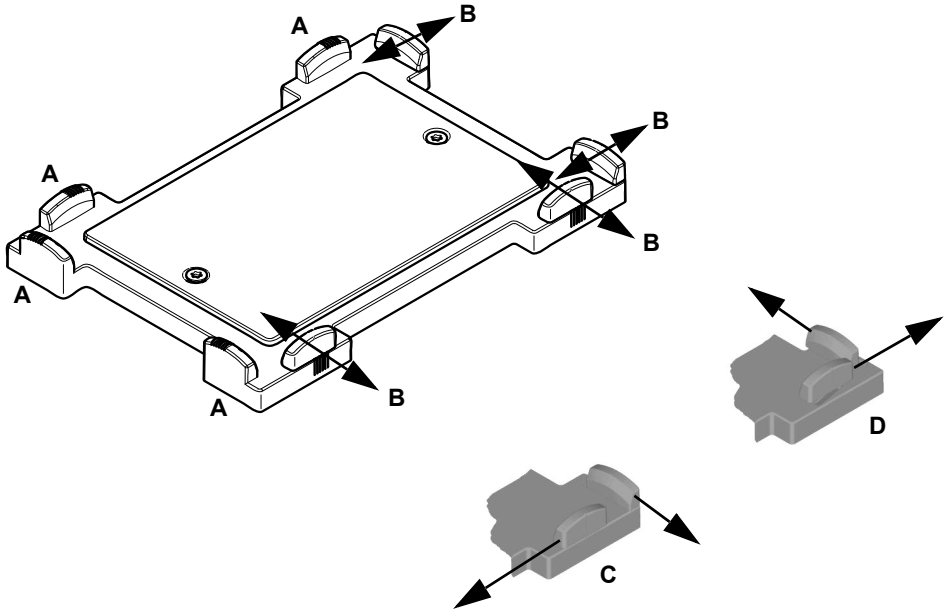


Fig. 3-53 *Adjustment of microplate nest*

The curbs (A) on the microplate nest are stationary. They position the microplate in the upper left corner (usually well position A1 of the MP is in this corner).
The positioners (B) are adjustable. They can be moved along an inclined slot to adjust the nest to the microplates footprint. If moved in the directions of the arrows as indicated in figure (C) the footprint gets wider; if moved in the directions of the arrows (D) the footprint gets narrower.

3.7.2 Deck Segments

The deck segments represent a part of the grid on the instrument deck. The smallest deck segment is two grid positions wide.

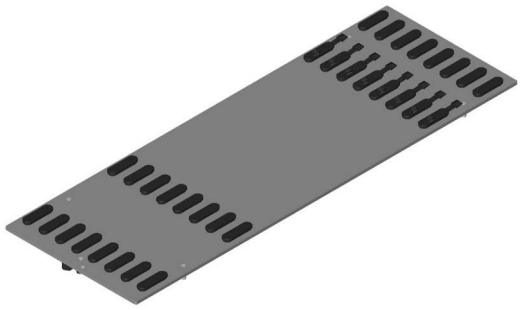


Fig. 3-54 *Deck segment*

Positioning Pins

Evenly spaced positioning pins on the deck segment ensure proper positioning of the runners—sample tube runners and reagent trough runners—on the deck. For loading and unloading, the positioning pins allow the runners to slide in Y-direction. The lock pin defines the end position of the runner.

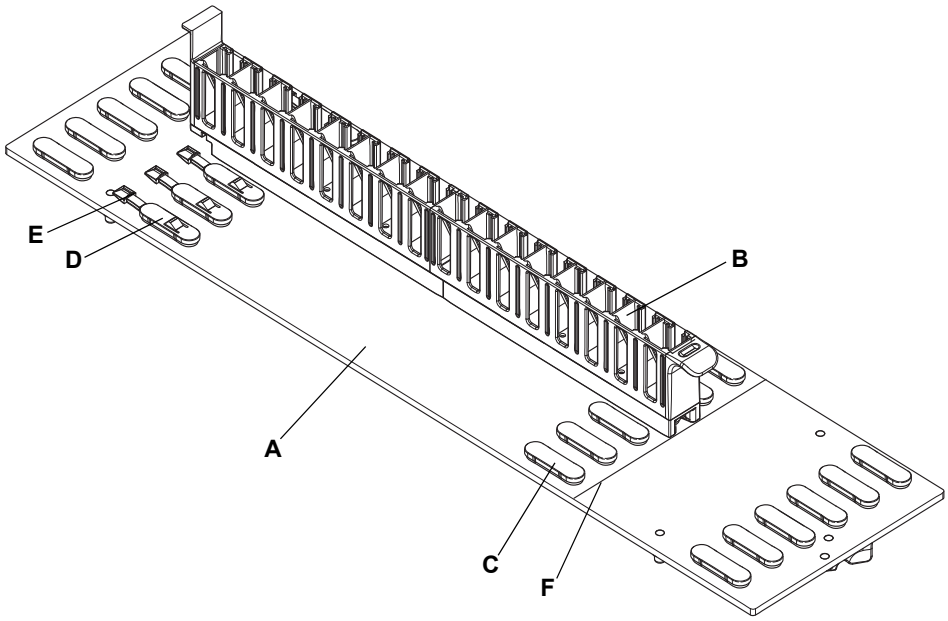


Fig. 3-55 *Runner on deck segment*

A	*Deck segment*	***D***	*Lock pin*
B	*Runner*	***E***	*Nose on the lock pin*
C	*Guide pin*	***F***	*Indicator line*

The runner is in proper position when it abuts the nose of the lock pin. An indicator line on the deck segment shows the runner's position. This enables the operator to visually check if the runner has been placed properly.

Adapters

The positioning pins are also used to position adapters, which are used as sites for hotels, incubators or other options. These adapters have slots that match the shape of the positioning pins, and on the other side they have cavities that match, for example, the feet of a microplate reader.

There is a number of deck segments with special functions—for example, with positioning pins on the side to install a hotel or other options, or with a cutout for the gripper to gain access to options below the deck surface.

Runners

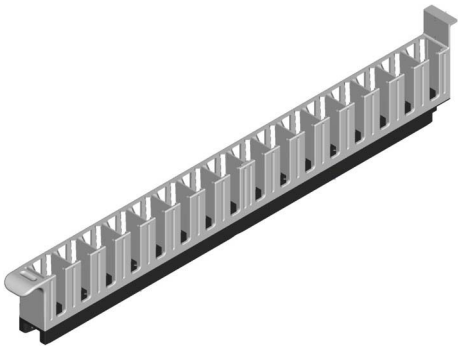


Fig. 3-56 *Tube runner*

3.7.3 Combo Segments

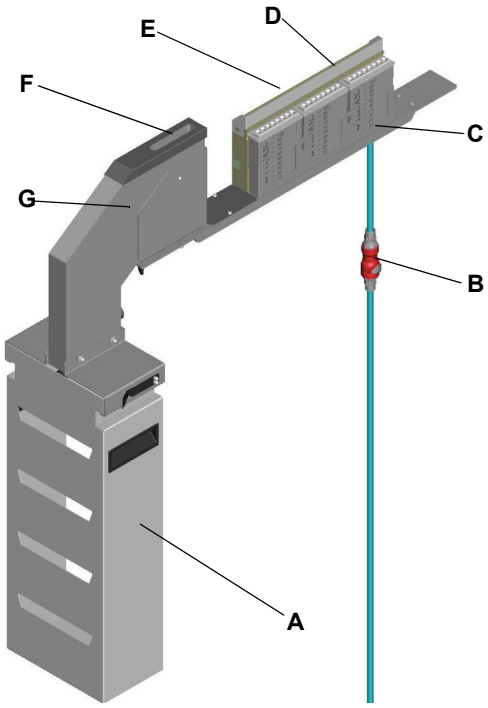
The combo segments combine, for example, the following functions:

- Disposable tip nests
- Microplate nests
- Reagent trough nests
- DiTi waste “through”
- DiTi waste front
- Wash/waste station

In the following, a few examples of combo segments are explained with respect to their specific advantages.

Examples

The figure shows an example of a combo segment with wash/waste station, trough nests and front DiTi waste:



A *Container for DiTi waste bag*
B *Coupling of waste tubing*
C *Trough nests*
D *Separator*
E *Wash station*
F *Cover with slot*
G *DiTi waste slide*

Fig. 3-57 *Combo segment example 1*

Front DiTi Waste

The front DiTi waste is equipped with a DiTi waste slide. The waste is collected in front of the deck in an exchangeable DiTi waste bag. The front safety panel needs a dedicated cutout at the position where the combo segment is placed.

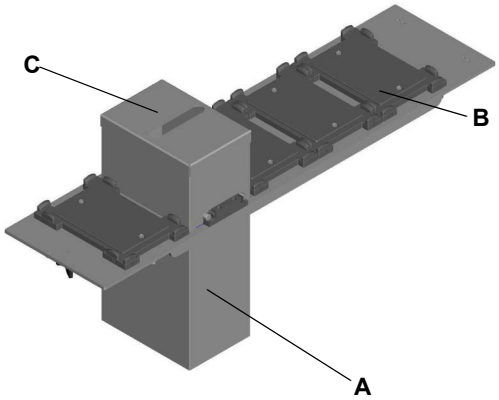
The cover minimizes the risk of liquid splashes falling onto the deck during tip ejection, since the wet part of the DiTis is already moved through the slot before DiTi ejection.

The front DiTi waste works together with the disposable tip ejection system. Refer to section 3.8.2 “Disposable Tip Ejection System (TES)”, 2 3-61.

Wash/Waste Station

The separator between the wash/waste station serves as a splash protection in order to reduce the risks cross contamination during liquid handling.

The figure shows an example of a nest segment for microplates and “through” DiTi waste:



A *“Through” DiTi waste funnel*
B *Microplate nest*
C *Cover with slot*

Fig. 3-58 *Combo segment example 2*

“Trough” DiTi Waste

The “through” DiTi waste is equipped with a straight waste funnel. The space underneath the instrument deck must be free to place a container to collect the waste. This means that the segment cannot be used on instruments placed on a standard laboratory bench. Normally, the instrument is placed on an optional cabinet.

The waste is either collected in a bin under the funnel, or an optional waste cart is placed here. The “through” DiTi waste stations can also be equipped with a waste bag holder. In this case an exchangeable waste bag collects the waste.

The cover minimizes the risk of liquid splashes falling onto the deck during tip ejection, since the wet part of the DiTis is already moved through the slot before DiTi ejection.

The “through” DiTi waste works together with the disposable tip ejection system. Refer to section 3.8.2 “Disposable Tip Ejection System (TES)”, 2 3-61.

3.7.4 MCA System Segments

The MCA system segments are customized segments with specific components to be used with the Multiple Channel Arms.

For the MCA384 refer to section 3.1.2.5 “MCA384-Specific Segments”, 2 3-20

3.8 Optional Equipment and Modules

3.8.1 Monitored Liquid Level

Container Fill Level

The optional liquid level sensors monitor the liquid level in the system liquid and waste liquid containers.
The figure shows how the sensors detect the liquid level in the containers:

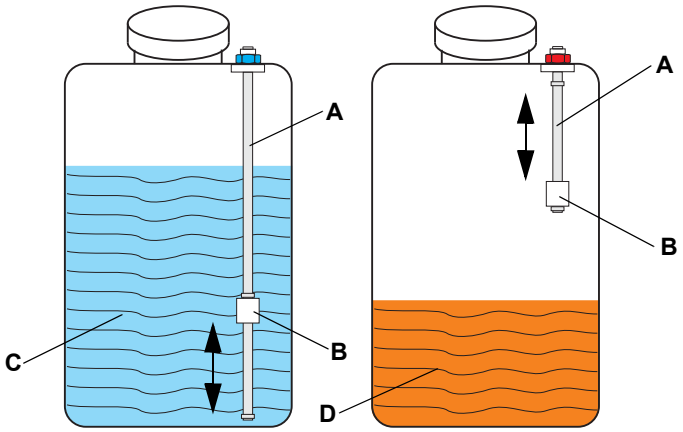


Fig. 3-59 *Liquid level sensors in the containers*

The sensors consist of a tube (A), a floater (B) and electric contacts in the tube. The floaters, which are made of a material that is lighter than the liquid, can move along the tube within the range indicated by arrows.
Lifted by the liquid, the floaters activate switches that are placed at the corresponding height in the tubes.

The electrical signals are used to generate a corresponding message

- when the system liquid (C) falls below a certain level.
- when the waste liquid (D) exceeds a certain level.

3.8.2 Disposable Tip Ejection System (TES)

Introduction

The disposable tip ejection system is used to automatically eject disposable tips from the FCA. The DiTi waste station below the TES, which collects the waste DiTis, is part of a combo segment.
Refer to section 3.7.3 “Combo Segments”, 2 3-57.

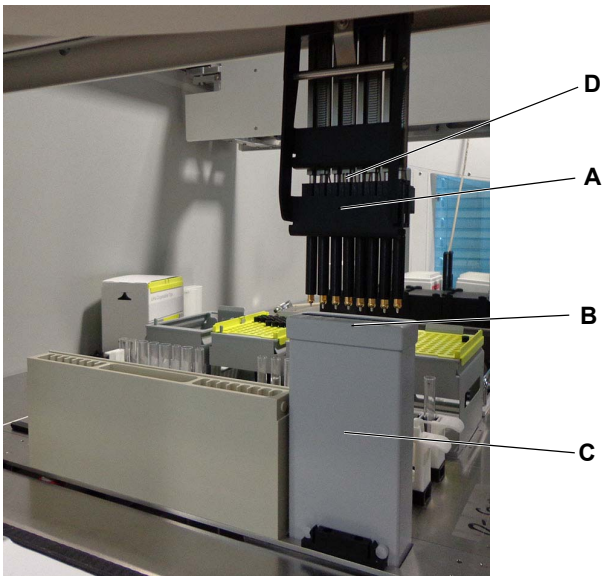


Fig. 3-60 *Disposable tip ejection system and waste slide*

A	*DiTi ejector (rocker)*	***C***	*DiTi waste slide*
B	*Cover for DiTi waste*	***D***	*Z-rod*

Function

The TES enables DiTi ejection at a lower position. This means that the FCA positions the wet part of the DiTi through the slot in the cover of the DiTi waste station before DiTi ejection in order to minimize the risk of aerosol over the deck area.

To eject the DiTis the rocker is moved towards the Z-rods, then the Z-rods retract to strip the DiTis off.

DiTi Waste Station

There are different kinds of DiTi waste stations. The front DiTi waste has a waste slide and the DiTis are collected in a waste bag. The “through” DiTi waste has a straight funnel and the DiTis are collected in a container below, or in a waste bag.

3.8.3 Readers and Washers

Optional readers and washers are listed in 2.5.2 “Third Party Options”, 2 2-72.

The readers and washers can be installed

- in a cabinet compartment underneath the instrument deck.
- on a deck extension that is placed on the side of the instrument.
- on the instrument deck (in the rear or on the side).

If the reader is installed on a shelf for devices, it is loaded and unloaded by means of an RGA with eccentric gripper fingers.

For more information about the microplate reader, refer to the reader's documentation.

3.8.4 Balance

The pipetting precision of the Fluent instrument can be verified by means of a precision balance.

Note: *The balance SAG 285 from Mettler Toledo is validated with the software. In principle, other balances can also be used for this task, but the user needs to make the necessary adaptations by her/himself.*

Please note:

- The SAG 285 balance consists of a weighing module and a separate display unit. The weighing module is placed on an appropriate adapter plate on the instrument deck, while the display unit is usually placed on a table beside the instrument.
- The WXS205SDU balance consists of a weighing module and a control unit. It has no separate display unit. The weighing module is placed on an appropriate adapter plate on the instrument deck.

For detailed information about the balance, its installation and setup, and the gravimetric test refer to the following documents:

- Operating Manual Balance Kit
- Operating Manual of the balance itself (e.g., provided by Mettler Toledo)

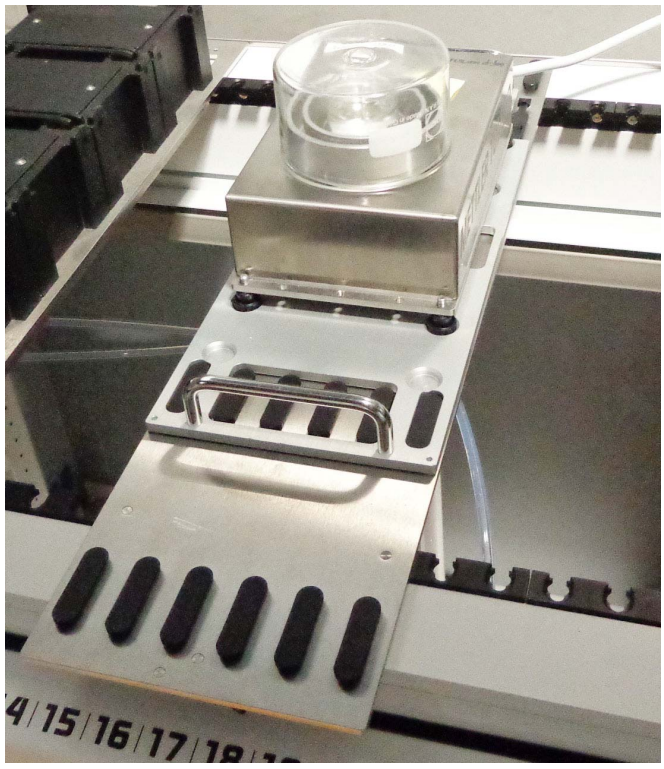


Fig. 3-61 *Balance WXS205SDU*

Adapter Plate for Balance

The adapter plate for balance allows accurate positioning of the balance on a deck segment.

Fig. 3-62 *Adapter plate for balance*

3.8.5 Front Door Locks

A pair of door locks can be added optionally to the instrument. These prevent the door being opened during the run and triggering the ActiveStop. This can be useful to protect the process that is running. Door locks can be released by pause/ stop request via the software.

Note: *Door sensors are always present on the instrument, these trigger the ActiveStop so door locks are not required for user safety purposes.*

3.8.6 Cabinet Door Locks

Cabinet door locks include a door sensor. At least one cabinet door lock is required on a system with an Robotic Gripper Arm with Long Z-axis and should be placed to prevent user access to space below the deck which is accessed by the Robotic Gripper Arm Long Z. Door locks are required on all cabinet doors on Instruments that have UVC light (HEPA hood with UVC or UVC light option). Opening the door locks will deactivate the UVC light.

3.8.7 External Door Locks

External door locks transfer the door sensor and door lock concept of both the instrument and the cabinet to an external door system via an extended cabling system. Door locks must be present on the external enclosure, such as the doors on a Biological safety enclosure. Door locks supported are from EUCHNER GmbH + Co. The integrator is responsible for maintaining the physical safety concept of the Fluent instrument.

3.8.8 Phase Separator

Overview

The Phase Separator is designed to detect interfaces between liquids of different viscosity.

The Phase Separator is integrated in the Air FCA arm of the Fluent, not requiring additional hardware. A FluentControl software license is required to enable the use of this functionality.

A prerequisite for the use of this functionality, is a distinct liquid-liquid interface between the liquids to be separated (separation phase), which is usually achieved by centrifugation of the source liquid(s).

To be able to determine the pressure changes, the disposable tips of the Air FCA with the detection technology are needed to be moved into close proximity of the liquid-liquid interface. Thus, the liquid transfer has to be optimized for every application during the validation of the workflow by the laboratory to avoid uptake of liquid from the adjacent phase.

The eight Air FCA pipetting channels work in parallel, independently detecting the corresponding liquid-liquid interface.

Note: *The Phase Separator feature can only be used together with a MultiSense Air FCA and FluentControl version 3.3_SP1 or later.*

How Does it Work?

The basic principle of the Phase Separator is to detect the liquid-liquid interface via pressure measurement.

1 and **2**:
The pressure is continually measured within the disposable tip during aspiration.

3:
Upon reaching the liquid-liquid interface, a change in pressure will be registered. This position is then recorded as the height of the liquid-liquid interface (Phase Height).

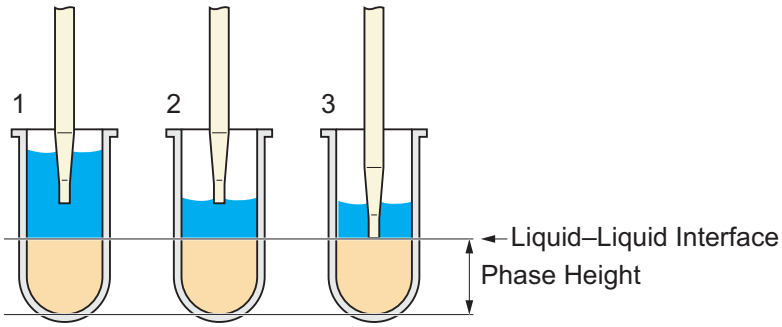


Fig. 3-63 *Phase Separator*

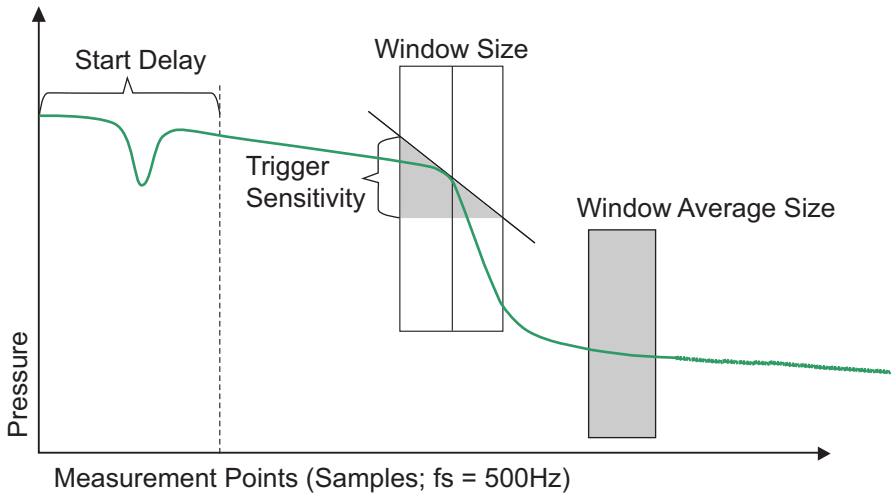


Fig. 3-64 *Phase Separator Graph*

Using the Phase Separator it is thus possible to automate the identification and the separation of liquid fractions based on their different liquid viscosities. The identification of the separation layer in a tube can be determined within a precision of 1 mm.

Procedure

Workflow integration

To integrate the Phase Separator into a workflow, the “Detect Phase” command needs to be inserted into a (dedicated) liquid class.

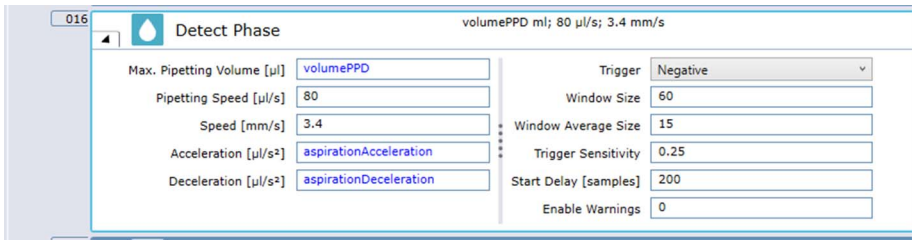


Fig. 3-65 *Example liquid class* that contains the detect phase command for a centrifuged whole blood sample (*object may be subject to change)*

Start Delay (samples)

Number of measuring points from the starting point of the measurement that are left out during the search for the liquid-liquid interface.

Trigger Sensitivity

The Trigger Sensitivity depends on the slope of the curve and is calculated from the 1st and 2nd derivative of the curve (curve change) within the measurement window. It represents the threshold at which the pressure changes trigger the detection of a liquid-liquid interface. Value from 0 to 1.
The smaller the value of the Trigger Sensitivity, the smaller the threshold that signals a liquid-liquid interface detection (thus a smaller slope change / pressure change is needed to signal an interface).
The bigger the Trigger Sensitivity value, the bigger the change in the slope of the curve must be to indicate the detection of a liquid-liquid interface.

Window Size

The Window Size defines the amount of data points that will be used to evaluate if a pressure change occured. The value range is from 1 to 250.
A larger Window Size allows monitoring a broader data set for a change in pressure (slope change of the curve), therewith reducing false positive detections. At the same time, the larger value increases the time needed to detect the interface.
A smaller value allows faster interface detection but increases the risk of false positive detections.

Window Average Size

The Window Average Size filter, that flattens small bumps in the curve before the detection algorithm analyzes the curve to detect real pressure changes, indicating a liquid-liquid
interface. The Window Avg. Size defines how big the smoothing window for this filter shall be. If too large, too many data points will be used in the curve smoothing calculation and a small pressure change might be missed.
Recommendation is to only increase the Window Size if too many false positive detections occur.
The Window Avg. Size is instrument type specific and has been optimized for use on Fluent.

Default Values

The default values delivered with the FluentControl software microscript command have been optimized for interface detection in centrifuged blood (EDTA and Streck tubes), detecting the interface between plasma (at the top) and cellular layer (buffy coat and red blood cells at the bottom) on all Fluent base unit sizes. Different liquids might need adjustment of the default values to optimize the interface detection.
This liquid class can be used in a FluentControl “Aspirate” command to identify the height of the liquid-liquid interface. When the detection command is triggered, the corresponding detection height is saved as a “well attribute” (Phase Height) and can be retrieved via the “GetAttribute” function.
After the Phase Height is known, the upper fraction can be removed using regular liquid handling procedures and liquid classes.

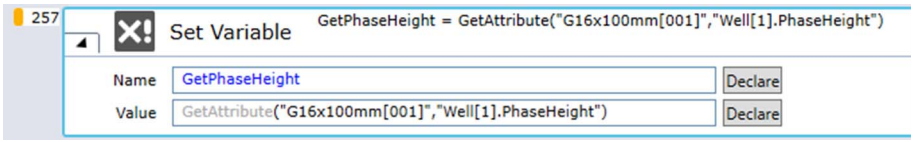


Fig. 3-66 *Example command to extract the identified Phase Height of a G16x100 tube in a script (object may be subject to change).*

Note: *The default values given in the detection command are optimized for centrifuged whole blood samples (centrifugation conditions 2500 rcf at room temperature for 10 minutes). For other liquids, the parameters in the microscript command might need to be adjusted.*

Precautional Measures

As the detection (Z-speed) in the labware usually exceeds the regular liquid tracking speed, an increased tip submerge will occur during detection. This results in a displacement of liquid during detection, which can cause a fast rise of the overall liquid level in labware with a small diameter. To avoid spillover, it is recommended not to fill the labware completely or remove an appropriate amount

of liquid before interface detection to allow a larger submerge of the disposable tip.

Additionally, to prevent contamination of the pipetting channel above the disposable tip, the sample tube height must be considered during phase detection. The system provides a default safety measure against contamination that prevents the contact of the tip cone with the liquid during phase detection. It is still recommended to choose phase detection settings that avoid a full submersion of the channel—e.g., via reduction of the detection volume.

In case the lower fraction of two liquids shall be separated, the upper fraction should be removed first to avoid contamination of the disposable tip with liquid from the upper layer and to prevent pipetting channel contamination.

Parameter Evaluation

Depending on the liquid type, the parameters for the sample preparation and the parameters for the separation phase detection must be optimized. The optimization of the workflows lies in the responsibility of the customer.

Relevant parameters such as centrifugation conditions, the detection (e.g., z-speed, aspiration speed, algorithm parameters) and aspiration (e.g., distance to the lower phase) need to be adapted accordingly.

Detailed description of each parameter can be found in the Application Software Manual (Refer to section 1.1 “Reference Documents”, 2 1-1).

Optimizing Liquid Handling

Phase detection occurs in close proximity to the liquid-liquid interface. To prevent inadvertent uptake of liquid from the adjacent phase, a liquid dispense of 40 µl at low speed back to the source tube after detection is recommended. Additionally, it might be beneficial to aspirate a small volume prior to the detection to condition the disposable tip.

The transfer of the upper and lower phase to the destination tubes must have optimized liquid handling parameters (e.g., standard tracking speed for non-phase detection processes in the source and destination, dispensing with contact in the destination tube) to avoid sample contamination.

Separation Speed

By default the phase detection speed during aspiration is set to 80 µl/s and the z-speed is set to 3.4 mm/s (see Fig. 3-65, 2 3-66), which has been verified for the separation of plasma in centrifuged blood collection tubes.
While the exact time for the separation of liquid is linked to the volume to be separated and the distance of the destination labware from the source tubes, the separation of 3 to 4 ml of plasma from eight blood collection tubes takes approximately three minutes.

Evaluation of Phase Location

FluentControl includes a function to determine if the height of the liquid-liquid interface is located above, below, or inside of an expected range of a specific labware. The confidence levels can be defined in FluentControl. Samples where the liquid phase is detected outside of the defined range are flagged. The statistical baseline for this feature has been determined with centrifuged blood samples of healthy individuals and would need to be adjusted for other liquids.

Limitation of Phase Detection

The Phase Separator can detect liquid phases without prior knowledge of the phase position (height) in a defined labware at a range between 5 mm below liquid level and 5 mm above tube bottom.

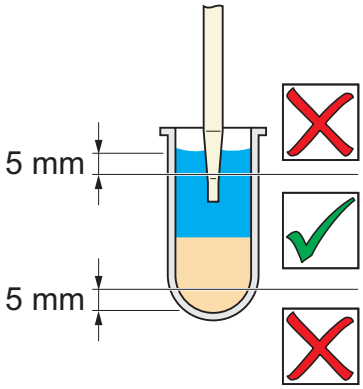


Fig. 3-67 *Phase Separator range*

Consumables

The Phase Separator was designed to work in a specific range of labware.
The system has been verified for the use of tubes with an inner diameter of standard 9 ml blood collection tubes (Greiner VACUETTE 13 x 100 mm tubes) and up to 50 ml disposable conical centrifuge tubes (Thermo Fisher Scientific Falcon). For the use with labware of diameters outside the named range, the phase separator functionality has to be evaluated by the laboratory.

Error Handling

The Phase Seperator microscript command has an optional feature to raise a warning, in case the aspiration volume is reached but no detection was triggered. This is useful, when only a single detection is performed, during which the liquid-liquid layer is expected to be found.

Note: *In case several detections are expected to occur before the phase is found (e.g., during plasma separation from a 9 ml blood tube), this feature should be disabled in the command to avoid unnecessary warnings.*

If no phase is found and the tip reaches the bottom of the labware, a warning will be raised. The laboratory has to define the response to the warning in the workflow. The most common procedure would be to either pause the script for user inspection or skip this sample for downstream liquid handling.

Example Workflow

For an example script for plasma and/or buffy coat extraction, please contact your local sales and service team. Refer to chapter 7 “Customer Support”, 2 7-1.

3.8.9 PMP-AI

Pressure Monitored Pipetting on Fluent uses Artificial Intelligence (PMP-AI) as a tool to interpret pressure curves, in order to help identify pipetting anomalies and mitigate the risk of undetected pipetting errors.

PMP-AI requires

- an Air FCA*
- an additional FluentControl Software license

*An additional cable (p/n 30224609) that must be installed on Air FCA with AST board. On newer Air FCA with MultiSense the additional cable is not required.

For further details on using PMP-AI refer to the Application Software Manual.

4 Operation

Purpose of This Chapter

This chapter explains the operating elements and possible operating modes. It gives instructions on how to operate the Fluent properly and safely.

For the options used by your configuration, refer to the separate operating manuals. Additionally, perform a test run after each repositioning of external devices or options.

4.1 Liquid Handling Settings

Recommendation

Before running an application for the first time, optimize all liquid handling parameters by means of test runs with a neutral liquid.

4.1.1 General Instructions

Setting of Z-heights

Z-travel

A segment's Z-travel is the Z-height at which the tip travels from one segment to another. It is adjusted to be above any possible obstacle associated with this segment.

Z-dispense

Z-dispense is the Z-height at which liquid is dispensed. It is adjusted to be always above the liquid level and low enough to prevent splashing in adjacent containers.

Z-start

Z-start is the Z-height at which the liquid level detection is activated.

For tubes, Z-start must be situated at least 1 mm below the rim and 2 mm above the liquid surface. For microplates, Z-start is defined 1 mm above the well rim and at least 2 mm above the liquid surface.

Z-max

Z-max is the Z-height which lies as close as possible to the lowest container point without touching the container bottom.

Z-bottom

Z-bottom is the Z-height of the container bottom.

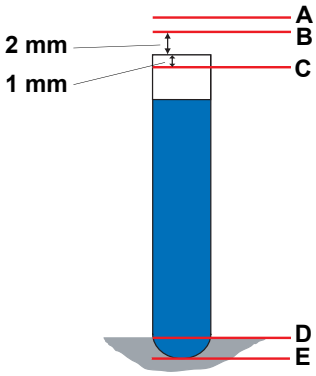


Fig. 4-1 *Sample tube Z-heights*

A *Z-travel*
B *Z-start*
C *Z-dispense*
D *Z-max*
E *Z-bottom*

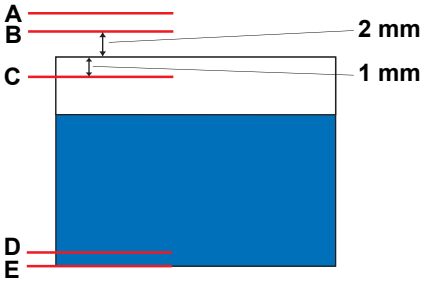


Fig. 4-2 *Reagent trough Z-heights*

A *Z-travel*
B *Z-start*
C *Z-dispense*
D *Z-max*
E *Z-bottom*

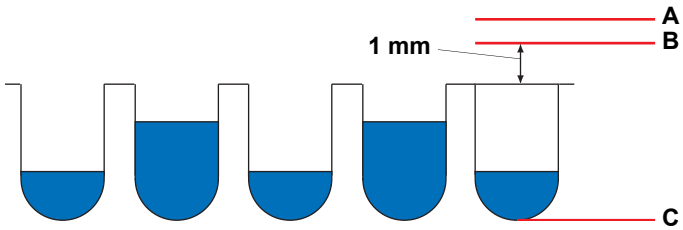


Fig. 4-3 *Microplate Z-heights*

A *Z-travel*
B *Z-start, Z-dispense below rim*
C *Z-max*

Fill Level of Containers

To ensure safe handling (e.g., transport by means of an MCA 96 gripper, RGA, etc.) of the containers, make sure that the fill level of the containers does not exceed the following limits:

- Fill the test tubes to a maximum of 80%.
- Fill microplates to a maximum of 80% of the container volume
- Fill reagent troughs at maximum to the specified volume (e.g., 100 ml trough: 100 ml equals approx. 90% of the total trough volume)

4.1.2 Liquid FCA—Liquid Class Parameters

This information applies to Tecan 8-channel flexible channel arms and 1250 µl syringes.

Minimum Volumes

Pay attention to the minimum volumes for the corresponding tip types.
Refer to section "Liquid Level Detection (cLLD)", 2 2-41.

Note: *In some cases, lower volumes can be dispensed with contact dispense. Please discuss the possibilities with the responsible Tecan application specialist.*

Aspiration Speed and Delay/Waiting Time

In order to obtain optimal pipetting results, the following settings for aspiration speed and delay/waiting time must be considered:

- Recommended slow aspirating speed between 10 and 200 µl/s.

Tab. 4-1 *Examples for recommended aspirating speed*

Aspiration speed	Pipetted volume
30 µl/s	**10 µl**
70 µl/s	**100 µl**
150 µl/s	**500 µl**
150 µl/s	**750 µl**
200 µl/s	**1000 µl**

- Sufficient delay after aspiration, recommended delay is between 200 and 1000 ms.
- When working with viscous samples and solutions like serums or highly concentrated reagents, observing a delay of ≥ 500 ms is recommended.
- Highly viscous liquids may require lower aspiration speed.

Submerge

If the liquid level is used as reference for the aspiration position, the submerge should be adapted to the container:

- Microplates: 1 mm
- Sample tubes: 2 mm
- Reagent troughs: 3 mm

Air gaps

The following table shows the recommended air gap volumes:

Tab. 4-2 *Recommended air gap volumes*

Tip Type	Mode	STAG	LAG	TAG
DiTi 10 µl	Single	20 µl	5 µl	10 µl
DiTi 200 µl	Single	Σ ≤ 40 µl		5 to 20 µl, 10 µl ideal
	Multi	Σ ≤ 30 µl		0 µl
DiTi 1000 µl	Single	Σ ≤ 40 µl		5 to 20 µl, 10 µl ideal
	Multi	Σ ≤ 30 µl		10 to 20 µl

STAG *System trailing air gap* ***LAG*** *Leading air gap*
TAG *Trailing air gap*

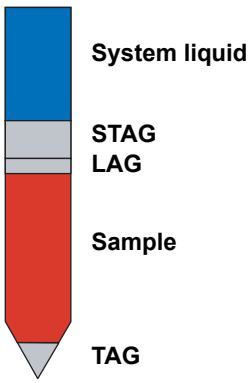


Fig. 4-4 *Air gaps in tip*

Dispense and Waiting Time

In order to obtain optimal pipetting results using the standard pipetting method (free dispense), the following settings are recommended:

- Fast dispense speed is between 250 and 600 µl/s
  ideal dispense speed: ≥ 400 µl/s
- Sufficiently long delay when using viscous samples and solutions like serums or highly concentrated reagents ≥ 200 ms.
- Highly viscous liquids may require lower dispense speed and dispense in contact mode.

Multi Pipetting

The term **Multi Pipetting** designates the pipetting method which aspirates once and then dispenses several aliquots. For this pipetting method, all the rules listed in this section apply. In addition, the following parameters are needed:

- A **conditioning volume** is needed, to attain for the first aliquot the same conditions as for all the following aliquots.
  The recommended conditioning volume is ≥ 30 µl, or is ideally of the same volume as one aliquot.
  The conditioning volume is dispensed back into the original container or into the wash station.
- An **excess volume** is used to attain for the last aliquot the same conditions as for all the preceding aliquots.
  The recommended excess volume is ≥ 30 µl. Ideally it amounts to 15% of the total volume.
  The excess volume is either dispensed back into the original container or into the wash station.

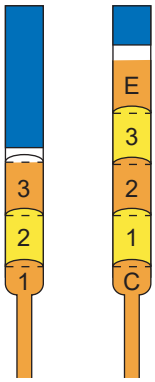


Fig. 4-5 *Conditioning and excess volumes*

1,2,3 *Aliquots* ***E*** *Excess volume*
C *Conditioning volume*

- Best precision is attained with 4 to 12 aliquots.
- Recommendation: When multi pipetting with aliquots of various volumes, dispense the smaller volumes earlier than the larger volumes. The largest volume is then the last to be dispensed.

Liquid Level Detection

For optimal liquid level detection:

- Make sure each tip is positioned in the center of the container.
- Make sure Z-Start is at least 2 mm above the liquid level.

ATTENTION

Malfunction of the liquid level detection.

- For optimal reliability and efficiency, avoid the presence of bubbles and foam.
- Adjust previous liquid handling steps as necessary to reduce bubbles and foam.

Capacitive Liquid Level Detection (cLLD)

Adapt the sensitivity settings for the cLLD function. The liquid needs to be assigned to the corresponding sensitivity group.
Refer to section 3.6.2 “How Does cLLD Work?”, 2 3-43.

ATTENTION

Wrong detection signal during piercing. The use of cLLD in conjunction with septum piercing needs to be carefully validated.
Refer to section 3.6.5 “cLLD with Septum Piercing”, 2 3-52

Tip Retract Supervision and Aspiration Supervision

- For microplates and small-diameter tubes, centrifugation is recommended before loading them on the Fluent deck. This ensures consistency in the liquid surface before starting with pipetting.

Disposable Tips

- Disposable tips must not be reused as this bears the risk of incorrect detection and influences the precision. Disposable tips are intended for one single transfer cycle, i.e., one aspiration and one or more dispense steps.
- Always use a Trailing Airgap (TAG) when operating with 1000 µl disposable tips. In this case a conditioning volume in multi pipetting mode is not necessary.
- Liquids with high vapor pressure require increased sample trailing air gaps. Sometimes, pre-wetting and decreased temperatures have to be taken into consideration.

4.1.3 Liquid Handling with MCA384

Wash

- The wash efficiency for the MCA384 tips must be checked for each application within the scope of the validation.
  Refer to section 4.1 “Liquid Handling Settings”, 2 4-1.

Disposable Tips

For disposable tips, the information in the section for Liquid FCA liquid handling applies also to the MCA384.
Refer to section 4.1.2 “Liquid FCA—Liquid Class Parameters”, 2 4-3.

WARNING

Unsatisfactory pipetting results, if the MCA384 DiTis have not the same temperature as the instrument / pipetting head.

- Acclimate the MCA384 DiTis for at least 48 hours

Fixed Tip Block (MCA96)

If you use fixed tip blocks in small volume ranges, pay attention to the following:

- If deionized water is used as wash liquid, volumes of water smaller than 30 µl (standard fixed tip block) or 20 µl (high precision fixed tip block) cannot be pipetted reliably without taking precautions.
  - To achieve good pipetting results it may be necessary to prime the fixed tip block. Priming means moistening the surfaces of the tips with wash liquid.
  - Wash liquid containing 20% ethanol has provided good results at volumes of down to 5 µl. It can be assumed that wash liquids containing detergents or other surface tension reducing agents provide similar results.
- For good results at volumes below 5 µl a conditioning procedure for dry fixed tip blocks with 1-Propanol 99% for 30 minutes, followed by wash steps with wash liquid, is recommended.
- The effects of the wash liquid on the pipetting results must be checked for each application within the scope of the validation.
  Refer to section 4.1 “Liquid Handling Settings”, 2 4-1.

Fixed Tip Adapter (MCA384)

If you use the fixed tip adapter in small volume ranges, pay attention to the following:

Prime Fixed Tip Adapter

- To achieve good pipetting results it may be necessary to prime the fixed tip adapter. Priming means moistening the surfaces of the tips with wash liquid.
- Wash liquid containing 5% ethanol has provided good results at the following volumes:

  Adapter 15 µl: 1 µl

  Adapter 125 µl: 3 µl

  It can be assumed that wash liquids containing detergents or other surface tension reducing agents provide similar results.

- The effects of the wash liquid on the pipetting results must be checked for each application within the scope of the validation.
  Refer to section 4.1 “Liquid Handling Settings”, 2 4-1.

MCA384 Wash Station

WARNING

Damage to the wash station channels and tips if the wash height is not taught appropriately.

- When using fixed tip adapters in conjunction with the MCA384 wash station, the teaching of the wash height should be conducted with care.
- The “Adapter 96 Fixed 125 µl MCA384” has a tip length of 44 mm. The other fixed tip adapters have a tip length of 28 mm and therefore cannot enter the channels of the wash station as deeply as the longer tips.

MCA384

WARNING

Tip displacement due to contact during teaching can lead to liquid transfer failures, and, therefore, impair safety and clinical condition of patient samples!

- Avoid contact between tips and labware during teaching.
- Check for tip displacement.

4.1.4 Working with Beads

ATTENTION

Tips blocked by beads

When working with beads the pipetting tips can be clogged by beads if their diameter is inappropriate.

- Make sure that the beads cannot clog the tips.

4.1.5 Influence of a HEPA Hood

Note: *If the instrument is equipped with a HEPA laminar flow hood the produced air flow may have an influence on the pipetting performance of the FCA or MCA.*

The specifications concerning pipetting performance given in this manual correspond to an instrument without HEPA hood.

Therefore, pay attention to the following:

- Be aware of a possible increase of evaporation due to the air flow.
- Especially for small volumes the air flow may have an impact.
- Control the air flow in such a way as to be sure that it causes no errors in your method.

4.1.6 Liquid Handling with MCA 96

The section for Liquid FCA liquid handling applies to the MCA 96. Refer to section 4.1.2 Liquid FCA – Liquid Class Parameters.

4.2 Defining Scripts and Methods

Note: *This section gives instructions on good usage, safe deck layout and correct use of the instrument.*

Please pay attention to the following general items when defining scripts and methods:

- Make sure that the log file function is always switched on. This facilitates troubleshooting and tracking of method steps.
- If a user management function is available in the FluentControl software, keep this function switched on. This prevents unauthorized or untrained operators from interfering with the application.
- Make sure that all coordinates (X, Y, Z) of the used carriers/racks/containers have been calibrated carefully. Well calibrated segments/racks/containers help avoiding collisions and malfunction.
- Use rich user prompt to prompt the user to check the bottles at the start of the method.

Regarding specific system modules, take the following essential considerations into account when defining scripts and methods.

4.2.1 Safe Deck Layout

Segment Positioning

Before deciding on the positions of segments on the deck, especially before installing wash stations or other stationary segments, the handling concepts of the FluentControl software and the consequences of the segment positioning for the application run must be considered.

ATTENTION

Disturbance in the method due to unsafe deck layout. This can result in:

- Loss or dropping of DiTi
- Loss or dropping of microplates
- Spillage of hazardous liquids because of collisions or overfilling of containers
- Cross-contamination because critical elements are placed near the wash station or DiTi waste (splashes).

For a safe deck layout, pay attention to the following instructions:

- Reagent Troughs / Wash Station
  - Be aware of the fact that splashes from the wash station may get into reagent troughs that are placed near the wash station. In critical cases do not place the reagents troughs next to the wash station.
- DiTi Waste and Wash Station Unit
  - The same applies to the DiTi waste and wash station unit. Avoid placing critical reagents in the troughs next to the wash station (e.g., 1536 well plates).
- DiTis
  - Use the correct combination of DiTis and labware.
  - DiTi 10 cannot be set back reliably into the DiTi tray by FCA and Air FCA.
- Piercing Tips
  - Define a safe location as home position for the FCA and enable the automatic movement to home position after every run and before shutdown in the Fluent Control “Configure Settings” window.
  - Move piercing tips to a safe location before any user interaction on the worktable.

4.2.2 Flexible Channel Arm

High-Density Applications

Vibrations, caused by the movement of other arms, may result in positioning difficulties in high density applications, where the mechanical precision is very critical. Speed and acceleration of the arm movements may be adapted accordingly.

4.2.3 Multiple Channel Arm (MCA384)

Operation with Fixed Tip Block / Fixed Tip Adapter

When working with a fixed tip block / fixed tip adapter, pay attention to the following:

- Wash the tips before starting a procedure as means of priming and cleaning the system.
  Priming the fixed tip block / fixed tip adapter can also improve the pipetting results.
  Refer to section 4.1.3 “Liquid Handling with MCA384”, 2 4-6.
- Routine pipetting with steel tips requires washing between each pipetting step to ensure that the tips are clean; i.e., carry-over from liquid to liquid is minimized.

Deck Layout

When defining the deck layout for a specific method, pay attention to the following:

- The multiple channel head footprint is larger than an SBS microplate.
- Depending on the tip length and on the height of the adjacent labware and segments an aspirate, dispense or mix command can result in a collision of the head with the adjacent object.
  For the corresponding tip lengths and the clearance between the tips and the deck refer to section 2.4.5 “Multiple Channel Arm (MCA384)”, 2 2-42.

4.2.4 Robotic Gripper Arm (RGA)

If your instrument is equipped with a robotic gripper arm, pay attention to the following:

- When handling microplates
  - Create a deck layout that minimizes the risk of collision and contamination—for example, by avoiding movements of microplates over critical sections, such as sample sections, etc.
  - Do not exceed the recommended fill levels for containers.

4.2.5 Multiple Channel Arm 96 (MCA96)

Deck Layout

When defining the deck layout for a specific method, pay attention to the following:

- The MCA 96 head footprint is larger than an SBS microplate.
- Depending on the tip length and on the height of adjacent labware and segments an aspirate, dispense or mix command can result in a collision of the head with the adjacent object.
- For optimal deck layout regarding accessibility, “30042309” SEGMENT NEST 7MM LAND 4 Y-SPACED” is recommended.
- Column-wise offset pickup requires sufficient space in X-direction, row-wise offset pickup corresponding space in Y-direction. Placing objects too close to the target labware can lead to collisions of the head.

If your instrument is equipped with a MCA 96 gripper, pay attention to the following:

When defining the deck layout for a specific method, pay attention to the following:

- can result in a collision warning for situations as shown in Figure 4-6 a) and b), where the head would collide with the adjacent object.
- Create deck layouts with enough spacing, e.g. 1 grid spacing between two segments is recommended as shown in Fig. 4-6 c).

Labware fill level

- Do not exceed the recommended liquid fill levels for gripped containers/ labware to avoid spilling of liquid during transportation.
  Spillage can be caused by high acceleration/deceleration.

Labware

- Use only labware that is rigid enough not to be deformed by the gripper force.

Possible Collisions with Labware

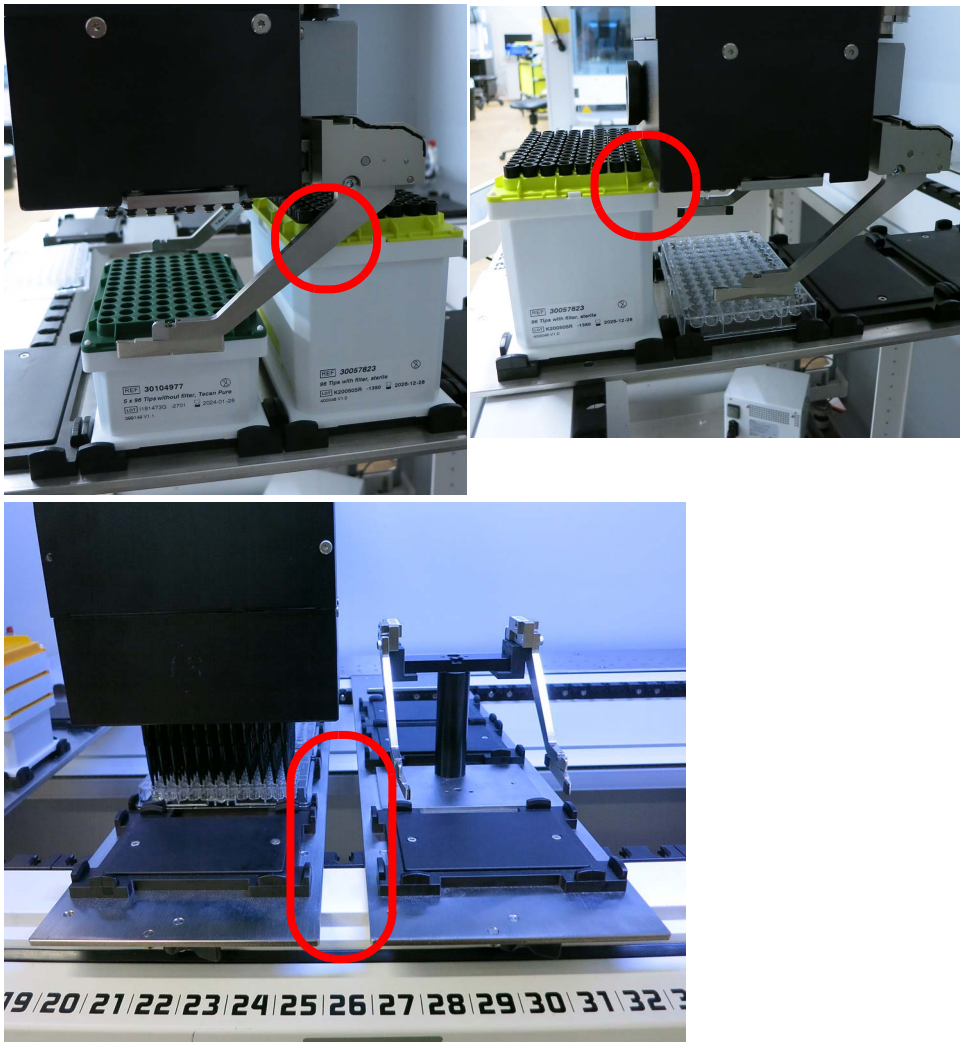


Fig. 4-6 *Collision with Labware*

4.3 Setting Up Customized Segments

To create and set up a customized segment, proceed as follows:

1. Order the necessary base plate and elements that meet your needs.
   Refer to 6.3.5 “Customized Segments”, 2 6-25.
2. Place the element onto the base plate.
   Make sure that the elements are positioned correctly (no offset from middle, at right angles).
3. Fasten the elements with the corresponding screws as shown in the figure:

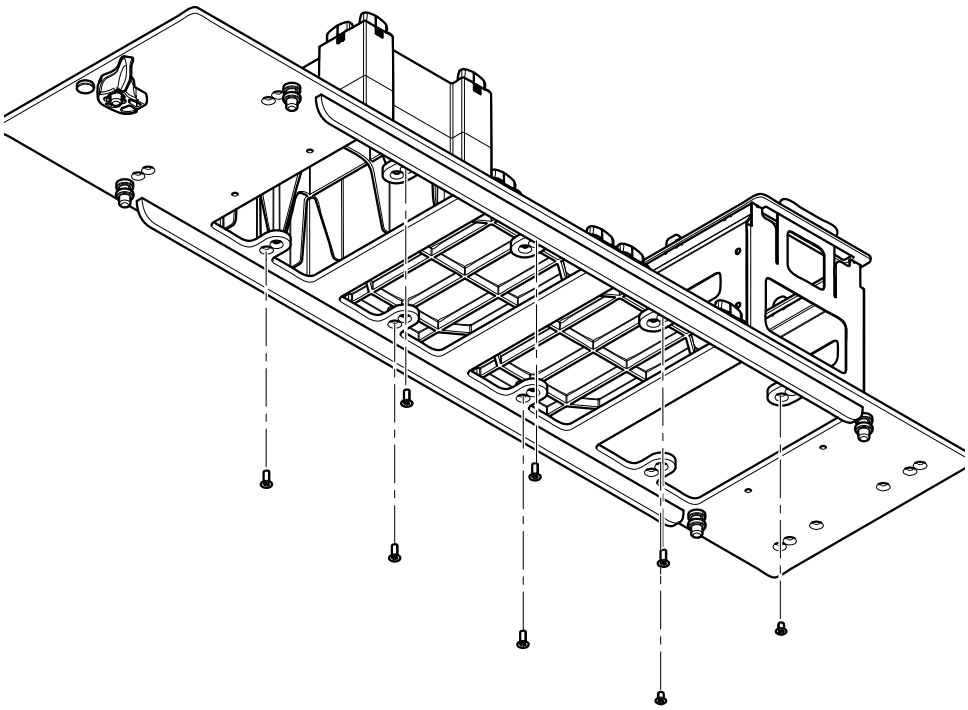


Fig. 4-7 *Assembling a customized segment (example), view from below the carrier*

ATTENTION

Damage to the microplate nests.
The material (conductive plastics) the nests are made of is fragile. Overtightening the screws may result in cracks.

- Only moderately tighten the screws of the microplate nests.

Note: *If you intend to use liquid level detection (cLLD) on the segment, make sure that the container bottom is near to the base plate or the microplate nest. To achieve this with the wells of a microplates, the microplate nest adapter needs to be screwed onto the MP nest.*

4 Place and lock the carrier on the instrument deck.

5 For information on how to define the customized segment in the software refer to the FluentControl Software Manual.

6 Teach the corresponding positions in the FluentControl software.

Note: *If you feel that this information is not sufficient, please ask you nearest Tecan representative for information on how to order and configure a customized segment.*

4.4 Setting up FCA Gripper

1. Place the holders (A) on the adapter plate (B) and tighten one of the two screws (C) hand-tight.
2. Insert the second screw (C) and tighten.
3. Tighten the first screw.
4. Place the FCA gripper docking station on the a deck segment in place of a microplate nest position, such that the holders are on the left side of the nest position, and fasten to the segment with two screws (D).

Note: *The docking station should be mounted on a segment nest position with only 7mm or no nest adjacent.*

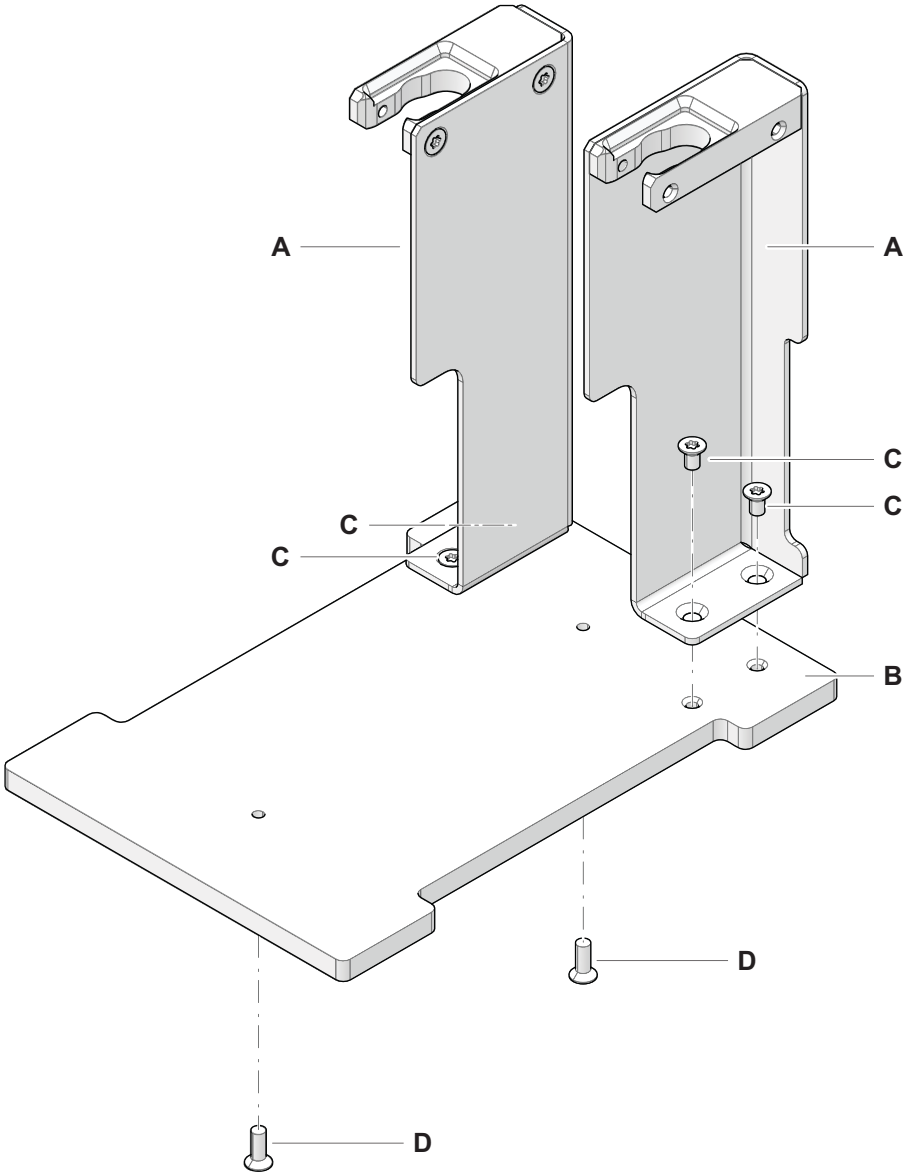


Fig. 4-8 *Assembling the FCA gripper docking station*

5 For information on how to define the FCA gripper in the software refer to the FluentControl Software Manual.

Note: *If you need more information on configuring a customized segment, please contact your Tecan representative.*

5 Shutdown, Storage and Shipping

Purpose of This Chapter

This chapter instructs how to shut down the Fluent and how to prepare it for storage or shipping.

Note: *Information concerning storage conditions & transport of instrument are outlined in the Fluent Operating Manual.*

5.1 Instrument

Since the material processed by the Fluent is not known to Tecan, detailed information on how to dispose of it cannot be given here.

WARNING

Chemical, biological and radioactive hazards can be associated with the waste material from the method run on the Fluent.
Treat these substances and disposables, such as DiTis, wash 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.
When disposing of operating material of the Fluent the relevant national and regional laws, directives and recommendations must be followed.

To shut down the instrument for a long period:

1. Empty the liquid system and thoroughly clean and decontaminate all liquid system components. Refer to the Operating Manual for decontamination.
2. Save data and exit the FluentControl software.
3. Disconnect the power supply of the Fluent instrument from the mains.

5.2 Multiple Channel Arm (MCA384)

5.2.1 MCA384 Pipetting Head

Mount an Adapter QC MCA384 onto the head to safeguard the gaskets and the area between the head and the adapter.

5.2.2 Wash System

If the instrument is equipped with an MCA384 with wash system, perform the following tasks:

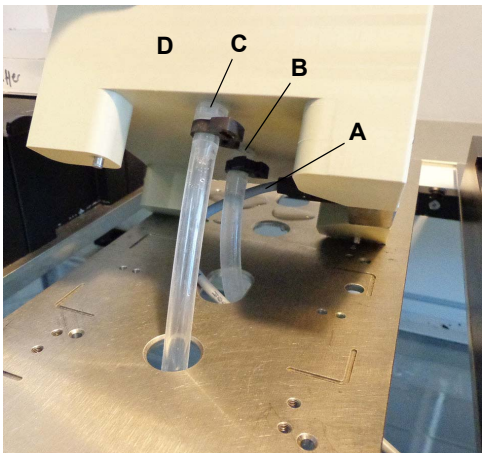


Fig. 5-1 Connections of the wash station

1. Empty and clean the wash station (see Operating Manual).
2. Disconnect the level sensor cable (A) from the wash station.
3. Disconnect the wash tube from the wash station (B).
4. Disconnect the waste tube from the wash station (C).
5. Remove the wash station (D).

6. Store DiTi and fixed tip adapters in a safe place.

ATTENTION

Damage to the tips can occur if the fixed tip adapter is stored incorrectly.
Never put a fixed tip adapter down with its tips resting on the table.

7. Disconnect all tubes from the wash unit, wash liquid container and waste container.

5.3 Decontamination declaration

1. Fill out a copy of the decontamination form and place it with the instrument. Contact your local service organization to obtain the form and refer to the section “Decontamination” of the Operating Manual.

6 Spare Parts and Accessories

Purpose of This Chapter

This chapter lists spare parts, accessories, and options including their ordering information.

How to Find Spare Parts

- Look up the ordering information in the table.
- Follow the references in the table to view an image of the respective component. Next to the images the components' main characteristics are listed.

How to Order Spare Parts

Order the parts from Tecan. Always state the designation and the part number when ordering spare parts.

Note: *This chapter only contains spare parts that can be replaced by the operator himself. To order spare parts other than listed here, please contact the Tecan Customer Support.*

Ordering Address

Order the parts from Tecan.
For addresses, refer to section 7 "Customer Support", 2 7-1.

6.1 Optional System Modules

6.1.1 Liquid Flexible Channel Arm (Liquid FCA)

6.1.1.1 DiTi Adapter Accessories and Spare Parts

Tab. 6-1 *DiTi option accessories*

No.	Plain Text Designation	p/n	Label Designation
1	Channel Kit Standard Volume for DiTi incl. 1 cone wrench	30042140	KIT FCA CHANNEL STD.DISPOSABLE TIP
2	Disposable tip preventive system care set for 8 channels consisting of 8 tubing extensions, 8 cones	30061826	ADAPTER DITI FLUENT
3	Set of sealing rings for option, 8 washers and 8 O-rings	30026789	O-RING 2*0.75 mm NEEDLE INSERT
4	Standard Volume NoTip Channel Tip	30042150	KIT FCA CHANNEL STANDARD VOL.NO TIP
5	Piercing Tip incl. lock nut	30042210	TIP PIERCING WITH LOCK NUT

6.1.2 Air Flexible Channel Arm (Air FCA)

Tab. 6-2 *DiTi option*

No.	Plain Text Designation	p/n	Label Designation
1	Channel Kit incl. 1 cone wrench	30065419	OPTION DITI CONE AIR FCA
2	30 replacement inline filters incl. disassembly tool	30066883	INLINE FILTER

6.1.3 Multiple Channel Arm (MCA384)

6.1.3.1 MCA384 Accessories

Tab. 6-3 Multiple channel Arm (MCA384), adapters

No.	Plain Text Designation	p/n	Label Designation
1	Adapter 384 DiTi Combo MCA384 • Can pick up 384 DiTis or one or two columns of 16 or 32 DiTis or one row of 24 DiTis. Compatible with MCA384 15 µl, 50 µl and 125 µl disposable tips	30032060	ADAPTER COMBO 384 DITI MCA384
2	Adapter DiTi MCA384 • Can pick up 384 MCA384 DiTis 15 µl, 50 µl and 125 µl	30032061	ADAPTER 384 DITI MCA384
3	Adapter 96 DiTi Combo MCA384 • Can pick up 96 DiTis out of a box of 384 MCA384 DiTis (4 picks for all 384 DiTis), 15 µl, 50 µl and 125 µl	30032063	ADAPTER COMBO 96 DITI MCA384
4	Adapter 96 DiTi 1to1 MCA384 • Can pick up 96 MCA96 DiTis from DiTi boxes in SBS format	30032048	ADAPTER 96 MCA96 DITI MCA384
5	Adapter 96 DiTi 4to1 MCA384 EVA (Extended Volume Adapter) • Can pick up 96 MCA96 DiTis from DiTi boxes in SBS format	30032062	ADAPTER EXT VOL 96 MCA96 DITI MCA384
6	Adapter Set, Combo MCA384 and EVA • incl. the following two adapters: 30032060 and 30032062	30051709	SET ADAPTER COMBO 384 AND EVA
7	Adapter Fixed 125 µl MCA384 • Has 384 fixed tips of 28 mm length with a capacity of 125 µl / channel	30032064	ADAPTER+384 FIXED TIPS LC MCA384 UNCOATED
8	Adapter Fixed 15 µl MCA384 • Has 384 fixed tips of 28 mm length with a capacity of 15 µl / channel	30032065	ADAPTER+384 FIXED TIPS SC MCA384
9	Adapter 96 Fixed 125 µl MCA384 • Has 96 fixed tips of 44 mm length with a capacity of 125 µl / channel	30032066	ADAPTER+96 FIXED TIPS LC MCA384 UNCOATED
10	Adapter 96 Fixed 15 µl MCA384 • Has 96 fixed tips of 28 mm length with a capacity of 15 µl / channel	30032067	ADAPTER+96 FIXED TIPS SC MCA384
11	Adapter QC MCA384 • Head adapter for QC ID 15 (four magnets)	30043622	ADAPTER QC FOR MCA384

6.1.3.2 Wash System Accessories and Spare Parts

Tab. 6-4 *Multiple channel Arm (MCA384), wash system*

No.	Plain Text Designation	p/n	Label Designation
1	Wash Control Unit MCA (requires wash block on System Carrier)	30032025	OPTION WASHSTATION ASSY MCA384
2	Wash Station Block MCA384 Vertical (for System Carrier)	30042355	WASHBLOCK MCA384 VERTICAL

6.1.3.3 MCA384 Spare Parts

Tab. 6-5 *Multiple channel arm (MCA384), pipetting head*

No.	Plain Text Designation	p/n	Label Designation
1	Set of gaskets and blunt tubes MCA384, 10 pieces	30020064	GASKET AND BLUNT TUBE SET MCA384

6.1.4 Robotic Gripper Arm (RGA)

6.1.4.1 RGA Accessories

Tab. 6-6 *Robotic gripper arm (RGA)*

No.	Plain Text Designation	p/n	Label Designation
1	Finger Exchange System: Left and right coded exchangeable standard eccentric fingers for handling microplates	30042415	SET FINGER EXCHANGEABLE MP ECCEN-TRIC
2	Finger Exchange System: Left and right coded exchangeable standard centric fingers for handling microplates	30042416	SET FINGER EXCHANGEABLE MP CENTRIC
3	Finger Exchange System: Left and right coded exchangeable tube fingers for handling tubes and bottles. Finger length 43 mm	30042417	SET FINGER EXCHANGEABLE TUBE STD. 43MM
4	Finger Exchange System: Left and right coded exchangeable long eccen-tric fingers for handling microplates with moni-tored incubator	30042418	SET FINGER EXCHANGEABLE MP ECC. LONG

Tab. 6-6 Robotic gripper arm (RGA) (cont.)

No.	Plain Text Designation	p/n	Label Designation
5	Regular Finger System: Left and right fixed mounted standard eccentric fingers for handling microplates	30042430	SET FINGER REGULAR MP ECCENTRIC
6	Regular Finger System: Left and right fixed mounted standard centric fingers for handling microplates	30042431	FINGER REGULAR MP CENTRIC
7	Regular Finger System: Left and right fixed mounted standard tube fingers for handling tubes & bottles. Finger length 43 mm	30042432	FINGER REGULAR TUBE STD. 43MM
8	Regular Finger System: Left and right fixed mounted long eccentric fingers for handling microplates with monitored incubator	30042433	FINGER REGULAR MP ECCENTRIC LONG

6.1.4.2 Frida Reader

Tab. 6-7 Frida Reader

No.	Plain Text Designation	p/n	Label Designation
1	Insert, autoclavable	30178818	DRIP CHAMBER SPARE
2	Plug (red)	30178816	PLUG BLANK DRIP CHAMBER SPARE
3	Decktray Frida Reader	30184791	DECK TRAY FRIDA READER SPARE

6.1.5 Multiple Channel Arm (MCA 96)

Tab. 6-8 Multiple Channel Arm (MCA 96)

No.	Plain Text Designation	p/n	Label Designation
1	MCA 96 for Fluent GP, including arm and head, PN for new instruments	30042300	ARM FLUENT MULTIPLE CHANNEL 96
2	Upgrade MCA 96 for Fluent GP, including arm, head and packaging	30042301	UPGRADE ARM FLUENT MULTIPLE CHANNEL 96
3	Gripper head for MCA 96 on Fluent GP, gripper fingers NOT included	30042306	GRIPPER MULTIPLE CHANNEL 96
4	Upgrade gripper head for MCA 96 on Fluent GP, gripper fingers NOT included, packaging included	30042307	UPGRADE GRIPPER MULTIPLE CHANNEL 96

Tab. 6-8 Multiple Channel Arm (MCA 96)

No.	Plain Text Designation	p/n	Label Designation
5	Gripper fingers for MCA 96 gripper head on Fluent GP	30042314	SET FINGER GRIPPER MULTIPLE CHANNEL 96
6	For finger exchange system, eccentric type fingers	30042437	DOCKING STATION - WIDE
7	Carrier with four 7mm nests with additional y-spacing for full access with MCA 96	30042309	SEGMENT NEST 7MM LAND 4 YSPACED
8	Teach block for MCA 96 QC testing	30042310	TEACHBLOCK 96HEAD 1000UL ASSY

6.2 Optional Equipment

6.2.1 Hotels

The following microplate hotels are standard items for storing different microplates:

Plain Text Designation	p/n	Label Designation	Width[a)]	Reference
Microplate hotel with 9 site positions without back wall	30042863	HOTEL DECK FLUENT 9 SLOT	4	See Fig. 6-1 , 2 6-8
Microplate hotel with 9 site positions with back wall	30042868	HOTEL DECK FLUENT STATIC 9 SLOT	4	See Fig. 6-1 , 2 6-8
Microplate hotel with 6 site positions without back wall	30042864	HOTEL DECK FLUENT 6 SLOT	4	See Fig. 6-2 , 2 6-8
Microplate hotel with 5 site positions without back wall	30042865	HOTEL DECK FLUENT 5 SLOT	4	See Fig. 6-3 , 2 6-9
Microplate hotel with 5 site positions with back wall	30042869	HOTEL DECK FLUENT STATIC 5 SLOT	4	See Fig. 6-3 , 2 6-9

a)*Number or grid positions the deck segment occupied; one position equals 25 mm (0.984 in.)*

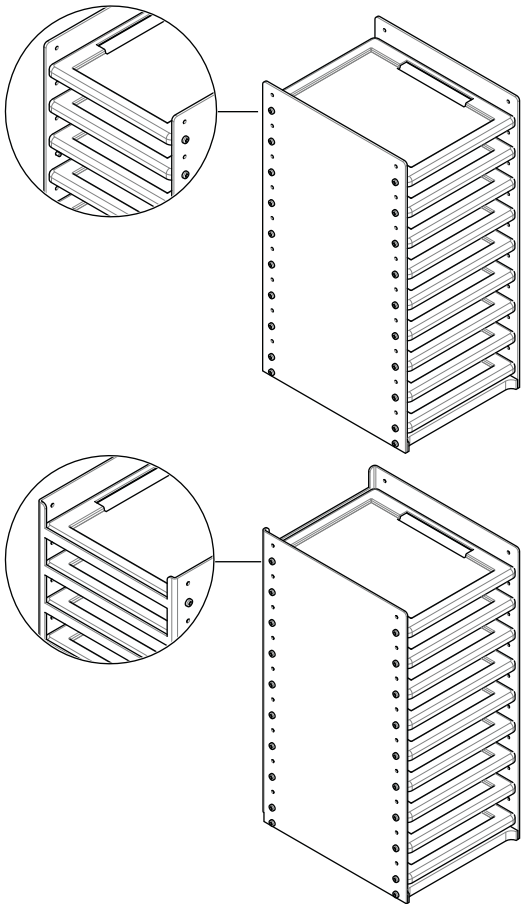
Access

Hotels without back wall can be easily loaded from either front or rear.
"Static" hotel versions have a back wall to increase the stability, however limited slot height may reduce access from the rear.

Placement

Hotels in the right side wall can be placed inside the side panel thus occupying grids Y and Z, using right sidewall segment 87 mm (30042711).
Or, off the worktable using a side panel cut out and right sidewall segment 147 mm (30042713).
Hotels cannot be placed in the left side wall inside the side panel, as occupation of grids A and B obstructs arm initialization. For Hotels in the left side wall use side panel cut out and left sidewall segment 147 mm (30042714).

Hotels

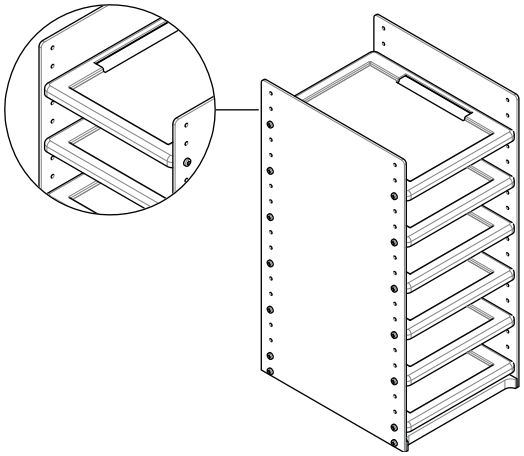


Microplate hotels with 9 site positions

Main characteristics:

- To be placed on deck segments or extensions
- Can be secured in place with two screws
- Accessed by eccentric gripper of RGA
- Can be equipped with optional barcode reader
- Up to 3 hotels may be placed in side wall
- Slot height: 21 mm
- Slot width without back wall: 116 mm
  Slot width with back wall: 106 mm

Fig. 6-1 *Hotel with 9 site positions*



Microplate hotel with 6 site positions

Main characteristics:

- Apt for half height deep well plates
- To be placed on deck segments or extensions
- Can be secured in place with two screws
- Accessed by eccentric gripper of RGA
- Can be equipped with optional barcode reader
- Up to 3 hotels may be placed in side wall
- Slot height: 35 mm
- Slot width: 116 mm

Fig. 6-2 *Hotel with 6 site positions*

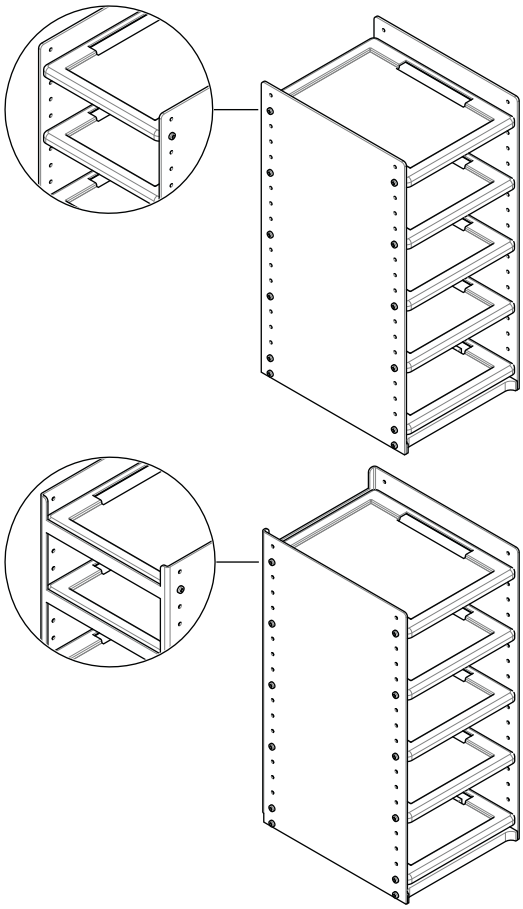


Fig. 6-3 Hotel with 5 site positions

Microplate hotels with 5 site positions

Main characteristics:

- Apt for deep well plates
- To be placed on deck segments or extensions
- Can be secured in place with two screws
- Accessed by eccentric gripper of RGA
- Can be equipped with optional barcode reader
- Up to 3 hotels may be placed in side wall
- Slot height without back wall: 49 mm
  Slot height with back wall: 46 mm
- Slot width without back wall: 116 mm
  Slot width with back wall: 106 mm

6.2.2 Barcode Scanner Options

Tab. 6-9 *Barcode reader option on hotel*

No.	Plain Text Designation	p/n	Label Designation
1	Barcode scanner	30042867	BARCODE READER HOTEL DECK FLUENT

Barcode Scanner

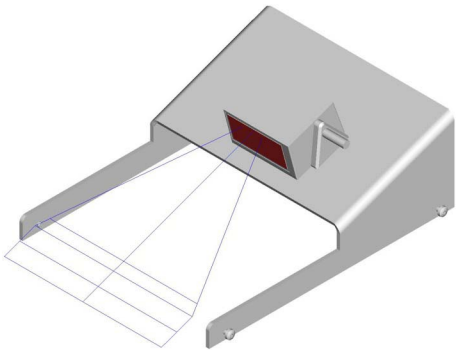


Fig. 6-4 *Barcode scanner*

Barcode scanner

Main characteristics:

- To be placed on top of a hotel
- The gripper presents a microplate to be read in front of the barcode reader

Tab. 6-10 *Fluent ID option*

No.	Plain Text Designation	p/n	Label Designation
1	Spare reflector foil	30111409	REFLECTOR FOIL SPARE

6.2.3 Passive Stacker

Plain Text Designation	p/n	Label Designation	Width[a)]	Reference
Passive stacker for 15 microplates	30042860	STACKER PASSIVE FLUENT 15 MP	4	See Fig. 6-5 , 2 6-11

a) Number or grid positions the deck segment occupies; one position equals 25 mm (.984 in.)

Fig. 6-5 *Passive stacker for 15 Microplates*

Passive stacker for 15 microplates

Main characteristics:

- Accessed by eccentric gripper of RGA
- Can be secured in place with two screws
- Up to 3 stackers may be placed in side wall

6.2.4 Adapters for Options

The following adapters are standard items to position different options on the instrument:

Plain Text Designation	p/n	Label Designation	Width[a)]	Reference
Adapter for balance SAG and WXS	30042796	SEGMENT ADAPTER BALANCE SAG WXS	6	See Fig. 6-6 , 2 6-12
Segment 3 Te-Shake	30042797	SEGMENT 3 TE-SHAKE	6	See Fig. 6-7 , 2 6-12
Adapter plate for Te-Shake	30042798	SEGMENT ADAPTER TE-SHAKE	6	See Fig. 6-8 , 2 6-12

a) Number or grid positions the deck segment occupies; one position equals 25 mm (.984 in.)

Balance

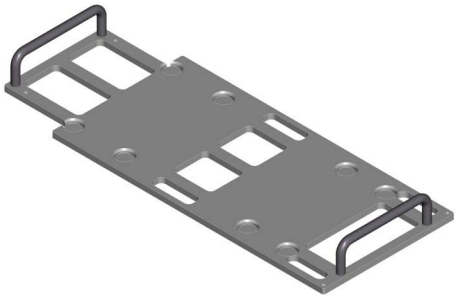


Fig. 6-6 *Adapter for balance*

Adapter plate for balance

Main characteristics:

- Fits balance SAG 285/01
- Fits balance WXS205SDU
- To be placed on standard deck segment

Te-Shake

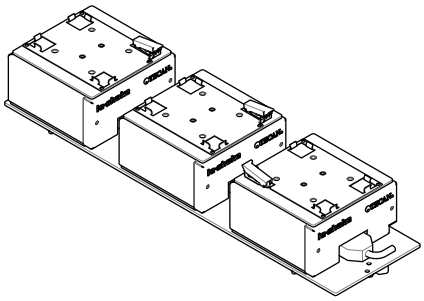


Fig. 6-7 *Segment 3 Te-Shake*

Segment 3 Te-Shake

Main characteristics:

- Positions 3 Te-Shake on the deck
- To be placed on upper deck only
- Occupies 6 grids

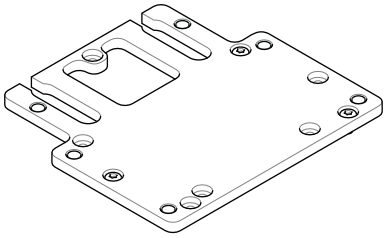


Fig. 6-8 *Adapter for Te-Shake*

Adapter plate for Te-Shake

Main characteristics:

- Positions one Te-Shake on the deck
- To be placed on standard deck segment

6.2.5 Adapters for Devices to Deck Segments

Tab. 6-11 Adapter for Devices to Deck Segments

No.	Plain Text Designation	p/n	Label Designation
1	Set grid adapter 6.5 mm device 15 mm foot Foot height 6.5 mm over deck	30042755	SET GRID ADAPTER 6.5MM DEVICE FOOT 15MM
2	Grid adapter blank 10 mm to customize Raw adapter for machining locally to locate third party products	30042756	GRID ADAPTER 10MM BLANK TO CUSTOM-IZE
3	Set foot M4-M5 for grid adapter 15 mm Set of 4 pieces for grid adapter device 15 mm foot 30042755	30042758	SET FOOT M4-M5 FOR GRID ADAPTER 15MM
4	Set adapter spark foot for grid adapter 15 mm Set of 4 adapters fitting between spark foot and grid adapter 15 mm diameter 30042755 and 30042754	30042759	SET ADAPTER FOOT SPARK FOR GRID ADAPTER

6.3 Deck Components

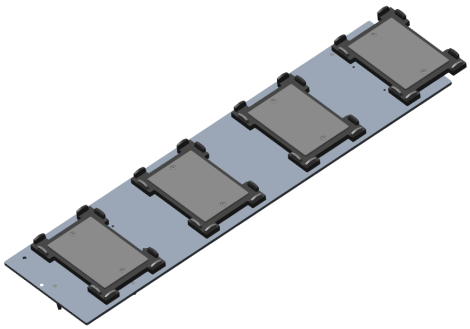
6.3.1 Microplate Nest Segments

Plain Text Designation	p/n	Label Designation	Width[a)]	Reference
Nest segment, 4 positions, landscape orientation	30042720	SEGMENT NEST 61MM LANDSCAPE 4	6	See Fig. 6-10 , 2 6-14
Nest segment, 4 positions, landscape orientation, 7 mm high	30042721	SEGMENT NEST 7MM LANDSCAPE 4	6	See Fig. 6-11 , 2 6-14
Nest segment, 5 positions, landscape orientation	30042722	SEGMENT NEST 61MM LANDSCAPE 5	6	See Fig. 6-12 , 2 6-15
Nest segment, 5 positions, landscape orientation, 7 mm high	30042723	SEGMENT NEST 7MM LANDSCAPE 5	6	See Fig. 6-13 , 2 6-15
Nest segment, 6 positions, landscape orientation	30042724	SEGMENT NEST 61MM LANDSCAPE 6	6	See Fig. 6-14 , 2 6-15
Nest segment, 6 positions, landscape orientation, 7 mm high	30042725	SEGMENT NEST 7MM LANDSCAPE 6	6	See Fig. 6-15 , 2 6-16
Nest segment, 3 positions, portrait orientation	30042726	SEGMENT NEST 61MM PORTRAIT 3	4	See Fig. 6-16 , 2 6-16

Plain Text Designation	p/n	Label Designation	Width[a)]	Reference
Nest runner, 4 positions, landscape orientation, placement on deck segment	30042760	RUNNER NEST 61MM LANDSCAPE 4	6	See Fig. 6-17 , 2 6-16
Nest runner, 2 positions, portrait orientation, placement on deck segment	30042761	RUNNER NEST 61MM PORTAIT 2	4	See Fig. 6-18 , 2 6-16
Cool/heat segment, 4 positions, landscape orientation	30042733	SEGMENT COOL/HEAT BASE LANDSCAPE 4	6	See Fig. 6-19 , 2 6-17
Cool/heat segment, 4 MP nests, landscape orientation	30042734	SEGMENT COOL/HEAT NEST MP LANDSCAPE 4	6	See Fig. 6-20 , 2 6-17

a) Number or grid positions the carrier occupies; one position equals 25 mm (.984 in.)

Microplate Nest Segments

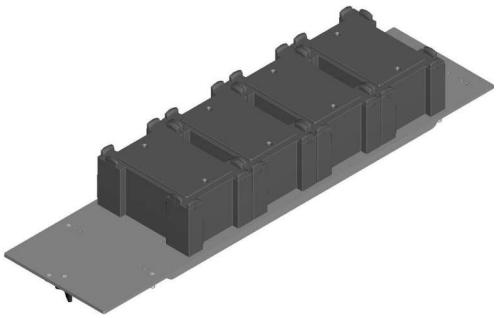


Nest segment for 4 microplates in “landscape” orientation

Main characteristics:

- 7 mm high MP nests
- Full access for FCA on positions 2 and 3
- Restricted access for FCA on positions 1 and 4
- Full access for MCA
- Occupies 6 grid positions

Fig. 6-9 *Nest segment, 4 positions, landscape orientation, 7mm high, Y-spaced*

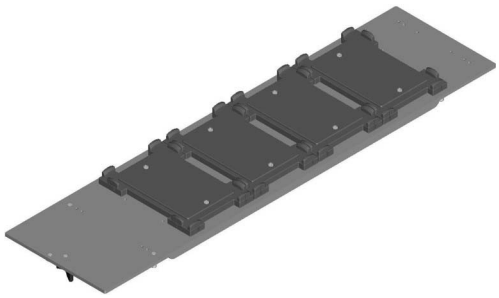


Nest segment for 4 microplates in “landscape” orientation

Main characteristics:

- Full access for FCA
- Full access for MCA
- Waste slide option possible
- Occupies 6 grid positions

Fig. 6-10 *Nest segment, 4 positions, landscape orientation*

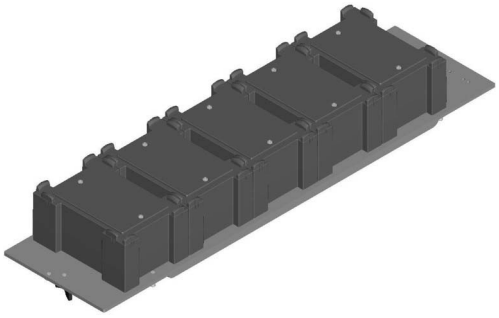


Nest segment for 4 microplates in “landscape” orientation

Main characteristics:

- 7 mm high MP nests
- Full access for FCA
- Full access for MCA
- Waste slide option possible
- Occupies 6 grid positions

Fig. 6-11 *Nest segment, 4 positions, landscape orientation, 7 mm high*

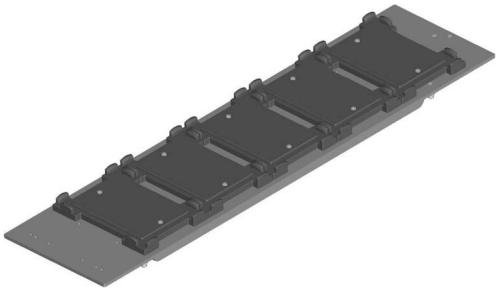


Nest segment for 5 microplates in “landscape” orientation

Main characteristics:

- Full access for FCA on positions 1 to 4
- Semi access for FCA on position 5
- Full access for MCA
- Full access for DiTi box (Software selects correct tip)
- Occupies 6 grid positions

Fig. 6-12 *Nest segment, 5 positions, landscape orientation*

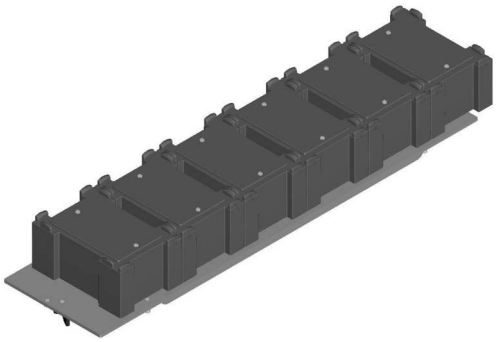


Nest segment for 5 microplates in “landscape” orientation

Main characteristics:

- 7 mm high MP nests
- Full access for FCA on positions 1 to 4
- Semi access for FCA on position 5
- Access for MCA
- Full access for DiTi box (Software selects correct tip)
- Occupies 6 grid positions

Fig. 6-13 *Nest segment, 5 positions, landscape orientation, 7 mm high*

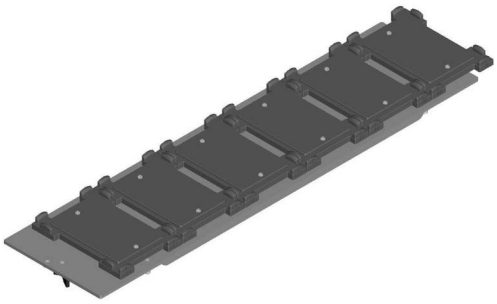


Nest segment for 6 microplates in “landscape” orientation

Main characteristics:

- Full access for FCA on positions 2 to 5
- Full access for MCA
- Semi access for FCA on positions 1 and 6
- Full access for DiTi box (Software selects correct tip)
- Occupies 6 grid positions

Fig. 6-14 *Nest segment, 6 positions, landscape orientation*

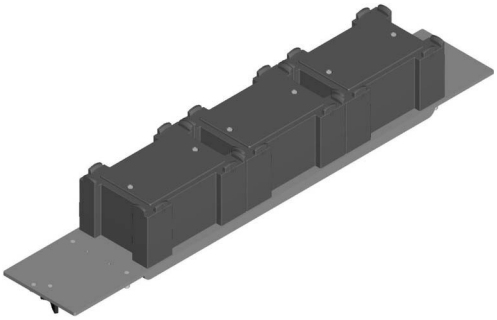


Nest segment for 6 microplates in “landscape” orientation

Main characteristics:

- 7 mm high MP nests
- Full access for FCA on positions 2 to 5
- Restricted access for FCA on positions 1 and 6
- Full access for MCA
- Occupies 6 grid positions

Fig. 6-15 *Nest segment, 6 positions, landscape orientation, 7 mm high*



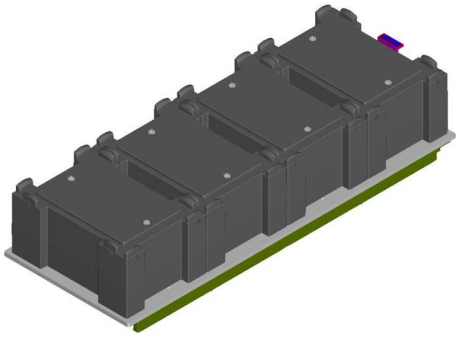
Nest segment for 3 microplates in “portrait” orientation

Main characteristics:

- Full access for FCA
- Occupies 4 grid positions

Fig. 6-16 *Nest segment, 3 positions, portrait orientation*

Microplate Nest Runners

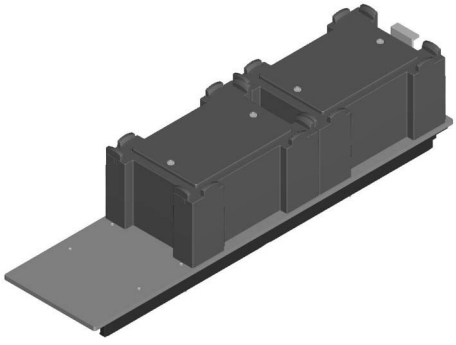


Nest runner for 4 microplates in “landscape” orientation

Main characteristics:

- Placement on deck segment
- Full access for FCA
- Occupies 6 grid positions

Fig. 6-17 *Nest runner, 4 positions, landscape orientation, placement on deck segment*



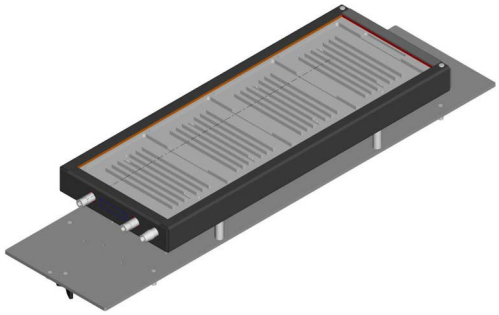
Nest runner for 2 microplates in “portrait” orientation

Main characteristics:

- Placement on deck segment
- Full access for FCA
- Occupies 4 grid positions

Fig. 6-18 *Nest runner, 2 positions, portrait orientation, placement on deck segment*

Cool/Heat Segments

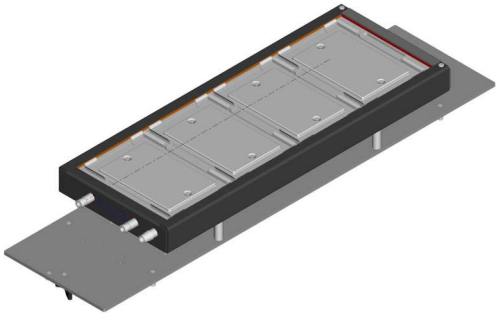


Cooled/heated carrier for 4 microplates in “landscape” orientation

Main characteristics:

- Connections for heating / cooling fluid
- Full access for FCA
- Occupies 7 grid positions

Fig. 6-19 *Cool/heat segment, 4 positions, landscape orientation*



Cooled/heated carrier for 4 microplates in “landscape” orientation

Main characteristics:

- Connections for heating / cooling fluid
- Full access for FCA
- Occupies 7 grid positions

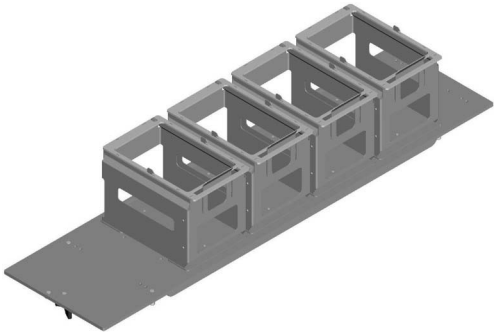
Fig. 6-20 *Cool/heat segment, 4 nests, landscape orientation*

6.3.2 Disposable Tip Nest Segments

Plain Text Designation	p/n	Label Designation	Width[a)]	Reference
DiTi nest segment, 4 fixed positions	30042739	SEGMENT NEST FCA DITI TRAY LANDSCAPE 4	6	See Fig. 6-21 , 2 6-18
DiTi nest segment, 4 fixed positions, with “through” waste slide	30042741	SEGMENT NEST FCA DITI TRAY 4 WASTE THRU	6	See Fig. 6-22 , 2 6-18
DiTi nest runner, 4 positions	30042772	RUNNER NEST FCA DITI TRAY LANDSCAPE 4	6	See Fig. 6-23 , 2 6-18
MCA384 active DiTi nest segment, 2 positions, active lock	30042742	SEGMENT MCA 384 DITI ACTIVE LANDSCAPE 2	6	See Fig. 6-24 , 2 6-19
MCA384 active DiTi nest segment	30042305	SEGMENT MCA384 DITI ACT.FRONT RACK2 REAR	6	See Fig. 6-25 , 2 6-19

a) Number or grid positions the carrier occupies; one position equals 25 mm (.984 in.)

DiTi Nest Segments

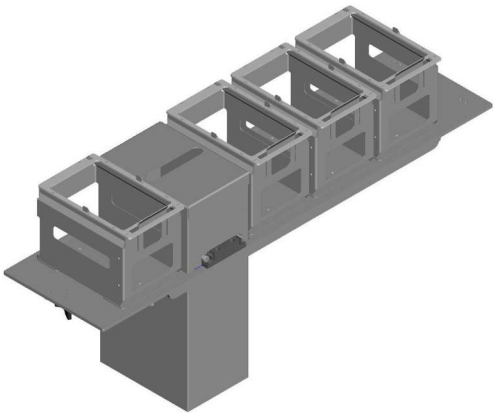


DiTi nest segment for 4 FCA DiTi trays

Main characteristics:

- Full access for FCA
- Waste slide option possible
- Occupies 6 grid positions
- An optional “Front DiTi waste wide” (30042794) can be mounted on the front (refer to 6.3.5, 2 6-25)

Fig. 6-21 *DiTi nest segment, 4 fixed positions*



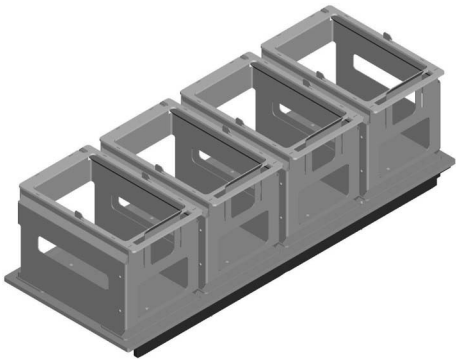
DiTi nest segment for 4 FCA DiTi boxes

Main characteristics:

- Full access for FCA
- Waste slide through the deck area, space underneath must be free
- Occupies 6 grid positions

Fig. 6-22 *DiTi nest segment, 4 fixed positions, “through” waste slide*

DiTi Nest Runner



Nest runner for 4 FCA DiTi boxes

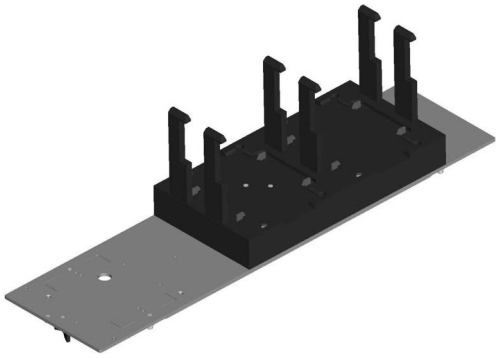
Main characteristics:

- Placement on deck segment
- Full access for FCA
- Occupies 6 grid positions

Fig. 6-23 *DiTi nest runner, 4 positions*

MCA384

Note: *MCA active carrier has electronic connection for operation. Caution in removing active carrier to prevent cable or connector damage.*

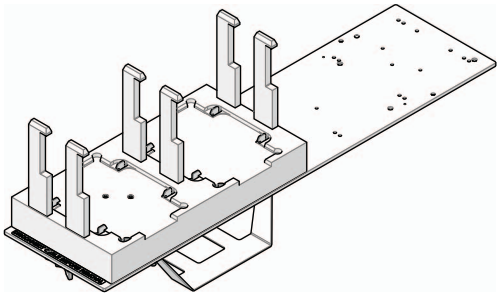


Nest segment for 2 MCA384 DiTi boxes

Main characteristics:

- Active locking mechanism
- Access for MCA384 1:1
- No column or row pick-up
- Occupies 6 grid positions
- Space for 1 MCA rack adapter position front

Fig. 6-24 *MCA384 active DiTi nest segment*



Nest segment for 2 MCA384 DiTi boxes

Main characteristics:

- Active locking mechanism
- Access for MCA384 1:1
- No column or row pick-up
- Occupies 6 grid positions
- Space for 3 microplate nests rear or space for 2 MCA Rack adapters

Fig. 6-25 *MCA384 active DiTi nest segment front*

6.3.3 Trough Segments

Plain Text Designation	p/n	Label Designation	Width[a)]	Reference
Segment for 100 ml troughs	30042750	SEGMENT TROUGH 8*100ML	2	See Fig. 6-26 , 2 6-20
Segment for 320 ml troughs	30042731	SEGMENT TROUGH 3*320ML	2	See Fig. 6-27 , 2 6-20

a) Number or grid positions the carrier occupies; one position equals 25 mm (.984 in.)

Segment for 100 ml troughs

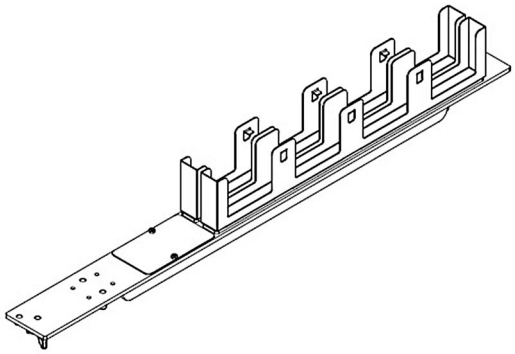


Fig. 6-26 *Segment for 100 ml troughs*

Trough segment with 8 positions for 100ML troughs

Main characteristics:

- A disposable tip waste chute 30042795 can be mounted on the front
- Positions for 8 reagent troughs 100 ml

Segment for 320 ml troughs

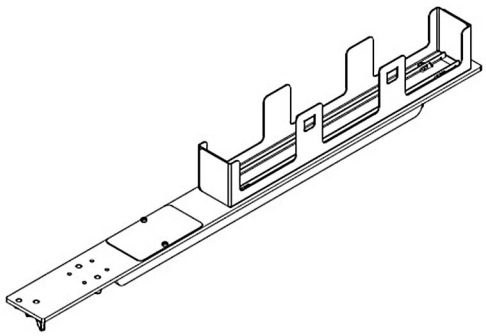


Fig. 6-27 *Segment for 320 ml troughs*

Trough segment with 3 positions for 320 ml troughs

Main characteristics:

- A disposable tip waste chute 30042795 can be mounted on the front
- Positions for 3 reagent troughs 320 ml

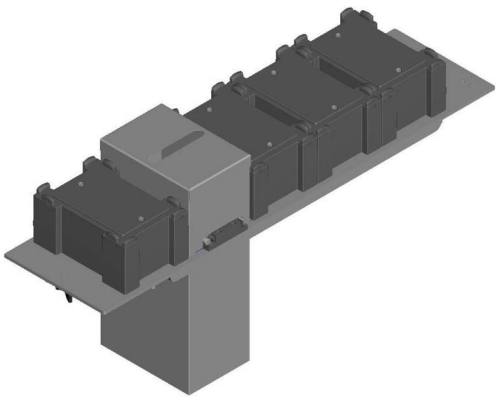
6.3.4 Combo Segments

Note: *Combo segments combine different functions in one segment (e.g., a wash/waste station and trough nests, or microplate nests and a DiTi waste station).*

Plain Text Designation	p/n	Label Designation	Width[a)]	Reference
Nest segment 61 mm high, 4 landscape positions, with “through” DiTi waste	30042737	SEGMENT NEST 61MM LANDSCAPE 4 WASTE THRU	6	See Fig. 6-28 , 2 6-21
Nest segment 7 mm high, 4 landscape positions, with “through” DiTi waste	30042738	SEGMENT NEST 7MM LANDSCAPE 4 WASTE THRU	6	See Fig. 6-29 , 2 6-22
Waste bag holder for wide funnel	30042778	HOLDER BAG WASTE CHUTE THRU.6 GRID	n.a.	See Fig. 6-30 , 2 6-22
Segment with wash/waste station, trough nests and “through” DiTi waste	30042745	SEGMENT WASH WASTE THRU TROUGH 100ML	2	See Fig. 6-31 , 2 6-22
Waste bag holder for narrow funnel	30042777	HOLDER BAG WASTE CHUTE THRU.2 GRID	n.a.	See Fig. 6-32 , 2 6-23
Segment with wash/waste station and trough positions	30042748	SEGMENT WASH TROUGH 4*100ML	2	See Fig. 6-33 , 2 6-23
Segment with active wash/waste station, through positions and low volume fixed tips waste	30042749	SEGMENT ACTIVE WASH WASTE TROUGH 100ML	2	See Fig. 6-34 , 2 6-23
Waste guide to dispose MCA384 tips directly to waste.	30042825	GUIDE DROP TIP 384 WASTE THRU		See Fig. 6-35 , 2 6-23
Waste guide to dispose MCA384 tips directly to waste.	30042826	GUIDE DROP TIP 384 WASTE FRONT		See Fig. 6-36 , 2 6-24

a) Number or grid positions the carrier occupies; one position equals 25 mm (.984 in.)

Combo Segments

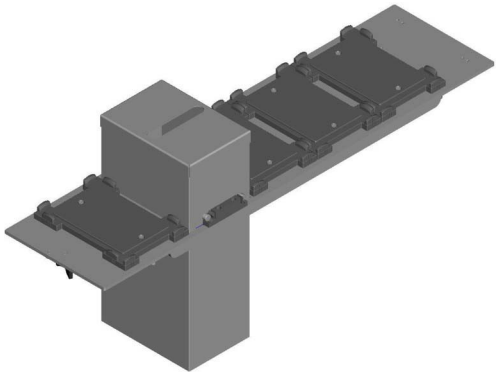


Nest segment for 4 microplates in “landscape” orientation, with “through” DiTi waste

Main characteristics:

- For instruments placed on a cabinet only (takes space underneath)
- Optional waste bag holder for DiTi waste available
- 61 mm high MP nests
- Full access for FCA
- Occupies 6 grid positions

Fig. 6-28 *Nest segment 61 mm high, 4 landscape positions, with “through” DiTi waste*

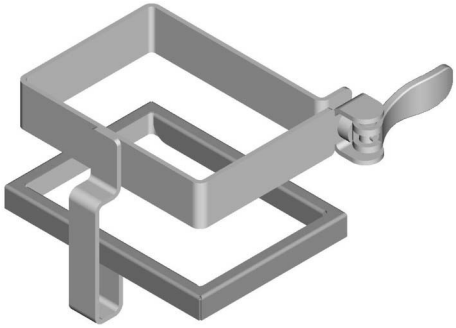


Nest segment for 4 microplates in “landscape” orientation, with “through” DiTi waste

Main characteristics:

- For instruments placed on a cabinet only (takes space underneath)
- Optional waste bag holder for DiTi waste available
- 7 mm high MP nests
- Full access for FCA
- Occupies 6 grid positions

Fig. 6-29 *Nest segment 7 mm high, 4 landscape positions, with “through” DiTi waste*

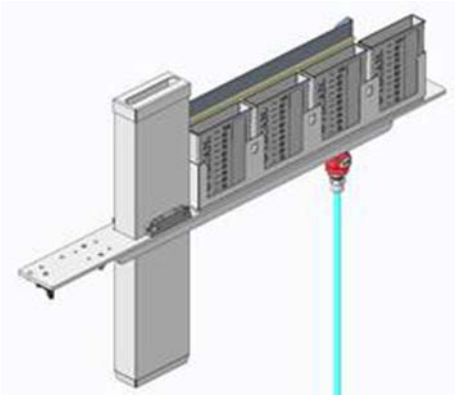


Waste bag holder

Main characteristics:

- To be mounted on combo segments with “through” DiTi waste.
- For wide waste funnel

Fig. 6-30 *Waste bag holder wide funnel*

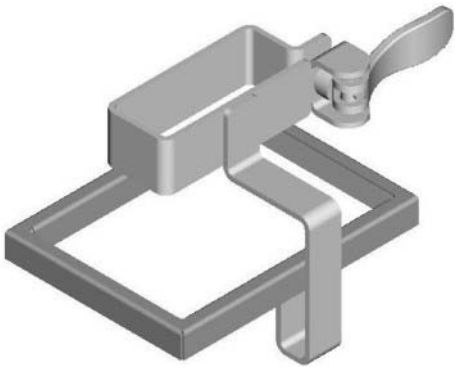


Combo segment with wash/waste station, trough nests and “through deck” DiTi waste

Main characteristics:

- For instruments placed on a cabinet only (takes space underneath)
- Optional waste bag holder for DiTi waste available
- Wash station
- Positions for 4 reagent troughs 100 ml
- Occupies 2 grid positions

Fig. 6-31 *Segment with wash/waste station, trough nests and “through” DiTi waste*

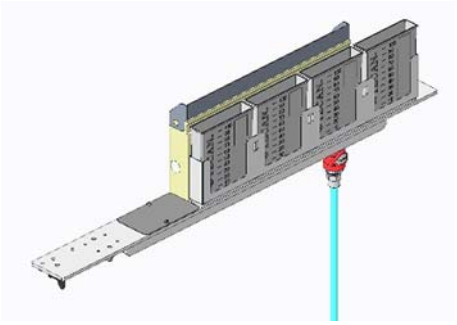


Waste bag holder

Main characteristics:

- To be mounted on combo segments with “through” DiTi waste.
- For narrow waste funnel

Fig. 6-32 *Waste bag holder narrow funnel*

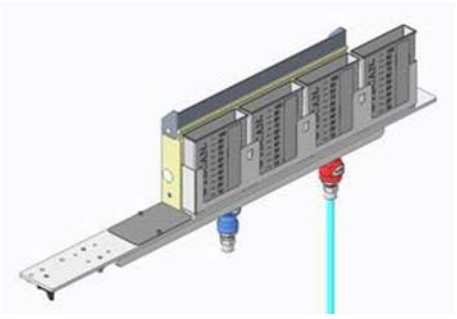


Combo segment with wash/waste station and trough nests

Main characteristics:

- Wash station
- Positions for 4 reagent troughs 100 ml
- Occupies 2 grid positions

Fig. 6-33 *Segment with wash/waste station and trough nests*

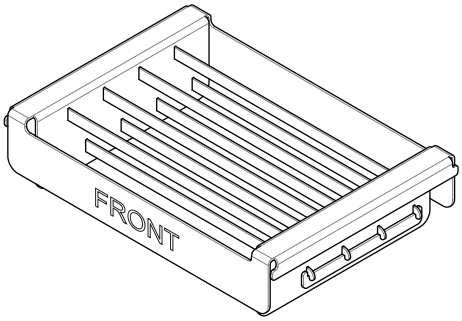


Combo segment with active wash/waste station and trough nests

Main characteristics:

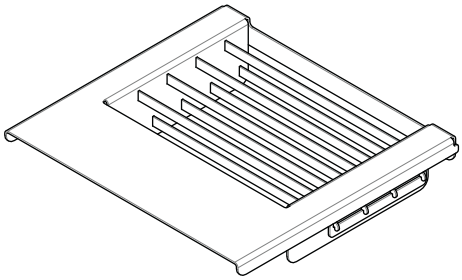
- Wash station
- Positions for 4 reagent troughs 100 ml
- Deep and shallow cleaning positions

Fig. 6-34 *Segment with wash/waste station and trough nests*



Waste Guide Thru

Fig. 6-35 *Waste guide Thru to dispose MCA384 tips*



Waste Guide Front

Fig. 6-36 *Waste guide Front to dispose MCA384 tips*

6.3.5 Customized Segments

For information on how to assemble a customized segment, refer to 4.3 “Setting Up Customized Segments”, 2 4-14.

Plain Text Designation	p/n	Label Designation	Width[a)]	Reference
Nest segment base plate “landscape”	30042786	SEGMENT BASE NEST LANDSCAPE	6	See Fig. 6-37 , 2 6-26
Nest segment base plate “portrait”	30042788	SEGMENT BASE NEST PORTRAIT	4	See Fig. 6-38 , 2 6-26
Microplate nest “low”	30042780	NEST MP/DITI 7MM	n.a.	See Fig. 6-39 , 2 6-26
Microplate nest “high”	30042781	NEST MP/DITI 61MM	n.a.	See Fig. 6-40 , 2 6-26
Microplate nest “low”, without adapter nest	30042782	NEST MP/DITI 7MM BASE	n.a.	See Fig. 6-41 , 2 6-27
Microplate nest “high”, without adapter nest	30042783	NEST MP/DITI 61MM BASE	n.a.	See Fig. 6-42 , 2 6-27
Microplate nest adapter	30042784	ADAPTER NEST MP STANDARD	n.a.	See Fig. 6-43 , 2 6-27
FCA DiTi nest	30042785	NEST FCA DITI TRAY	n.a.	See Fig. 6-44 , 2 6-28
MCA base segment plate	30042743	SEGMENT SYSTEM BASE MCA FLUENT	6	See Fig. 6-45 , 2 6-28
MCA384 DiTi box nest	30032026	NEST SBS FOR MCA384 SYSTEM CARRIER	n.a.	See Fig. 6-46 , 2 6-28
MCA384 wash station	30032028	WASHBLOCK MCA384	n.a.	See Fig. 6-47 , 2 6-29
MCA384 adapter nest	30032027	RACK ADAPTER MCA384	n.a.	See Fig. 6-48 , 2 6-29
Front DiTi waste wide	30042794	WASTE CHUTE FRONT 6 GRID	6	See Fig. 6-49 , 2 6-29
Front DiTi waste narrow	30042795	WASTE CHUTE FRONT 2 GRID	2	See Fig. 6-50 , 2 6-30
Deck segment, 8 grid positions, with Freedom EVO positioning pins	30042707	SEGMENT DECK 8 GRIDS FREEDOM EVO PIN	8	See Fig. 6-51 , 2 6-30
Finger Exchange System: Docking station for left and right coded fingers (wide for eccentric type fingers).	30042437	STATION DOCKING FINGER EXCHANGE WIDE	n.a	See Fig. 6-52 , 2 6-30
Finger Exchange System: Docking station for left and right coded fingers (narrow for centric type fingers).	30042438	STATION DOCKING FINGER EXCHANGE NARROW	n.a	See Fig. 6-53 , 2 6-31

a) Number or grid positions the deck segment occupies; one position equals 25 mm (.984 in.)

Base Plates

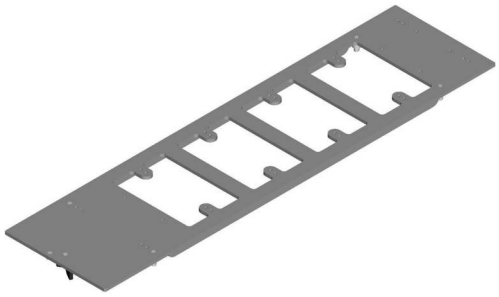


Fig. 6-37 *Base plate landscape*

Base plate to build a customized segment

Main characteristics:

- 4 nest positions in “landscape” orientation

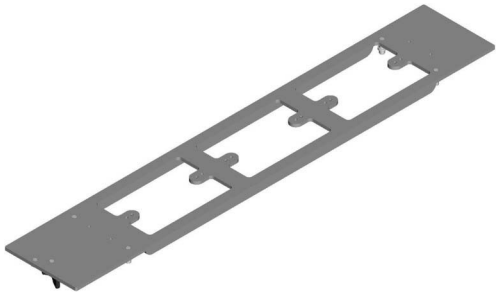


Fig. 6-38 *Base plate portrait*

Base plate to build a customized segment

Main characteristics:

- 3 nest positions in “portrait” orientation

MP / DiTi Box Nests

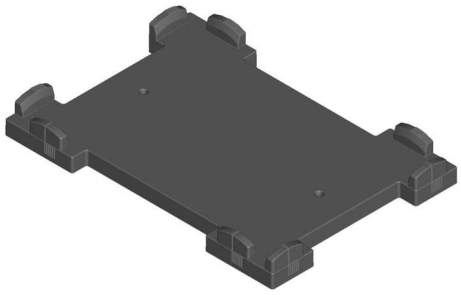


Fig. 6-39 *Microplate nest low*

Microplate nest to build a customized segment

Main characteristics:

- 7 mm high MP nest
- For microplates, DiTi boxes and deepwell plates
- SBS footprint
- 7 mm deep

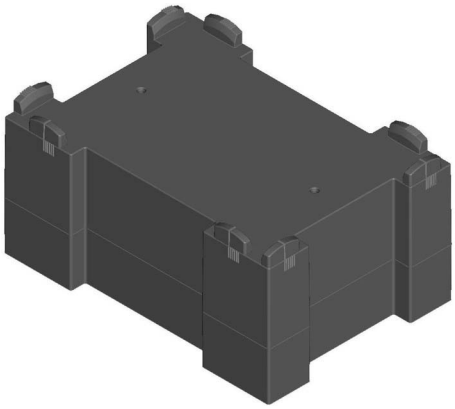


Fig. 6-40 *Microplate nest high*

Microplate nest to build a customized segment

Main characteristics:

- 61 mm high MP nests
- For microplates, DiTi boxes and lids
- SBS footprint
- 61 mm deep

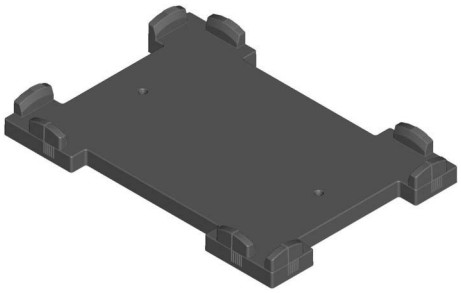


Fig. 6-41 Microplate nest low, base

Microplate nest to build a customized segment

Main characteristics:

- For microplates, DiTi boxes and deepwell plates
- SBS footprint
- 7 mm deep
- designed for 7 mm high MP nest

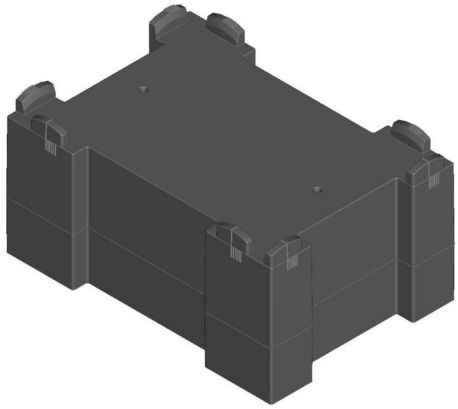


Fig. 6-42 Microplate nest high, base

Microplate nest to build a customized segment

Main characteristics:

- For microplates, DiTi boxes and lids
- SBS footprint
- 61 mm deep
- designed 61 mm high MP nests

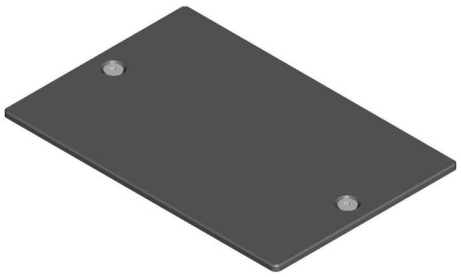
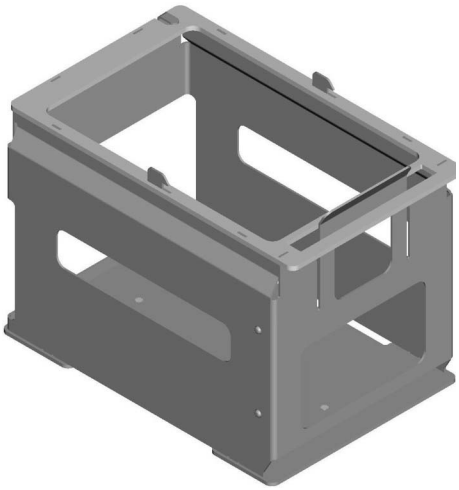


Fig. 6-43 Microplate nest adapter

Microplate nest adapter (screwed on MP nest)

Main characteristics:

- Enables cLLD for skirted microplates



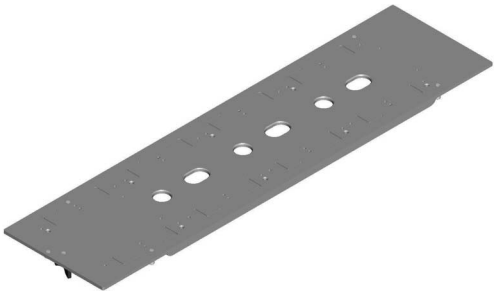
DiTi nest to build a customized segment

Main characteristics:

- For FCA access
- Holds FCA DiTi trays

Fig. 6-44 *FCA DiTi nest*

MCA Base Segment

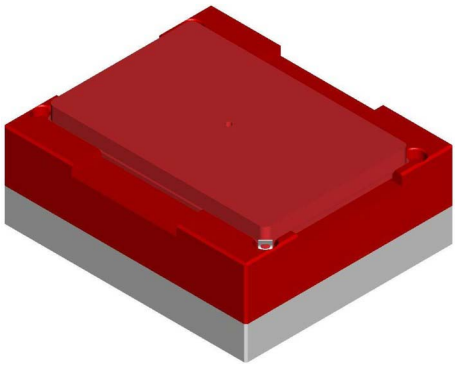


MCA system segment base plate

Main characteristics:

- To hold MCA options and adapters

Fig. 6-45 *MCA system segment base plate*



MCA384 DiT box nest

Main characteristics:

- To be mounted on the MCA system segment base plate

Fig. 6-46 *MCA384 DiTi box nest*

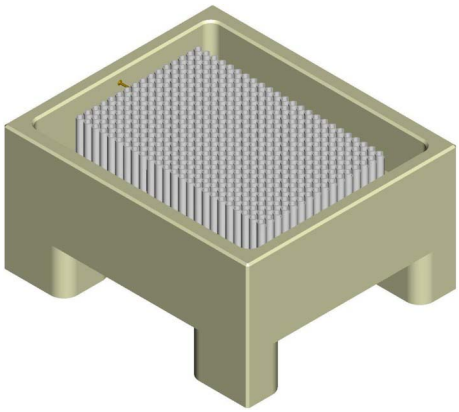


Fig. 6-47 MCA384 wash station

MCA384 wash station

Main characteristics:

- To be mounted on the MCA system segment base plate

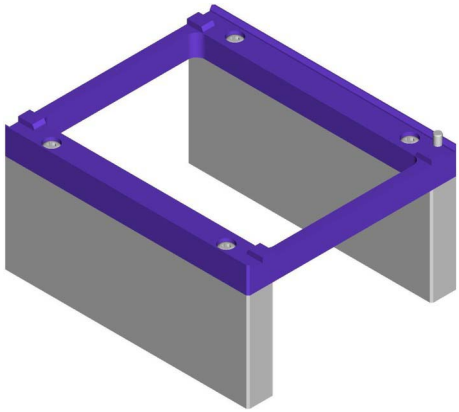


Fig. 6-48 MCA384 adapter nest

MCA384 adapter nest

Main characteristics:

- To be mounted on the MCA system segment base plate

DiTi Waste Segments

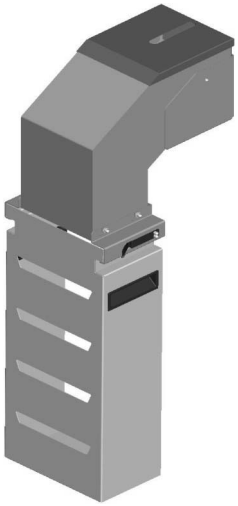
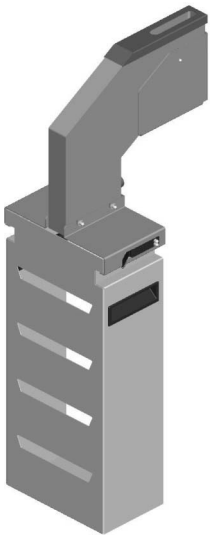


Fig. 6-49 Front DiTi waste wide

Front DiTi waste wide

Main characteristics:

- To be mounted on a segment 30042720, 30042721, 30042739 or 30042786
- Opening in the front safety panel necessary

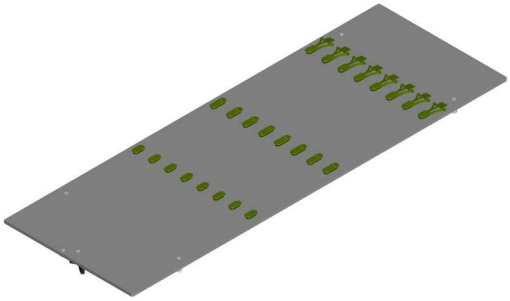


Front DiTi waste narrow

Main characteristics:

- To be mounted on a segment 30042731, 30042748, 30042749, or 30042750
- Opening in the front safety panel necessary

Fig. 6-50 *Front DiTi waste narrow*



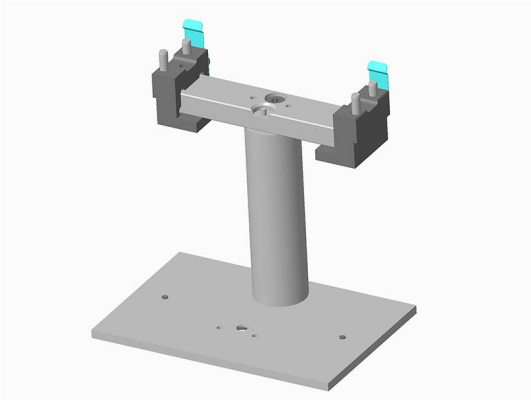
Deck segment that spreads over 8 grid positions

Main characteristics:

- Holds Freedom EVO carriers
- Not compatible with Fluent carriers
- must be defined as custom carrier

Fig. 6-51 *Deck segment, 8 grid positions, with Freedom EVO positioning pins*

FES Docking Station for Eccentric-Type Fingers



Finger Exchange System (FES) docking station that can be built into a customized segment

Main characteristics:

- for Finger Exchange System eccentric-type fingers
- for eccentric fingers (30042415)
- for eccentric long fingers (30042418)
- for MCA96 eccentric fingers (30042314)

Fig. 6-52 *FES docking station (wide)*

FES Docking Station for Centric-Type Fingers

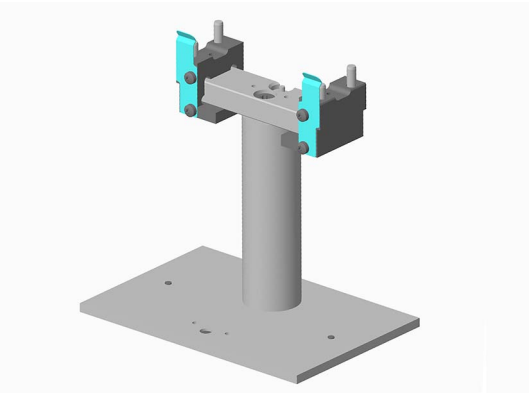


Fig. 6-53 FES docking station (narrow)

Finger Exchange System (FES) docking station that can be built into a customized segment

Main characteristics:

- For Finger Exchange System centric-type fingers
- for centric fingers (30042416)
- for tube fingers (30042417)

6.3.6 Grid Segments

Plain Text Designation	p/n	Label Designation	Width[a)]	Reference
Deck segment, 8 grid positions	30042700	SEGMENT DECK 8 GRIDS	8	See Fig. 6-54 , 2 6-32
Deck segment, 6 grid positions	30042701	SEGMENT DECK 6 GRIDS	6	See Fig. 6-55 , 2 6-33
Deck segment, 3 grid positions	30042702	SEGMENT DECK 3 GRIDS	3	See Fig. 6-56 , 2 6-33
Deck segment, 2 grid positions	30042703	SEGMENT DECK 2 GRIDS	2	See Fig. 6-57 , 2 6-33
Deck segment, 9 grid positions, with hole	30042705	SEGMENT DECK 9 GRIDS THRU	9	See Fig. 6-58 , 2 6-33
Deck segment, 6 grid positions, lower deck position	30042708	SEGMENT DECK 6 GRIDS LOWER RASTER	6	See Fig. 6-59 , 2 6-34
Deck segment, 2 grid positions, with side extension right	30042711	SEGMENT DECK SIDE WALL RIGHT 87MM	2[b)]	See Fig. 6-60 , 2 6-34
Deck segment, 2 grid positions, with side extension left	30042712	SEGMENT DECK SIDE WALL LEFT 87MM	2[c)]	See Fig. 6-61 , 2 6-34
Set locator segment lower deck 16 grids	30042080	SET LOCATOR CARRIER LOWER DECK 16 GRIDS	n.a	See Fig. 6-62 , 2 6-34
Tool alignment locators Fluent deck	30042091	TOOL ALIGNMENT LOCATORS FLUENT DECK	n.a	See Fig. 6-63 , 2 6-35
Additional set (7 pcs) of deck trays for below deck	30042079	SET FLUENT DECK TRAY 7 PC	n.a	-

a) Number or grid positions the deck segment occupies; one position equals 25 mm (.984 in.)
b) Plus side extension on the right
c) Plus side extension on the left

Grid Segments

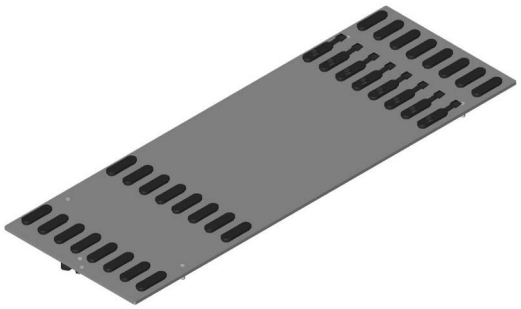
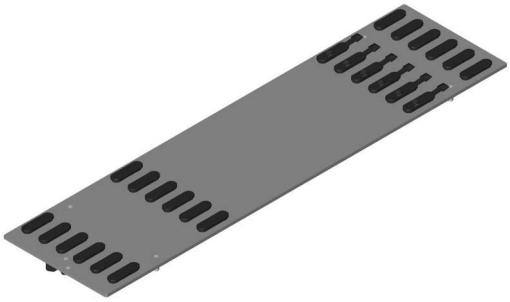


Fig. 6-54 *Deck segment, 8 grid positions*

Deck segment that spreads over 8 grid positions

Main characteristics:

- Holds runners

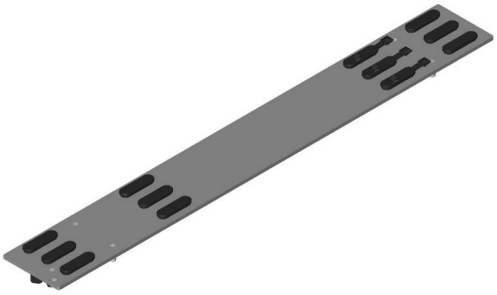


Deck segment that spreads over 6 grid positions

Main characteristics:

- Holds runners

Fig. 6-55 *Deck segment, 6 grid positions*

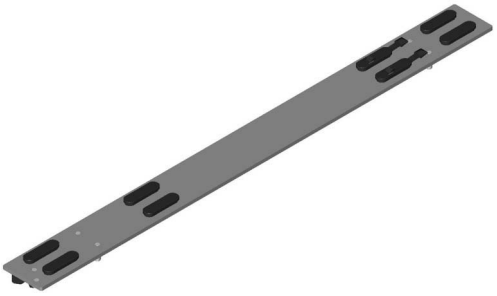


Deck segment that spreads over 3 grid positions

Main characteristics:

- Holds runners

Fig. 6-56 *Deck segment, 3 grid positions*



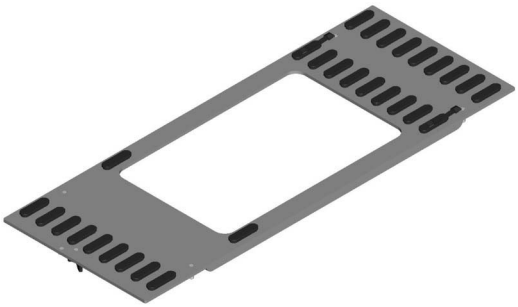
Deck segment that spreads over 2 grid positions

Main characteristics:

- Holds runners

Fig. 6-57 *Deck segment, 2 grid positions*

Special Grid Segments

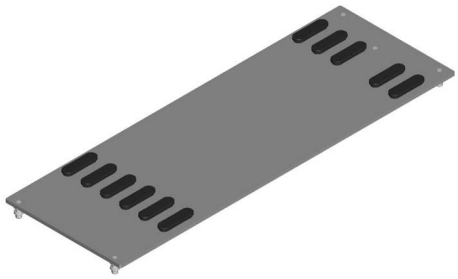


Deck segment that spreads over 9 grid positions, with hole for gripper access below the deck

Main characteristics:

- Holds runners
- Hole allows for gripper access with microplates in portrait orientation

Fig. 6-58 *Deck segment, 9 grid positions, with hole*



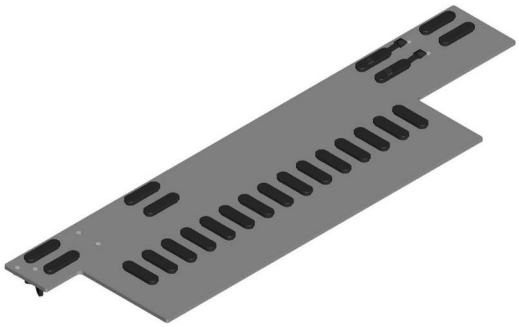
Deck segment that spreads over 6 grid positions

Main characteristics:

- To be placed in the lower row of segment holders (below the standard deck surface)
  Note that the lock lever is under the deck at the front

Fig. 6-59 *Deck segment, 6 grid positions, lower deck position*

Side Extensions

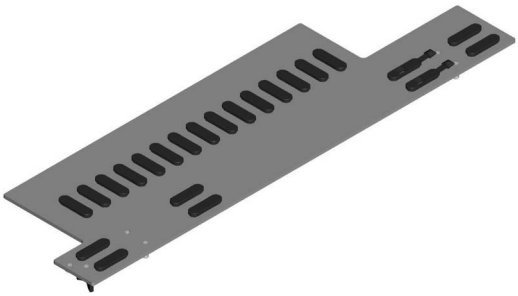


Deck segment that spreads over 2 grid positions

Main characteristics:

- Holds runners
- To be installed in the extreme right position on the deck
- Intended to hold up to 3 hotels or incubators on the side

Fig. 6-60 *Deck segment, 2 grid positions, with side extension right*



Deck segment that spreads over 2 grid positions

Main characteristics:

- Holds runners
- To be installed in the extreme left position on the deck
- Intended to hold up to 3 hotels or incubators on the side

Fig. 6-61 *Deck segment, 2 grid positions, with side extension left*

Set locator segment lower deck 16 grids

Main characteristics:

- Lower deck segments require segment locators
- Comprises set of 8 rasters (4 front, 4 rear)
- Each raster has 4 positions

Fig. 6-62 *Set locator segment lower deck 16 grids*

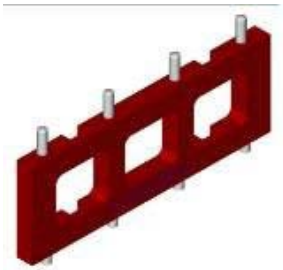


Fig. 6-63 Tool alignment locators Fluent deck

Tool alignment locators Fluent deck

Main characteristics:

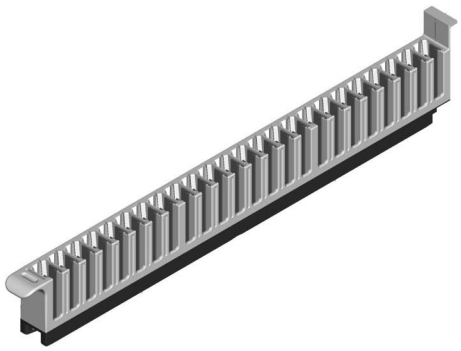
- Tool to align upper and lower deck segments
- Service tool for customer site

6.3.7 Standard Tube Runners

Plain Text Designation	p/n	Label Designation	Width[a)]	Reference
Tube runner, diameter 10 mm, 1*24 positions	30042762	RUNNER TUBE 10MM 1*24	1	See Fig. 6-64 , 2 6-36
Tube runner, diameter 13 mm, 1*24 positions	30042763	RUNNER TUBE 13MM 1*24	1	See Fig. 6-65 , 2 6-37
Tube runner, diameter 16 mm, 1*24 positions	30042764	RUNNER TUBE 16MM 1*16	1	See Fig. 6-66 , 2 6-37
Tube runner, diameter 10 mm, 4*24 positions	30042765	RUNNER TUBE 10MM 4*24	4	See Fig. 6-67 , 2 6-37
Tube runner, diameter 13 mm, 4*24 positions	30042766	RUNNER TUBE 13MM 4*24	4	See Fig. 6-68 , 2 6-37
Tube runner, diameter 16 mm, 4*24 positions	30042767	RUNNER TUBE 16MM 6*16	6	See Fig. 6-69 , 2 6-38
Tube runner, diameter 10 mm, 3*32 positions	30042768	RUNNER TUBE 10MM 3*32	6	See Fig. 6-70 , 2 6-38
Tube runner, Eppendorf tubes 1.5 ml and 2 ml, 24 positions	30042769	RUNNER TUBE EPPENDORF 1.5-2ML 1*24	1	See Fig. 6-71 , 2 6-38
Tube runner, Falcon tubes 15 ml, 16 positions	30042770	RUNNER TUBE FALCON 15ML 1*16	1	See Fig. 6-72 , 2 6-38
Tube runner, Falcon tubes 50 ml, 10 positions	30042771	RUNNER TUBE FALCON 50ML 1*10	2	See Fig. 6-73 , 2 6-39

a) Number or grid positions the carrier occupies; one position equals 25 mm (.984 in.)

Tube Runners

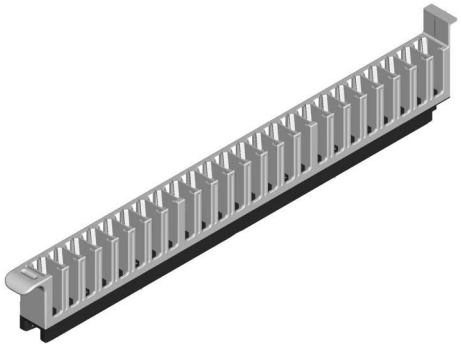


Runner for 24 tubes with a diameter of 10 mm

Main characteristics:

- Placement on deck segment
- Occupies one grid position

Fig. 6-64 *Tube runner, diameter 10 mm, 24 positions*

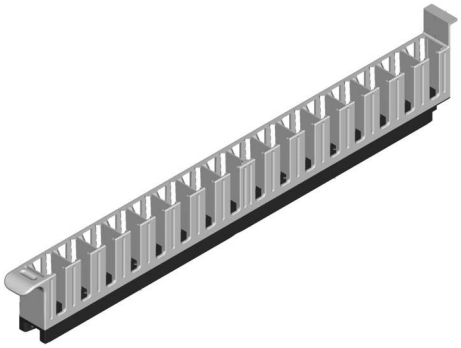


Runner for 24 tubes with a diameter of 13 mm

Main characteristics:

- Placement on deck segment
- Occupies one grid position

Fig. 6-65 *Tube runner, diameter 13 mm, 24 positions*

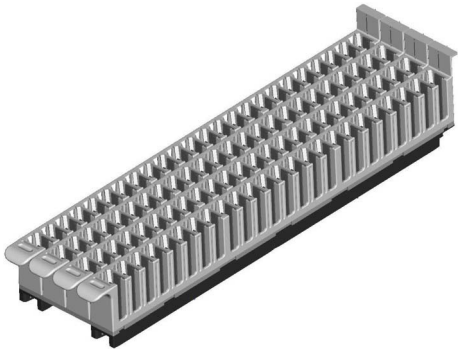


Runner for 16 tubes with a diameter of 16 mm

Main characteristics:

- Placement on deck segment
- Occupies one grid position

Fig. 6-66 *Tube runner, diameter 16 mm, 16 positions*

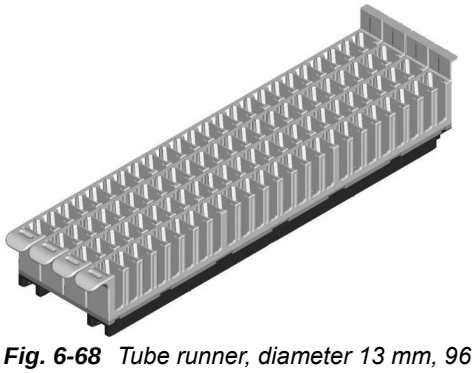


Runner for 96 tubes with a diameter of 10 mm

Main characteristics:

- 4 x 24 positions
- Placement on deck segment
- Occupies 4 grid positions

Fig. 6-67 *Tube runner, diameter 10 mm, 96 positions*

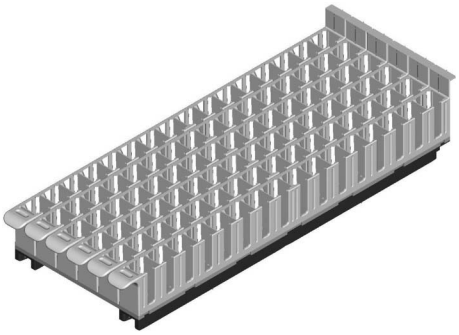


Runner for 96 tubes with a diameter of 13 mm

Main characteristics:

- 4 x 24 positions
- Placement on deck segment
- Occupies 4 grid positions

Fig. 6-68 *Tube runner, diameter 13 mm, 96 positions*

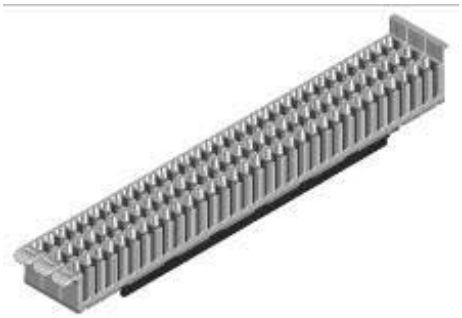


Runner for 96 tubes with a diameter of 16 mm

Main characteristics:

- 6 x 16 positions
- Placement on deck segment
- Occupies 6 grid positions

Fig. 6-69 *Tube runner, diameter 16 mm, 96 positions*

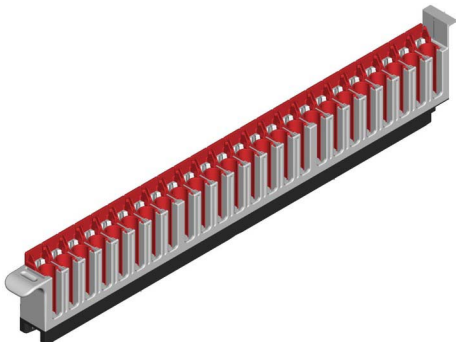


Runner for 96 tubes with a diameter of 10 mm

Main characteristics:

- 3*32 positions
- Placement on deck segment
- Occupies 3 grid positions

Fig. 6-70 *Tube runner, diameter 10 mm, 3*32 positions*

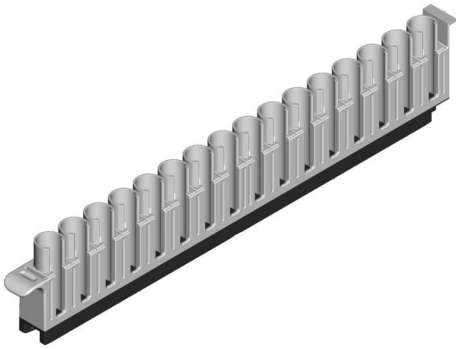


Runner for 24 Eppendorf tubes 1.5/2.0 ml

Main characteristics:

- Placement on deck segment
- Occupies one grid position

Fig. 6-71 *Tube runner, Eppendorf tubes 1.5 ml, 24 positions*

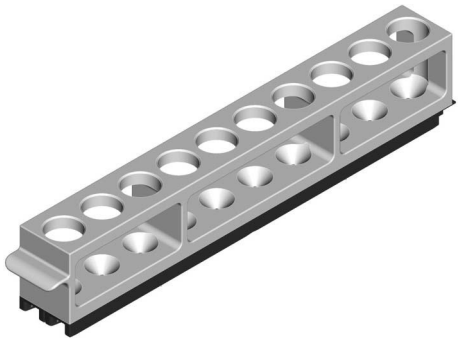


Runner for 16 Falcon tubes 15 ml

Main characteristics:

- Placement on deck segment
- Occupies one grid position

Fig. 6-72 *Tube runner, Falcon tubes 15 ml, 16 positions*



Runner for 10 Falcon tubes 50 ml

Main characteristics:

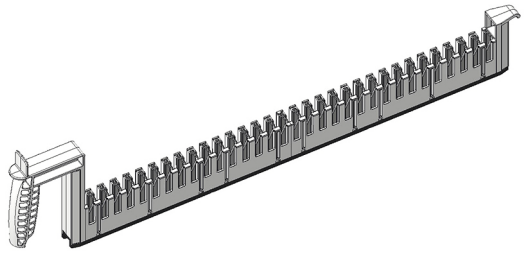
- Placement on deck segment
- Occupies 2 grid positions

Fig. 6-73 *Tube runner, Falcon tubes 50 ml, 10 positions*

6.3.8 Fluent ID Tube Runners

Plain Text Designation	p/n	Label Designation	Width[a)]	Reference
Tube runner, diameter 10 mm, 1*32 positions	30042506	RUNNER TUBE 10MM 1*32	1	See Fig. 6-74 , 2 6-39
Tube runner, diameter 13 mm, 1*32 positions	30042507	RUNNER TUBE 13MM 1*32	1	See Fig. 6-75 , 2 6-40
Tube runner, diameter 16 mm, 1*32 positions	30042508	RUNNER TUBE 16MM 1*26	1	See Fig. 6-76 , 2 6-40
Tube runner, Eppendorf safe lock 2ml, 1*32 positions	30042509	RUNNER TUBE SAFE LOCK 2 ML 1*32	1	See Fig. 6-77 , 2 6-40
Set of two 16 mm diameter plug inserts	30042525	SET INSERT RUNNER 16MM	n.a.	See Fig. 6-78 , 2 6-40

a) Number or grid positions the carrier occupies; one position equals 25 mm (.984 in.)

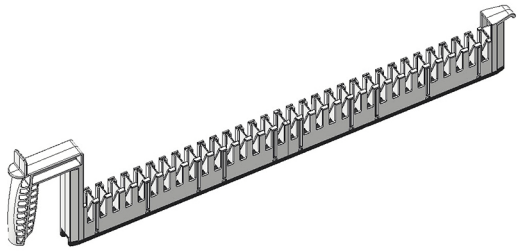


Tube runner, diameter 10 mm, 1*32 positions

Main characteristic:

- Compatible with the Fluent ID option

Fig. 6-74 *Tube runner, diameter 10 mm, 32 positions*

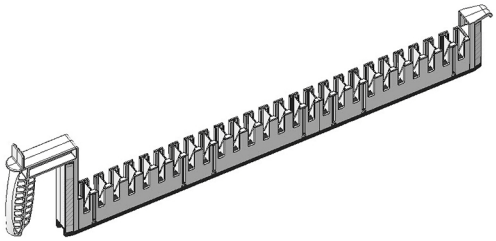


Tube runner, diameter 13 mm, 1*32 positions

Main characteristic:

- Compatible with the Fluent ID option

Fig. 6-75 *Tube runner, diameter 13 mm, 32 positions*

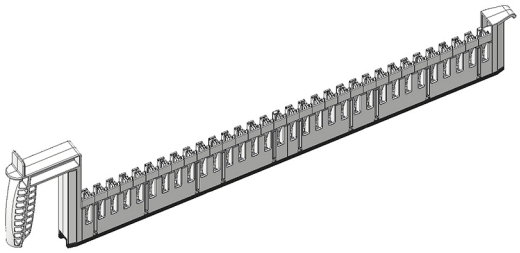


Tube runner, diameter 16 mm, 1*32 positions

Main characteristic:

- Compatible with the Fluent ID option

Fig. 6-76 *Tube runner, diameter 16 mm, 32 positions*



Tube runner, Eppendorf safe lock 2 ml, 1*32 positions

Main characteristic:

- Compatible with the Fluent ID option

Fig. 6-77 *Tube runner, Eppendorf safe lock 2 ml, 32 positions*

Set of two 16 mm diameter plug inserts

Main characteristic:

- intended for blocking two tube positions of the runner 30042508

Fig. 6-78 *Plug inserts*

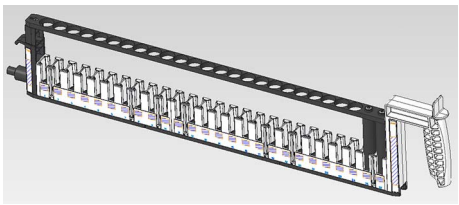
6.3.9 Tube Rotator Runners

Plain Text Designation	p/n	Label Designation	Width[a)]	Reference
TR Tube runner, diameter 16 mm, tube length 100 mm, 1 x 24 positions (black bridge)	30042545	RUNNER TUBE 16X100 MM ROTATOR	1	See Fig. 6-79 , 2 6-41
TR Tube runner, diameter 13 mm, tube length 100 mm, 1 x 24 positions, BD Vacutainer (white bridge)	30042546	RUNNER TUBE GREINER 13X100 MM ROTATOR	1	See Fig. 6-80 , 2 6-41
TR Tube runner, diameter 13 mm, tube length 100 mm, 1 x 24 positions, Greiner (grey bridge)	30042547	RUNNER TUBE BD 13X100 MM ROTATOR	1	See Fig. 6-81 , 2 6-41
TR Tube runner, diameter 13 mm, tube length 75 mm, 1 x 24 positions, BD Vacutainer (white bridge)	30042548	RUNNER TUBE GREINER 13X75 MM ROTATOR	1	See Fig. 6-82 , 2 6-42
TR Tube runner, diameter 13 mm, tube length 75 mm, 1 x 24 positions, Greiner (grey bridge)	30042549	RUNNER TUBE BD 13X75 MM ROTATOR	1	See Fig. 6-83 , 2 6-42

a) Number or grid positions the carrier occupies; one position equals 25 mm (.984 in.)

***Note:** Do not mix tubes of different height on a single Tube Rotator Runner.*

Tube Runners

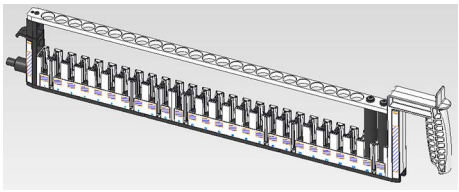


TR Tube runner, diameter 16 mm, tube length 100 mm, 1 x 24 positions

Main characteristic:

- Compatible with the Tube Rotator
- Black bridge

***Fig. 6-79** TR Tube runner, diameter 16 mm, tube length 100 mm, 1 x 24 positions*

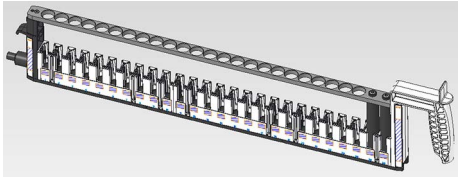


TR Tube runner, diameter 13 mm, tube length 100 mm, 1 x 4 positions, BD Vacutainer

Main characteristic:

- Compatible with the Tube Rotator
- White Bridge

***Fig. 6-80** TR Tube runner, diameter 13 mm, tube length 100 mm, 1 x 24 positions, BD Vacutainer*

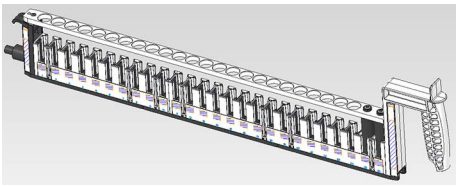


TR Tube runner, diameter 13 mm, tube length 100 mm, 1 x 24 positions, Greiner

Main characteristic:

- Compatible with the Tube Rotator
- Grey Bridge

***Fig. 6-81** TR Tube runner, diameter 13 mm, tube length 100 mm, 1 x 24 positions, Greiner*

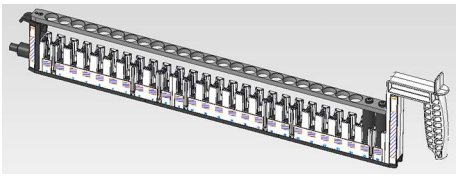


TR Tube runner, diameter 13 mm, tube length 75 mm, 1 x 24 positions, BD Vacutainer

Main characteristic:

- Compatible with the Tube Rotator
- White Bridge

Fig. 6-82 *TR Tube runner, diameter 13 mm, tube length 75 mm, 1 x 24 positions, BD Vacutainer*



TR Tube runner, diameter 13 mm, tube length 75 mm, 1 x 24 positions, Greiner

Main characteristic:

- Compatible with the Tube Rotator
- Grey Bridge

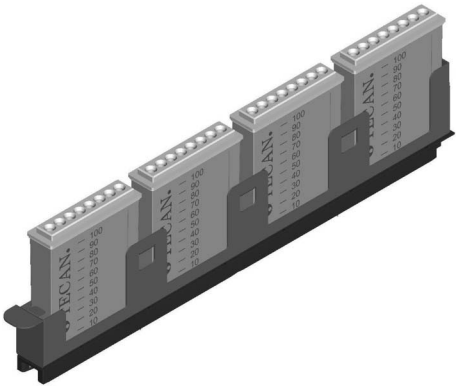
Fig. 6-83 *TR Tube runner, diameter 13 mm, tube length 75 mm, 1 x 24 positions, Greiner*

6.3.10 Trough Runners

Plain Text Designation	p/n	Label Designation	Width[a)]	Reference
Trough runner, 4 positions, for 100 ml troughs	30042773	RUNNER TROUGH 100ML 1*4	1	See Fig. 6-84 , 2 6-42
Trough runner, 3 positions, for 320 ml troughs	30042774	RUNNER TROUGH 320ML 1*3	2	See Fig. 6-85 , 2 6-43
Trough runner, 1000 ml	30042775	RUNNER TROUGH 1000ML 1*1	2	See Fig. 6-86 , 2 6-43

a) Number or grid positions the carrier occupies; one position equals 25 mm (.984 in.)

Trough Runners



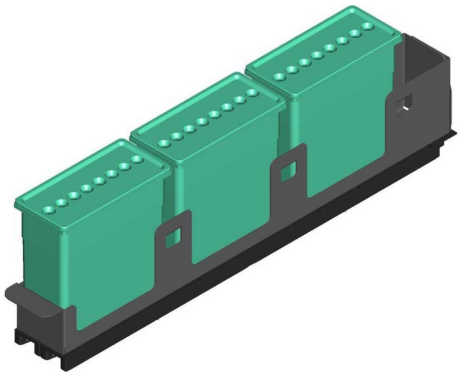
Runner for 4 x 100 ml reagent troughs

Main characteristics:

- Placement on deck segment
- Full access for FCA
- Occupies one grid position

Note: *The runner does not include the troughs. These need to be ordered separately.*

Fig. 6-84 *Trough runner, 4 positions, for 100 ml troughs*



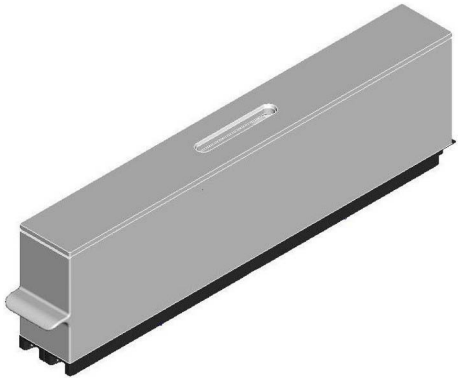
Runner for 3 x 320 ml reagent troughs

Main characteristics:

- Placement on deck segment
- Full access for FCA
- Occupies 2 grid positions

Note: *The runner does not include the troughs. These need to be ordered separately.*

Fig. 6-85 *Trough runner, 3 positions, for 320 ml troughs*



Runner for 1000 ml reagent trough

Main characteristics:

- Placement on deck segment
- Full access for FCA
- Occupies 2 grid positions

Fig. 6-86 *Trough runner, 1000 ml*

6.3.11 FCA Gripper

Plain Text Designation	p/n	Label Designation	Width[a)]	Reference
FCA gripper docking station	30042451	STATION DOCKING FCA GRIPPER	n.a	See Fig. 6-87, 2 6-44
FCA gripper fingers	30042450	SET FINGERS FCA GRIPPER CENTRIC	n.a	See Fig. 6-88, 2 6-44

a) Number or grid positions the carrier occupies; one position equals 25 mm (.984 in.)

FCA Gripper

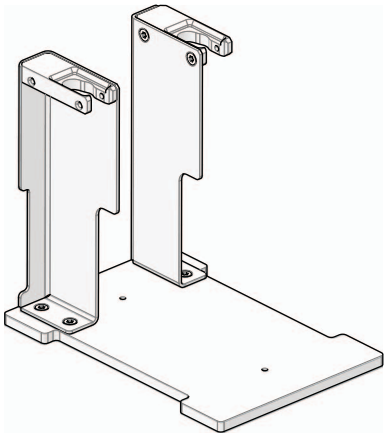


Fig. 6-87 *FCA gripper docking station*

FCA gripper docking station for FCA gripper fingers

Main characteristics:

- Can be mounted on a deck segment like a microplate nest

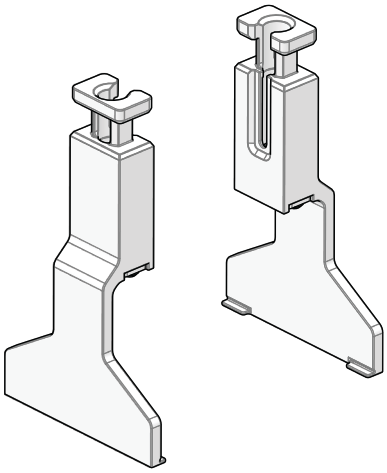


Fig. 6-88 *FCA gripper fingers*

Gripper fingers for the FCA gripper docking station

6.3.12 Mix and Pierce

Plain Text Designation	p/n	Label Designation	Reference
Troughs	30042212	TROUGH REUSE DEEP 100ML PP 3 PCE.	See Fig. 6-89, 2 6-45
Piercing tip	30042210	TIP PIERCING WITH LOCK NUT	See Fig. 6-90, 2 6-45
Piercing tip protection (100 pc.)	30042213	PROTECTION TIP PIERCING 100 PCE.	See Fig. 6-91, 2 6-46
Piercing tip removal tool	30042214	TOOL TIP PIERCING REMOVAL 1 PCE.	See Fig. 6-92, 2 6-46
Deep wash station on separate Fluent segment	30042211	SEGMENT WASH STAT DEEP TROUGH PP 3*100ML	See Fig. 6-93, 2 6-46

Plain Text Designation	p/n	Label Designation	Reference
Safety shield	30042215	HIELD SAFETY LIQUID FCA 1 PCE.	See Fig. 6-94 , 2 6-46
Deep wash station for integration on tube rotator	30042550	WASHSTAT DEEP TROUGH 3X100ML ROTATOR	See Fig. 6-95 , 2 6-47
Tube Rotator	30042540	ROTATOR TUBE 12 GRID	See Fig. 6-96 , 2 6-47
Rotator Tube Cover 2x 100 mm / 3x 75 mm	30042541	COVER ROTATOR TUBE 2X 100MM / 3X 75MM	See Fig. 6-97 , 2 6-47
Rotator Tube Cover 5x 100 mm	30042542	COVER ROTATOR TUBE 5X 100 MM	See Fig. 6-98 , 2 6-47
Rotator Tube Cover 5x 75 mm	30042543	COVER ROTATOR TUBE 5X 75 MM	See Fig. 6-99 , 2 6-48
Rotator Tube Cover 1x 100 mm / 4x 75 mm	30042544	COVER ROTATOR TUBE 1X 100 MM 4X 75 MM	See Fig. 6-100 , 2 6-48
Tube holder 4x 13 mm	30042551	INSERT TUBE 4X13MM CARRIER TROUGH	See Fig. 6-101 , 2 6-48

Note: *Tube Rotator requires special runners, refer to 6.3.9 "Tube Rotator Runners", 2 6-41*

Troughs

Fig. 6-89 *Troughs*

Set of 3 chemical resistant troughs, special format for decontamination of tube piercing tips.

To be used with material 30042211 and 30042550

Piercing Tip

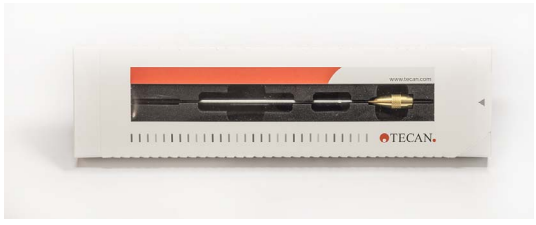


Fig. 6-90 *Piercing tip*

Single tube piercing tip with lock nut.

Piercing Tip Protection

Fig. 6-91 Piercing tip protection

Set of 100 piercing tip protections to be used to shield piercing tips (during needle change or in case of errors). One set will be delivered automatically per instrument ordered with piercing tips.

Piercing Tip Removal Tool

Fig. 6-92 Piercing tip removal tool

Tool to remove needles stuck in tube caps during piercing.
One tool will be delivered automatically per instrument ordered with piercing tips.

Wash Station

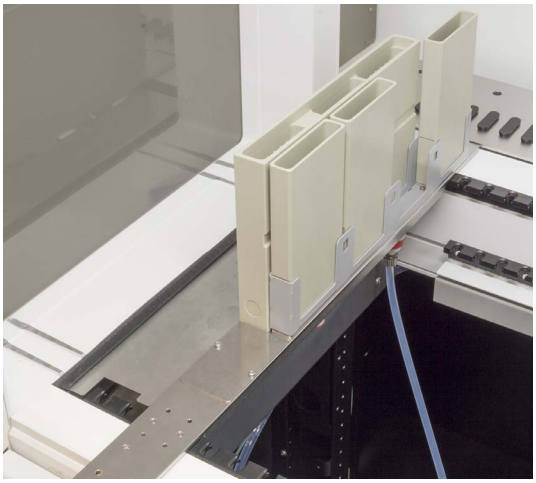


Fig. 6-93 Wash Station

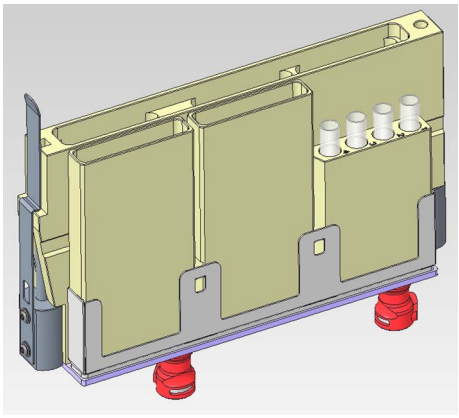
Passive wash station for piercing tips, high and low volume syringes.
Three positions for Tecan decontamination troughs (reusable).
Includes all tubing and 1 set of 3 troughs.
Additional sets of reusable troughs: 30042212.

Safety Shield

Fig. 6-94 Safety shield

The safety shield is mounted in front of the FCA arm

Deep wash station for piercing tips

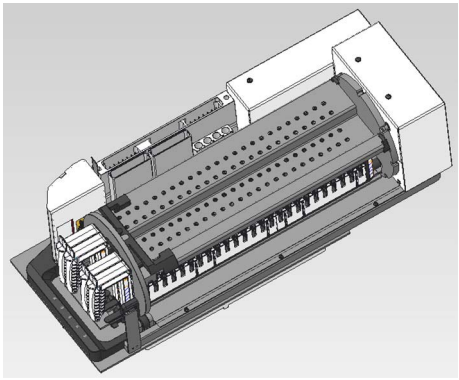


Delivered with two troughs (reusable) and one error tube holder.

For integration on Tube Rotator only.

Fig. 6-95 *Deep wash station for piercing tips*

Tube Rotator



Tube Rotator for tube rotation or oscillation. Space for five Tube Rotator runners, 24 tubes each.

To be ordered with a cover for different combinations of 75 mm and/or 100 mm tubes.

Space for one deep wash station per module (30042550, optional).

Fig. 6-96 *Tube Rotator*

Rotator Tube Cover

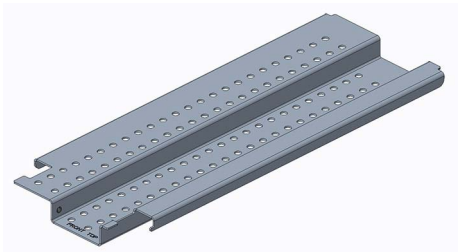


Fig. 6-97 *Rotator Tube Cover 2x 100 mm / 3x 75 mm*

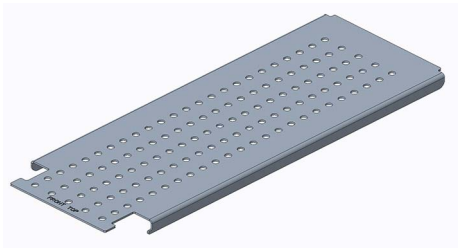


Fig. 6-98 *Rotator Tube Cover 5x 100 mm*

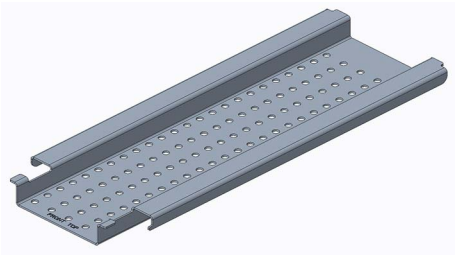


Fig. 6-99 *Rotator Tube Cover 5x 75 mm*

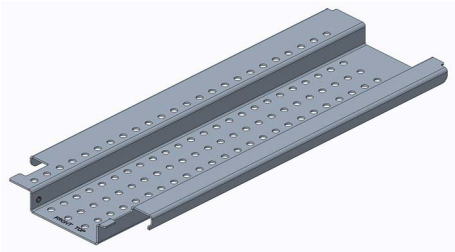
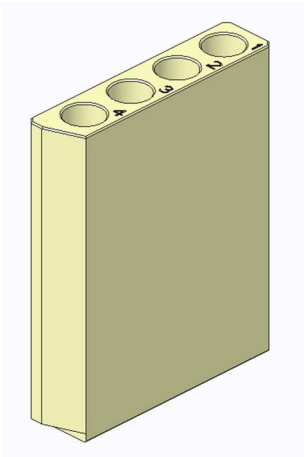


Fig. 6-100 *Rotator Tube Cover 1x 100 mm / 4x 75 mm*



Fits into trough holders

Fig. 6-101 *Tube holder 4x 13 mm*

6.4 Deck Extensions

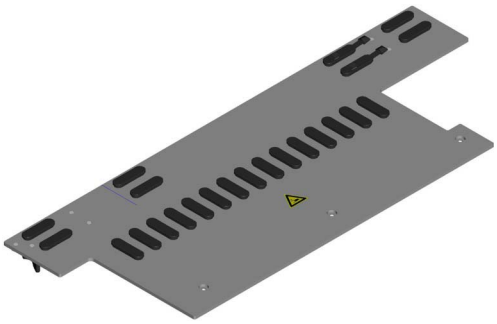
The deck extensions are used to enable the placement of elements outside the standard deck area. Elements, such as a microplate reader, a washer or a Fluent Carousel are installed on the deck extensions.
The following deck extensions are available:

Note: *Follow the references in the table to view an image of the respective component. Next to the image the components' main characteristics are listed.*

Plain Text Designation	p/n	Label Designation	Width[a)]	Reference
Deck extension, 2 positions, for mounting extension on the right	30042713	SEGMENT DECK SIDE WALL RIGHT 147MM	2[b)]	See Fig. 6-102 , 2 6-50
Deck extension, 2 positions, for mounting extension on the left	30042714	SEGMENT DECK SIDE WALL LEFT 147MM	2[c)]	See Fig. 6-103 , 2 6-50
Deck extension, 20 positions, rear mounting	30042710	SEGMENT DECK EXTENSION BACK 20 GRIDS	20	See Fig. 6-104 , 2 6-50
Deck extension 340 left or right side	30042667	DECK EXTENSION 340	700 mm	See Fig. 6-106 , 2 6-51
Adapter deck extension 340 to cabinet 340	30042668	ADAPTER DECK EXTENSION 340 CABINET	n.a	See Fig. 6-106 , 2 6-51
Deck extension 300	30042665	DECK EXTENSION 300	500 mm	See Fig. 6-107 , 2 6-51
Shelf Hydroflex washer deck	30042666	SHELF HYDROFLEX DECK EXT.300	n.a.	See Fig. 6-108 , 2 6-51
Bottle holder	30042698	HOLDER BOTTLES HYDROFLEX EXT. 300	n.a.	See Fig. 6-109 , 2 6-51

a) Number or grid positions the carrier occupies; one position equals 25 mm (.984 in.)
b) Plus side extension on the right and area to connect further extension
c) Plus side extension on the left and area to connect further extension

Deck Extensions

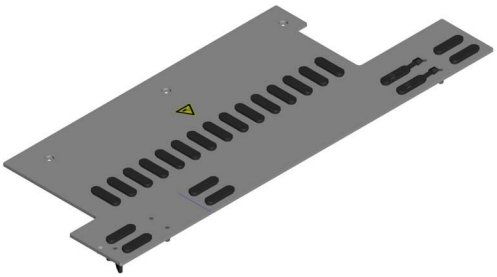


Deck extension right

Main characteristics:

- Holds sliding carriers
- To be installed in the extreme right position on the deck
- Intended to connect extension on the right

Fig. 6-102 *Deck extension, 2 positions, for mounting extension on the right*

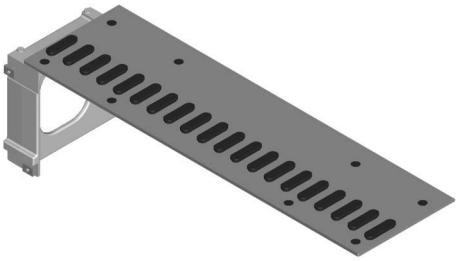


Deck extension left

Main characteristics:

- Holds sliding carriers
- To be installed in the extreme left position on the deck
- Intended to connect extension on the left

Fig. 6-103 *Deck extension, 2 positions, for mounting extension on the left*



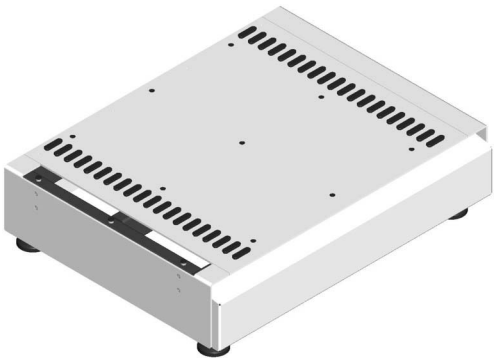
Deck extension in the rear

Main characteristics:

- To be installed in the rear of the deck, where the extension fills the space

To install nest segments with 6 positions and 7 mm high, the pins have to be removed.

Fig. 6-104 *Deck extension, 20 positions, rear mounting*

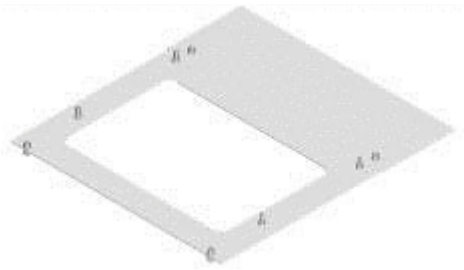


Deck extension 340

Main characteristics:

- Holds options (e.g., Hydrospeed)
- Takes additional adapter plate, according to option

Fig. 6-105 *Deck extension 340*

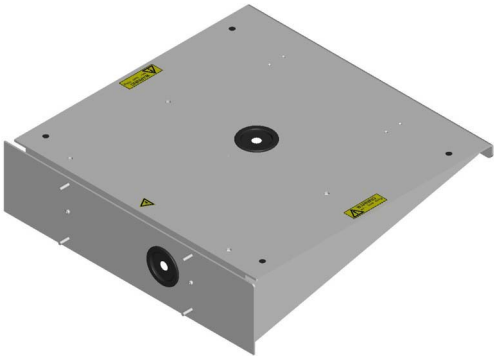


Adapter deck extension 340

Main characteristics:

- Mounts the deck extension 340 on a cabinet 340
- Valid for left and right side extension mounted on a cabinet
- Adapter locates the deck extension on standard cabinet 340

Fig. 6-106 *Adapter deck extension 340*



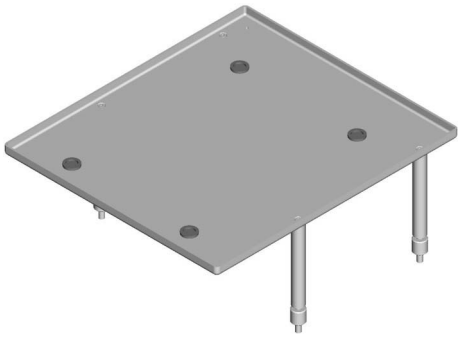
Deck extension 300

Main characteristics:

- Holds options (e.g., HydroFlex)
- To be mounted on the right of the instrument, can be modified for installation on the left
- Max. weight: 40 kg

Fig. 6-107 *Deck extension 300*

HydroFlex Washer



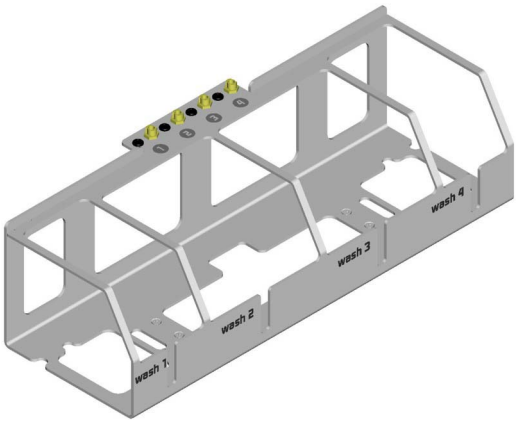
Shelf HydroFlex washer deck

Main characteristics:

- Holds a HydroFlex washer
- Allows a Inf200/Inf50 reader to be placed underneath

Fig. 6-108 *Shelf HydroFlex washer deck*

Bottle Holder



Bottle holder deck extension 300

Main characteristics:

- Holds
  - 2 x 2 l bottles
  - 2 x 4 l bottles
- Can be placed on Deck extension 300 or on deck extension in the rear
- Left or right side mounting

Fig. 6-109 *Bottle holder (e.g., HydroFlex Washer)*

6.5 Liquid Handling Parts

6.5.1 Liquid Containers and Carts

Tab. 6-12 *Liquid containers*

No.	Plain Text Designation	p/n	Label Designation
1	System liquid bottle 10 l	30042180	CONTAINER FLUENT LIQUID SYSTEM 10L
2	Waste bottle 10 l	30042183	CONTAINER FLUENT LIQUID WASTE 10L
3	System liquid bottle 20 l	30042181	CONTAINER FLUENT LIQUID SYSTEM 20L
4	Waste bottle 20 l	30042184	CONTAINER FLUENT LIQUID WASTE 20L
5	System liquid bottle 30 l	30042182	CONTAINER FLUENT LIQUID SYSTEM 30L
6	Waste bottle 30 l	30042185	CONTAINER FLUENT LIQUID WASTE 30L
7	Cart for 20 l system or waste liquid container	30042186	CART CONTAINER LIQUID 20L
	Cart for 30 l system or waste liquid container	30042187	CART CONTAINER LIQUID 30L
	Cart for 30 l system or waste liquid container and disposable tip waste bin	30042188	CART CONTAINER LIQUID 30L TIP WASTE
	Cart for disposable tip waste - 2 waste bins	30042189	CART DISPOSABLE TIP WASTE
	Set of 2 adapters for 20 l or 30 l carts. Adapts to hold smaller container—recommended for stability of small containers (e.g., 20 l or 30 l cart)	30042190	KIT ADAPTER CART CONTAINER LIQUID

6.5.2 Syringes and Accessories

Tab. 6-13 *Syringes and accessories*

Plain Text Designation	p/n	Label Designation
Syringe 5 ml for diluter type cXP	30042160	SYRINGE CXP 5000UL
Syringe 1.25 ml for diluter type cXP	30042158	SYRINGE CXP 1250UL
Syringe 0.25 ml for low volume fix pipetting tip	30042155	SYRINGE CXP 250UL

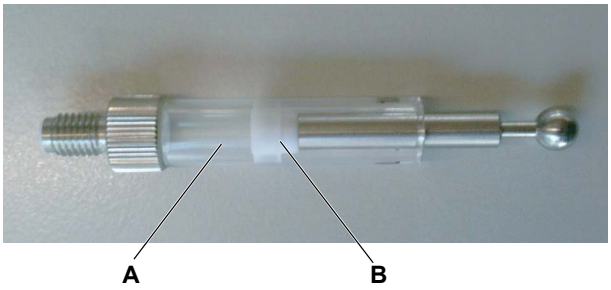


Fig. 6-110 *Syringe*

A *Syringe*

B *Syringe cap*

6.6 Consumables

DiTis have an expiring date. Observe the storage conditions of all consumables.

6.6.1 Reagent Troughs

Tab. 6-14 *Reagent troughs*

Plain Text Designation	p/n	Label Designation	Reference
Reagent troughs 100 ml, gray, 108 pcs	10613049	TROUGH DISPOSABLE 100ML PP GREY 108 PCE.	See Fig. 6-111 , 2 6-54
Reagent troughs 100 ml, with certified cleanliness, natural 108 pcs	10613048	TROUGH DISPOSABLE 100ML PP TRA. 108 PCE.	See Fig. 6-111 , 2 6-54
Reagent troughs COA 25 ml, PS, with cover, PE, 100 pcs In use with trough holder (10619626)	10613102	TROUGH REAGENT 25ML PP SET 100 PCE.	See Fig. 6-112 , 2 6-55
Reagent trough blisters (PP), 250 ml, 50 pcs	10619191	BLISTER REAG.TROUGH 250ML GEN-MATE/TE-MO	-
Reagent trough blisters (PP), 125 ml, 50 pcs	10619196	BLISTER REAGENT TROUGH 125ML TE-MO	-

Reagent Troughs

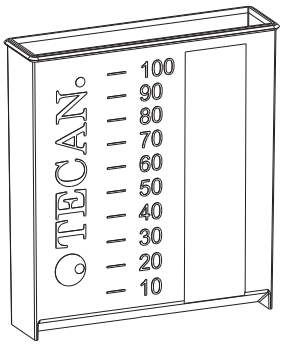


Fig. 6-111 *Trough 100 ml*

Reagent trough 100 ml

Main characteristics:

- Liquid level indication markings 10 to 100 ml
- Color: gray or natural (certified cleanliness)
- Available with certified cleanliness
- For use with trough runners and segments with trough nests

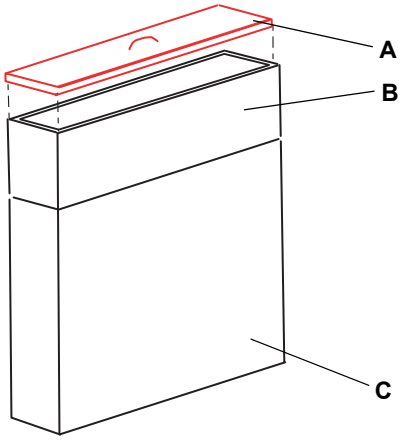


Fig. 6-112 Trough holder and 25 ml trough

Reagent trough COA 25 ml (B)

Main characteristics:

- Low volume applications
- Requires trough holder (C)
- Delivered with cover (A)

6.6.2 Disposable Tips for FCA

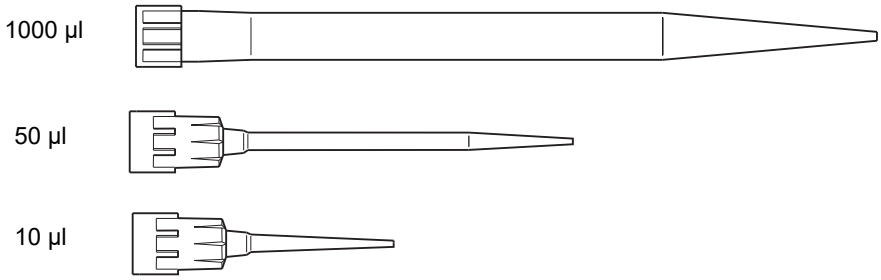


Fig. 6-113 Disposable tips FCA

Tab. 6-15 Disposable tips FCA

Plain Text Designation	p/n	Former p/n[a)]	Label Designation	Volume
Disposable tips without filter, conductive, blister packaging, 2,304 tips (24 trays of 96 tips)	10612516	612516	DITI 10µL CONDUCTIVE 2304 TIP STD.CONE	10 µl
Disposable tips with filter, conductive, blister packaging, 2,304 tips (24 trays of 96 tips)	10612517	612517	DITI 10µL CONDUCT.FI.2304 TIP STD.CONE	10 µl
Disposable tips without filter, conductive, cardboard boxes, 17,280 tips (180 trays of 96 tips)	10612552	612510	DITI LIHA 200µL CONDU.17280 PCE.	200 µl
Disposable tips without filter, conductive, blister packaging, 2,304 tips (24 trays of 96 tips)	30000627	612510.1	DITI 200µL CONDUCTIVE 2304 TIP STD.CONE	200 µl
Disposable tips with filter, conductive, cardboard boxes, 17,280 tips (180 trays of 96 tips)	10612553	612511	DITI LIHA 200µL CONDU.FIL.17280 PCE.	200 µl
Disposable tips with filter, conductive, blister packaging, 2,304 tips (24 trays of 96 tips)	30000629	612511.1	DITI 200µL CONDUCT.FI.2304 TIP STD.CONE	200 µl

Tab. 6-15 Disposable tips (cont.)FCA

Plain Text Designation	p/n	Former p/n[a)]	Label Designation	Volume
Disposable tips without filter, conductive, cardboard boxes, 9,600 tips (100 trays of 96 tips)	10612554	612512	DITI LIHA 1000µL CONDU.9600 PCE.	1000 µl
Disposable tips without filter, conductive, blister packaging, 2,304 tips (24 trays of 96 tips)	30000630	612512.1	DITI 1.0ML CONDUCTIVE 2304 TIP STD.CONE	1000 µl
Disposable tips with filter, conductive, cardboard boxes, 9,600 tips (100 trays of 96 tips)	10612555	612513	DITI LIHA 1000µL CONDU.FIL.9600 PCE.	1000 µl
Disposable tips with filter, conductive, blister packaging, 2,304 tips (24 trays of 96 tips)	30000631	612513.1	DITI 1.0ML CONDUCT.FI.2304 TIP STD.CONE	1000 µl
Nested 5-stack 350 µl LiHa Disposable Tips, non-filtered, pure, 5x96 tips	30083400	-	DITI LIHA 350µL COND.NESTED 7680 PCE	350 µl
Nested 5-stack 350 µl LiHa Disposable Tips, non-filtered, sterile, 5x96 tips	30083401	-	DITI LIHA 350µL COND.STE.NESTED 7680 PCE	350 µl
Nested 10-stack 350 µl LiHa Disposable Tips, non-filtered, standard, 10x96 tips	30083402	-	DITI LIHA 350µL COND.TESTACK 9600 PCE	350 µl

a) For a transitional period the consumable packaging will be labeled with the “old” part No.

6.6.3 Disposable Tips for MCA384 head – MCA96 tip adapters

Tab. 6-16 Disposable tips for MCA384 head – MCA96 tip adapters

No.	Plain Text Designation	p/n	Label Designation
1	50 µl Disposable Tip for MCA96, without filter; 4*10 racks of 96 tips (3,840 tips) Tecan Pure	30038606	DITI 50µL 3840 PCE. MCA96 SBS
2	50 µl Disposable Tip for MCA96, without filter; 4*10 racks of 96 tips (3,840 tips) Tecan Sterile	30038607	DITI 50µL STE. 3840 PCE. MCA96 SBS
3	50 µl Disposable Tip for MCA96, filtered; 4*10 racks of 96 tips (3,840 tips) Tecan Sterile	30038608	DITI 50µL STE.FIL. 3840 PCE. MCA96 SBS
4	50 µl Disposable Tip for MCA96, without filter; nested for Passive Stack, 8*5 racks of 96 tips (3,840 tips) Tecan Pure	30038609	DITI 50µL 3840 PCE. MCA96 NESTED
5	50 µl Disposable Tip for MCA96, without filter; nested for Passive Stack, 8*5 racks of 96 tips (3,840 tips) Tecan Sterile	30048822	DITI 50µL STE. 3840 PCE. MCA96 NESTED

Tab. 6-16 Disposable tips for MCA384 head – MCA96 tip adapters (cont.)

No.	Plain Text Designation	p/n	Label Designation
6	50 µl Disposable Tip for MCA96, without filter; nested for Te-Stack, 10*8 racks of 96 tips (7,680 tips) Tecan Pure	30038610	DITI 50µL 7680 PCE. MCA96 TE-STACK SBS
7	100 µl Disposable Tip for MCA96, without filter; 4*10 racks of 96 tips (3,840 tips) Tecan Pure	30038611	DITI 100µL 3840 PCE. MCA96 SBS
8	100 µl Disposable Tip for MCA96, without filter; 4*10 racks of 96 tips (3,840 tips) Tecan Sterile	30038612	DITI 100µL STE. 3840 PCE. MCA96 SBS
9	100 µl Disposable Tip for MCA96, filtered; 4*10 racks of 96 tips (3,840 tips) Tecan Sterile	30038613	DITI 100µL STE.FIL. 3840 PCE. MCA96 SBS
10	100 µl Disposable Tip for MCA96, without filter; nested for Passive Stack, 8*5 racks of 96 tips (3,840 tips) Tecan Pure	30038614	DITI 100µL 3840 PCE. MCA96 NESTED
11	100 µl Disposable Tip for MCA96, without filter; nested for Passive Stack, 8*5 racks of 96 tips (3,840 tips) Tecan Sterile	30048823	DITI 100µL STE. 3840 PCE. MCA96 NESTED
12	200 µl Disposable Tip for MCA96, without filter; 4*10 racks of 96 tips (3,840 tips) Tecan Pure	30038616	DITI 200µL 3840 PCE. MCA96 SBS
13	150 µl Disposable Tip for MCA96, filtered; 4*10 racks of 96 tips (3,840 tips) Tecan Pure	30180837	DITI 150UL FIL. 3840 PCE. MCA96
14	200 µl Disposable Tip for MCA96, without filter; 4*10 racks of 96 tips (3,840 tips) Tecan Sterile	30038617	DITI 200µL STE. 3840 PCE. MCA96 SBS
15	150 µl Disposable Tip for MCA96, filtered; 4*10 racks of 96 tips (3,840 tips) Tecan Sterile	30038618	DITI 150µL STE.FIL. 3840 PCE. MCA96 SBS
16	200 µl wide bore Disposable Tip for MCA96, without filter; 4*10 racks of 96 tips (3,840 tips) Tecan Pure	30050348	DITI 200µL 3840 PCE. MCA96 WIDE BORE SBS
17	150 µl wide bore Disposable Tip for MCA96, filtered; 4*10 racks of 96 tips (3,840 tips) Tecan Sterile	30050349	DITI 150µL 3840 PCE.FIL. MCA96 WIDE BORE
18	200 µl Disposable Tip for MCA96, without filter; nested for Passive Stack, 8*5 racks of 96 tips (3,840 tips) Tecan Pure	30038619	DITI 200µL 3840 PCE.MCA96 NESTED

Tab. 6-16 Disposable tips for MCA384 head – MCA96 tip adapters (cont.)

No.	Plain Text Designation	p/n	Label Designation
19	200 µl Disposable Tip for MCA96, without filter; nested for Passive Stack, 8*5 racks of 96 tips (3,840 tips) Tecan Sterile	30048824	DITI 200µL STE. 3840 PCE. MCA96 NESTED
20	200 µl Disposable Tip for MCA96, without filter; nested for Te-Stack, 10*8 racks of 96 tips (7,680 tips) Tecan Pure	30038620	DITI 200µL 7680 PCE. MCA96 TE-STACK SBS
21	500 µl Disposable Tip for MCA96, without filter, 5*10 racks of 96 tips (4,800 tips) Tecan Pure	30046341	DITI 500µL 4800 PCE. MCA96 SBS
22	500 µl Disposable Tip for MCA96, filtered; 5*10 racks of 96 tips (4,800 tips) Tecan Sterile	30046342	DITI 500µL STE.FIL. 4800 PCE. MCA96 SBS

6.6.4 Disposable Tips for MCA384

Tab. 6-17 Disposable tips for MCA384 head- MCA384 tip adapter

No.	Plain Text Designation	p/n	Label Designation
1	15 µl Disposable Tip for MCA384, without filter; 4*10 racks with 384 tips (15,360 tips); TECAN PURE	30138080	DITI 15µL 40*384P MCA384
2	50 µl Disposable Tip for MCA384, without filter; 4*10 racks with 384 tips (15,360 tips); TECAN PURE	30138087	DITI 50µL 40*384P MCA384
3	125 µl Disposable Tip for MCA384, without filter; 4*10 racks with 384 tips (15,360 tips); TECAN PURE	30138090	DITI 125µL 40*384P MCA384
4	15 µl Disposable Tip for MCA384, without filter; 4*10 racks with 384 tips (15,360 tips); TECAN STERILE	30138085	DITI 15µL STE. 40*384P MCA384
5	50 µl Disposable Tip for MCA384, without filter; 4*10 racks with 384 tips (15,360 tips); TECAN STERILE	30138088	DITI 50µL STE. 40*384P MCA384

Tab. 6-17 Disposable tips for MCA384 head- MCA384 tip adapter (cont.)

No.	Plain Text Designation	p/n	Label Designation
6	125 µl Disposable Tip for MCA384, without filter; 4*10 racks with 384 tips (15,360 tips); TECAN STERILE	30138091	DITI 125µL STE. 40*384P MCA384
7	15 µl Disposable Tip for MCA384, with filter; 4*10 racks with 384 tips (15,360 tips); TECAN STERILE	30138086	DITI 15µL STE. FIL. 40*384P MCA384
8	50 µl Disposable Tip for MCA384, with filter; 4*10 racks with 384 tips (15,360 tips); TECAN STERILE	30138089	DITI 50µL STE. FIL. 40*384P MCA384
9	125 µl Disposable Tip for MCA384, with filter; 4*10 racks with 384 tips (15,360 tips); TECAN STERILE	30138092	DITI 125µL STE. FIL. 40*384P MCA384

TECAN STERILE	purity level: sterile, tested and certified to be free from human DNA, DNase, RNase, pyrogens and endotoxins
TECAN PURE	purity level: tested and certified to be free of human DNA, RNase, DNase and PCR inhibitors

6.6.5 Disposable Tips for MCA 96

Tab. 6-18 Disposable tips for MCA 96

No.	Plain Text Designation	p/n	Label Designation
1	10 µl Disposable Tip for MCA96, without filter; 4*10 racks of 96 tips ANSI; Tecan Pure	30104973	DITI LIHA 10µL COND. 2304 PCE. SBS
2	10 µl Disposable Tip for MCA96, with filter; 4*10 racks of 96 tips ANSI; Tecan Pure	30104974	DITI LIHA 10µL COND.FIL. 2304 PCE. SBS
3	50 µl Disposable Tip for MCA96, without filter; 4*10 racks of 96 tips ANSI; Tecan Pure	30057811	DITI LIHA 50µL CONDU. 2304 PCE. SBS
4	50 µl Disposable Tip for MCA96, with filter; *10 racks of 96 tips ANSI; Tecan Pure	30057813	DITI LIHA 50µL CONDU.FIL. 2304 PCE. SBS
5	200 µl Disposable Tip for MCA96, without filter; 4*10 racks of 96 tips ANSI Tecan Pure	30057814	DITI LIHA 200µL CONDU. 2304 PCE. SBS
6	200 µl Disposable Tip for MCA96, with filter; 4*10 racks of 96 tips ANSI; Tecan Pure	30057815	DITI LIHA 200µL CONDU.FIL. 2304 PCE. SBS

Tab. 6-18 Disposable tips for MCA 96

No.	Plain Text Designation	p/n	Label Designation
7	1000 µl Disposable Tip for MCA96, without filter; 4*10 racks of 96 tips ANSI; Tecan Pure	30057816	DITI LIHA 1000µL CONDU. 2304 PCE. SBS
8	1000 µl Disposable Tip for MCA96, with filter; 4*10 racks of 96 tips ANSI; Tecan Pure	30057817	DITI LIHA 1000µL CONDU.FIL. 2304PCE. SBS
9	10 µl Disposable Tip for MCA96, without filter; 4*10 racks of 96 tips ANSI; Tecan Sterile	30104975	DITI LIHA 10µL COND. STE. 3840 PCE.
10	10 µl Disposable Tip for MCA96, with filter; 4*10 racks of 96 tips ANSI; Tecan Sterile	30104976	DITI LIHA 10µL COND.FIL.STE. 3840 PCE
11	50 µl Disposable Tip for MCA96, without filter; 4*10 racks of 96 tips ANSI; Tecan Sterile	30057818	DITI LIHA 50µL CONDU. STE. 3840 PCE.
12	50 µl Disposable Tip for MCA96, with filter; 4*10 racks of 96 tips ANSI; Tecan Sterile	30057819	DITI LIHA 50µL CONDU.FIL.STE. 3840 PCE.
13	200 µl Disposable Tip for MCA96, without filter; 4*10 racks of 96 tips ANSI; Tecan Sterile	30057820	DITI LIHA 200µL CONDU.STE. 3840 PCE.
14	200 µl Disposable Tip for MCA96, without filter; 4*10 racks of 96 tips ANSI; Tecan Sterile	30057821	DITI LIHA 200µL CONDU.FIL.STE. 3840 PCE.
15	1000 µl Disposable Tip for MCA96, without filter; 4*10 racks of 96 tips ANSI; Tecan Sterile	30057822	DITI LIHA 1000µL CONDU.STE. 3840 PCE.
16	1000 µl Disposable Tip for MCA96, with filter; 4*10 racks of 96 tips ANSI; Tecan Sterile	30057823	DITI LIHA 1000µL CONDU.FIL.STE. 3840 PCE
17	10 µl Disposable Tip for MCA96, without filter; nested ANSI; Tecan Pure	30104977	DITI LIHA 10µL COND.NESTED 7680 PCE
18	10 µl Disposable Tip for MCA96, with filter; nested ANSI; Tecan Pure as well as Tecan sterile	30104978	DITI LIHA 10µL COND.NESTED FIL.7680 PCE
19	350 µl Disposable Tip for MCA96, without filter; nested ANSI; Tecan Pure	30083400	DITI LIHA 350µL COND.NESTED 7680 PCE
20	350 µl Disposable Tip for MCA96, with filter; nested ANSI; Tecan Sterile	30083401	DITI LIHA 350µL COND.STE.NESTED 7680 PCE
21	Tecan Combi Tray	30159331	TRAY DITI SLAS

Tab. 6-18 Disposable tips for MCA 96

No.	Plain Text Designation	p/n	Label Designation
22	50µl Disposable Tips with Filters, Combi tray; Tecan Pure	30201339	DITI COMBI 500µL CONDU.FIL. 2304 PCE.
23	200µl Disposable Tips with Filters, Combi tray; Tecan Pure	30201341	DITI COMBI 200µL CONDU.FIL. 2304 PCE.
24	1000µl Disposable Tips with Filters, Combi tray; Tecan Pure	30199162	DITI COMBI 1000µL CONDU.FIL. 2304 PCE.
25	1000µl Disposable Tips with Filters, Combi tray; Tecan Pure	30201344	DITI COMBI 1000µL COND.FIL.WB. 2304 PCE.

TECAN STERILE — purity level: sterile, tested and certified to be free from human DNA, DNase, RNase, pyrogens and endotoxins

TECAN PURE — purity level: tested and certified to be free of human DNA, RNase, DNase and PCR inhibitors

Offset pickup is only possible from ANSI/SLAS trays without flanges.

6.7 Tools and Gauges

Tab. 6-19 Tools and Gauges

Plain Text Designation	p/n	Label Designation
Te-PS tubing widener	10643003	WIDENER PIPETTING TUBING TE-PS

7 Customer Support

Purpose of This Chapter

This chapter informs you how to contact us in case help is needed. It lists addresses and telephone numbers of the manufacturer's representatives.

How to get Help

Tecan and its representatives maintain a fully trained staff of technical specialists around the world. For any technical question, contact the nearest Tecan representative.

Feedback on This Manual

If you have any comments on this Reference Manual or suggestions for improvement, please send them by e-mail to **docfeedback@tecan.com**.
In your e-mail, please specify the manual name, the document ID and the manual version. This information is shown at the bottom of each printed page and on the first page of the help file (context-sensitive help of software products).

7.1 Contacts

Addresses

Contact your local distributor or one of the addresses below.
Also see our homepage on the web: **www.tecan.com**

Country/Region	Address	Telephone/Telefax/E-mail	
Asia	Tecan Asia Pte Ltd. 18 Boon Lay Way, #10-106 TradeHub 21 Singapore 609966 Singapore	Phone Fax E-mail	+65 6444 1886 +65 6444 1836 tecan@tecan.com.sg
Australia New Zealand Pacific Islands	Tecan Australia Pty Ltd 21 / 3 Westside Avenue Port Melbourne Vic 3207 Australia	Phone Phone Fax E-mail	Toll Free: 1300 808 403 +61 3 9647 4100 +61 3 9647 4199 helpdesk-aus@tecan.com
Austria	Tecan Austria GmbH Untersbergstrasse 1a 5082 Grödig Austria	Phone Fax E-mail	+43 6246 8933 256 +43 6246 72770 helpdesk-at@tecan.com
Belgium	Tecan Benelux B.V.B.A. Mechelen Campus Schaliënhoevedreef 20A 2800 Mechelen Belgium	Phone Fax E-mail	+32 15 42 13 19 +32 15 42 16 12 tecan-be@tecan.com

China	Tecan (Shanghai) Laboratory Equimpment Co., Ltd. 1F, T 15-4, #999, Ningqiao Road, Pilot Free Trade Zone Shanghai, PRC, 201206 P.R.China	Phone Fax E-mail	+86 40 0821 38 88 helpdesk-cn@tecan.com
France	Tecan France S.A.S.U 6, Avenue du Château de Gerland F-69007 Lyon France	Phone Fax E-mail	+33 820 88 77 36 +33 4 72 76 04 99 helpdesk-fr@tecan.com
Germany	Tecan Deutschland GmbH Werner-von-Siemens-Straße 23 74564 Crailsheim Germany	Phone Fax E-mail	+49 1805 8322 633 or +49 1805 TECAN DE +49 7951 9417 92 helpdesk-de@tecan.com
Italy	Tecan Italia, S.r.l. Via Brescia, 39 20063 Cernusco Sul Naviglio (MI) Italy	Phone Fax E-mail	+39 800 11 22 91 +39 (02) 92 72 90 47 helpdesk-it@tecan.com
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USA (Tecan Systems)	Tecan Systems, Inc. 2450 Zanker Road San Jose, CA 95131 USA	Phone Fax E-mail	+1 408 953 3100 Toll Free: +1 800 231 0711 +1 408 953 3101 helpdesk-sy@tecan.com

8 Glossary

Purpose of This Chapter

This chapter contains a glossary to explain terms and expressions used in this Reference Manual.

Note: *The expressions that are marked with italics in the descriptive text have their own entry in this glossary.*

Accuracy
The degree of closeness of measurements to a standard or true value. It is expressed as a percentage, represented by the function: Difference between expected value and actual value, divided by the expected value, multiplied by 100%.

Active Wash Waste System
A liquid active wash and waste station for low volume fixed tips for deep and shallow cleaning positions.

Adapter rack
A special rack for the *System Carrier* of the Multiple Channel Arm (MCA384). Various versions to hold *tip adapters*, *DiTi boxes* or *microplates*.

Adapter DiTi
Adapter for the MCA384 pipetting head for mounting *disposable tips*.

Adapter Fixed
Adapter for the MCA384 pipetting head with 384 or 96 fixed tips.

Adapter QC
Adapter for setups and tests with the MCA384.

Application
Generally refers to a specific procedure or test, such as RIA (Radio Immuno Assay), EIA (Enzyme Immuno Assay), etc. A corresponding *method* is programmed in the FluentControl software and the *application* is performed with defined samples and reagents.

Base Carrier
A special carrier for the *Multiple Channel Arm* (MCA384), which is equipped with a *wash station* and *adapter racks* to hold *tip adapters*, *DiTi boxes* or *microplates*.

Capacitive Liquid Level Detection (cLLD)
This is a standard feature of the liquid handling channels of the *Flexible Channel Arm*. It measures the capacitance between the pipetting *tip* and the electrical ground (instrument *deck*). As soon as the *tip* touches the liquid, the change in capacitance triggers a signal, which is used for liquid detection. The special features of the cLLD also monitor the tip for an exit signal during aspiration and when the tip retracts from the liquid. The function only works with conductive *tips* (and DiTis) and liquids.

Fluent Carousel
An optional module to store *microplates* in stacks that are arranged in a circle. It offers random access to the *microplates* and can be used for *microplate* feed and incubation purposes.

Carrier

The generic term for components that can be placed on the instrument deck. Carriers are categorized as *nest segments*, *deck segments*, *runners* (placed on deck segments) and special deck components (e.g., disposable tip waste station, combo carriers).

Carry-over

Residue of any liquid that remains in a tip after rinsing at the end of a pipetting cycle. Such residue is “carried over” to the next cycle. Where carry-over needs to be kept to a minimum, *disposable tips (DiTis)* must be used.

Cleaner

The position in the *wash station* into which a tip is placed during a wash cycle. System liquid is pumped through the *tip*. The liquid rising in the cleaner rinses the outer surface of the tips. Overflowing liquid is collected in the waste.

Coefficient of variation (CV%)

The statistical representation of the *precision* of a measurement. It is expressed as a percentage, represented by the function: Standard deviation divided by the mean value, multiplied by 100%.

Conditioning volume

The volume of excess liquid which is aspirated together with the liquid to be distributed and immediately discarded (usually in the source container) before the dispense process starts. It serves to create a controlled state of the system.

Contact dispense

A dispense mode in which liquid is dispensed while the pipetting tip is submerged or at least touches the liquid surface in the container. In this mode a higher precision may be expected in comparison with free dispense, however, carry-over effects need to be considered.

Container

Any vessel placed on or under the deck and containing a liquid or other chemical (e.g., one well in a microplate, a sample tube or a system liquid bottle).

Control

A liquid containing a known concentration of the substance which is to be tested. Used to determine (high/low/cutoff) limits and/or as reference for quality control. The properties of the control are well known and stable.

Deck

Part of the instrument where *carriers* and options are placed for access by the robotic arm(s).

Deck segment

A plate with positioning pins. It is placed on the instrument deck and positions the r*unners*.

Diluter

A precision pump used for aspiration and dispense of exactly defined liquid volumes. It mainly consists of a *syringe* with a motor-driven *plunger* and a valve to control flow direction. Each pipetting channel is equipped with a diluter.

Disposable tip (DiTi)

Tip that will be discarded after a single aspiration / dispense cycle. Used when *carry-over* needs to be kept to a minimum.

DiTi transfer rack

A special rack for the *Multiple Channel Arm*, which is used to pick up or park the *disposable tips*.

Excess volume

The volume of excess liquid which is aspirated together (not separated by an air gap) with the liquid to be distributed. It is not dispensed anywhere, but discarded to waste (or a special position) after use, and serves to minimize dilution of the reagents by the system liquid.

Field service engineer (FSE)

A person especially trained by the manufacturer for the performance of maintenance and service jobs on the instrument. Also carries out the initial installation of the instrument and its options as well as product upgrades at the user's site.

Fixed Tip

General term for a washable and reusable tip for aspiration / dispense that is fixed to the pipetting device.

Flexible Channel Arm (FCA)

Robotic arm positioned above the instrument deck area. It holds the pipetting tips and controls the liquid handling.

Flush

The procedure which rinses the complete *liquid system* with the purpose of removing outgassed air or exchanging the *system liquid*. It is executed only at the beginning or the end of a *pipetting cycle*.

Free dispense

A dispense mode in which liquid is dispensed while the pipetting *tip* does not touch the liquid surface in the *container*. In this mode *carry-over* is minimal, however, droplets may remain sticking to the tip due to surface tension of the liquid.

Labware

Disposable item, such as a *microplate* or a sample tube, able to hold liquid in an arrangement of *containers*; placed on a *carrier* for pipetting. Labware can be moved using one of the robotic arms on the instrument.

Liquid class

A set of properties defining a theoretical model of a liquid for a specific pipetting device. The liquid classes are set up in the FluentControl software. Standard liquid classes are identified by a generic name (e.g., "Water", "Serum", "Ethanol", etc.) and include all default liquid handling parameters required to properly handle these liquids. The application specialist may define new liquid classes for optimization or liquids with special properties.

Liquid system

All instrument modules and parts which contain or directly influence liquid (tubing, diluters, valves, tips, etc.).

Method

A collection of scripts or processes defined in the FluentControl software. The method can be executed in a *run*.

Microplate

A *labware* in the shape of a rectangular plate of standardized size and layout, mostly comprising 96, 384 or 1536 *wells*.

Multiple Channel Arm (MCA)
Robotic arm with a multiple channel pipetting head (with 96 or 384 channels) fixed to it. All channels of the pipetting head can aspirate/dispense liquid simultaneously.

Multi pipetting
The pipetting mode in which a larger amount of liquid is aspirated and then several aliquots are dispensed to different positions.

Nest segment
A nest segment is a mount for *microplates* or other *labware*. It is placed on the instrument deck.

Piercing
The penetration of a sealing membrane on a *container*, such as a *microplate* or sample tube, by means of a pipetting *tip* in order to make the liquid inside the *container* accessible for pipetting.

Pipetting cycle
A sequence of aspiration and dispense steps to complete a pipetting task.

Pipetting mode
Describes the main method by which a liquid can be distributed: either by *single pipetting* or *multi pipetting*.

Plunger
The piston in a *syringe* or a channel of a *multiple channel pipetting head*. It aspirates liquid by moving in one direction and dispenses it when moving in the opposite direction.

Precision
The degree to which repeated measurements under unchanged conditions show the same results. It is expressed in the coefficient of variation (CV%).

Rack
A holder for *containers*, such as sample tubes, or other *labware*.

RapidWash
Part of the *liquid system*. Contains a pump which features a higher flow rate than the diluters to support the tip wash function.

Reader
An optional microplate reader, such as a Sunrise, Infinite, etc. Based on optical detection modes, the reader delivers test results for the assays.

Reagent trough
A *container* from which reagents can be aspirated to be used in the *application*.

Reference tip
Special tool that can be fixed to a pipetting device (e.g., FCA or MCA). Used to exactly adjust the device in the various axes. Reference tips cannot be used for pipetting.

Retract
The process of pulling a tip back up after aspiration or dispense.

Robotic gripper arm (RGA)
Robotic arm which picks up and moves objects within the working area of the instrument. In can be equipped with the corresponding gripper fingers for different objects.

Run

The execution of a *method* defined in the FluentControl software. Only one run can be executed at a time.

Runner

Holds sample tubes or reagent troughs. The runners are placed on a *deck segment* and can slide along the positioning pins, for example, for barcode identification.

Sample

Specimen of the substance (e.g., blood, serum, urine, etc.) to be analyzed by means of a *test*.

System segment

Customized segment used for the *Multiple Channel Arm* (MCA384).

Setup

The configuration of the hardware on an instrument (e.g., tip type, size of installed syringes on a diluter, etc.) and the assignment of basic settings (e.g., permissible ranges of the robotic arms for a specific instrument). This is usually done by the *field service engineer* during the installation of a new instrument or option.

Single pipetting

The *pipetting mode* in which an individual aspiration is performed for each dispense action.

Standard

A liquid containing a defined concentration of the substance to be tested. Used to create a standard curve by which concentration of the analyte in the *samples* can be determined. The properties of the standard are well known and stable.

Submerge

The distance the tip will travel downward after liquid is detected. This parameter is programmed by the operator to avoid aspirating bubbles or debris at the liquid surface.

Syringe

Part of the *diluter*. In consists of a glass barrel and a movable *plunger* to aspirate/dispense the required quantity of liquid.

System liquid

The liquid which fills the *liquid system* and is used as wash fluid and /or can be added to *samples* as a diluent.

Te-Shake

An optional module (Tecan Shaker) with orbital shake movements for *microplates*. It is used for mixing purposes.

Teach block

Special *tip block* for the *Multiple Channel Arm*, used as a tool. It can be installed instead of the standard tip block and is used to check and teach the carrier positions.

Test

A sequence of actions, defined in a *method*, that is performed automatically and gives a result that is automatically measured.

Tip

A needle-like device attached to a pipetting device for aspiration/dispense liquids. The following tip types are used with Tecan instruments:

- *Fixed tips*
  - *Tip block* (multiple channel pipetting heads)
- *Disposable tip*

Tip retract supervision

A special function of the *capacitive liquid level detection (cLLD)* which generates a message if the difference between the liquid levels measured before and after sample aspiration/dispense does not correspond to the calculated difference. This indicates that the *tip* may be occluded or that an object, such as a filament, is hanging from the *tip*.

Trough

Refer to “Reagent trough”.

Tube

Cylindrical *container* which holds the substance to be analyzed. Tubes are often marked with a barcode label so that they can be identified with a barcode reader.

Wash

Aspirating *system liquid* from the system liquid container and dispensing it through the pipetting *tip* into the wash position to clean the inside and the outside of the pipetting *tip*.

Wash station

The tip wash position for the *Multiple Channel Arm* (MCA384). It is a block with 384 cleaner tubes to wash the tips.

Washer

An optional *microplate* washer, such as the Hydrospeed, used to remove reagents from *microplate* wells during assay wash steps.

Wash station

Generally referred to as the physical combination of a c*leaner* position and a *waste* position.

Wash system

Part of the *Multiple Channel Arm* (MCA384), used to wash disposable or fixed tips. It consists of the *wash control unit*, the *wash unit*, the *wash station*, tubing, wash liquid container and waste container.

Wash unit

Part of the *wash system* of the *Multiple Channel Arm* (MCA384). It contains pumps and valves to connect the *wash station* with the wash liquid and waste containers.

Wash control unit

Part of the *wash system* of the *Multiple Channel Arm* (MCA384). It is connected to the instrument’s electronics and controls the pumps, valves and the *wash station* of the wash system.

Waste

The position in the *wash station* where waste liquid from the wash method or from the *tips* can be discarded. The liquid is collected in the waste container.

Well

Cavity in a *microplate,* i.e., name of containers on a microplate.

Z-dispense

The height of the point of the pipetting *tip* at which liquid is dispensed.

Z-max

The lowest possible position the pipetting *tip* is allowed to reach. During a “search liquid command” the instrument will search for liquid from *Z-start* down to Z-max. If the *tip* reaches Z-max without finding liquid, the instrument reacts according to the liquid detection error mode selected.

Z-start

The height of the pipetting *tip* at which the cLLD is switched on during a “search liquid command”. It is usually slightly above the rim of the liquid *container*.

Z-travel

The height at which the pipetting *tip* moves from one X/Y-position to another. Moves passing over different *labware* always use the highest Z-travel defined.

Z-bottom

The deepest point for liquid, the container bottom.