

# Liquid Station



Automated sample preparation  
simple - fast - precisely

**DURATEC**  
Analysetechnik GmbH

# DURATEC Liquid Station

The liquid station is made to run automated dilution and dispensing tasks. It saves time, money and helps to avoid unnecessary mistakes. A two-syringe dispenser and a sample station are fully controlled by an easy-to-use software. Every step is performed quickly and with the highest precision. The two-syringe diluter Microlab 600 from Hamilton can also be used without the sample station as a semi-automated liquid handling system for sample preparation.

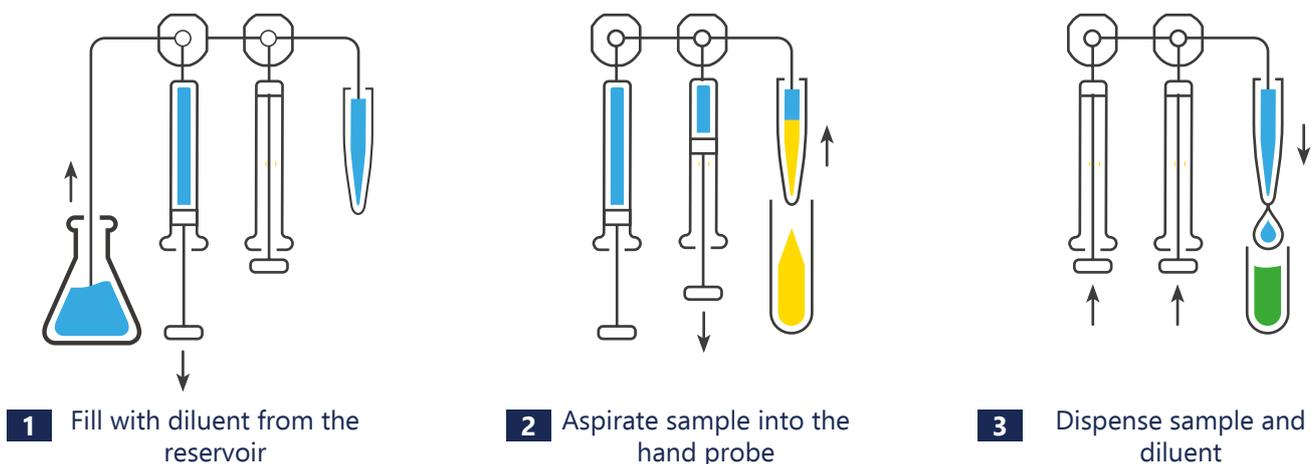
The Liquid Station is qualified for sample preparation in AAS, ICP, GC, HPLC and photometric analysis in the fields of production control, routine analysis, environmental analysis and research.

Most users perform elemental analysis, i.e. analyzing environmental samples (soil, water, food & feed) or raw materials (e.g. mining).

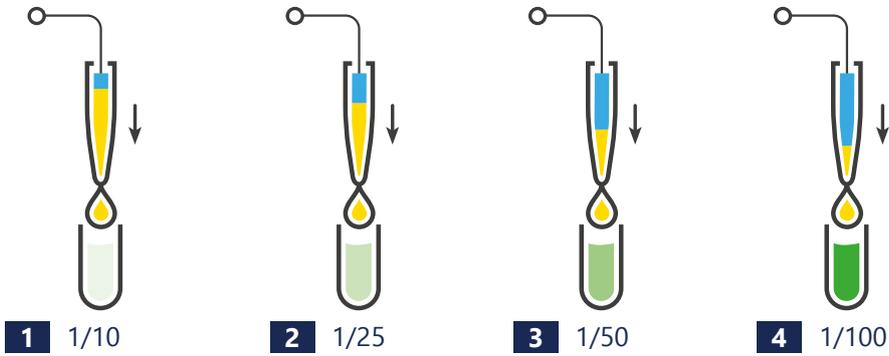
Another field of application is routine analysis using HPLC and GC. The systems are typically installed in the chemical, pharmaceutical and life science industries.

## Operating principle

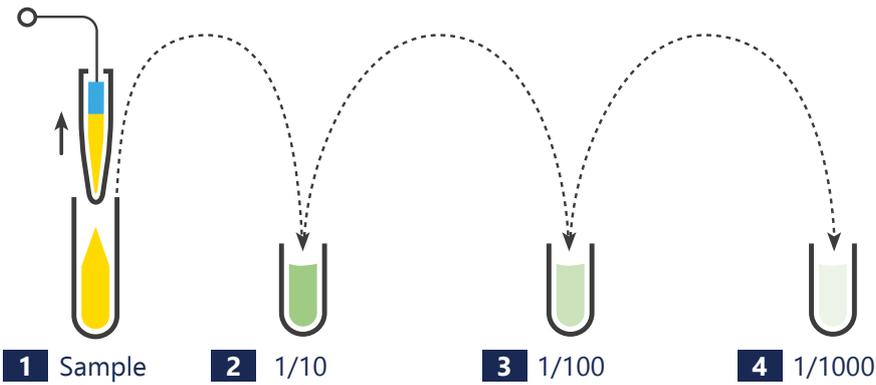
### Simple dilution



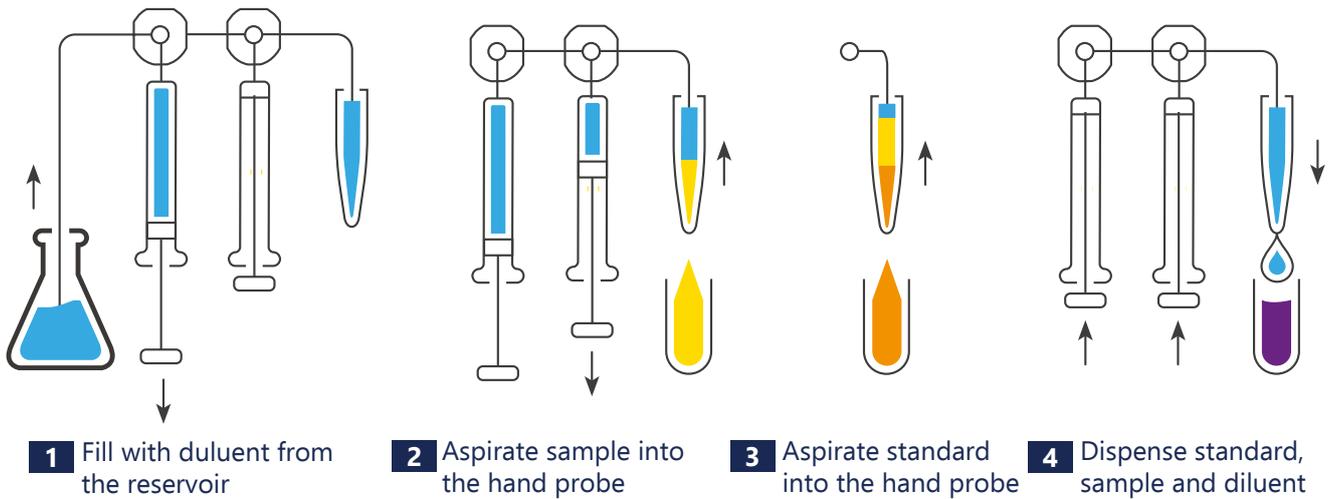
## Serial dilution (Programmed)



## Serial dilution (Tube to Tube)

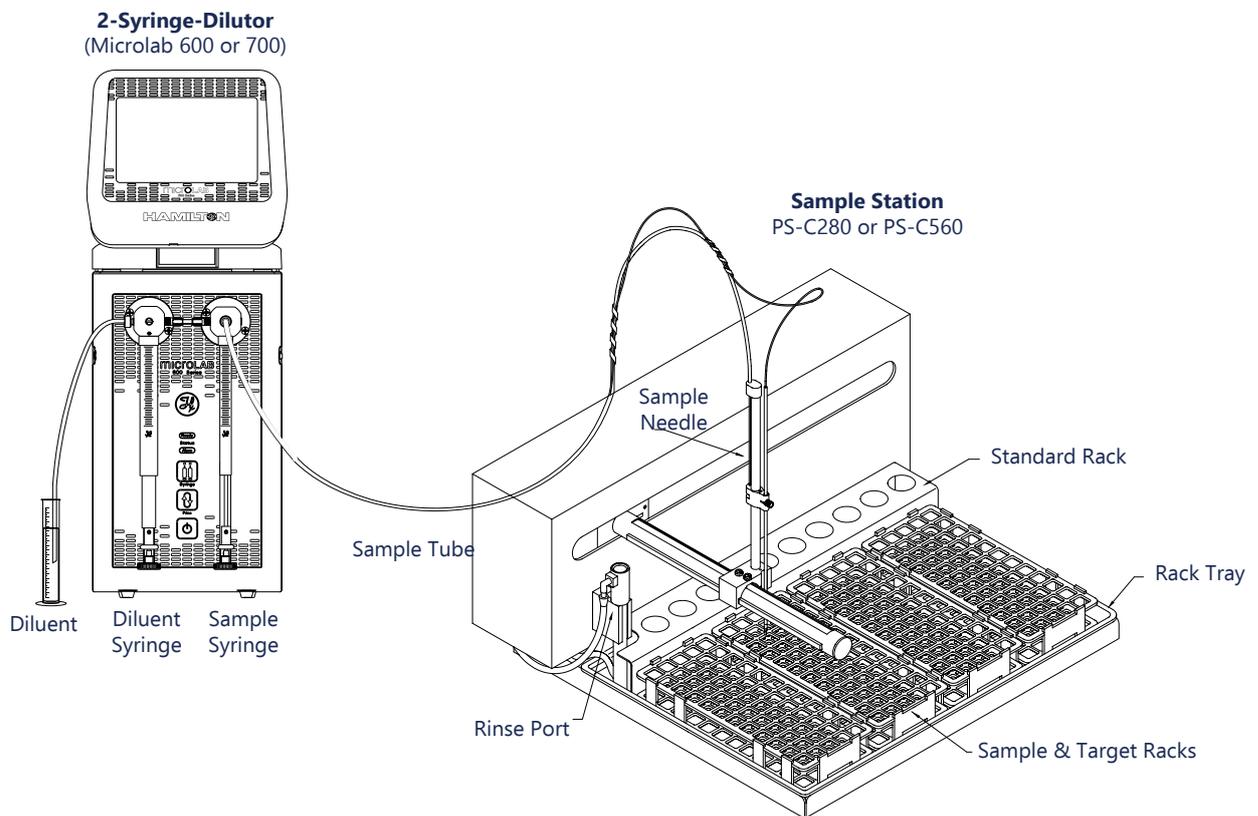


## Multi sample dilution



## Operating principle - Workflow

### Liquid Station Hardware



The DURATEC liquid station includes a two-syringe dilutor and a sample station. Both are connected to each other via a sample tube. The complete fluid path (diluent aspiration tube to sample needle) is filled with diluent. Racks with filled sample vessels and racks with empty dilution vessels are placed on the sample station.

To setup an individual dilution for every source (sample) and target vial (dilution) a sequence table is used. The respective sequence table can be saved and reloaded for new dilutions. After starting a sequence, the dilutions are processed automatically.

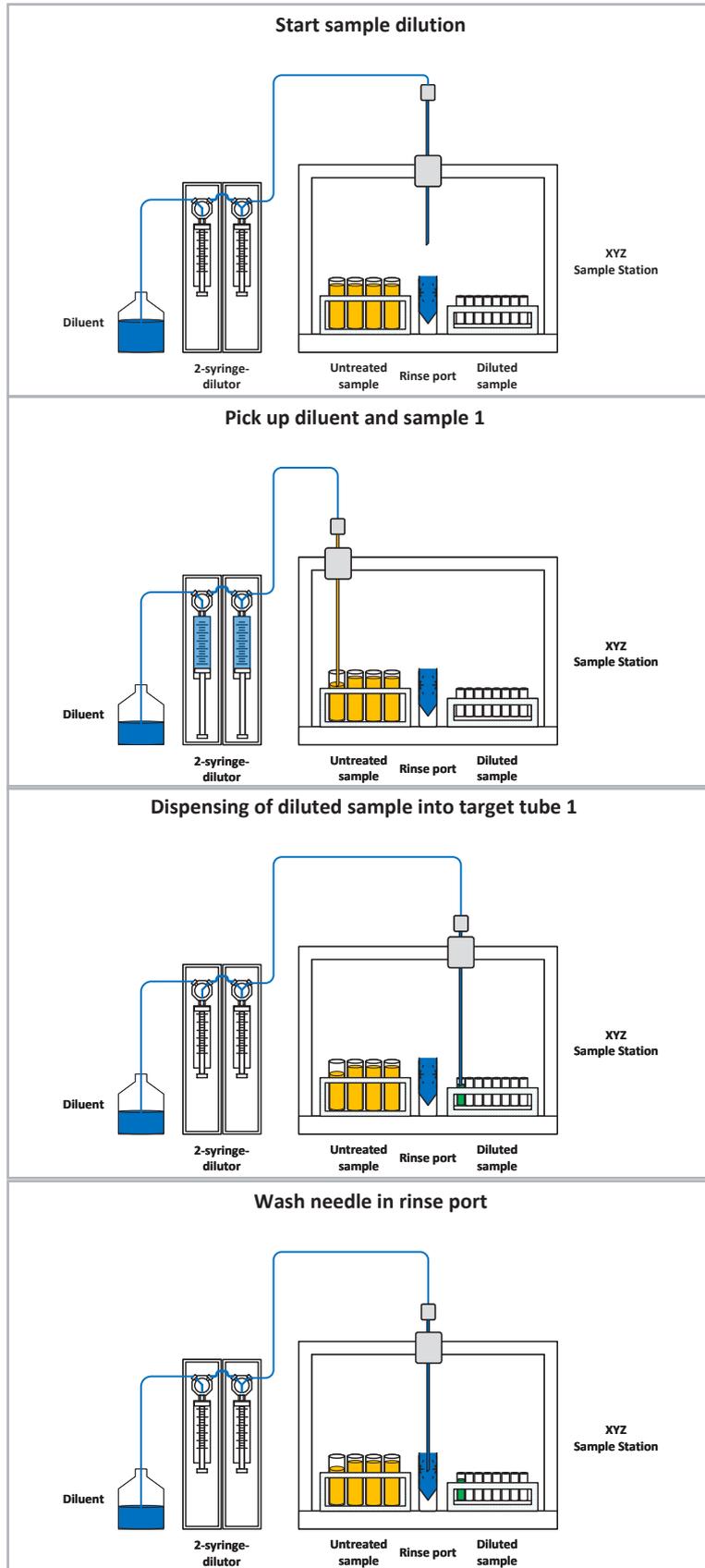
Following steps will run:

1. Initial rinsing of fluid path with diluent (volume selectable)
2. Respective volume of diluent is drawn up into diluent Syringe (speed selectable)
3. Sample needle runs to sample position and plunges into sample (needle depth selectable)
4. Sample is drawn up into sample tube via sample needle (speed selectable)
5. Sample needle runs to dilution position and plunges into dilution vial (needle depth selectable)
6. Diluent syringe and sample syringe dispense diluent and sample into dilution vial (speed selectable)
7. Optionally, the dilution can be mixed in the dilution vial due to pick-up and dispensing (mix volume and cycles selectable)
8. Sample needle moves to rinsing port and is rinsed with diluent from the in- and outside (volume selectable)
9. Steps 2.-8. are repeated until complete dilution sequence is performed

Source and target vial could be located in the same or in different vial racks.

Multiple dilutions of the same sample with various dilution factors are possible.

Within one sequence different dilutions with different end volumes could be executed.



## Operating principle - Software

**File:** New, Open, Save, Print dilution sequences

**Edit:** Copy, Paste, Delete, Enable, Disable sequence lines

**Station:** Start & Stop sequence, System initialization, Rinse, Syringe change

**Settings:** Syringe volumes, Flow rates, Needle depths, Rinsing volumes, Diluent, Standards, Mix, Air segment, user administration ...

**Buttons** für: Start, Stop, Rinse, Initialization

Diluent selection

Rack type selection

DURATEC - Liquid Station : Webseite Sequenz.seq

Datei Bearbeiten Station Einstellungen Hilfe

Benutzer Startzeitpunkt Ersteller der Methode Datum Diluent Rack 1 Rack 2 Rack 3 Rack 4

	Status	Probe		Verdünnung 1				Verdünnung 2				Verdünnung 3							
		Position	Name	Position	Volumen [µl]	Vol Probe	Vol Std	Name Std	Position	Volumen [µl]	Vol Probe	Vol Std	Name Std	Position	Volumen [µl]	Vol Probe	Vol Std	Name Std	
1	▶	R1-A1	Probe 1	R2-A1	10000	1000													
2	▶	R1-A2	Probe 2	R2-A2	10000	1000			R2-B2	10000	500								
3	▶	R1-A3	Probe 3	R2-A3	5000	500	20	Standard 1											
4	▶	R1-A4	Probe 4	R2-A4	10000	100													
5	▶	R1-A5	Probe 5	R2-A5	7500	0													
6	▶	R1-A6	Probe 6	R2-A6	5000	2500													
7	▶	R1-A7	Probe 7	R2-C1	10000	1000			R2-B7	10000	500			R2-C7	5000	250			
8	✖																		
9	✖																		
10	✖																		
11																			

**Dilution 2 /3:** These fields can be used optionally for different dilutions of the same sample

**Name of Standard:** Selection out of 10 Standard positions possible

**Volume Standard:** Drawn up standard volume

**Sample Volume:** Drawn up sample volume

**Dilution Volume:** End volume of dilution

**Dilution Position:** Position where dilution should take place

**Sample Name:** Sample name entry can be made via keyboard or barcode reader

**Sample Position:** Position of sample in sample station. R1 for Rack 1 - A1 for column A row 1

**Status:** sample is processed /not processed / finished / is processed preferred / in process/ error

The Liquid Station is controlled via Windows software. The software can be installed on PCs, laptops and netbooks with Windows version 7 and higher. Two USB ports are used to control the syringe diluter and sample station.

The software has a simple user interface and intuitive menu navigation, allowing any user quickly and easily to create and run dilution sequences.

The dilution sequences can be saved and reloaded with a wide variety of settings and parameters. A new configuration is not necessary. To exclude samples, mark them as „Not for processing“ within the sequence table.

## Functions

<b>Dilute</b>	Classical dilutions are the main application performed with the Liquid Station. Depending on the syringe configurations (10 µl – 50ml syringes) the possible dilution factors are ranging from 1:1 to 1:50.000. In order to achieve a precise dilution, the smallest dispensing volume should not be smaller than 1/10th of the syringe volume.
<b>Dilution series</b>	The same sample can be diluted multiple times by applying different factors. Additionally, dilution series of calibration standards can be prepared.
<b>Serial dilutions</b>	In cases where the syringe configuration does not fit to the required dilution directly, it is also possible to serial dilute with the help of intermediate dilution.
<b>Dilute &amp; standard addition</b>	There are 10 positions for standards available on the Liquid Station. This option can provide you the possibility of adding a standard to the dilution (e.g. as internal standard). Before the sample is drawn up, a defined volume of standard is drawn into the sample needle (optionally over multipoint valve).
<b>Fillings</b>	The Liquid Station can also be your assistant for fillings. If the sample volume is set 0, the system will fill the appropriate diluent volume (sequence table) into the according vial.
<b>Mixing</b>	The first mixture step occurs by dispensing sample and dilution medium into the empty target vial. If you prefer a more sufficient mixture the sample can be additionally mixed with the sample needle by repetitive aspiration and dispensing a smaller partial volume.
<b>Air segment</b>	The definition of air segments helps to avoid the mixture of sample (standard) and diluent already in the sample tube.
<b>Drop withdrawal</b>	After the sample needle drove out of the vial, possibly there is a drop hanging on the needle tip. By choosing a withdrawal volume you can draw back this drop into the needle.
<b>Rinse needle</b>	To avoid contamination in two sample vials, the sample needle is rinsed from the in- and outside due to the overflow rinsing port between two dilution steps.

## Functions - Options

<b>Setting syringe speed</b>	Drawing and dispensing speed for syringes can be set separately for each rack and be saved in the sequence file. For viscous fluids the drawing speed can be reduced or the emitting speed can be raised to achieve a more efficient mixing.
<b>Setting needle depth</b>	The sample needle depth can be set separately for each rack and be saved in the sequence file. For samples with sediment this configuration is valuable to avoid absorption of the sediment.
<b>User concept</b>	Various operators with different user rights can be created with the help of the user concept. This ensures that dilution methods (sample sequences) are only executed and will not be modified by unauthorized persons.
<b>Documentation</b>	After sequence completion you are able to print the sequence table for the documentation. This printout covers important data like operator, date & time, dilution parameters, sample name and status.
<b>Selection of various diluents (optional)</b>	With a multiport selection valve up to 8 different diluents can be connected.
<b>Selection of various standards (optional)</b>	A multiport selection valve allows up to 6 different standards to be placed in separate sample loop.
<b>Inclusion of customer-specific racks (optional)</b>	If sample or dilution vials do not fit in standard racks or the rack of the analytical instrument should be used there is the possibility that racks are linked via rack adapters. In this case appropriate dimensions of the rack are required.
<b>Inclusion of diluter Microlab 500 (optional)</b>	In case that a syringe-diluter of the Microlab series 500 is already integrated in the laboratory, it is possible to link it to the hard- and software of the Liquid Station via a special adapter kit.
<b>Inclusion of several syringe diluters (optional)</b>	For complex dilution tasks or for wider dilution ranges there is the possibility to link two 2-Syringe-Diluters to the Liquid Station.
<b>Bubble detection (optional)</b>	Bubbles in tubings can be detected via an optical sensor and furthermore be documented in the sample sequence.

## Examples of Applications

### Dilutions for elemental/metal analysis by AAS/ICP/ICP-OES/ICP-MS

In the fields of environmental analysis, consumer protection and mining, the samples e.g. metals and heavy metals are mostly analyzed by AAS/ICP/ICP-OES/ICP-MS. Strongly concentrated acids are used to isolate and dissolve the metal ions from the sample. To make the samples measurable for the different analytical systems, they often have to be diluted with different ratios. Due to the inert sample path and the extremely precise dilution, the Liquid Station is ideally equipped for this purpose. The use of the Liquid Station also makes sense in terms of occupational safety. The employee avoids unnecessarily long contact with the corrosive media. While the Liquid Station automatically dilutes the samples, the operator can work on more important projects.



### *Your advantages - Your benefit*

- By using the Liquid Station, you save valuable working time, as dilution runs automatically in the background. You can use this time for higher-value applications.
- You achieve better reproducibility compared to manual handling, as the automated processes run in recurring, uniform sequences. Compared to conventional dilution with pipette and volumetric flask, you save solvent and working time, thus reducing costs.
- Usable for almost all methods of instrumental analysis, i.e. you only need one dilution station for possibly several analytical systems in a laboratory.
- You have the possibility to extend to the complete sample preparation, e.g. addition of standard, buffer or performing reactions (enzymatic, derivatization)
- Adaptation of already existing sample racks to the Liquid Station, which eliminates the need to re-sort sample vessels.

## Specification

<b>Number of rack positions</b>	PS-C280: 2 PS-C560: 4
<b>Standard rack types</b>	Rack 1: No. of samples 6x15- 13 mm diameter Rack 2: No. of samples 5x12- 16 mm diameter Rack 3: No. of samples 4x10- 20 mm diameter Rack 4: No. of samples 3x8 - 25 mm diameter Rack 5: No. of samples 3x7 - 30 mm diameter Rack 6: No. of samples 5x10- 12 mm diameter (HPLC/GC Vials)
<b>Dimension</b>	PS-C280: H: 620 mm / W: 355 mm / D: 550 mm PS-C560: H: 620 mm / W: 580 mm / D: 550 mm Microlab 635: H: 366 mm / W: 140 mm / D: 178 mm
<b>x-y-z positions (max.)</b>	PS-C280: X: 220 mm / Y: 300 mm / Z: 150 mm PS-C560: X: 420 mm / Y: 300 mm / Z: 150 mm
<b>Weight</b>	PS-C280: 8,1 kg PS-C560: 11,7 kg Microlab 635: 5,9 kg
<b>Material with liquid contact</b>	PTFE, PCTFE, FEP, Borosilicate glass
<b>Volume Sample Tube</b>	approx. 7,5 ml
<b>Interfaces</b>	RS232, USB
<b>Power supply</b>	PS-C280: 100-240 VAC, 37-63 Hz, 1,9 A PS-C560: 100-240 VAC, 37-63 Hz, 1,9 A Microlab 635: 100-240 VAC, 50/60 Hz, 1,5 A
<b>Syringe Volume Microlab 600</b>	10 µl, 25 µl, 50 µl, 100 µl, 250 µl, 500 µl, 1.0 ml, 2.5 ml, 5.0 ml, 10.0 ml, 25.0 ml, 50 ml
<b>Flow range Microlab 600</b>	0,003 - 6000 µl/sec (depending on the syringe size)
<b>Resolution Syringe</b>	0,02 % (of nominal volume of the syringe)
<b>Accuracy Microlab 600</b>	+/- 1 % (full stroke)
<b>Precision Microlab 600</b>	+/- 0,2 % (full stroke)

## Ordering Information - Liquid Station & Accessories

Part no.	Description
810923	Liquid Station Windows control software for easy connection of a Microlab 500/600 (without Microlab) incl. special connection cables for Microlab 600 and sample station
810924	Sample station PS-C280 with 2 rack positions
810925	Sample station PS-C280 with 4 rack positions
810923-004	Sample needle PS-C260/280/520/560 Carbon/PTFE (ID: 0,8 mm)
810923-007	Sample tube Liquidstation FEP 2x 1/4-UNF 28 Fittings / OD 3 mm / ID 2 mm/ Length 200 cm (approx. 7,5 ml)
810923-008	Sample Tube Liquidstation FEP 2x 1/4-UNF 28 Fittings / OD 2 mm / ID 1 mm/ Length 200 cm (approx. 1,75 ml)
810923-009	Adapterkit Microlab 500 Liquidstation (Fluidics & Control)
810923-005	Rackadapter for HPLC/GC Vial Rack 810923-020
810923-010	Rack PP blue 6x15 Samples / Vial diameter 13 mm
810923-011	Rack PP blue 5x12 Samples / Vial diameter 16 mm
810923-012	Rack PP blue 4x10 Samples / Vial diameter 20 mm
810923-013	Rack PP blue 3x8 Samples / Vial diameter 25 mm
810923-014	Rack PP blue 3x7 Samples / Vial diameter 30 mm
810923-015	Rack PP white 6x15 Samples / Vial diameter 13 mm
810923-016	Rack PP white 5x12 Samples / Vial diameter 16 mm
810923-017	Rack PP white 4x10 Samples / Vial diameter 20 mm
810923-018	Rack PP white 3x8 Samples / Vial diameter 25 mm
810923-019	Rack PP white 3x7 Samples / Vial diameter 30 mm
810923-020	Rack PP blue 5x10 Samples / Vial diameter 12 mm (HPLC/GC Vials)



810924



810925

## Ordering Information - Microlab 600 & Accessories

Part no.	Description
HML625-DIL*	Microlab 2-Syringe-Dilutor ML625-DIL with Advanced Controller, 2 Valves, 2 Syringes of your choice, Concorde probe (incl. holder), 220 V power supply
HML635	Microlab 2-Syringe-Pump ML635, without Controller and Tubings, 2 Valves, 2 Syringes of your choice, 220 V power supply
HML620-DIS*	Microlab 1-Syringe-Dispenser ML620-DIS mit with Advanced Controller, 1 Valve, 1 Syringe of your choice, Concorde probe (incl. holder), 220 V power supply
HML630	Microlab 1-Syringe-Dispenser ML630-DIS without Controller and Tubings, 1 Valve, 1 Syringe of your choice, 220 V power supply
H60675-01-REVG	Right valve for ML600
H60676-01-REVG	Left valve for ML600
H59000-05	10 µl syringe 1701BFP (Bubble Free) for Microlab 600 series
H59000-10	25 µl syringe 1702BFP (Bubble Free) for Microlab 600 series
H59000-15	50 µl syringe 1705BFP (Bubble Free) for Microlab 600 series
H59000-20	100 µl syringe 1710BFP (Bubble Free) for Microlab 600 series
H59000-30	250 µl syringe 1710BFP (Bubble Free) for Microlab 600 series
H59000-35	1 ml syringe 1710BFP (Bubble Free) for Microlab 600 series
H59000-40	2.5 ml syringe 1710BFP (Bubble Free) for Microlab 600 series
H59000-45	5 ml syringe 1710BFP (Bubble Free) for Microlab 600 series
H59000-50	10 ml syringe 1710BFP (Bubble Free) for Microlab 600 series
H59000-55	25 ml syringe 1710BFP (Bubble Free) for Microlab 600 series
H59000-60	50 ml syringe 1710BFP (Bubble Free) for Microlab 600 series
H61614-01	FEP aspiration tubing (gauge 12 / length 1219 mm) for Microlab 600
H61615-01	FEP aspiration tubing (gauge 18 / length 1219 mm) for Microlab 600

\*Usable as standalone device without sample station



HML625-DIL



HML635



HML620-DIS



HML630

