

Installation Instruction for ProfIC Vario 1 AnCat

ProfIC Vario 1 AnCat is a very compact and professional IC system for the fully automatic determination of anions with sequential suppression and cations. With «ProfIC Vario 1 AnCat», anions and cations can be determined both in parallel as well as independently to save time. Both systems use the same 858 Professional Sample Processor with pump, which is controlled by the MagIC Net software.

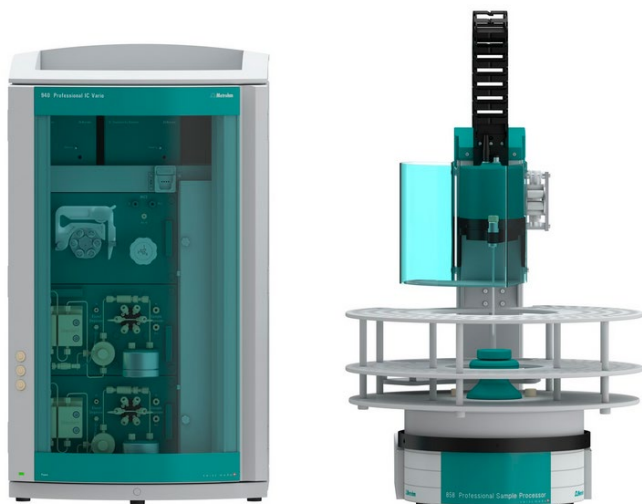


Table of contents

1.	Delivery Package	2
	IC	2
	Detector	2
	Sample processor.....	2
	Optional	2
2.	Installation.....	2
2.1.	Installation of the software	2
2.2.	Accessory Kit: Vario/Flex Basic (6.5000.000)	2
2.3.	Accessory Kit: Vario/Flex ONE (6.5000.010)	2
2.4.	858 Professional Sample Processor	3
2.5.	Interconnection of devices	3
2.6.	940 Professional IC Vario	3
3.	MagIC Net.....	4
3.1.	Configuration.....	4
3.2.	Method adjustment	4
3.3.	Purge of the system	5
3.4.	User defined determination	5
4.	Optional equipment.....	6
4.1.	Liquid Handling Station	6
4.2.	Eluent Production Module.....	7
4.3.	Alternative MSM rinsing and regeneration	7

1. Delivery Package

Delivered with ProfIC Vario 1 AnCat package:

Nr	Article no.	Article designation
IC		
1	2.940.2500	Professional IC Vario TWO/SeS/PP
Detector		
2	2.850.9010	IC Conductivity Detector
Sample processor		
1	2.858.0020	Professional Sample Processor
Optional		
1	6.6059.4*	MagIC Net 4.* Professional (* newest MagIC Net version) CD – 1 license
1	6.6059.4*	MagIC Net 4* Multi (* newest MagIC Net version) – 3 licenses
1	6.2041.760	Sample rack 54 × 11 mL + 1 × 300 mL
1	6.2041.440	Sample rack 148 × 11 mL + 3 × 300 mL
1	6.2743.040	Sample tubes 2.5 mL
1	6.2743.050	Sample tubes 11 mL
1	6.2743.070	Stopper with perforation
1	6.xxxx	Metrosep A Supp column depending on application
1	6.xxxx	resp. Metrosep A Supp Guard column
1	6.xxxx	Metrosep C Supp column depending on application
1	6.xxxx	resp. Metrosep C Supp Guard column
1	6.2832.000	MSM Rotor A
1	6.2842.000	MSM-HC Rotor A
1	6.2844.000	MSM-LC Rotor A
1	6.2842.020	Adapter sleeve, MSM
1	2.941.0010	Eluent Production Module
1	6.5330.090	IC Equipment: Additional eluent for 941
1	2.800.0010	Dosino
1	6.2769.110	Sensor empty 2L
1	6.5330.130	IC Equipment: LQH Station, left

2. Installation

Following is a detailed description of how to install the ProfIC Vario 1 AnCat.

We strongly recommend that the individual steps are carried out in the order given below.

2.1. Installation of the software

All programs must be shut down first. Make sure that no Metrohm instrument is connected to the PC. Install MagIC Net with the help of the MagIC Net CD. The Microsoft Installation Wizard is accepted and executed. All the standard directories proposed by the program should be accepted. Restart Windows.

When a new Metrohm instrument is connected to the PC via USB, the driver is installed and a window will pop up in MagIC Net asking if you'd like to store this device in your configuration. If you do, please answer with yes. The names will be checked later in this installation instruction.

2.2. Accessory Kit: Vario/Flex Basic (6.5000.000)

Using the Accessory Kit Vario/Flex Basic, install the Professional IC Vario. Remove the handle, place the detector blocks in the instrument, and connect the detector cables (anion detector into the "Detector 1" socket, the cation detector to "Detector 2"). Then remove the transport locking screws, connect the leak sensor cable, and connect the drainage tubing.

Next, set up the waste collector by assembling the cap and screwing it onto the vessel. Then hang the waste collector holder on the side of the IC, so you can observe the droplets coming out of the capillaries later connected to the collector. Attach the waste tube to the vessel and lead it to the waste canister. If the tube is too long, please shorten it, because it is important to have a high level difference for the liquid to drain.

The power cable and USB cable (6.2151.020) are plugged into the rear of the Professional IC Vario. Please don't switch on the instrument yet. This step will follow after the completed installation.

2.3. Accessory Kit: Vario/Flex ONE (6.5000.010)

In the two boxes with the Accessory Kits ONE, you will find all the accessories for setting up the eluent bottles. Please lead the aspiration tubes for the eluents through the M8 stopper, the O-ring, and the eluent caps. Then fix the white weight (6.2744.210), the adaptor (6.2744.210), and the aspiration filter (6.2821.090) on the eluent aspiration tube, all the while being careful not to touch the filter and its connections with bare hands to avoid cross-contamination. Also fix the filled adsorber tube on the eluent cap. Please refer to the 940 Professional IC Vario manual for a detailed description.

2.4. 858 Professional Sample Processor

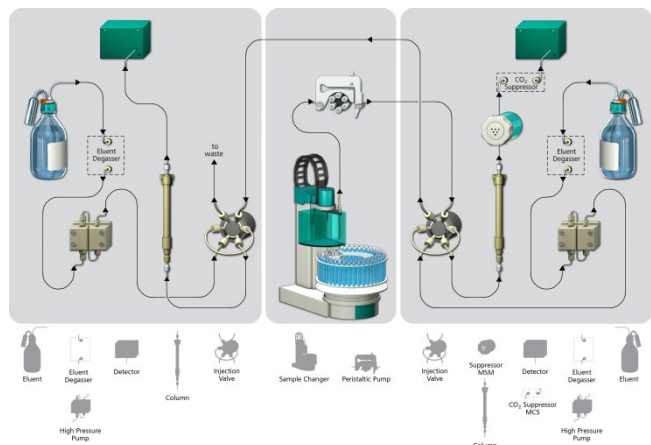
For a detailed description, please refer to the 858 Professional Sample Processor manual. In general, you will have to do the following: first, plug in the Swing Head connection cable and the power supply cable. The controller cable (6.2151.000) is plugged into the plug "Contr." on the 858 and is connected to the IC device via USB. The Sample Processor initializes and lifts its Swing Head, once the IC device it is connected to is recognized by the software. For this to occur, you have to plug the USB cable of the IC into the PC and turn it on. Afterwards, it is possible to mount the retaining plate, the needle, and the safety shield.

Insert the pump tubing (white/white 6.1826.360) into the peristaltic pump and connect the aspiration side to the needle via a PEEK capillary (6.1831.160) (see also 858 manual).

For the following installations, please shut down the IC again and disconnect the 858 from the power supply.

2.5. Interconnection of devices

The complete setup of the ProflC Vario 1 AnCat package is depicted here:



Prepare and degas two eluents suitable for the anion and cation columns you plan to use (see column manual). For the Metrosep A Supp 15 - 150/4.0, a solution of 5.0 mmol/L Na₂CO₃ + 0.3 mmol/L NaOH is recommended. For the Metrosep C 4 - 150/4.0, a solution of 1.7 mmol/L HNO₃ + 0.7 mmol/L dipicolinic acid (DPA, 2,6-Pyridinedicarboxylic acid) is adequate.

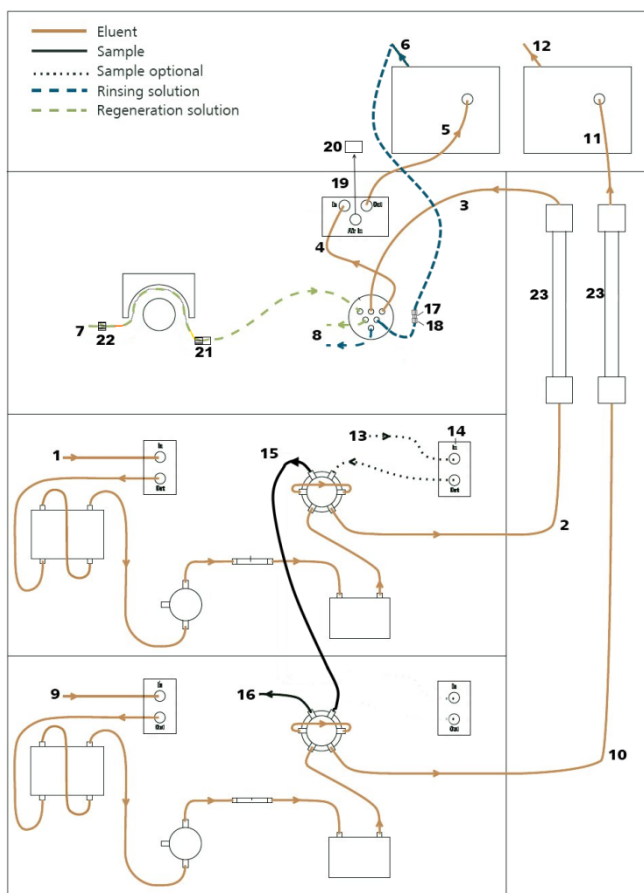
Provide the regeneration solution for the MSM Suppressor (100 mmol/L sulfuric acid).

2.6. 940 Professional IC Vario

Capillaries are connected according to the following list and diagram:

1. Connection to the eluent bottle for anion determination
2. Capillary to anion separation column
3. MSM inlet capillary – labeled with *In*

4. MSM outlet capillary – labeled with *Out*, which can be connected to the MCS with a long PEEK pressure screws (6.2477.090) or directly to the detector (5) using a coupling (6.2744.040).
5. Capillary from MCS to anion detector, long PEEK pressure screws (6.2744.090) are used for the MCS connection
6. Detector outlet capillary connected to the MSM inlet capillary – labeled with *Rinsing solution* with the help of a coupling (6.2744.040)
7. Regeneration solution aspiration capillary – PTFE, 0.5 mm ID, connected to the bottle with 100 mmol/L sulfuric acid and the orange/yellow pump tubing. This pump tubing is, on the other side, relayed to the regeneration solution capillary of the MSM – labeled with *regenerant* – with a security lock and filter (21)
8. MSM regeneration and rinsing solution outlet capillaries – labeled with *Waste reg.* and *Waste rins.* – to be connected to the waste collector
9. Connection to the eluent bottle for cation determination
10. Capillary to cation separation column
11. Capillary from cation separation column to cation detector
12. Detector outlet capillary, connected to the waste collector
13. Sample aspiration capillary (PTFE, 0.5 mm ID), connected to the anion valve (position 1)
14. Optional sample degasser
15. Capillary connection (PTFE, 0.5 mm ID) between anion valve (position 2) and cation valve (position 1)
16. Capillary to the waste collector
17. Coupling 2× UNF 10/32 PEEK (6.2744.040)
18. PEEK pressure screw short (6.2744.070)
19. MCS air aspiration capillary – connected to the CO₂-adsorber cartridge
20. Luer coupling – connect with short PEEK pressure screw to CO₂-adsorber cartridge
21. Pump tubing connector with security lock and filter (6.2744.180)
22. Coupling nozzle – UNF 10/32 (6.2744.034)
23. The UNF 10/32 couplings (6.2744.040) are installed instead of the columns to rinse the system with eluent. After rinsing the columns are installed.



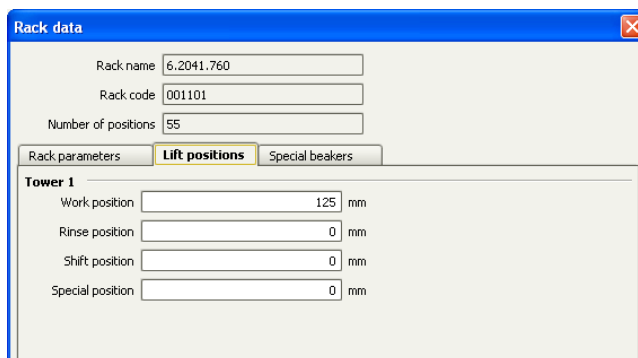
3. MagIC Net

3.1. Configuration

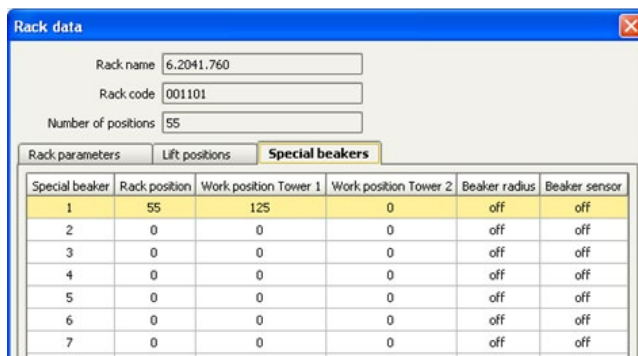
Now connect the USB cables from the instruments and turn their power on. Connected USB devices are automatically recognized when MagIC Net is started. After confirmation of the automatically generated requests, the devices and columns are stored in the configuration. The devices are predefined as "940 Professional IC Vario 1" and "858 Professional Sample Processor 1". Name them accordingly if other names appear in your configuration (e.g., due to changed settings on your computer).

In the window configuration, the 940 Professional IC Vario, the 858 Professional Sample Processor, and the columns Metrosep A Supp 15 - 150/4.0 and Metrosep C 4 - 150/4.0 are visible. Add and define the eluents and the suppressor solution.

The settings for the rack require a "work position" fitting to the respective rack (e.g., 125 mm for rack 6.2041.760).



Also define a special beaker for rinsing the needle. Fill a beaker with ultrapure water and place it at the defined position on the rack.



3.2. Method adjustment

There are two possibilities to conduct these analyses, either in parallel or independently from each other. Example methods for both possibilities are found on the MagIC Net CD.

The installation is the same, but the parallel analysis of anions and cations is conducted in one workplace. Immediately after starting the cation determination, the anion determination (of the same sample) is initialized. Samples could be taken from the same vial or from two vials—one of which contains the acidified sample solution for cation determination. Both measurements are recorded in the same data file.

For this kind of setting, import the method for ProfIC Vario 1 AnCat from the installation CD: Go to File → method manager and choose your method group. Afterwards, click on edit → import and choose the pathway on the installation CD:

MagICnet\examples\methods\ ProfIC Vario \ProfIC Vario_1_AnCat.imet.

Another option would be an independent determination. A sample series A for anion determination and a sample series B for cation determination are set up in two separate workplaces and performed independently. After each sample injection, the Professional Sample Processor is set

free by the “release” command in the time program in order to save time.

For this, import the methods ProfIC Vario 1 AnCat Anion and ProfIC Vario 1 AnCat Cation from the installation CD: Go to File → method manager and choose your method group. Afterwards, click on edit → import and choose the pathway on the installation CD:

MagICnet\examples\methods\ ProfIC Vario\ProfIC Vario_1_AnCat_Anion.imet and MagICnet\examples\ProfIC Vario\ProfIC Vario_1_AnCat_Cation

In the window method, open the respective method(s) and assign the following equipment: the columns Metrosep A Supp 15 - 150/4.0 and Metrosep C 4 - 150/4.0 to the corresponding analysis, assign the two eluents to their respective IC pump, match the suppressor solution to the IC peristaltic pump, and define the rack of the connected sample processor. Adjust the temperature of the column oven to 35 °C.

Perform a method test and save the methods.

3.3. Purge of the system

Before inserting the columns, disconnect the *Out* capillary of the suppressor connection piece from the MCS or from the detector and put it into a waste beaker. The suppressor needs to be rinsed with the system first and its waste should not pass through the sensitive MCS and/or detector in the beginning, as loose particles could be flushed out.

Flush the system for about 10 minutes to remove any air bubbles (by using the purge valve and syringe). During these 10 minutes, step the MSM three times in order to flush all three chambers.

As soon as the whole system is purged, reconnect the suppressor *Out* capillary back to the MCS or the detector.

Now insert and rinse the guard column for 10 minutes by placing the outlets directly into the waste. Afterwards connect the analytical columns and flush them likewise for 10 minutes. Only afterward are the columns completely connected to the flow path of the eluent (see the 940 Professional IC Vario manual for more information). Start the peristaltic pump and adjust the pressure of the lever on the tubing to see the droplets of suppressor regeneration solution drop into the waste collector.

To start the equilibration, go to the window workplace, load your method, and press “Start HW”.

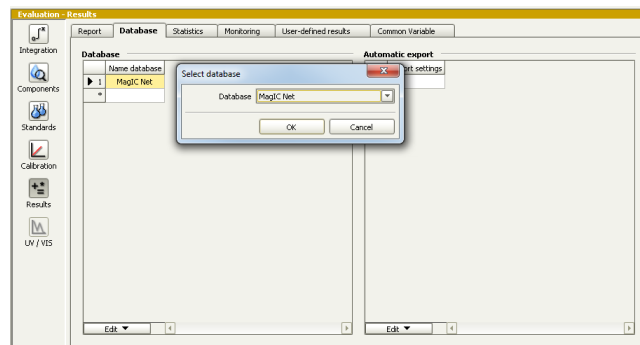
If you chose to use two separate methods for anion and cation analysis, please start the anion method in one workplace by pressing “Start HW” and open a second workplace for the cation method. This, you can do by choosing “File” → “Workplace” → “New...”.

Name it as you wish and load the cation method. Press “Start HW” to start the equilibration of the system.

Equilibrate the system until the baseline is stable.

3.4. User defined determination

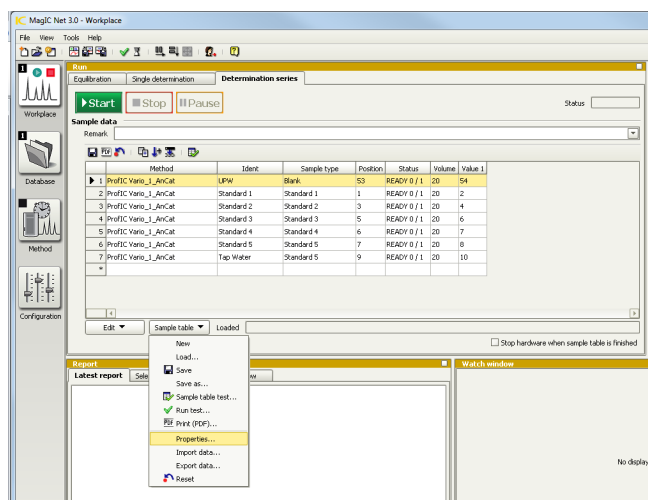
In the window method, under evaluation, enter the concentrations of the required standards. Then add the correct Database in the Evaluation window (Evaluation → Results → Database) for your method(s).



In the window workplace, set up one or two “determination series” depending on your method choice, describing your samples by ident, vial number, sample type (standard, blank, or sample, etc.). For quantitative analysis, samples subjected to cation analysis are normally acidified, whereas anion analysis is normally carried out with unmodified samples.

Hence for ProfIC Vario 1 AnCat, two sample vials are positioned on the rack for each sample (an acidified one for cation determination, and an unmodified one for anion determination). According to the method ProfIC Vario_1_AnCat.imet, the position of the vial for anion determination should be defined in the column “sample position” and the position of the vial for cation determination should be defined in the column “Value 1”.

To be able to see and use the Value 1 of the determination table, click on the subcategory “Properties...” under Sample table in the run window. In the newly opened window, check the “Value 1” case under “Display”.



Now you'll be able to add the cation vial position in your determination series. Therefore, your sample table might look like the following one:

Method	Ident	Sample type	Position	Status	Volume	Value 1
1 ProfIC Vario_1_AnCat	UPW	Blank	53	READY 0 / 1	20	54
2 ProfIC Vario_1_AnCat	Standard 1	Standard 1	1	READY 0 / 1	20	2
3 ProfIC Vario_1_AnCat	Standard 2	Standard 2	3	READY 0 / 1	20	4
4 ProfIC Vario_1_AnCat	Standard 3	Standard 3	5	READY 0 / 1	20	6
5 ProfIC Vario_1_AnCat	Standard 4	Standard 4	6	READY 0 / 1	20	7
6 ProfIC Vario_1_AnCat	Standard 5	Standard 5	7	READY 0 / 1	20	8
7 ProfIC Vario_1_AnCat	Tap Water	Standard 5	9	READY 0 / 1	20	10
*						

For evaluation and after recording the first chromatogram, check the retention times of your compounds. Since they depend on the performance of your column, you may have to adjust them in your method.

4. Optional equipment

4.1. Liquid Handling Station

The Liquid Handling Station (LQH Station) consists of two functional units: rinsing and dilution. As an add-on it is mainly useful for rinsing the needle on the inside and outside, thus minimizing contamination.

The following kit is needed:

Nr	Article no.	Article designation
1	6.5330.130	IC Equipment: LQH Station, left

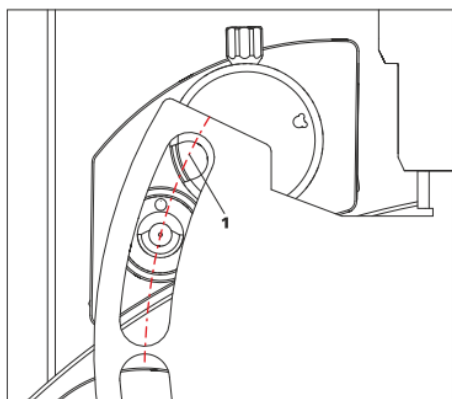


The kit includes:

Nr	Article no.	Article designation
1	6.1014.200	Metrosep I Trap 1 - 100/4.0
1	6.1602.160	Eluent bottle cap GL 45
1	6.1608.070	Eluent bottle /2 L / GL 45
1	6.1619.000	Adsorber tube for 807 Dosing Unit
1	6.1624.000	Adapter SGJ 14
1	6.1826.390	Pump tubing LFL (yellow/yellow) 3 stoppers
1	6.1831.180	PEEK capillary ID 0.5 mm, 3 m
1	6.2744.010	Pressure screw 5x
1	6.2744.034	Coupling nozzle UNF 10/32
1	6.2841.120	Liquid Handling Station, left

The installation of the LQH Station is done in two steps. First, mount and align the Liquid Handling Station on the left-hand side of the Sample Processor. To accomplish this, remove the sample rack and place the Liquid Handling Station on the black rail of the Sample Processor. Secure it temporarily in place with the screw and then loosen the small screws of the foot. The rack is replaced on the Sample Processor, and the small screws are fixed in a way that the approximate distance between the LQH Station and rack is 0.5–1 mm.

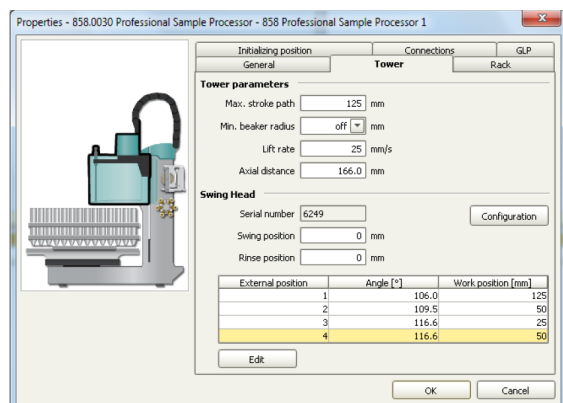
Now the Liquid Handling Station needs to be aligned with the retaining plate. For this, loosen the big screw again and move the Station underneath the retaining plate. Looking from above, you should now be able to see the small hole of the rinsing unit and part of the larger hole of the dilution vessel, similar to the following illustration.



When you have found the correct position, please tighten the screw to fix the LQH Station completely to the Sample Processor.

In a second step, the work positions for the sample tube need to be defined in the configuration.

Please go to the configuration of the Sample Processor. Under Tower it is possible to define external positions of the swing head. For rinsing purposes, only the External Position 1 (small inner tube) and the External Position 2 (outer tube of rinsing unit) have to be defined. The proposed angles are only guiding values; they need to be adapted for every system separately. This can be done easily by adjusting the angles in the manual control window. As soon as you have found the correct angles, make sure to save them in the configuration. The work positions are fixed for all of the different setups.



Depending on the available parts, the water supply to the Liquid Handling Station is managed differently. The inner tube of the rinsing unit is meant to be filled constantly with fresh ultrapure water so the aspiration needle can be thoroughly cleaned from the outside.

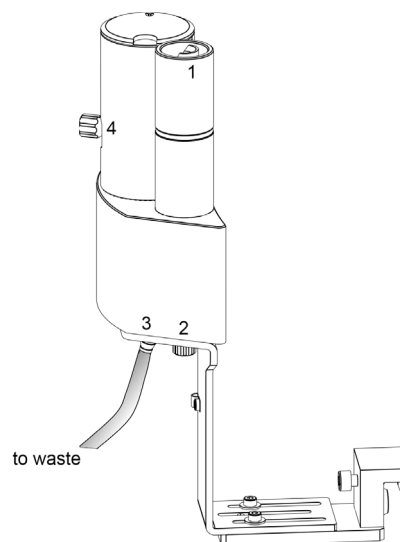
All possibilities have the waste tube in common, Number 3 in the following illustration. Please fix the PVC tubing (6.1801.120) on the disposal connector on the bottom of the Liquid Handling Station.

If there is a free peristaltic pump channel, then there is the possibility to connect a water bottle with a peristaltic pump

tubing and lead a capillary to the PEEK pressure screw on the bottom of the Liquid Handling Station (Number 2 in the following schematic). Between the peristaltic pump and the LQH Station, please install an I-Trap (6.1014.200) into the flow path to cleanse the water before it enters the IC system.

Another possibility arises with a Dosino:

Similar to the setup with the peristaltic pump explained before, connect one of the Dosino ports with a capillary to the PEEK pressure screw (Number 2) on the Liquid Handling Station. Then use the Dosino to push water into the rinsing unit from below when needed. Here, it is recommended to install an I-Trap (6.1014.200) into the flow path of the water, in order to purify the water from anything that could accumulate in the water reservoir.



Number 4 of the picture above shows the attachment point of a capillary in case of a dilution feature and Number 1 indicates the rinsing entity.

In the time program you can treat the external positions like a special beaker: just move to the desired angle, go into work position, and start the Dosino or the peristaltic pump. Make sure to always dispose the waste in the external position 2.

4.2. Eluent Production Module

The 941 Eluent Production Module creates fresh new eluent out of eluent concentrate and ultrapure water. For installation instructions and further information, please refer to the 941 Eluent Production Module Manual.

4.3. Alternative MSM rinsing and regeneration

For alternative suppressor rinsing and regeneration methods and setups, please refer to the Application Bulletin 800105018EN.