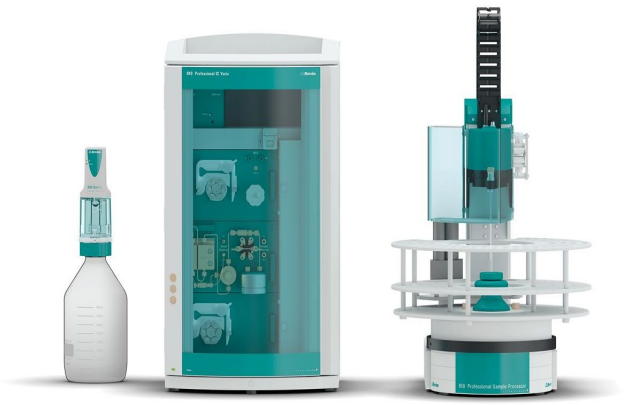
Metrohm

Application Bulletin 800105012EN

Installation Instruction for ProfIC Vario 7 Anion

The ProfIC Vario 7 Anion is a Professional IC Vario system with Inline Dilution and Inline Dialysis for the fully automatic determination of anions with sequential suppression in very high concentrations in matrices containing emulsions. This system enables users to dilute the sample and eliminate droplets of fat or organic solvents or particles prior to the analysis.



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1. Delivery Package

Delivered with ProfIC Vario 7 Anion package:

Nr	Article no.	Article designation
IC		
1	2.940.1510	Professional IC Vario ONE/SeS/PP/Prep 1
Detector		
1	2.850.9010	IC Conductivity Detector
Sample processor		
1	2.858.0020	Professional Sample Processor - Pump
Accessories		
1	2.741.0010	741 Magnetic Stirrer
1	2.800.0010	800 Dosino
1	6.5330.120	IC Equipment: Inline Dilution
1	6.5330.200	IC Equipment: Dialysis Low Volume
Optional		
1	6.6059.4*	MagIC Net 4.* Professional (* newest MagIC Net version)
1	6.6059.4*	MagIC Net 4.* Multi – 3 licenses (* newest MagIC Net version)
1	6.2041.440	Sample rack 148 × 11 mL + 3 × 300 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	6.2842.200	MSM-HC Rotor C
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	2.800.0010	800 Dosino
1	6.1580.210	807 Dosing Unit 10 mL
1	6.2744.080	M6 thread / UNF 10/32 coupling

2. Installation

Following is a detailed description of how to install a ProfIC Vario 7 Anion.

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.

Now as soon as 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 block in the instrument, and connect the detector cable. 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.

Plug the power cable and USB cable (6.2151.020) 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)

All the accessories for setting up the Eluent bottle are found in the box with the Accessory Kits ONE. Please lead the aspiration tube for the Eluent through the M8 stopper, the O-ring, and the eluent cap. 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 in order 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: 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 Professional Sample Processor and 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, you must 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.

Please remove one element of the guide chain close to the Swing Head by using a screwdriver to unfix it. In its place, connect the transfer tubing with holder 2× M6 / 10 mL (6.1562.130). Then, connect one end of the transfer tubing onto the swing arm, where the aspiration tip is connected with the help of the adapter UNF 10/32 outer / M6 inner (6.2744.200).

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

2.4.1. Liquid Handling Station (LQH Station)

The Liquid Handling Station consists of two functional units. The rinsing unit is equipped with a two-pipe system and is used for rinsing the sample tube from the inside and outside. The second unit is used for dilution of samples and standards. In the present case, both units will be used.

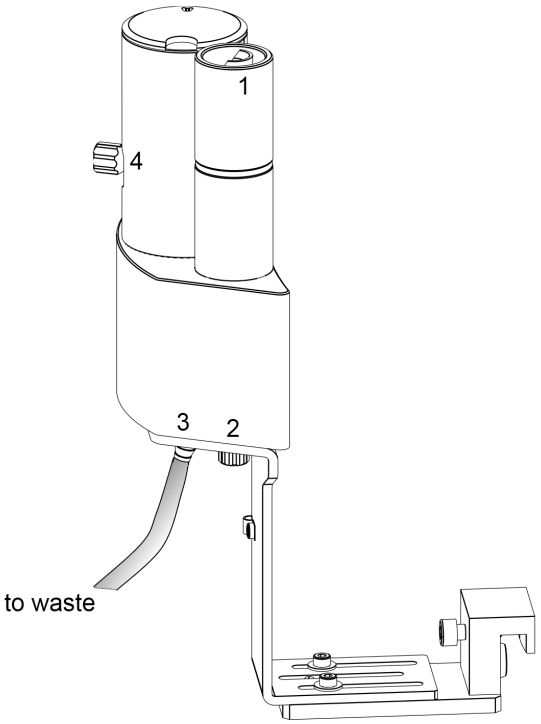
Before adding the Liquid Handling Station onto the Sample Processor, insert the stirrer into the socket of the LQH Station. This is done according to the description in the Liquid Handling Station manual (chapter 2). Subsequently, it is mounted onto the left side of the Sample Processor. For installation instructions, please refer to the Liquid Handling Station manual. All parts are included in the IC Equipment: Inline Dilution (6.5330.120) set. Please make sure that the LQH Station is aligned properly before continuing the setup. All angle settings will be configured in a later step.

2.4.1.1. Rinsing unit

The waste tubing (6.1801.120) is fixed at the bottom of the rinsing station to drain the wastewater.

Ultrapure water for rinsing will be supplied by the dilution Dosino. Fill the 2 L bottle with ultrapure water. The water will be needed for dilution and rinsing purposes and the installation of the Dosino and its connecting parts will be mentioned in the next section.

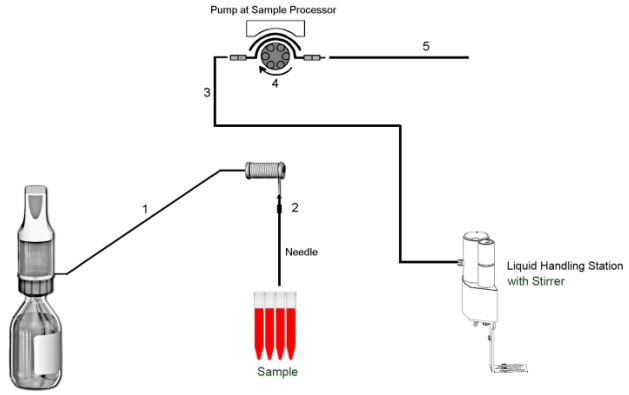
Please close the hole at bottom of the LQH Station (number 2 in the following image) with a stopper.



2.4.1.2. Dilution unit and 800 Dosino

At port 1 of the 10 mL 807 Dosing Unit, please connect the loose end of the transfer tubing (6.1841.000). Port 2 is used for the ultrapure water supply; therefore, please screw the FEP aspiration tubing (6.1819.110) into Port 2 on the bottom of the 807 Dosing Unit. Then fix the 807 Dosing Unit onto the 2 L bottle with ultrapure water. Adjust the Dosino on top and connect its cable on the backside of the 858 Professional Sample Processor on MSB1. Please make sure that the 858 is switched off.

The stirrer cable is plugged into the ⏚- socket on the Tower. Capillary connections are carried out according to the following schematic.



1. Transfer Tubing with holder 2× M6 / 10 mL (6.1562.130) to be connected to Dosino port 1. The holder can be fixed as a chain element on the

Tower. The other end is fixed to Adapter UNF 10/32 outer / M6 inner (6.2744.200) (see number 2 below)

2. Adapter UNF 10/32 outer / M6 inner (6.2744.200) for the connection between the needle and the transfer tubing
3. PTFE capillary 0.97 mm ID / 40 cm (6.1803.070) connected to the black/black pump tubing with a coupling nozzle (6.2744.034). Its other end is connected to position 1 on the side of the LQH Station with a PEEK pressure screw (6.2744.010)
4. Pump tubing LFL (black/black), 3 stoppers (6.1826.340)
5. The PTFE capillary 0.5 mm ID / 1 m (6.1803.040) is connected to the dialysis cell IN. The other end is attached to the black/black pump tubing with the help of a nozzle coupling with security device (6.2744.160)

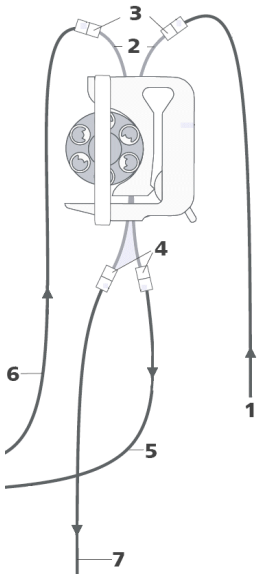
2.4.2. Dialysis cell

Inline dialysis is used for samples with a complex matrix (e.g., emulsions, samples containing fat and protein, body fluids, or waste waters with high pollution loads). The dialysis is performed directly before the injection of the sample into the IC. The main component of the equipment is the high-performance dialysis cell. Driven by a concentration gradient, the ions diffuse out of the (flowing) sample through a semi-permeable membrane into the stationary acceptor solution. After a user-defined dialysis time during which ion equilibrium between sample and acceptor solution should be reached, the acceptor solution is transferred to the sample loop and injected into the IC system. For more details, see the dialysis manual 8.110.8028.

The filter membrane is soaked in ultrapure water for preconditioning for about 5 minutes. After inserting the filter membrane (6.2714.010) and the sealing ring (E3010111), the cell is screwed together (please refer to the manual chapters 2.2 and 4.0). Do not over tighten the screws, as this may damage the cell. The dialysis cell is placed with its assembly groove in the cell holder of the IC device, if a cell holder is present. Otherwise, the dialysis cell can be placed onto an external holder (6.2057.130) in the detector chamber of the IC instrument.

A 2 L bottle of degassed ultrapure water is provided as acceptor solution.

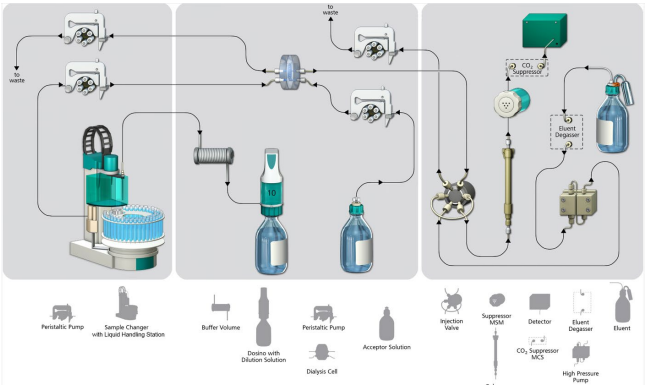
The peristaltic pump at the Sample Processor is used to transport the sample to the dialysis cell and from the cell to the waste. Capillaries are connected as shown in the following graphic.



1. Sample-aspirating PTFE capillary (6.1803.040) connected to black/black pump tubing which provides the sample from the dilution station
2. Two pump tubings (6.1826.340) with black/black stoppers
3. PEEK pressure screws (6.2744.070) and coupling olives (6.2744.034)
4. PEEK pressure screws (6.2744.070) and pump tube connections with safety device (6.2744.160)
5. PTFE capillary (6.1803.040) to convey sample from peristaltic pump to the cell (refers to number 8 in chapter 2.6.)
6. PTFE capillary (6.1803.040) to convey sample from the cell to the peristaltic pump (refers to number 9 in chapter 2.6)
7. PTFE capillary (6.1803.040) to convey sample from the peristaltic pump to the waste collector

2.5. Interconnection of devices

The complete setup of the ProfIC Vario 7 Anion package is depicted here:



Prepare and degas an eluent suitable for the column you plan to use (see column manual).

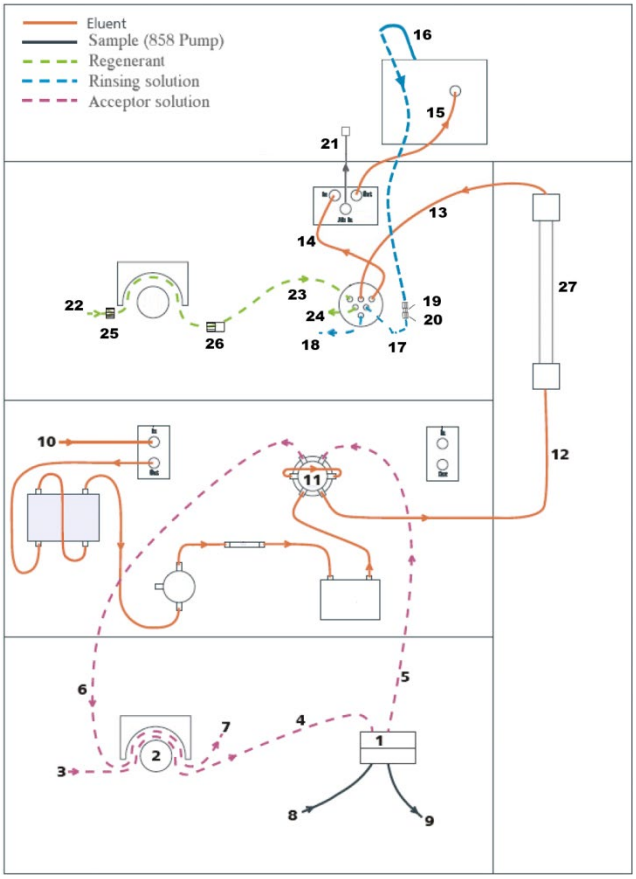
Provide the regeneration solution for the MSM Suppressor (100 mmol/L sulfuric acid for anions or 70 mmol/L Na_2CO_3, 70 mmol/L $NaHCO_3$ for cations).

2.6. 940 Professional IC Vario

Capillaries are connected according to the following list and diagram:

1. Dialysis cell – all capillaries have to be connected with PVDF pressure screws to preserve the plexiglass cell
2. Peristaltic pump for the acceptor solution, equipped with two yellow/orange pump tubings (6.1826.320)
3. PTFE capillary, 0.5 mm ID (6.1803.040) for supplying acceptor solution to the peristaltic pump
4. PTFE capillary, 0.5 mm ID (6.1803.040) to convey acceptor solution from peristaltic pump to the cell
5. PEEK capillary, 40 cm 0.5 mm ID (6.1831.050) or 45 cm 0.25 mm ID (6.1831.120) for Low Volume Dialysis to convey acceptor solution from the cell to the injection valve. The correct length is crucial for reproducible data.
6. PTFE capillary, 0.5 mm ID (6.1803.040) to convey the acceptor solution from injection valve to peristaltic pump
7. PTFE capillary, 0.5 mm ID (6.1803.040) to convey the acceptor solution from peristaltic pump to the waste collector
8. PTFE capillary, 0.5 mm ID (6.1831.160) to convey the sample from the dilution station using the peristaltic pump at the 858 to the cell
9. PTFE capillary, 0.5 mm ID (6.1803.040) to convey the sample from the cell to the peristaltic pump at the 858 Professional Sample Processor
10. Connection to the eluent bottle
11. Loop (20 µL) connected to the valve positions 3 and 6
12. Capillary to Column inlet – 0.25 mm ID
13. MSM inlet capillary – labeled with *In*
14. MSM outlet capillary – labeled with *Out* can be connected to the MCS (with PEEK pressure screw long (6.2744.090)) or directly to the detector (15) using a coupling (6.2744.040)
15. Detector inlet capillary
16. Detector outlet capillary connected to the MSM inlet capillary – labeled with *Rinsing solution* with the help of a coupling (6.2744.040)
17. MSM rinsing solution inlet capillary – labeled with *Rinsing solution*
18. MSM rinsing solution outlet capillary – labeled with *Waste rins.* – to be connected to the waste collector
19. PEEK pressure screw short (6.2744.070)
20. Coupling 2× UNF 10/32 PEEK (6.2744.040)
21. MCS air aspiration capillary – connected to the CO_2-absorber cartridge
22. 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 (6.1826.320). 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 (see number 26 below)
23. MSM regeneration inlet capillary – labeled with *Regenerant*
24. MSM regeneration solution outlet capillary – labeled with *Waste reg.* – to be connected to the waste collector
25. Coupling nozzle – UNF 10/32 (6.2744.034)
26. Pump tubing connector with security lock and filter (6.2744.180)
27. The UNF 10/32 coupling (6.2744.040) is installed instead of the column to rinse the system with eluent. After rinsing, the column is installed.

Make sure that the direction of the flow is kept as indicated with the arrows in the following illustration.

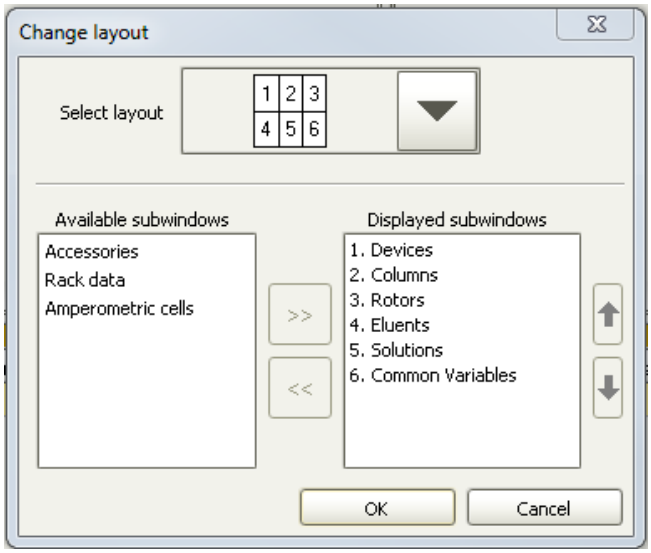


The sample injection is at position 1 of the valve. A counter current flow of the sample with regard to the eluent flow is recommended in order to minimize diffusion and carryover. Make sure that all outlet capillaries are put into the waste collector.

3. MagIC Net

3.1 Configuration

Adjust the “view layout” of the configuration. Please configure it in the following way (the order of the sub windows is up to you):

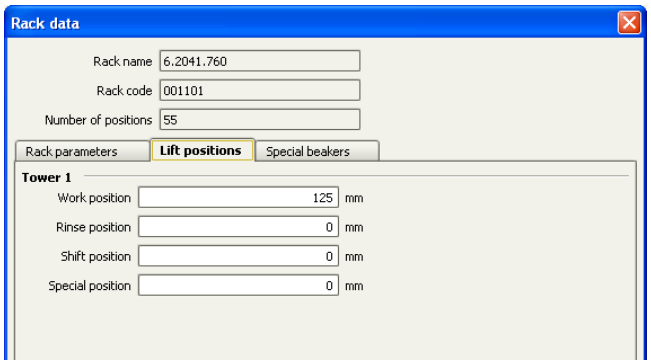


Now connect the USB cables from the instruments and turn their power on. Connected USB devices are automatically recognized when MagIC Net is started. After confirmation of the automatically generated requests, the devices and columns are stored in the configuration. The devices are predefined as “940 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).

Accept the request to add the Dosino connected to the 940 Professional IC Vario, name the Dosino solution “UPW” (for ultrapure water), and choose “Dosino” in the “Use” dropdown menu.

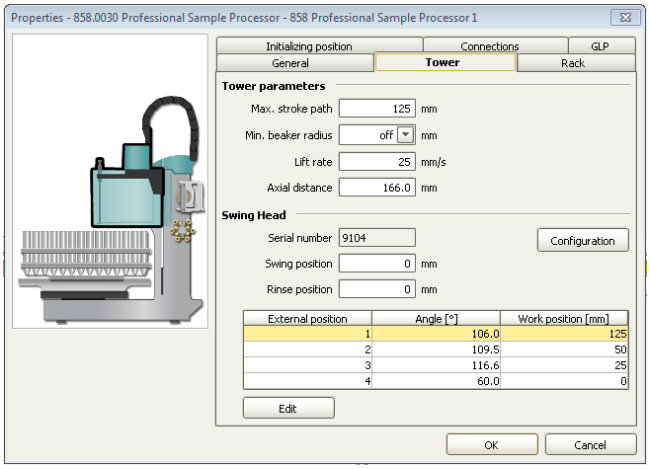
In the window configuration, the 940 Professional IC Vario, the 858 Professional Sample Processor, and the column are visible. Add and define the eluent, the suppressor solution, and the MSM Rotor.

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

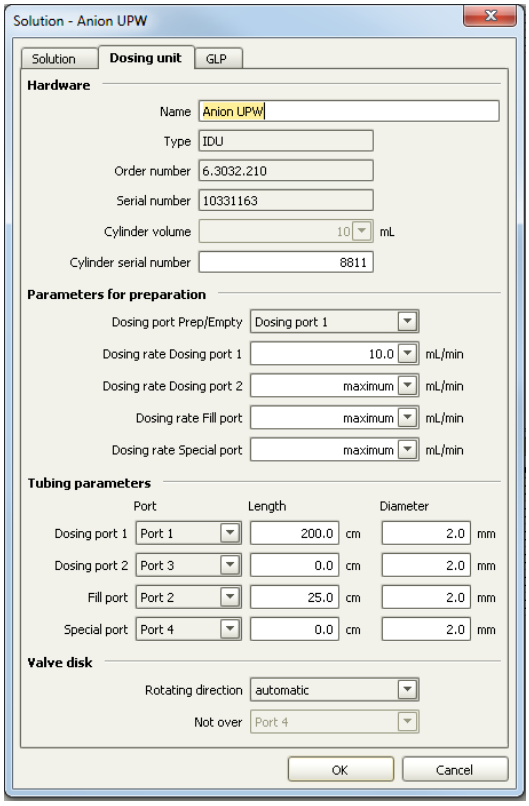


When using the Liquid Handling Station, it is necessary to define external positions for the needle. This is done in the configuration of the Sample Processor in the subtab “Tower”. Define the external positions 1, 2, and 3 according to the picture below. Attention: the angles are only approximate

values; for fine tuning, please use the manual control to find the correct values for this system and then adjust them in the configuration.



For the Dosino, the exact lengths and diameters of the tubings used need to be added for it to work properly. This can be done in the configuration as follows:



Please add a common variable called: “end volume” and set its value to 8 mL.

3.2 Method adjustment

For the configuration of the method, contact your local Metrohm specialist.

3.3. Purge of the system

Before inserting the column, 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 initially, as loose particles could be flushed out.

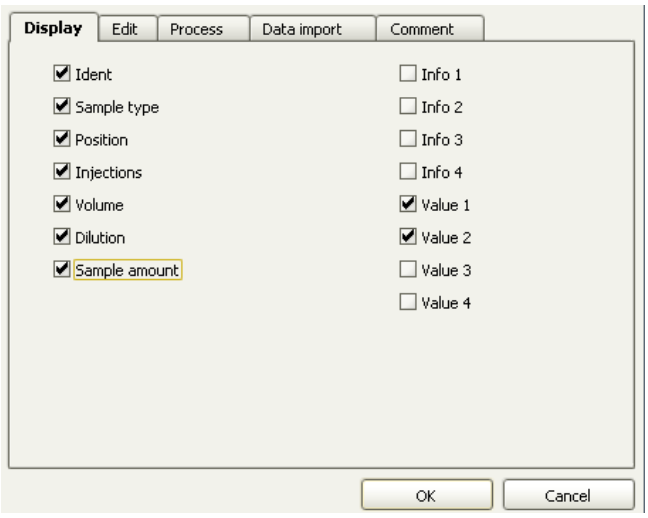
Now flush the system for about 10 minutes to remove any air bubbles (by using the purge valve and syringe). During these 10 minutes, step the MSM three times to flush all three chambers.

When 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 leading the outlet directly into the waste. Afterward, connect the analytical column and flush it likewise for 10 minutes. Only then can the column be 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. Rinse the Dosino and fill the transfer tubing by applying the “prepare” button under manual control.

In order to start the equilibration, go to the window workplace, load the anion method, and press “Start HW.” To display values 1 and 2 in the sample table, go to “View” → properties → properties Run window and tick Value 1 and Value 2.

Equilibrate the system until the baseline is stable.



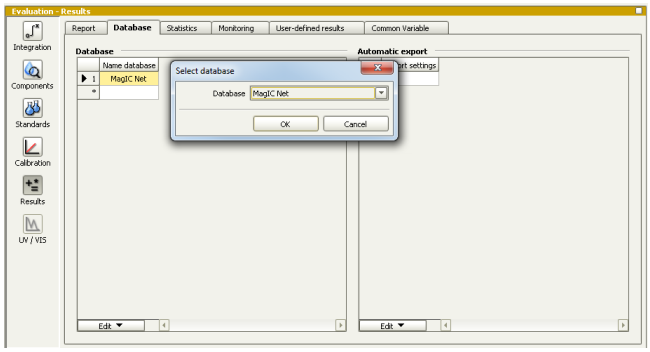
3.4. User-defined determination

In the window method, under evaluation, enter the ions and the concentrations of the required standards. You can either calibrate with a set of calibration standards, or you can calibrate with a single standard and dilute it to different calibration levels.

If you wish to calibrate by diluting one standard solution, the standard with the highest concentration must be prepared and labeled as standard 1 in this method. All other standards have to be divisors of standard 1, e.g., all components of standard 2 have half the concentration of those in standard 1, all components of standard 10 have a tenth of the standard 1 concentration, and so on.

Always use the standard number as the factor that lies between the two solutions. Make sure to always fix the dilution factor = 1 for all the standards in your determination table.

Now please add the correct Database in the Evaluation window (Evaluation → Results → Database) for the method.



For the dialysis setup it is imperative to determine the optimal settings for your individual setup. The dialysis time (Value 1) depends on your analytes, the matrix, the membrane used, and the temperature. The transfer time (Value 2) depends on the exact capillary length from the dialysis cell to the sample injection loop.

First, choose a reasonable dialysis time at which you expect analyte signals of acceptable height, e.g., 10 minutes. Then start to optimize the transfer time. For this, measure the same sample with different transfer times, starting from around 20 seconds, and going up to around 45 seconds in increments less than or equal to 5 seconds, while the dialysis time is kept constant. Screen your data for the determination with the maximum peak area of your compounds of interest, which is easiest using the detailed overview in MagIC Net. The optimal transfer time is expected at approximately 30 seconds.

Now optimize the dialysis time. Start with, e.g., 5 minutes and add increments of 1 minute, while the transfer time is kept constant with the previously determined optimized value. The optimal time for dialysis is reached when peak areas do not increase any further. Please refer to the manual for a detailed description (8.110.8028; chapter 4).

In the window workplace, set up a “determination series”, describing your samples by ident, vial number, and sample type (standard, blank, or sample, etc.). After putting the analyte solutions onto the rack, press “start”.

In the field dilution, indicate the dilution you wish to apply to your sample, e.g., “2” if you want to dilute your sample two times. If no dilution is required or a standard is measured, write 1. After putting the analyte solutions onto the rack, press “start”.

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 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.

4.2 Alternative MSM rinsing and regeneration

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