# 761 SD Compact IC


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8.761.1043
Instructions for Use

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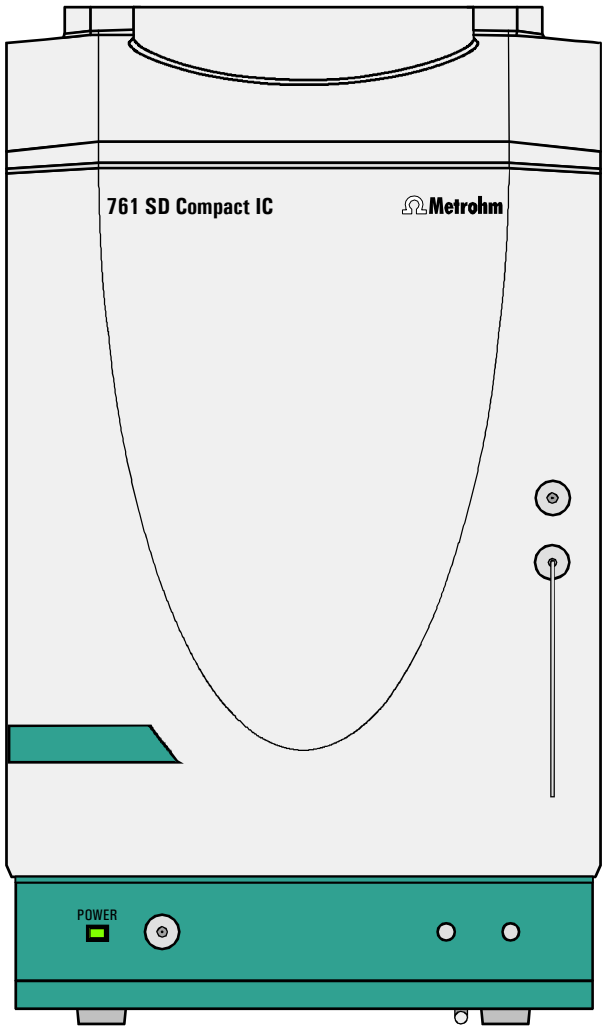


## 8.761.1043 Instructions for Use

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1. Edition 2004



Although all the information given in these instructions has been checked with great care, errors cannot be entirely excluded. Should you notice any mistakes please inform the author at the address given above.

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# 1 Introduction

## 1.1 Instrument description

The **761 SD Compact IC** is a version of the time-proven 761 Compact IC which has been developed specifically for soft drink analysis. The **761 SD Compact IC** is designed for determining phosphoric acid and its intermediate products in soft drinks but also continues to offer all functionalities of the original version.

The advantages of the 761 SD Compact IC over the conventional methods of phosphoric acid analysis in soft drinks are its short analysis times, its ease of operation and the option for automated sampling. There is no need for time-consuming sample preparation and only small quantities of chemicals are consumed (more environmentally friendly).

The 761 SD Compact IC has a very compact housing accommodating all equipment required for ion-chromatographic determination:

- **Injection valve** – this supplies the sample to the eluent stream by switching over the flow paths.
- **High-pressure pump** – extremely low-pulsation dual piston pump with a flow range of 0.2 to 2.5 mL/min and a maximum pressure of 25 MPa (250 bar).
- **Pulsation dampener** – the pulsation dampener protects the separating column reliably against damage even in the case of low-level pressure fluctuations.
- **Column chamber** – perfect insulation of the housing not only creates thermally stable conditions for the separating column, but also shields the system against electromagnetic interference.
- **Column** – Metrosep A Supp 1 HS anion column as IC separating column; Metrosep RP Guard as protective precolumn.
- **Suppressor** – the Metrohm-Suppressor-Module (MSM) which is already integrated features stable pressure characteristics, automatic regeneration, high performance and optimum reproducibility.
- **Peristaltic pump** – integrated, two-channel peristaltic pump with a flow rate of 0.5 to 0.6 mL/min for regeneration of the suppressor module and aspiration of the sample for manual operation.
- **Detector** – conductivity detector with excellent temperature stability. The detector temperature fluctuates by less than 0.01°C and can be matched optimally to ambient conditions.

All components coming into contact with eluent and sample are metal-free. Ready-to-use eluents in certified MPaks are supplied for soft drink analysis.

The 761 SD Compact IC is **operated** by means of a PC connected to the RS232 interface. The 761 SD Compact IC can be controlled by the «IC Net» software or by the “master” «IC Cap» software.

The systems required for soft drink analysis (and the methods linked to them) are supplied on the installation CD.

The following instrument versions are available:

- **2.761.0420 761 SD Compact IC**
- **2.761.0520 761 SD Compact IC** with **IC Sample Processor 766** for automated sample change

## Principle:

The eluent flows on the eluent path through the injection valve into the separating column and then into the detector. The sample flows on the sample path also through the injection valve and the red sample loop visible at the centre of the injection valve. At a specific instant (<Inject>; controlled by the program), the flow paths in the injection valve are switched and the sample loop is reintegrated in the eluent path (it is now no longer a part of the sample path). The sample quantity which is located in the sample loop at the switchover instant is then entrained with the eluent stream, thus entering the separating column (where the actual chromatographic separation of the components occurs) and, finally, chromatographically separated, into the conductivity detector.

# 1.2 Parts and controls

*In this section you will find the numbers and designations of the parts and controls of the 761 SD Compact IC. The numbering applies throughout the instructions for use, i.e. bold numbers in the text (e.g. **4**) refer to the parts and controls illustrated here.*

## 1.2.1 Front view

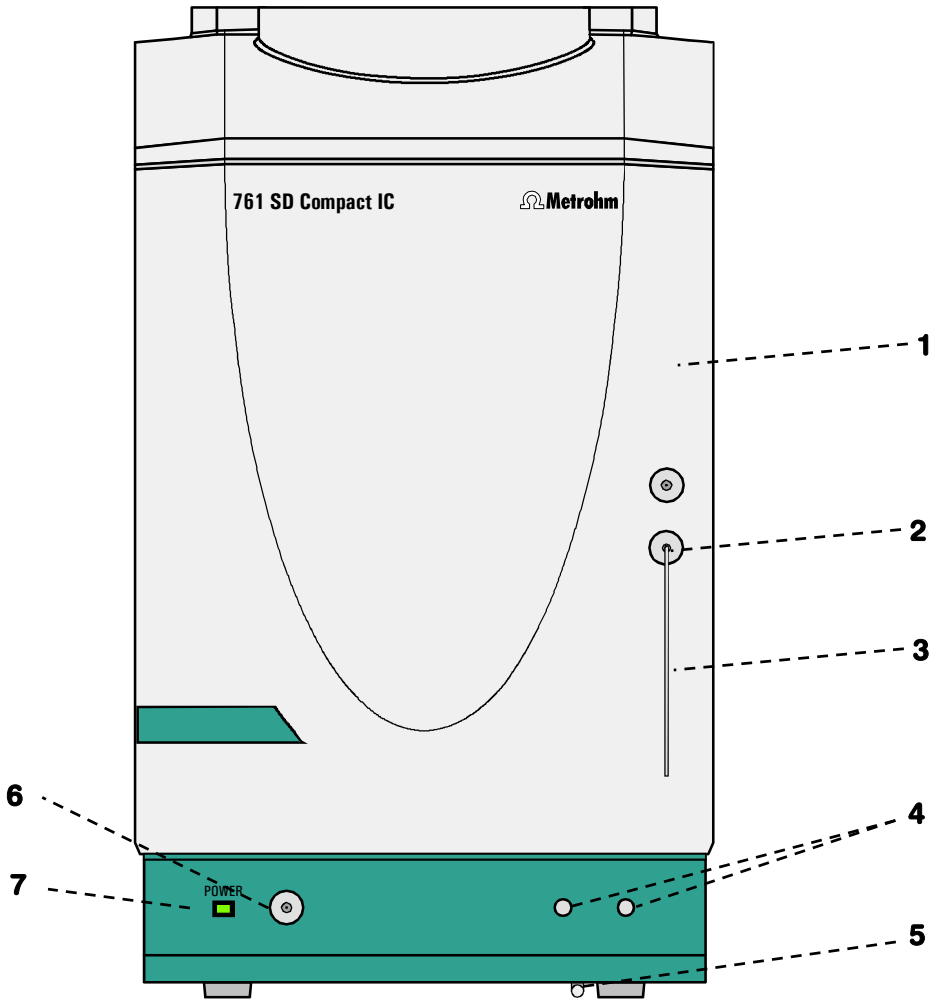



***Figure 1: Front of the 761 SD Compact IC***

**1 Door to inner compartment**

**2 Feedthrough for aspirating tubing**

**3 Aspirating tubing**
for sample

**4 Feedthrough for capillaries**

**5 Connection for drain tube**
for discharging escaped fluid from the inner compartment

**6 Connection purge valve**

**7 Pilot lamp**
This is on when the instrument is switched on

### 1.2.2 Rear view

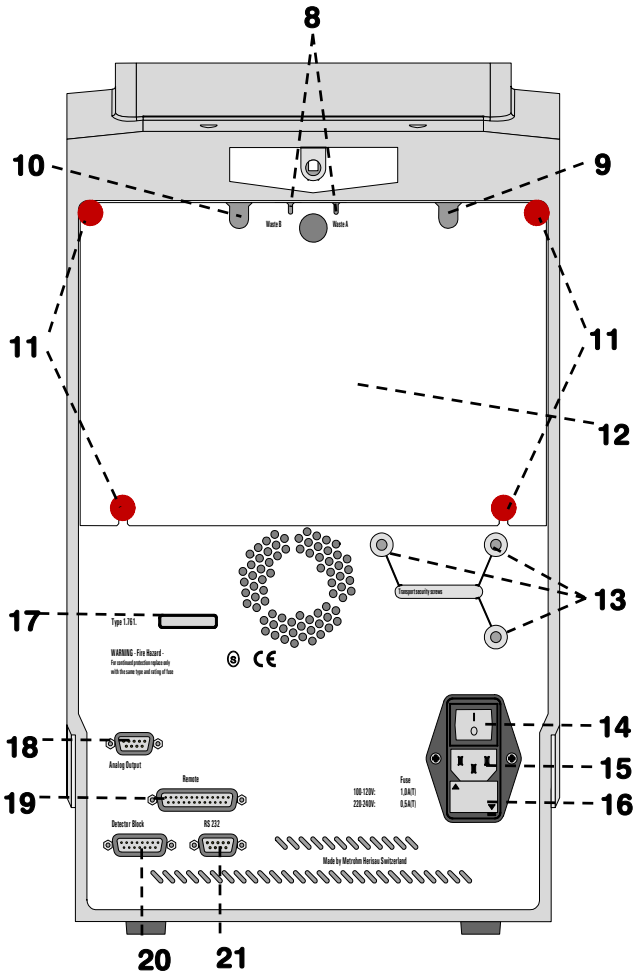



*Figure 2: Rear panel 761 SD Compact IC*

**8 Opening for outlet capillaries**
for discharge of eluent, regeneration solution and sample solution

**9 Opening for inlet capillaries**
for supply of eluent, regeneration solution and sample solution

**10 Opening for detector cable**

**11 Knurled screw**
for fastening the rear panel

**12 Detachable rear panel**
Access to the inner compartment

**13 Transport security screws**
to secure the pump head when the instrument is transported

**14 Mains switch**
to switch instrument on and off:
I = ON 0 = OFF

**15 Mains connection plug**
Mains connection, see *section 2.11*

**16 Fuse holder**
Changing the fuses, see *section 2.11.2*

**17 Serial number**

**18 Analogue output**
output for analogue signal

**19 Remote interface**
Remote-I/O lines for connection of external devices

**20 Connection for detector block**

**21 RS232 interface**
PC connection

### 1.2.3 Connection schematic

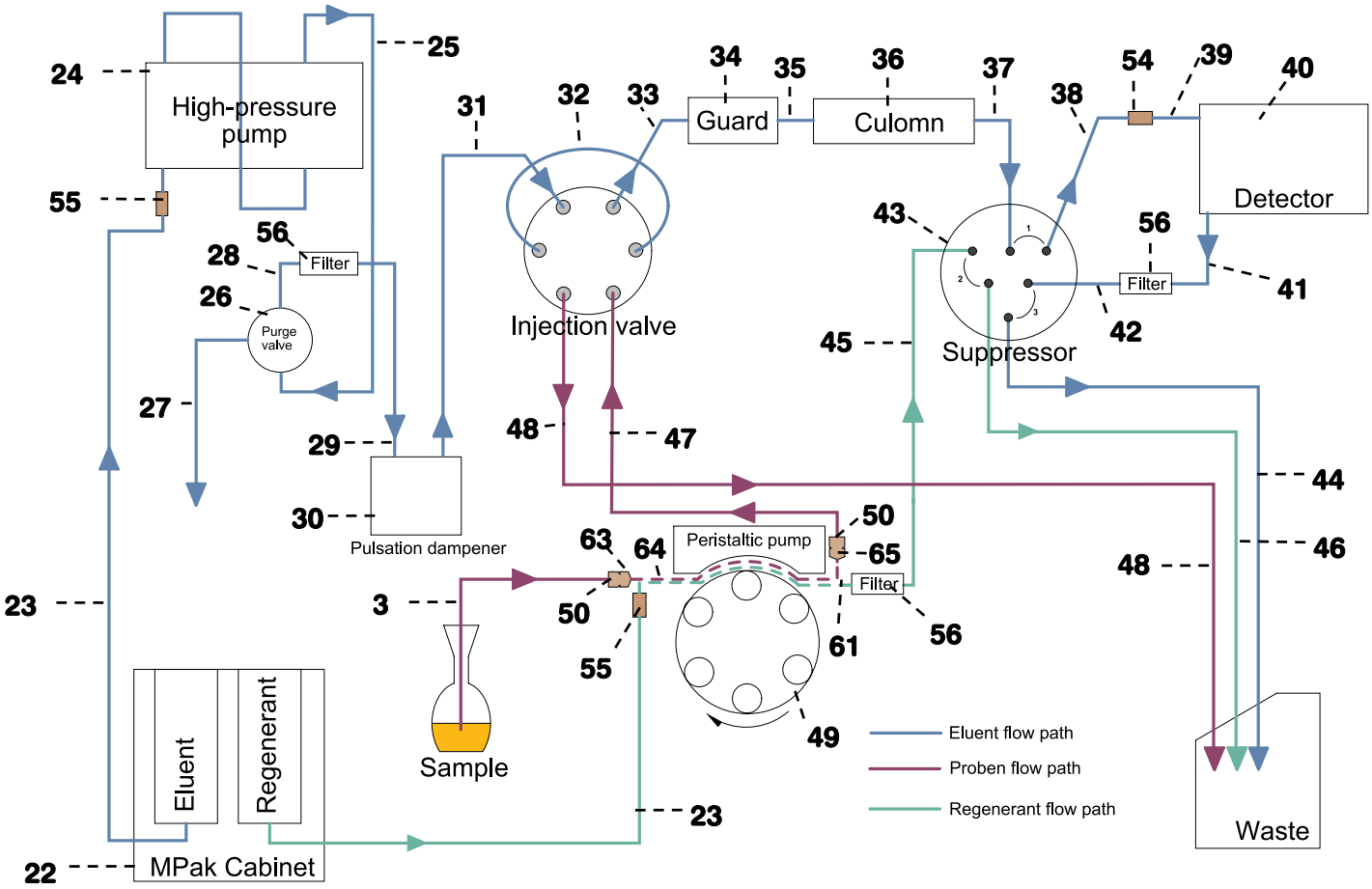



*Figure 3: Connection schematic for 761 SD Compact IC*

**3 Aspirating tubing**
for sample

**22 MPak cabinet**
for suspending eluent and regenerant bag

**23 Tubing connection to MPak 6.1837.000**

**24 Pump head 6.2824.100**

**25 Connection capillary**
Connection between pump head and purge valve, permanently mounted

**26 Purge valve**

**27 Connection capillary**
PEEK capillary 6.1831.010 for deaerating,
length $L$ = 15 cm

**28 Connection capillary**
PEEK capillary 6.1831.010,
length $L$ = 13 cm

**29 Connection capillary**
PEEK capillary 6.1831.010,
length $L$ = 13 cm

**30 Pulsation dampener 6.2620.150**

**31 Inlet capillary for injector**
PEEK capillary 6.1831.010,
length $L$ = 24 cm

**32 Sample loop 1.5 µL (6.1825.240)**
PEEK sample loop

**33 Column connection capillary**
PEEK capillary 6.1831.010, length $L$ = 30 cm

**34 Metrosep RP Guard 6.1011.020**
Precolumn for protecting the separating column

**35 Connection capillary**
PEEK connection capillary between precolumn and separating column

**36 Metrosep A Supp 1 HS separating column (6.1005.350)**
IC separating column

**37 Suppressor inlet capillary for eluent ("Eluent")**
PTFE capillary, permanently mounted on suppressor, labelled "Eluent"

**38 Suppressor outlet capillary for eluent ("Detector")**
PTFE capillary permanently mounted on suppressor, labelled "Detector"

**39 Inlet capillary to detector block**
PEEK capillary, permanently mounted

**40 Detector block 1.732.0420**

**41 Outlet capillary from detector block**
PEEK capillary, permanently mounted

**42 Suppressor inlet capillary for eluent ("H2O")**
PTFE capillary, permanently mounted on suppressor, labelled "H2O"

**43 Suppressor module**

**44 Suppressor outlet capillary for eluent ("Waste")**
PTFE capillary, permanently mounted on suppressor, leading to the waste, labelled "Waste"

**45 Suppressor inlet capillary for regenerant**
PTFE capillary, permanently mounted on suppressor, labelled "H2SO4"

**46 Suppressor outlet capillary for regenerant ("Waste")**
PTFE capillary, permanently mounted on suppressor, leading into the waste, labelled "Waste"

**47 Connection capillary**
PTFE capillary 6.1803.030, connection between pump tubing and injection valve

**48 Connection capillary**
PTFE capillary 6.1803.030, connection between injection valve and waste container

**49 Pump drive of the peristaltic pump**
Drive of the two-channel-peristaltic pump for pumping sample and regenerant

**50 Pressure screw 6.2744.010**

**54 PEEK coupling 6.2744.040**

**55 PEEK coupling 4.455.4500**
Coupling for "tubing connection to MPak"

**56 Filter unit PEEK 6.2821.120**

**61 Pump tubing 6.1826.110 for $H_2SO_4$**

**63 PEEK coupling 6.2744.030**

**64 Pump tubing 6.1826.110 for sample**

**65 PEEK coupling 6.2744.160**
with tubing security device

*On instrument version 2.761.0520 with automated sample change with the 766 IC Sample Processor, the aspirating tubing **3** is replaced by the PEEK capillary tubing **18** (see Instructions for Use 766 IC Sample Processor) installed on the 766 IC Sample Processor. See Section 2.9. for installation of the 766 IC Sample Processor.*

# 1.3 Information on the Instructions for Use

*Please read through these Instructions for Use carefully before you put the 761 SD IC Compact IC into operation. The Instructions for Use contain information and warnings to which the user must pay attention in order to assure safe operation of the instrument.*

## 1.3.1 Organisation

These **Instructions for Use 8.761.1043** for the 761 SD Compact IC provide a comprehensive overview of installation, startup procedure, operation, fault rectification and technical specifications of this instrument. The Instructions for Use are organised as follows:

**Section 1 Introduction**
General description of instrument, parts and controls and safety notes

**Section 2 Installation**
Installation and connection of the instrument, of the accessories and of the software

**Section 3 «IC Net»**
Explanatory information on the user interface of the «IC Net» control software

**Section 4 «IC Cap**
Explanatory information on the user interface of the «IC Cap» control software

**Section 5 Operation**
Description of operation with manual and automatic sample change, with «IC Net» and «IC Cap» in each case

**Section 6 Notes – Maintenance – Faults**
Notes on ion chromatography, maintenance, fault rectification, diagnostic tests and validation

**Section 7 Appendix**
Technical data, standard equipment, options, warranty, declarations of conformity and index

To find the required information on the instruments, you will find it an advantage to use either the **Table of contents** or the **Index** at the back.

### 1.3.2 Notation and pictograms

The following notations and pictograms (symbols) are used in these Instructions for Use:

| | |
|---|---|
| **Fill** | **Menu item, parameter or entry value**<br>in the software |
| **SYSTEM STATE** | **Program window**<br>in the software |
| **<OK>** | **Button**<br>in the software |
| **20** | **Part or control of 761 SD** |
| **18** | **Part or control of 766** |
|  | **Hazard**<br>This symbol draws attention to a possible danger to life or of injury if the associated directions are not followed correctly. . |
|  | **Warning**<br>This symbol draws attention to possible damage to instruments or instrument parts if the associated directions are not followed correctly. |
|  | **Caution**<br>This symbol marks important information. First read the associated directions before you continue. |
|  | **Comment**<br>This symbol marks additional information and tips. |

# 1.4 Safety notes

## 1.4.1 Electrical safety

While electrical safety in the handling of the 761 SD Compact IC is assured in the context of the specifications IEC/EN 61010-1 (prot. class 1, degree of protection IP20), the following points should be noted:

- **Mains connection**

*Setting of the **mains voltage**, checking the **mains fuse** and the **mains connection** must be effected in accordance with the instructions in section 2.11.*

- **Opening the 761 SD Compact IC**

*If the 761 SD Compact IC is connected to the power supply, the instrument must not be opened nor must parts be removed from it, otherwise there is a danger of coming into contact with components which are live. Hence, always disconnect the instrument from all voltage sources before you open it and ensure that the **mains cable is disconnected from mains connection 15**!*

- **Protection against static charges**

*Electronic components are sensitive to static charging and can be destroyed by discharges. Before you touch any of the components inside the 761 SD Compact IC, you should earth yourself and any tools you are using by touching an earthed object (e.g. housing of the instrument or a radiator) to eliminate any static charges which exist.*

## 1.4.2 General precautionary rules

- **Handling of solvents**

*Check all lines of the IC system periodically for possible leaks. Follow the relevant instructions regarding the handling of flammable and/or toxic solvents and their disposal.*

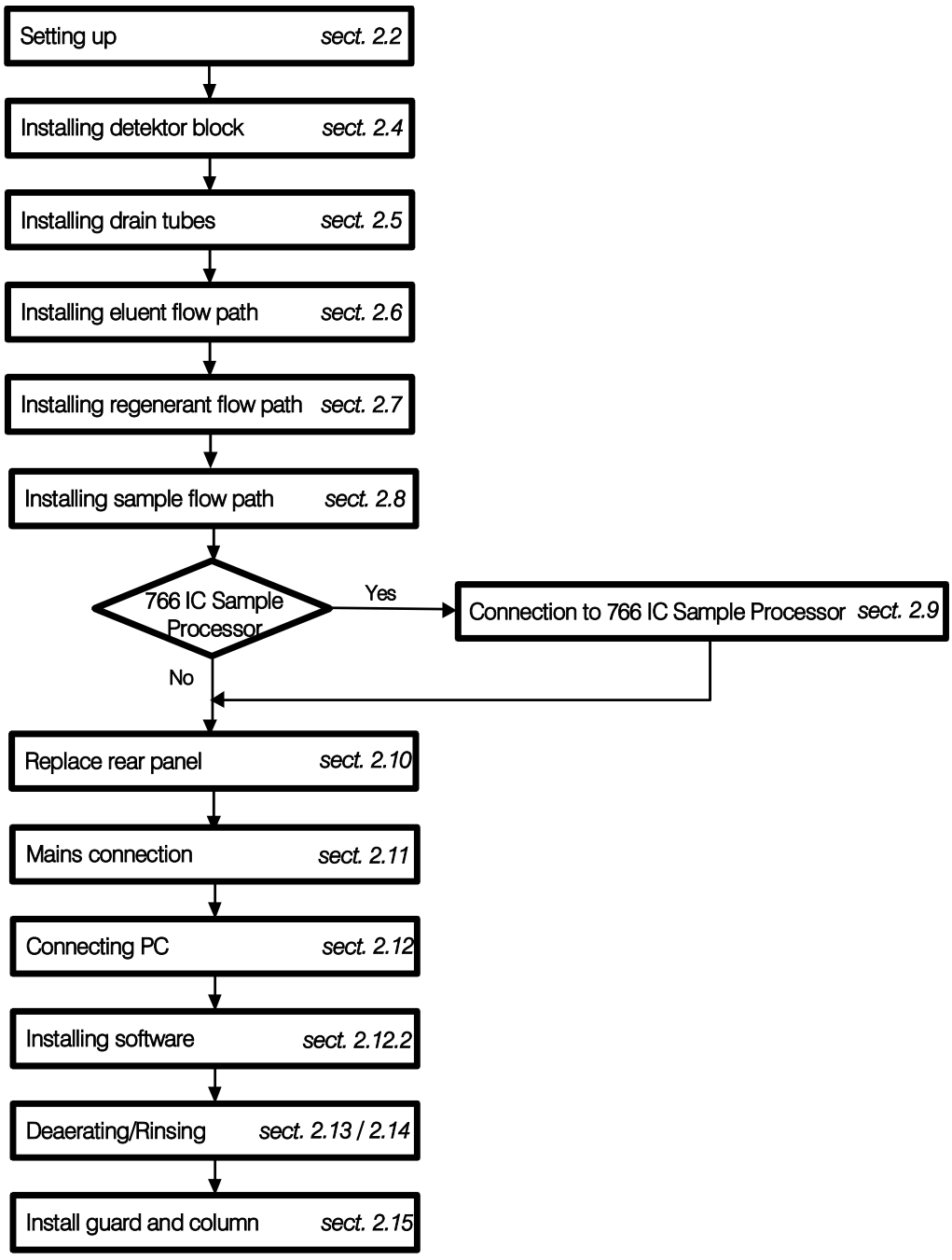
- **Periodic exchange of pump tubing**

*Pump tubing is consumable material and must be replaced from time to time (see Section 6.2.9). Please take suitable measures to ensure that any leakage on pump tubing or connections in unattended continuous operation does not cause damage (position the instrument at the bottom and provide a receptacle for catching escaping fluid).*

# 2 Installation

## 2.1 Flow chart

The following flow chart provides an overview of all installation work. You will find more detailed information in the relevant section.



# 2.2 Setting up the instrument

## 2.2.1 Packaging

The 761 SD Compact IC is supplied together with the separately packed accessories in special packagings containing shock-absorbing foam linings designed to provide excellent protection. The instrument itself is packed in an evacuated polyethylene bag to prevent the ingress of dust. Please store all these special packagings as only they assure transport of the instrument free from damage.

## 2.2.2 Check

After receipt, immediately check whether the shipment is complete and has arrived without damage (compare with delivery note and list of accessories in *section 7.2*). In the case of transport damage, see instructions in *section 7.4.1* "Warranty".

## 2.2.3 Location

Position the instrument in the laboratory at a location convenient for operation, free from vibrations and protected against a corrosive atmosphere and contamination by chemicals.

*To avoid disturbing temperature influences on the insulated column compartment, the instrument must be protected against direct sunlight.*

# 2.3 Description of the connections

## 2.3.1 Connection of capillaries/tubing

The connections for eluent, sample and regenerant consist of:

- **PEEK capillaries 6.1831.010** (inner diameter = 0.25 mm)
- **PTFE microcapillaries 6.1803.030** (inner diameter = 0.5 mm)
- **PTFE tubing connections** to the MPaks **6.1837.000** (inner diameter = 1.5 mm)

The PEEK capillaries and PTFE microcapillaries can be connected either with **PEEK pressure screws 50** 6.2744.010 (long) or **PEEK pressure screws 51** 6.2744.070 (short, for connection to the IC pump).

The "PTFE tubing connection to the MPak" **23** can be connected to the **PEEK pressure screw 52** 4.422.4510 (wide).

The connectors must be fitted to the capillaries as follows in this case:

*Capillaries provided with new connectors must feature a flawless, flat cut edge. In order to ensure this, it is best to use the* ***tubing cutter 6.2621.080****.*

**1 Fit pressure screw**

Slide the corresponding pressure screw (**50**, **51** or **52**), as shown in *Figure 4* onto the capillary **53** (**23** for MPak connection).

**2 Insert the capillary into the connection**

Slide the end of the capillary fully into the corresponding connector (in order to avoid dead volume).

**3 Tighten the pressure screw**

Firmly tighten the pressure screw (**50**, **51** or **52**) by hand (**do not** use tools).

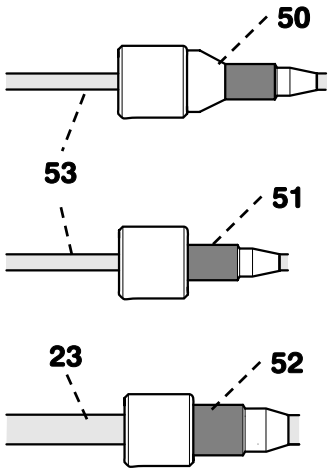



*Figure 4: Connectors for capillaries*

**23** **Tubing connection to MPak 6.1837.000**

**50** **Pressure screw 6.2744.010**

**51** **Pressure screw 6.2744.070** for IC pump

**52** **Pressure screw 4.422.4510** for tubing connection **23** to MPak

**53** **Capillary** PEEK capillary 6.1831.010 or PTFE-microcapillary 6.1803.030

## 2.3.2 Connection between capillaries/tubing

Capillaries and tubing can be connected together using PEEK couplings. If **PEEK capillaries** 6.1831.010 and/or **PTFE microcapillaries** 6.1803.030 are to be connected together, use the **PEEK coupling** 6.2744.040. If the "tubing connection to the MPak" is to be connected, use the **PEEK coupling** 4.422.4500.

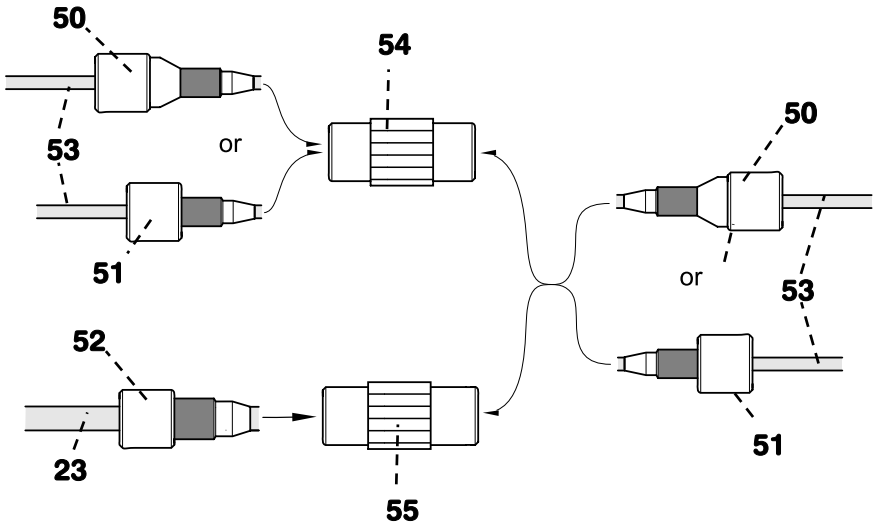



*Figure 5: PEEK couplings*

**23** **Tubing connection to MPak 6.1837.000**

**50** **Pressure screw 6.2744.010**

**51** **Pressure screw 6.2744.070** for IC pump

**52** **Pressure screw 4.422.4510** for tubing connection **23** to MPak

**53** **Capillary** PEEK capillary 6.1831.010 or PTFE-microcapillary 6.1803.030

**54** **PEEK coupling 6.2744.040**

**55** **PEEK coupling 4.455.4500** coupling for "tubing connection to the MPak"

Capillaries may also be connected together via PEEK inline filters, see *Section 2.3.3*.

### 2.3.3 Filter unit PEEK

Three **PEEK filter units** 6.2821.120 should be fitted in the 761 SD Compact IC.

The first one should be fitted between IC pump head **24** and pulsation dampener **30**. It serves to avoid contamination by abrasive particles of the piston seals.

The two other filter units are installed upstream of the suppressor module. One upstream of the inlet capillary **42** (labelled "H2O") in the return path from the detector to the suppressor in the eluent path (see *Section 2.6.6*). The other one upstream of the inlet capillary **45** (labelled "H2SO4"), between peristaltic pump and suppressor module in the regenerant path (see *Section 2.7.2*). They serve to protect the suppressor module against foreign particles and bacterial growth.

*For the connection of the filter unit, please note the flow direction arrow printed on the housing.*

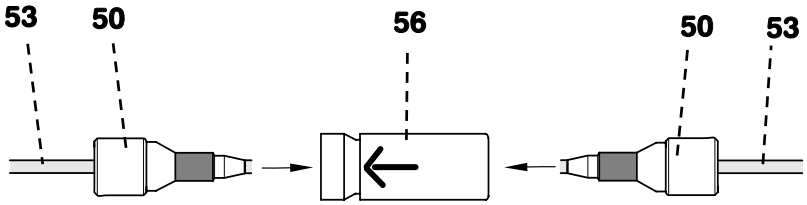



***Figure 6: Connecting the filter unit PEEK***

| | |
|---|---|
| **50** | **Pressure screw 6.2744.010** |
| **53** | **Capillary**<br>PEEK capillary 6.1831.010 or PTFE-microcapillary 6.1803.030 |
| **56** | **Filter unit PEEK 6.2821.120** |

# 2.4 Connection of the detector block

The **metal-free detector block** 1.732.0420 which must be fitted in the instrument and connected belongs to the scope of delivery of the 761 SD Compact IC. Proceed as follows:

**1 Note the cell constant**

- The cell constant **c = XX.X /cm**, measured at the works, is printed on the rear side of the detector block. Note this value; it must subsequently be entered in the software in order to ensure that an exact display of the conductivity is obtained (see *Section 2.12.3*).

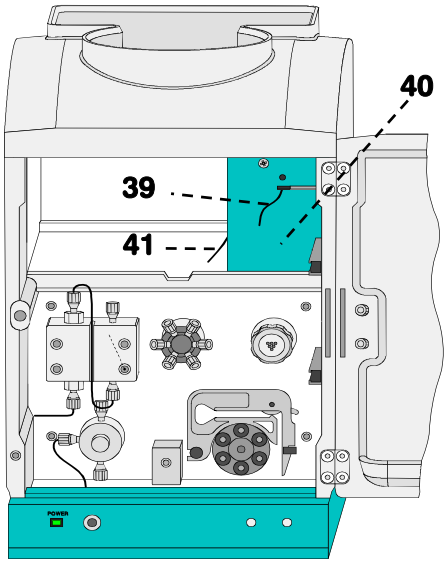
**2 Install detector block**

- Unscrew the two upper knurled screws **11** from the upper rear panel **12** of the 761 SD Compact IC, slacken the two lower knurled screws **11** a little and remove the rear panel (see *Figure 2*).
- Position the detector block **40** from the rear onto the space provided in the 761 SD Compact IC and push it fully to the front (see *Figure 7*).

**3 Connect detector block**

- Pull the grey connecting cable permanently attached to the detector block **40** out through the opening (where the upper rear panel **12** previously was) on the rear of the 761 SD Compact IC and plug it in to connection **20** "**Detector Block**" of the 761 SD Compact IC.

*Since other connections need to be routed through the rear openings of the 761 SD Compact IC later on, you should not fit the rear panel **12** back on until the end of the installation procedure (see Section 2.10).*




| | |
|---|---|
| **39** | **Inlet capillary to detector block**<br>PEEK capillary, permanently attached |
| **40** | **Detector block 1.732.0420** |
| **41** | **Outlet capillary from detector block**<br>PEEK capillary, permanently attached |

***Figure 7: Position of the detector block 40***

*The inlet and outlet capillaries (**39** and **41**) to and from the detector block must be fitted in the eluent path as described in Sections 2.6.5 and 2.6.6.*

# 2.5 Installation of the MPak cabinet and connection of the drain tubes

## 2.5.1 Installing the MPak cabinet

Install the MPak cabinet as shown on the drawing accompanying the package. Position it next to the 761 SD Compact IC and suspend the eluent and regenerant MPaks from the crossbars. Since eluent and regenerant are supplied from the rear to the 761 SD Compact IC, the outlets of the MPaks should point to the rear.

## 2.5.2 Drain tube for inner compartment

The 761 SD Compact IC features a connector (**5**) for escaped fluids on the front panel. A drain tube can be fitted to the connector. Proceed as follows:

**1 Connect drain tube**

- Plug the silicone tube 6.1816.020 onto the nipple.

**2 Route the drain tube into an outlet**

- Route the other end of the drain tube into an outlet and secure it at this point.

## 2.5.3 Drain tube for MPak cabinet

The basin of the MPak cabinet **22** features a connection for fluids escaping from the MPaks to which a drain tube can be fitted. Proceed as follows:

**1 Connect drain tube**

- Plug the silicone tubing 6.1816.020 onto the nipple.

**2 Route the drain tube into an outlet**

- Route the other end of the drain tube into an outlet and secure it there.

# 2.6 Installing the eluent path

## 2.6.1 High-pressure pump – Removing the transport security screws

The pump head is locked with three transport security screws **13** in order to prevent damage to the pump drive during transport (see *Figure* 2). These transport security screws must be removed before placing the high-pressure pump into operation. Also remove the red sticker attached to the pump head **24**.

*The three transport security screws must be refitted every time before a major transport operation of the pump in order to avoid damage to the pump head.*

## 2.6.2 Connection MPak → high-pressure pump

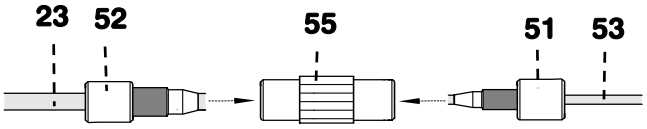
The eluent MPak must be connected to the pump head **24** via the tubing connection **23** 6.1837.000.

*First connect the end at the pump head and then, not before, connect the end at the MPak output. The eluent will start to drain out if you connect the end at the MPak output first.*

Procedure when connecting the tubing connection:

### 1 Connect the tubing connection using the PEEK coupling to the pump head

- Connect the tubing connection **23** 6.1837.000 using the PEEK coupling **55** (already pre-fitted to the tubing) to the capillary inlet of the pump head **24**.




### 2 Connect the tubing connection to the eluent MPak outlet

- Connect the other end of the tubing connection **23** to the eluent MPak outlet (pierce the connection and turn it through 90° clockwise).

### 2.6.3 Connection high-pressure pump → injection valve

In order to protect the column material against hammering effects owing to injection, the supplied **pulsation dampener 6.2620.150** must be fitted between high-pressure pump and injection valve of the 761 SD Compact IC.

Connection between pump head and injection valve (see *Figure 3*):

Pump head **24** → connection capillary **25** → purge valve **26** → connection capillary **28** → inline filter **56** → connection capillary **29** → pulsation dampener **30** → connection capillary **31** → injection valve

When delivered, a PEEK coupling **54** is fitted in place of the pulsation dampener **30** between connection capillary **29** and **31**. The PEEK coupling should be removed and the pulsation dampener should be fitted at the same position. Proceed as follows:

**1 Position the pulsation dampener**

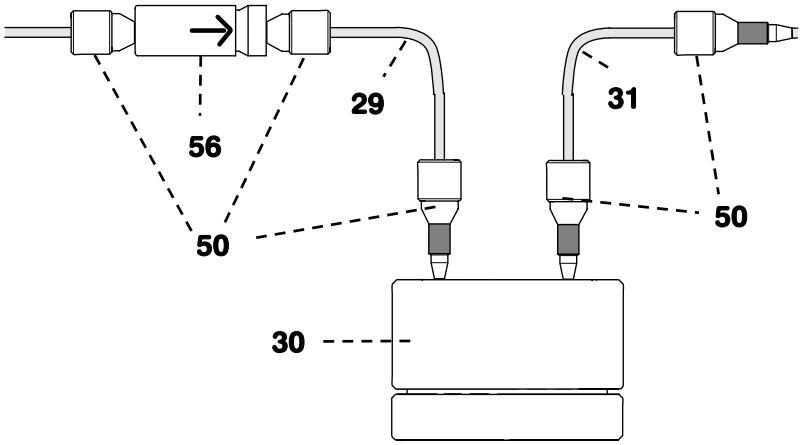
Place the pulsation dampener **30** 6.2620.150 in the inner compartment of the 761 SD Compact IC on the bottom.

**2 Remove the PEEK coupling**

Remove the PEEK coupling **54** located between connection capillary **29** and **31**.

**3 Connect the pulsation dampener**

Connect the connection capillary **29** and connection capillary **31** to the pulsation dampener.




*The pulsation dampener is filled with isopropanol and must be rinsed with eluent before connection of a separating column (see Section 2.13.2).*

*The pulsation dampener 6.2620.150 can be operated in both directions.*

### 2.6.4 Connection injection valve → suppressor

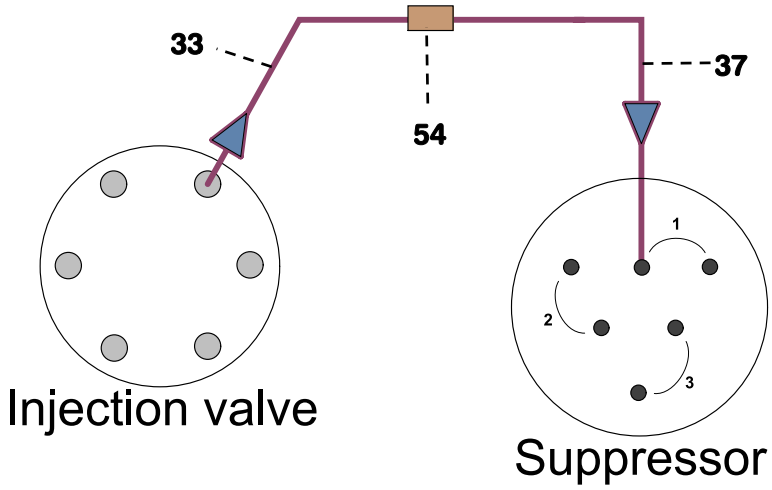
The precolumn and the separating column are fitted between injection valve and suppressor in the operational system (see *Figure 3*). However, since the system should first be rinsed without columns (so as not to damage them), the columns may be fitted only later (see *Section 2.15*). A PEEK coupling **54** is fitted as a temporary replacement.

Proceed as follows:

**1 Fit the PEEK coupling 54**

Connect the column connection capillary **33** to the "suppressor inlet capillary for eluent ("Eluent")" **37** via the PEEK coupling **54** (see *Section 2.3.2*).

Temporary connection schematic (c.f. *Figure 3*):




### 2.6.5 Connection suppressor → detector

From the suppressor, the eluent stream is routed on to the detector (see *Figure 3*). The connection is made using a PEEK coupling. Proceed as follows:

**1 Fit the PEEK coupling 54**

Connect the "suppressor outlet capillary for eluent ("Detector")" **38** via the PEEK coupling **54** (see *Section 2.3.2*) to the "inlet capillary to detector block" **39**.

### 2.6.6 Connection detector → suppressor

Downstream of the detector, the eluent flow is routed back into the suppressor. It rinses the suppressor there after its regeneration phase. A filter unit PEEK is fitted between detector and suppressor. Proceed as follows:

**1 Fit the filter unit PEEK**

Connect the "outlet capillary from detector block" **41** via the filter unit PEEK **54** (see *Section 2.3.3*) to the "suppressor inlet capillary for eluent ("H2O")" **42**.

### 2.6.7 Connection suppressor → waste

Route the "suppressor outlet capillary for eluent ("Waste")" **44** at the rear out of the 761 SD Compact IC into a waste container.

## 2.7 Installing the regenerant path

The regenerant (100 mmol/L $H_2SO_4$) is aspirated with the peristaltic pump from the regenerant MPak and forced into the suppressor via the filter unit PEEK. From the suppressor, it is then routed into a waste container (see *Figure 9*).

### 2.7.1 Fitting the pump tubing for regenerant

One channel of the two-channel peristaltic pump is used to pump the regenerant. Fit a **pump tubing 61** 6.1826.110 as follows:

**1 Disengage the tubing cartridges**

- Detach and disengage the two tubing cartridges **57** above the pump drive **49** by pressing in the snap-action lever **59** on the retaining bracket.
- Press the pressure lever **58** down fully.

**2 Fit the couplings 60**

- Fit one coupling **60** 6.2744.110 onto each end of the pump tubing **61** 6.1826.110. Moistening the tip of the coupling lightly will make it easier to slip it on.

**3 Fit the pump tubing**

- Insert the fitted pump tubing **61** as shown in *Figure 8* into the tubing cartridge. The left-hand stopper **62** should latch into the corresponding fixture on the left-hand side of the tubing cartridge.

**4 Reengage the tubing cartridge**

- Reengage the tubing cartridge with pump tubing **61** in the retaining bracket. Engage it at the left first and then press the right-hand side down until the snap-action lever **59** engages. Ensure that the pump tubing is not kinked when doing this.
- Leave the other tubing cartridge outside. It is fitted with the pump tubing for the sample path (see *Section 2.8.1*).

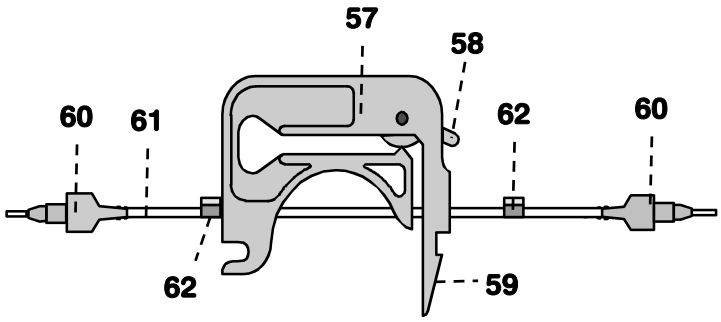



*Figure 8: Pump tubing for regenerant path*

| | |
|---|---|
| **57** Tubing cartridge | **61** Pump tubing 6.1826.110 for $H_2SO_4$ |
| **58** Pressure lever | **62** Stopper orange-yellow |
| **59** Snap-action lever | |
| **60** Coupling 6.2744.110 | |

### 2.7.2 Connection regenerant-MPak → pump tubing → suppressor → waste

*The connections to the pump tubing, suppressor and waste must be connected first. Then, and not before, connect the end at the MPak outlet. If the end at the MPak outlet is connected first, the regenerant ($H_2SO_4$) will begin to escape.*

Proceed as follows:

**1 Connection Pump tubing - Suppressor**

- Screw the filter unit PEEK **56** 6.2821.120 onto the coupling **60** 6.2744.110 at the right-hand end (flow outlet) of the pump tubing **61** fitted in the peristaltic pump. Note the flow direction arrow on the filter unit.
- Firmly screw the "suppressor inlet capillary for regenerant ("H2SO4")" **45** onto the filter unit **56** with a pressure screw **50** 6.2744.010 (see also *Section 2.3.3*).

**2 Connection Suppressor - Waste**

- Route the "suppressor outlet capillary for regenerant ("Waste")" **46** at the rear out of the 761 SD Compact IC into a waste container.

### 3 Connection MPak pump tubing

The regenerant MPak and pump tubing are connected using the "tubing connection to MPak" **23** 6.1837.000:

- First connect the end which is to be connected to the pump tubing!
- Pressure screw **52** 4.422.4510 and coupling **55** 4.455.4500 are already pre-fitted on the "tubing connection to MPak" **23** 6.1837.000. Screw this coupling **55** 4.455.4500 onto the coupling **60** 6.2744.110 plugged onto the left-hand end of the pump tubing (flow inlet).
- Latch the other end of the "tubing connection to MPak" **23** 6.1837.000 at the outlet of the regenerant MPak.

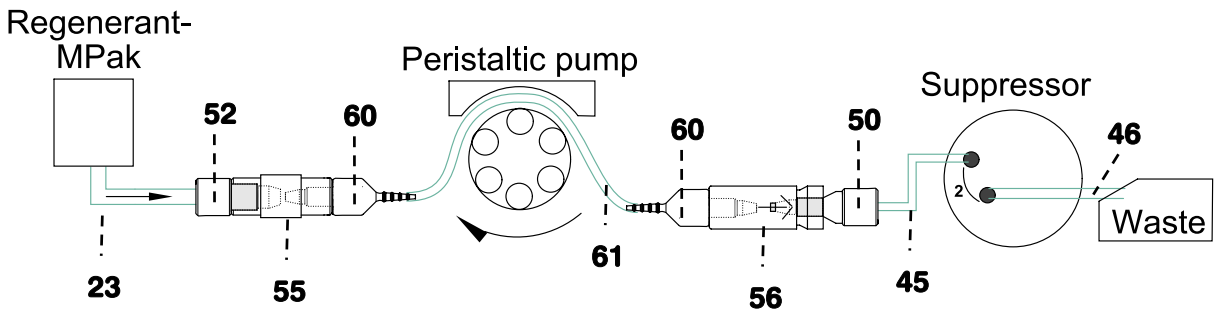



***Figure 9: Flow schematic regenerant flow***

| | |
|---|---|
| **23** | **Tubing connection to MPak 6.1837.000** |
| **45** | **Suppressor inlet capillary for regenerant**<br>PTFE capillary, permanently attached to the suppressor, labelled "H2SO4" |
| **46** | **Suppressor outlet capillary for regenerant ("Waste")**<br>PTFE capillary, permanently attached to the suppressor; leads in to the waste, labelled "Waste" |
| **50** | **Pressure screw 6.2744.010** |
| **52** | **Pressure screw 4.422.4510**<br>for "tubing connection to MPak" **23** |
| **55** | **PEEK coupling 4.455.4500**<br>Coupling for "tubing connection to MPak" **23** |
| **56** | **Filter unit PEEK 6.2821.120** |
| **60** | **Coupling 6.2744.110** |
| **61** | **Pump tubing 6.1826.110 for $H_2SO_4$** |

# 2.8 Installing the sample path

The sample is aspirated with the peristaltic pump from the sample vessel into the injection valve and finally ejected into a waste container.

*See Section 2.9. for connection of the 766 IC Sample Processor (supplied together with instrument version 2.761.0520).*

## 2.8.1 Fitting the pump tubing for sample

The second channel of the two-channel peristaltic pump is used to pump the sample. Fit the **pump tubing 64** 6.1826.110 as follows:

**1 Disengage the tubing cartridges**

- The tubing cartridge for the pump tubing should still be outside from installing the regenerant path. If not, remove it as specified in *Section 2.7.1*.

**2 Fit the coupling 63**

- Plug a coupling **63** 6.2744.030 onto the left-hand of the pump tubing **64** 6.1826.110. Lightly moistening the tip of the coupling will make it easier to slip on.

**3 Fit the coupling with tubing security device 65**

Fit a coupling with tubing security device **65** 6.2744.160 onto the right-hand end of the pump tubing **64** 6.1826.110 (see *Figure 10*):

- Dismantle the tubing security device and first slide the union nut and the thrust piece onto the tubing.
- Plug the tubing onto the coupling and screw the union nut onto the coupling in order to lock the tubing.

**4 Insert the pump tubing**

- Insert the fitted pump tubing **64**, as shown in *Figure 10*, into the tubing cartridge. The left-hand stopper **62** should engage in the corresponding fixture on the left-hand side of the tubing cartridge when doing this.

**5 Reengage the tubing cartridge**

- The tubing cartridge with the pump tubing **61** for the regenerant path should already be engaged (see *Section 2.7.1*). Slide it to the rear.
- Engage the tubing cartridge with pump tubing **64** for the sample path at the front into the retaining bracket. Engage it at the left first and then push the right-hand side down until the snap-action lever **59** engages. Ensure that the pump tubing is not kinked when doing this.

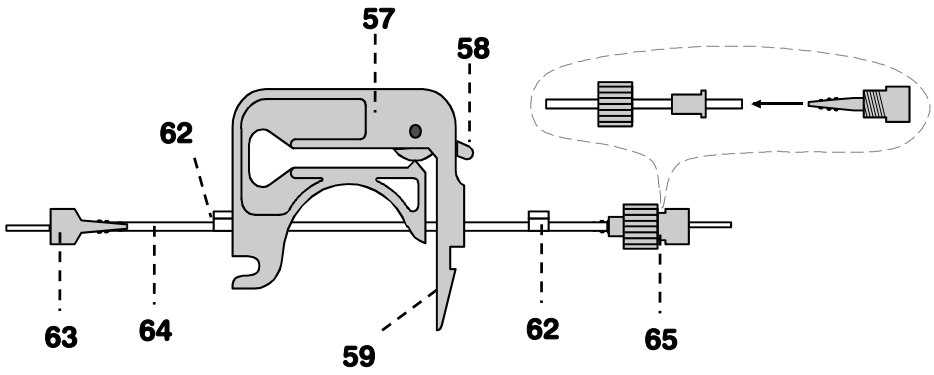



*Figure 10: Pump tubing for sample path*

| | |
|---|---|
| **57** | **Tubing cartridge** |
| **58** | **Pressure lever** |
| **59** | **Snap-action lever** |
| **62** | **Stopper orange-yellow** |
| **63** | **PEEK coupling 6.2744.030** |
| **64** | **Pump tubing 6.1826.110 for sample** |
| **65** | **PEEK coupling 6.2744.160** with tubing security device |

### 2.8.2 Connection sample vessel → pump tubing → injection valve → waste

Proceed as follows in order to make the connections for the sample path:

**1 Connection Sample vessel - pump tubing**

The sample is aspirated with the aspirating tubing **3**:

- The aspirating tubing **3** is routed through the "feedthrough for aspirating tubing" **2** out of the front door into the sample vessel. It is fixed in position on the feedthrough **2** with a rotary nipple (see *Section 2.9.2* if using the 766 IC Sample Processor).
- Detach the other end of the aspirating tubing **3** with pressure screw **50** from the injection valve (it is fitted there only for delivery purposes) and screw it firmly onto the PEEK coupling **63** on the left-hand end of the pump tubing (flow inlet) (see *Figure 11*).

### 2 Connection pump tubing - injection valve

- The sample is forced into the injection valve via the connection capillary **47**.
- Detach the connection capillary **47** with the two pressure screws **50** from the outlet of the injection valve and from the opening in the door (it is fitted there only for delivery purposes).
- Screw the ends of the connection capillary **47** to the inlet of the injection valve and to the PEEK coupling **65** on the right-hand end of the pump tubing (flow outlet) using one pressure screw **50** (see *Figure 11*).

### 3 Connection injection valve - waste container

The connection capillary **48** routes the sample from the injection valve into the waste:

- Connect the supplied PTFE capillary 6.1803.030 with a pressure screw **50** 6.2744.010 to the outlet of the injection valve.
- Route the other end at the rear out of the 761 SD Compact IC into the waste container. Wait until after the rear panel has been fitted to cut it to size (see *Section 2.10*).

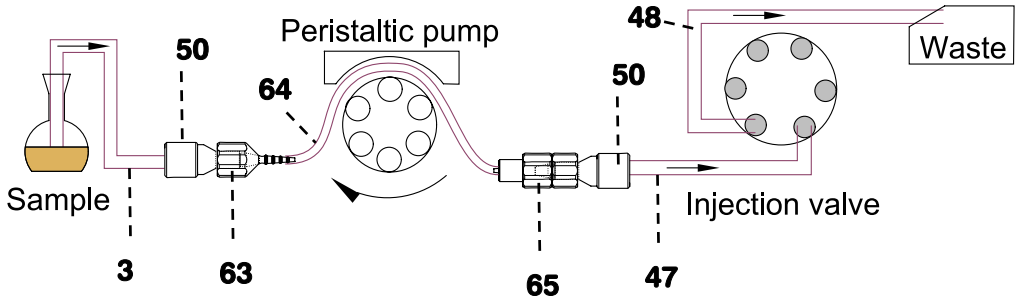



***Figure 11: Flow schematic sample stream***

**3 Aspirating tubing**
for sample

**47 Connection capillary**
PTFE capillary 6.1831.030, connection pump tubing - injection valve

**48 Connection capillary**
PTFE capillary 6.1831.030, connection injection valve - waste container

**50 Pressure screw 6.2744.010**

**63 PEEK coupling 6.2744.030**

**64 Pump tubing 6.1826.110 for sample**

**65 PEEK coupling 6.2744.160**
with tubing security device

*The sample stream should be routed into a waste container downstream of the injection valve (see Section 2.8.2.).*

# 2.9 Connecting the 766 IC Sample Processor

On instrument version 2.761.0520, the related 766 IC Sample Processor should now be installed and connected.

The 766 IC Sample Processor is an automatic sampler for ion chromatography. The instrument accommodates max. 127 samples (sample vessels: 2.5 mL or 11 mL) which are automatically transferred to the sample loop attached to the injection valve of the 761 SD Compact IC. Sample changing and filling of the sample loop are each started by a signal output on the 761 SD Compact IC (761 SD Compact IC as "master").

## 2.9.1 Installing the 766 IC Sample Processor

Please refer to the supplied *Instructions for Use 766 IC Sample Processor (8.766.1001)* for installation of the 766 IC Sample Processor.

## 2.9.2 Connecting the 766 IC Sample Processor

Connect the 766 IC Sample Processor as follows:

### 1 Electrical connection 761 – 766

- Connect the remote end of cable 6.2125.110 to the RS232 connection **32** (see *Instructions for Use 766*) of the 766 IC Sample Processors.
- Connect the other end to the COM2 output of the PC.

### 2 Tubing connection 766 – injection valve

- Undo the rotary nipple which is screwed in on the inner compartment side of the "feedthrough for aspirating tubing" **2**.
- Pull the aspirating tubing **3** fully out of the "feedthrough for aspirating tubing" **2** and unscrew it from the injection valve.
- Cut the PEEK capillary tubing **18** (see *Instructions for Use 766*) installed on the 766 IC Sample Processor to the required length.
- Pull the free end of the PEEK capillary tubing **18** (see *Instructions for Use 766*) through the "feedthrough for aspirating tubing" **2** into the inner compartment of the 761 SD Compact IC and screw it on to the inlet of the injection valve which is now free (see also *Figure 11*) using a PEEK pressure screw 6.2744.010.
- Screw the rotary nipple on the inner compartment side of the "feedthrough for aspirating tubing" **2** back on and thus fix the transfer tubing **18** (see *Instructions for Use 766*) in position.

# 2.10 Fitting the rear panel

Now refit the rear panel which was removed during installation (*Section 2.4*). Place the incoming and outgoing cables and tubing at the rear into the openings in the rear panel.

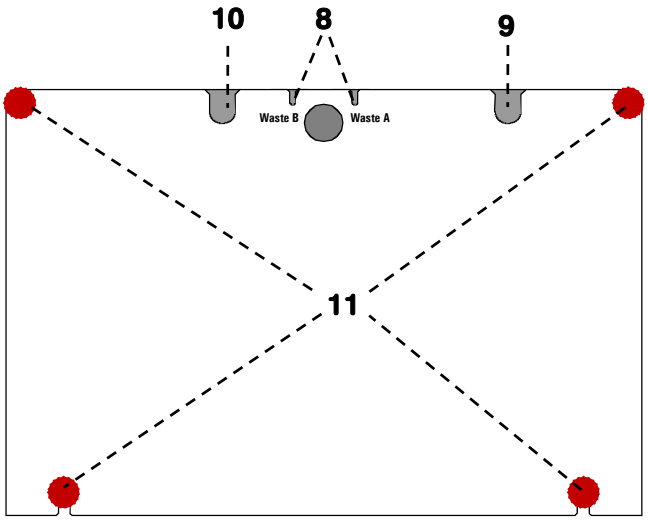



***Figure 12: Rear panel***

**8 Opening for outlet capillaries**
for discharge of eluent, regeneration and sample solution

**9 Opening for inlet capillaries**
for supply of eluent, regeneration and sample solution

**10 Opening for detector cable**

**11 Knurled screws**
for fastening the rear panel

Metrohm recommends the following distribution over the openings:

| Connection | Opening | leads to |
|---|---|---|
| • Suppressor outlet capillary for eluent ("Waste") **44**<br>• Suppressor outlet capillary for regenerant ("Waste") **46**<br>• Connection capillary **48** | **8** | • Waste container |
| • Tubing connection to eluent MPak **23**<br>• Tubing connection to regenerant MPak **23** | **9** | • Eluent MPak<br>• Regenerant MPak |
| • Detector connection cable | **10** | • Input "**Detector Block**" |

Then fit the rear panel, fit the upper 2 knurled screws **11** and firmly screw all 4 knurled screws **11** tight.

# 2.11 Mains connections

Next connect the 761 SD Compact IC to the electrical mains. Separating column and precolumn will not yet have been fitted. They are fitted only after rinsing the new equipment components (see *Section 2.15*).

*Follow the instructions below for connecting to the power supply. If the instrument is operated with a mains voltage set wrongly and/or wrong mains fuse, there is a danger of fire!*

## 2.11.1 Setting the mains voltage

Before switching on the 761 SD Compact IC for the first time, check that the mains voltage set on the instrument (see *Figure 13*) matches the local mains voltage. If this is **not** the case, you must reset the mains voltage on the instrument as follows:

**1 Disconnect mains cable**

Disconnect mains cable from mains connection plug **15** of the 761 SD Compact IC.

**2 Remove fuse holder**

Using a screwdriver, loosen the fuse holder **16** below the mains connection plug **15** and take it out completely.

**3 Check and change the fuse**

Carefully remove the fuse installed for the desired mains voltage out of the fuse holder **16** and check its specifications (the position of the fuse in the fuse holder is marked by the white arrow imprinted next to the mains voltage range):

| | |
|---|---|
| **100…120 V 1.0 A (slow-blow)** | Metrohm No. U.600.0016 |
| **220…240 V 0.5 A (slow-blow)** | Metrohm No. U.600.0013 |

**4 Insert fuse**

Change the fuse if necessary and reinsert it in the fuse holder **16**.

**5 Fit the fuse holder**

Depending on the desired mains voltage, insert the fuse holder **16** in the 761 SD Compact IC so that the corresponding mains voltage range can be read normally and the adjacent white arrow points to the white bar imprinted below the fuse holder (see *Figure 13*).

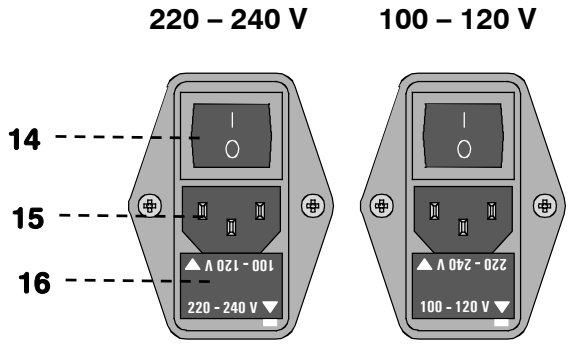



***Figure 13: Setting the mains voltage***

**14 Mains switch**
Switch for switching the instrument on and off:
I = ON 0 = OFF

**15 Mains connection plug**
Mains connection, see *Section 2.11.3*

**16 Fuse holder**

## 2.11.2 Fuses

One of the two fuses 1 A/slow-blow for 100…120 V or 0.5 A/slow-blow for 220…240 V is installed in the fuse holder **16** of the 761 SD Compact IC as standard.

*Ensure that the instrument is never put into operation with fuses of another type; otherwise there is a danger of fire!*

For checking or changing fuses, proceed as described in *Section 2.11.1*.

## 2.11.3 Mains cable and mains connection

### Mains cable

The instrument is supplied with one of three mains cables

- 6.2122.020 with plug SEV 12 (Switzerland, …)
- 6.2122.040 with plug CEE(7), VII (Germany, …)
- 6.2133.070 with plug NEMA 5-15 (USA, …)

which are three-cored and fitted with a plug with an earthing pin. If a different plug has to be fitted, the yellow/green lead (IEC Standard) must be connected to protective earth (protection class 1).

*Any break in the earthing inside or outside the instrument can make it a hazard!*

### Mains connection

Plug the mains cable into the mains connection plug **15** of the 761 SD Compact IC (see *Figure 13*).

## 2.11.4 Switching the instruments on/off

The 761 SD Compact IC is switched on and off using the mains switch **14**. When the instrument is switched on, the mains pilot lamp **7** lights.

# 2.12 Connection to the PC

The next step is to connect the 761 SD Compact IC to the PC.

## 2.12.1 Connecting cable 6.2134.100

*Always switch off the 761 SD Compact IC and PC before you connect the two instruments with cable 6.2134.100.*

Connect the **RS 232** interface **21** on the 761 SD Compact IC to the serial COM1 port of the PC using the connecting cable 6.2134.100 (9-pin/9-pin).

## 2.12.2 Software installation

The CD A.705.001 with software package «SD Analyzer 1.0» is supplied with the 761 SD Compact IC. The two programs «IC Net» (see *Section 3*) and «IC Cap» (see *Section 4*), and in addition to the «Autodatabase», are installed when installing «SD Analyzer 1.0». The software runs under the Windows 2000 and Windows XP operating systems and must be installed as follows:

**1 Install program**

- Insert the installation CD A.705.001 into your CD-ROM drive.
- Select **Run** in the Start menu and open file **Setup.exe** on the installation CD. Follow the on-screen prompts of the Setup program.

*Metrohm recommends that you install the software in the stated default destination folder C:\Metrohm\SD Analyzer. If you install it to another location, you must (if you wish to work with «IC Cap») adapt the path for* ***chromatogram directory*** *(in the* ***Processing*** *registry tab of the* ***METHOD SETUP*** *window) for all used methods (see Section 3.1.3 and the Software Instructions for Use «IC Net 2.3» Section 7.3.4).*

**2 766 IC Sample Processor**

During installation, you will see the prompt "Do you work with 766 IC sample processor". Your selection will determine what configuration is loaded in «IC Cap» when you install it (see also *Section 4.2*).

**3 Files**

The installation program copies the files from the installation CD to the directory which you specify and also creates the following subdirectories:

**\Metrohm\Sd Analyzer\Ic Net**

| | |
|---|---|
| **Data** | Directory for data files (***.chw**) and batch reprocessing files (***.bar**) |
| **Devices** | Directory for device drivers (***.dev**) |
| **ExcelReport** | Directory for the Excel reports |
| **ICCap** | Directory for «IC Cap» installation files and «IC Cap» configuration files (***.cfg**) |
| **Methods** | Directory for method files (***.mtw**) |
| **Reports** | Directory for report files (***.txt**) and graphic files (***.wmf**) |
| **Systems** | Directory containing system files (***.smt**) and sample table files (***.que**). |

**4 Registration**

- Please send us your registration card 8.761.8047 as soon as possible so that we can register you as an official purchaser. As a registered purchaser, you will receive any revised program versions at a special price.

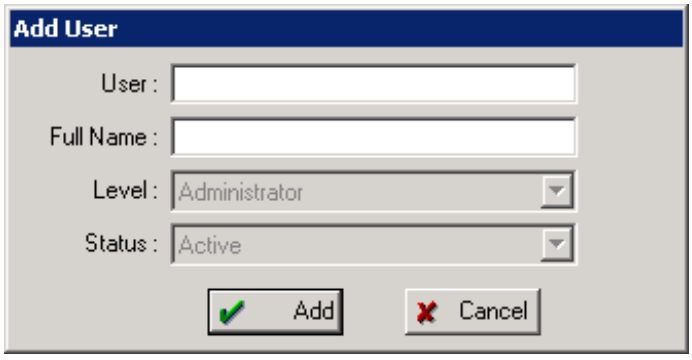
*The installed files are generally **not** write-protected. To prevent these files from being deleted by mistake, switch on the write-protection or make a backup copy in another directory.*

## 2.12.3 Basic settings «IC Net»

The procedure for starting and quitting the software is described in the *Software Instructions for Use «IC Net 2.3» Section 2*.

*The **Add User** window (see below) opens the first time you launch the program after installing the software and a user with Administrator access rights is created.*

*You are advised to create the other users straight after installation. See Software Instructions for Use «IC Net 2.3», Section 3.2 for creating users.*

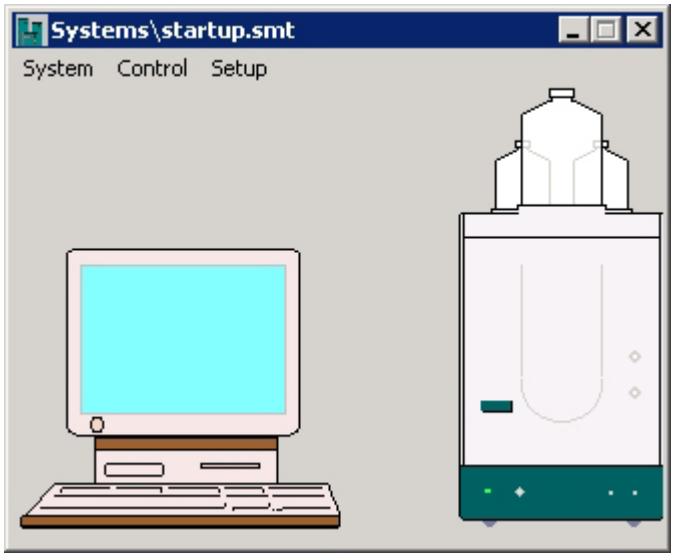


## Enter cell constant

Now enter the cell constant (see *Section 2.4*) printed on the detector block. Proceed as follows:

### 1 Open and connect a system

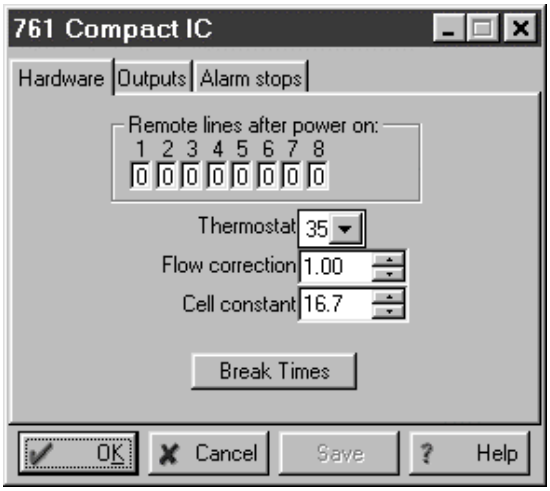
- Click on **File** / **Open** / **System** in the main window. In the window which now opens, select file **startup.smt** and click on **<Open>**. You will see the following system window:




- Select the **Connect to workplace** menu item of the **Control** menu in this window.

### 2 Open the window for hardware settings

- Click with the right mouse button on the 761 image in the system window and choose menu item **Hardware**. You will see the following window for the hardware settings:




### 3 Enter the cell constant

- Enter the cell constant printed on detector block 1.732.0420 in field **Cell constant**.
- Click on **<OK>** to save the settings and close the window.

## 2.12.4 Basic settings «IC Cap»

### Logging in

The first time you start the «IC Cap» software, you must log in without **User** or **Password**. The particular configuration loaded the first time you open the program depends on whether you work with or without 766 IC Sample Processor (you must make this selection during the installation process, see *Section 2.12.2*).

| | |
|---|---|
| **Without** 766 IC Sample Processor: | **manual.cfg** (see *Section 4.2.2*) |
| **With** 766 IC Sample Processor: | **auto.cfg** (see *Section 4.2.3*) |

The first time you log in, you should define the Administrator and other users.

### Defining Administrator/Users

In order to do this, open the **CONFIGURATION** window with the right mouse button (see *Section 4.2*). Then, in the **General** tab of the **CONFIGURATION** window, define the Administrator by entering **User** with **Level** (level: Administrator) and **Password**. For the Administrator, enter the same **user** with the same **password** which you already defined in «IC Net».

Then define the other users. For the users, enter the same **user** with the same **password** which you already defined in «IC Net». See the *Administrator Manual «IC Cap 2.0», Section 3.2* for creating users.

*The users are a part of the configuration and are saved together with it.*

### Save configuration

Select the **Miscellaneous** tab in the **CONFIGURATION** window and click on the **<Store Configuration>** button. Save the configuration under a separate name.

Close the software again (see *Administrator Manual «IC Cap 2.0» Section 3.2*).

# 2.13 Deaerating the pump and rinsing the pulsation dampener

The high-pressure pump must be deaerated and the isopropanol-filled pulsation dampener must be rinsed before placing into operation for the first time.

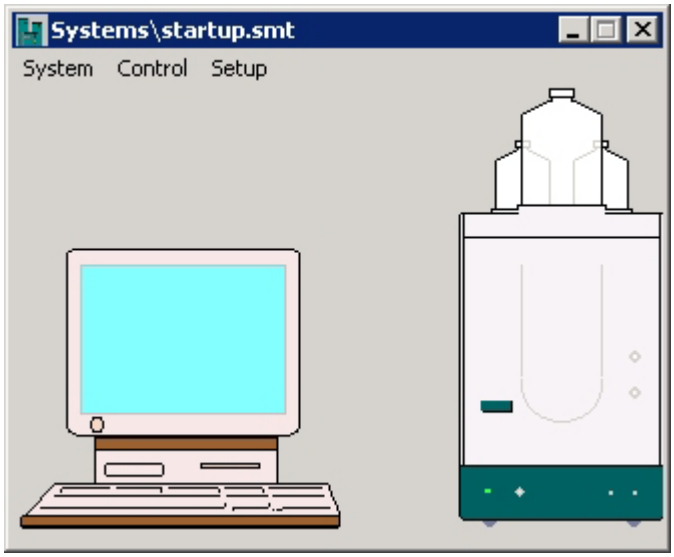
## 2.13.1 Deaerating the pump

**1 Prepare for deaeration**

- Open the rotary knob on the purge valve **26** by approx. ½ a turn counter-clockwise.
- Remove the plastic stopper from the connection **6** on the front panel of the 761 SD Compact IC (see *Figure 1*).
- Push the syringe 6.2816.020 (without needle) fully into the connection **6**.

**2 Open and connect the system**

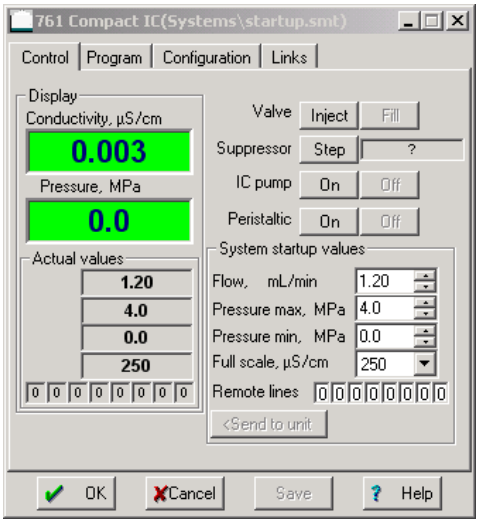
- Launch the «IC Net» PC program if it has not already been launched.
- Choose **File** / **Open** / **System** in the main window. In the window which now opens, select file **startup.smt** and click on **<Open>**. You will now see the following system window:




- Select the **Connect to workplace** item from the **Control** menu in this window.

### 3 Open the control window

- Double-click on the 761 image in the System window. You will see the window for manual operation of the 761 SD Compact IC (see below).




### 4 Deaerate the pump

- Ensure that the "tubing connection to the eluent MPak" **23** is connected to the eluent MPak.
- Click on the **<On>** button for **IC pump** to switch on the high-pressure pump.
- Aspirate air with the syringe inserted in connection **6** until eluent flows into the syringe.
- Click on the **<Off>** button for **IC pump**, to switch the high-pressure pump back off.
- Close the rotary knob on the purge valve **26** by turning it clockwise.
- Remove the syringe from the connection **6**.

## 2.13.2 Rinsing the pulsation dampener

The pulsation dampener must be rinsed before using it for the first time so as to remove the isopropanol which is located in the flow area of the eluent on delivery.

*The isopropanol should not be rinsed through the suppressor and the detector. Consequently, the column connection capillary **33** (which is currently connected to the suppressor via the PEEK coupling) must be detached from the PEEK coupling and routed into a beaker.*

**1 Detach the column connection capillary 33 from the PEEK coupling**

- Undo the pressure screw **50** with which the column connection capillary **33** is screwed to the PEEK coupling **54** (transition to the suppressor). Take this end of the capillary and route it into a beaker.

The column connection capillary **33** should now connect the injection valve to the beaker.

**2 Open and connect the system**

- Open the **startup.smt** system, connect it and make the same settings as described in *Section 2.13.1*.

**3 Rinse the pulsation dampener**

- Click on the **<On>** button for **IC pump** to switch on the high-pressure pump and rinse the pulsation dampener **30** filled with isopropanol for approx. 10 minutes with eluent.
- Click on the **<Off>** button for **IC pump** to switch the high-pressure pump back off again.

**4 Connect the column connection capillary 33 back to the PEEK coupling**

- Take the end of the column connection capillary **33** out of the beaker and screw it back onto the PEEK coupling **54** (as a transition to the suppressor) with a pressure screw **50**.

# 2.14 Rinsing before fitting the column

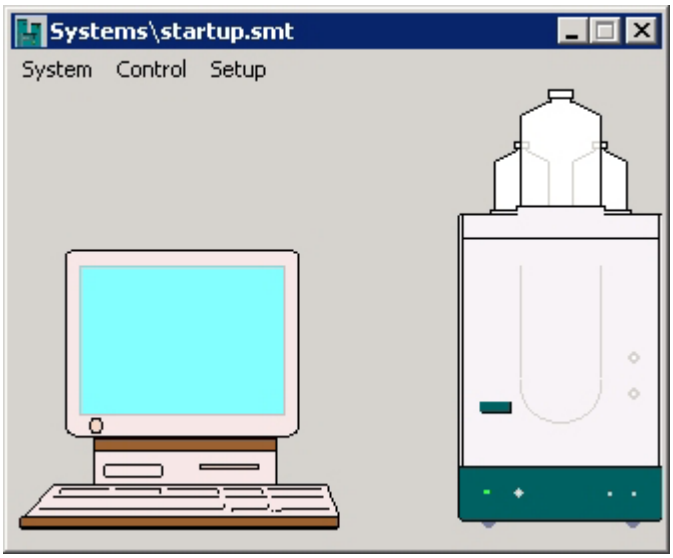
Before the column is fitted, you should rinse again for 10 minutes. During this rinsing time, the connections should be checked for leaks and the pressure of the peristaltic pump should be set optimally.

### 1 Check the fluid connections

- Immerse the aspirating tubing for sample **3** into a sample vessel filled with ultra-pure water.
- Check whether the "tubing connections to MPaks" are connected to the relevant MPak (eluent or regenerant).
- Check that all waste outlet capillaries lead into a waste container.

### 2 Open and connect the system

- Launch the «IC Net» PC program if it has not already been launched and open the **startup.smt** system with **File** / **Open** / **System** unless it has already been opened. You should see the following window on the screen:




### 3 Connect the workplace

- Choose item **Connect to workplace** from the **Control** menu in this window.

### 4 Start the pump

- Choose item **Startup hardware** from the **Control** menu in the above window. All saved settings are restored.

### 5 Set the pressure for pump tubing

- Push the pressure lever **58** up on both tubing cartridges **57** until regeneration and rinsing solution is aspirated.
- Then push the pressure lever **58** one detent position upwards to achieve an optimum pressure.

### 6 Check for leaks

- Check all capillaries and tubing and their connections in the 761 SD Compact IC for escaping fluid. If fluid is escaping at any point, the corresponding pressure screw must be tightened more firmly or exchanged.

*Pump tubing is consumable material with a lifetime which depends on the contact pressure. This is why the tubing cartridges should be raised completely by loosening the snap-action lever on the right-hand side if the pump is to remain switched off for a considerable length of time (the set contact pressure remains unchanged).*

# 2.15 Precolumn and separating column

## 2.15.1 Metrosep RP Guard

Using the precolumn (Metrosep RP Guard **34**) with easily exchangeable filters serves to protect the separating column **36** and considerably prolongs its service life.

The precolumn has two connections for PEEK capillaries and must be fitted as follows:

**1 Remove the PEEK coupling between column connection capillary 33 and suppressor**

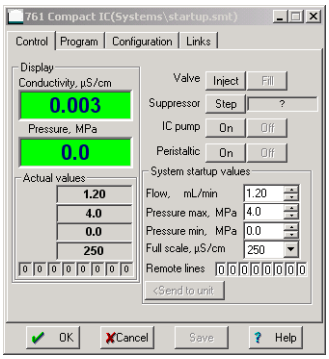
- Undo the PEEK coupling **54** fitted in *Section 2.6.4* between column connection capillary **33** and suppressor and remove it. It was fitted only for rinsing without column (*Section 2.14*).

**2 Connect the Metrosep RP Guard 34**

- Detach the screw caps from the Metrosep RP Guard.
- Attach a PEEK pressure screw **50** to the column connection capillary **33**.
- Firmly screw the precolumn to the column connection capillary **33** (the arrow on the precolumn must point in the flow direction).
- Connect the connection capillary **35** belonging to the precolumn to the other end of the precolumn.

**3 Prepare for rinsing the precolumn**

- Route the free end of connection capillary **35** connected to the precolumn **34** into a beaker.
- Open the **startup.smt** system and connect it as described in *Section 2.13.1*.
- Double-click on the 761 image in the system window. You will see the window for manual operation of the 761 SD Compact IC (see below):




**4 Rinse the precolumn**

- Switch on the high-pressure pump (**IC pump**) by clicking on <On>, rinse the precolumn for approx. 10 minutes with eluent.
- Switch the high-pressure pump back off again by clicking on <Off>.

Next connect the Metrosep A Supp 1 HS separating column **36**, see *Section 2.15.2*.

### 2.15.2 Metrosep A Supp 1 HS separating column

Now fit the supplied Metrosep A Supp 1 HS as the actual IC separating column.

*When fitting the column, always ensure that it is fitted correctly as shown by the flow direction on the sticker (the arrow must point in the flow direction). Ensure that the set flow rate is not higher than the permitted flow rate for the corresponding column (see the sheet enclosed with the column).*

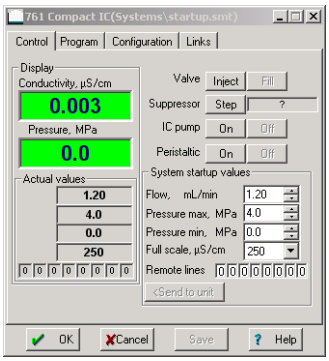
The separating column **36** has two connections for PEEK capillaries and must be fitted as follows:

**1 Connect the separating column 36 downstream of the precolumn 34**

- Detach the screw caps from the Metrosep A Supp 1 HS separating column **36**.
- Screw the inlet end of the separating column **36** (note the flow direction, the arrow on the sticker must point in the flow direction) to the free end of the connector **35** attached to the precolumn **34**.

**2 Prepare for rinsing the separating column**

- Position the beaker beneath the column outlet.
- Open the **startup.smt** system and connect it as described in *Section 2.13.1*.
- Double-click on the 761 image in the system window. You will see the window for manual operation of the 761 SD Compact IC:




**3 Rinse the separating column**

- Switch on the high-pressure pump (IC pump) by clicking on <On> and rinse the column for approx. 10 min with eluent.
- Switch the high-pressure pump back off again by clicking on <Off>.

**4 Connect the separating column to the suppressor**

The column outlet is connected to the eluent inlet of the suppressor so as to close the eluent path:

- Fit a PEEK pressure screw **50** to the "suppressor inlet capillary for eluent ("Eluent")" **37**.
- Then screw this pressure screw into the column connection of the separating column **36**.

**5 Fix the separating column in position**

- Insert a column holder (6.2027.040) **67** into the mounting rails **66** and secure the separating column **36** in the column holder.

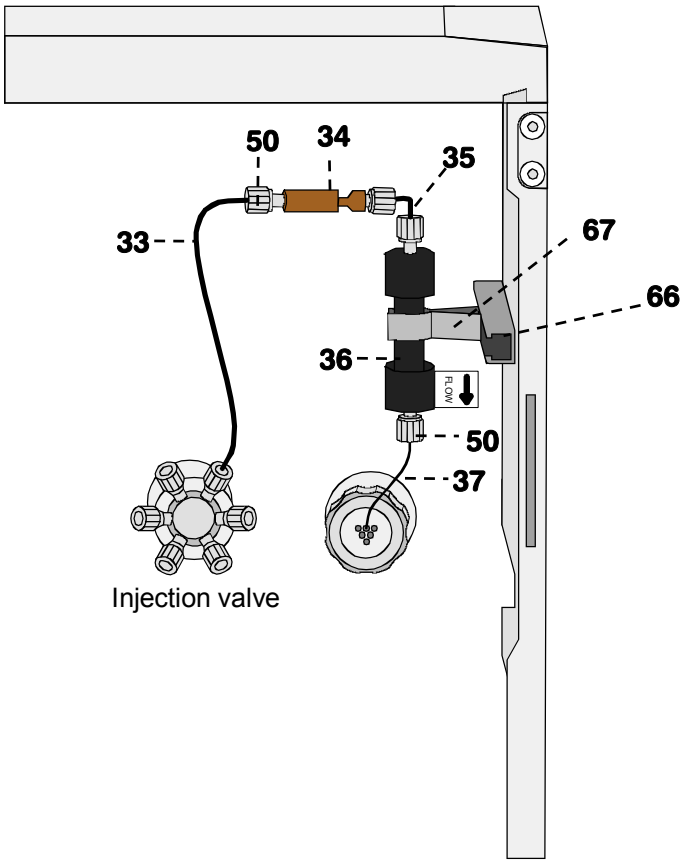



*Figure 14: Connection of precolumn and separating column*

**33 Column connection capillary**
PEEK capillary 6.1831.010,
length $L$ = 30 cm

**34 Metrosep RP Guard 6.1011.020**
Precolumn for protecting the separating column

**35 Connector**
PEEK connection between precolumn and separating column

**36 Metrosep A Supp 1 HS separating column**
IC separating column

**37 Suppressor inlet capillary for eluent ("Eluent")**
PTFE capillary; permanently attached to the suppressor; labelled "Eluent"

**50 Pressure screw 6.2744.010**

**66 Mounting rail**
for column holder **67**

**67 Column holder 6.2027.040**

## 2.16 Attaching tubing to side panels

If required, the two "tubing connections to MPaks" **23** can be attached to the required point in the inner compartment using the self-adhesive straps Y.107.0150. The same applies to the two suppressor outlet capillaries **44** and **46** and to the connection capillaries **48** which all lead into a waste container.

# 3 «IC Net»

The 761 SD Compact IC can be operated via «IC Net» or «IC Cap» (see *Section 4*). System and method settings can be modified only with «IC Net». Use of «IC Cap» is advisable for day-to-day operation. «IC Cap» is an interface with a simplified GUI which can be used to control the «IC Net» software.

*This Section discusses the most important points of operation of the 761 SD Compact IC via «IC Net». For further details, please refer to the supplied Software Instructions for Use «IC Net 2.3» (8.110.8283) and the Online Help in the «IC Net» program.*

## 3.1 «IC Net» – User interface for the 761 SD Compact IC

Operation of the «IC Net» program is described in detail in the supplied *Software Instructions for Use «IC Net 2.3»* (8.110.8283). Only the settings specific to the 761 SD Compact IC are described below.

### 3.1.1 Systems - Methods

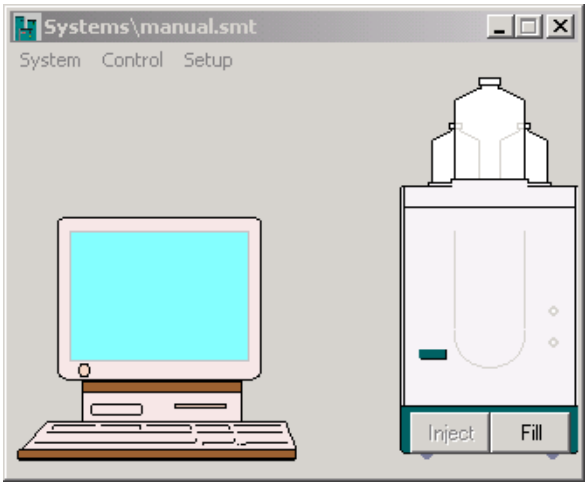
The **Systems** contain all instrument settings, time programs, the data recording parameters and a linked process method which has been optimised for the determination process to be performed (see *Software Instructions for Use «IC Net 2.3», Section 4*).

Four systems (**startup.smt**, **manual.smt**, **auto.smt** and **shutdown.smt**, see *Section 3.2*) are supplied for soft drink analysis. They are saved as **system files** (***.smt**) in the **Systems** directory.

To each system a **method** (**SD_startup.mtw** / **SD_phosphate.mtw** (linked with **manual.smt** and **auto.smt**) / **SD_shutdown.mtw**) is linked . A method contains all information required for data acquisition, integration, peak evaluation and result calculation. It can be considered as an empty chromatogram, i.e. a chromatogram without data. Methods are saved as **method files** (***.mtw**) in the **Methods** directory (see *Software Instructions for Use «IC Net 2.3», Section 7*).

### 3.1.2 Opening a system

A system window can be opened with **IC Net** / **File** / **Open** / **System** and selecting the required system file. It contains icons for **data recorders**, **Watch window** (screen) and all **devices** which have been installed in the system. Opening displays the System window on the screen. Here, we can see the example system window for the **manual.smt** system:



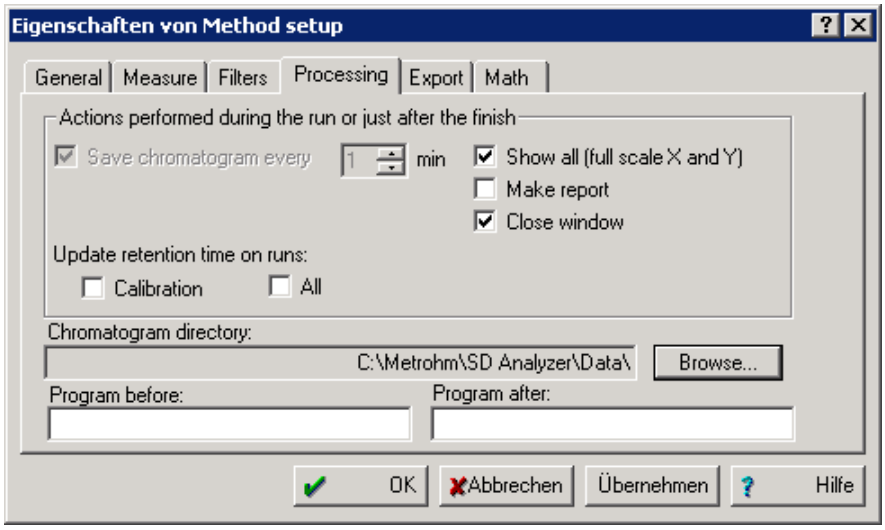

### 3.1.3 Opening a method

The method linked to the system can be opened by double-clicking on the keyboard icon in the system window.

#### Settings

The ***METHOD SETUP*** window can be opened with **IC Net** / **Method** / **Method setup**.

*Please ensure that the path to which the chromatograms are saved is correctly set. The path can be found on the* ***Processing*** *tab of the* ***METHOD SETUP*** *window in menu item* ***Chromatogram directory:***

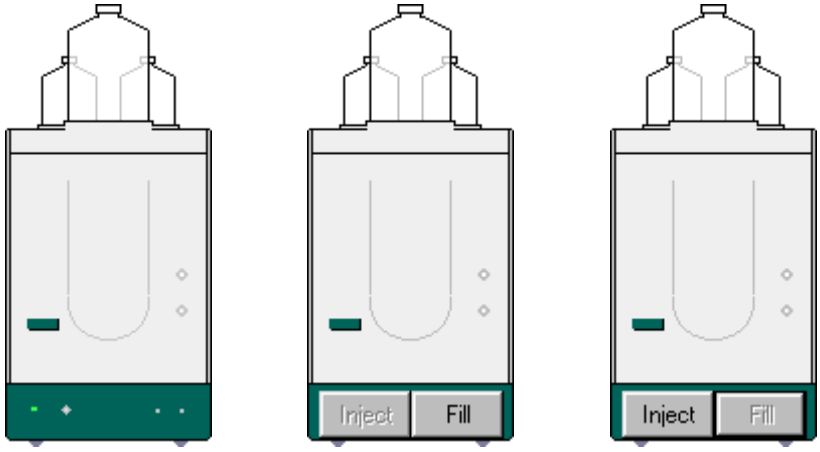



*If you've installed the software in the default destination folder C:\Metrohm\SD Analyzer, this path will be correct for the supplied methods. You must otherwise adapt it.*

### 3.1.4 Connect a system

The selected system must be linked to the workplace for controlling the instrument and starting determination processes. Systems are linked by selecting **SYSTEM** / **Control** / **Connect to workplace** (see also *Software Instructions for Use «IC Net 2.3», Section 4.3.1*).

### 3.1.5 Instrument icon




**System disconnected**

**System connected**
Injection valve in "**INJECT**" position

**System connected**
Injection valve in "**FILL**" position

The instrument icon for the 761 SD Compact IC is one of the three elements in the System window. If the system is linked (see *Section 3.1.4*), the icon is provided with two buttons for manual operation of the injection valve:

**<Inject>** Switch over the injection valve to position "INJECT".

**<Fill>** Switch over the injection valve to position "FILL".

When you click with the right mouse button on the instrument icon, you will see the following menu:

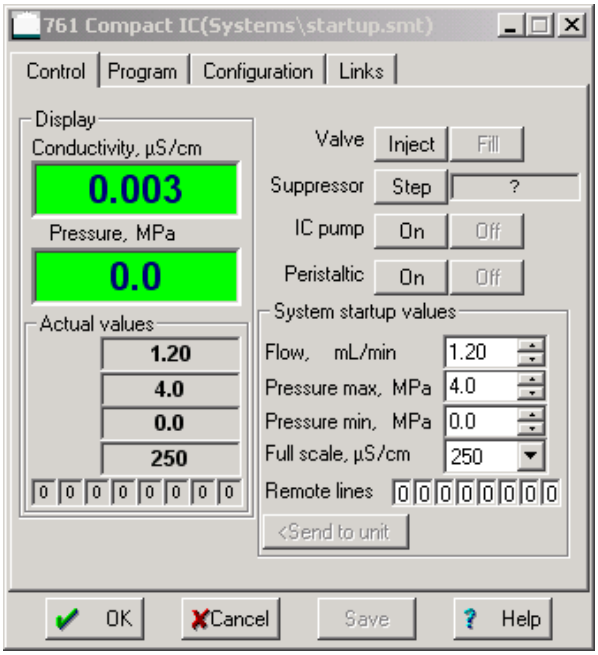
**Open** Opens the window for **System Settings**.

**Hardware** Opens the window for **Hardware Settings**.

**Diagnostics** Opens the **Diagnosis window**.

### 3.1.6 System parameters for linked system

Double-clicking on the instrument icon or selecting menu item **Open** with the right mouse button opens the window for the system settings. In the case of a linked system, the **Control** page is displayed on which the instrument functions can be manually triggered and the instrument parameters can be set and activated. In addition, the current measured values for conductivity and pressure are displayed on this page.

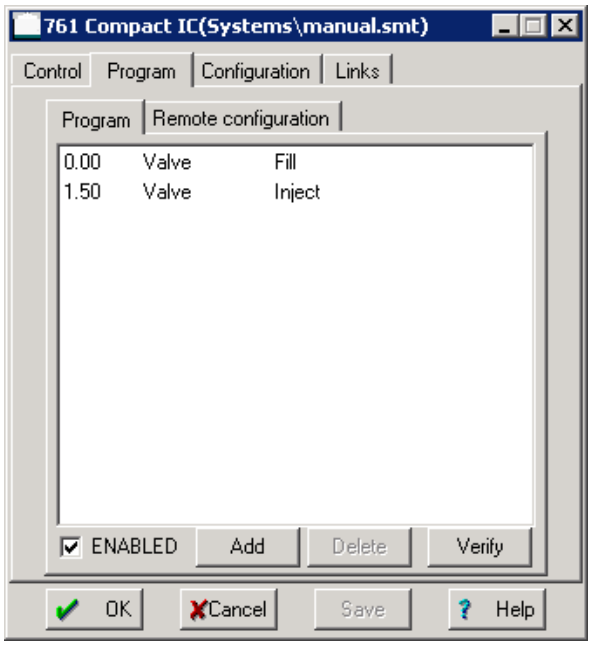



| | |
|---|---|
| **Conductivity, µS/cm** | Display of the currently measured conductivity. |
| **Pressure, MPa** | Display of the currently measured pressure.<br>The colour settings of the two display fields can be changed by clicking on the field with the right mouse button and choosing the corresponding menu item **Choose color / ...** . |
| **Actual values** | Current instrument parameters |
| **Flow, mL/min** | Display of the flow rate of the high-pressure pump. |
| **Pressure max, MPa** | Display of the maximum switch-off pressure for the high-pressure pump. |
| **Pressure min, MPa** | Display of the minimum switch-off pressure for the high-pressure pump. |
| **Full scale, µS/cm** | Display of the selected full-scale range. |
| **Remote lines** | Display of the current status of the remote output lines. |
| **Valve** | Injection valve |
| **<Inject>** | Switching over to position "INJECT". |
| **<Fill>** | Switching over to position "FILL". |
| **Suppressor** | Suppressor module |
| **<Step>** | Advancing to the next position.<br>The time since the last advance is displayed in the field next to **<Step>**. |
| **IC pump** | High-pressure pump |
| **<On>** | Switching on the pump drive. |
| **<Off>** | Switching off the pump drive. |

| | |
|---|---|
| **Peristaltic pump** | Peristaltic pump |
| **<On>** | Switching on the pump drive. |
| **<Off>** | Switching off the pump drive. |
| **System startup values** | System startup values. These parameters are set on the 761 SD Compact IC when linking the system, when starting a determination process or when sending manually with **<Send to unit>**. |
| **Flow, mL/min** | Startup value for flow rate of the high-pressure pump.<br>Entry range: **0.20** ... **2.50 mL/min** |
| **Pressure max, MPa** | Startup value for maximum switch-off pressure for the high-pressure pump. (This value is monitored once it has been set even without a connection to the PC).<br>Entry range: **0.0** ... **25.0 MPa** |
| **Pressure min, MPa** | Startup value for minimum switch-off pressure for the high-pressure pump. This value is monitored even without a connection to the PC. |
| **Full scale, µS/cm** | Startup value for full-scale range.<br>Selection: **50**, **250**, **1000 µS/cm** |
| **Remote lines** | Startup values for status of the remote output lines 1…8.<br>Selection: **0**, **1** |

## Time program

A user-specific time program for instrument control can be entered on the **Program** page in the window for the system settings. This program is automatically started either when starting the determination process (**Start with determination**) or on injection of the sample (**Start with inject**), depending on the setting in window **Start mode** (see *Software Instructions for Use «IC Net 2.3», Section 4.3.3*).



The **Program** page contains the following two subpages:

| | |
|---|---|
| **Program** | Main program with all program steps. |
| **Remote configuration** | Option for creating user-specific remote commands. |

## Program

Program steps covering time, command and command parameters can be entered on subpage **Program**.

| | |
|---|---|
| **Time (1st column)** | Instant for executing the command.<br>Entry range: **0.0 ... 999.9 min**<br>If no time is entered, the command is executed simultaneously with the last command with a time entry. |
| **Command (2nd column)** | Program command (see list of program commands).<br>In addition to the predefined commands, it is also possible to insert user-specific remote commands defined on subpage **Remote configuration**. |
| **Parameters (3rd column)** | Parameters for program command (see list of program commands). |
| **ENABLED** | Activate program for program start (a non-activated program is not started). |
| **<Add>** | Add new program command. |
| **<Delete>** | Delete selected program command. |
| **<Verify>** | Verify time program (error messages are displayed in the event of an error). |

## List of program instructions

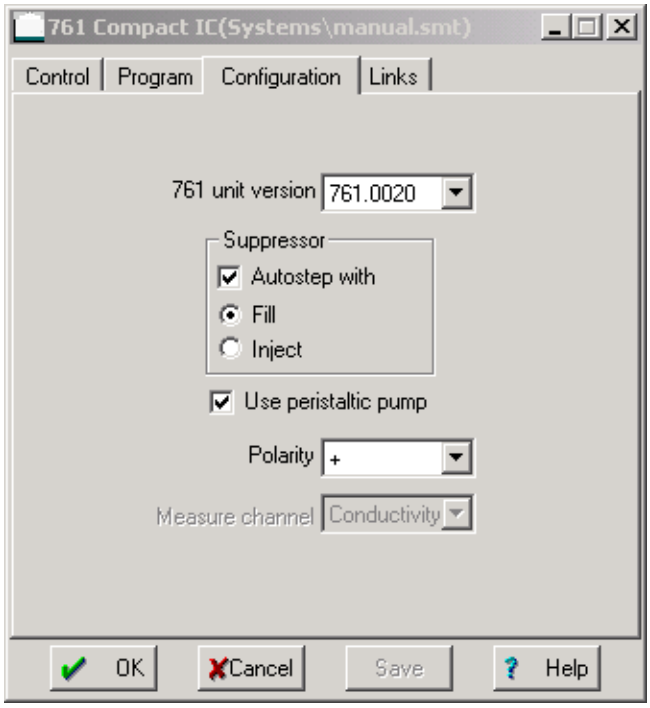
The following program instructions can be added to the time program on the **Program** subpage:

| | | |
|---|---|---|
| **Valve** | **Inject, Fill** | Switch **injection valve** to "INJECT" or "FILL" position. |
| **FullScale** | **50, 250, 1000 µS/cm** | Set **full scale range** to the selected value. |
| **ICPump** | **on, off** | Switch on or off the **high-pressure pump**. |
| **Flow** | **0.2 ... 2.5 mL/min** | Set **flow rate** of the high-pressure pump to the desired value. |
| **Pmax** | **0.0 ... 25.0 MPa** | Set **maximum pressure limit** for the high-pressure pump to the desired value. |
| **Pmin** | **0.0 ... 25.0 MPa** | Set **minimum pressure limit** for the high-pressure pump to the desired value. |

| | | |
|---|---|---|
| **Remote** | **0, 1, *, p** | Set **remote output lines** 1...8 to the desired values. For entry of the first value, enter **1**, **0**, **p** or *****. For entry of the other values, move the cursor in front of the value to be changed and enter **1**, **0**, **p** or *****. |
| **Program** | **END, RESET** | The **END** flag can be used to end a program, especially if the program time should be longer than the chromatogram duration. Additional steps after this flag are not allowed. The **RESET** flag is used to reset the parameters to the system startup values. |
| **Suppressor** | | Switch **suppressor module** to the next position. switch to next position. |
| **Peristaltic** | **on, off** | Switch on or off the **peristaltic pump**. |

## Configuration

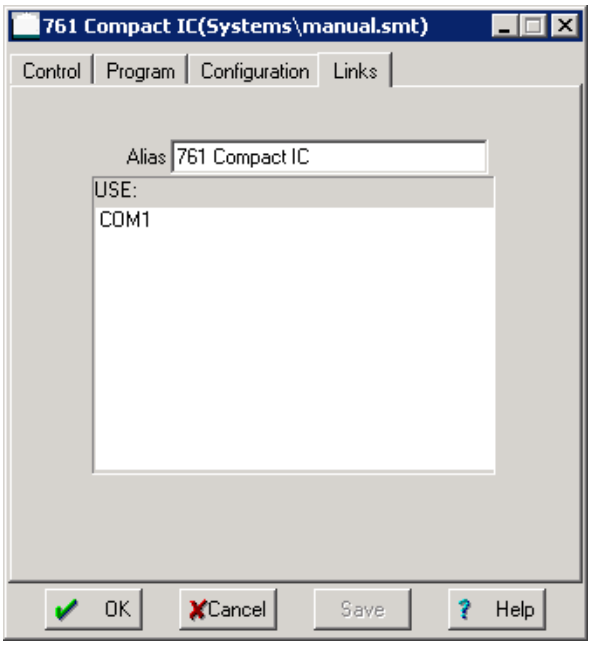
Page **Configuration** in the window for the system settings contains configuration settings for the 761 SD Compact IC.




| | |
|---|---|
| **761 unit version** | Selection of the instrument version: **761.0020** must be set at this point. |
| **Suppressor** | Suppressor module: |
| **Autostep with** | Automatic advancing to the next position when switching over the injection valve to the **Fill** or **Inject** position. |
| **Use peristaltic pump** | If this option is deactivated, the peristaltic pump is not started on **Startup hardware** or when starting a determination process. |

| | |
|---|---|
| **Polarity** | Selection of the polarity for the output signal:<br>+ Positive polarity (for anions)<br>– Negative polarity (for cations) |
| **Measure channel** | Display of the data source selected in the **Data source** window (see *Software Instructions for Use «IC Net 2.3», Section 6.26.2*). |

### Links



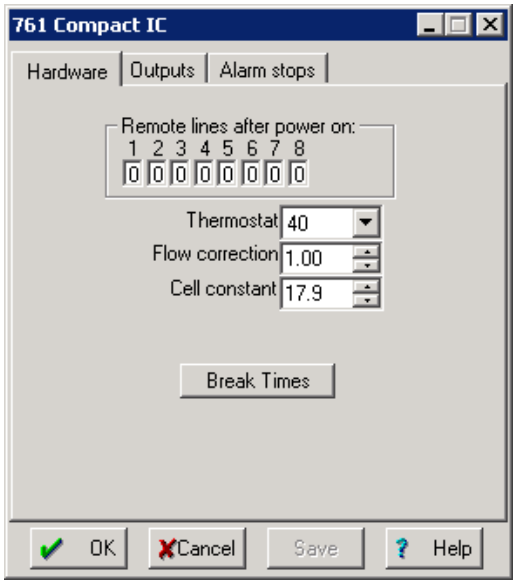

The **Links** tab in the window for the system settings serves to select and set the COM port (for details see *Software Instructions for Use «IC Net 2.3», Section 5.2.4 Links*).

## 3.1.7 Hardware settings

Selecting menu item **Hardware** when clicking with the right mouse button on the 761 instrument icon opens the window for the hardware settings consisting of the three pages **Hardware**, **Outputs** and **Alarm stops**.

### Hardware

The **Hardware** tab in the window for the hardware settings contains generally valid settings which are set automatically when the instrument is switched on.




**Remote lines after power on**

The output lines 1… 8 are set to the values defined here after switching on the instrument or after an emergency stop with **Shutdown hardware**.
Selection: **0**, **1**

**Thermostat**

Operating temperature of the conductivity measuring cell.
Selection: **25, 30, 35, 40, 45 °C, off**

*The Thermostat function operates only if the ambient temperature is at least 5 °C lower than the operating temperature. Normally, it takes approx. 30 to 60 minutes for the operating temperature to be reached with a temperature stability of ±0.01 °C.*

**Flow correction**

Correction factor for allowing for the deviation between the displayed flow rate and the actual flow rate of the high-pressure pump.
Range: **0.9 ... 1.09**

The correction factor is determined by measuring the actual flow rate using a measuring cylinder as follows:

$$\textbf{Flow correction} = \frac{\textit{Displayed flow rate}}{\textit{Measured flow rate}}$$

**Cell constant**

Cell constant of the conductivity measuring cell for correct display of the absolute conductivity. Enter the value printed on the detector block in this field.
Range: **0.1 ... 99.9 /cm**

In order to determine the cell constant yourself, you must pump a calibration so-

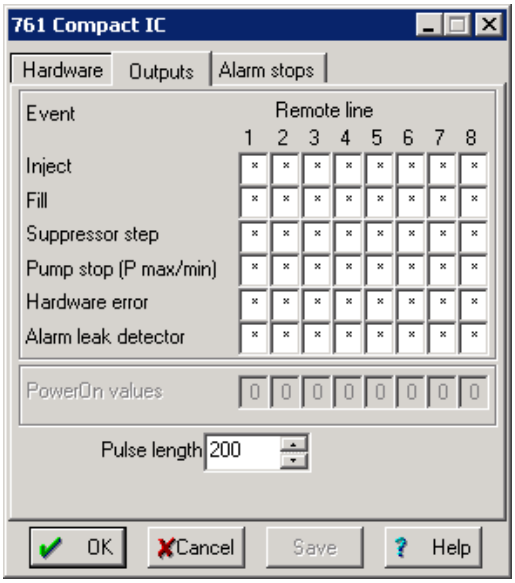
lution with a known conductivity through the IC system. Observe the displayed conductivity and change the cell constant until the correct conductivity is displayed.

**<Brake times>** Option for changing the brake times for the injection valve **Valve** and the suppressor module **Suppressor**.

*Please change these values only after consulting Metrohm Service.*

## Outputs

Automatic output of remote output signals for specific events is defined on the **Outputs** tab.




**Event** Events for automatic remote signal output:

**Inject** Switch over the injection valve to position "INJECT".

**Fill** Switch over the injection valve to position "FILL".

**Suppressor step** Advance of the suppressor module to the next position.

**Pump stop (P max/min)** The pump stops owing to violation of the pressure limits.

**Hardware error** Hardware error on 761 SD Compact IC (high-pressure pump, injection valve or suppressor not operating correctly).

**Alarm leak detector** Leak in the inner compartment.

**Remote line** Sets the output lines 1…8.
Selection: **0** (line off, inactive, open)
**1** (line on, active, 0 V)
**p** (output of a pulse)
***** (do not change state)

| | |
|---|---|
| **PowerOn values** | Display of the values for the remote output lines for switching on the instrument, set on page **Hardware**. |
| **Pulse length** | Pulse length in ms. |

## Alarm stops

The **Alarm stops** tab of the hardware settings window defines the events for which the 761 SD Compact IC is stopped immediately. At an alarm stop, high-pressure pump and peristaltic pump are stopped immediately, the running determination and the active sample queue are also stopped.


**Event** — Events for alarm stop:

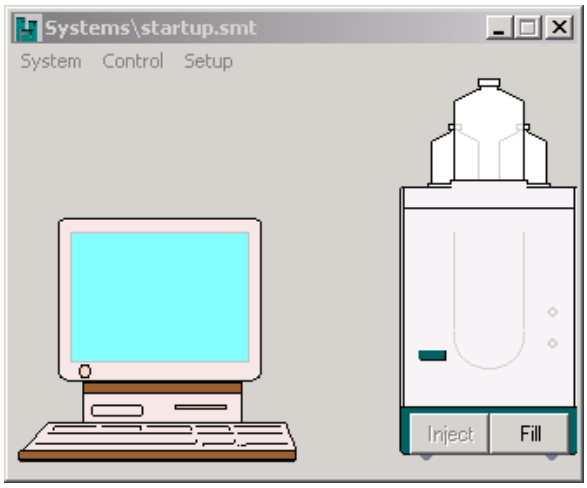
- **Pump stop** — Pump stopped because pressure limits are exceeded.
- **Hardware error** — Hardware error detected at the 761 SD Compact IC (high-pressure pump, injection valve, or suppressor not working correctly).
- **Leak** — Leak detector has detected solvent in the instruments interior. This information is also stored in the instrument itself, so that it is stopped automatically even without connection to the PC.
- **Power on** — Temporary power failure at the 761 SD Compact IC hardware.

# 3.2 Systems supplied

## 3.2.1 System "startup.smt"

System **startup.smt** is used to run the instrument in before the actual measurements. It must be run after long interruptions in measurement (for example overnight) at the start of the measurements and has a program runtime of 30 minutes.

### System window

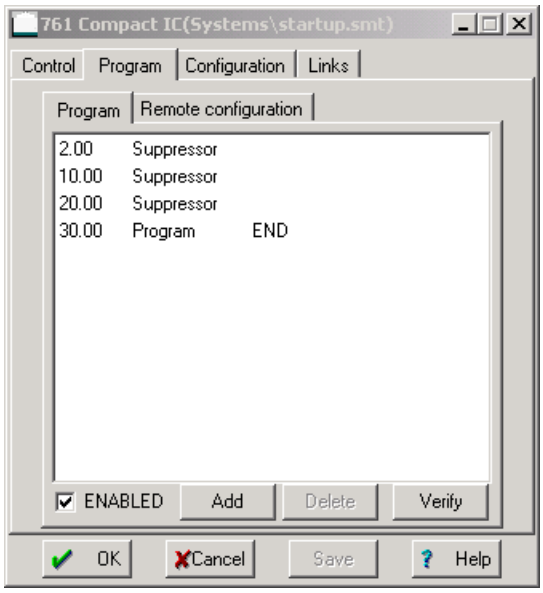



### System parameters

#### Control tab

Same settings as in the example with the **manual.smt** system in *Section 3.1.6*.

#### Program tab




Time program of the **startup.smt** system.

#### Configuration tab

Same settings as in the example with system **manual.smt** in *Section 3.1.6*.

#### Links tab

Same settings as in the example with system **manual.smt** in *Section 3.1.6*. The 761 SD Compact IC should always be attached to COM1.

### Linked method

Method **SD_startup.mtw** is linked to system **startup.smt**.

Most important settings:

- You should always ensure that the path for **Chromatogram directory** exists on the **Processing** tab of the **METHOD SETUP** window. Otherwise, it must be adapted (see *Section 3.1.3*). The default path is C:\Metrohm\SD Analyzer..
- Field **IC Cap** should be activated on the **Export** tab of the **METHOD SETUP** window.
- "**30 min**" should be entered for **Duration** on the **General** tab of the **METHOD SETUP** window.

## 3.2.2 System "manual.smt"

System **manual.smt** is used to manually measure samples (see also *Section 5.1*).

System **manual.smt** was used in *Section 3.1* as an example for the screenshots.

### System window

See *Section 3.1.2*.

### System parameters

See *Section 3.1.6*.

### Linked method

Method **SD_phosphate.mtw** is linked to system **manual.smt**.

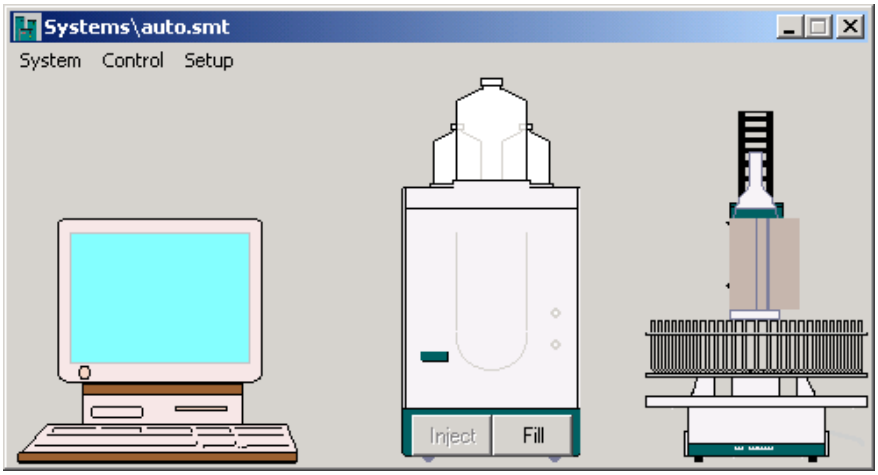
Most important settings:

- You should ensure that the path for **Chromatogram directory** on the **Processing** tab of the **METHOD SETUP** window exists. Otherwise, it must be adapted (see *Section 3.1.3*). The default path is C:\Metrohm\SD Analyzer..
- Fields **IC Cap** and **Excel** should be activated on the **Export** tab of the **METHOD SETUP** window.
- "**4 min**" should be entered for **Duration** on the **General** tab of the **METHOD SETUP** window.

### 3.2.3 System "auto.smt"

System **auto.smt** is used for automatic measurement of samples with the 766 IC Sample Processor (see also *Section 5.2*).

#### System window




System window for **auto.smt** with 761 and 766 IC Sample Processor.

#### System parameters for 761

##### Control tab

Same settings as in the example with system **manual.smt** in *Section 3.1.6*.

##### Program tab

Same program as in the example with system **manual.smt** in *Section 3.1.6*.

##### Configuration tab

Same settings as in the example with system **manual.smt** in *Section 3.1.6*.

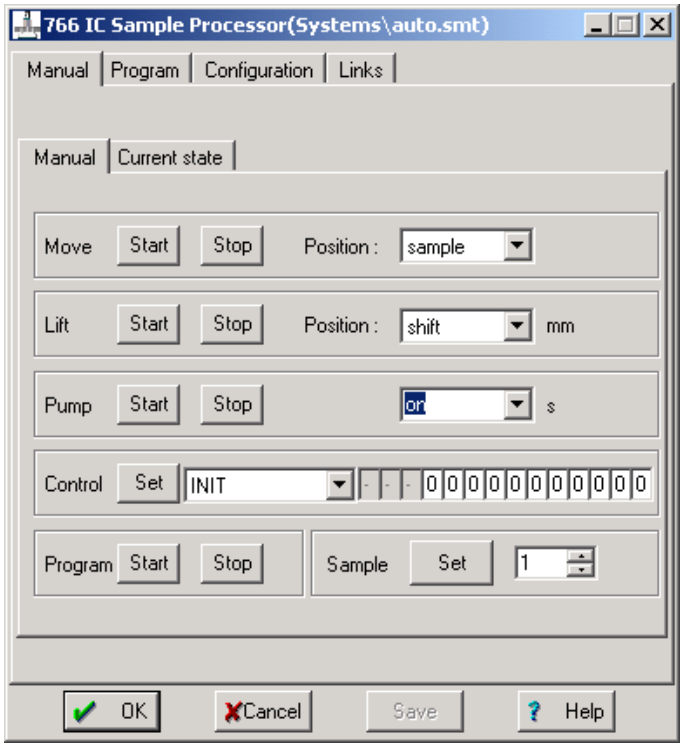
##### Links tab

Same settings as in the example with system **manual.smt** in *Section 3.1.6*.

#### System parameters for 766 IC Sample Processor

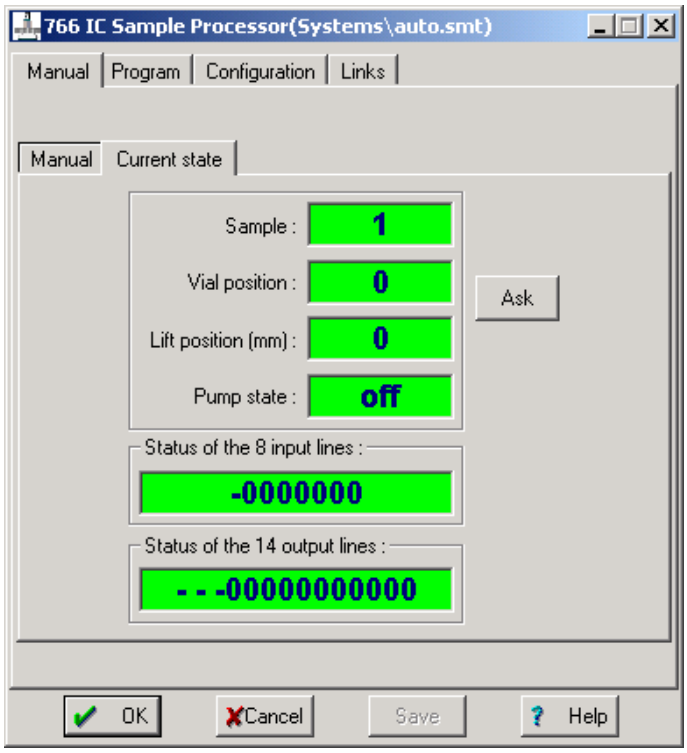
Only a brief overview of the windows and settings is provided below. A detailed description of controlling the 766 IC Sample Processor using the «IC Net» software can be found in the *Software Instructions for Use «IC Net 2.3», Section 6.23*, and in the *Instructions for Use for the 766 IC Sample Processor*.

### Manual tab - Manual subwindow



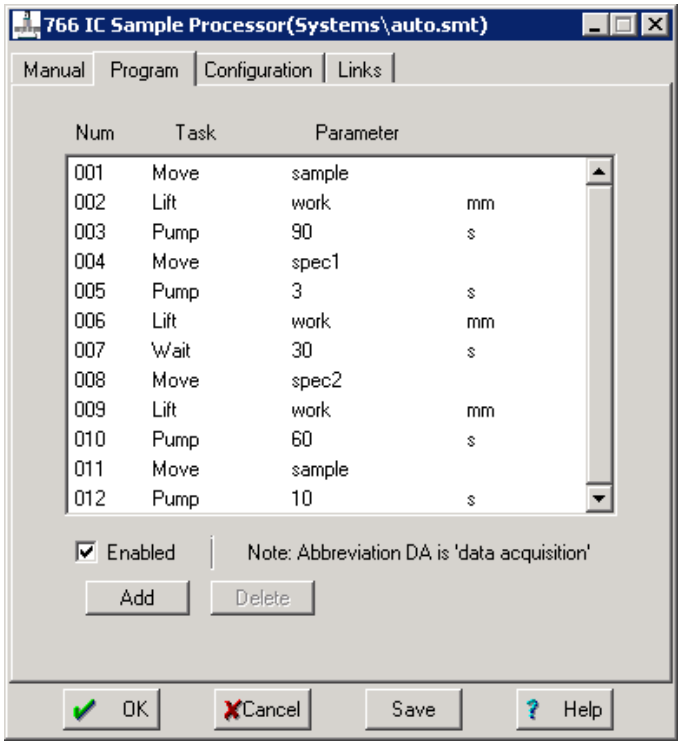

For manual control of the 766 IC Sample Processor.

### Manual tab - Current State subwindow



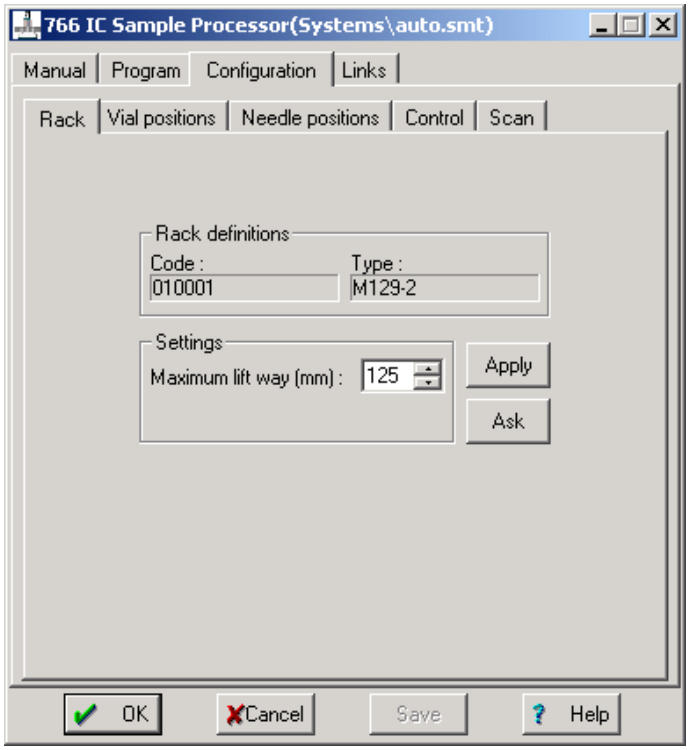

Status display of the 766 IC Sample Processor.

### Program tab

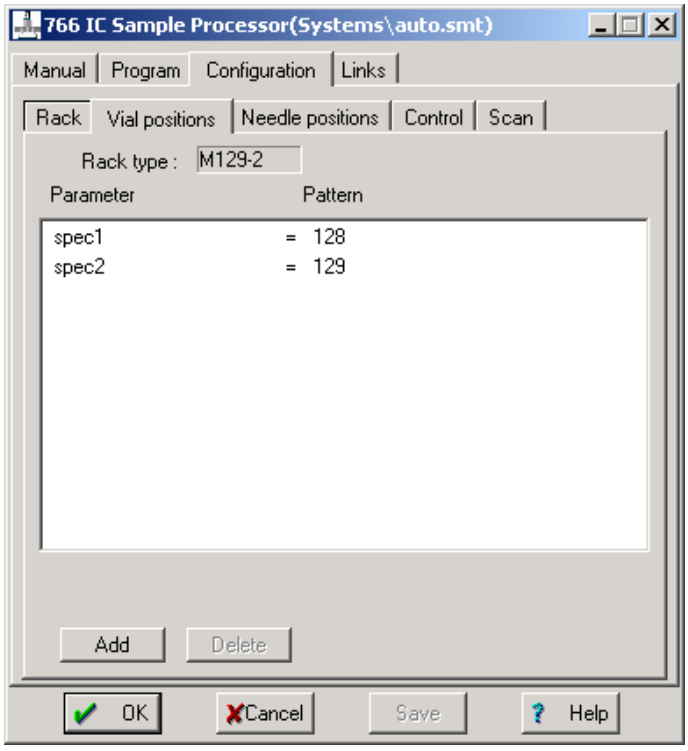



Time program of the 766 IC Sample Processor.

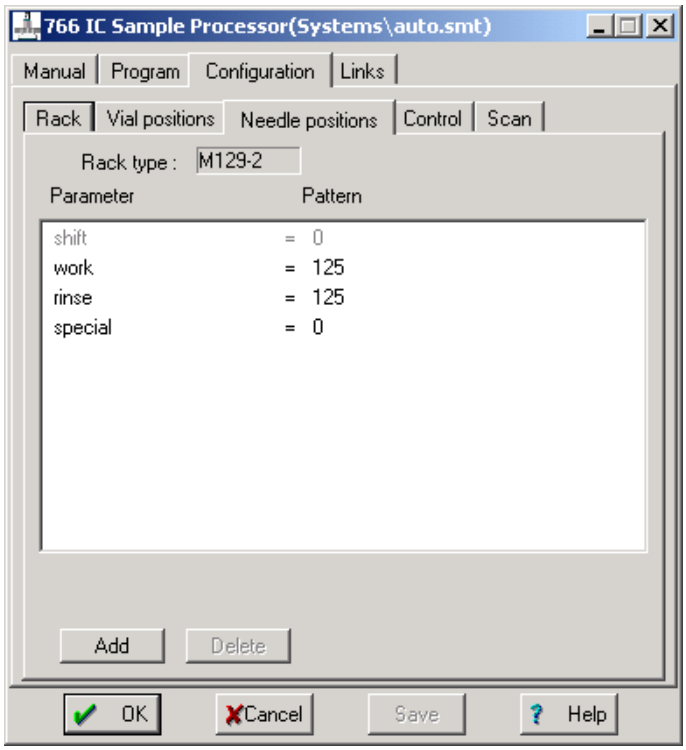
### Configuration tab – Rack subwindow



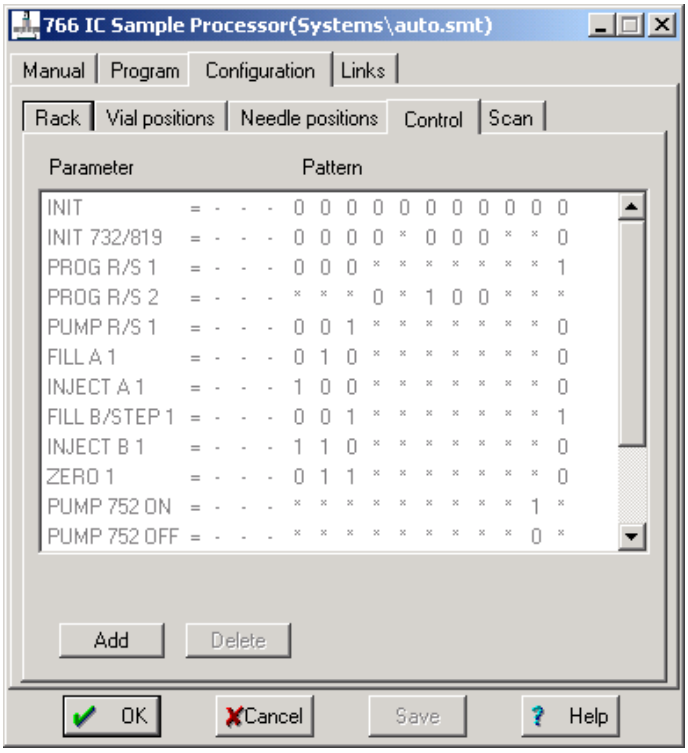
## Configuration tab - Vial positions subwindow



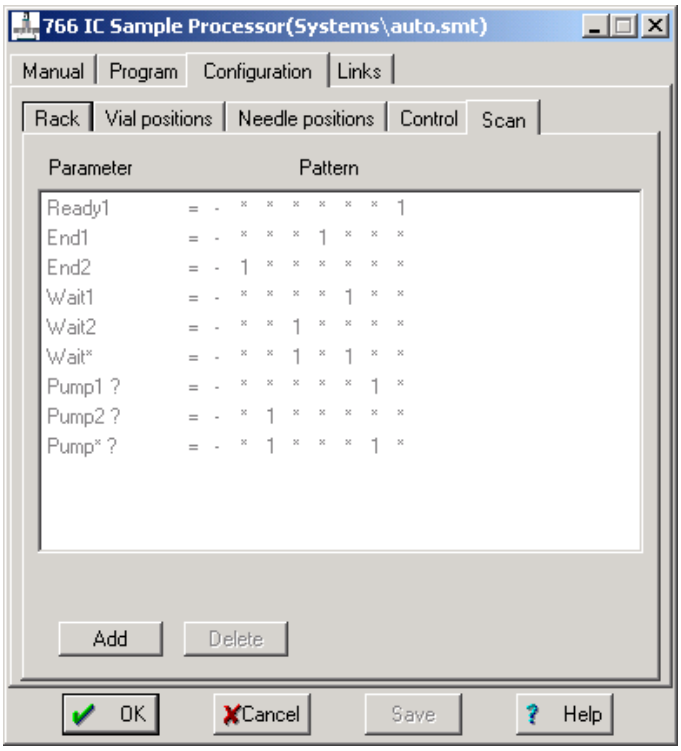

## Configuration tab - Needle positions subwindow



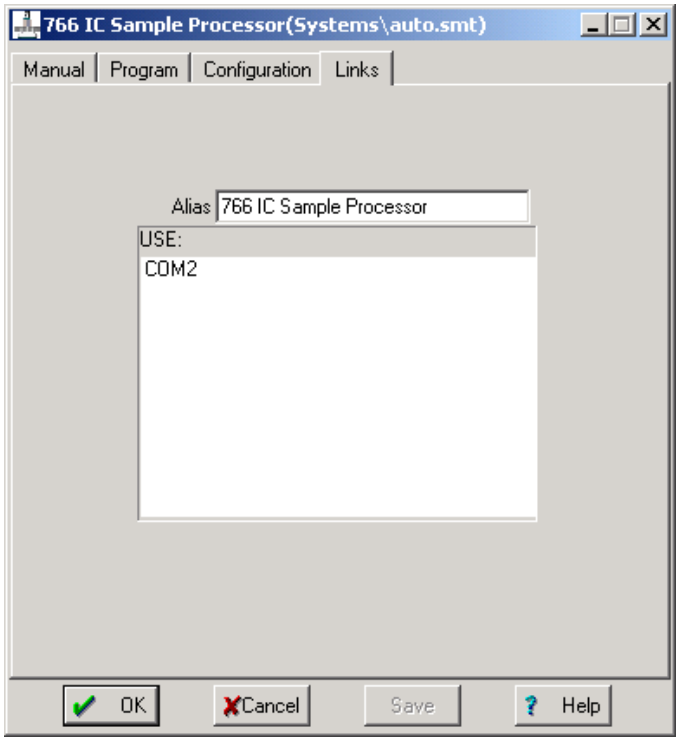
## Configuration tab - Control subwindow




## Configuration tab - Scan subwindow



### Links tab




Always connect the 766 IC Sample Processor to COM2.

### Linked method

Method **SD_phosphate.mtw** is linked to system **auto.smt**.

Most important settings:

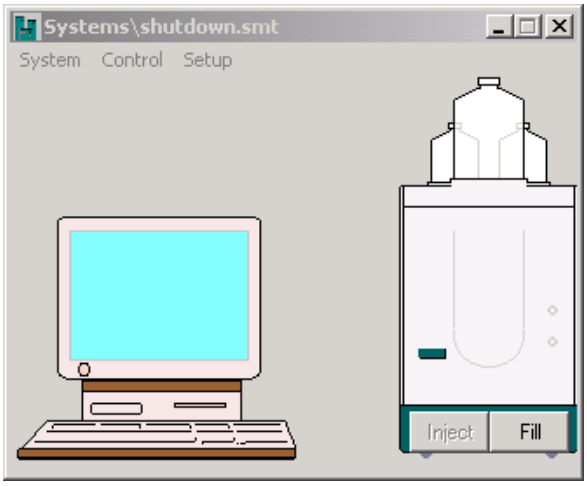
- Always ensure that the path for **Chromatogram directory** on the **Processing** tab of the **METHOD SETUP** window exists. Otherwise, it must be adapted (see *Section 3.1.3*). The default path is C:\Metrohm\SD Analyzer..
- Fields **IC Cap** and **Excel** should be activated on the **Export** tab of the **METHOD SETUP** window.
- "**4 min**" should be entered for **Duration** on the **General** tab of the **METHOD SETUP** window.

## 3.2.4 System "shutdown.smt"

System **shutdown.smt** is used after the actual measurements (at the end of the working day) in order to shut down the instrument. Water is injected and the runtime of the program is 7 minutes.

*Always inject water as the last sample and thus rinse the tubing connections with water in order to avoid damage to the instrument.*

### System window

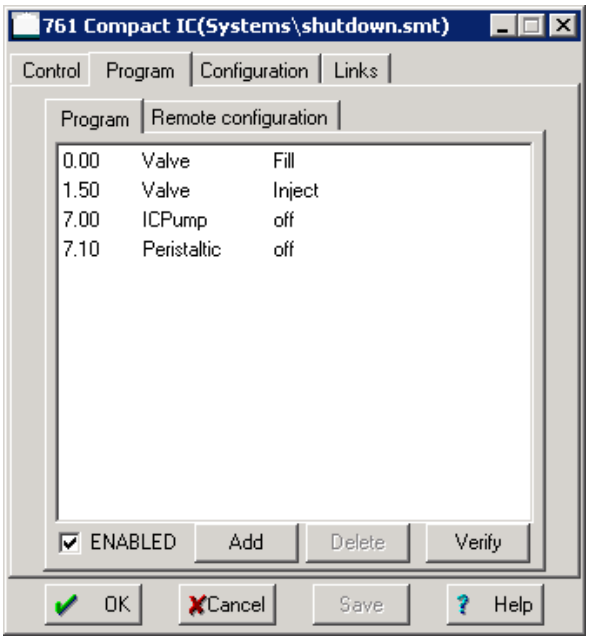



### System parameters

#### Control tab

Same settings as in the example with system **manual.smt** in *Section 3.1.6*.

#### Program tab




Time program of system **shutdown.smt**.

#### Configuration tab

Same settings as in the example with system **manual.smt** in *Section 3.1.6*.

#### Links tab

Same settings as in the example with system **manual.smt** in *Section 3.1.6*. The 761 SD Compact IC should always be attached to COM1.

### Linked method

Method **SD_shutdown.mtw** is linked to system **shutdown.smt**.

Most important settings:

- Always ensure that the path for **Chromatogram directory** on the **Processing** tab of the **METHOD SETUP** window exists. Otherwise, it must be adapted (see *Section 3.1.3*). The default path is C:\Metrohm\SD Analyzer..
- Field **IC Cap** must be activated on the **Export** tab of the **METHOD SETUP** window.
- "**7 min**" should be entered for **Duration** on the **General** tab of the **METHOD SETUP** window.

# 4 «IC Cap»

The 761 SD Compact IC can be operated via «IC Net» (see *Section 3*) or «IC Cap». System and method settings can be modified only with «IC Net». Using «IC Cap» is recommended for day-to-day operation. «IC Cap» is an interface with a simplified GUI via which it is possible to control the «IC Net» software.

*This Section discusses the most important aspects of operation of the 761 SD Compact IC using the «IC Cap» program. For further details, please refer to the supplied* Administrator Manual *«IC Cap 2.0» (8.110.8313) and the Online Help in the «IC Cap» program.*

## 4.1 «IC Cap» introduction

Operation of program «IC Cap» is described in detailed in the supplied *Administrator Manual «IC Cap 2.0»* (8.110.8313). Only fundamental aspects for working with «IC Cap» are described below.

### 4.1.1 Login

You must have logged in with a **User** name and **Password** which are also listed as users in the installed «IC Net». «IC Net» is reopened with each measurement started by «IC Cap». Login to «IC Net» is automatic in this case with the same **User** name and **Password** used by the user for logging in to «IC Cap». This is why the user data for «IC Cap» should correspond to that of «IC Net».

*Installation: The first login after installation is made without **User** or **Password**. The Administrator should then be defined on the **General** tab of the **CONFIGURATION** window the first time the program is launched (see Section 2.12.4).*

### 4.1.2 User interface

The main window consists of two parts, the **button bar** at the right and a **frame** in the left-hand side of the window. The particular elements included in the **button bar** and what elements are displayed in the **frame** depends on whether mode **Manual** or **Queue** is activated in the configuration of **«IC Cap»** (see *Section 4.2*).

**Button bar**: Determinations can be started/stopped with the buttons. In addition, the buttons can be used to set what is displayed in the **frame** (sample parameters, chromatogram or results). For detailed information, see *Administrator Manual «IC Cap 2.0» Section 2*.

**Frame**: A sample parameter window, a chromatogram window or a result window is displayed in the **frame** on the left-hand side, depending on the selection (using the buttons). The mode of representation of the sample parameters depends on whether **Manual** or **Queue** is activated in the configuration (see *Section 4.2*).

# 4.2 «IC Cap» - Configuration

Clicking with the right mouse button (anywhere on the «IC Cap»-interface) and selecting menu item **Configuration** opens the **CONFIGURATION** window. This is where you make the settings for measurements using «IC Cap».

## 4.2.1 Predefined configurations

**Two predefined configurations** are supplied for operating the 761 SD Compact IC:

**manual.cfg** for manual operation

**auto.cfg** for automatic operation of the 766 IC Sample Processor

### Loading a configuration

*During installation, you can select which configuration (***manual.cfg** *or* **auto.cfg***) is opened the first time the program is launched (see Section 2.12.2).*

The two predefined configurations are saved in folder **SD Analyzer\Ic Net\Iccap**. Clicking on the **<Read Configuration>** button in the **Miscellaneous** tab in the **CONFIGURATION** window opens this folder (**Iccap**) and you can load a predefined configuration.

The configuration settings set the last time the program was closed are loaded when you launch the «IC Cap» software.

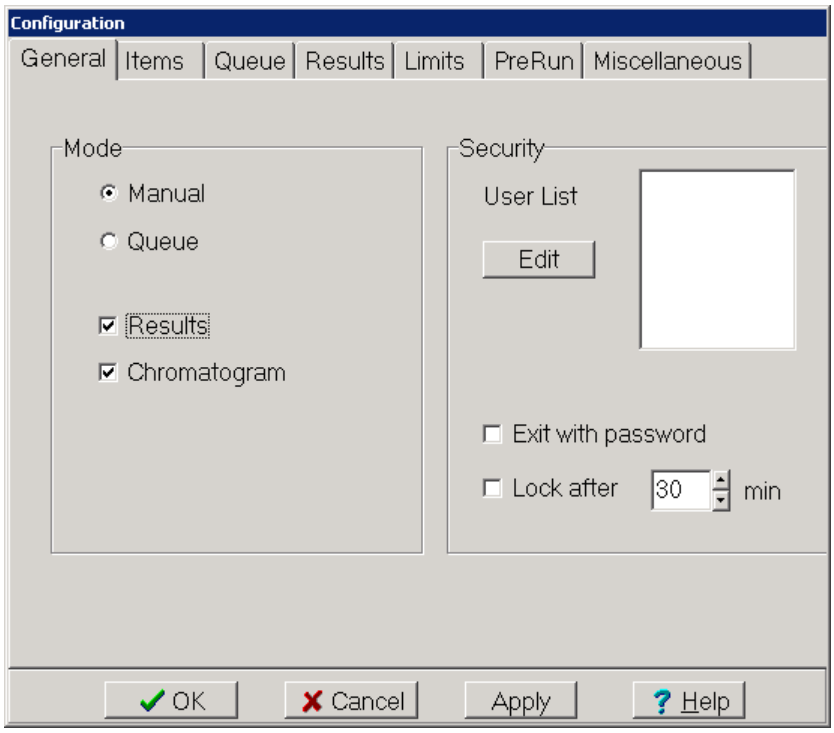
For a detailed description of the configuration settings, see *Administrator Manual «IC Cap 2.0» Section 2*.

## 4.2.2 Configuration "manual.cfg"

You should load configuration **manual.cfg** for manual control of the 761 SD Compact IC using «IC Cap». If you answered the prompt "Do you work with 766 IC Sample Processor?" (see *Section 2.12.2*) with <No> during the installation process, configuration **manual.cfg** is loaded automatically. Otherwise, you must load it subsequently (see *Section 4.2.1*).

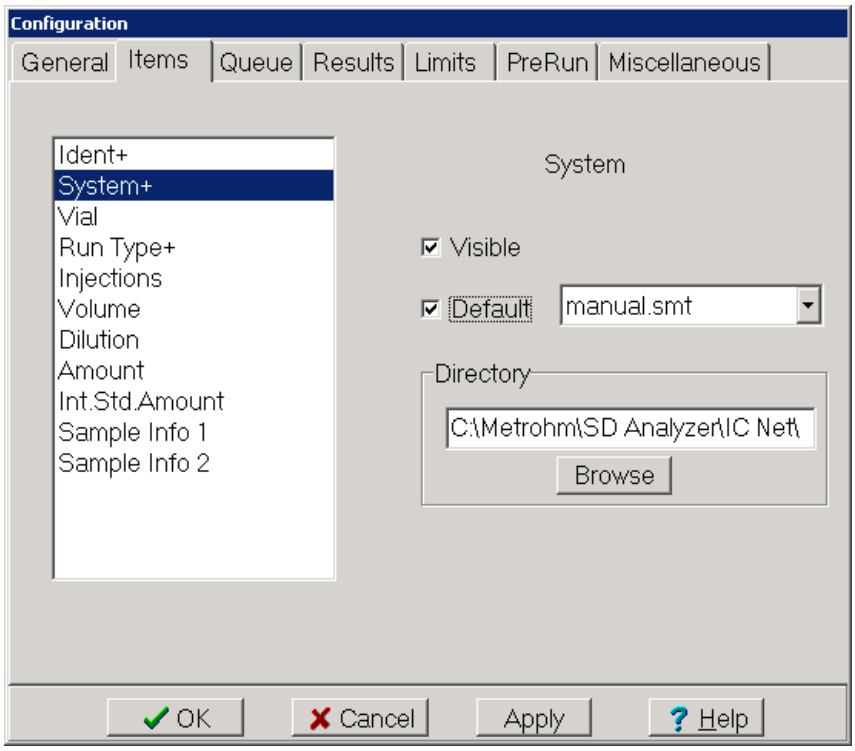
## Settings of configuration "manual.cfg"

### General tab




The **Users** defined after installation (see *Section 2.12.4*) are listed in the **User List**.

### Items tab



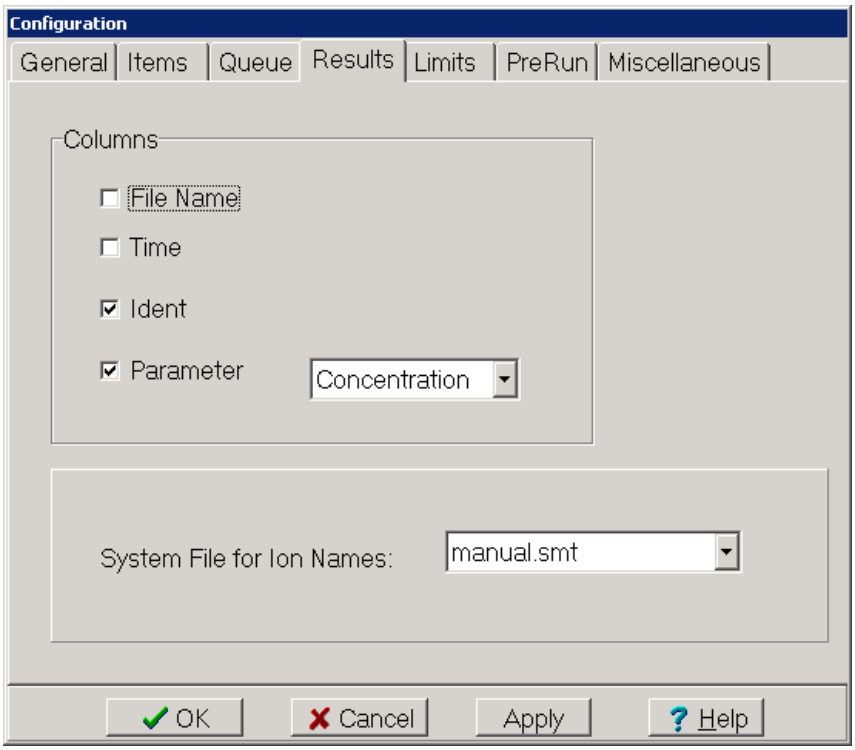
On the **Items** tab, you can select which sample parameters are to be displayed in the main window. The parameters shown with a '+' at the end are displayed.

*Check the path in the system folder: activate "System" on the tab **Items** (as in the screenshot example); the path to the system file must now be specified correctly in the field **Directory**. This path defines the list box for system in the main window.*

### Queue tab

These settings are important only for automatic operation with a queue (see *Section 4.2.3*).

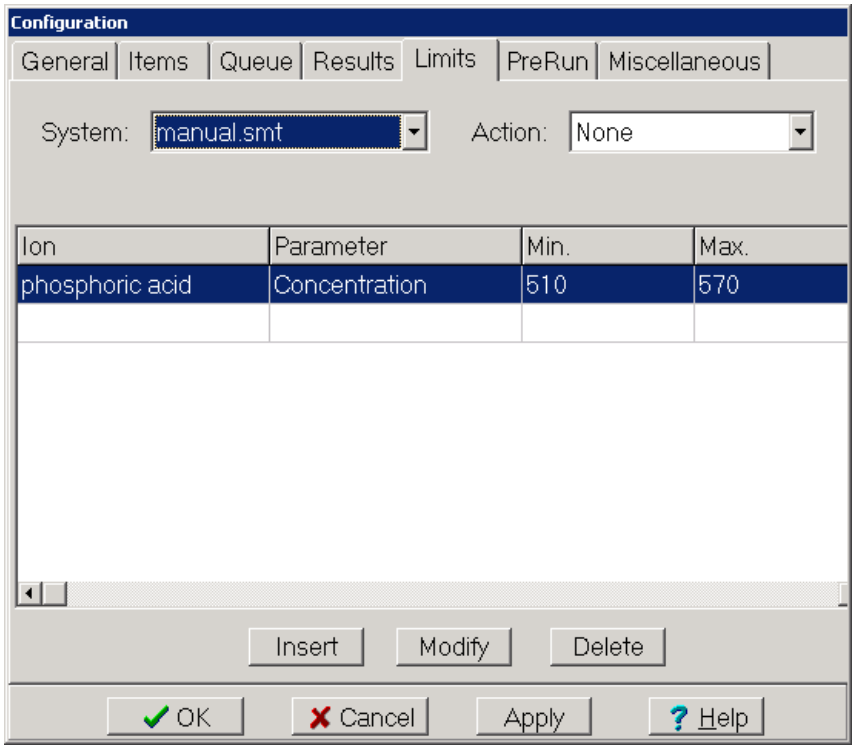
### Results tab




These settings define the appearance of the **Results** frame.

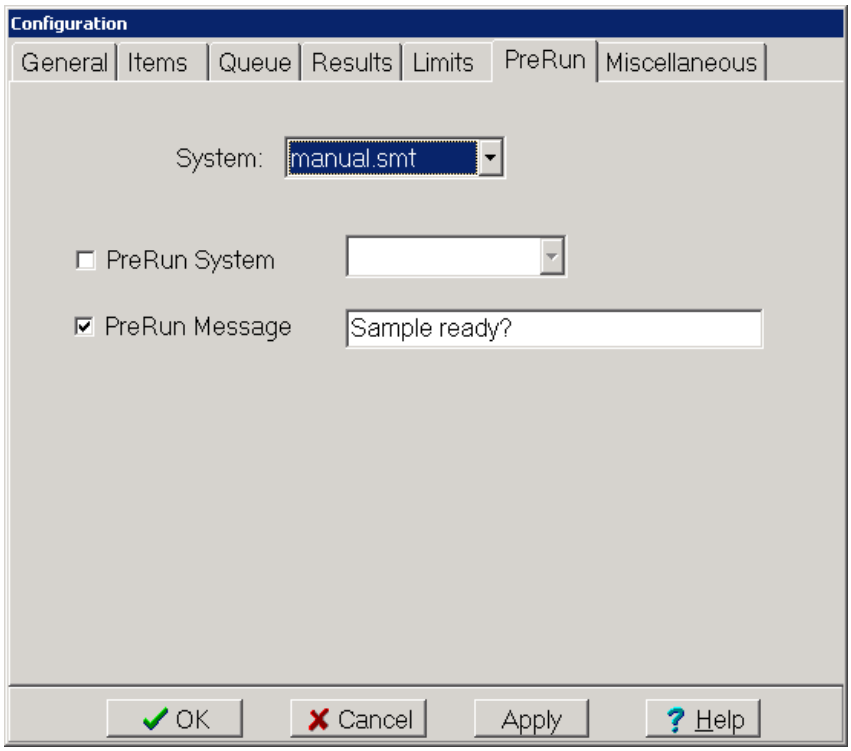
You can define the system which contains the corresponding ion names under **System File for Ion Names**.

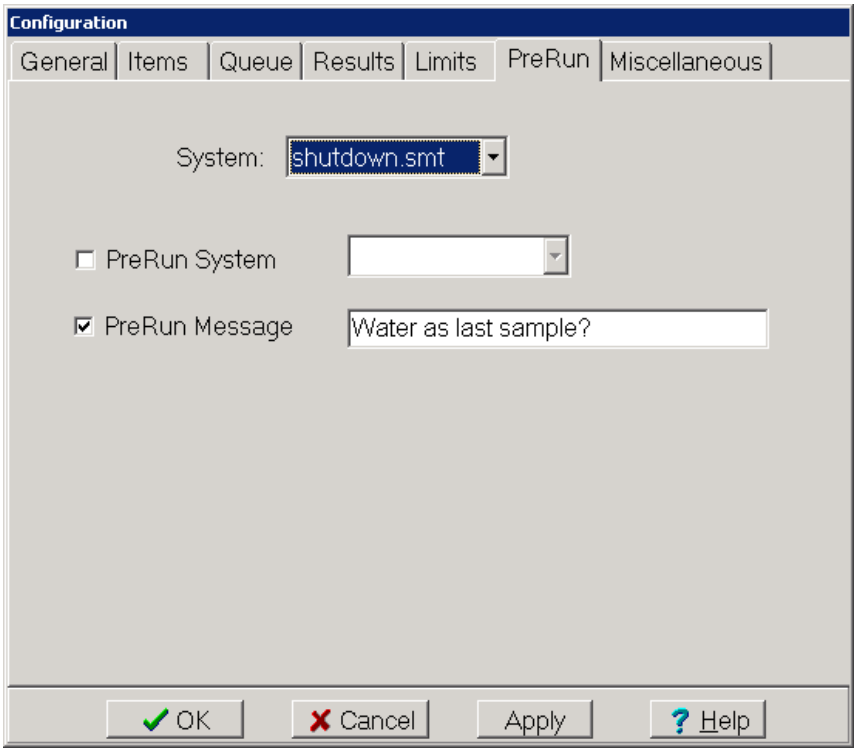
### Limits tab




With **None** as **Action**, there is only a warning entered in the report.

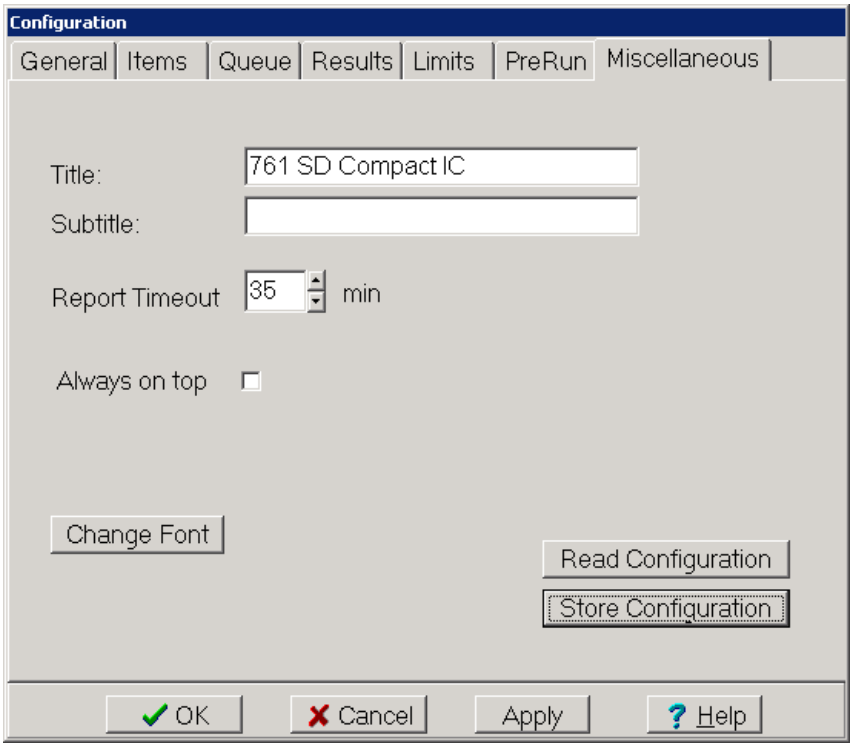
### PreRun tab





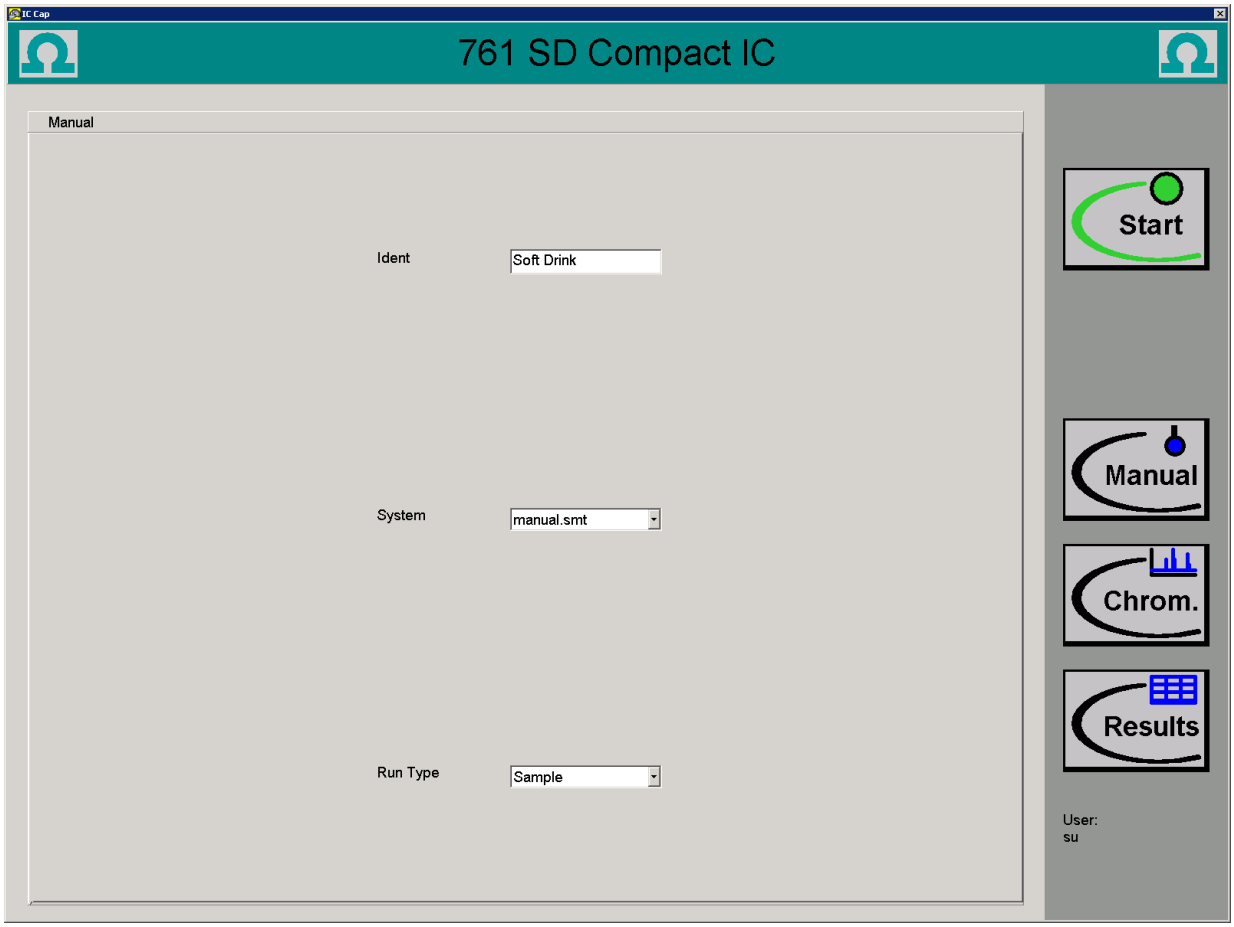

In the case of two systems a prompt is displayed each time before starting the determination process: "Sample ready?" for system **manual.smt** and "Water as last sample?" for system **shutdown.smt**. This message must be confirmed. The system does not start until after this confirmation.

### Miscellaneous tab




The **Report Timeout** must be longer than 30 minutes. Otherwise there will be a timeout with system **startup.smt**.

### Main page with configuration "manual.cfg"

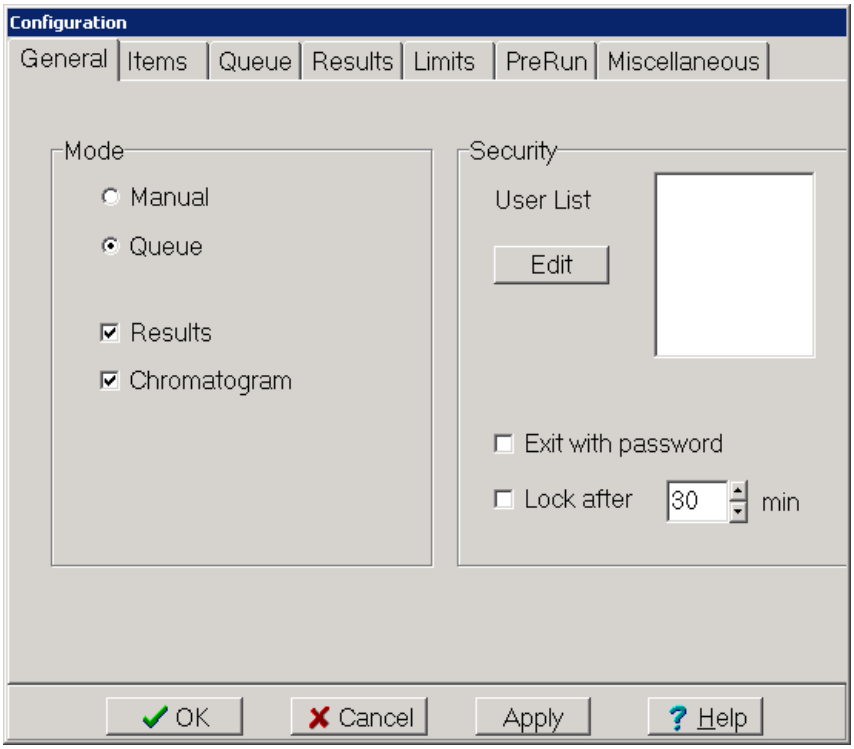


### 4.2.3 Configuration "auto.cfg"

Configuration **auto.cfg** should be loaded for automatic control of the 761 SD Compact IC with 766 IC Sample Processor using «IC Cap».

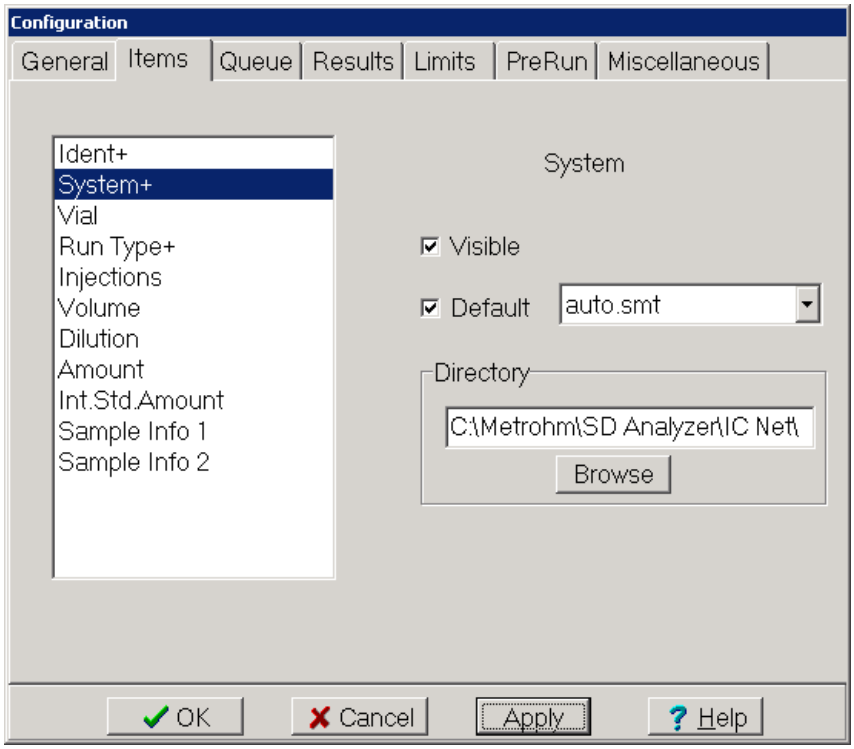
#### Settings of configuration "auto.cfg"

##### General tab




**Queue** is activated in configuration **auto.cfg**. The "Queue" is a string of measurements. The "Queue" is shown in the main window and is processed there (see *Section 4.1.2*).

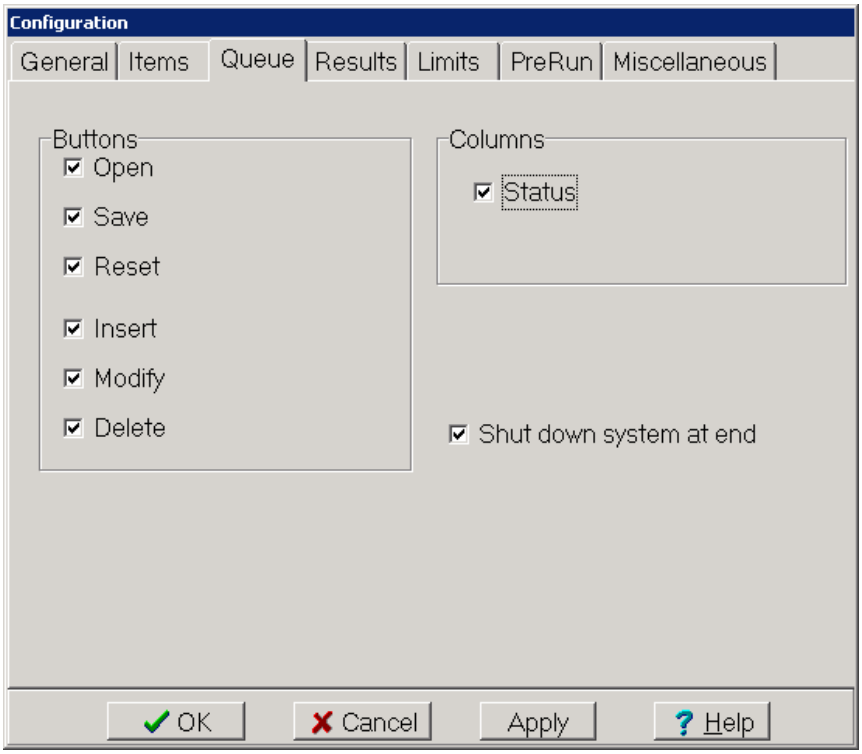
### Items tab




On the **Items** tab, you can select which sample parameters are to be displayed in the main window. The parameters displayed with a'+' at the end are displayed.

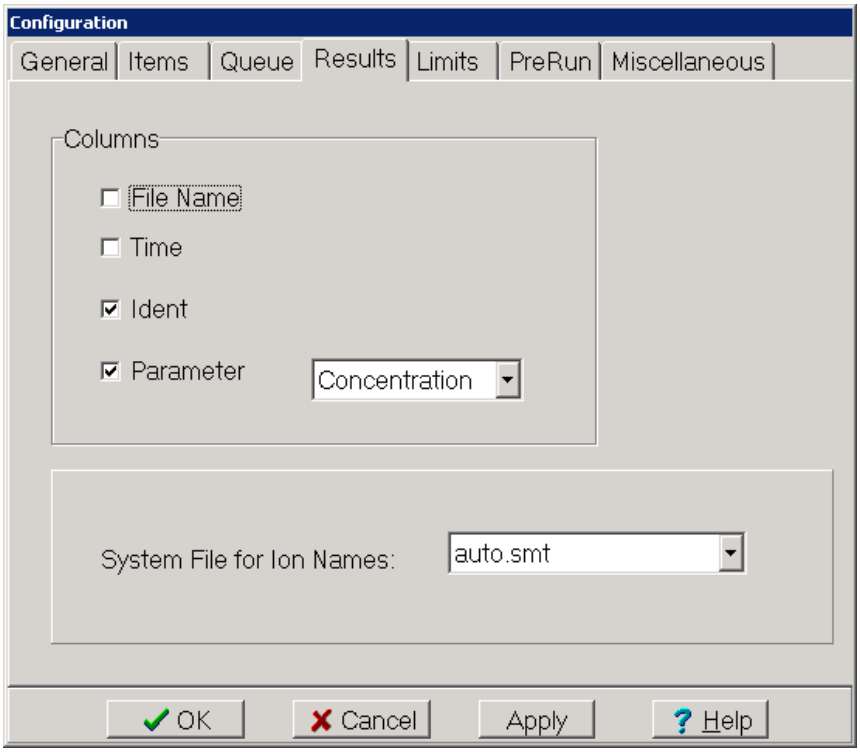
*Check the path in the system folder: activate "System" on the tab **Items** (as in the screenshot example); the path to the system file must now be specified correctly in the field **Directory**. This path defines the list box for system in the main window.*

### Queue tab




If **Shut down system at the end** is activated, no additional step is required at the end of the "Queue" with system **shutdown.smt**.

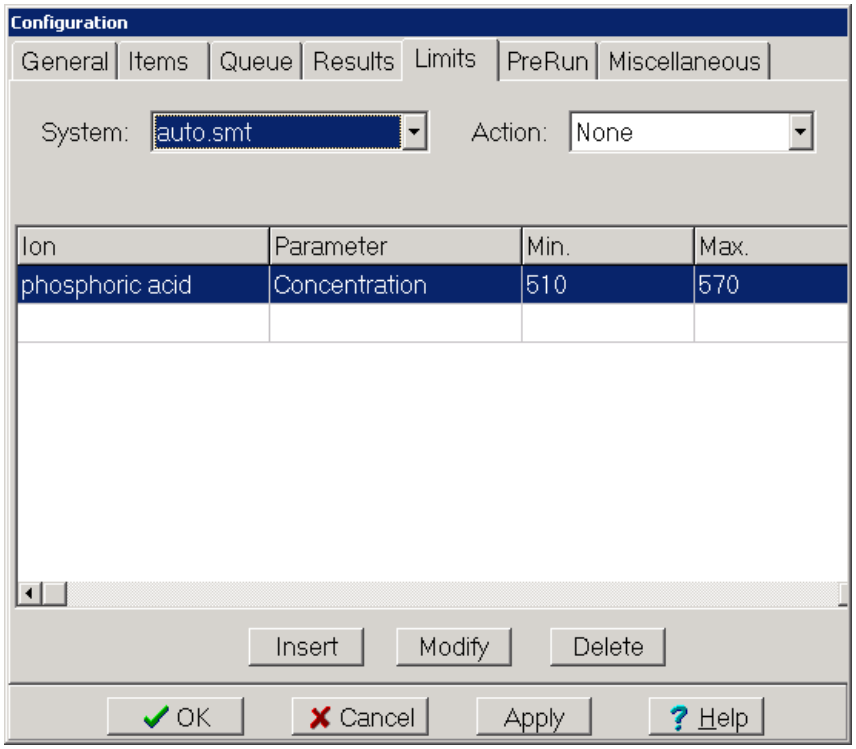
### Results tab




These settings define the appearance of the **Results** frame.

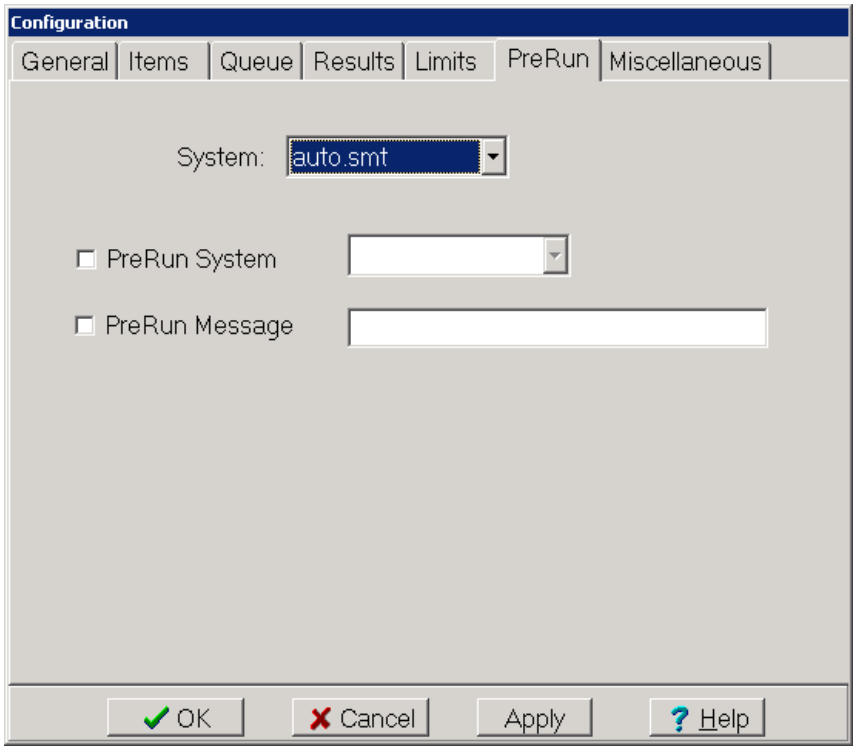
You can define the system which contains the corresponding ion names under **System File for Ion Names**.

### Limits tab



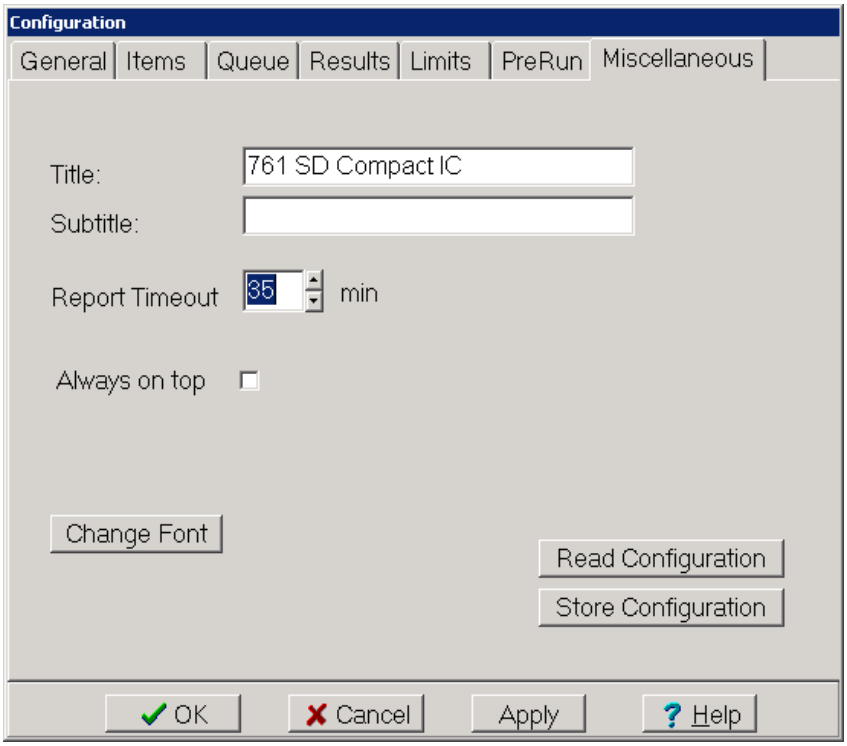

With **None** as **Action**, there is only a warning entered in the report.

### PreRun tab



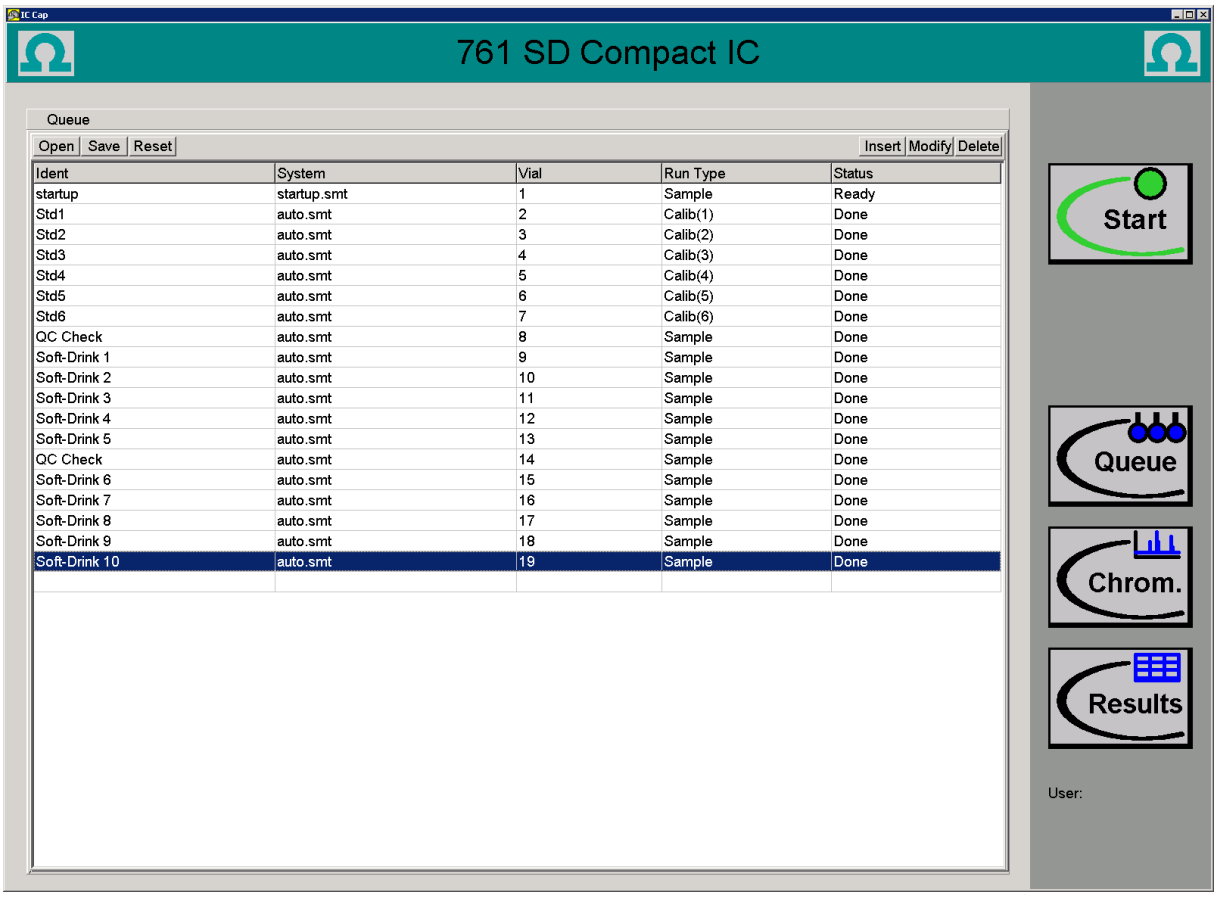

No prompts which would interrupt the sequence should be defined.

### Miscellaneous tab




The **Report Timeout** must be longer than 30 minutes. Otherwise, there will be a timeout with system **startup.smt**.

### Main page with configuration "auto.cfg"




| Ident | System | Vial | Run Type | Status |
|---|---|---|---|---|
| startup | startup.smt | 1 | Sample | Ready |
| Std1 | auto.smt | 2 | Calib(1) | Done |
| Std2 | auto.smt | 3 | Calib(2) | Done |
| Std3 | auto.smt | 4 | Calib(3) | Done |
| Std4 | auto.smt | 5 | Calib(4) | Done |
| Std5 | auto.smt | 6 | Calib(5) | Done |
| Std6 | auto.smt | 7 | Calib(6) | Done |
| QC Check | auto.smt | 8 | Sample | Done |
| Soft-Drink 1 | auto.smt | 9 | Sample | Done |
| Soft-Drink 2 | auto.smt | 10 | Sample | Done |
| Soft-Drink 3 | auto.smt | 11 | Sample | Done |
| Soft-Drink 4 | auto.smt | 12 | Sample | Done |
| Soft-Drink 5 | auto.smt | 13 | Sample | Done |
| QC Check | auto.smt | 14 | Sample | Done |
| Soft-Drink 6 | auto.smt | 15 | Sample | Done |
| Soft-Drink 7 | auto.smt | 16 | Sample | Done |
| Soft-Drink 8 | auto.smt | 17 | Sample | Done |
| Soft-Drink 9 | auto.smt | 18 | Sample | Done |
| Soft-Drink 10 | auto.smt | 19 | Sample | Done |

# 5 Operation

*This section describes day-to-day operation of the 761 SD Compact IC. A distinction is made between operation with manual sample change (Section 5.1, Instrument version 2.761.0420) and operation with automatic sample change with the 766 IC Sample Processor (Section 5.2, Instrument version 2.761.0520).*

## 5.1 Operation with manual sample change

*The instrument must have been connected and the related software must have been installed as described in Section 2 before the instrument can be operated.*

Switching the equipment on:

**1 Switch on the PC**

⇒ Switch on the PC.

**2 Switch on the 761 SD Compact IC**

⇒ Switch the 761 SD Compact IC on with the mains switch **14** on the rear panel of the instrument. The pilot lamp **7** lights after the instrument has been switched on.

### 5.1.1 Control with «IC Net» (manual operation)

Launch the «IC Net» software and log in (see *Section 2.12.3*).

#### 5.1.1.1 Conditioning (manual operation / «IC Net»)

The instrument should be conditioned each time it is restarted:

**1 Open and link system startup.smt**

⇒ Open (see *Section 3.1.2*) system **startup.smt** (see *Section 3.2.1*) and link it (see *Section 3.1.4*).

**2 Condition the instrument for 30 minutes**

⇒ Insert the free end of the sample aspirating tubing **3** into a container filled with ultra-pure water.

⇒ Start the system by selecting **SYSTEM** / **Control** / **Start determination** (see *Software Instructions for Use «IC Net 2.3», Sections 4.3.3 and 4.3.4*) and allow it run through to the end (30 minutes).

⇒ The baseline should now be stable.

### 5.1.1.2 Calibration and sample determination (manual operation / «IC Net»)

*The instrument should be calibrated after each restart.*

*The sample aspirating tubing **3** should be immersed in the PE bottle (6.1608.080) filled with ultra-pure water after each sample (or after an MCAL standard).*

**1 Switch to system manual.smt and link it**

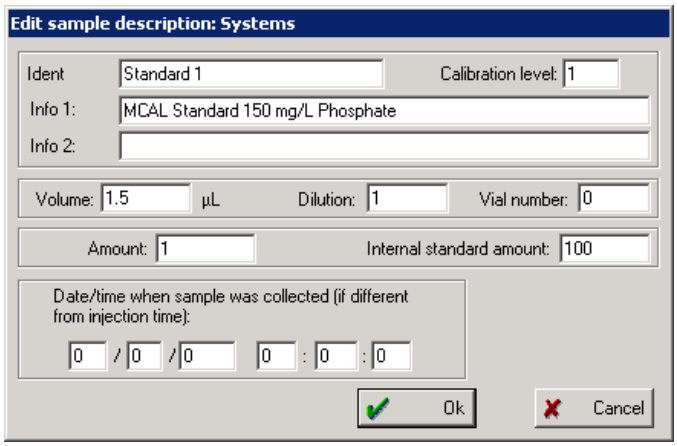
⇒ Switch (see *Software Instructions for Use «IC Net 2.3», Section 4.2*) to system **manual.smt** (see *Section 3.2.2*).

## 2 Calibration

⇒ Dry off the free end of the sample aspirating tubing **3** with a clean cloth.

⇒ Then immerse it in the lowest MCAL standard (mg/L $H_3PO_4$ plus basic content of nitrate and sulfate). The MCAL standard bottles are supplied as accessories (6.2321.000).

⇒ Start the system by selecting **SYSTEM** / **Control** / **Start determination** (see *Software Instructions for Use «IC Net 2.3», Sections 4.3.3 and 4.3.4*). After start, you will see the **EDIT SAMPLE DESCRIPTION: SYSTEMS** window. You should make the following entries:




What is important above all is to set menu option **Calibration level** to **1**.

⇒ After completing this measurement, you should determine the other 5 MCAL standards one after the other (250, 350, 450, 550 and 650 mg/L $H_3PO_4$ plus basic content of nitrate and sulfate) and, when doing this, increase menu item **Calibration level** in window **EDIT SAMPLE DESCRIPTION: SYSTEMS** incrementally by one (this means that the measurement with the 650 mg/L standard would then be **Calibration level** 6).

⇒ In order to check calibration, you should also determine the MCAL QC check standard with 545 mg/L $H_3PO_4$ plus basic content of nitrate and sulfate at the end of the series of calibration measurements.

⇒ Detailed information on calibration can be found in the *Software Instructions for Use «IC Net 2.3», Section 7.5*.

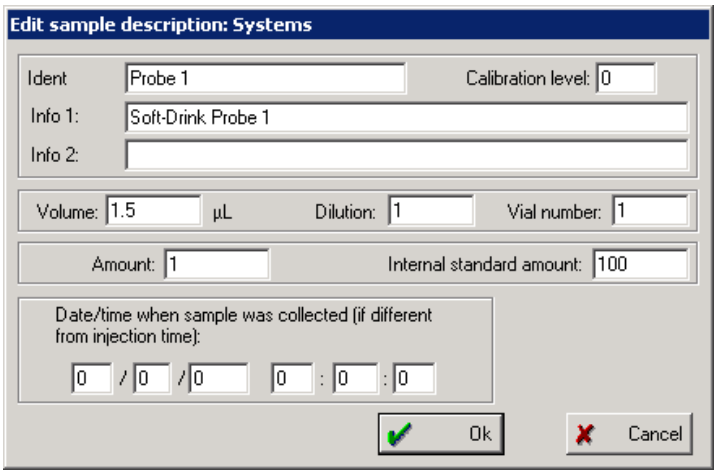
**3 Sample determination**

⇒ System **manual.smt** (see *Section 3.2.2*) should still be open and linked from calibration. If not, open it (see *Section 3.1.2*) and link it (see *Section 3.1.4*).

⇒ Dry off the free end of the sample aspirating tubing **3** with a clean cloth.

⇒ Then insert it into the sample vessel.

⇒ Start the system by selecting **SYSTEM** / **Control** / **Start determination** (see *Software Instructions for Use «IC Net 2.3», Sections 4.3.3* and *4.3.4*). Set the **Calibration level** in window **EDIT SAMPLE DESCRIPTION: SYSTEMS** to **0**.




⇒ Information on chromatograms and post-processing chromatograms can be found in the *Software Instructions for Use «IC Net 2.3», Section 8 resp. Section 10*.

### 5.1.1.3 Shutdown (manual operation / «IC Net»)

*In order to prevent damage to the instrument, it should be rinsed with water before shutting it down after the end of sample determination. This rinsing operation should be performed with system* ***shutdown.smt*** *(see Section 3.2.4).*

**1 Switch to system shutdown.smt and link it**

⇒ Switch (see *Software Instructions for Use «IC Net 2.3», Section 4.2*) to system **shutdown.smt** (see *Section 3.2.2*).

**2 Allow shutdown.smt to run**

⇒ Insert the free end of the sample aspirating tubing **3** into a vessel filled with water.

⇒ Start the system by selecting **SYSTEM** / **Control** / **Start determination** (see *Software Instructions for Use «IC Net 2.3», Section 4.3.3*).

⇒ Let the system run to the end (duration: 7.10 minutes). High-pressure pump and peristaltic pump are switched off automatically at the end.

### 5.1.2 Control with «IC Cap» (manual operation)

Launch the «IC Cap» software and log in (see *Section 2.12.4*).

*Configuration **manual.cfg** should have been installed during installation (see Section 2.12.2). If not, configuration **manual.cfg** should now be loaded (see Section 4.2.1).*

#### 5.1.2.1 Conditioning (manual operation / «IC Cap»)

The instrument should be conditioned after each restart:

**1 Settings**

⇒ Click on the yellow <**Sample**> button at the top right so that it changes to the green <**Start**> button.

⇒ Choose System **startup.smt** for item **System**.

⇒ Choose type "Sample" for item **Run Type**.

⇒ Enter "Startup" for item **Ident**.

**2 Condition the instrument for 30 minutes**

⇒ Insert the free end of the sample aspirating tubing **3** into a container filled with water.

⇒ Start the system by clicking on the green <**Start**> button and allow it run through to the end (30 minutes). Clicking on the <**Chrom**> button displays the **CHROMATOGRAM** window.

⇒ The baseline should be stable at the end.

### 5.1.2.2 Calibration and sample determination (manual operation / «IC Cap»)

*The instrument should be calibrated after each restart.*

*The sample aspirating tubing **3** should be immersed in the PE bottle (6.1608.080) filled with ultra-pure water after each sample (or standard).*

#### 1 Set system manual.smt

⇒ Click on the yellow <**Sample**> button at the top right so that it changes to the green <**Start**> button.

⇒ Choose system **manual.smt** for item **System**.

#### 2 Calibration

⇒ Insert the free (dry) end of the sample aspirating tubing **3** into the MCAL standard with the lowest concentration (150 mg/L $H_3PO_4$ plus basic content of nitrate and sulfate). The MCAL standard bottles are supplied as accessories (6.2321.000).

⇒ Choose type "Calib(1)" for item **Run Type**.

⇒ Enter a selection, e.g. "Standard 1" for item **Ident**.

⇒ Start the determination by clicking on the green <Start> button and allow it to run through to the end.

⇒ After completion of this measurement, you should determine the other 5 MCAL standards one after the other (250, 350, 450, 550 and 650 mg/L $H_3PO_4$ plus basic content of nitrate and sulfate). When doing this, increase the type in increments in each case by 1 (Calib(X)) in item **Run Type** and adjust the entry in item **Ident** (this means that type "Calib(6)" should be set for the **Run Type** and “Standard 6” should be set for item **Ident** in the above example for measurement with the 650 mg/L standard).

⇒ In order to check calibration, you should also determine the MCAL QC check standard with 545 mg/L $H_3PO_4$ plus basic content of nitrate and sulfate at the end of the series of calibration measurements. Choose type “Sample” in item **Run Type** for this measurement.

**3 Sample determination**

⇒ Click on the yellow <**Sample**> button at the top right so that it changes to the green <**Start**> button.

⇒ System **manual.smt** should still be set in item **System** from calibration. If not, set it.

⇒ Choose type "Sample" for item **Run Type**.

⇒ Enter the name of the sample for item **Ident**.

⇒ Insert the free (dry) end of the sample aspirating tubing **3** into the sample vessel.

⇒ Start the determination by clicking on the green <**Start**> button. Answer the prompt **Sample ready?** and allow the determination to run through to the end.

### 5.1.2.3 Shutdown (manual operation / «IC Cap»)

*In order to avoid damage to the instrument, it should be rinsed with water before shutting down after the end of sample determination. This rinsing operation should be performed with system* ***shutdown.smt*** *(see Section 3.2.4).*

**1 Settings**

⇒ Click on the yellow <**Sample**> button at the top right so that it changes to the green <**Start**> button.

⇒ Choose system **shutdown.smt** for item **System**.

⇒ Choose type "Sample" for item **Run Type**.

⇒ Enter “Shutdown” for item **Ident**.

**2 Allow shutdown.smt to run**

⇒ Insert the free end of the sample aspirating tubing **3** into a container filled with water.

⇒ Start the system by clicking on the green <**Start**> button. Answer prompt **water as last sample?** (answer should be yes!) and allow the determination to run through to the end (7.10 minutes). High-pressure pump and peristaltic pump are switched off automatically at the end.

# 5.2 Operation with automated sample change

*The instrument must have been connected and the related software must have been installed in accordance with Section 2 before operation can be started.*

Switching on the equipment:

**1 Switch on the PC**

⇒ Switch on the PC

**2 Switch on the 761 SD Compact IC**

⇒ Switch on the 761 SD Compact IC with the mains switch **14** on the instrument rear panel. The pilot lamp **7** lights after switching on the instrument.

**3 Switch on the 766 IC Sample Processor**

⇒ Switch on the 766 IC Sample Processor (see *Instructions for Use 766 IC Sample Processor, Section 2.2.4*).

## 5.2.1 Control with «IC Net» (automated operation)

Launch the «IC Net» software and log in (see *Section 2.12.3*).

With automated sample change, it is possible to predefine the sequence of conditioning, calibration and sample determination with a sample table.

### 5.2.1.1 Preparing sample vessels (automated operation / «IC Net»)

**1 Prepare calibration standards**

⇒ Fill each of 6 sample vessels with and MCAL standard (150, 250, 350, 450, 550 and 650 mg/L $H_3PO_4$ plus basic content of nitrate and sulfate) and position them at the required position in the sample rack of the 766 IC Sample Processor. The MCAL standard bottles are supplied as accessories (6.2321.000).

**2 Prepare the samples**

⇒ Fill the sample vessels with the samples to be measured and position them at the required position in the sample rack.

**3 Prepare the rinsing solution**

⇒ Fill the special beakers at the rinsing position of the 766 IC Sample Processor with ultra-pure water.

### 5.2.1.2 Creating the sample table (automated operation / «IC Net»)

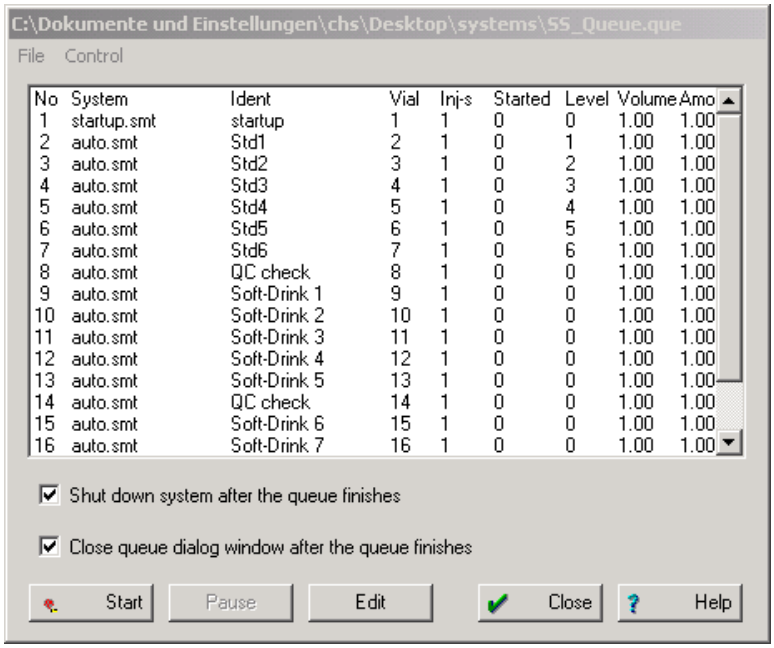
**1 Open a new sample table**

⇒ Choose **IC NET** / **File** / **Open** / **Sample Queue...** , the **OPEN SAMPLE QUEUE** window opens.

⇒ Enter a file name and choose <Open>.

**2 Create the sample table**

⇒ Create the sample table (see *Software Instructions for Use «IC Net 2.3», Section 9.2*). You should first perform a conditioning step with system **startup.smt**. Then perform the calibration measurements and sample determinations with system **auto.smt**. Assign the number for **Vial** to the rack positions you have selected. Example of a sample table:




⇒ If **Shut down system after the queue finishes** is activated, you do not need to run system **shutdown.smt** at the end.

*If your sample sequence corresponds to an existing sample table, you can open it with **IC NET** / **File** / **Open** / **Sample Queue...** or via a system **SYSTEMS** / **System** / **Sample Queue...** .*

### 5.2.1.3 Starting the sample table

Start the open sample table by clicking on <Start> (see *Software Instructions for Use «IC Net 2.3», Section 9.2.2*)

### 5.2.2 Control with «IC Cap» (automated operation)

Start the «IC Cap» software and log in (see *Section 2.12.4*).

*Configuration* **auto.cfg** *should have been installed during installation (see Section 2.12.2). If not, now load configuration* **auto.cfg** *(see Section 4.2.1).*

With automated sample change, it is possible to predefine the sequence of conditioning, calibration and sample determination with a sample table (queue).

#### 5.2.2.1 Preparing sample vessels (automated operation / «IC Cap»)

**1 Prepare calibration standards**

⇒ Fill each of the 6 sample vessels with an MCAL standard (150, 250, 350, 450, 550 and 650 mg/L $H_3PO_4$ plus basic content of nitrate and sulfate) and position them at the required position in the sample rack of the 766 IC Sample Processor. The MCAL standard bottles are supplied as accessories (6.2321.000).

**2 Prepare the samples**

⇒ Fill sample vessels with the samples to be measured and position them at the required position in the sample rack.

**3 Prepare the rinsing solution**

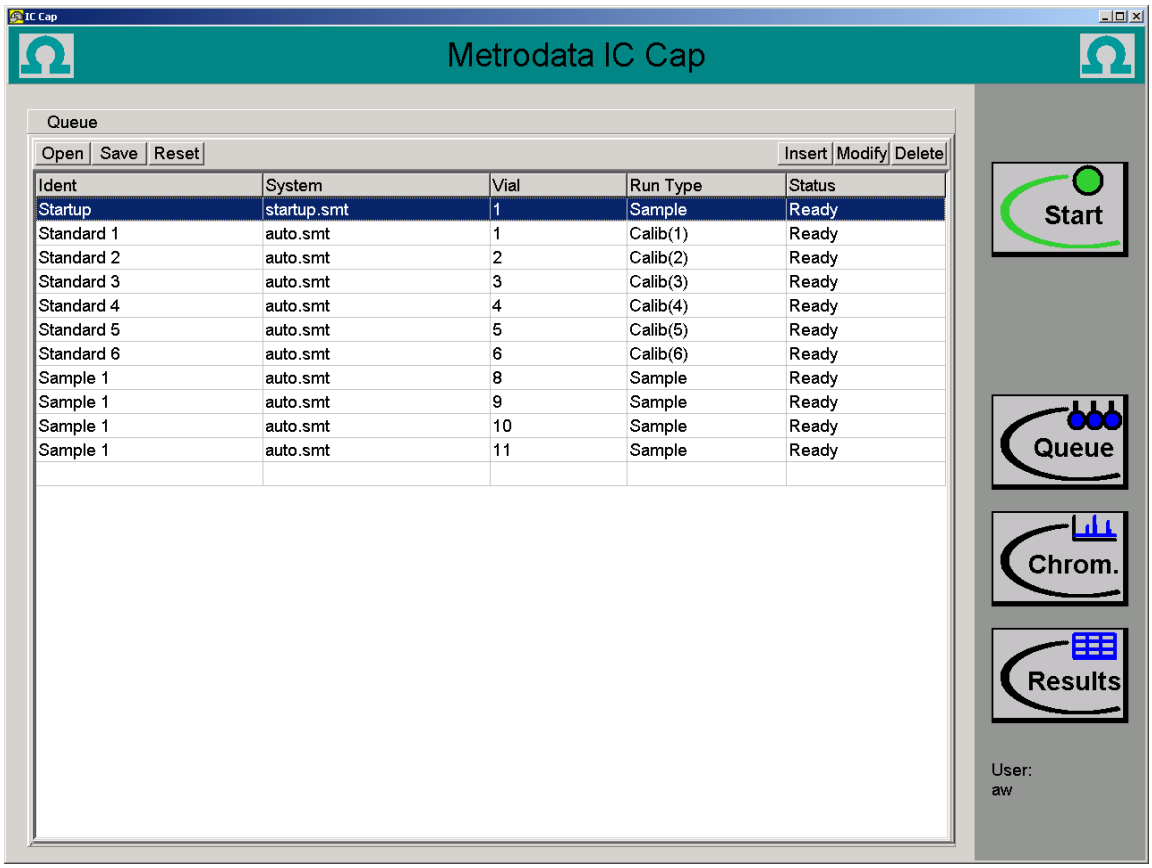
⇒ Fill the special beakers at the rinsing position of the 766 IC Sample Processor with ultra-pure water.

#### 5.2.2.2 Creating a sample table (automated operation / «IC Cap»)

⇒ After opening «IC Cap», the sample table (queue) should be displayed at the left-hand side of the screen (if configuration ***auto.cfg*** is loaded).

⇒ Create the sample table (see *Administrator Manual «IC Cap 2.0», Section 2.3*). First perform a conditioning step with system **startup.smt**. Then perform the calibration measurements and the sample determinations with the system **auto.smt**. Assign the number for **Vial** to the rack positions you have selected.

**Example of a sample table:**




| Ident | System | Vial | Run Type | Status |
|---|---|---|---|---|
| Startup | startup.smt | 1 | Sample | Ready |
| Standard 1 | auto.smt | 1 | Calib(1) | Ready |
| Standard 2 | auto.smt | 2 | Calib(2) | Ready |
| Standard 3 | auto.smt | 3 | Calib(3) | Ready |
| Standard 4 | auto.smt | 4 | Calib(4) | Ready |
| Standard 5 | auto.smt | 5 | Calib(5) | Ready |
| Standard 6 | auto.smt | 6 | Calib(6) | Ready |
| Sample 1 | auto.smt | 8 | Sample | Ready |
| Sample 1 | auto.smt | 9 | Sample | Ready |
| Sample 1 | auto.smt | 10 | Sample | Ready |
| Sample 1 | auto.smt | 11 | Sample | Ready |

⇒ If **Shut down system at the end** is activated on the **Queue** tab (of the **CONFIGURATION** window), you do not need to allow system **shutdown.smt** to run at the end.

### 5.2.2.3 Starting the sample table

The sample table (Queue) is started with the green <**Start**> button at the top right (see *Administrator Manual «IC Cap 2.0», Section 2.1*).

# 6 Notes – Maintenance – Faults

## 6.1 Practical notes on ion chromatography

### 6.1.1 Separating columns

#### Separation efficiency

If difficulties occur, always first check the quality of the column by recording a **standard chromatogram**.

You will find general tips on handling IC separating columns in **Metrohm Monography 8.732.2001 "Ion chromatography"**.

#### Protection

Using the interchangeable **Metrosup RP Guard** (6.1011.020) serves to protect the actual separating column and substantially prolongs its service life.

#### Storage

Always store separating columns closed and filled in accordance with the manufacturer's instructions when not in use.

#### Dead volume

Dead volume in the column can be the cause of extreme peak broadening or splitting (occurrence of double peaks).

#### Regeneration

If the separation properties of the column have deteriorated, it can be regenerated in accordance with the column manufacturer's specifications. The instructions for regeneration can be found on the leaflet enclosed with the column.

### 6.1.2 High-pressure pump

#### Pulsation dampener

It serves to reduce disturbing pulsations in the case of highly sensitive measurements and also offers protection against pressure shocks acting on the column material caused by injection (installation, see *Section 2.15*).

#### Maintenance

An unstable baseline (pulsation and flow rate fluctuations) is attributable to contaminated valves or defective, leaking piston seals in many cases.

**Contaminated valves** are cleaned by rinsing with water, RBS solution or acetone (see *Section 6.2.5*). When the cleaned valves are reinstalled, you must ensure that the flow direction is correct.

The procedure for **replacement of piston seals** is described in *Section 6.2.5*.

Salt crystals between the piston and the seal are the cause of abrasive particles which can contaminate the eluent. These lead to contaminated valves, pressure rise and, in extreme cases, to scratched pistons. It is thus essential to ensure that **no precipitates** can occur.

### 6.1.3 Eluents

The eluent for determining soft drinks is pre-prepared and packed in MPaks. If you wish to use your own eluents, please follow the conventional rules for eluent handling for IC.

### 6.1.4 Peristaltic pump

The pump tubing used by the peristaltic pump is consumable material with a limited lifetime and should be exchanged at regular intervals (approx. every 4 weeks under continuous use; see *Section 6.2.9*).

The working life of pump tubing depends to a considerable extent on contact pressure. This is why the contact pressure must be correctly set as described in *Section 2.14* and the tubing cartridges **57** must be fully raised by releasing the snap-action lever **59** on the right-hand side if the pump is to remain switched off for a lengthy period of time (this means that the optimum contact pressure, once set, remains unchanged).

### 6.1.5 Suppressor module

#### Protection

To avoid contamination of the suppressor module by foreign particles or bacterial growth, the two **filter units PEEK 56** (6.2821.120) must be fitted upstream of the suppressor module's inlet capillaries (see *Section 2.3.3*).

#### Operation

The **Metrohm Suppressor Module MSM** consists of a total of 3 suppressor units which are in turn used for suppression, regenerated with sulphuric acid and rinsed with back-flowing eluent. In order to record every new chromatogram under comparable conditions, work is normally carried out with freshly regenerated suppressor. Switchover occurs automatically together with valve switchover to **Fill**.

*The suppressor units must never be regenerated (with $H_2SO_4$) in the same flow direction used for the eluent.*

*The suppressor module must **never** be switched in dry state as there is a danger of blocking.*

#### Maintenance

In the event of reduced capacity or high counter-pressure, the suppressor module must be regenerated (*Section 6.2.6*), cleaned (*Section 6.2.7*) or exchanged (*Section 6.2.8*).

### 6.1.6 Connections

All connections between injector, column and detector must be as short as possible, have a low dead volume and must be absolutely tight.

# 6.2 Maintenance and servicing

## 6.2.1 General information

### Care

The 761 SD Compact IC requires proper care and attention. Excessive contamination of the instrument could possibly lead to malfunctions and a shorter service life of the inherently rugged mechanical and electronic parts.

For protection against escaping fluids, the two drain tubes for the inner compartment and for the bottle rack must be fitted (see *Section 2.5*).

Spilled chemicals and solvents should be wiped up immediately. It is especially important to protect the plug connections at the rear of the instrument (in particular, the mains plug) against contamination.

*Even though design measures virtually eliminate such a situation, should corrosive media penetrate the interior of the instrument, the mains plug of the 761 SD Compact IC must be immediately disconnected to prevent extensive damage to the instrument electronics. Inform Metrohm Service if your instrument(s) has or have been damaged in such a way.*

*The instrument may not be opened by untrained personnel. Please comply with the safety notes in Section 1.4.*

### Maintenance by Metrohm service

Maintenance of the 761 SD Compact IC is best done as part of an annual service performed by specialists from the Metrohm company. If work is frequently performed with caustic and corrosive chemicals, it may be necessary to shorten the interval between servicing.

The Metrohm servicing department is always willing to offer expert advice on the maintenance and servicing of all Metrohm instruments.

## 6.2.2 Passivation

Passivation of the complete IC system (without column) by rinsing with 20...50 mL 0.2 mol/L $HNO_3$ is required only if unusual changes to the measuring properties of the cell are observed. In this case, remove the separating column **36** from the 761 SD Compact IC and connect the two capillaries **35** and **37** (see *Figure 3*) directly together using a coupling **54** (6.2744.040).

## 6.2.3 Shutdown

If the 761 SD Compact IC is shut down for a considerable length of time, the entire IC system (**without** column and suppressor) must be

**rinsed** free of salt with methanol/water (1:4) to avoid crystallisation of eluent salts with the corresponding subsequent damage.

The connections to the separating column and suppressor module must be removed for rinsing. The two capillaries **35** and **37** (see *Figure 3*) must be directly connected together using a coupling **54** (6.2744.040). Rinse with methanol/water (1:4) until the conductivity drops below 10 µS/cm.

### 6.2.4 Changing separating columns

If you wish to replace the separating column **36** by a new column, proceed as follows:

**1 Remove old column**

- Switch off the high-pressure pump and wait for the pressure to drop.
- Unscrew the separating column **36** from the suppressor inlet capillary **37**.
- Unscrew the separating column **36** from the connection capillary **35**.

**2 Connect the new column to the injector**

- Remove the screw caps from the new separating column **36**.
- Screw the inlet end of the separating column **36** (note flow direction) to the connection capillary **35**.

**3 Rinse the column**

- Place a beaker beneath the column outlet.
- Switch on the high-pressure pump and rinse the column with eluent for approx. 10 minutes, then switch off the pump.

**4 Connect the column to the suppressor**

- Screw the outlet end of the separating column **36** to the suppressor inlet capillary **37**.

### 6.2.5 Maintenance work on the pump head

In many cases, an unstable baseline (pulsation or flow rate fluctuations) can be traced to contaminated valves or faulty, leaking piston seals on the high-pressure pump. Proceed as follows for cleaning contaminated valves and/or replacement of parts subject to wear such as pistons, piston seals and valves:

### 1 Detach the pump head

- Disconnect the "tubing connection to the eluent MPak" **23** (with PEEK coupling **55**) from the aspirating capillary on the pump head **24** and detach it.
- Unscrew the connection capillary **25** from the pump head **24**.
- Remove the pump head **24** by slackening the 4 securing screws on the front of the pump head with the aid of the Allen key 6.2621.030 from the pump housing. The main piston is located at the left (when viewed from the front) and the auxiliary piston is located at the right.

### 2 Dismantle the pump head

- Strip down the pump head **24** in accordance with *Figure 15* into its components. The main piston and auxiliary piston are identical, apart from the following exceptions:
  - The spring **71** of the auxiliary piston (right-hand piston) is more powerful (longer) than that of the main piston (left-hand piston).
  - The inlet and outlet valve are not present in the secondary cylinder.

*In order to prevent the piston **69** suddenly jumping out of the piston cartridge **72**, the screw **68** must be undone very carefully by hand.*

### 3 Clean/replace the pistons 69

- Pistons contaminated by abrasive particles or deposits are cleaned with scouring powder and rinsed free of any particles with distilled water.
- More heavily contaminated or scratched pistons must be replaced (spare part: zirconium piston 6.2824.070).

### 4 Replace piston seal 76

- Use the special tool **80** to remove damaged piston seals **76**. The tool must be screwed into the seal **76** which can then be pulled out (see *Figure 16A*).

*When the special tool **80** is screwed into the piston seal **76**, the latter is destroyed completely!*

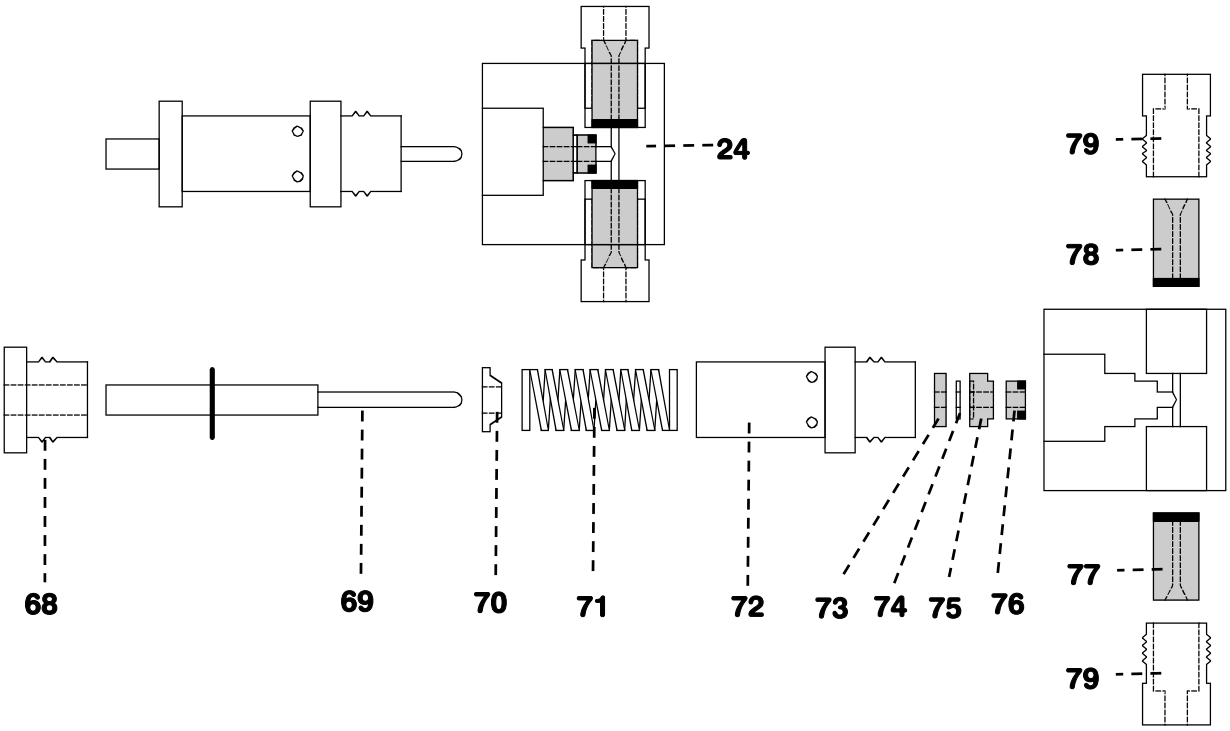



*Figure 15: Components of the pump head*

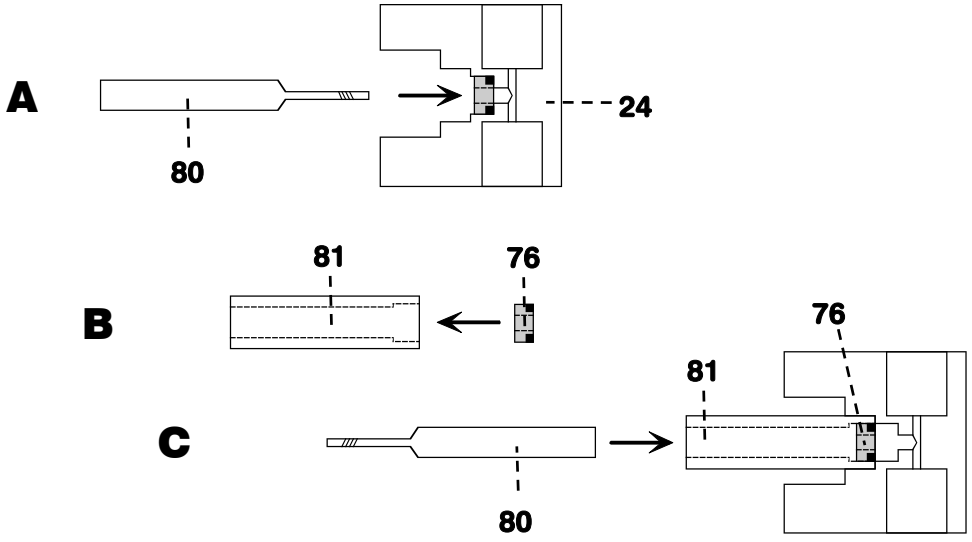



*Figure 16: Replacement of the piston seal **76***

**24** **Pump head 6.2824.100**

**68** **Screw** for piston cartridge **72**

**69** **Zirconium piston 6.2824.070** with piston shaft

**70** **Spring retainer**

**71** **Spring 6.2824.050** (for main piston) or **Spring 6.2824.060** (for auxiliary piston)

**72** **Piston cartridge 4.709.0760**

**73** **Piston guide sleeve 4.709.4380**

**74** **Sapphire supporting ring 6.2824.030**

**75** **Piston guide sleeve 4.709.4370**

**76** **Piston seal 6.2741.020**

**77** **Inlet valve 6.2824.090**

**78** **Outlet valve 6.2824.080**

**79** **Screw holder** for valve

**80** **Special tool 6.2617.010** for removing the piston seal **76**

**81** **Special tool 6.2617.010** for fitting the piston seal **76**

- Use the special tool **81** to fit a new piston seal **76**.
- First firmly fit the new seal by hand into the recess in the tool **81** (see *Figure 16B*). The seal spring must be located on the outside.
- Then insert the tool **81**, together with the seal, in the pump head **24** and use the tool **80** to press the seal into the pump head recess (see *Figure 16C*).

*The seal surface in the pump head **24** may not be damaged (avoid contact with tool)!*

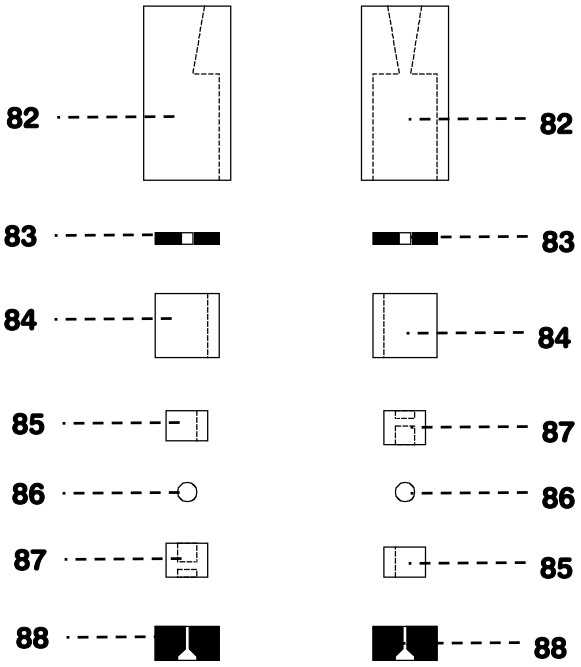
### 5 Clean/replace inlet valve 77 and outlet valve 78

- Clean contaminated or blocked valves by rinsing with distilled water, RBS solution or acetone.
- If this does not have the desired effect, the valve can be dismantled as shown in *Figure 17*. The valve components must be pushed out of the housing using the tool 6.2617.020. The individual components can then be rinsed with distilled water and/or acetone, and the sapphire sphere cleaned with a paper towel. Then reassemble the valve in accordance with *Figure 17*. The components of the inlet and outlet valves are identical. They are distinguished only by the positioning of the sapphire sleeve **85** and the ceramic holder **87** (see *Figure 17*).
- Valves which fail to function faultlessly after such cleaning must be replaced.
- When reinstalling the inlet valve **77** or outlet valve **78**, on no account may the two outwardly identical valves be interchanged. In order to determine which valve is which, note that the fluid flows through the pump head from bottom to top. The flow direction of the valves can be checked simply by blowing through the clean valve. Both valves must be fitted with the black face pointing in the direction of the pump head (see *Figure 15*).

*If an inlet valve **77** is installed by mistake instead of the outlet valve **78**, an extreme pressure build-up occurs within the working cylinder, and this is not detected by the pressure transducer and will destroy the piston seal **76**!*

### 6 Fit the pump head

- Reassemble the components of the pump head **24** as shown in *Figure 15.* Tighten the screw **68** by hand. First screw in the piston cartridge **72** fully and then tighten it a further 15° with a spanner. Firmly tighten the two valve screw holders **79** with a spanner.
- Reattach the pump head **24** to the pump with the four securing screws. Tighten the screws when doing this with the Allen key 6.2621.030.
- Screw the connection capillary **25** back onto the pump head **24**.
- Connect the PEEK capillary **55** back onto the aspirating capillary on the pump head **24**.




**82 Valve housing**

**83 Sealing ring** (black)

**84 Sleeve**

**85 Sapphire sleeve**
The bright side must point towards the sapphire sphere

**86 Sapphire sphere**

**87 Ceramic holder for sapphire sphere**

**88 Seal**
The larger opening must point outwards.

***Figure 17: Components of inlet valve 77 and outlet valve 78***

*The rear side of the pump is provided with differing bore depths for the securing pins, i.e. one securing pin is longer than all the others, so as to prevent the pump head being positioned the wrong way round. Consequently, the deepest bore must be assigned to the longest pin. If this is not the case, the pump will not function correctly.*

## 6.2.6 Regeneration of the suppressor module

### Regeneration of a suppressor operating at reduced capacity

If the suppressor units are exposed to certain heavy metals (e.g. iron) or organic contaminants for long periods of time, these can no longer be completely removed by the regeneration solution (100 mmol/L $H_2SO_4$) normally used. This diminishes the capacity of the suppressor units which, in milder cases, results in a reduced sensitivity to phosphates and, in severe cases, results in a strong increase in the baseline and/or pressure rise. If such capacity problems occur at one or several positions, the corresponding suppressor units must be treated as follows:

**1 Disconnect the suppressor from the IC system**

- Disconnect the suppressor from the separating column and detector.

**2 Regenerate the suppressor**

- Rinse each suppressor unit for approx. 15 minutes with one of the following solutions:

**Contamination with heavy metals**

1 mol/L $H_2SO_4$ + 0.1 mol/L oxalic acid

**Contamination with organic cationic complexing agents**

0.1 mol/L $H_2SO_4$ / 0.1 mol/L oxalic acid / acetone 5 %

**Severe contamination with organic substances**

0.2 mol/L $H_2SO_4$ / acetone ≥ 20 %

**3 Connect the suppressor to the IC system**

- Reconnect the suppressor to the IC system. If capacity problems persist, replace the suppressor rotor (see *Section 6.2.8*).

### Regeneration of the suppressor in the case of high counter-pressure

If excessive counter-pressure is observed in one or several suppressor units, treat the units as follows:

**1 Disconnect the suppressor from the IC system**

- Disconnect the suppressor from the separating column and detector.

**2 Regenerate the suppressor**

- Connect the inlet capillary **45** marked "H2SO4" to the “inlet capillary to injector” **31** using the PEEK coupling **54** (see *Figure 3*). This connects the suppressor module directly to the high-pressure pump.
- Set the flow rate for the high-pressure pump to 0.5 mL/min and rinse the suppressor unit with 1 mol/L $H_2SO_4$ for 5…10 minutes.
- As the pressure falls, slowly increase the flow at the high-pressure pump to 2 mL/min. Do not exceed the maximum pressure of 2 MPa (20 bar).
- Switch off the high-pressure pump.
- Switch the suppressor to the next position using the Step button.
- Set the flow rate for the high-pressure pump to 0.5 mL/min and rinse the suppressor unit with 1 mol/L $H_2SO_4$ for 5…10 minutes.
- As the pressure falls, slowly increase the flow rate at the high-pressure pump to 2 mL/min. Do not exceed the maximum pressure of 2 MPa (20 bar).
- Switch off the high-pressure pump.
- Switch the suppressor to the next position using the Step button.
- Set the flow rate for the high-pressure pump to 0.5 mL/min and rinse the suppressor unit with 1 mol/L $H_2SO_4$ for 5…10 minutes.
- As the pressure falls, slowly increase the flow rate at the high-pressure pump to 2 mL/min. Do not exceed the maximum pressure of 2 MPa (20 bar).
- Switch off the high-pressure pump.

**3 Connect the suppressor to the IC system**

- Reconnect the suppressor inlet capillaries **45** and **42** normally again (see *Figure 3*).
- If the pressure problems persist, replace the suppressor rotor (see *Section 6.2.8*).

### 6.2.7 Cleaning the suppressor

It may be necessary to clean the suppressor in the following cases:

- Increased counter-pressure on the suppressor connection tubing
- Irremediable blockage of the suppressor
  (Solutions can no longer be pumped through the suppressor)
- Irremediable obstruction of the suppressor
  (The suppressor can no longer be switched to the next position)

Proceed as follows (see *Figure 18*) to clean the connector and the suppressor rotor:

**1 Disconnect the suppressor from the IC system**

- Disconnect the suppressor inlet capillary ("Eluent") **37** from the separating column **36**.
- Disconnect the suppressor outlet capillary ("Detector") **38** from the "inlet capillary to detector block" **39**.
- Disconnect the inlet capillaries ("H2O") **42** and ("H2SO4") **45** from the filter units **56**.

**2 Dismantle the suppressor**

- Unscrew the nut **89** from the suppressor holder **92**.
- Pull out the connector **90** and suppressor rotor **91** from the suppressor holder **92** (the connector and rotor normally stick together).
- Detach the connector **90** from the suppressor rotor **91**.

**3 Clean the inlet and outlet capillaries**

- Connect each of the 6 capillary tubings attached to connector **90** to the high-pressure pump one after the other and pump through ultra-pure water.
- Check whether the solution emerges from the connector **90**. If one of the inlet or outlet capillaries remains blocked, replace the connector **90** (order number 6.2832.010).

**4 Clean the suppressor rotor**

- Clean the sealing surface of the suppressor rotor **91** using a lint-free cloth and ethanol.

### 5 Insert the suppressor rotor

- Insert the suppressor rotor **91** into the suppressor holder **92** in such a way that the tubing connections at the rear of the rotor fit in the corresponding openings inside of the holder and that one of the three holes in the rotor can be seen from below in the opening in the holder.
- If the rotor has been inserted correctly, its sealing surface will be approx. 4 mm inside of the holder. If this is not the case, move the rotor into the correct position from below with the aid of a sharp object (e.g. screwdriver)

### 6 Clean the connector

- Clean the sealing surface of the connector **90** using a lint-free cloth and ethanol.

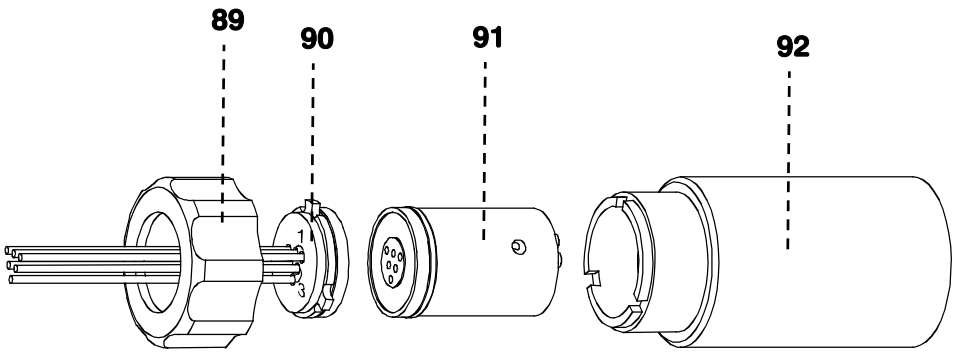



*Figure 18: Assembling the suppressor*

**89** Nut

**90** Connector 6.2832.010 with inlet and outlet capillaries

**91** Suppressor rotor 6.2832.000

**92** Suppressor holder

### 7 Insert the connector

- Fit the connector **90** onto the suppressor holder **92** in such a way that connection "1" is at the top and that the three lugs on the connector fit in the corresponding openings of the holder.
- Screw the nut **89** onto the thread of the suppressor holder **92** by hand (**do not** use tools).

### 8 Connect and condition the suppressor

- Reconnect the suppressor to the IC system.
- Before switching the suppressor to the next position, rinse all three suppressor units with solution for 5 minutes.

### 6.2.8 Replacing the suppressor

The suppressor in the suppressor block may have to be replaced in the following cases:

- Irremediable loss of suppressor capacity (reduced phosphate sensitivity and/or major rise in baseline)
- Irremediable blockage of the suppressor (Solutions can no longer be pumped through the suppressor)

Both the suppressor rotor 6.2832.000 and the connector 6.2832.010 with the inlet and outlet capillaries can be replaced. Proceed as follows in order to replace these components (see *Figure 18*):

**1 Disconnect the suppressor from the IC system**

- Disconnect all inlet and outlet capillaries of the suppressor from the IC system and peristaltic pump.

**2 Dismantle the suppressor**

- Unscrew the nut **89** from the suppressor holder **92**.
- Pull out the connector **90** and suppressor rotor **91** from the suppressor holder **92** (the connector and the rotor normally stick together).
- Detach the connector **90** from the suppressor rotor **91**.

**3 Clean the suppressor rotor**

- Clean the sealing surface of the new suppressor rotors **91** (6.2832.000) using a lint-free cloth and ethanol.

**4 Insert the suppressor rotor**

- Insert the new suppressor rotor **91** in the suppressor holder **92** in such a way that the tubing connections at the rear of the rotor fit in the corresponding openings inside the holder and that one of the three holes in the rotor can be seen below in the opening in the holder.
- If the rotor has been inserted correctly, its sealing surface will be approx. 4 mm inside of the holder. If this is not the case, move the rotor into the correct position from below with the aid of a sharp object (e.g. screwdriver).

**5 Clean the connector**

- Clean the sealing surface of the new connector **90** (6.2832.010) with the aid of a lint-free cloth and ethanol.

**6 Insert the connector**

- Fit the new connector **90** onto the suppressor holder **92** in such a way that connection "1" is at the top and that the three lugs on the connector fit in the corresponding openings of the holder.
- Screw the nut **89** onto the thread of the suppressor holder **92** by hand (do not use tools).

**7 Connect and condition the suppressor**

- Reconnect the suppressor to the IC system.
- Before switching the suppressor to the next position for first time, rinse all three suppressors with solution for 5 minutes.

### 6.2.9 Replacing the pump tubing

The pump tubing **61** and **64** used in the peristaltic pump are consumable material with a limited lifetime and should be exchanged at regular intervals (approx. every 4 weeks under continuous use).

The working life of pump tubing depends to a considerable extent on the contact pressure. This is why the contact pressure must be correctly set as described in *Section 2.14*. If the pump is to remain switched off for a lengthy period of time, the tubing cartridges **57** should be raised completely by loosening the snap-action lever **59** on the right-hand side (once set, the contact pressure remains unchanged).

As the pump is always operated on the same side, the supplied pump tubing 6.1826.110 can be used on both sides. Proceed as follows in order to exchange pump tubing:

**1 Remove the old pump tubing**

- Press the contact pressure lever **58** on the tubing cartridge **57** down as far as it will go.
- Release the tubing cartridge **57** from the holding clamp by pressing down the snap-action lever **59** and remove from the mounting pin.
- Remove the old pump tubing **61** or **64**.

**2 Insert the new pump tubing**

- Insert the new pump tubing **61** or **64** in the tubing cartridge **57** as shown in *Figure 8* or *Figure 10*. The stopper **62** must click into the corresponding holder on the left-hand side of the tubing cartridge.
- Place the tubing cartridge **57** on the mounting pin and press down on the right-hand side until the snap-action lever **59** clicks into position on the holding clamp. Take care that no kinks are formed on the pump tubing.

**3 Set contact pressure**

- Switch on the peristaltic pump.
- Press the contact pressure lever **58** upwards until the solution just starts to be aspirated. Then press the contact pressure lever upwards until it clicks once more to obtain optimal contact pressure.
- Switch off the peristaltic pump.

# 6.3 Faults and malfunctions

## 6.3.1 Error messages

If any type of malfunction occurs during operation of the 761 SD Compact IC, this is shown by error messages in the PC program, which appear either in an error window or in the **SYSTEM STATE** window.

Follow the instructions listed in the **Error window** and close this window with **<OK>**.

You fill find further details of the error messages of the **SYSTEM STATE** window, their possible causes and the procedure for rectifying them in the *Software Instructions for Use «IC Net 2.3» Section 4.5*.

## 6.3.2 Malfunctions and their rectification

If difficulties appear with The 761 SD Compact IC during analyses, their causes are best investigated in The order **separating column → high-pressure pump → eluent → connections**. Several of The malfunctions which may appear are listed in The following table with details of possible causes and countermeasures.

| *Malfunction* | *Cause* | *Rectification* |
|---|---|---|
| **Baseline with high noise level, pulsation** | • Contaminated pump valves<br>• Defective piston seals | • Clean the valves (see *Section 6.2.5*)<br>• Replace the piston seals (see *Section 6.2.5*) |
| **Drift of the baseline** | • Thermal equilibrium not yet reached<br>• Leakage in the system | • Condition system with heating switched on<br>• Check connections and seal them |
| **Considerable pressure drop** | • Leakage in the system | • Check connections and seal them |
| **Considerable pressure rise** | • Blockage of filter unit PEEK 6.2821.120<br>• Change of column packing by injection of contaminated samples | • Replace the filter 6.2821.130 (see *Section 2.3.3*)<br>• Regenerate the column or replace the column (see *Section 6.2.4*)<br>*Note:*<br>*Samples should always be microfiltered* |
| **Chromatograms with poor resolution, Change in the retention times** | • Deterioration in separation efficiency of the IC column | • Regenerate the column or replace the column (see *Section 6.2.4*) |
| **Extreme peak broadening, splitting (double peaks)** | • Dead volume at the column ends | • Regenerate the column (see *Section 6.2.4*) |

| *Malfunction* | *Cause* | *Rectification* |
|---|---|---|
| **No feed of regeneration or rinsing solution for the suppressor** | • Contact pressure too low<br>• Leakage in the system<br>• Defective pump tubing<br>• Contamination of the filter in the filter unit PEEK 6.2821.120<br>• Counter-pressure at suppressor module too high | • Adjust contact pressure (see *Section 2.14*)<br>• Check connections<br>• Replace pump tubing (see *Section 6.2.9*)<br>• Replace the filter 6.2821.130 (see *Section 2.3.3*)<br>• Clean or replace the suppressor (see *Sections 6.2.6…6.2.8*) |

## 6.4 Diagnostic tests / Validation / GLP

The requirements of **GLP** (**G**ood **L**aboratory **P**ractice) include a periodic check of analytical measuring instruments with regard to their reproducibility and accuracy using **S**tandard **O**perating **P**rocedures, **SOP**.

Under the title **«Application Bulletin No. 277 – Validation of Metrohm ion chromatographs»** an example of such a standard operating procedure is available from Metrohm; it can be adapted and used with the 761 SD Compact IC.

Further information on the subjects of QA, GLP and validation can also be found in the brochure «**Quality management with Metrohm**», which is available from your local Metrohm agency.

Testing of the electronic and mechanical function groups of Metrohm instruments can and should be performed as part of a regular service by trained personnel of the manufacturing company (see *section 6.2.1*). All Metrohm instruments are equipped with start-up-test routines which check for perfect functioning of the relevant assemblies when the instrument is switched on. If no error message is displayed, it may be assumed the instrument is operating without faults.

The Metrohm company also supplies its instruments with an integrated diagnostic program which, in the case of possible malfunctions or faulty behaviour, allows the service technician to check the functioning of certain assemblies and localize the fault.

# 7 Appendix

## 7.1 Technical data

*Unless otherwise specified, the published data comprises typical values for the 761 SD Compact IC at an ambient temperature of 25 °C.*

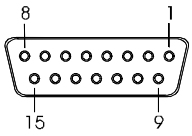
### 7.1.1 Conductivity measurement

| | |
|---|---|
| *Measurement range 1* | 0…1000 µS/cm (resolution: 0.56 nS/cm) |
| *Measurement range 2* | 0…250 µS/cm (resolution: 0.14 nS/cm) |
| *Measurement range 3* | 0…50 µS/cm (resolution: 0.028 nS/cm) |
| *Maximum error* | ± 1 % of full scale value and<br>± 1 % of measurement value (k = 16.7/cm) |
| *Linearity* | Deviations < ± 0.5 % of full scale value |
| *Noise* | |
| *Measurement range 1* | typ. 10 nS/cm |
| *Measurement range 2* | typ. 2.5 nS/cm |
| *Measurement range 3* | typ. 0.5 nS/cm |
| *Drift (electronic)* | typ. < 10 ppm/h of full scale value |
| *Temperature dependence* | typ. < 40 ppm/°C of full scale value |
| *Reserve range* | > 33 % (k = 16.7/cm) |
| *Sampling rate* | 10 measurements/s (fixed) |

### 7.1.2 Conductivity detector

| | |
|---|---|
| *Construction* | Thermostatted conductivity detector with<br>2 ring-shaped steel electrodes |
| *Measurement principle* | Alternating current measurement with 1 kHz frequency and ca. 1.7 V amplitude (peak to peak). |
| *Cell volume* | 1.5 µL |
| *Cell constant* | approx. 17 /cm (the exact value is printed on the detector) |
| *Maximum back pressure for measuring cell* | 5.0 MPa (50 bar) |
| *Thermostatting* | Connectable dynamic control to adjustable operating temperature |
| *Operating temperature* | Adjustable in steps of 5°C from 25…45°C |

| | |
|---|---|
| *Max. temperature deviation* | ± 2.5°C |
| *Heating time* | ≥ 30 min |
| *Temperature stability* | ≤ 0.01°C at constant ambient temperature |
| *Connection for detector block* | Dsub 15 pin (female) |




### 7.1.3 Injection valve

| | |
|---|---|
| *Actuator switching duration* | 100…150 ms |
| *Pressure resistance* | 25 MPa (250 bar) |

### 7.1.4 High-pressure pump

| | |
|---|---|
| *Type* | Serial dual piston pump with two valves |
| *Pump capacity* | |
| *Flow range* | 0.20...2.5 mL/min |
| *Maximum error* | < ± 2 % of set value |
| *Flow constancy* | < 0.5 % of set value |
| *Reproducibility of eluent flow* | typ. better than ± 0.1 % |
| *Pressure measurement* | |
| *Pressure range* | 0...25.0 MPa (0...250 bar) |
| *Residual pulsation* | < 10 % (at 1 mL/min water and 10 MPa pressure, without pulsation dampener) |
| *Measurement principle* | Piezoresistive measurement<br>Response time: 3 ms<br>Measurement volume: ca. 50 µL |
| *Maximum error* | ± 3 % of set value |
| *Resolution* | 0.1 MPa (conductivity measurements)<br>0.01 MPa (pressure measurements) |
| *Sampling rate* | 1 measurement/piston stroke (pump running)<br>1 measurement/s (pump not running)<br>10 measurements/s (pressure measurements) |
| *Safety shutdown* | |
| *Function* | Automatic shutdown when upper and lower pressure limits violated |
| *Maximum pressure limit* | adjustable between 0.1...25.0 MPa (1...250 bar)<br>Response time: 1 pump cycle |
| *Minimum pressure limit* | adjustable between 0.1 ... 25.0 MPa (1...250 bar), inactive at 0 MPa<br>Response time: 5 pump cycles |
| *Pump head* | |
| *Pump head volumes* | Main piston: 40 µL<br>Priming piston: 20 µL |

| | | |
|---|---|---|
| *Pump displacement volumes* | Main piston:<br>Priming piston: | 28.5 µL<br>14.25 µL |
| *Length of stroke* | Main piston:<br>Priming piston: | 3.6 mm<br>1.8 mm |

### 7.1.5 Peristaltic pump

*Type* 2-channel peristaltic pump

*Pump capacity*

*Rotational speed* 20 U/min at 50 Hz
24 U/min at 60 Hz

*Flow range* 0.4…0.5 mL/min with 6.1826.110 / 6.1826.040 Pump tubing

*Maximum error* ± 5 %

*Maximum pressure* 0.4 MPa (4 bar)

*Pumpable liquids* Clear liquids with no solid contents

*Pump tubing material* PP (polypropylene)

### 7.1.6 Suppressor module

*Switching duration* 140 ms

*Pressure resistance* 2.5 MPa (25 bar)

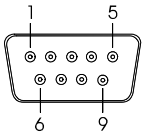
### 7.1.7 Leak detector

*Type* Detector with 2 electrodes approx. 1 mm above base of interior

*Response level* Resistance $< 1$ MΩ (for deion. water)

### 7.1.8 RS232 interface

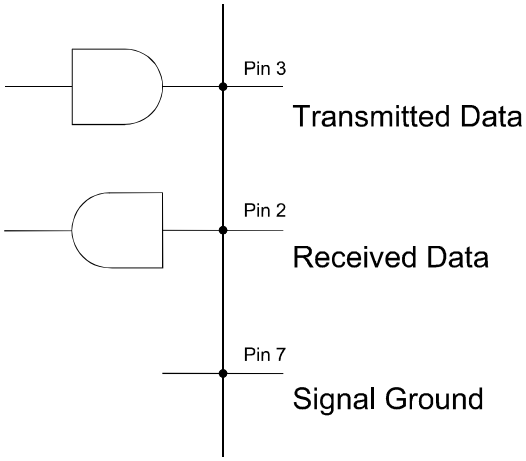
*Connector* Dsub 9 pin (male)




*Function* TxD and RxD signal for connection with software handshake

*Default settings* 9600 baud, 8 bit, 1 stop bit, no parity, XON/XOFF

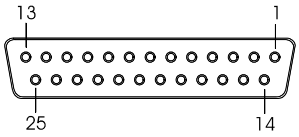
*Pin assignment*



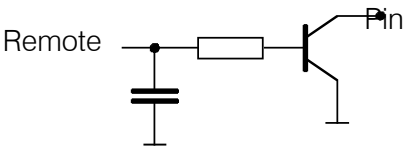

## 7.1.9 Remote interface

*Connector*

Dsub 25 pin (female)



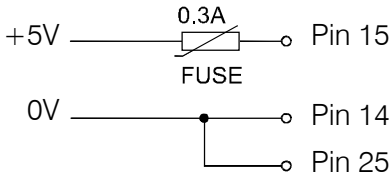

*Circuit diagram for output lines 1…8*




*Assignment of output lines 1…8*

| | | |
|---|---|---|
| Remote 1 | Pin | 18 |
| Remote 2 | Pin | 4 |
| Remote 3 | Pin | 3 |
| Remote 4 | Pin | 1 |
| Remote 5 | Pin | 2 |
| Remote 6 | Pin | 16 |
| Remote 7 | Pin | 17 |
| Remote 8 | Pin | 5 |

*Potentials*




## 7.1.10 Mains connection

*Voltage*

115 V: 100...120 V ± 10 %
230 V: 220...240 V ± 10 %

*Frequency*

50...60 Hz

*Power consumption*

100 VA

*Fuse*

5 mm dia., 20 mm length
100…120 V: 1.0 A (slow-blow)
220…240 V: 0.5 A (slow-blow)

### 7.1.11 Safety specifications

| | |
|---|---|
| *Construction/testing* | According to IEC/EN 61010-1 / UL 3101-1, protection class 1, degree of protection IP20 |
| *Safety directions* | The Instructions for Use include information and warnings which must be heeded by the user to assure safe operation of the instrument. |

### 7.1.12 Electromagnetic compatibility (EMC)

| | |
|---|---|
| *Emitted interference* | Standards met:<br>-IEC/EN 61326<br>-EN 55022<br>-CISPR 22<br>-IEC/EN 61000-3-2<br>-IEC/EN 61000-3-3 |
| *Immunity to interference* | Standards met:<br>- EN/IEC 61326<br>- EN/IEC 61000-4-2<br>- EN/IEC 61000-4-3<br>- EN/IEC 61000-4-4<br>- EN/IEC 61000-4-5<br>- EN/IEC 61000-4-6<br>- EN/IEC 61000-4-11<br>- EN/IEC 61000-4-14 |

### 7.1.13 Ambient temperature

| | |
|---|---|
| *Nominal operating range* | +5…+45°C<br>(at 20…80 % atmospheric humidity) |
| *Storage* | –20…+70°C |
| *Transport* | –40…+70°C |

### 7.1.14 Housing

| | |
|---|---|
| *Material of cover* | Polyurethane rigid foam (PUR) with fire protection for fire class UL94VO, CFC-free |
| *Material of base* | Steel, enamelled |
| *Width* | 259 mm |
| *Height* | 446 mm |
| *Depth* | 355 mm |
| *Weight* | |
| *761 SD Compact IC* | 14.7 kg (without accessories) |
| *766 IC Sample Processor* | 12.3 kg (without accessories) |

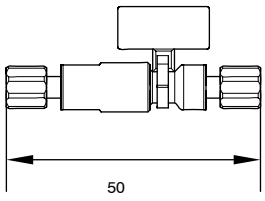
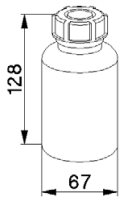
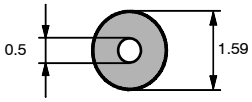
## 7.2 Standard equipment

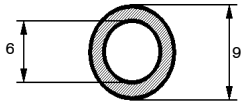
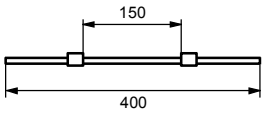
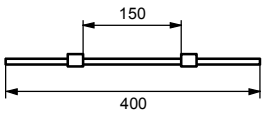
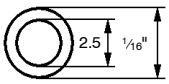
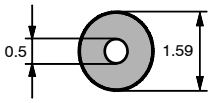
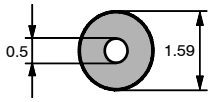
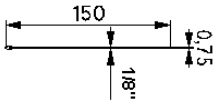
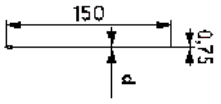
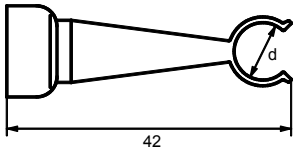
*Subject to changes !*
*All dimensions are given in mm.*

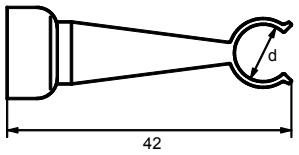
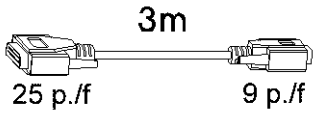
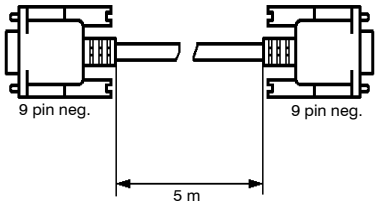
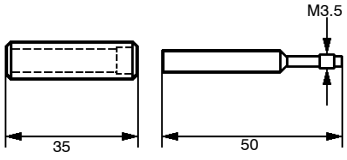
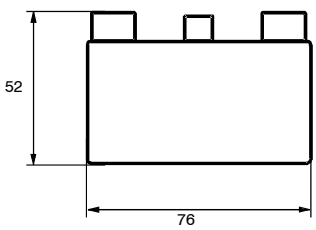
The 761 Compact IC is available in two versions:

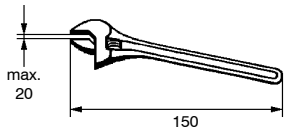
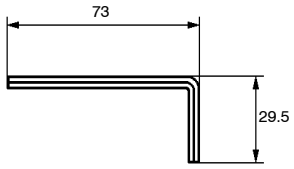
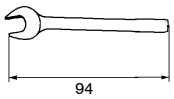
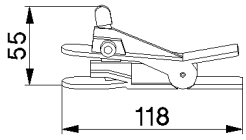
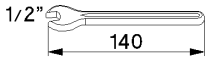
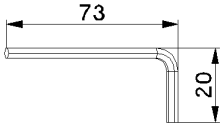
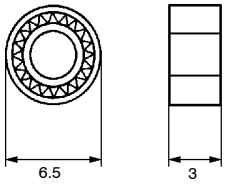
- **2.761.0420** 761 SD Compact IC
- **2.761.0520** 761 SD Compact IC with 766 IC Sample Processor

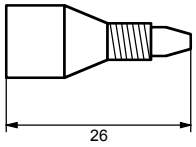
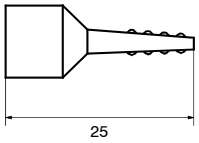
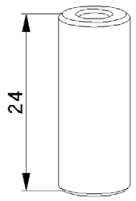
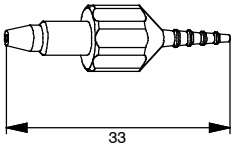
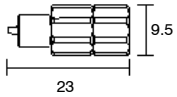
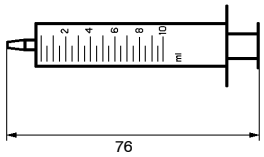
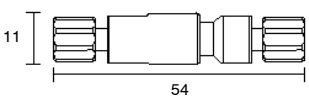
These instruments include the following parts:

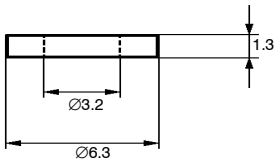
| Quant. | | Order No. | Description |
|---|---|---|---|
| 2.761.0420 | 2.761.0520 | | |
| 1 | 1 | 1.761.0420 | **Compact IC with Suppressor** (Soft Drink variant) |
| 1 | 1 | 1.732.0420 | **Detector block** (metal-free)<br>with permanently attached connecting cable to 761 SD Compact IC |
| - | 1 | 1.766.0010 | **766 IC Sample Processor** |
| 1 | 1 | 6.1005.350 | **Metrosep A Supp 1 HS**<br>IC - separation column |
| 1 | 1 | 6.1011.020 | **Metrosep RP Guard**<br>Pre-column for the protection of the separation column<br>  |
| 1 | 1 | 6.1011.120 | **RP Guard replacement filter**<br>Set of 10k |
| 1 | 3 | 6.1608.080 | **PE Bottle**<br>300 mL<br>  |
| 1 | 1 | 6.1803.030 | **PTFE capillary**<br>i.d. = 0.5<br>Length = 3 m<br>  |

| Quant. | | Order No. | Description |
|---|---|---|---|
| 2.761.0420 | 2.761.0520 | | |
| 2 | 2 | 6.1816.020 | **Silicone tubing**<br>Drain tube for inner compartment MPak cabinet,<br>Length = 1 m   |
| - | 2 | 6.1826.040 | **Pump tubing for Sample Processor**<br>made of PVC with 2 firmly attached stoppers(black-black);<br>i.d. = 0.8 mm, Length = 0.4 m   |
| 4 | 4 | 6.1826.110 | **Pump tubing**<br>made of PVC with 2 firmly attached stoppers (orange-yellow);<br>i.d. = 0.51 mm, Length = 0.4 m   |
| 1 | 1 | 6.1831.010 | **PEEK capillary**<br>Length = 3 m   |
| - | 1 | 6.1831.050 | **PEEK capillary**<br>Length = 0.4 m   |
| - | 2 | 6.1831.060 | **PEEK capillary**<br>Length = 1 m   |
| - | 1 | 6.1835.010 | **PEEK needle**<br>For aspiration of solutions from sealed sample tubes   |
| - | 1 | 6.1835.020 | **PEEK needle**<br>For aspiration of solutions from open sample tubes   |
| 2 | 2 | 6.1837.000 | **Tubing connection to MPak**<br>Connection to Eluent- and Regenerant MPak, with PEEK coupling (**55**) 4.455.4500<br><br>Length = 1.5 m |
| 1 | 1 | 6.2027.030 | **Column holder**<br>Diameter d = 8.5 mm   |

| Quant. | | Order No. | Description |
|---|---|---|---|
| 2.761.0420 | 2.761.0520 | | |
| 1 | 1 | 6.2027.040 | **Column holder**<br>Diameter d = 11.3 mm<br>  |
| - | 1 | 6.2041.430 | **Sample rack (M129-2)**<br>for 127 sample tubes 6.2743.050 (11 mL) and<br>2 PE bottles 6.1608.080 (300 mL) |
| 1 | 1 | 6.2062.000 | **MPak cabinet**<br>Rack for Eluent- and Regenerant MPaks |
| - | 1 | 6.2125.110 | **Connecting cable**<br>Connecting cable<br>766 IC Sample Processor – PC<br>  |
| 1 | 1 | 6.2134.100 | **Connecting cable**<br>Connecting cable 761 SD Compact IC (RS232) – PC<br>  |
| - | 1 | 6.2142.010 | **Keyboard**<br>for 766 IC Sample Processor |
| 1 | 1 | 6.2321.000 | **MCAL H3PO4 Validation Kit**<br>Standards of 150, 250, 350, 450, 550, 650 mg/L $H_3PO_4$ plus basic content of nitrate and sulfate;<br>and a QC check standard of 545 mg/L $H_3PO_4$ plus basic content of nitrate and sulfate |
| 1 | 1 | 6.2617.010 | **Special tool**<br>For removing/fitting the piston seal of the pump head.<br>  |
| 1 | 1 | 6.2620.150 | **Pulsation dampener MF**<br>Metal-free pulsation dampener to reduce pulsation and prolong the life of separating columns.<br>  |

| Quant. | | Order No. | Description |
|---|---|---|---|
| 2.761.0420 | 2.761.0520 | | |
| 2 | 2 | 6.2621.000 | **Adjustable spanner**   |
| 1 | 1 | 6.2621.030 | **Hexagon key 4 mm**<br>For mounting the pump head of the high-pressure pump.   |
| - | 1 | 6.2621.060 | **Wrench 5/16"**   |
| 1 | 1 | 6.2621.080 | **Capillary cutter for plastic capillaries**   |
| - | 2 | 6.2621.090 | **Wrench ½"**   |
| - | 1 | 6.2621.100 | **Allen key 3 mm**<br>For Allen screws on sample rack and for splash protection   |
| 2 | 2 | 6.2741.020 | **Piston seal PE**<br>Spare part for 6.2824.100 pump head (only suitable for aqueous eluents)   |
| - | 1 | 6.2743.050 | **PP Sample tube (11 mL)**<br>For 6.2041.430 sample rack.<br>set of 2000 |
| - | 1 | 6.2743.070 | **PP Cap**<br>For sealing the 6.2743.050 sample tubes.<br>set of 2000 |

| Quant. | | Order No. | Description |
|---|---|---|---|
| 2.761.0420 | 2.761.0520 | | |
| 5 | 6 | 6.2744.010 | **PEEK compression fitting**<br>For the connection of 6.1831.010 PEEK capillaries or 6.1822.010 PTFE capillaries.<br>set of 5<br>  |
| 1 | 1 | 6.2744.030 | **PEEK coupling**<br>Connection between 6.2744.010 PEEK compression fitting and 6.1826.060 pump tubing.<br>set of 4<br>  |
| 1 | 1 | 6.2744.040 | **PEEK coupling**<br>For the connection of 1⁄16"-Capillaries<br>  |
| 2 | 2 | 6.2744.110 | **PEEK coupling**<br>Connection between 6.2821.120 PEEK inline filter and pump tubing.<br>  |
| 1 | 1 | 6.2744.160 | **PEEK coupling**<br>With tubing security device for connecting to pressure side of 6.1826.0X0 Pump tubing.<br>  |
| - | 1 | 6.2751.040 | **Splash protection**<br>Must be installed at the tower of the 766 IC Sample Processor. |
| - | 1 | 6.2752.010 | **Plug cover**<br>Must be installed at the 766 IC Sample Processor. |
| 3 | 3 | 6.2816.020 | **Syringe**<br>made of PP, volume = 10 mL for manual filling of the sample loop<br>  |
| 2 | 2 | 6.2821.120 | **Filter unit PEEK 2 µm**<br>To avoid contamination due to abrasive particles of piston seals.<br><br>Spare part: 6.2821.130 Filter<br>  |

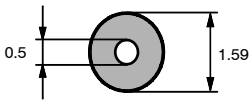
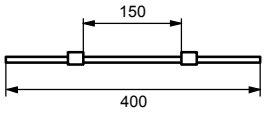
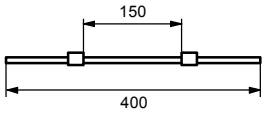
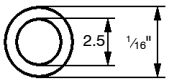
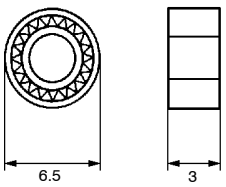
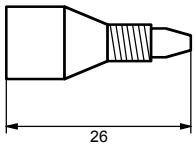
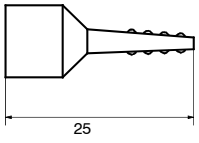
| Quant. | | Order No. | Description |
|---|---|---|---|
| 2.761.0420 | 2.761.0520 | | |
| 1 | 1 | 6.2821.130 | **Filter for Filter Unit PEEK 2 µm**<br>Spare filter for filter Unit PEEK 6.2821.120.<br>set of 10 |
| 2 | 2 | 6.2824.030 | **Sapphire supporting ring**<br>Spare part for 6.2824.100<br>pump head<br>  |
| 1 | 1 | A.705.0001 | **Software-CD «761 SD Analyzer»** |
| 3 | 3 | Y.107.0150 | **Cable strap** |
| 1 | 1 | 8.761.1041 | **Instructions for Use** (English)<br>for 761 SD Compact IC |
| 1 | 1 | 8.761.8007 | **Registration card** (German/English)<br>for PC-program «761 SD Analyzer» |
| 1 | 1 | 8.110.8213 | **Software-Manual** (English)<br>for PC-program «Autodatabase 1.0» |
| - | 1 | 8.766.1003 | **Instructions for Use** (English)<br>for 766 IC Sample Processor |
| - | 1 | 8.766.1013 | **Quick Reference Guide** (English)<br>for 766 IC Sample Processor |
| - | 1 | 8.766.1023 | **Annex** (English)<br>for 766 IC Sample Processor |
| 1 | 1 | 8.110.8283 | **Software-Manual** (English)<br>for PC-program «IC Net 2.3» |
| 1 | 1 | 8.110.8293 | **Compliance white paper** (English)<br>for PC-program «IC Net 2.3» |
| 1 | 1 | 8.110.8313 | **Administrator manual** (English)<br>for PC-program «IC Cap 2.0» |
| 1 | 1 | 8.110.8319 | **User manual** (English)<br>for PC-program «IC Cap 2.0» |

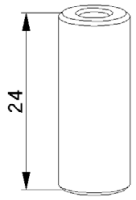
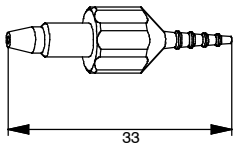
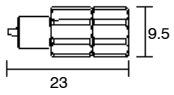
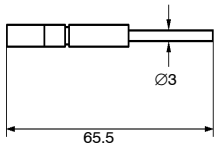
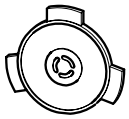
# 7.3 Optional accessories

## 7.3.1 6.5328.000 SD Spare Part Set

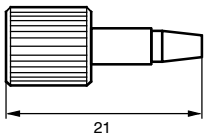
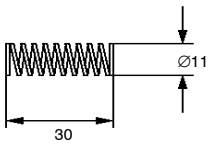
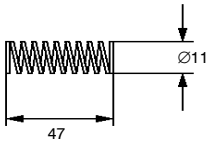
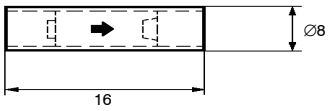
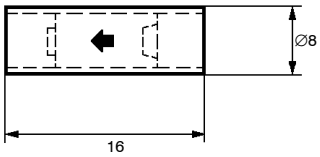
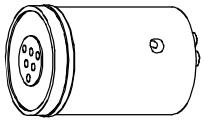
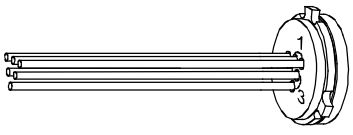
A specially selected spare parts set is available under order number 6.5328.000 for the 761 SD Compact IC. All parts listed can also be ordered individually, quoting the corresponding order number.

The 6.5328.000 SD Spare Part Set includes the following parts:

| *Quant.* | *Order No.* | *Description* |
|---|---|---|
| 1 | **6.1803.030** | **PTFE capillary**<br>i.d. = 0.5<br>Length = 3 m<br>  |
| 1 | **6.1826.040** | **Pump tubing for Sample Processor**<br>made of PVC with 2 firmly attached stoppers(black-black);<br>i.d. = 0.8 mm, Length = 0.4 m<br>  |
| 2 | **6.1826.110** | **Pump tubing**<br>made of PVC with 2 firmly attached stoppers (orange-yellow);<br>i.d. = 0.51 mm, Length = 0.4 m<br>  |
| 1 | **6.1831.010** | **PEEK capillary**<br>Length = 3 m<br>  |
| 2 | **6.1837.000** | **Tubing connection to MPak**<br>Connection to Eluent- and Regenerant MPak, with PEEK coupling (**55**) 4.455.4500<br><br>Length = 1.5 m |
| 2 | **6.2741.020** | **Piston seal PE**<br><br>Spare part for 6.2824.100 pump head (only suitable for aqueous eluents)<br>  |
| 2 | **6.2744.010** | **PEEK Compression fitting**<br>For the connection of 6.1831.010 PEEK capillaries or 6.1822.010 PTFE capillaries.<br>set of 5<br>  |
| 1 | **6.2744.030** | **PEEK Coupling**<br>Connection between 6.2744.010 PEEK compression fitting and 6.1826.060 pump tubing.<br>set of 4<br>  |

| | | | |
|---|---|---|---|
| 1 | 6.2744.040 | **PEEK coupling**<br>For the connection of 1⁄16"-Capillaries |  |
| 2 | 6.2744.110 | **PEEK coupling**<br>Connection between 6.2821.120 PEEK inline filter and pump tubing. |  |
| 1 | 6.2744.160 | **PEEK coupling**<br>With tubing security device for connecting to pressure side of 6.1826.0X0 Pump tubing. |  |
| 1 | 6.2821.130 | **Filter for Filter Unit PEEK 2 µm**<br>Spare filter for filter unit PEEK 6.2821.120.<br>set of 10 | |
| 2 | 6.2824.070 | **Zircon piston**<br>Spare part for 6.2824.040 and 6.2824.100 pump heads |  |
| 1 | 6.5904.030 | **Rotor to injection valve** |  |

## 7.3.2 Other optional accessories

| Order No. | Description |
|---|---|
| 6.2321.010 | **MCAL Check Standard**<br>Individual QC Check Standard of 545 mg/L $H_3PO_4$ plus basic content of nitrate and sulfate |
| 6.2744.070 | **PEEK compression fitting-(short)**<br>for the connection of 6.1831.010 PEEK capillaries in cramped conditions, e.g. in the column heating.<br>set of 5<br>  |
| 6.2824.100 | **Pump head (metal-free)**<br>Complete, with fixations screws |
| 6.2824.050 | **Spring for main piston**<br>Spare part for 6.2824.100 Pump head<br>  |
| 6.2824.060 | **Spring for auxiliary piston**<br>Spare part for 6.2824.100 Pump head<br>  |
| 6.2824.080 | **Outlet valve (metal-free)**<br>Spare part for 6.2824.100 Pump head<br>  |
| 6.2824.090 | **Inlet valve (metal-free)**<br>Spare part for 6.2824.100 Pump head<br>  |
| 6.2832.000 | **Suppressor rotor**<br>Replacement cartridge for Metrohm suppressor module<br>  |
| 6.2832.420 | **Connection to Suppressor-Rotor**<br>With in- and outlet tubing<br>  |

# 7.4 Warranty and conformity

## 7.4.1 Warranty

The warranty on our products is limited to defects that are traceable to material, construction or manufacturing error which occur within 12 months from the day of delivery. In this case, the defects will be rectified in our workshops free of charge. Transport costs are to be paid by the customer.

For day and night operation, the warranty is limited to 6 months.

Glass breakage in the case of electrodes or other parts is not covered by the warranty. Checks which are not a result of material or manufacturing faults are also charged during the warranty period. For parts of outside manufacture insofar as these constitute an appreciable part of our instrument, the warranty stipulations of the manufacturer in question apply.

With the regard to the guarantee of accuracy, the technical specifications in the instruction manual are authoritative.

Concerning defects in material, construction or design as well as the absence of guaranteed features, the orderer has no rights or claims except those mentioned above.

If damage of the packaging is evident on receipt of a consignment or if the goods show signs of transport damage after unpacking, the carrier must be informed immediately and a written damage report demanded. lack of an official damage report releases Metrohm from any liability to pay compensation.

If any instruments and parts have to be returned, the original packaging should be used if at all possible. This applies above all to instruments, electrodes, burette cylinders and PTFE pistons. Before embedment in wood shavings or similar material, the parts must be packed in a dust-proof package (for instruments, use of a plastic bag is imperative). If open assemblies are enclosed in the scope of delivery that are sensitive to electromagnetic voltages (e.g. data interfaces etc.) these must be returned in the associated original protective packaging (e.g. conductive protective bag). (Exception: assemblies with built-in voltage source belong in a non-conductive protective packaging). For damage which arises as a result of non-compliance with these instructions, no warranty responsibility whatsoever will be accepted by Metrohm.

## 7.4.2 Declaration of Conformity

This is to certify the conformity to the standard specifications for electrical appliances and accessories, as well as to the standard specifications for security and to system validation issued by the manufacturing company.

Metrohm
Ion analysis
CH-9101 Herisau, Switzerland
Tel. +41 71 353 85 85
Fax +41 71 353 89 01
www.metrohm.com

| | |
|---|---|
| *Name of commodity* | **761 SD Compact IC** |
| *Name of manufacturer* | Metrohm Ltd., Herisau, Switzerland |

*Description*
Compact IC instrument to analyse Soft Drinks. Variant of the 761 Compact IC.

This Metrohm instrument has been built and has undergone final type testing according to the standards:

*Electromagnetic compatibility: Emission*
IEC/EN 61326, EN 55022 / CISPR 22, IEC/EN 61000-3-2, IEC/EN 61000-3-3

*Electromagnetic compatibility: Immunity*
IEC/EN 61326, IEC/EN 61000-4-2, IEC/EN 61000-4-3, IEC/EN 61000-4-4, IEC/EN 61000-4-5, IEC/EN 61000-4-6, IEC/EN 61000-4-11, IEC/EN 61000-4-14

*Safety specifications*
IEC/EN 61010-1, UL 3101-1 protection class I

It has also been certified by ElectroSuisse, which is member of the International Certification Body (CB/IEC).

*The instrument meets the requirements of the CE mark as contained in the EU directives 89/336/EEC and 73/23/EEC and fulfils the following specifications:*

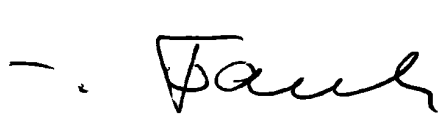
| | |
|---|---|
| EN 61326 | Electrical equipment for measurement, control and laboratory use – EMC requirements |
| EN 61010-1 | Safety requirements for electrical equipment for measurement, control and laboratory use |

Metrohm Ltd. is holder of the SQS-certificate of the quality system ISO 9001 for quality assurance in design/development, production, installation and servicing.

The system software, stored in Read Only Memories (ROMs) has been validated in connection with standard operating procedures in respect to functionality and performance.

The technical specifications are documented in the instruction manual.

Herisau, Nov 10, 2003



Dr. J. Frank
Development Manager

Ch. Buchmann
Production and
Quality Assurance Manager

## 7.4.3 Quality Management Principles

Metrohm Ltd., CH-9101 Herisau, Switzerland

Metrohm
Ion analysis
CH-9101 Herisau/Switzerland
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Internet www.metrohm.com

Metrohm Ltd. holds the ISO 9001 Certificate, registration number 10872-02, issued by SQS (Swiss Association for Quality and Management Systems). Internal and external audits are carried out periodically to assure that the standards defined by Metrohm's QM Manual are maintained.

The steps involved in the design, manufacture and servicing of instruments are fully documented and the resulting reports are archived for ten years. The development of software for PCs and instruments is also duly documented and the documents and source codes are archived. Both remain the possession of Metrohm. A non-disclosure agreement may be asked to be provided by those requiring access to them.

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The implementation of the ISO 9001 quality system is described in Metrohm's QM Manual, which comprises detailed instructions on the following fields of activity:

### Instrument development

The organisation of the instrument design, its planning and the intermediate controls are fully documented and traceable. Laboratory testing accompanies all phases of instrument development.

### Software development

Software development occurs in terms of the software life cycle. Tests are performed to detect programming errors and to assess the program's functionality in a laboratory environment.

### Components

All components used in the Metrohm instruments have to satisfy the quality standards that are defined and implemented for our products. Suppliers of components are audited by Metrohm as the need arises.

### Manufacture

The measures put into practice in the production of our instruments guarantee a constant quality standard. Production planning and manufacturing procedures, maintenance of production means and testing of components, intermediate and finished products are prescribed.

### Customer support and service

Customer support involves all phases of instrument acquisition and use by the customer, i.e. consulting to define the adequate equipment for the analytical problem at hand, delivery of the equipment, user manuals, training, after-sales service and processing of customer complaints. The Metrohm service organisation is equipped to support customers in implementing standards such as GLP, GMP, ISO 900X, in performing Operational Qualification and Performance Verification of the system components or in carrying out the System Validation for the quantitative determination of a substance in a given matrix.

# 7.5 Index