761 Compact IC

Metrohm
ion analysis

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8.761.1063
Instructions for Use

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761 Compact IC

Program «761 PC Software 1.1»

8.761.1063 Instructions for Use

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1 Introduction

1.1 Instrument description

The **761 Compact IC** is a PC-controlled system for ion chromatographic analyses. The two following versions are available:

- **2.761.0010 Compact IC without suppressor module**
- **2.761.0020 Compact IC with suppressor module**

The extremely compact housing of the 761 Compact IC contains everything needed to carry out ion chromatography at the highest quality level:

- **Injection valve** – for individual injections or for use with a sample changer such as the Metrohm 766 IC Sample Processor
- **High-pressure pump** – extremely low-pulsation double piston pump with a flow range from 0.2 … 2.5 mL/min and a maximum pressure of 25 MPa (250 bar)
- **Pulsation dampener** – even with low-level pressure variations the pulsation dampener reliably protects the column against damage
- **Column chamber** – the perfect insulation of the housing provides not only thermally stable conditions for the separation column but also shields the system against electromagnetic interference
- **Columns** – whether anion columns with or without suppression, separation columns for cations or organic acids – the 761 Compact IC can accommodate them all
- **Suppressor** – the Metrohm Suppressor Module (MSM) is already integrated in the 2.761.0020 Compact IC – pressure-resistant, with fully automatic regeneration, highest performance and optimal reproducibility
- **Peristaltic pump** – integrated two-channel peristaltic pump with a flow rate of 0.5 … 0.6 mL/min for regeneration and rinsing of the suppressor module built into the 2.761.0020 Compact IC
- **Detector** – conductivity detector with outstanding temperature stability. The detector temperature varies by less than 0.01°C and can be optimally adapted to the ambient conditions.

All components which come into contact with eluent and sample are metal-free.

The **operation** of the 761 Compact IC takes place via a PC connected to the RS232 interface with the help of the control and evaluation program «**761 Compact IC**». This PC program can be used to create systems for recording and evaluating chromatograms. Time programs can also be created in which a large number of instrument functions can be triggered for each program step. It is also possible to use programmable signals to control external instruments such as the 750 Autosampler or the 766 IC Sample Processor via the remote interface.

About 80 prepared system configurations for more than 300 applications are already permanently stored and additional new applications can be downloaded at any time from the Internet under «www.metrohm.ch».

The operating software for the 761 Compact IC meets all the requirements you could place today on a modern integration software: single or multi-point calibration, internal or external standard, selectable algorithms for non-linear calibration, various integration modes with integration parameters and integration events, different methods for peak recognition, peak editor, free scaling, superimposing several chromatograms, use of sample tables and batch reprocessing; a powerful and GLP-conform report generator with output interfaces for monitor, printer and external databases.

The independent «Autodatabase» PC programm supplied can be used to save and handle results and chromatograms produced by the «761 Compact IC» program in a database. With «Autodatabase», data can be sorted, filtered and searched with the help of different criteria. In addition, data and curves can be printed out according to user-defined report templates.

1.2 Parts and controls

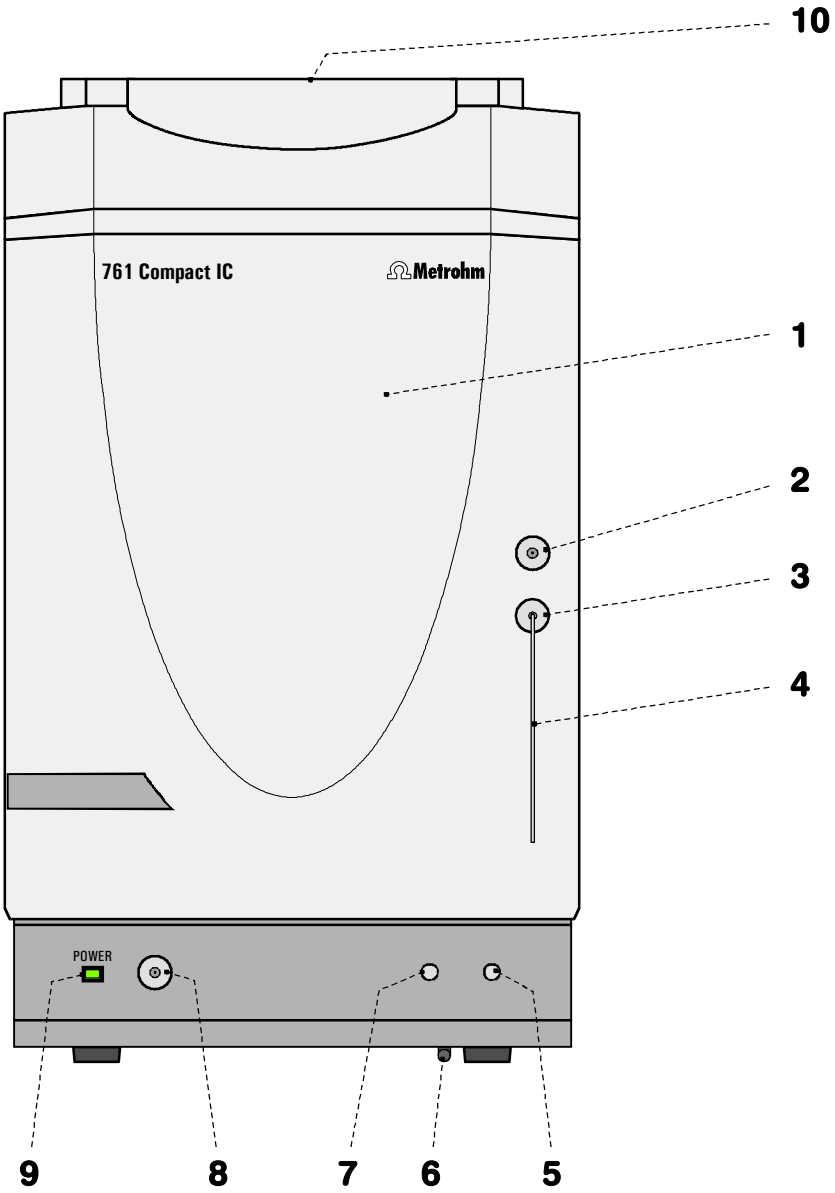


Fig. 1: Front of the 761 Compact IC

1	**Door to interior**	**6**	**Connection for drain tube** for discharge of spilled liquid from the interior
2	**Connection for 6.2816.020 Syringe** for aspiration of the sample	**7**	**Feedthrough for capillaries**
3	**Feedthrough for aspirating tubing**	**8**	**Connection to purge valve**
4	**Aspirating tubing** for sample	**9**	**Mains pilot lamp** lit up when instrument switched on
5	**Feedthrough for capillaries**	**10**	**Bottle rack** for holding supply bottles with eluent, regeneration solution, and rinsing solution

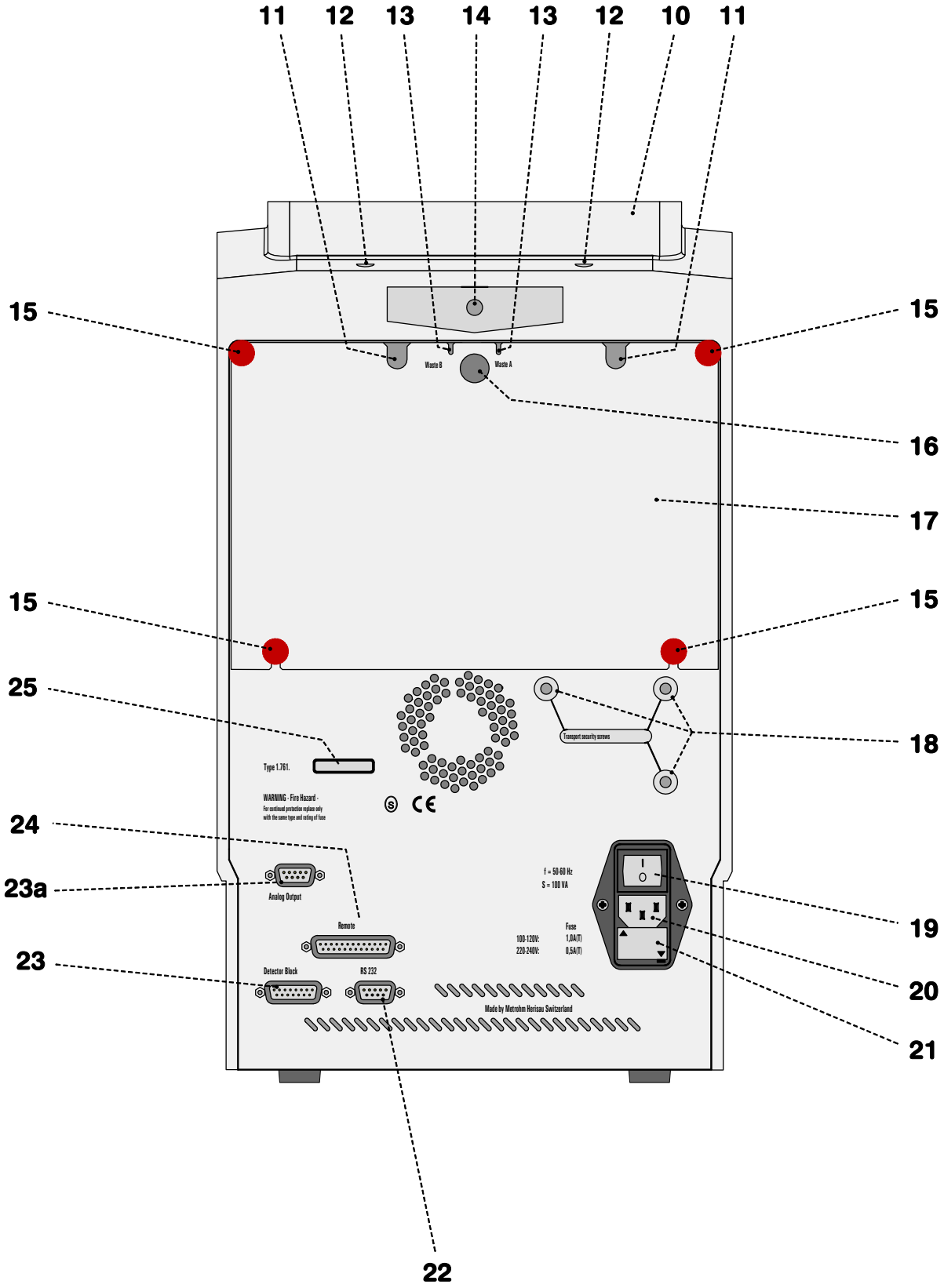


Fig. 2: Rear of the 761 Compact IC

10 **Bottle rack**
for holding supply bottles with eluent, regeneration solution, and rinsing solution

11 **Opening for detector cable**

12 **Opening for inlet capillaries**
for supply of eluent, regeneration solution, and rinsing solution into the inner compartment

13 **Opening for outlet capillaries**
for discharge of eluent, regeneration solution, and rinsing solution from the inner compartment

14 **Connection for drain tube**
for discharge of spilled liquid from the bottle rack

15 **Knurled screw**
for fastening the rear panel **17**

16 **Rear panel opening**
(closed with plastic stopper) for additional supply and discharge lines to and from the inner compartment

17 **Detachable rear panel**
access to upper part of inner compartment

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

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

20 **Mains connection plug**
mains connection, see *section 2.4*

21 **Fuse holder**
changing the fuses, see *section 2.4*

22 **RS232 interface**
connection of the PC

23 **Connection for detector block**

23a **Analog output for measuring signal**

24 **Remote interface**
remote I/O lines for connection of external devices

25 **Serial number**

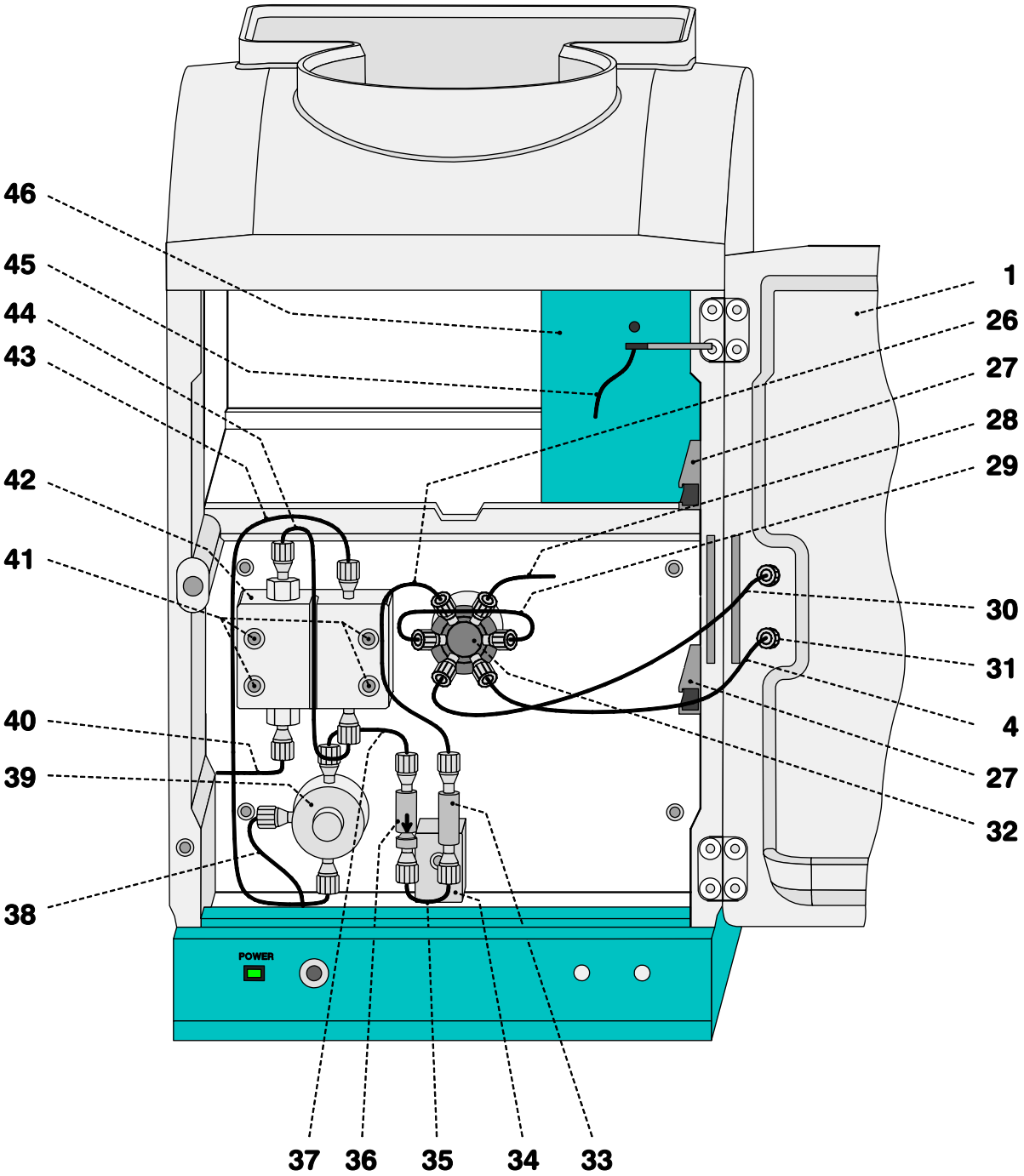


Fig. 3: Interior of the 2.761.0010 Compact IC (with permanently attached accessories and 1.733.0110 Detector block)

1	**Door to interior**	**36**	**Filter unit PEEK (6.2821.120)**
4	**Aspirating tubing** for aspirating the sample; 6.1803.020 PTFE tubing, length *L* = 52 cm	**37**	**Connection capillary** 6.1831.010 PEEK capillary, length *L* = 13 cm
26	**Inlet capillary for injector** 6.1831.010 PEEK capillary, length *L* = 24 cm	**38**	**Connection capillary** 6.1831.010 PEEK capillary, length *L* = 15 cm
27	**Mounting rail** for 6.2027.0X0 column holder	**39**	**Purge valve**
28	**Column connection capillary** 6.1831.010 PEEK capillary, length *L* = 30 cm	**40**	**Aspirating capillary** Connection for 6.1834.010 aspirating tubing
29	**Sample loop 10 µL** 6.1825.230 PEEK sample loop	**41**	**Fastening screws** for pump head **42**
30	**Connection capillary to syringe** 6.1803.020 PTFE tubing, length *L* = 30 cm	**42**	**Pump head (6.2824.100)**
31	**Rotary nipple for aspirating tube** for fixing the aspirating tube	**43**	**Connection capillary** Connection pump head – purge valve, fixed mounting
32	**Injection valve**	**44**	**Connection capillary** in pump head, fixed mounting
33	**PEEK coupling (6.2744.040)**	**45**	**Inlet capillary for detector block** PEEK capillary, fixed mounting
34	**Leak detector**	**46**	**Detector block (1.732.0110)**
35	**Connection capillary** 6.1831.010 PEEK capillary, length *L* = 13 cm		

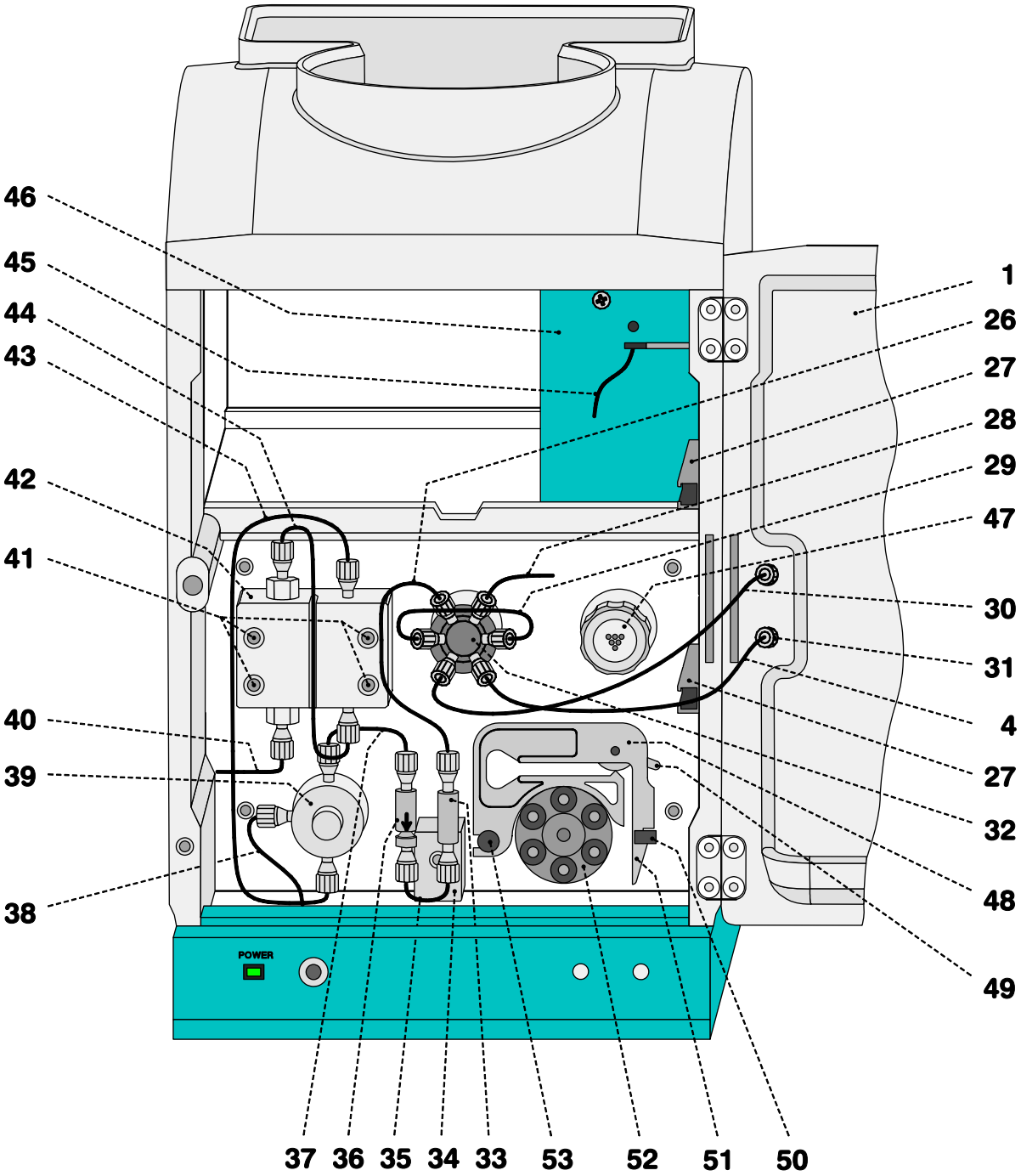


Fig. 4: Interior of the 2.761.0020 Compact IC (with permanently attached accessories and 1.733.0110 Detector block)

1	**Door to interior**	**39**	**Purge valve**
4	**Aspirating tubing** for aspirating the sample; 6.1803.020 PTFE tubing, length L = 52 cm	**40**	**Aspirating capillary** Connection for 6.1834.010 aspirating tubing
26	**Inlet capillary for injector** 6.1831.010 PEEK capillary, length L = 24 cm	**41**	**Fastening screws** for pump head **42**
27	**Mounting rail** for 6.2027.0X0 column holder	**42**	**Pump head (6.2824.100)**
28	**Column connection capillary** 6.1831.010 PEEK capillary, length L = 30 cm	**43**	**Connection capillary** Connection pump head – purge valve, fixed mounting
29	**Sample loop 20 µL** 6.1825.210 PEEK sample loop	**44**	**Connection capillary** in pump head, fixed mounting
30	**Connection capillary to syringe** 6.1803.020 PTFE tubing, length L = 30 cm	**45**	**Inlet capillary for detector block** PEEK capillary, fixed mounting
31	**Rotary nipple for aspirating tube** for fixing the aspirating tube	**46**	**Detector block (1.732.0110)**
32	**Injection valve**	**47**	**Suppressor module** (inlet and outlet capillaries are not shown)
33	**PEEK coupling (6.2744.040)**	**48**	**Tubing cartridge (6.2755.000)** for 6.1826.060 pump tubing
34	**Leak detector**	**49**	**Contact pressure lever** for adjusting the contact pressure
35	**Connection capillary** 6.1831.010 PEEK capillary, length L = 13 cm	**50**	**Holding clamp** for locking the tubing cartridge into place
36	**Filter unit PEEK (6.2821.120)**	**51**	**Snap-action lever** for releasing the tubing cartridge
37	**Connection capillary** 6.1831.010 PEEK capillary, length L = 13 cm	**52**	**Pump drive** roller head with contact rollers
38	**Connection capillary** 6.1831.030 PEEK capillary, length L = 20 cm	**53**	**Mounting pin** for attaching the tubing cartridges

1.3 Information on the Instructions for Use

Please read through these Instructions for Use carefully before you put the 761 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 Organization

These **8.761.1063 Instructions for Use** for the 761 Compact IC provide a comprehensive overview of the installation, startup procedure, operation, fault rectification and technical specifications of this instrument. The Instructions for Use are organized as follows:

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

Section 2 **Installation**
Installation of instrument, accessories, and external devices

Section 3 **Operating tutorial**
Introduction to the operation using an example

Section 4 **Operation**
Detailed description of the operation

Section 5 **Notes – Maintenance – Faults**
Notes on ion chromatography, maintenance, fault rectification, diagnostic tests, validation

Section 6 **Appendix**
Technical data, standard equipment, options, warranty, declarations of conformity, 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.

As a supplement to the Instructions for Use, the **Metrohm Monograph 8.732.2003 "Ion chromatography"** is also supplied. This provides an introduction to the theoretical fundamentals and general information on separating columns and sample pretreatment.

The **8.732.2013 IC Applications Collection** is also supplied; this contains all the **Application Notes** on the subject of ion chromatography. Each of these applications can be carried out directly with the 761 Compact IC by loading the system file with the same name. The Applications Collection can be updated at any time by downloading the latest applications from the Internet under «www.metrohm.ch».

You will find detailed information on the separating columns available from Metrohm and on special IC applications in the relevant "**Application Bulletins**", which are available on request free of charge from your Metrohm agency.

1.3.2 Notation and pictograms

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

Range	**Menu item, parameter or entry value**
SYSTEM STATE	**Program window**
<OK>	**Button**
[Ctrl]	**Key**
35	**Part or control of 761**
12	**Part or control of 750**
26	**Part or control of 766**
	**Hazard** This symbol draws attention to a possible danger to life or of injury if the associated directions are not followed correctly.
	**Warning** This symbol draws attention to possible damage to instruments or instrument parts if the associated directions are not followed correctly.
	**Caution** This symbol marks important information. First read the associated directions before you continue.
	**Comment** 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 Compact IC is assured in the context of the specifications IEC 1010-1 (protection 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 2.4.*

- **Opening the 761 Compact IC**

*If the 761 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 20** !*

- **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 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**

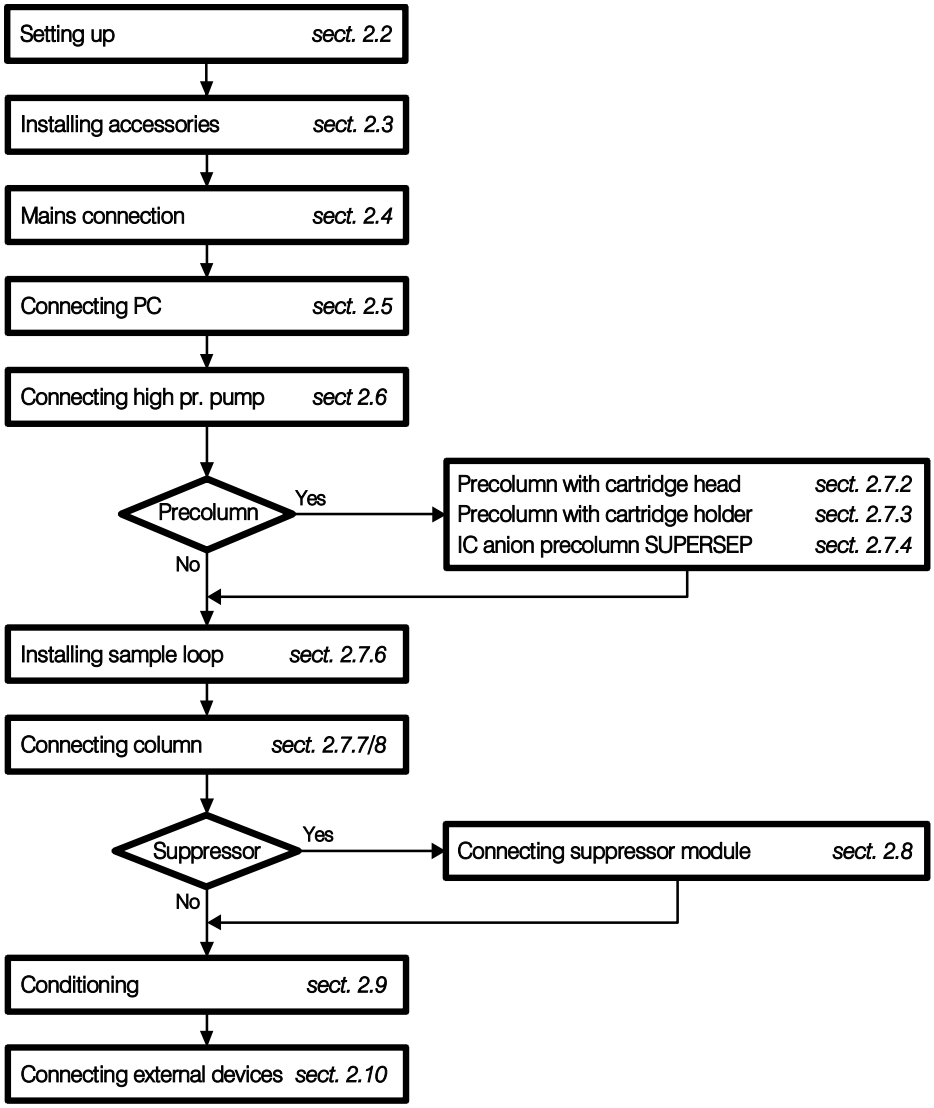
Check all lines of the IC system periodically for possible leaks. Follow the relevant instructions regarding the handling of flammable and/or toxic solvents and their disposal.

2 Installation

2.1 Overview

2.1.1 Flow chart

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



2.1.2 Connections in the 761 Compact IC

The two following illustrations show the internal connections in the 761 Compact IC in schematic form. The meanings of the various numbered components are given in the detailed illustrations and descriptions in *sections 2.2 – 2.10*.

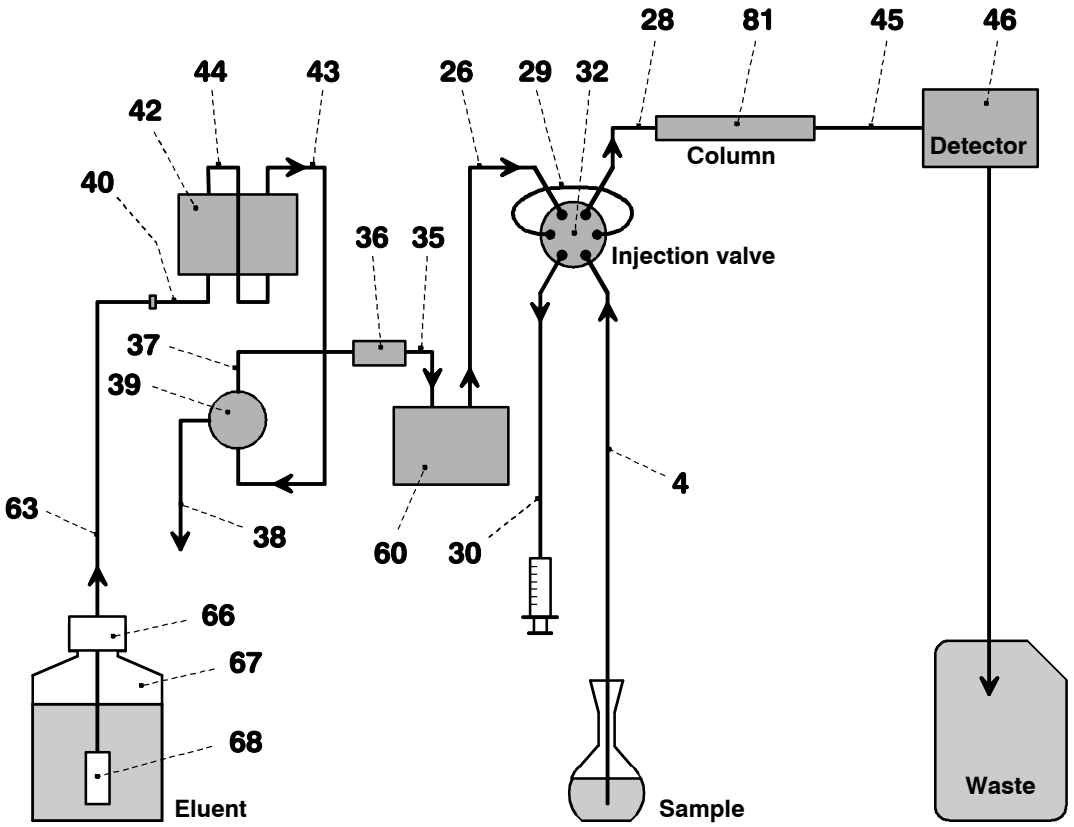


Fig. 5: Connecting diagram for 2.761.0010 Compact IC without suppressor

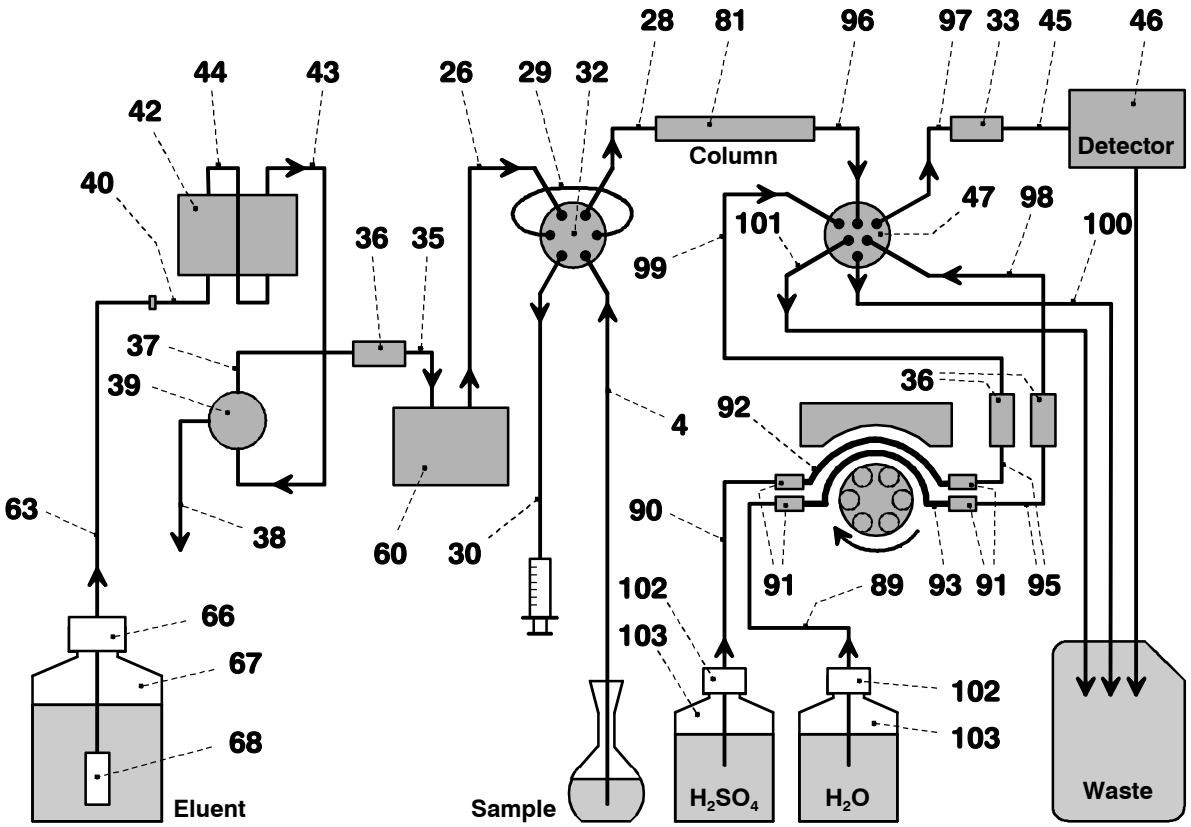


Fig. 6: Connecting diagram for 2.761.0020 Compact IC with suppressor

2.2 Setting up the instrument

2.2.1 Packaging

The 761 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 6.2*). In the case of transport damage, see instructions in *section 6.4.1* "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 Attaching the accessories

2.3.1 Connection of detector block

The metal-free **1.732.0110 Detector block** belongs to the scope of supply of the 761 Compact IC; it must be inserted in the instrument and connected up. Proceed as follows:

1 Note the cell constant

- The cell constant **c = XX,X /cm** is printed on the rear 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 2.5.3*).

2 Install detector block

- Unscrew the four knurled screws **15** from the top rear panel **17** of the 761 Compact IC and remove rear panel (see *Fig. 2*).
- Position detector block **46** from the back in the space provided in the 761 Compact IC and push fully to the front (see *Fig. 3* and *Fig. 4*).

- Insert the cable permanently attached to the detector block **46** in one of the openings **11** and the outlet capillary in one of the openings **13** of the rear panel **17**.
- Replace rear panel **17** and screw to the 761 Compact IC using the four knurled screws **15**.

3 Connect detector block

- Plug the gray connecting cable permanently attached to the detector block **46** into connection **23** "Detector Block" of the 761 Compact IC and fasten to the instrument by tightening the screws in the cable connector (see *Fig. 2*).

4 Connect waste container

- Lead the outlet capillary of the detector block **46** to a sufficiently large waste container and fix in place.

2.3.2 Connection of syringe and aspirating tubing

For manual filling of the sample loop **29** mounted on the injection valve, the 6.2816.020 Syringe and the PTFE aspirating tubing **4** already screwed to the valve are needed. These accessories are mounted or adjusted as follows:

1 Connect syringe

- Push 6.2816.020 Syringe (without needle) as far as it will go into connection socket **2** (see *Fig. 1*).

2 Adjust aspirating tubing

- Loosen the rotary nipple **31** screwed onto the interior side of feedthrough **3** (see *Fig. 3* and *Fig. 4*).
- Pull PTFE aspirating tubing **4** (see *Fig. 3* and *Fig. 4*) by hand out of feedthrough **3** as far as desired.
- Retighten rotary nipple **31** on the interior side of feedthrough **3** to fix the aspirating tubing **4** in place.

2.3.3 Connection of the drain tube for the inner compartment

The 761 Compact IC has a connection at the front to which a drain tube for discharged liquids in the inner compartment can be attached. Proceed as follows:

1 Connect drain tube

- Mount 6.1816.020 Silicone tubing on connection nipple **6** (see *Fig. 1*).

2 Lead drain tube to collecting vessel

- Lead the other end of the drain tube to a suitable collecting vessel and fix in place.

2.3.4 Connection of the drain tube for bottle rack

The 761 Compact IC has a connection at the rear to which a drain tube for discharged liquids in the bottle rack can be attached. Proceed as follows:

1 Connect drain tube

- Mount 6.1816.020 Silicone tubing on connection nipple **14** (see *Fig. 2*).

2 Lead drain tube to collecting vessel

- Lead the other end of the drain tube to a suitable collecting vessel and fix in place.

2.3.5 Connection of PEEK capillaries

For the connections between high-pressure pump and detector block **6.1831.010 PEEK capillaries** (i.d. = 0.25 mm, e.d. = 1/16") are used which are connected using either **6.2744.010 PEEK compression fittings (long)** or **6.2744.070 PEEK compression fittings (short)**. These PEEK connectors can also be used to connect 6.1822.010 PTFE microcapillaries (i.d. = 0.3 mm). Proceed as follows:

*Capillaries fitted with new connectors must have a perfectly flat cut surface. To cut PEEK or PTFE capillaries it is best to use the **6.2621.080 Capillary tubing cutter**.*

1 Mount compression fitting

Slide a compression fitting **54** (6.2744.010) or a compression fitting **55** (6.2744.070) over the end of the capillary **56** to be fastened as shown in *Fig. 7*.

2 Insert capillary in connection

Push capillary end in the corresponding connection as far as it will go (to avoid dead volume).

3 Tighten compression fitting

Tighten compression fitting **54** or **55** by hand (never use tools).

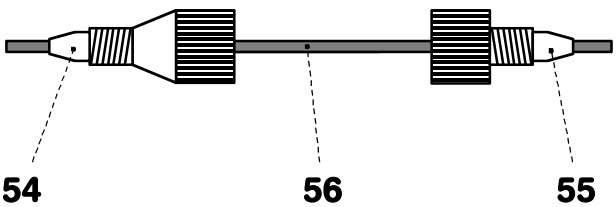


Fig. 7: Connectors for capillaries

54	**Compression fitting (6.2744.010)**
55	**Compression fitting (6.2744.070)**
56	**Capillary** 6.1831.010 PEEK capillary or 6.1822.010 PTFE microcapillary

2.3.6 Filter unit PEEK

One **6.2821.120 Filter unit PEEK** (see *Fig. 8*) is already installed between the high-pressure pump and the injection valve at the 761 Compact IC. This filter unit serves to avoid contamination by abrasive particles of the piston seals.

The two other filter units PEEK supplied with the 2.761.0020 Compact IC (with suppressor) are installed between the pump tubings of the peristaltic pump and the inlet capillaries for regeneration and rinsing solution (see *section 2.8.2*). These filter units serve to protect the suppressor module from foreign particles and bacterial growth.

The Filter unit PEEK **36** consists of the filter-housing **59**, the filter-screw **57** and the 6.2821.130 filter **58**. For the connection of capillaries **56** PEEK compression fittings **54** (6.2744.010 or 6.2744.070) must be used. New filters **58** are available as an option with the ordering number 6.2821.130 (set of 10).

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

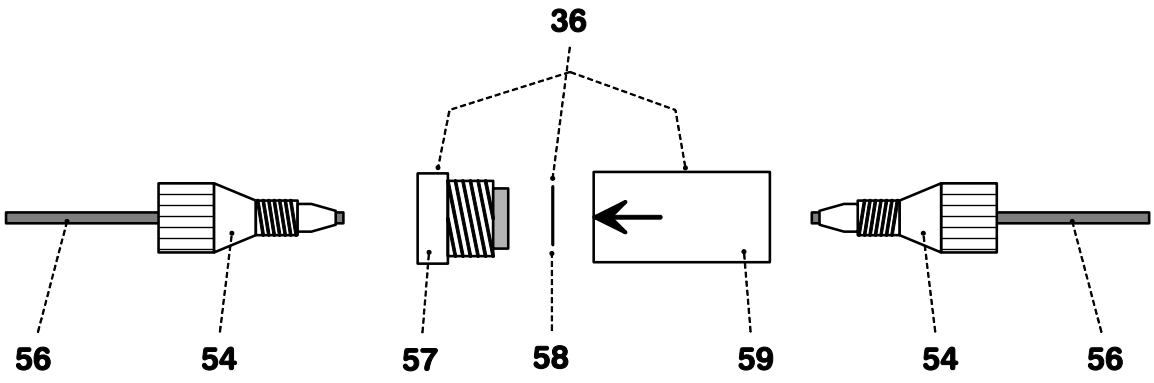


Fig. 8: 6.2821.120 Filter unit PEEK

36	**Filter unit PEEK (6.2821.120)**	**57**	**Filter-Screw of Filter Unit** Part of 6.2821.120 Filter unit
54	**Compression fitting (6.2744.010)**	**58**	**Filter 6.2821.130** Part of 6.2821.120 Filter unit
56	**Capillary** 6.1831.010 PEEK capillary or 6.1822.010 PTFE microcapillary	**59**	**Filter-Housing of Filter Unit** Part of 6.2821.120 Filter unit

2.4 Mains connection

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!

2.4.1 Setting the mains voltage

Before switching on the 761 Compact IC for the first time, check that the mains voltage set on the instrument (see *Fig. 9*) 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 **20** of the 761 Compact IC.

2 Remove fuse holder

Using a screwdriver, loosen fuse holder **21** below the mains connection plug **20** and take out completely.

3 Check and change fuse if necessary

Carefully take the fuse installed for the desired mains voltage out of fuse holder **21** 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):

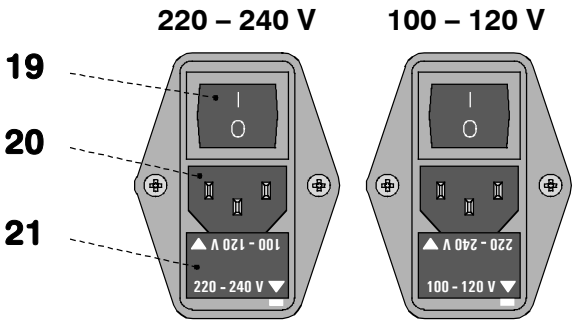
100…120 V	**1.0 A (slow-blow)**	Metrohm No. U.600.0016
220…240 V	**0.5 A (slow-blow)**	Metrohm No. U.600.0013

4 Insert fuse

Change fuse if necessary and reinsert in fuse holder **21**.

5 Install fuse holder

Depending on the desired mains voltage, insert fuse holder **21** in the 761 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 *Fig. 9*).



19	**Mains switch**
20	**Mains connection plug**
21	**Fuse holder**

Fig. 9: Setting the mains voltage

2.4.2 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 fuse holder **21** of the 761 Compact IC as standard.

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

For checking or changing fuses, process as described in *section 2.4.1*.

2.4.3 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 mains connection plug **20** of the 761 Compact IC (see *Fig. 9*).

2.4.4 On/off switching of the instrument

The 761 Compact IC is switched on and off using mains switch **19**. When the instrument is switched on, the mains pilot lamp **9** lights up.

2.5 Connection to the PC

2.5.1 Connecting cable

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

Connect the RS232 interface **22** at the 761 Compact IC to one of the serial COM ports at the PC using the 6.2134.100 Cable (9 pin/9 pin). If only a 25-pin COM interface is available on the PC then the 6.2125.110 Adapter cable or a commercially available adapter must be used.

2.5.2 Software installation

These Instructions for Use describe the operation of a single 761 Compact IC connected to a PC. If several instruments should be operated simultaneously with one PC, the «IC Net 2.0» PC program must be installed for this purpose (details see Instructions for Use for «IC Net»).

The PC program **«761 Compact IC 1.1»** is required for the operation of the 761 Compact IC; this is contained on the 6.6030.013 CD included in the accessories. This program runs under Windows 95, Windows 98 and Windows NT operating systems and is installed as follows:

1 Install program

- Insert 6.6030.013 Installation CD into CD drive.
- Select **<Start>** and **Run**. Browse for the **setup.exe** file on the installation CD and click on **<OK>**. Follow the instructions given in the setup program.

  The software package will be installed in the desired directory. Icons are created in the program folder and in the startup folder. In addition to the program files, the following folders are installed:

Data	Folder for storage of chromatogram files (***.chw**) and batch reprocessing files (***.bar**)
Devices	Folder for storage of device files (***.dev**)
Methods	Folder for storage of method files (***.mtw**)
Reports	Folder for storage of report files (***.txt**) and graphic files (***.wmf**)
Systems	Folder with subfolders with system files (***.smt**) and sample queue files (***.que**).

2 Registration

- Please send us your 8.761.8007 Registration card as soon as possible. Only registered users will get updated program versions at a special price.

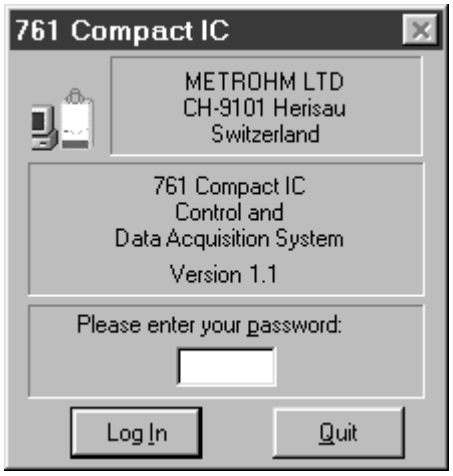
The installed files (incl. system and method files) are generally not write-protected. To prevent these files from being deleted by mistake, switch on the write-protection or make a backup copy in another directory.

2.5.3 Basic settings

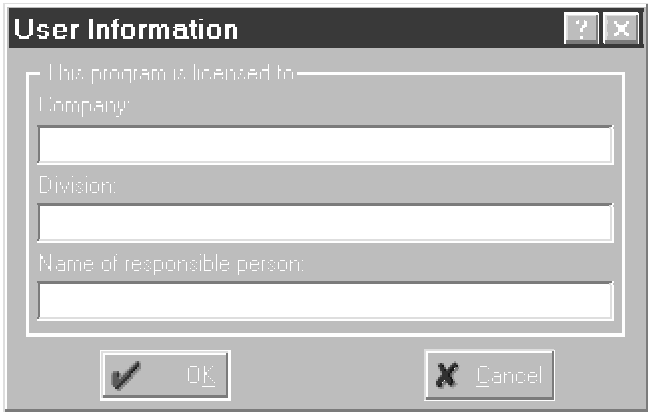
When the program is started for the first time several basic settings must be made for the 761 Compact IC. Proceed as follows:

1 Start program

- Double-click the software icon to start the program. The program window with the opening picture is opened and the Log In window appears on the screen:



- Do not enter any password here, just click on **<Log In>**. The following window appears:



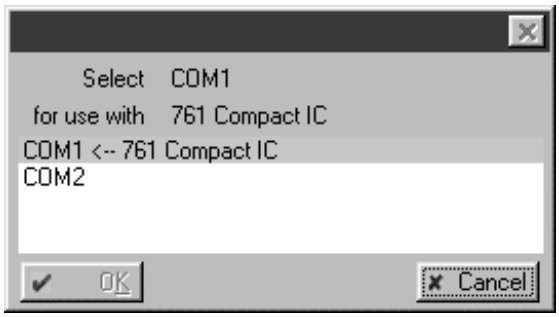
- Enter company, division and name and click on **<OK>**. This window appears only one time after software installation.

2 COM port settings

*This step must only be carried out if a different **COM interface from COM1** is used for connection to the 761 Compact IC.*

- Click on **Options** / **761 Compact IC:COM1** to open the **Links** window:

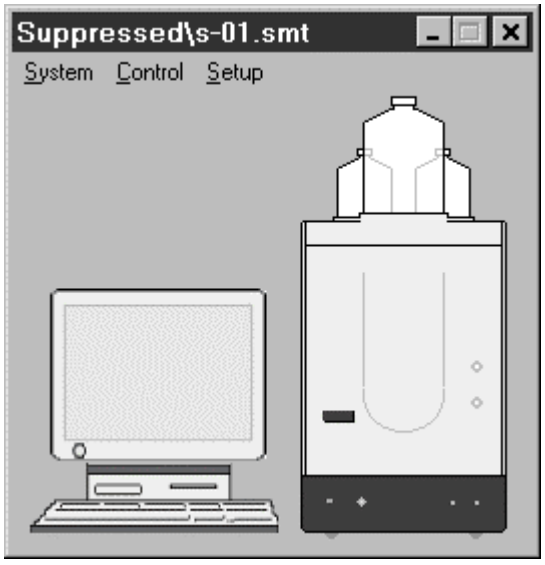
- Click on **COM1** using the right mouse button and select the **Change** menu item to open the following window listing all available COM ports at the PC:



- Select the desired COM port to which the 761 Compact IC has been connected and click on **<OK>**. The window is closed.
- Close the **Links** window by clicking on **<OK>**.

3 Open a system

- Click on **File** / **Open** / **System** in the main window. Open either the subfolder **Non-suppressed** (for 2.761.0010 Compact IC without suppressor) or the subfolder **Suppressed** (for 2.761.0020 Compact IC with suppressor). Select the system file **n-01.smt** or **s-01.smt** and click on **<Open>**. The corresponding system window is opened:

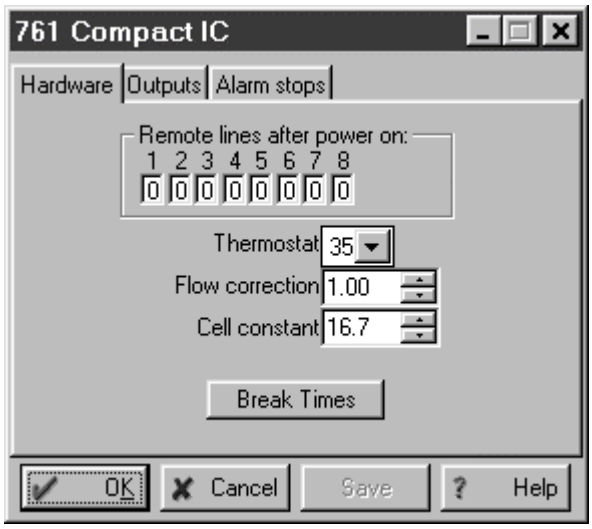


- Select the **Connect to workplace** menu item of the **Control** menu in this window.
- If the connection between PC and Compact IC is working the message **Hardware settings file for 761 unit with serial number '#####' not found! Create?** will appear. Click **<Yes>** in order to create the configuration file **#####.761** for this instrument.
- If the connection between PC and Compact IC does not work then the message **Detection of hardware failed[761 Compact IC [COM#]]** appears in the **SYSTEM STATE** window. In this case check whether the instrument has been switched on, whether the connection cable is connected up properly and whether the COM interface has been set correctly (see point **2**). Then repeat point **3**.

4 Hardware settings

Of the general hardware settings only the input of the cell constant is described. Standard settings can normally be used for all other parameters.

- Click the 761 icon using the right mouse button and select the **Hardware** item. The **Hardware settings** window is opened:



- In the **Cell constant** field enter the cell constant which is printed on the 1.732.0110 Detector block (see *section 2.3.1*).
- Click on **<OK>** to close the window and save the settings.

2.6 High-pressure pump

In order to avoid damage to the pump it must never be operated dry. Each time that the pump is switched on always first check that the eluent supply has been connected up correctly and that sufficient eluent is present in the eluent bottle.

2.6.1 Removing the transport security screws

In order to prevent the pump drive from being damaged during transport the pump head is fitted with three transport security screws **18** (see *Fig. 2*). These transport security screws must be removed before the high-pressure pump is started up. Also remove the red sticker attached to the pump head.

In order to avoid damage to the pump head these three security screws should be attached to the pump head each time that it is to be transported.

2.6.2 Installing the pulsation dampener

To protect the column material against pressure drops caused by the injector, the **6.2620.150 Pulsation dampener MF** has to be installed between the high-pressure pump and the injection valve of the 761 Compact IC. Proceed as follows (see *Fig. 10*):

1 Install pulsation dampener

- Position the pulsation dampener **60** in the interior of the 761 Compact IC on the base.

2 Connection to the pump

- Unscrew PEEK capillary **35** of coupling **33** and attach it to connection **62** of the pulsation dampener **60**.

3 Connection to injection valve

- Unscrew PEEK capillary **26** of coupling **33** and attach it to connection **61** of the pulsation dampener **60**.

The pulsation dampener is filled with isopropanol and must be rinsed with eluent before connection to a separating column (see section 2.6.4).

The 6.2620.150 Pulsation dampener can be operated in both directions.

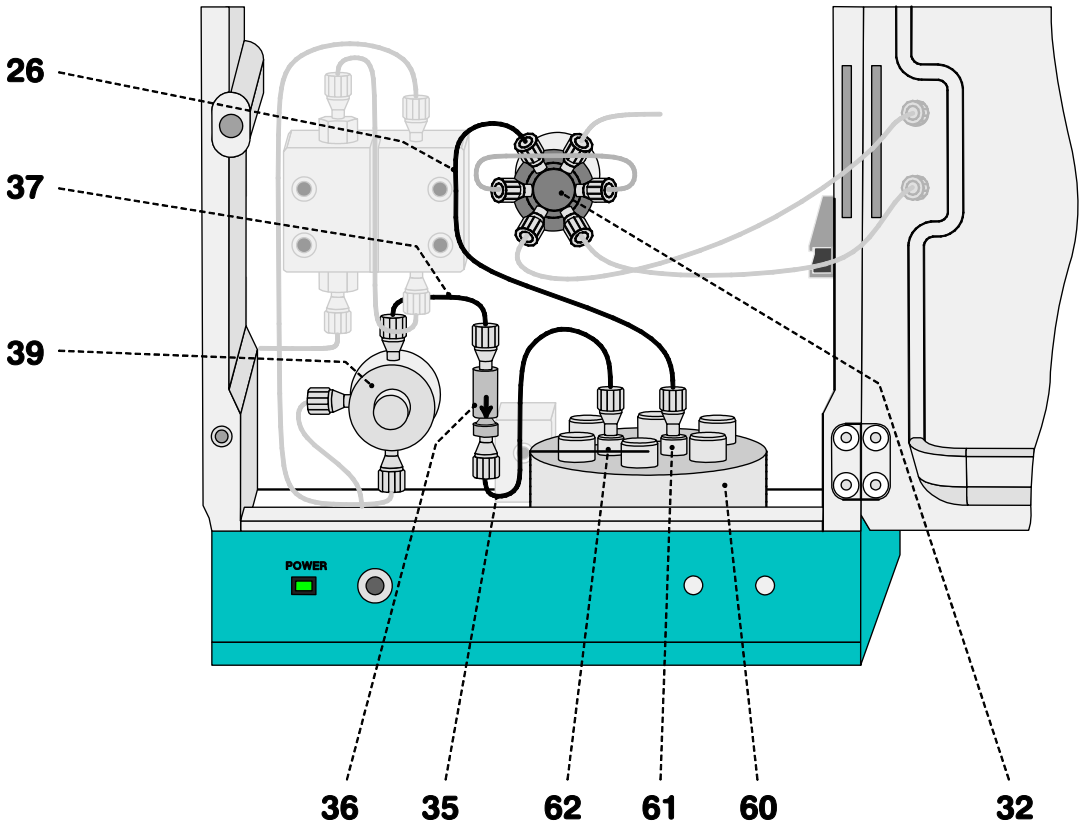


Fig. 10: Connection of the pulsation dampener

26	**Inlet capillary for injector** 6.1831.010 PEEK capillary, length *L* = 24 cm	**39**	**Purge valve**
32	**Injection valve**	**60**	**Pulsation dampener (6.2620.150)**
35	**Connection capillary** 6.1831.010 PEEK capillary, length *L* = 13 cm	**61**	**Connection to injection valve**
36	**Filter unit PEEK (6.2821.120)**	**62**	**Connection to purge valve**
37	**Connection capillary** 6.1831.010 PEEK capillary, length *L* = 13 cm		

2.6.3 Connecting the eluent bottle

The eluent supply line from the storage bottle to the high-pressure pump is connected as follows (see *Fig. 11*):

*Only **degassed** (with N_2, He or vacuum) and **microfiltered** (0.45 µm filter) **eluents** should be used!*

*The 6.1608.070 Eluent bottle (2 L) supplied is **not suitable for vacuum degassing**. Use a pressure-resistant container for this.*

*Care must be taken that the **eluent** used is **freely miscible** with any solvent remaining in the pump head (the pump head leaves the factory filled with either isopropanol or methanol/water). If this is not the case then the pump must first be rinsed with a solvent which is miscible with both the previous eluent and the following eluent (e.g. acetone).*

1 Prepare eluent bottle

- Prepare, microfilter (0.45 µm microfilter) and degas (with N_2, He, or vacuum) the suitable eluent for the required application and separating column.
- Fill eluent into eluent vessel **67** (clear glass, 2 L).
- Place eluent bottle **67** at the front in bottle holder **10** on the 761 Compact IC (see *Fig. 1*).

2 Install bottle attachment

- Firmly screw threaded stopper **65** (6.1446.040; part of 6.1602.160) into the smaller threaded opening (M6) of bottle attachment **66** (6.1602.105; part of 6.1602.160).
- Firmly screw aspirating filter **68** onto aspirating tubing **63**.
- Pull the other end of aspirating tubing **63** through the larger threaded opening (M8) of bottle attachment **66** from below.
- Push O-ring (E.301.0021; part of 6.1602.160) over the free end of aspirating tubing **63** and move it towards bottle attachment **66**.
- Push tubing nipple **64** (4.420.4300; part of 6.1602.160) over the free end of aspirating tubing **63,** move it as far as required towards bottle attachment **66** and screw it loosely in the larger opening of bottle attachment **66**.
- Insert aspirating tubing **63** with screwed-on aspiration filter **68** into eluent bottle **67** and screw bottle attachment **66** onto eluent bottle **67**.
- Pull aspirating tubing **63** so far through the opening of tubing nipple **64** that aspirating filter **68** is touching the bottom of eluent bottle **67**.
- Fix aspirating tubing **63** in place by screwing shut tubing nipple **64**.

3 Mount CO_2 absorber tube

- First place a piece of cotton wool **70** followed by CO_2 absorber **69** (e.g. Merck soda-lime pellets with indicator, no. 6839.1000) in the large opening of absorber tube **72** and then close it with the plastic lid.
- Fasten absorber tube **72** to bottle attachment **66** with the aid of SGJ clip **71**.

4 Connect aspirating tubing to pump

- Insert the free end of aspirating tubing **63** into one of the openings **12** in the interior of the 761 Compact IC (see *Fig. 2*).
- Pull aspirating tubing **63** sufficiently far into the interior of the 761 Compact IC, cut off to the required length and push at least 5 mm of it onto aspirating capillary **40** (see *Fig. 3* and *Fig. 4*) of the high-pressure pump (it may be necessary to use emery paper).
- If necessary, fix aspirating tubing **63** in the required position in the interior with the aid of the Y.107.0150 self-adhesive strap.

*Instead of threaded stopper **65**, the 4.420.0311 Tubing nipple (M6) which belongs to the 6.1602.160 Bottle attachment accessories can be used together with the included second E.301.0021 O-ring for recycling operation (see section 5.2.3), in which the outlet capillary from the detector block is led back into eluent bottle **67**.*

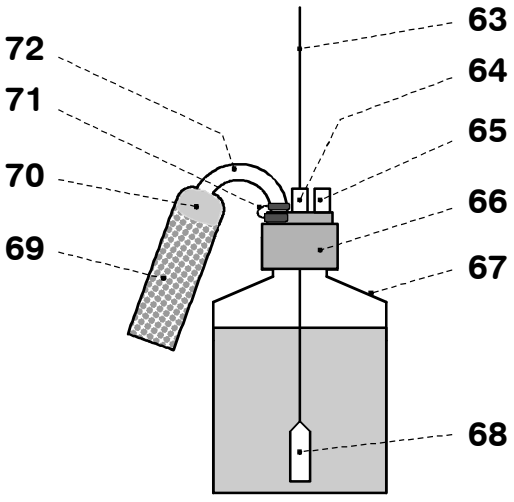


Fig. 11: Connection of eluent bottle

63	**Aspirating tubing (6.1834.010)**
64	**Tubing nipple (4.420.4300; M8)** with E.301.0021 O-ring
65	**Threaded stopper (6.1446.040; M6)**
66	**Bottle attachment (6.1602.105)**
67	**Eluent bottle (6.1608.070)**
68	**Aspirating filter (6.2821.090)**
69	**CO_2 absorber**
70	**Cotton wool**
71	**SGJ clip (6.2023.020)**
72	**Absorber tube (6.1609.000)**

2.6.4 Deaerating the pump and rinsing the pulsation dampener

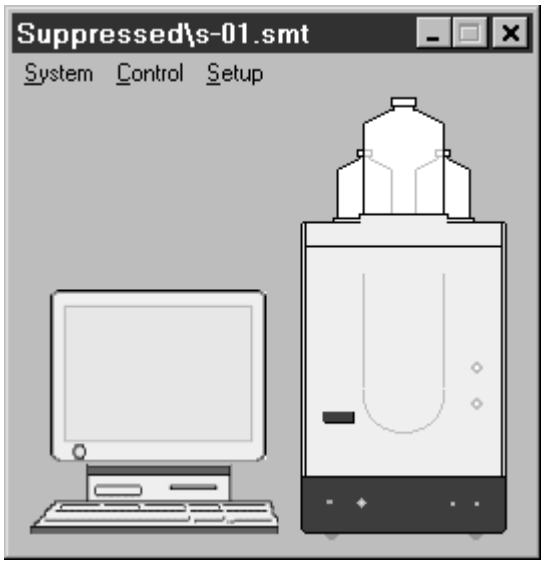
The first time that it is started up the high-pressure pump must be deaerated. Proceed as follows:

1 Prepare for deaeration

- Open the rotary knob on purge valve **39** by approx. ½ turn in the counterclockwise direction (see *Fig. 3* and *Fig. 4*).
- Remove the plastic stopper from connection **8** on the front panel of 761 Compact IC (see *Fig. 1*).
- Push 6.2816.020 Syringe (without needle) into connection **8** until the stop is reached.

2 Open and connect system

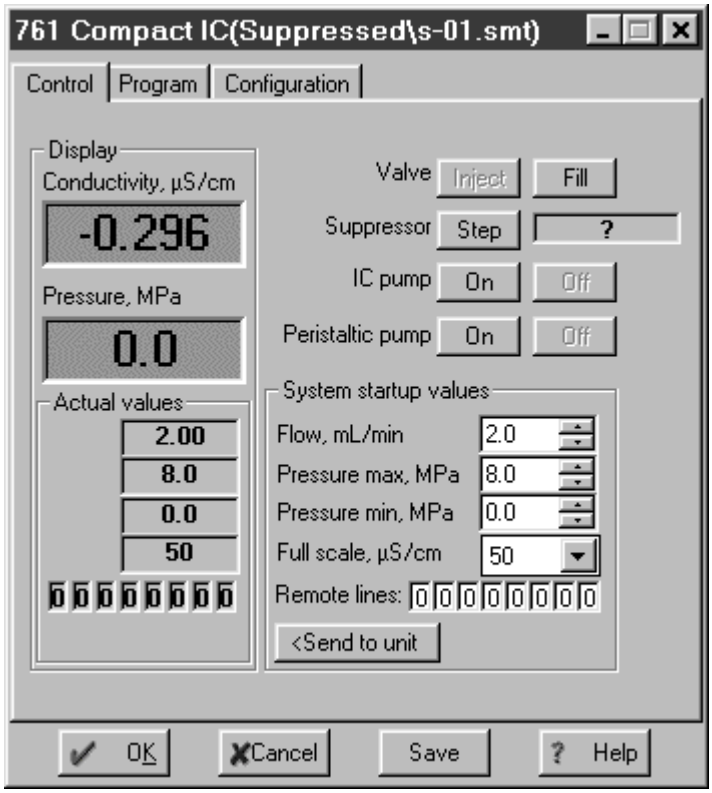
- Start the «761 Compact IC» PC program, if it has not been already been started (see *section 2.5.3*).
- Select **File** / **Open** / **System** in the main window. Open either the subfolder **Non-suppressed** (for 2.761.0010 Compact IC without suppressor) or the subfolder **Suppressed** (for 2.761.0020 Compact IC with suppressor). Select the system file **n-01.smt** or **s-01.smt** and click on **<Open>**. The corresponding system window is opened:



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

3 Set flow rate to 2 mL/min

- Double-click the 761 icon in the system window to open the window for manual control of the 761 Compact IC (see below).
- Set the flow rate to **2 mL/min** in the **Flow** field.
- Click to **<Send to unit>** to send this value to the 761 Compact IC.



4 Deaerate pump

- Make sure that the aspirating tubing **63** for the high-pressure pump has been immersed into the eluent.
- Click the **<On>** button for **IC pump** to switch on the high-pressure pump.
- Use the syringe inserted into connection **8** to aspirate air until eluent flows into the syringe.
- Click the **<Off>** button for **IC pump** to switch off the high-pressure pump.
- Close the rotary knob on purge valve **39** by turning it in a clockwise direction (see *Fig. 3* and *Fig. 4*).
- Remove the syringe from connection **8**.

5 Rinse pulsation dampener

- Place a beaker beneath the column connection capillary **28**.
- Click the **<On>** button for **IC pump** to switch on the high-pressure pump and rinse the pulsation dampener **60** filled with isopropanol for ca. 10 min with eluent.
- Click the **<Off>** button for **IC pump** to switch off the high-pressure pump.

6 Reduce flow rate

- Reset the original flow rate under **Flow** (e.g. **0.5 mL/min**).
- Click **<Send to unit>** to send this value to the 761 Compact IC.

2.7 Precolumns and separating columns

2.7.1 General information on precolumns

The use of easily exchangeable precolumns protects the separating columns and prolongs their lifetime. The precolumns available from Metrohm (see *section 6.3.2*) are either real precolumns or precolumn cartridges, which are used together with the 6.2821.040 Cartridge head or the 6.2828.010 Precolumn cartridge holder.

New IC precolumns are normally filled with solution and sealed at both ends. Before the precolumn is installed in the system, it must be ensured that this solution is freely miscible with the eluent used (check manufacturer's specifications).

2.7.2 Precolumns with cartridge head

The 6.1005.020, 6.1005.040, 6.1005.050, 6.1007.010 and 6.1010.010 Precolumn cartridges are installed in the 6.2821.040 Cartridge head as follows (see *Fig. 12*):

1 Prepare separating column

- Remove end caps from separating column **81**.
- Unscrew fastening screw from column inlet.
- Take steel connector **74** for ferrule out of fastening screw.

2 Install cartridge

- Remove end caps for precolumn cartridge **77** (the steel mesh **76** and gaskets **75** are already installed in the cartridge).
- Mount steel spacer **78** on Manufit pressure screw **80** (the steel mesh **79** and gaskets **75** are already installed in the pressure screw).
- Mount precolumn cartridge **77** on the steel spacer **78** (comply with flow direction if specified on the precolumn).
- Screw Manufit pressure screw **80** firmly to separating column **81**.
- Mount steel connector **74** for ferrule on the inlet side of the precolumn cartridge **77**.
- Screw on Manufit housing **73** with Manufit pressure screw **80**.

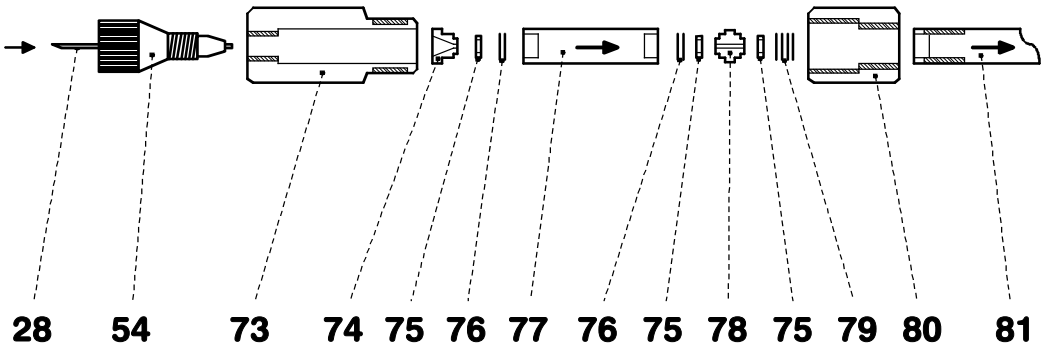


Fig. 12: Installation of precolumn cartridges with cartridge head

28	**Column connection capillary from injector**	**77**	**Precolumn cartridge**
54	**Compression fitting (6.2744.010)**	**78**	**Steel spacer (6.2821.080)**
73	**Manufit housing**	**79**	**4 Steel meshes (6.2821.020)**
74	**Steel connector** (of IC separating column)	**80**	**Manufit pressure screw**
75	**PTFE gasket (6.2821.010)**	**81**	**IC separating column**
76	**2 Steel meshes (6.2821.020)**		

3 Connect precolumn

- Fit PEEK compression fitting **54** to the column connection capillary **28** mounted on the injection valve (see *section 2.3.5*).
- Screw column connection capillary **28** to Manufit housing **73**.

The precolumn cartridge built into the cartridge head can only be rinsed together with the separating column (see section 2.7.7/8). This increases the rinsing time by approx. 20 min.

2.7.3 Precolumn glass cartridges with cartridge holder

The precolumn glass cartridge METROSEP Anion Dual 1 (6.1006.030) is inserted in the 6.2828.010 Precolumn cartridge holder as follows (see *Fig. 13*):

1 Insert cartridge

- Remove end fittings **82** from screw caps **83**.
- Insert precolumn cartridge **85** in sleeve **84** (mark flow direction of the column cartridge on sleeve, the column cartridge should always be operated in the same flow direction).
- Screw both screw caps **83** loosely to sleeve **84** by hand.
- Screw both end fittings **82** into screw caps **83** so that their capillary ends are seated in the PTFE seals of the cartridge.
- Tighten both screw caps **83** by hand.

2 Connect precolumn

- Provide the column connection capillary **28** mounted on the injection valve with a PEEK compression fitting **54** (see *section 2.3.5*) and screw it tightly onto end fitting **82** on the inlet side of the precolumn.
- Cut off as short a piece as possible from PEEK capillary **56** and fit this with two PEEK compression fittings **54** (see *section 2.3.5*).
- Screw prepared capillary **56** to end fitting **82** on the other end of the precolumn.

3 Rinse precolumn

- Place a beaker beneath the outlet capillary of the precolumn.
- Open software window for manual system control.
- If necessary, modify **Flow rate** to the value suited for the inserted separating column and click on **<Send to unit>** to send this value to the 761 Compact IC.
- Switch on high-pressure pump (**IC pump**) by clicking **<On>** and rinse precolumn with eluent for ca. 10 min.
- Switch off high-pressure pump by clicking **<Off>**.

The rinsed precolumn can be connected directly to the separating column instead of by means of a PEEK capillary. Proceed as follows:

- *Screw off PEEK capillary from end fitting* **82** *of the precolumn.*
- *Screw off end fitting* **82** *from screw cap* **83** *of the precolumn.*
- *Screw connection piece* **86** *onto screw cap* **83**.
- *Screw screw cap* **87** *of separating column* **81** *onto connection piece* **86**.

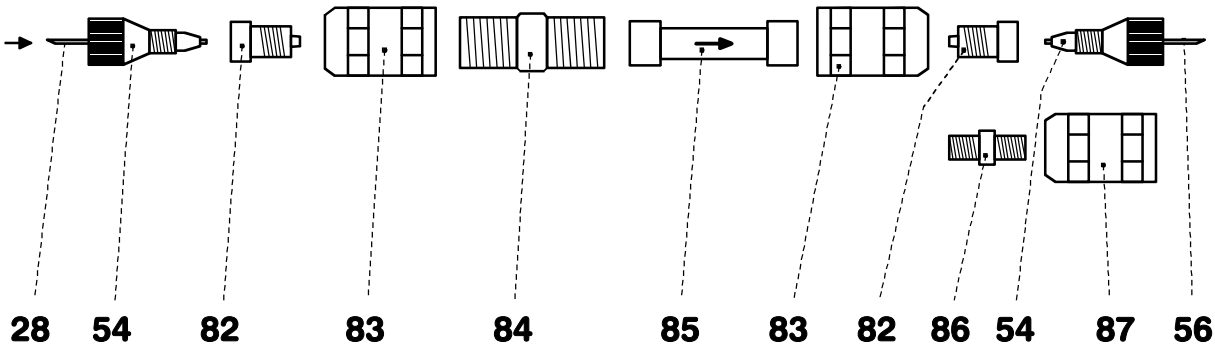


Fig. 13: Installation of precolumn glass cartridges with cartridge holder

28	**Column connection capillary from injector**	**84**	**Sleeve for precolumn cartridge**
54	**Compression fitting (6.2744.010)**	**85**	**Precolumn cartridge (6.1006.030)**
56	**PEEK capillary (6.1831.010)**	**86**	**Connection piece** for connection precolumn – column
82	**End fitting**	**87**	**Screw cap for column**
83	**Screw cap for precolumn**		

2.7.4 IC anion precolumn SUPERSEP

The 6.1009.010 IC Anion Precolumn SUPERSEP has two connections for PEEK capillaries and is installed as follows:

1 Connect precolumn

- Remove end caps from the precolumn.
- Fit PEEK compression fitting **54** to column connection capillary **28** mounted on the injection valve (see *section 2.3.5*).
- Screw precolumn to column connection capillary **28**.
- Cut a piece from the 6.1831.010 PEEK capillary as short as possible and fit with PEEK compression fittings **54** (see *section 2.3.5*).
- Fasten the prepared capillary to the other end of the precolumn.

2 Rinse precolumn

- Place a beaker beneath the outlet capillary of the precolumn.
- Open software window for manual system control.
- If necessary, modify **Flow rate** to the value suited for the inserted separating column and click on **<Send to unit>** to send this value to the 761 Compact IC.
- Switch on high-pressure pump (**IC pump**) by clicking **<On>** and rinse precolumn with eluent for ca. 10 min.
- Switch off high-pressure pump by clicking **<Off>**.

2.7.5 General information on separating columns

New IC separating columns are normally filled with solution and sealed at both ends. Before the column is installed in the system, it must be ensured that this solution is freely miscible with the eluent used (check manufacturer's specifications).

The IC separating columns and precolumns currently available from Metrohm are listed in *section 6.3.2*. A test chromatogram and an information leaflet is provided with each column. You will find additional information concerning these columns in the 8.732.2003 Metrohm Monograph «Ion chromatography» and in special "Application Bulletins", which are available on request free of charge from your local Metrohm agency.

When you install the column, always ensure that this is inserted correctly in accordance with the flow direction shown (arrow must point upwards).

2.7.6 Selection of the sample loop

Selection of the sample loop depends on the separating column used. Normally, the following sample loops are used:

Cation columns	10 µL
Anion columns with suppressor	20 µL
Anion columns without suppressor	10 µL

Depending on the instrument version, the following sample loops are installed in the 761 Compact IC 761:

Version	*Sample loop*	*Volume*
2.761.0010	6.1825.230 (PEEK)	10 µL
2.761.0020	6.1825.210 (PEEK)	20 µL

If desired, the built-in sample loop can be replaced by one of the sample loops available as an option (see *section 6.3.1*).

2.7.7 Installation of the separating column without suppressor

With the 2.761.0010 Compact IC without suppressor module, the IC separating column is installed as follows (see *Fig. 14*):

1 Connect column to injector

- Remove end caps from column **81**.
- *without precolumn:*
  Screw inlet end of separating column **81** (note flow direction) to column connection capillary **28** mounted on the injector.
- *with precolumn in cartridge head:*
  Install separating column **81** (note flow direction) in the cartridge head (see *Fig. 12*) as described in *section 2.7.2*.
- *with precolumn in cartridge holder:*
  Screw inlet end of separating column **81** (note flow direction) to the precolumn fixed in the cartridge holder as described in *section 2.7.3* (see *Fig. 13*).
- *with IC anion precolumn SUPERSEP:*
  Screw inlet end of separating column **81** (note flow direction) to the precolumn installed as described in *section 2.7.4*.

2 Rinse column

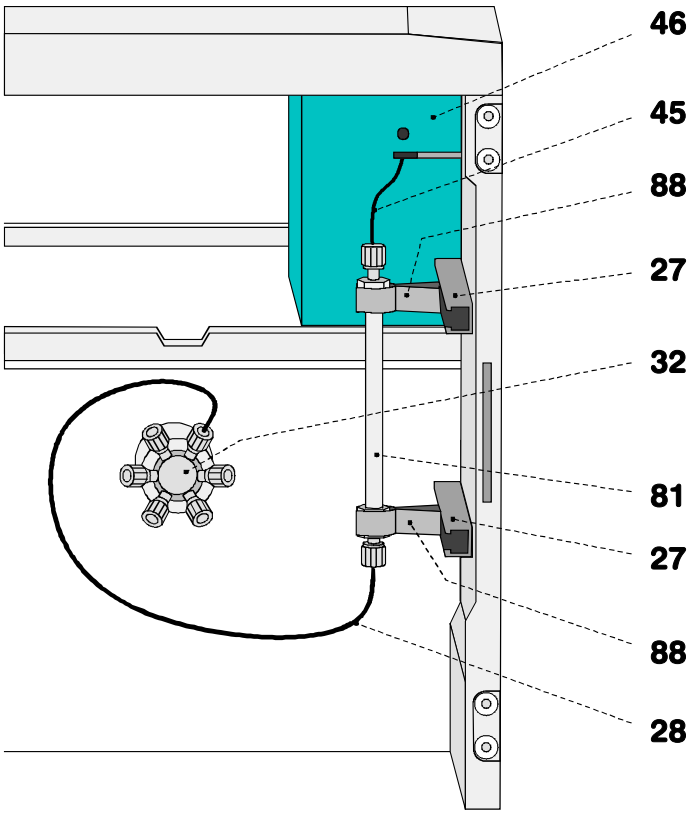
- Place a beaker beneath the column outlet.
- Open software window for manual system control.
- If necessary, modify **Flow rate** to the value suited for the inserted separating column and click on **<Send to unit>** to send this value to the 761 Compact IC.
- Switch on high-pressure pump (**IC pump**) by clicking **<On>** and rinse column with eluent for ca. 10 min.
- Switch off high-pressure pump by clicking **<Off>**.

3 Connect column to detector block

- Screw outlet end of separating column **81** to the inlet capillary **45** permanently mounted on the detector block.

4 Fix column

- Insert one or two column holders **88** (6.2027.030, 6.2027.040 or 6.2027.050) in the mounting rails **27** and fasten separating column **81** in the column holder **88**.



27	**Mounting rail** for column holder **88**
28	**Column connection capillary** Connection injection valve **32** – separating column **81**
32	**Injection valve**
45	**Inlet capillary for detector block** PEEK capillary, fixed mounting
46	**Detector block (1.733.0110)**
81	**Separating column**
88	**Column holder (6.2027.0X0)**

Fig. 14: Installation of column without suppressor

2.7.8 Installation of the separating column with suppressor

With the 2.761.0020 Compact IC with suppressor module, the IC separating column is first connected to the injector or precolumn. The connection to the suppressor module and the detector block is described in *section 2.8*.

1 Connect column to injector

- Remove end caps from column **81**.
- Screw inlet end of separating column **81** (note flow direction) to column connection capillary **28** or to the already installed precolumn (procedure see *section 2.7.7*).

2 Rinse column

- Place a beaker beneath the column outlet.
- Open software window for manual system control.
- If necessary, modify **Flow rate** to the value suited for the inserted separating column and click on **<Send to unit>** to send this value to the 761 Compact IC.
- Switch on high-pressure pump (**IC pump**) by clicking **<On>** and rinse column with eluent for ca. 10 min.
- Switch off high-pressure pump by clicking **<Off>**.

3 Fix column

- Insert one or two column holders **88** (6.2027.030, 6.2027.040 or 6.2027.050) in the mounting rails **27** and fasten separating column **81** in the column holder **88**.

2.8 Suppressor module

2.8.1 General information on suppressor module

The **Metrohm Suppressor Module MSM** for chemical suppression installed in the 2.761.0020 Compact IC comprises a total of 3 suppressor units which are in turn used for suppression, regenerated with sulfuric acid and rinsed with water. To record every new chromatogram under comparable conditions, work is normally carried out with freshly regenerated suppressor. Switching is either automatic together with the valve switching or manual.

The suppressor units must never be regenerated with H_2SO_4 in the same flow direction used for the eluent. You should thus always install the inlet and outlet capillaries as described in section 2.8.4 according to the scheme shown in Fig. 18.

For operation of the suppressor module, the **two-channel peristaltic pump** built into the 2.761.0020 Compact IC is used which conveys the regeneration solution (normally **20 mmol/L H_2SO_4**) and the rinsing solution (normally **dist. H_2O**) to the suppressor units (flow rate of 0.5 mL/min).

The three inlets and outlets numbered 1...3 on the suppressor module each have 2 permanently mounted PTFE capillaries, which must be connected as described in *section 2.8.4* (see *Fig. 16* and *Fig. 18*).

To avoid contamination of the suppressor module by foreign particles or bacterial growth, the two **6.2821.120 Filter units PEEK** (see *section 2.3.6*) supplied with the 2.761.0020 Compact IC must be installed between the peristaltic pump and the inlet capillaries of the suppressor module.

The suppressor module must <u>never</u> be switched in the dry state as there is a danger of blocking. Before every switching operation of the suppressor module, the three suppressor units must have been rinsed for at least ½ h with eluent, regeneration and rinsing solution.

2.8.2 Preparation of the peristaltic pump

Before start-up the accessories for the 2-channel peristaltic pump built into the 761 Compact IC must be mounted according to *Fig. 15*. Proceed as follows:

1 Attach pump tubings

- Loosen both tubing cartridges **48** mounted above pump drive **52** from the holding clamp **50** by pressing down snap-action lever **51** and remove from mounting pin **53** (see *Fig. 16*).

- Press contact pressure lever **49** on both tubing cartridges down as far as it will go.
- Insert the pump tubings **92** and **93** (6.1826.060) into each of the tubing cartridges as shown in *Fig. 15*. The white-yellow stopper **94** must click into the corresponding holder on the left-hand side of the tubing cartridge.
- Place the tubing cartridges on mounting pin **53** and press down on the right-hand side until snap-action lever **51** clicks into position on holding clamp **50**. Take care that no kinks are formed in the pump tubing.

2 Install Filter units PEEK

- Mount a coupling **91** (6.2744.030) to the outlet end of the two Pump tubings **92** and **93**.
- Attach a piece of PTFE tubing **95** (6.1803.020) cut to the required length (normally ca. 10 cm) using a compression fitting **54** (6.2744.010) to the other end of this coupling.
- Attach the PTFE tubing **95** using a compression fitting **54** (6.2744.010) to the filter-screw **57** of the filter unit PEEK (see *section 2.3.6*).

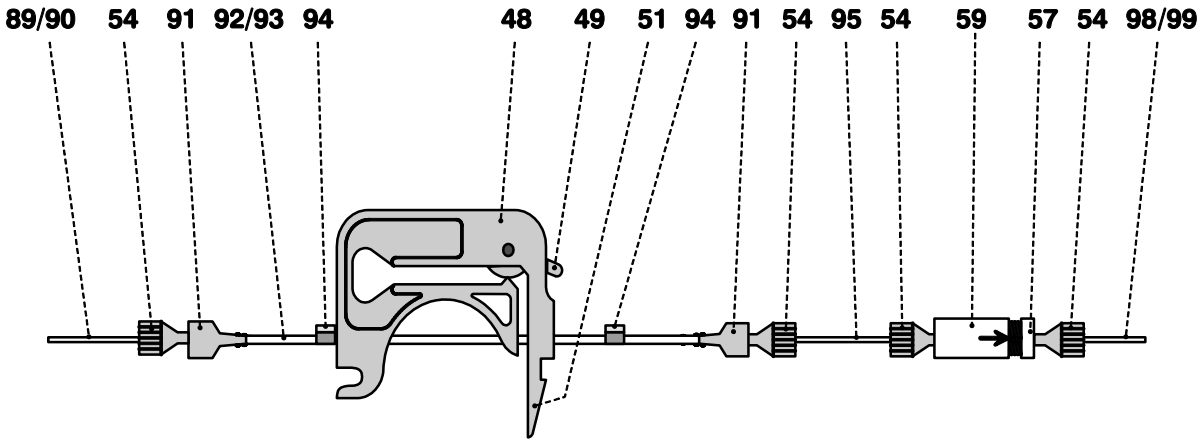


Fig. 15: Installing pump tubings

48	**Tubing cartridge**	**91**	**Coupling (6.2744.030)**
49	**Contact pressure lever**	**92**	**Pump tubing (6.1826.060) for H_2SO_4**
51	**Snap-action lever**	**93**	**Pump tubing (6.1826.060) for H_2O**
54	**PEEK compression fitting (6.2744.010)**	**94**	**Stopper (white-yellow)**
57	**Filter-Screw of Filter Unit** Part of 6.2821.120 Filter unit	**95**	**PTFE tubing (6.1803.020)**
59	**Filter-Housing of Filter Unit** Part of 6.2821.120 Filter unit	**98**	**Suppressor inlet capillary for H_2O**
89	**Aspirating tubing for H_2O**	**99**	**Suppressor inlet capillary for H_2SO_4**
90	**Aspirating tubing for H_2SO_4**		

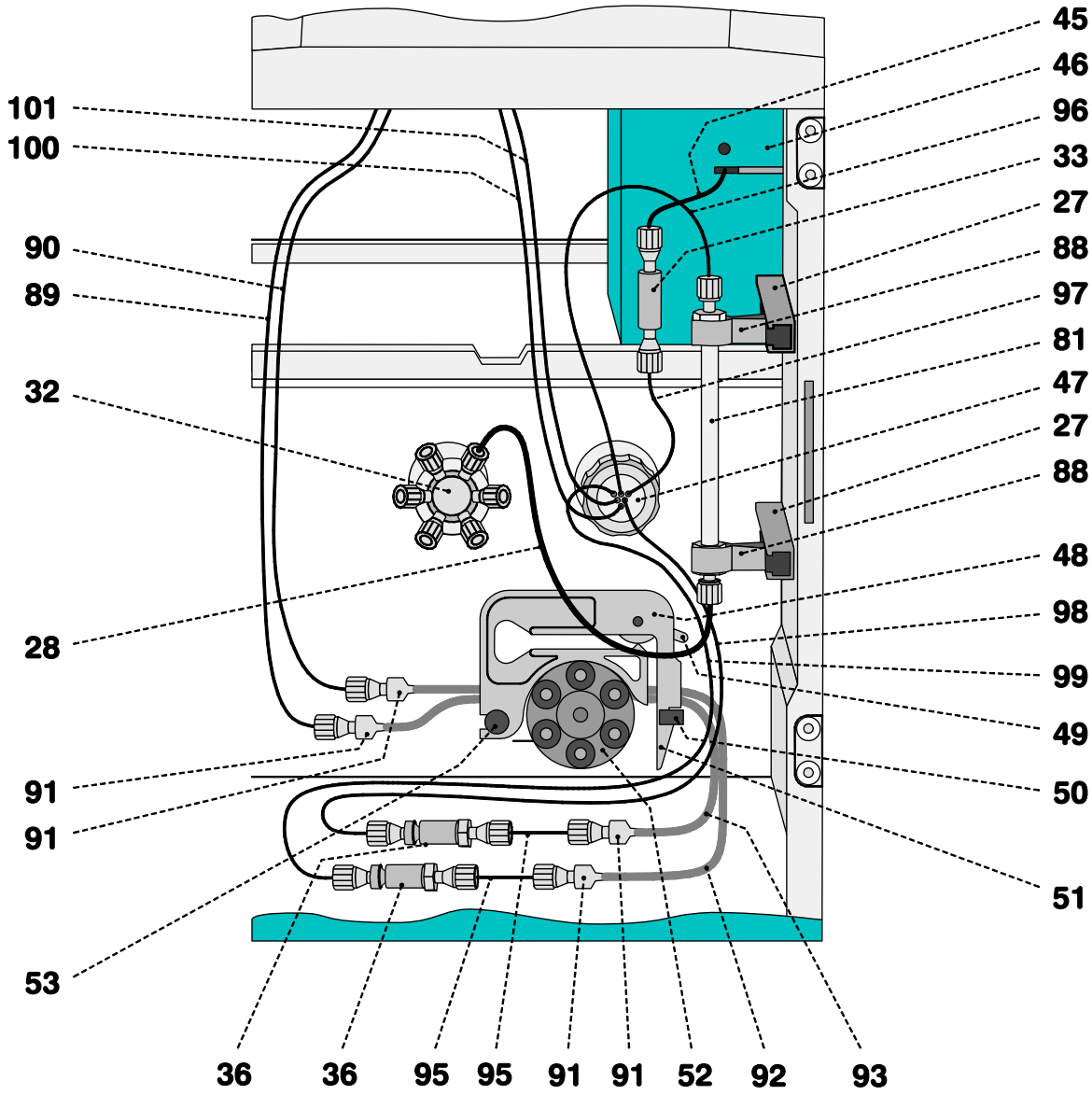


Fig. 16: Connection of the separating column with suppressor

27	**Mounting rail** for column holder **88**	**81**	**Separating column**
28	**Column connection capillary** PEEK capillary (6.1831.010; 30 cm)	**88**	**Column holder (6.2027.0X0)**
32	**Injection valve**	**89**	**Aspirating tubing for H_2O** 6.1803.020 PTFE tubing
33	**PEEK coupling (6.2744.040)**	**90**	**Aspirating tubing for H_2SO_4** 6.1803.020 PTFE tubing
36	**Filter unit PEEK (6.2821.120)**	**91**	**Coupling (6.2744.030)**
45	**Inlet capillary to detector block** (fixed mounting)	**92**	**Pump tubing (6.1826.060) for H_2SO_4**
46	**Detector block (1.733.0110)**	**93**	**Pump tubing (6.1826.060) for H_2O**

47	**Suppressor module**	**95**	**PTFE tubing (6.1803.020)**
48	**Tubing cartridge (6.2755.000)** for pump tubings **92/93**	**96**	**Suppressor inlet capillary for eluent**
49	**Contact pressure lever** for adjusting the contact pressure	**97**	**Suppressor outlet capillary for eluent**
50	**Holding clamp** for locking the tubing cartridge into place	**98**	**Suppressor inlet capillary for H_2O**
51	**Snap-action lever** for releasing the tubing cartridge	**99**	**Suppressor inlet capillary for H_2SO_4**
52	**Pump drive** Roller head with contact rollers	**100**	**Suppressor outlet capillary for H_2O**
53	**Mounting pin** for attaching the tubing cartridge	**101**	**Suppressor outlet capillary for H_2SO_4**

2.8.3 Connection of supply bottles

The supply lines for the regeneration and rinsing solution between the storage bottles and the peristaltic pump are installed as follows (see *Fig. 17*):

1 Prepare supply bottle for H_2SO_4

- Prepare regeneration solution suited for the desired application and separating column (normally 20 mmol/L H_2SO_4).
- Fill regeneration solution into supply bottle **103** (amber glass, 1 L) and label the bottle.
- Screw bottle attachment **102** on to supply bottle **103**.
- Place supply bottle **103** at one of the rear positions of the bottle rack **10** on the 761 Compact IC (see *Fig. 1*).

2 Connect aspirating tubing for H_2SO_4

- Prepare aspirating tubing **90**: Cut a piece of the 6.1803.020 PTFE tubing to the required length (normally ca. 120 cm).
- Pull one end of aspirating tubing **90** through a PEEK compression fitting **54** (6.2744.010) so that approx. 30 cm of the tubing projects.
- Screw PEEK compression fitting **54** with tubing into one opening of bottle attachment **102** attached to the regeneration solution storage bottle and tighten it so that the tubing is firmly held.
- Insert the free end of aspirating tubing **90** into one of the openings in **12** of the 761 Compact IC (*see Fig. 2*) from above and pull it sufficiently far into the interior.
- Mount a coupling **91** (6.2744.030) to the inlet end of the rear

pump tubing **92**.

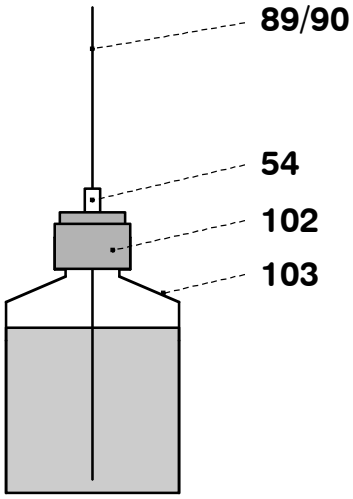
- Mount a 6.2744.010 Compression fitting at the end of the aspirating tubing **90** and screw this compression fitting on to the coupling **91** (see *Fig. 16*).

3 Prepare supply bottle for H_2O

- Prepare rinsing solution suited for the desired application and separating column (normally dist. H_2O).
- Fill rinsing solution into supply bottle **103** (amber glass, 1 L) and label the bottle.
- Screw bottle attachment **102** on to supply bottle **103**.
- Place supply bottle **103** beside the other supply bottle on the bottle rack **10** on the 761 Compact IC (see *Fig. 1*).

4 Connect aspirating tubing for H_2O

- Prepare aspirating tubing **89**: Cut a piece of the 6.1803.020 PTFE tubing to the required length (normally ca. 120 cm).
- Pull one end of aspirating tubing **89** through a PEEK compression fitting **54** (6.2744.010) so that approx. 30 cm of the tubing projects.
- Screw PEEK compression fitting **54** with tubing into one opening of bottle attachment **102** attached to the rinsing solution storage bottle and tighten it so that the tubing is firmly held.
- Insert the free end of aspirating tubing **89** into one of the openings in **12** of the 761 Compact IC (*see Fig. 2*) from above and pull it sufficiently far into the interior.
- Mount a coupling **91** (6.2744.030) to the inlet end of the front pump tubing **93**.
- Mount a 6.2744.010 Compression fitting at the end of the aspirating tubing **89** and screw this compression fitting on to the coupling **91** (see *Fig. 16*).



54	**PEEK compression fitting (6.2744.010)**
89	**Aspirating tubing for H_2O** 6.1803.020 PTFE tubing
90	**Aspirating tubing for H_2SO_4** 6.1803.020 PTFE tubing
102	**Bottle attachment (6.1602.150)**
103	**Supply bottle (6.1608.023)**

Fig. 17: Connection of supply bottles

2.8.4 Connection of the suppressor module

The three inlets and outlets numbered 1...3 on the suppressor module **47** each have 2 permanently mounted PTFE capillaries, which must be connected as described as follows (see *Fig. 16* and *Fig. 18*).

1 Inlet capillary for eluent

- Screw inlet capillary **96** marked with "Eluent" of suppressor module **47** to outlet end of separating column **81** using a 6.2744.010 Compression fitting.

2 Outlet capillary for eluent

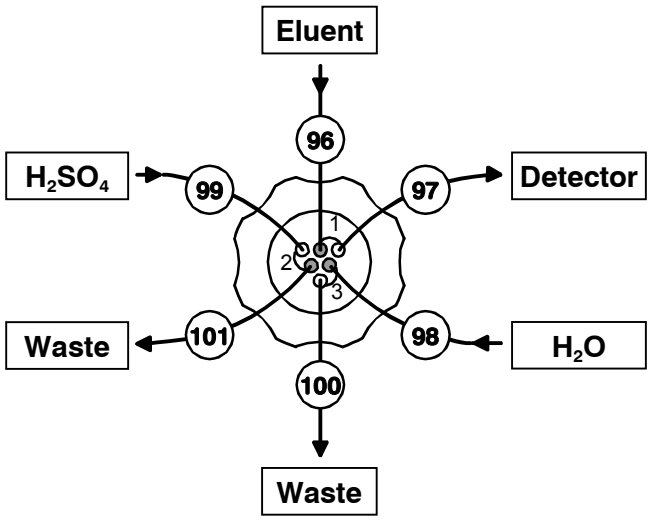
- Screw outlet capillary **97** marked with "Detector" of suppressor module **47** to coupling **33** using a 6.2744.010 Compression fitting.
- Screw inlet capillary **45** of detector block **46** to other end of coupling **33**.

3 Inlet capillary for H_2SO_4

- Attach inlet capillary **99** marked with "H_2SO_4" of suppressor module **47** using a 6.2744.010 Compression fitting to the filter unit PEEK **36** connected to the rear pump tubing **92**.

4 Outlet capillary for H_2SO_4

- Pull outlet capillary **101** marked with "Waste" of the suppressor module **47** from below through one of the openings **13** out of the inner compartment of the 761 Compact IC.
- Lead outlet capillary **101** to a sufficiently large waste container and fix it in place.



96	**Suppressor inlet capillary for eluent**
97	**Suppressor outlet capillary for eluent**
98	**Suppressor inlet capillary for H_2O**
99	**Suppressor inlet capillary for H_2SO_4**
100	**Suppressor outlet capillary for H_2O**
101	**Suppressor outlet capillary for H_2SO_4**

Fig. 18: Connections at suppressor module

5 Inlet capillary for H_2O

- Attach inlet capillary **98** marked with "H_2O" of suppressor module **47** using a 6.2744.010 Compression fitting to the filter unit PEEK **36** connected to the front pump tubing **93**.

6 Outlet capillary for H_2O

- Pull outlet capillary **100** marked with "Waste" of the suppressor module **47** from below through one of the openings **13** out of the inner compartment of the 761 Compact IC.
- Lead outlet capillary **100** to a sufficiently large waste container and fix it in place.

7 Fasten capillaries to the side walls

- If necessary, the two aspirating tubings **89** and **90** can be fixed in the required position in the interior with the help of a Y.107.0150 self-adhesive strap.
- If necessary, the two outlet capillaries **100** and **101** can be fixed in the required position in the interior with the help of a Y.107.0150 self-adhesive strap.

2.9 Putting into operation

2.9.1 Putting into operation without suppressor

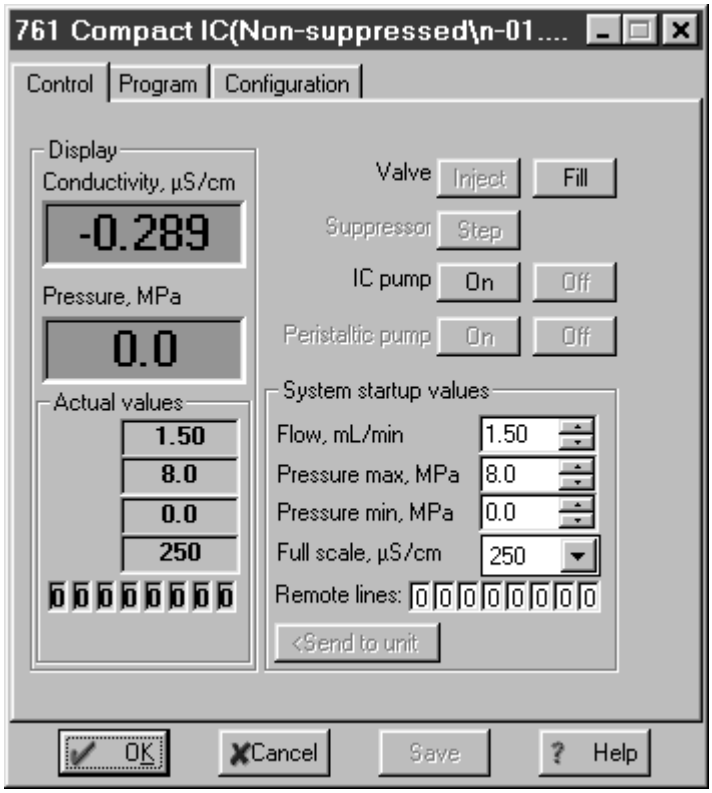
Before sample solutions can be injected at the **2.761.0010 Compact IC** (without suppressor), the entire system must be tested for leaks and then conditioned with eluent until the baseline is stable. Proceed as follows:

1 Open and connect system

- Start the «761 Compact IC» PC program, if it has not already been started (see *section 2.5.3*).
- Select **File** / **Open** / **System** in the main window. Select the system file suited for the inserted separating column (e.g. **n-01.smt**) and click on **<Open>**.
- Select the **Connect to workplace** item from the **Control** menu of the system window.

2 Open control window

- Double-click the 761 icon in the system window. The control window for manual control of the 761 Compact IC appears, which indicates conductivity, pressure and current system parameters.



3 Start system

- Make sure, that the aspirating tubing **63** for the high-pressure pump is immersed in the eluent.
- Select **Startup hardware (Measure baseline)** from the **Control** menu in the system window. The high-pressure pump is started, at the same time, a chromatogram window is opened where the baseline is recorded continuously.

4 Check for leaks

- Check all capillaries and their connections between the high-pressure pump and the detector block for escaping liquid. If eluent escapes anywhere, the appropriate compression fitting must be tightened further or changed.

5 Condition system

- Rinse the system with eluent until the desired stability of the baseline is reached (normally 30…60 min; if the eluent is changed, the establishment of the ion exchanger equilibrium on the separating column can take longer).
- The instrument is now ready for sample determinations using the selected system.

2.9.2 Putting into operation with suppressor

Before sample solutions can be injected at the **2.761.0020 Compact IC** (with suppressor), the entire system must be tested for leaks and then conditioned with eluent until the baseline is stable. At the same time, the suppressor module must be conditioned. Proceed as follows:

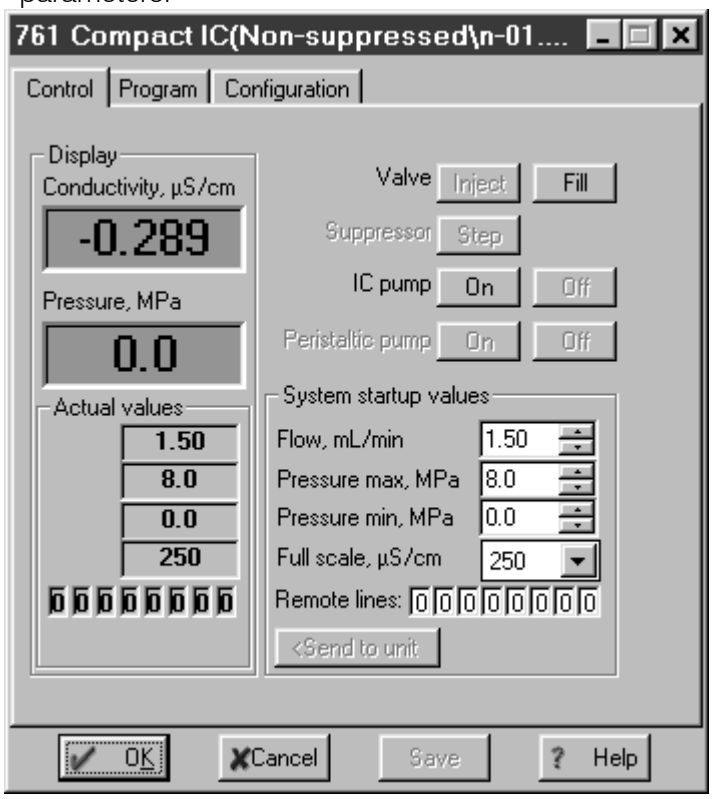
1 Open and connect system "Prep-MSM*.smt"

- Start the «761 Compact IC» PC program, if it has not already been started (see *section 2.5.3*).
- Select **File** / **Open** / **System** in the main window. Open the folder **Suppressed** and select the system file **Prep-MSM1.smt** (for anion column Dual 1) or **Prep-MSM2.smt** (for anion column Dual 2) suited for the inserted separating column. Click on **<Open>**.
- Select the **Connect to workplace** item from the **Control** menu of the system window.

2 Open control window

- Double-click the 761 icon in the system window. The control window for manual control of the 761 Compact IC appears, which indicates conductivity, pressure and current system

parameters.



3 Start system

- Make sure, that the aspirating tubing **63** for the high-pressure pump is immersed in the eluent.
- Select **Startup determination** from the **Control** menu in the system window. The high-pressure pump and the peristaltic pump are started, at the same time, a chromatogram window is opened where the baseline is recorded continuously. The suppressor module is automatically switched to the next position every 20 min and conditioned in this way.

4 Set contact pressure for pump tubings

- Press contact pressure lever **49** on both tubing cartridges **48** upwards until regeneration and rinsing solution just start to be drawn in.
- Then press contact pressure lever **49** upwards until it clicks once more to obtain optimal contact pressure.

5 Check for leaks

- Check all capillaries and their connections between the high-pressure pump and the detector block for escaping liquid. If eluent escapes anywhere, the appropriate compression fitting must be tightened further or changed.

6 Condition system

- Rinse the system with eluent until the desired stability of the baseline is reached (normally 30…60 min; if the eluent is changed, the establishment of the ion exchanger equilibrium on the separating column can take longer). After this time the suppressor module is sufficiently conditioned too.
- The instrument is now ready for sample determinations using the selected system.

Pump tubings are consumable material with a lifetime which depends on the contact pressure. This is why the tubing cartridges should be raised completely by loosening 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).

2.10 Connection of external devices

2.10.1 Connection of the 750 Autosampler

The 750 Autosampler available from Metrohm as an option is an automatic sampler for ion chromatography. It accommodates max. 128 samples each of 730 µL, which are automatically transferred to the sample loop attached to the injection valve of the 761 Compact IC. The samples on the 750 Autosampler are changed by a remote signal which is outputted by the 761 Compact IC (761 Compact IC as "Master").

In order to connect the 750 Autosampler the 6.2128.160 Cable which is available as an option is additionally required. The 750 Autosampler is connected to the 761 Compact IC as follows:

1 Electrical connection 761 – 750

- Connect 6.2140.010 Connector plug to contact closure strip **9** of the 750 Autosampler (see *750 Instructions for Use*).
- Connect one end of the 6.2128.160 Cable to the connections 13 "EXTERNAL INJECT INPUT" and 14 "GND" on the connector plug. The two cable ends are appropriately inscribed with "750" (white) and "GND" (brown).
- Connect the other end of the 6.2128.160 Cable to the remote interface **24** of the 761 Compact IC (see *Fig. 2*).

2 Tubing connection 750 – injection valve

- Loosen rotary nipple **31** which is screwed onto the inner side of connection **3** of the 761 Compact IC (see *Fig. 3* and *Fig. 4*).
- Pull aspiration tubing **4** completely out from connection **3** and screw it off from connection "1" of injection valve **32**.
- Cut transfer tubing **8** (see *750 Instructions for Use*) to the shortest possible length between the needle of the 750 Autosampler and injection valve **32** of the 761 Compact IC.
- Pull the free end of transfer tubing **8** through the opening of connection **3** on the 761 Compact IC and screw it onto connection "1" of injection valve **32** using a 6.2744.010 PEEK compression fitting.
- Retighten rotary nipple on the interior side of connection **3** to fix the transfer tubing.

3 Tubing connection injection valve – waste

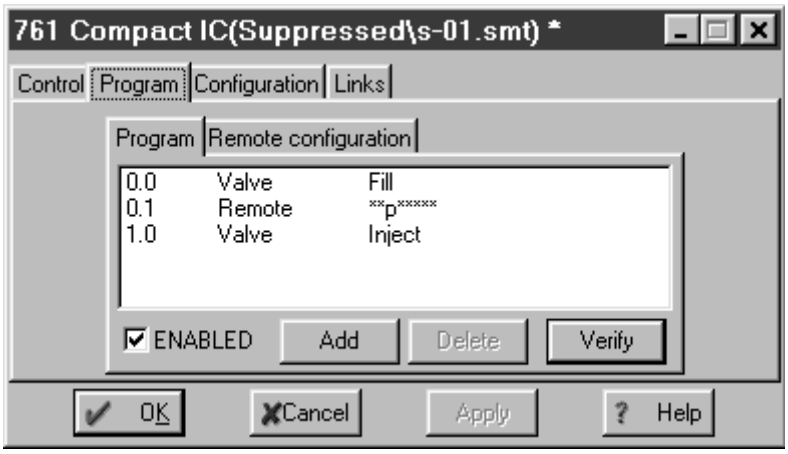
- Insert 6.2744.020 Coupling (from 761 accessories) into connection **3** of the 761 Compact IC.
- Screw aspirating tubing **4** onto the 6.2744.020 Coupling and lead it into the waste container.

4 Settings at the 750 Autosampler

- Set parameter "**Run time**" to **0.0** to activate the external start of the 750 Autosampler (see *section 3.5* of the *750 Instructions for Use*). Filling the sample loop of the injection valve only takes place when the impulse produced by the 761 Compact IC at remote output 3 (see point **5**) makes contact at the "EXTERNAL INJECT INPUT" of the 750 Autosampler. The run time will then be determined externally.

5 Settings in the «761 Compact IC» program

- A time program must be drawn up for the selected system which first switches the injection valve to the "Fill" position, then produces an impulse at remote lead 3 to start sample addition by the 750 Autosampler and finally switches the injection valve to the "Inject" position. The following example shows such a program:



2.10.2 Connection of the 766 IC Sample Processor

The 766 IC Sample Processor available from Metrohm as an option is an automatic sampler for ion chromatography. It accommodates max. 127 samples each of 2.5 mL or 11 mL, which are automatically transferred to the sample loop attached to the injection valve of the 761 Compact IC. Sample changing and filling the sample loop are started by a remote signal produced by the 761 Compact IC (761 Compact IC as "Master").

The 6.2141.110 Cable is required for connecting the 766 IC Sample Processor. The 766 IC Sample Processor is connected to the 761 Compact IC as follows:

1 Electrical connection 761 – 766

- Connect the end of the 6.2141.110 Cable marked with "766" to the remote interface **22** of the 766 IC Sample Processor (see *766 Instructions for Use*).

- Connect the end of the 6.2141.110 Cable marked with "732/1" to the remote interface **24** of the 761 Compact IC (see *Fig. 2*).

2 Tubing connection 766 – injection valve

- At the 761 Compact IC, loosen the rotary nipple **31** screwed onto the interior side of connection **3** (see *Fig. 3* and *Fig. 4*).
- Take aspirating tubing **4** completely out of connection **3** and unscrew from connection "1" of injection valve **32**.
- Cut PEEK capillary **18** installed at the 766 IC Sample Processor (see *766 Instructions for Use*) to the desired length.
- Pull the free end of PEEK capillary tubing **18** through the opening of connection **3** of the 761 Compact IC and screw it onto connection "1" of injection valve **32** with the help of a 6.2744.010 PEEK compression fitting.
- Retighten rotary nipple **31** on the interior side of connection **3** to fix the capillary.

3 Tubing connection injection valve – waste

- Insert 6.2744.020 Coupling (from 761 accessories) into connection **3** of the 761 Compact IC.
- Screw aspirating tubing **4** onto the 6.2744.020 Coupling and lead it into the waste container.

4 Settings at the 766 IC Sample Processor

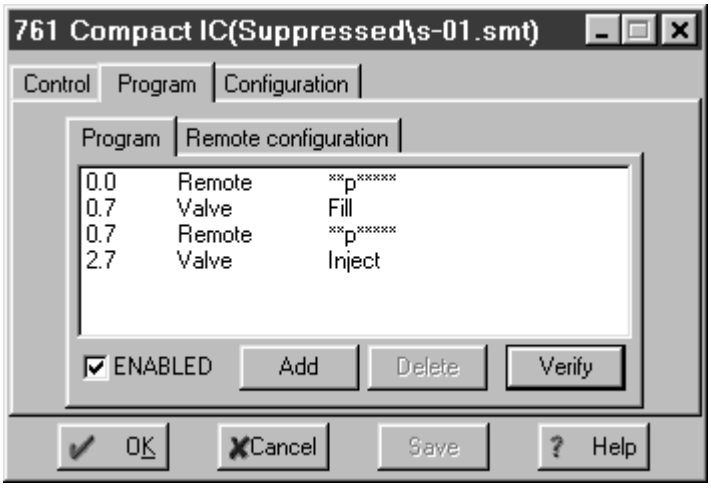
- For operation with the 761 Compact IC it is recommended that the following program "**761**" is used with the 766 IC Sample Processor:

```
parameters
  method                   761
  number of samples:      Rack

>start sequence
   1 CTL:Rm:               INIT
>sample sequence
   1 SCN:Rm      :       Wait1

   2 MOVE  1     :      sample
   3 LIFT: 1  :           work mm

   4 SCN:Rm      :       Wait1

   5 PUMP  1.1   :         120 s

>final sequence
>changer settings
  rack number                0
  lift rate 1               12 mm/s
  shift rate                20
>manual stop
  CTL Rmt:     **************
  CTL RS232:
          ------------
```

– Method name
– Number of samples to be processed (entire sample rack)
– Initialize remote interface
– Waiting until 761 Compact IC sends signal on remote line 3
– Move needle to sample position
– Place lift with needle to working position
– Waiting until 761 Compact IC sends signal on remote line 3
– Fill sample loop with sample during 120 s
– Settings for changer functions
– Reaction to manual stop

5 Settings in the «761 Compact IC» program

- A time program must be drawn up for the selected system which first produces an impulse at remote lead 3 to start sample changing on the 766 IC Sample Processor and then switches the injection valve to the "Fill" position. A further impulse is then produced to start filling the sample loop within 120 s. At the end the injection valve is switched to the "Inject" position, which also starts data acquisition.



6 Run conditions

In order that the joint operation of 761 – 766 functions properly the following conditions must be fulfilled:

- The program must be started first on the 766 IC Sample Processor, then the "Sample Queue" on 761 Compact IC.
- Remote lead 3 on the Compact IC must be set to 0 at the start of each determination (Set **System startup values**: **Remote line 3 = 0**).

2.10.3 Connection of other devices

Any external devices can be connected to the 25-pin remote interface **24** (see *Fig. 2*). The 8 output lines can be used to control these external devices.

Before an external device is connected to the remote interface **24,** *the 761 Compact IC must always be switched off using mains switch* **19** *!*

The pin assignment of the remote interface, its functions and the electrical requirements and the conditions are described in *section 6.1*.

3 Operating tutorial

This section introduces you to the operation of the 761 Compact IC by means of a brief operating tutorial which describes the basic operating steps needed for the recording of an ion chromatogram using one of the system files supplied.

The determination of the anionic content of a drinking water sample with the METROSEP Anion Dual 2 column with chemical suppression is used an illustrative example. Please note that the steps and parameter settings described apply only to this example. If you use a different separating column and system file, the procedures described in the tutorial must be modified appropriately.

For further explanations of the operation, please refer to section 4.

3.1 Requirements

For the determination of anions in drinking water described in this tutorial, the following instruments, accessories and solutions are required:

- **2.761.0020 Compact IC**
  with suppressor module
- **6.1825.210 Sample loop (20 µL, PEEK)**
  already integrated in the 2.761.0020 Compact IC
- **6.1006.100 IC anion column METROSEP Anion Dual 2**
- **Eluent**
  2 mmol/L $NaHCO_3$ / 1.3 mmol/L Na_2CO_3 in dist. H_2O
  flow: 0.8 mL/min
- **Standard**
  Standard solution with 0.5 mg/L F^-, 5 mg/L Cl^- and
  10 mg/L each of NO_3^- and SO_4^{2-} (in dist. H_2O)

3.2 Preparations

Before you start this brief tutorial, the entire IC system must be correctly installed as described in s*ection 2.* In what follows, the most important points for the installation are described once again (for details, see the sections mentioned).

1 Install 761 Compact IC

⇒ Setting up instrument	*section 2.2*
⇒ Installing and connecting detector block	*section 2.3.1*
⇒ Mounting syringe and aspirating tubing	*section 2.3.2*
⇒ Mounting drain tubes	*section 2.3.3/4*
⇒ Mains connection	*section 2.4*
⇒ Connection to PC	*section 2.5*

2 Prepare eluent

⇒ Preparing eluent:
2 mmol/L $NaHCO_3$ / 1.3 mmol/L Na_2CO_3 in dist. H_2O

⇒ Microfiltering and degassing eluent *section 5.1.3*

3 Install high-pressure pump

⇒ Removing transport security screws	*section 2.6.1*
⇒ Mounting pulsation dampener	*section 2.6.2*
⇒ Installing eluent supply	*section 2.6.3*
⇒ Degassing pump	*section 2.6.4*

4 Connecting separating column and suppressor

⇒ Connecting IC anion column	*section 2.7.8*
⇒ Connecting peristaltic pump	*section 2.8.2*
⇒ Connecting supply bottles	*section 2.8.3*
⇒ Connecting suppressor module	*section 2.8.4*
⇒ Conditioning system	*section 2.9.2*

3.3 Calibration

After the complete IC system has been installed as described in *section 3.2*, the first calibration can be started. A standard solution is required for this; it should contain the substances to be determined in approximately the same concentrations in which they can be expected in the sample.

In our example of drinking water determination using the METROSEP Anion Dual 2 IC-anion column a 20 µL sample loop is used; this is filled with the following standard solution:

0.5 mg/L F^-
5 mg/L Cl^-
10 mg/L NO_3^-
10 mg/L SO_4^{2-}
(as Na^+- or K^+ salts in dist. water)

Please note that all program displays refer to the condition in which the system **s-03.smt** is loaded for the first time. If you want to work through this tutorial at a later date and the system **s-03.smt** has been altered in the meantime then differences with respect to the program display and the parameter values may occur.

In the description of the calibration procedure it is assumed that the PC and 761 Compact IC are not in operation and that the system must first be conditioned again. If this is not the case (e.g. if you start the tutorial immediately after conditioning) then you can skip steps **1** to **6**.

1 Switch on 761 Compact IC

⇒ Switch on 761 Compact IC with mains switch **19** on the rear of the instrument. After the instrument has been switched on the mains pilot lamp **9** lights up.

2 Switch on PC

⇒ Switch on PC and start «761 Compact IC» program.

3 Open and connect system "PrepMSM2.smt"

⇒ Start PC program «761 Compact IC», if it is not already running (see *section 2.5.3*).

⇒ Select **File** / **Open** / **System** in the main window. Select the system file **PrepMSM2.smt** in the folder **Suppressed** and click on **<Open>**.

⇒ Select **Connect to workplace** of the **Control** menu in the system window.

4 Start system "PrepMSM2.smt"

⇒ Select **Start determination** of the **Control** menu in the system window. High-pressure pump and peristaltic pump are started, at the same time, a chromatogram window opens where the baseline is recorded continuously. The suppressor

module is switched to the next position every 20 min and conditioned in this way.

5 Condition system "PrepMSM2.smt"

⇒ Rinse IC system with eluent until the desired stability of the baseline is achieved and the suppressor module is sufficiently conditioned (at least 1 h).

6 Stop system "PrepMSM2.smt"

⇒ Select **Stop determination** of the **Control** menu in the system window. Data recording and time program are stopped, high-pressure pump and peristaltic pump keep running on.

7 Open and connect system "s-03.smt"

⇒ Select **Change** of the **System** menu in the system window. Select the system file **s-03.smt** suited for the METROSEP Anion Dual 2 column in the folder **Suppressed** and click on **<Open>**. The system **PrepMSM2.smt** is closed, the system **s-03.smt** is opened and automatically connected.

8 Start system "s-03.smt"

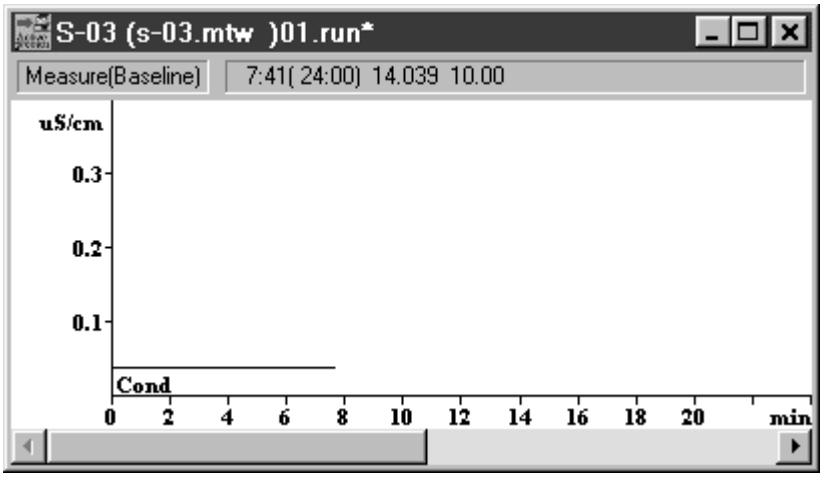
⇒ Select **Start determination** of the **Control** menu in the system window. High-pressure pump and peristaltic pump are started, at the same time, a chromatogram window opens where the baseline is recorded continuously. The status bar of this window shows the message **Measure(Baseline)**, beside this running time, analysis time, absolute conductivity and number of measuring points per second are displayed. The messages **Running [761 Compact IC]** and **Waiting for INJECT [Suppressed]** appear in the **SYSTEM STATE** window

⇒ Let the system run for several minutes. If the system has already been conditioned then a stable conductivity value of approx. 14 µS/cm will be obtained after a few minutes.

⇒ Double-click the chromatogram or select **View all** of the **View** menu. The sensitivity is set automatically so that all measuring points are visible.

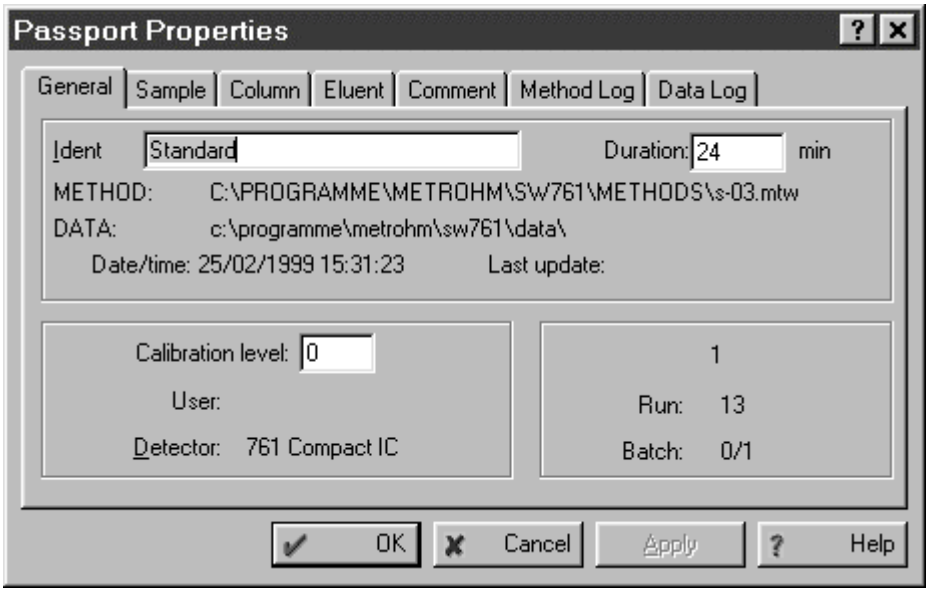
This function is only available if the integration has been started. In the present example the integration only starts after a delay period **Delay = 2.6 min**.

⇒ Select the desired sensitivity using the cursor keys <↑> or <↓>. In the chromatogram window the following display is seen, for example:



9 Enter information for determination

⇒ Click on  or select **Passport** of the **Method** menu. The passport opens with the **General** page, which contains the general information about the determination.



⇒ Enter a title for the calibration as **Ident** (e.g. **Standard**).

⇒ Change the analysis time under **Duration** if required.

⇒ Change other parameters on the passport tabs to characterize sample and acquirement conditions if required.

10 Switch injection valve to "FILL" position

⇒ Click on the  button of the 761 icon in the system window to switch the injection valve to the "FILL" position. At the same time, the suppressor module is switched to the next position.

11 Fill sample loop

⇒ Immerse the aspirating tubing **4** attached to connection **3** in the standard solution.

⇒ Using the syringe fixed to connection **2** siphon in ca. 1 mL standard solution.

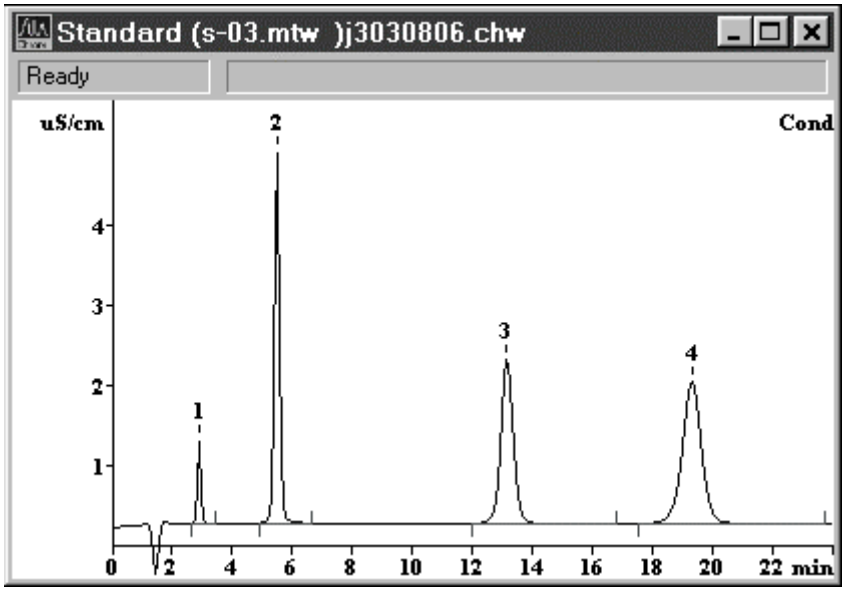
12 Switch injection valve to "INJECT" position

⇒ Click on the Inject button of the 761 icon in the system window to switch the injection valve to the "INJECT" position. At the same time, the data recording is started automatically. The status bar of the chromatogram window shows the message **Measure**, the **SYSTEM STATE** window shows the messages **Running [761 Compact IC]** and **INJECT done [Suppressed]**.

⇒ When the analysis time of 24 min set in the method has expired the recorded chromatogram is automatically evaluated and stored. The chromatogram window then closes.

13 Open chromatogram

⇒ Click on or **File** / **Open** / **Chromatogram** in the main window. Select the chromatogram file ***.chw** just recorded and click on **<OK>**. The chromatogram window is opened where the found peaks are numbered and the baselines are drawn in.

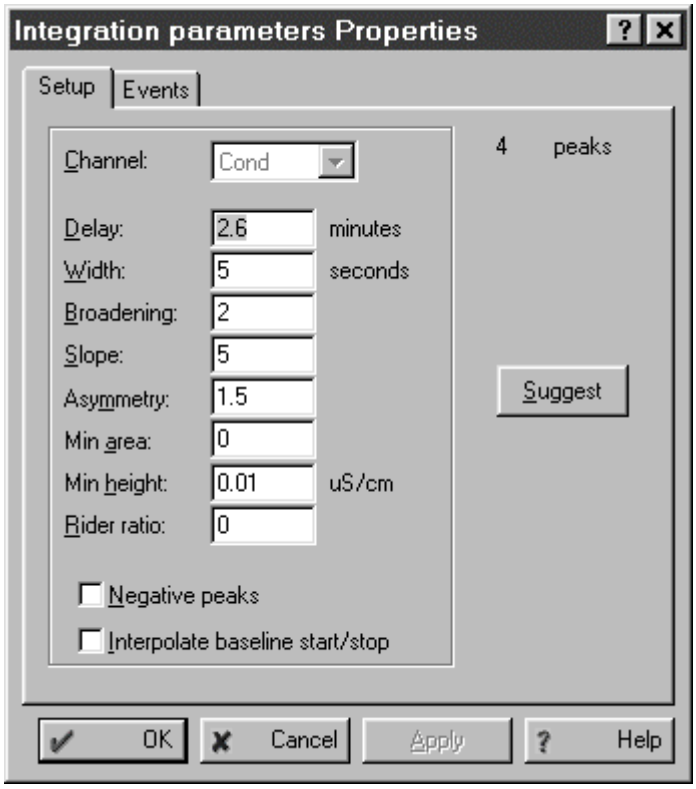


14 Modify integration parameters

⇒ Click on or select **Integration** from the **Method** menu in the main window to open the integration parameters window.

⇒ If required (e.g. if the fluoride peak is not detected), change the time delay **Delay** before starting peak integration.

⇒ Click on **<Apply>**. The **Integration parameters** window is opened and the chromatogram is reintegrated.



⇒ Repeat this procedure for all other integration parameters until the result satisfies your expectations. Click on **<Apply>** for each parameter change.

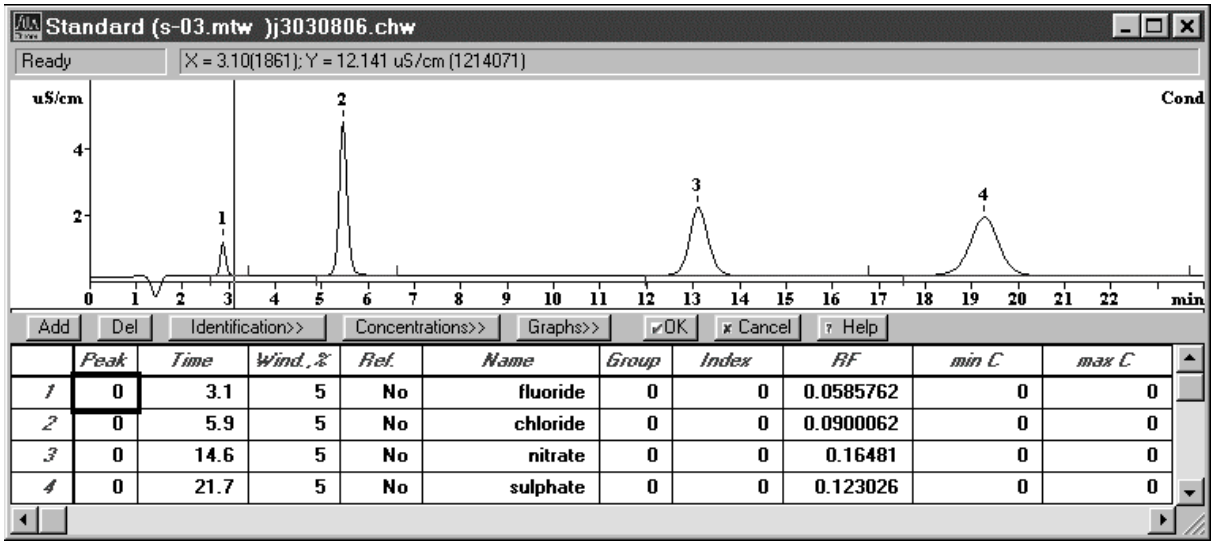
⇒ Close the **Integration parameters** window with **<OK>**.

15 Modify peak allocation

⇒ Click on  or select **Calibration** / **Components** from the **Method** menu. The prepared table for the components fluoride, chloride, nitrate, and sulfate is displayed below the chromatogram. For all peaks which could be allocated unambiguously to a component this table contains the peak number in the ***Peak*** column and the retention time in the ***Time*** column. In the chromatogram itself this retention time is indicated by the cursor (vertical line).

⇒ If the ***Peak*** column contains a **0** the peak must be manually allocated to a component. In this case, insert the peak number from the chromatogram into the ***Peak*** column and click the ***Time*** field on this row with the mouse. The corresponding retention time is then inserted automatically as the new time for this component.

⇒ For each correctly allocated peak click on the retention time in the ***Time*** column. This time is automatically shown in the chromatogram by the cursor. If the retention time is not located in the area of the middle of the peak then the value in the ***Time*** column should be adapted accordingly.



	Peak	Time	Wind.,%	Ref.	Name	Group	Index	RF	min C	max C
1	0	3.1	5	No	fluoride	0	0	0.0585762	0	0
2	0	5.9	5	No	chloride	0	0	0.0900062	0	0
3	0	14.6	5	No	nitrate	0	0	0.16481	0	0
4	0	21.7	5	No	sulphate	0	0	0.123026	0	0

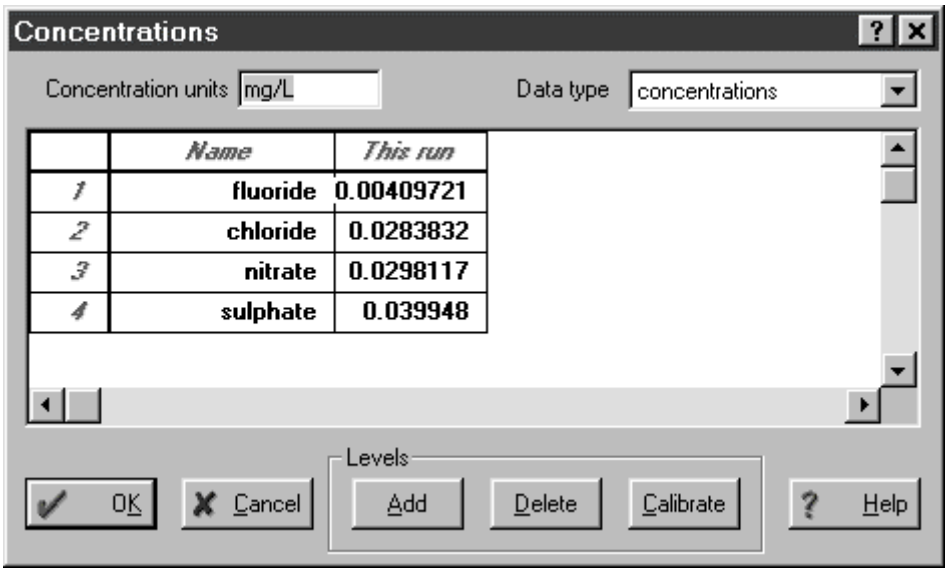
This is done by clicking on the chromatogram and moving the cursor with the aid of the cursor keys <🡐> and <🡒> to the middle of the peak and reading off the corresponding retention time in the status line. Enter this value (rounded off if necessary) into the ***Time*** column.

The optimized table could, for example, then appear as follows:

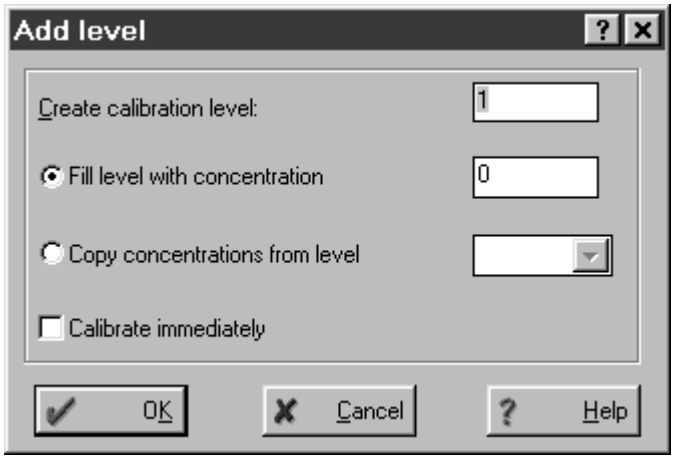
	Peak	Time	Wind.,%	Ref.	Name	Group	Index	RF	min C	max C
1	1	2.9	5	No	fluoride	0	0	0.0585762	0	0
2	2	5.5	5	No	chloride	0	0	0.0900062	0	0
3	3	13.1	5	No	nitrate	0	0	0.16481	0	0
4	4	19.3	5	No	sulphate	0	0	0.123026	0	0

16 Start calibration

⇒ Click the **<Concentrations>** button in the component window.

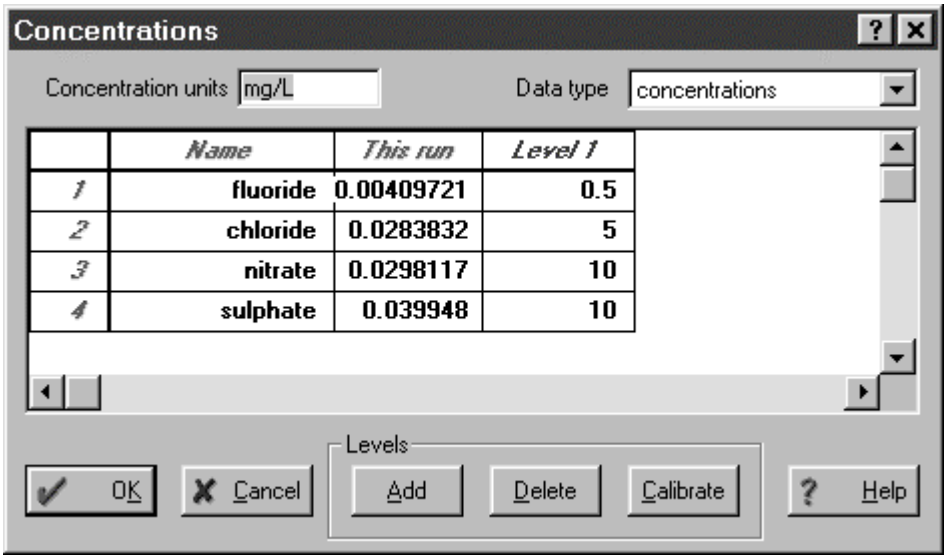


⇒ Click on **<Add>**. The **Add level** window appears.

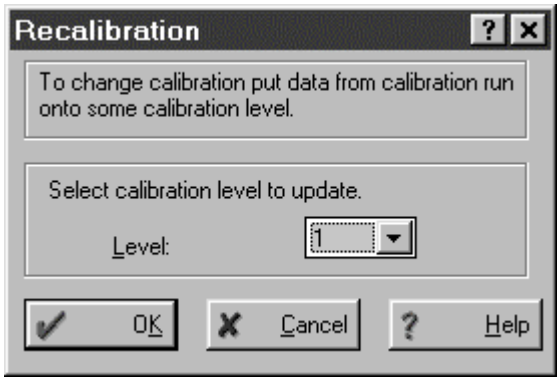


⇒ Confirm **Calibration level 1** in this window with **<OK>**. A new column **Level 1** is added in the **Concentrations** window.

⇒ Enter the concentrations of all components of the standard solution used in this column:



⇒ Click on **<Calibrate>**. The following window appears:



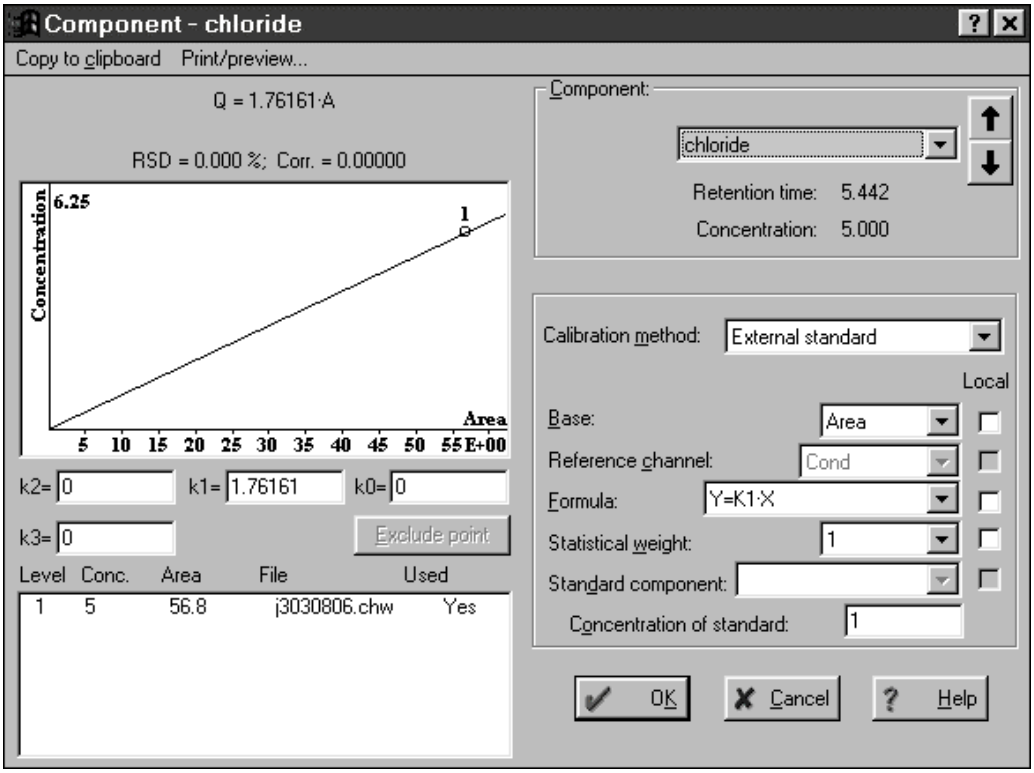
⇒ Confirm **Level 1** with **<OK>**.

⇒ Click on **<OK>** in the **Concentrations** window.

17 Display calibration curves

⇒ Click on **<Graphs>** in the **Components** window.

⇒ Select the desired component in the **Component** field for which the calibration curve should be displayed (e.g. for **chloride**).



⇒ Close the **Component - chloride** window with **<OK>**.

⇒ Close the **Components** window below the chromatogram by clicking on **<OK>**.

18 Save chromatogram and method

⇒ Close the chromatogram window. A window appears with the message **Changes in *.chw. Modified: Calibration. Save changes?**.

⇒ Click on **<Yes>**. A window appears with the message ***.chw already exists. Overwrite?**.

⇒ Click on **<Yes>**. A window appears with the message **Method s-03.mtw was modified. Save changes?**.

⇒ Click on **<Yes>**. The **File Save As** window appears.

⇒ Save the method under the previously given name **s-03.mtw**.

*If you want to store the method under a different name then this must be newly selected for the system under **PC icon** / **Setup** / **Processing method**.*

3.4 Sample determination

Following the calibration of the IC system as described in *section 3.3* the first sample solution can be injected.

1 Enable "Verify sample"

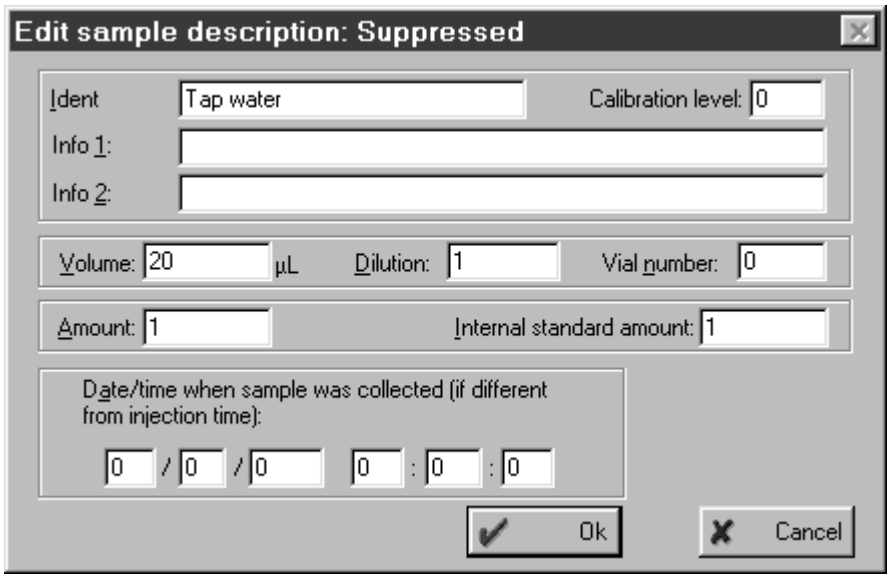
⇒ Switch on the **Verify sample** option of the **Control** menu in the system window. This causes the **Edit sample description** window to open at the start of each determination; the most important data for the sample can then be entered in this window.

2 Start system "s-03.smt"

⇒ Select **Start determination** of the **Control** menu in the system window. An empty chromatogram window opens where the baseline is recorded continuously. The messages **Ready [761 Compact IC]** and **Initialisation [Suppressed]** appear in the **SYSTEM STATE** window. Because of the **Verify sample** option switched on the **Edit sample description** window is opened automatically.

3 Enter information for determination

⇒ Enter the desired information concerning the sample in the **Edit sample description** window and confirm with **<OK>**.



4 Switch injection valve to "FILL" position

⇒ Click on the Fill button of the 761 icon in the system window to switch the injection valve to the "FILL" position. At the same time, the suppressor module is switched to the next position.

5 Fill sample loop

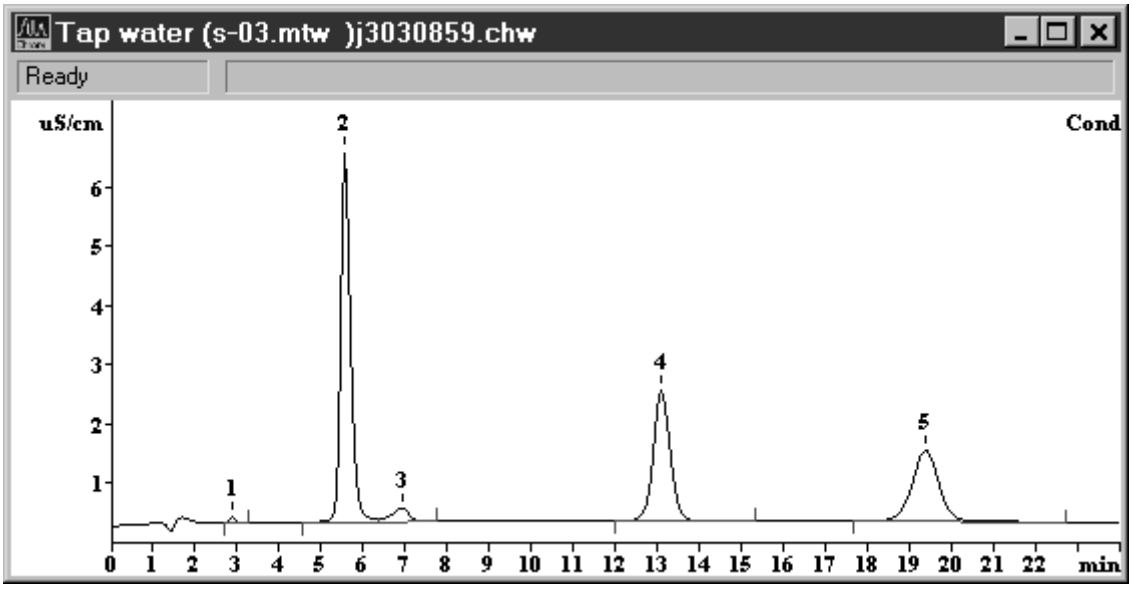
⇒ Immerse the aspirating tubing **4** attached to connection **3** in the vessel containing the drinking water sample.

⇒ Using the syringe fixed to connection **2** siphon in ca. 1 mL drinking water.

6 Switch injection valve to "INJECT" position

⇒ Click on the Inject button of the 761 icon in the system window to switch the injection valve to the "INJECT" position. At the same time, the data recording is started automatically. The status bar of the chromatogram window shows the message **Measure**, the **SYSTEM STATE** window shows the messages **Running [761 Compact IC]** and **INJECT done [Suppressed]**.

⇒ When the analysis time of 24 min set in the method has expired data recording is automatically stopped and the chromatogram is integrated and evaluated. In the chromatogram window the peaks which have been found are numbered and the baseline drawn. In the **SYSTEM STATE** window the message **Finished [Suppressed]** appears. It is now possible to record further samples with the same system.



⇒ At the end of the determination, the chromatogram window is closed and the chromatogram is saved automatically. The file name is generated automatically and contains date and time in a coded form:

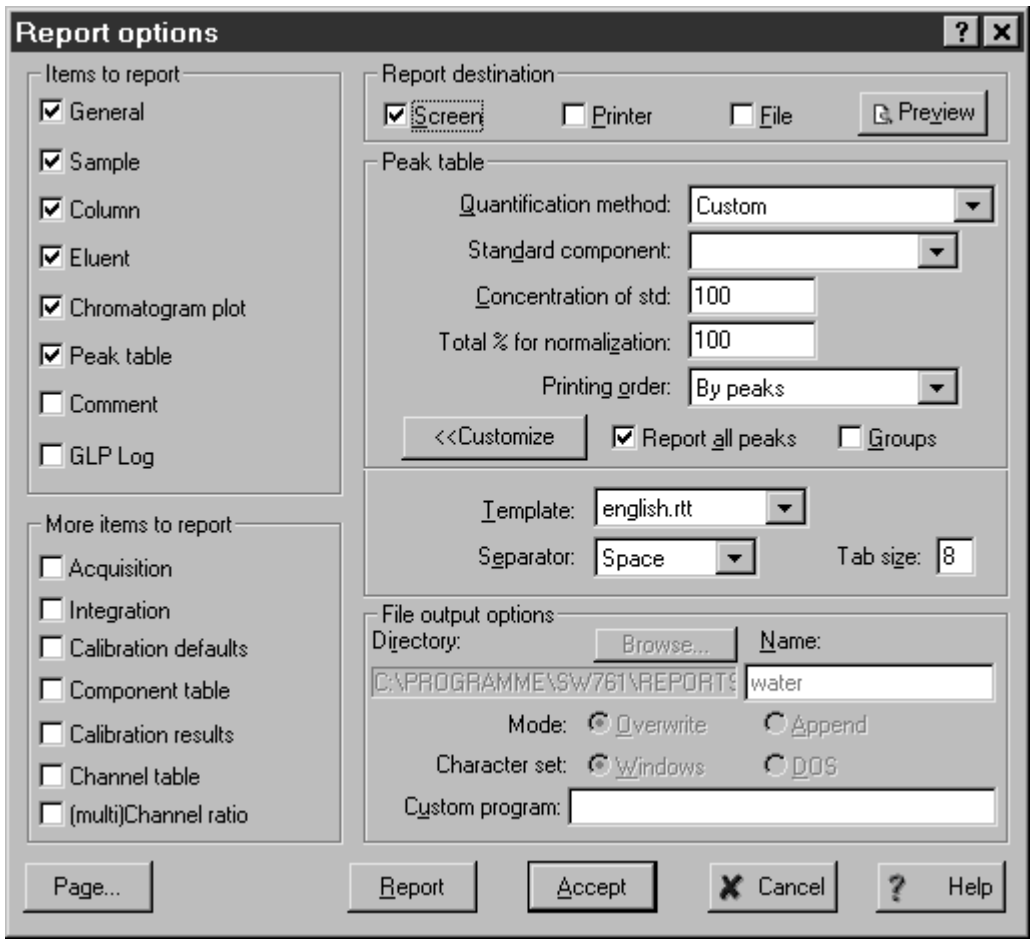
1st numeral:	Alphabetical code for year (e.g. j = 1999, k = 2000, l = 2001, etc.)
2nd numeral:	Code for month (1...9 = Jan....Sept., a...c = Oct....Dec.)
3rd+4th numeral:	Day (01 ... 31)
5th - 8th numeral:	Time (hh:mm)

7 Open chromatogram

⇒ Click on  or **File** / **Open** / **Chromatogram** in the main window. Select the chromatogram file ***.chw** just recorded and click on **<OK>**. The chromatogram window is opened where the found peaks are numbered and the baselines are drawn in.

8 Report output

⇒ Click on  or select **Make report** of the **Process** menu in the main window. The **Report Options** window appears.



⇒ Under **Report destination**, switch on the desired target option for report output.

⇒ Under **Items to report** and **More items to report**, click all desired elements for the report output.

⇒ Click on **<Report>** to start the report output to the selected target.

9 Print report

⇒ Click on  or select **Print** of the **File** menu in the main window. The standard printing window is opened where printer, printing range and number of copies can be selected. After confirmation with **<OK>** the results including the chromatogram are printed out.

4 Operation

This section describes the most important points concerning the operation of the 761 Compact IC. For further details please refer to the on-line help in the PC program which can provide you with the required information rapidly and conveniently from any place in the program.

4.1 Fundamentals of the operation

4.1.1 Starting/closing the program

Start the «761 Compact IC» program

Start the program
Double-click this icon or the **Metro761.exe** file to start the «761 Compact IC 1.1» program. The Login window appears:

Enter your password and click on **<Log In>**.

After software installation, the program can be started without entering a **Password***. For the definition of users, see section 4.2.2.*

Close the «761 Compact IC» program

761 COMPACT IC / File / Exit
Exit the «761 Compact IC» program.

The program is also quit by clicking on  in the upper right part of the main window **761 COMPACT IC**.

4.1.2 Glossary

System

The term "system" is used to describe the combination of **instrument settings**, **time program** and **process method** which have been optimized for the specific separating column and the determination to be carried out with it. A system is used to start single determinations or determinations with the help of a sample queue.

Systems are stored as **system files** (***.smt**) in the **Systems** directory.

Method

A method contains all information necessary for **data acquisition**, **integration**, **peak evaluation** and **quantification**. It can be considered as the chromatogram template, i.e. chromatogram without raw data.

Methods are stored as **method files** (***.mtw**) in the **Methods** directory.

Each system is linked to a method. This method is called **processing method** and is opened automatically at the start of a new determination.

Chromatogram

A chromatogram is a graphic plot of the elution curve (signal vs. time) recorded following a chromatographic separation on a separating column.

Chromatograms are stored as **chromatogram files** (***.chw**) in the **Data** directory. As well as the measuring data the chromatogram files also contain the method parameters and system settings which have been used for data recording, data processing and remote control.

Determination

In order to carry out a determination a suitable **system** must be selected for the separating problem. The result of the determination is a **chromatogram**, in which the measuring data and results of the determination are stored.

Calibration

Calibration is used to describe the method of determining the relationship between the peak height or peak area found for one component and its concentration in the sample. The result of the calibration is a **calibration function** (calibration curve), which shows the relationship between the amount of sample and the evaluated quantity.

The determination of the calibration function with reference solutions can be carried out as a **one-point** or as a **multiple-point calibration**. The calibration method which is mainly used in ion chromatography is the **external standard calibration** (absolute calibration); calibration with an **internal standard** (relative calibration) or **tabulated calibration** are also possible.

Integration

Integration is to be understood as being the method for determining the peak area and peak height with the aid of approximate baselines. The integration algorithm included in the program is influenced by the **integration parameters** and the optionally programmable **integration events** which are defined in the method. In addition, the integration can be manually corrected later with the aid of the **peak editor**.

Sample queue

A sample queue is used for the automated processing of series of samples, particularly in combination with a sample changer.

Batch reprocessing

Batch reprocessing is understood to be the subsequent reprocessing of a series of chromatograms which have been loaded in a batch reprocessing queue. During reprocessing with a selected method the settings for calibration, integration, passport, appearance and report can be altered at will.

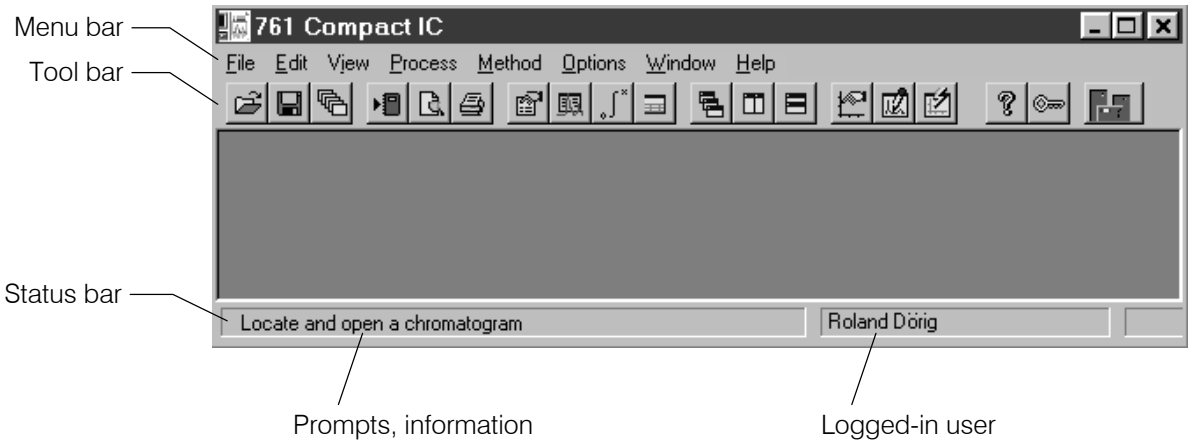
4.1.3 Overview of program windows

The «761 Compact IC» program consists of different windows whose functionality is linked together. The different windows are:

761 COMPACT IC	Main program window for file administration, printing, opening of systems, methods and chromatograms, login and user rights, optional settings and window handling.
CHROMATOGRAM	Window for graphic plot of running or recorded chromatograms.
SYSTEM	Window for loaded system with possibility for manual control of the 761 Compact IC.
SYSTEM STATE	Window for display of status messages for the connected system.
WATCH WINDOW	Window for display of conductivity and pressure.
QUEUE EDITOR	Window for edition of sample queues and batch reprocessing queues.

4.1.4 Main window elements

The elements of the main window **761 COMPACT IC** are the menu bar, the tool bar and the status bar, indicating prompts and logged-in user.



4.1.5 Icons of the main window

The following icons are displayed in the **761 COMPACT IC** main window:

 Open chromatogram

 Save chromatogram

 Open last batch reprocessing file

 Report settings

 Print preview

 Send chromatograms to «Autodatabase»

 Print report

 Passport

 General method settings

 Integration parameters

 Component table

 Cascade all opened chromatogram windows

 Vertical tiling of open chromatogram windows

 Horizontal tiling of open chromatogram windows

 Appearance of the chromatogram window

 Enable/disable peak editor mode

 View whole chromatogram

 Help

 Lock system

 Connected system

4.1.6 Overview of file types

The following file types are produced by the «761 Compact IC» software:

***.bar** **Batch reprocessing file**
This binary file contains data of the batch reprocessing queue. The ***.bar** file is stored automatically in the **Data** folder.

***.cal** **Calibration file**
This binary file contains calibration data, which can be exported with **761 COMPACT IC** / **Method** / **Calibration** / **Export calibration**. The ***.cal** file is stored automatically in the **Methods** folder.

***.chw** **Chromatogram file**
This binary file contains chromatogram, system and method data of a determination. The ***.chw** file is stored automatically in the **Data** folder.

***.mtw** **Method**
This binary file contains the data acquisition method, which can be linked to a system. The ***.mtw** file is stored automatically in the **Methods** folder.

***.que** **Sample queue file**
This binary file contains sample table queue. The ***.que** file is stored automatically in the **Methods** folder.

***.rtt** **Report template**
This ASCII file contains a report template. The ***.rtt** file is stored in the program folder.

***.smt** **System file**
This ASCII file contains the system settings. The ***.stm** file is stored automatically in the **Systems** folder.

***.dev** **Device file**
This ASCII file contains drivers for devices. The ***.dev** file is stored in the **Devices** folder.

4.1.7 Context sensitive menus

Some of the menu functions of the program windows are also accessible by clicking on the desired window or item and pressing the **right mouse button**. The pop up windows have different contents and functions depending on the selected active window or item type.

4.1.8 Keyboard and mouse functions

The **mouse** can be used to carry out the normal program operating functions such as the selection of menu items and fields. It can additionally be used for magnifying a section of a chromatogram (**zooming**). To **zoom** a portion of the plot it is necessary to place the mouse cursor to the upper left corner of the square to zoom, press the left mouse button and drag the cursor to the lower right corner of the rectangle. After releasing of the left mouse button the selected region will be zoomed full-screen. If the cursor is active in the peak editor mode then it can be moved by pressing down the right-hand mouse key.

The **keyboard** can also be used to scale a chromatogram in the window, as described below.

Keyboard quick reference

Cursor is inactive:

[up]	Increases sensitivity on the Y axis.
[down]	Reduces sensitivity on the Y axis.
[right]	Expands a chromatogram on the X axis.
[left]	Shrinks a chromatogram on the X axis.
[Ctrl] + [Home]	Autoscale procedure on the X axis (shows all on X).
[Ctrl] + [End]	Autoscale procedure on the Y axis (shows all on Y).
[PageUp]	Shifts a chromatogram on $^1/_{10}$ part of a screen upwards.
[PageDown]	Shifts a chromatogram on $^1/_{10}$ part of a screen downwards.
[Shift] + [up]	Increases a distance between channels of a chromatogram.
[Shift] + [down]	Reduces a distance between channels of a chromatogram.
[0 (Zero)]	Adjusts a zero on the last point of a chromatogram (running chromatogram) or its lowest level (finished run).

Only part of the chromatogram is on screen:

[Ctrl] + [right]	Moves one window right (without change of scale on X and Y axes).
[Ctrl] + [left]	Moves one window left (without change of scale on X and Y axes).
[Home]	Shows the beginning of a chromatogram (without change of scale on X and Y).
[End]	Shows the end of a chromatogram (without change of scale on X and Y).
[0 (Zero)]	Adjusts a zero on the lowest level in the window.

Cursor is active:

[0 (Zero)]	Adjust a zero in site of the cursor.
[right]	Moves cursor left to right.
[Shift] + [right]	Quickly moves cursor left to right.
[left]	Moves cursor to the left.
[Shift] + [left]	Quickly moves cursor to the left.
[Home]	Moves cursor to beginning of a window.
[End]	Moves the cursor to end of a window.
[Shift] + [End]	Sets the beginning of a window in site of the cursor.
[Shift] + [Home]	Sets the end of a window in site of the cursor.

4.1.9 Help

By clicking on  , by clicking on 

, by selecting the **Help** / **Contents** menu item, or by pressing the [F1] key you can get on-line help on the current topic anywhere in the program.

Green texts	can be clicked to jump to a different Help topic.
Violet texts	identify the dialog item, parameter or button in the corresponding window.
Blue texts	identify important information.

4.2 Instrument and software settings

4.2.1 Fonts

761 COMPACT IC / **Options** / **Fonts**

This option allows the selection of fonts used by the system.

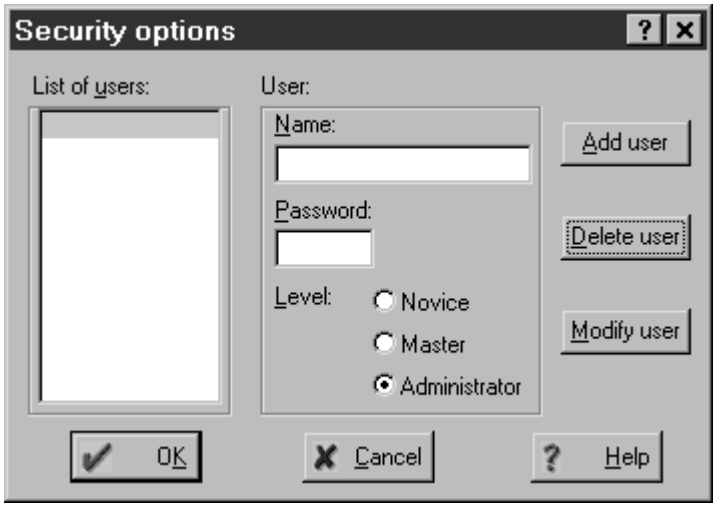
Font for dialog...	Selection of font used for dialog boxes. Default setting: **MS Sans Serif** / **Standard** / **8 pt.**
Font for reports...	Selection of font used for report output to the screen or printer. Default setting: **Courier New** / **Standard** / **10 pt.**
Font for tables...	Selection of font used for data presentation in tables on the screen. Default setting: **MS Sans Serif** / **Bold** / **8 pt.**
Font for plots...	Selection of font used for labels on chromatogram plots and calibration curves. Default setting: **Times New Roman** / **Bold** / **10 pt.**
Save fonts configuration	Save chosen font configuration.

4.2.2 Security system

The «761 Compact IC» program has a security system based on the list of users. Every user has his unique password and one of the following access levels:

Novice	Restricted access to program functions. Allows only start and stop of determinations using existing system and method files and manual control of the 761 Compact IC. Modifications of system, method and data files are not allowed.
Master	Access to all program functions with few exceptions: the user cannot set **Global preferences**, **Hardware settings** and security system.
Administrator	Access to all program functions.

It is recommended to make user lists and enter passwords as a first action after system installation. So, select the menu item **761 COMPACT IC** / **Options** / **Security** and click on **<Log In>** in the Log In window without entering a password. The **Security options** window appears:



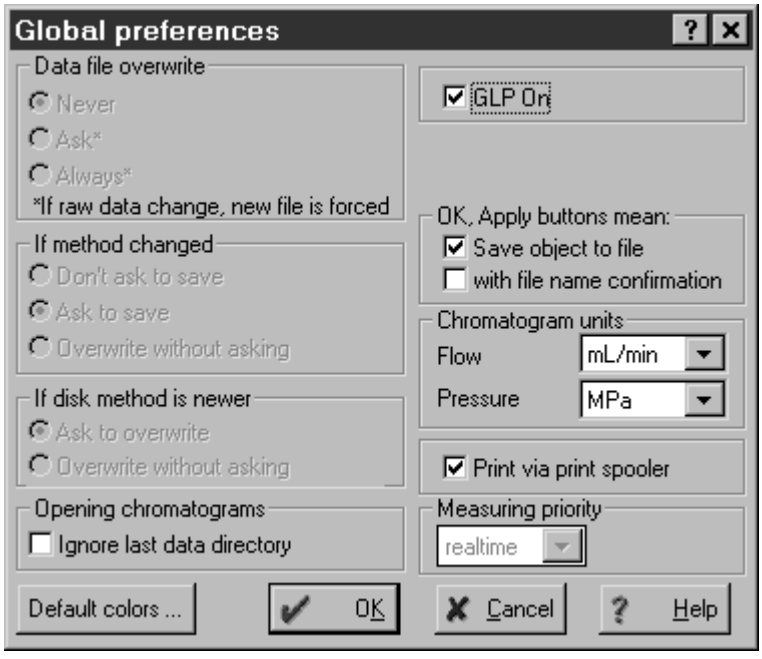
Enter user name, password and access level for all users. Don't forget to make one of the user an **Administrator**, otherwise this window will not open again. At the end, click on **<OK>**.

After configuration of the security system the program prompts for the password every time the system starts. This user name stamps all methods, chromatograms and reports. It is possible at any time to change the user with the menu item **761 COMPACT IC** / **Options** / **Lock system**.

4.2.3 Global settings

761 COMPACT IC / **Options** / **Global preferences**

This window is used for **global program settings**.



This window is only accessible for users with **Administrator** *access level.*

GLP On If this option is enabled, the following parameters are automatically set:

Data file overwrite	=	**Never**
If method changed save	=	**Don't ask to**
If disk method is newer write	=	**Ask to over-**

Data file overwrite — Overwriting of chromatogram files:

- **Never** — Chromatogram files cannot be overwritten. A modified chromatogram is saved as a new file with the file name number raised by 1.
- **Ask** — The user is asked if the chromatogram should be overwritten.
- **Always** — Chromatogram files are always overwritten without confirmation.

If method changed — Saving of method files:

- **Don't ask to save** — The method file is not saved automatically. It can be saved only with **File** / **Save** / **Method**.
- **Ask to save** — The user is asked if the method should be saved.
- **Overwrite without asking** — Method files are overwritten without confirmation.

If disk method is newer — Overwriting of method files:

- **Ask to overwrite** — The user is asked if the method should be overwritten.
- **Overwrite without asking** — Method files are overwritten without confirmation.

Opening chromatograms — Opening of chromatograms:

- **Ignore last data directory** — If this option is enabled, the default data directory **Data** is opened.

OK, Apply buttons mean

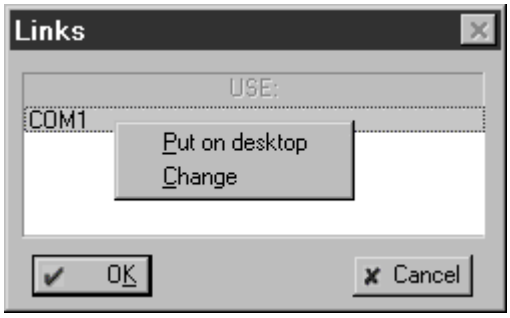
- **Save object to file** — If this option is enabled, the **<Apply>** button in system settings windows is replaced by the **<Save>** button. The system settings are saved if the **<Save>** or **<OK>** button is clicked.
- **with file name confirmation** — If this option is enabled, the **<Apply>** button in system settings windows is replaced by the **<Save as>** button. The system settings can be saved in a new file if the **<Save as>** or **<OK>** button is clicked.

Chromatogram units	Units for chromatograms:
Flow	Unit for flow rate: **µL/min**, **mL/min**
Pressure	Unit for pressure: **MPa**, **psi**, **bar**, **atm**
Print via print spooler	Switch on/off printing via print spooler. Switch off this option if you use a GDI printer.
Measuring priority	Setting the priority of program execution. **real-time** means that the «761 Compact IC» program has the highest priority, **normal** means that all active programs have the same priority.
<Default colors>	Default colors for chromatographic windows (details see *section 4.5.3*).

4.2.4 COM port

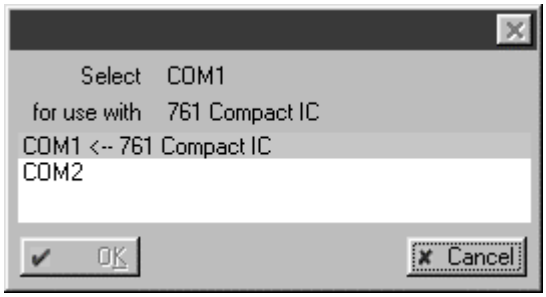
761 COMPACT IC / Options / 761 Compact IC:COM1

This menu item opens the **Links** window for COM port (serial RS232 interface) selection and settings.



If **COM1** is clicked with the right mouse button, the following menu items appear:

Put on desktop	Possibility for setting COM port parameters for recording data transfer (details see on-line help).
Change	Possibility for changing the COM port (default setting: **COM1**). The following window is opened, where the interface can be changed by clicking on the desired COM port.

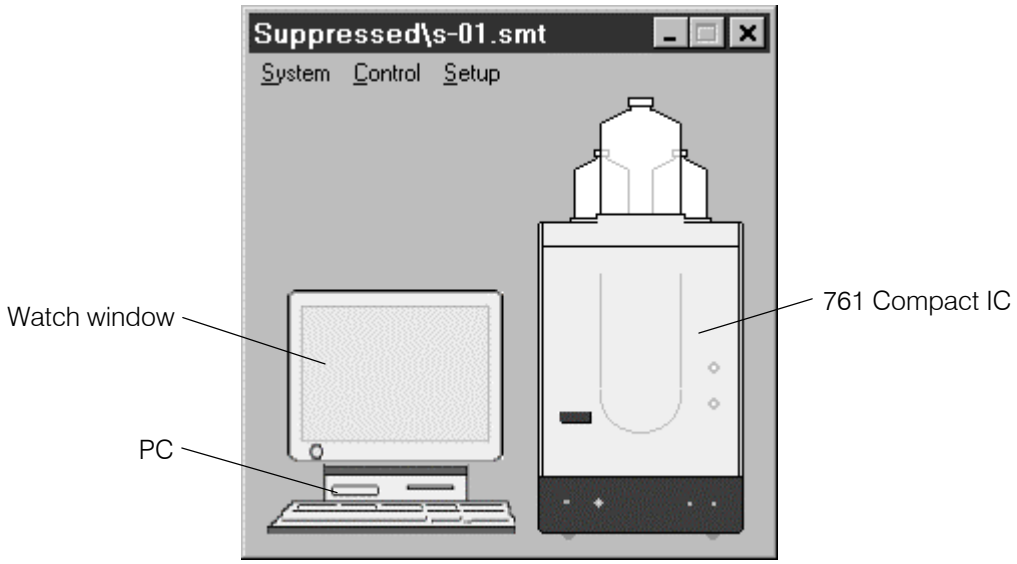


4.3 Systems

The term “System“ describes the combination of **instrument settings**, **time program** and **process method** which has been optimized for a specific separating column and the determination to be carried out with it. A system is used to start single determinations or determinations with the help of a sample queue. Systems are stored as **system files** (***.smt**) in the **Systems** directory.

4.3.1 System window

A system window is opened with **761 COMPACT IC** / **File** / **Open** / **System** and the selection of the desired system file. It contains icons for **PC**, **Watch window** (screen) and **761 Compact IC**.



4.3.2 System file handling

The following menu items are used for opening, changing, saving and closing of systems:

761 COMPACT IC / **File** / **Open** / **System**

Load an existing system file (***.smt**) from the **Systems** directory and open the corresponding **SYSTEM** window

The directory and name of the opened system file are displayed in the title bar of the **SYSTEM** window. A star (*****) at the end of the name indicates that the system settings have been changed since the last saving.

SYSTEM / **System** / **Open other**

Load an existing system file (***.smt**) from the **Systems** directory and open a new **SYSTEM** window. The system parameters can be changed for this system, but it can not be connected without disconnecting the actual system first.

SYSTEM / **System** / **Change**

Disconnect the current system, open the selected new system and connect it automatically.

SYSTEM / System / Save

Save the current system settings in a system file (***.smt**) in the **Systems** directory.

SYSTEM / System / Close

Disconnect the selected system (if it is connected) and close the system window.

4.3.3 System functions

Connect and disconnect system

To make possible manual control of the instrument and start of determinations the selected system must be connected to the PC. Only one system can be connected at the same time. Systems are connected and disconnected as follows:

SYSTEM / Control / Connect to workplace

Connect selected system to the COM port of the PC. If the system is connected, the two buttons **<Inject>** and **<Fill>** appear on the 761 icon in the system window for manual control of the injection valve (see *section 4.3.7*).

At the same time, the  icon appears on the tool bar. If this icon is clicked, the **SYSTEM** window is always displayed in front of all other windows.

SYSTEM / Control / Disconnect from workplace

Disconnect selected system from the COM port of the PC. If the system is disconnected, the two buttons **<Inject>** and **<Fill>** disappear on the 761 icon in the system window. Manual control is not available for this system any more, but all other system settings can be modified and saved.

Start/stop hardware and record baseline

SYSTEM / Control / Startup hardware (Measure Baseline)

Starting the hardware at the 761 Compact IC includes sending of **System startup values**, starting of the high-pressure pump and (if present) starting of the peristaltic pump.

At the same time, the recording of the measurement signal using the method of the connected system is started. Independently of the set chromatogram **Duration**, the measurement signal is recorded until the data acquisition is stopped with **SYSTEM / Control / Stop data acquisition** or a new determination is started. Alternatively the baseline recording can be stopped by clicking the  icon of the chromatogram window. In this case the user is asked if the recorded baseline should be saved or not.

SYSTEM / Control / Shutdown hardware

High-pressure pump and (if present) peristaltic pump at the 761 Compact IC are immediately stopped. A running determination and an active sample queue are also stopped and the remote output lines are set to the values defined under **Hardware / Remote lines after power on**.

SYSTEM / Control / Stop data acquisition

Stop recording of the baseline.

Start/stop determinations

SYSTEM / Control / Start determination

Start determination using the settings of the selected system. At this start command, the **System startup values** are set at the 761 Compact IC. The high-pressure pump and the peristaltic pump are started if they are not already running. The time program and the data recording are started either immediately (**Start with determination**) or after switching the injection valve to the "Inject" position (**Start with inject**) as set in the **Start mode** window.

SYSTEM / Control / Stop determination

Stop running determination. Data acquisition and time program are terminated immediately. The recorded chromatogram is saved automatically if the **Save chromatogram after the run** option on the **Passport / Processing** tab is enabled.

Alternatively the determination can be stopped by clicking the  icon of the chromatogram window. In this case the user is asked always if the determination should be saved or not.

SYSTEM / Control / Stop data acquisition

Stop data acquisition of the running determination immediately and save the recorded chromatogram automatically if the **Save chromatogram after the run** option on the **Passport / Processing** tab is enabled. The time program of the running determination is continued normally.

Options for determinations

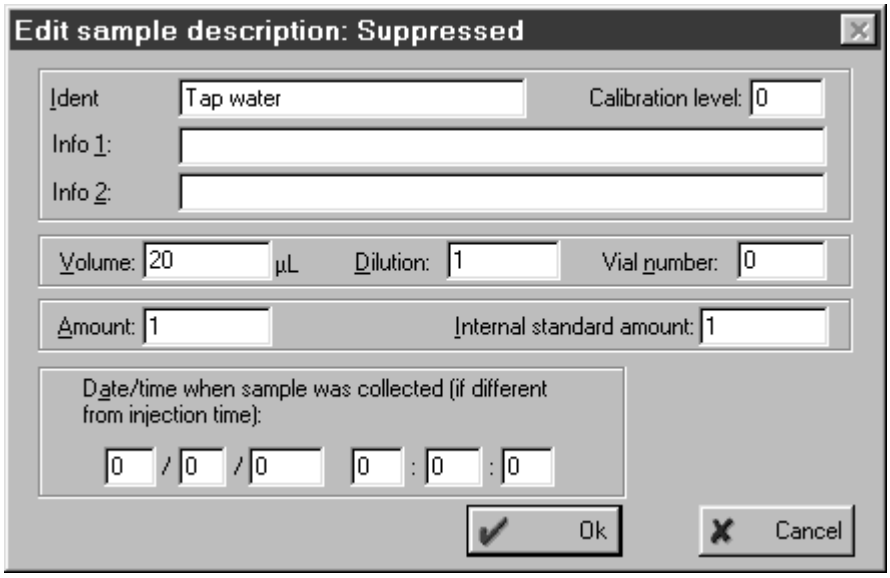
SYSTEM / Control / Auto restart

If this option is enabled, a new determination is started automatically using the current system after the preceding determination has been finished normally or stopped manually.

The **Auto restart** option is disabled if determinations are made with an active sample queue.

SYSTEM / Control / Verify sample

If this option is enabled, the **Edit sample description** window is opened automatically at the start of each determination for entry of the following sample information:



Ident	User defined identifier (title) for the chromatogram to be displayed in the title bar of the chromatogram window and in the **Chromatogram open** window.
Calibration level	Calibration level (0 = sample; 1…n = calibration solutions).
Info 1 / **Info 2**	Sample description.
Volume	Injected volume in µL.
Dilution	Dilution of the sample.
Vial number	Autosampler vial position to take sample from.
Amount	Sample amount. If this value is different for the calibration run (**c**) and the sample run (**s**), the component concentrations of the sample are calculated as follows: $\mathbf{C_s = C_c \cdot Amount_s / Amount_c}$
Internal standard amount	Concentration of the internal standard component for relative concentration calculations.
Date/time when...	Date and time of sample collection (the default values are equal to the date and time when the chromatogram starts).

The **Verify sample** option is disabled if determinations are made with an active sample queue.

4.3.4 System settings

Modify system window

SYSTEM / Setup / Drag icons

If this option is enabled, the system icons can be resized and moved in the **SYSTEM** window and the **SYSTEM** window itself can be resized.

To **resize** an icon or the window, move the cursor to the desired object until ⤡ appears. Press the left mouse button and resize the object to the desired size.

To **move** an icon, move the cursor to the desired object until ✛ appears. Press the left mouse button and move the object to the desired place.

Watch window display

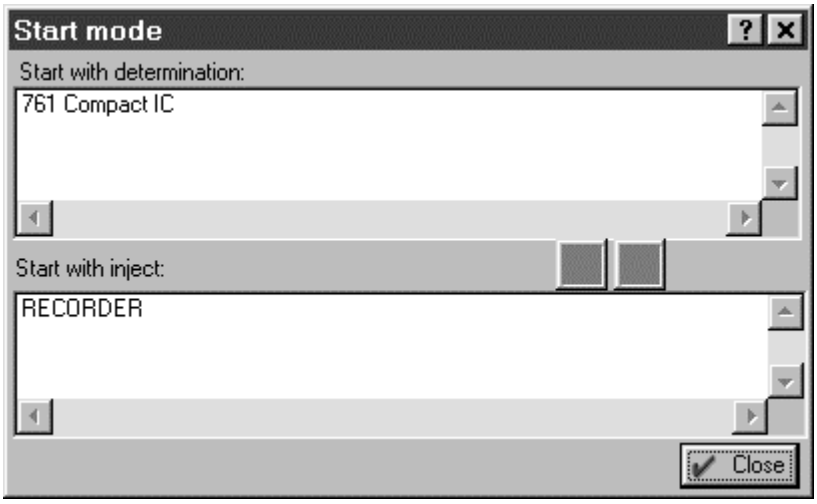
SYSTEM / Setup / Watch window

If this option is enabled, the **WATCH WINDOW** with conductivity and pressure display is automatically opened if a determination or measure baseline is started (see *section 4.3.6*).

Set start mode

SYSTEM / Setup / Start mode

This menu item opens the **Start mode** window for definition of start mode for time program and data acquisition.



This window contains the following two fields:

Start with determination	The loaded object is started at the moment the determination is started.
Start with inject	The loaded object is started at the moment the sample is injected.

The two objects available are:

RECORDER	**Data acquisition** defined in the method.
761 Compact IC	**Time program** defined on the **Program** tab of the system control window.

These two objects can be moved from one field to the other using the ↓ or ↑ buttons.

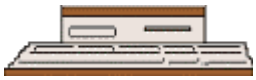
Print system parameters

SYSTEM / Setup / Parameters / Print

A report of the system parameters including the time program is created and opened using the «Wordpad» program. The ***.txt** file opened can be printed, saved and exported into other programs. The system report includes the name of the method linked to the system, the configuration settings for the 761 Compact IC, the system startup values and the time program (incl. **Remote configuration**), if such a program exists and is switched on (**ENABLED**).

4.3.5 PC icon

Menu options for PC icon



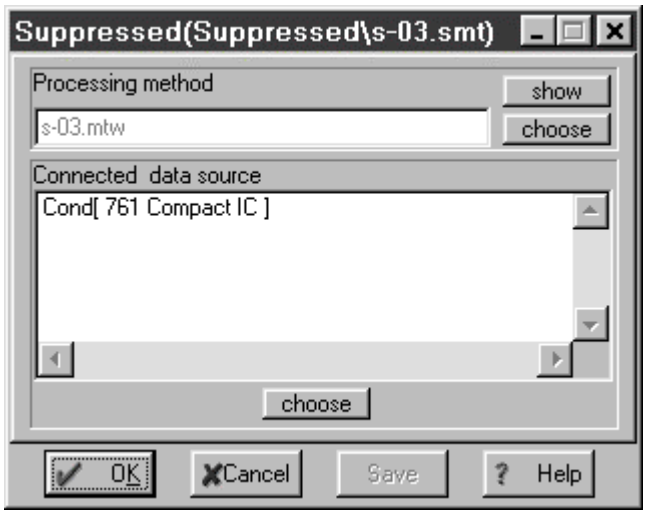
The PC icon is one of the three components of the **SYSTEM** window. If the system is connected and this icon is clicked with the right mouse button, the following menu appears:

Open Load the processing method linked to the system and open an empty chromatogram window.

Setup Open PC setup window for selection of processing method and data source.

Select processing method and data source

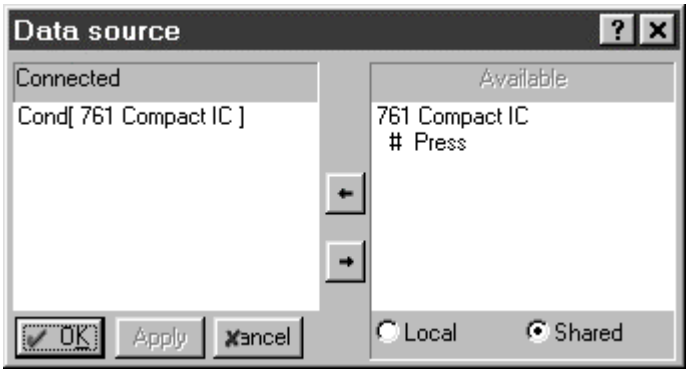
The **PC / Setup** menu item opens the following window:



This window contains the following two fields:

Processing method Directory and name of the method file (***.mtw**) linked to the system.
The method file can be selected with **<choose>** and opened with **<show>**.

Connected data source Data source for main measurement channel. By clicking on **<choose>**, the **Data source** window is opened for selection of the data source:



This window contains the following two fields:

Connected Connected data source.
Default setting: **Cond[761 Compact IC]**

Available Available data sources of the 761 Compact IC:
 # Cond Conductivity
 # Press Pressure

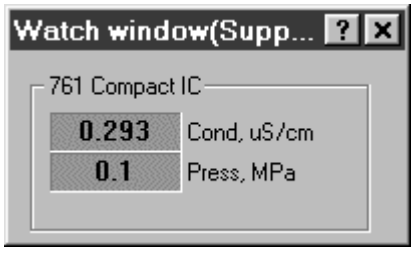
The data sources can be moved from one field to the other using the → or ← buttons (only one data source can be connected).

4.3.6 Watch window

Menu options for screen icon

The watch window icon is one of the three components of the **SYSTEM** window. If the system is connected and this icon is clicked with the right mouse button, the following menu item appears:

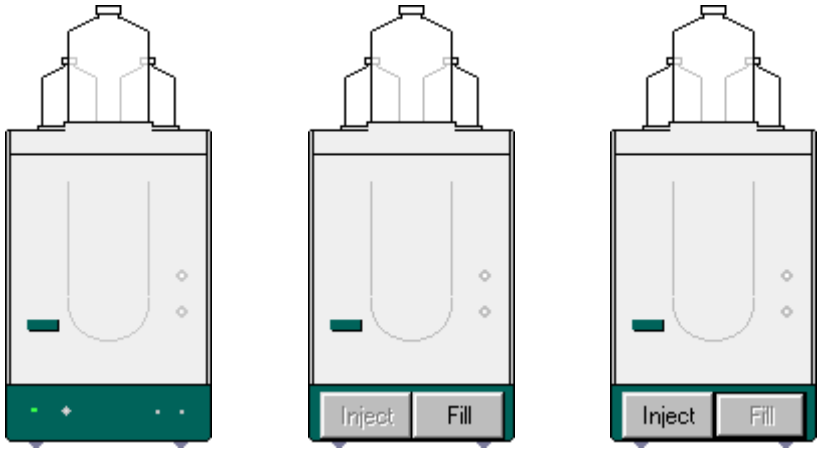
Open Open the **WATCH WINDOW** for live display of conductivity and pressure:



The colors of the watch window fields can be changed by clicking the fields with the right mouse button and selecting the menu item **Choose color** / **...** .

4.3.7 Instrument icon

Menu options for instrument icon



System disconnected

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

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

The instrument icon for the 761 Compact IC is one of the three components of the **SYSTEM** window. If the system is connected, the 761 icon contains two buttons for manual control of the injection valve:

<Inject> Switch injection valve to "INJECT" position.

<Fill> Switch injection valve to "FILL" position.

If the system is connected and the 761 icon is clicked with the right mouse button, the following menu appears:

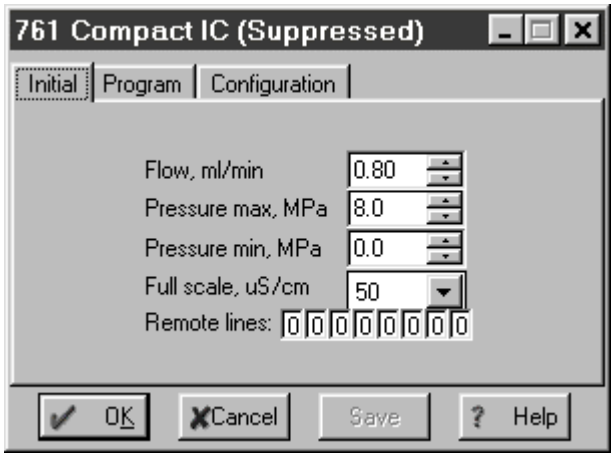
Open Open the **system settings** window.

Hardware Open the **hardware settings** window.

Diagnostics Open the **diagnostics** window.

System parameters for disconnected system

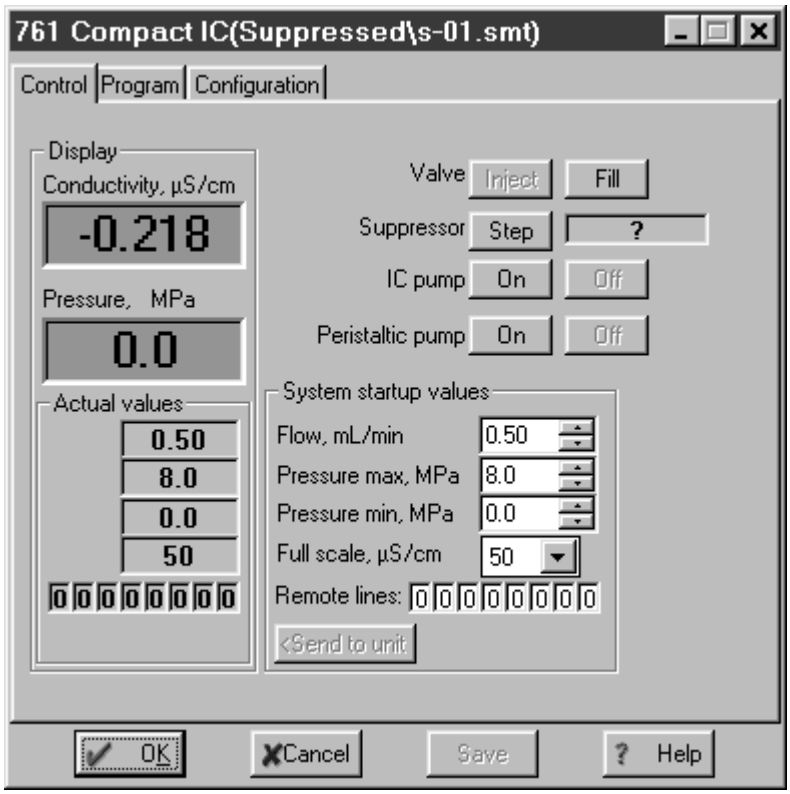
A double-click on the instrument icon or selection of the **Open** menu item using the right mouse button opens the system settings window. For a disconnected system, the **Initial** tab is displayed.



Flow, mL/min	Startup value for flow rate of the high-pressure pump. Entry range: **0.20** ... **2.50 mL/min**
Pressure max, MPa	Startup value for maximum pressure limit for high-pressure pump. Entry range: **0.0** ... **25.0 MPa**
Pressure min, MPa	Startup value for minimum pressure limit for high-pressure pump. Entry range: **0.0** ... **25.0 MPa**
Full scale, µS/cm	Startup value for full scale range. Selection: **50**, **250**, **1000 µS/cm**
Remote lines	Startup value for remote line settings 1…8. Selection: **0**, **1**

Instrument control for connected system

A double-click on the instrument icon or selection of the **Open** menu item using the right mouse button opens the system settings window. For a connected system, the **Control** tab is displayed. It allows manual control of the 761 Compact IC functions and setting of startup values to be sent to the instrument. This tab shows the current measurement values for conductivity and pressure.

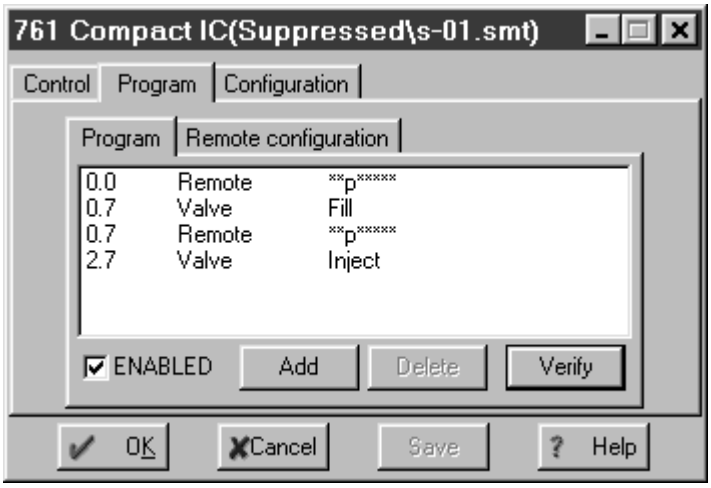


Conductivity, µS/cm	Live display of measured conductivity.
Pressure, MPa	Live display of measured pressure. The color settings for this two fields can be changed by clicking the fields with the right

	mouse button and selecting the menu item **Choose color** / **...** .
Actual values	Display of actual values
Flow, mL/min	Display of flow rate of the high-pressure pump.
Pressure max, MPa	Display of maximum pressure limit for high-pressure pump.
Pressure min, MPa	Display of minimum pressure limit for high-pressure pump.
Full scale, µS/cm	Display of selected full scale range.
Remote lines	Display of current remote line settings.
Valve	Injection valve
<Inject>	Switch injection valve to "INJECT" position.
<Fill>	Switch injection valve to "FILL" position
Suppressor	Suppressor module
<Step>	Switch the suppressor module to the next position. The time since the last switching of the suppressor module is displayed in the field beside the **<Step>** button.
IC pump	High-pressure pump
<On>	Start high-pressure pump.
<Off>	Stop high-pressure pump.
Peristaltic pump	Peristaltic pump
<On>	Start peristaltic pump.
<Off>	Stop peristaltic pump.
System startup values	The system startup values are sent and applied to the 761 Compact IC each time the system is connected, a determination is started, or the values are sent manually with **<Send to unit>**.
Flow, mL/min	Startup value for flow rate of the high-pressure pump. Entry range: **0.20** ... **2.50 mL/min**
Pressure max, MPa	Startup value for maximum pressure limit for high-pressure pump. This limit is controlled even without connection to the PC. Entry range: **0.0** ... **25.0 MPa**
Pressure min, MPa	Startup value for minimum pressure limit for high-pressure pump. This limit is controlled even without connection to the PC. Entry range: **0.0** ... **25.0 MPa**
Full scale, µS/cm	Startup value for full scale range. Selection: **50**, **250**, **1000 µS/cm**
Remote lines	Startup value for remote line settings 1…8. Selection: **0**, **1**

Time program

On the **Program** tab of the system settings window a user-defined time program for instrument control can be entered. This program is started automatically as defined in the **Start mode** window (see *section 4.3.3*) either at the moment the determination is started (**Start with determination**) or at the moment the sample is injected (**Start with inject**).



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

Program	Main time program with all program steps.
Remote configuration	Possibility for creation of user-defined remote commands.

Program

On the **Program** subpage, program steps including time, program instruction and parameter can be entered.

Time (1st column)	Time at which program instruction is applied. Entry range: **0.0 ... 999.9 min** If no time is entered, the program instruction is applied together with the last instruction with time entry.
Command (2nd column)	Program instruction (see *List of program instructions*). In addition to these predefined instructions, user-defined remote commands can be entered if activated on the **Remote configuration** tab.
Parameter (3rd column)	Parameter for program instruction (see *List of program instructions*).
ENABLED	Enable program start (a disabled program is not started).
<Add>	Add new program instruction.
<Delete>	Delete selected program instruction.
<Verify>	Test the time program (error messages are displayed if program is wrong).

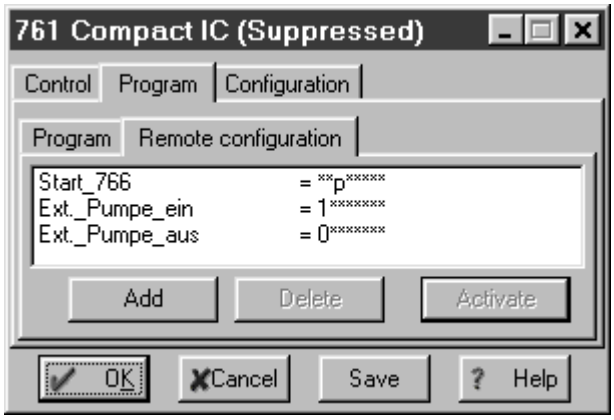
List of program instructions

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

Instruction	*Parameter entry*	*Meaning*
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.
Peristaltic	**on, off**	Switch **on** or **off** the **peristaltic pump**.

Remote configuration

On the **Remote configuration** subtab user-defined remote commands can be defined, which can be inserted into a time program.



Name (1st column) User-definable name of the remote command (e.g. **Start_766**).

Remote command (2nd column)

Setting the remote output lines 1…8.
Selection:
- **0** (line off, inactive, open)
- **1** (line on, active, 0 V)
- **p** (pulse)
- ***** (leave line in current status)

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 *****.

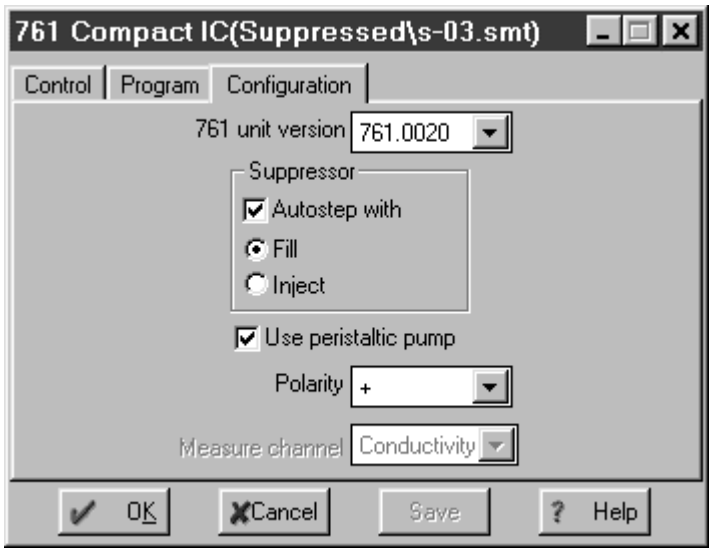
<Add> Add new remote command.

<Delete> Delete selected remote command.

<Activate> Activate the defined remote commands for insertion into the time program.

Configuration

The **Configuration** tab in the system settings window contains configuration settings for the 761 Compact IC.



761 unit version Selection of instrument version:
- **761.0010** 761 Compact IC without suppressor
- **761.0020** 761 Compact IC with suppressor

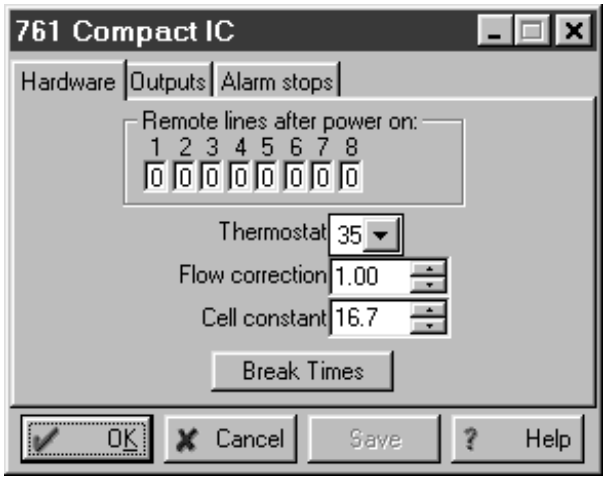
Suppressor	Suppressor module:
Autostep with	Automatic switching to the next position each time the injection valve is switched either to the **Fill** or to the **Inject** position.
Use peristaltic pump	If this option is disabled, the peristaltic pump is not switched on automatically at the start of a determination or with **Startup hardware**.
Polarity	Selection of the polarity of the output signal: **+** positive polarity (for anions) **–** negative polarity (for cations)
Measure channel	Display of the data source selected in the **Data source** window (see *section 4.3.5*).

Hardware settings

Selection of the **Hardware** menu item using the right mouse button opens the hardware settings window consisting of the three tabs **Hardware**, **Outputs** and **Alarm stops**.

Hardware

This tab of the hardware settings window defines general parameters which are set automatically at power on of the instrument.



Remote lines after power on

The remote output lines 1…8 are set to this values after power on or a manual stop with **Shutdown hardware**.
Selection: **0**, **1**

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

Thermostatting functions only if the ambient temperature is at least 5 °C lower than the operating temperature. It normally takes 30…60 min after power on until a temperature stability of ± 0.01 °C is attained.

Flow correction

Factor for correction of the difference between displayed and actual flow rate of the high-pressure pump.
Range: **0.9** ... **1.09**

The flow correction is determined by measurement of the actual flow rate with the aid of a measuring cylinder as follows:

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

Cell constant

Cell constant of the conductivity cell for correct display of the absolute conductivity. Enter the cell constant printed on the detector block into this field.
Range: **0.1** ... **1000 /cm**

For a precise determination of the cell constant, pump a calibration solution of known conductivity through the IC system, observe the displayed conductivity and change the cell constant until the correct conductivity value is displayed.

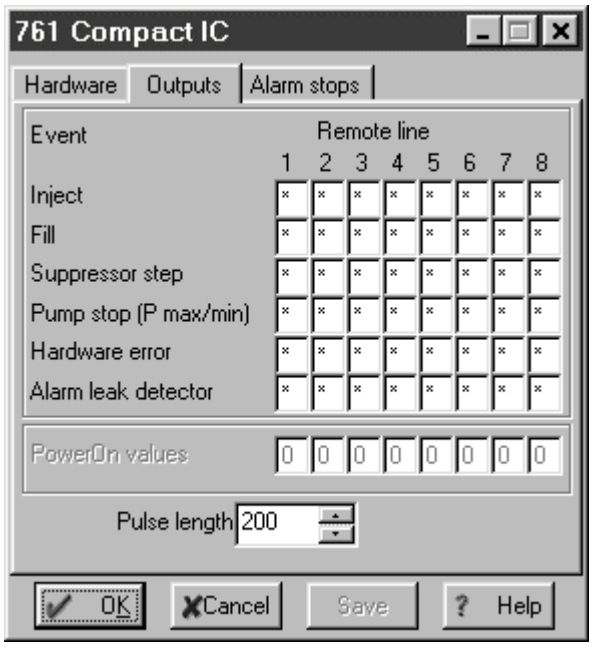
<Break times>

Possibility for changing the break times for injection valve **Valve** and suppressor module **Suppressor**.

These values should only be changed after consulting the Metrohm Service.

Outputs

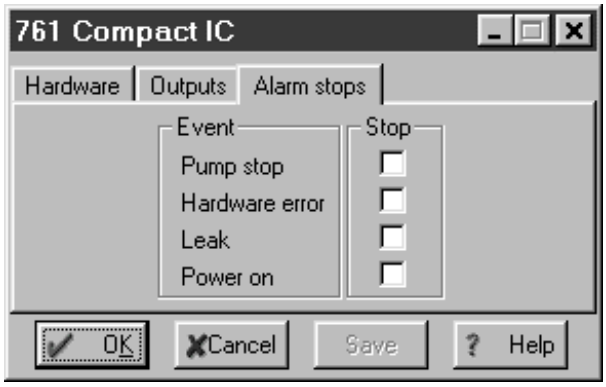
The **Outputs** tab of the hardware settings window defines remote output signals to be set automatically if specific events occur.



Event	Events for automatic remote signal output:
Inject	Switching of the injection valve to the "INJECT" position.
Fill	Switching of the injection valve to the "FILL" position.
Suppressor step	Switching of the suppressor module to the next position.
Pump stop (P max/min)	Pump stopped because pressure limits are exceeded.
Hardware error	Hardware error detected at the 761 Compact IC (high-pressure pump, injection valve, or suppressor not working correctly).
Alarm leak detector	Leak detector has detected solvent in the instruments interior.
Remote line	Set remote output lines 1…8. Selection: **0** (line off, inactive, open) **1** (line on, active, 0 V) **p** (pulse output) ***** (leave line in current status)
PowerOn values	Display of the power on startup values for remote output lines set on the **Hardware** tab.
Pulse length	Length of a pulse in ms.

Alarm stops

The **Alarm stops** tab of the hardware settings window defines the events for which the 761 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 Compact IC (high-pressure pump, injection valve, or suppressor not working correctly).

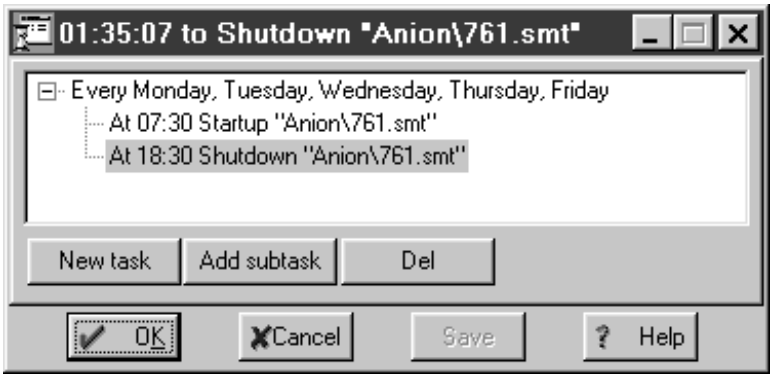
Leak	Leak detector has detected solvent in the instruments interior. This information is also stored in the instrument itself, so that it is stopped automatically even without connection to the PC.
Power on	Temporary power failure at the 761 Compact IC hardware.

4.3.8 Timer

the timer can be used to program system tasks which are started automatically daily or once at the desired time.

Timer icon

Clicking this icon opens the **Timer** window with the following options:

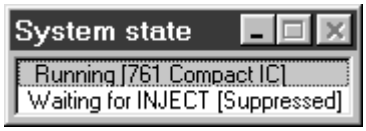


<New task>	Add a new task to the timer program.
<Daily>	Selecting this option opens a subwindow for selection of the days at which the task should be started.
<Once>	Selecting this option opens a subwindow for selection of time and day at which the task should be started. After the selection of the desired program instruction the system file for which this instruction should be applied must be selected in the **Systems** folder.
<Add subtask>	Add a new subtask for the selected daily task. The **time** and program instruction for this subtask has to be entered in the opened subwindow and the system file to which this instruction should be applied must be selected in the **Systems** folder.
<Del>	Delete the selected task from the timer program.

The following **program instructions** can be used for user-defined **event program tasks** in the **Timer program** window:

Open	Open the selected system.
Close	Close the selected system and disconnect it from the workplace.
Startup	**Startup hardware** of the selected system.
Start	**Start determination** using the selected system.
Stop	**Stop determination** using the selected system.
Shutdown	**Shutdown hardware** of the selected system.

4.3.9 System state window



The **SYSTEM STATE** window is automatically opened if a system is connected. It shows status and error messages for this system. Messages concerning the 761 Compact IC hardware are followed by **[761 Compact IC]**, messages concerning the loaded system are followed by **["folder name"]** (name of the folder that contains the system file).

Status messages

Checking on-line	Checking connection between PC and 761 Compact IC.
On-line	Connection between PC and 761 Compact IC OK.
UploadStartupValues	Hardware or system startup values have been loaded to the 761 Compact IC.
Initialization	Hardware or system initialization.
Ready	System is ready for starting a new determination.
Starting	Starting program or chromatogram data acquisition.
Running	Running program or chromatogram data acquisition.
Running program (xxx min left)	Running time program (in brackets: time left).
Waiting for INJECT	Waiting for "INJECT" to start program and/or chromatogram data acquisition.
INJECT done	Injection valve has been switched to the "INJECT" position.
Finished	Determination has been finished.
SHUTDOWN	761 Compact IC hardware is shutdown.

Error messages

Detection of hardware failed	Bad connection between PC and 761 Compact IC or instrument switched off (check connecting cable or switch on instrument).
LEAK DETECTED	The leak detector has detected a leak (check IC system and connections).
E1	Program checksum wrong (call Metrohm service).
E2	RAM faulty (call Metrohm service).
E200	Invalid instrument adjustment (call Metrohm service).
E237	Storage of configuration values failed (repeat last action; if error reappears, call Metrohm service).
E238	Storage of instrument number failed (repeat last action; if error reappears, call Metrohm service).
E240	EEPROM faulty (call Metrohm service).
E258	Storage of setup values failed (repeat last action; if error reappears, call Metrohm service).
E295	Storage of memory values failed (repeat last action; if error reappears, call Metrohm service).
E296	Instrument stopped (restart instrument; if error reappears, call Metrohm service).
E297	Storage of remote line values failed (repeat last action; if error reappears, call Metrohm service).
E298	Storage of flow correction value failed (repeat last action; if error reappears, call Metrohm service).
E299	Storage of break time values failed (repeat last action; if error reappears, call Metrohm service).
E300	High-pressure pump faulty (restart pump; if error reappears, call Metrohm service).
E301	Injection valve blocked (check injection valve; if error reappears, call Metrohm service).
E302	Suppressor module blocked (check suppressor; if error reappears, call Metrohm service).
E303	Storage of maintenance information failed (repeat last action; if error reappears, call Metrohm service).

4.4 Methods

A method contains all information necessary for **data acquisition**, **integration**, **peak evaluation** and **quantification**. It can be considered as the chromatogram template, i.e. chromatogram without raw data.

Methods are stored as **method files** (***.mtw**) in the **Methods** directory.

Each system is linked to a method. This method is called **processing method** and is opened automatically at the start of a new determination.

4.4.1 Method file handling

The following menu items are used for opening and saving of methods:

761 COMPACT IC / File / Open / Method

Load an existing method file (***.mtw**) from the **Methods** directory and open an empty chromatogram window.

The name of the method is displayed in the title bar of the **SYSTEM** window. A star (*****) at the end of the name indicates that the method has been changed since the last saving.

761 COMPACT IC / File / Save / Method

Save the method of the current chromatogram in a method file (***.mtw**) in the **Methods** directory.

4.4.2 Passport

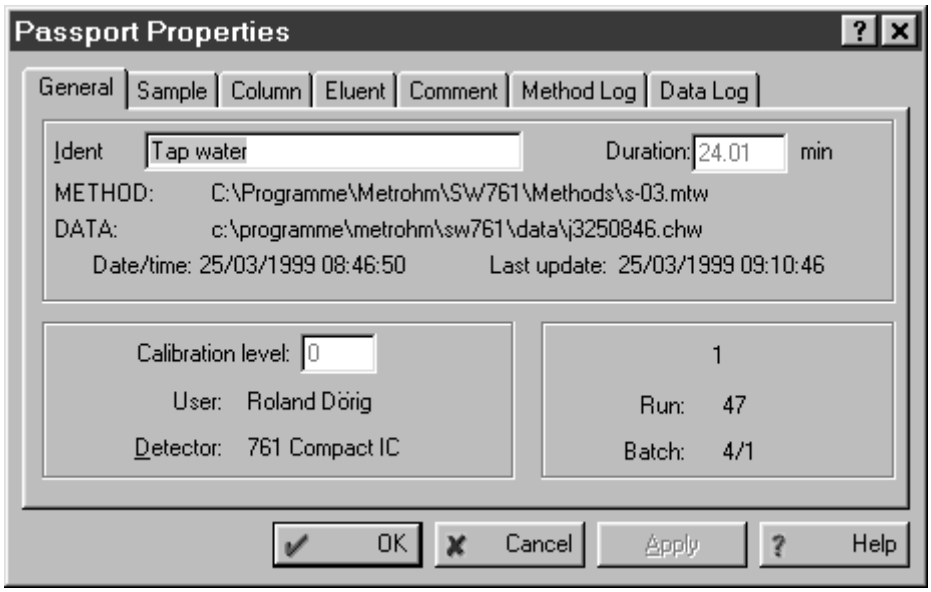
761 COMPACT IC / Method / Passport

This menu item opens the **Passport** window which includes a detailed textual description of the chromatographic run and consists of the following tabs:

General	General information on determination.
Sample	Sample information.
Column	Column information.
Eluent	Eluent information.
Comment	User comments on chromatogram.
Method Log	GLP log with date/time stamp for method.
Data Log	GLP log with date/time stamp for chromatogram.

General

Tab **General** of the passport with general description of the method and determination.



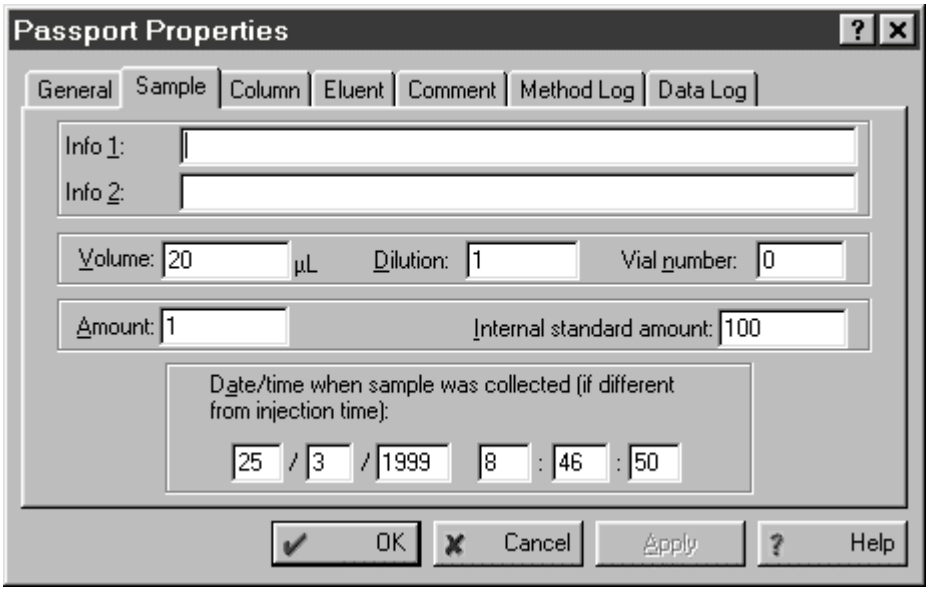
Ident	User defined identifier (title) for the chromatogram to be displayed in the title bar of the chromatogram window and in the **Chromatogram open** window.
Duration	Duration of the chromatogram in minutes. You can modify this value when the chromatogram is running.
METHOD	Path and file name of the **method** used for data acquisition (read-only).
DATA	Path and file name of the current **chromatogram** (read-only).
Date/time	Date and time of the chromatogram start (read-only).
Last update	Date and time of the last chromatogram modification and saving (read-only).
Calibration level	Calibration level. If the current run is used for calibration, the calibration level is a positive integer, otherwise it equals 0. You can modify this value when the chromatogram is running.
User	Name of the current user. It is taken from the list of users, in accordance with the password entered at the program starting.
Detector	Name of the detector. It can be entered with **Method setup** / **Measure**.
Run	Number of the current run starting from the very first one. All runs are automatically numbered by the system.

To reset the **Run** *number press [Ctrl] [F8]. The* **Analysis number** *window is opened where the run number for the next run can be modified to the desired value.*

Batch X/Y: total number of started sample queues / current analysis number in the sample queue (read-only).

Sample

Tab **Sample** of the passport with sample information.



Info 1 First sample description (max. 256 characters).

Info 2 Second sample description (max. 256 characters).

Volume Injected volume in µL.

Dilution Dilution of the sample.

Vial number Autosampler vial position to take sample from.

Amount Sample amount. If this value is different for the calibration run (**c**) and the sample run (**s**), the component concentrations of the sample are calculated as follows:

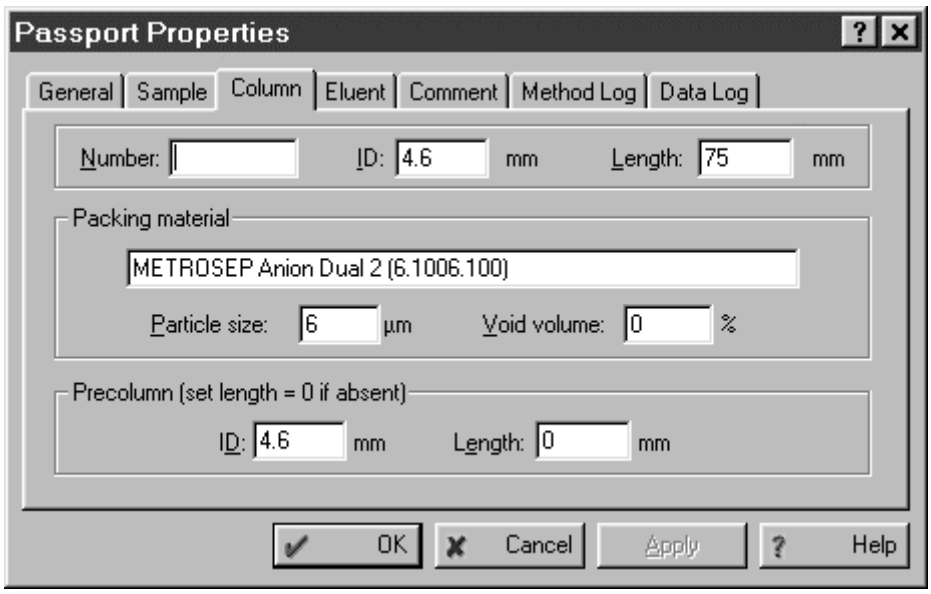
$$C_s = C_c \cdot \text{Amount}_s / \text{Amount}_c$$

Internal standard amount Concentration of the internal standard component for relative concentration calculations.

Date/time when... Date and time of sample collection (the default values are equal to the date and time when the chromatogram starts).

Column

Tab **Column** of passport with column information.



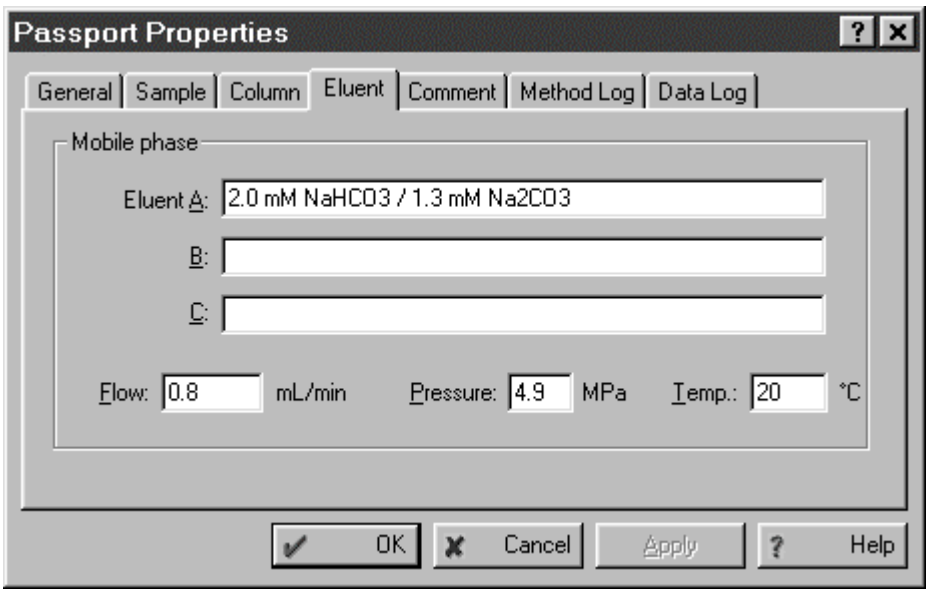
Number	Serial number of column (max. 256 characters).
ID	Internal diameter of the column in mm.
Length	Length of the column in mm. This parameter is used to calculate **Linear flow**.

Packing material	
Column	Column description (max. 256 characters).
Particle size	Particle size of the column in µm. This value is used for the calculation of reduced theoretical plate height **Reduced TP height**.
Void volume	Void volume for the column in %. Used to calculate **Logarithmic index**, **Capacity factor** and **Linear flow**. It is calculated by the system in accordance with the settings defined on **Method setup** / **Math**.

Precolumn	
ID	Internal diameter of the precolumn in mm.
Length	Length of the precolumn in mm (set length to 0 if no precolumn is used).

Eluent

Tab **Eluent** of passport with eluent information.

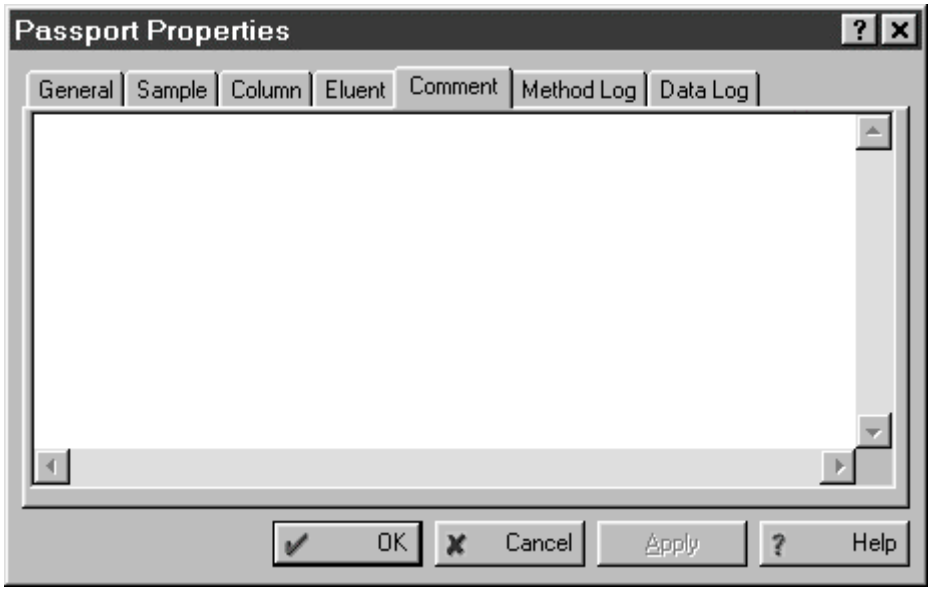


Eluent A	Description of eluent composition (max. 256 characters).
Eluent B	Description of eluent composition (max. 256 characters).
Eluent C	Description of eluent composition (max. 256 characters).

Flow	Flow rate of the high-pressure pump in mL/min. The flow rate is used to recalculate the time axis into volumetric units. The system startup value for the flow rate is entered automatically into this field at the start of a determination with **Start with inject**.
Pressure	Pressure in MPa. The measured value for the pressure is entered automatically into this field at the start of a determination with **Start with inject**.
Temp.	Temperature in °C. Here you can enter the temperature of the column's thermostat or the ambient temperature.

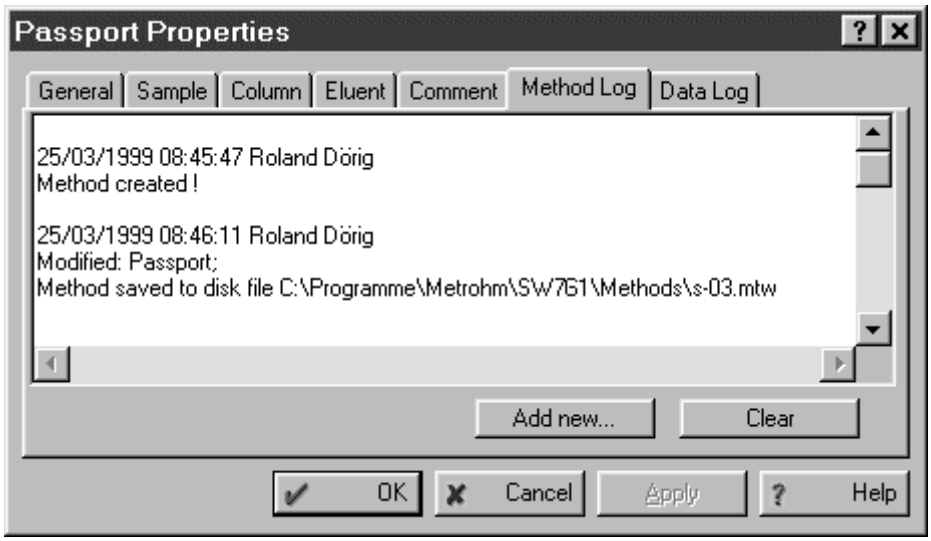
Comment

Tab **Comment** of passport for entry of free-text user comments into the chromatogram description. Use this feature to enter any additional information about the chromatogram not included in other sections of the method.



Method Log

Tab **Method Log** of passport with GLP Log for the method. The **Method Log** displays all automatically produced GLP messages concerning modifications made on a method. In addition to this messages free-text user comments can be entered. All this entries are stamped automatically with date and time of the entry.

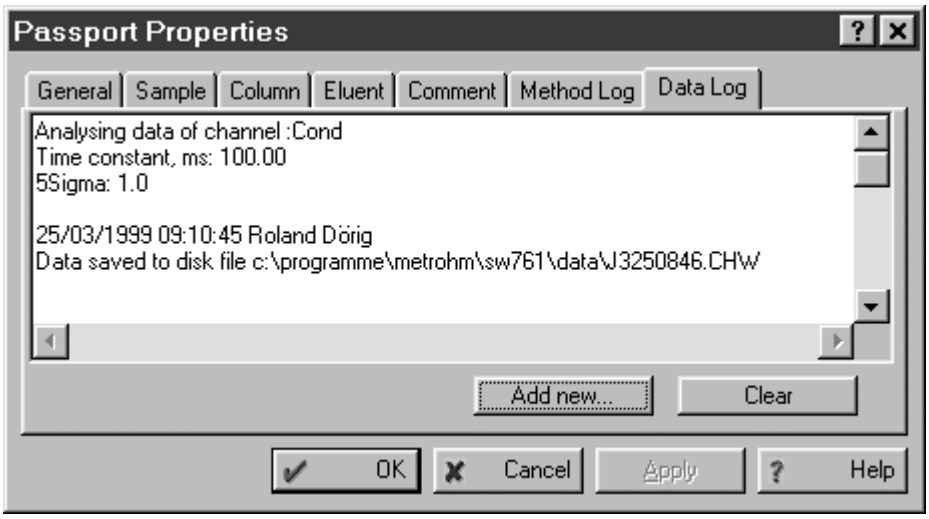


<Add new> Add a new GLP comment to the Method Log. Text can be entered in the **New comment** window, date/time and logged-in user are automatically added.

<Clear> Clear all GLP messages in the GLP Log and add a new GLP comment. Text can be entered in the **New comment** window, date/time and logged-in user are automatically added.

Data Log

Tab **Data Log** of passport with GLP Log for the recorded chromatogram. Here a GLP message is automatically produced for every modification made on a recorded chromatogram. In addition to this messages free-text user comments can be entered. All this entries are stamped automatically with date and time of the entry and cannot be cleared.



<Add new> Add a new GLP comment to the Data Log. Text can be entered in the **New comment** window, date/time and logged-in user are automatically added.

4.4.3 Method setup

761 COMPACT IC / Method / Method setup

This menu item opens the **Method setup** window which includes the most common parameters for data acquisition and evaluation of the method and consists of the following tabs:

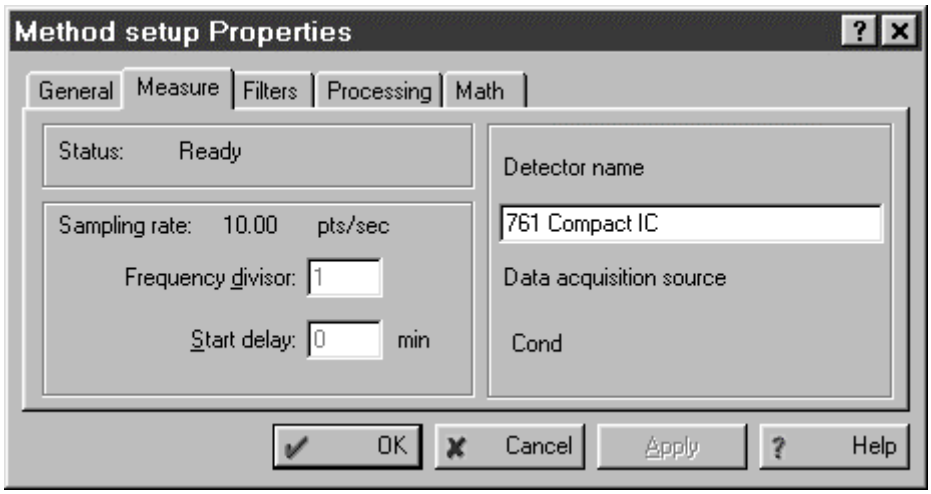
General	General information on determination.
Measure	Important data acquisition parameters.
Filters	Parameters for noise filtration.
Processing	Set actions that are performed when the chromatogram finishes.
Math	Parameters that are used for various types of calculations.

General

Tab **General** of **Method setup** window with general description of the method and determination. This tab is identical to the **General** tab called with **Method** / **Passport** (see *section 4.4.2*).

Measure

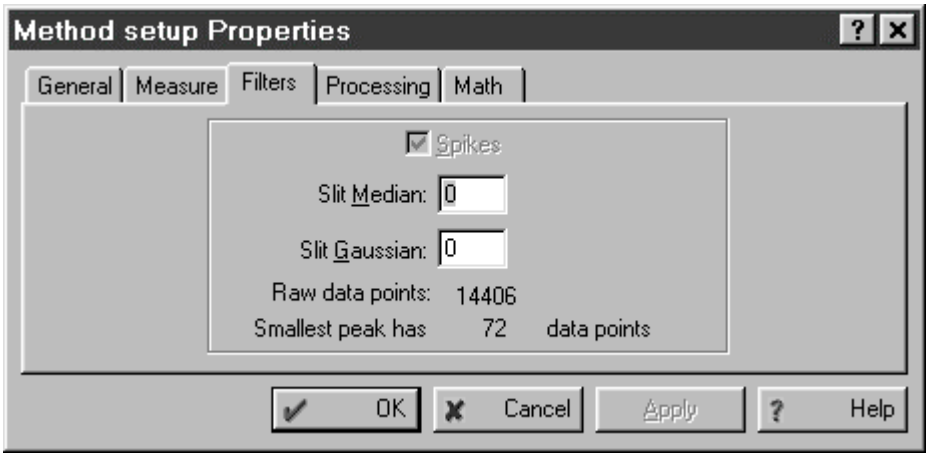
Tab **Measure** of **Method setup** window with data acquisition parameters.



Status	Chromatogram measurement status (read-only).
Sampling rate	Sampling rate for recording the chromatogram (read-only; only displayed correctly for running or recorded chromatograms).
Frequency divisor	Divisor to reduce the sampling rate. Entry range: **1…9999**
Start delay	Time delay before starting data acquisition in min.
Detector	Detector name.
Data acquisition source	Measuring channel (read-only).

Filters

Tab **Filters** of **Method setup** window with parameters for noise filtration of raw data. Three different filtration algorithms are available to reduce noise and increase apparent signal-to-noise ratio.



Spikes — **Spikes filter**. The Spikes filter smoothes the first and last points of the chromatogram and the points identified as spikes. The spike is exchanged with half of the sum of two neighboring signal values.

Slit Median — **Median filter**. Performs filtration if non-zero smoothing degree is entered. Smoothing degree should be a natural number. In the Median filter the values within the window are sorted by increasing response level and the response corresponding to the middle of the window is replaced with the value in the middle of a sorted array. This method affects chromatographic peaks in minimal extent, improves baseline and very effectively eliminates single-point spikes. In this case spike will be replaced with one of the neighboring points.

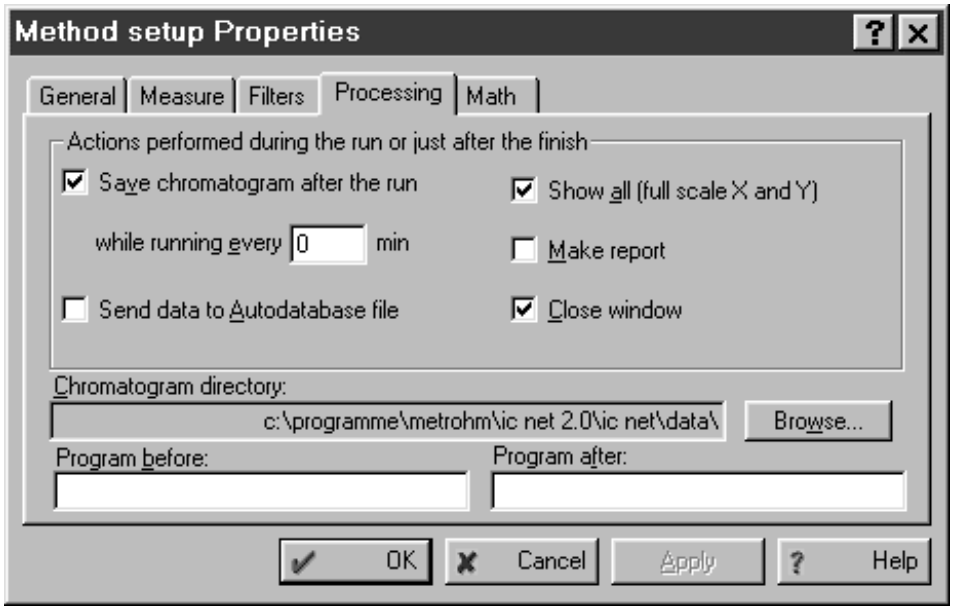
Slit Gaussian — **Gauss filter**. Performs filtration in non-zero smoothing degree is entered. In case of the Gauss filter the sum of all points within a window with Gauss weights distribution is calculated and used as a new raw data value. Peaks after smoothing become a bit smaller and wider, but their area does not change.

Raw data points — Number of data points per chromatogram (read-only).

Smallest peak has ... — Number of data points per smallest peak on the chromatogram (read-only). This information is valuable to perform the **Compress** procedure (data compression).

Processing

Tab **Processing** of **Method setup** window for definition of actions that are performed during the run or when the chromatogram finishes. Automatic post-run data processing is especially useful for chromatographic systems that include an autosampler.



Save chromatogram after the run

If checked, autosaving of the chromatogram will be performed on data acquisition ending.

while running every ... min

Save the chromatogram during the run for data safety at the time interval set (if **0** is set, the chromatogram is not saved during the run).

Send data to Autodatabase file

If checked, the chromatogram data are automatically sent to the Autodatabase file specified in the **Autodatabase options** window (see *section 4.5.6*) at the end of the determination

Show all — If checked, scales on X and Y axes will be automatically chosen so that the recorded chromatogram fits the window.

Make report — If checked, report auto-printing will be performed on data acquisition ending.

Close window — If checked, the window is closed automatically after the run (or sample queue) is finished.

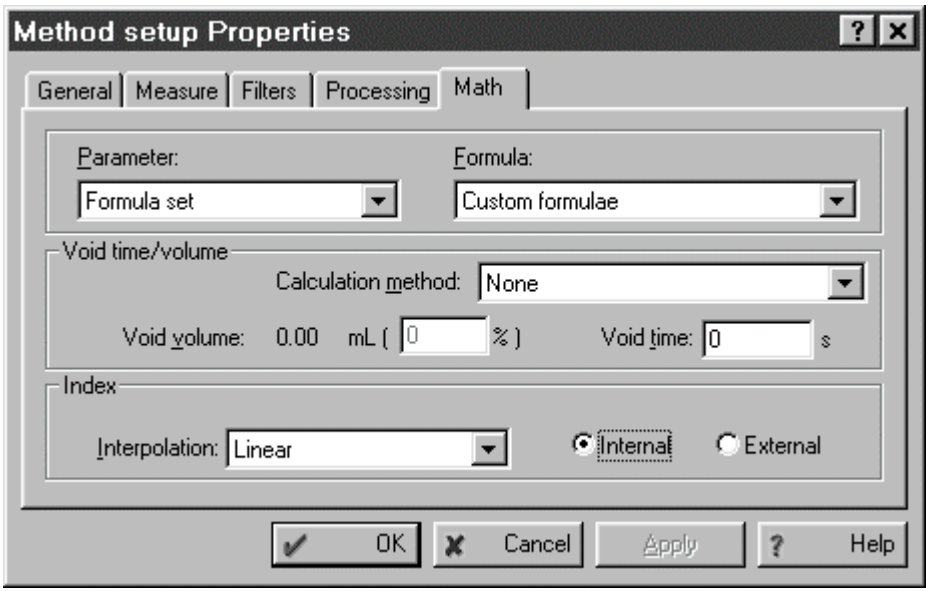
Chromatogram directory — Directory where the current chromatogram is saved. Use the **<Browse>** button to select a new directory.

Program before — Name and path of the program to be started automatically before the run is started.

Program after — Name and path of the program to be started automatically after the run is finished.

Math

Tab **Math** of **Method setup** window with parameters that are used for various types of calculations.



Parameter Selection of **calculation parameter**:

- **Formula set** Formula setting by customer (**Custom formulae**) or according either to **European Pharmacopoeia** or **US Pharmacopoeia**.
- **Theoretical plates** Selection of calculation formula for number of theoretical plates if **Formula set** = **Custom formulae** is set.
- **Resolution** Selection of calculation formula for resolution if **Formula set** = **Custom formulae** is set.
- **Asymmetry** Selection of calculation formula for asymmetry if **Formula set** = **Custom formulae** is set.

Formula Selection of **calculation formula** for the calculation parameter selected for **Parameter**. With **Parameter = Formula set** the following settings are possible:

- **Custom formulae** Formula setting by customer.
- **European Pharmacopoeia** Formula setting according to European Pharmacopoeia.
- **US Pharmacopoeia** Formula setting according to US Pharmacopoeia.

Void time/volume Calculation of **void time/void volume**:

- **Calculation method** Selection of the method for void time calculation:
  - **None** Manual entry in the **Void time** field.
  - **1st component** The peak corresponding to the first component is selected as a void time marker and its reten-

tion time replaces the previous value of the void time. If the first component is not identified, the expected retention time is used.

1st peak The first detected peak is used as a void time marker for the run and its retention time is stored in the **Void time** field.

From void volume % For the calculation of the void time, the % value entered in the **Void volume** field is multiplied by the ratio of empty column volume and eluent flow rate.

Void volume Void volume in mL and % of column volume. The % value can be entered manually if **Calculation method = From void volume %** is set.

Void time Void time in s. This value can be entered manually if **Calculation method = None** is set .

Index Calculation of **Retention index**:

Interpolation Use of linear or logarithmic interpolation scale for retention index calculation.

Internal The index scale is constructed on the basis of the current chromatogram. All components used for index scale calibration should be present in the current sample.

External The index scale is constructed on the basis of another standard chromatogram.

4.4.4 Integration

761 COMPACT IC / Method / Integration

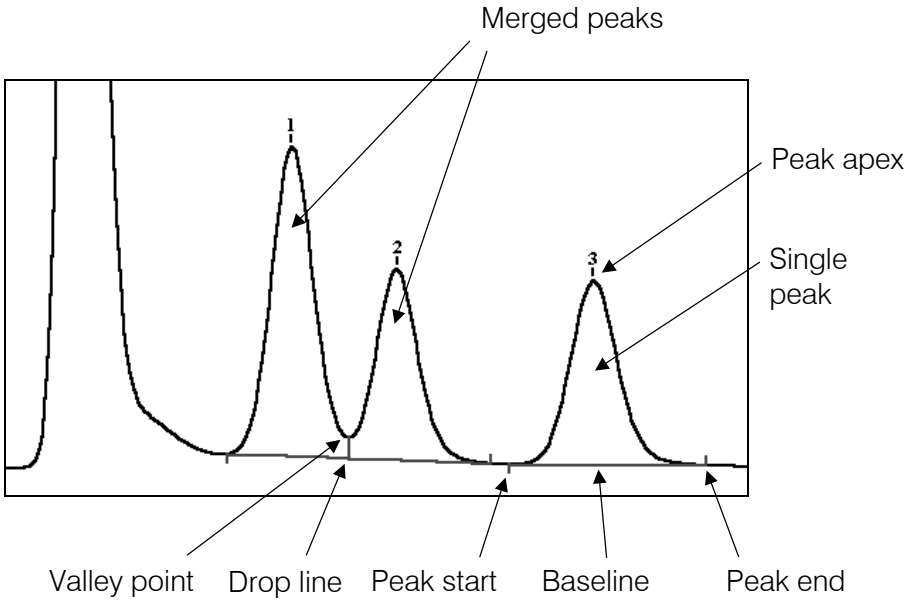
This menu item opens the **Integration parameters** window which contains parameters and events for peak integration and consists of the following two tabs:

Setup	Integration parameters.
Events	Integration events.

The «Compact IC 761» software includes a built-in automatic integration algorithm to detect peaks on the chromatographic curve and to evaluate them using calculated baselines. The integration procedure is tuned by the integration parameters on the **Setup** tab and the integration events on the **Events** tab. Integration events have higher priority than integration parameters. The integration can be modified manually using the peak editor (see *section 4.5.4*).

The built-in integrator algorithm is based on the use of the first derivative (slope). In order to decide whether the slope at some point is significant, the first derivative value is divided by the baseline noise and the result is compared with a threshold value called "**Slope**". The threshold values for the upslope and downslope differ.

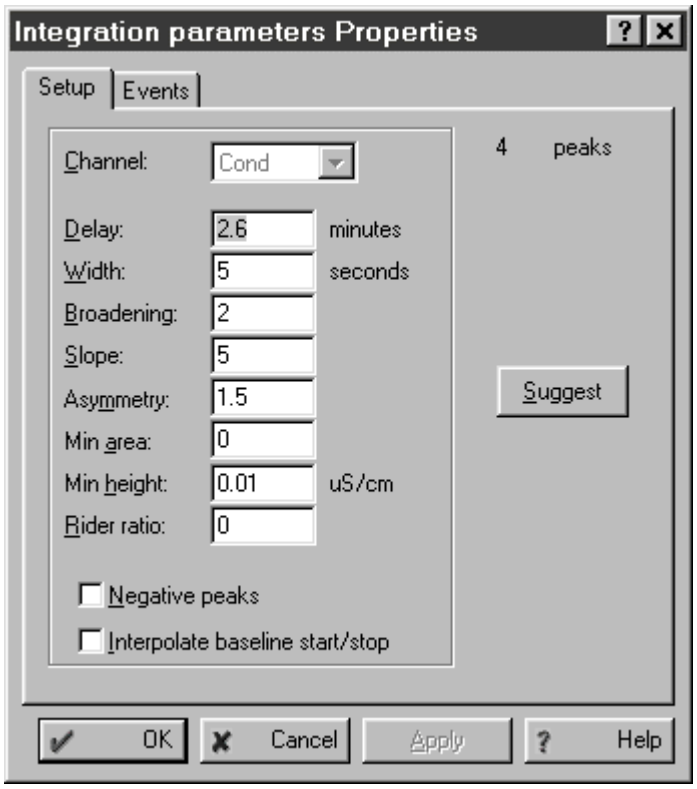
The baseline and the starting and finishing points are determined for each peak. For separated peaks the baseline consists of a straight line between the starting point and the finishing point. For neighboring peaks which overlap a common baseline is normally constructed; this connects the starting point of the first peak with the finishing point of the last peak. The peaks are separated from one another by dropping a perpendicular line from the lowest point (valley) between the peaks to the common baseline. Alternatively the baseline can also be drawn directly between the valleys of the peaks with the event **Enable valley-to-valley** (see integration events for baseline).



Setup

Tab **Setup** of **Integration parameters** window with integration parameters. The two most important of these parameters for peak recognition are **Width** and **Slope**.

If the signal-to-noise ratio of the chromatogram is high enough (e.g. 100:1 or higher), the integration algorithm is not too sensitive to changes in integration parameters. On the contrary, if the baseline noise is high, careful tuning of these parameters may be needed.



Number of peaks	Number of peaks detected (read-only).
Channel	Data acquisition channel for peak detection (read-only)
Delay	Time delay before starting peak detection (in min). Entry range: **0…1440 min**
Width	**Peak width** (at the baseline, in s). This parameter is used for setting baseline start and end points. If this value is too low, excessive narrow peaks are detected from the baseline noise. If it is too large, several adjacent peaks or baseline drift can be integrated as a single peak. For an optimal evaluation, it is recommended to enter the width of the narrowest peak on the chromatogram (normally 2…10 s). Entry range: **0.1…480 s**

Broadening

Broadening for peaks in the end of the chromatogram compared to peaks in the beginning. This parameter is used for automatic adjustment of **Width**.
Entry range: **0.1…100**

Slope

Threshold for peak recognition.
The value of the first derivation (slope) of the curve is divided by the baseline noise (which is estimated using a special algorithm) and the result is compared with the **Slope** threshold value. Reasonable range of **Slope** parameter is 0.5...5.
Entry range: **0.1…400**

Asymmetry

Ratio of slope threshold at the start of the peak to slope threshold at the end of the peak. This parameter is used for automatic adjustment of **Slope**.
Entry range: **0.2…5**

Min area

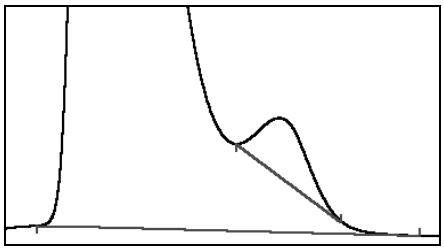
Minimum area of peaks to be detected.

Min height

Minimum height of peaks to be detected.

Rider ratio

Ratio of peak heights for two adjacent peaks. If this threshold value is exceeded, the smaller peak is separated from the higher one by tangent skimming. This function is switched off always if 0 is entered.
Entry range: **0…100**



Negative peaks

If this option is enabled, negative peaks are also detected.

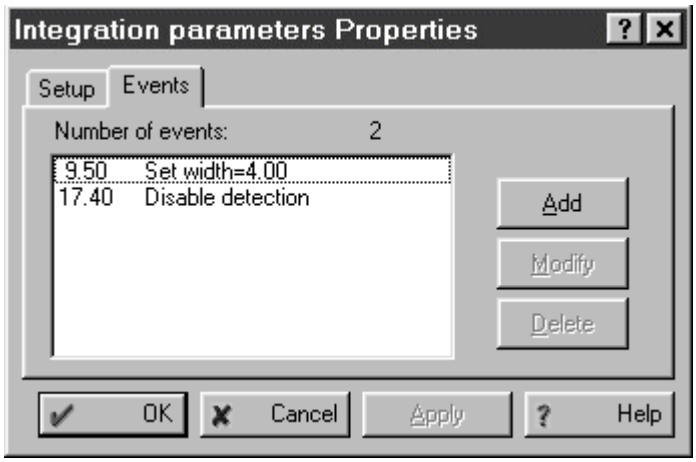
Interpolate baseline start/stop

If this option is enabled, the baseline start and stop points are interpolated. This setting is recommended for very sensitive determinations with high noise

<Suggest>	This function sets up reasonable integration parameters in the following way (assumes that several peaks are marked manually in the peak editor mode (see *section 4.5.4*) and wrong peaks deleted): – **Slope** is set to 3. – **Asymmetry** is set to 1.5. – **Width** and **Broadening** are calculated by fitting a straight line through the measured peak halfwidth values vs. retention time. **Width** is determined as the y value of this line at the **Delay** time, **Broadening** is calculated as the y value at the end of the chromatogram divided by the y value at the **Delay** time. If this procedure does not provide adequate result, – **Width** is set equal to the minimum value of peak width for the chromatogram, – **Broadening** is set to 1.

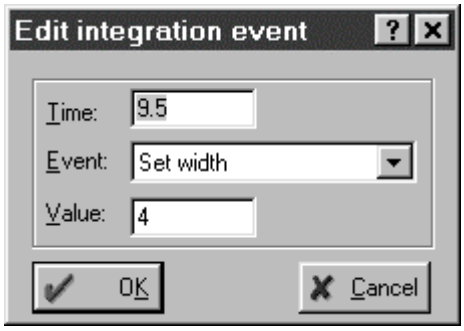
Events

Tab **Events** of **Integration parameters** window for definition of integration events. Integration events have a higher priority than integration parameters and are used for fine tuning of the integration process. They should be used only in the case when problems cannot be solved by tuning a set of parameters from the integration parameters window.



Number of events	Number of integration events (read-only).
<Add>	Add event to the list.
<Modify>	Edit the selected event.
<Delete>	Delete the selected event.
<Apply>	Accept integration parameters and perform re-integration.

If an integration event is added or modified, the **Edit integration event** window is opened where the following parameters can be set:



Time Start time for integration event in min.

Event List box with integration events to be selected (see below).

Value Parameter value for selected integration event. This field appears for events that demand input of an additional parameter.

Integration events for peak detection

Disable detection Set this mode to stop detection of new peaks. If a peak is available at the moment of the event it is either finished (downslope peaks) or rejected (upslope peaks).

Enable detection Clear **Disable detection** mode.

Enable negative peaks Enable detection of negative peaks. In some cases this mode may result in instability of detection algorithm.

Disable negative peaks Disable detection of negative peaks. This event does not influence negative peaks which already started.

Disable peak reject Set this mode, if a small peak should not be rejected because of its flat apex.

Enable peak reject Clear **Disable peak reject** mode.

Integration events for peak start/end

Set peak start Force the beginning of a new peak. If a peak is available at the moment of the event it is either rejected (upslope) or terminated (downslope).

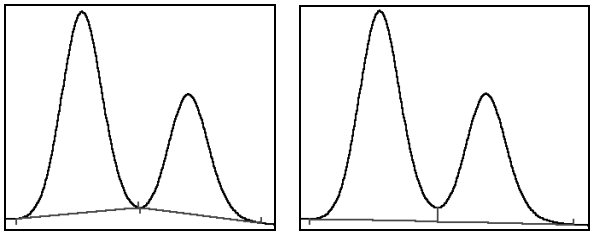
Set peak end Force peak end at the time of the event. Upslope peaks are rejected (except those born by **Set peak start** event), downslope peaks are terminated.

Stop single peak mode Disable peak end detection. All peaks of any group after this event will be treated as one peak. The group end will be treated as peak end.

Start single peak mode Set normal detection mode, when valley causes perpendicular drop or skim line separation.

Split peak Terminates the current peak and starts a new one.

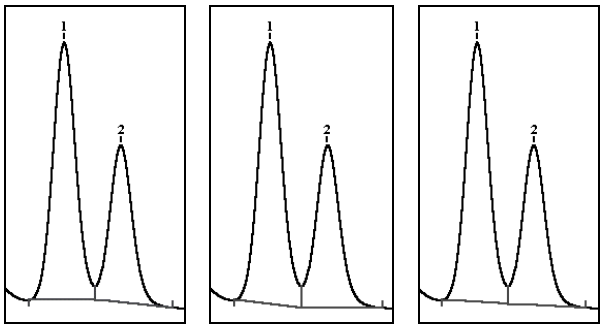
Integration events for baseline



Enable valley-to-valley **Disable valley-to-valley**

Enable valley-to-valley Disable perpendicular drop peak separation. All peaks are considered to be baseline-separated. The bottom of the valley becomes the baseline point.

Disable valley-to-valley Enable perpendicular drop peak separation (default setting).

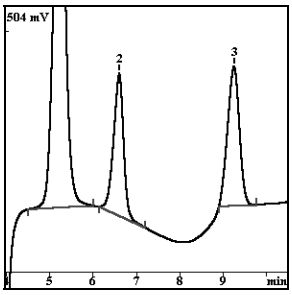


Set horizontal baseline **Set back horizontal base** **Set normal baseline**

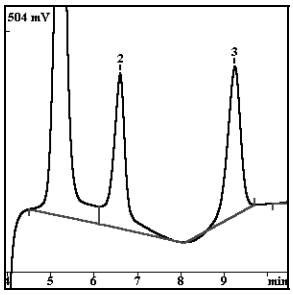
Set horizontal baseline Set horizontal baseline for all peaks except the last one of adjacent peaks that are not separated. The baseline is drawn **forwards** from the peak start point.

Set back horizontal base Set horizontal baseline for all peaks except the first one of adjacent peaks that are not separated. The baseline is drawn **backwards** from the peak end point.

Set normal baseline Set default baseline detection mode.



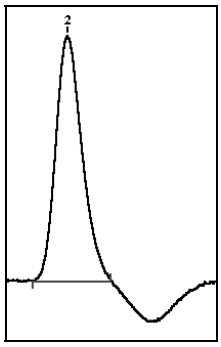
Set baseline point at **4.5, 6, 7.2, 8.9 and 9.8 min**



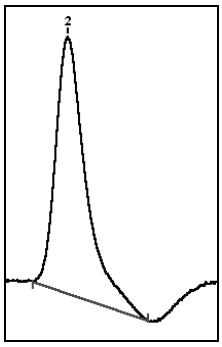
without **Set baseline point**

Set baseline point

Set defined baseline point for better evaluation of peaks on descending or ascending baselines. The baseline between two successive baseline points is set to zero for optimum integration.



Force horizontal baseline



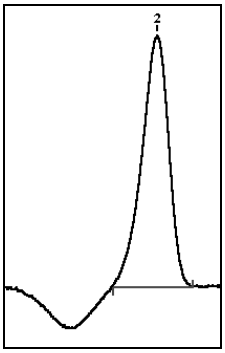
Cancel horizontal baseline

Force horizontal baseline

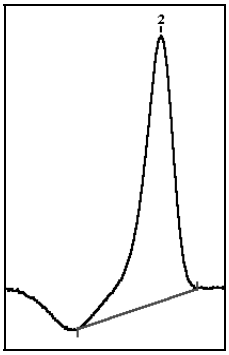
Set horizontal baseline for a single peak. The baseline is drawn **forwards** from the peak start point. The intersection of the baseline with the signal is defined as peak end point.

Cancel horizontal baseline

Clear **Force horizontal baseline** mode.



Force horizontal base back



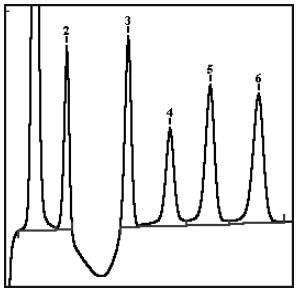
Cancel horizontal base back

Force horizontal base back

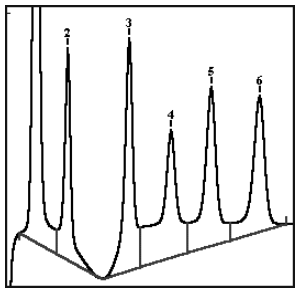
Set horizontal baseline for a single peak. The baseline is drawn **backwards** from the peak end point. The intersection of the baseline with the signal is defined as peak start point.

Cancel horizontal base back

Clear **Force horizontal base back**mode.



Enable baseline penetration



Disable baseline penetration

Enable baseline penetration

Allow crossing of the signal by the baseline.

Disable baseline penetration

Clear **Enable baseline penetration** mode. The baseline is aligned to the bottom value of the signal.

Integration events for integration parameters

Set width Sets new **Width** parameter that supersedes default linear growth of expected peak.

Set slope Sets new **Slope** value.

Set min height Sets new **Minimum peak height** value.

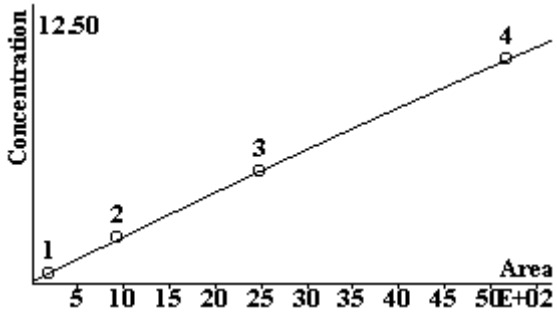
Set rider ratio Sets new value of **Rider ratio** parameter.

4.4.5 Calibration and quantification

General information

The aim of any chromatographic analysis is to answer the question "What components are present in the sample and what are their concentrations?". Two procedures are used to achieve this goal: the first step is called **calibration**, the second step includes **quantification**.

Calibration has two aims: to get retention characteristics for all components of interest (these data are stored in the component table) and to establish a relation between injected amounts and corresponding instrumental responses for all components of interest (stored in the concentration table). Calibration is performed by running one or several chromatograms of samples with known composition and known concentration of components (standards). For each calibrated component a **calibration curve** is constructed as a result.



With the 761 Compact IC three different procedures can be used for the construction of the calibration curve. By far the most important method for ion chromatography is the **external standard calibration** (absolute calibration) which is described in detail in this section. The other methods of **internal standard calibration** (relative calibration) and **tabulated calibration** (relative gradient factor, a modified method for external standard calibration) are of lesser importance and are not described in detail here (for details please refer to on-line help).

Identification is a procedure that enables to decide what peaks on the chromatogram correspond to what components. The identification is performed on the basis of the **Component table** created for calibration.

Quantification is a calculation procedure that determines components concentrations, on the basis of instrumental response (peak height or area), using the calibration curves obtained earlier for each component.

Notations

R	Stands for response value, either **area** or **height**, depending on setting selected in the **Calibration graphs** window.
V	Sample **Volume** injected.
D	**Dilution** coefficient, shows number of times to which the initial solution is dissolved before injection.
V' = V / D	**Adjusted volume** of injected sample. A correction is made for the dilution coefficient.
C	Concentration of the component in the initial solution (before dilution).
Q = C • V'	**Quantity** of component, used for calibration curve construction.
t	**Retention time**. Time needed by the mobile phase to flow through the separation system.
t_0	**Void time**. Dead time needed by the mobile phase to flow through the separation system.
$t' = t - t_0$	**Corrected retention time**, called also net retention time.
L	Column length.
$v = L / t_0$	Linear **Flow rate**.
$W(R) = k_2R^2 + k_1R + k_0$	Calibration function (component quantity **W** vs. detector response **R**). In the case of the most common linear calibration curve **$Q = W(R) = k_1R$** it comes through the origin. The concentration of the component in the analyzed mixture is calculated by the formula **C = W(R) / V'**.
RSD(Q, R)	Procedure, used for computation of regression coefficients (**k_0**, **k_1** and **k_2**) of the calibration function **W(R)** using RSD (Residual Standard Deviation). The procedure gets input as a set of calibration points (quantity **Q** vs. response **R**) and outputs the calibration function **W(R)** used for prediction of the component quantity **$Q_i = W(R_i)$**.

Subscript values used:

j	Stands for j-th calibration level run.
s	Stands for standard component.
i	Stands for component number.

External standard calibration

External standard calibration (absolute calibration) is a key way of calibration. Basically this procedure calculates the dependence of injected component's quantity versus area (or height) of the corresponding peak. This dependence is showed as a calibration plot with injected quantity along the Y axis and peak area (or height) along the X axis. The injected quantity $\mathbf{Q_i}$ is calculated as product of component's concentration $\mathbf{C_i}$ to the reduced injected sample volume **V'**:

$$\mathbf{Q_i = C_i \cdot V'}$$

The calibration function $\mathbf{W_i(R)}$ for each component is calculated using the RSD method.

$$\mathbf{W_i(R) = RSD(Q_{ij}\ ,\ R_{ij}) = RSD((C_i \cdot V'),\ R_{ij})}$$

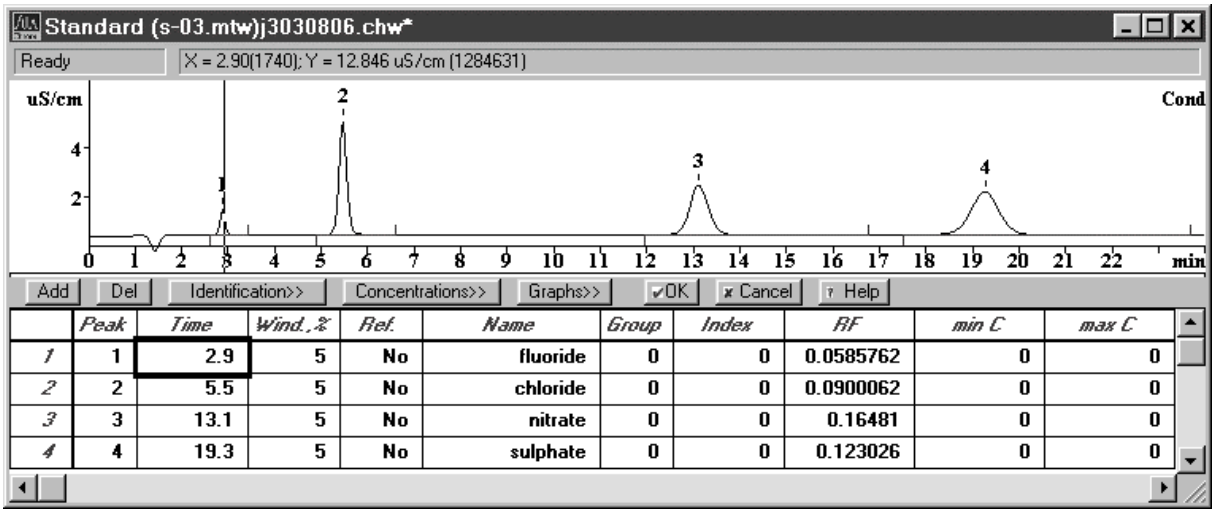
When quantification procedure is performed, a concentration $\mathbf{C_i}$ (absolute concentration of a component in the sample) is determined as a ratio of the computed quantity $\mathbf{W_i(R_i)}$ to the corrected volume of sample injected **V'**:

$$\mathbf{C_i = W_i(R_i) / V'}$$

Component table

761 COMPACT IC / Method / Calibration / Components

If the component table is opened, the chromatogram window is split into two parts. The upper one shows the chromatogram, the component table appears in the bottom part of the screen. When moving into the component table, a special cursor in the upper part of the window jumps to the peak corresponding to the current component.



	Peak	Time	Wind./%	Ref.	Name	Group	Index	RF	min C	max C
1	1	2.9	5	No	fluoride	0	0	0.0585762	0	0
2	2	5.5	5	No	chloride	0	0	0.0900062	0	0
3	3	13.1	5	No	nitrate	0	0	0.16481	0	0
4	4	19.3	5	No	sulphate	0	0	0.123026	0	0

The **Components table** stores the following information on the components to be analyzed:

Number	**Row number** (read-only).
Peak	Number of the peak in the chromatogram that corresponds to the given component. If this field contains a **0**, the **peak number** must be entered manually.
Time	**Expected retention time** of the component in the calibration run. After a new entry of the peak number the corresponding retention time is entered automatically as soon as this field is clicked on with the mouse.
Wind.%	**Identification window** of the component. This value is the maximum allowed difference of the actual retention time of the component and its expected retention time, measured as % of expected retention time. The component will be identified within its identification window only.
Ref.	**Reference component**. The entry **Yes** defines components as reference components; these ensure improved peak identification of the other **Ordinary components** (details see on-line help).
Name	**Component's name** (cannot include spaces). Rows with empty names are excluded from the table of components when you leave the component table editor.
Group	Number of the **group** to which the components are allocated. If group numbers ≥ 1 are entered here then a group report can be outputted for each group; this also contains the intermediate totals for this group. This group report is produced after the main report table.
Index	**Retention index** for components with known index. In the case of an unknown index this value should be equal to **0**. For index calculation the user must define index values for at least two peaks, and all other values will be calculated by the software using linear or logarithmic approximation (details see on-line help).
RF	**Response factor**. This value corresponds to the slope of the calibration curve (coefficient $\mathbf{k_1}$ of the calibration formula).
min C (max C)	**Minimum (Maximum) concentration** value for the component. Components whose concentration leaves the range **min C…max C** are marked in the peak table by the sign " **!** ".

Additionally, the **Components table** contains the following buttons:

<Add>	Add a new component (an empty column) to the component table.
<Del>	Delete the current component from the component table.
<Identification>	Open the **Peak identification** window (see *Identification*).
<Concentrations>	Open the **Concentration table** (see *Concentration table*).
<Graphs>	Open the component window with display of calibration curve and calibration parameters.
<OK>	Accept all changes and close the **Component table**.
<Cancel>	Reject all changes and close the **Component table**.

The standard methods supplied with the «761 Compact IC» program all contain a component table with pre-defined components with entries for the names and retention times.

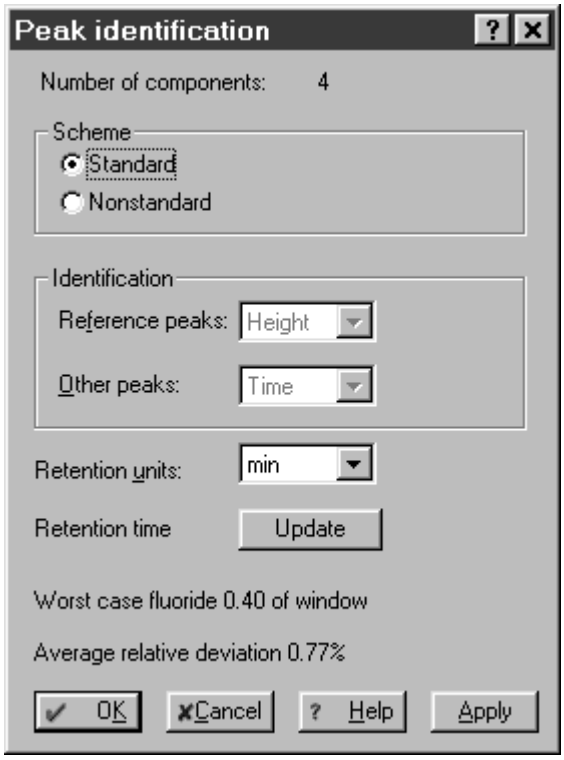
If the output of all peaks is required in the result report then a so-called universal component can be defined in the component table for this purpose; this receives the value **0** *in the* **Time** *field and no peak is allocated to it. The name entered under* **Name** *(e.g.* **unknown***) is then used for all peaks for which no component can be allocated.*

Peak identification

761 COMPACT IC / Method / Calibration / Identification

Selecting this menu item or clicking on **<Identification>** in the component table opens the **Peak identification** window with parameters for tuning the peak identification procedure.

Number of components	Number of components in the component table (read-only).
Scheme	Quick choice of identification parameters scheme.
Standard	Set default meanings of identification parameters: **Height** for reference components, **Time** for all other components (ordinary components).
Nonstandard	Set custom meanings of identification parameters.

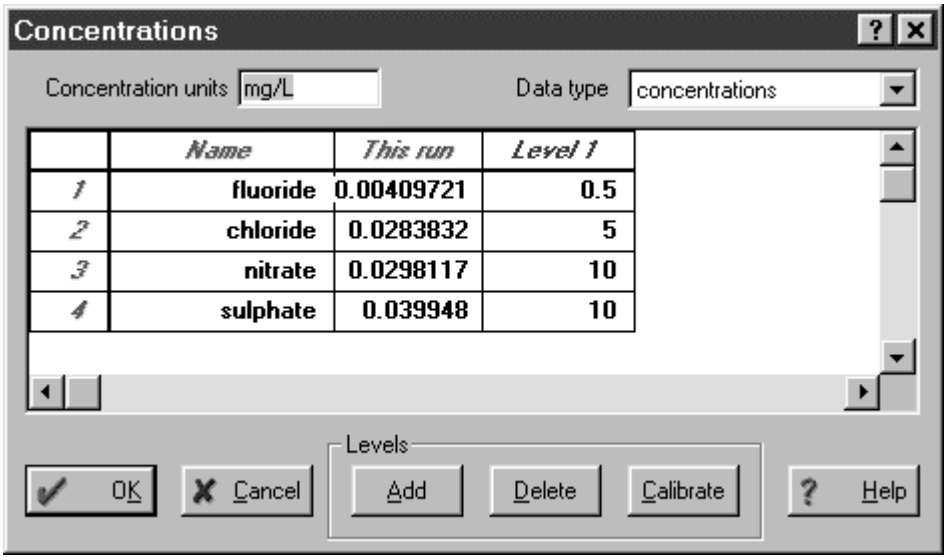


Identification	Identification parameters.
Reference peaks	Identification parameter for reference components. Default is **Height**.
Other peaks	Identification parameter for ordinary components. Default is **Time**.
Retention units	Choice of retention units. Default is **min**.
Retention time	Retention time.
<Update>	Updates expected retention times of components according to the current chromatogram.
Worst case...	Information on the component with the worst (largest) deviation of actual and expected retention time. Deviation is given as a part of component's identification window.
Average relative deviation	Relative deviation averaged for all components.

Concentration table

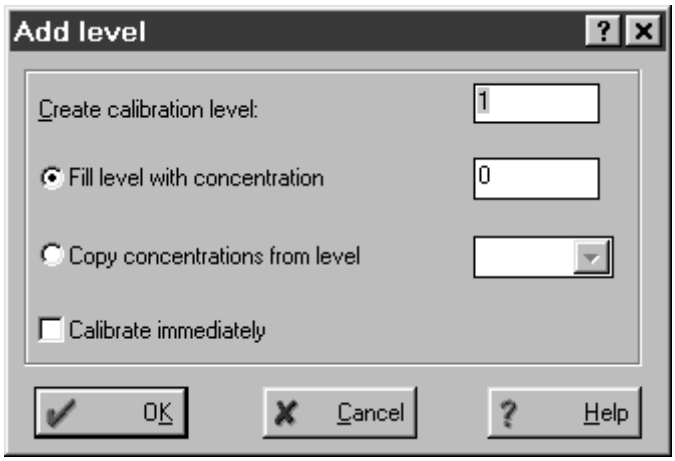
761 COMPACT IC / Method / Calibration / Concentrations

Selecting this menu item or clicking on **<Concentrations>** in the component table opens the **Concentrations** window with the concentration table containing concentrations of all components for all **Calibration levels**. Each calibration level corresponds to a sample used for calibration and to a point on the calibration curve.



Concentration units	User defined units of concentration which will appear in the report. Nevertheless, entry of new concentration units does not cause recalculation of concentrations.
Data type	Choice of the data type that will be shown in the concentration table: **concentrations** (default setting), peak **heights**, peak **areas**, **volumes**.
Number	Number of the component (read-only).
Name	Name of the component taken from the component table (read-only).
This run	Contains concentrations (or other chosen values) obtained in the current run (read-only, except for universal component).
Level 1...Level N	Contains concentrations (or other chosen values) of components for corresponding **Calibration level**.

<Add> Add a new **Calibration level** to the concentration table. The following window appears:



Create calibration level
Number of calibration level to add.

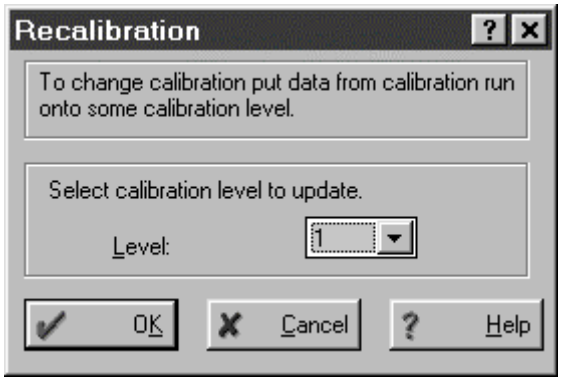
Fill level with concentration
Concentration to be filled in for all components.

Copy concentrations from level
Number of calibration level from which concentrations are copied.

Calibrate immediately
Recalibration with new calibration levels.

<Delete> Delete the current calibration level (where cursor is situated) from the concentration table.

<Calibrate> Calibrate the current chromatogram with the selected calibration level. The following window appears:

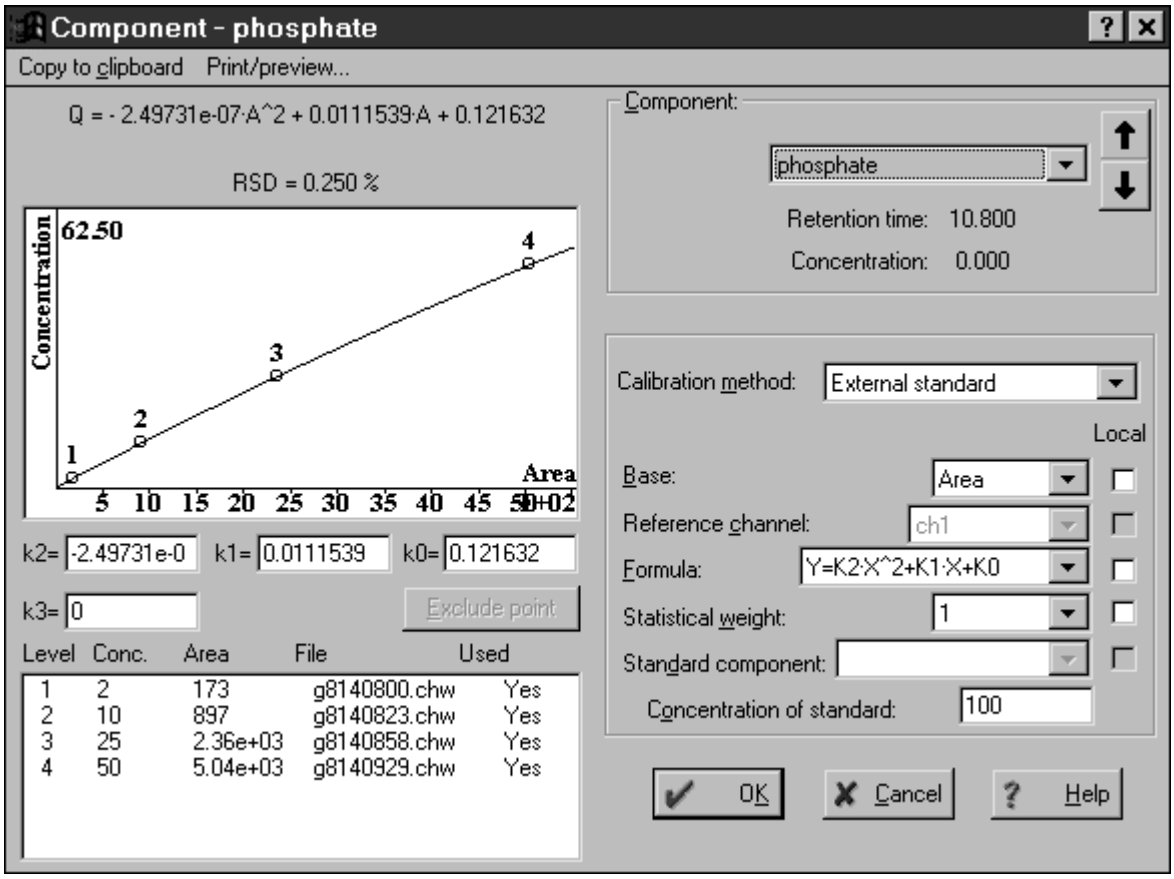


Level Calibration level to be used for recalibration.

Calibration curve

761 COMPACT IC / Method / Calibration / Graphs

Selecting this menu item or clicking on **<Graphs>** in the component table opens the **Component** window.



In this window the results of the calibration are shown for each component together with the calibration curve. The parameters for calculating the calibration curve can also be entered here.

Calibration results and curve

Analytical expression — A line above the calibration curve looking like $\mathbf{Q = k_3 \cdot A^3 + k_2 \cdot A^2 + k_1 \cdot A + k_0}$.
This formula is used for approximation of the calibration curve.

RSD — RSD (Residual Standard Deviation) value to evaluate the error of calibration curve approximation.

Corr. — Correlation coefficient value is available only in the case of linear calibrations without weighting of data points.

Calibration curve — Plot of measured calibration points and calculated calibration curve.

k0, k1, k2, k3 — Calibration coefficients $\mathbf{k_0}$, $\mathbf{k_1}$, $\mathbf{k_2}$ and $\mathbf{k_3}$ (coefficients of the calibration formula).

Calibration points table

This table contains the basic information used to construct the calibration curve:

Level Number of **Calibration level**.

Conc. Concentration of the current component in the calibration sample. It is taken from the concentration table.

Area (or Height) Peak height or area of the current component, depending on calibration base.

File File name of calibration chromatogram that stores data on the given calibration level.

Used Information whether the calibration level is used for calculation of the calibration curve or not.

<Exclude point> Exclude the selected calibration point from the list and recalculate calibration coefficients for the current component. Repeated pressing includes the point again. You can exclude points that drop out of the calibration curve watching for RSD values.

Component information

Component Allows to select the current component from the list. It is possible also to scroll the list of components by mouse, using the special arrow buttons on the right.

Retention time Retention time of the selected component (read-only).

Concentration Concentration of the selected component (read-only).

Calibration parameters

Calibration method Method that is used for calibration procedure. There are three basic methods of calibration:

External standard calibration
Absolute calibration. It is the basic calibration procedure in ion chromatography.

Internal standard calibration
Relative calibration.

Tabulated calibration Relative response factor calibration. It is a simplified method of external standard calibration.

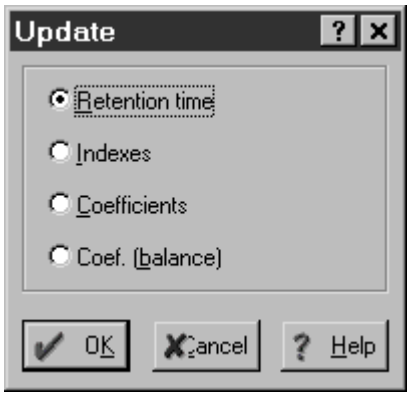
Local If this checkbox is marked then the corresponding parameter is valid for the current component only. Otherwise this parameter is global (i.e. default for all other components).

Base	Base for calculations (**Area** or **Height**) in quantification and calibration procedures. Indicates, which parameter is to be used as a peak response.
Reference channel	Channel which is used to measure area or height (read-only).
Formula	Formula for calibration function. There are six possible calibration dependencies for linear and nonlinear calibration curves.
Statistical weight	Weighting parameter used to weight calibration points deviations on calculating coefficients of the calibration formula. Apart from the uniform weighting **1** the values **1/x**, **1/x²**, **1/y** and **1/y²** are also possible.
Standard component	Name of the standard component in the case of **Internal standard calibration** or **Tabulated calibration** method (details see on-line help).
Concentration of standard	Concentration of the standard component in the case of **Internal standard calibration** or **Tabulated calibration** method (details see on-line help).

Update calibration

761 COMPACT IC / **Method** / **Calibration** / **Update**

Selection of this menu item opens the **Update** window.



Retention time	Replace the expected retention times of the components with the retention times of the corresponding peaks obtained in the current run.
Indexes	Fill **Index** field for components with zero index.
Coefficients	Recalculate all calibration coefficients for all components (performs re-calibration).
Coef. (balance)	Recalculate coefficient of the universal component. The aim of this action is to adjust the re-

sponse factor of this component so, that the total amount of the injected components becomes equal to the declared value. This declared summary amount is entered into the **Concentration** field of the universal component for **This run** level.

Load and save calibration data

761 COMPACT IC / **Method** / **Calibration** / **Load from method**

Load the calibration from the method. This option is used to update the calibration for the current run by the one taken from the method used for acquisition.

761 COMPACT IC / **Method** / **Calibration** / **Save to method**

Save the current calibration to the method. This option is used to transfer the updated calibration from the run to the current method (i.e. the method associated with the current chromatogram window).

Import and export calibration data

761 COMPACT IC / **Method** / **Calibration** / **Import calibration**

This option imports a calibration from a calibration file ***.cal** to the current method or chromatogram. It is used to transfer the updated calibration from chromatogram-to-chromatogram or from method-to-method. Different methods can be processed in this case using the same calibration.

761 COMPACT IC / **Method** / **Calibration** / **Export calibration**

This option exports a calibration to a in calibration file ***.cal**. It is useful to transfer a calibration from chromatogram-to-chromatogram that were obtained by different methods.

Put out calibration curves

COMPONENT / **Copy to clipboard**

This option allows to copy the calibration curve of the selected component to the clipboard so that it is available for other Windows applications, such as WinWord, Excel, etc.

COMPONENT / **Print/Preview** / **Preview this**

Display calibration curve print preview of the selected component.

COMPONENT / **Print/Preview** / **Preview all**

Display calibration curve print preview of all components.

COMPONENT / **Print/Preview** / **Print this**

Print selected calibration curve of the selected component.

COMPONENT / **Print/Preview** / **Print all**

Print calibration curves of all components.

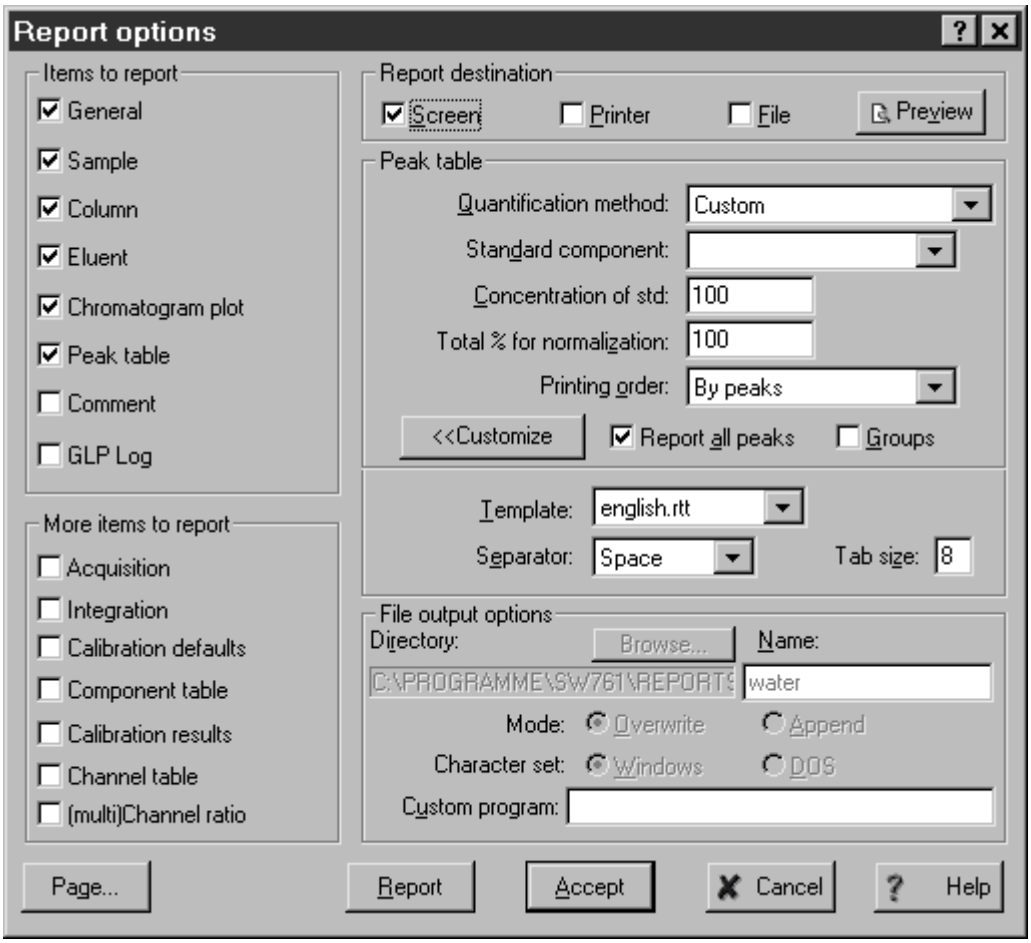
4.4.6 Report output

Report options

761 COMPACT IC / **Method** / **Report options**

761 COMPACT IC / **Process** / **Make report**

The **Report options** window is divided into several regions that combine parameters for report output on their functionality and includes several different areas. The report output is started by clicking on **<Report>**.



Items to report

This part of the **Report options** window contains a list of important report items that can be included into the report on the user's choice:

General General description on the analysis from the Passport. The **Report date** and the logged-in user **Printed by** are also put out.

```
        Report date: 05/04/1999 12:34:00
        Printed by:  Roland Dörig
Ident:          Tap water
Analysis from: 19/02/1999 11:06:41
File:           j2191106.chw            Last save: 23/02/1999 10:02:30
Modified!
Method:           s-03.mtw              Last save: 23/02/1999 09:57:48
Run operator:  Urs Waldburger
Analysis number: 5
```

Sample Sample information from the **Sample** tab of the passport.

```
SAMPLE:       Tap water from Application Laboratory
      :       Herisau, Switzerland
Vial number:  2
Volume:       20.0 µl
Dilution:     1.00
```

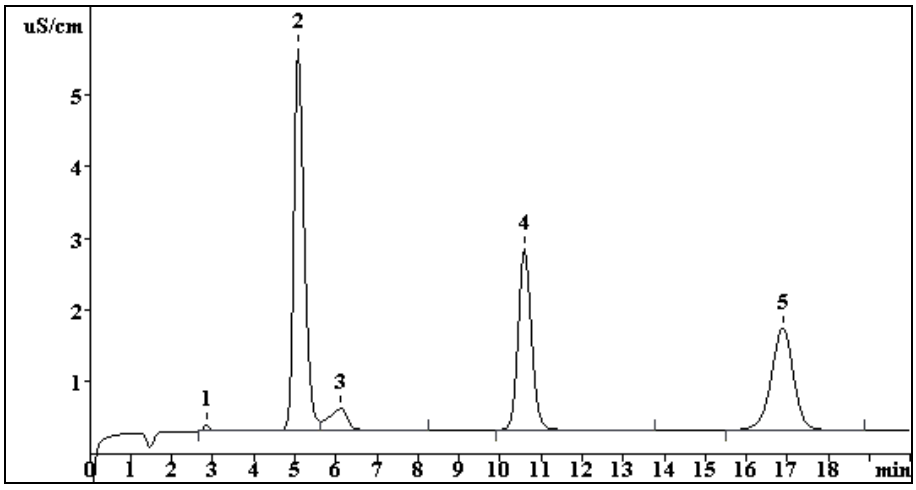
Column Column information from the **Column** tab of the passport.

```
COLUMN:       METROSEP Anion Dual 2 (6.1006.100)
Size:         4.6 x 75 mm
Number:       A106
Part.size:    6.0 µm
```

Eluent Eluent information from the **Eluent** tab of the passport.

```
ELUENT:       2.0 mM NaHCO3 / 1.3 mM Na2CO3


Flow:         0.80 mL/min
Temperature:  20.0°C
Pressure:     3.4 MPa
```

Chromatogram plot Plot of the chromatogram (only for **Printer** or **File** destination).



Peak table Peak table with results. The structure of the peak table depends on the selected **Quantification method**. The following report is put out as default:

```
Quantification method: Custom
Standard component:    No
Normalization:         100.00

 No  Retention  Height      Area       Conc.   Name
           min   uS/cm uS/cm*sec       mg/L
  1       2.83    0.09     0.803       0.04   fluoride
  2       5.06    5.35    94.134       8.06   chloride
  3       6.11    0.31    10.254       0.00
  4      10.57    2.52    57.007       9.06   nitrate
  5      16.87    1.43    53.565       6.40   sulfate
_____________________________________________
  5      20.01    9.70   215.763      23.57
```

Comment User defined comment from the **Comment** tab of the passport.

```
Method example for water determination.
```

GLP Log Method and Data GLP messages from the **Method Log** and **Data Log** tabs of the passport.

```
METHOD GLP LOG

15/02/1999 17:35:47
Method created !

15/02/1999 17:35:56
Modified: Passport;
Method saved to disk file C:\IC761\Methods\s-03.mtw


DATA GLP LOG
Time constant: 0.100000

19/02/1999 11:26:38 Urs Waldburger
Modified: RAW DATA! Integration; Peaks;
Data saved to disk file C:\IC761\DATA\J2191106.CHW

23/02/1999 10:02:29 Urs Waldburger
Data saved to disk file c:\ic761\data\j2191106.CHW
```

More items to report

This part of the **Report options** window contains a list of rarely used report items that can be included into the report on the user's choice:

Acquisition Parameters used for data acquisition from the from the **General**, **Measure** and **Filters** tabs of the **Method setup** window.

```
        ACQUISITION PARAMETERS
Channels:        1
Method duration: 20.00min
Run duration:    20.01min
Measurements (method): 12006
Measurements (run):    12006
Freq.divisor:    1
Sampling:        10.00 pts/sec
Device:          761Compact IC
Interface:
Program before:
Program after:
Spikes filter:   Yes
Median filter:   No
  slit:          0
Gauss filter:    No
  slit:          0
```

Integration Integration parameters and integration events.

```
           INTEGRATION DEFAULTS
Channel:         Cond
Delay:           2.60 min
Width:           5.00 sec
Broadening:      2.00
Slope:           5.00
Asymmetry:       1.50
MinArea:         0.00
MinHeight:       0.01
Rider ratio:     0.00
```

Calibration defaults Calibration parameters defined in the component window and on the **Math** tab of the **Method setup** window.

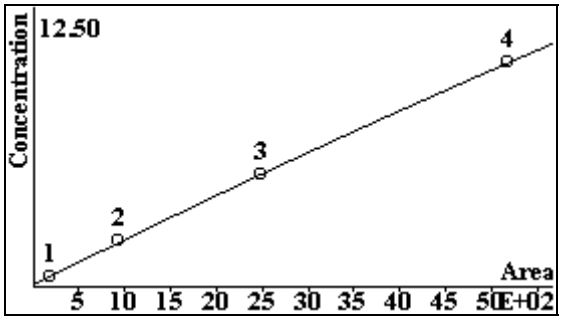
```
           CALIBRATION
Channel:          Cond
Method:           External standard
Response:         Area
Standard:         No
Index:            Linear Internal
Effectivity:      2*Pi*(T*H/A)^2
           IDENTIFICATION
Reference peaks: Time
Other peaks:     Time
Retention units: min
```

Component table Component table.

No	Retention	Window%	RF	Conc.	Index	Type	Group	Name
1	2.85	5.0	1.095e+00	0.04	0.000		0	fluoride
2	4.94	5.0	1.713e+00	8.06	0.000		0	chloride
3	6.78	5.0	2.816e+00	0.00	0.000		0	nitrite
4	8.48	5.0	4.269e+00	0.00	0.000		0	bromide
5	10.56	5.0	3.177e+00	9.06	0.000		0	nitrate
6	13.65	5.0	6.368e+00	0.00	0.000		0	phosphate
7	16.86	5.0	2.391e+00	6.40	0.000		0	sulphate

Calibration results Calibration results of the component window. For each component a new page with calibration results and calibration curve is put out.

```
CALIBRATION OF COMPONENT  phosphate

Method:     Mpoint.mtw
Equation:   Q = - 2.49731e-07·A^2 + 0.0111539·A + 0.121632
RSD: 0.250 %
Correlation coefficient: 0.999452
```




```
K3 = 0     K2 = -2.49731e-07     K1 = 0.0111539     K0 = 0.121632
Base:        Area
Ref.channel: ch1
ISTD:
Formula:     Y=K2·X^2+K1·X+K0
Weight:      1
```

Level	Height	Area	Conc.	Volume	Retention	Used	File
1	6.46	173	2	1	10.8	Yes	g8140800.chw
2	34	897	10	1	10.8	Yes	g8140823.chw
3	90.9	2.36e+03	25	1	10.8	Yes	g8140858.chw
4	198	5.04e+03	50	1	10.8	Yes	g8140929.chw

Channel table Parameters of the data acquisition channel used.

```
           CHANNELS TABLE
Cond
 No     Name    Units Input  Minimum     Zero  Maximum     Range Coefficient  Noise Shift

  1     Cond    uS/cm     1 -8388607        0  8388607 8.389e+01   1.000e-05   5.63     0

 # Name/Units     Noise         RMS   PeakToPeak  Drift/hour
  1 Cond           5.6     63047.3    796371.8   15119.570
    uS/cm      5.63e-05        0.63        7.96       0.151
```

Name Channel's name. This text appears as **Channel label** in the chromatogram.

Units Units of detector response (µS/cm).

Input Number of data acquisition channel.

Minimum Minimum value of the linear range of the AD converter (in ADC conversion units). This parameter is used to detect an underflow condition.

Zero A signal level on a baseline (in ADC conversion units). This parameter is a result of the ADC calibration.

Maximum Maximum value of the linear range of the AD interface (in ADC conversion units). This parameter is used to detect overflow condition.

Range An input signal value in maximum in µS/cm.
Range = (**Maximum** - **Zero**) • **Coef**

Coef ADC sensitivity coefficient (weight of ADC bit in µS/cm).

Noise Estimated baseline noise value of the channel in ADC conversion units (bits).

Shift *Not used for 761 Compact IC*.

Report destination

The following output devices can be selected simultaneously in any combination as targets for report output:

Screen Output report (without curves) to screen.

Printer Output report to printer.

File Output report to file (see *File output options*).

Peak table

The following parameters can be selected for peak table output with determination results:

Quantification method Selection of the method to calculate concentrations of components:

Response normalization

The method normalizes the sum of responses for all peaks of the chromatogram to the **NORM** factor entered in the **Total % for normalization** field:

$$R_i\% = NORM \cdot R_i / \Sigma R_i.$$

All peaks are calculated and reported no matter whether they have been recognized or not.

The peak table includes the following columns: **Peak number**, **Retention time**, **Area + Area% or Height + Height%**, **Name**

Normalized concentration

The method normalizes the sum of absolute concentrations for all peaks of the chromatogram to the **NORM** factor entered in the **Total % for normalization** field:

$$C_i\% = NORM \cdot W_i(R_i) / \Sigma W_i(R_i)$$

As long as no universal component is defined, only peaks with non-zero concentrations are listed.

The peak table includes the following columns: **Peak number**, **Retention time**, **Height**, **Area**, **Response factor**, **Concentration%**, **Name**

Absolute concentration

This quantification method reports raw quantity (absolute concentration) of the component which is calculated directly from the calibration formula:

$$Q_i = W_i(R_i) / V'$$

As long as no universal component is defined, only peaks with non-zero concentrations are listed.

The peak table includes the following columns: **Peak number**, **Retention time**, **Height**, **Area**, **Response factor**, **Concentration**, **Concentration%**, **Name**

Relative concentration

This quantification method uses the internal standard method to calculate the relative concentrations of the components. For this procedure, a **Standard component** must be selected

	and the concentration of this internal standard must be entered in the **Concentration of std** field. As long as no universal component is defined, only peaks with non-zero concentrations are listed. The peak table includes the following columns: **Peak number**, **Retention time**, **Height**, **Area**, **Response factor**, **Relative concentration**, **Relative concentration%**, **Name**
Index	This column reports retention indexes of identified components. The peak table includes the following columns: **Peak number**, **Retention time**, **Width/2**, **Height**, **Index**, **Name**
Column test	Column test quantification method calculates multiple values that are necessary to evaluate column performance. The peak table includes the following columns: **Peak number**, **Retention time**, **K'** (capacity factor), **TP** (number of theoretical plates per column), **TP/m** (number of theoretical plates per m), **HETP/dp** (reduced height equivalent to theoretical plate), **Asym.** (peak asymmetry), **Name**
Custom	This quantification method enables to customize the peak table on the user's choice using the **<Customize>** button. The peak table for the methods supplied contains the following columns as standard: **Peak number**, **Retention time**, **Height**, **Area**, **Conc.**, **Name**
Standard component	Internal standard component for quantification procedure.
Concentration of std	Concentration of the internal standard component for relative concentration calculations. This value is stored in **This run** column of the concentration table.
Total % for normalization	A value to which the sum of concentrations is normalized. It is used for **Response normalization** and **Normalized concentrations** quantification methods. The default value is 100.
Printing order	Determines the order of the components in the peak table.
By peaks	Lists run results for all peaks detected. Unidentified peaks (corresponding to the universal component) are included, but missing components are not listed.

By components	Missing components are always included into the report, even those with concentration equal to zero. In the case of presence of universal component the summary for all unidentified peaks is presented as a single line.
<Customize>	Calls up a box with a list of columns that can be included into the report (see *Report elements*). It is available only if **Quantification method = Custom** has been selected.
Report all peaks	Checkbox that includes all peaks irrespective of the concentration of the substance. Otherwise the report generator excludes lines with zero concentration of the component. It is available only if **Quantification method = Custom** has been selected.
Groups	If this checkbox is checked, a separate peak table report is put out for every group specified in the component table.

Template options

For report output using a report template the following parameters can be modified:

Template	Selection of the report template file ***.rtt**. Several templates for different languages and applications are available.
Separator	Defines which character separates report columns in tables. A separator other than **Space** is useful when the report is printed to a file and this file is imported into a spreadsheet software.
Tab size	Sets tab stop value for the screen window. Important only when **Separator = Tabulation** has been selected or there are tab characters in the template file ***.rtt**.

File output options

If **File** has been selected for the report destination, the following parameters can be modified:

Directory	Directory for report output. For creation of a new directory, use the **<Browse>** button.
Name	File name to save report to. The report is saved in text form in the ANSI or ASCII format. So add an extension like ***.txt** to the file name. If the chromatogram plot checkbox is checked, the plot is saved in a separate file ***.wmf** in the WMF format under the same name.

Mode The two options **Overwrite** (overwrite the file) or **Append** (append to existing file) are available.

Character set The two options **Windows** (ANSI) or **DOS** (ASCII) are available. This settings are essential for printing of non-English symbols (e.g. ö, ä, ü).

Custom program Path and name of the program to be started after report output. This option enables to transfer the report to a database, an electronic table or another application for further processing.

Report elements

If **Quantification method = Custom** has been selected, the peak table can be customized on the user's choice. After clicking the **<Customize>** button, the following columns can be included in the peak table.

number Peak number.

retention time Retention time of the component (in minutes, irrespective of the chosen retention units on the chromatogram graph axes). The total value in the column is equal to the chromatogram duration.

halfwidth Width of the peak at half height (in minutes).

height Height of the peak (in µS/cm). The total value in this column is the sum of heights for all identified peaks.

height% Normalization of peak heights for all peaks using the **NORM** value entered in the **Total % for normalization** field (default setting 100%):

$$H_i\% = NORM \cdot H_i / \Sigma H_i$$

area Area of the peak. Depends on the units on the X and Y axes of the chromatogram. The total value in this column is the sum of areas for all identified peaks (including universal component).

area% Normalization of peak areas for all peaks using the **NORM** value entered in the **Total % for normalization** field (default setting 100%):

$$A_i\% = NORM \cdot A_i / \Sigma A_i$$

capacity factor The capacity factor k'_i of the component is equal to the ratio of its corrected retention time $(t - t_0)$ to the void time of the system t_0:

$$k'_i = (t_i - t_0) / t_0$$

Total for this column is equal to the capacity factor of the last peak of the chromatogram.

resolution Resolution **R** for two neighboring peaks is calculated as:

$$R = (t_{i+1} - t_i) / (w_{0.607i} + w_{0.607(i+1)})$$

where **i** and **i+1** indexes refer to the neighboring peaks, and $w_{0.607}$ stands for the peak width at 60.7 % of the peak height.

effectivity, TP

Effectivity for the peak in number of theoretical plates. The number of theoretical plates N_i per column for a chosen peak is calculated for a chromatographic peak by one of two formulas:

$$N_i = 2\ PI\ (t_i \cdot H_i / A_i)^2,$$

where **PI** = 3.1415926..., t_i = retention time, H_i = height, A_i = area of the peak. The more commonly used formula is:

$$N_i = 5.54\ (t_i / w_i)^2,$$

where w_i is the width on the half-height of the peak. The first formula offers better estimates for fused or unresolved peaks, because the half-width errors for those peaks are much greater than height or area errors.

Total for this column includes average value for the peaks listed.

effectivity, TP/m

Effectivity for the peak in number of theoretical plates per meter. The number of theoretical plates per meter **N'** for the given component is calculated as:

$$N' = N_i \cdot 1000 / L,$$

where **L** is length of the column in mm and N_i is effectivity of the column for i-th component.

Total for this column includes average value for the peaks listed.

reduced TP height, HETP/dp

The height of theoretical plate divided by particle size, called also reduced height, is calculated by formula:

$$H_i = 1000 \cdot L / (N_i\ dp).$$

where **L** is length of the column in mm, **dp** is particle diameter in µm.

asymmetry

Peak asymmetry A_s is calculated at $^1/_{10}$ of the peak height as a ratio of width after the top of the peak w_2 to the width before the top w_1.

$$A_s = w_2 / w_1$$

response factor

Coefficient k_1 of the calibration curve.

raw concentration

Absolute concentrations (raw quantity) of the components, calculated as

$$C_i = W_i(R_i) / V'$$

Total value for the column is the sum of concentrations for all components.

concentration%

Normalization of concentrations for all peaks using the **NORM** value entered in the **Total % for normalization** field (default setting 100%):

$$C_i\% = NORM \cdot W_i(R_i) / \Sigma W_i(R_i)$$

Total value for the column equals **NORM** for the main table, and the sum of concentrations in the group for the group table.

rel. concentration

Relative concentration of the component relative to the standard component, assumes concentration of one of the components to be known in advance. The concentration of the component is calculated by the formula:

$$C'_i = W_i(R_i) / V' = W_i(R_i) \cdot C_s / W_s(R_s),$$

where $V' = W_s(R_s) / C_s$ is the effective (reduced) volume of injected sample. The standard component concentration C_s is entered by the user.

Total value for relative concentration column does not include the concentration of the standard component.

rel. concentration%

Relative concentration percent differs from **concentration%** by exclusion of standard component(s) from summation, so that sum of all concentrations (excluding standard) equals **NORM**.

Total value for the column equals **NORM** value for main peak table, and the sum of concentrations in the group for Group table.

index

Linear or logarithmic retention index for identified components.

Total value for the column is a weighted index average with absolute concentration as weight.

$$I = \Sigma (I_i C_i) / \Sigma C_i.$$

type

The types of components are designated by a one-letter code:

R Reference component (used for peak identification).

S Standard component.

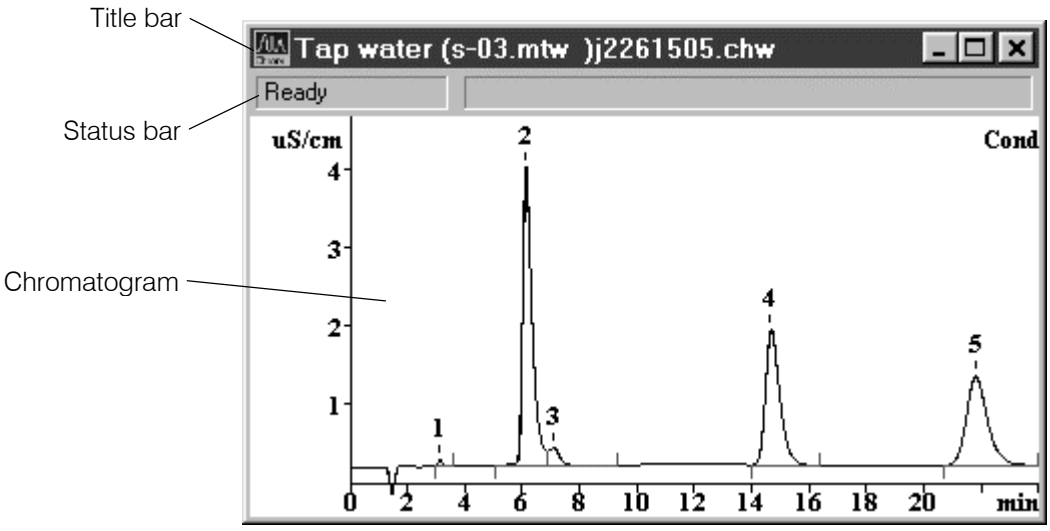
C Calibration standard in the case it is different from the quantification standard.

	?	Some points of corresponding peak are out of ADC or detector range – suspicious result.
	!	Component concentration is outside of minimum (**min C**) and maximum limits (**max C**), set in the component table.
	p	Special component (it has one of the special flags checked on in the **COMPONENT** window).
	N	The component response is outside of calibrated region.
		In the case of peaks additional letters precede the component type information, indicating, how peaks are separated from other peaks, for example:
	BD_	Peak that starts on the baseline (**B**) and ends on the drop line (**D**) that separates it from another adjacent peak.
	BBR	Special case of a rider (**R**) peak that is tangentially separated from the main one. A main peak will have a third letter **H** (horse) in this case.
		The complete component type may look like: **BBD : !R**.
group		Number of the group for the component.
spectral ratio		*Not used for 761 Compact IC.*
name		Name of the component.
file name		File name of chromatogram. This column is very useful for the purpose of processing of exported data.
ident		Title (identifier) for the chromatogram. This column is useful for the processing of exported data.

4.5 Chromatograms

4.5.1 Chromatogram window

The **CHROMATOGRAM** window is used to show a running or recorded chromatogram.



The **title bar** of the chromatogram window contains buttons for minimizing, maximizing and closing the window. The window name consists of the elements "**Ident (method name) chromatogram name**". A star (*****) at the end of the name indicates that the chromatogram has been changed since the last saving.

The **status bar** contains two fields. The first field indicates the current measurement status, one of the listed below:

Ready	Chromatogram is ready to start.
Waiting	Chromatogram is waiting for the first measuring points.
Measure	Chromatogram is being measured.
Measure(Baseline)	Recording of baseline.
Finished	Measurement finished, but the chromatogram is not processed.
Processing	Chromatogram is being processed after finishing.
Failure	Failure, e.g. unexpected pump stop, etc.
COM error	Error on COM port interface.

During active data acquisition the elapsed time, the duration of the chromatogram or program and the current X and Y values are shown in the second field of the status bar. If the peak editor is switched on then the position of the cursor will be shown.

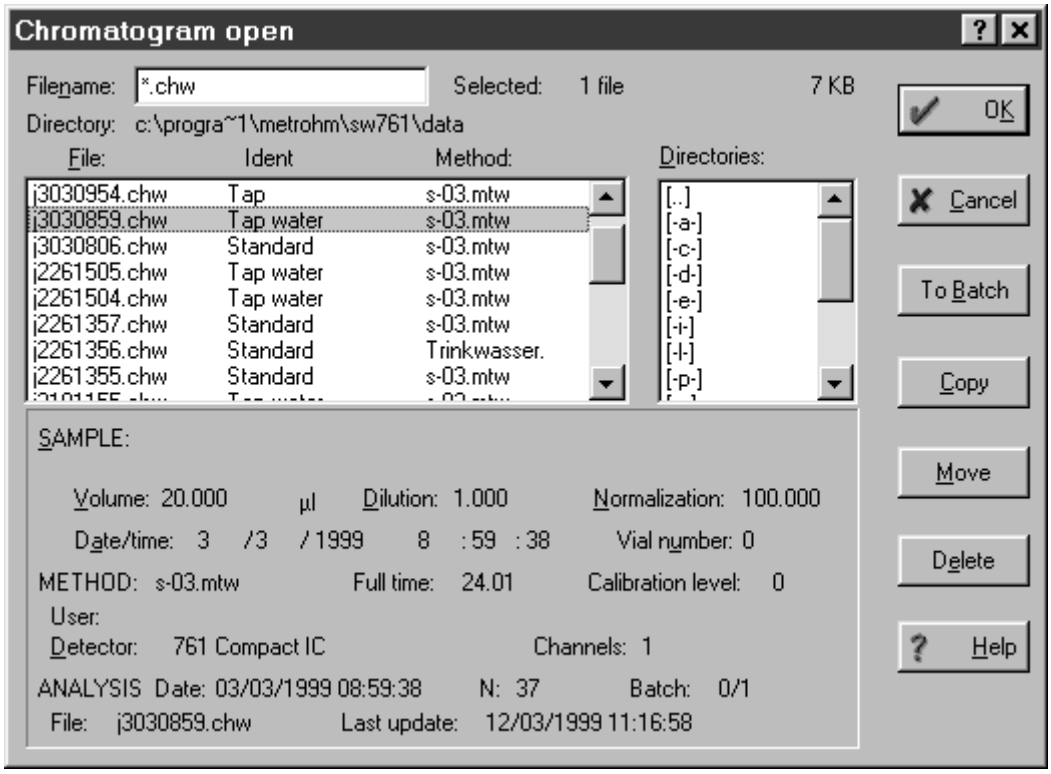
A chromatogram can be scaled with the help of keyboard or mouse functions or through the **Chromatogram axes** window opened with **761 COMPACT IC** / **View** / **Appearance** / **Chromatogram axes**. Some of the window control functions are collected in the **Window** menu.

4.5.2 Chromatogram file handling

Open chromatogram

761 COMPACT IC / File / Open / Chromatogram

Load an existing chromatogram file (***.chw**) from the **Data** directory and open the chromatogram window. The following window appears:



Filename	Filename (common wildcards as ***** and **?** are possible).
Selected	Number of selected chromatograms and their total size.
Directory	Path name of the working directory.
File window	Box with the list of files residing in the working directory sorted by time (the last recorded chromatogram is at the top of the list). As additional short information on the chromatogram the two parameters **Ident** and **Method** are also displayed. Files in this box can be selected by moving the selection bar to the desired chromatogram and pressing the [Space] key or by a single mouse click. It is possible to select several chromatograms at once. Press [Shift] and the left mouse button to select all chromatograms up to last item clicked, press [Ctrl] and the left mouse button to add a single chromatogram to the selection already made. All selected items are painted.

Directories	Box with the list of directories. Allows to change the working directory defined in the method, if necessary.
Chromatogram description	A set of fields with the description of the current chromatogram. Selected fields from the passport are listed here.
<OK>	Load all selected chromatogram files (***.chw**) and open each in its own window.
<Cancel>	Close this window without any action.
<To Batch>	Add selected chromatograms to the specified batch reprocessing file.
<Copy>	Copy selected chromatograms to the specified location.
<Move>	Move selected chromatograms to the specified location.
<Delete>	Delete selected chromatograms and move them to the Windows waste-basket.

Save chromatogram

761 COMPACT IC / File / Save / Chromatogram

Save the selected chromatogram in a chromatogram file (***.chw**) in the working directory. If this chromatogram has been already stored in this directory, the message **File ... exists. Overwrite?** appears. If it is preferable to overwrite the previous copy (for example, after the reprocessing), press the **<OK>** button. Pressing **<No>** saves the chromatogram into the new file (a new copy of the chromatogram is created).

Close chromatogram

761 COMPACT IC / File / Close

Close the selected chromatogram window. If the data were not saved or the method was modified, a warning appears. Usually it is more convenient to close the window by clicking the  button at the top corner area of the window.

Delete chromatogram

761 COMPACT IC / File / Delete

Delete the selected chromatogram window. A warning will be generated by the software in any case.

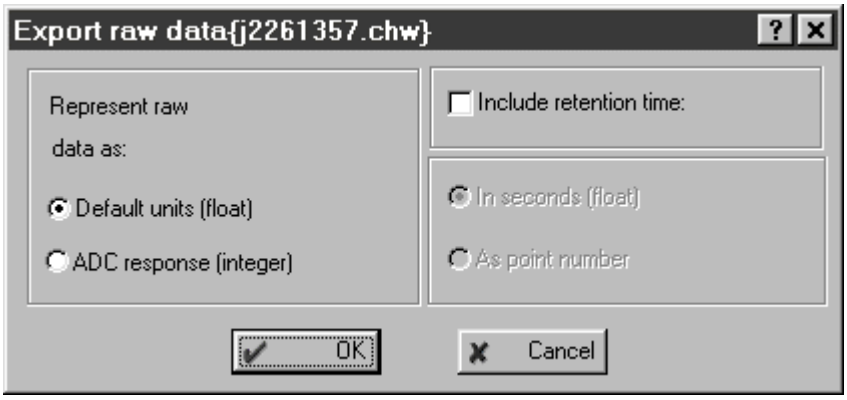
Export chromatogram

761 COMPACT IC / File / Export / AIA file

Export the selected chromatogram in the AIA format (Analytical Instrument Association) as CDF file (***.cdf**).

761 COMPACT IC / File / Export / Raw data to txt

Export chromatographic raw data into an ASCII text file (***.txt**). The following window appears:



Represent raw data as Output of raw data:

Default units (float) Y values are exported in default units for the channel (µS/cm).

ADC response (integer) Y values are exported in bits.

Include retention time

In seconds (float) X values are exported in seconds.

As point number X values are exported as point number.

Import chromatogram

761 COMPACT IC / File / Import / Chromatogram

Import chromatogram of the following formats:

***.chm** Chromatogram files of the «Chrom&Spec» program (DOS version).

***._rd** Chromatogram files of the «714 IC Metrodata» program (DOS version). After selection of the file to be imported you are asked to load a method.

***.chr** Chromatogram files of the «EnviroChrom» program.

***.dar** Chromatogram files of the «AtomChrom» program.

LongInteger (*.*) Chromatogram files in Long Integer format.

761 COMPACT IC / File / Import / AIA file

Import chromatogram in the AIA format (Analytical Instrument Association) from a CDF file (***.cdf**).

761 COMPACT IC / File / Import / Raw data from txt

Import chromatographic raw data from a text file ***.txt** (ASCII format). This is only possible if an appropriate method has been opened.

4.5.3 Graphical representation

Appearance

761 COMPACT IC / View / Appearance

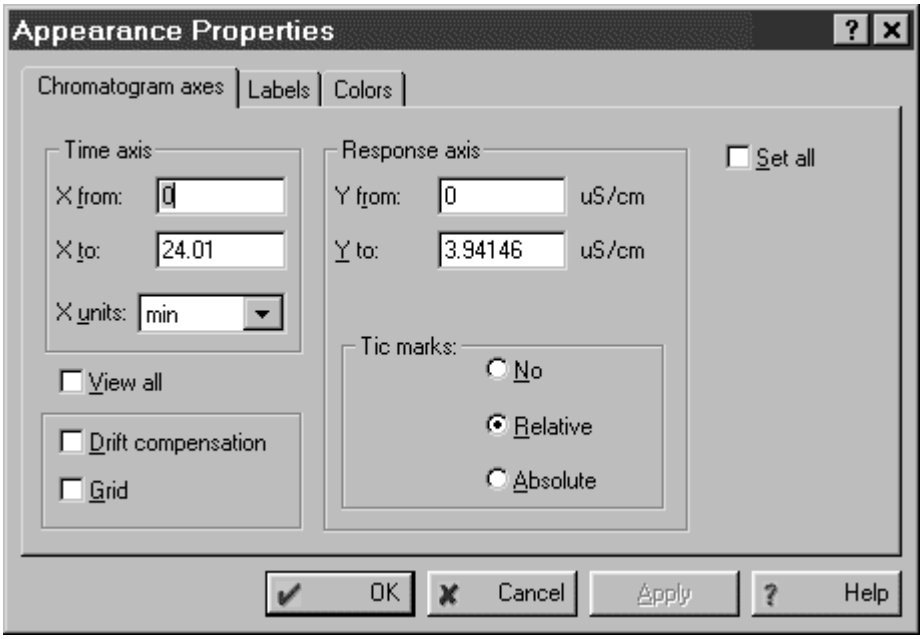
This menu item opens the **Appearance** window. It determines the appearance of the chromatogram and consists of four tabs:

Chromatogram axes	Scaling of chromatogram axes.
Labels	Settings for peak labels and baseline drawing.
Select channel	Select channels to be displayed (only available for multi-channel chromatograms).
Colors	Color settings for chromatogram elements.

The appearance settings for a chromatogram are not saved automatically on closing the chromatogram. In order to have the same appearance after reopening the chromatogram, it must be saved explicitly after modification of these parameters with **761 COMPACT IC** / **File** / **Save** / **Chromatogram**.

Chromatogram axes

Tab **Chromatogram axes** of the **Appearance** window with parameters for scaling of the chromatogram axes.



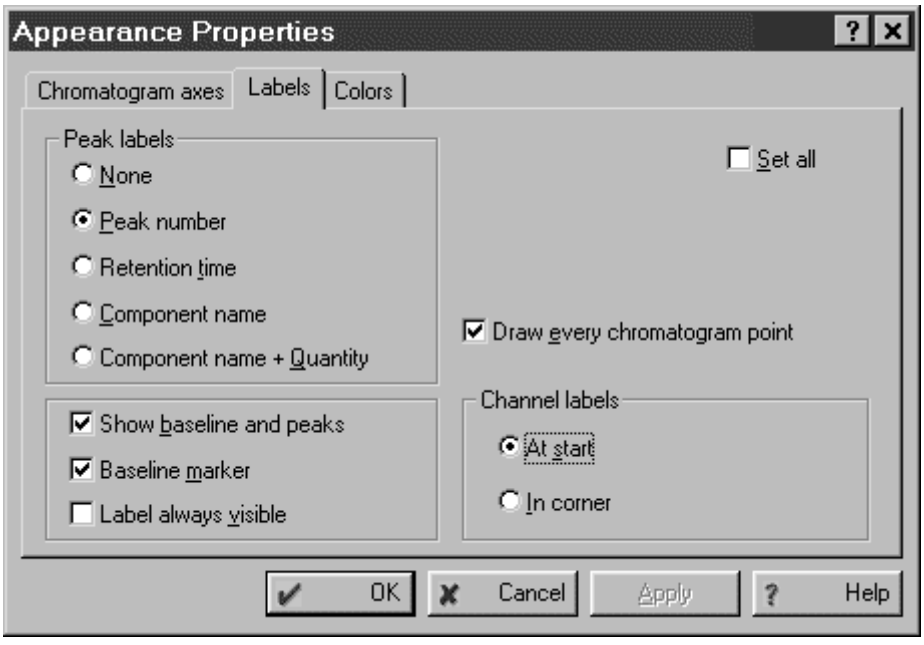
Time axis

X from	Beginning of the window on X axis.
X to	End of the window on X axis.
X units	Selection of unit (**Retention unit**) for X axis.

Response axis	
Y from	Beginning of the window on Y axis.
Y to	End of the window on Y axis.
Tic marks	Plot axes labels and tic marks on Y axis with **no**, **relative** or **absolute** scaling.
View all	Set scales on X and Y axes so that the whole chromatogram is visible.
Drift compensation	Turns the chromatogram screen image so that the last and first points of the chromatogram are on the same level. This option is useful for gradient chromatograms. Drift compensation has no effect while a chromatogram is running.
Grid	Plot dotted grid lines in the selected chromatogram window.
Set all	Set scales on X and Y axes of all opened chromatograms automatically to the settings in the selected chromatogram window.

Labels

Tab **Labels** of the **Appearance** window with parameters for peak labeling and baseline drawing.

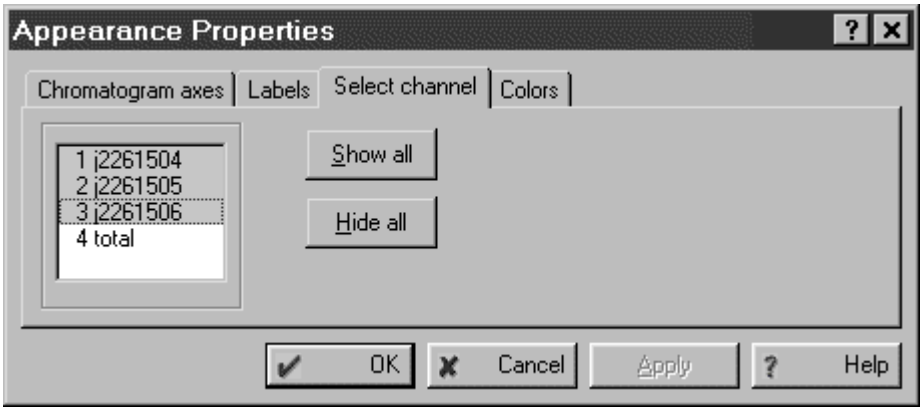


Peak labels	
None	No peak labels.
Peak number	Peak number.
Retention time	Retention time.
Component name	Name of the component.

Component name + Quantity	Name and quantity of the component.
Channel labels	Label for data acquisition channel.
At start	Channel label is shown at the start of the chromatogram.
In corner	Channel label is shown in the upper right corner of the chromatogram.
Show baseline and peaks	Baselines are shown.
Baseline marker	Start and end of baselines are marked.
Label always visible	Label is shown always with zooming.
Set all	Set peak labeling of all opened chromatograms automatically to the settings in the selected chromatogram window.
Draw every chromatogram point	Show chromatogram with all measured points (disable smoothing).

Select channel

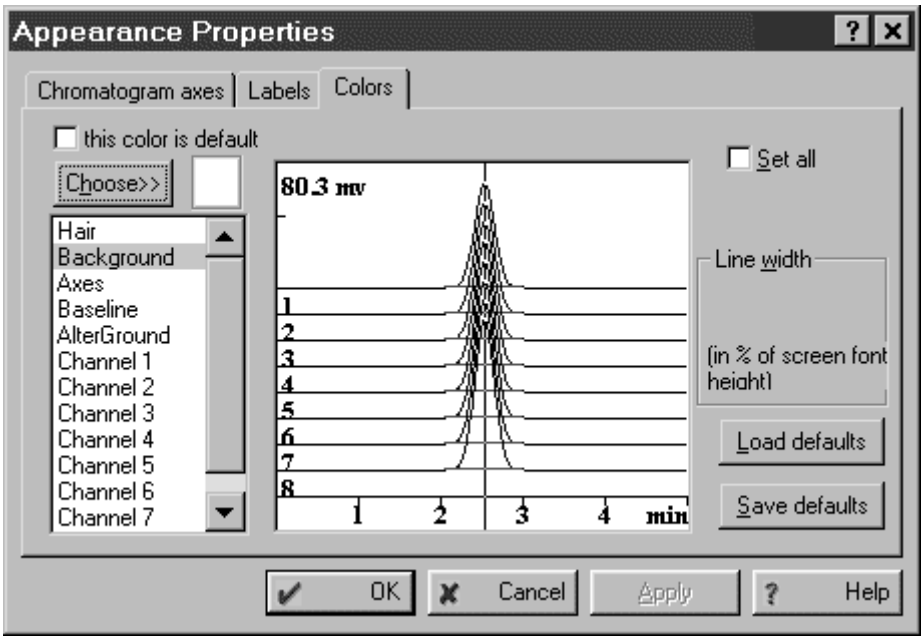
Tab **Select channel** of the **Appearance** window for selection of channels for multi-channel chromatograms.



Selection window	The selection window shows all chromatograms of the batch reprocessing queue which can be selected for display. If **total** is selected, all chromatograms are added and the resulting addition curve is shown.
<Show all>	Select all chromatograms in the selection window.
<Hide all>	Deselect all chromatograms in the selection window.

Colors

Tab **Colors** of the **Appearance** window with color settings parameters for chromatograms.



this color is default	Reset the selected element to the default color.
<Choose>	Choose a new color for the selected element. An example of the chosen color is shown beside the button.
Hair	Cursor's color.
Background	Background color.
Axes	Axes and axes labels color.
Baseline	Baseline color.
AlterGround	Alternative background color for **Measure baseline** option.
Channel 1...8	Color of the selected channel. Each channel can be of a unique color.
Line width	Line width for the selected element (**Axes** or **Channel 1...8**) in % of selected plot font height. Range: **0** ... **232**
Set all	Set colors of all opened chromatograms automatically to the settings in the selected chromatogram window.
<Load defaults>	Set colors in the selected chromatogram window to the set defaults colors.
<Save defaults>	Save color settings in the selected chromatogram window as default colors.

Other graphical functions

761 COMPACT IC / View / X full scale

By selecting this menu item or pressing [Ctrl] + [Home] the X axis is scaled so that the chromatogram perfectly fits the window horizontally.

761 COMPACT IC / View / Y full scale

By selecting this menu item or pressing [Ctrl] + [End] the Y axis is scaled so that the chromatogram perfectly fits the window vertically.

761 COMPACT IC / View / View all

By selecting this menu item or pressing [Alt] + [V] the X and Y axes are scaled so that the chromatogram perfectly fits the window horizontally and vertically.

761 COMPACT IC / View / Recorder autoscale

This option allows to look at the chromatogram so that the last point is always visible on the screen while data are acquired.

If the **Recorder autoscale** option is switched on, the following autoscaling rules apply:

- If the last acquired point comes out of the window down, autozero is performed.
- If the last point is too high, the recorder scale shrinks twice until the point comes to screen.
- If the last point comes outside of the plotting area to the right, the window is shifted half-screen right.

If the **Recorder autoscale** option is switched off, the window scale does not change automatically during data acquisition.

4.5.4 Peak editor

Switching on/off the peak editor

761 COMPACT IC / Process / Peak editor

The peak editor mode is used for subsequent manual correction of the automatic integration for chromatogram peaks (see *section 4.4.4*). It can be used to select the most important points for the peak evaluation (start, end and top of peak, valley between peaks) and move them to the required position.

If the peak editor mode is enabled, the vertical bar cursor appears in the chromatogram window. At the same time, the **Peak** menu appears in the menu bar and the peak editor icons appear in the icon bar of the main window.

The peak editor mode is switched on or off by clicking on  or by pressing [Alt] + [C]. It is also possible to click the right mouse button somewhere in the chromatogram window and to select the **Peak editor** item.

You cannot edit the peak pattern while the component table is active and vice versa, when the peak editor mode is switched on the component table option is disabled.

Peak editor functions

The functions of the peak editor can be triggered with the corresponding menu items of the **Peak** menu, by the peak editor symbols in the symbol bar or with key combinations.

761 COMPACT IC / Peak / Undo

Undo the last action.

761 COMPACT IC / Peak / Insert peak [Insert]

Add a peak to the chromatogram.

761 COMPACT IC / Peak / Delete peak [Delete]

Delete selected peak.

761 COMPACT IC / Peak / Select nearest point

Move the cursor to the nearest start, top, end, or valley point and select the peak.

761 COMPACT IC / Peak / Select start point

Move the cursor to the beginning of the nearest peak and select the peak.

761 COMPACT IC / Peak / Select top point

Move the cursor to the top of the nearest peak and select the peak.

761 COMPACT IC / Peak / Select end point
Move the cursor to the end of the nearest peak and select the peak.

761 COMPACT IC / Peak / Select valley point
Move the cursor to the valley of the two nearest peaks.

761 COMPACT IC / Peak / Unselect peak
Delete the selection.

761 COMPACT IC / Peak / Move selected point [–]
Move a selected point (start, top, end, valley) to the cursor position.

761 COMPACT IC / Peak / Merge peaks [+]
Merge two neighboring peaks into a single peak.

761 COMPACT IC / Peak / Fuse peaks [*]
Fuse the beginning of the previous and the end of the next peak at the cursor position.

761 COMPACT IC / Peak / Split peaks [/]
Split a single peak into two peaks at the cursor position.

761 COMPACT IC / Peak / Delete all left
Delete all peaks to the left of the selected point.

761 COMPACT IC / Peak / Delete all right
Delete all peaks to the right of the selected point.

Moving the cursor

The cursor can be dragged by the **mouse** when the right mouse button is pressed. Releasing the button will leave the cursor at the new position. The position of the cursor is displayed in the status bar of the chromatogram window.

The cursor can also be moved using the **keyboard**:

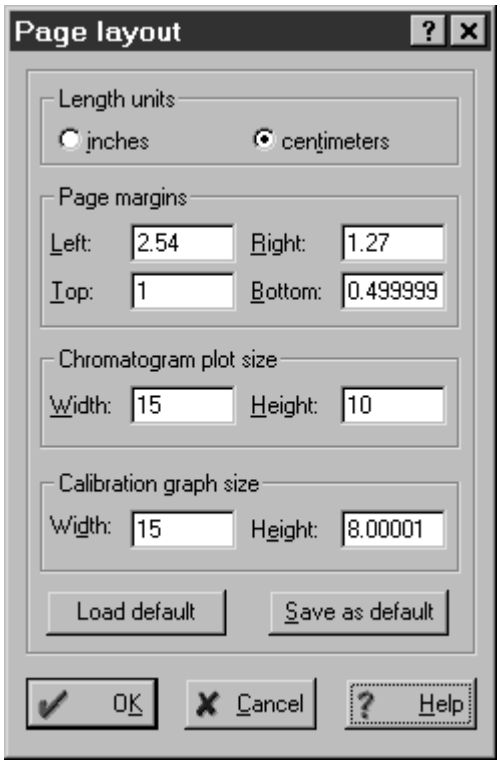
[←]	Move cursor left.
[Shift] + [←]	Move cursor left quickly.
[→]	Move cursor right.
[Shift] + [→]	Move cursor right quickly.
[Home]	Move cursor to the beginning of the window.
[End]	Move cursor to the end of window.

4.5.5 Printing

Page layout for printing

761 COMPACT IC / File / Page layout

The selection of this menu item or clicking on **<Page...>** in the **Report options** window opens the **Page layout** window for page layout parameters.



Length units	Selection of length units.
inches	Inches.
centimeters	Centimeters.
Page margins	Selection of page margins.
Left	Left margin.
Right	Right margin.
Top	Top margin.
Bottom	Bottom margin.
Chromatogram plot size	Selection of plot area for chromatograms.
Width	Width of plot area.
Height	Height of plot area.
Calibration graph size	Selection of plot area for calibration curves.
Width	Width of plot area.
Height	Height of plot area.
<Load default>	Load default values for page layout parameters.
<Save as default>	Save set page layout parameters as default values.

Printer settings

761 COMPACT IC / File / Printer setup

By selecting this menu item the **PRINT SETUP** window is opened where printer, paper size and format can be defined.

Print preview

761 COMPACT IC / File / Preview

By selecting this menu item the **Preview** window appears on the screen where the report is shown in the appearance formatted for the desired printer as defined in the **Report options** window.

Printing

761 COMPACT IC / File / Print

By selecting this menu item the **Printing** window is opened where printer, printing range and number of copies can be defined. All settings defined in the **Report options** window will be active except the destination of the printout.

In order for the chromatogram to be printed, the option **Chromatogram plot** must be switched on in the **Report options** window under **Items to report**.

761 COMPACT IC / Process / Make report

Selection of this menu item opens the **Report options** window for report output to screen, printer or file (details see *section 4.4.6*).

4.5.6 Miscellaneous functions

Reintegration

761 COMPACT IC / Process / Reintegrate

This menu item opens the **Integration parameters** window where the reintegration of the chromatogram can be started (details see *section 4.4.4*).

Recalibration

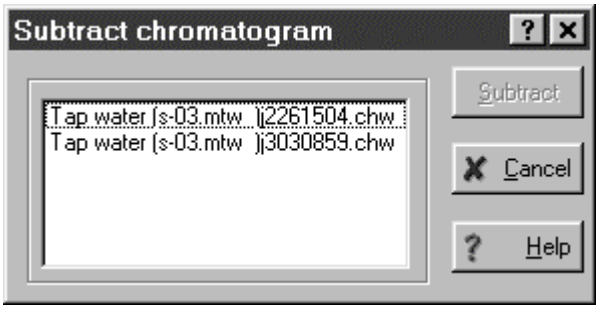
761 COMPACT IC / Process / Calibrate

This menu item opens the **Recalibration** window for entry of the calibration level and recalibration of the chromatogram using this level (details see *section 4.4.5*).

Subtraction of a chromatogram

761 COMPACT IC / Process / More / Subtract

This menu item opens the **Subtract chromatogram** window allowing the subtraction of any opened chromatogram from the active, selected chromatogram.

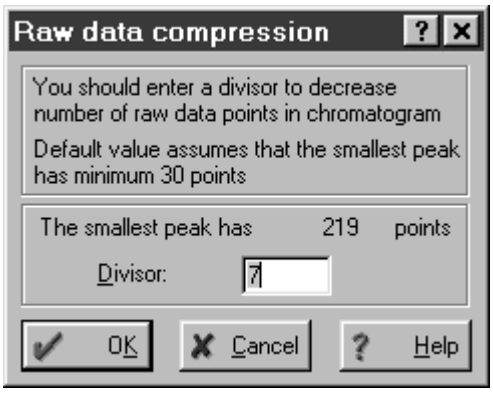


Select the chromatogram that should be subtracted, click on **<Subtract>** and then on **761 COMPACT IC / View / View all**. The result is shown in the active chromatogram window, which is considered as a new chromatogram and will be stored under a new name to avoid overwriting of old data.

Data compression

761 COMPACT IC / Process / More / Compress

Selection of this menu item opens the **Raw data compression** window for compression of the raw data of the active chromatogram by summing up several neighboring points.



Divisor Coefficient of compression (the number of data points is reduced by this value). The default value of the compression coefficient is calculated so that the width at half-height of the narrowest peak will be digitized by at least 30 points. If the user enters a coefficient of compression that exceeds the value offered by the software, integration precision may decrease.

Invert chromatogram

761 COMPACT IC / Process / More / Invert!

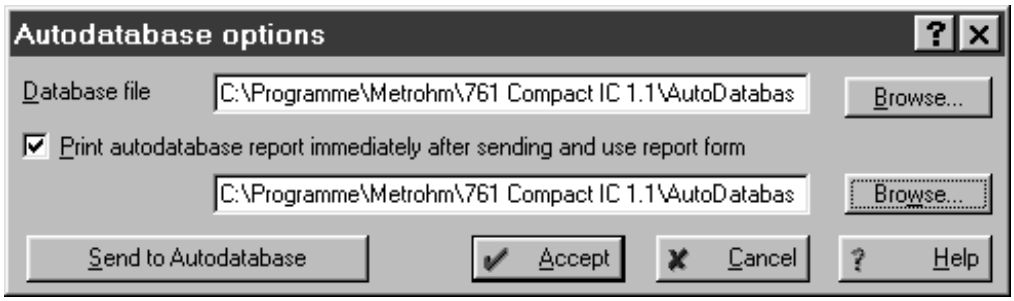
This menu item inverts the response curves for all channels of the chromatogram so that negative peaks become positive and vice versa (useful for chromatograms with wrong input polarity).

Autodatabase options

The «Autodatabase 1.0» PC program is a part of the 761 Compact IC standard accessories and is used to save and handle chromatograms and results produced with «761 Compact IC» in a database. You find a detailed description of this database program in the 8.110.8193 Instructions for Use supplied.

761 COMPACT IC / Method / Autodatabase

This menu item opens the **Autodatabase options** window with parameters and settings for the **Autodatabase** program.



Database file	Definition of the database file (***.adb**) to which chromatograms are sent manually with **<Send to Autodatabase>** or automatically if the **Send data to Autodatabase file** option is enabled in the **Processing** tab of the **Method setup** window. Use **<Browse>** to select a new database file.
Print autodatabase report immediately after sending	If this option is enabled, a report is automatically printed using the defined report template file (***.rt**). Use **<Browse>** to select a new report template file.
<Send to Autodatabase>	Send data of selected chromatogram to specified Autodatabase file.
<Accept>	Accept changes in **Autodatabase options** window.
<Cancel>	Close the window and abandon changes.

Indicate active Autodatabase program

761 COMPACT IC / Options / Indicate AutoDB server

Indicate **Autodatabase** program icon on the task bar if it has been already activated in the background by sending data.

4.6 Sample queue

A **sample queue** is a table containing sample-specific data which is used to facilitate work with autosamplers and multiple analyses. The number of rows of the sample queue table defines the number of determinations which are run automatically. Once the queue has been started, the sample-specific data are transferred line-by-line to the running determination overwriting the corresponding fields of the method.

A sample queue is stored in a sample queue file ***.que** in a subfolder of the **Methods** directory.

4.6.1 Sample queue file handling

Open sample queue

761 COMPACT IC / **File** / **Open** / **Sample queue**

SYSTEM / **System** / **Sample queue**

These two menu items open the **OPEN** window for opening an existing sample queue file ***.que** or creation of a new sample queue file ***.que** by entering a new name. After confirmation with **<OK>** the sample queue overview table is opened (see *section 4.6.2*).

Save sample queue

QUEUE EDITOR / **File** / **Save**

Save the sample queue table in a sample queue file (***.que**) in the working directory. The sample queue editor window remains open.

QUEUE EDITOR / **File** / **Save & exit**

Save the sample queue table in a sample queue file (***.que**) in the working directory and close the sample queue editor window.

SAMPLE QUEUE OVERVIEW / **File** / **Save as**

Save a copy of the current sample queue into a new sample queue file (***.que**) in the working directory.

Delete sample queue

SAMPLE QUEUE OVERVIEW / **File** / **Delete**

Close the sample queue overview window and delete the sample queue file (***.que**).

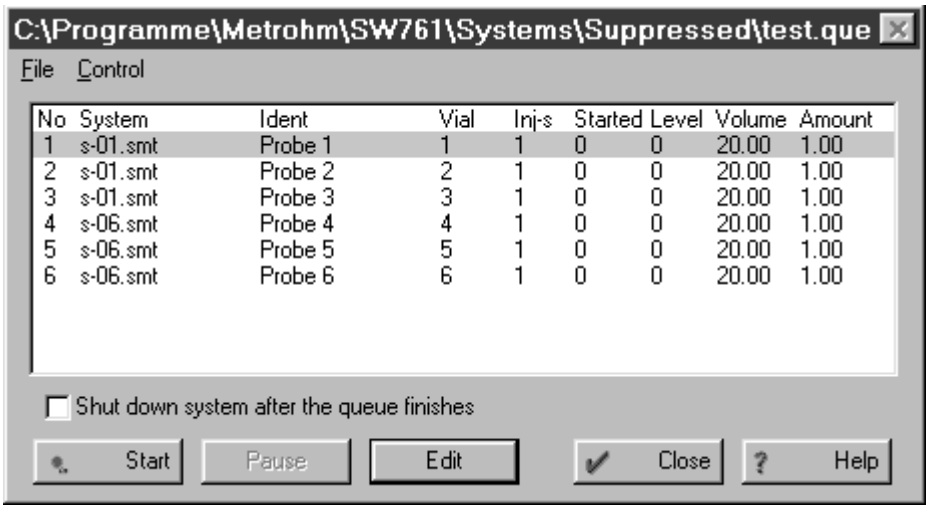
4.6.2 Sample queue control

Sample queue overview table

761 COMPACT IC / File / Open / Sample queue

SYSTEM / System / Sample queue

These two menu items open the **OPEN** window for opening an existing sample queue file ***.que** or creation of a new sample queue file ***.que** by entering a new name. After confirmation with **<OK>** the sample queue overview table is opened showing the current status of the sample queue:



No	Row number.
System	System file to be used for the determination.
Ident	User defined identifier for chromatogram. Will be placed into appropriate passport field when starting the chromatogram.
Vial	Autosampler vial position to take sample from.

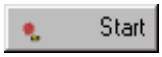
This value will not be transferred automatically to the autosampler. Make sure that the vial positions entered in this column are identical to the vial positions used at the autosampler.

Inj-s	Number of injections for the same vial position (only 1 injection is permissible for **Level ≥ 1**).

This value will not be transferred automatically to the autosampler. Make sure that the numbers of injections entered in this column are identical to the numbers of injections used at the autosampler.

Started	Indication whether the sample has been started or not: **0** sample not started **1** sample started **2…n** number of injections done
Level	Calibration level (see *section 4.4.5*) for the sample: Level **0** stays for normal analysis, levels **1** and greater for calibration runs. Correct filling of this column enables to calculate calibration coefficients automatically.
Volume	Injected volume of sample in µL.
Amount	Sample amount. If this value is different for the calibration run (**c**) and the sample run (**s**), the component concentrations of the sample are calculated as follows: $C_s = C_c \cdot Amount_s / Amount_c$
Shut down system after the queue finishes	If this option is enabled, the system hardware is shut down after the sample queue has been finished (all pumps are switched off), but it remains connected.
<Start>	Start execution of the sample queue from the first line with **Started = 0**.
<Pause>	Stop execution of the sample queue after the current determination has been finished.
<Edit>	Open the sample queue editor program for editing the sample queue table (see *section 4.6.3*).
<Close>	Close the sample queue overview table.

Start sample queue



SAMPLE QUEUE OVERVIEW / Control / Start

Start execution of the sample queue from the first row with **Started = 0**. For each row, the sample-specific data are transferred to the method of the current determination and the parameter **Started** is set to **1** for this row.

If processing the sample queue is interrupted with **<Pause>** then it can be continued again with **<Start>** (with a running chromatogram only when data acquisition is finished).

Pause sample queue

Pause

SAMPLE QUEUE OVERVIEW / Control / Pause

Interrupt execution of the sample queue after the current determination has been finished.

If processing the sample queue is interrupted with **<Pause>** then it can be continued again with **<Start>** (with a running chromatogram only when data acquisition is finished).

Cancel last run

SAMPLE QUEUE OVERVIEW / Control / Cancel last run

Cancel the last run (set **Started = 0** for this row). If the queue is re-started, this row is executed again.

This function is only available if the sample queue has been interrupted by pressing the **<Pause>** button.

Reset sample queue

SAMPLE QUEUE OVERVIEW / Control / Reset

Reset sample queue table (set **Started = 0** for all rows).

This function is only available if the sample queue has been interrupted by pressing the **<Pause>** button.

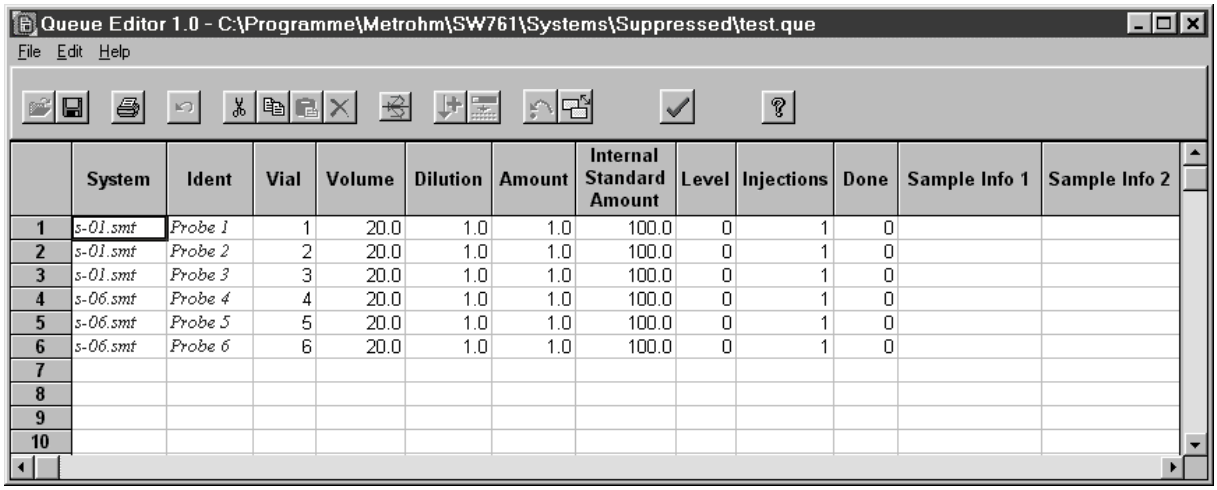
4.6.3 Sample queue editor

Open queue editor window

Edit

SAMPLE QUEUE OVERVIEW / Control / Edit

This menu item opens the **Queue editor** window for editing the sample queue table.



	System	Ident	Vial	Volume	Dilution	Amount	Internal Standard Amount	Level	Injections	Done	Sample Info 1	Sample Info 2
1	s-01.smt	Probe 1	1	20.0	1.0	1.0	100.0	0	1	0		
2	s-01.smt	Probe 2	2	20.0	1.0	1.0	100.0	0	1	0		
3	s-01.smt	Probe 3	3	20.0	1.0	1.0	100.0	0	1	0		
4	s-06.smt	Probe 4	4	20.0	1.0	1.0	100.0	0	1	0		
5	s-06.smt	Probe 5	5	20.0	1.0	1.0	100.0	0	1	0		
6	s-06.smt	Probe 6	6	20.0	1.0	1.0	100.0	0	1	0		
7												
8												
9												
10												

No	Row number.
System	System file to be used for the determination. The system is automatically opened and connected.
Ident	User defined identifier for chromatogram. Will be placed into appropriate passport field when starting the chromatogram.
Vial	Autosampler vial position to take sample from.  *This value will not be transferred automatically to the autosampler. Make sure that the vial positions entered in this column are identical to the vial positions used at the autosampler.*
Volume	Injected volume of sample in µL.
Dilution	Sample dilution prior to injection.
Amount	Sample amount. If this value is different for the calibration run (**c**) and the sample run (**s**), the component concentrations of the sample are calculated as follows: $C_s = C_c \cdot Amount_s / Amount_c$
Internal standard amount	Concentration of the internal standard component for relative concentration calculations.
Level	Calibration level (see *section 4.4.5*) for the sample: Level **0** stays for normal analysis, levels **1** and greater for calibration runs. Correct filling of this column enables to calculate calibration coefficients automatically.
Injections	Number of injections for the same vial position (only 1 injection is permissible for **Level ≥ 1**).  *This value will not be transferred automatically to the autosampler. Make sure that the numbers of injections entered in this column are identical to the numbers of injections used at the autosampler.*
Done	Indication whether the sample determination has been done or not: **0** determination not yet done **1…n** determination or injection done
Sample Info 1	First sample description.
Sample Info 2	Second sample description.

Sample queue editor functions

The functions in the editor window for sample queues can be triggered with the corresponding menu items of the **Edit** menu or with the corresponding symbols in the symbol bar.

QUEUE EDITOR / Edit / Undo
Undo the last modification of the sample queue table.

QUEUE EDITOR / Edit / Cut row(s)
Cut the selected rows of the sample queue table and copy them into the clipboard.

QUEUE EDITOR / Edit / Copy row(s)
Copy the selected rows of the sample queue table into the clipboard.

QUEUE EDITOR / Edit / Paste row(s)
Paste the rows from the clipboard into the sample queue table.

QUEUE EDITOR / Edit / Delete row(s)
Delete the selected rows from the sample queue table.

QUEUE EDITOR / Edit / Duplicate row(s)
Duplicate the selected rows of the sample queue table.

QUEUE EDITOR / Edit / Increment
Fill selected column fields with values automatically incremented by 1. The last character of the first selected field must be a number. This function is available for the fields **Ident**, **Vial**, **Level**, **Sample Info 1** and **Sample Info 2**.

QUEUE EDITOR / Edit / Propagate
Fill selected column fields with the same value as the first field.

QUEUE EDITOR / Edit / Reset
Reset sample queue table (set **Done = 0** for all rows).

QUEUE EDITOR / Edit / Change system
Change system file (***.smt**) to be used for the selected rows.

Print sample queue

QUEUE EDITOR / File / Print
Print the sample queue table in landscape format.

Close sample queue editor

QUEUE EDITOR / File / Save & Exit
Save the modified sample queue table and close the sample queue editor window.

QUEUE EDITOR / File / Exit
Close the sample queue editor window. An inquiry appears asking whether or not the sample queue should be saved.

4.7 Batch reprocessing

Reprocessing is understood to be the subsequent reprocessing of a series of chromatograms which have been loaded in a **queue (Batch reprocessing queue)**. For reprocessing according to a selected method the settings for calibration, integration, passport, appearance and report can be altered at will.

A batch reprocessing queue is stored in a batch reprocessing queue file ***.bar** in the **Data** directory.

4.7.1 Batch reprocessing queue file handling

Open batch reprocessing queue

761 COMPACT IC / File / Open / Batch reprocessing

Load an existing batch reprocessing file (***.bar**) from the **Data** directory and open the **Reprocess** window.

761 COMPACT IC / File / Open / Last batch

Load the last opened batch reprocessing file (***.bar**) from the **Data** directory and open the **Reprocess** window.

Create new batch reprocessing queue

761 COMPACT IC / File / Open / Chromatogram

For creation of a new batch reprocessing queue, open the **Chromatogram open** window. Select the desired chromatograms (***.chw**) and click the **<To Batch>** button. Enter the name of the new batch reprocessing file and press **<OK>**. The selected chromatograms are then added to this batch reprocessing queue.

If the reprocessing includes reintegration and/or recalibration, only chromatograms recorded with the same method should be loaded into the batch reprocessing queue.

Save batch reprocessing queue

QUEUE EDITOR / File / Save

Save the batch reprocessing queue in a batch reprocessing queue file (***.bar**) in the working directory. The batch reprocessing queue editor window remains open.

QUEUE EDITOR / File / Save & exit

Save the batch reprocessing queue in a batch reprocessing queue file (***.bar**) in the working directory and close the batch reprocessing editor window.

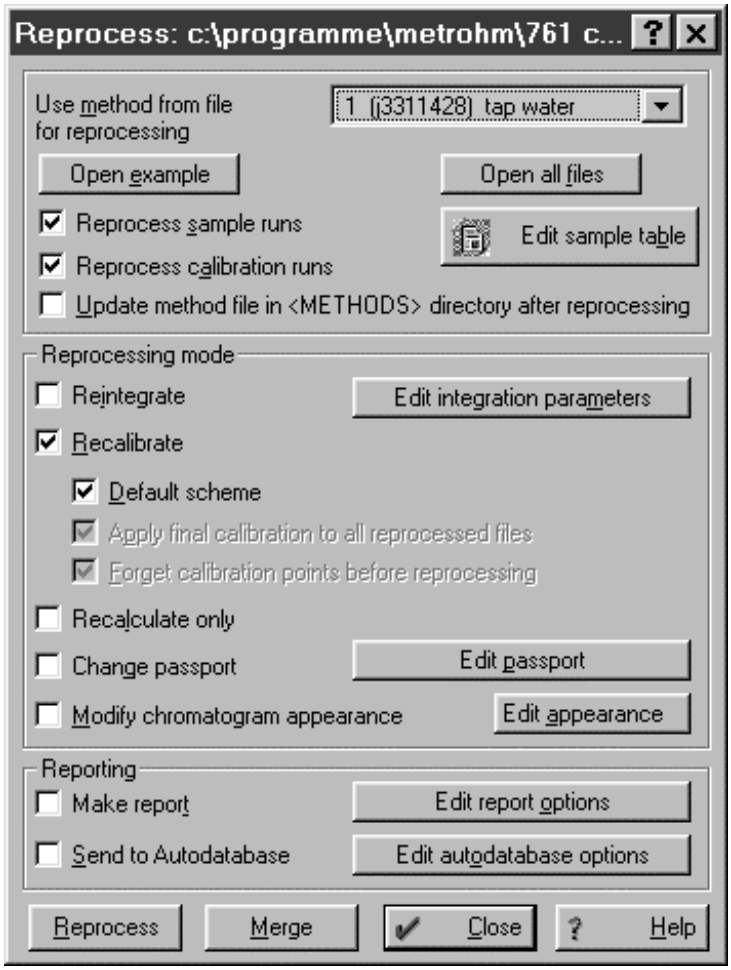
4.7.2 Perform batch reprocessing

Reprocess options window

761 COMPACT IC / File / Open / Batch reprocessing

761 COMPACT IC / File / Open / Last batch

These two menu items are used to open the **Reprocess** window, in which the various options for reprocessing are set and can then be triggered.



Use method from file for reprocessing

Selection of the desired chromatogram file whose method should be used for reprocessing.

If the reprocessing includes reintegration and/or recalibration, only chromatograms recorded with the same method should be loaded into the batch reprocessing queue.

<Open example>	Open the chromatogram selected above in the **Use method...** field.
<Open all files>	Open all chromatograms of the batch reprocessing queue.

<Edit sample table> Open the batch reprocessing editor program for editing the batch reprocessing table (see *section 4.7.3*).

Reprocess sample runs Reprocess all sample chromatograms (**calibration level = 0**).

Reprocess calibration runs
Reprocess all calibration chromatograms (**calibration level > 0**).

Update method file in <METHODS> directory after reprocessing
Save the method file ***.mtw** after reprocessing if the method is changed.

Reintegrate Reintegrate chromatograms according to the current settings of the integration parameters and integration events.

<Edit integration parameters>
Open the **Integration parameters** window for modification of integration parameters and integration events.

Recalibrate Reprocess all calibration chromatograms (if **Reprocess calibration runs** is switched on) and apply new calibration to all sample chromatograms (if **Reprocess sample runs** is switched on) by updating the concentration table.

Default scheme Default setting for recalibration reprocessing. The two options **Apply final calibration...** and **Forget calibration points...** are switched on. A new calibration is performed with the calibration runs and the resulting new calibration parameters (component table, concentration table and calibration curve) are applied to all sample runs.

Apply final calibration to all reprocessed files
Apply the updated calibration to all calibration and sample runs. If this option is switched off, the calibration stored in the first chromatogram is used for all other chromatograms.

Forget calibration points before reprocessing
Forget old calibration points of the calibration curve and perform a new calibration using all calibration runs of the batch reprocessing queue. In this case each calibration chromatogram adds a new point to the calibration curve. If this option is switched off, the calibration curve stored in the first chromatogram remains active. Each further calibration chromatogram in the batch reprocessing queue adds a new point to this calibration curve.

Recalculate only

Enable recalculation of chromatograms with values for **Volume**, **Dilution**, **Amount** and **Internal standard amount** entered in the batch reprocessing table.

The recalculation is done automatically if the **Reintegrate** *and/or* **Recalculate** *options are enabled. If the* **Recalculate only** *option is enabled, the* **Reintegrate** *and* **Recalculate** *options are disabled automatically.*

Change passport

If this option is enabled, those parameters of the passport which have been changed after clicking the **<Edit passport>** button are applied to all chromatograms.

<Edit passport>

Open the **Passport** window for modification of the passport parameters.

Only some of the passport parameters can be modified. The passport parameters **Ident**, **Sample Info 1** *and* **Sample Info 2** *entered in the batch reprocessing table are overwritten if these values are modified in the* **Passport** *window.*

Modify chromatogram appearance

If this option is enabled, the chromatogram **Appearance** parameters which have been changed after clicking the **<Edit appearance>** button are applied to all chromatograms.

<Edit appearance>

Open the **Appearance** window for modification of the settings for chromatogram axes, labels and colors.

Make report

Print report for all chromatograms using the current report settings of the selected chromatogram in the **Use method...** field.

<Edit report options>

Open the **Report options** window for modification of the report settings.

Send to Autodatabase

Send chromatogram data to Autodatabase file specified in the **Autodatabase options** window (see *section 4.5.6*).

<Edit Autodatabase options>

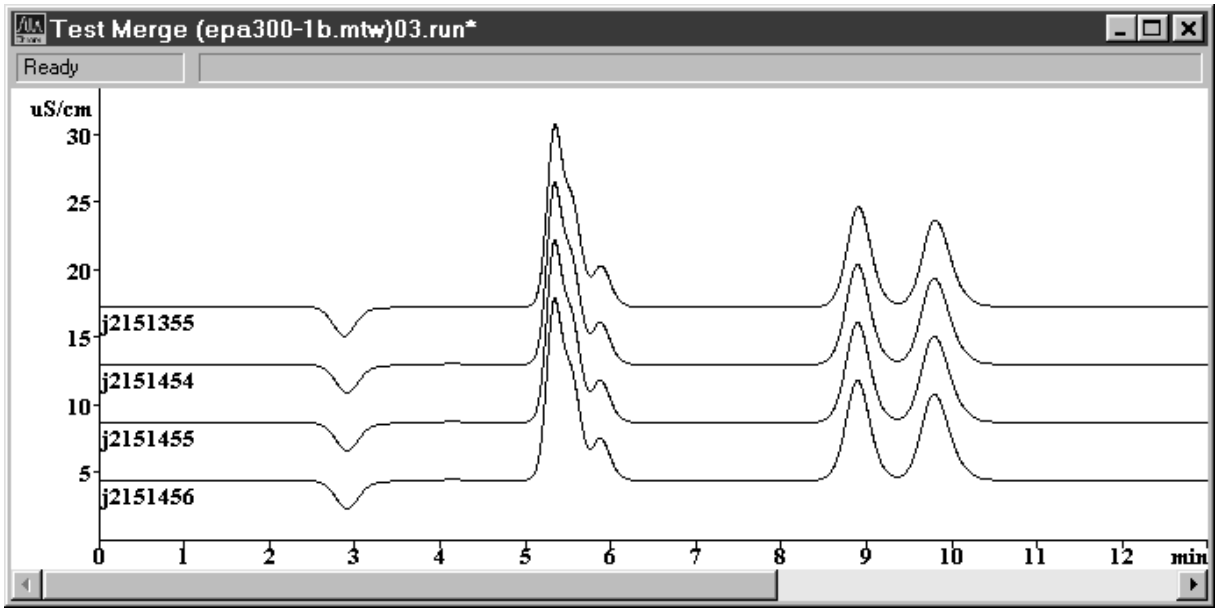
Open the **Autodatabase options** window (see *section 4.5.6*).

<Reprocess>	Start reprocessing.
<Merge>	Combine all chromatograms of the batch reprocessing queue into a single multi-channel chromatogram.
<Close>	Close the **Reprocess** window.

Merge chromatograms

REPROCESS / <Merge>

Combine all chromatograms of the batch reprocessing queue into a single multi-channel chromatogram.



The chromatograms are displayed in the same order as in the batch reprocessing table slightly displaced one upon the other. The distance between the curves can be increased by pressing [Shift] + [↑] and decreased by pressing [Shift] + [↓].

The chromatogram axes, labels and colors can be set in the **Appearance** window.

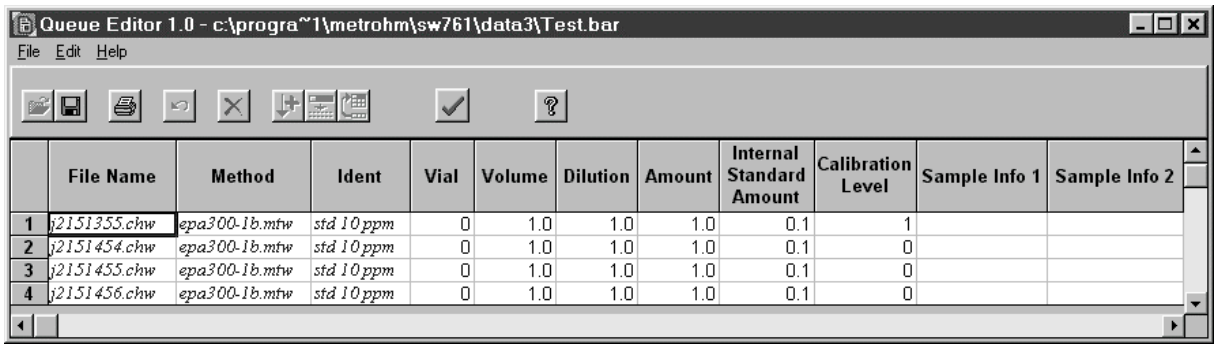
The multi-channel chromatogram can be saved with **File** / **Save** / **Chromatogram**.

4.7.3 Batch reprocessing queue editor

Open batch reprocessing queue editor window

REPROCESS / <Edit sample table>

This menu item opens the batch reprocessing editor program for editing the batch reprocessing table.



	File Name	Method	Ident	Vial	Volume	Dilution	Amount	Internal Standard Amount	Calibration Level	Sample Info 1	Sample Info 2
1	j2151355.chw	epa300-1b.mtw	std 10 ppm	0	1.0	1.0	1.0	0.1	1		
2	j2151454.chw	epa300-1b.mtw	std 10 ppm	0	1.0	1.0	1.0	0.1	0		
3	j2151455.chw	epa300-1b.mtw	std 10 ppm	0	1.0	1.0	1.0	0.1	0		
4	j2151456.chw	epa300-1b.mtw	std 10 ppm	0	1.0	1.0	1.0	0.1	0		

No	Row number.
File name	Name of the chromatogram file (read-only).
Method	Name of the method file ***.mtw** used for recording the chromatogram (read-only).
Ident	User defined identifier for chromatogram. Will be placed into appropriate passport field when starting the chromatogram.
Vial	Autosampler vial position to take sample from. Will be placed into appropriate passport field.
Volume	Injected volume of sample in µL. Will be placed into appropriate passport field.
Dilution	Sample dilution prior to injection. Will be placed into appropriate passport field.
Amount	Sample amount. If this value is different for the calibration run (**c**) and the sample run (**s**), the component concentrations of the sample are calculated as follows: $C_s = C_c \cdot Amount_s / Amount_c$ Will be placed into appropriate passport field.
Internal standard amount	Concentration of the internal standard component for relative concentration calculations. Will be placed into appropriate passport field.
Calibration level	Calibration level (see *section 4.4.5*) for the sample: Level **0** stays for normal analysis, levels **1** and greater for calibration runs. Correct filling

	of this column enables to calculate calibration coefficients automatically.
Sample Info 1	First sample description. Will be placed into appropriate passport field.
Sample Info 2	Second sample description. Will be placed into appropriate passport field.

Batch reprocessing queue editor functions

The functions in the editor window for the batch reprocessing queues can be triggered with the corresponding menu items of the **Edit** menu or with the corresponding symbols in the symbol bar.

QUEUE EDITOR / **Edit** / **Undo**
Undo the last modification of the batch reprocessing queue.

QUEUE EDITOR / **Edit** / **Delete row(s)**
Delete the selected rows from the batch reprocessing queue.

QUEUE EDITOR / **Edit** / **Increment**
Fill selected column fields with values automatically incremented by 1. The last character of the first selected field must be a number. This function is available for the fields **Ident**, **Vial**, **Calibration level**, **Sample Info 1** and **Sample Info 2**.

QUEUE EDITOR / **Edit** / **Propagate**
Fill selected column fields with the same value as the first field.

QUEUE EDITOR / **Edit** / **Rotate rows**
Rotate selected rows by one position (the bottom line is moved to the first position; all other lines are moved down by 1 position).

Print batch reprocessing queue

QUEUE EDITOR / **File** / **Print**
Print the batch reprocessing table in landscape format.

Close batch reprocessing queue editor

QUEUE EDITOR / **File** / **Save & Exit**
Save the modified batch reprocessing queue and close the **QUEUE EDITOR** window.

QUEUE EDITOR / **File** / **Exit**
Close the batch reprocessing **QUEUE EDITOR** window without saving the modified batch reprocessing table.

5 Notes – Maintenance – Faults

5.1 Practical notes on ion chromatography

5.1.1 Separating columns

Separation efficiency

The attainable quality of analyses with the 761 Compact IC depends to a large extent on the separation efficiency of the column used. When purchasing an IC column you should ensure that the separation efficiency suffices for the analysis problems at hand. Ascertain the **characteristic data of the IC column** on the standard chromatogram enclosed with the column such as capacity factors, selectivity, plate number and resolution and check these data with your own measurements. If any difficulties arise, you should always first check the quality of the column by recording a **standard chromatogram**.

You will find additional general tips on handling IC separating columns in the **8.732.2003 Metrohm Monograph "Ion chromatography"**, as well as detailed information on the separating columns available from Metrohm (see *section 6.3.2*) in the leaflets supplied and in the special **Application Bulletins** available free of charge from your nearest Metrohm agency.

Protection

To protect the column against foreign particles which could have an adverse influence on the separation efficiency, we advise you to subject both the eluents and all samples to **microfiltration** (0.45 µm filter) and to siphon the eluent through the **6.2821.090 Aspirating filter**.

To avoid contamination by abrasive particles arising from piston seals of the high-pressure pump, it is advantageous to install an **in-line filter** between the pump and the injection valve. In the 761 Compact IC a **6.2821.120 Filter unit PEEK** is already mounted for this purpose (see *section 2.6.2*).

The use of readily interchangeable **precolumns** serves to protect the actual separating columns and increase their service life appreciably. The precolumns available from Metrohm (see *section 6.3.2*) are either actual precolumns or so-called precolumn cartridges which are used together with the 6.2821.040 Cartridge head or the 6.2828.010 Precolumn cartridge holder (see *section 2.7*).

Storage

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

Dead volume

Dead volume at the end of a column can be the cause of extreme peak broadening or splitting (appearance of double peaks). Filling the column with glass beads (∅ ≤ 100 µm) frequently improves the separation efficiency.

Regeneration

If the separation properties of the column have deteriorated, it can be regenerated in accordance with the column manufacturer's specifications. With the separating columns available from Metrohm (see *section 6.3.2*), the instructions for regeneration can be found on the leaflet enclosed with every column.

In the case of separating columns with carrier material based on silica, ***only solutions with pH 2…7*** *may be used for regeneration, otherwise the columns could be damaged.*

5.1.2 High-pressure pump

Pulsation dampener

The **MF 6.2620.150 Pulsation dampener** belongs to the standard accessories of the 761 Compact IC; its installation is described in *section 2.6.2*. It is used to reduce interfering pulsation in highly sensitive measurements and also protects the column material against pressure shocks caused by the injection.

Maintenance

To protect the pump against foreign particles, we advise you to subject the eluent to **microfiltration** (0.45 µm filter) and siphon the eluent through the **6.2821.090 Aspirating filter**.

In many cases, an unstable baseline (pulsation, flow fluctuations) can be traced to contaminated valves or faulty, leaky piston seals.

Contaminated valves are cleaned by rinsing with water, RBS solution or acetone (see *section 5.2.6*). When the cleaned valves are reinstalled, you must ensure that the flow direction is correct.

The **replacement of piston seals** is described in *section 5.2.6*.

Salt crystals between the piston and the seal are the cause of abrasive particles, which can enter 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 appear (see also *section 5.1.3*).

5.1.3 Eluents

Treatment

For the preparation of the eluents only chemicals of a purity degree of at least "**p.a.**" should be used. For diluting please use only **high purity water**.

Fresh eluents should always be **microfiltered** (0.45 µm filter) and **degassed** (with N_2, He or vacuum). For alkaline eluents and eluents with low buffering capacity one should preferably use a **CO_2 absorber** (see *section 2.6.3*).

The supply vessel containing the eluent must be closed as tightly as possible to avoid excessive evaporation. This is primarily important with eluents containing organic solvents (e.g. acetone), the evaporation of which can lead to drifts in the long term. If work is performed in a very sensitive range, even if one drop of condensate falls back in the eluent this can cause a noticeable change in the background conductivity.

Influence of various parameters on anion columns

- *Concentration:* An increase in the concentration usually leads to shorter retention times and quicker separation, but also to a higher background conductivity.
- *pH:* pH alterations lead to shifts in the dissociation equilibrium and thus to changes in the retention times.
- *Organic modifiers:* Addition of an organic solvent (e.g. methanol, acetone, acetonitrile) to aqueous eluents generally accelerates lipophilic ions.

Eluent change

When the eluent is changed, it must be ensured that **no precipitates** can be formed. Solutions used in direct succession must therefore be miscible. If the system has to be rinsed with an organic solution, several solvents with increasing or decreasing lipophilic character may possibly have to be used (e.g. water ↔ acetone ↔ chloroform).

5.1.4 Peristaltic pump

The pump tubings used by the peristaltic pump are consumable material with a limited lifetime and should be exchanged at regular intervals (approx. every 4 weeks under continuous use; see *section 5.2.10*).

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 2.9.2*. If the pump is to remain switched off for a lengthy period of time the tubing cartridges **48** should be raised completely by loosening the snap-action lever **51** on the right-hand side (the set contact pressure remains unchanged).

5.1.5 Suppressor module

Protection

To avoid contamination of the suppressor module by foreign particles or bacterial growth, the two **6.2821.120 Filter units PEEK** (see *section 2.6.3*) supplied must be installed between peristaltic pump and inlet capillaries of the suppressor module (see *section 2.8.2*).

Operation

The **Metrohm Suppressor Module MSM** comprises a total of 3 suppressor units which are in turn used for suppression, regenerated with sulfuric acid and rinsed with water. To record every new chromatogram under comparable conditions, work is normally carried out with freshly regenerated suppressor. Switching takes place automatically together with the valve switching.

For operation of the suppressor module, a **two-channel peristaltic pump** is needed which conveys the regeneration solution (normally **20 mmol/L H_2SO_4**) and the rinsing solution (normally **dist. H_2O**) to the suppressor units (flow rate of 0.5 mL/min).

The suppressor units must never be regenerated with H_2SO_4 in the same flow direction used for the eluent. You should thus always install the inlet and outlet capillaries as described in section 2.8.4 according to the scheme shown in Fig. 18.

The suppressor module must <u>never</u> be switched in the dry state as there is a danger of blocking. Before every switching operation of the suppressor module, the three suppressor units must have been rinsed for at least ½ h with eluent, regeneration and rinsing solution.

The capacity of the suppressor units is exhausted after approx. 2 h. With longer interruptions between the individual measurements it is recommended that, depending on the separating column used, either the **Prep-MSM1** or **Prep-MSM2** system is started during the pauses; this automatically switches the suppressor module further every 20 min.

Maintenance

In the event of reduced capacity or high counter-pressure the suppressor module must be regenerated (*section 5.2.7*), cleaned (*section 5.2.8*) or exchanged (*section 5.2.9*).

5.1.6 Connections

All connections between injector, column and detector must be as short as possible, have a low dead volume and be absolutely tight. The PEEK capillary after the detector block must be free from constriction (the measuring cell is tested to 5 MPa = 50 bar back pressure).

5.2 Maintenance and servicing

5.2.1 General information

Care

The 761 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 liquids the two drain tubes for the inner compartment (*section 2.3.3*) and for the bottle rack (*section 2.3.4*) must be mounted.

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

Although constructional measures have been designed to virtually eliminate such a situation, should corrosive media penetrate the interior of the instruments the mains plug of the 761 Compact IC must be immediately disconnected to prevent extensive damage to the instrument electronics. Inform Metrohm service if your instrument(s) have been damaged in such a way.

The instrument must not be opened by untrained personnel. Please comply with the safety notes in section 1.4.1.

Maintenance by Metrohm service

Maintenance of the 761 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 service department is always willing to offer expert advice on the maintenance and servicing of all Metrohm instruments.

5.2.2 Passivation

Passivation of the complete IC System (without column) by rinsing with 20...50 mL 0.2 mol/L HNO_3 is only required when unusual alterations to the measuring properties of the cell are observed. For passivation the separating column **81** is removed from the 761 Compact IC. The two capillaries **28** and **45** (see *Fig. 14* and *Fig. 16*) are directly connected to each other using the Coupling **33** (6.2620.060).

5.2.3 Recycling

To keep the eluent consumption between injections to a minimum when the system is at rest (e.g. overnight), the so-called recycling procedure can be used. In recycling the eluent exiting the outlet capillary of the detector block is led back directly to the eluent supply vessel **67**. The IC system is thus quickly ready for new injections without a long conditioning period.

Instead of threaded stopper **65** the 4.420.0311 Tubing nipple (M6), which belongs to the accessories of the 6.1602.160 Bottle attachment, can be used together with the second E.301.0021 O-ring (which is also included) for returning the eluent (see *section 2.6.3*).

*The recycling procedure must **not** be used*

- *in operation with the suppressor module,*
- *with alkaline eluents,*
- *with the 6.1010.000 IC Cation column METROSEP Cation 1-2.*

5.2.4 Shutdown

If the 761 Compact IC is shut down for a considerable length of time, the entire IC system (**without** column and suppressor) must be **rinsed free from salt** with methanol/water (1:4) to avoid crystallization of eluent salts with the corresponding subsequent damage.

For rinsing the connections to the separating column and the suppressor module are removed; the two capillaries **28** and **45** (see *Fig. 13* and *Fig. 14*) are directly connected to each other using coupling **33** (6.2620.060). Rinse with methanol/water (1:4) until the conductivity drops below 10 µS/cm.

5.2.5 Changing separating columns

Identical separation system

If you wish to replace an IC separating column by a column of the same type, proceed as follows (see *Fig. 14* and *Fig. 16*):

1 Remove old column

- Switch off high-pressure pump and wait for pressure to drop.
- Unscrew column **81** from inlet capillary **45** of the detector block or from suppressor inlet capillary **96**.
- Unscrew column **81** from column connection capillary **28** or the precolumn.

2 Connect new column to injector

- Remove end caps from column **81**.
- Screw inlet end of separating column **81** (note flow direction) to column connection capillary **28** or to the precolumn (see *section 2.7.7*/*section 2.7.8*).

3 Rinse column

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

4 Connect column to detector block

- Screw outlet end of separating column **81** to inlet capillary **45** or suppressor inlet capillary **96**.

Changing the separation system

If you wish to replace an IC separating column by a column of a different type, proceed as follows (see *Fig. 14* and *Fig. 16*):

1 Remove old column

- Switch off high-pressure pump and wait for pressure to drop.
- Unscrew column **81** from inlet capillary **45** of the detector block or from the suppressor inlet capillary **96**.
- Unscrew column **81** from column connection capillary **28** or the precolumn.

2 Rinse with eluent

- Place beaker beneath the column connection capillary **28**.
- Rinse IC system with eluent used for the separating column (flow rate 1 mL/min) for ca. 15 min.

3 Connect new column to injector

- Remove end caps from column **81**.
- Screw inlet end of separating column **81** (note flow direction) to column connection capillary **28** or to the precolumn (see *section 2.7.7*/*section 2.7.8*).

4 Rinse column

- Place beaker beneath the column outlet.
- Set flow rate for new separating column.
- Switch on high-pressure pump and rinse column with eluent for ca. 10 min, then switch off pump.

5 Connect column to detector block

- Screw outlet end of separating column **81** to inlet capillary **45** or suppressor inlet capillary **96**.

5.2.6 Maintenance work at the pump head

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

1 Detach pump head

- Disconnect aspirating tubing **63** from aspirating capillary **40** at the pump head **42** (see *Fig. 3* and *Fig. 4*).
- Unscrew connection capillary **43** from the pump head **42**.
- Remove pump head **42** by loosening the 4 hexagon screws **41** using the 6.2621.030 Hexagon key. The main piston is on the left (when viewed from front), the auxiliary piston on the right.

2 Disassemble pump head

- Strip down pump head **42** in accordance with *Fig. 19*. Main and auxiliary pistons are identical with the following exceptions:

– The spring **107** of the auxiliary piston (right piston) is more powerful (longer) than that of the main piston (left piston).

– Inlet and outlet valve are not present in the secondary cylinder.

*To prevent the piston **105** suddenly jumping out of the piston cartridge **107**, the screw **104** must be undone very carefully by hand.*

3 Cleaning/replacement of piston 105

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

4 Replacement of piston seal 112

- To remove damaged piston seals **112** the special tool **116** is used. This is screwed into the seal **112**, which can then be pulled out (see *Fig. 20A*).

*When the special tool **116** is screwed into the piston seal **112** the latter is completely destroyed!*

If you use only aqueous eluents the 6.2741.000 Piston seal can be replaced by the 6.2741.010 PE Piston seal available as an option.

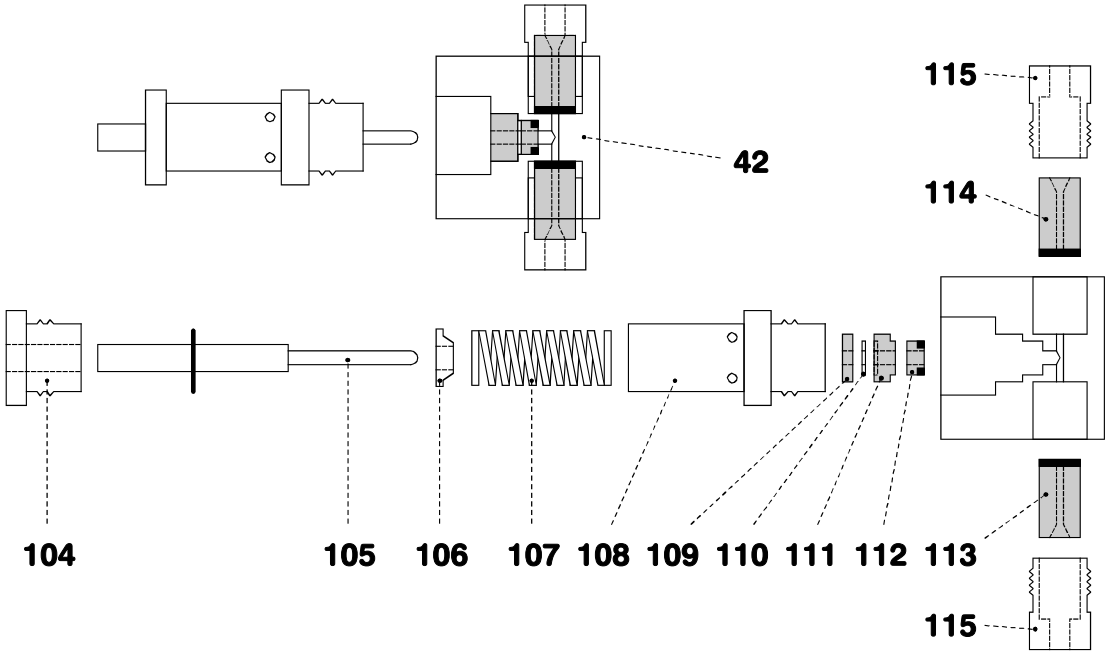


Fig. 19: Components of the pump head

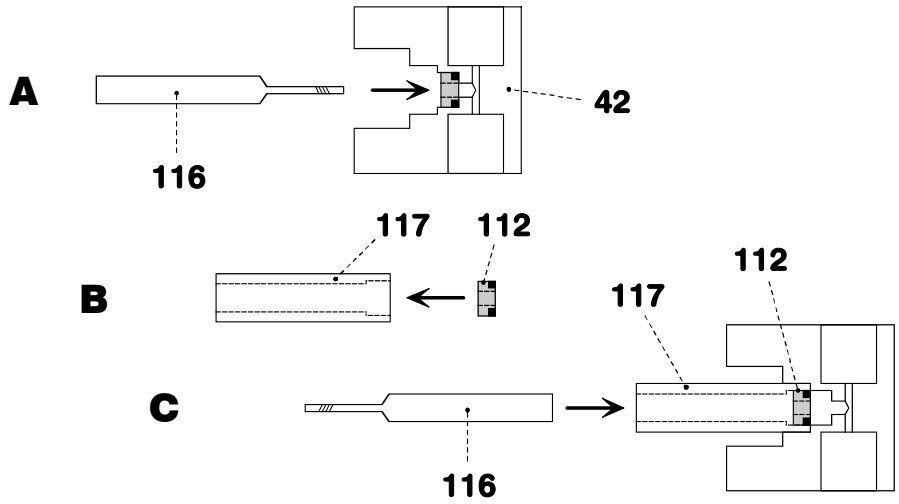


Fig. 20: Replacement of the piston seal 112

42	**Pump head (6.2824.100)**	**111**	**Piston guide sleeve (4.709.4370)**
104	**Screw (3.709.1100)** for piston cartridge **108**	**112**	**Piston seal (6.2741.000/6.2741.010)**
105	**Zircon piston (6.2824.070)** with piston shaft	**113**	**Inlet valve (6.2824.090)**
106	**Spring retainer**	**114**	**Outlet valve (6.2824.080)**
107	**Spring (6.2824.050)** for main piston or **Spring (6.2824.060)** for auxiliary piston	**115**	**Screw holder** for valve
108	**Piston cartridge (4.709.0760)**	**116**	**Special tool (6.2617.010)** to remove the piston seal **112**
109	**Piston guide sleeve (4.709.4380)**	**117**	**Special tool (6.2617.010)** to install the piston seal **112**
110	**Sapphire supporting ring (6.2824.030)**		

- To install a new piston seal **112** the special tool **117** is used.
- First the new seal is inserted firmly in the recess of tool **117** by hand (see *Fig. 20B*). The seal spring must be located on the outside.
- The tool **117** together with the seal is then inserted in the pump head **42** and the seal pressed into the pump head recess with the aid of tool **116** (see *Fig. 20C*).

*The seal surface in the pump head **42** must not be damaged (avoid contact with tool)!*

5 Cleaning/replacement of inlet valve 113 and outlet valve 114

- Contaminated or blocked valves are cleaned by rinsing with dist. water, RBS solution or acetone. The rinsing effect can be reinforced by brief treatment in an ultrasonic bath (max. 20 s; if longer the sapphire sphere of the valve can be damaged).
- If this does not have the desired effect, the valves can be disassembled as shown in *Fig. 21*. The valve components are pushed out with the aid of a syringe needle inserted through the upper opening in the valve housing **118**. The individual components are rinsed with dist. water and/or acetone, and the sapphire sphere cleaned with a paper towel. The valve is then reassembled in accordance with *Fig. 21*. The components of the inlet and outlet valves are identical, they are distinguished only by the positioning of the sapphire sleeve **121** and the ceramic holder **123** (see *Fig. 21*).
- Valves that fail to function faultlessly after such cleaning must be replaced.
- In the reinstallation of the inlet valve **113** or the outlet valve **114** on no account must the two outwardly identical valves be interchanged. To determine which valve is which, note that the liquid flows through the pump head from the bottom up. The flow direction of the valves can be checked simply by blowing through the clean valve. Both valves are installed with the black face in the direction of the pump head (see *Fig. 19*).

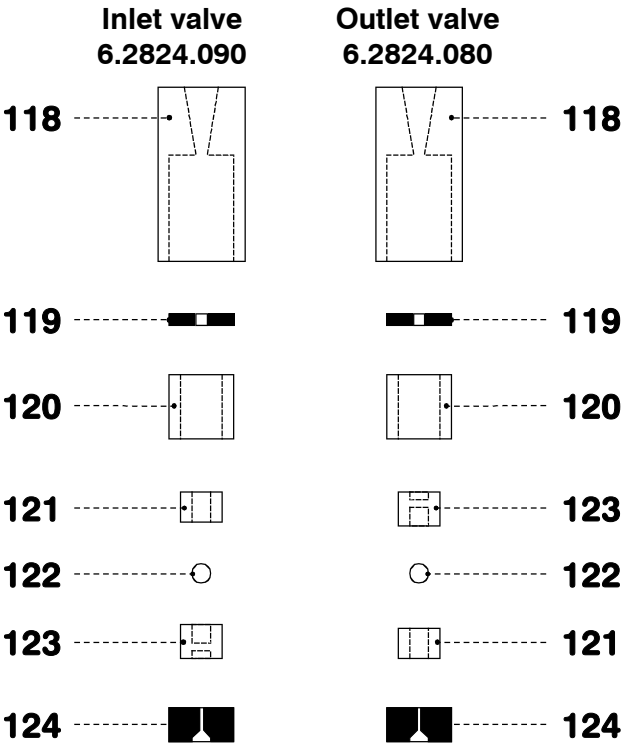
*If by mistake an inlet valve **113** is installed instead of the outlet valve **114**, an extreme pressure buildup occurs within the working cylinder, which is not detected by the pressure transducer and will destroy the piston seal **112**!*

6 Mounting the pump head

- Reassemble the components of the pump head **42** as shown in *Fig. 19*. Tighten the screw **104** by hand. First screw in piston cartridge **108** manually until the stop is reached and then use a wrench to turn it through a further 15°. Firmly tighten the two valve screw holders **115** with a wrench.
- Reattach pump head **42** to the pump with the help of the 4 fixing screws **41**. Firmly tighten them with the 6.2621.030 Allen key.

To ensure that the pump head is not positioned wrongly, the holes at the rear for the clamping bolts have different depths, i.e. 1 clamping bolt is longer than the rest. The deepest hole must naturally accommodate the longest bolt. If this is not the case, the pump will not function properly.

- Screw connection capillary **43** to pump head **42** (see *Fig. 3* and *Fig. 4*).
- Connect aspirating tubing **63** to aspirating capillary **40** at the pump head **42**.



118	**Valve housing**
119	**Sealing ring** (black)
120	**Sleeve**
121	**Sapphire sleeve** The bright side must point towards the sapphire sphere
122	**Sapphire sphere**
123	**Ceramic holder for sapphire sphere** The large recess must point in the direction of the sapphire sphere
124	**Seal** The larger opening must point outwards

Fig. 21: ***Components of inlet valve 113 and outlet valve 114***

5.2.7 Regeneration of the suppressor module

Regenerating 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 normally used (20 mmol/L H_2SO_4). This diminishes the capacity of the suppressor units, which, in milder cases, results in a reduced sensitivity to phosphates and, in severe cases, in a strong increase in the baseline. If such capacity problems occur at one or several positions, the suppressor units must be treated as follows:

1 Disconnect suppressor from IC system

- Disconnect suppressor from separating column and detector.

2 Regenerate suppressor

- Rinse each suppressor unit for about 15 min with one of the following solutions:

  Contamination with heavy metals
  1 mol/L H_2SO_4

  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%

The 6.1826.060 pump tubing is made of PP and must not be used for rinsing with solutions which contain organic solvents. In such cases, rinse with different pump tubing or a different pump.

3 Connect suppressor to IC system

- Reconnect suppressor to the IC system. If capacity problems persist, replace the suppressor rotor (see *section 5.2.9*).

Regenerating the suppressor in case of high counterpressure

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

1 Disconnect suppressor from IC system

- Disconnect suppressor from separating column and detector.

2 Regenerate suppressor

- Connect the inlet capillary **99** marked "H_2SO_4" to the inlet capillary **26** using coupling **33** (see *Fig. 10* and *Fig. 16*). This connects the suppressor module directly to the high-pressure pump.

- Set the flow at the high-pressure pump to 0.5 mL/min and rinse the suppressor unit with 1 mol/L H_2SO_4 for 5 to 10 min.
- As the pressure falls, slowly increase the flow at the high-pressure pump to 2 mL/min. Do not exceed a maximum pressure of 2 MPa (20 bar).
- Switch off high-pressure pump.
- Switch suppressor to the next position using the Step button.
- Connect the inlet capillary **98** marked "H_2O" to the inlet capillary **26** using coupling **33** (see *Fig. 10* and *Fig. 16*).
- Set the flow at the high-pressure pump to 0.5 mL/min and rinse the suppressor unit with 1 mol/L H_2SO_4 for 5 to 10 min.
- As the pressure falls, slowly increase the flow at the high-pressure pump to 2 mL/min. Do not exceed a maximum pressure of 2 MPa (20 bar).
- Switch off high-pressure pump.

3 Connect suppressor to IC system

- Connect inlet capillaries **98** and **99** to the peristaltic pump (see *section 2.8.4*).
- If the pressure problems persist, replace the suppressor rotor (see *section 5.2.9*).

5.2.8 Cleaning the suppressor

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

- High counterpressure on the suppressor connection tubing
- Irremediable blockage of the suppressor (the suppressor can no longer deliver solutions)
- Irremediable obstruction of the suppressor (the suppressor can no longer be switched to next position)

To clean the connection piece and the rotor, proceed as follows (see *Fig. 22*):

1 Disconnect suppressor from IC system

- Disconnect input capillary **96** of the suppressor module **47** from the separating column **81** (see *Fig. 16*).
- Disconnect output capillary **97** from inlet capillary **45**.
- Disconnect inlet capillaries **98** and **99** from the filter units **96** (supply from peristaltic pump).

2 Dismantle suppressor

- Unscrew nut **125** from suppressor holder **128**.
- Pull out connection piece **126** and suppressor rotor **126** from suppressor holder **128** (the connection piece and the rotor normally stick together).
- Loosen connection piece **126** from suppressor rotor **127**.

3 Clean input and output leads

- Connect each of the 6 capillary tubings attached to connection piece **126** to the high-pressure pump one after another, and pump through ultrapure water.
- Check whether solution emerges from connection piece **126**. If one of the input or output leads remains blocked, replace the connection piece (order number 6.2832.010).

4 Clean suppressor rotor

- Clean the sealing surface of suppressor rotor **127** using a lint-free cloth and ethanol.

5 Insert suppressor rotor

- Insert suppressor rotor **127** in suppressor holder **128** in such a way that the tubing connections at the rear of the rotor fit in the corresponding openings inside the rotor, and that one of the three holes in the rotor can be seen from below in one of the openings of the holder.
- If the rotor has been inserted correctly, its sealing surface will be about 4 mm inside the holder. If this is not the case, bring the rotor into the correct position from below with the aid of a sharp object (e.g. a screwdriver).

6 Clean connection piece

- Clean the sealing surface of connection piece **126** using a lint-free cloth and ethanol.

7 Insert connection piece

- Insert connection piece **126** in suppressor holder **128** in such a way that connection "1" is at the top, and that the three lugs on the connection piece fit in the corresponding openings of the holder.
- Screw nut **125** onto the thread of suppressor holder **128** manually (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 for the first time, rinse all 3 suppressor units with solution for 5 min.

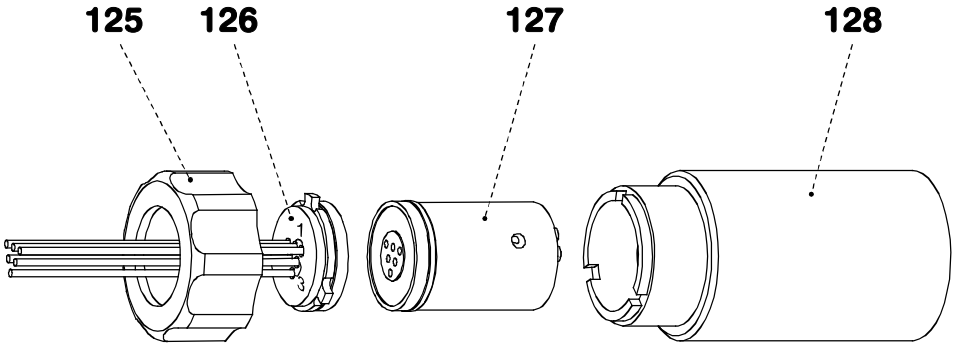


Fig. 22: Assembling the suppressor

125	**Screw nut**	**127**	**Suppressor rotor (6.2832.000)**
126	**Connection piece (6.2832.010) with input and output leads**	**128**	**Suppressor holder**

5.2.9 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 strong rise in baseline)
- Irremediable blockage of the suppressor (the suppressor can no longer deliver solutions)

Both the 6.2832.000 Suppressor rotor and the 6.2832.010 Connection piece with the input and output leads can be replaced. To replace these components proceed as follows (see *Fig. 22*):

1 Disconnect suppressor from IC system

- Disconnect all input and output leads of the suppressor from IC system and peristaltic pump.

2 Dismantle suppressor

- Unscrew nut **125** from suppressor holder **128**.
- Pull out connection piece **126** and suppressor rotor **127** from suppressor holder **128** (the connection piece and the rotor normally stick together).
- Loosen connection piece **126** from suppressor rotor **127**.

3 Clean suppressor rotor

- Clean the sealing surface of new suppressor rotor **127** (6.2832.000) using a lint-free cloth and ethanol.

4 Insert suppressor rotor

- Insert new suppressor rotor **127** in suppressor holder **128** in such a way that the tubing connections at the rear of the rotor fit in the corresponding openings inside the rotor and that one of the three holes in the rotor can be seen from below in one of the openings of the holder.
- If the rotor has been inserted correctly, its sealing surface will be about 4 mm inside the holder. If this is not the case, bring the rotor into the correct position from below with the aid of a sharp object (e.g. a screwdriver).

5 Clean connection piece

- Clean the sealing surface of new connection piece **126** (6.2832.010) with the aid of a lint-free cloth and ethanol.

6 Insert connection piece

- Insert new connection piece **126** in suppressor holder **128** in such a way that connection "1" is at the top and that the three lugs on the connection piece fit in the corresponding openings of the holder.
- Screw nut **125** onto the thread of suppressor holder **128** manually (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 the first time, rinse all 3 suppressor units with solution for 5 min.

5.2.10 Exchanging the pump tubing

The pump tubings used by 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 2.9.2*. If the pump is to remain switched off for a lengthy period of time the tubing cartridges **48** should be raised completely by loosening the snap-action lever **51** on the right-hand side (the set contact pressure remains unchanged).

As the pump is always operated on the same side the 6.1826.060 Pump tubings supplied can be used on both sides. To exchange a pump tubing proceed as follows:

1 Remove old pump tubing

- Press contact pressure lever **49** on the tubing cartridge **48** down as far as it will go.
- Release tubing cartridge **48** from holding clamp **50** by pressing down snap-action lever **51** and remove from mounting pin **53** (see *Fig. 16*).
- Remove old pump tubing **92** or **93**.

2 Insert new pump tubing

- Insert the new pump tubing **92** or **93** in the tubing cartridge **48** as shown in *Fig. 15*. The white-yellow stopper **94** must click into the corresponding holder on the left-hand side of the tubing cartridge.
- Place the tubing cartridge **48** on mounting pin **53** and press down on the right-hand side until snap-action lever **51** clicks into position on holding clamp **50**. Take care that no kinks are formed in the pump tubing.

3 Set contact pressure

- Switch on peristaltic pump.
- Press contact pressure lever **49** upwards until the solution just starts to be drawn in. Then press contact pressure lever upwards until it clicks once more to obtain optimal contact pressure.
- Switch off peristaltic pump.

5.3 Faults and malfunctions

5.3.1 Error messages

If any type of malfunction occurs during operation of the 761 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 given in the **error window** and close this window with **<OK>**.

You will find further details of the error messages of the **SYSTEM STATE** window, their possible causes and the procedure for their rectification in *section 4.3.8*.

5.3.2 Malfunctions and their rectification

If difficulties appear with the 761 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 • Faulty piston seals	• Clean the valves (see *section 5.1.5*) • Replace the piston seals (see *section 5.1.5*)
Drift of the baseline	• Thermal equilibrium not yet reached • Leak in system • Evaporation of organic solvent in eluent	• Condition system with heating switched on • Check connections and make leakproof • Ensure better closure of eluent supply vessel
Considerable pressure drop	• Leak in system	• Check connections and make leakproof
Considerable pressure rise	• Contamination of the filter in the 6.2821.120 Filter unit PEEK • Contamination of the column inlet filter • Change of column packing by injection of contaminated samples	• Replace the 6.2821.130 Filter (see *section 2.3.6*) • Clean or replace 6.2821.020 Steel mesh(es) • Regenerate column (see *section 5.1.1*) or replace column *Note:* *Samples should always be microfiltered.*

Malfunction	*Cause*	*Rectification*
Chromatograms with poor resolution, change in the retention times	• Deterioration in separation efficiency of the IC column	• Regenerate column (see *section 5.1.1*) or replace column
Extreme peak broadening, splitting (double peaks)	• Dead volume at the column ends	• Fill column with glass beads (∅ ≤ 100 µm) or replace column
No feed of regeneration or rinsing solution for suppressor	• Contact pressure too low • Leak in system • Defective pump tubing • Contamination of the filter in the 6.2821.120 Filter unit PEEK • Counterpressure at suppressor module too high	• Adjust contact pressure (see *section 2.9.2*) • Check connections and make leakproof • Replace pump tubing (see *section 5.2.9*) • Replace the 6.2821.130 Filter (see *section 2.3.6*) • Clean or replace suppressor (see *section 5.2.6…5.2.8*)

5.4 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 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 5.2.1*). 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 behavior, allows the service technician to check the functioning of certain assemblies and localize the fault.

6 Appendix

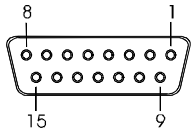
6.1 Technical data

6.1.1 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 ± 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)

6.1.2 Conductivity detector

Construction	Thermostatted conductivity detector with 2 ring-shaped steel electrodes
Measurement principle	Alternating current measurement with 1 kHz frequency and ca. 1.7 V amplitude (peak to peak).
Effective cell volume	0.8 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)



6.1.3 Injection valve

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

6.1.4 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	< 1 % (at 1 mL/min water and 10 MPa pressure, without pulsation dampener)	
Measurement principle	Piezoresistive measurement Response time: 3 ms Measurement volume: ca. 50 µL	
Maximum error	± 3 % of set value	
Resolution	0.1 MPa (conductivity measurements) 0.01 MPa (pressure measurements)	
Sampling rate	1 measurement/piston stroke (pump running) 1 measurement/s (pump not running) 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) Response time: 1 pump cycle	
Minimum pressure limit	adjustable between 0.1 ... 25.0 MPa (1...250 bar), inactive at 0 MPa Response time: 5 pump cycles	
Pump head		
Pump head volumes	Main piston: Priming piston:	40 µL 20 µL
Pump displacement volumes	Main piston: Priming piston:	28.5 µL 14.25 µL
Length of stroke	Main piston: Priming piston:	3.6 mm 1.8 mm

6.1.5 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	0.5…0.6 mL/min with 6.1826.060 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)

6.1.6 Suppressor module

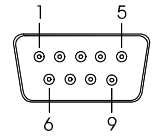
Switching duration	140 ms
Pressure resistance	2.5 MPa (25 bar)

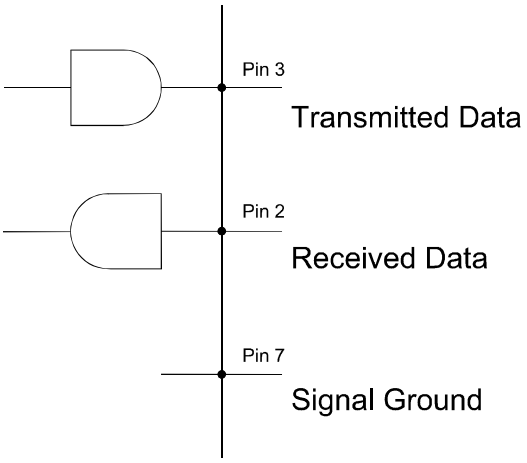
6.1.7 Leak detector

Type	Detector with 2 electrodes approx. 1 mm above base of interior
Response level	Resistance < 1 MΩ (for deion. water)

6.1.8 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	

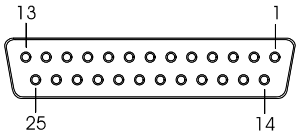




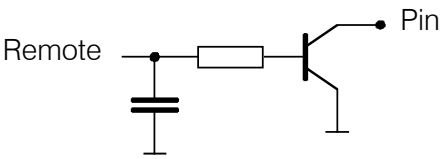
6.1.9 Remote interface

Connector

Dsub 25 pin (female)



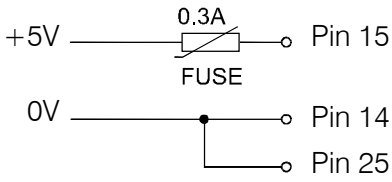
Circuit diagram for output lines 1…8



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

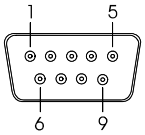
Potentials



6.1.10 Analog output

Connector

Dsub 9 pin (male)



Pin assignment

0 V

Measurement signal (0...1 V for set Full Scale range 50, 250 or 1000 µS/cm)

Accuracy

± 1 %

6.1.11 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)

6.1.12 Safety specifications

Construction/testing

According to IEC 1010 / EN 61010 / 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.

6.1.13 Electromagnetic compatibility (EMC)

Emitted interference	Standards met: EN55011 (class B), EN55022 (class B), EN50081-1, IEC61326 (class B)
Immunity to interference	Standards met: IEC801-2/IEC1000-4-2 (class 3), IEC801-3/ IEC1000-4-3 (class 2), IEC801-4/IEC1000-4-4 (class 4), IEC801-5/IEC1000-4-5 (class 2/3), IEC801-6/IEC1000-4-6 (class 2), EN50082-1, EN61000-3-2/IEC1000-3-2, EN61000-3-3/ IEC1000-3-3, EN61000-4-11/IEC1000-4-11, IEC61326

6.1.14 Ambient temperature

Nominal operating range	+5…+45°C (at 20…80 % atmospheric humidity)
Storage	–20…+70°C
Transport	–40…+70°C

6.1.15 Housing

Material of cover	Polyurethane rigid foam (PUR) with fire protection for fire class UL94VO, CFC-free
Material of base	Steel, enameled
Width	259 mm
Height	446 mm
Depth	355 mm
Weight	2.761.0010: 13.5 kg (without accessories) 15.7 kg (with accessories) 2.761.0020: 14.7 kg (without accessories) 21.7 kg (with accessories)

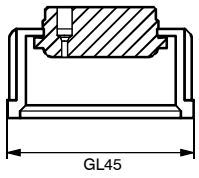
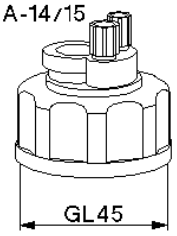
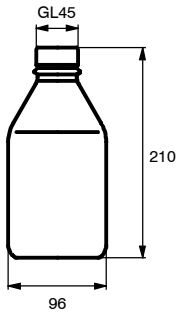
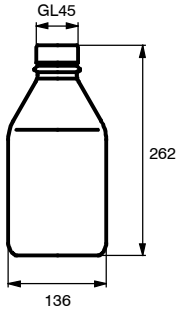
6.2 Standard equipment

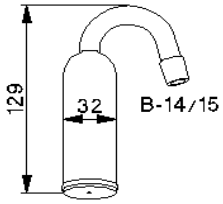
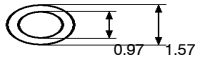
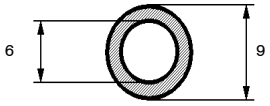
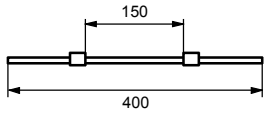
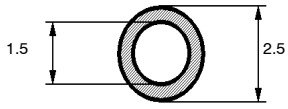
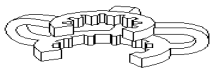
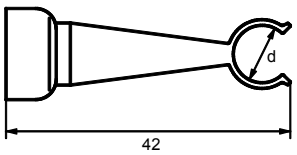
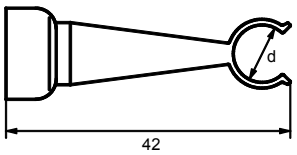
Subject to changes !
All dimensions are given in mm.

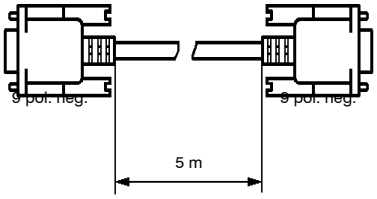
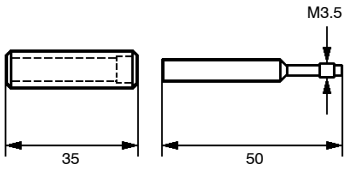
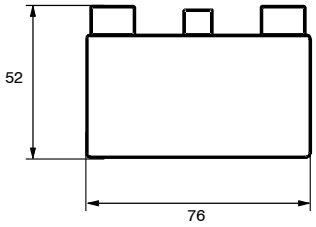
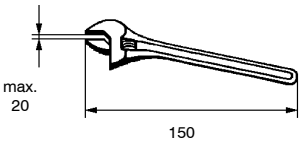
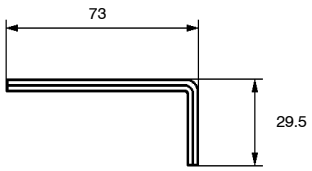
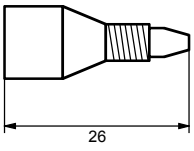
The 761 Compact IC is available in two versions:

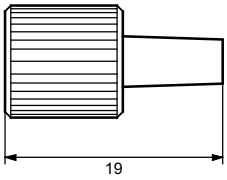
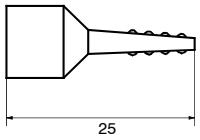
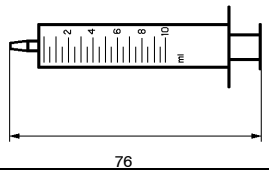
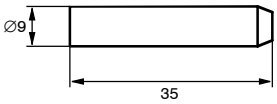
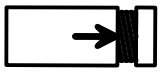
- **2.761.0010** Compact IC without suppressor module
- **2.761.0020** Compact IC with suppressor module

These instruments include the following parts:

Quant.		Order No.	Description
2.761.0010	2.761.0020		
1	1	1.732.0110	**Detector block (metal-free)** with permanently attached connecting cable to 761 Compact IC
-	2	6.1602.150	**Bottle attachment GL45** for 6.1608.023 Amber glass bottle (1 L) 
1	1	6.1602.160	**Bottle attachment GL45** for 6.1608.070 Clear glass bottle (2 L), incl. the following accessories: 1 × 6.1446.040 Thread stopper M6 1 × 6.1602.105 Bottle attachment GL 45 1 × 4.420.0311 Tubing nipple M6 1 × 4.420.4300 Tubing nipple M8 2 × E.301.0021 O-ring 
-	2	6.1608.023	**Amber glass bottle 1 L** Supply bottles for regeneration and rinsing solutions, with GL45 thread 
1	1	6.1608.070	**Clear glass bottle 2 L** Eluent bottle, with GL45 thread 

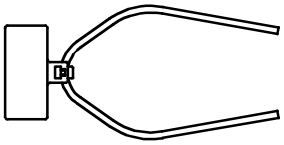
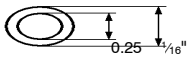
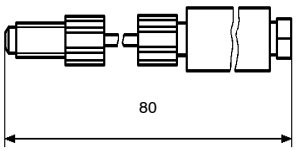
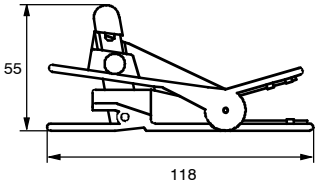
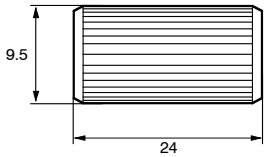
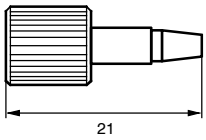
Quant.		Order No.	Description
2.761.0010	2.761.0020		
1	1	6.1609.000	**CO_2 Absorber tube** incl. 6.2701.020 Stopper For 6.1602.160 Bottle attachment. 
-	1	6.1803.020	**PTFE capillary** Length = 5 m 
2	2	6.1816.020	**Silicone tubing** Drain tube for inner compartment and bottle rack, length = 1 m 
-	2	6.1826.060	**Pump tubing** made of PP (polypropylene) with 2 firmly attached white-yellow stoppers; in.d. = 0.51 mm, ex.d. = 2.31 mm 
1	1	6.1834.010	**Aspirating tubing** made of PTFE, with connector for 6.2821.090 aspirating filter Length = 2.5 m For the connection high-pressure pump – eluent bottle 
1	1	6.2023.020	**SGJ clip** 
1	1	6.2027.030	**Column holder** Diameter d = 8.5 mm 
1	1	6.2027.040	**Column holder** Diameter d = 11.3 mm 

Quant.		Order No.	Description
2.761.0010	2.761.0020		
1	1	6.2122.0X0	**Mains cable** to customer's specifications: Cable socket — Cable connector Type IEC 320/C 13 — Type SEV 12 (CH…) ..... 6.2122.020 Type IEC 320/C 13 — Type CEE (7), VII (D…) ..... 6.2122.040 Type CEE (22), V — Type NEMA 5-15 (USA…) 6.2122.070
1	1	6.2134.100	**Connecting cable** Connecting cable 761 Compact IC (RS232) – PC 
1	1	6.2617.010	**Special tool** For removing the piston seal of the pump head 
1	1	6.2620.150	**Pulsation dampener MF** Metal-free pulsation dampener to reduce pulsation and prolong the life of separating columns. 
1	1	6.2621.000	**Adjustable spanner** 
1	1	6.2621.030	**Hexagon key 4 mm** For mounting the pump head of the high-pressure pump. 
1	3	6.2744.010	**PEEK compression fitting** For the connection of 6.1831.010 PEEK capillaries or 6.1822.010 PTFE microcapillaries, set of 5 

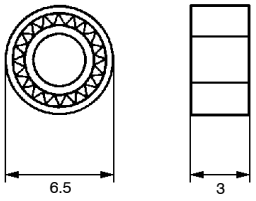
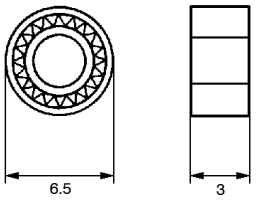
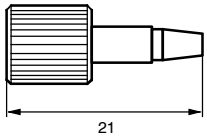
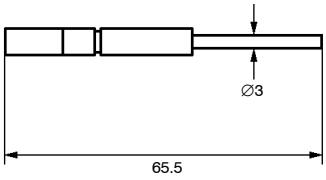
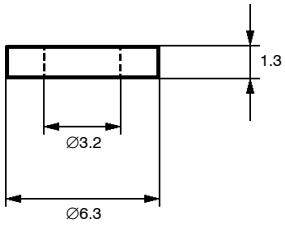
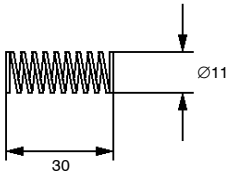
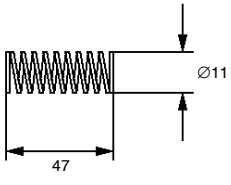
Quant.		Order No.	Description
2.761.0010	2.761.0020		
1	1	6.2744.020	**Coupling 1/16" – Luer** Coupling for connection of a 6.1803.000 PTFE capillary to connection **2** of the 761 Compact IC when a 750 Autosampler or a 766 IC Sample Processor is used 
-	1	6.2744.030	**PEEK coupling** Connection between 6.2744.010 PEEK compression fitting and 6.1826.060 Pump tubing; Set of 4 
1	1	6.2816.020	**Syringe** made of PP, volume = 10 mL; for manual filling of the sample loop 
1	1	6.2821.090	**Aspirating filter** Pore dimension 20 µm For 6.1834.000 Aspirating tubing. Set of 5 
-	2	6.2821.120	**Filter unit PEEK** To avoid contamination due to abrasive particles of piston seals. Spare part: 6.2821.130 Filter 
1	1	6.6030.013	**Software CD «761 PC Software 1.1»**
1	3	Y.107.0150	**Cable strap**
1	1	8.110.8213	**Instructions for Use (English)** for «Autodatabase 1.0» PC program
1	1	8.732.2003	**Metrohm Monograph «Ion chromatography» (English)**
1	1	8.732.2013	**«IC Application Notes» (English)**
1	1	8.761.1063	**Instructions for Use (English)** for 761 Compact IC
1	1	8.761.8007	**Registration card (German/English)** for PC program «Metrodata 761 PC Software 1.1»

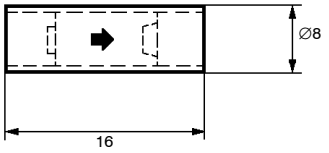
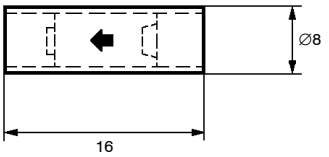
6.3 Optional accessories

6.3.1 Accessories for capillary connections

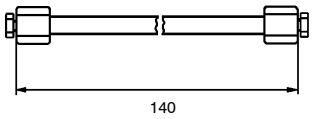
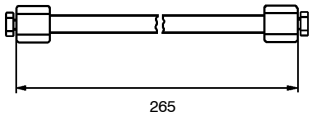
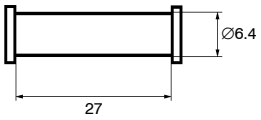
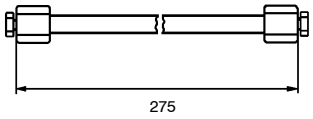
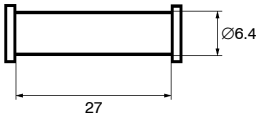
Order No.	Description	
6.1825.XXX	**Sample loop, made of PEEK** For injection valve; incl. two 6.2744.010 PEEK compression fittings 6.1825.210: Volume = 20 µL 6.1825.230: Volume = 10 µL	
6.1831.010	**PEEK capillary** Length = 3 m	
6.2620.040	**Coupling 1/16" – ¼"** Connector for plastic separating columns with ¼"-28 thread.	
6.2621.080	**Capillary tubing cutter for plastic capillaries** For 6.1831.010 PEEK capillaries and 6.1822.010 PTFE microcapillaries incl. 5 additional blades	
6.2744.040	**PEEK coupling** For connection of 1/16" capillaries	
6.2744.070	**PEEK compression fitting short** Spare part for 6.2824.100 Pump head Set of 5	
6.2821.130	**Filter for filter unit PEEK** Spare part for 6.2821.120 Filter unit PEEK. Set of 10	

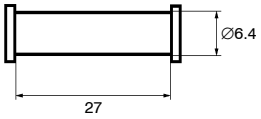
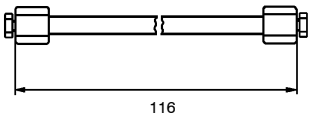
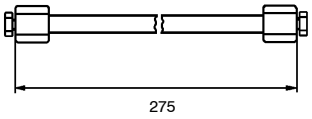
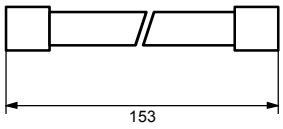
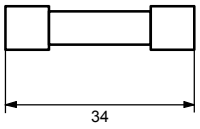
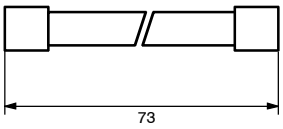
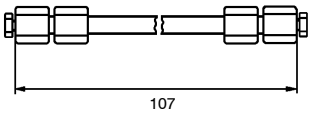
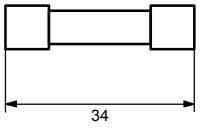
6.3.2 High-pressure pump

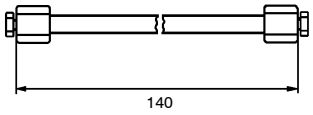
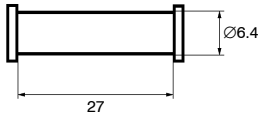
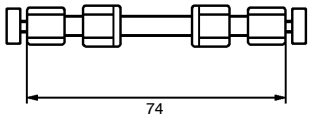
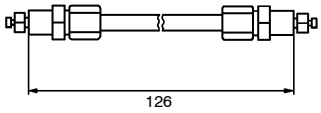
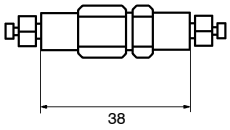
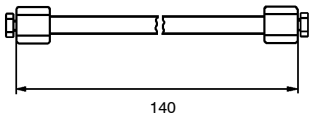
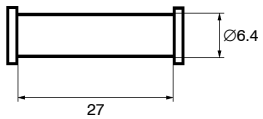
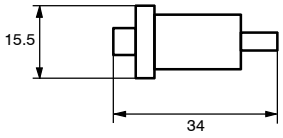
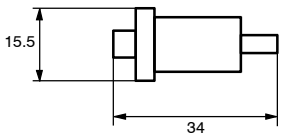
Order No.	Description
6.2824.100	**Pump head (metal-free)** Complete, with fixations screws
6.2741.000	**Piston seal** Spare part for 6.2824.100 Pump head 
6.2741.010	**PE piston seal** Spare part for 6.2824.100 Pump head (only suitable for aqueous eluents) 
6.2744.070	**PEEK compression fitting short** Spare part for 6.2824.100 Pump head Set of 5 
6.2824.070	**Zircon piston** Spare part for 6.2824.100 Pump head 
6.2824.030	**Sapphire supporting ring** Spare part for 6.2824.100 Pump head 
6.2824.050	**Spring for main piston** Spare part for 6.2824.100 Pump head 
6.2824.060	**Spring for auxiliary piston** Spare part for 6.2824.100 Pump head 

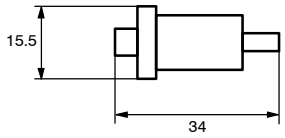
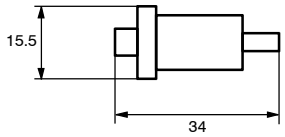
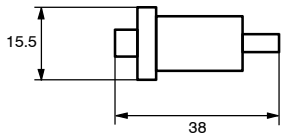
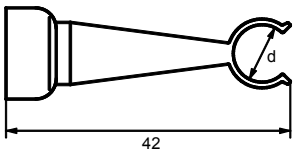
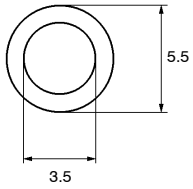
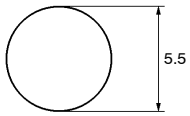
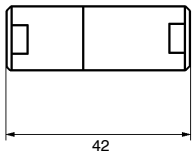
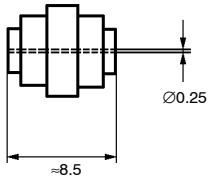
Order No.	Description	
6.2824.080	**Outlet valve (metal-free)** Spare part for 6.2824.100 Pump head	
6.2824.090	**Inlet valve (metal-free)** Spare part for 6.2824.100 Pump head	

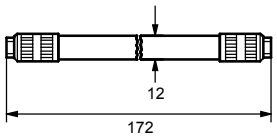
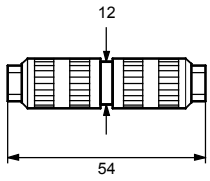
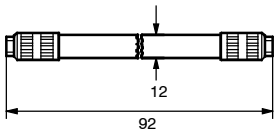
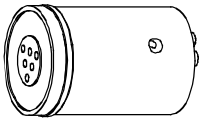
6.3.3 Separating columns and precolumns

Order No.	Description	
6.1005.000	**IC anion column PRP-X100 (125 mm)** For the determination of anions without chemical suppression. Column dimensions: 125 × 4.0 mm Precolumn: 6.1005.020	
6.1005.010	**IC anion column PRP-X100 (250 mm)** For the determination of anions without chemical suppression. Column dimensions: 250 × 4.0 mm Precolumn: 6.1005.020	
6.1005.020	**IC precolumn cartridge PRP-X100** To prolong the service life of 6.1005.000 and 6.1005.010 IC anion columns PRP-X100. Column dimensions: 20 × 4.0 mm Installation using 6.2821.040 Cartridge head.	
6.1005.030	**IC exclusion column PRP-X300** For the determination of organic acids without chemical suppression. Column dimensions: 250 × 4.0 mm Precolumn: 6.1005.040	
6.1005.040	**IC precolumn cartridge PRP-X300** To prolong the service life of the 6.1005.030 IC exclusion column PRP-X300. Column dimensions: 20 × 4.0 mm Installation using 6.2821.040 Cartridge head.	

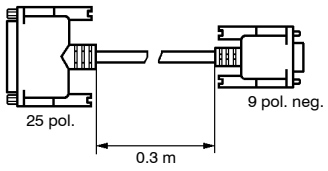
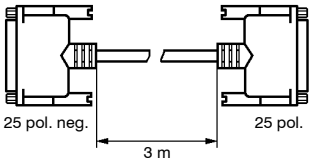
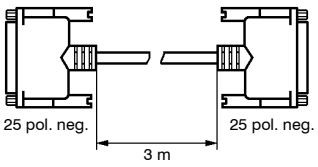
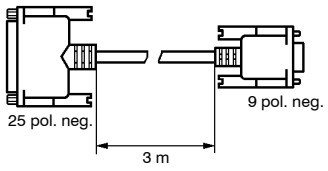
Order No.	Description
6.1005.050	**IC precolumn cartridge PRP-1** To prolong the service life of the 6.1009.000 IC anion column SUPERSEP and the 6.1006.100 IC anion column METROSEP Anion Dual 2. Column dimensions: 20 × 4.0 mm Installation using 6.2821.040 Cartridge head. 
6.1005.100	**IC anion column Star-Ion A300** For the determination of anions with chemical suppression. Column dimensions: 100 × 4.6 mm 
6.1005.200	**IC anion column Organic Acids** For the determination of organic acids. Column dimensions: 250 × 7.5 mm 
6.1006.020	**IC column cartridge METROSEP Anion Dual 1** For the determination of anions with and without chemical suppression. Column dimensions: 150 × 3.0 mm Installation using 6.2828.000 Glass cartridge holder. 
6.1006.030	**IC precolumn cartridge METROSEP Anion Dual 1** Set of 3 To prolong the service life of the 6.1006.020 IC column cartridge METROSEP Anion Dual 1. Column dimensions: 30 × 3.0 mm Installation using 6.2828.010 Precolumn cartridge holder. 
6.1006.040	**IC column cartridge METROSEP Anion Dual 1** For the determination of anions with and without chemical suppression. Column dimensions: 70 × 3.0 mm Installation using 6.2828.020 Glass cartridge holder. 
6.1006.100	**IC anion column METROSEP Anion Dual 2** For the determination of anions with and without chemical suppression. Column dimensions: 75 × 4.6 mm Precolumn: 6.1005.050 (installation with 6.2821.050 Twin cartridge holder) 
6.1006.200	**Preconcentration cartridge METROSEP Anion** For anion preconcentration. Column dimensions: 30 × 3.0 mm Installation using 6.2828.010 Precolumn cartridge holder. 

Order No.	Description	
6.1007.000	**IC cation column Nucleosil 5SA** For the determination of divalent cations without chemical suppression. Column dimensions: 125 × 4.0 mm Precolumn: 6.1007.010	
6.1007.010	**IC precolumn cartridge Nucleosil 5SA** To prolong the service life of the 6.1007.000 IC cation column Nucleosil 5SA. Column dimensions: 20 × 4.0 mm Installation using 6.2821.040 Cartridge head.	
6.1008.010	**IC cation column Hyperrez Monovalent** For the determination of monovalent cations without chemical suppression. Column dimensions: 50 × 4.6 mm	
6.1009.000	**IC anion column SUPERSEP** For the determination of anions without chemical suppression. Column dimensions: 100 × 4.6 mm Precolumns: 6.1009.010 IC anion column SUPERSEP or 6.1005.010 IC precolumn cartridge	
6.1009.010	**IC anion precolumn SUPERSEP** To prolong the service life of the 6.1009.000 IC anion column SUPERSEP.	
6.1010.000	**IC cation column METROSEP Cation 1-2** For the determination of monovalent and divalent cations without chemical suppression. Column dimensions: 125 × 4.0 mm Precolumn: 6.1010.010	
6.1010.010	**IC precolumn cartridge METROSEP Cation 1-2** To prolong the service life of the 6.1010.000 IC cation column METROSEP Cation 1-2. Column dimensions: 20 × 4.0 mm Installation using 6.2821.040 Cartridge head.	
6.1012.X00	**Sample pretreatment cartridge IC-RP** For non-polar solid phase extraction. Removes organic substances; for the enrichment of heavy metals. With Luer connection. 6.1012.000: set of 50 6.1012.100: set of 10	
6.1012.X10	**Sample pretreatment cartridge IC-H** Cation exchanger in H^+ form. Removes interfering cations, CO_3^{2-}, HCO_3^- or for alkaline samples. With Luer connection. 6.1012.010: set of 50 6.1012.110: set of 10	

Order No.	Description
6.1012.X20	**Sample pretreatment cartridge IC-Ag** Cation exchanger in Ag^+ form. Removes halides. With Luer connection. 6.1012.020: set of 50 6.1012.120: set of 10 
6.1012.X30	**Sample pretreatment cartridge IC-OH** Cation exchanger in OH^- form. For highly acidic samples. With Luer connection. 6.1012.030: set of 50 6.1012.130: set of 10 
6.1012.200	**Sample pretreatment cartridge Chromafix C18** Removes organic substances (not suitable for fluoride determinations). With Luer connection. 6.1012.200: set of 50 
6.2027.050	**Column holder** Diameter d = 15.0 mm 
6.2821.010	**PTFE gasket** Spare part for 6.1005.000, 6.1005.010, 6.1005.030, 6.1007.000 and 6.1010.000 separating columns; set of 4. 
6.2821.020	**Steel mesh** Spare part for 6.1005.000, 6.1005.010, 6.1005.030, 6.1007.000 and 6.1010.000 separating columns; set of 4. 
6.2821.040	**Cartridge head** To hold precolumn cartridges; installed in the inlet capillary of the separating column. 
6.2821.080	**Steel spacer** Spare part for 6.2821.040 Cartridge head. 

Order No.	Description	
6.2828.000	**Glass cartridge holder** To hold the 6.1006.0020 Column cartridge METROSEP Anion Dual 1.	
6.2828.010	**Precolumn cartridge holder** To hold the 6.1006.0030 Precolumn cartridge METROSEP Anion Dual 1.	
6.2828.020	**Glass cartridge holder** To hold the 6.1006.0040 Column cartridge METROSEP Anion Dual 1.	
6.2832.000	**Suppressor rotor** Replacement cartridge for Metrohm suppressor module	
6.2832.010	**Connection piece for suppressor rotor** with input and output leads	

6.3.4 Additional devices and cables

Order No.	*Description*
2.750.0010	**750 Autosampler** Sampler for the automation of sample injection. Capacity: 128 sample vessels each with an effective volume of ca. 700 µL; incl. accessories. Accessories: 6.2413.000 Glass sample vessels, set of 1000 6.2743.000 PP sample vessels, set of 1000 6.2743.010 Polyethylene stoppers, transparent, set of 1000 6.2743.020 Polyethylene stoppers, red, set of 1000 6.2743.030 Filter stoppers, set of 100
2.766.0010	**766 IC Sample Processor** Sampler for the automation of sample injection. Capacity: 127 sample vessels each with an effective volume of ca. 11 mL; incl. accessories. Accessories: 6.2743.050 PP sample vessels, set of 2000 6.2743.060 Polyethylene stoppers, transparent, set of 1000
6.2125.010	**Cable** Connecting cable 761 Compact IC (RS232 interface) – PC Adapter cable 25-pin to 9-pin. 
6.2125.020	**Cable** RS232 extension cable 
6.2125.060	**Cable** Connecting cable 761 Compact IC (RS232 interface) – PC 
6.2125.110	**Cable** Connecting cable 761 Compact IC (RS232 interface) – PC 

6.4 Warranty and conformity

6.4.1 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.

6.4.2 EU Declaration of conformity

CE

EU Declaration of Conformity

The METROHM AG company, Herisau, Switzerland hereby certifies, that the instrument:

761 Compact IC

meets the requirements of EC Directives 89/336/EEC and 73/23/EEC.

Source of the specifications:

EN 50081-1	Electromagnetic compatibility, basic specification; Emitted Interference
EN 50082-1	Electromagnetic compatibility, basic specification; Interference Immunity
EN 61010	Safety requirements for electrical laboratory measurement and control equipment

Description of the instrument:

Instrument for recording ion chromatograms with electronic or chemical suppression.

Herisau, April 12, 1999

Dr. J. Frank	Ch. Buchmann
Development Manager	Production and Quality Assurance Manager

6.4.3 Certificate of conformity and system validation

Certificate of Conformity and System Validation

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.

Name of commodity:	761 Compact IC
System software:	Stored in ROMs
Name of manufacturer:	Metrohm Ltd., Herisau, Switzerland
Principal technical information:	Voltages: 100…120, 220…240 V Frequency: 50…60 Hz

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

IEC801-2/IEC1000-4-2 (class 3), IEC801-3/ IEC1000-4-3 (class 2), IEC801-4/IEC1000-4-4 (class 4), IEC801-5/IEC1000-4-5 (class 2/3), IEC801-6/IEC1000-4-6 (class 2), EN50082-1, EN61000-3-2/3/IEC1000-3-2/3, EN61000-4-11/IEC1000-4-11, IEC61326 (class B), EN55011 (class B), EN55022 (class B), EN50081-1 — *Electromagnetic compatibility*

IEC1010, EN61010, UL3101-1 — *Security specifications*

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

The technical specifications are documented in the instruction manual.

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 features of the system software are documented in the instruction manual.

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

Herisau, April 12, 1999

Dr. J. Frank	Ch. Buchmann
Development Manager	Production and Quality Assurance Manager

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