

# Pride of Drug Discoverer

## A Compact Semi-Prep Chromatography System

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## To assure Precision, Productivity and Pride in Drug Discovery

*Product Guide vers. 1 , July 2020*



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## 1.0. GENERAL INFORMATION

Pride of Drug Discoverer is a Compact Semi-Prep High-quality Chromatography System made in Europe for use in laboratories to perform Semi-preparative HPLC chromatographic methods. The compact system includes a UV-VIS detector, preparative gradient pump, Stepper motor driven injection valve and fraction collector.

### 1.1. Product Function

The system unit allows the collection of liquid samples outflowing from the UV-Vis DAD detector, which is supplied by the quaternary gradient pump. The detector measures light absorbance of any chosen range between 200 and 800 nm wavelengths. The sample fractions are collected into a collection tubes of 21ml or 40 ml volumes within two racks. Sample collection is based on the selected collection mode. An electromagnetic valve located on the movable arm switches between collecting a portion of the sample liquid into the tubes or it drains the unnecessary portion of the liquid into waste. Separate collection can take place in a time mode where everything is collected or based on a signal from the touch screen software. The All system operation is controlled by a built-in touch screen computer. A deuterium lamp combined with a halogen lamp is used as the light source in the UV-Vis Diode Array Detector. The system is equipped with a quaternary gradient HPLC pump with flow rate from 0.1 to 50 ml/min. The pump is double-acting with two pump heads connected in parallel. Both working heads are fitted with inlet and outlet check valves. Smooth flow of the mobile phase is ensured by suitable shaping of the driving cams, by means of which a uniform movement of the ceramic pistons pumping under counterpressure and at the same time precise control of the motor rotation is achieved. The pump works in isocratic and gradient mode. The gradient valve is a standard 6-channel valve.

### 1.2. Delivered Versions

Pride of Drug Discoverer Compact Semi-Prep HPLC System comprises of:

- Quaternary Gradient HPLC Pump, Flowrate 0.1 to 50ml/min, 30 MPa
- DAD UV-Vis 200 - 800 nm and prep cell
- Fraction collector with two rack for 21 ml and 40 ml tubes.

### 1.3. Accessories delivered as parts

P/N	Quantity	Description
EKAB-011	1	Mains cable 10A-250V, 2 m
23986000	1	Tube fuse T – 6,3A/250V, CSA
EKAB-041	1	LAN cable 3 m, (to connector ETHERNET
ECS90110	1	Touch screen stylus, to control the display of the unit
AFAR040X	2	Rack for 24 tubes, OD 20 mm, volume 40 ml
AFAJ0080	1	Needle OD 1/16", ID 1mm, L=57 mm stainless steel for AFAR008X, a substitute needle when changing rack type



AFAT0400	1	Tube 40 ml, OD 20 mm, L 180 mm with round bottom, packing 50pcs, for AFAR040X
ANA95000	1	Testing cell in bracket ZK04L, for testing detector and cell functionality (Preparative cell in bracket PLCC 07 L (P/N 25L0000X) is supplied with the unit.
414321950	6	GL 45 Media/Storage Bottles 2000 ml
ACE98001	6	FEP Tubing 3/16" 2000 mm with filter 20 um and lid FEP tubing, ID=1/18", volume = 3078 µL only tubing, 2x PEEK nut 3/16", thread 5/16"-24, PP lid on tray GL45 with PA plug with tubing holes, PE filter 20 µm No-Met with reduction UNF 5/16", 2x Tefzel ferrule 3/16", marking set 2x4pc)
PN000080	1	Waste tubing with adapter 3/32" (Silicone tubing 1 m, adapter Male Luer 3/32" Barb; (from by-pass valve to waste)
ECS90080	1	Waste set Europe's Pride Compact system (Long waste tubing – silicone tubing ID 0.25" x OD 0.375", connector L ¼ "Qosina)
ECS90100	1	Piston back washing set Compact system
58606000	1	GL 45 Media/Storage Bottles 1000 ml
ECS90090	1	Column holder set Compact system (rod holder, a rod for a clamp holding, double cross clamp, laboratory clamp for compact system, 5 pcs. M4x10 Torx pan head screw A2)
AVVSL2KC	1	Sample loop 2 ml, UW type, 1/16" with nuts and ferrules
ECS90170	1	Capillary loop valve-column PEEK 1/16" 1 m, 1,00mm, LUER LOCK (can be used instead of stainless-steel capillaries)
ECS90180	1	Capillary column-detector PEEK 1/16" 0.6 m, 1,00mm, LUER LOCK (can be used instead of stainless-steel capillaries)
00000201	1	Coupling 1/16" stainless steel, UNF 10-32 (possibility to use instead of a column)
YY007000	1	Syringe LUER 50ml, plastic (for loop injection into sample loop 10 ml)
YY005000	1	Syringe LUER 10ml, plastic (for loop injection into sample loop 2 ml)
18329000	1	Screwdriver Torx T10 S2 FESTA (for halogen lamp exchange)
18331000	1	Screwdriver Torx T20 S2 FESTA (for mounting the column holder and fixing the column rod; mounting the heads when replacing seals)
E1132890	1	Open End Wrench 1/4" – 5/16". (for metal nuts on capillaries; mounting of valve holders)
990395	1	Open End Wrench 3/8" – 7/16" (loosing capillary while replacing check valves)
99038300	1	Open End Wrench 8-10 mm (loosing nuts while replacing seals, check valves, o-ring or needle)
99040300	1	Open End Wrench 5,5 – 7 mm (when mounting halogen lamps)
990397	1	Allen wrench 7/64" (for mounting switching valve)
DOC00001	1	User's guide
DOC00002	1	Production protocol

## 2.0. GENERAL OPERATING INSTRUCTION

Caution:	If the unit is used in a manner not specified by the manufacturer, the protection provided by the unit may be impaired!
Caution:	The unit may not be used, if it is leaking.
Caution:	Do not place unit or any other equipment so that disconnecting power cord is difficult.
Caution:	Never dismount unit cover. There is nothing needing customer service or maintenance.
Caution:	The pump is filled with isopropanol after construction or service.
Caution:	When using buffers or other crystalizing agents in mobile phases, manual backwash of pistons must be proceeded.
Caution:	UV light is dangerous for eyes. During regular operation of the detector is UV light perfectly shielded. While exchanging the cell, never look in the cell area. Always put in at least test cell. Exchange of deuterium lamp must be carried out with disconnected power cord.
Caution:	Viewing the screen too close for a long time may impair your vision. Let your eyes rest for more than 5 minutes or aim at objects in the distance every 1 hour of using the unit.
Caution:	Do not use sharp objects when handling the display of the unit, as this may damage the unit.
Caution:	If the unit emits unusual noises, a burning odor or smoke, unplug the power cord and contact customer service immediately.
Caution:	The unit may only be used in accordance with the precautions for handling liquids. For information on precautions when handling liquids, see the safety data sheets for each liquid.

### 2.1. Safety Symbols



**UV light is dangerous to your eyes.** If the flow-cell is installed in unit then UV light is perfectly shielded. **In case of any manipulation with flow-cell is very important to protect the eyes with glasses absorbing UV light.**

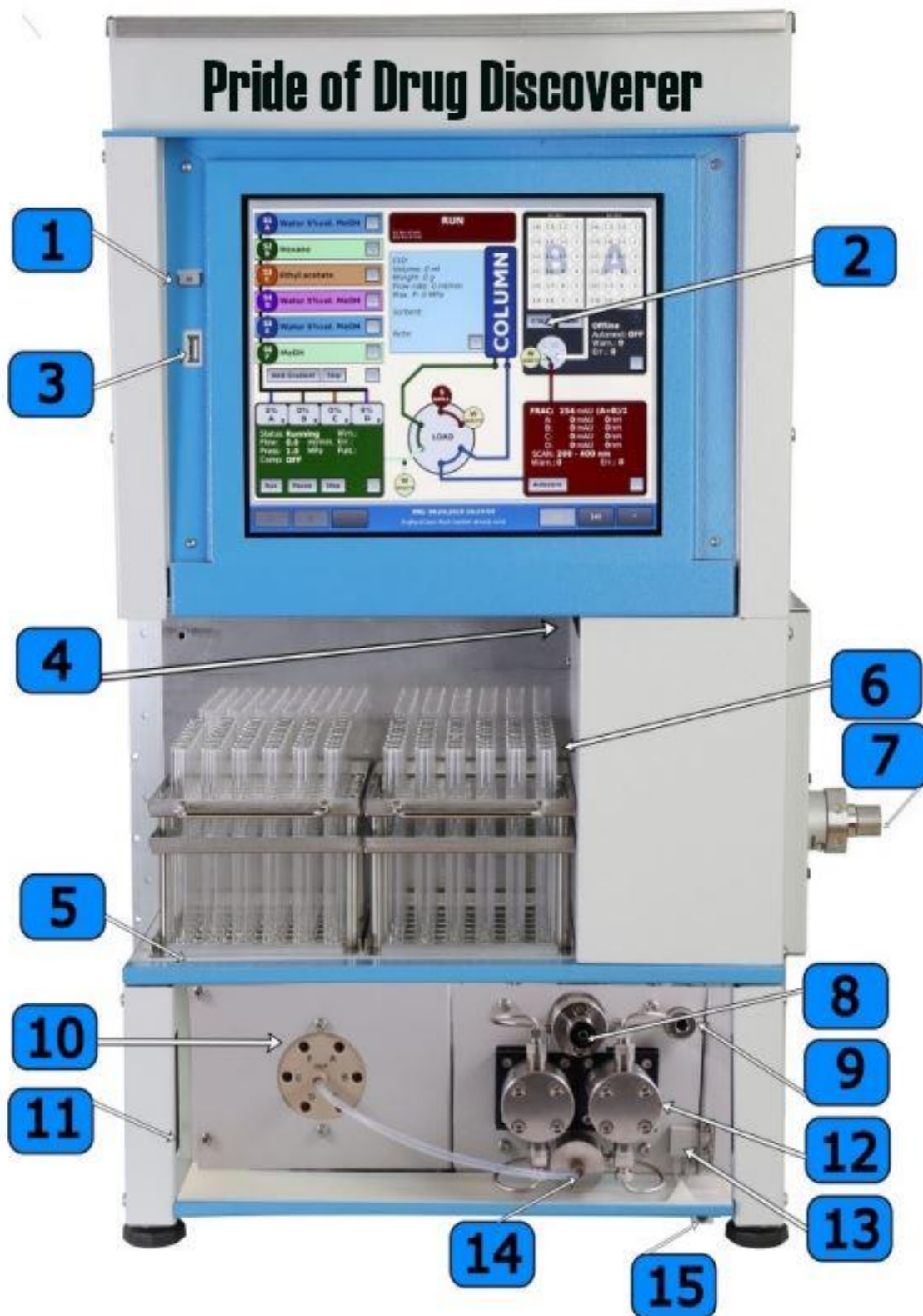


**Attention electrical equipment! Unplug the power cord before servicing the unit.**



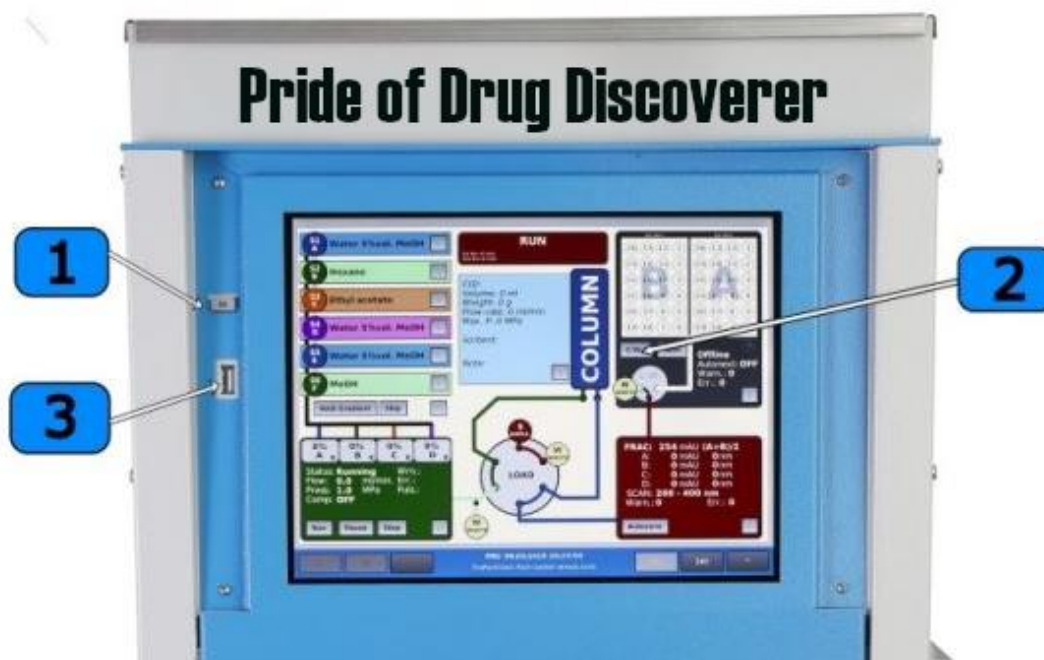
**Electrical unit! Disconnect power cord before servicing. Read the operational guide before replacing fuse!**

### 3.0. PRODUCT DESCRIPTION





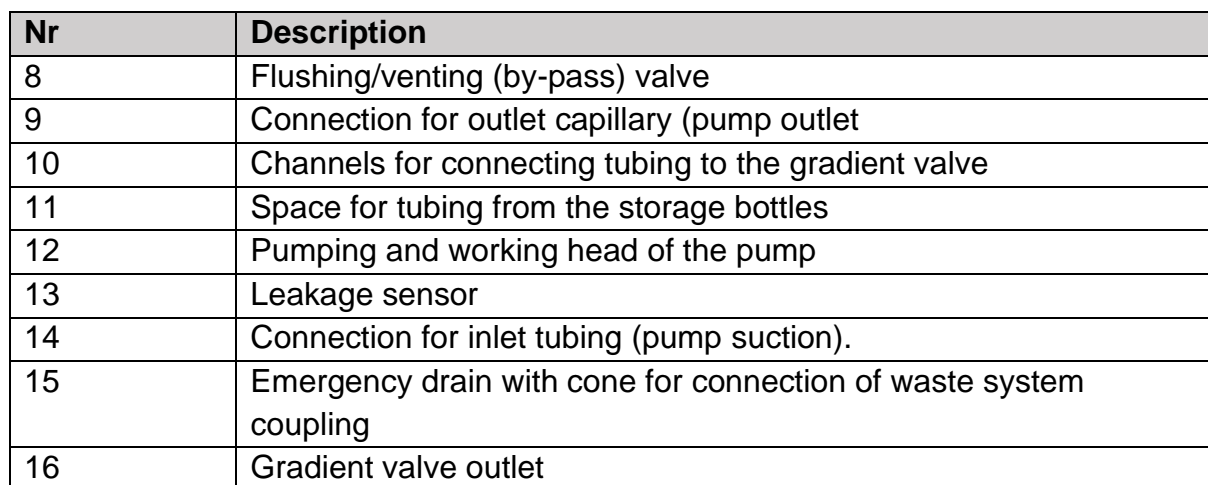
## PC Display Part



Nr.	Description
1	Main Switch front
2	Touch Screen
3	USB Connector



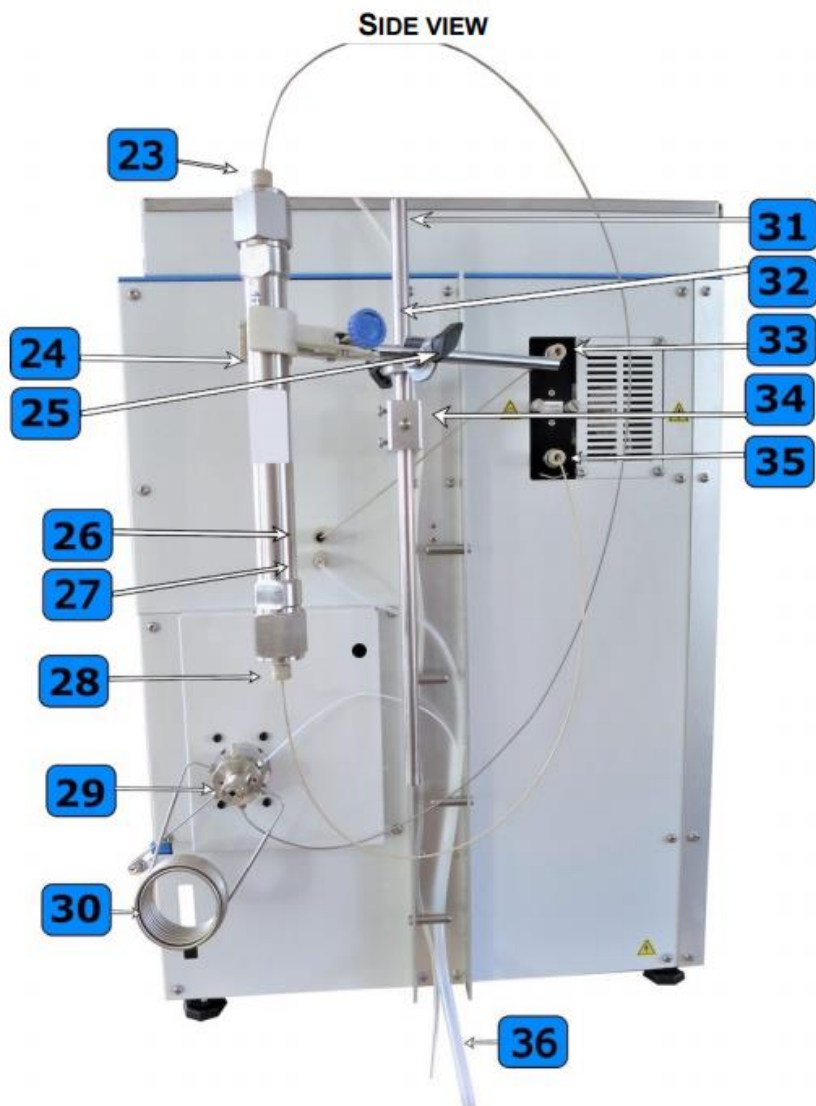
Nr	Description
4	Injection needle.
5	Space for racks (Rack A is on the right).
6	Removable racks with tubes
7	Loop valve for Sample injection



## Rear Side View



Nr	Description
17	Coupled power socket with main switch and main fuse.
18	RS232 connector
19	VGA connector
20	USB connector
21	HDMI connector
22	Ethernet/LAN connector



Nr	Description
23	Column inlet.
24	Column
25	Cross clamp mounted on a laboratory clamp
26	Input to the fraction collector from the detector
27	Output from the fraction collector to the waste tubing
28	Column Outlet
29	Loop valve
30	Loop 10 ml
31	Rod for a laboratory clamp holding
32	Laboratory clamp
33	Detector outlet
34	Column holder
35	Detector inlet
36	Waste tubing

## 4.0. INSTALLATION

### 4.1. Unit Placement

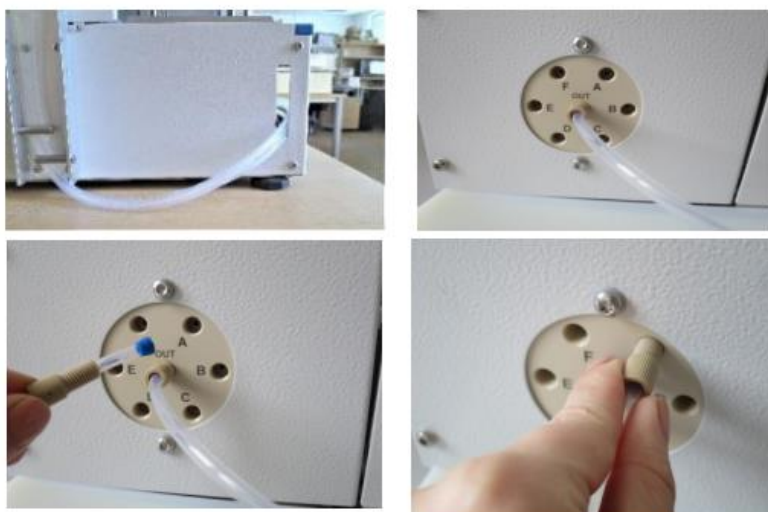
Place the unit in a suitable location that satisfies the following conditions:

- Horizontal place.
- Keep at least 10 cm space behind the rear of the system.
- Keep away from equipment generating strong magnetic field.
- Equipment is intended for use in regular laboratory environment only - see Technical parameters – operating environment conditions.

### 4.2. Connection of Inlet Tubing



The inlet tubing with a filter (ACE98001) is inserted into the reagent bottle and screwed on with the cap. The tubing is marked with a coloured marker clip. All parts mentioned are included as Accessories.



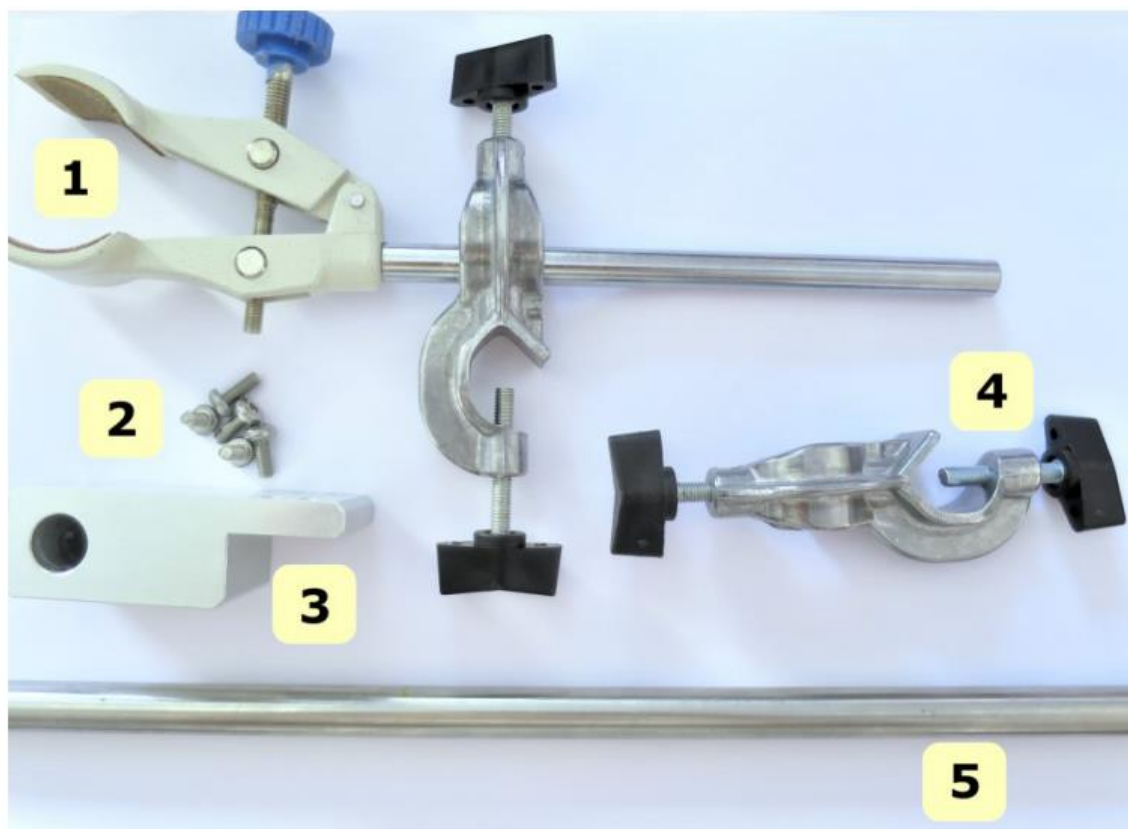
The same procedure applies to all other inlet tubing. The opposite end of the tubing is threaded through the metal U-profile from the side of the unit and the tubing is passed



through the side opening into the instrument compartment where the gradient valve is located.

The channel plugs will be removed, and the individual tubing screwed into the appropriate channels.

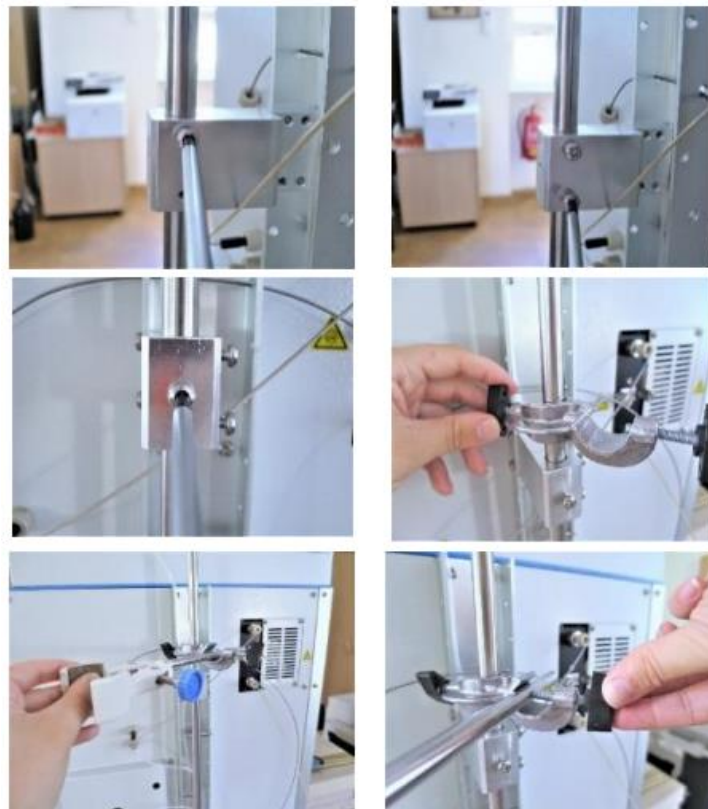
### 4.3. Column Holder Construction



Nr	Description
1	Laboratory clamp
2	Screw TX M4x20 (5 pcs),
3	3 Column Holder,
4	Crossed clamp
5	Rod for a clamp holding

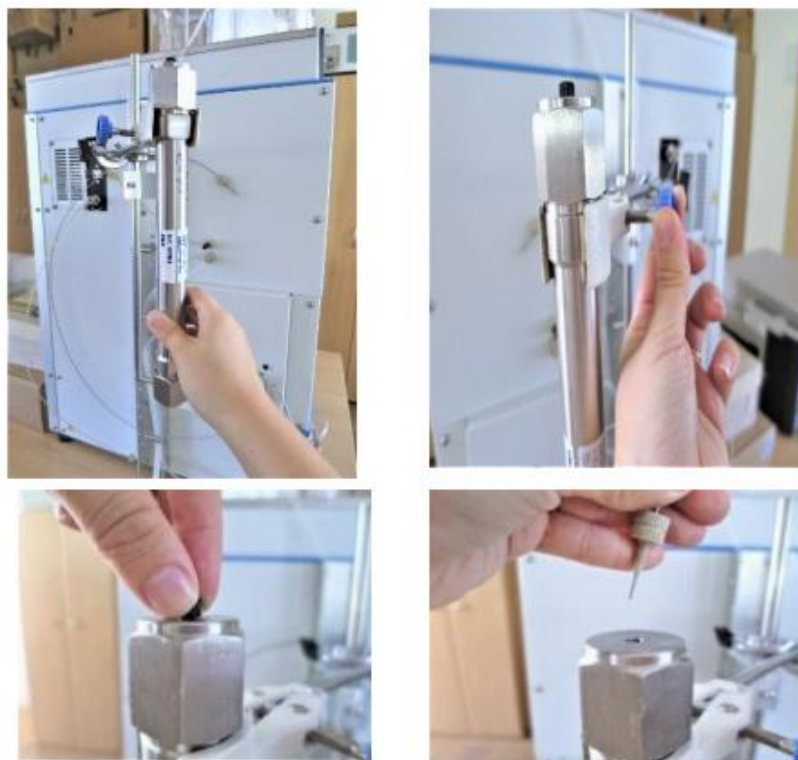


- The column holder is used to attach the outer column to the side of the compact system.
- The holder is screwed with a TX20 screwdriver to the side of the U-profile using two TX M4x20 screws.
- The clamp rod is inserted into the bracket, which is fastened in the bracket again using three TX M4x20 screws and a TX20 screwdriver.





- The cross clamp is fastened to the attached rod using a screw.
- The laboratory clamp is then mounted in the cross clamp.

#### 4.4. Installation of the Column



- Attach a column that is not a part of the accessory to the laboratory clamp.
- Unscrew the plug from the column inlet and screw in a stainless steel capillary OD 1/16 "x ID 1 mm, L = 1m (S6099300) with a PEEK hand screw 1/16" UNF 10-32 (00000121), which comes out of a loop valve.

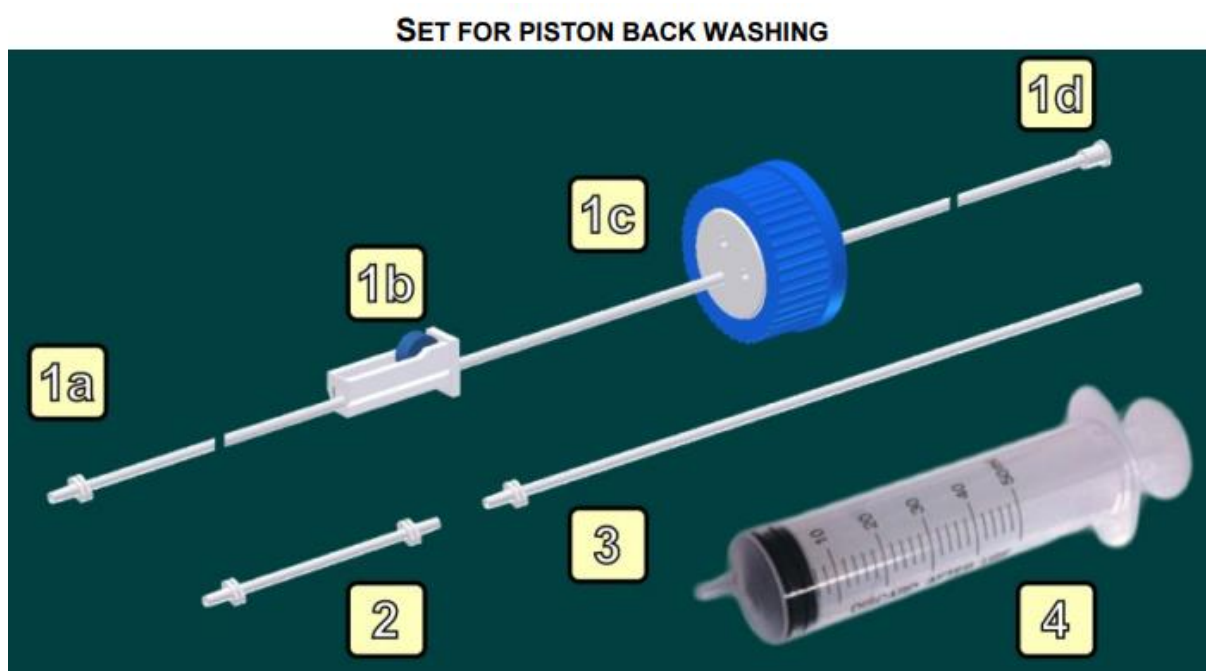
#### 4.5. Connection of Fraction Collector Needle

P/N	Rack Type	Appropriate	Picture
AFAR021X	Rack for 24 tubes, OD 20 mm, volume 40 ml (default)  Rack for 36 tubes, OD 16 mm, volume 21 ml	Needle OD 1/8", ID 2,1 mm, L=57 mm (AFAJ0400) with 1/8"PEEK through screw (00000450) and 1/8" KEL-F ring (00000470).	
AFAR008X	Rack for 48 tubes, OD 12 mm, volume 8 ml	Needle OD 1/16 ", ID 1mm, L = 57 mm (AFAJ0080) with 1/16"PPS through screw (J0055070) and 1/16 "Tefzel™ ring (J0000041).	

## 4.6. Piston Backwash

**Caution: When using buffers or other crystallizing substances in mobile phases, the piston backwash must be rinsed.**

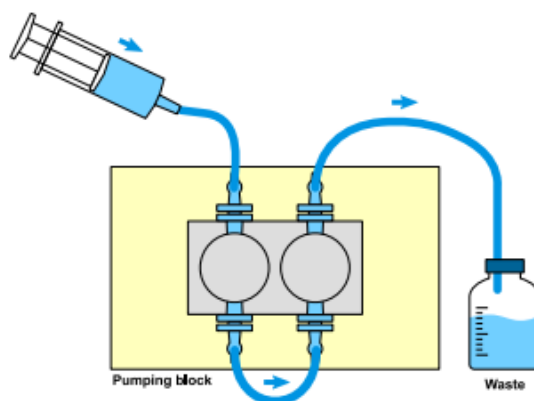
Each pumping block (left and right) has two heads – pumping and washing. Pumping heads are farther from the unit. Washing heads have in upper- and lower-part slot with LUER cone, for connection of piston backwash. Both heads are equipped with a seal (piston padding) and during work with buffer solutions may buffer crystals adhering to the piston may damage the seal and pump can start leaking.



Nr	Description
1a	Inlet part; Luer cone for connecting to backwashing head
1b	Flow regulator
1c	Lid GL45 with plug
1d	Luer cone for syringe connection
2	Coupling of washing heads
3	Outlet into waste system
4	Syringe 50ml

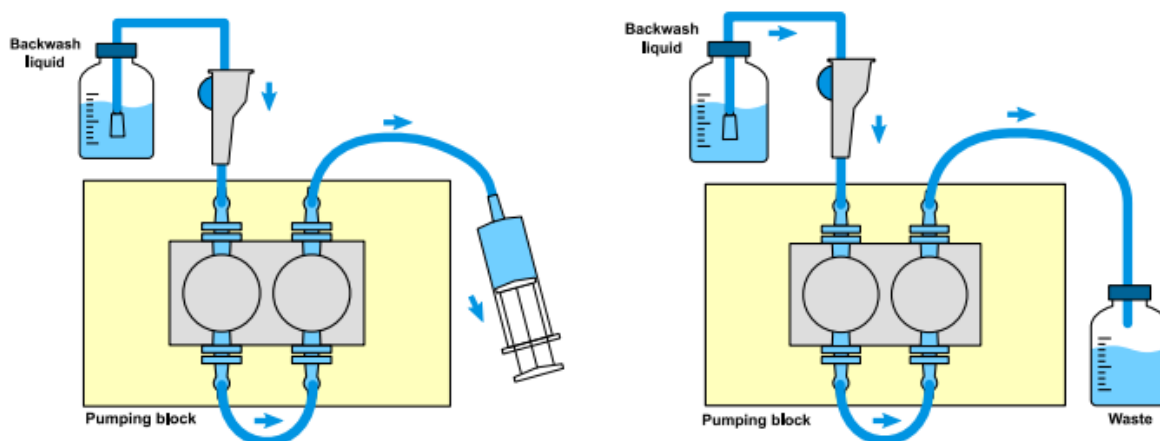
### 4.6.1. Simple Manual Use

Both Washing heads are connected in series using tubing and LUER adapters. A syringe is filled with HPLC water (or mobile phase dissolving buffers) and the heads are washed. Washing heads are now filled with liquid, rinsing the pistons from rear side. Now occasionally during work with the pump some liquid is pushed through the pump to the washing system (approx. 1x per hour).



### 4.6.2. Automatic Backwash

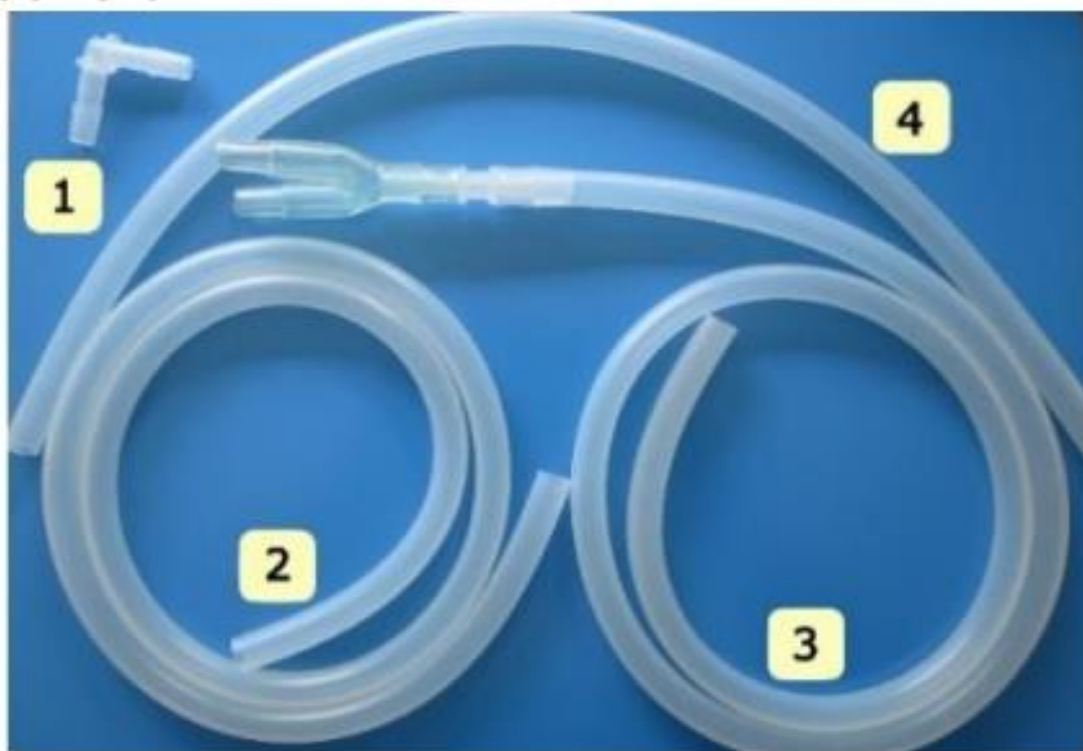
**Both Washing heads** are connected in series using tubing and LUER adapters. The tubing with flow regulator is inserted into the reservoir with HPLC water (or mobile phase dissolving buffers). The flow regulator is loosened, and the liquid is sucked into the system using plastic syringe connected to the other end of the system (left picture). The syringe will be disconnected, and the tubing end will be placed into the waste reservoir. Now the liquid is flowing through the system by gravity (right picture). The flow regulator is set so that at the end of the tubing escapes approx. 5-7 drops per minute.



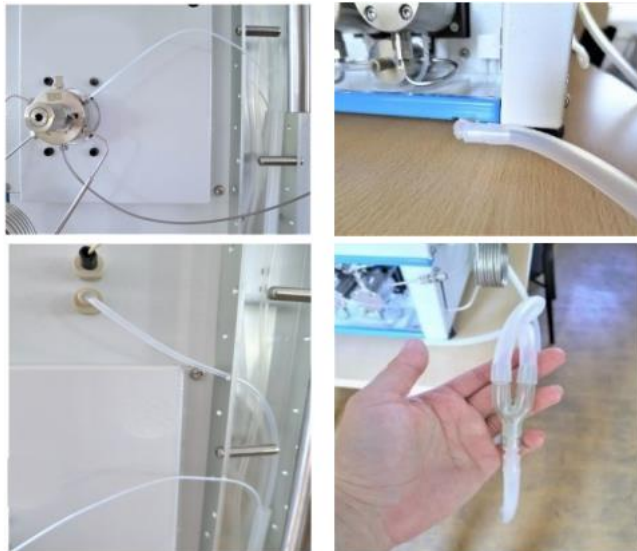


## 4.7. Waste System Assemblage

The waste liquids of the compact system are discharged from three parts - a loop (injection and loop washing), a gradient pump and a fraction collector, possibly from a flush/by-pass valve to a common waste tubing, which then leads to a waste reservoir. A leakage sensor is located near the pump block (see 4.7.1). Leaking liquid from the cell is trapped in a trough located below the cell and flows out of the instrument.



Nr	Description
1	L connector
2	Tubing,
3	Tubing
4	Tubing with I and Y connector



Tubing No. 2 and 4 are formed by cutting off, if necessary, from the end of tubing No. 3 so that the Y-connector of part 3 is placed below the working surface level of at least 10 cm. This prevents liquid accumulation in the tubing. The two tubing are attached to the Y-connector. The shorter tubing is connected to the No. 1 connector which forms a 90° angle to the desktop and is inserted horizontally into the emergency drain channel of the pump with the desktop. The longer tubing serves as a drain for the waste tubing from the loop valve and fraction collector which is passed in the metal U-profile of the instrument

**Caution: Place the connector Y of part 3 at least 10 cm below the desktop**

#### 4.7.1. Leakage

The liquid leak sensor consists of a reference and a measuring sensor. If the measuring sensor is immersed in a liquid, the sensor gives a signal. The Control Screen and status bar will display the message: "Paused, pump leakage"- the method will be paused. If a liquid leak occurs, the liquid leak must first be eliminated, then the liquid drain area and especially the measuring sensor should be dried. Wait at least 1 minute after drying the sensor, then the error message in the Control Screen background and status bar should disappear. The error will not be corrected until the pump is started. The error log is displayed in Menu/Main/Control/Status.

## 4.8. Mains Voltage Connection



The power supply is plugged into the instrument socket on the rear panel. The main power switch is located next to the power cord. It is turned on only after the system has been fully installed

## 4.9. Start up and Quit the Unit

### 4.9.1. Start up the Unit

The switch on the rear panel connects the unit to the mains voltage (230 V, 50 Hz). The unit is switched on by pressing the button on the front panel, which glows red when the power supply is off and green when it is on. If the power supply is interrupted, the power supply will remember the last state of this switch and the last state will be restored when power is restored. The screen lights up and the system automatically enters the menu.

**Caution:** After turning on the instrument, wait approximately 15-30 minutes before starting the analysis to allow the detector lamp to warm up sufficiently (to stabilize the signal). Failure to do so may lead to erroneous analysis.

**Caution:** It is recommended to run-in and stabilize the gradient pump before starting the analyses or after a longer shutdown of the instrument at 100 ml/min pressure 5-10 MPa for about 30 min.

**Caution:** It is recommended to start the gradient pump also with a 25 % concentration setting for each valve for approximately 10 min.

### 4.9.2. Quit the Unit

The unit is switched off by default by pressing the Quit button in the Main Menu. If the instrument is turned off by the front panel button, unsaved changes in the system will not be retained and analysis data may be lost.

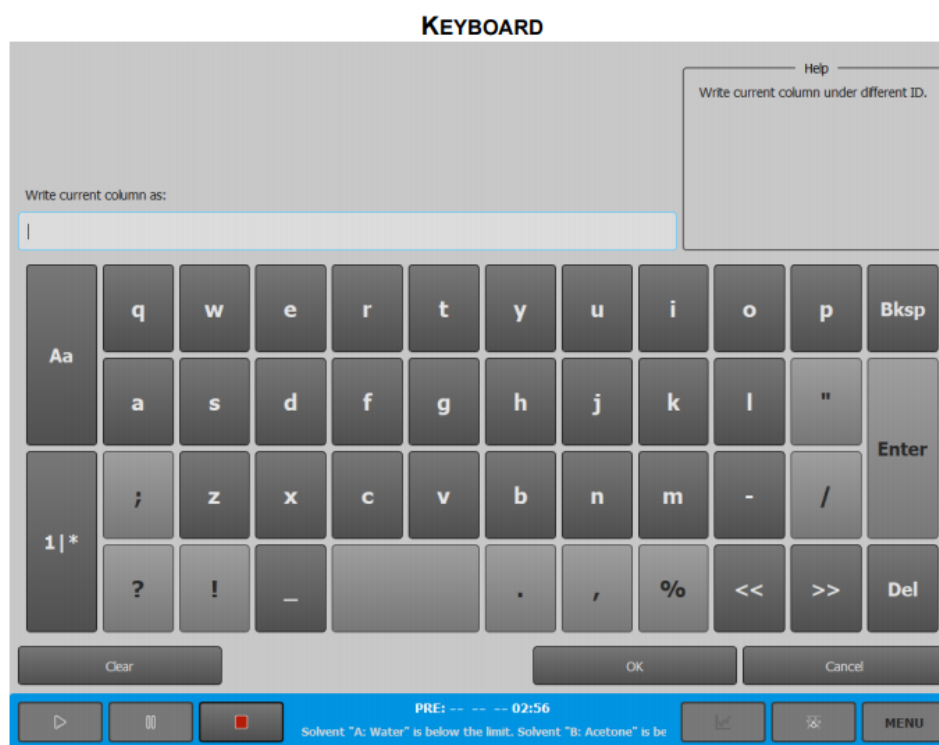
The unit contains a built-in PC display and is touch-controlled. The unit menu is in English.



## 4.10. PC Screen

### 4.10.1. Keyboard Control

The keyboard is a part of a PC display. Light Gray coloured buttons are disabled (unavailable).



KEYBOARD SCREEN

Value/Symbol	Meaning
Aa	Switching between uppercase and lowercase letters.
1 *	Passes on numbers and characters keyboard.
Bksp	Characters after the cursor are removed.
Enter	Confirmation.
Del	Characters before the cursor are removed.
<< /	Moves the cursor forward/backward between characters.
Clear	Removes all characters from the line.
Ok	The name/note is saved and the keyboard screen closes.
Cancel	The action is terminated and the keyboard screen closes.

### 4.10.2. Status Bar

In the status bar there are buttons for the basic controls. It shows the current system status and information about the test method. The status bar is displayed at the bottom part of the display.



STATUS BAR CONTROL

Value/Symbol	Meaning
	RUN button. It is primarily used to run the method (to switch to <i>WAIT FOR A LOAD</i> and <i>RUN</i> mode).
	PAUSE button. It is primarily used to pause the method (to switch to <i>PAUSE</i> mode).
	STOP button. Switches to <i>PAUSE</i> and <i>POST RUN</i> mode.
XX:	Operating mode in which the system persists (see chapter 0).
OFF/ON	Indicates the pump status. <i>OFF</i> indicates that the pump is not pumping. <i>ON</i> indicates that the pump is pumping.
XX ml/min	Current flow rate.
XX.XX MPa	Current pressure.
XX.XX mAU	Current absorbance.

Value/Symbol	Meaning
W / C	C/W valve state. <b>W</b> (W=Waste): fractions are sent to the waste container. <b>C</b> (C=Collect): fractions are collected into the tubes.
MM:SS	The current time of the system state. After the start of the analysis, the calculation starts from 0:00 and equals the length of the method.
	CONTROL SCREEN button, pass to the <i>Control Screen</i> (see 4.10.4)
	SCHEME SCREEN button, pass to <i>Scheme Screen</i> (see 4.10.5)
	MENU button, pass to the Menu screen (see 4.10.3).

### 4.10.3. Menu

Menu is the main screen of the system. It is possible to create, edit and store the necessary data for proper operation of the compact system after switching to other screens. The individual menu items are described in chapter 6.



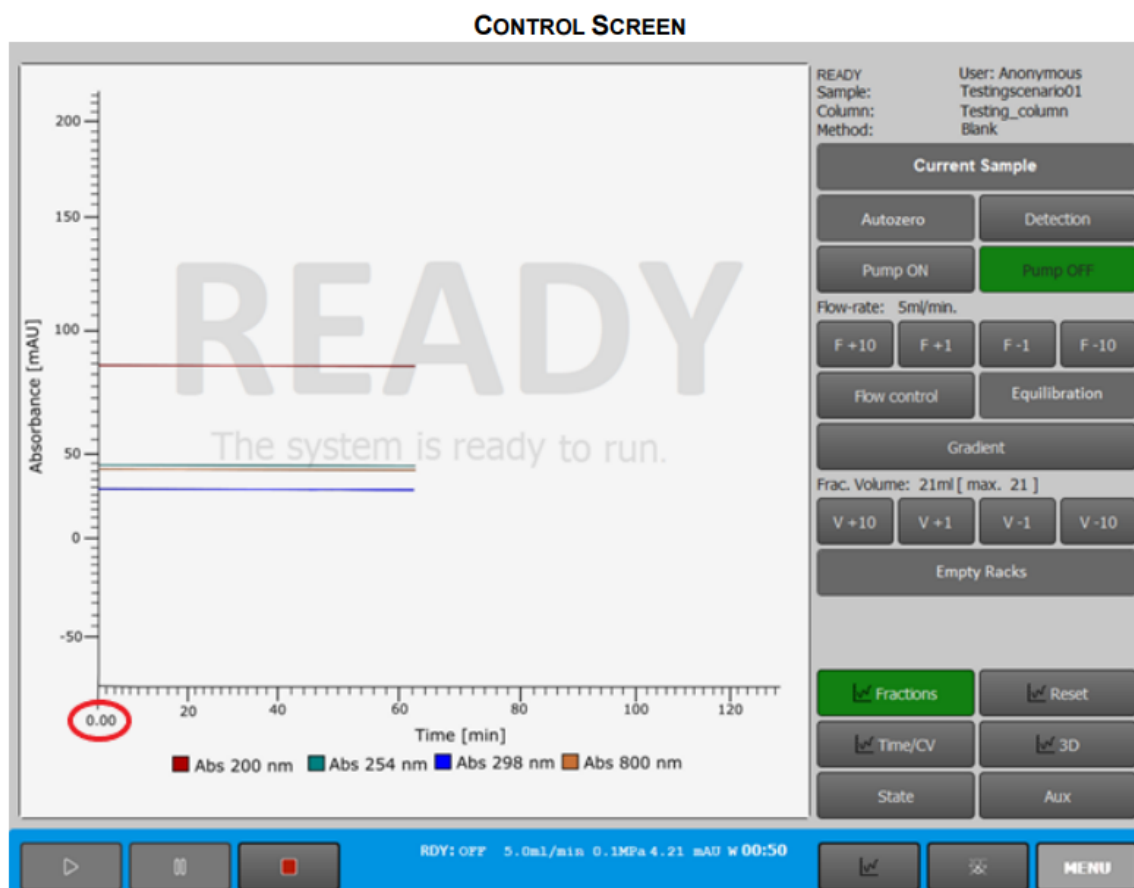
**Note:** The selected button is highlighted in green.

Value/Symbol	Meaning
Main Menu	A field containing items - Main, Files, Setup, and Quit. This field remains constant at all times. Allows access to the next menu structure. <b>Pressing the Quit button switches the unit off.</b> The other buttons are described in chapter 6.
Main	A field name changes depending on the selection of the item's sub-item from the <i>Main Menu</i> .
Control/Settings/Method	A field whose name and menu of other possible buttons changes depending on the selected item in <i>Main</i> .

Value/Symbol	Meaning
Fast Actions	A field that display frequently used buttons, used to quickly navigate to individual screens. The field name does not change.

#### 4.10.4. Control Screen

Control Screen graphically shows the progress of the method. The progress messages are displayed in the background of the chromatogram. It also controls individual parts of the unit, functions for controlling the graphical form of the chromatogram, information on the sample, user, method, column, etc. Individual items are called up by clicking on the button. Zoom in the chromatogram is performed by clicking on the selected zoom location in the chromatogram. To return to the original size, click in the empty space to the left of point 0.00 (see Control Screen picture below).



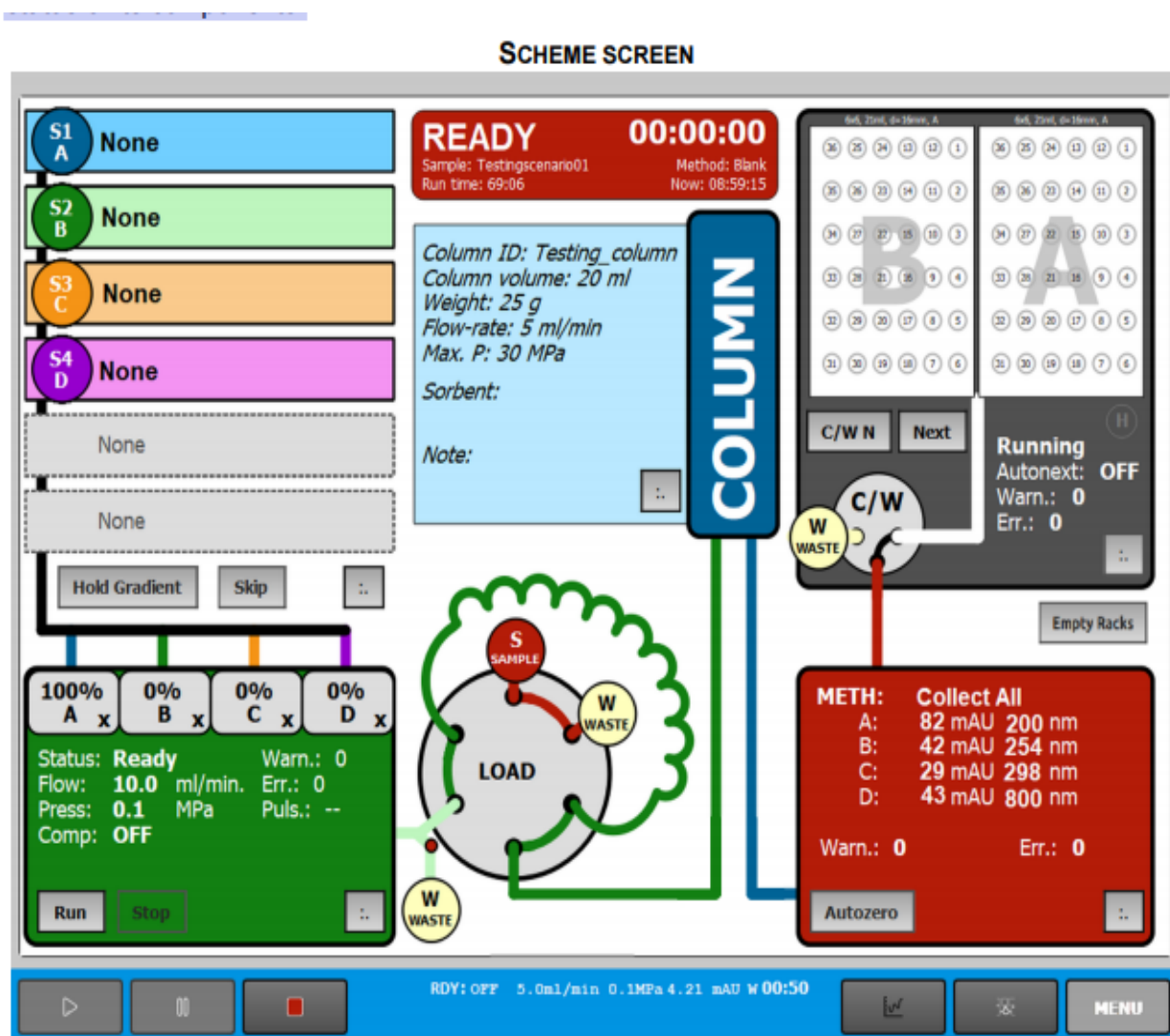
**Note:** Buttons on the screen change according to the state of the system.

Value/Symbol	Meaning
Current Sample	Basic information of sample, user, fraction collector, test method and column that can be edited (see 6.1.1.2) is displayed.
Autozero	Reset the signal of the detector.

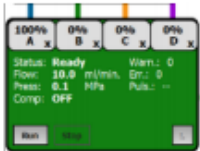
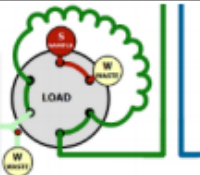

Value/Symbol	Meaning
Detection	The detector settings screen and fraction collector options will open.
Pump on / Pump off	Starting/stopping pumping.
F+10 / F-10 / F+1 / F-1	Fast selection of current flow rate change by +10, -10, +1 and -1 ml/min buttons.
Flow Control	The setup and <i>Control Screen</i> open. It is possible to set up loop valve, flow rate, gradient valve and pump.
Equilibration	The mobile phases <i>S1</i> and <i>S2</i> and the initial and final concentrations of the mobile phases <i>S1</i> in <i>S2</i> or <i>S2</i> in <i>S1</i> are set. Six options (mobile channels) are available for both mobile phases. Pressing the RUN button initiates the equilibration, which is primarily used to exchange the mobile phases in the column, which prepares the column for further analysis.
Gradient (Gradient)	A gradient table, where the percentage of mobile phases at a specific time and flow rate are set, is displayed.
V+10 / V-10/ V+1/ V-1	Quick selection of change of actual volume of collected fraction into tubes by +10, -10, +1 and -1 ml buttons.
Empty Racks	Informing the system about rack replacement/emptying. <b>Racks have to be replaced/emptied manually!</b>
Fractions	The button is automatically turned on during analysis, but can be turned off. If switched on, the filled tubes are displayed in color on the chromatogram during analysis.
Reset	The chromatogram is deleted and is displayed from the beginning.
Time/CV	Switches between the time display and the column volume on the x-axis.
3D	The 3D chromatogram is displayed on the screen.
State	A table showing the current status of the unit's devices is displayed on the screen.
Aux	The pressure record is displayed in the chromatogram.

### 4.10.5. Scheme Screen

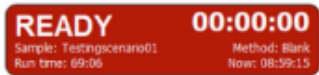
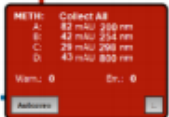
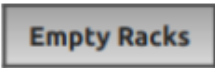

The Scheme Screen shows the wiring diagram of the compact system and the status of its components.




Value/Symbol	Meaning
	<p>Field showing the state of the gradient valve. It is possible to set up to six mobile phases (A-F channels) and solvent name in each channel.</p> <p><b>Hold Gradient:</b> The current concentration in the gradient table will be extended and will remain constant until the Hold button is clicked again.</p> <p><b>Skip:</b> The next step in the gradient table is skipped.</p>

Value/Symbol	Meaning
	<p>Fields showing pump status: Actual concentration of individual mobile phases</p> <p><b>Status:</b> The current status of the pump. The pump may be in the following state: <i>Ready:</i> pump does not pump. <i>Running:</i> pump is pumping.</p> <p><b>Flow:</b> current pump flow.</p> <p><b>Press:</b> current pump pressure.</p> <p><b>Comp:</b> pulsation compensation - not supported yet.</p> <p><b>Warn.:</b> warning messages in the unit. The number of alerts is displayed in integers, the default alert state is 0.</p> <p><b>Err.:</b> unit error messages. The number of errors is displayed in integers, the default error-free state is 0.</p> <p><b>Pulse. (Pulsation):</b> pulsation report. The RUN/STOP buttons start or stop pumping.</p>
	<p>Loop valve diagram. When the sample is injected, <i>LOAD</i> changes to <i>INJECT</i> and the mobile phase flow display changes.</p>
	<p>Marking of the column. Information about the used column is displayed in a blue box:</p> <p><b>Column ID</b></p> <p><b>Column volume:</b> The volume is listed in ml.</p> <p><b>Weight:</b> maximum weight of liquid that the column can hold. Weight is listed in g.</p> <p><b>Flow-rate:</b> current flow rate of the column.</p> <p><b>Max. P (Maximum pressure):</b> the maximum pressure that can be applied to the column. The pressure value is listed in MPa.</p> <p><b>Sorbent</b></p> <p><b>Note</b></p>



Value/Symbol	Meaning
	<p>Fields showing analysis information:</p> <p><b>Operating mode of the method</b> (see chapter 0)</p> <p><b>Sample:</b> the name entered in <i>Menu/Main/Control/Current Sample</i></p> <p><b>Run time:</b> indicates the amount of time the system will remain in the operating mode. Time is in MM:SS format (M = minute, S = second).</p> <p><b>Time:</b> count down the time until the end of the method. The timer is shown in bold and is in HH:MM:SS format (H=hour).</p> <p><b>Method:</b> name of the method.</p> <p><b>Now:</b> HH:MM:SS</p>
	<p>Fields showing detector status and collection mode:</p> <p><b>METH:</b> Collection modes are set in <i>Menu/Main/Method/ Detection</i></p> <p>Absorbance and wavelength for up to 4 channels (A-D)</p> <p><b>Warn. (Warning):</b> warning messages in the unit.</p> <p>The number of alerts is displayed in integers, the default alert state is 0.</p> <p><b>Err. (Error):</b> unit error messages.</p> <p>The number of errors is displayed in integers, the default error-free state is 0.</p> <p>The button AUTOZERO is used to reset the absorbances in the chromatogram.</p>
	<p>By clicking the button, the system is informed about rack replacement/emptying. <b>Racks have to be replaced/emptied manually!</b></p>
	<p>The field displays the status of the fraction collector:</p> <p><b>C/W button N:</b> toggles the valve between sample collection (C = Collect) and waste (W = Waste). After switching back to C, the needle automatically moves to the next tube.</p> <p><b>Next button:</b> the needle will move to the next tube automatically.</p> <p><b>Changeover valve diagram C/W:</b> Flow display changes between C and W.</p> <p><b>Scheme of seagulls A, B:</b> information about tubes and their filling during the method.</p> <p><b>Autonext:</b> not yet supported.</p>



Value/Symbol	Meaning
	<p>Pressing the button opens the window for editing field.</p> <p><b>In the mobile phase field:</b> switches to the Solvents screen.</p> <p><b>In the pump field:</b> switches to the gradient table screen.</p> <p><b>In the column field:</b> switches to the Current Column screen to set or edit the parameters of the currently used column.</p> <p><b>In the fraction collector field:</b> Not supported yet.</p> <p><b>In the detector field:</b> switches to the Detection screen, where the wavelengths for measurement and the mode of collecting fractions in time mode are set.</p>

#### 4.10.6. Date, Time, and Other Parameters Settings

General parameters are set in *Menu/Setup/System/General Settings*.

Settings	Is set
Delay volume Detector – Fraction collector	Dead volume of tubing (volume of tubing between the detector and the fraction collector).
Loop volume	Volume of the loop.
Upper Pressure limit	Maximum pressure limit.
Startup state	Not supported yet.
System date	Year, month and day (YY:MM:DD).
System time	Hours and minutes (MM:SS).

Pressing the Apply button will overwrite the set parameters and then press the OK button to go back to the *Menu*.

## 4.11. Collection

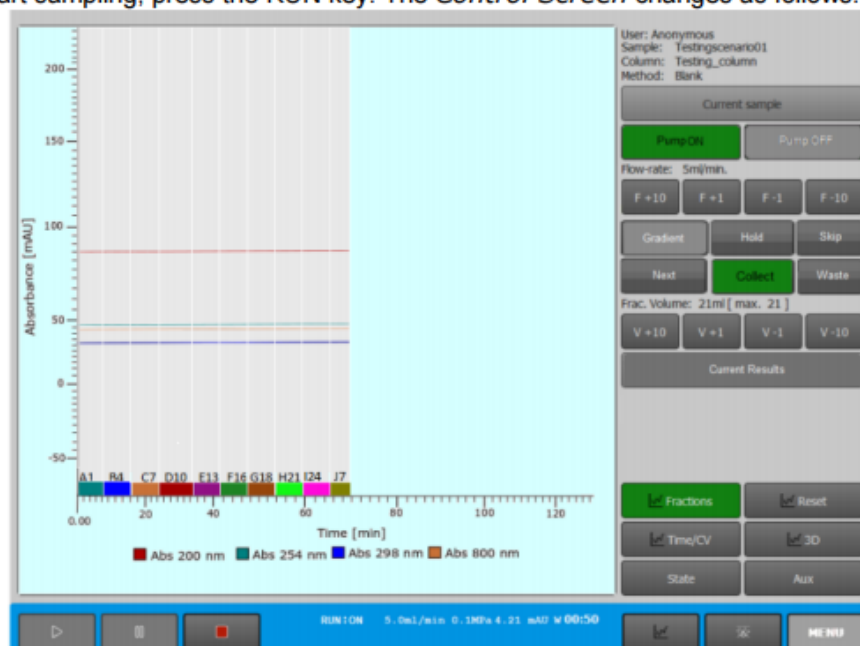
### 4.11.1. Collection in Time Mode

The described sample collection in the chapters below proceeds without connection to a higher control system (e.g. PC).

### 4.11.2. Collection in Collect All Mode

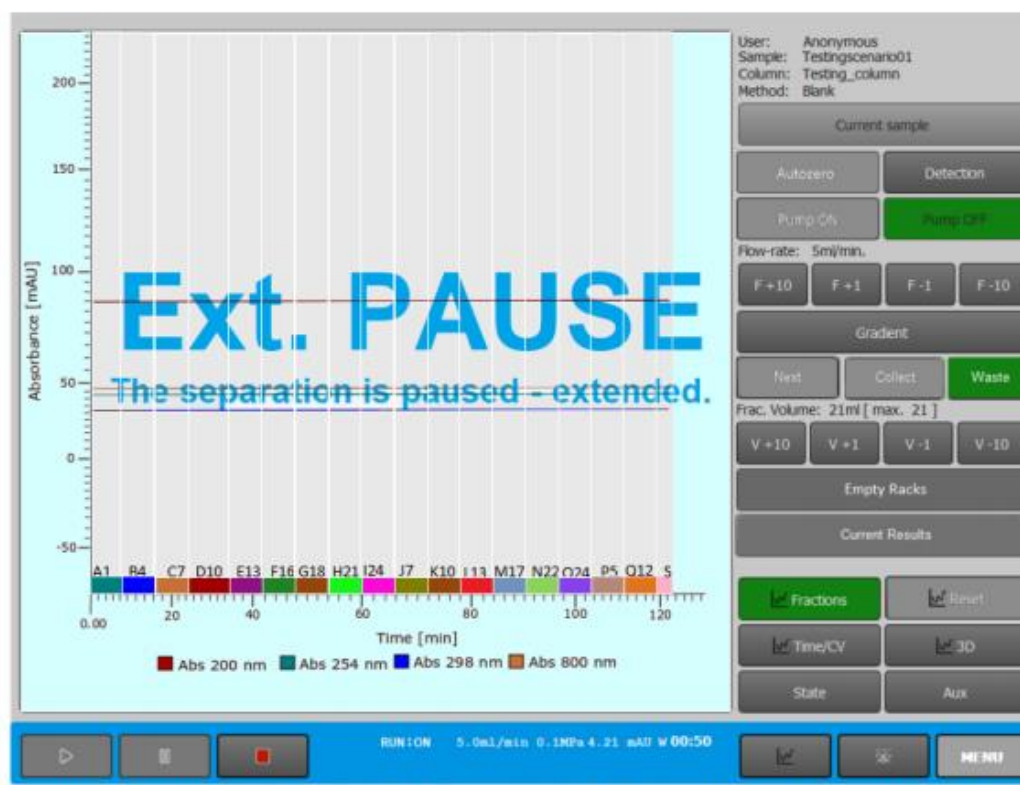
Fraction collecting in time mode is done by moving the fraction collector needle over the tubes according to the set parameters in the instrument, which are entered in Menu/Main/Control, Menu/Main/Settings, Menu/Main/Method. Disabled (unavailable) buttons are light grey.

To start sampling, press the RUN key. The *Control Screen* changes as follows:



The fraction collector needle is automatically set above the first tube of the set rack type in *Menu/Main/Control/Current Sample*. The time starts counting. The fraction collector valve is switched to waste (W). Collection begins by switching the C/W valve into the tube (C) and visually begins to fill the tubes on the *Scheme Screen* in the upper right gray box showing the Fraction collector (see 4.10.5).

Fraction collection ends and the switching valve switches to waste (W) after the set time (quantity) in the gradient table in *Menu/Main/Method/Gradient* has elapsed. The message "Extended Pause - The separation is paused - extended" appears on the *Control Screen* background.



Fraction collection of the collected volume ends. Time countdown stops. The needle returns above the first rack tube. Then, either the STOP button is pressed, and the system enters POSTRUN mode or the RUN button is pressed, and the system enters EXTENDED RUN mode.

#### **Changing the screen after selecting the next step and describing the operation of the unit**

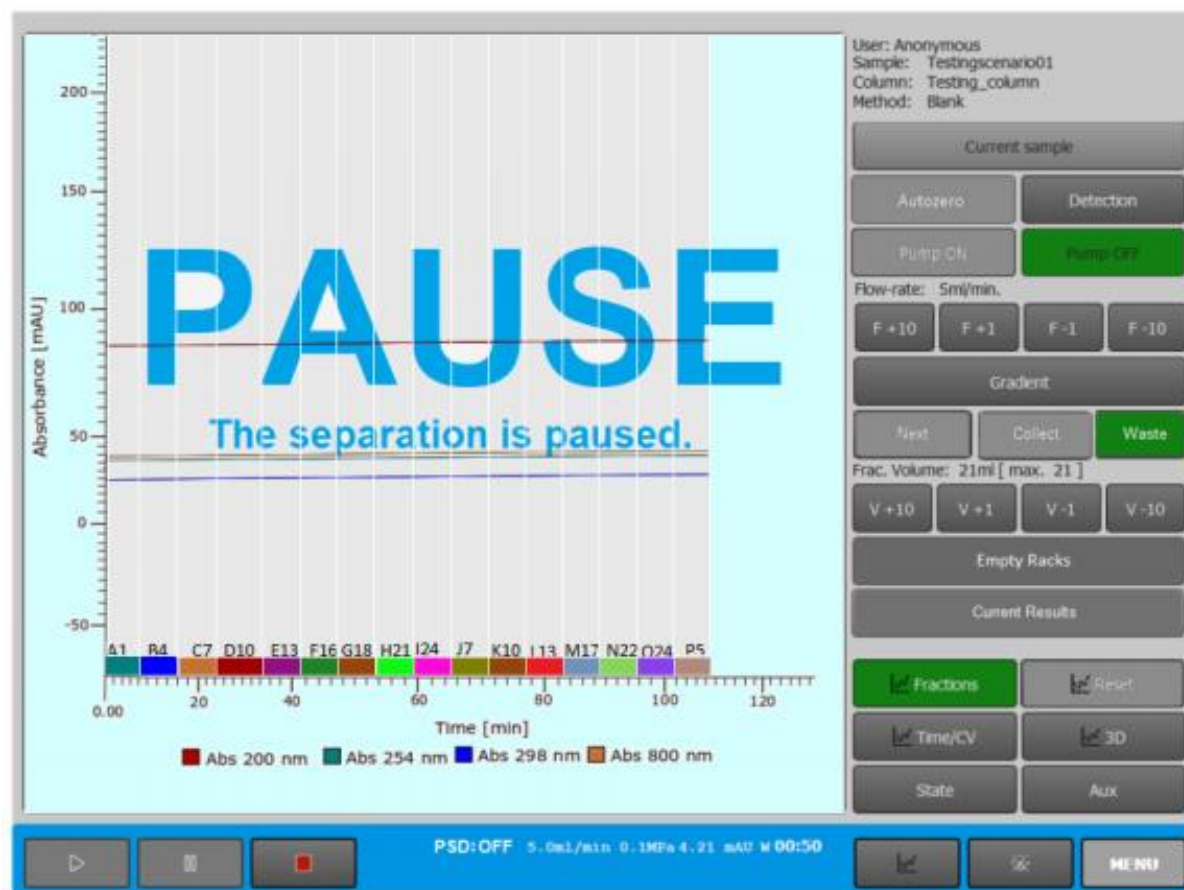
##### **1 IN POSTRUN MODE:**

The run ends and the arm is returned to the Home position. The countdown of the time after pressing the STOP button stops. Pressing the Current Results button displays a file with the results of the measurement.

##### **2 IN EXTENDED RUN MODE:**

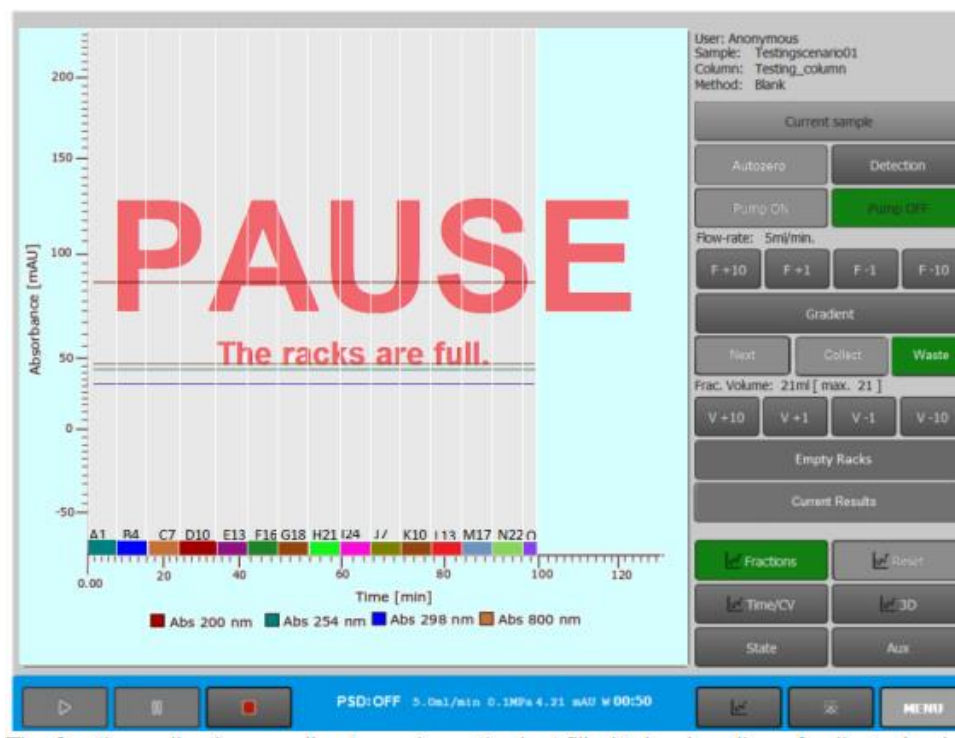
The run is terminated and the arm returns to the Home position. Fraction collection starts again from the selected tube according to the set parameters.

The collection is paused and the valve is switched to the waste by pressing the PAUSE button.



The fraction collector needle stays above the last filled tube. Loading of collected volume and time will be paused. By pressing the RUN button will return the system to the fraction collection mode. Press NEXT button to change the needle position above the tubes.

After filling all tubes in racks, A and B, the system will pause the fraction collection and switch the switching valve to the waste. The message "PAUSED - The racks are full," appears on the Control Screen background.



The fraction collection needle stays above the last filled tube. Loading of collected volume and time will be paused. Press the NEXT button to change the needle position above the tubes.

By pressing the Empty Racks button on the Control Screen, the system will receive a message that the racks have been emptied or replaced, and the method will start again.

The collection can be stopped at any time by pressing the C/W button (pressing again will start the collection again). The C/W valve is switched to waste (W) (to tube (C)). The arm stays above the last filled tube or moves to the next one (according to the Auto next setting). Pressing the NEXT button moves the arm to the next tube. Pressing the RUN button will stop the collection and follow the next menu.

Even while the fraction collector is running, you can press the NEXT button to move the arm to the next tube regardless of the fill level.

Press the RUN button to start the collection. The collection ends and the switching valve switches to waste with the same commands as in the Collect All mode.

Again, there is the possibility of control by the C/W and NEXT buttons. 4.11.2. Based on the signal from the detector

Collection based on the signal from the detector takes place in various collection modes, which are set in Menu/Main/Method/Detection (see 6.1.5).

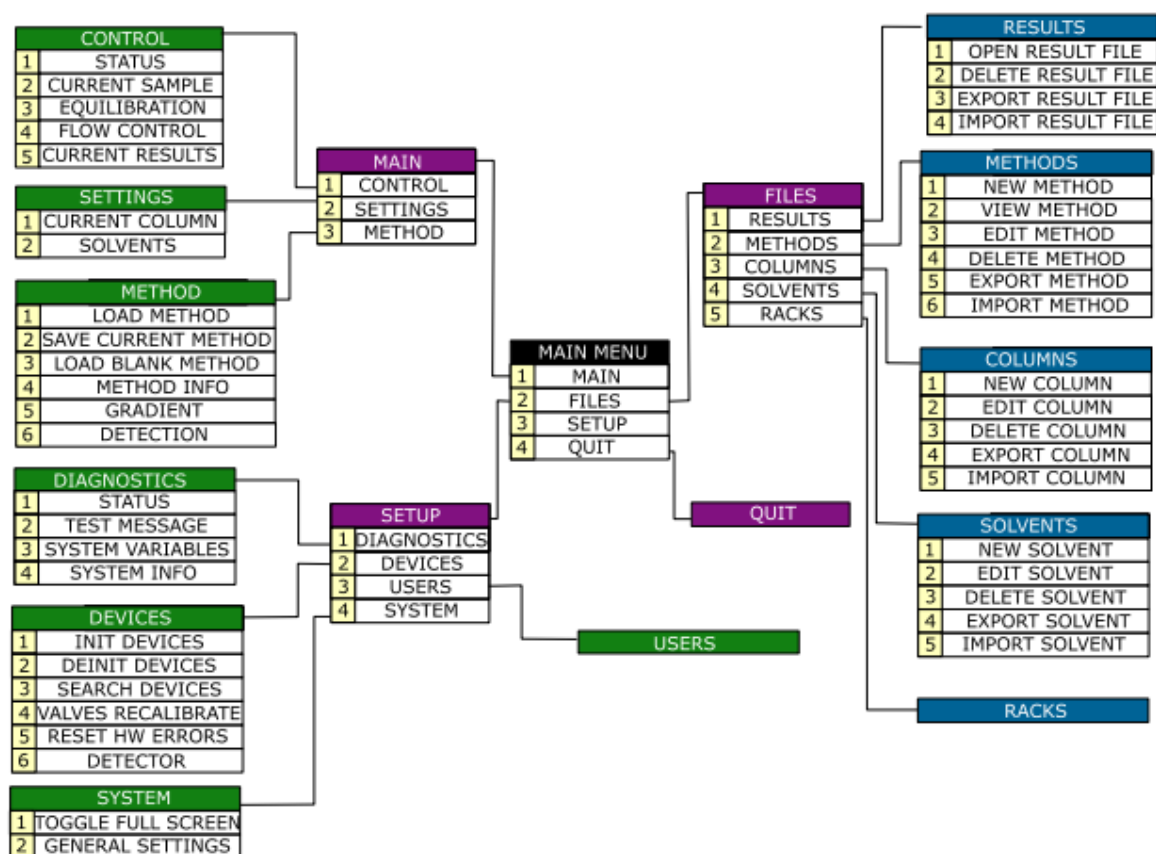
## 5.0. STARTUP OF THE UNIT

After switching the unit on, the main menu for operating the unit is displayed. Calibration of individual parts of the unit in the system is not necessary.

## 6.0. WORKING WITH MENU

The menu field is called up by pressing the Menu button. The description and the dependence between individual fields is described in 4.10.3

**MENU DIAGRAM**



### 6.1. Main

Primarily, the parameters of the method that will be used in the analysis of samples are set, as well as the column settings, sample information and results.



### 6.1.1. Control

In the item Control you can find the sub-items Status, Current Sample, Equilibration, Flow Control and Current Results.

#### 6.1.1.1. Status

A screen showing actions, errors, and system state logs. If an error occurs, a red error message appears on the status screen.

#### 6.1.1.2. Current Sample

The screen is used to set information about the sample, the user, used racks (both racks must be the same), as well as to select or create or edit the column and the methods to be used in the measurement.

**CURRENT SAMPLE SCREEN**

Current sample setup

Sample: AS\_999 System ID: 1802 System time: 12:52 2019/12/09

User: AS Inj. Type: Loop Estimated: 00:20:00

Note:

Rack type: 4x6, 40ml, d=20mm, A Fraction collector: 40 ml +10 +1 -1 -10

Gradient Flow-rate: 20 ml/min; CV: 20 ml; Expected Collect Duration: 20 min. || 1\*Rack: 960ml / 48.0CV / 48min. || Needed: 1

Column: /home/antonin.spurny/ecs/columns/ColumnOmega.cfm Select Blank

Column ID: ColumnOmega; Column volume [ml]: 20; Weight [g]: 0; Flow-rate [ml/min]: 20; Max. P [MPa]: 2; Sorbent: ; Note: Save as Edit

Method: /home/antonin.spurny/ecs/methods/gama.mth Select Blank

Desc: Initial waste: 0.00 [CV], Signal: AbsorbanceA, Method: Level, Fractionation: Valley. File: gama.mth  
Gradient: 2 rows, Solvents: Water TFA, Methanol, Acetonitrile, iso-Propanol, Acetone, Chlorophorm  
Detection: Initial waste: 0.00 [CV], Signal: AbsorbanceA, Method: Level, Fractionation: Valley. ... Save as Info

Detection Gradient Solvents Return

RDY: OFF 20ml/min 0.0MPa 201nm -26mAU W04:13 MENU

Value/Symbol	Meaning
Sample	The sample name will be filled.
System ID	Identification number assigned to each system by the manufacturer.
System Time	Corresponds to the set time in <i>Menu/Setup/General Settings</i> . Not supported yet.

Value/Symbol	Meaning
User	Enter the name of the user operating the instrument when performing the analyzes.
Inj. Type	The injection method is selected <b>Loop:</b> The sample will be injected into the loop and then loaded onto the column. <b>Column:</b> The sample will be injected onto the column. More detailed information in 8.9.4.
Estimated	Estimated time of analysis.
Note	A note will be filled in..
Rack Type	The roller shutter needs to be used to select the rack type: <b>4x6</b> tubes, OD 20 mm, volume 40 ml <b>6x6</b> tubes, OD 16 mm, volume 21 ml <b>8x6</b> tubes, OD 12 mm, volume 8 ml
Frac. Volume	Use the +10, -10, +1, -1 buttons to adjust the volume of the fraction collected into the tubes in ml.
Column	The buttons are used to select the desired action: <b>Select:</b> An existing column is selected from the list. <b>Blank:</b> A new column is added. <b>Save as:</b> The new column is saved under the selected name. <b>Edit:</b> A column is selected from the list and can be edited subsequently.
Method	The buttons are used to select the desired action: <b>Select:</b> An existing method is selected from the list. <b>Blank:</b> A new method is added. <b>Save as:</b> The new method is saved under the selected name. <b>Edit:</b> A method is selected from the list and can be edited subsequently.
Detection/Gradient/Solvents	The user will be moved to the selected screen.
Return	Return back to the menu.



### 6.1.1.3. *Equilibration*

Equilibration is used primarily for the exchange of mobile phases in the column. This will prepare the column for further analysis.

**EQUILIBRATION SCREEN**

<b>Value/Symbol</b>	<b>Meaning</b>
Solvent S1/S2	Mobile phase S1/S2. Six options (mobile channels) are available for both mobile phases.
Flow-rate	Current flow in equilibration.
Begin step	Concentration of the mobile phase S2 in S1 in the initial equilibration step.
Gradient Pass	Gradient pass between mobile phases S1 and S2.
End step	Concentration of the mobile phase S1 in S2 in the final equilibration step.
Duration	The duration of equilibration is given in CV (Column volume).
State	Current equilibration state.
Phase	Current equilibration phase (step) (Begin step/Gradient Pass/End step).
Estimated	Estimated time to the end of the current equilibration phase.
Concentration	Current concentration of mobile phase S1 in S2 given in %.
Loop valve	The loop valve position is selected. (LOAD/INJECT).
Column valve	The column valve position is selected. (COLUMN/BYPASS).
Run button	Press to start equilibration.
Pause button	Press to pause equilibration.
Skip button	Press to skip from the current equilibration step to the next step.
Stop button	Press to stop equilibration.

Press the Return button to return to the Menu. Pressing the Solvents button takes the system to the Solvents screen (see 6.1.2.2).

#### 6.1.1.4. Flow Control

The screen is primarily used to edit the parameters of the gradient valve and pump flush.

FLOW CONTROL SCREEN

Value/Symbol	Meaning
Loop valve	<b>Load:</b> the loop valve will be in the pre-injection state. <b>Inject:</b> the loop valve will be in the injected state.
Column Valve	For a preparative system, the fields in this row should be disabled.
Flow-rate	Use +10; +1; -1, -10 buttons to change the flow rate (in ml). Pressing the ignore Pressure button ignores the column limit pressure. Pressing the from Gradient button overwrites the flow rate set in the gradient table (see 6.1.4). Pressing the from Column button overwrites the flow rate set in the information about the currently used column (see 6.1.2.1). The Purge button is unavailable.
Solvent Names	Mobile phase names are displayed.
Remaining	Remaining volume of the mobile phase.
Set 100 %	The A-D button set the concentration of 100% mobile phase on respective channel. The 25 % and 50 % buttons are used to quickly select concentrations.
Concentration	The current concentration of the mobile phases on the respective channels is displayed.
Gradient starts at:	Concentration of mobile phases corresponding to the zero row in the gradient table.
from Gradient	The concentration of the mobile phases is set, which corresponds to the zero row in the gradient table.
Custom conc.	Button is disabled.
Reset counter	The counter is reset.
Total	The sum of the volumes of the mobile phases flowing through the pump.
Pump ON/OFF	The pump starts/stops pumping.

#### 6.1.1.5. Current Results

The current results of the method are displayed. There are optional buttons in the right column of the screen. Depending on the selection, the selected data are displayed/disappeared on the screen. Optional Data - Options, Chart Fractions, Chart Gradient, Chart Auxiliary, Gradient Table, Racks, Time / CV), Export to PDF. Press the desired button to select. To cancel the selection, press the button again. The selected button is displayed in green.

### 6.1.2. Settings

Set up and adjustment of the currently used column and mobile phases (see 6.1.2.1 and 6.1.2.2)

#### 6.1.2.1. Current Column

The parameters of the selected column are set – Column ID, Column volume, Weight, Flowrate, Max. Pressure, Sorbent and Note.

#### 6.1.2.2. Solvents

The parameters of the mobile phases, storage bottles and waste container are set.

**SOLVENTS SCREEN**

Value/Symbol	Meaning
Solvent A-F	The mobile phase is selected from the menu after clicking the roller shutter. The current volume of the used mobile phase (0-100000 ml) is written in the field of the row. When working with the same mobile phases, it is not necessary to re-write the current volume of mobile phases when the new method is started; based on a gradient table, the system calculates the mobile phase consumption during the method and then subtracts it from the existing volume. The volume in the gray box of the row is the same as <i>Reservoir</i> . If the current volume of the mobile phase equals the volume of the Reservoir, pressing the gray box overwrites the value of the storage bottle volume to the field with the current volume of the mobile phase. Check to select the desired channels.
Minimum	Minimum mobile phase volume (0-100000 ml).
Reservoir	Volume of the storage bottle in which the mobile phase is stored (0-100000 ml).

Value/Symbol	Meaning
Reaction	<p>In the event that the mobile phase falls below the minimum volume of the mobile phase, the system reacts in the selected manner in the roller shutter.</p> <p><b>Off:</b> The system is not responding.</p> <p><b>Warning:</b> The status bar displays the message "Solvent" A: Name of solvent "is below the limit."</p> <p><b>Pause:</b> The system enters PAUSE state. On the <i>Control Screen</i> and in the status bar is displayed message: "Pause - Solvent A: Name of the solvent is below the limit." Subsequently, the message: "Pause - An error has been detected, look into status and continue, " is displayed.</p>
Maximum	Maximum volume of waste container (0-100000 ml).
Volume	Actual volume of waste liquid in the waste container (0-100000 ml).
Empty	After removing the waste liquid from the waste container, press the button. The value in the Volume field is overwritten to 0.

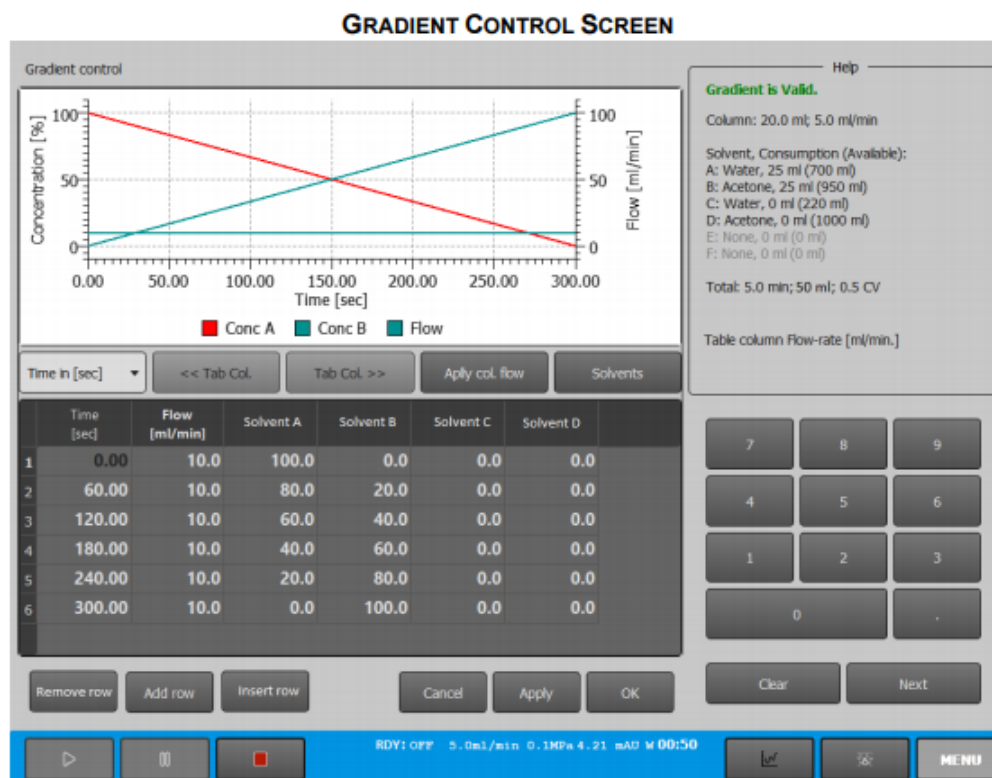
### 6.1.3. Method

This item performs work operations related to the creation, retrieval, and information about used methods.

Value/Symbol	Meaning
Load method	The method menu opens.
Save current method	Save the newly created method.
Load blank method	A new method is loaded and automatically saved as Blank. Subsequently, other parameters are entered in the menu (see 6, 6.1.4, 6.1.5.)
Method info	A screen with information about the currently used method appears.

### 6.1.4. Gradient

The gradient table is displayed, along with a preview of the gradient.



### GRADIENT SCREEN

Value/Symbol	Meaning
Time in [ ] / Span in [ ]	<p>A menu roller shutter is displayed with a menu of time entry options for each step.</p> <p><b>Time in [sec]:</b> time in seconds.</p> <p><b>Time in [min]:</b> time in minutes.</p> <p><b>Time in [ml]:</b> time in milliliters.</p> <p><b>Time in [CV]:</b> time in column volume.</p> <p><b>Span in [sec]:</b> interval in seconds.</p> <p><b>Span in [min]:</b> interval in minutes.</p> <p><b>Span in [ml]:</b> interval in milliliters.</p> <p><b>Span in [CV]:</b> interval in column volume.</p>
Tab Col.	The button only works if one of the solvent columns is selected. The volume concentrations of the two columns are substituted.
Apply col. flow	Possibility to set actual column flow rate. The flow rate is given in ml/min.

Value/Symbol	Meaning
Solvents	The screen for setting up or editing the mobile phases is displayed. The screen is the same as <i>Menu/Main/Settings/Solvents</i> .
Time	A column showing the time at which the concentration of each mobile phase changes. The units and column name vary depending on the selected item in the Time in [ ] roller shutter.
Flow	Pump flow rate from 0.0-300.0 ml/min.
Solvent A-D (A-F)	Column indicating concentration of mobile phases at a certain time, volume, etc. Concentration is given in percent, in the range 0-100 %. The sum of the concentrations of all mobile phases in one row of the gradient table must be equal to 100 %. When 100 % is exceeded/not reached, the row turns red.
Remove row	The selected gradient table row is deleted.
Add row	A new gradient table row is added to the end of the table.
Insert row	A new gradient table row is inserted between two existing rows.
Help	Field showing basic information about the column and its current flow rate, mobile phases and calculated total run time of the method, the volume of mobile phases that will be consumed in the method and the volume that will flow through the column in the method.

### 6.1.5. Detection

#### DETECTION SCREEN

Value/Symbol	Meaning
Signal A-D	Any wavelength in the range of 200-800 nm is set.
Sum () in range	Check to add all signals in the entered range. Not supported yet.
Visible	Check to display the signal graphically in the chromatogram record on the <i>Control Screen</i> .
Math	Mathematical operations performed between wavelengths. Not supported yet.

In this sub-item it is possible to open, edit, delete, or move files in its sub-items.



## FRACTIONATION

Value/Symbol		Meaning
Method	Volume	The fractionation is driven by the set volume of the collected fraction (fraction volume).
	Shoulder	When the system detects the shoulder, it automatically moves to the next tube and begins collecting the sample. It fractionates on rising/falling shoulders and double fractionates on valleys.
	Valley	Collection takes place in the valley (local minimum) of the peak -fractionates on valleys.
Shoulder		The signal slope value from 0-1000 mAU/CV is entered.

## COLLECTING

Value/Symbol		Meaning
Initial Waste		Dead volume.
Method	Manual	The start and end of the sample collection are performed by the user. The collection is driven only by the C/W valve.
	Collect All	After initial waste the system starts to collect everything. Default settings.
	Level	Collection is controlled by a signal from the detector based on the mAU signal level. Collection starts/is stopped when the detector signal is at or above the selected value.
	Slope	Collection is controlled by a signal from the detector based on the mAU signal level and the mAU/CV signal slope. Collection will start running (stop), if the detector signal increase (decrease) is at the same level or higher (lower) than the selected value.
	Slope over Level	Collection is controlled by a signal from the detector based on the mAU signal level and the mAU/CV signal slope. Collection will start running (stop), if the detector signal is at the same level or higher than the selected value and at the same time if the detector signal increase (decrease) is at the same level or higher (lower) than the selected value.
Level		The absorbance value from 0-1000 mAU is entered.
on signal		The level, slope, slope over level signal is set for channel A, B, AB.
Slope		The signal slope value from 0-1000 mAU/CV is entered.

Value/Symbol		Meaning
Valley		The signal slope value from 0-1000 mAU/CV is entered.

## 6.1.6. Method of collecting samples

### 6.1.6.1. Manual Collection

Manual collection is started and stopped manually by operating with a C/W valve.

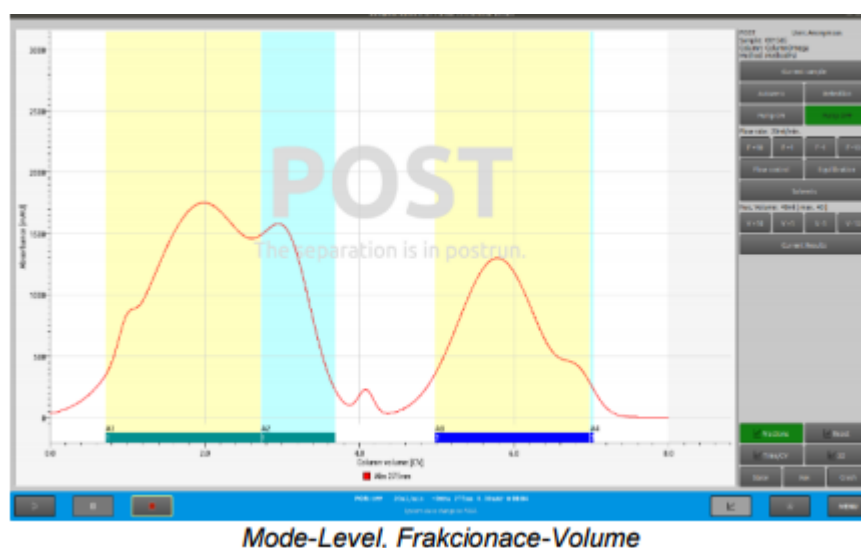
Fractionation is driven by a selected fractionation method, but the default setting is the Volume method – a test tube is filled with a collected sample with an identical volume, which was set (written) in the Menu/Main/Control/Current Sample in a Fraction collector section in a Frac. Volume field. It is possible to switch to another test tube at any time by pressing Next button in the Control and Scheme Screen (see 4.10.4 and 4.10.5).

### 6.1.6.2. Collect All

The collection of everything is started after the initial waste.

### 6.1.6.3. Level

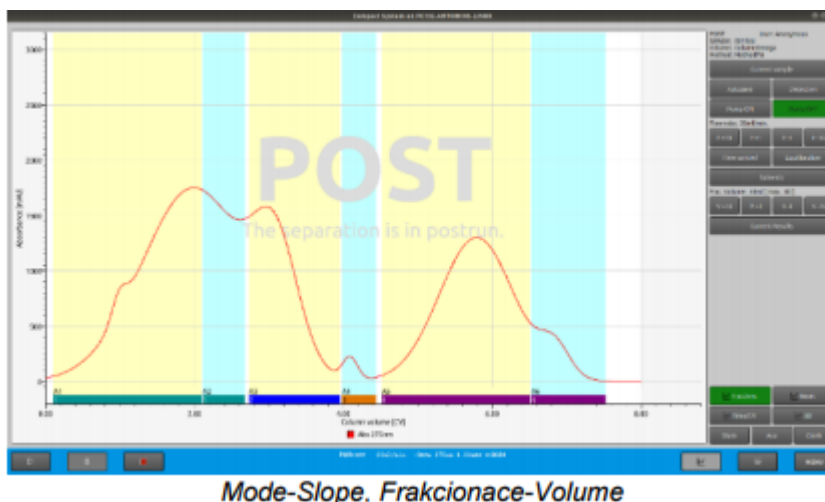
When the collection is started depends on the calculated level that is based on the signal from the UV det



### 6.1.6.4. Slope

When the collection is started depends on the calculated slope that is based on the signal from the UV detector. The minimum signal slope is set (written) in Menu/Main/Method/Detection in the Collection section in the Slope field (1-6000 mAU/CV).

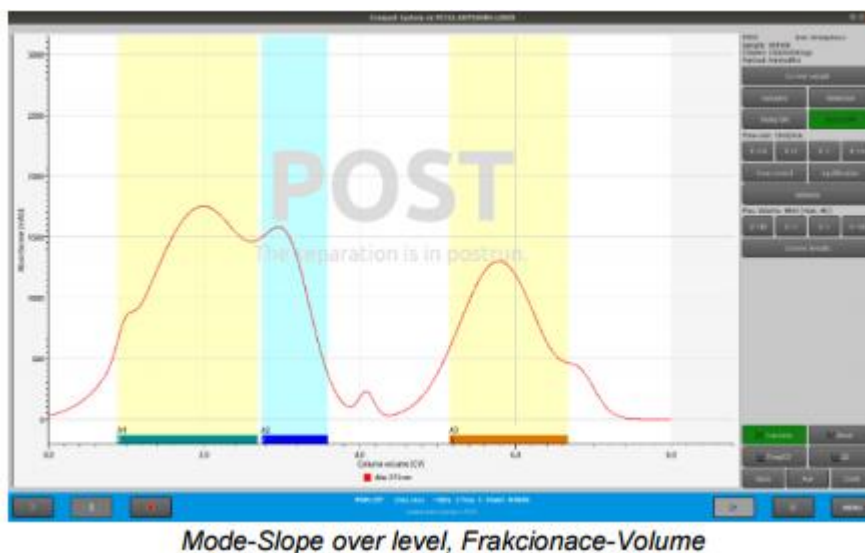
The collection is stopped when the signal slope is below the set minimum. The default value of the signal slope is 100 mAU/CV



#### 6.1.6.5. Slope over level

When the collection is started depends on the calculated slope and level that are based on the signal from the UV detector. The minimum signal slope and level are set (written) in Menu/Main/Method/Detection in the Collection section in the Level and Slope field (1-6000 mAU/CV).

The collection is stopped when the signal level or slope falls below the set minimum. The default value of the signal level is 30 mAU and of the slope is 100 mAU/CV.



### 6.1.7. Fractionation methods

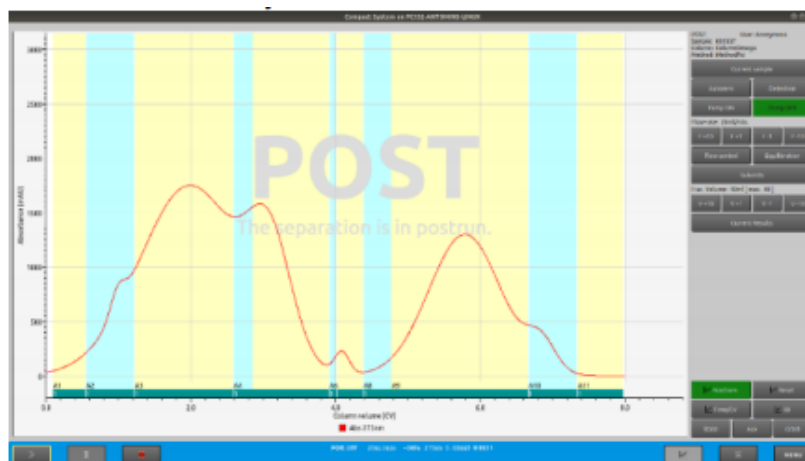
#### 6.1.7.1. Volume

A test tube is filled with a collected sample with an identical volume, which was set (written) in the Menu/Main/Control/Current Sample in a Fraction collector section in a Frac. Volume field. It is possible to switch to another test tube at any time by pressing Next button in the

Control and Scheme Screen (see 4.10.4 and 4.10.5).

### 6.1.7.2. Shoulder

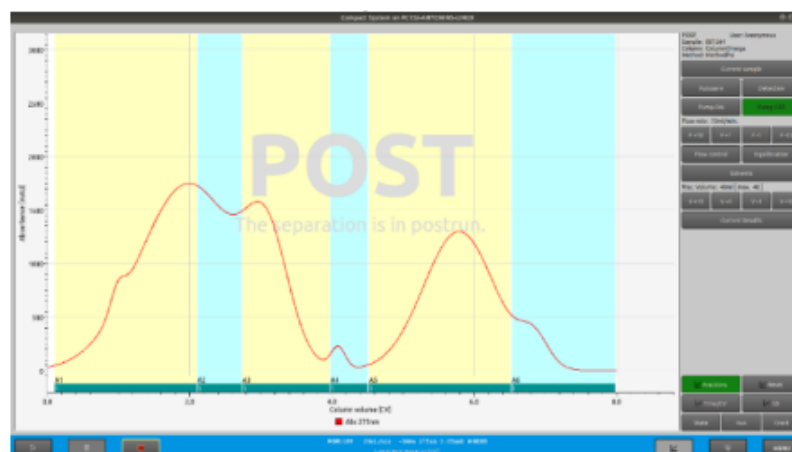
The fractionation is started when a rising/falling shoulder is detected, and the double fractionation is started when the valley is detected.



*Mode-Collect All, Frakcionace-Shoulder*

### 6.1.7.3. Valley

The fractionation is started when a valley is detected.



*Mode-Collect All, Frakcionace-Valley*

## 6.2. Files

In this item it is possible to open, edit, delete, or move files in its sub-items.

### 6.2.1. Results

In this sub-item you can open, edit, delete, or move files in its sub-items.

RESULTS SCREEN

Value/Symbol	Meaning
Open result file	The measurement results menu opens. Clicking on the selected file opens the same screen as for <i>Current Results</i> , only with the completed method. Press OK button to confirm.
Delete result file	The measurement results menu opens. After clicking on the selected file and confirming the action by pressing the OK button, the file will be deleted.
Export result file	A USB drive is connected to the unit. The desired file is selected and exported by pressing Export to PDF button. The following screen displays: "PDF was successfully exported to: /xxx/XXXXX/XXxxx/as file: xxxxx.pdf"
Import result file	A USB drive is connected to the unit. The desired USB file is selected from the connected USB disk and then imported into the system. Not supported yet.

### 6.2.2. Methods

This sub-item performs operations related to creating, displaying, editing, deleting, and moving files in its sub-items.

METHODS SCREEN

Value/Symbol	Meaning
New method	Not supported yet.
View method	A list of available methods in the system is displayed. The desired method is selected and confirmed by pressing the OK button. Relocation is performed automatically from the menu to the <i>Method Info</i> screen, where you can find all information about a specific method.
Edit method	A list of available methods in the system is displayed. The desired method is selected and press OK to confirm. The menu is automatically moved to the table, where the required parameters are modified.
Delete method	A list of available methods in the system is displayed. The desired method is selected, confirmed by pressing the OK button for deletion and selection. The method will then be removed.
Export method	A USB drive is connected to the unit. Select the desired method to export and click the Export to USB Drive button.
Import method	A USB drive is connected to the unit. Select the desired method to import. Not supported yet.

### 6.2.3. Columns

This sub-item performs operations related to opening, editing, deleting, and moving files in its sub-items.

**COLUMNS SCREEN**

<b>Value/Symbol</b>	<b>Meaning</b>
New column	The screen for creation of a new column is displayed. Enter the required parameters of the used column - column identification name (ID), column volume, flow rate, maximum column pressure, solvent and note. Press APPLY to overwrite. After pressing the OK button, a column for entering the column ID is displayed. After typing, the system automatically returns to the menu.
Edit column	The editing screen for editing the parameters of the selected column is displayed.
Delete column	A list of available methods in the system is displayed. The desired column is selected and the selection is confirmed by pressing the OK button. The column is then removed.
Export column	Not supported yet.
Import column	Not supported yet.

#### 6.2.4. Solvents

This sub-item performs the operations associated with creating, editing, deleting, and moving files in its sub-items.

**SOLVENTS SCREEN**

<b>Value/Symbol</b>	<b>Meaning</b>
New solvent	Not supported yet.
Edit solvent	Not supported yet.
Delete solvent	Not supported yet.
Export solvent	Not supported yet.
Import solvent	Not supported yet.

#### 6.2.5. Racks

Not supported yet.



## 6.3. Setup

In the setup it is possible to set basic parameters of the unit - date, time, connected devices, etc., or to display system information.

### 6.3.1. Diagnostics

DIAGNOSTICS SCREEN	
Value/Symbol	Meaning
Status	A screen showing actions, errors, and system state logs. If an error occurs, a red error message appears on the status screen.
System variables	System information for possible service.
System info	System information - unit name, system type, serial number, network information, and hard disk information is displayed.

### 6.3.2. Devices

This subitem carries out the operations associated with the connection, disconnection, search, and service settings in its subitems.

#### 6.3.2.1. Init Devices

The searched devices (pump, detector, and fraction collector) that have been added to the list are connected. A message displays in the status bar.

#### 6.3.2.2. Deinit Devices

The devices inside the unit - the detector, pump, and fraction collector are disconnected. The message: „System state change to deinit” displays on the status bar.

#### 6.3.2.3. Search Devices

The device search table appears. From the roller shutter is possible to select the searched device and the manner of the device connection. By pressing the Search button, the device will search the connected devices. After selecting a device from the list of found devices and pressing the Add button, the device will be added. The Remove button removes the device. The message:

„Added advice: xxxx” will be shown up at the status bar.

#### 6.3.2.4. Valves Recalibrate

The loop valve is recalibrated.

#### 6.3.2.5. Reset HW Errors

Hardware errors are removed.

#### 6.3.2.6. Detector Configuration

A screen used as diagnostic info for the detector when used by a service technician.

#### *6.3.2.7. Fraction Collector Configuration*

A screen used as diagnostic info for the fraction collector when used by service technician.

#### *6.3.2.8. Loop Valve Configuration*

A screen used as diagnostic info for the loop valve when used by a service technician.

#### *6.3.2.9. Set to Default*

Pressing the Set to Default button restores all devices of the compact system to their default settings.

### **6.3.3. Users**

Not supported yet.

### **6.3.4. System**

This subitem carries out the operations associated with working with the screen and general settings.

#### *6.3.4.1. General Settings*

A screen used as diagnostic info for the compact system when used by a service technician.

#### *6.3.4.2. System Update*

A flash drive with an updated software version is inserted into the switched-on compact system. The message: "Update file found. For restart and update press Update button" is displayed in Menu/Setup/System/System Update. item. Pressing the Update button restarts and updates the compact system.

## 7.0. OPERATING MODES

### 7.1. PRERUN Mode (PRE)

At start-up, the system enters PRERUN mode, which is displayed in the status bar as an “PRE” shortcut. Waiting approximately 13 seconds for the system to go from PRERUN to READY mode, which is displayed in the status bar when the abbreviation changes from “PRE” to “RDY”.

The detector lamp is turned on and remains on for as long as the instrument is turned on.

### 7.2. READY Mode (RDY)

In READY mode, the abbreviation has changed from “PRE” to “RDY”. The system is ready to run the analysis. When the system is in READY mode, the status bar displays the following information (in this order, numbers that change are written as XXX). RDY: OFF XX ml/min X.XMP and XXX nm XX.X mAU W MM: SS

#### 7.2.1. Control Screen

The chromatogram is recorded on the Control Screen. The message “READY - System is ready to run” displays in the background of the chromatogram and READY is displayed in the right column at the top of the screen. The pump is not pumping.

#### 7.2.2. Scheme Screen

The Scheme Screen displays information in the top red box. The method displays READY, RUN TIME runs and does not deduct the remaining time until the end of the analysis. READY is displayed in the lower left green box showing the pump part of the pump and the pump output is drawn in light green. RUNNING is displayed in the upper right grey box showing the fraction collector and the C/W valve is switched to WASTE. The loop valve loop is drawn red and the valve is in the LOAD state.

When all analysis parameters are set, pressing the RUN button switches the system from READY mode to WAIT FOR A LOAD mode, which is displayed in the status bar when the abbreviation changes from “RDY” to “WLO”.

### 7.3. WAIT FOR A LOAD Mode (WLO)

In WAIT FOR A LOAD mode, the abbreviation has changed from “RDY” to “WLO”.

In this mode, the system waits for the sample to be injected into the loop or column.

After the sample has been injected, pressing the RUN button again will start the analysis run.

#### 7.3.1. Control Screen

The chromatogram is recorded on the Control Screen. “WAIT - The separation is waiting

for sample” is displayed in the background of the chromatogram and WAIT is displayed in the right column at the top of the screen. The pump is not pumping.

### 7.3.2. Scheme Screen

The Scheme Screen displays information in the top red box. The method displays WAIT, runs RUN TIME and does not deduct the remaining time until the end of the analysis. READY is displayed in the lower left green box showing the pump part of the pump and the pump output is drawn in light green. RUNNING is displayed in the upper right grey box showing the fraction collector and the C/W valve is switched to WASTE. The loop valve loop is drawn red and the valve is in the LOAD state.

When the RUN button is pressed, the pump starts pumping and the system goes out of WAIT FOR A LOAD to RUN mode, which is displayed in the status bar where the abbreviation changes from “WLO” to “RUN”.

## 7.4. RUN Mode (RUN)

The analysis starts in the RUN state. The pump starts pumping.

### 7.4.1. Control Screen

On the Control Screen, the chromatogram will be recorded from the beginning. RUN is displayed in the right column at the top of the screen. The pump is pumping. After running the analysis, the results of the analysis can be continuously monitored on the Current Results screen, which can be displayed by pressing the Current Results button.

### 7.4.2. Scheme Screen

On the Scheme Screen, RUN is displayed in the upper red box displaying method information, RUN TIME is running and the remaining time is subtracted to the end of the method. In the lower left green box showing the part of the machine with the pump. RUNNING is displayed and the currently used mobile phase (s) in use are coloured. RUNNING is displayed in the upper right grey box showing the fraction collector. Colour changes to the tubes in the pantograph during filling into tubes. The C/W valve is switched to COLLECT.

**COLOR CHANGE OF FILLED TUBES**

Color of the tube	Meaning
Deep colored (turquoise, purple, etc.)	Already filled tube.
Deep colored in red circle	Currently filling tube.
Light colored tube (beige)	The next tube to be filled.

The loop valve loop is drawn in green and the valve is in the Inject state.

## 7.5. PAUSED Mode (PSD)

Press PAUSE button to enter PAUSED mode and to pause the analysis. The system

switches from RUN to PAUSED mode, which is displayed in the status bar, where the abbreviation changes from "RUN" to "PSD".

#### **7.5.1. Control Screen**

On the Control Screen, the chromatogram is no longer recorded but doesn't disappear.

The background of the chromatogram shows the message: „PAUSE - The separation is paused" and the right column at the top of the screen shows PAUSE. The pump is not pumping.

#### **7.5.2. Scheme Screen**

On the Scheme Screen, PAUSE is displayed in the upper red box displaying method information, RUN TIME is not running, and the remaining time until the end of the method is not displayed. The READY is shown in the lower left green box showing the part of the pump and the currently used mobile phase (s) used are color-coded. PAUSED is shown in the upper right grey box showing the fraction collector and the Home Position indicator is green (the letter H in a circle). The C/W valve is switched to WASTE. The loop valve loop is drawn in green and the valve is in the Inject state. Press the RUN button to restart.

## 7.6. EXTENDED PAUSE Mode (EXP)

When the method is complete, the system will switch from RUN to EXTENDED PAUSE mode, which is shown in the status bar, where the abbreviation will change from "RUN" to "EXP" and at the time in the end of the bar is 00:00.

### 7.6.1. Control Screen

On the Control Screen, the chromatogram is no longer recorded but doesn't disappear.

The background of the chromatogram shows the message: „Ext. PAUSE - The separation is paused – extended.” The pump is not pumping.

### 7.6.2. Scheme Screen

On the Scheme Screen, PAUSE is displayed in the upper red box displaying method information, RUN TIME is not running, and the remaining time until the end of the method is 00:00.

READY is shown in the lower left green box showing the part of the pump and the pump output is drawn in light green. PAUSED is shown in the upper right grey box showing the fraction collector and the Home Position indicator is green (the letter H in a circle). The C/W valve is switched to WASTE. The loop valve loop is drawn in green and the valve is in the Inject state.

## 7.7. EXTENDED RUN Mode (EXR)

Pressing the RUN button again will start the extended run of the analysis, so it will enter Extended Run mode, which will be displayed in the status bar, where the abbreviation will change from "EXP" to "EXR". The essence of the mode is to extend the last step in the gradient table if the length of the analysis is not long enough and needs to be extended.

### 7.7.1. Control Screen

On the Control Screen, the chromatogram is again recorded from the point where it was stopped in the previous mode. Ext. RUN is shown in the right column at the top of the screen.

The pump is pumping.

### 7.7.2. Scheme Screen

On the Scheme Screen, Ext. RUN is displayed in the upper red box displaying method information, RUN TIME is running, and the remaining time until the end of the method is subtracted. RUNNING is shown in the lower left green box showing the part of the pump and the currently used mobile phase (s) in use are color-coded. RUNNING is shown in the upper right grey box showing the fraction collector, the C/W valve is switched to COLLECT and the needle position above the tube is plotted. The loop valve loop is drawn in green and the valve is in the Inject state.



## 7.8. POST RUN Mode (POR)

When changing from Extended Pause to Post Run mode, the STOP button is pressed. When changing from Extended Run to Post Run mode, the STOP button is pressed twice.

The transition to Post Run mode shows in the status bar, where the abbreviation changes from “EXP” or “EXR” to “POR”.

### 7.8.1. Control Screen

On the Control Screen, the chromatogram is no longer recorded but doesn't disappear.

In the background of the chromatogram, the message: “POST - The separation is in post run” shows and the right column at the top of the screen shows POST. The pump is not pumping.

### 7.8.2. Scheme Screen

On the Scheme Screen, POSTRUN is displayed in the upper red box displaying method information, RUN TIME is running, and the remaining time until the end of the method is restored.

READY is shown in the lower left box showing the part of the pump and the pump output is drawn in light green. READY is shown in the upper right grey box showing the fraction collector, the C/W valve is switched to WASTE. The loop valve loop is drawn in green and the valve is in the Inject state.

## 8.0. SETTING UP AND STARTING PREP CHROMATOGRAPHY

### Starting Chromatography in Points

1. Switching the unit on.
2. Creation, saving and editing columns.
3. Creation, saving and editing methods.
4. Gradient table settings.
5. Wavelength and collection mode settings.
6. Loading of the column.
7. Loading of the method.
8. General parameters settings (sample name, username, note, injection method, rack type and volume of collected fraction).
9. Start separation.

**Caution:** To save all changes made to the screens, press the button Apply - changes are written to the system. Then press the button OK confirms saving and closes the screen.

### 8.1. Switching the Unit On

Switching on the unit is described in chapter 4.9.1.

### 8.2. Creation, Saving and Editing Columns.

#### 8.2.1. Creation and Saving a New Column

To add a new column, Menu/Main/Settings/Current Column from the MENU main screen must be opened and the NEW button pressed. The required parameters of the used column - volume and column weight, column flow rate, maximum pressure for the column, sorbent, or note must be filled in. The column is saved in Menu/Main/Settings/Current Column by pressing the SAVE

AS button and the desired column name is entered. The status bar displays the message: "Column written as XX."

#### 8.2.2. Editing of the Column

In Menu/Main/Settings/Current Column, pressing the OPEN button will display a list of all stored columns in the system. The column is highlighted, and the selection is confirmed with the OK button. The status bar displays: "Column XX loaded." The column parameters are edited.

Saving the edited column is described in the chapter 8.2.1.

## **8.3. Creation, Saving and Editing Methods**

### **8.3.1. Creating a new Method**

To create a new method, Menu/Main/Method from the MENU screen must be opened.

By clicking the Load Blank Method sub-item an empty method will be loaded.

The message: „The blank method is prepared" shows in the status bar. Then set the gradient table (see 8.4), the sampling method and up to four wavelengths for detector measurement

### **8.3.2. Saving of the Method**

The method is saved by clicking the Save Current Method sub-item in Menu/Main/Method under the desired name. In the status bar shows a message: "Method XY was written as XY".

### **8.3.3. Editing Method**

Clicking the Load Method sub-menu item under Menu/Main/Method will list all stored methods in the system. The method is highlighted, and the selection is confirmed with the OK button. The message "The Method "XY" was loaded." Saving the edited method is described in chapter 8.3.2.

## **8.4. Gradient Table Settings**

A gradient table is displayed in Menu/Main/Method/Gradient. The individual mobile phases are set by pressing the Solvents button (see 8.6), the time course of the analysis, the required flow rate and the percentage volume concentration of individual mobile phases at a given time (see 6.1.4). The sum of the individual percent volume concentrations in each row must always be 100 %.

## **8.5. Setting wavelengths and collecting mode**

### **8.5.1. Wavelength Settings**

In the Menu/Main/Method/Detection item in the Signals section, an optional wavelength in the range 0-800 nm at which the analysis will be performed is written in the individual channel fields (A-D). In the Math field, you can select math operations to be performed between signals (see 6.1.5). By checking the Sum ( ) in range field, the channel fields (A-D) become disabled and two sub-fields are opened to fill the wavelength interval at which the measurement will take place.

By checking the Visible button displays the wavelength record in the chromatogram on the Control Screen.

### **8.5.2. Collecting Mode Settings**

In the Menu/Main/Method/Detection in the Collecting section, the dead volume between the loop/column and the detector is written in the Initial waste field. Use the roller shutter to select

the method of collection in the Method field and the signal on the A, B or AB channels in the on-signal field (see 6.1.5). If you select the Level method, you must enter the absorbance level in the Level field at which the system starts or stops collecting fractions. If the Slope method is selected, the Slope field must be filled with the slope value at which the system starts or stops collecting fractions. If the Slope over Level method is selected, the absorbance level value must be entered in the Level field and the Slope value must be entered in the Slope field.

In the Fractionation section the method of collecting individual fractions is selected.

## **8.6. Mobile Phases Settings**

In Menu/Main/Settings/Solvents, the desired mobile phase (at least one mobile phase should be different), the minimum volume of mobile phases for the method operation, the volume of storage bottles in which the mobile phases are stored, system reaction, if the volume of the mobile phase falls below the set minimum volume, maximum waste volume and its current volume during the measurement (see 6.1.2.2). When the Empty button is pressed, the system receives a signal that the waste container has been emptied/replaced. Pressing the Return button returns you to the MENU.

## **8.7. Loading of the Column**

In Menu/Main/Control/Current Sample in the Column section by pressing the Select button the desired column will be selected. A list of all stored columns in the system will display.

The column will be selected by clicking on the desired displayed column file and confirmed by the OK button. The status bar displays the message: "Column XX loaded."

## **8.8. Loading of the Method**

In Menu/Main/Control/Current Sample in the Method section by pressing the Select button the desired method will be selected. A list of all stored methods in the system is displayed.

The method will be selected by clicking on the desired displayed method file and confirmed with OK. The status bar displays the message: "The Method" XX "was loaded."

## **8.9. General Parameters Settings**

### **8.9.1. Sample Name Settings**

The name of the testing sample is set up in Menu/Main/Control/Current Sample in the Sample section. The name of the sample is entered in the Sample field.

### **8.9.2. User Settings**

The sample user is set up in Menu/Main/Control/Current Sample in the Sample section.

The name of the user currently operating the unit is entered in the User field.

### **8.9.3. Adding a Note**

A note can be added in Menu/Main/Control/Current Sample in the Sample section. Any

note can be written in the Note field.

#### 8.9.4. An Injection Method Setting

The sample injection method is set in Menu/Main/Control/Current Sample in the Sample section. In the Inj. Type field is from the roller shutter selected the desired injection method.

INJ. TYPE ROLLER SHUTTER

Injection method	Meaning
Loop	The injected sample passes through the loop into the column.
Column	The injected sample does not pass through the loop but passes straight through the column.

#### 8.9.5. Rack Type and a Volume of the Collected Fractions Settings

##### 8.9.5.1. Rack Type Setting

In the Menu/Main/Control/Current Sample item in the Fraction collector section in the Rack type field, the roller shutter is used to select the rack type inserted in the rack space.

##### 8.9.5.2. Volume of the Collected Fractions Setting

In Menu/Main/Control/Current Sample in the Fraction collector section in the Frac. volume field, using the buttons +10, +1, -10, -1 the desired volume of the fraction collected in the tubes is set.

#### 8.10. Run the Analysis

The analysis is started when the system changes from WAIT FOR A LOAD to RUN mode (see 7.3 and 7.4).

## 9.0. SERVICE

**Caution:** The unit must be disconnected from the power supply before servicing!!!

### 9.1. Replacement of Line Fuse

- Using a flat-tip screwdriver release the fuse holder from its bottom.
- Take out the fuse holder.
- Remove old line fuse. Insert in the holder new line fuse noted on the product label, which is a part of detector accessories.
- Insert the fuse holder back. Push the fuse holder all the way inside.



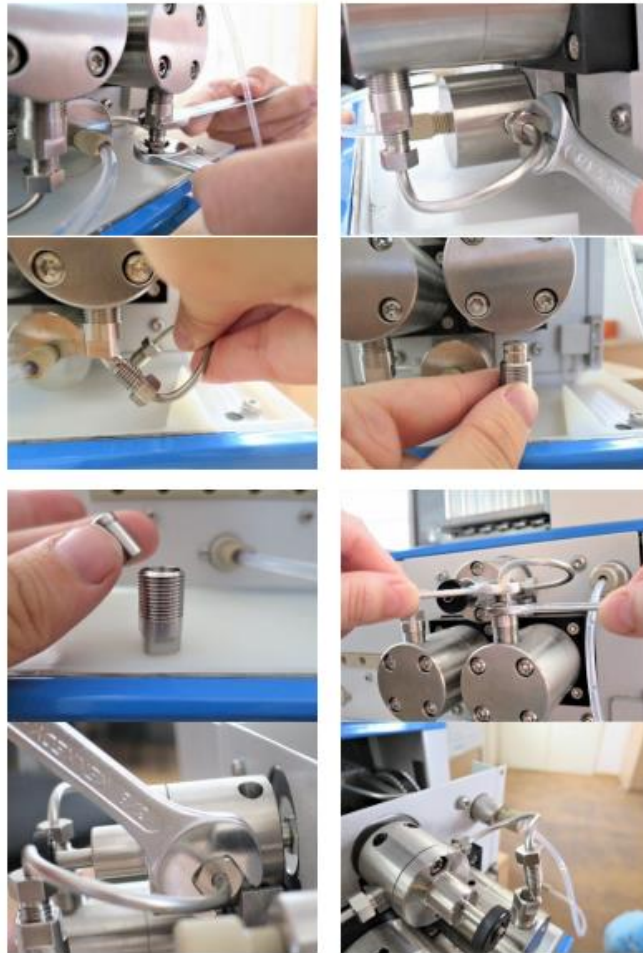
### 9.2. Check Valves



The basis of check valve is precise ball and seat placed in a case made of PEEK with stainless steel reinforcement. Liquid flow pushes the ball into the seat and this way it seals. Regarding high pressures in the pump any slight impurity stuck on the ball or seat may cause pressure fluctuation or the pump cannot start at all. If it is not possible to eliminate this problem by repeated purge, it is necessary to exchange or clean the check valves.



Flow direction through the valve is according to the arrows on check valve side.  
Disconnect inlet tubing



- Loosen capillary on outlet valve holder using side wrench 3/8" and bend it slightly. Or you can dismount the connecting capillary completely.
- To exchange inlet valve, loosen its holder using side wrench 10 mm.
- Remove the holder with inlet valve.
- Take out inlet valve from the holder.
- Replace the inlet valve with a new one.
- The whole capillary is dismounted on the outlet valve holder using side wrench 3/8" and bend it slightly.
- To exchange the outlet valve, loosen its holder using side wrench 10 mm.
- Remove the outlet valve holder.
- Take out outlet valve from the head by using a tweezer.
- Replace the outlet valve with a new one.



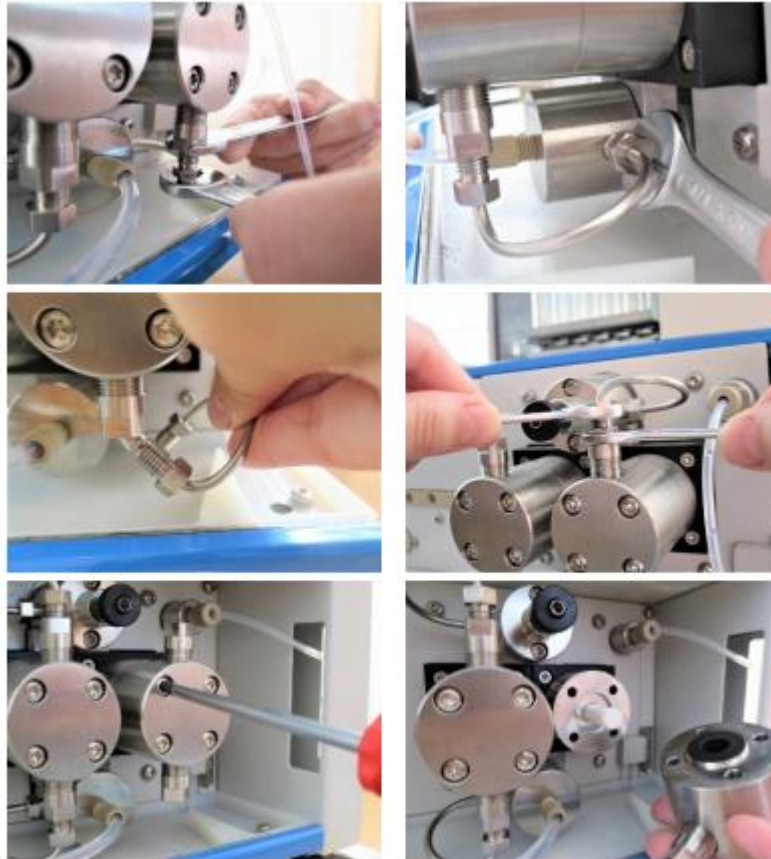
- Insert the new valve in the same way as the old one, four holes must head up. Continue the same

way as during dismounting, but in reverse order. Tight all screws strongly and after starting the pump, check all connections for any leakage.

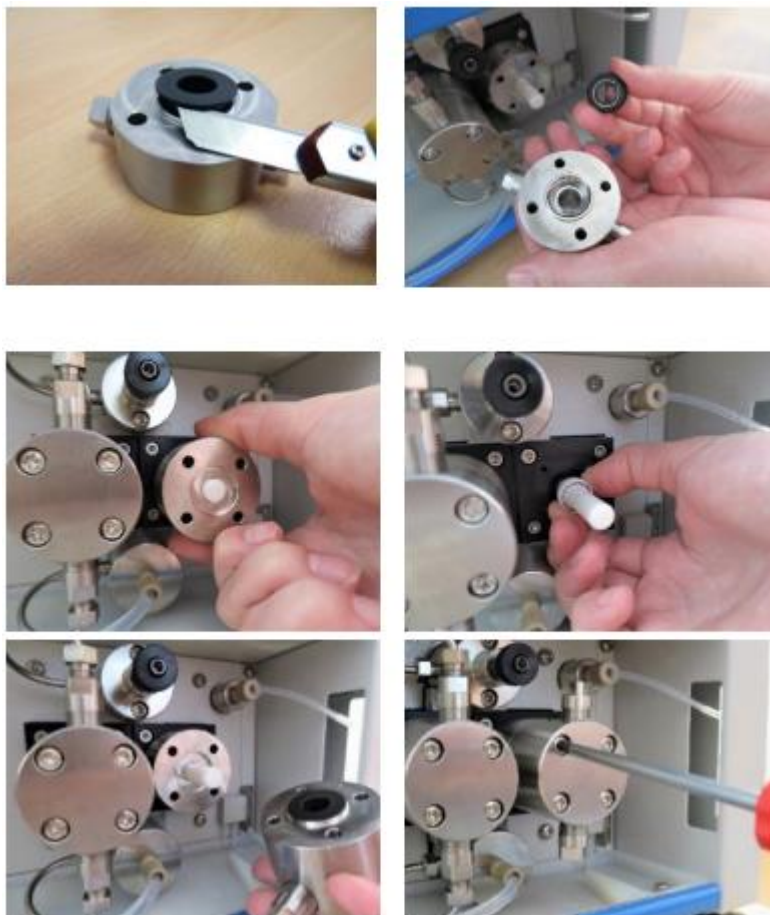
- **Caution: After replacing check valves, purge/degas the unit**

### 9.3. Seals

**Caution: Pump piston is made of fragile material. Improper manipulation may cause irreversible harm or piston fracture!**



- Disconnect inlet tubing.
- Loosen nut on left head using side wrench 1/4 ".
- Dismount output capillary.
- Remove the capillary on the outlet valve holder with a 3/8 "wrench and bend it slightly.
- Loosen four M4x20 screws in left head using TX20 screwdriver from unit accessories.
- Pull the head straight out of the piston.
- Leaning the head to sides may cause piston damage!



- Remove the seal using a suitable tool. Wash and clean the piston and interior of the head with isopropanol. Usually it is not necessary to exchange the seal in washing heads, but in case it is needed, follow the same steps as with working heads.
- Wet new seal in isopropanol and place it on the piston carefully.
- The spring is facing toward the head.
- Pushing the head back on the piston must be straight.
- Leaning the head to sides may cause seal damage.
- Fasten the screws and mount tubing and capillary back on their place.
- After seal replacement are the steps for mounting the same as during dismounting, but in reverse order.
- Pushing the head with new seal back on the piston must be straight. Leaning the head to sides may cause seal damage.
- **Caution: Screw in the left and right screw alternately into the heads of each blocks.**

Each screw must be screwed with the same number of turns.

New seals should be run in before first use. Disconnect all equipment connected to the pump output. Connect reduction valve (or another reliable hydrodynamic resistor) directly to the pump output. Put the inlet tubing and output capillary into same reservoir with solvent isopropanol: water 1:1.

With Pride of Drug Discoverer Compact Semi Prep HPLC System Flow rate is set to 50 ml/min, start pumping and set pressure at 10MPa using reduction valve. Let the pumping for at least 30 min (optimal 2 h). Keep the flow rate at 50 ml/min and set pressure at 20MPa. Let the pumping for at least 30 min (optimal 2h). Keep the flow rate at 50 ml/min and set pressure at 25MPa. Let the pumping for at least 10 min (optimal 30 min).

Keep the flow rate at 10 ml/min and set pressure at 20MPa. Let the pumping for at least 10 min (optimal 30 min).

Seals are now set and run in. Pump is ready for standard operation. Do not forget to wash the isopropanol from the pump using your mobile phase. If the pressure decreases during operation, it is necessary to run the pump in for a longer time (optimally). If you do not have a reduction valve, you can use an old column, which meets the above stated parameters).

**Caution: Watch washing heads and all connections during run-in for any leakage.**  
Correct every up tightness!

#### 9.4. Needle of Degassing/Purging Valve

Unscrew Screw new needle



#### 9.5. O-Ring in degassing purging valve



Unscrew two screws M4X20 using screwdriver TX20 from unit accessories.



Take out the degassing/purging valve. Under head, there is white or transparent seal.

Unscrew needle, take out metal ring and O-ring.

Take in new O-ring.

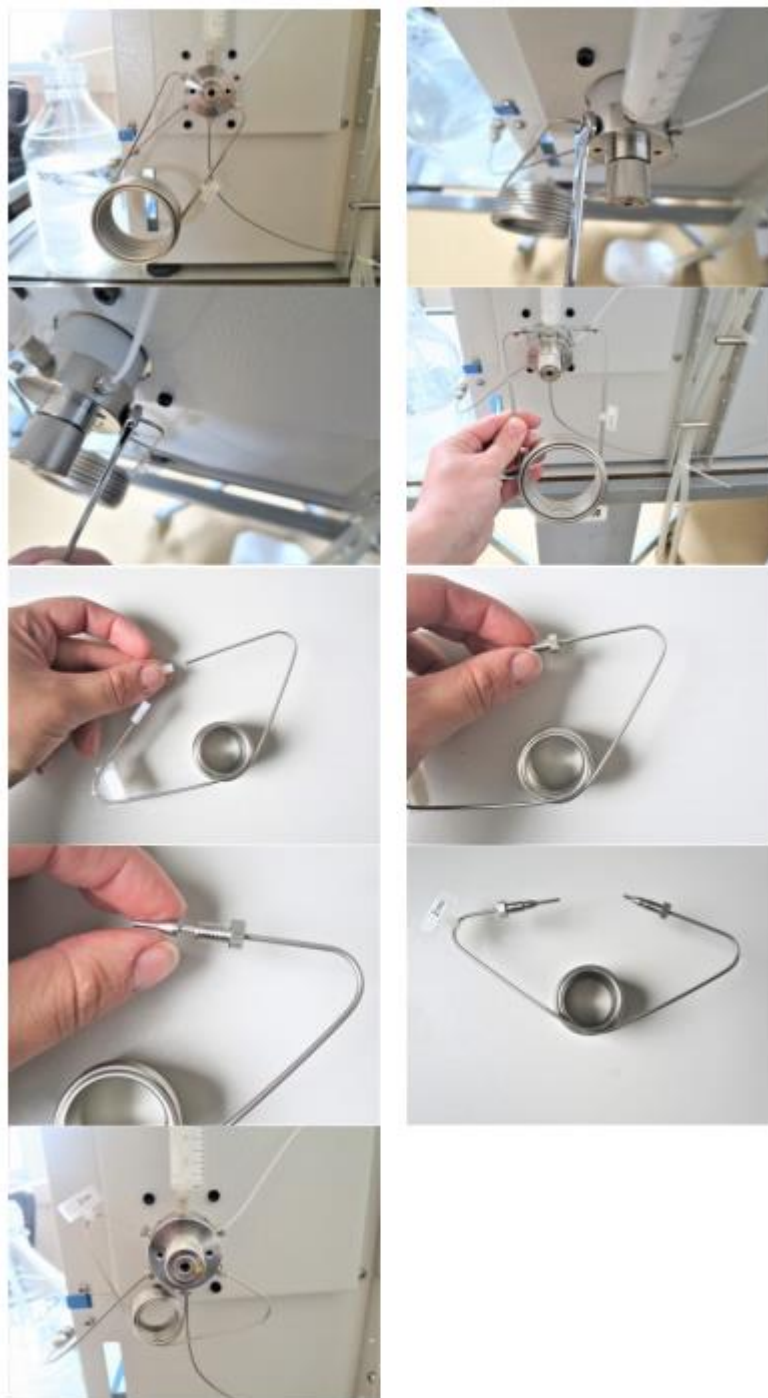
Remove the seal using a suitable tool and carefully insert a new seal into the sealing space. Pushing the head back on the piston must be straight. Leaning the head to sides may cause seal damage.

Fasten the screws and screw the needle back properly.

After replacement of O-ring, steps for mounting are the same as for dismounting, only in reverse order.

**Caution:** Needle is screwed into head of degassing/purging valve so that it does not go out and then screw head of valve with needle onto compensating block.

## 9.6. Sample Loop



- Loosen the nuts on the injection valve with the side wrench  $\frac{1}{4}$  ".
- The loop, including the nuts and ferrules, is removed.
- The protective rubber plugs are removed from the loop ends.
- A nut and a ferrule are fitted to the end of both arms of the loop.
- The upper part of the ferrule should face the screw.



- Steps for mounting the new sample loop are the same as for dismounting the original one, only in reverse order.

## **9.7. Pistons**

Replacement of a piston can be done only by a qualified person.

## 10.0.TROUBLESHOOTING

Problem	Caused by / Conditions	Solution
Leaking liquid from washing heads.	Damaged seal in pumping head.	Replace the seal immediately. The pump must not be used with damaged seal.
Pressure pulsation. Pressure sometime suddenly decreases.	Column, injection valve or other equipment connected after the pump.	Test if the problem persists without any equipment after the pump. Then try to connect any reliable source of hydrodynamic resistance (column, reduction valve).
	Bubbles.	Check all connections on capillaries and tubing before, in and after the pump. Try to purge the pump again and watch tubing after connected mobile phase filter, for bubble formation. If any bubbles are formed there, exchange/rinse this filter. You can use degassing unit.
	Bad check valve.	Try to replace check valve (see 9.2).
	Impurity in check valve.	Purge it with air flow or insert in ultrasound bath.
	Damaged seal – esp. when using solvents as Acetonitrile. It may seem like that bubbles are formed inside the pumping system. It is convenient to exclude other source of bubbles using degasser.	Try to replace seals (see 9.3).
	The pump is not run-in properly after seals replacement.	Run-in the pump under optimal conditions (see 4.9.1).
	Electronic failure.	Contact service centre.
Flowrate is lower then set value.	Pressure stability.	Problems with lower flow rate occur and usually relate to problems with pressure stability – see solution above.
	Solution agent.	Solution agents with very high or very low viscosity may cause these problems. As well as not degassed solvents.
	Electronic failure.	Contact service centre.

Problem	Caused by / Conditions	Solution
Motor works hardly/loudly, there isn't indicated any pressure and flow rate is low or none.	Clogged frit of outlet valve. Only if check valves with frit are used.	Check the frit, try to clean it or replace the check valve.
	Electronic/mechanic failure.	Contact service centre.
Higher noise and drift	Leaking cell, dirty cell, gas bubbles, nontransparent mobile phase, old/defective lamp, flow and temperature fluctuations.	Perform <i>Lamp test and Cell test</i> Check cell connection. Check mobile phase. Check cell purity manually. Check pump. Stabilize the external environment. Heat the lamp sufficiently.
	Electronic / optic failure	Contact service.
Leaking cell	Broken cell window, Defective seal.	Repair or exchange cell, see <i>chapter</i>
Leaking liquid from tubing joints.	Damaged tightening elements.	Shorten the tubing by a few mm, with a straight cut, and use new tightening ferules. <b>Replace switching valve.</b>
	Damaged thread on switching valve.	Call service centre.
Stammering run of needle trolley.	Small clearance of distance guidance on guiding bar.	Adjust clearances. Call service centre.
	Seized guiding bearing.	Clean any impurities from the guiding bar. Call service centre.
	Defective step motor.	Call service centre.
	Electronic failure.	Call service centre.
Needle is not moving.	Damaged belt of relevant direction.	Call service centre.
	Defective step motor.	Call service centre.
	Electronic failure.	Call service centre.
Needle trolley is interfering with mechanical endstops, step motor is still running	Error on optical end bolts.	Replace DPS with optical end bolts. Call service centre.
	Damaged shutters on optical switches.	Call service centre.
	Electronic failure.	Call service centre.

## 11.0.MAINTENANCE

### 11.1. Periods

- Minimal period for check valve and seal exchange is one year. This period may be shorter if there are used buffers, high pressure/flow rate, aggressive solvents, or other aggravating conditions. In case of such difficult environment it is recommended to exchange the check, valves and seals every 6 months.
- Piston replacement can be done approximately once per 5 years when conditions are hard, or when they are damaged after inappropriate replacement of other parts. When the unit is used under common conditions, replacement is done approximately once per 10 years.
- Periodic control of pumping blocks (working and washing) screws tightness is recommended once per month.
- It is recommended to check lubrication of moving parts of pump mechanics once per year.
- Recommended period for replacing mobile phase filters on inlet tubing is one year.
- Checking unit function (Operational qualification OQ, unit validation) under heavy-duty operating conditions is recommended to be done once per 6 months, or once per 1 year, if the working conditions are optimal, max. once per 2 years. During unit validation a complete unit control is proceeded, and according to observed unit condition can be replaced damaged parts.

### 11.2. Cleaning and Decontamination

- Follow safety instructions of agents used in chromatography process.
- Use dry or moistened cotton cloth for cleaning or unit surface.

### 11.3. Storage and Transport

If the unit shall be put out of service for a longer period or it shall be transported, it is advisable to purge it with isopropanol and plug it afterwards. Remove unit door before transportation and pack it to avoid damage during transportation.

### 11.4. Checking Tubing

Check all tubing connections for leaks before starting the process. Any liquid leaks must be removed.



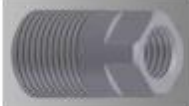









### 11.5. Cleaning Check Valves

Remove the valves (see 9.2) and clean them using ultrasound in distilled water or other solution agent, dissolving used buffers. You may also try a combination of water bath with inorganic/organic or polar/nonpolar solvent.












## 12.0. SPARE PARTS And ACCESSORIES



SPARE PARTS		
P/N	Picture	Description
<b>Spare parts</b> (basic spare parts)		
58606000		GL 45 Media/Storage Bottle 1000mL
AFAR021X		Rack for 36 tubes OD 16 mm, volume 21 ml
AFAR008X		Rack for 48 tubes OD 12 mm, volume 8 ml
2052B90000		Halogen lamp with a cable and connector
L6999 MOD3		Deuterium lamp for TOYDAD-L + TOY14 + TOY18
ACE98100		PE Mobile Phase Filter 20 µm No-Met with reduction UNF 5/16"-24 (ECS28 P)
ACC16100		PE Filter 20u No-Met with reduction UNF 1/4" (EC54 P)
99043600		Piston seal 3/8" U-R325 HB (CC)-204-GFP-HST (working head seal; Teflon with graphite; high chemical resistance; lower abrasion resistance, ECS28 P, ECS54 P)
99043700		Piston seal 3/8" U-325 MB-204-T-316 (PTFE washing head seal, ECS28 P, ECS54 P)
99043000		Piston seal 3/8" U-R325 HB (CC)-204-UHMWPE40-HST (working head seal; high molecular weight polyethylene; lower chemical resistance; high abrasion resistance, ECS28 P, ECS54 P)

Please also visit our Website : [www.chromatographyshop.com](http://www.chromatographyshop.com) or our Contact form








P/N	Picture	Description
PJ250000		<b>High-flow check valve 1/8"</b> (for high flow rate, EC28 P)
53381000		<b>Check valve</b> (inlet and outlet check valve, EC54 P)
PJ200070		<b>Check valve holder UNF 5/16"-24</b> (ECS28 P)
53380012		<b>Holder of outlet check valve UNF-10</b> (ECS54 P)
63000070		<b>Holder of inlet check valve UNF 1/4"-28</b> (EC54 P)
PJ230000		<b>Piston with holder</b> (piston diameter 3/8, ECS28 P)
PM014000		<b>Piston with holder</b> (piston diameter 3/8", ECS54 P)
ART05477		<b>O – ring ID 4,47 mm, cross section 1,78 mm, Kalrez®</b> (Bypass Valve Seal, ECS28 P, ECS54 P)
PG252000		<b>Needle of degassing/purging valve, PEEK</b> (ECS28 P, ECS54 P)
ACE21001		<b>Pressure sensor preparative 60 MPa</b> (ECS28P)
ACA61001		<b>Pressure sensor 600 bar</b> (EC54 P)
A 6R 3M066095		<b>Single sided timing belt 9.5 mm 66 teeth</b> (ECS28 P)



P/N	Picture	Description
A 6R 3M058095		Single sided timing belt 9.5 mm 58 teeth (ECS54 P)
ACC21001		Motor K 50, 100, 300 (when ordering, note unit serial number and system type, ECS28 P, ECS54 P)
EKAB-024		Crossed serial cable 9pin RS232 (2x DB9 female, length approx. 2 m)
SL10KCUW		Sample loop 10ml UW 1/16" topped with nuts and ferrules
JRZLAPK1		Adapter, PEEK 1/16" female Luer (by inserting a syringe into the adapter, an injection of the sample is performed)
S6099100		Stainless steel capillary pump-injection valve 1/8" - 1/16", L=302 mm (with reduction, volume = 0.68 ml)
S6099900		Pump inlet tubing FEP OD 3/16" x ID 1/8", L=260 mm (volume = 2.06 ml)
S6099300		Stainless steel capillary injection valve-column OD 1/16" x ID 1 mm, L=1 m (volume = 0.79 ml)
S6099400		PEEK capillary column-detector OD 1/16" x ID 1 mm, L=0.6 m (volume = 4.71 ml)
S6099500		PEEK capillary detector-fraction collector OD 1/16" x ID 1 mm, L=310 mm (volume = 0.24 ml)
S6099600		FEP tubing fraction collector-waste OD 1/8" x ID 1/16", L=0.4 m (volume = 0.79 ml)
S6099700		FEP tubing fraction collector inlet OD 1/8" x ID 1/16", L=0.65 m (volume = 1.29 ml)

P/N	Picture	Description
S6099800		FEP tubing fraction collector outlet OD 1/8"x ID 1/16", L=0.7 m (volume = 1.39 ml)
ECS90030		PTFE waste tubing from injection valve OD 1/16" x ID 0.75 mm, L=0.3 m (volume = 0.53 ml)

## PREPARATIVE CELLS

Cell	P/N	Picture	Description
Optional Accessories			
Low Pressure (up to 2 MPa)			
PLCC 3L L	ANA9203X		Optical path: 0.3 mm Internal volume: 80 µl OD: 3/16" Thread: 5/16"-24
PLCC 07 L	25L0000X		Optical path: 0.3 mm Internal volume: 40 µl OD: 1/8" Thread: 1/4" – 28 Max. flow rate: 500 ml/min
PLCC 15 L	ANA9400X		Optical path: 0.3 mm Internal volume: 40 µl OD: 1/8" Thread: 1/4" – 28 Max. flow rate: 500 ml/min
PLCC 17 L	ANA9300X		Optical path: 1.3 mm Internal volume: 55 µl OD: 1/8" Thread: 1/4" – 28 Max. flow rate: 500 ml/min
PLCC 19 L	ANA9400X		Optical path: 2.4 mm Internal volume: 70 µl OD: 1/8" Thread: 1/4" – 28 Max. flow rate: 500 ml/min
PLCC 07 L PEEK	25LP000X		Optical path: 0.3 mm Internal volume: 40 µl OD: 1/8" Thread: 1/4" – 28 Max. flow rate: 500 ml/min
PLCC 15 L PEEK	ANA94L0X		Optical path: 0.3 mm Internal volume: 40 µl OD: 1/8" Thread: 1/4" – 28 Max. flow rate: 500 ml/min

## 13.0.CELLS

### 13.1. Preparative Cell PLCC 07 L

Note: Optical path can be adjusted by different orientation of windows, as shown earlier. Optical path 0.3 mm was adjusted in the manufacturing plant by combination of FEP sealing of various thickness (there may be even two on one side), and by special testing. Therefore, when adjusting this optical path,

address to your supplier.

A unique design of the cell allows you to change optical path according to conditions of analysis from 0.1 to 2.4 mm. Cell volume is 40, 55, and 70  $\mu$ l, respectively,



According to the adjusted optical path. Maximum flow rate is 500 ml/min.

The cell is designed for preparative or TOY applications. Inlet tubing of OD 1/8", or 1/16" can be connected using a threaded screw 1/4"-28 and a ferrule.

Required test cell for PLCC 07 L is ZK 04 Stepwise arrangement of the cell windows makes possible to change the optical path of the cell in a simple way, by means of changing the positions of the windows and the gasket thickness.

A by-pass formed by the windows and internal diameter of the cell forms free space securing a high flow through the measuring cell even in this arrangement. We recommend not to replace the cell windows. If it's necessary to change the optical path of the cell, please contact your distributor.

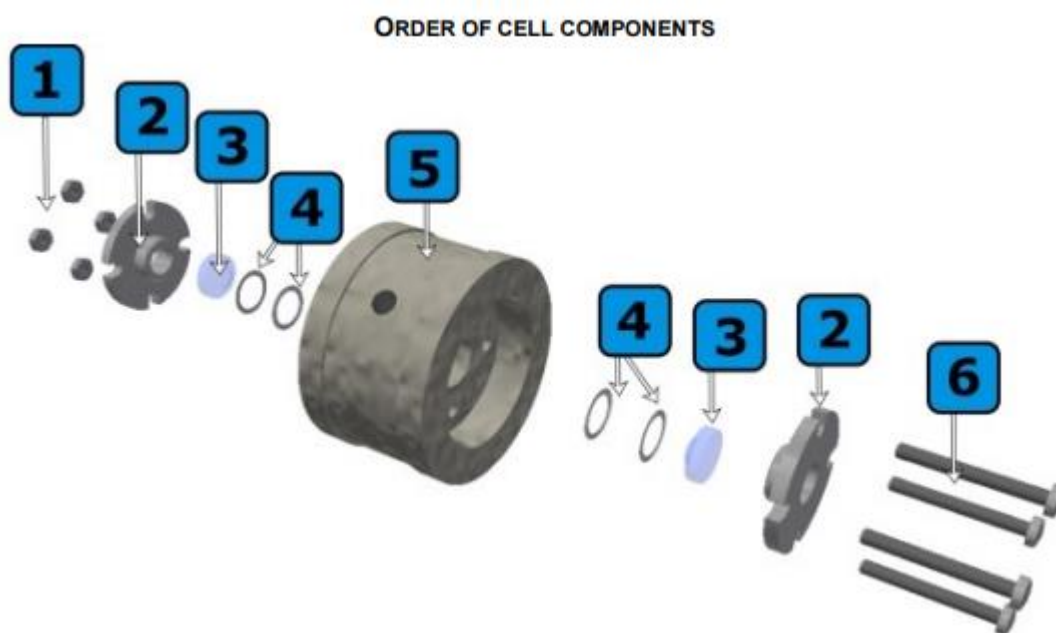
If you need to purchase a cuvette with a different optical path, please contact your distributor or manufacturer.

To restrict formation of bubbles a hydrodynamic resistor is supplied with the cell to be connected to the outlet capillary. Decrease of the effect of changing flow rate and

temperature is achieved by conical shape of the cell and a heat exchanger at the cell inlet.

Test cell ZK04L is a cell without windows and serves for verification of correct detector function, for indication of lamp wear, and for checking cell cleanness. This cell is a part of delivery.

### 13.2. Components of the preparative cell in the order as they are assembled:



Nr.	Description
1	4x nut
2	cell cover
3	PLCC window
4	PTFE sealing
5	cell body
6	4x screws

## 14.0. Technical Parameters

Parameter	Value
<b>DETECTOR</b>	TOY18DAD800L (SCANNING)
Wavelength range	200-800 nm (256 elements of CCD)
Number of channels	4
Scan	200-800 nm, up to 20 Hz, step 1 nm
Typical spectral half-width	10 nm
Accuracy of adjustment / Reproducibility	$\pm 1$ nm / $\pm 0.5$ nm
Noise level at test cell (254 nm, TC 0.75 s)	$5 \times 10^{-5}$ AU
Drift at test cell (254 nm after 1 hour.)	$1 \times 10^{-3}$ AU/ hr
Materials in contact with mobile phase	FEP; fused silica, stainless steel, PEEK
Time constant	0.5 s, 0.75 s, 1.0 s, 2.0 s, 4.0 s, 8.0 s, 16.0 s, 0.2 s, 0.1 s
Volume of PEEK inlet capillary of the detector (from the column) OD 1/16 "x ID 1 mm, L = 0.6 m	4.71 ml
Volume of PEEK detector output capillary (to fraction collector) OD 1/16 "x ID 1 mm, L = 310 mm	0.24 ml
<b>PUMP</b>	ECP2050
Flow rate	0.1-50 ml/min
Pumping system	two plungers dia. 3/8" connected in parallel
Maximum operating pressure	30 MPa (4351 psi, 300 bar)
Precision of the pressure measurement	$\pm 2$ %
Flow rate setting	0.1 ml/min steps
Repeatability of flowrate adjusting (10 ml/min, 12 MPa, H <sub>2</sub> O)	$\pm 0.5$ %
Accuracy of flow rate setting	$\pm 2$ %
Upper pressure limit (MPa)	1-30 (4351 psi)
Wetted materials	Stainless steel, PEEK, Tefzel <sup>TM</sup> , PE, ceramic, seals*
Output capillary volume from the pump (to the injection valve) OD 1/8 "x ID 1/16", L = 302 mm	0.68 ml
*Seals material:	default is GFP (PTFE), optional is UHMW-PE
<b>FRACTION COLLECTOR</b>	ECF 2096
Available racks (two racks per unit)	EC08 48 tubes, tube volume 8 ml EC21 36 tubes, tube volume 21 ml EC40 24 tubes, tube volume 40 ml
Maximum operating pressure	1.3 bar (0.13 MPa, 20 psi)
Maximum flow rate for tubes 8 ml	max.50 ml/min
Maximum flow rate for tubes 21, 40 ml	max. 300 ml/min

Parameter	Value
Wetted materials	FEP, Tefzel®, PPS, KEL-F, PTFE, PEEK, stainless steel, glass SIMAX
Needle speed between tubes	approx. 50 mm/s
Switching time of valve	approx. 10 ms
FEP fraction collector inlet tubing volume OD 1/8" x ID 1/16", L = 0.65 m	1.29 ml
FEP fraction collector waste tubing volume OD 1/8" x ID 1/16", L = 0.4 m	0.79 ml
FEP fraction collector outlet tubing volume OD 1/8" x ID 1/16", L = 0.7 m	1.39 ml
Operational environment conditions	Indoor use only. Altitude: do 2000 m Temperature: 5-40 °C Humidity: max. relative humidity 80 % for temperatures up to 31 °C decreasing linearly to 50 % rel. humidity at 40 °C. Voltage fluctuations: up to ± 10 % of nominal voltage. Overvoltage category II. Pollution degree 2.
<b>Gradient Valve</b>	
Number of valves	6 (A, B, C, D, E, F)
Volume of one valve	0.97 ml
Wetted materials	PEEK, Kalrez®
Setting of components concentration	0 – 100 %
Maximum operating pressure	0.3 MPa (43.5 psi)
Liquid temperature	0 to 50 °C
<b>Europe's Pride Compact System</b>	
Column inlet tubing volume (from injection valve) OD 1/16" x ID 1 mm, L = 1 m	0.79 ml
Volume of the injection valve	17.6 µl
Injection valve wetted material	stainless steel, Vespel®
Communication	3x USB, 2x LAN, RS232
Power supply	100–240 V AC, 50 Hz
Power input	400 W
Dimensions (W x H x D)	500 x 678 x 482 mm (19.69 x 26.69 x 18.98")
Weigh	t 55 kg (121.3 lb)

WG20062020



## **15.0. WARRANTY AND POST-WARRANTY REPAIRS**

Warranty and post-warranty repairs are provided by the manufacturer or dealer organization authorized by

### **LCC Engineering & Trading GmbH**

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Repair of products in the warranty period carried out by other person than that authorized by the service organization is a reason for warranty nullification.

The scope of the warranty and its duration is given in the certificate of warranty.