



RotaChrom  
Perpetual Innovation

RotaChrom

rCPC

Operation Manual

Version number: OPM-rCPC-121818  
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**Operation Manual**  
**rCPC**  
OPM-rCPC-121818

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## Revision History

This document applies to the latest software listed and higher versions. When a subsequent software version changes the information in this document, a new issue will be released.

### **OPM-rCPC-121818, December 2018**

Software version 1.0

This document was created to:

- Replace the previous Operation Manual
- Improve the content and usability of the instructions
- Update the Hazards section

## Warranty

The system is covered by and subject to the provisions of the warranty included in your contractual agreement for the system.

The customer is responsible for routine preventive maintenance procedures. The cost of repairs, arising from the failure to perform these maintenance procedures at the indicated time intervals according to the specifications provided by RotaChrom, is not covered in the warranty; therefore, it is the expense of the customer.

## Safety Notice

Read all manuals and consult with RotaChrom-trained personnel before you operate the system. Do not perform any procedure before you carefully read all instructions. Always follow the product labels and the recommendations from the manufacturer. For more information, please contact RotaChrom.

### Alerts for Warning, Caution and Note

#### WARNING



Warning sign indicates a potentially hazardous situation which, if not avoided, could cause death or serious injury.

#### CAUTION



Caution sign indicates a potentially hazardous situation which, if not avoided, can cause minor or moderate injury. Caution can also alert against unsafe practices.

#### NOTE



Note sign indicates notable information must be followed.

## Summary of Hazards

This section describes the possible hazards of the system. The hazards of individual procedures in this manual are included in the warnings or cautions within the instructions.

Read this section before you operate this system.

Follow the power requirements in the system specifications. Follow the procedures and safety warnings throughout this manual.

If you use the system in a manner not specified by RotaChrom, the protection provided by the system can be impaired or system failure can occur.

#### Chemical Materials

Observe all chemical hazard precautions when doing maintenance, service, or troubleshooting on the system. Chemical hazard precautions include, but are not limited to: wearing gloves, eye shields and lab coats, and washing hands after working on contaminated parts of the system.

Follow all laboratory procedures and policies for handling chemical preparations.

Avoid skin contact with chemical preparations. Wear Personal Protective Equipment (PPE) to work with chemical preparations used with the system. For more information, see the corresponding MSDS (Material Safety Data Sheet) for all chemicals.

Clean spills immediately of potentially hazardous substances on the system. If the system must be decontaminated, contact RotaChrom.

Follow your laboratory procedure for the disposal of hazardous material.

### **Electric Shock**

Do not replace or service any components where you can contact hazardous parts that could cause electric shock. These maintenances must be performed by RotaChrom.

### **Electrical Ground**

#### **WARNING**



**Never operate the system until the power cord is connected correctly to an electrical ground.**

Use a three-pronged (grounded) power cord to connect the system to a matching three wire grounded outlet. A three-phase AC outlet is required with free ends supplying 1 × 16A, with pins P+N+E. Line frequency should be 50 or 60 Hz, with line voltage of 230V +/- 5%.

### **Electromagnetic Compatibility**

The system generates, uses, and can radiate radio frequency energy. If the system is not installed and operated correctly, this energy can cause interference with other equipment.

In addition, other equipment can radiate radio frequency energy to which the system is sensitive. If you suspect interference between the system and other equipment, please contact RotaChrom.

### **Moving Parts**

While the system is in operation, do not touch or go close to any moving parts. Close all covers during operation. Failure to close covers correctly can cause injury or death.

### **Liquid Waste**

Some liquid waste can require special treatment before disposal. Follow your laboratory procedure that corresponds the regulations of your country.

Some substances in the chemical preparations may have different storage and disposal regulations. Follow your operation procedure that corresponds the regulations of your country.

### **rCPC Hazards**

Only a RotaChrom representative can install the system. If the system installation needs modification, please contact RotaChrom.

- If the system malfunctions, power off the system completely using the main breaker located on the left side of the rCPC unit before any repair service.
- To confirm system performance, maintain and inspect the system periodically by replacing the parts according to the instructions in this guide.

- Have and follow a maintenance schedule for this system.
  - Create a maintenance routine for the computer software and hardware, including frequent backing up of data.
  - Do not store backups onsite. Keep one copy on-site for reference and one copy offsite.
- Dedicate the computer hardware to only running the system software. Do not connect the computer hardware to the Internet, unless instructed to do so by RotaChrom.
  - Keep the system's safety coverings and top coverings closed except for startup procedures and maintenance.
  - All covers (including front door) must be attached and sealed before plugging the instrument into the main outlet. Before removing any cover or removing safety screws of the front door, shut down the system.

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## Introduction

RotaChrom rCPC is a research & development purpose Centrifugal Partition Chromatography system intended for pilot scale purification of compounds. Centrifugal Partition Chromatography is a liquid-liquid chromatographic technique, where both stationary and mobile phases are liquids, and the liquid stationary phase is immobilized by a strong centrifugal force.

CPC system consists of two interconnected parts:

1. Preparative unit composed of the following items:
  - Stainless steel stand
  - Input selector valve with the built in control system
  - Liquid pump with solvent selector valve – 4 inputs, capable of 300 mL/min (0.079 gpm), at 150 bar (2 175 psi)
  - UV detector – 200-400 nm range
  - Fraction collector (spider) – 10 outputs



1. figure: Preparative units

2. CPC rotor with extraction cells (with Variable Frequency Drive) – max 1 500 rpm



2. figure: CPC rotor

This manual contains the operating instructions of the rCPC system, as well as cleaning instructions and maintenance instructions.



3. figure: rCPC with connected vessels

## Safety precautions

**Be aware that all covers (including front door) should be mounted before plugging instrument into the mains outlet. Before removing any cover or removing safety screws of the front door, shut down the system and remove mains plug.**

## RotaChrom cell design

RotaChrom's unique cell design represents the Keep It Simple Straight (KISS) concept, and so cells are constructed with easily assembled parts of the following:

Cell tube wall – two 3/8" NPT internal threads, 20 mm hex form, M22 outside fine thread

- PEEK plug – 3/8" NPT thread for cell connection, Swagelok connector for tubing
- Stainless Steel wool filling – available in different materials (standard: SS434)
- 1/8" SS tubing for connection

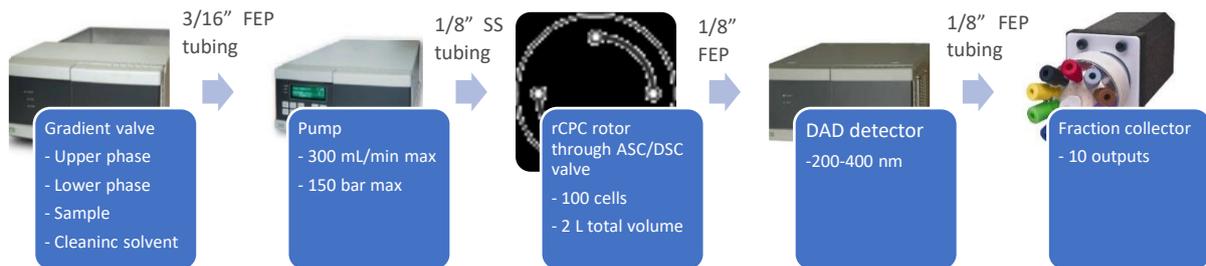


4. figure: RotaChrom rCPC cells in holder

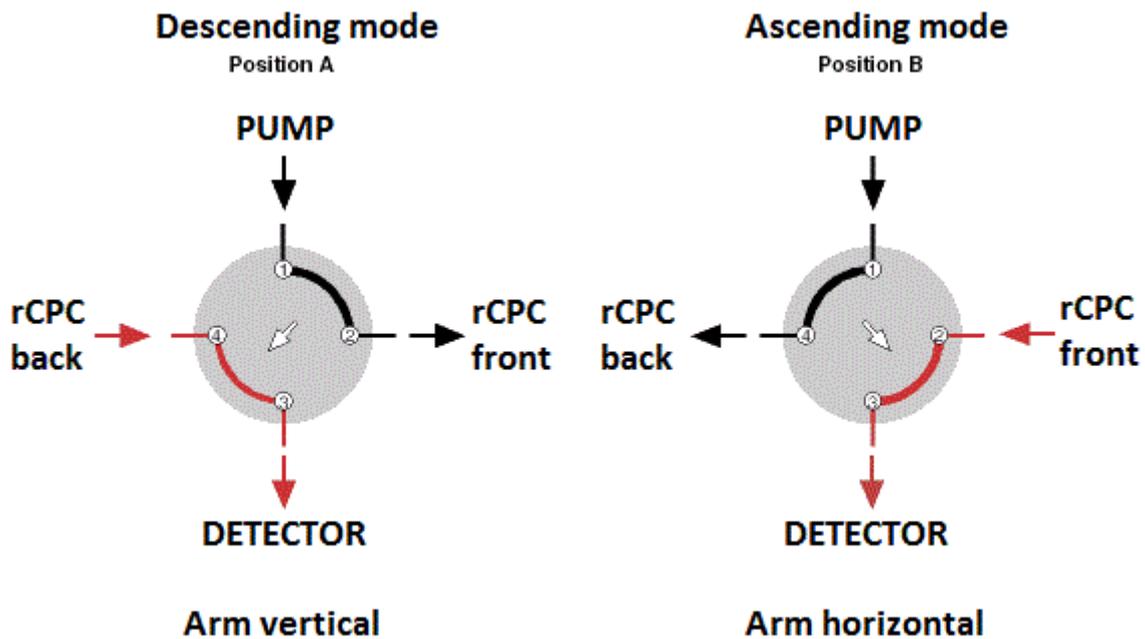
## Instrument installation

RotaChrom rCPC system installation is always carried out by qualified personnel trained by RotaChrom or its partners. User may disconnect some connections and reinstall them by the instructions described in this chapter.

The flow connection is described on the figure below:



5. figure: schematic of flow connection



6. figure: operation of ASC/DSC valve

Solvent vessels can be connected to gradient valve by 3/16" FEP tubing. The gradient valve is connected to the pump with 3/16" FEP tubing.



7. figure: Gradient box



8. figure: Pump

These FEP tubing utilize PEEK nuts with inverted ferrules. Pump should be connected to the ASC/DSC valve with 1/8" SS tubing, with VICI nut and SS/PEEK ferrule at both ends. ASC/DSC valve should be connected to the rotor with 1/8" SS tubing, with VICI nut and SS/PEEK ferrule at valve end and Swagelok nut and ferrule at rotor front (DSC).



9. figure: ASC/DSC valve

Rotor back (ASC) should be connected to the ASC/DSC valve with 1/8" SS tubing, Swagelok nut and ferrule at rotor end, and VICI nut and SS/PEEK ferrule at valve. Valve should be connected to the detector with inverted ferrule at detector end.



10. figure: UV-VIS detector

Detector should be connected to fraction collector with 1/8" FEP or PEEK tubing, with PEEK nuts and inverted ferrules. Fraction collector has 10 output connections, recommended tubing is 1/8" FEP or PEEK with PEEK nuts and inverted ferrules.



11. figure: Fraction collector

See the figures below for guidance:



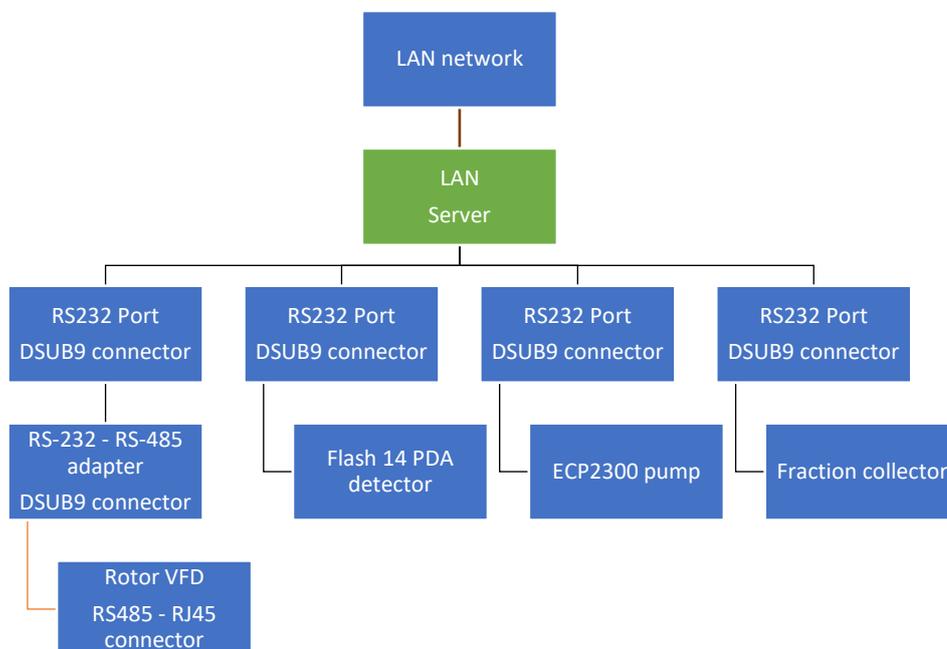
12. figure: Flow connections on units

Pay special attention to the front and rear of the rotor connection. The rotary seals are standard units (see spare parts list) and are connected to rotor with  $\frac{1}{4}$ " G threads and can be removed by a wrench. There is a Swagelok  $\frac{1}{8}$ " tubing to  $\frac{1}{4}$ " G thread adapter, with SS304 seal. Check the connection tubing for bending. Check the interconnects for proper connection and fixing.



13. figure: Rotary seals and interconnects

The server communicates with the peripherals with different ports. RS485 items are daisy-chained through a common RS-485 bus and connected into an RS232-RS485 adapter (converter), which is connected to one of the RS-232 ports of the server. ECP2300 pump, Flash 14 DAD 400 detector and fraction collector communicates with the server through their own RS232 ports. Server is accessible through LAN by Remote Desktop.



14. figure: Communication connection of peripherals

Default IP setting for the Instrument Data server is DHCP assigned. It is recommended to note the MAC-address of the instrument and set a fixed IP-assignment on router (contact IT) based on the instrument’s MAC address. Using a fixed IP to address the instruments minimizes communication problems, latency and provides easy access from web browser.

## Starting of the instrument

**Connect the instrument to mains AC and turn on the mains switch.**



15. figure: Mains switch

Let some time the server to boot up and use Remote Desktop to connect to the server.

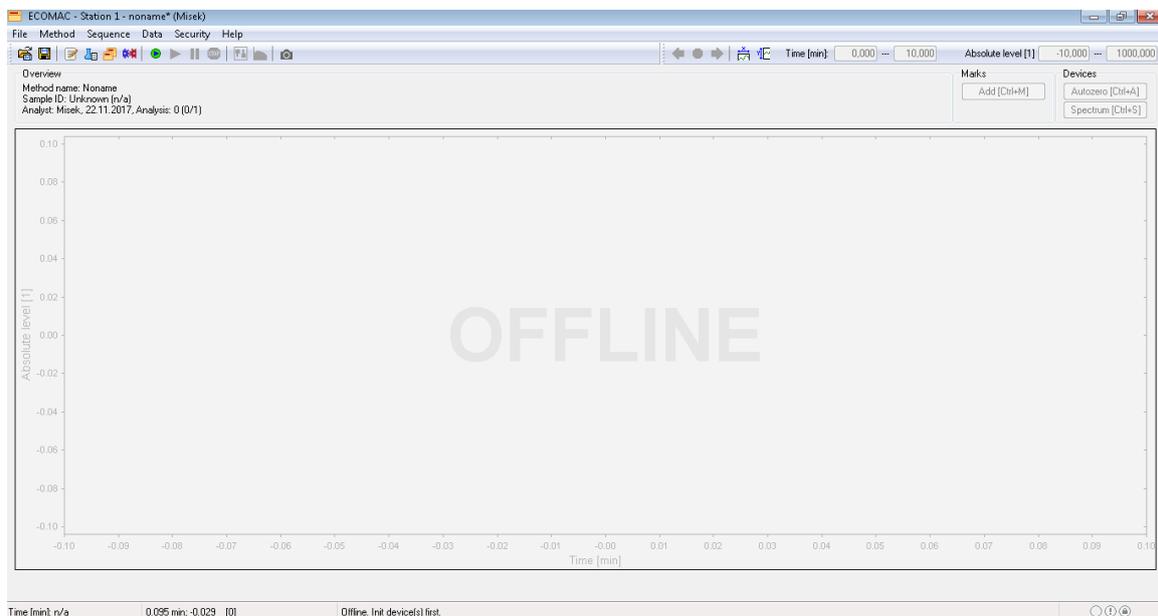


16. figure: Remote Desktop connection

Give the fix IP address, username and password in the Remote Desktop Connection window.

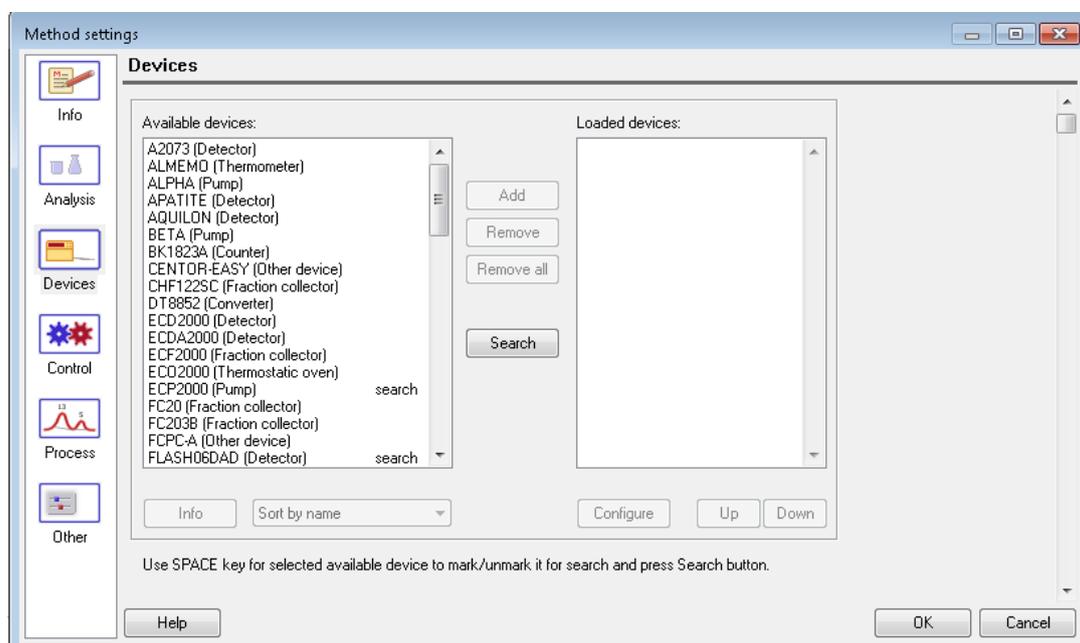
After successful installation of software please contact [info@rotachrom.com](mailto:info@rotachrom.com) or +36-70-885-6922 for registration key. (Normally the registration is done by RotaChrom during the installation.)

After you execute ECOMAC application you can see next window or similar one. It is the main window running as Station 1. Main part of the window is the graph where application shows measured data. State of your analysis or the application is displayed on status bar (analysis time, cursor position or selection, analysis status, application's status icons) at bottom of the window.



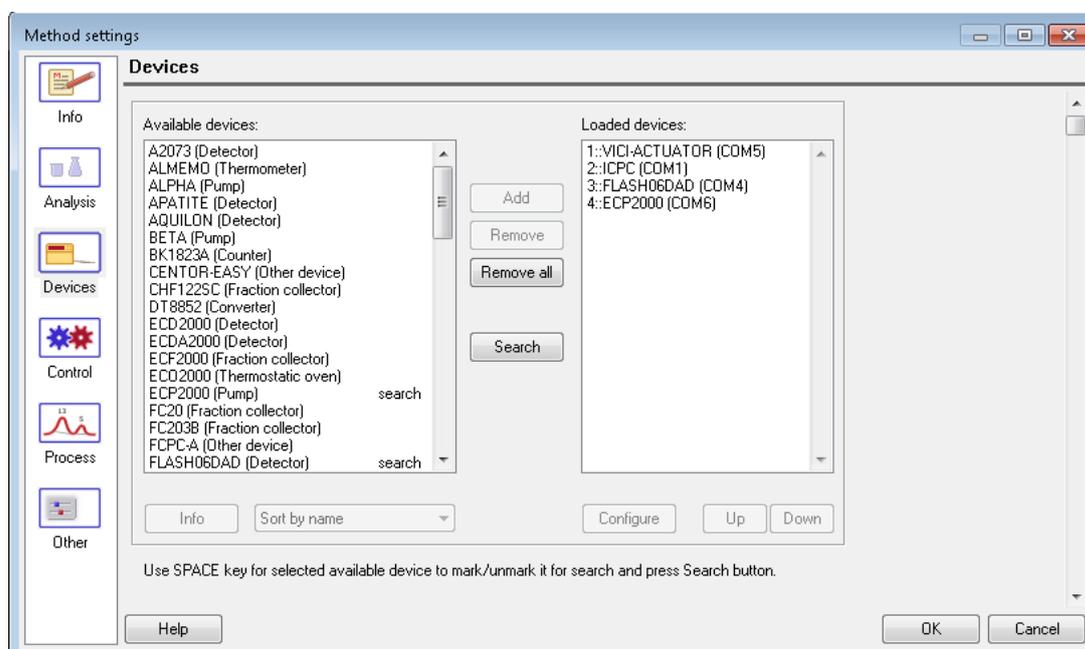
17. figure: Main window of software

Method file contains all settings of station configuration. Method configuration dialog is accessible from main menu Method >Setup. You should set device configuration at first. Open Method configuration dialog by choosing Method >Devices. On the left side of section are displayed supported devices to you.



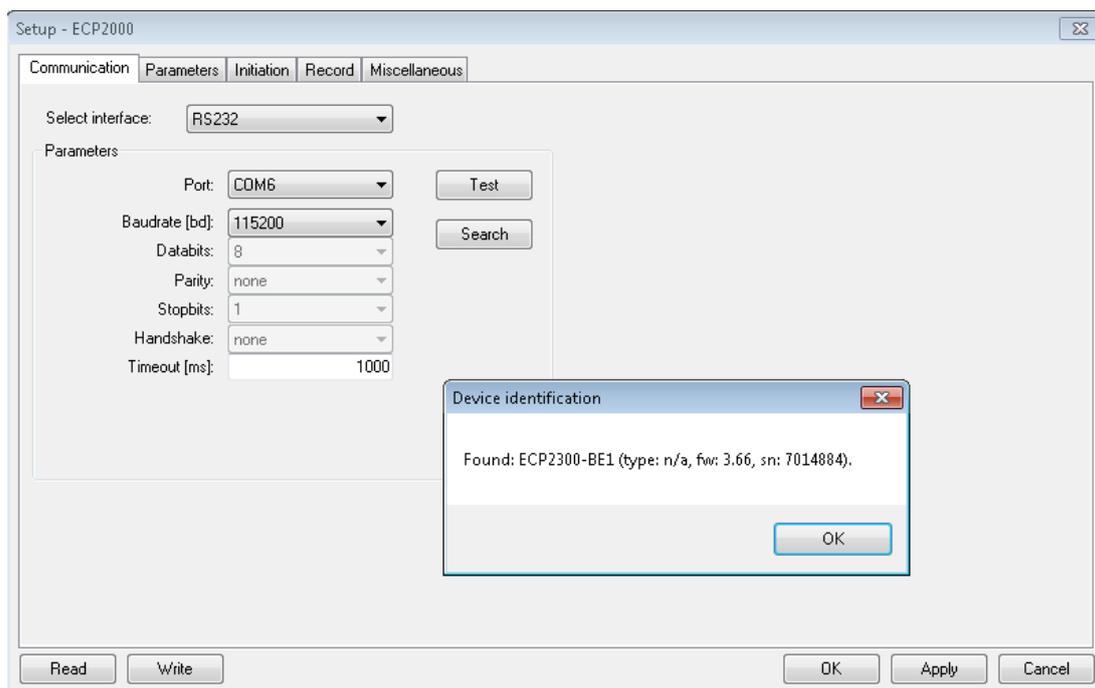
18. figure: Device configuration window

You can add selected device to the right by pressing Add button. Devices on the right side are those which application should connect at start time (initiation phase). Check the list for main components of rCPC instrument (CPC, ECP pump, Flash detector and Vici actuator /spider).



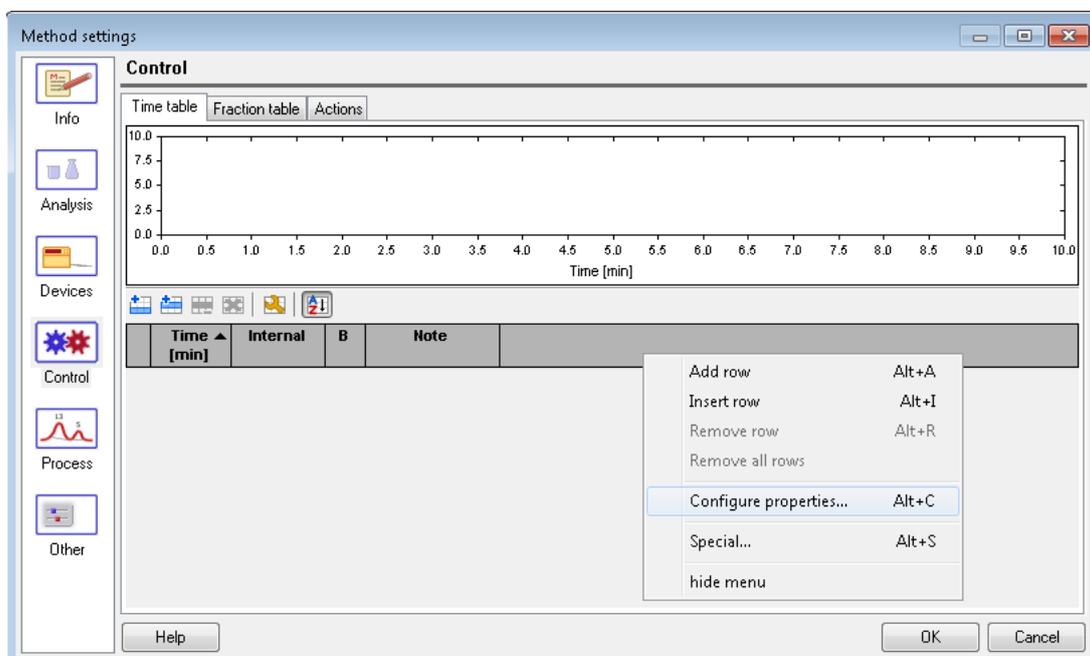
19. figure: Device identification

Pressing Test button (for added devices) initiates application to test a connection with device and returning device's identification (if available). Most of the parameters are disabled often, because other settings are not possible, or parameter is not used.



20. figure: Communication test of device

After communication tests click on Control button. Time table allows doing available actions in specified time of analysis. Use right click on area under preview graph to manipulate with this table.



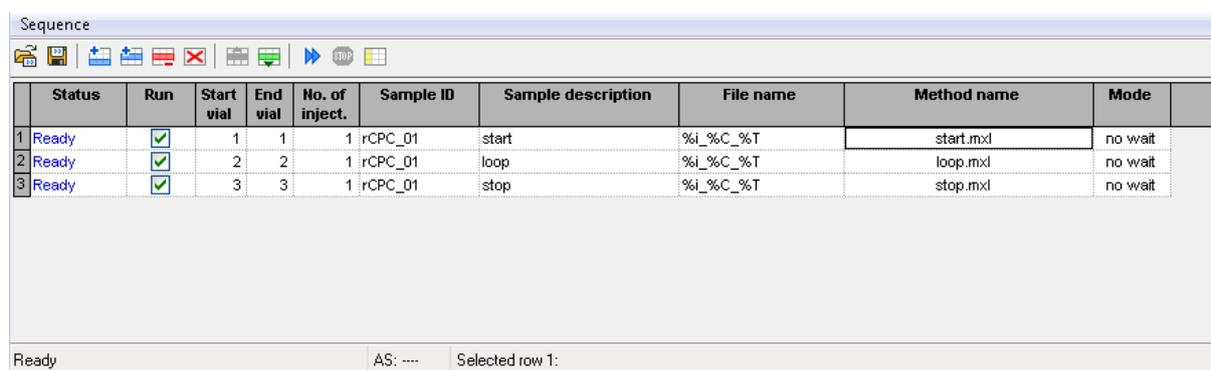
21. figure: Method setup

For normal operation of instrument, you should add the following: Flow rate, RPM, Inlet % (A,B,C,D), Detector wavelength (A,B), Position (outlet), Pump and Rotation.

	Time ▲ [min]	Position	Wl A [nm]	Pump	Set flow [ml/min]	B [%]	C [%]	D [%]	Speed [RPM]	Rotation	Internal	B	Note
1	0.000	1	190	True	0.0	0.0	0.0	0.0	150.0	True	----	--	

22. figure: Required tabs for normal operation

After method development (table filled with timings and actions) make sure to save method changes. Repeat these steps to write individual start, loop and stop methods. Before analysis set up a sequence. Click on Sequence button and fill table as you can see below, then save your sequence.



Status	Run	Start vial	End vial	No. of inject.	Sample ID	Sample description	File name	Method name	Mode
1 Ready	<input checked="" type="checkbox"/>	1	1	1	rCPC_01	start	%I_%C_%T	start.mxl	no wait
2 Ready	<input checked="" type="checkbox"/>	2	2	1	rCPC_01	loop	%I_%C_%T	loop.mxl	no wait
3 Ready	<input checked="" type="checkbox"/>	3	3	1	rCPC_01	stop	%I_%C_%T	stop.mxl	no wait

Ready AS: ---- Selected row 1:

23. figure: Setup of sequence

Before you run an analysis you have to initiate devices (click on Method >Init Device or press Alt+I). Ready state is useful for stabilization of devices (warming up, settle signals, etc.) and you can observe this process at real time. You can change devices' parameters now through Devices' On-line Configuration dialog (click on Method >Online configuration or press F10). If ready state is set it is possible to start analysis. Choose Method >Run menu item or choose Run analysis menu item from context menu to start analysis manually.

For more see Software manual for detailed usage of software.

Make sure that input liquids are connected to the gradient box and are in adequate amount and quality for the operation. Connect waste container to fraction collector output 1 and connect fraction vessels if necessary.

## Normal operation of the instrument

The timing tab of the GUI is responsible for the order of the sequences. Normally it consists of 3 steps:

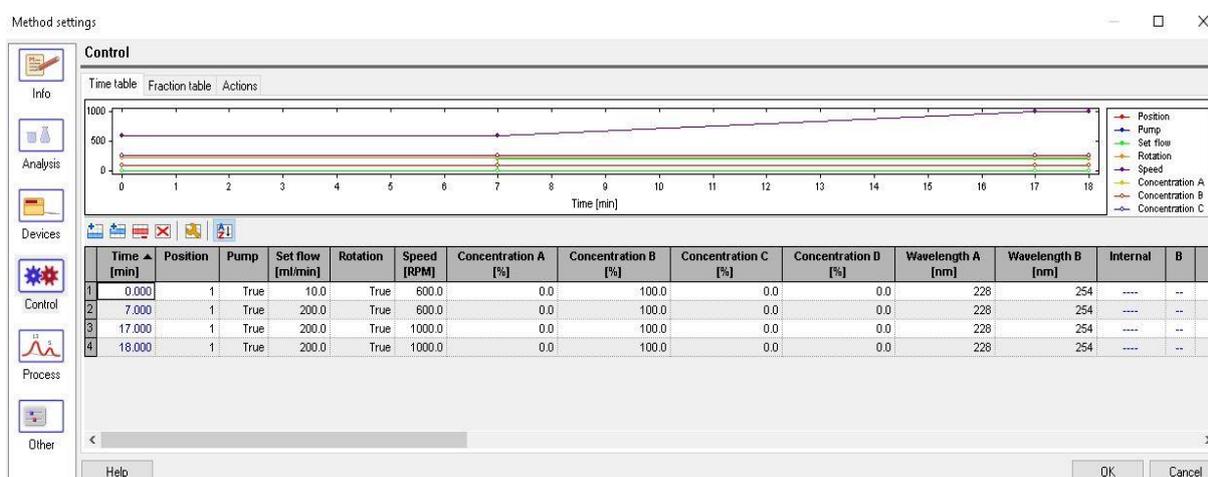
- Start – startup of the instrument (detector wavelength, filling with stationary phase, spin up of rotor)
- Loop – injection cycle (injection, elution, fraction collection, extrusion)
- Stop – stopping of the instrument

## Method creating in the software

Before the method creating the operator prepared and connected the solvents and the dissolved sample to the rCPC. The gradient box inlet connections are the next:

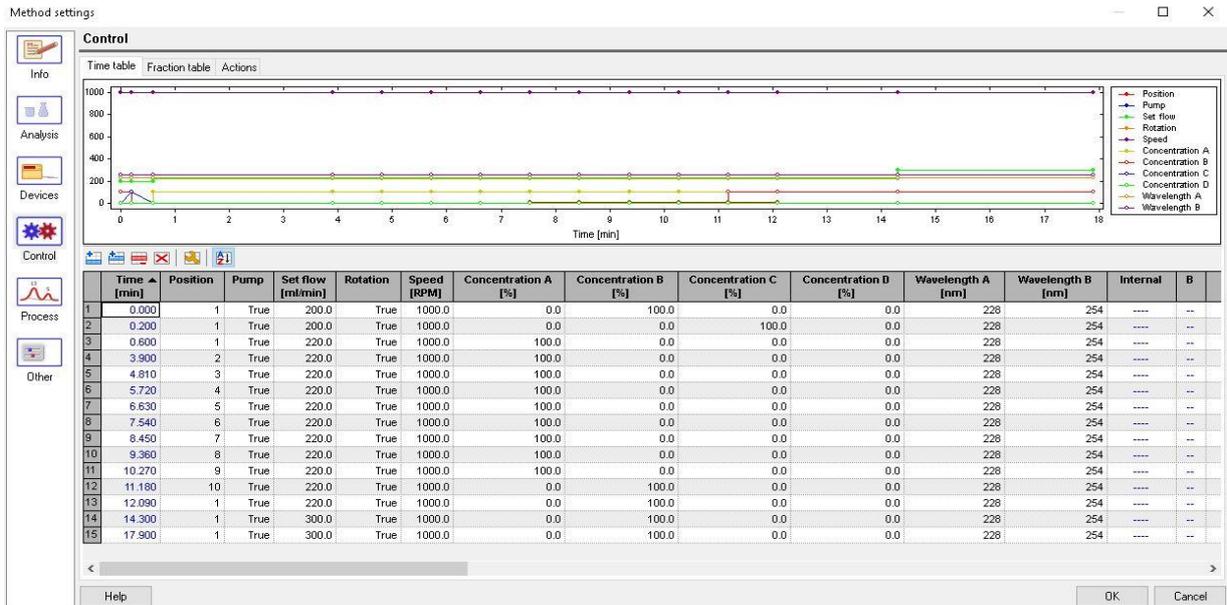
- connect the mobile phase to the A line
- connect the stationary phase to the B line
- connect the sample to the C line

Firstly, the operator has to write a start method. In the start method filling up the rotor with stationary phase and set up the detector wavelength. The end of the start method the set up speed of the rotor has to be the operating speed.



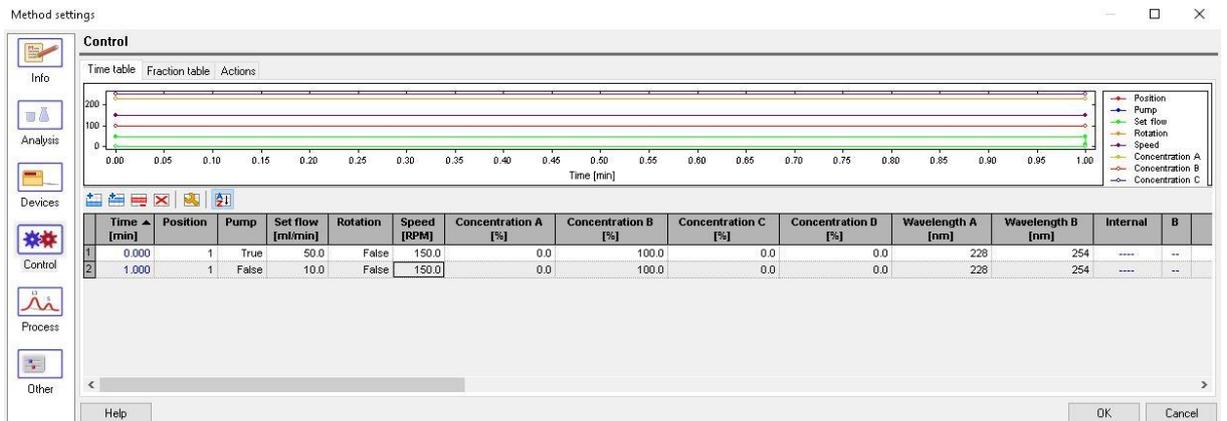
24. figure: Start method writing

Secondly, the operator has to write a loop method. In the loop method inject the dissolved and filtered crude with the gradient box C line. Thereafter pumping mobile phase around the same volume, then the rotor total volume. This called elution. If the main component come down during the elution, then collect it in the fraction bottles. See in the position column collect fraction from 2 to 10. After the elution pumping stationary phase. It is necessary to refresh the column with fresh clean solvent and push down the all components from the sample what stayed in the stationary phase. This called extrusion.



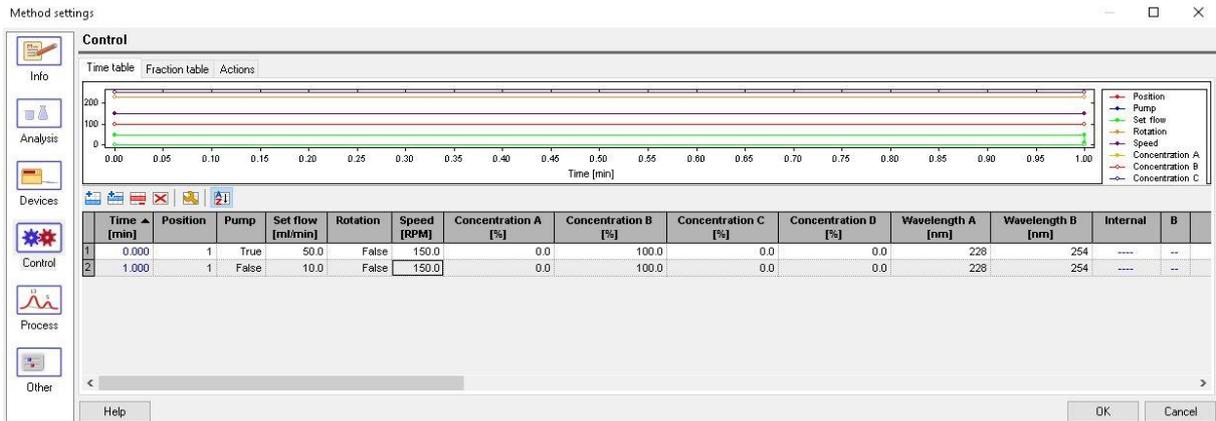
25. figure: Loop method writing

Thirdly, the operator has to write a stop method. It includes stopping the pump and the rotor speed. That means the separation is finished.



26. figure: Loop method writing

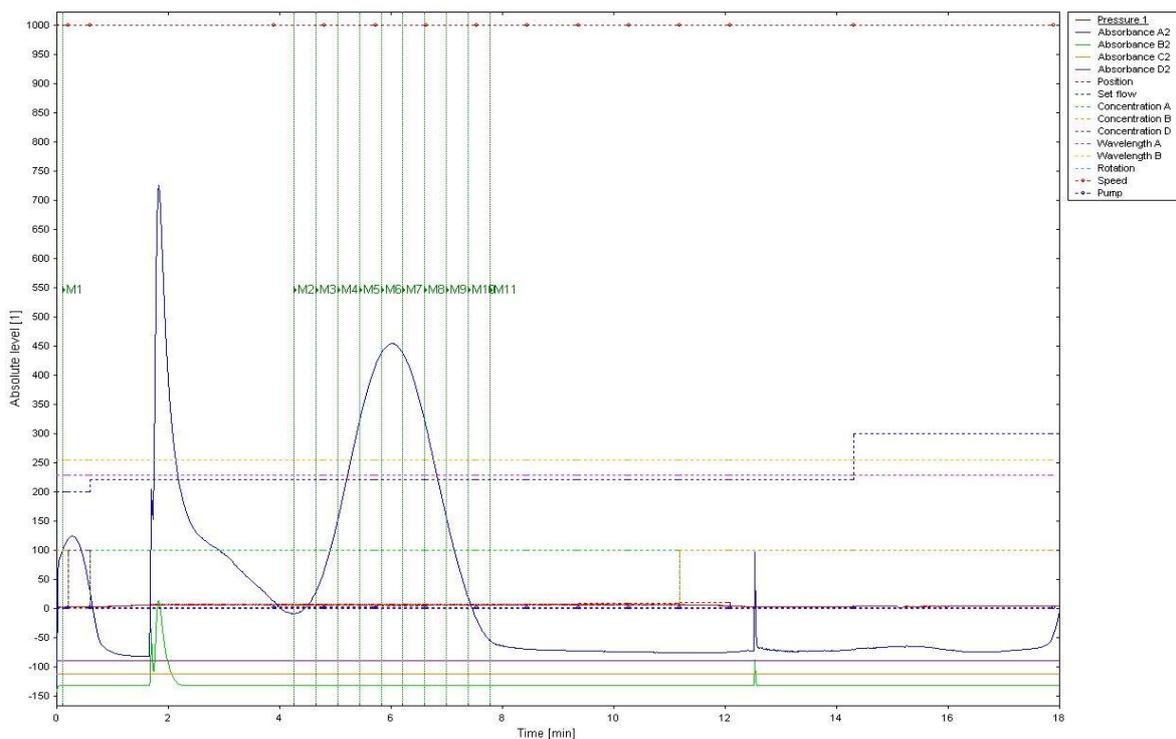
Fourthly, the operator has to write a sequence. Here inserts the start, loop and stop method. If the operator wants more injection during the run insert more than one loop method in the sequence.



27. figure: Sequence writing



The end of the method the software saves the chromatogram file automatically. In the chromatogram file divided by 9 fraction the main component peak. Everything that comes down on the time line before and after is impurity component.



28. figure: Chromatogram

During the filling with stationary phase it is recommended to pump at least 2 l of new (fresh) stationary phase to completely exchange previous one, especially if different solvent systems are used.

Before spinning up the rotor, set a small flow speed (if stationary phase filling is carried out at high speed), to ensure rotary seal lubrication. **It is highly recommended to have flow through the rotor when it is spinning. Running the rotor at high speed without flow decreases rotary seal lifetime.**

Elution and fraction collection should be planned before starting the sequence, by calculating possible retention volumes of the compounds with the following equation:

$$V_{elution} = V_{deadvolume} + K \times V_{stationary}$$

During an extrusion all compounds leave the column, and the stationary phase is refreshed with a new one. It is possible to partially or completely refresh the stationary phase.



**If you want to know more about the ECOMAC software functioning please turn a page of the ECOMAC software User's guide.**

## Cleaning and maintenance

### Cleaning

RotaChrom rCPC is used in a laboratory or in pilot scale production, as so requires attention during handling of solvents and solutes, as well as occasional cleaning. During a spillage or leak it is recommended to stop the instrument, shut it down and clean it right away.

Before cleaning the outside, it is recommended to switch mains switch off and unplug the instrument. Outside covers of the instrument can be cleaned with usual detergents, 50% ethanol solution, and can be wiped with soft cloth.



**During the separation must use filtration. For example: 20µm filter at the end of the inlet tubing.**

After a purification process or a production is highly recommended to clean the inside of the flow line, for what the easiest way is to pump through some cleaning solvent. Here are some recommendations for cleaning solvent:

- Highly polar compounds: deionized water
- Polar compounds: 50% Methanol
- Apolar compounds: 50% Ethanol
- Lipids: 70% Ethanol

It is recommended to flush the inside with at least 3l of solvent, while switching fraction collector to flush all lines.

Gradient input lines can be easily flushed by opening the purge valve and pumping some solvent.

If the precious cleaning process is not considered adequate it is possible to use other solvent as well as possible. However, if throughout cleaning is needed, cell disassembly is necessary.

### *Cell disassembly for cleaning and cleaning validation*

Referring to cell assembly but working in an opposite order. Remove the Swagelok nuts with a 11mm wrench, then by pulling the tubes remove tubing. Make sure to check the ferrule state, as excessive torque on nuts deform ferrules.

After removing the nuts, the PEEK plugs can be removed with a 14mm pipe wrench. Do not use standard wrench, and make sure pipe wrench covers all of the plug to prolong plug lifetime. To remove the filling use a clean plastic or metal rod to push it out. Alternatively, forceps can be used to pull filling out.

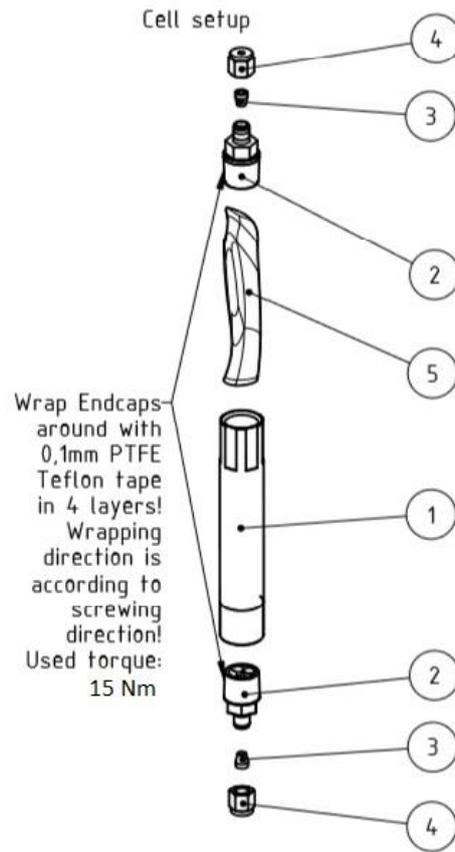
Stainless steel mesh can be cleaned in solvent in an ultrasonic bath. However, if it is found to contain risk, it is possible to exchange them easily. The empty cell can be cleaned with a standard test-tube brush.

Validation of cleaning usually utilizes the swab-probing method, where a swab soaked in a solvent (good solvent of material under study) is rubbed on to the surface of the item under validation. The swab is then put to solvent to make a reference solution which is then measured by a sufficient analytical technique for remaining of material under study.

When cell disassembly is carried out only for swab probing, we recommend choosing a few number of cells on a random basis. Then it is only necessary to remove front nut and tubing, then remove only one plug per cell. Using a forceps filling can be pulled out, and cell can be swab-probed for remaining.

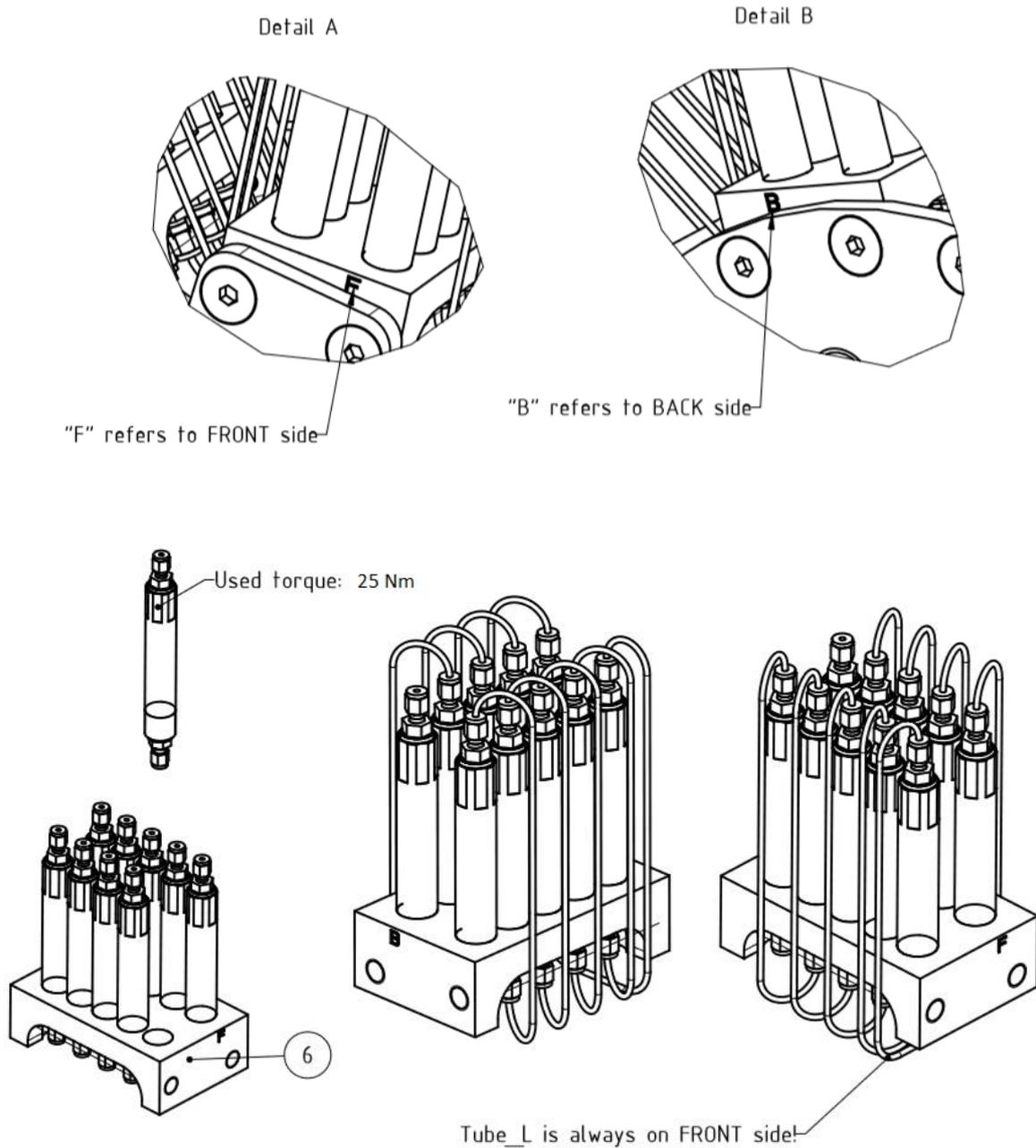
### *Cell assembly after cleaning*

During the assembly of the cell (1) be sure to wear gloves. Assembly of the cells is described on 29. figure, as cells should be filled in with the filling material (5). Using a cigar-making movement roll the filler into the tube then push on both ends with fingers or a plastic rod. Cover the NPT thread of the plugs (2) with 3-4 layer of standard PTFE tape (A-A-58092 standard, „white” or „yellow” coded). Screw on the two plugs with a 14 mm pipe wrench and fix with a torque of 11 Nm. Do not use standard wrench and make sure pipe wrench firmly covers all of the plug.



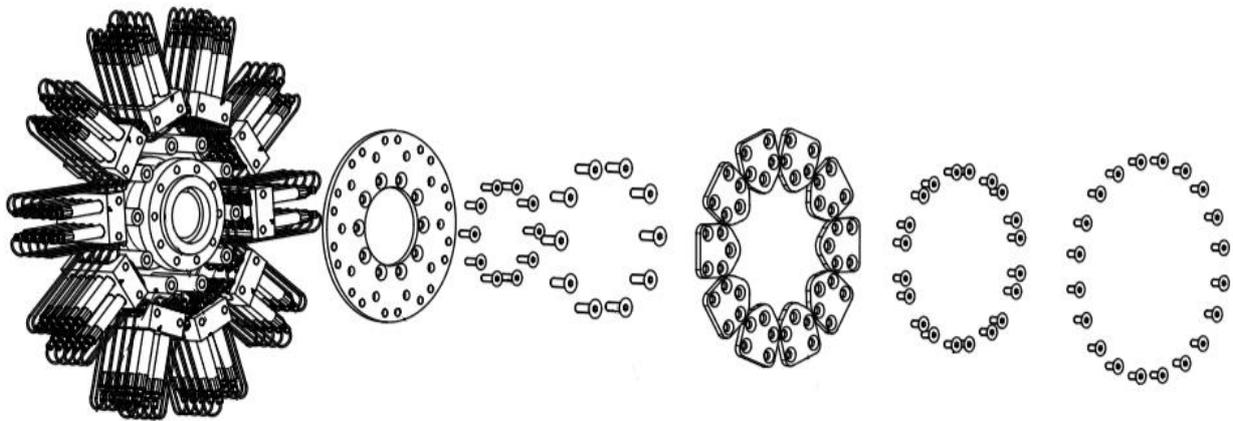
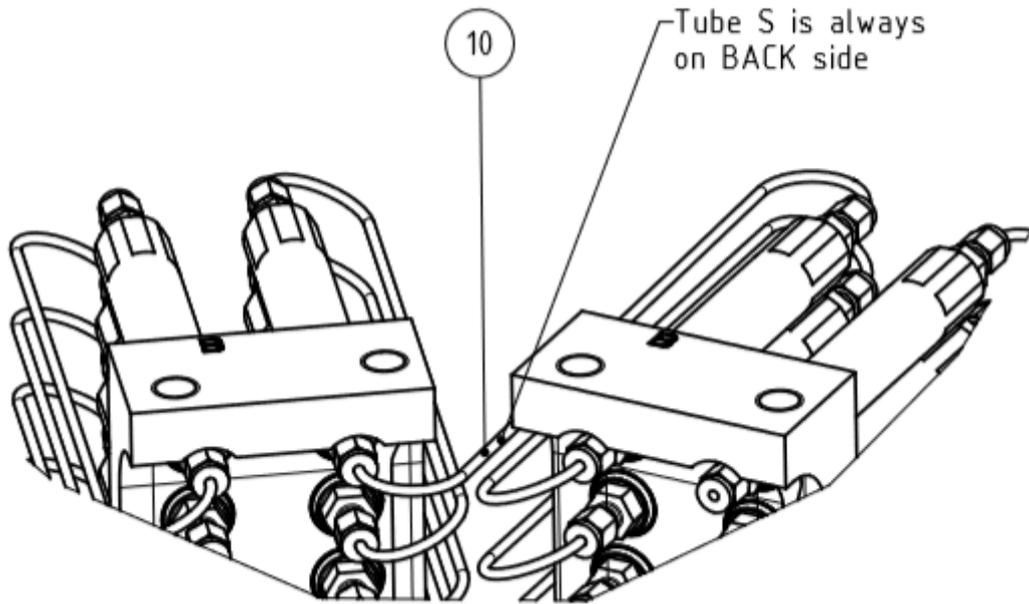
29. figure: RotaChrom rCPC cell assembly

After connecting plugs screw in the cell in to the cell holder block (6). It is recommended to fix the holder temporary to a stand. Fix with torque of 19-20 Nm. Connect the cells in-line with „C” type (7) interconnect tubing. Connect the cells between lines with „L” type (8) interconnect tubing. When connection the tubes, first put on the nuts (4) and ferrules (3) to the desired position. Use some force to pull the tubes on the connection ends. Be sure that the tubes slip into the holes till the shoulder of the connection. When fixing nuts push the tubes in to the shoulder (see figure 30).

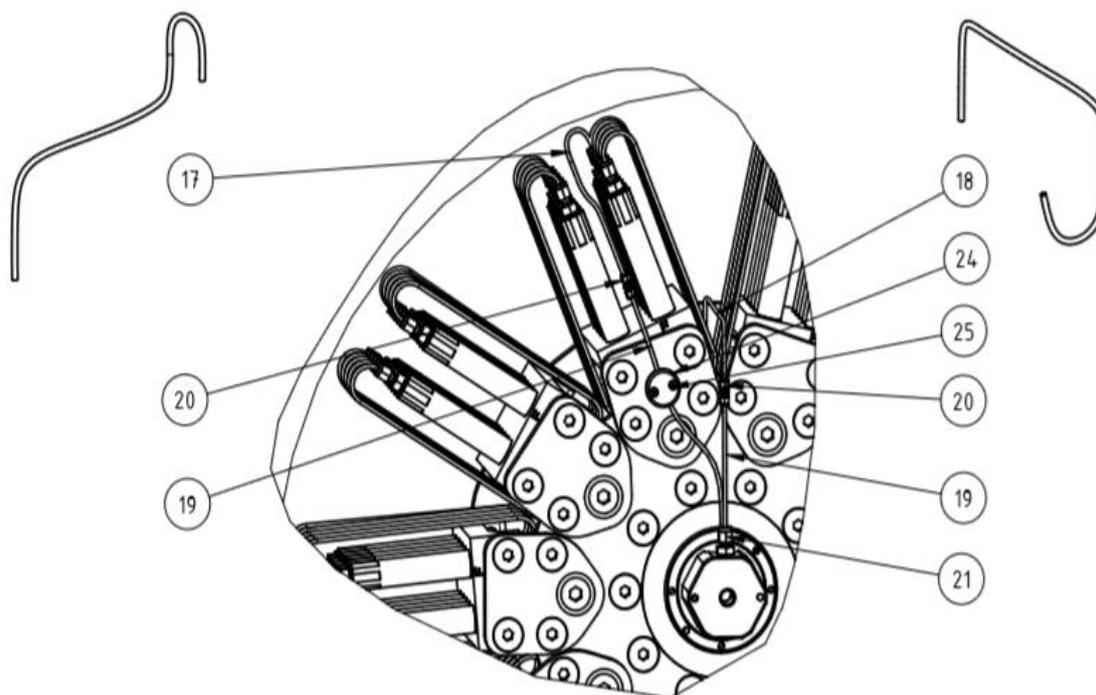


30. figure: schematic of flow connection

Cell blocks should be screwed into the rotor, on a stand. Interconnects between cell blocks should be made with „S” type interconnects (10). Input and Output interconnect should be screwed before putting on rotor cover and putting rotor inside machine.



31. figure: rotor assembly and schematic of flow connection between blocks



32. figure: schematic of flow input and output connectors

input: (18, 19 - SS tube, 20 - union, 21 - nut, 24 - tube holder, 25 – tube holder screw) and output: (17 – SS tube, 19, 20, 24, 25) connectors

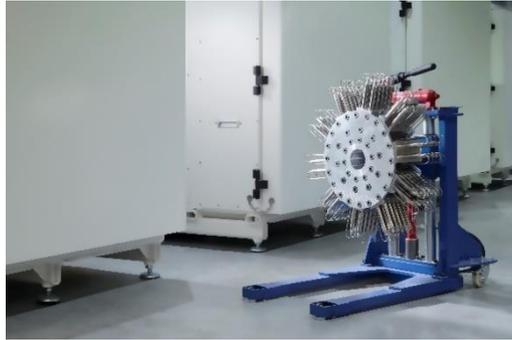
## Maintenance and service

To ensure maximal performance it is necessary to have occasional maintenance over the instrument. The instrument can also be maintained by the customer. It is necessary to send the maintenance report.

Inspection	Interval	Note
Check for leaks	At startup/purging/during sequence	Check tubes and nuts for tightness
Rotary seals	Every week	Seals should not leak
Rotor	Every week	No leak or deformation

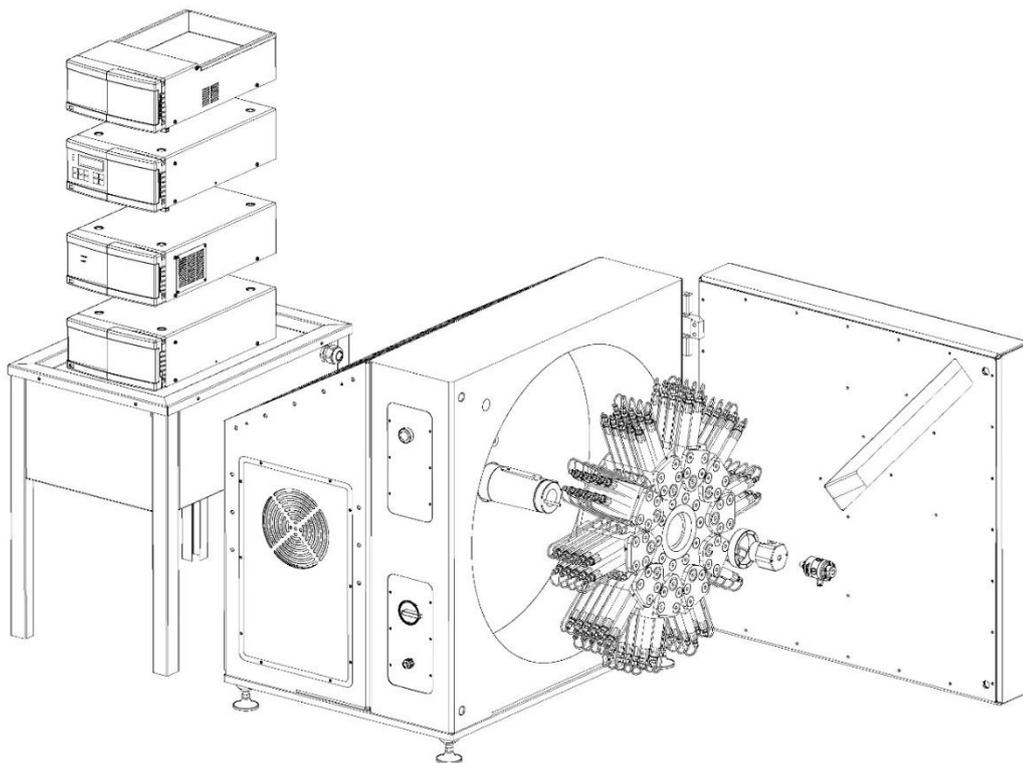
### Mounting of the rotor

Mounting the rotor requires serious attention, as the heavy weight should be carried by two workers. Rotor should be touched on the cells and rotor plates, but not on the interconnects! Extensive force on interconnects bends them or even brakes the plugs. It is advised to ask RotaChrom's personnel for rotor removal/mounting and/or use the dedicated device for rotor removal/mounting.

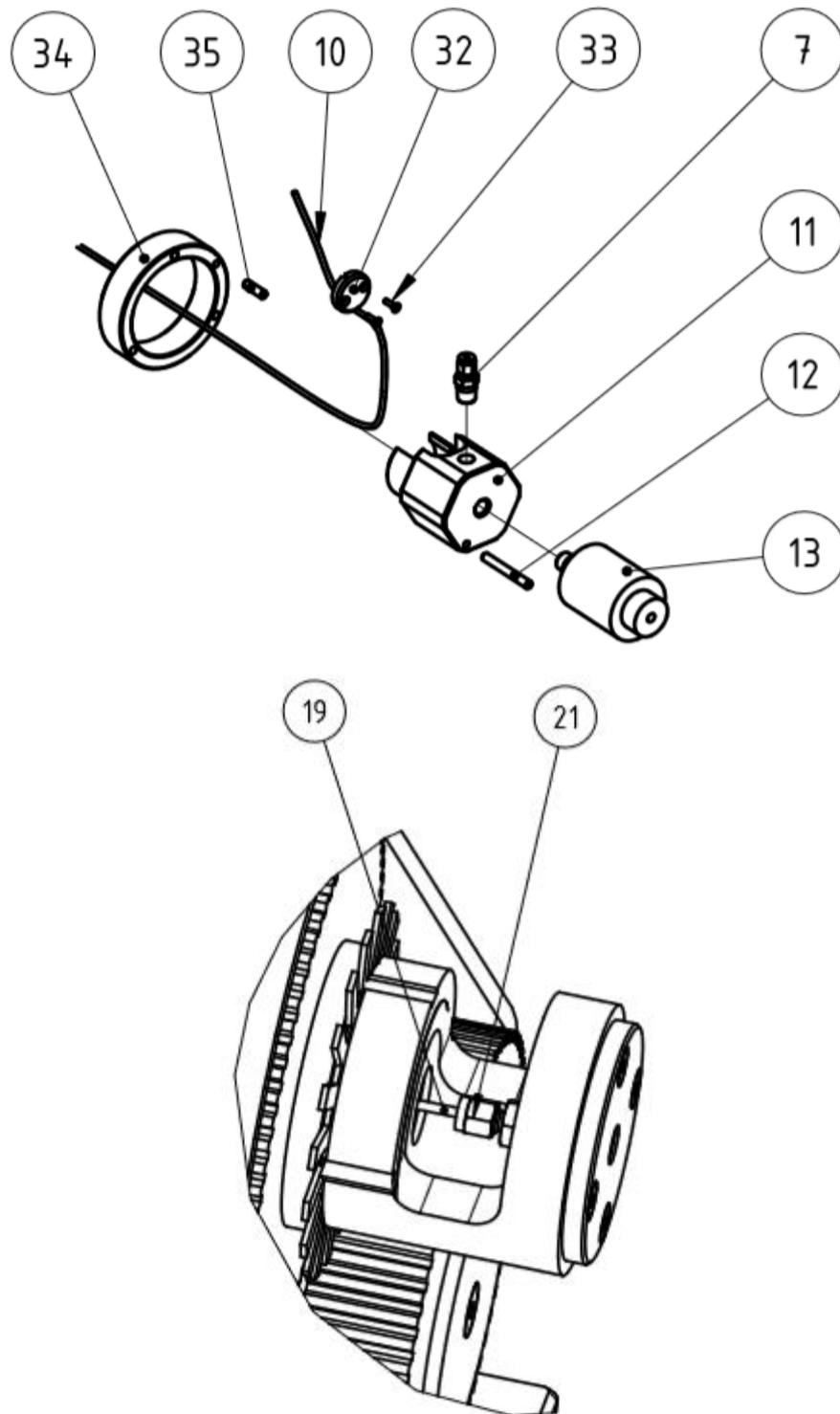


33. figure: Rotor removal fork-lift with rotor

Before mounting the rotor remove any rotary seal, tubing and the hex adapter from the axis and make sure that the axis wedge is in place. The axis end is slightly conical to ease the putting on of the rotor. With the rotor holding tool (or carried by two workers) move the rotor close to the axis and check the wedge to be in the correct position.



34. figure: mounting of rotor



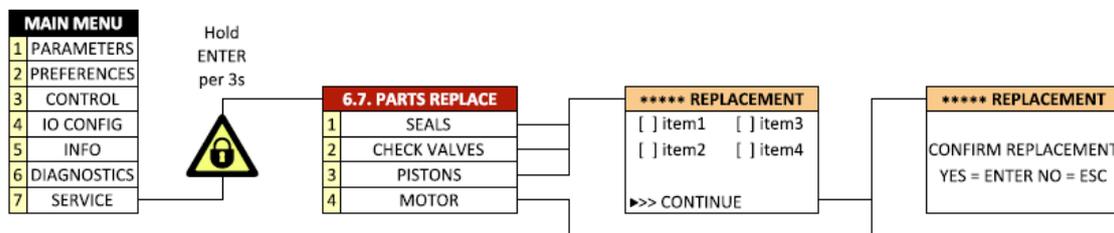
35. figure: inlet and outlet connections on the front and back side of instrument  
 output tube (10, 19) hex adapter (11), rotary seal (13), screw (35, 33, 12), tube holder (32), nut (21),  
 slot for screw (11, 13) and input (7) connectors

### Pump seals and check valves replacement

Service menu is secured with a password. Before entering this part, please read following chapters first!

Code for entering service menu = press and hold key **ENTER** for the period of 3 s!

#### SERVICE MENU FLOW DIAGRAM



The following operations can be executed only by qualified person. Before starting below described procedures, disconnect unit from power source by disconnecting the main supply cable. The unit may be reconnected to power source only after all service operations are finished!

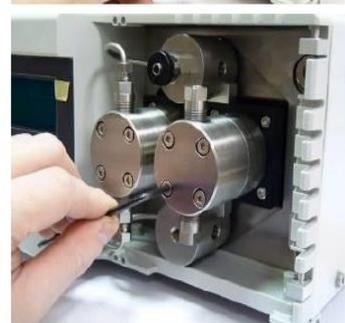
Pump piston is made of fragile material. When mishandled, its smooth surface may be irreversibly damaged, or it may crack!

#### Disconnect the unit from power source!!!

Disconnect inlet tubing.  
Loosen nut on head using side wrench 1/4".



Dismount output capillary.  
Loosen screws in head using TX20 screwdriver from unit accessories.



Pull the head straightly out of the piston.  
**Leaning the head to sides may cause piston damage!**  
Detail of working head.



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. The steps for mounting are same as for dismounting, but in reverse order.



**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. Set the flow rate to 300 ml/min., start pumping and set pressure at 2MPa using reduction valve. Let the pumping for at least 30 min (optimally 2 h). Keep the flow rate at 300 ml/min. and set pressure at 5 MPa. Let the pumping for at least 30 min (optimally 2h). Keep the flow rate at 300 ml/min. and set pressure at 7 MPa. Let the pumping for at least 10 min (optimally 30 min.). Then set flow rate at 30 ml/min. and pressure at 2 MPa. Let the pumping for at least 10 min (optimally 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)

**Watch washing heads and all connections during run-in for any leakage. Correct every untightens!**

*Detector lamp replacement:*

**This operation may be performed only by a qualified person. Before starting below described procedures unplug the unit from power source by disconnecting main supply cable. The unit may be reconnected to the power source only after the cover is mounted back on its place.**

**UV light is harmful for eyes! During regular operation of the detector is UV light perfectly shielded. In case of any service requiring dismantling of any part covering optical unit and when the lamp is on, it is necessary to protect eyes with glasses absorbing UV light.**

Disconnect the unit from the power source.

Unscrew four screws on the small cover on front side of the unit.

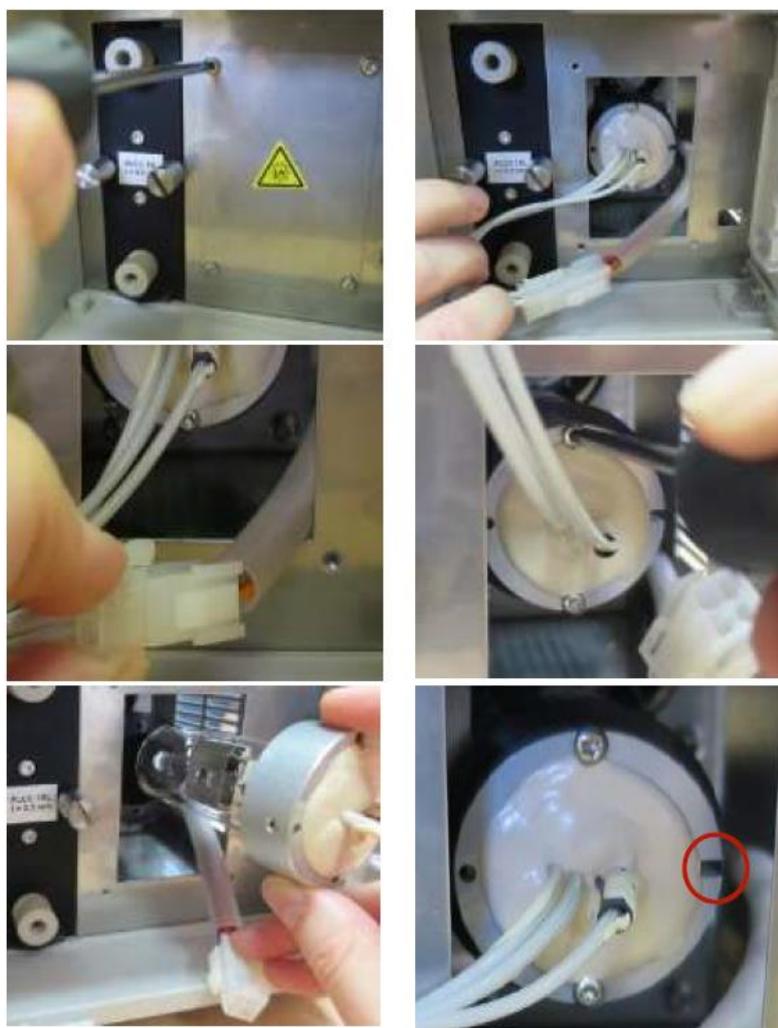
Remove this cover.

Disconnect the connectors; pull away the lamp conductors from the instrument.

Slacken two screws M3 Torx TX10 on the socket.

Remove the lamp. Insert a new lamp.

The notch on the sleeve must be on the right (see red ring in the right figure)



**Never touch the quartz bulb with bare fingers because fingerprints will irreversibly damage the lamp after being switched on. Clean any dust with air duster.**

*Electrical and communication cable disconnection:*

At first the rCPC must be switched off and the electrical cable must be pulled out.

**Connectors on Unit Rear Panel**  
Unplug the power supply cord into the instrument socket on the rear panel.



Unplug serial line cable into connector RS232 for interconnection with PC. Connector can be fixed by two screws using cross tip screwdriver.



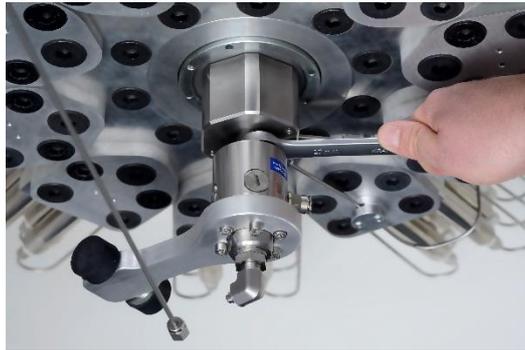
*Rotary union replacement:*

Open the door of the instrument to access the front rotary union. On the connection of the 1/8" tubing to the rotary union, loosen the female nut with a 11mm wrench, and disconnect the tubing.

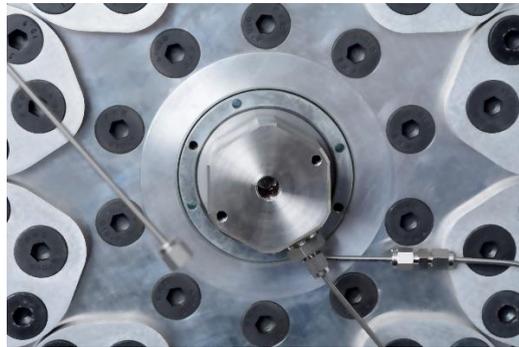


36. figure: Disconnect of the 1/8" tubing

Then use a 17mm wrench to unscrew the rotary union from the holding block and replace it with the new one. Connect the tubing with the female nut the new one.



37. figure: Disconnect of the rotary union



38. figure: Disconnected rotary union holder

Connect the tubing with the female nut the new one.



39. figure: Replaced rotary union

The process of the back rotary union replacement is the same.  
The terms of service are provided on the basis of the service guideline.

## Spare parts

The RotaChrom rCPC incorporates many wear parts, which has defined exchange interval for preventative maintenance. The following table summarizes user exchangeable wear parts. However, we do recommend exchange carried out by RotaChrom personnel for maximal performance.

Unit	Part	Interval	P/N
Gradient Box	3/16" FEP tubing	when leaking	RA00101
	Tefzel ferrule for 3/16"	when deformed after leak	RA00201
	PEEK nut for 3/16"	when deformed	RA00301
	Flow selection valve	when the inlet side the valves changing badly	RA00401
	Replacement PE filter element 20 µm	when the filter is stuck	RA00501
	Reduce No-Met filter 5/16"-24 flangeless	when deformed	RA00601
Pump	Ceramic piston	Leak, low flow accuracy	RB00101
	Working head Teflon piston seal 3/8"	Leak, low flow accuracy	RB00201
	Washing head Teflon piston seal 3/8"	Leak, low flow accuracy	RB00301
	Working head PE piston seal 3/8"	Leak, low flow accuracy	RB00401
	Check valve 1/8"	Leak, low flow accuracy	RB00501
	1/8" Vici ferrule	Leak	RB00601
	1/8" Vici nut	Leak	RB00701
rCPC rotor	Rotary Union	Leak	RB00101
	1/8" SW nut	Leak	RB00201
	1/8" PEEK ferrule	Leak	RB60301
	1/8" SS ferrule	Leak	RB00401
	¼" G SS seal	Leak	RB00501
	RS232/485 Converter	when, communication error with iCPC device	RB00601
Detector	Deuterium detector lamp	Low signal, no signal	RC00201
	Halogen detector lamp	Low signal, no signal	RC00301
	Preparative cell in bracket	Low signal, no signal	RC00401
Fraction collector	¼"-28 PEEK nut	Leak	RD00101
	KEL-F ferrule for 1/8"	Leak	RD00201
	1/8" PEEK tubing	Leak	RD00301
	1/8" FEP tubing	Leak	RD00401

## Warranty

Instrument is covered under limited warranty for 12 months.

List of wear parts not covered by the warranty:

- Pump piston seals, check valves
- Nuts, ferrules, tubing
- Rotary seals
- Detector lamp

## Troubleshooting

Some problems may arise during the operation of the instrument, but most of them are minor, and can be handled by the user. Upon any major problem feel free to contact support at [info@rotachrom.com](mailto:info@rotachrom.com) or +36-70-885-6922. The following table summarizes some errors and answers:

Problem	Possible causes	Solution
Leak at the pump	Loosened connection	Check connection tighten them by hand (finger tight) or by wrench (VICI nut 3/8" wrench)
	Deformed ferrule	Loosen nut, exchange ferrule (cut from the tubing if necessary) and tighten nut
Low flow or pressure	Piston wear	Exchange piston
	Seal wear	Exchange piston seal
High pulsation	Solvent bubbles	Check for input solvent flow, put containers on the top of the instrument
	Dampener failing	Contact support
Bad solvent selection	Loosened electric connector	Check electric connection between pump and gradient box – tighten the screw
High noise in detector	Bad wavelength	Use wavelength where solvent absorption is lower
	Contaminated solvent	Check solvents for contamination
	Air bubbles	Check flow lines for bubbles
	High pulsation	See before
	Lamp failing	Exchange detector lamp
	Other	Contact support
Fraction collection not working	Loosened electric connector	Check connection on the back of the fraction collector
	Noise in signal	Check for interference sources
	Valve fail	Contact support
Other	Unspecified	Contact support

## General Safety Information

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Rotachrom assumes no liability for the customer's failure to comply with these requirements.

Ensure the proper usage of the equipment.

The protection provided by the equipment may be impaired.

The operator of this instrument is advised to use the equipment in a manner as specified in this manual.

### General

This is a Safety Class I instrument (provided with terminal for protective earthing) and has been manufactured and tested according to international safety standards.

### Operation

Before applying power, comply with the installation section. Additionally, the following must be observed.

Do not remove instrument covers when operating. Before the instrument is switched on, all protective earth terminals, extension cords, auto-transformers, and devices connected to it must be connected to a protective earth via a ground socket. Any interruption of the protective earth grounding will cause a potential shock hazard that could result in serious personal injury. Whenever it is likely that the protection has been impaired, the instrument must be made inoperative and be secured against any intended operation.

Make sure that only fuses with the required rated current and of the specified type (normal blow, time delay, and so on) are used for replacement. The use of repaired fuses and the short-circuiting of fuse holders must be avoided.

Some adjustments described in the manual, are made with power supplied to the instrument, and protective covers removed. Energy available at many points may, if contacted, result in personal injury.

Any adjustment, maintenance, and repair of the opened instrument under voltage should be avoided whenever possible. When inevitable, this has to be carried out by a skilled person who is aware of the hazard involved. Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present. Do not replace components with power cable connected.

Do not install substitute parts or make any unauthorized modification to the instrument.

Capacitors inside the instrument may still be charged, even though the instrument has been disconnected from its source of supply. Dangerous voltages, capable of causing serious personal injury, are present in this instrument. Use extreme caution when handling, testing and adjusting.

When working with solvents please observe appropriate safety procedures (e.g. goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet by the solvent vendor, especially when toxic or hazardous solvents are used.

Do not touch the power button and the electrical parts with wet hands. During the operation, the door of the instrument must be closed.



In case of emergency stopping the operator has two possible choices:



**Hardware emergency stop:** press the red button on the rCPC left side and unplug the wall electrical connection



40. figure: Emergency stop

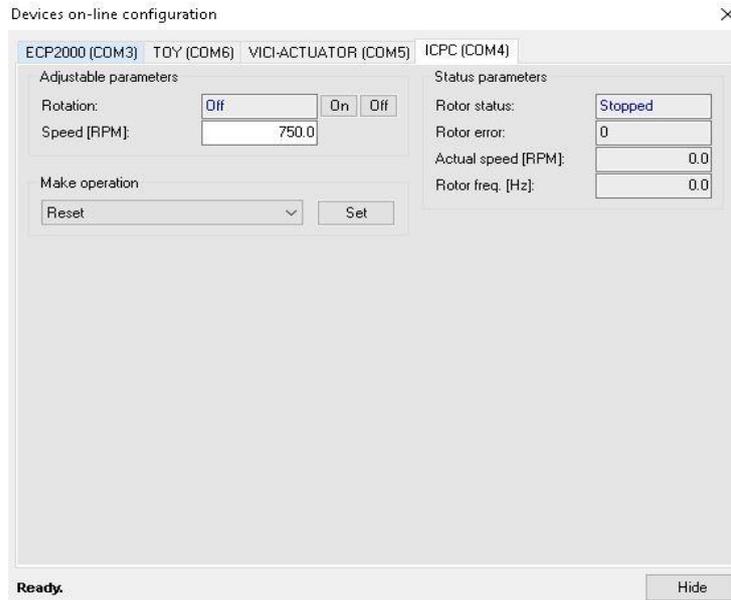


**Software emergency stop:** Firstly, click the stop icon at the top of the window.

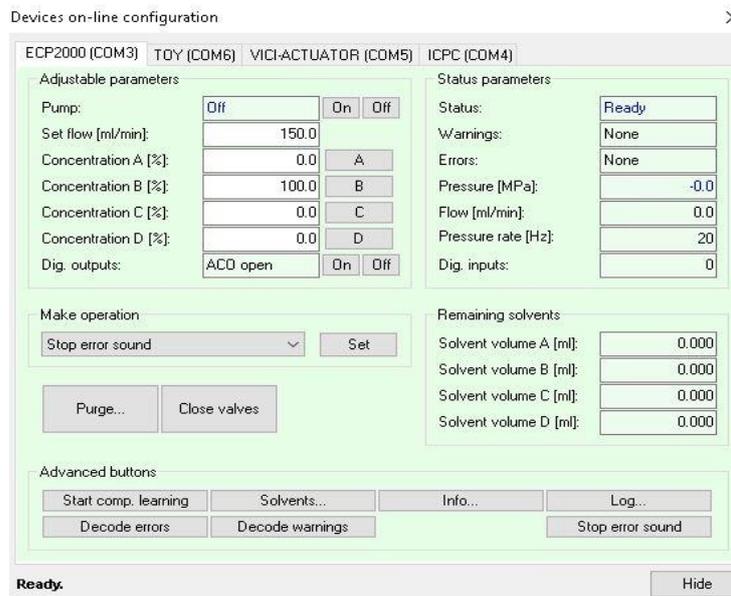


41. figure: STOP icon

Secondly, switch off the rotation and after the pump on the on-line configuration side.



42. figure: Switch off the rotation



43. figure: Switch off the pump