BARTEC BENKE

CFPP Process Analyzer CFPP-4.2
Operating Instructions

395778MDHEN A

03/2016

BARTEC BENKE GmbH
Borsigstraße 10
21465 Reinbek
Germany

Tel.: +49 (0) 40 - 72703 - 0
Fax: +49 (0) 40 - 72703 - 363
E-Mail: service@bartec-benke.de

Contents

1 General

1.1 About this Document

These operating instructions are intended for personnel with a basic technical knowledge of instruments such as the one described here. If you have little or no experience working with such instruments, we recommend that you get advice from experienced persons or take part in a training course by BARTEC BENKE before using the instrument.

These operating instructions must always be kept with the analyzer and must be accessible at any time. They are an integral part of the analyzer.

Should you sell the analyzer, you must pass on the operating instructions to the next owner. If you receive supplements to the operating instructions from BARTEC BENKE, you must add them to the original document.

In addition to these operating instructions, all documents apply which are listed in the table of contents of the customer file. You must observe the instructions in these documents, particularly the safety instructions in the operating instructions for analyzer components.

These operating instructions do not state the duties of the operating company which are stated in the applicable laws, regulations and technical standards (e.g. organizational measures, explosion protection document, regular checks, etc.).

For translations of these operating instructions into other languages, the German version is to be regarded as the original document.

1.2 Liability and Warranty

Read these operating instructions carefully before installation and startup of the instrument and observe the safety precautions. BARTEC BENKE cannot accept liability for injuries or damages caused by failure to observe the operating instructions and safety precautions.

We have checked the information in this document carefully to ensure its completeness and correctness. However, as alterations may occur due to technical improvements, we cannot accept liability for complete consistency. These operating instructions do not constitute any obligation or guarantee of performance on the part of BARTEC BENKE.

2 Safety

This chapter gives you an overview of the most important safety issues.

2.1 General

The analyzer may be dangerous if the safety instructions are not observed, or if the analyzer is used for purposes for which it is not intended, or if it is operated by unqualified personnel.

Make sure that any person working with the analyzer has first read and understood the operating instructions. This is also necessary if the person has worked with a similar analyzer before or has been trained for this purpose.

Also observe the detailed safety instructions in the individual chapters. They are highlighted with signal words and symbols. In addition, observe the notes and instructions on the instrument and keep them readable. Also observe the safety instructions in the supplied operation manuals of all built-in equipment and components. Observe the information on operation, maintenance and servicing.

2.2 Intended Use

The CFPP Process Analyzer CFPP-4.2 is designed for determining in a fully automated process the temperature limit value for the filterability of liquid petrochemical products. A sample stream and a calibration stream (optional) can be connected to the analyzer, which operates online. It is intended to monitor the quality of production in the process and also the compliance with mandatory specifications for petrochemical products.

The analyzer is intended exclusively for stationary operation in an analysis building.

The analyzer may only be used for products which correspond to the specification defined at the time of ordering.

The analyzer is designed for operating in zones 1 and 2 of potentially explosive areas caused by gases. Make sure that no other gases (e.g. hydrogen or oxygen used by other analyzers) and no other vapors or liquids can reach the analyzer through the vent- drain-system (vent = waste gas outlet; drain = waste liquid outlet).

It is not permissible to make any technical modifications to the analyzer without written authorization from BARTEC BENKE.

Use only spare parts supplied by BARTEC BENKE.

2.3 Safety Symbols and Signal Words

In this document, safety instructions are highlighted by signal words and safety symbols.

The following signal words are used for safety instructions:

DANGER! indicates an imminently hazardous situation which **will** very likely result in death or serious injury if the safety instructions are not observed.

WARNING! indicates a potentially hazardous situation which **could** result in death or serious injury if the safety instructions are not observed.

CAUTION! indicates a potentially hazardous situation which **may** result in minor or moderate injury if the safety instructions are not observed.

ATTENTION! indicates that the analyzer may be damaged or may malfunction if the safety instructions are not observed.

The signal words **DANGER!**, **WARNING!** and **CAUTION!** are used with triangular symbols which state the type of hazard, for example:


General hazard


Dangerous electric current

Potentially explosive atmosphere


Hazardous substances


Coldness


Hot surfaces

The following symbol is used with the signal word **ATTENTION!**:

2.4 Explosion Protection

2.4.1 Labeling on the Analyzer

The analyzer is designed for operation in explosion hazard areas. It is labeled as follows:

II 2 G IIC T4 Gb

The labeling gives you the following information:

Labeling	Meaning
II	Equipment group: The analyzer may be used in places likely to become endangered by explosive atmospheres, except underground (mining).
2 G	Equipment category: The figure 2 means that an explosive atmosphere may occur occasionally. The analyzer ensures a high level of protection and may be used in zones 1 and 2. The letter G means that the flammable substances which cause the explosive atmosphere may be gas, mist or vapor (but not dust).
IIC	Gases and vapors which form an explosive atmosphere are classified by their explosion characteristics in the subgroups IIA, IIB or IIC. In this case, gases and vapors of the subgroups IIC are permitted.
T4	Gases and vapors which form an explosive atmosphere are classified by their ignition temperature in the temperature classes T1 to T6. In this case, gases and vapors in the temperature classes T1 to T4 (ignition temperature >135°C according to IEC 60079-4) are permitted. These are for example gasoline, diesel fuel, hydrogen sulfide and hydrogen. The maximum surface temperature of the analyzer is <135°C.
Gb	Gb: The device ensures a high degree of safety. It can be used in zone 1 and in zone 2. A potentially explosive atmosphere may occasionally occur.

For use in the American region the analyzer is marked additionally according to the National Electrical Code NEC 500 of the USA respectively the Canadian Electrical Code CEC J18:

Class I, Division 2, Groups B, C, D, T4

The labeling gives you the following information:

Labeling	Meaning
Class I	Classification of potentially explosive atmospheres in classes 1 (combustible gases, vapors and mist), 2 (dusts) and 3 (fibers and lint). The device may be used in class 1 potentially explosive areas.
Div 2	Classification of potentially explosive areas in divisions 1 and 2 according to the frequency in which potentially explosive atmospheres arise. In division 2, hazardous concentrations of combustible gases, vapors and mist do not usually occur under normal operating conditions. The device may be used in such areas.
Group A, B, C, D	Classification of gases, vapors and mists into the groups A (acetylene), B (hydrogen), C (ethylene) and D (propane). The device provides explosion protection for groups B, C and D.
T4	Classification of gases and vapors depending on their ignition temperature into the classes T1 to T6 (in accordance with IEC 60079-4). The device has been designed for use with gases and vapors of temperature class: T4: 135 °C < ignition temperature < 200 °C

2.4.2 Types of Protection and certificates

The analyzer and its components conform to different types of protection which are defined as follows:

Pressurized enclosure „p“

The surrounding potentially explosive atmosphere is prevented from entering the measuring unit enclosure by means of an ignition shield gas (in this case: air) which is held inside the enclosure and kept at a higher pressure than the surrounding atmospheric pressure.

Flameproof enclosure “d”

Type of protection where components which could ignite an explosive atmosphere are built into an enclosure. The enclosure is designed to withstand the pressure of an explosion inside the enclosure and to prevent the transmission of the explosion to the explosive atmosphere surrounding the enclosure.

Increased safety “e”

An increased safety level is achieved by additional measures. This eliminates the risk of incorrectly high temperatures and the risk of sparks or electric arcs inside and on the surface of electrical components which do not constitute an ignition source during normal operation.

Encapsulation “m”

Components which could ignite an explosive atmosphere by sparks or heat are potted so as to prevent ignition of the explosive atmosphere. This is achieved by encapsulating the components in a compound resistant to physical and chemical influences.

Intrinsic safety “i”

Intrinsically safe circuits are circuits in which no spark or thermic effect can ignite an explosive atmosphere of the subgroups IIA, IIB or IIC.

The device is essentially made up of main subassemblies, which are installed in the following boxes:

Housing	Types of protection
Control box	p
Measuring cell housing	p
Power supply box	e
Signal junction box	e
Measuring unit enclosure	not required

The explosion-proof boxes and their installations have been ATEX-certified as individual subassemblies. All components relevant for explosion protection outside the control box and measuring cell housing are protected against explosions by their own ignition protection class. Electrical equipment inside the measuring unit enclosure and the thermostat for the optional chiller are operated out of the control box in intrinsically safe electrical circuits.

Note: The list with explosion-proof components or subassemblies used and the corresponding certificates can be found in your customer folder.

The risk assessment shows that no additional ignition hazards arise from the combination of the explosion protect components and subassemblies. For this reason the device does not require an assessment as an electrical device according to ATEX. The conformity assessment process has been checked by a notified body and has been approved via a statement of conformity.

2.4.3 Ensuring and Maintaining Explosion Protection

- **The explosion protection system of the analyzer is designed for the technical characteristics of the substances which were specified at the time of ordering the analyzer. Before you switch on the analyzer, and while the analyzer is operating, make sure (e.g. by de-airing the lines carefully) that the product feed lines and all lines carrying product contain only the specified product. Also make sure that the product properties correspond to the specification.**

- **Make sure that no other gases (e.g. hydrogen or oxygen used by other analyzers) and no other vapors or liquids can reach the analyzer through the vent-drain-system (vent = waste gas outlet; drain = waste liquid outlet).**

- **It is not permissible to make any technical modifications to the analyzer without written authorization from BARTEC BENKE. Any unauthorized modification can impair the safety of the analyzer and lead to accidents.**

- **Use only spare parts supplied by BARTEC BENKE.**

2.5 Protective Devices

The protective devices are required for safe operation of the analyzer.

In addition to the protective devices described above, there are numerous other components and electrical equipment required for safe operation. Particularly, there are several individual electrical components which conform to different types of protection. For further information, please refer to chapter 2.4.

The analyzer is equipped with the following protective devices:

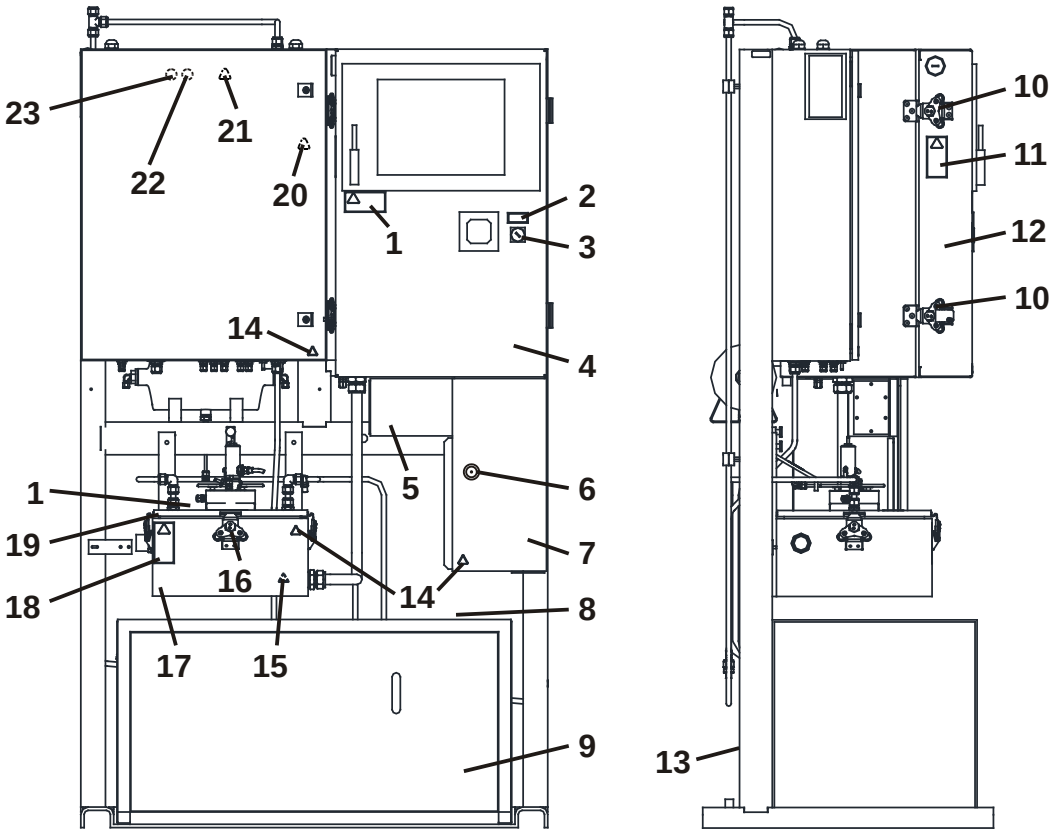


Fig. 2.1: Protective Devices

1 Warning label “Clean plastics”
2 Label for key switch
3 Key switch
4 Control box
5 Signal junction box with cover
6 Lock for double-bit key
7 Power supply box
8 Upper cover of Chiller for Liquids
9 Housing and front cover of Chiller for Liquids
10 Locks of control box
11 Warning label “Opening the housing”
12 Door of control box
13 Rear cover of Chiller for Liquids
14 Warning label “Electrical equipment” (lightning symbol)
15 Warning label “Coldness”
16 Locks of measuring cell housing
17 Measuring cell housing
18 Warning label “Opening the housing”
19 Cover of measuring cell housing
20 Warning label “Hot surfaces”
21 Warning label “Fluids under pressure”
22 Mandatory-sign “Wear protective goggles”
23 Mandatory-sign “Wear protective gloves”

Control box and measuring cell housing

The control box (4) and the measuring cell housing (17) are pressurized (p). The housings are connected by a flushing pipe.

By means of the key switch (3) ("bypass switch"), you can activate or deactivate the explosion protection (overpressure monitoring) for the housings. Above the key switch there is a label (2) explaining the key switch positions.

During normal analyzer operation (explosive atmosphere may be present), the key switch (3) must be in position “Explosion protection ON”. The position “Explosion protection OFF” is only intended for service tasks. In that case, you must make sure that there is no explosive atmosphere.

The touchscreen is made of plastic. If you rub the touchscreen with a dry cloth, sparks can occur caused by static electricity discharge. If there is an explosive atmosphere present, this can cause an explosion. Therefore, never clean the touchscreen with a dry cloth, but always with a damp cloth. The warning label (1) indicates this.

The control box (4) and the measuring cell housing (17) contain equipment without individual flame protection, i.e. potential ignition sources. In addition, the housings ensure protection against contact and foreign matter as well as protection against moisture, and thus prevent damage to the electrical equipment. Therefore, the door (12) of the control box and the cover (19) of the measuring cell housing must be closed during normal analyzer operation and locked by means of the locks (10 and 16). Even after the power is switched off, the housings may be opened only after a waiting period of 5 minutes. This is necessary because there may be components under electric charge and with high temperature, i.e. potential ignition sources. The waiting period allows time for electric charges to decrease and for hot components to cool down. The warning labels (11, 18) indicate these risks.

Junction boxes

The power supply box (7) contains the terminals for connecting the power supply, contactors and the APEX control unit. It is required for the pressurization of the control box and the measuring cell housing. The control unit controls and monitors the flow rate of the protective gas and the inner box pressure during rinsing. During operation, only the inner box pressure is monitored. During operation, the control unit activates the voltages via the contactors.

The power supply box is open and closed using a double-bit key. Explosion protection is provided for the power supply box by the increased safety ignition protection (e) in closed condition only. Therefore keep the power supply box closed during normal operation.

The signal junction box (5) contains terminals for connecting the signal lines. Explosion protection is provided for the signal junction box by the increased safety ignition protection (e) in closed condition only. Therefore keep the cover of the signal junction box closed with all fastening bolts during normal operation.

Chiller for Liquids

The housing of the chiller for Liquids (9) with its removable covers (8, 9, 13) ensures protection against contact and foreign matter as well as protection against moisture, and thus prevents damage to the electrical equipment. The upper cover (8) is fastened with screws. You can remove the front cover (9) easily with a key. The covers must be closed during normal analyzer operation.

Note: Further information to the Chiller for Liquids you find in the provided manual for the Chiller for Liquids.

Labeling

The mandatory-signs (22, 23) in the measuring unit enclosure indicate that you must wear protective goggles and protective gloves while you work in the measuring unit enclosure.

The warning labels (14 respectively 20) indicate that the measuring unit enclosure contains electrical equipment respectively units with hot surfaces. The warning label (15) indicates that the measuring cell housing contains actuated units with very cold surfaces. Before opening the measuring cell housing wait always for warming up of the units in the measuring cell housing.

You must check the protective devices at regular intervals. For further information, please refer to chapter 10.4. The protective devices must never be removed, bypassed or made unusable in any way. The warning labels must be kept easily readable. Spare warning labels are available from BARTEC BENKE.

2.6 Personnel

Personnel working with the analyzer must be trained, authorized and instructed, particularly with respect to possible hazards. Personnel must be qualified for the task. Due to their training, experience and knowledge, particularly of applicable regulations, qualified persons can assess and thus avoid the potential risks of a task.

Persons who carry out checks and maintenance work on the analyzer must be qualified according to EN 60079-17 / IEC 60079-17.

2.7 Personal Protective Equipment

When you carry out work on the analyzer, you must wear the following protective equipment:

- Protective clothing
- Protective goggles

When dealing with dangerous substances, e.g. during maintenance work, you must wear the following additional equipment:

- Appropriate protective gloves (see safety data sheet for the particular substance)
- Appropriate breathing protection, if required, according to the safety data sheet for the particular substance

For further information, please refer to the safety data sheet for the respective substance.

2.8 Potential Dangers and Risks

The analyzer conforms to the current state of the art. However, there is still a remaining risk.

The analyzer operates with electrical power.

DANGER!

Dangerous electric current!

If you touch components carrying electric current, the electrical power can cause serious injury or death. FOR THIS REASON:

- Before cleaning or carrying out maintenance or repair work, switch off all main control switches and secure them, so that the system cannot be switched on accidentally.
- Work on electrical equipment must be carried out by qualified personnel according to chapter 2.6.
- Do not remove or disable any protective devices.

The analyzer is constructed for operation in a explosive atmosphere and contains potential ignition sources.

WARNING!

Possible explosion or fire!

An explosion or a fire can cause serious injury or death. FOR THIS REASON:

- Do not open the housing while a potentially explosive atmosphere may be present, or while the analyzer is under electrical power.
- After switching off the power to the analyzer, wait for at least 5 minutes before you open the control box (to allow hot surfaces to cool down and electric charges to decrease).
- If you want to open an Ex housing with the power switched on: Make sure that there is no explosive atmosphere.
- If you want to open an Ex housing with the power switched on: First get a hot-work permit from the operating company.
- After finishing work, close and lock the Ex housing (explosive atmosphere may develop later).
- Never clean plastic parts (such as the touchscreen) with a dry cloth, but always use a damp cloth to avoid static electricity discharge and sparks.
- Do not remove or disable any protective devices.

The analyzer contains the product to be analyzed. Due to leaks or during maintenance and repair tasks, the product may leak from the components through which it flows. Furthermore, detergents and solvents may be used during maintenance, cleaning and repair.

WARNING!

Hazardous substances (product, detergents or solvents and their vapors)!

Serious injury or death can result from swallowing, breathing in or skin contact with harmful substances. FOR THIS REASON:

- Before starting work, read the safety instructions, for example in the safety data sheet for the respective substances.
- Wear your personal protective equipment, at least wear protective goggles and protective gloves suitable for the respective substances.
- Make sure there is sufficient ventilation.
- Immediately clean up spilled chemicals.

Also observe other possibly hazardous substance characteristics (see safety data sheet): can form an explosive gas mixture if in contact with air, highly flammable, caustic or can cause skin irritation.

Analyzer components contain pressurized liquids and gases.

CAUTION!

Pressurized liquids and gases!

Risk of injury! FOR THIS REASON:

- Before starting work on components carrying liquid or gas, shut off the feed lines and ensure that they are depressurized.
- Wear your personal protective equipment, at least wear protective goggles and protective gloves.
- Do not remove or disable any protective devices.

The heater in the measuring unit enclosure heats up the product, before it flows into the measuring cell. The heater and the adjacent components carrying the product can be hot.

CAUTION!

Hot components!

Risk of burning! FOR THIS REASON:

- Before touching a component in case of malfunction, check that the component has cooled down sufficiently.
- Wear protective gloves.
- Do not remove or disable any protective devices.

The temperatures of components in the measuring cell housing activated are very deep.

CAUTION!

Very cold components!

Risk of skin damage on direct contact. FOR THIS REASON:

- Before you touch a component, check, if it is not too cold.
- Wear protective gloves.
- Do not remove or put out of operation a safety device.

The analyzer contents components out of plastic:

WARNING!

Danger of explosions due to static discharge!

Cleaning plastic surfaces with a dry cloth can result in static discharge. Resulting sparks can ignite potentially explosive atmospheres.

FOR THIS REASON:

- Always clean plastic surfaces with a **moist** cloth.

Note:	Detailed information for a safe use of the Chiller for Liquids you find in the manual for the Chiller for Liquids.

2.9 In Case of an Accident or Emergency

To switch off the analyzer as quickly as possible in an emergency:

- Switch off the power, using the separator for the power supply (fuse or main switch) for the analyzer.
- Close the manual shut-off valves to stop the product streams connected to the analyzer.

The analyzer is now switched off.

CAUTION!

Switching off the analyzer by disconnecting it from the power supply can lead to lost data. FOR THIS REASON:

- Only use this procedure to switch off the analyzer in an emergency.

- Suitable fire extinguishing agent: Fire extinguisher with ABC powder.

3 Introduction

3.1 The CFPP Process Analyzer CFPP-4.2

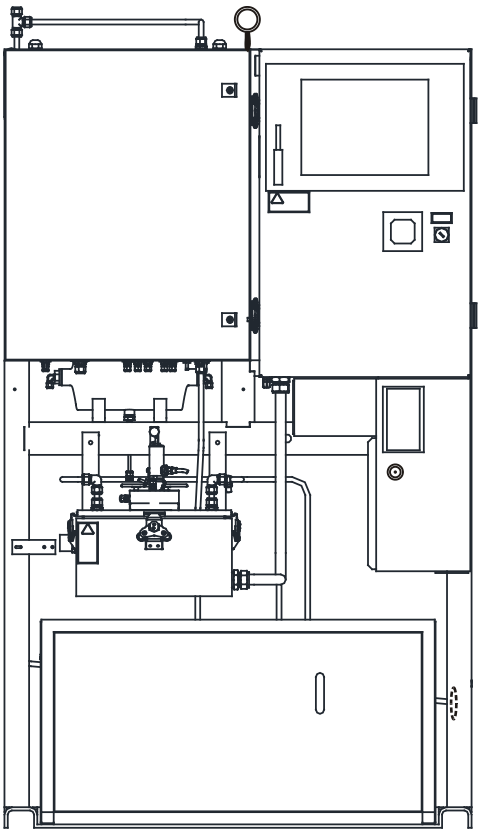


Fig. 3.1: The CFPP Process Analyzer CFPP-4.2

The analyzer CFPP-4.2 measures the cold filter plugging point (CFPP, temperature limit value for filterability) online in a fully automated process. The measuring range is from -35°C to +10°C. A sample stream and a calibration stream can be connected (additional components required).

The analyzer carries out measurements according to the standards for measuring the CFFP in the laboratory. The test filter corresponds to the test filter used in laboratory analysis. The measuring cell is made of transparent material and allows you to observe the analysis process directly. The control unit with integrated industry standard PC provides various possibilities for communication and configuration.

Additionally, the analyzer can be equipped with:

- Sample conditioning system
- Cooling system for the control box for problematic environmental conditions
- Validation system
- Recovery system
- Automatic sampling

- Explosion-proof chiller for liquids
- MODBUS interface
- Remote maintenance interface

3.2 Significance of the Cold Filter Plugging Point

The cold filter plugging point (CFPP) of a petrochemical product is an important indicator for the behavior of that product at low temperatures. The analyzer CFPP-4.2 is designed for monitoring and controlling the production process and the composition of blends such as diesel fuels and heating oils.

Analysis of the CFPP of petrochemical products in the laboratory is defined by national and international standards, for example:

- DIN EN 116
- ASTM D 6371
- IP 309

3.3 Measuring Principle

The cold filter plugging point (CFPP) is defined as the temperature at which a certain amount of sample that is being cooled down in a defined way no longer flows through a standardized test filter.

In laboratory analysis, the CFPP of a sample is determined according to the standards listed above. The analyzer operates in accordance with these standards and carries out measurements automatically.

The sample is fed into a sample container and cooled down to a specific temperature. It is then pulled through a test filter with defined diameter by means of low pressure and must pass a liquid sensor within 60 seconds. The sample then flows back into the sample container and is cooled down by 1 K. The next text cycle begins.

If the sample does not reach the liquid sensor within 60 seconds, or if it does not flow back into the sample container, this indicates that paraffin particles have formed which block the test filter. The temperature at the start of the test cycle is the CFPP.

Note: For a detailed description of the analysis process, please refer to the software manual.

4 Technical Data

Analysis	
Measuring range	-35 °C ... +10 °C; different specification on request
Comparability	≤ DIN EN / ASTM
Reproducibility	≤ DIN EN / ASTM
Method	according to DIN EN 116; ASTM D 6371; IP 309; BS 2000-309
Measuring cycle	discontinuous, cycle time 25 min ... 90 min
Electrical Data	
Rated voltage	230 VAC ± 10 % 1Ph.; 50 Hz; different spec. on request
Rated current	See type plate, technical documents
Back-up fuse	See type plate, technical documents
Protection class	IP54 *
Explosion Protection	
Marking	II 2 G IIC T4 Gb
EC Type-Examination Certificate	TÜV 09 ATEX 554793
Environmental conditions	
Ambient temperature	operation 5 °C ... 35 °C
	storage -20 °C ... 60 °C
Humidity	5 – 80 % relative humidity, non-corrosive
Sample	
Consumption	approx. 10 l/h; during purging (approx. 4 min) 40 l/h
Primary pressure	1 bar ... 4 bar
Temperature at inlet	15 °C ... 40 °C
Viscosity	max. 50 cSt at inlet temperature
Sample quality	filtered 10 µm; water content max. 550 ppm
Auxiliary media	
Instrument air	
Consumption	approx. 8 Nm^3/h (purging phase)
	approx. 2.3 Nm^3/h (normal operation)
Option Vortex	approx. 1.7 Nm^3/h in operation (in addition)
Quality	According to ISO 8573-1: class 2 or better
Primary pressure	3 bar ... 7 bar

Operating characteristics of control box

Positive operating pressure typ.	3 mbar ... 4 mbar
Switch-off pressure	0.8 mbar

Electrical data of the signal outputs and inputs

Analog output	4...20 mA; max. burden 800 Ω; reference potential 0 V (ground)
Analog input	Not provided
Digital output	24 VDC; max. 0.1 A (sum of all signal streams max. 0.8 A) reference potential 0 V (ground)
Digital input	high: 15...28 VDC; low: 0...4 VDC reference potential 0 V (ground)
Auxiliary power supply output	24 VDC; max. 0.8 A

Signal outputs and inputs

Analog output	1. CFPP measured value 2. Option: product temperature in the measuring cell, or next trigger point, or temperature of the cooling bath, or time between the last suction attempts
Analog inputs	Option: 1. Cloud Point
Digital outputs	1. system alarm 2. ready signal (end of measuring cycle, measured value valid) 3. identification of a validation cycle Options: 4. alarm: measuring range exceeded 5. warning, a (minor) error has occurred
Digital inputs	1. reset 2. request for validation cycle Options: 1. summer product / winter product

Control unit	
Central control unit	industry standard PC
Operating system	Windows XP®
Control software	PACS
Remote maintenance (optional)	remote maintenance software via modem, ISDN or Ethernet
User interfaces	
Touchscreen	TFT display with touch function, 800 x 600 pixels
Keyboard	virtual keyboard, controlled via TFT display with touch function
Connections	
Pipe fittings	Swagelok® 6 mm / 12 mm / 18 mm, (¼", ½") on request
Vent / Drain	open to atmosphere
Max. high of the drain connection	200 mm above the floor
Cable inlets	M20 / M25
Weight and Dimensions	
Weight	approx. 400kg (without optional equipment)
Dimensions (B x H x T)	approx. 1140 mm x 2030 mm x 710 mm
Required space	Right and left hand side approx. 0.5 m free space (supply air and exit air for Chiller for Liquids)
	For option Chiller for Liquids you need free space on the left and on the right hand side according to specification.
Noise Emission	
Emission sound pressure level	79 dB(A)
Options	
	Sample conditioning system
	Cooling system for the control box
	Validation system
	Recovery system

* If a vortex cooler is used for the control box, make sure that at the very most drip water can hit the analyzer in compliance with EN 60529.

Note: The analyzer is subject to continuous improvements, so that technical changes are possible.

5 Analyzer Description

5.1 Overview and Operating Elements

The following illustration gives you an overview of the analyzer:

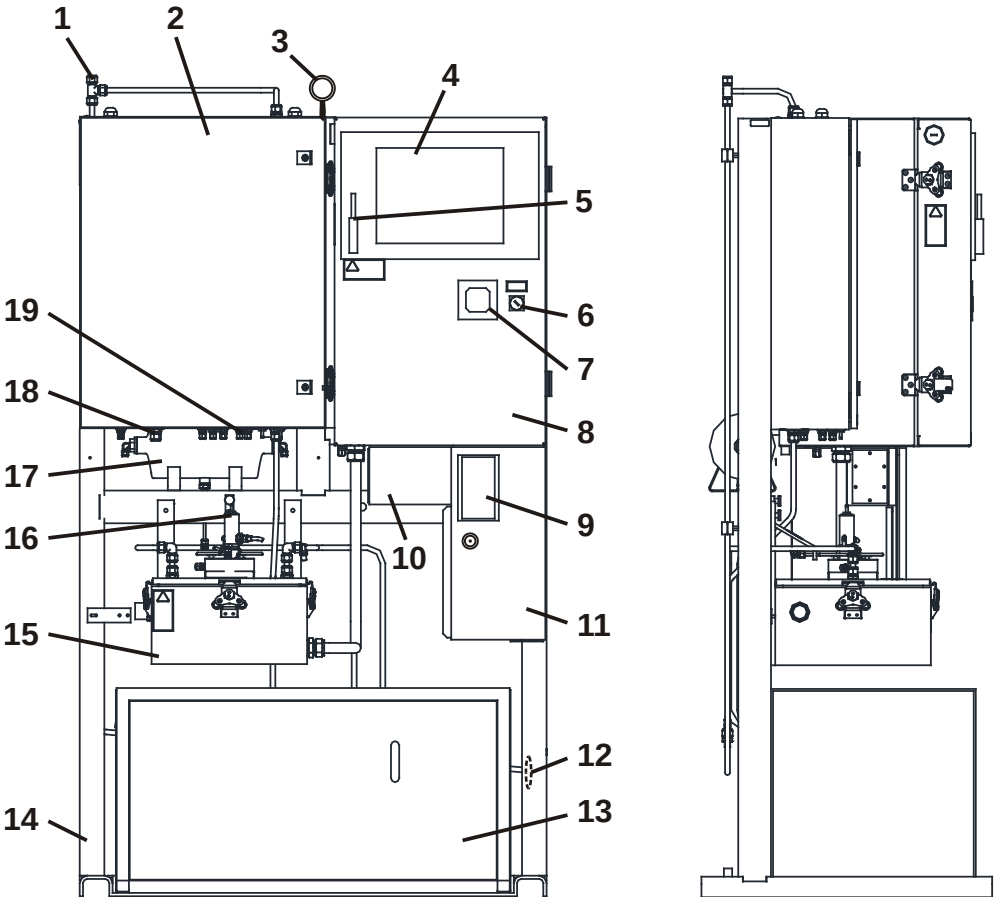


Fig. 5.1: Overview

1 Vent connection (waste gas outlet)
2 Measuring unit enclosure
3 Transport eye
4 Touchscreen
5 Pen
6 Key switch
7 Overpressure control display
8 Control box (Ex p)
9 Type plate
10 Signal junction box (Ex e)
11 Power supply box (Ex e)
12 Drain connection (waste liquid outlet)
13 Chiller for Liquids
14 Frame
15 Measuring cell housing (Ex p)
16 Measuring cell
17 Vacuum tank
18 Instrument air connection
19 Product inlet

The measurement takes place inside the measuring cell (16). The Chiller for Liquids (13) combined with a heat exchanger and peltier elements in the measuring cell housing (15) cool the sample. The measuring cell housing is pressurized together with the control box (8). The control box contains the analyzer control unit and the control unit for the cooling system.

Note: Further information to the Chiller for Liquids you find in the manual for the Chiller for Liquids.

Most of the fluid technology components are located inside the measuring unit enclosure (2).

The power supply box (11) contains the terminals for connecting the power supply, contactors and the APEX control unit. It is required for the pressurization of the control box and the measuring cell housing.

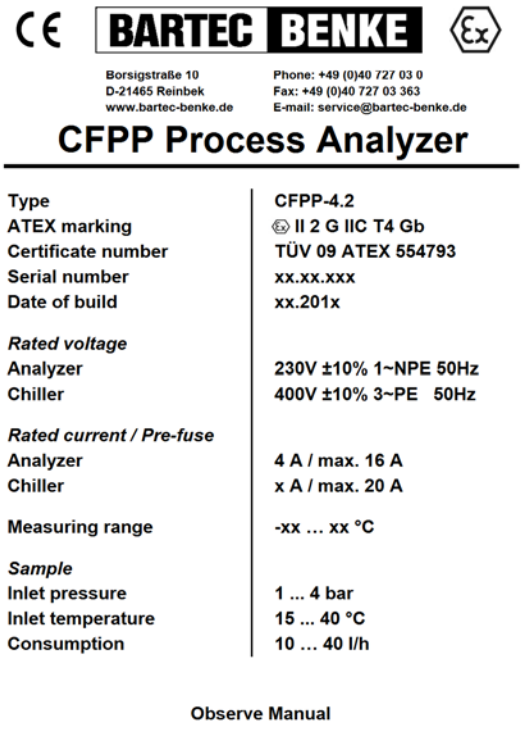
The signal junction box (10) contains terminals for connecting the signal lines.

You operate the analyzer with the touch-screen (4) and the pen (5).

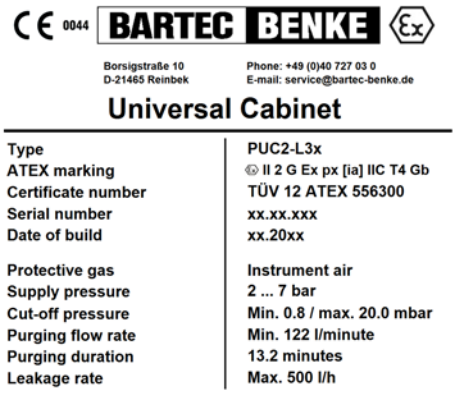
The overpressure control display (7) provides information on current operating states and parameter settings of the overpressure control system.

By means of the key switch (6) ("bypass switch"), you can activate or deactivate the explosion protection (overpressure monitoring) for the pressurized control box (8) and the measuring cell housing (15).

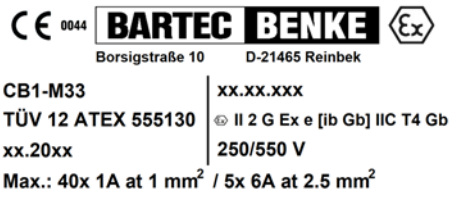
5.2 Type plates



Main type plate at power supply box



At Control box (Ex p)



At the junction boxes (Ex e)

Measuring cell housing (Ex p)

Fig. 5.2: Type plates (examples for ATEX version) and their position at the analyzer.

On the type plates, you will find the most important information on explosion protection and safe operation of the analyzer as well as the analyzer's serial number. Make sure that the type plate is always kept easily readable.

5.3 Analyzer Components

5.3.1 Measuring unit enclosure

The following illustration gives you an overview of the most important components inside the measuring unit enclosure. For detailed information, please refer to the supplied flow diagram.

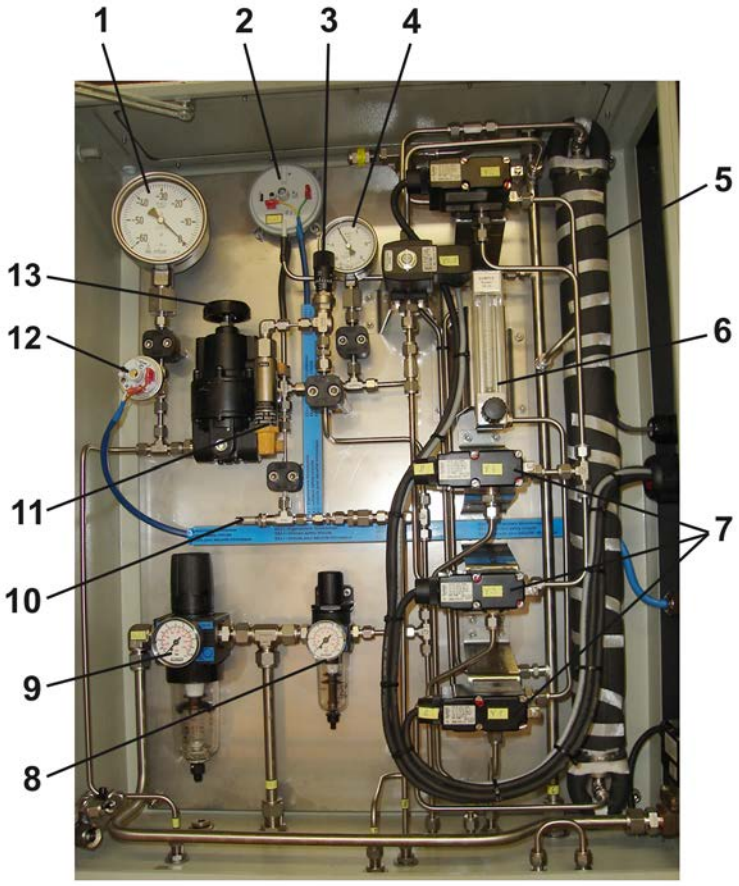


Fig. 5.3: Measuring unit enclosure, open

1 Vacuum pressure gauge
2 Pressure switch for backflow detection
3 Metering valve injector
4 Pressure gauge for backflow detection
5 Pipe heater
6 Flow controller
7 Magnetic valves
8 Air service unit for injector and measuring cell
9 Air service unit for pressurized housings
10 Metering valve measuring cell
11 Vacuum injector
12 Vacuum pressure switch
13 Vacuum pressure controller

At the air service unit (9), you can check and adjust the instrument air pressure for the buildup of the overpressure in the control box and in the measuring cell housing. The air service unit (8) supplies the injector and the measuring cell with instrument air.

The vacuum is created by means of the injector (11) and is monitored by the vacuum pressure switch (12). With the metering valve (3) you can adjust the supply with instrument air for the injector. With the pressure controller (13) you can adjust the vacuum. The vacuum pressure gauge (1) allows you to monitor the vacuum visually.

For the supply of the analyzer with always fresh product you can adjust a product flow through the bypass by using the flow controller (6).

With metering valve (10) you can adjust a small air flow through the measuring cell.

Depending on the current process step, the magnetic valves (7) connect the feed lines of the measuring cell with the vacuum, the product inlet or the vent.

The pressure switch for backflow detection (2) allows to determine whether the product, after being sucked through the test filter, flows back into the sample container. The Pressure gauge for backflow detection (4) allows you to monitor the pressure visually.

5.3.2 Measuring cell

The following illustration shows the most important visible components of the measuring cell.

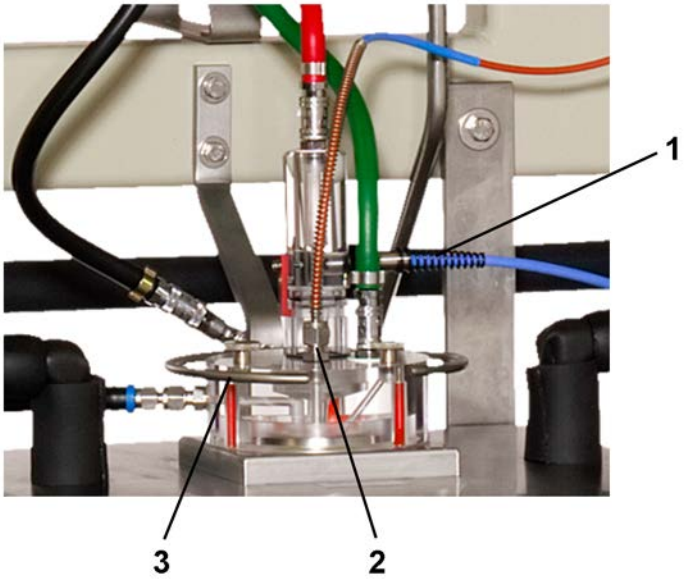


Fig. 5.4: Measuring cell, installed

1 Liquid sensor
2 Sample temperature sensor
3 Decondensation ring

The sample temperature sensor (2) is screwed into the measuring cell body, which is made of transparent plastic. The liquid sensor (1) detects the sample that is sucked through the test filter. Instrument air from the decondensation ring (3) prevents condensation or ice on the cold surface of the measuring cell.

5.4 Control box

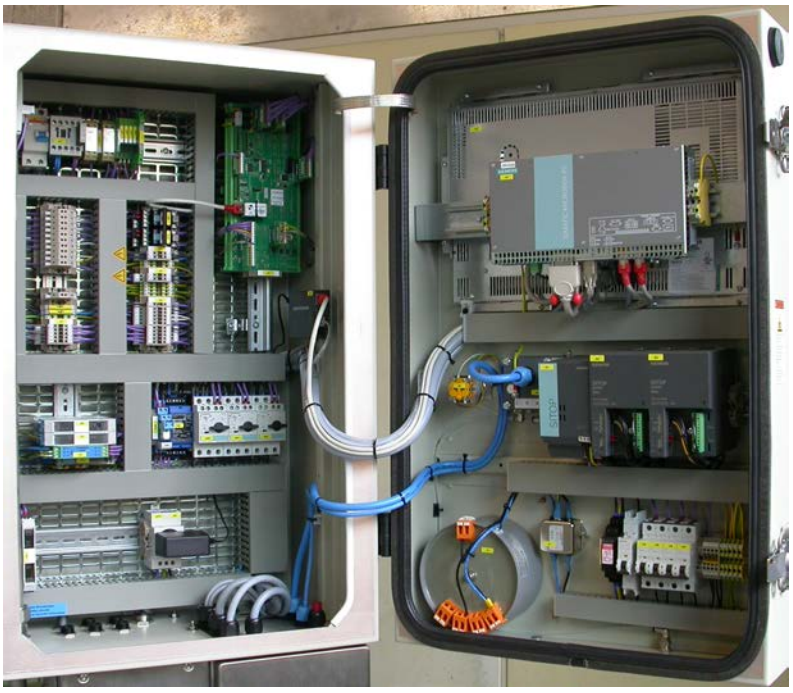


Fig. 5.5: Typical example of a control box

The pressurized control box contains all necessary electrical and electronic components for controlling the analyzer. These are, for example:

- Industry standard PC (Analyzer Control Unit) running the PACS software, which provides the user interface, controls and monitors all processes, and handles external communication.
- Components for the overpressure control system of the housing
- I/O board for processing internal and external digital and analog inputs and outputs
- Power supply units
- Transformers to adapt the power supply voltage for the analyzer
- Control components for the Chiller for Liquids
- Automatic circuit breakers, motor protection switches and error relays, filters, and contactors
- Measuring transmitters and amplifiers, switching amplifiers
- Cooler for the housing (optional)

Note: The description given here refers to the standard system. The construction of your control box may be different from the one described here.

5.5 Sample conditioning system (optional)

The following illustration shows a standard sample conditioning system.

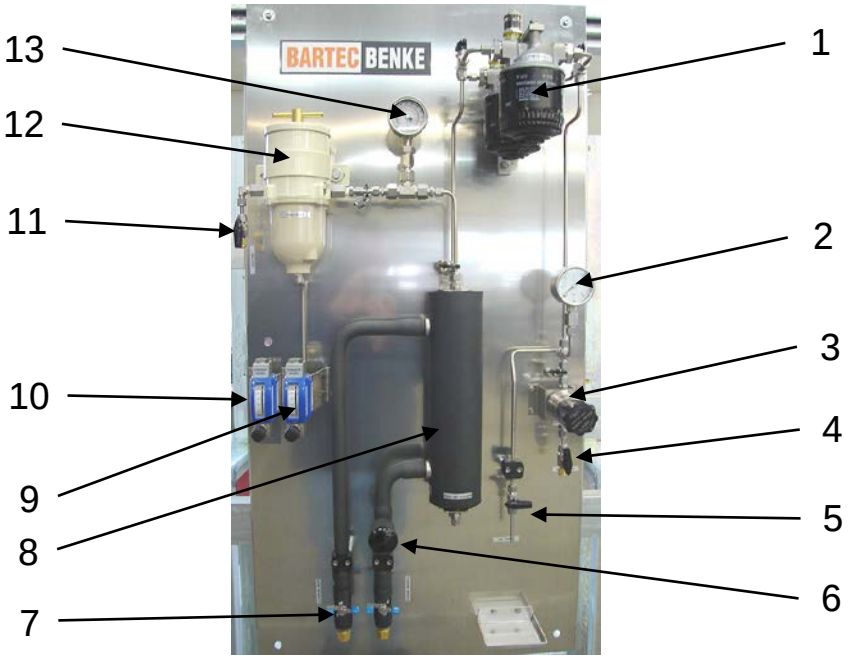


Fig. 5.6: Sample conditioning system (example)

The standard sample conditioning system consists of the following main components listed here in the sample flow direction:

- Inlet valve, connection for product inlet (4)
- Pressure regulator (3)
- Laboratory sampling point (5)
- Pressure gauge (2)
- Fine filter with bypass valves (1)
- Heat exchanger (8)
- Thermometer (13)
- Water separator (coalescer) (12)
- Flow meter for the water separator outlet (9) with connector for outlet
- Switching valve for validation product (11) with connector for validation product
- Flow meter for product (10) with connector for product outlet
- Control valve for cooling water (6)
- Shut-off valves for cooling water (7)

Note: The description given here refers to the standard system. For a detailed description of your sample conditioning system, please refer to the technical documents supplied.

5.6 Further Options

Cooling of the control box

If ambient temperatures are high, the temperature inside the control box can rise beyond the permitted limit value. To prevent this, the housing can be equipped with a cooler, for example a vortex cooler.

Validation system

The standard validation system consists of a container, a pump, one or several valves, and further components. The valves are either actuated manually or controlled via the PACS analyzer process software.

Recovery system

A recovery system collects the product which flows into the drain line of the analyzer, for further processing. The system consists mainly of a container, a pump, valves, sensors and a separate control unit.

Automatic sampling

The analyzer can be equipped with additional valves, switches and sensors which allow automatic taking of samples. The PACS process control software controls the sampling system, which fills a sampling container with a sample of the current product on request.

Explosion-proof chiller for liquids

The liquid chiller supplies cold cooling medium for the heat exchanger in the sample conditioning system (see Fig. above, pos. 8) and for any additional heat exchangers that may be installed. For more detailed information on the explosion-proof chiller for liquids, please refer to the supplied operation manual.

6 Transport, Packaging and Storage

6.1 Transport

To move the analyzer across short distances, suitable lifting machinery can be used. Consider the substantial weight of the analyzer (see technical data in chapter 4), the asymmetrical distribution of its weight, and its high center of gravity.

WARNING!

Danger of overbalancing!

If you get caught underneath the analyzer, this can cause serious injury or death. FOR THIS REASON:

- Only move the analyzer within its packaging, if possible.
- Do not lift the analyzer higher than necessary.
- During transport, secure the analyzer with tension belts to prevent it from toppling over.
- Keep the analyzer upright while moving it.
- Keep a safe distance.

If you want to move the analyzer without its packaging, also note the following:

- Only the lower frame is appropriate for lifting the analyzer.
- To prevent the analyzer from slipping, use intermediate layers of wood.

For moving the analyzer with a crane, a ring screw is provided in the center of the upper crossbeam of the carrying frame.

WARNING!

Suspended loads!

If you get caught underneath the analyzer, this can cause serious injury or death. FOR THIS REASON:

- Use suitable lifting equipment.
- Keep a safe distance when lifting the analyzer, because it may swivel out to one side.
- Do not lift the analyzer higher than necessary.
- Do not stand below the analyzer.
- Keep a safe distance.

6.2 Delivery

Immediately after receiving the delivery, in the presence of the transport company, check the scope of delivery and compare it with the items on the delivery slip. Check the packaging and the analyzer itself for visible outer damage before removing the packaging.

In case of an incomplete delivery or damage, contact the transport company and BARTEC BENKE immediately. Only promptly reported claims can be considered.

6.3 Intermediate Storage

If it is necessary to store the system intermediately before installation, the analyzer must be stored in its closed transport packaging. In the storage area, there must be no large temperature variations (risk of condensation) and no strong vibrations. For details on permitted environmental conditions, please refer to the chapter Technical Data.

6.4 Packaging

The analyzer is delivered in a packing unit which, unless specified otherwise in the contract, satisfies the packing guidelines of the German Federal Society for Wood, Pallet and Export Packaging.

Remove the packing on the analyzer carefully at the installation site and dispose of it in an environmentally sound manner. Pay attention to the notes on the packing material.

7 Installation and Disassembly

7.1 Installation

7.1.1 Operating Area Requirements

The analyzer is intended exclusively for stationary operation in a weather-protected analysis building. For details on environmental conditions in the operating area, please refer to the chapter Technical Data.

The analyzer must be freely accessible from the front. On the right and left of the analyzer, a minimum distance of 0.5 m is required for proper ventilation of the Chiller for Liquids. The drain outlet connection on the analyzer must be at most 200 mm above the floor. For details on dimensions, please refer to the supplied layout drawing.

If a vortex cooler (optional) is used for the control box, the analyzer must be protected except from dripping water according to EN 60529. The warm air outlet of the vortex cooler must not be obstructed.

The floor in the operating area must be even and level, and capable of supporting the weight of the analyzer. The analyzer building must be ventilated sufficiently, and the analyzer must be well-lit.

7.1.2 Assembly of the Sample Conditioning System (Optional)

Before making any pipe connections, install a manual shut-off valve on the product feed line into the sample conditioning system. The shut-off valve must be installed near the sample conditioning system and must be easily accessible. It must be clearly marked so that it can be identified as belonging to the sample conditioning system and the analyzer.

Install the sample conditioning system near the analyzer, at a height where instruments can be read easily. For mounting, use the fixing holes in the mounting plate. The distances between the fixing holes can be found in the supplied plan.

Observe the regulations for mounting the pipe connections. Please refer to the supplied manufacturer's documentation. Make sure that the minimum bending radius of the pipes is observed.

Note: Your sample conditioning system may be different from the one described here. If in doubt, please contact BARTEC BENKE.

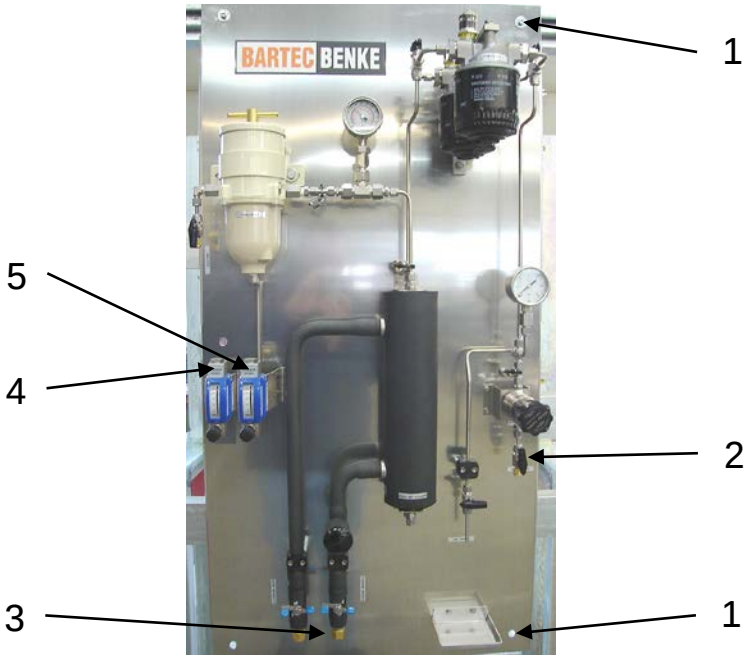


Fig. 7.1: Sample conditioning system (example)

1 Fixing holes
2 Product inlet
3 Connections for coolant
4 Product outlet
5 Drain

- Adjust the sample conditioning system into an upright position.
- Secure the sample conditioning system at the fixing holes (1).
- Connect the coolant lines to the connections (3).
- Connect the product feed line to the product inlet (2).
- Connect the product outlet (4) to the analyzer.
- Connect the drain (5) to the drain.

The sample conditioning system is now installed and can be put into operation.

7.1.3 Securing the Analyzer

Adjust the analyzer vertically and horizontally and secure it to the floor with four fastening screws M 12 (not included in delivery). For the dimensions of the fixing holes, please refer to the supplied layout drawing.

7.1.4 Tubing Connections

During installation, product can leak from the lines. Additional detergents and solvents may be used.

WARNING!

Hazardous substances (product, detergents or solvents and their vapors)!

Serious injury or death can result from swallowing, breathing in or skin contact with harmful substances. FOR THIS REASON:

- Before starting work, read the safety instructions, for example in the safety data sheet for the respective substances.
- Wear your personal protective equipment, at least wear protective goggles and protective gloves suitable for the respective substances.
- Make sure there is sufficient ventilation.
- Immediately clean up spilled chemicals.

The pipes to which the analyzer is connected contain pressurized liquids and gases.

CAUTION!

Pressurized liquids and gases!

Risk of injury! FOR THIS REASON:

- Before starting work on components carrying liquid or gas, shut off the feed lines and ensure that they are depressurized.
- Wear your personal protective equipment, at least wear protective goggles and protective gloves.
- Do not remove or disable any protective devices.

Before making any pipe connections, install manual shut-off valves on the product feed line and the instrument air supply line into the analyzer. The shut-off valves must be installed near the analyzer and must be easily accessible. They must be clearly marked so that they can be identified as belonging to the analyzer and to the substances they carry.

Before installing the vent and drain lines, observe the following safety warning:

WARNING!

Possible explosion or fire!

An explosion or a fire can cause serious injury or death. FOR THIS REASON:

- Make sure that no other gases (e.g. hydrogen or oxygen used by other analyzers) and no other vapors or liquids can reach the analyzer through the vent-drain-system.

The vent and drain lines must be pressure-free and open to the atmosphere. Make sure that the lines always run downwards to the drain.

Observe the regulations for mounting the pipe connections. Please refer to the supplied manufacturer's documentation.

- Clean incoming pipes to remove any dirt particles and shavings.
- Observe the minimum bending radius of the pipes.
- Make the pipe connections according to the supplied layout drawing.
- Check all connections for possible leaks.

The connections are now made. The analyzer is now ready to be connected to the power supply.

7.1.5 Electrical Connections

The analyzer operates with electrical power.

DANGER!

Dangerous electric current!

If you touch components carrying electric current, the electrical power can cause serious injury or death. FOR THIS REASON:

- Switch off the power supply and secure it, so that it cannot be switched on accidentally.
- All work on the electrical system must be carried out by personnel qualified for electrical installation and explosion protection.
- Do not remove or disable any protective devices.

Before making any electrical connections, observe the following:

1. The power supply to the analyzer must be equipped with a separator that allows it to be safely disconnected from the power supply. Use a separator which disconnects all-polo and which can be locked and secured. The separator must be installed near the analyzer and must be easily accessible. It must be clearly marked so that it can be identified as belonging to the analyzer.

2. The power supply to the analyzer must be equipped with a fuse, as specified in the technical data (see chapter 4).

3. All important information for installation can be found in the supplied electrical documentation and in the wiring diagram.

4. Before starting work, make sure that the voltage of the power supply matches the required voltage shown on the instrument type plate.

5. If intrinsically-safe operating equipment which is not part of the analyzer (e.g. for signal transfer) is supplied with power from the cabinet, ensure that all capacities and inductivities are below the specified limits.

6. Make sure that only screened cable is used for control connections. Check the polarity of the signal cables.

To make the electrical connections, proceed as follows:

- Connect the analyzer to the local equipotential bonding, using cable with at least 16 mm^2 cross section. The position of the connectors on the frame can be found in the supplied layout drawing.
- Open the power supply box and the signal junction box.
- Thread the cables through the provided cable glands into the junction boxes.
- Connect the ground wire and the power and signal cables according to the information in the supplied plan of terminal connections.
- Pull tight the cable glands.
- Close any unused cable glands and bores for cable glands.
- Replace the protective covers on the terminals.
- Close the junction boxes.
- Lock the power supply box by using a double-bit key. Secure the cover of the signal junction box with the fastening screws.

The electrical connections are complete. The analyzer is now ready to be put into operation (see chapter 8).

7.2 Disassembly

7.2.1 Disconnecting Electrical Connections

The analyzer operates with electrical power.

DANGER!

Dangerous electric current!

If you touch components carrying electric current, the electrical power can cause serious injury or death. FOR THIS REASON:

- Switch off the power supply and secure it, so that it cannot be switched on accidentally.
- All work on the electrical system must be carried out by personnel qualified for electrical installation and explosion protection.
- Do not remove or disable any protective devices.

- Disconnect the analyzer completely from the power supply.
- Secure to prevent the system from being switched on again.
- Open the junction box.
- Disconnect all cable connections and pull them out of the junction box.
- Unscrew the equipotential bonding cable at the frame.
- Close the junction box.

The analyzer is now disconnected from the power supply.

7.2.2 Removing Tubing Connections

During installation, product can leak from the lines. Additional detergents and solvents may be used.

WARNING!

Hazardous substances (product, detergents or solvents and their vapors)!

Serious injury or death can result from swallowing, breathing in or skin contact with harmful substances. FOR THIS REASON:

- Before starting work, read the safety instructions, for example in the safety data sheet for the respective substances.
- Wear your personal protective equipment, at least wear protective goggles and protective gloves suitable for the respective substances.
- Make sure there is sufficient ventilation.
- Immediately clean up spilled chemicals.

The pipes to which the analyzer is connected contain pressurized liquids and gases.

CAUTION!

Pressurized liquids and gases!

Risk of injury! FOR THIS REASON:

- Before starting work on components carrying liquid or gas, shut off the feed lines and ensure that they are depressurized.
- Wear your personal protective equipment, at least wear protective goggles and protective gloves.

- Make sure the system is depressurized.
- Loosen the pipe connections as described in the supplied layout drawing.

The pipe connections are now disconnected and the analyzer is ready to be disassembled.

7.3 Disposal

Make sure that the analyzer is recycled and disposed of in an environmentally sound manner. Observe the applicable local regulations.

8 Initial Operation

Note:	We recommend to have the system put into operation by BARTEC BENKE service personnel, and to have your operators and maintenance staff instructed and trained by BARTEC BENKE.

8.1 Putting the Analyzer into Operation

Note:	Before you put the analyzer into operation, you have to refill the Chiller for Liquids with coolant. Further information to the Chiller for Liquids you find in the provided manual for the Chiller for Liquids.

Before putting the analyzer into operation, check the protective devices (see chapter 10.4).

After putting the analyzer into operation and running it for approx. 2 hours, the following maintenance tasks must be carried out:

- General visual inspection (see chapter 10.5).
- Visual inspection in the measuring unit enclosure (see chapter 10.6).
- Check liquid level in the sample container (see chapter 10.14).
- Clean the test filter (see chapter 10.13).

Note:	If the residual-current device (RCD) has triggered immediately during commissioning follow the hints in chapter 10.7 „Checking the residual-current device (RCD)“ on page 75.

8.2 Flushing the Product Feed Line

Flushing removes dirt particles and air from the product feed line and is **only necessary before initial operation or after maintenance or repair work** on the product feed line.

Observe the regulations for mounting the pipe connections. Please refer to the supplied manufacturer’s documentation.

Proceed as follows:

During these tasks, product can leak from the lines. Additional detergents and solvents may be used.

WARNING!

Hazardous substances (product, detergents or solvents and their vapors)!

Serious injury or death can result from swallowing, breathing in or skin contact with harmful substances. FOR THIS REASON:

- Before starting work, read the safety instructions, for example in the safety data sheet for the respective substances.
- Wear your personal protective equipment, at least wear protective goggles and protective gloves suitable for the respective substances.
- Make sure there is sufficient ventilation.
- Immediately clean up spilled chemicals.

The pipe that will be opened contains pressurized liquids.

CAUTION!

Pressurized liquid!

Risk of injury! FOR THIS REASON:

- Close the product feed line before starting work.
- Wear your personal protective equipment, at least wear protective goggles and protective gloves.

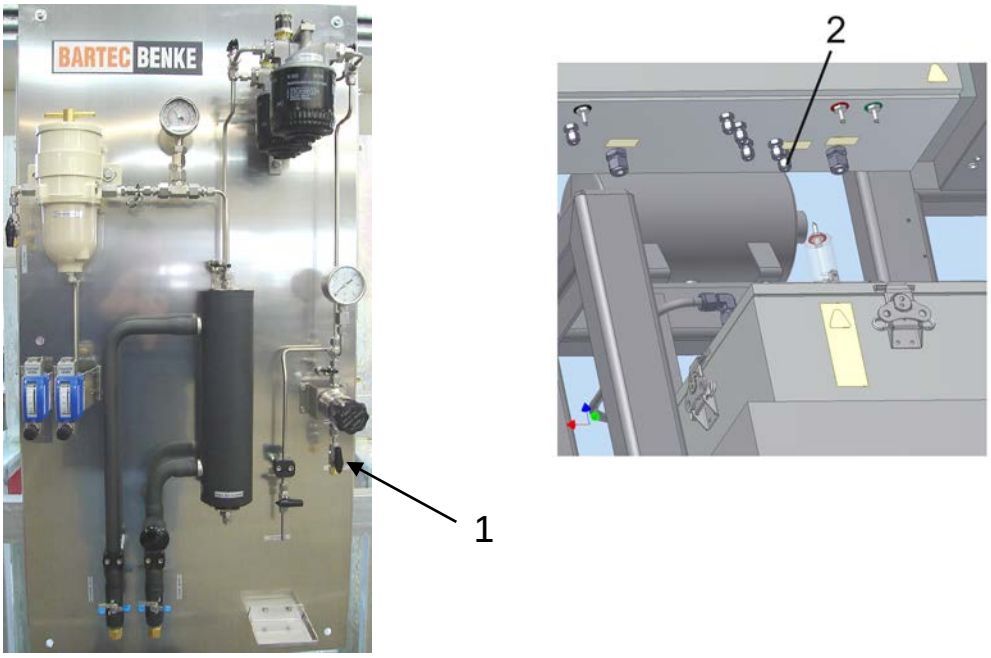


Fig. 8.1: Connections of the product feed line

1 Product feed line on the sample conditioning system
2 Product feed line on the analyzer

Note: Your sample conditioning system may be different from the one described here. If in doubt, please contact BARTEC BENKE.

- Close the shut-off valve on the system side of the product feed line.
- Slightly open the fastening screw of the product feed line (1) on the sample conditioning system and on the analyzer (2). When the product has leaked from the lines, fully open the fastening screws.
- Install a collecting container (capacity at least 5 liters) at the open end of the product feed line on the system side.
- Carefully open the shut-off valve of the product feed line and let the product drain into the collecting container.
- Flush the product feed line with product until there are no more air bubbles.
- Flush the product feed line for another 2 minutes. Make sure that the collecting container does not overflow.
- Close the shut-off valve of the product feed line.
- Reconnect the product feed line to the sample conditioning system and the analyzer.
- Open the shut-off valve of the product feed line.
- Check that the screw connections (1) and (2) are tight.

The product feed line is now flushed.

8.3 Initial Operation of the Sample Conditioning System (Optional)

This chapter applies only to **initial operation or after maintenance work**, for example filter change.

Note: Your sample conditioning system may be different from the one described here. If in doubt, please contact BARTEC BENKE.

To put the sample conditioning system into operation, proceed as follows:

- Make sure that the pressure and temperature in the product feed line correspond to the specification in the layout drawing and the technical data.
- Make sure that the product feed line is clean (see chapter 8.2).
- Ensure that the vent-drain system and the recovery system, if installed, are ready for operation.

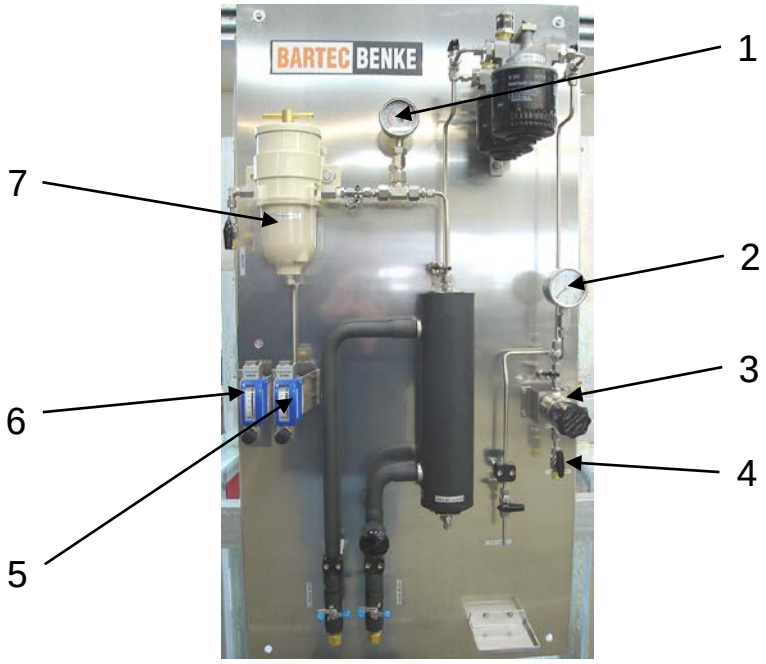


Fig. 8.2: Sample conditioning system (example)

1 Thermometer
2 Pressure gauge
3 Pressure regulator
4 Inlet valve
5 Flow meter for water separator outlet
6 Flow meter for product outlet
7 Water separator

- Fully open the needle valves of the flow meters (5) and (6) (turn anti-clockwise).

- Open the inlet valve (4) (knob lies parallel to pipe).

CAUTION!

Components of the sample conditioning system will be damaged if the pressure is too high. FOR THIS REASON:

- Make sure that the pressure in the sample conditioning system does not exceed 6 bar.

- Turn the knop of the pressure regulator (3) clockwise to adjust the pressure. See target value on the label on the pressure gauge (2).
- The sample conditioning system is filled and de-aired. The pressure may vary during this step.
- Observe the values indicated on the flow meters (5) and (6). After 3 to 4 minutes, a flow should be indicated.
- Flush for at least 2 minutes.
- If required, adjust the pressure with the pressure regulator (3).
- Adjust the flow rate for outlet of the water separator with the needle valve of the flow meter (5) (see target value on the label).
- If required, adjust the pressure with the pressure regulator (3).
- Check the temperature on the thermometer (1) (permitted temperature see supplied layout drawing and technical data).

The flow meter for the product outlet (6) can only be adjusted when the analyzer is switched on.

- Feed in product (see chapter 8.4).
- Supply the analyzer with instrument air (see chapter 8.5).
- Switch on the analyzer (see chapter 9).
- Start the analysis process (see software manual).
- During the process step „Hot Flushing“, adjust the flow rate for the product outlet with the needle valve of the flow meter (6).
- If required, readjust the flow rate for outlet of the water separator with the needle valve of the flow meter (5) (see target value on the label).
- If required, readjust the pressure with the pressure regulator (3) (see target value on the label).

The sample conditioning system is now ready for operation.

8.4 Feeding In Product

Note: The product can be supplied without the analyzer being switched on.

- Make sure that the pressure and temperature in the product feed line correspond to the specification in the layout drawing and the technical data.
- Make sure that the product feed line is clean (see chapter 8.2).
- Make sure that the sample conditioning system is ready for operation.
- Ensure that the vent-drain system and the recovery system, if installed, are ready for operation.
- Open the shut-off valve in the product feed line, if it is not already open.
- Make sure that the parameters correspond to the values specified in the supplied layout drawing and the technical data.
    - Product pressure at inlet
    - Product flow rate
    - Product temperature

The analyzer is now supplied with product.

8.5 Connecting the Analyzer to Instrument Air Supply

The analyzer requires instrument air for the analysis process and for the pressurized enclosure of the control box and the measuring cell housing. To connect the analyzer to the instrument air supply, proceed as follows:

- Make sure that the instrument air corresponds to the specifications (see technical data).
- Open the shut-off valve of the instrument air line.
- Open the measuring unit enclosure.

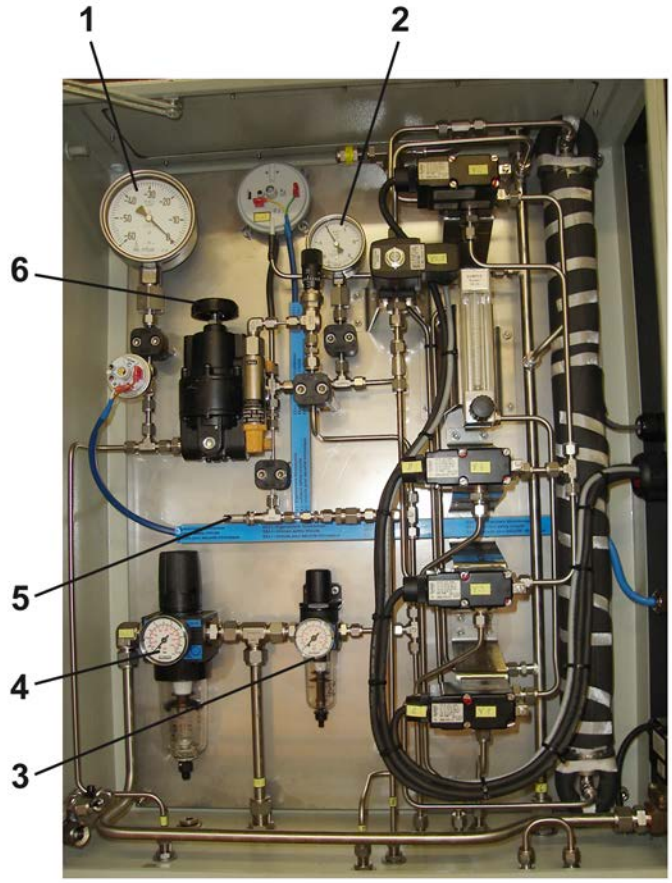


Fig. 8.3: Open measuring unit enclosure

1 Vacuum pressure gauge
2 Pressure gauge for backflow detection
3 Air service unit for injector and measuring cell
4 Air service unit for pressurized housings
5 Metering valve measuring cell
6 Vacuum pressure controller

- Adjust the pressure at the air service unit (4) (see target value on the label).

The control box and the measuring cell housing are supplied with instrument air.

- Adjust the pressure at the air service unit (3) (see target value on the label).

The measuring cell and the injector for generation of the vacuum are supplied with instrument air.

- Adjust the vacuum with the pressure controller (6) (see target value on the label at the vacuum pressure gauge (1)).
- Adjust a small air flow through the measuring cell with the metering valve (5).

The air flow is important for the detection of the sample backflow. The precise adjusting of the air flow you have to do during the process step “Instrument testing” by considering the pressure gauge (2).

9 Operation

9.1 Switching on the Analyzer

To switch on the analyzer, proceed as follows:

- Open the shut-off valve in the product feed line, if it is not already open.
- Make sure that pressure and flow rates for product and instrument air are adjusted correctly (see chapter 8).
- Check the protective devices (see chapter 2.5).
- Switch on the power, using the separator for the power supply (fuse or main switch) for the analyzer.
- The control box and the measuring cell housing are purged with instrument air (loud noise).

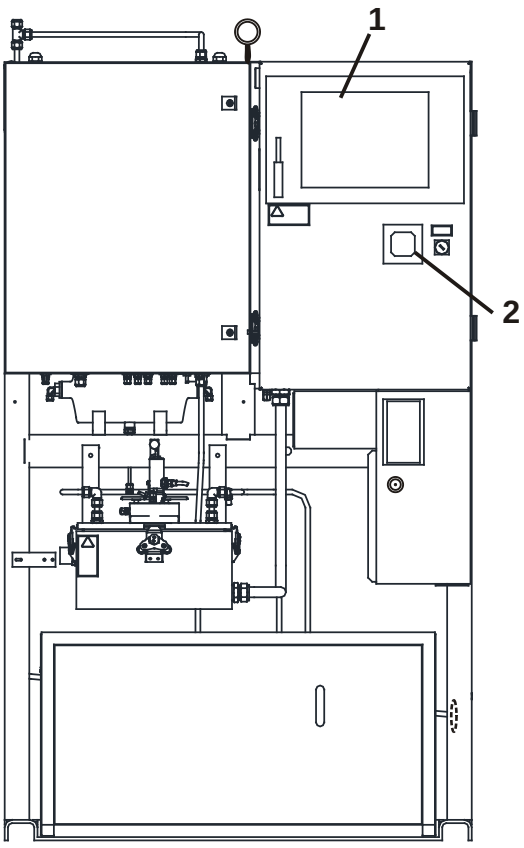


Fig. 9.1: Overpressure control display

1 Touchscreen
2 Overpressure control display

- The remaining purge time is displayed by the overpressure control system (2).

- During the purging cycle, all electrical equipment without an individual type of protection remains switched off. The analyzer is not yet ready for operation.
- After purging, the computer boots up, and the touchscreen (1) is switched on.
- The operating system, the PACS process software and further applications start.
- The Chiller for Liquids starts and cools down the cooling circle. The measuring cell is cooled down by using a heat exchanger and peltier elements. This takes about 15 minutes.
- Generally, the analyzer starts automatically with the first measurement.

The analyzer is now operating.

9.2 Operation

Generally, analyzer operation is fully automated. You can monitor the analysis process on the touchscreen. You operate the analyzer with the pen and the touchscreen.

The supplied software manual describes in detail how to operate, control and configure the analyzer and the analysis process.

9.3 Switching off the Analyzer

9.3.1 Switching off in Normal Operation

To switch off the analyzer, proceed as follows:

Note: For a detailed description of the software and for details on how to operate the analyzer with the touchscreen and the pen, please refer to the software manual.

- Using the pen on the touchscreen, click on File in the menu.
- Click on Exit.
- Click on Shutdown.
- Wait until the computer has shut down.

- Switch off the power, using the separator for the power supply (fuse or main switch) for the analyzer.

Note: If there is no optional product inlet valve installed which can be controlled by the PACS process software, the product flow through the analyzer will remain open.

- If required, stop the product flow and the purging air supply.

The analyzer is now switched off.

9.3.2 Switching off in an Emergency

To switch off the analyzer as quickly as possible in an emergency:

- Switch off the power, using the separator for the power supply (fuse or main switch) for the analyzer.
- Close the manual shut-off valves to stop the product streams connected to the analyzer.

The analyzer is now switched off.

CAUTION!

Switching off the analyzer by disconnecting it from the power supply can lead to lost data. FOR THIS REASON:

- Only use this procedure to switch off the analyzer in an emergency.

10 Maintenance

10.1 Safety during Maintenance

WARNING!

Danger if maintenance work is not carried out correctly.

FOR THIS REASON:

- Before starting work on electrical components, or on components carrying product or other substances, or on the protective devices: Switch off the power supply and secure it, so that it cannot be switched on accidentally.
- After switching off the power to the analyzer, wait for at least 5 minutes before you open the control box (to allow hot surfaces to cool down and electric charges to decrease).
- For certain tasks, a hot-work permit from the operating company is required.

WARNING!

Danger if unsuitable spare parts are used!

FOR THIS REASON:

- Use only spare parts from BARTEC BENKE. Other components may not meet the required safety standards, particularly for explosion protection.

Warning!
No explosion protection due to using incorrect spare parts!

Some optional used spare parts are modified by BARTEC BENKE for a particular purpose. The use of non-modified original spare parts of the relative manufacturer can cause loss of explosion protection.

FOR THIS REASON:

- Only use spare parts from BARTEC BENKE.

BARTEC BENKE cannot accept liability if maintenance is not carried out correctly.

10.1.1 Qualification of Personnel

Inspection and maintenance personnel must be qualified in accordance with the standards EN 60079-17 / IEC 60079-17 (experience, training, knowledge about installation procedures, types of protection, rules and regulations, etc.).

10.2 Measures after Maintenance

- Check that all pipe connections, screw connections and cable clamps which were disconnected during maintenance are again tightly fastened.
- Check that all covers and protective devices are in place again.
- Remove tools and other materials used during work from the work area.
- Clean the work area, remove any leaked substances thoroughly.
- Close and secure all housings tightly.
- Check the protective devices (see chapters 2.5 and 10.4).

10.3 Maintenance and Inspection Plan

The standard EN 60079-17 / IEC 60079-17 describes inspection and maintenance of electrical systems in explosion hazard areas. In addition, the inspection and maintenance measures listed in the table must be carried out.

The intervals given below are intended as a general overview. Depending on the product quality (solids and water content) and on the environmental conditions during operation, the actually required intervals may differ from the intervals stated below. In case of malfunctions before the end of an interval, shorten the intervals appropriately. Document all inspections and maintenance work in suitable form.

Interval	Inspection / Maintenance
daily	Check the protective devices (see chapter 10.4). General visual inspection (see chapter 10.5).
weekly	Visual inspections in the measuring unit enclosure (see chapter 10.6). Check the test filter (see chapter 10.8).
Every 6 months	Checking for product and emptying vacuum tank (see chapter 10.11). Check if all electrical terminals are fastened Check the residual-current device (see chapter 10.7)
Every 5 years	Change Lithium battery of PC (see chapter 10.10).
	Have the Chiller for Liquids serviced by cooling systems expert (check dryer and level of cooling agent, clean fins). Information therefor you find in the manual for the Chiller for Liquids.

10.4 Checking the Protective Devices

Note: For a description of the protective devices and their functions, please refer to chapter 2.5.

The following illustration shows the protective devices:

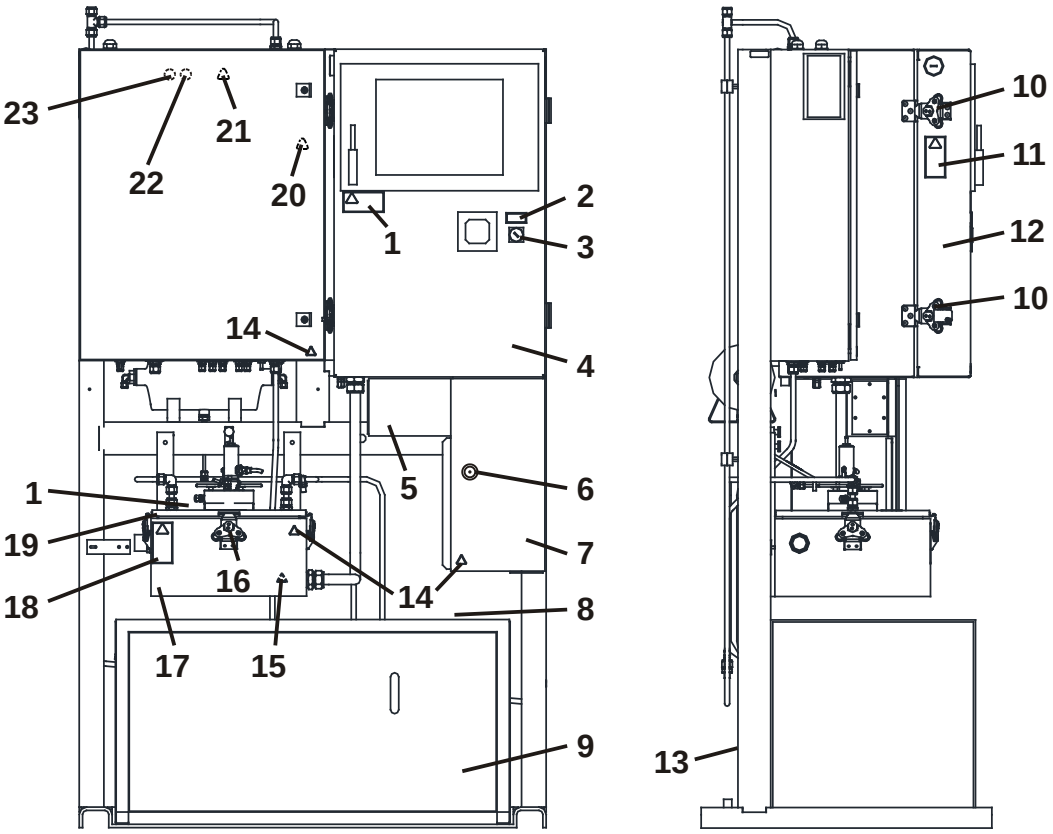


Fig. 10.1: Protective Devices

1 Warning label “Clean plastics”
2 Label for key switch
3 Key switch
4 Control box
5 Signal junction box with cover
6 Lock for double-bit key
7 Power supply box
8 Upper cover of Chiller for Liquids
9 Housing and front cover of Chiller for Liquids
10 Locks of control box
11 Warning label “Opening the housing”
12 Door of control box
13 Rear cover of Chiller for Liquids
14 Warning label “Electrical equipment” (lightning symbol)
15 Warning label “Coldness”
16 Locks of measuring cell housing
17 Measuring cell housing
18 Warning label “Opening the housing”
19 Cover of measuring cell housing
20 Warning label “Hot surfaces”
21 Warning label “Fluids under pressure”
22 Mandatory-sign “Wear protective goggles”
23 Mandatory-sign “Wear protective gloves”

Check the protective devices according to the following list. The checks of the protective devices can be carried out while the analyzer is operating.

If any protective devices are missing, damaged or unusable, switch off the analyzer immediately. Do not switch the analyzer back on before all protective devices are again operating correctly.

Protective device	Required state
Label for key switch (2)	present, easily readable
Key switch (3)	in position “On” according to label (2)
Warning labels (1, 11, 14, 15, 18, 20-23)	present, easily readable
Control box (4)	undamaged, also visible outer components (e.g. touchscreen) no open bore holes or mounting cut-outs door (12) is closed tightly and locked with both locks (10)
Measuring cell housing (17) with rinsing tube	undamaged, also visible outer components no open bore holes or mounting cut-outs cover (19) is closed tightly and fastened with four locks (16)
Power supply box (7)	undamaged no open bore holes door is locked (double-bit key)
Signal junction box (5)	undamaged no open bore holes cover is closed tightly and fastened with all fastening screws
Housing of Chiller for Liquids (9)	undamaged no open bore holes or mounting cut-outs (except ventilation holes) all covers (8, 9 and 13) are closed tightly

Spare warning labels are available from BARTEC BENKE.

10.5 General Visual Inspection

During the visual inspection, check the analyzer according to the following table. The visual inspection can be carried out while the analyzer is operating.

Checks	Remedy
Error messages from the PACS process software	see software manual
Leakages	remove immediately
Ice forming on measuring cell	ensure instrument air supply according to specification (see chapter 4)

10.6 Visual Inspection Inside Measuring unit enclosure

Open the measuring unit enclosure and check all pressure values and flow rates according to the following table. The visual inspection can be carried out while the analyzer is operating.

The pressure target values are stated on the respective pressure gauges.

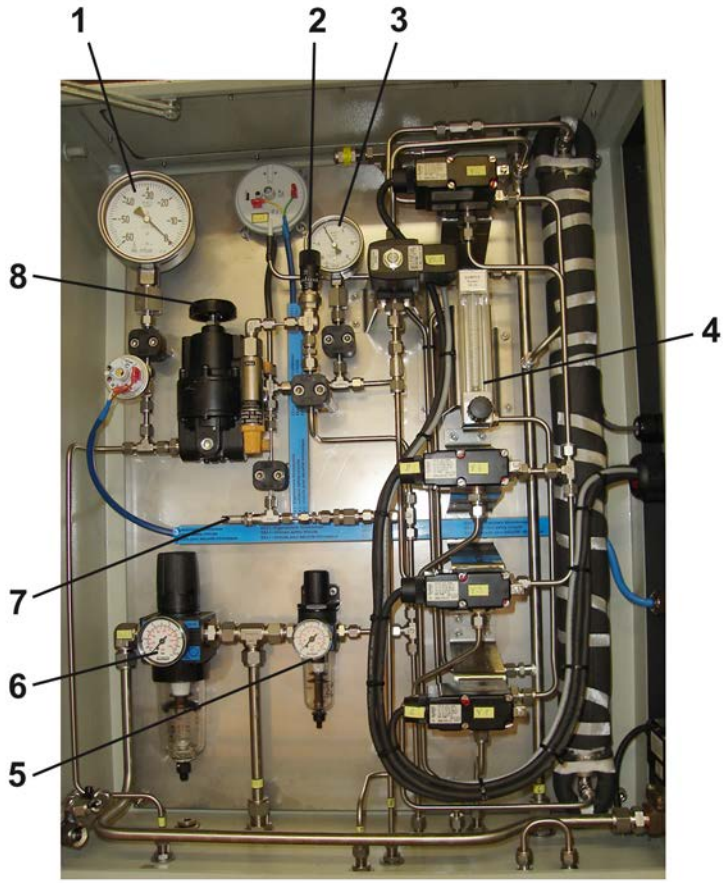


Fig. 10.2: Visual Inspection Inside Measuring unit enclosure

1 Vacuum pressure gauge
2 Metering valve injector
3 Pressure gauge for backflow detection
4 Flow controller
5 Air service unit for injector and measuring cell
6 Air service unit for pressurized housings
7 Metering valve measuring cell
8 Vacuum pressure controller

Checks	Remedy / Setting
Instrument air pressure for overpressure control system (5)	Adjust pressure at air service unit (6).
Instrument air pressure for injector and measuring cell	Adjust pressure at air service unit (5).
Check vacuum pressure (1).	Adjust vacuum at pressure controller (8). If necessary readjust the metering valve (2).
Check measuring cell pressure (3) for backflow recognition (during process step “Instrument Testing”).	Adjust measuring cell pressure at needle valve (7).
Leakages	Remove

Close the measuring unit enclosure. The visual inspection is finished.

10.7 Checking the residual-current device (RCD)

Should only be performed by a qualified electrician.

Personal protective equipmente

- Safety goggles
- Protective gloves (hazardous materials)

Required material

- Software manual

Procedure

1. Ensure that the ambient atmosphere is not explosive.

Warning!
Danger of explosion due to open ignition sources!

The control box contains ignition sources. Opening the control box can cause explosion of potentially explosive atmosphere.

FOR THIS REASON:

- Avoid measures see chapter 2 „Safety“.

1. Turn the *Explosion protection* key switch to the *Off* position.
2. Open the control box.
3. Activate the test button *T* **once every six month at least**, if no other regional or application-specific additional tests are specified.
   The RCD must trigger.

10.7.1 Measures after the RCD has triggered

1. If the RCD has triggered, switch it back on.
2. Close the control box and secure the connections with safety bolts.
3. Turn the *Explosion protection* key switch back to the *On* position.

10.7.2 Measures in case of troubles

If the RCD has triggered immediately during commissioning, do the following steps:

1. Check whether the downstream working circuit and connected current-using equipment are connected to earth.

2. Remove insulation faults or eventually available connections between neutral conductor and the earth conductor on the load side.

If the above mentioned causes are impossible or if the RCD malfunctions replace the RCD.

A new RCD is available at BARTEC BENKE.

If the RCD is damaged it may not be repaired.

10.8 Checking the Test Filter

To check that the test filter is clean and is being flushed correctly, proceed as follows:

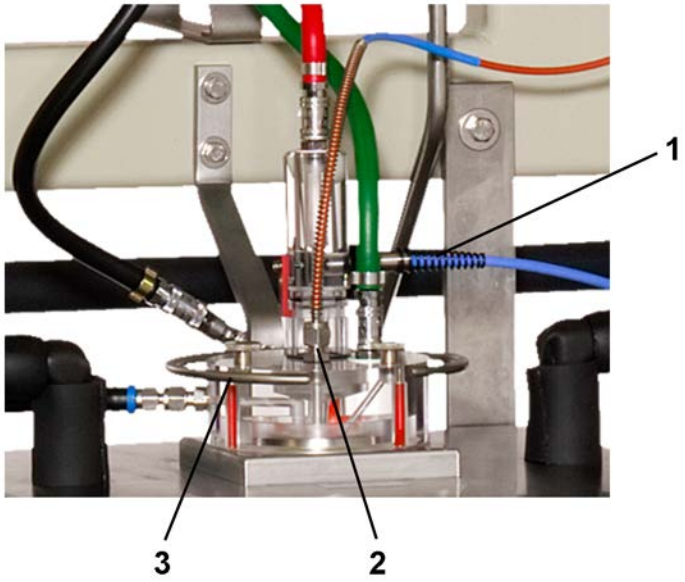


Fig. 10.3: Measuring cell

1 Pipe connection
2 Measuring cell

- The analyzer must be operating and the analysis process must be running.

Note: For a detailed description of the analysis process, please refer to the software manual.

- Wait for the process step Instrument Testing.
- Observe the sample rising in the measuring cell (2) and check for visible dirt particles.
- If dirt particles are visible, clean the test filter (see chapter 10.13).
- Wait for the process step Hot Flushing.
- Watch the upper part of the measuring cell. A strong product stream should be visible coming from the pipe connection (1).

- If this is not the case, increase product flow to the analyzer.

The test filter check is finished.

10.9 Cleaning the touchscreen

To clean the touchscreen, use only water with dish soap or foaming display cleaner as cleaning agents.

WARNING!

Possible explosion or fire!

An explosion or a fire can cause serious injury or death. FOR THIS REASON:

- Never clean the touchscreen with a dry cloth, but always use a damp cloth to avoid static electricity discharge and sparks.
- Do not clean the touchscreen with aggressive solvents or abrasives, not with pressurized air or steam. The touchscreen is a part of the control box with a protective function, therefore it must not be damaged.

To clean the touchscreen, proceed as follows:

- Switch off the analyzer (see chapter 9.3). This prevents you from operating the software accidentally while you are touching the touchscreen.
- Moisten a cleaning cloth.
- Apply some cleaning agent to the cloth, not to the touchscreen.
- Clean the touchscreen with the cleaning cloth.

The touchscreen has been cleaned. You can now switch the analyzer back on (see chapter 9).

10.10 Changing the battery of the box PC

The analyzer is controlled by a box PC. It is located in the control box (see page Fehler! Textmarke nicht definiert.). The box PC is equipped with a Lithium battery. During voltage breakdown it ensures among other things, that the system clock carries on running. To ensure the functionality of the box PC, you should change the battery every five years.

WARNING!

Danger of explosion by changing the battery in potentially explosive atmosphere!

Dismounting and installing the battery can cause sparks. They can ignite potentially explosive atmosphere!

FOR THIS REASON:

- Make sure, that during all operations for changing the battery no potentially explosive atmosphere is present.

For changing the battery you must open the control box.

- For it switch off the analyzer (see page 65).
- Make sure, that the power supply is switched off.
- Open the control box.

WARNING!

Danger of explosion by using unsuitable batteries in potentially explosive atmosphere!

Unsuitable batteries can ignite potentially explosive atmosphere by overheating in the event of an error!

FOR THIS REASON:

- For replacement use only batteries from BARTEC BENKE.

CAUTION!

Unsuitable batteries can damage the box PC.

FOR THIS REASON:

- For replacement use only batteries from BARTEC BENKE.

Note: Information for changing the battery you find in the provided manual for the box PC.

- Change the battery of the box PC.
- Close the control box.
- Switch on the analyzer (see page 64).

10.11 Checking for product and emptying vacuum tank

In exceptional cases, e.g. after a fault product can accumulate in the vacuum tank. Product in the vacuum tank reduces the required reservoir of vacuum. You can check the vacuum tank for product. For it open the drain of the vacuum tank:

Preparing

- Get the analyzer into the *Safe State*. To do this, click *Safe State* in the PACS main window (see software manual).
- Product and instrument air can feed into the analyzer furthermore.

  Product flowing through the analyzer is going on. The vacuum injector is operated with instrument air. With it a low-pressure in the vacuum tank is produced continuously furthermore.

Emptying vacuum tank

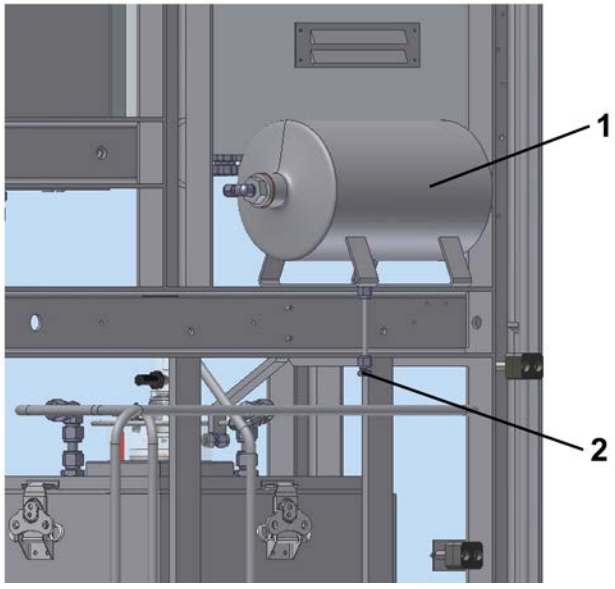


Fig. 10.4: Vacuum tank with drain.

1 Vacuum tank
2 Blind cap on drain

The vacuum tank is located on the back side of the analyzer. At the bottom side of the vacuum tank a drain with blind cap (**2**) is installed.

- Keep a drain bottle (at least 200 ml) for product ready.

WARNING!

Hazardous substances (product and its vapors) can leave!

Serious injury can result from swallowing, breathing in or skin contact. FOR THIS REASON:

- Before starting work, read the safety instructions, for example in the safety data sheet for the respective substances.
- Wear your personal protective equipment, at least wear protective goggles and protective gloves suitable for the respective substances.
- Make sure there is sufficient ventilation.
- Immediately clean up spilled chemicals.

- Loosen the blind cape with two size 13 spanners.
- Collect flowing product by using the drain bottle. Wait, until no product is flowing.

  The vacuum tank is emptied.

Note:	Only in the case of a fault a bigger amount of product accumulate in the vacuum tank. The fault must be solved as soon as possible. Contact for it BARTEC BENKE.

- Close the drain professionally with the blind cape (**2**).
- Dispose the collected product professionally.
- Make sure, that the pressure in the vacuum tank is 20 mbar. The pressure is shown at the vaccum pressure gauge. It is located in the measuring unit enclosure (see page Fehler! Textmarke nicht definiert.).
- You can go on with measuring (see chapter 9.2).

10.12 Removing the Measuring Cell

For cleaning the test filter, for checking the liquid level in the sample container and for changing the cover of the measuring cell housing you must remove the measuring cell.

To remove the measuring cell, proceed as follows:

- Switch off the analyzer and secure it, so that it cannot be switched on accidentally (see chapter 9.3).
- Close the shut-off valve of the product feed line.

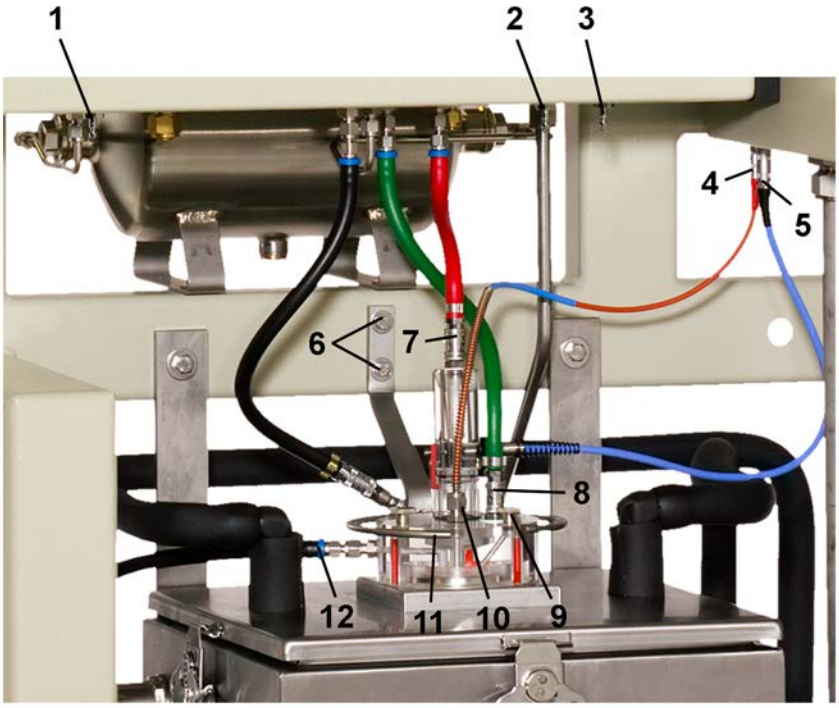


Fig. 10.5: Measuring cell

1 Plug nipple for black pipe
2 Plug nipple for red pipe
3 Plug nipple for green pipe
4 Connectors for the temperature sensors
5 Connectors for the liquid sensor
6 Screws decondensation ring
7 Quick-release coupling of the red pipe
8 Quick-release coupling of the green pipe
9 Fixing screw
10 Union nut sample temperature sensor
11 Decondensation ring
12 Drain pipe

- Pull off the connector (4) for the temperature sensors and the liquid sensor (5).

WARNING!

Hazardous substances (product, detergents or solvents and their vapors)!

Serious injury or death can result from swallowing, breathing in or skin contact with harmful substances. FOR THIS REASON:

- Before starting work, read the safety instructions, for example in the safety data sheet for the respective substances.
- Wear your personal protective equipment, at least wear protective goggles and protective gloves suitable for the respective substances.
- Make sure there is sufficient ventilation.
- Immediately clean up spilled chemicals.

Note:	In order to remove the cover of the measuring cell housing it is not necessary to dismount the temperature sensors. To protect the delicate temperature sensors, please do not loose the screw connections as described in the following.

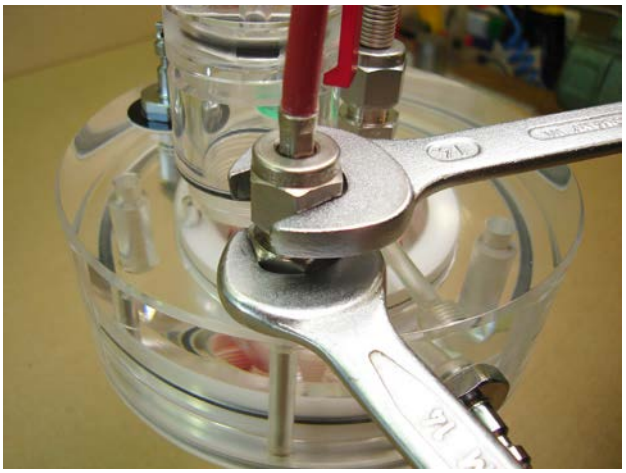


Fig. 10.6: Loosen screw connections

- Loosen union nut (10) of the sample temperature sensors, while holding the assembly in position with a wrench (see figure Fig. 10.6).

CAUTION!

The tips of the temperature sensors, particularly the sample temperature sensor (glass tip!) are very fragile and can bend or break if handled carelessly. FOR THIS REASON:

- Handle temperature sensors with great care.
- If possible, take the sensors from the work area immediately after removing them, and keep them in a safe place.

- Carefully pull out the temperature sensor.
- Carefully clean them with a soft cloth.
- Keep them in a safe place.

- One after the other, pull off the quick-release couplings of the green (8) and red (7) pipes from the measuring cell and immediately push them onto the two remaining plug nipples (3, 2) on the underside of the measuring unit enclosure.
- Pull off the quick-release coupling of the drain pipe (12) and push the drain pipe slightly to the side.
- Remove any leaked product.
- Disconnect the holder of the decondensation ring from the frame by loosing the two screws (6). Remove the decondensation ring (11).
- Unscrew and remove the fixing screws (9).

CAUTION!

Very cold components and product!

Risk of skin damage on direct contact. FOR THIS REASON:

- Wear protective gloves and protective goggles.
- Hold the measuring cell only by its upper transparent plastic parts.

- Place a clean cloth on the surface where the measuring cell will be put down.
- Lift out the measuring cell in an upright position, without tilting it.
- Put down the measuring cell in an upright position.

CAUTION!

The transparent plastic of the measuring cell is not alcohol-resistant, it will be damaged by contact with alcohol. FOR THIS REASON:

- Do not clean the transparent plastic parts with alcohol.

- Clean the measuring cell.

The measuring cell has now been removed.

Now you can clean the test filter or you can check the liquid level in the sample container (see chapter 10.14).

10.13 Cleaning the Test Filter

If you have detected dirt particles while checking the test filter (see chapter 10.8), you can now clean the test filter as follows:

- Remove the measuring cell (see chapter 10.10).

Fig. 10.7: Measuring cell

- Wait until the cooling jacket (1) has warmed up to > 0 °C (no ice visible).

WARNING!

Hazardous substances (product, detergents or solvents and their vapors)!

Serious injury or death can result from swallowing, breathing in or skin contact with harmful substances. FOR THIS REASON:

- Before starting work, read the safety instructions, for example in the safety data sheet for the respective substances.
- Wear your personal protective equipment, at least wear protective goggles and protective gloves suitable for the respective substances.
- Make sure there is sufficient ventilation.
- Immediately clean up spilled chemicals.

- Open the measuring unit enclosure.

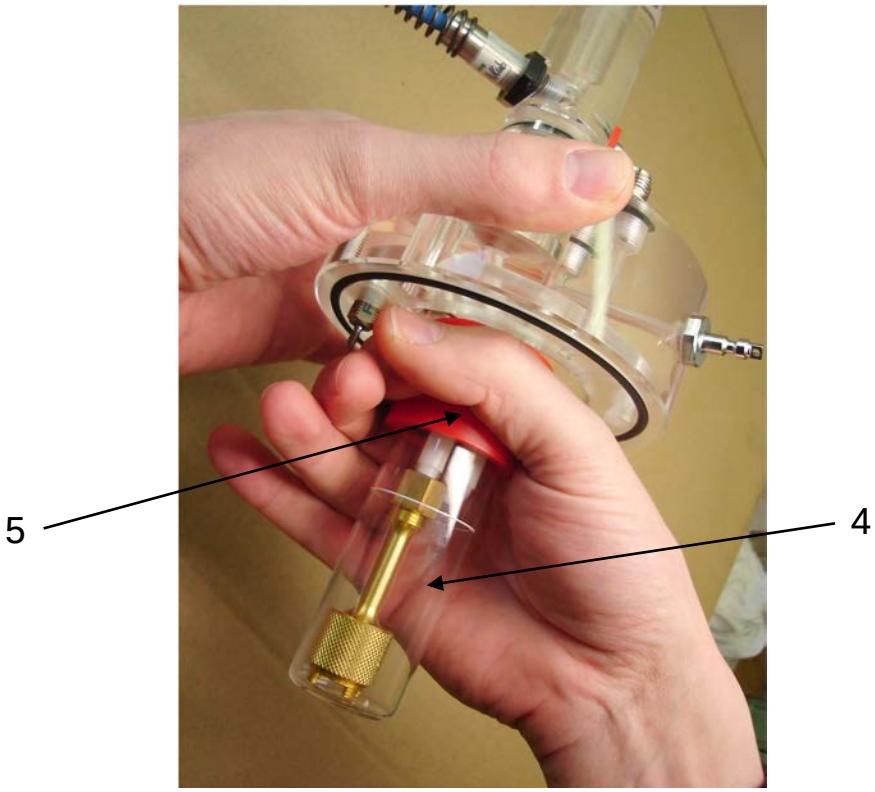


Fig. 10.8: Disassembling the sample container

4 Glass body
5 Red plastic ring

- Holding the measuring cell upright, remove the sample container.
- To do this, hold the red plastic ring (5), not the glass body (4).

- Keep a suitable container ready for remaining product from the measuring cell.
- Remove remaining product from the measuring cell.

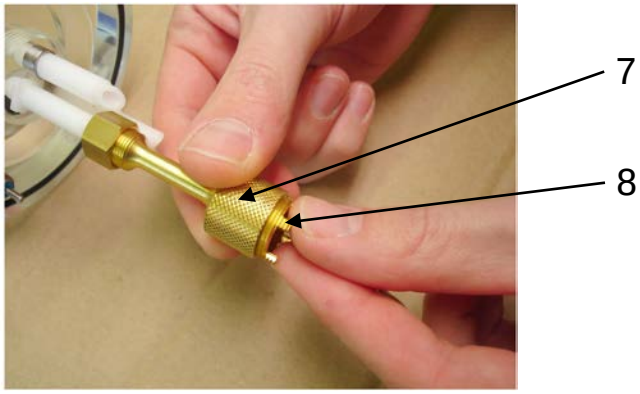


Fig. 10.9: Removing the test filter

7 Filter assembly
8 Cylinder

- Remove the test filter while holding the filter assembly with one hand by its knurled part (7).
- Unscrew the cylinder (8) with the other hand.

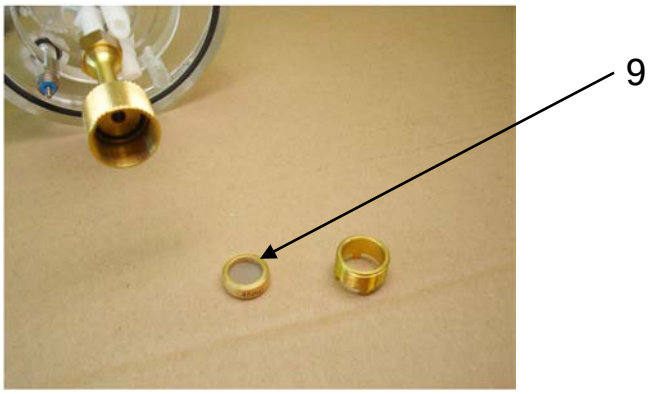


Fig. 10.10: Test filter

9 Test filter

- Remove the test filter (9).
- Clean the test filter and the sample container with a suitable detergent or solvent.

Disassembly and cleaning are now finished. You can now reassemble the test filter.

- Check all O-rings. If there are signs of damage, replace the O-ring.
- Reassemble the test filter (orientation does not matter), and tighten the cylinder by hand.

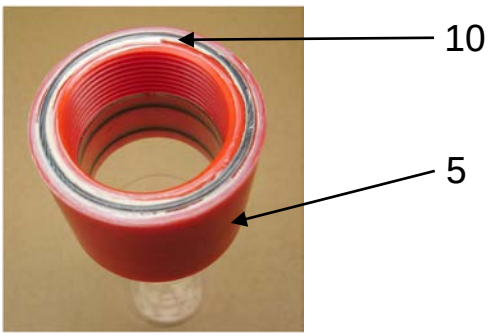


Fig. 10.11: O-ring sample container

10 O-ring of the sample container
5 Red plastic ring

- Apply a small amount of mounting paste to the O-ring (10) of the sample container.
- To mount the sample container, hold the red plastic ring (5), not the glass body (4).
- Reinstall the measuring cell (see chapter 10.15).

The test filter is now ready for operation. You can now switch the analyzer back on (see chapter 9.1).

10.14 Checking Liquid Level in the Sample Container

Note: You can combine this task with the task “Cleaning the Test Filter” (see chapter 10.13).

10.14.1 Checking the Liquid Level in the Sample Container

- The analyzer must be operating.
- Wait until the analyzer has finished the process step *Drip down*.

- Switch off the analyzer and secure it, so that it cannot be switched on accidentally (see chapter 9.3).
- Close the shut-off valve of the product feed line.
- Remove the measuring cell (see chapter 10.10).

Fig. 10.12: Measuring cell

- Wait until the measuring cell has warmed to about room temperature.
- Always hold the measuring cell upright so that no sample is spilled.

WARNING!

Hazardous substances (product, detergents or solvents and their vapors)!

Serious injury or death can result from swallowing, breathing in or skin contact with harmful substances. FOR THIS REASON:

- Before starting work, read the safety instructions, for example in the safety data sheet for the respective substances.
- Wear your personal protective equipment, at least wear protective goggles and protective gloves suitable for the respective substances.
- Make sure there is sufficient ventilation.
- Immediately clean up spilled chemicals.

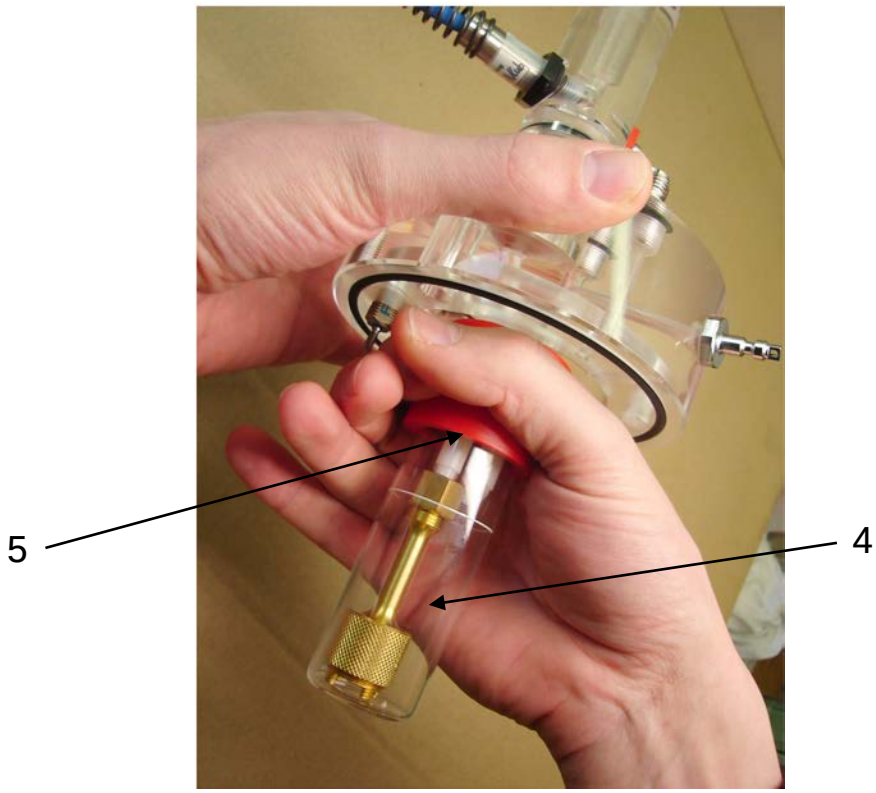


Fig. 10.13: Disassembling the sample container

4 Glass body
5 Red plastic ring

- Holding the measuring cell upright, remove the sample container.
- To do this, hold the red plastic ring (5), not the glass body (4).

Fig. 10.14: Sample container (without sample)

- The liquid level of the sample should correspond to the level mark on the sample container.
- If it does not, measure the distance between the liquid level and the level mark and make a note of it, then adjust the liquid level (see chapter 10.14.2).
- Empty the sample container and clean it.

The measuring cell can now be reassembled and reinstalled.

- Check all O-rings. If there are signs of damage, replace the O-ring.

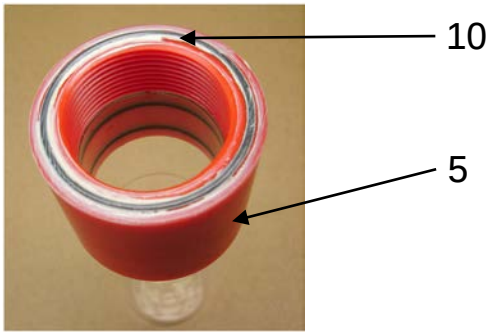


Fig. 10.15: O-ring sample container

10 O-ring of the sample container
5 Red plastic ring

- Apply a small amount of mounting paste to the O-ring (10) of the sample container.
- To mount the sample container, hold the red plastic ring (5), not the glass body (4).

- Reinstall the measuring cell (see chapter 10.15).

The measuring cell is now ready for operation. You can now switch the analyzer back on (see chapter 9.1).

10.14.2 Adjusting the Liquid Level in the Sample Container

To adjust the liquid level, proceed as follows:

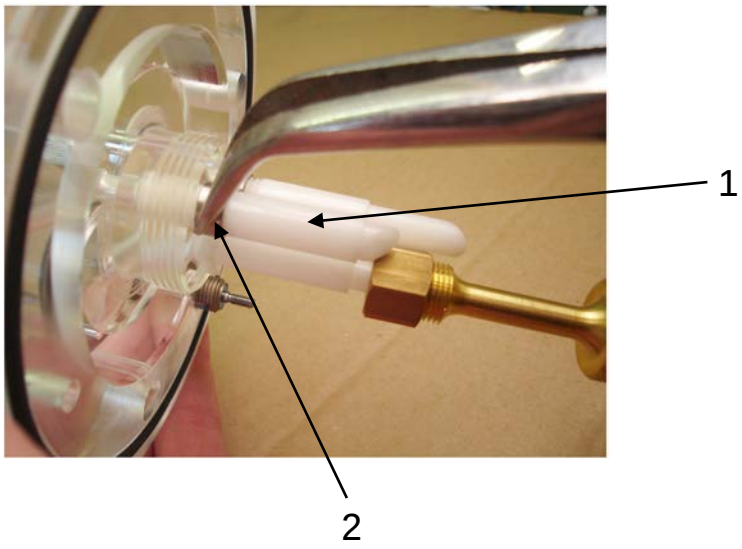


Fig. 10.16: Lock nut of the outlet pipe

1 Outlet pipe
2 Lock nut

- Loosen the lock nut (2) of the outlet pipe (1) with needle-nosed pliers while holding the outlet pipe to keep it in position.

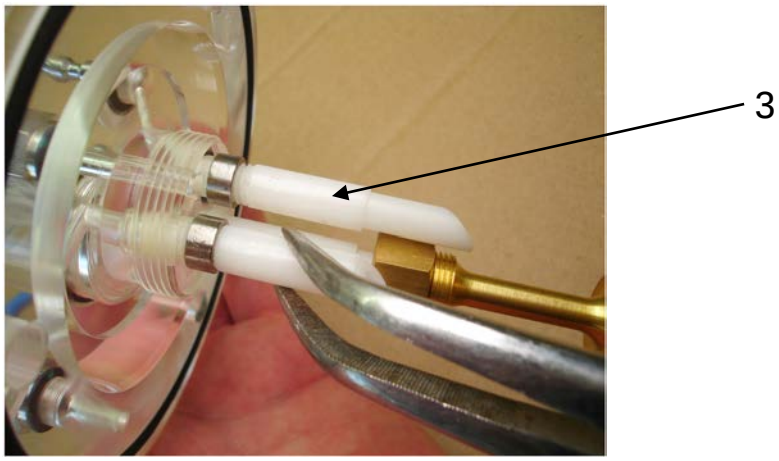


Fig. 10.17: Adjusting the outlet pipe

3 Bypass pipe

- If the liquid level was below the level mark, screw the outlet pipe (1) further in (one turn corresponds to 1.25 mm).
- If the liquid level was above the level mark, screw the outlet pipe (1) further out (one turn corresponds to 1.25 mm).
- Secure the outlet pipe with the lock nut while holding it in position.
- By the same procedure, adjust the bypass pipe (3) so that the distance from the outlet pipe is about 15 mm.

The liquid level is adjusted.

10.15 Reinstalling the Measuring Cell

CAUTION!

The transparent plastic of the measuring cell is not alcohol-resistant, it will be damaged by contact with alcohol. FOR THIS REASON:

- Do not clean the transparent plastic parts with alcohol.

CAUTION!

Very cold components and product!

Risk of skin damage on direct contact. FOR THIS REASON:

- Wear protective gloves and protective goggles.
- Hold the measuring cell only by its upper transparent plastic parts.

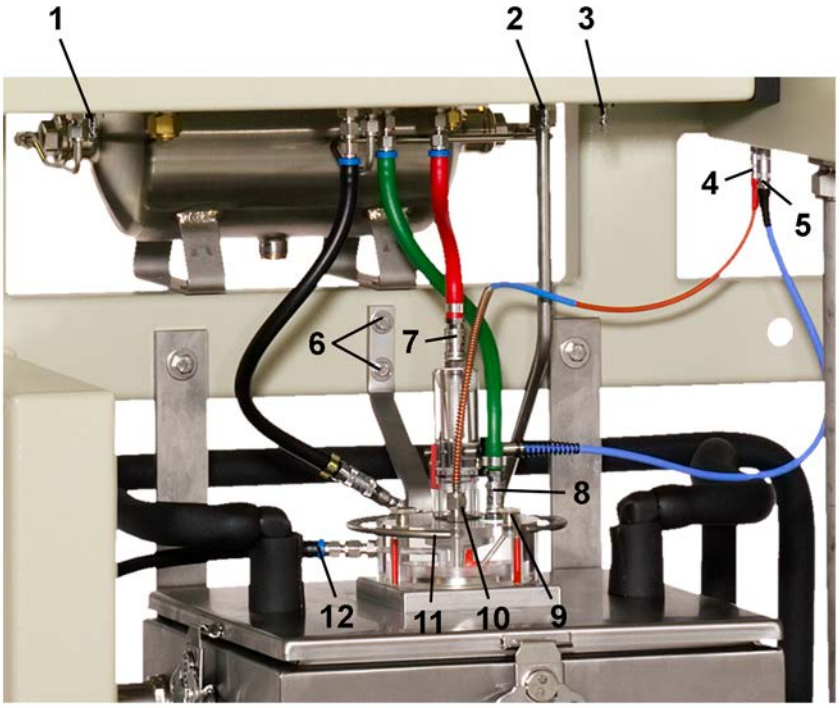


Fig. 10.18: Measuring cell (installed)

1 Plug nipple for black pipe
2 Plug nipple for red pipe
3 Plug nipple for green pipe
4 Connectors for the temperature sensors
5 Connectors for the liquid sensor
6 Screws decondensation ring
7 Quick-release coupling of the red pipe
8 Quick-release coupling of the green pipe
9 Fixing screw
10 Union nut sample temperature sensor
11 Decondensation ring
12 Drain pipe

The correct mounting position can be checked by the position of the drain pipe (12).

- Slowly lower the measuring cell.
- Replace the fixing screws (9) and tighten them hand-tight.

- Position the decondensation ring (11). Tighten the holder of the decondensation ring at the frame with two screws (6).
- Push the quick-release couplings of all pipes onto the respective plug nipples with the corresponding color.

Note: For changing the peltier elements the temperature sensors have not been dismounted. The screw connections described in the following have not been loosed!

CAUTION!

The tips of the temperature sensors, particularly the sample temperature sensor (glass tip!) are very fragile and can bend or break if handled carelessly. FOR THIS REASON:

- Handle temperature sensors with great care.
- Do not exchange temperature sensors.

- Carefully slide the sample temperature sensor (with glass tip) into the screw connector.

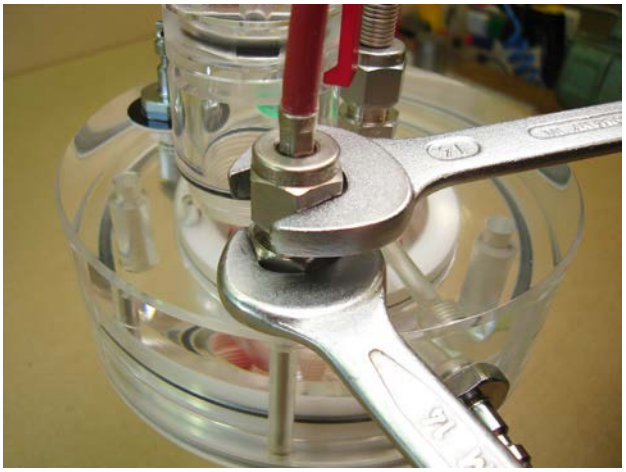


Fig. 10.19: Tightening screw connections

- Slightly tighten the corresponding union nut while holding the assembly in position with a wrench.
- Push the connectors for the temperature sensors and for the liquid sensor (5) into the corresponding sockets with the same color.

The measuring cell has now been replaced. The product stream can be activated and the analyzer can be switched on (see chapter 9.1).

10.16 Remove the cover of the measuring cell housing

The measuring cell housing (5) is closed by a cover (3). At the bottom side of the cover a heat exchanger with peltier elements is located for the cooling of the measuring cell. For changing the peltier elements you must remove the cover.

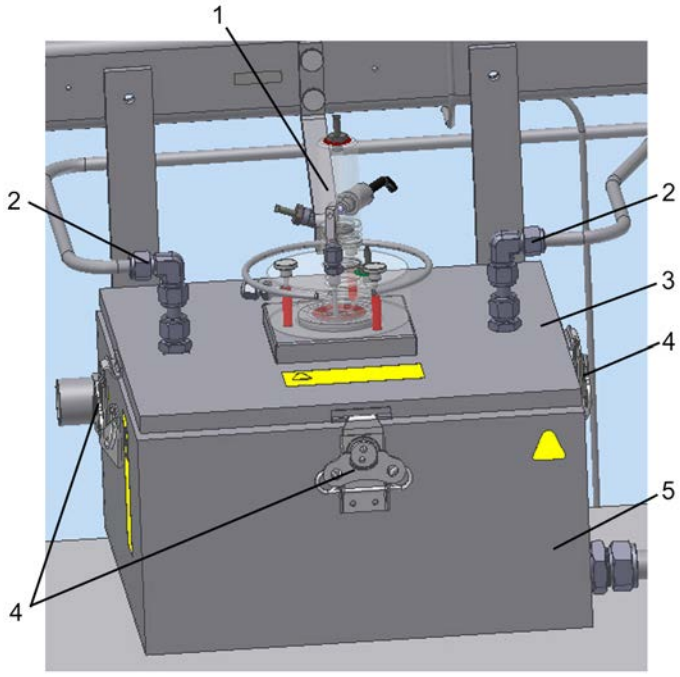


Fig. 10.20: Measuring cell housing

1 Measuring cell
2 Screw connections of coolant lines
3 Cover
4 Locks
5 Measuring cell housing

This is how to remove the cover:

- Remove the measuring cell (see page 82).

To remove the cover you have to loose the screw connections (2) of the coolant lines.

CAUTION!

Very cold components and coolant!

Risk of skin damage on direct contact. FOR THIS REASON:

- Wear protective gloves and protective goggles.

Note: For closing the open coolant lines prepare blind plugs. Suitable blind plugs you find in the measuring unit enclosure.

- For opening the screw connections (2) displace the Amaflex insulating. For absorbing of coolant prepare a cleaning cloth. Open the screw connections. Close the coolant lines with the blind plugs.
- Open the four locks (4) of the measuring cell housing.

Note: At the bottom side of the cover are located the heat exchanger with peltier elements and other electrical components. The cover is connected to the measuring cell housing with a connecting cable via a plug connection at the bottom of the measuring cell housing.

- Lift the cover (3) gently. Separate the connecting cable from the measuring cell housing by disconnecting the connector at the bottom of the measuring cell housing.
- Remove the cover in complete.

10.17 Install the cover on the measuring cell housing

- Prepare a cover (3 in Fig. 10.20).

The cover is arranged with a connecting cable with a connector.

- Plug the connector into the female connector at the bottom of the measuring cell housing (5).
- Position the cover on the measuring cell housing.
- Fix the cover on the measuring cell housing using the four locks (4).

CAUTION!

Very cold components and coolant!

Risk of skin damage on direct contact. FOR THIS REASON:

- Wear protective gloves and protective goggles.

- Close the screw connections (2) of the coolant lines. To this remove the blind plugs.
- Reinstall the measuring cell (see page 94).

11 Troubleshooting

In case of a malfunction, first check if the PACS process software shows any error messages. In the software manual, you will find a list of error messages, possible causes and suggested solutions.

If the process software does not display any error messages, the following list helps you to identify the problem and its possible causes.

If you are unable to solve the problem, we will be pleased to help you:

BARTEC BENKE GmbH
Borsigstraße 10
21465 Reinbek/Hamburg
Germany

Tel.: +49 (0) 40 -72703 0
Fax: +49 (0) 40 -72703 363
E-Mail: service@bartec-benke.de

Error	Possible cause	Troubleshooting
Analyzer is switched off / does not start a) Display of overpressure control is not present	Power supply of the analyzer is interrupted (e.g. broken or blown fuse)	Check and restore power supply
	Fusing of overpressure control system is faulty.	Remove the cause of the malfunction.
Analyzer is switched off / does not start a) Display of overpressure control is present	Overpressure control system has switched off the analyzer / cannot start the analyzer	Please refer to operating manual of the overpressure control system.
	Internal fuses are faulty / blown	Remove the cause of the malfunction.
	Power supply of the I/O board interrupted or I/O board faulty	Remove the cause of the malfunction.
	Instrument air supply is interrupted	Remove the cause of the malfunction.
No Ready signal / measuring result over a longer period of time	Analyzer is switched off.	see above
	PACS is in “Standby” or “Shutdown” state; or PACS is not operating;	Please refer to the software manual.
	Unsuitable parameter settings	Adjust the parameters (see software manual).
	Cable connection to the analyzer is interrupted	Remove the cause of the malfunction.
Measuring value output signals an unusual or	Sudden significant changes in product properties	

Error	Possible cause	Troubleshooting
implausible value / reproducibility of measuring results decreases	An alarm has caused the measuring value output to be reset to the initial value.	Remove the cause of the alarm. Carry out a reset (see software manual).
	Error in sample conditioning system (contamination, water, temperature, gas in product...)	Make sure that the product is conditioned as specified in the technical data.
	Test filter is soiled.	Check the test filter and clean it if necessary (see chapters 10.8 and 10.13).
	Vacuum too low.	Check vacuum at vacuum pressure gauge (see chapter 5.3), adjust the vacuum by using the pressure controller, if required.
	A valve is out of order.	Replace the respective valve
	Drain and/or vent is blocked	Remove the cause of the malfunction.
	A configured alarm has occurred.	Please refer to the software manual.
	Liquid level in the sample container is incorrect.	Check liquid level (see chapter 10.14).
No heating of the heater	Fuse or residual current circuit-breaker has blown.	Find and remove the cause of the malfunction.
Ice forming on measuring cell	Instrument air supply failed / interrupted or humidity of instrument air too high.	ensure instrument air supply according to specification (see chapter 4)
No product flow in the analyzer	Malfunction in the sample conditioning system	Remove the cause of the malfunction. Make sure that the product is conditioned as specified in the technical data.

Error	Possible cause	Troubleshooting
Bath temperature is not reached.	Peltier elements are out of order.	Change the cover of the measuring cell housing (see chapter 10.16). A new completely converted cover with heat exchanger and peltier elements you obtain from BARTEC BENKE.
	Fuse or residual current circuit-breaker has blown.	Find and remove the cause of the malfunction.
	Thermal fuse of peltier elements has blown.	Find and remove the cause of the malfunction.
	Temperature of coolant is not deep enough.	Please refer to the manual Chiller for Liquids.