BÜHLER TECHNOLOGIES

Gas Analysis

Sample gas cooler

EGK 2-19 (+)

Installation and Operation Instructions

Original instructions

BE450010
05/2023

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Read this instruction carefully prior to installation and/or use. Pay attention particularly to all advises and safety instructions to prevent injuries. Bühler Technologies can not be held responsible for misusing the product or unreliable function due to unauthorised modifications.

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1 Introduction

1.1 Intended use

This unit is intended for industrial use in gas analysis systems. It's an essential component for conditioning the sample gas to protect the analysis instrument from residual moisture in the sample gas.

Please note the specifications in the data sheet on the specific intended use, existing material combinations, as well as pressure and temperature limits.

1.2 Types

The device is delivered with different configurations. The part number given on the type plate informs you about the specific configuration of your device.

1.3 Scope of delivery

- Cooler
- Product documentation
- Connection-/mounting accessories (optional)

1.4 Ordering instructions

1.4.1 Gas cooler models with one heat exchanger

The item number is a code for the configuration of your unit. Please use the following model key:

452	X	X	X	X	X	X	X	X	0	Product characteristic
										Gas cooler models (with 1 heat exchanger)
	0									Wall mounting
	1									19" rack installation
										Supply voltage
		1								115 V metric screw connections
		2								230 V metric screw connections
		3								115 V US screw connections
		4								230 V US screw connections
										Heat exchanger
			0	0						without heat exchanger
			1	1						Single stainless steel heat exchanger / (PTS and PTS-I)
			1	2						Single glass heat exchanger / (PTG)
			1	3						Single PVDF heat exchanger / (PTV and PTV-I)
										Condensate drain
					0					without condensate drain
					1					1 CPsingle peristaltic pump with 90° angle hose connection [1]
					3					1 CPsingle peristaltic pump with straight hose connection [1]
										Filter
						0				Without filter
						1				1 filter installed
										Moisture detector [2]
							0			Without moisture detector
							1			1 moisture detector installed
										Optional [2]
								0		Without option
								1		With 4 - 20 mA analogue output for temperature

[1] Each heat exchanger is equipped with one peristaltic pump. The supply voltage corresponds with that of the main unit.

[2] The “moisture detector” option includes the option “4 - 20 mA analogue output”.

1.4.2 Gas cooler models with two heat exchangers

The item number is a code for the configuration of your unit. Please use the following model key:

452	X	X	X	X	X	X	X	X	0	Product characteristic
										Gas cooler models (with 2 heat exchangers)
	0									Wall mounting
	1									19" rack installation
										Supply voltage
		1								115 V metric screw connections
		2								230 V metric screw connections
		3								115 V US screw connections
		4								230 V US screw connections
										Heat exchanger
			0	0						without heat exchanger
			2	1						2 single stainless steel heat exchangers / (PTS and PTS-I)
			2	2						2 single glass heat exchangers / (PTG)
			2	3						2 single PVDF heat exchangers / (PTV and PTV-I)
										Condensate drain
					0					Without condensate drain
					2					2 CPsingle peristaltic pumps with 90° angle hose connection [1]
					4					2 CPsingle peristaltic pumps with straight hose connection [1]
										Filter
						0				Without filter
						1				1 filter installed
						2				2 filters installed
										Moisture detector [2]
							0			Without moisture detector
							1			1 moisture detector installed (only possible with 1 filter)
							2			2 moisture detectors installed (only possible with 2 filter)
										Optional [2]
								0		Without option
								1		With 4 - 20 mA analogue output for temperature

[1] Each heat exchanger is equipped with one peristaltic pump. The supply voltage corresponds with that of the main unit.

[2] The “moisture detector” option includes the option “4 - 20 mA analogue output”.

1.4.3 Gas cooler type with two heat exchangers in series

The item number is a code for the configuration of your unit. Please use the following model key:

452	X	X	X	X	X	X	X	X	0	Product characteristic
										Gas cooler models (with 2 heat exchangers)
	0									Wall mounting
	1									19" rack installation
										Supply voltage
		1								115 V metric screw connections
		2								230 V metric screw connections
		3								115 V US screw connections
		4								230 V US screw connections
										Heat exchanger
			0	0						Without heat exchanger
			1	6						2 single glass heat exchangers/ (2x PTG-2)
			1	7						2 single PVDF heat exchangers/ (2x PTV-2 or PTV-2-I)
										Condensate drain
					0					Without condensate drain
					2					2 CPsingle peristaltic pumps with 90° angle hose connection [1]
					4					2 CPsingle peristaltic pumps with straight hose connection [1]
										Filter
						0				Without filter
						1				1 filter installed
										Moisture detector [2]
							0			Without moisture detector
							1			1 moisture detector installed (only possible with 1 filter)
										Optional [2]
								0		Without option
								1		With 4 - 20 mA analogue output for temperature

[1] Each heat exchanger is equipped with one peristaltic pump. The supply voltage corresponds with that of the main unit.

[2] The “moisture detector” option includes the option “4 - 20 mA analogue output”.

2 Safety instructions

2.1 Important advice

Operation of the device is only permitted if:

- the product is used under the conditions described in the installation- and operation instruction, the intended application according to the type plate and the intended use. In case of unauthorized modifications done by the user Bühler Technologies GmbH can not be held responsible for any damage,
- when complying with the specifications and markings on the nameplates.
- the performance limits given in the datasheets and in the installation- and operation instruction are obeyed,
- monitoring devices and safety devices are installed properly,
- service and repair is carried out by Bühler Technologies GmbH,
- only original spare parts are used.

This manual is part of the equipment. The manufacturer keeps the right to modify specifications without advanced notice. Keep this manual for later use.

Signal words for warnings

DANGER	Signal word for an imminent danger with high risk, resulting in severe injuries or death if not avoided.
WARNING	Signal word for a hazardous situation with medium risk, possibly resulting in severe injuries or death if not avoided.
CAUTION	Signal word for a hazardous situation with low risk, resulting in damaged to the device or the property or minor or medium injuries if not avoided.
NOTICE	Signal word for important information to the product.

Warning signs

These instructions use the following warning signs:

	Warns of a general hazard		General information
	Warns of voltage		Unplug from mains
	Warns not to inhale toxic gasses		Wear respiratory equipment
	Warns of corrosive liquids		Wear a safety mask
	Warns of explosive areas		Wear gloves

2.2 General hazard warnings

The equipment must be installed by a professional familiar with the safety requirements and risks.

Be sure to observe the safety regulations and generally applicable rules of technology relevant for the installation site. Prevent malfunctions and avoid personal injuries and property damage.

The operator of the system must ensure:

- Safety notices and operating instructions are available and observed,
- The respective national accident prevention regulations are observed,
- The permissible data and operational conditions are maintained,
- Safety guards are used and mandatory maintenance is performed,
- Legal regulations are observed during disposal,
- compliance with national installation regulations.
- the device is protected from mechanical loads.

Maintenance, Repair

Please note during maintenance and repairs:

- Repairs to the unit must be performed by Bühler authorised personnel.
- Only perform conversion-, maintenance or installation work described in these operating and installation instructions.
- Always use genuine spare parts.
- Do not install damaged or defective spare part. If necessary, visually inspect prior to installation to determine any obvious damage to the spare parts.

Always observe the applicable safety and operating regulations in the respective country of use when performing any type of maintenance.

DANGER **Electrical voltage**

Electrocution hazard.

a) Disconnect the device from power supply.

b) Make sure that the equipment cannot be reconnected to mains unintentionally.

c) The device must be opened by trained staff only.

d) Regard correct mains voltage.

DANGER **Toxic, corrosive gas/condensate**

Sample gas/condensate may be hazardous to health.

a) If necessary, ensure a safe gas/condensate discharge.

b) Always disconnect the gas supply when performing maintenance or repairs.

c) Protect yourself from toxic/corrosive gasses/condensate when performing maintenance. Wear appropriate protective equipment.

DANGER **Potentially explosive atmosphere**

Explosion hazard if used in hazardous areas.
The device is not suitable for operation in hazardous areas with potentially explosive atmospheres.
Do not expose the device to combustible or explosive gas mixtures.

3 Transport and storage

Only transport the product inside the original packaging or a suitable alternative.

The equipment must be protected from moisture and heat when not in use. It must be stored in a covered, dry and dust-free room at a temperature of -20 °C to 60 °C (-4 °F to 140 °F).

4 Installation and connection

4.1 Installation site requirements

The unit is only intended for use in enclosed areas in a 19” rack or wall-mounted. Adequate protection from the weather must be provided when used outdoors.

Install the unit leaving enough room below the cooler to discharge the condensate. Leave room above for the gas supply.

Be sure to maintain the approved ambient temperature. Do not obstruct the convection of the cooler. The vents must have enough room to the next obstacle. The distance must especially be a minimum of 10 cm on the air outlet side.

Ensure adequate ventilation when installing in enclosed housings, e.g. analyser cabinets. If the convection is inadequate, we recommend aerating the cabinet or installing a fan to lower the inside temperature.

4.2 Installation

Run the gas supply to the cooler with a downward slope. The gas inputs are marked in red and additionally labelled "IN".

If a large amount of condensate accumulates, we recommend using a condensate trap with automatic condensate drain. Our condensate drains, 11 LD spec., AK 20 V, or model 165 SS, are suitable.

Glass vessels and automatic condensate drains are available for draining condensate for external mounting below the unit. When using automatic condensate drains, the sample gas pump must be installed upstream of the cooler (pressure operation) to ensure proper function of the condensate drain.

If the sample gas pump is located at the cooler outlet (suction operation), we recommend using glass condensate traps or peristaltic pumps.

Connecting the condensate drains

Depending on the material, build a connecting line with fittings and tubing or hose between the heat exchanger and condensate drain. For stainless steel the condensate drain can be suspended directly to the connecting tube, for hoses the condensate drain must be secured separately using a clamp.

The condensate drain can be mounted directly to the heat exchanger.

Condensate lines must always be installed with a slope and a minimum inside diameter of DN 8/10 (5/16”).

4.2.1 Peristaltic pump connector (optional)

Coolers ordered with attached peristaltic pump already have it installed and wired. Heat exchangers ordered at the same time are already installed and connected to the peristaltic pump.

The ø6 mm (0.24 inch) hose nipple for the pump’s condensate outlet must be carefully and properly connected with a suitable hose and hose clamp.

Versions with screw connections DN 4/6 or 1/6”-1/4” are supplied with ferrule and knurled nut and must be carefully sealed with appropriate hose.

NOTICE

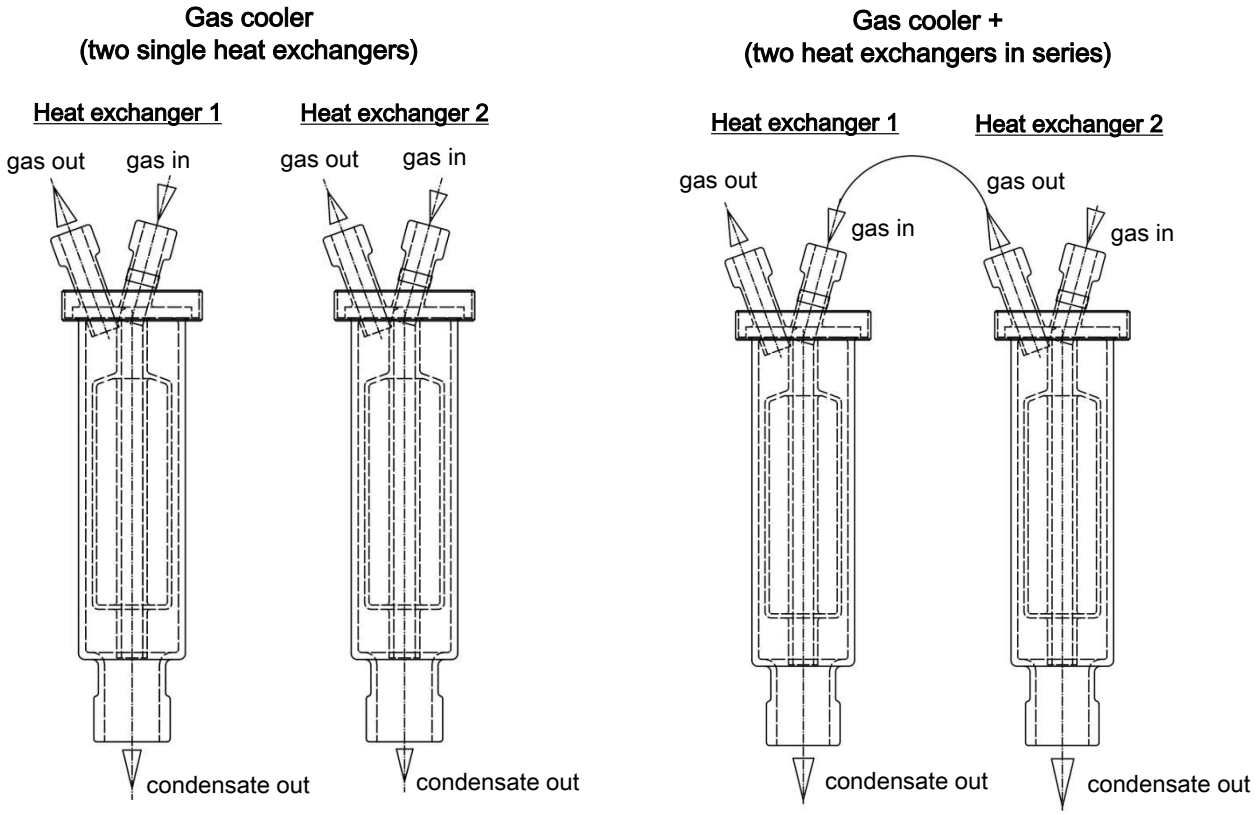
Installing peristaltic **pumps** CPsingle / CPdouble limits the maximum permissible **operating pressure** in the system!
Operating pressure ≤ 1 bar

4.2.2 Connecting the heat exchanger

The picture on the left shows the schematics for connecting two separate heat exchangers.

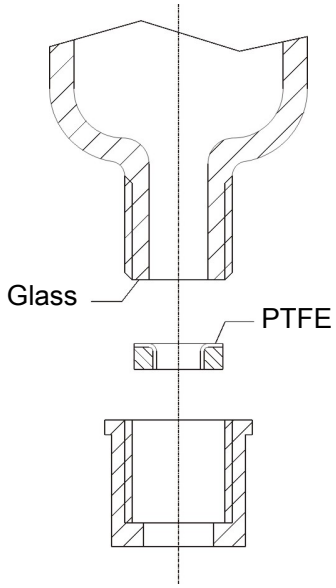
To minimise gas wash out in the cooler, the two (identical) heat exchangers must be operated in series (right picture). This should be done as follows:

1. Gas inlet line to red gas inlet on heat exchanger 2 (pre-cooling).
2. Connection between gas outlet on heat exchanger 2 and the red gas inlet on heat exchanger 1 (after-cooling).
3. Attaching the final gas output line to the gas outlet on heat exchanger 1.



The gas inputs are marked in red.

On glass heat exchangers the correct position of the seal is important when connecting the gas lines (see image). The seal consists of a silicone ring with a PTFE sleeve. The PTFE side must face the glass thread.



Pay attention to the appropriate spanner size when selecting fittings for stainless steel heat exchangers.

PTS/PTS-I gas connections: SW 14 or 9/16”

PTS/PTS-I condensate out connections: SW 22

4.3 Electrical connections

The operator must install an external separator for the device which is clearly assigned to this device.

This separator

- must be located near the device,
- must be easy for the operator to reach,
- must comply with IEC 60947-1 and IEC 60947-3,
- must separate all live conductors and the status output, and
- must not be attached to the power feed.

WARNING

Hazardous electrical voltage

The device must be installed by trained staff only.

CAUTION

Wrong mains voltage

Wrong mains voltage may damage the device.
Regard the correct mains voltage as given on the type plate.

WARNING

High voltage

Damage to the device in case of insulation testing
Do not proceed insulation tests with high voltage to the device as a whole!

Insulation test

The device is equipped with extensive EMC protection. If insulation tests are carried out the electronic filter devices will be damaged. All necessary tests have been carried out for all concerned groups of components at the factory (test voltage 1 kV or 1.5 kV respectively, depending on the device).

If you wish to carry out the insulation test by yourself, please test only separate groups of components.

Disconnect the compressor, the fan, the heating or the peristaltic pumps, respectively, and then carry out the insulation tests.

Plug connection

This device has one EN 175301-803 plug each for the power supply and the signal output. If the lead is connected correctly, these cannot be confused. Therefore please be sure to correctly reassemble the plugs after connecting the wires. Below you will find the pin assignments, with the numbers corresponding to those on the plugs:

The supply line cross-sections must be suitable for the rated current. Use a maximum line cross-section of 1.5 mm² (AWG 16) and a cable diameter of 8 - 10 mm (0.31 - 0.39 inch).

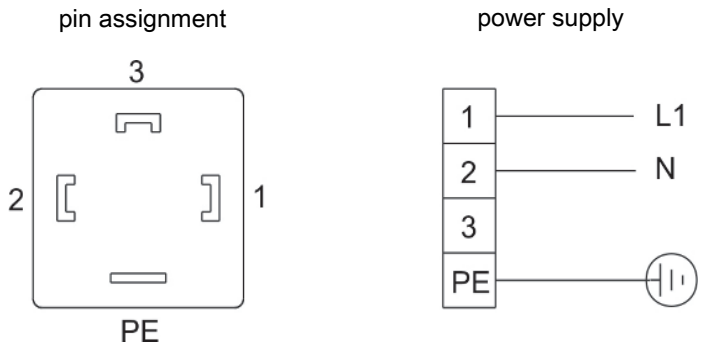


Fig. 1: A100048 Cooler electric supply

The supply voltage is 230 VAC 50/60 Hz or 115 VAC 50/60 Hz (please note type plate!). The mains supply must be protected with 10 A. The clamping area has a diameter of 8-10 mm.

4.4 Signal outputs

At the back of the unit is a 12-pin PHÖNIX connector which provides various status signals. The maximum switching power of the alarm outputs is 250 VAC/DC, 1 A each.

An alarm is triggered if the temperature of the cooler is outside the specified limits. It does not indicate if the alarm was triggered due to excess temperature or insufficient temperature.

When the moisture detector (optional) is installed, an alarm is activated if moisture is still present in the prepared sample gas or a cable break is detected. It does not differentiate if the alarm / cable break was triggered by moisture detector 1 or 2. This information, however, appears in the display.

If the option “temperature signal” is built in, the unit has a signal to indicate the actual cooler temperature. The option “Moisture detector” includes the option “Temperature signal”.

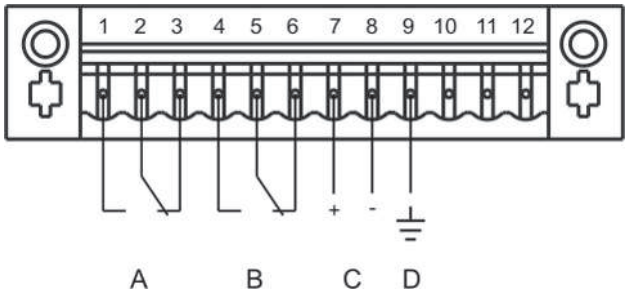


Fig. 2: 12-pin PHÖNIX connector

A	Moisture detector status (residual moisture) (option)	C	Analogue temperature output (4-20 mA) (optional)
B	Cooler status (excess or insufficient temperature)	D	Equipment dimensions: Connection for the 4-20 mA signal line shielding

Description of signal outputs

	Function / contact type	**Description**	
Regarding B)	internal changeover contact: max. 250 VAC/DC, 1A	the following device statuses can be indicated via two switching outputs:	Contact between 5 and 6 closed (alarm) – No mains voltage and/or actual temperature outside the alarm thresholds Contact between 4 and 5 closed (ok) – Mains voltage attached + actual temperature within the alarm thresholds
Moisture detector option (includes temperature signal option)			
Regarding A)	internal changeover contact: max. 250 VAC/DC, 1A	the following device statuses can be indicated via two switching outputs:	Contact between 1 and 2 closed (alarm) – The moisture detector registers residual humidity in the sample gas or cable break: Error message Contact between 2 and 3 closed (ok) – no residual moisture in measuring gas / no cable break
Temperature signal option			
Regarding C)	4-20 mA analogue output (R_{Load} <600 Ω)	Signalling of actual temperature (please use shielded cables)	T_{Cooler} = -20 °C -> 4 mA T_{Cooler} = 5 °C -> 9.71 mA T_{Cooler} = 50 °C -> 20 mA

5 Operation and control

NOTICE

The device must not be operated beyond its specifications.

After switching on the cooler the block temperature will be displayed. The display will flash until the block temperature has reached the preset target value (± adjustable alarm range). The status contact is in the Alarm position.

Once the target temperature range has been reached, the temperature will continuously be displayed and the status contact switches over.

If the display flashes during operation or an error message appears, please refer to bullet “Troubleshooting”.

Please refer to the data sheet for performance data and maximum ratings.

5.1 Use of menu functions

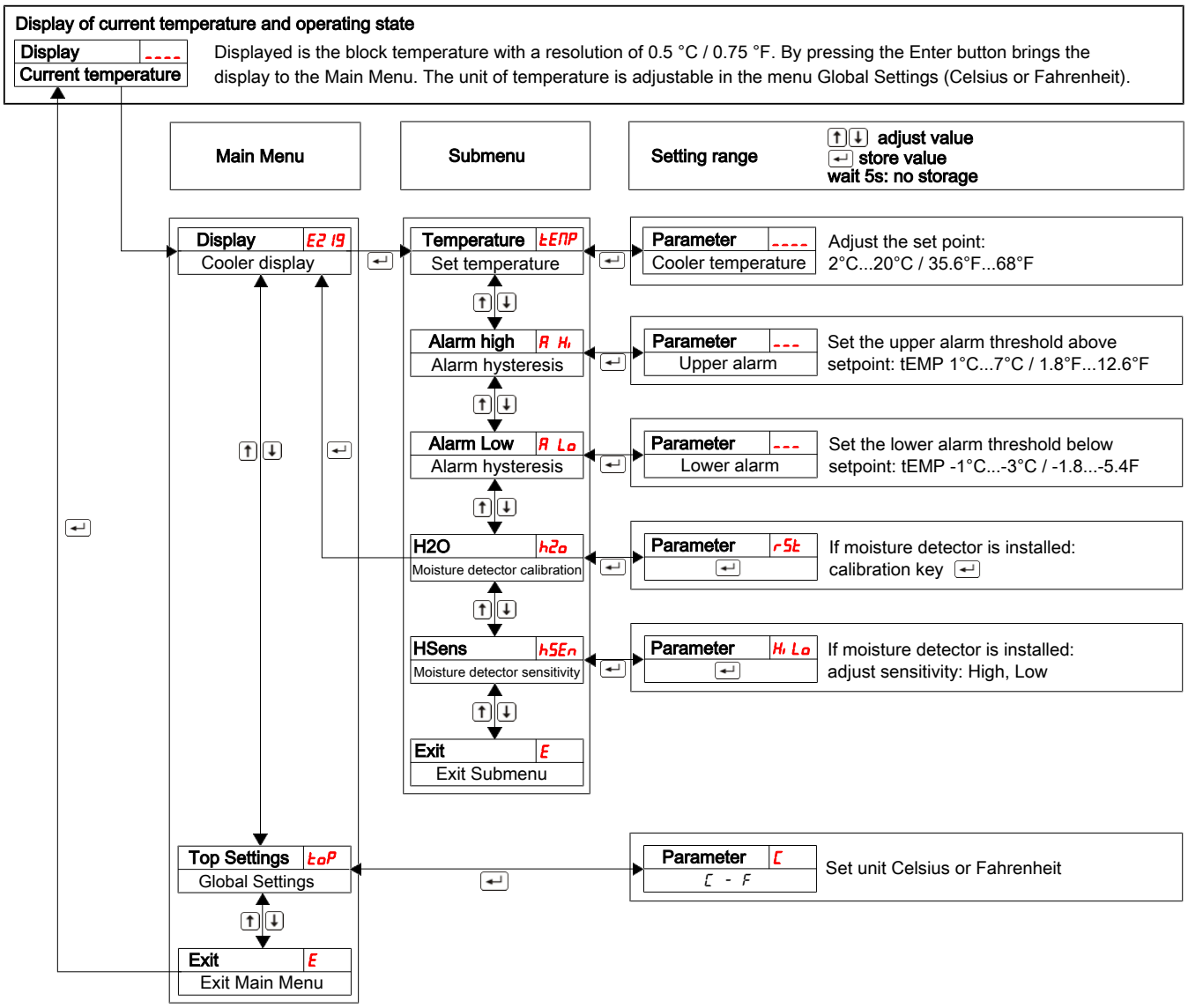
Overview of the operational principal:

Use this short description if you have experience with the device.

Operation is carried out by only the keys with the following functions:

Key	Function
↵	– Switch from measurement display to main menu – Selection of the display menu item – Accepting the changed value or selection
↑	– Switch to the upper menu item – Increase of the value of switching the selection – Temporary display of the alternative measurement display (if option is installed)
↓	– Switch to lower menu item – Decrease of the value of switching the selection – Temporary display of the alternative measurement display (if option is installed)

5.1.1 Overview of the menu items



5.1.2 Detailed description of the operational principle

The detailed description will guide you through the menu step by step.

Connect the unit to the power supply and wait for the startup procedure to complete. At first the software version implemented on the unit will be displayed for a brief period. The unit will then switch directly into measured value display.

↵ Pressing the button will take you from display mode to the main menu. (The control will continue running whilst in menu mode.)

↑↓ Use these buttons to navigate the main menu.

↵ After confirming a main menu item the associated submenu will open

Here you can configure operating parameters:

↑↓ Cycle through the submenu to configure the parameters,

↵ then confirm the menu item to be changed.

↑↓ You can now set values within specific limits.

↵ After confirming the value the system will save it. This will automatically return you to the submenu.

If no button is pushed for approx. 5 s, the unit will automatically return to the submenu. Changes to values will not be saved.

The same applies to the sub- and main menu. The system will automatically return to display mode without saving the (last) value changed. Parameters which were previously changed and saved will be retained and not reset.

NOTICE! After saving values with the Enter key they will be applied to the control.

E To exit the main or submenu, select menu item E (Exit).

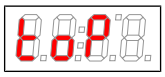
5.2 Description of menu functions

5.2.1 Main menu

Cooler

This item allows all relevant settings for the cooler. In the corresponding submenu nominal temperature and alarm limits may be selected.

Globale settings (ToP Settings)

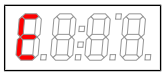


Selection of the global temperature unit, either degree Celsius (C) or degree Fahrenheit (F).

Note:	This menu item has no sub-item. The temperature unit is directly selected.

Exit main menu

Display → *E*



Selecting this will return you to display mode.

5.2.2 Submenu

Cooler -> nominal temperature (temperature)

This setting determines the nominal temperature for the cooler temperature. The value can be set to a range from 2 °C (35.6 °F) to 20 °C (68 °F).

Note: The standard value at delivery is 5 °C (41 °F) (unless otherwise agreed). If the temperature is changed the indicator may blink, until the new operating range has been reached.

Cooler -> upper alarm limit (alarm high)

Here you can set the upper threshold for the visual signal and the alarm relay. The alarm limit is set to a range from 1 °C (1.8 °F) to 7 °C (12.6 °F) in relation to the cooler temperature setting.

Note: The standard value at delivery is 3 °C (5.4 °F) (unless otherwise agreed).

Cooler -> lower alarm limit (alarm low)

Here you can set the lower threshold for the visual signal and the alarm relay. The alarm limit is set to a range from -1 °C (-1.8 °F) to -3 °C (-5.4 °F) in relation to the cooler temperature setting.

Note: The standard value at delivery is -3 °C (-5.4 °F) (unless otherwise agreed).

Cooler -> calibrate moisture detector (h2o)

If a moisture detector is installed, calibration can now be performed. To do so, the unit must be flushed with dry gas.

Note: Calibration was performed at the factory using ambient air. After replacing the moisture detector a calibration is again required.

Cooler -> moisture detector sensitivity (hSens)

If moisture detectors are installed, the sensitivity can be reduced here. Select between high and low.

Note: At delivery the sensitivity is set to high. The moisture detector is therefore sensitive.

Exit submenu

Selecting this item returns to the main menu.

6 Maintenance

If the cooler is delivered in basic configuration, no special maintenance is necessary.

Nevertheless, depending on the configuration different options or accessories may be installed. In this case, follow the maintenance schedule in regular intervals.

- **Option peristaltic pump:** Checking the hoses
- **Option filter:** Checking the filter element
- **Option moisture detector:** Calibrating the moisture detector

During maintenance, remember:

- The equipment must be maintained by a professional familiar with the safety requirements and risks.
- Only perform maintenance work described in these operating and installation instructions.
- Observe the respective safety regulations and operating specifications when performing any type of maintenance.
- Always use genuine spare parts.

DANGER **Electrical voltage**

Electrocution hazard.

a) Disconnect the device from power supply.

b) Make sure that the equipment cannot be reconnected to mains unintentionally.

c) The device must be opened by trained staff only.

d) Regard correct mains voltage.

DANGER **Toxic, corrosive gas/condensate**

Sample gas/condensate may be hazardous to health.

a) If necessary, ensure a safe gas/condensate discharge.

b) Always disconnect the gas supply when performing maintenance or repairs.

c) Protect yourself from toxic/corrosive gasses/condensate when performing maintenance. Wear appropriate protective equipment.

7 Service and repair

This chapter contains information on troubleshooting and correction should an error occur during operation.

Repairs to the unit must be performed by Bühler authorised personnel.

Please contact our Service Department with any questions:

Tel.: +49-(0)2102-498955 or your agent

For further information about our services and customised maintenance visit http://www.buehler-technologies.com/service.

If the equipment is not functioning properly after correcting any malfunctions and switching on the power, it must be inspected by the manufacturer. Please send the equipment inside suitable packaging to:

Bühler Technologies GmbH

- Reparatur/Service -

Harkortstraße 29

40880 Ratingen

Germany

Please also attach the completed and signed RMA decontamination statement to the packaging. We will otherwise be unable to process your repair order.

You will find the form in the appendix of these instructions, or simply request it by e-mail:

service@buehler-technologies.com.

7.1 Troubleshooting

Problem / Malfunction	Possible cause	Action
No display	– Mains voltage interrupted	– Connect to mains; check the plug is correctly inserted
	– Fuse defective	– Check fuse and replace, if necessary
Cooler doesn't start up	– Housing temperature too high	– Allow to cool down and ensure adequate ventilation
Display flashes if:		
– Excess temperature	– Operating point not yet reached	– Wait (max. 20 min)
	– Cooling outlet too long despite the cooler running	– Be sure the vents are not covered (heat buildup)
	– Flow rate / dew point / gas temperature too high	– Maintain limits / install pre-separator
	– Installed fan stopped	– Check and replace if necessary
– Insufficient temperature	– Faulty control	– Send in cooler
Condensate inside the gas outlet	– Condensate trap full	– Empty condensate trap
	– Valve inside the automatic condensate drain may be stuck	– Flush in both directions
	– Cooler overloaded	– Maintain limits
Reduced gas flow rate	– Gas circuit clogged	– Uninstall and clean heat exchanger – if necessary, replace filter element
	– Condensate outlet iced over	– Send in cooler

Error messages on the display

The display alternates between the temperature and error message.

Problem / Malfunction		Possible cause	Action
Er01	Error 01	– Broken wire	– Temperature sensor defective: Send in cooler
Er02	Error 02	– Short circuit	– Temperature sensor defective: Send in cooler
Moisture detector 1 or 2 reports alarm (only if option installed) **NOTICE! If the moisture detector was triggered, it must then be dried**			
1h2o	1h2o	– Cooler overloaded, flow rate / dew point / gas temperature too high	– Maintain limits / install pre-separator
2h2o	2h2o	– Cooling output too long despite the cooler running	– Be sure not to cover the ventilation slots (heat buildup); maintain limits
		– Condensate trap full	– Empty condensate trap
		– Water penetrating from water bag	– Observe delivery rate of peristaltic pumps – Install condensate drain with downward slope
1bw	Error 1bw	– Cable break in the moisture detector connection line	– Check connection line and plug-in connection
2bw	Error 2bw		

7.2 Safety instructions

- The device must be operated within its specifications.
- All repairs must be carried out by Bühler authorised personnel only.
- Only perform modifications, servicing or mounting described in this manual.
- Only use original spare parts.

DANGER

Electrical voltage

Electrocution hazard.

a) Disconnect the device from power supply.

b) Make sure that the equipment cannot be reconnected to mains unintentionally.

c) The device must be opened by trained staff only.

d) Regard correct mains voltage.

DANGER

Toxic, corrosive gas/condensate

Sample gas/condensate may be hazardous to health.

a) If necessary, ensure a safe gas/condensate discharge.

b) Always disconnect the gas supply when performing maintenance or repairs.

c) Protect yourself from toxic/corrosive gasses/condensate when performing maintenance. Wear appropriate protective equipment.

CAUTION	**Health hazard in case of leaking cooling circuit / heat exchanger**
	The cooling circuit is filled with coolant R134a. The heat exchanger is filled with a coolant based on glycol. In case of leaking / broken cooling circuit / heat exchanger: a) Avoid contact with skin or eyes. b) Do not ingest or inhale coolant. ⇨ Due to the small amount of coolant no health hazards need be feared. ⇨ Do not put the device back to operation if leakage of the cooling circuit happend.

7.3 Cleaning and removal of the heat exchanger

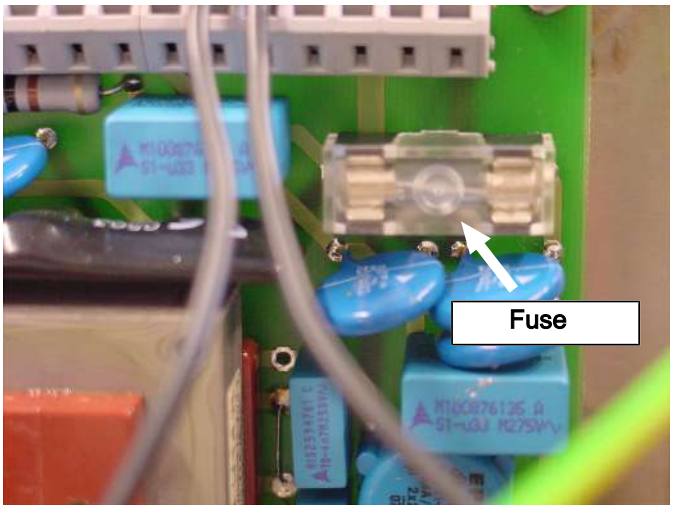
Heat exchangers only need to be replaced or maintained if clogged or damaged. If they are clogged, we recommend checking if using a filter will avoid future occurrences.

- Close gas supply.
- Switch off device and disconnect all plugs (e.g. status output connector, supply input, etc.).
- Disconnect gas connections and condensate drain.
- Pull the heat exchanger up and out.
- Clean cleaning nest (hole inside the cooler block), as the heat exchangers are installed with silicone grease.
- Flush the heat exchanger until all contaminants have been removed.
- Grease the cooled outside surface external surface with silicone grease.
- Reinsert the heat exchanger into the cooling nest with a rotating movement.
- Reconnect the gas supply and condensate drain. The gas inlet is marked red.
- Restore power/gas supply and wait for unit to be ready for operation.
- Open gas supply.

7.4 Replacing the fuse of the cooler

- Close the gas supply.
- Switch off and unplug the device.
- Loosen the screws on the cover.
- Carefully remove the cover.
- The fuse is located on the board under a plastic cap. Replace micro-fuse and put the cap back on. Please note the mains voltage in order to select the correct micro-fuse.
- Reattach cover. Screw in mounting screws.
- Restore the power and gas supply.

Example:



7.5 Replacing the hoses of the peristaltic pump (option)

- Turn off gas supply.
- Switch the device off and disconnect power supply.
- Remove the supplying and draining hoses from the pump (**Take care of the safety instructions!**).
- Loosen the centre knurled screw but do not remove it. Push the screw downwards.
- Pull off the cover.
- Pull the connections sidewards and remove the hose.
- Replace the hose and remount the pump in reverse order.
- Reconnect power supply.

7.6 Replacing the filter element (option)

CAUTION	**Gas leakage**
	The filter should not be dismantled under pressure. Don't use damaged parts again.

- Close the gas supply.
- Switch off and unplug the device.
- Twist off the swivel nut counter-clockwise and remove the filter cover.
- Remove the filter element and insert a new one.
- Check for leaks and replace, if necessary.
- Screw filter cover on clockwise and tighten carefully.
- Restore the power and gas supply.

NOTICE! Please observe legal regulations when disposing of filter elements.

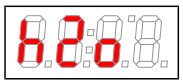
7.7 Drying of the moisture detector (option)

The moisture detector must be dried if moisture enters.

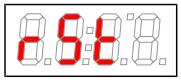
- Close the gas supply.
- Switch off and unplug the device.
- Loosen the swivel nut for the moisture detector connection line and disconnect the line.
- Unscrew the moisture detector counter-clockwise and remove.
- Dry moisture detector.
- Reinsert the moisture detector and carefully tighten the screw connection.
- Connect the connection line and tighten the swivel nut.
- Restore the power and gas supply.

7.8 Calibration of the moisture detector (option)

- When replacing the moisture detectors, they must be recalibrated.
- Be sure dry gas flows through the cooler.
- Select cooler menu and confirm.



- Select menu item moisture detector.



- The display shows (Reset).
- Confirm the display to calibrate the moisture detectors.

For a detailed overview of menu navigation, refer to chapter "Operation and Control".

7.9 Spare parts

Please also specify the model and serial number when ordering parts.

Upgrade and expansion parts can be found in our catalog.

Available spare parts:

Item no.	Description
9100110124	Display ABT 400
9100010125	Controller board MCP 1
9110000059	Sample gas cooler micro-fuse 230 V, 5 x 20 mm, 3.15 A, delayed action
9110000013	Sample gas cooler micro-fuse 115 V, 5 x 20 mm, 2.5 A, delayed action
9100010128	Mains and controller board 230 V
9100010136	Mains and controller board 115 V
9124040023	Fan 230 V
9124040026	Fan 115 V
4111100	Moisture detector FF-3-N, without cable
9144050045	Moisture detector connection cable
44920035012	Condensate pump hose, Tygon (Norprene), angled hose nipple
44920035013	Condensate pump hose, Tygon (Norprene), straight and angled hose nipple

7.9.1 Spare parts and accessories

Item no.	Description
41151050	Filter element FE-4; Unit 8 count
4101003	O-ring for filter AGF-FA-5, Unit 8 count, sintered PTFE

8 Disposal

The refrigerant circuit of the cooler contains R134a refrigerant. The heat exchanger is charged with glycol-based coolant.

The applicable national laws must be observed when disposing of the products. Disposal must not result in a danger to health and environment.

The crossed out wheelie bin symbol on Bühler Technologies GmbH electrical and electronic products indicates special disposal notices within the European Union (EU).

The crossed out wheelie bin symbol indicates the electric and electronic products bearing the symbol must be disposed of separate from household waste. They must be properly disposed of as waste electrical and electronic equipment.

Bühler Technologies GmbH will gladly dispose of your device bearing this mark. Please send your device to the address below for this purpose.

We are obligated by law to protect our employees from hazards posed by contaminated devices. Therefore please understand that we can only dispose of your waste equipment if the device is free from any aggressive, corrosive or other operating fluids dangerous to health or environment. **Please complete the "RMA Form and Decontamination Statement", available on our website, for every waste electrical and electronic equipment. The form must be applied to the packaging so it is visible from the outside.**

Please return waste electrical and electronic equipment to the following address:

Bühler Technologies GmbH
WEEE
Harkortstr. 29
40880 Ratingen
Germany

Please also observe data protection regulations and remember you are personally responsible for the returned waste equipment not bearing any personal data. Therefore please be sure to delete your personal data before returning your waste equipment.

9 Appendices

9.1 Gas Cooler Technical Data

EGK 2-19

Gas Cooler Technical Data			
Ready for operation	after max. 15 minutes		
Rated cooling capacity (at 25 °C)	320 kJ/h		
Ambient temperature	5 °C to 50 °C		
Gas outlet dew point, preset	5 °C		
Dew point fluctuations static: in the entire specification range:	 ± 0.1 K ± 1.5 K		
Temperature difference between heat exchangers	< 0.5 K		
Max. inlet temperature	see table "Heat Exchanger Overview"		
Max. pressure	see table "Heat Exchanger Overview" Limitations due to filter or peristaltic pump (see Technical Data - Options)		
IP rating	IP 20		
Housing	Stainless steel		
Packaging dimensions	approx. 550 x 430 x 340 mm		
Weight incl. heat exchanger	approx. 15 kg approx. 19 kg at full expansion stage		
Electric supply	115 V, 60 Hz or 230 V, 50 Hz Plug per EN 175301-803		
Electrical data		230 V	115 V
	Typical power input:	140 VA	155 VA
	max. operating current:	1.6 A	3.2 A
Alarm output switching connection	max. 250 V, 2 A Phoenix plug		
Gas connections	Heat exchanger see table "Heat exchanger overview" Filter DN 4/6 or 1/4"-1/6"		
Condensate outlet	Hose nipple Ø5 mm		
Parts in contact with mediums Filter: Moisture detector: Heat exchanger: Peristaltic pump: Tubing:	 see "Technical Data - Options" see "Technical Data - Options" see table "Heat Exchanger Overview" see "Technical Data - Options" PTFE/Viton		

EGK 2-19+

Gas Cooler Technical Data			
Ready for operation	after max. 15 minutes		
Rated cooling capacity (at 25 °C)	320 kJ/h		
Ambient temperature	5 °C to 50 °C		
Gas outlet dew point, preset	5 °C		
Dew point fluctuations static: in the entire specification range:	 ± 0.1 K ± 1.5 K		
Temperature difference between heat exchangers	< 0.5 K		
Max. inlet temperature	see table "Heat Exchanger Overview"		
Max. pressure	see table "Heat Exchanger Overview" Limitations due to filter or peristaltic pump (see Technical Data - Options)		
IP rating	IP 20		
Housing	Stainless steel		
Packaging dimensions	approx. 550 x 430 x 340 mm		
Weight incl. heat exchanger	approx. 15 kg approx. 18.5 kg at full expansion stage		
Electric supply	115 V, 60 Hz or 230 V, 50 Hz Plug per EN 175301-803		
Electrical data		230 V	115 V
	Typical power input:	140 VA	155 VA
	max. operating current:	1.6 A	3.2 A
Alarm output switching connection	max. 250 V, 2 A Phoenix plug		
Gas connections	Heat exchanger see table "Heat exchanger overview" Filter DN 4/6 or 1/4"-1/6"		
Condensate outlet	Hose nipple Ø5 mm		
Parts in contact with mediums Filter: Moisture detector: Heat exchanger: Peristaltic pump: Tubing:	 see "Technical Data - Options" see "Technical Data - Options" see table "Heat Exchanger Overview" see "Technical Data - Options" PTFE/Viton		

9.2 Technical Data - Options

Analogue Output Cooler Temperature Technical Data	
Signal	4-20 mA or 2-10 V corresponds to -20 °C to +50 °C cooler temperature Plug M12x1, DIN EN 61076-2-101

Technical Data FF-3-N Moisture Detector	
Ambient temperature	3 °C to 50 °C
max. operating pressure with FF-3-N	2 bar
Material	PVDF, PTFE, epoxy resin, stainless steel 1.4571, 1.4576

CPsingle Peristaltic Pumps Technical Data	
Flow rate	0.3 L/h (50 Hz) / 0.36 L/h (60 Hz) with standard hose
Vacuum inlet	max. 0.8 bar
Pressure inlet	max. 1 bar
Outlet pressure	1 bar
Hose	4 x 1.6 mm
Protection class	IP 40
Materials Hose: Connections:	 Norprene (standard), Marprene, Fluran PVDF

Technical Data Filter AGF-FA-5	
max. operating pressure with filter	2 bar
Filter surface	42 cm^2
Filter mesh	2 µm
Dead volume	28.5 ml
Materials Filter: Seal: Filter element:	 PTFE, PVDF, Duran glass (parts in contact with mediums) Viton sintered PTFE

9.3 Heat exchanger

9.3.1 Heat exchanger description

The energy content of the sample gas and the required cooling capacity of the gas cooler is determined by three parameters: gas temperature ϑ_G, dew point τ_e (moisture content) and volume flow v. The outlet dew point rises with increasing energy content of the gas. The following limits for the maximum flow are specified for a standard operating point of τ_e = 40 °C and ϑ_G = 70 °C. The maximum flow v_{max} in Nl/h of cooled air indicated, so after moisture has condensed. Values may differ for other dew points and gas inlet temperatures. However, the physical facts are so vast we decided to omit the illustration. Please contact our experts for clarification or refer to our calculation programme.

9.3.2 Heat exchanger overview

EGK 2-19

Heat exchanger	**PTS** **PTS-I** [2]	**PTG**	**PTV** **PTV-I** [2]
Materials in contact with media	Stainless steel	Glass PTFE	PVDF
Flow rate v_{max} [1]	500 Nl/h	280 Nl/h	280 Nl/h
Inlet dew point $\tau_{e,max}$ [1]	65 °C	65 °C	65 °C
Gas inlet temperature $\vartheta_{G,max}$ [1]	180 °C	140 °C	140 °C
Max. Cooling capacity Q_{max}	150 kJ/h	90 kJ/h	90 kJ/h
Gas pressure p_{max}	160 bar	3 bar	2 bar
Pressure drop Δp (v=150 L/h)	10 mbar	10 mbar	10 mbar
Dead volume V_{tot}	29 ml	29 ml	57 ml
Gas connections (metric)	6 mm	GL 14 (6 mm) [3]	DN 4/6
Gas connections (US)	1/4"	GL 14 (1/4") [3]	1/4"-1/6"
Condensate out connections (metric)	G3/8	GL 25 (12 mm) [3]	G3/8
Condensate out connections (US)	NPT 3/8"	GL 25 (1/2") [3]	NPT 3/8"

[1] Max. cooling capacity of the cooler must be considered

[2] Models marked I have NPT threads or US tubes, respectively.

[3] Gasket inside diameter

EGK 2-19+

Heat exchanger	**2x PTG-2** **2x PTG-2-I** [2]	**2x PTV-2** **2x PTV-2-I** [2]
Materials in contact with media	Glass PTFE	PVDF
Flow rate v_{max} [1]	250 Nl/h	250 Nl/h
Inlet dew point $\tau_{e,max}$ [1]	70 °C	70 °C
Gas inlet temperature $\vartheta_{G,max}$ [1]	140 °C	140 °C
Max. Cooling capacity Q_{max}	230 kJ/h	215 kJ/h
Gas pressure p_{max}	3 bar	2 bar
Pressure drop Δp (v=150 L/h) total	20 mbar	20 mbar
Dead volume V_{tot} total	59 ml	115 ml
Gas connections (metric)	GL 14 (6 mm) [3]	DN 4/6
Gas connections (US)	GL 14 (1/4") [3]	1/4"-1/6"
Condensate out connections (metric)	GL 25 (12 mm) [3]	G3/8
Condensate out connections (US)	GL 25 (1/2") [3]	NPT 3/8"

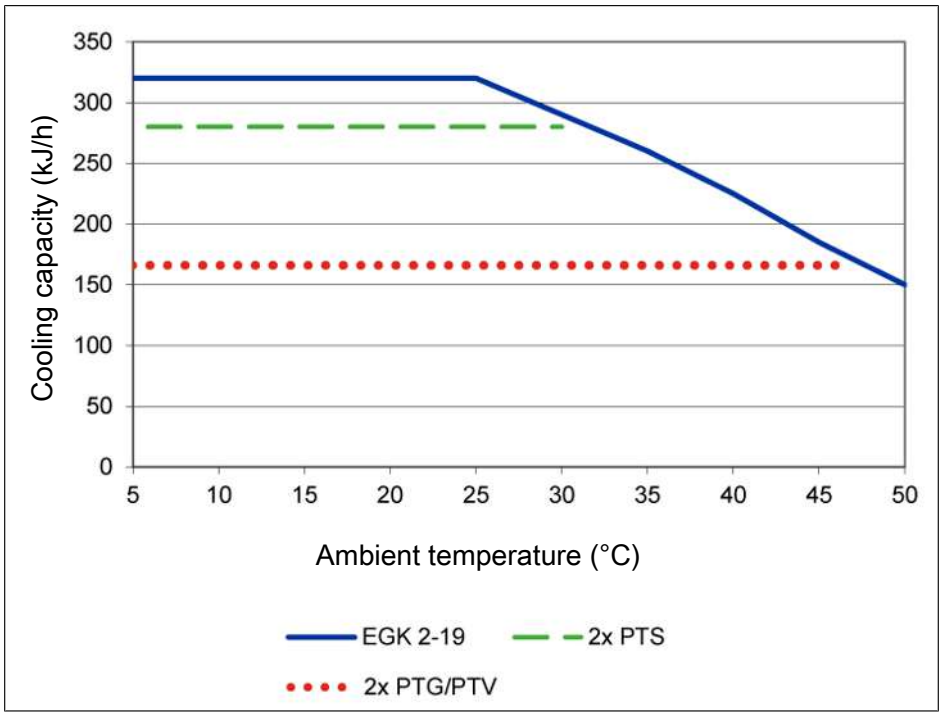
[1] Max. cooling capacity of the cooler must be considered.

[2] Models marked I have NPT threads or US tubes, respectively.

[3] Gasket inside diameter.

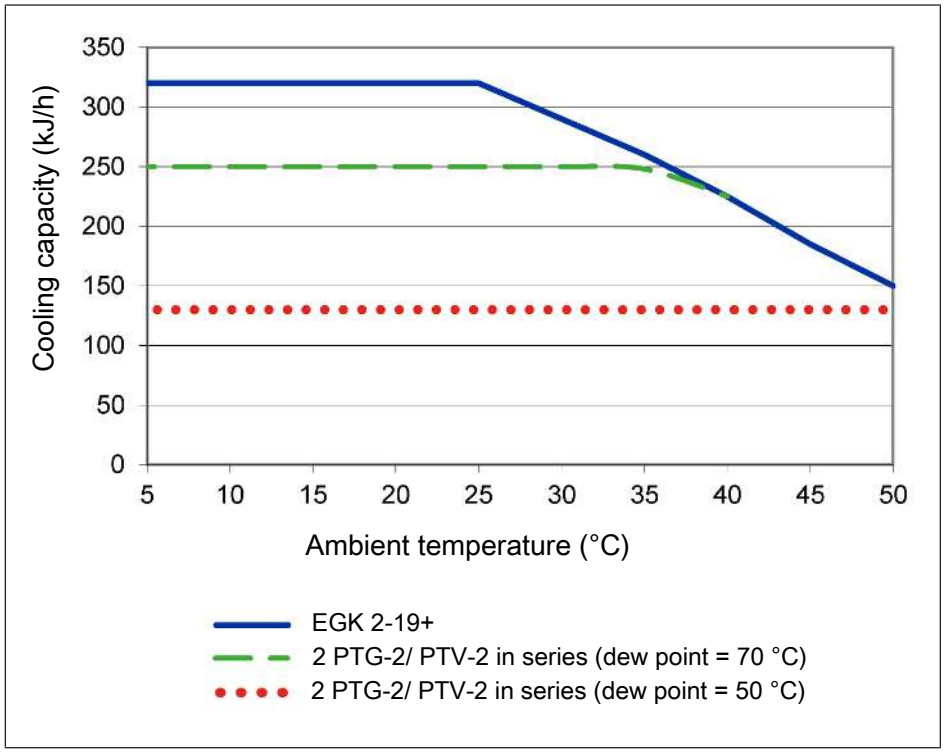
9.4 Performance curves

EGK 2-19



Note: The limit curves for the heat exchangers exchanger apply to a dew point of 40 °C.

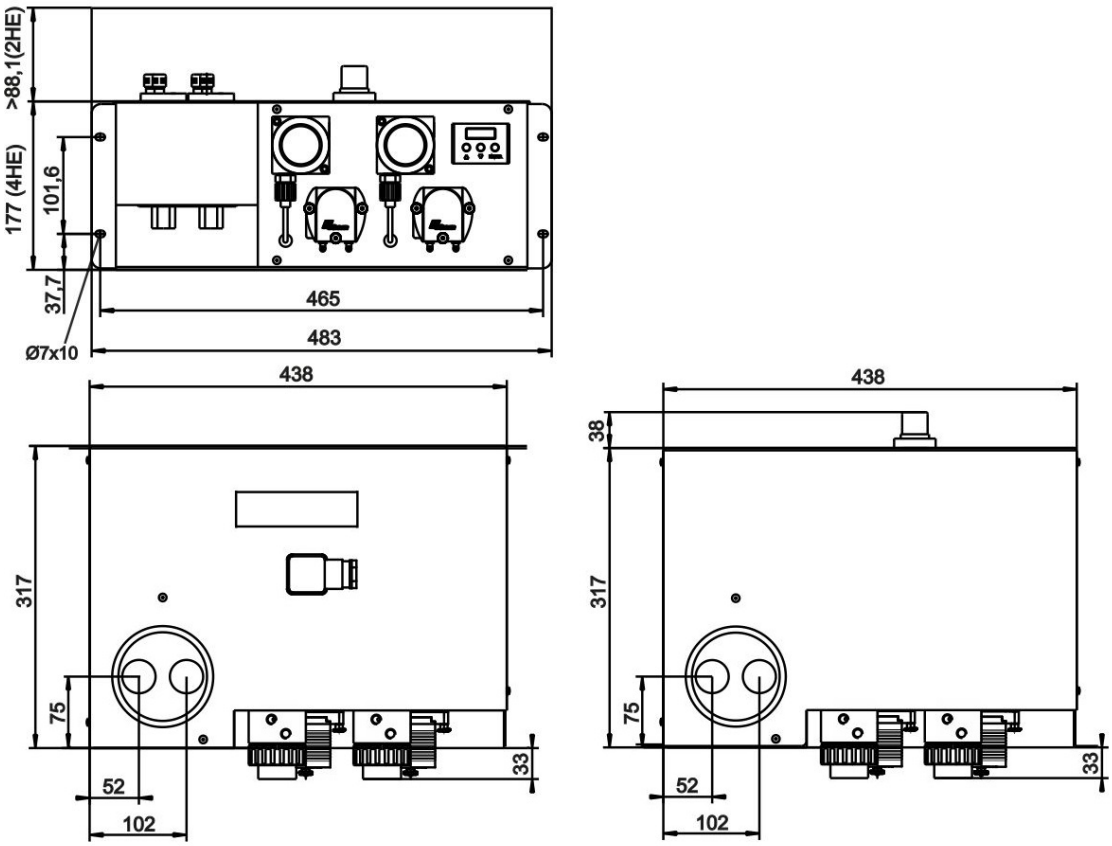
EGK 2-19+



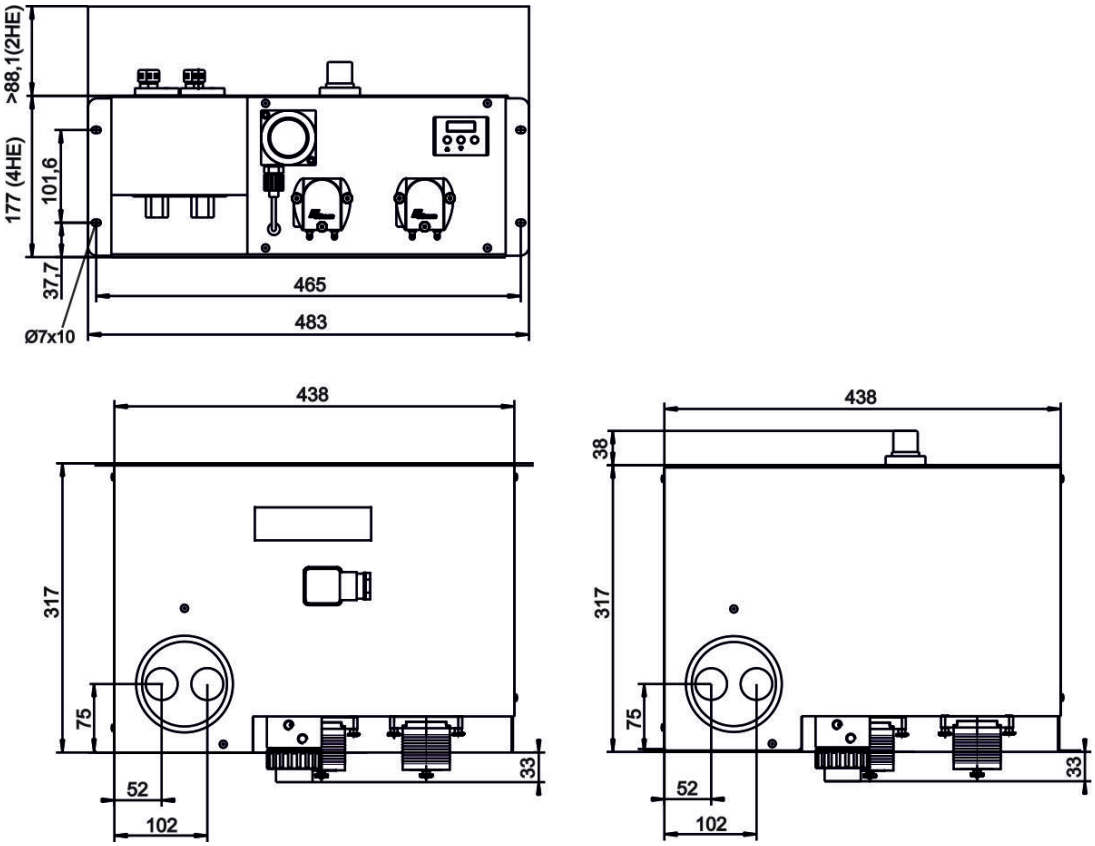
Remark: The limit curves for the heat exchanger apply to a dew point of 70 °C under standard conditions per DIN EN 15267-3:2008-03 and to a dew point of 50 °C under operating conditions.

9.5 Dimensions

EGK 2-19



EGK 2-19+



10 Attached documents

– Declaration of conformity KX450010
– RMA - Decontamination Statement

EU-Konformitätserklärung
EU-declaration of conformity

Hiermit erklärt Bühler Technologies GmbH, dass die nachfolgenden Produkte den wesentlichen Anforderungen der Richtlinie

Herewith declares Bühler Technologies GmbH that the following products correspond to the essential requirements of Directive

2014/35/EU
(Niederspannungsrichtlinie / *low voltage directive*)

in ihrer aktuellen Fassung entsprechen.

in its actual version.

Folgende Richtlinie wurde berücksichtigt:

The following directive was regarded:

2014/30/EU (EMV/EMC)

Produkt / products: Kompressor Messgaskühler / *Compressor sample gas cooler*
Typ / type: EGK 2-19, EGK 2-19+

Das Betriebsmittel dient der Aufbereitung des Messgases von bis zu zwei Gaswegen, um das Analysengerät vor Restfeuchtigkeit und Fremdpartikel im Messgas zu schützen.
This equipment is used for conditioning the sample gas with up to two gas pathes to protect the analysis instrument from residual moisture and particles in the sample gas.

Das oben beschriebene Produkt der Erklärung erfüllt die einschlägigen Harmonisierungsrechtsvorschriften der Union:
The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

EN 61010-1:2010/A1:2019/AC:2019-04
EN 61000-6-2:2005/AC:2005
EN 61000-6-3:2007/A1:2011
EN ISO 12100:2010

Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller.
This declaration of conformity is issued under the sole responsibility of the manufacturer.

Dokumentationsverantwortlicher für diese Konformitätserklärung ist Herr Stefan Eschweiler mit Anschrift am Firmensitz.
The person authorized to compile the technical file is Mr. Stefan Eschweiler located at the company's address.

Ratingen, den 17.02.2023

Stefan Eschweiler
Geschäftsführer – *Managing Director*

Frank Pospiech
Geschäftsführer – *Managing Director*

Bühler Technologies GmbH, Harkortstr. 29, D-40880 Ratingen,
Tel. +49 (0) 21 02 / 49 89-0, Fax. +49 (0) 21 02 / 49 89-20
Internet: www.buehler-technologies.com

UK Declaration of Conformity

The manufacturer Bühler Technologies GmbH declares, under the sole responsibility, that the product complies with the requirements of the following UK legislation:

Electrical Equipment Safety Regulations 2016

The following legislation were regarded:

Electromagnetic Compatibility Regulations 2016

Product: Compressor sample gas cooler
Types: EGK 2-19
EGK 2-19+

This equipment is used for conditioning the sample gas with up to two gas pathes to protect the analysis instrument from residual moisture and particles in the sample gas.

The object of the declaration described above is in conformity with the relevant designated standards:

EN 61010-1:2010/A1:2019/AC:2019-04
EN 61000-6-2:2005/AC:2005
EN 61000-6-3:2007/A1:2011
EN ISO 12100:2010

Ratingen in Germany, 17.02.2023

Stefan Eschweiler
Managing Director

Frank Pospiech
Managing Director

Bühler Technologies GmbH, Harkortstr. 29, D-40880 Ratingen,
Tel. +49 (0) 21 02 / 49 89-0, Fax. +49 (0) 21 02 / 49 89-20
Internet: www.buehler-technologies.com

RMA-Formular und Erklärung über Dekontaminierung
RMA-Form and explanation for decontamination

RMA-Nr./ RMA-No.

Die RMA-Nr. bekommen Sie von Ihrem Ansprechpartner im Vertrieb oder Service. Bei Rücksendung eines Altgeräts zur Entsorgung tragen Sie bitte in das Feld der RMA-Nr. "WEEE" ein./ You may obtain the RMA number from your sales or service representative. When returning an old appliance for disposal, please enter "WEEE" in the RMA number box.

Zu diesem Rücksendeschein gehört eine Dekontaminierungserklärung. Die gesetzlichen Vorschriften schreiben vor, dass Sie uns diese Dekontaminierungserklärung ausgefüllt und unterschrieben zurücksenden müssen. Bitte füllen Sie auch diese im Sinne der Gesundheit unserer Mitarbeiter vollständig aus./ This return form includes a decontamination statement. The law requires you to submit this completed and signed decontamination statement to us. Please complete the entire form, also in the interest of our employee health.

Firma/ Company

Firma/ Company	
Straße/ Street	
PLZ, Ort/ Zip, City	
Land/ Country	

Ansprechpartner/ Person in charge

Name/ Name	
Abt./ Dept.	
Tel./ Phone	
E-Mail	

Gerät/ Device	
Anzahl/ Quantity	
Auftragsnr./ Order No.	

Serien-Nr./ Serial No.	
Artikel-Nr./ Item No.	

Grund der Rücksendung/ Reason for return

- ☐ Kalibrierung/ Calibration
- ☐ Modifikation/ Modification
- ☐ Reklamation/ Claim
- ☐ Reparatur/ Repair
- ☐ Elektroaltgerät/ Waste Electrical & Electronic Equipment (WEEE)
- ☐ andere/ other

bitte spezifizieren/ please specify

Ist das Gerät möglicherweise kontaminiert?/ Could the equipment be contaminated?

☐ Nein, da das Gerät nicht mit gesundheitsgefährdenden Stoffen betrieben wurde./ No, because the device was not operated with hazardous substances.

☐ Nein, da das Gerät ordnungsgemäß gereinigt und dekontaminiert wurde./ No, because the device has been properly cleaned and decontaminated.

☐ Ja, kontaminiert mit:/ Yes, contaminated with:

☐ explosiv/ explosive	☐ entzündlich/ flammable	☐ brandfördernd/ oxidizing	☐ komprimierte Gase/ compressed gases	☐ ätzend/ caustic	☐ giftig, Lebensgefahr/ poisonous, risk of death	☐ gesundheitsgefährdend/ harmful to health	☐ gesundheitsschädlich/ health hazard	☐ umweltgefährdend/ environmental hazard

Bitte Sicherheitsdatenblatt beilegen!/ Please enclose safety data sheet!

Das Gerät wurde gespült mit:/ The equipment was purged with:

Diese Erklärung wurde korrekt und vollständig ausgefüllt und von einer dazu befugten Person unterschrieben. Der Versand der (dekontaminierten) Geräte und Komponenten erfolgt gemäß den gesetzlichen Bestimmungen.

This declaration has been filled out correctly and completely, and signed by an authorized person. The dispatch of the (decontaminated) devices and components takes place according to the legal regulations.

Falls die Ware nicht gereinigt, also kontaminiert bei uns eintrifft, muss die Firma Bühler sich vorbehalten, diese durch einen externen Dienstleister reinigen zu lassen und Ihnen dies in Rechnung zu stellen.

Should the goods not arrive clean, but contaminated, Bühler reserves the right, to comission an external service provider to clean the goods and invoice it to your account.

Firmenstempel/ Company Sign

Datum/ Date

rechtsverbindliche Unterschrift/ Legally binding signature

Bühler Technologies GmbH, Harkortstr. 29, D-40880 Ratingen
Tel. +49 (0) 21 02 / 49 89-0, Fax: +49 (0) 21 02 / 49 89-20
E-Mail: service@buehler-technologies.com
Internet: www.buehler-technologies.com

Vermeiden von Veränderung und Beschädigung der einzusendenden Baugruppe

Die Analyse defekter Baugruppen ist ein wesentlicher Bestandteil der Qualitätssicherung der Firma Bühler Technologies GmbH. Um eine aussagekräftige Analyse zu gewährleisten muss die Ware möglichst unverändert untersucht werden. Es dürfen keine Veränderungen oder weitere Beschädigungen auftreten, die Ursachen verdecken oder eine Analyse unmöglich machen.

Umgang mit elektrostatisch sensiblen Baugruppen

Bei elektronischen Baugruppen kann es sich um elektrostatisch sensible Baugruppen handeln. Es ist darauf zu achten, diese Baugruppen ESD-gerecht zu behandeln. Nach Möglichkeit sollten die Baugruppen an einem ESD-gerechten Arbeitsplatz getauscht werden. Ist dies nicht möglich sollten ESD-gerechte Maßnahmen beim Austausch getroffen werden. Der Transport darf nur in ESD-gerechten Behältnissen durchgeführt werden. Die Verpackung der Baugruppen muss ESD-konform sein. Verwenden Sie nach Möglichkeit die Verpackung des Ersatzteils oder wählen Sie selber eine ESD-gerechte Verpackung.

Einbau von Ersatzteilen

Beachten Sie beim Einbau des Ersatzteils die gleichen Vorgaben wie oben beschrieben. Achten Sie auf die ordnungsgemäße Montage des Bauteils und aller Komponenten. Versetzen Sie vor der Inbetriebnahme die Verkabelung wieder in den ursprünglichen Zustand. Fragen Sie im Zweifel beim Hersteller nach weiteren Informationen.

Einsenden von Elektroaltgeräten zur Entsorgung

Wollen Sie ein von Bühler Technologies GmbH stammendes Elektroprodukt zur fachgerechten Entsorgung einsenden, dann tragen Sie bitte in das Feld der RMA-Nr. „WEEE“ ein. Legen Sie dem Altgerät die vollständig ausgefüllte Dekontaminierungserklärung für den Transport von außen sichtbar bei. Weitere Informationen zur Entsorgung von Elektroaltgeräten finden Sie auf der Webseite unseres Unternehmens.

Avoiding alterations and damage to the components to be returned

Analysing defective assemblies is an essential part of quality assurance at Bühler Technologies GmbH. To ensure conclusive analysis the goods must be inspected unaltered, if possible. Modifications or other damages which may hide the cause or render it impossible to analyse are prohibited.

Handling electrostatically conductive components

Electronic assemblies may be sensitive to static electricity. Be sure to handle these assemblies in an ESD-safe manner. Where possible, the assembles should be replaced in an ESD-safe location. If unable to do so, take ESD-safe precautions when replacing these. Must be transported in ESD-safe containers. The packaging of the assemblies must be ESD-safe. If possible, use the packaging of the spare part or use ESD-safe packaging.

Fitting of spare parts

Observe the above specifications when installing the spare part. Ensure the part and all components are properly installed. Return the cables to the original state before putting into service. When in doubt, contact the manufacturer for additional information.

Returning old electrical appliances for disposal

If you wish to return an electrical product from Bühler Technologies GmbH for proper disposal, please enter "WEEE" in the RMA number box. Please attach the fully completed decontamination declaration form for transport to the old appliance so that it is visible from the outside. You can find more information on the disposal of old electrical appliances on our company’s website.

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