Sample gas cooler

EGK 1SD

Installation and Operation Instructions

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

*Please note:* Every individual gas path must be equipped with peristaltic pump or condensate drain.

<table>
<thead>
<tr>
<th>4561</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>0</th>
<th>0</th>
<th>0</th>
<th>Product Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Voltage</strong></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>115 V metric screw connections</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>230 V metric screw connections</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>115 V US screw connections</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>230 V US screw connections</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Gas path / Material / Version</strong></td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td>without heat exchanger</td>
</tr>
<tr>
<td>1 1</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 gas path / single stainless steel heat exchanger / (TS or TS-I)</td>
</tr>
<tr>
<td>1 2</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 gas path / single glass heat exchanger / (TG)</td>
</tr>
<tr>
<td>1 3</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 gas path / single PVDF heat exchanger / (TV-SS or TV-I)</td>
</tr>
<tr>
<td>2 6</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 gas paths / dual stainless steel heat exchanger / (DTS or DTS-I)</td>
</tr>
<tr>
<td>2 6</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 gas paths / dual stainless steel heat exchanger / (DTS-6 or DTS-6-I) i)</td>
</tr>
<tr>
<td>2 7</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 gas paths / dual glass heat exchanger / (DTG)</td>
</tr>
<tr>
<td>2 8</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 gas paths / dual PVDF heat exchanger / (DTV or DTV-I) i)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Condensate drain</strong> i)</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

i) Condensate outlets only suitable for connecting peristaltic pumps.

ii) Peristaltic pumps available for separate installation.
2 Safety instructions

2.1 Important advice

Operation of the device is only valid 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

<table>
<thead>
<tr>
<th>Signal word</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DANGER</td>
<td>Signal word for an imminent danger with high risk, resulting in severe injuries or death if not avoided.</td>
</tr>
<tr>
<td>WARNING</td>
<td>Signal word for a hazardous situation with medium risk, possibly resulting in severe injuries or death if not avoided.</td>
</tr>
<tr>
<td>CAUTION</td>
<td>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.</td>
</tr>
<tr>
<td>NOTICE</td>
<td>Signal word for important information to the product.</td>
</tr>
</tbody>
</table>

Warning signs

These instructions use the following warning signs:

<table>
<thead>
<tr>
<th>Warning sign</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>!</td>
<td>General information</td>
</tr>
<tr>
<td></td>
<td>Unplug from mains</td>
</tr>
<tr>
<td></td>
<td>Wear respiratory equipment</td>
</tr>
<tr>
<td></td>
<td>Wear a safety mask</td>
</tr>
<tr>
<td></td>
<td>Wear gloves</td>
</tr>
</tbody>
</table>
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.
- 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.

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

<table>
<thead>
<tr>
<th>DANGER</th>
<th>Electrical voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Electrocution hazard.</td>
</tr>
<tr>
<td></td>
<td>a) Disconnect the device from power supply.</td>
</tr>
<tr>
<td></td>
<td>b) Make sure that the equipment cannot be reconnected to mains unintentionally.</td>
</tr>
<tr>
<td></td>
<td>c) The device must be opened by trained staff only.</td>
</tr>
<tr>
<td></td>
<td>d) Regard correct mains voltage.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DANGER</th>
<th>Toxic, corrosive gas/condensate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sample gas/condensate may be hazardous to health.</td>
</tr>
<tr>
<td></td>
<td>a) If necessary, ensure a safe gas/condensate discharge.</td>
</tr>
<tr>
<td></td>
<td>b) Always disconnect the gas supply when performing maintenance or repairs.</td>
</tr>
<tr>
<td></td>
<td>c) Protect yourself from toxic/corrosive gasses/condensate when performing maintenance. Wear appropriate protective equipment.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DANGER</th>
<th>Potentially explosive atmosphere</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Explosion hazard if used in hazardous areas.</td>
</tr>
<tr>
<td></td>
<td>The device is not suitable for operation in hazardous areas with potentially explosive atmospheres.</td>
</tr>
<tr>
<td></td>
<td>Do not expose the device to combustible or explosive gas mixtures.</td>
</tr>
</tbody>
</table>
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 intended for wall-mounted or table-top use in enclosed areas. 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”).

The DTV heat exchanger cannot be operated in conjunction with an automatic condensate drain.

Peristaltic pump (optional)

A peristaltic pump may also be installed a little away from the cooler.

**NOTICE**

Installing peristaltic pumps CPsingle / CPdouble limits the maximum permissible operating pressure in the system!

Operating pressure ≤ 1 bar
4.2.1 Connecting the heat exchanger

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.

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.
**Connection via plug**

The device is equipped with connectors according to EN 175301-803 for mains and status output. If the cables are mounted properly, they cannot be interchanged. Please make sure that the connectors are remounted correctly after connecting the cable. The following figures show the pin assignment with respect to the numbers printed on the connector.

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: A05-100002 Cooler electric supply**

The mains supply must be protected with 10 A. The clamping area has a diameter of 8-10 mm.
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:

<table>
<thead>
<tr>
<th>Key</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>← →</td>
<td>Switch from measurement display to main menu</td>
</tr>
<tr>
<td>← →</td>
<td>Selection of the display menu item</td>
</tr>
<tr>
<td>← →</td>
<td>Accepting the changed value or selection</td>
</tr>
<tr>
<td>↑</td>
<td>Switch to the upper menu item</td>
</tr>
<tr>
<td>↑</td>
<td>Increase of the value of switching the selection</td>
</tr>
<tr>
<td>↑</td>
<td>Temporary display of the alternative measurement display (if option is installed)</td>
</tr>
<tr>
<td>↓</td>
<td>Switch to lower menu item</td>
</tr>
<tr>
<td>↓</td>
<td>Decrease of the value of switching the selection</td>
</tr>
<tr>
<td>↓</td>
<td>Temporary display of the alternative measurement display (if option is installed)</td>
</tr>
</tbody>
</table>
5.1.1 Overview of the menu items

Display of current temperature and operating state

Displayed is the block temperature with a resolution of 0.5°C/0.75 °F. By pressing the Enter button brings the display to the Main Menu. The unit of temperature is adjustable in the menu Global Settings (Celsius or Fahrenheit).

Main Menu

Submenu

Setting range

Temperature

Current temperature

Cooler display

Alarm high

Alarm hysteresis

Alarm Low

Alarm hysteresis

Exit

Top Settings

Global Settings

Parameter

Adjust the set point:

Cooler temperature

2°C...20°C / 35.6°F...68°F

Parameter

Set the upper alarm threshold above setpoint: tEMP 1°C...7°C / 1.8°F...12.6°F

Parameter

Set the lower alarm threshold below setpoint: tEMP -1°C...-3°C / -1.8...-5.4F

Parameter

Set unit Celsius or Fahrenheit

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.

To exit the main or submenu, select menu item E (Exit).
5.2 Description of menu functions

5.2.1 Main menu

Cooler

From here you will be able to access to all relevant cooler settings. The related submenu allows you to select the target temperature and alarm thresholds.

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 → ✏

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).

Exit submenu

Selecting this item returns to the main menu.
6 Maintenance

The basic version of the cooler requires no special maintenance. However, it may have different options depending on the cooler model. In this case the following maintenance must be performed regularly:

- **Optional peristaltic pump**: Check hoses

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.
- When performing maintenance of any type, observe the respective safety and operation regulations.

### 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

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

<table>
<thead>
<tr>
<th>Problem / Malfunction</th>
<th>Possible cause</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>No display</td>
<td>Mains voltage interrupted</td>
<td>Connect to mains; verify the plug is inserted correctly</td>
</tr>
<tr>
<td></td>
<td>Fuse defective</td>
<td>Check fuse and replace, if necessary</td>
</tr>
<tr>
<td>Cooler doesn’t start up</td>
<td>Compressor housing temperature too high</td>
<td>Allow to cool down and ensure adequate ventilation</td>
</tr>
</tbody>
</table>

Display flashes due to:

- Excess temperature
  - Operating point not yet reached
  - Cooling output too low despite the cooler running
  - Flow rate / dew point / gas temperature too high
  - Built-in fan stopped
  
- Temperature low
  - Control unit failure
  - Condensate trap full
  - Valve inside the automatic condensate drain may be stuck
  - Cooler overload

Condensate inside the gas output

- Condensate output iced over
- Condensate output iced over
- Condensate output iced over

Reduced gas flow rate

- Gas circuit clogged
- Condensate output iced over

No cooling

- Compressor doesn’t start up
- Compressor PTC not cooled down sufficiently. Wait 5 minutes and try again.

Fuse is triggering

- Increased compressor current consumption due to faulty compressor start-up
- Compressor PTC not cooled down sufficiently. Wait 5 minutes and try again.

Error Messages in the Display

The display alternates between the temperature and error message,

<table>
<thead>
<tr>
<th>Problem / Malfunction</th>
<th>Possible cause</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error 01</td>
<td>Interruption</td>
<td>Temperature sensor failure: Send in cooler</td>
</tr>
<tr>
<td>Error 02</td>
<td>Short circuit</td>
<td>Temperature sensor failure: Send in cooler</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>DANGER</th>
<th>Electrical voltage</th>
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<tbody>
<tr>
<td></td>
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<td>d) Regard correct mains voltage.</td>
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<table>
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<tr>
<th>DANGER</th>
<th>Toxic, corrosive gas/condensate</th>
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<tr>
<td></td>
<td>a) If necessary, ensure a safe gas/condensate discharge.</td>
</tr>
<tr>
<td></td>
<td>b) Always disconnect the gas supply when performing maintenance or repairs.</td>
</tr>
<tr>
<td></td>
<td>c) Protect yourself from toxic/corrosive gasses/condensate when performing maintenance. Wear appropriate protective equipment.</td>
</tr>
</tbody>
</table>

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

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. connector plug alarm output, supply input, etc.).
- Disconnect gas connections and condensate drain.
- Pull the heat exchanger up and out.
- Clean the heat exchanger hole (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.
– If applicable, disconnect the tubing between the condensate drain and peristaltic pumps, and the heat exchanger and filters.
– Loosen the screws on the cover.
– Carefully remove the cover. CAUTION! The display is attached to the front face and connected to the electronics on the base plate. The plug connection can be removed. Pumps, filters and moisture detector are connected to the electronics. The connections cannot be disconnected.
– 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.
– Reconnect the plug connections and reattach the cover. Attach the mounting screws, or reinstall the pumps.
– 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 Spare parts and accessories

Please also specify the model and serial number when ordering parts.
Upgrade and expansion parts can be found in our catalog.

Available spare parts:

<table>
<thead>
<tr>
<th>Item no.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>44 10 030</td>
<td>230 V Fan</td>
</tr>
<tr>
<td>44 00 030</td>
<td>115 V Fan</td>
</tr>
<tr>
<td>91 000 10 133</td>
<td>230 V power and controller board</td>
</tr>
<tr>
<td>91 000 10 134</td>
<td>115 V power and controller board</td>
</tr>
<tr>
<td>91 000 10 124</td>
<td>Display ABT 400</td>
</tr>
<tr>
<td>91 000 10 125</td>
<td>Controller Board MCP 1</td>
</tr>
<tr>
<td>91 100 00 001</td>
<td>Sample gas cooler micro-fuse, 230 V / 115 V, 5 x 20 mm, 800 mA delayed action</td>
</tr>
</tbody>
</table>

7.6.1 Spare parts and accessories

<table>
<thead>
<tr>
<th>Item no.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>44 10 00 1</td>
<td>Automatic condensate drain 11 LD V 38</td>
</tr>
<tr>
<td>44 10 00 4</td>
<td>Automatic condensate drain AK 20, PVDF</td>
</tr>
<tr>
<td>44 10 00 5</td>
<td>Condensate trap GL 1; glass, 0.4 L</td>
</tr>
<tr>
<td>44 10 01 9</td>
<td>Condensate trap GL 2; glass, 1 L</td>
</tr>
<tr>
<td>see data sheet 450020</td>
<td>Peristaltic Pump CPSingle, CPDouble</td>
</tr>
</tbody>
</table>
8 Disposal

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

Dispose of parts so as not to endanger the health or environment. Follow the laws in the country of use for disposing of electronic components and devices as well as hazardous materials during disposal.
9 Appendices

9.1 Technical Data

Gas Cooler Technical Data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ready for operation:</td>
<td>after max. 15 minutes</td>
</tr>
<tr>
<td>Rated cooling capacity (at 25 °C):</td>
<td>320 kJ/h</td>
</tr>
<tr>
<td>Ambient temperature:</td>
<td>5 °C to 50 °C</td>
</tr>
<tr>
<td>Gas output dew temperature, preset:</td>
<td>5 °C</td>
</tr>
<tr>
<td>Dew point fluctuations</td>
<td></td>
</tr>
<tr>
<td>static:</td>
<td>± 0.1 K</td>
</tr>
<tr>
<td>in the entire specification range:</td>
<td>± 1.5 K</td>
</tr>
<tr>
<td>IP rating:</td>
<td>IP 20</td>
</tr>
<tr>
<td>Housing:</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>Weight incl. heat exchanger:</td>
<td>approx. 15 kg</td>
</tr>
<tr>
<td>Electric supply:</td>
<td>115 V, 60 Hz or 230 V, 50 Hz</td>
</tr>
<tr>
<td></td>
<td>Plug per EN 175301-803</td>
</tr>
<tr>
<td>Electrical data:</td>
<td></td>
</tr>
<tr>
<td>Typical power input:</td>
<td>230 V: 140 VA</td>
</tr>
<tr>
<td>max. operating current:</td>
<td>115 V: 155 VA</td>
</tr>
<tr>
<td></td>
<td>1.6 A</td>
</tr>
<tr>
<td></td>
<td>3.2 A</td>
</tr>
<tr>
<td>Alarm output switching connection:</td>
<td>250 V, 2 A, 50 VA</td>
</tr>
<tr>
<td></td>
<td>Plug per EN 175301-803</td>
</tr>
<tr>
<td>Packaging dimensions:</td>
<td>approx. 420 mm x 440 mm x 350 mm</td>
</tr>
<tr>
<td>FM approval no.:</td>
<td>3040918</td>
</tr>
</tbody>
</table>

9.2 Performance data

Remark: The limit curves for the heat exchangers exchanger apply to a dew point of 65 °C.
9.3 Diagram typical installation

See data sheets for individual component models and data.

9.4 Heat exchanger

9.4.1 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 $\theta_{G}$ (inlet) dew point $\tau_{e}$ (moisture content) and volume flow $v$. The outlet dew point rises with increasing energy content of the gas. The approved energy load from the gas is therefore determined by the tolerated rise in the dew point.

The following limits are specified for a normal standard operating point of $\tau_{e} = 65 \degree C$ and $\theta_{G} = 90 \degree C$. The maximum volume flow $v_{\text{max}}$ in Nl/h of cooled air is indicated, so after moisture has condensed. If the values fall below $\tau_{e}$ and $\theta_{G}$, the flow $v_{\text{max}}$ may be increased. For example, on the TG heat exchanger the parameter triple $\tau_{e} = 65 \degree C$, $\theta_{G} = 90 \degree C$ and $v = 280$ Nl/h may also be used in place of $\tau_{e} = 50 \degree C$, $\theta_{e} = 80 \degree C$ and $v = 380$ Nl/h.

Please contact our experts for clarification or refer to our design program.

9.4.2 Heat exchanger overview

<table>
<thead>
<tr>
<th>Heat exchanger</th>
<th>TS</th>
<th>TS-I</th>
<th>TG</th>
<th>TV-SS</th>
<th>TV-SS-I</th>
<th>DTS (DTS-6)</th>
<th>DTS-I (DTS-6-I)</th>
<th>DTG</th>
<th>DTG</th>
<th>DTV</th>
<th>DTV-I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version / Material</td>
<td>Stainless steel</td>
<td>Glass</td>
<td>PVDF</td>
<td>Stainless steel</td>
<td>Glass</td>
<td>PVDF</td>
<td>Stainless steel</td>
<td>Glass</td>
<td>PVDF</td>
<td>Stainless steel</td>
<td>Glass</td>
</tr>
<tr>
<td>Flow rate $v_{\text{max}}$</td>
<td>530 L/h</td>
<td>280 L/h</td>
<td>155 L/h</td>
<td>2 x 250 L/h</td>
<td>2 x 140 L/h</td>
<td>2 x 115 L/h</td>
<td>Stainless steel</td>
<td>Glass</td>
<td>PVDF</td>
<td>Stainless steel</td>
<td>Glass</td>
</tr>
<tr>
<td>Inlet dew point $\tau_{e_{\text{max}}}$</td>
<td>80 °C</td>
<td>80 °C</td>
<td>65 °C</td>
<td>80 °C</td>
<td>65 °C</td>
<td>65 °C</td>
<td>Stainless steel</td>
<td>Glass</td>
<td>PVDF</td>
<td>Stainless steel</td>
<td>Glass</td>
</tr>
<tr>
<td>Gas inlet temperature $\theta_{G_{\text{max}}}$</td>
<td>180 °C</td>
<td>140 °C</td>
<td>140 °C</td>
<td>180 °C</td>
<td>140 °C</td>
<td>140 °C</td>
<td>Stainless steel</td>
<td>Glass</td>
<td>PVDF</td>
<td>Stainless steel</td>
<td>Glass</td>
</tr>
<tr>
<td>Max. Cooling capacity $Q_{\text{max}}$</td>
<td>450 kJ/h</td>
<td>230 kJ/h</td>
<td>120 kJ/h</td>
<td>450 kJ/h</td>
<td>230 kJ/h</td>
<td>185 kJ/h</td>
<td>Stainless steel</td>
<td>Glass</td>
<td>PVDF</td>
<td>Stainless steel</td>
<td>Glass</td>
</tr>
<tr>
<td>Gas pressure $p_{\text{max}}$</td>
<td>160 bar</td>
<td>3 bar</td>
<td>3 bar</td>
<td>25 bar</td>
<td>3 bar</td>
<td>2 bar</td>
<td>Stainless steel</td>
<td>Glass</td>
<td>PVDF</td>
<td>Stainless steel</td>
<td>Glass</td>
</tr>
<tr>
<td>Pressure drop $\Delta p$ (v=150 L/h)</td>
<td>8 mbar</td>
<td>8 mbar</td>
<td>8 mbar</td>
<td>5 mbar each</td>
<td>5 mbar each</td>
<td>15 mbar each</td>
<td>Stainless steel</td>
<td>Glass</td>
<td>PVDF</td>
<td>Stainless steel</td>
<td>Glass</td>
</tr>
<tr>
<td>Dead volume $V_{\text{tot}}$</td>
<td>69 ml</td>
<td>48 ml</td>
<td>129 ml</td>
<td>28 / 25 ml</td>
<td>28 / 25 ml</td>
<td>21 / 21 ml</td>
<td>Stainless steel</td>
<td>Glass</td>
<td>PVDF</td>
<td>Stainless steel</td>
<td>Glass</td>
</tr>
<tr>
<td>Gas connections (metric)</td>
<td>G1/4</td>
<td>GL14 (6 mm)</td>
<td>GL14 (6 mm)</td>
<td>GL14 (6 mm)</td>
<td>GL14 (6 mm)</td>
<td>GL14 (6 mm)</td>
<td>Stainless steel</td>
<td>Glass</td>
<td>PVDF</td>
<td>Stainless steel</td>
<td>Glass</td>
</tr>
<tr>
<td>Gas connections (US)</td>
<td>NPT 1/4&quot;</td>
<td>1/4&quot;-1/6&quot;</td>
<td>1/4&quot;-1/6&quot;</td>
<td>1/4&quot;-1/6&quot;</td>
<td>1/4&quot;-1/6&quot;</td>
<td>1/4&quot;-1/6&quot;</td>
<td>Stainless steel</td>
<td>Glass</td>
<td>PVDF</td>
<td>Stainless steel</td>
<td>Glass</td>
</tr>
<tr>
<td>Condensate out connections (metric)</td>
<td>G3/8</td>
<td>GL25 (12 mm)</td>
<td>GL25 (12 mm)</td>
<td>G3/8</td>
<td>Tube 10 mm (6 mm)</td>
<td>Tube 10 mm (6 mm)</td>
<td>Stainless steel</td>
<td>Glass</td>
<td>PVDF</td>
<td>Stainless steel</td>
<td>Glass</td>
</tr>
<tr>
<td>Condensate out connections (US)</td>
<td>NPT 3/8&quot;</td>
<td>GL25 (1/2&quot;)</td>
<td>NPT 3/8&quot;</td>
<td>Tube 3/8&quot; (1/4&quot;)</td>
<td>GL18 (3/8&quot;)</td>
<td>GL18 (3/8&quot;)</td>
<td>Stainless steel</td>
<td>Glass</td>
<td>PVDF</td>
<td>Stainless steel</td>
<td>Glass</td>
</tr>
</tbody>
</table>

1) Max. cooling capacity of the cooler must be considered

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

3) Condensate drain only possible with condensate pump

4) Gasket inside diameter
9.5 Dimensions

![Diagram showing the dimensions of the device with labels for Air ON and Air OFF.]
10 Attached documents

- Declaration of conformity KX450001
- RMA - Decontamination Statement
Hiermit erklärt Bühler Technologies GmbH, dass die nachfolgenden Produkte den wesentlichen Anforderungen der Richtlinie 2014/35/EU (Niederspannungsrichtlinie / low voltage directive) in ihrer aktuellen Fassung entsprechen.

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 1, EGK 1 SD-L, EGK 1/2, EGK 1/2-L, EGK 4S, EGK 10

Das Betriebsmittel dient der Aufbereitung des Messgases, um das Analysengerät vor Restfeuchtigkeit im Messgas zu schützen.

This equipment is used for conditioning the sample gas to protect the analysis instrument from residual moisture 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
EN 61326-1:2013

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.


Stefan Eschweiler
Geschäftsführer – Managing Director

Frank Pospiech
Geschäftsführer – Managing Director
RMA-Formular und Erklärung über Dekontamination
RMA-Form and explanation for decontamination

Firma/ Company

<table>
<thead>
<tr>
<th>Straße/ Street</th>
<th>PLZ, Ort/ Zip, City</th>
<th>Land/ Country</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Anzahl/ Quantity

<table>
<thead>
<tr>
<th>Auftragsnr./ Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

Grund der Rücksendung/ Reason for return

- [ ] Kalibrierung/ Calibration
- [ ] Modifikation/ Modification
- [ ] Reklamation/ Claim
- [ ] Reparatur/ Repair
- [ ] 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:

Bitte Sicherheitsdatenblatt beifügen/ Please enclose safety data sheet

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

- [ ] explosive/ explosive
- [ ] entzündlich/ flammable
- [ ] brauchbar/ oxidizing
- [ ] komprimierte Gase/ compressed gases
- [ ] ätzend/ caustic
- [ ] giftig/ poisonous/ risk of death
- [ ] gesundheitsschädlich/ harmful to health
- [ ] gesundheitsschädlich/ health hazard
- [ ] umweltgefährlich/ environmental hazard


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

Datum/ Date

rechtsverbindliche Unterschrift/ Legally binding signature
Die Analyse defekter Baugruppen ist ein wesentlicher Bestandteil der Qualitätssicherung der Firma Bühler Technologies.

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.


Analysing defective assemblies is an essential part of quality assurance at Bühler Technologies.

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.

Electronic assemblies may be sensitive to static electricity. Be sure to handle these assemblies in an ESD-safe manner. Where possible, the assemblies 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.

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.