BÜHLER TECHNOLOGIES

Analysentechnik

Sample gas cooler

TC-Standard

Installation and Operation Instructions

Original instructions

BE440017
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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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Contents

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 Overview

The TC-Standard series consists of various models which can be classified by two criteria:

1. The number of heat exchangers.
2. The available cooling capacity or ambient temperature.

This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the type code in the category ordering information.

Application	Standard applications		
Ambient temperature	40 °C	50 °C	
1 heat exchanger	TC-Standard 6111	TC-Standard 6112	3rd digit=1
2 heat exchangers	TC-Standard 6121	TC-Standard 6122	3rd digit=2
	4th digit=1	4th digit=2	

Additional components which every conditioning system should feature can optionally be integrated:

– Peristaltic pump for condensate separation
– Filter
– Moisture detector

This allows for various configurations of cooler and options. Here the approach is to simplify creating a complete system in a cost-efficient way through pre-installed components with hoses connected. We further paid attention to easy access to wear parts and consumables.

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:

4496	2	1	1	X	0	X	X	X	X	X	0	X	X	X	0	X	0	Product characteristic
																		Gas cooler models (with 1 heat exchanger)
				1														TC-Standard 6111: Ambient temperature 40 °C
				2														TC-Standard 6112: Ambient temperature 50 °C
																		Certifications
					0													Standard unit, no special certification
																		Supply voltage
						1												115 V AC, 50/60 Hz
						2												230 V AC, 50/60 Hz
						4												24 V DC
																		Heat exchanger
							1	1	0									Stainless steel, PTS, metric
							1	1	5									Stainless steel, PTS-I, US fittings
							1	2	0									Duran glass, PTG, metric
							1	2	5									Duran glass, PTG, US fittings
							1	3	0									PVDF, PTV, metric
							1	3	5									PVDF, PTV-I, US fittings
																		Peristaltic Pumps
										0	0							without peristaltic pump
										1	0							Single peristaltic pump CPsingle with hose nipple
										3	0							Single peristaltic pump CPsingle with screw connection
																		Moisture detector / filter
												0	0					without filter, without moisture detector
												0	1					without filter, 1 moisture detector with adapter
												1	0					1 filter, without moisture detector
												1	1					1 filter with built-in moisture detector
																		Status outputs
														0				status output only
														1				Analogue output option, add-on
																		Delta T control
																0		without Delta T control
																1		Delta T control option

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:

4496	2	1	2	X	0	X	X	X	X	X	0	X	X	X	0	X	0	Product characteristic
																		Gas cooler models (with 2 heat exchangers)
				1														TC-Standard 6121: Ambient temperature 40 °C
				2														TC-Standard 6122: Ambient temperature 50 °C
																		Certifications
					0													Standard unit, no special certification
																		Supply voltage
						1												115 V AC, 50/60 Hz
						2												230 V AC, 50/60 Hz
						4												24 V DC
																		Heat exchanger
							2	1	0									Stainless steel, 2 MTS, metric
							2	1	5									Stainless steel, 2 MTS-I, US fittings
							2	2	0									Duran glass, 2 MTG, metric
							2	2	5									Duran glass, 2 MTG, US
							2	3	0									PVDF, 2 MTV, metric
							2	3	5									PVDF, 2 MTV-I, US fitting
																		Peristaltic Pumps
										0	0							without peristaltic pump
										2	0							Dual peristaltic pump CPdouble with hose nipple
										4	0							Dual peristaltic pump CPdouble with screw connection
																		Moisture detector / filter
												0	0					without filter, without moisture detector
												0	1					without filter, 1 moisture detector with adapter
												0	2					without filter, 2 moisture detectors with adapter
												1	0					1 filter, without moisture detector
												1	1					1 filter with built-in moisture detector
												2	0					2 filters, without moisture detector
												2	1					2 filters, 1 moisture detector
												2	2					2 filters, 2 moisture detectors
																		Status outputs
														0				status output only
														1				Analogue output option, add-on
																		Delta T control
																0		without Delta T control
																1		Delta T control option

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

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

Installation of the device shall be performed by trained staff only, familiar with the safety requirements and risks.

Check all relevant safety regulations and technical indications for the specific installation place. Prevent failures and protect persons against injuries and the device against damage.

The operator of the system must secure that:

- safety and operation instructions are accessible and followed,
- local safety regulations and standards are obeyed,
- performance data and installation specifications are regarded,
- safety devices are installed and recommended maintenance is performed,
- national regulations for disposal of electrical equipment are obeyed.

Maintenance, repair:

- Repairs on the device must be carried out by Bühler authorized persons only.
- Only perform modifications, maintenance or mounting described in this manual.
- Only use original spare parts.

When carrying out maintenance works of any kind, the relevant health and safety regulations of the country of use must be observed.

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 and corrosive gases / condensate**

Sample gas / condensate can be hazardous.

a) Take care that the gas is exhausted in a place where no persons are in danger.

b) Before maintenance turn off the gas supply and make sure that it cannot be turned on unintentionally.

c) Protect yourself during maintenance against toxic / corrosive gases / condensate. Use gloves, respirator and face protector under certain circumstances.

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

The product should only be transported inside the original packaging or a suitable alternative.

When not in use, the equipment must be protected from moisture and heat. They must be stored in a covered, dry and dust-free room at a temperature between -20 °C and 60 °C.

4 Installation and connection

4.1 Installation site requirements

The unit is only intended for wall-mounted 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 before the cooler. Our condensate drains, 11 LD V38, AK 20, AK 5.5 OR AK 5.2, 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 ahead 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 6/8 (1/4”).

The MTS and MTV heat exchangers (in coolers with 2 heat exchangers) can only be operated with peristaltic pumps.

4.2.1 Connecting the filter gas connections (optional)

The connection between the heat exchanger outlet and the filter inlet already has tubing. The connection G1/4 or NPT 1/4" (filter head marked NPT) for the gas outlet must be carefully and properly connected using a suitable screw connection.

When ordering the cooler with the **option filter without Moisture detector**, a bypass may be connected to the filter head.

The filter head is intended for a G1/4 internal screw thread which is plugged at the factory. To use it, unscrew the plug and screw in a suitable screw connection. Pay attention to leaks.

NOTICE

Installing **filters** limits the maximum approved **operating pressure** in the system!
Operating pressure ≤ 2 bar

4.2.2 Connecting gas connections flow adapter (option)

When ordering the cooler with the **option moisture detector without filter**, it will be factory installed inside a flow adapter.

The connection between the heat exchanger outlet and the flow adapter inlet does not have tubing included. The connection G 1/4 or NPT 1/4" (flow adapter marked NPT) for the gas inlet/outlet must be carefully and properly connected using a suitable screw connection. Here the direction of flow is not relevant.

4.2.3 Connecting the moisture detector (option)

When ordering the cooler with **moisture detector option**, it will be factory installed inside a flow adapter, or for the **filter option** installed and connected in the filter head.

4.2.4 Connecting the peristaltic pump (option)

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 connection for the pump's condensate output must be carefully and properly connected with a suitable hose and hose clamp.

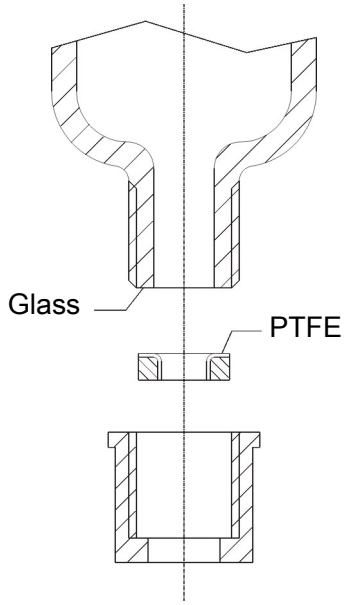
NOTICE

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

4.2.5 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
- must not be attached to the power feed.

WARNING **Hazardous electrical voltage**

The device must be installed by trained staff only.

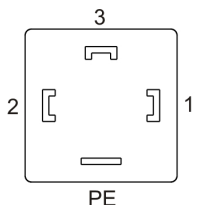
CAUTION **Wrong mains voltage**

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

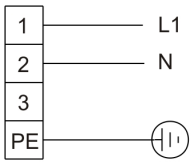
Connection via plug

The device is equipped with connectors according to DIN 43650 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.

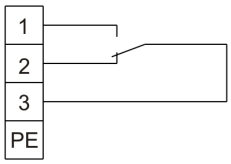
Plug numbering



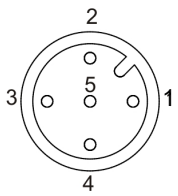
Electric supply S1



Alarm contact S2



Analogue output S3



1 - N/C
2 - n/c
3 - GND
4 - 4-20 mA out
5 - shield

The clamping area has a diameter of 8-10 mm.

4.4 Signal outputs

The device provides different status signals. The maximum switching load of the alarm outputs is limited to 250 VAC/DC, 1 A each.

Alarm is set if the actual temperature of the cooler is higher or lower than the preset alarm limits. The signal does not distinguish if the alarm is caused by to high or to low temperature.

When the moisture detector (optional) is installed, an alarm is activated if the moisture is still present in the prepared sample gas. Thereby, no distinction is made between the alarm / cable break triggered by moisture detector 1 or 2. This information is displayed by an error message instead.

If the option "temperature signal" is installed, the actual temperature of the connector is provided as an analogue signal. (Option "moisture detector" includes the option "temperature signal".) The signal is provided via connector S2 (M12x1). This port is placed next to the connectors of the moisture detector on top of the cooler.

Description of signal outputs

	Function / contact type	Description	
Regarding S2)	internal changeover contact: max. 230 V AC / 150 V DC, 2 A, 50 VA	the following device statuses can be indicated via two switching outputs:	Contact between 3 and 2 closed (alarm) – No mains voltage and/or actual temperature outside the alarm thresholds Contact between 3 and 1 closed (ok) – Mains voltage attached + actual temperature within the alarm thresholds
			With moisture detector option
			Contact between 3 and 2 closed (alarm) – The moisture detector registers residual humidity in the sample gas or cable break: Error message Contact between 1 and 3 closed (ok) – no residual moisture in measuring gas / no cable break
			With temperature signal option
Regarding S3)	4-20 mA analogue output (R_{Load} <600 Ω)	Signalling of actual temperature (please use shielded cables)	T_{Cooler} = -20 °C -> 4 mA / 2 V T_{Cooler} = 5 °C -> 9 mA / 4.5 V T_{Cooler} = 60 °C -> 20 mA / 10 V

5 Operation and control

NOTICE

The device must not be operated beyond its specifications.

After turning on the power supply the display shows the actual temperature of the cooling block. The display blinks until the (set) temperature range with respect to the pre-set output dew point is reached. The status contact is switched to "Alarm".

If the temperature range is reached, the actual temperature is shown constantly and status contact switches back.

If the display starts blinking during operation or if an error message is displayed see chapter "Troubleshooting".

For performance limits see datasheet.

5.1 Description of functions

The cooler is controlled by a microprocessor. With the factory preset the control already incorporates the various characteristics of the built-in heat exchangers.

The programmable display shows the block temperature in the selected unit (°C / °F) (factory preset °C). Application-specific settings can easily be configured guided by the menu, using the 5 buttons. For one, this applies to the target outlet dew point, which can be set from 2 to 20 °C (factory preset 5 °C).

And then the warning thresholds can be adjusted for the low and excess temperature. These are set relative to the outlet dew point T_a setting.

For the low temperature the range is T_a -1 to - 3 K (at a minimum 1 °C cooling block temperature), for the excess temperature the range is T_a +1 to +7 K. The factory presets for both values are 3 K.

The flashing display and the status relays indicate the conditions are below or above the configured warning range (e.g. after switching on).

The status output can e.g. be used to control the sample gas pump to allow for the gas flow to only be switched on once the permissible cooling range has been reached or shut off the pump in the event of a moisture detector alarm.

The separated condensate can be drained via add-on peristaltic pumps.

In addition, fine filters can be attached to the cooler, which optional moisture detectors can be integrated into.

The glass dome allows the dirt level of the filter element to easily be determined.

The moisture detector is easy to remove. This may be required if water enters the cooler due to a malfunction and the peristaltic pump can no longer remove it.

5.2 Option Delta-T Control

Not all applications require an output dew point of 5 °C. In some applications a higher dew point is sufficient. In other applications a stable output dew point doesn't matter, it's enough for the gas to be dry, so if the output dew point has an adequate difference in temperature below the ambient temperature.

Here the electronics measure the ambient temperature and regulate the output dew point to an adjustable value below it. This extends the potential cooling capacity to the limits of the heat exchanger. Here it's important to note the output dew point fluctuates along with the ambient temperature and a stable dew point cannot be a prerequisite for the measurement.

Example: At a difference of 30 °C, at a set output dew point of 5 °C this means the dew point remains stable up to an ambient temperature of approx. 35 °C, and the safe drop is only preferred over the ambient temperature with ambient temperature peaks over 35 °C. The cooling capacity specified in the cooling capacity graphs at 35 °C is then available at above 35 °C.

5.3 Use of menu functions

Brief description of the operating principle:

The unit is operated using 5 keys. Their functions are:

Button	Section	Functions
↵ or OK	Display	– Switches from the measurement display to the main menu
	Menu	– Selects the menu item displayed
	Enter	– Applies an edited value or a selection
▲	Display	– temporarily switches to the alternative measurement display (if option installed)
	Menu	– Back
	Enter	– Increase value or browse selection – Note: – Press button 1 x = changes parameter / value by one; – Hold button = fast mode (numerical values only) – Display flashes: modified parameter/value – Steady display: original display/value
▼	Display	– temporarily switches to the alternative measurement display (if option installed)
	Menu	– Next
	Enter	– Reduce value or browse selection
ESC	Menu	– Move one level up
	Enter	– Return to menu Changes will not be saved!
F or Func		– Sets a menu to favourite. (Note: The favourite menu will also be activated with the menu locked!)

5.3.1 Lock Menu

Some menus can be locked to prevent inadvertently changing the settings of the unit. This requires setting a code. For information on setting up or disabling the menu lock please refer to "Global Settings" (toP) under menu item toP > LOc.

The menu lock is **not** enabled at the time of delivery, all menu items can be accessed.

With the menu locked, only the following menu items will be visible without entering the correct code:

Menu item	Explanation
toP > unit	Temperature unit selection (°C or °F).
F or Func.	Accessing the Favourites menu **NOTICE! This menu may be one that is normally locked.**

5.3.2 Menu navigation overview

When pressing the **OK** button in normal mode, the display will show the prompt CodE if the menu is locked. Use the ▲ and ▼ buttons to enter the correct code and press **OK**.

If an incorrect code or no code is entered, the menu will not be unlocked and you will not be able to access all menu items.

If you forgot the password you can always enter master code 287 to access the menu; the menu will be unlocked.

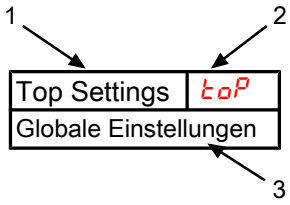
The following image shows an overview of the menu structure.

Items with a dashed frame will only appear with the respective settings or with the respective status messages.

The factory defaults and settings ranges are specified in the overview as well as under the respective menu item. The factory defaults apply unless otherwise agreed.

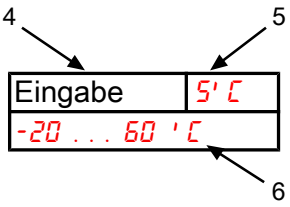
You can cancel entries and menu selections without saving by pressing the **ESC** key.

Menu:

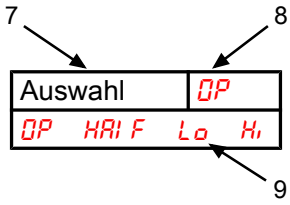


1. Menu designation
2. Display
3. Brief description

Parameter:



4. Value input
5. Factory preset
6. Parameter range



7. Selecting from the list of values
8. Factory preset
9. Parameter range/selection

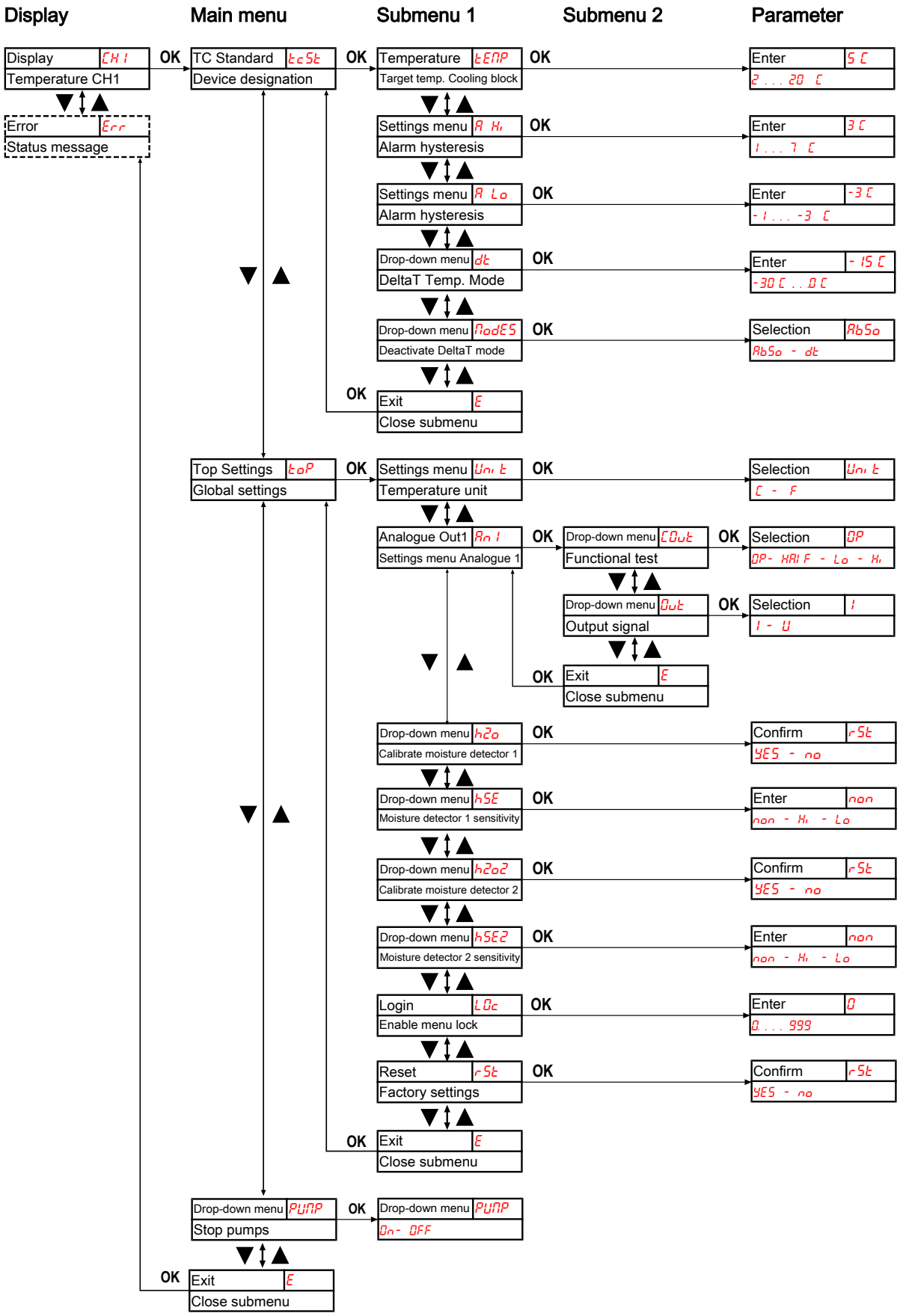


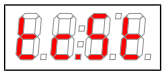
Fig. 1: Menu Overview TC Standard

5.4 Description of the menu functions

5.4.1 Main menu

Peltier Cooler TC Standard (tc.St)

Display → tc.St



This will take you to the cooler target temperature and the tolerance range setting (alarm threshold).

Global setting (ToP Settings)

Display → toP

This menu is used to configure the global cooler settings.

Peristaltic pump

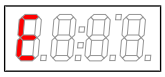
Display → PUMP

Switching the peristaltic pump on and off.

Parameter range:	On , OFF
Factory setting:	On
Note:	Status switches, "PUMP" flashes.

Exit main menu

Display → E



Selecting this will return you to display mode.

5.4.2 Submenu cooler

Target temperature (Temperature)

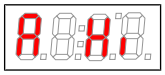
Display → Cooler → tEMP

This setting determines the nominal temperature for the cooler temperature.

Parameter range:	2 °C to 20 °C (35.6 °F to 68 °F)
Factory setting:	5 °C (41 °F)
Note:	If the temperature is changed the indicator may blink, until the new operating range has been reached. This menu item is hidden if the keylock is enabled.

upper alarm limit (alarm high)

Display → Cooler → A Hi

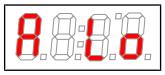


Here you can set the upper threshold for the visual signal and the alarm relay. The alarm limit is set based on the cooler temperature setting.

Parameter range:	1 °C to 7 °C (1.8 °F to 12.6 °F)
Factory setting:	3 °C (5.4 °F)
Note:	This menu item is hidden if the keylock is enabled.

lower alarm limit (alarm low)

Display → Cooler → A Lo



Here you can set the lower threshold for the visual signal and the alarm relay. The alarm limit is set based on the cooler temperature setting.

Parameter range:	-1 °C to -3 °C (-1.8 °F to -5.4 °F)
Factory setting:	-3 °C (-5.4 °F)
Note:	This menu item is hidden if the keylock is enabled.

DeltaT (dt)

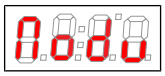
Display → Cooler → dt

Here you can set the nominal difference with respect to ambient temperature.

Parameter range:	-30 K...0 K
Factory setting:	-15 K
Note:	This menu will be hidden if the menu is locked.

DeltaT mode (Modu)

Display → Cooler → Modu

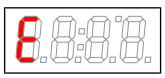


Here you can activate or deactivate DeltaT-mode.

Parameter range:	AbSo , dt
Factory setting:	AbSo (normal operation mode)
Note:	This menu will be hidden if the menu is locked.

Exit submenu

Display → Submenu → E

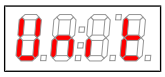


Selecting this will return you to the main menu.

5.4.3 Submenu global settings

Temperature unit

Display → toP → Unit

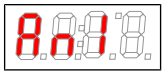


Used to select the temperature display unit.

Parameter range:	°C, °F
Factory setting:	°C

Analogue output

Display → toP → An1

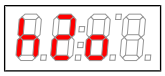


This submenu is used to specify the settings for analogue output 1, see chapter Submenu analogue output 1

Note:	This menu will be hidden if the menu is locked.

Calibrate moisture detector

Display → toP → h2o (h2o)



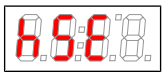
If a moisture detector is installed, calibration can now be performed. To do so, the unit must be flushed with dry gas.

Note:	Calibration was performed at the factory using ambient air. After replacing the moisture detector a calibration is again required. Calibrating the moisture detector will set menu hSE to Hi . This menu will be hidden if the menu is locked.

If the unit has multiple moisture detectors built in, they will be numbered in the menu. In this case, h2o indicates the first, h2o2 the second moisture detector. The same apples to setting the sensor sensitivity in menu hSE.

Moisture detector sensitivity

Display → toP → hSE



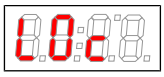
If moisture detectors are installed, the sensitivity can be reduced here.

Parameter range:	High: high sensitivity Low: low sensitivity non: no moisture detector
Factory setting:	High
Note:	This menu will be hidden if the menu is locked.

Lock Menu

To protect the menu from unauthorised use, enter a value for the lock code. Menu items can then only be accessed after entering the correct code.

Display → toP → LOc



This setting will cancel/enable the menu lock.

Parameter range:	0 to 9999
Factory setting:	0 (keylock cancelled)
Note:	This menu will be hidden if the menu is locked.

Factory settings

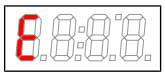
Display → toP → rSt

This setting restores the factory settings.

Parameter range:	YES: factory settings restored. no: Exit menu without making changes.
Factory setting:	no
Note:	This menu will be hidden if the menu is locked.

Exit submenu

Display → Submenu → E



Selecting this will return you to the main menu.

5.4.3.1 Submenu analogue output 1

The analogue output will display the actual cooler temperature.

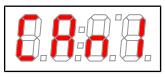
Signal behaviour

In normal mode (nOP) the measuring point will output the actual temperature. For testing purposes you can generate constant values Hi , Lo or HALF. The analogue output will output a constant signal with a value as specified in the table.

Constant	Current output 4 – 20 mA	Voltage output 2 – 10 V
Hi	20 mA	10 V
Lo	4 mA	2 V
Fi	12 mA	6 V
nOP	4 – 20 mA	2 – 10 V

After testing, the signal behaviour must be changed back to normal mode.

Display → toP → An1 → CAn1

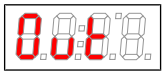


This setting determines how the analogue output will behave.

Parameter range:	nOP = Operation (normal mode), Hi , Lo, HALF
Factory setting:	nOP
Note:	This menu will be hidden if the menu is locked.

Selection -> Signal output

Display → toP → An 1 → out



Select type of signal output.

Parameter range	I Status output 4... 20 mA U Status output 2...10 V
Factory setting:	I
Note:	Disconnect the measuring device before changing the output signal. This menu will be hidden if the menu is locked.

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
- Maintenance of the device shall be performed by trained staff only, familiar with the safety requirements and risks.
- Only perform maintenance work described in this manual.
- Regard all relevant safety regulations and internal operating instructions during 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 and corrosive gases / condensate**

Sample gas / condensate can be hazardous.

a) Take care that the gas is exhausted in a place where no persons are in danger.

b) Before maintenance turn off the gas supply and make sure that it cannot be turned on unintentionally.

c) Protect yourself during maintenance against toxic / corrosive gases / condensate. Use gloves, respirator and face protector under certain circumstances.

7 Service und 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 attached the completed and signed RMA decontamination statement to the packaging. We will otherwise be unable to process your repair order.

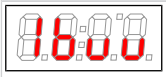
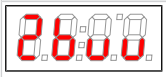
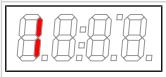
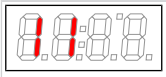
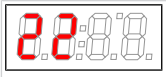
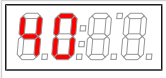
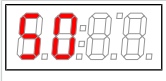
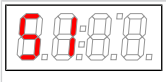
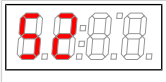
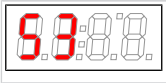
You will find the form in the appendix of these instructions, or simply request it by e-mail: **service@buehler-technologies.com**.

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
Display flashes if:		
– Excess temperature	– Operating point not yet reached	– Wait (max. 20 min)
	– Cooling output 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 output	– 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 output iced over	– Send in unit

Error messages on the display

The display alternates between the temperature and error message.

Problem / malfunction		Possible cause	Action
 Display Software Version	D1.02	– No communication	– Check connections – Send in cooler
	Error 1bw	– Moisture alarm moisture detector 1	– Dry – Check condensate trap
	Error 2bw	– Moisture alarm moisture detector 2	– Dry – Check condensate trap
	Error 1	– Display error	– Check connections
	Error 2	– Controller error	– Check connections – if necessary, replace controller board – Send in unit
	Error 11	– Controller electronics error	– Send in unit
	Error 22	– Moisture detector 1 cable break	– Replace moisture detector
	Error 32	– Moisture detector 2 cable break	– Replace moisture detector
	Error 40	– General temperature sensor error	– Unit defective
	Error 41	– Temperature sensor short-circuit	– Unit defective
	Error 42	– Temperature sensor cable break	– Unit defective
	Error 43	– Temperature sensor measurement fluctuation	– Unit defective
	Error 50	– General error ΔT	– Unit defective
	Error 51	– Temperature sensor ΔT short-circuit	– Unit defective
	Error 52	– Temperature sensor ΔT cable break	– Unit defective
	Error 53	– Temperature sensor ΔT measurement fluctuation	– Unit defective
	PUMP	– Pumps deactivated	– Activate in submenu

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 and corrosive gases / condensate**

Sample gas / condensate can be hazardous.

a) Take care that the gas is exhausted in a place where no persons are in danger.

b) Before maintenance turn off the gas supply and make sure that it cannot be turned on unintentionally.

c) Protect yourself during maintenance against toxic / corrosive gases / condensate. Use gloves, respirator and face protector under certain circumstances.

CAUTION **Health hazard if the heat exchanger leaks**

The heat exchanger is charged with glycol-based coolant.
In the event of a heat exchanger leak:

a) Avoid contact with the skin and eyes.

b) In the event of a leak, do not restart the cooler under any circumstances The cooler must be repaired by the manufacturer.

7.3 Cleaning and removal of the heat exchanger

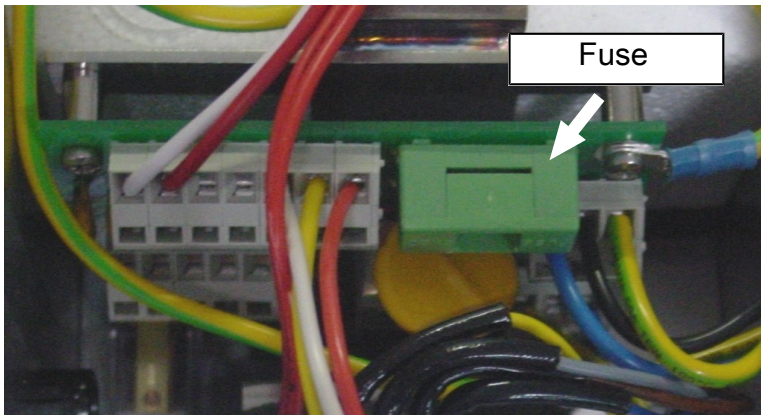
Heat exchangers only need to be replaced or maintained when plugged or damaged. If they are clogged, we recommend checking if using a filter will avoid future occurrences.

- Close the gas supply.
- Switch off and unplug the device.
- Disconnect gas connections and condensate drain.
- Pull the heat exchanger up and out.
- Clean the cooling nest (hole inside the cooler block).
- 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 the power and gas supply.

7.4 Replacing the fuse of the cooler

7.4.1 115 V and 230 V

- Close the gas supply.
- Switch off and unplug the device.
- Loosen the screws on the cover.
- Carefully remove the cover. **CAUTION! Die display is attached to the front cover 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 display plug connections and reattach the cover. Screw in mounting screws.
- Restore the power and gas supply.



7.4.2 24 V DC

- Turn off gas supply.
- Switch the device off and disconnect power supply.
- Loosen the screws of the cover.
- Remove the cover carefully. **CAUTION! The display is fixed to the cover and is connected to the electronics inside the device. This connection can be removed. Pumps, filters and moisture detectors are connected to the electronics. These connections should not be removed.**
- The fuse is placed in the fuse holder. Turn to open it and replace the fuse. Regard the supply voltage for selecting the correct value of the fuse.
- Reconnect the plug of the display and fix the cover. Fasten the screws.
- Reconnect power supply.

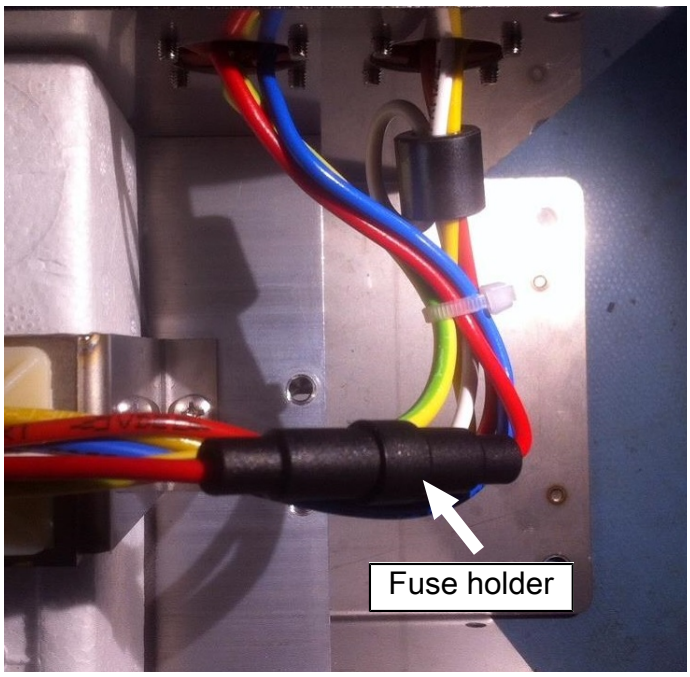


Fig. 2: Fuse holder

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.
- Pull the bracket, holding on to the filter glass.
- Whilst holding the filter head, move the glass back and forth and carefully remove downward.
- Remove the filter element and insert a new one.
- Check for leaks and replace, if necessary.
- Whilst holding the filter head, move the glass back and forth and carefully reattach the filter head, attach the bracket, and ensure it is seated securely.
- Restore the power and gas supply.

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

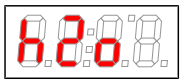
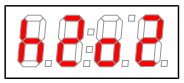
7.7 Drying of the moisture detector (option)

The moisture detector must be dried if moisture enters.

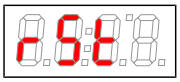
- Close the gas supply.
- Switch off and unplug the device.
- Loosen the swivel nut for the moisture detector connection line and disconnect the line.
- Unscrew the moisture detector counter-clockwise and remove.
- Dry moisture detector.
- Reinsert the moisture detector and carefully tighten the screw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

 or 

- 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 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:

Item no.	Description
91 00 10 00 07	Display module MCD400
91 44 05 00 80	Connecting cable controller board display module
91 00 01 01 80	Controller board MCP2
40 11 00 0	Flow adapter type G, PVDF G1/4
40 11 00 0I	Flow adapter type NPT, PVDF NPT 1/4"
91 10 00 00 58	Sample gas cooler micro-fuse 230 V, 5 x 20 mm, 1.5 A, delayed action
91 10 00 00 13	Sample gas cooler micro-fuse 115 V, 5 x 20 mm, 2.5 A, delayed action
41 11 10 0	Moisture detector FF-3-N, without cable
91 44 05 00 81	Moisture detector connection cable, 300 mm
91 44 05 00 82	Moisture detector connection cable, 450 mm
41 50 29 99	Filter AGF-PV-30-F2, G1/4
41 50 29 99 I	Filter AGF-PV-30-F2, NPT 1/4"
44 65 90 00 5	Fan, 12 V DC
91 00 01 01 85	Power board
91 00 01 01 87	Controller board
see data sheet 450020	Peristaltic Pumps CPsingle, CPdouble

7.9.1 Consumables and accessories

Item no.	Description
45 10 008	Automatic Condensate Drain AK 5.2
45 10 028	Automatic Condensate Drain AK 5.5
44 10 004	Automatic Condensate Drain AK 20
44 10 001	Automatic Condensate Drain 11 LD V 38
41 03 00 50	Replacement filter element F2; Unit 5 count
91 44 05 00 38	Cable for cooler temperature analogue output 4 m
44 10 005	Condensate Trap GL1, 0.4L
44 92 00 35 011	Norprene replacement hose with straight connections for peristaltic pump 0.3 L/h
44 92 00 35 012	Norprene replacement hose with angled connections for peristaltic pump 0.3 L/h
44 92 00 35 013	Norprene replacement hose with one straight and one angled connection for peristaltic pump 0.3 L/h
44 92 00 35 014	Norprene replacement hose with one angled connection and one screw connection (metric) for peristaltic pump 0.3 L/h
44 92 00 35 015	Norprene replacement hose with one angled connection and one screw connection (US) for peristaltic pump 0.3 L/h
43 81 045	Screw connection G1/4 – DN 8/12 for passive condensate connection MTS and MTV
43 81 048	Screw connection NPT 1/4" for passive condensate connection MTS and MTV

8 Disposal

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 Gas cooler technical data

Gas cooler technical data						
Ready for operation	after max. 10 minutes					
Ambient temperature	5 °C to 50 °C					
Gas output temperature preset: adjustable:	 5 °C 2 °C...20°C or ΔT control					
Protection class	IP 20					
Housing	Stainless steel					
Packaging dimensions	approx. 355 x 220 x 205 mm					
Weight incl. heat exchanger	approx. 7.5 kg approx. 6 kg (for 24 V DC) approx. 9 kg fully upgraded					
Electrical power input	Unit without add-on			Unit with add-on (1 peristaltic pump)		
	24 V DC	230 V AC	115 V AC	24 V DC	230 V AC	115 V AC
	5 A	0.6 A	1.2 A	5.5 A	0.7 A	1.4 A
	120 W	110 W / 140 VA		130 W	130 W / 160 VA	
Status output switching capacity	max. 230 V AC, 150 V DC 2 A, 50 VA, potential-free					
Electrical connections	Plug per DIN 43650					
Gas connections	Heat exchanger see table "Heat Exchanger Overview" Filter, moisture detector adapter G1/4 or NPT 1/4"					
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

Technical data analogue output cooler temperature	
Signal	4-20 mA, 2-10 V or corresponds with -20 °C to +60 °C cooler temperature Plug M12x1

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

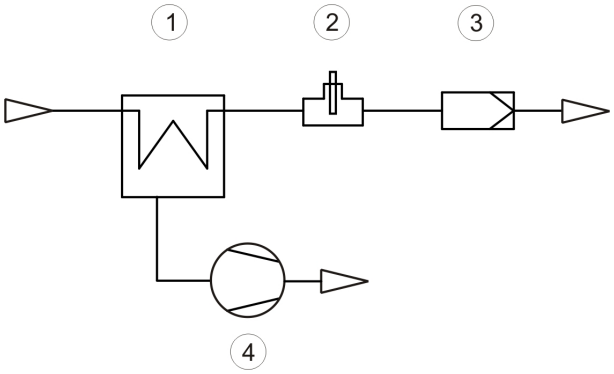
Technical Data Peristaltic Pumps CPsingle / CPdouble	
Flow rate	0.3 L/h (50 Hz) / 0.36 L/h (60 Hz) with standard hose
Vacuum inlet	max. 0.8 bar
Pressure inlet	max. 1 bar
Pressure output	1 bar
Hose	4 x 1.6 mm
Protection class	IP 44

Technical Data Peristaltic Pumps CPsingle / CPdouble	
Materials	
Hose:	Norprene (Standard), Marprene, Fluran
Connections:	PVDF

Technical Data Filter AGF-PV-30-F2	
max. operating pressure with filter	2 bar
Filter surface	60 cm^2
Filter fineness	2 µm
Dead volume	57 ml
Materials	
Filter:	PVDF, Duran glass (parts in contact with mediums)
Seal:	Viton
Filter element:	sintered PTFE

9.3 Flow chart

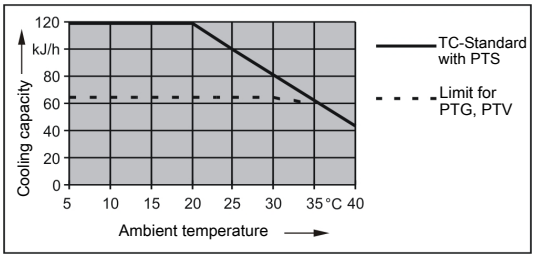
Each gas path:

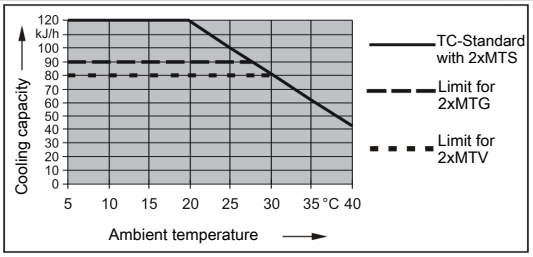


1	Cooler	2	Moisture detector (option)
3	Filter (optional)	4	Condensate pump (optional)

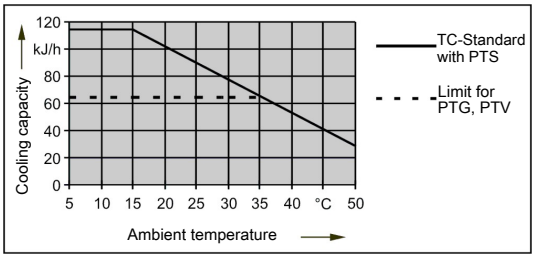
9.4 Output

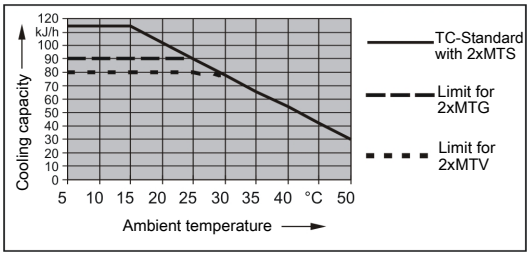
One heat exchanger		Two heat exchangers	
Model TC-Standard 6111		**Model TC-Standard 6121**	
Rated cooling capacity (at 25 °C)	100 kJ/h	Rated cooling capacity (at 25 °C)	100 kJ/h
Max. Ambient temperature	40 °C	Max. Ambient temperature	40 °C
Dew point fluctuations		Dew point fluctuations	
static	± 0.1 K	static	± 0.1 K
in the entire specification range	± 1.5 K	in the entire specification range	± 1.5 K
		Temperature difference between heat exchangers	< 0.5 K





Model TC-Standard 6112		**Model TC-Standard 6122**	
Rated cooling capacity (at 25 °C)	90 kJ/h	Rated cooling capacity (at 25 °C)	90 kJ/h
Max. Ambient temperature	50 °C	Max. Ambient temperature	50 °C
Dew point fluctuations		Dew point fluctuations	
static	± 0.1 K	static	± 0.1 K
in the entire specification range	± 1.5 K	in the entire specification range	± 1.5 K
		Temperature difference between heat exchangers	< 0.5 K





Remark: The limit curves for the heat exchangers exchanger PTG, PTV or MTV apply to a dew point of 40 °C.

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 ϑ_G, dew point T_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 T_e=40 °C and ϑ_G =70 °C. Indicated is the maximum flow v_{max} in Nl/h of cooled air, 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 design program.

9.4.2 Heat exchanger overview

Heat exchanger	PTS PTS-I [2]	PTG PTG	PTV PTV-I [2]	MTS [3] MTS-I [2] [3]	MTG [3] MTG [3]	MTV [3] MTV-I [2] [3]
Version / Material	Stainless steel	Glass	PVDF	Stainless steel	Glass	PVDF
Flow rate v_{max} [1]	450 Nl/h	250 Nl/h	250 Nl/h	300 Nl/h	210 Nl/h	190 Nl/h
Inlet dew point $T_{e,max}$ [1]	65 °C	65 °C	65 °C	65 °C	65 °C	65 °C
Gas inlet temperature $\vartheta_{G,max}$ [1]	180 °C	140 °C	140 °C	140 °C	140 °C	140 °C
Max. Cooling capacity Q_{max}	150 kJ/h	90 kJ/h	90 kJ/h	95 kJ/h	80 kJ/h	65 kJ/h
Gas pressure p_{max}	160 bar	3 bar	2 bar	25 bar	3 bar	2 bar
Pressure drop Δp (v=150 l/h)	10 mbar	10 mbar	10 mbar	20 mbar	19 mbar	18 mbar
Dead volume V_{tot}	29 ml	29 ml	57 ml	19 ml	18 ml	17 ml
Gas connections (metric)	Swagelock 6 mm	GL 14 (6 mm) [4]	DN 4/6	6 mm tube	GL14 (6 mm)	DN 4/6
Gas connections (US)	1/4"	GL 14 (1/4") [4]	1/4"-1/6"	1/4" tube	GL14 (1/4")	1/4"-1/6"
Condensate out connections (metric)	G3/8	GL 25 (12 mm) [4]	G3/8	G1/4	GL18 (8 mm)	G1/4
Condensate out connections (US)	NPT 3/8"	GL 25 (1/2") [4]	NPT 3/8"	NPT 1/4"	GL18 (8 mm)	NPT 1/4"

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

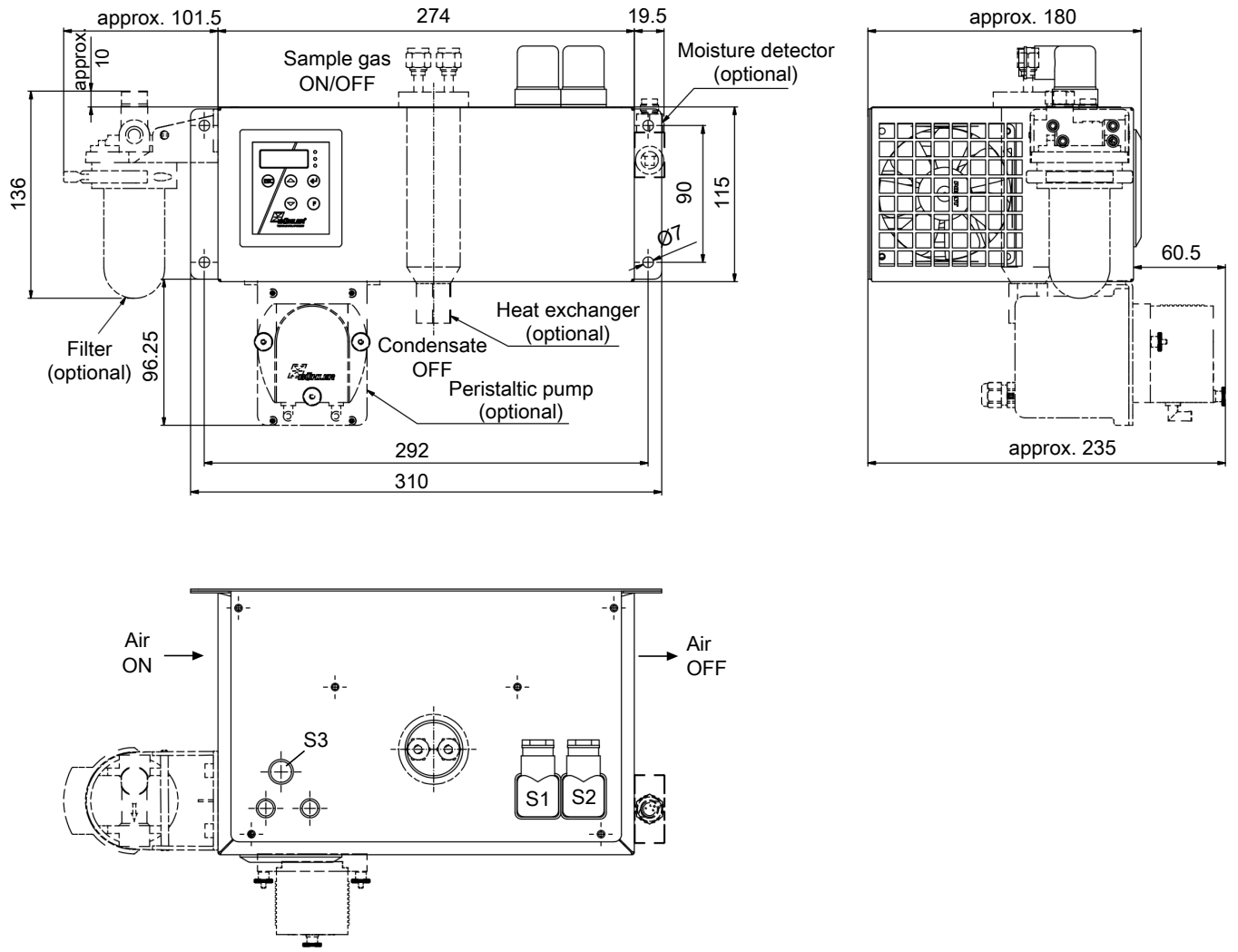
[2] Models marked I have NPT threads or US tubes, respectively.

[3] Passive discharge via automatic condensate drains or traps not applicable for MTG heat exchangers. For passive discharge on the MTS and MTV heat exchangers, use a screw connection with a clearance of at least 7 mm (see accessories).

[4] Gasket inside diameter

9.5 Dimensions (mm)

Models for standard applications (TC-Standard 611x and 612x):



10 Attached documents

– Declaration of conformity KX440006
– RMA - Decontamination Statement

EG-Konformitätserklärung
EC-declaration of conformity

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

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

2006/95/EG

(Niederspannungsrichtlinie / *low voltage directive*)

in ihrer aktuellen Fassung entsprechen

in its actual version

Folgende weitere Richtlinien wurden berücksichtigt

The following directives were regarded

2004/108/EG (EMV / EMC)

Produkt: ***products***	Peltier Messgaskühler / Peltier sample gas cooler
Typ: ***type***	TC-Standard
Angewandte harmonisierte Normen: **Applied harmonised standards**	EN 61010-1:2011 EN 61326-1:2013
Die CE- Kennzeichnung wurde angebracht im Jahr **The device was CE-labelled in**	16

Dokumentationsverantwortlicher für diese Konformitätserklärung ist der Unterzeichnende mit Anschrift am Firmensitz.
The person authorised to compile the technical file is the one that has signed and is located at the company's address

Ratingen, den 18.01.2016

Stefan Eschweiler
Geschäftsführer – *Managing Director*

Frank Pospiech
Geschäftsführer – *Managing Director*

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Tel. +49 (0) 21 02 / 49 89-0, Fax. +49 (0) 21 02 / 49 89-20
Internet: www.buehler-technologies.com

RMA - Dekontaminierungserklärung
RMA - Decontamination Statement

Um eine schnelle und reibungslose Bearbeitung Ihres Anliegens zu erreichen, füllen Sie bitte diesen Rücksendeschein aus. Eine genaue Fehlerbeschreibung ist für die Ursachenanalyse nötig und hilft bei der schnellen Bearbeitung des Vorgangs. Die Aussage „Defekt“ hilft bei der Fehlersuche leider nicht.

Please complete this return form to ensure your claim is processed quickly and efficiently. An accurate description of the problem is necessary for cause analysis and will help processing the claim quickly. Unfortunately, stating “defective” will not help us troubleshoot the issue.

Die RMA-Nummer bekommen Sie von Ihrem Ansprechpartner im Vertrieb oder Service.

You may obtain the RMA number from your sales or service representative.

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 employees’ health.*

Bringen Sie den Rücksendeschein mit der Dekontaminierungserklärung bitte zusammen mit den Versandpapieren in einer Klarsichthülle außen an der Verpackung an. Ansonsten ist eine Bearbeitung Ihres Reparaturauftrages nicht möglich!

Attach the return form including decontamination statement along with the shipping documentation to the outside of the package, inside a clear pouch. Otherwise we are unable to process your repair order!

Angaben zum Absender:

Sender information:

Firma / *Company*			Ansprechpartner / *Contact person*	
Anschrift / *Address*			Abteilung / *Department*	
			E-Mai / *E-Mail*:	
			Tel. / *Phone*	
			Fax / *Fax*:	
Artikelnummer / *Item number*			**RMA-Nr. / *RMA no*.**	
Auftragsnummer / *Order number*				
Anzahl / *Quantity*				
Rücksendegrund / *Return reason*	☐	Reparatur / *Repair*	Vorgangsnummer des Kunden / *Customer transaction number*::	
	☐	Garantie / *Warranty*		
	☐	Zur Prüfung / *For inspection*		
	☐	Rückgabe / *Return*		
Fehlerbeschreibung / *Description of the problem*:				

Ort, Datum /
Place, Date _____

Unterschrift / Stempel /
***Signature / Stamp*:** _____

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e-mail: service@buehler-technologies.com
Internet: www.buehler-technologies.com

RMA - Dekontaminierungserklärung
RMA - Decontamination Statement

Bitte füllen Sie diese Dekontaminierungserklärung **für jedes einzelne Gerät** aus.

*Please complete this decontamination statement **for each individual item***

Gerät / Device		**RMA-Nr / *RMA no*:**	
Serien-Nr. / Serial no.			

[ ] Ich bestätige hiermit, dass das oben spezifizierte Gerät ordnungsgemäß gereinigt und dekontaminiert wurde und keinerlei Gefahren im Umgang mit dem Produkt bestehen.

I herewith declare that the device as specified above has been properly cleaned and decontaminated and that there are no risks present when dealing with the device.

Ansonsten ist die mögliche Gefährdung genauer zu beschreiben*:*

In other cases, please describe the hazards in detail:

Aggregatzustand (bitte ankreuzen):

Aggregate state (please check):

☐ Flüssig / *Liquid* ☐ Fest / *Solid* ☐ Pulvrig / *Powdery* ☐ Gasförmig / *Gaseous*

Folgende Warnhinweise sind zu beachten (bitte ankreuzen)*:*

Please note the following warnings (please check):

			
☐ Explosiv *Explosive*	☐ Giftig / Tödlich *Toxic / lethal*	☐ Entzündliche Stoffe *Flammable substances*	☐ Brandfördernd *Oxidizing*

			
☐ Komprimierte Gase *Compressed gasses*	☐ Gesundheitsgefährdend *Hazardous to health*	☐ Gesundheitsschädlich *Harmful to health*	☐ Umweltgefährdend *Harmful to the environment*

Bitte legen Sie ein aktuelles Datenblatt des Gefahrenstoffes bei!

Please include an updated data sheet of the hazardous substance!

Ort, Datum / *Place, Date*: _____

Unterschrift / Stempel *Signature / Stamp*: _____

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