Gas Analysis

Sample gas cooler

Series TC-Kit

Installation and Operation Instructions

Original instructions

BE440028
07/2024

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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.

Document information
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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-Kit series consists of various models which can be classified by the number of heat exchangers.

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

The TC-Kit+ series was designed specifically for the requirements in so-called automated measuring systems (AMS) according to EN 15267-4. Dividing the unit into an internal and external section achieves the IP rating required under the standard without requiring venting the interior. The series connection of the heat exchangers will cool in two cycles to minimise wash out effects.

The Peltier coolers are distinguished according to cooling capacity/operating temperature. This classification is reflected in the type designation. The exact item number of the model defined by you is determined by the model code in the category ordering information.

Application	Standard applications
Operating temperature	55 °C
1 heat exchanger	TC-Kit 6312
2 heat exchangers	TC-Kit 6322
2 heat exchangers in series	TC-Kit 6322+

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

- Peristaltic pump for condensate separation*,
- Moisture detector,
- Sample gas pump*,
- Power supply module 230/115 V,
- Alarm output*,
- Analog output
- Controller for heated line**.

* Expansion module (option 10 or 11) required.

** Controller (option 01 or 11) required.

This allows for various configurations of cooler and options. We further paid attention to easy access to wear parts and consumables.

1.3 Scope of delivery

- Cooler
- Product documentation
- Supply module (optional)
- Controller for heated line (optional)
- Expansion module for connecting add-on components (optional)

1.4 Ordering instructions

1.4.1 Gas cooler models

TC-Kit

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

4496	2	3	X	2	0	X	X	X	0	Product Characteristics
			1							Gas cooler for 1 heat exchanger
			2							Gas cooler for 2 heat exchangers
										Gas cooler type
				2						TC-Kit: Ambient temperature 55 °C
										Supply voltage
					1					115 VAC, 50/60 Hz (power supply module)
					2					230 VAC, 50/60 Hz (power supply module)
					4					24 VDC
										Options
						0	0			Without option
						0	1			Controller for heated line
						1	0			Expansion module
						1	1			Controller and expansion module

TC-Kit+

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

4496	2	3	2	2	0	X	X	X	0	Product Characteristics
			2							Gas cooler for 2 heat exchangers in series
										Gas cooler type
				2						TC-Kit+: Ambient temperature 55 °C
										Supply voltage
					1					115 VAC, 50/60 Hz (power supply module)
					2					230 VAC, 50/60 Hz (power supply module)
					4					24 VDC
										Options
						0	0			Without option
						0	1			Controller for heated line
						1	0			Expansion module
						1	1			Controller and expansion module

1.4.2 Heat exchanger options

TC-Kit:

Item no.	Description
4465099	MTS, steel heat exchanger ø20 mm, metric connections
4465099I	MTS-I, steel heat exchanger ø20 mm, US connections
4465299	MTS-WS, steel heat exchanger ø20 mm, horizontal gas inlet/output, metric connections
4465199	MTV, plastic heat exchanger ø20 mm, metric connections
4465199I	MTV-I, plastic heat exchanger ø20 mm, US connections
44651997	MTG, glass heat exchanger ø20 mm, metric and US connections
4447999	PTS, steel heat exchanger ø35 mm, metric connections
4447999I	PTS-I, steel heat exchanger ø35 mm, US connections
4446999	PTV, plastic heat exchanger ø35 mm, metric connections
4446999I	PTV-I, plastic heat exchanger ø35 mm, US connections
4445999	PTG, glass heat exchanger ø35 mm, metric and US connections

TC-Kit+:

Item no.	Description
449601222	MTG-2, plastic heat exchanger ø20 mm, metric connections
449601232	MTV-2, plastic heat exchanger ø20 mm, US connections
449601237	MTV-2-I, glass heat exchanger ø20 mm, metric and US connections

2 Safety instructions

2.1 Important advice

Operation of the device is only permitted if:

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

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

Signal words for warnings

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

Warning signs

These instructions include the following warnings:

	General warning sign		General mandatory sign
	Voltage warning		Unplug from mains
	Warning not to inhale toxic gases		Wear respiratory equipment
	Warning of corrosive substances		Wear a safety mask
	Warning of explosion hazard		Wear gloves
	Warning of hot surfaces		

2.2 General hazard warnings

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

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

The operator of the system must ensure:

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

Maintenance, Repair

Please note during maintenance and repairs:

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

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

DANGER

Electrical voltage

Electrocution hazard.

a) Disconnect the device from power supply.

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

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

d) Regard correct mains voltage.

DANGER

Toxic, corrosive gas/condensate

Sample gas/condensate may be hazardous to health.

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

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

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

DANGER

Potentially explosive atmosphere

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

CAUTION

Hot surface

Burning hazard
Let the device cool down before maintaining.

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 outdoors, for installation in a housing, switch cabinet or portable sample gas conditioning. Avoid direct and indirect contact with the interior when installing and assembling the equipment. Indoors, further protect the equipment from moisture, dust and mechanical impact. Consider the electromagnetic compatibility of nearby equipment when selecting the installation site.

Install the unit leaving enough room below the cooler to discharge the condensate. Leave room above for the gas supply and the power supply, if applicable.

Be sure to maintain the approved ambient temperature. Do not obstruct the convection of the cooler. Leave adequate clearance between the vents and the nearest object. The clearance must especially be a minimum of 10 cm on the air outlet side. The air intake and outlet must be clear. Heat may otherwise build up.

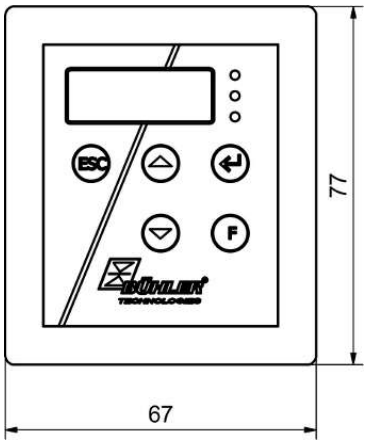
Only install the sample gas cooler in housings with sufficient capability to remove the heat generated. Alternatively, ensure adequate ventilation. We recommend a minimum of IP protection class 24.

Access to dangerous parts must at a minimum comply with a rating of IPxxB, access from the top to dangerous active parts must at a minimum comply with a rating of IP2xC. The protection should further protect from mechanical blows and ambient effects such as moisture and dust.

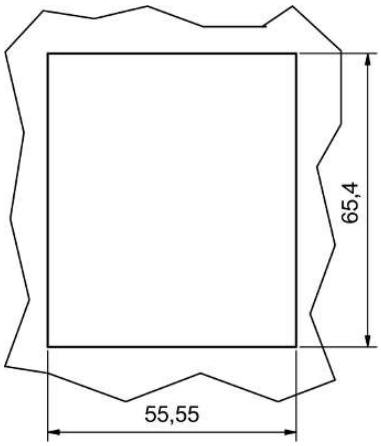
4.2 Installing the cooler into a housing

Please refer to the drawings in chapter Dimensions basic version [> page 37] for the installation dimensions of the respective cooler. Plan for the respective mounting holes at the installation site.

A suitable opening for the display module must be provided in the front panel of the housing. For a secure fit we recommend a front panel thickness between 1.5 mm (0.06 in) and 4 mm (0.16 in).



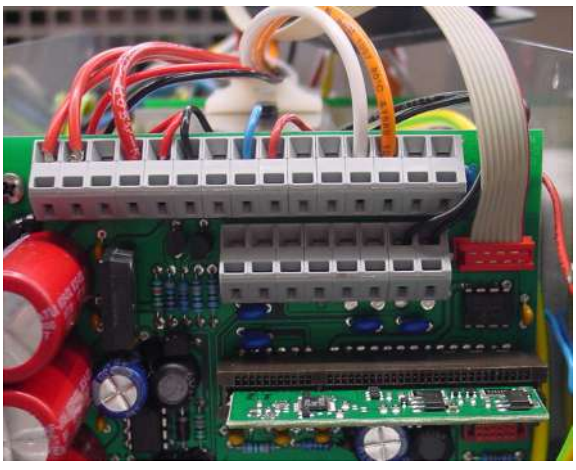
Display unit



Cut-out

The ribbon cable must be plugged into the plug connections for the display and into the electronics board.

Installing the display, ribbon cable



Installing the display, plug into the electronics board

4.3 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 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 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 drain

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 hung directly from 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 6 mm (1/4").

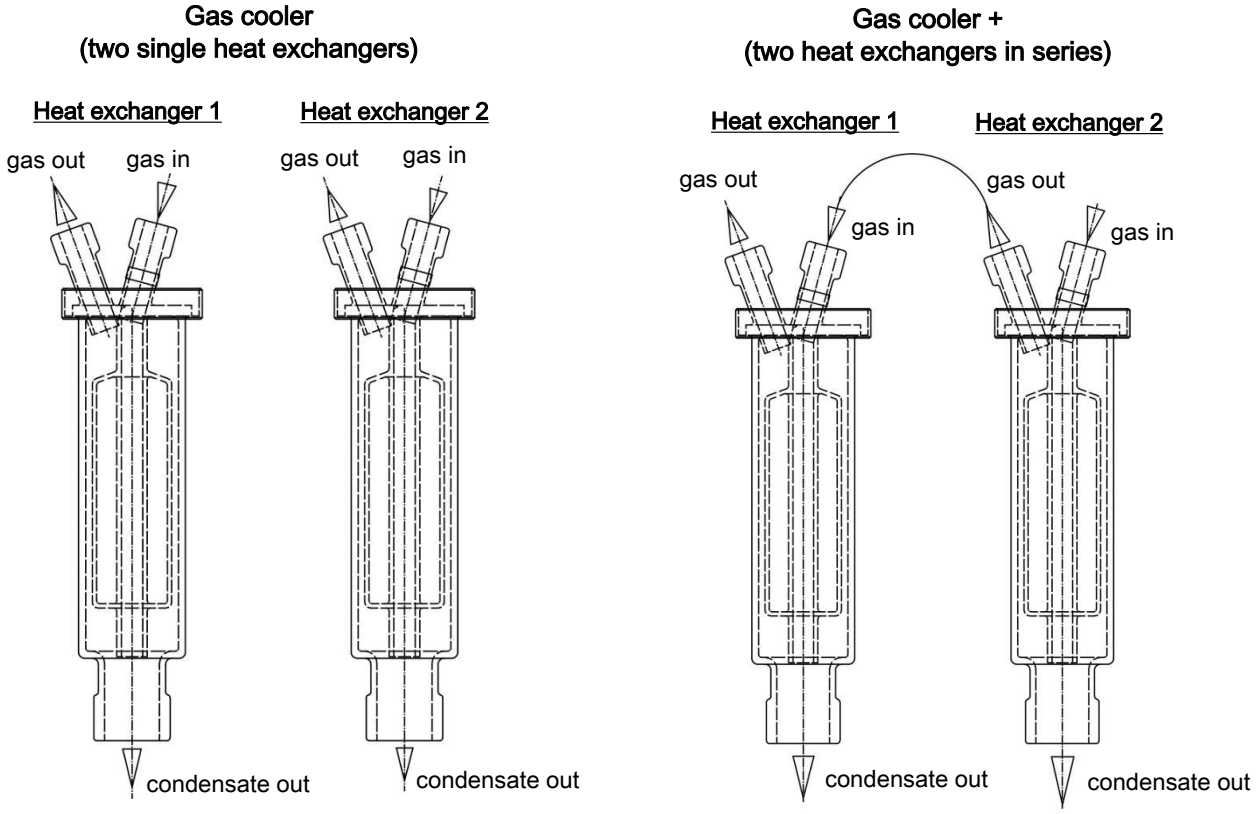
The MTG heat exchanger (in coolers with 2 heat exchangers) can only be operated with peristaltic pumps.

4.4 Connecting the heat exchanger

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

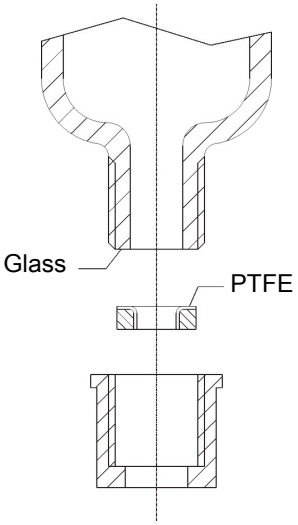
To minimise gas wash out in the cooler, the two (identical) heat exchangers must be operated in series (right picture). This should be done as follows:

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



The gas inputs are marked in red.

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



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

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

PTS/PTS-I condensate out connections: SW 22

4.5 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.

Run the lines so the insulation will not be damaged. If necessary, secure the lines with suitable means and avoid excess line lengths.

The power supply must be installed according to the following wiring diagrams and have the respective voltage.

Particularly maintain a discharge time of at least 5 seconds after switching off the power supply on the version with switching power supply.

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

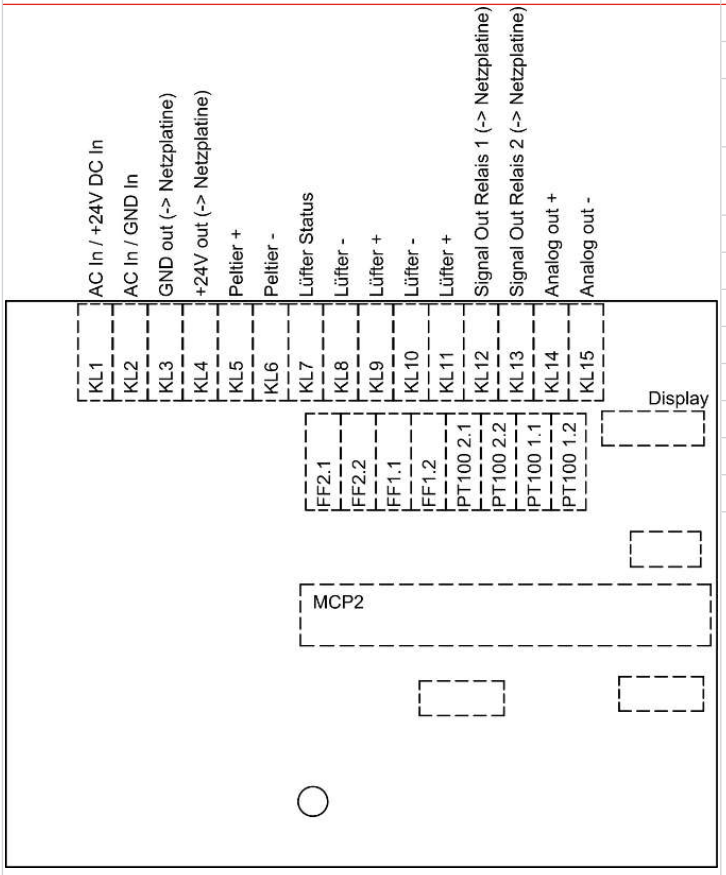
Damage to the device in case of insulation testing
Do not proceed insulation tests with high voltage to the device as a whole!

Electric strength test

This device is equipped with extensive EMC protection. The necessary tests were carried out at the factory (test voltage 2.1 kV or 2.55 kV DC depending on approval).

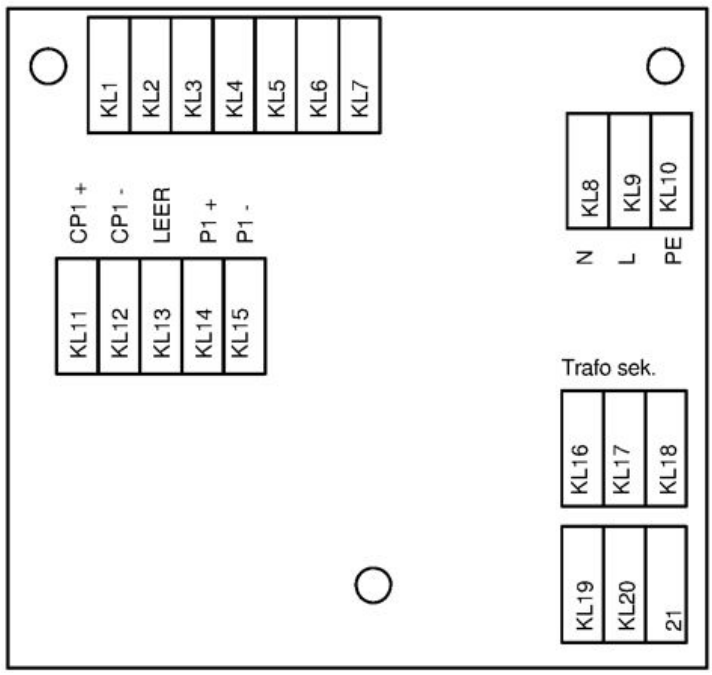
If you wish to check the electric strength again yourself, you can do so on the entire unit. Only test the device with the specified values using direct current voltage. Testing the electric strength with alternating current voltage will damage electronic components. The recommended voltage in this case is 2.1 kV DC, 2 s. Disconnect all supply lines from the device before testing. Power can be supplied via the mains connection.

4.5.1 Wiring diagrams



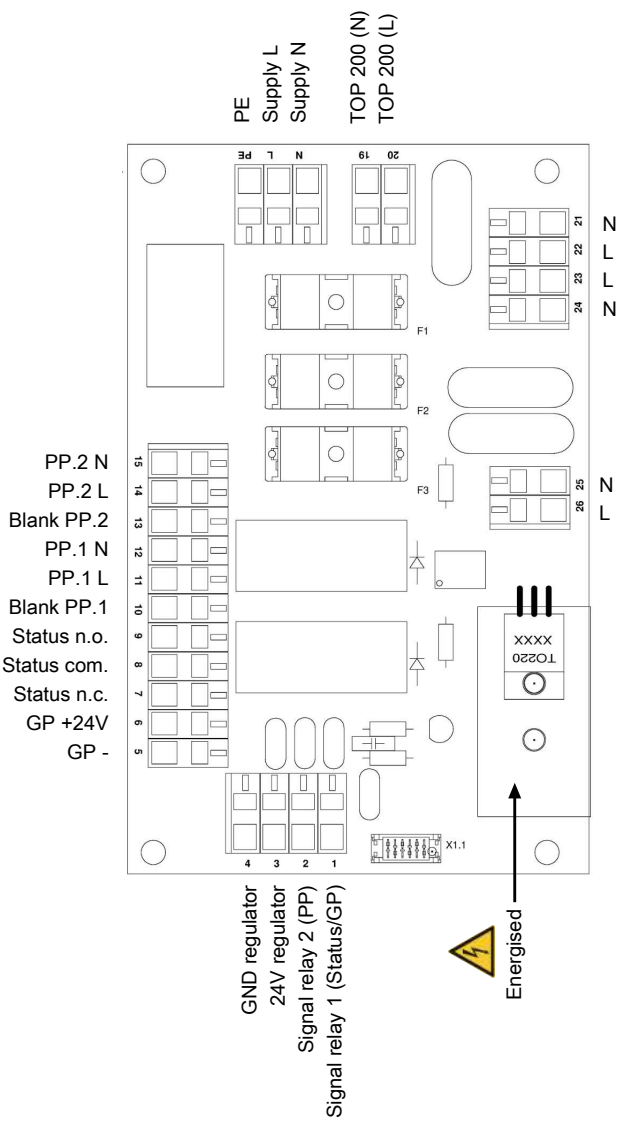
Controller board	Terminal	Function
	1	AC In/+24 V DC In
	2	AC In/GND In
	3	Connection to power and expansion board
	4	Connection to power and expansion board
	14	Analog output +
	15	Analog output -
		Moisture detector
	FF1.1	brown
	FF1.2	white
	FF2.1	brown
	FF2.2	white
	PT100 2.1	Pt100 heated line
	PT100 2.2	Pt100 heated line

Power board (option expansion module 24 V)



Terminal	24 V
	Status output
5	Status n.o. / white
6	Status com. / yellow
7	Status n.c. / red
	Power supply
8	GND
9	+24 V
10	-
	Condensate pump (CP)
11	+24 V
12	GND
13	-
	Sample gas pump (P1)
14	+24 V
15	GND

Expansion module 230/115 V



Terminal	230 V	115 V	Note
1	Signal relay 1, white		Connection expansion and controller board
2	Signal relay 2, orange		
3	+24 V, red		
4	GND, blue		
5	blue		Sample gas pump (GP 24 V)
6	red		
7	Status n.c., red		Status output
8	Status com., yellow		
9	Status n.o., white		
10	white	yellow	Condensate pumps (230/115 V)
11	yellow	white	
12	blue	blue	
13	white	yellow	
14	yellow	white	
15	blue	blue	
16	Functional earth		Power supply
17	Lead, black		
18	N-lead, blue		
19	Lead, black		Connection SNT and expansion board
20	N-lead, blue		
21	-		-
22	-		
23	Lead, brown		self-regulating heated line
24	N-lead, white		
25	N-lead, blue		regulated heated line
26	Lead, black		

4.5.1.1 115 V and 230 V switching power supply

Connect the power supply for the sample gas cooler to the switching power supply. The earth conductor must be connected to the earth bolt on the housing. Please note the polarity when connecting.

4.5.1.2 24 V DC

The voltage supply for the sample gas cooler must be connected to terminals 8 and 9 on the power board. The earth conductor must be connected to the earth bolt on the housing.

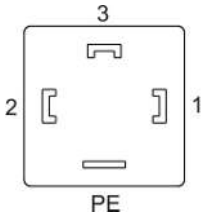
The operating voltage of the pumps which may optionally be connected is 24 V DC. Please note the polarity when connecting.

4.6 Signal outputs

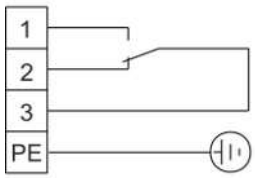
Plug connection (optional)

The unit is optionally equipped with a EN 175301-803 plug for the status output.

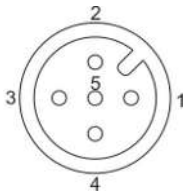
Plug numbering



Alarm contact (S2)



Analog 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 (0.31 – 0.39 inch).

Connection regulated heated line (optional)

Connection	Pin	Assignment	Line type
	1	L 230/115 V	regulated heated line
	2	N 230/115 V	
	3	N 230/115 V	self-regulating heated line
	4	L 230/115 V	
	5	Pt100	regulated heated line
	6	Pt100	
	7	PE	

Connection to board see chapter Wiring diagrams [> page 11].

Connecting other options

Optional	Supply voltage	max. power input
Condensate pump	230 V/115 V	0.025/0.044 A
Gas pump	24 V	0.8 A

When using options by other manufacturers, use suitable fuses.

Description of signal outputs

Function / contact type	Description	
internal changeover contact: max. 250 V AC/ 150 V DC, 2 A, 50 VA	the following device statuses can be indicated via two switching outputs:	Contact between T6 and T7 on the power board closed (alarm) – No mains voltage and/or actual temperature outside the alarm thresholds Contact between T5 and T6 on the power board closed (OK) – Mains voltage attached + actual temperature within the alarm thresholds
		With moisture detector option
		Contact between 6 and 7 closed (alarm) – The moisture detector registers residual humidity in the sample gas or cable break: Error message Contact between 5 and 6 closed (OK) – no residual moisture in measuring gas / no cable break
		With temperature signal option
4-20 mA analogue output (R_{Load} <500 Ω)	Signalling of actual temperature (please use shielded cables)	T_{Cooler} = -20 °C ≙ (-4 °F) -> 4 mA/ 2 V T_{Cooler} = 5 °C ≙ (41 °F) -> 9 mA/ 4,5 V T_{Cooler} = 60 °C ≙ (140 °F) -> 20 mA/ 10 V

5 Operation and control

NOTICE

The device must not be operated beyond its specifications.

After starting the cooler, the software version will be displayed, followed by the block temperature. The display S2 will stay on until the block temperature has reached the preset 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 item "Troubleshooting".

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

When starting for the first time, optional equipment purchased separately must be registered once. The options heat exchanger material, analog output and moisture detector must be configured, tested and registered in the menu.

5.1 Description of functions

The cooler is controlled by a microprocessor.

The programmable display shows the block temperature in the selected display 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 (36 to 68 °F) (factory setting 5 °C/41 °F).

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

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

The flashing display as well as a red LED on the display module along with the status relay indicate the conditions are below or above the configured warning range (e.g. after switching on).

The outputs are:

A potential-free status output. The relay is activated when the block temperature is within the target range. The output also serves as collective alarm for device faults, moisture ingress, etc.

A switched output for connecting a gas pump. The output uses the same relay as the status output. This output can only be used for pumps designed for 24 VDC operating voltage.

Another relay output is available for switching up to two peristaltic pumps. The pumps are supplied with the mains voltage and can be shut off via the device menu for maintenance purposes.

The TC-Kit can optionally be configured for connecting a heated line, which can be either self-regulating or a heated line regulated by the cooler.

Operation via 115 VAC/230 VAC and using the regulator for a heated line requires the optional expansion module.

5.2 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!)

5.2.1 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.**

5.2.2 Overview of the menu items

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.

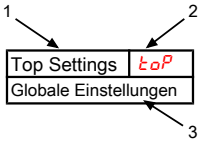
The following image shows an overview of the menu structure.

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.

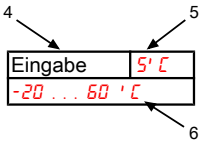
You can cancel entries and menu selections without saving by pressing the **ESC** key.

Menu:

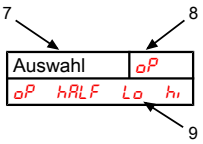


1. Menu designation
2. Display
3. Brief description

Parameter:



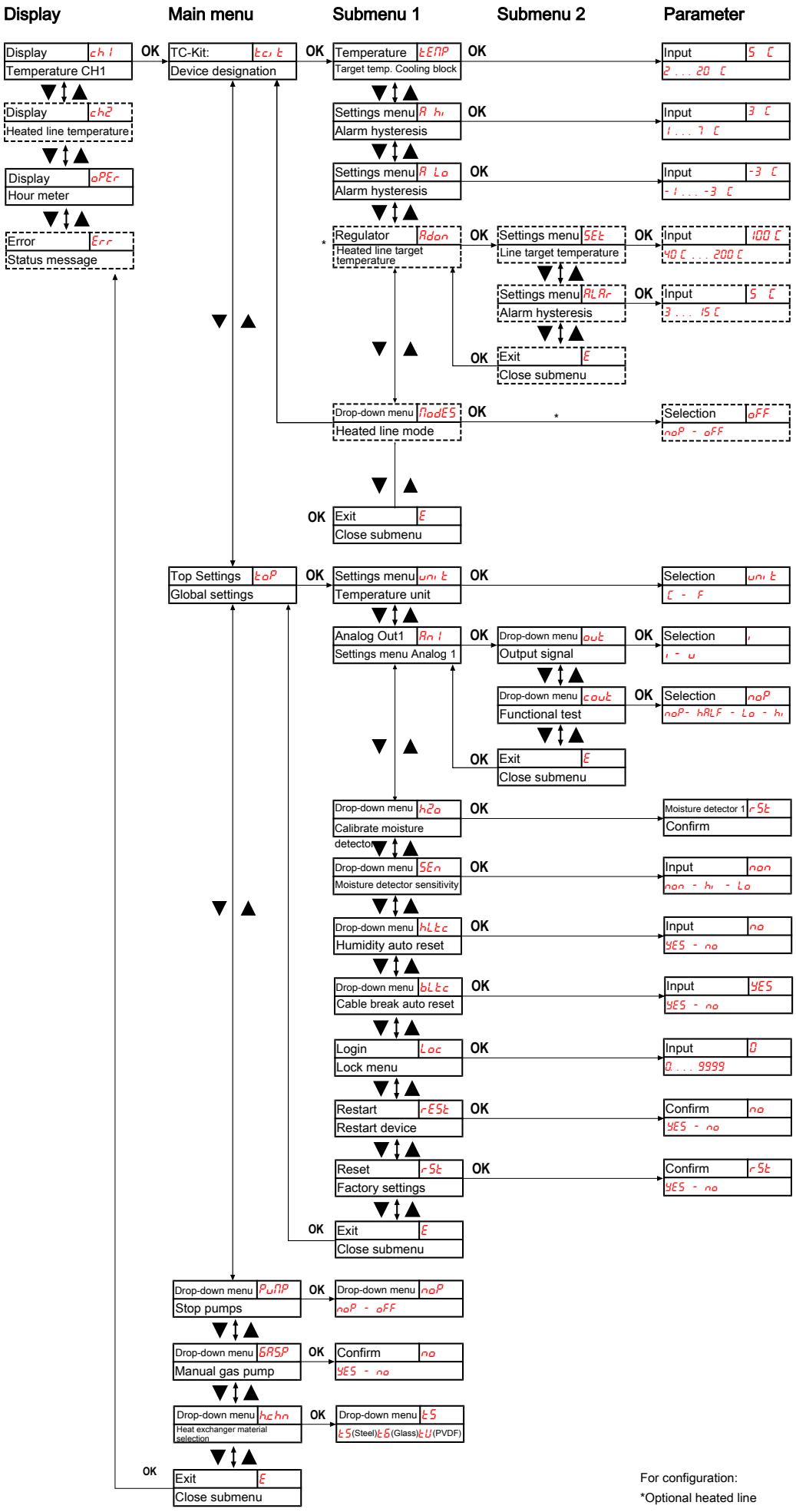
4. Value input
5. Factory preset
6. Parameter range



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

Optional menu navigation:

10. dashed box = Optional

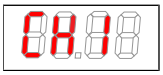

Display
Main menu
Submenu 1
Submenu 2
Parameter
Display ch1
Temperature CH1
OK
TC-Kit: tc.t
Device designation
Temperature tEMP
Target temp. Cooling block
Input 5 C
2 ... 20 C
Display ch2
Heated line temperature
Settings menu A hi
Alarm hysteresis
Input 3 C
1 ... 7 C
Display oPEr
Hour meter
Settings menu A Lo
Alarm hysteresis
Input -3 C
-1 ... -3 C
Error Err
Status message
Regulator Rdon
Heated line target temperature
Settings menu SEt
Line target temperature
Input 100 C
40 C ... 200 C
Settings menu ALAr
Alarm hysteresis
Input 5 C
3 ... 15 C
Exit E
Close submenu
Drop-down menu modES
Heated line mode
Selection oFF
noP - oFF
Exit E
Close submenu
Top Settings toP
Global settings
Settings menu uni t
Temperature unit
Selection uni t
C - F
Analog Out1 An1
Settings menu Analog 1
Drop-down menu out
Output signal
Selection
1 - U
Drop-down menu cout
Functional test
Selection noP
noP- hALF - Lo - hi
Exit E
Close submenu
Drop-down menu h2o
Calibrate moisture detector
Moisture detector 1 rSt
Confirm
Drop-down menu SEn
Moisture detector sensitivity
Input non
non - hi - Lo
Drop-down menu hLtc
Humidity auto reset
Input no
YES - no
Drop-down menu bLtc
Cable break auto reset
Input YES
YES - no
Login Loc
Lock menu
Input 0
0 ... 9999
Restart rESt
Restart device
Confirm no
YES - no
Reset rSt
Factory settings
Confirm rSt
YES - no
Exit E
Close submenu
Drop-down menu PuMP
Stop pumps
Drop-down menu noP
noP - oFF
Drop-down menu GASP
Manual gas pump
Confirm no
YES - no
Drop-down menu hchn
Heat exchanger material selection
Drop-down menu t5
t5(Steel) t6(Glass) tU(PVDF)
Exit E
Close submenu
For configuration:
*Optional heated line

5.3 Description of menu functions

5.3.1 Display Menu

Block temperature display

Display → ch 1



Depending on the device state, the temperature will be displayed as a constant, flashing, or alternating with a status message.

Heated line display

Display → ch2

The display is only available on devices with the "heated line" option. Depending on the device state, the temperature will be displayed as a constant, flashing, or alternating with a status message.

Operating hours /runtime display

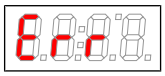
Display → oPEr

Displays the operating hours of the unit. The runtime cannot be reset and can be output in various display formats. To view/exit the runtime, press the „Enter" key.

- YYMM – display in years and months (default)
- MtH – display in months
- WEEH – display in weeks
- dAYS – display in days
- One month corresponds to 30 days. Press the „F" key to switch between the display formats. The display will then first show the selected format as short text, then the duration.

Error code display

Display → Err



In the event of errors/malfunctions not related to operation, the error code indicates possible causes and solutions.

5.3.2 Main menu

Portable Gas Conditioning System TC-Kit

Display → tc, t

This will take you to the portable gas conditioning system target temperature and the tolerance range setting (alarm threshold).

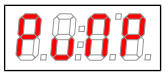
Global setting

Display → toP (ToP Settings)

This menu is used to configure the global cooler settings.

Peristaltic pump and sample gas pump

Display → PUMP



Switching the peristaltic pump and sample gas pump on and off.

Parameter range:	noP , oFF
Factory setting:	noP
Note:	Status switches, "PUMP" flashes.

Peristaltic pump and sample gas pump

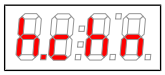
Display → GASP

The sample gas pump can be manually activated for 30 seconds. This process can be repeated several times.

Parameter range:	YES , no
Factory setting:	no

Heat exchanger material selection

Display → hchn

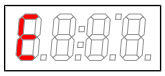


Heat exchanger material selection

Parameter range:	t5 (Steel), t6 (Glass), tU (PVDF)
Factory setting:	t5 (cooler without heat exchanger), or respective material per configuration

Exit main menu

Display → E



Selecting this will return you to display mode.

5.3.3 Submenu cooler

Target temperature

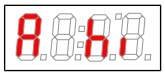
Display → Cooler → tEMP

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

Display → Cooler → A hi (Alarm high)

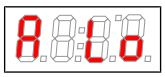


Here you can set the upper threshold for the visual signal and the alarm relay. The alarm limit is set based on the cooler temperature setting.

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

Display → Cooler → A Lo (Alarm low)

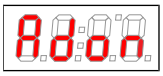


Here you can set the lower threshold for the visual signal and the alarm relay. The alarm limit is set based on the cooler temperature setting.

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.

Regulator/heated line

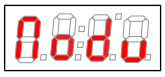
Display → tcLt → Rdon



This will take you to the target temperature setting for the heated line regulator and the tolerance range (alarm thresholds).

Enabling/disabling the heated line

Display → Cooler → Rodu

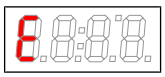


Used to de(activate) the heated line.

Parameter range:	noP, oFF
Factory setting:	oFF
Note:	This menu item is hidden if the keylock is enabled.

Exit submenu 1

Display → Submenu → E

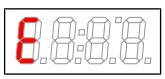


Selecting this will return you to the main menu.

5.3.3.1 Submenu heated line

Exit submenu 1

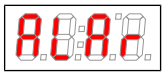
Display → Submenu → E



Selecting this will return you to the main menu.

Alarm thresholds

Display → tc1 t → tEM2 → ALAr



Used to specify the threshold for the alarm with respect to the heated line target temperature. If the temperature measured is outside this interval, the temperature display will flash and the alarm relay will trip.

Parameter range	±5 °C (±41 °F)
Factory setting:	±3 °C .... ±15 °C (±37 °F ... ±59 °F)
Note:	This menu item is hidden if the keylock is enabled.

Target temperature regulator 2

Display → tc1 t → tEM2 → SEt

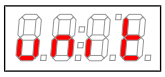
This setting defines the heated line target temperature.

Parameter range:	40 °C to 200 °C (104 °F to 392 °F)
Factory setting:	100 °C (212 °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.

5.3.4 Submenu 1 (global settings)

Temperature unit

Display → toP → uni t

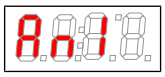


Used to select the temperature display unit.

Parameter range:	C, F
Factory setting:	C

Analog output

Display → toP → An1

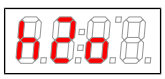


This submenu is used to specify the settings for analog output 1, see chapter Submenu 2 (Analog Output 1)

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

Calibrate moisture detector

Display → toP → h2o



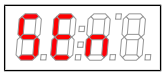
If a moisture detector is installed, calibration can now be performed. To do so, the unit must be flushed with dry gas.

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 the menu SEn 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 applies to setting the sensor sensitivity in menu SEn.

Moisture detector sensitivity

Display → toP → SEn



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

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

Moisture detector: manual or automatic reset following moisture ingress

Display → toP → hLtc

(hLtc = humidity latch). The setting applies to all connected moisture detectors.

Specifies whether the moisture ingress message must be reset manually or will automatically be reset after the sensor dries.

Parameter range:	YES: The status will be indicated until the user restarts the device and the pumps will be disabled. no: The status message will automatically be cleared/the pumps will be released again once moisture is no longer detected.
Factory setting:	no
Note:	This menu will be hidden if the menu is locked.

Moisture detector: error cleared automatically after cable break

Display → toP → bLtc

(bLtc = broken wire latch). The setting applies to all connected moisture detectors.

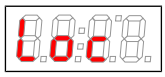
Determines whether the cable break alarm must be reset manually or will automatically clear on valid measuring signal.

Parameter range:	YES: The status will be indicated until the user restarts the device. Clears the error, and the pumps will be deactivated. no: The error message will disappear. The pumps will be switched on again once the moisture detector is reactivated again.
Factory setting:	YES
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.

Restart

Display → toP → rESt

(rESt = restart)

	The device will restart, all settings are saved. All error messages will be reset. The moisture detector will be reset, irrespective of the settings in menus hi tc and hMoi .
Parameter range:	YES: Restart. The display will show the software version for the device and returns to measurement display. no: Exit menu without restarting.
Note:	The user settings will be saved.

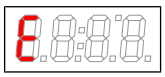
Factory settings

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 1

Display → Submenu → E

	Selecting this will return you to the main menu.

5.3.4.1 Submenu 2 (Analog Output 1)

The analog output will display the actual cooler temperature.

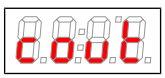
Signal behaviour

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
Mi	12 mA	6 V
Lo	4 mA	2 V
noP	4 – 20 mA	2 – 10 V

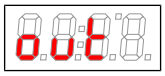
After testing, the signal behaviour must be changed back to normal mode (noP).

Display → toP → An1 → cout

	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 -> Output Signal

Display → toP → An 1 → out

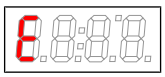


Select the type of output signal.

Parameter range:	' Status output 4... 20 mA
	u Status output 2...10 V
Factory setting:	'
Note:	Disconnect meter before switching!
	This menu item is hidden if the keylock is enabled.

Exit Submenu 2

Display → toP → An 1 → E



Selecting this will return you to submenu 1.

5.3.5 Set favourite menu

Use the **F** or **Func** (function) key to set a favourite menu to later open it with just the push of a button.

– Open the menu you wish to set as the favourite. This menu can also be a lockable menu.
– Press the function key for more than 3 sec.
  The current menu has been set as the favourite. The display will briefly show the message Func.
– Press **ESC** or E (Exit) to return to the display.

To now access the favourite menu, press the **F** or **Func** key.

NOTICE! The favourite menu can also be accessed if the menu is locked.

6 Maintenance

The basic version of the cooler requires no special maintenance.

However, it may have different options depending on the application. In this case the following routine maintenance is required:

- **Optional peristaltic pump:** Check hoses
- **Optional moisture detector:** Calibrate moisture detector
- **Filter option:** Check filter element
- **Optional sample gas pump:** Check valves for contamination. After 500 operating hours tighten the screws for the mounting ring to 3 Nm.

Maintenance is described in the respective operating instructions.

During maintenance, remember:

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

DANGER

Electrical voltage

Electrocution hazard.

a) Disconnect the device from power supply.

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

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

d) Regard correct mains voltage.

DANGER

Toxic, corrosive gas/condensate

Sample gas/condensate may be hazardous to health.

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

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

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

CAUTION

Hot surface

Burning hazard
Let the device cool down before maintaining.

7 Service and repair

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

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

Please contact our Service Department with any questions:

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

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

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

Bühler Technologies GmbH

- Reparatur/Service -

Harkortstraße 29

40880 Ratingen

Germany

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

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

service@buehler-technologies.com.

7.1 Troubleshooting

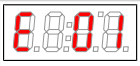
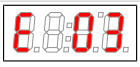
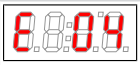
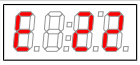
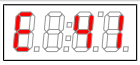
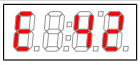
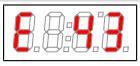
Problem / Malfunction	Possible cause	Action
Condensate inside the gas outlet	– Condensate trap full	– Empty condensate trap
	– Valve inside the automatic condensate drain may be stuck	– Flush in both directions
	– Cooler overloaded	– Maintain limits
Reduced gas flow rate	– Gas circuit clogged	– Uninstall and clean heat exchanger – if necessary, replace filter element
	– Condensate outlet iced over	– Send in unit
Excess temperature	– Operating point not yet reached	– Wait (max. 20 min)
	– Cooling outlet too long despite the cooler running	– Be sure the vents are not covered (heat buildup)
	– Flow rate / dew point / gas temperature too high	– Maintain limits / install pre-separator
	– Installed fan stopped	– Check and replace if necessary
Insufficient temperature	– Faulty control	– Send in cooler

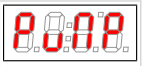
7.1.1 Error messages on the display

If an error occurs, the display will read "Err". Press the "▲" button to show the error number(s).

Error messages will appear until the unit has been restarted or the error is cleared using the "Func" button. It can only be cleared if the cause for the error has been corrected.

Causes / Action: The following is a list of the most common causes and actions for the respective error. If the actions listed do not resolve the problem, please contact Service.

Problem/malfunction		Possible cause	Action
No display		– No voltage – Loose connecting cable – Display failure	– Check the supply cable – Check fuse – Check connections
 (permanent)	D1.02	(The software version for the display will appear). – Not communicating with the controller	– Check connections
	Error	– An error has occurred	– Read the error number as described above
	Error 01	– Controller malfunction	– Clear error (temporary fault) – Disconnect from power for approx. 5 s – Contact service
	Error 03	– Microcontroller fault / MCP2	– Contact service
	Error 04	– EEPROM error	– Contact service
	Error 22	– Moisture detector 1 cable break	– Check moisture detector line – Check moisture detector
	Error 32	– Moisture detector 2 cable break	– Check moisture detector line – Check moisture detector
	Error 40	– General error temperature sensor 1 (block temperature)	– Possible sensor failure
	Error 41	– Low temperature / short-circuit temperature sensor 1	– Check temperature sensor connection
	Error 42	– Excess temperature / short-circuit temperature sensor 1	– Check temperature sensor connection
	Error 43	– Measurement fluctuation temperature sensor 1	– Check temperature sensor connection
	Error 50	– General error temperature sensor 2 (reference temperature Delta-T)	– Possible sensor failure
	Error 51	– Low temperature / short-circuit temperature sensor 2	– Check temperature sensor connection
	Error 52	– Excess temperature / short-circuit temperature sensor 2	– Check temperature sensor connection
	Error 53	– Measurement fluctuation temperature sensor 2	– Check temperature sensor connection

Status text		Possible cause	Action
	H2o.1	– Moisture alarm moisture detector 1	– Dry – Check condensate trap
	H2o.2	– Moisture alarm moisture detector 2	– Dry – Check condensate trap
	init	– Initialization phase	– Wait
	PuMP	– Pumps deactivated	– Reactivate pumps from the menu
 (Flashing)		– Excess/low temperature	– see chapter "Troubleshooting"

7.2 Safety instructions

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

DANGER

Electrical voltage

Electrocution hazard.

a) Disconnect the device from power supply.

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

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

d) Regard correct mains voltage.

DANGER

Toxic, corrosive gas/condensate

Sample gas/condensate may be hazardous to health.

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

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

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

CAUTION

Health hazard 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.

CAUTION

Hot surface

Burning hazard
Let the device cool down before maintaining.

7.3 Cleaning and removal of the heat exchanger

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

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

7.4 Replacing the Microfuse for the Expansion Module/Regulator

- Close gas supply.
- Switch off and unplug the device.
- Replace microfuse (pos. F1, F2 or F3).

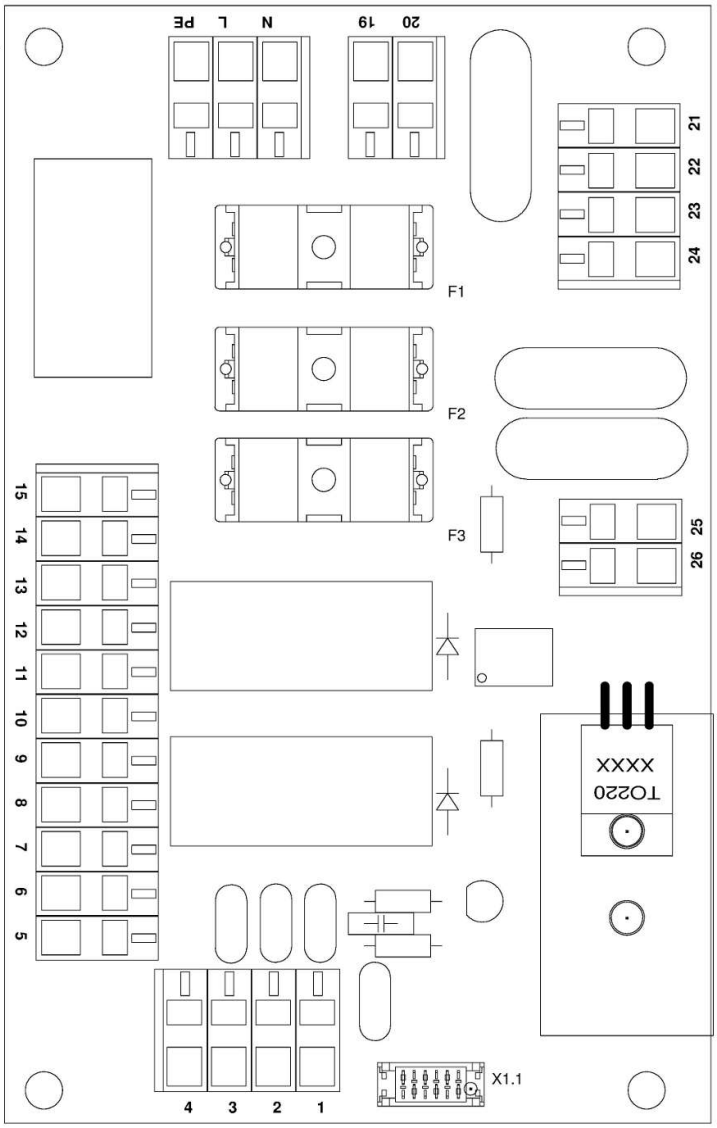


Fig. 1: Add-on electronics wiring diagram

No.	Function	Fusing	
		230 V	115 V
F1	Main unit + pumps	1.25 A	2.5 A
F2	self-regulating, heated line	8 A	8 A
F3	built-in regulator	8 A	8 A

– The fuse is located under a plastic cap on the top board. Replace micro-fuse and put the cap back on. Please note the mains voltage in order to select the correct micro-fuse.
– Restore the power and gas supply.

7.5 Spare Parts

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

Upgrade and expansion parts can be found in our catalog.

Available spare parts:

Item no.	Description
9100100007	Display module MCD400
9144050079	Controller board display module connecting cable, 400 mm
9100130180	Microcontroller board LPP MCP2
9110000058	Sample gas cooler microfuse 230 V, 5 x 20 mm, 1.25 A, delayed action
9110000013	Sample gas cooler microfuse 115 V, 5 x 20 mm, 2.5 A, delayed action
9110000063	Micro-fuse sample gas cooler 24 V DC, 5 x 20 mm, 6.3 A delayed action
446590005	Fan, 12 V DC
9100010185	Power board
9100011185	Power board 24 V DC
9100011187	Controller board
9144050123	7-pin jack with wires 450 mm
see data sheet 464002	Smartline

7.5.1 Spare parts and accessories

Item no.	Description
see data sheet 450005	Automatic condensate drain
see data sheet 410011	Moisture detector and flow cell, various models
41111000	Moisture detector connection cable, 4 m
9144050082	Moisture detector connection cable, 450 mm
9144050038	Cable for cooler temperature analog output 4 m
see data sheet 420011	Sample gas pump P1.x
see data sheet 450020	Peristaltic pump CPsingle, CPdouble and replacement hose
see data sheet 440002	Condensate trap
4381045	Screw connection G1/4 – DN 8/12 for passive condensate connection MTS and MTV
4381048	Screw connection NPT 1/4" for passive condensate connection MTS and MTV
449601000	Analog output kit
449600047	Mains supply, M3 plug, cable length 400 mm
449600049	Status output, M3 plug, cable length 380 mm
449601001	Mounting kit 1 for thin housings

8 Disposal

The heat exchanger is charged with glycol-based coolant.

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

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

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

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

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

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

Bühler Technologies GmbH
WEEE
Harkortstr. 29
40880 Ratingen
Germany

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

9 Appendices

9.1 Gas cooler technical data

Gas cooler			
Ready for operation	after max. 10 minutes		
Ambient temperature	5 °C to 55 °C		
Gas output dew point preset: adjustable:	 5 °C 2 °C to 20 °C		
Mechanical load	Tested based on DNV-GL CG0339 vibration class A (0.7g) 2 Hz-13.2 Hz Amplitude ± 1.0 mm 13.2 Hz -100 Hz 0.7g acceleration		
Protection rating	IPxxC, with tight installation IP54		
Rack material (outdoors):	Stainless steel, aluminium		
Packaging dimensions	approx. 215 x 200 x 360 mm		
Weight without heat exchanger	approx. 3.8 kg (switched-mode power supply + controller) approx. 3.4 kg (at 24 V DC)		
Electrical power input	Base version	Optional switching power supply	
	24 V DC	230 V AC	115 V AC
	5 A	0.6 A	1.2 A
	120 W	110 W/140 VA	
Status output switching capacity (optional)	max. 250 V AC, 150 V DC 2 A, 50 VA, potential-free		
Electrical Connections	Cable clamp (for 24 V DC) or blade receptacle (for 115/230 V AC)		
Gas connections	Heat exchanger see table "Heat exchanger overview"		
Parts in contact with mediums	Heat exchanger see table "Heat exchanger overview"		

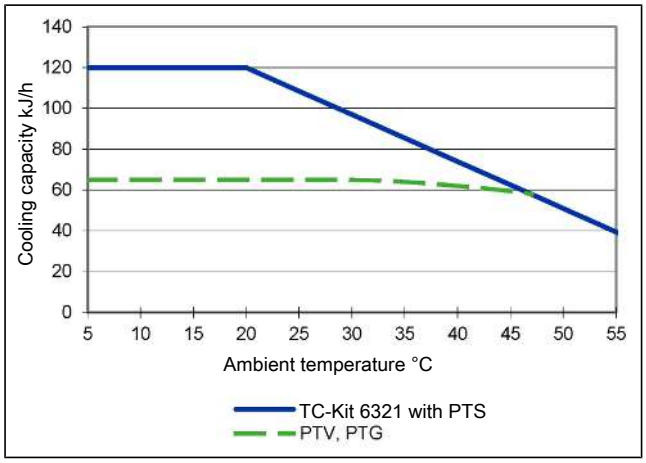
9.2 Technical Data - Options

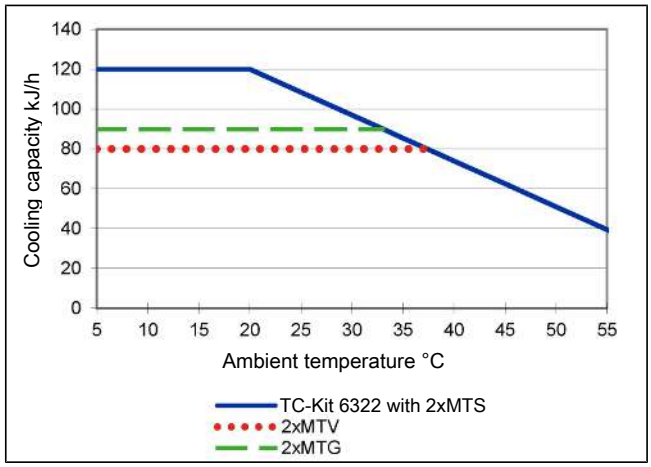
Technical data controller for heated line	
Temperature, preset: adjustable:	 100 °C 40 °C .. 200 °C
Motor power:	max. 1600 W (230 V)/800 W (115 V)
Sensor type:	Pt100, 2-wire
Connection:	693 series socket, 7-pin

9.3 Outlet

TC-Kit:

One heat exchanger		Two heat exchangers	
Model TC-Kit 6312		**Model TC-Kit 6322**	
Rated cooling capacity (at 25 °C)	110 kJ/h	Rated cooling capacity (at 25 °C)	110 kJ/h
max. ambient temperature	55 °C	max. ambient temperature	55 °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



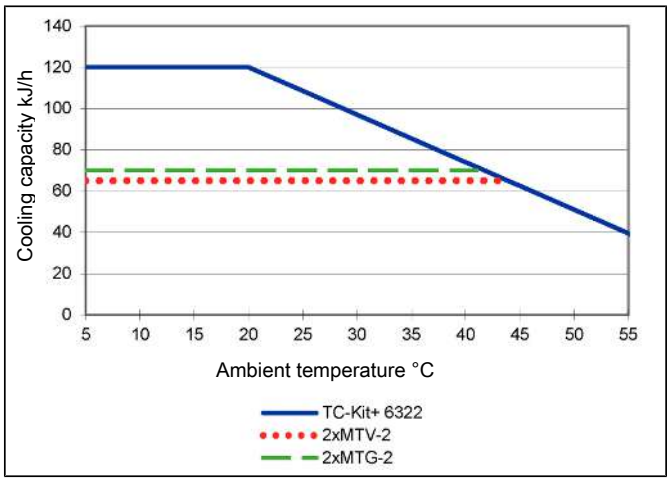


Note: The limit curves for the heat exchangers exchanger PTG, MTG, PTV or MTV apply to a dew point of 50 °C.

The cooling capacity curves of the TC-Kit apply to ideal installation in a housing. Depending how it is installed, the value may deviate from the cooling capacity curve.

TC-Kit+:

Two heat exchangers	
Model TC-Kit 6322+	
Rated cooling capacity (at 25 °C)	110 kJ/h
max. ambient temperature	55 °C
Dew point fluctuations	
static	± 0.1 K
in the entire specification range	± 1.5 K
Temperature difference between heat exchangers	< 0.5 K



Note: The limit curves for the heat exchangers MTV-2 and MTG-2 apply to a dew point of 50 °C.

The cooling capacity curves of the TC-Kit+ apply to ideal installation in a housing. Depending how it is installed, the value may deviate from the cooling capacity curve.

9.3.1 Heat exchanger description

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

9.3.2 Heat exchanger overview

TC-Kit:

Heat exchanger	**PTS** **PTS-I** [2]	**PTG** **PTG-I** [2]	**PTV** **PTV-I** [2]	**MTS** [3] **MTS-I** [2] [3]	**MTG** [3] **MTG-I** [2] [3]	**MTV** [3] **MTV-I** [2] [3]
Materials in contact with media	Stainless steel	Glass PTFE	PVDF	Stainless steel PVDF	Glass PTFE	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 $\tau_{e,max}$ [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)	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.

TC-Kit+:

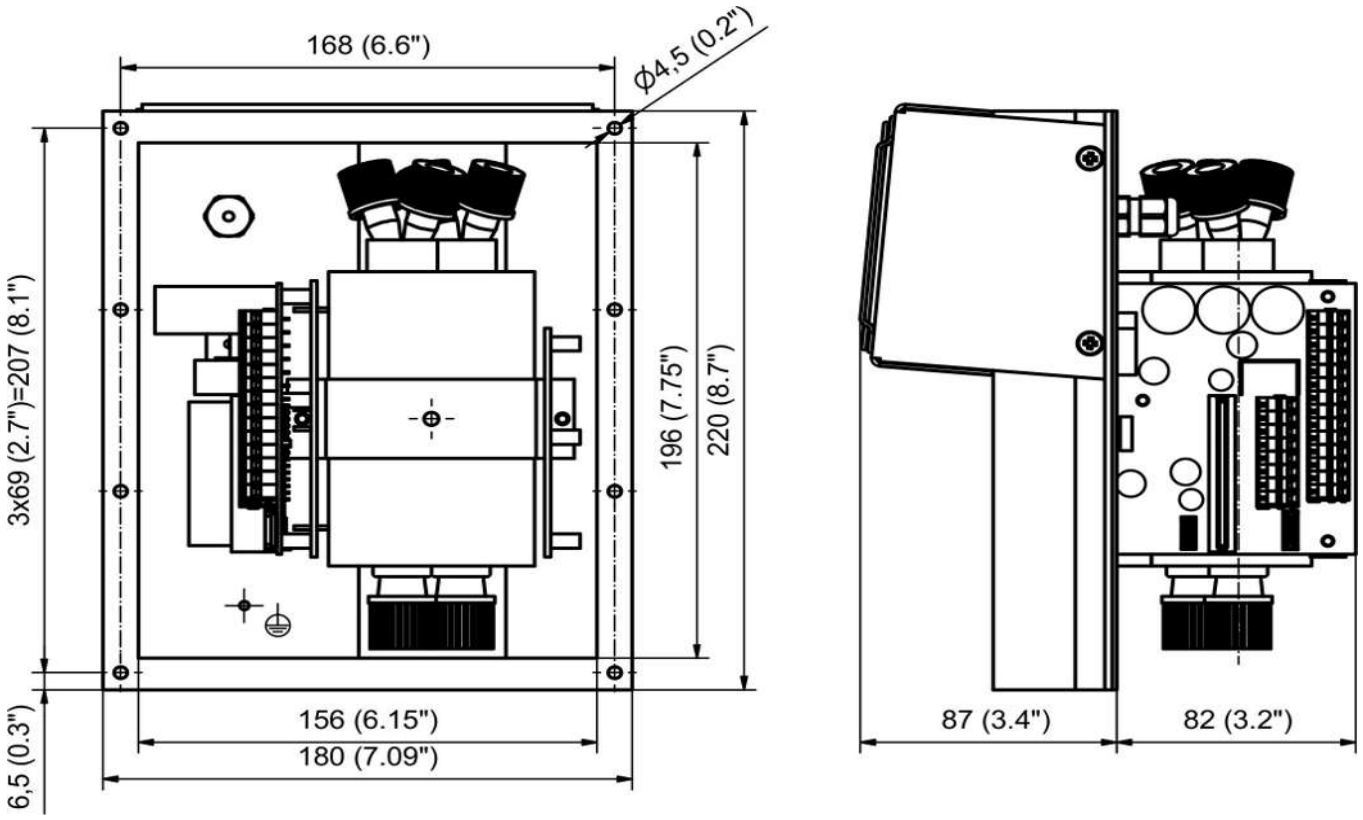
Heat exchanger	2x MTG-2 [3]	2x MTV-2 [3] 2x MTV-2-I [2] [3]
Materials in contact with media	Glass PTFE	PVDF
Flow rate v_{max} [1]	210 Nl/h	190 Nl/h
Inlet dew point $\tau_{e,max}$ [1]	65 °C	65 °C
Gas inlet temperature $\vartheta_{G,max}$ [1]	140 °C	140 °C
Max. cooling capacity Q_{max}	80 kJ/h	65 kJ/h
Gas pressure p_{max}	3 bar	2 bar
Pressure drop Δp (v=150 L/h)	19 mbar	18 mbar
Dead volume V_{dead}	38 ml	36 ml
Gas connections (metric)	GL14 (6 mm)	DN 4/6
Gas connections (US)	GL14 (1/4")	1/4"-1/6"
Condensate out connection (metric)	GL18 (8 mm)	G1/4
Condensate out connection (US)	GL18 (8 mm)	NPT 1/4"

[1] Considering the maximum cooling capacity of the cooler.

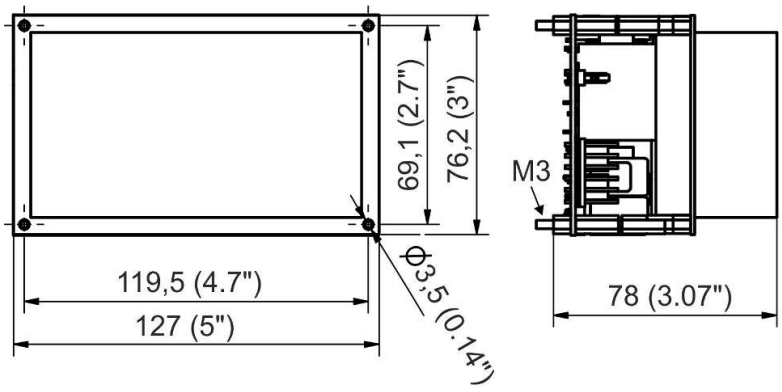
[2] Models marked I have NPT threads or US tubes, respectively.

[3] Passive discharge via automatic condensate drains or traps not applicable for MTG-2 heat exchangers. For passive discharge on the MTV-2 heat exchangers, use a screw connection with a clearance of at least 7 mm (see accessories).

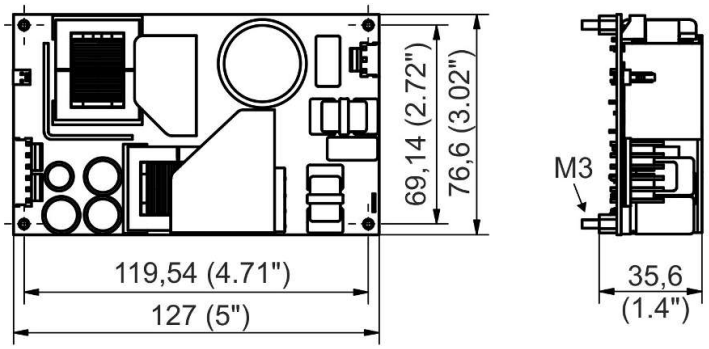
9.4 Dimensions basic version



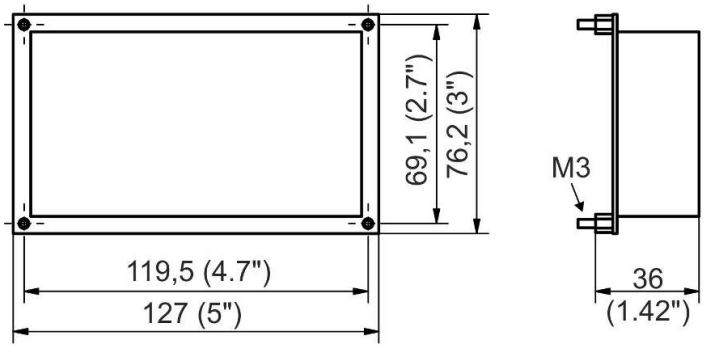
Power supply and expansion module



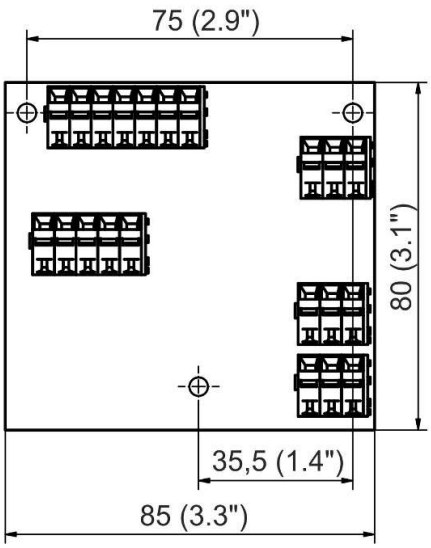
Power supply module



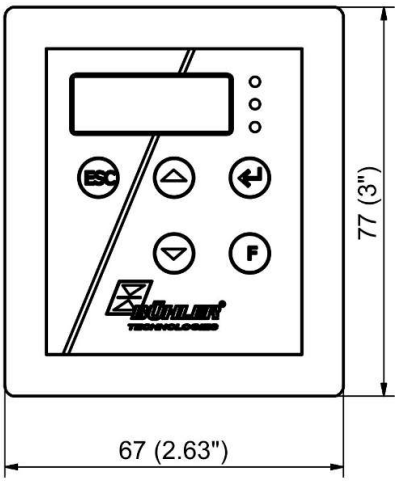
Expansion module (230 V/115 V)



Power board (option expansion module 24 V)



Display unit



Cut-out in front panel 55.5 x 65.4 mm (2.18" x 2.57")

10 Attached documents

– Declaration of Conformity KX440011
– RMA - Decontamination Statement

EU-Konformitätserklärung
EU Declaration of Conformity

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

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

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

in ihrer aktuellen Fassung entsprechen.

in its actual version.

Produkt / products: Peltier Messgaskühler / *Peltier sample gas cooler*
Typ / type: TC-Kit, TC-Kit+

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/A1:2019/AC:2019-04

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

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

Ratingen, den 17.02.2023

Stefan Eschweiler
Geschäftsführer – *Managing Director*

Frank Pospiech
Geschäftsführer – *Managing Director*

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

UK Declaration of Conformity

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

Electrical Equipment Safety Regulations 2016

Product: Peltier sample gas cooler
Types: TC-Kit
TC-Kit+

The equipment is used for conditioning the sample gas to protect the analysis instrument from residual moisture in the sample gas.

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

EN 61010-1:2010/A1:2019/AC:2019-04

Ratingen in Germany, 17.02.2023

Stefan Eschweiler
Managing Director

Frank Pospiech
Managing Director

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

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

RMA-Nr./ RMA-No.

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

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

Firma/ Company

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

Ansprechpartner/ Person in charge

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

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

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

Grund der Rücksendung/ Reason for return

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

bitte spezifizieren/ please specify

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

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

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

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

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

Bitte Sicherheitsdatenblatt beilegen!/ Please enclose safety data sheet!

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

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

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

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

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

Firmenstempel/ Company Sign

Datum/ Date

rechtsverbindliche Unterschrift/ Legally binding signature

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

Vermeiden von Veränderung und Beschädigung der einzusendenden Baugruppe

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

Umgang mit elektrostatisch sensiblen Baugruppen

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

Einbau von Ersatzteilen

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

Einsenden von Elektroaltgeräten zur Entsorgung

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

Avoiding alterations and damage to the components to be returned

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

Handling electrostatically conductive components

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

Fitting of spare parts

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

Returning old electrical appliances for disposal

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

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