



Gas cooler series TC-Kit+

In the chemical industry, petrochemistry or biochemistry, reliable process control relies on prompt and exact determination of the operating parameters.

Here, gas analysis is key for safe and efficient control of process flows, environmental protection and quality assurance. This benefits controlling flue gas emission in power stations or exhaust gas analysis in automotive engineering, as well as the efficient control of air separators or sterile production and packaging in the food industry.

Many of the analysis processes used in these fields require extracting the sample gas. This inevitably also extracts process-related contamination such as particles or moisture. These in turn can impact the measurement results or damage the measuring cells. The sample gas must therefore be conditioned before entering the analyser.

The TC-Kit+ series features a new generation heat exchangers with a particularly low wash out effect of water-soluble components and are specifically suitable for measuring emissions. Particularly washout of SO₂ is low. These coolers can therefore be used for so-called automated measuring systems (AMS) per EN 15267-4.

Compact design for installation in a gas cooling system

Effective heat release through external fans and cooling ribs

Version 24 V, optionally 230 V/115 V

Protection class IPxxC, with tight installation IP54

One gas path

Optimised glass or PVDF heat exchanger model

Adjustable outlet dew point and alarm thresholds

Nominal capacity 104 Btu/h

Dew point stability ± 0.2 °F

MCD400 display module for separate installation

Used in **DNV-GL and LR type-tested** conditioning unit

Compliance with requirements of **MARPOL MEPC.259(68)** of **IMO** confirmed

Low wash out effects confirmed by **DNV-GL**



Overview

The TC-Kit+ series was designed specifically for the requirements in so-called automated measuring systems (AMS) according to EN 15267-4. Dividing the interior and exterior ensures the IP rating required by the standard without requiring ventilation of the interior. The series connection of the heat exchangers will cool in two cycles to minimise wash out effects.

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 | 131 °F |
| 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.

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 $\tau_a -1$ to -3 K (at a minimum 1 °C cooling block temperature), for the excess temperature the range is $\tau_a +1$ 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.

Gas cooler technical data

Gas cooler

| | | | |
|---|--|---------------------------------|----------|
| Ready for operation | after max. 10 minutes | | |
| Ambient temperature | 41 °F to 131 °F | | |
| Gas output dew point preset: | 41 °F | | |
| adjustable: | 36 °C...68 °F | | |
| 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. 8.5 x 7.9 x 14.2 in | | |
| Weight without heat exchanger | approx. 8.4 lb (switched-mode power supply + controller) approx. 7.5 lb (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" | | |

Technical Data - Options

Technical data controller for heated line

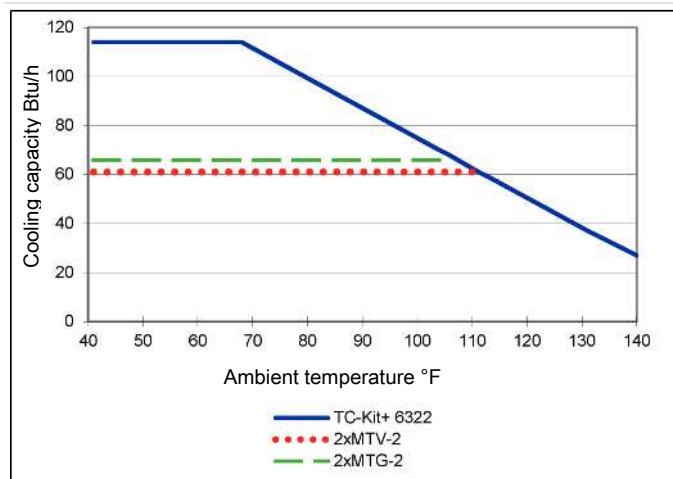
| | |
|-------------------------|-----------------------------------|
| Temperature, preset: | 212 °F |
| adjustable: | 104 °F .. 392 °F |
| Motor power: | max. 1600 W (230 V)/800 W (115 V) |
| Sensor type: | Pt100, 2-wire |
| Connection: | 693 series socket, 7-pin |

Outlet

Two heat exchangers

Model TC-Kit 6322+

| | |
|--|-------------|
| Rated cooling capacity (at 77 °F) | 104 Btu/h |
| max. ambient temperature | 131 °F |
| 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 122 °F.

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.

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 $T_e = 104$ °F and $\vartheta_G = 158$ °F. The maximum flow v_{\max} in NI/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 program.

Heat exchanger overview

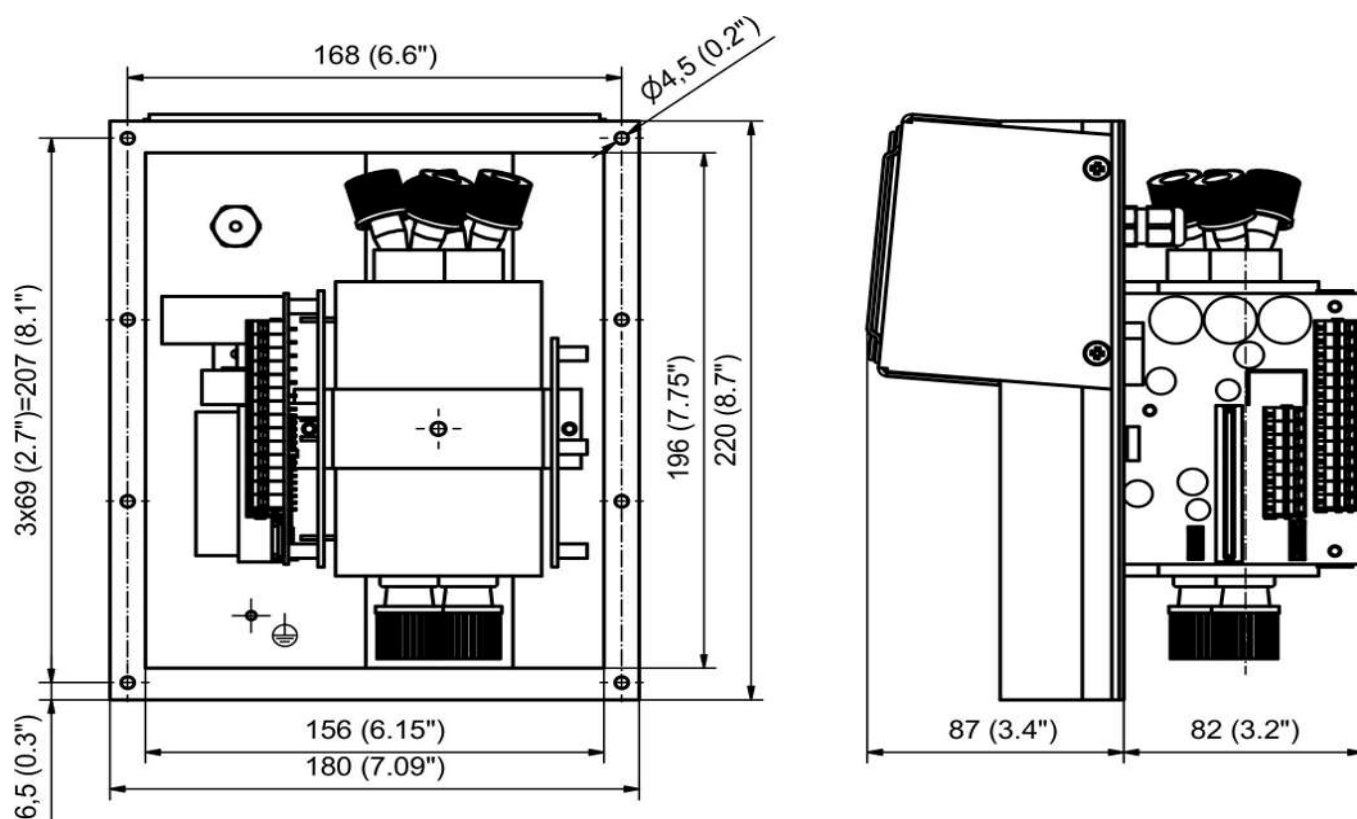
| Heat exchanger | 2x MTG-2 ³⁾ | 2x MTV-2 ³⁾ 2x MTV-2-I ^{2) 3)} |
|--|------------------------|---|
| Materials in contact with media | Glass PTFE | PVDF |
| Flow rate v_{\max} ¹⁾ | 3.5 lpm | 3.2 lpm |
| Inlet dew point $\tau_{e,\max}$ ¹⁾ | 149 °F | 149 °F |
| Gas inlet temperature $\vartheta_{G,\max}$ ¹⁾ | 284 °F | 284 °F |
| Max. cooling capacity Q_{\max} | 76 Btu/h | 62 Btu/h |
| Gas pressure p_{\max} | 44 psi | 29 psi |
| Pressure drop Δp ($v=2.5$ lpm) | 0.28 psi | 0.26 psi |
| Dead volume V_{dead} | 2.3 cu. in. | 2.1 cu. in. |
| 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.

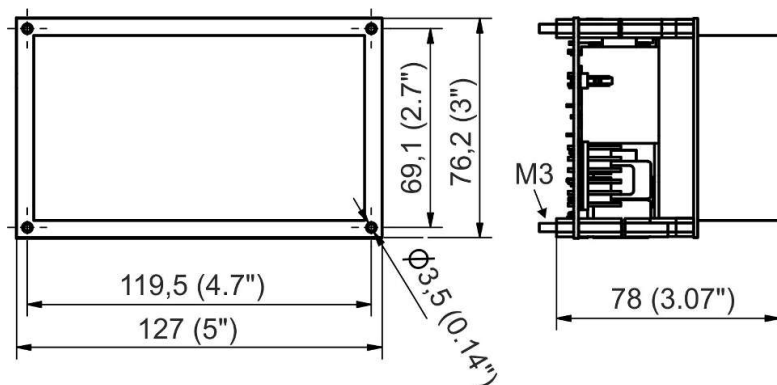
²⁾ Models marked I have NPT threads or US tubes, respectively.

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 0.3 in (see accessories).

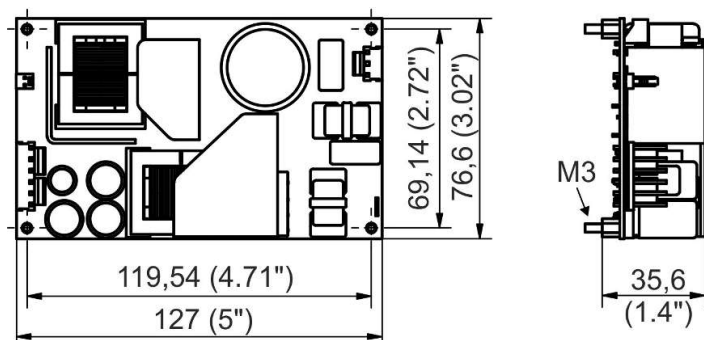
Dimensions basic version



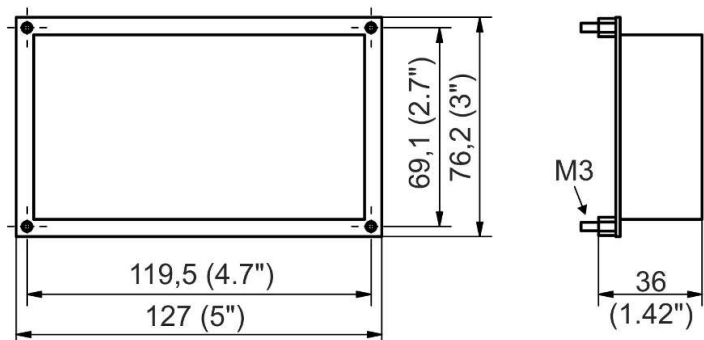
Power supply and expansion module



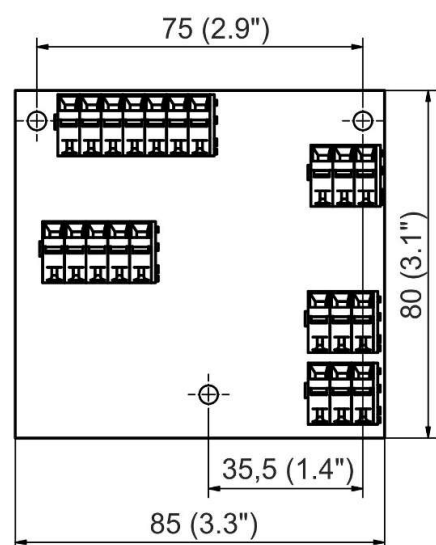
Power supply module



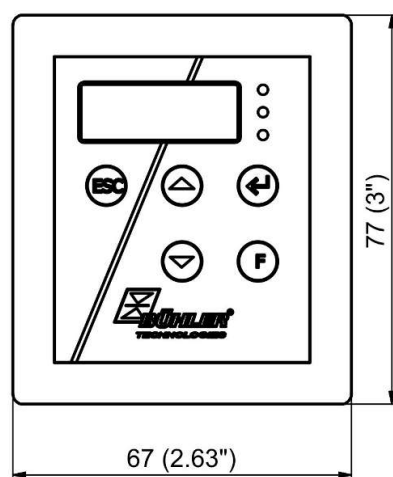
Expansion module (230 V/115 V)



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")

Ordering instructions

Gas cooler model with two heat exchangers in series

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

| 4496 | 2 | 3 | 2 | X | 0 | X | X | X | 0 | Product Characteristics | |
|------|---|---|---|---|---|---|---|---|---|--|---|
| | | | 2 | | | | | | | Gas cooler for 2 heat exchangers in series | |
| | | | | | | | | | | | Gas cooler type |
| | | | 2 | | | | | | | | TC-Kit+: Ambient temperature 131 °F |
| | | | | | | | | | | | 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 |

Heat exchanger options

| 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 |

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 (13 ft) |
| 9144050082 | Moisture detector connection cable, 450 mm (17.7 in) |
| 9144050038 | Cable for cooler temperature analog output 4 m (13 ft) |
| 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 (15.7 in) |
| 449600049 | Status output, M3 plug, cable length 380 mm (15 in) |
| 449601001 | Mounting kit 1 for thin housings |