

4 Installation and connection

4.1 Installation site requirements

The device is designed for indoor use, either wall-mounted or as a benchtop device. The maximum installation altitude is suitable for elevations up to 2000 m.

Wall mounting: The device must be fixed at the designated mounting points. Flange through holes: $4 \times \varnothing 7$ mm.

Benchtop device: Ensure that the device is positioned upright and level on a flat, secure surface.

The device is designed for use with pollution degree 2 and overvoltage category II. When used outdoors, adequate weather protection must be provided.

Install the device, leaving enough room below the cooler to discharge the condensate. There should also be some space above for gas supply connections. During operation, condensate may form and drip off under unfavourable ambient conditions. Ensure that no moisture-sensitive components or devices are positioned beneath the device.

Ensure that the permissible ambient temperature is maintained. Do not obstruct the convection of the cooler. The vents must have enough room to the next obstacle. In particular, on the air outlet side, the distance must be at least 10 cm.

The device contains the flammable refrigerant R600a (isobutane) in a technically permanently sealed refrigerant circuit and was leak-tested at the factory.

Despite the basic, safe design, residual risks should be minimised through appropriate measures with regard to installation location, operation, maintenance, service, repair and disposal (see corresponding chapter). Please observe in particular the warning on flammable substances.

The respective national legal regulations regarding devices with flammable refrigerants apply. The refrigerant quantity can be found in the technical data or directly on the device.

Adequate ventilation must especially be ensured when installing in enclosed housings, e.g. analyser cabinets, to prevent refrigerant accumulation.

This can be done using one of the following measures, for example:

- Ensuring an adequate free air volume (see minimum room volume recommendation) around the device.
- Ensuring natural convection.
- Active ventilation through suitable ventilation equipment (cooler air outlet directly into a free minimum room volume).
- Purging the sealed housing with air or other inert gases.
- Use of a fan to dissipate heat and mix the ambient air.
- Use of an LEL (lower explosion limit) sensor with automatic shutoff.

All measures should be implemented under consideration of applicable national regulations. The operator is responsible for assessing safety.

Recommended minimum room

The recommended minimum room for assembly, startup, maintenance, service, repair and disposal is 3.5 m³.

The recommended minimum room for operation is 0.75 m³.

WARNING

Flammable substances



The device is filled with flammable refrigerant R600a.

a) Careful handling and specific choice of installation location and operating conditions. The recommended minimum room must be observed, or other safety measures must be taken.

b) Do not damage the refrigeration circuit. In the event of damage:

- ⇒ Keep away from open flames or sources of ignition.
- ⇒ Ventilate the room for several minutes.
- ⇒ Switch off the device.
- ⇒ Contact the manufacturer for repair.
- ⇒ Do not discharge refrigerant into drains or rooms where there are open flames or sources of ignition.

CAUTION**Contamination of cleaned components**

For sample gas coolers with stainless steel heat exchangers for O₂ applications (suffix -O₂), contamination with oil, grease, dust, particles, lint, hair, etc. must be ruled out for fire protection reasons when working on components that come into contact with media. If necessary, adapt your operational and organisational measures with regard to the work clothing to be used, hygiene regulations, etc. If necessary, move such work to a suitable, cleaner work area.



4.2 Installation

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

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

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

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

With the option for high-purity water or oxygen (suffix -H₂/-O₂), the components are each supplied in separate packaging. To prevent soiling, these should only be unpacked shortly before use.

Installation instructions additional type plate -H₂:

To ensure traceability of the leakage test of the heat exchanger in H₂ applications, affix the enclosed additional type plate in a suitable place before commissioning. When affixing to the cooler housing, no openings must be closed, and overlapping with other stickers or components is not permitted – minimum distance: 2 mm.

CAUTION**Warning of electrical charge (-H₂)**

When affixing to the cooler:
The enclosed additional type plate of the heat exchanger must be affixed to the cooler according to the installation instructions.

4.2.1 Connecting the filter gas connections (optional)

The connection between the heat exchanger outlet and the filter inlet does not have tubing included. 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 ≤ 4 bar

4.2.2 Flow adapter connection (optional)

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 G1/4 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 Peristaltic pump connector (optional)

Coolers ordered with built-in peristaltic pumps already have these installed and wired. Heat exchangers ordered at the same time are already installed and connected to the peristaltic pumps.

NOTICE



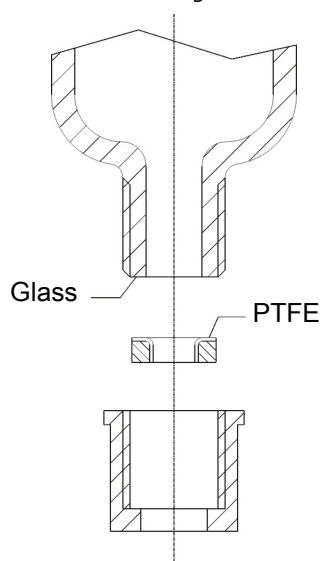
Installing peristaltic **pumps** CPsingle / CPdouble limits the maximum permissible **operating pressure** in the system!
Operating pressure ≤ 1 bar

A peristaltic pump may also be installed away from the cooler. A mounting angle is available for mounting the pump directly below the cooler. Mounts for securing the angle directly to the cooler are designated.

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.



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

TS/TS-I gas connections: SW 17

TS/TS-I condensate out connections: SW 22

4.2.6 Condensate drain connection

Depending on the material, a connecting line consisting of fitting and pipe or hose must be installed between the heat exchanger and condensate drain. For stainless steel, the condensate drain can be suspended directly from the connecting pipe; for hose connections, the condensate drain must be fixed separately with a clamp.

For the high-purity oxygen option, ensure selection of components with suffix -O2.

If the condensate drain type 11 LD V 38 is used for high hydrogen concentrations, the system into which it is installed must be checked for leak-tightness.

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

The DTS-6(-I) and DTV(-I) heat exchangers cannot be operated in conjunction with an automatic condensate drain.

4.2.7 Adapter plate connection

The adapter plate is intended to easily replace the cooler with an existing bore pattern of the predecessor EGK 1/2. It is first inserted from behind with the threaded bolts through the bores of the RC 1.x and locked in place with the included nuts. The cooler with adapter plate can then be fastened to the existing bore pattern.

4.3 Electrical connections

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

This separator

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

The power supply line of the device must be protected according to the specifications in the technical data.

WARNING



Hazardous electrical voltage

The device must be installed by trained staff only.

CAUTION



Wrong mains voltage

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

WARNING



High voltage

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

Insulation test

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

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

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

Connection via plug

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

The supply line cross-sections must be suitable for the rated current. Use a maximum line cross-section of 1 mm² (AWG 17) and a maximum line cross-section of 1.5 mm² (AWG 16) and a cable diameter of 8–10 mm (0.31–0.39 inches).

For connecting the analogue output or digital interface, shielded signal cables with a maximum length of 30 m (98.4 ft) must be used and connected at both ends.

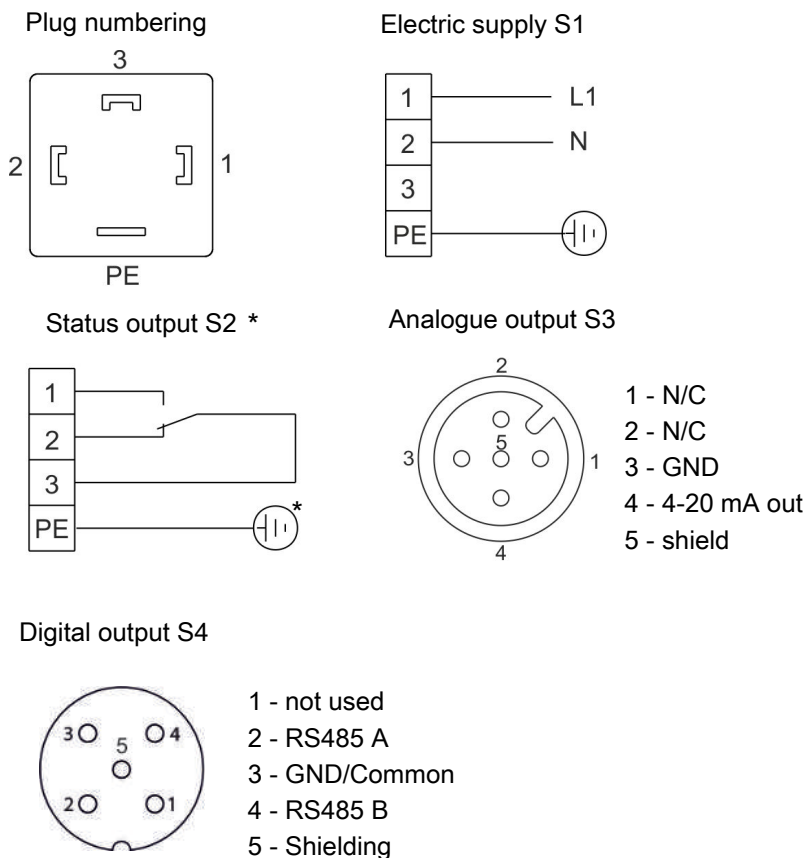


Fig. 1: Cooler connection

* When using the status output with a voltage ≥ 33 V AC or ≥ 70 V DC, the protective earth (PE) must be connected.

The clamping range has a diameter of 8–10 mm (0.31–0.39 inch).

4.4 Signal outputs

The device has various standard and optional signal outputs. Signalling via the display and the status output are always included in the scope of delivery. An analogue or digital output is optional.

4.4.1 Signalling via the display

The front foil contains three LEDs:

Colour	Marking	Function
Red	S2	High/low temperature, device error
Yellow	S1	---
Green	OP	Normal operation

The OP and S2 LEDs indicate the device status in the same way as status output S2.

4.4.2 Status output (terminal S2)

The maximum switching capacity of the status outputs is 250 V AC / 150 V DC, 2 A, 50 VA each.

The status output (S2) indicates when the cooler block temperature is outside the specified limits. No distinction is made as to whether the alarm was triggered by excess temperature or insufficient temperature.

If the “humidity sensor” option is installed, status output S2 will also signal if moisture is still present in the conditioned sample gas or if a cable break is detected. The signalling does not distinguish between humidity sensor 1 or 2.

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 3 and 2 closed (alarm) – No mains voltage and/or actual temperature value outside the set alarm thresholds. – Device in fault condition / pump deactivated. Contact between 3 and 1 closed (ok) – Mains voltage applied + actual temperature value within the set alarm thresholds. with humidity sensor option Contact between 3 and 2 closed (alarm) – Humidity sensor detects residual moisture in the sample gas or cable break: Error message. Contact between 1 and 3 closed (ok) – No residual moisture in the sample gas / no cable break.

4.4.3 Analogue output (connection S3)

If the ‘analogue output’ option (*see type code*) is integrated, the actual value of the cooler block temperature is output via the analogue output as a 4...20 mA signal.

The device menu offers the option to reconfigure the interface from current output to voltage output. The analogue value is then represented as a 2...10 V signal.

The temperature signal can be tapped via the built-in connector (S3) with M12x1 connection. This connector is located next to the connections for the humidity sensors on the top of the cooler.

Function / contact type	Description
4-20 mA analog output ($R_{load} < 500 \Omega$)	Signalling of the cooler block temperature $T_{cooler} = -20\text{ °C} \triangleq (-4\text{ °F}) \rightarrow 4\text{ mA}/2\text{ V}$ $T_{cooler} = 5\text{ °C} \triangleq (41\text{ °F}) \rightarrow 9\text{ mA}/4.5\text{ V}$ $T_{cooler} = 60\text{ °C} \triangleq (140\text{ °F}) \rightarrow 20\text{ mA}/10\text{ V}$

4.4.4 Digital output (connection S4)

Via this interface, various measurement values and device statuses can be read and the cooler can be parameterised. A detailed description of the interface can be found in the chapter Using the Digital Interface.

Function / contact type	Description
Digital output	Modbus RTU (RS-485) Interface default values Baudrate – Parity – Stop bit: 19200 – Even – 1 Default ID: 10 The bus lines are not internally terminated.