

4 Installation and connection

Check the equipment for damage before installation. Among other things, this could be a damaged housing, supply cables, etc.. Never use equipment with obvious damage.

DANGER



Diffusing pumped media

Explosion hazard! Formation of explosive atmosphere due to escaping flammable gases.

When operating the sample gas pumps with media that tend to diffuse strongly, such as hydrogen (H₂) in high concentrations, it is essential to note that these are not permanently technically leak-proof due to their design. To ensure safe operation, the official regulations for installation and operation must be observed. In addition to regular leakage checks, suitable technical measures such as gas monitoring devices, technical ventilation, etc. must be provided depending on the installation situation.

CAUTION



Use appropriate tools

According to DIN EN 1127-1, the operator is responsible to select and use appropriate tools.

CAUTION



Contamination of cleaned components

With sample gas pumps P2.x AMEX-O2 (item no.: 42.....-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.



CAUTION



Unit leakage rate

With sample gas pumps P2.x AMEX-H2 (item no.: 42.....-H2), the leakage rate is tested at the factory to verify compliance with defined limit values. This may deviate after loosening or retightening cap screws and/or pipe fittings. Carry out a new test if necessary.

4.1 Requirements to the installation site

CAUTION



Equipment damage

Protect the equipment, particularly gas connections and gas lines, from dust, falling objects, as well as external blows.

Lightning

On principle, the operator must meet all applicable standards with respect to preventing damage to the equipment due to lightning, which could result in equipment damage.

CAUTION



Avoid vibrations and resonances

The operator is responsible to mount the pump in a way that vibrations and resonance do not cause premature failure resulting in creating an effective ignition source.

The sample gas pump must be assembled and connected as well as disassembled in a non-Ex zone with the unit cooled down. Never block the vent. The exhaust air, including from adjacent units, must not be immediately suctioned in.

When installing without a Bühler mounting bracket, ensure adequate distance between the motor and the back panel (at least 40 mm).

The sample gas pumps are rated for altitudes ≤ 1000 m. They're available in various styles, and the specific technical data may vary. Therefore, always note all device-specific data on the pump and motor type plate, along with their specific limits – see Technical Data.

4.1.1 Outdoor installation

The sample gas pumps were not specifically designed for outdoor setup. The operating and environmental conditions are crucial for the required types of protection and any additional measures required, such as:

- adequate protection from the weather
- Adjusting the maintenance intervals (e.g. cleaning and replacing wear parts)

Use suitable measures and regular inspections to prevent damage to the equipment from e.g.:

- Corrosion
- Sunlight (temperature peaks and damage from UV rays)
- Moisture from condensation (e.g. due to rapid temperature changes or downtimes)
- Icing
- Insects and microbes
- other animals, e.g. martens, etc.

Please remember that all technical operating parameters of the equipment must also be met with outdoor installation. Specifically:

- Maximum or minimum operating temperatures
- Degree of protection

4.2 Installation

CAUTION



Damage to the device

Protect the device, especially the gas inlets and tubes, against dust, falling parts and external impact.

P2.2 AMEX/P2.82 AMEX

When installing the P2.2 AMEX/P2.82 AMEX on mounting plates, use the mounting bracket included and only use the rubber/metal bumpers included. Operation without rubber/metal bumpers is prohibited. These must also be used when installing the pump on an existing substructure. For the hole pattern in the mounting bracket and the motor foot, please refer to the Technical Data at the end of the operating and installation instructions.

P2.4 AMEX/P2.84 AMEX

Please refer to assembly drawing **42/025-Z02-02-2** when installing the P2.4 AMEX/P2.84 AMEX sample gas pump. Before beginning the installation, ensure that the sample gas pump is complete. You will also require 6 x M6 bolts of suitable length and nuts for installation.

The pump head on all pump types can only be aligned turned by 0° or 180°.

4.3 Special condition moist sample gas

Applications where the sample gas is still moist may result in condensate forming in line and the pump body. In these events the pump head must be suspended (pump body facing down).

If the pump was not ordered this way, it can easily be converted on site.

Install the line between the gas output and condensate drain with a grade so the condensate can drain and does not collect inside the pump or the lines.

4.3.1 Alteration of hanging pump bodies

CAUTION



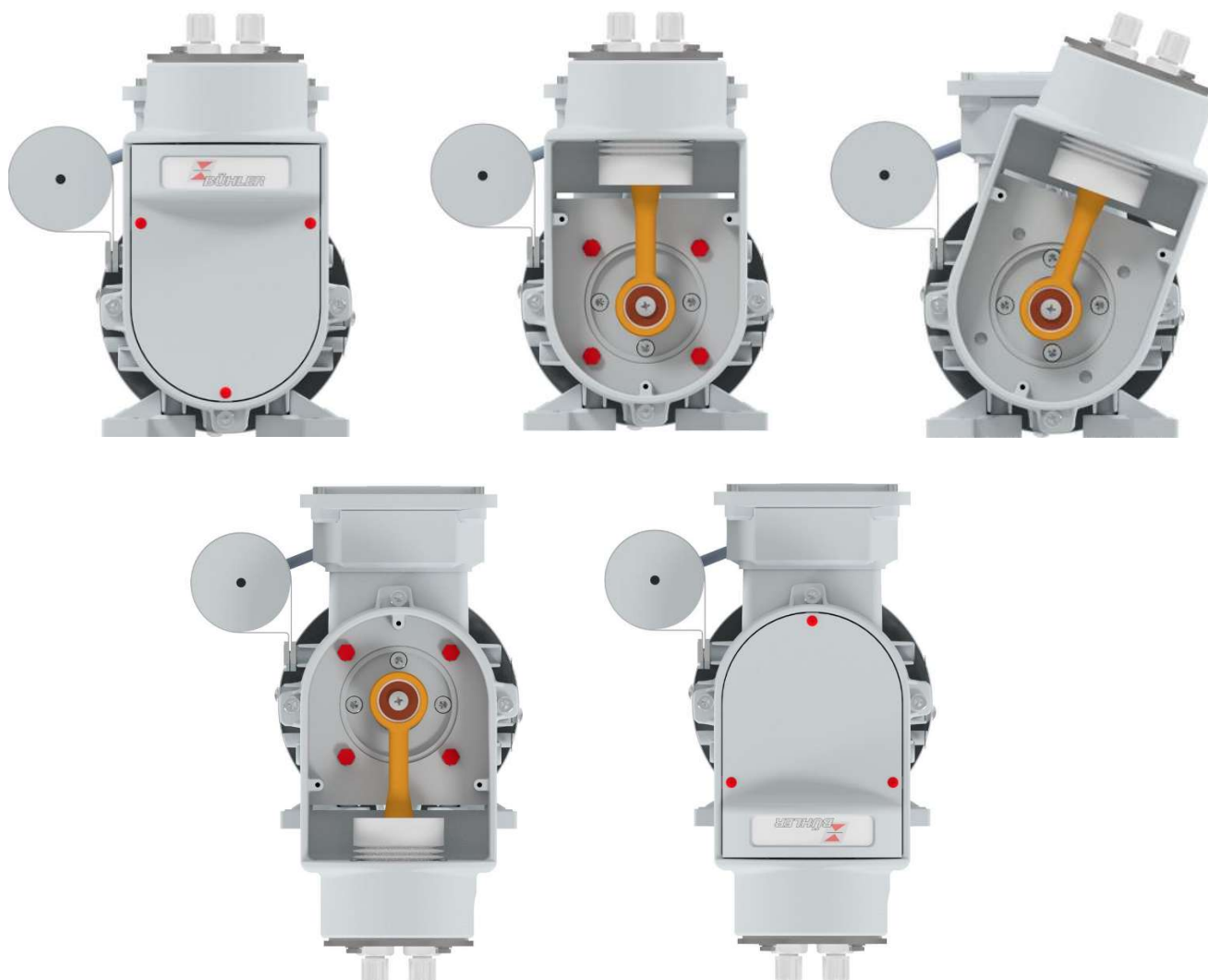
Damage to the device

Especially with pump head pointing down, make sure that no dust or small parts can intrude the pump through the ventilations slot. Nevertheless, the slot must not be covered directly. If this is not possible, the pump must not be mounted with pump head pointing downward.

Please refer to assembly drawing 42/025-Z02-01-2 in the appendix for the conversion.

- Remove the three cross-tip screws (9) and remove the console cover (8) from the pump console (5). This exposes the crank gear (10) and the Motor flange or, depending on pump model, the intermediate flange.
- The Pump console attaches to the flange with four hexagon screws (7) and lock washers (6). Completely unscrew these, holding the pump console, and rotate it 180° on the centring of the flange.
- Reinstall all parts in the reverse order. Please note the torque of the hexagon screws (7) is 3 Nm.

Installing the pump head offset by 90° is prohibited!



4.4 Connecting the gas tubes

The pumps are fitted with the connections you have selected (not pre-assembled for sample gas pumps P2.x AMEX-O2). Compare the item number on the type plate with the item number structure in the [Introduction](#) [> page 2].

Avoid mixed-material installation, i.e. piping on plastic bodies. If this cannot be avoided in isolated applications, screw the metal connections into the PTFE pump body with care, taking care to avoid use of force.

Lay the lines so that the line at the inlet and outlet remains flexible for an adequate distance (pump vibrates).

The pumps are marked “**In**” for inlet and “**Out**” for outlet. Ensure that the gas line connections are tight.

With sample gas pumps P2.x AMEX-O2 (item no.: 42.....-O2), only RT fittings (tapered thread) are supplied by the factory as separately packaged accessories. These must be fitted with H_2 PTFE sealing tape approved for O applications (see [Spare parts and accessories](#) [> page 29]).

4.4.1 Monitoring the sample gas pump

NOTICE



When following preventive maintenance according to the maintenance plan, a crack in the bellows is a rare malfunction, but cannot be completely eliminated.

NOTICE



If the bellow cracked, turn the pump off immediately!

NOTICE



If flammable gases (even above upper explosion limit (UEL)) or toxic gases are supplied, continuous monitoring of the pump is mandatory.

DANGER



Explosion hazard, danger of poisoning!

A crack in the bellows when conveying flammable or poisonous gasses may allow explosive or poisonous gas mixtures to leak or develop.
Monitor the pump with a flow- and/or vacuum monitoring system (see flow diagram).
If a pump defect occurs, shut it off immediately.

4.4.1.1 General monitoring measures

Since a crack **in the bellow allows** the ambient atmosphere to be sucked in and the sample gas pump continues to generate pressure, **the bellows of the sample gas pumps must be inspected regularly.**

In addition, the flow rate of the pump (to the sample gas outlet) must be monitored with a suitable flow meter.

For more information or inspecting the bellow the maintenance schedule, please refer to the chapter Maintenance at the end of the operating and installation instructions.

4.4.1.2 Monitoring measures when conveying flammable and/or toxic gasses

Conveying flammable and/or toxic gasses **further requires** continuous monitoring **of the sample gas** pump during operation. This can be done as follows (1) or (2).

1. Flow rate monitor before the pump's gas inlet and after the gas outlet. A sudden reduction of the suction volume / flow volume ahead of the pump and consistent or suddenly increased flow volume after the pump indicates a defective bellow (the pump can convey ambient air suctioned in due to the tear).
2. Vacuum monitoring before the pump's gas inlet and flow monitoring after the gas outlet (see illustration). A sudden drop in the vacuum before the gas inlet indicates a defective bellow.

When conveying flammable gasses above the upper explosive limit (UEL) we further recommend monitoring the lower explosive limit (LEL) in the installation location.

When conveying toxic gasses we recommend MAC monitoring (MAC: Maximum Workplace Concentration) at the installation site.

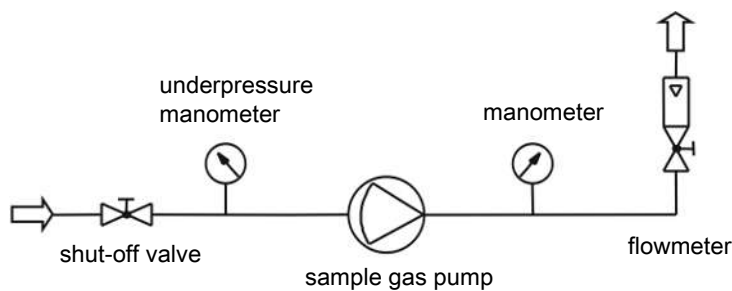


Fig. 1: Sample flow diagram of suitable monitoring

4.5 Electrical connections

WARNING



Hazardous electrical voltage

The device must be installed by trained staff only.

WARNING



Inverter operation is forbidden!

WARNING



Regard National directives concerning installation and operation of electrical devices in hazardous areas when installing and commissioning the motor (e. g. EN 60079-14).

CAUTION



Wrong mains voltage

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

Only operate the unit with the factory-installed motor. The user must not exchange the unit or replace it with a different motor. The sample gas pump must be protected against prohibited heating with suitable overload protection (protective motor switch following approval).

Please note the rated current for the protective switch settings (see motor type plate).

Verify that the pump motor has the correct voltage and frequency: Voltage tolerance $\pm 5\%$, frequency tolerance $\pm 2\%$ – from rated value.

Properly connect the sample gas pump as shown in the corresponding wiring diagram (see below). If the wiring diagram inside the cover of the terminal box is different, consult that instead.

The terminal box has a Ø22 mm bore for installing a 1/2" NPT cable fitting as per NEC Standard requirements. Ensure the connecting cable has adequate strain relief.

The supply line and earth cross-sections must be adjusted to the rated current. Use a minimum line cross-section of 1.5 mm².

Be sure to connect the following protective earth terminals to your on-site earth conductor in line with local regulations:

- Protective earth terminal inside the motor terminal box.
- Protective earth terminal on the mounting bracket.

Stray electrical currents must not be allowed to flow through this connection.

There must be no foreign objects, contaminants, or moisture inside the junction box.

To maintain the IP rating specified by the manufacturer, ensure that the original seal is correctly seated and tighten the bolts at 1.6–2 Nm when sealing the terminal box with the cover.

Be sure to observe any deviating information on the rating plate. The conditions at the site must correspond with all rating plate information.

