4 Installation and connection

Remove any transport locks on the fan blade and check the equipment for damage prior to installation. This could be a damaged housing, supply cables, etc., among other things. Never use equipment with obvious damage.

CAUTION

Use appropriate tools

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

4.1 Requirements to installation site

CAUTION

Damage to the device

Protect the equipment against dust, falling objects and external impacts.

Stroke of lightning

Outdoor installation is **forbidden**. As a matter of principle, the operator must regard all applicable standards according prevention of damage due to lightning, which may otherwise damage the device.

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 installation and the connection as well as the dismanteling of the sample gas pump have to be made in an EX-free area and in cooled down condition.

Sample gas pump P1.3 is a built-in unit and must be operated within an enclosure that provides sufficient protection against touching live or moving parts (fan) (IP54). Ingress of water or dust and dirt must be prevented.

Air ventilation must not be obstructed and exhausted air - including air from adjacent units - must not be sucked in directly.

The motor is suitable for ambient temperatures between 0 °C to +50 °C and altitude of height ≤ 1000 m above sea level.

Please refer to chapter “Appendices [> page 29]” of this manual for further information about ambient parameters at the installation site.

4.2 Installation

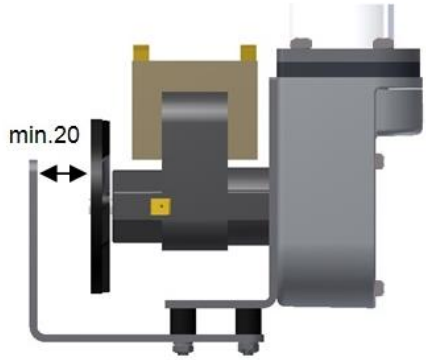
CAUTION

Damage to the device

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

Use suitable rubber-metal buffers when installing to mounting plates. We recommend buffers with a diameter or 10 mm, a height of 10 mm and a shore hardness of 70. These are also available from us.

The base angle of the sample gas pump features 4x M4 tapped holes for mounting the buffers. Suitable buffers and assembly brackets are accessories which may be ordered separately from us.



When installing the sample gas pump, always ensure an adequate amount of space between the motor and the back wall (20 mm).

When using a sample gas pump with housing (type P1.3E), the required spacing between the housing and back wall is 50 mm. This is based on the minimum required bend in the connection line.

The specific mounting brackets for the different product versions are available as accessories. Using the correct mounting bracket ensures the proper spacing between the device and the back wall.

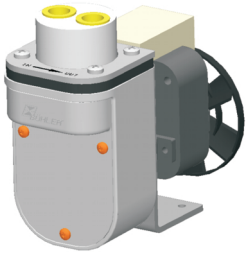
4.3 Special condition moist sample gas

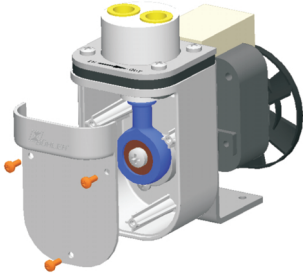
Applications where the sample gas is still moist may result in condensate forming in line and the pump body. In these events the pump head must be suspended (pump body facing down).

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.

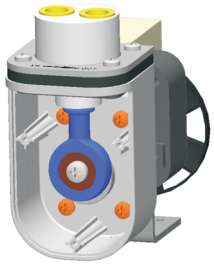
4.3.1 Conversion to pump body pointing down

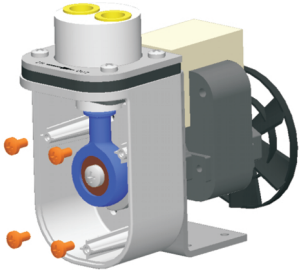




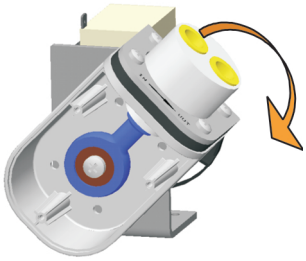
Loosen the 3 Torx screws (M3x8) on the front cover (Torx T10).

Remove the cover.





Loosen and remove the 4 Torx screws (M4x6) on the console (Torx T20).



Carefully turn the pump unit 180°.

Then reinstall the 4 Torx screws and tighten to 3 Nm.

Before tightening the screws be sure the pump unit is centered in the base angle.

Now reinstall the front cover and secure using the 3 M3x8 Torx screws.

4.4 Connecting the gas lines

A minimum of 20 cm of tubing or piping must be installed between the sample gas pump and other system elements installed in the gas outlet according to the flow chart (e.g. cooler, analyser, filter, flow regulator, etc.) to ensure compliance with the temperature classes.

The G1/4" threaded holes for the respective screw-in connections are factory closed with plastic plugs to protect from dirt. Screw-in connections are generally not included in delivery, but are sold separately for metric or for imperial installation.

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, never use force.

Lay the lines so 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. Be sure the gas line connections are tight.

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.

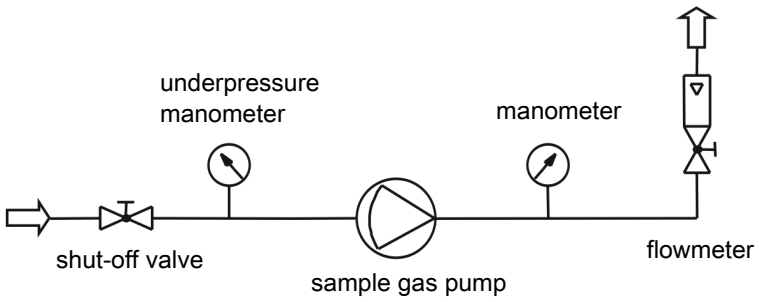


Fig. 1: Sample flow diagram of suitable monitoring

4.5 Electrical connections

DANGER	**Explosion hazard**
EX	Do not connect or disconnect equipment when a flammable or combustible atmosphere is present.

WARNING	**Hazardous electrical voltage**
	The device must be installed by trained staff only.

WARNING	
EX	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.

A switch or circuit breaker (in accordance with IEC 60947-1 and IEC 60947-3) is to be provided. This must be organized to be easily accessible for the operator. The switch must be labelled as an isolating device for the unit. It must not be inserted into a mains power line or interrupt the protective conductor. Furthermore, the switch must separate the sample gas pump from the live parts for all the poles.

The device must be operated with the factory-installed motor. The operator must not replace the device or the motor with a different model.

The sample gas pump must be secured against unacceptable excessive warming by using a suitable overload protection (motor protection circuit breaker). Sample gas pumps with a BLDC motor have already integrated protection against excessive warming in the motor electronics.

Observe the rated current for the protective switch (230 V = 0,48 A, 115 V = 0,84 A, 24 V DC = 0,8 A, 12 V DC = 1,55 A).

Make sure that mains voltage and frequency meet the specifications of the motor (voltage tolerance ± 5 % and frequency tolerance ± 2 %).

The electrical connection of type P1.3 (115 V/230 V) is made with the help of flat connectors size 6,3 mm.

Sample gas pumps of type P1.3 (12 V DC/24 V DC) and P1.3E (all voltages) are delivered as standard with a 3 m connecting cable.

It is essential to connect the protective earth conductor to the marked protection earth terminal. At model P1.3E (115 V/230 V) the protective earth has to be connected to the green/yellow wire of the connection cable (see Fig. Electrical connection P1.3 pumps).

Select mains and protection earth cross section according to the rated current.

For the electrical connections especially for the protective conductor use a cable cross-section from minimum 0,75 mm^2.

Obey differing specifications on the type plate. The conditions at the installation site must meet all specifications on the type plate.

All parts under voltage must be protected through appropriate measures against contact by persons or foreign body procedures.

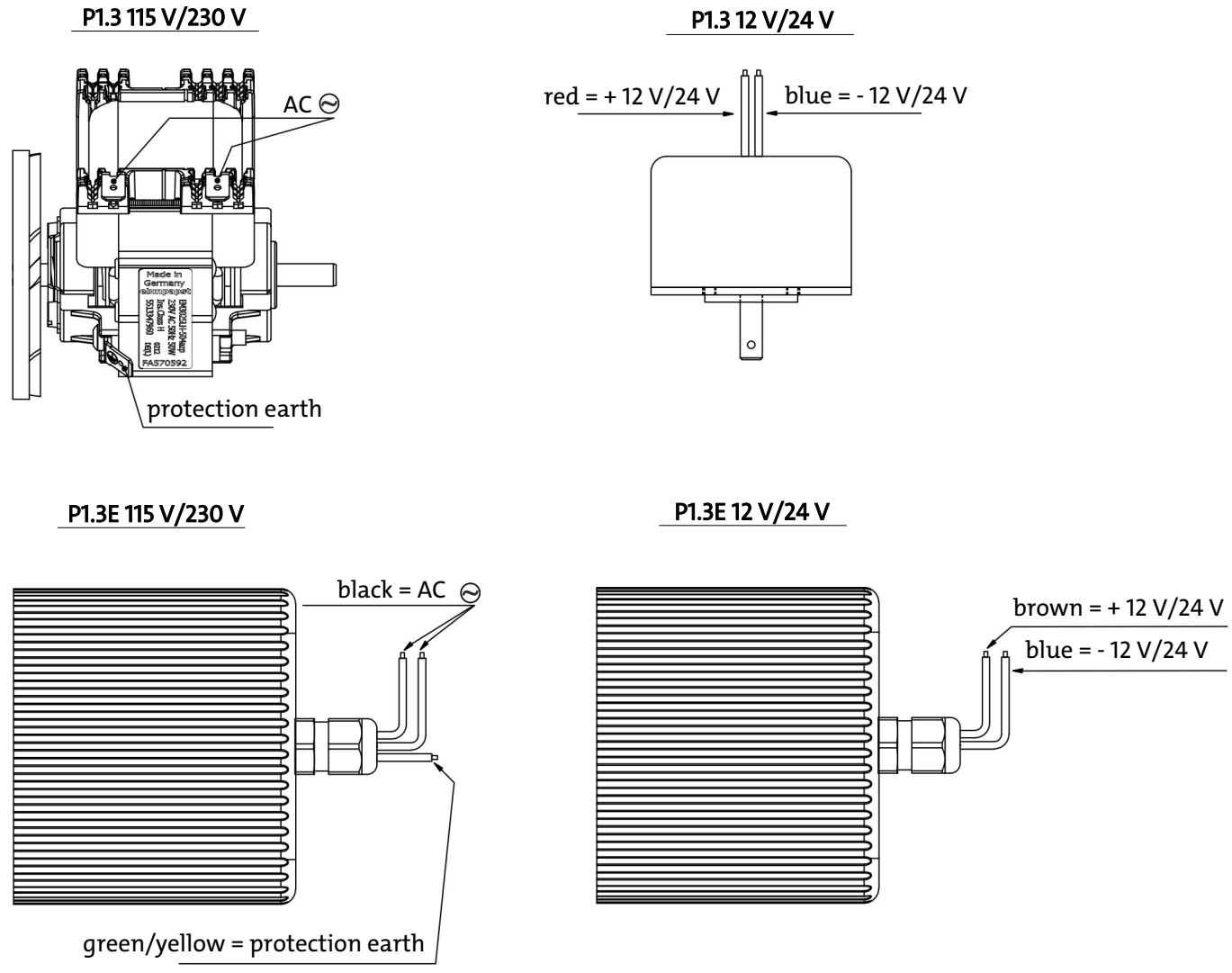


Fig. 2: Electrical connection P1.3 pumps