Gas Analysis

Sample gas pumps

P2.3C P2.4C

Installation and Operation Instructions

Original instructions

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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.

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Contents

1 Introduction

1.1 Intended use

Sample gas pumps are intended for installation in gas analysis systems for industrial applications.

DANGER

Danger of explosion if used in a potentially explosive atmosphere

Sample gas pumps of types P2.3C and P2.4C are not suitable for use in potentially explosive atmospheres and must not be placed in them.

The complete designation of the P2.3C and P2.4C sample gas pumps is:

II 3G/- Ex h IIB T4 Gc

The P2.3 C and P2.4C sample gas pumps may only be used to convey explosion class IIA and IIB flammable gaseous media which are not explosive during normal operation, as well as non-flammable gaseous media.

The maximum surface temperature varies by the medium and ambient temperatures. Please refer to the data sheets for the correlation between media temperature, ambient temperature and the pump's temperature class. Flammable mediums must not be heated beyond these values. Please note, flammable gas must only be heated up to 80 % of its ignition temperature. The lower of the two values is the maximum medium temperature.

Gas sampling is generally **prohibited** if the gas flow results in a dangerous electrostatic charge in the bellow/pump body (also see chapter "Operation and Control").

The sample gas pumps are only intended to convey gaseous media. They are not suitable for liquids.

Please note the additional information in chapter "Product Description" and "Operation and Control" along with the information on specific intended use, existing material combinations, as well as pressure and temperature limits in the data sheets.

When installed outdoors, ensure adequate protection from the weather, see chapter Requirements for the set-up location

1.2 Item number structure

The device is delivered with different configurations. The part number given on the type plate informs you about the specific configuration of your device.

On the type plate you will find the order number as well as the 13-digit product key. This number is a code where each digit (x) describes a certain feature:

42	xx	x	x	x	x	x	9	0	00	Product characteristic	
										Base model	
	52									P2.3C 400 l/h (II 3G/- Ex h IIB T4 Gc) (direct operation without intermediate flange)	
	53									P2.4C 400 l/h (II 3G/- Ex h IIB T4 Gc) (with intermediate flange)	
										Motor voltage	
		1								230 V 50/60 Hz; 0,78/0,86 A	
		2								115 V 50/60 Hz; 1,56/1,72 A	
		5								400 V 50 Hz; 0,52 A	
										Pump head position	
			1							Normal position vertical	
			2							turned by 180° *	
										Pump head material	
				1						PTFE	
				2						Stainless steel 1.4571	
				3						PTFE with bypass valve *	
				4						Stainless steel 1.4571 with bypass valve *	
										Valve material	
					1					up to 100 °C; PTFE / PVDF *	
					2					up to 160 °C; PTFE / PEEK	
										Screw-in connections (for 230 V and 400 V voltage)	
										PTFE Pump body	**Stainless steel pump body**
						9				DN 4/6 (Standard)	6 mm (Standard)
						1				DN 6/8	8 mm
						2				3/8"-1/4"	3/8"
						3				1/4"-1/8"	
						4				1/4"-1/6"	1/4"
										Screw-in connections (for 115 V voltage)	
										PTFE Pump body	**Stainless steel pump body**
						9				1/4"-1/6" (Standard)	1/4" (Standard)
						1				DN 6/8	8 mm
						2				3/8"-1/4"	3/8"
						3				1/4"-1/8"	
						5				DN 4/6	6 mm
										Mounting accessories	
							9			incl. mounting bracket and bumper *	

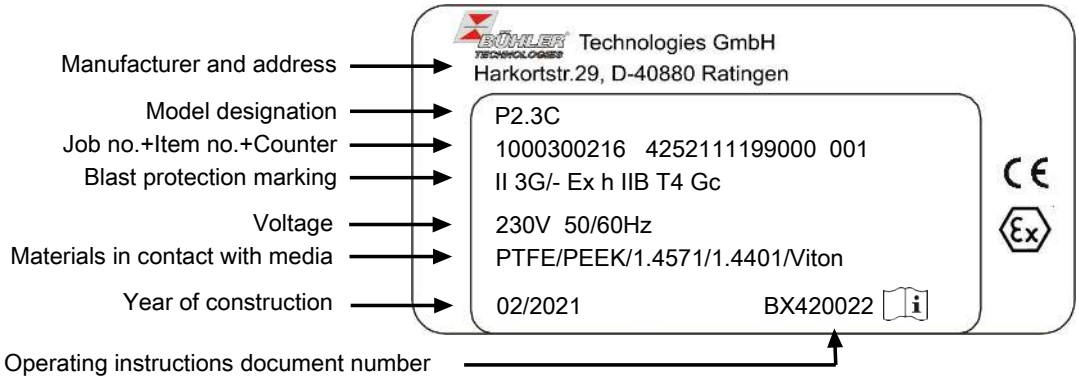
*not applicable to 2.4C

If there are special instructions for a pump type, they are marked in the manual.

Take care of the limits of the pump. When ordering spare parts chose for the type matching part numbers (e.g. valves).

1.3 Type plate

Example:



1.4 Scope of delivery

P2.3C	P2.4C
1 x Sample gas pump with motor	1 x Pump body with intermediate flange
4 x Rubber-metal bumpers	1 x Motor
1 x Mounting bracket	1 x Coupling flange
Product documentation	1 x Coupling
	1 x Mounting ring
	Product Documentation

1.5 Product description

The sample gas pumps are intended exclusively for the pumping of gaseous media. They are not suitable for liquids.

Please observe the information at the end of these instructions in relation to specific intended use, available material combinations, and pressure and temperature limits. In addition, please observe the information and labelling on the identification plates.

The maximum surface temperature depends on the ambient temperature and the temperature of the medium. The connection between the temperature of the medium, the ambient temperature and the temperature class of the pump is specified in the technical data.

NOTICE

Restriction

The **P2.xC** pumps can pump non-flammable gaseous media and flammable gaseous media that are probably not explosive in normal operation (sampling from zone 2).
Sampling gas from zone 2 is generally **forbidden** if the gas flow leads to a dangerous electro-static charge in the bellow / pump body (also see the “Operation” section).
The **P2.xC** pumps must not be operated in dusty areas.
The operating material is not suitable for use in a potentially explosive atmosphere!

The pump head and the drive motor on the P2.4C sample gas pump are isolated for use in hot applications. The sample gas pump has a split adapter which can be mounted with one half inside a heated cabinet while the other half mounted on the outside supports the drive motor. In doing so, wall thicknesses of up to 30 mm can be bridged without additional modifications.

Applications where sample gas is still moist, can result in condensation in the lines and the pump body. In these cases the pump head must be suspended (see item Alteration of hanging pump bodies).

2 Safety instructions

2.1 Important advice

This unit may only be used if:

- the product is being used under the conditions described in the operating- and system instructions, used according to the nameplate and for applications for which it is intended. Any unauthorized modifications of the device will void the warranty provided by Bühler Technologies GmbH,
- complying with the specifications and markings in the type plate,
- complying with the threshold values specified in the data sheet and the instructions,
- monitoring equipment / protection devices are connected correctly,
- service and repair work not described in these instructions are performed by Bühler Technologies GmbH,
- genuine spare parts are used.

These operating instructions are a part of the equipment. The manufacturer reserves the right to change performance-, specification- or technical data without prior notice. Please keep these instructions for future reference.

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 use the following warning signs:

	Warns of a general hazard		Warns of limbs being crushed
	Warns of voltage		General notice
	Warns not to inhale toxic gasses		Unplug from mains
	Warns of corrosive liquids		Wear respiratory equipment
	Warns of explosive areas		Wear a safety mask
	Warns of hot surfaces		Wear gloves

2.2 General hazard warnings

Installation into a complete system can pose new hazards on which the manufacturer of this sample gas pump has no bearing. If necessary, perform a risk assessment of the complete system this product will be installed into.

When configuring and building the complete system the relevant national safety regulations for the installation site and the generally applicable state of the art must be observed. These can be determined through applicable harmonised standards, among other things, e.g. **IEC 60079-14**. Additional national regulations pertaining to initial operation, operation, maintenance, repairs and disposal must be observed.

When conveying flammable gasses, avoid potential exothermic reactions in your system, do not use materials with a catalytic effect in the conveyor lines. Dangerous rises in temperature could result. Sample gas pump materials in contact with media are listed in this operating manual to facilitate the safety assessment.

Adiabatic compression is part of the physical operating principle of bellows pumps. Dangerous rises in temperature cannot be ruled out with improper exceeding of the operating parameters. Conveying flammable gasses then pose an explosion hazard.

Avoid these dangerous circumstances. If necessary, the complete system should be secured against flashback. Follow these notices and the applicable national regulations, prevent malfunctions to avoid personal injury and property damage.

The operator of the system must ensure:

- The equipment is only installed by a professional familiar with the safety requirements and risks,
- Safety notices and operating instructions are available and observed,
- The permissible data and operating conditions are observed,
- Protective devices are used and mandatory maintenance is performed,
- Legal regulations are observed during disposal.

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 **Danger of explosions, danger of poisoning from poisonous corrosive gases**

During maintenance work, depending on the medium used, explosive and/or poisonous corrosive gases could escape, and this could lead to a danger of explosion or could be hazardous to health.

a) Inspect the leak tightness of your sampling system before putting the device into operation.

b) Ensure that gases that are hazardous to health are discharged safely.

c) Turn off the gas supply before beginning any maintenance or repair work and flush the gas lines with inert gas or air. Secure the gas supply so that it cannot be turned on unintentionally.

d) Protect yourself during maintenance from poisonous / corrosive gases. 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.

DANGER

Explosion hazard

Life and explosion risk may result from gas leakage due to improper use.

a) Use the devices only as described in this manual.

b) Regard the process conditions.

c) Check tubes and hoses for leakage.

DANGER

Adiabatic compression (explosion hazard)!

In case of adiabatic compression, high gas temperatures may occur. The operator is responsible to consider this situation.
Make sure to obey the allowed technical specifications and ambient conditions, take special attention to the media temperature with respect to temperature class T4. These vary in addition to gas composition and ambient conditions. Where necessary, the operator must install temperature sensors for monitoring and must automatically shut down the sample gas pump should the temperature exceed the limits.

DANGER

DANGER - Explosion danger in case of high temperatures

Temperature of the device depends on the medium temperature. Correlation between medium temperature and **temperature classes** is given in chapter “Technical data”.
Observe maximum temperature classes T4 for the pumps and the allowed ambient temperatures and medium temperatures.

DANGER

Danger of explosion due to exothermic reactions

Avoid catalytic materials in the conveyor pipelines and other materials, e.g. male stud couplers, connecting to the sample gas pump.
Depending on the particular medium conveyed (e.g. ethylene oxide), a polymerisation of the medium may occur. Heat build-ups are possible and constitute an ignition source. If necessary, for clarification consult a technical department that possesses sufficient chemical expertise.

DANGER

Explosion hazard

Flammable media fed into the pump may only be heated to a maximum of 80 % of their respective ignition temperature.

CAUTION

Tilting risk

Damage of the device
Secure the device against any sudden translocation during maintenance.

CAUTION

Hot surface

Burning hazard
According to the product type and operation conditions, the temperature of the housing may exceed 50 °C during operation.
Depending on the conditions at the installation site it may be necessary to provide these areas with appropriate warning signs.

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. They must be stored in a covered, dry and dust-free room at a temperature between -20 °C to +40 °C (-4 °F to 104 °F). To avoid bearing damage, ensure a vibration-free environment (v eff<0.2 mm/s).

Outdoor storage is **prohibited**. On principle the operator must meet all applicable standards with respect to preventing damage due to lightning, which could result in sample gas pump damage.

Storage areas must not contain any equipment generating ozone, e.g. fluorescent lighting, mercury vapour lamps, high voltage electrical equipment.

After prolonged storage or downtimes test the insulation resistance of the winding, phase against phase and phase against mass, prior to initial operation. Moist windings can cause current leaks, flashovers and breakdown. The insulation resistance of the stator winding must be at least 1.5 MΩ measured at a winding temperature of 20 °C (68 °F). Values below this require drying the winding.

The motor shaft should be turned occasionally to ensure the entire bearing remains lubricated. To do so, remove the three cross-tip screws (9) of the console cover (8) and remove. This exposes the crank gear (10). You can now turn the motor shaft on it.

For the item numbers, please refer to the assembly drawing 42/025-Z02-01-2 in the appendix.

CAUTION	**Contusion hazard**
	Contusion of the fingers Don't have your fingers caught between eccenter and slide.

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.

CAUTION

Use appropriate tools

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

4.1 Requirements for the set-up location

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.

Never block the vent, and the exhaust air – including from adjacent units – must not be immediately suctioned in.

When installing without Bühler mounting bracket, be sure the motor is far enough from 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 and 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.

P2.3C

When installing the P2.3C sample gas pump on mounting plates, use the included mounting bracket and only the included rubber/metal bumpers. 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.

P2.4C

Please refer to assembly drawing **42/025-Z02-02-2** when installing the P2.4C sample gas pump. Before beginning the installation, verify the sample gas pump is complete. You will also require 6 x suitable length M6 bolts 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.

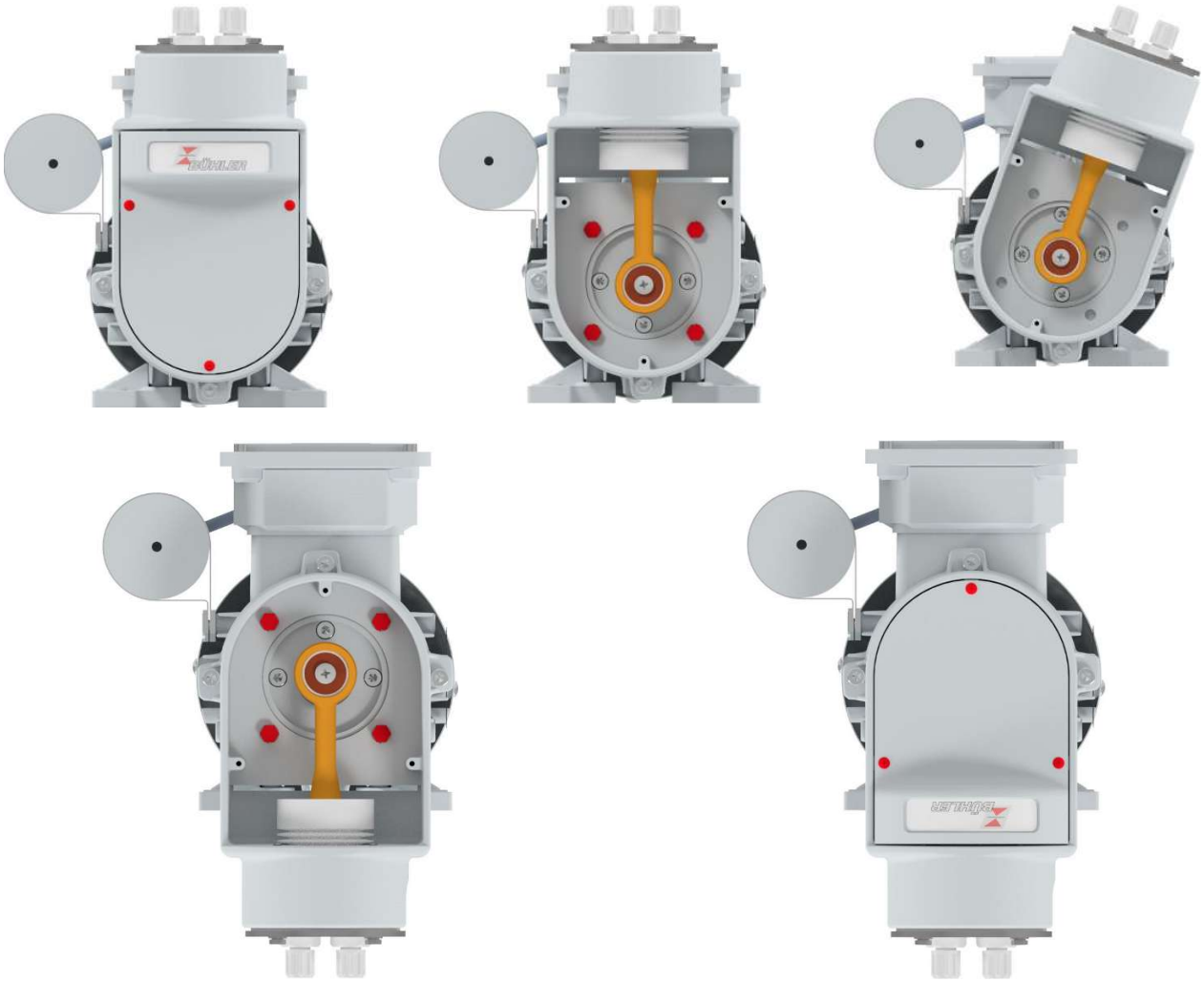
4.3.1 Alteration of hanging pump bodies

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 45° or 90° is prohibited!



4.4 Connecting the gas tubes

The pumps are delivered with customized gas connections. Please compare the part-no. on the type plate with the part-no. explained in chapter "Introduction".

Avoid mixed installations, that is connecting metal tubes to plastic bodies. If this is unavoidable for sporadic applications, screw the metal fitting with utmost care and without any use of force to the PTFE pump body.

Install the tubes in a way that the line at the inlet and outlet is flexible over a sufficient distance (pump vibrates).

The pumps are marked with **“In”** for inlet (input) and **“Out”** for outlet (output). Make sure that the connections to the tubes 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.

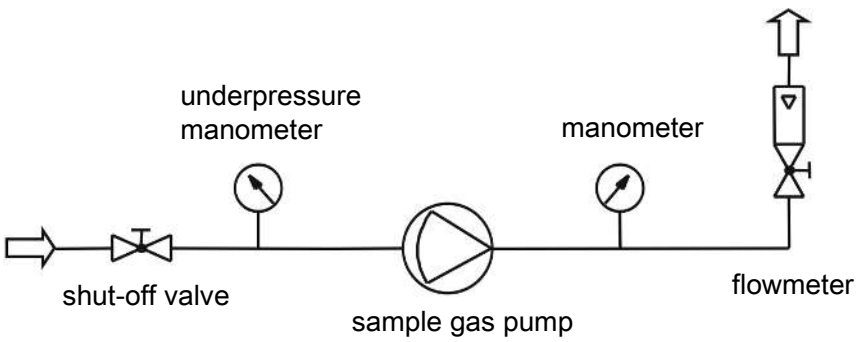


Fig. 1: Sample flow diagram of suitable monitoring

4.5 Electrical connections

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.

A switch or circuit breaker (per approval) must be installed for the sample gas pump. It must be easy for the operator to reach. The switch must be marked as a cut-off for the device. It mustn't be integrated into a supply cable or interrupt the earth conductor. It must further separate all poles of the sample gas pump from live parts.

The sample gas pump must be protected against prohibited heating with suitable overload protection (protective motor switch per approval).

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

Verify the pump motor has the correct voltage and frequency: Voltage tolerance ±5 %, frequency tolerance ±1 % - from rated value.

Properly connect the sample gas pump per the respective wiring diagram (see below). If the wiring diagram inside the cover of the terminal box is different, observe that instead. The required tightening torque for the nuts on the terminal board is 1.5 Nm.

Ensure the connecting cable has adequate cable relief. The clamping area of the cable gland is 6-10 mm. The required tightening torque for the cable gland is 5 Nm.

The supply line and earthing cross-sections must be aligned with the rated current. Use a minimum line cross-section of 1.5 mm^2.

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

- Protective earth terminal inside the motor terminal box.
- Protective earth terminal on the outside of the motor housing.
- Protective earth terminal on the mounting bracket. (The earth bolt on the mounting bracket may alternatively be connected to the protective earth connection on the outside of the motor housing via cable bridge.)

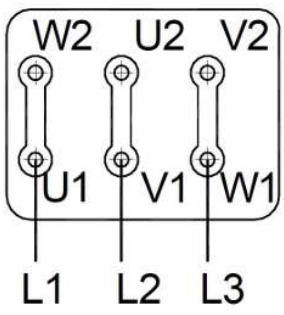
Stray electric currents may not flow through this connection.

No foreign objects, contaminants or moisture may be inside the junction box. Any unused cable gland openings must be sealed with plugs approved for the application (if necessary Atex, IECEx).

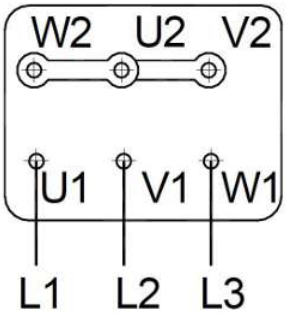
To maintain the IP rating specified by the manufacturer, when sealing the terminal box with the cover ensure the original seal is correctly seated and appropriately tighten the bolts.

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

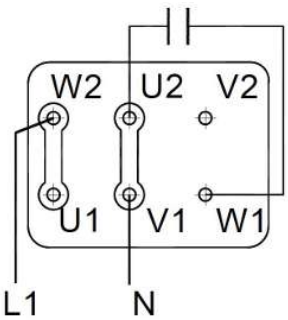
Three-phase motors
Delta connection
lower voltage



Three-phase motors
star connection
higher voltage



AC motors with operating capacitor



5 Operation and control

NOTICE

The device must not be operated beyond its specifications.

DANGER

Danger of explosions, danger of poisoning from poisonous corrosive gases

During maintenance work, depending on the medium used, explosive and/or poisonous corrosive gases could escape, and this could lead to a danger of explosion or could be hazardous to health.

a) Inspect the leak tightness of your sampling system before putting the device into operation.

b) Ensure that gases that are hazardous to health are discharged safely.

c) Turn off the gas supply before beginning any maintenance or repair work and flush the gas lines with inert gas or air. Secure the gas supply so that it cannot be turned on unintentionally.

d) Protect yourself during maintenance from poisonous / corrosive gases. Wear appropriate protective equipment.

DANGER

Adiabatic compression (explosion hazard)!

In case of adiabatic compression, high gas temperatures may occur. The operator is responsible to consider this situation.
Make sure to obey the allowed technical specifications and ambient conditions, take special attention to the media temperature with respect to temperature class T4. These vary in addition to gas composition and ambient conditions. Where necessary, the operator must install temperature sensors for monitoring and must automatically shut down the sample gas pump should the temperature exceed the limits.

DANGER

Dangerous electro-static charge (danger of explosion)

During the pumping of, for instance, very dry gases or gases contaminated with particulate matter, potentially incendiary electro-static charges could build up in the bellow / pump body.
Provide the pump with a particle filtration with a suitable filter unit placed before the pump gas inlet.
The extraction of explosive gaseous media (max. zone 2) with the pumps **is not permitted** if the gas flow leads to a potentially incendiary electro-static charge in the bellow / pump body (projected surface area in bellow / pump body ~ 15 cm^2).

DANGER

Explosion hazard

Flammable media fed into the pump may only be heated to a maximum of 80 % of their respective ignition temperature.

CAUTION

Hot surface

Burning hazard
According to the product type and operation conditions, the temperature of the housing may exceed 50 °C during operation.
Depending on the conditions at the installation site it may be necessary to provide these areas with appropriate warning signs.

5.1 Switching on the sample gas pump

Before switching on the device, ensure that:

- the hose and electrical connections are undamaged and correctly installed,
- no parts of the sample gas pump have been dismantled (e.g. cover),
- the gas inlet and outlet of the sample gas pump is not shut,
- the preliminary pressure is under 0.5 bar,
- in the event of throttling under 150 l/h in continuous operation, a bypass is available,
- the ambient parameters are complied with,
- information on rating plates is observed,
- the voltage and frequency of the motor correspond to those of the network,
- the electrical connections are tightly fastened and the monitoring devices have been connected and configured correctly!
- air inlet openings and cooling surfaces are clean,
- protective measures have been carried out; earthing!
- the motor is secured correctly,
- the terminal box cover is closed and the cable entry points have been properly sealed,
- the elastomer sprocket of the coupling (P2.4C only) is correctly installed and undamaged,
- depending on the operating mode, the necessary protective and monitoring devices are present and functional (depending on the type of pump, e.g. motor circuit breaker, manometer, flame arrestor, temperature monitoring).

When switching the sample gas pump on make sure that

- no abnormal sounds or vibrations occur.
- the flow rate is neither too low nor too high. This would indicate a cracked bellow.

5.2 Operating the sample gas pump

The sample gas pump is intended exclusively for the pumping of gaseous media. It is not suitable for liquids.

The sample gas pump should be operated without pre-compression. A preliminary pressure of more than 0.5 bar is not permitted. The gas outlet must not be shut.

The sample gas pump should be operated without pre-compression. A preliminary pressure of more than 0.5 bar is not permitted. The gas outlet must not be shut. The flow rate must be at least 50 l/h. In the event of throttling under 150 l/h in continuous operation, the flow rate must be regulated via a bypass. In this case you should choose a version with bypass valve.

NOTICE

Extreme throttling reduces the life time of the bellow.

For pumps with an integrated bypass valve, the output power can be adjusted. Do not expend a great amount of power when turning the valve as otherwise the valve could be damaged! The turning range of the valve is around seven rotations.

NOTE: Read and observe the maintenance plan!

6 Maintenance

The unit must be cool before performing maintenance.

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.

NOTICE

Please refer to the assembly drawings in the appendix when carrying out 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.

CAUTION

Tipping hazard

Equipment damage.
Secure the device against tipping, sliding and falling.

CAUTION

Gas leakage

The sample gas pump should not be dismantled under pressure.

DANGER

Danger of explosions, danger of poisoning from poisonous corrosive gases

During maintenance work, depending on the medium used, explosive and/or poisonous corrosive gases could escape, and this could lead to a danger of explosion or could be hazardous to health.

a) Inspect the leak tightness of your sampling system before putting the device into operation.

b) Ensure that gases that are hazardous to health are discharged safely.

c) Turn off the gas supply before beginning any maintenance or repair work and flush the gas lines with inert gas or air. Secure the gas supply so that it cannot be turned on unintentionally.

d) Protect yourself during maintenance from poisonous / corrosive gases. Wear appropriate protective equipment.

DANGER

Explosion hazard due to incorrect replacement of components

The replacement of the components requires carefulness. Inexpert operation could lead to explosion.
If you feel uncertain about any details of the operation, please bear in mind that the replacement should be done by the manufacturer only.

CAUTION	Hot surface
	Burning hazard According to the product type and operation conditions, the temperature of the housing may exceed 50 °C during operation. Depending on the conditions at the installation site it may be necessary to provide these areas with appropriate warning signs.

Depending on the quality of the sample gas being transported, you may need to occasionally replace the inlet and outlet valves. Instructions for replacing parts can be found in chapter Replacing the inlet and outlet valves.

If the valves are very dirty, particularly after just a short time of operation, you should install a particle filter upstream from the pump. This will significantly increase the operating life.

6.1 Maintenance plan

Component	Interval	Work to be performed	To be performed by
Pump body screws	After 500 h	Tighten screws to 3 Nm	Customer
Complete pump	Every 500 h	Check hose connections, protective and control devices, proper function, dirt, tightness. Replace if damaged or have repaired by Bühler Technologies.	Customer
Complete pump	Every 8,000 h or under high dust load	For cleaning the entire pump, see Cleaning the pump console.	Customer
Valves	Every 8,000 h or if pressure drops	For checking or replacing the valves, see Replacing the inlet and outlet valves.	Customer
Bellow	Every 4,000 h or 6 months	Check by shutting off the suction pipe. Repair if damaged, see Inspecting the bellow.	Customer
	After 2 years	Replace bellows, see Replacing bellow and connecting rod-eccentric-combination.	Customer
Wear parts in contact with media	After 43,800 h or 5 years from date of manufacture	Replace all wear parts in contact with media such as valves, bellows, bypass valve O-ring.	Customer

6.2 Inspecting the bellow

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.

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

This is done by connecting a suitable shut-off unit and a suitable vacuum pressure gauge ahead of the sample gas input (see illustration). If during operation, after closing the suction line, no negative pressure is produced, the bellows is defective and must be replaced.

Please refer to the Maintenance schedule for maintenance intervals.

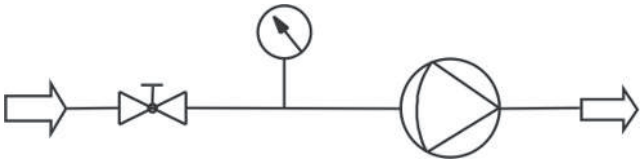


Fig. 2: Inspecting the bellow

6.3 Replacing bellow and connecting rod-eccentric-combination

NOTICE

Restrictions for connecting rod-eccentric replacement

The individual replacement of the eccentric, connecting rod or bearings is not allowed. Only the factory pre-assembled connecting rod-eccentric combination is suitable for replacement by the operator.

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

1. Remove the three cross-tip screws (9) and remove the console cover (8) from the pump console (5)
2. Clean any dust and other dirt off the sample gas pump. Wipe off stubborn dirt with a damp, clean cloth (do not use cleaning products containing solvents).
   Be sure to observe all notes in chapter Cleaning.
3. Remove the 4 hexagon screws (16) and the spring washers (15) at the top of the pump body (13). PTFE pump bodies also have a mounting ring (14) installed for improved seating stress.
4. Carefully pull the pump body up and out of the pump console. Be careful not to overstretch the bellow (12). If the pump body is stuck to the bellow, try carefully turning it to release it.
5. Hold the bellow just above the follower (10) and unscrew it anti-clockwise. When only changing the bellow, skip to step 14.
6. Remove the 4 hexagon screws (7) and lock washers (6) and remove the pump console from the flange.
7. Loosen and remove the set screw (11) from the eccentric of the crank gear (10). This may either be hexagon socket (SW 2) or star drive (TX 8). Use the proper tool.
8. Now carefully remove the crank gear from the shaft. This is best done with 2 large slot screwdrivers.
9. Clean the shaft and if necessary remove any residue such as frictional corrosion, etc.
   Check the fit size of 11k6.
10. Dampen the shaft with resin-free oil prior to assembly.
11. Attach the new crank gear to the shaft and align the locking bore for the set screw with the corresponding bore in the shaft. Avoid using striking tools, as these may damage the ball bearings.
12. Insert the set screw with medium-strength threadlock and tighten to 1.5 Nm. Be sure the flat point of the set screw is properly seated in the bore on the shaft.
13. Now place the pump console over the crank gear again and either align it upward or rotated by 180° and secure with the hexagon screws (7) and lock washers (6) - tightening torque 3 Nm.
14. Check the sealing surface and the pleats of the bellow for damage and dirt.
15. Insert the bellow through the pump console from above and twist it clockwise onto the plunger of the crank gear hand tight.
16. Clean the pump body and check the sealing face for damage.
17. Attach the pump body to the bellow and turn into the desired position in relation to the gas inlet and outlet. On principle the alignment of the pump body is irrelevant.
    However, it's important to ensure the marking on the mounting ring or pump body matches the installed valve and its function. There is no difference between inlet valve and outlet valve. Their installation position determines the function. The valves are always labelled "EIN" or "IN" for inlet and "AUS" or "OUT" for outlet.
18. Reattach the pump body with the 4 hexagon screws (16) and spring washers (15) and in the case of PTFE bodies with the mounting ring, and tighten the bolts crosswise, first at 1Nm, then 3 Nm.
19. Lastly, reattach the console cover with the 3 cross-tip screws.
20. Check the sample gas pump for leaks.
21. Perform a test run. At a minimum, the following values must be reached:
    Overpressure: 1.7 bar
    Negative pressure: -0.65 bar
    Flow rate: 400 L/h

Record the maintenance including test values in the „operating log (template)" of the sample gas pump.

6.4 Replacement of the O-ring of the bypass valve (optional)

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

- Loosen the two bolts (24) and carefully pull the entire unit, consisting of valve plate (23), spindle (22) and O-ring (21) on the knob (26) out of the pump body (13). On VA pump bodies, unscrew the spindle holder (25) with a SW13 open-end spanner, turning clockwise, and remove the entire unit.
- Remove the old O-ring from the spindle.
- Moisten a new O-ring with suitable O-ring grease (e.g. Fluoronox S90/2) and carefully attach it to the spindle.
- Carefully reinsert the entire unit into the pump body, turning, and tighten the bolts or spindle holder.
- Check the sample gas pump for leaks.

6.5 Replacing the inlet and outlet valves

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

- Remove the screw-in connections (18) from the pump body (13).
- Unscrew the valves (17) with a wide slot screwdriver. Stainless steel pump bodies have so-called displacers (20) under the valves. These reduce the dead volume and must remain installed on these pump bodies.
- Screw the new valves into the pump body and tighten to max. 1 Nm. Be sure the valve is installed the correct direction. Valves for a permitted gas inlet temperature of max. 100 °C are black/red, and grey/orange for max. 160 °C. Here the red or orange end corresponds to the gas inlet and the black or grey end the gas outlet. The valves at the gas inlet are marked "EIN" and "IN" and "AUS" and "OUT" at the gas outlet. The marking you see looking into the pump body from above determines the valve function.
- Lastly, reinstall the screw-in connections in the pump body. In the case of stainless steel screw-in connections, replace any damaged seals (19).
- Check the sample gas pump for leaks.
- Perform a test run. At a minimum, the following values must be reached:
  Overpressure: 1.7 bar
  Negative pressure: -0.65 bar
  Flow rate: 400 L/h

Record the maintenance including test values in the „operating log (template)" of the sample gas pump.

6.6 Cleaning the pump console

- To clean the inside of the pump console, unscrew the three cross-tip screws (9) of the console cover (8) and remove the cover.
- You can now clean dust and other dirt inside the pump console. Wipe off stubborn dirt with a damp, clean cloth. Do not use cleaning products containing solvents.
- Now reattach the console cover and tighten the three bolts.

For the item numbers, please refer to the assembly drawing 42/025-Z02-01-2 in the appendix.

6.7 Changing the Coupling

Please refer to assembly drawing 42/025-Z02-02-2 in the appendix for this maintenance.

If the coupling breaks, always investigate the cause! If caused by e.g. a frozen bearing, replace the entire head.

- Remove the pump head and motor with coupling flange.
- Remove the coupling flange from the motor.
- After removing the set screw, remove the coupling parts from the shafts and attach a new coupling.
- Screw the coupling flange back onto the motor and install the pump the same as during initial installation.

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 and fault rectification

CAUTION

Risk due to defective device

Personal injury or damage to property

a) Switch off the device and disconnect it from the mains.

b) Repair the fault immediately. The device should not be turned on again before elimination of the failure.

CAUTION

Hot surface

Burning hazard
According to the product type and operation conditions, the temperature of the housing may exceed 50 °C during operation.
Depending on the conditions at the installation site it may be necessary to provide these areas with appropriate warning signs.

Malfunction	Cause	Action
Pump doesn't start up	– Broken or incorrectly connected lead	– Check connection or fuse and switch
	– Defective motor	– Replace motor
Pump doesn't convey	– Defective or dirty valves	– Carefully blow out or replace valves or see chapter Replacing inlet and outlet valves.
	– Bypass valve open	– Close bypass valve
	– Defective bypass valve O-ring	– have repaired by a Bühler service technician or see Replacing the bypass valve O-ring
	– Torn bellow	– have repaired by Bühler service technician or see Replacing the bellows and cam follower-eccentric combination.
	– Broken/worn ring gear	– have repaired by a Bühler service technician or "Replacing the coupling".
Noisy pump operation	– Crankshaft out of alignment	– have repaired by Bühler service technician or see Replacing the bellows and cam follower-eccentric combination.
	– Work ring gear	– have repaired by a Bühler service technician or "Replacing the coupling".
	– Loose coupling hub	– have repaired by a Bühler service technician or tighten the stud on the coupling hub to 1.34 Nm

Malfunction	Cause	Action
	– Engine bracket damaged	– Replace motor
Premature ring gear wear	– e.g. contact with ozone influences or similar, causing a physical change to the ring gear	– Eliminate any physical changes to the ring gear
Protective device is triggering	– Coil- and terminal short circuit	– Measure insulation resistance
	– Start-up time exceeded	– Check start-up requirements
Poor performance	– Leakage	– Tighten head screws, note torque (see chapter "Maintenance").
	– Torn bellow	– have repaired by Bühler service technician or see Replacing the bellows and cam follower-eccentric combination.
	– Defective or dirty valves	– Carefully blow out or replace valves or see chapter Replacing inlet and outlet valves.

Tab. 1: Troubleshooting

7.2 Spare parts and accessories

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

Upgrade and expansion parts can be found in our catalog.

Available spare parts:

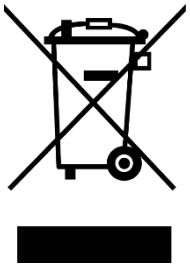
Spare part	Item no.	Position in assembly drawings 42/025-Z02-01-2 & 42/025-Z02-02-2
Bellow	4200015	12a
Plunger / eccentric combination	4200075	10a, 11
Coupling ring gear	4220011	28c
Set of 100 °C valves	4201002	2x 17a
Set of 160 °C valves	4202002	2x 17b
Bypass O-ring (Viton)	9009115	21a

Tab. 2: Spare Parts and Accessories

8 Disposal

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 General specifications for all pumps

General Specifications	
Nominal voltage:	see ordering information
Protection class:	electric IP55 mechanical IP20
Dead volume:	8.5 ml
Materials of parts in contact with mediums by pump type:	PTFE / PVDF (standard pump with 100 °C valves) + PEEK (standard pump with 160 °C valves) + Viton (standard pump with 100 °C valves and bypass valve) + PCTFE, Viton (standard pump with 160 °C valves and bypass valve) + 1.4571 (VA pump body) + 1.4401, Viton (VA pipe fitting) + Viton (VA pump body with bypass valve)

9.2 Technical data for P2.3C and P2.4C

P2.3C/P2.4C Technical Data	
Weight P2.3 C: P2.4 C:	 approx. 6.5 kg approx. 7 kg
Marking:	Ex II 3G/- Ex h IIB T4 Gc
Ambient temperature Motor: Pump head:	 max. 50 °C see table
Medium temperature:	see table

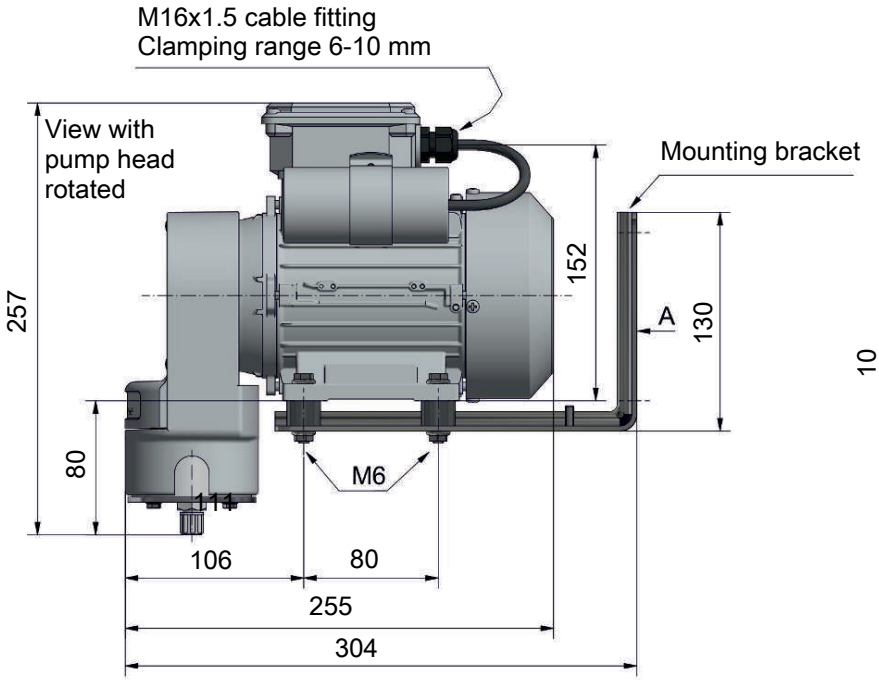
NOTICE! The devices are not suitable for use in explosive areas!

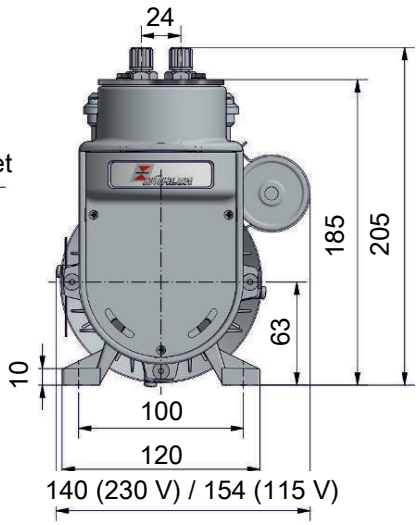
9.3 Temperature classes for P2.3C and P2.4C

P 2.3C		Medium temperature
no flammable gasses in the gas circuit		see P2.3/P.283
Flammable gasses in the gas circuit above the LEL	T3	120 °C
	T4	50 °C

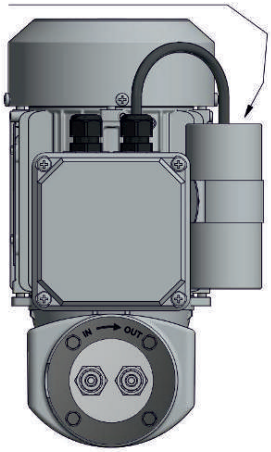
P 2.4C		Medium temperature	Pump head temperature
no flammable gasses in the gas circuit		see P2.4/P2.84	
Flammable gasses in the gas circuit above the LEL	T3	100 °C	80 °C
	T4	50 °C	50 °C

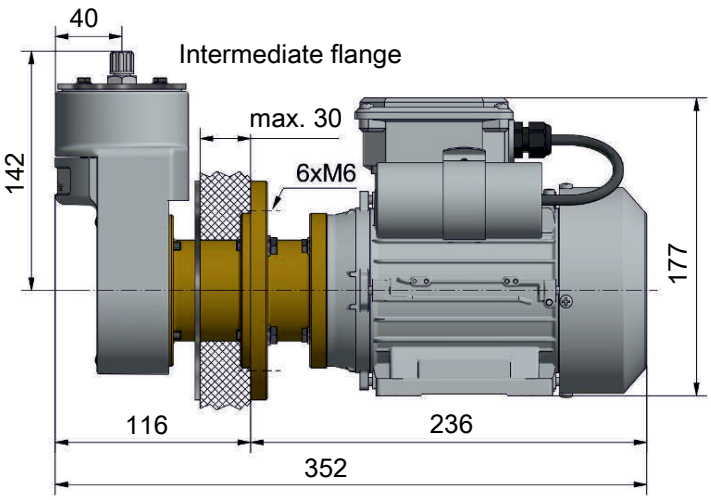
9.4 Dimensions



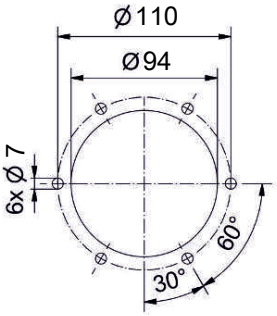


Three-phase motors without capacitor

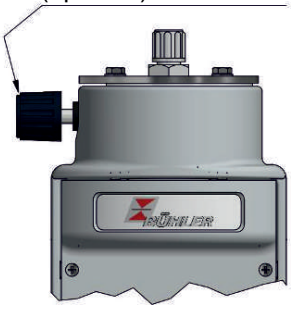




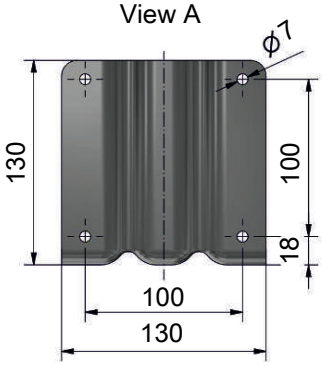
Cabinet cut-out for pumps with intermediate flange



Adjustable bypass valve (optional)



View A



Installation notices:
1) This pump should be installed horizontally
2) If necessary, rotate the pump head during installation. When conveying gasses with condensate content it must be installed valves down.

9.5 List of chemical resistance

The wetted materials of your device are printed on the type plate.

Formula	Substance	Concentration	Teflon® PTFE	PCTFE	PEEK	PVDF	FFKM	Viton® FPM	V4A
CH_3COCH_3	Acetone		1/1	1/3	1/1	3/4	1/1	4/4	1/1
C_6H_6	Benzene		1/1	1/3	1/1	1/3	1/1	3/3	1/1
Cl_2	Chlorine	10 % wet	1/1	0/0	4/4	2/2	1/1	3/0	4/4
Cl_2	Chlorine	97 %	1/0	1/3	4/4	1/1	1/0	1/1	1/1
C_2H_6	Ethane		1/0	0/0	1/0	2/0	1/0	1/0	2/0
C_2H_5OH	Ethanol	50 %	1/1	1/3	1/1	1/1	1/1	2/2	1/0
C_2H_4	Ethene		1/0	0/0	0/0	1/0	1/0	1/0	1/0
C_2H_2	Ethine		1/0	0/0	0/0	1/0	1/0	2/0	1/0
$C_6H_5C_2H_5$	Ethylbenzene		1/0	0/0	0/0	1/1	1/0	2/0	1/0
HF	Hydrofluoric acid		1/0	0/0	0/0	2/2	2/0	4/0	3/4
CO_2	Carbon dioxide		1/1	0/0	1/0	1/1	1/0	1/1	1/1
CO	Carbon monoxide		1/0	0/0	1/1	1/1	1/0	1/0	1/1
CH_4	Methane	technically pure	1/1	0/0	1/1	1/0	1/0	1/1	1/1
CH_3OH	Methanol		1/1	1/1	1/1	1/1	1/1	3/4	1/1
CH_3Cl_2	Methylene chloride		1/0	2/0	1/0	1/0	1/0	3/0	1/1
H_3PO_4	Phosphoric acid	1-5 %	1/1	1/1	1/1	1/1	1/1	1/1	1/1
H_3PO_4	Phosphoric acid	30 %	1/1	1/1	1/1	1/1	1/1	1/1	1/1
C_3H_8	Propane	gaseous	1/1	0/0	1/0	1/1	1/0	1/0	1/0
C_3H_6O	Propenoxide		1/0	0/0	0/0	2/4	2/0	4/0	1/0
HNO_3	Nitric acid	1-10 %	1/1	1/0	1/1	1/1	1/0	1/1	1/1
HNO_3	Nitric acid	50 %	1/1	1/0	3/3	1/1	1/0	1/0	1/2
HCl	Hydrochloric acid	1-5 %	1/1	1/1	1/0	1/1	1/1	1/1	2/4
HCl	Hydrochloric acid	35 %	1/1	1/1	1/0	1/1	1/1	1/2	2/4
O_2	Oxygen		1/1	0/0	1/0	1/1	1/1	1/2	1/1
SF_6	Sulfur hexafluoride		1/0	0/0	1/0	0/0	1/0	2/0	0/0
H_2SO_4	Sulfuric acid	1-6 %	1/1	1/1	2/2	1/1	1/1	1/1	1/2
H_2S	Hydrosulphide		1/1	1/1	0/0	1/1	1/1	4/4	1/1
N_2	Nitrogen		1/1	0/0	1/0	1/1	1/0	1/1	1/0
$C_6H_5C_2H_3$	Styrene		1/1	0/0	1/0	1/0	1/0	3/0	1/0
$C_6H_5CH_3$	Toluene (Methylbenzene)		1/1	0/0	1/0	1/1	1/1	3/3	1/1
H_2O	Water		1/1	0/0	1/1	1/1	1/1	1/1	1/1

Tab. 3: List of chemical resistance

0 - resistant

1 - practically resistant

2 - partially resistant

3 - not resistant

4 - no data available

Two values are given for each medium, left number = value at 20 °C (68 °F), right number = value at 50 °C (122 °F) Temperature.

Important note

The tables headed "Chemical resistance of plastics" and "Properties of plastics materials" have been compiled from information from various producers of raw materials. The figures relate exclusively to laboratory tests on raw materials. Plastics items made from these materials are often subject to influences which cannot be detected in a laboratory test (temperature, pressure, stresses in the material, chemical substances, design features, etc.). For these reasons the figures quoted can serve only as a guideline. In case of doubt we strongly recommend that a test be carried out. No legal claims can be derived from these figures and we disclaim all liability. The chemical and mechanical resistance of a product does not suffice for the assessment of its suitability for use, for example legislation on flammable liquids (explosion protection) is to be taken into particular consideration.

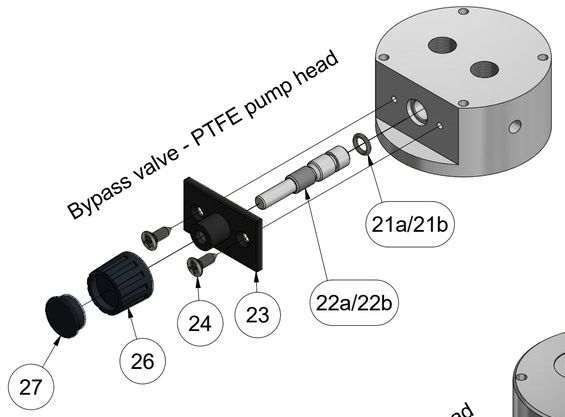
Chemical resistance for other substance on request.

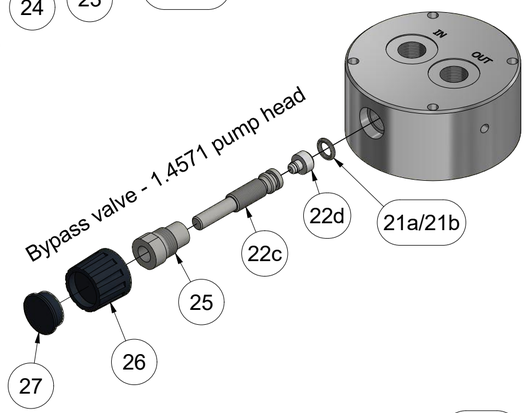
9.6 User book (Please make copies)

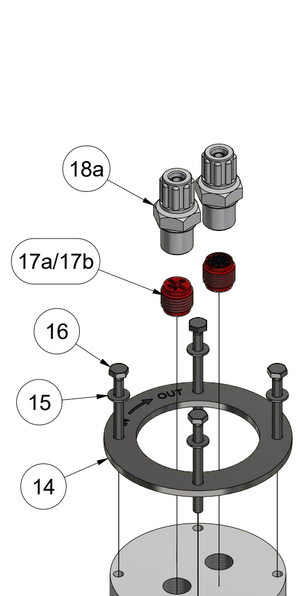
Maintained on	Unit no.	Operating hours	Remarks	Signature

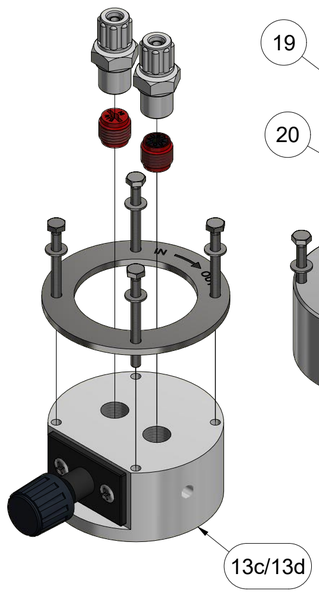
10 Attached documents

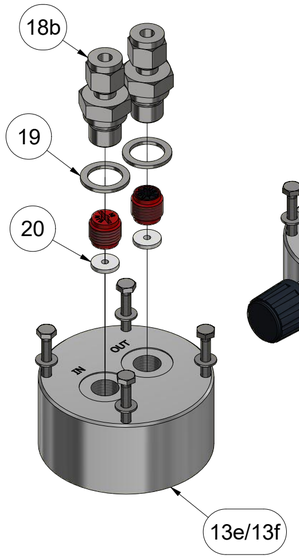
- Drawings: 42/025-Z02-01-2, 42/025-Z02-02-2; 42/025-Z02-03-2
- Declaration of conformity: KX 42 0012
- Operating instructions: Electric motor:
- RMA - Decontamination Statement

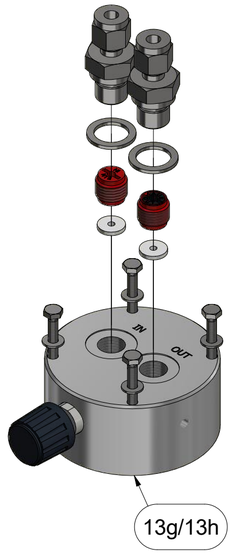


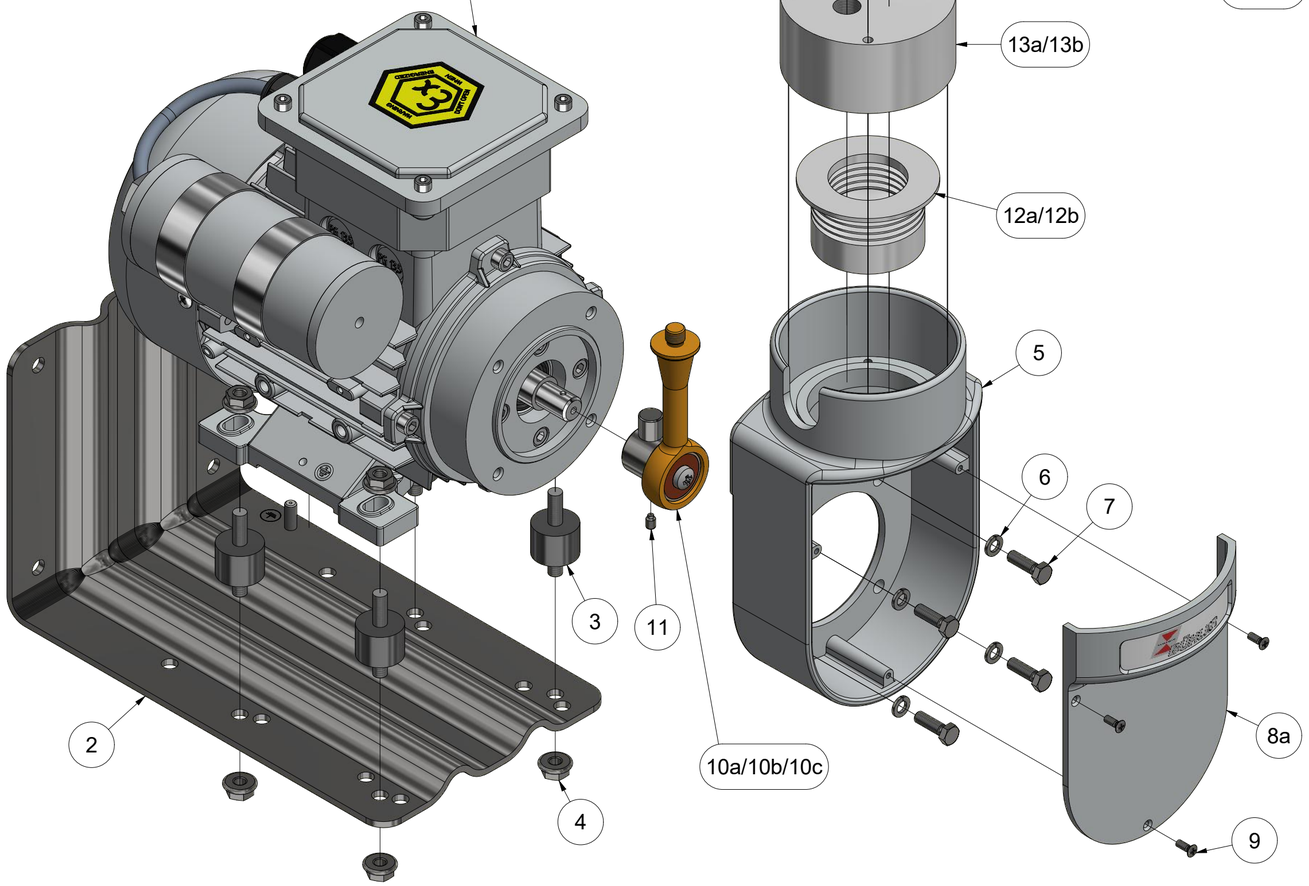


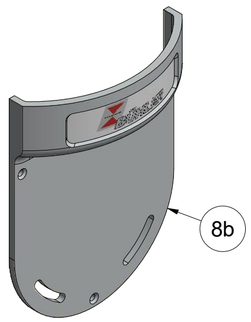












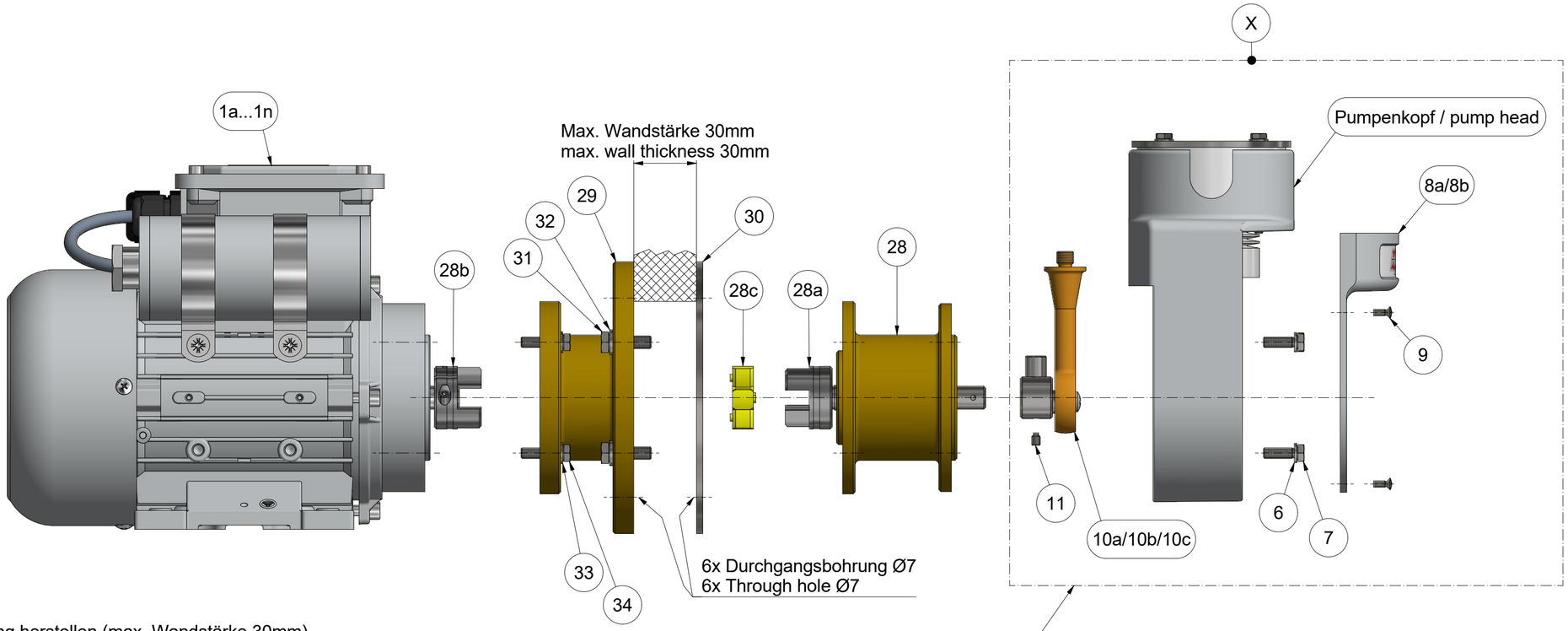
Die Pumpentypen P2.4, P2.84, P2.4C, P2.4 Atex/Amex, P2.74 Atex und P2.84 Amex sind mit einem Zwischenflansch zwischen Motor und Pumpe ausgestattet. Beachten Sie hierzu zusätzlich die spezifische Explosions- und Montagezeichnung 42/025-Z02-02-2.

The pump types P2.4, P2.84, P2.4C, P2.4 Atex/Amex, P2.74 Atex and P2.84 Amex are equipped with an intermediate flange between the motor and the pump. Please also note the specific exploded view and assembly drawing 42/025-Z02-02-2.

Die Legende zu den Positionsnummerierungen dieser Zeichnung, sowie deren spezifische Zuordnung zu den unterschiedlichen Pumpentypen befindet sich auf der Zeichnung 42/025-Z02-03-2.

The legend for the item numbers in this drawing and their specific assignment to the different pump types can be found on drawing 42/025-Z02-03-2.

Alle Kanten gratfrei		Alle Rechte vorbehalten				Maße ohne Toleranzangabe nach ISO 2768-mK			Maßstab: 1:1,75	Masse:	
									Werkstoff:		
							Datum:	Name:	Benennung:		(b)
= Roh						Bearb.	03.02.2021	Sundergeld	Montagezeichnung - Assembly drawing - P2.3, P2.83, P2.4, P2.84, P4.3, P4.83, P2.3C, P2.4C, P2.2 Atex / Amex, P2.4 Atex / Amex, P2.72 Atex, P2.74 Atex, P2.82 Amex, P2.84 Amex		
X = Rz 63						Gepr.					
Y = Rz 16						BÜHLER Technologies GmbH 40880 Ratingen			ZeichnungsNr.: 42/025-Z02-01-2B		
Z = Rz 4		b	Bezeichn.	16.09.21	Sun				Art.Nr.: ---		
		a	Motor Nr.	15.06.21	Sun						
		Zust.	Änd.	Datum	Name	Ers.für:			Arbeitsanweisung:		



Alle Details zu den pumpenspezifischen Bauteilen können der Explosions- und Montagezeichnung 42/025-Z02-01-2 entnommen werden

All details about the pump-specific components can be found in the Exploded and assembly drawing 42/025-Z02-01-2

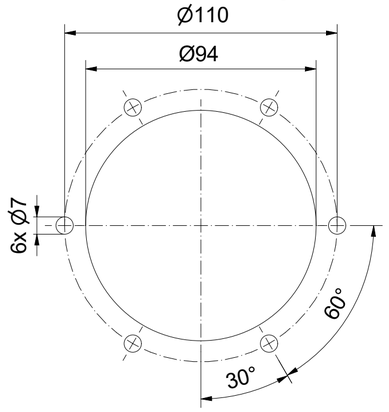
Montagehinweise:
- Wandausschnitt nach Zeichnung herstellen (max. Wandstärke 30mm)
- Verbindungsschrauben (31/32) lösen und die Einheit "Pumpenkopf-Zwischenflansch" (28/28a/28c/X) vom Kupplungsflansch (29) trennen/abziehen
- Montage der Einheit "Motor-Kupplungsflansch" (1a-g/28b/29) von Außen (z.B. an einen Schaltschrank) und Montagering (30) von Innen (z.B. innerhalb eines Schaltschranks) mit passenden Schrauben und Muttern (M6)
- Die Einheit "Pumpenkopf-Zwischenflansch" auf das Gegenstück (28b) schieben und wieder mit den Verbindungsschrauben (31/32) montieren - an dieser Stelle kann der Pumpenkopf auch um 180° gedreht montiert werden - der Pumpenkopf zeigt dann nach unten
- Die zusätzliche Befestigung des Motors mit z.B. der Bühler Montagekonsole ist bei Pumpen mit Zwischenflansch weder notwendig noch zulässig. Dies könnte sich aufgrund einer Systemüberbestimmung negativ auf die Kugellager auswirken.

Wichtiger Hinweis zur Kupplung bei Atex/Amex Pumpentypen:
Die Kupplungsnaben 28a und 28b werden mit einer Klemmschraube auf den jeweiligen Wellen montiert. Diese Klemmschraube wird mit einem Schraubensicherungskleber und einem speziellen Drehmoment montiert und dürfen nur durch einen Bühler Servicetechniker gelöst werden. Bei dem Ersatzteil "Zwischenflanschbaugruppe (28/28a)" ist die Kupplungsnabe bereits vormontiert und kann demnach auch betreiber-seitig ausgetauscht werden.

Assembly instructions:
- Create a wall cut-out according to the drawing (max. wall thickness 30mm)
- Loosen the connecting screws (31/32) and remove the unit "pump head-intermediate flange" (28/28a/28c/X) from the coupling flange (29)
- Assemble the unit "Motor-coupling flange" (1a-g/28b/29) from the outside (e.g. to a cabinet) and the mounting ring (30) from the inside (e.g. inside a cabinet) with suitable screws and nuts (M6)
- The unit "pump head-intermediate flange" slide onto the counterpart (28b) and re-assembled with the connecting screws (31/32) - at this point the pump head can also be rotated by 180° installed - the pump head then points downwards
- The additional fastening of the motor with e.g. the Bühler mounting bracket at pumps with Intermediate flange is neither necessary nor allowed. This could be due to system over-determination and have a negative effect on the ball bearings.

Important note for the coupling at Atex/Amex pump types:
The coupling hubs 28a and 28b are mounted onto the shafts using clamping screws. This clamping screws are mounted with a screw lock adhesive and a special torque and shall only be released by a Bühler service technician. In case of the "intermediate flange assembly" (28/28a) as a replacement part, the coupling hub is already pre-assembled and can therefore also be exchanged by the operator.

Wandausschnitt / mounting cut-out



Die Legende zu den Positionsnummerierungen dieser Zeichnung, sowie deren spezifische Zuordnung zu den unterschiedlichen Pumpentypen befindet sich auf der Zeichnung 42/025-Z02-03-2.

The legend for the item numbers in this drawing and their specific assignment to the different pump types can be found on drawing 42/025-Z02-03-2.

Alle Kanten gratfrei				Alle Rechte vorbehalten				Maße ohne Toleranzangabe nach ISO 2768-mK			Maßstab: 1:1,75	Masse:
									Datum:	Name:	Werkstoff:	
√ = √ Roh								Bearb.	04.02.2021	Sundergeld	Benennung: Montagezeichnung - Assembly drawing - P2.4, P2.84, P2.4C, P2.4 Atex/Amex, P2.74 Atex, P2.84 Amex	
X √ = √ Rz 63								Gepr.				
Y √ = √ Rz 16								BÜHLER Technologies GmbH 40880 Ratingen			ZeichnungsNr.: 42/025-Z02-02-2A	
Z √ = √ Rz 4	a	Motor Nr.	15.06.21	Sun							Art.Nr.: ---	
	Zust.	Änd.	Datum	Name				Ers.für:			Arbeitsanweisung:	

Zeichnungsnummer/Drawing no. 42/025-Z02-03-2 | Rev.B | Date: 16.09.2021 | Autor: Sundergeld
Änderung: B = P4 Motoren hinzugefügt | Geprüft am: | Prüfer:

Legende und spezifische Zuordnung der Positionsnummern aus den Montagezeichnungen
Legend and specific assignment for the item numbers of the assembly drawings

42/025-Z02-01-2 & 42/025-Z02-02-2

Pos. No.	Description	Beschreibung	P2.3	P2.83	P2.4	P2.84	P4.3	P4.83	P2.3C	P2.4C	P2.2 Atex	P2.2 Amex	P2.4 Atex	P2.4 Amex	P2.72 Atex	P2.74 Atex	P2.82 Amex	P2.84 Amex
1a	Motor 230V 50/60Hz	Motor 230V 50/60Hz	X	X	X	X	---	---	X	X	---	---	---	---	---	---	---	---
1b	Motor 115V 50/60Hz	Motor 115V 50/60Hz	X	X	X	X	---	---	X	X	---	---	---	---	---	---	---	---
1c	Motor 230/400V 50/60Hz	Motor 230/400V 50/60Hz	X	X	X		---	---	X	X	---	---	---	---	---	---	---	---
1d	Motor 230V 50/60Hz with two shaft ends	Motor 230V 50/60Hz mit 2 Wellenenden	---	---	---	---	X	X	---	---	---	---	---	---	---	---	---	---
1e	Motor 115V 50/60Hz with two shaft ends	Motor 115V 50/60Hz mit 2 Wellenenden	---	---	---	---	X	X	---	---	---	---	---	---	---	---	---	---
1f	Motor 230V 50/60Hz Atex, IECEx	Motor 230V 50/60Hz Atex, IECEx	---	---	---	---	---	---	---	---	X	---	X	---	X	X	---	---
1g	Motor 115V 50/60Hz Atex, IECEx	Motor 115V 50/60Hz Atex, IECEx	---	---	---	---	---	---	---	---	X	---	X	---	X	X	---	---
1h	Motor 380-420V 50Hz Atex, IECEx	Motor 380-420V 50Hz Atex, IECEx	---	---	---	---	---	---	---	---	X	---	X	---	X	X	---	---
1i	Motor 500V 50Hz Atex, IECEx	Motor 500V 50Hz Atex, IECEx	---	---	---	---	---	---	---	---	X	---	X	---	X	X	---	---
1j	Motor 230V 50/60Hz Cl.I, Div.2	Motor 230V 50/60Hz Cl.I, Div.2	---	---	---	---	---	---	---	---	---	X	---	X	---	---	X	X
1k	Motor 115V 50/60Hz Cl.I, Div.2	Motor 115V 50/60Hz Cl.I, Div.2	---	---	---	---	---	---	---	---	---	X	---	X	---	---	X	X
2	Montagekonsole	Mounting bracket	X	X	---	---	X	X	X	---	X	X	---	---	X	---	X	---
3	Gummi-Metall-Puffer	Shock absorber	X	X	---	---	X	X	X	---	X	X	---	---	X	---	X	---
4	Mutter DIN 6923 - M6	Nut DIN 6923 - M6	X	X	---	---	X	X	X	---	X	X	---	---	X	---	X	---
5	Pumpenkonsole	Pump housing	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	Federring DIN 127 B5,1	Spring washer DIN 127 B5,1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
7	Schraube DIN 933 M5x16	Screw DIN 933 M5x16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8a	Konsolendeckel - standard	Cover - standard	X	X	X	X	X	X	---	---	X	X	X	X	X	X	X	X
8b	Konsolendeckel mit Schlitzen	Cover with slots	---	---	---	---	---	---	X	X	---	---	---	---	---	---	---	---
9	Schraube DIN 966 M3x8	Screw DIN 966 M3x8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10a	Kurbeltrieb für 400l/h Pumpen (Stößel gold)	Crank drive for 400l/h pumps (plunger gold)	X	---	X	---	X	---	X	X	X	X	X	X	---	---	---	---
10b	Kurbeltrieb für 700l/h Pumpen (Stößel grün)	Crank drive for 700l/h pumps (plunger green)	---	---	---	---	---	---	---	---	---	---	---	---	X	X	---	---
10c	Kurbeltrieb für 800l/h Pumpen (Stößel schwarz)	Crank drive for 800l/h pumps (plunger black)	---	X	---	X	---	X	---	---	---	---	---	---	---	---	X	X
11	Schraube DIN 915 M4x6 oder ISO 4028 M4X6 TX 8	Screw DIN 915 M4x6 or ISO 4028 M4X6 TX 8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12a	Faltenbalg für 400l/h Pumpen (4 Falten)	Below for 400l/h pumps (4 folds)	X	---	X	---	X	---	X	X	X	X	X	X	---	---	---	---
12b	Faltenbalg für 700l/h und 800l/h Pumpen (8 Falten)	Below for 700l/h and 800l/h pumps (8 folds)	---	X	---	X	---	X	---	---	---	---	---	---	X	X	X	X
13a	Pumpenkörper - PTFE für 400l/h Pumpen	Pump head - PTFE for 400l/h pumps	X	---	X	---	X	---	X	X	X	X	X	X	---	---	---	---
13b	Pumpenkörper - PTFE für 800l/h Pumpen	Pump head - PTFE for 800l/h pumps	---	X	---	X	---	X	---	---	---	---	---	---	---	---	X	X
13c	Pumpenkörper - PTFE mit Bypassventil für 400l/h Pumpen	Pump head - PTFE with bypass valve for 400l/h pumps	X	---	X	---	X	---	X	X	X	X	X	X	---	---	---	---
13d	Pumpenkörper - PTFE mit Bypassventil 800l/h Pumpen	Pump head - PTFE with bypass valve for 800l/h pumps	---	X	---	X	---	X	---	---	---	---	---	---	---	---	X	X
13e	Pumpenkörper - 1.4571 für 400l/h und 700l/h Pumpen	Pump head - 1.4571 for 400l/h and 700l/h pumps	X	---	X	---	X	---	X	X	X	X	X	X	X	X	---	---
13f	Pumpenkörper - 1.4571 für 800l/h Pumpen	Pump head - 1.4571 for 800l/h pumps	---	X	---	X	---	X	---	---	---	---	---	---	---	---	X	X
13g	Pumpenkörper - 1.4571 mit Bypassventil für 400l/h und 700l/h Pumpen	Pump head - 1.4571 with bypass valve for 400l/h and 700l/h pumps	X	---	X	---	X	---	X	X	X	X	X	X	X	X	---	---
13h	Pumpenkörper - 1.4571 mit Bypassventil für 800l/h Pumpen	Pump head - 1.4571 with bypass valve for 800l/h pumps	---	X	---	X	---	X	---	---	---	---	---	---	---	---	X	X
14	Montagering - nur für PTFE Pumpenkörper	Mounting ring - only for pump heads made of PTFE	X	X	X	X	X	X	X	X	X	X	X	X	---	---	X	X
15	Spannscheibe DIN 6796 d=4	Clamping washer DIN 6796 d=4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16	Schraube DIN 933 M4x45	Screw DIN 933 M4x45	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
17a	Ventil - geeignet bis zu 100°C Gaseingangstemperatur	Valve - suitable up to 100°C gas inlet temperature	X	---	---	---	X	---	X	---	X	X	---	---	---	---	---	---
17b	Ventil - geeignet bis zu 160°C Gaseingangstemperatur	Valve - suitable up to 160°C gas inlet temperature	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
18a	Kunststoff Einschraubverschraubung - diverse Typen - siehe Pumpendatenblätter	Plastic fitting - various types - see pump data sheets	X	X	X	X	X	X	X	X	X	X	X	X	---	---	X	X
18b	Edelstahl Rohrverschraubung - diverse Typen - siehe Pumpendatenblätter	Stainless steel fitting - various types - see pump data sheets	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
19	Dichtring - nur für Edelstahl Pumpenkörper	Sealing ring - only for pump heads made of 1.4571	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
20	Verdränger - nur für Edelstahl Pumpenkörper	Displacer - only for pump heads made of 1.4571	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
21a	O-Ring - FKM	O-Ring made of FKM	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
21b	O-Ring - FFKM	O-Ring made of FFKM	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
22a	Spindel für Bypassventil - geeignet bis zu 100°C Gaseingangstemperatur	Spindle for PTFE bypass valve - suitable up to 100°C gas inlet temperature	X	---	---	---	X	---	X	---	X	X	---	---	---	---	---	---
22b	Spindel für Bypassventil - geeignet bis zu 160°C Gaseingangstemperatur	Spindle for PTFE bypass valve - suitable up to 160°C gas inlet temperature	---	X	X	X	---	X	---	X	---	---	X	X	X	X	X	X
22c	Spindel für Edelstahl Bypassventil	Spindle for 1.4571 bypass valve	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
22d	Spindelspitze	Spindle tip	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23	Montageplatte Bypassventil	Mounting plate bypass valve	X	X	X	X	X	X	X	X	X	X	X	X	---	---	X	X
24	Schraube DIN 7982 4,2x13	Screw DIN 7982 4,2x13	X	X	X	X	X	X	X	X	X	X	X	X	---	---	X	X
25	Spindelaufnahme	Spindle holder	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
26	Drehknopf	Knob	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
27	Deckel	Cover	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
28	Zwischenflansch	Intermediate flange	---	---	X	X	---	---	---	X	---	---	X	X	---	X	---	X
28a/28b	Kupplungsnabe	Coupling hub	---	---	X	X	---	---	---	X	---	---	X	X	---	X	---	X
28c	Kupplungsstern	Spider	---	---	X	X	---	---	---	X	---	---	X	X	---	X	---	X
29	Kupplungsflansch	Coupling flange	---	---	X	X	---	---	---	X	---	---	X	X	---	X	---	X
30	Montagering	Mounting ring	---	---	X	X	---	---	---	X	---	---	X	X	---	X	---	X
31	Schraube DIN 933 M6x20	Screw DIN 933 M6x20	---	---	X	X	---	---	---	X	---	---	X	X	---	X	---	X
32	Unterlegscheibe DIN 125 A6,4	Washer DIN 125 A6,4	---	---	X	X	---	---	---	X	---	---	X	X	---	X	---	X
33	Unterlegscheibe DIN 125 A5,3	Washer DIN 125 A5,3	---	---	X	X	---	---	---	X	---	---	X	X	---	X	---	X
34	Schraube DIN 933 M5x20	Screw DIN 933 M5x20	---	---	X	X			---	X	---	---	X	X	---	X	---	X
X	Kompletter Pumpenkopf - diverse Kombinationsmöglichkeiten	Complete pump head - various combinations	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

EG-/EU Konformitätserklärung
EC/EU Declaration of Conformity

Hiermit erklärt Bühler Technologies GmbH, dass die nachfolgenden Produkte „Geräte“ im Sinne der Richtlinie

Herewith declares Bühler Technologies GmbH that the following products are"equipment" according to Directive

2014/34/EU
(Atex)

in ihrer aktuellen Fassung sind.

in its actual version.

Die Produkte sind Maschinen im Sinne der Richtlinie
2006/42/EG
(MRL)
Artikel 2 a)
und erfüllen alle einschlägigen Anforderungen.

The products are machines according to Directive
2006/42/EC
(MD)
Article 2 (a)
and fulfill all relevant requirements.

Folgende Richtlinien wurden berücksichtigt:

The following directives were regarded:

2011/65/EU (RoHS)

Produkt / *products*: Messgaspumpe / *Sample gas pump*
Typ / *type*: P2.3C, P2.4C

Die Produkte werden entsprechend der derzeitig gültigen Atex-Richtlinie innerhalb der internen Fertigungskontrolle folgendermaßen gekennzeichnet:
The products are marked according to the currently valid Atex directive during internal control of production:

Ⓔx II 3G/- Ex h IIB T4 Gc

Zur Beurteilung der Konformität gemäß Atex-Richtlinie wurden folgende harmonisierte Normen herangezogen:
For the assessment of conformity according to the Atex directive the following standards have been used:

EN ISO 80079-36:2016 **EN 809:1998+A1:2009 + AC:2010** **EN 60204-1:2018**

Zusätzlich wurden berücksichtigt:
In addition, the following standards have been used:

EN ISO 12100:2010 **EN 50581:2012**

Die Vorschriften zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten und die Änderung 2015/863 wurden berücksichtigt.
The product is in conformity with the restriction of the use of certain hazardous substances in electrical and electronic equipment and the amending through the directive 2015/863 was regarded.

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 authorised to compile the technical file is Mr. Stefan Eschweiler located at the company's address.

Ratingen, den 15.09.2022

Stefan Eschweiler
Geschäftsführer – *Managing Director*

Frank Pospiech
Geschäftsführer – *Managing Director*

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Internet: www.buehler-technologies.com

Istruzioni di servizio

Prescrizioni sulla sicurezza uso e manutenzione del prodotto

Via Mantova, 93 43122 Parma
www.orange1.eu

(Revisione 2019/01/19)

Indicazioni sulle misure di sicurezza ed istruzioni per i motori trifase e i motori monofase

I simboli di seguito riportati servono da riferimento alle misure di sicurezza ed alle istruzioni supplementari contenute nelle presenti istruzioni di servizio.

Istruzioni speciali di sicurezza e garanzia

Pericolo

Attenersi strettamente alle misure di sicurezza ed alle istruzioni supplementari contenute nelle presenti istruzioni di servizio per la salvaguardia di persone e cose.

Le macchine elettriche rotanti presentano parti sotto tensione o in movimento e parti molto calde. Il trasporto, il collegamento per la messa in funzione e la manutenzione devono essere eseguiti da personale qualificato e responsabile (vedere IEC 364). Interventi inadeguati possono causare danni a persone e cose.

Tutti i lavori di collegamento devono essere eseguiti da personale qualificato.

UTILIZZO PRESCRITTO E CONDIZIONI DI FUNZIONAMENTO

I motori a bassa tensione sono destinati a impianti industriali e sono conformi alle norme armonizzate EN 60034/IEC34. Se non espressamente previsto è vietato l'utilizzo in zone classificate per pericolo di esplosione ed incendio.
I motori sono adatti a temperature ambiente che vanno da -20°C a +40°C ed a luoghi con altitudine fino a 1000 m. s.l.m.

Controllare attentamente i dati indicati sulla targa prima della messa in funzione del motore. I motori in bassa tensione sono considerati come componenti da installare in altre macchine ai sensi
della Direttiva Comunitaria sulle macchine 2006/42/EC. La messa in funzione è proibita fino ad avvenuto accertamento della conformità finale a tale direttiva.
Le macchine elettriche rotanti alimentate da rete sono conformi alle norme EN 50081 e EN 50082 riguardanti fenomeni di compatibilità elettromagnetica - Direttiva 2004/108/EC e non sono necessari particolari accorgimenti di schermatura. Nel caso di funzionamento intermittente, gli eventuali disturbi generati dai dispositivi di inserzione devono essere limitati mediante adeguati cablaggi.

I lavori sulla macchina elettrica devono avvenire a macchina ferma e scollegata dalla rete (compresi gli equipaggiamenti ausiliari). Se sono presenti protezioni elettriche, eliminare ogni possibilità di avviamento improvviso attenendosi alle specifiche raccomandazioni sull'impiego delle varie apparecchiature.

Nei motori monofase il condensatore può rimanere caricato tenendo temporaneamente in tensione i morsetti anche a motore fermo.

TRASPORTO, IMMAGAZZINAMENTO

Al ricevimento della fornitura accertarsi che non sussistano danni imputabili al trasporto e nell'eventualità darne comunicazione immediata, contestandoli allo spedizioniere ed astenendosi dalla messa in funzione.

Quando sono forniti con il motore, serrare saldamente i golfari a vite; poiché essi servono per il sollevamento del solo motore, non si devono sollevare macchine o accessori aggiuntivi ad esso accoppiati.
Se necessario, fare ricorso a mezzi di trasporto adeguati e sufficientemente dimensionati. Se sul motore sono presenti due golfari utilizzare sempre entrambi per il sollevamento.
Se i motori vengono immagazzinati accertarsi che l'ambiente sia asciutto,senza polvere ed esente da vibrazioni (v eff. <0,2 mm/s) al fine di evitare danneggiamenti ai cuscinetti. Prima della messa in funzione misurare la resistenza di isolamento. Se si misurano valori di resistenza <1,5MΩ essiccare l'avvolgimento. Per la procedura di essiccazione rivolgersi direttamente al nostro ufficio tecnico.

INSTALLAZIONE

Tutte le operazioni di allacciamento elettrico devono essere eseguite da personale qualificato con motore fermo disinserito e nell'impossibilità di essere riavviato.
Il rotore è equilibrato dinamicamente con mezza chiavetta. Gli organi di accoppiamento devono essere equilibrati con mezza chiavetta su mandrino liscio. Giunti e pulegge devono essere montati mediante apparecchiature apposite al fine di non danneggiare i cuscinetti del motore. Dopo il montaggio controllare che gli organi di accoppiamento siano ben fissi sull'estremità albero e spinti contro l'arresto. Se il mozzo dell'organo di accoppiamento fosse più corto dell'estremità d'albero la differenza dovrà essere compensata mediante bussola distanziatrice. Pulegge troppo piccole o troppo larghe compromettono il buon funzionamento dei cuscinetti.
I motori devono essere installati in posizione tale che l'aria di raffreddamento possa entrare ed uscire facilmente. La ventilazione non deve essere impedita e l'aria di scarico, anche di gruppi adiacenti, non deve essere riaspirata dalla ventola. Evitare di avere fonti di calore tali da influenzare la temperatura sia dell'aria sia del motore.
In caso di installazione all'aperto proteggere il motore con opportuni accorgimenti dall'irraggiamento solare e dalle intemperie. si consiglia di proteggere il motore con dispositivi salvamotore, limitatori elettronici di coppia qualora il motore non sia dotato di termistori.
Nel caso di ambienti con forti escursioni termiche ed ove si preveda la formazione di condensa, il motore deve essere dotato di apposite scaldiglie anticondensa, fori di scolo sono da praticarsi nella posizione più idonea a seconda della posizione di installazione.

Nel caso di installazione di motori con flangia B14, assicurarsi che la lunghezza dei bulloni di fissaggio sia adeguata con il loro diametro e la profondità del foro: viti troppo lunghe possono causare danni all'avvolgimento del motore. Quando i fori sono fornito chiusi con viti e guarnizioni o-ring, ripristinare le guarnizioni in fase di accoppiamento.

Controllare il senso di rotazione a motore non accoppiato facendo attenzione di assicurare la linguetta al fine di evitarne un distacco violento durante la rotazione.
Se il senso di rotazione non è quello voluto, togliere tensione e quando il motore si sarà fermato:

- nel caso di motore trifase scambiare tra loro due delle tre fasi
- nel caso di motore monofase scambiare tra loro i cavetti dell'avvolgimento ausiliario

L'allacciamento elettrico deve essere eseguito in modo sicuro e permanente: utilizzare adeguati capicorda.

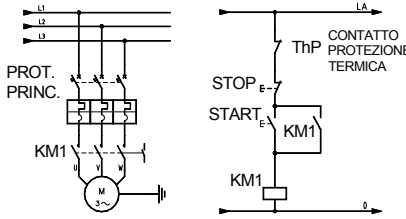
Le parti metalliche del motore che normalmente non sono sotto tensione devono essere francamente collegate a terra mediante un cavo di sezione adeguata di colore giallo-verde, utilizzando l'apposito morsetto contrassegnato all'interno della scatola morsettiera.
Nella scatola morsettiera non devono essere presenti corpi estranei, sporcizia ed umidità. Chiudere gli imbocchi dei cavi qualora restino inutilizzati ed usare adeguati passacavi qualora non siano stati forniti con il motore. Controllare che il diametro del cavo sia compatibile con il pressacavo fornito od utilizzato.
Richiudere sempre il coperchio della scatola morsettiera per non alterare il grado di protezione previsto.

COLLEGAMENTO

Il collegamento elettrico deve sempre essere eseguito da personale qualificato in accordo con le vigenti norme IEE , EN 60204 ed eventuali prescrizioni locali.

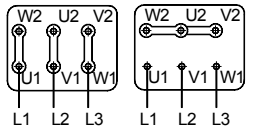
Fare sempre riferimento ai dati stampati sulla targa di tensione e frequenza per assicurarsi un corretto accoppiamento alla rete di alimentazione. Se non specificato si possono assumere tolleranze di ±5% sulla tensione e ±1% sulla frequenza indicati in targa.
I diagrammi di collegamento vengono normalmente forniti con il motore o sono stampati nella scatola morsettiera. qualora mancassero, fare riferimento a quelli forniti nel presente manuale.
Assicurarsi che, nel caso di avviamento stella/triangolo, il passaggio da stella a triangolo sia eseguito solo quando la corrente di avviamento sia diminuita al valore corrispondente a quello di stella: ciò è importante per evitare il rischio di sovraccarichi non ammessi.

Nel caso in cui il motore sia provvisto di protettore termico, collegare i cavi del protettore ad un contatto ausiliario del contattore sulla linea di alimentazione.



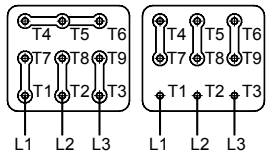
FUNZIONAMENTO:
Una volta avviato il motore a pieno carico controllare che parta e giri silenziosamente, e che non si verifichino vibrazioni eccessive o forti rumori anomali.
Per un primo esame di un eventuale anomalia fare riferimento alla tabella in calce.

TRIFASE 1 VELOCITA' 2-4-6-8 POLI (6 fili)



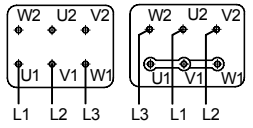
(Δ) Collegamento Delta — Tensione inferiore
(Y) Collegamento stella — Tensione superiore

TRIFASE 1 VELOCITA' 2-4-6-8 POLI (9 fili)



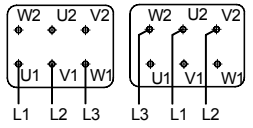
Tensione inferiore — Tensione superiore

TRIFASE DOPPIA VELOCITA' 1 AVVOLGIMENTO



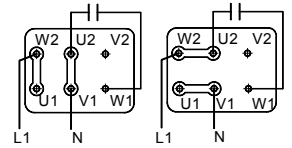
Bassa velocità — Alta velocità

TRIFASE DOPPIA VELOCITA' AVVOLGIMENTI SEPARATI



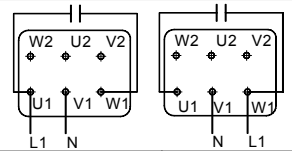
Bassa velocità — Alta velocità

MONOFASE 4 FILI



Rotazione oraria — Rotazione antioraria
(VISTA LATO ALBERO)

MONOFASE 3 FILI



Rotazione oraria | Rotazione antioraria
(VISTA LATO ALBERO)

MANUTENZIONE:
All'occorrenza e periodicamente (in funzione dell'ambiente e del servizio) verificare e ripristinare se necessario:
- la pulizia del motore (assenza di oli, sporcizia, residui di lavorazione) ed il libero passaggio dell'aria di ventilazione
- il corretto serraggio delle connessioni elettriche, degli organi di accoppiamento e fissaggio meccanico del motore
- le condizioni delle tenute statiche e rotanti

il livello di vibrazione del motore (v eff<3,5 mm/s per Pn<15KW veff<4,5 mm/s per Pn>15KW) il livello di rumore e nel caso questo si presenti anormale verificare il fissaggio motore, l'equilibratura della macchina accoppiata o l'esigenza di sostituzione dei cuscinetti.

ANOMALIA			Possibili cause	Rimedio
Cuscinetto troppo caldo	Cuscinetto rumoroso	Motore gira irregolarmente		
■			Cinghia troppo tesa	Diminuire la tensione della cinghia
■		■	Il giunto trasmette sforzi al motore	Riallineare il motore o il giunto
■			Temperatura aria raffreddamento >40°C (104 °F)	Ristabilire temperatura raffreddamento
■	■	■	Motore non montato correttamente	Controllare la forma costruttiva
		■	Sbilanciamento causato dalla puleggia o giunto	Controllare la bilanciatura
		■	Fissaggio labile del motore	Controllare il fissaggio
Se I rimedi sopra descritti non sono sufficienti, vi consigliamo di sostituire I cuscinetti				

ANOMALIA				Possibili cause	Rimedio
Non parte	Troppo caldo	Diminuzione velocità	Intervento protezioni		
■		■		Coppia resistente troppo alta	Controllare il motore e la coppia di carico
■		■		Tensione alimentazione troppo bassa	Verificare rete di alimentazione
■		■	■	Interruzione di una fase	Verificare rete di alimentazione
■	■	■	■	Errato collegamento	Verificare con schema
	■	■	■	Sovraccarico	Controllare dati di targa
	■		■	Frequenza di inserzioni troppo elevata	Controllare il tipo di servizio indicato in targa
	■			Ventilazione insufficiente	Controllare i canali di ventilazione
			■	Corto circuito nell'avvolgimento o nella scatola morsettiera	Verificare resistenza isolamento
			■	Eccessiva durata dell'avviamento	Verificare condizioni di avviamento

Service instructions

Safety prescriptions
product use and maintenance

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(Issued 2019/01/19)

Indications on safety prescriptions and special instructions for three phase and single phase motors

These symbols will draw your attention to the safety measures and additional instructions given in these Operating Instructions.

Special instructions regarding safety and warranty

Danger

For reasons of protection of persons and objects strictly follow the safety measures and additional instructions given in these Operating Instructions.

Electric rotating machines present dangers from live and rotating parts, and probably very hot surfaces. All work on them including transportation , connection , commissioning and maintenance must be by qualified and responsible specialists (IEC 364 must be observed). Inadequate work can lead to severe damage to persons and property.

All work on electrical connections to the motors must be performed only by qualified personnel.

SPECIFIED USE AND WORKING CONDITIONS

These low voltage motors are only intended for use in industrial plants and are in accordance with the relevant sections of EN 60034/IEC34.Their use in hazardous areas is prohibited, unless explicitly indicated.
The motors are suitable for ambient temperatures from -20°C (68°F) to +40°C (104°F) and altitudes <= 1000m above sea level.

It is imperative to observe the data printed on the nameplate before operating the motor. Low voltage motors are components to be installed into machines in accordance with Directive 2006/42/EC.
Commissioning is not allowed until the conformity of the end product with this directive has been established.
These asynchronous motors comply with EN 50081 and EN 50082 standards on electromagnetic compatibility for the EMC (2004/108/EC) Directive and no particular shielding is necessary when connected to a pure sinewave voltage supply.

Before working on the motor, ensure it has stopped and is disconnected from the power supply (including auxiliary equipment).If there is any form of automatic starting, automatic resetting , relays or remote starting, avoid any possibility of unexpected re-starting, paying attention to specific recommendations on equipment application.

In single phase motors, capacitors can remain temporarily charged resulting in live terminals even after the motor has stopped. Discharge all the capacitors and ground every terminal before touching any connection.

TRANSPORT, STORAGE

On receipt verify that the motor has not been damaged during transport and in this case avoid any installation and communicate immediately to the transport service.

Eyebolts, when provided with the motor, must be tightened properly as they are suitable only for lifting the motor, no additional loads are allowed to be attached. If necessary use sufficiently dimensioned devices as a means of transport.
Do not use any projection of the motor body to hang the motor for transport purposes.
If two eyebolts are present on the motor use both for lifting.
Store low voltage motors in a dry, dust free and low vibration (v eff <0,2 mm/s) area to prevent bearing damage. Before commissioning, the insulation resistance must be measured. In case of values < 1,5 MΩ the winding must be dried. Contact our technical department directly for information on the drying procedure.

INSTALLATION

All work must only be done by qualified personnel with the low voltage motor and driven machine at standstill, electrically dead and locked against restart.
The rotor has been balanced dynamically with a half key fitted. The coupling components must also be balanced with a half key on a smooth mandrel. Coupling belts and pulleys must be assembled by suitable tools to protect the bearings.
After assembly check that the coupling components are well fixed on the shaft end; they must be properly pushed against the shaft shoulder. Where the hub of the coupling gear is shorter than the shaft end, compensate the difference by use of a bush spacer. Too large or too small pulleys can impair the shaft bearing life; similarly excessive belt tension can cause low bearing life or shaft breakage.
The motors must be installed in a proper position so that cooling air can go in and out easily. The ventilation must not be hindered and the outgoing air - also from adjacent units - must not be directly sucked in again.
Avoid heat sources near the motor that might affect the temperatures both of cooling air and of the motor.
In case of outdoor installation protect the motor from solar radiation and extremes of weather.
It is advisable to protect the motor with such as over-current devices and torque limiters where it is not protected by winding temperature transducers connected to appropriate switchgear.
In case of environments with wide thermal excursions and when can be preview the presence of moisture, the motor must be equipped with heaters, drain holes must be positioned in places dependent on the installation configuration.

In case of installation of motors with face flange B14, make sure that the fixing screws are of a proper length compared to the tapped diameter: too long screws could damage the motor winding. In case of motor provided with screws and o-ring seals, such seals shall be replaced in the right position during the assembling.

Check the direction of rotation with the motor not coupled fastening the shaft key to avoid its violent ejection during rotation.
If the direction of rotation is not as desired, disconnect the motor and wait until the motor is completely stopped:
- in the case of three phase motors interchange two phases at the terminals
- in the case of single phase motors refer to the diagram supplied with the motor

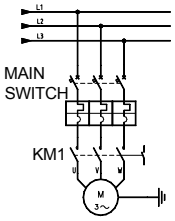
Connection must be made in such a way that a durably safe, electrical connection is maintained : adequate cable and associated equipment must be used.

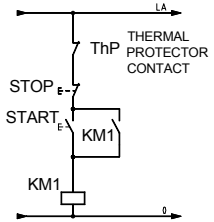
Metallic parts that are normally not energized must be connected to earth by means of green-yellow cable of a proper section using the earth terminal inside the terminal box.
The terminal box must be free of foreign bodies, dirt and humidity. Open cable gland holes must be sealed.
Use appropriate cable glands if these are not included with the motor. Check if the cable diameter is compatible with the cable gland installed.
Always close the terminal box cover in order not to invalidate the protection class of the motor.

CONNECTION

The electrical connection must be done by qualified personnel in accordance with appropriate regulations such as IEE, EN 60204 and local prescriptions.

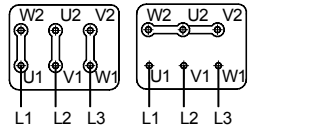
Always refer to the data printed on the nameplate for voltage and frequency to ensure the motor is appropriate for the mains supply.
If not specified it is possible to assume tolerances of ±5% on voltage and ±1% on frequency indicated on the nameplate.
The connection diagrams are normally supplied together with the motor or are printed in the terminal box. If they are missing please refer to this manual or contact directly to our technical office.
Check and make sure that, in the case of star /delta start, the switching from star to delta can only be executed after the starting current of the star step has fallen; this is important because of the risk of not permitted operational loads.
In case the motor is provided with thermal protector connect the thermal protector cables to a auxiliary contact following the drawing:





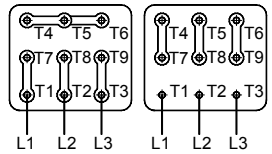
OPERATION:
Once the motor is running at full load check if the motor starts freely and runs smoothly and ensure excessive vibrations and high noise are absent.
For a first check following a failure please refer to the table below.

SINGLE SPEED 3-ph 2-4-6-8 POLES (6 wires)



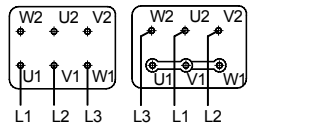
(△) Delta connection Lower voltage — (Y) Star connection Higher voltage

SINGLE SPEED 3-ph 2-4-6-8 POLES (9 wires)



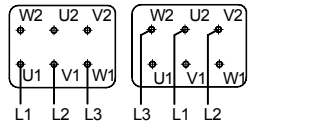
Lower voltage — Higher voltage

DOUBLE SPEED 3-ph SINGLE WINDING



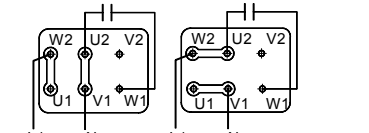
Low speed — High speed

DOUBLE SPEED 3-ph SEPARATE WINDINGS



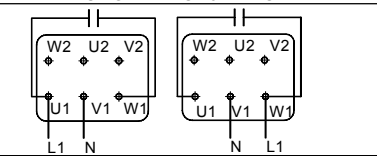
Low speed — High speed

SINGLE PHASE 4 WIRES



Clockwise rotation — Counter clockwise rotation
(SHAFT SIDE VIEW)

SINGLE PHASE 3 WIRES



Clockwise rotation | Counter clockwise rotation
(SHAFT SIDE VIEW)

MAINTENANCE:
If necessary and periodically (depending on the environment and duty) verify and maintain as necessary to ensure:
- motor cleanliness (oil, dirt and machining residuals absence) and free passage of cooling air
- correct tightening of electrical connections, of fastening screws
- free motor running with low vibration (v eff<3,5mm/s for Pn<15KW v eff<4,5 mm/s for Pn>15KW) and
absence of anomalous noises; where there is high vibration and/or noise verify the motor fastenings, machine balancing and that the bearings are in good condition.

FAULT			Possible causes	Remedy
Bearing too hot	Bearing noise	Motor runs unevenly		
■			Pulley tension too high	Reduce pulley tension
■		■	Coupling forces are pulling or pushing	Realign motor, correct coupling
■			Coolant temperature above 40°C (104°F)	Adjust temperature of cooling air
■	■	■	Motor incorrectly mounted	Correct the motor mounting
		■	Unbalance caused by pulley or coupling	Balance finely
		■	Motor fastening insecure	Improve fastening
If the remedies described here are insufficient, we recommend replacement of the bearings				

FAULT				Possible causes	Remedy
Doesn't start	Too hot	Speed reduction	Protective devices intervention		
■		■		Resisting torque is too high	Reduce the load torque
■		■		Mains voltage too low	Increase mains voltage
■		■	■	Phase interruption	Check mains supply
■	■	■	■	Wrong connection	Check with the wiring diagram
	■	■	■	Overload	compare data on rating plate with measurements
	■		■	Switching frequency too high	Observe rated duty type
	■			Insufficient ventilation	Check ventilation passages
			■	Short circuit of winding or terminal board	Measure insulation resistance
			■	Starting time exceeded	Reduce load torque/load inertia

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
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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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