BÜHLER TECHNOLOGIES

Gas Analysis

Sample gas pumps

P4.3, P4.83

Installation and Operation Instructions

Original instructions

BE420010
05/2024

Bühler Technologies GmbH, Harkortstr. 29, D-40880 Ratingen
Tel. +49 (0) 21 02 / 49 89-0, Fax: +49 (0) 21 02 / 49 89-20
E-Mail: analyse@buehler-technologies.com
Internet: www.buehler-technologies.com

Bühler Technologies GmbH, Harkortstr. 29, D-40880 Ratingen
Tel. +49 (0) 21 02 / 49 89-0, Fax: +49 (0) 21 02 / 49 89-20
Internet: www.buehler-technologies.com
E-Mail: analyse@buehler-technologies.com

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.

The way two pumps are aligned in a motor with twin shaft is a cost-effective solution for analysis systems with two independent gas circuits. Applications requiring a quick response time the flow rate of the P4.83 pump can be increased by coupling both gas gas circuits.

The sample gas pump is only intended to convey gaseous media. It is not suitable for liquids.

Please note the additional information in chapters Product description [> page 4] and Operation and control [> page 12] along with the information on specific intended use, existing material combinations, as well as pressure and temperature limits in the data sheets.

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. Do not expose the device to combustible or explosive gas mixtures.

When installed outdoors, ensure adequate protection from the weather, see chapter Requirements for the set-up location [> page 8]

1.2 Product key

This unit is available in various versions. Please refer to the type plate for the specific version.

In addition to the order number or ID number, the type plate also contains the item number with a code, where each character (x) represents specific equipment:

42	xx	x	x	x	x	x	9	0	0	0	Product characteristic	
											Base model	
	80										P4.3, 2 x 400 L/h	
	81										P4.83, 2 x 800 L/h	
											Motor voltage	
		1									230 V 50/60 Hz; 1,4/1,2 A	
		2									115 V 50/60 Hz; 2,4/2,2 A	
											Pump head position	
			1								Normal position vertical	
			2								turned by 180°	
											Pump body material	
				1							PTFE	
				2							Stainless steel 1.4571	
				3							PTFE with bypass valve [1]	
				4							Stainless steel 1.4571 with bypass valve [1]	
											Valve material	
					1						up to 100°C; PTFE/PVDF [2]	
					2						up to 160°C; PTFE/PEEK	
											Screw-in connections (for 230 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 bumpers	
											Connection kit for parallel operation	
								0			without	
								1			Tubing kit PVDF/PTFE [3]	
								2			Piping kit 1.4571/1.4401 [3]	

[1] not with parallel operation.

[2] not P4.83.

[3] P4.83 only.

Any special features applicable to a pump model are described separately in the operating manual.

When connecting, please note the specific values of the pump, and the correct version when ordering spare parts (e.g.: valve).

1.3 Scope of delivery

P4.3	P4.83
2 x Sample gas pump with motor	2 x Sample gas pump with motor
4 x Rubber-metal bumpers	4 x Rubber-metal bumpers
1 x Mounting bracket	1 x Mounting bracket
Product documentation	Product documentation
	if necessary, 1 x connection kit (optional)

1.4 Product description

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

Please note the specifications in the appendix to this manual on the specific intended use, existing material combinations, as well as pressure and temperature limits. In addition, please also not the specifications and markings on the nameplates.

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 head [> page 9]).

2 Safety instructions

2.1 Important advice

Operation of the device is only permitted if:

- the product is used under the conditions described in the installation- and operation instruction, the intended application according to the type plate and the intended use. In case of unauthorized modifications done by the user Bühler Technologies GmbH can not be held responsible for any damage,
- when complying with the specifications and markings on the nameplates.
- the performance limits given in the datasheets and in the installation- and operation instruction are obeyed,
- monitoring devices and safety devices are installed properly,
- service and repair is carried out by Bühler Technologies GmbH,
- only original spare parts are used.

This manual is part of the equipment. The manufacturer keeps the right to modify specifications without advanced notice. Keep this manual for later use.

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 include the following warnings:

	General warning sign		General mandatory sign
	Voltage warning		Unplug from mains
	Warning not to inhale toxic gases		Wear respiratory equipment
	Warning of corrosive substances		Wear a safety mask
	Warning of explosion hazard		Wear gloves
	Warning of hot surfaces		

2.2 General indication of risk

The equipment must be installed by a professional familiar with the safety requirements and risks.

Be sure to observe the safety regulations and generally applicable rules of technology relevant for the installation site. Prevent malfunctions and avoid personal injuries and property damage.

The operator of the system must ensure:

- Safety notices and operating instructions are available and observed,
- The respective national accident prevention regulations are observed,
- The permissible data and operational conditions are maintained,
- Safety guards are used and mandatory maintenance is performed,
- Legal regulations are observed during disposal,
- compliance with national installation regulations.

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 **Toxic, corrosive gases**

The measuring gas led through the equipment can be hazardous when breathing or touching it.

a) Check tightness of the measuring system before putting it into operation.

b) Take care that harmful gases are exhausted to a save place.

c) Before maintenance turn off the gas supply and make sure that it cannot be turned on unintentionally.

d) Protect yourself during maintenance against toxic / corrosive gases. Use suitable 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.
Do not expose the device to combustible or explosive gas mixtures.

CAUTION **Tipping hazard**

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

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.

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.

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 Mounting

CAUTION

Damage to the device

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

When installing the P4 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.

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.

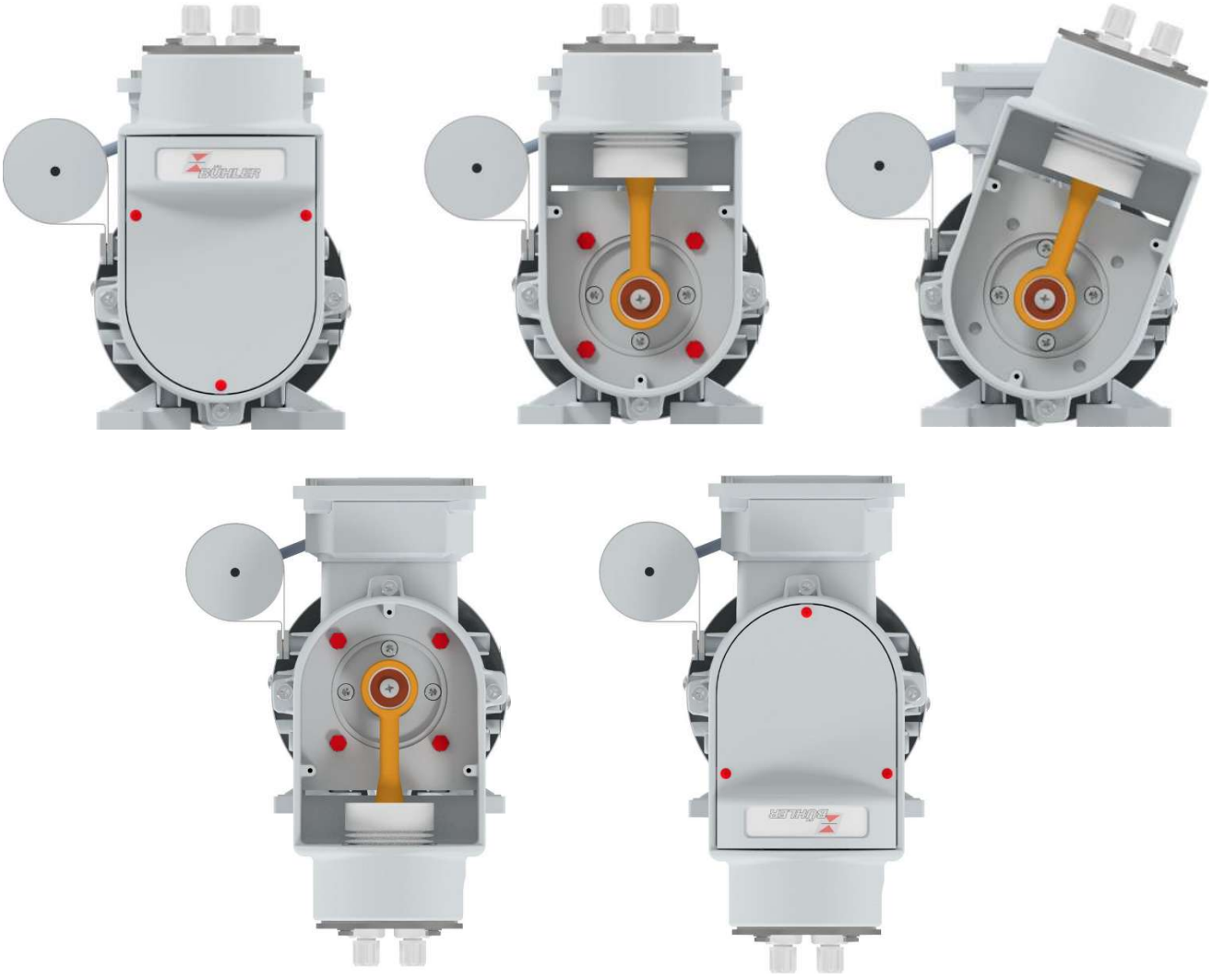
4.3.1 Alteration of hanging pump head

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

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

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

Installing the pump head offset by 90° is prohibited!



4.4 Connecting the gas lines

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).

Individual operation

If the pumps are used in individual operation, the gas feed paths are to be connected to the corresponding pump head. The inlets are labelled with **"In"** (inlet), the outlets with **"Out"** (outlet). Ensure that the connections with the gas pipelines are airtight.

Parallel operation (P4.83 only)

In parallel operation, the pump heads are connected with the help of the connection set. In doing so, the outlets and inlets of each pump head are to be connected to each other. The inlets are labelled with **"In"** (inlet), the outlets with **"Out"** (outlet). The gas path is connected to the corresponding T-pipe of the connection set. The union nut for the securing of the connection set is a component part of the pump.

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.

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

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:

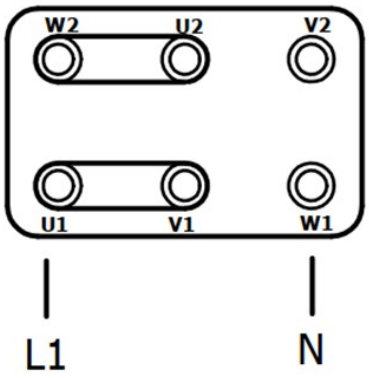
– Protective earth terminal inside the motor terminal box.
– Protective earth terminal on the mounting bracket.

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.



5 Operation and control

NOTICE

The device must not be operated beyond its specifications.

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.

DANGER

Toxic, corrosive gases

The measuring gas led through the equipment can be hazardous when breathing or touching it.

a) Check tightness of the measuring system before putting it into operation.

b) Take care that harmful gases are exhausted to a save place.

c) Before maintenance turn off the gas supply and make sure that it cannot be turned on unintentionally.

d) Protect yourself during maintenance against toxic / corrosive gases. Use suitable protective equipment.

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 (per head in the P4.3) or under 400 l/h (per head in the P4.83) in continuous operation, a bypass is available,
- the ambient parameters are complied with,
- information from the identification plate is complied with,
- the voltage and frequency of the motor correspond to those of the network,
- the electrical connections are fastened tightly and the monitoring devices have been connected and set correctly,
- the 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.

When switching on the unit, check that:

- there is no unusual noise or vibration.
- the flow rate is not elevated or low. This can indicate a bellow defect.

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 flow rate per pump head must be at least 50 l/h for the P4.3 and at least 200 l/h for the P4.83 pumps. In the event of throttling under 150 l/h for the P4.3 or under 400 l/h for the P4.83 pumps 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.

The output can be adjusted on pumps with built-in bypass valve. Do not apply a lot of force when turning the valve as the valve could otherwise be damaged! The rotation range of the valve is about 7 rotations.

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.

DANGER

Toxic, corrosive gases

The measuring gas led through the equipment can be hazardous when breathing or touching it.

a) Check tightness of the measuring system before putting it into operation.

b) Take care that harmful gases are exhausted to a save place.

c) Before maintenance turn off the gas supply and make sure that it cannot be turned on unintentionally.

d) Protect yourself during maintenance against toxic / corrosive gases. Use suitable protective equipment.

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.

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.

After approx. 500 operating hours tighten the screws for the mounting ring to 3 Nm.

6.1 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: P4.3 = 1.7 bar; P4.83 = 3.5 bar
Negative pressure: P4.3 = -0.65 bar; P4.83 = -0.75 bar
Flow rate: P4.3 = 400 L/h; P4.83 = 800 L/h

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

6.2 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 solvent-containing cleaning products).
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 1 Nm, 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: P4.3 = 1.7 bar; P4.83 = 3.5 bar
    Negative pressure: P4.3 = -0.65 bar; P4.83 = -0.75 bar
    Flow rate: P4.3 = 400 L/h; P4.83 = 800 L/h

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

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

Please refer to assembly drawing 42/025-Z02-01-2 in the appendix for help with 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 (min. continuous operating temperature: 215 °C, e.g. Fluoronox S90/2) and carefully attach it to the spindle.
– Carefully reinsert the entire unit into the pump body in a turning motion and tighten the bolts or spindle holder.
– Check the sample gas pump for leaks.

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

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 the inlet and outlet valves [> page 15].
	– Bypass valve open	– Close bypass valve
	– Defective bypass valve O-ring	– have repaired by Bühler service technician or see Replacement of the O-ring of the bypass valve (optional) [> page 16].
	– Torn bellow	– have repaired by Bühler service technician or see Replacing bellow and connecting rod-eccentric-combination [> page 15].
Noisy pump operation	– Crankshaft out of alignment	– have repaired by Bühler service technician or see Replacing bellow and connecting rod-eccentric-combination [> page 15].
	– Engine bracket damaged	– Replace motor
Protective device is triggering	– Coil- and terminal short circuit	– Measure insulation resistance
	– Start-up time exceeded	– Check start-up requirements

Malfunction	Cause	Action
Poor performance	– Leakage	– Tighten head screws, note torque (see chapter Maintenance [> page 14]).
	– Torn bellow	– have repaired by Bühler service technician or see Replacing bellow and connecting rod-eccentric-combination [> page 15].
	– Defective or dirty valves	– Carefully blow out or replace valves or see chapter Replacing the inlet and outlet valves [> page 15].

Tab. 1: Troubleshooting

7.2 Spare Parts

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

Upgrade and expansion parts can be found in our catalog.

Available spare parts:

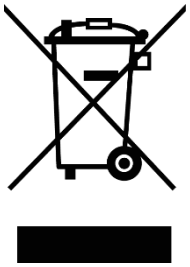
Spare part		Item no.	Position in assembly drawing 42/025-Z02-01-2
P4.3	Bellow	4200015	12a
	Plunger / eccentric combination	4200075	10a, 11
	Set of 100 °C valves	4201002	2x 17a
	Set of 160 °C valves	4202002	2x 17b
	Bypass O-ring	9009115	21a
P4.83	Bellow	4200071	12b
	Plunger / eccentric combination	4200034	10c, 11
	Set of 160 °C valves	4202002	2x 17b
	Bypass O-ring	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.

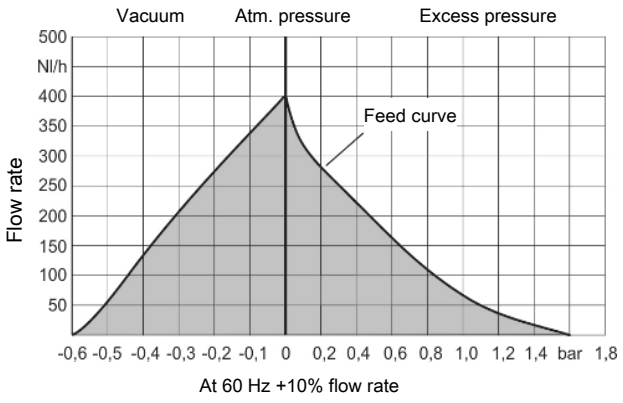
9 Appendices

9.1 Technical Data

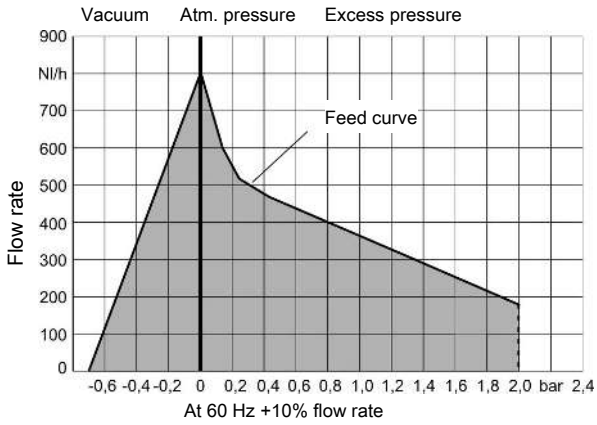
P4.3/P4.83 Technical Data	
Nominal voltage:	see ordering information
Nominal current:	see ordering information
Protection class:	electric IP55 mechanical IP20
Weight:	approx. 12.5 kg
Dead volume:	2 x 8.5 ml
FM C-US (115 V only) FM approval no.:	3038101/3038101C
Ambient temperature:	max. 60 °C
Media temperature:	PTFE/PVDF valves max. 100 °C PTFE/PEEK valves max. 160 °C
Materials of parts in contact with media 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 Feed Curves

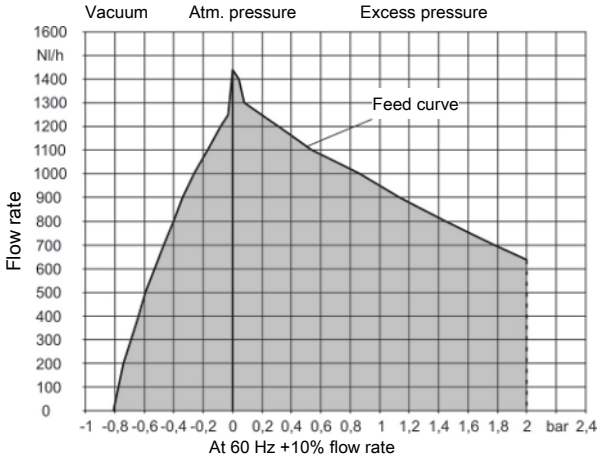
P4.3 (per head)



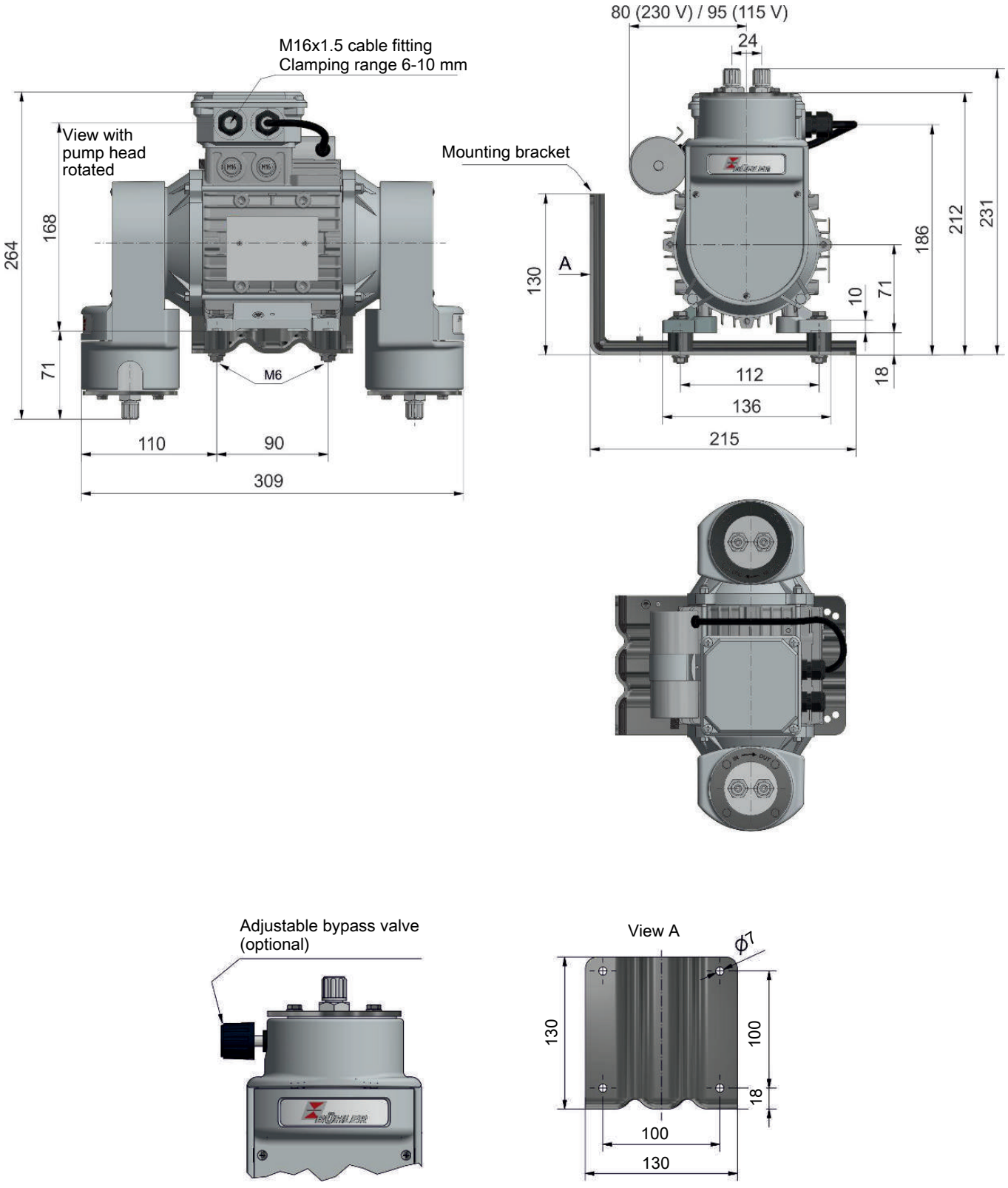
P4.83 (per head)



P4.83 (parallel circuit)



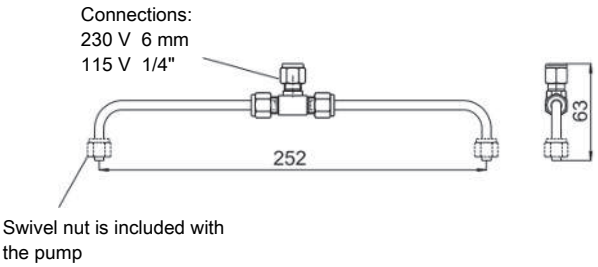
9.3 Dimensions



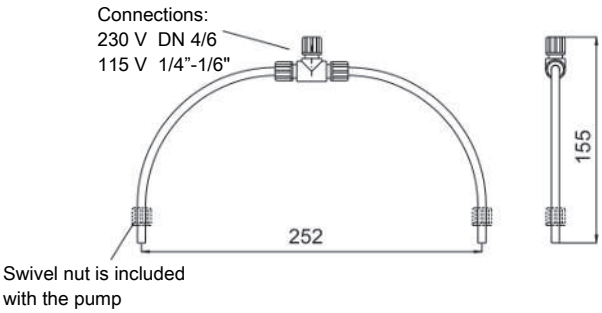
Installation notices:
1) This pump should be installed horizontally
2) If necessary, rotate the pump head during installation. When conveying gasses with condensate content it must be installed valves down.

9.4 Dimensions piping kit/tubing kit for P4.83 with parallel operation

Piping kit

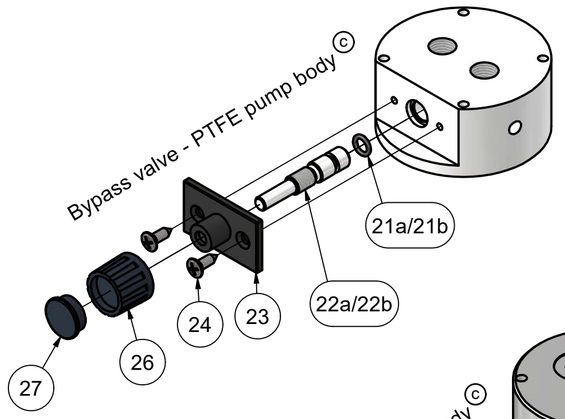


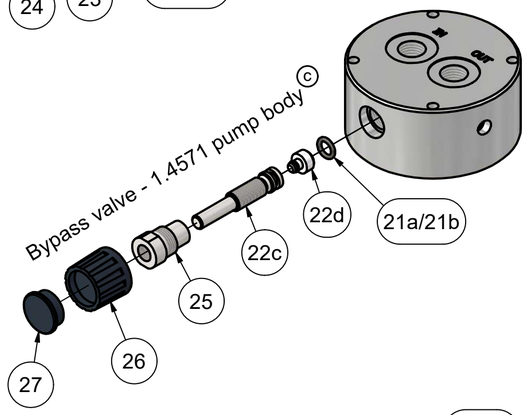
Tubing kit

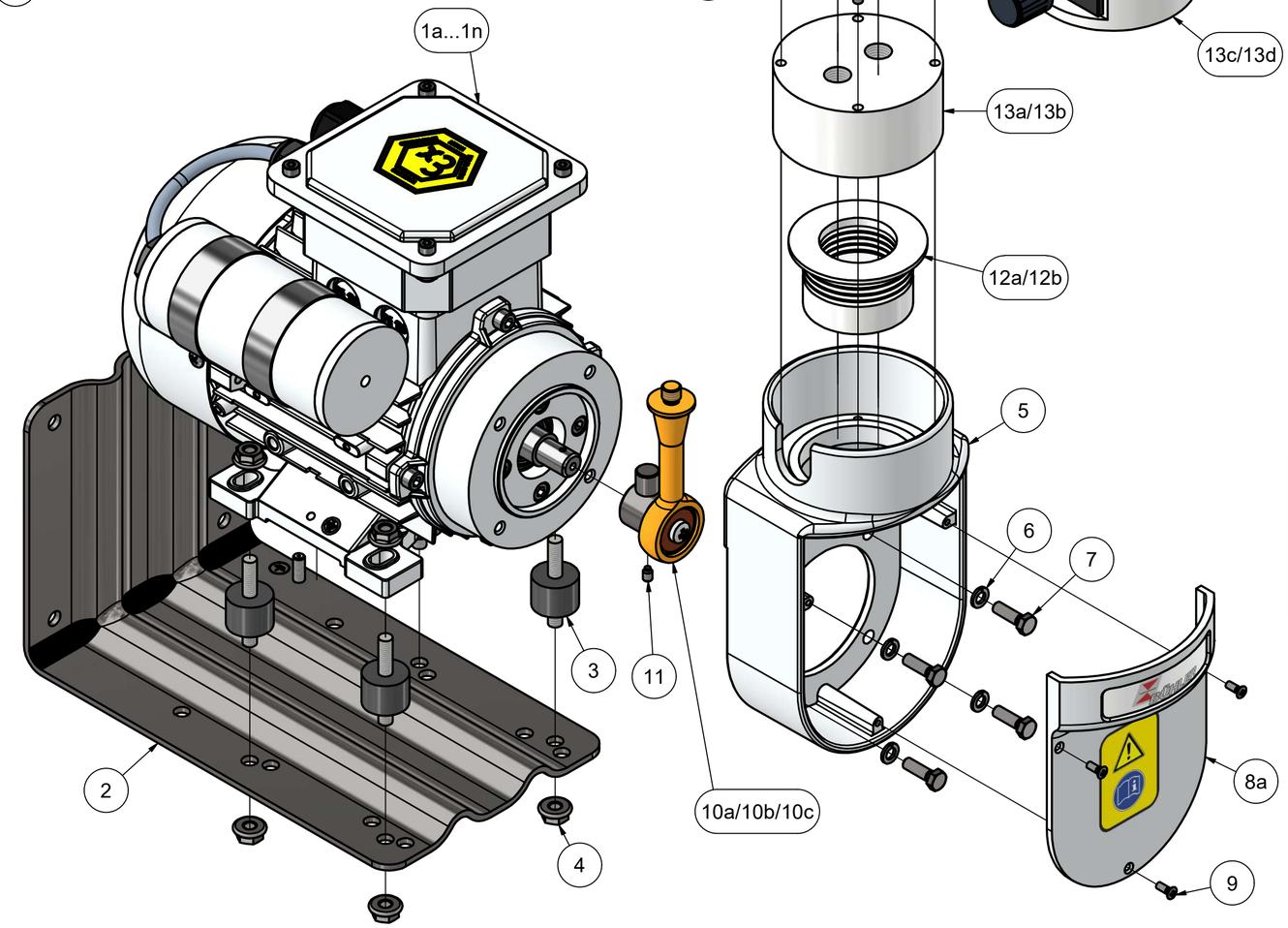


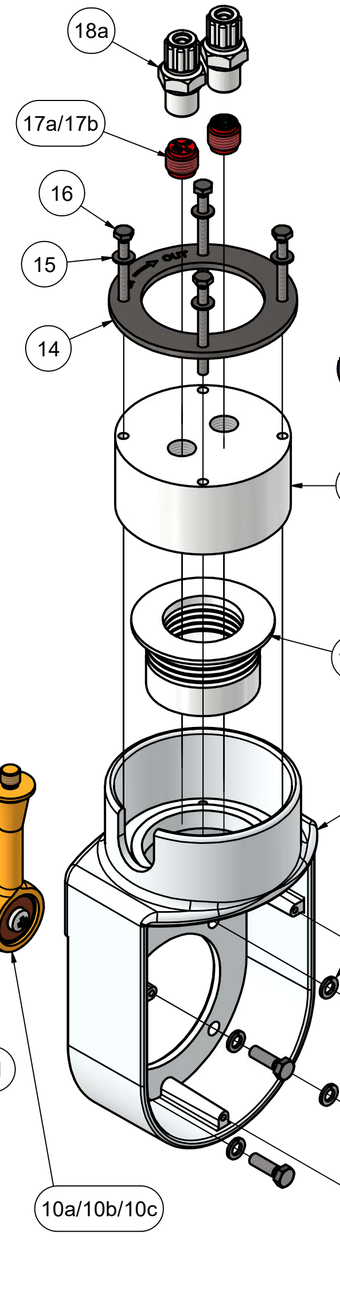
10 Attached documents

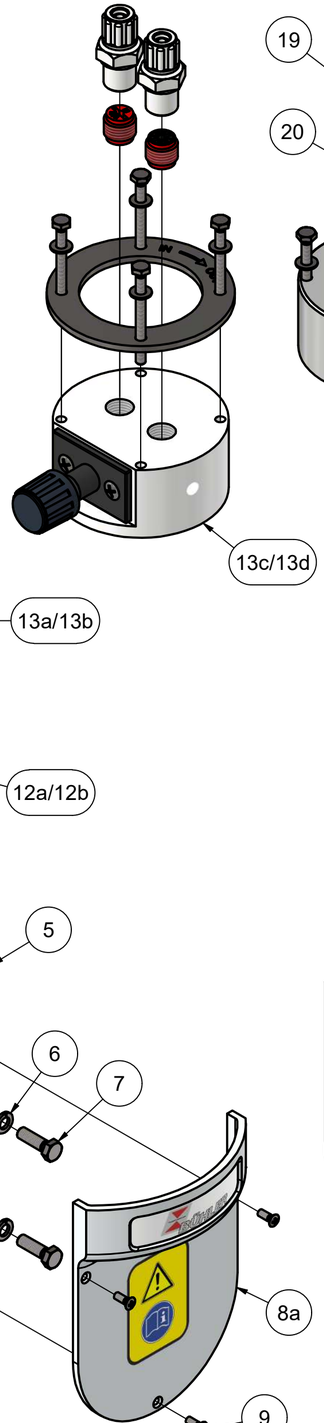
- Drawings: 42/025-Z02-01-2, 42/025-Z02-03-2
- Declaration of conformity: KX 42 0002
- Operating instructions: Electric motor
- Certificates: FM21NUS0010, FM21NCA0007
- RMA - Decontamination Statement

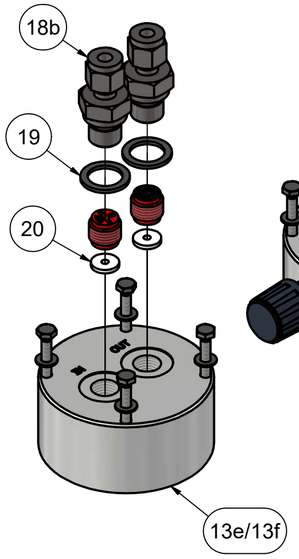


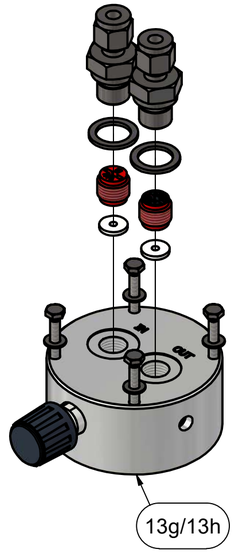


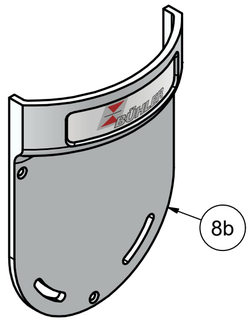












Die Pumpentypen P2.4, P2.84, P2.4C, P2.4 Atex/Amex, P2.74 Atex und P2.84 Amex sind mit einem Zwischenflansch zwischen Motor und Pumpe ausgestattet. Beachten Sie hierzu zusätzlich die spezifische Explosions- und Montagezeichnung 42/025-Z02-02-2.

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)
						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		
						Gepr.	27.05.2024				
									ZeichnungsNr.: 42/025-Z02-01-2C		
	c	Übersetzung	24.05.24	Sun		BÜHLER Technologies GmbH 40880 Ratingen			Art.Nr.: ---		
	b	Bezeichn.	16.09.21	Sun							
	a	Motor Nr	15.06.21	Sun							
	Zust.	And.	Datum	Name		Ers.für:			Arbeitsanweisung:		

Zeichnungsnummer/Drawing no. 42/025-Z02-03-2 | Rev.C | Date: 24.05.2024 | Autor: Sundergeld
Änderung: C = Übersetzungskorrektur => pump "head">"body"| Geprüft am: 27.05.2024 **| Prüfer:** Breitenmann

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 body - PTFE for 400l/h pumps	X	---	X	---	X	---	X	X	X	X	X	X	---	---	---	---
13b	Pumpenkörper - PTFE für 800l/h Pumpen	Pump body - PTFE for 800l/h pumps	---	X	---	X	---	X	---	---	---	---	---	---	---	---	X	X
13c	Pumpenkörper - PTFE mit Bypassventil für 400l/h Pumpen	Pump body - 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 body - 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 body - 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 body - 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 body - 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 body - 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 bodys 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 bodys 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 bodys 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 den wesentlichen Anforderungen der Richtlinie

2006/42/EG

(MRL)

in ihrer aktuellen Fassung entsprechen.

Herewith declares Bühler Technologies GmbH that the following products correspond to the essential requirements of Directive

2006/42/EC

(MD)

in its actual version.

Die Produkte sind Maschinen nach Artikel 2 a).

The products are machines according to article 2 (a).

Produkt / *products*: Messgaspumpen / *Sample gas pumps*
Typ / *type*: P4.3, P4.83

Das Betriebsmittel ist für den Einbau in Gasanalysesystemen bestimmt und für das Fördern von ausschließlich gasförmigen Medien vorgesehen
The equipment is designed for installation in gas analyser systems and is designed to transport only gaseous media.

Das oben beschriebene Produkt der Erklärung erfüllt die einschlägigen Harmonisierungsrechtsvorschriften der Union:
The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

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

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*

Bühler Technologies GmbH, Harkortstr. 29, D-40880 Ratingen,
Tel. +49 (0) 21 02 / 49 89-0, Fax. +49 (0) 21 02 / 49 89-20
Internet: www.buehler-technologies.com

UK Declaration of Conformity

The manufacturer Bühler Technologies GmbH declares, under the sole responsibility, that the product complies with the requirements of the following UK legislation:

Machinery Safety Regulations 2008

Products: Sample gas pumps
Types: P4.3
P4.83

The equipment is designed for installation in gas analyser systems and is designed to transport only gaseous media.

The object of the declaration described above is in conformity with the relevant designated standards:

EN 809:1998+A1:2009 + AC:2010

EN 60204-1:2018

In addition, the following standards have been used:

EN ISO 12100:2010

Ratingen in Germany, 01.11.2022

Stefan Eschweiler
Managing Director

Frank Pospiech
Managing Director

Bühler Technologies GmbH, Harkortstr. 29, D-40880 Ratingen,
Tel. +49 (0) 21 02 / 49 89-0, Fax. +49 (0) 21 02 / 49 89-20
Internet: www.buehler-technologies.com

Istruzioni di servizio

Prescrizioni sulla sicurezza uso e manutenzione del prodotto

Via Achille Grandi, 23 47030, San Mauro Pascoli (FC)
www.orange1.eu

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 <1,5M□ 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 delletre fasi

nel caso di motore monofase scambiare tra loro icavetti dell'avvolgimento ausiliario

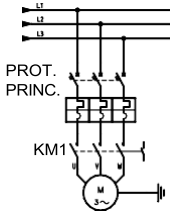
L'allacciamento elettrico deve essere eseguito in modo sicuro e permanente: utilizzare adeguati capicorda.

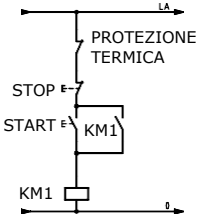
Le parti metalliche del motore che normalmente non sono sotto tensione devono essere francamente collegate a terra mediante un cavo di sezione adeguata di colore giallo-verde, utilizzando l'apposito morsetto contrassegnato all'interno della scatola morsettiera.
Nella scatola morsettiera non devono essere 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 cheil 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.

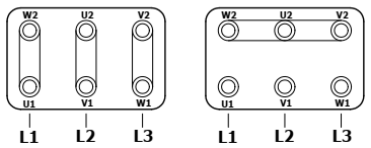
Fare sempre riferimento ai dati stampati sulla targa di tensione e frequenza per assicurarsi un corretto accoppiamento alla rete di alimentazione. Se non specificato si possono assumere tolleranze di ±5% sulla tensione e ±1% sulla frequenza indicati in targa.
I diagrammi di collegamento vengono normalmente 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.



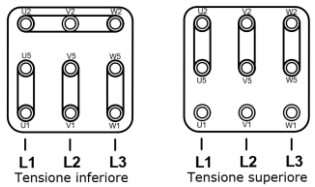


FUNZIONAMENTO:
Una volta avviato il motore a pieno carico controllare che parta e giri silenziosamente, e che non si verifichino vibrazioni eccessive o forti rumori anomali.
Per un primo esame di un eventuale anomalia fare riferimento alla tabella in calce.

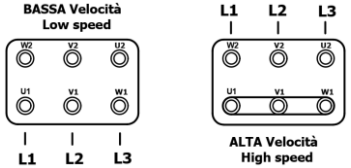
TRIFASE 1 VELOCITÀ 2-4-6-8 POLI (6 fili)



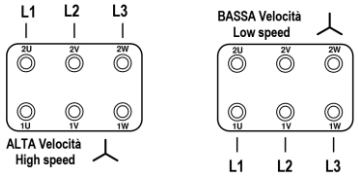
TRIFASE 1 VELOCITÀ 2-4-6-8 POLI (9 fili)



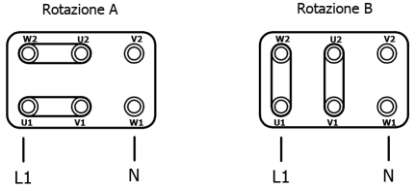
TRIFASE DOPPIA VELOCITÀ 1 AVVOLGIMENTO (DAHLANDER)



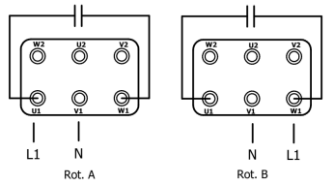
TRIFASE DOPPIA VELOCITÀ AVVOLGIMENTI SEPARATI



MONOFASE 4 FILI



MONOFASE 3 FILI



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

Via Achille Grandi, 23 47030, San Mauro Pascoli (FC)
PROTEZIONE

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 warran nger

For reasons of protection of persons and objects s y 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 performedonly 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 M□ 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 themotor

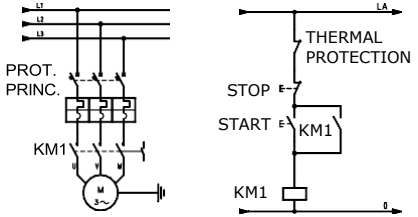
Connection must be made in such a way that a durably safe, electrical connection is maintained : adequate cable and associated equipment must be used.

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 cablegland holes must be sealed.
Use appropriate cable glands if these are not included with the motor. Check ifthe cable diameter is compatible with the cable gland installed.
Always close the terminal box cover in order not to invalidate the protectionclass of the motor.

CONNECTION

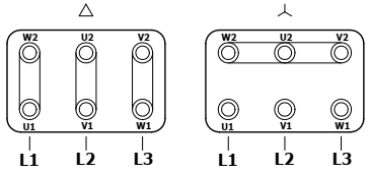
The electrical connection must be done by qualified personnel in accordance with appropriate regulations such as IEE, EN 60204 and local prescriptions.

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:

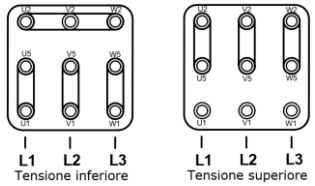


OPERATION:
Once the motor is running at full load check if the motor starts freely and runs smoothly and ensure excessive vibrations and high noise are absent.
For a first check following a failure please refer to the table below.

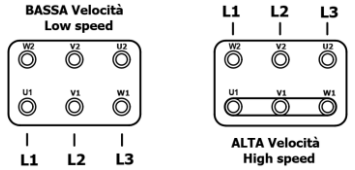
SINGLE SPEED 3-ph 2-4-6-8 POLES (6 wires)



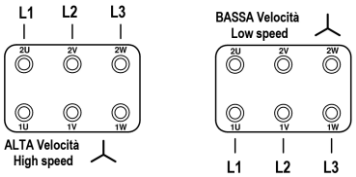
SINGLE SPEED 3-ph 2-4-6-8 POLES (9 wires)



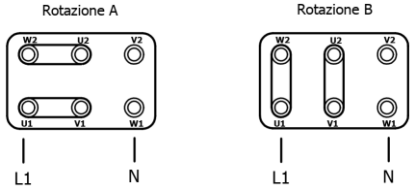
DOUBLE SPEED 3-ph SINGLE WINDING (DAHLANDER)



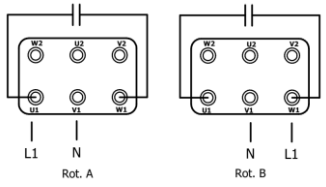
DOUBLE SPEED 3-ph SEPARATE WINDINGS



SINGLE PHASE 4 WIRES



SINGLE PHASE 3 WIRES



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 temperatureof 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

FM Approvals
1151 Boston Providence Turnpike
P.O. Box 9102 Norwood, MA 02062 USA
T: **781 762 4300** F: 781-762-9375 www.fmapprovals.com

CERTIFICATE OF COMPLIANCE

HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT

This certificate is issued for the following equipment:

P2.2 AMEX (P/N 4271XXXX99), P2.4 AMEX (P/N 4272XXXX99), P2.5 AMEX (P/N 4278XXXX99), P2.82 AMEX (P/N 4273XXXX99) and P2.84 AMEX (P/N4274XXXX99) Rated 115V/230V AC, 50/60Hz, 1.7A/0.89A. Sample Gas Pumps.
NI / I / 2 / BCD / T3, T4 Ta = -20 °C to +50 °C
x = denote power supply, position of pump head, material of pump head and material of valves.

For ordinary locations:

P2.3 (P/N 4256XXXX99), P2.4 (P/N 4257XXXX99), P2.5 (P/N 4258XXXX99), P2.83 (P/N4263XXXX99), P2.84 (P/N 4264XXXX99) Rated 115VAC, 50/60Hz, 1.7A and P4.3 (P/N 4280XXXXX99), P4.83 (P/N 4281XXXX99) Rated 115VAC, 50/60Hz, 1.7A . Sample Gas Pumps.
x = denote power supply, position of pump head, material of pump head, material of valves and accessories (only P4.XX)

Equipment Ratings:

Nonincendive electric apparatus for use in Class I, II, Division 2, Groups A, B, C & D indoor hazardous (Classified) locations and for use in ordinary Locations

FM Approved for:

Bühler Technologies GmbH
Ratingen D-40880 Germany

FM Approvals

Member of the FM Global Group

This certifies that the equipment described has been found to comply with the following Approval Standards and other documents:

Class 3600	1998
Class 3611	2004
Class 3810	2005

Original Project ID: 3038101 Approval Granted: May 24, 2010

Subsequent Revision Reports / Date Approval Amended

Report Number	Date	Report Number	Date

FM Approvals LLC

J. E. Marquedant
Group Manager, Electrical

24 May 2010
Date

FM Approvals
Member of the FM Global Group

FM Approvals
1151 Boston Providence Turnpike
P.O. Box 9102 Norwood, MA 02062 USA
T: **781 762 4300** F: 781-762-9375 www.fmapprovals.com

CERTIFICATE OF COMPLIANCE

ELECTRICAL EQUIPMENT

This certificate is issued for the following equipment:

P2.3 (P/N 4256XXXX99), P2.4 (P/N 4257XXXX99), P2.5 (P/N 4258XXXX99), P2.83 (P/N4263XXXX99), P2.84 (P/N 4264XXXX99) Rated 115VAC, 50/60Hz, 1.7A and P4.3 (P/N 4280XXXXX99), P4.83 (P/N 4281XXXX99) Rated 115VAC, 50/60Hz, 1.7A . Sample Gas Pumps.
x = denote power supply, position of pump head, material of pump head, material of valves and accessories (only P4.XX)

Equipment Ratings:

Industrial electrical equipment meeting basic electrical, mechanical and fire protection requirements.

FM Approved for:

Bühler Technologies GmbH
Ratingen D-40880 Germany

FM Approvals®

Member of the FM Global Group

This certifies that the equipment described has been found to comply with the following Approval Standards and other documents:

Class 3600	2011
Class 3611	2004
Class 3810	2005

Original Project ID: 3038101 Approval Granted: 24 May 2010

Subsequent Revision Reports / Date Approval Amended

Report Number	Date	Report Number	Date
120709	July 24, 2012		

FM Approvals LLC

J. E. Marquedant
Group Manager, Electrical

24 July 2012
Date

CERTIFICATE OF CONFORMITY

1. **ELECTRICAL EQUIPMENT PER US REQUIREMENTS**

2. **Certificate No:** **FM21NUS0010**

3. **Equipment:**
   (Type Reference and Name) **Model P2.3, P2.4, P2.83, P2.84, P4.3 and P4.83 Sample Gas Pumps**

4. **Name of Listing Company:** **Bühler Technologies GmbH**

5. **Address of Listing Company:** **Harkortstrasse 29**
   Ratingen
   D-40880
   Germany

6. The examination and test results are recorded in confidential report number:

   3038101 dated 24th May 2010

7. FM Approvals LLC, certifies that the equipment described has been found to comply with the following Approval standards and other documents:

   FM Class 3810:2005

Certificate issued by:

J.E. Marquedant
VP, Manager - Electrical Systems

24 September 2021
Date

To verify the availability of the Approved product, please refer to www.approvalguide.com

FM Approvals LLC. 1151 Boston-Providence Turnpike, Norwood, MA 02062 USA
T: +1 (1) 781 762 4300 F: +1 (1) 781 762 9375 E-mail: information@fmapprovals.com www.fmapprovals.com

SCHEDULE

to US Certificate of Conformity No: FM21NUS0010

8. This certificate relates to the design, examination and testing of the products specified herein. The FM Approvals surveillance audit program has further determined that the manufacturing processes and quality control procedures in place are satisfactory to manufacture the product as examined, tested and Approved.

9. **Equipment Ratings:**

The P2.3, P2.4, P2.83 and P2.84 pumps (models 4256*****9*00, 4257*****9*00, 4263*****9*00 and 4264*****9*00) operate at 115 Vac, at a current of 1.5 to 1.6 A, or 2.3 to 2.78 A, depending upon motor utilized. The P4.3 and P4.83 pumps (models 4280*****9*00 and 4281*****9*00) operate at 115 Vac, at a current of 2.55 to 2.8 A. The pumps are rated for an ambient temperature range of -20°C to +60°C.

10. **Description of Equipment:**

General – The sample pumps move sample gases from stacks to an analyzer. A sample pump consists of a motor and a pump head, which can be split by an intermediate flange with variable versions.

Construction – The sample pumps are of painted metal construction. The motors for the pumps provide a terminal box fitted with an M16x1.5 cable gland suitable for use with a 6 to 10 mm diameter cable.

Model types – Approved model number variants are as defined below.

42aabcdef9g00. Sample Gas Pumps, where:

aa = Base model: 56, 57, 63, 64, 80, 81
(where 56 = P2.3, 57 = P2.4, 63 = P2.83, 64 = P2.84, 80 = P4.3, 81 = P4.83)
b = Motor voltage: 2
c = Pump head position: 1, 2
d = Pump head material: 1, 2, 3, 4
e = Valve material: 1, 2
f = Screw-in connections: 9, 1, 2, 3, 5
g = Connection kit for parallel operation: 0, 1, 2

11. **Test and Assessment Procedure and Conditions:**

This Certificate has been issued in accordance with FM Approvals US Certification Requirements.

12. **Schedule Drawings**

A copy of the technical documentation has been kept by FM Approvals.

13. **Certificate History**

Details of the supplements to this certificate are described below:

SCHEDULE

to US Certificate of Conformity No: FM21NUS0010

Date	Description
24th May 2010	Original Issue.
24th July 2012	Supplement 1: Report Reference: 120709 dated 24th July 2012 Description of the Change: Create separate certificate for ordinary location certificate. Refer to FM21US0082X certificate history for changes to hazardous location pump variants under revision 120709.
24th September 2021	Supplement 2: Report Reference: RR228650 dated 24th September 2021. Description of the Change: Re-create certificate in new format. Reformat model number scheme in Certificate and Approval Guide listing. Remove erroneous references to FM Class 3600 and FM Class 3611 from certificate. Refer to FM21US0082X certificate history for changes to hazardous location pump variants under RR228650.

FM Approvals LLC. 1151 Boston-Providence Turnpike, Norwood, MA 02062 USA
T: +1 (1) 781 762 4300 F: +1 (1) 781 762 9375 E-mail: information@fmapprovals.com www.fmapprovals.com

CERTIFICATE OF CONFORMITY

1. **ELECTRICAL EQUIPMENT PER US REQUIREMENTS**

2. **Certificate No:** **FM21NUS0010**

3. **Equipment:**
   (Type Reference and Name) **Model P2.3, P2.4, P2.83, P2.84, P4.3 and P4.83 Sample Gas Pumps**

4. **Name of Listing Company:** **Bühler Technologies GmbH**

5. **Address of Listing Company:** **Harkortstrasse 29**
   Ratingen
   D-40880
   Germany

6. The examination and test results are recorded in confidential report number:

   3038101 dated 24th May 2010

7. FM Approvals LLC, certifies that the equipment described has been found to comply with the following Approval standards and other documents:

   FM Class 3810:2005

Certificate issued by:

J.E. Marquedant
VP, Manager - Electrical Systems

2 December 2021
Date

To verify the availability of the Approved product, please refer to www.approvalguide.com

FM Approvals LLC. 1151 Boston-Providence Turnpike, Norwood, MA 02062 USA
T: +1 (1) 781 762 4300 F: +1 (1) 781 762 9375 E-mail: information@fmapprovals.com www.fmapprovals.com

SCHEDULE

to US Certificate of Conformity No: FM21NUS0010

8. This certificate relates to the design, examination and testing of the products specified herein. The FM Approvals surveillance audit program has further determined that the manufacturing processes and quality control procedures in place are satisfactory to manufacture the product as examined, tested and Approved.

9. **Equipment Ratings:**

The P2.3, P2.4, P2.83 and P2.84 pumps (models 4256*****9*00, 4257*****9*00, 4263*****9*00 and 4264*****9*00) operate at 115 Vac, at a current of 1.5 to 1.6 A, or 2.3 to 2.78 A, depending upon motor utilized. The P4.3 and P4.83 pumps (models 4280*****9*00 and 4281*****9*00) operate at 115 Vac, at a current of 2.55 to 2.8 A, or 2.8 to 3.4 A, depending upon motor utilized. The pumps are rated for an ambient temperature range of -20°C to +60°C.

10. **Description of Equipment:**

General – The sample pumps move sample gases from stacks to an analyzer. A sample pump consists of a motor and a pump head, which can be split by an intermediate flange with variable versions.

Construction – The sample pumps are of painted metal construction. The motors for the pumps provide a terminal box fitted with an M16x1.5 cable gland suitable for use with a 6 to 10 mm diameter cable.

Model types – Approved model number variants are as defined below.

42aabcdef9g00. Sample Gas Pumps, where:
aa = Base model: 56, 57, 63, 64, 80, 81
(where 56 = P2.3, 57 = P2.4, 63 = P2.83, 64 = P2.84, 80 = P4.3, 81 = P4.83)
b = Motor voltage: 2
c = Pump head position: 1, 2
d = Pump head material: 1, 2, 3, 4
e = Valve material: 1, 2
f = Screw-in connections: 9, 1, 2, 3, 5
g = Connection kit for parallel operation: 0, 1, 2

11. **Test and Assessment Procedure and Conditions:**

This Certificate has been issued in accordance with FM Approvals US Certification Requirements.

12. **Schedule Drawings**

A copy of the technical documentation has been kept by FM Approvals.

13. **Certificate History**

Details of the supplements to this certificate are described below:

SCHEDULE

to US Certificate of Conformity No: FM21NUS0010

Date	Description
24th May 2010	Original Issue.
24th July 2012	Supplement 1: Report Reference: 120709 dated 24th July 2012. Description of the Change: Create separate certificate for ordinary location certificate. Refer to FM21US0082X certificate history for changes to hazardous location pump variants under revision 120709.
24th September 2021	Supplement 2: Report Reference: RR228650 dated 24th September 2021. Description of the Change: Re-create certificate in new format. Reformat model number scheme in Certificate and Approval Guide listing. Remove erroneous references to FM Class 3600 and FM Class 3611 from certificate. Refer to FM21US0082X certificate history for changes to hazardous location pump variants under RR228650.
2nd December 2021	Supplement 3: Report Reference: RR230190 dated 2nd December 2021. Description of the Change: Addition of alternate motor supplier/type, impacting equipment ratings field of certificate.

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T: **781 762 4300** F: 781-762-9375 www.fmapprovals.com

CERTIFICATE OF COMPLIANCE

ELECTRICAL EQUIPMENT
PER CANADIAN REQUIREMENTS

This certificate is issued for the following equipment:

P2.3 (P/N 4256XXXX99), P2.4 (P/N 4257XXXX99), P2.5 (P/N 4258XXXX99), P2.83 (P/N4263XXXX99), P2.84 (P/N 4264XXXX99) Rated 115VAC, 50/60Hz, 1.7A and P4.3 (P/N 4280XXXXX99), P4.83 (P/N 4281XXXX99) Rated 115VAC, 50/60Hz, 1.7A . Sample Gas Pumps.
x = denote power supply, position of pump head, material of pump head, material of valves and accessories (only P4.XX)

Equipment Ratings:

Industrial electrical equipment meeting basic electrical, mechanical and fire protection requirements.

FM Approved for:

Bühler Technologies GmbH
Ratingen D-40880 Germany

FM Approvals®

Member of the FM Global Group

This certifies that the equipment described has been found to comply with the following Approval Standards and other documents:

CSA C22.2 61010-1, 2004 Re-affirmed 2009

Original Project ID: 3038101

Canadian Project ID: 3038101C

Approval Granted: July 24, 2012

Subsequent Revision Reports / Date Approval Amended

Report Number	Date	Report Number	Date

FM Approvals LLC

J. E. Marquedant

J. E. Marquedant
Group Manager, Electrical

24 July 2012
Date

CERTIFICATE OF CONFORMITY

1. **ELECTRICAL EQUIPMENT PER CANADIAN REQUIREMENTS**

2. **Certificate No:** **FM21NCA0007**

3. **Equipment:**
   (Type Reference and Name) **Model P2.3, P2.4, P2.83, P2.84, P4.3 and P4.83 Sample Gas Pumps**

4. **Name of Listing Company:** **Bühler Technologies GmbH**

5. **Address of Listing Company:** **Harkortstrasse 29**
   Ratingen
   D-40880
   Germany

6. The examination and test results are recorded in confidential report number:

   3038101C_Rev120709 dated 24th July 2012

7. FM Approvals LLC, certifies that the equipment described has been found to comply with the following Approval standards and other documents:

   CAN/CSA-C22.2 No. 61010-1:R2009

8. This certificate relates to the design, examination and testing of the products specified herein. The FM Approvals surveillance audit program has further determined that the manufacturing processes and quality control procedures in place are satisfactory to manufacture the product as examined, tested and Approved.

Certificate issued by:

J.E. Marquedant
VP, Manager - Electrical Systems

24 September 2021
Date

To verify the availability of the Approved product, please refer to www.approvalguide.com

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T: +1 (1) 781 762 4300 F: +1 (1) 781 762 9375 E-mail: information@fmapprovals.com www.fmapprovals.com

SCHEDULE

to Canadian Certificate of Conformity No: FM21NCA0007

9. Equipment Ratings:

The P2.3, P2.4, P2.83 and P2.84 pumps (models 4256*****9*00, 4257*****9*00, 4263*****9*00 and 4264*****9*00) operate at 115 Vac, at a current of 1.5 to 1.6 A, or 2.3 to 2.78 A, depending upon motor utilized. The P4.3 and P4.83 pumps (models 4280*****9*00 and 4281*****9*00) operate at 115 Vac, at a current of 2.55 to 2.8 A. The pumps are rated for an ambient temperature range of -20°C to +60°C.

10. **Description of Equipment:**

General – The sample pumps move sample gases from stacks to an analyzer. A sample pump consists of a motor and a pump head, which can be split by an intermediate flange with variable versions.

Construction – The sample pumps are of painted metal construction. The motors for the pumps provide a terminal box fitted with an M16x1.5 cable gland suitable for use with a 6 to 10 mm diameter cable.

Model types – Approved model number variants are as defined below.

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aa = Base model: 56, 57, 63, 64, 80, 81
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d = Pump head material: 1, 2, 3, 4
e = Valve material: 1, 2
f = Screw-in connections: 9, 1, 2, 3, 5
g = Connection kit for parallel operation: 0, 1, 2

11. **Test and Assessment Procedure and Conditions:**

This Certificate has been issued in accordance with FM Approvals Canadian Certification Requirements.

12. **Schedule Drawings**

A copy of the technical documentation has been kept by FM Approvals.

13. **Certificate History**

Details of the supplements to this certificate are described below:

Date	Description
24th July 2012	Original Issue.

SCHEDULE

to Canadian Certificate of Conformity No: FM21NCA0007

Date	Description
24th September 2021	Supplement 1: Report Reference: RR228650 dated 24th September 2021. Description of the Change: Re-create certificate in new format. Reformat model number scheme in Certificate and Approval Guide listing. Refer to FM21CA0055X certificate history for changes to hazardous location pump variants under RR228650.

CERTIFICATE OF CONFORMITY

1. **ELECTRICAL EQUIPMENT PER CANADIAN REQUIREMENTS**

2. **Certificate No:** **FM21NCA0007**

3. **Equipment:**
   (Type Reference and Name) **Model P2.3, P2.4, P2.83, P2.84, P4.3 and P4.83 Sample Gas Pumps**

4. **Name of Listing Company:** **Bühler Technologies GmbH**

5. **Address of Listing Company:** **Harkortstrasse 29**
   Ratingen
   D-40880
   Germany

6. The examination and test results are recorded in confidential report number:

   3038101C_Rev120709 dated 24th July 2012

7. FM Approvals LLC, certifies that the equipment described has been found to comply with the following Approval standards and other documents:

   CAN/CSA-C22.2 No. 61010-1:R2009

8. This certificate relates to the design, examination and testing of the products specified herein. The FM Approvals surveillance audit program has further determined that the manufacturing processes and quality control procedures in place are satisfactory to manufacture the product as examined, tested and Approved.

Certificate issued by:

J.E. Marquedant
VP, Manager - Electrical Systems

2 December 2021
Date

To verify the availability of the Approved product, please refer to www.approvalguide.com

FM Approvals LLC. 1151 Boston-Providence Turnpike, Norwood, MA 02062 USA
T: +1 (1) 781 762 4300 F: +1 (1) 781 762 9375 E-mail: information@fmapprovals.com www.fmapprovals.com

SCHEDULE

to Canadian Certificate of Conformity No: FM21NCA0007

9. **Equipment Ratings:**

The P2.3, P2.4, P2.83 and P2.84 pumps (models 4256*****9*00, 4257*****9*00, 4263*****9*00 and 4264*****9*00) operate at 115 Vac, at a current of 1.5 to 1.6 A, or 2.3 to 2.78 A, depending upon motor utilized. The P4.3 and P4.83 pumps (models 4280*****9*00 and 4281*****9*00) operate at 115 Vac, at a current of 2.55 to 2.8 A, or 2.8 to 3.4 A, depending upon motor utilized. The pumps are rated for an ambient temperature range of -20°C to +60°C.

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General – The sample pumps move sample gases from stacks to an analyzer. A sample pump consists of a motor and a pump head, which can be split by an intermediate flange with variable versions.

Construction – The sample pumps are of painted metal construction. The motors for the pumps provide a terminal box fitted with an M16x1.5 cable gland suitable for use with a 6 to 10 mm diameter cable.

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42aabcdef9g00. Sample Gas Pumps, where:

aa = Base model: 56, 57, 63, 64, 80, 81
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d = Pump head material: 1, 2, 3, 4
e = Valve material: 1, 2
f = Screw-in connections: 9, 1, 2, 3, 5
g = Connection kit for parallel operation: 0, 1, 2

11. **Test and Assessment Procedure and Conditions:**

This Certificate has been issued in accordance with FM Approvals Canadian Certification Requirements.

12. **Schedule Drawings**

A copy of the technical documentation has been kept by FM Approvals.

13. **Certificate History**

Details of the supplements to this certificate are described below:

Date	Description
24th July 2012	Original Issue.

SCHEDULE

to Canadian Certificate of Conformity No: FM21NCA0007

Date	Description
24th September 2021	Supplement 1: Report Reference: RR228650 dated 24th September 2021. Description of the Change: Re-create certificate in new format. Reformat model number scheme in Certificate and Approval Guide listing. Refer to FM21CA0055X certificate history for changes to hazardous location pump variants under RR228650.
2nd December 2021	Supplement 2: Report Reference: RR230190 dated 2nd December 2021. Description of the Change: Addition of alternate motor supplier/type, impacting equipment ratings field of certificate.

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
Tel. +49 (0) 21 02 / 49 89-0, Fax: +49 (0) 21 02 / 49 89-20
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.

Bühler Technologies GmbH, Harkortstr. 29, D-40880 Ratingen
Tel. +49 (0) 21 02 / 49 89-0, Fax: +49 (0) 21 02 / 49 89-20
E-Mail: service@buehler-technologies.com
Internet: www.buehler-technologies.com