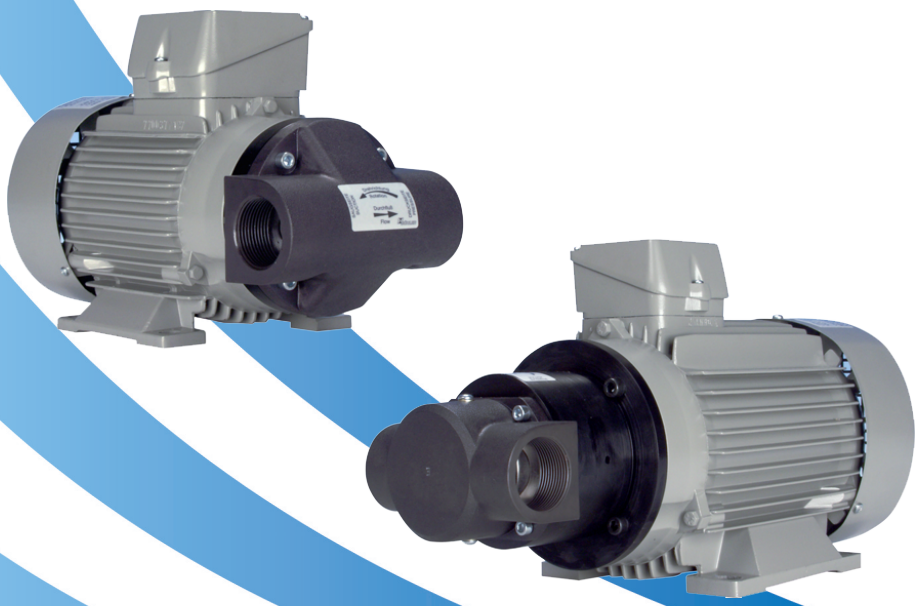
Circulation pumps

BFP



Installation and Operation Instructions

Original instructions

BE370001 ◦ 12/2015

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Read this instruction carefully prior to installation and/or use. Pay attention particularly to all advises and safety instructions to prevent injuries. Bühler Technologies can not be held responsible for misusing the product or unreliable function due to unauthorised modifications.

Document information
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Contents

1 Introduction

1.1 Intended use

BFP circulation pumps are suited for the transportation of oils in hydraulic and lubrication systems. Their scope is given by their specifications. The use in other applications is not permitted without confirmation by Bühler Technologies GmbH.

1.2 Scope of delivery

- 1 x Circulation pump
- Product documentation

2 Safety instructions

2.1 Important advice

Operation of the device is only valid 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.

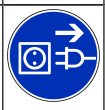
This manual is part of the equipment. The manufacturer keeps the right to modify specifications without advanced notice. Keep this manual for later use.

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

In this manual, the following warning signs are used:

	Warning against hazardous situations		Warning against high pressure
	Warning against electrical voltage		General notice
	Warning against hot surface		Disconnect from mains
	Warning against environmental hazard		Wear protection gloves
	Warning against potentially explosive atmospheres		

2.2 General hazard warnings

Installation of the device shall be performed by trained staff only, familiar with the safety requirements and risks.

Check all relevant safety regulations and technical indications for the specific installation place. Prevent failures and protect persons against injuries and the device against damage.

The operator of the system must secure that:

- safety and operation instructions are accessible and followed,
- local safety regulations and standards are obeyed,
- performance data and installation specifications are regarded,
- safety devices are installed and recommended maintenance is performed,
- national regulations for disposal of electrical equipment are obeyed.

Maintenance, repair:

- Repairs on the device must be carried out by Bühler authorized persons only.
- Only perform modifications, maintenance or mounting described in this manual.
- Only use original spare parts.

When carrying out maintenance works of any kind, the relevant health and safety regulations of the country of use must be observed.

DANGER **Electrical voltage**

Electrocution hazard.

a) Disconnect the device from power supply.

b) Make sure that the equipment cannot be reconnected to mains unintentionally.

c) The device must be opened by trained staff only.

d) Regard correct mains voltage.

CAUTION **Hot surface**

Burning hazard
Let the device cool down before maintaining.

CAUTION **High pressure**

Hazard of injury due to flung off parts or oil, environmental hazard due to oil.

a) Before starting any maintenance or repair to the oil circuit, make sure that the device is depressurized. This applies to the locking screws as well.

b) Avoid environmental pollution (oil spills) during cleaning or maintenance of the oil circuit.

c) Use drip pans.

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.

3 Transport and storage

The products should be transported only in its original packaging or a suitable replacement. Secure device for transportation.

When not in use, protect the equipment against moisture and heat. Keep it in a covered, dry and dust-free room at ambient temperature.

4 Installation and connection

4.1 Anforderungen an den Aufstellort

Unit

The unit must be located in such a way that there is free airflow around and enough room for servicing and repair. If the device is installed outdoors, regard the protection class of the motor (IP55 is standard).

4.2 Installing the unit

The unit is mounted with bolts to the mounting points on an adequate support structure. The connections to the system should be stress and vibration free. The use of flexible hoses is highly recommended. Please regard that the hose on the suction side is suitable for suction pressure for ex-ample a mesh wire reinforced type. Avoid leakage in the oil circuit. If necessary, place drip pans. Comply with local safety requirements and avoid any risk to the environment from oil spills etc.

4.2.1 Additional advices for units with pump

The distance from the pump to the reservoir should be as short as possible. Especially the suction pipe should be short and of sufficient inner diameter.

We suggest mounting the pump in the same height as the liquid level. Mounting below the liquid level is possible as well.

If the aggregate can only be installed above this level, the pump will have a constant suction pressure of 0.4 bar (atmosphere). Depending on the oil viscosity and temperature, this will result in a different suction lift. A difference in value of 2 m can be used as a guide.

Until the oil is heated to operating temperature, a suction pressure of 0.6 bar is permissible temporarily.

The diameter of the intake pipe should not be smaller than specified in the data sheet. We recommend a max. flow rate of 1.5 m/s.

When first starting up a hydraulic system with a long intake pipe can cause problems due to excess air in the intake pipe. In this case we suggest filling the suction pipe with oil and using a suction valve without spring.

Oil is sprayed into the pump housing during the assembly process at our factory. This is necessary to seal the gerator from the housing with an oil film. During extended periods of storage the pump housing may not have enough oil anymore to create this oil film when switching on the pump. The pump may then completely lose suction. Before connecting the suction pipe we recommend spraying some oil into the pump housing to prevent this.

The pump may be exposed to max. 0.5 bar of pressure on the suction side.

4.3 Hydraulic connection

Hydraulic connection is to be carried out as described in the appended data. All pipes are free of vibration and current. Generally speaking, connections should be made using tubes.

Contaminated fluids affect the service life of the fluid system. For this reason we advise using fluids of purity class 23/19/13 (as per ISO 4406).

Should your hydraulic system be equipped with switching valves or check valves, we recommend using a pressure relief valve to protect your system.

4.4 Electrical connections

DANGER **Electrical voltage**

Electrocution hazard.

a) Disconnect the device from power supply.

b) Make sure that the equipment cannot be reconnected to mains unintentionally.

c) The device must be opened by trained staff only.

d) Regard correct mains voltage.

CAUTION **Electrical voltage**

Wrong mains voltage may damage the device.
Installation of the device shall be performed by trained staff only. Regard the voltage given on the type plate. Make sure that the cables have sufficient strain relief.
Fusing
Fusing has to be done due to local standards!
Polarity
Take care of the directional rotation of the motor. The rotation direction is indicated on the motor housing “M” and an arrow.

Abb. 1

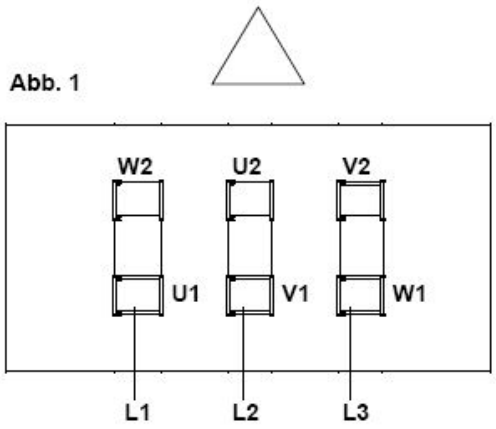
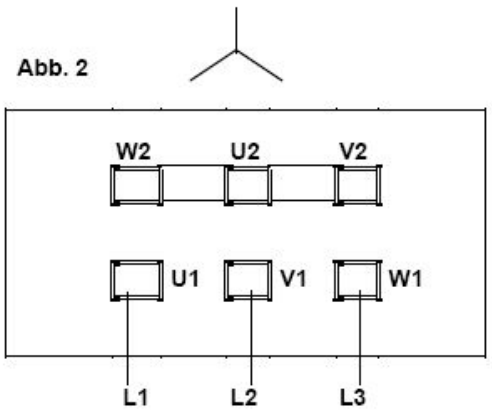


Abb. 2



The rotational direction is changed by exchanging the connection two phases.

For calculating the correct values of fuses and cross-section of connection wires, refer to local rules and standards. The motor and, if equipped, starting devices must be connected to protective earth.

Lead fuses protect the cables in case of a short cut, but are not sufficient to protect the motor coils from burning due to overload. Therefore, install an adequate motor circuit breaker with high precision range of adjustment for thermal protection to protect the motor against overload and operation with two phases.

Adjust the motor circuit breaker according to the nominal value given on the type plate of the motor. Operation out of the limits for mains voltage and frequency range is prohibited.

Lightning protection must beinstalled by the operator.

5 Operation and control

NOTICE

The device must not be operated beyond its specifications.

5.1 Before starting

- Check that all parts are free of damage. Do not put a damaged device into operation.
- Check the correct connections of oil and power circuits according to chapter "Installation and connection".
- Make sure that all valves or other parts in the cooling circuit, which have to be opened, are opened.

5.2 During starting

First, check that the pump rotates counter clockwise. The direction is marked on the pump housing with M and directional arrow.

CAUTION

Hot surface

Burning hazard
Let the device cool down before maintaining.

CAUTION

High pressure

Hazard of injury due to flung off parts or oil, environmental hazard due to oil.

a) Before starting any maintenance or repair to the oil circuit, make sure that the device is depressurized. This applies to the locking screws as well.

b) Avoid environmental pollution (oil spills) during cleaning or maintenance of the oil circuit.

c) Use drip pans.

Noise level

Our pump is supplied with a low noise. If the noise level increases significantly check if the suction line has the right dimension and if the pump works in the appropriate temp/viscosity range. Ask Bühler Technologies GmbH for technical advice.

6 Maintenance

– Maintenance of the device shall be performed by trained staff only, familiar with the safety requirements and risks.
– Only perform maintenance work described in this manual.
– Regard all relevant safety regulations and internal operating instructions during maintenance.

DANGER **Electrical voltage**

Electrocution hazard.

a) Disconnect the device from power supply.
b) Make sure that the equipment cannot be reconnected to mains unintentionally.
c) The device must be opened by trained staff only.
d) Regard correct mains voltage.

CAUTION **Hot surface**

Burning hazard
Let the device cool down before maintaining.

CAUTION **High pressure**

Hazard of injury due to flung off parts or oil, environmental hazard due to oil.

a) Before starting any maintenance or repair to the oil circuit, make sure that the device is depressurized. This applies to the locking screws as well.
b) Avoid environmental pollution (oil spills) during cleaning or maintenance of the oil circuit.
c) Use drip pans.

The outer parts of the motor, especially the cooling fins and the cooling ducts must be kept as clean as possible to ensure sufficient heat dissipation.

Keep in mind the protection class for dust and humidity. Cleaning the device with high pressure cleaners is only allowed if the motor has the respective protection class.

The motor is equipped with on both sides with sealed ball bearings. The greasing is designed for the total lifetime. Maintenance (subsequent greasing) is not necessary.

The bearings must be replaced by trained staff only.

7 Service und 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

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 attached 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

Problem / Failure	Possible cause	Solution
Oil flow not sufficient	– Motor's rotation direction wrong	– Correct connection, see Electrical connections
	– Motor doesn't start	– Correct connection, see Electrical connections
	– Oil flow too low	– Correct connection, see Electrical connections
	– Oil circuit blocked	– Open valves and cocks
	– Suction pressure to high, therefore reduced oil flow.	– Reduce suction height
	– Back pressure in the pressure line too big. Motor will be overloaded and motor speed braked down.	– Choose bigger nominal width of pressure line
No oil flow	– Not enough oil inside pump housing due to long standstill or storage, therefore no suction.	– Refill some oil into the pump housing before connecting the suction hose
Pump too noisy	– Suction pressure too high	– Select suction hose with sufficient diameter
		– Reduce suction height

Tab. 1: Troubleshooting

8 Disposal

Dispose of the parts in such a way that does not present a danger to other people's heath or to the environment. Observe the legal requirements in the country of use for the disposal of electrical components and oils and coolants.

9 Calculations

9.1 Calculating viscosity

Valid for VG-oil between 10 - 100 °C at an exactness from ± 5 %.

	Definitions
V_{40}	oil viscosity at 40 °C in cst
T	temperature in °C
υ	viscosity in cst

	Example: oil VG 46
V_{40}	46 cst
T	25 °C

$$b = 159 \cdot \ln \frac{V_{40}}{0{,}23}$$

$$b = 159 \cdot \ln \frac{46}{0{,}23} = 842{,}4325$$

$$a = 0{,}23 \cdot e^{\frac{-b}{877}}$$

$$a = 0{,}23 \cdot e^{\frac{-842{,}4325}{877}} = 0{,}08801$$

$$\upsilon = a \cdot e^{\frac{b}{T+95{,}2}}$$

$$\upsilon = 0{,}08801 \cdot e^{\frac{842{,}4325}{25+95{,}2}} = 97{,}35\ \text{cst}$$

9.2 Table of operational viscosity for VG oil

	10 °C	20 °C	30 °C	40 °C	50 °C	60 °C	70 °C	80 °C	90 °C
VG 46	264,45	131,96	73,58	46,00	29,13	20,04	14,43	10,78	8,32
VG 68	444,77	210,85	112,61	68,00	41,63	27,86	19,58	14,32	10,84
VG 220	2.120,17	861,60	404,31	220,00	121,71	74,99	49,00	33,61	24,01
VG 320	3.489,92	1.350,22	607,96	320,00	171,40	102,85	65,66	44,12	30,94

Viscosity given in cst (mm^2/s)

9.3 Calculating the pressure loss

Valid for smooth straight piping per meter at laminar current.

	Definitions
υ	Viscosity in cst
ρ	spec. gravity in kg/dm^3
DN	tube diameter in mm
V	flow in m/s
PV	pressure loss in bar

	Example: oil VG 46
υ	97,35 cst
ρ	0,8817 kg/dm^3
DN	20 mm
V	3,18 m/s (60 l/min for tube DN 20)

$$PV = \frac{0{,}32 \cdot \upsilon \cdot \rho \cdot V}{DN^2}$$

$$PV = \frac{0{,}32 \cdot 97{,}35 \cdot 0{,}8817 \cdot 3{,}18}{20^2} = 0{,}22\ bar$$

NOTICE

Pressure loss increases significantly for bends and fittings.
It might be necessary in some cases to determine the final shape of the suction line on site under specific conditions.

Please do not hesitate to contact us for help to calculate the pressure loss of the suction line for you specific application.

NOTICE

To avoid damage of the cooling system, make sure that the maximum pump pressure is not exceeded. High pressure may occur if the system is shut off or throttled at the pressure side.

10 Pressure loss in straight pipes

Pressure loss (bar) in straight pipes per meter at laminar flow with mineral flow:

BFP 8 8 l/min – DN 25								
	VG 46	VG 68	VG 120	VG 160	VG 220	VG 320	VG 460	VG 680
10 °C	0.03	0.05	0.11	0.17	0.25	0.42	0.68	1.14
20 °C	0.02	0.03	0.05	0.07	0.10	0.16	0.25	0.40
30 °C	0.01	0.01	0.02	0.03	0.05	0.07	0.11	0.17
40 °C	0.01	0.01	0.01	0.03	0.03	0.04	0.05	0.08
50 °C	0.01	0.01	0.01	0.02	0.01	0.02	0.03	0.04
60 °C – **100 °C** < 0,03 bar								

BFP 15 16 l/min – DN 32								
	VG 46	VG 68	VG 120	VG 160	VG 220	VG 320	VG 460	VG 680
10 °C	0.02	0.04	0.08	0.12	0.19	0.31	0.50	0.85
20 °C	0.01	0.02	0.04	0.10	0.08	0.12	0.19	0.30
30 °C	0.01	0.01	0.02	0.05	0.04	0.05	0.08	0.12
40 °C	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.06
50 °C	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.03
60 °C – **100 °C** < 0,02 bar								

BFP 30 28 l/min – DN 32								
	VG 46	VG 68	VG 120	VG 160	VG 220	VG 320	VG 460	VG 680
10 °C	0.04	0.07	0.15	0.22	0.33	0.54	0.88	1.48
20 °C	0.02	0.03	0.06	0.09	0.13	0.21	0.33	0.52
30 °C	0.01	0.02	0.03	0.04	0.07	0.09	0.14	0.22
40 °C	0.01	0.01	0.02	0.02	0.03	0.05	0.07	0.10
50 °C	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.06
60 °C – **100 °C** < 0,03 bar								

BFP 60 57 l/min – DN 40								
	VG 46	VG 68	VG 120	VG 160	VG 220	VG 320	VG 460	VG 680
10 °C	0.03	0.06	0.12	0.18	0.28	0.45	0.74	1.24
20 °C	0.02	0.03	0.05	0.08	0.11	0.18	0.27	0.43
30 °C	0.01	0.01	0.03	0.04	0.05	0.08	0.12	0.18
40 °C	0.01	0.01	0.02	0.02	0.02	0.04	0.06	0.08
50 °C	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.05
60 °C – **100 °C** < 0,03 bar								

BFP 90 86 l/min – DN 40								
	VG 46	VG 68	VG 120	VG 160	VG 220	VG 320	VG 460	VG 680
10 °C	0.05	0.09	0.19	0.27	0.42	0.68	1.11	1.87
20 °C	0.03	0.04	0.08	0.12	0.17	0.26	0.41	0.65
30 °C	0.02	0.02	0.04	0.06	0.08	0.12	0.18	0.27
40 °C	0.01	0.01	0.02	0.03	0.04	0.06	0.09	0.13
50 °C	0.01	0.01	0.01	0.02	0.02	0.03	0.05	0.07
60 °C – **100 °C** < 0,04 bar								

11 Appendices

11.1 Technical data

Technical data	
Pump housing:	anodised and impregnated cast aluminium
Gerotor:	sintered steel
Operating fluids:	mineral oils per DIN 51524
Operating oil temperature:	max. 80 °C (higher temperatures on request)
Seal:	Perbunan (NBR) Viton (FPM) available on request
Ambient temperature:	-15 °C to +40 °C

Electric motors	
Voltage / frequency:	230 / 400 V - 50 Hz ± 5 % 276 / 480 V - 60 Hz ± 5 %
Thermal stability:	Class of insulation F, utilisation per class B
Design:	three-phase asynchronous squirrel-cage induction motor totally enclosed, fan cooled
Protection class:	IP55
on request:	other voltages higher motor powers for higher viscosities UL- or CSA-approved motors higher protection type
The motors comply with standards IEC 60034, IEC 60072, IEC 60085	

Please also observe the operating manual for the motor! All pumps are supplied with cable gland inside the motor terminal box. The total length and height of the pump may vary by motor make.

Pump selection information:

When selecting the pump model, choose the motor output according to the oil viscosity to be used. Motor output information refers to the maximum oil viscosity at maximum operating pressure.

The BFP 5 to BFP 40 are also available as a special version with a 6 bar internal bypass valve for protection. This does not change the dimensions.

Installation information:

The pump head of all pumps can be mounted turned in 90° increments to align with the line routing. Please note the offset from the centre of the motor.

The connection threads are manufactured to ISO 228. The screw-in surfaces are finished and suitable for the use of soft seals. We recommend using screwed plugs per ISO 1179-2.

Please note:

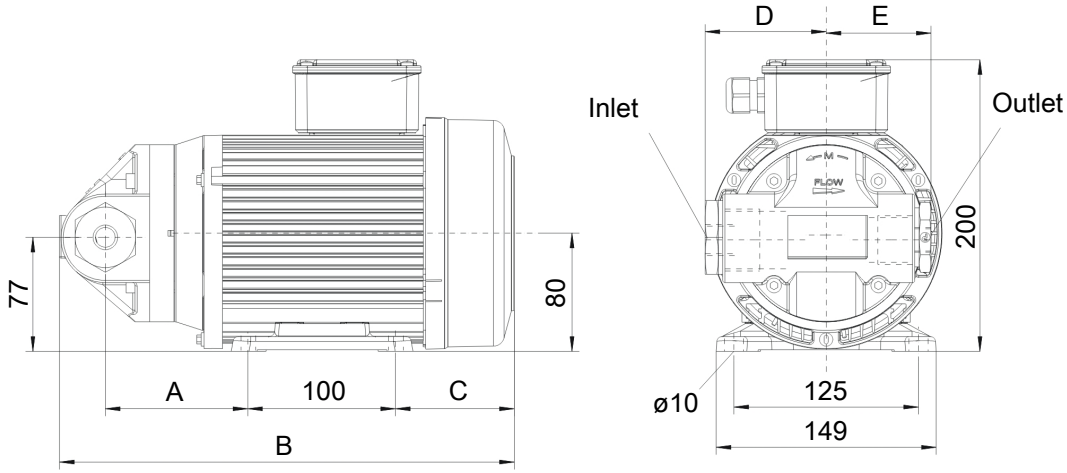
Especially note the dimension of the suction pipe. The cross-sections should not be smaller than specified. In most cases, loud noise indicates the cross-section was reduced too much.

Please refer to the notices in the operating instructions.

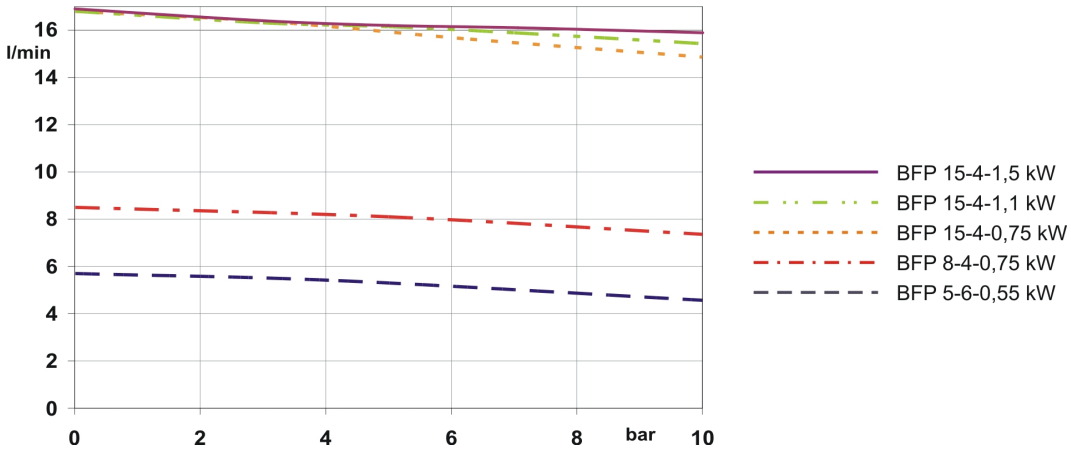
11.1.1 BFP 5 / BFP 8 / BFP 15

	BFP 5-6-0.55kW	BFP 8-4-0.75kW	BFP15-4-0.75kW	BFP15-4-1.1kW	BFP15-4-1.5kW
Item number	3705055	3708075IE2	3715075IE2	3715110IE2	3715150IE2
Motor power	0.55 kW	0.75 kW	0.75 kW	1.1 kW	1.5 kW
Max. oil viscosity	1500 cSt	1500 cSt	300 cSt	1500 cSt	2000 cSt
At max. working pressure	10 bar	10 bar	10 bar	10 bar	10 bar
Number of poles	6	4	4	4	4
Max. current consumption (400V / 50Hz)*	approx. 1.8 A	approx. 2.1 A	approx. 2.1 A	approx. 2.7 A	approx. 3.5 A
Nominal delivery volume*	5.8 cm^3/U	5.8 cm^3/U	11.7 cm^3/U	11.7 cm^3/U	11.7 cm^3/U
	5.5 l/min	8 l/min	16 l/min	16 l/min	16 l/min
Suction side connection	G1/2-DN16	G3/4/DN20	G1 1/4-DN32	G1 1/4-DN32	G1 1/4-DN32
Pressure side connection	G3/8-DN12	G1/2-DN16	G1-DN25	G1-DN25	G1-DN25
Suction pressure for all models temporarily up to	-0.4 bar	-0.4 bar	-0.4 bar	-0.4 bar	-0.4 bar
	-0.6 bar				
Acoustic power per ISO 3744*	52 dB(A)	56 dB(A)	59 dB(A)	59 dB(A)	59 dB(A)
Weight	10.8 kg	10.8 kg	10.9 kg	13.2 kg	16.2 kg
Dimensions					
A	96.5	96.5	96.5	96.5	96.5
B	308	308	308	346	368
C	80	80	80	118	140
D	82	82	70	70	70
E	71	71	60	60	60

* For 60 Hz versions please multiply the delivery volume by a factor of 1.2. The acoustic emission increases by approx. 3 dB.



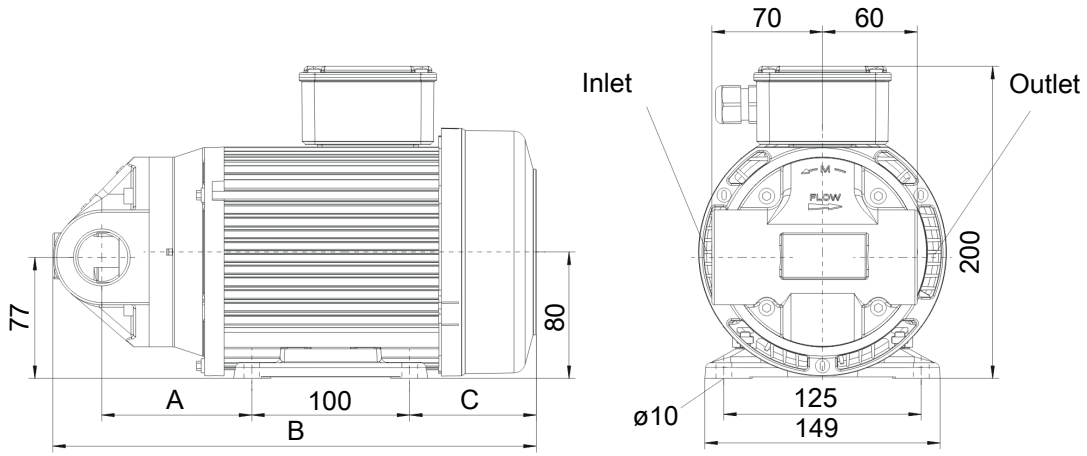
Flow rate

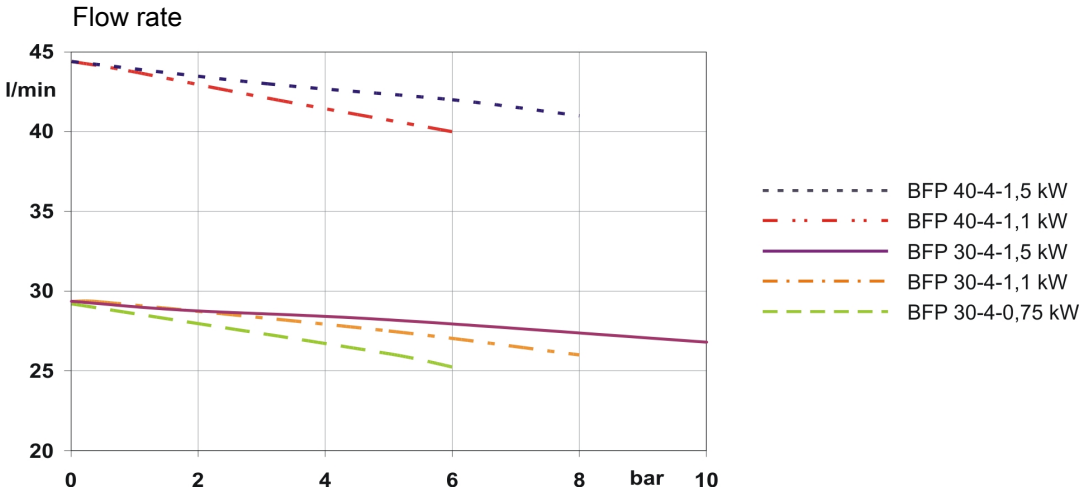

16
l/min
14
12
10
8
6
4
2
0
0
2
4
6
8
bar
10
BFP 15-4-1,5 kW
BFP 15-4-1,1 kW
BFP 15-4-0,75 kW
BFP 8-4-0,75 kW
BFP 5-6-0,55 kW

11.1.2 BFP 30 / BFP 40

	BFP 30-4-0.75kW	BFP 30-4-1.1kW	BFP30-4-1.5kW	BFP40-4-1.1kW	BFP40-4-1.5kW
Item number	3730075IE2	3730110IE2	3730150IE2	3740110IE2	3740150IE2
Motor power	0.75 kW	1.1 kW	1.5 kW	1.1 kW	1.5 kW
Max. oil viscosity	100 cSt	300 cSt	1000 cSt	100 cSt	700 cSt
At max. working pressure	6 bar	8 bar	10 bar	6 bar	8 bar
Number of poles	4	4	4	4	4
Max. current consumption (400V / 50Hz)*	approx. 2.1 A	approx. 2.7 A	approx. 3.5 A	approx. 2.7 A	approx. 3.5 A
Nominal delivery volume*	20.4 cm^3/U	20.4 cm^3/U	20.4 cm^3/U	30.6 cm^3/U	30.6 cm^3/U
	29 l/min	29 l/min	29 l/min	42 l/min	42 l/min
Suction side connection	G1 1/4-DN32	G1 1/4-DN32	G1 1/4-DN32	G1 1/4-DN32	G1 1/4-DN32
Pressure side connection	G1-DN25	G1-DN25	G1-DN25	G1-DN25	G1-DN25
Suction pressure for all models temporarily up to	-0.4 bar	-0.4 bar	-0.4 bar	-0.4 bar	-0.4 bar
	-0.6 bar				
Acoustic power per ISO 3744*	61 dB(A)	61 dB(A)	61 dB(A)	62 dB(A)	62 dB(A)
Weight	11 kg	13.2 kg	16.2 kg	13.7 kg	16.7 kg
Dimensions					
A	95	95	95	104.5	104.5
B	306	344	366	354	376
C	80	118	140	118	140

* For 60 Hz versions please multiply the delivery volume by a factor of 1.2. The acoustic emission increases by approx. 3 dB.

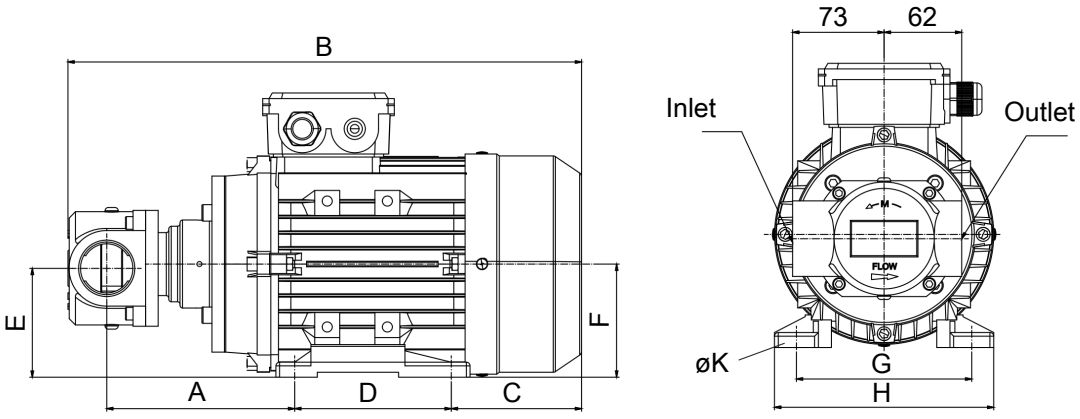


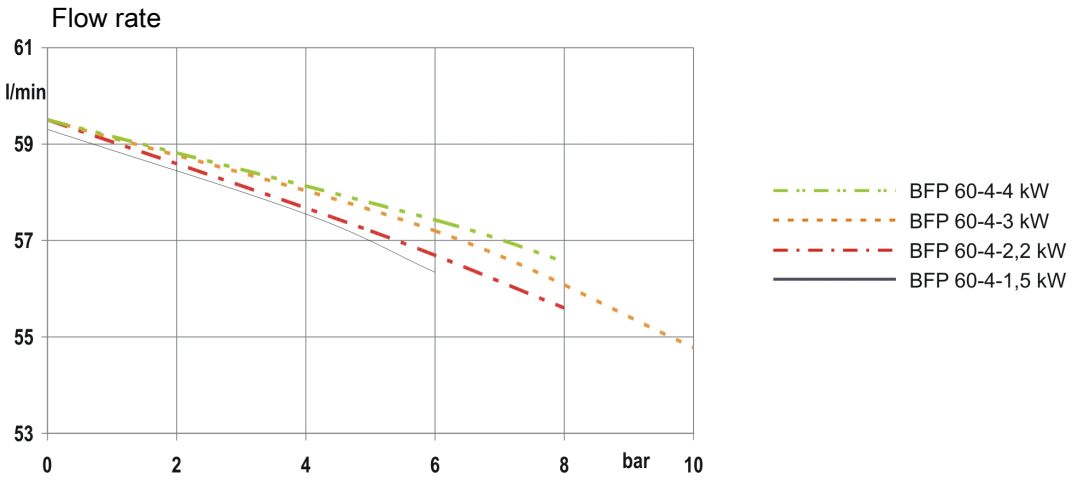

Flow rate
45
l/min
40
35
30
25
20
0
2
4
6
8
bar
10
BFP 40-4-1,5 kW
BFP 40-4-1,1 kW
BFP 30-4-1,5 kW
BFP 30-4-1,1 kW
BFP 30-4-0,75 kW

11.1.3 BFP 60

	BFP 60-4-1.5 kW	BFP 60-4-2.2kW	BFP 60-4-3kW	BFP 60-4-4kW
Item number	3760150IE2	3760220IE2	3760300IE2	3760400IE2
Motor power	1.5 kW	2.2 kW	3 kW	4 kW
Max. oil viscosity	100 cSt	300 cSt	800 cSt	1500 cSt
At max. working pressure	6 bar	8 bar	10 bar	8 bar
Number of poles	4	4	4	4
Max. current consumption (400 V / 50 Hz)*	approx. 3.6 A	approx. 4.9 A	approx. 6.4 A	approx. 8.3 A
Nominal delivery volume*	40.8 cm^3/U	40.8 cm^3/U	40.8 cm^3/U	40.8 cm^3/U
	58 l/min	58 l/min	58 l/min	58 l/min
Suction side connection	G1 1/2-DN40	G1 1/2-DN40	G1 1/2-DN40	G1 1/2-DN40
Pressure side connection	G1 1/4-DN32	G1 1/4-DN32	G1 1/4-DN32	G1 1/4-DN32
Suction pressure	-0.4 bar	-0.4 bar	-0.4 bar	-0.4 bar
for all models temporarily up to	-0.6 bar			
Acoustic power per ISO 3744*	64 dB(A)	64 dB(A)	64 dB(A)	64 dB(A)
Weight	17.4 kg	23.2 kg	23.2 kg	32.6 kg
Dimensions				
A	150	172	172	179
B	410	448	466	476
C	104	105	123	126
D	125	140	140	140
E	87	97	97	109
F	90	100	100	112
G	140	160	160	190
H	175	198	198	222
J	226	248	248	276
K	10	12	12	12

* For 60 Hz versions please multiply the delivery volume by a factor of 1.2. The acoustic emission increases by approx. 3 dB.

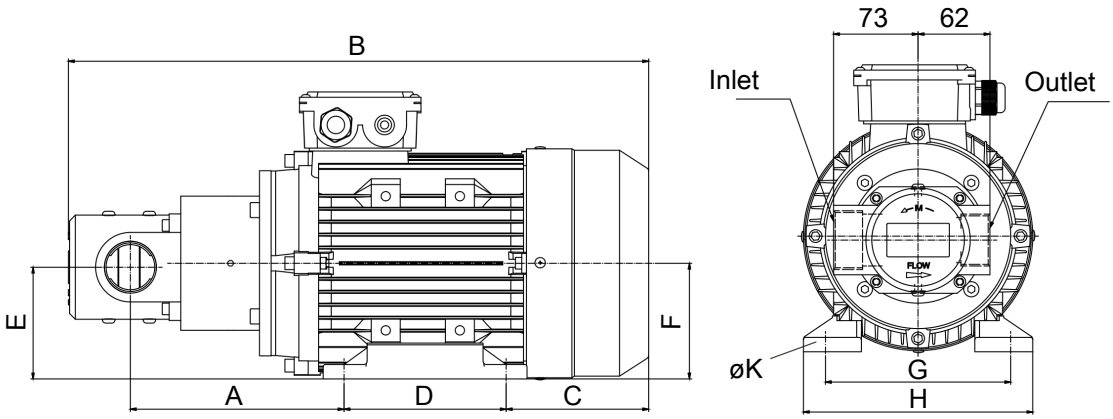


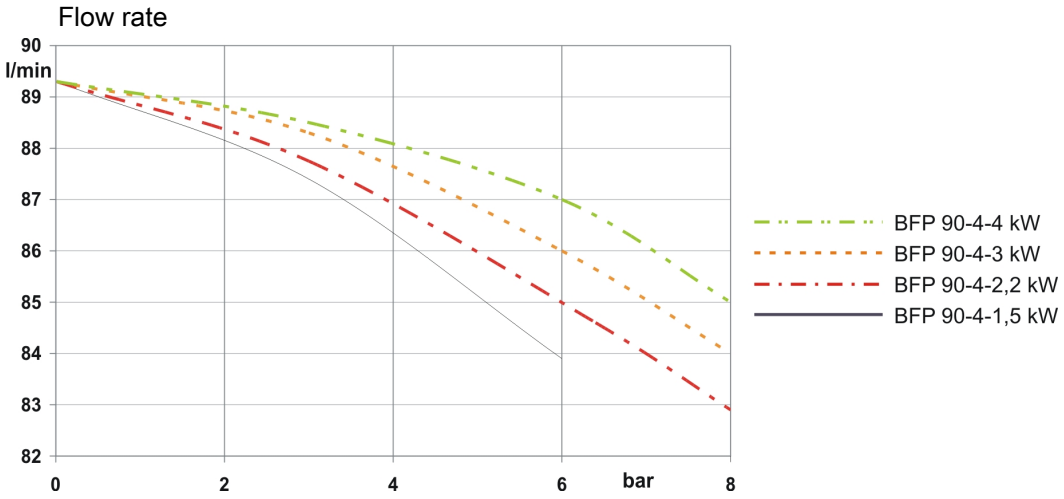

Flow rate
61
l/min
59
57
55
53
0
2
4
6
8
bar
10
BFP 60-4-4 kW
BFP 60-4-3 kW
BFP 60-4-2,2 kW
BFP 60-4-1,5 kW

11.1.4 BFP 90

	BFP 90-4-1.5kW	BFP 90-4-2.2 kW	BFP 90-4-3kW	BFP 90-4-4kW
Item number	3790150IE2	3790220IE2	3790300IE2	3790400IE2
Motor power	1.5 kW	2.2 kW	3 kW	4 kW
Max. oil viscosity	46 cSt	100 cSt	300 cSt	1000 cSt
At max. working pressure	6 bar	8 bar	8 bar	8 bar
Number of poles	4	4	4	4
Max. current consumption (400 V / 50 Hz)*	approx. 3.6 A	approx. 4.9 A	approx. 6.4 A	approx. 8.3 A
Nominal delivery volume*	61.2 cm^3/U	61.2 cm^3/U	61.2 cm^3/U	61.2 cm^3/U
	88 l/min	88 l/min	88 l/min	88 l/min
Suction side connection	G1 1/2-DN40	G1 1/2-DN40	G1 1/2-DN40	G1 1/2-DN40
Pressure side connection	G1 1/4-DN32	G1 1/4-DN32	G1 1/4-DN32	G1 1/4-DN32
Suction pressure	-0.4 bar	-0.4 bar	-0.4 bar	-0.4 bar
for all models temporarily up to	-0.6 bar			
Acoustic power per ISO 3744*	65 dB(A)	65 dB(A)	65 dB(A)	65 dB(A)
Weight	19 kg	24.8 kg	24.8 kg	34.2 kg
Dimensions				
A	162.5	184.5	184.5	191.5
B	445	483	500	511
C	104	105	122	126
D	125	140	140	140
E	87	97	97	109
F	90	100	100	112
G	140	160	160	190
H	175	198	198	222
J	226	248	248	276
K	10	12	12	12

* For 60 Hz versions please multiply the delivery volume by a factor of 1.2. The acoustic emission increases by approx. 3 dB.




Flow rate
90
l/min
89
88
87
86
85
84
83
82
0
2
4
6
bar
8
BFP 90-4-4 kW
BFP 90-4-3 kW
BFP 90-4-2,2 kW
BFP 90-4-1,5 kW

12 Attached documents

- Declaration of conformity KX 370001
- RMA - Decontamination Statement

EG-Konformitätserklärung
EC-declaration of conformity

Hiermit erklären wir, dass die nachfolgenden Produkte den wesentlichen Anforderungen der folgenden EG-Richtlinie in ihrer aktuellen Fassung entsprechen:
Herewith we declare that the following products correspond to the essential requirements of the following EC directive in its actual version:

2006/42/EG (Maschinenrichtlinie / *machinery*)

Folgende weitere Richtlinien wurden berücksichtigt */ the following directives were regarded*

2006/95/EG (Niederspannungsrichtlinie / *low voltage directive*)
2004/108/EG (EMV / *EMC*)

Produkte / *products*:

Förderpumpen
Circulation pumps

Typ(en) / *type(s)*:

BFP

Zur Beurteilung der Konformität wurden folgende harmonisierte Normen in aktueller Fassung herangezogen:
The following harmonized standards in actual revision have been used:

- **EN 12100-1** — **Sicherheit von Maschinen - Grundbegriffe, allgemeine Gestaltungsleitsätze - Teil 1: Grundsätzliche Terminologie, Methodologie**
- **EN 12100-2** — **Sicherheit von Maschinen - Grundbegriffe, allgemeine Gestaltungsleitsätze - Teil 2: Technische Leitsätze**
- **EN 60204-1** — **Sicherheit von Maschinen - Elektrische Ausrüstung von Maschinen - Teil 1: Allgemeine Anforderungen**
- **EN 55011** — **Industrielle, wissenschaftliche und medizinische Geräte - Funkstörungen - Grenzwerte und Messverfahren**
- **EN 61000-6-2** — **Elektromagnetische Verträglichkeit (EMV) - Teil 6-2: Fachgrundnormen - Störfestigkeit für Industriebereiche**

Dokumentationsverantwortlicher für diese Konformitätserklärung ist der Unterzeichnende mit Anschrift am Firmensitz.
The person authorised to compile the technical file is the one that has signed and is located at the company's address

Ratingen, den 14.07.2010

Stefan Eschweiler
Geschäftsführer – *general manager*

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Tel. +49 (0) 21 02 / 49 89-0, Fax. +49 (0) 21 02 / 49 89-20
Internet: www.buehler-technologies.com
Email: fluidcontrol@buehler-technologies.com

RMA - Dekontaminierungserklärung
RMA - Decontamination Statement

Um eine schnelle und reibungslose Bearbeitung Ihres Anliegens zu erreichen, füllen Sie bitte diesen Rücksendeschein aus. Eine genaue Fehlerbeschreibung ist für die Ursachenanalyse nötig und hilft bei der schnellen Bearbeitung des Vorgangs. Die Aussage „Defekt“ hilft bei der Fehlersuche leider nicht.

Please complete this return form to ensure your claim is processed quickly and efficiently. An accurate description of the problem is necessary for cause analysis and will help processing the claim quickly. Unfortunately, stating “defective” will not help us troubleshoot the issue.

Die RMA-Nummer bekommen Sie von Ihrem Ansprechpartner im Vertrieb oder Service.

You may obtain the RMA number from your sales or service representative.

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 employees’ health.*

Bringen Sie den Rücksendeschein mit der Dekontaminierungserklärung bitte zusammen mit den Versandpapieren in einer Klarsichthülle außen an der Verpackung an. Ansonsten ist eine Bearbeitung Ihres Reparaturauftrages nicht möglich!

Attach the return form including decontamination statement along with the shipping documentation to the outside of the package, inside a clear pouch. Otherwise we are unable to process your repair order!

Angaben zum Absender:

Sender information:

Firma / *Company*			Ansprechpartner / *Contact person*	
Anschrift / *Address*			Abteilung / *Department*	
			E-Mai / *E-Mail*:	
			Tel. / *Phone*	
			Fax / *Fax*:	
Artikelnummer / *Item number*			**RMA-Nr. / *RMA no*.**	
Auftragsnummer / *Order number*				
Anzahl / *Quantity*				
Rücksendegrund / *Return reason*	☐	Reparatur / *Repair*	Vorgangsnummer des Kunden / *Customer transaction number*::	
	☐	Garantie / *Warranty*		
	☐	Zur Prüfung / *For inspection*		
	☐	Rückgabe / *Return*		
Fehlerbeschreibung / *Description of the problem*:				

Ort, Datum /
Place, Date _____

Unterschrift / Stempel /
***Signature / Stamp*:** _____

Bühler Technologies GmbH
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e-mail: service@buehler-technologies.com
Internet: www.buehler-technologies.com

RMA - Dekontaminierungserklärung
RMA - Decontamination Statement

Bitte füllen Sie diese Dekontaminierungserklärung **für jedes einzelne Gerät** aus.

*Please complete this decontamination statement **for each individual item***

Gerät / Device		**RMA-Nr / *RMA no*:**	
Serien-Nr. / Serial no.			

[ ] Ich bestätige hiermit, dass das oben spezifizierte Gerät ordnungsgemäß gereinigt und dekontaminiert wurde und keinerlei Gefahren im Umgang mit dem Produkt bestehen.

I herewith declare that the device as specified above has been properly cleaned and decontaminated and that there are no risks present when dealing with the device.

Ansonsten ist die mögliche Gefährdung genauer zu beschreiben*:*

In other cases, please describe the hazards in detail:

Aggregatzustand (bitte ankreuzen):

Aggregate state (please check):

☐ Flüssig / *Liquid* ☐ Fest / *Solid* ☐ Pulvrig / *Powdery* ☐ Gasförmig / *Gaseous*

Folgende Warnhinweise sind zu beachten (bitte ankreuzen)*:*

Please note the following warnings (please check):

			
☐ Explosiv *Explosive*	☐ Giftig / Tödlich *Toxic / lethal*	☐ Entzündliche Stoffe *Flammable substances*	☐ Brandfördernd *Oxidizing*

			
☐ Komprimierte Gase *Compressed gasses*	☐ Gesundheitsgefährdend *Hazardous to health*	☐ Gesundheitsschädlich *Harmful to health*	☐ Umweltgefährdend *Harmful to the environment*

Bitte legen Sie ein aktuelles Datenblatt des Gefahrenstoffes bei!

Please include an updated data sheet of the hazardous substance!

Ort, Datum / *Place, Date*: _____

Unterschrift / Stempel *Signature / Stamp*: _____

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