FLUX

More than just pumps

MAGSON magnetically coupled self-priming centrifugal pumps MAS types 4-6

Operating Manual

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1. Declaration of conformity

EC Declaration of Conformity

pursuant to the EC Machinery Directive 2006/42/EC, Annex II 1. A

Manufacturer:

FLUX-GERÄTE GMBH
Talweg 12
D-75433 Maulbronn

CE

Description and identification of the machine:

Product:	Centrifugal pump
Type:	MAGSON, series MA(S), MM, MML, MPL, MPLN, MPT, MMT
Trade name:	Magnetically coupled (self-priming) centrifugal pump,in horizontal alignment
Function:	Pumps of the MAGSON series are designed to operate as centrifugal pumps and are used to pump liquids.

It is explicitly stated that the machine corresponds to all relevant provisions of the following EC Directives:

2006/42/EC	Directive 2006/42/EC of the European Parliament and the European Council from 17 May 2006 concerning machinery and the amendment to the 95/16/EC Directive (new version) (1)
2014/30/EU	Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility (recast)
2014/35/EU	Directive 2014/35 / EU of the European Parliament and of the Council of February 26, 2014 on the harmonization of the legal provisions of the member states on the provision of electrical equipment for use on the market within certain voltage limits (new version)

Source of applied harmonised standards according to Article 7 Paragraph 2:

Type A standard

EN ISO 12100:2010-11	Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010)

Type B standard

EN ISO 13732-1:2008	Ergonomic of the thermal environment – Methods for the assessment of human responses to contact with surfaces – Part 1: Hot surfaces (ISO 13732-1:2008)
EN 1032:2003+A1:2008	Mechanical vibration – Testing of mobile machinery in order to determine the vibration emission value
EN 60204-1:2018	Safety of machinery – Electrical equipment of machines – Part 1: General requirements

Type C standard

809:1998+A1:2009/AC:2010	Pumps and pump units for liquids – Common safety requirements
EN 61000-6-4:2007/A1:2011	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards; Emission standards for industrial environments
EN 61000-6-2:2005/AC:2005	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
EN 60034-1:2010/AC:2010	Rotating electrical machines – Part 1: Rating and performance
EN 60034-5/:2020	Rotating electrical machines – Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP Code) – Classification
EN 60034-6:1993-11	Rotating electrical machines – Part 6: Methods of cooling (IC Code)
EN 60034-9/2005+A1 :2007	Rotating electrical machines – Part 9: Noise limits

01.08.2022 / FLUX-GERÄTE GMBH
Klaus Hahn
Geschäftsführer / Managing Director

2. Basic information

2.1 Notes on the operating manual

This operating manual has been prepared to meet all product-specific and user-related requirements of the law and of all relevant regulations and rules, technical standards, directives and agreements.

The manual includes important information on the functioning of MAGSON magnetically coupled centrifugal pumps and how to use, install, service and dispose of them.

In the following, the magnetically coupled centrifugal pumps are referred to as "pump".

Before putting the pump into operation, carefully read the operating manual and make sure that it is always ready at hand to all users of the pump.

Complying with all instructions of this operating manual is an essential prerequisite to guarantee the safe operation and maintenance of the pump.

Make sure that all operators and service technicians have fully read and understood the manual before they start working at or with the pump.

2.2 Validity of data

All technical data, dimensions and indications of weight etc. were valid at the day when this manual went to press. Specifications listed here may differ from the actual design of the pump but will not modify any relevant information in principle.

2.3 Purpose

MAGSON pumps are designed to function as centrifugal pumps delivering fluids.

2.4 Use to the intended purpose

MAGSON pumps must only be used to deliver fluids of watery viscosity without coarse solids. So the fluids meant to be delivered are

- water and aqueous solutions,
- acid,
- base (brine),
- similar fluids free of magnetizable metal particles.

Do not use the pump to deliver

- inflammable or explosive fluids,
- solid containing or abrasive fluids,
- fluids being used to process food because the pump has not been certified according to FDA or EC 1935/2004 standards.

If you want to deliver solid containing or abrasive fluids, please contact the pump's manufacturer.

2.5 Anticipated misuse

The pump is misused if

- it is used other than to the intended purpose;
- it is operated beyond its defined limits;
- it is used to deliver inadmissible fluids like fluids containing magnetizable metal particles or coarse contaminants, for example.

2.6 Limits of use

Dimensional limits

For dimensions of the pump see æ Dimensioned drawings in the Appendix page 32 ff.

For technical data of the pump see æ Appendix page 30 ff.

Other limits

Ambient temperature	0 to 40°C for PP; -20 to ±40°C for ETFE

Pumps made of PP must not be operated in frost because PP will embrittle at temperatures below 0°C.

2.7 Warranty and liability

The pump must only be used to the intended purpose specified by this operating manual. Inappropriate operation or insufficient service and maintenance will cancel the right to all warranty claims.

2.8 Contact details

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Process Pumps & Systems

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51149 Cologne (Porz), Germany

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Fax: +49(0)2203 939 448

info-process@flux-pumpen.de
www.flux-pumps.com

3. Safety

3.1 Standards and directives

Name	Contents
2006/42/EG	Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/ECG (recast) (1)
2014/30/EU	Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility (recast)

Table 1: European Directives

Name	Contents
EN ISO 13732-1:2008	Ergonomics of the thermal environment — Methods for the assessment of human responses to contact with surfaces – Part 1: Hot surfaces (ISO 13732-1:2008)
EN 1032:2003+A1:2008	Mechanical vibration - Testing of mobile machinery in order to determine the vibration emission value
EN 61000-6-4:2007+ A1:2011	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments
EN 61000-6-2:2005/ AC:2005	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
EN 809:1998+A1:2009 + AC:2010	Pumps and pump units for liquids - Common safety requirements
EN ISO 12100:2010-11	Safety of machinery – General principles for design - Risk assessment and risk reduction (ISO 12100:2010)
EN 60204-1:2006/ AC:2010	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
EN 60034-1:2010/ AC:2010	Rotating electrical machines - Part 1: Rating and performance
EN 60034-5/A1:2007-01	Rotating electrical machines - Part 5: Degrees of protection provided by integral design of rotating electrical machines (IP code) – Classification
EN 60034-6:1993-11	Rotating electrical machines - Part 6: Methods of cooling (IC code)
EN 60034-9/A1:2007-04	Rotating electrical machines - Part 9: Noise limits

Table 2: EN Standards

3.2 Depiction of safety instructions

All safety instructions of this document are marked with symbols designed on the basis of the SAFE principle. Each of them describes the kind and source of danger, possible consequences and information on how to avert them.

DANGER
The symbol warns you of a potential accident resulting from ignoring safety or other instructions. The accident will cause serious and maybe even mortal injuries or death when touching a high-voltage electrical equipment, for example.

WARNING
The symbol warns you of a potential accident resulting from ignoring safety or other instructions. The accident may cause serious and maybe even mortal injuries or death when touching a high-voltage electrical equipment, for example.

CAUTION
The symbol warns you of a potential accident resulting from ignoring safety or other instructions. The accident may cause slight injuries like burns, injuries of the skin and bruises, for example.

ATTENTION
The symbol warns you of a potential material damage.

NOTE
The symbol indicates an important information.

3.3 Symbols used

Symbol	Meaning
æ	Cross-reference such as "see chapter xx", "see page yy"

Table 3: Symbols used

4. Technical Information

4.1 General description

MAGSON type MAS magnetically coupled centrifugal pumps are self-priming centrifugal pumps made of plastic and built in horizontal single-stage monoblock design. A magnetic coupling connects the pump to the motor and transmits the power of the motor to the impeller.
Pump housings, impellers, inner magnet sheaths and rear casings are made of plastic. The rear casing hermetically seals the fluid from the ambient atmosphere. Because of magnetic power transmission, there is no need to mechanically seal the shaft. So, in contrast to mechanically or gland sealed pumps, any leakage at the shaft is completely impossible.

Pump type MAS has an **integrated priming tank** which must be filled with liquid before initial startup.

4.2 Nameplate

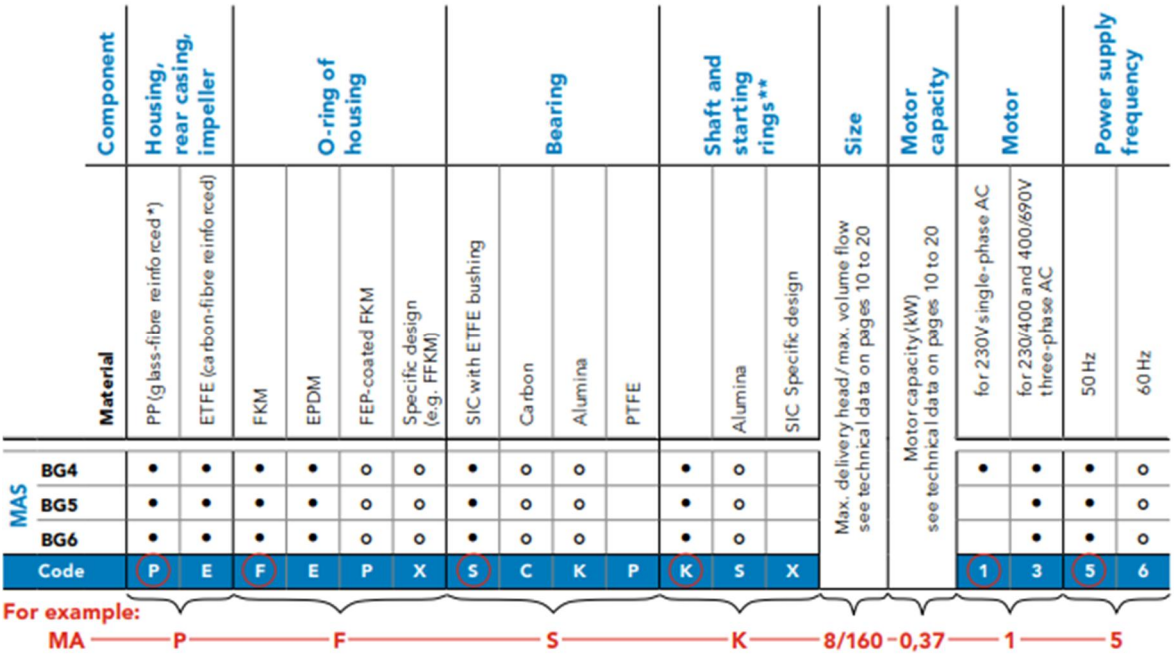
The nameplate of the pump not only specifies its operating data but also its type and serial number. Please indicate all these data when making an inquiry, reordering parts and, in particular, when ordering spare parts. Data of the electric motor are given on a separate rating plate. For further information, contact your pump's supplier or the manufacturer.

4.3 Types MAGSON MAS

MAS Self-priming	Size	Suction port	Discharge port
Type 4	13/115	DN 25	
Type 5	17/230	DN 40	
Type 6	27/470	DN 50	

4.4 Type codes and materials

The type code on the nameplate informs you about the pump materials in contact with fluid.



Overview of available materials being in contact with fluid:

Component	Symbol	Material	Temperature
All components in contact with fluid	PP	polypropylene	0 to 70°C
	ETFE	ethylene tetrafluoride ethylene	-20 to +100°C
	PTFE	polytetrafluoroethylene	-20 to +100°C
	CFR-PTFE	carbon fibre reinforced polytetrafluoroethylene	-20 to +100°C
	PPS	polyphenylene sulphide	-20 to +100°C
	SIC	silicon carbide	-20 to +100°C
	Alumina	aluminum oxide ceramic (99.7%)	-20 to +100°C
Seals	EPDM	ethylene-propylene-diene rubber	-20 to +100°C
	FKM	fluorinated rubber	-20 to +100°C
	FEP	FEP-coated FKM	-20 to +100°C

NOTE
Pump housings made of PP are of dark blue colour.

Pump housings made of ETFE are of black colour and marked with a yellow

sticker.

WARNING
Danger of chemical non-resistance of components
Make sure that the materials used for making the pump are resistant to the fluid(s) delivered.
Chemical non-resistance may result in leakage of fluid.
Potential danger to the environment and health.
In case of doubt, please contact the pump's manufacturer.

NOTE
For the chemical resistance of materials, please request the material resistance list of the pump's manufacturer.

4.5 Structure of MAGSON MAS

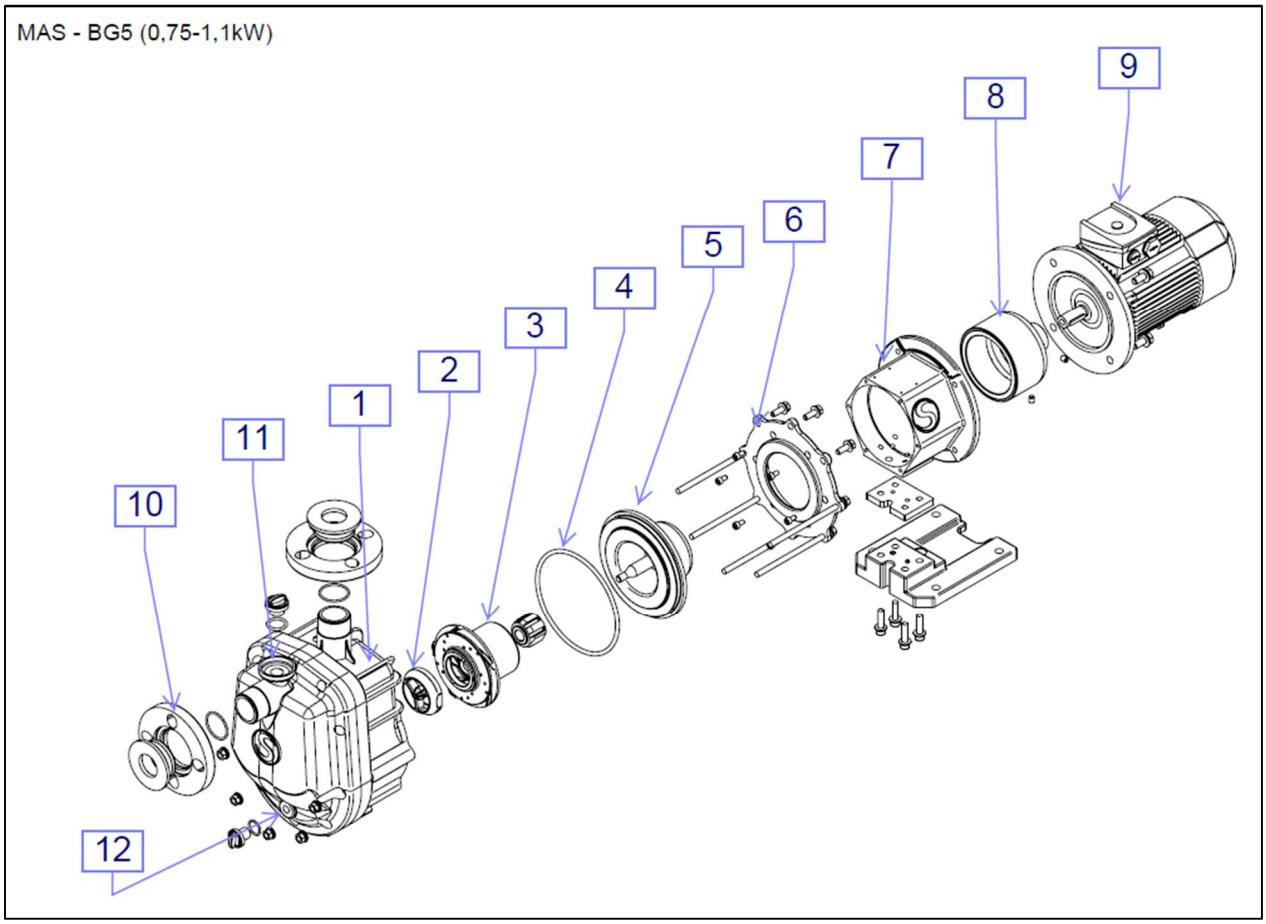


Abb. 1: Structure of MAS BG 5

1	Pump casing	2	Shaft mounting
3	Impeller magnet	4	Casing-O-Ring
5	Rear casing with shaft	6	Mounting flange
7	Bracket with base	8	Outer magnet
9	Motor	10	Lose flange
11	Filling plug	12	Drain plug

Picture shows a MAS BG 5. Other sizes may differ,
please refer spare part drawing within appendix

5. Transport and temporary storage

5.1 Safety instruction

WARNING

Danger of getting jammed or bruised during transport of the pump

Make sure to use lifting devices suitable to the weight of the pump.
Do not remove the lifting device before you have put down the pump safely.

5.2 Transport

1. Unpack the pump or unit upon receipt and check it for damage in transit.
2. In case of damage in transit, make sure to have the carrier draw up and sign the damage report document.
3. Make sure that the information of the nameplate corresponds with the specifications and dimensions of the purchase order.
4. The packaging material has to be disposed of according to local regulations.

5.3 Temporary storage

The pump must only be stored at a dry place free of frost. When storing the pump, protect it against any contaminants getting in.

6. Installation

6.1 Safety precautions

WARNING

Danger of getting jammed or bruised during installation of the pump

If necessary, use lifting and holding devices suitable to the size and weight of the pump.
Make sure that all installation work is done by competent and qualified personnel only.

WARNING

Danger of being hit by falling components

If necessary, use lifting and holding devices suitable to the size and weight of the pump.
Make sure that all installation work is done by competent and qualified personnel only.

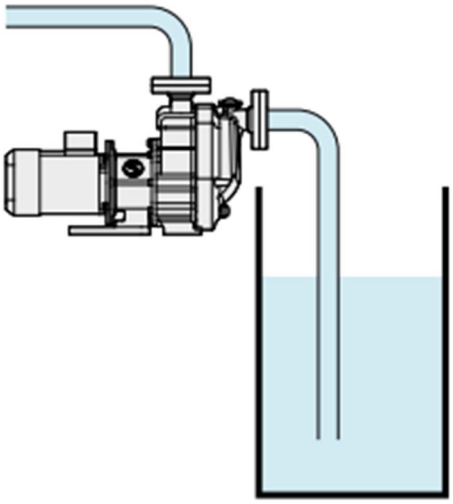
6.2 Installation requirements

Install the pump at a place that allows you easy access at any time. The limit values of

Ambient temperature is as follows: 0 to +40°C for pumps of PP;
-20 to +40°C for pumps of ETFE.

6.3 Installation

1. Install the pump in a horizontal position. For any other installation position, please contact the manufacturer.
2. Remove all covers and caps from the flanges before installing the pump.
3. The Pump is self-priming. Therefore it can be placed above liquid level.
4. Max. suction height is 5 mWc (Water @ 20°C)!



Maximum suction height depends on the fluid to be handled. It may change due to:

Friction losses in suction pipe
Higher temperature of the fluid
Higher density and/or viscosity
Lower boiling temperature

WARNING

Make sure all bolting's at suction pipe are vacuum tight!

In case of leaky suction pipe the suction capacity of the pump can be reduced or pump fails!

Make sure that the pump does not draw in impurities when priming.

6.3.1 Hose and pipe lines

5. All pipe line diameters should be sufficiently large. The speed within the suction pipe should be between 1 and 2m/s; speed within the discharge pipe should not exceed 3m/s. Pipe diameters have to be at least the size of the suction and discharge ports.
6. All suction and discharge pipes to the pump housing should be free of tensile stress.
7. If necessary, install expansion joints at the pipes to compensate excessive tension due to the pipe's thermal expansion.
8. Avoid bending radii of less than 1.5 times the nominal pipe size.
9. Also avoid sharp changes in diameters within the piping.

6.3.2 Suction line

ATTENTION

Risk of damaging the pump by cavitation

When installing the suction line, make sure to meet the NSPH value given in the æ Appendix page 32 foll.. If the NPSH falls below this value, there will be cavitation resulting in running noise, drumming and vibration of the pump.
We do not provide warranty for any damage to the pump caused by cavitation!

10. The suction pipe or hose should be made of a material that will not deform or distort by vacuum or higher temperatures.
    The suction line also should be as short as possible, its installation preventing any gas accumulation.
11. When dimensioning pipelines, fittings etc., make sure to keep the flow resistances as low as possible.
12. Provide for a straight steadying section of at least 5 times the nominal diameter before the suction port.
13. Suction lines have to be vacuum-sealed because penetrating air causes malfunction and may result in damage to the pump.
14. Make sure that the flow rate in the suction line installed does not exceed 1m/s.
15. Protect the pump against dry-running by installing adequate equipment (optionally available).
16. For easy installation and removal of the pump, a shut-off valve (but no diaphragm valve) should be built into the suction line.

NOTE

Do not use the shut-off valve of the suction line to adjust the delivery rate!

6.3.3 Discharge line

Standard flow rate of the discharge line is 3m/s.

Discharge pipe should go straight upwards (approx. 500mm) to avoid liquid losses during suction procedure.

We recommend installing a control element to adjust the flow rate of the discharge line.

ATTENTION

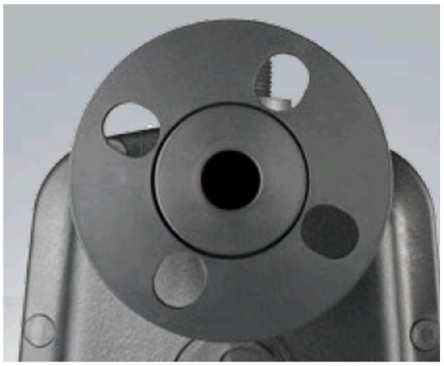
Damaging of the pump housing by pressure jerks

Do not install any quick-acting stop valves to the pipelines!

To measure working conditions, you better install a manometer between the discharge port of the pump and the throttle valve as well as a volume flow meter, if necessary.

6.3.4 Flange or threaded connections

MAGSON MAS pumps of types BG4 to BG6 are equipped with slip-on flanges as standard features. The rotating flange allows you to easily connect the pump without considering the angular position of the mating flange.
Do not use hard material to seal the flange but appropriate elastomer seals.



Replacing a flange by a threaded adapter

Alternatively you can use an insert fitting and spigot nut to connect the pump.
To do so, you have to replace the screwed flange by the attached threaded adapter as follows:

1. Take the slip-on flange off the flange fixture using a rubber mallet.

2. Use a strap wrench to unscrew the flange fixture. Take the O-ring off the fixture and put it into the (inner thread) of the threaded adapter.

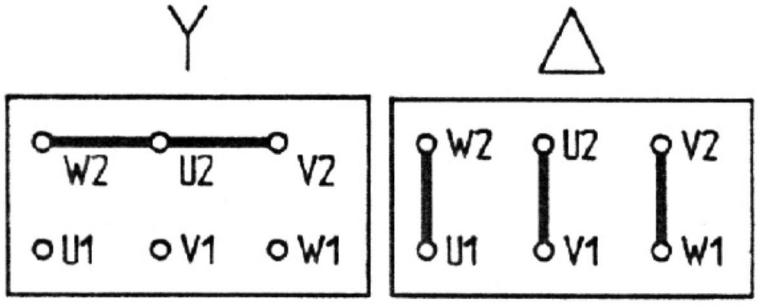
3. Screw the threaded adapter to the pump housing using the strap wrench. Make sure that the O-ring fits exactly into the groove of the inner thread.

6.3.5 Electrical connection

NOTE
Qualified personnel only are allowed to connect the pump to the electrical mains.
All electrical connections and the installation of additional protection devices has to be done in accordance with the regulations of your local power supplier and the VDE Association of German Electrical Engineers.

Before working on the terminal box of the pump, the power supply must have been cut off for at least 5 minutes.

17. Make sure that the power supply available corresponds to the data of the nameplate.
18. Connect the motor according to the following schematic attached to the terminal box:



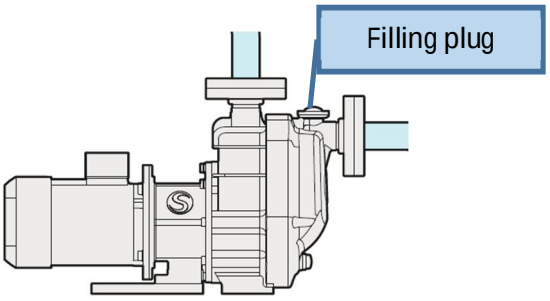
19. As standard features, all three-phase AC motors have PTC resistors to monitor the winding temperature. To operate the pump with frequency converter, also connect the PTC resistors.
20. All AC motors have a thermal sensor as standard feature which also has to be connected.
21. Do not operate any AC motor without circuit-breaker!

NOTE
Please ask the manufacturer for additional motor protection devices.

6.3.6 Controlling the direction of rotation

ATTENTION
Dry-running will damage the pump
Do not check the direction of rotation when there is no fluid in the pump!

1. Mind the direction of rotation indicated by an arrow on the pump. Before verifying it after the installation, fill the pump housing and suction line with water or fluid (refer item 2).
2. Detach filling plug at pump casing and fill fluid into the integrated priming tank. Attach filling plug properly afterwards. Dry run of pump without fluid within integrated priming tank has to be avoided!



Filling amount:

MAS BG-4 13/115	2,7 Liter
MAS BG-5 17/230	2,7 Liter
MAS BG-6 27/470	3,6 Liter

3. Then switch on and immediately off the motor to check the direction of rotation. To check whether the direction of rotation corresponds to the direction indicated by the arrow, push a piece of soft material like paper or cable tie into the slots of the fan cowl.
4. If necessary, exchange 2 phases at the terminal box to reverse the direction of rotation.

7. Putting into operation

7.1 Safety precautions

WARNING

Danger of breaking during operation

Regularly check the pump for damages.

If there is damage, the pump must not be operated!
Replace wearing parts at regular intervals.
Do not operate the pump to other than the intended purpose.

WARNING

Risk of electrical hazards when touching parts carrying voltage by fault

Fasten all loose connections. Immediately replace defective cables.
Always disconnect the power supply before doing any electrical work.
Cables must neither be jammed nor squeezed. When laying cables and connections make sure you cannot trip over them and they won't be damaged.
Check all electrical equipment at regular intervals according to the locally valid regulations (like the German DGUV accident prevention regulation 3, for example).
Only qualified and authorized personnel are allowed to do any work at the electrical equipment.

7.2 Preparatory work

WARNING

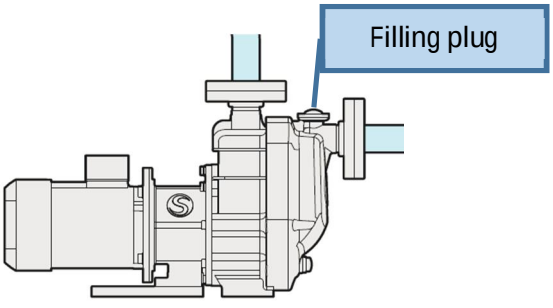
Danger of injuries and intoxication by fluid squirting out

Always wear personal protective equipment when working at the pump.

NOTE

We recommend installing dry-running protection devices such as flow monitors, contact manometers, differential pressure switches or level controllers.

1. Detach filling plug at pump casing and fill fluid into the integrated priming tank. Attach filling plug properly afterwards. Dry run of pump without fluid within integrated priming tank has to be avoided!



2. Check necessary torques at all screws of the flanges. Take care of vacuum tight suction pipe installation.
3. Open all valves at suction and discharge side completely.

7.3 Putting into operation

1. Switch on the motor.
2. Pump starts to suck the air from suction pipe. This may take between 5 – 10 minutes depending size and length of suction pipe
   As soon as the suction pipe is filled completely with fluid the normal pump operation starts.
3. Slowly open discharge valve to reach operation point. If no valve is installed at discharge side the operation conditions will be created according to plant installation and pump performance curve.

ATTENTION

Overheating will damage the pump!

Do not run the pump with the discharge line closed for a longer period of time. This may result in heating up the fluid inside the pump housing and damaging interior components of the pump.

WARNING

Hazard of pressure

Use a manometer at the discharge line to check the system pressure and prevent it from going beyond its limit specified in the technical data sheet (see Appendix).
If the system pressure is too high, the rear casing may burst releasing fluid.
When pressure testing the piping, take into account the maximum system pressure, but do not test the pump as well, if possible.

4. Check all screw joints and union pieces of the piping system for leakage.
5. Check the pump for vibration. Excessive vibration suggests cavitation or foreign particles in the impeller (see æ chapter 10: Troubleshooting).
6. Make sure that the power input of the motor is less than or equal to the rated current given on the motor's nameplate.
   If the power input is too high, reduce the delivery rate of the pump at the discharge side or decrease the density of the fluid, if possible.

7.4 Possible malfunction when putting the pump into operation

If the motor circuit-breaker switches off the motor, proceed as follows:

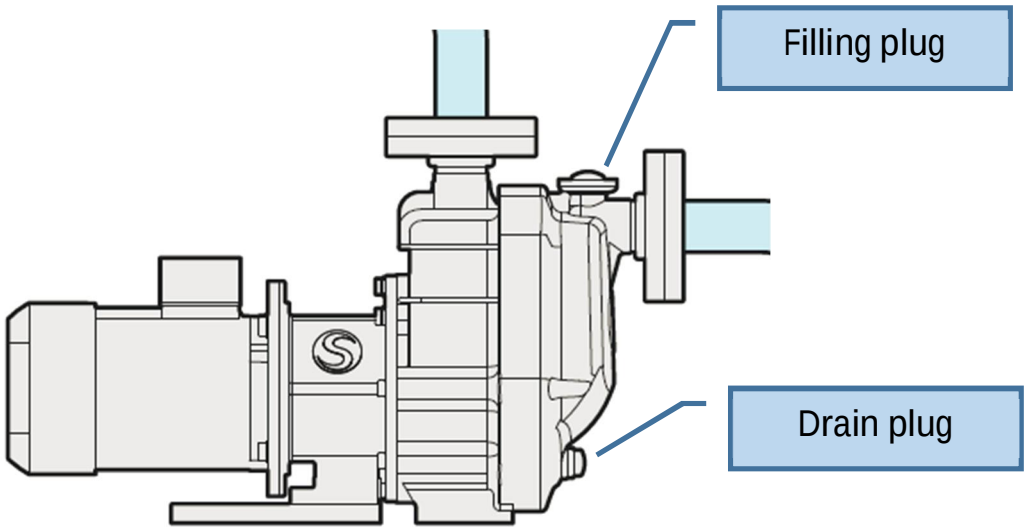
7. Before switching on the motor again, check whether the impeller turns readily.
8. Make sure that the suction line and the pump housing are filled with fluid.
9. Switch on the motor.

If the pump delivers for a short period of time only and then stops pumping, the magnetic coupling has been overloaded and disengaged. In this case, follow the instructions of æ chapter 10: Troubleshooting (see page 30).

8. Shut-down procedure

1. Switch off the motor.
2. Close the shut-off valves.
3. When some fluid remains within the pump, secure the shut-off valves to prevent an accidental opening.
4. In case of crystallizing fluids, heat both the pump and the piping. Protect freezing fluids against frost.
5. If the pump will be out of operation for a longer period of time, thoroughly rinse it off with a clean and neutral liquid to prevent remaining fluid from depositing within the pump and at the sleeve bearings.
6. Open the drain plug an the integrated priming tank and rinse the fluid. Now open filling plug and clean the pump with fresh water.
7. In case the pump is shut down for repair or maintenance work, lock the driving unit so that it cannot be switched on. Before dismantling the pump, shut off the suction and discharge lines and empty the pump housing under monitored conditions.

NOTE
Secure all valves to prevent an accidental opening!
Always wear personal protective equipment!



9. Service and maintenance

9.1 Safety precautions

WARNING

Risk of electrical hazards when touching parts carrying voltage by fault

Only qualified and authorized personnel are allowed to work on motors at a standstill. The motors have to be disconnected and secured against any accidental start.
Strictly follow the instructions of the motor manufacturer.
Comply with the safety rules for working on electrical equipment.

WARNING

Hazardous magnetic fields

The magnetic fields resulting from the pump's permanent-magnetic components will endanger persons with cardiac pacemakers.

WARNING

Danger of breaking during operation

Regularly check the pump for damages.

If there is damage, the pump must not be operated!
Immediately replace the corrosion protection if it's damaged. Replace wearing parts at regular intervals.
Do not operate the pump to other than the intended purpose.

WARNING

Risk of electrical hazards when touching parts carrying voltage by fault

Fasten all loose connections. Immediately replace defective cables.
Always disconnect the power supply before doing any electrical work.
Cables must neither be jammed nor squeezed. When laying cables and connections make sure you cannot trip over them and they won't be damaged.
Check all electrical equipment at regular intervals according to the locally valid regulations (like the German DGUV accident prevention regulation 3, for example).
Only qualified and authorized personnel are allowed to do any work at the electrical equipment.

WARNING

Risk of getting into contact with dangerous substances

Before doing service and maintenance work that requires opening the pump, carefully clean the pump and rinse it off with a neutral fluid.

WARNING

Danger of faulty installation and use of wrong or inadmissible spare parts

Components should be only replaced with genuine parts or spare parts authorized by the manufacturer.

WARNING

Risk of getting into contact with hot surfaces

Before working on drive units cool down the motors and actuators or wear heat-resistant protection gloves.

9.2 General information

This pump is designed for continuous operation and does not require specific maintenance. Nevertheless, we recommend doing the following preventive maintenance work.

9.3 Preventive maintenance

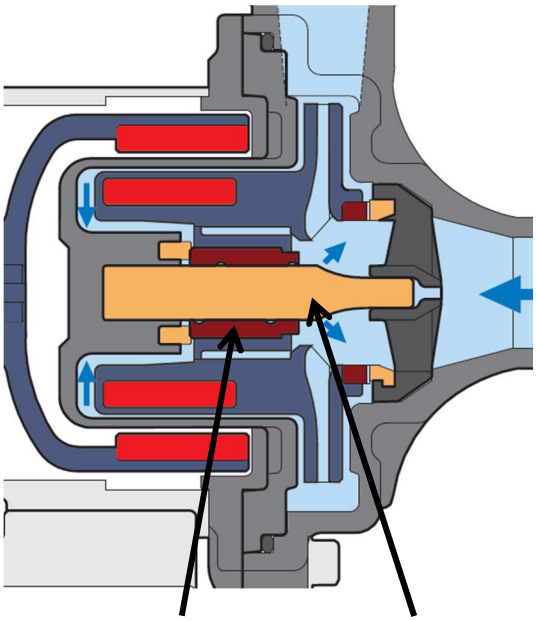
9.3.1 Overall pump

Check the pump at regular intervals for

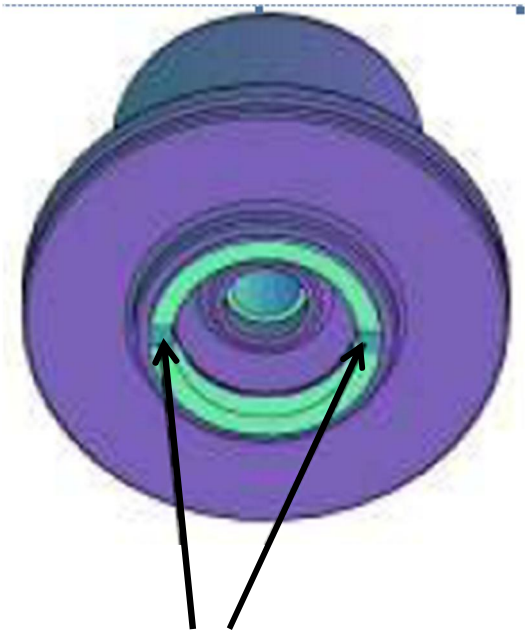
1. vibrations or unusual noise,
2. a minimum volume flow of at least 5% of the maximum volume flow,
3. changes in normal operating conditions, overheating or dry-running,
4. leakage at the pump or piping,
5. cavitation in running,
6. open valves of the suction line and a clogged filter, if any.

9.3.2 Wearing parts

Though sleeve bearing, centering shaft and starting rings are designed for continuous operation, they are subject to wear and tear as well. So check the bearings for wear and deposits at regular intervals, and replace them, if necessary.



1. The sleeve bearing and centering shaft should be replaced when they slack.



2. The starting ring inside the impeller should be replaced once the grooves are no longer visible.

Impeller
Replace the impeller magnet as soon as you see signs of wear or corrosion.

Starting rings
Check them for fissures, cracks and wear.

Rear casing
Check it inside and outside for signs of wear.

O-ring
Replace the O-ring as soon as the elastomer shows signs of chemical attack, fissures or loss of elasticity.

NOTE
All spare parts are available at FLUX-GERÄTE GMBH Process Pumps & Systems. See the Appendix for the parts lists.

When delivering dirty, muddy or crystallizing fluids, you should check and clean the pump at shorter intervals.

9.3.3 Motor

8. Clean the fan cowl and cooling fins once a month.
9. Check the power input of the motor and compare it to the rated current given on the nameplate.

9.3.4 Static O-ring seals

7. Visually inspect the seals for signs of wear at regular intervals.
8. Replace the seal, if necessary.

NOTE
If not only wear parts are replaced, but also repair work has to be done, this should be performed by an expert only. Improper maintenance work often results in superfluous extra costs.

9.4 Dismantling and replacing the motor

The back pull-out design allows you to replace the entire drive unit without dismounting the pump. So neither the pump nor the piping has to be drained. Just loosen the 4 motor screws and pull the motor off the pump.

WARNING

Danger of strong magnetic forces and bruises

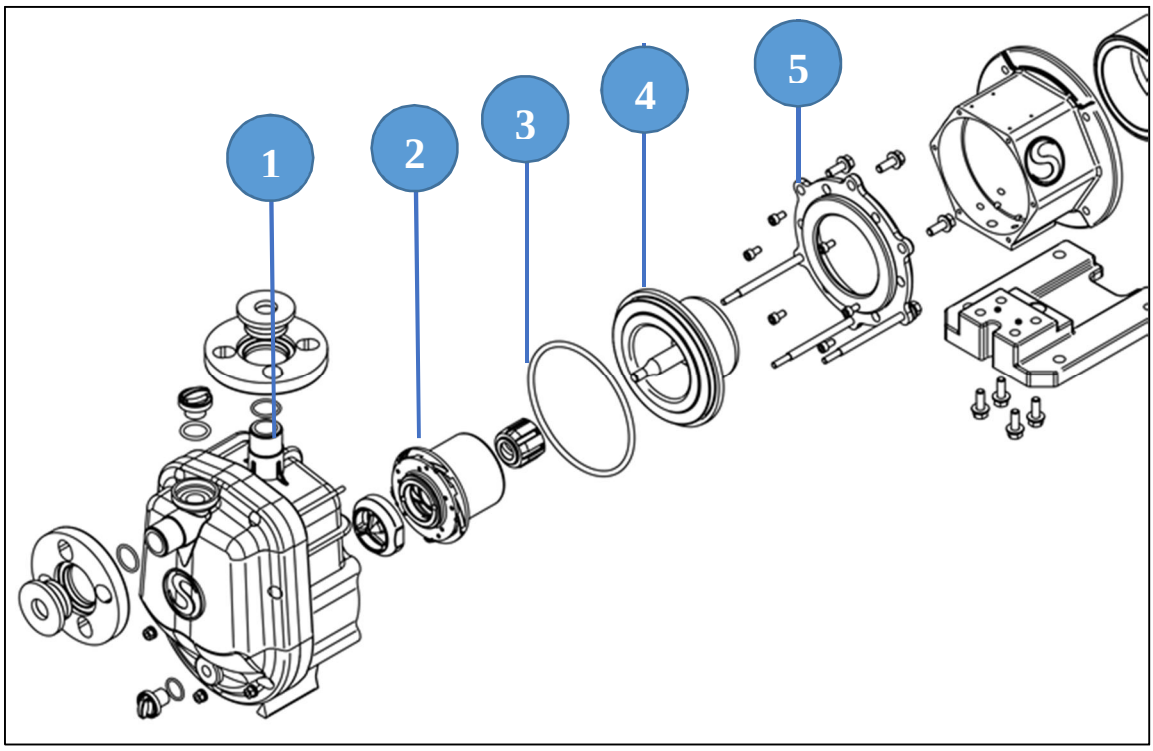
There are strong magnetic forces inside the pump between the inner magnet and the driving magnet. So pull out the drive unit with a jerk being careful not to be bruised. Perhaps you will want to work in pairs.

9.5 Dismantling the pump head

1. Before dismantling the pump head, drain and carefully rinse it.
2. Loosen of 5 nuts at front of pump casing.

3. Loosen of 3 screws on top of backside of pump casing.

Dismantling the pump head



Dismantling pump head – explosion drawing

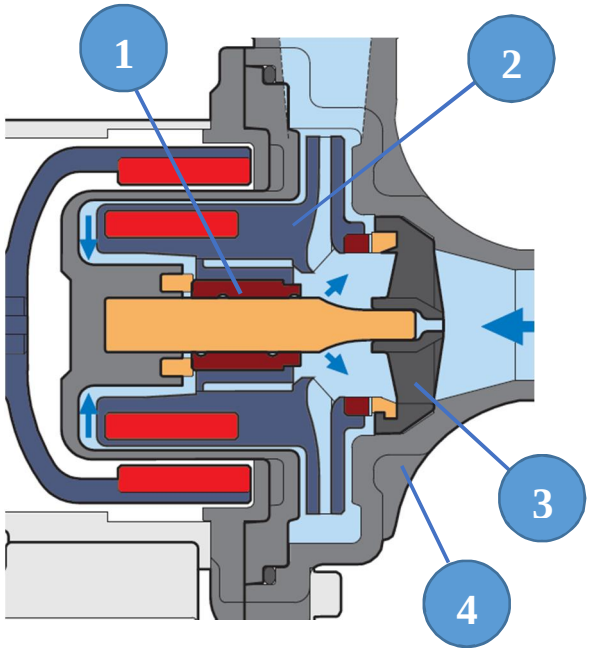
4. Pull off the complete casing (1)
5. Pull off the impeller magnet (2)
6. Remove casing O-Ring (3)
7. Take rear casing (4) off the bracket (5)
   Caution: Strong magnetic forces and risk of bruises!

9.6 Disassembling the pump head

Press out the sleeve bearing B of the impeller magnet C and replace it.

Press out the shaft mounting D of the front housing E and replace it.

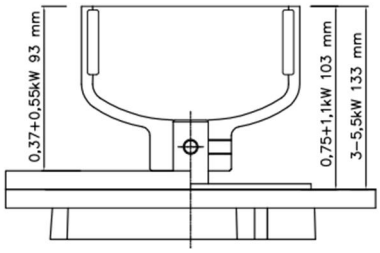
Use appropriate tools to press out the components. If in doubt, ask the manufacturer to replace them.



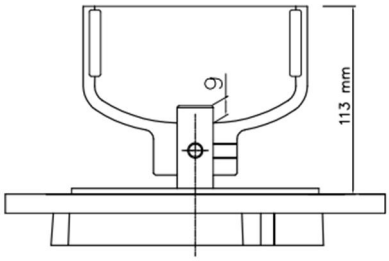
9.7 Assembling the pump

To reassemble the dismantled pump, proceed as follows:

Place the driving magnet on the motor shaft and align it.



Valid for motor with following power:
0,37; 0,55; 0,75; 1,1; 3,0; 4,0; 5,5 kW

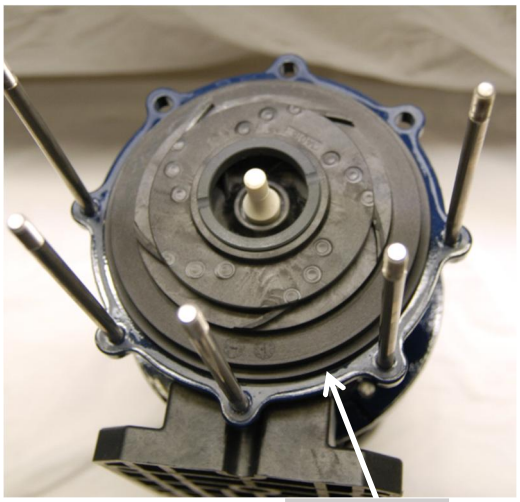


Valid for motor with following power:
1,5; 2,2 kW

Screw mounting flange to bracket. Check if outer magnet can be moved easily.

Mark „V“ hast o be placed at the bottom

Place rear casing with impeller magnet into bracket.



O-Ring

Caution: Strong magnetic forces and risk of bruises.

Place O-Ring at rear casing

10. Troubleshooting

Malfunction	Cause	Elimination
The pump does not start when being switched on.	No voltage.	Check the voltage.
	The impeller jams.	Check both the impeller and the fan blade of the motor for easy movement.
The magnetic coupling disengages.	The relative density and/or viscosity of the fluid are too high.	Reduce the delivery rate; use a stronger magnetic coupling and a more powerful motor. Reduce the impeller diameter.
	The pump was switched off, then switched on again before the rotor stopped completely.	Make sure that the rotor has stopped completely before you switch on the pump again.
	The impeller jams.	Open the pump head to eliminate the obstruction.
There is a loud drumming flow noise.	Cavitation.	Reduce the delivery rate of the discharge line. Increase the suction line diameter. Cool down the fluid. Increase the NPSH of the system.
There is a loud flow noise. The starting delivery rate is insufficient.	Wrong direction of rotation.	Correct the motor's direction of rotation.
	There is air in the suction line or pump housing.	Deaerate the piping and the housing.
	Since the pump is non-self-priming, both the suction line and the pump housing must be filled with fluid.	Fill the suction line and housing with fluid
The delivery rate is too low.	Wrong direction of rotation.	Correct the direction of rotation.
	The suction and/or discharge line is clogged.	Clear the line, open the valves.
	Cavitation.	Increase the NPSH of the system, see Cavitation above.
	There is air in the pump.	Check the suction line and seal it.

Malfunction	Cause	Elimination
The delivery rate is too high.	Pump losses are less significant than presumed.	Reduce the flow rate of the discharge line. Reduce the impeller diameter. Use a frequency converter to adjust the motor speed.
Unusual mechanical running noise.	Damaged bearing of the motor.	Take the motor off the pump and check the motor bearings.
	Foreign particle in the pump head.	Open the pump head to check it.
	The pump head bearing overheats when running dry or hot.	Open the pump head to check it. Replace the sleeve bearing, if necessary.
Leakage between pump and motor.	The pump housing is damaged. The pump is damaged because of solids, dry-running or overheating*.	Make an expert dismantle the pump and eliminate the fault.

Table 4: Troubleshooting

***) Detailed information on overheating and dry-running**

„Overheating" means the excessive warming of the fluid resulting from a closed discharge and/or suction line. As the fluid cannot leave the pump, there is no exchange of fluid. The fluid remains in the pump where it permanently circulates and heats up. This excessive warming may cause considerable damage to the pump and its components.

To avoid an increase in temperature, the minimum flow rate must not fall below 5% of the maximum delivery rate!

If a pump is **„running dry"**, there is either air in the pump chamber or the pump is not filled up with fluid. Being neither cooled nor lubricated, the sleeve bearings will overheat.

As a consequence, the plastic material of the pump will also overheat resulting in a leaky rear casing out of which fluid will pass.

Appendix

A) Technical data of MAS BG 4 - 6

Technical data	MAS type 4	MAS type 5		MAS type 6		
Size	**13/115**	**17/230**		**27/470**		
Material*	PP (glass-fibre reinforced) / ETFE (carbon-fibre reinforced)					
Max. delivery head in [m.WC] at 50 Hz	13	17		27		
Max. volume flow in [l/min] at 50 Hz	115	230		470		
Max. suction head for water of 20°C in [m.WC]	5					
Max. density in [g/cm³] at 50 Hz**	1.8	1	1.4	1.15	1.6	2
Motor capacity in [kW]	0.75	0.75	1.1	2.2	3	4
Current rating (400 V, 50 Hz) in [A]	1.56	1.56	2.25	2.0	5.6	7.3
Rated speed in [rpm] at 50 Hz / 60 Hz	3000/3600					
Suction port	DN 25 (G 1 1/2")	DN 40 (G 2 1/4")		DN 50 (G 2 3/4")		
Discharge port	DN 25 (G 1 1/2")	DN 40 (G 2 1/4")		DN 50 (G 2 3/4")		
Voltage in [V]	230/400 V three-phase AC					
Protection class	IP 55					
Max. flow velocity in [m/s]	suction side = 1 / discharge side = 3					
Approx. weight for PP/ETFE in [kg]	24	26	29	42	54	62
Max. temperature for PP/ETFE in [°C]	70/60					
Max. system pressure for PP/ETFE at 20 °C in [bar]	2	2.2		4	5.2/4.4	

* Material used for housing, impeller unit and rear casing: (sheath of inner magnet made of PP without fibre reinforcement)

** approx. value at max. volume flow (higher density possible when flow rate is reduced)

Tab. 5: Technical data of MAS BG 4

Dimensions in [mm]

Size	13/115	17/230		27/470		
Dimension a in [mm]	130	130		208	230	
Dimension c in [mm]	130	130		200	261	
Dimension d in [mm]	255	276		296		
Dimension e in [mm]	70	84		93		
Dimension f in [mm]	167	190		206		
Dimension g in [mm]	275	305		309		
Dimension i in [mm]	Ø12	Ø12		Ø14×36		
Dimension J in [mm]	196	228		248		
Dimension H in [mm]	325	360		389		
Dimension K in [mm]	18	18		18	20	
Dimension L in [mm]	582	612	647	718	772	755
Dimension w in [mm]	160	160		260		

Motor dimensions may differ according to manufacture.

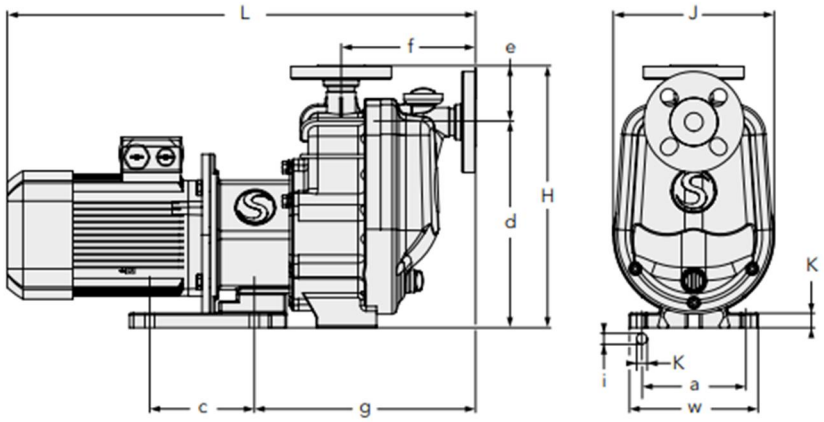


Abb. 2: Technical drawing of MAS BG 4

Characteristic curves

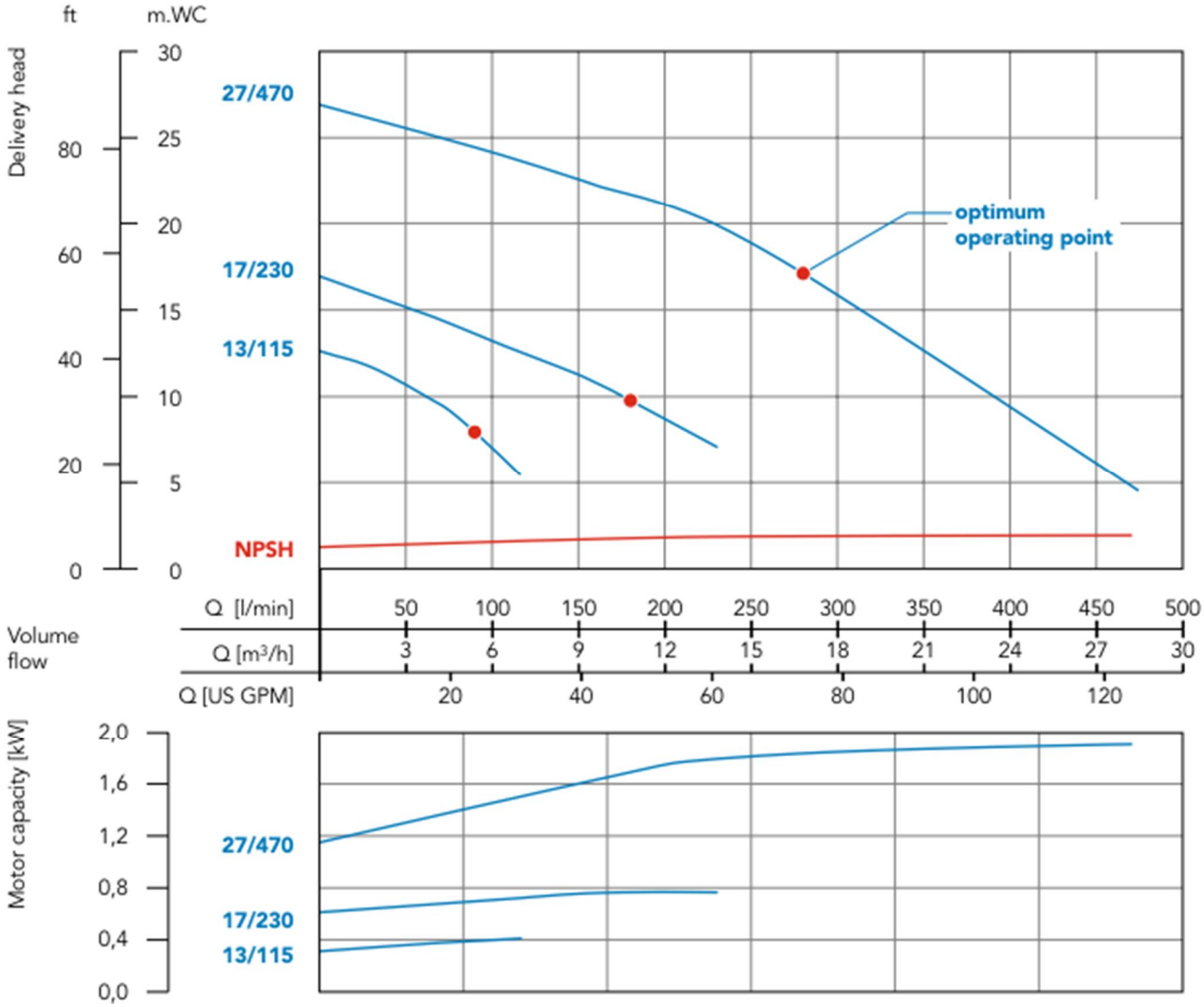
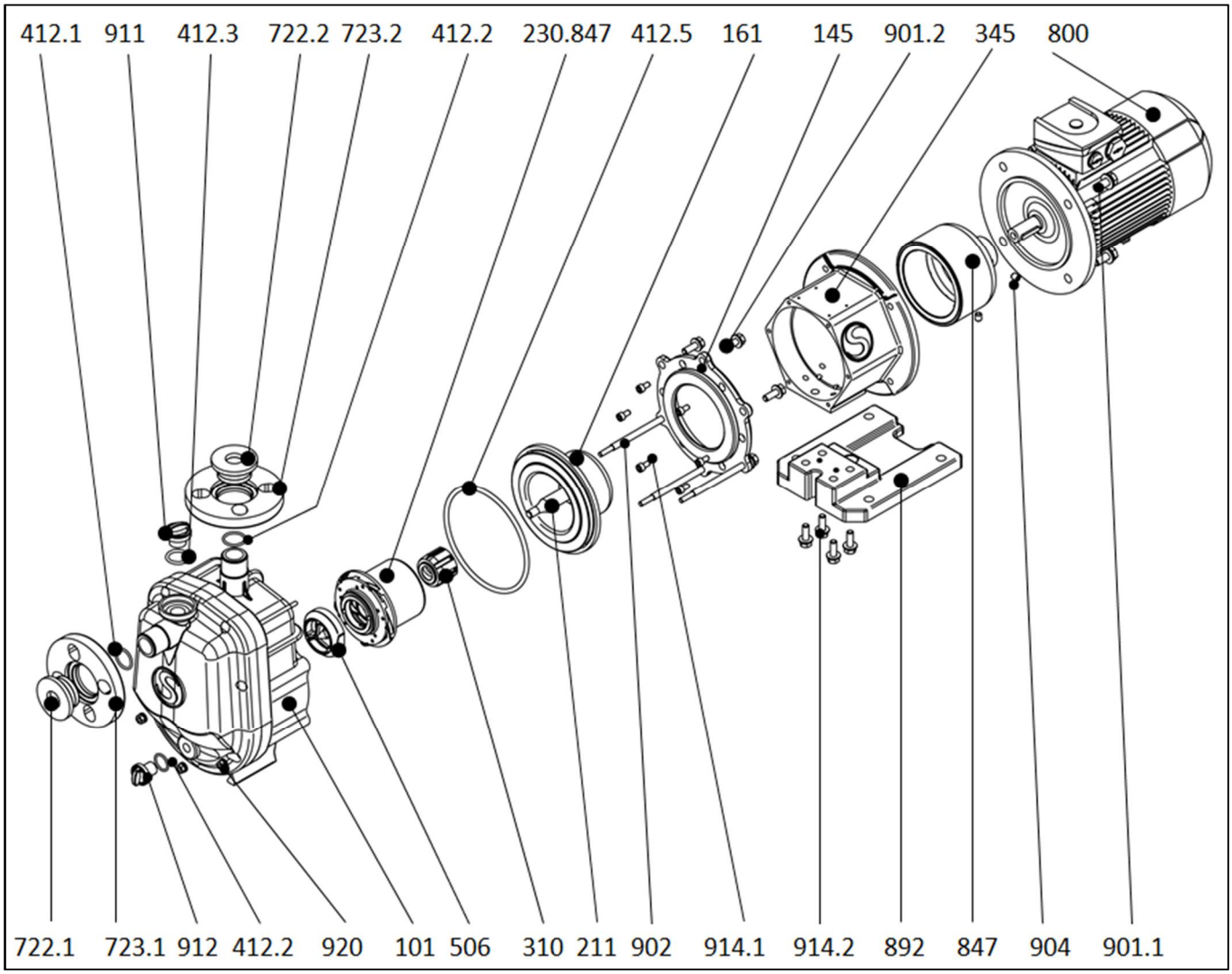


Fig. 3: performance curves MAS, measured with water @ 20°C

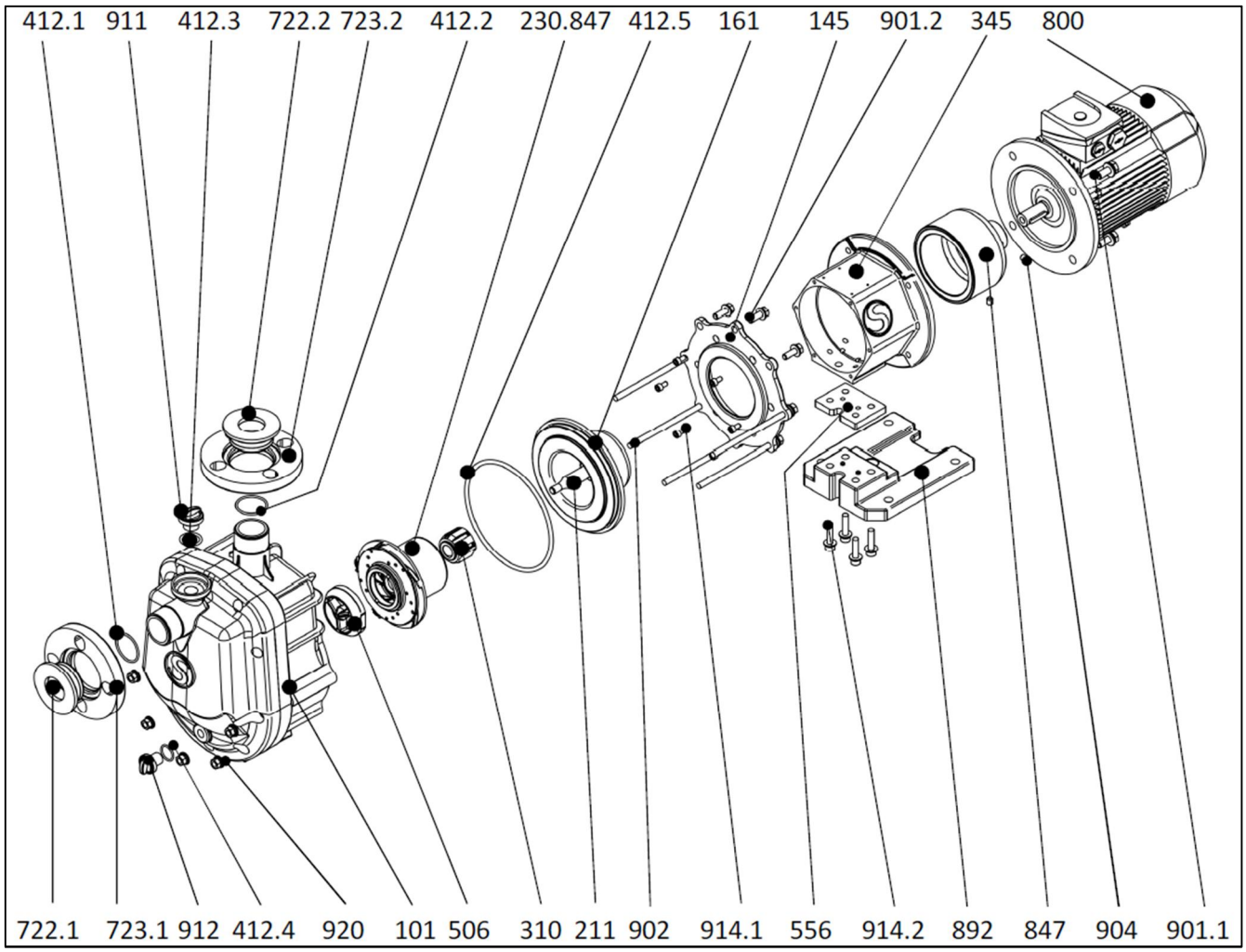
B) Exploded view MAS BG 4



Spare parts list MAS BG 4

Part no.	Quantity	Article no.	Name	Material
101	1		Pump casing	see technical data sheet
145	1		Mounting flange	Cast iron
161	1		Rear casing	see technical data sheet
211	1		Shaft	aluminum oxide ceramic 99.7%
230.847	1		Impeller magnet	see technical data sheet
310	1		Sleeve bearing	SiC / PTFE
314.1	1		Impeller starting ring	Graphite
314.2	1		Starting ring of rear casing	aluminum oxide ceramic 99.7%
345	1		Bracket	GG
412.1	1		O-Ring of flange	see technical data sheet
412.2	1		O-Ring of flange	see technical data sheet
412.3	1		O-Ring Filling plug	see technical data sheet
412.4	1		O-Ring Draing plug	see technical data sheet
412.5	1		O-Ring of casing	see technical data sheet
506	1		Shaft mounting	see technical data sheet
722.1	1		Flange insert suction port	see technical data sheet
722.2	1		Flange insert discharge port	see technical data sheet
723.1	1		Slip-on flange suction port	see technical data sheet
723.2	1		Slip-on flange discharge port	see technical data sheet
800	1		Elektric motor	Aluminum
847	1		Outer magnet	Cast iron / ferrite
892	1		Base plate	PP (glass fiber reinforced)
901.1	4		Hexagon screw M10 x 25	A2
901.2	3		Hexagon screw M8 x 25	A2
902	3		Stud bolt M5	A2
904	2		Set screw M8 x 10	A2
911	1		Filling plug	see technical data sheet
912	1		Drain plug	see technical data sheet
914.1	6		Allen screw M6 x 12	A2
914.2	4		Allen screw M8 x 25	A2
920	5		Nut M6	A2

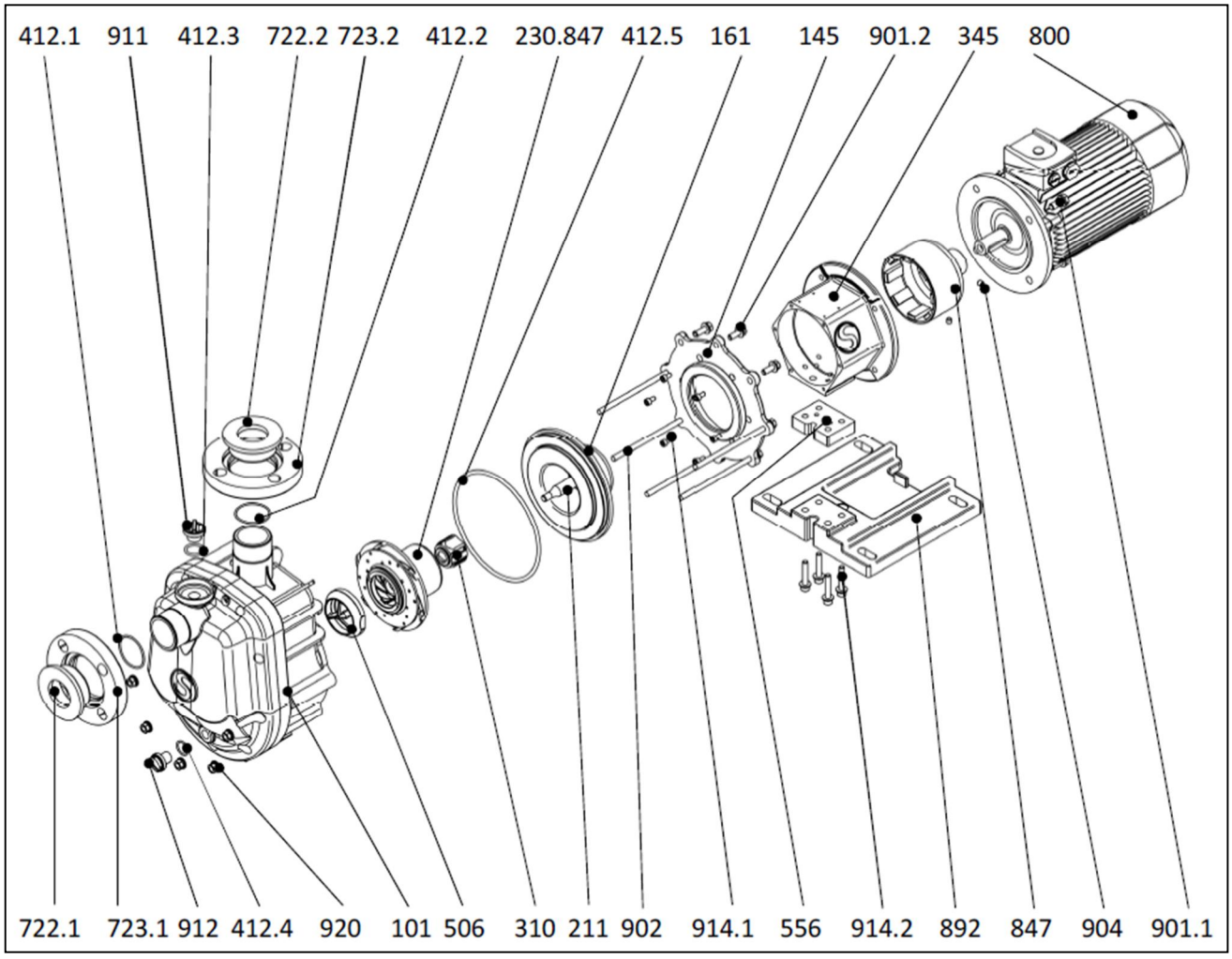
C) Exploded view MAS BG 5



Spare parts list MAS BG 5

Part no.	Quantity	Article no.	Name	Material
101	1		Pump casing	see technical data sheet
145	1		Mounting flange	Cast iron
161	1		Rear casing	see technical data sheet
211	1		Shaft	aluminum oxide ceramic 99.7%
230.847	1		Impeller magnet	see technical data sheet
310	1		Sleeve bearing	SiC / PTFE
314.1	1		Impeller starting ring	Graphite
314.2	1		Starting ring of rear casing	aluminum oxide ceramic 99.7%
345	1		Bracket	GG
412.1	1		O-Ring of flange	see technical data sheet
412.2	1		O-Ring of flange	see technical data sheet
412.3	1		O-Ring Filling plug	see technical data sheet
412.4	1		O-Ring Draining plug	see technical data sheet
412.5	1		O-Ring of casing	see technical data sheet
506	1		Shaft mounting	see technical data sheet
722.1	1		Flange insert suction port	see technical data sheet
722.2	1		Flange insert discharge port	see technical data sheet
723.1	1		Slip-on flange suction port	see technical data sheet
723.2	1		Slip-on flange discharge port	see technical data sheet
800	1		Electric motor	Aluminum
847	1		Outer magnet	Cast iron / ferrite
892	1		Base plate	PP (glass fiber reinforced)
901.1	4		Hexagon screw M10 x 25	A2
901.2	3		Hexagon screw M8 x 25	A2
902	3		Stud bolt M5	A2
904	2		Set screw M8 x 10	A2
911	1		Filling plug	see technical data sheet
912	1		Drain plug	see technical data sheet
914.1	6		Allen screw M6 x 12	A2
914.2	4		Allen screw M8 x 25	A2
920	5		Nut M6	A2

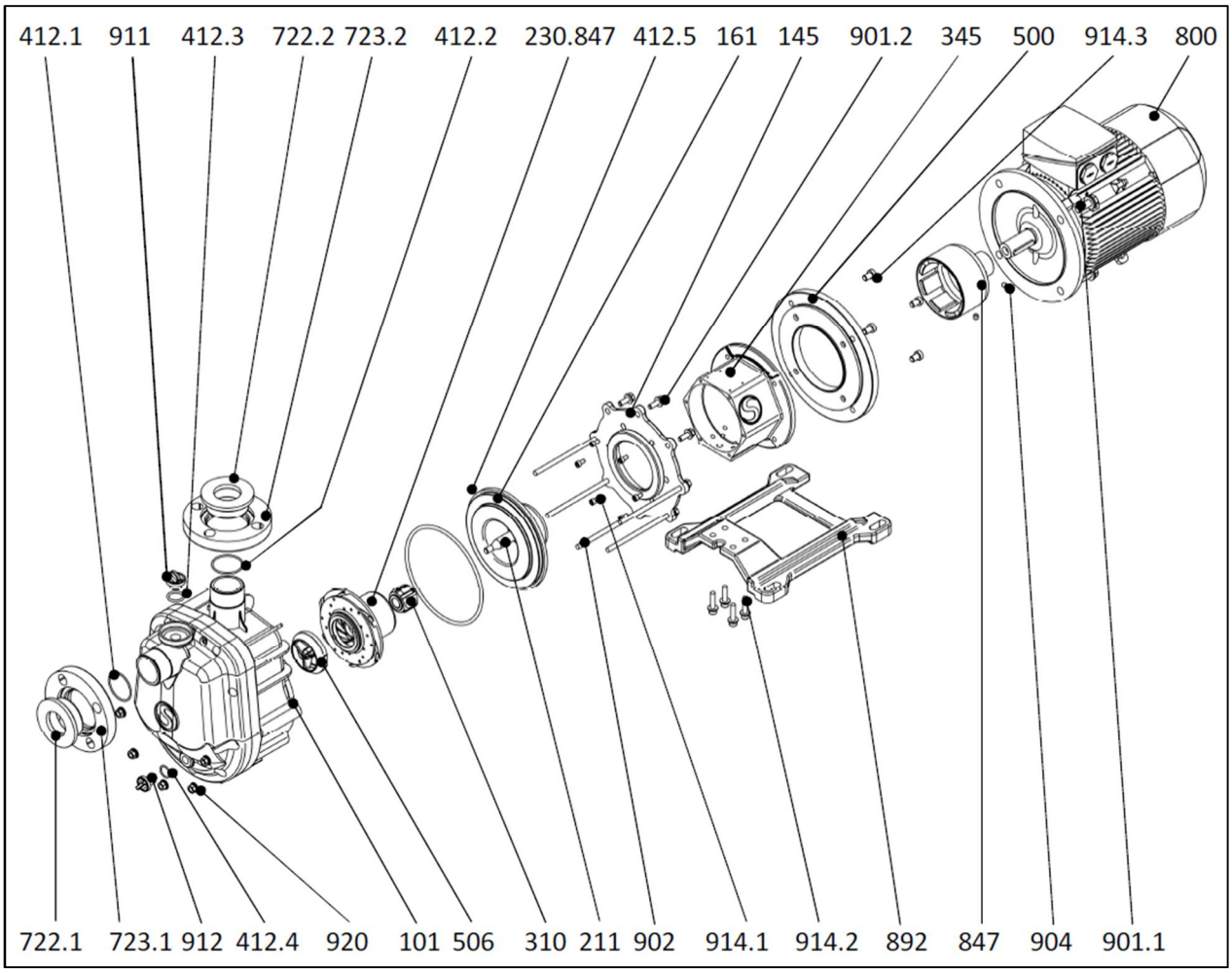
D) Exploded view MAS BG 6; 2.2 kW



Spare parts list MAS BG 6; 2.2 kW

Part no.	Quantity	Article no.	Name	Material
101	1		Pump casing	see technical data sheet
145	1		Mounting flange	Cast iron
161	1		Rear casing	see technical data sheet
211	1		Shaft	aluminum oxide ceramic 99.7%
230.847	1		Impeller magnet	see technical data sheet
310	1		Sleeve bearing	SiC / PTFE
314.1	1		Impeller starting ring	Graphite
314.2	1		Starting ring of rear casing	aluminum oxide ceramic 99.7%
345	1		Bracket	GG
412.1	1		O-Ring of flange	see technical data sheet
412.2	1		O-Ring of flange	see technical data sheet
412.3	1		O-Ring Filling plug	see technical data sheet
412.4	1		O-Ring Draining plug	see technical data sheet
412.5	1		O-Ring of casing	see technical data sheet
506	1		Shaft mounting	see technical data sheet
722.1	1		Flange insert suction port	see technical data sheet
722.2	1		Flange insert discharge port	see technical data sheet
723.1	1		Slip-on flange suction port	see technical data sheet
723.2	1		Slip-on flange discharge port	see technical data sheet
800	1		Electric motor	Aluminum
847	1		Outer magnet	Cast iron / ferrite
892	1		Base plate	PP (glass fiber reinforced)
901.1	4		Hexagon screw M10 x 25	A2
901.2	3		Hexagon screw M8 x 25	A2
902	3		Stud bolt M5	A2
904	2		Set screw M8 x 10	A2
911	1		Filling plug	see technical data sheet
912	1		Drain plug	see technical data sheet
914.1	6		Allen screw M6 x 12	A2
914.2	4		Allen screw M8 x 25	A2
920	5		Nut M6	A2

E) Exploded view MAS BG 6; 3.0 – 4.0 kW



Spare parts list MAS BG 6; 3.0 – 4.0 kW

Part no.	Quantity	Article no.	Name	Material
101	1		Pump casing	see technical data sheet
145	1		Mounting flange	Cast iron
161	1		Rear casing	see technical data sheet
211	1		Shaft	aluminum oxide ceramic 99.7%
230.847	1		Impeller magnet	see technical data sheet
310	1		Sleeve bearing	SiC / PTFE
314.1	1		Impeller starting ring	Graphite
314.2	1		Starting ring of rear casing	aluminum oxide ceramic 99.7%
345	1		Bracket	GG
412.1	1		O-Ring of flange	see technical data sheet
412.2	1		O-Ring of flange	see technical data sheet
412.3	1		O-Ring Filling plug	see technical data sheet
412.4	1		O-Ring Draining plug	see technical data sheet
412.5	1		O-Ring of casing	see technical data sheet
506	1		Shaft mounting	see technical data sheet
722.1	1		Flange insert suction port	see technical data sheet
722.2	1		Flange insert discharge port	see technical data sheet
723.1	1		Slip-on flange suction port	see technical data sheet
723.2	1		Slip-on flange discharge port	see technical data sheet
800	1		Electric motor	Aluminum
847	1		Outer magnet	Cast iron / ferrite
892	1		Base plate	PP (glass fiber reinforced)
901.1	4		Hexagon screw M12 x 30	A2
901.2	3		Hexagon screw M8 x 25	A2
902	3		Stud bolt M8	A2
904	2		Set screw M8 x 10	A2
911	1		Filling plug	see technical data sheet
912	1		Drain plug	see technical data sheet
914.1	6		Allen screw M6 x 12	A2
914.2	4		Allen screw M8 x 30	A2
914.3	4		Allen screw M8 x 20	A2
920	5		Nut M8	A2

F) Safety informations electric motor

Information on safety and commissioning for low voltage asynchronous motors
(in accordance with L. V. directive 2006/95/EC)

Types: 1TZ9,5AP..,6AP..,7AA,7AP..,7JB,7JE, 8AP..,9AP..

Shaft height: 56 to 315 mm

1 General information

Electric motors have dangerous voltage-carrying and rotating components as well as surfaces that may become hot. All work involved in the transport, connection, commissioning and regular maintenance must be carried out by **qualified, responsible specialists** (note VDE 0105; IEC 364). Improper behaviour may result in serious **injury** and **damage to property**. The applicable **national, local** and **works regulations** and **requirements** must be complied with.

2 Intended use

These motors are intended for commercial installations. They comply with the harmonized standards of the **EN60034 (VDE 0530)** series. Utilization in areas subject to **explosion hazard is not permitted**, unless **expressly intended** for this purpose (see additional notes). In certain special cases, for example, on use in non-commercial installations, if requirements are more strict (e.g. protection against contact with children's fingers), it is the responsibility of the customer to ensure compliance on installing the equipment.
The motors are rated for ambient temperatures of **-20°C to +40°C** and site altitudes **≤ 1000 m** above sea level. Any contradictory information on the rating plate **must** be observed. The conditions on site **must** correspond to all rating plate specifications.

Low voltage motors are **components** for installation in machinery in terms of the Machine directive 2006/42/EC. **Commissioning** must not take place until it has been proved that the end product conforms with this guideline (please note EN 60204-1).

3 Transport and storage

Any **damage** detected after dispatch should be reported immediately to the transport company and **commissioning** must be postponed. Tighten the eyebolts. They are designed for the weight of the motor only therefore do not attach any additional loads. If necessary, use suitable, adequately dimensioned transporting equipment (e.g. rope guides).
Remove existing **shipping braces** before commissioning; and reuse for subsequent transport. If motors are stored, a **dry**, **dust-free** and **low vibration** (v_{rms} ≤ 0.2 mm/s) environment is important (to avoid bearing standstill damage). On long-term storage, the regrease interval of the bearings is reduced.
Before commissioning, measure the impedance of the insulation. If values ≤1kΩ per volt of rated voltage are measured, the windings must be dried out.
When motors with roller bearings for increased cantilever force are operated the value of cantilever force must be minimal 30% of permissible cantilever force.. Operating with smaller cantilever force is the cause of bearing faults.

4 Installation

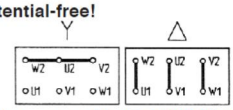
Ensure an even underlying surface, good foot or flange fixing and precise alignment for direct coupling. It is important to ensure that the mounting conditions do not cause resonance with the rotational frequency and the doubled supply frequency. Turn the rotor **by hand** and listen for any unusual grinding noises. **Check** the **direction of rotation** in the decoupled state (note section 5).
Only mount or remove drive components (belt pulley, coupling, etc.) using suitable tools (heat up), and cover to shield against contact. Avoid unpermissible belt tensions (see catalogue and technical data).
The **balancing type** is specified on the shaft end face or rating plate (**H** = half- and **F** = full-key balancing). On mounting the drive, note the balancing type! In the case of half key balancing, the **protruding, visible part** of the half-featherkey must be removed.
A canopy is recommended for designs with the shaft end pointing downwards, and with the shaft end pointing upwards a cover must be **provided by the customer** to prevent foreign bodies from falling into the fan.

Do not obstruct ventilation! Discharged air, also from neighbouring equipment, must not be sucked in again immediately.
Checking of bearing grease must be carry out when motors are longer than 12 months storaged. When storage conditions are the cause of grease depreciation (presence of condensate, consistency change) the grease must be exchanged. Grease exchangr must be carry out no later than in three year interval.

5 Electrical connection

Work is only permitted to be carried out by **qualified specialists** on the **stationary motor**, while **disconnected** and **prevented from being switched on again**. This also applies for the auxiliary power circuits (e.g. Anti-condensation heaters).

Check that the equipment is potential-free!



If the **tolerance limits** are exceeded that are specified in **EN 60034, part 1 / IEC 34-1** (voltage ± 5%, frequency ± 2%, shape of curve, symmetry) the heating effect is increased and the electromagnetic compatibility is affected. Please note the specifications on the rating plate and the connection diagram in the terminal box.
Connections must be made in such a way as to ensure that a **permanently** safe electrical connection is maintained (no protruding wire ends); use the corresponding cable end pieces. Create a **safe earth continuity connection**.

Tightening torques for terminal board connections

	Thread ⌀	M4	M5	M6	M8	M10	M12	M16
	Tightening torque [Nm]	0,8.. ..1,2	1,8.. ..2,5	2,7.. ..4	5,5.. ..8	9.. ..13	16.. ..20	36.. ..40

Clearences in air between bare live parts themselves and between bare live parts and earth must be ≥ 5,5 mm (U_{rated} ≤ 690 V) .

It must be ensured that the terminal box does not contain **foreign** bodies, dirt or humidity. Seal any unused cable entry openings against **dust** and **water**.
Secure the **featherkey** on test operation without drive components. For motors with brakes, check that the brakes are operating perfectly before commissioning.

6 Operation

Vibration levels of v_{rms} ≤ 3.5 mm/s (P_N ≤ 15 kW) or v_{rms} ≤ 4.5 mm/s (P_N > 15 kW) are quite acceptable in the coupled state.
If deviations from normal operation occur - e.g. **increased temperatures, noises, vibration** - the motor should be **switched off** in the event of doubt. Determine the causes and contact the manufacturer if necessary. Do not disconnect protective equipment, even under test operation.
Under dirty operating conditions, clean the air channels regularly. Open any closed **condensate water** holes from time to time!

For motors **without regreasing facilities**, bearing or grease replacement must be carried out in accordance with the manufacturer's instructions, or after 3 years, whichever is sooner.
Bearings **with regreasing facilities** must be regreased when the motor is running.
In the case of **motors with separate ventilation**, the separately-driven fan must be switched on throughout motor operation.

7 Further information

Information provided about any additional equipment must be noted!

These notes on safety and commissioning must be retained for future reference!

G) Declaration of decontamination

According to various legal regulations on labor protection, including the German Workplace Regulations (ArbStättV), Hazardous Substances Regulations (GefStoffV) and regulations for the prevention of accidents, as well as environmental regulations such as the German Waste Act (AbfG) and the Water Resources Law (WHG), all industrial and commercial enterprises are obliged to protect their employees and other persons as well as the environment from harmful influences and effects when handling hazardous substances.

We therefore ask you to attach a declaration of decontamination to any pump or component you send us for repair, stating that you carefully cleaned and, if necessary, thoroughly rinsed with neutral fluid the pump or component before you shipped it to us. Notwithstanding the receipt of this declaration, we reserve the right to reject its repair for other reasons.

No FLUX product or component of them will be accepted for service or repair unless the declaration of decontamination is enclosed!

Apart from that, we do NOT accept any pump that has been operated with radioactive substances.

When sending in the pump or a component, please inform us if, despite carefully emptying and cleaning the pump, there are still some safety precautions required.

Declaration of Decontamination

The undersigned herewith declare that the following pump and its accessories are harmless and ask you to service and/or repair it for them.

Type:

.....

.....

Serial number:

.....

Date of delivery:

.....

Kind of problem:

.....

.....

Declaration:

The pump was not used to deliver harmful or noxious substances

☐ but with the following fluids:

.....

.....

☐ Before being shipped, the pump was carefully emptied and cleaned inside and outside.

☐ There are no special safety precautions required.

☐ It is necessary to take the following safety precautions with regard to residual fluids and waste disposal:

.....

.....

Date: Signature:

More than just pumps

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