



EC Declaration of Conformity (valid only for Xylem Water Solutions Austria GmbH aggregate supplied in its entirety)

(according to **EC Directive on Machinery 2006/42/EC, Annex II A**)



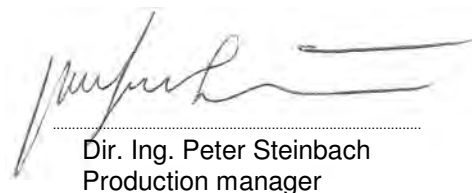
The manufacturer,
Xylem Water Solutions Austria GmbH
Ernst Vogel-Strasse 2
2000 Stockerau
Austria

of the pumps from the standard product line hereby declares:

MP40.2, MP40.3, MP65.1, MP65.2, MP100.1, MP100.2, MP125.1, MP125.2,
MPA40.2, MPA40.3, MPA65.1, MPA65.2, MPA100.1, MPA100.2, MPA125.1, MPA125.2,
MPAI40.2, MPAI40.3, MPAI65.1, MPAI65.2, MPAI100.1, MPAI100.2, MPAI125.1, MPAI125.2

- The supplied aggregates meet the relevant regulations of the EC Directive on Machinery, 2006/42/EC.
- The three-phase electric motor supplied at the same time meets the relevant regulations of Directive 2004/108/EC.
- Special technical documentation has been prepared, in accordance with Annex VII A.
- If necessary, we can submit the above-listed special technical documentation, in electronic form on a data storage medium, to the relevant authorities.
- The above-listed special documentation can be requested at the following address:
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Abtlg. Research & Development
Xylem Water Solutions Austria GmbH
Ernst Vogel-Strasse 2
2000 Stockerau
Austria
- Among others, the following harmonised standards have been applied:
EN 809 :1998+A1:2009+AC:2010(D)
EN 953 :1997+A1:2009(D)
EN ISO 12100 :2010(D)
EN 60204-1 :2006/A1:2009 D
- A change to an aggregate which was not approved by us invalidates this declaration. This also applies in the case that the aggregate is installed in equipment that does not have the declaration of conformity in accordance with the Directive on Machinery, 2006/42/EC.

Stockerau, 15.10.2011



Dir. Ing. Peter Steinbach
Production manager

TABLE of CONTENTS

Pump Name Plate	70	6.4 Limits of Operation	83
1. General.....	71	6.5 Lubrication of Bearings.....	84
1.1 Guarantee	71	6.6 Monitoring	84
2. Safety Regulations	71	6.7 Shutting down	84
2.1 Marking of References in the Operating Instructions	71	6.8 Storage / longer periods of non-operation	84
2.2 Dangers of non-observance of the Safety Instructions	72	7. Servicing, Maintenance	85
2.3 Safety Instructions for the Operator / Worker ..	72	7.1 General remarks.....	85
2.4 Safety Instructions for Maintenance, Inspections and Mounting Work	72	7.2 Mechanical seals	85
2.5 Unauthorized Alteration and Spare Parts Production	72	7.3 Stuffing boxes	85
2.6 Undue Operation	72	7.4 Lubrication and Change of Lubricant.....	85
2.7 Explosion Protection.....	72	7.5 Coupling.....	85
2.8 Use acc. to Regulations	74	7.6 Cleaning of pump	86
3. Description	75	8. Dismantling and repair of pump	86
3.1 Models.....	75	8.1 General remarks.....	86
3.2 Shaft Sealing	75	8.2 General	86
3.3 Bearings	75	8.3 Tools and Equipment.....	87
3.4 Approximate Value for Sound Pressure Level	75	8.4 Dismantling the Pump	87
3.5 Permitted Nozzle Loads and Torques at the Pump Nozzles ...	76	8.5 Replacing Roller Bearings	87
3.6 Permitted Pressures and Temperatures.....	77	8.6 Replacement of the slide bearing	88
4. Transport, Handling, Storage	78	8.7 Replacement of the shaft sleeve with a packing gland / Replacement of the mechanical seal.....	89
4.1 Transport, Handling.....	78	8.8 Dismantling	90
4.2 Storage / Preservation.....	78	8.9 Repairs	92
5. Mounting / Installation	79	9.Reassembly	93
5.1 Mounting of Pump / Unit.....	79	9.1 Preliminary work	93
5.2 Connection of Pipings to the Pump.....	79	9.2 Model MPA, MPAI (axial intake lines).....	94
5.3 Coupling	80	9.3 Model MP (bearings on both sides)	95
5.4 Drive	82	10. Spare Parts, Spare Pumps	95
5.5 Electric Connection	82	10.1 Spare Parts.....	95
5.6 Final Control.....	82	10.2 Stand-by pumps.....	96
6. Start-up, Operation, Shut down	82	11. Faults - Causes and Solutions.....	97
6.1 Initial start-up.....	82	12. Motor Operating Instructions	98
6.2 Switch on drive	83	Sectional drawings.....	100-127
6.3 Restarting	83	Connections.....	128-129
		Tightening Torques.....	130

Pump Name Plate

Type			
S/N		Year	
Q		m ³ /h	P
H		m	n
p _{all w c}		bar at t _{max op}	°C
Item No		Imp Ø	mm

Sch. 44.03

Type *)	Type of pump
S/N *)	Serial number
Year	Year of construction
Q	Rated capacity at the operating point
P	Rated power at the operating point
H	Head (Energy head) at the operating point
n	Speed
p _{all w c}	Max. permitted casing-operation-pressure (=highest discharge pressure at the rated operating temperature to which the pump casing can be used).
t _{max op}	Maximum permitted operating temperature of pumped liquid
Item No	Customer related order number
Imp Ø	Outer diameter of the impeller

*) All details of design and materials are defined with this information. They must be stated on all inquiries to the manufacturer resp. orders of spare.

1. General

This product corresponds with the requirements of the Machine directive 2006/42/EG.



The staff employed on installation, operation, inspection and maintenance must be able to prove that they know about the relevant accident prevention regulations and that they are suitably qualified for this work. If the staff does not have the relevant knowledge, they should be provided with suitable instruction.

The operation safety of the delivered pump resp. unit (= pump with motor) can only be guaranteed on designated use according to the attached data sheet and / or order confirmation resp. chapter 6 "Start-up, Operation, Shut down".

The operator is responsible for following the instructions and complying with the safety requirements given in these Operating Instructions.

Smooth operation of the pump or pump unit can only be achieved if installation and maintenance are carried out carefully in accordance with the rules generally applied in the field of engineering and electrical engineering.

If not all the information can be found in these Operating Instructions, please contact us.

The manufacturer takes no responsibility for the pump or pump unit if the Operating Instructions are not followed.

These Operating Instructions should be kept in a safe place for future use.

If this pump or pump unit is handed on to any third party, it is essential that these Operating Instructions and the operating conditions and working limits given in the Confirmation of Order are also passed on in full. These Operating Instructions do not take into account all design details and variants nor all the possible

chance occurrences and events which might happen during installation, operation and maintenance.

We retain all copyright in these Operating Instructions; they are intended only for personal use by the owner of the pump or the pump unit. The Operating Instructions contain technical instructions and drawings which may not, as a whole or in part, be reproduced, distributed or used in any unauthorised way for competitive purposes or passed on to others.

1.1 Guarantee

The guarantee is given in accordance with our Conditions of Delivery and/or the confirmation of order.

Repair work during the guarantee period may only be carried out by us, or subject to our written approval. Otherwise the guarantee ceases to apply.

Longer-term guarantees basically only cover correct handling and use of the specified material. The guarantee shall not cover natural wear and tear and all parts subject to wear, such as impellers, shaft sealings, shafts, shaft sleeves, bearings, wear rings etc. or damage caused by transport or improper handling.

In order for the guarantee to apply, it is essential that the pump or pump unit is used in accordance with the operating conditions given on the name plate, confirmation of order and in the data sheet. This applies particularly for the endurance of the materials and smooth running of the pump and shaft sealing.

If one or more aspects of the actual operating conditions are different, we should be asked to confirm in writing that the pump is suitable.

2. Safety Regulations

These Operating Instructions contain important instructions which must be followed when the pump is assembled and commissioned and during operating and maintenance. For this reason, these Operating Instructions must be read by the skilled staff responsible and/or by the operator of the plant before it is installed and commissioned, and they must be left permanently available at the place where the pump or pump unit is in use.

These Operating Instructions do not refer to the General Regulations on Accident Prevention or local safety and/or operating regulations. The operator is responsible for complying with these (if necessary by calling in additional installation staff).

Equally, instructions and safety devices regarding handling and disposal of the pumped media and/or auxiliary media for flushing, lubrication a.s.o., especially if they are explosive, toxic, hot a.s.o., are not part of this operating instruction.

For the competent and prescribed handling only the operator is responsible.

2.1 Marking of References in the Operating Instructions

The safety regulations contained in these Operating Instructions are specially marked with safety signs acc. to nach DIN 4844:



Safety reference!

Non-observance can impair the pump and its function.



EC-Ex Marking

Products intended for use in explosive atmospheres must be marked.



General Symbol for Danger!

Persons can be endangered.



Warning of electric voltage!

Safety instructions attached directly to the pump resp. unit must be followed under any circumstances. Further they must be kept in good readable condition.

In the same way, as these Operating Instructions of the pump, all possibly attached Operating Instructions of accessories (e.g. motor) must be noticed and kept available.

2.2 Dangers of non-observance of the Safety Instructions

Non-observance of the Safety Instructions can lead to loss of any claim for damages.

Further, non-observance can lead to following risks:

- Failure of important functions of the machine or facility.
- Failure of electronic appliances and measuring instruments by magnetic fields.
- Endangering of persons and their personal property by magnetic fields.
- Endangering of persons by electric, mechanic and chemical influences.
- Endangering of environment through leakage of dangerous substances.



On application of the unit in areas endangered to explosion special attention must be paid to sections marked with Ex.

2.3 Safety Instructions for the Operator / Worker

- Depending on the operating conditions, wear and tear, corrosion or age will limit the working life of the pump/pump unit, and its specified characteristics. The operator must ensure that regular inspection and maintenance are carried out so that all parts are replaced in good time, which would otherwise endanger the safe operation of the system. If abnormal operation or any damage is observed, the pump must cease operation immediately.
- If the breakdown or failure of any system or unit could lead to people being hurt or property being damaged, such system or unit must be provided with alarm devices and/or spare modules, and they should be tested regularly to ensure that they function properly.
- If there is any risk of injury from hot or cold machine parts, these parts must be protected against contact by the user, or suitable warning signs must be affixed.
- Contact protection on moving parts (e.g. coupling guards) must not be removed from systems that are in operation.
- If the sound level of a pump or pump unit is above 85 dB(A) an ear protection has to be used when staying near the pump for some time.
- If dangerous media (e.g. explosive, toxic, hot) leak out (e.g. from shaft seals), these must be directed away so that there is no danger to people or the environment. The provisions of the law must be observed.
- Measures should be taken to exclude any danger from electricity (e.g. by complying with the local regulations on electrical equipment). If work is carried out on live electrical components, they

should be unplugged from the mains or the main switch turned off and fuse unscrewed. A motor protection switch is to be provided.

2.4 Safety Instructions for Maintenance, Inspections and Mounting Work

- The operator is responsible that any maintenance, inspections and mounting work is made by authorized competent personnel, which must be informed by having read the Operating Instructions.
- Basically, all work on the pump or pump unit should only be carried out when the pump is stationary and not under pressure. All parts must be allowed to return to ambient temperature. Make sure that no-one can start the motor during such work. It is essential that the procedure for stopping the system described in the Operating Instructions is observed. Pumps or pump systems that carry media that are dangerous to health must be decontaminated before being taken apart. Safety Data Sheets for the various liquids handled. Immediately after finishing work, all safety and protective devices must be replaced or restarted.

2.5 Unauthorized Alteration and Spare Parts Production

Alteration or changes of the machine are permitted after agreement with the manufacturer. Original spare parts and accessory authorized by the manufacturer are serving the safety. The use of other parts can lead to loss of liability for there from resulting consequences.

2.6 Undue Operation

The operating safety of the delivered machine can only be guaranteed by designated use acc. to the following chapters of the Operating Instructions. The limits stated in the data sheet and / or order confirmation must not be exceeded under any circumstances.

2.7 Explosion Protection

On application of units in areas endangered to explosion measures and references in the chapters 2.7.1 to 2.7.6 must be observed, so that explosion protection is guaranteed.


2.7.1 Filling of unit




During operation of the pump the system of the suction and pressure pipe and the pump itself must permanently be filled with the pumped liquid. Thus, no explosive atmosphere can develop and the danger of dry-run is avoided.



If the operator can't guarantee that, according monitoring measures must be provided.

 Equally all seal casings, auxiliary systems of the shaft sealing, as well as heating and cooling systems must be filled carefully.

2.7.2 Marking

 The marking of the pump refers to the pump itself. For coupling and motor resp. further additions a separate Declaration of Conformity, as well as a corresponding marking must be available.


Example of marking at pump:


CE Ex II 2 G c T... .

The marking shows the theoretically applicable range of temperature classes. The different temperatures, permitted acc. to pump design, result as shown in chapter 2.7.5. The same is valid for the drive.

For a whole unit (pump, coupling, motor) with different temperature classes the lowest is valid.

2.7.3 Rotation Control

 Carry out rotation control with separated coupling halves only! Refer to chapter 5.5 and 6.1 as well.


 If danger of explosion is also existing during installation, the rotation control must not be carried out by short start-up of the empty pump, to avoid undue temperature increase in case of contact of rotating and stationary parts.

2.7.4 Operation of pump

The pump must only be started up with fully opened suction side and slightly opened pressure side valve. The start-up against closed non-return valve, however, is possible. Immediately after the start-up the discharge side valve must be adjusted to the operating point.

Refer to chapter 6.2, as well.

Operation with closed valve in suction and / or discharge pipe is not permitted!


 There's a danger, that high surface temperatures are developing at the pump casing after relatively short time, through fast heating of the liquid inside the pump.



Fast pressure increase inside the pump can lead to overload and, thus, the pump can burst.


In chapter 6.4.1 the minimum flow is stated. Longer operating phases with these flows and the named liquids don't cause additional increase of surface temperature at the pump.

Furthermore the references in chapter 6 of these operating Instructions must be taken into consideration.


 On pumps with mech. seals the permitted temperature limits can be exceeded due to dry-run. Dry run not only can occur on insufficiently filled seal casing, but also because of too much gas in the medium.

Operation of the pump out of the permitted operating range can lead to dry-run, as well.


2.7.5 Temperature Limits

 Under normal operating conditions the highest temperatures must be expected at the surface of the pump casing and in the area of the bearings.

The surface temperature occurring at pump casing corresponds with the temperature of the pumped liquid.

 If the pump is heated (e. g. heating jacket), care must be taken, that the temperature classes, prescribed for the plant are observed.


In the area of the bearing bracket free contact from surface to surrounding must be given.

 During operation of the pump it must be secured that an overabundant sedimentation of dust is avoided (regular cleaning), to prevent heating of pump surface over the permitted temperature.

The operator of the plant must secure that the defined operating temperature is observed. The max. allowed temperature of the pumped liquid at suction depends on the particular temperature class.


The following table shows the theoretical temperature limits of the pumped liquid in consideration of the temperature classes acc. to EN 13463-1.

Temperature class acc. EN 13463-1	Temperature limit of pumped liquid
T4 (135°C)	135°C
T3 (200°C)	140°C
T2 (300°C)	140°C
T1 (450°C)	140°C

 The particular allowed operating temperature of the pump is shown in the data sheet and / or the order confirmation resp. the type plate at the pump.

In the area of the bearings the temperature class T4 is guaranteed, provided that the ambient temperature is 40°C and the appliance is duly operated and maintained.

2.7.6 Maintenance

 For a secure and reliable operation it must be secured by regular inspections, that the unit is maintained competently and is kept in good technical condition.

Example: Function of bearings. Operation and application conditions are essentially responsible for their achievable life cycle.

By regular control of the lubricant and the running sound the danger of occurring over temperatures by bearings running hot or defect bearing seals is avoided. Refer to chapter 6.6 and 7.4.

The function of the shaft sealing must be secured by regular control.

If auxiliary systems (e.g. external flushing, cooling, heating) are installed, it must be checked, if monitoring devices are necessary to secure the function.

2.7.7 Electric switches and control device, Instrumentation and accessories



Electric switches and control devices, instrumentation and accessories like e.g. flush tanks, a.s.o., must correspond with the valid safety requirements and regulations for explosion protection.

2.8 Use acc. to Regulations

2.8.1 Speed, Pressure, Temperature



Suitable safety measures must be taken at the plant to ensure that the speed, pressure and temperature of the pump and the shaft sealing do not exceed the limit values given in the data sheet and / or order confirmation. The given admission pressures (system pressures) must also be sufficiently high.

Further, pressure shocks, as can occur on too fast shut down of the facility, must be kept away from the pump (e.g. by non-return valve at pressure side, fly wheel, air tanks). Quick temperature changes must be avoided. They could cause a temperature shock and lead to damage or impair the function of single components.

2.8.2 Permitted Nozzle Loads and Torques



Basically the suction and discharge piping must be designed in such way, that as little forces as possible are effective to the pump. If that is not possible, the values shown in chapter 3.5 must not be exceeded under any circumstances. This is valid for the operation as well as for the standstill of the pump and therefore for all possible pressures and temperatures of the unit.

2.8.3 NPSH



The pumped liquid must have a min. pressure NPSH at the impeller inlet, so that cavitation free work is secured resp. a "break off" of the pump flow is prevented. This condition is fulfilled, when NPSH-value of the system (NPSHA) lies above NPSH-value of the pump (NPSHR) under all operating conditions.

Attention must especially be paid to the NPSH-value on pumping liquids near the vapour pressure. If the NPSH-value of the pump remains under, this can lead from damage of the material due to cavitation to destruction by overheating.

The NPSH-value of the pump (NPSHR) is shown in the curves of every pump type.

2.8.4 Sealing, Flushing, Cooling

Suitable provisions for the regulation and monitoring of sealing, flushing or cooling are to be provided.

When handling dangerous liquids or if temperatures are high, care should be taken to ensure that the pump ceases operating if the sealing, flushing or cooling system fails.

Sealing, flushing and cooling systems must always be operational before the pump is started up. They should not be taken out of operation until the pump has stopped, provided that the nature of the operation allows this at all.

2.8.5 Minimum flows

If the pump is started against a closed pressure line valve, it should be noted that the power taken up by the pump is transmitted to the liquid handled in the form of heat. This can cause the liquid to heat up excessively within a relatively short time, which will then cause damage to the pump's internal fittings. After the pump has reached operating speed, the discharge valve should therefore be opened as quickly as possible. If operating conditions mean that $Q = 0$ is unavoidable, or if hot water is circulating, a free flow non-return valve, or, on smaller systems, a by-pass pipe, should be provided. We should be pleased to advise on determining the minimum flow or designing the by-pass line.

2.8.6 Protection against running dry

The pumps may under no circumstances be operated without containing a pumped medium because the heating can lead to a destruction of pump parts (e.g. the mechanical seal).

2.8.7 Back Flow

In systems where pumps are operating in closed circuits under pressure (gas cushions, steam pressure), the pressure of the gas cushion must not be reduced via the pump, since the back flow speed may be much higher than the operating speed, which would destroy the unit.

3. Description

3.1 Models

Design MP: Horizontal shaft with bearings at both ends, drive end at discharge side (standard), rotation clockwise with suction branch left and discharge branch radially upwards. Grease lubrication.

Optional: Suction branch right or radially upwards, discharge branch left or right, drive-end at suction side (rotation anti-clockwise).

Design MPA: Endsuction type, discharge branch radially upwards. Drive end at discharge side. Thrust bearing at drive side, grease lubrication, medium lubricated slide bearing between first and second stage.

Optional: Discharge branch left or right.

MPAI Design: As the MPA design, but also with an inducer.

The pumps are designed as modular systems and can, therefore, be delivered in many variants (e.g. different materials, shaft sealings, different kinds of lubrication, cooling / heating, a.s.o.).

The permitted application conditions and design details of the delivered pump are shown in the attached data sheet and / or order confirmation.

3.2 Shaft Sealing

Basically there are two kinds of shaft sealing: the packing and the mechanical seal, whereas, there again are many variants of both kinds. At the data sheet and / or the order confirmation the shaft sealing type of your pump is shown.

Instructions for packing a gland can be found in Section 7.3 and instructions for installation and operation of mechanical seals in Section 8 "Disassembly of the Pump and Repair".



Further details about packing and mech. seals, as well as the therewith connected accidental dangers, you can find in chapter 6.6 and in chapters 7.2 and 7.3.



In areas endangered to explosion the use of pumps with packing is forbidden!

3.3 Bearings

Design MP: Bearings at both ends; thrust bearing at discharge side, ball bearing at suction side. Lubrication: Grease lubrication (standard design) with relubricating mechanism (lubricating nipple).

Design MPA, MPAI: Thrust bearing at discharge side, medium lubricated slide bearing between first and second stage at suction side.

Lubrication: Grease lubrication (standard design) with relubricating mechanism (lubricating nipple).

Bearing types

Pump size	Grease lubrication Bearing type	
	Suction side (only MP)	Discharge side (MP, MPA, MPAI)
MP/MPA/MPAI 40.2	6306-C3	3306-C3
MP/MPA/MPAI 40.3	6306-C3	3306-C3
MP/MPA/MPAI 65.1	6307-C3	3307-C3
MP/MPA/MPAI 65.2	6307-C3	3307-C3
MP/MPA/MPAI 100.1	6308-C3	2x 7308 (X-arrangement)
MP/MPA/MPAI 100.2	6308-C3	2x 7308 (X-arrangement)
MP/MPA/MPAI 125.1	6310-C3	2x 7310 (X-arrangement)
MP/MPA/MPAI 125.2	6310-C3	2x 7310 (X-arrangement)

3.4 Approximate Value for Sound Pressure Level

Nominal power P_N in kW	Sound pressure level L_{pA} in dB(A)					
	Pump alone			Pump + Motor		
	2950 min^{-1}	1450 min^{-1}	975 min^{-1}	2950 min^{-1}	1450 min^{-1}	975 min^{-1}
1,5	66,7	65,8	65,3	68,2	66,0	65,5
2,2	68	67	66,5	69,2	67,2	66,7
3	69	68,1	67,6	71,5	68,3	68,5
4	69,9	69	68,5	72,1	69,2	69,2
5,5	71	70	69,5	73,1	70,4	70,1
7,5	71,9	71	70,5	73,7	71,3	71,8
11	73,3	72,3	71,8	75,0	73,2	72,8
15	74,2	73,3	72,8	75,6	74,0	74,0
18,5	74,9	74	73,5	76,1	74,6	76,3
22	75,5	74,5	74	77,1	75,1	76,5
30	76,5	75,6	75,1	77,8	76,1	75,7
37	77,1	76,2	75,7	78,3	76,8	76,4
45	77,9	76,9	76,4	79,4	77,4	76,8
55	78,5	77,5	77	80,1	78,0	77,3
75	79,4	78,5	78	81,4	78,9	78,4
90	80,1	79,1	78,6	81,8	79,4	79,0
110	80,8	79,8		83,4	80,2	
132	81,3	80,4		83,7	80,8	
160	81,9	81		84,1	81,3	
200	82,7			84,6		
250	83,4			86,2		
315	84,1			86,6		
355	84,6			86,9		
400	84,9			87,1		
450	85,4			87,4		
500	85,6			88,3		

Sound pressure level L_{pA} measured in 1 m distance from pump surface acc. to DIN 45635, part 1 and 24. Room and foundation influences are not considered. The tolerance for these values is ± 3 dB(A).

Addition with 60 Hz-operation:

Pump alone: –

Pump with motor: +4 dB(A)

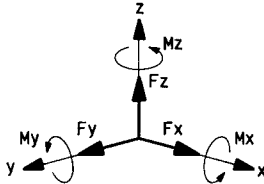
3.5 Permitted Nozzle Loads and Torques at the Pump Nozzles ...

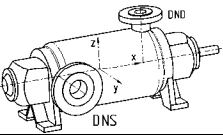
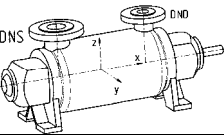
... following the Europump-Recommendation for pump acc. to ISO 5199.

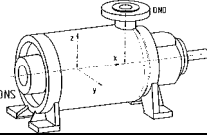
The individual forces and individual torques as well as collective forces and collective torques given in the table may not be exceeded.

$$\sum F = \sqrt{(F_x^2 + F_y^2 + F_z^2)} \quad [N]$$

$$\sum M = \sqrt{(M_x^2 + M_y^2 + M_z^2)} \quad [Nm]$$



MP Design Permissible Forces / Torques on the DNS Suction Joints			
Dimension			
		Horizontal Suction Joints, Left or Right	Vertical Suction Joints
MP40.2 MP40.3 DNS 65	Fx	560	560
	Fy	620	510
	Fz	510	620
	$\sum F$	980	980
	Mx	350	350
	My	200	200
	Mz	260	260
	$\sum M$	480	480
MP65.1 MP65.2 DNS 100	Fx	900	900
	Fy	1010	810
	Fz	810	1010
	$\sum F$	1580	1580
	Mx	440	440
	My	260	260
	Mz	330	330
	$\sum M$	610	610
MP100.1 MP100.2 DNS 125	Fx	1130	1130
	Fy	1250	1010
	Fz	1010	1250
	$\sum F$	1970	1970
	Mx	570	570
	My	350	350
	Mz	440	440
	$\sum M$	800	800
MP125.1 MP125.2 DNS 150	Fx	1350	1350
	Fy	1500	1220
	Fz	1220	1500
	$\sum F$	2360	2360
	Mx	700	700
	My	440	440
	Mz	540	540
	$\sum M$	990	990

MPA, MPAI Design Permissible Forces / Torques on the DNS Suction Joints			
Dimension			
		Vertical Suction Joints	
MPA40.2 MPAI40.2 MPA40.3 MPAI40.3 DNS 65	Fx	620	
	Fy	560	
	Fz	510	
	$\sum F$	980	
	Mx	350	
	My	200	
	Mz	260	
	$\sum M$	480	
MPA65.1 MPAI65.1 MPA65.2 MPAI65.2 DNS 100	Fx	1010	
	Fy	900	
	Fz	810	
	$\sum F$	1850	
	Mx	440	
	My	260	
	Mz	330	
	$\sum M$	610	
MPA100.1 MPAI100.1 MPA100.2 MPAI100.2 DNS 125	Fx	1250	
	Fy	1130	
	Fz	1010	
	$\sum F$	1970	
	Mx	570	
	My	350	
	Mz	440	
	$\sum M$	800	
MPA125.1 MPAI125.1 MPA125.2 MPAI125.2 DNS 150	Fx	1500	
	Fy	1350	
	Fz	1220	
	$\sum F$	2360	
	Mx	700	
	My	440	
	Mz	540	
	$\sum M$	990	

General Instructions:

Direction of the forces and torques:

- Fx ...Force in direction of the x-axis (pump shaft)
- Fy ...Force in direction of the y-axis (perpendicular to the x-axis)
- Fz ...Force in direction of the z-axis (perpendicular to the x-axis)
- Mx ...Torque around the x-axis
- My ...Torque around the y-axis
- Mz ...Torque around the z-axis

MP, MPA, MPAI Design Permissible Forces / Torques on the DND Pressure Joints			
Dimension			
		Vertical Pressure Joints	Horizontal Pressure Joints, Right or Left
MP40.2 MP40.3 MPA40.2 MPAI40.2 MPA40.3 MPAI40.3 DND 40	F _x	330	330
	F _y	300	380
	F _z	380	300
	ΣF	590	590
	M _x	280	280
	M _y	140	140
	M _z	190	190
	ΣM	370	370
MP65.1 MP65.2 MPA65.1 MPAI65.1 MPA65.2 MPAI65.2 DND 65	F _x	560	560
	F _y	510	620
	F _z	620	510
	ΣF	980	980
	M _x	350	350
	M _y	200	200
	M _z	260	260
	ΣM	480	480
MP100.1 MP100.2 MPA100.1 MPAI100.1 MPA100.2 MPAI100.2 DND 100	F _x	900	900
	F _y	810	1010
	F _z	1010	810
	ΣF	1580	1580
	M _x	440	440
	M _y	260	260
	M _z	330	330
	ΣM	610	610
MP125.1 MP125.2 MPA125.1 MPAI125.1 MPA125.2 MPAI125.2 DND 125	F _x	1130	1130
	F _y	1010	1250
	F _z	1250	1010
	ΣF	1970	1970
	M _x	570	570
	M _y	350	350
	M _z	440	440
	ΣM	800	800

The suction and pressure joints must be considered separately.

If not all loads in effect reach the value limits, one of these loads may exceed the usual value limit by 1.4 times. The following requirement must be observed here:

$$((\sum F_{\text{berechnet}} / \sum F_{\text{max.,zul.}})^2 + (\sum M_{\text{berechnet}} / \sum M_{\text{max.,zul.}})^2) \leq 2$$

3.6 Permitted Pressures and Temperatures

In principle, the pressure and temperature values given in the datasheet and/or order confirmation as well as the performance label apply. Values (for pressure and temperature) exceeding these values or falling below them (for temperature) are not permitted. If no pressures and/or temperatures are specified in the data sheet and/or the order confirmation, the following limits apply for supply pressure and room temperature:

Supply pressure (system pressure) = Pressure at the pump intake:

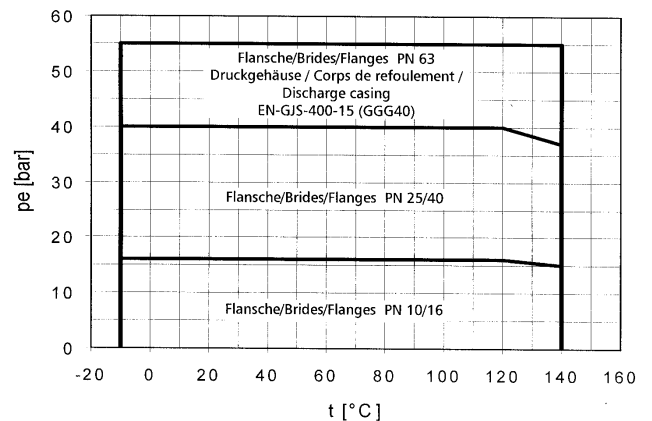
MP design: max. 40 bar

MPA, MPAI design: max. 10 bar

Room temperature: max. 40 °C

Also obey the applicable laws and regulations when using the pump (e.g. DIN 4747 or DIN 4752, Section 4.5).

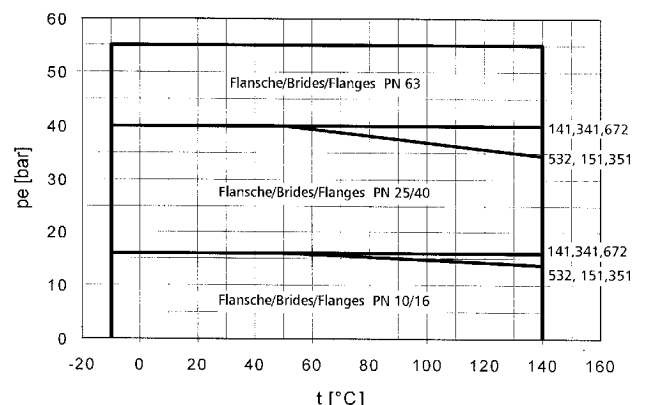
Curve acc. EN 1092



Max. permissible operating pressure (casing and flange) applies for the material codes:

111, 211, 311, 262, 411, 462

Curve acc. EN 1092



Max. permissible operating pressure (casing and flange) applies for the material codes:

532, 141, 341, 151, 351, 672

For the material code used, see the data sheet and/or the order confirmation.


The specified pressure and temperature limits apply for standard materials.

The usage limits for other materials are available upon request.

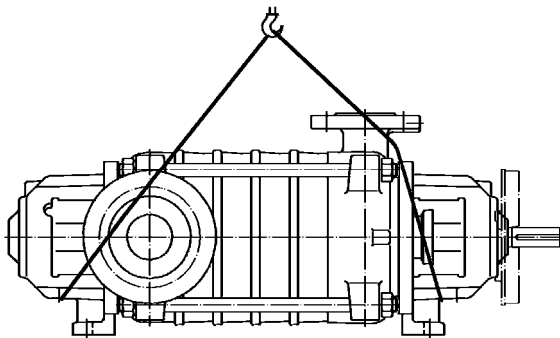
4. Transport, Handling, Storage

4.1 Transport, Handling

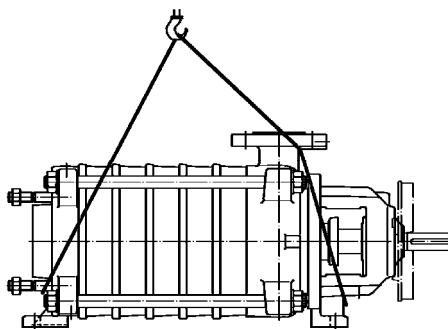
- Check the pump / pump unit immediately upon delivery / receipt of despatch for damage or missing parts.
- The pump / pump unit must be transported carefully and by competent personnel. Avoid serious impacts.
- Keep the pump/pump unit in the same position in which it was supplied from the factory. Take note of the instructions on the packaging.
- The suction and discharge side of the pump must be closed with plugs during transport and storage.

 Dispose of all packing materials in accordance with local regulations.

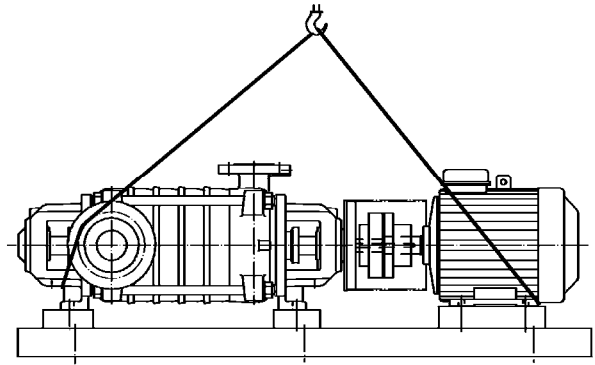
- Lifting devices (e.g. fork-lift truck, crane, crane device, pulleys, sling ropes, etc.) must be sufficiently strong and must only be used by authorized persons.
- Lifting of the pump / unit may only be performed at stable suspension points such as the casing, bearing supports or frame. Figures 1a, 1b and 2 show the correct handling during transport by crane.



pic 1a



pic 1b



pic 2



Do not stand underneath suspended loads. Take note of the general regulations on prevention of accidents. The pump / pump unit must be secured against tipping over and slipping until it has been fixed in its final location.



Sling ropes must not be fixed to ends of shafts or the ring loops of the motor.



Slipping out of the pump / pump unit of the transport lifting device can cause damages to persons and things.

4.2 Storage / Preservation

Pumps or units, which are stored over a longer period before start-up (max. 6 months), must be protected from moisture, vibrations and dirt (e.g. by wrapping in oil paper or plastic). Pumps must basically be stored in a place where they are protected from the weather, e.g. under dry cover. During this time, all suction and discharge branches and all other intakes and outlets must be closed with dummy flanges or plugs.

For longer periods of storage conservation measurements at machined surfaces and packing with moisture protection can be necessary!

Drained pumps

- Turn shaft at least 1x week (do not switch on because of dry running).
- Replace the grease in the bearings after 2 years.
- If the pump jams, it can be loosened with moderate pounding on the coupling in the axial direction. Use a plastic hammer for this.

Preservation

On storing the pump longer than 3 month (depends on order; also see adhesive plate on the pump):

A special preservation has been made ex works. The product used for that must be flushed away from the unit before the first normal operation.

5. Mounting / Installation

5.1 Mounting of Pump / Unit

5.1.1 Mounting of pump on a base frame

The pump and motor (= pump unit) must be provided with a base frame made of steel or cast iron or a fabricated (welded) frame, where this does not exist already or if it is not included in the delivery. This base frame must be placed on a foundation which can withstand all loads that arise during operation (refer to chapter 5.1.2).

When mounting the pump onto the base frame the following must to be noticed:

- The base frame must be solid, so that there won't occur any twists or vibrations during the operation.
- The mounting surfaces of the pump feet and motor on the base frame must be flat (machining is recommended). Bracing of the pump leads to premature breakdown of the pump and to a loss of warranty.
- The drillings for the pump mounting must be in such a way, that safe fastening is guaranteed.
- Between pump and motor shaft an adequate space must be left depending on the used coupling, refer to chapter 5.3.
- Between pump and base frame there must be an adequate shimming, so that in the case of replacement of the pump the equal height between bottom and centerline can be adjusted (recommended vertical adjustment 4 to 6 mm).
- Align pump and motor, refer to chapter 5.3, as well.

5.1.2. Mounting the unit to a foundation

The place, where the pump is mounted must be prepared acc. to the dimensions of the dimensional drawings. The concrete foundations should have sufficient firmness acc. to DIN 1045 or equal standard (min. BN 15), to ensure a secure, functional mounting. The concrete foundation must have set, before the unit is erected. Ist surface must be horizontal and even.



Sufficient space must be provided for maintenance and repair work, especially for replacing the drive motor or the complete pump unit. The motor fan must be able to take in enough cool air, and the intake grille must therefore be at least 10 cm away from any wall, etc.

- For the set of anchor bolts according recesses must be provided. If that is not the case, concrete expansion bolts resp. epoxy capsule anchor bolts can be used.
- When mounting the pump on the foundation it must be adjusted at the discharge nozzle by means of a spirit-level (at discharge nozzle). The permitted deviation is 0,5 mm/m. After inserting the foundation bolts they must be cast in the foundation with concrete. After setting of the grout the coupling alignment must be checked according chapter 5.3.1 and possible

misalignments must be corrected by adjusting foundation frame in the area of the drive motor. The smoothness of the base frame must be 0,5 mm/m before it is filled up resp. fastened. For adjustment levelling shims or levelling screws (optional, not delivered standard wise) can be used. Levelling shims must be inserted next to the foundation anchors and must lie plainly. After that fasten foundation bolts symmetrically but only slightly. Fill in base frame with non shrinking grout.

Notice:

- Avoid air bubbles (e.g. by vibrating).
- Check that the grout has properly set and hardened.
- Take care for the after-treatment of the concrete acc. to DIN 1045.

After setting, tighten the foundation anchor evenly and firmly. Check alignment of coupling acc. to chapter 5.3.1 and re-adjust, if necessary. Further, check that all screws between pump / motor and the base frame fit snugly.

Although the original MP-base frames are designed solidly, the filling in of the adjusted base frame up to the rim is recommended.

- If vibrations are transmitted to the foundation from adjoining components, it must be guarded through adequate vibration damping padding (vibrations from outside can impair the bearing).
- To prevent vibrations being transmitted to adjoining components, the foundation should be laid on a suitable insulating base.



The size of these insulating pads will vary, depending on circumstances, and should therefore be determined by an experienced specialist.

5.2 Connection of Pipings to the Pump



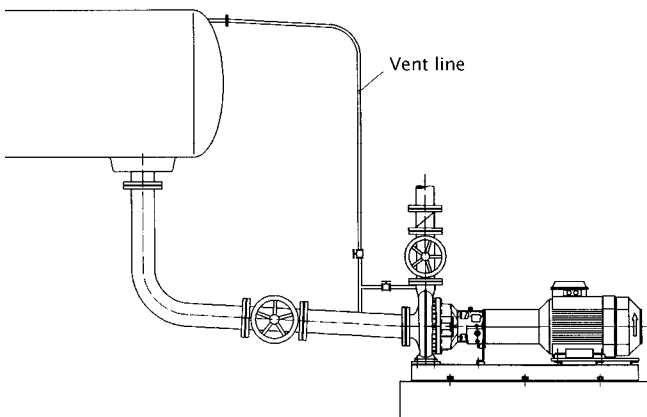
The pump must not be used as fixed point for the piping. The permitted piping loads must not be exceeded, refer to chapter 3.5.

5.2.1 Suction and discharge pipe

- The pipes must be of a size and design that liquid can flow freely into the pump and that the pump functions without problems. Particular attention is to be paid to ensuring that suction pipes are airtight and that the NPSH values are observed. Under suction lift condition laid the suction pipe in the horizontal section towards the pump so that it is slightly inclined upwards so that no air traps occur. Under positive suction head condition install the suction pipe work slightly declined towards the pump. Do not install fittings or elbows right before the suction nozzle.
- If the suction supply is under vacuum and entrained gas may be present in the liquid, it is recommended that a vent line be considered

upstream of the pump suction with return to the suction supply, above the max liquid level.

- An additional flushed piping - discharge branch-vent line - makes it easier to de-aerate the pump before start-up (pic 3).



pic 3

- When laying the pipes, make sure that the pump is accessible for maintenance, installation and disassembly.
- Notice "Permitted Forces on Flanges" (chapter 3.5).
- If expansion joints are used in the pipes, they have to be supported in such a way that the pump is not loaded unduly high because of the pressure in the pipes.
- Before connecting up to pump: remove protective coverings from suction and discharge branches.
- Before starting up, the pipe system, fittings and equipment must be cleaned to remove weld spatter, scale etc. Any pollutants are to be completely removed from pump units that are directly or indirectly connected to drinking water systems before being installed and taken into use.
- To protect the shaft sealing (especially mechanical seals) against foreign impurities, it is recommended that a sieve, 800 micron, is installed in the suction/intake pipe when the motor is being started up.
- If the pipe system is tested with the pump installed, do not exceed the maximum permitted casing pressure of the pump and/or shaft sealing.
- When emptying the pipe after the pressure test, make sure that the pump is treated properly (danger of rust and problems when starting up).
- In the case of pumps with stuffing boxes, replace packing after pressure test (packing may be over-compressed and thus no longer suitable for use).

5.2.2 Additional connections

Any required sealing, flushing or cooling pipe connections must be installed. Please consult the data sheet and/or the confirmation of order to see which pipes, pressures and amounts are necessary. The position and size of connections to the pump are given in the appendix, "Connections".



These connections are essential for the function!

It is recommended that a pipeline is installed to take off any leakage from the shaft seal. For connection, see appendix, "Connections".

5.3 Coupling



Make sure that nobody can start the motor during work on the coupling.

According to Accident Prevention Regulations, the pump unit may only be operated when the coupling guard is mounted.



On operation in zone 1 and 2 a coupling with valid ATEX-certification must be used.

The Operating Instructions of the manufacturer must be followed.

5.3.1 Installation of Coupling

If the pump unit is not completely assembled until it reaches its place of use and no separate operating instructions have been supplied by the manufacturer, you should proceed according to the following points:

- Before starting installation, carefully clean shaft ends and coupling components.
- Pull coupling onto shaft end, do not hit. The coupling may be heated beforehand in an oil bath to approx. 100°C (pulling on is then easier). Remove rubber packs from coupling section first.
- The coupling sections must be flush with the shaft end surfaces.
- Secure coupling hubs against axial sliding using a pin screw.

5.3.2 Alignment of coupling

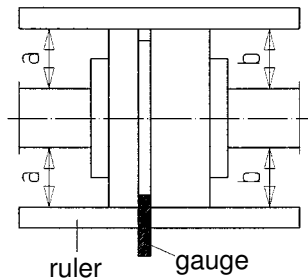


The alignment of the coupling must be carried out with the utmost care and attention, so that the unit will operate without failure. If you do not pay attention to this hint you will lose your warranty!

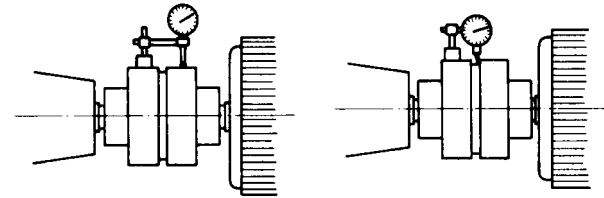


After mounting onto the foundation and the connection of the pipings the coupling must be adjusted again, even, if the unit was delivered completely mounted on the frame.

- Before starting installation, carefully clean shaft ends and coupling components.
- The unit is properly aligned, when a ruler, which is laid axially over both coupling halves, has the same distance to the particular shaft everywhere on the circumference. Further, both coupling halves must have the same distance to one another on every of the circumference. This must be checked by means of a tracer, gauge or dial gage; refer to pic. 4 and 5.
- The permitted tolerances for your coupling are shown in the operating instructions of the coupling. For the exact characterization of your coupling refer to data sheet and / or order confirmation.



pic 4 - Alignment of coupling with gauge and ruler



pic 5 - Adjustment using dial gauge



Control alignment of coupling again in operation warm condition and on system pressure (if available) and correct, if necessary. Pay attention to chapter 6 beforehand! It must be possible to turn the unit easily and harmoniously by hand.

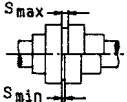
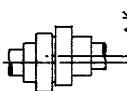
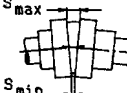


Improper alignment of the unit can lead to damages at coupling and unit!

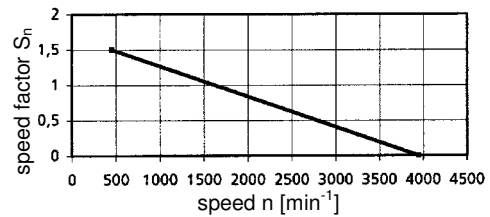


Mount coupling guard after alignment and before start-up.

5.3.3 Permitted displacement for flexible couplings

Coupling size	H80FK	H95FK	H110FK	B125KF	H125FK	B140FK	H140FK	B160FK	H160FK	B180FK	H180FK	B200FK	H200FK	B225FK	H225FK
Outer diameter of coupling [mm]	80	95	110	125	140	160	160	180	180	200	200	225	225	225	225
Axial distance S 	S_{max}		3				6								
S_{min}	S_{min}		2												
Max. axial displacement ΔK_r 	0,1				0,2										
Max. angular displacement $S_{max} \cdot S_{min}$ $\Delta K_w = S_{max} - S_{min}$ 	0,1				0,2				0,3						

The given values ΔK_r and ΔK_w apply for 1500 min^{-1} .
For all other speeds the following applies:
 $\Delta K_w \cdot S_n$ bzw. $\Delta K_r \cdot S_n$



5.3.4 Coupling Guard

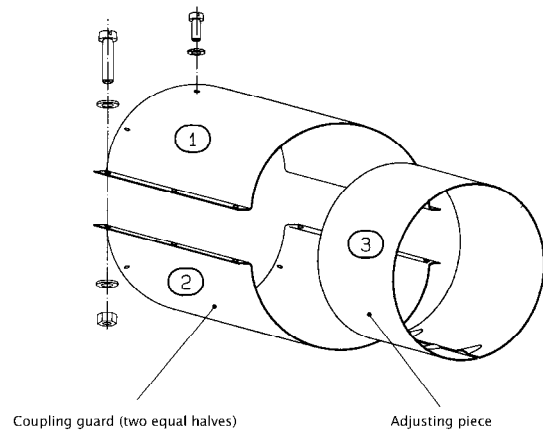


Acc. to accident prevention regulations the pump must only be operated with coupling guard.

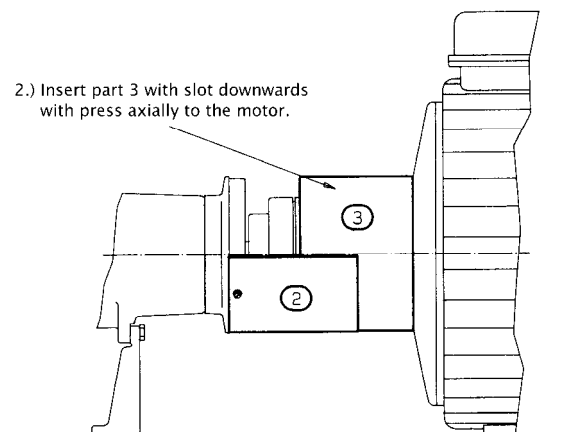
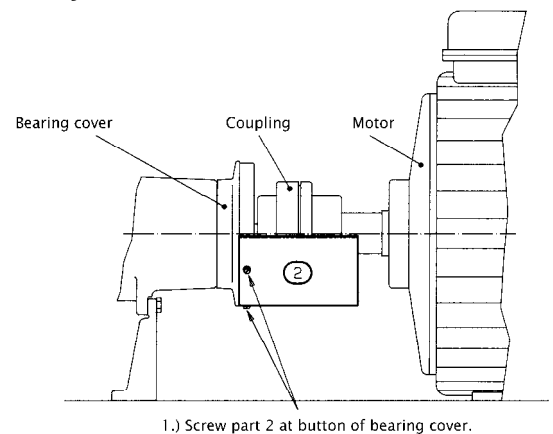


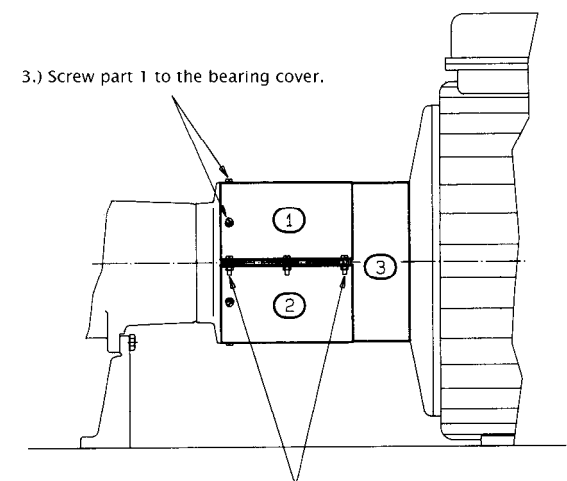
Care has to be taken, that the used coupling guard consists of non-sparking material.

Parts:



Assembly:







4.) Screw part 1 and part 2 together, which fixes the adjusting piece.

5.4 Drive


On selecting the motor size care has to be taken, that the requirements acc. to ISO 5199 are fulfilled. **Note the Operating Instructions of the motor manufacturer.**

 On application in zone 1 and 2 a motor with valid Atex-certification must be used.

5.5 Electric Connection

 Electrical connection work may only be carried out by an authorised professional. The rules and regulations valid for electrical technology, especially those concerned with safety measures, must be observed. The regulations of the national power supply companies operating in that area must also be observed.

6. Start-up, Operation, Shut down

 The plant may only be started up by people who are familiar with the local safety regulations and with these Operating Instructions (especially with the safety regulations and safety instructions given here).

Hints for the use as boiler feed pump

Limits for cast iron when used in boiler feed or condensate applications: pH-value $\geq 9,0$ (optimum $\geq 9,3$), short term: pH-value $\geq 8,5$.

The above stated values must be guaranteed at the suction side of the pump in any case.


The water treatment must be in acc. with the specifications for water treatment of boiler feed water in steam plants up to 64 bar.


Air traps in the system must be avoided in any case.


6.1 Initial start-up

Before starting up the pump, check, if the following points were controlled and carried out:

Before starting work, check that the information on the motor name plate is the same as the local mains network. The power supply cable of the coupled drive motor must be connected up in accordance with the wiring diagram produced by the motor manufacturer. A protective motor switch must be provided.

 In areas endangered to explosion IEC 60079-14 must additionally be noticed for the electric installation.

 Care must be taken that the base frame (2x M10-thread available for earthing screws) is earthed by means of corresponding measures.

 The direction of rotation must only be checked when the pump is full. Dry running will cause damage to the pump.

5.6 Final Control

Check alignment of coupling acc. to chapter 5.3.1 again. It must be possible to turn the unit easily by hand at the coupling.

- The bearings are already filled with grease and therefore ready for operation.
- Pump and suction pipe must be filled completely with liquid when starting up. Open the screwed plugs "PM1" resp. "M2" when filling the pump. Close them when water is flowing out.
- Turn pump unit once again by hand and check that it moves smoothly and evenly.
- Check that coupling guard is installed and that all safety devices are operational.
- Switch on any sealing, flushing or cooling devices that are provided. See Data Sheet for quantity and pressure.
- Open valve in suction /intake pipe.
- Set the pressure-side slider to approx. 25% of the pump rate for which the system was designed. For pumps with a drive output lower than 30 kW, the slider may also remain closed briefly upon startup.
- Secure, that unit is electrically connected acc. to all regulations and with all safety devices.
- Check direction of rotation by switching on and off briefly. It must be the same as the directional arrow on the bearing frame.

6.2 Switch on drive

- Immediately (max. 10 seconds on 50 Hz resp. max. 7 seconds on 60 Hz currency feed) after reaching normal operating speed open discharge valve adjust the required operating point. The pumping data shown at the type plate resp. in the data sheet and / or the order confirmation must be met. Every change is only permitted after talking with the manufacturer!



Operation with closed valve in the suction and / or discharge piping is not permitted.



On starting-up without back-pressure, the back-pressure must be produced through throttling at the discharge side. After reaching full back-pressure open valve



In order that the shaft sealing can be monitored and maintained unhindered, no protection cover is provided in this area. Therefore special attention is required when pump is working (no long hair, loose clothes, a.s.o.).

- Packing: Packing need leakage for trouble free function (drop wise outlet of pumped medium). Adjust ample leakage in the beginning. Reduce that slowly during the first operating hours by continuously fastening of gland (see position "69" and "M3" in sectional drawing) when pump is running. Assume 60-100 drops / minute as approx. value.
The leakage must flow out liquid in any case (not vaporous).



Packing that run dry will harden and then destroy the shaft sleeve and/or the shaft.

- Mechanical seals: Mech. seals don't need to be maintained and are almost free of leakage.



If pump does not reach attended head or if atypical sounds or vibrations do occur:
Switch off pump (see chapter 6.7) and seek for causes (see chapter 10).

6.3 Restarting

Basically, the same procedure should be followed as for starting up for the first time. However, there is no need to check the direction of rotation and the accessibility of the pump unit.

The pump should only be automatically restarted if it has been made sure that the pump has remained filled whilst stand by.



Be particularly careful not to touch hot machine parts and when working in the unprotected shaft seal area. Remember that automatically controlled systems may switch themselves on suddenly at any time. Suitable warning signs should be affixed.

6.4 Limits of Operation



The operating limits of the pump / unit regarding pressure, temperature, performance and speed are shown in the data sheet and / or order confirmation and must be observed under any circumstances!

- Do not exceed the output given on the motor name plate.
- Avoid sudden changes in temperature (temperature shocks).
- The pump and motor should run evenly and without vibrations; check at least once a week.

6.4.1 Flow min. / max.

If no other data are given in the curves or data sheets, the following is valid:

$$Q_{\min} = 0,1 \times Q_{\text{BEP}} \text{ for short time operation}$$

$$Q_{\min} = 0,3 \times Q_{\text{BEP}} \text{ for continuous operation}$$

$$Q_{\max} = 1,2 \times Q_{\text{BEP}} \text{ for continuous operation *)}$$

$$Q_{\text{BEP}} = \text{Flow in efficiency optimum}$$

$$*) \text{ on condition that } \text{NPSH}_{\text{facility}} > (\text{NPSH}_{\text{pump}} + 0,5 \text{ m})$$

6.4.2 Abrasive Media



On pumping liquids with abrasive components an increased wear at hydraulic and shaft sealing must be expected. The intervals of inspection should be reduced compared to the usual times.

6.4.3 Permitted number of starts

With electric motors, the permitted number of starts is given in the attached motor operating instructions.

If no values for the switching frequency are given in the motor operating manual, the values according to Diagram 7 apply.

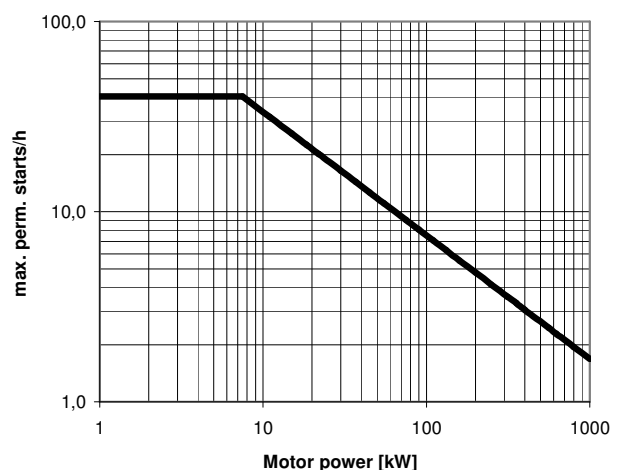


Diagram 7

If two different figures are given, the lower figure is valid.

6.5 Lubrication of Bearings

Grease lubrication



For quality of grease refer to chapter 7.4.
For quantity of grease refer to chapter 7.4.

- The bearings are already filled with lithium based grease at the factory and are thus ready for use.
- The grease provided is suitable for a temperature range from -30° to +90°C (measured at surface of bearing bracket).
- Re-lubrication via the two grease nipples (G).
- Bearing temperature (measured at bearing bracket) should lie max. 50°C over ambient temperature and must not exceed 90°C, control weekly at least. On grease lubrication the bearing temperature can temporarily be higher by 5-10°C after regreasing, till a possible surplus of grease in the bearings is cut.

6.6 Monitoring



In areas endangered to explosion it is recommended to monitor the temperature of the bearings and the vibrations of the bearing bracket.



Regular monitoring and maintenance will extend the life of your pump or pump system.

- Check pump for leaks at least once a week.
- On packing, check quantity of leakage at least once a week (see chapter 6.2 section "Packing").
- Check the regulating and monitoring devices of any sealing, flushing or cooling systems once a week to ensure that they function properly. Outgoing cooling water should be hand warm.
- With double mechanical seals, monitor pressure and flow rate in mechanical seal area; check at least once a week.
- Pumps which are exposed to corrosive chemicals or to wear through abrasion must be inspected periodically for corrosion or wear and tear. The first inspection should be carried out after six months. All further inspection intervals should be determined on the basis of the state of the pump.

6.7 Shutting down

- Close the valve in discharge pipe right before (max. 10 seconds) switching off the motor. This is not necessary if there is a spring-loaded check valve.
- Switch off motor (make sure it runs down quietly).
- Close the valve on suction side.
- Close auxiliary systems. Do not shut down cooling system until pump has cooled down.
- If there is any risk of freezing, empty pump, cooling areas and pipes completely.
- If the pump also remains under operating conditions (pressure and temperature) when stationary, leave all sealing, flushing and cooling systems switched on.

- The shaft sealing must remain sealed if there is a risk of air being sucked in (in the event of supply from vacuum systems or parallel operation with shared suction pipe).

6.8 Storage / longer periods of non-operation

6.8.1 Storage of new pumps

If the putting into operation shall happen a longer period after the delivery, we recommend the following measures for the storage of the pump:

- Store pump at a dry place.
- Rotate pump by hand at least once a month.

6.8.2 Measures for longer putting out of operation

Pump remains installed and in ready for operation:

- Test runs of 5 min. duration must be made in regular intervals. The span between the test runs is depending on the plant. However, it should be made once a week, at least.

6.8.3 Longer periods of non-operation



After long stationary periods, packing may have hardened; these must be replaced before start-up.

When starting up, follow the instructions for starting up for the first time (see chapter 6)!

a) Filled pumps

- Switch stand-by pumps on and immediately off again once a week. Possibly use as main pump.
- If the stand-by pump is at operating pressure and temperature, leave all sealing, flushing and cooling systems switched on.
- Replace the grease in the bearings after 2 years.
- Stuffing box must be adjusted to maintain lubrication of the packing (e.g. do not over tighten).

b) Drained pumps

- Turn shaft at least 1x week (do not switch on because of dry running).
- Replace the grease in the bearings after 2 years.
- If the pump jams, it can be loosened with moderate pounding on the coupling in the axial direction. Use a plastic hammer for this.

7. Servicing, Maintenance

7.1 General remarks



Maintenance and servicing work must only be carried out by trained, experienced staff who are familiar with the contents of these Operating Instructions, or by the Manufacturer's own service staff.



Work should only be carried out on the pump or pump unit when it is not in operation. You must observe chapter 2.

7.2 Mechanical seals



Before opening the pump, it is essential that you note chapter 2 and chapter 8.

If the liquid being handled leaks out at the mechanical seal, it is damaged and must be replaced.

Replace the mechanical seal according to Section 8.6 "Replacing the Shaft Seal".

Mech. seals do not need to be maintained and are completely free of leakage. Pumps with mech. seals must only be operated when completely filled and vented. The mechanical seal chamber must always remain filled with liquid during operation of the pump. If the liquid being handled drips out at the mechanical seal, it is damaged and must be replaced.

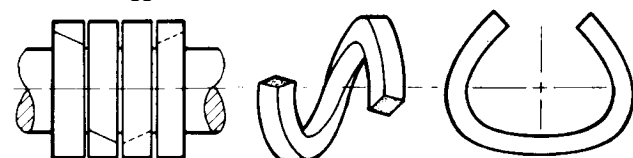
When installing the mechanical seal make sure that the seal casing is absolutely clean, particular care has to be paid to the surface of the seal rings. To facilitate the slip-on of the rotating components of the seal onto the shaft lubricate all moving components and sliding areas by means of water, soapy water or soft soap. Use mineral oils only in case all elastomers are oil resistant. Do not lubricate the surface of the seal rings. Do not force elastomeric elements over sharp edges, if necessary use assembling aiding sleeves.

7.3 Stuffing boxes

Stuffing boxes require constant maintenance, see chapter 6.2 section "Stuffing box". If the leakage rate can no longer be set correctly, the packing is worn out and must be replaced in good time (increased wear on shaft sleeve). Replace the packing gland according to Section 8.7 "Replacing the Shaft Seal".

If employing new packing tight at the beginning the gland only gentle (heavy leakage). Arrange ends of packing rings at opposite positions (refer to drawing). After a while tighten the gland smoothly until leakage is reduced to only a few drops per minute. Avoid dry run.

Method of opening packing rings to fit over shaft
Joints staggered correct incorrect



Because of the risk of accidents, addition of packing to pumps during operation or at operating pressure or temperature is strictly forbidden!

7.4 Lubrication and Change of Lubricant

Re-greasing

- Grease lubricated bearings with the possibility of re-greasing must be re-lubricated all 4000 operating hours, but at least 1x year. Clean lubricating nipples (G) first.

Lubricating grease quality ...

... K2K-20, KP2K-20, etc. as per DIN 51825:

- Lithium soap grease
- NLGI GRADE 2
- Temperature range -20 to 120°C
- Dripping point > 175°C
- Base oil viscosity 70 to 150 mm²/s at 40°C



When changing the grease type, ensure compatibility with the residual grease.

Quantity of re-greasing (approx. value)

Pump Size	Grease Quantity	
	Suction Side	Pressure Side
	[cm ³]	[cm ³]
MP/MPA/MPAI 40.2	7,6	12,1
MP/MPA/MPAI 40.3	7,6	12,1
MP/MPA/MPAI 65.1	9,3	15,5
MP/MPA/MPAI 65.2	9,3	15,5
MP/MPA/MPAI 100.1	11,5	23,0
MP/MPA/MPAI 100.2	11,5	23,0
MP/MPA/MPAI 125.1	16,5	33,0
MP/MPA/MPAI 125.2	16,5	33,0

Pump Size	Relubrication Intervals in Operating Hours				
	3550	2950	2200	1750	1450
	[min ⁻¹]	[min ⁻¹]	[min ⁻¹]	[min ⁻¹]	[min ⁻¹]
MP/MPA/MPAI 40.2	3800	4300	5500	6000	6500
MP/MPA/MPAI 40.3	3800	4300	5500	6000	6500
MP/MPA/MPAI 65.1	3500	4000	5000	5500	6000
MP/MPA/MPAI 65.2	3500	4000	5000	5500	6000
MP/MPA/MPAI 100.1	3300	3800	4500	5000	5500
MP/MPA/MPAI 100.2	3300	3800	4500	5000	5500
MP/MPA/MPAI 125.1	2500	3300	4300	4800	5000
MP/MPA/MPAI 125.2	2500	3300	4300	4800	5000

Relubrication intervals with activation durations of approx. 50% (cycle duration 1 hour).

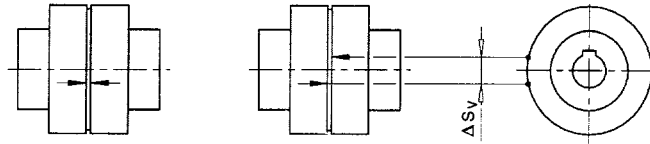
For activation durations of approx. 100%, halve the relubrication intervals.

- If the pump is left non-operational for a longer time, the grease in the bearings should be changed after 2 years.


7.5 Coupling

Check the clearance in the coupling components regularly approx. every 1000 operating hours, but at least 1x year, the radial clearance in the coupling parts must be checked.

For couplings with rubber pads the following applies:
Unless a clearance in the couplings is necessary, the coupling pads may wear out to approximately $\frac{1}{4}$ of their usual thickness, before they have to be changed. To measure the clearance in the coupling place a mark on the O.D. of each coupling hub (see following pic). Then fixing one hub, turn the opposite hub as far as possible. Then measure the distance (ΔS_v) between the marks of the coupling. If this measure exceeds the value given in the chart, the packing must be replaced. They must be replaced in sets.



Size	80	95	110	125	140	160	180	200	225
ΔS_v [mm]	5,0	6,0	7,0	8,0	8,5	8,0	8,0	8,5	9,0

 If wear is heavy, it must be assumed that the motor is not properly aligned with the pump or that the distance between the coupling sections has changed. Replace worn elements and re-install or adjust coupling, as described in chapter 5.3.



8. Dismantling and repair of pump

8.1 General remarks



Repair to the pump or pump system may only be carried out by authorised skilled personnel or by the manufacturer's specialist staff.



When disassembling the pump pay attention to chapter 2 and chapter 4.1.

For mounting and repair you can order specialized personnel if you want.



If dangerous liquids are pumped the appropriate disposal of the handled liquid is necessary before the disassembly of the pump. Pay attention to the fact, that even in drained pumps there are remainders of the handled liquid. If necessary the pump must be flushed or decontaminated. Laws must be observed, otherwise danger to health is existing!

- Before the disassembly the pump has to be secured in such a way, that it can't be started.
- The pump casing must be drained and without pressure.
- All locking devices in the suction- and discharge-pipe must be closed.
- All parts must have taken on the temperature of the environment.



While disassembling the pump use of an open flame (blowlamp, etc.) only, when there is no danger of setting fire, cause an explosion or cause injurious vapours.
Never apply heat to remove the impeller nut. Use of heat may result in severe physical injury and property damage.

7.6 Cleaning of pump



The pump must not be cleaned with pressurised water - water will get into the bearings.



Dirt on the outside of the pump has an adverse effect on transmission of heat. The pump should therefore be cleaned with water at regular intervals (depending on the degree of dirt).



Secure disassembled pumps, units or single parts against tipping over or rolling off.



Use original spare parts only. Pay attention to the right materials and the matching design.

8.2 General



Works, which require shocks (hammer), must only be performed outside the explosive atmosphere or only non-sparking tools must be used.

The schematic sectional drawing with part designations that matches the delivered pump and the design of the shaft seal can be found in the enclosed data sheet and/or the order confirmation and the enclosures.

All work carried out on the pump must be performed in compliance with the rules of machine construction.

- Never use force (never hit too hard with a hammer and always use a suitable base (hard wood or copper)).
- Obey safety instructions, secure components so that they cannot fall over or roll away
- Only use suitable products in a perfect technical condition, (e.g. properties of lubricating agent must be known)
- Always clean parts before installation (dust, rust, particles, old grease etc.).
- All specified values must be complied with (e.g. torque etc.)
- Fitting surfaces and centering should only be lubricated shortly before assembly.

8.3 Tools and Equipment

In normal cases no special tools are required.

The following tools simplify assembly work:

- Warm-up equipment for roller bearings
- Two-armed withdrawing screw
- Sickle spanner for shaft nuts

Cleaning and degreasing agents (e.g. Acetone).

Lubricating agent for roller bearings (see Operating Instructions for appropriate products).

Lubricating agent for assembly work (e.g. beef dripping, Molikote, silicon grease and soap water).



For drinking water pumps only lubricants should be used that are guaranteed to contain no harmful substances.

8.4 Dismantling the Pump

Work may only be carried out while the pump is at a standstill.

The pump must be shut down in accordance with the Operating Instructions. For pumps with automatic pump control appropriate measures must be taken to prevent the pump from starting up accidentally (e.g. cutting off the power supply).

- Empty pump.



In the case of sizes MP, MPA 40 and 65, emptying the pump over the drain holes (D) provided will not completely empty the pump cover. The pump can only be emptied completely by turning it.



The operator's or manufacturer's fitters must be informed about the nature of the pumping medium. In the case of pumps that are operated with hazardous materials, the pumping medium must be disposed of in an environmentally friendly manner before the pump is dismantled. Please note that residues of pumping medium are present even in pumps that have been drained. If necessary the pump must be rinsed or decontaminated.

- Unscrew the pump from the pipe system and base.
- Disconnect pumps with standard couplings by pulling apart the engagement.
- Separate screwed coupling halves by unscrewing the connector screws (see Coupling Operating Instructions).
- Transport to the workplace (see Transport, Handling in the Operating Instructions).

8.5 Replacing Roller Bearings

This section describes how to replace roller bearings. Clean and check condition of all parts that have been removed. In case of doubt, components should be replaced. Wearing parts and seals must always be replaced.

If parts or half-open pumps are to be stored for any length of time, they must be protected from dirt and corrosion.

8.5.1 Intake Side Roller Bearings (K2), (Suction Side) – MP only

See the "Appendix" in the Operating Instructions for relevant sectional drawing.

Dismantling

- Place the pump in a horizontal position, raise the suction casing (3) with wooden blocks so that the feet of the bearing flange (10) are exposed by approx. 10 to 20 mm.
- Move back the splash ring (73)
- Unscrew nuts (M2) and nuts (M5); pull the bearing cap (12) off the bearing flange (10).
- Remove bearing flange (10) (tapping the bearing flange lightly in an axial direction (10) facilitates removal)
- Unscrew shaft nut (50) (sickle spanner). The shaft nut has a securing device to prevent it coming loose.
- If this securing device is no longer adequate, the nut must be replaced.
- Remove roller bearings (K2) with the withdrawing screw.
- Check the surface of the shaft for damage, grind away any furrows.

Assembly

- Clean and lubricate the fitting surfaces between the bearing flange (10) and suction casing (3).
- Preheat new bearing (K2) (max. 80°C) and slide onto the shaft (24).
- Tighten the shaft nut (50) while the bearing is still hot, then turn back a ¼ turn.
- Fill approximately 60% of the space in the roller bearing (K2) with grease (when the bearing has cooled down).
- Fit bearing flange (10) and screw on lightly for the time being.
- Screw the bearing cap (12) to the bearing flange (10).
- Grease the counter contact surface of the splash ring packing washer on the bearing cap (12).
- Bring the splash ring (73) into position (nut in the spacer sleeve (72)).
- Align the bearing surface of the pump feet (place pump on an even surface).
- Tighten nuts (M2) firmly (see Supplementary Sheet for torque)
- Rotate shaft (24) to see that it runs smoothly.

8.5.2 Discharge Side Roller Bearing (K1), (delivery side)

See the "Appendix" in the Operating Instructions for relevant sectional drawing.

Dismantling

- Remove coupling halves with withdrawing screw.
- Place the pump in a horizontal position, raise the suction casing (4) with wooden blocks so that the feet of the bearing flange are exposed by approximately 10 to 20 mm.
- Move back the splash ring (73)
- Unscrew nuts (M2) and nuts (M5), pull the bearing cap (12) off the bearing flange (10).

- Remove bearing flange (10) (lightly tapping the bearing flange (10) facilitates removal).

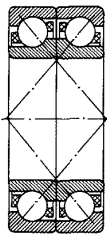


After the bearing flange (10) has been removed the shaft can be moved freely in an axial direction (approx. 3 – 4 mm). Standard shaft seals can absorb this adjustment without their function being impaired. In the case of special shaft seals (e.g. cartridge seals) please follow the Operating Instructions of the seal.

- Unscrew shaft nuts (50) (sickle spanner). The shaft nut has a securing device to prevent it coming loose.
- If this securing device is no longer adequate, the nut must be replaced.
- Remove roller bearings (K1) with the withdrawing screw.
- Check the surface of the shaft for damage, grind away any furrows.

Assembly

- Clean and lubricate the fitting surfaces between the bearing flange (10) and suction casing (3).
- Preheat the new bearing (K1) (max. 80 °C) and slide onto the shaft (24).
(Variants): MP, MPA 40 and 65roller bearing (K1) – double row angular ball bearings (single bearing)
MP, MPA 100 and 125roller bearing (K1) – paired angular ball bearings in X arrangement



Paired angular ball bearings in X arrangement

- Tighten shaft nut (50) while the bearing is still hot.
- Fill approximately 60% of the space in the roller bearing (K1) with grease (when the bearing has cooled down).
- Mount bearing flange (10) and screw on lightly for the time being.
- Screw the bearing cap (12) to the bearing flange (10).
- Grease the counter contact surface of the splash ring packing washer on the bearing cap (12).
- Bring the splash ring into position (73) (groove in the spacer sleeve (72)).
- Align the bearing surface of the pump feet (place pump on an even surface).
- Tighten nuts (M2) firmly (see Supplementary Sheet for torque).
- Rotate shaft (24) to see that it runs smoothly.
- Mount coupling half (maybe preheat to approx. 80 °C).

8.6 Replacement of the slide bearing

This section describes the replacement of the slide bearing in the inner bearing casing (54 – MPA, MPAI design).

If the whole pump is to be dismantled for maintenance work, the pump should be placed in a vertical position (intake pipe facing upwards). A workbench with a hole (approx. 10 mm larger than the shaft) is very helpful in such cases.

MPA 40 and MPA 65 can be placed on the coupling protection adapter (95). Stand MPA 100 and MPA 125 vertically with an additional support.

A hoist or a second person is required for dismantling type MPA 100 and MPA 125 pumps.

See the "Appendix" in the Operating Instructions for relevant sectional drawing.



Secure the pump so that it cannot fall over.



This description does not include dismantling the mechanical seal. Read the instructions for "Replacing the Shaft Seal" before dismantling the pump in order to carry out any necessary preparations in good time.

Dismantling

- Loosen nuts (M1) and remove casing anchor (25).
- Remove suction casing (3) and take out O-ring (OR1).

Model MP:

- Loosen impeller nuts (28), remove washer (29).

Model MPAI (Sizes 40.1 and 40.2)

- Screw off the inducer (101), thereby fix the shaft on the coupling against twist.

Model MPAI (Sizes.1, 65.2, 100.1, 100.2, 125.1 and 125.2)

- Loosen impeller nuts (28), remove washer (29).
- Remove the inducer (101) and take out the key (PF5).
- Dismantle impeller (1) and diffuser (2), take out key (PF1).
- Remove inside bearing housing (54) and bearing sleeve (23).
- Inspect the shaft for surface damage, grind off any remaining furrows.
- Remove the bearing bush (21) from the suction casing (3) (screw off).

Assembly

- Press the new bearing bush (21) into the inner bearing casing (54).
- Clean the fitting surfaces between the inner bearing casing (54) and the suction casing (3) and coat them with lubricant.
- Slide the new bearing sleeve (23) onto the shaft (24).
- Insert the key (PF1), install the diffuser (2) and impeller (1).

Model MP:

- Slide on the impeller (1) with washer (29).
- Tighten the first impeller nut (28), then turn it back approx. ¼ turn, secure with the locknut.

Model MPAI (Baugrößen 40.1 und 40.2)

- Screw on the inducer (101), thereby fix the shaft on the coupling against twist.

Model MPAI (Sizes 65.1, 65.2, 100.1, 100.2, 125.1 and 125.2)

- Insert the key (PF5) and put the inducer (101) off.
- Insert the washer (29).
- Tighten the first nut (28), then turn it back approx. ¼ turn, secure with the locknut.
- Put the suction casing (3) in place, screw in the tie bolts (25) and tighten the nut (M1) (see the appendix for the tightening torque).
- Turn the shaft (24) and check for easy motion.

8.7 Replacement of the shaft sleeve with a packing gland / Replacement of the mechanical seal

This section describes the replacement of the shaft sleeve for designs with a packing gland or the replacement of the mechanical seal.

Clean and check condition of all parts that have been removed. In case of doubt, components should be replaced. Wearing parts (roller bearings) and seals must always be replaced.

If parts or half-open pumps are to be stored for any length of time, they must be protected from dirt and corrosion.

8.7.1 Model with Packing Gland (Code "P")

See the "Appendix" in the Operating Instructions for relevant sectional drawing.

Instructions are valid for shaft seals on the intake side (MP) and discharge side (MP, MPA, MPAI).

Dismantling

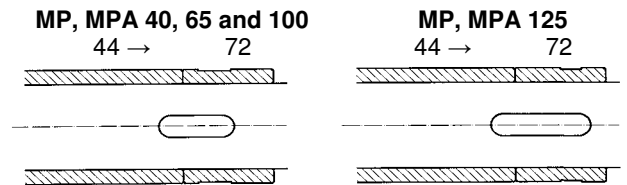
- Dismantle pump on the appropriate side as described in Point 3 (Replacing Roller Bearings)
- Remove bearing cap (12), spacer sleeve (72) and splash ring (73).
- Remove feather key (PF3).
- Unscrew nuts (M3) and remove packing box gland (69).
- Pull out worn packing rings (P).
- Pull off shaft protective sleeve (44), draw out O-Ring (OR4).
- Depending on how worn the bearing surface is (less than 0.5mm diameter) the shaft protective sleeve (44) can be levelled (take finishing cut and polish or grind). If the shaft protective sleeve (44) is very worn it must be replaced.
- Remove rest of packing rings (P) from the packing chamber and clean all other parts. Degrease shaft (24) but do not lubricate yet.

Assembly

- Slide on O-Ring (OR4) and apply lubricant with a brush (e.g. silicon grease).
- Lubricate the shaft protective sleeve (44) in the borehole) so that the O-ring groove remains clean (start approx. 10-15mm inside). Standard O-rings made of EP rubber are not resistant to oil emulsive lubricants and must not come into

contact with them. Once resistance has been ensured (e.g. beef dripping as lubricating agent or oil resistant O-rings) the entire shaft (24) may be lubricated.

- Slide on the shaft protective sleeve (44), insert new packing rings (P) (see Operating Instructions) and fix loosely with the packing box gland (69) (nuts (M3)). When sliding on the shaft protective sleeve (44) take care that the O-ring can slide easily into the groove.
- Insert the feather key (PF3) and slide on the spacer sleeve (72). Pump must be assembled in the following direction.)



- Slide on splash ring (73) and bearing cap (12)
- For further assembly work see Point 3 (Replacing Roller Bearings) "Assembly".

8.7.2 Model with Standard Rotating Mechanical Seal (Code "SA, SB, SC, SD, SE and SF")

See the "Appendix" in the Operating Instructions for relevant sectional drawing.

Instructions are valid for shaft seals on the intake side (MP) and discharge side (MP, MPA, MPAI).

Shaft protective sleeves (44) and the mechanical seals (GLRD) are different. The parts must be marked so that they can be mounted in the same position.

Dismantling

- Dismantle pump on the appropriate side as described in Point 3 (replacing roller bearings)
- Remove bearing cap (12), spacer sleeve (72) and splash ring (73).
- Remove feather key (PF3).
- Remove seal cap (18). Pre-treat fitting surface between the seal cap and the casing with branded penetrating agent.
- Slide off shaft protective sleeve (44U and 44B), pull out O-ring (OR4).
- Press out the countering of the mechanical seal (GLRD) from the seal cap (18) using even pressure. Attention: The seal has very sharp edges if it breaks → danger of injury
- Slide the rotating unit of the mechanical seal off the shaft protective sleeve (44). If the mechanical seal has securing screws these must be loosened earlier.
- Clean and check all parts for wear. Mechanical seals must always be replaced. Repairing mechanical seals is only to be recommended with specialist training.

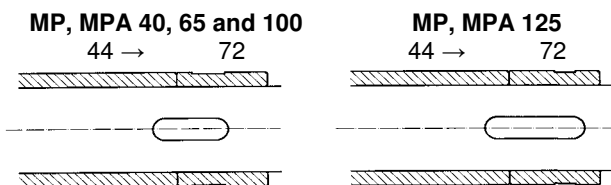
Assembly

Placing the pump in a vertical position is advantageous for assembly).

- Always use a lubricant when mounting mechanical seals. We recommend lubricating the O-ring or

rubber bellows with soap water shortly before it is mounted. Do not use any mineral grease or oil if you are not absolutely certain that the O-ring is resistant to it.

- Insert the countering of the mechanical seal (GLRD) in the seal cap (18). Slide the rotating unit of the mechanical seal (GLRD) onto the shaft protective sleeve (44) and secure (if possible).
- Work on mechanical seals with a rubber bellows must now proceed quickly. This is the only way to guarantee that the rotating mechanical seal element can still be moved during assembly and can be brought into the correct position.
- Slide on the O-ring (OR4) and apply lubricating agent (e.g. silicon grease) using a brush.
- Lubricate the shaft protective sleeve (44) in the borehole so that the O-ring groove remains clean (start approx. 10-15mm inside). Standard O-rings made of EP rubber are not resistant to mineral oil or greases and must not come into contact with them. Once resistance has been ascertained (e.g. beef dripping as lubricant or oil-resistant O-rings) the entire shaft may be lubricated.
- Slide on the shaft protective sleeve (44). When sliding on the shaft protective sleeve take care that the O-ring can slide easily into the groove.
- Insert the O-ring (OR3) in the casing and secure with silicon grease. If possible, the O-ring should lie touching the outer diameter (the O-ring can be enlarged slightly by pulling).
- Carefully mount the sealing cap (18), taking care that the pin is in the correct direction (S4), (groove in bearing flange).
- Insert feather key (PF3) and slide on the spacer sleeve (72). Pump must be assembled in the following direction.



- Slide on splash ring (73) and bearing cap (12)
- For further assembly work see Point 3 (replacing roller bearings) "Assembly".

8.7.3 Model with Cartridge Mechanical Seal (Code "CS, CQ, CD")

See "Appendix" in the Operating Instructions for sectional drawing

Description is valid for shaft seals on the intake (MP) and discharge sides (MP, MPA, MPAI).

Normally the pump is fitted with two identical cartridge mechanical seals.

In certain cases there may, however, be differences. We recommend that parts are always marked before dismantling.

The Appendix in the Operating Instructions contains a detailed description of the cartridge mechanical seal.

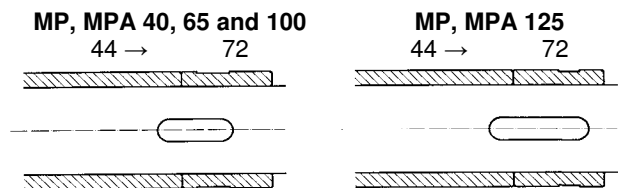
- Fix the rotating part of the cartridge mechanical seal (GLRD) axially with the stationary part. For

this purpose, a fixing clamp (FB) (or similar construction) is provided on the stationary part (see sectional drawing).

- Loosen nuts (M3) and screws (S9), cartridge mechanical seal (GLRD) should move freely
- Dismantle pump as described in Point 3 (replacing roller bearings).
- Remove bearing cap (12), spacer sleeve (72) and splash ring (73).
- Slide off cartridge seal (without shaft protective sleeve) (44).
- Take out feather key (PF3) and slide off shaft protective sleeve (44). Remove O-ring (OR4).
- Clean all parts and check for wear. Mechanical seals must always be replaced. Repairing mechanical seals is only recommended with specialist training. Worn cartridge seal parts can be replaced or repaired by the manufacturer.

Assembly

- Always use a lubricant when mounting the mechanical seal (e.g. silicon grease). Do not use mineral grease or oil if you are not absolutely certain that the O-ring is resistant to it.
- Slide on the O-ring (OR4) and apply lubricant (e.g. Silicon grease) with a brush.
- Lubricate the shaft protective sleeve (44) in the borehole so that the O-ring groove remains clean (start approx. 10-15mm inside). Standard O-rings made of EP rubber are not resistant to mineral oils or greases and must not come into contact with them. Once resistance has been ascertained (e.g. beef dripping as lubricating agent or oil resistant O-rings) the entire shaft may be lubricated (24)
- Slide on the shaft protective sleeve (44). When sliding on the shaft protective sleeve take care that the O-ring can slide easily into the groove.
- Slide on cartridge mechanical seal (GLRD) but do not screw on tightly (M3 and S9 remain loose).
- Insert feather key (PF3) and slide on the spacer sleeve (72). Pump must be assembled in the following direction.



- Slide on splash ring (73) and bearing cap (12)
- For further assembly work see Point 3 (Replacing Roller Bearings) "Assembly".
- Finally tighten the nuts (M3) and then the screws (S9) (must be done in this order). Bring fixing clamp (FB) in its original position.
- Rotate shaft (24) to see that it runs smoothly.

8.8 Dismantling

8.8.1 Model MPA, MPAI (axial intake pipe)

See "Appendix" in Operating Instructions for sectional drawing

If the whole pump is to be dismantled for maintenance work, the pump should be placed in a vertical position (intake pipe facing upwards). A workbench with a hole (approx. 10 mm larger than the shaft) is very helpful in such cases.

MPA 40, MPAI 40, MPA 65 and MPAI 65 can be placed on the coupling protection adapter (95). Stand MPA 100, MPAI 100 and MPA 125, MPAI 125 vertically with an additional support.

A hoist or a second person is required for dismantling type MPA 100, MPAI 100 and MPA 125, MPAI 125 pumps.



Secure the pump so that it cannot fall over.



This description does not include dismantling the mechanical seal. Read the instructions for "Replacing the Shaft Seal" before dismantling the pump in order to carry out any necessary preparations in good time.

- Loosen nuts (M1) and remove casing anchor (25).
- Remove suction casing (3) and take out O-ring (OR1).

Model MP:

- Loosen impeller nuts (28), remove washer (29).

Model MPAI (Sizes 40.1 and 40.2)

- Screw off the inducer (101), thereby fix the shaft on the coupling against twist.

Model MPAI (Sizes 65.1, 65.2, 100.1, 100.2, 125.1 and 125.2)

- Loosen impeller nuts (28), remove washer (29).
- Remove the inducer (101) and take out the key (PF5).
- Dismantle impeller (1) and diffuser (2), take out feather key (PF1). Mark all parts for assembly.
- Remove inside bearing housing (54) and bearing sleeve (23).
- Dismantle pump in stages down to the pump casing
- Turn over the remaining part of the pump (bearing flange (10) faces upward), axially secure shaft (24) (use a support so that it cannot slip.)
- Move back splash ring (73)
- Unscrew nuts (M2) and nuts (M5), pull the bearing cap (12) off the bearing flange (10).
- Remove bearing flange (10) (lightly tapping the bearing flange (10) facilitates removal)
- Unscrew shaft nut (50) (sickle spanner), the shaft nut has a securing device to prevent it from coming loose.
- If this securing device is no longer adequate, the nut must be replaced.
- Remove roller bearing (K1) with withdrawing screw.
- Remove spacer sleeve (72), bearing cap (12) and splash ring (73), pull out feather key (PF3).
- Removing the shaft seal: See "Replacing the Shaft Seal".
- Clean all parts. If the pump is to be reassembled at a later date, carefully store all parts and protect from corrosion.

8.8.2 Model MP (bearings on both sides)

See "Appendix" in Operating Instructions for sectional drawing.

If the whole pump is to be dismantled for maintenance work, the pump should be placed in a vertical position (intake pipe facing upwards). A workbench with a hole (approx. 10 mm larger than the shaft) is very helpful in such cases.

MPA 40 and MP65 can be placed on the coupling protection adapter (95). Stand MPA 100 and MPA 125 vertically with an additional support.

A hoist or a second person is required for dismantling type MPA 100 and MPA 125 pumps.



Secure the pump so that it cannot fall over.



This description does not include dismantling the mechanical seal. Read the instructions for "Replacing the Shaft Seal" before dismantling the pump in order to carry out any necessary preparations in good time.

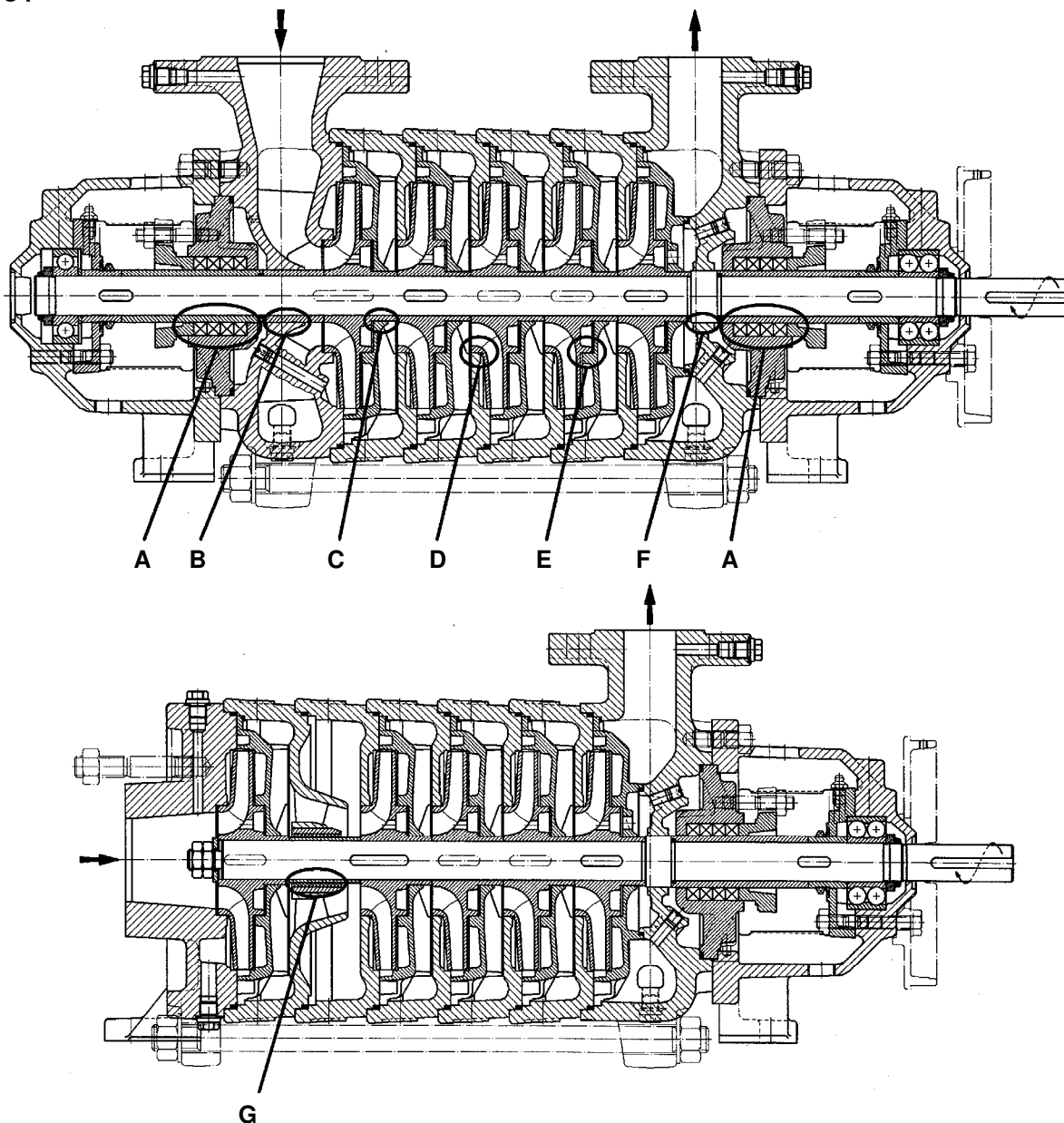
- Move back the splash ring (73).
- Unscrew nuts (M2) and nuts (M5), pull the bearing cap (12) off the bearing flange (10).
- Remove bearing flange (10) (tapping the bearing flange lightly in an axial direction (10) facilitates removal).
- Unscrew shaft nut (50) (sickle spanner). The shaft nut has a securing device to prevent it coming loose. If this securing device is no longer adequate, the nut must be replaced.
- Remove roller bearing (K2) with withdrawing screw.
- Remove spacing washer (SS) and spacer sleeve (72)
- For removal of the shaft seal see: "Replacing Shaft Seal".
- Loosen nuts (M1) and remove casing anchor (25).
- Remove suction casing (3) and take out O-ring (OR1). Remove sleeve (38).
- Remove impeller (1) and diffuser (2), take out feather key. Mark all parts for assembly.
- Remove stage casing (60).
- Dismantle pump in stages down to the pump casing
- Turn over the remaining part of the pump (bearing flange (10) faces upward), axially secure shaft (24) (use a support so that it cannot slip).
- Move back splash ring (73)
- Unscrew nuts (M2) and nuts (M5), pull the bearing cap (12) off the bearing flange (10).
- Remove bearing flange (10) (lightly tapping the bearing flange (10) facilitates removal)
- Unscrew shaft nut (50) (sickle spanner). The shaft nut has a securing device to prevent it from coming loose.
- If this securing device is no longer adequate, the nut must be replaced.
- Remove roller bearing (K1) with withdrawing screw.
- Remove spacer sleeve (72), bearing cap (12) and splash ring (73), pull out feather key (PF3).

- Removing the shaft seal: See "Replacing the Shaft Seal".
- Clean all parts. If the pump is to be reassembled at a later date, carefully store all parts and protect from corrosion.

8.9 Repairs

Clean all parts and check for wear. In case of excessive wear, parts must be replaced. This is a practical opportunity to renew parts such as seals (O-rings), roller bearings and shaft seals.

Wearing parts and dimensions:



Models	Area A					Area B					Area C					Area D					Area E					Area F					Area G																																																																																																																																																																															
	Gap between shaft protective shaft sleeve (44) and packing box gland (69)					Gap between sleeve (38) and suction casing					Gap between impeller hub (1) and peeler (2, 2E)					Gap between impeller (1) and casing (3) and stage casing (60)					Gap between impeller (1) and peeler (2, 2E)					Gap between pump shaft (24) and pressure casing (4)					Gap between bearing sleeve (23) and bearing bush (21)																																																																																																																																																																															
	Code	all models				111, 211, 311, 411, 141, 341, 151, 351, 262, 462	111, 211, 311, 141, 341, 151, 351, 262	111, 211, 311, 411, 141, 341, 151, 351, 262, 462	111, 211, 311, 411, 141, 341, 151, 351, 262, 462	111, 211, 311, 411, 141, 341, 151, 351, 262, 462	111, 211, 311, 411, 141, 341, 151, 351, 262, 462	111, 211, 311, 411, 141, 341, 151, 351, 262, 462	111, 211, 311, 411, 141, 341, 151, 351, 262, 462	111, 211, 311, 411, 141, 341, 151, 351, 262, 462	111, 211, 311, 411, 141, 341, 151, 351, 262, 462	111, 211, 311, 411, 141, 341, 151, 351, 262, 462	111, 211, 311, 411, 141, 341, 151, 351, 262, 462	111, 211, 311, 411, 141, 341, 151, 351, 262, 462	111, 211, 311, 411, 141, 341, 151, 351, 262, 462	111, 211, 311, 411, 141, 341, 151, 351, 262, 462	111, 211, 311, 411, 141, 341, 151, 351, 262, 462	111, 211, 311, 411, 141, 341, 151, 351, 262, 462	111, 211, 311, 411, 141, 341, 151, 351, 262, 462	111, 211, 311, 411, 141, 341, 151, 351, 262, 462	111, 211, 311, 411, 141, 341, 151, 351, 262, 462	111, 211, 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A number of methods can be used for repair work. Depending on the area (A to G) the following methods can be used. In certain cases, it is better to use new parts.

"A": Reworking the outer diameter (levelling), the gap width should not exceed the value stated in the table. The new surface should be as fine as possible (grind). Polish the surface using a grinding belt.

"B": New Part (only use original parts)

"C": Replace impeller (only use original parts)

.) Turn away impeller hub and make an appropriate spacer sleeve (take care with material selection)

It might be necessary to rework the bore in the diffuser

"D": Replace impeller (only use original parts)

.) Rework seal (level), hollow out casing and insert ring (split ring).

"E": Replace impeller (only use original parts)

.) Rework seal (level), hollow out casing and insert ring (split ring).

"F": The precise gap width in this area is only necessary in special cases (shaft seal with discharge line). In normal cases, the gap width is unimportant. The value specified in the table may be exceeded.

"G": New parts (only use original parts)

Bearing play has a direct influence on the smooth running of the pipe. If pump oscillation rises perceptibly this can indicate that the bearing is worn.

When carrying out repairs always replace the bearing bush (23) and bearing sleeve (21).

9. Reassembly

9.1 Preliminary work

Assembling a pump consisting of new parts requires preliminary work. Therefore some of the following points might already have been carried out when the pump is reassembled. Always use the sectional drawing contained in the Appendix of the Operating Instructions.

- Clean all components and remove any rust.
- Suction housing (3) (only for MP): Screw in and secure throttle part (DR).
- A bore with approx. 4mm diameter must be provided to ventilate the sealing chamber. Depending on the location of the lines of the suction casing, the bore must always be in the top position (use one of the three depressions cast)
- Screw in stud bolts (S2)

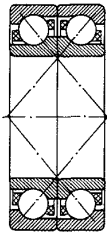
- Pressure casing (4): Code "P" Screw in and secure screw plugs (V2)
- Code "SA,SB etc." Screw in and secure throttle part (DR) (use correct bore)
- Screw in stud bolts (S2)
- Stuffing box casing (19): Hammer in pin (S4)
- Screw in stud bolts (S3)
- Sealing cap (18): Hammer in pin (S4) and pin (S7) (if present)
- Bearing flange (10): Screw in stud bolts (S5)
- Bearing cap (12): Screw in lubricating nipple (G)
- Inside bearing casing (54): Press in bearing bush (21)

9.2 Model MPA, MPAI (axial intake lines)

See "Appendix" in Operating Instructions for sectional drawing.

All parts must be cleaned, free of grease and prepared in accordance with Point 9.1.

- Clamp the shaft in a vertical position (24) (use soft protective wedges), with coupling stub pointing upwards.
 - Other assembly work depends on the type of shaft seal, see Points 4.1 to 4.3, Section Assembly.
 - Attention: In contrast to the description in Points 4.1 to 4.3, the casing of the shaft seal is exposed.
 - Proceed carefully in order to avoid damage to the mechanical seal (GLRD).
 - Preheat bearing (K1) (max. 80°C) and slide onto the shaft (24).
- Variants: MP, MPA, MPAI 40 and 65roller bearing (K1) – double row angular ball bearings (single bearings)
MP, MPA, MPAI 100 and 125roller bearing (K1) – paired angular ball bearings in X arrangement



Paired angular ball bearings in X arrangement

- Tighten shaft nut (50) while the bearing is still hot.
- Fill approx. 60% of the space in the roller bearing (K1) with grease (when the bearing has cooled down)
- Mount bearing flange (10), at the same time insert shaft seal casing (18 and 19).
- Screw bearing cap (12) to bearing flange (10).
- Grease the counter contact surface of the splash ring packing on the bearing cap (12).
- Bring the splash ring (73) into position (groove in the spacer sleeve) (72).
- Lay pressure casing (4) horizontally so that the shaft can be inserted (24) (mounting plate with borehole or assembling trestle)
- Place pre-mounted unit on the pressure casing (4) and tighten nuts (M2) (see Supplementary Sheet for torque)
- Rotate shaft (24) to see that it runs smoothly.
- The pump must be turned around for further assembly work (free shaft pointing upwards vertically)
- Assembly as for dismantling.
- Lubricate shaft (24)
- Check position of the impeller: Insert diffuser (2/E), slide impeller (1) until impact.
- The impeller is in the correct position when the impeller outlet channel lies within the diffuser intake channel
- (avoids impact losses). Corrections can be carried out by adding compensation disks or by turning off

the impeller hub on the rear side. This check must be carried out at every stage.

- If a pump is assembled with new impellers, care must be taken that the first and last stage is always provided with an impeller with the full blade diameter. If only one impeller is available with the full blade diameter it must be used as the first stage.



Please note that assembly work always starts with the final stage.

- Remove impeller and diffuser once more, insert O-ring (OR2), re-insert diffuser (2/E).
- Insert feather key (PF1 or PF2) for the impeller that is to be mounted.
- Mount impeller (1) (as the O-ring (OR2) presses on the diffuser (2/E) the setting will not be correct at first).
- Generously grease O-ring (OR1) with silicon grease and stage casing (60). Do not twist O-ring.
- Place stage casing (60) on level and force down sharply. Hit with a plastic hammer until it impacts.
- Assemble pump down to the inside bearing casing (54).
- Slide on bearing sleeve (23), lubricate bearing surface.
- Mount inside bearing casing (54) with bearing bushing (21) as for stage casing.
- Mount first stage of the pump, secure impeller (1) with washer (29) and nuts (28).
- Tighten first nut (28) securely, then turn back by ¼ turn and secure with counter nut.
- Mount suction casing (3) with O-ring (OR1), pull pump with casing armature (25) and nuts (M1) together slightly.
- Align bearing surface of pump feet (place pump on a flat surface).
- Tighten nuts (M1), see table in Appendix for torque.
- Rotate shaft (24) to see that it runs smoothly.

Model MP:

- Put off the impeller (1) with washer (29).
- Tighten first nut (28) securely, then turn back by ¼ turn and secure with counter nut.

Model MPAI (Sizes 40.1 and 40.2)

- Screw on the inducer (101), thereby fix the shaft on the coupling against twist.

Model MPAI (Sizes 65.1, 65.2, 100.1, 100.2, 125.1 and 125.2)

- Insert the key (PF5) and put the inducer (101) off.
- Insert the washer (29).
- Tighten first nut (28) securely, then turn back by ¼ turn and secure with counter nut.
- Mount suction casing (3) with O-ring (OR1), pull pump with casing armature (25) and nuts (M1) together slightly.
- Align bearing surface of pump feet (place pump on a flat surface).
- Tighten nuts (M1), see table in Appendix for torque.
- Rotate shaft (24) to see that it runs smoothly.

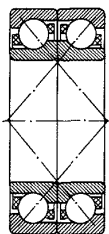
9.3 Model MP (bearings on both sides)

See "Appendix" in Operating Instructions for sectional drawing.

All parts must be cleaned, free of grease and prepared in accordance with Point 9.1.

- Clamp the shaft in a vertical position (24) (use soft protective wedges), with coupling stub pointing upwards.
- Other assembly work depends on the type of shaft seal, see Points 4.1 to 4.3, Section Assembly.
- Attention: In contrast to the description in Points 4.1 to 4.3, the casing of the shaft seal is exposed.
- Proceed carefully in order to avoid damage to the mechanical seal (GLRD).
- Preheat bearing (K1) (max. 80 °C) and slide onto the shaft (24).

Variants: MP, MPA 40 and 65roller bearing (K1) – double row angular ball bearings (single bearings)
MP, MPA 100 and 125roller bearing (K1) – paired angular ball bearings in X arrangement



Paired angular ball bearings in X arrangement

- Tighten shaft nut (50) while the bearing is still hot.
- Fill approx. 60% of the space in the roller bearing (K1) with grease (when the bearing has cooled down)
- Mount bearing flange (10), at the same time insert shaft seal casing (18 and 19).
- Screw bearing cap (12) to bearing flange (10).
- Grease the counter contact surface of the splash ring packing on the bearing cap (12).
- Bring the splash ring (73) into position (groove in the spacer sleeve) (72).
- Lay pressure casing (4) horizontally so that the shaft can be inserted (24) (mounting plate with borehole or assembling trestle)

- Place pre-mounted unit on the pressure casing (4) and tighten nuts (M2) (see Supplementary Sheet for torque)
- Rotate shaft (24) to see that it runs smoothly.
- The pump must be turned around for further assembly work (free shaft pointing upwards vertically)
- Assembly as for dismantling.
- Lubricate shaft (24)
- Check position of the impeller: Insert diffuser (2/E), slide impeller (1) until impact.
- The impeller is in the correct position when the impeller outlet channel lies within the diffuser intake channel
- (avoids impact losses). Corrections can be carried out by adding compensation disks or by turning off the impeller hub on the rear side. This check must be carried out at every stage.
- If a pump is assembled with new impellers, care must be taken that the first and last stage is always provided with an impeller with the full blade diameter. If only one impeller is available with the full blade diameter it must be used as the first stage.



Please note that assembly work always starts with the final stage.

- Remove impeller and diffuser once more, insert O-ring (OR2), re-insert diffuser (2/E).
- Insert feather key (PF1 or PF2) for the impeller that is to be mounted.
- Mount impeller (1) (as the O-ring (OR2) presses on the diffuser (2/E) the setting will not be correct at first.
- Generously grease O-ring (OR1) with silicon grease and stage casing (60). Do not twist O-ring.
- Place stage casing (60) on level and force down sharply. Hit with a plastic hammer until it impacts.
- Assemble pump down to the suction casing (3)
- Slide on sleeve (38), mount suction casing (3) with O-ring (OR1), take care that the lines are in the correct position.
- Further assembly work depends on the type of the shaft seal. See Point 4.1 to 4.3 Section Assembly

"Assemble" bearings according to Point 3 (Replacing Roller Bearings).

10. Spare Parts, Spare Pumps

10.1 Spare Parts

Spare parts should be selected to last for two-years continuous operation. If no other guidelines are applicable, we recommend that you stock the number of parts listed below (in accordance with DIN 24296).



To ensure optimum availability, we recommend that suitable quantities of spare parts are held in stock, especially if these are made from special materials and in the case of mechanical seals, because of the longer delivery times.

	Number of pumps (incl. stand-by pumps)						
	2	3	4	5	6/7	8/9	10/+
Spare Parts	Number of spare parts						
Impeller	i	i	i	2i	2i	3i	30%
Diffuser	i/2	i/2	i/2	i	i	3i/2	15%
Wear ring-casing	2i	2i	2i	4i	4i	6i	30%
Shaft with key and shaft screws/nuts	1	1	2	2	2	3	30%
Bearing (roller bearing)	1	1	2	2	2	3	30%
Shaft sleeve	2	2	2	3	3	4	50%
Packing rings	16	16	24	24	24	32	40%
Joints for pump casing sets	4	6	8	8	9	12	150%
other joints sets	4	6	8	8	9	10	100%
Mechanical seal	2	3	4	5	6	7	90%

i = number of stages

Ordering Spare Parts

When ordering spare parts, please supply the following information:

- Type: _____
- S/N (Order No.): _____
- Part name: _____
- Sectional Drawing _____

All the information is given in the data sheet or the confirmation of order and the relevant sectional drawing.



Store spare parts in dry and clean rooms!

10.2 Stand-by pumps



It is essential that a sufficient number of stand-by pumps are kept ready for use in plants where failure of a pump could endanger human life or cause damage to property or high costs. Regular checks should be carried out to ensure that such pumps are always ready for use (see chapter 6.8).



Store stand-by pumps according to chapter 6.8.

11. Faults - Causes and Solutions

The following notes on causes of faults and how to repair them are intended as an aid to recognising the problem. The manufacturer's Customer Service Department is available to help repair faults that the operator cannot or does not want to repair. If the

operator repairs or changes the pump, the design data on the Confirmation of Order / Data Sheet and chapter 2 of these Operating Instructions should be particularly taken into account. If necessary, the written agreement of the manufacturer must be obtained.

Discharge too low	Discharge stops after a time	Head too low	Head too high	Drive mechanism overloaded	Pump not running quietly	Pump too high	Temperature in pump too high	Temperature in shaft sealing too high	Temperature at the bearing too high	Pump leaking	Leakage rate at shaft sealing too high	Cause	Solution
■												Back-pressure too high	check facility for pollution, open discharge valve reduce resistance in discharge pipe (e.g. clean filter if necessary) use larger impeller (note available motor power)
		■		■				■				Back-pressure too low, discharge too low	throttle discharge valve
			■	■								Speed too high	reduce speed compare speed of motor with specified pump speed (rating plate) when adjusting speed (frequency transformer) check reference value setting
■	■											Speed too low	increase speed (check available motor power) compare speed of motor with specified pump speed (rating plate) when adjusting speed (frequency transformer) check reference value settings
	■	■			■	■						Flow too little	increase min. flow (open discharge valve, bypass)
								■				Flow too big	reduce flow (throttle discharge valve)
			■	■								Impeller diameter too big	use smaller impeller
■		■										Impeller diameter too small	use larger impeller (check available motor power)
■		■			■	■						Pump and/or pipes not completely filled with liquid	fill vent
■	■	■										Pump or suction/intake pipe blocked	clean
■		■										Air pocket in pipeline	vent improve course of pipe
■	■	■			■	■						Suction height too big / NPSH of system too small	increase liquid level and admission pressure reduce resistance in the intake/suction pipe (change course and rated width, open shut-off valves, clean filters)
■	■	■										Air being sucked in	increase liquid level check if suction pipe is vacuum-tight
■	■	■										Air being sucked in through shaft sealing	clean sealing pipe increase sealing pressure replace shaft sealing
■		■										Direction of rotation is wrong	swap over two phases of power supply (to be done by an electrician)
■		■			■			■				Inner components suffering from wear	replace worn parts
■		■		■								Density and/or viscosity of liquid handled is too high	seek assistance
				■							■	Stuffing box not straight	tighten evenly
							■					Stuffing box is fastened too tight resp. shaft sealing is worn	loosen stuffing box replace packing and/or mechanical seal check sealing, flushing and cooling pipes (pressure) avoid dry running
							■				■	Lines and roughness on shaft or shaft sleeve	replace parts
							■				■	Unsuitable packing material	use suitable material (check shaft or shaft sleeve for damage beforehand)
							■				■	Deposits on mechanical seal	clean replace mechanical seal if necessary if necessary provide additional rinsing or quench
					■						■	Impeller out of balance	remove blocks/deposits replace impeller if broken or unevenly worn check shafts to ensure that they are running true
					■			■			■	Coupling not aligned	align pump unit better
					■			■			■	Coupling distance too small	change
				■	■			■	■		■	Forces in pipeline too high (pump unit under strain)	change (support pipes, use compensators, etc.) is foundation plate/frame properly cast in place?
								■				Too much, too little or the wrong type of lubricant	change
				■								Electricity supply not right (2-phase running)	check voltage of all phases check cable connections and fuses
										■		Sealing insufficient	tighten screws replace sealing
					■			■				Bearing damaged	replace check lubricant and bearing space for pollutants (rinse oil area)
								■				Relief fittings insufficient	clean relief openings in impeller replace worn parts (impeller, split rings) adjust in line with the system pressure/intake pressure given on ordering
				■								System-related vibrations (resonance)	seek assistance

12. Motor Operating Instructions



The following instructions must be followed exactly, to guarantee the safety at the installation, at the operation and at the maintenance of the motor. All persons should be directed to the present manual which are performing these tasks. The neglect of the instructions can cause the loss of the guarantee.

Electrical connections



Make sure that the rated voltage corresponds to the supply voltage.



Ground the pump before making any other connection.

We recommend that a high sensitivity differential switch (30 mA) be installed as extra protection against lethal electric shocks in the event of faulty grounding.

Connect the pump to the mains using a multiple-pole switch or other device ensuring multiple-pole disconnection (interruption of all the supply wires) from the mains, with a contact separation of at least 3 mm. Remove the terminal board cover by first removing the screws.

Carry out the connections as indicated on the back of the terminal board cover, and as shown in fig. 3 - 4.

The single-phase version has a built-in overload protection; the three-phase version must be equipped by the user with a magneto-thermal switch or magnetic starter with overload and undervoltage protection, a thermal relay and fuses installed upstream.

The overload relay must be set to the motor current rating. The thermal relay may be set to a current value slightly lower than the full load value when the electric pump is definitely underloaded, but the thermal overload protection must not be set to current values higher than the full load values.

Checking the rotation direction of electric pumps with three-phase motors.

The direction of rotation may be checked before the pump is filled with the liquid to be pumped, provided it is run for very short starts only.



The pump must not be run until it is filled with liquid.

Continuous dry running will damage the mechanical seal beyond repair.

If the direction of rotation is not anti-clockwise when facing the pump from the suction side interchange two supply leads.

Fault finding chart

PROBLEM	PROBABLE CAUSE	POSSIBLE REMEDIES
1. The pump doesn't start	A) No electrical power B) Blown fuses: B1 Because inadequate (blowing current too low) B2 Because the motor or the supply cable are damaged C) Overload protection previously tripped	A) Supply electrical power B1 Replace fuses with adequate ones B2 Repair the motor or replace the cable C) Reset the protection (if it trips again see problem 2)
2. Overload protection trips: – accidentally – systematically	A) Momentary loss of a phase C) Incorrect setting of the motor switch D) The pump's delivery is higher than the rated one E) Dense and viscous liquid	C) Set to rated current D) Close the delivery valve until the capacity returns to the rated value E) Determine the actual power requirements and replace the motor accordingly

Machines with permanently greased bearings

Machines up to frame size 180 are normally fitted with permanently greased bearings of either 2RS or 2Z types.

Machines fitted with grease nipples for the frame size 200 – 355

Lubricate the machine while running with a grease gun on the grease nipple. The grease nipple must be cleaned before lubrication.

The quantity of grease for regreasing or change are shown in the table.

If a grease outlet plug is fitted, remove temporarily when lubricating, or permanently with automatic lubrication.

If the machine is fitted with a lubrication information plate, follow the values given, otherwise use values as follows.

Speed [rpm]	lubrication Interval [h]	time [months]
max. 1800	1.500	6
above 1800	750	3

Speed [rpm]	lubrication Interval [h]	time [months]
max. 1800	10.000	24
above 1800	5.000	12

The maintenance intervals are based on standard ambient conditions.

Life time of roller bearings

approx. 20.000 hours for the frame size 56-180.

FIG. - ABB - KUWA - رسم - EIK. - ŞEKİL - РИС. - RYS. - 3

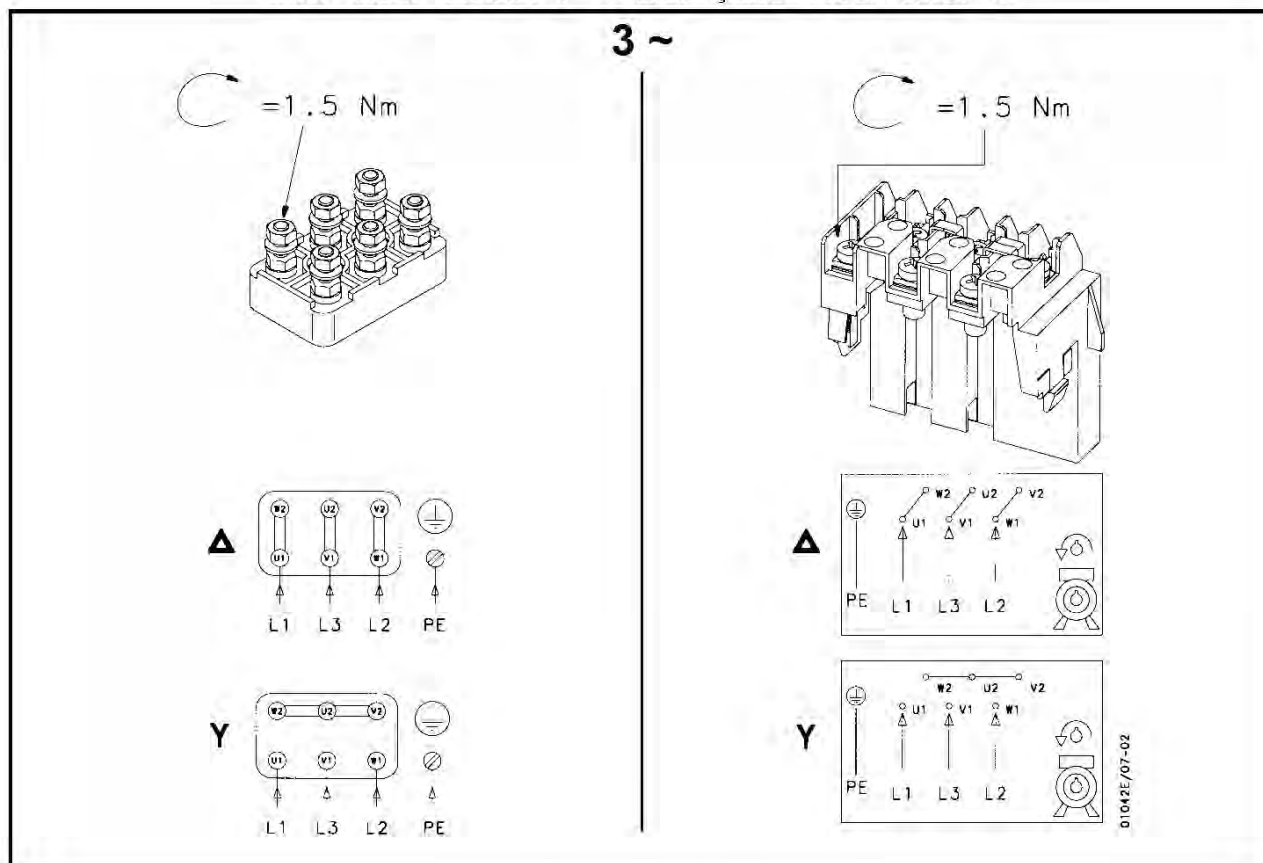
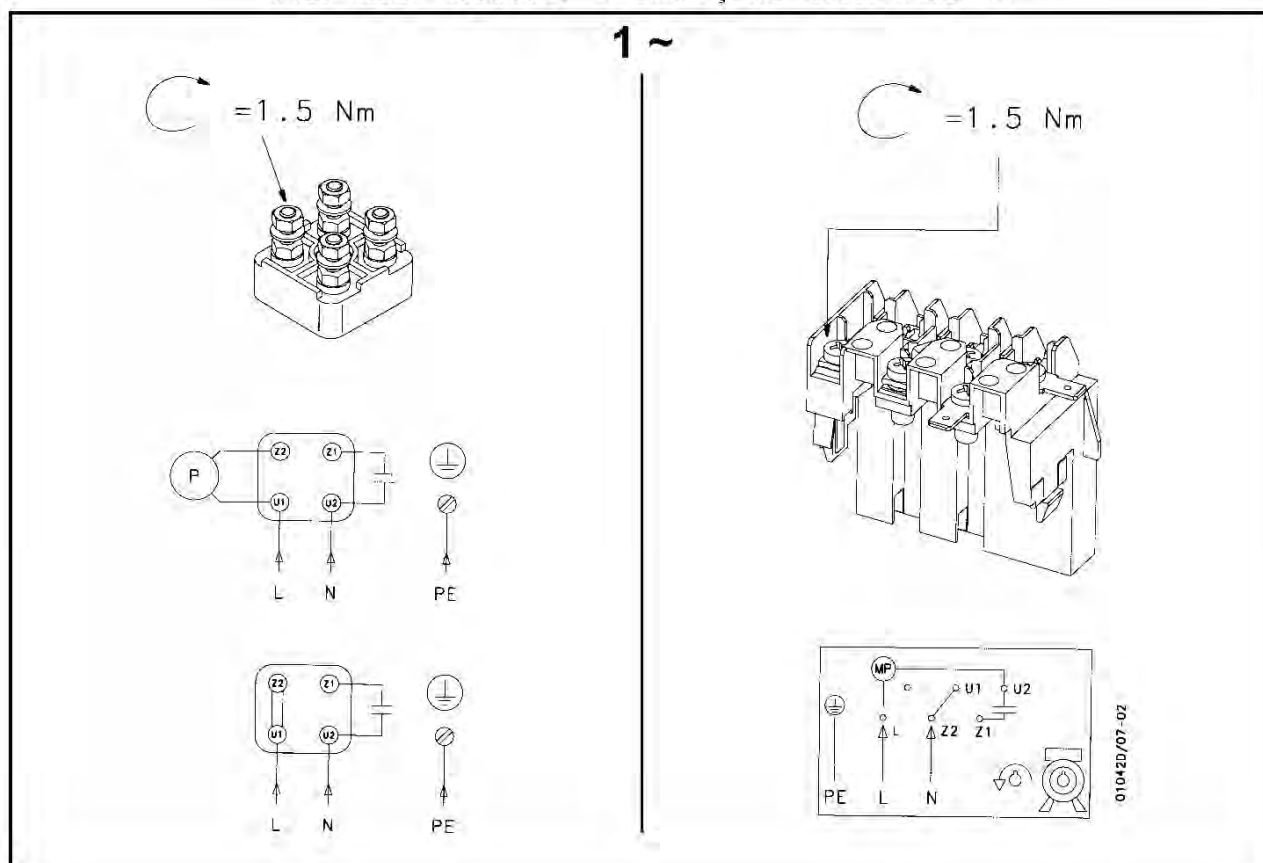


FIG. - ABB - KUWA - رسم - EIK. - ŞEKİL - РИС. - RYS. - 4



Baugrößen: MP40.2, MP40.3, MP65.1, MP65.2, MP100.1, MP100.2, MP125.1, MP125.2

Taille:

Size:

Wellenabdichtung: Packungsstopfbuchse

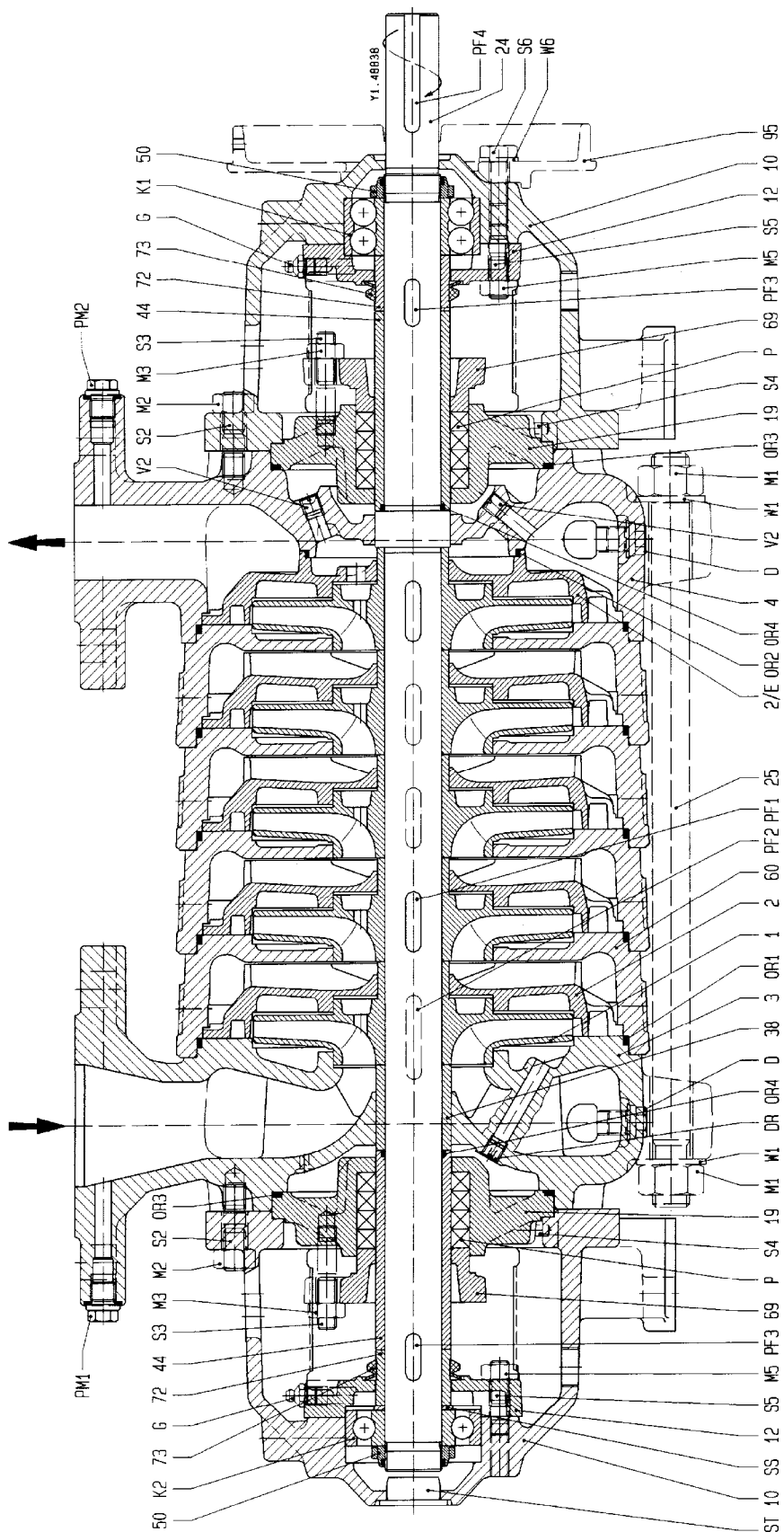
Etanchéité d'arbre: presse-étoupe

Shaft seal: stuffing box

Code...P

Code...P

Code...P



Nr.	Teilebezeichnung	Nomenclature	Index of Parts
1	Lauftrad	roue	impeller
2	Leitrad	diffuseur	diffuser
2/E	Leitrad, letzte Stufe	diffuseur, dernier étage	diffuser, last stage
3	Sauggehäuse	corps d'aspiration	suction casing
4	Druckgehäuse	corps de refoulement	discharge casing
10	Lagerträger	corps de palier	bearing bracket
12	Lagerdeckel	couvercle de palier	bearing cover
19	Stopfbuchsgehäuse	boîtier de presse-étoupe	stuffing box housing
24	Welle	arbre	shaft
25	Gehäuseschraube	tirant d'assemblage	tie bolt
38	Hülse	chemise d'arbre	sleeve
44	Wellenschutzhülse	chemise d'arbre sous garniture	shaft wearing sleeve
50	Lagermutter	écrou de roulement	bearing nut
60	Stufengehäuse	corps d'étage	stage casing
69	Stopfbuchsbrille	fouloir	gland
72	Distanzhülse	entretoise	spacer sleeve
73	Spritzring	défecteur	thrower
95	Kupplungsschutzadapter (nur auf Wunsch)	protetion d'accouplement raccord (sur demande)	Coupling guard adapter (by request)
D	Entleerungsstopfen	bouchon de vidange	drain plug
DR	Drosselstück	organe d'étranglement	throttling element
G	Schmiernippel	raiseur	grease nipple
K1	Radialkugellager	roulement a billes	radial ball bearing
K2	Radialkugellager	roulement a billes	radial ball bearing
M1	Mutter	écrou	nut
M2	Mutter	écrou	nut
M3	Mutter	écrou	nut
M5	Mutter	écrou	nut
OR1	Runddichtring	joint torique	O-ring
OR2	Runddichtring	joint torique	O-ring
OR3	Runddichtring	joint torique	O-ring
OR4	Runddichtring	joint torique	O-ring
P	Stopfbuchspackung	garniture de presse-étoupe	gland packing
PM1	Druckmesser	mesureur de pression	pressure gauge
PM2	Druckmesser	mesureur de pression	pressure gauge
PF1	Paßfeder	clavette	key
PF2	Paßfeder	clavette	key
PF3	Paßfeder	clavette	key
PF4	Paßfeder	clavette	key
S2	Stiftschraube	goujon	stud
S3	Stiftschraube	goujon	stud
S4	Stift	pointe	pin
S5	Stiftschraube	goujon	stud
S6	Sechskantschraube	vis a tete hexagonale	hexagon head screw
S7	Stift	pointe	pin
SS	Abstandscheibe	rondelle-entretoise	disc spacer
V2	Verschlußschraube	bouchon filete	screwed plug
VST	Verschlußstopfen	bouchon	plug
W1	Scheibe	rondelle	washer
W6	Scheibe	rondelle	washer

Nr.	Teilebezeichnung	Nomenclature	Index of Parts
1	Lauftrad	roue	impeller
2	Leitrad	diffuseur	diffuser
2/E	Leitrad, letzte Stufe	diffuseur, dernier étage	diffuser, last stage
3	Sauggehäuse	corps d'aspiration	suction casing
4	Druckgehäuse	corps de refoulement	discharge casing
10	Lagerträger	corps de palier	bearing bracket
12	Lagerdeckel	couvercle de palier	bearing cover
18	Dichtungsdeckel	couvercle d'étanchéité	seal cover
24	Welle	arbre	shaft
25	Hülse	chemise d'arbre	sleeve
44U	Wellenschutzhülse	chemise d'arbre sous garniture	bearing nut
60	Stufengehäuse	corps d'étage	stage casing
72	Distanzhülse	entretoise	spacer sleeve
73	Spritzring	défecteur	thrower
95	Kupplungsschutzadapter (nur auf Wunsch)	protection d'accouplement raccord (sur demande)	Coupling guard adapter (by request)
D	Entleerungsstopfen	bouchon de vidange	drain plug
DR	Drosselstück	organe d'étranglement	throttling element
G	Schmiernippel	graisseur	grease nipple
GLRD1	Gleitringdichtung	garniture mécanique	mechanical seal
K1	Radialkugellager	roulement à billes	radial ball bearing
K2	Radialkugellager	roulement à billes	radial ball bearing
M1	Mutter	écrou	nut
M2	Mutter	écrou	nut
OR1	Runddichtring	joint torique	O-ring
OR2	Runddichtring	joint torique	O-ring
OR3	Runddichtring	joint torique	O-ring
OR4	Runddichtring	joint torique	O-ring
PM1	Druckmesser	mesureur de pression	pressure gauge
PM2	Druckmesser	mesureur de pression	pressure gauge
PF1	Paßfeder	clavette	key
PF2	Paßfeder	clavette	key
PF3	Paßfeder	clavette	key
PF4	Paßfeder	clavette	key
S2	Stiftschraube	goujon	stud
S4	Stift	pointe	pin
S5	Stiftschraube	goujon	stud
S6	Sechskantschraube	vis à tête hexagonale	hexagon head screw
SS	Abstandscheibe	rondelle-entretoise	disc spacer
V1	Verschlußschraube	bouchon fileté	plug
W1	Scheibe	rondelle	washer
W6	Scheibe	rondelle	washer

Baugrößen: MP40.2, MP40.3, MP65.1, MP65.2, MP100.1, MP100.2, MP125.1, MP125.2

Taille:

Size:

Wellenabdichtung: Gleitringdichtung

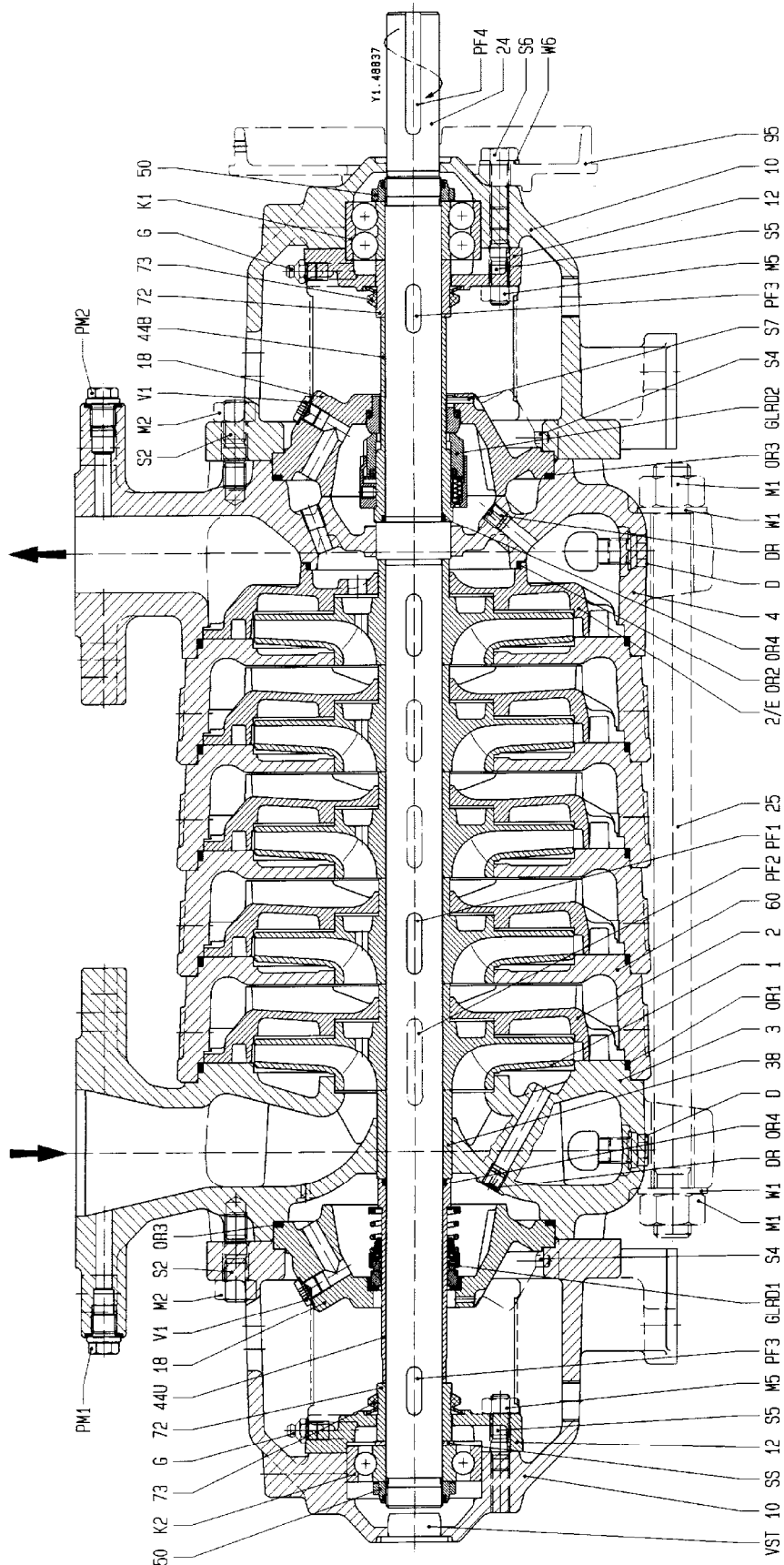
Code...SB, SD

Etanchéité d'arbre: garniture mécanique

Code...SB, SD

Shaft seal: mechanical seal

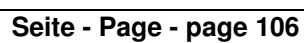
Code...SB, SD



Nr.	Teilebezeichnung	Nomenclature	Index of Parts
1	Lauftrad	roue	impeller
2	Leitrad	diffuseur	diffuser
2/E	Leitrad, letzte Stufe	diffuseur, dernier étage	diffuser, last stage
3	Sauggehäuse	corps d'aspiration	suction casing
4	Druckgehäuse	corps de refoulement	discharge casing
10	Lagerträger	corps de palier	bearing bracket
12	Lagerdeckel	couvercle de palier	bearing cover
18	Dichtungsdeckel	couvercle d'étanchéité	seal cover
24	Welle	arbre	shaft
25	Gehäuseschraube	tirant d'assemblage	tie bolt
38	Hülse	chemise d'arbre	sleeve
44B	Wellenschutzhülse	chemise d'arbre sous garniture	shaft wearing sleeve
44U	Wellenschutzhülse	chemise d'arbre sous garniture	shaft wearing sleeve
50	Lagermutter	écrou de roulement	bearing nut
60	Stufengehäuse	corps d'étage	stage casing
72	Distanzhülse	entretoise	spacer sleeve
73	Spritzring	défecteur	thrower
95	Kupplungsschutzadapter (nur auf Wunsch)	protection d'accouplement raccord (sur demande)	Coupling guard adapter (by request)
D	Entleerungsstopfen	bouchon de vidange	drain plug
DR	Drosselstück	organe d'étranglement	throttling element
G	Schmiernippel	graisseur	grease nipple
GLRD1	Gleitringdichtung	garniture mécanique	mechanical seal
GLRD2	Gleitringdichtung	garniture mécanique	mechanical seal
K1	Radialkugellager	roulement à billes	radial ball bearing
K2	Radialkugellager	roulement à billes	radial ball bearing
M1	Mutter	écrou	nut
M2	Mutter	écrou	nut
M5	Mutter	écrou	nut
OR1	Runddichtring	joint torique	O-ring
OR2	Runddichtring	joint torique	O-ring
OR3	Runddichtring	joint torique	O-ring
OR4	Runddichtring	joint torique	O-ring
PM1	Druckmesser	mesureur de pression	pressure gauge
PM2	Druckmesser	mesureur de pression	pressure gauge
PF1	Paßfeder	clavette	key
PF2	Paßfeder	clavette	key
PF3	Paßfeder	clavette	key
PF4	Paßfeder	clavette	key
S2	Stiftschraube	goujon	stud
S4	Stift	pointe	pin
S5	Stiftschraube	goujon	stud
S6	Sechskantschraube	vis à tête hexagonale	hexagon head screw
S7	Stift	pointe	pin
SS	Abstandscheibe	rondelle-entretoise	disc spacer
V1	Verschlußschraube	bouchon fileté	screwed plug
VST	Verschlußstopfen	bouchon	plug
W1	Scheibe	rondelle	washer
W6	Scheibe	rondelle	washer

Size:

Code...SC, SE, SF
Code...SC, SE, SF
Code...SC, SE, SF



Nr.	Teilebezeichnung	Nomenclature	Index of Parts
1	Lauftrad	roue	impeller
2	Leitrad	diffuseur	diffuser
2/E	Leitrad, letzte Stufe	diffuseur, dernier étage	diffuser, last stage
3	Sauggehäuse	corps d'aspiration	suction casing
4	Druckgehäuse	corps de refoulement	discharge casing
10	Lagerträger	corps de palier	bearing bracket
12	Lagerdeckel	couvercle de palier	bearing cover
18	Dichtungsdeckel	couvercle d'étanchéité	seal cover
24	Welle	arbre	shaft
25	Gehäuseschraube	tirant d'assemblage	tie bolt
38	Hülse	chemise d'arbre	sleeve
44B	Wellenschutzhülse	chemise d'arbre sous garniture	shaft wearing sleeve
50	Lagermutter	écrou de roulement	bearing nut
60	Stufengehäuse	corps d'étage	stage casing
72	Distanzhülse	entretoise	spacer sleeve
73	Spritzring	défecteur	thrower
95	Kupplungsschutzadapter (nur auf Wunsch)	protection d'accouplement raccord (sur demande)	Coupling guard adapter (by request)
D	Entleerungsstopfen	bouchon de vidange	drain plug
DR	Drosselstück	organe d'étranglement	throttling element
G	Schmiernippel	graisseur	grease nipple
GLRD2	Gleitringdichtung	garniture mécanique	mechanical seal
K1	Radialkugellager	roulement à billes	radial ball bearing
K2	Radialkugellager	roulement à billes	radial ball bearing
M1	Mutter	écrou	nut
M2	Mutter	écrou	nut
M5	Mutter	écrou	nut
OR1	Runddichtring	joint torique	O-ring
OR2	Runddichtring	joint torique	O-ring
OR3	Runddichtring	joint torique	O-ring
OR4	Runddichtring	joint torique	O-ring
PM1	Druckmesser	mesureur de pression	pressure gauge
PM2	Druckmesser	mesureur de pression	pressure gauge
PF1	Paßfeder	clavette	key
PF2	Paßfeder	clavette	key
PF3	Paßfeder	clavette	key
PF4	Paßfeder	clavette	key
S2	Stiftschraube	goujon	stud
S4	Stift	pointe	pin
S5	Stiftschraube	goujon	stud
S6	Sechskantschraube	vis à tête hexagonale	hexagon head screw
S7	Stift	pointe	pin
SS	Abstandscheibe	rondelle-entretoise	disc spacer
V1	Verschlußschraube	bouchon fileté	screw plug
VST	Verschlußstopfen	bouchon	plug
W1	Scheibe	rondelle	washer
W6	Scheibe	rondelle	washer

Nr.	Teilebezeichnung	Nomenclature	Index of Parts
1	Lauftrad	roue	impeller
2	Leitrad	diffuseur	diffuser
2/E	Leitrad, letzte Stufe	diffuseur, dernier étage	diffuser, last stage
3	Sauggehäuse	corps d'aspiration	suction casing
4	Druckgehäuse	corps de refoulement	discharge casing
10	Lagerträger	corps de palier	bearing bracket
12	Lagerdeckel	couvercle de palier	bearing cover
18	Dichtungsdeckel	couvercle d'étanchéité	seal cover
18SW	Dichtungsdeckel	couvercle d'étanchéité	seal cover
24	Welle	arbre	shaft
25	Gehäuseschraube	tirant d'assemblage	tie bolt
38	Hülse	chemise d'arbre	sleeve
44SW	Wellenschutzhülse	chemise d'arbre sous garniture	shaft wearing sleeve
44U	Wellenschutzhülse	chemise d'arbre sous garniture	shaft wearing sleeve
50	Lagermutter	écrou de roulement	bearing nut
60	Stufengehäuse	corps d'étage	stage casing
72	Distanzhülse	entretoise	spacer sleeve
73	Spritzring	défecteur	thrower
95	Kupplungsschutzadapter (nur auf Wunsch)	protection d'accouplement raccord (sur demande)	coupling guard adapter (by request)
D	Entleerungsstopfen	bouchon de vidange	drain plug
DR	Drosselstück	organe d'étranglement	throttling element
G	Schmiernippel	graisseur	grease nipple
GLRD1	Gleitringdichtung	garniture mécanique	mechanical seal
GLRD3	Gleitringdichtung	garniture mécanique	mechanical seal
K1	Radialkugellager	roulement à billes	radial ball bearing
K2	Radialkugellager	roulement à billes	radial ball bearing
M1	Mutter	écrou	nut
M2	Mutter	écrou	nut
M5	Mutter	écrou	nut
OR1	Runddichtring	joint torique	O-ring
OR2	Runddichtring	joint torique	O-ring
OR3	Runddichtring	joint torique	O-ring
OR4	Runddichtring	joint torique	O-ring
OR5	Runddichtring	joint torique	O-ring
PM1	Druckmesser	mesureur de pression	pressure gauge
PM2	Druckmesser	mesureur de pression	pressure gauge
PF1	Paßfeder	clavette	key
PF2	Paßfeder	clavette	key
PF3	Paßfeder	clavette	key
PF4	Paßfeder	clavette	key
S2	Stiftschraube	goujon	stud
S4	Stift	pointe	pin
S5	Stiftschraube	goujon	stud
S6	Sechskantschraube	vis à tête hexagonale	hexagon head screw
S7	Stift	pointe	pin
S12	Stift	pointe	pin
S13	Stift	pointe	pin
SS	Abstandscheibe	rondelle-entretoise	disc spacer
V1	Verschlußschraube	bouchon fileté	screw plug
VST	Verschlußstopfen	bouchon	plug
W1	Scheibe	rondelle	washer
W6	Scheibe	rondelle	washer

Baugrößen: MP40.2, MP40.3, MP65.1, MP65.2, MP100.1, MP100.2, MP125.1, MP125.2

Taille:

Size:

Wellenabdichtung: Gleitringdichtung

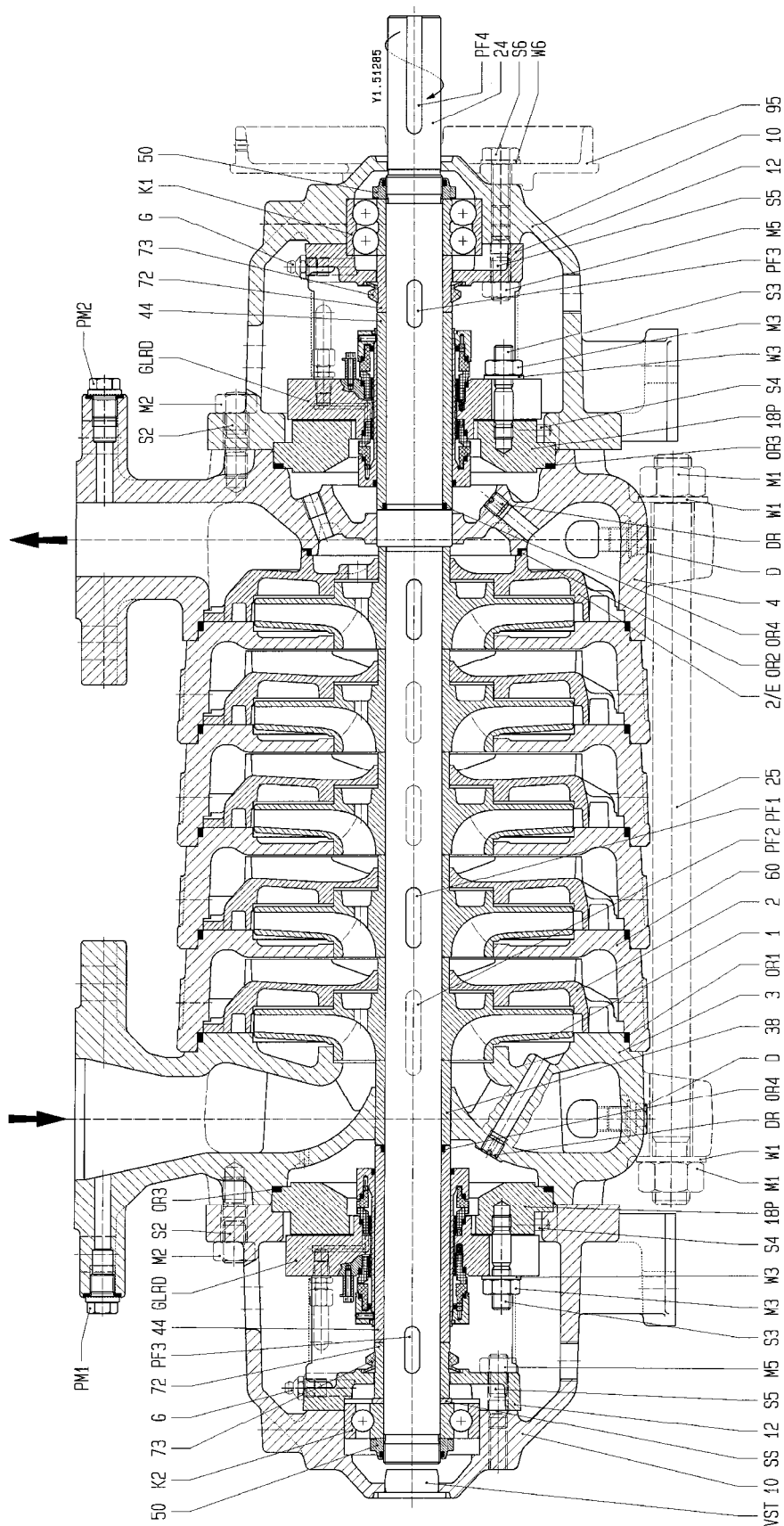
Code...CD

Etanchéité d'arbre: garniture mécanique

Code...CD

Shaft seal: mechanical seal

Code...CD



Nr.	Teilebezeichnung	Nomenclature	Index of Parts
1	Lauftrad	roue	impeller
2	Leitrad	diffuseur	diffuser
2/E	Leitrad, letzte Stufe	diffuseur, dernier étage	diffuser, last stage
3	Sauggehäuse	corps d'aspiration	suction casing
4	Druckgehäuse	corps de refoulement	discharge casing
10	Lagerträger	corps de palier	bearing bracket
12	Lagerdeckel	couvercle de palier	bearing cover
18P	Gehäusedeckel	couvercle de corps	casing cover
24	Welle	arbre	shaft
25	Gehäuseschraube	tirant d'assemblage	tie bolt
38	Hülse	chemise d'arbre	sleeve
44	Wellenschutzhülse	chemise d'arbre sous garniture	shaft wearing sleeve
50	Lagermutter	écrou de roulement	bearing nut
60	Stufengehäuse	corps d'étage	stage casing
72	Distanzhülse	entretoise	spacer sleeve
73	Spritzring	défecteur	thrower
95	Kupplungsschutzadapter (nur auf Wunsch)	protetion d'accouplement raccord (sur demande)	Coupling guard adapter (by request)
D	Entleerungsstopfen	bouchon de vidange	drain plug
DR	Drosselstück	organe d'étranglement	throttling element
G	Schmiernippel	raiseur	grease nipple
GLRD	Gleitringdichtung	garniture mecanique	mechanical seal
K1	Radialkugellager	roulement a billes	radial ball bearing
K2	Radialkugellager	roulement a billes	radial ball bearing
M1	Mutter	écrou	nut
M2	Mutter	écrou	nut
M3	Mutter	écrou	nut
M5	Mutter	écrou	nut
OR1	Runddichtring	joint torique	O-ring
OR2	Runddichtring	joint torique	O-ring
OR3	Runddichtring	joint torique	O-ring
OR4	Runddichtring	joint torique	O-ring
PM1	Druckmesser	mesureur de pression	pressure gauge
PM2	Druckmesser	mesureur de pression	pressure gauge
PF1	Paßfeder	clavette	key
PF2	Paßfeder	clavette	key
PF3	Paßfeder	clavette	key
PF4	Paßfeder	clavette	key
S2	Stiftschraube	goujon	stud
S3	Stiftschraube	goujon	stud
S4	Stift	pointe	pin
S5	Stiftschraube	goujon	stud
S6	Sechskantschraube	vis a tete hexagonale	hexagon head screw
SS	Abstandscheibe	rondelle-entretoise	disc spacer
VST	Verschlußstopfen	bouchon	plug
W1	Scheibe	rondelle	washer
W3	Scheibe	rondelle	washer
W6	Scheibe	rondelle	washer

Baugrößen: MP40.2, MP40.3, MP65.1, MP65.2, MP100.1, MP100.2, MP125.1, MP125.2

Taille:

Size:

Wellenabdichtung: Gleitringdichtung

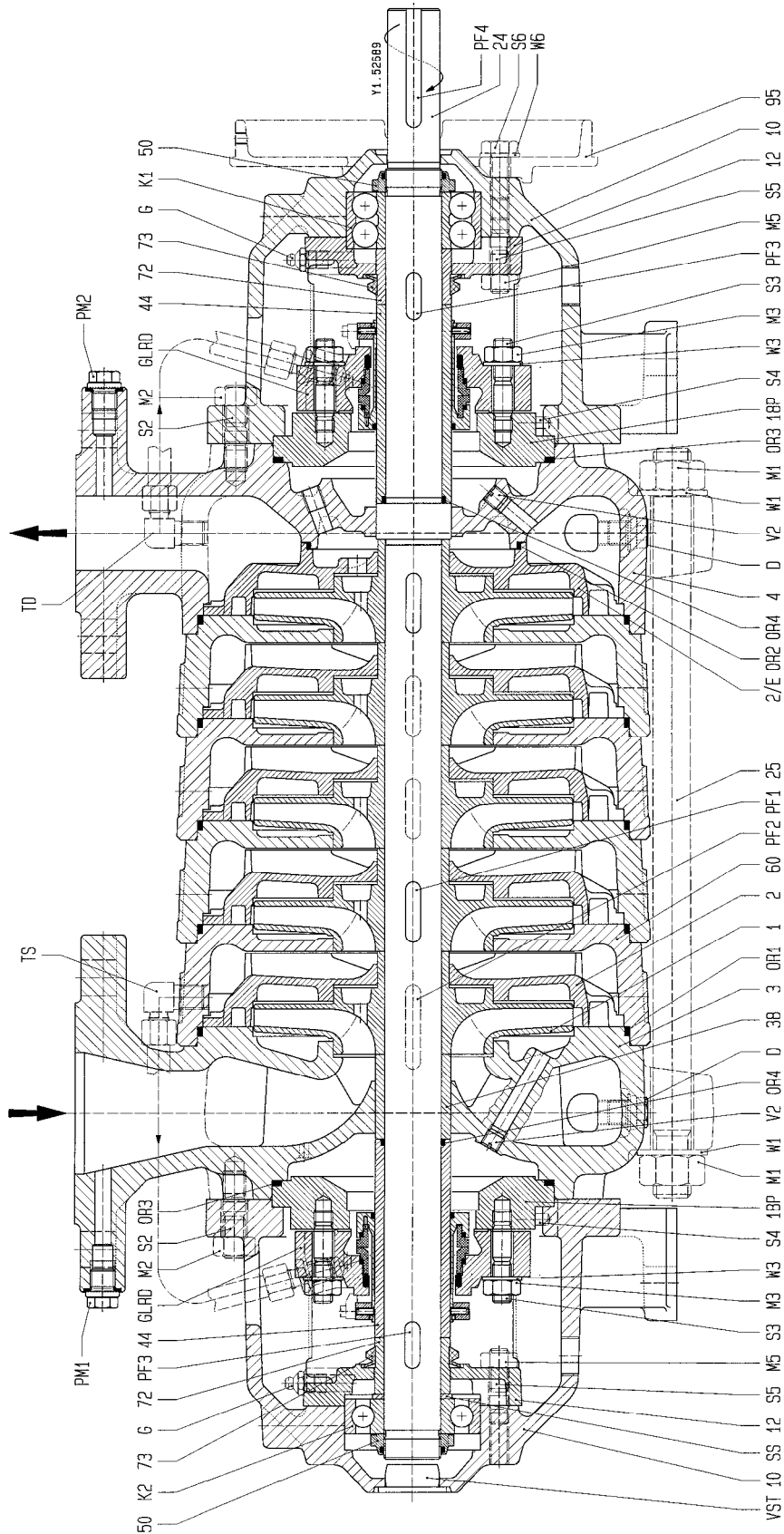
Code...CS

Etanchéité d'arbre: garniture mécanique

Code...CS

Shaft seal: mechanical seal

Code...CS



Nr.	Teilebezeichnung	Nomenclature	Index of Parts
1	Lauftrad	roue	impeller
2	Leitrad	diffuseur	diffuser
2/E	Leitrad, letzte Stufe	diffuseur, dernier étage	diffuser, last stage
3	Sauggehäuse	corps d'aspiration	suction casing
4	Druckgehäuse	corps de refoulement	discharge casing
10	Lagerträger	corps de palier	bearing bracket
12	Lagerdeckel	couvercle de palier	bearing cover
18P	Gehäusedeckel	couvercle de corps	casing cover
24	Welle	arbre	shaft
25	Gehäuseschraube	tirant d'assemblage	tie bolt
38	Hülse	chemise d'arbre	sleeve
44	Wellenschutzhülse	chemise d'arbre sous garniture	shaft wearing sleeve
50	Lagermutter	écrou de roulement	bearing nut
60	Stufengehäuse	corps d'étage	stage casing
72	Distanzhülse	entretoise	spacer sleeve
73	Spritzring	défecteur	thrower
95	Kupplungsschutzadapter (nur auf Wunsch)	protetion d'accouplement raccord (sur demande)	Coupling guard adapter (by request)
D	Entleerungsstopfen	bouchon de vidange	drain plug
G	Schmiernippel	raiseur	grease nipple
GLRD	Gleitringdichtung	garniture mecanique	mechanical seal
K1	Radialkugellager	roulement a billes	radial ball bearing
K2	Radialkugellager	roulement a billes	radial ball bearing
M1	Mutter	écrou	nut
M2	Mutter	écrou	nut
M3	Mutter	écrou	nut
M5	Mutter	écrou	nut
OR1	Runddichtring	joint torique	O-ring
OR2	Runddichtring	joint torique	O-ring
OR3	Runddichtring	joint torique	O-ring
OR4	Runddichtring	joint torique	O-ring
PM1	Druckmesser	mesureur de pression	pressure gauge
PM2	Druckmesser	mesureur de pression	pressure gauge
PF1	Paßfeder	clavette	key
PF2	Paßfeder	clavette	key
PF3	Paßfeder	clavette	key
PF4	Paßfeder	clavette	key
S2	Stiftschraube	goujon	stud
S3	Stiftschraube	goujon	stud
S4	Stift	pointe	pin
S5	Stiftschraube	goujon	stud
S6	Sechskantschraube	vis a tete hexagonale	hexagon head screw
SS	Abstandscheibe	rondelle-entretoise	disc spacer
TS	Rohrleitung	tuyauterie	tubing
TD	Rohrleitung	tuyauterie	tubing
V2	Verschlußschraube	bouchon filete	screwed plug
VST	Verschlußstopfen	bouchon	plug
W1	Scheibe	rondelle	washer
W3	Scheibe	rondelle	washer
W6	Scheibe	rondelle	washer

Baugrößen: MP40.2, MP40.3, MP65.1, MP65.2, MP100.1, MP100.2, MP125.1, MP125.2

Taille:

Size:

Wellenabdichtung: Gleitringdichtung

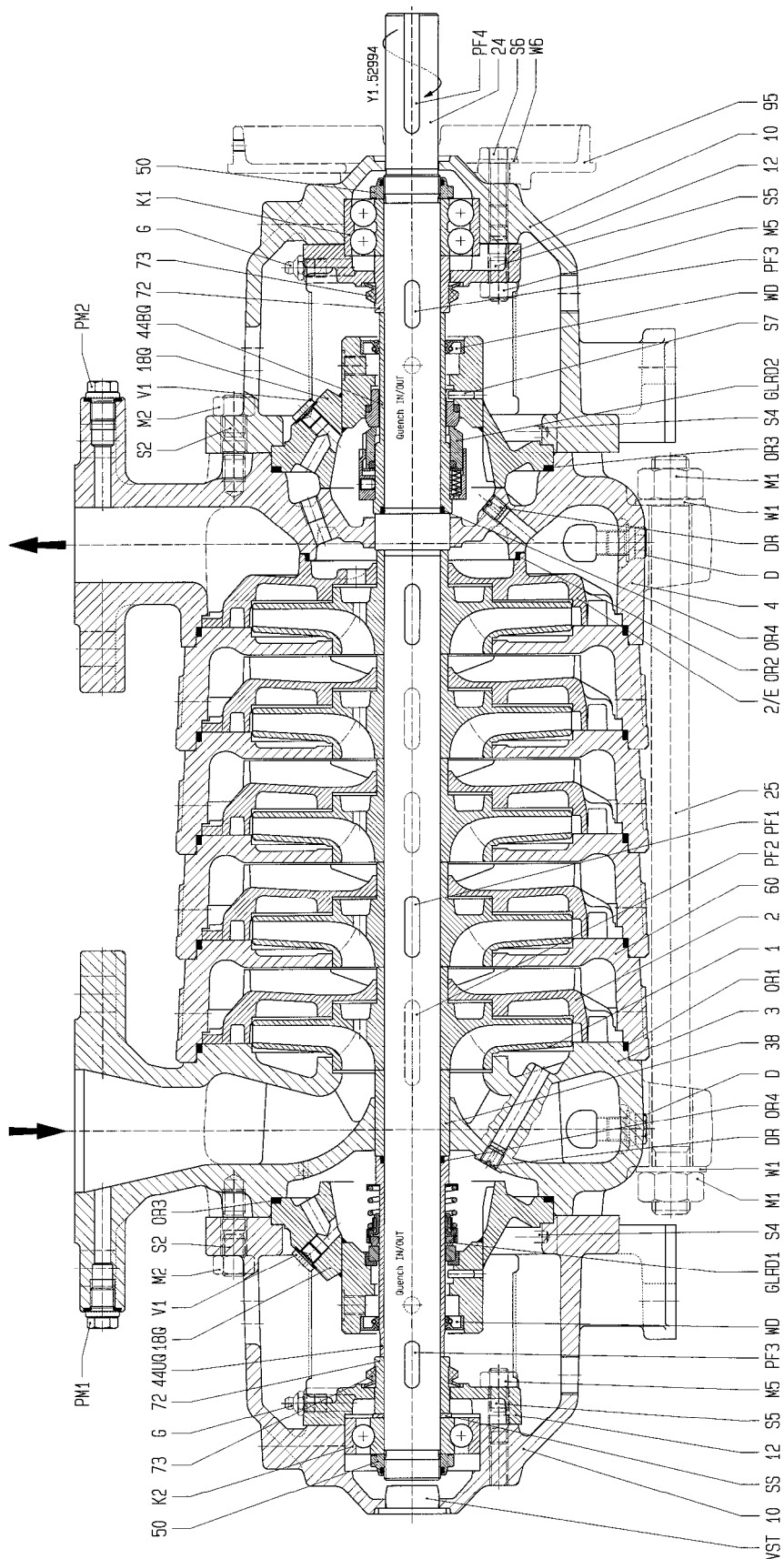
Code...SBQ, SDQ

Etanchéité d'arbre: garniture mécanique

Code...SBQ, SDQ

Shaft seal: mechanical seal

Code...SBQ, SDQ



Nr.	Teilebezeichnung	Nomenclature	Index of Parts
1	Lauftrad	roue	impeller
2	Leitrad	diffuseur	diffuser
2/E	Leitrad, letzte Stufe	diffuseur, dernier étage	diffuser, last stage
3	Sauggehäuse	corps d'aspiration	suction casing
4	Druckgehäuse	corps de refoulement	discharge casing
10	Lagerträger	corps de palier	bearing bracket
12	Lagerdeckel	couvercle de palier	bearing cover
18Q	Dichtungsdeckel	couvercle d'étanchéité	seal cover
24	Welle	arbre	shaft
25	Gehäuseschraube	tirant d'assemblage	tie bolt
38	Hülse	chemise d'arbre	sleeve
44BQ	Wellenschutzhülse	chemise d'arbre sous garniture	shaft wearing sleeve
44UQ	Wellenschutzhülse	chemise d'arbre sous garniture	shaft wearing sleeve
50	Lagermutter	écrou de roulement	bearing nut
60	Stufengehäuse	corps d'étage	stage casing
72	Distanzhülse	entretoise	spacer sleeve
73	Spritzring	défecteur	thrower
95	Kupplungsschutzadapter (nur auf Wunsch)	protection d'accouplement raccord (sur demande)	Coupling guard adapter (by request)
D	Entleerungsstopfen	bouchon de vidange	drain plug
DR	Drosselstück	organe d'étranglement	throttling element
G	Schmiernippel	graisseur	grease nipple
GLRD1	Gleitringdichtung	garniture mécanique	mechanical seal
GLRD2	Gleitringdichtung	garniture mécanique	mechanical seal
K1	Radialkugellager	roulement à billes	radial ball bearing
K2	Radialkugellager	roulement à billes	radial ball bearing
M1	Mutter	écrou	nut
M2	Mutter	écrou	nut
M5	Mutter	écrou	nut
OR1	Runddichtring	joint torique	O-ring
OR2	Runddichtring	joint torique	O-ring
OR3	Runddichtring	joint torique	O-ring
OR4	Runddichtring	joint torique	O-ring
PM1	Druckmesser	mesureur de pression	pressure gauge
PM2	Druckmesser	mesureur de pression	pressure gauge
PF1	Paßfeder	clavette	key
PF2	Paßfeder	clavette	key
PF3	Paßfeder	clavette	key
PF4	Paßfeder	clavette	key
S2	Stiftschraube	goujon	stud
S4	Stift	pointe	pin
S5	Stiftschraube	goujon	stud
S6	Sechskantschraube	vis à tête hexagonale	hexagon head screw
S7	Stift	pointe	pin
SS	Abstandscheibe	rondelle-entretoise	disc spacer
V1	Verschlußschraube	bouchon fileté	screwed plug
VST	Verschlußstopfen	bouchon	plug
WD	Wellendichtring	bague d'étanchéité d'arbre	Shaft seal ring
W1	Scheibe	rondelle	washer
W6	Scheibe	rondelle	washer

Baugrößen: MPA40.2, MPA40.3, MPA65.1, MPA65.2, MPA100.1, MPA100.2, MPA125.1, MPA125.2

Taille:

Size:

Wellenabdichtung: Packungsstopfbuchse

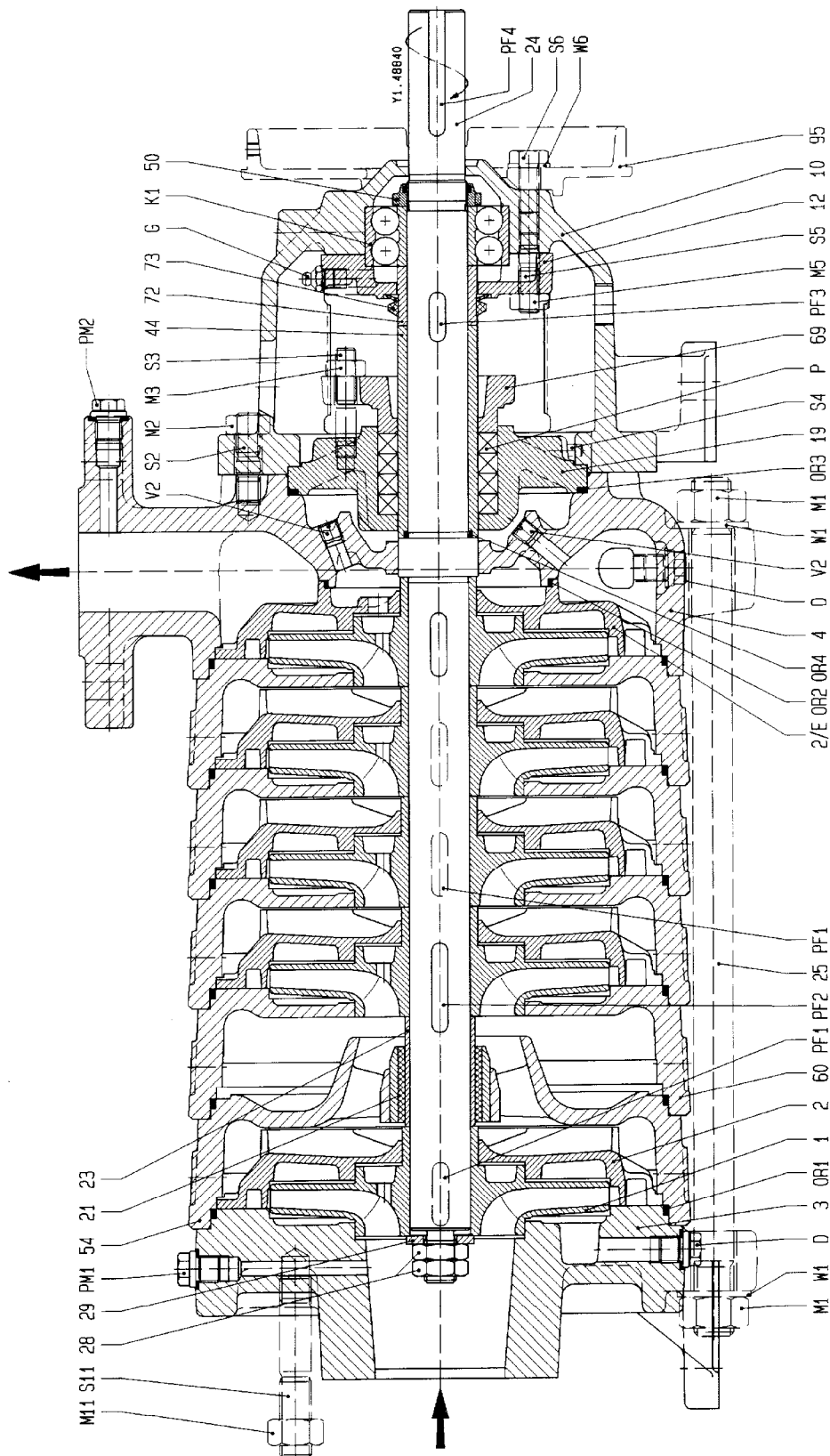
Etanchéité d'arbre: presse-étoupe

Shaft seal: stuffing box

Code...P

Code...P

Code...P



Nr.	Teilebezeichnung	Nomenclature	Index of Parts
1	Lauftrad	roue	impeller
2	Leitrad	diffuseur	diffuser
2/E	Leitrad, letzte Stufe	diffuseur, dernier étage	diffuser, last stage
3	Sauggehäuse	corps d'aspiration	suction casing
4	Druckgehäuse	corps de refoulement	discharge casing
10	Lagerträger	corps de palier	bearing bracket
12	Lagerdeckel	couvercle de palier	bearing cover
19	Stopfbuchsgehäuse	boîtier de presse-étoupe	stuffing box housing
21	Lagerbuchse	coussinet	bearing bush
23	Lagerhülse	chemise d'arbre du palier	bearing sleeve
24	Welle	arbre	shaft
25	Gehäuseschraube	tirant d'assemblage	tie bolt
28	Laufradmutter	écrou de blocage de roue	impeller nut
29	Scheibe	rondelle	washer
44	Wellenschutzhülse	chemise d'arbre sous garniture	shaft wearing sleeve
50	Lagermutter	écrou de roulement	bearing nut
54	Innenlagergehäuse	corps de palier intermédiaire	intermediate bearing housing
60	Stufengehäuse	corps d'étage	stage casing
69	Stopfbuchsbrille	fouloir	gland
72	Distanzhülse	entretoise	spacer sleeve
73	Spritzring	défecteur	thrower
95	Kupplungsschutzadapter (nur auf Wunsch)	protetion d'accouplement raccord (sur demande)	Coupling guard adapter (by request)
D	Entleerungsstopfen	bouchon de vidange	drain plug
G	Schmiernippel	graisseur	grease nipple
K1	Radialkugellager	roulement a billes	radial ball bearing
M1	Mutter	écrou	nut
M2	Mutter	écrou	nut
M3	Mutter	écrou	nut
M5	Mutter	écrou	nut
M11	Mutter	écrou	nut
OR1	Runddichtring	joint torique	O-ring
OR2	Runddichtring	joint torique	O-ring
OR3	Runddichtring	joint torique	O-ring
OR4	Runddichtring	joint torique	O-ring
P	Stopfbuchspackung	garniture de presse-étoupe	gland packing
PM1	Druckmesser	mesureur de pression	pressure gauge
PM2	Druckmesser	mesureur de pression	pressure gauge
PF1	Paßfeder	clavette	key
PF2	Paßfeder	clavette	key
PF3	Paßfeder	clavette	key
PF4	Paßfeder	clavette	key
S2	Stiftschraube	goujon	stud
S3	Stiftschraube	goujon	stud
S4	Stift	pointe	pin
S5	Stiftschraube	goujon	stud
S6	Sechskantschraube	vis a tete hexagonale	hexagon head screw
S11	Stiftschraube	goujon	stud
V2	Verschlußschraube	bouchon filete	screwed plug
W1	Scheibe	rondelle	washer
W6	Scheibe	rondelle	washer

Baugrößen: MPA40.2, MPA40.3, MPA65.1, MPA65.2, MPA100.1, MPA100.2, MPA125.1, MPA125.2

Taille:

Size:

Wellenabdichtung: Gleitringdichtung

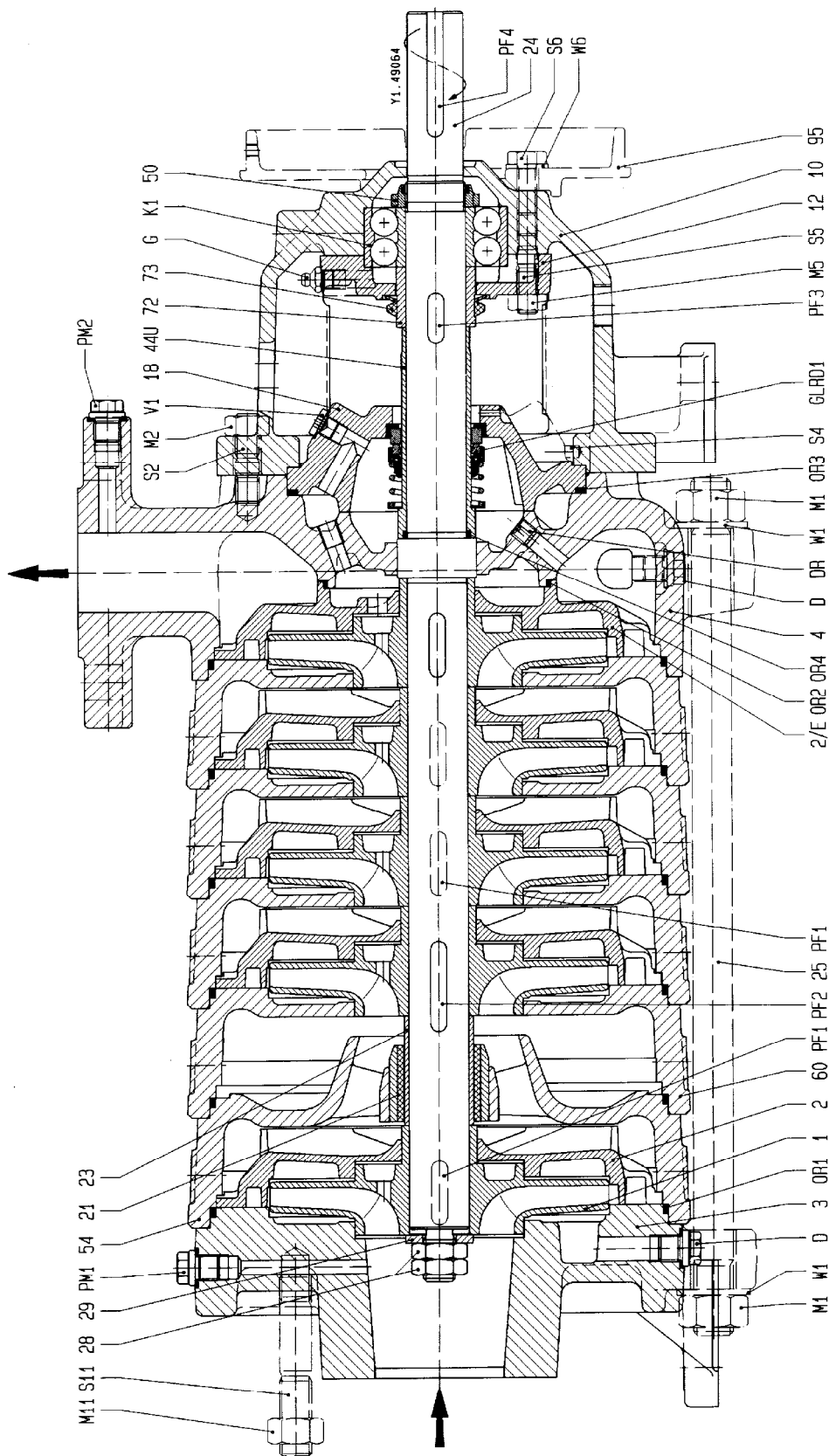
Code...SA

Etanchéité d'arbre: garniture mécanique

Code...SA

Shaft seal: mechanical seal

Code...SA



Nr.	Teilebezeichnung	Nomenclature	Index of Parts
1	Lauftrad	roue	impeller
2	Leitrad	diffuseur	diffuser
2/E	Leitrad, letzte Stufe	diffuseur, dernier étage	diffuser, last stage
3	Sauggehäuse	corps d'aspiration	suction casing
4	Druckgehäuse	corps de refoulement	discharge casing
10	Lagerträger	corps de palier	bearing bracket
12	Lagerdeckel	couvercle de palier	bearing cover
18	Dichtungsdeckel	couvercle d'étanchéité	seal cover
21	Lagerbuchse	coussinet	bearing bush
23	Lagerhülse	chemise d'arbre du palier	bearing sleeve
24	Welle	arbre	shaft
25	Gehäuseschraube	tirant d'assemblage	tie bolt
28	Laufradmutter	écrou de blocage de roue	impeller nut
29	Scheibe	rondelle	washer
44U	Wellenschutzhülse	chemise d'arbre sous garniture	shaft wearing sleeve
50	Lagermutter	écrou de roulement	bearing nut
54	Innenlagergehäuse	corps de palier intermédiaire	intermediate bearing housing
60	Stufengehäuse	corps d'étage	stage casing
72	Distanzhülse	entretoise	spacer sleeve
73	Spritzring	défecteur	thrower
95	Kupplungsschutzadapter (nur auf Wunsch)	protection d'accouplement raccord (sur demande)	Coupling guard adapter (by request)
D	Entleerungsstopfen	bouchon de vidange	drain plug
DR	Drosselstück	organe d'étranglement	throttling element
G	Schmiernippel	graisseur	grease nipple
GLRD1	Gleitringdichtung	garniture mécanique	mechanical seal
K1	Radialkugellager	roulement à billes	radial ball bearing
M1	Mutter	écrou	nut
M2	Mutter	écrou	nut
M5	Mutter	écrou	nut
M11	Mutter	écrou	nut
OR1	Runddichtring	joint torique	O-ring
OR2	Runddichtring	joint torique	O-ring
OR3	Runddichtring	joint torique	O-ring
OR4	Runddichtring	joint torique	O-ring
PM1	Druckmesser	mesureur de pression	pressure gauge
PM2	Druckmesser	mesureur de pression	pressure gauge
PF1	Paßfeder	clavette	key
PF2	Paßfeder	clavette	key
PF3	Paßfeder	clavette	key
PF4	Paßfeder	clavette	key
S2	Stiftschraube	goujon	stud
S4	Stift	pointe	pin
S5	Stiftschraube	goujon	stud
S6	Sechskantschraube	vis à tête hexagonale	hexagon head screw
S11	Stiftschraube	goujon	stud
V1	Verschlußschraube	bouchon fileté	screwed plug
W1	Scheibe	rondelle	washer
W6	Scheibe	rondelle	washer

Baugrößen: MPA40.2, MPA40.3, MPA65.1, MPA65.2, MPA100.1, MPA100.2, MPA125.1, MPA125.2

Taille:

Size:

Wellenabdichtung: Gleitringdichtung

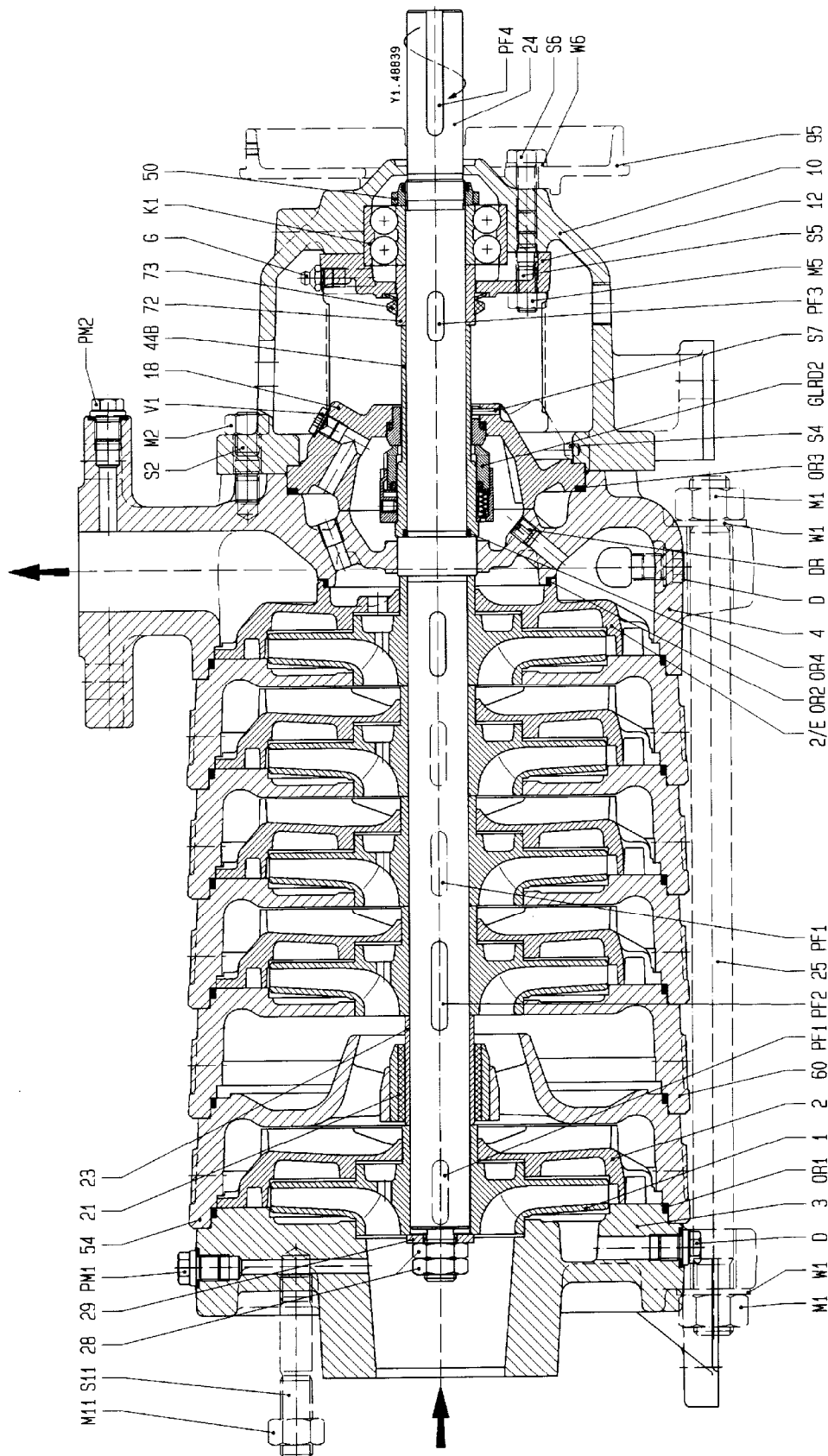
Code...SB, SD

Etanchéité d'arbre: garniture mécanique

Code...SB, SD

Shaft seal: mechanical seal

Code...SB, SD



Nr.	Teilebezeichnung	Nomenclature	Index of Parts
1	Lauftrad	roue	impeller
2	Leitrad	diffuseur	diffuser
2/E	Leitrad, letzte Stufe	diffuseur, dernier étage	diffuser, last stage
3	Sauggehäuse	corps d'aspiration	suction casing
4	Druckgehäuse	corps de refoulement	discharge casing
10	Lagerträger	corps de palier	bearing bracket
12	Lagerdeckel	couvercle de palier	bearing cover
18	Dichtungsdeckel	couvercle d'étanchéité	seal cover
21	Lagerbuchse	coussinet	bearing bush
23	Lagerhülse	chemise d'arbre du palier	bearing sleeve
24	Welle	arbre	shaft
25	Gehäuseschraube	tirant d'assemblage	tie bolt
28	Laufradmutter	écrou de blocage de roue	impeller nut
29	Scheibe	rondelle	washer
44B	Wellenschutzhülse	chemise d'arbre sous garniture	shaft wearing sleeve
50	Lagermutter	écrou de roulement	bearing nut
54	Innenlagergehäuse	corps de palier intermédiaire	intermediate bearing housing
60	Stufengehäuse	corps d'étage	stage casing
72	Distanzhülse	entretoise	spacer sleeve
73	Spritzring	défecteur	thrower
95	Kupplungsschutzadapter (nur auf Wunsch)	protection d'accouplement raccord (sur demande)	Coupling guard adapter (by request)
D	Entleerungsstopfen	bouchon de vidange	drain plug
DR	Drosselstück	organe d'étranglement	throttling element
G	Schmiernippel	graisseur	grease nipple
GLRD2	Gleitringdichtung	garniture mécanique	mechanical seal
K1	Radialkugellager	roulement à billes	radial ball bearing
M1	Mutter	écrou	nut
M2	Mutter	écrou	nut
M5	Mutter	écrou	nut
M11	Mutter	écrou	nut
OR1	Runddichtring	joint torique	O-ring
OR2	Runddichtring	joint torique	O-ring
OR3	Runddichtring	joint torique	O-ring
OR4	Runddichtring	joint torique	O-ring
PM1	Druckmesser	mesureur de pression	pressure gauge
PM2	Druckmesser	mesureur de pression	pressure gauge
PF1	Paßfeder	clavette	key
PF2	Paßfeder	clavette	key
PF3	Paßfeder	clavette	key
PF4	Paßfeder	clavette	key
S2	Stiftschraube	goujon	stud
S4	Stift	pointe	pin
S5	Stiftschraube	goujon	stud
S6	Sechskantschraube	vis à tête hexagonale	hexagon head screw
S7	Stift	pointe	pin
S11	Stiftschraube	goujon	stud
V1	Verschlußschraube	bouchon fileté	screwed plug
W1	Scheibe	rondelle	washer
W6	Scheibe	rondelle	washer

Baugrößen: MPA40.2, MPA40.3, MPA65.1, MPA65.2, MPA100.1, MPA100.2, MPA125.1, MPA125.2

Taille:

Size:

Wellenabdichtung: Gleitringdichtung

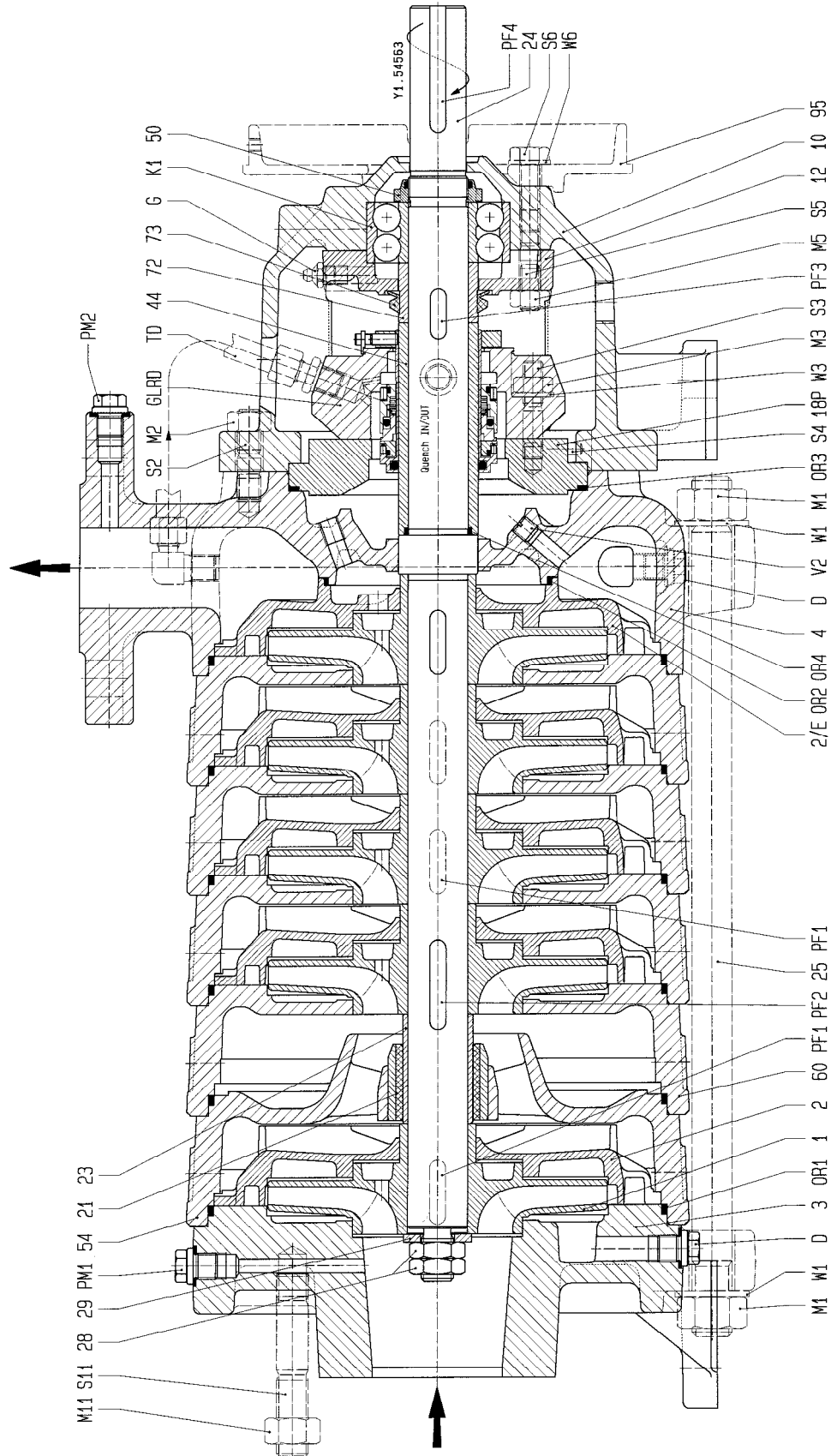
Code...CS, CQ

Etanchéité d'arbre: garniture mécanique

Code...CS, CQ

Shaft seal: mechanical seal

Code...CS, CQ



Nr.	Teilebezeichnung	Nomenclature	Index of Parts
1	Lauftrad	roue	impeller
2	Leitrad	diffuseur	diffuser
2/E	Leitrad, letzte Stufe	diffuseur, dernier étage	diffuser, last stage
3	Sauggehäuse	corps d'aspiration	suction casing
4	Druckgehäuse	corps de refoulement	discharge casing
10	Lagerträger	corps de palier	bearing bracket
12	Lagerdeckel	couvercle de palier	bearing cover
18P	Dichtungsdeckel	couvercle d'étanchéité	seal cover
21	Lagerbuchse	coussinet	bearing bush
23	Lagerhülse	chemise d'arbre du palier	bearing sleeve
24	Welle	arbre	shaft
25	Gehäuseschraube	tirant d'assemblage	tie bolt
28	Laufradmutter	écrou de blocage de roue	impeller nut
29	Scheibe	rondelle	washer
44	Wellenschutzhülse	chemise d'arbre sous garniture	shaft wearing sleeve
50	Lagermutter	écrou de roulement	bearing nut
54	Innenlagergehäuse	corps de palier intermédiaire	intermediate bearing housing
60	Stufengehäuse	corps d'étage	stage casing
72	Distanzhülse	entretoise	spacer sleeve
73	Spritzring	défecteur	thrower
95	Kupplungsschutzadapter (nur auf Wunsch)	protection d'accouplement raccord (sur demande)	Coupling guard adapter (by request)
D	Entleerungsstopfen	bouchon de vidange	drain plug
G	Schmiernippel	graisseur	grease nipple
GLRD	Gleitringdichtung	garniture mécanique	mechanical seal
K1	Radialkugellager	roulement à billes	radial ball bearing
M1	Mutter	écrou	nut
M2	Mutter	écrou	nut
M3	Mutter	écrou	nut
M5	Mutter	écrou	nut
M11	Mutter	écrou	nut
OR1	Runddichtring	joint torique	O-ring
OR2	Runddichtring	joint torique	O-ring
OR3	Runddichtring	joint torique	O-ring
OR4	Runddichtring	joint torique	O-ring
PM1	Druckmesser	mesureur de pression	pressure gauge
PM2	Druckmesser	mesureur de pression	pressure gauge
PF1	Paßfeder	clavette	key
PF2	Paßfeder	clavette	key
PF3	Paßfeder	clavette	key
PF4	Paßfeder	clavette	key
S2	Stiftschraube	goujon	stud
S3	Stiftschraube	goujon	stud
S4	Stift	pointe	pin
S5	Stiftschraube	goujon	stud
S6	Sechskantschraube	vis à tête hexagonale	hexagon head screw
S7	Stift	pointe	pin
S11	Stiftschraube	goujon	stud
TD	Rohrleitung	conduite	tubing
V2	Verschlußschraube	bouchon fileté	screwed plug
W1	Scheibe	rondelle	washer
W3	Scheibe	rondelle	washer
W6	Scheibe	rondelle	washer

Baugrößen: MPAI40.2, MPAI40.3

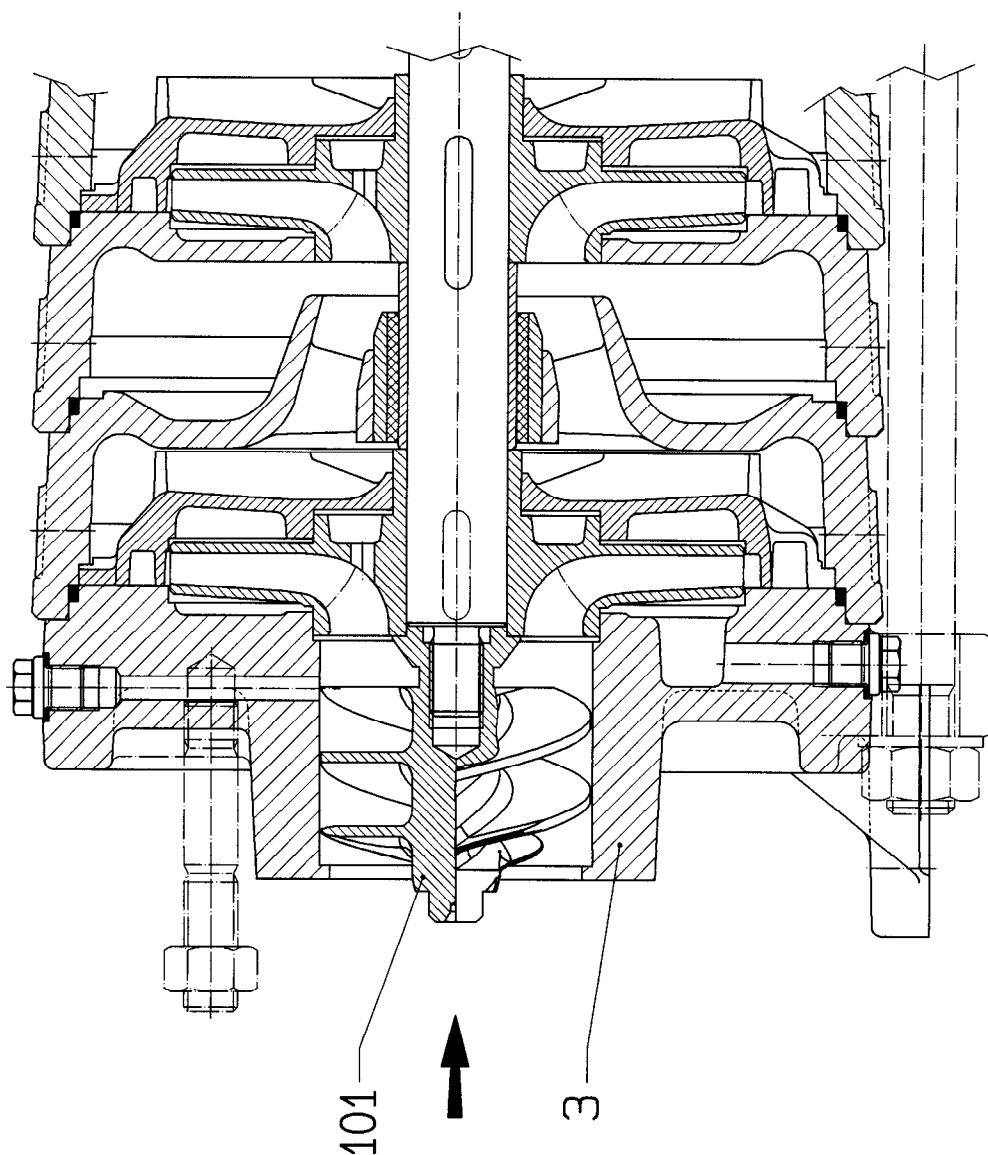
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Size:

Detailzeichnung mit Inducer

Dessin en détail avec inducer

Detail drawing with inducer



Nr.	Teilebezeichnung	Nomenclature	Index of Parts
101	Inducer	inducer	inducer
3	Sauggehäuse	corps d'aspiration	suction casing

Baugrößen: MPAI65.1, MPAI65.2, MPAI100.1, MPAI100.2, MPAI125.1, MPAI125.2

Taille:

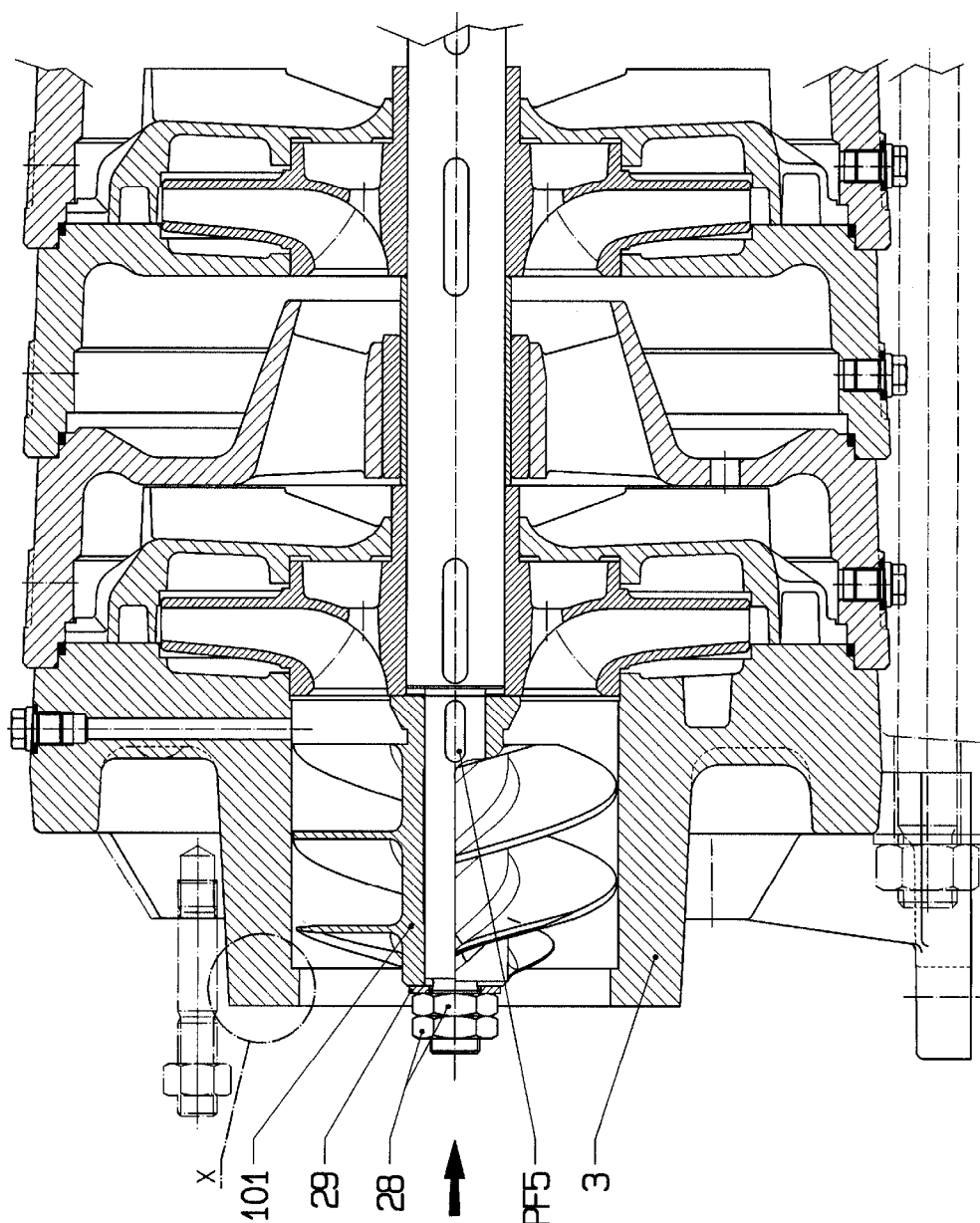
Size:

Detailzeichnung mit Inducer
Dessin en détail avec inducer
Detail drawing with inducer

Baugröße: MPAI100.1, MPAI100.2, MPAI125.1, MPAI125.2

Taille:

Size:

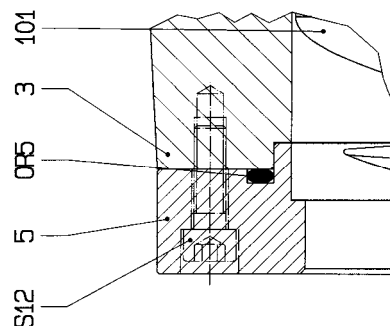


Detail „X“

Baugröße: MPAI65.1, MPAI65.2

Taille:

Size:



Nr.	Teilebezeichnung	Nomenclature	Index of Parts
101	Inducer	inducer	inducer
3	Sauggehäuse	corps d'aspiration	suction casing
5	Saugstutzen	tubulure d'aspiration	suction nozzle
28	Laufmutter	écrou de blocage de roue	impeller nut
29	Scheibe	rondelle	washer
PF5	Paßfeder	clavette	key
OR5	Runddichtring	joint torique	O-ring
S12	Zylinderschraube	vis à tête cylindrique	head cap screw

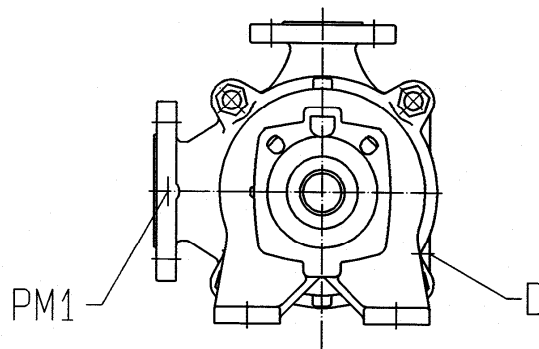
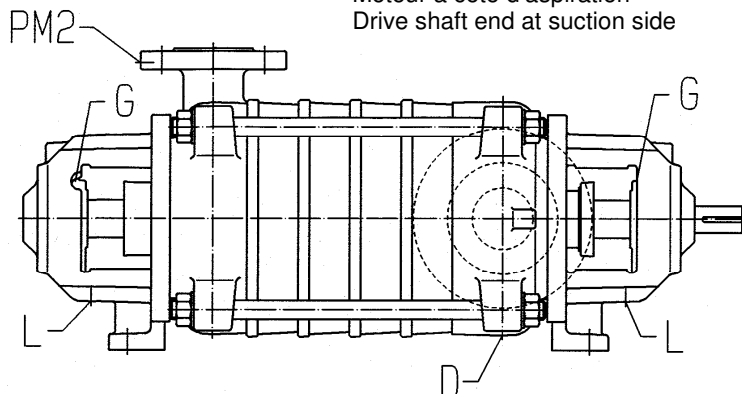
Baugrößen: MP40.2, MP40.3, MP65.1, MP65.2, MP100.1, MP100.2, MP125.1, MP125.2




Taille:

Size:

Saugseitiger Antrieb
Moteur à côté d'aspiration
Drive shaft end at suction side

Standardausführung: RO/S
Construction standard: RO/S
Standard construction: RO/S



  			Stutzenrichtungen Position des tubulures Position of branches					
DNS	DND	Code	DNS	DND	Code	DNS	DND	Code
L	O	LO/S	L	L	LL/S	L	R	LR/S
O	O	OO/S	O	L	OL/S	O	R	OR/S
R	O	RO/S	R	L	RL/S	R	R	RR/S

PM1...Vakuumeter G1/4
Vacuometre
Vacuum gauge

PM2...Manometer
Manometre
Pressure gauge

D.....Entleerung G1/4
Purge
Drain

L.....Leckflüssigkeit G1/2
Récupération des fuites
Leakage

G....Schmiernippel DIN 71412
Graisseur
Grease nipple

Anzugsmomente - Couples de serrage - Tightening Torques

				Pumpengröße											
				MP, MPA, MPAI 40			MP, MPA, MPAI 65			MP, MPA, MPAI 100			MP, MPA, MPAI 125		
	Schraube	Mutter	Qualität	Größe	Anzugsmoment in Nm (kgm)		Größe	Anzugsmoment in Nm (kgm)		Größe	Anzugsmoment in Nm (kgm)		Größe	Anzugsmoment in Nm (kgm)	
	Pos	Pos	min.		Gewinde			Gewinde			Gewinde			Gewinde	
Verschraubung					trocken	geölt		trocken	geölt		trocken	geölt		trocken	geölt
Gehäuseanker	25	M1	8.8	4 x M20	264 (26,9)	236 (24,1)	4 x M24	417 (42,5)	379 (38,6)	8 x M24	314 (32)	285 (29,1)	8 x M24	452 (46,1)	411 (41,9)
Lagerträger (10) mit Sauggehäuse (3) bzw. Druckgehäuse (4)	S2	M2	8.8	8 x M12	42 (4,3)	38 (3,9)	8 x M12	57 (5,8)	52 (5,3)	8 x M16	97 (9,9)	87 (8,9)	8 x M20	152 (15,5)	135 (13,8)
Lagerträger (10) mit Lagerdeckel (12)	S5	M5	4.6	2 x M10	22 (2,2)	20 (2,0)	2 x M10	22 (2,2)	20 (2,0)	4 x M10	22 (2,2)	20 (2,0)	4 x M10	22 (2,2)	20 (2,0)
Hinweis: Stiftschrauben müssen bis zum Gewindeende eingeschraubt werden.															

				Taille de la pompe											
				MP, MPA, MPAI 40			MP, MPA, MPAI 65			MP, MPA, MPAI 100			MP, MPA, MPAI 125		
	Vis	Ecrou	Qualité	Taille	Couple de serrage en Nm (kgm)		Taille	Couple de serrage en Nm (kgm)		Taille	Couple de serrage en Nm (kgm)		Taille	Couple de serrage en Nm (kgm)	
	Pos	Pos	min.		Filetage			Filetage			Filetage			Filetage	
Raccord					sec	huilé		sec	huilé		sec	huilé		sec	huilé
Ancrages du corps	25	M1	8.8	4 x M20	264 (26,9)	236 (24,1)	4 x M24	417 (42,5)	379 (38,6)	8 x M24	314 (32)	285 (29,1)	8 x M24	452 (46,1)	411 (41,9)
Corps de palier (10) avec corps d'aspiration (3) ou de refoulement (4)	S2	M2	8.8	8 x M12	42 (4,3)	38 (3,9)	8 x M12	57 (5,8)	52 (5,3)	8 x M16	97 (9,9)	87 (8,9)	8 x M20	152 (15,5)	135 (13,8)
Corps de palier (10) avec couvercle de palier (12)	S5	M5	4.6	2 x M10	22 (2,2)	20 (2,0)	2 x M10	22 (2,2)	20 (2,0)	4 x M10	22 (2,2)	20 (2,0)	4 x M10	22 (2,2)	20 (2,0)
Remarque : les goujons filetés doivent toujours être vissés jusqu'à la fin du filetage.															

				Pump Size											
				MP, MPA, MPAI 40			MP, MPA, MPAI 65			MP, MPA, MPAI 100			MP, MPA, MPAI 125		
	Screw	Nut	Quality	Size	Tightening Torque in Nm (kgm)		Size	Tightening Torque in Nm (kgm)		Size	Tightening Torque in Nm (kgm)		Size	Tightening Torque in Nm (kgm)	
	Item	Item	Min.		Thread			Thread			Thread			Thread	
Screw Connection					Dry	Oiled		Dry	Oiled		Dry	Oiled		Dry	Oiled
Casing anchor	25	M1	8.8	4 x M20	264 (26,9)	236 (24,1)	4 x M24	417 (42,5)	379 (38,6)	8 x M24	314 (32)	285 (29,1)	8 x M24	452 (46,1)	411 (41,9)
Bearing support (10) with suction casing (3) and pressure casing (4)	S2	M2	8.8	8 x M12	42 (4,3)	38 (3,9)	8 x M12	57 (5,8)	52 (5,3)	8 x M16	97 (9,9)	87 (8,9)	8 x M20	152 (15,5)	135 (13,8)
Bearing support (10) with bearing cover (12)	S5	M5	4.6	2 x M10	22 (2,2)	20 (2,0)	2 x M10	22 (2,2)	20 (2,0)	4 x M10	22 (2,2)	20 (2,0)	4 x M10	22 (2,2)	20 (2,0)
Note: Studs must be screwed in to the end of the thread.															

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