

Dry-installed Volute Casing Pump

Sewabloc

50 / 60 Hz
DIN / IEC Motors

Installation/Operating Manual



Mat. No.: 05154575

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Installation/Operating Manual Sewabloc

Original operating manual

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Glossary

Certificate of decontamination

A certificate of decontamination is enclosed by the customer when returning the product to the manufacturer to certify that the product has been properly drained to eliminate any environmental and health hazards arising from components in contact with the fluid handled.

Discharge line

The pipeline which is connected to the discharge nozzle

Hydraulic system

The part of the pump in which the kinetic energy is converted into pressure energy

Pump

Machine without drive, additional components or accessories

Pump set

Complete pump set consisting of pump, drive, additional components and accessories

Suction lift line/suction head line

The pipeline which is connected to the suction nozzle

1 General

1.1 Principles

This operating manual is valid for the type series and variants indicated on the front cover.

The operating manual describes the proper and safe use of this equipment in all phases of operation.

The name plate indicates the type series and size, the main operating data, the order number and the order item number. The order number and order item number clearly identify the pump set and serve as identification for all further business processes.

In the event of damage, immediately contact your nearest KSB service facility to maintain the right to claim under warranty.

1.2 Installation of partly completed machinery

To install partly completed machinery supplied by KSB refer to the sub-sections under Servicing/Maintenance. (⇒ Section 7.5.5, Page 56)

1.3 Target group

This operating manual is aimed at the target group of trained and qualified specialist technical personnel. (⇒ Section 2.3, Page 9)

1.4 Other applicable documents

Table 1: Overview of other applicable documents

Document	Contents
Data sheet	Description of the technical data of the pump (set)
General arrangement drawing / outline drawing	Description of mating dimensions and installation dimensions for the pump (set), weights
Drawing of auxiliary connections	Description of auxiliary connections
Hydraulic characteristic curve	Characteristic curves showing head, NPSH required, efficiency and power input
General assembly drawing ¹⁾	Sectional drawing of the pump
Sub-supplier product literature ¹⁾	Operating manuals and other product literature describing accessories and integrated machinery components
Spare parts lists ¹⁾	Description of spare parts
Piping layout ¹⁾	Description of auxiliary piping
List of components ¹⁾	Description of all pump components
Assembly drawing ¹⁾	Sectional drawing of the installed shaft seal


For accessories and/or integrated machinery components, observe the relevant manufacturer's product literature.

1.5 Symbols

Table 2: Symbols used in this manual








Symbol	Description
✓	Conditions which need to be fulfilled before proceeding with the step-by-step instructions
▷	Safety instructions
⇒	Result of an action
⇔	Cross-references

¹ If included in agreed scope of supply

Symbol	Description
1. 2.	Step-by-step instructions
	Note Recommendations and important information on how to handle the product

1.6 Key to safety symbols/markings

Table 3: Definition of safety symbols/markings

Symbol	Description
 DANGER	DANGER This signal word indicates a high-risk hazard which, if not avoided, will result in death or serious injury.
 WARNING	WARNING This signal word indicates a medium-risk hazard which, if not avoided, could result in death or serious injury.
 CAUTION	CAUTION This signal word indicates a hazard which, if not avoided, could result in damage to the machine and its functions.
	Explosion protection This symbol identifies information about avoiding explosions in potentially explosive atmospheres in accordance with the <i>Equipment and Protective Systems Intended for use in Potentially Explosive Atmospheres Regulations 2016</i> .
	General hazard In conjunction with one of the signal words this symbol indicates a hazard which will or could result in death or serious injury.
	Electrical hazard In conjunction with one of the signal words this symbol indicates a hazard involving electrical voltage and identifies information about protection against electrical voltage.
	Machine damage In conjunction with the signal word CAUTION this symbol indicates a hazard for the machine and its functions.



2 Safety

All the information contained in this section refers to hazardous situations.




In addition to the present general safety information the action-related safety information given in the other sections must be observed.

2.1 General

- This operating manual contains general installation, operating and maintenance instructions that must be observed to ensure safe operation of the system and prevent personal injury and damage to property.
- Comply with all the safety instructions given in the individual sections of this operating manual.
- The operating manual must be read and understood by the responsible specialist personnel/operators prior to installation and commissioning.
- The contents of this operating manual must be available to the specialist personnel at the site at all times.
- Information and markings attached directly to the product must always be complied with and kept in a perfectly legible condition at all times. This applies to, for example:
 - Arrow indicating the direction of rotation
 - Markings for connections
 - Name plate
- The operator is responsible for ensuring compliance with all local regulations not taken into account.

2.2 Intended use

- The pump set must only be operated within the operating limits described in the other applicable documents.
- Only operate pump sets which are in perfect technical condition.
- Do not operate partially assembled pump sets.
- Only use the pump to handle the fluids described in the data sheet or product literature of the pump model.
- Never operate the system without the fluid to be handled.
- Observe the limits for continuous duty specified in the data sheet or product literature (Q_{\min} and Q_{\max}) (to prevent damage such as shaft fracture, bearing failure, mechanical seal damage, etc).
- When untreated waste water is handled, the duty points in continuous operation lie within 0.7 to $1.2 \times Q_{\text{BEP}}$ to minimise the risk of clogging/hardening.
- Avoid duty points for continuous operation at very low speeds and small flow rates ($< 0.7 \times Q_{\text{BEP}}$).
- Observe the minimum flow rate and maximum flow rate indicated in the data sheet or product literature (to prevent overheating, mechanical seal damage, cavitation damage, bearing damage, etc).
- Do not throttle the flow rate on the suction side of the system (prevention of cavitation damage).
- Consult the manufacturer about any use or mode of operation not described in the data sheet or product literature.
- Only use the respective impeller types in combination with the fluids described below.

	Free-flow impeller (impeller type F/F-max)	Suitable for the following fluids: fluids containing solids and stringy material as well as fluids with entrapped air or entrapped gas
	Open, diagonal single-channel impeller (impeller type D)	Suitable for the following fluids: fluids containing solid substances and long fibres
	Closed multi-channel impeller (impeller type K/K-max)	Suitable for the following fluids: contaminated, solids-laden, non-gaseous fluids without stringy material

2.2.1 Prevention of foreseeable misuse

- Observe the minimum flow velocities required to fully open the swing check valves to prevent the reduction of pressure and risk of clogging.
(Contact the manufacturer for the required minimum flow velocities/loss coefficients.)
- Never exceed the permissible application and operating limits specified in the data sheet or product literature regarding pressure, temperature, etc.
- Observe all safety information and instructions in this manual.

2.3 Personnel qualification and training

All personnel involved must be fully qualified to transport, install, operate, maintain and inspect the machinery this manual refers to.

The responsibilities, competence and supervision of all personnel involved in transport, installation, operation, maintenance and inspection must be clearly defined by the operator.

Deficits in knowledge must be rectified by means of training and instruction provided by sufficiently trained specialist personnel. If required, the operator can commission the manufacturer/supplier to train the personnel.

Training on the pump (set) must always be supervised by technical specialist personnel.

2.4 Consequences and risks caused by non-compliance with this manual

- Non-compliance with these operating instructions will lead to forfeiture of warranty cover and of any and all rights to claims for damages.
- Non-compliance can, for example, have the following consequences:
 - Hazards to persons due to electrical, thermal, mechanical and chemical effects and explosions
 - Failure of important product functions
 - Failure of prescribed maintenance and servicing practices
 - Hazard to the environment due to leakage of hazardous substances

2.5 Safety awareness

In addition to the safety information contained in this operating manual and the intended use, the following safety regulations shall be complied with:

- Accident prevention, health regulations and safety regulations
- Explosion protection regulations
- Safety regulations for handling hazardous substances
- Applicable standards, directives and laws

2.6 Safety information for the operator/user

- Fit protective equipment (e.g. contact guards) supplied by the operator for hot, cold or moving parts, and check that the equipment functions properly.
- Do not remove any protective equipment (e.g. contact guards) during operation.
- Provide the personnel with protective equipment and make sure it is used.
- Contain leakages (e.g. at the shaft seal) of hazardous fluids handled (e.g. explosive, toxic, hot) so as to avoid any danger to persons and the environment. Adhere to all relevant laws.
- Eliminate all electrical hazards. (In this respect refer to the applicable national safety regulations and/or regulations issued by the local energy supply companies.)
- If stopping the pump does not increase potential risk, fit an emergency-stop control device in the immediate vicinity of the pump (set) during pump set installation.

2.7 Safety information for maintenance, inspection and installation

- Modifications or alterations of the pump (set) are only permitted with the manufacturer's prior consent.
- Use only original spare parts or parts/components authorised by the manufacturer. The use of other parts/components can invalidate any liability of the manufacturer for resulting damage.
- The operator ensures that maintenance, inspection and installation are performed by authorised, qualified specialist personnel who are thoroughly familiar with the manual.
- Only carry out work on the pump (set) during standstill of the pump.
- Only perform work on the pump set when it has been disconnected from the power supply (de-energised).
- The pump (set) must have cooled down to ambient temperature.
- Pump pressure must have been released and the pump must have been drained.
- When taking the pump set out of service always adhere to the procedure described in the manual.
- Decontaminate pumps which handle fluids posing a health hazard. (⇒ Section 7.3, Page 40)
- As soon as the work has been completed, re-install and re-activate any safety-relevant devices and protective devices. Before returning the product to service, observe all instructions on commissioning. (⇒ Section 6.1, Page 30)

2.8 Unauthorised modes of operation

Never operate the pump (set) outside the limits stated in the data sheet and in this operating manual.

The warranty relating to the operating reliability and safety of the pump (set) supplied is only valid if the equipment is used in accordance with its intended use.

2.9 Explosion protection



Always observe the information on explosion protection given in this section when operating an explosion-proof pump set.

Sections of the manual marked by the symbol opposite apply to explosion-proof pump sets also when temporarily operated outside potentially explosive atmospheres.

Pumps / pump sets must not be used in potentially explosive atmospheres unless marked as explosion-proof **and** identified as such in the data sheet.

Special conditions apply to the operation of explosion-proof pump sets in accordance with the UK's *Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016*.

Especially adhere to the sections in this manual marked with the symbol opposite. The explosion-proof status of the pump is only assured if the pump is used in accordance with its intended use.

Never operate the product outside the limits stated in the data sheet and on the name plate.

Prevent impermissible modes of operation.

2.9.1 Marking

Pump The marking on the pump refers to the pump part only.

Example of such marking:

II 2 G Ex h IIB T5 -T1 Gb

Refer to the individual Temperature Limits table for the temperatures permitted for the individual pump variants.

The pump complies with the requirements of type of protection constructional safety "c" to ISO 80079-37.

Shaft coupling An EC manufacturer's declaration is required for the shaft coupling; the shaft coupling must be marked accordingly.




Motor The motor must be considered separately.

3 Transport/Storage/Disposal

3.1 Checking the condition upon delivery

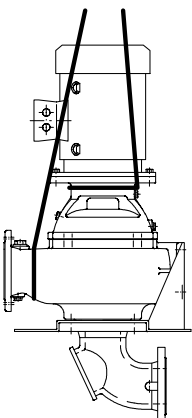
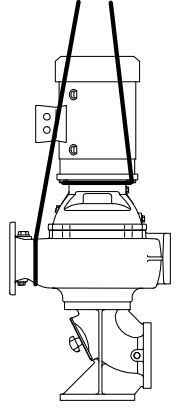
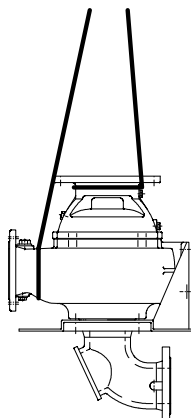
1. On transfer of goods, check each packaging unit for damage.
2. In the event of in-transit damage, assess the exact damage, document it and notify KSB or the supplying dealer and the insurer about the damage in writing immediately.

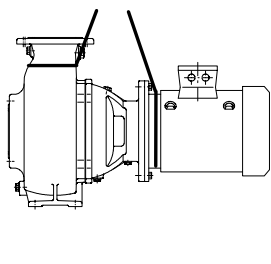
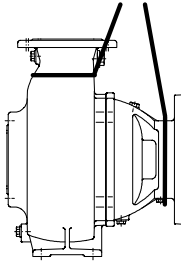
3.2 Transport

	<p>⚠ DANGER</p> <p>The pump (set) could slip out of the suspension arrangement Danger to life from falling parts!</p> <ul style="list-style-type: none"> ▷ Always transport the pump (set) in the specified position. ▷ Observe the applicable local accident prevention regulations. ▷ Give due attention to the weight data, centre of gravity and fastening points. ▷ Use suitable, permitted lifting accessories, e.g. self-tightening lifting tongs.
	<p>⚠ WARNING</p> <p>Uncontrolled lifting of the pump (set) or drive Risk of injury!</p> <ul style="list-style-type: none"> ▷ Maintain adequate safety distance during lifting operations (load may swing when being lifted).
	<p>⚠ WARNING</p> <p>Placing the pump / pump set / packaging unit on unsecured and uneven surfaces Personal injury and damage to property!</p> <ul style="list-style-type: none"> ▷ Only place the pump / pump set / packaging unit on a surface of sufficient load-carrying capacity. ▷ Use appropriate means to secure the pump / pump set / packaging unit against tilting or tipping over.

To transport the pump/pump set suspend it from the lifting tackle as shown.

Table 4: Transport options

		
Vertical transport Close-coupled pump V	Vertical transport Close-coupled pump VF	Vertical transport Close-coupled pump without motor

		
Horizontal transport Close-coupled pump	Horizontal transport Close-coupled pump without motor	

3.3 Storage/preservation

If commissioning is to take place some time after delivery, we recommend that the following measures be taken:




	CAUTION
	Damage during storage due to humidity, dirt or vermin Corrosion/contamination of pump (set)! <p>▷ For outdoor storage cover the pump (set) and accessories with waterproof material and protect against condensation.</p>
	CAUTION
	Wet, contaminated or damaged openings and connections Leakage or damage to the pump! <p>▷ Clean and cover pump openings and connections as required prior to putting the pump into storage.</p>

Table 5: Ambient conditions for storage

Ambient condition	Value
Relative humidity	5 % to 85 % (non-condensing)
Ambient temperature	-20 °C to +70 °C

- Store the pump set in dry, vibration-free conditions and in its original packaging. (⇒ Section 6.3, Page 34)
- 1. Spray-coat the inside wall of the pump casing and, in particular, the impeller clearance areas with a preservative.
- 2. Spray preservative through the suction nozzle and discharge nozzle.
It is advisable to then close the pump nozzles (e.g. with plastic caps or similar).



	NOTE
	Observe the manufacturer's instructions for application/removal of the preservative.

3.4 Return to supplier

1. Drain the pump as per operating instructions. (⇒ Section 7.3, Page 40)
2. Flush and clean the pump, particularly if it has been used for handling noxious, explosive, hot or other hazardous fluids.
3. If the pump has handled fluids whose residues could lead to corrosion damage in the presence of atmospheric humidity or could ignite upon contact with oxygen, the pump must also be neutralised, and anhydrous inert gas must be blown through the pump to ensure drying.
4. Always complete and enclose a certificate of decontamination when returning the pump.
Indicate any safety measures and decontamination measures taken.
(⇒ Section 11, Page 67)

	NOTE
If required, a blank certificate of decontamination can be downloaded from the following web site: www.ksb.com/certificate_of_decontamination	

3.5 Disposal

	 WARNING
Fluids handled, consumables and supplies which are hot and/or pose a health hazard	
Hazard to persons and the environment!	
<ul style="list-style-type: none"> ▷ Collect and properly dispose of flushing fluid and any fluid residues. ▷ Wear safety clothing and a protective mask if required. ▷ Observe all legal regulations on the disposal of fluids posing a health hazard. 	

1. Dismantle the pump (set).
Collect greases and other lubricants during dismantling.
2. Separate and sort the pump materials, e.g. by:
 - Metals
 - Plastics
 - Electronic waste
 - Greases and other lubricants
3. Dispose of materials in accordance with local regulations or in another controlled manner.

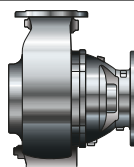
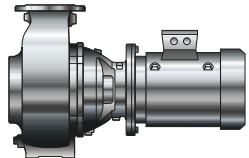
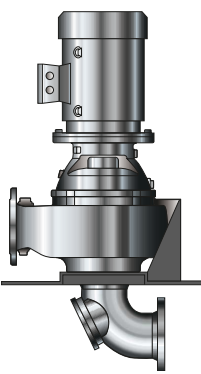
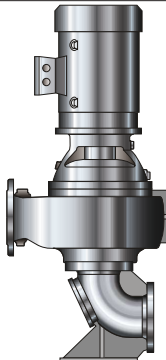
4 Description of the Pump (Set)

4.1 General description

Pump for handling untreated sewage and all types of waste water.

- Close-coupled pump with shaft seal
- Directly flanged standardised motor
- Direct drive electric motor

Table 6: Installation types

Installation type	Illustration	Description
Close-coupled pump without motor		Pump can be supplied without motor, horizontal installation
Close-coupled pump		Pump set with directly flanged motor (construction type B5/V1), horizontal installation
Close-coupled pump V		Pump set with directly flanged motor (construction type B5/V1), vertical installation, with soleplate and suction elbow, underfloor installation
Close-coupled pump VF		Pump set with directly flanged motor (construction type B5/V1), vertical installation, with suction duckfoot bend

4.2 Product information as per Regulation No. 1907/2006 (REACH)

For information as per chemicals Regulation (EC) No. 1907/2006 (REACH), see <https://www.ksb.com/ksb-en/About-KSB/Corporate-responsibility/reach/>.

4.3 Designation

Example: Sewabloc F100-250GV

Table 7: Designation key

Code	Description
Sewabloc	Type series
F	Impeller type
100	Nominal discharge nozzle diameter [mm]
250	Nominal impeller diameter [mm]
G	Material variant
V	Installation type

4.4 Name plate



Fig. 1: Name plate (example)

1	Series number	2	Identification of the pump set
3	Order number	4	Flow rate
5	Speed	6	Weight of the pump as close-coupled pump
7	Year of supply	8	Order item number
9	Head	10	Impeller diameter

4.5 Design details

Design

- Volute casing pump
- Close-coupled pump with shaft seal
- Various, application-oriented installation types (⇒ Section 4.1, Page 15)

Shaft seal

- Two bi-directional mechanical seals in tandem arrangement, with liquid reservoir

Impeller type

- Various application-oriented impeller types (⇒ Section 2.2, Page 8)

Bearings

- Grease-packed, zero-maintenance deep groove ball bearings (sealed for life) on pump and drive end

4.6 Configuration and function

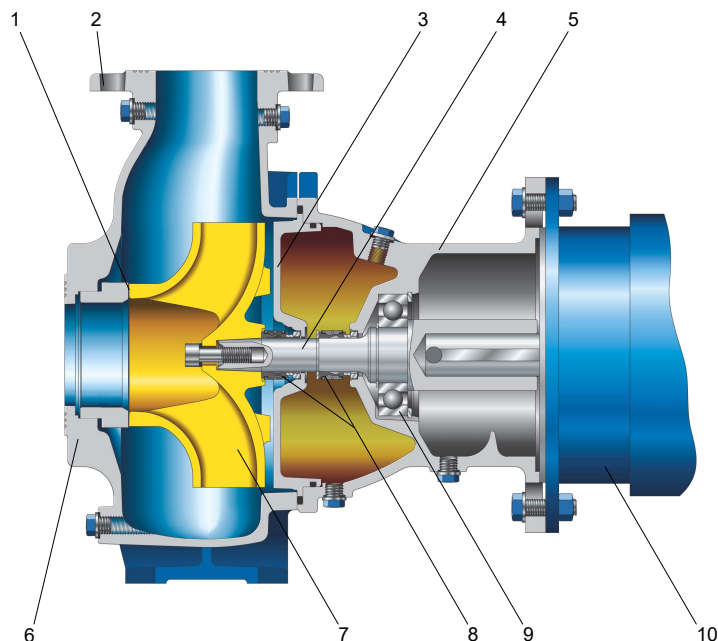


Fig. 2: Sectional drawing Sewabloc with K impeller

1	Clearance gap	2	Discharge nozzle
3	Discharge cover	4	Shaft
5	Bearing bracket	6	Suction nozzle
7	Impeller	8	Shaft seal
9	Rolling element bearing	10	Motor

Design The hydraulic system and the motor are firmly connected and form a close-coupled unit. Impeller (7) and motor are arranged on a common shaft (4).

Function The fluid enters the pump via the suction nozzle (6) and is accelerated outward by the rotating impeller (7). In the flow passage of the pump casing the kinetic energy of the fluid is converted into pressure energy. The fluid is pumped to the discharge nozzle (2), where it leaves the pump. The clearance gap (1) prevents any fluid from flowing back from the casing to the suction nozzle. At the rear side of the impeller, the shaft (4) enters the casing via the discharge cover (3). The shaft passage through the discharge cover is sealed to the atmosphere with a dynamic shaft seal (8). The shaft runs in a rolling element bearing (9), which is supported by a bearing bracket (5) linked with the pump casing and/or motor (10).

Sealing The pump is sealed by two bi-directional mechanical seals in tandem arrangement. A lubricant reservoir in-between the seals ensures cooling and lubrication of the mechanical seals.

4.7 Noise characteristics

Table 8: Surface sound pressure level $L_{pA}^{2)}$

Rated power input P_N	Pump set		
	2900 / 3500 rpm	1450 / 1750 rpm	960 / 1160 rpm 760 / 875 rpm
[kW]	[dB]	[dB]	[dB]
1,5	62,5	56,5	55,0
2,2	65,0	58,5	57,5
3.0	67,0	60,5	59,0

²⁾ Measured at a distance of 1 m from the pump outline (as per DIN 45635 Parts 1 and 24)

Rated power input P_N	Pump set		
	2900 / 3500 rpm	1450 / 1750 rpm	960 / 1160 rpm 760 / 875 rpm
[kW]	[dB]	[dB]	[dB]
4.0	68,5	62,0	60,5
5,5	70,0	63,5	63,0
7,5	71,0	65,0	63,5
11,0	72,5	67,0	65,5
15,0	73,5	68,0	66,5
18,5	74,0	68,5	67,5
22,0	74,5	69,0	68,0
30.0	75,0	70,5	69,0
37.0	76,0	71,0	69,5

4.8 Scope of supply

Depending on the model, the following items are included in the scope of supply:

- Pump without motor or with directly flanged standardised motor
- Suction-side flanged spacer or suction elbow with inspection hole
- Foundation rails ³⁾
- Soleplate ⁴⁾
- Suction elbow ⁴⁾
- Suction duckfoot bend ⁴⁾

4.9 Dimensions and weights

For dimensions and weights please refer to the data sheet of the pump (set).

- Pump weight: See name plate of the pump.
- Motor weight: See motor product literature.
- Weight of the shipping unit base frame with pump: See weight indicated on the base frame.
- Weight of the shipping unit base frame with pump and motor: See weight indicated on the base frame.



NOTE




Some individual components weigh more than 25 kg. Observe the weights indicated (or other applicable documents)

³ For horizontal installation

⁴ For vertical installation



5 Installation at Site

5.1 Safety regulations

	<div data-bbox="507 315 683 360"> DANGER</div> <p>Excessive temperatures in the shaft seal area Explosion hazard!</p> <ul style="list-style-type: none"> ▷ Never operate a pump (set) with gland packing in potentially explosive atmospheres.
	<div data-bbox="507 551 587 595">NOTE</div> <p>Operating pump sets with gland packings in combination with a frequency inverter / variable speed system is not recommended.</p>




5.2 Checks to be carried out prior to installation

Place of installation

	<div data-bbox="507 837 703 882"> WARNING</div> <p>Installation on a mounting surface which is unsecured and cannot support the load Personal injury and damage to property!</p> <ul style="list-style-type: none"> ▷ Use a concrete of compressive strength class C12/15 which meets the requirements of exposure class XS1 to EN 206 . ▷ The mounting surface must be set, even, and level. ▷ Observe the weights indicated.
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1. Check the structural requirements.
All structural work required must have been prepared in accordance with the dimensions stated in the outline drawing/general arrangement drawing.

5.3 Installing the pump set

	<div data-bbox="507 1335 683 1379"> DANGER</div> <p>Electrostatic charging Explosion hazard! Damage to the pump set!</p> <ul style="list-style-type: none"> ▷ Connect the potential equalisation conductor to the earthing terminal provided. ▷ Make sure that the connection between pump and baseplate is electrically conductive. ▷ Screws, bolts, nuts and shims must not be coated or the coating must be removed. ▷ Provide potential equalisation between the pump set and the foundation.
	<div data-bbox="507 1794 639 1839">CAUTION</div> <p>Ingress of leakage into the motor Damage to the pump!</p> <ul style="list-style-type: none"> ▷ Never install the pump set with the "motor below".

Fastening

- Fasten the pump feet or foundation rails, soleplate or suction duckfoot bend to a concrete foundation with chemical anchors.
 - ✓ The foundation has the required strength and characteristics.
 - ✓ The foundation has been prepared in accordance with the dimensions given in the outline drawing/general arrangement drawing.
1. Position the pump set on the foundation and level it with the help of a spirit level placed on the shaft and discharge nozzle.
Permissible deviation: 0.2 mm/m.
 2. Use shims (1) for height compensation if necessary.
Always fit shims, if any, immediately to the left and right of the chemical anchors (3) between the baseplate/foundation frame and the foundation.
All shims must lie perfectly flush.
 3. Drill the holes as specified in the "Chemical anchor dimensions" table. Then clean the holes.

	 WARNING
	<p>Improper handling of mortar cartridge Skin sensitisation and/or irritation!</p> <p>▷ Wear suitable protective clothing.</p>

4. Insert the mortar cartridges into the drilled holes.
Observe the curing times of the mortar cartridges!
5. Insert threaded rods into the corresponding drilled holes with an electric tool (e.g. impact drill, hammer drill).
6. After the curing time (see table), tighten the chemical anchors (3) evenly and tightly.

Chemical anchor dimensions

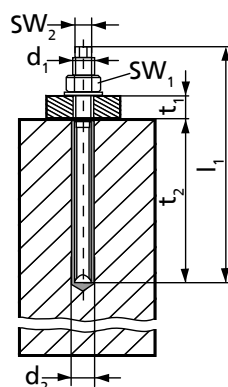


Fig. 3: Dimensions

Table 9: Chemical anchor dimensions

Size ($d_1 \times l_1$)	d_2	t_1	t_2	$SW_1^{5)}$	$SW_2^{5)}$	M_{d1}
	[mm]					[Nm]
M10 × 130	12	22	90	17	6	20
M12 × 160	14	25	110	19	8	40
M16 × 190	18	35	125	24	12	60
M20 × 260	25	65	170	30	14	120
M24 × 300 ⁶⁾	28	65	210	36	17	180
M30 × 380 ⁶⁾	35	65	280	46	-	400

⁵ SW = Width across flats




⁶ Mounting accessories of the respective manufacturer are required.

Table 10: Curing times of mortar cartridge

Floor temperature [°C]	Curing time [min]
-5 to 0	240
0 to +10	45
+10 to +20	20
> +20	10

5.4 Piping

5.4.1 Connecting the piping

	<div data-bbox="507 613 683 658" style="background-color: #e67e22; color: white; padding: 5px;">⚠ DANGER</div> <p>Impermissible loads acting on the pump nozzles Danger to life from leakage of hot, toxic, corrosive or flammable fluids!</p> <ul style="list-style-type: none"> ▷ Do not use the pump as an anchorage point for the piping. ▷ Anchor the pipelines in close proximity to the pump and connect them properly without transmitting any stresses or strains. ▷ Observe the permissible forces and moments at the pump nozzles. ▷ Take appropriate measures to compensate for thermal expansion of the piping.
	<div data-bbox="507 972 639 1008" style="background-color: #f1c40f; color: black; padding: 5px;">CAUTION</div> <p>Incorrect earthing during welding work at the piping Destruction of rolling element bearings (pitting effect)!</p> <ul style="list-style-type: none"> ▷ Never earth the electric welding equipment on the pump or baseplate. ▷ Prevent current flowing through the rolling element bearings.
	<div data-bbox="507 1218 587 1254" style="background-color: #2980b9; color: white; padding: 5px;">NOTE</div> <p>Installing check and shut-off elements in the system is recommended, depending on the type of plant and pump. However, such elements must not obstruct proper drainage or hinder disassembly of the pump.</p>

- ✓ Suction lift lines have been laid with a rising slope, suction head lines with a downward slope towards the pump.
 - ✓ A flow stabilisation section having a length equivalent to at least twice the diameter of the suction flange has been provided upstream of the suction flange.
 - ✓ The nominal pipe diameters are at least equal to or larger than the nominal pump nozzle diameters.
 - ✓ Adapters to larger nominal diameters are designed with a diffuser angle of approx. 8° to avoid excessive pressure losses.
 - ✓ The pipes have been anchored in close proximity to the pump and connected without transmitting any stresses or strains.
1. Thoroughly clean, flush and blow through all vessels, pipes and connections (especially of new installations).
 2. Before installing the pump in the piping, remove the flange covers on the suction and discharge nozzles of the pump.
 3. Connect the pump nozzles to the piping.

5.4.2 Permissible forces and moments at the pump nozzles

Horizontal installation

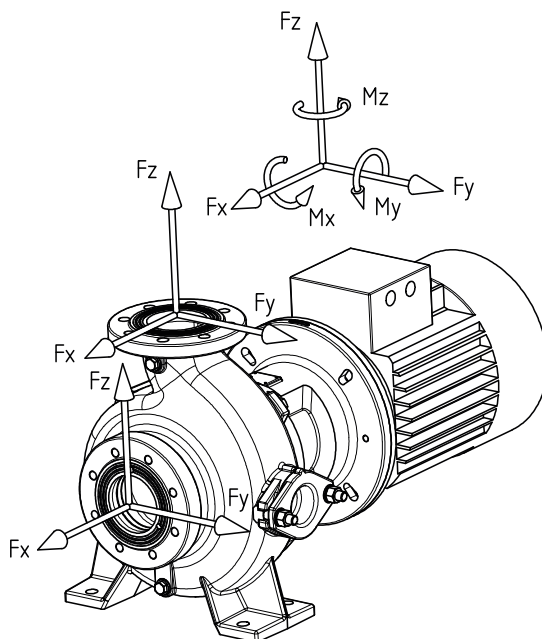


Fig. 4: Forces and moments at the pump nozzles, horizontal installation

The loads are taken from ISO 5199. The values are applicable to each of the pump nozzles, taking into account the markings for the three axes of the respective flange.

The data on forces and moments apply to static piping loads only. If the limits are exceeded, they must be checked and verified.

If a computerised strength analysis is required, values are available on request only. The values are only applicable if the pump is installed on a completely grouted baseplate and bolted to a rigid and level foundation.

Table 11: Forces and moments at the pump nozzles, horizontal installation

Sizes	Impeller type	Flanges		Forces at suction nozzle				Moments at suction nozzle				Forces at discharge nozzle				Moments at discharge nozzle			
		DN1	DN2	Fy	Fz	Fx	ΣF	My	Mz	Mx	ΣM	Fy	Fz	Fx	ΣF	My	Mz	Mx	ΣM
				[N]				[Nm]				[N]				[Nm]			
50-215	F	65	50	650	600	750	1150	400	400	550	750	500	600	550	900	350	400	500	700
50-216	F	65	50	650	600	750	1150	400	400	550	750	500	600	550	900	350	400	500	700
50-250	K	65	50	650	600	750	1150	400	400	550	750	500	600	550	900	350	400	500	700
50-251	K	65	50	650	600	750	1150	400	400	550	750	500	600	550	900	350	400	500	700
65-215	F	80	65	800	700	900	1400	400	450	600	800	600	750	650	1150	400	400	550	750
65-216	E	80	65	800	700	900	1400	400	450	600	800	600	750	650	1150	400	400	550	750
65-217	F	80	65	800	700	900	1400	400	450	600	800	600	750	650	1150	400	400	550	750
65-250	K	80	65	800	700	900	1400	400	450	600	800	600	750	650	1150	400	400	550	750
65-252	K	80	65	800	700	900	1400	400	450	600	800	600	750	650	1150	400	400	550	750
80-215	F	100	80	1050	950	1200	1850	450	500	600	900	700	900	800	1400	400	450	600	800
80-216	F	100	80	1050	950	1200	1850	450	500	600	900	700	900	800	1400	400	450	600	800
80-216	E	100	80	1050	950	1200	1850	450	500	600	900	700	900	800	1400	400	450	600	800
80-217	F	100	80	1050	950	1200	1850	450	500	600	900	700	900	800	1400	400	450	600	800
80-250	K	100	80	1050	950	1200	1850	450	500	600	900	700	900	800	1400	400	450	600	800
80-252	F	100	80	1050	950	1200	1850	450	500	600	900	700	900	800	1400	400	450	600	800
80-253	F	100	80	1050	950	1200	1850	450	500	600	900	700	900	800	1400	400	450	600	800
80-253	E	100	80	1050	950	1200	1850	450	500	600	900	700	900	800	1400	400	450	600	800
80-315	K	100	80	1050	950	1200	1850	450	500	600	900	700	900	800	1400	400	450	600	800
80-315	D	100	80	1050	950	1200	1850	450	500	600	900	700	900	800	1400	400	450	600	800
80-316	D	125	80	1250	1100	1400	2150	550	650	750	1050	700	900	800	1400	400	450	600	800
80-317	F	100	80	1050	950	1200	1850	450	500	600	900	700	900	800	1400	400	450	600	800
80-317	D	100	80	1050	950	1200	1850	450	500	600	900	700	900	800	1400	400	450	600	800

Sizes	Impeller type	Flanges		Forces at suction nozzle				Moments at suction nozzle				Forces at discharge nozzle				Moments at discharge nozzle			
		DN1	DN2	Fy	Fz	Fx	ΣF	My	Mz	Mx	ΣM	Fy	Fz	Fx	ΣF	My	Mz	Mx	ΣM
				[N]				[Nm]				[N]				[Nm]			
100-215	F	100	100	1050	950	1200	1850	450	500	600	900	950	1200	1050	1850	450	500	600	900
100-251	F	100	100	1050	950	1200	1850	450	500	600	900	950	1200	1050	1850	450	500	600	900
100-252	F	100	100	1050	950	1200	1850	450	500	600	900	950	1200	1050	1850	450	500	600	900
100-253	F	100	100	1050	950	1200	1850	450	500	600	900	950	1200	1050	1850	450	500	600	900
100-253	K	100	100	1050	950	1200	1850	450	500	600	900	950	1200	1050	1850	450	500	600	900
100-253	D	150	100	1600	1400	1750	2750	600	700	900	1300	950	1200	1050	1850	450	500	600	900
100-254	F,K	100	100	1050	950	1200	1850	450	500	600	900	950	1200	1050	1850	450	500	600	900
100-255	K	100	100	1050	950	1200	1850	450	500	600	900	950	1200	1050	1850	450	500	600	900
100-316	F,K	150	100	1600	1400	1750	2750	600	700	900	1300	950	1200	1050	1850	450	500	600	900
100-316	D	150	100	1600	1400	1750	2750	600	700	900	1300	950	1200	1050	1850	450	500	600	900
150-253	D	150	150	1600	1400	1750	2750	600	700	900	1300	1400	1750	1600	2750	600	700	900	1300
150-315	F	150	150	1600	1400	1750	2750	600	700	900	1300	1400	1750	1600	2750	600	700	900	1300
150-315	D	150	150	1600	1400	1750	2750	600	700	900	1300	1400	1750	1600	2750	600	700	900	1300
150-317	K	150	150	1600	1400	1750	2750	600	700	900	1300	1400	1750	1600	2750	600	700	900	1300
200-315	K	200	200	2100	1900	2350	3650	800	950	1150	1700	1900	2350	2100	3650	800	950	1150	1700
200-315	D	200	200	2100	1900	2350	3650	800	950	1150	1700	1900	2350	2100	3650	800	950	1150	1700
200-316	K	200	200	2100	1900	2350	3650	800	950	1150	1700	1900	2350	2100	3650	800	950	1150	1700
200-317	K	200	200	2100	1900	2350	3650	800	950	1150	1700	1900	2350	2100	3650	800	950	1150	1700
200-318	K	200	200	2100	1900	2350	3650	800	950	1150	1700	1900	2350	2100	3650	800	950	1150	1700

Vertical installation, with soleplate

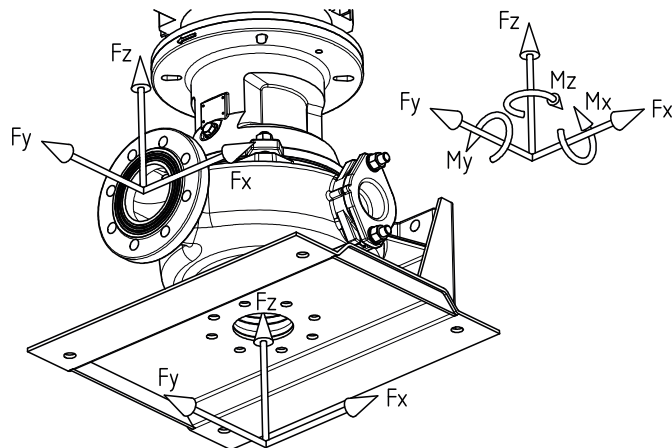


Fig. 5: Forces and moments at the pump nozzles, vertical installation, with soleplate
The loads are taken from ISO 5199. The values are applicable to each of the pump nozzles, taking into account the markings for the three axes of the respective flange.

The data on forces and moments apply to static piping loads only. If the limits are exceeded, they must be checked and verified.

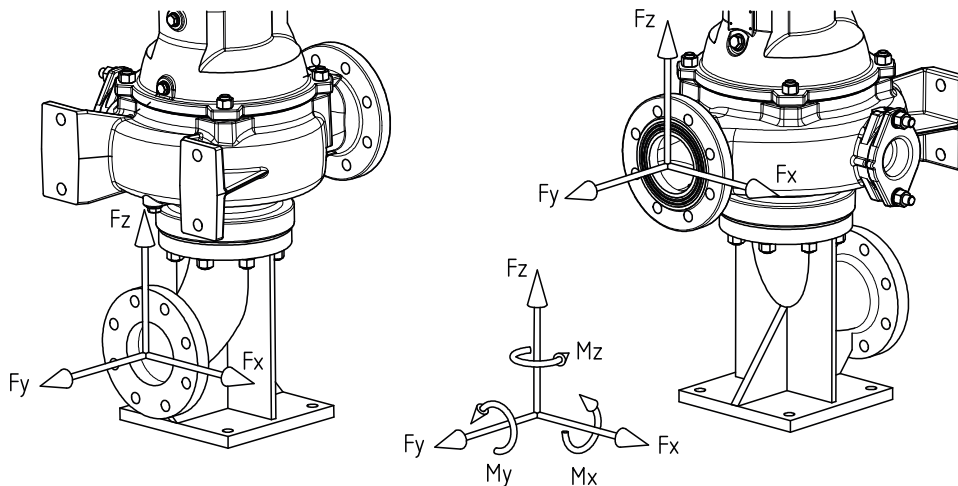
If a computerised strength analysis is required, values are available on request only. The values are only applicable if the pump is installed on a completely grouted baseplate and bolted to a rigid and level foundation.

Table 12: Forces and moments at the pump nozzles, vertical installation, with soleplate

Sizes	Impeller type	Flanges		Forces at suction nozzle				Moments at suction nozzle				Forces at discharge nozzle				Moments at discharge nozzle			
		DN1	DN2	Fy	Fz	Fx	ΣF	My	Mz	Mx	ΣM	Fy	Fz	Fx	ΣF	My	Mz	Mx	ΣM
				[N]				[Nm]				[N]				[Nm]			
50-215	F	65	50	600	750	650	1150	400	400	550	750	600	500	550	900	350	400	500	700
50-216	F	65	50	600	750	650	1150	400	400	550	750	600	500	550	900	350	400	500	700
50-250	K	65	50	600	750	650	1150	400	400	550	750	600	500	550	900	350	400	500	700
50-251	K	65	50	600	750	650	1150	400	400	550	750	600	500	550	900	350	400	500	700
65-215	F	80	65	700	900	800	1400	400	450	600	800	750	600	650	1150	400	400	550	750

Sizes	Impeller type	Flanges		Forces at suction nozzle				Moments at suction nozzle				Forces at discharge nozzle				Moments at discharge nozzle			
		DN1	DN2	Fy	Fz	Fx	ΣF	My	Mz	Mx	ΣM	Fy	Fz	Fx	ΣF	My	Mz	Mx	ΣM
				[N]				[Nm]				[N]				[Nm]			
65-216	E	80	65	700	900	800	1400	400	450	600	800	750	600	650	1150	400	400	550	750
65-217	F	80	65	700	900	800	1400	400	450	600	800	750	600	650	1150	400	400	550	750
65-250	K	80	65	700	900	800	1400	400	450	600	800	750	600	650	1150	400	400	550	750
65-252	K	80	65	700	900	800	1400	400	450	600	800	750	600	650	1150	400	400	550	750
80-215	F	100	80	950	1200	1050	1850	450	500	600	900	900	700	800	1400	400	450	600	800
80-216	F	100	80	950	1200	1050	1850	450	500	600	900	900	700	800	1400	400	450	600	800
80-216	E	100	80	950	1200	1050	1850	450	500	600	900	900	700	800	1400	400	450	600	800
80-217	F	100	80	950	1200	1050	1850	450	500	600	900	900	700	800	1400	400	450	600	800
80-250	K	100	80	950	1200	1050	1850	450	500	600	900	900	700	800	1400	400	450	600	800
80-252	F	100	80	950	1200	1050	1850	450	500	600	900	900	700	800	1400	400	450	600	800
80-253	F	100	80	950	1200	1050	1850	450	500	600	900	900	700	800	1400	400	450	600	800
80-253	E	100	80	950	1200	1050	1850	450	500	600	900	900	700	800	1400	400	450	600	800
80-315	K	100	80	950	1200	1050	1850	450	500	600	900	900	700	800	1400	400	450	600	800
80-315	D	100	80	950	1200	1050	1850	450	500	600	900	900	700	800	1400	400	450	600	800
80-316	D	125	80	1100	1400	1250	2150	550	650	750	1050	900	700	800	1400	400	450	600	800
80-317	F	100	80	950	1200	1050	1850	450	500	600	900	900	700	800	1400	400	450	600	800
80-317	D	100	80	950	1200	1050	1850	450	500	600	900	900	700	800	1400	400	450	600	800
100-215	F	100	100	950	1200	1050	1850	450	500	600	900	1200	950	1050	1850	450	500	600	900
100-251	F	100	100	950	1200	1050	1850	450	500	600	900	1200	950	1050	1850	450	500	600	900
100-252	F	100	100	950	1200	1050	1850	450	500	600	900	1200	950	1050	1850	450	500	600	900
100-253	F	100	100	950	1200	1050	1850	450	500	600	900	1200	950	1050	1850	450	500	600	900
100-253	K	100	100	950	1200	1050	1850	450	500	600	900	1200	950	1050	1850	450	500	600	900
100-253	D	150	100	1400	1750	1600	2750	600	700	900	1300	1200	950	1050	1850	450	500	600	900
100-254	F,K	100	100	950	1200	1050	1850	450	500	600	900	1200	950	1050	1850	450	500	600	900
100-255	K	100	100	950	1200	1050	1850	450	500	600	900	1200	950	1050	1850	450	500	600	900
100-316	F,K	150	100	1400	1750	1600	2750	600	700	900	1300	1200	950	1050	1850	450	500	600	900
100-316	D	150	100	1400	1750	1600	2750	600	700	900	1300	1200	950	1050	1850	450	500	600	900
150-253	D	150	150	1400	1750	1600	2750	600	700	900	1300	1750	1400	1600	2750	600	700	900	1300
150-315	F	150	150	1400	1750	1600	2750	600	700	900	1300	1750	1400	1600	2750	600	700	900	1300
150-315	D	150	150	1400	1750	1600	2750	600	700	900	1300	1750	1400	1600	2750	600	700	900	1300
150-317	K	150	150	1400	1750	1600	2750	600	700	900	1300	1750	1400	1600	2750	600	700	900	1300
200-315	K	200	200	1900	2350	2100	3650	800	950	1150	1700	2350	1900	2100	3650	800	950	1150	1700
200-315	D	200	200	1900	2350	2100	3650	800	950	1150	1700	2350	1900	2100	3650	800	950	1150	1700
200-316	K	200	200	1900	2350	2100	3650	800	950	1150	1700	2350	1900	2100	3650	800	950	1150	1700
200-317	K	200	200	1900	2350	2100	3650	800	950	1150	1700	2350	1900	2100	3650	800	950	1150	1700
200-318	K	200	200	1900	2350	2100	3650	800	950	1150	1700	2350	1900	2100	3650	800	950	1150	1700

Vertical installation, with suction elbow


Fig. 6: Forces and moments at the pump nozzles, vertical installation, with suction elbow

The loads are taken from ISO 5199. The values are applicable to each of the pump nozzles, taking into account the markings for the three axes of the respective flange.

The data on forces and moments apply to static piping loads only. If the limits are exceeded, they must be checked and verified.

If a computerised strength analysis is required, values are available on request only.

The values are only applicable if the pump is installed on a completely grouted baseplate and bolted to a rigid and level foundation.

Table 13: Forces and moments at the pump nozzles, vertical installation, with suction elbow

Sizes	Impeller type	Flanges		Forces at suction nozzle				Moments at suction nozzle				Forces at discharge nozzle				Moments at discharge nozzle			
		DN1	DN2	Fy	Fz	Fx	ΣF	My	Mz	Mx	ΣM	Fy	Fz	Fx	ΣF	My	Mz	Mx	ΣM
		[N]				[Nm]				[N]				[Nm]					
50-215	F	65	50	1700	2100	1850	3300	1100	1200	1500	2200	600	500	550	900	350	400	500	700
50-216	F	65	50	1700	2100	1850	3300	1100	1200	1500	2200	600	500	550	900	350	400	500	700
50-250	K	65	50	1700	2100	1850	3300	1100	1200	1500	2200	600	500	550	900	350	400	500	700
50-251	K	65	50	1700	2100	1850	3300	1100	1200	1500	2200	600	500	550	900	350	400	500	700
65-215	F	80	65	2050	2500	2250	3950	1150	1300	1600	2350	750	600	650	1150	400	400	550	750
65-216	E	80	65	2050	2500	2250	3950	1150	1300	1600	2350	750	600	650	1150	400	400	550	750
65-217	F	80	65	2050	2500	2250	3950	1150	1300	1600	2350	750	600	650	1150	400	400	550	750
65-250	K	80	65	2050	2500	2250	3950	1150	1300	1600	2350	750	600	650	1150	400	400	550	750
65-252	K	80	65	2050	2500	2250	3950	1150	1300	1600	2350	750	600	650	1150	400	400	550	750
80-215	F	100	80	2700	3350	3000	5250	1250	1450	1750	2600	900	700	800	1400	400	450	600	800
80-216	F	100	80	2700	3350	3000	5250	1250	1450	1750	2600	900	700	800	1400	400	450	600	800
80-216	E	100	80	2700	3350	3000	5250	1250	1450	1750	2600	900	700	800	1400	400	450	600	800
80-217	F	100	80	2700	3350	3000	5250	1250	1450	1750	2600	900	700	800	1400	400	450	600	800
80-250	K	100	80	2700	3350	3000	5250	1250	1450	1750	2600	900	700	800	1400	400	450	600	800
80-252	F	100	80	2700	3350	3000	5250	1250	1450	1750	2600	900	700	800	1400	400	450	600	800
80-253	F	100	80	2700	3350	3000	5250	1250	1450	1750	2600	900	700	800	1400	400	450	600	800
80-253	E	100	80	2700	3350	3000	5250	1250	1450	1750	2600	900	700	800	1400	400	450	600	800
80-315	K	100	80	2700	3350	3000	5250	1250	1450	1750	2600	900	700	800	1400	400	450	600	800
80-315	D	100	80	2700	3350	3000	5250	1250	1450	1750	2600	900	700	800	1400	400	450	600	800
80-316	D	125	80	3200	3950	3550	6200	1500	1900	2100	3050	900	700	800	1400	400	450	600	800
80-317	F	100	80	2700	3350	3000	5250	1250	1450	1750	2600	900	700	800	1400	400	450	600	800
80-317	D	100	80	2700	3350	3000	5250	1250	1450	1750	2600	900	700	800	1400	400	450	600	800
100-215	F	100	100	2700	3350	3000	5250	1250	1450	1750	2600	1200	950	1050	1850	450	500	600	900
100-251	F	100	100	2700	3350	3000	5250	1250	1450	1750	2600	1200	950	1050	1850	450	500	600	900
100-252	F	100	100	2700	3350	3000	5250	1250	1450	1750	2600	1200	950	1050	1850	450	500	600	900
100-253	F	100	100	2700	3350	3000	5250	1250	1450	1750	2600	1200	950	1050	1850	450	500	600	900
100-253	K	100	100	2700	3350	3000	5250	1250	1450	1750	2600	1200	950	1050	1850	450	500	600	900

Sizes	Impeller type	Flanges		Forces at suction nozzle				Moments at suction nozzle				Forces at discharge nozzle				Moments at discharge nozzle			
		DN1	DN2	Fy	Fz	Fx	ΣF	My	Mz	Mx	ΣM	Fy	Fz	Fx	ΣF	My	Mz	Mx	ΣM
				[N]				[Nm]				[N]				[Nm]			
100-253	D	150	100	4050	5000	4500	7850	1750	2050	2500	3650	1200	950	1050	1850	450	500	600	900
100-254	F,K	100	100	4050	5000	4500	7850	1750	2050	2500	3650	1200	950	1050	1850	450	500	600	900
100-255	K	100	100	4050	5000	4500	7850	1750	2050	2500	3650	1200	950	1050	1850	450	500	600	900
100-316	F,K	150	100	4050	5000	4500	7850	1750	2050	2500	3650	1200	950	1050	1850	450	500	600	900
100-316	D	150	100	4050	5000	4500	7850	1750	2050	2500	3650	1200	950	1050	1850	450	500	600	900
125-315	F,K	125	125	3200	3950	3550	6200	1500	1900	2100	3050	1200	950	1050	1850	450	500	600	900
150-253	D	150	150	4050	5000	4500	7850	1750	2050	2500	3650	1750	1400	1600	2750	600	700	900	1300
150-315	F	150	150	4050	5000	4500	7850	1750	2050	2500	3650	1750	1400	1600	2750	600	700	900	1300
150-315	D	150	150	4050	5000	4500	7850	1750	2050	2500	3650	1750	1400	1600	2750	600	700	900	1300
150-317	K	150	150	4050	5000	4500	7850	1750	2050	2500	3650	1750	1400	1600	2750	600	700	900	1300
200-315	K	200	200	5400	6700	6000	10450	2300	2650	3250	4800	2350	1900	2100	3650	800	950	1150	1700
200-315	D	200	200	5400	6700	6000	10450	2300	2650	3250	4800	2350	1900	2100	3650	800	950	1150	1700
200-316	K	200	200	5400	6700	6000	10450	2300	2650	3250	4800	2350	1900	2100	3650	800	950	1150	1700
200-317	K	200	200	5400	6700	6000	10450	2300	2650	3250	4800	2350	1900	2100	3650	800	950	1150	1700
200-318	K	200	200	5400	6700	6000	10450	2300	2650	3250	4800	2350	1900	2100	3650	800	950	1150	1700

5.4.3 Vacuum balance line



NOTE

Where fluid has to be pumped out of a vessel under vacuum, installing a vacuum balance line is recommended.

The following rules apply to vacuum balance lines:

- Minimum nominal line diameter 25 mm.
- The line extends above the highest permissible fluid level in the vessel.

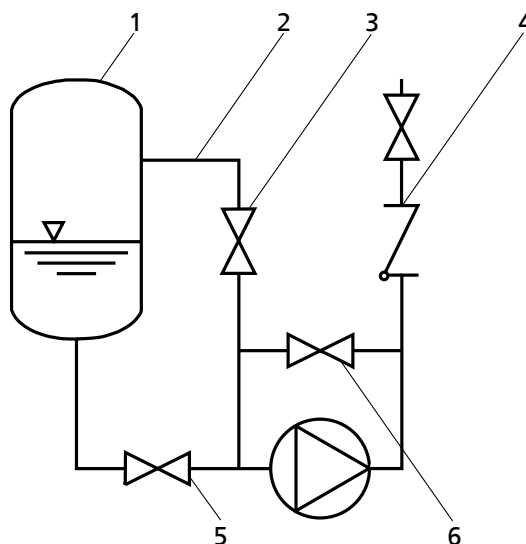


Fig. 7: Vacuum balance system


1	Vessel under vacuum	2	Vacuum balance line
3	Shut-off element	4	Swing check valve
5	Main shut-off element	6	Vacuum-tight shut-off element



NOTE

An additional line fitted with a shut-off valve (from the pump discharge nozzle to the balance line) facilitates venting of the pump before start-up.

5.5 Auxiliary connections



⚠ WARNING

Screw plugs subjected to pressure
Risk of injuries by parts flying off and escaping fluid!

- ▷ Never use screw plugs for releasing pressure from the pump casing.
- ▷ Always use suitable venting devices (e.g. vent valve).

The following auxiliary connections are available:

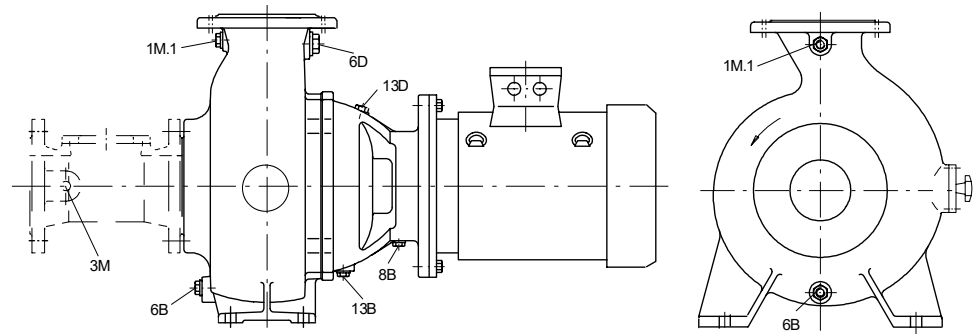


Fig. 8: Auxiliary connections

Table 14: Sizes of auxiliary connections

Connection	Description	Size			
		050 - 215 050 - 216 050 - 250 050 - 251 065 - 252 065 - 253	065 - 215 065 - 216 065 - 217 065 - 250 065 - 252 065 - 253	080 - 215	150 - 315
				080 - 216	150 - 317
				080 - 217	200 - 315
				080 - 250	200 - 316
				080 - 252	200 - 317
				080 - 253	200 - 318
				080 - 315	
				080 - 316	
				080 - 317	
				100 - 215	
				F 100 - 251	
				F 100 - 252	
				F 100 - 253	
				100 - 254	
				100 - 316	
100 - 317					
150 - 251					
1M.1	Pressure gauge	G 1/2			
6D	Vent	G 1/2	G 3/4	G 1	
3M	Pressure/vacuum gauge	G 1/2			
6B	Casing drain	G 1/2			G 1
8B	Leakage monitor	G 3/8			
13D	Filler opening	G 1/2			
13B	Drain opening	G 3/8			

5.6 Checking the lubricants

Grease-lubricated bearings

Grease-lubricated bearings have been packed with grease at the factory.

Lubrication of mechanical seals

The lubricant reservoirs have been filled at the factory.
Before commissioning the pump set, check the lubricant level.

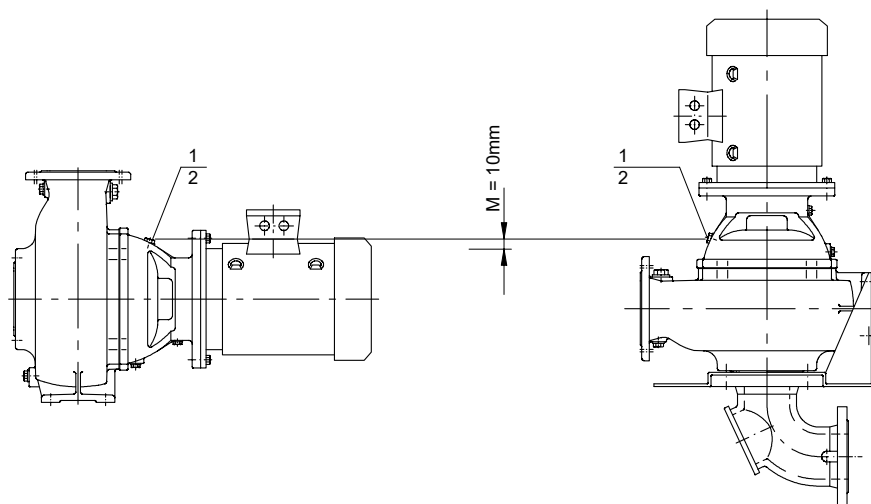





Fig. 9: Checking the lubricant level





- ✓ The pump set has been installed as specified.
- 1. Unscrew and remove screw plug (1) with joint ring (2).
- 2. If the lubricant level is within the tolerance range of 10 mm below the opening, screw screw plug (1) with joint ring (2) back in.
- 3. If the lubricant level is below the tolerance range, refill the chamber with lubricant.

5.7 Electrical connection

	<div style="background-color: #f4a460; padding: 5px;">⚠ DANGER</div> <p>Electrical connection work by unqualified personnel Danger of death from electric shock!</p> <ul style="list-style-type: none"> ▷ Always have the electrical connections installed by a trained electrician. ▷ Observe regulations IEC 60364 and, for explosion-proof versions, EN 60079 .
	<div style="background-color: #f4a460; padding: 5px;">⚠ WARNING</div> <p>Incorrect connection to the mains Damage to the power supply network, short circuit!</p> <ul style="list-style-type: none"> ▷ Observe the technical specifications of the local energy supply companies.
	<div style="background-color: #0070c0; color: white; padding: 5px;">NOTE</div> <p>Installing a motor protection device is recommended.</p>

1. Check the available mains voltage against the data on the motor name plate.
2. Select an appropriate starting method.


5.8 Checking the direction of rotation

 	<div style="background-color: #e67e22; color: white; padding: 5px;">⚠ DANGER</div> <p>Temperature increase resulting from contact between rotating and stationary components Explosion hazard! Damage to the pump set!</p> <p>▸ Never check the direction of rotation by starting up the unfilled pump.</p>
	<div style="background-color: #f1c40f; padding: 5px;">⚠ WARNING</div> <p>Hands inside the pump casing Risk of injuries, damage to the pump!</p> <p>▸ Always disconnect the pump set from the power supply and secure it against unintentional start-up before inserting your hands or other objects into the pump.</p>
	<div style="background-color: #f1c40f; padding: 5px;">CAUTION</div> <p>Drive and pump running in the wrong direction of rotation Damage to the pump!</p> <p>▸ Refer to the arrow indicating the direction of rotation on the pump. ▸ Check the direction of rotation. If required, check the electrical connection and correct the direction of rotation.</p>

The correct direction of rotation of motor and pump is in clock-wise direction (seen from the motor end).

1. Start the pump set and stop it again immediately to determine the motor's direction of rotation.
2. Check the direction of rotation.
The motor's direction of rotation must match the arrow indicating the direction of rotation on the pump.
3. If the pump runs in the wrong direction of rotation, check the connection of the motor and switchgear, if any.

5.9 Priming and venting the pump

	<div style="background-color: #e67e22; color: white; padding: 5px;">⚠ DANGER</div> <p>Shaft seal failure caused by insufficient lubrication Hot or toxic fluid could escape! Damage to the pump!</p> <p>▸ Before starting up the pump set, vent the pump and suction line and prime both with the fluid to be handled.</p>
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1. Vent the pump and suction line and prime both with the fluid to be handled.
2. Fully open the shut-off valve in the suction line.
3. Fully open all auxiliary connections (barrier fluid, flushing liquid, etc).

6 Commissioning/Start-up/Shutdown




6.1 Commissioning/Start-up



6.1.1 Prerequisites for commissioning/start-up

Before commissioning/starting up the pump set, make sure that the following conditions are met:

- The pump set has been properly connected to the power supply and is equipped with all protection devices. (⇒ Section 5.7, Page 28)
- The pump has been filled with the fluid to be handled. The pump has been vented.
- The direction of rotation has been checked.
- All auxiliary connections required are connected and operational.
- The lubricant has been checked.
- After prolonged shutdown of the pump (set), the activities required for returning the equipment to service have been carried out.

6.1.2 Start-up


	<div style="background-color: #e67e22; color: white; padding: 5px;">⚠ DANGER</div> <p>Non-compliance with the permissible pressure and temperature limits if the pump is operated with the suction and/or discharge line closed.</p> <p>Explosion hazard! Hot or toxic fluids escaping!</p> <ul style="list-style-type: none"> ▷ Never operate the pump with the shut-off elements in the suction line and/or discharge line closed. ▷ Only start up the pump set with the discharge-side shut-off element slightly or fully open.
	<div style="background-color: #e67e22; color: white; padding: 5px;">⚠ DANGER</div> <p>Excessive temperatures due to dry running or excessive gas content in the fluid handled</p> <p>Explosion hazard! Damage to the pump set!</p> <ul style="list-style-type: none"> ▷ Never operate the pump set without liquid fill. ▷ Prime the pump as per operating instructions. ▷ Always operate the pump within the permissible operating range. ▷ If the pump is in slurp mode, stop the pump immediately.
	<div style="background-color: #f1c40f; color: white; padding: 5px;">⚠ WARNING</div> <p>Pump sets with high noise levels</p> <p>Damage to hearing!</p> <ul style="list-style-type: none"> ▷ Persons must only enter the vicinity of the running pump set if they are wearing protective clothing/ear protection. ▷ See noise characteristics. (⇒ Section 4.7, Page 17)

	 WARNING
	<p>Abnormal noises, vibrations, temperatures or leakage</p> <p>Damage to the pump! Risk of personal injury!</p> <ul style="list-style-type: none"> ▷ Switch off the pump (set) immediately. ▷ Eliminate the causes before returning the pump set to service.

✓ The pump, suction line and discharge line have been vented and primed with the fluid to be handled.

1. Fully open the shut-off element in the suction head/suction lift line.
2. Close/slightly open the shut-off element in the discharge line; fully open the shut-off element if a check valve is installed.
3. Start up the motor.
4. Immediately after the pump has reached full rotational speed, swiftly open the shut-off element in the discharge line and adjust it to comply with the duty point.

Frequency inverter When the pump is started up via frequency inverter, ensure short start ramps (approximately 3 - 5 seconds).

	NOTE
	<p>Speed-controlled operation shall only start after approximately 3 to 5 minutes. Pump start-up with long start ramps and low frequency may cause clogging.</p>




6.1.3 Shutdown


1. Close the shut-off element in the discharge line.
If the discharge line is equipped with a check valve, the shut-off element may remain open as long as there is back pressure.
2. Switch off the motor, making sure that the unit runs down smoothly to a standstill.

Prolonged shutdown periods For prolonged shutdown, close the shut-off element in the suction line.

Danger of frost/freezing If there is any danger of frost/freezing, drain the pump and protect it against freezing.

6.2 Operating limits

 	 DANGER
	<p>Non-compliance with operating limits for pressure, temperature, fluid handled and speed</p> <p>Explosion hazard! Hot or toxic fluid could escape!</p> <ul style="list-style-type: none"> ▷ Comply with the operating data specified in the data sheet. ▷ Never use the pump for handling fluids it is not designed for. ▷ Avoid prolonged operation against a closed shut-off element. ▷ Never operate the pump at temperatures, pressures or rotational speeds exceeding those specified in the data sheet or on the name plate unless the written consent of the manufacturer has been obtained.

	<div style="background-color: #e67e22; color: white; padding: 5px;">⚠ DANGER</div> <p>Formation of a potentially explosive atmosphere inside the pump Explosion hazard!</p> <p>▷ When draining tanks take suitable measures to prevent dry running of the pump (e.g. fill level monitoring).</p>
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6.2.1 Maximum operating pressure


	<div style="background-color: #f1c40f; color: black; padding: 5px;">CAUTION</div> <p>Permissible operating pressure exceeded Damage to connections and seals!</p> <p>▷ Never exceed the operating pressure specified in the data sheet.</p>
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Table 15: Maximum operating pressure [bar]

Size	Maximum operating pressure	Maximum test pressure
050 - 215	10	15
050 - 216	10	15
050 - 250	10	15
050 - 251	10	15
065 - 215	6	9
065 - 216	6	9
065 - 217	7	10,5
065 - 250	6	9
065 - 252	6	9
065 - 253	6	9
080 - 215	6	8,5
080 - 216	7	10,5
080 - 217	6	9
080 - 250	6	9
080 - 252	6	9
080 - 253	6	9
080 - 315	10	15
080 - 316	10	15
080 - 317	10	15
100 - 215	6	9
F 100 - 251	6	9
100 - 252	6	9
100 - 253	6	9
100 - 254	6	9
100 - 255	6	9
D 100 - 316	10	15
100 - 316	6	9
125 - 315	6	9
150 - 253	6	9
150 - 315	6	9
150 - 317	6	9
200 - 315	6	9
200 - 316	6	9

Size	Maximum operating pressure	Maximum test pressure
200 - 317	4	6
200 - 318	4	6

6.2.2 Frequency of starts


To prevent high temperature increases in the motor and excessive loads on the pump, motor, seals and bearings, the frequency of starts shall not exceed the following number of starts per hour.

Table 16: Frequency of starts

Rated motor power [kW]	Maximum frequency of starts [Starts/hour]
≤ 11	25
12 - 37	20


6.2.3 Fluid handled

6.2.3.1 Temperature of the fluid handled

	<div style="background-color: #FFD700; padding: 5px;">CAUTION</div> <p>Impermissibly high temperature of fluid handled Damage to the pump!</p> <ul style="list-style-type: none"> ▷ Prolonged operation against a closed shut-off element is not permitted (heating up of the fluid). ▷ Observe the temperature limits in the data sheet and in the section on operating limits. (⇒ Section 6.2, Page 31)
--	---

6.2.3.2 Density of the fluid handled

The power input of the pump set will change in proportion to the density of the fluid handled.

	<div style="background-color: #FFD700; padding: 5px;">CAUTION</div> <p>Impermissibly high density of the fluid handled Motor overload!</p> <ul style="list-style-type: none"> ▷ Observe the information about fluid density in the data sheet. ▷ Make sure the motor has sufficient power reserves.
---	---

6.2.3.3 Abrasive fluids

Do not exceed the maximum permissible solids content specified in the data sheet. When the pump handles fluids containing abrasive substances, increased wear of the hydraulic system and the shaft seal are to be expected. In this case, halve the intervals commonly recommended for servicing and maintenance.

6.3 Shutdown/storage/preservation

Storing a new pump set

If commissioning is to take place some time after delivery, we recommend that the following measures be taken for pump (set) storage:

- Store the pump (set) in a dry and protected location.
- If properly stored indoors, the pump set is protected for a maximum of 12 months.
New pumps are supplied by our factory duly prepared for storage.
- Rotate the shaft of the pump by hand once a month.

The pump (set) remains installed

- ✓ Sufficient fluid is supplied for the functional check run of the pump.
 1. For prolonged shutdown periods, start up the pump (set) regularly between once a month and once every three months for approximately five minutes.
⇒ This will prevent the formation of deposits within the pump and the pump intake area.



The pump (set) is removed from the pipe and stored

- ✓ The pump has been properly drained. (⇒ Section 7.3, Page 40)
- ✓ The safety instructions for dismantling the pump have been observed.
- ✓ The permissible ambient temperature for storing the pump is observed.
 1. Spray-coat the inside wall of the pump casing and, in particular, the impeller clearance areas with a preservative.
 2. Spray the preservative through the suction nozzle and discharge nozzle.
It is advisable to then close the pump nozzles (e.g. with plastic caps)
 3. Oil or grease all exposed machined parts and surfaces of the pump (with silicone-free oil or grease, food-approved, if required) to protect them against corrosion.
Observe the additional instructions on preservation.

6.4 Returning to service












For returning the equipment to service, observe the sections on commissioning/start-up (⇒ Section 6.1, Page 30) and the operating limits (⇒ Section 6.2, Page 31) .

In addition, carry out all servicing/maintenance operations before returning the pump (set) to service. (⇒ Section 7, Page 35)


	! WARNING
	Failure to re-install or re-activate protective devices Risk of injury from moving parts or escaping fluid! ▷ As soon as the work is completed, properly re-install and re-activate any safety-relevant devices and protective devices.
	NOTE
	On pumps/pump sets older than 5 years we recommend replacing all elastomer seals.

7 Servicing/Maintenance

7.1 Safety regulations

	<div data-bbox="507 315 683 360"> DANGER</div> <p>Sparks produced during servicing work Explosion hazard!</p> <ul style="list-style-type: none"> ▷ Observe the safety regulations in force at the place of installation! ▷ Always perform maintenance work on explosion-proof pump sets outside potentially explosive atmospheres.
 	<div data-bbox="507 593 683 638"> DANGER</div> <p>Improperly serviced pump set Explosion hazard! Damage to the pump set!</p> <ul style="list-style-type: none"> ▷ Service the pump set regularly. ▷ Prepare a maintenance schedule with special emphasis on lubricants and shaft seal.
	<div data-bbox="507 1010 703 1055"> WARNING</div> <p>Unintentional starting of the pump set Risk of injury by moving components and shock currents!</p> <ul style="list-style-type: none"> ▷ Ensure that the pump set cannot be started unintentionally. ▷ Always make sure the electrical connections are disconnected before carrying out work on the pump set.
	<div data-bbox="507 1288 683 1332"> DANGER</div> <p>Improper cleaning of coated pump surfaces Explosion hazard by electrostatic discharge!</p> <ul style="list-style-type: none"> ▷ When cleaning coated pump surfaces in atmospheres of Explosion group IIC, use suitable anti-static equipment.
	<div data-bbox="507 1527 703 1572"> WARNING</div> <p>Fluids handled, consumables and supplies which are hot and/or pose a health hazard Risk of injury!</p> <ul style="list-style-type: none"> ▷ Observe all relevant laws. ▷ When draining the fluid take appropriate measures to protect persons and the environment. ▷ Decontaminate pumps which handle fluids posing a health hazard.

The operator ensures that maintenance, inspection and installation are performed by authorised, qualified specialist personnel who are thoroughly familiar with the manual.

	⚠ WARNING
	Insufficient stability Risk of crushing hands and feet! <ul style="list-style-type: none"> ▷ During assembly/dismantling, secure the pump (set)/pump parts to prevent tilting or tipping over.


A regular maintenance schedule will help avoid expensive repairs and contribute to trouble-free, reliable operation of the pump, pump set and pump parts with a minimum of servicing/maintenance expenditure and work.


	NOTE
	All maintenance work, service work and installation work can be carried out by KSB Service or authorised workshops. For contact details refer to the enclosed "Addresses" booklet or visit " www.ksb.com/contact " on the Internet.



Never use force when dismantling and reassembling the pump set.

7.2 Servicing/Inspection

7.2.1 Supervision of operation

	⚠ DANGER
	Formation of a potentially explosive atmosphere inside the pump Explosion hazard! <ul style="list-style-type: none"> ▷ The pump internals in contact with the fluid to be handled, including the seal chamber and auxiliary systems must be filled with the fluid to be handled at all times. ▷ Provide sufficient inlet pressure. ▷ Provide an appropriate monitoring system. ▷ If the pump is in slurp mode, stop the pump immediately.




	CAUTION
	Increased wear due to dry running Damage to the pump set! <ul style="list-style-type: none"> ▷ Never operate the pump set without liquid fill. ▷ Never close the shut-off element in the suction line and/or supply line during pump operation.

 	⚠ DANGER
	Non-compliance with operating limits for pressure, temperature, fluid handled and speed Explosion hazard! Hot or toxic fluid could escape! <ul style="list-style-type: none"> ▷ Comply with the operating data specified in the data sheet. ▷ Never use the pump for handling fluids it is not designed for. ▷ Avoid prolonged operation against a closed shut-off element. ▷ Never operate the pump at temperatures, pressures or rotational speeds exceeding those specified in the data sheet or on the name plate unless the written consent of the manufacturer has been obtained.

While the system is in operation, observe and check the following:





- The pump must run quietly and free from vibrations at all times.
- Monitor the correct functioning of any auxiliary connections.
- Monitor the stand-by pump.
To make sure that stand-by pumps are ready for operation, start them up once a week.
- Check the flexible elements of the coupling or belts and replace them if required.

7.2.2 Inspection work

 	<div style="background-color: #e67e22; color: white; padding: 5px;"> DANGER</div> <p>Electrostatic charging Explosion hazard! Damage to the pump set!</p> <ul style="list-style-type: none"> ▷ Connect the potential equalisation conductor to the earthing terminal provided. ▷ Make sure that the connection between pump and baseplate is electrically conductive. ▷ Screws, bolts, nuts and shims must not be coated or the coating must be removed. ▷ Provide potential equalisation between the pump set and the foundation.
--	---

7.2.2.1 Visual inspection through the inspection hole

If there are problems with clogging, the inside of the casing and the impeller can be checked via the inspection hole.

	<div style="background-color: #f1c40f; color: white; padding: 5px;"> WARNING</div> <p>Fluids handled, consumables and supplies which are hot and/or pose a health hazard Hazard to persons and the environment!</p> <ul style="list-style-type: none"> ▷ Collect and properly dispose of flushing fluid and any fluid residues. ▷ Wear safety clothing and a protective mask if required. ▷ Observe all legal regulations on the disposal of fluids posing a health hazard.
	<div style="background-color: #f1c40f; color: white; padding: 5px;"> WARNING</div> <p>Hands or foreign objects in the pump casing Risk of injuries, damage to the pump!</p> <ul style="list-style-type: none"> ▷ Check that the inside of the pump is free from any foreign objects. Remove any foreign objects. ▷ Never insert your hands or any other objects into the pump, if the pump set has not been disconnected from the power supply and secured against unintentional start-up.

If a problem has occurred which requires visual inspection, observe the following instructions:

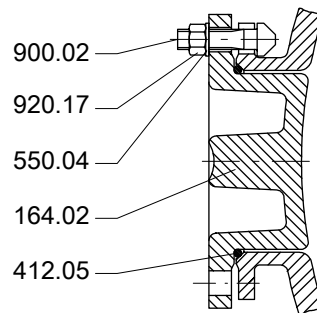


Fig. 10: Inspection hole in the casing

Opening the inspection hole

- Close the shut-off element on the suction side.
- Switch off the drive and make sure it cannot be re-started unintentionally.
- Close the shut-off element on the discharge side.
- Open the drain plug (auxiliary connection 6B).
- Collect and dispose of any liquid residues.
- Loosen nuts 920.17 at the inspection hole. Remove inspection cover 164.02.
- Perform a visual inspection with a lamp or similar.

Closing the inspection hole

- Fit new O-ring 412.05.
- Fit inspection cover 164.02.
- Fit discs 550.04 and nuts 920.17 on screws 900.02. Tighten the nuts.
- Observe the instructions on commissioning/start-up. (⇒ Section 6.1.1, Page 30)

7.2.3 Lubrication and lubricant change



	<p>! DANGER</p> <p>Excessive temperatures as a result of bearings running hot or defective bearing seals</p> <p>Explosion hazard! Fire hazard! Damage to the pump set!</p> <p>▷ Regularly check the condition of the lubricant.</p>
--	---

7.2.3.1 Lubricating the rolling element bearings

The rolling element bearings of the pump sets are grease-packed and maintenance-free.

7.2.3.2 Changing the lubricant of the mechanical seal

	<p>! DANGER</p> <p>Excessive temperatures in the shaft seal area</p> <p>Explosion hazard! Damage to the pump set!</p> <p>▷ Regularly check the lubricant level.</p>
--	---

	<p>! WARNING</p> <p>Lubricants posing a health hazard and/or hot lubricants Hazard to persons and the environment!</p> <ul style="list-style-type: none"> ▷ When draining the lubricant take appropriate measures to protect persons and the environment. ▷ Wear safety clothing and a protective mask if required. ▷ Collect and dispose of any lubricants. ▷ Observe all legal regulations on the disposal of fluids posing a health hazard.
	<p>! WARNING</p> <p>Screw plugs subjected to pressure When opening screw plugs, liquid might spurt out!</p> <ul style="list-style-type: none"> ▷ Wear safety goggles and protective clothing, if required. ▷ Open the screw plug slowly.

The lubricant reservoir of the pump set is filled at the factory with environmentally-friendly, non-toxic lubricant of medical quality.
Change the lubricant every 10,000 operating hours, but at least every 3 years.

Draining the lubricant

- ✓ Have a suitable container on hand for the used lubricant.
- 1. Place the container underneath screw plug 903.46.
- 2. Remove screw plug 903.46 and joint ring 411.46 at the bottom side of the bearing bracket and drain off the lubricant.
- 3. Fit screw plug 903.46 with joint ring 411.46.

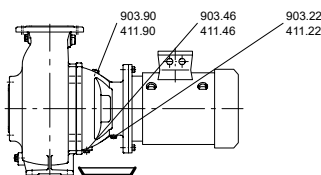



Fig. 11: Draining the lubricant

	<p>NOTE</p> <p>Paraffin oil is bright and transparent in appearance. If the oil fill is severely contaminated, this will suggest a defective mechanical seal.</p> <ul style="list-style-type: none"> ▷ Replace the mechanical seal.
---	--

Filling in the lubricant

- 1. Unscrew and remove screw plug 903.90 with joint ring 411.90.
- 2. Fill the lubricant reservoir up to the filler opening.
- 3. Fit screw plug 903.90 with joint ring 411.90.

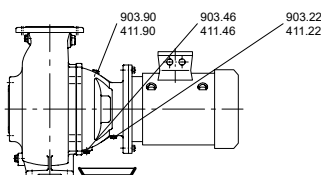


Fig. 12: Filling in the lubricant

7.2.3.3 Quantity of lubricant

Table 17: Lubricant quantity [l]

Size	Bearing bracket	Lubricant quantity
050 - 215	B01	2,5
050 - 216	B01	2,5
050 - 250	B01	3,2
050 - 251	B02	4,0
065 - 215	B01	2,5
065 - 216	B01	2,5
065 - 217	B01	2,5
065 - 250	B01	3,2

Size	Bearing bracket	Lubricant quantity
065 - 252	B01	3,2
065 - 252	B02	4,0
065 - 253	B01	3,2
065 - 253	B02	4,0
080 - 215	B01	2,5
080 - 216	B01	2,5
080 - 217	B01	2,5
080 - 250	B01	3,2
080 - 252	B01	3,2
080 - 253	B02	4,0
080 - 315	B03	6,0
080 - 316	B03	6,0
080 - 317	B03	6,0
100 - 215	B01	2,5
100 - 251	B02	4,0
100 - 252	B01	3,2
100 - 253	B02	4,0
100 - 254	B01	3,2
100 - 316	B03	6,0
150 - 253	B03	6,0
150 - 315	B03	6,0
150 - 317	B03	6,0
200 - 315	B03	6,0
200 - 316	B03	6,0
200 - 317	B03	6,0
200 - 318	B03	6,0



7.2.3.4 Lubricant quality

Recommended lubricant quality

Alternative

- Environmentally friendly, non-toxic white oil of medical quality
- Thin-bodied paraffin oil, non-toxic
- Water/propylene glycol mixture with corrosion inhibitors for frost protection down to < -20 °C

7.3 Drainage/cleaning



	 WARNING
	Fluids handled, consumables and supplies which are hot and/or pose a health hazard Hazard to persons and the environment! <ul style="list-style-type: none"> ▷ Collect and properly dispose of flushing fluid and any fluid residues. ▷ Wear safety clothing and a protective mask if required. ▷ Observe all legal regulations on the disposal of fluids posing a health hazard.

If the pump set has handled fluids whose residues could lead to corrosion damage in the presence of atmospheric humidity or could ignite upon contact with oxygen, the pump set must be neutralised, and anhydrous inert gas must be blown through the pump to ensure drying.

Use connection 6B to drain the fluid handled (see drawing of auxiliary connections).

7.4 Dismantling the pump set

7.4.1 General information/Safety regulations


	<p>! WARNING</p> <p>Unqualified personnel performing work on the pump (set) Risk of injury!</p> <ul style="list-style-type: none"> ▷ Always have repair work and maintenance work performed by specially trained, qualified personnel.
	<p>! WARNING</p> <p>Improper lifting/moving of heavy assemblies or components Personal injury and damage to property!</p> <ul style="list-style-type: none"> ▷ Use suitable transport devices, lifting equipment and lifting tackle to move heavy assemblies or components.

Observe the general safety instructions and information in



For any work on the motor, observe the instructions of the relevant motor manufacturer.

For dismantling and reassembly observe the exploded view and the general assembly drawing.

In case of damage you can always contact our service departments.

	<p>! DANGER</p> <p>Insufficient preparation of work on the pump (set) Risk of injury!</p> <ul style="list-style-type: none"> ▷ Properly shut down the pump set. ▷ Close the shut-off elements in the suction line and discharge line. ▷ Drain the pump and release the pump pressure. (⇒ Section 7.3, Page 40) ▷ Shut off any auxiliary feed lines. ▷ Allow the pump set to cool down to ambient temperature.
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7.4.2 Preparations for dismantling

	<p>! DANGER</p> <p>Insufficient preparation of work on the pump (set) Risk of injury!</p> <ul style="list-style-type: none"> ▷ Properly shut down the pump set. ▷ Close the shut-off elements in the suction line and discharge line. ▷ Drain the pump and release the pump pressure. (⇒ Section 7.3, Page 40) ▷ Shut off any auxiliary feed lines. ▷ Allow the pump set to cool down to ambient temperature.
	<p>! WARNING</p> <p>Components with sharp edges Risk of cutting or shearing injuries!</p> <ul style="list-style-type: none"> ▷ Always use appropriate caution for installation and dismantling work. ▷ Wear work gloves.



NOTE

The pump casing can remain installed in the piping for further dismantling.

1. Disconnect the power supply (e.g. at the motor).
2. Disconnect and remove all auxiliary pipework.
3. Remove coupling guard 681.
4. Remove the coupling spacer of coupling 848, if any.
5. Drain the oil.

7.4.3 Separating the pump from the piping

- ✓ The pump set has been switched off properly.
 - ✓ The shut-off elements in the suction line and discharge line have been closed.
 - ✓ Any auxiliary connections have been closed.
 - ✓ The pump has been drained and the pump pressure has been released.
1. Disconnect any auxiliary feed lines.
 2. Remove the discharge nozzle and suction nozzle from the piping.



NOTE

After the pump set has been dismantled, the suction casing should be cleaned with water. Suitable protective clothing is recommended.

7.4.4 Removing the pump set



WARNING

Pump set tilting

Risk of squashing hands and feet!

- ▷ Suspend or support the pump set.

- ✓ The pump set has been disconnected from the piping.
(⇒ Section 7.4.3, Page 42)
- 1. Suspend the pump set as specified for transport (⇒ Section 3.2, Page 12) .
- 2. Depending on the type of installation, loosen the fastening bolts at the pump foot or at the soleplate.
- 3. Place the pump set in a horizontal position.

7.4.5 Removing the motor



WARNING

Motor tipping over

Risk of crushing hands and feet!

- ▷ Suspend or support the motor to prevent it from tipping over.

- ✓ The steps in (⇒ Section 7.4.4, Page 42) have been carried out.
- ✓ The electrical connections of the motor have been disconnected.
- 1. Fasten rope to motor 800.
- 2. Undo screwed connection 901.57 / 920.57 / 550.57.
- 3. Pull motor in axial direction out of bearing bracket 330 and stub shaft 210.

7.4.6 Removing the impeller



NOTE

A forcing screw is required to remove the impeller.
The forcing screw is not included in the scope of supply. It can be ordered separately from KSB.

- ✓ The notes and steps stated in (⇒ Section 7.4.5, Page 42) have been observed/ carried out.
- 1. Remove screw plug 903.46 and joint ring 411.46. Then drain off the lubricant.
- 2. Fasten the rope to bearing bracket 330 and suspend it from the lifting equipment.
- 3. Loosen screwed connections 902.01 and 920.01 and pull complete bearing bracket 330 with shaft 210 and impeller 230 out of pump casing 101.
- 4. Undo hexagon socket head cap screw 914.10 and disc 550.23.
- 5. Screw the grub screw into the shaft thread.
- 6. Pull off impeller 230 with a forcing screw.

Table 18: Forcing screws for pulling off the impeller

Size	Impeller type	Forcing screw (ADS)	
		Thread	Code
050 - 215	F	M 10	ADS 0
050 - 216	F	M 10	ADS 0
050 - 250	F, K	M 16	ADS 1
050 - 251	F, K	M 20	ADS 2
065 - 215	F	M 10	ADS 6
065 - 216	E	M 12	ADS 7
065 - 217	F	M 10	ADS 6
065 - 250	F, K	M 16	ADS 1
065 - 252 B01	K	M 16	ADS 1
065 - 252 B02	K	M 20	ADS 2
065 - 253 B01	K	M 16	ADS 1
065 - 253 B02	K	M 20	ADS 2
065 - 253	F	M 20	ADS 2
080 - 215	F	M 10	ADS 6
080 - 216	F	M 10	ADS 6
080 - 216	E	M 12	ADS 7
080 - 217	F	M 10	ADS 6
080 - 250	F, K	M 16	ADS 1
080 - 252	F	M 16	ADS 1
080 - 253	F, E	M 20	ADS 2
080 - 315	K	M 20	ADS 2
080 - 315	D	M 20	ADS 4
080 - 316	D	M 20	ADS 4
080 - 317	F	M 20	ADS 2
080 - 317	D	M 20	ADS 4
100 - 215	F	M 10	ADS 6
100 - 251	F	M 20	ADS 2
100 - 252	F	M 16	ADS 1
100 - 253	E, F, K	M 20	ADS 2
100 - 253	D	M 16	ADS 3
100 - 254	F, K	M 16	ADS 1

Size	Impeller type	Forcing screw (ADS)	
		Thread	Code
100 - 316	D	M 20	ADS 4
100 - 316	F, K	M 20	ADS 2
100 - 317	E	M 20	ADS 2
150 - 253	D	M 16	ADS 3
150 - 315	F	M 20	ADS 2
150 - 315	D	M 20	ADS 4
150 - 317	E, K	M 20	ADS 2
200 - 315	K	M 20	ADS 2
200 - 315	D	M 20	ADS 4
200 - 316	K	M 20	ADS 2
200 - 317	K	M 20	ADS 2
200 - 318	K	M 20	ADS 2

7.4.7 Dismantling the mechanical seal

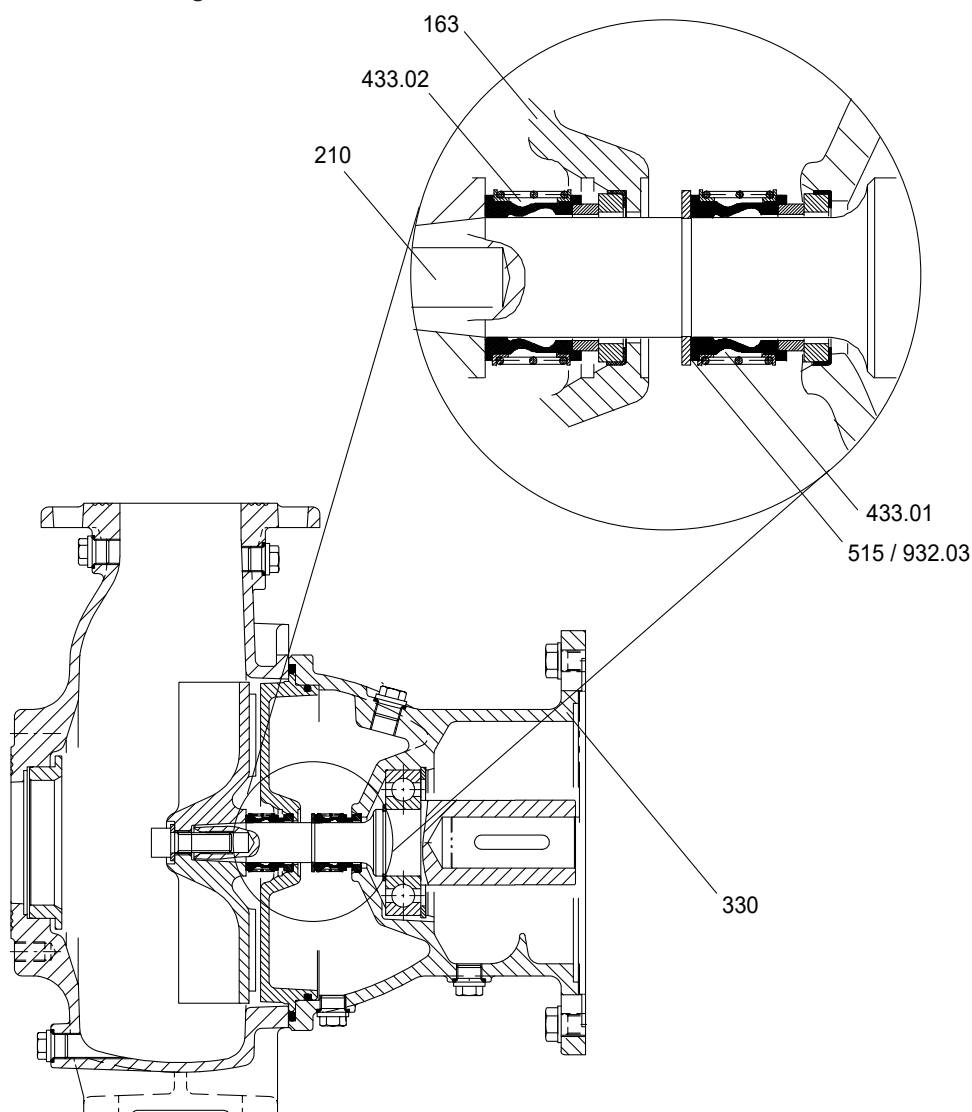


Fig. 13: Dismantling the mechanical seal

2580.8177/01-EN

7.4.7.1 Dismantling the pump-end mechanical seal

- ✓ The back pull-out unit and the impeller have been removed as described above.
 1. Pull the rotating assembly of mechanical seal 433.01 off shaft 210.
 2. Remove discharge cover 163 from bearing bracket 330.
 3. Press the stationary seat of mechanical seal 433.02 out of discharge cover 163.

7.4.7.2 Dismantling the motor-end mechanical seal

- ✓ The back pull-out unit and the impeller have been removed as described above.
 1. Remove locking ring 515 or circlip 932.03.
 2. Pull the rotating assembly of mechanical seal 433.01 off shaft 210.

7.4.7.3 Removing the C022/025/11-4STQ double cartridge seal

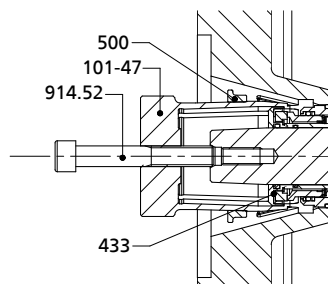


Fig. 14: Removing the C022/025/11-4STQ double cartridge seal

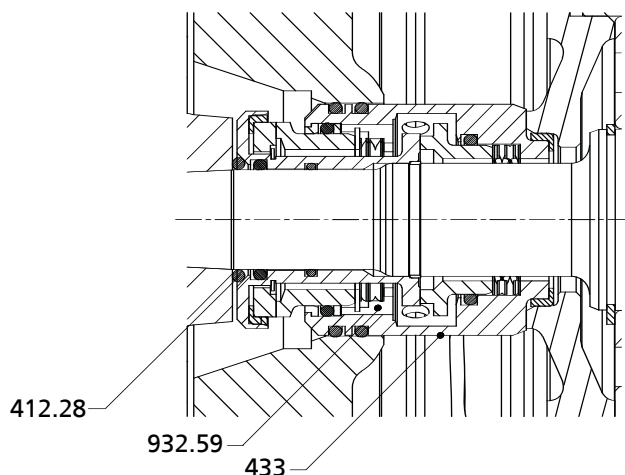


Fig. 15: Removing the mechanical seal

- ✓ The back pull-out unit and the impeller have been removed as described above.
 1. Fix discharge cover 163 to bearing bracket 330 using suitable bolts/screws and washers.
 2. Remove O-ring 412.28 from the shaft.
 3. Slide puller 101-47 over the shoulder of mechanical seal 433 and lock with ring 500.
 4. Press forcing screw 914.52 against shaft 210 and pull mechanical seal 433 out of discharge cover 163.

7.4.7.4 Removing the C033/055M1-4STQ double cartridge seal


The rules of sound engineering practice and the pump manufacturer's general provisions apply. Tidiness and cleanliness are essential for proper execution of the installation work.

- ✓ The back pull-out unit of the pump has been removed from the pump casing and safely positioned and secured in a horizontal position.
- ✓ The impeller and keys have been removed from the pump shaft.
 1. Remove circlip 932.53 from discharge cover 163.
 2. Use the radial groove in shaft sleeve 523 to remove the mechanical seal cartridge. Remove evenly, using a suitable extraction tool.
 3. Carefully pull the complete cartridge seal off the shaft.
 4. Clean the pump components in the area of the mechanical seal, pump shaft 210, discharge cover 163 and bearing bracket 330. Check for any damage.

Further dismantling of the mechanical seal is carried out at KSB.

7.4.8 Removing shaft and rolling element bearing

- ✓ Motor, impeller and mechanical seal have been removed as described.
 1. Remove circlip 932.02 from bearing bracket 330.
 2. Drive shaft 210 with deep groove ball bearing 321.01 out of the bearing bracket towards the drive end.
 3. Remove circlip 932.20.
 4. Pull deep groove ball bearing 321.01 off the shaft.
 5. Remove the stationary seat of drive-end mechanical seal 433.01 from bearing bracket 330.
 6. Clean all components and inspect them for signs of wear.

	CAUTION
	Re-installing damaged components Damage to the machine! ► Re-work damaged components or replace by new ones.

7.4.9 Removing the wear plate (for D type impellers only)

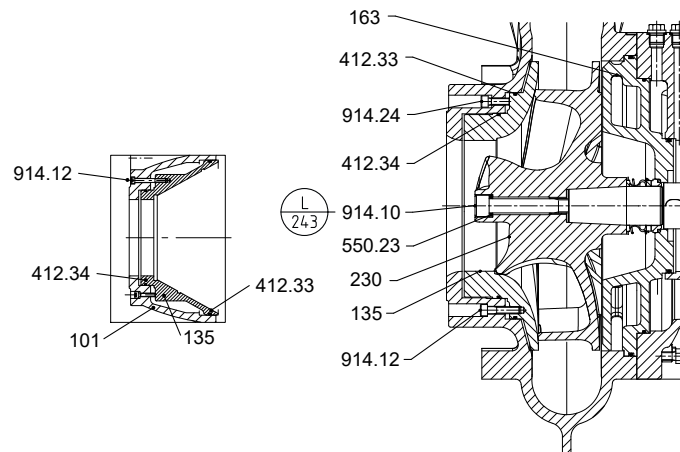


Fig. 16: Removing the wear plate

- ✓ The inside of the casing has been cleaned.
 - ✓ The wear plate needs to be replaced as a result of visual inspection.
1. Unbolt the pump casing from the piping.
 2. Undo hexagon socket head cap screws 914.12.
 3. Remove wear plate 135 and O-rings 412.33/34.

7.5 Reassembling the pump set

7.5.1 General information/Safety regulations

	<p>! WARNING</p> <p>Improper lifting/moving of heavy assemblies or components Personal injury and damage to property!</p> <ul style="list-style-type: none"> ▸ Use suitable transport devices, lifting equipment and lifting tackle to move heavy assemblies or components.
	<p>CAUTION</p> <p>Improper reassembly Damage to the pump!</p> <ul style="list-style-type: none"> ▸ Reassemble the pump (set) in accordance with the general rules of sound engineering practice. ▸ Use original spare parts only.

Sequence Always re-assemble the pump in accordance with the corresponding general assembly drawing or exploded view.

Sealing elements Check O-rings for any damage and replace by new O-rings, if required.
Never use O-rings that have been made by cutting an O-ring cord to size and gluing the ends together.
 Make sure that the sealing elements and sealing surfaces are clean.

Assembly adhesives Coat the locating surfaces of the individual components and screwed connections with graphite or similar before reassembly.

Tightening torques For reassembly, tighten all screws and bolts as specified in this manual.

Bearings Only use specified bearings to DIN 625 (item 320.01/.02).

Table 19: Bearings

Bearing bracket size	Grease-packed deep groove ball bearings, sealed for life
B01	6307 - 2 Z - C3
B02	6311 - 2 Z - C3
B03	6314 - 2 Z - C3

7.5.2 Installing the shaft and rolling element bearings

When re-installing the shaft, replace deep groove ball bearing 321.01 if required.

1. Press deep groove ball bearing 321.01 onto shaft 210 until it abuts against the shaft shoulder.
2. Insert circlip 932.20 into shaft 210.
3. Insert pre-assembled shaft 210 into bearing bracket 330 from the drive end.
4. Insert circlip 932.02.

7.5.3 Installing the mechanical seal

We recommend always using new original mechanical seals for re-assembly.

Observe the following to ensure trouble-free operation of the mechanical seal:

- Only remove the protective wrapping of the contact faces immediately before assembly takes place.
- The shaft surface must be absolutely clean and undamaged.
- Immediately before installing the mechanical seal, wet the contact faces with a drop of oil.
- For easier installation of bellows-type mechanical seals, wet the inside diameter of the bellows with soapy water (not oil).
- To prevent any damage to the rubber bellows, place a thin foil (of approximately 0.1 to 0.3 mm thickness) around the free shaft stub. Slide the rotating assembly over the foil into its installation position. Then remove the foil.

7.5.3.1 Installing the bellows-type mechanical seal

- ✓ The shaft and rolling element bearings have been properly installed in the bearing bracket.
- 1. Slide drive-end mechanical seal 433.01 onto shaft 210. Secure with locking ring 515 or circlip 932.03.
- 2. Insert O-rings 412.04 and 412.15 in discharge cover 163. Press discharge cover 163 into bearing bracket 330 until it will not go any further.
- 3. Slide pump-end mechanical seal 433.02 onto shaft 210.

For special mechanical seals with covered spring, tighten the socket head cap screw at the rotating assembly before fitting the impeller. Observe installation dimension "A".

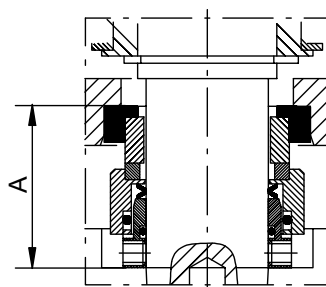

Fig. 17: Installation dimension "A"

Table 20: Installation dimension "A" [mm]

Size	Impeller type	Installation dimension "A" [mm]
050 - 215	F	29,0
050 - 216	F	29,0
050 - 250	F, K	29,0
050 - 251	F, K	38,5
065 - 215	F	29,0
065 - 216	E	38,5
065 - 217	F	29,0
065 - 250	F, K	29,0
065 - 252 B01	K	29,0
065 - 252 B02	K	38,5
065 - 253 B01	K	29,0
065 - 253 B02	K	38,5
065 - 253	F	38,5
080 - 215	F	29,0
080 - 216	F	29,0
080 - 216	E	38,5
080 - 217	F	29,0
080 - 250	F, K	29,0
080 - 252	F	29,0
080 - 253	E, F	38,5
080 - 315	K	38,5
080 - 315	D	38,5
080 - 316	D	38,5
080 - 317	D, F	38,5
100 - 215	F	29,0
100 - 251	F	38,5
100 - 252	F	29,0
100 - 253	D, E, F, K	38,5
100 - 254	F, K	29,0
100 - 316	D, F, K	38,5
150 - 253	D	38,5
150 - 315	D, F	38,5
150 - 317	K	38,5
200 - 315	D, K	38,5
200 - 316	K	38,5
200 - 317	K	38,5
200 - 318	K	38,5

7.5.3.2 Installing the C022/025M1-4STQ double cartridge seal

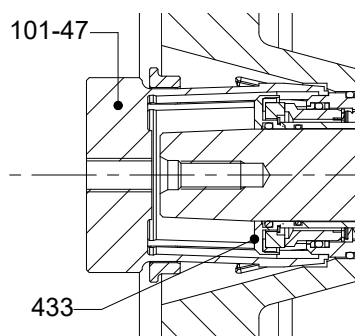


Fig. 18: Installing the C022/025M1-4STQ double cartridge seal

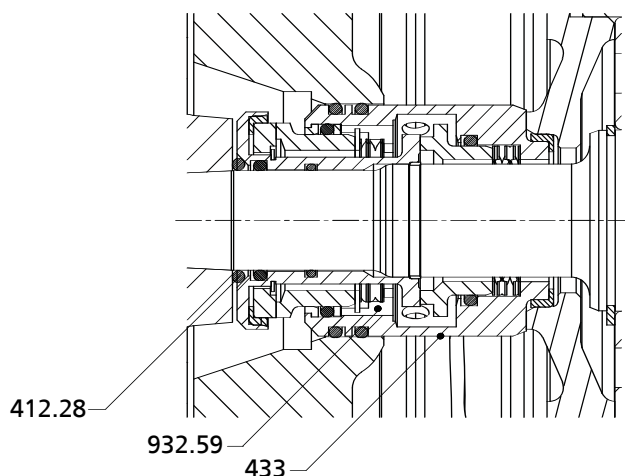



Fig. 19: Installing the mechanical seal

- ✓ The installation of the mechanical seal is carried out in accordance with the installation drawing.
 - ✓ The back pull-out unit of the pump has been placed in a clean and level assembly area.
 - ✓ The KSB 4STQ double cartridge seal is fully assembled and undamaged.
1. Insert circlip 932.59 in the shaft groove and make sure that circlip 932.59 is positioned correctly in the shaft groove. When fitting the circlip take care to prevent damage to the shaft.

	CAUTION
	<p>Use of grease or other permanent lubricants Torque transmission impeded / overheating of and damage to the pump!</p> <ul style="list-style-type: none"> ▷ Never use grease or other permanent lubricants for fitting the torque-transmitting elements of a mechanical seal. ▷ Use soft soap to reduce any friction caused during assembly. ▷ Never coat the mechanical seal faces with grease or oil.



CAUTION

Improper installation of the mechanical seal

Damage to the seal faces!

- ▷ Install the mechanical seal using the supplied mounting device 101-47.
- ▷ Prevent sudden forces acting on the mounting device and mechanical seal.

2. Prior to assembly, wet the external elastomers (O-rings and gasket) and the seats of the mechanical seal at the shaft, discharge cover 163 and seal housing with a suitable lubricant (e.g. soap suds).
3. Press mechanical seal 433 into discharge cover 163 by hand as far as possible.
4. Fit mechanical seal 433 using mounting device 101-47. Check the mechanical seal position against reference dimensions "K" (see table: Reference dimension "K") and correct the installation position if required.
5. Slide O-ring 412.28 over shaft, until it abuts against the mechanical seal.

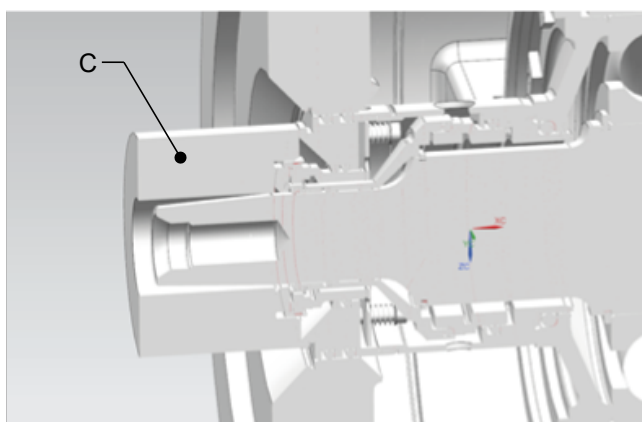


Fig. 20: Mounting device 101-47

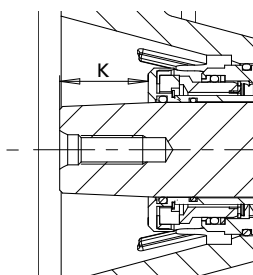





Fig. 21: Reference dimension "K" from shaft end to KSB double cartridge seal

Table 21: Reference dimension "K"

Size	Reference dimension "K"
50-215/216 65-215/217 80-215/217, F 80-216 100-215	25 +/- 0,5
65-216 E 80-216	33 +/- 0,5

Size	Reference dimension "K"
50-250 65-250/252 80-250/252 100-250/252/254	39 +/- 0,5
50-251 65-253 80-253/315/316/317 100-251/253/315/316/317 150-315/317 200-315/316/317/318	43 +/- 0,5

7.5.3.3 Installing the C033/055M1-4STQ double cartridge seal

	<p>! WARNING</p> <p>Components with sharp edges Risk of cutting or shearing injuries!</p> <ul style="list-style-type: none"> ▷ Always use appropriate caution for installation and dismantling work. ▷ Wear work gloves.
	<p>CAUTION</p> <p>Use of grease or other permanent lubricants Torque transmission impeded / overheating of and damage to the pump!</p> <ul style="list-style-type: none"> ▷ Never use grease or other permanent lubricants for fitting the torque-transmitting elements of a mechanical seal. ▷ Use soft soap to reduce any friction caused during assembly. ▷ Never coat the mechanical seal faces with grease or oil.
	<p>CAUTION</p> <p>Improper installation of the mechanical seal Damage to the seal faces!</p> <ul style="list-style-type: none"> ▷ Install the mechanical seal using the supplied mounting device C. ▷ Prevent sudden forces acting on the mounting device and mechanical seal.

- ✓ The relevant documentation for installing the mechanical seal is observed.
 - ✓ The back pull-out unit has been removed from the pump casing and safely positioned and secured in a horizontal position.
 - ✓ The original 4STQ cartridge seal is fully assembled and undamaged.
 - ✓ Mounting device C is available.
1. Guide the mechanical seal (without external O-rings) onto the shaft as far as it will go.

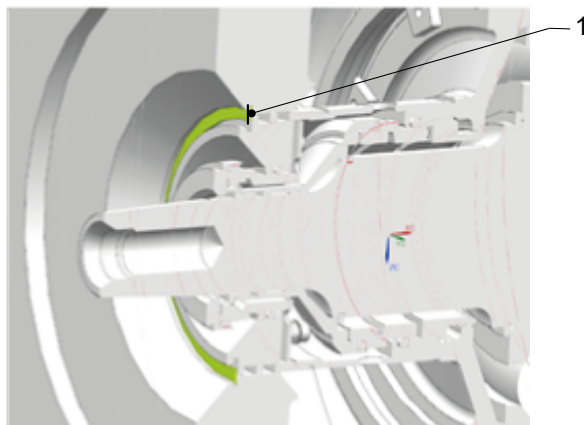


Fig. 22: Illustration of the groove

2. Visually check that the groove for the circlip in discharge cover 1 aligns with the corresponding surface of the mechanical seal (seal housing).
3. Pull the mechanical seal off the shaft.
4. Fit the circlip in the shaft groove.

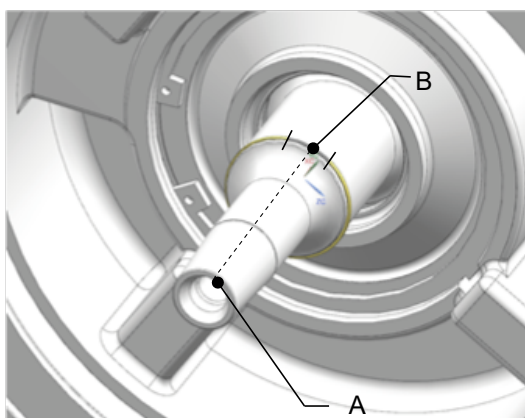


Fig. 23: Marking the shaft end

5. Mark the front face of shaft end A. To do so extend the central position of ring opening B in the axial direction.

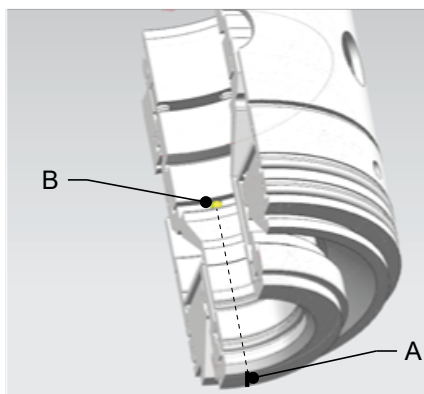


Fig. 24: Marking the mechanical seal

6. Mark the front face of mechanical seal A. To do so extend the position of the anti-rotation pin B in the axial direction.
7. Fit the external O-rings and wet them with a suitable lubricant (e.g. soap solution).

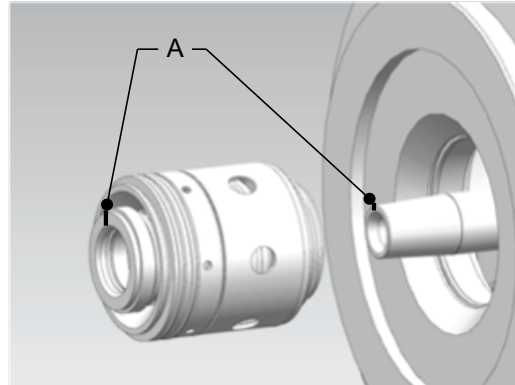


Fig. 25: Aligning the markings

8. Place the mechanical seal on the shaft. Guide it as far into the discharge cover as possible. Verify that the markings A are aligned with each other.

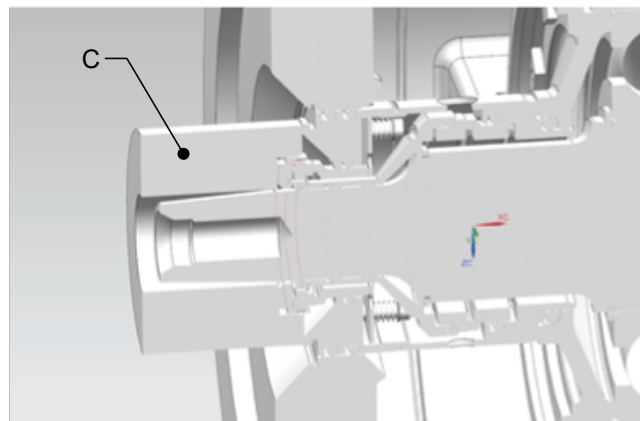


Fig. 26: Mounting device C

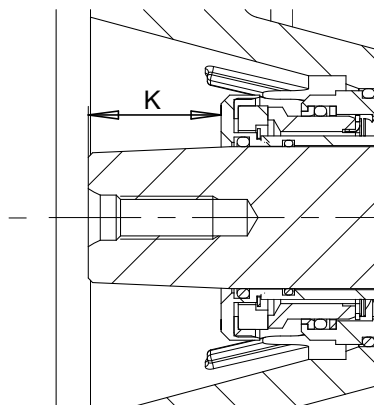


Fig. 27: Reference dimension "K" from shaft end to mechanical seal

9. Position mounting device C on the front face of the mechanical seal. Fit the mechanical seal. Verify the position of the mechanical seal with reference dimension "K" = 43+/- 0.5 mm; adjust the position if necessary.

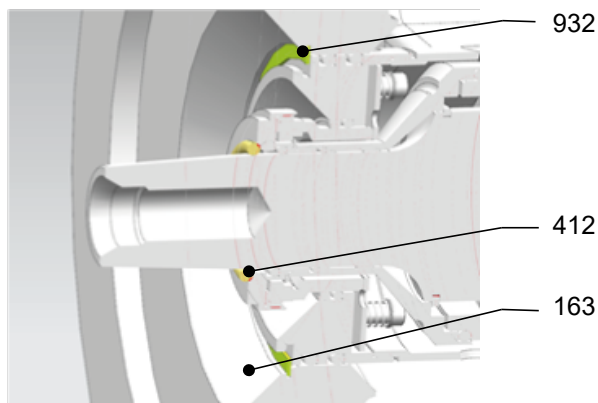


Fig. 28: Final assembly

10. Fit circlip 932 in the groove of discharge cover 163. Make sure it is correctly seated.
11. Slide O-ring 412 over the shaft until it abuts against the mechanical seal.

7.5.4 Fitting the impeller


- ✓ The shaft and rolling element bearings have been properly installed.
 - ✓ The mechanical seals have been properly installed.
1. Slide impeller 230 onto the shaft end.
 2. Screw in impeller screw 914.10 with disc 550.23. Tighten with a torque wrench.

Table 22: Tightening torque for impeller screw [Nm]

Size	Impeller type	Thread	Tightening torque [Nm]
050 - 215	F	M 8	26
050 - 216	F	M 8	26
050 - 250	F, K	M 10	35
050 - 251	F, K	M 16	150
065 - 215	F	M 8	26
065 - 216	E	M 10	35
065 - 217	F	M 8	26
065 - 250	F, K	M 10	35
065 - 252 B01	K	M 10	35
065 - 252 B02	K	M 16	150
065 - 253 B01	K	M 10	35
065 - 253 B02	K	M 16	150
065 - 253	F	M 16	150
080 - 215	F	M 8	26
080 - 216	F	M 8	26
080 - 216	E	M 10	35
080 - 217	F	M 8	26
080 - 250	F, K	M 10	35
080 - 252	F	M 10	35
080 - 253	E, F	M 16	150
080 - 315	D, F, K	M 16	150

Size	Impeller type	Thread	Tightening torque [Nm]
080 - 316	D	M 16	150
080 - 317	D, F	M 16	150
100 - 215	F	M 8	26
100 - 251	F	M 16	150
100 - 252	F	M 10	35
100 - 253	D, E, F, K	M 10	35
100 - 254	F, K	M 10	35
100 - 316	D, F, K	M 16	150
150 - 253	D	M 16	150
150 - 315	D, F	M 16	150
150 - 317	K	M 16	150
200 - 315	D, K	M 16	150
200 - 316	K	M 16	150
200 - 317	K	M 16	150
200 - 318	K	M 16	150

7.5.5 Installing the back pull-out unit



WARNING

Back pull-out unit tilting

Risk of crushing hands and feet!

▷ Suspend or support the bearing bracket at the pump end.

Version with adjustable casing wear ring (for sizes K100-253, K100-254, K100-316)

- ✓ The shaft, rolling element bearings, mechanical seal and impeller have been assembled properly.

1. Insert casing wear ring 502 into pump casing 101.
2. Glue 3 pieces of cardboard⁷⁾ of approximately 2 mm in thickness and 15 mm in length to the front face of the impeller.
 - ⇒ In assembled condition, this will result in a clearance of 0.5 mm between impeller and casing wear ring.
3. Insert the complete back pull-out unit into the pump casing.
4. Screw in grub screws 904.01, lock the casing wear ring in position.
5. Secure grub screws 904.01 with Loctite.
6. Evenly tighten screwed connection 920.01 between pump casing and bearing bracket.

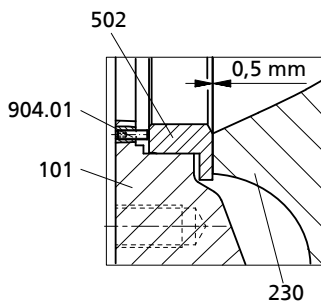


Fig. 29: Fitting the casing wear ring

Version with wear plate (for D type impellers only)

- ✓ The shaft, rolling element bearings, mechanical seal and impeller have been assembled properly.
- ✓ The pump casing is not connected to the piping.

⁷⁾ Use cardboard which easily dissolves in water.

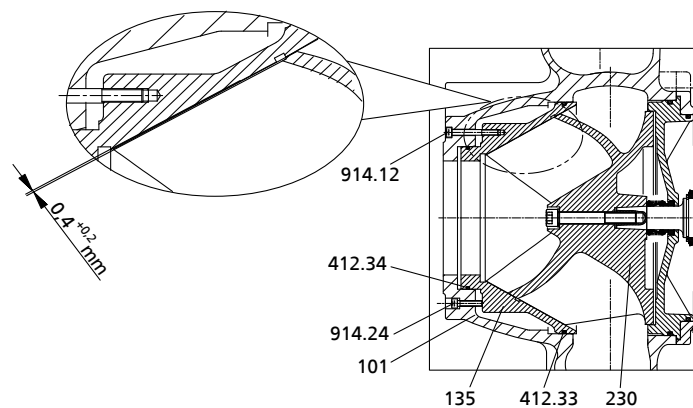


Fig. 30: Fitting the wear plate

1. Equip wear plate 135 with two new O-rings 412.33/34.
2. Insert wear plate 135 into pump casing 101.
3. Fasten wear plate 135 to pump casing 101 with hexagon socket head cap screws 914.12.
4. Adjust the clearance between impeller 230 and wear plate 135 by tightening and loosening screws 914.12 and 914.24.
 - ⇒ Screw 914.24 pushes the wear plate in the direction of the impeller.
 - ⇒ The clearance equals $0.4^{+0.2}$ mm (measured on the suction side from the outer surface of the impeller vane to the wear plate).
5. Insert the complete back pull-out unit into the pump casing.
6. Evenly tighten screwed connection 920.01 between pump casing and bearing bracket.

7.5.6 Leak test

After reassembly of the pump, subject the mechanical seal area/lubricant reservoir to a leak test.

1. Tightly screw the testing device into the filler opening (auxiliary connection 13D).
2. Test medium: Compressed air
 Test pressure: Max. 0.8 bar
 Test period: 2 min
 - ⇒ The pressure must not drop during the test period.
 - ⇒ If the pressure does drop, check the seals and screwed connections. Then perform another leak test.
3. Once the leak test has been successful, fill in the lubricant.

7.6 Tightening torques for the pump set

Table 23: Tightening torques for the pump set [Nm]

Thread	(A4-70 / 1.4462)
M 6	7
M 8	17
M 10	35
M 12	60
M 16	150
M 20	290
M 24	278 / 500
M 27	409 / 736
M 30	554 / 1000

7.7 Spare parts stock

7.7.1 Ordering spare parts

Always quote the following data when ordering replacement or spare parts:

- Order number
- Order item number
- Consecutive number
- Type series
- Size
- Material variant
- Seal code
- Year of construction

Refer to the name plate for all data.

Also specify the following data:

- Part number and description
- Quantity of spare parts
- Shipping address
- Mode of dispatch (freight, mail, express freight, air freight)

7.7.2 Recommended spare parts stock for 2 years' operation to DIN 24296

Table 24: Quantity of spare parts for recommended spare parts stock

Part No.	Description	Number of pumps (including stand-by pumps)								Type
		1	2	3	4	5	6	8	10 and more	
163	Discharge cover	1	2	2	2	3	3	4	50 %	S
210	Shaft	1	1	1	2	2	2	3	30 %	S
230	Impeller	1	1	1	2	2	2	3	30 %	R
321.01/02	Rolling element bearing (set)	1	1	1	2	2	3	4	50 %	W
330	Bearing bracket, complete	-	-	-	-	-	-	1	2	S
433.01/02	Mechanical seal, complete (set)	1	2	3	4	4	4	6	90 %	W
502.01	Casing wear ring	1	2	2	2	3	3	4	50 %	W
135	Wear plate	1	2	2	2	3	3	4	50 %	W
	Seal elements (set)	2	4	6	8	8	9	12	150 %	W

S = spare part

R = replacement part


W = wear part



NOTE

We recommend keeping a stock of wear and replacement parts also during the warranty period.

8 Trouble-shooting

	⚠ WARNING
	Improper work to remedy faults Risk of injury! <p>► For any work performed to remedy faults, observe the relevant information given in this operating manual and/or in the product literature provided by the accessories manufacturer.</p>

If problems occur that are not described in the following table, consultation with the KSB service is required.

- A Pump delivers insufficient flow rate
- B Motor is overloaded
- C Excessive discharge pressure
- D Increased bearing temperature
- E Leakage at the pump
- F Excessive leakage at the shaft seal
- G Vibrations during pump operation
- H Impermissible temperature increase in the pump

Table 25: Trouble-shooting

A	B	C	D	E	F	G	H	Possible cause	Remedy ⁸⁾
X	-	-	-	-	-	-	-	Pump delivers against an excessively high pressure.	Re-adjust to duty point.
X	-	-	-	-	-	-	-	Excessively high back pressure	Check system for impurities. Increase speed.
X	-	-	-	-	-	X	X	Pump and/or piping are not completely vented or primed.	Vent and/or prime.
X	-	-	-	-	-	-	-	Supply line or impeller clogged	Remove deposits in the pump and/or piping.
X	-	-	-	-	-	-	-	Formation of air pockets in the piping	Alter piping layout. Fit vent valve.
-	-	-	X	-	X	X	-	Pump is warped or sympathetic vibrations in the piping.	Check the piping connections and secure fixing of pump; if required, reduce distances between the pipe clamps. Fix the pipelines using anti-vibration material.
X	-	-	-	-	-	X	X	Suction lift is too high/NPSH _{available} (positive suction head) is too low.	Check/alter fluid level. Fully open the shut-off element in the supply line. Change suction line, if the friction losses in the suction line are too high. Check any strainers installed/suction opening. Observe permissible speed of pressure fall.
-	-	-	X	-	-	-	-	Increased axial thrust	Contact KSB.
X	-	-	-	-	-	-	-	Air intake at the shaft seal	Fit new shaft seal.
X	-	-	-	-	-	-	-	Wrong direction of rotation	Interchange two of the phases of the power cable.
X	X	-	-	-	-	-	-	Motor is running on 2 phases only.	Replace the defective fuse. Check the electric cable connections.
X	-	-	-	-	-	-	-	Speed is too low.	Increase speed ¹⁾ .
-	-	-	-	-	-	X	-	Defective bearing(s)	Replace bearing(s).
-	-	-	X	-	-	X	X	Pump delivers insufficient flow rate.	Increase the minimum flow rate.
X	-	-	-	-	-	X	-	Wear of internal components	Replace worn components by new ones.

⁸ Pump pressure must be released before attempting to remedy faults on parts which are subjected to pressure.

A	B	C	D	E	F	G	H	Possible cause	Remedy ⁹⁾
-	X	-	-	-	-	X	-	Pump back pressure is lower than specified in the purchase order.	Re-adjust to duty point.
-	X	-	-	-	-	-	-	Density or viscosity of the fluid handled is higher than stated in the purchase order.	
-	X	X	-	-	-	-	-	Speed is too high.	Reduce speed. ⁹⁾
-	-	-	-	X	-	-	-	Assembly bolts/sealing elements	Re-tighten bolts. Fit new sealing elements.
-	-	-	-	-	X	-	-	Worn shaft seal	Fit new shaft seal.
-	-	-	-	-	-	X	-	Vibrations during pump operation	Correct the suction conditions. Re-align the pump. Re-balance the impeller. Increase pressure at the pump suction nozzle.
-	X	-	-	-	-	-	-	Operating voltage too low.	Increase the voltage.

⁹⁾ Contact KSB.

9 Related Documents

9.1 General assembly drawing – Sewabloc

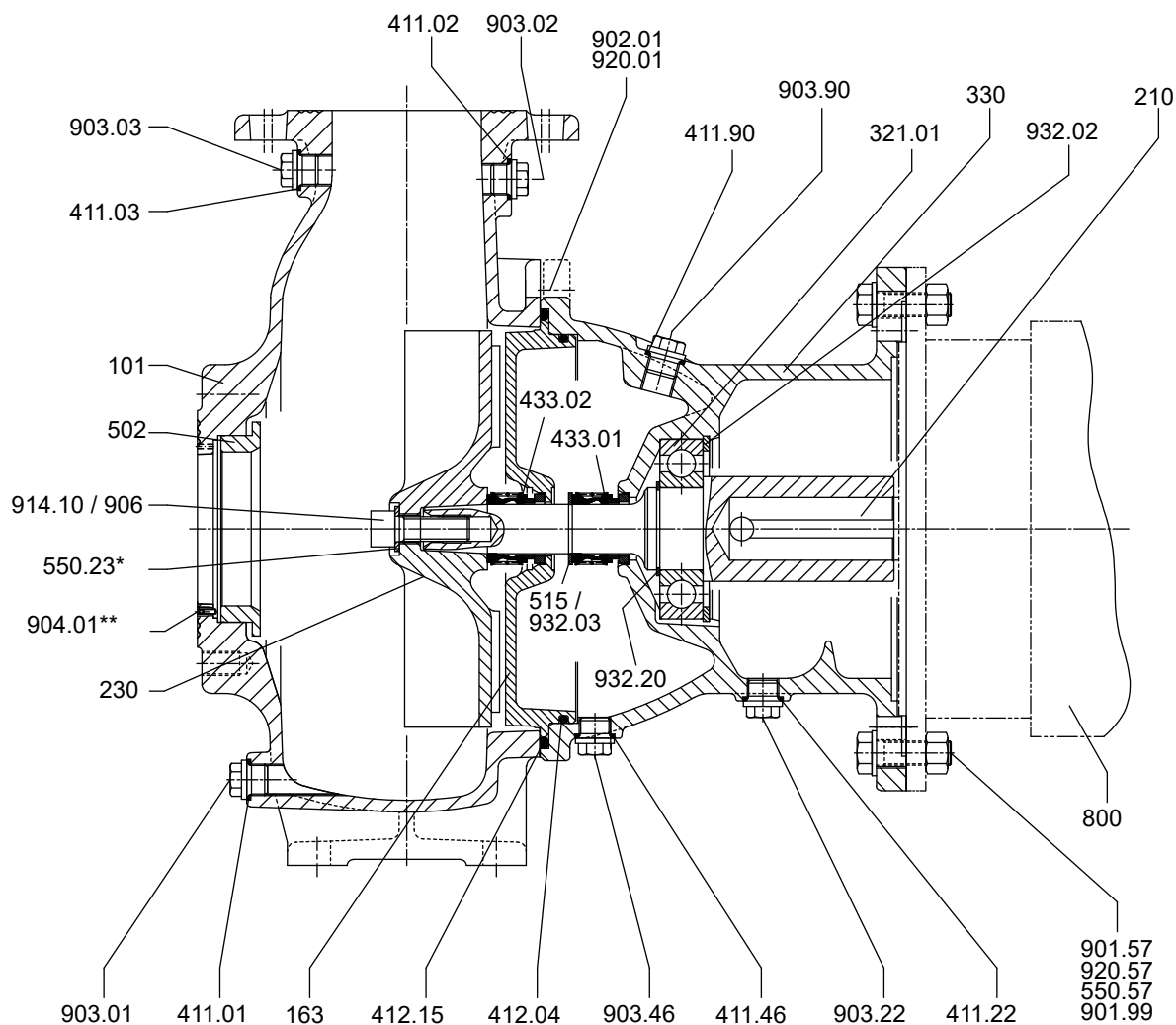


Fig. 31: General assembly drawing of Sewabloc; * if any, ** only for sizes 100-253, 100-254, K 100-316

Table 26: List of components

Part No.	Description	Part No.	Description
101	Pump casing	502	Casing wear ring
135	Wear plate	550.23/.57	Disc
163	Discharge cover	800	Motor
164	Inspection cover	901.57/.99	Hexagon head bolt
210	Shaft	902.01	Stud
230	Impeller	903.01/.02/.03/.22/.46/.90	Screw plug
321.01	Radial ball bearing	904.01	Grub screw
330	Bearing bracket	906	Impeller screw
411.01/.02/.03/.22/.46/.90	Joint ring	914.10/.12/.24	Hexagon socket head cap screw
412.04/.15/.34	O-ring	920.01/.57	Nut
433.01/.02	Mechanical seal	932.02	Circlip

9.2 Sectional drawings of the mechanical seal

9.2.1 Drive-end mechanical seal

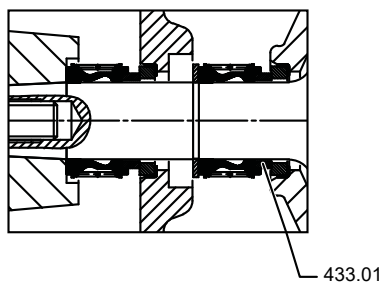


Fig. 32: Drive-end mechanical seal

Table 27: List of components

Part No.	Description
433.01	Mechanical seal

9.2.2 Pump-end mechanical seal

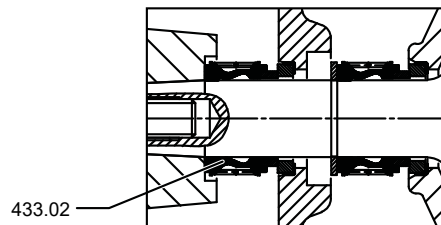


Fig. 33: Pump-end mechanical seal

Table 28: List of components

Part No.	Description
433.02	Mechanical seal

9.2.3 Cartridge seal C022/025M1-4STQ

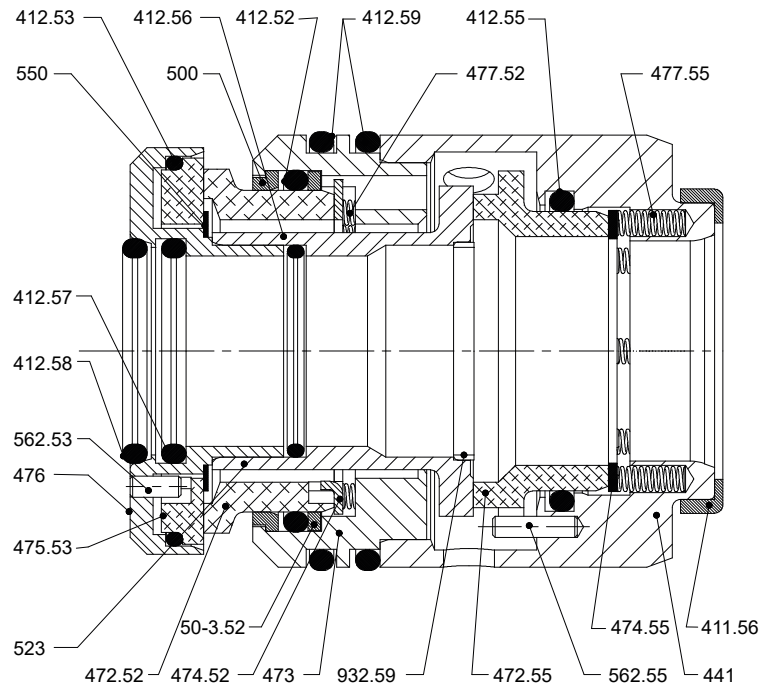


Fig. 34: Sectional drawing

Table 29: List of components

Part No.	Description	Part No.	Description
411.56	Joint ring	487	Mating ring carrier
412.52/.53/.55/.56/.57/.58/.59	O-ring	50-3.52	Backing ring
441	Shaft seal housing	500	Ring
472.53/.55	Primary ring	550	Disc
473	Primary ring carrier	562.52/.55	Parallel pin
474.53/.55	Thrust ring	904.53	Grub screw
475.52	Mating ring	914.52	Hexagon socket head cap screw
476	Mating ring carrier	932.52/.53/.59	Circlip
477.53/.55	Spring for mechanical seal	940	Key

9.2.4 Cartridge seal C033/055M1-4STQ

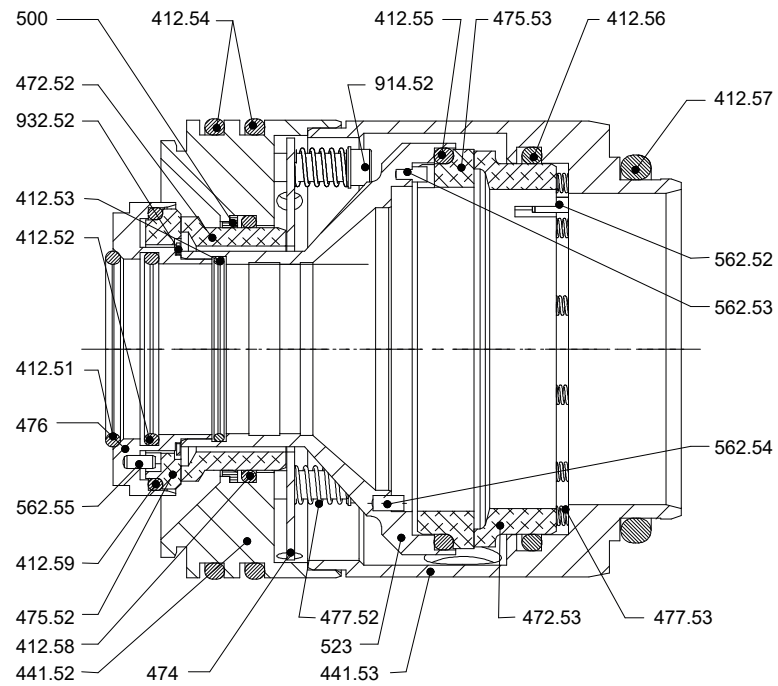


Fig. 35: Sectional drawing

Table 30: List of components

Part No.	Description	Part No.	Description
412.51/.52/.53/.54/.55/.56/.57/.58/.59	O-ring	477.52/.53	Spring for mechanical seal
441.52/.53	Shaft seal housing	500	Ring
472.52/.53	Primary ring	523	Shaft sleeve
474	Thrust ring	562.52/.53/.54/.55	Parallel pin
475.52/.53	Mating ring	914.52	Hexagon socket head cap screw
476	Mating ring carrier	932.52	Circlip

9.3 Exploded view of a Sewabloc

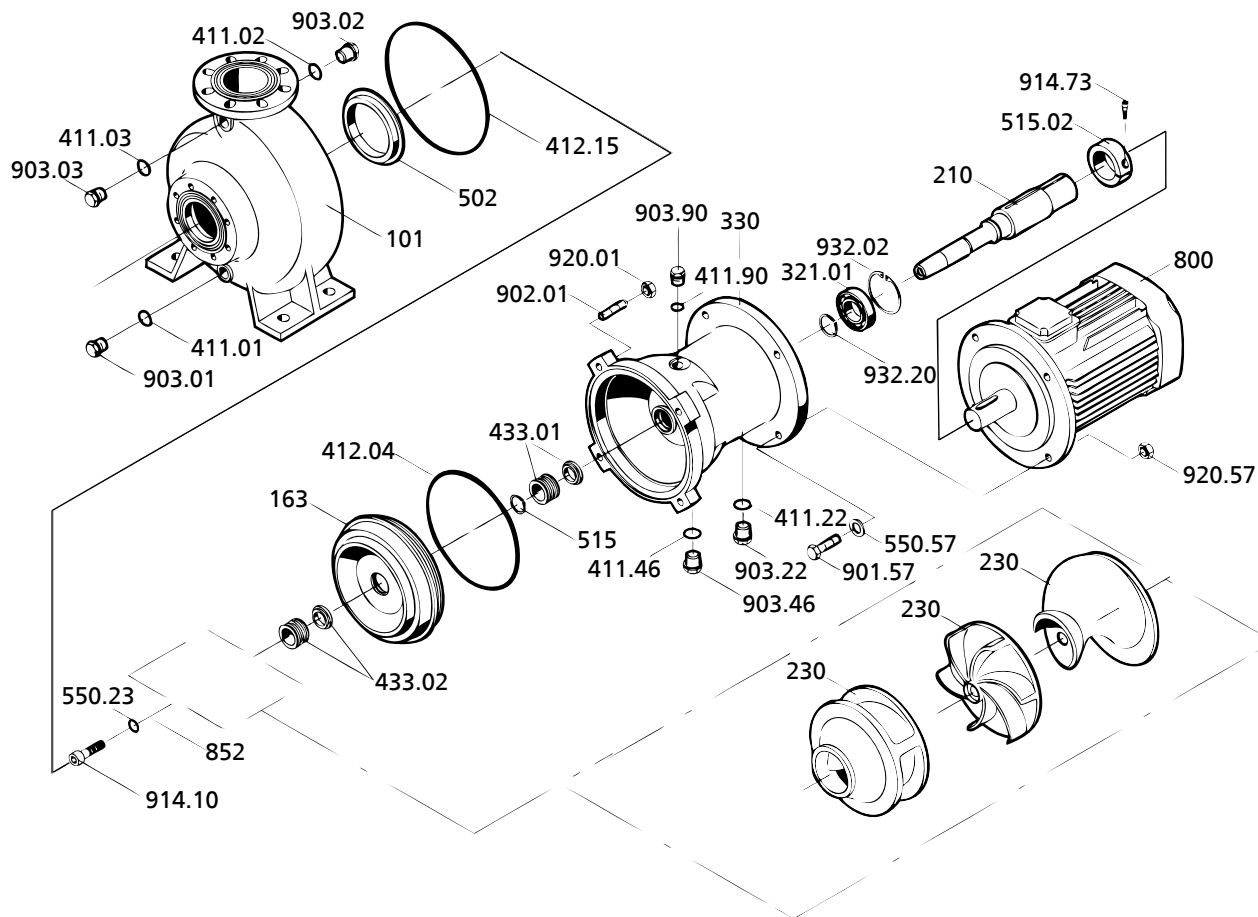


Fig. 36: Exploded view of a Sewabloc

Table 31: List of components

Part No.	Description	Part No.	Description
101	Pump casing	515/.02	Locking ring
163	Discharge cover	550.23/.57	Disc
210	Shaft	800	Motor
230	Impeller	852 ¹⁰⁾	Threaded coupling
321.01	Radial ball bearing	901.57	Hexagon head bolt
330	Bearing bracket	902.01	Stud
411.01/.02/.03/.22/.46/.90	Joint ring	903.01/.02/.03/.22/.46/.90	Screw plug
412.04/.15	O-ring	914.10/.73	Hexagon socket head cap screw
433.01/.02	Mechanical seal	920.01/.57	Nut
502	Casing wear ring	932.02/.20	Circlip

¹⁰⁾ Only for Sewabloc D150-251

10 UK Declaration of Conformity

Manufacturer:

KSB SE & Co. KGaA
Johann-Klein-Straße 9
67227 Frankenthal (Germany)

This UK Declaration of Conformity is issued under the sole responsibility of the manufacturer.

The manufacturer herewith declares that **the product**:

Sewabloc, Sewatec

KSB order number:

- is in conformity with the provisions of the following directives / regulations as amended from time to time:
 - Pump (set): Supply of Machinery (Safety) Regulations 2008
 - Electrical components¹¹⁾: The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

The manufacturer also declares that

- the following harmonised international standards¹²⁾ have been applied:
 - ISO 12100
 - EN 809

Person authorised to compile the technical file:

Name
Function
Address (company)
Address (street, No.)
Address (post or ZIP code, city) (country)

The UK Declaration of Conformity was issued in/on:

Place, date

.....¹³⁾

Name
Function
Company
Address

¹¹⁾ Where applicable

¹²⁾ Apart from the standards listed here referring to the *Supply of Machinery (Safety) Regulations 2008*, further standards are observed for explosion-proof versions (*Equipment and Protective Systems Intended for use in Potentially Explosive Atmospheres Regulations 2016*) as applicable and are listed in the legally binding UK Declaration of Conformity.

¹³⁾ A signed, legally binding UK Declaration of Conformity is supplied with the product.

11 Certificate of Decontamination

Type:
Order number /
Order item number¹⁴:
Delivery date:
Application:
Fluid handled¹⁴:

Please tick where applicable¹⁴:



Corrosive



Oxidising



Flammable



Explosive



Hazardous to health



Seriously hazardous to health



Toxic



Radioactive



Bio-hazardous



Safe

Reason for return¹⁴:
Comments:
.....

The product / accessories have been carefully drained, cleaned and decontaminated inside and outside prior to dispatch / placing at your disposal.

We herewith declare that this product is free from hazardous chemicals and biological and radioactive substances.

For mag-drive pumps, the inner rotor unit (impeller, casing cover, bearing ring carrier, plain bearing, inner rotor) has been removed from the pump and cleaned. In cases of containment shroud leakage, the outer rotor, bearing bracket lantern, leakage barrier and bearing bracket or intermediate piece have also been cleaned.

For canned motor pumps, the rotor and plain bearing have been removed from the pump for cleaning. In cases of leakage at the stator can, the stator space has been examined for fluid leakage; if fluid handled has penetrated the stator space, it has been removed.

- ☐ No special safety precautions are required for further handling.
☐ The following safety precautions are required for flushing fluids, fluid residues and disposal:

.....
.....

We confirm that the above data and information are correct and complete and that dispatch is effected in accordance with the relevant legal provisions.

.....
Place, date and signature

.....
Address

.....
Company stamp

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KSB SE & Co. KGaA

Johann-Klein-Straße 9 • 67227 Frankenthal (Germany)

Tel. +49 6233 86-0

www.ksb.com

2580.8177/01-EN (05154575)