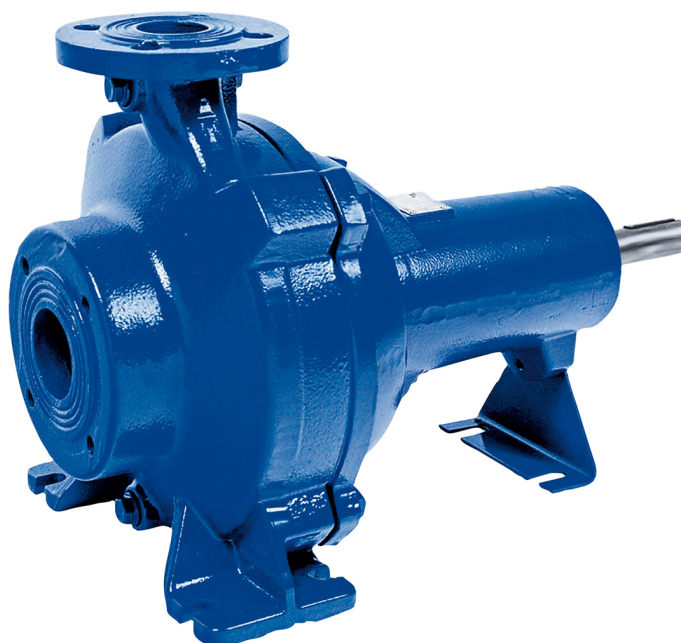


Sewatec

50 / 60 Hz
DIN / IEC Motors
Bearing Brackets S05, S06, S07, S08, S09, S10

Installation/Operating Manual



Legal information/Copyright

Installation/Operating Manual Sewatec

Original operating manual

All rights reserved. The contents provided herein must neither be distributed, copied, reproduced, edited or processed for any other purpose, nor otherwise transmitted, published or made available to a third party without the manufacturer's express written consent.

Subject to technical modification without prior notice.

© KSB SE & Co. KGaA, Frankenthal 2025-09-25

Contents

	Glossary	6
1	General	7
1.1	Principles	7
1.2	Installation of partly completed machinery	7
1.3	Target group	7
1.4	Other applicable documents	7
1.5	Symbols	7
1.6	Key to safety symbols/markings	8
2	Safety	9
2.1	General	9
2.2	Intended use	9
2.3	Personnel qualification and training	10
2.4	Consequences and risks caused by non-compliance with this manual	10
2.5	Safety awareness	10
2.6	Safety information for the operator/user	11
2.7	Safety information for maintenance, inspection and installation	11
2.8	Unauthorised modes of operation	11
2.9	Explosion protection	11
2.9.1	Marking	12
3	Transport/Storage/Disposal	13
3.1	Checking the condition upon delivery	13
3.2	Transport	13
3.3	Storage/preservation	15
3.4	Return to supplier	16
3.5	Disposal	16
4	Description of the Pump (Set)	18
4.1	General description	18
4.2	Product information as per Regulation No. 1907/2006 (REACH)	18
4.3	Designation	18
4.4	Name plate	18
4.5	Design details	19
4.6	Installation types	19
4.7	Design and function	21
4.8	Noise characteristics	22
4.9	Scope of supply	22
4.10	Dimensions and weights	23
5	Installation at Site	24
5.1	Safety regulations	24
5.2	Checks to be carried out prior to installation	24
5.3	Installing the pump set in a horizontal position	24
5.4	Installing the pump set in a vertical position	26
5.5	Piping	27
5.5.1	Connecting the piping	27
5.5.2	Permissible forces and moments at the pump nozzles	28
5.5.3	Vacuum balance line	32
5.6	Auxiliary connections	33
5.7	Checking the coupling alignment	35
5.8	Checking the belt drive	37
5.8.1	Checking the pulley alignment	37
5.8.2	Tensioning the belts	37

5.9	Installing pump sets with universal-joint shaft.....	39
5.10	Aligning the pump and motor	39
5.10.1	Motors with adjusting screw	39
5.10.2	Motors without adjusting screw.....	40
5.11	Checking the lubricants.....	41
5.12	Barrier fluid connection for version with gland packing.....	41
5.13	Electrical connection	42
5.14	Checking the direction of rotation	42
5.15	Priming and venting the pump	43
5.16	Protective devices	43
5.17	Connecting the vibration sensor	43
5.18	Connecting temperature measuring devices.....	43
5.19	Warning and trip values.....	44
5.20	Connecting a leakage monitor	44
6	Commissioning/Start-up/Shutdown	46
6.1	Commissioning/Start-up	46
6.1.1	Prerequisites for commissioning/start-up	46
6.1.2	Start-up	46
6.2	Operating limits.....	47
6.2.1	Maximum operating pressure.....	48
6.2.2	Frequency of starts	49
6.2.3	Fluid handled.....	50
6.3	Shutdown/storage/preservation.....	50
6.3.1	Shutdown	51
6.4	Returning to service	51
7	Servicing/Maintenance.....	52
7.1	Safety regulations	52
7.2	Servicing/inspection	53
7.2.1	Supervision of operation.....	53
7.2.2	Inspection work.....	54
7.2.3	Lubrication and lubricant change.....	55
7.3	Drainage/cleaning.....	60
7.4	Dismantling the pump set	60
7.4.1	General information/Safety regulations	60
7.4.2	Preparations for dismantling.....	61
7.4.3	Separating the pump from the piping.....	62
7.4.4	Removing the belt drive.....	62
7.4.5	Removing the back pull-out unit.....	65
7.4.6	Removing the impeller.....	66
7.4.7	Dismantling the mechanical seal	71
7.4.8	Dismantling the gland packing	72
7.4.9	Removing shaft and rolling element bearings	73
7.4.10	Removing the wear plate (for D impeller only)	74
7.5	Reassembling the pump set.....	74
7.5.1	General information/Safety regulations	74
7.5.2	Installing the shaft and rolling element bearings.....	75
7.5.3	Preparing and reassembling the bearing brackets.....	76
7.5.4	Installing the mechanical seal.....	77
7.5.5	Fitting the gland packing	82
7.5.6	Fitting the impeller.....	82
7.5.7	Installing the back pull-out unit.....	86
7.5.8	Leak test	86
7.5.9	Mounting the motor	87
7.5.10	Fitting the belt drive	88
7.6	Tightening torques	89
7.6.1	Tightening torques for the pump set.....	89

7.6.2	Tightening torques for the mechanical seal.....	90
7.7	Spare parts stock	90
7.7.1	Ordering spare parts	90
7.7.2	Recommended spare parts stock for 2 years' operation to DIN 24296.....	90
8	Trouble-shooting	92
9	Related Documents.....	94
9.1	Speed adjustment.....	94
9.2	Mass moments of inertia	96
9.3	General assembly drawings/exploded views with list of components	98
9.3.1	General assembly drawing – Sewatec with bearing brackets S05, S06, S07, S08	98
9.3.2	General assembly drawing: Sewatec with bearing brackets S05, S06, S07, underfloor installation and installation with universal-joint shaft	100
9.3.3	General assembly drawing – Sewatec with bearing brackets S09, S10	102
9.3.4	Detail drawings.....	104
9.3.5	Sectional drawings of the mechanical seal.....	108
9.3.6	Exploded view of Sewatec with mechanical seal.....	113
9.3.7	Exploded view of Sewatec with gland packing.....	114
10	UK Declaration of Conformity.....	115
11	Certificate of Decontamination	116
	Index.....	117

Glossary

Back pull-out design

The complete back pull-out unit can be pulled out without having to remove the pump casing from the piping.

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 7.5.7, Page 86)

1.3 Target group

This operating manual is aimed at the target group of trained and qualified specialist technical personnel. (⇒ Section 2.3, Page 10)

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
Wiring diagram	Description of electrical 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 This signal word indicates a high-risk hazard which, if not avoided, will result in death or serious injury.
	WARNING This signal word indicates a medium-risk hazard which, if not avoided, could result in death or serious injury.
	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 UK regulation titled Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016.
	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 $1.2 \times Q_{BEP}$ to minimise the risk of clogging/hardening.
- Avoid duty points for continuous operation at very low speeds and small flow rates ($< 0.7 \times Q_{BEP}$).
- 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
	Open radial multi-vane impeller (impeller type D-max)	Suitable for the following fluids: fluids containing solid substances and long fibres
	Closed single-channel impeller (impeller type E/E-max)	Suitable for the following fluids: fluids containing solids and stringy material
	Closed multi-channel impeller (impeller type K/K-max)	Suitable for the following fluids: contaminated, solids-laden, non-gaseous fluids without stringy material

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) while the pump is in operation. The only exception is the guard of the packing chamber.
- 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.
- 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 46)

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

	 DANGER The pump (set) could slip out of the suspension arrangement Danger to life from falling parts! ▷ Always transport the pump (set) in the specified position. ▷ Never attach the suspension arrangement to the free shaft end or the motor eyebolt. ▷ Observe the information about weights, centre of gravity and fastening points. ▷ Observe the applicable local accident prevention regulations. ▷ Use suitable, permitted lifting accessories, e.g. self-tightening lifting tongs.
	 WARNING Uncontrolled lifting of the pump (set) or drive Risk of injury! ▷ Maintain adequate safety distance during lifting operations (load may swing when being lifted).
	 WARNING Placing the pump / pump set / packaging unit on unsecured and uneven surfaces Personal injury and damage to property! ▷ 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: For configurations as shown in figures e, f and g attach hoisting chains to the hooks welded to the baseplate. Use 2 rope loops each for configurations as shown in figures h and i.

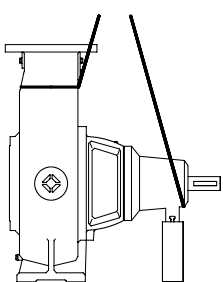
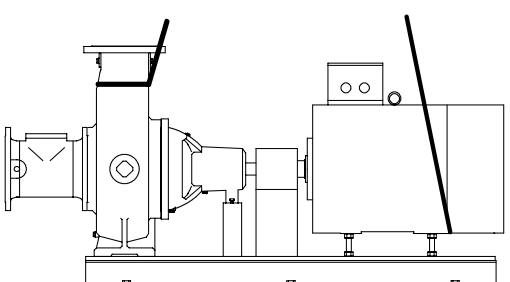
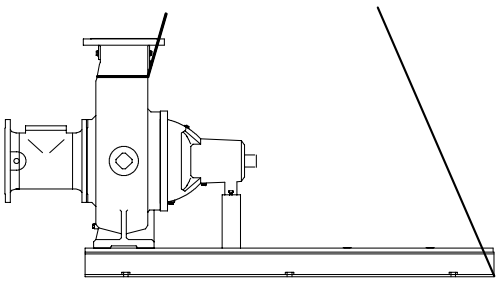
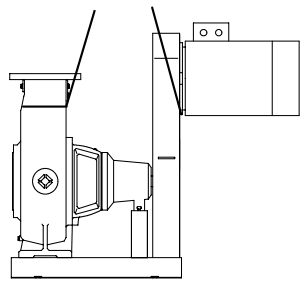
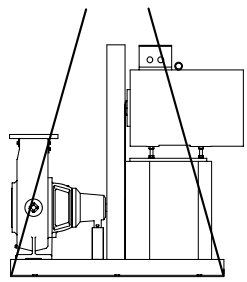
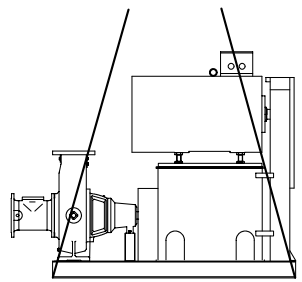
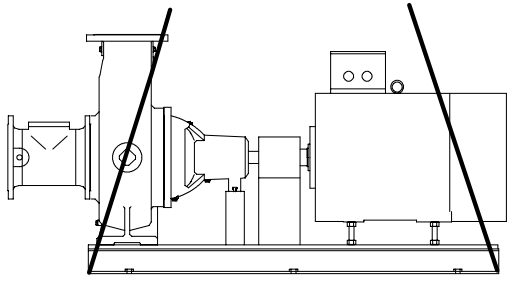
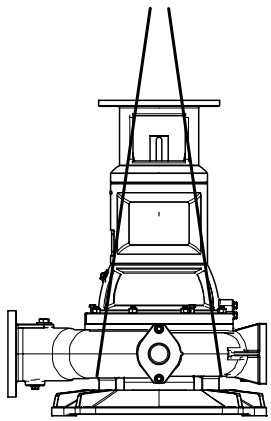
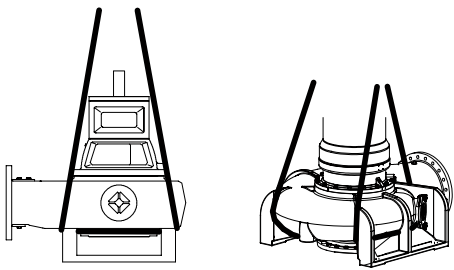
Fig. a)  Bare-shaft pump	Fig. b)  Pump set on baseplate
Fig. c)  Bare shaft pump on baseplate	Fig. d)  Pump set with belt drive on baseplate
Fig. e)  Pump set with belt drive and foot-mounted motor Use the hooks welded to the baseplate!	Fig. f)  Pump set with belt drive, countershaft and foot-mounted motor Use the hooks welded to the baseplate!

Fig. g)  Pump set on baseplate Use the hooks welded to the baseplate!	
Fig. h)  Vertical pump Attach two loops of rope around the pump casing or to the integrally cast feet of the pump casing!	Fig. i)  Vertical pump Attach two loops of rope around the pump casing or to the integrally cast feet of the pump casing!

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 the pump (set)! ▸ For outdoor storage cover the pump (set) or the packaged pump (set) and accessories with waterproof material.
	CAUTION Wet, contaminated or damaged openings and connections Leakage or damage to the pump! ▸ Clean and cover pump openings and connections as required prior to putting the pump into storage.

Table 5: Ambient conditions for storage

Ambient condition	Value
Relative humidity	5 % to 85 % (non-condensing)
Ambient temperature	-10 °C to +70 °C

- Store the pump set in dry, vibration-free conditions and, if possible, in its original packaging.
- Rotate the shaft once a month.
- 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 or similar).

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

3.4 Return to supplier

1. Drain the pump properly. (⇒ Section 7.3, Page 60)
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 116)

	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! ▷ Collect and properly dispose of flushing fluid and any residues of the fluid handled. ▷ Wear protective 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.

- Volute casing pump with single-vane impeller, multi-vane impeller, free-flow impeller or open diagonal single-vane impeller.
- Electric motor connected to the pump via a coupling, belt drive or universal-joint shaft

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

For information as per European chemicals regulation (EC) No. 1907/2006 (REACH) see <https://www.ksb.com/en-global/company/corporate-responsibility/reach>.

4.3 Designation

Example: Sewatec F 100-250G V

Table 6: Designation key

Code	Description
Sewatec	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

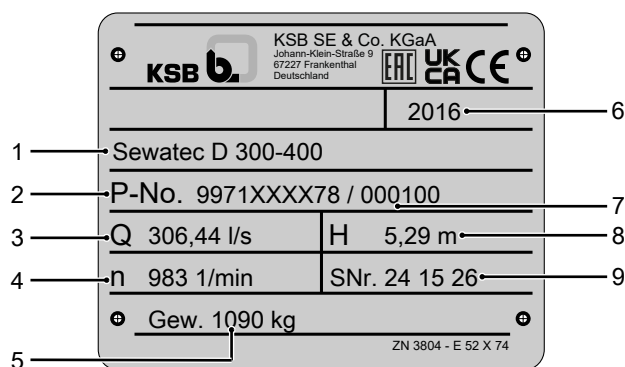


Fig. 1: Name plate (example)

1	Designation of the pump set	2	Order number
3	Flow rate	4	Speed
5	Weight of bare-shaft pump	6	Year of supply
7	Order item number	8	Head
9	Serial number		

4.5 Design details

Design

- Volute casing pump
- Back pull-out design
- Single-stage
- Various, application-oriented installation types (⇒ Section 4.1, Page 18)

Shaft seal

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

Impeller type

- Various application-oriented impeller types (⇒ Section 2.2, Page 9)

Bearings

- Grease-packed rolling element bearings with relubrication system on pump and drive end

4.6 Installation types

Horizontal installation

Sewatec - Fig. 0

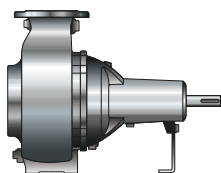


Fig. 2: Sewatec Fig. 0: Bare-shaft pump

Sewatec - 3H (3HZ)

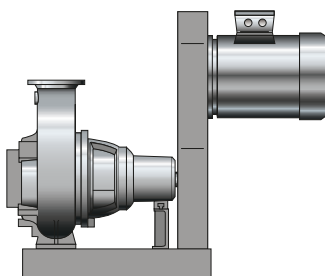


Fig. 3: Sewatec - 3H (3HZ): Pump set with baseplate, belt drive and belt guard

Sewatec - 3H (3HM)

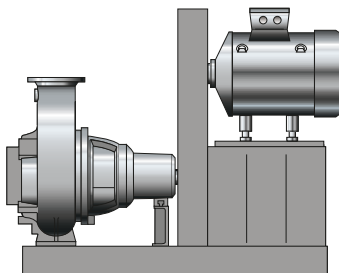


Fig. 4: Sewatec - 3H (3HM): Pump set with baseplate, belt drive, belt guard and motor stand

Sewatec - 3H with countershaft (3HVG)

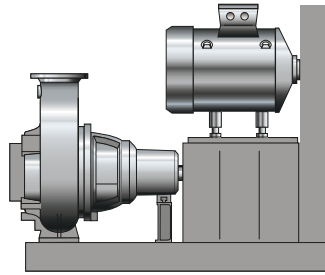


Fig. 5: Sewatec - 3H with countershaft (3HVG): Pump set with baseplate, coupling (also with coupling spacer), coupling guard, countershaft stand, countershaft, motor stand, belt drive and belt guard

Sewatec - 3E (3EN/3ENH)

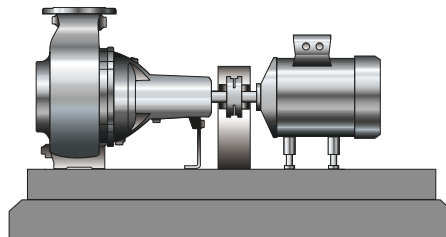


Fig. 6: Sewatec - 3E (3EN/3ENH): Pump set with directly coupled drive, baseplate, coupling (also with coupling spacer), coupling guard and height adjustment of the motor

Vertical installation

Sewatec - vertical (V)

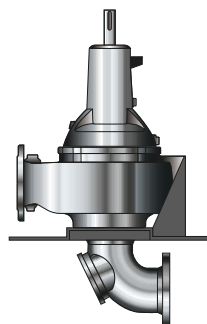


Fig. 7: Sewatec - vertical (V): Bare-shaft pump with soleplate or suction duckfoot bend

Sewatec - vertical (VU)

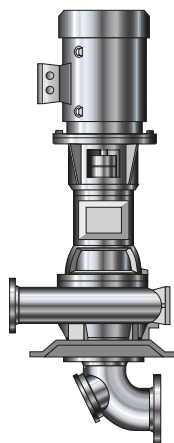


Fig. 8: Sewatec - vertical (VU): Pump set with soleplate, drive lantern, coupling, coupling guard and suction elbow

Sewatec - vertical (VGW)

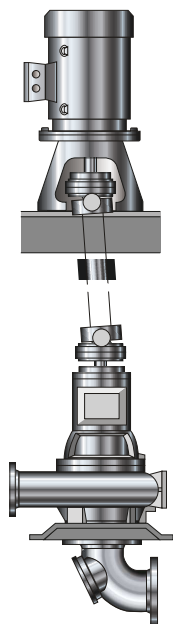


Fig. 9: Sewatec - vertical (VGW): Pump set with soleplate for pump and motor, support frame, drive lantern, suction elbow and universal-joint shaft

4.7 Design and function

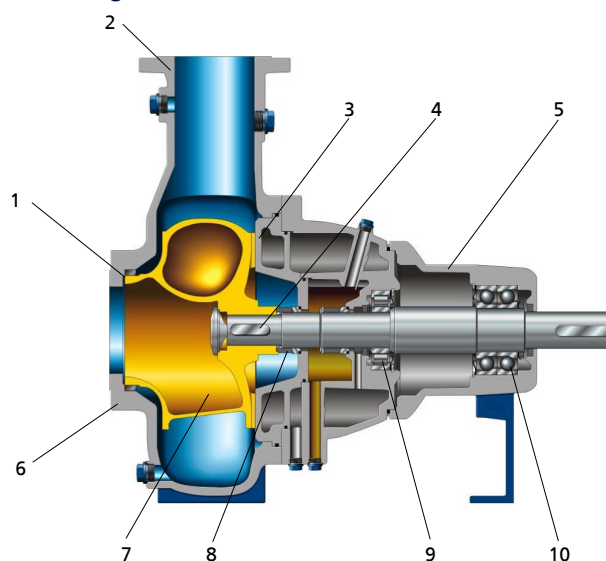


Fig. 10: Sectional drawing with single-vane impeller

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	Rolling element bearing

Design The pump is designed with an axial fluid inlet and a radial or tangential outlet. The hydraulic system runs in its own bearings and is connected to the motor by a shaft coupling or belt drive.

Function The fluid enters the pump axially 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 casing cover (3). The shaft passage through the cover is sealed to atmosphere with a shaft seal (8). The shaft runs in rolling element bearings (9 and 10), which are supported by a bearing bracket (5) linked with the pump casing and/or casing cover.

Sealing The pump is sealed by two bi-directional mechanical seals in tandem arrangement or by a gland packing.

4.8 Noise characteristics

Table 7: Surface sound pressure level L_{pA} ²⁾

Rated power input P_N	Pump			Pump set		
	2900 rpm ⁻¹	1450 rpm ⁻¹	960 / 760 rpm ⁻¹	2900 rpm ⁻¹	1450 rpm ⁻¹	960 / 760 rpm ⁻¹
[kW]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
11,0	62,5	60,5	59,5	72,5	67,0	65,5
15,0	64,0	61,5	60,5	73,5	68,0	66,5
18,5	64,5	62,5	61,5	74,0	68,5	67,5
22,0	65,5	63,5	62,5	74,5	69,0	68,0
30,0	67,0	65,0	63,5	75,0	70,5	69,0
37,0	68,0	65,5	64,5	75,5	71,0	69,5
45,0	68,5	66,5	65,5	77,0	71,5	70,5
55,0	69,5	67,5	66,5	77,5	72,5	71,0
75,0	71,0	68,5	67,5	78,0	73,5	72,0
90,0	71,5	69,5	68,5	78,5	74,0	72,5
110,0	73,0	70,5	69,5	79,0	74,5	73,0
132,0	--	72,0	71,0	--	75,0	73,5
160,0	--	73,0	72,0	--	75,5	74,0
200,0	--	75,0	73,5	--	76,0	74,5
250,0	--	76,0	75,0	--	80,0	79,0
315,0	--	78,5	77,0	--	81,0	79,5
355,0	--	79,0	78,0	--	81,5	80,0
400,0	--	79,5	78,5	--	82,0	80,5
500,0	--	81,5	80,0	--	82,5	81,5
600,0	--	--	81,0	--	--	
700,0	--	--	81,5	--	--	
800,0	--	--	82,0	--	--	



NOTE

For belt-driven pump sets add 2 dB.

4.9 Scope of supply

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

- Pump
- Drive
- Baseplate or soleplate
- Coupling
- Coupling guard

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

- Belt drive and belt guard
- Suction-side flanged spacer with inspection hole³⁾ (optional)
- Universal-joint shaft

4.10 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 indicated weights.
(⇒ Section 1.4, Page 7)

³ For nominal discharge nozzle diameter $\geq$ DN 100

5 Installation at Site

5.1 Safety regulations

 	⚠ DANGER Excessive temperatures in the shaft seal area Explosion hazard! Damage to the pump set! ▸ Regularly check the lubricant level.
	NOTE Operating pump sets with gland packings in combination with a frequency inverter / variable speed system is not recommended.

5.2 Checks to be carried out prior to installation

Place of installation

	⚠ WARNING Installation on mounting surfaces which are unsecured and cannot support the load Personal injury and damage to property! ▸ Use a concrete of compressive strength class C25/30 which meets the requirements of exposure class XS1 to BS 206 . ▸ The mounting surface must be set, even, and level. ▸ Observe the weights indicated.
--	--

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 in a horizontal position

 	⚠ DANGER Electrostatic charging Explosion hazard! Damage to the pump set! ▸ 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.
--	---

For installation types 3E and 3H

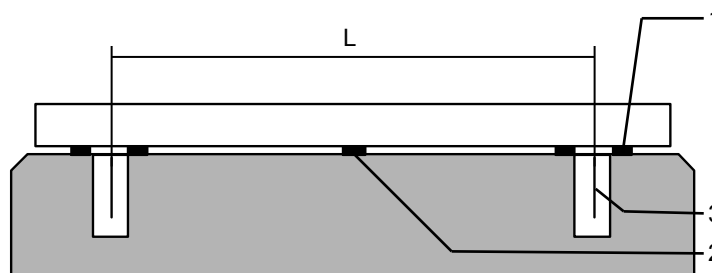


Fig. 11: Installation on a foundation with chemical anchors

L	Anchor-to-anchor distance	1	Shim
2	Shim if (L) > 800 mm	3	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 immediately to the left and right of the chemical anchors (3) between the baseplate/foundation frame and the foundation.
For an anchor-to-anchor distance (L) $\geq$ 800 mm fit additional shims (2) halfway between the adjoining holes.
All shims must lie perfectly flush.
- 3. Drill the holes as specified in the "Chemical anchor dimensions" table. Then clean the holes.

	! WARNING
	Improper handling of resin Skin sensitisation and/or irritation! ▷ Wear suitable protective clothing.

- 4. Insert the resin capsules into the drilled holes.
Observe the curing time of the resin capsule! Curing time: See the manufacturer's product literature.
- 5. Insert the threaded rods into the corresponding drilled holes with a rotary action power tool (e.g. impact drill, hammer drill).
- 6. After the curing time, tighten the chemical anchors (3) evenly and tightly.
- 7. Grout the baseplate using low-shrinkage concrete.

Chemical anchor dimensions

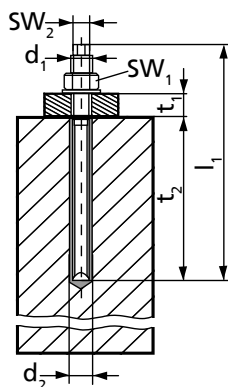
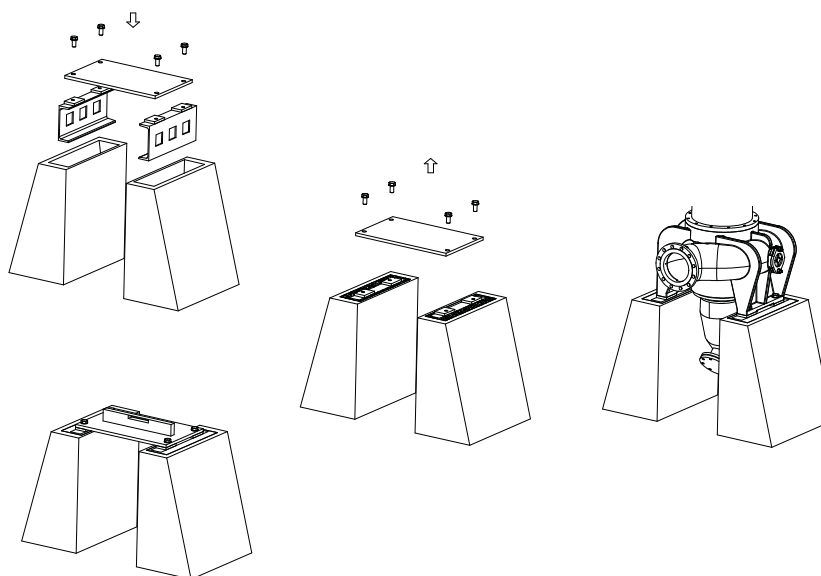


Fig. 12: Dimensions

Table 8: Chemical anchor dimensions

Size ($d_1 \times l_1$)	d_2	t_1	t_2	$SW_1^{4)}$	$SW_2^{4)}$	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 ⁵⁾	28	65	210	36	17	180
M30 × 380 ⁵⁾	35	65	280	46	-	400

5.4 Installing the pump set in a vertical position


Fig. 13: Preparing the foundation

The pump (set) is installed on horizontally aligned foundation rails. Depending on the pump size, the pump (set) is either mounted on a separate soleplate or on integrally cast feet.

- ✓ The foundation has been prepared in accordance with the dimensions given in the outline drawing / general arrangement drawing. The foundation rails have been grouted with concrete.

1. Lift the pump set with the lifting equipment and lower it down onto the prepared foundation.
2. Insert hexagon head bolts 901.16 with discs 550.16 into the drilled holes provided. Tighten the bolts.
3. Mount the motor on the drive lantern as described in the motor manufacturer's operating manual.
4. Align the coupling as described in the coupling manufacturer's operating manual.

⁴ SW = Width across flats

⁵ Mounting accessories of the respective manufacturer are required.

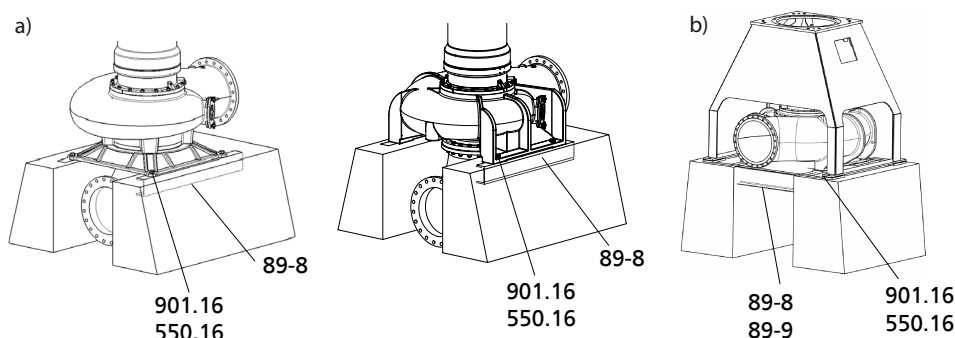


Fig. 14: a) Vertical installation on foundation rails b) Vertical installation with motor pedestal

89-8	Foundation rail	89-9	Foundation frame
550.16	Disc	901.16	Hexagon head bolt

The following instructions apply to installation with motor pedestal:

1. After installing the pump, attach the motor pedestal to the lifting equipment and lower it down onto the prepared foundation.
2. Insert hexagon head bolts 901.16 with discs 550.16 into the drilled holes provided in the foundation frame or foundation rails. Tighten the bolts.
3. Mount the motor on the drive lantern as described in the motor manufacturer's operating manual.
4. Align the coupling as described in the coupling manufacturer's operating manual.

5.5 Piping

	NOTE
	When installing pumps in piping systems make sure to avoid any resonances at the usual excitation frequencies (e.g. 1x or 2x rotational frequency or rotational noise) in the connected piping and in the foundation. See DIN ISO 10816-3.

5.5.1 Connecting the piping

	DANGER
	Impermissible loads acting on the pump nozzles Danger to life from leakage of hot, toxic, corrosive or flammable fluids! ▷ 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.
	CAUTION
	Incorrect earthing during welding work at the piping Destruction of rolling element bearings (pitting effect)! ▷ Never earth the electric welding equipment on the pump or baseplate. ▷ Prevent current flowing through the rolling element bearings.



NOTE

Installing check valves and shut-off elements in the system is recommended, depending on the type of plant and pump. Install the pump without any obstructions to its drainage or removal.

- ✓ The suction lift line has been laid with a rising slope, the suction head line with a downward slope towards the pump.⁶⁾
 - ✓ A flow stabilisation section having a length equivalent to at least five times the diameter of the suction flange has been provided upstream of the suction flange.⁶⁾
 - ✓ The nominal sizes of the pipelines are equal to or greater than the nominal sizes of the pump nozzles.⁶⁾
 - ✓ To prevent excessive pressure losses, adapters to larger nominal diameters are designed with a diffuser angle of approx. 8°. ⁶⁾
 - ✓ The pipelines have been anchored in close proximity to the pump or, for vertical installation, in close proximity to the suction elbow and connected without transmitting any stresses or strains.⁶⁾
1. Thoroughly clean, flush and blow through all vessels, pipes and connections (especially of new installations).
 2. Before installation in the piping, remove the flange covers on the suction nozzle and the discharge nozzle.
 3. Connect the pump nozzles to the piping.



CAUTION

Pumps connected with unbraced expansion joints

Damage to the pump!

- ▷ To prevent impermissible nozzle loads, never connect the pump with unbraced expansion joints.
4. If the owner / operator supplies an expansion joint, it has to be braced with external tie rods to prevent impermissible nozzle loads.

5.5.2 Permissible forces and moments at the pump nozzles

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.

⁶ If suction line requirements cannot be met, contact KSB Service.

Forces and moments at the pump nozzles, horizontal installation

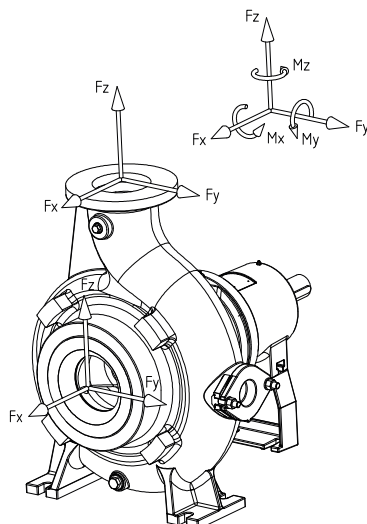


Fig. 15: Forces and moments at the pump nozzles for horizontal installation

Table 9: Forces and moments at the pump nozzles, horizontal installation

Sizes	Impeller type	Forces at suction nozzle				Moments at suction nozzle				Forces at discharge nozzle				Moments at discharge nozzle			
		Fy	Fz	Fx	ΣF	My	Mz	Mx	ΣM	Fy	Fz	Fx	ΣF	My	Mz	Mx	ΣM
		[N]				[Nm]				[N]				[Nm]			
80-315	D	1050	950	1200	1850	450	500	600	900	700	900	800	1400	400	450	600	800
100-315	D	1250	1100	1400	2150	550	650	750	1050	950	1200	1050	1850	450	500	600	900
100-400	K	1600	1400	1750	2750	600	700	900	1300	950	1200	1050	1850	450	500	600	900
100-401	E	1250	1100	1400	2150	550	650	750	1050	950	1200	1050	1850	450	500	600	900
100-401	F	1250	1100	1400	2150	550	650	750	1050	950	1200	1050	1850	450	500	600	900
100-401	K	1250	1100	1400	2150	550	650	750	1050	950	1200	1050	1850	450	500	600	900
100-403	D	2100	1900	2350	3650	800	950	1150	1700	950	1200	1050	1850	450	500	600	900
150-317	K	1600	1400	1750	2750	600	700	900	1300	1400	1750	1600	2750	600	700	900	1300
150-400	D	2100	1900	2350	3650	800	950	1150	1700	1400	1750	1600	2750	600	700	900	1300
150-400	K	2100	1900	2350	3650	800	950	1150	1700	1400	1750	1600	2750	600	700	900	1300
150-401	E	1600	1400	1750	2750	600	700	900	1300	1400	1750	1600	2750	600	700	900	1300
150-401	F	1600	1400	1750	2750	600	700	900	1300	1400	1750	1600	2750	600	700	900	1300
150-401	K	1600	1400	1750	2750	600	700	900	1300	1400	1750	1600	2750	600	700	900	1300
150-401	D	2600	2400	2950	4550	1100	1300	1550	2300	1400	1750	1600	2750	600	700	900	1300
150-403	K	2100	1900	2350	3650	800	950	1150	1700	1400	1750	1600	2750	600	700	900	1300
150-403	D	2100	1900	2350	3650	800	950	1150	1700	1400	1750	1600	2750	600	700	900	1300
150-503	D	2100	1900	2350	3650	800	950	1150	1700	1400	1750	1600	2750	600	700	900	1300
150-503	K	1600	1400	1750	2750	600	700	900	1300	1400	1750	1600	2750	600	700	900	1300
151-401	K	1600	1400	1750	2750	600	700	900	1300	1400	1750	1600	2750	600	700	900	1300
151-403	K	2100	1900	2350	3650	800	950	1150	1700	1400	1750	1600	2750	600	700	900	1300
200-317	K	2100	1900	2350	3650	800	950	1150	1700	1900	2350	2100	3650	800	950	1150	1700
200-330	K	2600	2400	2950	4550	1100	1300	1550	2300	1900	2350	2100	3650	800	950	1150	1700
200-400	D	2600	2400	2950	4550	1100	1300	1550	2300	1900	2350	2100	3650	800	950	1150	1700
200-401	E	2100	1900	2350	3650	800	950	1150	1700	1900	2350	2100	3650	800	950	1150	1700
200-401	K	2100	1900	2350	3650	800	950	1150	1700	1900	2350	2100	3650	800	950	1150	1700
200-402	K	2100	1900	2350	3650	800	950	1150	1700	1900	2350	2100	3650	800	950	1150	1700
200-402	D	2600	2400	2950	4550	1100	1300	1550	2300	1900	2350	2100	3650	800	950	1150	1700
200-403	K	2100	1900	2350	3650	800	950	1150	1700	1900	2350	2100	3650	800	950	1150	1700
200-405	D	2600	2400	2950	4550	1100	1300	1550	2300	1900	2350	2100	3650	800	950	1150	1700
200-500	E	2100	1900	2350	3650	800	950	1150	1700	1900	2350	2100	3650	800	950	1150	1700
200-501	K	2600	2400	2950	4550	1100	1300	1550	2300	1900	2350	2100	3650	800	950	1150	1700
200-502	K	2100	1900	2350	3650	800	950	1150	1700	1900	2350	2100	3650	800	950	1150	1700
200-503	D	2600	2400	2950	4550	1100	1300	1550	2300	1900	2350	2100	3650	800	950	1150	1700
200-503	K	2100	1900	2350	3650	800	950	1150	1700	1900	2350	2100	3650	800	950	1150	1700
200-504	K	2600	2400	2950	4550	1100	1300	1550	2300	1900	2350	2100	3650	800	950	1150	1700

Sizes	Impeller type	Forces at suction nozzle				Moments at suction nozzle				Forces at discharge nozzle				Moments at discharge nozzle			
		Fy	Fz	Fx	ΣF	My	Mz	Mx	ΣM	Fy	Fz	Fx	ΣF	My	Mz	Mx	ΣM
		[N]				[Nm]				[N]				[Nm]			
200-505	K	2600	2400	2950	4550	1100	1300	1550	2300	1900	2350	2100	3650	800	950	1150	1700
200-631	K	2600	2400	2950	4550	1100	1300	1550	2300	1900	2350	2100	3650	800	950	1150	1700
250-400	K	2600	2400	2950	4550	1100	1300	1550	2300	2400	2950	2600	4550	1100	1300	1550	2300
250-400	D	2600	2400	2950	4550	1100	1300	1550	2300	2400	2950	2600	4550	1100	1300	1550	2300
250-401	K	2600	2400	2950	4550	1100	1300	1550	2300	2400	2950	2600	4550	1100	1300	1550	2300
250-402	D	2600	2400	2950	4550	1100	1300	1550	2300	2400	2950	2600	4550	1100	1300	1550	2300
250-403	K	2600	2400	2950	4550	1100	1300	1550	2300	2400	2950	2600	4550	1100	1300	1550	2300
250-500	E	2600	2400	2950	4550	1100	1300	1550	2300	2400	2950	2600	4550	1100	1300	1550	2300
250-630	K	2600	2400	2950	4550	1100	1300	1550	2300	2400	2950	2600	4550	1100	1300	1550	2300
250-630	E	2600	2400	2950	4550	1100	1300	1550	2300	2400	2950	2600	4550	1100	1300	1550	2300
250-632	K	2600	2400	2950	4550	1100	1300	1550	2300	2400	2950	2600	4550	1100	1300	1550	2300
300-400	K	3150	2800	3500	5500	1500	1750	2100	3100	2800	3500	3150	5500	1500	1750	2100	3100
300-400	D	3150	2800	3500	5500	1500	1750	2100	3100	2800	3500	3150	5500	1500	1750	2100	3100
300-401	K	3150	2800	3500	5500	1500	1750	2100	3100	2800	3500	3150	5500	1500	1750	2100	3100
300-402	D	3150	2800	3500	5500	1500	1750	2100	3100	2800	3500	3150	5500	1500	1750	2100	3100
300-403	K	3150	2800	3500	5500	1500	1750	2100	3100	2800	3500	3150	5500	1500	1750	2100	3100
300-500	K	3150	2800	3500	5500	1500	1750	2100	3100	2800	3500	3150	5500	1500	1750	2100	3100
300-502	D	3150	2800	3500	5500	1500	1750	2100	3100	2800	3500	3150	5500	1500	1750	2100	3100
300-505	D	3150	2800	3500	5500	1500	1750	2100	3100	2800	3500	3150	5500	1500	1750	2100	3100
300-505	K	3150	2800	3500	5500	1500	1750	2100	3100	2800	3500	3150	5500	1500	1750	2100	3100
300-630	E	3150	2800	3500	5500	1500	1750	2100	3100	2800	3500	3150	5500	1500	1750	2100	3100
350-500	K	3650	3300	4100	6400	1950	2200	2700	4000	3300	4100	3650	6400	1950	2200	2700	4000
350-501	K	3650	3300	4100	6400	1950	2200	2700	4000	3300	4100	3650	6400	1950	2200	2700	4000
350-502	D	3650	3300	4100	6400	1950	2200	2700	4000	3300	4100	3650	6400	1950	2200	2700	4000
350-503	D	3650	3300	4100	6400	1950	2200	2700	4000	3300	4100	3650	6400	1950	2200	2700	4000
350-503	K	3650	3300	4100	6400	1950	2200	2700	4000	3300	4100	3650	6400	1950	2200	2700	4000
350-632	K	3650	3300	4100	6400	1950	2200	2700	4000	3300	4100	3650	6400	1950	2200	2700	4000
350-633	K	3650	3300	4100	6400	1950	2200	2700	4000	3300	4100	3650	6400	1950	2200	2700	4000
350-710	E	4200	3800	4650	7300	2400	2800	3400	5000	3300	4100	3650	6400	1950	2200	2700	4000
350-710	K	3650	3300	4100	6400	1950	2200	2700	4000	3300	4100	3650	6400	1950	2200	2700	4000
350-713	K	3650	3300	4100	6400	1950	2200	2700	4000	3300	4100	3650	6400	1950	2200	2700	4000
400-500	K	4200	3800	4650	7300	2400	2800	3400	5000	3800	4650	4200	7300	2400	2800	3400	5000
400-632	K	5250	4700	5800	9100	3600	4150	5050	7450	3800	4650	4200	7300	2400	2800	3400	5000
500-632	K	5250	4700	5800	9100	3600	4150	5050	7450	4700	5800	5250	9100	3600	4150	5050	7450
500-634	K	5250	4700	5800	9100	3600	4150	5050	7450	4700	5800	5250	9100	3600	4150	5050	7450
600-520	K	6300	5650	7000	10950	5050	5800	7050	10450	5650	7000	6300	10950	5050	5800	7050	10450
600-710	K	6300	5650	7000	10950	5050	5800	7050	10450	5650	7000	6300	10950	5050	5800	7050	10450
700-902	K	8300	7650	8950	14650	6550	8000	1000	14150	6700	7900	7300	12800	6000	7350	9000	13050

Forces and moments at the pump nozzles, vertical installation

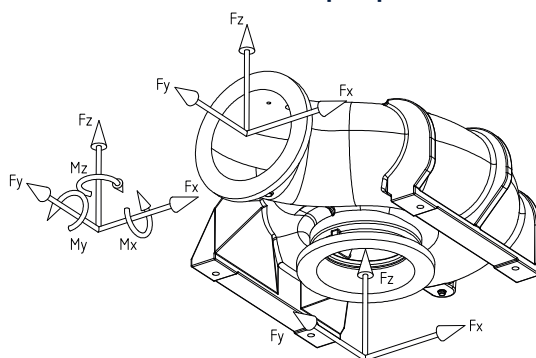


Fig. 16: Forces and moments at the pump nozzles for vertical installation

Table 10: Forces and moments at the pump nozzles, vertical installation

Sizes	Impeller type	Forces at suction nozzle				Moments at suction nozzle				Forces at discharge nozzle				Moments at discharge nozzle			
		Fy	Fz	Fx	ΣF	My	Mz	Mx	ΣM	Fy	Fz	Fx	ΣF	My	Mz	Mx	ΣM
		[N]				[Nm]				[N]				[Nm]			
100-315	D	3200	3950	3550	6200	1500	1900	2100	3050	2700	3350	3000	5250	1250	1450	1750	2600
100-400	K	4050	5000	4500	7850	1750	2050	2500	3650	2700	3350	3000	5250	1250	1450	1750	2600
100-401	E	3200	3950	3550	6200	1500	1900	2100	3050	2700	3350	3000	5250	1250	1450	1750	2600
100-401	F	3200	3950	3550	6200	1500	1900	2100	3050	2700	3350	3000	5250	1250	1450	1750	2600
100-401	K	3200	3950	3550	6200	1500	1900	2100	3050	2700	3350	3000	5250	1250	1450	1750	2600
100-403	D	5400	6700	6000	10450	2300	2650	3250	4800	2700	3350	3000	5250	1250	1450	1750	2600
150-400	D	5400	6700	6000	10450	2300	2650	3250	4800	4050	5000	4500	7850	1750	2050	2500	3650
150-400	K	5400	6700	6000	10450	2300	2650	3250	4800	4050	5000	4500	7850	1750	2050	2500	3650
150-401	E	4050	5000	4500	7850	1750	2050	2500	3650	4050	5000	4500	7850	1750	2050	2500	3650
150-401	F	4050	5000	4500	7850	1750	2050	2500	3650	4050	5000	4500	7850	1750	2050	2500	3650
150-401	K	4050	5000	4500	7850	1750	2050	2500	3650	4050	5000	4500	7850	1750	2050	2500	3650
150-401	D	6750	8350	7450	13050	3150	3650	4450	6550	4050	5000	4500	7850	1750	2050	2500	3650
150-403	K	5400	6700	6000	10450	2300	2650	3250	4800	4050	5000	4500	7850	1750	2050	2500	3650
150-403	D	5400	6700	6000	10450	2300	2650	3250	4800	4050	5000	4500	7850	1750	2050	2500	3650
150-503	D	5400	6700	6000	10450	2300	2650	3250	4800	4050	5000	4500	7850	1750	2050	2500	3650
150-503	K	4050	5000	4500	7850	1750	2050	2500	3650	4050	5000	4500	7850	1750	2050	2500	3650
151-401	K	4050	5000	4500	7850	1750	2050	2500	3650	4050	5000	4500	7850	1750	2050	2500	3650
151-403	K	5400	6700	6000	10450	2300	2650	3250	4800	4050	5000	4500	7850	1750	2050	2500	3650
200-330	K	6750	8350	7450	13050	3150	3650	4450	6550	5400	6700	6000	10450	2300	2650	3250	4800
200-400	D	6750	8350	7450	13050	3150	3650	4450	6550	5400	6700	6000	10450	2300	2650	3250	4800
200-401	E	5400	6700	6000	10450	2300	2650	3250	4800	5400	6700	6000	10450	2300	2650	3250	4800
200-401	K	5400	6700	6000	10450	2300	2650	3250	4800	5400	6700	6000	10450	2300	2650	3250	4800
200-402	K	5400	6700	6000	10450	2300	2650	3250	4800	5400	6700	6000	10450	2300	2650	3250	4800
200-403	K	5400	6700	6000	10450	2300	2650	3250	4800	5400	6700	6000	10450	2300	2650	3250	4800
200-402	D	6750	8350	7450	13050	3150	3650	4450	6550	5400	6700	6000	10450	2300	2650	3250	4800
200-405	D	6750	8350	7450	13050	3150	3650	4450	6550	5400	6700	6000	10450	2300	2650	3250	4800
200-500	E	5400	6700	6000	10450	2300	2650	3250	4800	5400	6700	6000	10450	2300	2650	3250	4800
200-501	K	6750	8350	7450	13050	3150	3650	4450	6550	5400	6700	6000	10450	2300	2650	3250	4800
200-502	K	5400	6700	6000	10450	2300	2650	3250	4800	5400	6700	6000	10450	2300	2650	3250	4800
200-503	D	6750	8350	7450	13050	3150	3650	4450	6550	5400	6700	6000	10450	2300	2650	3250	4800
200-503	K	5400	6700	6000	10450	2300	2650	3250	4800	5400	6700	6000	10450	2300	2650	3250	4800
200-504	K	6750	8350	7450	13050	3150	3650	4450	6550	5400	6700	6000	10450	2300	2650	3250	4800
200-505	K	6750	8350	7450	13050	3150	3650	4450	6550	5400	6700	6000	10450	2300	2650	3250	4800
200-631	K	6750	8350	7450	13050	3150	3650	4450	6550	5400	6700	6000	10450	2300	2650	3250	4800
250-400	K	6750	8350	7450	13050	3150	3650	4450	6550	6750	8350	7450	13050	3150	3650	4450	6550
250-400	D	6750	8350	7450	13050	3150	3650	4450	6550	6750	8350	7450	13050	3150	3650	4450	6550
250-401	K	6750	8350	7450	13050	3150	3650	4450	6550	6750	8350	7450	13050	3150	3650	4450	6550
250-402	D	6750	8350	7450	13050	3150	3650	4450	6550	6750	8350	7450	13050	3150	3650	4450	6550
250-403	K	6750	8350	7450	13050	3150	3650	4450	6550	6750	8350	7450	13050	3150	3650	4450	6550
250-500	E	6750	8350	7450	13050	3150	3650	4450	6550	6750	8350	7450	13050	3150	3650	4450	6550
250-630	K	6750	8350	7450	13050	3150	3650	4450	6550	6750	8350	7450	13050	3150	3650	4450	6550
250-630	E	6750	8350	7450	13050	3150	3650	4450	6550	6750	8350	7450	13050	3150	3650	4450	6550
250-632	K	6750	8350	7450	13050	3150	3650	4450	6550	6750	8350	7450	13050	3150	3650	4450	6550
250-900	K	9400	11650	10450	18250	5500	6350	7750	11400	6750	8350	7450	13050	3150	3650	4450	6550
300-400	K	8050	10000	8950	15650	4300	4950	6050	8900	8050	10000	8950	15650	4300	4950	6050	8900
300-400	D	8050	10000	8950	15650	4300	4950	6050	8900	8050	10000	8950	15650	4300	4950	6050	8900
300-401	K	8050	10000	8950	15650	4300	4950	6050	8900	8050	10000	8950	15650	4300	4950	6050	8900
300-402	D	8050	10000	8950	15650	4300	4950	6050	8900	8050	10000	8950	15650	4300	4950	6050	8900
300-403	K	8050	10000	8950	15650	4300	4950	6050	8900	8050	10000	8950	15650	4300	4950	6050	8900
300-500	K	8050	10000	8950	15650	4300	4950	6050	8900	8050	10000	8950	15650	4300	4950	6050	8900
300-502	D	8050	10000	8950	15650	4300	4950	6050	8900	8050	10000	8950	15650	4300	4950	6050	8900
300-505	D	8050	10000	8950	15650	4300	4950	6050	8900	8050	10000	8950	15650	4300	4950	6050	8900
300-505	K	8050	10000	8950	15650	4300	4950	6050	8900	8050	10000	8950	15650	4300	4950	6050	8900
300-630	E	8050	10000	8950	15650	4300	4950	6050	8900	8050	10000	8950	15650	4300	4950	6050	8900

Sizes	Impeller type	Forces at suction nozzle				Moments at suction nozzle				Forces at discharge nozzle				Moments at discharge nozzle			
		Fy	Fz	Fx	ΣF	My	Mz	Mx	ΣM	Fy	Fz	Fx	ΣF	My	Mz	Mx	ΣM
		[N]				[Nm]				[N]				[Nm]			
300-710	E	8050	10000	8950	15650	4300	4950	6050	8900	8050	10000	8950	15650	4300	4950	6050	8900
350-500	K	9400	11650	10450	18250	5500	6350	7750	11400	9400	11650	10450	18250	5500	6350	7750	11400
350-501	K	9400	11650	10450	18250	5500	6350	7750	11400	9400	11650	10450	18250	5500	6350	7750	11400
350-502	D	9400	11650	10450	18250	5500	6350	7750	11400	9400	11650	10450	18250	5500	6350	7750	11400
350-503	D	9400	11650	10450	18250	5500	6350	7750	11400	9400	11650	10450	18250	5500	6350	7750	11400
350-503	K	9400	11650	10450	18250	5500	6350	7750	11400	9400	11650	10450	18250	5500	6350	7750	11400
350-632	K	9400	11650	10450	18250	5500	6350	7750	11400	9400	11650	10450	18250	5500	6350	7750	11400
350-633	K	9400	11650	10450	18250	5500	6350	7750	11400	9400	11650	10450	18250	5500	6350	7750	11400
350-710	E	10750	13300	11950	20850	6900	7950	9700	14300	9400	11650	10450	18250	5500	6350	7750	11400
350-710	K	9400	11650	10450	18250	5500	6350	7750	11400	9400	11650	10450	18250	5500	6350	7750	11400
350-713	K	9400	11650	10450	18250	5500	6350	7750	11400	9400	11650	10450	18250	5500	6350	7750	11400
400-500	K	10750	13300	11950	20850	6900	7950	9700	14300	10750	13300	11950	20850	6900	7950	9700	14300
400-632	K	13450	16600	14950	26050	10250	11800	14450	21300	10750	13300	11950	20850	6900	7950	9700	14300
400-710	K	13450	16600	14950	26050	10250	11800	14450	21300	10750	13300	11950	20850	6900	7950	9700	14300
400-713	K	13450	16600	14950	26050	10250	11800	14450	21300	10750	13300	11950	20850	6900	7950	9700	14300
400-820	K	13450	16600	14950	26050	10250	11800	14450	21300	10750	13300	11950	20850	6900	7950	9700	14300
500-632	K	13450	16600	14950	26050	10250	11800	14450	21300	13450	16600	14950	26050	10250	11800	14450	21300
500-634	K	13450	16600	14950	26050	10250	11800	14450	21300	13450	16600	14950	26050	10250	11800	14450	21300
500-710	K	13450	16600	14950	26050	10250	11800	14450	21300	13450	16600	14950	26050	10250	11800	14450	21300
500-900	K	16150	19900	17950	31250	14400	16600	20200	29900	13450	16600	14950	26050	10250	11800	14450	21300
600-520	K	16150	19900	17950	31250	14400	16600	20200	29900	16150	19900	17950	31250	14400	16600	20200	29900
600-710	K	16150	19900	17950	31250	14400	16600	20200	29900	16150	19900	17950	31250	14400	16600	20200	29900
600-900	K	20100	23700	21900	38400	18000	22050	27000	39150	16150	19900	17950	31250	14400	16600	20200	29900
700-902	K	22950	23700	21900	38400	19650	24000	30000	42450	20100	23700	21900	38400	18000	22050	27000	39150

5.5.3 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.

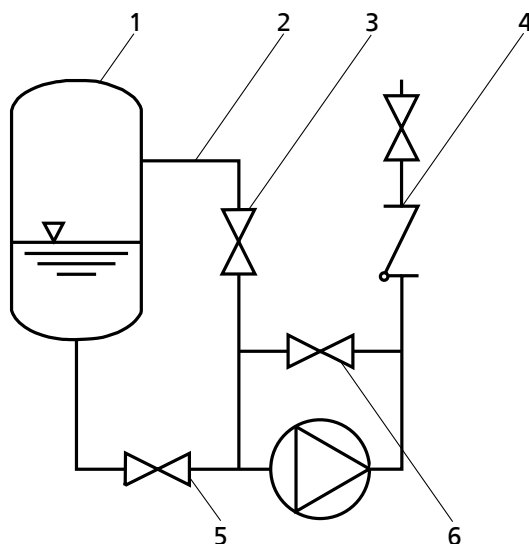


Fig. 17: Vacuum balance system

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.

5.6 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:

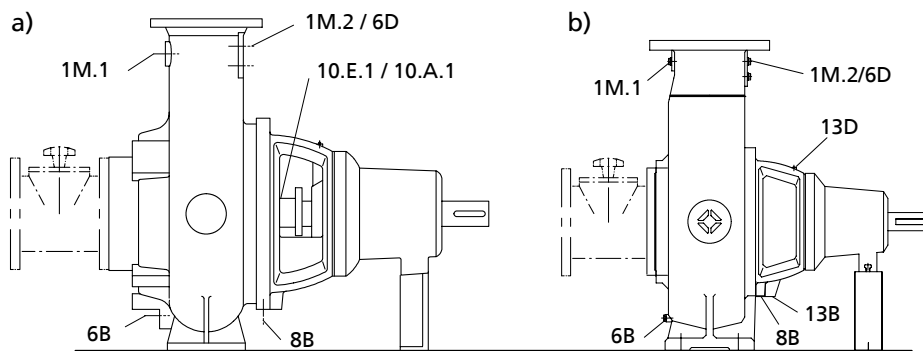


Fig. 18: Auxiliary connections: **a)** Pump with gland packing, **b)** Pump with mechanical seal

Table 11: Auxiliary connections, part 1

Connection	Description	Size				
		D 080-315	150-400	200-330	D 150-503	K 200-631
		D 080-317	150-401	250-400	K 150-503	K 250-900
		100-401	150-403	250-401	K 200-401	K 350-710
		D 100-315	151-401	250-402	K 200-402	K 350-713
		K 100-400	151-403	250-403	E 200-500	K 400-500
		D 100-403	200-400	300-400	D 200-503	K 400-710
			200-401	300-401	K 200-503	K 400-713
			200-402	300-402	K 200-504	K 400-820
			200-403	300-403	K 200-505	K 500-710
			200-405		E 250-500	K 500-900
			200-501		E 250-630	K 600-710
						K 600-900
				K 700-902		
1 M.1	Pressure gauge (horizontal installation)	G 1/2			G 1	G 1/2
1 M.2	Pressure gauge (vertical installation)	G 1/2				
6 D	Vent	G 1	G 1 1/4			
3 M	Pressure/vacuum gauge	G 1/2				
6 B	Casing drain	G 1 ⁷⁾				
8 B	Leakage check / leakage drain	G 1/2				
For versions with mechanical seal						
13 D	Lubricant filler opening	G 1/2				
13 B	Lubricant drain	G 1/2				
For versions with gland packing						
10.E.1	Barrier fluid filler opening	G 3/8				
10.A.1	Barrier fluid drain	G 3/8				

Table 12: Auxiliary connections, part 2

Connection	Description	Size						
		K 250-630 K 300-500 D 300-502 D 300-505 E 300-630 K 350-500 K 350-501 D 350-502 D 350-503 K 350-632	K 250-632 K 300-505 K 350-633 K 400-632 K 500-632 K 500-634	E 300-710	E 350-710	K 600-520		
		1 M.1	Pressure gauge (horizontal installation)	G 1/2		-	G 1	G 1/2
		1 M.2	Pressure gauge (vertical installation)	G 1/2				
		6 D	Vent	G 1 1/4	G 1 1/2	G 2	G 1	G 2
		3 M	Pressure/vacuum gauge	G 1/2				
		6 B	Casing drain	G 1		G 2	G 1 1/2	
		8 B	Leakage check / leakage drain	G 1/2				
		For versions with mechanical seal						
		13 D	Lubricant filler opening	G 1/2				
13 B	Lubricant drain	G 1/2						
For versions with gland packing								
10.E.1	Barrier fluid filler opening	G 3/8						
10.A.1	Barrier fluid drain	G 3/8						

⁷ Size D 80-315 = G 1/2

5.7 Checking the coupling alignment

	! DANGER Inadmissible temperatures at the coupling or bearings due to misalignment of the coupling Explosion hazard! Risk of burns! ▷ Make sure that the coupling is correctly aligned at all times.
	CAUTION Misalignment of pump and motor shafts Damage to pump, motor and coupling! ▷ Always check the coupling after the pump has been installed and connected to the piping. ▷ Also check the coupling of pump sets supplied with pump and motor mounted on the same baseplate.

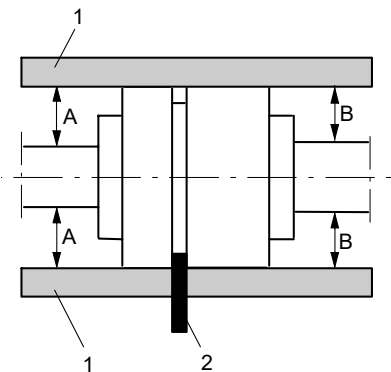


Fig. 19: Non-spacer-type coupling, checking the coupling alignment

1	Straight edge	2	Gauge
---	---------------	---	-------

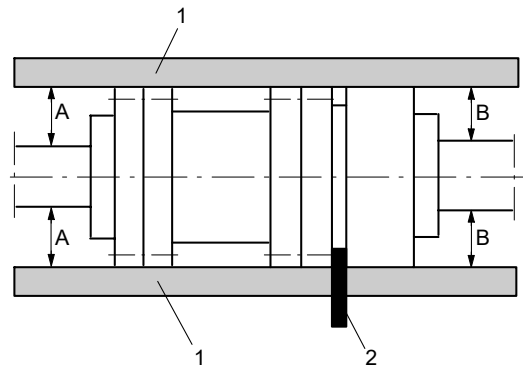


Fig. 20: Spacer-type coupling, checking the coupling alignment

1	Straight edge	2	Gauge
---	---------------	---	-------

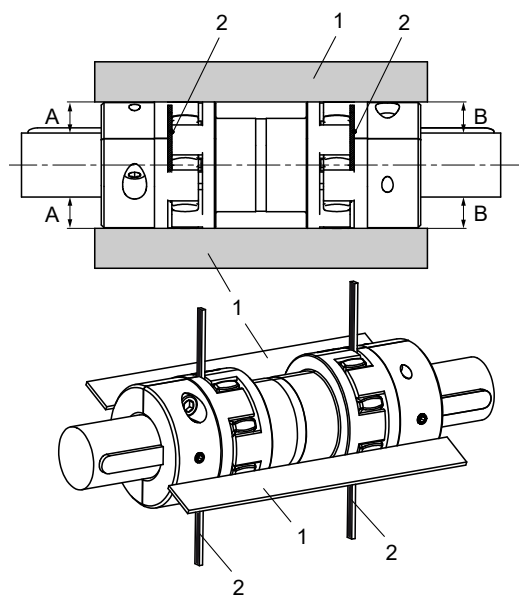


Fig. 21: Double Cardan spacer-type coupling, checking the coupling alignment

1	Straight edge	2	Gauge
---	---------------	---	-------

Table 13: Permissible alignment offset of coupling halves

Coupling type	Radial offset	Axial offset
	[mm]	[mm]
Non-spacer-type coupling (⇒ Fig. 19)	≤ 0,1	≤ 0,1
Spacer-type coupling (⇒ Fig. 20)	≤ 0,1	≤ 0,1
Double Cardan coupling (⇒ Fig. 21)	≤ 0,5	≤ 0,5

- ✓ The coupling guard and its footboard, if any, have been removed.
- 1. Loosen the support foot and re-tighten it without transmitting any stresses or strains.
- 2. Place the straight edge axially on both coupling halves.
- 3. Leave the straight edge in this position and turn the coupling by hand.
The coupling is aligned correctly if the distances A and B to the respective shafts are the same at all points around the circumference.
Observe the permissible radial offset in coupling half alignment (⇒ Table 13) both during standstill and at operating temperature as well as under inlet pressure.
- 4. Check the distance (dimension see general arrangement drawing) between the two coupling halves around the circumference.
The coupling is correctly aligned if the distance between the two coupling halves is the same at all points around the circumference.
Observe the permissible axial offset in coupling half alignment (⇒ Table 13) both during standstill and at operating temperature as well as under inlet pressure.

	DANGER
	Risk of ignition by frictional sparks Explosion hazard!! ▷ Choose a coupling guard material that is non-sparking in the event of mechanical contact.

	⚠ WARNING
	Unprotected rotating coupling Risk of injury by rotating shafts! ▸ Always operate the pump set with a coupling guard. If the customer specifically requests not to include a coupling guard in KSB's delivery, then the operator must supply one! ▸ Observe all relevant regulations for selecting a coupling guard.

5. If alignment is correct, re-install the coupling guard and its footboard, if any.

Checking the coupling alignment with a laser tool

Coupling alignment may also be checked with a laser tool. Observe the documentation provided by the manufacturer of the measuring instrument.

5.8 Checking the belt drive

5.8.1 Checking the pulley alignment

- ✓ The belt guard has been removed.
- ✓ Required tools: wedge gauge, straight-edge
 1. Place the straight-edge (1) vertically on both pulleys.
 2. Leave the straight-edge (1) in this position and turn the measuring point by hand.
 3. Adjust the alignment, if required. (⇒ Section 7.5.10, Page 88)
 4. Re-fit the belt guard.

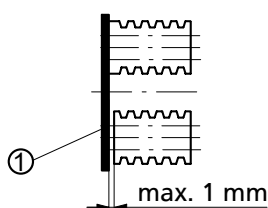


Fig. 22: Checking the pulley alignment

5.8.2 Tensioning the belts

	CAUTION
	Lack of tension Insufficient power transmission! Wear resulting from excessive slip! ▸ Check the tension forces.
	CAUTION
	Excessive tension Service life reduced by excessive stretching, unnecessary flexing work or excessive temperatures! ▸ Check the tension forces.

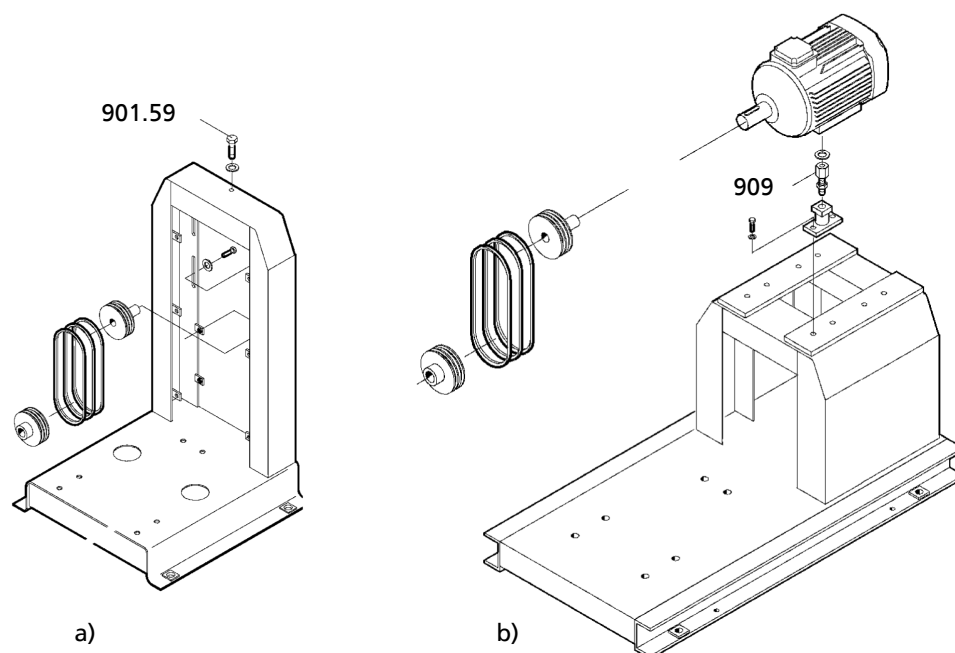


Fig. 23: Tensioning the belts, a) installation type 3 HZ, b) installation type 3 HM

1. Adjust the tension by tightening and loosening bolt 901.59 or adjusting screw 909.
2. Check the tension again between ½ hour and 1 hour after initial tensioning.
3. Check the V-belt forces and deflection with a suitable measuring device.
The profile and diameter of the smaller pulley are required to determine the correct V-belt tension.

Check the belt tension with a suitable measuring device (not included in the scope of supply).

Table 14: V-belt tension and deflection

Profile	Test force per V-belt	Diameter of smallest pulley	Static belt tension				Deflection per 100 mm centre distance	
			Standard		Raw edge		Standard	Raw edge
			Initial installation	After running in	Initial installation	After running in		
			[N]	[N]	[N]	[N]	[mm]	[mm]
SPA XPA	50	71 < 100	350	250	400	300	3,2	2,9
		> 100 < 140	400	300	500	400	2,75	2,55
		> 140 < 200	500	400	600	450	2,55	2,4
		> 200					2,45	2,3
SPB XPB	75	< 160	650	500	700	550	3,0	2,55
		> 160 < 224	700	550	850	650	2,55	2,2
		> 224 < 355	900	700	1000	800	2,25	1,85
		> 355					2,1	1,75
SPC XPC	125	180 < 250	350	250	400	300	2,55	2,2
		> 250 < 355	400	300	500	400	2,2	2,05
		> 355 < 560	500	400	600	450	2,0	1,9
		> 560					1,9	1,7

	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.

5.9 Installing pump sets with universal-joint shaft

	DANGER
	Risk of ignition by frictional sparks Explosion hazard!! ▷ Choose a coupling guard material that is non-sparking in the event of mechanical contact.

	WARNING
	Exposed rotating coupling or universal-joint shaft Risk of injury by rotating shafts! ▷ Always operate the pump set with a coupling guard. ▷ If the customer specifically requests not to include a coupling guard in KSB's delivery, then the operator must supply one! ▷ Observe all relevant regulations for selecting a coupling guard.

	NOTE
	If the customer specifically requests not to include a universal-joint shaft guard in KSB's delivery, then the operator must supply one.

For installing and aligning the universal-joint shaft refer to the technical product literature of the universal-joint shaft manufacturer.

5.10 Aligning the pump and motor

After having installed the pump set and connected the piping, check the coupling alignment and, if required, re-align the pump set (at the motor).

5.10.1 Motors with adjusting screw

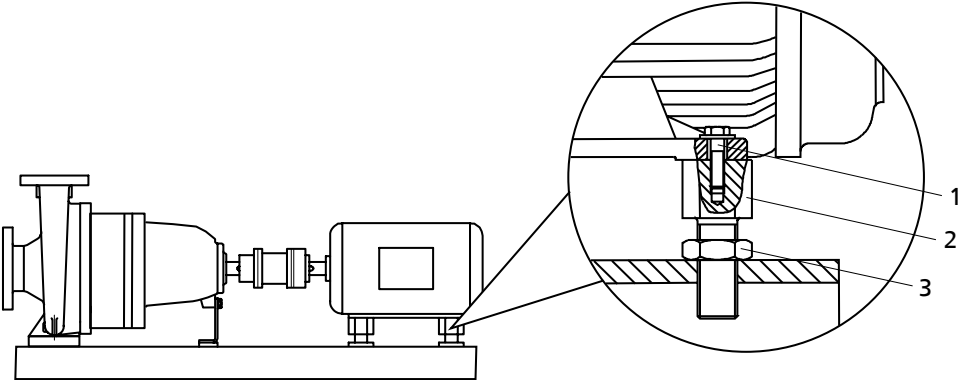


Fig. 24: Motor with adjusting screw

1	Hexagon head bolt	2	Adjusting screw
3	Locknut		

✓ The coupling guard and its footboard, if any, have been removed.

1. Check the coupling alignment.
2. Unscrew the hexagon head bolts (1) at the motor and the locknuts (3) at the baseplate.
3. Turn the adjusting screws (2) by hand or by means of an open-end wrench until the coupling alignment is correct and all motor feet rest squarely on the baseplate.
4. Re-tighten the hexagon head bolts (1) at the motor and the locknuts (3) at the baseplate.
5. Check proper functioning of coupling/shaft.
Check that coupling/shaft can easily be rotated by hand.

	⚠ WARNING Unprotected rotating coupling Risk of injury by rotating shafts! ▷ Always operate the pump set with a coupling guard. If the customer specifically requests not to include a coupling guard in KSB's delivery, then the operator must supply one! ▷ Observe all relevant regulations for selecting a coupling guard.
	⚠ DANGER Risk of ignition by frictional sparks Explosion hazard!! ▷ Choose a coupling guard material that is non-sparking in the event of mechanical contact.

6. Fit the coupling guard and its footboard, if any.
7. Check the distance between coupling and coupling guard.
The coupling guard must not touch the coupling.

5.10.2 Motors without adjusting screw

Any differences in the centreline heights of the pump and motor shafts are compensated by means of shims.

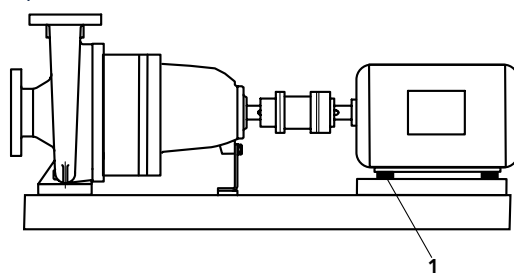


Fig. 25: Pump set with shim

1	Shim
---	------

- ✓ The coupling guard and its footboard, if any, have been removed.
1. Check the coupling alignment.
 2. Loosen the hexagon head bolts at the motor.
 3. Insert shims underneath the motor feet until the difference in shaft centreline height has been compensated.
 4. Re-tighten the hexagon head bolts.
 5. Check proper functioning of coupling/shaft.
Check that coupling/shaft can easily be rotated by hand.

	! WARNING Unprotected rotating coupling Risk of injury by rotating shafts! ▷ Always operate the pump set with a coupling guard. If the customer specifically requests not to include a coupling guard in KSB's delivery, then the operator must supply one! ▷ Observe all relevant regulations for selecting a coupling guard.
	! DANGER Risk of ignition by frictional sparks Explosion hazard!! ▷ Choose a coupling guard material that is non-sparking in the event of mechanical contact.

6. Fit the coupling guard and its footboard, if any.
7. Check the distance between coupling and coupling guard.
The coupling guard must not touch the coupling.

5.11 Checking the lubricants

- Grease-lubricated bearings
 - Grease-lubricated bearings have been packed with grease at the factory.
 - Lubricant reservoir for the mechanical seal
 - The lubricant reservoirs have been filled at the factory.
1. Before commissioning the pump set, check the lubricant level.

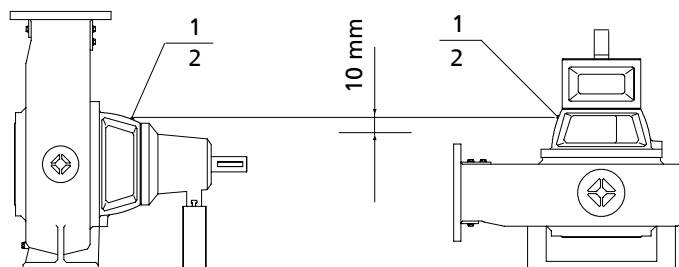


Fig. 26: Checking the lubricant level

- ✓ The pump set has been installed as described in this manual.
1. Unscrew and remove screw plug (1) with joint ring (2).
 2. If the lubricant level is within the 10 mm tolerance range below the opening, re-insert and fasten screw plug (1) with joint ring (2).
 3. If the lubricant level is below the tolerance range, fill in more lubricant.
(⇒ Section 7.2.3.2.2, Page 58)

5.12 Barrier fluid connection for version with gland packing

The fluid handled can be used as a barrier fluid or flushing liquid, provided that:

- It has been filtered.
- It has been cooled.
- An external fluid can be used, provided it has been filtered and small amounts of the external fluid may mix with the fluid handled.

If no barrier fluid is available, grease can be pressed in instead.

1. Install the correct connection for the type of barrier fluid to be used.
(⇒ Section 5.6, Page 33)

5.13 Electrical connection

	⚠ DANGER Electrical connection work by unqualified personnel Danger of death from electric shock and explosion! ▶ Always have the electrical connections installed by an electrically qualified person. ▶ Observe regulations IEC 60364 and, for explosion-proof versions, BS 60079 .
	⚠ WARNING Incorrect connection to the mains Damage to the power supply network, short circuit! ▶ Observe the technical specifications of the local energy supply companies.
1. Check the available mains voltage against the data on the motor name plate. 2. Select an appropriate starting method.	NOTE Installing a motor protection device is recommended.

5.14 Checking the direction of rotation

	⚠ DANGER Temperature increase resulting from contact between rotating and stationary components Explosion hazard! Damage to the pump set! ▶ Never check the direction of rotation by starting up the unfilled pump set. ▶ Separate the pump from the motor to check the direction of rotation.
	⚠ WARNING Hands inside the pump casing Risk of injuries, damage to the pump! ▶ 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.
	CAUTION Incorrect direction of rotation with non-reversible mechanical seal Damage to the mechanical seal and leakage! ▶ Separate the pump from the motor to check the direction of rotation.
	CAUTION Drive and pump running in the wrong direction of rotation Damage to the pump! ▶ 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.

The correct direction of rotation of the motor and pump is clockwise (seen from the drive end).

1. Start the motor 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 motor is running in the wrong direction of rotation, check the electrical connection of the motor and switchgear, if any.

5.15 Priming and venting the pump

	DANGER
	Shaft seal failure caused by insufficient lubrication Hot or toxic fluid could escape! Damage to the pump! ▷ Before starting up the pump set, vent the pump and suction line and prime both with the fluid to be handled.

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).

5.16 Protective devices

	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.

5.17 Connecting the vibration sensor

The pump is supplied prepared for the connection of a vibration sensor as an option. Fasten the vibration sensor at the point indicated at the bearing bracket. Observe the technical literature of the sensor for fastening and electrical wiring.

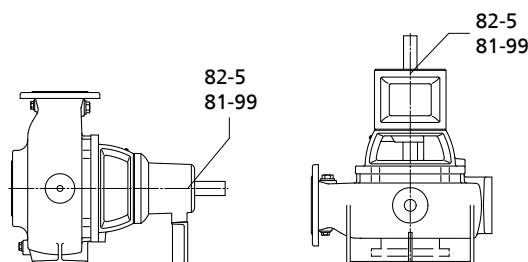


Fig. 27: Position of vibration sensor

82-5	Adapter	81-99	Electric part
------	---------	-------	---------------

5.18 Connecting temperature measuring devices

The pump is supplied prepared for the connection of resistance thermometers as an option. Fasten the resistance thermometers at the points indicated at the bearing bracket. Observe the technical literature of the sensor for fastening and electrical wiring.

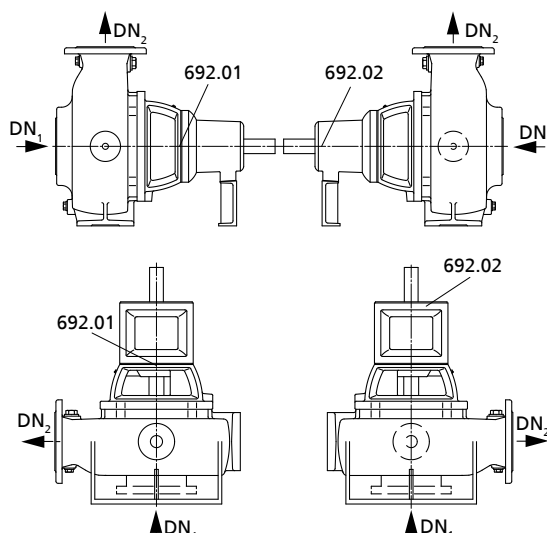


Fig. 28: Positions of temperature sensors

692-1	Temperature measuring device No. 1	692-2	Temperature measuring device No. 2
-------	------------------------------------	-------	------------------------------------

5.19 Warning and trip values

As an option, the pump can be fitted with various sensors. If such sensors are fitted, observe the following warning values and trip values:

Table 15: Warning values and trip values

Sensors		Warning value	Trip value
Vibrations ⁸⁾ of pumps with a drive rating < 200 kW	[mm/s - rms]	6,4 ⁹⁾	10,6
Vibrations ⁸⁾ of pumps with a drive rating > 200 kW	[mm/s - rms]	7,6 ⁹⁾	11,9
Bearing temperature at the outer bearing ring	[°C]	85	90

5.20 Connecting a leakage monitor

The pump features a leakage chamber between the discharge cover and the bearing bracket, which can be equipped with a leakage monitor. A leakage monitor detects when the leakage chamber is filled due to defective mechanical seals. The leakage monitor has a separate connection cable and is intended for connection to an electrode relay. Tripping of the electrode relay must result in the pump set cutting out.

The electrode relay (K1) must fulfil the following requirements:

- Sensor circuit 10 to 30V ~
- Tripping current 0.5 to 3 mA
(equivalent to a tripping resistance of 3 to 60 kΩ)

⁸ To DIN ISO 10816-7, category II For D and E impellers: An additional 3 mm/s are permitted in accordance with DIN ISO 10816-3.

⁹ Within the preferred operating range of $0.7 \leq Q/Q_{BEP} \leq 1.2$ the vibration values of newly commissioned pumps with good system conditions (piping layout, approach flow at the pump, etc.) are below the limits of zone A to DIN ISO 10816-7, i.e. below 3.2 mm/s rms ($P_2 \leq 200$ kW) and 4.2 mm/s rms ($P_2 > 200$ kW).

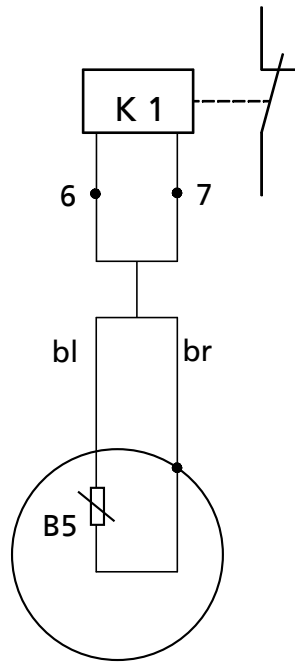


Fig. 29: Wiring of the electrode relay

6 Commissioning/Start-up/Shutdown

6.1 Commissioning/Start-up

6.1.1 Prerequisites for commissioning/start-up

Prior to commissioning, 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 5.13, Page 42)
- The pump has been primed with the fluid to be handled. The pump has been vented.
- The direction of rotation has been checked. (⇒ Section 5.14, Page 42)
- 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

	 DANGER Non-compliance with the permissible pressure and temperature limits if the pump is operated with the suction and/or discharge line closed. Explosion hazard! Hot or toxic fluids escaping! ▷ 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.
	 DANGER Excessive temperatures due to dry running or excessive gas content in the fluid handled Explosion hazard! Damage to the pump set! ▷ 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.
	 WARNING Pump sets with high noise levels Damage to hearing! ▷ Persons must only enter the vicinity of the running pump set if they are wearing protective clothing/ear protection. ▷ See noise characteristics. (⇒ Section 4.8, Page 22)

	CAUTION Re-starting while motor is still running down Damage to the pump set! ▷ Do not re-start the pump set before it has come to a standstill. ▷ Never start up the pump set while the pump is running in reverse.
---	--

	CAUTION Abnormal noises, vibrations, temperatures or leakage Damage to the pump! ▷ 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.
- 5. On pump sets with gland packing, check the leakage at the gland packing and re-adjust it if required. (⇒ Section 7.5.8.2, Page 87)

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

	NOTE 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.
---	---

6.2 Operating limits

	⚠ DANGER Non-compliance with operating limits for pressure, temperature, fluid handled and speed Explosion hazard! Hot or toxic fluid could escape! ▷ 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.
	⚠ DANGER Formation of a potentially explosive atmosphere inside the pump Explosion hazard! ▷ When draining tanks take suitable measures to prevent dry running of the pump (e.g. fill level monitoring).

6.2.1 Maximum operating pressure

	CAUTION
Permissible operating pressure exceeded	
Damage to connections and seals!	
▶ Never exceed the operating pressure specified in the data sheet.	

Table 16: Maximum operating pressure [bar]

Size	Maximum operating pressure
080-315	10
080-317	10
100-315	10
K 100-400	10
100-401	10
100-403	10
150-400	10
150-401	10
150-403	10
150-503	11
151-401	10
151-403	10
200-330	10
200-401	10
200-402	10
200-403	10
200-405	10
200-501	10
200-502	10
200-503	10
200-504	10
200-505	10
200-631	10
250-400	10
250-401	10
250-402	10
250-403	10
250-500	10
250-630	10
250-632	10
250-900	13
300-400	10
300-401	10
300-402	10
300-403	10
300-500	6
300-502	10
300-505	10
300-630	10
300-710	10

Size	Maximum operating pressure
350-500	6
350-501	6
350-502	6
350-503	6
350-632	10
350-633	10
E 350-710	6
K 350-710	10
350-713	13
400-500	6
400-632	6
400-710	10
400-713	13
400-820	13
500-634	4
500-632	4
500-710	6,9
500-900	9
600-520	4
600-710	4
600-900	9
700-902	3

6.2.2 Frequency of starts

	CAUTION
	Re-starting while motor is still running down Damage to the pump set! ▷ Do not re-start the pump set before it has come to a standstill. ▷ Never start up the pump set while the pump is running in reverse.

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

Table 17: Frequency of starts

Motor rating [kW]	Maximum frequency of starts [Starts/hour]
≤ 11	25
≤ 100	20
> 100	10

6.2.3 Fluid handled

6.2.3.1 Temperature of the fluid handled

	CAUTION
	Impermissibly high temperature of fluid handled Damage to the pump! ▷ 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 47)

6.2.3.2 Density of the fluid handled

	CAUTION
	Impermissibly high density of the fluid handled Motor overload! ▷ Observe the information about fluid density in the data sheet. ▷ Make sure the motor has sufficient power reserves.

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

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 60)
- ✓ The safety instructions for dismantling the pump have been observed. (⇒ Section 7.4.1, Page 60)
- ✓ 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 and grease, food-approved, if required) to protect them against corrosion.
Observe the additional instructions on preservation. (⇒ Section 3.3, Page 15)

6.3.1 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.

6.4 Returning to service

	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.

For returning the equipment to service observe the sections on commissioning/start-up (⇒ Section 6.1, Page 46) and the operating limits (⇒ Section 6.2, Page 47) .

In addition, carry out all servicing/maintenance operations before returning the pump (set) to service. (⇒ Section 7, Page 52)

7 Servicing/Maintenance

7.1 Safety regulations

	 DANGER Improper cleaning of coated pump surfaces Explosion hazard by electrostatic discharge! ▸ When cleaning coated pump surfaces in atmospheres of Explosion group IIC, use suitable anti-static equipment.
	 DANGER Sparks produced during servicing work Explosion hazard! ▸ Observe the safety regulations in force at the place of installation! ▸ Always perform maintenance work at an explosion-proof pump (set) outside of potentially explosive atmospheres.
 	 DANGER Improperly serviced pump set Explosion hazard! Damage to the pump set! ▸ Service the pump set regularly. ▸ Prepare a maintenance schedule with special emphasis on lubricants, shaft seal and coupling.
The operator ensures that maintenance, inspection and installation are performed by authorised, qualified specialist personnel who are thoroughly familiar with the manual.	
	 WARNING Unintentional starting of the pump set Risk of injury by moving components and shock currents! ▸ 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.
	 WARNING Fluids handled, consumables and supplies which are hot and/or pose a health hazard Risk of injury! ▸ 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.

	! WARNING
	Insufficient stability Risk of crushing hands and feet! ▷ 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. Find your contact in the attached Addresses booklet or visit https://www.ksb.com/en-global/contact .

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! ▷ 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.

 	! DANGER
	Non-compliance with operating limits for pressure, temperature, fluid handled and speed Explosion hazard! Hot or toxic fluid could escape! ▷ 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.

	CAUTION
	Increased wear due to dry running Damage to the pump set! ▷ 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.

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.
- For bearing temperature monitoring, set the temperatures as follows: alert at 85 °C, pump cut-out at 90 °C.
- Vibration monitoring equipment (⇒ Section 5.19, Page 44)

7.2.2 Inspection work

	 DANGER Electrostatic charging Explosion hazard! Damage to the pump set! ▸ 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.

	 WARNING Fluids handled, consumables and supplies which are hot and/or pose a health hazard Hazard to persons and the environment! ▸ Collect and properly dispose of flushing fluid and any residues of the fluid handled. ▸ Wear protective clothing and a protective mask if required. ▸ Observe all legal regulations on the disposal of fluids posing a health hazard.
	 WARNING Hands or foreign objects in the pump casing Risk of injuries, damage to the pump! ▸ 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:

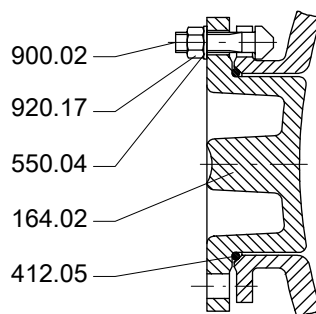


Fig. 30: Inspection hole in the casing

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). (⇒ Section 5.6, Page 33)
- 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 46)

7.2.3 Lubrication and lubricant change

7.2.3.1 Lubricating the rolling element bearings

	⚠ DANGER Excessive temperatures as a result of bearings running hot or defective bearing seals Explosion hazard! Fire hazard! Damage to the pump set! ▸ Regularly check the condition of the lubricant.
	⚠ WARNING Shaft seal ring overheating Explosion hazard! Bearings overheating! ▸ When fitting new shaft seal rings, apply grease to the sealing lip.

7.2.3.1.1 Changing the grease

Lubricating nipples at the bearing brackets allow re-lubrication of the rolling element bearings without opening the pump.

	⚠ DANGER Dry running Explosion hazard! ▸ Re-lubricate explosion-proof pump sets outside potentially explosive atmospheres.
	⚠ WARNING Hands or foreign objects in the pump casing Risk of injuries, damage to the pump! ▸ 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.
	CAUTION Incomplete re-lubrication Bearing damage! ▸ Always re-lubricate the bearings with the pump set in operation.
	NOTE Prior to the first re-lubrication, fill the cavities of the bearing bracket in the area to be re-lubricated with grease.

✓ The pump set remains installed in the piping.

✓ A sufficient grease quantity is available.

1. Press the grease through lubricating nipples 636.02 / 636.03.

Completely pack the bearings with grease; both side gaps should be $\frac{2}{3}$ filled.

7.2.3.1.2 Grease quality

Grease quality The rolling element bearings are packed with lithium soap grease at the factory. For re-lubrication use grease of the following properties:

- Lithium soap
- Free of resin and acid
- Not liable to crumble
- The grease should have a penetration number between two and three, corresponding to a worked penetration between 220 and 295 mm/10.
- Its drop point must be $> 175^{\circ}\text{C}$.

7.2.3.1.3 Grease quantity

Grease quantity For the first re-lubrication, a larger grease quantity is required as the cavities need to be filled too.
Refer to the table below for the grease quantities.

Table 18: Grease quantity

Bearing bracket size	Re-lubrication quantity [g]	Additional grease quantity for first re-lubrication [g]	
		Radial bearing (cylindrical roller bearing 322.01)	Fixed bearing (angular contact ball bearing 320.02)
S05	25	75	200
S06	50	150	500
S07 / S08	70	350	700
S09	200	260	850
S10	Re-lubrication by automatic grease pump		

7.2.3.1.4 Intervals

Table 19: Re-lubrication intervals

Bearing bracket size	Re-lubrication intervals in operating hours [h]
S05 / S06	3000
S07 / S08	2000
S09	3000
S10	Re-lubrication by automatic grease pump ¹⁰⁾

7.2.3.2 Lubricating the mechanical seal

7.2.3.2.1 Checking the leakage chamber

! WARNING

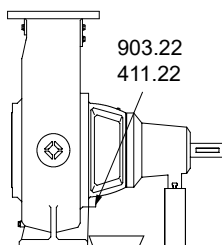
Fluids handled, consumables and supplies which are hot and/or pose a health hazard

Hazard to persons and the environment!

- ▷ Collect and properly dispose of flushing fluid and any residues of the fluid handled.
- ▷ Wear protective clothing and a protective mask if required.
- ▷ Observe all legal regulations on the disposal of fluids posing a health hazard.

Checking the leakage chamber serves to assess the function of the drive-end mechanical seal.

- ✓ A suitable container for the leakage is available.
- ✓ The pump is positioned on a level surface as illustrated.
 1. Place the container underneath screw plug 903.22.
 2. Remove screw plug 903.22 with joint ring 411.22.
 - ⇒ If there is no leakage or only a small amount (less than 0.2 litres) after several years of operation, the mechanical seals are working properly.
 - ⇒ If the leakage exceeds 0.2 litres, the mechanical seals are defective and must be replaced.
 3. Re-insert and tighten screw plug 903.22 with joint ring 411.22.


Fig. 31: Checking the leakage chamber

¹⁰ Set the periods of operation and standstill as per the supplementary operating manual of the grease pump.

7.2.3.2.2 Changing the lubricant of the mechanical seal

 	⚠ DANGER Excessive temperatures in the shaft seal area Explosion hazard! Damage to the pump set! ▷ Regularly check the lubricant level.
	⚠ WARNING Lubricants posing a health hazard and/or hot lubricants Hazard to persons and the environment! ▷ 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.
	⚠ WARNING Screw plugs subjected to pressure Risk of injury! ▷ Wear safety goggles and protective clothing. ▷ Open screw plugs slowly.

Draining the lubricant, horizontal installation

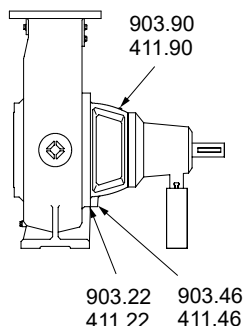


Fig. 32: Draining the lubricant

- ✓ 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.

Draining the lubricant, vertical installation

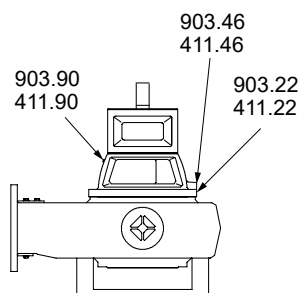


Fig. 33: Draining the lubricant

- ✓ A suitable container for the old lubricant is on hand.
- 1. Hold the container underneath screw plug 903.46.
- 2. Remove screw plug 903.46 and joint ring 411.46. Then drain off the lubricant.
 - ⇒ Due to the geometry of the discharge cover a small amount of lubricant will remain in the oil reservoir.
- 3. Fit screw plug 903.46 with joint ring 411.46.

	CAUTION Contamination of liquid lubricant Damage to the pump set! ▷ Replace the mechanical seal.
--	--

Filling in the lubricant, horizontal installation

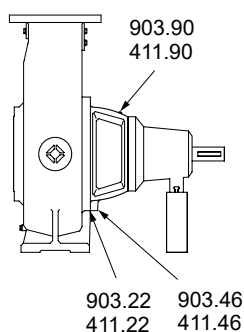


Fig. 34: Filling in the lubricant

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.

Filling in the lubricant, vertical installation

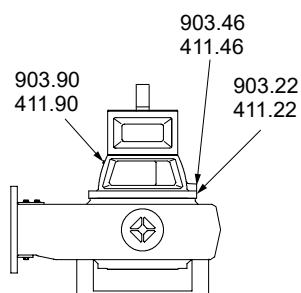


Fig. 35: Filling in the lubricant

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

Recommended lubricant quality

Alternative

3. Fit screw plug 903.90 with joint ring 411.90.
- 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



NOTE

Only use motor oil if there is no risk of the lubricant contaminating the fluid handled and if the motor oil can be disposed of properly.

Lubricant quantity Table 20: Lubricant quantity

Bearing bracket size	Size	Lubricant quantity [l]
S05	All	2,0
S06	All	4,3
S07	-500	4,6
	-630, -710	5,8
S08	All	6,0
S09	All	11,5
S10	All	9,0

Intervals Change the lubricant every 10000 operating hours, but at least every three years.

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!

- ▷ Collect and properly dispose of flushing fluid and any residues of the fluid handled.
- ▷ Wear protective 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 flushed through, neutralised, and anhydrous inert gas must be blown through the pump to ensure drying.

Use connection 6B to drain the fluid handled. (⇒ Section 5.6, Page 33)

7.4 Dismantling the pump set

7.4.1 General information/Safety regulations



! WARNING

Unqualified personnel performing work on the pump (set)

Risk of injury!

- ▷ Always have repair work and maintenance work performed by specially trained, qualified personnel.

	! WARNING
	Improper lifting/moving of heavy assemblies or components Personal injury and damage to property! ▶ Use suitable transport devices, lifting equipment and lifting tackle to move heavy assemblies or components.

Observe the general safety instructions and information.

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.

	! DANGER
	Insufficient preparation of work on the pump (set) Risk of injury! ▶ 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. ▶ Shut off any auxiliary feed lines. ▶ Allow the pump set to cool down to ambient temperature.

	NOTE
	An impeller removal tool is required to remove the impeller.

7.4.2 Preparations for dismantling

	! DANGER
	Insufficient preparation of work on the pump (set) Risk of injury! ▶ 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. ▶ Shut off any auxiliary feed lines. ▶ Allow the pump set to cool down to ambient temperature.

	! WARNING
	Components with sharp edges Risk of cutting or shearing injuries! ▶ 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 can be dismantled without removing the pump casing from the pipeline.
Exception: When removing or re-fitting a casing wear ring or wear plate.

	 DANGER Insufficient preparation of work on the pump (set) Risk of injury! ▸ 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. ▸ Shut off any auxiliary feed lines. ▸ Allow the pump set to cool down to ambient temperature.
	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 belt drive

7.4.4.1 Removing the belt drive for installation type 3HZ

	 DANGER Work in the area of the V-belts Injury by moving parts! ▸ Make sure that the pump set cannot be switched on.
	 DANGER Unsecured dismantled components Injury by falling parts! ▸ Secure all dismantled components or assemblies against moving or tipping over.

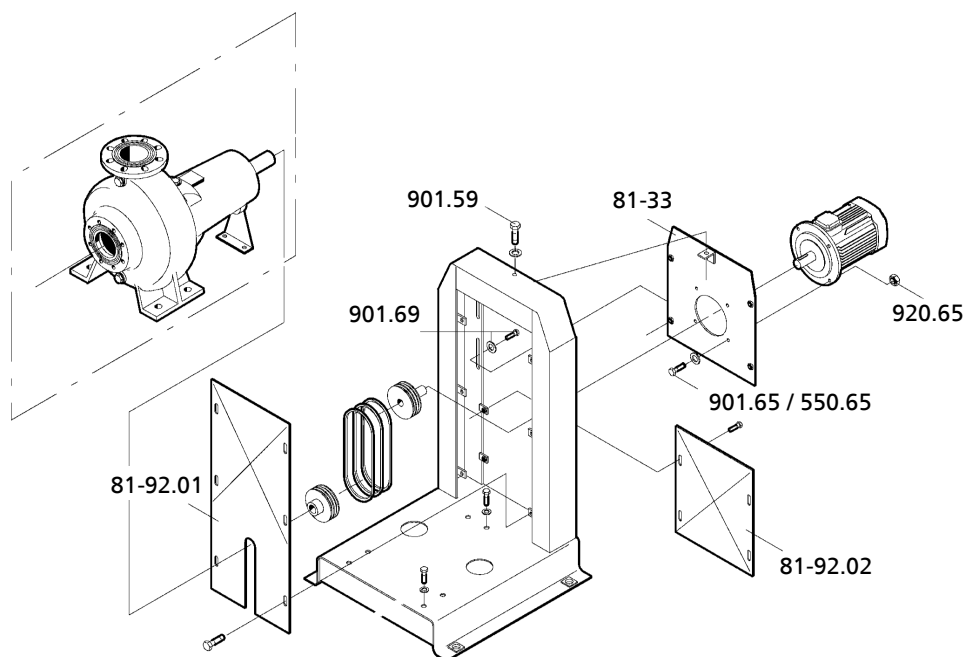


Fig. 36: Removing the belt drive

1. Loosen and remove pump-end and motor-end cover plates 81.92-01 and 81.92-02 from the pulley.
2. Slightly loosen bolt 901.69 at motor plate 81-33.
3. Lower the motor including the motor plate via adjusting screw 901.59 until the V-belt can be removed by hand.
4. If required, remove the pulley.
5. Secure the motor with a lifting rope.
Use the lifting lug.
6. Completely undo bolts 901.69 and 901.59 at motor plate 81.33 and remove the motor plate with the motor.
7. Undo screwed connections 901.65, 550.65 and 920.65 and remove the motor from the motor plate.

7.4.4.1.1 Using taper clamping bushes

- ✓ Dismantling steps 1 to 3 have been completed.

1. Loosen all screws.
2. Completely undo one or two screws, depending on the bush size. Oil the screw(s) and screw them into the jacking threads.
3. Tighten the screw(s) evenly until the bush separates from the hub and the disc can be moved freely on the shaft.
4. Remove the pulley from the shaft together with the bush.

7.4.4.1.2 Using pulleys to DIN 2211

- ✓ Dismantling steps 1 to 3 have been completed.

1. Use a puller to remove the pulleys from the shaft.



NOTE

The puller is not included in the scope of supply.

7.4.4.2 Removing the belt drive for installation type 3HM

	⚠ DANGER Work in the area of the V-belts Injury by moving parts! ▷ Make sure that the pump set cannot be switched on.
	⚠ DANGER Unsecured dismantled components Injury by falling parts! ▷ Secure all dismantled components or assemblies against moving or tipping over.

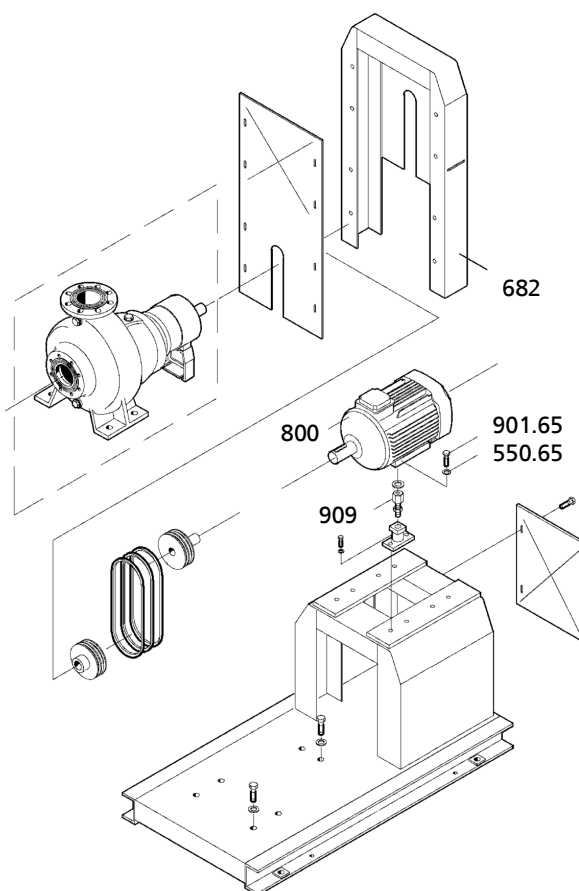


Fig. 37: Removing the belts

1. Unscrew and remove belt guard 682.
2. Lower motor 800 via adjusting screw 909 until the V-belt can be removed by hand.
3. If required, remove the pulley.
4. Secure motor 800 with a lifting rope.
Use the lifting lug.
5. Completely undo bolts 901.65 and remove motor 800.

7.4.4.2.1 Using taper clamping bushes

- ✓ Dismantling steps 1 to 3 have been completed.
1. Loosen all screws.

2. Completely undo one or two screws, depending on the bush size. Oil the screw(s) and screw them into the jacking threads.
3. Tighten the screw(s) evenly until the bush separates from the hub and the disc can be moved freely on the shaft.
4. Remove the pulley from the shaft together with the bush.

7.4.4.2.2 Using pulleys to DIN 2211

- ✓ Dismantling steps 1 to 3 have been completed.
- 1. Use a puller to remove the pulleys from the shaft.



NOTE

The puller is not included in the scope of supply.

7.4.5 Removing the back pull-out unit

The steps for dismantling vary depending on the installation type (3E or 3H):

For installation type 3E:

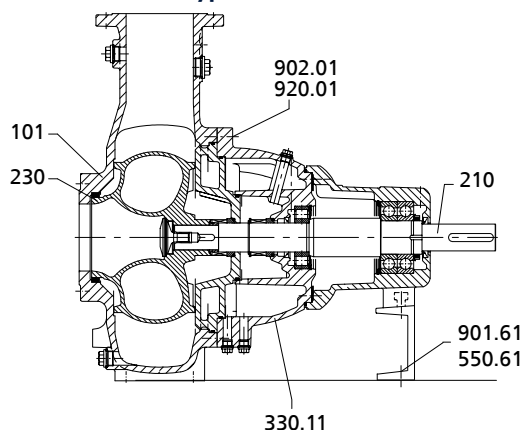


Fig. 38: Removing the back pull-out unit

- ✓ The lubricant chamber has been drained of all lubricant.
 - ✓ Transport equipment and lifting tackle are available.
 - ✓ An area for the back pull-out unit has been prepared.
1. Remove the coupling guard.
 2. Remove the coupling spacer, if any.
 3. Remove the drive, if required.
 4. Loop a rope tightly around the bearing bracket.
 5. Undo bolts 901.61 and discs 550.61 fastening the support foot.
 6. Undo screwed connection 902.01/920.01. Pull the complete back pull-out unit consisting of bearing bracket 330, shaft 210 and impeller 230 out of pump casing 101.
 7. Place the back pull-out unit in a safe and dry assembly area and secure it against tipping over or rolling away.

For installation type 3H:

- ✓ The lubricant chamber has been drained of all lubricant.
 - ✓ Transport equipment and lifting tackle are available.
 - ✓ The belt drive has been removed.
 - ✓ An area for the back pull-out unit has been prepared.
1. Loop a rope tightly around the bearing bracket.

2. Remove the drive and motor stand, if required.
3. Undo bolts 901.61 and discs 550.61 fastening the support foot.
4. Undo screwed connection 902.01/920.01. Pull the complete back pull-out unit consisting of bearing bracket 330, shaft 210 and impeller 230 out of pump casing 101.
5. Place the back pull-out unit in a safe and dry assembly area and secure it against tipping over or rolling away.

7.4.6 Removing the impeller

7.4.6.1 Removing K and E impellers with impeller screw M20

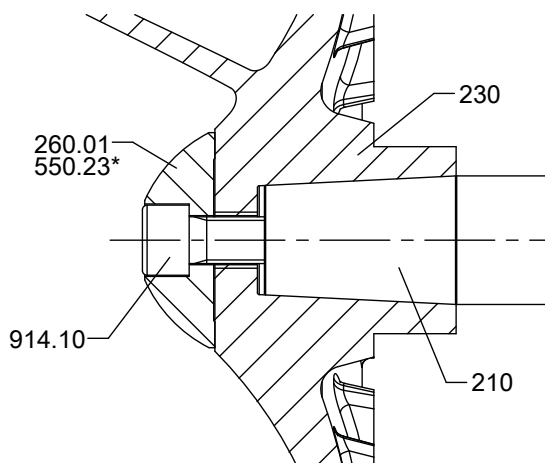


Fig. 39: Removing K and E impellers with impeller screw M20

1. Undo and remove impeller fastening screw 914.10.
⇒ The impeller/shaft connection is a tapered fit.
2. Remove impeller hub cap 260.01 or disc 550.23.
⇒ For dismantling the impeller, a jacking thread is provided at the impeller hub.
3. Screw in the forcing screw and remove impeller 230.

7.4.6.2 Removing K and E impellers with impeller screws M100, M125 or M160

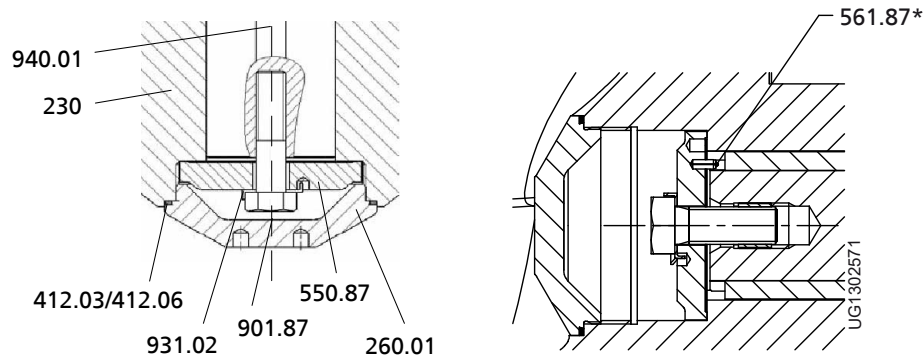


Fig. 40: Removing K and E impellers with impeller screws M100, M125 or M160

*: On specific designs only

- ✓ The back pull-out unit is securely positioned in a clean and dry assembly area.
1. Undo impeller hub cap 260.01 using a special wrench (right-hand thread).
 2. Remove O-ring 412.03/412.06.
 3. Unbend lock washer 931.02, undo hexagon head bolt 901.87 and remove them together with disc 550.87.
 4. Pull off impeller 230 with a special impeller removal tool.
 5. Remove key 940.01.



NOTE

The special impeller removal tool is not included in the scope of supply. It can be ordered separately from KSB.

7.4.6.3 Removing D impeller from pump with bearing bracket S05/S06

914.10

550.23

230

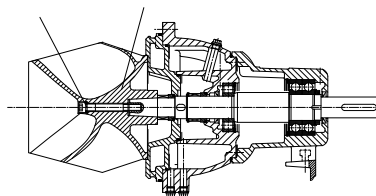


Fig. 41: Removing D impeller from pump with bearing bracket S05/S06

1. Unscrew socket head cap screw 914.10 with disc 550.23.
2. Completely screw the grub screw into the shaft thread.
3. Use a forcing screw to pull off impeller 230.



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.

Table 21: Forcing screws for pulling off the impeller

Size	Bearing bracket	Forcing screw (ADS)	
		Thread	Code
All	S05, S06	M 24	ADS 5

7.4.6.4 Removing K impeller from pump with bearing bracket S09/S10

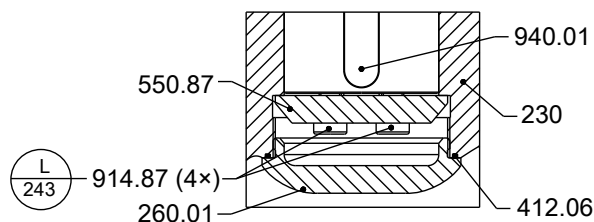


Fig. 42: Removing K impeller from pump with bearing bracket S09/S10

Table 22: Symbols key

Symbol	Description
	Always secure screwed connections marked with this symbol with Loctite 243 .

1. Unscrew impeller hub cap 260.01 using a special wrench (right-hand thread).
2. Remove O-ring 412.06.
3. Undo (four) hexagon socket head cap screws 914.87. Remove them together with disc 550.87.
4. Pull off impeller 230 with a special impeller fitting and removal tool.
5. Remove key 940.01.



NOTE

The special impeller removal tool is not included in the scope of supply. It can be ordered separately from KSB.

7.4.6.5 Removing the impeller of Sewatec E 200-401 (Ø 373 mm, bearing bracket S06), K 350-710, K 500-632 and K 500-640

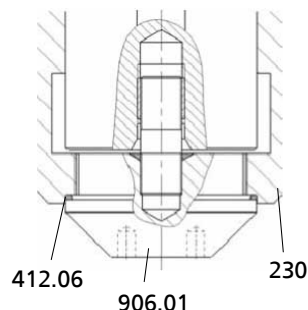


Fig. 43: Removing the impeller of Sewatec E 200-401 (Ø 373 mm, bearing bracket S06), K 350-710, K 500-632 and K 500-640

- ✓ The back pull-out unit is securely positioned in a clean and dry assembly area.
- 1. Undo impeller screw 906.01 using a special wrench (right-hand thread).
- 2. Remove O-ring 412.03.
- 3. Pull off impeller 230 with a special impeller removal tool.
- 4. Remove key 940.01.



NOTE

The special impeller removal tool is not included in the scope of supply. It can be ordered separately from KSB.

7.4.6.6 Removing D impeller with cylindrical fit from pump with bearing bracket S07

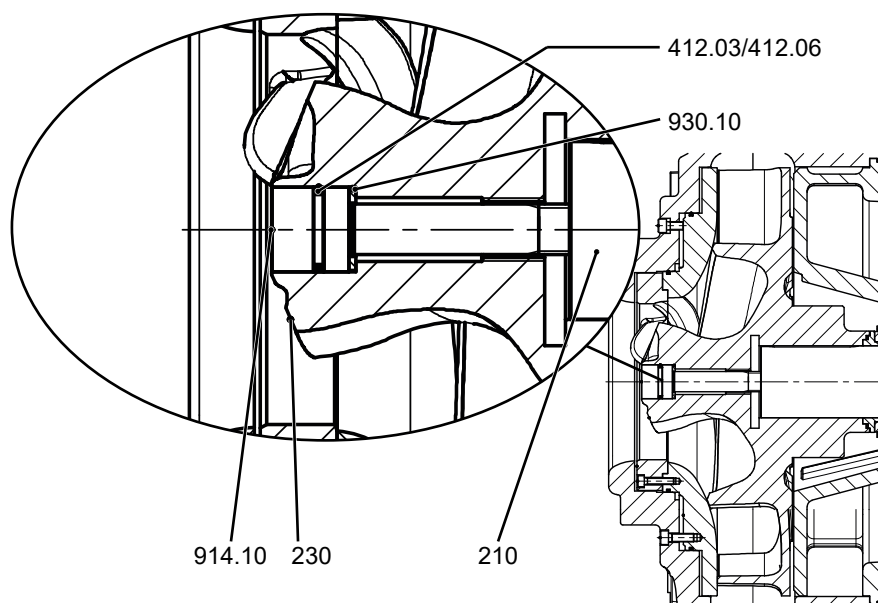


Fig. 44: Removing D impeller with cylindrical fit from pump with bearing bracket S07

- 1. Undo and remove hexagon socket head cap screw 914.10.
- 2. Remove O-ring 412.06 and safety device 930.10.
- 3. Pull impeller 230 off shaft 210 using the special impeller fitting/removal tool or forcing screw.

7.4.6.7 Using the special impeller removal tool

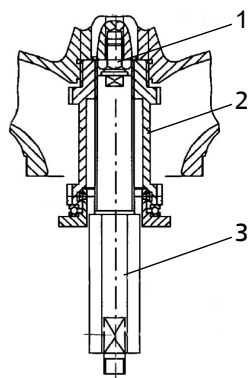


Fig. 45: Special impeller fitting and removal tool

1. Screw hexagon head bolt 1 into the shaft end to prevent any damage to the shaft thread.
2. Screw part 2 into the impeller.
3. Screw fully threaded stud 3 into part 2 and pull off the impeller.

Table 23: Impeller removal tool / forcing screws for pulling off the impeller

Size	Impeller type	Bearing bracket	Impeller removal tool (=AV)/ forcing screw (=ADS)	
			Thread	Designation
150-503	D	S06	M 24	ADS9
		S07	M 30	ADS6
	K	S06	M 24	ADS5
		S07	M100 × 2	AV5
200-500	E	S05	M 24	ADS5
200-502	K	S06	M 24	ADS5
		S07	M100 × 2	AV5
200-503	D	S06	M 24	ADS9
		S07	M 30	ADS6
	K	S06	M 24	ADS5
		S07	M 100 × 2	AV5
200-504	K	S06	M 24	ADS5
		S07	M 100 × 2	AV5
200-505	K	S06	M 24	ADS5
		S07	M 100 × 2	AV5
200-631	K	S07	M 125 × 2	AV4
		S08	M 125 × 2	AV4
250-500	E	S06	M 24	ADS5
	E	S07	M 125 × 2	AV4
250-630	K	S07	M 125 × 2	AV4
		S08	M 125 × 2	AV4
250-632	K	S07	M 125 × 2	AV4
		S08	M 125 × 2	AV4
250-900	K	S09	M 160 × 3	AV6
300-500	K	S06	M 24	ADS5
		S07	M 125 × 2	AV4
300-502	D	S06	M 24	ADS10
		S07	M 30	ADS11
300-505	D	S06	M 24	ADS10

Size	Impeller type	Bearing bracket	Impeller removal tool (=AV)/ forcing screw (=ADS)	
			Thread	Designation
300-505	D	S07	M 30	ADS11
	K	S06	M 24	ADS5
		S07	M 100 × 2	AV5
300-630	E	S06	M 125 × 2	AV4
		S07	M 125 × 2	AV4
300-710	E	S09	M 190 × 3	AV6
350-500	K	S06	M 24	ADS5
		S07	M 125 × 2	AV4
350-501	K	S06	M 24	ADS5
		S07	M 125 × 2	AV4
350-502	D	S06	M 24	ADS10
		S07	M 30	ADS11
350-503	D	S06	M 24	ADS10
		S07	M 30	ADS11
	K	S06	M 24	ADS5
		S07	M 100 × 2	AV5
350-630	E, K	S07	M 125 × 2	AV4
		S08	M 125 × 2	AV4
350-632	K	S07	M 125 × 2	AV4
		S08	M 125 × 2	AV4
350-633	K	S07	M 125 × 2	AV4
		S08	M 125 × 2	AV4
350-710	E	S07	M 125 × 2	AV4
		S08	M 125 × 2	AV4
	K	S08	M 100 × 2	AV5
350-713	K	S08	M 125 × 2	AV4
400-500	K	S06	M 24	ADS5
		S07	M 100 × 2	AV5
400-632	K	S07	M 125 × 2	AV4
		S08	M 125 × 2	AV4
400-710	K	S09	M 160 × 3	AV6
400-713	K	S09	M 160 × 3	AV6
400-820	K	S09	M 160 × 3	AV6
500-630	K	S07	M 125 × 2	AV4
		S08	M 125 × 2	AV4
500-632	K	S08	M 100 × 2	AV5
500-710	K	S09	M 160 × 3	AV6
500-900	K	S09	M 160 × 3	AV6
		S10	-	AV9
600-520	K	S07	M 100 × 2	AV5
600-710	K	S08	M 125 × 2	AV4
600-900	K	S10	-	AV9
700-902	K	S08	M 160 × 3	AV9
		S09	M 160 × 3	AV6

7.4.7 Dismantling the mechanical seal

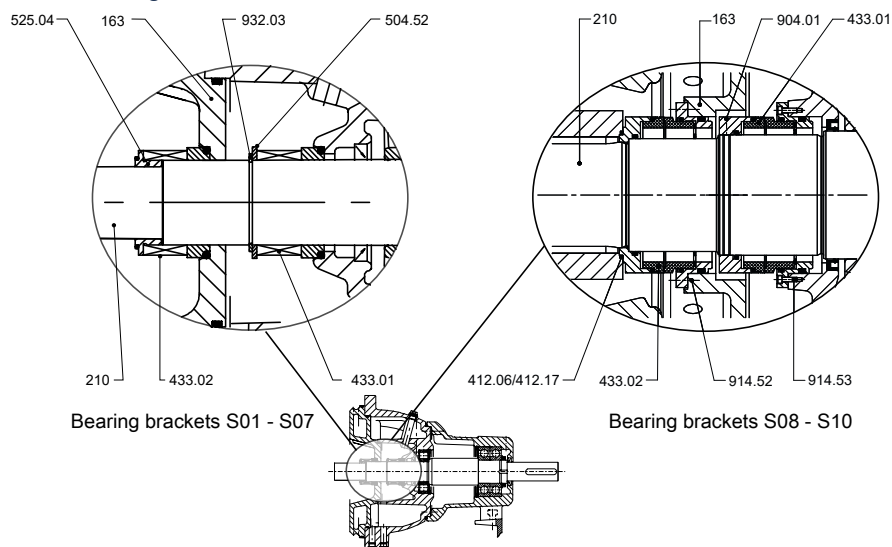


Fig. 46: Removing the mechanical seal

7.4.7.1 Removing the pump-end mechanical seal (bearing brackets S01 - S07)

- ✓ The back pull-out unit and the impeller have been removed as described above.
- 1. Pull the rotating assembly of mechanical seal 433.02 and spacer sleeve 525.04 off shaft 210.
- 2. Remove discharge cover 163 from bearing bracket 330.11.
- 3. Press the stationary seat of mechanical seal 433.02 out of discharge cover 163.

7.4.7.2 Removing the drive-end mechanical seal (bearing brackets S01 - S07)

- ✓ The back pull-out unit and the impeller have been removed as described above.
- 1. Remove circlip 932.03 and disc 504.52.
- 2. Pull the rotating assembly of mechanical seal 433.01 off shaft 210.

7.4.7.3 Removing the pump-end 4STC mechanical seal (bearing brackets S08 - S10)

- ✓ The back pull-out unit and the impeller have been removed as described above.
- 1. Undo grub screws 904. Pull mating ring carrier 476 and mating ring 475 off shaft 210. For the version with clamped mating ring carrier, pull the mating ring carrier together with the mating ring directly off the shaft.
- 2. On mechanical seals with axially secured primary ring carrier 473 undo screws 914.55.
- 3. Use the jacking threads to remove the primary ring carrier.
- 4. On mechanical seals without axially secured primary ring carrier, use assembly aids to remove the primary ring carrier. Another option of removing the primary ring carrier is to remove the discharge cover and apply pressure to the rear side of the primary ring carrier.

7.4.7.4 Removing the drive-end 4STC mechanical seal (bearing brackets S08 - S10)

- ✓ The back pull-out unit and the impeller have been removed as described above.
- 1. Undo grub screws 904. Pull mating ring carrier 476 and mating ring 475 off shaft 210. For the version with clamped mating ring carrier, pull the mating ring carrier together with the mating ring directly off the shaft.
- 2. On mechanical seals with axially secured primary ring carrier 473 undo screws 914.55.
- 3. Use the jacking threads to remove the primary ring carrier.

4. On mechanical seals without axially secured primary ring carrier, use assembly aids to remove the primary ring carrier. Another option of removing the primary ring carrier is to remove the discharge cover and apply pressure to the rear side of the primary ring carrier.

7.4.7.5 Removing the 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. Screw 2 M8 eyebolts into the front face of the shaft sleeve.
 3. Carefully pull the complete cartridge seal off the shaft by the eyebolts. Then remove the eyebolts again.
 4. Remove O-rings 412.54/.55 from discharge cover 163 and, if necessary, remove O-ring 412.59 from bearing bracket 330.
 5. Tighten the hexagon head bolts 901 (3 pcs.) that make up the transport lock to a low torque (hand-tight).
 6. 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 Dismantling the gland packing

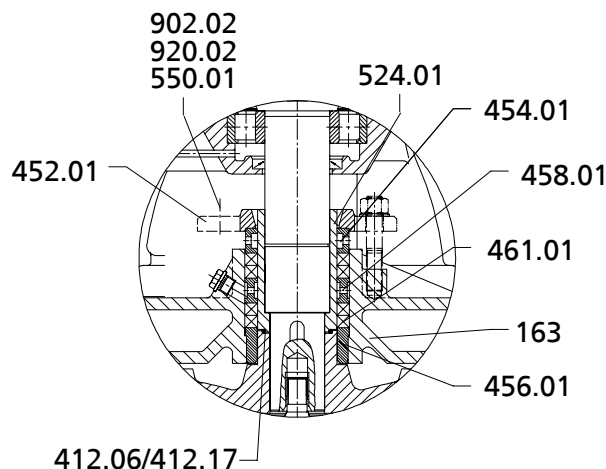


Fig. 47: Removing the gland packing

- ✓ The back pull-out unit and the impeller have been removed as specified.
1. Undo hexagon nuts 920.02.
 2. Remove gland follower 452.01 and stuffing box ring 454.01.
 3. Remove discharge cover 163 with gland packing.
 4. Remove packing ring 461.01 and lantern ring 458.01 from the packing chamber.
 5. Push neck bush 456.01 out of the discharge cover.
 6. Pull shaft protecting sleeve 524.01 with O-ring 412.06/412.17 off the shaft.

7.4.9 Removing shaft and rolling element bearings

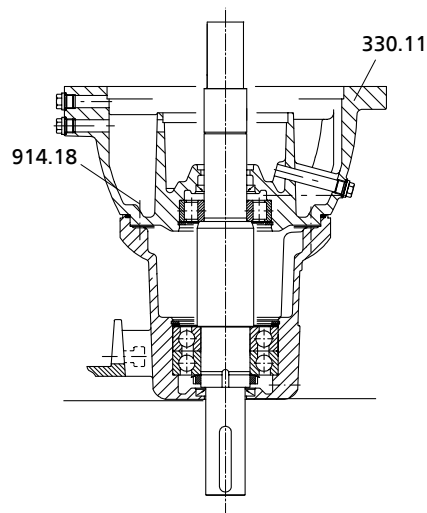


Fig. 48: Dismantling the bearing bracket

- ✓ The back pull-out unit is located in a suitable assembly area.
 - ✓ The mechanical seal or gland packing have been removed as described above.
1. Undo and remove socket head cap screws 914.18.
 2. Suspend bearing bracket 330.11 from the lifting tackle and lift it up.
 3. Place bearing bracket 330.11 in a suitable assembly area with the pump-end flange down.

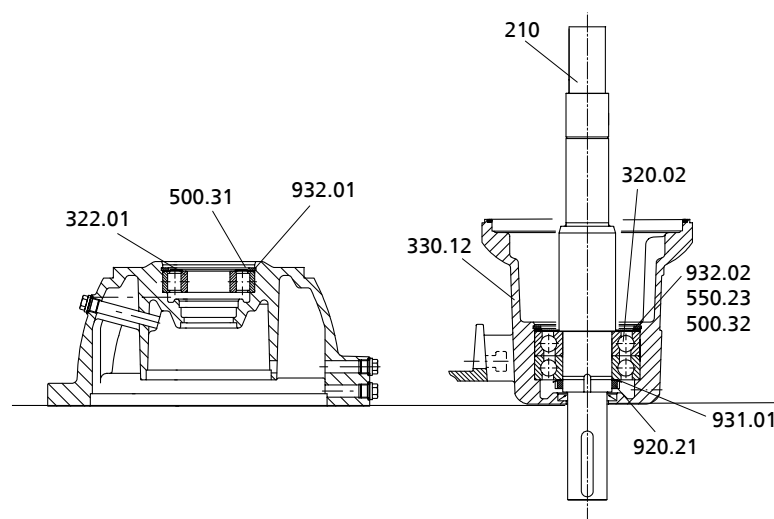


Fig. 49: Removing the shaft

4. Remove circlip 932.01, ring 500.31 and cylindrical roller bearing 322.01 from pump-end bearing bracket 330.11.
5. Remove circlip 932.02, support disc 550.23 and ring 500.32 from motor-end bearing bracket 330.12.
6. Use lifting tackle to lift shaft 210 and carefully pull it out of motor-end bearing bracket 330.12 together with angular contact ball bearings 320.02.
7. Bend open lock washer 931.01, unscrew keywayed nut 920.21 (right-hand thread) and remove the lock washer.
8. Heat up angular contact ball bearing 320.02 and pull it off shaft 210.
9. Clean all the components and examine them for signs of wear. If required, replace them.

7.4.10 Removing the wear plate (for D impeller only)

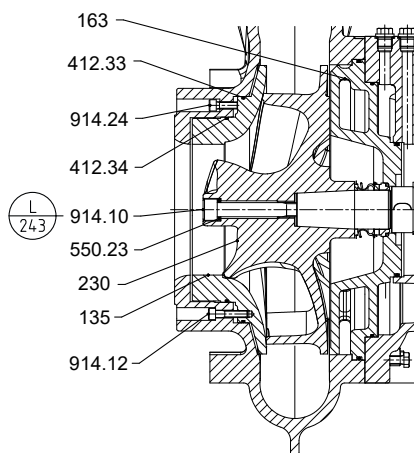


Fig. 50: Removing the wear plate

- ✓ The back pull-out unit, the belt drive (if any) and the motor have been properly removed from the pump casing.
- ✓ 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 135.01 and O-rings 412.34.

7.5 Reassembling the pump set

7.5.1 General information/Safety regulations

	WARNING
	Improper lifting/moving of heavy assemblies or components Personal injury and damage to property! ▷ Use suitable transport devices, lifting equipment and lifting tackle to move heavy assemblies or components.
	CAUTION
	Improper reassembly Damage to the pump! ▷ 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 (set) in accordance with the corresponding general assembly drawing and/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.

Assembly aids 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.
 (⇒ Section 7.6, Page 89) (Also see general assembly drawing and data sheet.)

Bearings Only use specified bearings to DIN 628 (320.02) and DIN 5412 (322.01).

Table 24: Bearings

Bearing bracket size	Angular contact ball bearings DIN 628 (320.02)	Cylindrical roller bearing DIN 5412 (322.01)
S05	2x 7315 BG 8	NU 313
S06	2x 7319 BUA	NU 416
S07 / S08	2x 7324 BUA	NU 324
S09	2x 7230 BCBM	NU 234 ECM
S10	2x 7334 BCBM	NU 240

Checking the alignment After assembly with the pump casing that has remained in the piping, check the coupling alignment. (⇒ Section 5.7, Page 35)

7.5.2 Installing the shaft and rolling element bearings

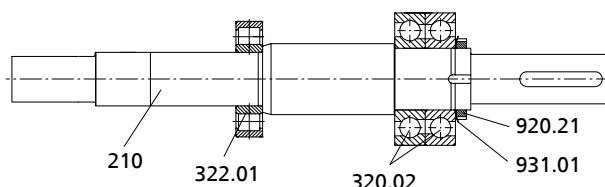


WARNING

Components heated up for assembly

Risk of burns!

- ▷ Wear protective clothing and protective gloves suitable for assembly work.
- ▷ Allow components to cool down after assembly.


Fig. 51: Mounting the rolling element bearings on the shaft

- ✓ When re-installing the shaft, replace angular contact ball bearings 320.02 or cylindrical roller bearing 322.02, if required.
1. Place shaft 210 in a horizontal position. Debur keyway and ring joints, if required.
 2. Clean the shaft and coat the bearing seats with a preservative.
 3. Heat the inner ring of cylindrical roller bearing 322.01 up to 100 °C and slide it onto the shaft from the pump end until it abuts against the shaft shoulder.
 4. Heat the first angular contact ball bearing 320.02 up to 100 °C and slide it onto the shaft from the drive end until it abuts against the shaft shoulder.
 5. Heat the second angular contact ball bearing 320.02 up to 100 °C and slide it onto the shaft from the drive end until it abuts against the first bearing. Press them back in as they cool down!



NOTE

Install angular contact ball bearings 320.02 in "O" arrangement.

6. Once the angular contact ball bearings have cooled down, coat the shaft thread with an assembly paste (e.g. ALTEMP Q NB 50).
7. Slip on lock washer 931.01. Screw on, tighten and lock locknut 920.21.
8. Completely pack the angular contact ball bearings with lubricating grease. (⇒ Section 7.2.3.1.1, Page 55)

Pre-assembly of bearing bracket 330.11

7.5.3 Preparing and reassembling the bearing brackets

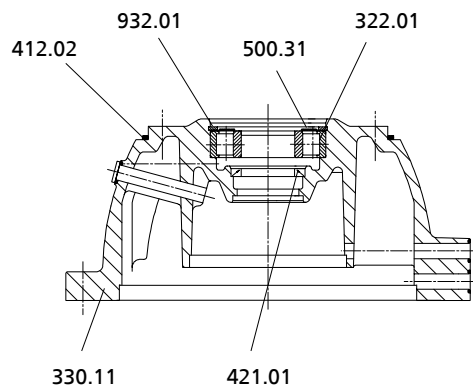


Fig. 52: Preparing the bearing bracket

- ✓ The bearings have been fitted on the shaft.
 - ✓ Lifting equipment and lifting tackle are available.
1. Insert shaft seal ring 421.01 into the specified drilled hole.
 2. Grease or pack the annular section with lubricating grease. (⇒ Section 7.2.3.1.1, Page 55)
 3. Coat the bearing seat (drilled hole seat) with a preservative.
 4. Press cylindrical roller bearing 322.1 (without inner ring) into the bearing bracket. Fill all cavities with lubricating grease.
 5. Insert ring 500.31 and circlip 932.01 into the drilled hole.
 6. Completely pack the cylindrical roller bearing with lubricating grease.
 7. Fit O-ring 412.02.

Pre-assembly of bearing bracket 330.12

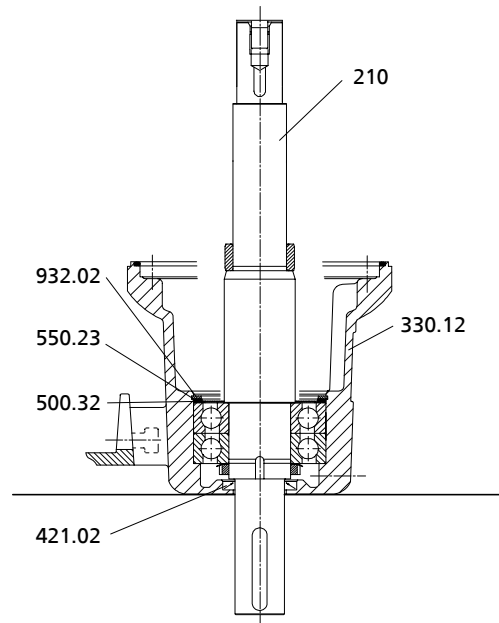


Fig. 53: Installing the shaft

- ✓ A suitable assembly area has been prepared.
 - ✓ All preparatory work has been completed.
 - ✓ Lifting equipment and lifting tackle are available.
1. Place bearing bracket 330.12 with the flange up in the assembly area.
 2. Coat the drilled hole for the shaft seal ring and the bearing seat with a preservative.
 3. Press in shaft seal ring 421.02.
 4. Grease the annular section with lubricating grease. (⇒ Section 7.2.3.1.1, Page 55)

5. Use lifting tackle to lift the preassembled shaft suspended at the pump end and lower it down into the bearing bracket.
6. Fit ring 500.32 and disc 550.23.
7. Fasten circlip 932.02.

Final assembly of the bearing bracket

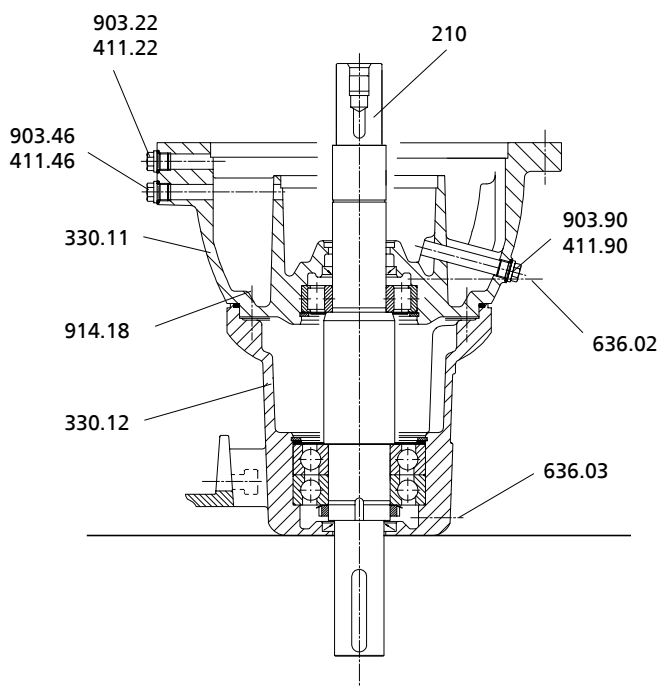


Fig. 54: Reassembling the bearing bracket

- ✓ All preparatory work at the bearing brackets has been completed.
 - ✓ Lifting equipment and lifting tackle are available.
1. Attach lifting tackle to the pump-end flange of bearing bracket 330.11. Position the flange above the centre of bearing bracket 330.12 with shaft 210.
 2. Slowly lower bearing bracket 330.11. Guiding the bearing bracket by hand helps with this assembly process.
 3. Coat the drilled holes for socket head cap screws 914.18 with an assembly paste.
 4. Screw in hexagon socket head cap screws 914.18. Use a torque wrench to apply the required tightening torque. (⇒ Section 7.6.1, Page 89)
 5. Insert and tighten screw plugs 903.22, 903.46 and 903.90 including joint rings 411.22, 411.46 and 411.90.
 6. Screw in lubricating nipples 636.02 and 636.03.

7.5.4 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 seal faces immediately before assembly takes place.
- Make sure the surface of the shaft is absolutely clean and undamaged.
- Immediately before installing the mechanical seal, wet the seal 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.

7.5.4.1 Installing the drive-end mechanical seal (bearing brackets S01 - S07)

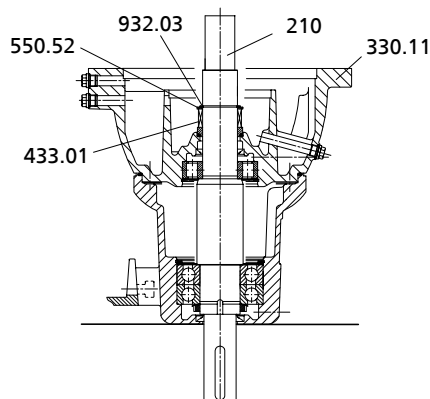


Fig. 55: Drive-end mechanical seal (bearing brackets S01 - S07)

- ✓ 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.
- 2. Insert spacer disc 550.52 and secure it with circlip 932.03.

7.5.4.2 Installing the drive-end 4STC mechanical seal (bearing brackets S08 - S10)

	CAUTION Use of grease or other permanent lubricants Torque transmission impeded / overheating of and damage to the pump! ▷ 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.
--	--

- ✓ The relevant documentation for installing the mechanical seal is observed (⇒ Section 9.3.5.5, Page 110).
- ✓ The back pull-out unit has been removed from the pump casing and safely positioned and secured in a horizontal position.
- ✓ The original KSB 4STC cartridge seal is fully assembled and undamaged.
- ✓ Assembly aids are available.
- 1. Properly remove any corrosion or wear.
- 2. Clean the seal faces with a suitable paper tissue and, if required, ethyl alcohol.
- 3. Wet O-ring 412.54 and discharge cover 163 with a non-permanent lubricant (e.g. a water/soap mixture).
- 4. Press the assembly consisting of primary ring carrier 473, primary ring 472, thrust ring 474, springs and O-rings 412 into the seat at discharge cover 163. If necessary, use a spacer sleeve and elastic intermediate element to protect the seal faces.

	NOTE The seal faces must not be damaged (score mark, etc). The assembly must not be pressed into the seat by pressing on the primary ring (risk of fracture). The force for mounting it must be applied via the primary ring carrier.
--	---

- 5. Fasten primary ring carrier 473 to discharge cover 163 with screws 914.55. Tighten the screws crosswise in several increments. Observe the tightening torques. This step does not apply to the version without axially secured primary ring carrier.
- 6. Check the seal face for any damage. Clean it again if required.

7. Check that primary ring 472 is correctly seated.
8. Wet O-ring 412.55 and the corresponding surface on shaft 210 with a suitable, non-permanent lubricant.
9. Slide the rotating assembly of the seal, comprising mating ring carrier 476, mating ring 475 and O-rings 412 onto shaft 210 as far as it will go.
10. Preload the rotating assembly with an assembly aid to match the installation dimension. This step does not apply to the version with clamped mating ring carrier. In this case, the installation dimension and torque transmission is ensured by mounting impeller 230.
11. Tighten grub screws 904, observing the installation dimension and tightening torques.



NOTE

Do not re-use cup point grub screws!
Used grub screws must be replaced by new cup point grub screws.

⇒ Cup point grub screws must not be re-used. Repeated tightening can impair the reliability of force transmission.

7.5.4.3 Installing the pump-end mechanical seal (bearing brackets S01 - S07)

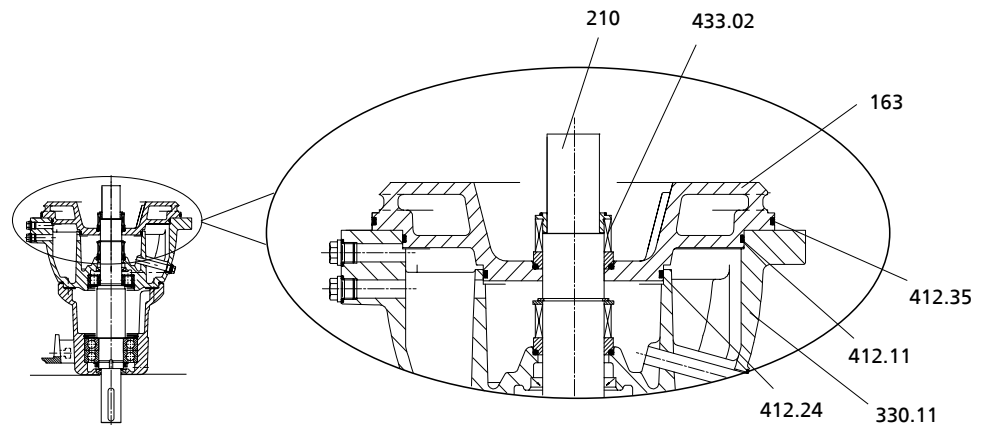


Fig. 56: Pump-end mechanical seal (bearing brackets S01 - S07)

1. Insert O-rings 412.11, 412.24 and 412.35.
2. Press discharge cover 163 into bearing bracket 330.11 until it will not go any further.
3. Fit mechanical seal 433.02 on 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".

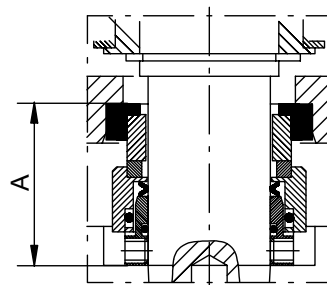


Fig. 57: Installation dimension "A"

Table 25: Installation dimension "A"

Bearing bracket size	Installation dimension "A" [mm]
S05	51
S06	54

7.5.4.4 Installing the pump-end 4STC mechanical seal (bearing brackets S08 - S10)

	CAUTION
	Use of grease or other permanent lubricants Torque transmission impeded / overheating of and damage to the pump! ▷ 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.

- ✓ The relevant documentation for installing the mechanical seal is observed (⇒ Section 9.3.5.2, Page 108) (⇒ Section 9.3.5.3, Page 109) .
- ✓ The back pull-out unit has been removed from the pump casing and safely positioned and secured in a horizontal position.
- ✓ The original KSB 4STC cartridge seal is fully assembled and undamaged.
- ✓ Assembly aids are available.
 1. Properly remove any corrosion or wear.
 2. Clean the seal faces with a suitable paper tissue and, if required, ethyl alcohol.
 3. Wet O-ring 412.54 and discharge cover 163 with a non-permanent lubricant (e.g. a water/soap mixture).
 4. Press the assembly consisting of primary ring carrier 473, primary ring 472, thrust ring 474, springs and O-rings 412 into the seat at discharge cover 163. If necessary, use a spacer sleeve and elastic intermediate element to protect the seal faces.

	NOTE
	The seal faces must not be damaged (score mark, etc). The assembly must not be pressed into the seat by pressing on the primary ring (risk of fracture). The force for mounting it must be applied via the primary ring carrier.

5. Fasten primary ring carrier 473 to discharge cover 163 with screws 914.55. Tighten the screws crosswise in several increments. Observe the tightening torques. This step does not apply to the version without axially secured primary ring carrier.
6. Check the seal face for any damage. Clean it again if required.
7. Check that primary ring 472 is correctly seated.
8. Wet O-ring 412.55 and the corresponding surface on shaft 210 with a suitable, non-permanent lubricant.
9. Slide the rotating assembly of the seal, comprising mating ring carrier 476, mating ring 475 and O-rings 412 onto shaft 210 as far as it will go.
10. Preload the rotating assembly with an assembly aid to match the installation dimension. This step does not apply to the version with clamped mating ring carrier. In this case, the installation dimension and torque transmission is ensured by mounting impeller 230.
11. Tighten grub screws 904, observing the installation dimension and tightening torques.



NOTE

Do not re-use cup point grub screws!
Used grub screws must be replaced by new cup point grub screws.

⇒ Cup point grub screws must not be re-used. Repeated tightening can impair the reliability of force transmission.

7.5.4.5 Installing the 4STQ double cartridge seal



CAUTION

Use of grease or other permanent lubricants

Torque transmission impeded / overheating of and damage to the pump!

- ▷ 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.

- ✓ The relevant documentation for installing the mechanical seal is observed (⇒ Section 9.3.5.6, Page 112).
- ✓ 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.
 1. Apply a suitable lubricant to the O-rings. Ensure that no permanent lubricant comes into contact with the O-rings, in order to guarantee reliable torque transmission.
 2. Insert O-rings 412.54 and 412.55 in discharge cover 163. Ensure that no permanent lubricant is used.
 3. Fit O-ring 412.59 on the shoulder of shaft seal housing 441.

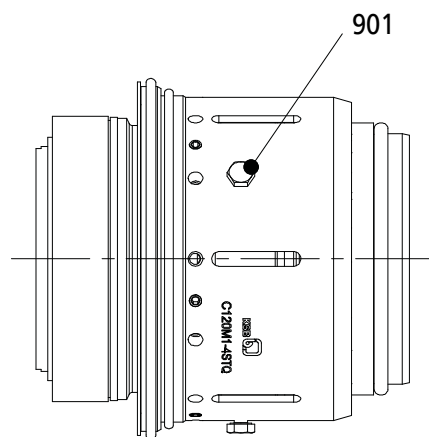


Fig. 58: Illustration of hexagon head bolt

4. Completely remove the hexagon head bolts 901 (3 pcs.) that make up the transport lock and store them.
5. Apply a coat of a suitable grease to shaft 210 in the area of the mechanical seal and the impeller hub.
6. Align the groove in shaft sleeve 523 with the groove in shaft 210.
7. Carefully slide the entire 4STQ cartridge seal onto the shaft until seal cover 471 abuts discharge cover 163. Apply the axial force required for insertion into the discharge cover via the seal cover only. Ensure that primary ring 472.52 and mating ring 475.52 are not damaged. A tube with an inside diameter larger than 170 mm and outside diameter smaller than 190 mm can be used to press the stationary seal cover into the discharge cover of the pump.

8. Fit circlip 932.53 in the groove of discharge cover 163. Make sure it is correctly seated.

7.5.5 Fitting the gland packing

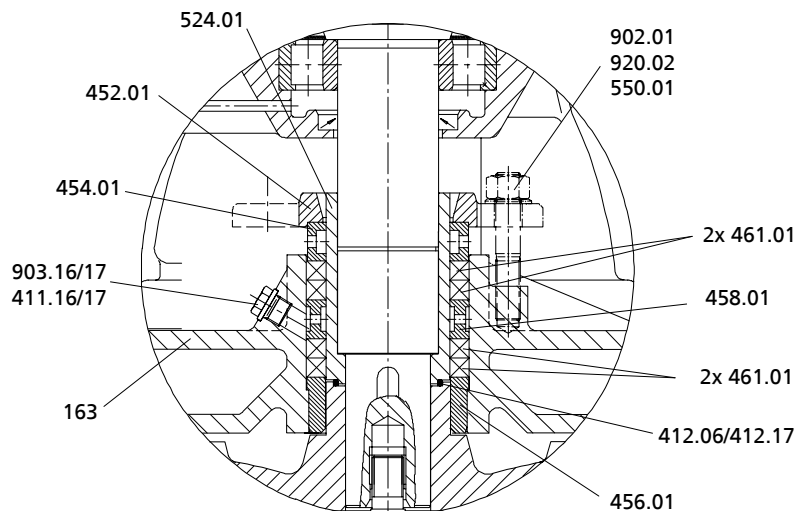


Fig. 59: Fitting the gland packing

1. Place discharge cover 163 in the assembly area with the drive end up.
2. Press neck bush 456.01 into the discharge cover.
3. Insert two packing rings 461.01 with their joints staggered at 90°.



NOTE

The packing rings can be expanded slightly by moving the shaft protecting sleeve back and forth.

4. Slide on lantern ring 458.01.
5. Insert subsequent packing rings 461.01 one at a time, with their joints staggered at 90°.
6. Fit shaft protecting sleeve 524.01.
7. Insert stuffing box ring 454.01.
8. Slide on gland follower 452.01 and fasten it with two studs 902.02, two discs 550.01 and two nuts 920.02.
Only lightly tighten both nuts by hand.
9. Insert O-rings 412.11 and 412.35 into discharge cover 163.
10. Insert O-ring 412.06/412.17 in shaft protecting sleeve 524.01.
11. Slide completely packed discharge cover 163 onto shaft 210 and press it to bearing bracket 330.11.

7.5.6 Fitting the impeller

Observe the instructions for your type of impeller fastening.

7.5.6.1 Fitting K and E impellers with impeller screw M20

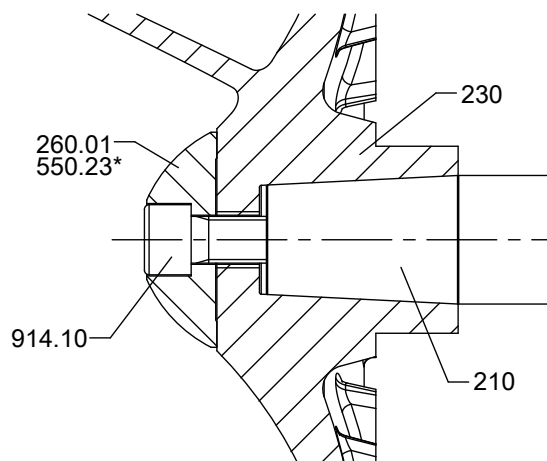


Fig. 60: Fitting K and E impellers with impeller screw M20

1. Slide impeller 230 onto the shaft end.
2. Apply Loctite 243 thread-locking agent to the thread of the impeller screw.
3. Screw in impeller screw 914.10 with impeller hub cap 260.01 or disc 550.23*. Tighten with a torque wrench. Observe the tightening torques.

7.5.6.2 Fitting K and E impellers with impeller screws M100, M125 or M160

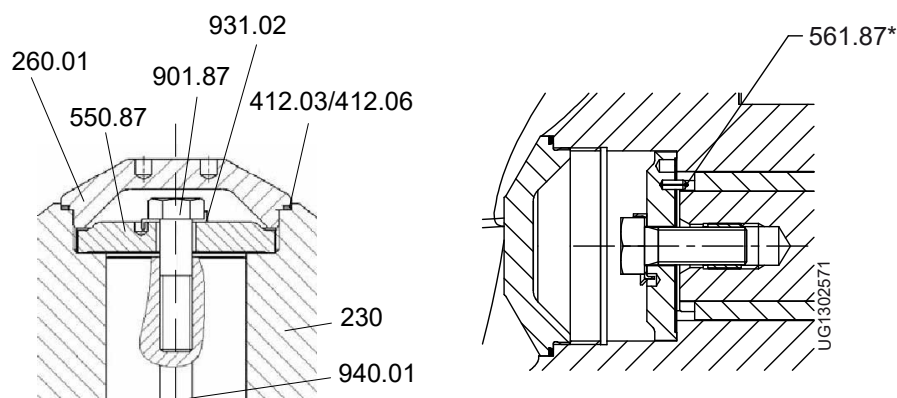


Fig. 61: Fitting K and E impellers with impeller screws M100, M125 or M160

*: On specific designs only

- ✓ Pre-assembly has been completed.
 - ✓ The assembled bearing bracket has been placed in a suitable assembly area with the pump end up.
 - ✓ Suitable lifting equipment is available.
1. Insert key 940.01 into the keyway.
 2. Slide impeller 230 onto shaft 210.
 3. Insert grooved pin 561.87 into the drilled hole in disc 550.87.
 4. Engage grooved pin 561.87, fitted in disc 550.87, in the groove of the shaft. Ensure that the disc sits flush on the impeller.
 5. Screw in hexagon head bolt 901.87 with disc 550.87. Bend over lock washer 931.02.
 6. Insert O-ring 412.03/412.06. Then fit impeller hub cap 260.01, screw it in and tighten it with a special wrench.

7.5.6.3 Fitting K impeller on pump with bearing bracket S09/S10

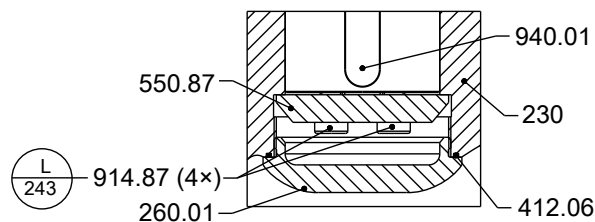


Fig. 62: Fitting K impeller on pump with bearing bracket S09/S10

Table 26: Symbols key

Symbol	Description
	Always secure screwed connections marked with this symbol with Loctite 243 .

1. Insert keys 940.01.
2. Fit impeller 230 using a special impeller fitting and removal tool.
3. Screw in hexagon socket head cap screws 914.87 with disc 550.87. Secure the hexagon socket head cap screws with a thread-locking agent (Loctite, type 243).
4. Insert O-ring 412.06.
5. Screw in impeller hub cap 260.01 using a special wrench (right-hand thread).

7.5.6.4 Fitting the impeller of Sewatec E 200-401 (Ø 373 mm, bearing bracket S06), K 350-710, K 500-632 and K 500-640

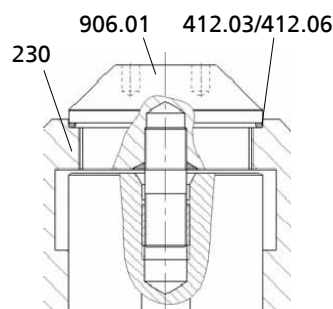


Fig. 63: Fitting the impeller of Sewatec E 200-401 (Ø 373 mm, bearing bracket S06), K 350-710, K 500-632 and K 500-640

- ✓ Pre-assembly has been completed.
 - ✓ The assembled bearing bracket has been placed in a suitable assembly area with the pump end up.
 - ✓ Suitable lifting equipment is available.
1. Insert key 940.01 into the keyway.
 2. Slide impeller 230 onto shaft 210.
 3. Insert O-ring 412.03/412.06.
 4. Screw in and tighten impeller screw 906.01.

7.5.6.5 Fitting impeller with tapered interference fit on pumps with bearing brackets S05/S06

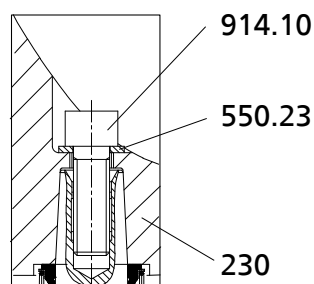


Fig. 64: Fitting impeller with tapered interference fit on pumps with bearing brackets S05/S06

- ✓ The pre-assembly has been completed.
 - ✓ The assembled bearing bracket has been placed in a suitable assembly area with the pump end up.
 - ✓ Suitable lifting equipment is available.
1. Slide impeller 230 onto shaft 210.
 2. Insert hexagon socket head cap screw 914.10 and disc 550.23. Tighten the screw.

7.5.6.6 Fitting D impeller with cylindrical fit on pump with bearing bracket S07

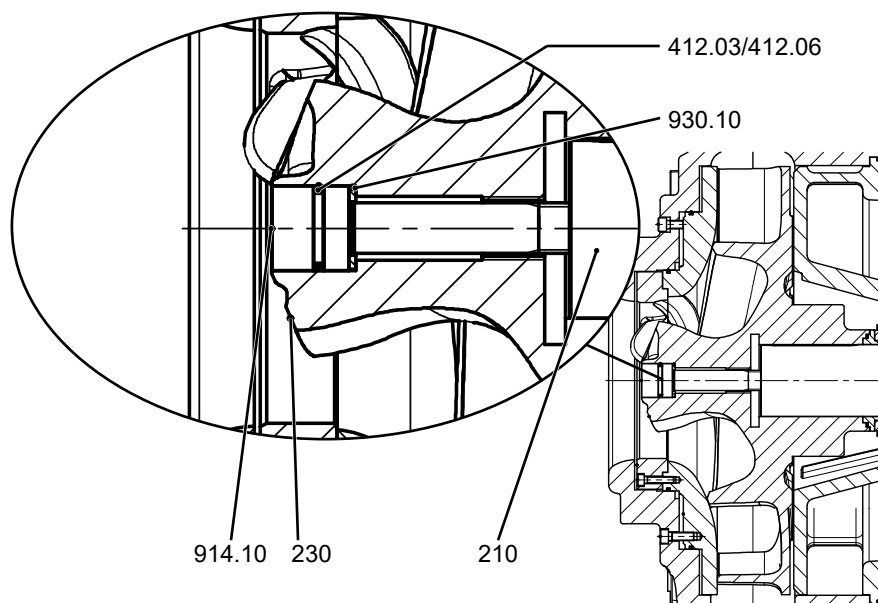


Fig. 65: Fitting D impeller with cylindrical fit on pump with bearing bracket S07

- ✓ The pre-assembly has been completed.
 - ✓ The assembled bearing bracket has been placed in a suitable assembly area with the pump end up.
 - ✓ Suitable lifting equipment is available.
1. Slide impeller 230 onto shaft 210.
 2. Insert hexagon socket head cap screw 914.10 with O-ring 412.06 and safety device 930.10. Tighten the screw.

7.5.7 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 wear plate (for D impellers only)

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

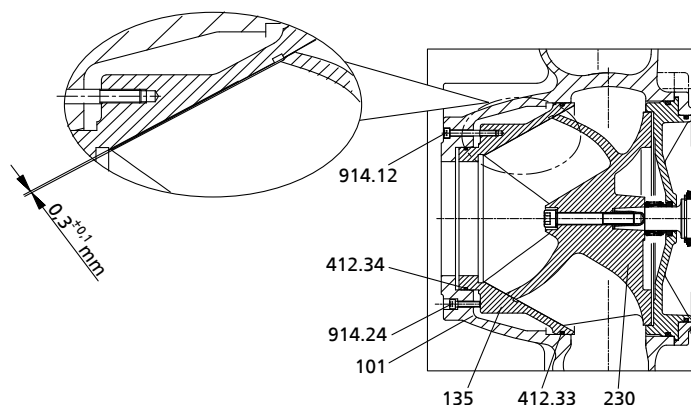


Fig. 66: Fitting the wear plate

1. Equip wear plate 135 with two new O-rings 412.33 and 412.34.
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.
 - ⇒ With a D impeller (single-vane impeller), the clearance equals 0.3 ± 0.1 mm (measured on the suction side from the outer surface of the impeller vane to the wear plate).
 - ⇒ With a D impeller (multi-vane impeller), the clearance equals 0.3 ± 0.1 mm (measured at the outer diameter 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. Fasten the support foot to the baseplate with bolts 901.61 and discs 550.61.

7.5.8 Leak test

7.5.8.1 Checking the mechanical seal for leakage

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.

7.5.8.2 Checking and adjusting the gland packing

	⚠ DANGER The temperatures at the gland packing have risen above the permissible limits Explosion hazard! ▷ Gland packings are not approved for use in potentially explosive atmospheres. ▷ Immediately switch off the pump set!
---	---

Check the gland packing during commissioning. Adjust the gland packing, if required.

The gland packing must leak slightly during operation.

Prior to commissioning

1. Only lightly tighten the nuts of the gland follower by hand.
 2. Use a feeler gauge to verify that the gland follower is mounted centred and at a right angle to the shaft.
- ⇒ The gland must leak after the pump has been primed.

After five minutes of operation

The leakage can be reduced.

1. Tighten the nuts of the gland follower by 1/6 turn.
2. Monitor the leakage for another five minutes.

Excessive leakage:

Repeat steps 1 and 2 until the minimum value has been reached.

Not enough leakage:

Slightly loosen the nuts at the gland follower.

No leakage:

Switch off the pump set immediately!

Loosen the gland follower and repeat start-up.

Checking for leakage

After the leakage has been adjusted, monitor the leakage for about two hours at maximum fluid temperature.

Check that enough leakage occurs at the gland at minimum inlet pressure.

7.5.9 Mounting the motor

Version with coupling

	NOTE Steps 1 and 2 do not apply to versions with spacer-type coupling.
---	--

1. Shift the motor to connect it to the pump via the coupling.
2. Fasten the motor to the baseplate.
3. Align the pump and motor. (⇒ Section 5.10, Page 39)
4. Connect the motor to the power supply (refer to manufacturer's product literature).

Version with belt drive

	WARNING
	Motor tipping over Risk of squashing hands and feet! ▷ Suspend or support the motor to prevent it from tipping over.

1. Fasten the motor to motor plate 81-33 with bolts 901.65, discs 550.65 and nuts 920.65.
2. Screw motor plate 81-33 including motor to motor bracket 890.
3. Screw in height-adjusting elements 901.59 / 550.59.
4. Mount motor bracket 890 on baseplate.

7.5.10 Fitting the belt drive

	CAUTION
	V-belts pulled on with force Damage to the V-belts! Reduced service life of V-belts! ▷ Only pull on V-belts if this is possible without using any force. ▷ Only pull on V-belts by hand. Do not use any tools (e.g. levers).

	CAUTION
	Multiple V-belt drives Reduced service life of the V-belts! ▷ Always replace the complete set of V-belts if individual belts are worn. ▷ Use V-belts of the same length.

- ✓ The V-belts are free from burs, rust and dirt.
 - ✓ The motor has been mounted on the motor plate or motor bracket as specified.
 - ✓ The pump has been assembled as specified.
1. Use bushing 540.03 to fit pulley 882.02 on the motor shaft.
 2. Fit bushing 540.02 on pump shaft 210.
 3. Place pulley 882.01 on bushing 540.02.
 4. Pull V-belts on pulleys 882.01/882.02.
 5. Check the alignment of the pulleys.
 6. Tension the V-belts.

	CAUTION
	Swelling of V-belts due to aggressive ambient conditions Reduced service life of V-belts! ▷ Protect V-belts suitably from oil mist, dripping oil and other chemical influences.

7.5.10.1 Using taper clamping bushes

- ✓ All bright (machined) surfaces, such as the drilled holes and the tapered sleeve of the taper clamping bush as well as the tapered drilled hole in the disc have been cleaned and degreased.
1. Insert the taper clamping bush into the hub and align all connection holes.
 - ⇒ Make sure all half threaded holes are matched with half unthreaded holes.

2. Lightly oil grub screws (sizes 1008 - 3030) or socket head cap screws (sizes 3535 - 5050) and screw them in. Do not tighten the screws at this stage.
3. Clean and degrease the shaft. Slide the disc with the taper clamping bush onto the shaft until it reaches the required position.
4. If using a key, first insert this key into the keyway of the shaft.
Make sure there is a clearance gap between the key and the drilled keyway.
5. Evenly tighten the grub screws or socket head cap screws.
6. Check the tightening torque of the screws after 1/2 to 1 hour. Re-adjust the tightening torque, if required.

Table 27: Tightening torque for taper clamping bushes

Bush	Tightening torque	Screws	
	[Nm]	Quantity	Size
1004 / 1108	5,6	2	1/4" BSW
1310 / 1315	20	2	3/8" BSW
1210 / 1215	20	2	3/8" BSW
1610 / 1615	20	2	3/8" BSW
2012	31	2	7/16" BSW
2517	48	2	1/2" BSW
3020 / 3030	90	2	5/8" BSW
3535	112	3	1/2" BSW
4040	170	3	5/8" BSW
4545	192	3	3/4" BSW
5050	271	3	7/8" BSW


NOTE

Fill any open connection holes with grease to prevent the ingress of foreign matter.

7.5.10.2 Using pulleys to DIN 2211

Use a pneumatic or hydraulic puller to fit the pulleys.
Watch the position of the key.
Secure the pulley axially with a grub screw.

7.6 Tightening torques
7.6.1 Tightening torques for the pump set
Table 28: Tightening torques for the pump set [Nm]

Thread	Property class			
	8.8	C3-80	A4-70	1.4462
M 6	10		7	7
M 8	25		17	17
M 10	50		35	35
M 12	85		60	60
M 16	210		150	150
M 20	410		290	290
M 24	710		278	500
M 27	1050		409	736
M 30	1420		554	1000

7.6.2 Tightening torques for the mechanical seal

Table 29: Tightening torques for grub screws with cup point to ISO 4029 in KSB mechanical seals

Thread	[Nm]
M5	4
M6	7
M8	15
M10	30
M12	40

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 (⇒ Section 9.3, Page 98)
- 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 30: Quantity of spare parts for recommended spare parts stock

Part No.	Description	Number of pumps (including stand-by pumps)								Spare part	Replacement part	Wear part
		1	2	3	4	5	6	8	10 and more			
135	Wear plate	1	2	2	2	3	3	4	50 %	-	-	✗
163	Discharge cover	1	2	2	2	3	3	4	50 %	✗	-	-
210	Shaft	1	1	1	2	2	2	3	30 %	✗	-	-
230	Impeller	1	1	1	2	2	2	3	30 %	-	✗	-
321.01/02	Rolling element bearing (set)	1	1	1	2	2	3	4	50 %	-	-	✗
330	Bearing bracket, complete	-	-	-	-	-	-	1	2 pcs.	✗	-	-
433.01/02	Mechanical seal, complete (set)	1	2	3	4	4	4	6	90 %	-	-	✗
502.01	Casing wear ring	1	2	2	2	3	3	4	50 %	-	-	✗
503	Impeller wear ring	1	2	2	2	3	3	4	50 %	-	-	✗

Part No.	Description	Number of pumps (including stand-by pumps)								Spare part	Replacement part	Wear part
		1	2	3	4	5	6	8	10 and more			
	Assembly for gland packing consisting of: ▪ Neck bush ▪ Shaft protecting sleeve ▪ Lantern ring	1	1	1	2	2	2	3	40 %	-	✗	-
	Packing cord (4 rings)	4	4	6	8	8	9	12	100 %	-	-	✗
	Sealing elements (set)	2	4	6	8	8	9	12	150 %	-	-	✗

Keeping a stock of wear parts and replacement parts is recommended also during the warranty period.

8 Trouble-shooting

	 WARNING
	Improper work to remedy faults Risk of injury! ► 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.

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 overload
- 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 31: Trouble-shooting

A	B	C	D	E	F	G	H	Possible cause	Remedy ¹¹⁾
X	-	-	-	-	-	-	-	Pump delivers against an excessively high pressure.	Re-adjust to duty point. 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 head 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, request particulars.
-	-	-	-	-	-	X	-	Defective bearing(s)	Replace bearing(s).
-	-	-	X	-	-	X	X	Insufficient flow rate	Increase the minimum flow rate.
X	-	-	-	-	-	X	-	Wear of internal components	Replace worn components by new ones.
-	X	-	-	-	-	X	-	Pump back pressure is lower than specified in the purchase order.	Re-adjust to duty point.

¹¹ 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 ¹⁾
-	X	-	-	-	-	-	-	Density or viscosity of the fluid handled is higher than stated in the purchase order.	Contact KSB.
-	X	X	-	-	-	-	-	Speed is too high.	Reduce speed, request particulars.
-	-	-	-	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	-	X	X	-	The pump set is misaligned.	Check the coupling/belt drive. Re-align, if required.
-	-	-	X	-	-	-	-	Non-compliance with specified coupling distance	Correct the distance according to general arrangement drawing.
-	X	-	-	-	-	-	-	Operating voltage too low.	Increase the voltage.

9 Related Documents

9.1 Speed adjustment

If the speed needs to be adjusted, the pulleys may only be changed within the limits specified below for the pulley dimensions and the centreline distances between pump and motor shaft. If the moment of inertia needs to be increased, a flywheel can be fitted to the motor in addition. In this case, select a motor with reinforced bearings.

Speed adjustment for bearing bracket S05 up to IEC 200L

Table 32: Pulley dimensions

Base frame size	Size	Pulley diameter		Pulley width	Number of belts	Centreline spacing	
		Pump	Motor			Max.	Min.
		[mm]	[mm]			[mm]	
3/55 (IEC 132-200)	K 100-400	400	400	100	5	560	440
	D 100-403	400	400	100	5	560	440
	K, E, F 100-401	400	400	100	5	560	440
	K 150-400,-403	400	400	100	5	520	400
	D 150-403	400	400	100	5	520	400
	K, E, F 150-401	400	400	100	5	520	400
	K 151-403	400	400	100	5	520	400
	K 200-330	400	400	100	5	520	400
	E 200-400	400	400	100	5	520	400
	K 200-401	400	400	100	5	520	400
	K 200-402	400	400	100	5	520	400
	D 200-402	400	400	100	5	520	400
	K 200-403	400	400	100	5	520	400
	D 200-405	400	400	100	5	520	400
	K 250-400	400	400	100	5	450	330
	K 250-401	400	400	100	5	450	330
	D 250-402	400	400	100	5	450	330
	K 250-403	400	400	100	5	450	330
	K 300-400	400	400	100	5	425	305
	K 300-401	400	400	100	5	425	305
	D 300-402	400	400	100	5	425	305
	K 300-403	400	400	100	5	425	305
3 (IEC 132-200)	D 100-315	400	400	100	5	585	465
	D 150-400	400	400	100	5	560	440
	D 150-401	400	400	100	5	520	400
	D 200-400	400	400	100	5	425	305
	D 250-400	400	400	100	5	420	300
	D 300-400	400	400	100	5	425	305
4 5 (IEC 132-200)	K 150-500	400	400	100	5	500	380
	E 200-500	400	400	100	5	500	380

Speed adjustment for motors IEC 225S and above

Table 33: Pulley dimensions

Base frame size	Size	Pulley diameter		Pulley width	Number of belts
		Pump	Motor		
		[mm]			
4/57 (IEC 225 S-250 M)	D 080-315	450	400	100	5
	D 080-317	450	400	100	5
	K 100-400	450	400	100	5
	100-401	450	400	100	5
	D 150-400	450	400	100	5
	K 150-400	450	400	100	5
	K 150-403	450	400	100	5
	150-401 with S05	450	400	100	5
	200-330	450	400	100	5
	200-400	450	400	100	5
	200-401	450	400	100	5
	K 200-402	450	400	100	5
	K 200-403	450	400	100	5
5 (IEC 225 S-250 M)	250-400	450	400	100	5
	250-401	450	400	100	5
	250-403	450	400	100	5
	300-400	450	400	100	5
	300-401	450	400	100	5
	300-403	450	400	100	5
5/58 (IEC 280 S-315 M)	D 080-315	450	400	156	8
	K 100-400	450	400	156	8
	100-401	450	400	156	8
	K 150-400	450	400	156	8
	K 150-403	450	400	156	8
	150-401 with S05	450	400	156	8
	150-403 with S05	450	400	156	8
	200-330	450	400	156	8
	200-400	450	400	156	8
	200-401	450	400	156	8
	K 200-402	450	400	156	8
	K 200-403	450	400	156	8
	250-400	450	400	156	8
	250-401	450	400	156	8
	250-402	450	400	156	8
	300-400	450	400	156	8
	300-401	450	400	156	8
	300-403	450	400	156	8
6 (IEC 225 S-250 M)	E 200-500 with S05	450	400	156	8
7 (IEC 225 S-315 M)	D 150-503 with S06	500	400	156	8
	K 150-503 with S06	500	400	156	8
	D 200-503 with S06	500	400	156	8
	K 200-502 with S07	500	400	156	8
	K 200-504 with S07	500	400	156	8

Base frame size	Size	Pulley diameter		Pulley width	Number of belts
		Pump	Motor		
		[mm]			[Qty]
7 (IEC 225 S-315 M)	E 250-500 with S06	500	400	156	8
	E 250-500 with S07	500	400	156	8
	K 250-630 with S07	500	400	156	8
	K 250-632 with S07	500	400	156	8
8 (IEC 225 S-315 M)	E 250-630 with S07	500	400	156	8
	E 300-630 with S07	500	400	156	8
9 (IEC 250 M-315 M)	K 500-634 with S07	560	400	156	8
19 (IEC 225 S-315 M)	K 300-500 with S06	500	400	156	8
	D 300-502 with S06	500	400	156	8
	D 300-505 with S06	500	400	156	8
	K 350-500 with S06	500	400	156	8
	K 350-500 with S07	500	400	156	8
	K 350-501 with S06	500	400	156	8
	D 350-502 with S07	500	400	156	8
	D 350-503 with S06	500	400	156	8
	K 350-503	500	400	156	8
20 (IEC 225 S-250 M)	D 100-403	450	400	100	5
	D, E 150-401 with S06	450	400	100	5
	D 150-403	450	400	100	5
	D, E 200-401 with S06	450	400	100	5
	D 200-402	450	400	100	5
	D 200-405	450	400	100	5
	D 250-400 with S06	450	400	100	5
	D 250-402	450	400	100	5
	D 300-400 with S06	450	400	100	5
	D 300-402	450	400	100	5
20 (IEC 225 S-315 M)	D 100-403	450	400	156	8
	D, E 150-401 with S06	450	400	156	8
	D 150-403	450	400	156	8
	D, E 200-401 with S06	450	400	156	8
	D 200-402	450	400	156	8
	D 200-405	450	400	156	8
	D 250-400 with S06	450	400	156	8
	D 250-402	450	400	156	8
	D 300-400 with S06	450	400	156	8

9.2 Mass moments of inertia

Table 34: Mass moments of inertia and mass details of pulleys in GG

Pulley width						Pulley diameter	n max. dyn. balanced
50 mm		80 mm		100 mm			
l [kgm²]	m [kg]	l [kgm²]	m [kg]	l [kgm²]	m [kg]	d [mm]	[rpm]
0,012	5	0,022	9	0,027	11	140	3000
0,017	6	0,028	10	0,034	12	150	3000

Pulley width						Pulley diameter	n max. dyn. bal- anced
50 mm		80 mm		100 mm			
l [kgm ²]	m [kg]	l [kgm ²]	m [kg]	l [kgm ²]	m [kg]	d [mm]	[rpm]
0,022	7	0,035	11	0,045	14	160	3000
0,036	9	0,057	14	0,073	18	180	3000
0,055	11	0,09	18	0,11	22	200	3000
0,088	14	0,14	22	0,18	28	224	3000
0,13	17	0,22	28	0,28	36	250	3000
0,22	22	0,35	36	0,44	45	280	2700
0,35	28	0,56	45	0,69	56	315	2700
0,57	36	0,89	57	1,13	72	355	2200
0,92	46	1,46	73	1,82	91	400	1900
1,46	58	2,34	92,8	2,92	116	450	1700
2,23	72	3,56	115	4,45	143	500	1500
3,5	90	5,61	144	7,01	180	560	1350

Table 35: Mass moments of inertia and mass details of pulleys with taper clamping bushes

Pulley width				Pulley diameter	n max. dyn. balanced
50 mm (SPA - 3 grooves)		100 mm (SPA - 5 grooves)			
I [kgm ²] ¹²⁾	m [kg] ¹²⁾	I [kgm ²] ¹²⁾	m [kg] ¹²⁾	d [mm]	[rpm]
0,0024	1,4	--	--	100	3000
0,0029	1,6	--	--	106	3000
0,0038	1,6	--	--	112	3000
0,0048	1,9	--	--	118	3000
0,0059	2,3	--	--	125	3000
0,0075	2,6	0,014	4,0	132	3000
0,0097	2,9	0,017	5,2	140	3000
0,013	3,6	0,021	5,9	150	3000
0,018	4,4	0,028	6,8	160	3000
--	--	0,034	7	170	3000
0,030	6,1	0,044	8	180	3000
--	--	0,055	9,3	190	3000
0,034	5,5	0,07	10,5	200	3000
--	--	0,089	12,2	212	3000
0,048	6,2	0,11	14	224	3000
--	--	0,17	19,5	236	3000
0,068	6,8	0,21	22,5	250	3000
0,097	7,6	0,23	21	280	2700
0,16	11	0,34	24	315	2700
0,163	12	0,48	25,5	335	2200
0,244	13	0,57	31,5	400	1900

9.3 General assembly drawings/exploded views with list of components

9.3.1 General assembly drawing – Sewatec with bearing brackets S05, S06, S07, S08

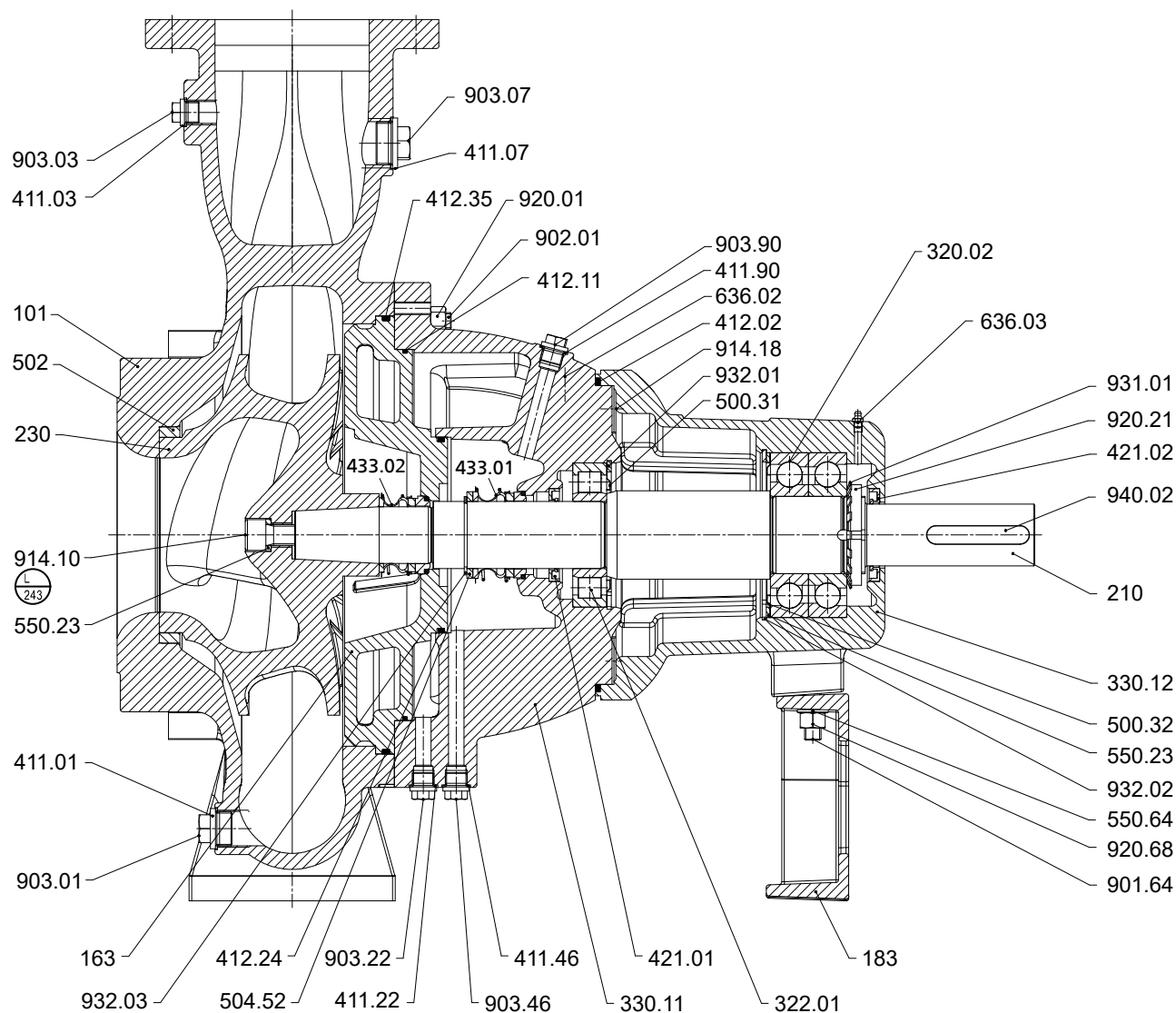


Fig. 67: Sewatec with bearing brackets S05 to S08

Table 36: Symbols key

Symbol	Description
	Always secure screwed connections marked with this symbol with Loctite 243 .

Table 37: List of components

Part No.	Description	Part No.	Description
101	Pump casing	502	Casing wear ring
163	Discharge cover	504.52	Spacer ring
183	Support foot	550.23/.64	Disc
210	Shaft	636.02/.03	Lubricating nipple
230	Impeller	901.64	Hexagon head bolt
320.02	Rolling element bearings	902.01	Stud
322.01	Radial roller bearing	903.01/.03/.07/.22/.46/.90	Screw plug
330.11/.12	Bearing bracket	914.10/.18	Hexagon socket head cap screw

Part No.	Description	Part No.	Description
411.01/.03/.07/.22/.46/.90	Joint ring	920.01/.21/.68	Nut
412.02/.11/.24/.35	O-ring	931.01	Lock washer
421.01/.02	Lip seal	932.01/.02/.03	Circlip
433.01/.02	Mechanical seal	940.02	Key
500.31/.32	Ring		

9.3.2 General assembly drawing: Sewatec with bearing brackets S05, S06, S07, underfloor installation and installation with universal-joint shaft

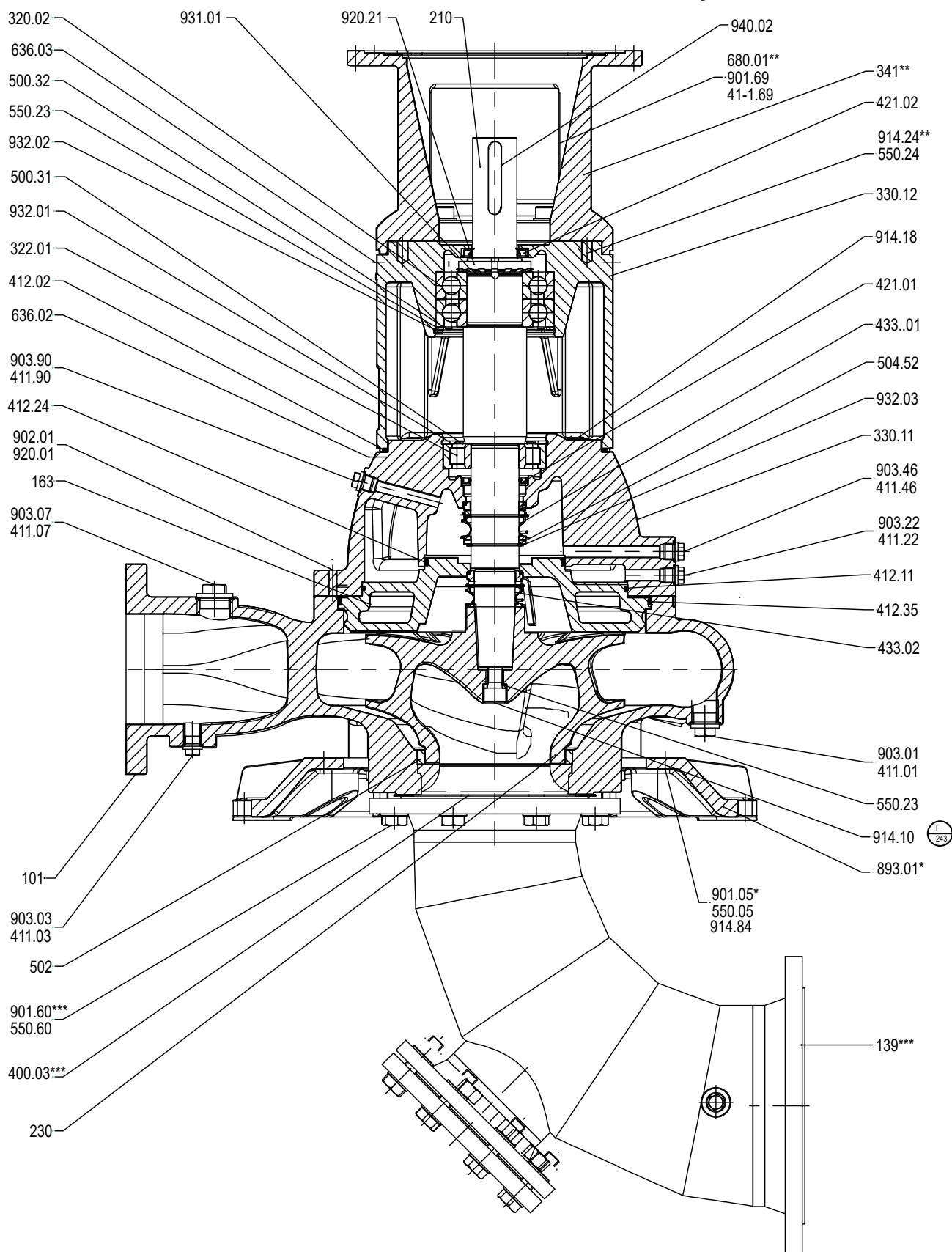


Fig. 68: Sewatec with E impeller – pump for underfloor installation and installation with universal-joint shaft

Table 38: Symbols key

Symbol	Description
	Always secure screwed connections marked with this symbol with Loctite 243 .
*	Only for Sewatec K 100-400, F/K 100-401, D 100-403, D/K 150-400, D 150-401, D/K 150-403, D 150-503, K 150-503, K 151-403, D 200-400, D/K 200-402, K 200-403, D 200-405, D 200-503, K 200-504, K 200-505, D 250-402, D 300-402
**	If any
***	Not for universal-joint shaft

Table 39: List of components

Part No.	Description	Part No.	Description
41-1.69	Sealing washer	502	Casing wear ring
101	Pump casing	504.52	Spacer ring
139	Suction elbow	525.04	Spacer sleeve
163	Discharge cover	550.05/.16/.23/.24/.60	Disc
210	Shaft	636.02/.03	Lubricating nipple
230	Impeller	680.01**	Guard
320.02	Rolling element bearing	893.01*	Soleplate
322	Radial roller bearing	901.05*/.16/.18/.60***	Hexagon head bolt
330.11/.12	Bearing bracket	902.01	Stud
341**	Drive lantern	903.01/.03/.07/.22/.46/.90	Screw plug
400.03***	Gasket	906	Impeller screw
411.01/.03/.07/.22/.46/.90	Joint ring	914.18/.10/24***	Hexagon socket head cap screw
412.02/.11/.24/.35	O-ring	920.01/.11/.21	Nut
421.01/.02	Lip seal	931.01	Lock washer
433.01/.02	Mechanical seal	932.01/.02/.03	Circlip
500.31/.32	Ring	940.02	Key

9.3.3 General assembly drawing – Sewatec with bearing brackets S09, S10

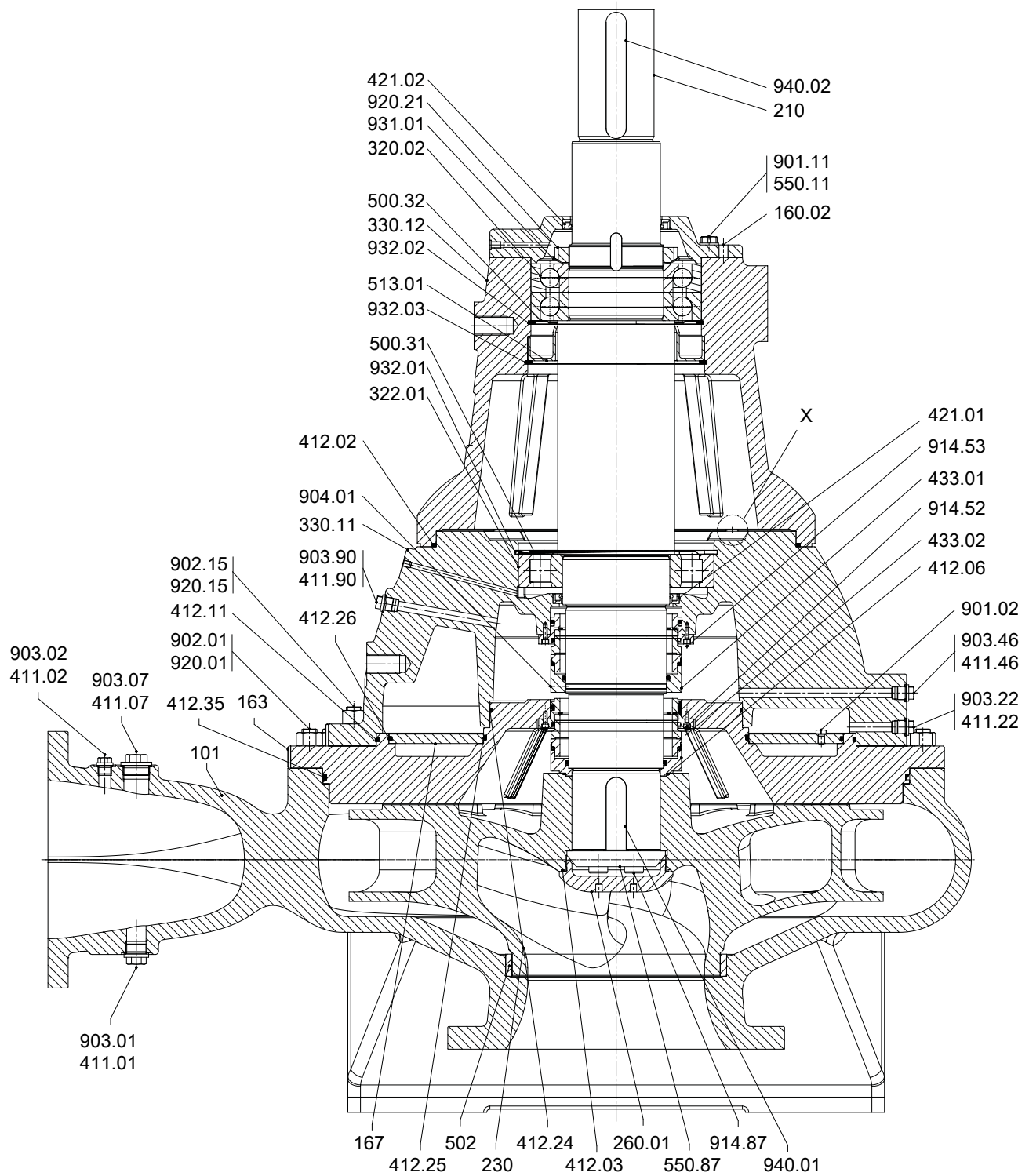


Fig. 69: Sewatec with bearing brackets S09, S10

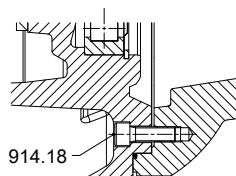


Fig. 70: Detail X

Table 40: List of components

Part No.	Description	Part No.	Description
101	Pump casing	500.31/.32	Ring
160.02	Cover	502	Casing wear ring
163	Discharge cover	513.01	Insert ring
167	Cover insert	550.04/.11/.87	Disc
210	Shaft	901.02/.11	Hexagon head bolt
230	Impeller	902.01/.02/.15	Stud
260.01	Impeller hub cap	903.01/.02/.07/.22/.46/.90	Screw plug
320.02	Rolling element bearings	904.01	Grub screw
322.01	Radial roller bearing	914.18/.52/.53/.87	Hexagon socket head cap screw
330.11/.12	Bearing bracket	920.01/.15/.17/.21	Nut
411.01/.02/.07/.22/.46/.90	Joint ring	931.01	Lock washer
412.02/.03/.05/.06/.11/.24/.25/.26/.35	O-ring	932.01/.02/.03	Circlip
421.01/.02	Lip seal	940.01/.02	Key
433.01/.02	Mechanical seal		

9.3.4 Detail drawings

9.3.4.1 Impeller types

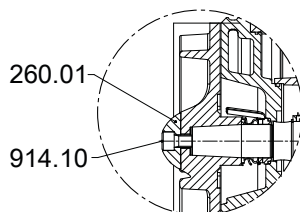


Fig. 71: F impeller

Table 41: List of components

Part No.	Description	Part No.	Description
260.01	Impeller hub cap	914.10	Hexagon socket head cap screw

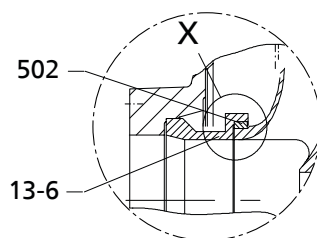


Fig. 72: K impeller

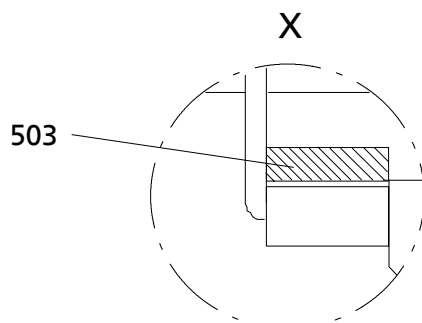


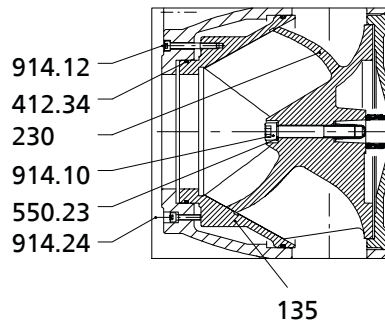
Fig. 73: Detail X: impeller wear ring for K impeller

Table 42: List of components

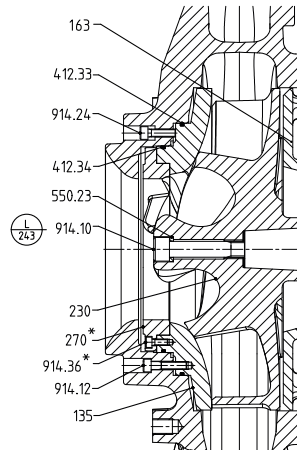
Part No.	Description	Part No.	Description
13-6 ¹³⁾	Casing insert	502 ¹⁴⁾	Casing wear ring
503	Impeller wear ring		

¹³ Only for Sewatec 100-401 and 200-400

¹⁴ Not for Sewatec 100-401


Fig. 74: D impeller (single-vane impeller)

Part No.	Description	Part No.	Description
230	Impeller	550.23	Disc
412.34	O-ring	914.10/.12/.24	Hexagon socket head cap screw


Fig. 75: D impeller (multi-vane impeller)

*: On specific designs only

Table 44: Impeller type D

Part No.	Description	Part No.	Description
135	Wear plate	412	O-ring
163	Discharge cover	550	Disc
230	Impeller	914	Hexagon socket head cap screw
270	Deflector		

9.3.4.2 Impeller fastening

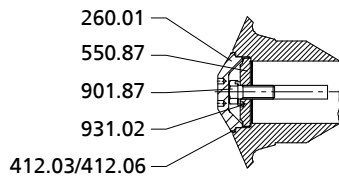

Fig. 76: Impeller fastening for bearing brackets S07 and S08 (impeller types E and K), except Sewatec size 500-632

Table 45: List of components

Part No.	Description	Part No.	Description
260.01	Impeller hub cap	901.87	Hexagon head bolt
412.03/412.06	O-ring	931.02	Lock washer
550.87	Disc		

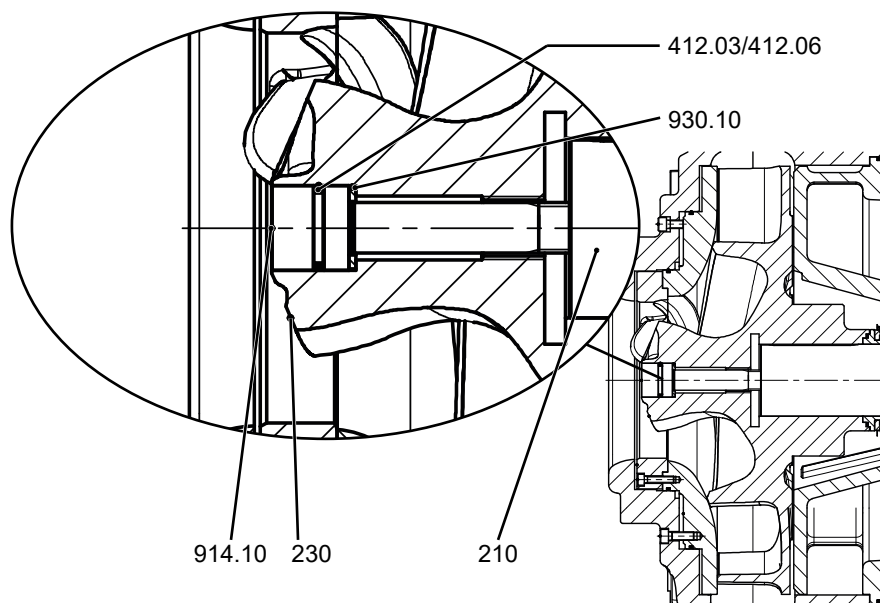


Fig. 77: Impeller fastening for bearing bracket S07 (impeller type D)

Table 46: List of components

Part No.	Description	Part No.	Description
210	Shaft	914.10	Hexagon socket head cap screw
230	Impeller	930.10	Safety device
412.03/412.06	O-ring		

9.3.4.3 Inspection hole, bearing brackets S05 to S08

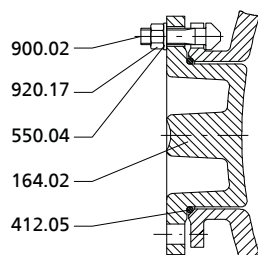


Fig. 78: Inspection hole, bearing brackets S05 to S08

Table 47: List of components

Part No.	Description	Part No.	Description
164.02	Inspection cover	900.02	Bolt/screw
412.05	O-ring	920.17	Nut
550.04	Disc		

9.3.4.4 Inspection hole, bearing brackets S09 and S10

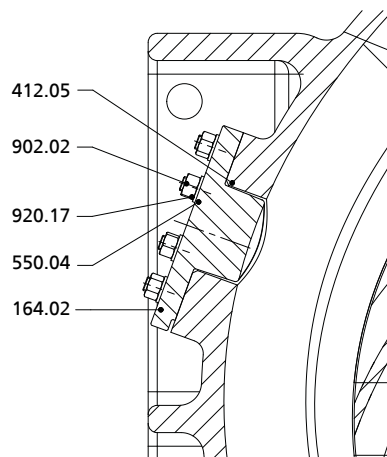


Fig. 79: Inspection hole, bearing brackets S09 and S10

Table 48: List of components

Part No.	Description	Part No.	Description
164.02	Inspection cover	902.17	Stud
412.05	O-ring	920.17	Nut
550.04	Disc		

9.3.4.5 Drilled hole required during manufacturing, bearing brackets S09 and S10

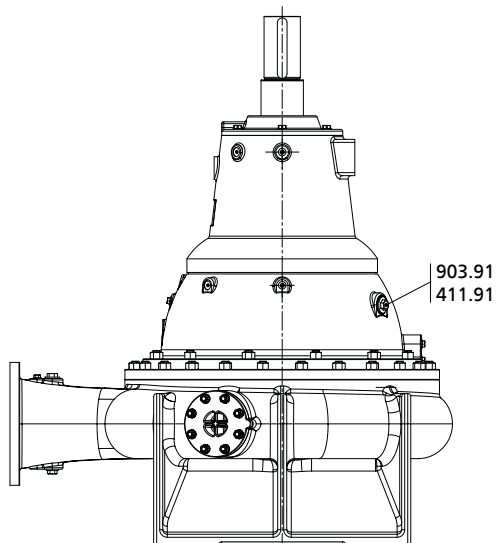


Fig. 80: Drilled hole required during manufacturing, bearing brackets S09 and S10

Table 49: List of components

Part No.	Description	Part No.	Description
411.91	Joint ring	903.91	Screw plug

9.3.5 Sectional drawings of the mechanical seal

9.3.5.1 Pump-end mechanical seal (bearing brackets S01 - S07)

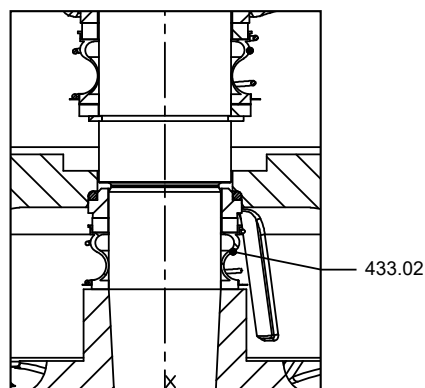


Fig. 81: Pump-end mechanical seal (bearing brackets S01 - S07)

Table 50: List of components

Part No.	Description
433.02	Mechanical seal

9.3.5.2 Pump-end mechanical seal (bearing bracket S08): 4STC, version with clamped mating ring carrier

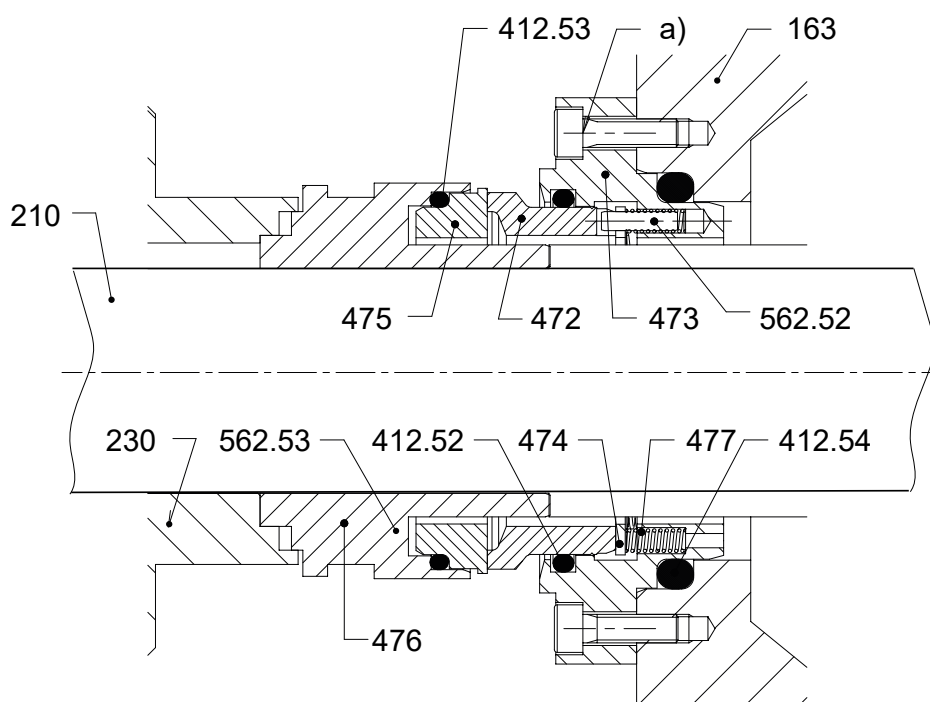


Fig. 82: 4STC, version with clamped mating ring carrier

a)	Screws ISO 4762-M6
----	--------------------

Table 51: List of components

Part No.	Description	Part No.	Description
163	Discharge cover	474	Thrust ring
210	Shaft ¹⁵⁾	475	Mating ring
230	Impeller	476	Mating ring carrier

¹⁵ Illustration not to scale

Part No.	Description	Part No.	Description
412.52/.53/.54	O-ring	477	Spring for mechanical seal
472	Primary ring	562.52/.53	Parallel pin
473	Primary ring carrier		

9.3.5.3 Pump-end mechanical seal (bearing brackets S09 - S10): 4STC, version with clamped mating ring carrier and secured primary ring carrier

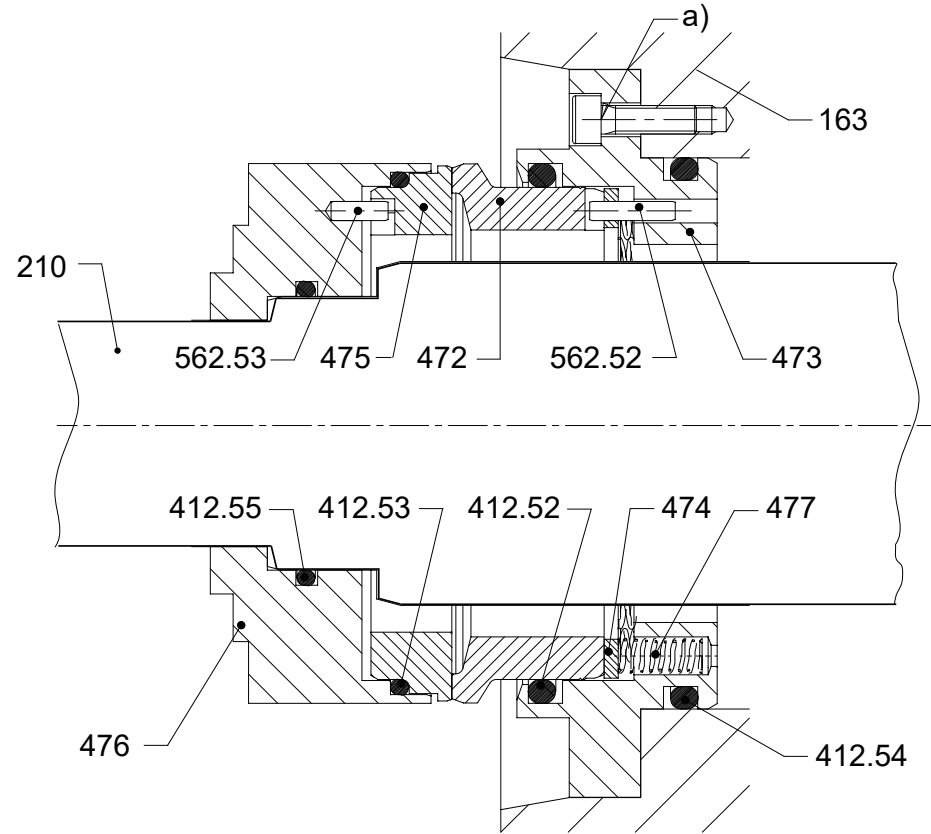


Fig. 83: 4STC, version with clamped mating ring carrier and secured primary ring carrier

a)	Screws ISO 4762-M6
----	--------------------

Table 52: List of components

Part No.	Description	Part No.	Description
163	Discharge cover	474	Thrust ring
210	Shaft ¹⁶⁾	475	Mating ring
412.52/.53/.54/.55	O-ring	476	Mating ring carrier
472	Primary ring	477	Spring for mechanical seal
473	Primary ring carrier	562.52/.53	Parallel pin

2580.8167/04-EN

¹⁶ Illustration not to scale

9.3.5.4 Drive-end mechanical seal (bearing brackets S01 - S07)

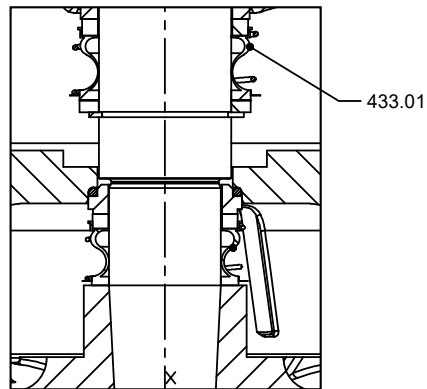


Fig. 84: Drive-end mechanical seal (bearing brackets S01 - S07)

Table 53: List of components

Part No.	Description
433.01	Mechanical seal

9.3.5.5 Drive-end mechanical seal (bearing brackets S08 - S10): 4STC, version with axially secured primary ring carrier

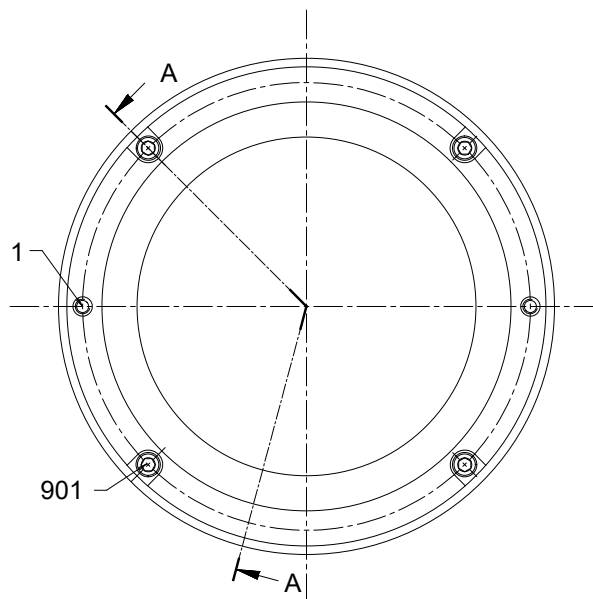


Fig. 85: Cross-section axis

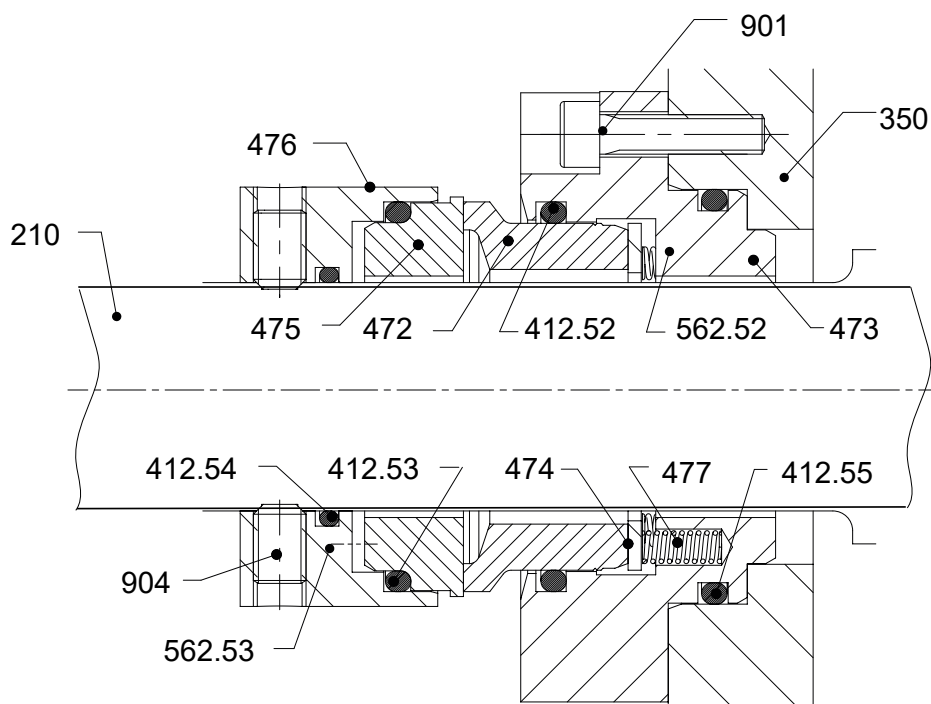


Fig. 86: 4STC, version with axially secured primary ring carrier

Table 54: List of components

Part No.	Description	Part No.	Description
1	Jacking thread	475	Mating ring
210	Shaft ¹⁷⁾	476	Mating ring carrier
350	Bearing housing	477	Spring for mechanical seal
412.52/.53/.54/.55	O-ring	562	Parallel pin
472	Primary ring	901	Hexagon head bolt
473	Primary ring carrier	904	Grub screw
474	Thrust ring		

9.3.5.6 Cartridge seal C120/120M1-4STQ

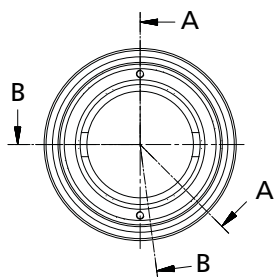


Fig. 87: Cross section axes

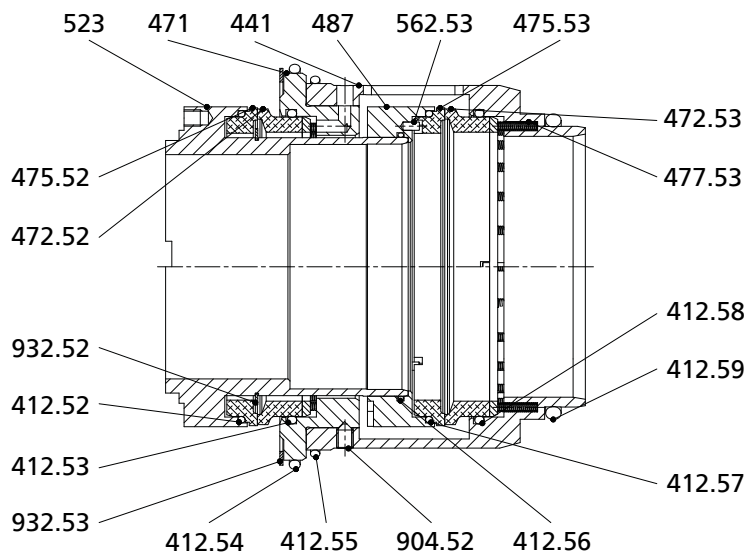


Fig. 88: View A

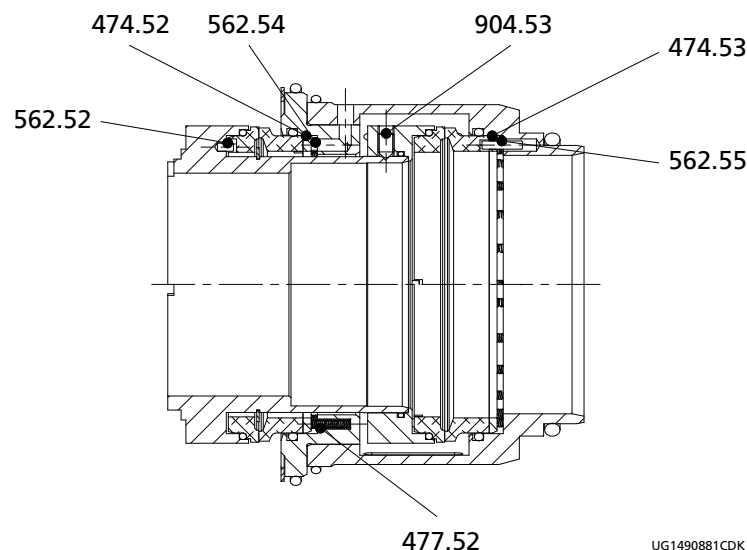


Fig. 89: View B

UG1490881CDK

Table 55: List of components

Part No.	Description	Part No.	Description
412.52/.53/.54/.55/.56/.57/.58/.59	O-ring	487	Mating ring carrier
441	Shaft seal housing	523	Shaft sleeve
471	Seal cover	562.52/.53/.54/.55	Parallel pin
472.52/.53	Primary ring	901	Hexagon head bolt
474.52/.53	Thrust ring	904.52/.53	Grub screw
475.52/.53	Mating ring	932.52/.53	Circlip
477.52/.53	Spring for mechanical seal		

This exploded view diagram illustrates the assembly of a pump. The main components and their associated part numbers are as follows:

- Motor/Drive End (Top Left):** Includes the motor housing (411.07), mounting feet (101), and base (903.03). The motor shaft (411.01) is shown with its coupling (903.01).
- Impeller Assembly (Bottom Left):** Features the impeller (230) mounted on the motor shaft, secured with a nut (412.03) and washer (906).
- Intermediate Shaft and Coupling (Middle Left):** Shows the intermediate shaft (163) with a coupling (412.11) and a nut (412.03).
- Impeller Assembly (Bottom Middle):** Includes the impeller (230) mounted on the intermediate shaft, secured with a nut (412.03) and washer (906).
- Impeller Assembly (Bottom Right):** Features the impeller (230) mounted on the intermediate shaft, secured with a nut (412.03) and washer (906).
- Discharge End (Top Right):** Includes the discharge housing (330.11) with mounting feet (903.07) and base (903.03). The discharge shaft (411.90) is shown with its coupling (903.01).
- Discharge End (Bottom Right):** Includes the discharge housing (330.12) with mounting feet (903.07) and base (903.03). The discharge shaft (411.90) is shown with its coupling (903.01).
- Internal Components (Middle Right):** Includes the impeller (230) mounted on the discharge shaft, secured with a nut (412.03) and washer (906).
- Internal Components (Bottom Right):** Includes the impeller (230) mounted on the discharge shaft, secured with a nut (412.03) and washer (906).

The diagram uses dashed lines to indicate the assembly path and alignment of the various parts.

Fig. 90: Exploded view of Sewatec with mechanical seal

Table 56: List of components

Part No.	Description	Part No.	Description
101	Pump casing	504.02	Spacer ring
163	Discharge cover	525.04	Spacer sleeve
164.02	Inspection cover	550.04/.23/.64	Disc
183	Support foot	636.02/.03	Lubricating nipple
210	Shaft	900.02	Bolt/screw
230	Impeller	901.64	Hexagon head bolt
320.02	Rolling element bearing	902.01	Stud
322.01	Radial roller bearing	903.01/.03/.07/.22/.46/.90	Screw plug
330.11/.12	Bearing bracket	906	Impeller screw
411.01/.03/.07/.22/.46/.90	Joint ring	914.18	Hexagon socket head cap screw
412.02/.03/.04/.11/.24/.35	O-ring	920.01/.17/.21/.68	Nut
421.01/.02	Lip seal	931.01	Lock washer
433.01/.02	Mechanical seal	932.01/.02/.03	Circlip
500.31/.32	Ring	940.01/.02	Key
502	Casing wear ring		

9.3.7 Exploded view of Sewatec with gland packing

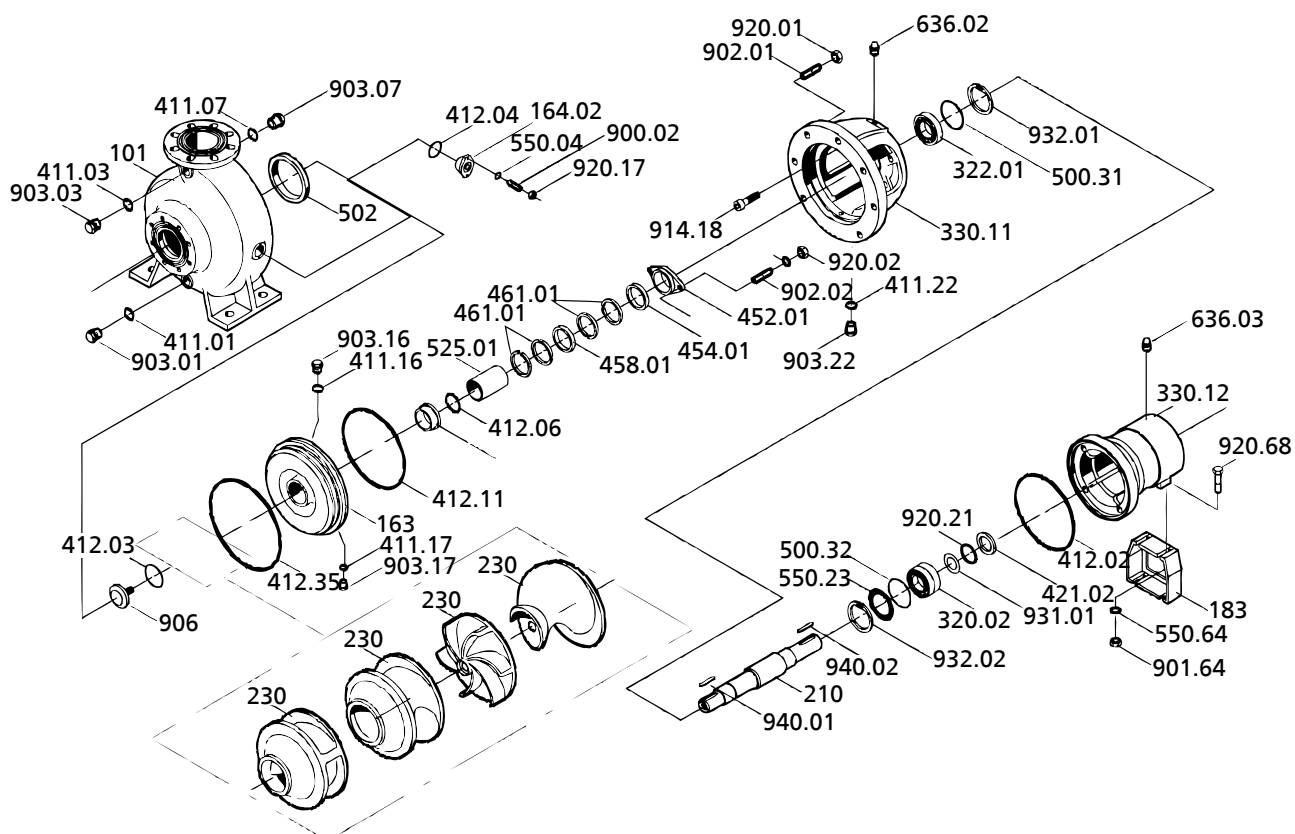


Fig. 91: Exploded view of Sewatec with gland packing

Table 57: List of components

Part No.	Description	Part No.	Description
101	Pump casing	500.31/.32	Ring
163	Discharge cover	502	Casing wear ring
164.02	Inspection cover	525.01	Spacer sleeve
183	Support foot	550.04/.23/.64	Disc
210	Shaft	636.02/.03	Lubricating nipple
230	Impeller	900.02	Bolt/screw
320.02	Rolling element bearing	901.64	Hexagon head bolt
322.01	Radial roller bearing	902.01/.02	Stud
330.11/.12	Bearing bracket	903.01/.03/.07/.16/.17/.22	Screw plug
411.01/.03/.07/.16/.17/.22	Joint ring	906	Impeller screw
412.02/.03/.04/.06/.11/.35	O-ring	914.18	Hexagon socket head cap screw
421.02	Lip seal	920.01/.02/.17/.21/.68	Nut
452.01	Gland follower	931.01	Lock washer
454.01	Stuffing box ring	932.01/.02	Circlip
458.01	Lantern ring	940.01/.02	Key
461.01	Gland packing		

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 as amended from time to time:
 - Pump (set): Supply of Machinery (Safety) Regulations 2008
 - Electrical components: Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

The manufacturer also declares that

- the following *designated standards*¹⁸⁾ have been applied:
 - EN ISO 12100:2010 (8 April 2011)
 - EN 809:1998+A1:2009/AC:2010 (18 December 2009)

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

.....¹⁹⁾.....

Name
Function
Company
Address

18 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.

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

11 Certificate of Decontamination

Type:

Order number /
Order item number²⁰⁾:

Delivery date:

Application:

Fluid handled²⁰⁾:

Please tick where applicable²⁰⁾:



☐
Corrosive



☐
Oxidising



☐
Flammable



☐
Explosive



☐
Hazardous to health



☐
Seriously hazardous to health



☐
Toxic



☐
Radioactive



☐
Bio-hazardous



☒
Safe

Reason for return²⁰⁾:

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

Index

A

Applications 9

B

Bearings 19

C

Certificate of Decontamination 116

Commissioning/start-up 46

Coupling alignment 35, 36

D

Design 19

Designation 18

Direction of rotation 43

Dismantling 61

Disposal 16

E

Event of damage 7

Ordering spare parts 90

Explosion protection 11, 24, 35, 36, 39, 40, 41, 42, 46, 47, 52, 53, 54, 55, 56, 87

F

Faults

Causes and remedies 92

Fluid handled

Density 50

Frequency of starts 49

G

Grease quantity 57

I

Impeller type 19

Installation

Installation on a foundation 25

Installation at site 24

Intended use 9

K

Key to safety symbols/markings 8

M

Maintenance 53

O

Operating limits 47, 53

Order number 7

Other applicable documents 7

P

Partly completed machinery 7

Piping 28

Preservation 15

Priming and venting 43

Product description 18

R

Reassembly 61, 74

Re-lubrication intervals 57

Return to supplier 16

Returning to service 51

S

Safety 9

Safety awareness 10

Scope of supply 22

Shaft seal 19

Spare part

Ordering spare parts 90

Spare parts stock 90

Storage 15

T

Tightening torques 89, 90

Transport 13

W

Warnings 8

Warranty claims 7



Simply scan
the QR code
and find your
regional contact.
ksb.com/en-global/contact



KSB SE & Co. KGaA

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

Tel. +49 6233 86-0

www.ksb.com

(05154577)

2580.8167/04-EN