Closed-coupled Pump

Etabloc

Installation/Operating Manual

CE

KSB

Legal information/Copyright

Installation/Operating Manual Etabloc

Original operating manual

Subject to technical modification without prior notice.

Contents

Glossary

ACS

French drinking water regulations (ACS = Attestation de Conformité Sanitaire)

Back pull-out unit

Pump without pump casing; partly completed machinery

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

IE3

Efficiency class to IEC 60034-30: 3 = Premium Efficiency (IE = International Efficiency)

Pool of pumps

Customers/operators' pumps which are purchased and stored regardless of their later use.

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

UBA

German drinking water regulations to German Environment Agency

WRAS

Approved by all water suppliers in the UK (WRAS = Water Regulations Advisory Scheme)

1173.8/08-EN

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.

1.3 Target group

This operating manual is aimed at the target group of trained and qualified specialist technical personnel. (⇨ Section 2.3, Page 8)

1.4 Other applicable documents

Table 1: Overview of other applicable documents

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

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

1.5 Symbols

Table 2: Symbols used in this manual

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

1173.8/08-EN

1 If included in agreed scope of supply

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

1.6 Key to safety symbols/markings

Table 3: Definition of safety symbols/markings

Symbol	Description
DANGER	**DANGER** This signal word indicates a high-risk hazard which, if not avoided, will result in death or serious injury.
WARNING	**WARNING** This signal word indicates a medium-risk hazard which, if not avoided, could result in death or serious injury.
CAUTION	**CAUTION** This signal word indicates a hazard which, if not avoided, could result in damage to the machine and its functions.
	**Explosion protection** This symbol identifies information about avoiding explosions in potentially explosive atmospheres in accordance with EU Directive 2014/34/EU (ATEX).
	**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

DANGER

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 in the fields of application and within the use limits specified in the other applicable documents.
- Only operate pumps/pump sets which are in perfect technical condition.
- Do not operate the pump (set) in partially assembled condition.
- Only use the pump (set) to handle the fluids described in the data sheet or product literature of the pump variant.
- Never operate the pump (set) without the fluid to be handled.
- 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).
- Always operate the pump (set) in the direction of rotation it is intended for.
- Do not throttle the flow rate on the suction side of the pump (to prevent cavitation damage).
- Consult the manufacturer about any use or mode of operation not described in the data sheet or product literature.

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.

1173.8/08-EN

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

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

2.5 Safety awareness

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

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

2.6 Safety information for the operator/user

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

2.7 Safety information for maintenance, inspection and installation

- Modifications or alterations of the pump (set) are only permitted with the manufacturer's prior consent.
- Use only original spare parts or parts/components authorised by the manufacturer. The use of other parts/components can invalidate any liability of the manufacturer for resulting damage.
- The operator ensures that maintenance, inspection and installation are performed by authorised, qualified specialist personnel who are thoroughly familiar with the manual.
- Only carry out work on the pump (set) during standstill of the pump.
- Only perform work on the pump set when it has been disconnected from the power supply (de-energised).
- The pump (set) must have cooled down to ambient temperature.
- Pump pressure must have been released and the pump must have been drained.

1173.8/08-EN

- When taking the pump set out of service always adhere to the procedure described in the manual. (⇨ Section 6.1.5, Page 40) (⇨ Section 6.3, Page 43)
- 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 38)

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. (⇨ Section 2.2, Page 8)

2.9 Explosion protection

DANGER

Always observe the information on explosion protection given in this section when operating the product in 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 EU Directive *2014/34/EU (ATEX)*.

Especially adhere to the sections in this manual marked with the Ex symbol and the following sections, (⇨ Section 2.9.1, Page 10) to (⇨ Section 2.9.4, Page 11)
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 at all times.

2.9.1 Marking

Pump

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

Example of such marking:
II 2G Ex h IIC T5-T1 Gb

Refer to the Temperature limits table for the maximum temperatures permitted for the individual pump variants. (⇨ Section 2.9.2, Page 10)

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 has its own marking. The marking is maintained on the condition that the temperatures the pump causes to develop at the motor flange and motor shaft are permitted by the motor manufacturer.

The motors fitted by KSB on pumps with *ATEX* certification meet this condition.

Misuse, malfunctions or non-compliance with the instructions may result in substantially higher temperatures.

2.9.2 Temperature limits

In normal pump operation, the highest temperatures are to be expected on the surface of the pump casing and at the shaft seal.
The surface temperature at the pump casing corresponds to the temperature of the fluid handled. If the pump is heated in addition, the operator of the system is responsible for observing the specified temperature class and fluid temperature (operating temperature).

1173.8/08-EN

The table (⇨ Table 4) lists the temperature classes and the resulting maximum permissible fluid temperatures. The values shown correspond to the theoretical limits. They include only a general safety margin for the mechanical seal. For single mechanical seals, the safety margin required for specific operating conditions and mechanical seal designs may be substantially higher. If operating conditions differ from those stated on the data sheet, or if different mechanical seals are used, the actual safety margin required needs to be determined individually. If in doubt please contact the manufacturer.

The temperature class specifies the maximum permissible temperature at the surface of the pump set during operation. For the permissible operating temperature of the pump in question refer to the data sheet.

Table 4: Temperature limits

Temperature class to ISO 80079-36	Maximum permissible fluid temperature[2)]
T1	Temperature limit of the pump
T2	280 °C
T3	185 °C
T4	120 °C
T5	85 °C
T6	Only after consultation with the manufacturer

If the pump is to be operated at a higher temperature, the data sheet is missing or if the pump is part of a pool of pumps, contact KSB for the maximum permissible operating temperature.

Motor supplied by the operator

If a pump is supplied without motor (as part of a pool of pumps), the motor specified in the pump data sheet must meet the following conditions:

- The permissible temperature limits at the motor flange and motor shaft must be higher than the temperatures generated by the pump.
- Contact the manufacturer for the actual pump temperatures.

2.9.3 Monitoring equipment

The pump (set) must only be operated within the limits specified in the data sheet and on the name plate.
If the system operator cannot warrant compliance with these operating limits, appropriate monitoring devices must be used.
Check whether monitoring equipment is required to ensure that the pump set functions properly.

Contact KSB for further information about monitoring equipment.

2.9.4 Operating limits

The minimum flow rates indicated in (⇨ Section 6.2.3.1, Page 43) refer to water and water-like fluids handled. Longer operating periods with these fluids and at the flow rates indicated will not cause an additional increase in the temperatures at the pump surface. However, if the physical properties of the fluids handled are different from water, it is essential to check whether an additional heat build-up may occur and if the minimum flow rate must therefore be increased. The calculation formula in (⇨ Section 6.2.3.1, Page 43) can be used to check whether an additional heat build-up may lead to a dangerous temperature increase at the pump surface.

1173.8/08-EN

2 Subject to further limitations for mechanical seal temperature rise

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.

CAUTION

Incorrect transport of the pump

Damage to the shaft seal!

- For transport, lock the pump shaft with a suitable transport lock to prevent any movement of the shaft.

When transporting the pump without motor, shaft 210 must be locked.

1. Remove cover plates 68-3 from the openings of drive lantern 341.
2. Insert lock washers 931.95 into the shaft groove.
3. Tighten bolts 901.50.

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

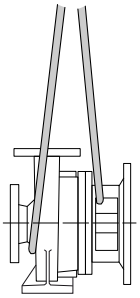


Fig. 1: Transporting the pump

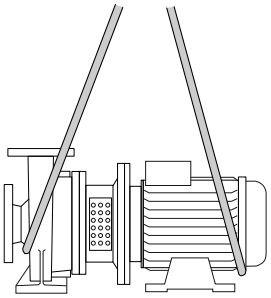


Fig. 2: Transporting the pump set

1173.8/08-EN

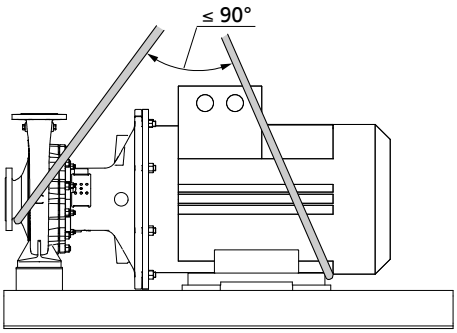


Fig. 3: Transporting the pump set on the baseplate

3.3 Storage/preservation

CAUTION

Damage during storage due to humidity, dirt or vermin

Corrosion/contamination of pump (set)!

- ▷ For outdoor storage cover the pump (set) and accessories with waterproof material and protect against condensation.

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.

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, protected room where the atmospheric humidity is as constant as possible.
- Rotate the shaft by hand once a month, e.g. via the motor fan.

If properly stored indoors, the pump set is protected for a maximum of 12 months. New pumps/pump sets are supplied by our factory duly prepared for storage.

For storing a pump (set) which has already been operated, the shutdown measures must be adhered to. (⇨ Section 6.3.1, Page 43)

3.4 Return to supplier

1. Drain the pump as per operating instructions.
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 68)

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 fluid residues.
- ▷ Wear safety clothing and a protective mask if required.
- ▷ Observe all legal regulations on the disposal of fluids posing a health hazard.

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

1173.8/08-EN

4 Description of the Pump (Set)

4.1 General description

- Centrifugal pump with shaft seal
- Close-coupled design
- Handling clean or aggressive fluids not chemically and mechanically aggressive to the pump materials.

4.2 Product Information as per Regulation No. 547/2012 (for water pumps with a maximum shaft power of 150 kW) implementing "Ecodesign" Directive 2009/125/EC

- Minimum efficiency index: see name plate, key to name plate
- The benchmark for the most efficient water pumps is MEI ≥ 0.70.
- Year of construction: see name plate, key to name plate
- Manufacturer's name or trade mark, commercial registration number and place of manufacture: see data sheet or order documentation
- Product's type and size identificator: see name plate, key to name plate
- Hydraulic pump efficiency (%) with trimmed impeller: see data sheet
- Pump performance curves, including efficiency characteristics: see documented characteristic curve
- The efficiency of a pump with a trimmed impeller is usually lower than that of a pump with the full impeller diameter. Trimming of the impeller will adapt the pump to a fixed duty point, leading to reduced energy consumption. The minimum efficiency index (MEI) is based on the full impeller diameter.
- Operation of this water pump with variable duty points may be more efficient and economic when controlled, for example, by the use of a variable speed drive that matches the pump duty to the system.
- Information on dismantling, recycling and disposal after decommissioning: (⇨ Section 3.5, Page 14)
- Information on benchmark efficiency or benchmark efficiency graph for MEI = 0.70 (0.40) for the pump based on the model shown in the Figure are available at: http://www.europump.org/efficiencycharts

4.3 Designation

Refer to position 26 to correctly interpret the designation.

If a number is specified, go to the 1st designation example. (⇨ Table 5)

If a letter is specified, go to the 2nd designation example. (⇨ Table 7)

Table 5: 1st designation example

Position																																				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
E	T	B	-	0	4	0	-	0	2	5	-	1	6	0	-	G	G	S	A	V	6	7	D	2	1	1	0	0	2	-	-	B	P	D	2	E	M
See name plate and data sheet																									See data sheet								-				

Table 6: Designation key

Position	Code	Description
1-4	Pump type	
	ETB	Etabloc
	ETBF	Etabloc bottle rinser variant
5-16	Size [mm], e.g.	
	040	Nominal suction nozzle diameter
	025	Nominal discharge nozzle diameter
	160	Nominal impeller diameter

Position	Code	Description		
17	Pump casing material			
	B	Bronze	CC480K-GS / B30 C90700	
	C	Stainless steel	1.4408 / A743CF8M	
	G	Cast iron	EN-GJL-250 / A48 Cl. 35B	
	S	Nodular cast iron	Nodular cast iron EN-GJS-400-15/ A536 Gr. 60-40-18	
18	Impeller material			
	B	Bronze	CC480K-DW	
	C	Stainless steel	1.4408 / A743CF8M	
	G	Cast iron	EN-GJL-250 / A48 Cl. 35B	
19	Design			
	E	European Regulation (EC) No. 1935/2004		
	F	Bottle rinser variant		
	H	Approved for drinking water to ACS		
	K	Approved for drinking water to KSB standard		
	P	Swimming pool variant		
	R	Gohl (special design)		
	S	Standard		
	U	Approved for drinking water to UBA		
	W	Approved for drinking water to WRAS		
	X	Non-standard (BT3D, BT3)		
20	Casing cover			
	A	Conical seal chamber		
	C	Cylindrical seal chamber		
21	Shaft seal type			
	D	Double mechanical seal in back-to-back arrangement		
	E	Single mechanical seal, external circulation		
	F	Single mechanical seal, external flushing		
	I	Single mechanical seal, internal circulation, conical cover (A-type cover) only		
	S	Single mechanical seal with vented chamber (A-type cover), discharge cover with anti-swirl baffles		
	T	Double mechanical seal in tandem arrangement with internal circulation		
	V	Single mechanical seal with vented chamber (A-type cover)		
22-23	Seal code, single mechanical seal			
	01	Q1Q1VGG	1 (ZN1181)	≥ -20 - ≤ +110 [°C]
	06	U3BEGG (shaft units 25, 35)	RMG13G606	≥ -30 - ≤ +140 [°C]
	07	Q1Q1EGG	1 A (ZN1181)	≥ -30 - ≤ +110 [°C]
	08	AQ1VGG	M32N69	≥ -30 - ≤ +110 [°C]
	09	U3U3VGG	MG13G60	≥ -20 - ≤ +110 [°C]
	10	Q1Q1X4GG	1 (ZN1181)	≥ -20 - ≤ +110 [°C]
	11	BQ1EGG-WA (WA = drinking water)	1 (ZN1181)	≥ -30 - ≤ +110 [°C]
	12	Q12Q1M1GG1	M37GN83	≥ -20 - ≤ +100 [°C]
	13	BQ1VGG	1 (ZN1181)	≥ -20 - ≤ +110 [°C]
	14	Q1Q1KY7G	KMB13S2G9	≥ -20 - ≤ +120 [°C]
	15	Q1Q1KGG	M7G49	≥ -20 - ≤ +110 [°C]
	16	BVPGG	MG1S20	≥ -20 - ≤ +110 [°C]
	17	Q1BVGG	M7N	≥ -20 - ≤ +110 [°C]

1173.8/08-EN

Position	Code	Description		
22-23	22	AQ1EGG (shaft unit 55)	M32N69	≥ -30 - ≤ +140 [°C]
	66	Q7Q7EGG	MG13G6	≥ -30 - ≤ +120 [°C]
	67	Q6Q6X4GG	MG13G60 / MG1G61S6	≥ -20 - ≤ +110 [°C]
	Seal code, double mechanical seal in tandem arrangement			
	18	Q1Q1EGG/G	MG12G6-E1	≥ -30 - ≤ +110 [°C]
		Q1Q1EGG-G	MG12G6-E1	≥ -30 - ≤ +110 [°C]
	19	Q1Q1M1GG	HN400N	≥ -30 - ≤ +110 [°C]
		Q1Q1EGG-G	MG12G6-E1	≥ -30 - ≤ +110 [°C]
	20	Q12Q1M1GG1	M37GN85	≥ -20 - ≤ +110 [°C]
		Q1Q1EGG-G	MG12G6-E1	≥ -20 - ≤ +110 [°C]
	23	Q12Q1M1GG1	M37GN92	≥ -20 - ≤ +110 [°C]
		Q1Q1EGG-G	MG12G6-E1	≥ -20 - ≤ +110 [°C]
	Seal code, double mechanical seal in back-to-back arrangement			
	21	Q1Q1KGG	M7G49	≥ -20 - ≤ +110 [°C]
		Q1Q1KGG	M7G49	≥ -20 - ≤ +110 [°C]
	24	Q1Q1KGG	M7G49	≥ -20 - ≤ +110 [°C]
		Q1BVGG	M7N	≥ -20 - ≤ +110 [°C]
	Seal code without mechanical seal			
	99	Shaft seal ring, variant Gohl		
24	Scope of supply			
	A	Pump only (Fig. 0)		
	D	Pump, motor		
	G	Pump, baseplate		
	E	Pump, back pull-out unit		
25	Shaft unit			
	2	Shaft unit 25		
	3	Shaft unit 35		
	5	Shaft unit 55		
26-29	Motor rating P_N [kW]			
	0075	7,5		
	0300	30		
	1100	110		
30	Number of motor poles			
	2	2 poles		
	4	4 poles		
	6	6 poles		
31-32	Explosion protection			
	ex	With explosion-proof motor		
	--	Without explosion-proof motor		
33	Product generation			
	B	Etabloc		
34-37	Description			
	-	Fixed speed version		
	PD2	Variable speed version, with PumpDrive 2		
	PD2E	Variable speed version, with PumpDrive 2 Eco		
	IFS	MyFlow Drive		
38	PumpMeter			
	M	PumpMeter		

Table 7: 2nd designation example

Position																												
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
E	T	B		0	4	0	-	0	2	5	-	1	6	0	-	G	G	S	B	E	1	1	W	S	E	J	B	2	H	C	B
See name plate and data sheet																															

Table 8: Designation key

Position	Code	Description	
1-4	Pump type		
	ETB	Etabloc	
	ETBF	Etabloc bottle rinser variant	
5-16	Size [mm], e.g.		
	040	Nominal suction nozzle diameter	
	025	Nominal discharge nozzle diameter	
	160	Nominal impeller diameter	
17	Pump casing material		
	B	Bronze	CC480K-GS / B30 C90700
	C	Stainless steel	1.4408 / A743CF8M
	G	Cast iron	EN-GJL-250 / A48CL35
	K	Cast iron, electrocoated	EN-GJL-250, electrocoated
	S	Nodular cast iron	EN-GJS-400-15 / A536 Gr. 60-40-18
18	Impeller material		
	B	Bronze	CC480K-GS / B30 C90700
	C	Stainless steel	1.4408 / A743CF8M
	G	Cast iron	EN-GJL-250 / A48CL35
	P	Cast iron without protective coating	EN-GJL-250 without protective coating
19	Design		
	E	Design as per European Regulation (EC) No. 1935/2004	
	F	Bottle rinser variant	
	H	Approved for drinking water to ACS	
	K	Approved for drinking water to KSB standard	
	P	Swimming pool variant	
	S	Standard	
	U	Approved for drinking water to UBA	
	W	Approved for drinking water to WRAS	
20	Casing cover connections		
	B	Conical casing cover with connection for venting	
	C	Conical casing cover with vent	
	D	Conical casing cover with connection for external flushing	
	E	Conical casing cover with connection for external flushing from discharge nozzle	
	H	Cylindrical casing cover for version with double mechanical seal in tandem arrangement with connection for quench system	
	I	Cylindrical casing cover for version with double mechanical seal in back-to-back arrangement with connection for barrier fluid system	
21	Shaft seal type		
	D	Double mechanical seal in back-to-back arrangement	
	E	Single mechanical seal, external circulation, conical casing cover	
	F	Single mechanical seal, external flushing, conical casing cover	

1173.8/08-EN

Position	Code	Description		
21	T	Double mechanical seal in tandem arrangement with internal circulation		
	V	Single mechanical seal with vented chamber (A-type cover)		
22-23	Seal code, single mechanical seal			
	01	Q1Q1VGG	1 (ZN1181)	≥ -20 - ≤ +110 [°C]
	06	U3BEGG	RMG13G606	≥ -30 - ≤ +140 [°C]
	07	Q1Q1EGG	1A (ZN1181)	≥ -30 - ≤ +110 [°C]
	08	AQ1VGG	M32N69	≥ -30 - ≤ +110 [°C]
	09	U3U3VGG	MG13G60	≥ -20 - ≤ +110 [°C]
	10	Q1Q1X4GG	1 (ZN1181)	≥ -20 - ≤ +110 [°C]
	11	BQ1EGG-WA	1 (ZN1181)	≥ -30 - ≤ +110 [°C]
	12	Q12Q1M1GG1	M37GN83	≥ -20 - ≤ +100 [°C]
	13	BQ1VGG	1 (ZN1181)	≥ -20 - ≤ +110 [°C]
	14	Q1Q1KY7G	KMB13S2G9	≥ -20 - ≤ +120 [°C]
	15	Q1Q1KGG	M7G49	≥ -20 - ≤ +110 [°C]
	16	BVPGG	MG1S20	≥ -20 - ≤ +110 [°C]
	17	Q1BVGG	M7N / 5A	≥ -20 - ≤ +110 [°C]
	22	AQ1EGG	M32N69	≥ -30 - ≤ +140 [°C]
	45	BQ7E1/Y10GG	EMG13G6	≥ -30 - ≤ +110 [°C]
	46	Q7Q7E1/Y10GG	EMG13G6	≥ -30 - ≤ +110 [°C]
	51	BQ7V16GG/Y10	EMG13G6	≥ -14 - ≤ +120 [°C]
	52	Q7Q7V16GG/Y10	EMG13G6	≥ -14 - ≤ +120 [°C]
	66	Q7Q7EGG	MG13G6	≥ -30 - ≤ +120 [°C]
	67	Q6Q6X4GG	MG13G60 / MG1G61S6	≥ -20 - ≤ +110 [°C]
	Seal code, double mechanical seal in tandem arrangement			
	18	Q1Q1EGG/G	MG12G6-E1	≥ -30 - ≤ +110 [°C]
		Q1Q1EGG-G	MG12G6-E1	≥ -30 - ≤ +110 [°C]
	20	Q12Q1M1GG1	M37GN85	≥ -20 - ≤ +110 [°C]
		Q1Q1EGG-G	MG12G6-E1	≥ -20 - ≤ +110 [°C]
	23	Q12Q1M1GG1	M37GN92	≥ -20 - ≤ +110 [°C]
		Q1Q1EGG-G	MG12G6-E1	≥ -20 - ≤ +110 [°C]
	Seal code, double mechanical seal in back-to-back arrangement			
	21	Q1Q1KGG	M7G49	≥ -20 - ≤ +110 [°C]
		Q1Q1KGG	M7G49	≥ -20 - ≤ +110 [°C]
	24	Q1Q1KGG	M7G49	≥ -20 - ≤ +110 [°C]
		Q1BVGG	M7N	≥ -20 - ≤ +110 [°C]
24	Type of lubrication			
	W	None		
25	Order type			
	C	Extended standard		
	S	KSB standard		
	X	Special design		
26	Bearing bracket / Shaft unit			
	E	Shaft unit 25		
	F	Shaft unit 35		
	H	Shaft unit 55		
27-28	Motor rating P_N [kW]			
	AJ	0,37		
	...	...		

Position	Code	Description
27-28	KP	160
29	Number of motor poles	
	2	2 poles
	4	4 poles
	6	6 poles
30	Scope of supply	
	A	Bare-shaft pump
	G	Back pull-out unit
	H	Pump, motor
31	Accessories / Automation	
	A	KSB PumpDrive 2
	B	KSB PumpMeter
	C	KSB PumpDrive 2 + KSB PumpMeter
	D	IFS
	E	KSB Guard
	F	Han-Drive 10E
	G	Han-Drive 10E + KSB PumpMeter
	H	None
	I	Version for potentially explosive atmospheres
	J	KSB PumpDrive 2 + KSB Guard
	K	KSB PumpMeter 2 + KSB Guard
	L	KSB PumpDrive 2 + KSB PumpMeter + KSB Guard
32	Product generation	
	B	Generation B

4.4 Name plate

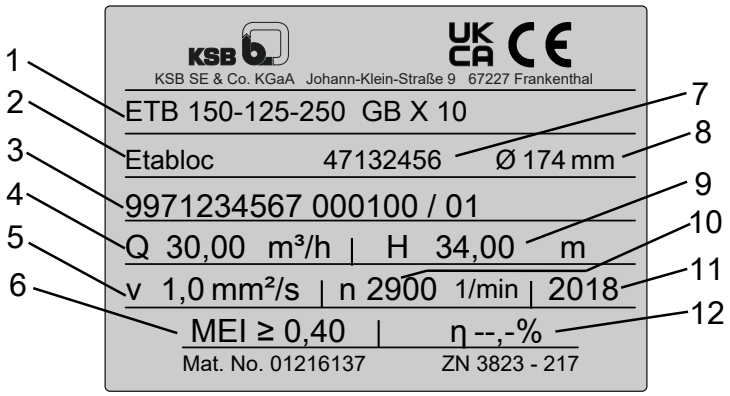


Fig. 4: Name plate (example)

1	Type series code, size and version	2	Type series
3	KSB order No., order item No. and consecutive No.	4	Flow rate
5	Kinematic viscosity of the fluid handled	6	Minimum efficiency index
7	Material number (if applicable)	8	Impeller diameter
9	Head	10	Speed
11	Year of construction	12	Efficiency (see data sheet)

1173.8/08-EN

4.5 Design details

Design

- Volute casing pump
- Single-stage
- Ratings to EN 733
- Requirements to 2009/125/EC Directive

Pump casing

- Radially split volute casing
- Replaceable casing wear rings (optional for pump casing material C)

Depending on pump size and design:

- Volute casing with integrally cast pump feet (not for pump casing material G, motor size ≤ 180)
- Volute casing with integrally cast pump feet

Drive

- Efficiency class IE3 to IEC 60034-30

Standard design:

- KSB surface-cooled IEC three-phase current squirrel-cage motor
- Rated voltage (50 Hz) 220-240 V / 380-420 V ≤ 2.20 kW
- Rated voltage (50 Hz) 380-420 V / 660 - 725 V ≥ 3.00 kW
- Rated voltage (60 Hz) 440-480 V ≤ 2.60 kW
- Rated voltage (60 Hz) 440-480 V ≥ 3.60 kW
- Type of construction IM V1 ≤ 4.00 kW
- Type of construction IM V15 ≥ 5.50 kW
- Enclosure IP55
- Duty type: continuous duty S1
- Thermal class F with temperature sensor, 3 PTC thermistors

Explosion-proof design:

- KSB surface-cooled IEC three-phase current squirrel-cage motor
- Rated voltage (50 Hz) 220 - 240 V / 380 - 420 V ≤ 1.85 kW
- Rated voltage (50 Hz) 380 - 420 V / 660 - 725 V ≥ 2.50 kW
- Type of construction IM V1 ≤ 3.30 kW
- Type of construction IM V15 ≥ 4.60 kW
- Enclosure IP55 or IP54
- Duty type: continuous duty S1
- Type of protection EEx eb II
- Temperature class T3

Shaft seal

- Shaft equipped with replaceable shaft protecting sleeve in the shaft seal area
- Single mechanical seals and double mechanical seals to EN 12756

Impeller type

- Closed radial impeller with multiply curved vanes

Automation

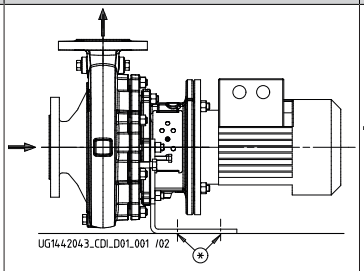
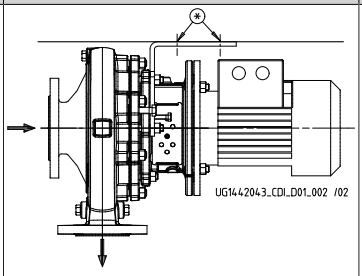
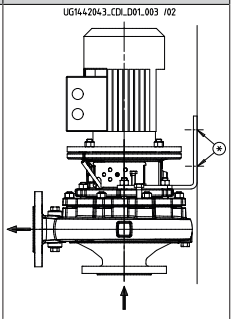
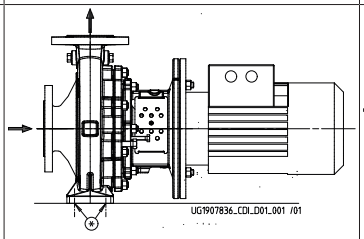
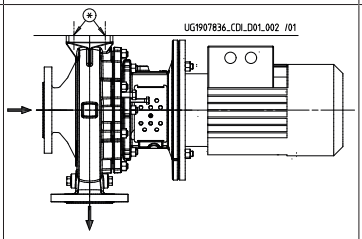
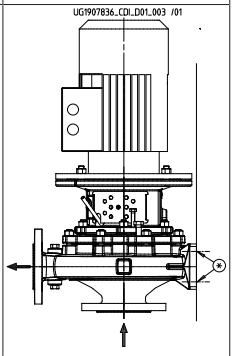
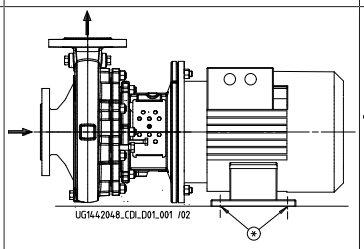
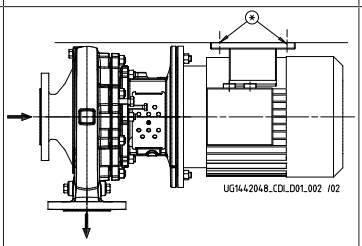
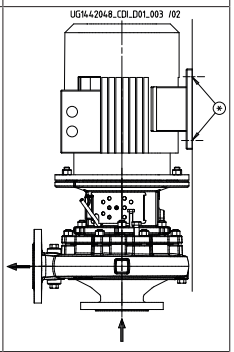
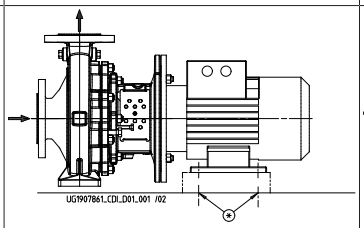
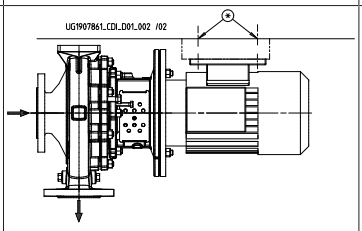
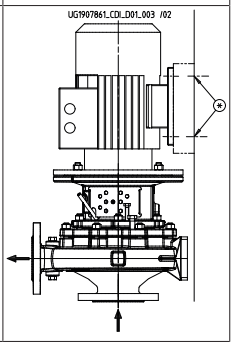
Automation options:

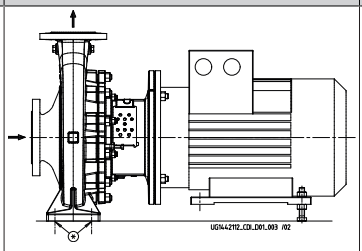
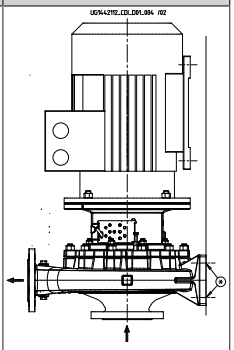
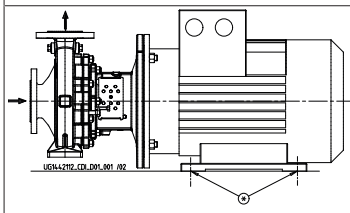
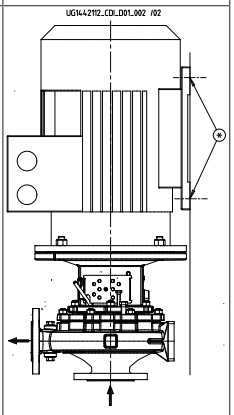
- PumpDrive
- PumpMeter

1173.8/08-EN

4.6 Installation types

Table 9: Installation types (examples)

Motor size	Pump foot provided	Horizontal installation, fastened below	Horizontal installation, fastened above	Vertical installation
71-112	No			
	Yes			
132-180	No			
	Yes			

Motor size	Pump foot provided	Horizontal installation, fastened below	Horizontal installation, fastened above	Vertical installation
200-315	Yes		-	
			-	
⊛ = connection of the pump set to the foundation				

1173.8/08-EN

4.7 Configuration and function

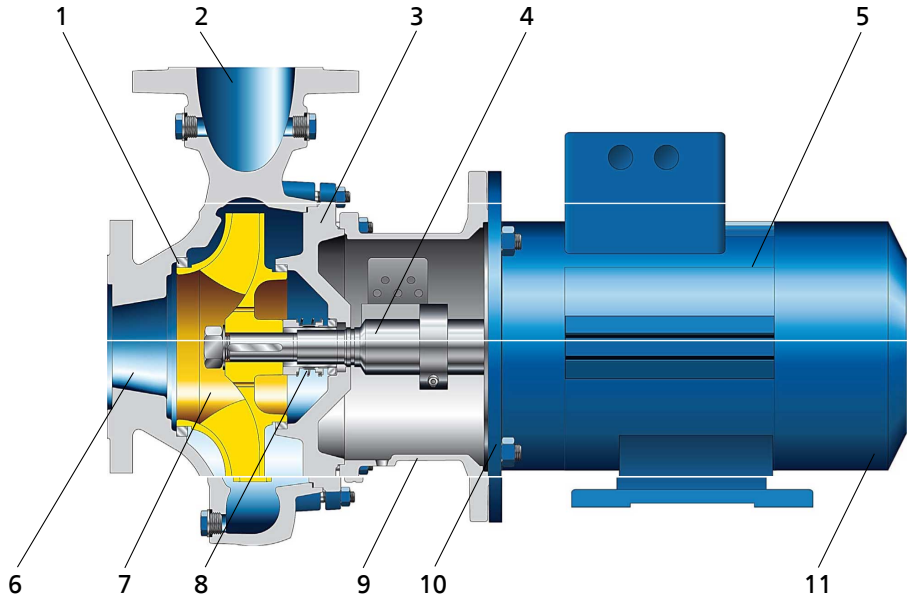


Fig. 5: Sectional drawing

1	Clearance gap	2	Discharge nozzle
3	Casing cover	4	Shaft
5	Motor housing	6	Suction nozzle
7	Impeller	8	Shaft seal
9	Drive lantern	10	Rolling element bearing
11	Rolling element bearing		

Design The pump is designed with an axial fluid inlet and a radial outlet. The hydraulic system is rigidly connected to the motor via a stub shaft.

Function The fluid enters the pump via the suction nozzle (6) and is accelerated outward by the rotating impeller (7). In the flow passage of the pump casing the kinetic energy of the fluid is converted into pressure energy. The fluid is pumped to the discharge nozzle (2), where it leaves the pump. The clearance gap (1) prevents any fluid from flowing back from the casing to the suction nozzle. At the rear side of the impeller, the shaft (4) enters the casing via the casing cover (3). The shaft passage through the cover is sealed to atmosphere with a dynamic shaft seal (8). The shaft runs in rolling element bearings (10 and 11), which are supported by a motor housing (5) linked with the pump casing and/or casing cover (3) via the drive lantern (9).

Sealing The pump is sealed by a standardised mechanical seal.

4.8 Noise characteristics

Table 10: Surface sound pressure level L_{pA} [3)]

Rated power input P_N [kW]	Pump set			
	1450 rpm [dB]	1750 rpm [dB]	2900 rpm [dB]	3500 rpm [dB]
0,25	53	54	-	-
0,37	54	55	-	-
0,55	55	56	-	-
0,75	56	57	66	-
1,1	57	58	66	69
1,5	58	59	67	70
2,2	59	60	67	70
3	60	61	68	71
4	61	62	68	71
5,5	62	63	70	73
7,5	64	65	71	74
11	65	66	73	76
15	67	68	74	77
18,5	68	69	75	78
22	69	70	76	79
30	70	71	77	80
37	71	72	78	81
45	73	74	78	81

4.9 Scope of supply

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

- Pump

Drive

- Surface-cooled IEC frame three-phase squirrel-cage motor

Contact guard

- Cover plates on drive lantern to EN 294

4.10 Dimensions and weights

For dimensions and weights refer to the general arrangement drawing/outline drawing of the pump/pump set.

1173.8/08-EN

3 Surface sound pressure level as per ISO 3744 and DIN EN ISO 20361 ; valid for a pump operating range of Q/QBEP = 0.8 - 1.1 and non-cavitating operation. If noise levels are to be guaranteed: Add +3 dB for measuring and constructional tolerance.

5 Installation at Site

5.1 Checking the site before installation

Place of installation

⚠ WARNING

Installation on a mounting surface which is unsecured and cannot support the load

Personal injury and damage to property!

- ▷ Use a concrete of compressive strength class C12/15 which meets the requirements of exposure class X0 to EN 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.

5.2 Installing the pump set

⚠ DANGER

Electrostatic charging due to insufficient potential equalisation

Explosion hazard!

- ▷ Make sure that the connection between pump and baseplate is electrically conductive.

CAUTION

Ingress of leakage into the motor

Damage to the pump!

- ▷ Never install the pump set with the "motor below".

CAUTION

Bearing damage and leakage due to stress and distortion of rotor

Damage to the pump!

- ▷ Never install the pump set with the motor foot and the pump foot both fastened to the foundation at the same time.

Fastening

Installation examples / Installation types (⇨ Section 4.6, Page 23)

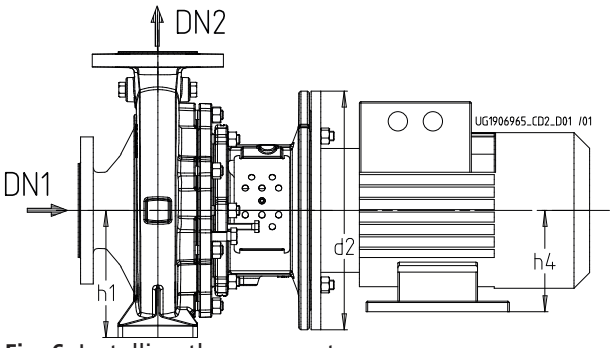


Fig. 6: Installing the pump set

Table 11: Types of fastening for pump set installation

Motor size	Pump foot provided	Relation of dimensions	Type of fastening (⇨ Section 4.6, Page 23)
Up to 112	Yes	-	Fastened via the pump foot or by suspending in the piping (remove the support foot)
	No	-	Fastened via the support foot or by suspending in the piping (remove the support foot)
132-180	Yes	h1 > h4	Fastened via the motor foot.[4)5)]
		h1 = h4	Fastened via the motor foot.[5)]
		h1 < h4	Fastened via the motor foot.
	No	-	Fastened via the motor foot.[6)]
200-315	Yes	h1 > h4	Fastened via the pump foot[7)]
		h1 = h4	Fastened via the motor foot.[5)]
		h1 < h4	Fastened via the motor foot.[6)8)]

NOTE

Shims may generally be required if d2/2 ≥ h1 or d2/2 ≥ h4. In such cases, shims should preferably be fitted underneath the motor foot.

1. Position the pump set on the foundation and fasten it (see the "Fastening" table).
2. Place a spirit level on the discharge nozzle to align the pump set.
3. If the volute casing is turned, drill a drain hole in the volute casing (see the "Drain hole" table below).

Table 12: Drain hole

Sizes	Drain hole diameter
040-025-160 to 100-080-315	G 3/8[9)]
125-100-160 to 200-150-400	G 1/2[9)]

4 The motor foot has to be shimmed for height compensation (shims not included in scope of supply). For vertical installation the pump set can alternatively be fastened via the pump foot.

5 The pump foot must not be fastened to the foundation.

6 The motor foot has to be shimmed for height compensation if necessary (shims not included in scope of supply).

7 The motor foot must be supported without transmitting any stresses or strains, but it must not be fastened. Use the support bolt supplied (not supplied for vertical installation).

8 For Etabloc 100-080-400, 125-100-400, 150-125-315, 150-125-400, 200-150-315 and 200-150-400 the pump foot must be supported without transmitting any stresses or strains. The pump foot must not be fastened to the foundation.

9 G = ISO 228/1

1173.8/08-EN

5.3 Piping

5.3.1 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 pipes in close proximity to the pump and connect them properly without transmitting any stresses or strains.
- ▹ 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 and shut-off elements in the system is recommended, depending on the type of plant and pump. However, such elements must not obstruct proper drainage or hinder disassembly of the pump.

- ✓ Suction lift lines have been laid with a rising slope, suction head lines with a downward slope towards the pump.
- ✓ A flow stabilisation section having a length equivalent to at least twice the inside diameter of the suction flange has been provided upstream of the suction flange.
- ✓ The nominal diameters of the pipelines are equal to or greater than the nominal diameters of the pump nozzles.
- ✓ Adapters to larger nominal diameters are designed with a diffuser angle of approx. 8° to avoid excessive pressure losses.
- ✓ The pipelines have been anchored in close proximity to the pump and connected without transmitting any stresses or strains.

1. Thoroughly clean, flush and blow through all vessels, pipelines and connections (especially of new installations).
2. Before installing the pump in the piping, remove the flange covers on the suction and discharge nozzles of the pump.

CAUTION

Welding beads, scale and other impurities in the piping

Damage to the pump!

- ▹ Remove any impurities from the piping.
- ▹ If necessary, install a filter.
- ▹ Observe the information in (⇨ Section 7.2.2.2, Page 48) .

3. Check that the inside of the pump is free from any foreign objects. Remove any foreign objects.

4. If required, install a filter in the piping (see drawing: Filter in the piping).

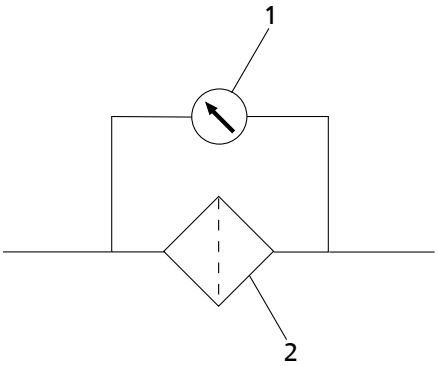


Fig. 7: Filter in the piping

1	Differential pressure gauge	2	Filter

NOTE

Use a filter with laid-in wire mesh (mesh width 0.5 mm, wire diameter 0.25 mm) of corrosion-resistant material.
Use a filter with a filter area three times the cross-section of the piping.
Conical filters have proved suitable.

5. Connect the pump nozzles to the piping.

CAUTION

Aggressive flushing liquid and pickling agent

Damage to the pump!

▷ Match the cleaning operation mode and duration of flushing and pickling to the casing materials and seal materials used.

5.3.2 Permissible forces and moments at the pump nozzles

The data on forces and moments apply to static piping loads only.

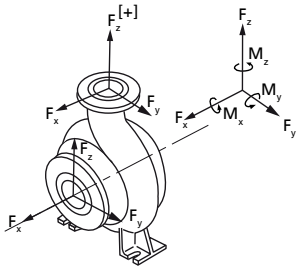


Fig. 8: Forces and moments at the pump nozzles

Table 13: Forces and moments at the pump nozzles for casing material G (JL1040/ A48 Cl. 35B)

Size	Suction nozzle								Discharge nozzle							
	DN	Fx	Fy	Fz	∑F	Mx	My	Mz	DN	Fx	Fy	Fz	∑F	Mx	My	Mz
		[N]	[N]	[N]	[N]	[Nm]	[Nm]	[Nm]		[N]	[N]	[N]	[N]	[Nm]	[Nm]	[Nm]
040-025-160	40	450	400	350	696	450	320	370	25	265	250	300	472	315	210	245
040-025-200	40	450	400	350	696	450	320	370	25	265	250	300	472	315	210	245
050-032-125.1	50	580	530	470	916	500	350	400	32	320	300	370	574	390	265	300
050-032-160.1	50	580	530	470	916	500	350	400	32	320	300	370	574	390	265	300
050-032-200.1	50	580	530	470	916	500	350	400	32	320	300	370	574	390	265	300
050-032-250.1	50	580	530	470	916	500	350	400	32	320	300	370	574	390	265	300
050-032-125	50	580	530	470	916	500	350	400	32	320	300	370	574	390	265	300
050-032-160	50	580	530	470	916	500	350	400	32	320	300	370	574	390	265	300

Size	Suction nozzle								Discharge nozzle							
	DN	Fx	Fy	Fz	∑F	Mx	My	Mz	DN	Fx	Fy	Fz	∑F	Mx	My	Mz
		[N]	[N]	[N]	[N]	[Nm]	[Nm]	[Nm]		[N]	[N]	[N]	[N]	[Nm]	[Nm]	[Nm]
050-032-200	50	580	530	470	916	500	350	400	32	320	300	370	574	390	265	300
050-032-250	50	580	530	470	916	500	350	400	32	320	300	370	574	390	265	300
065-040-125	65	740	650	600	1153	530	390	420	40	400	350	450	696	450	320	370
065-040-160	65	740	650	600	1153	530	390	420	40	400	350	450	696	450	320	370
065-040-200	65	740	650	600	1153	530	390	420	40	400	350	450	696	450	320	370
065-040-250	65	740	650	600	1153	530	390	420	40	400	350	450	696	450	320	370
065-040-315	65	740	650	600	1153	530	390	420	40	400	350	450	696	450	320	370
065-050-125	65	740	650	600	1153	530	390	420	50	530	470	580	916	500	350	400
065-050-160	65	740	650	600	1153	530	390	420	50	530	470	580	916	500	350	400
065-050-200	65	740	650	600	1153	530	390	420	50	530	470	580	916	500	350	400
065-050-250	65	740	650	600	1153	530	390	420	50	530	470	580	916	500	350	400
065-050-315	65	740	650	600	1153	530	390	420	50	530	470	580	916	500	350	400
080-065-125	80	880	790	720	1385	560	400	460	65	650	600	740	1153	530	390	420
080-065-160	80	880	790	720	1385	560	400	460	65	650	600	740	1153	530	390	420
080-065-200	80	880	790	720	1385	560	400	460	65	650	600	740	1153	530	390	420
080-065-250	80	880	790	720	1385	560	400	460	65	650	600	740	1153	530	390	420
080-065-315	80	880	790	720	1385	560	400	460	65	650	600	740	1153	530	390	420
100-080-160	100	1180	1050	950	1843	620	440	510	80	790	720	880	1385	560	400	460
100-080-200	100	1180	1050	950	1843	620	440	510	80	790	720	880	1385	560	400	460
100-080-250	100	1180	1050	950	1843	620	440	510	80	790	720	880	1385	560	400	460
100-080-315	100	1180	1050	950	1843	620	440	510	80	790	720	880	1385	560	400	460
100-080-400	100	1180	1050	950	1843	620	440	510	80	790	720	880	1385	560	400	460
125-100-160	125	1400	1250	1120	2186	740	530	670	100	1050	950	1180	1843	620	440	510
125-100-200	125	1400	1250	1120	2186	740	530	670	100	1050	950	1180	1843	620	440	510
125-100-250	125	1400	1250	1120	2186	740	530	670	100	1050	950	1180	1843	620	440	510
125-100-315	125	1400	1250	1120	2186	740	530	670	100	1050	950	1180	1843	620	440	510
125-100-400	125	1400	1250	1120	2186	740	530	670	100	1050	950	1180	1843	620	440	510
150-125-200	150	1750	1600	1400	2754	880	610	720	125	1250	1120	1400	2186	740	530	670
150-125-250	150	1750	1600	1400	2754	880	610	720	125	1250	1120	1400	2186	740	530	670
150-125-315	150	1750	1600	1400	2754	880	610	720	125	1250	1120	1400	2186	740	530	670
150-125-400	150	1750	1600	1400	2754	880	610	720	125	1250	1120	1400	2186	740	530	670
200-150-200	200	2350	2100	1900	3680	1150	800	930	150	1600	1400	1750	2754	880	610	720
200-150-250	200	2350	2100	1900	3680	1150	800	930	150	1600	1400	1750	2754	880	610	720
200-150-315	200	2350	2100	1900	3680	1150	800	930	150	1600	1400	1750	2754	880	610	720
200-150-400	200	2350	2100	1900	3680	1150	800	930	150	1600	1400	1750	2754	880	610	720

Correction coefficients depending on material and temperature (see diagram below).

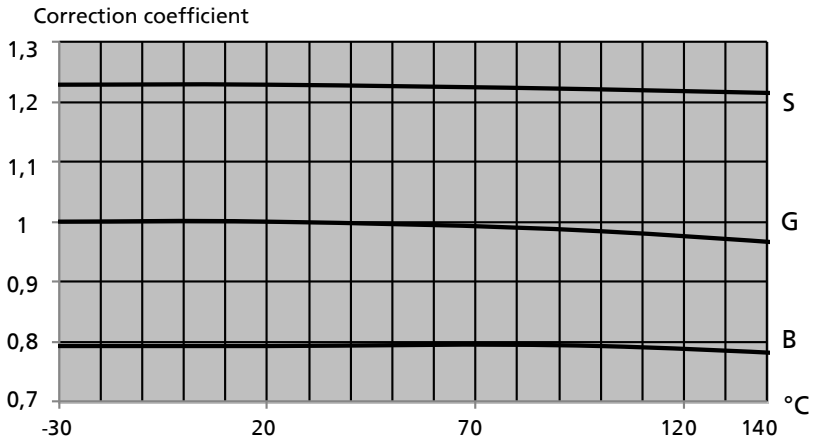


Fig. 9: Temperature/material correction diagram for casing materials G (EN-GJL-250/A48CL35B), S (EN-GJS-400-15/A536 GR 60-40-18) and B (CC480K-GS/B30 C90700)

Table 14: Forces and moments at the pump nozzles for casing material C (1.4408 / A743 Gr. CF8M)

Size	Suction nozzle								Discharge nozzle							
	DN	Fx	Fy	Fz	∑F	Mx	My	Mz	DN	Fx	Fy	Fz	∑F	Mx	My	Mz
		[N]	[N]	[N]	[N]	[Nm]	[Nm]	[Nm]		[N]	[N]	[N]	[N]	[Nm]	[Nm]	[Nm]
040-25-160	40	970	780	650	1404	500	280	410	25	460	410	600	860	370	185	280
040-25-200	40	970	780	650	1404	500	280	410	25	460	410	600	860	370	185	280
050-32-125.1	50	1240	1010	830	1802	650	320	500	32	650	500	780	1132	415	230	320
050-32-160.1	50	1240	1010	830	1802	650	320	500	32	650	500	780	1132	415	230	320
050-32-200.1	50	1240	1010	830	1802	650	320	500	32	650	500	780	1132	415	230	320
050-32-250.1	50	1240	1010	830	1802	650	320	500	32	650	500	780	1132	415	230	320
050-32-125	50	1240	1010	830	1802	650	320	500	32	650	500	780	1132	415	230	320
050-32-160	50	1240	1010	830	1802	650	320	500	32	650	500	780	1132	415	230	320
050-32-200	50	1240	1010	830	1802	650	320	500	32	650	500	780	1132	415	230	320
050-32-250	50	1240	1010	830	1802	650	320	500	32	650	500	780	1132	415	230	320
065-40-125	65	1600	1300	1050	2314	1050	550	780	40	780	640	1000	1421	500	280	415
065-40-160	65	1600	1300	1050	2314	1050	550	780	40	780	640	1000	1421	500	280	415
065-40-200	65	1600	1300	1050	2314	1050	550	780	40	780	640	1000	1421	500	280	415
065-40-250	65	1600	1300	1050	2314	1050	550	780	40	780	640	1000	1421	500	280	415
065-40-315	65	1600	1300	1050	2314	1050	550	780	40	780	640	1000	1421	500	280	415
065-50-125	65	1600	1300	1050	2314	1050	550	780	50	1000	830	1250	1803	650	320	500
065-50-160	65	1600	1300	1050	2314	1050	550	780	50	1000	830	1250	1803	650	320	500
065-50-200	65	1600	1300	1050	2314	1050	550	780	50	1000	830	1250	1803	650	320	500
065-50-250	65	1600	1300	1050	2314	1050	550	780	50	1000	830	1250	1803	650	320	500
065-50-315	65	1600	1300	1050	2314	1050	550	780	50	1000	830	1250	1803	650	320	500
080-65-125	80	2000	1550	1300	2845	1330	690	1010	65	1300	1050	1600	2314	1050	550	790
080-65-160	80	2000	1550	1300	2845	1330	690	1010	65	1300	1050	1600	2314	1050	550	790
080-65-200	80	2000	1550	1300	2845	1330	690	1010	65	1300	1050	1600	2314	1050	550	790
080-65-250	80	2000	1550	1300	2845	1330	690	1010	65	1300	1050	1600	2314	1050	550	790
080-65-315	80	2000	1550	1300	2845	1330	690	1010	65	1300	1050	1600	2314	1050	550	790
100-80-160	100	2500	1950	1600	3551	1850	900	1400	80	1550	1300	1950	2810	1350	690	1000
100-80-200	100	2500	1950	1600	3551	1850	900	1400	80	1550	1300	1950	2810	1350	690	1000
100-80-250	100	2500	1950	1600	3551	1850	900	1400	80	1550	1300	1950	2810	1350	690	1000
100-80-315	100	2500	1950	1600	3551	1850	900	1400	80	1550	1300	1950	2810	1350	690	1000
100-80-400	100	2500	1950	1600	3551	1850	900	1400	80	1550	1300	1950	2810	1350	690	1000
125-100-160	125	3400	2700	2200	4867	2500	1300	1950	100	2000	1600	2500	3579	1850	900	1400
125-100-200	125	3400	2700	2200	4867	2500	1300	1950	100	2000	1600	2500	3579	1850	900	1400

1173.8/08-EN

Size	Suction nozzle								Discharge nozzle							
	DN	Fx	Fy	Fz	∑F	Mx	My	Mz	DN	Fx	Fy	Fz	∑F	Mx	My	Mz
		[N]	[N]	[N]	[N]	[Nm]	[Nm]	[Nm]		[N]	[N]	[N]	[N]	[Nm]	[Nm]	[Nm]
125-100-250	125	3400	2700	2200	4867	2500	1300	1950	100	2000	1600	2500	3579	1850	900	1400
125-100-315	125	3400	2700	2200	4867	2500	1300	1950	100	2000	1600	2500	3579	1850	900	1400
125-100-400	125	3400	2700	2200	4867	2500	1300	1950	100	2000	1600	2500	3579	1850	900	1400
150-125-200	150	4300	3450	2850	6206	3200	1600	2450	125	2700	2200	3400	4867	2550	1300	1900
150-125-250	150	4300	3450	2850	6206	3200	1600	2450	125	2700	2200	3400	4867	2550	1300	1900
150-125-315	150	4300	3450	2850	6206	3200	1600	2450	125	2700	2200	3400	4867	2550	1300	1900
150-125-400	150	4300	3450	2850	6206	3200	1600	2450	125	2700	2200	3400	4867	2550	1300	1900
200-150-200	200	6750	5250	4300	9572	4850	2450	3550	150	3450	2850	4300	6206	3150	1600	2450
200-150-250	200	6750	5250	4300	9572	4850	2450	3550	150	3450	2850	4300	6206	3150	1600	2450
200-150-315	200	6750	5250	4300	9572	4850	2450	3550	150	3450	2850	4300	6206	3150	1600	2450
200-150-400	200	6750	5250	4300	9572	4850	2450	3550	150	3450	2850	4300	6206	3150	1600	2450

Correction coefficients depending on material and temperature (see diagram below).

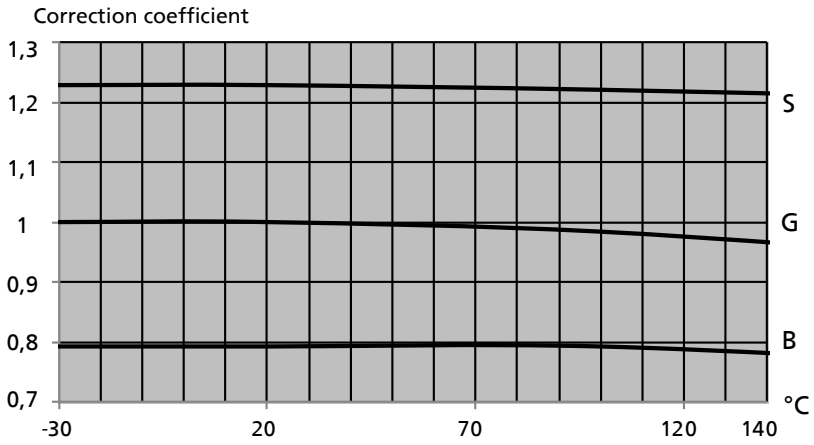


Fig. 10: Temperature/material correction diagram for casing materials G (EN-GJL-250/A48CL35B), S (EN-GJS-400-15/A536 GR 60-40-18) and B (CC480K-GS/B30 C90700)

5.3.3 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.

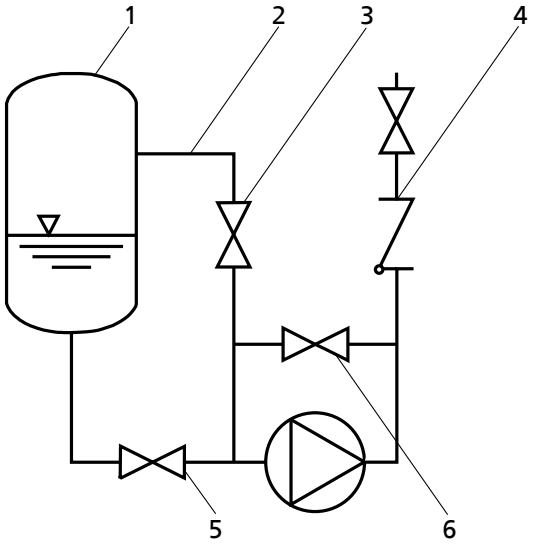


Fig. 11: Vacuum balance system

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.

5.3.4 Auxiliary connections

DANGER

Risk of potentially explosive atmosphere by incompatible fluids mixing in the auxiliary piping

Risk of burns!

Explosion hazard!

- Make sure that the barrier fluid or quench liquid are compatible with the fluid handled.

WARNING

Failure to use or incorrect use of auxiliary connections (e.g. barrier fluid, flushing liquid, etc.)

Risk of injury from escaping fluid!

Risk of burns!

Malfunction of the pump!

- Refer to the general arrangement drawing, the piping layout and pump markings (if any) for the quantity, dimensions and locations of auxiliary connections.
- Use the auxiliary connections provided.

1173.8/08-EN

5.4 Enclosure/insulation

DANGER

Explosive atmosphere forming due to insufficient venting

Explosion hazard!

- ▷ Make sure the space between the casing cover/discharge cover and the motor flange is sufficiently vented.
- ▷ Do not cover the perforations of the contact guards at the drive lantern (e.g. by insulation).

WARNING

The volute casing and casing/discharge cover take on the same temperature as the fluid handled

Risk of burns!

- ▷ Insulate the volute casing.
- ▷ Fit protective equipment.

CAUTION

Heat build-up inside the drive lantern

Damage to the bearing!

- ▷ Never insulate the casing cover and the drive lantern.

NOTE

Pump casings handling fluids at temperatures below freezing point may be insulated at the site, subject to the manufacturer's prior approval.

5.5 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, EN 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.

5.5.1 Setting the time relay

CAUTION

Switchover between star and delta on three-phase motors with star-delta starting takes too long.

Damage to the pump (set)!

- ▷ Keep switch-over intervals between star and delta as short as possible.

Table 15: Time relay settings for star-delta starting:

Motor rating	Y time to be set
[kW]	[s]
≤ 30	< 3
> 30	< 5

5.5.2 Earthing

DANGER

Electrostatic charging

Explosion hazard!

Fire hazard!

Damage to the pump set!

- ▷ Connect the PE conductor to the earthing terminal provided.

5.5.3 Connecting the motor

NOTE

In compliance with IEC 60034-8, three-phase motors are always wired for clockwise rotation (looking at the motor shaft stub).

The pump's direction of rotation is indicated by an arrow on the pump.

1. Match the motor's direction of rotation to that of the pump.
2. Observe the manufacturer's product literature supplied with the motor.

5.6 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.

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.

1173.8/08-EN

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 runs in the wrong direction of rotation, check the electrical connection of the motor and the control system, if applicable.

6 Commissioning/Start-up/Shutdown

6.1 Commissioning/Start-up

6.1.1 Prerequisites for commissioning/start-up

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

- The pump set has been properly connected to the power supply and is equipped with all protection devices. (⇨ Section 5.5, Page 35)
- The pump has been primed with the fluid to be handled. The pump has been vented.
- The direction of rotation has been checked. (⇨ Section 5.6, Page 36)
- All auxiliary connections required are connected and operational. (⇨ Section 5.3.4, Page 34)
- The lubricants have been checked.
- After prolonged shutdown of the pump (set), the activities required for returning the equipment to service have been carried out. (⇨ Section 6.4, Page 44)
- The lock washers, if any, have been removed from the shaft groove.

6.1.2 Priming and venting the pump

⚠ DANGER

Risk of 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.

⚠ DANGER

Risk of potentially explosive atmosphere by incompatible fluids mixing in the auxiliary piping

Risk of burns!

Explosion hazard!

- ▷ Make sure that the barrier fluid or quench liquid are compatible with the fluid handled.

1173.8/08-EN

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.

1. Vent the pump and suction line and prime both with the fluid to be handled. Connection 6D can be used for venting.
   For vertical installation with the motor on top use connection 5B (if any) for venting. (see general assembly drawing (⇨ Section 9.1.1, Page 61) and (⇨ Section 9.1.2, Page 63)
2. Fully open the shut-off element in the suction line.
3. Fully open all auxiliary feed lines (barrier fluid, flushing liquid, etc.), if any.
4. Open the shut-off valve (3), if any, in the vacuum balance line (2) and close the vacuum-tight shut-off valve (6), if any. (⇨ Section 5.3.3, Page 33)

NOTE

For design-inherent reasons some unfilled volume in the hydraulic system cannot be excluded after the pump has been primed for commissioning/start-up. However, once the motor is started up the pumping effect will immediately fill this volume with the fluid handled.

6.1.3 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.

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 system piping has been cleaned.
- ✓ The pump, suction line and inlet tank, if any, have been vented and primed with the fluid to be pumped.
- ✓ The lines for priming and venting have been closed.

CAUTION

Start-up against open discharge line

Motor overload!

- ▹ Make sure the motor has sufficient power reserves.
- ▹ Use a soft starter.
- ▹ Use speed control.

1. Fully open the shut-off element in the suction head/suction lift line.
2. Close or slightly open the shut-off element in the discharge line.
3. Start up the motor.
4. Immediately after the pump has reached full rotational speed, slowly open the shut-off element in the discharge line and adjust it to comply with the duty point.

6.1.4 Checking the shaft seal

Mechanical seal

The mechanical seal only leaks slightly or invisibly (as vapour) during operation. Mechanical seals are maintenance-free.

Double mechanical seal

DANGER

Excessive temperature of barrier fluid (pumps with double mechanical seal)

Explosion hazard!

Excessive surface temperature

- ▹ For pumps with double mechanical seal, make sure that the barrier fluid's temperature does not exceed 60 °C.

6.1.5 Shutdown

CAUTION

Heat build-up inside the pump

Damage to the shaft seal!

- ▹ Depending on the type of installation, the pump set requires sufficient after-run time – with the heat source switched off – until the fluid handled has cooled down.

1173.8/08-EN

CAUTION

Backflow of fluid handled is not permitted

Motor or winding damage! Mechanical seal damage!

- ▷ Close the shut-off elements.

✓ The shut-off element in the suction line is and remains open.

1. Close the shut-off element in the discharge line.
2. Switch off the motor and make sure the pump set runs down smoothly to a standstill.

NOTE

If the discharge line is equipped with a non-return or check valve, the shut-off element may remain open provided that the system conditions and system regulations are considered and observed.

For prolonged shutdown periods:

1. Close the shut-off element in the suction line.
2. Close any auxiliary lines.
   If the fluid to be handled is fed in under vacuum, also supply the shaft seal with barrier fluid during standstill.

CAUTION

Risk of freezing during prolonged pump shutdown periods

Damage to the pump!

- ▷ Drain the pump and the cooling/heating chambers (if any) or otherwise protect them against freezing.

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 Ambient temperature

CAUTION

Operation outside the permissible ambient temperature

Damage to the pump (set)!

- ▷ Observe the specified limits for permissible ambient temperatures.

Observe the following parameters and values during operation:

Table 16: Permissible ambient temperatures

Permissible ambient temperature	Value
Maximum	50 °C
Minimum	40 °C[10)]

6.2.2 Frequency of starts

DANGER

Excessive surface temperature of the motor

Explosion hazard!

Damage to the motor!

- ▷ In case of explosion-proof motors, observe the frequency of starts specified in the manufacturer's product literature.

The frequency of starts is determined by the maximum temperature increase of the motor. The frequency of starts depends on the power reserves of the motor in steady-state operation and on the starting conditions (DOL starting, star-delta starting, moments of inertia, etc). If the start-ups are evenly spaced over the period indicated, the following limits serve as orientation for start-up with the discharge-side shut-off valve slightly open:

Table 17: Frequency of starts

Impeller material	Maximum frequency of starts [Start-ups/hour]
G (JL1040/ A48CL35B)	15
B (CC480K-GS/B30 C90700)	6
C (1.4408/ A743 GR CF8M)	

CAUTION

Re-starting while motor is still running down

Damage to the pump (set)!

- ▷ Do not re-start the pump set before the pump rotor has come to a standstill.

1173.8/08-EN

10 For compliance with 2014/34/EU (ATEX Equipment Directive). Higher ambient temperature possible in individual cases, see data sheet and name plate.

6.2.3 Fluid handled

6.2.3.1 Flow rate

Table 18: Flow rate

Temperature range (t)	Minimum flow rate	Maximum flow rate
-30 to +70 °C	≈ 15 % of Q_{BEP} [11)]	See hydraulic characteristic curves
> 70 to +140 °C	≈ 25 % of Q_{BEP} [11)]	

The calculation formula below can be used to check if an additional heat build-up could lead to a dangerous temperature increase at the pump surface.

$$T_O = T_f + \Delta\vartheta$$

$$\Delta\vartheta = \frac{g \times H}{c \times \eta} \times (1 - \eta)$$

Table 19: Key

Symbol	Description	Unit
c	Specific heat capacity	J/kg K
g	Acceleration due to gravity	m/s^2
H	Pump discharge head	m
T_f	Fluid temperature	°C
T_O	Temperature at the casing surface	°C
η	Pump efficiency at duty point	-
$\Delta\vartheta$	Temperature difference	K

6.2.3.2 Density of the fluid handled

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

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.

6.2.3.3 Abrasive fluids

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, reduce the commonly recommended inspection intervals.

The fluid handled may contain abrasive particles up to a maximum content of 5 g/dm^3 and a maximum particle size of 0.5 mm.

6.3 Shutdown/storage/preservation

6.3.1 Measures to be taken for shutdown

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.

11 Best efficiency point

⇨ 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.

✓ The safety instructions for dismantling the pump have been observed. (⇨ Section 7.4.1, Page 49)

✓ The permissible ambient temperature for storing the pump is observed.

1. Spray-coat the inside wall of the pump casing and, in particular, the impeller clearance areas with a preservative.
2. Spray the preservative through the suction nozzle and discharge nozzle. It is advisable to then close the pump nozzles (e.g. with plastic caps)
3. Oil or grease all exposed machined parts and surfaces of the pump (with silicone-free oil or grease, food-approved, if required) to protect them against corrosion.
   Observe the additional instructions on preservation. (⇨ Section 3.3, Page 13)

If the pump set is to be stored temporarily, only preserve the wetted components made of low-alloy materials. Commercially available preservatives can be used for this purpose. Observe the manufacturer's instructions for application/removal.

6.4 Returning to service

For returning the equipment to service observe the sections on commissioning/start-up and the operating limits. (⇨ Section 6.1, Page 38) (⇨ Section 6.2, Page 41)

In addition, carry out all servicing/maintenance operations before returning the pump (set) to service. (⇨ Section 7, Page 45)

⚠ 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

If the equipment has been out of service for more than one year, replace all elastomer seals.

1173.8/08-EN

7 Servicing/Maintenance

7.1 Safety regulations

DANGER

Sparks produced during servicing work

Explosion hazard!

- Observe the safety regulations in force at the place of installation!
- Always perform maintenance work on explosion-proof pump sets outside 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 and shaft seal.

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.

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.

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. For contact details refer to the enclosed "Addresses" booklet or visit "www.ksb.com/contact" on the Internet.

Never use force when dismantling and reassembling the pump set.

7.2 Servicing/Inspection

7.2.1 Supervision of operation

DANGER

Risk of 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.

DANGER

Incorrectly serviced shaft seal

Explosion hazard!

Hot, toxic fluid escaping!

Damage to the pump set!

Risk of burns!

Fire hazard!

- ▷ Regularly service the shaft seal.

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 rolling element bearings for running noises.

1173.8/08-EN

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.

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 41)

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

- The pump must run quietly and free from vibrations at all times.
- Check the shaft seal. (⇨ Section 6.1.4, Page 40)
- Check the static sealing elements for leakage.
- Check the rolling element bearings for running noises.
  Vibrations, noise and an increase in current input occurring during unchanged operating conditions indicate wear.
- 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.
- Monitor the bearing temperature.
  The bearing temperature must not exceed 90 °C (measured on the motor housing).

CAUTION

Operation outside the permissible bearing temperature

Damage to the pump!

- ▷ The bearing temperature of the pump (set) must never exceed 90 °C (measured on the outside of the motor housing).

NOTE

After commissioning, increased temperatures may occur at grease-lubricated rolling element bearings due to the running-in process. The final bearing temperature is only reached after a certain period of operation (up to 48 hours depending on the conditions).

7.2.2 Inspection work

DANGER

Excessive temperatures caused by friction, impact or frictional sparks

Explosion hazard!

Fire hazard!

Damage to the pump set!

- ▷ Regularly check the coupling guard, plastic components and other guards of rotating parts for deformation and sufficient distance from rotating parts.

DANGER

Electrostatic charging due to insufficient potential equalisation

Explosion hazard!

- ▷ Make sure that the connection between pump and baseplate is electrically conductive.

7.2.2.1 Checking the clearances

To check the clearances, remove the back pull-out unit.
If the clearance is larger than permitted (see the following table), fit a new casing wear ring 502.1 and/or 502.2.
The clearances specified refer to the impeller diameter.

Table 20: Clearances between impeller and casing and/or between impeller and casing cover

Impeller material	Permissible clearance	
	New	Maximum
G (JL1040/ A48CL35B) B (CC480K-GS/B30 C90700)	0,3 mm	0,9 mm
C (1.4408/ A743 GR CF8M)	0,5 mm	1,5 mm

7.2.2.2 Cleaning filters

CAUTION

Insufficient inlet pressure due to clogged filter in the suction line

Damage to the pump!

- ▷ Monitor contamination of filter with suitable means (e.g. differential pressure gauge).
- ▷ Clean filter at appropriate intervals.

1173.8/08-EN

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 fluid residues.
- ▹ Wear safety clothing and a protective mask if required.
- ▹ Observe all legal regulations on the disposal of fluids posing a health hazard.

1. Use connection 6B to drain the fluid handled. (⇨ Section 9.1.1, Page 61) (⇨ Section 9.1.2, Page 63)
2. Always flush the pump if it has been used for handling noxious, explosive, hot or other hazardous fluids.
   Always flush and clean the pump before transporting it to the workshop.
   Provide a certificate of decontamination for the pump. (⇨ Section 11, Page 68)

7.4 Dismantling the pump set

7.4.1 General information/Safety regulations

⚠ DANGER

Insufficient preparation of work on the pump (set)

Risk of injury!

- ▹ Properly shut down the pump set. (⇨ Section 6.1.5, Page 40)
- ▹ 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

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

Hot surface

Risk of injury!

- ▹ Allow the pump set to cool down to ambient temperature.

⚠ 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.

Always observe the safety instructions and information. (⇨ Section 7.1, Page 45)

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

For dismantling and reassembly observe the exploded views and the general assembly drawing. (⇨ Section 9.1, Page 61)

In the event of damage you can always contact our service departments.

NOTE

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

NOTE

After a prolonged period of operation the individual components may be hard to pull off the shaft. If this is the case, use a brand name penetrating agent and/or - if possible - an appropriate puller.

7.4.2 Preparing the pump set

1. De-energise the pump set and secure it against unintentional start-up.
2. Reduce pressure in the piping by opening a consumer installation.
3. Disconnect and remove all auxiliary pipework.

7.4.3 Dismantling the complete pump set

NOTE

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

✓ The notes and steps stated in (⇨ Section 7.4.1, Page 49) to (⇨ Section 7.4.2, Page 50) have been observed/carried out.

1. Disconnect the discharge and suction nozzle from the piping.
2. Depending on the pump/motor size, unscrew the bolts that fix the support foot and/or motor foot to the foundation.
3. Remove the complete pump set from the piping.

7.4.4 Removing the motor

⚠ WARNING

Motor tipping over

Risk of crushing hands and feet!

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

✓ The notes and steps stated in (⇨ Section 7.4.1, Page 49) to (⇨ Section 7.4.3, Page 50) have been observed/carried out.

1. Depending on the pump/motor size, unscrew the bolts that fix the motor foot to the foundation.
2. Undo bolts of cover plates 68-3.01/.02.
3. Remove cover plates 68-3.01/.02 from drive lantern 341.
4. Undo hexagon head bolts 901.5.
5. Insert both lock washers 931.95 into the groove in shaft 210.
6. Tighten hexagon head bolts 901.5.
7. Undo hexagon nuts 920.11.
8. Remove the motor.

1173.8/08-EN

7.4.5 Removing the back pull-out unit

⚠ WARNING

Back pull-out unit tilting

Risk of squashing hands and feet!

▹ Suspend or support the back pull-out unit at the pump end.

✓ The notes and steps stated in (⇨ Section 7.4.1, Page 49) to (⇨ Section 7.4.4, Page 50) have been observed/carried out.

1. If required, suspend or support the back pull-out unit to prevent it from tipping over.
2. Undo hexagon nut 920.1 at the volute casing.
3. Use forcing screws 901.30 to remove the back pull-out unit from its seat in the volute casing. Pull the back pull-out unit completely out of volute casing 102.
4. Remove and dispose of gasket 400.10.
5. Place the back pull-out unit on a clean and level surface.

7.4.6 Removing the impeller

✓ The notes and steps stated in (⇨ Section 7.4.1, Page 49) to (⇨ Section 7.4.5, Page 51) have been observed/carried out.

✓ The back pull-out unit is kept in a clean and level assembly area.

1. Undo impeller nut 920.95 (right-hand thread).
2. Remove impeller 230 with an impeller removal tool.
3. Place impeller 230 on a clean and level surface.
4. Remove key 940.01 from shaft 210.

7.4.7 Removing the mechanical seal

✓ The notes and steps stated in (⇨ Section 7.4.1, Page 49) to (⇨ Section 7.4.6, Page 51) have been observed/carried out.

✓ The back pull-out unit is kept in a clean and level assembly area.

1. Remove shaft sleeve 523 with the rotating assembly of the mechanical seal (primary ring) from shaft 210.
2. Remove the rotating assembly of the mechanical seal (primary ring) from shaft sleeve 523.
3. Undo hexagon nuts 920.01 and 914.22, if any, on drive lantern 341.
4. Remove casing cover 161 from drive lantern 341.
5. Remove the stationary assembly of the mechanical seal (mating ring) from casing cover 161.
6. Remove and dispose of gasket 400.75.

7.5 Reassembling the pump set

7.5.1 General information/Safety regulations

DANGER

Wrong selection of motor

Explosion hazard!

- Use an original motor or a motor of identical design from the same manufacturer.
- The permissible temperature limits at the motor flange and motor shaft must be higher than the temperatures generated by the pump. (Contact KSB for temperatures).

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 in accordance with the corresponding general assembly drawing or exploded view.

Sealing elements
Check O-rings for any damage and replace by new O-rings, if required.

Always use new gaskets. Make sure that new gaskets have the same thickness as the old ones.

Always fit gaskets of asbestos-free materials or graphite without using lubricants (e.g. copper grease, graphite paste).

Assembly adhesives
Avoid the use of assembly adhesives, if possible.

Should an assembly adhesive be required after all, use a commercially available contact adhesive (e.g. Pattex) or sealant (e.g. HYLOMAR or Epple 33).

Only apply adhesive at selected points and in thin layers.

Never use quick-setting adhesives (cyanoacrylate adhesives).

Coat the locating surfaces of the individual components with graphite or similar before reassembly.

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

1173.8/08-EN

7.5.2 Installing the mechanical seal

Installing the mechanical seal

The following rules must be observed when installing the mechanical seal:

- Work cleanly and accurately.
- Only remove the protective wrapping of the contact faces immediately before installation takes place.
- Prevent any damage to the sealing surfaces or O-rings.

✓ The notes and steps stated in (⇨ Section 7.5.1, Page 52) have been observed/ carried out.

✓ The bearing assembly as well as the individual parts are kept in a clean and level assembly area.

✓ All dismantled parts have been cleaned and checked for wear.

✓ Any damaged or worn parts have been replaced by original spare parts.

✓ The sealing surfaces have been cleaned.

1. Clean shaft sleeve 523, and touch up any score marks or scratches with a polishing cloth, if necessary.
   If score marks or scratches are still visible, fit new shaft sleeve 523.
2. Slide shaft sleeve 523 with new gasket 400.75 onto shaft 210.
3. Clean the mating ring location in casing cover 161.

CAUTION

Elastomers in contact with oil/grease

Shaft seal failure!

- ▷ Use water as assembly lubricant.
- ▷ Never use oil or grease as assembly lubricant.

4. Carefully insert the mating ring. Make sure to apply pressure evenly.
5. **On variants with a bolted casing cover** undo forcing screws 901.31 without removing them.
6. Place casing cover 161 into the locating fit of drive lantern 341.
7. Fit and tighten hexagon nuts 920.01 and/or 920.15, if any.

NOTE

To reduce friction forces when assembling the seal, wet the shaft sleeve and the location of the stationary ring with water.

8. Fit the rotating assembly of the mechanical seal (primary ring) on shaft sleeve 523.

Observe the following installation dimension b for mechanical seals with installation length L_{1k} to EN 12756 (design KU):

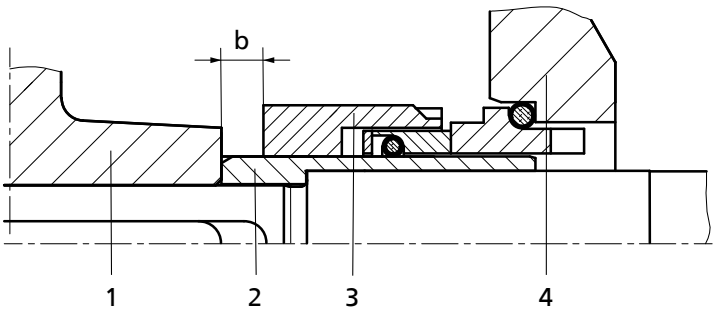


Fig. 12: Installation dimension b of mechanical seal

1	Impeller	2	Shaft sleeve
3	Mechanical seal	4	Casing cover

Table 21: Installation dimensions of the mechanical seal

Shaft unit[12)]	Installation dimension b
25	7,5 mm
35	10 mm
55	15 mm

7.5.3 Fitting the impeller

- ✓ The notes and steps stated in (⇨ Section 7.5.1, Page 52) to (⇨ Section 7.5.2, Page 53) have been observed/carried out.
- ✓ The pre-assembled unit (motor, shaft, drive lantern, casing cover) as well as the individual parts have been placed in a clean and level assembly area.
- ✓ All dismantled parts have been cleaned and checked for wear.
- ✓ Any damaged or worn parts have been replaced by original spare parts.
- ✓ The sealing surfaces have been cleaned.

1. Insert key 940.01 and slide impeller 230 onto shaft 210.
2. Fasten impeller nut 920.95, safety device 930.95 and disc 550.95, if any. Observe the tightening torques. (⇨ Section 7.6, Page 56)

7.5.4 Installing the back pull-out unit

⚠ WARNING

Back pull-out unit tilting

Risk of squashing hands and feet!

▹ Suspend or support the back pull-out unit at the pump end.

- ✓ The notes and steps stated in (⇨ Section 7.5.1, Page 52) to (⇨ Section 7.5.3, Page 54) have been observed/carried out.
- ✓ Any damaged or worn parts have been replaced by original spare parts.
- ✓ The sealing surfaces have been cleaned.

1. If required, suspend or support the back pull-out unit to prevent it from tipping over.
2. Fit new gasket 400.10 into the recess of volute casing 102.
3. **On variants with a bolted casing cover** undo forcing screws 901.31 without removing them.
4. Insert the back pull-out unit into volute casing 102.
5. Depending on the pump size and motor size, fit support foot 183.
6. Tighten hexagon nut 920.15 (on variant with a bolted casing cover) or 920.01 (on variant with a clamped casing cover) at volute casing 102.

7.5.5 Mounting the motor

⚠ DANGER

Incorrect shaft connection

Explosion hazard!

▹ Connect the shafts between pump and motor as described in this manual.

1173.8/08-EN

12 Shaft unit see data sheet.

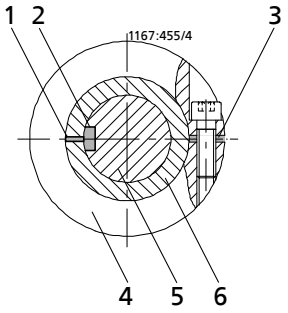


Fig. 13: Fitting the motor shaft stub on the shaft

1	Shaft slot	2	Keyway of the motor shaft end
3	Slot of the locking ring	4	Locking ring
5	Motor shaft	6	Shaft

✓ The notes and steps stated in (⇨ Section 7.5.1, Page 52) to (⇨ Section 7.5.4, Page 54) have been observed/carried out.

1. Fit the motor shaft stub on shaft 210 and make sure that the keyway of the motor shaft end aligns with the slot in shaft 210 and that both are located opposite the slot of locking ring 515 (see illustration: Fitting the motor shaft stub on the shaft).
2. Tighten hexagon socket head cap screws 914.24.
3. Undo hexagon head bolts 901.50.

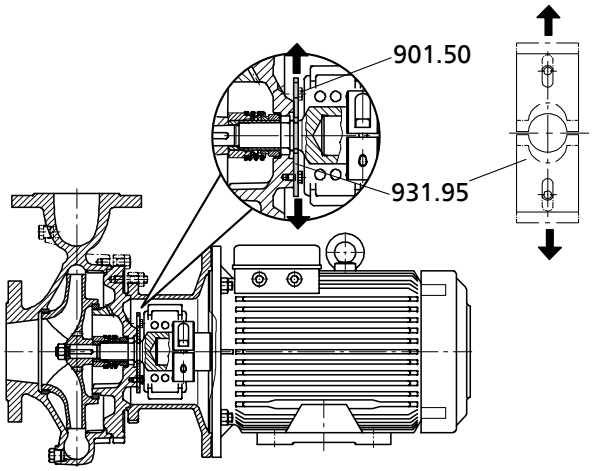


Fig. 14: Removing the lock washers

901.50	Hexagon head bolts	931.95	Lock washer

4. Pull both lock washers 931.95 out of the groove in shaft 210.
5. Tighten hexagon head bolts 901.50.
6. Fit and tighten hexagon nuts 920.11.

7.6 Tightening torques

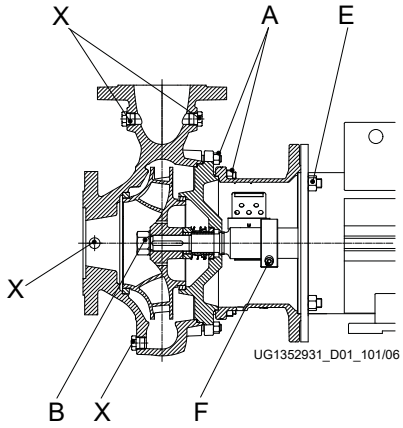


Fig. 15: Tightening points, version with bolted casing cover

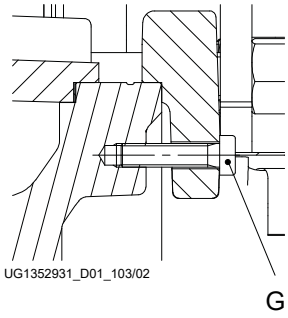


Fig. 16: Tightening points, version with clamped casing cover

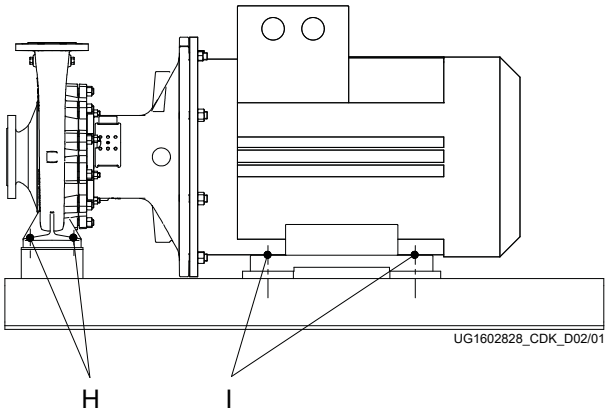


Fig. 17: Tightening points, version with baseplate

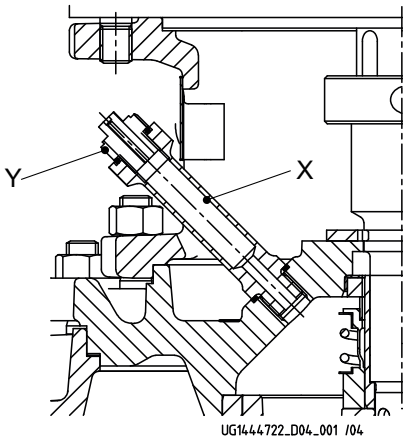


Fig. 18: Tightening points, vertical installation with vent valve

Table 22: Tightening torques for bolted/screwed connections at the pump

Position	Thread	Tightening torque [Nm]
A	M12	55
	M16	130
B	M12 × 1,5	55
	M24 × 1,5	130
	M30 × 1,5	170
E	M8	20
	M10	38
	M12	55
	M16	130
F	M6	15
	M8	38
	M10	85
	M12	91
G	M6	5
H	M12	30
	M16	75
	M20	75
I	M20	140
	M24	140
X	1/8	25
	1/4	55
	3/8	80
	1/2	130
	3/4	220
Y	1/4	25

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 9.1, Page 61)
- Quantity of spare parts
- Shipping address
- Mode of dispatch (freight, mail, express freight, air freight)

7.7.2 Recommended spare parts stock

Table 23: Quantity of spare parts for recommended spare parts stock for commissioning

Part No.	Description	Number of pumps									
		1	2	3	4	5	6	7	8	9	10 and more
433	Mechanical seal	1	1	1	2	2	2	2	3	3	25 %
433.01/.02	Mechanical seal[13)]	1	1	1	2	2	2	2	3	3	25 %
400.10	Gasket	2	4	6	8	8	9	9	12	12	150 %
400.75	Gasket	2	4	6	8	8	9	9	12	12	150 %
400.15	Gasket[13)]	2	4	6	8	8	9	9	12	12	150 %
411.15	Joint ring[13)]	2	4	6	8	8	9	9	12	12	150 %
412.15	O-ring[13)]	2	4	6	8	8	9	9	12	12	150 %

Table 24: Quantity of spare parts for recommended spare parts stock for 2 years' operation to DIN 24296

Part No.	Description	Number of pumps									
		1	2	3	4	5	6	7	8	9	10 and more
210	Shaft	1	1	1	1	2	2	2	2	2	20 %
230	Impeller	1	1	1	1	2	2	2	2	2	20 %
433	Mechanical seal	1	1	1	2	2	2	2	3	3	25 %
433.01/.02	Mechanical seal[13)]	1	1	1	2	2	2	2	3	3	25 %
502.01/.02	Casing wear ring[14)] (set)	1	2	2	2	3	3	3	4	4	50 %
523	Shaft sleeve	1	2	2	2	3	3	3	4	4	50 %
400.10	Gasket	2	4	6	8	8	9	9	12	12	150 %
400.75	Gasket	2	4	6	8	8	9	9	12	12	150 %
400.15	Gasket[13)]	2	4	6	8	8	9	9	12	12	150 %
411.15	Joint ring[13)]	2	4	6	8	8	9	9	12	12	150 %
412.15	O-ring[13)]	2	4	6	8	8	9	9	12	12	150 %

1173.8/08-EN

13 For double mechanical seal
14 If any

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 is overloaded

C Excessive discharge pressure

D Increased bearing temperature

E Leakage at the pump

F Excessive leakage at the shaft seal

G Vibrations during pump operation

H Impermissible temperature increase in the pump

Table 25: Trouble-shooting

A	B	C	D	E	F	G	H	Possible cause	Remedy[15]
✗	-	-	-	-	-	-	-	Pump delivers against an excessively high pressure.	Re-adjust to duty point. Check system for impurities. Fit a larger impeller.[16] Increase the speed (turbine, I.C. engine).
✗	-	-	-	-	-	✗	✗	Pump or piping are not completely vented or primed.	Vent and/or prime.
✗	-	-	-	-	-	-	-	Supply line or impeller clogged	Remove deposits in the pump and/or piping.
✗	-	-	-	-	-	-	-	Formation of air pockets in the piping	Alter piping layout. Fit vent valve.
✗	-	-	-	-	-	✗	✗	Suction lift is too high/NPSHavailable (positive suction head) is too low.	Check/alter fluid level. Install pump at a lower level. Fully open the shut-off element in the suction 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.
✗	-	-	-	-	-	-	-	Air intake at the shaft seal	Supply external barrier fluid, if necessary, or increase barrier fluid pressure. Replace shaft seal.
✗	-	-	-	-	-	-	-	Wrong direction of rotation	Check the electrical connection of the motor and the control system, if any.
✗	-	-	-	-	-	-	-	Speed is too low. - Operation with frequency inverter - Operation without frequency inverter	 - Increase voltage/frequency at the FI in the permissible range. - Check voltage.
✗	-	-	-	-	-	✗	-	Wear of internal components	Replace worn components by new ones.
-	✗	-	-	-	-	✗	-	Pump back pressure is lower than specified in the purchase order.	Re-adjust to duty point. In the case of persistent overloading, turn down impeller.[16]

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

16 Contact the manufacturer.

A	B	C	D	E	F	G	H	Possible cause	Remedy[15)]
-	✗	-	-	-	-	-	-	Density or viscosity of fluid handled higher than stated in purchase order	Contact the manufacturer.
-	-	-	-	-	✗	-	-	Use of unsuitable shaft seal materials	Change the material combination. [16)]
-	✗	✗	-	-	-	-	-	Speed is too high.	Reduce speed.[16)]
-	-	-	-	✗	-	-	-	Tie bolts/sealing element defective	Fit new sealing element between volute casing and casing cover. Re-tighten the bolts.
-	-	-	-	-	✗	-	-	Worn shaft seal	Fit new shaft seal. Check flushing liquid/barrier fluid.
✗	-	-	-	-	✗	-	-	Score marks or roughness on shaft protecting sleeve / shaft sleeve	Replace shaft protecting sleeve / shaft sleeve. Fit new shaft seal.
-	-	-	-	-	✗	-	-	Dismantle to find out.	Correct. Fit new shaft seal, if required.
-	-	-	-	-	✗	-	-	Vibrations during pump operation	Correct suction conditions. Re-align the pump set. Re-balance the impeller. Increase pressure at the pump suction nozzle.
-	-	-	✗	-	✗	✗	-	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.
-	-	-	✗	-	-	-	-	Increased axial thrust[16)]	Clean balancing holes in the impeller. Replace the casing wear rings.
-	-	-	✗	-	-	-	-	Insufficient or excessive quantity of lubricant or unsuitable lubricant.	Top up, reduce or change lubricant.
✗	✗	-	-	-	-	-	-	Motor is running on two phases only.	Replace the defective fuse. Check the electric cable connections.
-	-	-	-	-	-	✗	-	Rotor out of balance	Clean the impeller. Re-balance the impeller.
-	-	-	-	-	-	✗	-	Defective bearing(s)	Replace.
-	-	-	✗	-	-	✗	✗	Flow rate is too low.	Increase the minimum flow rate.
-	-	-	-	-	✗	-	-	Incorrect inflow of circulation liquid.	Increase the free cross-section.
-	✗	✗	-	-	-	-	-	Transport lock has not been removed from the shaft groove.	Remove transport lock from the shaft groove.

1173.8/08-EN

9 Related Documents

9.1 General assembly drawings

9.1.1 Model with single mechanical seal and bolted casing cover

Table 26: This illustration applies to the following pump sizes:

40-25-200	50-32-200.1 50-32-250.1 50-32-200 50-32-250	65-40-200 65-40-250 65-40-315	65-50-200 65-50-250 65-50-315	80-65-200 80-65-250 80-65-315	100-80-250 100-80-315 100-80-400	125-100-250 125-100-315 125-100-400	150-125-250 150-125-315 150-125-400	200-150-250 200-150-315 200-150-400

[Supplied in packaging units only]

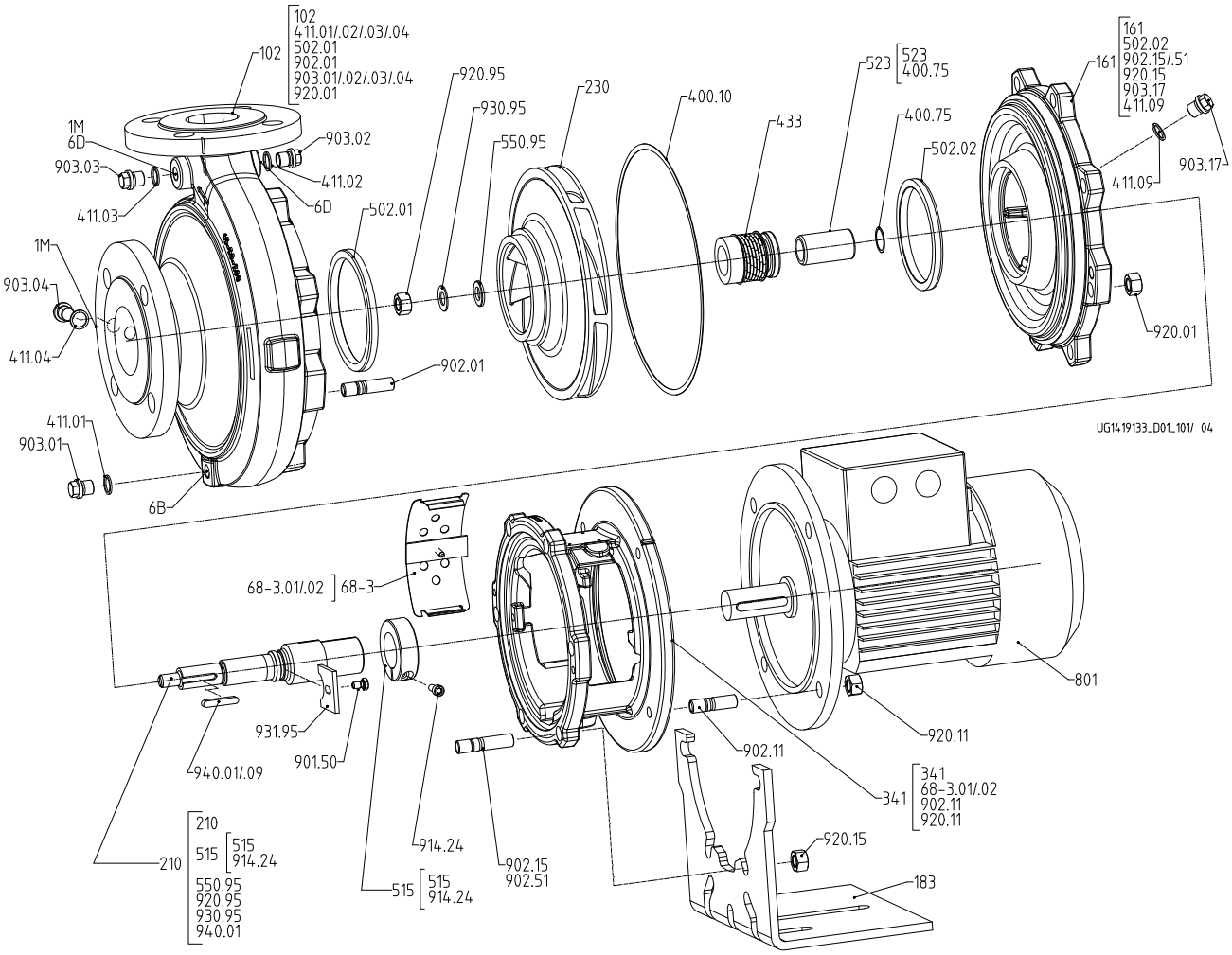


Fig. 19: Model with single mechanical seal and bolted casing cover, without pump foot

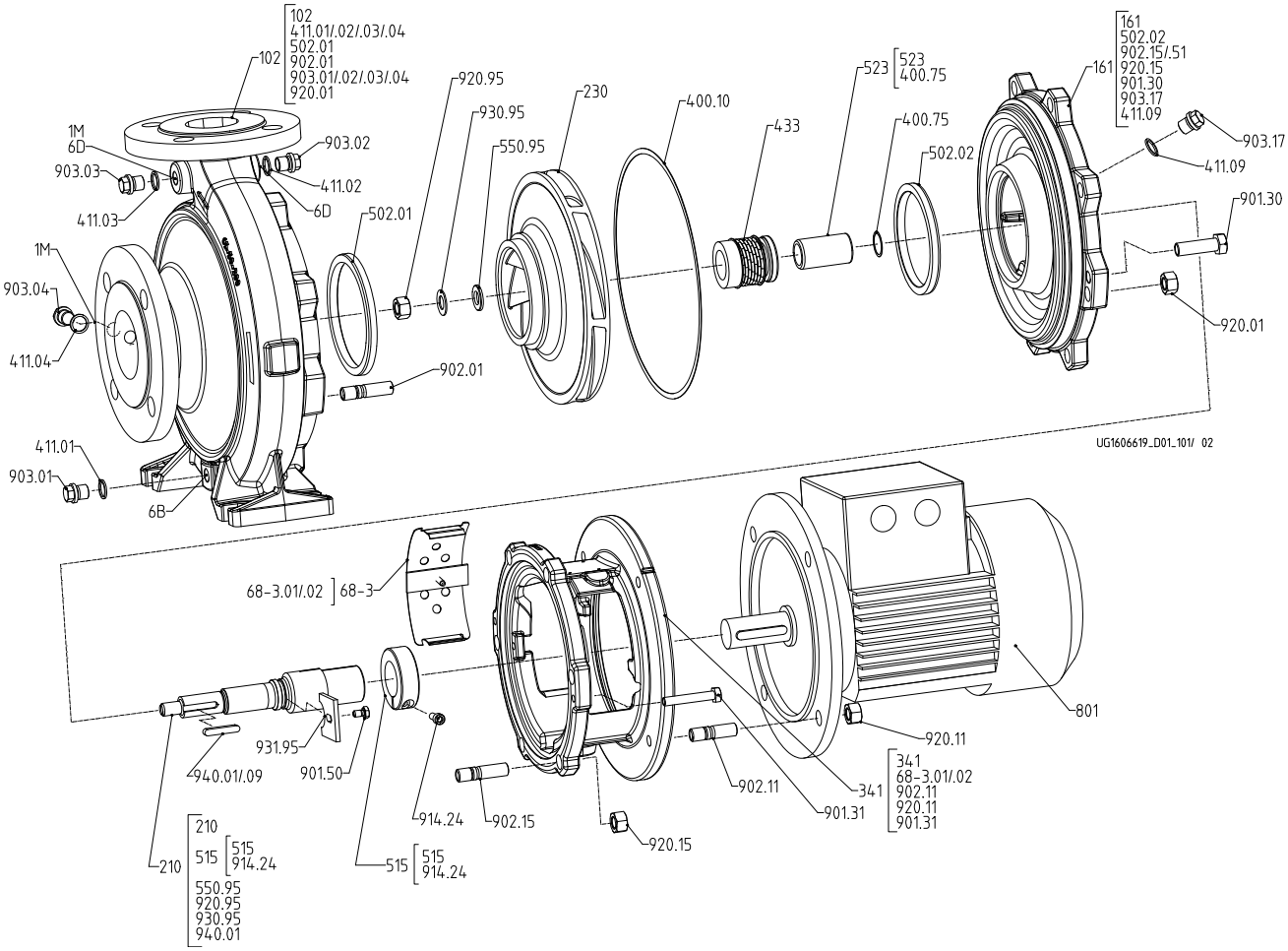


Fig. 20: Model with single mechanical seal and bolted casing cover, with pump foot

Table 27: List of components[17)]

Part No.	Description	Part No.	Description
102	Volute casing	68-3.01/.02	Cover plate
146	Intermediate lantern	801	Flanged motor
161	Casing cover	901.30[18)]/.31[18)]/.50	Hexagon head bolt
183[19)]	Support foot	902.01/.06/.11/.15/.50/.51	Stud
210	Shaft	903.01/.02/.03/.04/.08/.17	Screw plug
230	Impeller	914.24	Hexagon socket head cap screw
341	Drive lantern	920.01/.06/.11/.15/.95	Nut
400.10/.75	Gasket	930.95	Spring washer
411.01/.02/.03/.04/.08/.09	Joint ring	931.95	Lock washer
433	Mechanical seal	940.01/.09[20)]	Key
502.01/.02	Casing wear ring	Connections:	
515	Locking ring	1M	Connection for pressure gauge
523	Shaft sleeve	6B	Fluid drain
550.95	Disc	6D	Fluid priming and venting

17 Some individual components might not be applicable, depending on the pump size and material.
18 Not available for model with support foot
19 For region A, C only
20 For shaft unit 55 only

9.1.2 Pump set with single mechanical seal and clamped casing cover

Table 28: This illustration applies to the following pump sizes:

40-25-160	50-32-125.1 50-32-160.1 50-32-125 50-32-160	65-40-125 65-40-160	65-50-125 65-50-160	80-65-125 80-65-160	100-80-160 100-80-200	125-100-160 125-100-200	150-125-200	200-150-200

[Supplied in packaging units only]

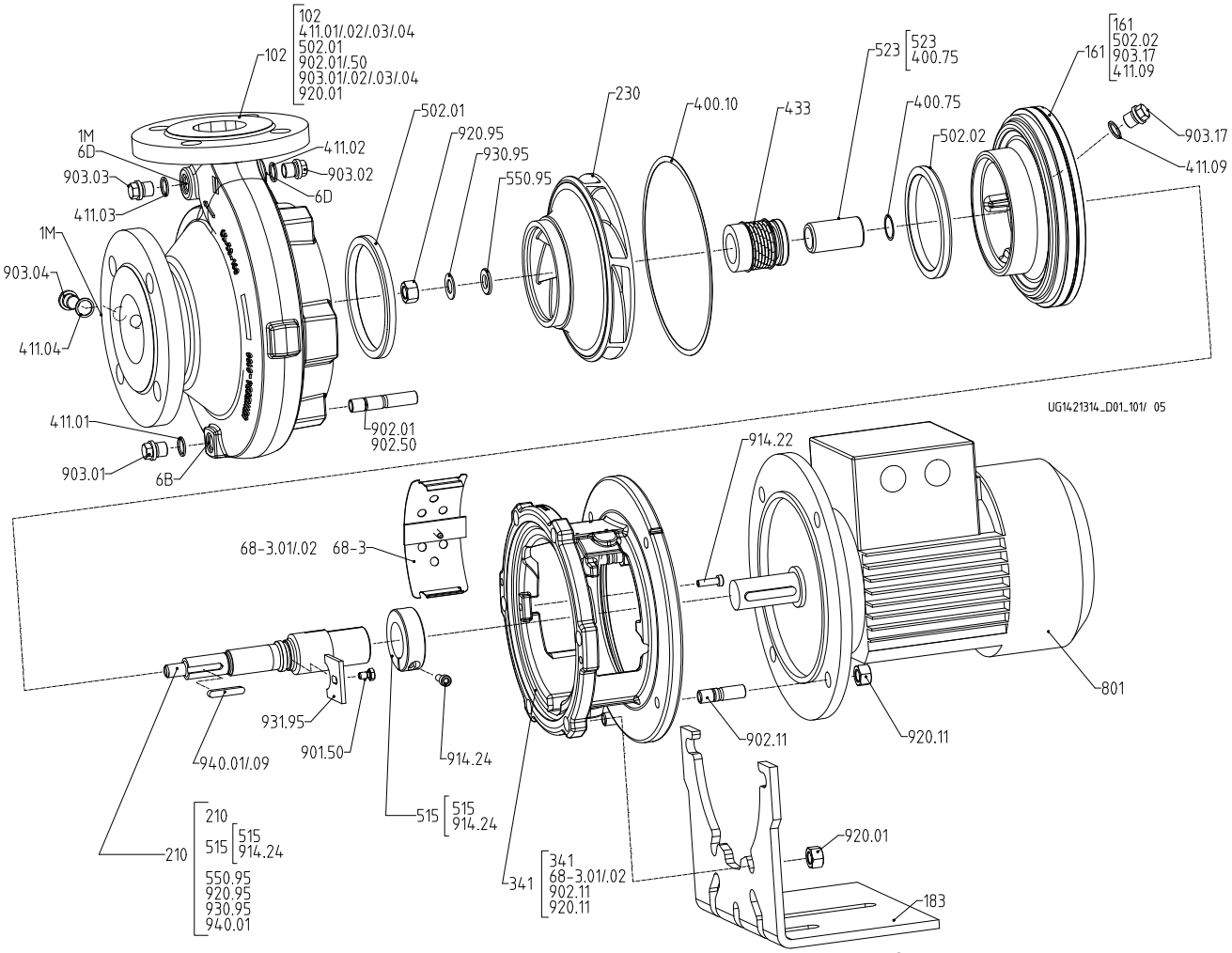


Fig. 21: Model with single mechanical seal and clamped casing cover, without pump foot

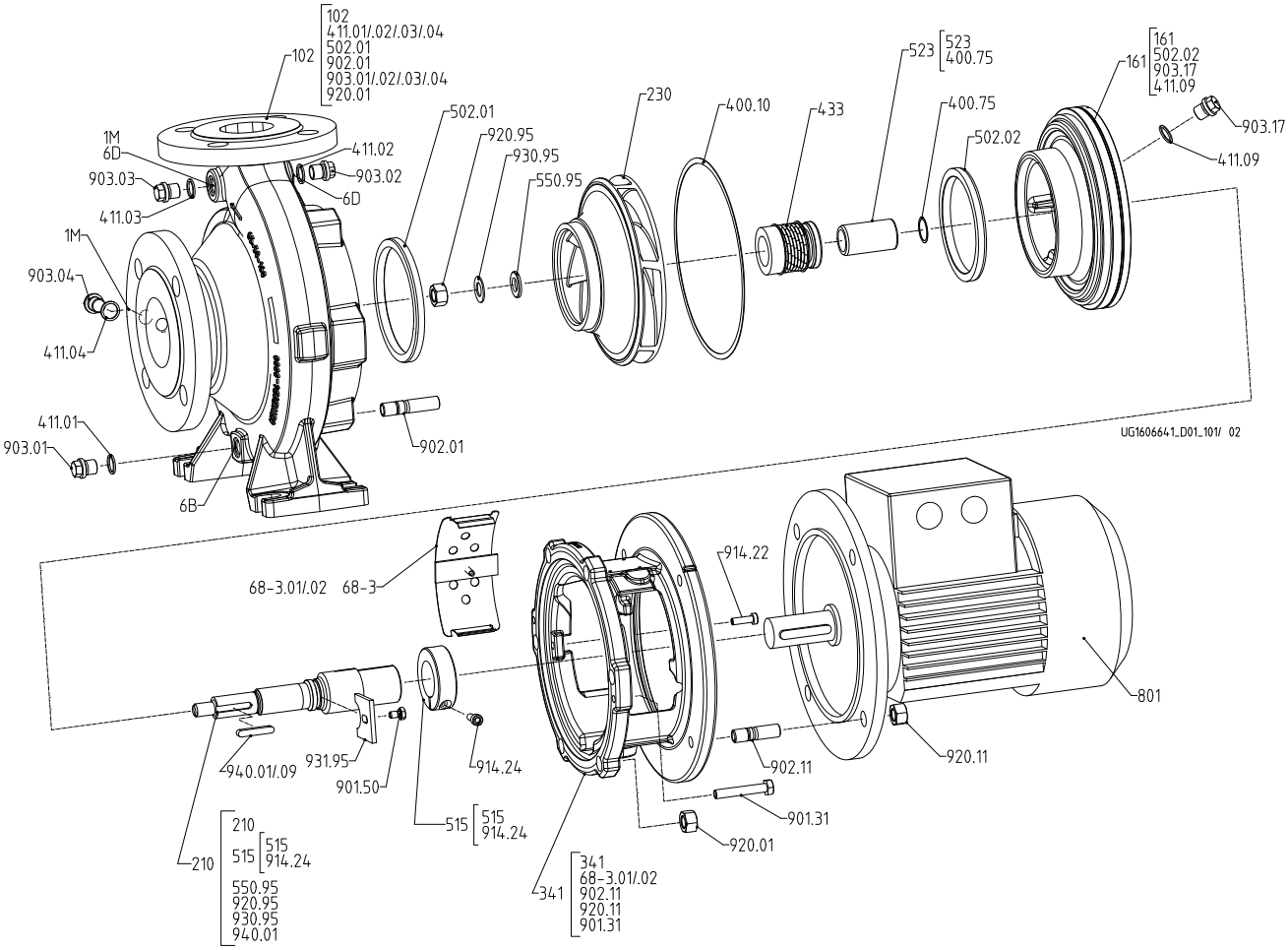


Fig. 22: Model with single mechanical seal and clamped casing cover, with pump foot

Table 29: List of components[21)]

Part No.	Description	Part No.	Description
102	Volute casing	68-3.01/.02	Cover plate
146	Intermediate lantern	801	Flanged motor
161	Casing cover	901.31[22)]/.50	Hexagon head bolt
183	Support foot	902.01/.06/.11/.15/.50/.51	Stud
210	Shaft	903.01/.02/.03/.04/.08/.17	Screw plug
230	Shaft	914.22/.24	Hexagon socket head cap screw
341	Drive lantern	920.01/.06/.11/.15/.95	Hexagon nut
400.10/.75	Gasket	930.95	Spring washer
411.01/.02/.03/.04/.08/.09	Joint ring	931.95	Lock washer
433	Mechanical seal	940.01/.09[23)]	Key
502.01/.02	Casing wear ring	Connections:	
515	Casing wear ring	1M	Connection for pressure gauge
523	Shaft sleeve	6B	Fluid drain
550.95	Disc	6D	Fluid priming and venting

21 Some individual components might not be applicable, depending on the pump size and material.

22 Not available for model with support foot

23 For shaft unit 55 only

9.1.3 Version with double mechanical seal in back-to-back arrangement

Supplied in packaging units only

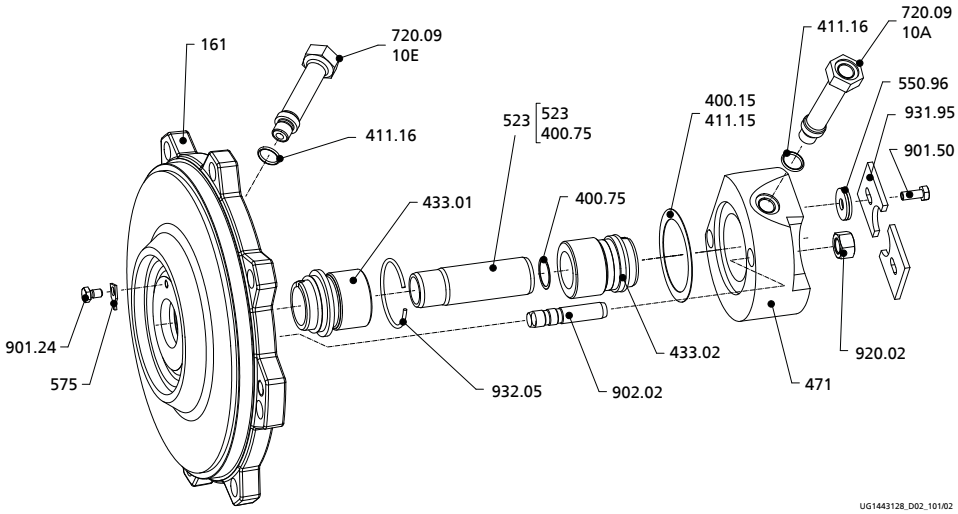


Fig. 23: Version with double mechanical seal in back-to-back arrangement

Table 30: List of components[24)]

Part No.	Description	Part No.	Description
161	Casing cover	575	Strip
400.15/.75	Gasket	720.09	Fitting
411.15/.16	Joint ring	901.24/.50	Hexagon head bolt
433.01/.02	Mechanical seal	902.02	Stud
471	Seal cover	920.02	Hexagon nut
523	Shaft sleeve	931.95	Lock washer
550.96	Disc	932.05	Circlip
562.02	Parallel pin		

Table 31: Auxiliary connections

Part No.	Description	Part No.	Description
10A	External barrier water outlet	10E	External barrier water inlet

24 Some individual components might not be applicable, depending on the pump size and material.

9.1.4 Version with double mechanical seal in tandem arrangement

Supplied in packaging units only

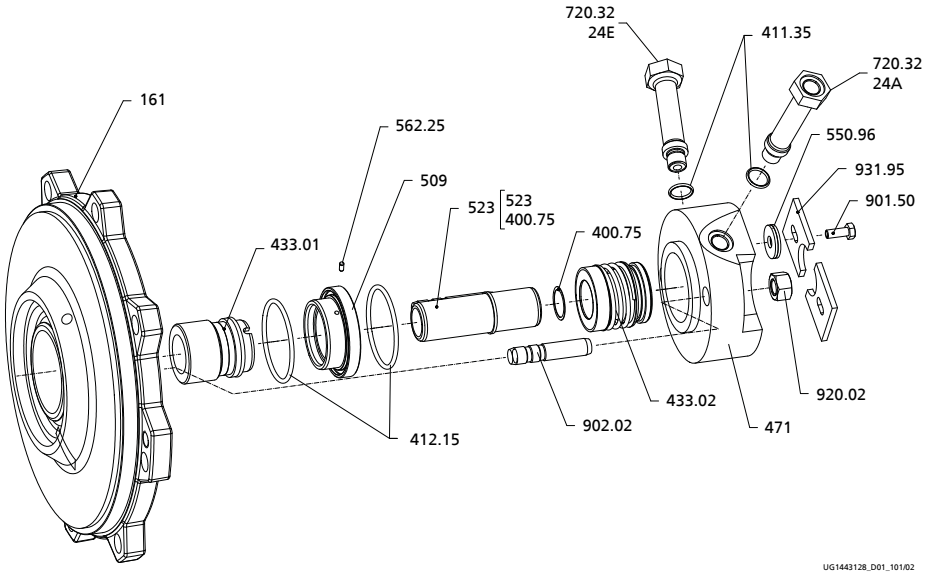


Fig. 24: Version with double mechanical seal in tandem arrangement

Table 32: List of components[25)]

Part No.	Description	Part No.	Description
161	Casing cover	550.96	Disc
400.75	Gasket	562.25	Parallel pin
411.35	Joint ring	720.32	Fitting
412.15	O-ring	901.50	Hexagon head bolt
433.01/.02	Mechanical seal	902.02	Stud
471	Seal cover	920.02	Hexagon nut
509	Intermediate ring	931.95	Lock washer
523	Shaft sleeve		

Table 33: Auxiliary connections

Part No.	Description	Part No.	Description
24A	Quench liquid outlet	24E	Quench liquid inlet

1173.8/08-EN

25 Some individual components might not be applicable, depending on the pump size and material.

10 EU Declaration of Conformity

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

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

Etabloc, Etabloc SYT, Etaline, Etaline SYT, Etaline Z, Etachrom B, Etachrom L, Etanorm, Etanorm SYT, Etanorm V, Etaprime L, Etaprime B

KSB order number: .....

- is in conformity with the provisions of the following directives / regulations as amended from time to time:
  - Pump (set): 2006/42/EC Machinery Directive

The manufacturer also declares that

- the following harmonised international standards[26)] have been applied:
  - ISO 12100
  - EN 809

Person authorised to compile the technical file:

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

The EU Declaration of Conformity was issued in/on:

Place, date

.....[27)].....

Name

Function

Company
Address

26 Apart from the standards listed here referring to the Machinery Directive, further standards are observed for explosion-proof versions (ATEX Directive) as applicable and are listed in the legally binding EU Declaration of Conformity.

27 A signed, legally binding EU Declaration of Conformity is supplied with the product.

11 Certificate of Decontamination

Type: .....

Order number /

Order item number[28]: .....

Delivery date: .....

Application: .....

Fluid handled[28]: .....

Please tick where applicable[28]:

☐ Corrosive

☐ Oxidising

☐ Flammable

☐ Explosive

☐ Hazardous to health

☐ Seriously hazardous to health

☐ Toxic

☐ Radioactive

☐ Bio-hazardous

☐ Safe

Reason for return:[28]: .....

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

1173.8/08-EN

28 Required field

Index

1173.8/08-EN

1173.8/08-EN (01561570)

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