Vertical Immersion Pump

Estigia

Installation/Operating Manual

Legal information/Copyright

Installation/Operating Manual Estigia

Original operating manual

Subject to technical modification without prior notice.

Contents

Glossary

Certificate of decontamination

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

Discharge line

The pipeline which is connected to the discharge nozzle

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

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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 10)

1.4 Other applicable documents

Table 1: Overview of other applicable documents

Document	Contents
Data sheet	Description of the technical data of the pump (set)
General arrangement drawing/ outline drawing	Description of mating 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.

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1 If agreed to be included in the scope of supply

1.5 Symbols

Table 2: Symbols used in this manual

Symbol	Description
✓	Conditions which need to be fulfilled before proceeding with the step-by-step instructions
▷	Safety instructions
⇨	Result of an action
⇨	Cross-references
1. 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 Technical Regulation TP TC 012/2011.
	**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.

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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. (⇨ Section 1.4, Page 7)
- Only operate pumps/pump sets which are in perfect technical condition.
- Do not operate the pump (set) in partially assembled condition.
- The pump (set) must only be operated on a frequency inverter upon prior consultation.
- Only use the pump to handle the fluids described in the data sheet or product literature of the pump model or variant.
- Never operate the pump 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).
- Consult the manufacturer about any use or mode of operation not described in the data sheet or product literature.

2.2.1 Prevention of foreseeable misuse

- Never exceed the permissible application and operating limits specified in the data sheet or product literature regarding pressure, temperature, etc.
- Never open the discharge-side shut-off elements further than permitted.
  - The maximum flow rates specified in the product literature or data sheet would be exceeded.
  - Risk of cavitation damage
- Never close the suction-side shut-off elements further than permitted.
  - The minimum flow rate specified in the product literature or data sheet would not be met.
  - Possible damage by vibrations
- Observe all safety information and instructions in this manual.

2.3 Personnel qualification and training

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

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

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

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

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

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

2.5 Safety awareness

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

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

2.6 Safety information for the user/operator

- 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.

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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.
- Make sure the structure into which the pump (set) is to be installed has been designed correctly.
- Only carry out work on the pump (set) during standstill of the pump.
- Only perform work on the pump set when it has been disconnected from the power supply (de-energised).
- The pump (set) must have cooled down to ambient temperature.
- Pump pressure must have been released and the pump must have been drained.
- When taking the pump set out of service always adhere to the procedure described in the manual. (⇨ Section 6.3, Page 39)
- Decontaminate pumps which handle fluids posing a health hazard. (⇨ Section 7.3, Page 46)
- 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 35)

2.8 Unauthorised modes of operation

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

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

2.9 Explosion protection

DANGER

Always observe the information on explosion protection given in this section when operating the product in potentially explosive atmospheres.

Only pumps/pump sets marked as explosion-proof **and**identified as such in the data sheet may be used in potentially explosive atmospheres.

Special conditions apply to the operation of explosion-proof pump sets in accordance with TP TC 012/2011.
Especially adhere to the sections in this manual marked with the symbol opposite and the following sections to (⇨ Section 2.9.4, Page 12) .
The explosion-proof status is only assured if the product 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 data sheet for the applicable temperature class.

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

Shaft coupling

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

Motor The motor must be considered separately.

2.9.2 Temperature limits

In normal pump operation, the highest temperatures on accessible components are to be expected on the surface of the soleplate and the discharge piping, at the shaft seal and in the bearing areas.
The surface temperature at the discharge piping 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).
The table below lists the temperature classes and the resulting theoretical temperature limits of the fluid handled (a possible temperature rise in the shaft seal area has already been taken into account).

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 EN 13463-1	Maximum permissible fluid temperature
T1	Maximum 400 °C[2)]
T2	280 °C
T3	185 °C
T4	120 °C

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

If the pump is to be operated at a higher temperature, if there is no data sheet or if the pump is part of a pool of pumps, contact KSB for the maximum permissible operating temperature.

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 flows indicated in 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.

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2 Depending on the material variant

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

Improper pump transport

Damage to the pump!

- Never suspend the pump/pump set from the power cable.
- Prevent the pump (set) from getting knocked or dropped.

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

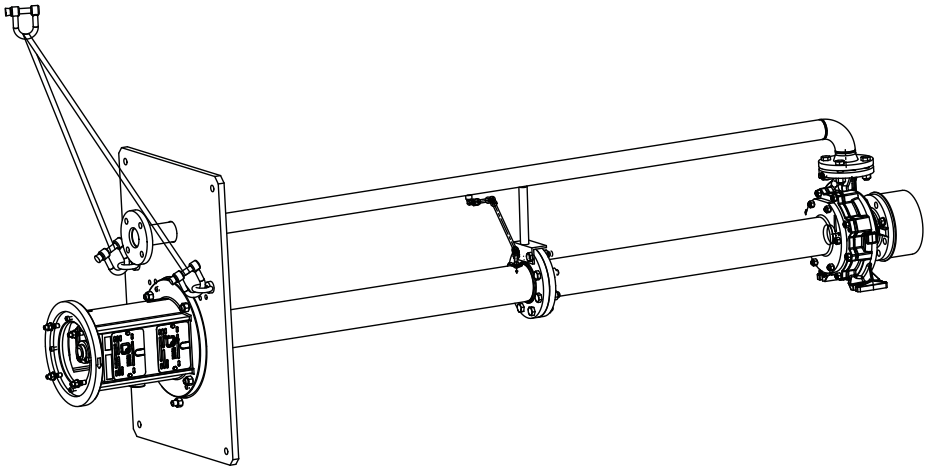

Fig. 1: Transporting the pump set

3.3 Storage/preservation

CAUTION

Damage during storage due to humidity, dirt or vermin

Corrosion/contamination of the pump (set)!

- For outdoor storage cover the pump (set) or the packaged pump (set) and accessories with waterproof material.

CAUTION

Wet, contaminated or damaged openings and connections

Leakage or damage to the pump!

- ▷ Clean and cover pump openings and connections as required prior to putting the pump into storage.

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 equipment is protected for a maximum of 12 months.

For storing a pump which has already been operated, observe the measures to be taken for shutdown. (⇨ Section 6.3.1, Page 39)

3.4 Return to supplier

1. Drain the pump as per operating instructions. (⇨ Section 7.3, Page 46)
2. Flush and clean the pump, particularly if it has been used for handling noxious, explosive, hot or other hazardous fluids. (⇨ Section 6.5, Page 40)
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 also neutralise the pump and blow through with anhydrous inert gas 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 10, Page 70)

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.

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4 Description of the Pump (Set)

4.1 General description

- Vertical immersion pump

Pump for wells, ditches and tanks. For neutral or aggressive liquids without solids or with a low solids content.

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

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

4.3 Designation

Table 5: 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	39	40
S	T	G	C	0	6	5	-	3	1	5	-	G	G	X	W	D	L	0	-	1	D	4	3	1	0	S	5	L	0	0	7	5	E	2	B	P	D	2	-
See name plate and data sheet																										See data sheet												

Table 6: Designation key

Position	Code	Description	
1-3	Pump type		
	STG	Estigia	
4	Impeller type		
	C	Closed impeller	
5-11	Size, e.g.		
	065	Nominal discharge nozzle diameter [mm]	
	315	Nominal impeller diameter [mm]	
12	Hydraulic design		
	-	Standard hydraulic system	
	1	Alternative hydraulic system	
13	Casing material		
	G	Cast iron	EN-GJL 250 / A48 CL35B
	C	Stainless steel	1.4408 / A743 CF8M
	D	Noridur	1.4593/1.4517 / A995 CD4MCuN
14	Impeller material		
	G	Cast iron	EN-GJL 250 / A48 CL35B
	C	Stainless steel	1.4408 / A743 CF8M
	D	Noridur	1.4593/1.4517 / A995 CD4MCuN
15	Design		
	-	Standard	
	X	Non-standard (BT3D, BT3)	
16	Installation type		
	D	Dry (cantilever design)	
	W	Wet (with plain bearing)	
17	Scope of supply		
	C	Pump and coupling	
	D	Pump set	
18	Sealing element		
	L	Lip seal	
	C	Cartridge mechanical seal	
19	Bearing lubrication		

Position	Code	Description
19	0	Fluid handled
	1	External liquid
	2	By electric grease pump
20	Explosion protection status	
	-	Non-explosion-proof
	A	Explosion-proof
21-22	Riser design	
	0D	DN discharge nozzle, with DIN upper flange
	1D	DN discharge nozzle + 1 nominal size, with DIN upper flange
	2D	DN discharge nozzle + 2 nominal sizes, with DIN upper flange
	0A	DN discharge nozzle, with ANSI upper flange
	1A	DN discharge nozzle + 1 nominal size, with ANSI upper flange
	2A	DN discharge nozzle + 2 nominal sizes, with ANSI upper flange
23-26	Immersion depth [mm]	
27	Suction option	
	-	Suction flange without suction strainer and without bellmouth
	S	Suction strainer
	B	Bellmouth
	X	Suction pipe with or without strainer
28	Bearing size	
	4	VCS 40
	5	VCS 50
	6	VCS 60
	8	VCS 80
29	Bearing lubrication	
	L	Grease-packed for life
	G	Re-greasable
30-33	Motor rating P_N [kW]	
	-	Without motor
	0007	0,75
	...	...
	1320	132,00
34	Frequency [Hz]	
	E	50
	A	60
35	Number of motor poles	
36	Product generation	
	B	Estigia from 2017
37-40	Automation	
	PD2-	PumpDrive 2
	PD2E	PumpDrive 2 Eco
	-NPD	Without PumpDrive

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4.4 Name plate

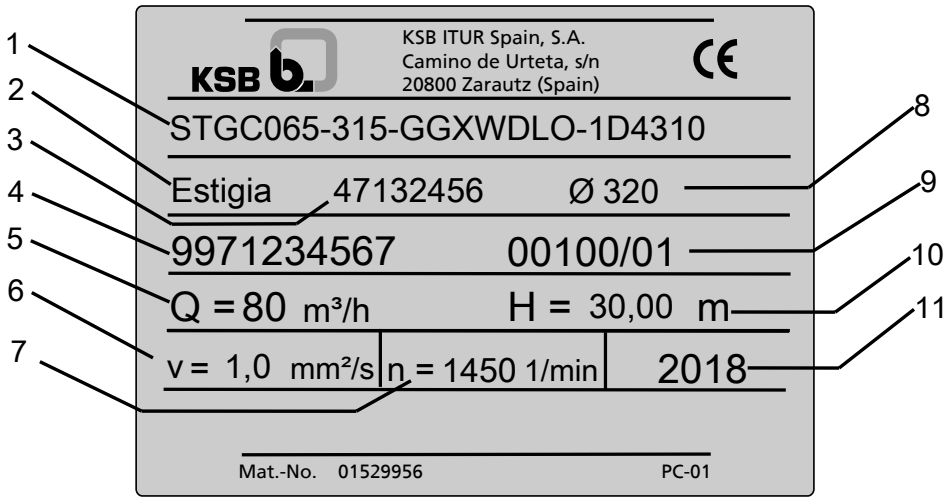

Fig. 2: Name plate

1	Type series code, size and version	7	Speed
2	Type series	8	Nominal impeller diameter
3	Material number	9	KSB order item number
4	KSB order number	10	Head
5	Flow rate	11	Year of construction
6	Kinematic viscosity of the fluid handled		

4.5 Design details

Design

- Volute casing pump
- For vertical installation in closed tanks under atmospheric pressure
- Single-stage
- In accordance with DIN EN ISO 5199 (with comments)
- Coupling between pump and motor

Pump casing

- Radially split volute casing
- Volute casing with integrally cast pump feet
- Replaceable casing wear rings

Drive

- KSB surface-cooled IEC three-phase current squirrel-cage motor
- Type of construction IM V1
- Frequency 50 Hz/60 Hz
- Enclosure IP55
- Thermal class F with temperature sensor, 3 PTC thermistors
- Duty type: continuous duty S1

Shaft seal

- Cartridge seal
- Lip seal

Impeller type

- Various application-oriented impeller types

Bearings

- Various application-oriented bearings

Automation

Automation options:

- PumpDrive[3)]
- PumpMeter
- KSB SuPremE

4.6 Configuration and function

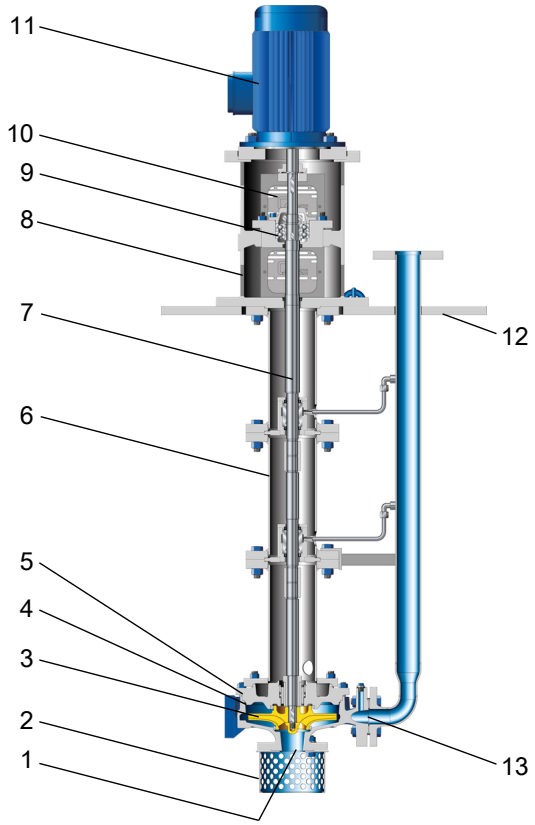

Fig. 3: Sectional drawing

1	Suction nozzle	8	Drive lantern
2	Strainer	9	Rolling element bearing
3	Impeller	10	Coupling
4	Pump casing	11	Motor
5	Casing cover	12	Cover plate
6	Support column	13	Discharge nozzle
7	Shaft		

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3 Consultation with KSB is required for operation on a frequency inverter.

Design The pump is designed with an axial fluid inlet and a radial fluid outlet. The hydraulic system is connected to the motor (11) via a coupling (10). On the rear side of the impeller (3) the shaft (7) enters the hydraulic system through the casing cover (5). The shaft (7) runs in rolling element bearings (9), which are supported by a drive lantern (8). The drive lantern (8) is connected to the pump casing (4) or casing cover (5), as applicable, via the support column (6). The pump set is mounted on a cover plate (12).
Thanks to the variable lengths of support column (6) and shaft (7) the pump set can be matched to different immersion depths.

Function The fluid enters the pump via the strainer (2) installed in the suction nozzle (1) and is accelerated outward by the rotating impeller (3). In the flow passage of the pump casing (4) the kinetic energy of the fluid is converted into pressure energy. The fluid is pumped to the discharge nozzle (13), where it leaves the pump.

Sealing Depending on the fluid handled, the pump is fitted with a lip seal or cartridge mechanical seal.

4.7 Bearings

Table 7: Overview of bearings used

Bearing size	Plain bearing		Double angular contact ball bearing [4)5)]
	Pump end	Intermediate[6)]	Drive end
VCS 40	SiC/SiC	PTFE-GF25	3307 2RS C3
VCS 50	SiC/SiC	PTFE-GF25	3310 2RS C3
VCS 60	SiC/SiC	PTFE-GF25	3312 2RS C3
VCS 80	SiC/SiC	PTFE-GF25	3314 2Z C3

The plain bearings are located in the casing cover of the pumps and, for pumps with several support column sections, in the intermediate couplings.

These bearings must always be lubricated and cooled. The bearings can be lubricated in any of the following three ways:

- Lubrication by fluid handled
  (To be used for clean and non-aggressive fluids without particles; no additional lubricant required).
- Lubrication by external liquid
  (An external auxiliary connection is provided in the cover plate on which the pump is mounted; clean water or another liquid that is compatible with the fluid handled is injected at a pressure of approximately 3 kg/cm² (pressure gauge)).
- Lubrication by electrically driven pump
  (The auxiliary pump is designed with a grease reservoir for lubricating the bearings. The auxiliary pump is maintenance-free; the reservoir must be filled with grease at all times.)

4.8 Scope of supply

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

- Pump
- Drive
- Cover plate
- Discharge line

For pump sets with cartridge seal:

- Assembly fixture

4 Grease-packed for life or re-greasable
5 Mainly for severely abrasive liquids and liquids with a high solids content
6 Can be lubricated by the fluid handled, by an external liquid or grease-lubricated by means of an electric grease pump

4.9 Dimensions and weights

4.9.1 Pump dimensions and immersion depths

Estigia with rectangular baseplate

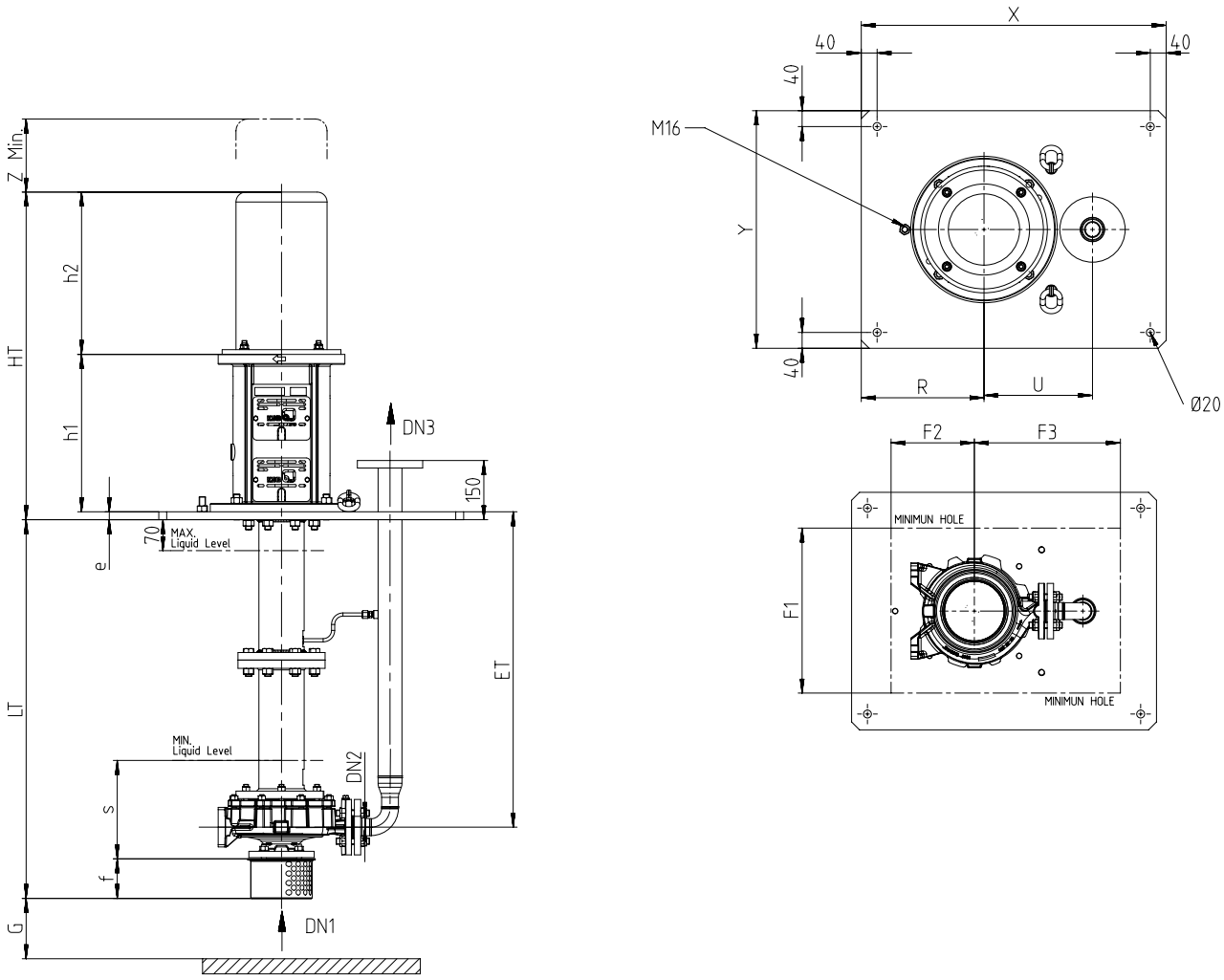

Fig. 4: Pump dimensions and immersion depths, rectangular baseplate

>: Minimum

<: Maximum

Table 8: Pump dimensions and immersion depths [mm] - rectangular baseplate

Size	Motor size	Bearing size	Possible immersion depth (ET)[7]	DN1	DN2	a	e	f min	F1 min	F2 min	F3 min[8]	G	LT	R	s min	U	X	Y
						[mm]												
25-160	≤ 280	VCS 40	A	40	25	80	20	100	340	182	318	40	ET+160	310	220	242	770	600
25-200	≤ 280	VCS 40	A	40	25	80	20	100	400	210	338	40	ET+160	310	220	262	770	600
32-125	≤ 280	VCS 40	A	50	32	80	20	100	330	162	316	50	ET+160	310	220	234	770	600
32-125.1	≤ 280	VCS 40	A	50	32	80	20	100	330	162	316	50	ET+160	310	220	234	770	600
32-160	≤ 280	VCS 40	A	50	32	80	20	100	360	182	336	50	ET+160	310	220	254	770	600
32-160.1	≤ 280	VCS 40	A	50	32	80	20	100	340	182	336	50	ET+160	310	220	254	770	600

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7 See Table: Possible immersion depths (ET) depending on number of support columns

8 Minimum dimension if maximum dimension is selected for DN3

Size	Motor size	Bearing size	Possible immersion depth (ET)[7]	DN1	DN2	a	e	f min	F1 min	F2 min	F3 min[8]	G	LT	R	s min	U	X	Y
						[mm]												
32-200	≤ 280	VCS 40	A	50	32	80	20	100	400	210	356	50	ET+160	310	220	274	770	600
32-200.1	≤ 280	VCS 40	A	50	32	80	20	100	400	210	356	50	ET+160	310	220	274	770	600
32-250	≤ 280	VCS 50	B	50	32	100	20	100	460	230	401	50	ET+180	375	270	319	980	740
32-250.1	≤ 280	VCS 50	B	50	32	100	20	100	450	230	401	50	ET+180	375	270	319	980	740
40-125	≤ 280	VCS 40	A	65	40	80	20	100	340	162	336	65	ET+160	350	220	246	890	630
40-160	≤ 280	VCS 40	A	65	40	80	20	100	340	182	356	65	ET+160	350	220	266	890	630
40-200	≤ 280	VCS 40	A	65	40	100	20	100	410	210	376	65	ET+180	350	240	286	890	630
40-250	≤ 280	VCS 50	B	65	40	100	20	100	460	230	421	65	ET+180	375	270	331	980	740
40-315	≤ 280	VCS 50	B	65	40	125	20	100	515	250	446	65	ET+205	375	295	356	980	740
50-125	≤ 280	VCS 40	A	80	50	100	20	100	370	182	381	80	ET+180	350	240	285	890	630
50-160	≤ 280	VCS 40	A	80	50	100	20	100	400	210	401	80	ET+180	350	240	305	890	630
50-200	≤ 280	VCS 40	A	80	50	100	20	100	430	210	421	80	ET+180	350	240	325	890	630
50-250	≤ 280	VCS 50	B	80	50	125	20	100	480	230	446	80	ET+205	375	295	350	980	740
50-315	≤ 280	VCS 50	B	80	50	125	20	100	540	275	501	80	ET+205	375	295	405	980	740
65-125	≤ 280	VCS 40	A	100	65	100	20	100	400	210	432	100	ET+180	350	240	324	890	630
65-160	≤ 280	VCS 50	B	100	65	100	20	100	420	210	452	100	ET+180	375	270	344	1100	750
65-200	≤ 280	VCS 50	B	100	65	100	20	100	460	230	477	100	ET+180	375	270	369	1100	750
65-250	≤ 280	VCS 50	B	100	80	125	20	100	500	250	502	100	ET+205	375	295	394	1100	750
65-315	≤ 280	VCS 60	B	100	65	100	20	100	560	275	532	100	ET+205	430	295	424	1260	870
65-315	≥ 315	VCS 80	B	100	65	100	30	100	560	275	532	100	ET+205	465	295	424	1340	850
80-160	≤ 280	VCS 50	B	125	80	125	20	150	460	230	515	125	ET+255	375	295	393	1100	750
80-200	≤ 280	VCS 50	B	125	80	125	20	150	480	230	540	125	ET+255	375	295	418	1100	750
80-250	≤ 280	VCS 50	B	125	80	125	20	150	520	275	570	125	ET+255	375	295	448	1100	750
80-250	≥ 315	VCS 80	B	125	80	125	30	150	520	275	570	125	ET+255	465	295	448	1340	850
80-315	≤ 280	VCS 60	B	125	80	125	20	150	590	300	605	125	ET+255	430	295	483	1260	870
80-315	≥ 315	VCS 80	B	125	80	125	30	150	590	300	605	125	ET+255	465	295	483	1340	850
80-400	≤ 280	VCS 60	B	125	80	125	20	150	660	330	645	125	ET+255	430	295	523	1260	870
100-160	≤ 280	VCS 50	B	125	100	125	20	150	550	250	624	125	ET+255	375	295	488	1100	750
100-160	≥ 315	VCS 80	B	125	100	125	30	150	550	250	624	125	ET+255	465	295	488	1340	850
100-200	≤ 280	VCS 50	B	125	100	125	20	150	530	250	624	125	ET+255	375	295	488	1100	750
100-200	≥ 315	VCS 80	B	125	100	125	30	150	530	250	624	125	ET+255	465	295	488	1340	850
100-250	≤ 280	VCS 60	B	125	100	140	20	150	540	275	624	125	ET+270	430	310	488	1260	870
100-250	≥ 315	VCS 80	B	125	100	140	30	150	540	275	624	125	ET+270	465	310	488	1340	850
100-315	≤ 280	VCS 60	B	125	100	140	20	150	610	300	659	125	ET+270	430	310	523	1260	870
100-315	≥ 315	VCS 80	B	125	100	140	30	150	610	300	659	125	ET+270	465	310	523	1340	850
100-400	≤ 280	VCS 60	B	125	100	140	20	150	670	330	699	125	ET+270	430	310	563	1260	870
125-200	≤ 280	VCS 60	B	150	125	140	20	150	590	300	726	150	ET+270	430	310	564	1260	870
125-200	≥ 315	VCS 80	B	125	125	140	30	150	590	300	726	150	ET+270	465	310	564	1340	850
125-250	≤ 280	VCS 60	B	150	125	140	20	150	650	300	766	150	ET+270	465	310	604	1445	930
125-250	≥ 315	VCS 80	B	125	125	140	30	150	650	300	766	150	ET+270	465	310	604	1340	850
125-315	≤ 280	VCS 60	B	150	125	140	20	150	660	330	766	150	ET+270	465	310	604	1445	930
125-315	≥ 315	VCS 80	B	150	125	140	30	150	660	330	766	150	ET+270	465	310	604	1340	850
125-400	≤ 280	VCS 60	B	150	150	140	20	150	720	365	811	150	ET+270	465	310	649	1445	930
150-200	≤ 280	VCS 60	B	200	150	180	20	200	730	330	877	200	ET+360	465	350	688	1445	930
150-250	≤ 280	VCS 60	B	200	150	160	20	200	700	330	852	200	ET+340	465	330	663	1445	930
150-315	≤ 280	VCS 80	C	200	150	160	30	200	710	365	877	200	ET+330	525	450	688	1712	1100

Size	Motor size	Bearing size	Possible immersion depth (ET)[7]	DN1	DN2	a	e	f min	F1 min	F2 min	F3 min[8]	G	LT	R	s min	U	X	Y
						[mm]												
150-315	≥ 315	VCS 80	C	200	150	160	30	200	710	365	877	200	ET+330	525	450	688	1712	1100
150-400	≤ 280	VCS 80	C	200	150	160	30	200	770	365	927	200	ET+330	525	450	738	1712	1100
150-400	≥ 315	VCS 80	C	200	150	160	30	200	770	365	927	200	ET+330	525	450	738	1712	1100

Table 9: Possible immersion depths (ET) depending on number of support columns

Number of support columns	Possible immersion depth (ET)		
	A	B	C
[Qty]	[mm]		
1	692	715	729
1	842	865	879
1	1092	1115	1129
1	1292	1315	1329
1	1429	1452	1466
1	1593	1616	1630
1	1843	1866	1880
1	2093	2116	2130
2	2312	2335	2349
2	2512	2535	2549
2	2613	2636	2650
2	2786	2809	2769
2	2813	2836	2850
2	2950	2973	2987
2	3114	3137	3151
2	3313	3336	3350
2	3450	3473	3487
2	3614	3637	3651
2	3864	3887	3901
2	4114	4137	4151
3	4143	4166	4180
3	4170	4193	4207
3	4307	4330	4344
3	4471	4494	4508
3	4557	4580	4594
3	4635	4658	4672
3	4721	4744	4758
3	4885	4908	4922
3	5135	5158	5172
3	5385	5408	5422
3	5635	5658	5672
3	5885	5908	5922
3	6135	6158	6172

Estigia with round baseplate

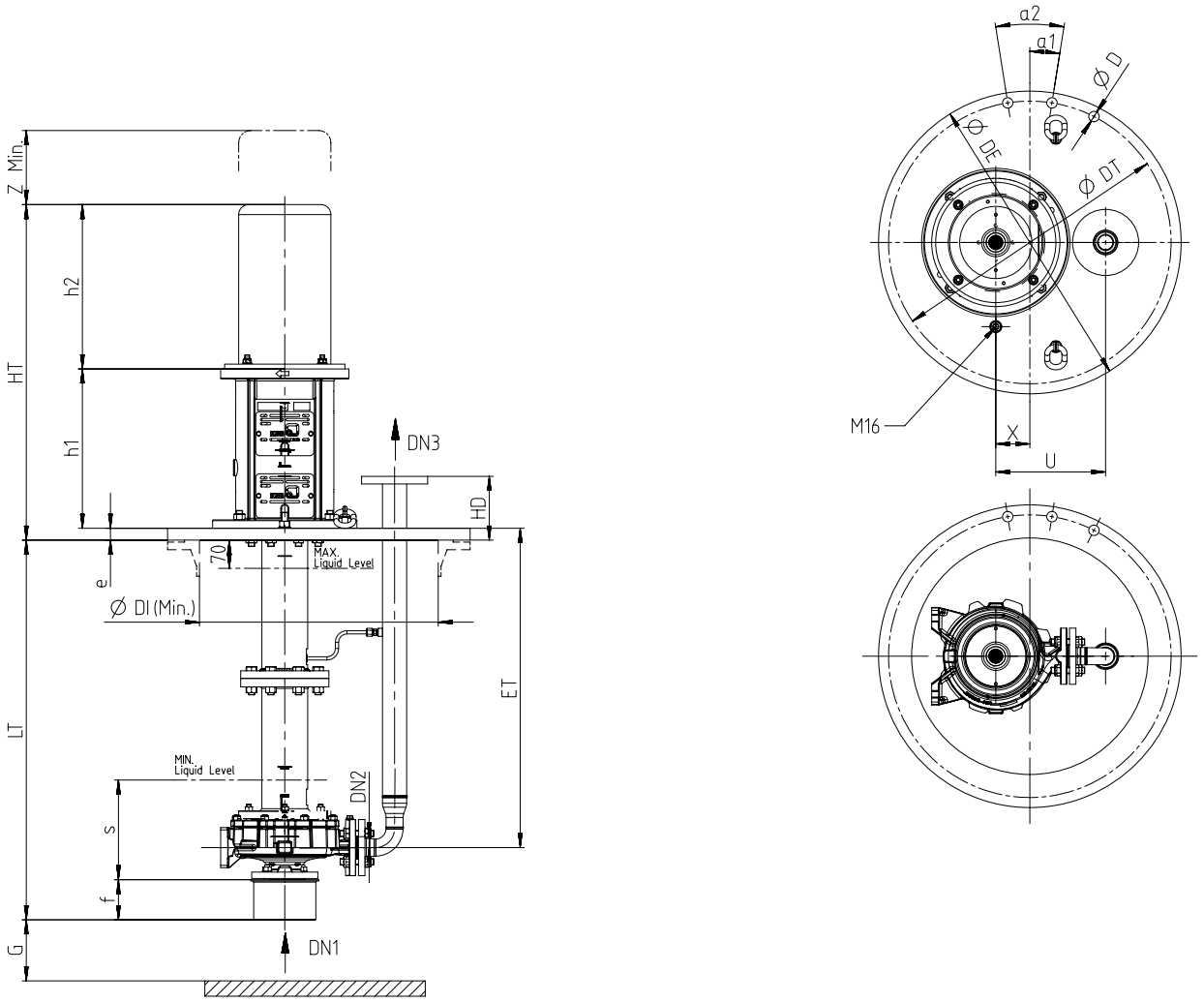

Fig. 5: Pump dimensions and immersion depths, round baseplate

>: Minimum

<: Maximum

Table 10: Pump nominal sizes - round baseplate

Size	Motor size	Bearing size	DN 500	DN 600	DN 700	DN 800	DN 900	DN 1000	DN 1200	DN 1400	DN 1600	DN 1800
25-160	≤280	VSC 40	*	*	*							
25-200	≤280	VSC 40		*	*	*						
32-125	≤280	VSC 40	*	*	*							
32-125.1	≤280	VSC 40	*	*	*							
32-160	≤280	VSC 40	*	*	*							
32-160.1	≤280	VSC 40	*	*	*							
32-200	≤280	VSC 40		*	*	*						
32-200.1	≤280	VSC 40		*	*	*						
32-250	≤280	VSC 50			*	*	*					
32-250.1	≤280	VSC 50			*	*	*					
40-125	≤280	VSC 40		*	*	*						

Size	Motor size	Bearing size	DN 500	DN 600	DN 700	DN 800	DN 900	DN 1000	DN 1200	DN 1400	DN 1600	DN 1800
40-160	≤280	VSC 40		*	*	*						
40-200	≤280	VSC 40		*	*	*						
40-250	≤280	VSC 50			*	*	*					
40-315	≤280	VSC 50			*	*	*					
50-125	≤280	VSC 40		*	*	*						
50-160	≤280	VSC 40		*	*	*						
50-200	≤280	VSC 40		*	*	*						
50-250	≤280	VSC 50			*	*	*					
50-315	≤280	VSC 50				*	*	*				
65-125	≤280	VSC 40			*	*	*					
65-160	≤280	VSC 50			*	*	*					
65-200	≤280	VSC 50				*	*	*				
65-250	≤280	VSC 50				*	*	*				
65-315	≤280	VSC 60					*	*	*			
65-315	≥315	VSC 80					*	*	*			
80-160	≤280	VSC 50				*	*	*				
80-200	≤280	VSC 50				*	*	*				
80-250	≤280	VSC 50					*	*	*			
80-250	≥315	VSC 80					*	*	*			
80-315	≤280	VSC 60						*	*	*		
80-315	≥315	VSC 80						*	*	*		
80-400	≤280	VSC 60						*	*	*		
100-160	≤280	VSC 50					*	*	*			
100-160	≥315	VSC 80					*	*	*			
100-200	≤280	VSC 50					*	*	*			
100-200	≥315	VSC 80					*	*	*			
100-250	≤280	VSC 60					*	*	*			
100-250	≥315	VSC 80					*	*	*			
100-315	≤280	VSC 60						*	*	*		
100-315	≥315	VSC 80						*	*	*		
100-400	≤280	VSC 60							*	*	*	
125-200	≤280	VSC 60							*	*	*	
125-200	≥315	VSC 80							*	*	*	
125-250	≤280	VSC 60							*	*	*	
125-250	≥315	VSC 80							*	*	*	
125-315	≤280	VSC 60							*	*	*	
125-315	≥315	VSC 80							*	*	*	
125-400	≤280	VSC 60							*	*	*	
150-200	≤280	VSC 60								*	*	*
150-250	≤280	VSC 60								*	*	*
150-315	≤280	VSC 80								*	*	*
150-315	≥315	VSC 80								*	*	*
150-400	≤280	VSC 80								*	*	*
150-400	≥315	VSC 80								*	*	*

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Flange: DN $_{min}$	DE	DT	DI	NT	D	a1	a2	Maximum difference in pressures inside and outside of the tank[9)]
DN500	645	600	494	20	22	9	18	0.500 bar
DN600	755	705	595	20	26	9	18	0.500 bar
DN700	860	810	697	24	26	7,5	15	0.500 bar
DN800	975	920	800	24	30	7,5	15	0.410 bar
DN900	1075	1020	900	24	30	7,5	15	0.330 bar
DN1000	1175	1120	1000	28	30	6,428	12,856	0.270 bar
DN1200	1405	1340	1203	32	33	5,625	11,25	0.200 bar
DN1400	1630	1560	1406	36	36	5	10	0.150 bar
DN1600	1830	1760	1602	40	36	4,5	9	0.120 bar
DN1800	2045	1970	1800	44	39	4,09	8,18	0.100 bar

9 Only for atmospheric or slightly pressurised tanks. The pump is not designed for use in tanks under vacuum. The pressure inside the tank must always be equal to the pressure outside the tank. The maximum difference of the pressures inside and outside of the tank is specified in the column, i.e. the pressure inside the tank must always be higher than the pressure outside the tank.

Table 11: Pump dimensions and immersion depths [mm] - round baseplate

Size	Motor size	Bearing size	Possible immersion depth (ET)[10]	DN1	DN2	a	e	f min	G	LT	s min	U	X
						[mm]							
25-160	≤ 280	VCS 40	A	40	25	80	30	100	40	ET+150	220	242	770
25-200	≤ 280	VCS 40	A	40	25	80	30	100	40	ET+150	220	262	770
32-125	≤ 280	VCS 40	A	50	32	80	30	100	50	ET+150	220	234	770
32-125.1	≤ 280	VCS 40	A	50	32	80	30	100	50	ET+150	220	234	770
32-160	≤ 280	VCS 40	A	50	32	80	30	100	50	ET+150	220	254	770
32-160.1	≤ 280	VCS 40	A	50	32	80	30	100	50	ET+150	220	254	770
32-200	≤ 280	VCS 40	A	50	32	80	30	100	50	ET+150	220	274	770
32-200.1	≤ 280	VCS 40	A	50	32	80	30	100	50	ET+150	220	274	770
32-250	≤ 280	VCS 50	B	50	32	100	30	100	50	ET+170	270	319	980
32-250.1	≤ 280	VCS 50	B	50	32	100	30	100	50	ET+170	270	319	980
40-125	≤ 280	VCS 40	A	65	40	80	30	100	65	ET+150	220	246	890
40-160	≤ 280	VCS 40	A	65	40	80	30	100	65	ET+150	220	266	890
40-200	≤ 280	VCS 40	A	65	40	100	30	100	65	ET+170	240	286	890
40-250	≤ 280	VCS 50	B	65	40	100	30	100	65	ET+170	270	331	980
40-315	≤ 280	VCS 50	B	65	40	125	30	100	65	ET+195	295	356	980
50-125	≤ 280	VCS 40	A	80	50	100	30	100	80	ET+170	240	285	890
50-160	≤ 280	VCS 40	A	80	50	100	30	100	80	ET+170	240	305	890
50-200	≤ 280	VCS 40	A	80	50	100	30	100	80	ET+170	240	325	890
50-250	≤ 280	VCS 50	B	80	50	125	30	100	80	ET+195	295	350	980
50-315	≤ 280	VCS 50	B	80	50	125	30	100	80	ET+195	295	405	980
65-125	≤ 280	VCS 40	A	100	65	100	30	100	100	ET+170	240	324	890
65-160	≤ 280	VCS 50	B	100	65	100	30	100	100	ET+170	270	344	1100
65-200	≤ 280	VCS 50	B	100	65	100	30	100	100	ET+170	270	369	1100
65-250	≤ 280	VCS 50	B	100	80	125	30	100	100	ET+195	295	394	1100
65-315	≤ 280	VCS 60	B	100	65	100	30	100	100	ET+205	295	424	1260
65-315	≥ 315	VCS 80	B	100	65	100	30	100	100	ET+195	295	424	1340
80-160	≤ 280	VCS 50	B	125	80	125	30	150	125	ET+245	295	393	1100
80-200	≤ 280	VCS 50	B	125	80	125	30	150	125	ET+245	295	418	1100
80-250	≤ 280	VCS 50	B	125	80	125	30	150	125	ET+255	295	448	1100
80-250	≥ 315	VCS 80	B	125	80	125	30	150	125	ET+245	295	448	1340
80-315	≤ 280	VCS 60	B	125	80	125	30	150	125	ET+255	295	483	1260
80-315	≥ 315	VCS 80	B	125	80	125	30	150	125	ET+245	295	483	1340
80-400	≤ 280	VCS 60	B	125	80	125	30	150	125	ET+245	295	523	1260
100-160	≤ 280	VCS 50	B	125	100	125	30	150	125	ET+255	295	488	1100
100-160	≥ 315	VCS 80	B	125	100	125	30	150	125	ET+245	295	488	1340
100-200	≤ 280	VCS 50	B	125	100	125	30	150	125	ET+255	295	488	1100
100-200	≥ 315	VCS 80	B	125	100	125	30	150	125	ET+245	295	488	1340
100-250	≤ 280	VCS 60	B	125	100	140	30	150	125	ET+270	310	488	1260
100-250	≥ 315	VCS 80	B	125	100	140	30	150	125	ET+260	310	488	1340
100-315	≤ 280	VCS 60	B	125	100	140	30	150	125	ET+270	310	523	1260
100-315	≥ 315	VCS 80	B	125	100	140	30	150	125	ET+260	310	523	1340
100-400	≤ 280	VCS 60	B	125	100	140	30	150	125	ET+260	310	563	1260
125-200	≤ 280	VCS 60	B	150	125	140	30	150	150	ET+270	310	564	1260

[10] See Table: Possible immersion depths (ET) depending on number of support columns

Size	Motor size	Bearing size	Possible immersion depth (ET)[10]	DN1	DN2	a	e	f min	G	LT	s min	U	X
						[mm]							
125-200	≥ 315	VCS 80	B	125	125	140	30	150	150	ET+260	310	564	1340
125-250	≤ 280	VCS 60	B	150	125	140	30	150	150	ET+270	310	604	1445
125-250	≥ 315	VCS 80	B	125	125	140	30	150	150	ET+260	310	604	1340
125-315	≤ 280	VCS 60	B	150	125	140	30	150	150	ET+270	310	604	1445
125-315	≥ 315	VCS 80	B	150	125	140	30	150	150	ET+260	310	604	1340
125-400	≤ 280	VCS 60	B	150	150	140	30	150	150	ET+260	310	649	1445
150-200	≤ 280	VCS 60	B	200	150	180	30	200	200	ET+260	350	688	1445
150-250	≤ 280	VCS 60	B	200	150	160	30	200	200	ET+330	330	663	1445
150-315	≤ 280	VCS 80	C	200	150	160	30	200	200	ET+330	450	688	1712
150-315	≥ 315	VCS 80	C	200	150	160	30	200	200	ET+330	450	688	1712
150-400	≤ 280	VCS 80	C	200	150	160	30	200	200	ET+330	450	738	1712
150-400	≥ 315	VCS 80	C	200	150	160	30	200	200	ET+330	450	738	1712

Table 12: Possible immersion depths (ET) depending on number of support columns

Number of support columns	Possible immersion depth (ET)		
	A	B	C
[Qty]	[mm]		
1	692	715	729
1	842	865	879
1	1092	1115	1129
1	1292	1315	1329
1	1429	1452	1466
1	1593	1616	1630
1	1843	1866	1880
1	2093	2116	2130
2	2312	2335	2349
2	2512	2535	2549
2	2613	2636	2650
2	2786	2809	2769
2	2813	2836	2850
2	2950	2973	2987
2	3114	3137	3151
2	3313	3336	3350
2	3450	3473	3487
2	3614	3637	3651
2	3864	3887	3901
2	4114	4137	4151
3	4143	4166	4180
3	4170	4193	4207
3	4307	4330	4344
3	4471	4494	4508
3	4557	4580	4594
3	4635	4658	4672
3	4721	4744	4758
3	4885	4908	4922
3	5135	5158	5172
3	5385	5408	5422

Number of support columns	Possible immersion depth (ET)		
	A	B	C
[Qty]	[mm]		
3	5635	5658	5672
3	5885	5908	5922
3	6135	6158	6172

4.9.2 Motor dimensions

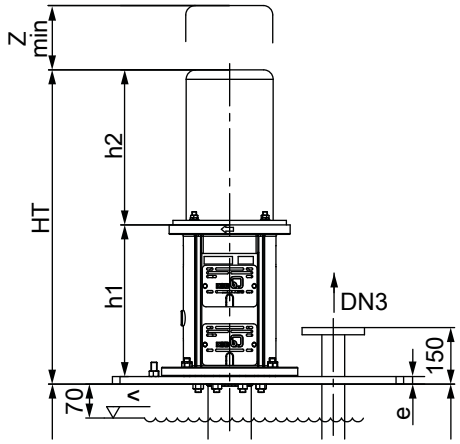

Fig. 6: Motor dimensions

<: Maximum

Table 13: Motor dimensions [mm]

Motor size	Number of Poles		Z min	h2[11]	VCS 40				VCS 50 / 60				VCS 80			
	2	4			h1	e[12]	e[13]	HT[11]	h1	e[12]	e[13]	HT[11]	h1	e[12]	e[13]	HT[11]
					[mm]											
90L	✘	✘	100	297	368	20	30	685	-	-	-	-	-	-	-	-
90S	✘	✘	100	297	368	20	30	685	-	-	-	-	-	-	-	-
100L	✘	✘	110	335	378	20	30	733	463	20	30	818	-	-	-	-
112M	✘	✘	110	333	378	20	30	731	463	20	30	816	-	-	-	-
132S	✘	✘	130	385	398	20	30	803	483	20	30	888	-	-	-	-
132M	✘	✘	130	410	398	20	30	828	483	20	30	913	-	-	-	-
160M	✘	✘	160	494	428	20	30	942	513	20	30	1027	515	30	30	1039
160L	✘	✘	160	532	428	20	30	980	513	20	30	1065	515	30	30	1077
180M	✘	✘	160	602	428	20	30	1050	513	20	30	1135	515	30	30	1147
180L	✘	✘	160	602	428	20	30	1050	513	20	30	1135	515	30	30	1147
200L	✘	✘	160	660	-	-	-	-	513	20	30	1193	515	30	30	1205
225S	✘	-	160	746	-	-	-	-	513	20	30	1279	515	30	30	1291
225M	✘	-	160	746	-	-	-	-	513	20	30	1279	515	30	30	1291
225S	-	✘	190	746	-	-	-	-	543	20	30	1309	545	30	30	1321
225M	-	✘	190	746	-	-	-	-	543	20	30	1309	545	30	30	1321
250M	✘	✘	190	825	-	-	-	-	543	20	30	1388	545	30	30	1400
280S	✘	✘	190	820	-	-	-	-	543	20	30	1383	545	30	30	1395
280M	✘	✘	190	931	-	-	-	-	543	20	30	1494	545	30	30	1506

11 Depending on motor manufacturer
12 Rectangular baseplate
13 Round baseplate

Motor size	Number of Poles		Z min	h2[11)]	VCS 40				VCS 50 / 60				VCS 80			
	2	4			h1	e[12)]	e[13)]	HT[11)]	h1	e[12)]	e[13)]	HT[11)]	h1	e[12)]	e[13)]	HT[11)]
					[mm]											
315S	✘	-	190	932	-	-	-	-	-	-	-	-	545	30	30	1507
315M	✘	-	190	1104	-	-	-	-	-	-	-	-	545	30	30	1679
315L	✘	-	190	1092	-	-	-	-	-	-	-	-	545	30	30	1667
315S	-	✘	220	932	-	-	-	-	-	-	-	-	575	30	30	1537
315M	-	✘	220	1104	-	-	-	-	-	-	-	-	575	30	30	1709
315L	-	✘	220	1092	-	-	-	-	-	-	-	-	575	30	30	1697
355S	-	✘	260	1177	-	-	-	-	-	-	-	-	615	30	30	1822
355M	-	✘	260	1237	-	-	-	-	-	-	-	-	615	30	30	1882
355L	-	✘	260	1237	-	-	-	-	-	-	-	-	615	30	30	1882

4.9.3 Weights

For weights refer to the general arrangement drawing / outline drawing of the pump (set).

5 Installation at Site

5.1 Safety regulations

DANGER

Installing electric equipment (motors) in potentially explosive atmospheres

Explosion hazard!

- Comply with the applicable local explosion protection regulations.
- Verify the test certificate of the motor.
- Keep the test certificate close to the location of operation (e.g. in the foreman's office).

5.2 Checks to be carried out prior to installation

Check the structural requirements.
The structural work required must have been prepared in accordance with the dimensions stated in the outline drawing and/or general arrangement drawing.

Check the operating data.
Before installing the pump set, verify that the name plate data matches the data given in the purchase order and the site system data.

NOTE

Observe the recommendations by the Hydraulic Institute regarding the construction of wells to prevent undesirable operating behaviour (vortex formation etc).

5.3 Installing the pump set

Foundation

Cover plate 68-3.01 serves as a foundation on which the pump set is fastened. This cover plate covers the tank opening completely.

Installing the pump

1. Carefully align the support for the cover plate.
2. Align the upper flange of the support column with a spirit level.
3. Make adjustments between cover plate and tank edge if required.

If the pump is installed without suction strainer, observe a minimum distance G to the tank floor. (⇨ Section 4.9.1, Page 20)

Mounting the motor

✓ The motor's direction of rotation has been checked and corrected if necessary. (⇨ Section 5.6, Page 33)

1. Mount the motor.
2. Bolt the motor to the drive lantern.

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Installing the coupling

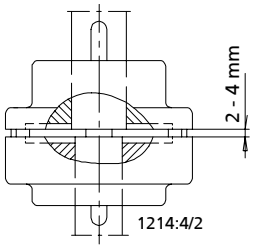

Fig. 7: Coupling clearance

✓ The coupling is torsionally flexible and dampens shock and vibrations.

✓ The motor has been mounted on the drive lantern.

1. Secure both coupling halves on the respective shaft ends using a grub screw each.
   The clearance between the two coupling halves must range between 2 and max. 4 mm.

5.4 Piping

5.4.1 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.

✓ The nominal diameters of the pipelines are at least equal to the nominal diameters of the pump nozzles.

✓ To prevent excessive pressure losses, adapters to larger diameters have a diffuser angle of approx. 8°.

✓ The pipeline is anchored in close proximity to the discharge flange and connected without transmitting any stresses or strains. Its weight must not be carried by the pump discharge flange.

1. Thoroughly clean, flush and blow through all vessels, pipelines and connections (especially of new installations).
2. Check that the coupling and shaft can easily be rotated by hand.

5.4.2 Permissible forces and moments at the pump nozzles

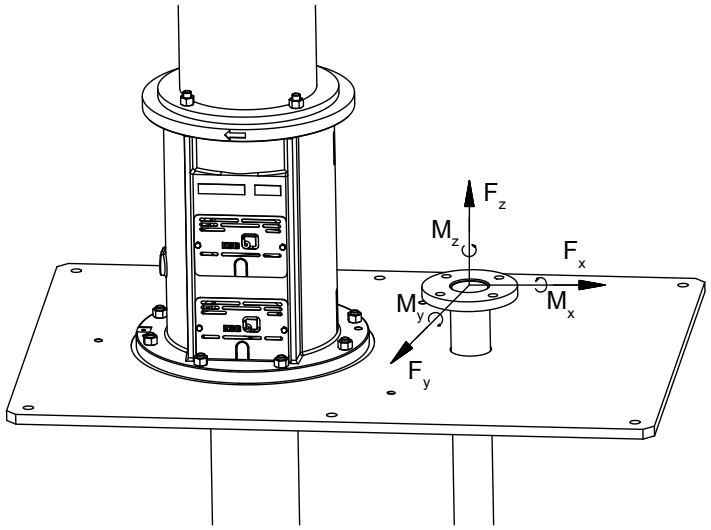

Fig. 8: Forces and moments at the pump nozzles

The data on forces and moments apply to static piping loads only. The values are only applicable if the pump set is bolted to a rigid and level foundation.

Table 14: Forces and moments at the pump nozzles

DN_3	F_x	F_y	F_z	M_x	M_y	M_z
	[N]	[N]	[N]	[Nm]	[Nm]	[Nm]
25	394	368	446	280	70	140
30	473	446	551	420	175	245
40	578	525	656	504	252	347
50	788	709	866	630	350	455
65	971	893	1103	700	420	490
80	1181	1076	1313	770	455	560
100	1575	1418	1759	875	525	665
125	1864	1680	2074	1120	700	980
150	2363	2126	2625	1400	875	1085
200	3150	2838	3518	1925	1260	1505
250	3911	3544	4384	2765	1855	2205
300	4699	4226	5250	3885	2660	3115
350	5486	4935	6116	5075	3500	4095

5.5 Electrical connection

DANGER

Electrical connection work by unqualified personnel

Risk of fatal injury due to electric shock!

- Always have the electrical connections installed by a trained and qualified electrician.
- Observe regulations IEC 60364 and, for explosion-proof models, IEC 60079.

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⚠ 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 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.

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 or rotation of the motor and pump is clockwise (seen from the drive end).

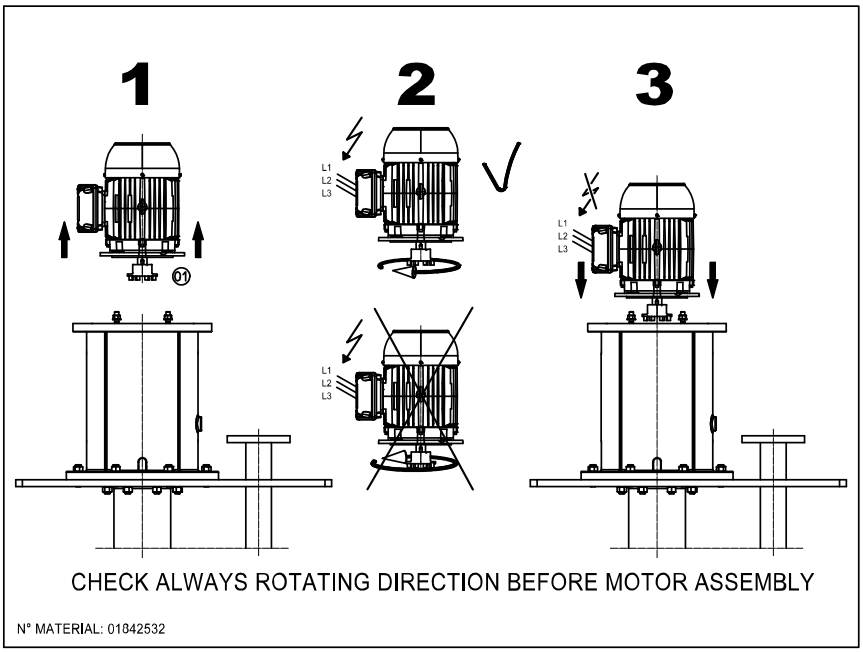

Fig. 9: Checking the direction of rotation of the motor

1. Start the motor and stop it again immediately to determine the motor's direction of rotation.
2. Check the direction of rotation.
   The motor's direction of rotation must match the arrow indicating the direction of rotation on the pump.
3. If the motor is running in the wrong direction of rotation, check the electrical connection of the motor and 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 32)
- The minimum fluid level has been reached. (⇨ Section 4.9.1, Page 20)
- The direction of rotation has been checked.
- All auxiliary connections required are connected and operational.
- The lubricants have been checked. (⇨ Section 7.2.3, Page 44)
- After prolonged shutdown of the pump (set), the activities required for returning the equipment to service have been carried out. (⇨ Section 6.4, Page 39)

6.1.2 Priming and venting the pump

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.
- ▷ 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.
- ▷ Never operate the pump set at less than the minimum immersion depth.
- ▷ Provide an appropriate monitoring system.

DANGER

Excessive temperatures due to insufficient lubrication

Explosion hazard!

Damage to the pump set!

- ▷ Never operate the pump set without liquid fill.
- ▷ Set the required pressure for the barrier fluid and the external lubricating liquid.
- ▷ Always operate the pump within the permissible operating range.

CAUTION

Increased wear due to dry running

Damage to the pump set!

- ▷ Never operate the pump set at less than the minimum immersion depth.

The liquid level must be higher than the minimum immersion depth and max. 70 mm below the cover plate. (⇨ Section 4.9.1, Page 20)

1. Vent the pump and suction line and prime both with the fluid to be handled.
2. Fully open the shut-off element in the suction line.

6.1.3 Start-up

DANGER

Non-compliance with the permissible pressure and temperature limits due to a clogged intake or if the pump is operated with the discharge line closed.

Explosion hazard!

Leakage of hot fluids!

- ▷ Never operate the pump with the shut-off elements in the discharge line closed.
- ▷ Only start up the pump set against a slightly or completely open discharge-side shut-off element.
- ▷ Make sure that the intake area is clean and free from foreign objects.

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 inlet area has been cleaned.
- ✓ The pump has been vented and primed with the fluid to be handled.
- ✓ The vent lines have been closed.
- ✓ If an external lubricant is used, it has been pressurised correctly.

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. Close or slightly open the shut-off element in the discharge line.
2. Start up the motor.
3. 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.

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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

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.

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	40 °C
Minimum	See data sheet.

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:

To prevent high temperature increases in the motor and excessive loads on the pump, coupling, motor, seals and bearings, do not exceed 10 starts per hour [h].

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.

6.2.3 Fluid handled

6.2.3.1 Flow rate

Table 17: Flow rate Q

Operating period	Flow rate Q	
	Min.	Max.
For a short period (approximately 2 minutes)	≈ 25 % of Q_{BEP} [14)]	See hydraulic characteristic curves
Continuous duty	$Q_{Part\ load}$ ≥ 50 % of Q_{BEP} [14)]	

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.

14 Best efficiency point

	**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 Fluid temperature

	**CAUTION** **Lubricant washed out of the bearing by vaporisation of the fluid handled** Damage to the bearings! ▷ Never exceed the fluid temperature of 100 °C. ▷ The fluid temperature must remain at least 5 °C below the boiling point.

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.
   ⇨ This will prevent the formation of deposits within the pump and the pump intake area.

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

✓ The pump has been properly drained. (⇨ Section 7.3, Page 46)

✓ The safety instructions for dismantling the pump have been observed.

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

1. Spray-coat the inside wall of the pump casing and, in particular, the impeller clearance areas with a preservative.
2. Spray the preservative through the suction nozzle and discharge nozzle.
   It is advisable to then close the pump nozzles (e.g. with plastic caps).
3. Oil or grease all exposed machined parts and surfaces of the pump (with silicone-free oil and 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 35) (⇨ Section 6.2, Page 37)

In addition, carry out all servicing/maintenance operations before returning the pump (set) to service. (⇨ Section 7, Page 41)

⚠ 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.

6.5 Cleaning the pump set

CAUTION

Cleaning the pump set

Damage to the coupling and bearing!

- ▷ Never allow spray water to enter the coupling and bearing area through the bearing lantern's cover plate.

NOTE

For the electric motor observe the manufacturer´s product literature.

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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

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!

Risk of burns!

- ▷ Regularly check the lubricant level.
- ▷ Regularly check the rolling element bearings for running noises.

⚠ 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.

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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 37)

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.
- 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.
- Cooling system
  Take the pump out of service at least once a year to thoroughly clean the cooling system.
- 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 outside of the bearing bracket).

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 bearing bracket).

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 cover plates, plastic components and other guards of rotating parts for deformation and sufficient distance from rotating parts.

7.2.2.1 Checking the coupling

Check the flexible elements of the coupling. Replace the relevant parts in due time if there is any sign of wear and check the alignment.

If the distance between the half couplings needs adjusting, unscrew the grub screws. Make sure to fit and tighten the grub screws again after the adjustment.

7.2.2.2 Checking the clearances

If the clearances need to be checked, remove the impeller. If the clearance gap is larger or smaller than permitted (see the following table), replace casing wear rings 502.01 and/or 502.02.
The clearances given refer to the diameter.

Table 18: Clearances between impeller and casing / between impeller and casing cover depending on the material variant

Clearances	Material variant	
	GG	CC
As-new	0,3 mm	0,5 mm
Maximum permissible enlargement	0,9 mm	1,5 mm

7.2.3 Lubrication and lubricant change of rolling element bearings

DANGER

Excessive temperatures as a result of bearings running hot or defective bearing seals

Explosion hazard!

Fire hazard!

Damage to the pump set!

- ▷ Regularly check the rolling element bearings for running noises.

7.2.3.1 Grease lubrication

The bearings are packed with high-quality grease at the factory.

7.2.3.1.1 Intervals

Under normal conditions the grease-lubricated bearings will run for 15,000 operating hours or 2 years. Under unfavourable operating conditions (e.g. high room temperature, high atmospheric humidity, dust-laden air, aggressive industrial atmosphere etc.), check the bearings earlier and clean and relubricate them if required.

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7.2.3.1.2 Grease quality

Optimum grease properties for rolling element bearings

Table 19: Grease quality to DIN 51825

Soap basis	NLGI grade	Worked penetration at 25° C in mm/10	Drop point
Lithium	2 to 3	220-295	≥ 175 °C

- Free of resin and acid
- Not liable to crumble
- Rust-preventive characteristics

If required, the bearings may be lubricated with greases of other soap bases. Make sure to remove any old grease and rinse the bearings thoroughly.

7.2.3.1.3 Grease quantity

Shaft unit[15)]	Motor end	
	Code	Grease per bearing approx. [g]
VCS_40	3307 2RS C3	14
VCS_50	3310 2RS C3	14
VCS_60	3312 2RS C3	35
VCS_80	3314 2Z C3	48

7.2.3.1.4 Changing the grease

CAUTION

Mixing greases of differing soap bases

Changed lubricating qualities!

▷ Thoroughly clean the bearings.

▷ Adjust the re-lubrication intervals to the grease used.

✓ The pump has been dismantled for changing the grease.

1. Only half-fill the bearing cavities with grease.

7.2.4 Plain bearing lubrication

CAUTION

Pump set filled insufficiently

Lack of lubrication of product-lubricated plain bearings!

Dry running of the plain bearings!

▷ Monitor the pump set fill with a fill level monitoring device.

During operation the hydrodynamic plain bearings are lubricated by the fluid handled or the barrier fluid. Bearings must be checked for wear in the following cases:

- When the pump has been operated under dry-running or cavitation conditions, the bearings should be checked immediately if possible.
- Vibrations, noise and an increase in current input occurring during unchanged operating conditions indicate wear at the bearings (insufficient lubrication). Also check the bearings in this case.

15 Shaft unit see data sheet.

7.2.4.1 Grease lubrication

The bearings are packed with high-quality grease at the factory.

7.2.4.1.1 Grease quality

Optimum grease properties for plain bearings

Table 20: Grease quality to DIN 51502

Soap basis	NLGI grade	Class
Lithium	2 to 3	K2K

- Antioxidant additives

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. 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 cleaning record for the pump.

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.
- ▷ Close the shut-off elements in the 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 41)

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 62)

In case of damage you can always contact KSB Service.

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 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 general information / safety regulations for dismantling have been observed. (⇨ Section 7.4.1, Page 46)

✓ The pump set has been prepared accordingly. (⇨ Section 7.4.2, Page 47)

1. Undo and remove hexagon nuts 920.6, discs 550.6 and studs 902.6.
2. Take motor 800 off drive lantern 341.
3. If applicable, take intermediate lantern 146 off drive lantern 341.

7.4.4 Removing the complete pump set from the piping

✓ The general information / safety regulations for dismantling have been observed. (⇨ Section 7.4.1, Page 46)

✓ The pump set has been prepared accordingly. (⇨ Section 7.4.2, Page 47)

1. Remove studs 902.8 and nuts 920.8 from cover plate 68-3.
2. Remove the complete pump set with the cover plate from the tank opening.
3. Place the removed pump with cover plate 68-3.01 horizontally on a suitable surface in a clean and level assembly area.
4. Place a drip tray underneath the pump for collecting any escaping fluid.

7.4.5 Removing the riser

✓ The general information / safety regulations for dismantling have been observed. (⇨ Section 7.4.1, Page 46)

✓ The pump set has been prepared accordingly. (⇨ Section 7.4.2, Page 47)

1. If applicable, remove suction strainer 143 from the suction nozzle of the pump.
2. Undo and remove hexagon head bolts 901.11 and nuts 920.11.
3. Remove gasket 400 or profile seal 410.

7.4.6 Removing the volute casing

✓ The riser has been removed. (⇨ Section 7.4.5, Page 48)

1. Undo and remove nuts 920.1 and studs 902.1.
2. Remove volute casing 102.

7.4.7 Removing the impeller

✓ The volute casing has been removed. (⇨ Section 7.4.6, Page 48)

1. Undo impeller nut 922.
2. Remove impeller 230 and key 940.1.
3. If applicable, take washer 554.2 off pump shaft 211.
4. Carefully pull out the shaft sleeve.

7.4.8 Removing the casing cover

✓ The impeller has been removed. (⇨ Section 7.4.7, Page 48)

1. Undo and remove nuts 920.2 and studs 902.2.
2. Remove casing cover 161 from shaft 210 or pump shaft 211.

7.4.9 Removing the support column

✓ The casing cover has been removed. (⇨ Section 7.4.8, Page 48)

1. Remove the connections of the plain bearings.
2. Undo and remove hexagon head bolts 901.10 and nuts 920.10. Remove support columns 712.1 and 712.2.
3. Undo and remove nuts 920.3 and studs 902.3.
4. Remove support column 712.3 or 712.4 from drive lantern 341.
5. Remove shaft 210 or pump shaft 211 from coupling part 860.
6. Remove bearing carrier 382 with bearing bush 545.

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7.4.10 Removing the drive shaft

Version with lip seal

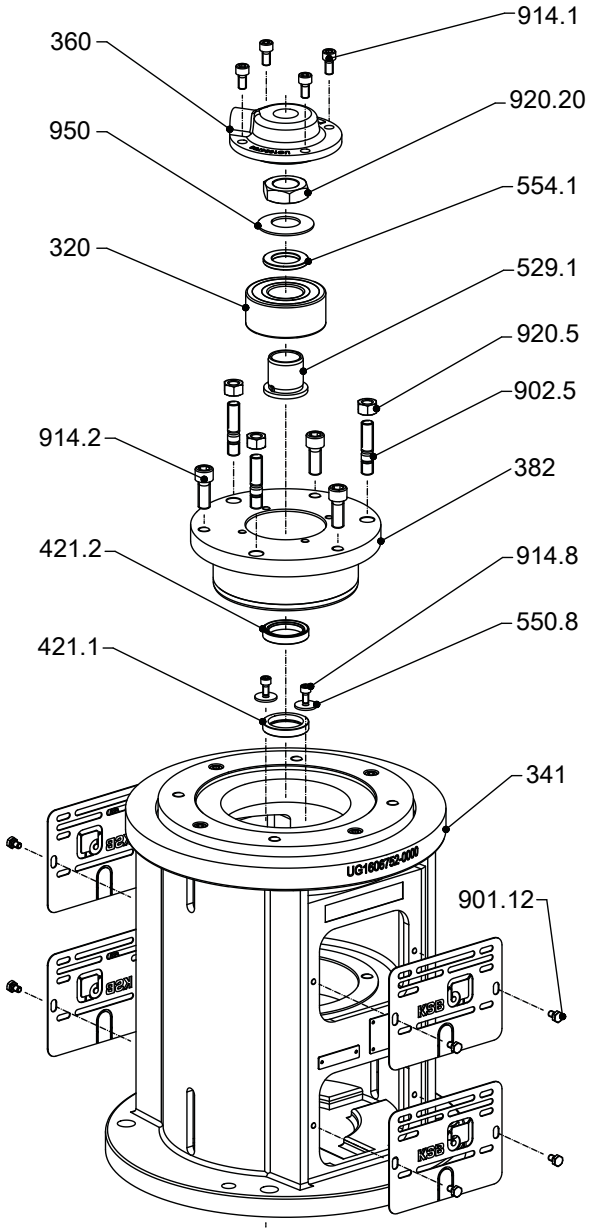

Fig. 10: Removing the drive shaft for version with lip seal

✓ The support column has been removed. (⇨ Section 7.4.9, Page 48)

1. Undo hexagon socket head cap screws 914.2.
2. Remove nuts 920.5 and studs 902.5.
3. Carefully remove the top shaft from drive lantern 341.
4. Undo hexagon socket head cap screws 914.1. Remove bearing cover 360.
5. Remove washer 554.1, spring 950 and nut 920.20.
6. Carefully pull rolling element bearing 320 with bearing sleeve 529.1 out of bearing carrier 382.
7. Undo hexagon socket head cap screws 914.8 and discs 550.8.
8. If applicable, remove lip seal 421.2 from drive shaft 213.
9. If applicable, pull circlip 932.1 off drive shaft 213.

Version with mechanical seal

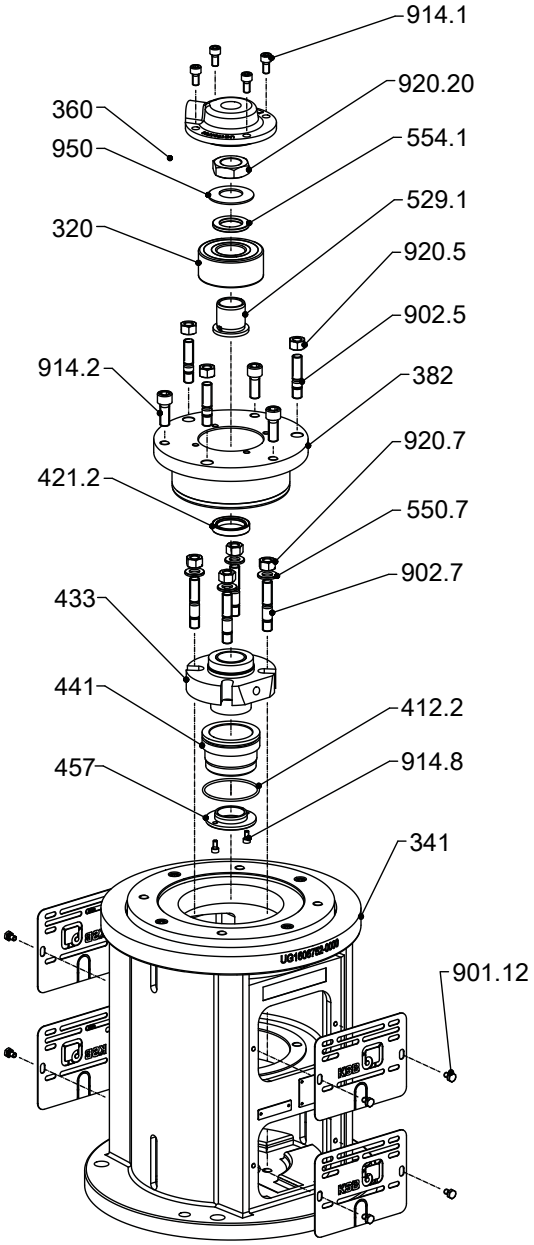

Fig. 11: Removing the drive shaft for version with mechanical seal

✓ The support column has been removed. (⇨ Section 7.4.9, Page 48)

1. Undo hexagon socket head cap screws 914.2.
2. Remove nuts 920.5.
3. Carefully remove drive shaft 213 from drive lantern 341.
4. Fasten the mechanical seal to shaft seal housing 441 with the assembly fixtures supplied with the pump to maintain the internal pressure of the mechanical seal.
5. Undo nuts 920.7 and discs 550.7 at the mechanical seal.
6. Remove hexagon socket head cap screws 914.1. Remove bearing cover 360.
7. Remove washer 554.1, spring 950 and nut 920.20.
8. Carefully pull out rolling element bearing 320 with bearing sleeve 529.1 at bearing carrier 382.
9. Undo and remove mechanical seal nuts 920.7 and discs 550.7 from studs 902.7.
10. Pull mechanical seal 433 off drive shaft 213.

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7.4.11 Removing the drive lantern from the cover plate

✓ The drive shaft has been removed. (⇨ Section 7.4.10, Page 49)

1. Undo nuts 920.4 and remove them from studs 902.4.
2. Carefully take drive lantern 341 off cover plate 68-3.
3. If applicable, remove the sealing element.

7.5 Reassembling the pump set

7.5.1 General information/Safety regulations

⚠ WARNING

Improper lifting/moving of heavy assemblies or components

Personal injury and damage to property!

▹ Use suitable transport devices, lifting equipment and lifting tackle to move heavy assemblies or components.

CAUTION

Improper reassembly

Damage to the pump!

▹ Reassemble the pump (set) in accordance with the general rules of sound engineering practice.

▹ Use original spare parts only.

Sequence Always reassemble 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, making sure that they 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 aids 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.

Prior to reassembly, screw back any forcing screws and adjusting screws.

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

7.5.2 Mounting the drive lantern on the cover plate

✓ 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.

1. Insert studs 902.4 in cover plate 68-3.
2. If applicable, fit the sealing element.
3. Place drive lantern 341 on the cover plate. Fasten it with nuts 920.4.

7.5.3 Installing the drive shaft

Version with lip seal

✓ The drive lantern has been mounted on the cover plate.

1. Slide lip seal 421.2 onto drive shaft 213.
2. If applicable, slide circlip 932.1 onto drive shaft 213.
3. Carefully insert rolling element bearing 320 with bearing sleeve 529.1 into bearing carrier 382, and slide the bearing carrier onto drive shaft 213.
4. Fasten the bearing with washer 554.1, spring 950 and nut 920.20.
5. Fit bearing cover 360. Fit and tighten hexagon socket head cap screws 914.1.
6. Carefully insert the top shaft into drive lantern 341.
7. Position lip seal 421.2.
8. Fit and tighten nuts 920.5 and studs 902.5.
9. Tighten hexagon socket head cap screws 914.2.

Design with mechanical seal

✓ The drive lantern has been mounted on the cover plate.

1. Slide mechanical seal 433 and shaft seal housing 441 onto drive shaft 213.
2. If applicable, slide circlip 932.1 onto drive shaft 213.
3. Carefully insert rolling element bearing 320 with bearing sleeve 529.1 into bearing carrier 382, and slide the bearing carrier onto drive shaft 213.
4. Fasten the bearing with washer 554.1, spring 950 and nut 920.20.
5. Fit bearing cover 360. Fit and tighten hexagon socket head cap screws 914.1.
6. Remove nuts 920.5 and studs 902.5.
7. Insert key 940. Lubricate the O-ring of the mechanical seal.
8. Position lip seal 421.2.
9. Fit and tighten nuts 920.5 and studs 902.5.
10. Tighten hexagon socket head cap screws 914.2.
11. Tighten mechanical seal nuts 920.7 and discs 550.7 on studs 902.7.
12. Leave the rotor in its lowest position.

7.5.4 Installing the support column

✓ The drive shaft has been installed. (⇨ Section 7.5.3, Page 52)

1. Place support column 712.3 or 712.4 on drive lantern 341.
2. Fit and tighten nuts 920.3 and studs 902.3.
3. Insert bearing carrier 382 with bearing bush 545.
4. Connect the connections of the plain bearings.
5. Thoroughly clean the shaft ends.
6. Apply Loctite to coupling 852 and half the thread of top shaft 213. Screw the top shaft into the coupling.
7. Apply Loctite to half the thread of shaft 210 or pump shaft 211, as applicable. Screw the shaft into the coupling.
8. If applicable, fit support columns 712.1 and 712.2. Check the correct positioning of the pipe connections. Fasten with hexagon head bolts 901.10 and nuts 920.10.

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7.5.5 Fitting the casing cover

Bearing sizes VCS 40 and VCS 60

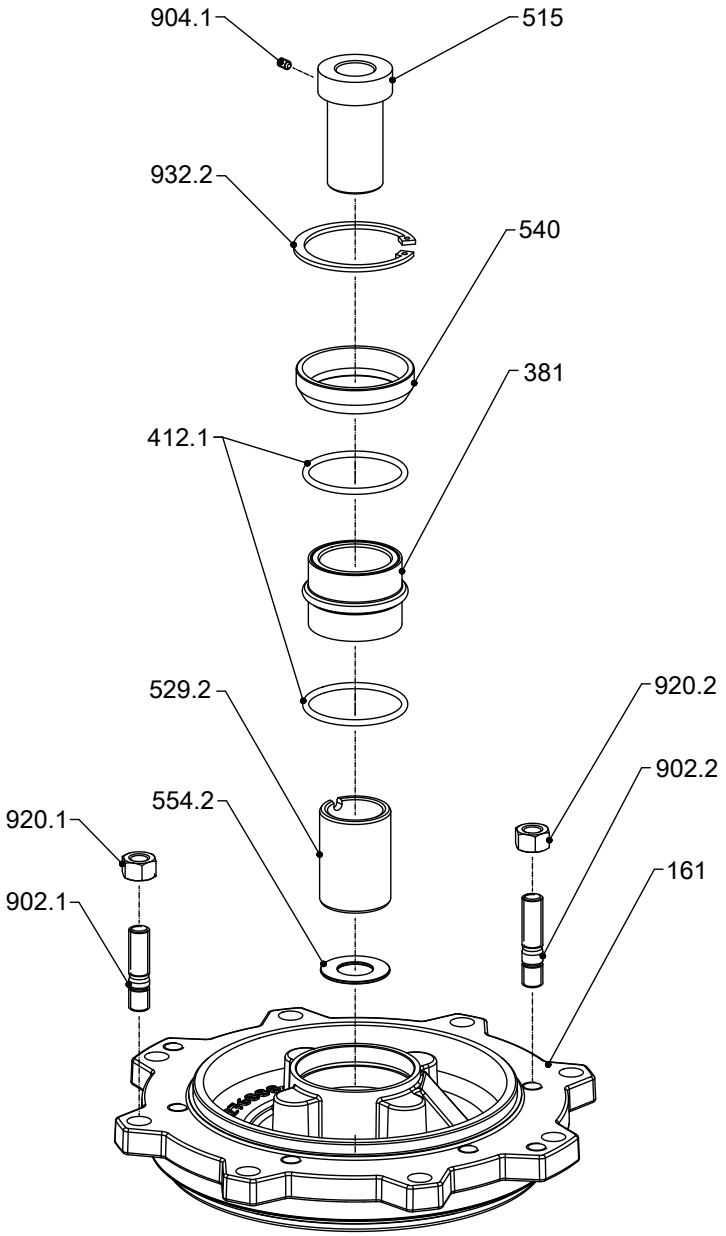

Fig. 12: Fitting the casing cover for bearing sizes VCS 40 and VCS 60

✓ The support column has been fitted. (⇨ Section 7.5.4, Page 52)

1. If applicable, fit casing wear ring 502.2 in casing cover 161.
2. Insert O-rings 412.1 in bearing cartridge 381. Lubricate them.
3. Fit bearing cartridge 381 in non-drive-end bearing cover 361.
4. Insert bush 540. Fasten it with circlip 932.2.
5. Tighten grub screw 904.1 at locking ring 515.
6. Place bearing sleeve 529.2 on locking ring 515.
7. Fit casing cover 161 on pump shaft 211. Fasten studs 902.2 with nuts 920.2.

Bearing sizes VCS 50 and VCS 80

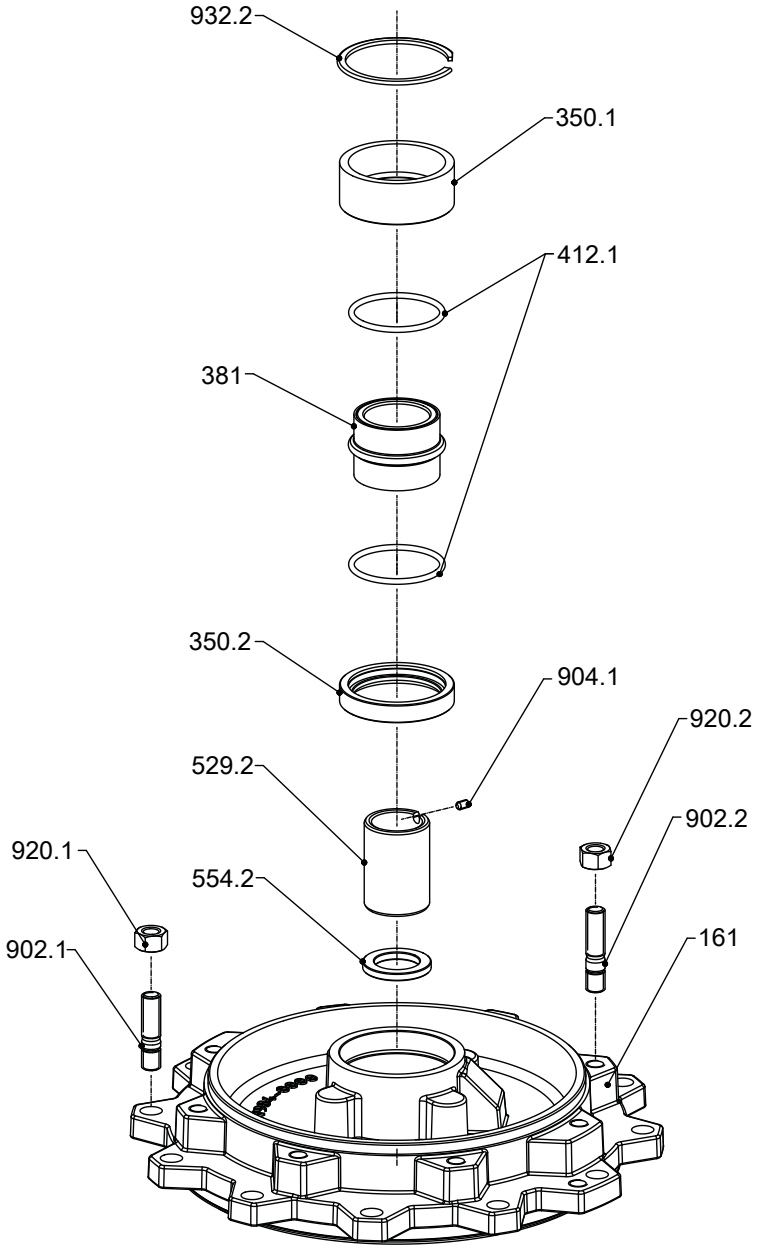

Fig. 13: Fitting the casing cover for bearing sizes VCS 50 and VCS 80

✓ The support column has been fitted. (⇨ Section 7.5.4, Page 52)

1. If applicable, fit casing wear ring 502.2 in casing cover 161.
2. Insert O-rings 412.1 in bearing cartridge 381. Lubricate them.
3. Insert bearing cartridge 381 into bearing housing 350.1.
4. Fit upper bearing housing 350.2. Fasten it with circlip 932.2.
5. Fit grub screw 904.1 on pump shaft 211.
6. Fit bearing sleeve 529.2 on pump shaft 211.
7. Fit casing cover 161 on pump shaft 211. Fasten studs 902.2 with nuts 920.2.

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7.5.6 Fitting the impeller

✓ The casing cover has been fitted. (⇨ Section 7.5.5, Page 53)

1. If applicable, fit washer 554.2 on pump shaft 211.[16)]
2. Insert key 940.1 in pump shaft 211.
3. Slide impeller 230 onto pump shaft 211. Fasten it with impeller nut 922.
4. Insert casing wear ring 502.1 into volute casing 102.
5. Fit volute casing 102.
6. Fit and tighten studs 902.1 and nuts 920.1.

Adjusting the impeller, version with lip seal

1. Remove nuts 920.4.
2. Move the rotor to its highest position. Tighten hexagon socket head cap screws 914.2.
3. Undo hexagon socket head cap screws 914.2 by two turns.
4. Tighten nuts 920.5.
5. Tighten hexagon socket head cap screws 914.2.

Adjusting the impeller, version with mechanical seal

1. Unlock mechanical seal 433.
2. Fasten the mechanical seal to shaft seal housing 441 with the assembly fixtures to maintain the internal pressure of the mechanical seal.
3. Move the rotor to its highest position. Tighten hexagon socket head cap screws 914.2.
4. Undo hexagon socket head cap screws 914.2 by two turns.
5. Tighten nuts 920.5.
6. Tighten hexagon socket head cap screws 914.2.
7. Separate mechanical seal 433 from mechanical seal housing 441.
8. Fasten the cartridge seal to the shaft with fastening pins. Secure the fastening pins with a thread-locking agent (e.g. Loctite 243).
9. Remove and store the assembly fixture.

7.5.7 Installing the riser

✓ The general information / safety regulations for re-assembly have been observed. (⇨ Section 7.5.1, Page 51)

✓ The fastening bolts of the support column have not be tightened completely.

1. Turn the pump casing until the two flanges are perfectly parallel to each other.
2. Position gasket 400 or profile seal 410 between the discharge nozzle and the riser.
3. Fasten riser 711 to the discharge nozzle with screw plug 903.2/.3.
4. Completely tighten the support columns and the fastening bolts at the pump casing.
5. Fit suction strainer 143 at the suction nozzle.

7.5.8 Mounting the motor

✓ The riser has been installed. (⇨ Section 7.5.7, Page 55)

✓ The direction of rotation has been checked.

16 Only for bearing sizes VCS 40, VCS 50, VCS 60

⚠ WARNING

Motor tipping over

Risk of crushing hands and feet!

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

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.

1. Pull coupling half 861 onto the motor shaft end. Fasten it with a grub screw.
2. Place the motor on drive lantern 341.
   Make sure that coupling half 861 engages in the other coupling half 861.
3. Tighten hexagon nuts 920.11 on studs 902.11.
   The motor and the drive lantern or intermediate lantern are centred via the motor flange.

7.5.9 Installing the complete pump set

✓ The general information / safety regulations for re-assembly have been observed. (⇨ Section 7.5.1, Page 51)

1. Place the complete pump set with cover plate on the tank opening.
2. Fasten studs 902.8 and nuts 920.8.
3. Tighten hexagon head bolts 901.11 and nuts 920.11.

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7.6 Tightening torques

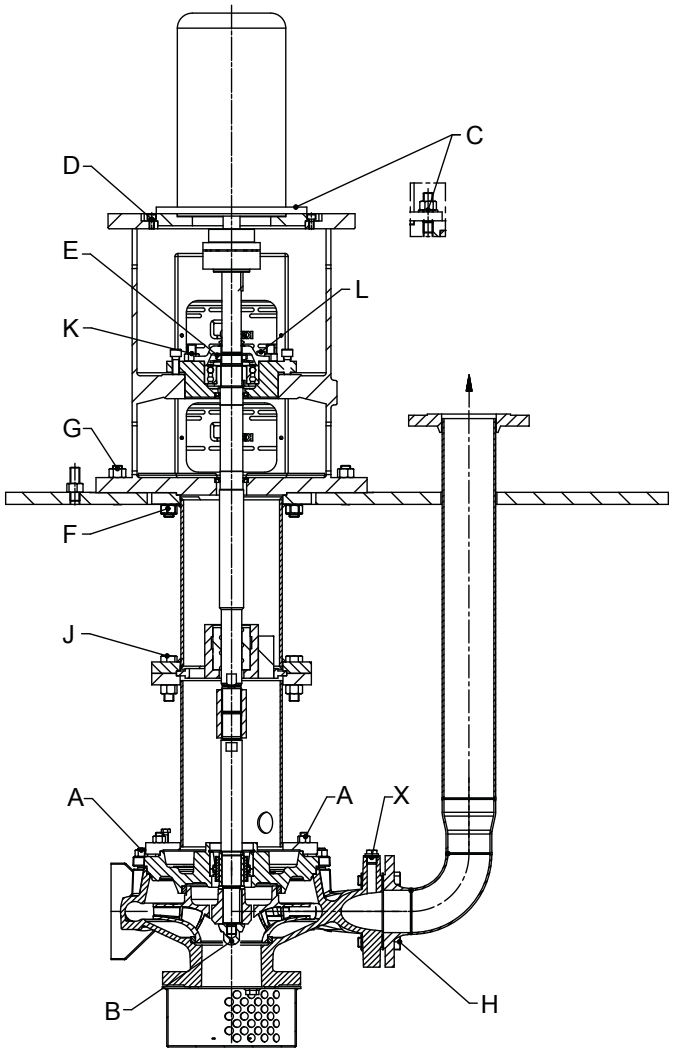

Fig. 14: Tightening torques

Table 21: Tightening torques for bolted/screwed connections at the pump

Position	Part No.	Thread	Tightening torques [Nm]
A	901.1/.2 920.1/.2	M12	50
		M16	125
B	922	M14 × 1,5[17)]	60
		M16 × 1,5[18)]	125
		M20 × 1,5[19)]	200
		M24 × 1,5[20)]	300
C	902.6 920.6 550.6	M10	40
		M12	70
		M16	175
		M20	540
D	914.3	M8	23

17 Width across flats (WAF) 21, bearing size VCS 40
18 Width across flats (WAF) 24, bearing size VCS 50
19 Width across flats (WAF) 30, bearing size VCS 60
20 Width across flats (WAF) 36, bearing size VCS 80

Position	Part No.	Thread	Tightening torques [Nm]
D	914.3	M10	45
E	920.20	M27 × 1,5[21)]	Until the conical disc flattens
		M35 × 1,5[22)]	Until the conical disc flattens
		M45 × 1,5[23)]	Until the conical disc flattens
		M50 × 1,5[24)]	Until the conical disc flattens
F	902.3 920.3	M16	125
G	902.4 920.4	M16	175
H	901.11 920.11	M12	50
		M16	125
		M20	240
		M24	420
J	901.10 920.10	M16	125
K	902.5 920.5	M12	70
		M14	70
L	914.1	M8	23
		M10	45
X	903.2	1/4	55
		3/8	80
		1/2	130

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 62)
- Quantity of spare parts
- Shipping address
- Mode of dispatch (freight, mail, express freight, air freight)

21 Bearing size VCS 40
22 Bearing size VCS 50
23 Bearing size VCS 60
24 Bearing size VCS 80

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

Table 22: Quantity of spare parts for recommended spare parts stock

Part No.	Description	Number of pumps (including stand-by pumps)						
		2	3	4	5	6 - 7	8 - 9	10 and more
		Number of spare parts						
210	Shaft	1	1	2	2	2	3	30 %
211[25)]	Pump shaft	1	1	2	2	2	3	30 %
230	Impeller	1	1	2	2	2	3	30 %
320	Rolling element bearing	1	1	2	2	2	3	30 %
381[25)]	Bearing cartridge	1	1	2	2	2	3	30 %
410[25)]	Profile seal	2	3	4	5	6	7	80 %
411[25)]	Joint ring	2	3	4	5	6	7	80 %
412[25)]	O-ring	2	3	4	5	6	7	80 %
421.1[26)]/.2/.3	Lip seal	1	1	2	2	2	3	30 %
422	Felt ring	1	1	2	2	2	3	30 %
433[27)]	Mechanical seal	2	3	4	5	6	7	80 %
502.1/.2	Casing wear ring	1	1	2	2	2	3	30 %
529.1	Bearing sleeve	1	1	2	2	2	3	30 %
545[28)]	Bearing bush	1	1	2	2	3	4	40 %
554.1	Washer	1	1	2	2	3	4	50 %
852	Screwed coupling	1	1	2	2	2	3	30 %
860[25)]	Coupling part	1	1	2	2	2	3	30 %
904.2[28)]	Grub screw	1	1	2	2	2	3	40 %
950	Spring	1	1	2	2	2	3	30 %

25 Available as spare parts kit, see general assembly drawing with list of components
26 For versions with lip seal only
27 For versions with mechanical seal only
28 Quantity of parts per support column

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 Increased bearing temperature

D Vibrations during pump operation

E Insufficient discharge pressure

Table 23: Trouble-shooting

A	B	C	D	E	Possible cause	Remedy[29]
✗	-	-	-	-	Pump delivers against an excessively high pressure.	Re-adjust duty point. Fit a larger impeller.
✗	-	-	-	-	Supply line or impeller clogged	Remove deposits in the pump and/or piping.
✗	-	-	✗	-	Suction lift is too high/$NPSH_{Available}$ (positive suction head) is too low.	Check/alter liquid level. Check any strainers installed/suction opening.
✗	-	-	-	-	Wrong direction of rotation	Interchange two of the phases of the power cable.
✗	-	-	-	-	Speed is too low.[30]	Increase the speed.
✗	-	-	✗	-	Wear of internal parts	Replace worn parts 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.[30].
-	✗	-	-	-	Density or viscosity of fluid handled higher than stated in purchase order	Contact KSB.
-	-	✗	-	-	Increased axial thrust[30]	Clean balancing holes in the impeller. Fit new casing wear rings.
-	-	✗	✗	-	Deep groove ball bearing defective	Replace.
✗	✗	-	-	-	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 plain bearing	Replace.
-	-	-	✗	-	Insufficient flow rate	Increase the minimum flow rate.
✗	-	-	✗	-	Unsuitable installation / disturbances caused by other pumps	Observe the installation information.
-	-	-	✗	-	Stresses and strains in the piping at the pump	Observe the installation information.
-	-	-	✗	-	Foundation or chemical anchors not rigid enough	Replace foundation or chemical anchors.
✗	-	-	-	✗	Excessive air content in fluid handled	Increase suction-side liquid level in the tank/ well.
✗	-	-	✗	✗	Intake area is clogged.	Clean the intake area.

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

30 Contact KSB.

A	B	C	D	E	Possible cause	Remedy[29)]
✗	-	-	-	✗	Insufficient submergence of suction nozzle	Increase suction-side liquid level in the tank/ well.
✗	-	-	-	✗	Unsuitable tank/well design	Correct the tank/well design.
✗	-	-	✗	✗	Formation of vortices	Correct the tank/well design. Increase suction-side liquid level in the tank/ well.

9 Related Documents

9.1 General drawings with list of components

9.1.1 Estigia, 1 support column

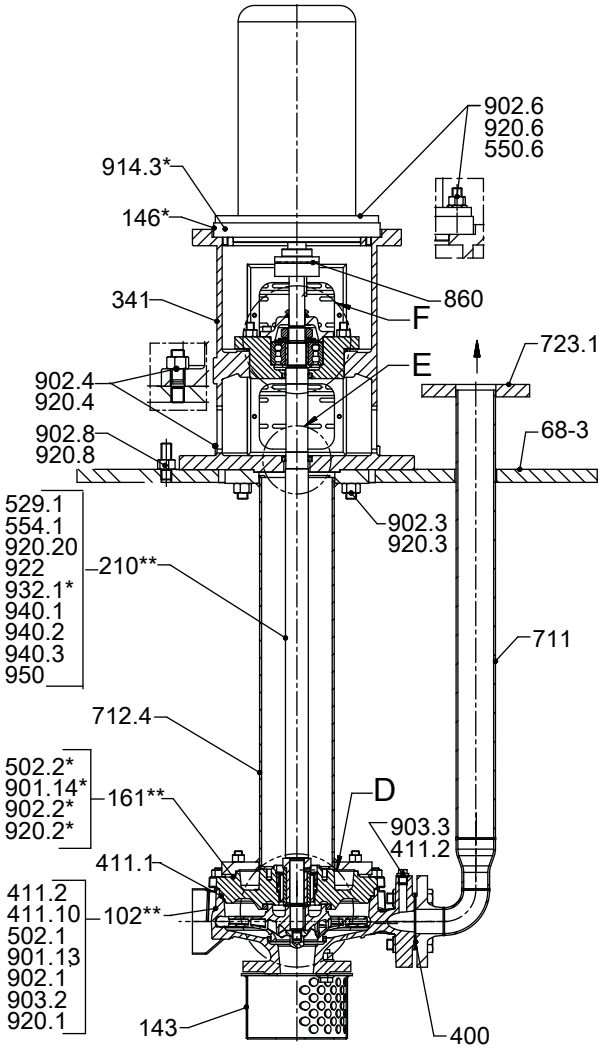

Fig. 15: General assembly drawing

D	Hydraulic system (⇨ Section 9.1.3.3, Page 65)	E	Seal (⇨ Section 9.1.3.4, Page 66)
F	Bearing (⇨ Section 9.1.3.5, Page 66)		

*: On specific designs only

**: Available as spare parts kit including the parts listed

Table 24: List of components

Part No.	Description	Part No.	Description
102	Volute casing	711	Riser
143	Suction strainer	712.4	Support column
146	Intermediate lantern	723.1	Flange
161	Casing cover	860	Coupling part
210	Shaft	901.13/.14	Hexagon head bolt
341	Drive lantern	902.1/.2/.3/.4/.6/.8	Stud
400	Gasket	903.2/.3	Screw plug
411.1/.2	Joint ring	914.3	Hexagon socket head cap screw
502.1/.2	Casing wear ring	920.1/.2/.3/.4/.6/.8/.20	Nut

Part No.	Description	Part No.	Description
529.1	Bearing sleeve	922	Impeller nut
550.6	Disc	932.1	Circlip
554.1	Washer	940.1/.2/.3	Key
68-3	Cover plate	950	Spring

9.1.2 Estigia, 3 support columns

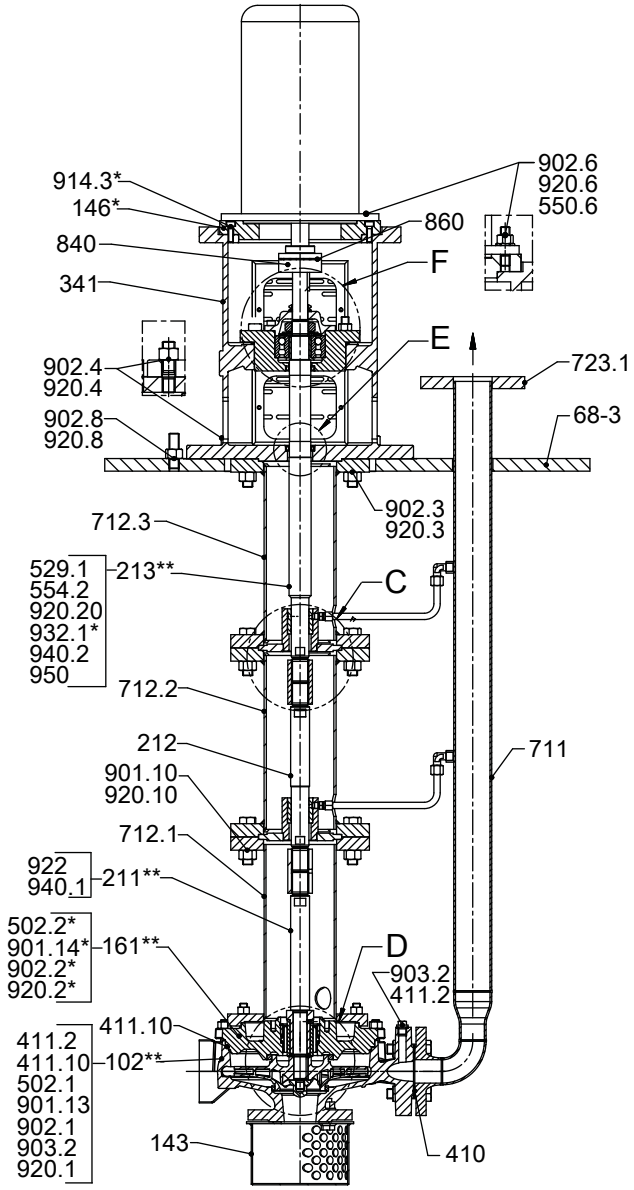

Fig. 16: General assembly drawing

C	Screwed coupling (⇨ Section 9.1.3.2, Page 65)	D	Hydraulic system (⇨ Section 9.1.3.3, Page 65)
E	Seal (⇨ Section 9.1.3.4, Page 66)	F	Bearing (⇨ Section 9.1.3.5, Page 66)

*: On specific designs only

**: Available as spare parts kit including the parts listed

Table 25: List of components

Part No.	Description	Part No.	Description
102	Volute casing	711	Discharge pipe
143	Suction strainer	712.1/.2/.3	Support column
146	Intermediate lantern	723.1	Flange

Part No.	Description	Part No.	Description
161	Casing cover	840	Coupling
211	Pump shaft	860	Coupling part
212	Intermediate shaft	901.10/.13/.14	Hexagon head bolt
341	Drive lantern	902.1/.2/.3/.4/.6/.8	Stud
410	Profile seal	903.3	Screw plug
411.2/.10	Joint ring	914.3	Hexagon socket head cap screw
502.1/.2	Casing wear ring	920.1/.2/.3/.4/.6/.8/.10/.20	Nut
529.1	Bearing sleeve	922	Impeller nut
550.6	Disc	932.1	Circlip
554.2	Washer	940.2/.3	Key
68-3	Cover plate	950	Spring

9.1.3 Detail drawings

9.1.3.1 Casing fastening elements

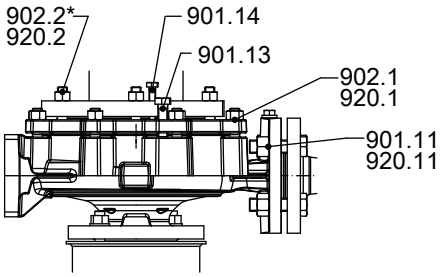

Fig. 17: Detail drawing of casing fastening elements

*: On specific designs only

Table 26: List of components

Part No.	Description	Part No.	Description
901.11/.13/.14	Hexagon head bolt	920.1/.2/.11	Nut
902.1/.2	Stud		

9.1.3.2 Screwed coupling

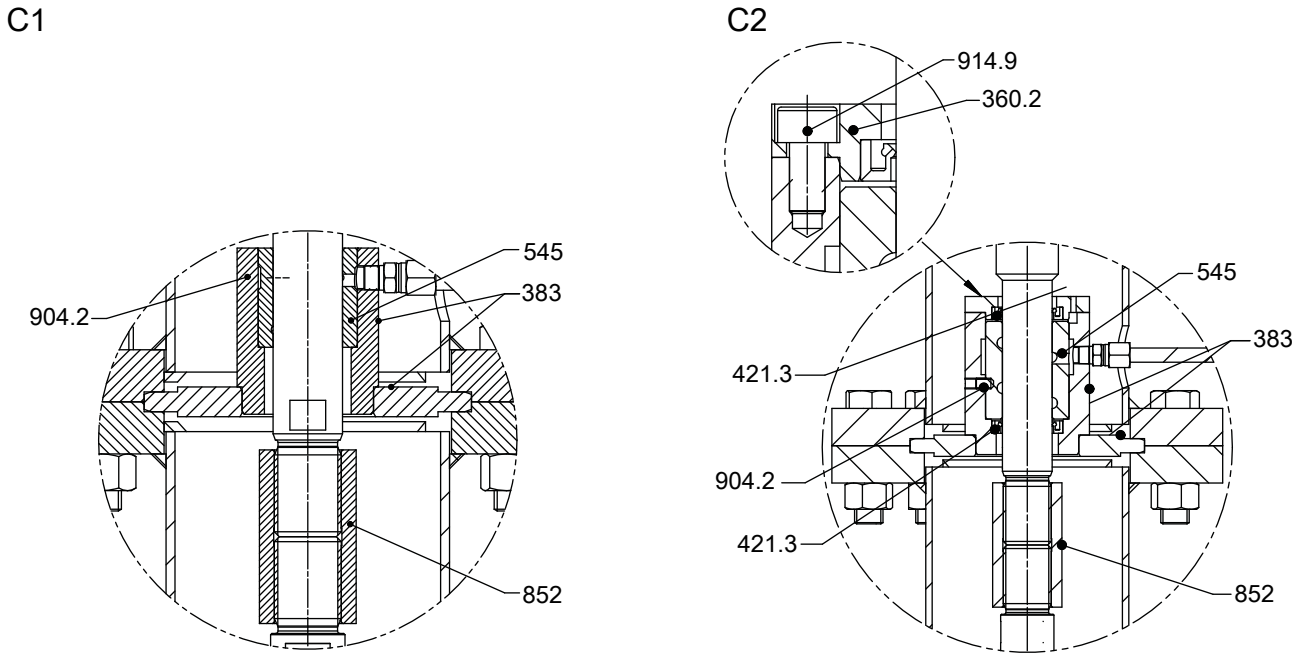

Fig. 18: Detail drawings of screwed coupling (only for versions with 2 or 3 support columns)

C1	Lubricated by fluid handled or external liquid	C2	Lubricated by electrically driven pump

Table 27: List of components

Part No.	Description	Part No.	Description
383	Bearing spider	852	Screwed coupling
421.3	Lip seal	904.2	Grub screw
545	Bearing bush		

9.1.3.3 Hydraulic system

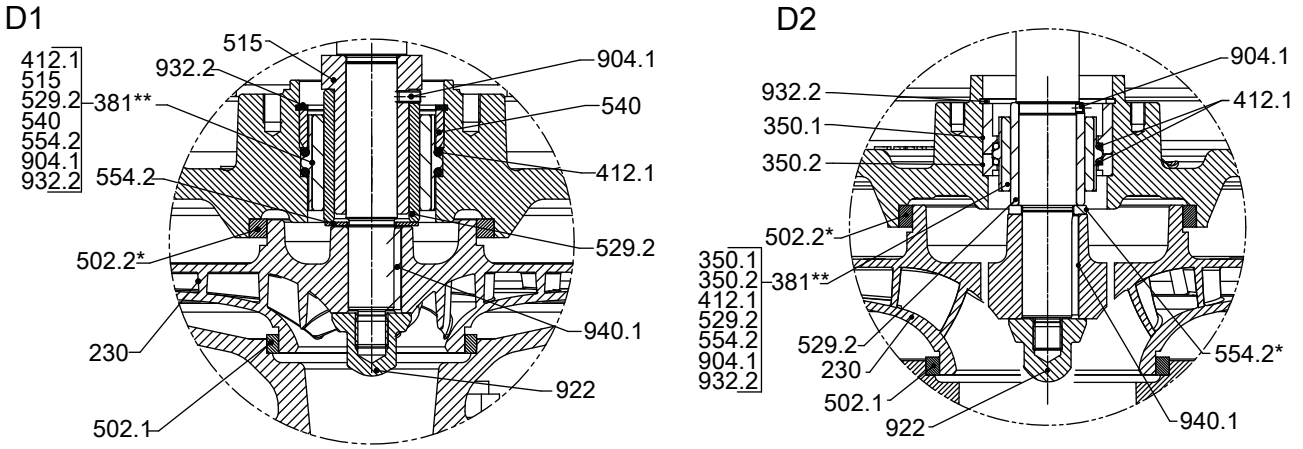

Fig. 19: Detail drawings of hydraulic system (depending on bearing size)

D1	VCS 40 and VCS 60	D2	VCS 50 and VCS 80

*: On specific designs only

**: Available as spare parts kit including the parts listed

Table 28: List of components

Part No.	Description	Part No.	Description
230	Impeller	529.2	Bearing sleeve
350	Bearing housing	540	Bush

Part No.	Description	Part No.	Description
381	Bearing cartridge	554.2	Washer
412.1	O-ring	904.1	Grub screw
502.1/.2	Casing wear ring	922	Impeller nut
504	Spacer ring	932.2/.3	Circlip
515	Locking ring	940.1	Key

9.1.3.4 Seal

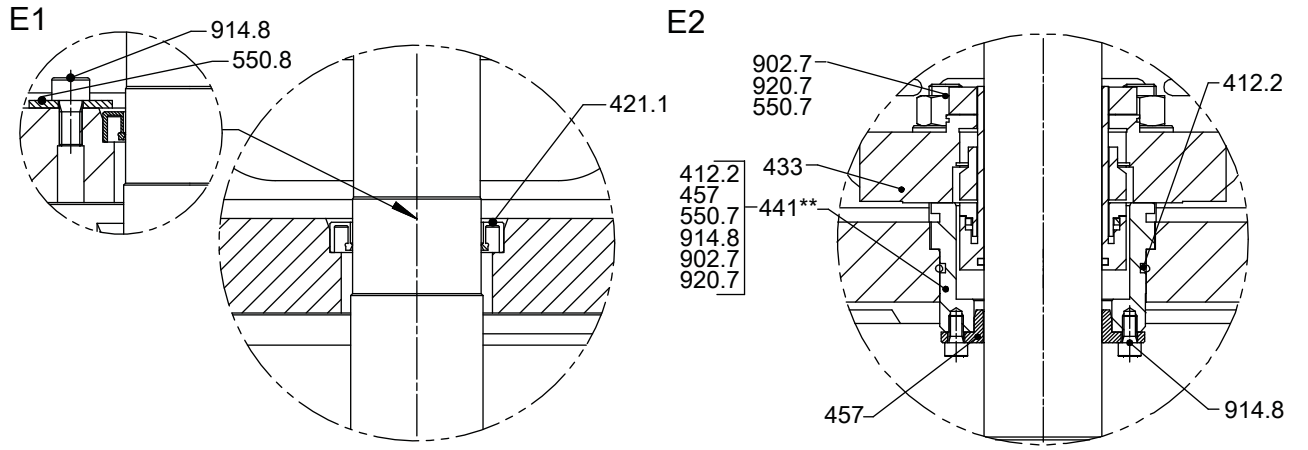

Fig. 20: Detail drawings of seal

E1	Lip seal	E2	Mechanical seal

**: Available as spare parts kit including the parts listed

Table 29: List of components

Part No.	Description	Part No.	Description
412.2	O-ring	550.7/.8	Disc
421.1	Lip seal	902.7	Stud
433	Mechanical seal	914.8	Hexagon socket head cap screw
441/.99	Shaft seal housing	920.7	Nut
457	Neck ring		

9.1.3.5 Bearing

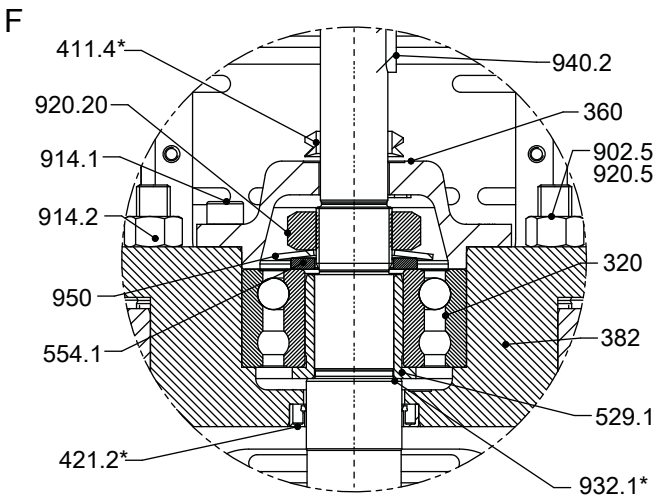

Fig. 21: Detail drawing of bearing

*: On specific designs only

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Table 30: List of components

Part No.	Description	Part No.	Description
320	Rolling element bearing	554.1	Washer
360	Bearing cover	902.5	Stud
382	Bearing carrier	914.2	Hexagon socket head cap screw
411.4	Joint ring	920.5/.20	Nut
421.2	Lip seal	932.1	Circlip
529.1	Bearing sleeve	950	Spring

9.1.3.6 Bearing lubrication

Lubrication by fluid handled

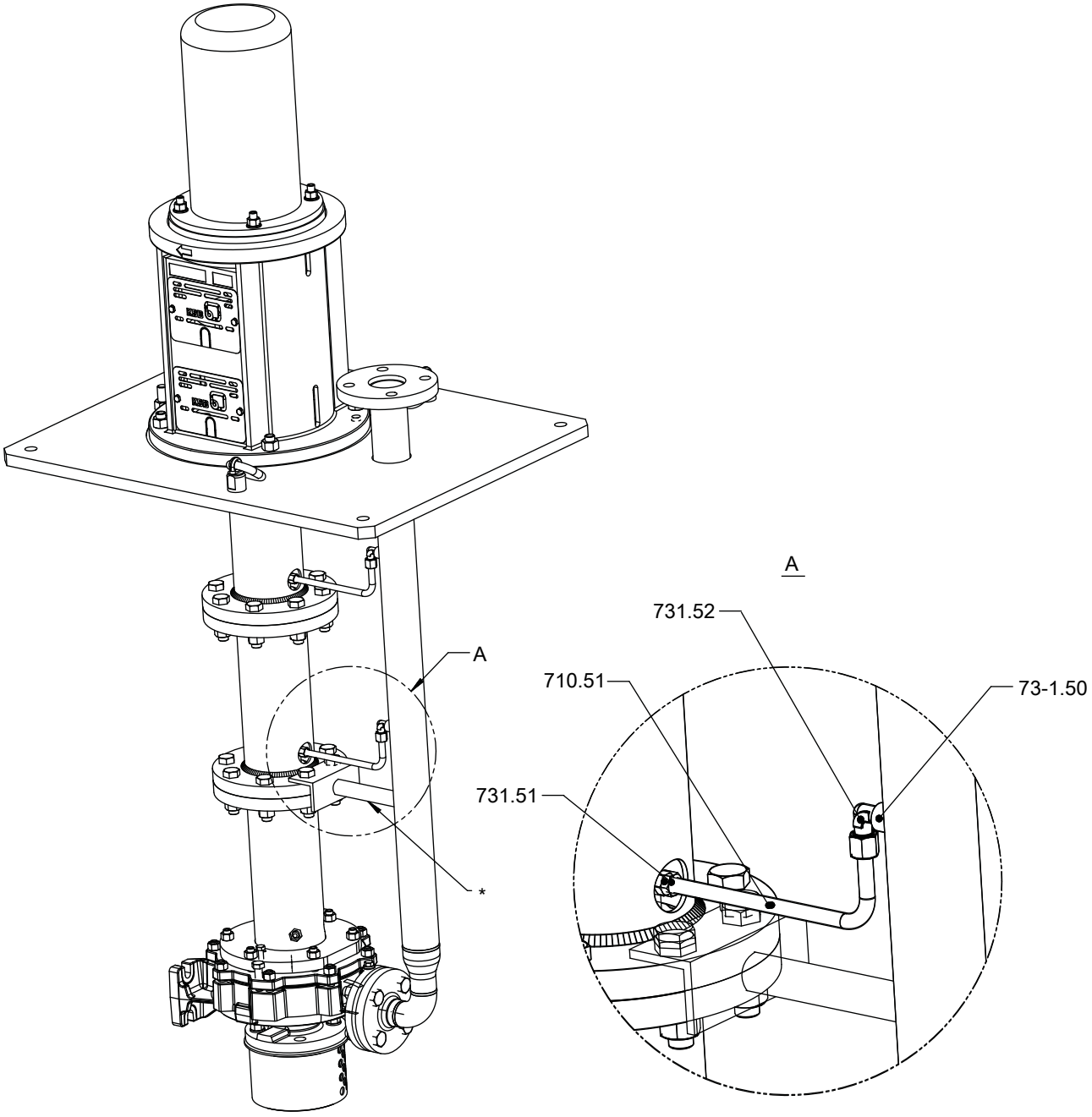

Fig. 22: Detail drawing of lubrication by fluid handled

*: On specific designs only

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Table 31: List of components

Part No.	Description	Part No.	Description
710.51	Pipe	731.51/.52	Pipe union
73-1.50	Socket		

Lubrication by external liquid

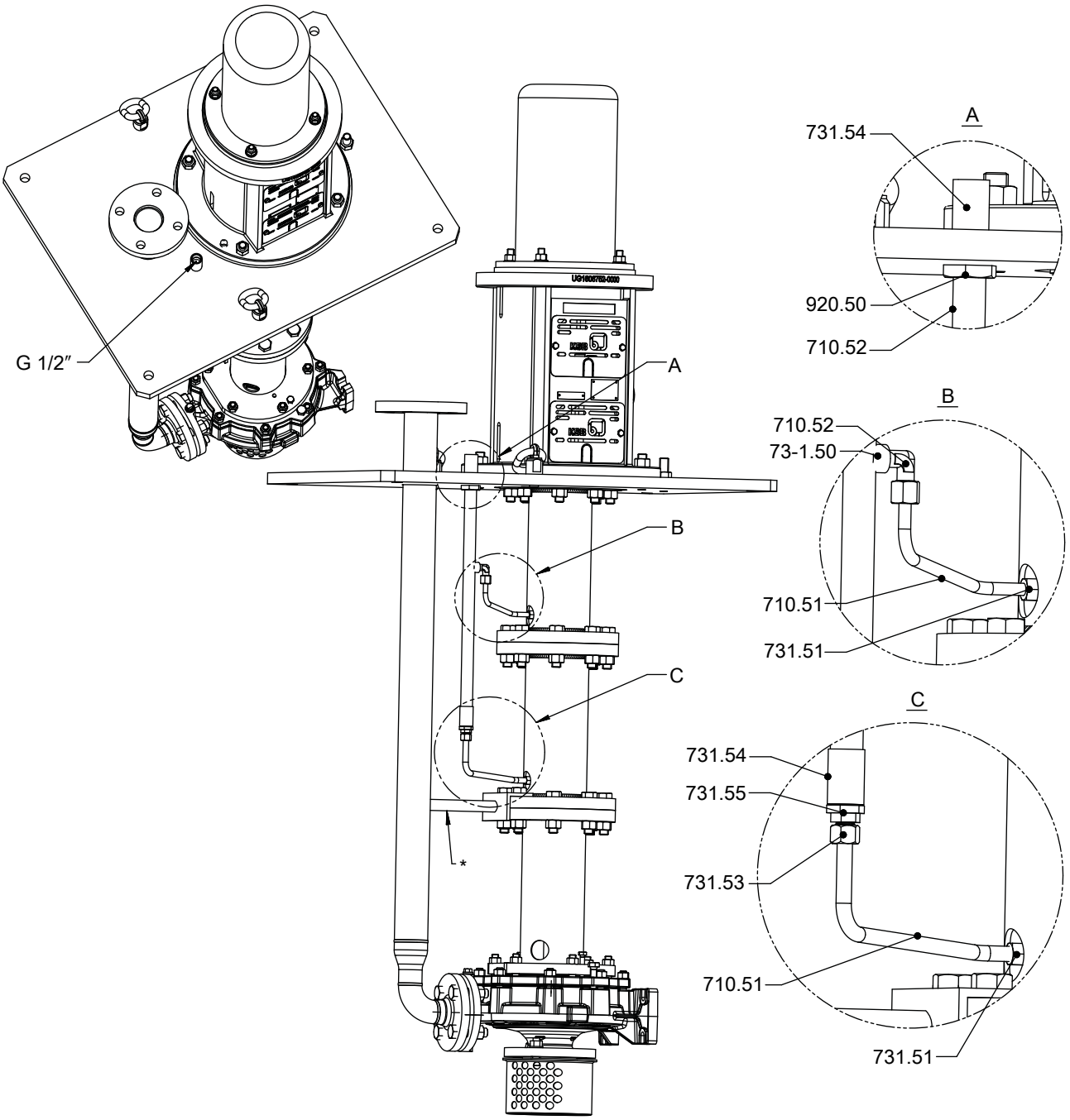

Fig. 23: Detail drawing of lubrication by external liquid

*: On specific designs only

Table 32: List of components

Part No.	Description	Part No.	Description
710.51/.52	Pipe	731.51/.53/.54/.55	Pipe union
73-1.50	Socket	920.50	Nut

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Lubrication by electrically driven pump

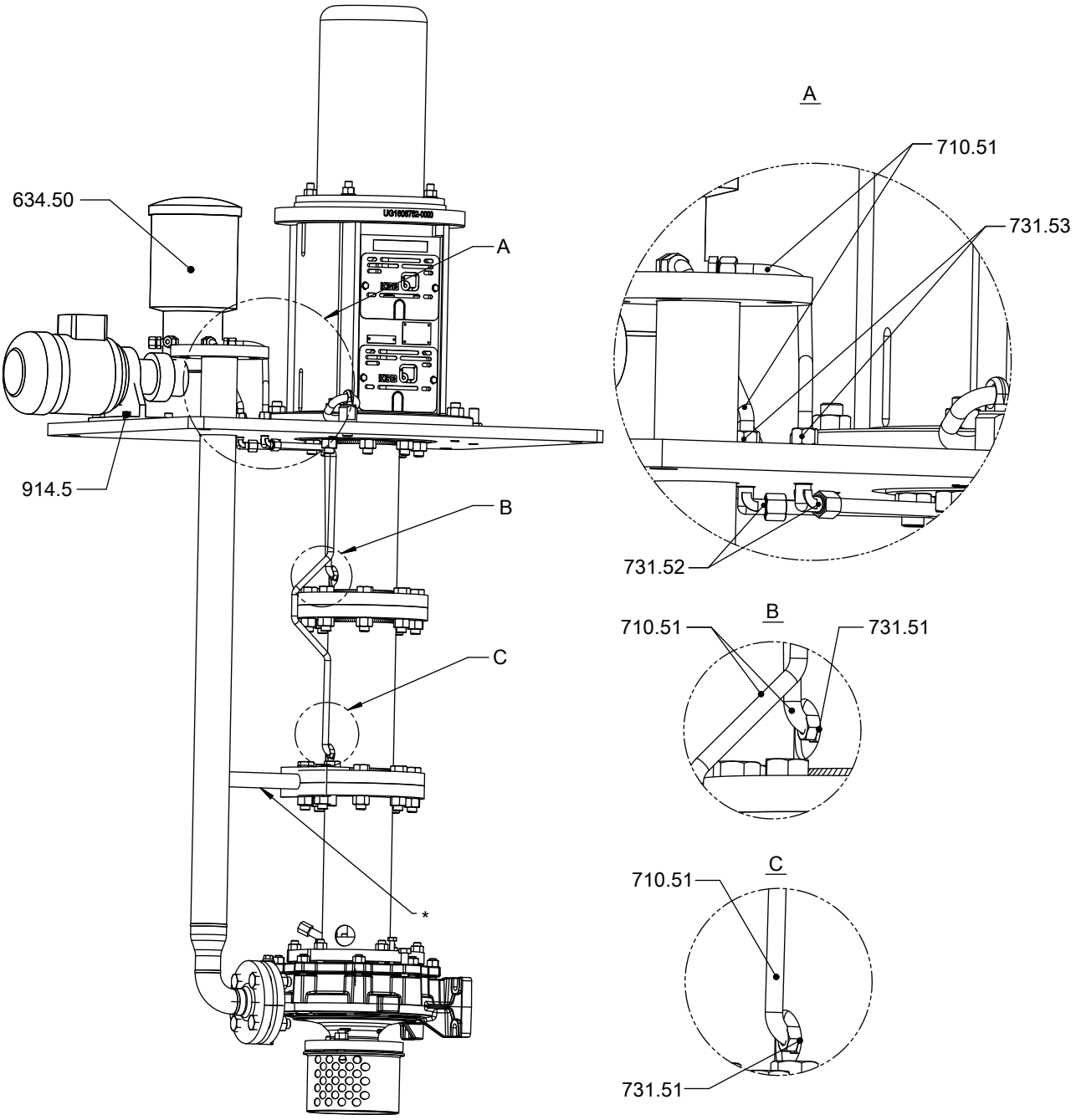

Fig. 24: Lubrication by electrically driven pump

*: On specific designs only

Table 33: List of components

Part No.	Description	Part No.	Description
634.50	Grease pump	914.5	Hexagon socket head cap screw
731.51/.52/.53	Pipe union		

10 Certificate of Decontamination

Type: .....

Order number /

Order item number[31)]: .....

Delivery date: .....

Application: .....

Fluid handled[31)]: .....

Please tick where applicable[31)]:

☐ Corrosive

☐ Oxidising

☐ Flammable

☐ Explosive

☐ Hazardous to health

☐ Seriously hazardous to health

☐ Toxic

☐ Radioactive

☐ Bio-hazardous

☐ Safe

Reason for return:[31)]: .....

Comments: .....

.....

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

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

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

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

☐ No special safety precautions are required for further handling.

☐ The following safety precautions are required for flushing fluids, fluid residues and disposal:

.....

.....

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

.....	.....	.....
Place, date and signature	Address	Company stamp

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31 Required field

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