VS4 model

Installation, Operation, and Maintenance Manual

Model VS4, API 610 10th Edition/ISO 13709

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Table of Contents

1 General

	1.1 Principles This manual is supplied as an integral part of the type series and variants indicated on the front cover. This 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 ASK Service centre to maintain the right to claim under warranty.
	1.2 Installation of partly completed machinery To install partly completed machinery supplied by ASK, please refer to the subsections under Servicing/Maintenance.
	1.3 Target group This manual is aimed at the target group of trained and qualified specialist technical personnel.

2 Safety

DANGER

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

2.1 Key to safety symbols / markings

Table 1: 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 EC Directive 94/9/EC (ATEX).
	**General hazard** In conjunction with one of the signal words this symbol indicates a hazard which will or could result in death or serious injury.
	**Electrical hazard** In conjunction with one of the signal words this symbol indicates a hazard involving electrical voltage and identifies information about protection against electrical voltage.
	**Machine damage** In conjunction with the signal word CAUTION this symbol indicates a hazard for the machine and its functions.

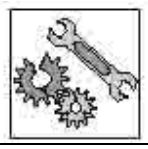
	2.2 General This manual contains general installation, operating and maintenance instructions that must be observed to ensure safe pump operation and prevent injury and damage to property. The safety instructions in all sections of this manual must be complied with. This manual must be read and completely understood by the responsible specialist personnel/operators prior to installation and commissioning. The contents of this manual must be available to the specialist personnel at the site at all times. Instructions attached directly to the pump must always be complied with and be 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 meeting all local regulations which are not taken into account in this manual.
	2.3 Intended use Only operate the pump (set) within the application limits specified in the other applicable documents. ▪ Only operate pump sets which are in perfect technical condition. ▪ Do not operate partially assembled pump sets. ▪ Only use the pump to handle the fluids described in the data sheet or product literature of the pump model. ▪ Never operate the system without the fluid to be handled. ▪ Observe the limits for continuous operation specified in the data sheet or product literature (Q_{min} and Q_{max}) (prevention of damage such as shaft fracture, bearing failure, damaged mechanical seal, etc). ▪ When handling untreated waste water the duty points in continuous operation lie within 0.7 to 1.2 x Q_{opt} to minimize the risk of clogging/hardening. ▪ Avoid duty points for continuous operation at very low speeds and small flow rates (<0.7 x Q_{opt}). ▪ Observe the information on the maximum flow rates provided in the data sheet or technical product literature (prevention of overheating damage, cavitation damage, bearing damage, etc). ▪ Do not throttle the flow rate on the suction side of the system (prevention of cavitation damage). ▪ For any operating modes which are not specified in the data sheet or product literature, contact the manufacturer.
	Prevention of fore see able misuse ▪ Observe the minimum flow velocities for fully open swing check valves to prevent the reduction of pressure and risk of clogging. (Contact the manufacturer for the required minimum flow velocities/loss coefficients.) ▪ Never exceed the permissible application limits specified in the data sheet and in the product literature regarding pressure, temperature, etc. ▪ Observe all safety notes and instructions in this manual.
	2.4 Personnel qualification and training All personnel involved must be fully qualified to install, operate, maintain and inspect the machinery this manual refers to. The responsibilities, competence and supervision of all personnel involved in installation, operation, maintenance and inspection must be clearly defined by the operator. Deficits in knowledge must be rectified by sufficiently trained specialist personnel training and instructing the personnel who will carry out the respective tasks. 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.

	2.5 Consequences and risks caused by non-compliance with these operating instructions ▪ 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
	2.6 Safety awareness In addition to the safety information contained in this manual and the intended use, the following safety regulations shall be complied with: ▪ Accident prevention, health and safety regulations ▪ Explosion protection regulations ▪ Safety regulations for handling hazardous substances ▪ Applicable standards and laws
	2.7 Safety instructions for the operator / user ▪ The operator shall fit contact guards for hot, cold and moving parts, and check that the guards function properly. ▪ Never remove the contact guard when the pump is in 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.)
	2.8 Safety information for maintenance, inspection and installation work ▪ Modifications or alterations of the pump are only permitted with the manufacturer's prior consent. ▪ Use only original spare parts or parts authorized by the manufacturer. The use of other parts can invalidate any liability of the manufacturer for consequential damage. ▪ The operator ensures that all maintenance, inspection and installation work is performed by authorized, qualified specialist personnel who are thoroughly familiar with the manual. ▪ Carry out work on the pump (set) during standstill only. ▪ The pump casing must have cooled down to ambient temperature. ▪ Pump pressure must have been released and the pump must have been drained. ▪ When taking the pump set out of service always adhere to the procedure described in the manual. ▪ Decontaminate pumps which handle fluids posing a health hazard. ▪ As soon as the work is complete, re-install and/or re-activate any safety-relevant and protective devices. Before returning the product to service, observe all instructions on commissioning.
	2.9 Unauthorized 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.
DANGER 	**2.10 Explosion protection** Always observe the information on explosion protection given in this section when operating an explosion-proof pump set. Sections of the manual marked by the Ex symbol apply to explosion-proof pump sets also when temporarily operated outside potentially explosive atmospheres. Only pumps/pump sets marked as explosion-proof and identified as such in the data

	sheet must be used in potentially explosive atmospheres. Special conditions apply to the operation of explosion-proof pump sets in accordance with EC Directive 94/9/EC (ATEX). When operating explosion-proof pump sets, especially adhere to the additional requirements marked by the Ex symbol. The explosion-proof status of the pump set is only assured if the pump set is used in accordance with its intended use. Never operate the pump (set) outside the limits stated in the data sheet and on the name plate. Prevent impermissible modes of operation at all times.
	2.10.1 Repair Special regulations apply to repair work on explosion-proof pumps. Modifications or alteration of the pump set may affect explosion protection and are only permitted after consultation with the manufacturer. Repair work at the flameproof joints must only be performed in accordance with the manufacturer's instructions. Repair to the values in tables 1 and 2 of EN 60079-1 is not permitted.

3 Transport / Temporary Storage / Disposal

3.1 Transport

	**DANGER** The pump (set) could slip out of the suspension arrangement Danger to life from falling parts! - Always transport the pump (set) in horizontal position. - Never attach the suspension arrangement to the free shaft end or the motor eyebolt. - Refer to the weights given in the general arrangement drawing. - Observe the local accident prevention regulations. - Use suitable permitted lifting tackle, e.g. self-tightening lifting tongs.
	CAUTION
	Incorrect transport of the pump Damage to the shaft seal! - For transport, lock the pump shaft with a suitable transport lock to prevent any movement of the shaft.
	To transport the pump/pump set suspend it from the lifting tackle as shown below.

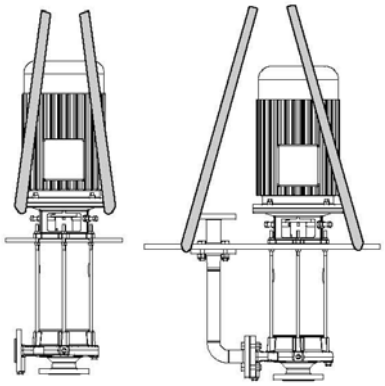


Fig. 1: Transporting the pump set without / with cover plate up to motor size 160

NOTE

For pump sets with motors of size 180 or larger the pump and motor are supplied separately as the motor weighs more than the pump. The motor is mounted on site. If required, screw eyebolts for attaching the lifting gear into the threaded holes of the lantern.

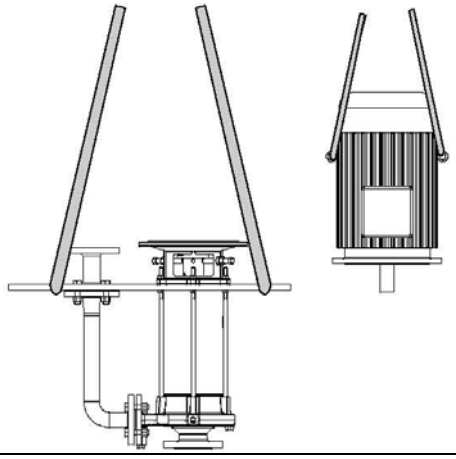


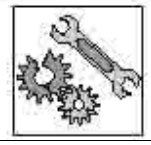
Fig. 2: Transporting the pump and motor from motor size 180 upwards

3.2 Storage and preservation

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

CAUTION

Damage during storage by 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 set! - Only remove caps/covers from the openings of the pump set at the time of installation.
	Store the pump (set) in a dry, protected room where the atmospheric humidity is as constant as possible. Rotate the shaft by hand once a month, e.g. via the motor fan. If properly stored indoors, the pump set is protected for a maximum of 12 months. New pumps/pump sets are supplied by our factory duly prepared for storage. For storing a pump (set) which has already been operated, observe the relevant instructions.
	3.3 Return to supplier 1. Drain the pump as per operating instructions. 2. Always flush and clean the pump, particularly if it has been used for handling noxious, explosive, hot or other hazardous fluids. 3. If the fluids handled by the pump leave residues which might lead to corrosion damage when coming into contact with atmospheric humidity, or which might Ignite when coming into contact with oxygen, the pump set must also bem neutralized, and anhydrous inert gas must be blown through the pump for drying purposes. 4. Always complete and enclose a certificate of decontamination when returning the pump set. It is imperative to indicate any safety and decontamination measures taken.
	3.4 Disposal
	WARNING
	Fluids posing a health hazard Hazardous to persons and the environment! - Collect and properly dispose of flushing liquid and any fluid residues. - Wear safety clothing and a protective mask, if required. - Observe all legal regulations on the disposal of fluids posing a health hazard.
	1. Dismantle the pump (set). Collect greases and other lubricants during dismantling. 2. Separate and sort the pump materials, e.g. by: - Metals - Plastics - Electronic waste - Greases and other lubricants 3. Dispose of materials in accordance with local regulations or in another controlled manner.

4 Description of the Pump (Set)

	4.1 General description ▪ Vertical low-pressure centrifugal pump Pump for handling neutral degreasing and phosphating agents, wash water with degreasing agents and electrode position paints.
	4.2 Configuration and function

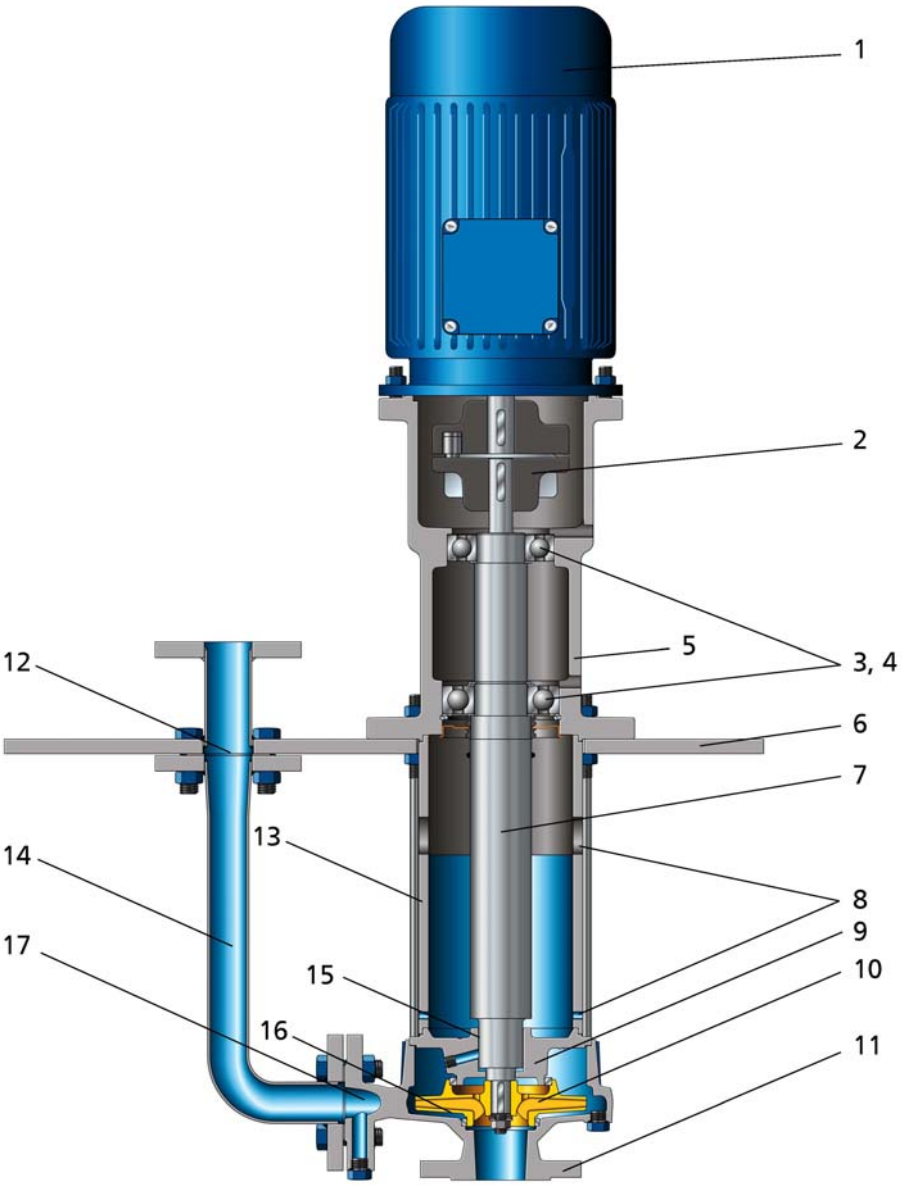


Fig. 5: Sectional drawing

1	Motor housing	2	Shaft coupling
3, 4	Rolling element bearing	5	Bearing lantern
6	Cover plate	7	Shaft
8	Overflow opening	9	Casing cover
10	Impeller	11	Suction nozzle
12	Discharge nozzle, cover plate	13	Intermediate pipe
14	Riser	15	Shaft passage
16	Clearance gap	17	Discharge nozzle, volute casing

Design

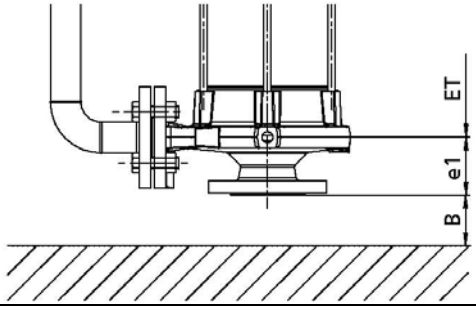
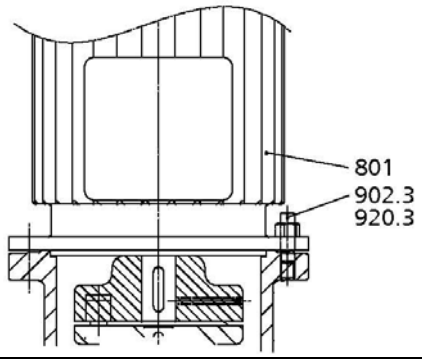
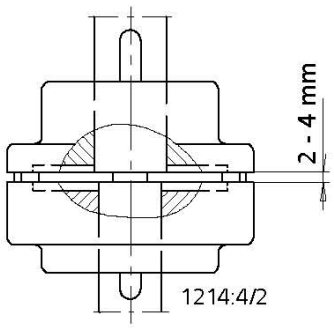
The pump is designed with an axial fluid inlet and a radial fluid outlet. The hydraulic system runs in its own bearings (3, 4) and is connected to the motor by a shaft coupling (2). Thanks to the graded lengths of intermediate pipe (13) and shaft (7) the pump set can be matched to various installation depths. The pump set is

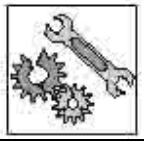
	mounted on a cover plate (6). The discharge nozzle of the volute casing (17) is connected with the discharge nozzle (12) of the cover plate via a riser (14). If on request the pump set is supplied without cover plate and riser, it is supplied with a bracket.
Function	The fluid enters the pump via the suction nozzle (11) and is accelerated outward in a cylindrical flow by the rotating impeller (10). The flow profile of the pump casing converts the kinetic energy of the fluid into pressure energy. The fluid is pumped to the discharge nozzle (17), where it leaves the pump. The clearance gap (16) prevents any fluid from flowing back from the casing into the inlet. The hydraulic system is closed with a casing cover (9) at the rear side of the impeller; the shaft (7) enters the casing via the casing cover (9). The shaft runs in rolling element bearings (3 and 4), which are supported by a bearing lantern (5) linked with the pump casing and/or casing cover (9) via the intermediate pipe (13).
Sealing	The pump is seal-less with little leakage flowing into the intermediate pipe (8) at the shaft passage (9) and then through the overflow opening (7) back to the tank.

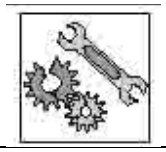
5 Installation at Site

5.1 Safety regulations

	DANGER
	Installing electric equipment (motors) in potentially explosive atmospheres Risk of explosion! - 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 work. All structural work required must have been prepared in accordance with the dimensions stated in the outline drawing/general arrangement drawing.
	5.3 Installing the pump set
Foundation	The sturdy cover plate 68-3.1 serves as a foundation on which the pump set is fastened. This cover plate covers the tank opening completely. If the pump set is supplied with cover plate and riser, the cover plate is supported by a sectional steel frame provided on the tank. If ordered without cover plate and riser, the pump unit is supplied with a bolted-on bracket 732. This bracket serves to mount the pump unit on the tank.
	Installing the pump 1. Carefully align the support for the cover plate or the base of the bracket. 2. Align the upper flange of the bearing/intermediate lantern 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 B to the tank floor.

	
	Fig. 6: Distance to the tank floor
	Mounting the motor
	
	Fig. 7: Fastening the pump with motor
	1. Tighten hexagon nuts 920.3 on studs 902.3. The motor and bearing/intermediate lantern are centered above the motor flange.
	Securing the coupling
	
	Fig. 8: Coupling clearance
	✓ The coupling is flexible to torsional movement and dampens shock and vibrations. ✓ The Motor is mounted onto the pump. 1. Secure both coupling halves on the shaft collar 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

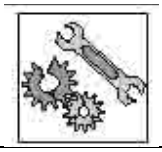
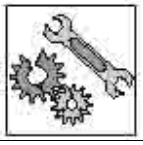
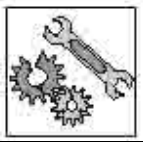
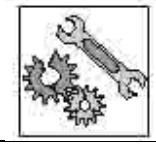
	DANGER
	Excessive loads acting on the pump nozzles Danger to life from leakage of hot, toxic, corrosive or flammable fluids! - Do not use the pump as an anchorage point for the piping. - Anchor the pipelines in close proximity to the pump and connect them without transmitting any stresses or strains. - Take appropriate measures to compensate 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
	It is recommended to install check and shut-off elements in the system, 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 No piping-induced forces and moments (from warped pipelines or thermal expansion, for example) must act on the pump.
	5.5 Connection to power supply
	DANGER
	Work on the pump set by unqualified personnel Danger of death from electric shock! - Always have the electrical connections installed by a trained electrician. - Observe regulations IEC 30364 (DIN VDE 0100) and, for explosion-proof pump sets, IEC 60079 (DIN VDE 0165).
	WARNING
	Incorrect connection to the mains Damage to the mains network, short circuit! - Observe the technical specifications of the local energy supply companies.
	1. Check the available mains voltage against the data on the name plate. 2. Select an appropriate start-up method.
	5.5.1 Connecting the motor

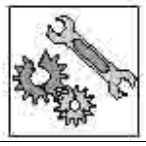
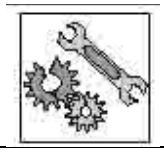
	NOTE
	In compliance with DIN VDE 0530 - Part 8, three-phase motors are always wired for clockwise rotation (looking at the motor shaft stub). The pump's direction of rotation is indicated by an arrow on the pump.
	1. Change the motor's direction of rotation to match that of the pump. 2. Observe the manufacturer's product literature supplied with the motor.
	5.6 Checking the direction of rotation
	WARNING
	Hands or objects inside the pump casing Risk of injuries, damage to the pump! - Never insert your hands or any other objects into the pump. - Check that the inside of the pump is free from any foreign objects.
	WARNING
	Reaching into the tank Risk of personal injury! - When the cover plate is removed, never reach into the uncovered tank.
	CAUTION
	Motor 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, interchange any two phases to correct the direction of rotation.
	The correct direction of rotation of motor and pump is clockwise (seen from the motor end). 1. Start the pump set and stop it again immediately to determine the motor's direction of rotation. 2. Check the direction of rotation. The motor's direction of rotation must match the arrow indicating the direction of rotation on the motor stool/bearing lantern. 3. If the motor runs in the wrong direction of rotation, check the electrical connection of the motor and the control system, if applicable.

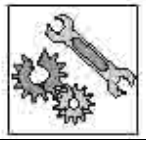
6 Commissioning / Start-up / Shutdown

6.1 Commissioning / start-up

	6.1.1 Prerequisites for commissioning/start-up
	Before starting up the pump set make sure that the following requirements are met: ▪ The pump set has been properly connected to the electric power supply and is equipped with all protection devices. ▪ The pump has been primed with the fluid to be handled. ▪ The direction of rotation has been checked. ▪ All auxiliary connections required are connected and operational.

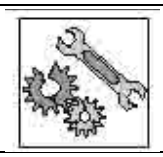
	▪ The lubricants have been checked. ▪ After prolonged shutdown of the pump (set), the activities described in
	6.1.2 Filling and venting the pump
	CAUTION
	Increased wear due to dry running Damage to the pump set! - Never operate the pump set without liquid fill.
	CAUTION
	Fluid entering the bearings Damage to the pump! - Never allow the fluid level to rise above the cover plate/bracket.
	During pump start-up and operation, the fluid level must be within 130 mm above the volute casing centre line and 50 mm below the cover plate/bracket.
	6.1.3 Start-up
	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 cleained. ✓ Pump, suction line and inlet tank, if any, have been vented and filled with the fluid to be handled.
	CAUTION
	Start-up against open discharge line Overloading of the motor! - Use a soft starter. - Use speed control. - Make sure the power reserve of the motor is sufficient.
	✓ The fluid level has been checked. 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.
	6.1.4 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 as long as there is back pressure.
	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 and speed Hot or toxic fluid could escape! Explosion hazard! - Comply with the operating data indicated in the data sheet. - Avoid prolonged operation against a closed shut-off element. - Never operate the pump at temperatures exceeding those specified in the data sheet or on the name plate unless the written consent of the manufacturer has been obtained.
	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.
	6.2.2 Switching frequency
	The frequency of starts is usually determined by the maximum temperature increase of the motor. This largely depends on the power reserves of the motor in steady state operation and on the starting conditions (D.O.L., star-delta, moments of inertia, etc). If the start-ups are evenly spaced over the period indicated, the following limits can be used for orientation for start-up with the discharge-side gate valve slightly open: To prevent high temperature increases in the motor and excessive loads on the pump, coupling, motor, seals and bearings, the switching frequency shall not exceed 10 start-ups per hour [h].
	6.2.3 Density of the fluid handled
	The power input of the pump increases in proportion to the density of the fluid handled.

	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 operation check run of the pump. 1. Start up the pump (set) regularly once a month or once every three months for approximately five minutes during prolonged shutdown periods. This will prevent the formation of deposits within the pump and the pump intake area.
	The pump (set) is removed from the pipe and stored ✓ The pump has been properly drained and the safety instructions for dismantling the pump have been 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 and discharge nozzles. It is advisable to then close the pump nozzles (e.g. with plastic caps or similar). 3. Oil or grease all blank 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. 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. Observe any additional instructions and information provided.
	6.4 Returning to service after storage
	For returning the pump to service observes the sections on commissioning/start-up and the operating limits. In addition, carry out all servicing/maintenance operations before returning the pump (set) to service.
	WARNING
	Failure to re-install or re-activate protective devices Risk of personal injury from moving parts or escaping fluid! - As soon as the work is complete, re-install and/or re-activate any safety-relevant and protective devices.
	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.

7 Servicing / Maintenance

	7.1 Safety regulations
	The operator ensures that all maintenance, inspection and installation work is performed by authorized, qualified specialist personnel who are thoroughly familiar with the manual.
	WARNING
	Pump set started up inadvertently Risk of injury by moving parts! - Always make sure the electrical connections are disconnected before carrying out work on the pump set. - Make sure that the pump set cannot be started up accidentally.
	WARNING
	Fluids posing a health hazard or hot fluids Risk of personal injury! - Observe all relevant laws. - When draining the fluid take appropriate measures to protect persons and the environment. - Decontaminate pumps handling fluids posing a health hazard.
	A regular maintenance schedule will help avoid expensive repairs and contribute to trouble-free, reliable operation of the pump (set) with a minimum of maintenance expenditure and work. Never use force when dismantling and re-assembling a pump set.
	7.2 Servicing / inspection 7.2.1 Supervision of operation
	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.
	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 seals for leakages. ▪ 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 stand-by pump. To make sure that the 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

	motor housing).
	CAUTION
	Operation outside the permissible bearing temperature Damage to the pump! - The bearing temperature of the pump (set) must never exceed 90 °C (measured on the outside of the motor housing).
	NOTE
	After commissioning, increased temperatures may occur at grease-lubricated rolling element bearings due to the running-in process. The final bearing temperature is only reached after a certain period of operation (up to 48 h depending on the conditions).
	7.2.2 Inspection work 7.2.2.1 Checking the coupling Check the flexible elements of the coupling. Replace these parts in due time if there is any sign of wear.
	7.3 Lubrication and lubricant change of rolling element bearings
	7.3.1 Grease lubrication The bearings are supplied packed with high-quality lithium-soap grease.
	7.3.1.1 Intervals Under normal conditions the grease-lubricated bearings will run for 15,000 operating hours or 2 years. Under unfavorable operating conditions (e.g. high room temperature, high atmospheric humidity, dust laden air, aggressive industrial atmosphere etc.), check the bearings earlier and clean and re-lubricate them, if required.
	7.4 Drainage / disposal
	WARNING
	Fluids posing a health hazard Hazardous to persons and the environment! - Collect and properly dispose of flushing liquid 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. For draining the fluid handled use connection 6B (see drawing of auxiliary connections). 2. If noxious, explosive, hot or other hazardous fluids have been handled, flush the pump. Always flush and clean the pump before transporting it to the workshop. Provide a cleaning record for the pump.
	7.5 Dismantling the pump set
	7.5.1 General notes/Safety regulations

	WARNING
	Unqualified personnel performing work on the pump (set) Risk of personal injury! - Always have repair and maintenance work performed by specially trained, qualified personnel.
	WARNING
	Hot surface Risk of personal injury! - Allow the pump set to cool down to ambient temperature.
	Observe the general safety instructions and information. For any work on the motor, observe the instructions of the relevant motor manufacturer. For dismantling and reassembly observe the exploded view and the general assembly drawing.
	DANGER
	Insufficient preparation of work on the pump (set) Risk of personal injury! - Properly shut down the pump set. - Close the shut-off elements in the suction and discharge line. - Drain the pump and release the pump pressure. - Close any auxiliary connections. - Allow the pump set to cool down to ambient temperature.
	NOTE
	After a prolonged period of operation the individual parts 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 pull-off device.
	7.5.2 Preparing the pump set 1. Disconnect the power supply (e.g. at the motor). 2. Disconnect and remove all auxiliary pipe work.
	7.5.3 Dismantling the complete pump set 1. Unbolt the discharge nozzle from the pipeline. 2. Remove the pump set with intermediate pipe/discharge pipe and cover plate from the tank.
	7.5.4 Dismantling the motor
	WARNING
	Motor tipping over Risk of squashing hands and feet! - Suspend or support the motor to prevent it from tipping over.
	1. Remove cover plates 68-3.2 from bearing lantern 340. 2. Undo hexagon nuts 920.3. 3. Pull motor 801 off bearing lantern 340.
	7.5.5 Removing the riser 1. Remove nuts 920.5/920.8 and screws 901.5/901.1. 2. Remove riser 711. 3. Remove gaskets 400.3/400.4.

8 Trouble-shooting

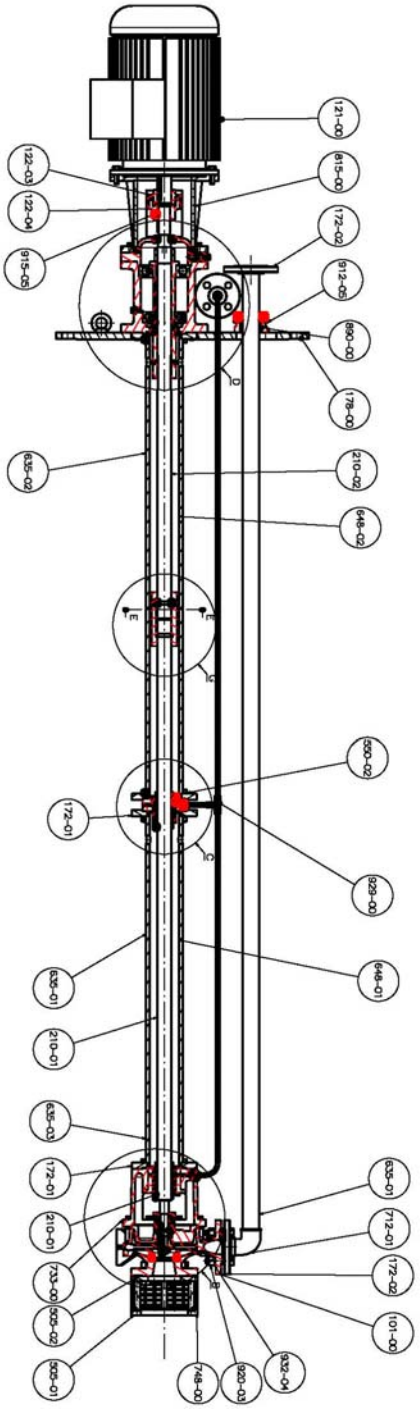
A	Pump delivers insufficient flow rate
B	Motor is overloaded
C	Excessive bearing temperature
D	Vibrations during pump operation

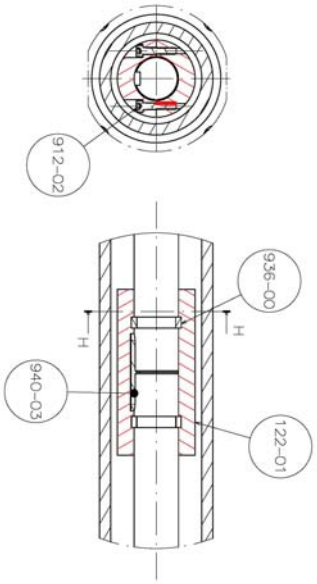
Table 1: Trouble-shooting

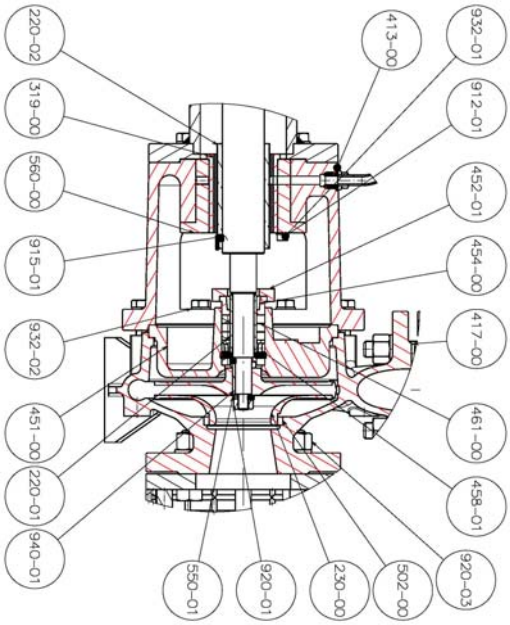
A	B	C	D	Possible cause	Remedy
X				Pump delivers against an excessively high discharge pressure.	Re-adjust to duty point. Fit a larger impeller.
X				Supply line or impeller clogged.	Remove deposits in the pump and/or piping.
X			X	Suction head is too high/NPSH available (positive suction head) is too low.	Check/alter liquid level. Check any strainers installed/suction opening.
X				Wrong direction of rotation	Interchange two of the phases of the power cable.
X				Speed is too low	Increase the speed.
X			X	Wear of internal pump parts	Replace worn parts by new ones.
	X		X	Pump back pressure is lower than specified in the purchase order.	Adjust duty point accurately. In the case of persistent overloading, turn down impeller.
	X			Density or viscosity of the fluid handled is higher than stated in the purchase order.	Contact ASK
		X		Increased axial thrust	Clean balancing holes in the impeller. Replace the casing wear rings.
		X	X	Defective motor deep-groove ball bearing.	Fit new bearing.
X	X			Motor is running on two phases only.	Replace the defective fuse. Check the electric cable connections.
			X	Rotor is out of balance.	Clean the impeller. Re-balance the impeller.
			X	Defective plain bearing.	Fit new bearing.
			X	Insufficient flow rate.	Increase the minimum flow rate.

9 Related Documents

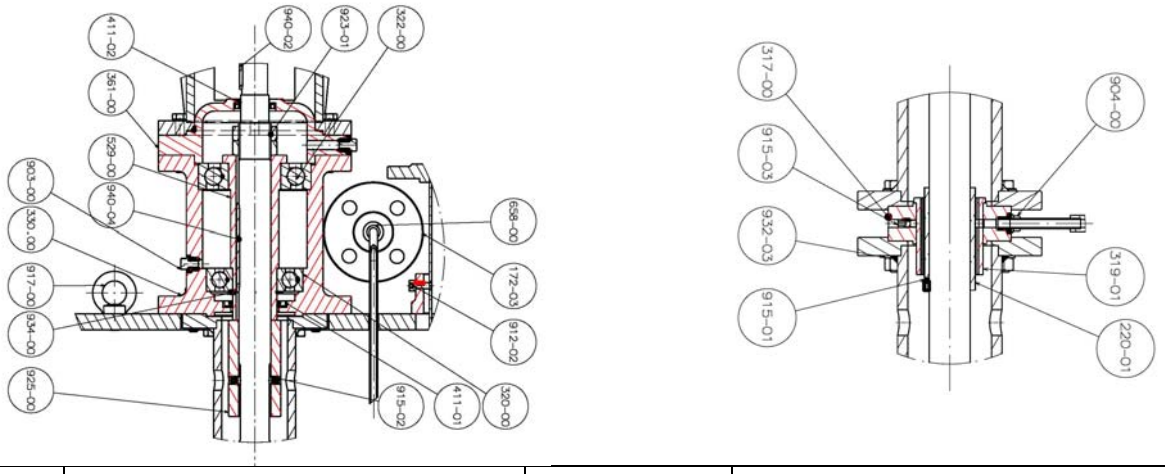
9.1 General assembly drawing with list of components







General assembly drawing with list of components



Part No	Name	Part No	Name
121.00	Electric motor	502.00	Wear ring
122.03	Coupling hub motor side	458.00	Lantern ring
122.04	Coupling hub pump side	461.00	Soft Packing
915.05	Hex. screw	454.00	Stuffing box ring
815.00	Motor seat	452.00	Stuffing box gland
172.01	Flange	940.04	Parallel key
890.00	Barcket fitting	411.02	Oil seal
178.00	Bearing housing support	361.00	Bearing cover
648.01	Lower column	529.00	Bearing sleeve
648.02	Upper column	940.03	Parallel key
635.03	Flushing pipe	903.01	Oil drain plug
172.02	Flange	330.00	Bearing housing
210.01	Lower shaft	934.01	Shaft key
733.00	Connecting piece	925.00	Tightening bush
635.01	Discharge pipe	411.01	Oil seal
712.01	Discharge elbow	320.00	Deep grooved ball bearing
101.00	Volute	912.02	Cylindrical head cap screw
748.00	Strainer	172.03	Flushing flange
920.02	Hex. nut	322.00	Angular cantact ball beaing
932.01	Spring washer	923.01	Tightening nut
550.02	Washer	319.00	Rubber bearing
910.01	Hex-head bolt	560.00	Rubber bearing seat
220.01	Shaft sleeve	915.01	Hex. socket set screw
319.01	Rubber bearing	220.02	Shaft sleeve
915.01	Hex.socket set screw	940.01	Parallel key
317.00	Spider	550.01	Washer
122.01	Split coupling	920.01	Hex.nut
936.00	Split ring	230.00	Impeller
940.02	Parallel key	220.01	Lower shaft

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