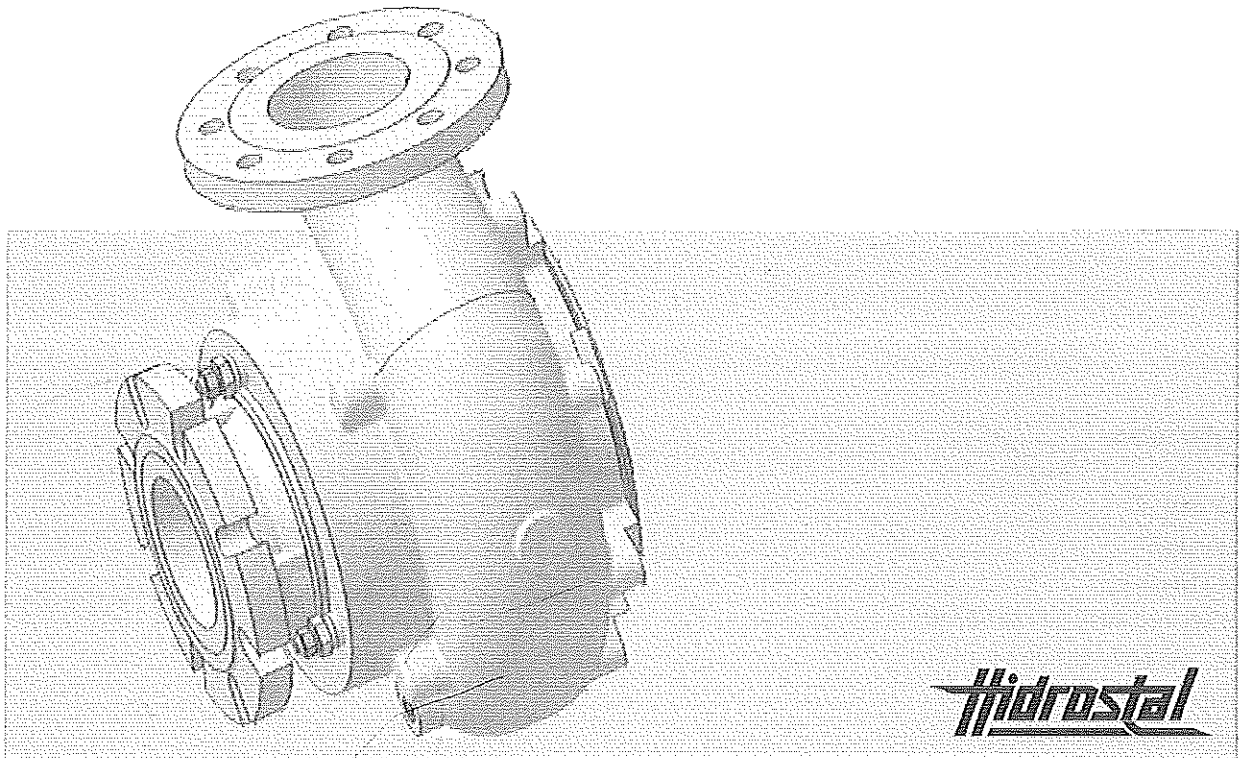


Operating instructions

Submersible and immersible screw-centrifugal pumps



hidrostal

Hydraulic B-N
Motor size 002–300 and B-Z



Read the instructions prior to performing any task!

10-BA7597en

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Translation of the original operating instructions

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Table of contents

1	General.....	6
1.1	Information on these instructions.....	6
1.2	Explanation of symbols.....	6
1.3	Limitation of liability.....	7
1.4	Spare parts.....	8
1.5	Warranty terms.....	8
1.6	Customer Service.....	9
1.7	Copyright.....	9
2	Safety.....	10
2.1	Responsibility of operating company.....	10
2.2	Personnel requirements.....	11
2.2.1	Qualifications.....	11
2.2.2	Unauthorised persons.....	12
2.2.3	Instructions.....	13
2.3	Intended use.....	13
2.4	Personal safety equipment.....	14
2.5	Principal hazards.....	14
2.6	Safety devices.....	17
2.7	Securing to prevent restart.....	18
2.8	Behaviour in the event of fire or accidents.....	19
2.9	Environmental protection.....	20
2.10	Labelling.....	20
3	Technical data.....	22
3.1	General information.....	22
3.2	Type code.....	22
3.3	Operating conditions.....	22
3.4	Operating materials.....	22
3.5	Type plate.....	23
4	Structure and function.....	26
4.1	Overview.....	26
4.2	Electric motors.....	27
4.2.1	Submersible motors (cooling method "N").....	28
4.2.2	Immersible electric motors (cooling method "E", "K", "F").....	28
4.3	Operational safety components.....	32
4.4	Hydraulics.....	33
4.5	Connections.....	33
4.6	Operating elements.....	34
5	Transport, packaging and storage.....	35
5.1	Safety instructions for transport.....	35
5.2	Transport inspection.....	36
5.3	Transport.....	37
5.4	Symbols on packaging.....	38

5.5	Packaging.....	39
5.6	Storage.....	40
6	Installation and initial commissioning.....	41
6.1	Safety.....	41
6.2	Preparations.....	43
6.2.1	Set-up location requirements.....	43
6.2.2	Pipeline requirements.....	43
6.3	Initial set-up.....	46
6.3.1	Installing pump in sump.....	46
6.3.2	Installing pump dry	52
6.3.3	Connecting to energy supply.....	53
6.3.4	Check rotational direction	56
6.3.5	Requirements on installation of options.....	57
6.3.6	To be done prior to starting the pump.....	58
6.3.7	Starting the pump.....	59
7	Operation.....	61
7.1	Switching on.....	61
7.2	Switching off.....	61
7.3	Standard operation.....	61
7.4	Required submersion depth.....	63
7.4.1	Submersible motors (cooling method "N").....	63
7.4.2	Immersible electric motors (cooling method "E", "K", "F").....	64
7.5	Special conditions.....	65
7.6	Emergency shutdown.....	65
8	Maintenance.....	67
8.1	Safety.....	67
8.2	Maintenance schedule.....	68
8.3	Service connections and inspection openings.....	69
8.4	Maintenance work.....	70
8.4.1	Visual condition check.....	70
8.4.2	Check/readjust impeller clearance.....	71
8.4.3	Check insulation resistance.....	84
8.4.4	Check oil level.....	85
8.4.5	Check oil quality.....	87
8.4.6	Change oil.....	89
8.5	Actions after maintenance has been completed.....	93
9	Malfunctions.....	94
9.1	Safety.....	94
9.2	Malfunction table.....	95
9.3	Startup after fault has been rectified.....	100
10	Disassembly.....	101
10.1	Safety.....	101
10.2	Dismantling.....	101



Table of contents

	10.3 Disposal.....	102
11	Appendix.....	103
12	Index.....	104

1 General

1.1 Information on these instructions

This manual enables safe and efficient handling of the system. This manual is an integral part of the system, and must be kept in close proximity to the system where it is permanently accessible to the personnel.

Before starting any work, the personnel must have read the manual thoroughly and understood its contents. Compliance with all specified safety instructions and operating instructions is vital to ensure safe operation.

In addition, local accident prevention regulations and general safety instructions must be observed for the operational area of the system.

Illustrations in this manual are intended to facilitate basic understanding, and may differ from the actual design.

1.2 Explanation of symbols

Safety instructions

The safety instructions provided in this manual are marked by symbols. The safety instructions are introduced by keywords used to express the extent of the danger.

Strictly adhere to all safety instructions and use caution to prevent accidents, personal injury and material damage.



DANGER!

This combination of symbol and keyword points to a situation of immediate danger which may lead to serious injury or death unless avoided.



WARNING!

This combination of symbol and keyword points to a situation of possible danger which may lead to serious injury or death unless avoided.



CAUTION!

This combination of symbol and keyword points to a possibly dangerous situation which may lead to slight or minor injury unless avoided.



NOTICE!

This combination of symbol and keyword points to a possibly dangerous situation which may lead to material and environmental damage unless avoided.

Tips and recommendations



This symbol highlights useful tips and recommendations as well as information designed to ensure efficient and smooth operation.

Special safety instructions

The following symbols are used in the safety instructions to draw attention to specific dangers:



DANGER!

This combination of symbol and signal word indicates dangers posed by electric power. If the safety instructions are not observed, there is a danger of serious or fatal injuries.

Symbols used in this manual

To indicate guidelines, descriptions of results, lists, references and other elements, the following symbols and markings are used in this manual:



Indicates step-by-step guidelines.

⇒ Indicates a condition or automatic sequence as result of action taken.



Indicates lists or list entries without a certain sequence.



„Symbols used in this manual“ on page 7 Indicates references to chapters in this manual.

1.3 Limitation of liability

All information and notes in this manual were compiled under consideration of the applicable standards and regulations, the present state of technology, as well as our many years of knowledge and experience.

The manufacturer assumes no liability for damages caused by:

- Non-observance of this manual
- Any use other than intended
- Assignment of untrained personnel
- Unauthorised conversions
- Technical modifications
- Use of unapproved spare parts
- Disassembly and repair of pump by unauthorised service centre & Chapter 1.6 „Customer Service“ on page 9.

In case of customised versions, utilisation of additional order options, or latest technical modifications, the actual scope of delivery can vary from the explanations and interpretations described herein.

The commitments set out in the delivery contract, the general terms and conditions, as well as the delivery conditions of the manufacturer and the regulations applicable at the time of contract conclusion are in force.

1.4 Spare parts

Procure spare parts from authorised dealer or directly from manufacturer. For contact information refer to Internet address on page 2.



WARNING!

Risk of injury when using incorrect spare parts!

The use of incorrect or defective spare parts can create hazards for the personnel and cause damages, malfunctions or total failure.

- Use only genuine parts from manufacturer or parts approved by manufacturer.
- In case of any questions, please always contact manufacturer.



When using unapproved spare parts, all claims concerning warranty, service, damage and/or liability against manufacturer or his agents, dealers and representatives will be forfeited.

When making spare parts enquiries or placing spare parts orders, complete information must be provided & *Type designation in contract.*

Spare parts list can be found in appendix.

1.5 Warranty terms

The warranty terms are included in the manufacturer's Terms and Conditions.

1.6 Customer Service

Contact our Customer Service for technical information. For contact information refer to Internet address on page 2.

In addition, our employees are always interested in new information and experiences that result from application and may be beneficial for improving our products.

1.7 Copyright

This manual is protected by copyright and intended solely for internal use.

This manual must not be made available to third parties, duplicated in any manner or form – whether in whole or in part – and the content must not be used and/or communicated, except for internal purposes, without the written consent of the manufacturer.

Violation of the copyright will result in legal action for damages. We reserve the right to assert further claims.

2 Safety

This section provides an overview of all the main safety aspects involved in ensuring optimal personnel protection and safe and smooth operation.

Non-compliance with the action guidelines and safety instructions contained in this manual may result in serious hazards.

2.1 Responsibility of operating company

Customer

The term 'customer' refers to the person who himself operates the system for trade or commercial purposes, or who surrenders the system to a third party for use/application, and who bears the legal product liability for protecting the user, the personnel or third parties during the operation.

Owner's obligations

The system is used in the industrial sector. The owner of the system must therefore comply with statutory occupational safety requirements.

In addition to the safety instructions in this manual, the safety, accident prevention and environmental protection regulations governing the operating area of the system must be observed.

In this regard, the following requirements should be particularly observed:

- The owner must obtain information about the applicable occupational safety regulations, and - in the context of a risk assessment - must determine any additional dangers resulting from the specific working conditions at the usage location of the system. The owner must then implement this information in a set of operating instructions governing operation of the system.
- During the complete operating time of the system, the owner must assess whether the operating instructions issued comply with the current status of regulations, and must update the operating instructions if necessary.
- The owner must clearly lay down and specify responsibilities with respect to installation, operation, troubleshooting, maintenance and cleaning.
- The owner must ensure that all personnel dealing with the system have read and understood this manual. In addition, the owner must provide personnel with training and hazards information at regular intervals.
- The owner must provide the personnel with the necessary protective equipment.

Furthermore, the owner is responsible for ensuring that the system is always in a technically faultless condition. Therefore, the following applies:

- The owner must ensure that the maintenance intervals described in this manual are observed.
- The owner must ensure that all safety devices are regularly checked to ensure full functionality and completeness.

2.2 Personnel requirements

2.2.1 Qualifications



WARNING!

Danger of injury if personnel are insufficiently qualified

If unqualified personnel perform work on the system or are in the system's danger zone, hazards may arise which can cause serious injury and substantial damage to property.

- Therefore, all work must only be carried out by appropriately qualified personnel.
- Unqualified personnel must be kept away from the danger zones.

This manual specifies the personnel qualifications required for the different areas of work, listed below:

Forklift driver

The forklift driver must be at least 18 years old and, based on his physical and intellectual attributes and character, suited to driving industrial trucks with a driver's seat or driver's platform.

Furthermore, the forklift driver has been trained to drive industrial trucks with a driver's seat or driver's platform.

The forklift driver has provided the owner with evidence of his skills in driving industrial trucks with a driver's seat or driver's platform and has therefore been authorised in writing by the owner to drive the forklift.

Instructed person (operator)

has been informed by the operating company about the assigned tasks and possible hazards in case of incorrect behaviour.

Manufacturer (service centre)

Certain types of work may only be performed by our professionals. Any other personnel is not authorised to perform this work. To schedule the corresponding work, contact our Service department, see address on page 2.

Qualified Electrician

Based on his technical training, knowledge, experience and knowledge of the applicable standards and regulations, the Qualified Electrician is able to perform work on electrical systems and recognise and avoid potential hazards himself.

The Qualified Electrician is specially trained for the area of responsibility he is involved with and knows the relevant standards and regulations.

The Qualified Electrician must comply with the requirements of the applicable legal regulations for accident prevention.

Qualified personnel

Qualified personnel is able to carry out assigned work and to recognize and prevent possible dangers self-reliantly due to its professional training, knowledge and experience as well as profound knowledge of applicable regulations.

The workforce must only consist of persons who can be expected to carry out their work reliably. Persons with impaired reactions due to, for example, the consumption of drugs, alcohol, or medication are prohibited.

When selecting personnel, the age-related and occupation-related regulations governing the usage location must be observed.

2.2.2 Unauthorised persons



WARNING!

Risk to life for unauthorised persons due to hazards in the danger and working zone!

Unauthorised persons who do not meet the requirements described here will not be familiar with the dangers in the working zone. Therefore, unauthorised persons face the risk of serious injury or death.

- Unauthorised persons must be kept away from the danger and working zone.
- If in doubt, address the persons in question and ask them to leave the danger and working zone.
- Cease work while unauthorised persons are in the danger and working zone.

2.2.3 Instructions

The personnel must receive regular instruction from the owner. The instruction must be documented to facilitate improved verification.

[illegible]

2.3 Intended use

The pumps are exclusively designed and constructed for the intended use described herein.

The pumps are intended for use in the food and chemical industry, environmental technology for domestic and industrial wastewater, mines and in the petroleum industry.

The pump serves exclusively for the delivery of media according to technical data sheets & Chapter 11 „Appendix“ on page 103.

Intended use also includes compliance with all information contained in this manual.

Any use other than the one intended or any other type of use, is considered incorrect.



WARNING!

Risk due to incorrect use!

Any use beyond the intended one, or other use of the equipment, can result in dangerous situations.

- Use device only as intended.
- Strictly follow the information contained in these operating instructions.
- Do not use device in potentially explosive atmospheres.
- Refrain from delivery of flammable liquid.
- Refrain from altering, converting or modifying the construction or individual pieces of equipment, aimed at changing the area of application or the use of the device.
- Never operate device outside the technical application and operating limits.

Claims of any kind for damages due to incorrect use are excluded.

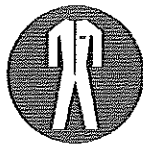
2.4 Personal safety equipment

Personal protective equipment is used to protect the personnel from dangers which could affect their safety or health while working.

The personnel must wear personal protective equipment while carrying out the different operations at and with the system. This equipment will be indicated separately in the individual chapters of this manual. This personal protective equipment is described below:

- It is mandatory to put on the personal protective equipment specified in the different chapters of this manual before starting work.
- Always comply with the instructions governing personal protective equipment posted in the work area.

Description of the personal protective equipment



Protective clothing

Protective clothing are tight fitting working clothes with low tear resistance, with tight sleeves and without any parts sticking out. These clothes primarily protect against getting caught by moving machine parts. Do not wear rings, chains, necklaces, and other jewellery.



Protective helmet

The protective helmet provides protection against falling and flying parts and materials.



Safety boots

Safety boots are intended to protect against slipping hazards or foot hazards like heavy gear.



Safety gloves

Safety gloves are intended to protect hands against friction, abrasion, stabs or deeper wounds and against direct contact with hot surfaces.

2.5 Principal hazards

The following section specifies the residual risks determined on the basis of a risk assessment.

In order to reduce health risks and avoid dangerous situations, observe the safety instructions listed here and the safety instructions contained in other chapters of this manual.

Electrical current



DANGER!

Life-threatening hazard from electric shock!

There is an imminent life-threatening hazard from electric shocks from live parts. Damage to insulation or to specific components can pose a life-threatening hazard.

- Only a qualified electrician should perform work on the electrical equipment.
- Immediately switch off the power supply and have it repaired if there is damage to the insulation.
- Before beginning work at live parts of electrical systems and resources, cut the electricity and ensure it remains off for the duration of the work. Comply with the five safety rules in the process:
 - cut electricity;
 - safeguard against restart;
 - ensure electricity is not flowing;
 - earth and short-circuit; and
 - cover or shield neighbouring live parts.
- Never bypass fuses or render them inoperable. Always use the correct amperage when changing fuses.
- Keep moisture away from live parts. Moisture can cause short circuits.

Impeller



WARNING!

Risk of injury from rotating parts!

Impeller of pump can cause severe injuries.

- Never reach into impeller while in operation.
- Observe delay time: Before performing any maintenance, ensure that parts have come to a complete stop.

Safety

Principal hazards



Highly inflammable substances



WARNING!

Danger to life in the event of fire due to highly inflammable substances!

Highly inflammable substances, liquids or gases may catch fire, causing serious or fatal injuries.

- Do not smoke within or around the danger zone. Do not handle open flames, fire or ignition sources of any kind.
- Ensure availability of suitable extinguishing agents (fire blanket, fire extinguisher).
- Immediately report suspicious substances, liquids or gases to the person in charge.
- Cease work immediately in the event of fire. Leave the danger zone until the all-clear is sounded and notify the fire brigade.

Risk of entanglement caused by submersible pump



WARNING!

Risk of entanglement caused by submersible pump!

During operation of the submersible pump there is a risk of entanglement at the side of the pump's suction inlet. This can cause severe injuries.

- Do not enter hazardous area during operation.
- Prior to any set-up and maintenance work as well as troubleshooting measures, switch off power supply and protect against restart.

Lubricants, preservatives



WARNING!

Fire hazard due to lubricants and preservatives!

Oil and grease can ignite after contact with ignition sources.

- No open fire when working on devices.
- No smoking.
- Remove oil and grease residues from device and floor.

Hot surfaces



WARNING!

Danger of injury from hot surfaces!

Component surfaces may heat up greatly during operation. Skin contact with hot surfaces will cause severe skin burns.

- Always wear heat-resistant protective work clothing and protective gloves as a matter of principle when working in the vicinity of hot surfaces.
- Before carrying out any work, make sure that the surfaces have cooled down to the ambient temperature.

Poisoning hazard



CAUTION!

Poisoning hazard from oil, grease and preservatives!

Contact with oil and grease can be harmful to health.

- Avoid skin contact with oil and grease.
- Remove oil and grease immediately from skin.
- Do not inhale oil and grease vapours.

2.6 Safety devices



WARNING!

Mortal danger due to non-functioning safety devices!

Safety is only guaranteed if safety devices are faultless.

- Always maintain safety components in good order.
- Never disable safety devices.
- Do not bypass or modify safety components.
- Ensure that safety devices, such as emergency-stop buttons, ripcords, etc. are always accessible.

The operating company must retrofit the following safety devices:

Integration in an emergency-stop concept required

The device is intended for use within a system. It has no separate emergency-stop function.

Before initial use of the device, install emergency-stop devices and main switch, and integrate into safety chain of system control.

Safety

Securing to prevent restart



Connect emergency-stop devices so as to prevent situations that could endanger human life or property in case of energy supply interruption or energy supply activation after an interruption.

The emergency-stop devices must be freely accessible at all times.

Time-lag fuses or circuit breakers

Time-lag fuses or circuit breakers must be installed in each supply phase.

Lightning protection

Overcurrent circuit breakers must be installed in each supply phase if there is a risk of lightning damage.

Motor starting switch

A magnetic contact starter, designed for full voltage, must be installed and dimensioned according to applicable local regulations, based on motor power rating.

Quick trip overcurrent circuit breakers

They must be selected based on the power consumption indicated on the type plate. In case of locked rotor (approximately 6 times the full-load current) they must switch off within 6 seconds to sufficiently protect the motor windings. Check "switch-off curve" of circuit breaker to ensure that this requirement is met.



The warranty for the immersible motors applies only if quick trip overcurrent circuit breakers are installed in all phases. For repair of motors under warranty, provide documents proving that the correct overcurrent circuit breakers were installed.

2.7 Securing to prevent restart



WARNING!

Danger to life from an unauthorised restart!

In the event of an unauthorised restart of the power supply, there is a danger of serious injuries or death for persons in the danger zone.

- Observe all instructions in the chapters of this manual relating to preventing a restart
- Always comply with the sequence described below to prevent a restart.

Securing to prevent restart

Switch secured with lock
on: at o'clock.
DO NOT SWITCH ON
The lock may be removed
only by:
after making sure that no
persons are in the hazardous
area.

Fig. 1: "Switch secured using a lock"
sign

Switched off
on: at o'clock.
DO NOT SWITCH ON
Switching on may be performed
only by:
after making sure that no
persons are in the hazardous
area.

Fig. 2: "Switched off" sign

1. ➤ Switch off the power supply.
2. ➤ If possible, secure the switch using a lock and attach a corresponding sign Fig. 1 to the switch ensuring high visibility.
3. ➤ Place the key in the safekeeping of the personnel specified on the sign.

4. ➤ If it is not possible to secure a switch using a lock, an appropriate sign Fig. 2 should be attached.
5. ➤ After all work has been completed, ensure that the danger zone has been cleared of people.
6. ➤ Ensure that all safety and protective devices are installed and completely functional.
7. ➤ Only then should the sign be removed.

2.8 Behaviour in the event of fire or accidents

Precautions

- Always be prepared for accidents or fire!
- Ensure that first aid supplies (box of dressings, blankets etc.) and fire extinguishers are completely functional and ready to hand.
- Ensure that personnel are familiar with accident reporting, first aid and rescue equipment.
- Keep access routes clear for emergency service vehicles.

Actions in the event of accidents

- Immediately use the emergency stop device to trigger an emergency stop.
- Rescue people from the danger zone.
- Initiate first aid measures.
- Notify the rescue services.
- Notify those responsible at the place of use.
- Clear access routes for emergency service vehicles.

2.9 Environmental protection



NOTICE!

Danger to the environment from incorrect handling of pollutants!

Incorrect handling of pollutants, particularly incorrect waste disposal, may cause serious damage to the environment.

- Always observe the instructions below regarding handling and disposal of pollutants.
- Take the appropriate actions immediately if pollutants escape accidentally into the environment. If in doubt, inform the responsible municipal authorities about the damage and ask about the appropriate actions to be taken.

The following pollutants are used:

Lubricants, preservatives

Lubricants, such as greases, oils and preservatives, contain poisonous substances. Do not allow them to enter the environment. Disposal must be carried out by a professional disposal company.

2.10 Labelling

The following symbols and information signs can be found in the work area. They refer to their immediate surroundings.

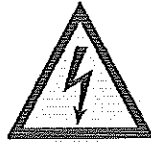


WARNING!

Danger of injury from illegible symbols!

Stickers and signs can become dirty or otherwise obscured over time, with the result that dangers cannot be recognised and the necessary operating instructions cannot be complied with. This, in turn, poses a risk of injury.

- All safety, warning and operating instructions must always be maintained in a completely legible condition.
- Damaged signs or stickers must be replaced immediately.

Electrical voltage

Only qualified electricians are permitted to work in a work room marked by this sign.

Unauthorised persons must not enter the workplaces thus marked and must not open the marked cabinet.

Information label on motors with PTC thermistors

All motors equipped with PTC thermistors have the following information label at the cable end:

"CAUTION! PTC thermistor! Voltage larger than 2,5 V destroys the winding!"

Technical data

Operating materials



3 Technical data

3.1 General information



For technical data (dimensions, weights, performances, connected loads, etc.) refer to enclosed delivery drawings and data sheets. ↗ Chapter 11 „Appendix“ on page 103.

3.2 Type code



Explanation of type code (motor code and hydraulic designation) ↗ Chapter 11 „Appendix“ on page 103).

3.3 Operating conditions

Environment

Data	Value	Unit
Temperature of medium	up to 40	°C
Ambient temperature	up to 40	°C



Minimum values for medium and ambient temperature depend on operating conditions. For additional information ↗ Chapter 7.5 „Special conditions“ on page 65.

Duration

Data	Value
Maximum operating time	designed for continuous operation

3.4 Operating materials

Operating material	Characteristic	Value	Unit
STABURAGS NBU 8EP from Klüber-Lubrication (lubricant)	Colour	beige	
	Apparent dynamic viscosity	6000	mPas
	Range of operating temperature	-30...150	°C

Operating material	Characteristic	Value	Unit
Hydraulic fluid no. 856 or equivalent oil (cooling and sealing liquid)	Max. temperature (short-term)	170	°C
	Viscosity grade (NLGI)	2	
	Penetration, DIN ISO 2137 (0.1 mm)	280	
	Dropping point DIN ISO 2176, minimum	220	°C
	Corrosion protection DIN 51802	0	
	RPM parameters (n x d m)	5 x 10 ⁵	
	Specific gravity at 20 °C	0,812	g/ml
	Viscosity at 40 °C	3,5	mm ² /s (cst)
	Pour point	-38	°C
	Flash point	132	°C
Corrosion protection No. 846 (Preservative)	Fire point	142	°C
	Heat of vaporization	251	kJ/kg
	Water solubility	none	
	Boiling point/boiling range	148	°C
	Flash point	30	°C
	Ignition temperature	260	°C
	Lower explosive limit	0,5	Vol. %
	Upper explosive limit	6,5	Vol. %
	Density at 20 °C	0,87	g/cm ³

3.5 Type plate

The type plate is located on the motor casing.

Technical data

Type plate



Type plate

Fig. 3

The type plate includes the following information:

Explanation	Designation	Example	Unit
Name and address of manufacturer	Manufacturer		
CE marking	CE		
Hidrostat motor code	TYP (TYPE)		
Order number	O.NR. (O.No.)		
Serial number	M.NR. (M.No.)		
Rotating electrical machines	VDE 0530		
Insulation class	I.CL.		
Degrees of protection (based on overall design)	IP Code	68	
Mains frequency		50	Hz
Nominal voltage (operating voltage)		400	V
Nominal motor current			A
Power input	P1		kW
Power factor	cos φ		
Nominal speed	RPM 1/min		rpm
Nominal output	P2		kW
Phase circuits	Con. Schalt. (Con. circuit)		
Weight			kg
Flow rate	Q		l/s



Technical data

Type plate

Explanation	Designation	Example	Unit
Delivery head	H		m
Ambient temperature	Umg. Temperatur (Amb. temperature)		°C

4 Structure and function

4.1 Overview

The pump is used for the delivery of media according to technical data sheets.

- 1 Cable part
- 2 Electric motor
- 3 Hydraulic part
- 4 Suction flange
- 5 Pressure flange

The medium is sucked via the suction inlet (4) by means of the impeller of the hydraulic part (3) and delivered to the pressure line.

The pump may be installed horizontally or vertically.

Depending on type of electric motor, the pump is suitable for wet or dry installation & Chapter 4.2 „Electric motors“ on page 27.

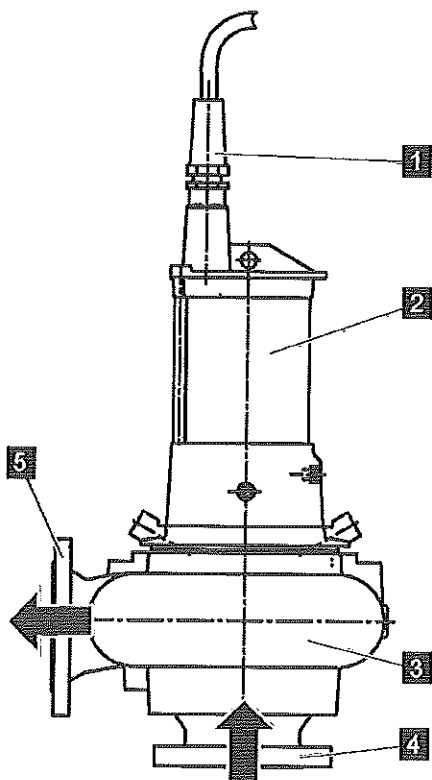
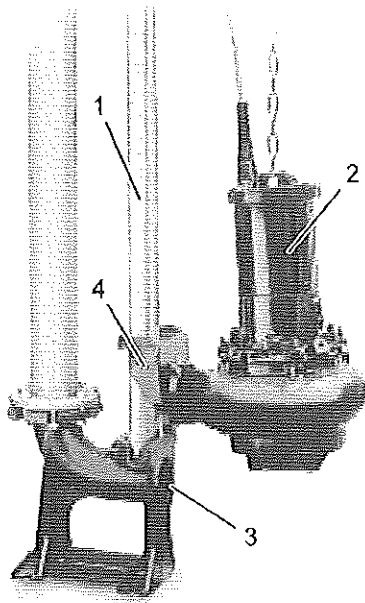


Fig. 4



If pump (2) is sump-mounted, it is equipped with guide rail (1) (optional) and slide shoe (4). This ensures that pump is precisely positioned on the automatic coupling on the discharge outlet (3).

Fig. 5

4.2 Electric motors

Cooling methods for electric motors

Depending on motor size and application, various cooling methods can be applied (second digit of motor code):

- Submersible motors for sump installation (cooling method "N")
The pump is fully submerged during operation, but it can emerge.
- Immersible electric motors for dry installation in immersed area (cooling method "E", "K", "F") The pump is installed dry, but can be immersed.

Structure and function

Electric motors > Immersible electric motors (cooling method "E"...



4.2.1 Submersible motors (cooling method "N")

Immersion cooling (cooling method "N")

On this type, the waste heat of the motor is transferred directly to the surrounding liquid via the stator housing (1).

- 1 Stator housing
- 2 Oil drain opening
- 3 Stator housing opening
- 4 Flushing connection

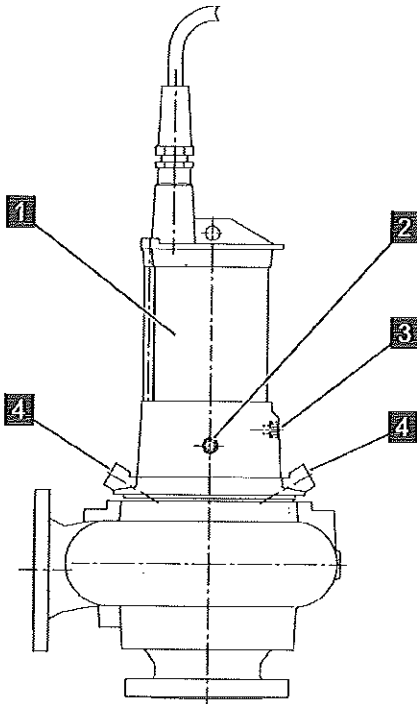
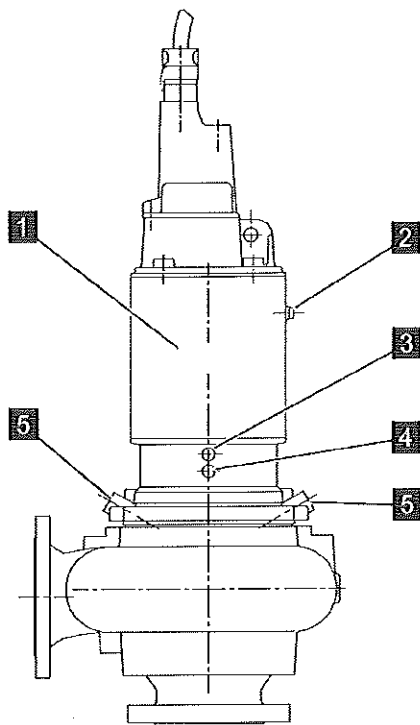


Fig. 6

4.2.2 Immersible electric motors (cooling method "E", "K", "F")

Self-cooling (cooling method "E")

On this type, the pump is equipped with an oil jacket (1) with forced circulation.



- 1 Cooling jacket of stator housing
- 2 Oil filler opening
- 3 Stator housing opening
- 4 Oil drain opening
- 5 Flushing connection

The waste heat of the motor is transferred to the cooling oil, which circulates in the cooling jacket. The oil discharges the waste heat through the sealing part of the motor (serves as heat exchanger). The oil is circulated by an impeller on the motor shaft.

Fig. 7

Structure and function

Electric motors > Immersible electric motors (cooling method "E"...



Convection cooling (cooling method "K")

On this type, the waste heat of the motor is transferred directly to the surrounding liquid (pump submerged) or the air (pump not submerged) via the stator housing (1).

- 1 Stator housing
- 2 Stator housing opening
- 3 Oil drain opening
- 4 Flushing connection

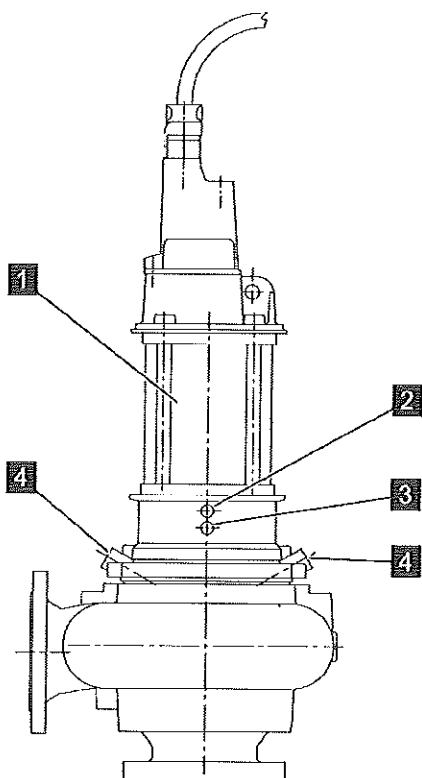
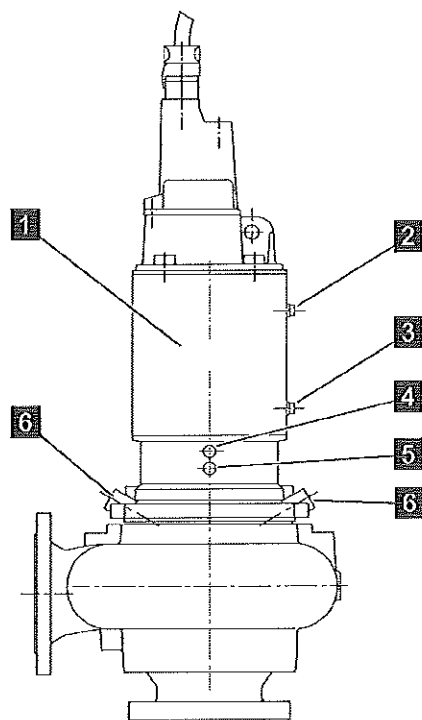


Fig. 8

Forced cooling (cooling method "F")

On this type, the waste heat of the motor is transferred from the stator to a cooling liquid. It circulates in the cooling jacket (1), which encloses the stator housing. The cooling liquid transfers the waste heat to an external heat exchanger. It must be circulated by an external pump system.



- 1 Cooling jacket of stator housing
- 2 Coolant outlet
- 3 Coolant inlet
- 4 Stator housing opening
- 5 Oil drain opening
- 6 Flushing connection

This type is suitable for applications where self-cooling is not sufficient, particularly when the temperature of the delivered medium is too high for an effective cooling.

Fig. 9

4.3 Operational safety components

The following components are installed:

- 1 Cable protection
- 2 Bearing temperature probe in upper bearing (optional)
- 3 Winding head with built-in temperature limiter
- 4 Bearing temperature probe in lower bearing (optional)
- 5 Float switch (optional)
- 6 Moisture probe (optional)

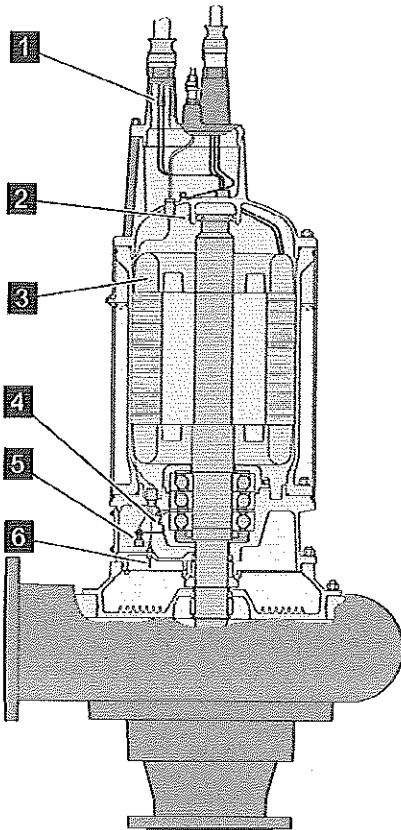


Fig. 10

Cable protection (1)

The cable inlet prevents moisture from entering the interior of the motor. The cables are sealed with epoxy resin; the wires are fed into separate conductors, which also form the connection to the motor, thus completely sealing the interior space between the cable sheathing and the wires.

Temperature limiter - circuit with temperature controller built into the winding (3)

The motors are made with temperature limiters, which are installed in the winding head (conductor connection 1 and 2). When trigger temperature of limit switch is reached, operation is interrupted. They are bimetallic switches (similar to Klaxon). They can be directly connected to the motor's control circuit at 220/240 volt, with a maximum load of 2.5 A.

A temperature controller (conductor terminal 1 and 3) ensures that operation is interrupted 12 to 15 °C before reaching the trigger temperature of the limit switch.

Overtemperature protection of windings (when in inverter mode)

Overtemperature protection takes place via PTC thermistor and PTC thermistor triggering device. PTC thermistor sensors protect against excessive temperatures in case of blocking rotors, heavy start-ups, counter-current operation, undervoltage and phase failure, increased ambient temperature and impaired cooling.

Bearing temperature probe in lower bearing (optional) (4); in upper bearing (optional) (2)

The bearing temperatures of the lower and upper bearings of the electric motor are monitored by temperature probes. Thus, bearing damage can be detected at an early stage and necessary measures can be taken.

Float switch (5) (optional)

Leakage monitoring of upper seal is performed by means of a float switch, which is installed in the oil chamber. If water enters the drying chamber, it reacts before the water reaches the lower bearing. This prevents lubricating grease from washing out and damage to the bearing.

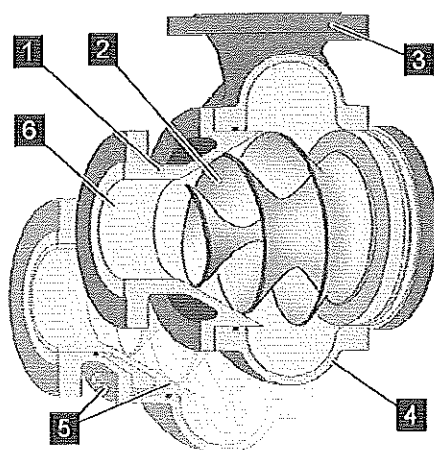
Moisture probe (6) (optional)

Moisture is monitored by means of a moisture probe. If a certain water content is exceeded in the oil chamber of the electric motor, the integrated moisture probe triggers an alarm.

Operating hours counter (optional)

The operating hours counter is used to keep track of operating hours.

4.4 Hydraulics



- 1 Suction cone
- 2 Screw centrifugal impeller (impeller)
- 3 Outlet
- 4 Spiral casing
- 5 Clearance adjustment
- 6 Inlet

The standard hydraulic system consists of a spiral casing (4), an impeller (2) and a suction cone (1). The impeller - suction cone clearance can be adjusted (5).

Fig. 11

4.5 Connections

The pump is connected to the energy supply by means of an electric cable.

Structure and function

Operating elements



Each cable set has three or six power current leads per rotational speed, a ground conductor and additional conductors for overtemperature protection and leakage monitoring.

4.6 Operating elements



The device has no separate operating elements. Operation is performed via a separate control & separate operating manual.

5 Transport, packaging and storage

5.1 Safety instructions for transport

Industrial trucks

**WARNING!****Danger to life from industrial trucks!**

Objects and other loads may fall from industrial trucks during transport in an uncontrolled manner, causing serious injuries or death. There is also a danger that the vehicle driver will fail to see persons and may run over them.

- Industrial trucks should only be operated by trained drivers (e.g. forklift operators).
- Only pass an industrial truck once the driver has signalled that he has seen the persons.
- Only use approved industrial trucks with sufficient load-bearing capacity.
- Never drive material transports around people or areas where people gather.

Eccentric centre of gravity

**WARNING!****Danger of injury from falling or tipping packages!**

Packages may have an eccentric centre of gravity. Incorrect attachment may cause the package to tip and fall. Falling or tipping packages may cause serious injury.

- Observe the markings and specifications on the packages relating to the centre of gravity.
- When transporting with a crane, attach the crane hook so that it is above the package's centre of gravity.
- Lift the package carefully and observe whether it tips. Change the attachment position if necessary.

Suspended loads



WARNING!

Danger of fatal injury from suspended loads!

During lifting operations, loads may swing out and fall down. This may result in serious injury or death.

- Never step under suspended loads, and do not step within their pivoting range.
- Only move loads under supervision.
- Only use approved hoists and lifting gear with a sufficient load-bearing capacity.
- Do not use torn or abraded hoists such as ropes and straps.
- Do not place hoists such as ropes and straps against sharp edges or corners and do not knot or twist them.
- Set the load down when leaving the workplace.

Improper transport



NOTICE!

Damage to property due to improper transport!

Transport units may fall or tip over as a result of improper transport. This can cause a significant level of property damage.

- Proceed carefully when unloading transport units at delivery and during in-house transport; observe the symbols and instructions on the packaging.
- Only use the attachment points provided.
- Only remove the packaging shortly before assembly.

5.2 Transport inspection

On receipt, immediately inspect the delivery for completeness and transport damage.

Proceed as follows in the event of externally apparent transport damage:

- Do not accept the delivery, or only accept it subject to reservation.
- Note the extent of the damage on the transport documentation or the shipper's delivery note.
- Initiate complaint procedures.



Issue a complaint in respect of each defect immediately following detection. Damage compensation claims can only be asserted within the applicable complaint deadlines.

5.3 Transport

Attachment points

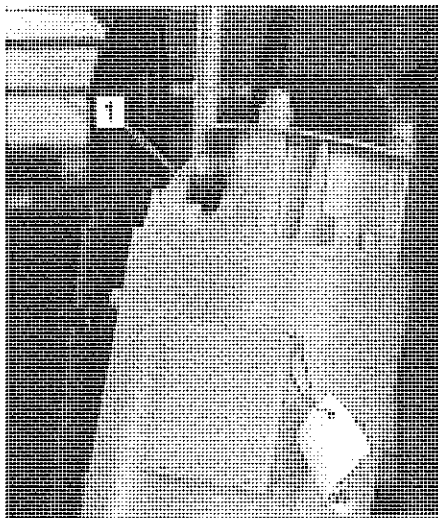


Fig. 12

Transporting packages with a crane

The following attachment points are provided:

- Attachment lugs (1) on electric motor and on pump

Attachment

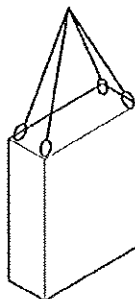


Fig. 13: Transport with a crane

Packages with lifting eyes can be transported directly with a crane subject to the following conditions:

- The crane and hoists must be designed for the weight of the packages.
- The operator must be authorised to operate the crane

Protective equipment: ■ Protective helmet

1. ➤ Attach ropes, straps or multi-point suspension gear in accordance with Fig. 13.
2. ➤ Ensure that the package hangs straight; if necessary, take account of eccentric centre of gravity.
3. ➤ Start transport.

Transporting pallets with a crane

Packages fixed to pallets can be transported directly with a crane subject to the following conditions:

- The crane and hoists must be designed for the weight of the packages.
- The operator must be authorised to operate the crane.

Protective equipment: ■ Protective helmet

Attachment

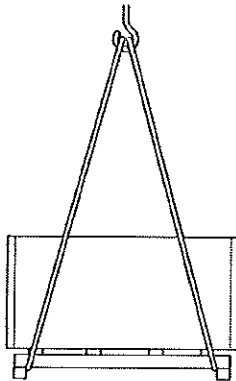


Fig. 14: Attaching the hoist

1. ▶ Attach ropes, straps or multi-point suspension gear in accordance with Fig. 14 to the pallet and secure the pallet to prevent slippage.
2. ▶ Check that the packages are not damaged by the lifting gear. Use different lifting gear if necessary.
3. ▶ In the event of an eccentric centre of gravity, ensure that the pallet cannot tip over.
4. ▶ Start transport.

Transporting pallets with a forklift

Packages fixed to pallets can be transported with a forklift subject to the following conditions:

- The forklift must be designed for the weight of the packages.
- The package must be securely fixed to the pallet.

Personnel: ■ Forklift driver

Transporting

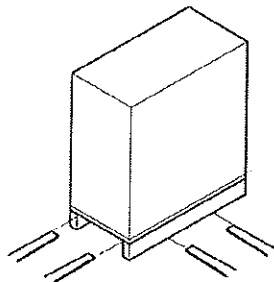
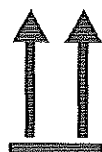


Fig. 15: Transport with a forklift

1. ▶ Drive the forklift with the forks between or beneath the pallet struts.
2. ▶ Drive the forks in to such an extent that they protrude from the opposite side.
3. ▶ In the event of an eccentric centre of gravity, ensure that the pallet cannot tip over.
4. ▶ Lift the pallet with its package and start the transport.

5.4 Symbols on packaging

Top



The arrow tips on the sign mark the top of the package. They must always point upwards; otherwise the content could be damaged.

Attach here



Lifting gear (lifting chain, lifting strap) must only be attached to points bearing this symbol.

Centre of gravity



Marks the centre of gravity of packages.

Note the location of the centre of gravity when lifting and transporting.

Weight, attached load



Indicates the weight of packages.

Handle the marked package in accordance with its weight.

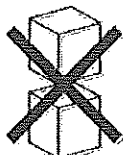
Permitted stacking load



Indicates packages which are partially stackable.

Do not exceed the maximum load-bearing capacity specified in the symbol in order to avoid damaging or destroying the content.

Do not stack



Indicates packages that cannot be stacked.

5.5 Packaging

About packaging

The individual packages are packaged in accordance with anticipated transport conditions. Only environmentally-friendly materials have been used in the packaging.

The packaging is intended to protect the individual components from transport damage, corrosion and other damage prior to assembly. Therefore do not destroy the packaging and only remove it shortly before assembly.

Handling packaging materials

Dispose of packaging material in accordance with the relevant applicable legal requirements and local regulations.



NOTICE!

Danger to the environment due to incorrect disposal!

Packaging materials are valuable raw materials and in many cases can continue to be used or can be properly processed and recycled. Incorrect disposal of packaging materials may pose risks to the environment.

- Dispose of packaging materials in accordance with the environmental regulations.
- Observe locally applicable waste disposal regulations. If necessary, outsource the disposal to a specialist company.

5.6 Storage



NOTICE!

Damage to property due to incorrect storage!

Incorrect storage can cause considerable damage to property.

- Always observe the following instructions on storage:

Storage of packages

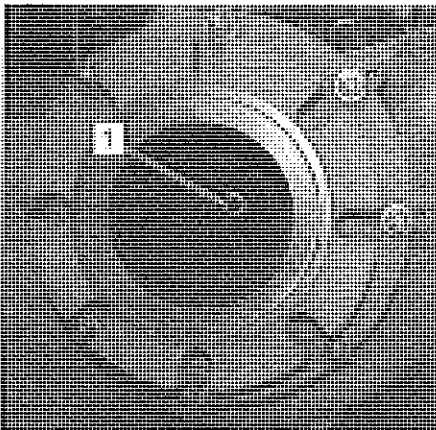


Fig. 16

Store packages under the following conditions:

- Do not store outside.
- Keep dry and dust-free.
- Do not expose to aggressive media.
- Do not expose to any mechanical agitations and vibrations.
- Turn shaft of impeller via front screw (1) every two weeks to prevent oxidation and rust.
- Storage temperature: -10 to 40° C.
- Relative humidity: max. 60 %.
- If storage exceeds 3 months, check general condition of all parts and of packaging in regular intervals. If necessary, refresh or renew preservation & Chapter 3.4 „Operating materials“ on page 22.



It is possible that the packages contain storage instructions that go beyond the requirements mentioned here. Please follow them.

6 Installation and initial commissioning



Installation and initial commissioning shall only be performed by employees appointed by the manufacturer, or by individuals authorised by him. In the event of non-compliance, all warranty claims against manufacturer or his representative shall be forfeited.



WARNING!

Danger due to faulty installation and initial commissioning!

Installation and initial commissioning require trained professionals with adequate experience. Errors during installation can result in fatal situations or considerable property damage.

- Ensure that installation and initial commissioning is performed exclusively by trained professionals or specialist department.

After set-up, completion of installation, initial commissioning and performance of recorded test runs by manufacturer or his representatives, the equipment is handed over to the operating company.

After this, the operating company is allowed to carry out operation as intended in compliance with the information contained in these operating instructions.

6.1 Safety

Electrical system



DANGER!

Danger to life from electric power!

Contact with live parts may prove fatal. When switched on, electric components can be subject to uncontrolled movements and may cause grave injury or death.

- Switch off the power supply before starting work and make sure that it cannot be switched on again.



WARNING!

Risk of injury and damage to property due to potentially explosive atmosphere!

Use of devices in potentially explosive atmosphere that are not approved for Ex atmospheres can result in severe injuries, even death.

- Operate pump only after exclusion of potentially explosive atmosphere.

Securing to prevent restart



WARNING!

Danger to life from an unauthorised restart!

In the event of an unauthorised restart of the power supply during installation, there is a danger of serious injuries or death for persons in the danger zone.

- Switch off all power supplies before starting work and make sure they cannot be switched on again.

Improper installation and initial commissioning



WARNING!

Danger of injury from an improper installation and initial commissioning!

Improper installation and initial commissioning can result in serious injury and significant damage to property.

- Ensure sufficient assembly space before starting work.
- Handle exposed, sharp-edged components with caution.
- Pay attention to orderliness and cleanliness in the assembly location! Loosely stacked or scattered components and tools could cause accidents.
- Assemble the components properly. Comply with the specified bolt tightening torques.
- Secure components so that they cannot fall down or topple over.
- Before the initial commissioning, ensure that
 - all installation work has been carried out and completed in accordance with the specifications and instructions in this manual.
 - no persons are in the danger zone.

6.2 Preparations

6.2.1 Set-up location requirements

Prior to installing the device ensure that set-up location meets the following requirements:

- Ensure observance of applicable local safety regulations.
- Ensure that there is no potentially explosive atmosphere.
- The set-up location of the pump must be as close to the liquid source as possible.
- Ensure that pump room has sufficient ventilation.
- Ensure that length of supplied cable is sufficient for local requirements.
- The device must not be subject to any vibrations or agitations of adjacent machines or systems. Under no circumstances is the generation of resonance oscillations by the foundation/ fastening structure allowed.
- There must be sufficient space for assembly, maintenance and cleaning work.



Manufacturer recommends that a minimum operating space of 1 metre around the device is kept clear for maintenance and servicing work.

For sump installation

In addition to above requirements, observe the following:

- When installing submersible pump in sump, ensure that sump floor is level and smooth.
- For installation and service work above the pump sump, a pulley or chain hoist must be installed. The load capacity of the lifting gear must be at least twice that of the pump weight.
- A water connection with a pressure of about 4 bar (70 psi) must be available to hose down pump when pulling it out of the sump.

6.2.2 Pipeline requirements

- Irrespective of the pump, suction and pressure lines must be supported so as not to place additional load on the pump.
- Temperature or pressure expansion of pipelines are not to affect the pump.

6.2.2.1 Suction line



NOTICE!

Property damage and loss of suction due to air or gas pockets in suction lines!

Air or gas pockets in suction lines can result in property damage and loss of suction.

- Install suction lines in such a way that pump is never operated with positive suction head (pump higher than suction point) and the liquid carries air or gas.
- Do not install any check valves in suction line.
- Install gate valve with horizontal spindle in suction line to prevent air or gas pockets.

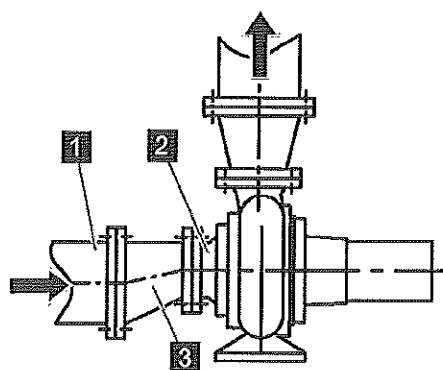


Fig. 17: Horizontal pump installation

- To achieve maximum available suction head, the suction line must be as direct and short as possible and without any bends. If bends are unavoidable, they should preferably have large radii.
- The suction line must be free of counter bores. They result in air accumulations and loss of suction.
- Ensure that suction line is airtight if the medium is to be lifted by suction.
- Install suction line in such a way as to prevent formation of air pockets.

In doing so, observe the following:

- The suction line (1) must point towards the suction inlet (2) of the pump (Fig. 17) or upward (Fig. 18).

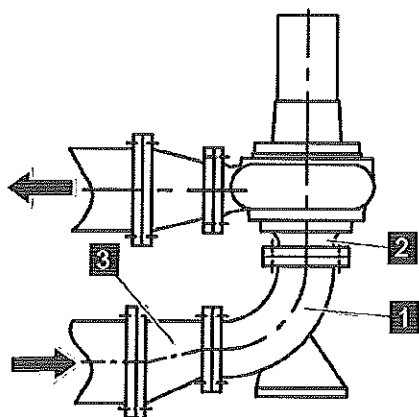


Fig. 18: Vertical pump installation

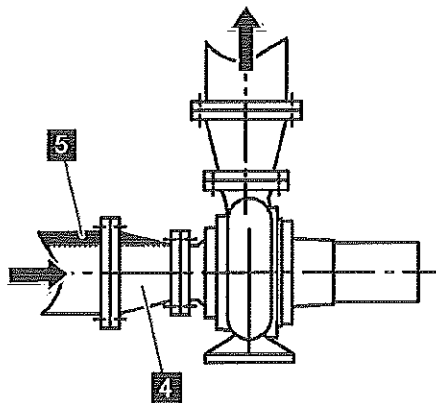


Fig. 19: Air pocket when installing pump horizontally

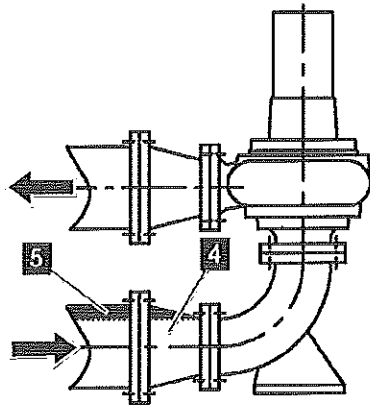


Fig. 20: Air pocket when installing pump vertically

Dimensioning

Unusual suction conditions

- Use only eccentric reducers (Fig. 17/3 and Fig. 18/3), whose flat part must be on top. Centric reducers (Fig. 19/4 and Fig. 20/4) result in the air pockets (Fig. 19/5 and Fig. 20/5).

- To prevent excessive losses, the suction line diameter must be one nominal size larger than the diameter of the pump's suction inlet.

Unusual suction conditions, such as high liquid temperature, altitude from sea level and high specific gravity, must be compensated by proper planning and adequate dimensioning of the suction line.

Installation and initial commissioning



Initial set-up > Installing pump in sump

6.2.2.2 Pressure line

- Use as few fittings as possible. If the medium is pumped up, guide the line vertically upward starting from the pump, and then horizontally to the outlet point.
- Do not exceed maximum permitted speed if using check valves in the pressure line. The maximum speed for simple check valves in waste water is 3.5 m/s. Exceeding these values can result in pressure shocks when closing check valve: Sealing error by lifting of the surface of the mechanical seal, or coolant loss.

6.3 Initial set-up

The pump may be installed horizontally or vertically.

6.3.1 Installing pump in sump

Personnel: ■ Qualified personnel

Protective equipment: ■ Protective clothing

■ Safety gloves

■ Protective helmet

■ Safety boots

Special tool: ■ Pulley or chain hoist

1. ► Ensure that there is no potentially explosive atmosphere.

2. ► Ensure that the sump floor at installation site of pump is level and smooth.

Installing pump guide rail system:

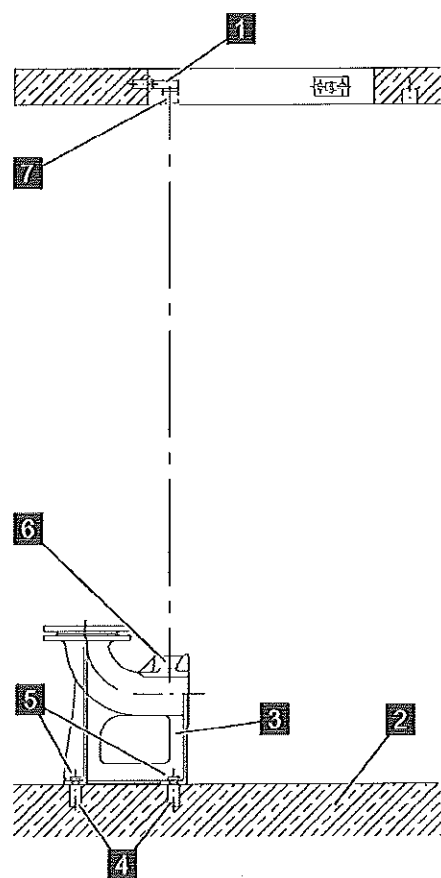


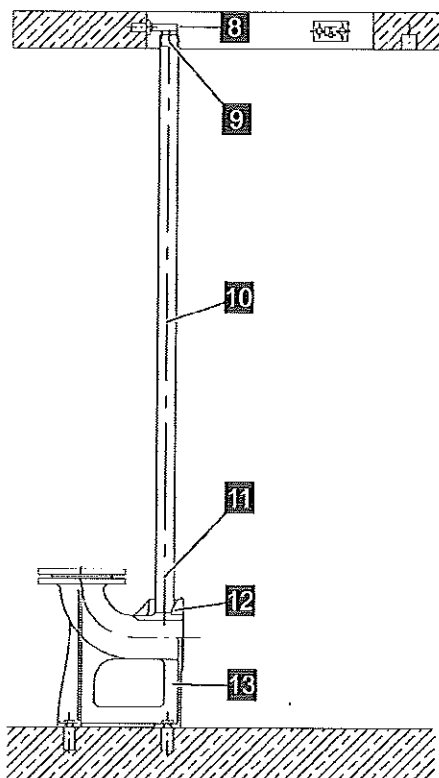
Fig. 21

3. ➤ Complete foundation (2).
4. ➤ Wait until foundation has hardened (if cast-in sleeves (4) are used).
5. ➤ Fasten pipe bracket (1). Make sure that there is enough space available for the slide shoe.
6. ➤ Attach outlet bracket (3) with cast-in sleeves (4) or expansion anchors and nuts (5) to sump floor.
7. ➤ Ensure that guide tube bolts or recesses (6) of outlet bracket (3) are vertically aligned with the guide tube bolts (7) of the pipe bracket (1).

Installation and initial commissioning

Initial set-up > Installing pump in sump

hidrostal



- 8. ➤ Produce guide tube (10) from galvanized steel pipe (or stainless steel).
- 9. ➤ Cut guide tube (10) to correct length.
- 10. ➤ Push lower pipe end (11) over guide tube bolts or into recesses (12) of outlet bracket (13).
- 11. ➤ Unscrew pipe bracket (8) and insert into upper pipe end (9).
- 12. ➤ Attach pipe bracket (8) again.
- 13. ➤ Ensure that guide tube (10) is vertical and parallel.

Fig. 22

Installing pressure line:

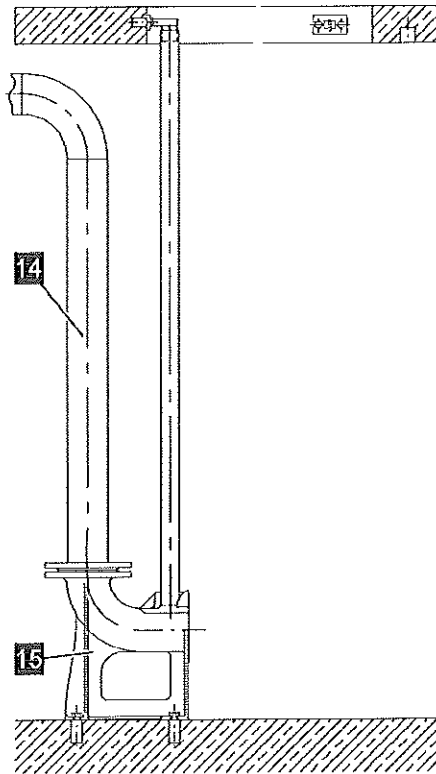


Fig. 23

- 14.▶ Install pressure line (14) to outlet bracket (15) .
- 15.▶ Ensure that pressure line (14) is connected to outlet bracket (15) without any tension or misalignments.
- 16.▶ Connect pump to energy supply & Chapter 6.3.3 „Connecting to energy supply“ on page 53.

Lowering pump into sump:

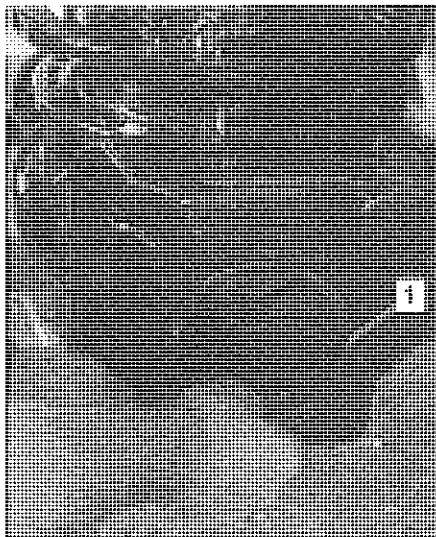


Fig. 24

- 17.▶ Carefully remove old construction waste and other solid parts from sump floor.
- 18.▶ Check rubber seal (1) at pump outlet for damages and correct position in the groove.
- 19.▶ Using a brush, lubricate rubber seal with standard grease.

Installation and initial commissioning

Initial set-up > Installing pump in sump

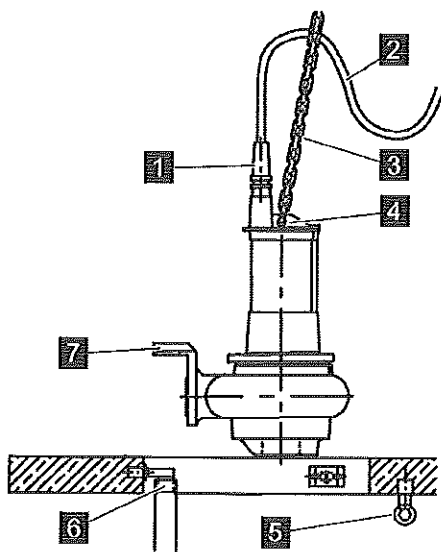


Fig. 25

- 20.▶ Correctly attach hoisting chain or steel hoisting rope (3) to suspension lugs (4).

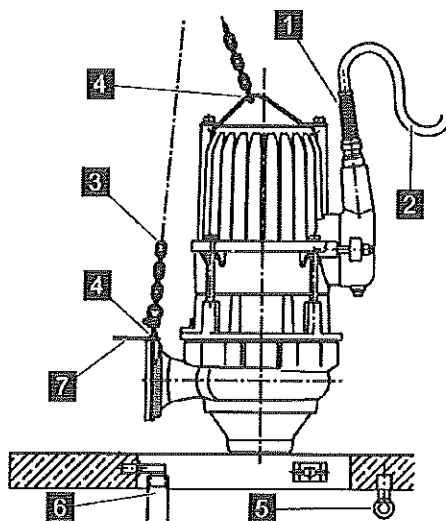


Fig. 26

- 21.▶ Check cable inlet (1) for damage.
22.▶ Ensure that the cable (2) is firmly clamped in the cable inlet (1).
23.▶ Feed cable (2) through the cable bracket (5). Make sure that cable is long enough to follow the pump.
24.▶ Lift pump with crane and move directly over the guide rail (6) until the slide shoe (7) engages.

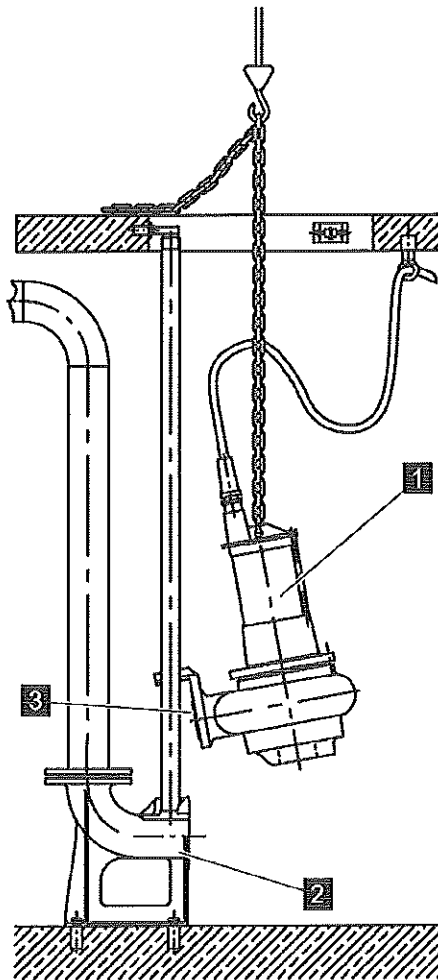


Fig. 27

- 25.** Lower pump (1) until it rests against the outlet bracket (2). The fitting surfaces are sealed by means of the rubber seal (3) that is installed in the slide shoe at the outlet flange. The empty weight of the pump pushes it onto the outlet bracket (2) (as soon as the pump is in its place).

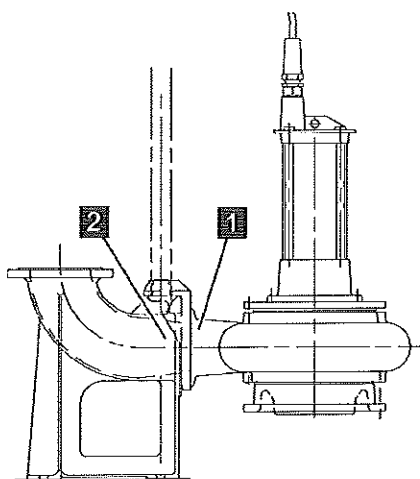
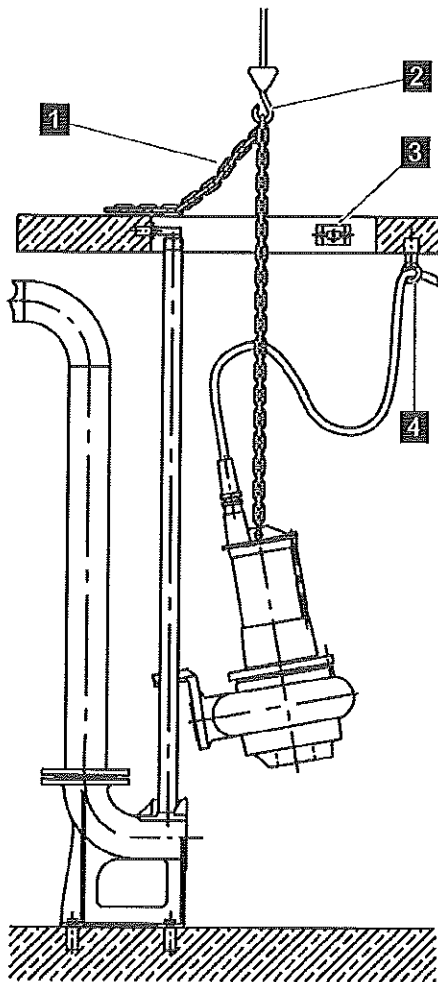


Fig. 28

- 26.** Ensure proper connection between pump (1) and outlet bracket (2).

Installation and initial commissioning

Initial set-up > Installing pump dry



27. ▶ Release hoisting chain (1) from crane (2) and firmly fasten to chain bracket (3).



WARNING!

Risk of injury and damage to property due to loose hoisting chain and cable!

Loose hoisting chain or cable can be drawn into the suction inlet of the pump. This can result in considerable personal injury and property damage.

- Always fasten cable to cable bracket (4).
- After installation and maintenance work, always fasten hoisting chain to chain bracket (3).

6.3.2 Installing pump dry

- Personnel:
- Qualified personnel
- Protective equipment:
- Protective clothing
 - Safety gloves
 - Protective helmet
 - Safety boots



If a pulley or chain hoist is used for pump installation, perform the steps according to chapter "Installing pump in sump".

1. ▶ Ensure that there is no potentially explosive atmosphere.
2. ▶ Complete foundation.
3. ▶ Wait until foundation has hardened (if cast-in sleeves are used).
4. ▶ Install suction and pressure lines.

5. ➤ Connect pump to energy supply & Chapter 6.3.3 „Connecting to energy supply“ on page 53.
6. ➤ Remove all construction waste from pump basin.
7. ➤ Mount pump to foundation.
8. ➤ Ensure that suction and pressure lines are equipped with all seals.
9. ➤ Mount suction line (1) and pressure line (2) to pump flange and tighten screws evenly.

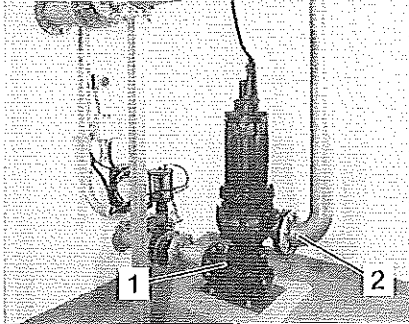


Fig. 29



NOTICE!

Property damage due to pipeline pressure!

Pipeline pressure can cause considerable damage to property.

- Never expose pump casing to pipeline pressure.
- When connecting the pipelines, always tighten screws evenly and ensure a solid fit.
- Ensure that flanges are parallel.
- Ensure that base plate or suction bend are fastened to the foundation.

6.3.3 Connecting to energy supply

- | | |
|-----------------------|-------------------------|
| Personnel: | ■ Qualified Electrician |
| Protective equipment: | ■ Protective clothing |
| | ■ Protective helmet |
| | ■ Safety boots |



WARNING!

Risk of injury and property damage due to improper connection to power supply!

Improper connection to the power supply can result in severe injuries and considerable property damage.

- Any work on electrical system must be performed by authorized electricians.
- Make sure that cable ends never get in contact with water during connection to power supply. This could cause a short circuit.
- Never open motor to connect power supply. Opening the motor can damage the hermetic seal applied in the factory.

Connection table

Installation and initial commissioning

Initial set-up > Connecting to energy supply



Each cable set has three or six power current leads per rotational speed, a ground conductor and additional conductors for overtemperature protection and leakage monitoring.

The power current leads of the motor are marked according to the following table:

Motor type	Number of revolutions	Number of conductors	Speed	Winding connection	Designation at cable end, according to standard DIN VDE 0530
up to 4 kW, direct start	1	3 + C + E		Y	U1 V1 W1
via 4 kW star delta start	1	6 + C + E		Δ	U1 V1 W1 W2 U2 V2
Dahlander pole changing Y/YY for two speeds, direct start	2	6 + C + E	N	Y	1U 1V 1W
			H	YY	1U 1V 1W 2U 2V 2W
Pole-changing motor, all speeds with direct start	2	6 + C + E	N	Y	1U1 1V1 1W1
			H	Y	2U1 2V1 2W1
Pole changing motor, low speed: Direct start, high speed: Star delta start	2	9 + C + E	N	Y 1)	1U1 1V1 1W1
			H	Δ	2U1 2V1 2W1 2U2 2V2 2W2
Pole changing motor, low and high speed with star delta start	2	12 + C + E	N	Δ	1U1 1V1 1W1 1U2 1V2 1W2
			H	Δ	2U1 2V1 2W1 2U2 2V2 2W2

The following abbreviations are used in the table:

Designation	Abbreviation	Explanation
Number of conductors	E	Earthing (yellow-green)
	C	Control conductor
Speed	N	Low speed
	H	High speed
Winding connection	Y/YY	Direct start (Dahlander)
	Δ	The starting current at this speed is lower than the starting current at high speed during star delta start
	1)	Star delta start possible

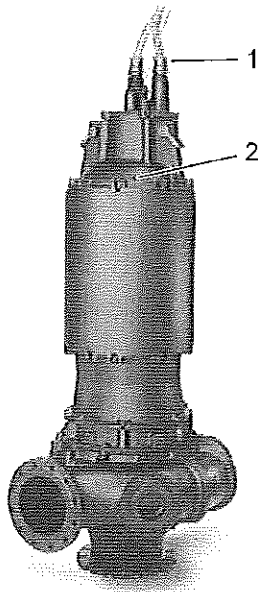


Fig. 30

When establishing connection to power supply, observe the following:

Electrical controls and junction boxes

Lowest threshold value (temperature controller)

Highest threshold value (temperature limiter)

Temperature sensor

- The electrical controls and junction boxes of the pump's power supply cable must be installed above the anticipated flood level. They should be adequately sealed and/or ventilated to prevent interior condensation.
- Connect control conductors 1 and 3 in such a way to allow automatic restart of motor after it has cooled down and circuit is closed again. An overheated motor can resume operation as soon as it is submerged again in cooling water.
- Connect control conductors 1 and 2 in such a way to prevent automatic restart of motor. In case of malfunction it must be determined why the temperature control circuit did not switch off first. The malfunction must be corrected before motor is started up again.
- Motor is only deenergized by the temperature sensors if it gradually overheats due to an electrical malfunction. This device does not provide protection against fast temperature increase caused by overload, such as a locked rotor. They are therefore no adequate substitute for the specified overcurrent circuit breakers (e.g. for pump stations with several pumps).



Seal monitoring is located in a separate cable, which is led through the motor.

1. Turn impeller by hand to ensure free rotation.
2. Check motor cover (2) and cable inlet (1) for visible damage.
3. Ensure that the cable is firmly clamped in the cable inlet (1).
4. Perform electrical connections according to electrical diagram & Chapter 11 „Appendix“ on page 103.
5. Ensure that PTC thermistor is connected in such a way that motor is deenergized without delay in case of overheating & Information label on motors with PTC thermistor.



Non-observance results in forfeiture of all warranty claims.

6. Check rotational direction & Chapter 6.3.4 „Check rotational direction“ on page 56.
7. Ensure that the options are installed correctly. & Chapter 6.3.5 „Requirements on installation of options“ on page 57.

6.3.4 Check rotational direction

- Personnel: ☒ Qualified Electrician
- Protective equipment: ☒ Protective clothing
☒ Protective helmet
☒ Safety boots



WARNING!

Risk of injury and damage to property due to incorrect rotational direction!

Incorrect rotational direction can result in serious injuries or property damages.

- In case of incorrect rotational direction, switch only the pump's cable conductors or speed with wrong rotational direction at the corresponding starting switch in the control panel.
- Never switch the primary feeders to the control panel. This reverses the rotational direction of all pumps at all speeds.

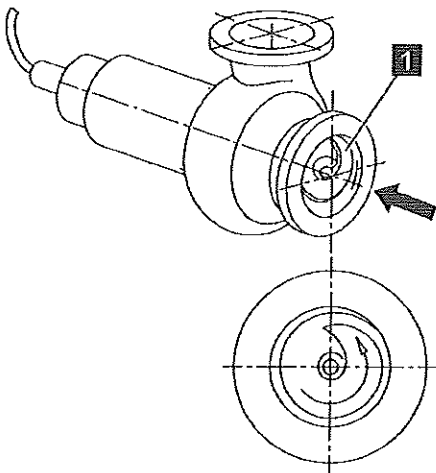


Fig. 31

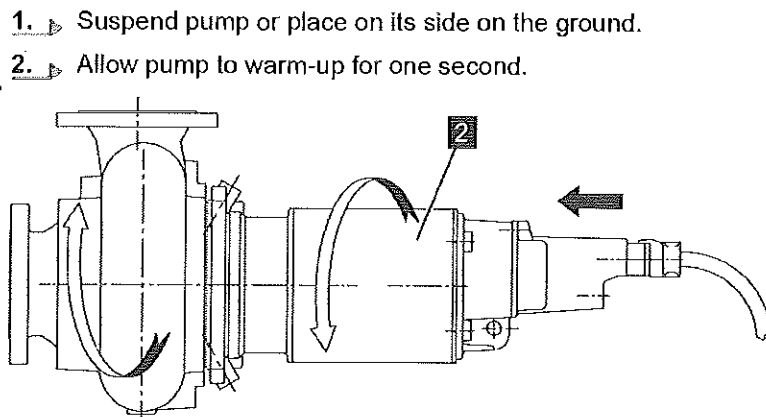


Fig. 32

1. ➤ Suspend pump or place on its side on the ground.
2. ➤ Allow pump to warm-up for one second.
3. ➤ Ensure that rotational direction of impeller (1) is counter clockwise as seen from suction end (Fig. 31). The starting jerk must act counter clockwise as seen from the drive end of the motor (2) (Fig. 32).
4. ➤ On pump units with several speeds, repeat points 2 to 3 for each speed.



In case of incorrect rotational direction on systems with several speeds or pumps, switch speed with wrong rotational direction at the corresponding starting switch in the control panel.

6.3.5 Requirements on installation of options

It is recommended to install the following options:

- "Manual – Off – Automatic" switch
- Low voltage terminals for level switch
- Signal lamps "Pump on" and "Pump defective"
- Operating hours counter & „Operating hours counter (optional)“ on page 33
- Changeover switch for pump stations with several pumps
- Alarm system for high sump level with separate power supply. This ensures uninterrupted protection in case of main power supply failure.
- Moisture probe & „Moisture probe (6) (optional)“ on page 33
- Float switch & „Float switch (5) (optional)“ on page 33
- Bearing temperature probe & „Bearing temperature probe in lower bearing (optional) (4); in upper bearing (optional) (2)“ on page 33

When installing the options, observe the following:

Level switch

- For the level switches (switching on and off), use control systems that are suitable for the liquid that is being delivered.
- Use float switches for the high level alarm, even if another type is used for the pump control.
- To prevent wrong alarm, arrange float switches for the alarm at reasonable distance.

Level control

- Set level switches "ON" and "OFF" in such a way to allow for sufficient sump volume in between. This prevents that the pump is switched on more than 10 times per hour. More starts can cause damage to the controls in the control panel. This also increases power consumption. The minimum sump volume is calculated with the following formula:

$$V = \frac{0,9 \times Q_p}{Z}$$

Fig. 33: Formula minimum sump volume

V = Capacity or sump volume between switch-on and switch-off level (in cubic metres)

Q_p = Flow rate of a pump (litres per second)

Z = Number of starts per hour (Z = max. 10)

6.3.6 To be done prior to starting the pump

Personnel: ■ Instructed person (operator)

Protective equipment: ■ Protective clothing

■ Protective helmet

■ Safety boots

1. ▶ Ensure that all level controls are set correctly. The switch-off level must be high enough to prevent air from entering the pump part.
2. ▶ Ensure that all inlet and outlet valves on suction and pressure side are completely open.
3. ▶ Immerse pump sump.
4. ▶ Calculate sump in such a way as to prevent pump from running dry under normal conditions & Chapter 7.4 „Required submersion depth“ on page 63.
5. ▶ Ensure that there is no potentially explosive atmosphere.



WARNING!

Risk of injury and damage to property due to potentially explosive atmosphere!

Use of devices in potentially explosive atmosphere that are not approved for Ex atmospheres can result in severe injuries, even death.

- Operate pump only after exclusion of potentially explosive atmosphere.

6. ▶ Vent air between pump and check valve if necessary.

Vent air between pump and check valve

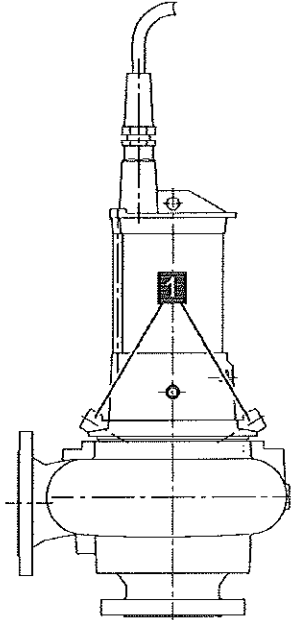


Fig. 34

Personnel: ■ Instructed person (operator)

1. ➤ If a check valve is installed near the pump, air can collect between pump and check valve. To allow pump to prime, the air must be vented from the casing or pressure line (upstream of check valve) during initial commissioning.
2. ➤ Maintain flush water pressure via pressure regulator at 0,5 to 1 bar (7 to 14 psi) above outlet pressure.
3. ➤ Flush pump for 60 seconds. The water is controlled by means of a solenoid valve and a timer, and drained via flush water connections (1).
 - ⇒ The flush water rate fluctuates depending on pump size and application. Usually flow rates of 6-8 litre per minute are adequate.



If pump is operating with positive suction head (pump above suction level), it can be evacuated via jet or vacuum pump. Vertically installed HIDROSTAL solids handling pumps are self-priming when the impeller tip is submerged into the liquid to be pumped and an automatic vent valve is connected to the pump casing or the pressure line (between pump and check valve).

6.3.7 Starting the pump

Personnel: ■ Qualified Electrician

Protective equipment: ■ Protective clothing
■ Protective helmet
■ Safety boots

1. ➤ Ensure that no persons are in the danger zone.
2. ➤ Switch on pump in manual mode.
3. ➤ Measure power input separately in each phase.
4. ➤ Write down measured values and compare to information on type plate.



If power input is more than 5% higher, shut down pump, determine cause and correct malfunction.

5. ➤ Switch pump to automatic mode.
6. ➤ Allow basin to be emptied several times.
7. ➤ Ensure that level switch is set correctly and functions properly.

Installation and initial commissioning



Initial set-up > Starting the pump

8. ▶ Ensure that alarm system and changeover switch (if installed in control panel) function correctly.
9. ▶ Record date and operating hours to determine the actual operating hours for maintenance.

7 Operation

Improper operation



WARNING!

Danger of injury from improper operation!

Improper operation can result in serious injury and significant damage to property.

- Carry out all operating steps in accordance with the specifications and instructions in this manual.
- Before starting work, ensure that
 - all covers and safety devices are installed and functioning properly.
 - no persons are in the danger zone.
- Never disable or bypass safety devices during operation.

7.1 Switching on

Personnel: ☒ Instructed person (operator)

Protective equipment: ☒ Protective clothing

☒ Safety boots

1. ➤ Ensure that all inlet and outlet valves on suction and pressure side are completely open.
2. ➤ Ensure that there is no potentially explosive atmosphere.
3. ➤ Ensure that no persons are in the danger zone.
4. ➤ Place main switch of system in „On“ position.

7.2 Switching off

- Place main switch of system in „Off“ position.

7.3 Standard operation

„Automatic mode“ is the pump's standard operating mode.



NOTICE!

Property damage and loss of suction due to improper operation!

Improper operation of device can result in property damage and loss of suction.

- Never operate pump with positive suction head (pump above suction point). This prevents that air or gas is entrained in the liquid.
- Avoid vortex formation.
- Keep medium from drying out.
- Never operate pump with closed or clogged suction and pressure line.
- Do not operate pump in continuous operation in duty points that are outside the outlet pressure - flow rate curve; High outlet pressure at low flow rate or low outlet pressure at high flow rate.

The duties and responsibilities of the operator are restricted to the following activities during operation:

- Flushing of pump in case of high concentrations of dirt or sludge
- Draining of pump when shut down for more than 14 days
- Reaction to malfunctions & Chapter 9 „Malfunctions“ on page 94

Flushing of pump

Personnel: ■ Instructed person (operator)

Protective equipment: ■ Protective clothing

■ Safety boots

In special cases, e.g. high concentrations of dirt or sludge, accumulated solids (between impeller and mechanical seal on pump side) can be periodically flushed away.

1. ➤ Maintain flush water pressure via pressure regulator at 0,5 to 1 bar (7 to 14 psi) above outlet pressure.
2. ➤ Flush pump for 60 seconds. The water is controlled by means of a solenoid valve and a timer, and drained via the flush water connection (1).

The flush water rate fluctuates depending on pump size and application. Usually flow rates of 6-8 litre per minute are adequate.

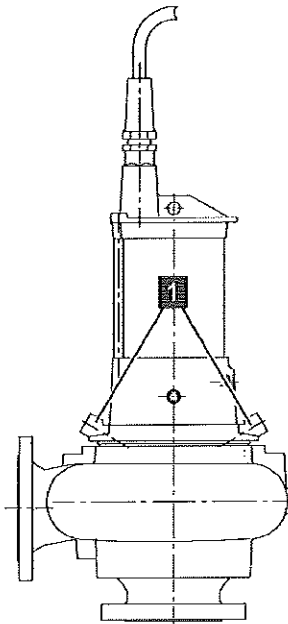


Fig. 35



The frequency of flushing must be determined individually for each system.

Draining of pump

- When shut down for more than 14 days, drain pump completely. This prevents movable parts from being stuck due to corrosion.
- Turn pump every 14 days (by hand or by switching impulse) to lubricate mechanical seal.

7.4 Required submersion depth
7.4.1 Submersible motors (cooling method "N")

Submersible motors perform at their maximum level when staying submerged in liquid.

However, on submersible motors it is permitted to install the switch-off level below the upper edge of the motor.

Dry run times

The possible dry run time of a pump depends on ambient temperature and liquid temperature, hydraulic load of motor and duty point on pump curve.

Operation



Required submersion depth > Immersible electric motors (cooling method "E"...

The following times are maximum operating times for a fully loaded motor, which is first fully submerged in a liquid of 15 °C and then suddenly operates in 40 °C air:

Size of motor	Dry run time
B, Y, 002, 003	5 minutes
Z, X, 004, 006, 007	7 minutes
4/W, 5/V, 6/U, 7/T, 014, 020, 030, 090, 130	9 minutes
300/S	15 minutes

If motor operates in air for a longer time, it is shut down by the overtemperature fuse circuit and suffers no damage. The sump must have sufficient volume to hold the inflowing liquid until motor has cooled down and can be restarted.

Cool-down periods

Approximate cool down periods for the various motor sizes at maximum liquid temperature of 15 °C:

Size of motor	Cool down period to restart
B, Y, 002, 003	3 minutes
Z, X, 004, 006, 007	4 minutes
4/W, 014, 020	5 minutes
5/V, 030	8 minutes
6/U, 090, 130	11 minutes
7/T	15 minutes
300/S	20 minutes



If sump construction requires that motor runs for an extended period while not fully submerged, use immersible electric motors with independent cooling & Chapter 7.4.2 „Immersible electric motors (cooling method "E", "K", "F")" on page 64.

7.4.2 Immersible electric motors (cooling method "E", "K", "F")

Dry run times

Immersible electric motors can operate continuously in fully submerged condition or in completely dry environment.

Cool-down periods

For cooling purposes, the motors must not be continuously immersed.

To start the pump, the "ON" level must be at least as high as the impeller tip.

7.5 Special conditions

Operation around the freezing point



WARNING!

Risk of injury and damage to property due to ice formation and bursting construction!

Ice formation and bursting construction when operating pump around the freezing point can result in severe injuries.

- When operating pump around the freezing point, drain all hollow spaces filled with medium by opening the according plugs.

Pump operation in food sector



WARNING!

Hazard due to deposition of harmful substances and bacterial

Lack of hygiene can cause diseases and infections.

- Drain and clean pump on a regular basis. Intervals of cleaning work & *separate operating instructions for food system*.

7.6 Emergency shutdown

Emergency shutdown

In a danger situation, it is vital to stop components moving as quickly as possible and to switch off the power supply.

Proceed as follows in an emergency:

1. ▶ Immediately use the emergency stop device to trigger an emergency stop.
2. ▶ Rescue people from the danger zone.
Initiate first aid measures.
3. ▶ Notify a doctor and the fire brigade.
4. ▶ Notify those responsible at the place of use.
5. ▶ Switch off the main switch and secure to prevent a restart.
6. ▶ Keep access routes clear for emergency service vehicles.
7. ▶ If warranted by the gravity of the emergency, notify the responsible authorities.
8. ▶ Delegate specialist personnel to rectify the fault.

After rescue measures have been taken



WARNING!

Danger to life from an unauthorised restart!

In the event of an unauthorised restart of the power supply, there is a danger of serious injuries or death for persons in the danger zone.

- Before a restart, ensure that there are no persons still in the danger zone.

9. Before the restart, check the system and ensure that all safety devices are installed and fully functional.

8 Maintenance

8.1 Safety

Electrical system



DANGER!

Danger to life from electric power!

Contact with live parts may prove fatal. When switched on, electric components may be subject to uncontrolled movements and may cause grave injury.

- Switch off the power supply before starting work and make sure that it cannot be switched on again.

Securing to prevent restart



WARNING!

Danger to life from an unauthorised restart!

In the event of an unauthorised restart of the power supply during maintenance, there is a danger of serious injuries or death for persons in the danger zone.

- Switch off all power supplies before starting work and make sure they cannot be switched on again.

Improperly executed maintenance work



WARNING!

Danger of injury from improperly executed maintenance work!

Improper maintenance may result in serious injury and significant damage to property.

- Ensure sufficient assembly space before starting work.
- Pay attention to orderliness and cleanliness in the assembly location! Loosely stacked or scattered components and tools could cause accidents.
- If components have been removed, pay attention to correct assembly, refit all fixing elements and comply with bolt tightening torques.
- Before the restart, ensure that
 - all maintenance work has been carried out and completed in accordance with the specifications and instructions in this manual.
 - no persons are in the danger zone.
 - all covers and safety devices are installed and functioning properly.

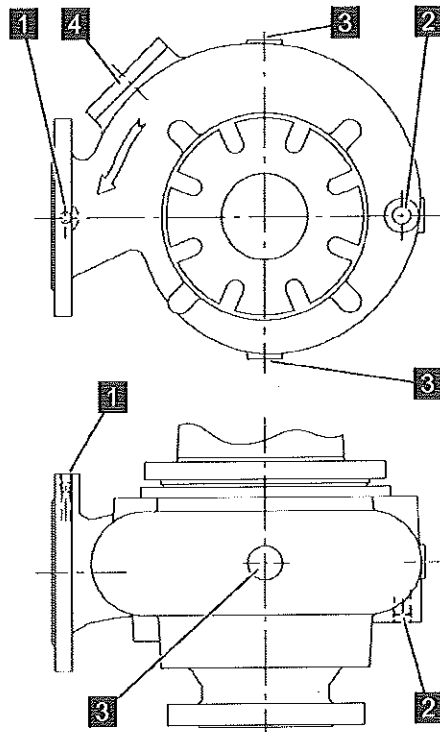
8.2 Maintenance schedule

The sections below describe the maintenance work required to ensure optimal and smooth operation of the system.

If increased wear is found during regular checks, the required maintenance intervals should be shortened in accordance with the actual wear occurrences. Contact the manufacturer in the event of queries regarding maintenance work and intervals; see the service address on page 2.

Interval	Maintenance work	Personnel
Weekly	Check pump for damages	Instructed person (operator)
Monthly	Check function of level control, correct if necessary ↳ Chapter 6.3.5 „Requirements on installation of options“ on page 57	Instructed person (operator)
Initially after about 1000 oh (operating hours)	Check oil level ↳ Chapter 8.4.4 „Check oil level“ on page 85	Qualified personnel
Semi-annual	Check flow rate and outlet pressure according to flow rate – outlet pressure curve ↳ Technical data sheets, readjust impeller clearance if necessary ↳ Chapter 8.4.2 „Check/readjust impeller clearance“ on page 71	Instructed person (operator)
Annually	Check electric motor and cable for damage	Qualified Electrician
	Check overcurrent relay, fuses and time relay (if available) for accurate setting, correct if necessary	Qualified Electrician
	Check insulation resistance of motor winding and cable ↳ Chapter 8.4.3 „Check insulation resistance“ on page 84	Qualified Electrician
	Check mechanical seal on motor side in motor casing	Manufacturer (service centre)
	Check mechanical seals on pump side	Manufacturer (service centre)
	Check oil level ↳ Chapter 8.4.4 „Check oil level“ on page 85	Qualified personnel
	Check oil quality ↳ Chapter 8.4.5 „Check oil quality“ on page 87	Qualified personnel
	Check impeller clearance, readjust if necessary ↳ Chapter 8.4.2 „Check/readjust impeller clearance“ on page 71	Qualified personnel
If needed	change oil ↳ Chapter 8.4.6 „Change oil“ on page 89	Qualified personnel
	Revision work	Manufacturer (service centre)

8.3 Service connections and inspection openings



- 1 Connection at pressure flange
- 2 Connection as drain opening for horizontally installed pumps with vertical outlet
- 3 Position of additional connections for horizontally installed pumps with horizontal outlet
- 4 Inspection opening on casing for checking hydraulics (starting at hydraulic size E05Q/E125)

The service connections (1), (2) and (3) are for transport of the pump.

The inspection opening (4) is used to check the hydraulic system during repair work.

Inspection openings are only to be opened at complete standstill and with power supply switched off and protected against restart.

The inspection openings can only be opened with tools. After completion of work and before restart, the inspection openings must be closed and all fasteners properly mounted again.



Refer to the following table for the size of connection thread for connections (1) and (2).

Fig. 36

Hydraulic type designation	Size of connection thread		Diameter
	Connection (1)	Connection (2)	
B02Q	G ½"	-	-
B050	G ½"	G ¼"	-
B0BQ/B065	G ½"	-	30
C0CQ	-	-	-
C080/C03Q	G ½"	G ¼"	-
D0DQ	-	-	-
D03Q/D04Q/D080/D100	G ½"	G ¼"	35
D03R/DE3R/D04R/DE4R	G ½"	G ¼"	40
D03H/DE3H/D03M/DE3M/D04M/DE4M	-	G ¼"	40
D03U/DE3U/D04U/DE4U	G ½"	G ¼"	40
D06M	-	G ½"	40
D06U/E03Q/E080	G ½"	G ½"	35
E0EQ	-	-	-
DE5Q/E05Q/E125/E08Q/E06U/E08U/E200	G ½"	G ½"	50

Maintenance

Maintenance work > Visual condition check



Hydraulic type designation	Size of connection thread		Diameter
	Connection (1)	Connection (2)	
E06M/E08M	-	G ½"	40
F06Q/F150	G ½"	G ½"	60
H125/H08Q/H200	G ½"	G ½"	35
L12Q/L300/L20Q/L500	G 1"	G ½"	60
M16Q/M400	G 1"	G ½"	60
M28Q/M700	G 2"	G ½"	60

8.4 Maintenance work

Preparations



WARNING!

Risk of injury and property damage due to improperly performed preparatory work!

Improperly performed preparatory work can result in most severe injuries and property damage!

- When unfastening the power supply cable at the control panel, make sure that cable ends never get in contact with water. This could cause a short circuit.
- Place protective plastic tube on cable ends or wrap cable ends in a plastic sack and seal with tape.
- Never open motor. This can damage the hermetic seal applied in the factory.

8.4.1 Visual condition check

Personnel: ☒ Instructed person (operator)

Protective equipment: ☒ Protective clothing

☒ Safety gloves

☒ Safety boots

1. ▶ Turn off pump or system and protect against restart.
2. ▶ If pump is submerged in sump, pull pump from sump with pulley or chain hoist.
3. ▶ Hose down pump with water.
4. ▶ Check pump and motor for mechanical damages.
5. ▶ Check motor cover and cable inlet for visual damages.

6. ➤ Ensure that cables are firmly clamped in the cable inlet.

8.4.2 Check/readjust impeller clearance

Personnel: ■ Instructed person (operator)

Protective equipment: ■ Protective clothing

■ Safety boots

Special tool: ■ Feeler gauge

1. ➤ Turn off pump or system and protect against restart.
2. ➤ If pump is submerged in sump, pull pump from sump with pulley or chain hoist.
3. ➤ If necessary, hose down pump with water and lay on side (Fig. 37).

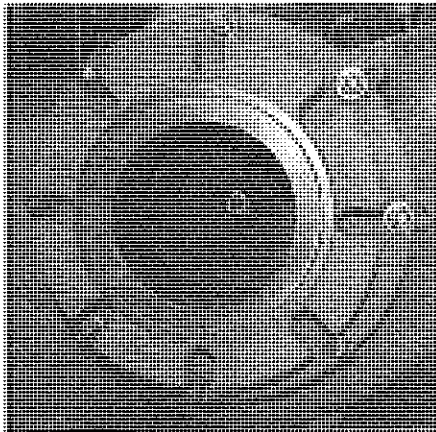


Fig. 37

8.4.2.1 Check impeller clearance "C"

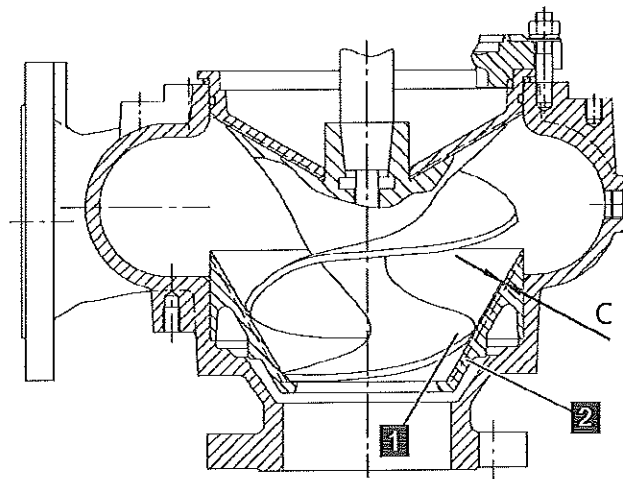


Fig. 38

Maintenance

Maintenance work > Check/readjust impeller clearance

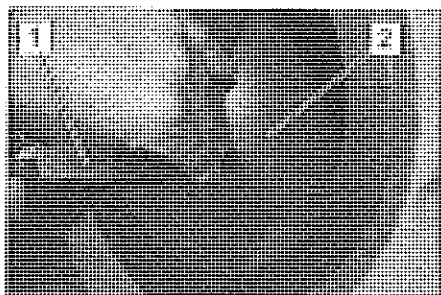


Fig. 39

Impeller clearance "C" is clearance between impeller (1) and inlet cone (2).

1. ➤ Measure clearance between impeller (2) and inlet cone with feeler gauge (1) after 0, $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$ impeller rotations.
2. ➤ Compare measured values with value specified in the following table.

Hydraulic size	Impeller clearance "C"
B	0,2 mm
C, D	0,3 mm
E	0,4 mm
F	0,6 mm
H	0,8 mm
I	1,0 mm
L, M	1,5 mm

3. ➤ If the measured values do not match the specified values, readjust impeller clearance ☞ Chapter 8.4.2.1 „Check impeller clearance "C" on page 71.

8.4.2.2 Readjust impeller clearance "C"

8.4.2.2.1 Adjustable pump with three adjusting screws

The impeller clearance is set via three adjusting screws (arrows) on the casing.

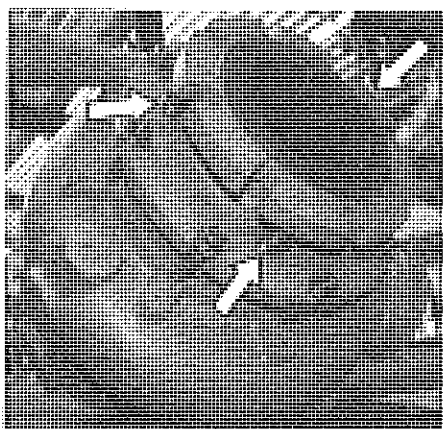


Fig. 40

1. ➤ Perform chapter "Check impeller clearance "S" on page 82.

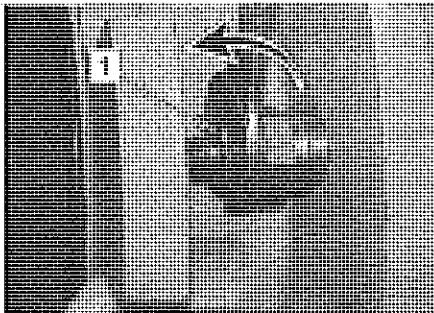


Fig. 41

2. ➤ Loosen locknut (1) counter clockwise and turn back.



Pump types L500 and M700 have two locking screws beside the adjusting sleeves. Loosen them before setting the clearance, then tighten them again.



Fig. 42

3. ➤ Slowly and evenly tighten all three adjusting sleeves (3) clockwise by means of hexagon nut (2), until inlet cone is blocked by pump shaft. Ensure that the same amount of rotations are performed on each adjusting sleeve, allowing inlet cone to remain concentric to the impeller.

The clearance between impeller and inlet cone is cancelled.

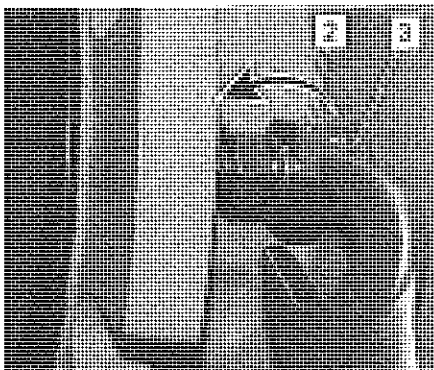


Fig. 43

4. ➤ Turn back all three adjusting sleeves (3) evenly via hexagon nut (2) counter clockwise (e.g. by $\frac{1}{3}$ rotation).

Maintenance

Maintenance work > Check/readjust impeller clearance

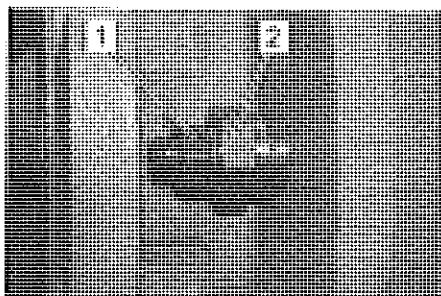


Fig. 44

5. ➤ Hold locknut (2) with spanner and tighten hexagon nuts (1) clockwise.

The inlet cone is pulled back from the impeller by the required clearance and the adjusting sleeves (3) are firmly clamped again.

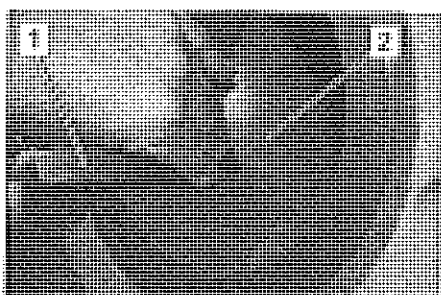


Fig. 45

6. ➤ Check clearance between impeller (2) and inlet cone with feeler gauge (1) after 0, $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$ impeller rotations & Table from chapter 8.4.2.1 Check impeller clearance "C" on page 71.

In case of non-uniform clearance



In case impeller clearance is irregular or too large, have wear parts of pump checked for wear by a service centre.

In case of uniform clearance

If the impeller clearance is uniform and deviates from value in table, proceed as follows:

1. ➤ Loosen locknut (1) counter clockwise and turn back.

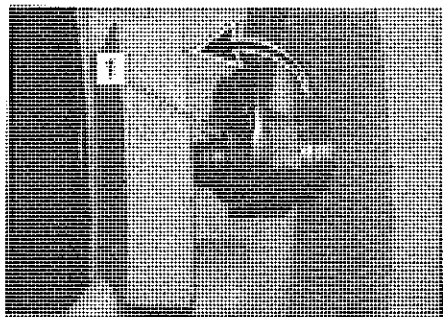


Fig. 46

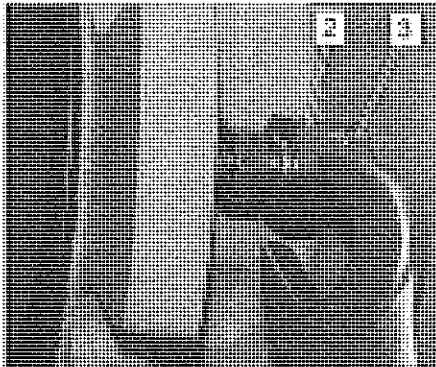


Fig. 47

2. ➤ Tighten all three adjusting sleeves (3) via hexagon nut (2) with the same number of clockwise rotations (in case of excessive clearance), or counter clockwise (in case of insufficient clearance).

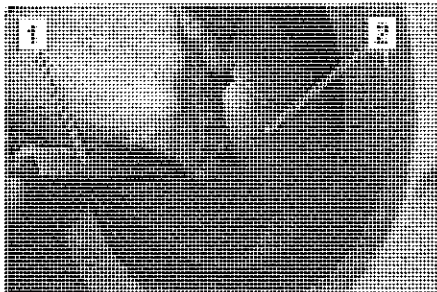


Fig. 48

3. ➤ Check clearance between impeller (2) and inlet cone with feeler gauge (1) after 0, $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$ impeller rotations & Table from chapter 8.4.2.1 Check impeller clearance "C" on page 71.
4. ➤ Repeat steps 2 to 3 until clearance between impeller and inlet cone is correctly set.

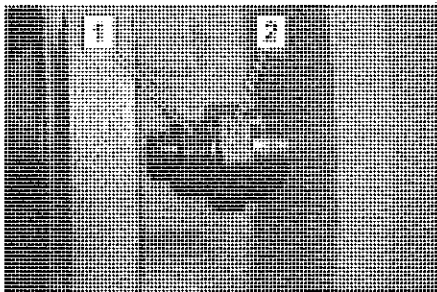


Fig. 49

5. ➤ Hold locknut (2) with spanner and tighten hexagon nuts (1) clockwise.

8.4.2.2.2 Adjustable pump with two adjusting screws

The impeller clearance is set via two adjusting screws on the casing.

1. ▶ Perform chapter "Check impeller clearance "S"" & Chapter 8.4.2.3 „Check impeller clearance "S"" on page 82.
2. ▶ Loosen locknut (1) and turn back.
3. ▶ Turn back adjusting screw (2) by several mm.

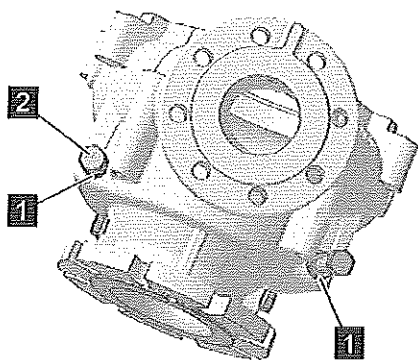
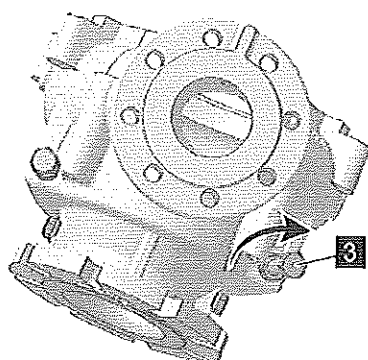


Fig. 50

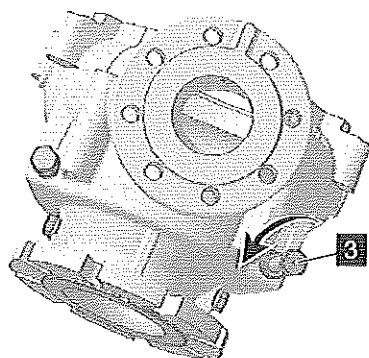


4. ▶ Slowly insert adjusting screw (3) until inlet cone is blocked by pump shaft. The clearance between impeller and inlet cone is cancelled.



The cast-in arrow beside the adjusting screw indicates the direction in which the inlet cone is moved when the corresponding screw is inserted.

Fig. 51



5. ▶ Turn back adjusting screw (3), e.g. by a quarter rotation.

Fig. 52

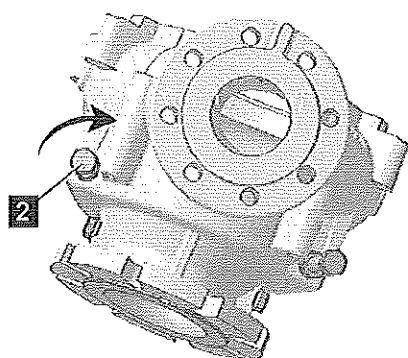


Fig. 53

6. ➤ Tighten adjusting screw (2) with small torque. The inlet cone is pulled back from the impeller by the required clearance and the adjusting sleeve firmly clamped.

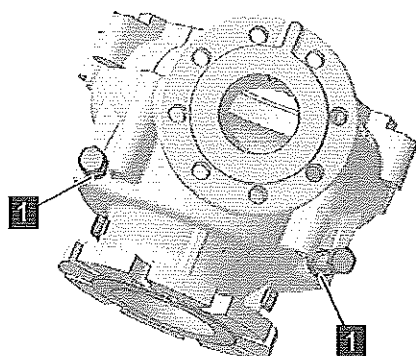


Fig. 54

7. ➤ Tighten locknut (1) again.

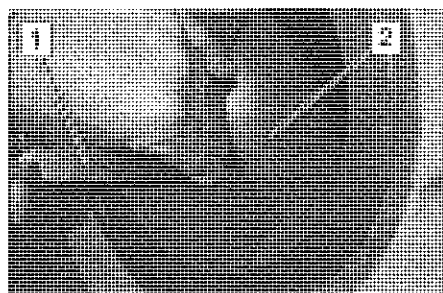


Fig. 55

8. ➤ Check clearance between impeller (2) and inlet cone with feeler gauge (1) after 0, 1/4, 1/2 and 3/4 impeller rotations & Table from chapter 8.4.2.1 Check impeller clearance "C" on page 71.

In case of non-uniform clearance



In case impeller clearance is irregular or too large, have wear parts of pump checked for wear by a service centre.

In case of uniform clearance

If the impeller clearance is uniform and deviates from value in table, proceed as follows:

1. ➤ Loosen locknut (1) and turn back.

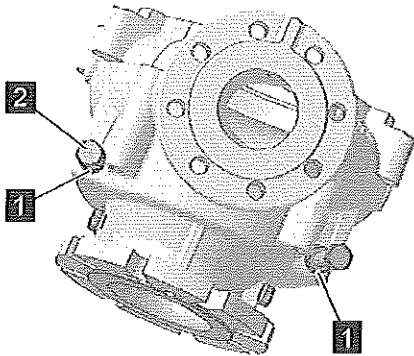


Fig. 56

2. ➤ Tighten adjusting screw (3) clockwise (in case of excessive clearance) or turn back adjusting screw (2) counter clockwise (in case of insufficient clearance).

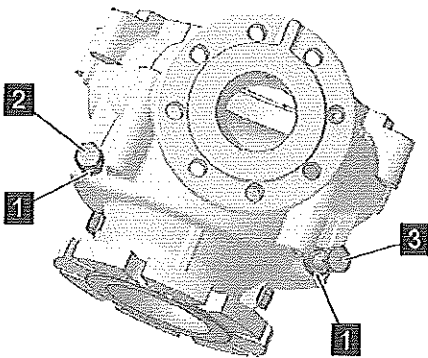


Fig. 57

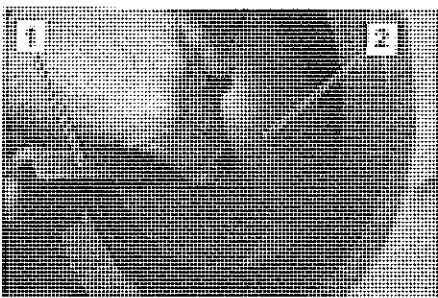


Fig. 58

3. ➤ Check clearance between impeller (2) and inlet cone with feeler gauge (1) after 0, 1/4, 1/2 and 3/4 impeller rotations & Table from chapter 8.4.2.1 Check impeller clearance "C" on page 71.
4. ➤ Repeat steps 2 to 3 until clearance between impeller and inlet cone is correctly set.

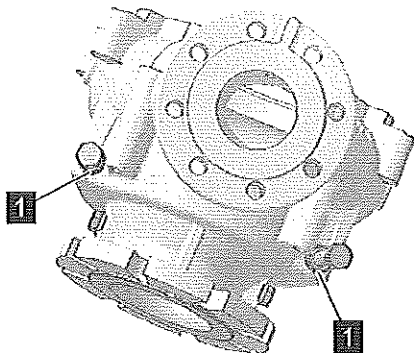


Fig. 59

5. ▶ Tighten locknut (1) again.

8.4.2.2.3 Non-adjustable pump

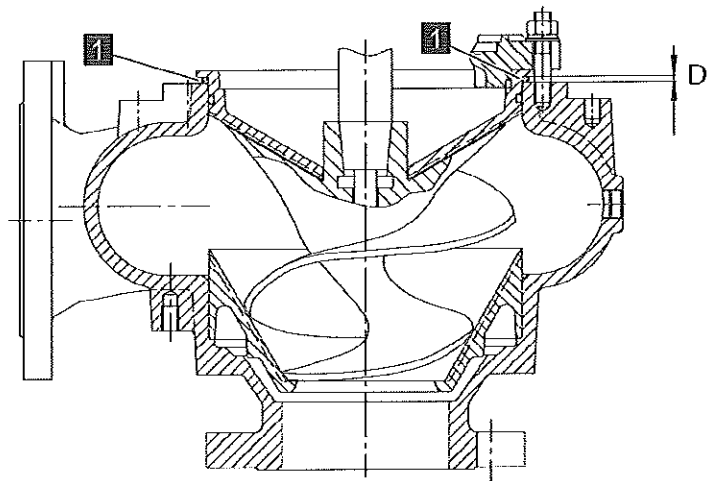


Fig. 60

On non-adjustable pumps, the impeller clearance is adjusted via adjustment spacers D (1).

1. ▶ Loosen and remove all hexagon nuts (1) on casing.

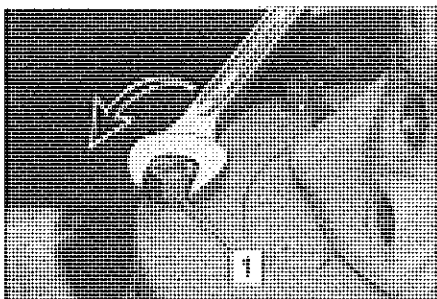


Fig. 61

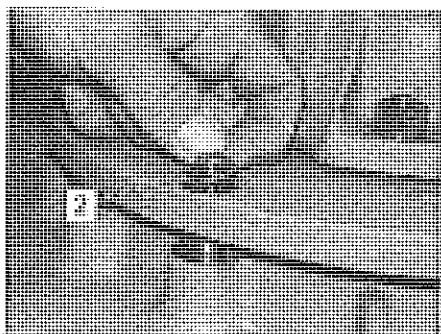


Fig. 62

2. ➤ Remove all washers (2).

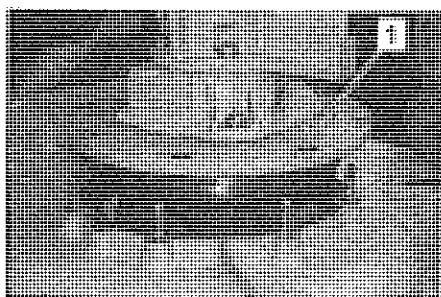


Fig. 63

3. ➤ Lift drive unit of pump (1) with lifting gear.

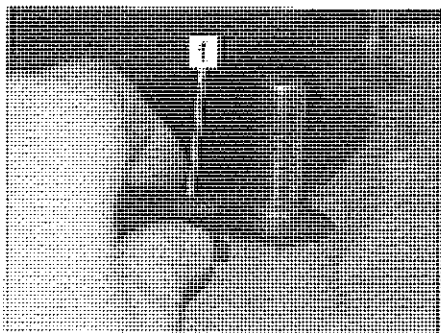


Fig. 64

4. ➤ Remove all adjustment spacers (1).

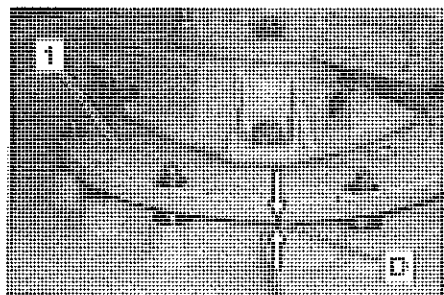


Fig. 65

5. ➤ Lower drive unit of pump (1) again with lifting gear.
6. ➤ Perform chapter "Check impeller clearance "S"" & Chapter 8.4.2.3 „Check impeller clearance "S"" on page 82.
7. ➤ Measure gap D between drive unit and pump casing at several points in the circumference and use to calculate mean value.
8. ➤ Add about 0,5–1,0 mm to measured value. The result is the required thickness of the adjusting spacer to obtain clearance "C" & Table from chapter 8.4.2.1 Check impeller clearance "C" on page 71 .

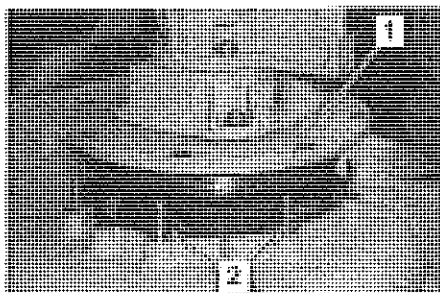


Fig. 66

9. ➤ Lift drive unit of pump (1) again with lifting gear.
10. ➤ Insert adjusting spacers (2) with calculated thickness at each fastening.

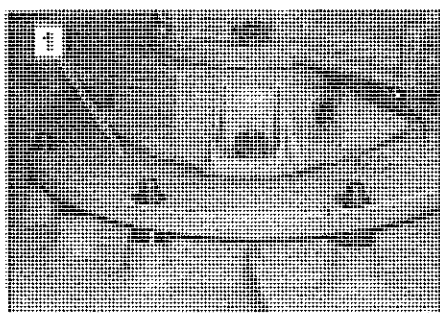


Fig. 67

11. ➤ Lower drive unit of pump (1) again with lifting gear.

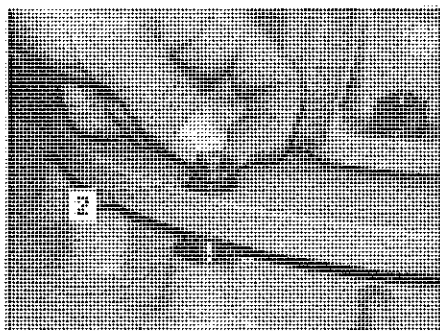


Fig. 68

12. ➤ Put all washers (2) in place again.

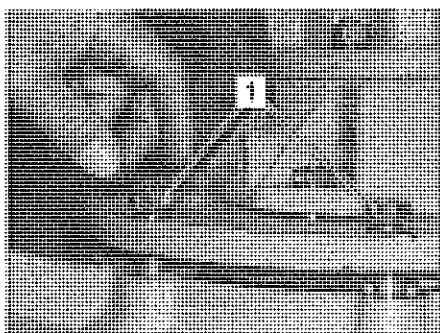


Fig. 69

13. ➤ Position all hexagon nuts (1).

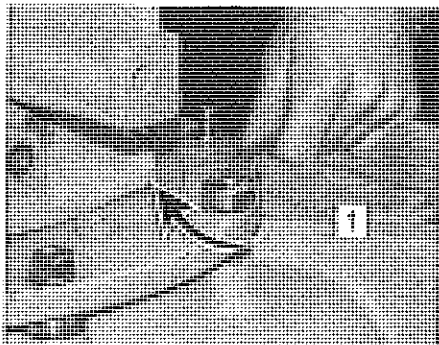


Fig. 70

14. ➤ Tighten all hexagon nuts (1).



On hydraulic type B0BQ/B065, the impeller clearance is adjusted via a spacer ring that is located on the fastenings between pump and suction cover.

8.4.2.3 Check impeller clearance "S"

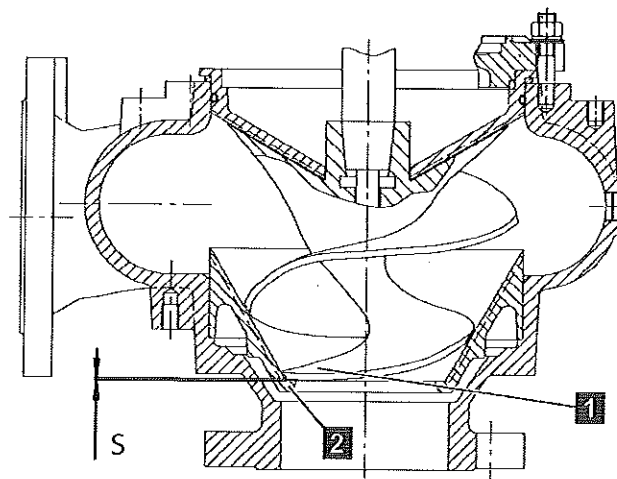


Fig. 71

Impeller clearance "S" is clearance between impeller tip (1) and wear ring (2).

➤ Check clearance between impeller tip (1) and wear ring (2) with a feeler gauge. The clearance must be about 1 to 2 mm.



Contact Service Centre if clearance is too small or impeller tip touches wear ring & Chapter 1.6 „Customer Service“ on page 9.

8.4.2.4 Check impeller clearance "B"

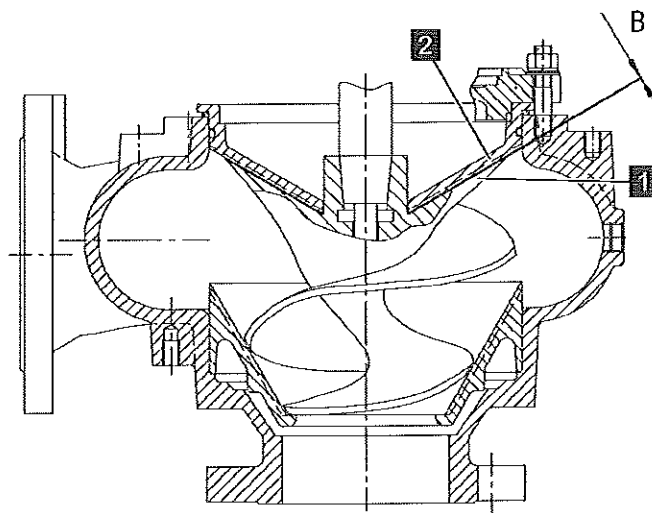


Fig. 72

Impeller clearance "B" is clearance between impeller (1) and rear cone (2) or seal.

Clearance "B" must be kept as small as possible to hinder fibres or solids from entering the seal space. Due to abrasive media, the clearance can increase over time.

1. ▶ Perform steps 1 to 3 ↗ Chapter 8.4.2.2.3 „Non-adjustable pump“ on page 79.
2. ▶ Measure clearance "B" (Fig. 72) between impeller and rear cone or seal via feeler gauge at several points in the circumference.
3. ▶ Compare the smallest measured value with the value listed in the following table:

Hydraulic size	Impeller clearance "B"
B, C, D, E	0,2–0,5 mm
F, H	0,3–0,8 mm
I, L, M	0,5–1,5 mm



Contact Service Centre in case of excessive or insufficient clearance ↗ Chapter 1.6 „Customer Service“ on page 9.

8.4.3 Check insulation resistance

- Personnel: ■ Qualified Electrician
- Protective equipment: ■ Protective clothing
■ Safety boots

Check insulation resistance of motor windings and cable with a high-voltage ohmmeter.



NOTICE!

Damage to property due to excessive voltage!

Voltages above 2,5 volt destroy motors with built-in PTC thermistor.

- Never perform tests with a high-voltage ohmmeter on motors with built-in triple PTC thermistor.

1. ▶ Attach cable at starter switch of motor.
2. ▶ Measure resistance of winding conductors among themselves.
3. ▶ Check earth resistance of each conductor.
4. ▶ Compare the measured resistance values with the values in the following insulation table.

Resistance in ohm	Resistance in mega ohm	Assessment of motor condition and cables
$\geq 2\ 000\ 000$	2	New motor
$\geq 1\ 000\ 000$	1	Used motor, which can be reinstalled in pit
500 000–1 000 000	0,5–1,0	Motor in pit. The ohm values apply to the cable and motor. Motor is in good condition.
20 000–500 000	0,02–0,5	Motor, which possibly was damaged by lightening or conductor damages. Do not pull out pump.
10 000–20 000	0,01–0,02	Motor with wet or damaged cable or windings. Motor will not fail due to this reason alone, but will not continue operation for long.
$\leq 10\ 000$	0–0,01	Defective motor, or motor with completely destroyed cable insulation. Motor must be replaced.
0	0	– Motor will not remain operational for long – Motor is defective



Each reading below 1,0 mega ohm can be an indication for cable or winding damage. If a defect is suspected, have pump repaired by a service centre.

8.4.4 Check oil level

Personnel: ■ Qualified personnel

Protective equipment: ■ Protective clothing

■ Safety boots

1. ➤ Let pump run several minutes to evenly distribute contaminations in the oil.
2. ➤ Turn off pump or system and protect against restart.
3. ➤ If pump is submerged in sump, pull pump from sump with pulley or chain hoist.
4. ➤ Hose down pump with water.

8.4.4.1 Cooling method "N", "K" and "F"

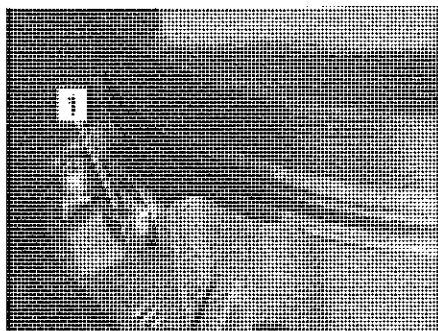


Fig. 73

1. ➤ Place the pump vertically.
2. ➤ Loosen screw plug (1) of oil drain opening and remove.

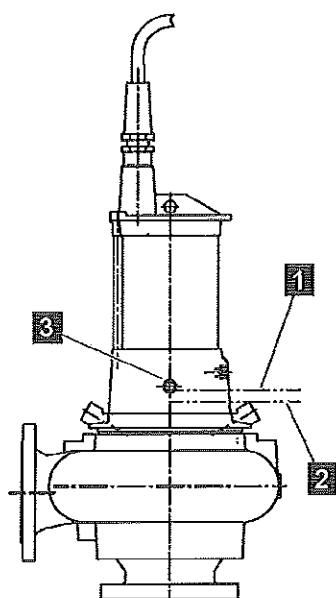


Fig. 74

3. ➤ Check level. Level must reach to bottom edge (1) of oil drain opening (3). If level (2) is only slightly lower, add new oil via opening (3) and check again after 200-500 hours.



A significantly lower level could be caused by a leak in the pump-side seal, which must be replaced by the Service Centre.

4. ➤ Close oil drain opening (3) with screw plug.
5. ➤ Tighten screw plug (1).

8.4.4.2 Cooling method "E"

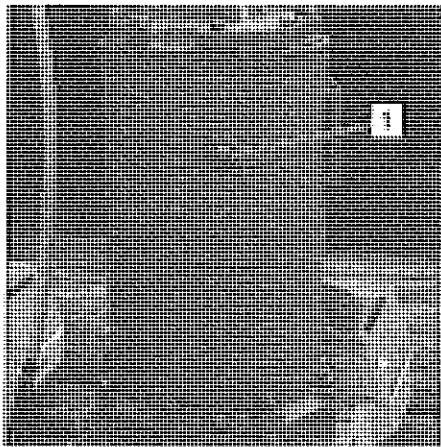


Fig. 75

1. ➤ Place the pump vertically.
2. ➤ Loosen screw plug (1) of oil filler opening and remove.

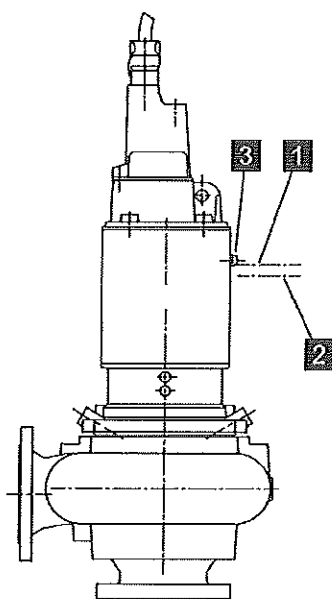


Fig. 76

3. ➤ Check level. Level must reach to bottom edge (1) of oil drain opening (3).

If level (2) is only slightly lower, add new oil via opening (3) and check again after 200-500 hours



A significantly lower level could be caused by a leak in the pump-side seal, which must be replaced by the Service Centre.

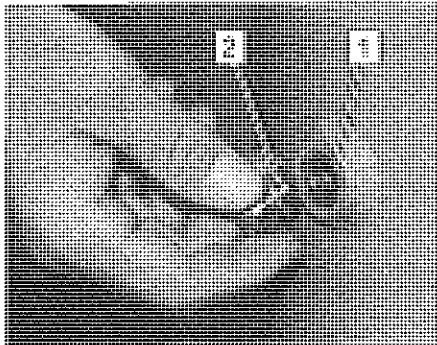


Fig. 77

4. ➤ Close oil drain opening (1) with screw plug (2).

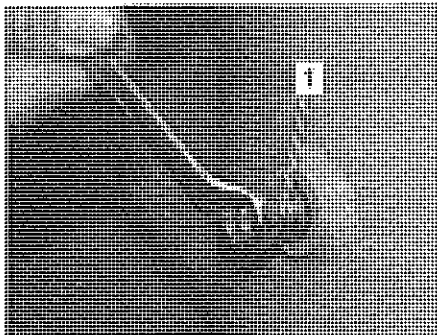


Fig. 78

5. ➤ Tighten screw plug (1).

8.4.5 Check oil quality

Personnel: ☒ Qualified personnel

Protective equipment: ☒ Protective clothing

☒ Safety boots



Fig. 79

1. ➤ Place pump horizontally. The oil drain opening must be on top.

2. ➤ Loosen screw plug (1) and remove.

3. ➤ Insert pipette into oil drain opening and remove a small amount of oil.

4. ➤ Place oil from pipette into a glass bowl.

5. ➤ Repeat steps 3 to 4 until an adequate amount is available for observation.

6. ➤ Assess oil quality as follows:

Maintenance

Maintenance work > Check oil quality



Clear oil

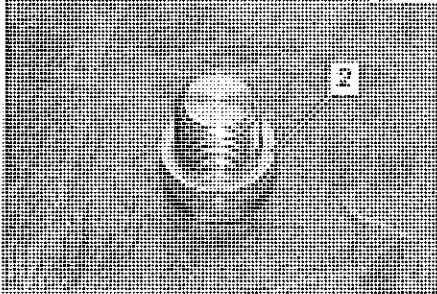


Fig. 80

- If oil is clear, add oil to level (Fig. 74/1). Close oil drain opening with screw plug with new, annealed copper seal (2).

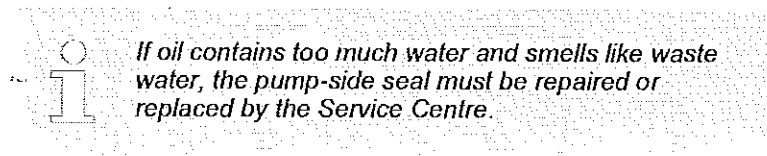
Clear oil with a small amount of water

Oil with a small amount of water has a milky appearance.

- Drain oil, remove water from oil and refill or add new oil. Close oil drain opening with new annealed copper seal (Fig. 80/2).

Too much water in oil

If too much water enters the oil, the viscosity is much higher. The oil is as thick as motor oil, or even thicker.



If oil contains too much water and smells like waste water, the pump-side seal must be repaired or replaced by the Service Centre.

8.4.6 Change oil

- Personnel: ■ Qualified personnel
- Protective equipment: ■ Protective clothing
■ Safety boots



Replace oil only if it is heavily contaminated. Otherwise, just separate the water from the oil and reuse. On the characteristics of the required oil ↗ Chapter 3.4 „Operating materials“ on page 22.

8.4.6.1 Cooling method "N", "K" and "F"

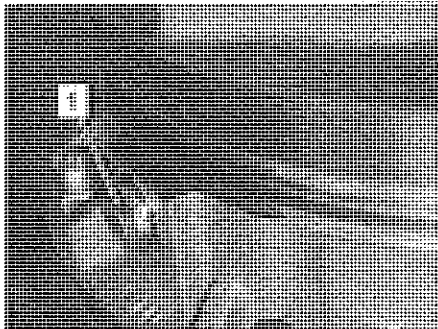


Fig. 81

1. ➤ Loosen screw plug (1) of oil drain opening and remove.

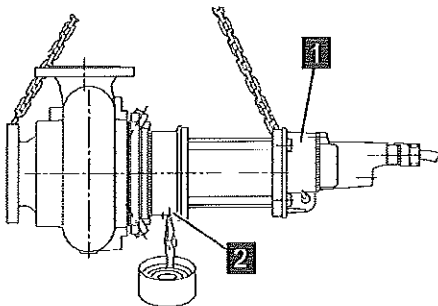


Fig. 82

2. ➤ Lift and turn pump (1) with lifting gear until oil drain opening (2) points downward.
3. ➤ Completely drain oil chamber casing.



Some larger motors are equipped with a second screw plug, positioned directly below the oil drain opening at the seal. By removing this screw plug it is possible to drain even the last oil residues.

Maintenance

Maintenance work > Change oil

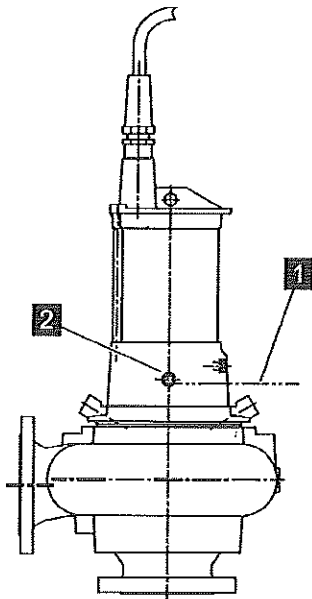


Fig. 83

4. ➤ Place pump vertically onto the suction flange.
5. ➤ Add dewatered or new oil via oil drain opening (2) until correct level (1) (bottom edge of oil drain opening) is reached.

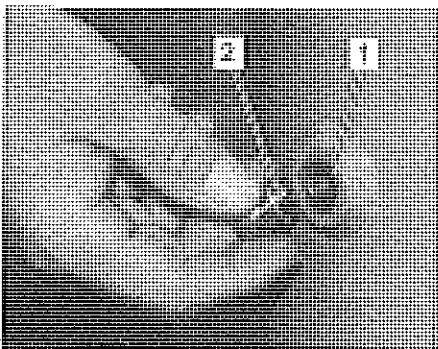


Fig. 84

6. ➤ Close oil drain opening (1) with screw plug (2) with the annealed copper seal.

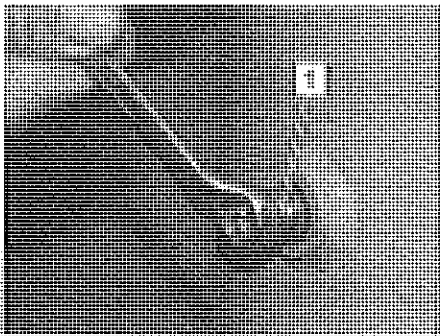


Fig. 85

7. ➤ Tighten screw plug (1).

8.4.6.2 Cooling method "E"

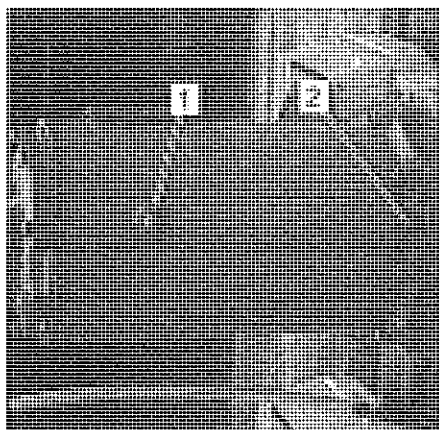


Fig. 86

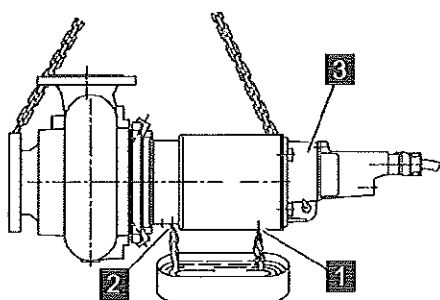


Fig. 87

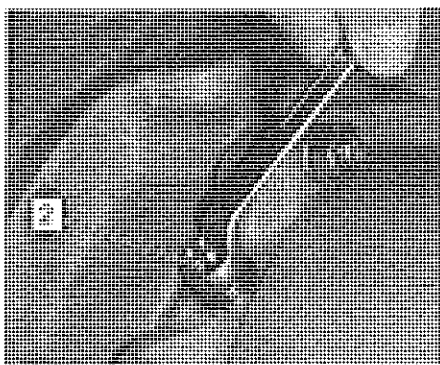


Fig. 88

1. ➤ Loosen and remove screw plug of oil filler opening (1) and oil drain opening (2).

2. ➤ Lift and turn pump (3) with lifting gear and turn until oil drain openings (1) and (2) point downward.

3. ➤ Completely drain oil chamber casing.

4. ➤ Close oil drain opening (2) with screw plug with the annealed copper seal.

Maintenance

Maintenance work > Change oil

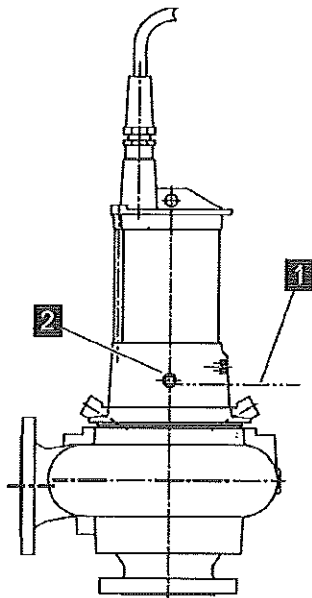


Fig. 89

5. ▶ Place pump vertically onto the suction flange.
6. ▶ Add dewatered or new oil via oil drain opening (2) until correct level (1) (bottom edge of oil drain opening) is reached.

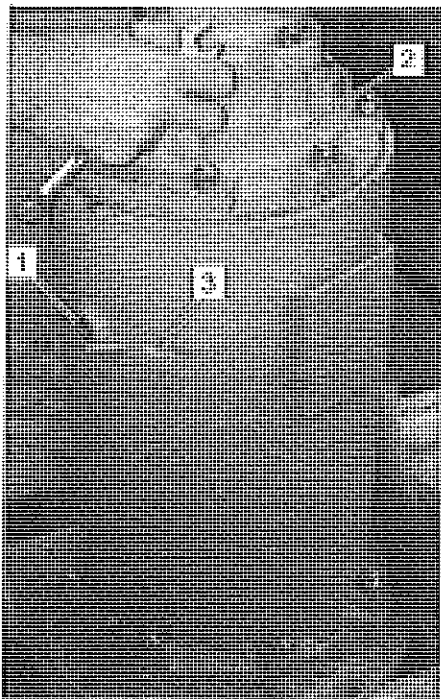


Fig. 90

7. ▶ Place the pump (2) vertically.
8. ▶ Add dewatered or new oil via oil drain opening (1) until correct level (3) (bottom edge of oil drain opening) is reached.

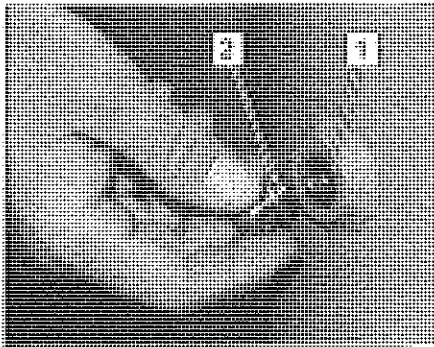


Fig. 91

9. ➤ Close oil drain opening (1) with screw plug (2) with the annealed copper seal.

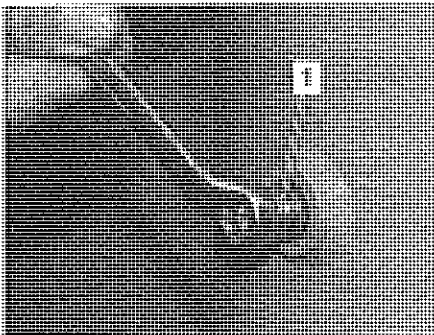


Fig. 92

10. ➤ Tighten screw plug (1).

8.5 Actions after maintenance has been completed

After completing the maintenance work and before switching on the system, carry out the following steps:

1. ➤ Check that all previously loosened threaded connections are tight.
2. ➤ Check that all previously removed protective devices and covers have been replaced properly.
3. ➤ Check that all tools, materials and other equipment used have been removed from the work area.
4. ➤ Clean the work area and remove any substances which may have escaped, such as liquids, processing material or similar.
5. ➤ Ensure that all the system's safety devices are completely functional.

9 Malfunctions

The following chapter describes possible causes for malfunctions and what needs to be done to correct them.

If malfunctions occur more frequently, shorten maintenance intervals according to actual load.

If malfunctions cannot be corrected by the following information, contact manufacturer or service partner, see service addresses in appendix.

9.1 Safety

Electrical system



DANGER!

Danger to life from electric power!

Contact with live parts may prove fatal. When switched on, electric components may be subject to uncontrolled movements and may cause grave injury.

- Switch off the power supply before starting work and make sure that it cannot be switched on again.

Securing to prevent restart



WARNING!

Danger to life from an unauthorised restart!

In the event of an unauthorised restart of the power supply while tracking down and rectifying a fault, there is a danger of serious injuries or death for persons in the danger zone.

- Switch off all power supplies before starting work and make sure they cannot be switched on again.

Behaviour in the event of faults

The following applies in principle:

1. ▶ Immediately initiate an emergency stop in the event of faults posing an immediate danger to people or property.
2. ▶ Ascertain the cause of the fault.
3. ▶ If fault rectification requires work in the danger zone, shut down the system and secure to prevent restarting.
Immediately notify those responsible at the place of use about the fault.
4. ▶ Depending on the nature of the fault, have it rectified by authorised specialised personnel or rectify it yourself.



The fault table below provides information about who is authorised to rectify the fault.

9.2 Malfunction table

Fault description	Cause	Remedy	Personnel
No delivery	Pump not sufficiently submerged or not vented	Check required submersion depth & Chapter 7.4 „Required submersion depth“ on page 63 or vent pump	Instructed person (operator)
	Speed too low	Check speed, increase if necessary	Instructed person (operator)
	Air entering suction line	Check suction line	Instructed person (operator)
	Pressure line clogged / gate valve closed	Check pressure line/gate valve	Instructed person (operator)
	Air or gas in delivery medium	Check delivery medium for air or gas	Instructed person (operator)
	Delivery head too high (exceeds calculation)	Check delivery head	Instructed person (operator)
	Suction pipe insufficiently submerged	Check submersion depth of suction pipe	Instructed person (operator)
	Impeller or suction line clogged	Check pump and suction line for obstruction	Instructed person (operator)
	Wrong rotational direction	Check rotational direction, make correction if necessary & Chapter 6.3.4 „Check rotational direction“ on page 56	Qualified Electrician
Insufficient flow rate	Air or gas on back side of impeller	Check delivery medium for air or gas	Instructed person (operator)
	Air entering suction line	Check suction line	Instructed person (operator)

Malfunctions

Malfunction table



Fault description	Cause	Remedy	Personnel
	Air or gas in delivery medium	Check delivery medium for air or gas	Instructed person (operator)
	Delivery head too high (exceeds calculation)	Check delivery head	Instructed person (operator)
	Insufficient suction pressure for hot liquids	Check suction pressure, increase if necessary	Qualified personnel
	Suction pipe insufficiently submerged	Check submersion depth of suction pipe	Instructed person (operator)
	Solids concentration higher than assumed	Check solids concentration	Instructed person (operator)
	Impeller or suction line clogged	Check pump and suction line for obstruction	Instructed person (operator)
	Wrong rotational direction	Check rotational direction, make correction if necessary & Chapter 6.3.4 „Check rotational direction“ on page 56	Qualified Electrician
	Excessive impeller clearance	Check impeller clearance & Chapter 8.4.2 „Check/readjust impeller clearance“ on page 71	Instructed person (operator)
	Impeller damaged	Check impeller for damage, replace if necessary	Manufacturer (service centre)
	Voltage too low	Check voltage	Qualified Electrician
	Speed too low	Check speed, increase if necessary	Instructed person (operator)
Insufficient delivery pressure			

Fault description	Cause	Remedy	Personnel
	Air or gas in delivery medium	Check delivery medium for air or gas	Instructed person (operator)
	Suction pipe insufficiently submerged	Check submersion depth of suction pipe	Instructed person (operator)
	Solids concentration higher than assumed	Check solids concentration	Instructed person (operator)
	Wrong rotational direction	Check rotational direction, make correction if necessary <i>↪ Chapter 6.3.4 „Check rotational direction“ on page 56</i>	Qualified Electrician
	Excessive impeller clearance	Check impeller clearance, readjust if necessary <i>↪ Chapter 8.4.2 „Check/readjust impeller clearance“ on page 71</i>	Instructed person (operator)
	Impeller damaged	Check impeller for damage, replace if necessary	Manufacturer (service centre)
	Voltage too low	Check voltage	Qualified Electrician
	Impeller too small	Check impeller, replace if necessary	Instructed person (operator) Manufacturer (service centre)
Decrease in flow rate or loss of pressure after startup	Air or gas on back side of impeller	Check delivery medium for air or gas	Instructed person (operator)
	Air entering suction line	Check suction line	Instructed person (operator)
	Air or gas in delivery medium	Check delivery medium for air or gas	Instructed person (operator)
	Suction head too high	Check suction head	Instructed person (operator)
Vibrations	Suction pipe insufficiently submerged	Check submersion depth of suction pipe	Instructed person (operator)
	Speed too high	Check speed, reduce if necessary	Instructed person (operator)

Malfunctions

Malfunction table



Fault description	Cause	Remedy	Personnel
	Air entering suction line	Check suction line	Instructed person (operator)
	Pressure line clogged / gate valve closed	Check pressure line/gate valve	Instructed person (operator)
	Air or gas in delivery medium	Check delivery medium for air or gas	Instructed person (operator)
	Delivery head too high (exceeds calculation)	Check delivery head	Instructed person (operator)
	Suction head too high	Check suction head	Instructed person (operator)
	Insufficient suction pressure for hot liquids	Check suction pressure, increase if necessary	Qualified personnel
	Suction pipe insufficiently submerged	Check submersion depth of suction pipe	Instructed person (operator)
	Impeller or suction line clogged	Check pump and suction line for obstruction	Instructed person (operator)
	Impeller damaged	Check impeller for damage, replace if necessary	Manufacturer (service centre)
	Motor damaged	Check motor, repair if necessary	Qualified Electrician Manufacturer (service centre)
	Loose fastening	Check fastening, make correction if necessary	Qualified personnel
	Worn bearing	Check bearing for damage, replace if necessary	Qualified personnel Manufacturer (service centre)
	Impeller out-of-balance	Check impeller, replace if necessary	Instructed person (operator)
	Impeller touches suction cover	Check impeller clearance, readjust if necessary & Chapter 8.4.2 „Check/readjust impeller clearance“ on page 71	Instructed person (operator)
Motor overloaded	Speed too high	Check speed, reduce if necessary	Instructed person (operator)
	Pressure line clogged / gate valve closed	Check pressure line/gate valve	Instructed person (operator)
	Solids concentration higher than assumed	Check solids concentration	Instructed person (operator)
	Specific gravity of delivery medium higher than assumed	Check specific gravity of delivery medium	Qualified personnel
	Motor damaged	Check motor, repair if necessary	Qualified Electrician

Fault description	Cause	Remedy	Personnel
			Manufacturer (service centre)
	Voltage too low	Check voltage	Qualified Electrician
	Loss of coolant	Check coolant level or oil level, add if necessary & Chapter 8.4.4 „Check oil level“ on page 85	Qualified personnel
	Impeller touches suction cover	Check impeller clearance, readjust if necessary & Chapter 8.4.2 „Check/readjust impeller clearance“ on page 71	Instructed person (operator)
	Thick sludge and small impeller clearance	Increase impeller clearance & Chapter 8.4.2 „Check/readjust impeller clearance“ on page 71	Instructed person (operator)
Motor does not start	Main switch is off	Place main switch in „On“ position.	Instructed person (operator)
	Thermal overcurrent trip has responded	Check overcurrent trip	Qualified Electrician
	Motor damaged	Check motor, repair if necessary	Qualified Electrician Manufacturer (service centre)
	Voltage too low	Check voltage	Qualified Electrician
	Switch-on level not reached; defective probe or switch	Check fluid level; check level switch for function, replace if necessary	Qualified personnel
Noise	Speed too high	Check speed, reduce if necessary	Instructed person (operator)
	Air entering suction line	Check suction line	Instructed person (operator)
	Air or gas in delivery medium	Check delivery medium for air or gas	Instructed person (operator)
	Suction head too high	Check suction head	Instructed person (operator)
	Insufficient suction pressure for hot liquids	Check suction pressure, increase if necessary	Qualified personnel
	Suction pipe insufficiently submerged	Check submersion depth of suction pipe	Instructed person (operator)
	Motor damaged	Check motor, repair if necessary	Qualified Electrician

Malfunctions



Startup after fault has been rectified

Fault description	Cause	Remedy	Personnel
	Loose fastening	Check fastening, make correction if necessary	Manufacturer (service centre) Qualified personnel
	Impeller touches suction cover	Check impeller clearance, readjust if necessary <i>↳ Chapter 8.4.2 „Check/readjust impeller clearance“ on page 71</i>	Instructed person (operator)

9.3 Startup after fault has been rectified

After repair of malfunction, perform the following steps to restart:

1. ▶ Check if all protective devices and covers that were previously removed are properly installed again.
2. ▶ Check all screw connections that were previously loosened for tightness.
3. ▶ Ensure that all tools, materials and other equipment used have been removed from working area.
4. ▶ Clean device and remove any escaped substances, such as liquids, processing material or the like.
5. ▶ Ensure that all safety devices of the system function properly.
6. ▶ Ensure that no persons are in the danger zone.
7. ▶ Start according to the information in chapter "Operation".

10 Disassembly

Following the end of its useful life, the system must be dismantled and disposed of in accordance with the environmental regulations.

10.1 Safety

Electrical system


DANGER!

Danger to life from electric power!

Contact with live parts may prove fatal. When switched on, electric components may be subject to uncontrolled movements and may cause grave injury.

- Before starting the dismantling, switch off the electric power supply and disconnect completely.

Improper dismantling


WARNING!

Danger of injury due to improper dismantling!

Stored residual energy, angular components, points and edges on or in the system or on the tools needed can cause injuries.

- Ensure sufficient space before starting work.
- Handle exposed, sharp-edged components with care.
- Pay attention to orderliness and cleanliness in the workplace! Loosely stacked or scattered components and tools could cause accidents.
- Dismantle the components properly. Note that some components may have a high intrinsic weight. Use hoists if necessary.
- Secure components so that they cannot fall down or topple over.
- Consult the manufacturer if in doubt.

10.2 Dismantling

Before starting dismantling:

- Shut down the system and secure to prevent restarting.
- Physically disconnect the power supply from the system; discharge stored residual energy.
- Remove consumables, auxiliary materials and other processing materials and dispose of in accordance with the environmental regulations.

Disassembly

Disposal



Then clean assemblies and parts properly and dismantle in compliance with applicable local occupational safety and environmental protection regulations.

10.3 Disposal

If no return or disposal agreement has been made, send the dismantled components for recycling.

- Scrap metals.
- Send plastic elements for recycling.
- Sort and dispose of other components in accordance with their material composition.



NOTICE!

Danger to the environment due to incorrect disposal!

Incorrect disposal may pose risks to the environment.

- Electrical scrap, electronic components, lubricants and other auxiliary materials must be disposed of by authorised specialist companies.
- If in doubt, obtain information about disposal in accordance with the environmental regulations from the local municipal authorities or specialised waste disposal companies.

11 Appendix

- Technical data sheets
- Technical drawings
- CE Declaration of Conformity
- Spare parts list
- Connection diagram
- Explanation of type code
- Transfer protocol
- List of applied standards

12 Index

A		Hydraulics.....	33
Accident.....	19	I	
Adjustable pump.....	72, 76	Impeller.....	15
B		Impeller clearance.....	71
Bearing temperature probe.....	32	Inlet.....	33
C		Inspection at delivery.....	36
Cable part.....	26	Intended use.....	13
Cable protection.....	32	L	
Clearance adjustment.....	33	Level control.....	57
Compression flange.....	26	Level switch.....	57
Connections.....	33	Lifting eyes.....	37
Contact.....	9	Limitation of liability.....	7
Coolant inlet.....	31	Loads.....	36
Coolant outlet.....	31	Lubricants.....	20
Cool-down periods.....	64	M	
Cooling jacket of stator housing.....	29, 31	Maintenance schedule.....	68
Copyright.....	9	Maintenance work.....	70
Customer Service.....	9	Malfunction table.....	95
D		Moisture probe.....	32
Discharge outlet.....	27	N	
Dismantling.....	101	Non-adjustable pump.....	79
Disposal.....	102	O	
Dry run times.....	63, 64	Oil drain opening.....	28, 29, 30, 31
E		Oil filler opening.....	29
Electrical current	15	Operating conditions.....	22
Electric motor.....	26	Operating elements.....	34
Electric motors		Operating materials.....	22
Cooling methods.....	27	Operational safety components.....	32
EMERGENCY STOP.....	65	Outlet.....	33
Energy supply		Owner.....	10
Connecting.....	53	P	
F		Packaging.....	39
Fire.....	19	Personnel.....	11
First aid.....	19	Preservatives.....	20
Float switch.....	32	Pressure line.....	46
Flushing connection.....	28, 29, 30, 31	Protective equipment.....	14
Flush water connections.....	59	Pump	
G		Draining.....	63
Guide rail.....	27	Flushing.....	63
H		R	
Hydraulic part.....	26	Rot. direction.....	56

S		
Safety		
General.....	10	
Safety devices.....	17	
Screw centrifugal impeller.....	33	
Service.....	9	
Service connections.....	69	
Set-up location		
Requirements.....	43	
Signs.....	20	
Slide shoe.....	27	
Spare parts.....	8	
Spiral casing.....	33	
Standard operation.....	61	
Stator housing.....	28, 30	
Stator housing opening.....	28, 29, 30, 31	
Storage.....	40	
Submersion depth		
Submersible motors.....	63	
		Suction cone..... 33
		Suction flange..... 26
		Suction line..... 44
		Switching off..... 61
		Switching on..... 61
		Symbols
		in this manual..... 6
		T
		Temperature limiter..... 32
		Transport
		Crane..... 37
		Pallets..... 38
		Type code..... 22
		U
		Use..... 13
		W
		Warranty terms..... 8



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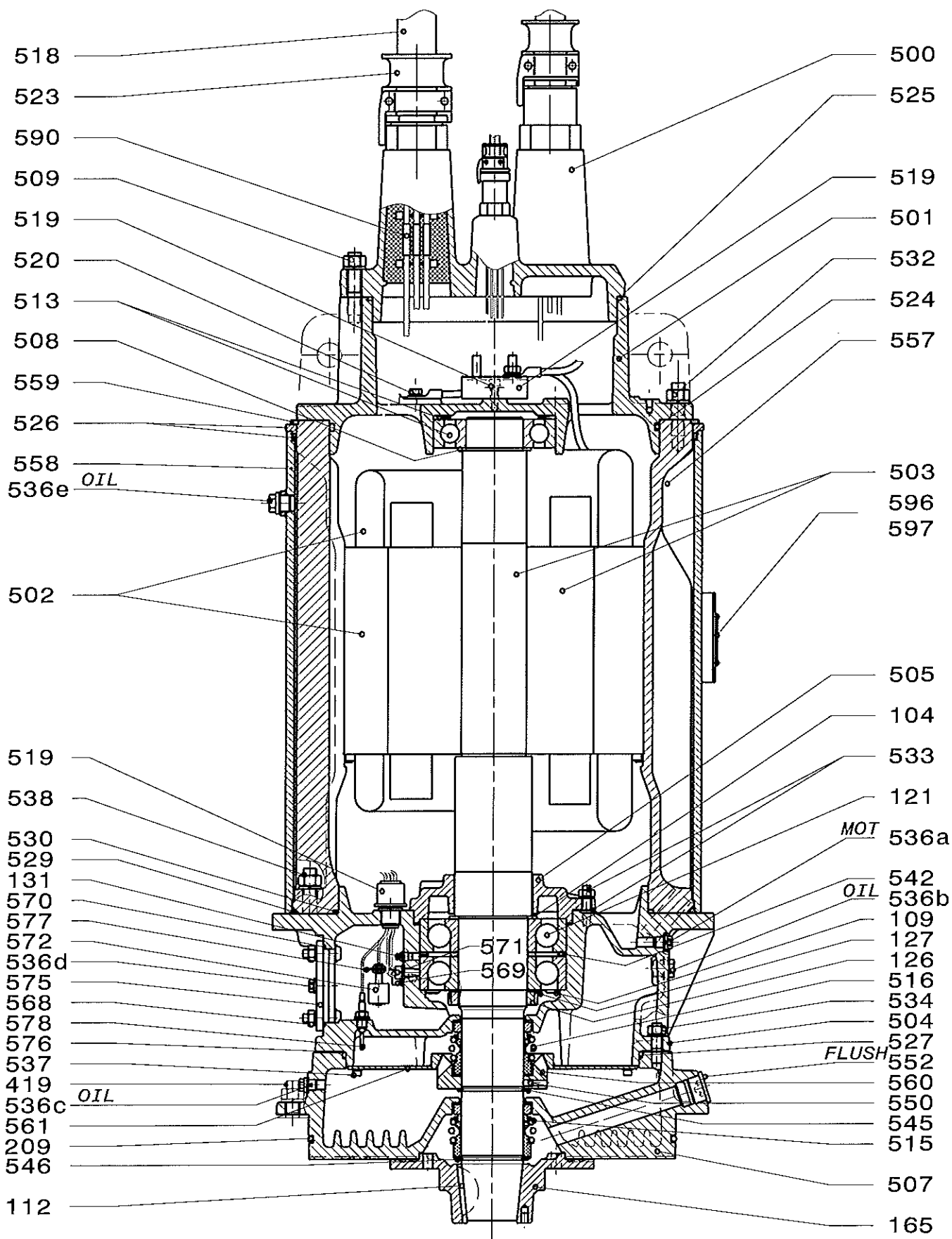
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Australia

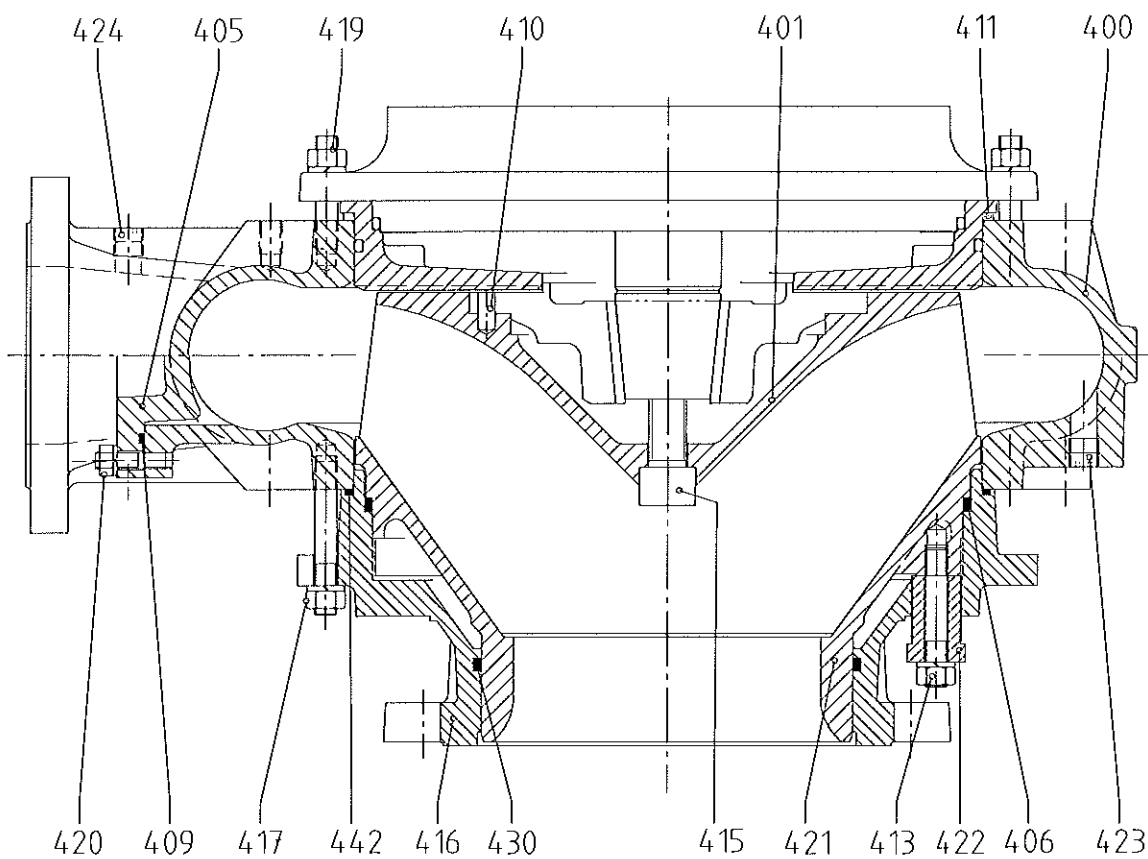
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10.0	Pumpe-00003136 H05K-MH3R + HE050X4-GSEK1 + NE1B5E-15 + B0-250X300H200 H05K-MH3R + HE050X4-GSEK1 <i>Serien Nr. 206665 - 206666</i>		2	Stk

Betriebsanleitungen
Betriebsanleitung 1: 10-BA 7597en
Betriebsanleitung 2: 99-BA 6052E
Elektroschema
Elektro-Schema Nr: 3324



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PART	DESCRIPTION	MATERIALS OF CONSTRUCTION			
		1R	2R	3R	5R
400	VOLUTE		GREY CAST IRON		STAINLESS STEEL A4
401	IMPELLER	NODULAR IRON	NODULAR IRON	STAINLESS STEEL A4	
405	INSPECTION HOLE		GREY CAST IRON		STAINLESS STEEL A4
406	O-RING		NITRILE		
409	O-RING		NITRILE		
410	DRIVING PIN		STAINLESS STEEL A4		
411	SHIMS		CARBON STEEL		
413	ADJUSTING BOLT		STAINLESS STEEL A4		
415	IMPELLER BOLT		STAINLESS STEEL A4		
416	SUCTION CASING		GREY CAST IRON		STAINLESS STEEL A4
417	FASTENING SET	*	RUSTLESS STEEL		STAINLESS STEEL A4
419	FASTENING SET	*	RUSTLESS STEEL		
420	FASTENING SET	*	RUSTLESS STEEL		
421	LINER	GREY CAST IRON	HIDRO HARD		STAINLESS STEEL A4
422	REGULATION NUT		STAINLESS STEEL A4		
423	DRAIN PLUG		STEEL		STAINLESS STEEL A4
424	PLUG		STEEL		STAINLESS STEEL A4
430	O-RING		NITRILE		
442	O-RING		NITRILE		

* = For Bearing frames: Steel

Konstruktionsänderungen vorbehalten.
Hidrostat reserves the right to make changes without giving prior notice.
Hidrostat se reserve tous droits de changement de construction.

File: DATA1

Drawn by / Bearb. Dat. Vis.: 20.03.02 db/mf
Approved by / Gepr. Dat. Vis.: 20.03.02 db

No. 87-TU 3672/b

General

As a standard we will mount the suction flange of the suction stand (635) and the pressure flange of the pump casing (400) in the same direction. If another mounting is required you must indicate the direction of mounting in your order.

The permissible ground load has to be compared with the total weight of the pump. The concrete foundation must correspond to the guidelines of the strength of foundation and the resistance to pressure.

**ATTENTION:**

Please consider the exact length of the foundation screws! Please refer to the detailed description below.

HIDROSTAL AG recommends the use of chemical anchor screws which are secured with a 2 part Epoxy resin.

1. Mounting of accessories and premounting of the pump to the suction stand

The dimension sheet (97-M5502) shows which pump types need a support (670) between the suction stand (635) and the pump casing (400). The following description relates to mounting with the support. Pay attention to the correct position of the pump outlet to the suction stand. The pump can be mounted in any of the normal 90° positions (some pumps can be mounted at 45° positions). However the support (670) can only be mounted on the suction stand (635) in one position. Therefore great care must be taken to ensure that the support (670) is positioned correctly. The correct position can be achieved by aligning the outer mounting holes of the support (670) with the mounting holes of the suction stand (635). Attach the support (670) to the suction side of the pump casing (400) with the fastening set (671) using the ring of tapped holes provided. Insert O-ring (672) into the groove on the upper flange of the suction stand (670). Fasten suction flange of the pump to the suction stand with fastening set (673).

There is now a resultant clearance between the machined 'Gauge' faces on the support (670) and the suction stand (635). See below for the description for the fitting of the wedge blocks (677, 678).

2. Fastening the support to the ground

See dimension sheet (97-M5502) and data sheet (99-TU6050) for the needed space for the suction stand and length of the foundation screws. The pump must be aligned and in the correct position!

**ATTENTION:**

The suction stand has to be supported on all 4 edges. If necessary, differences of dimension could be compensated by 2-part flow concrete epoxy resin (self leveling epoxy grout)!

Mark and drill the holes for the foundation screws. Place the foundation screws. Pay attention to the correct length of the threaded rod. Allow the required length of time for the epoxy to harden! Now screw down the suction stand.

**DIRECTION:**

Foundation screws have to be tightened with the prescribed torque! Check this torque during operation occasionally!

3. Final mounting of the pump to the suction stand

Screw down the delivered threaded rods and extension nuts (674) according data sheet (99-TU6050). Insert wedge blocks (677+678) between the machined gauge surfaces at the threaded rods and tap them in *lightly* at all 4 positions with the same expenditure of energy. When the clearance is compensated on all 4 supporting surfaces, screw down the support to the suction stand with fastening set (674).

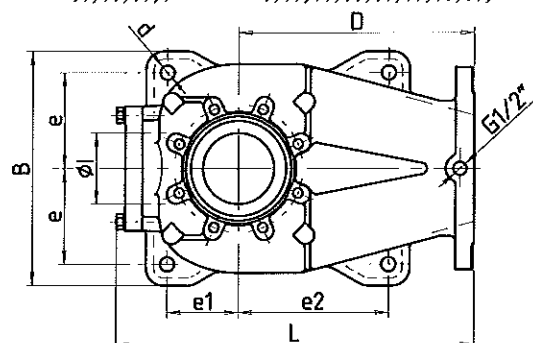
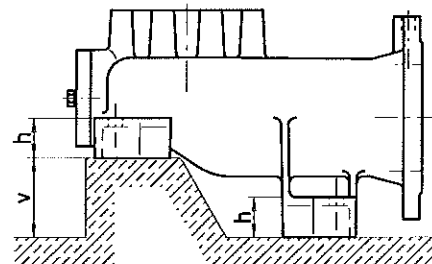
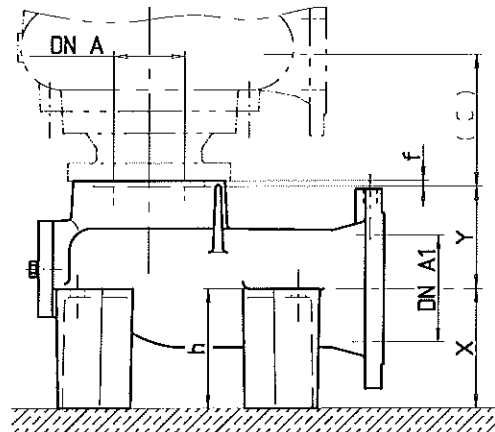
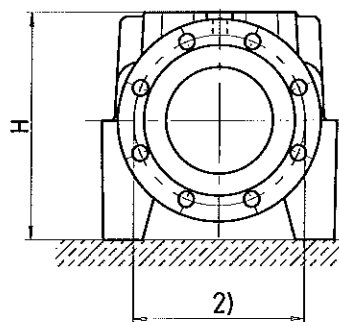
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SUCTION- STAND FUSSBOGEN 6BB-	HYDRAULIC HYDRAULIK	PUMP- SUPPORT PUMPEN- ABSTÜTZUNG 6BS-	WEIGHT GEWICHT (B0-) ~kg	A	A1	B	D	d	e	e1	e2	f	H	h	I	L	v	X	Y
D100 ¹⁾	C/D	----	34	100	100	300	240	16	120	80	160	0	212	12	90	380	0	120	92
100X100	C/D	----	50	100	100	330	330	20	135	100	210	3	244	120	100	505	0	120	121
100X150	C/D	Option	52	100	150	330	330	20	135	100	210	3	320	168	100	505	0	168	149
E150 ¹⁾	E	----	53	150	150	400	330	20	160	160	160	0	270	60	90	540	0	160	110
150X150	E	E125	135	150	150	440	460	25	185	160	320	3	311	160	100	660	0	160	148
150X200	E	E125	160	150	200	440	460	25	185	160	320	3	363	190	125	720	0	190	170
200X250	E	-	180	200	250	545	550	25	230	160	370	3	423	202	150	850	0	230	190
	F	F150.	220																
250X300	F	-	310	250	300	680	660	42	275	200	420	3	503	260	150	1000	0	260	240
	H	H200.	360																
300X400	H	-	530	300	400	870	880	42	370	370	640	4	605	320	165	1315	0	320	281
	I	I250.	630																
400X500	I	-	1160	400	500	1150	1200	50	470	470	885	4	770	370	225	1770	0	370	396
	L	L300	1380																
500X700	L	-	2080	500	700	1450	1400	50	650	660	740	4	1000	100	250	2135	400	500	496
500X1000	L	-	1850	500	1000	1450	1000	50	650	660	740	4	1300	100	250	1735	700	650	646



¹⁾ OBSOLETE TYPES
¹⁾ AUSLAUFENDE TYPEN

²⁾ OPTION:
A1 ≥ DN200 = possible to be drilled
PN16 accord. to 'DIN EN 1092'
A1 ≥ DN200 = Flanschanschluss PN16
nach DIN EN 1092 möglich

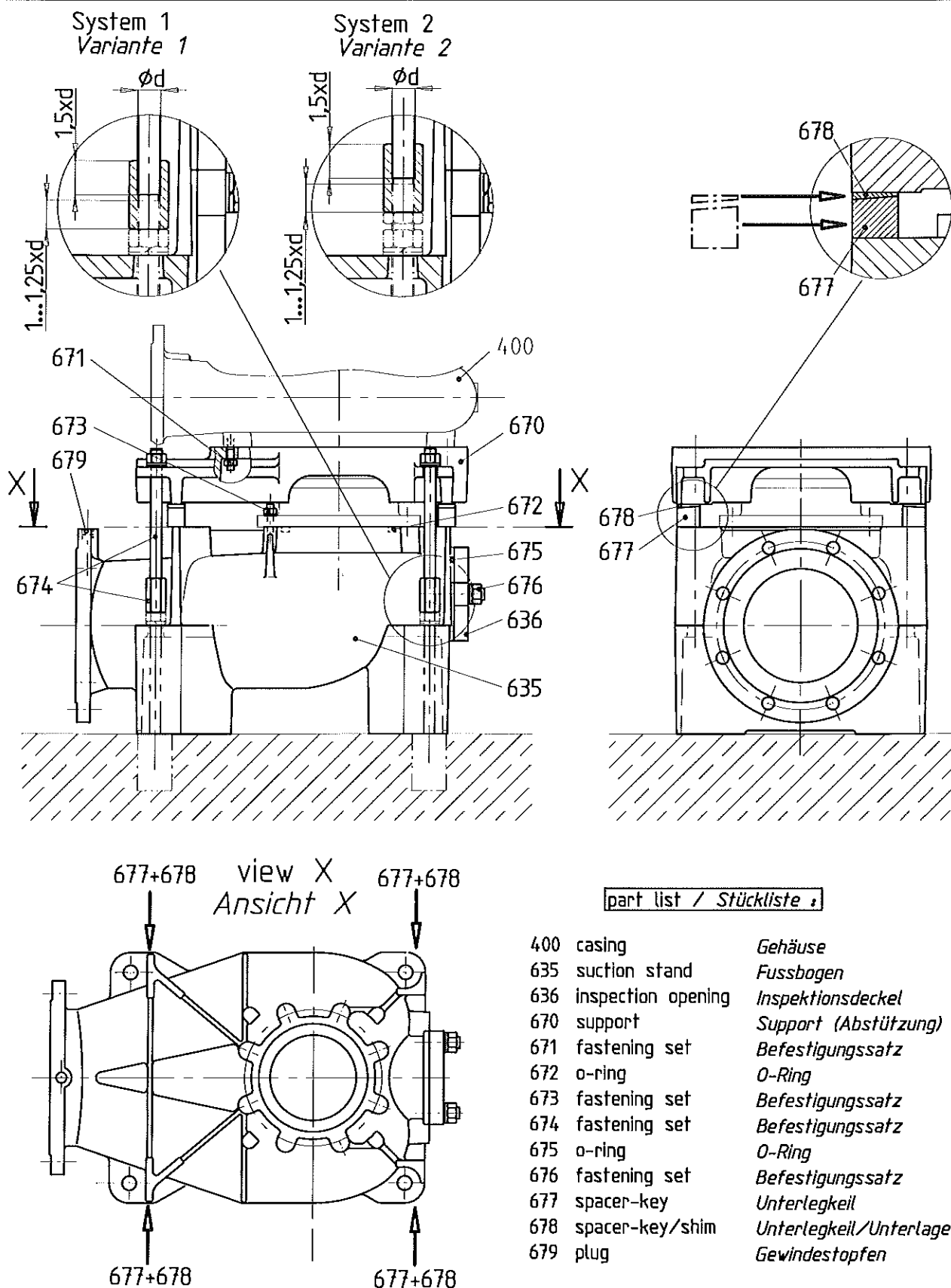
A1, A2 ≤ DN150/PN16 DIN EN 1092
≥ DN200/PN10 DIN EN 1092

Konstruktionsänderungen vorbehalten
Subject to change without prior notice
Modifications réservées sans préavis

Drawn by/Bearb. Dat. Vis. : 25.01.01 pda
Approved by/Gepr. Dat. Vis. : 27.09.04 db

No : 97-M55020

B0-MOUNTING B0-AUFSTELLUNG



File :

Drawn by/Bearb. Dat. Vis. : 03.06.99 pko
Approved by/Gepr. Dat. Vis. : 08.11.04 db

No : 99 - TU 6050 a



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www.hidrostal.ch

EC-Declaration of Conformity

We declare in exclusive responsibility that the construction of the Hidrostal Screw Centrifugal Pumps to which this declaration relates are in conformity with the following health and safety standards:

EC-Directive:	2006/42/EC	Machinery directive
	2006/95/EC	Electrical Apparatus for use within specified voltage limitations.
		Low Voltage Directive (LVD)
	2004/108/EC	Electromagnetic compatibility EMC

Hydraulic-sizes:

A....., B....., C....., D....., E....., F....., H....., I....., L....., M....., X.....

Assembled with the units "Three-phase current motor"

..B....., ..S....., ..T....., ..U....., ..V....., ..W....., ..X....., ..Y....., ..Z.....
..002....., ..003....., ..004....., ..006....., ..007....., ..011....., ..014....., ..020....., ..030.....,
..050....., ..090....., ..130....., ..190....., ..300....., B02....., B03.....

or the units "Bearing frame" mechanical seal

..BM....., ..CM....., ..DM....., ..EM....., ..FM....., ..GM....., ..HM....., ..IM.....
..LM....., ..MM....., ..XM.....

or the units "Bearing frame" stuffing box seal

..BZ....., ..CZ....., ..DZ....., ..BS....., ..CS....., ..DS....., ..ES....., ..FS....., ..GS.....,
..HS....., ..IS....., ..LS....., ..MS....., ..XS.....

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Neunkirch, 07.04.2010

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Quality manager

Rev. 6; 10

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POS.	DESCRIPTION	BESCHREIBUNG	CODE	MATERIAL*	
				a	b/c **
104	Spacer ring P.S.	Stützring (Fettring) P.S.	1RD	K	K
106	Bearing spacer	Distanzring	1RD	K	K
112	Woodruff key	Woodruffkeil	2FK	L	F
121	Angular contact ball bearing	Schräggrollager	8LW	-	-
126	Lock nut for shaft	Mutter SKF für Welle		L	L
127	Lock washer for 126	Sicherungsblech zu 126		O	O
157	Spacer ring	Stützring aussen	1RD	K	K
165	Impeller flange	Lauftradaufnahme	2SF	B	C
166	Impeller nut	Laufradmutter	2FM	K	F
167	Impeller locking washer for 165	Sicherungsblech für 165	2FF	K	F
173	Seal cup	Dichtungsdeckel	1DD	A	-
191	O-ring for 173 and 400	O-Ring zu 173 und 400	8DO	Q	Q
209	O-ring for 511 and 400	O-Ring zu 511 und 400	8DO	Q	Q
400	Volute casing	Gehäuse	4G1	A	C
401	Impeller	Laufrad	411	B/D	C
402	Suction cover	Saugdeckel	421	A	C
403					
404					
405	Inspection opening	Inspektionsöffnung	451	A	-
406	O-ring for 402 or 421	O-Ring zu 402 oder 421		Q	Q
407	O-ring for 421 - 462	O-Ring zu 421 - 462			
408	Wear ring	Verschleissring	4R.	A/D	C
409	O-ring for 405	O-Ring zu 405		Q	Q
410					
411	Set of shims or wire 200-400	Regulierunterlagen 200-400		K	F
412					
413	Adjusting bolt	Regulierschraube		F	F
414	Spacer ring	Distanzring		K	F
415	Impeller bolt	Frontschraube	4B.	H	F
416	Suction casing	Eintrittskappe	4H.	A	C
417	Fastening set	Befestigung		H	F
418					
419	Fastening set	Befestigung		H	F
420	Fastening set	Befestigung		H	F
421	Liner	Eintrittskonus	4K.	A/D	C
422	Regulation nut	Regulierhülse	4V1	F	F
423	Plug	Stopfen		N	F
424	Plug	Stopfen		N	F
425					
426	Fastening set 463-400	Befestigung 463-400			
427					
428					
429					
430	O-ring	O-Ring		Q	Q
431	O-ring	O-Ring		Q	Q
432					
433	Bush impeller/impeller bolt	Uebergangsbüchse Laufrad/Frontschraube	4BZ	H	F
434	Bush shaft/impeller	Uebergangsbüchse Welle/Laufrad	4ZW	H	F
462	Guide cone	Leitkonus	4Z1		
463	Guidance sheet	Leitblech	4LB	H	F
464	O-ring	O-Ring	8DO	Q	Q
465	Fastening set 421 - 462	Befestigung 421 - 462			
500	Junction box cover	Kabeldeckel	5DK	A	C
501	Upper motor cover	Motordeckel oben	5DM	A	A
502	Motor stator	Wicklung	5ES	-	-
503	Shaft (Rotor)	Welle (Rotor)	5WO(5ER)	H	F/H
504	Oil chamber casing	Öl-kammergehäuse	5GO	A	A/F
505	Lower bearing cap P.S.	Lagerdeckel P.S.	5DL	A	A
506	Retaining ring	Fettring		K	K
507	Back cover/mech. seal plate	Mech.Dichtteil/Dichtplatte	5GD/1PM	A	C
508	Spacer ring	Stützring	5RS	O	O
509	Fastening set 500-501	Befestigung 500-501		H	F
510	O-ring for 557 P.S. ex-proof old type	O-Ring zu 557 P.S. Ex		Q	Q
511	Back cone	Rückkonus	1K.	A/D	C
512	Lower ball bearing P.S.	Lager für Radialbelastung P.S.	8LW	-	-
513	Upper ball bearing cable side	Lager Kabelseite	8LW	-	-
514	Double row angular contact ball bearing	Lager P.S. (für Pumpe bis 5 kW)	8LW	-	-
515	Mechanical seal P.S.	Mech.Dichtung P.S.	8DM	-	-
516	Mechanical seal M.S.	Mech.Dichtung M.S.	8DM	-	-
517	Humidity relay	Feuchtigkeitsschutz-Relais	5EU	-	-
518	Cable	Kabel	5EK	-	-
519	Terminal board	Klemmenbrett		-	-
520	Ground cable connection (earth)	Befestigung für Erdanschlusskabel		K	K
521	Terminal connectors ex-proof	Leitungsdurchführung Ex-Schutz		-	-
522	Terminal connectors	Leitungsdurchführung		-	-
523	Cable entry assembly (intermittent fitting)	Kabeleinführung komplett (Zwischenstück)	5EE (5EZ)	-	-
524	O-ring for 501	O-Ring zu 501		Q	Q
525	O-ring for 500	O-Ring zu 500		Q	Q

* For material explanations see sheet of section "ENGINEERING DATA"
 ** a: Standard material execution
 b: All internal wetted parts stainless steel
 c: All wetted parts stainless steel depending on size

Für Materialangaben s. Spezifikationsblatt des Kapitels "ENGINEERING DATEN"
 ** a: Standardmässige Materialausführung
 b: Alle intern benetzten Teile rostfrei
 c: Alle benetzten Teile rostfrei, grössenabhängig

File : QTLSTPRT

Drawn by / Bearb. Dat. Vis. : 10.02.98 / mf
 Approved by / Gepr. Dat. Vis. : 10.02.98 / DB

No. : 93-TU 4531/1c

POS.	DESCRIPTION	BESCHREIBUNG	CODE	MATERIAL*	
				a	b/c **
526	O-ring for 558 on top	O-Ring zu 558 oben		Q	Q
526	Steel ring	Stahlring gerollt		J	F
527	O-ring for 200 M.S.	O-Ring zu 200		Q	Q
528	O-ring for 519	O-Ring zu 519		Q	Q
529	O-ring for 558 bottom	O-Ring zu 558 unten		Q	Q
530	O-ring for 504 M.S.	O-Ring zu 504 M.S.		Q	Q
531	O-ring for 505	O-Ring zu 505		Q	Q
532	Fastening set 557-501 (small Motors)	Befestigung 501-557 (kleine Motoren)	5FB	H	F
533	Fastening set 504-505	Befestigung 505-504		H	F
534	Fastening set 507-557/504	Befestigung 507-557/504		H	F
535	Fastening set 501-519	Befestigung für 519		H	F
536	Plug with gasket	Stopfen		F+C	F
537	Fastening set 561	Befestigung für 561		H	F
538	Fastening set 504-557	Befestigung 504-557		H	F
539	Snap ring for 534 (C-Type)	Seegerring für 534 (Typ C)		O	K
540	Distance bolt for 519	Distanzbolzen zu 519		K	K
541	O-ring for 540	O-Ring zu 540		Q	Q
542	Grease retaining disc P.S.	Fettscheibe P.S. + Monobloc M.S.	5SF	K	K
543	Holding ring for 519	Halterring zu 519		K	K
544	Snap ring for 553	Seegerring zu 553		O	O
545	Snap ring for 516 = M.S.	Seegerring zu 516 = M.S.		O	O
546	Snap ring for 515 = P.S.	Seegerring zu 515 = P.S.		O	F
547	O-ring for 598 (400-557)	O-Ring zu 598 (400-557)		Q	Q
548	Plug for lubricating hole	Stopfen zu Schmierloch		F+P	F
549	Oil glass	Oelschauglas		-	-
550	Driving pin for 560	Öelradmitnehmer		G	G
551	Fastening 502-400 (A02Q)	Befestigung 502-400 (A02Q)		G	G
552	Plug for flushing connection 581	Stopfen für Spülwasseranschluss 581		N	F
553	Oil seal sleeve	Laufbüchse für Simmerring	5DB	J	J
554	Spacer (if no oil impeller)	Distanzring (wenn kein Köhlrad)	5KD	K	K
555	shaft seal	Simmerring		Q	Q
556	Ring screw	Ringschraube		N	F
557	Stator housing	Statorgehäuse	5GM	A	A/F
558	Cooling jacket	Kühlmantel	5KG	K	F
559	Spring ring for 558	Sprengerring zu 558	5RF	K	F
560	Impeller for circ. of cooling liquid	Köhlrad	5KI	A	A
561	Guidance sheet	Leitblech	5KB	K	K
562	Snap ring for ventilator	Seegerring zu Lüfter		O	O
563	Ventilator cap	Lüfterhaube		-	-
564					
565	O-ring for 566-598	O-Ring zu 566-598		Q	Q
566	Oil elbow	Öelbogen		A	-
567	cabl bush	Kabeltülle		Q	Q
568	Fastening set 575	Befestigung 575		H	F
569	Fastening set 577	Befestigung 577		H	F
570	O-ring for 575	O-Ring zu 575		Q	Q
571	Temperature probe	Temperatursonde	5ET	-	-
572	Float switch	Schwimmerschalter	5ES	-	-
573	Snap ring 574	Seegerring zu 574		O	O
574	Cover disc Mot. 6 + 7	Deckscheibe Mot. 6 + 7 5DA		K	K
575	Cable cover (probe. Mot. 6+7)	Kabeldeckel (Sonde, Mot. 6+7)	5DK	A	-
576	Shims for 507-504, 507-511	Regulierunterlagen zu 507-504, 507-511		K	F
577	Probeholding	Sondenblech		K	K
578	Moisture detector	Öelmesssonde	8EF	-	-
579	Fastening set 593-300	Befestigung 593-300		M	-
580	O-ring for 593 gear side	O-Ring zu 593, getriebeseitig		Q	Q
581	Pipe for 507 old types	Spülrohr zu 507		N	-
582	Inset for 557 ex-proof old types	Einsatz zu 557, Ex-Schutz		A	A
583	Grease disc M.S.	Fettscheibe M.S.	5SS	K	K
584	Spacer for 503 standard bearing	Distanzring zu 503, normale Lagerung		K	K
585	Spacer for 557 standard bearing	Distanzring zu 557, normale Lagerung		K	K
586	Small plate for ground cable (earth)	Plättchen für Erdanschluss		P	P
587	Spacer P.S.	Distanzring P.S.		K	K
588	Grease disc, cable side	Fettscheibe kabelseitig		K	K
589	Snap ring for 588	Seegerring zu 588		O	O
590	Cable connection	Miniklemme	5EV	-	-
591	Carrying plate for 590	Tragschiene zu 590		-	-
592	Winding	Paket		-	-
593	Motor support	Motor Support		A	-
594	Snap ring for 595	Seegerring zu 595		O	-
595	Heat shield	Hitzeschutzschild		-	-
596	Name plate ex-proof	Prüfschild Ex-Schutz		F	F
597	Name plate	Hauptschild		F	F
598	Oil tubes (elbow for oil)	Öelröhrchen (Anschlussbogen)	5KR/5BO	A/P/K	P/F
599	Fastening set 598	Befestigung von 598		H	F
640	Fastening set 646-400	Befestigung 646-400		H	F
642	Rubber seal	Dichtungsgummi	6AD	Q	Q
646	Gliding shoe	Gleitschuh	6AS	A	C

* For material explanations see sheet of section "ENGINEERING DATA"

** a: Standard material execution

b: All internal welded parts stainless steel

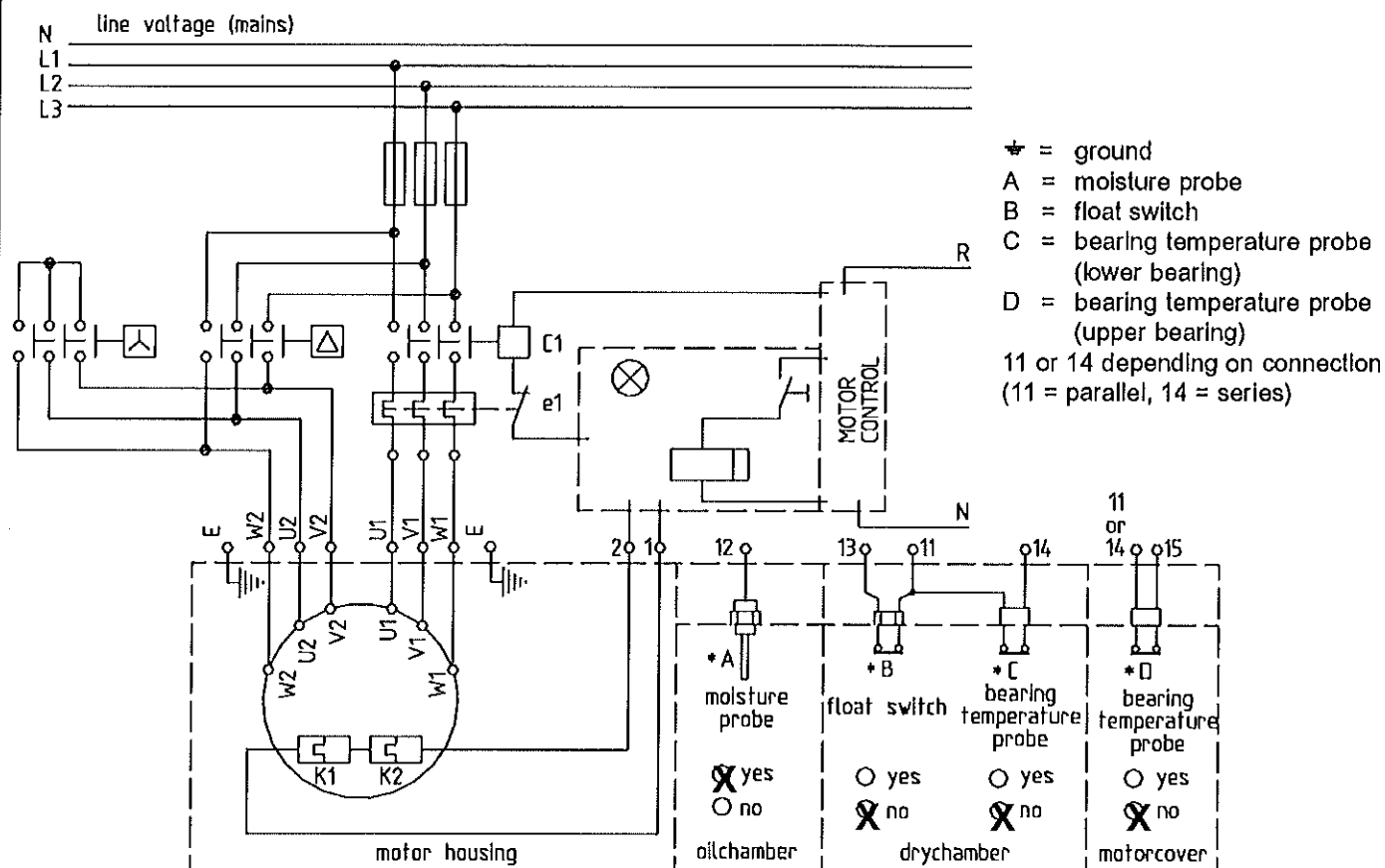
c: All welded parts stainless steel depending on size

Für Materialangaben s. Spezifikationsblatt des Kapitels "ENGINEERING DATEN"

** a: Standardmässige Materialausführung

b: Alle intern benetzten Teile rostfrei

c: Alle benetzten Teile rostfrei, grössenabhängig



Operate pump with contactor equipped with thermal protector. The protectors must trip within 6 seconds on locked rotor condition.

Do not start until the temperature limit sensors (terminals 1+2) have been connected. If one limit sensor opens, the power supply to the motor must cut off. The circuit has to be laid out in such a way, that the motor cannot automatically come on again, even after temperature limit sensors have cooled and re-closed the circuit (1+2). The cause of overheating must be determined and corrected before the motor is put back manually into service. After a loss of power an automatic restart must be possible by return of power.

C1 = contactor
e1 = thermal protector
K1, K2 = temperature limit sensor

☐ bimetal switch 250 V, 2,5 A
☒ thermistor

U1, U2
V1, V2
W1, W2
E } motor cable

1+2 = control cable for temperature limit sensor

11+14+15 = bearing temperature probe
11+13 = float switch
12+E = control cable for moisture probe

} For Ex-proof execution
"intrinsically safe circuit"

* **ADDITIONAL PROTECTION ELEMENTS**
Above indicated elements are installed as an option. For proper connection inside the control panel see sheet 96-EL 5455E.

Client:

Pump type: **H05K-MH3R + HE050X4-GSEK1 + NE1B5E-15**

Order No. **12003908 / 10**

Motor:

N = 50.00	kW	U = 400	Volts	I = 92.0	Amp.
n = ca. 1479	rpm	f = 50	Cycles	cos φ = 0.87	

Cable: **2 4x10mm², 4x1,5mm² PURWIL,, EMV**

L = 15 m

File: **SCHEMA_E**

Drawn by / Bearb. Dat. Vis.: 22.04.02 FW/ml

Approved by / Gepr. Dat. Vis.: 23.11.05 FW

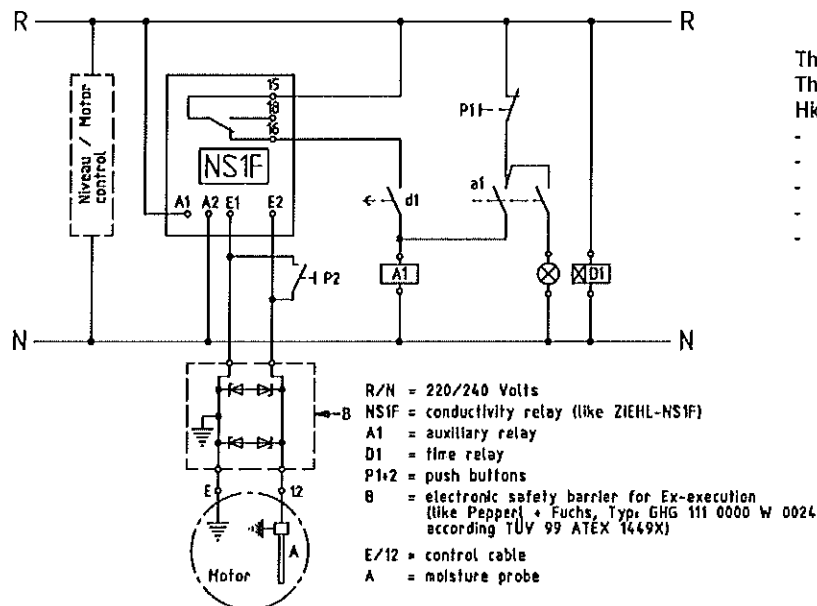
No.: **85-EL 3324E/I**

ADDITIONAL INCORPORATE PROTECTION ELEMENTS

In addition to the standard elements in HIDROSTAT-motors, they could have the following protection devices installed in the lower part of the motor, directly accessible from the outside, by removal of the cover.

- A: Moisture probe in the oil chamber
- B: Float switch for leakage detection of the upper mechanical seal
- C: Bearing temperature probe (only for motor sizes W - T)

A. MOISTURE PROBES (cable 12 + ground)



The relay must be activated at 60 k Ω .

The following relays have been approved for use with Hidrostat motors:

- ZIEHL NS1F
- FANAL TR003 (NW)
- SCHIELE ENN
- WARRICK 6B1F0 od. 6B2F0
- CHROMALOCK-LCA

When the chamber is full of clean oil, no current flows between the probe 12 and ground (E). As soon as the oil will be conducted by the ingress of water, a visual alarm will be released by flowing current. There is no need to trip-out the motor, because there is no reason for failing. First the water has to ingress to the motorspace through the second seal. Experience has shown that this will take a longer time.

As the conductivity of the mix of oil and water between earth and probe is different, if the motor is running or not and therefore the electronic level control would always switch on and off, the visual alarm has to be made in a way that one pulse is sufficient to carry the alarm condition. This condition can only be resetted by pressing the button P1 by hand.

As the electronic level control mostly have an internal delay circuit (approx. 1 sec.) and the connection 15 and 16 are closed in idle condition, a time relay (D1) for the visual alarm is recommended. This relay is also efficient, because the alarm would be activated by the delay circuit on switch-on after a circuit failure or after switch-off of the control line. In order to control the function of the alarm it is useful to mount push button P2 at the connections E1 and E2.

B. FLOAT SWITCH (cable 11+13)

Generally the upper mechanical seal will not leak, however during the initial run-in period, it is possible that some fluid will leak through the seal, and in order to protect bearings and winding against liquid a float switch has been fitted which will indicate if the seal leakage has reached the first bearing. In this case the cover of this chamber should be removed for cleaning and inspection. This can be done without disturbing the motor interior. The float switch is a closed contact switch during normal operation and should be connected to give an indication only when liquid is in the chamber, but should not shut the motor down. Normally it would be sufficient removing the liquid during the next scheduled maintenance action. For machines which work in ex-proof area the element has to be connected to an ATEX certificated circuit amplification (relay, Optokoppler).

C. BEARING TEMPERATURE PROBE (cable 11+14/15)

A temperature measuring device rated at 110° C is installed in the bearing housing. The switch is connected during normal run and is connected with an independent circuit. The signal can be switched in a way that the motor automatically shut down or only an alarm is given. Circuit must be manually resettable as sensor will automatically close when motor cools down. For machines which work in ex-proof area the element has to be connected to an ATEX certificated circuit amplification (relay, Optokoppler).


NOTE:

Circuits for features B and C have been selected to work on a closed circuit so as to protect the motor in the event of the control cable being damaged (broken).

ATTENTION: By intrinsically safe circuit for above elements the max. connected load is $U_i = 28 \text{ V}$, $I_i = 0.3 \text{ A}$, $P_i = 1.3 \text{ W}$

de	<u>Erklärung des Typencodes</u> E125 - HL1 + Hydraulik	EEXW4 – GSEQ + Motor	NC1A20 -10 Kabel
cs	<u>Vysvětlení typového kódu</u> E125 - HL1 + Hydraulická	EEXW4 – GSEQ + Elektromotor	NC1A20 - 10 Kabelová
da	<u>Forklaring af typekoden</u> E125 - HL1 + Hydraulik	EEXW4 – GSEQ + El-motor	NC1A20 - 10 Kabel
el	<u>Επεξήγηση του κωδικού τύπου</u> E125 – HL1 + Τμήμα υδραυλικών	EEXW4 – GSEQ + Ηλεκτρικό μοτέρ	NC1A20 - 10 Τμήμα καλωδίου
en	<u>Explanation of type code</u> E125 – HL1 + Hydraulic	EEXW4 – GSEQ + Electric motor	NC1A20 - 10 Cable
es	<u>Explicación del código de tipo</u> E125 – HL1 + Hidráulica	EEXW4 – GSEQ + Motor eléctrico	NC1A20 - 10 Cable
fr	<u>Explication du code de type</u> E125 – HL1 + Hydraulique	EEXW4 – GSEQ + Moteur électrique	NC1A20 - 10 Câbles
fi	<u>Tyyppikoodin selitys</u> E125 – HL1 + Hydrauliikkaosa	EEXW4 – GSEQ + Sähkömoottori	NC1A20 - 10 Johto-osa
hu	<u>Típuskód magyarázata</u> E125 – HL1 + Hidraulikus	EEXW4 – GSEQ + Elektromos motor	NC1A20 - 10 Kábel
it	<u>Spiegazione del codice modello</u> E125 – HL1 + Idraulica	EEXW4 – GSEQ + Elettromotore	NC1A20 - 10 Cavo
nl	<u>Verklaring van de typecode</u> E125 – HL1 + Hydraulisch	EEXW4 – GSEQ + Elektromotor	NC1A20 - 10 Kabeldeel

pl	<u>Objaśnienie pl kodu typów</u> E125 – HL1 + Hydrauliczna	EEXW4 – GSEQ + Silnik elektryczny	NC1A20 - 10 Kablowa
pt	<u>Explicação do código dos tipos</u> E125 – HL1 + Peça hidráulica	EEXW4 – GSEQ + Motor eléctrico	NC1A20 - 10 Peça de cabo
sk	<u>Vysvetlenie typového kódu</u> E125 – HL1 + Hydraulická	EEXW4 – GSEQ + Elektromotor	NC1A20 - 10 Káblová
sl	<u>Razlaga tipske kode</u> E125 – HL1 + Hidravlični	EEXW4 – GSEQ + Elektromotor	NC1A20 - 10 Kabelski
sv	<u>Förklaring av typkoderna</u> E125 – HL1 + Hydraulde	EEXW4 – GSEQ + Elmotor	NC1A20 - 10 Kabelde!

					REVISIONSTABELLE TAUCHPUMPEN OVERHAUL CHART SUBMERSIBLE PUMPS				
Motor Typ	motor- seitige Dichtung	pump- seitige Dichtung	Dicht. Öl Lit.	Nach- schmier- frist Std.	Motor Typ	motor- seitige Dichtung	pump- seitige Dichtung	Dicht. Öl Lit.	Nach- schmier- frist Std.
Motor type	motor- side seal	pump- side seal	seal oil lit.	hours between regreasing	Motor type	motor- side seal	pump- side seal	seal oil lit.	hours between regreasing
BNBA2	25 mm	20 mm	1.0	20'000	HNNT4	3"	3"	19.0	35'000
BNZK2	25 mm	20 mm	1.0	20'000	HNUC4 / HNUT4	95 mm	3"	22.0	20'000
BNZR2	25 mm	20 mm	1.0	20'000	INUT4	95 mm	3"	28.0	20'000
BNZY2	25 mm	20 mm	1.0	30'000	INTZ4	100 mm	100 mm	47.0	18'000
CNBA2	25 mm	20 mm	1.0	30'000					
CNZR2	25 mm	20 mm	1.1	20'000	DNYS6 / DNYS6	1 1/2"	1 1/8"	1.2	35'000
CNZY2	25 mm	20 mm	1.1	20'000	ENYS6 / ENYT6	1 1/2"	1 1/8"	1.2	35'000
CNYS2	1 1/2"	1 1/8"	1.5	20'000	ENXA6 / ENXR7	1 1/2"	1 1/2"	3.8	50'000
CNYT2	1 1/2"	1 1/8"	1.5	30'000	FNXT6 / FNXT7	2"	2"	6.0	50'000
DNYS2	1 1/2"	1 1/8"	1.2	20'000	FNXW6	2"	2"	6.0	50'000
DNYT2	1 1/2"	1 1/8"	1.2	20'000	FNXZ6 / FNXZ7	2"	2"	6.0	50'000
DNXA2	1 1/2"	1 1/8"	3.6	25'000	FNWB6	2 1/2"	2"	12.0	50'000
DNXB2	1 1/2"	1 1/8"	3.6	25'000	HNWB6 / HNWS6	2 1/2"	2"	14.0	50'000
DNXK2 / DNXL2	1 1/2"	1 1/8"	3.6	25'000	HNVB6	3"	3"	19.0	45'000
DNXT2	2"	1 1/2"	4.0	25'000	HNVS6	3"	3"	19.0	45'000
DNXQ2 / DNXXQ3	2"	1 1/2"	4.0	25'000	INVS6	3"	3"	27.0	45'000
DNXZ2	2"	1 1/2"	4.0	25'000	INNT6	3"	3"	27.0	35'000
DNXW2	2"	1 1/2"	4.0	25'000	INUC6	95 mm	3"	28.0	35'000
DNWS2	2 1/2"	1 1/2"	9.0	25'000	LNTT6 / LNTZ6	100 mm	100 mm	49.0	35'000
ENWS2	2 1/2"	2"	9.0	25'000					
ENWS3	2 1/2"	1 1/2"	9.0	25'000	DNYS8 / DNYS8	1 1/2"	1 1/8"	1.2	35'000
ENVT2	3"	2"	13.0	20'000	ENYS8 / ENYT8	1 1/2"	1 1/8"	1.2	35'000
					FNXTW	2"	2"	6.0	50'000
BNBA4	25 mm	20 mm	1.0	30'000	FNXT8 / FNXZ8	2"	2"	6.0	50'000
BNZK4	25 mm	20 mm	1.0	30'000	FNXZ9	2"	2"	6.0	50'000
CNBA4	25 mm	20 mm	1.0	30'000	HNWB8/HNWS8	2 1/2"	3"	14.0	50'000
CNZK4	25 mm	20 mm	1.1	30'000	HNVB8	3"	3"	19.0	45'000
CNZY4	25 mm	20 mm	1.1	30'000	INVB8 / INVS8	3"	3"	27.0	45'000
DNBA4	25 mm	20 mm	0.9	30'000	INNT8	3"	3"	27.0	40'000
DNYS4	1 1/2"	1 1/8"	1.2	30'000	INUC8	95 mm	3"	28.0	30'000
DNYS4	1 1/2"	1 1/8"	1.2	30'000	LNUC8	95 mm	3"	28.0	30'000
DNYS4	1 1/2"	1 1/8"	1.2	35'000	LNTT8 / LNTZ8	100 mm	100 mm	49.0	30'000
ENYT4	1 1/2"	1 1/8"	1.2	35'000					
ENXA4 / ENXB4	1 1/2"	1 1/2"	3.8	45'000	ENXRA	1 1/2"	1 1/2"	3.8	50'000
ENXK4 / ENXO4	1 1/2"	1 1/2"	3.8	45'000	FNXTA	2"	2"	5.4	50'000
ENXR4 / ENXR5	1 1/2"	1 1/2"	3.8	45'000	HNXTA / HNXZA	2"	2"	8.0	50'000
ENXS4	1 1/2"	1 1/2"	3.8	45'000	HNXZA	2"	2"	9.0	50'000
ENXW4	2"	1 1/2"	4.7	45'000	INVBA / INVSA	3"	3"	27.0	50'000
ENXY4 / ENXY5	1 1/2"	1 1/2"	3.8	40'000	LNUCA	95 mm	3"	43.0	30'000
ENXZ4	2"	2"	4.7	40'000					
ENWB4	2 1/2"	2"	10.0	40'000	HNXTC	2"	2"	9.5	50'000
FNXT4	2"	2"	6.0	40'000	HNXZC	2"	2"	9.5	50'000
FNXW4 / FNXZ4	2"	2"	6.0	40'000	LNUCC	95 mm	3"		50'000
FNWB4 / FNWS4	2 1/2"	2"	12.0	40'000					
FNWT4	2 1/2"	2"	12.0	40'000	INVE	3"	3"		50'000
FNVB4	3"	2"	17.0	35'000	LNVBE	3"	3"		50'000
HNVCA / HNVTA	3"	3"	19.0	35'000	LNVSE	3"	3"		50'000
File: Excel/Revisionstabelle Tauchpumpen					Drawn by / Bearb. Dat. Vis.: 03.08.10 HPH/mf Approved by / Gepr. Dat. Vis.: 03.08.10 mf				
					No. 10-TU 7621/1				



REVISIONSTABELLE TAUCHPUMPEN
OVERHAUL CHART SUBMERSIBLE PUMPS

[illegible]



REVISIONSTABELLE UEBERFLUTBARE PUMPEN

OVERHAUL CHART IMMERSIBLE PUMPS

Motor Typ	motor- seitige Dichtung	pump- seitige Dichtung	Dicht. Öl Lit.	Nach- schmier- frist Std.	Motor Typ	motor- seitige Dichtung	pump- seitige Dichtung	Dicht. Öl Lit.	Nach- schmier- frist Std.
Motor type	motor- side seal	pump- side seal	seal oil lit.	hours between regreasing	Motor type	motor- side seal	pump- side seal	seal oil lit.	hours between regreasing
BKBA2	25 mm	20 mm	1.0	20'000	EEYT6	1 1/2"	1 1/8"	4.0	35'000
BKZR2 / BKZY2	25 mm	20 mm	1.0	30'000	DKXA6	1 1/2"	1 1/8"	3.7	50'000
BEZR2 / BEZY2	25 mm	20 mm	2.8	30'000	EKXA6 / EKXR7	1 1/2"	1 1/2"	3.8	50'000
CEZR2 / CEZY2	25 mm	20 mm	2.8	30'000	EEXA6 / EEXK6	1 1/2"	1 1/2"	7.0	50'000
CEYS2	1 1/2"	1 1/8"	3.5	30'000	EEXR6 / EEXR7	1 1/2"	1 1/2"	8.0	50'000
CEYT2	1 1/2"	1 1/8"	4.0	30'000	EEXZ6	2"	1 1/2"	9.5	50'000
DEYT2	1 1/2"	1 1/8"	3.8	20'000	FEXQ6	2"	2"	11.0	50'000
DEXB2	1 1/2"	1 1/8"	7.0	25'000	FEXT6 / FEXT7	2"	2"	11.0	50'000
DKXB2	1 1/2"	1 1/8"	3.6	25'000	FEXW6	2"	2"	12.0	50'000
DEXL2	1 1/2"	1 1/8"	7.0	25'000	FEXZ6 / FEXZ7	2"	2"	12.0	50'000
DEXQ2 / DEXT2	2"	1 1/2"	8.0	25'000	FEWA7	2 1/2"	2"	20.0	50'000
DEWX2 / DEXZ2	2"	1 1/2"	8.5	25'000	FEWB6 / FEWB7	2 1/2"	2"	20.0	50'000
DEWS2	2 1/2"	1 1/2"	19.0	15'000	FEWS6 / FEWS7	2 1/2"	2"	20.0	50'000
EEVT2	3"	2"	26.5	20'000	HEWB6	2 1/2"	2"	24.0	50'000
					HEWS6 / HEWS7	2 1/2"	2"	24.0	50'000
BKBA4 / BKZR4	25 mm	20 mm	1.0	30'000	HEVB6 / HEVB7	3"	3"	35.0	45'000
CKBA4	25 mm	20 mm	1.0	30'000	HEVS6 / HEVS7	3"	3"	35.0	45'000
CKZR4 / CKZY4	25 mm	20 mm	1.1	50'000	HEUC7 / HEUT7	95 mm	3"	59.0	35'000
CEZY4	25 mm	20 mm	2.8	50'000	IEVS6	3"	3"	42.0	45'000
CKYT4	1 1/2"	1 1/8"	1.5	40'000	IENT6	3"	3"	53.0	45'000
DKYT4	1 1/2"	1 1/8"	1.2	35'000	IEUC6 / IEUC7	95 mm	3"	68.0	35'000
DEYS4	1 1/2"	1 1/8"	3.0	35'000	IEUT6 / IEUT7	95 mm	3"	68.0	35'000
DEYT4	1 1/2"	1 1/8"	3.8	35'000	IETT6 / IETT7	100 mm	100 mm	99.0	35'000
DEXA4 / DEXA5	1 1/2"	1 1/8"	7.0	45'000	IETZ7	100 mm	100 mm	99.0	35'000
DEXK4	1 1/2"	1 1/8"	7.0	45'000	LETZ6	100 mm	100 mm	106.0	35'000
DKXA4	1 1/2"	1 1/8"	3.7	45'000	LESC6	120 mm	100 mm	119.0	35'000
EEXA4 / EEXA5	1 1/2"	1 1/2"	7.0	45'000	LEST6	120 mm	100 mm	125.0	35'000
EEXK4	1 1/2"	1 1/2"	7.0	45'000					
EEXO4	1 1/2"	1 1/2"	8.0	45'000	DKYT8	1 1/2"	1 1/8"	1.2	35'000
EEXR4 / EEXR5	1 1/2"	1 1/2"	8.0	45'000	DEYS8	1 1/2"	1 1/8"	3.0	35'000
EEXW4 / EEXZ4	2"	1 1/2"	9.5	40'000	EEYT8	1 1/2"	1 1/8"	4.0	35'000
EEXY4 / EEXY5	1 1/2"	1 1/2"	9.5	40'000	EEXR9	1 1/2"	1 1/2"	8.0	50'000
EEWB4 / EEWB5	2 1/2"	2"	17.0	40'000	EKXR8	1 1/2"	1 1/2"	3.8	50'000
EEWS4 / EEWS5	2 1/2"	2"	18.0	40'000	FEXQ8 / FEXT8	2"	2"	11.0	50'000
FEXT4	2"	2"	11.0	40'000	FEXZ8 / FEXZ9	2"	2"	12.0	50'000
FEXW4 / FEXZ4	2"	2"	12.0	40'000	HEWB8 / HEWB9	2 1/2"	2"	25.0	50'000
FEWB4 / FEWB5	2 1/2"	2"	21.0	40'000	HEWS8 / HEWS9	2 1/2"	2"	32.0	50'000
					HEVB8 / HEVB9	3"	3"	35.0	45'000
FEWS4 / FEWS5	2 1/2"	2"	23.0	40'000	HEVS9	3"	3"	35.0	45'000
FEVB4 / FEVB5	3"	2"	31.0	35'000	IEVS8	3"	3"	43.0	45'000
FEVS5	3"	2"	36.0	35'000	IENT8	3"	3"	53.0	45'000
FEVV4	3"	3"	31.0	35'000	IEUC8 / IEUC9	95 mm	3"	68.0	35'000
HEVC4 / HEVT4	3"	3"	35.0	35'000	IEUT8 / IEUT9	95 mm	3"	68.0	35'000
HEVS5	3"	3"	35.0	35'000	IETT9	100 mm	100 mm	99.0	35'000
HENT4	3"	3"	45.0	35'000	IETZ8	100 mm	100 mm	99.0	35'000
HEUC4 / HEUC5	95 mm	3"	59.0	20'000	LETT8	100 mm	100 mm	106.0	35'000
HEUT4 / HEUT5	95 mm	3"	59.0	20'000	LETZ8 / LETZ9	100 mm	100 mm	106.0	35'000
IEUT4	95 mm	3"	68.0	20'000	MEST8	120 mm	120 mm	140.0	50'000
IETT4 / IETT5	100 mm	100 mm	99.0	18'000					
IETZ4 / IETZ5	100 mm	100 mm	99.0	18'000	EEXRA	1 1/2"	1 1/2"	8.0	50'000
IESB4 / IESC4	120 mm	100 mm	109.0	18'000	FEXTA	2"	2"	11.0	50'000
IEST4	120 mm	100 mm	115.0	18'000	HEXTA / HEXZA	2"	2"	13.0	50'000
					IEVCA	3"	3"	47.0	50'000
DEYS6	1 1/2"	1 1/8"	3.0	35'000	IEVSA / IEVSB	3"	3"	47.0	50'000
DKYT6	1 1/2"	1 1/8"	1.2	35'000	LETTA / LETZA	100 mm	100 mm	106.0	40'000
EEYS6	1 1/2"	1 1/8"	3.0	35'000	MESCA	120 mm	120 mm	136.0	35'000
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					No. 10-TU 7622/1				



REVISIONSTABELLE UEBERFLUTBARE PUMPEN OVERHAUL CHART IMMERSIBLE PUMPS

Motor Typ	motor- seitige Dichtung	pump- seitige Dichtung	Dicht. Öl Lit.	Nach- schmier- frist Std.	Motor Typ	motor- seitige Dichtung	pump- seitige Dichtung	Dicht. Öl Lit.	Nach- schmier- frist Std.
Motor type	motor- side seal	pump- side seal	seal oil lit.	hours between regreasing	Motor type	motor- side seal	pump- side seal	seal oil lit.	hours between regreasing
B03UR02	25 mm	20 mm	0.25	25'000	HE130X4	3"	3"	44.0	35'000
					HE130X6	3"	3"	44.0	45'000
DK002X2	25 mm	20 mm	0.25	25'000	IE130X6	3"	3"	52.0	45'000
DK002X4	25 mm	20 mm	0.25	45'000	IE130X8	3"	3"	52.0	45'000
					LE130X8	3"	3"	52.0	45'000
DK003X2	25 mm	20 mm	0.25	25'000					
DK003X4	25 mm	20 mm	0.25	45'000	IE190X6	100 mm	100 mm		35'000
DK004X2	1 1/8"	1 1/8"	0.2	25'000					
DK004X4	1 1/8"	1 1/8"	0.2	45'000					
DK006X2	1 1/8"	1 1/8"	2.0	25'000					
DK006X4	1 1/8"	1 1/8"	2.0	45'000					
DK007X2	1 1/8"	1 1/8"	2.0	25'000					
DK007X4	1 1/8"	1 1/8"	2.0	45'000					
DE011X2	1 1/2"	1 1/8"	5.7	25'000					
DE011X4	1 1/2"	1 1/8"	5.7	45'000					
EE011X2	1 1/2"	1 1/2"	6.7	45'000					
EE011X4	1 1/2"	1 1/2"	6.7	45'000					
EK014X2	1 1/2"	1 1/8"	4.0	25'000					
EK014X4	1 1/2"	1 1/2"	4.0	45'000					
EE020X2	2"	1 1/2"	11.5	25'000					
EE020X4	2"	1 1/2"	10.0	45'000					
FE020X4	2"	2"	12.0	45'000					
FE020X6	2"	2"	12.0	45'000					
EE030X2	2"	1 1/2"	18.0	25'000					
FE030X4	2"	2"	22.0	45'000					
FE030X6	2"	2"	22.0	45'000					
HE030X6	2"	2"	25.0	45'000					
HE030X8	2"	2"	25.0	45'000					
EE050X2	3"	2"	41.0	25'000					
FE050X4	3"	2"	47.0	35'000					
HE050X4	3"	3"		35'000					
HE050X6	3"	3"		45'000					
HE050X8	3"	3"		45'000					
EE090X2	3"	2"	41.0	20'000					
FE090X4	3"	3"	41.0	35'000					
HE090X4	3"	3"	44.0	35'000					
HE090X6	3"	3"	44.0	45'000					
IE090X8	3"	3"	50.0	45'000					
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					No. 10-TU 7622/2				