

# Submersible Borehole Pump

## UPA / UPA S

with Motors up to 1000 V Operating Voltage  
50 Hz, 60 Hz, 100 Hz

## Installation/Operating Manual



## **Legal information/Copyright**

Installation/Operating Manual UPA / UPA S

Original operating manual

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

Subject to technical modification without prior notice.

© KSB SE & Co. KGaA, Frankenthal 2022-10-24

## Contents

<b>1</b>	<b>General.....</b>	<b>6</b>
1.1	Principles .....	6
1.2	Target group.....	6
1.3	Other applicable documentation .....	7
1.4	Symbols .....	7
1.5	Key to safety symbols/markings.....	8
<b>2</b>	<b>Safety .....</b>	<b>9</b>
2.1	General.....	9
2.2	Intended use .....	9
2.3	Personnel qualification and training.....	9
2.4	Consequences and risks caused by non-compliance with this manual .....	10
2.5	Safety awareness .....	10
2.6	Safety information for the operator/user .....	10
2.7	Safety information for maintenance, inspection and installation .....	10
2.8	Unauthorised modes of operation .....	11
2.9	Magnet rotor .....	11
<b>3</b>	<b>Transport/Storage/Disposal .....</b>	<b>12</b>
3.1	Checking the condition upon delivery .....	12
3.2	Transport.....	12
3.3	Pulling the pump/motor/pump set upright .....	14
3.4	Storage/preservation .....	15
3.5	Return to supplier.....	16
3.6	Disposal .....	17
<b>4</b>	<b>Description of the Pump (Set) .....</b>	<b>18</b>
4.1	General description .....	18
4.2	Product information.....	18
4.2.1	Product information as per Regulation No. 1907/2006 (REACH) .....	18
4.2.2	Product information as per Regulation No. 547/2012 (for 4" and 6" water pumps) implementing "Ecodesign" Directive 2009/125/EC.....	18
4.3	Designation.....	19
4.3.1	Designation used for pump sets with VdS certification .....	20
4.4	VdS approval numbers .....	20
4.5	Name plate.....	21
4.6	Design details.....	22
4.7	Configuration and function.....	23
4.8	Scope of supply.....	24
4.9	Dimensions and weights .....	24
<b>5</b>	<b>Installation at Site .....</b>	<b>25</b>
5.1	General information/Safety regulations .....	25
5.2	Preparing the installation .....	26
5.2.1	Checking the installation conditions .....	26
5.2.2	Checking the installation position .....	27
5.2.3	Checking the motor fill.....	28
5.2.4	Installing water storage tanks.....	29
5.2.5	Preventing backflow.....	30
5.2.6	Calculating the total weight .....	30
5.2.7	Electric wiring.....	31
5.2.8	Measuring the insulation resistance .....	33
5.3	Installing the pump set in a vertical position .....	34
5.3.1	Attaching the cable ties.....	36
5.4	Installing the pump set in a horizontal position .....	38
5.4.1	Mounting the pump set on pedestals.....	39
5.4.2	Installing the pump set on support frame and pedestal.....	39

5.4.3	Installing the pump set in a suction, pressure or cooling shroud .....	40
5.5	Installing the pump set in an angled position .....	41
5.6	Information on electrical connection .....	41
5.6.1	Operation with star-delta contactor, autotransformer and starting resistors .....	41
5.6.2	Operation with soft starter .....	42
5.6.3	Operation on a frequency inverter .....	42
5.7	Connection to power supply .....	44
5.7.1	Recommended: monitoring equipment and protective equipment .....	51
5.7.2	Connecting the temperature monitoring equipment .....	52
<b>6</b>	<b>Commissioning/Start-up/Shutdown .....</b>	<b>54</b>
6.1	Commissioning/Start-up .....	54
6.1.1	Start-up .....	54
6.1.2	Checking the direction of rotation .....	55
6.2	Operating limits .....	56
6.2.1	Frequency of starts .....	56
6.2.2	Supply voltage .....	57
6.2.3	Immersion depth .....	57
6.2.4	Fluid handled .....	57
6.3	Shutdown .....	62
<b>7</b>	<b>Servicing/Maintenance .....</b>	<b>63</b>
7.1	Servicing/inspection .....	63
7.2	Removing the pump set .....	63
7.3	Separating pump and motor .....	65
7.4	Motor fill .....	65
7.4.1	Motor fill - DN 100 .....	68
7.4.2	Motor fill – UMA 150, UMA-S 150, UMA 200, UMA-S 200, UMA 250, UMA-S 250 .....	68
7.4.3	Motor fill – UMA 300 and 14D .....	72
7.5	Storage and preservation .....	74
7.5.1	Storing new submersible borehole pumps .....	75
7.5.2	Storing submersible borehole pumps that have been removed from the system .....	75
7.6	Reassembling the pump set .....	75
7.6.1	Mounting the motor .....	75
7.6.2	Tightening torques .....	77
<b>8</b>	<b>Trouble-shooting .....</b>	<b>79</b>
<b>9</b>	<b>Related Documents .....</b>	<b>81</b>
9.1	General arrangement drawings with list of components .....	81
9.1.1	UPA S 250, standard design .....	81
9.1.2	UMA 150 submersible motor .....	86
9.2	Mating dimensions for the motors .....	89
9.2.1	UMA 150, UMA-S 150 mating dimensions .....	89
9.2.2	UMA 200, UMA-S 200 mating dimensions .....	90
9.2.3	UMA 250, UMA-S 250 mating dimensions .....	90
9.2.4	UMA 300 (2-pole) mating dimensions .....	91
9.2.5	UMA 300 (4-pole) mating dimensions .....	91
9.2.6	Mating dimensions 14D .....	92
<b>10</b>	<b>EU Declaration of Conformity .....</b>	<b>93</b>
<b>11</b>	<b>Certificate of Decontamination .....</b>	<b>94</b>



## Glossary

### Certificate of decontamination

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

## 1 General

### 1.1 Principles

This operating manual is valid for the type series and variants indicated on the front cover.

- Pump sizes**
- UPA C 150
  - UPA 200
  - UPA S 200
  - UPA 250
  - UPA 250C<sup>1)</sup>
  - UPA S 250
  - UPA 300
  - UPA S 300
  - UPA 350
  - UPA S 350
  - BSX
  - BRY
  - BRZs
  - BRE
  - BSF
  - BSK

**Motor sizes** See the detailed designation (⇒ Section 4.3, Page 19) and the brief designation used in the product literature.

- DN 100
- UMA 150
- UMA-S 150
- UMA 200
- UMA-S 200
- UMA 250
- UMA-S 250
- UMA 300
- 14D

The operating manual describes the proper and safe use of this equipment in all phases of operation.

The name plate indicates the type series and size, the main operating data, the order number and the order item number. The order number and order item number clearly identify the pump set and serve as identification for all further business processes.

In the event of damage, immediately contact your nearest KSB service facility to maintain the right to claim under warranty.

### 1.2 Target group

This operating manual is aimed at the target group of trained and qualified specialist technical personnel. (⇒ Section 2.3, Page 9)

3400.86/17-EN

<sup>1</sup> Only for sprinkler applications.

### 1.3 Other applicable documentation


**Table 1:** Overview of other applicable documents

Document	Contents
Data sheet	Description of the technical data of the pump (set)
General arrangement drawing / outline drawing	Description of mating dimensions and installation dimensions for the pump (set), weights
Hydraulic characteristic curve	Characteristic curves showing head, NPSH required, efficiency and power input
General assembly drawing <sup>2)</sup>	Description of the pump in a sectional drawing Description of the motor in a sectional drawing
Sub-supplier product literature <sup>2)</sup>	Operating manuals and other product literature describing accessories and integrated machinery components
Spare parts lists <sup>2)</sup>	Description of spare parts
Operating manual for accessories <sup>2)</sup>	Description of accessories, e.g. cable connectors

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

### 1.4 Symbols










**Table 2:** Symbols used in this manual

Symbol	Description
✓	Conditions which need to be fulfilled before proceeding with the step-by-step instructions
▷	Safety instructions
⇒	Result of an action
⇨	Cross-references
1.	Step-by-step instructions
2.	
	Note Recommendations and important information on how to handle the product

<sup>2)</sup> If included in agreed scope of supply

## 1.5 Key to safety symbols/markings

Table 3: Definition of safety symbols/markings

Symbol	Description
 <b>DANGER</b>	<b>DANGER</b> This signal word indicates a high-risk hazard which, if not avoided, will result in death or serious injury.
 <b>WARNING</b>	<b>WARNING</b> This signal word indicates a medium-risk hazard which, if not avoided, could result in death or serious injury.
 <b>CAUTION</b>	<b>CAUTION</b> This signal word indicates a hazard which, if not avoided, could result in damage to the machine and its functions.
	<b>Explosion protection</b> This symbol identifies information about avoiding explosions in potentially explosive atmospheres in accordance with EU Directive 2014/34/EU (ATEX).
	<b>General hazard</b> In conjunction with one of the signal words this symbol indicates a hazard which will or could result in death or serious injury.
	<b>Electrical hazard</b> In conjunction with one of the signal words this symbol indicates a hazard involving electrical voltage and identifies information about protection against electrical voltage.
	<b>Machine damage</b> In conjunction with the signal word CAUTION this symbol indicates a hazard for the machine and its functions.
	<b>Warning: Strong magnetic field</b> In conjunction with one of the signal words this symbol indicates a hazard involving magnetic fields and identifies information about protection against magnetic fields.
	<b>Warning for persons with pacemaker</b> In conjunction with one of the signal words this symbol indicates a hazard involving magnetic fields and identifies special information for persons with a pacemaker.



## 2 Safety

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

In addition to the present general safety information the action-related safety information given in the other sections must be observed.

### 2.1 General

- This operating manual contains general installation, operating and maintenance instructions that must be observed to ensure safe operation of the system and prevent personal injury and damage to property.
- Comply with all the safety instructions given in the individual sections of this operating manual.
- The operating manual must be read and understood by the responsible specialist personnel/operators prior to installation and commissioning.
- The contents of this operating manual must be available to the specialist personnel at the site at all times.
- Information and markings attached directly to the product must always be complied with and kept in a perfectly legible condition at all times. This applies to, for example:
  - Markings for connections
  - Name plate
- The operator is responsible for ensuring compliance with all local regulations not taken into account.

### 2.2 Intended use

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

### 2.3 Personnel qualification and training

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

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

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

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

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

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

## 2.5 Safety awareness

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

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

## 2.6 Safety information for the operator/user

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

## 2.7 Safety information for maintenance, inspection and installation

- Modifications or alterations of the pump (set) are only permitted with the manufacturer's prior consent.
- Use only original spare parts or parts/components authorised by the manufacturer. The use of other parts/components can invalidate any liability of the manufacturer for resulting damage.
- The operator ensures that maintenance, inspection and installation are performed by authorised, qualified specialist personnel who are thoroughly familiar with the manual.
- Only carry out work on the pump (set) during standstill of the pump.
- The pump (set) must have cooled down to ambient temperature.
- Pump pressure must have been released and the pump must have been drained.
- When taking the pump set out of service always adhere to the procedure described in the manual.
- Decontaminate pumps which handle fluids posing a health hazard.
- As soon as the work has been completed, re-install and re-activate any safety-relevant devices and protective devices. Before returning the product to service, observe all instructions on commissioning. (⇒ Section 6.1, Page 54)

The motors of the UMA-S 150 and UMA-S 200 type series are fitted with strong permanent magnets at the rotor.


- Observe the following safety instructions when dismantling / reassembling the motor or when storing / transporting the magnet rotor.
  - Users of electronic or magnetisable aids, e.g. pacemakers, hearing aids, implants, etc. must not perform any work in the vicinity of the rotor. Keep a safety distance of at least 0.3 m.
  - Mark the working area with special warnings.
  - Metal tools, keys, jewellery and similar items can be attracted by the magnetic force.
  - Electronic devices and data carriers, such as bank cards, security passes, etc. can become damaged in the vicinity of the magnet rotor.
  - The magnet rotor must only be machined (e.g. turned, milled, ground) by trained specialist personnel.

## 2.8 Unauthorised modes of operation

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

The warranty relating to the operating reliability and safety of the pump (set) supplied is only valid if the equipment is used in accordance with its intended use. (⇒ Section 2.2, Page 9)

## 2.9 Magnet rotor

	<div style="background-color: #e67e22; color: white; padding: 5px;"><b>! DANGER</b></div> <p><b>Strong magnetic field in the area of the magnet rotor of UMA-S 150, UMA-S 200 or UMA-S 250 submersible motors</b></p> <p>Danger of death for persons with pacemaker!</p> <p>Interference with magnetic data carriers, electronic devices, components and instruments!</p> <p>Uncontrolled magnetic attraction forces between magnet-equipped components, tools or similar!</p> <p>▷ Keep a safety distance of at least 0.3 m.</p>
---	---

### Distance to assembled pump sets:


The safety distance refers to magnet-equipped rotors not yet installed in motors as well as to loose magnets.

In installed condition the magnetic field is fully shielded so that an assembled motor / pump set does not pose a hazard as a result of magnetic fields (even to persons with pacemaker), neither during standstill nor during operation.









### 3 Transport/Storage/Disposal

#### 3.1 Checking the condition upon delivery

1. On transfer of goods, check each packaging unit for damage.
2. In the event of in-transit damage, assess the exact damage, document it and notify KSB or the supplying dealer and the insurer about the damage in writing immediately.

	<b>NOTE</b>
The pump set/pump/motor is supplied by the manufacturer/supplier in packaging which largely prevents sagging or other damage during transport and/or storage.	

#### 3.2 Transport

	 <b>DANGER</b>
<b>Improper transport</b>	
Personal injury and damage to property!	
<ul style="list-style-type: none"> <li>▷ Do not use add-on parts, such as dosing equipment, pipelines and centring devices for transport purposes.</li> </ul>	
	 <b>WARNING</b>
<b>Improper transport</b>	
Risk of crushing hands and feet!	
Damage to the pump set!	
<ul style="list-style-type: none"> <li>▷ Always transport the pump set in a horizontal position.</li> <li>▷ Do not use power cables for transport.</li> <li>▷ Gently place the pump set down on a suitable surface.</li> <li>▷ Observe the centre of gravity of the pump set and the weights indicated.</li> </ul>	
	 <b>WARNING</b>
<b>Pump set tilting or rolling off</b>	
Risk of personal injury!	
<ul style="list-style-type: none"> <li>▷ Always secure vertically positioned pump sets against tipping over.</li> <li>▷ Always secure horizontally positioned pump sets against rolling off.</li> </ul>	
	<b>CAUTION</b>
<b>Ambient temperature below the specified minimum</b>	
Danger of frost!	
<ul style="list-style-type: none"> <li>▷ Never subject the pump set to ambient temperatures which are lower than those permitted for the drinking water/antifreeze mixture provided.</li> </ul>	
	<b>NOTE</b>
Take into account the unequal weight distribution between pump and motor.	

**Magnet rotor** Magnet rotors are always stored and transported in non-magnetic, latchable boxes, which are **marked with special safety notices on the outside**. The distance from the magnet rotor to the outside of the box must be equivalent to the safety distance of 0.3 m as a minimum.






### Moving the transport boxes

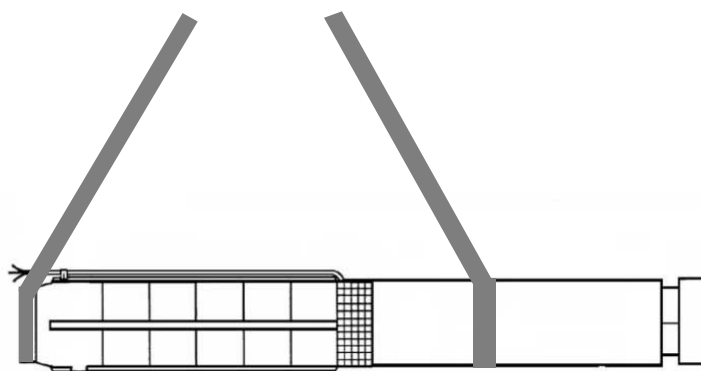
**Transport boxes** The product is supplied in appropriate packaging, e.g. transport boxes, containing either the pump set or the pump and drive as individual components.

1. Use suitable lifting equipment to transport the transport boxes to the place of installation or storage.  
Observe the marking on the long side of the transport boxes. This marking indicates the centre of gravity.

### Unpacking the pump set/pump/motor

	<p><b>! WARNING</b></p> <p><b>Unsecured cable drum</b> Risk of injury!</p> <ul style="list-style-type: none"> <li>▷ Always secure the cable drum against tipping over.</li> <li>▷ Always secure the cable drum against rolling off.</li> </ul>
	<p><b>! WARNING</b></p> <p><b>Laying electric cables at temperatures below zero degrees</b> Damage to the electric cable!</p> <ul style="list-style-type: none"> <li>▷ Observe the minimum permissible temperature at the cable surface of -25 °C for moving cables.</li> <li>▷ Observe the minimum permissible temperature at the cable surface of -40 °C for stationary cables.</li> </ul>
	<p><b>CAUTION</b></p> <p><b>Excessive bending stress on the pump set</b> Damage to the pump set!</p> <ul style="list-style-type: none"> <li>▷ Choose attachment points which prevent excessive bending stress on the pump set.</li> </ul>

**Unpacking** Use suitable lifting equipment for lifting the pump set out of the packaging and for transporting it. (⇒ Section 4.9, Page 24) Use suitable lifting tackle for lifting the pump set out of the packaging and for transporting it, e. g. lifting straps. Attachment points: in the middle of the motor and at the upper end of the pump.







**Fig. 1: Transporting the pump set by crane**


- ✓ Suitable lifting equipment and lifting tackle are available.
  - ✓ The surface on which the pump set is to be positioned is solid and level.
  - ✓ Securing means, e.g. timber wedges, are on hand.
1. Gently place down the transport box.
  2. Open the transport box.
  3. Take out the electric cables (if any) and place them down.

4. Position the lifting tackle to ensure balanced lifting. The centre of gravity of the pump set is in the motor area. Watch any add-on parts, such as piping and electric cables.
5. Lift the pump set out with one or two pieces of lifting equipment, depending on the pump set size. Place the pump set down on a suitable surface.
6. Use appropriate means to secure the pump set against rolling off.

### 3.3 Pulling the pump/motor/pump set upright

	<div style="background-color: #f4a460; padding: 5px;"><b>⚠ WARNING</b></div> <p><b>Incorrect positioning/placing down</b> Personal injury and damage to property!</p> <ul style="list-style-type: none"> <li>▷ Position the pump set vertically with the motor below.</li> <li>▷ Use appropriate means to secure the pump set against tilting and tipping over.</li> <li>▷ Refer to the weights given in the data sheet.</li> </ul>
	<div style="background-color: #f4a460; padding: 5px;"><b>⚠ WARNING</b></div> <p><b>Improper handling when placing the pump set in a vertical/horizontal position</b> Personal injury and damage to property!</p> <ul style="list-style-type: none"> <li>▷ Use one or two pieces of lifting equipment, depending on the pump (set) size.</li> <li>▷ Use appropriate means to secure the pump set against tilting, tipping over or rolling off.</li> <li>▷ Maintain a safe distance during lifting operations (load may swing when being lifted).</li> <li>▷ Use additional supports for the transport holder to secure it against tilting.</li> </ul>
	<div style="background-color: #f4a460; padding: 5px;"><b>⚠ WARNING</b></div> <p><b>Incorrect handling of the power cable</b> Personal injury and damage to property!</p> <ul style="list-style-type: none"> <li>▷ Secure the power cable against falling down.</li> </ul>
	<div style="background-color: #f4d03f; padding: 5px;"><b>CAUTION</b></div> <p><b>Improper storage</b> Damage to the electric cables!</p> <ul style="list-style-type: none"> <li>▷ Observe the minimum bending radius<sup>3)</sup> of the electric cables.</li> <li>▷ Only remove the protective caps from the electric cables at the time of installation.</li> </ul>





<sup>3</sup> Observe the cable manufacturer's documentation, DIN VDE 0298-3 and/or the general arrangement drawing.

	<div style="background-color: #FFD700; padding: 5px;"><b>CAUTION</b></div> <p><b>Excessive bending stress on the pump set</b> Damage to the pump set!</p> <ul style="list-style-type: none"> <li>▷ Choose attachment points which prevent excessive bending stress on the pump set.</li> </ul>
---	--

- ✓ Suitable lifting equipment for the total weight has been selected and is on hand.
1. Fasten to a suitable lifting accessory, e.g. mounting plate.
  2. Attach the lifting equipment, pull the pump/motor/pump set upright, and secure it against tipping over.

### 3.4 Storage/preservation

If commissioning is to take place some time after delivery, we recommend that the following measures be taken:

	<div style="background-color: #FFA500; padding: 5px;"><b>! WARNING</b></div> <p><b>Pump set tilting or rolling off</b> Risk of personal injury!</p> <ul style="list-style-type: none"> <li>▷ Always secure vertically positioned pump sets against tipping over.</li> <li>▷ Always secure horizontally positioned pump sets against rolling off.</li> </ul>
	<div style="background-color: #FFA500; padding: 5px;"><b>! WARNING</b></div> <p><b>Laying electric cables at temperatures below zero degrees</b> Damage to the electric cable!</p> <ul style="list-style-type: none"> <li>▷ Observe the minimum permissible temperature at the cable surface of -25 °C for moving cables.</li> <li>▷ Observe the minimum permissible temperature at the cable surface of -40 °C for stationary cables.</li> </ul>
	<div style="background-color: #FFD700; padding: 5px;"><b>CAUTION</b></div> <p><b>Ambient temperature below the specified minimum</b> Danger of frost!</p> <ul style="list-style-type: none"> <li>▷ Never subject the pump set to ambient temperatures which are lower than those permitted for the drinking water/antifreeze mixture provided.</li> </ul>
	<div style="background-color: #FFD700; padding: 5px;"><b>CAUTION</b></div> <p><b>Improper storage</b> Damage to the electric cables!</p> <ul style="list-style-type: none"> <li>▷ Observe the minimum bending radius<sup>4)</sup> of the electric cables.</li> <li>▷ Only remove the protective caps from the electric cables at the time of installation.</li> </ul>

For temporary storage, store submersible borehole pumps as follows:


1. In the original packaging: in a **horizontal** position
2. Without packaging: in a **vertical** position with the motor below
3. In a dry environment
4. Protected against direct sunlight and heat

<sup>4</sup> Observe the cable manufacturer's documentation, DIN VDE 0298-3 and/or the general arrangement drawing.



5. Protected against dirt and dust
6. Protected against freezing
7. Protected against vermin

For further information on storing the pump set after it has been in use see (⇒ Section 7.5, Page 74) .

### 3.5 Return to supplier

	<div style="background-color: #FFD700; padding: 5px;"><b>CAUTION</b></div> <p><b>Ambient temperature below the specified minimum</b>  <b>Danger of frost!</b></p> <ul style="list-style-type: none"> <li>▷ Never subject the pump set to ambient temperatures which are lower than those permitted for the drinking water/antifreeze mixture provided.</li> </ul>
---	---

1. Clean the pump set properly from the outside.
2. Flush and clean the pump, particularly if it has been used for handling noxious, explosive or other hazardous fluids.
3. If the pump has handled fluids whose residues could lead to corrosion damage in the presence of atmospheric humidity or could ignite upon contact with oxygen also neutralise the pump and blow through with anhydrous inert gas to ensure drying.
4. Always fully complete and enclose a certificate of decontamination when returning the pump (set).  
Indicate any safety measures and decontamination measures taken.  
(⇒ Section 11, Page 94)

 	<div style="background-color: #FF4500; padding: 5px;"><b>⚠ DANGER</b></div> <p><b>Strong magnetic field in the area of the magnet rotor of  UMA-S 150, UMA-S 200 or UMA-S 250 submersible motors</b></p> <p><b>Danger of death for persons with pacemaker!</b>  Interference with magnetic data carriers, electronic devices, components and instruments!  Uncontrolled magnetic attraction forces between magnet-equipped components, tools or similar!</p> <ul style="list-style-type: none"> <li>▷ If the submersible motor is to be returned to the supplier, attach the adhesive safety notice to the submersible motor. The safety notice must be clearly visible.</li> </ul>
--	---

**UMA-S 150, UMA-S 200 or UMA-S 250 motors as well as pump sets containing these motors must be clearly marked to identify the motor as a synchronous motor with permanent magnets.** For this purpose, a "synchronous motor" warning sticker is supplied with the delivery, which must be attached to the motor if it is to be returned to the supplier.



**Fig. 2:** Warning sticker to be attached to the motor if it is to be returned to the supplier.

If the sticker is no longer available, contact your nearest KSB service centre for a replacement.

	<p><b>NOTE</b></p> <p>If required, a blank certificate of decontamination can be downloaded from the following web site: <a href="http://www.ksb.com/certificate_of_decontamination">www.ksb.com/certificate_of_decontamination</a></p>
--	---

### 3.6 Disposal

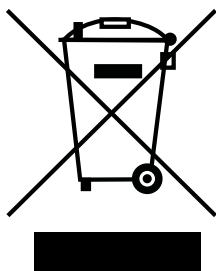
	<p><b>WARNING</b></p> <p><b>Fluids posing a health hazard</b> Hazard to persons and the environment!</p> <ul style="list-style-type: none"> <li>▷ Collect and properly dispose of the flushing liquid and any liquid residues.</li> <li>▷ Wear safety clothing and a protective mask if required.</li> <li>▷ Observe all legal regulations and internal safety information on the disposal of fluids posing a health hazard.</li> </ul>
--	---

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

Electrical or electronic equipment marked with the adjacent symbol must not be disposed of in household waste at the end of its service life.

Contact your local waste disposal partner for returns.

If the used electrical or electronic equipment contains personal data, the operator is responsible for deleting it before the equipment is returned.



## 4 Description of the Pump (Set)

### 4.1 General description

Pump for handling clean or slightly contaminated water.

1. Verify the fluid handled and its contents against the data sheet.

### 4.2 Product information

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

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

#### 4.2.2 Product information as per Regulation No. 547/2012 (for 4" and 6" water pumps) implementing "Ecodesign" Directive 2009/125/EC

- Minimum efficiency index: see name plate, key to name plate  
(⇒ Section 4.5, Page 21)
- The benchmark for the most efficient water pumps is  $MEI \geq 0.70$ .
- Year of construction: see name plate, key to name plate  
(⇒ Section 4.5, Page 21)
- Manufacturer's name or trade mark, commercial registration number and place of manufacture: see data sheet or order documentation
- Product's type and size identifier: see name plate, key to name plate  
(⇒ Section 4.5, Page 21)
- Hydraulic pump efficiency (%) with trimmed impeller: see data sheet
- Pump performance curves, including efficiency characteristics: see documented characteristic curve
- The efficiency of a pump with a trimmed impeller is usually lower than that of a pump with the full impeller diameter. Trimming of the impeller will adapt the pump to a fixed duty point, leading to reduced energy consumption. The minimum efficiency index (MEI) is based on the full impeller diameter.
- Operation of this water pump with variable duty points may be more efficient and economic when controlled, for example, by the use of a variable speed drive that matches the pump duty to the system.
- Information on dismantling, recycling and disposal after decommissioning:  
(⇒ Section 3.6, Page 17)
- Information on benchmark efficiency or benchmark efficiency graph for  $MEI = 0.70$  (0.40) for the pump based on the model shown in the Figure are available at: <http://www.europump.org/efficiencycharts>

### 4.3 Designation

Submersible borehole pump

Example: UPA S 200 - 135 / 04 CC

Table 4: Designation key

Code	Description
UPA S	Pump type series, investment cast variant
200	Nominal size [mm]
135	Flow rate at best efficiency point [m³/h]
04	Number of stages
CC	Material variant
	CC Casing and impeller in stainless steel 1.4408

Submersible motor

Example: UMA 200 - 45 / 2 1 C

Table 5: Designation key

Code	Description
UMA	Motor type series, asynchronous motor
200	Nominal size [mm]
45	Maximum rated power [kW] for 50 Hz
2	Number of poles
1	Winding
	1 J1 (PVC)
C	Material variant
	C Stainless steel 1.4408

Example: UMA-S 150 - 37 / 4 2 C

Table 6: Designation key

Code	Description
UMA-S	Motor type series, synchronous motor
150	Nominal size [mm]
37	Maximum rated power [kW] for 100 Hz
4	Number of poles
2	Winding
	2 J2 (VPE)
C	Material variant
	C Stainless steel 1.4571

Example: 14D 270 3 / 4

Table 7: Designation key

Code	Description
14	Nominal size [inch]
D	Product generation
270	Maximum rated power [kW] for 50 Hz
3	Number of phases
4	Number of poles

### 4.3.1 Designation used for pump sets with VdS certification

#### Submersible borehole pump

Example: UPA 250C - 150 / 1a

**Table 8:** Designation key

Code	Description
UPA	Type series
250	Minimum well diameter [mm]
C	Design status
150	Flow rate at best efficiency point [m <sup>3</sup> /h]
1	Number of stages
a	Trimmed impellers

#### Submersible motor

Example: UMA 150E - 26 / 21

**Table 9:** Designation key

Code	Description
UMA	Motor type series
150	Nominal size [mm]
E	Product generation
26	Maximum rated power [kW]
2	Number of poles
1	Winding insulation

### 4.4 VdS approval numbers

The following pump sets have been approved by the VdS<sup>5)</sup>:

**Table 10:** Selection table

Pump designation	VdS approval number
UPA 250C - 150	P 4020008
UPA 300 - 65	P 4850440
UPA 300 - 94	P 4020009
UPA 350 - 128	P 4910453

Lift check valve PN 25 without VdS approval

<sup>5</sup> VdS Schadenverhütung GmbH [German association of property insurance companies]



### 4.5 Name plate

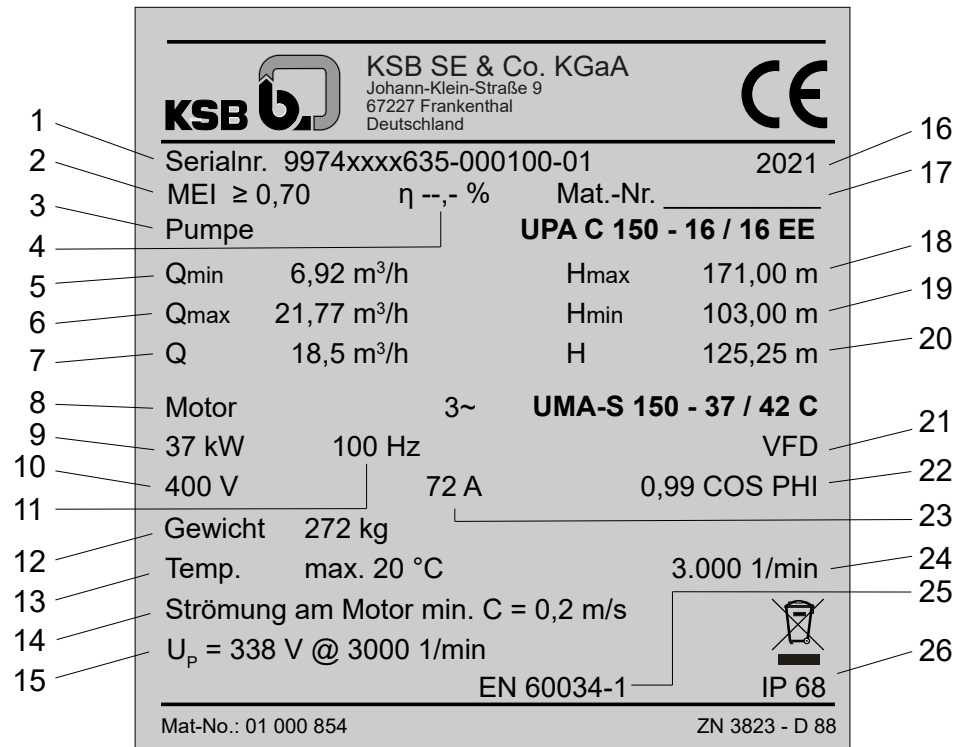


Fig. 3: Name plate (example)

1	Order number	2	Minimum efficiency index
3	Pump designation	4	Efficiency (see data sheet)
5	Minimum flow rate	6	Maximum flow rate
7	Flow rate at duty point	8	Motor designation
9	Rated power	10	Voltage
11	Frequency	12	Weight
13	Maximum fluid temperature	14	Minimum available flow velocity past the motor
15	Magnet wheel voltage <sup>6)</sup>	16	Year of construction
17	Material number	18	Maximum head
19	Minimum head	20	Head at duty point
21	Configuration / starting method of the motor	22	Power factor
23	Current	24	Speed
25	VDE standard	26	Motor enclosure

<sup>6)</sup> Only for UMA-S 150, UMA-S 200 submersible motors

## Name plate for pumps in VdS-approved sprinkler installations

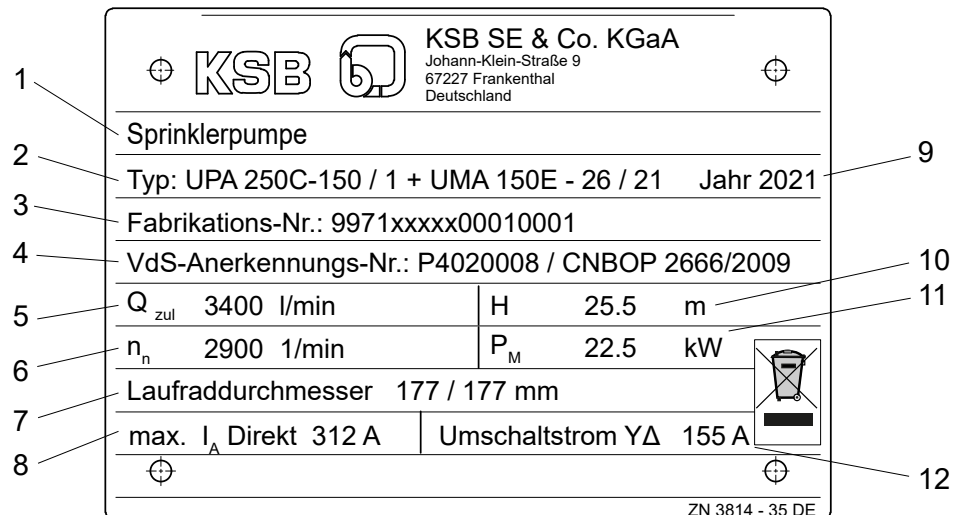


Fig. 4: Name plate for pump set in sprinkler installations (example)

1	KSB code	2	Type series, size
3	KSB order number and order item number	4	VdS approval number
5	VdS-approved flow rate	6	Nominal speed
7	Nominal impeller diameter [mm]	8	Maximum starting current
9	Year of construction	10	VdS-approved head
11	Required motor rating at 15 m NPSH	12	Switching current

## 4.6 Design details

## Design

- Centrifugal pump
- Single-stage or multistage
- Radial or mixed flow versions
- Single-suction
- Ring-section design
- Rigid connection between pump and motor

## Connections

- Pump screw-ended or flanged
- With lift check valve or connection nozzle

## Impeller type

- Mixed flow hydraulic system with trimmable impellers

## Type of installation

- Vertical installation
- Horizontal installation (depending on the number of stages)

## Drive

- Three-phase asynchronous motor

or

- Interior (buried) permanent magnet synchronous motor (IPMSM)
- Motor shaft<sup>7)</sup> protected by sealed sleeve coupling

#### Shaft seal

- Mechanical seal

#### Bearings

- Radial plain bearings
- Pump bearings lubricated by fluid handled; motor bearings lubricated by water fill
- Axial thrust is balanced by a tilting-pad thrust bearing in the motor (lower end)

### 4.7 Configuration and function

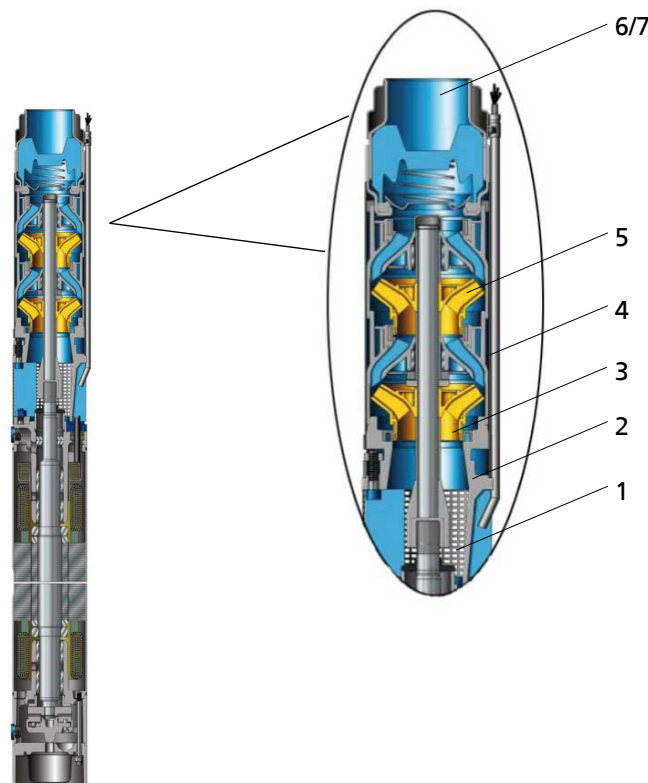


Fig. 5: Sectional drawing, example of a UPA 200

**Design** Pump and motor are connected by a rigid coupling. The stage casings are connected by means of studs. A suction strainer at the suction casing protects the pump from coarse particles in the fluid. The pump set is connected to the piping via a lift check valve or connection nozzle with either internal thread or flanged end (optional).

**Function** The fluid flows along the motor and enters the suction casing (2) through the suction strainer (1). It is accelerated outward by the suction stage impeller (3). In the flow passage of the stage casing (4) the kinetic energy of the fluid is converted into pressure energy, and the fluid is routed to the next impeller (5). This process is repeated in all stages until the fluid has passed the last impeller (5). It is then guided through the integrated lift check valve (6) to the connection nozzle (7), where it leaves the pump. The integrated lift check valve prevents uncontrolled backflow of the fluid.

<sup>7)</sup> Only for 14D motor

### 4.8 Scope of supply

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

- Pump set with motor lead

Optional:

- Pump and/or motor as individual units
- Power cable
  - Connected or supplied but not fitted
- Equipment for filling the motor <sup>8)</sup>
- Separate name plate
- Separate warning sticker <sup>9)</sup> (⇒ Section 3.5, Page 16)

Optional accessories:

- Cable connector
- Cable clips
- Cooling shroud, suction shroud or pressure shroud
- Pedestals
- Electrical protection equipment
- Automatic control units



#### NOTE

A separate name plate is included in the scope of supply.  
This name plate must be attached in a clearly visible position outside the place of installation, e.g. at the control panel, pipeline or mounting bracket.

### 4.9 Dimensions and weights











For dimensions and weights refer to the data sheet of the pump (set).

<sup>8</sup> Only for UMA 300, 14D submersible motors





<sup>9</sup> Only for UMA-S 150, UMA-S 200, UMA-S 250 submersible motors

## 5 Installation at Site

### 5.1 General information/Safety regulations

	<div data-bbox="507 315 683 360">  <b>DANGER</b> </div> <p><b>Using damaged cables in a well</b> Electric shock!</p> <ul style="list-style-type: none"> <li>▷ Do not kink the electric cable.</li> <li>▷ Observe the minimum bending radius<sup>10)</sup> of the electric cable. Do not drag the cable over sharp edges.</li> <li>▷ Use cable ties or other suitable fasteners to fasten the electric cables to the riser or piping every 3 m.</li> <li>▷ Do not use any tools, equipment or accessories with sharp edges (e.g. sharp-edged pipe sockets) for installation.</li> </ul>
	<div data-bbox="507 734 703 779">  <b>WARNING</b> </div> <p><b>Pump set falling into the well</b> Risk of injury from uncontrolled movements of electric cables! Damage to the pump set and the well!</p> <ul style="list-style-type: none"> <li>▷ Store electric cables safely. Keep at a safe distance during installation.</li> <li>▷ Secure the pump set during the entire installation procedure.</li> <li>▷ Dimension any securing devices (supporting clamps, supports, etc.) so that they can carry all weights during the installation.</li> </ul>
	<div data-bbox="507 1088 703 1133">  <b>WARNING</b> </div> <p><b>Persons could fall into unsecured wells/reservoirs/tanks</b> Risk of personal injury!</p> <ul style="list-style-type: none"> <li>▷ During installation work, take suitable precautions to protect anyone from falling into an open well/reservoir/tank.</li> <li>▷ Suitably fence off the work area.</li> </ul>
	<div data-bbox="507 1368 703 1413">  <b>WARNING</b> </div> <p><b>Improper handling when placing the pump set in a vertical/horizontal position</b> Personal injury and damage to property!</p> <ul style="list-style-type: none"> <li>▷ Use one or two pieces of lifting equipment, depending on the pump (set) size.</li> <li>▷ Use appropriate means to secure the pump set against tilting, tipping over or rolling off.</li> <li>▷ Maintain a safe distance during lifting operations (load may swing when being lifted).</li> <li>▷ Use additional supports for the transport holder to secure it against tilting.</li> </ul>
	<div data-bbox="507 1756 703 1800">  <b>WARNING</b> </div> <p><b>Incorrect handling of the power cable</b> Personal injury and damage to property!</p> <ul style="list-style-type: none"> <li>▷ Secure the power cable against falling down.</li> </ul>

<sup>10)</sup> Observe the cable manufacturer's documentation, DIN VDE 0298-3 and/or the general arrangement drawing.

	<div style="background-color: #f4a460; padding: 5px;"><b>⚠ WARNING</b></div> <p><b>Laying electric cables at temperatures below zero degrees</b></p> <p>Damage to the electric cable!</p> <ul style="list-style-type: none"> <li>▷ Observe the minimum permissible temperature at the cable surface of -25 °C for moving cables.</li> <li>▷ Observe the minimum permissible temperature at the cable surface of -40 °C for stationary cables.</li> </ul>
	<div style="background-color: #0072bc; color: white; padding: 5px;"><b>NOTE</b></div> <p>Do not expose the electric cable to direct sunlight.</p>
	<div style="background-color: #0072bc; color: white; padding: 5px;"><b>NOTE</b></div> <p>A separate name plate is included in the scope of supply. This name plate must be attached in a clearly visible position outside the place of installation, e.g. at the control panel, pipeline or mounting bracket.</p>
	<div style="background-color: #0072bc; color: white; padding: 5px;"><b>NOTE</b></div> <p>The motor lead is selected for submerged operation and must be completely submerged, including the cable connector. See order documentation for any other use! For pump sets installed in VdS-approved sprinkler installations always refer to and observe the applicable requirements stipulated by VdS (German association of property insurance companies). In accordance with VdS 2025, the cable must be laid in such a way that it is protected against short circuit and earth fault.</p>

## 5.2 Preparing the installation

### 5.2.1 Checking the installation conditions


Prior to starting with the installation, check compliance with the particular framework conditions required for a trouble-free operation of the submersible borehole pump. To do so, verify the order data or delivery data against the constructional plans, the operating conditions and the operating limits of the pump set.

1. Has this pump set been ordered for this particular installation position?  
(⇒ Section 5.2.2, Page 27)
2. Does the material variant of the pump set match the operating conditions?
3. Is appropriate flow along the motor provided? (⇒ Section 6.2.4.6, Page 60)
4. Can the required minimum submergence be ensured during operation?  
(⇒ Section 6.2.4.2, Page 57)
5. Is the sand content of the fluid to be handled below the specified maximum?  
(⇒ Section 6.2.4.4, Page 60)
6. Is the temperature of the fluid to be handled below the specified maximum?  
(⇒ Section 6.2.4.5, Page 60)
7. If fluids liable to form deposits are handled, is temperature monitoring provided?  
(⇒ Section 5.7.2, Page 52)
8. Will the motor lead and the cable connector be completely immersed in the fluid to be handled? (⇒ Section 5.2.7, Page 31)

### General information on the system design

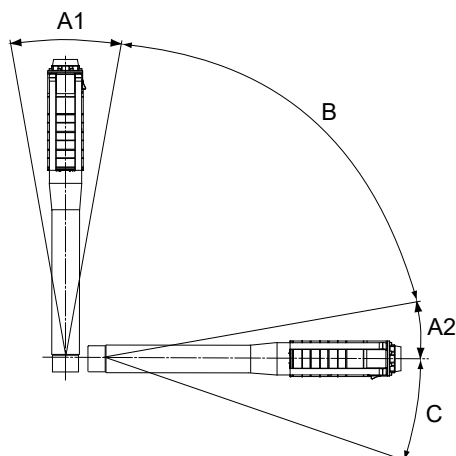
<b>Well head</b>	<ul style="list-style-type: none"> <li>Design and dimension the suspension arrangement of the pump set so that all static and dynamic forces can be absorbed.</li> <li>Fasten the supporting clamps or supporting flanges at the well head so that they cannot shift or lift off the well head.</li> <li>Make sure not to damage existing sealing surfaces.</li> <li>Position the well head in such a way that the pump set is suspended in a perfectly vertical position.</li> </ul>
<b>Vibrations</b>	<ul style="list-style-type: none"> <li>System-induced vibrations must not be transmitted to the pump set.</li> <li>The system must be designed in such a way that vibrations are not amplified. Abrupt pressure equalisation processes (pressure surges), in particular, present a hazard for the pump set. Take suitable precautions (e.g. fit expansion joints, air vessels).</li> </ul>
<b>Sand deposits</b>	<ul style="list-style-type: none"> <li>Do not install the pump set with the suction strainer exactly at the level of the well screen/filter.</li> <li>Excessive flow in the area of the well screen/filter entails the risk of large amounts of entrained sand causing excessive wear in the pump.</li> </ul>
<b>Narrowing</b>	<ul style="list-style-type: none"> <li>Verify the well dimensions.</li> </ul>
<b>Installation conditions</b>	<p>Pump sets which are to be installed in a pump sump are always designed with a suction shroud or cooling shroud.</p> <ul style="list-style-type: none"> <li>The pump set must not sit on the base of the well.</li> <li>The pump set must not touch the walls of the well or tank. Use a centring device.</li> <li>Prevent adjacent pump sets from influencing each other.</li> <li>Provide an even approach flow in the suction area and do not obstruct it with any structural components or installations.</li> <li>Air intake from an inlet arranged above the fluid level is not permitted.</li> </ul>

### 5.2.2 Checking the installation position

	<b>! WARNING</b>
	<p><b>Impermissible installation position</b></p> <p>Damage to the machine! Damage to the bearings!</p> <ul style="list-style-type: none"> <li>For angled installation, always install the pump set with a rising slope towards the discharge side.</li> </ul>

Submersible borehole pumps can be installed in a vertical or, depending on the number of stages, also in an angled or horizontal position.



- Never install horizontally a pump set which has been selected for vertical installation.
- Never install the pump set with the pump at the lowest point.



**Fig. 6:** Checking the installation position

A1	Permissible up to maximum 3°	Installing the pump set in a vertical position (⇒ Section 5.3, Page 34)
A2	Permissible up to maximum 3°	Installing the pump set in a horizontal position (⇒ Section 5.4, Page 38)
B	Permissible installation position, <b>if approved</b> in the order documentation	
C	Not permitted	The pump set must not be installed in this position.

### 5.2.3 Checking the motor fill

	<b>CAUTION</b>
	<b>Unfilled or insufficiently filled motor</b> Damage to the motor winding! ▷ Never install and run the motor without sufficient motor fill. ▷ Observe the information sticker on the motors and top up the motor fill as instructed.
	<b>CAUTION</b>
	<b>Freezing of motor fill</b> Damage to the motor! ▷ Always protect motors filled with water against frost. ▷ Provide frost-proof storage.

#### Information sticker / motor fill

Submersible motors are filled with a liquid based on drinking water. A distinction is made between filled and unfilled motors, marked by a colour-coded information sticker attached to the motor.

Motors which are supplied filled with a mixture of drinking water / antifreeze agent must not be filled with pure drinking water at a later stage without prior consultation with the manufacturer.

**Table 11:** Motor fill details

Motor type series	Supplied condition	Information sticker	Motor fill check required	See Section
DN 100	Filled	-	Not required	(⇒ Section 7.4.1, Page 68)
UMA 150	Filled	-	Required if the motor has been stored or out of service for more than 1 year	(⇒ Section 7.4.2, Page 68)



Motor type series	Supplied condition	Information sticker	Motor fill check required	See Section
UMA-S 150	Filled	-	Required if the motor has been stored or out of service for more than 1 year	(⇒ Section 7.4.2, Page 68)
UMA 200	Filled	-	Required if the motor has been stored or out of service for more than 1 year	(⇒ Section 7.4.2, Page 68)
UMA-S 200	Filled	-	Required if the motor has been stored or out of service for more than 1 year	(⇒ Section 7.4.2, Page 68)
UMA 250	Filled	-	Required if the motor has been stored or out of service for more than 1 year	(⇒ Section 7.4.2, Page 68)
UMA-S 250	Filled	-	Required if the motor has been stored or out of service for more than 1 year	(⇒ Section 7.4.2, Page 68)
UMA 300	Filled	Green information sticker	Required	(⇒ Section 7.4.3, Page 72)
	Unfilled	Red information sticker		
14D	Filled	Green information sticker	Required	(⇒ Section 7.4.3, Page 72)
	Unfilled	Red information sticker		

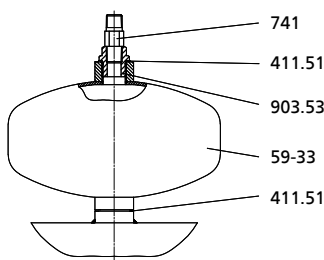


#### NOTE

The loss of a few drops of liquid fill will not impair the motor function. If any larger amounts of leakage are suspected, the motor fill must definitely be checked.

#### 5.2.4 Installing water storage tanks




If the pump set is intended for horizontal installation, submersible motors UMA 300 or 14D require a water reservoir.



**Fig. 7:** Installing water storage tanks

- ✓ The motor has been placed down in a horizontal position on a level and solid surface. It has been secured against rolling off.
  - ✓ Position the motor with the connections for the water storage tanks at the highest point.
  - ✓ The water storage tanks are on hand.
  - ✓ The motor fill has been checked with the motor in a vertical position.
  - ✓ Suitable liquid for topping up the motor fill has been prepared.
1. Remove the screw plugs from the top and bottom of the stator case. Remove the joint rings.
  2. Insert the water storage tanks (59-33) with new joint rings (411.51) into the stator and screw them in tightly.
  3. Fill the water storage tanks with the specified liquid fill until they overflow.
  4. Close both water storage tanks with a screw plug with integrated vent valve (741) and joint ring (411.51).

### 5.2.5 Preventing backflow

	<div style="background-color: #f4a460; padding: 5px;"><b>⚠ DANGER</b></div> <p><b>Uncontrolled backflow of the fluid handled turning the magnet rotor in the UMA-S 150, UMA-S 200 and UMA-S 250 submersible motor</b></p> <p>The rotating permanent magnet rotor may generate an electric current at the motor lead ends!</p> <p>Danger of death from electric shock!</p> <ul style="list-style-type: none"> <li>▷ Take suitable precautions to prevent any inadvertent rotation caused by uncontrolled backflow of the fluid handled.</li> <li>▷ Make sure the motor cannot be rotated inadvertently.</li> <li>▷ Observe the safety regulations that apply to work involving electrical hazards. Verify that the equipment is de-energised.</li> </ul>
	<div style="background-color: #f4a460; padding: 5px;"><b>⚠ DANGER</b></div> <p><b>Electrical equipment overloaded by uncontrolled rotation of the magnet rotor of a UMA-S 150, UMA-S 200 or UMA-S 250 submersible motor</b></p> <p>Danger of death from electric shock!</p> <ul style="list-style-type: none"> <li>▷ Take suitable precautions to prevent any inadvertent motor rotation caused by uncontrolled backflow of the fluid handled.</li> <li>▷ As an option, provide electrical protection devices between the motor and the frequency inverter, such as fuses or circuit breakers.</li> </ul>
	<div style="background-color: #fde725; padding: 5px;"><b>CAUTION</b></div> <p><b>Uncontrolled backflow of the fluid from the riser</b></p> <p>Damage to the pump set!</p> <ul style="list-style-type: none"> <li>▷ Prevent any <b>uncontrolled</b> backflow of the fluid handled with suitable means.</li> <li>▷ Make sure that backflow of the fluid handled is <b>slow</b> and <b>controlled</b>, so that the pump rotor does not start to rotate, e.g. by throttling the discharge-side gate valve accordingly.</li> </ul>

The submersible borehole pumps generally feature an integrated lift check valve. On pump sets **without** lift check valve the operator must prevent any uncontrolled backflow of the fluid, e.g. by structural means. Otherwise the pump could be operated in the wrong direction of rotation and critical speeds could be exceeded.

If backflow rotates submersible motors of the UMA-S 150, UMA-S 200 or UMA-S 250 type series, a hazardous voltage will occur at the motor lead ends.

If the submersible motor is connected to the power supply, excessive induction voltage can lead to overloading (short circuit) of the electrical equipment. This must be prevented at all times. Provide electrical protection devices as an option.

### 5.2.6 Calculating the total weight

One or several pieces of suitable lifting equipment, e.g. tripod or crane, are required for installing and removing submersible borehole pumps.

The load-carrying capacity of the lifting equipment must be larger than the weight of the pump set + riser<sup>11)</sup> + water column<sup>12)</sup> in the riser + power cable + holders.

For the weights see the other applicable documentation and the following table.





<sup>11)</sup> See product literature of the riser used.

<sup>12)</sup> Applies to pumps with lift check valve if no other measures to drain the riser have been taken.

Table 12: Weight of the water column per 1 metre of the riser

	Pipe diameter [mm] Pipe diameter [inch]									
	50 2"	80 3"	100 4"	125 5"	150 6"	200 8"	250 10"	300 --	350 --	400 --
Weight [kg]	2	5	8	12	18	32	49	72	98	125

## 5.2.7 Electric wiring

	<p><b>⚠ DANGER</b></p> <p><b>Unqualified personnel connecting extension cables</b> Installation in a well - electric shock!</p> <ul style="list-style-type: none"> <li>▷ The extension cable must be connected by a professional electrician only.</li> <li>▷ The cable ends must be dry and clean.</li> </ul>
	<p><b>⚠ DANGER</b></p> <p><b>Freely accessible motor lead ends</b> Danger of death from electric shock!</p> <ul style="list-style-type: none"> <li>▷ In the case of UMA-S 150, UMA-S 200 and UMA-S 250 submersible motors, the motor lead ends are electrically connected together at the time of supply.</li> <li>▷ This is a protective measure to prevent touch voltage if the motor is rotated inadvertently. If an extension cable is connected, transfer this protection to the extension cable.</li> </ul>
	<p><b>⚠ DANGER</b></p> <p><b>Earth conductor not properly connected</b> Danger of death from electric shock!</p> <ul style="list-style-type: none"> <li>▷ Never operate the motor without earth conductor.</li> <li>▷ The earth conductor must be connected by a professional electrician only.</li> </ul>
	<p><b>NOTE</b></p> <p>The motor lead is selected for submerged operation and must be completely submerged, including the cable connector. See order documentation for any other use! For pump sets installed in VdS-approved sprinkler installations always refer to and observe the applicable requirements stipulated by VdS (German association of property insurance companies). In accordance with VdS 2025, the cable must be laid in such a way that it is protected against short circuit and earth fault.</p>

Submersible motors are supplied fitted with a motor lead. The motor lead has been extended with a suitably sized extension cable to meet the length required for the specific installation. Unless otherwise indicated, the motor lead is designed for submerged operation in water only. To meet this condition the cable connector must be completely submerged.

**Extension cables connected by KSB**

If agreed with KSB, the extension cable is supplied connected to the motor lead with a water-proof cable connector.

- Unless otherwise specified in the order documentation, KSB's **extension cables** are designed for:
  - Being laid freely exposed to air and in contact with surfaces
  - A voltage drop along the electric cable of  $\Delta V \leq 3 \%$

For any other ways of laying electric cables, e.g. in cable ducts, observe the information on the maximum current-carrying capacity as per the applicable directives.

**Extension cables connected by the operator**

	<p><b>NOTE</b></p> <p><b>For pump sets in VdS-approved sprinkler installations</b> For pump sets in VdS-approved sprinkler installations, also observe VdS guideline VdS CEA 4001!</p>
---	--

If the supplied extension cables are to be connected at the site, observe the following:



1. Observe the installation instructions of the cable connector to be used.
2. Make sure the extension cable is selected and dimensioned for a maximum voltage drop of  $\leq 3\%$ . The extension cable has to be approved for the applicable operating conditions.
3. In 4-core motor leads the earth conductor is part of the electric cable and must also be connected in the cable connector when connecting an extension cable.
4. 3-core motor leads do not include an earth conductor. A separate earth conductor is connected on the outside of the motor. Extend and connect the earth conductor separately. If no earth conductor is provided, the operator shall be responsible for earthing the motor externally. (Core cross-section corresponding to line conductor, min. 4 mm<sup>2</sup>)
5. Connect the shield of shielded extension cables to the earth conductor. 3-core motor leads as described in paragraph 4 must be earthed externally; connect the shield of the extension cable to the earth conductor.
6. Transfer the core identification of the motor lead to the cores of the extension cable. Make sure the colour codes match when connecting the cables.

The core codes depend on the wiring type of the motor:

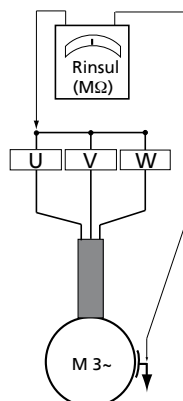
**Table 13: Core codes**

<b>Motors for DOL starting with 1 electric cable</b>					
U	V	W	-	-	-
<b>Motors for star-delta starting with 2 electric cables</b>					
U 1	V 1	W 1	U 2	V 2	W 2
<b>Motors for DOL starting with 2 parallel electric cables</b>					
U1 - 1	V1 - 1	W1 - 1	U1 - 2	V1 - 2	W1 - 2

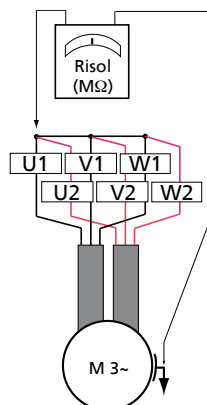
### 5.2.8 Measuring the insulation resistance

	<div style="background-color: #f4a460; padding: 5px; border: 1px solid black; margin-bottom: 5px;">  <b>DANGER</b> </div> <p><b>Hazardous voltage during and after measurement</b></p> <p>Danger of death from electric shock!</p> <ul style="list-style-type: none"> <li>▷ Do not touch the contact points during and immediately after measurement.</li> <li>▷ Insulation resistance measurement must be effected by a trained electrician only.</li> </ul>
---	--

1. Measure the insulation resistance prior to installation and prior to connection to the power supply.
  2. Insulation resistance measurement must be effected by a trained electrician only.
  3. Prior to the measurement, ensure compliance with the operating manual of the insulation resistance measuring device.
    - ✓ An insulation resistance measuring device with a measuring voltage of 1000 V DC is available.
    - ✓ The contact points are clean and dry.
1. Measurement period: 1 minute<sup>13)</sup>
  2. Recommendation: insulation resistance at 20 °C - 30 °C: > 200 MOhm<sup>14)</sup>



**Fig. 8:** Insulation resistance measurement, 1 power cable



**Fig. 9:** Insulation resistance measurement, 2 power cables (open)

<sup>13</sup> The measured value must be steady. A longer measurement period might be needed for larger cable cross-sections.

<sup>14</sup> The insulation resistance depends on the cable type and cable length.

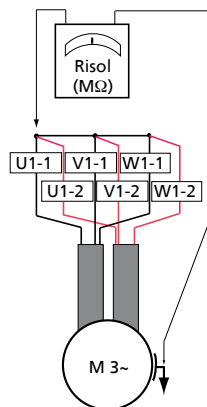


Fig. 10: Insulation resistance measurement, 2 power cables (parallel)

### 5.3 Installing the pump set in a vertical position

#### General information on lowering the pump set into the well

Suspend the submersible borehole pump from a riser to transport it to its actual place of installation/operation.

The riser can differ in design and material. Consequentially, the installation and application options also differ. Always observe the installation instructions of the respective riser when installing a submersible borehole pump.

The riser always has to be designed for the maximum forces, torques and pressures in the system.

Table 14: Special features

Type of riser	Comments
Flanged riser	Use a riser with a recess in the flanges for the power cables.
Threaded riser	Fit an anti-rotation device to prevent the pump set from unscrewing itself from the threaded riser during start-up.
Riser hose	Especially observe the information on routing the power cable provided in the installation instructions of the riser.  Any deformation of the riser hose could lead to small, light pump sets not being installed vertically and centred in the well. Take appropriate measures to ensure the correct installation position of the pump set.

#### General information on lowering the pump set into the well

- Fitting a centring device is recommended to prevent the pump set and the walls of the well from any damage during installation.
- Fit cable ties every 3 m to protect the electric cable against any damage. Cable ties are suitable for metal risers and thick-walled plastic risers. On all other riser types, the electric cable also has to be secured every 3 m.  
(⇒ Section 5.3.1, Page 36)
- Tighten the cable ties firmly to prevent the electric cable from slipping downwards by its own weight! Otherwise, the electric cable could be affected by impermissibly high tensile stress.

	<b>DANGER</b>
	<b>Installing pipe sections of extensive length</b> Risk of injury by falling components! Impermissible bending of the pump set when pulling it upright! ▷ The length of the first pipe section must not exceed 2 m.

### Installation example with a metal riser (pipes)

- ✓ The safety regulations have been observed. (⇒ Section 5.1, Page 25)
  - ✓ Suitable lifting equipment for the total weight has been selected and is on hand. (⇒ Section 5.2.6, Page 30)
  - ✓ The motor fill has been checked and topped up if required.
  - ✓ Extension cables have been properly connected to the power cable, measuring cable and control cable.
  - ✓ The pump set has been placed in a horizontal position in a level assembly area and is protected against rolling off.
  - ✓ Cable ties to securely fasten the power cable, measuring cable and control cable are available.
  - ✓ A sealing agent is available.
  - ✓ A mounting plate, pairs of supporting clamps and beams have been selected for the total weight (⇒ Section 5.2.6, Page 30) and are on hand.
  - ✓ Risers with recesses in the flanges<sup>15)</sup> are available.
1. **For flanged risers:**  
Bolt the first pipe section (max. length 2 m) to the connection nozzle. Fasten the mounting plate to this pipe section.
  2. Fasten the first pair of supporting clamps below the upper flange.



#### NOTE

On threaded risers fit an anti-rotation device to prevent the pump set from unscrewing itself from the threaded riser during start-up.

1. **For threaded risers:**  
Screw the first pipe section (max. length 2 m) with sealing agent applied into the connection nozzle. In addition, secure it with the two locking screws supplied. For this purpose, drill a shallow hole into the threaded end of the pipe section, taking care not to drill through the threaded end. Insert the locking screws with thread-locking compound in such a way that their tips rest lightly but do not press on the threaded pipe end. Allow time for the sealing agent to cure. The connection is now sufficiently secured against loosening.
2. Use cable ties to attach the power supply cable as well as any control and measuring cables to the riser approximately 0.5 m above the lower flange. (⇒ Section 5.3.1, Page 36)
3. Place two sturdy beams across the well opening.
4. Pull the pump set into upright position with the lifting equipment.
5. Attach the pump set to the crane hook (e.g. mobile crane) by the mounting plate and lower it into the well until the first pair of supporting clamps rests on the beams.
6. Remove the mounting plate and fasten it to the second riser.
7. Fasten the second pair of supporting clamps to the second riser.
8. Use the lifting equipment to lower the second riser onto the first riser, and install it.
9. Undo the first pair of supporting clamps and lower the pump set until the second pair of supporting clamps rests on the sturdy beams.
10. Repeat these steps for every pipe section, lowering the pump set into the well until the installation depth  $H_e$  is reached.

<sup>15)</sup> Applies to flanged risers only

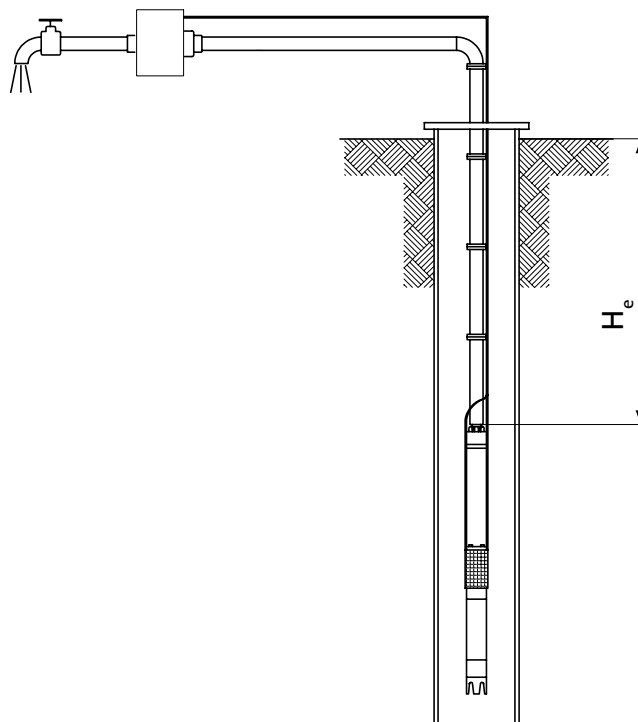



Fig. 11: Installation depth  $H_e$

### 5.3.1 Attaching the cable ties

	CAUTION
	<p><b>Increased voltage drop along the lead</b>  <b>Damage to the motor!</b></p> <ul style="list-style-type: none"> <li>▸ On motors with individual cables, the cables are arranged symmetrically in groups.</li> </ul>

Fasten power cables to the riser with a cable tie each on both sides of the riser flange or socket. In the case of individual cables fasten the cables in groups. Attach a cable tie every 3 metres. Implement this arrangement over the entire length of the riser.

On motors with individual cables, lay the cables symmetrically. Arrange the cables in groups along the riser with the cables as close to each other as possible. If there are 2 groups, offset them by 90° or 180°.

- Group 1: U1-1, V1-1, W1-1 or U1, V1, W1
- Group 2: U1-2, V1-2, W1-2 or U2, V2, W2



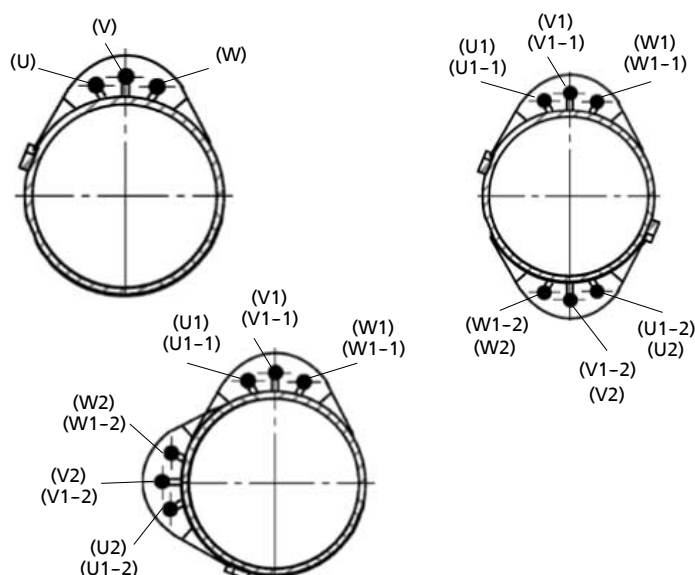


Fig. 12: Arrangement of 3 or 6 individual cables at the riser

### 5.3.1.1 Cable tie size 1 (rubber)

This cable tie (rubber strap + plastic studs) can be used for the following cables:

- flat, 3 and 4 cores, 1.5 mm<sup>2</sup> to 6 mm<sup>2</sup>
- round, 4 cores, 1.5 mm<sup>2</sup> to 6 mm<sup>2</sup>

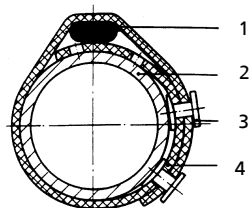


Fig. 13: Cable tie size 1

1	Power cable	2	Riser
3	Plastic stud	4	Rubber strap

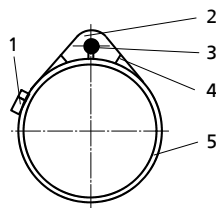
1. Cut the rubber strap (4) to size for the corresponding diameter of the riser (2) as indicated in the table below. Cut the strap half way between two holes.
2. Place one plastic stud (3) each into the third and fourth hole. Then wrap the rubber strap (4) around the riser (2) with one end beneath the power cable (1)
3. Wrap the other end around the riser (2) and the power cable and fasten it with the stud. Tighten the rubber strap (4) firmly to ensure that the power cable (1) cannot slip downwards by its own weight!

Table 15: Length of the rubber strap

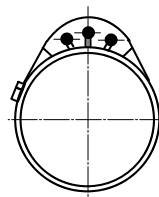
DN (mm)	50	80	100	125	150
R (inch)	2	3	4	5	6
L (mm)	320	400	450	500	600

### 5.3.1.2 Cable tie sizes 2 to 11 (metal)

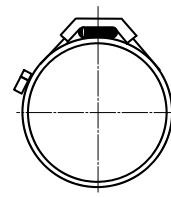
This type of cable tie (metal + rubber cable guard) is used for cables of large cross-section.



Sizes 2, 3, 3a, 3b, 4



Sizes 6 to 9



Size 11

- 1 = turnbuckle (reusable)  
2 = cable guard  
3 = power cable  
4 = metal strap  
5 = riser

1. Cut the metal strap (4) to size (length  $L$  = circumference of riser + approx. 200 mm allowance) and bend approximately 100 mm of both strap ends inwards.
2. Fully open the turnbuckle (1) and attach it to one end of the metal strap (4).
3. Place the cable guard (2) around the power cable (3). Place it around the riser (5) together with the metal strap (4). Then attach the other end of the turnbuckle (1) to the metal strap (4).
4. Tighten the turnbuckle (1) with a screwdriver so that the power cable (3) cannot slip downwards by its own weight!

#### 5.4 Installing the pump set in a horizontal position

	<div style="background-color: #f4a460; padding: 5px;"><b>! WARNING</b></div> <p><b>Installation on a mounting surface which is unsecured and cannot support the load</b> Personal injury and damage to property!</p> <ul style="list-style-type: none"> <li>▷ Use a concrete of compressive strength class C12/15 which meets the requirements of exposure class XS1 to EN 206.</li> <li>▷ The mounting surface must be set, even, and level.</li> <li>▷ Observe the weights indicated.</li> </ul>
	<div style="background-color: #f4d03f; padding: 5px;"><b>CAUTION</b></div> <p><b>Temperature and pressure increase of the motor fill</b> Damage to the motor!</p> <ul style="list-style-type: none"> <li>▷ Always protect non-flooded pump sets against direct exposure to sun.</li> </ul>
	<div style="background-color: #2980b9; color: white; padding: 5px;"><b>NOTE</b></div> <p>Only install the pump set in a horizontal position if it has been explicitly approved for this type of installation.</p>


A submersible borehole pump can be installed in a horizontal position, provided the pump set is designed for this type of installation. See order documentation.

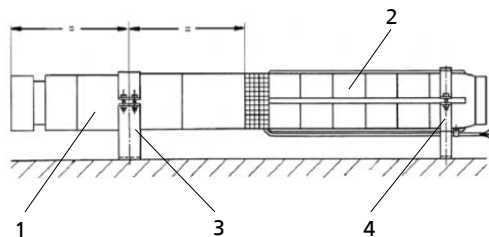
The required accessories depend on the weight and the overall length of the pump set.

- If agreed with KSB, the pump set is supplied with the accessories for the required installation type already fitted.
- Using original accessories (pedestal, supporting frame, pressure shroud) is imperative for assembly at the site.

### 5.4.1 Mounting the pump set on pedestals

Applicable to pump sets with the following motors: DN 100, UMA 150, UMA-S 150, UMA 200, UMA-S 200, UMA 250, UMA-S 250

	<b>CAUTION</b>
	<p><b>Incorrect position of the pedestals</b> Bending or deformation of the pump set!</p> <p>▷ Observe the following positions of the pedestals:  <b>Pedestal for the motor:</b> middle of the motor  <b>Pedestal for the pump:</b> last stage or lift check valve / connection nozzle.</p>




**Fig. 14:** Mounting the pump set on pedestals (example)


1	Motor	2	Pump
3	Motor pedestal	4	Pump pedestal

The required foundation bolts (M12 × 200) shall be provided by the operator.

- ✓ The safety regulations have been observed. (⇒ Section 5.1, Page 25)
  - ✓ The structural dimensions have been verified.
  - ✓ The motor fill has been checked and topped up if required.
  - ✓ Extension cables have been connected to the power cable, measuring cable and control cable.
1. Undo the ties holding the cable guard. Remove the cable guard.
  2. Fasten the pedestals to the pump set. Place the pump set on the foundation with the pedestals and level it.
  3. Mark and drill the holes for the foundation bolts on the foundation. Fasten the pump set to the foundation via the pedestals.
  4. Run the power cable through the foot of the pump pedestal. Fasten the power cable to the pump and to the lift check valve / connection nozzle with cable ties.
  5. Securely fasten all electric cables to prevent them from fluttering in the water flow. Use a cable conduit if necessary.
  6. Install the piping.


	<b>NOTE</b>
	<p>Fit an expansion joint between the piping and the pump set to prevent any piping forces and piping vibrations from affecting the pump set.</p>

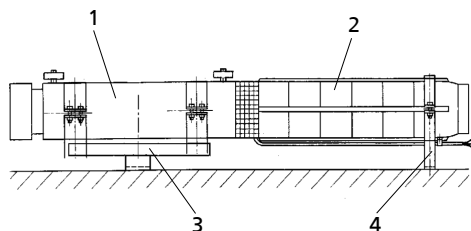
7. Fasten all electric cables to the riser with cable ties.

	<b>NOTE</b>
	<p>Fasten all electric cables to the piping every three metres as well as upstream and downstream of any pipe bends by means of suitable fasteners, e.g. cable ties. This prevents any fluttering of the electric cables in the water flow. Use a cable conduit if necessary.</p>

### 5.4.2 Installing the pump set on support frame and pedestal

Applicable to pump sets with the following motors: UMA 300, 14D


	<b>CAUTION</b>
	<p><b>Incorrect position of support frame and pedestal</b></p> <p>Bending or deformation of the pump set!</p> <p>▷ Observe the following positions of the support frame and pedestal:  <b>Support frame for the motor:</b> mounting clamps at the casing flanges  <b>Pedestal for the pump:</b> last stage or lift check valve / connection nozzle.</p>




**Fig. 15: Mounting the pump set on support frame and pedestal (example)**

1	Motor	2	Pump
3	Support frame	4	Pedestal

- ✓ The safety regulations have been observed. (⇒ Section 5.1, Page 25)
  - ✓ The structural dimensions have been verified.
  - ✓ The water reservoirs have been installed.
  - ✓ The motor fill has been checked and topped up if required.
  - ✓ Extension cables have been connected to the power cable, measuring cable and control cable.
1. Undo the ties holding the cable guard. Remove the cable guard.
  2. Fasten the support frame and pedestals to the pump set. Position and align the assembly on the foundation.
  3. Mark and drill the holes for the fixing bolts on the foundation and fasten the pump set with the support frame / pedestals on the foundation.
  4. Run the power cable through the foot of the pump pedestal. Fasten the power cable to the pump and to the lift check valve / connection nozzle with cable ties.
  5. Securely fasten all electric cables to prevent them from fluttering in the water flow. Use a cable conduit if necessary.
  6. Install the piping.

	<b>NOTE</b>
	<p>Fit an expansion joint between the piping and the pump set to prevent any piping forces and piping vibrations from affecting the pump set.</p>

7. Fasten all electric cables to the riser with cable ties.

	<b>NOTE</b>
	<p>Fasten all electric cables to the piping every three metres as well as upstream and downstream of any pipe bends by means of suitable fasteners, e.g. cable ties. This prevents any fluttering of the electric cables in the water flow. Use a cable conduit if necessary.</p>

#### 5.4.3 Installing the pump set in a suction, pressure or cooling shroud

For special operating conditions submersible borehole pumps can be fitted with a pressure, suction or cooling shroud. See order documentation.

For these applications always observe the separate order documentation.

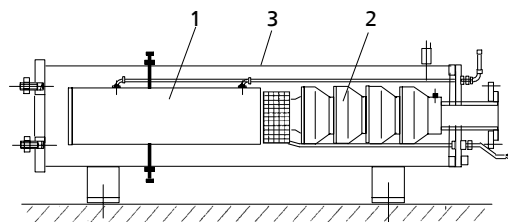


Fig. 16: Installing the pump set in a pressure shroud (example)

1	Motor	2	Pump
3	Pressure shroud		

### 5.5 Installing the pump set in an angled position

- ✓ The safety regulations have been observed. (⇒ Section 5.1, Page 25)
  - ✓ The pump set has been selected and approved for angled installation. See order documentation.
1. Some structural adjustments are required to install submersible borehole pumps in an angled position. To do so, observe the separate order documentation.
  2. Check the order documentation to verify the permitted installation position. (⇒ Section 5.2.2, Page 27)

### 5.6 Information on electrical connection

#### Asynchronous motor

Pump sets with asynchronous motors by KSB must only be used for DOL starting. During start-up and run-up the voltage must not fall below the value specified in the order documentation. If this starting method is not permitted for the power supply network used, starting devices to reduce starting currents must be provided (e.g. star-delta contactors (Y-Δ), autotransformers, starting resistors, soft starters, etc).

#### Synchronous motor

Pump sets with synchronous motors must only be operated on a frequency inverter. They must not be operated directly on the power supply network.

#### General information on the motor

##### Motor protection

Provide a temperature-compensated overcurrent relay of tripping class 10 or 10A as motor protection. If an earth leakage relay is used, it must be fitted in the motor circuit.

##### Rating

The rating specified on the name plate and in the order documentation applies to S1 continuous duty to DIN EN 60034-1.

#### 5.6.1 Operation with star-delta contactor, autotransformer and starting resistors

<b>Star-delta contactor</b>	The Y-phase or partial voltage period shall not exceed 4 s. The switchover interval from Y to Δ must not be longer than 60 ms. <b>Additional delays are not permitted.</b>
<b>Starting devices</b>	Set up the starting devices for automatic operation, i.e. switchover from partial to full voltage must be automatic. The partial voltage period shall not exceed 4 s. To operate the pump set with a starting transformer or starting resistor, choose a closed-transition switchover method (e.g. Korndorfer connection).

### 5.6.2 Operation with soft starter

	NOTE
	<p><b>For pump sets in VdS-approved sprinkler installations</b> For pump sets in VdS-approved sprinkler installations, also observe VdS guideline VdS CEA 4001!</p>

Submersible motors differ from ordinary standardised asynchronous motors in their slim design (low moments of inertia), their output per size, mechanical seal design and winding type.


The following reference values, based on our experience, ensure safe operation of submersible borehole pumps.

The operator and the manufacturer of the soft starter are responsible for ensuring that the particular features of submersible borehole pumps have been taken into account. Depending on the make, the reference values provided might be exceeded.

**Table 16:** Reference values for soft starters


Parameter / function	Setting
Minimum starting voltage	40 % of the motor's rated voltage
Ramp time / acceleration (run-up) time	$t_H < 4$ seconds
Current limitation	$I_A / I_N$ Approx. 3.5
Deceleration (run-down) time / stop ramp	$t_A < 4$ seconds
Special functions, e.g. <ul style="list-style-type: none"> <li>▪ Delayed starting</li> <li>▪ Current control</li> <li>▪ Speed control</li> <li>▪ Kick-start / boost function</li> </ul>	OFF

- ✓ The operating manual of the soft starter is available and complied with.
  1. After run-up, the soft starter must be bypassed by a contactor.
  2. Always observe the operating manual of the soft starter.
  3. Soft starters for two-phase connection are only permitted if the starter's control algorithm eliminates the physically caused DC components.
  4. If the soft starter fulfils motor protection functions, such as an over-current trip (tripping class 10 or 10A), phase failure, etc., these functions must also be ensured when the soft starter is bypassed.

	NOTE
	<p>Conspicuous noises or vibrations during run-up and run-down could indicate incorrect parameter settings on the soft starter, such as excessive ramp times, incorrect operating mode (control) or enabled special functions.</p>

### 5.6.3 Operation on a frequency inverter

	NOTE
	<p><b>For pump sets in VdS-approved sprinkler installations</b> For pump sets in VdS-approved sprinkler installations, also observe VdS guideline VdS CEA 4001!</p>

	NOTE
	<p>For pump sets with a UMA-S 150, UMA-S 200 or UMA-S 250 submersible motor that are fitted with a PumpDrive R frequency inverter, also observe the operating manuals of the frequency inverter and output filter.</p>

If KSB's submersible borehole pumps are operated on a frequency inverter, the pumps' special design (low moment of inertia, high output per size, etc.) requires that the following points be observed.

#### Power reserve of the submersible motor

If supplied by KSB for operation on a frequency inverter (see data sheet), the motor comes with a 5 % power reserve.

To check whether a frequency inverter can be retrofitted, contact the pump manufacturer.

#### Power reserve of the drive

Apart from the dimensioning factors for the submersible motor, additional voltage losses in power cables, filters, inverter, etc. must be taken into account as they can lead to the required current input exceeding the rated motor current. A reserve for the frequency inverter / system must be provided for this purpose. In addition, for UMA-S 150, UMA-S 200 and UMA-S 250 motors, the rated motor current depends on the type and quality of the frequency inverter's control process. Sub-optimal motor control can lead to a higher motor current, which can have a negative impact on the efficiency, for example. This must be considered when selecting the system. A reserve of 10 % of the rated motor current is recommended. For any queries, contact the manufacturer of the frequency inverter.

#### Control principle of the frequency inverter

- For asynchronous motors, the control principle must correspond with a linear V/f characteristic.
- For synchronous motors, frequency inverters are used that have a sensorless control principle suitable for motors with interior magnets.

If any other control principles are employed, such as field-oriented frequency inverters or frequency inverters with DTC or NFO, the manufacturer of the frequency inverter must ensure that the particular characteristics of submersible motors (very small moment of inertia, electrical data) are taken into account.

#### Maximum permissible run-up time and run-down time

The run-up time from standstill to the minimum frequency  $f_{\min}$  must not exceed 2 seconds. The run-down time must also be limited to a maximum of 2 seconds.

#### Minimum frequency

Make sure the following minimum frequencies are met.

**Table 17:** Minimum frequencies [Hz]

Motor size	Minimum frequency $f_{\min}$	
	For vertical installation	For horizontal installation
DN 100	30	30
UMA 150	20	30
UMA-S 150	40	60
UMA 200	20	30
UMA-S 200	40	60
UMA 250	20	30
UMA-S 250	40	60
UMA 300 - 2 poles	20	30
UMA 300 - 4 poles	30	35
14D - 2 poles	20	30
14D - 4 poles	30	35

### Maximum operating frequency

- For an asynchronous motor: Do not exceed the maximum operating frequency of 50 Hz or 60 Hz respectively.
- For a synchronous motor: Do not exceed the maximum operating frequency of 100 Hz.

### Maximum permissible rate of voltage rise and peak voltages

Observe the following limits:

**Table 18:** Limit values

	Limit value
Maximum rate of voltage rise:	$dv/dt \leq 500 \text{ V}/\mu\text{s}$
Maximum peak voltages to earth:	J1 insulation $\leq 600 \text{ V}$ J2 insulation $\leq 800 \text{ V}$



### NOTE

Fit an output filter to ensure the limits are observed.

In the case of UMA-S 150, UMA-S 200 and UMA-S 250 submersible motors, the output filter must be rated for 100 Hz.

## 5.7 Connection to power supply



### DANGER

#### Electrical connection work by unqualified personnel

Danger of death from electric shock!

- Always have the electrical connections installed by a trained and qualified electrician.
- Observe regulations IEC 60364 .



### DANGER

#### Uncontrolled backflow of the fluid handled turning the magnet rotor in the UMA-S 150, UMA-S 200 and UMA-S 250 submersible motor

The rotating permanent magnet rotor may generate an electric current at the motor lead ends!

Danger of death from electric shock!

- Take suitable precautions to prevent any inadvertent rotation caused by uncontrolled backflow of the fluid handled.
- Make sure the motor cannot be rotated inadvertently.
- Observe the safety regulations that apply to work involving electrical hazards. Verify that the equipment is de-energised.








### DANGER

#### Electrical equipment overloaded by uncontrolled rotation of the magnet rotor of a UMA-S 150, UMA-S 200 or UMA-S 250 submersible motor

Danger of death from electric shock!


- Take suitable precautions to prevent any inadvertent motor rotation caused by uncontrolled backflow of the fluid handled.
- As an option, provide electrical protection devices between the motor and the frequency inverter, such as fuses or circuit breakers.



	<div data-bbox="507 190 683 235">  <b>DANGER</b> </div> <p><b>Earth conductor not properly connected</b>            Danger of death from electric shock!</p> <ul style="list-style-type: none"> <li>▷ Never operate the motor without earth conductor.</li> <li>▷ The earth conductor must be connected by a professional electrician only.</li> </ul>
	<div data-bbox="507 443 702 488">  <b>WARNING</b> </div> <p><b>Incorrect connection to the mains</b>            Damage to the power supply network, short circuit!</p> <ul style="list-style-type: none"> <li>▷ Observe the technical specifications of the local energy supply companies.</li> </ul>
	<div data-bbox="507 651 587 685"> <b>NOTE</b> </div> <p>Only <b>VDS-approved switchgear</b> shall be used for pump sets in sprinkler installations.            Due to the special conditions of pumps in fire protection applications, switchgear with overcurrent relay must not be used, for example.</p>

1. Check the available mains voltage against the data on the name plate.
2. Select an appropriate start-up method and observe the respective requirements.
3. Check the starting method in the data sheet and select the corresponding circuit diagram.
4. Connect the power cable including earth conductor.
5. Remove the safety notice from the motor lead ends and attach it near the actual place of connection.

In the case of UMA-S 150, UMA-S 200 and UMA-S 250 submersible motors, the power cable cores are connected together at the time of supply. Prior to disconnecting them, make sure that the motor is not rotating (e.g. due to backflow in the pump caused by a lack of or a defective check valve). Observe the safety regulations that apply to work involving electrical hazards. Verify that the equipment is de-energised.

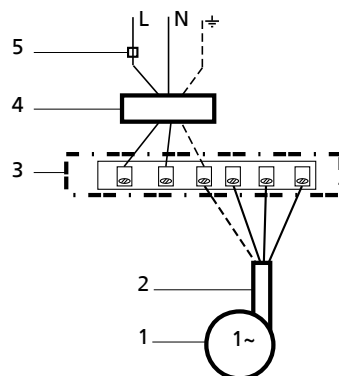
	<div data-bbox="507 1288 587 1321"> <b>NOTE</b> </div> <p>Connect the shielded motor power cable with the exposed shield as short as possible and the shield ends having contact over a large area. Interruptions of the shield must be compliant with EMC<sup>16)</sup>. Observe the EMC instructions given by the equipment manufacturers.</p>
---	--

#### Single-phase (1~) motors with one power cable for DOL starting

For this motor type a starting device is required. The starting device is included in the scope of supply.

1. Check the terminal assignment diagram. Wire the starting device in accordance with the illustration and the manufacturer's product literature.

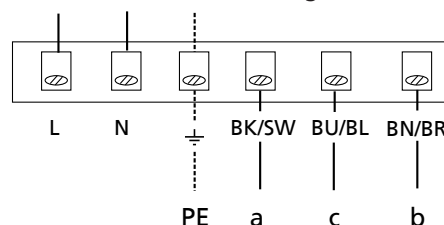
<sup>16</sup> Electromagnetic compatibility



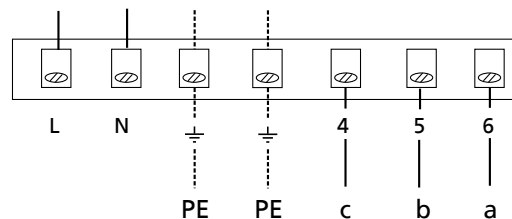
**Fig. 17:** Circuit diagram: single-phase (1~) motors with one power cable for DOL starting

1	Motor	2	Motor power cable
3	Starting device	4	Control unit
5	Line conductor		

#### Connections at the starting device



**Fig. 18:** Starting device, manufacturer A



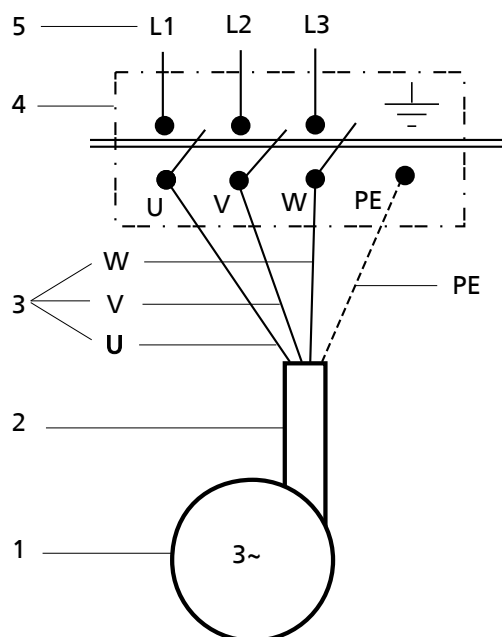
**Fig. 19:** Starting device, manufacturer B

L	Line conductor	a	Core marking: black
N	Neutral conductor	b	Core marking: brown
PE	Earth conductor; core marking: green/yellow	c	Core marking: grey (blue)

When installing the starting device of manufacturer B (terminal assignment 4, 5, 6) also observe the manufacturer's product literature.

#### Three-phase (3~) motors with one power cable for DOL starting or operation on a frequency inverter (VFD)

The three current-carrying conductors are designated U, V and W; the earth conductor is marked PE.



**Fig. 20:** Circuit diagram: three-phase (3~) motors with one power cable for DOL starting or operation on a frequency inverter (VFD)

1	Motor	2	Motor power cable
3	Core marking	4	Control unit
5	Line conductor	PE	Earth conductor; core marking: green/yellow

### Three-phase (3~) motors with two power cables for DOL starting

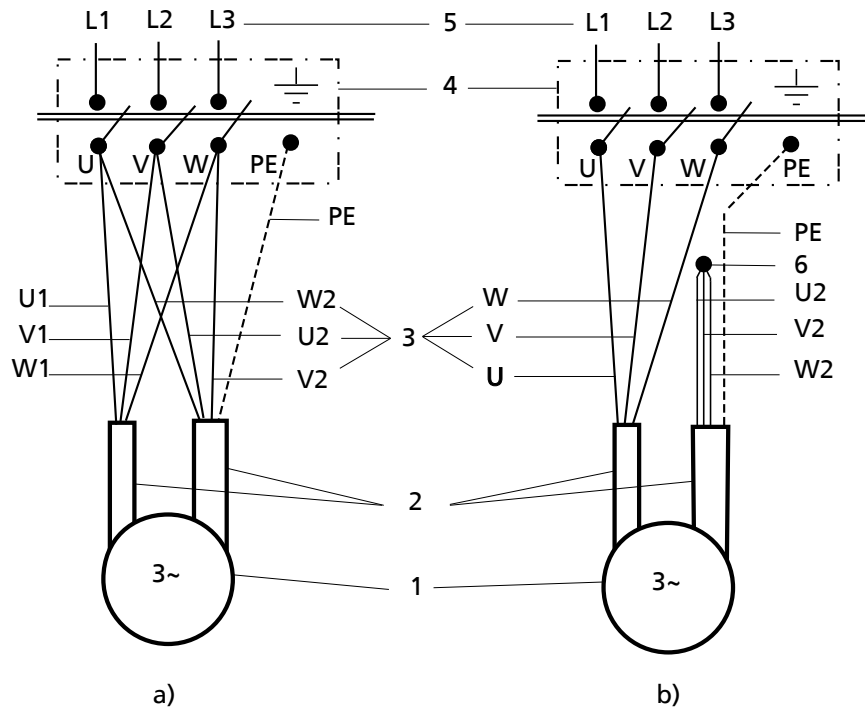
The six current-carrying conductors of the two power cables are designated U1, V1, W1 and U2, V2, W2; the earth conductor is marked PE.

✓ The motors are wired for both star and delta operation, as shown on the name plate.

1. Depending on the winding voltage, wire the motors in delta ( $\Delta$ ) or star (Y) configuration in the control unit (e.g. 400 V / 690 V)

⇒ For a supply voltage of 400 V, connect the motor in delta ( $\Delta$ ) configuration.

⇒ For a supply voltage of 690 V, connect the motor in star (Y) configuration.



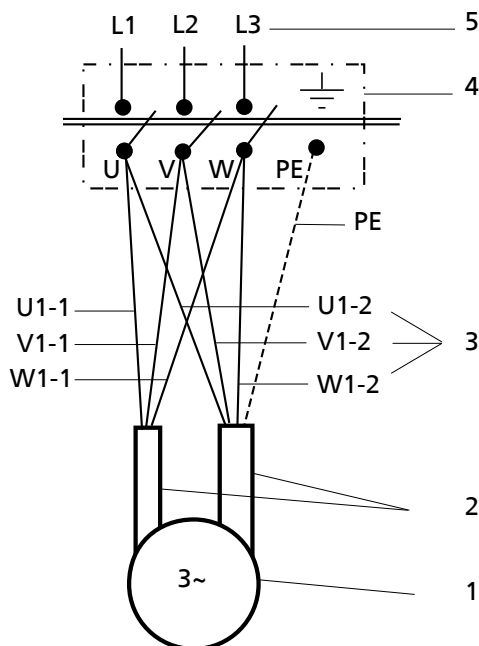
**Fig. 21:** Circuit diagram: motors with two power cables for DOL starting; a) star, b) delta

1	Motor	2	Motor power cable
3	Core marking	4	Control unit
5	Line conductor	6	Star point
PE	Earth conductor; core marking: green/yellow		

### Three-phase (3~) motors with two parallel power cables for DOL starting or operation on a frequency inverter (VFD)

The six current-carrying conductors of the two parallel power cables are designated U1-1, V1-1, W1-1 and U1-2, V1-2, W1-2; the earth conductor is marked PE.

The motors are wired in delta ( $\Delta$ ) or star ( $Y$ ) configuration, as shown on the name plate, and are fitted with two parallel power cables.

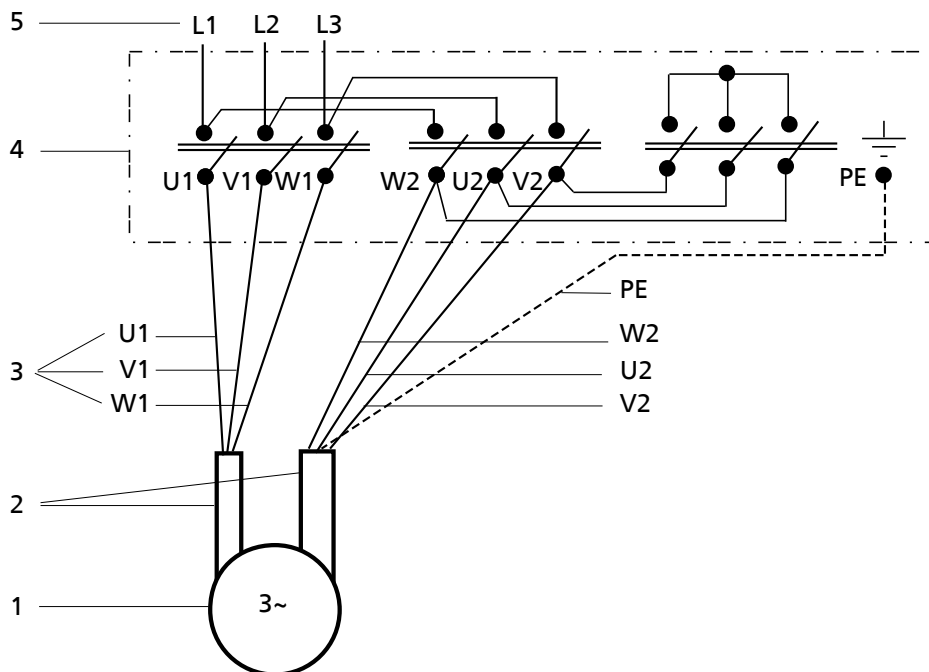


**Fig. 22:** Circuit diagram: motors with two parallel power cables for DOL starting or operation on a frequency inverter (VFD)

1	Motor	2	Motor power cable
3	Core marking	4	Control unit
5	Line conductor	PE	Earth conductor; core marking: green/yellow

### Three-phase (3~) motors with two power cables for star-delta starting

The six current-carrying conductors of the two power cables are designated U1, V1, W1 and U2, V2, W2; the earth conductor is marked PE. The motors are wired for both star and delta operation, as shown on the name plate.



**Fig. 23:** Circuit diagram: motors with two power cables for star-delta starting

1	Motor	2	Motor power cables
3	Core marking	4	Control unit
5	Line conductor	PE	Earth conductor; core marking: green/yellow

Set the overcurrent relay for the applicable starting method:

- For DOL starting to the operating current or, at most, to nominal current  $I_N$
- For star-delta starting to the operating current or, at most, to the nominal current x 0.58.



#### NOTE

Fitting an ammeter is recommended.

### 5.7.1 Recommended: monitoring equipment and protective equipment

	<p><b>NOTE</b></p> <p><b>For pump sets in VdS-approved sprinkler installations</b>  For pump sets in VdS-approved sprinkler installations, also observe VdS guideline VdS CEA 4001!</p>
---	---

The following monitoring equipment and protective equipment is recommended for proper operation of the pump set:

**Table 19:** Monitoring options

To be monitored	If there is any risk of:	Monitoring option
Dry running	<ul style="list-style-type: none"> <li>▪ Highly fluctuating water levels</li> <li>▪ Wells with temporary low yields</li> </ul>	<ul style="list-style-type: none"> <li>▪ Semi-automatic or fully automatic dry running protection equipment (e.g. integrated in KSB's control unit UPA Control)</li> </ul>
Lightning/overvoltage	A lightning protection device cannot offer protection against direct lightning strikes, however, it will protect the pump set against atmospheric overvoltages and any lightning strikes nearby.	<ul style="list-style-type: none"> <li>▪ Lightning protection with earthing terminal (available from KSB)</li> </ul>
Phase failure	<ul style="list-style-type: none"> <li>▪ Failure of one phase resulting in overloading of the remaining two phases</li> </ul>	
Excessive temperature in the motor	<ul style="list-style-type: none"> <li>▪ Permissible motor temperature exceeded by system conditions, e.g.: <ul style="list-style-type: none"> <li>– Deposits on the stator</li> <li>– Installation in stagnant water</li> <li>– Dirt/sand deposits in the stator area</li> <li>– Major temperature rise in the fluid handled</li> <li>– Motor operating on a frequency inverter</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Pt100 resistance thermometer with corresponding analysing device (⇒ Section 5.7.2, Page 52)</li> </ul>

Also recommended:

- Overcurrent / undercurrent
- Earth fault / short circuit
- Current asymmetry
- Overvoltage / undervoltage
- Vibrations

### 5.7.2 Connecting the temperature monitoring equipment

The submersible motors can be fitted with a temperature sensor for the motor fill temperature.

A temperature sensor is required whenever the operating limits of the motor may be exceeded because of reduced cooling (e.g. ochre build-up, increased temperature of fluid handled, etc.).

UMA 150, UMA-S 150,  
UMA 200, UMA-S 200,  
UMA 250, UMA-S 250

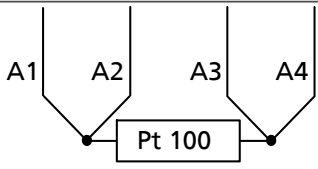
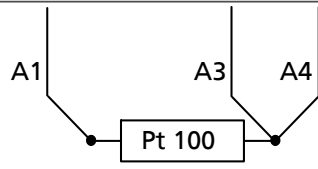
- Insertion-type sensor
- Can be retrofitted
- 4-core, 0.5 mm<sup>2</sup>
- 10 m shielded electric cable
- Maximum total length: 280 m
- **Retrofitting requires the pump and motor to be separated from each other, see the manufacturer's product literature.**

UMA 300, 14D

- Insertion-type sensor
  - 4-core, 0.5 mm<sup>2</sup><sup>17)</sup>
  - Shielded electric cable
- or
- A temperature sensor directly fastened to the end windings
  - 3-core, 1.5 mm<sup>2</sup><sup>17)</sup>
  - Maximum total length 1400 m

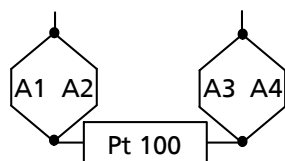
**Analysing device** A separate analysing device is required to analyse the temperature sensor readings.

**Table 20:** Number of cores and corresponding colour codes

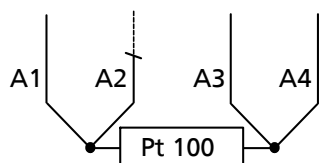
4 cores	3 cores
	
A1 = black core A2 = grey core A3 = blue core A4 = brown core	

#### Connection to the analysing device

The sensor can be connected by a 2, 3 or 4-wire system.



2-wire system

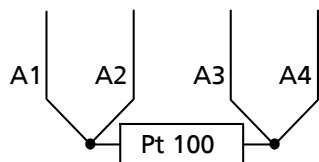


3-wire system

For 4-core power cables, do not connect core A2.

<sup>17</sup> Order-specific adjustments are possible.





4-wire system  
For 4-core power cables only.

- Testing**
- Core-to-core electrical resistance (measure with DC voltage  $V < 6\text{ V}$ )  
If the temperature sensor is intact, the electrical resistance between the individual cores shall be as follows:
    - Resistance between A1 and A2 / between A3 and A4:  $0\ \Omega$  to  $30\ \Omega$
    - Resistance between A1 and A3 / between A2 and A4:  $100\ \Omega$  to  $130\ \Omega$
  - Insulation resistance (measure with DC voltage  $V < 100\text{ V}$ ). Combine all core ends.
    - The resistance between the core ends and chassis ground (e.g. motor housing) must be higher than  $6\text{ M}\Omega$ .

**Function** Two temperature limits are important for submersible motors.

- Alert temperature  $t_{\text{Alert}}$**   
If the alert temperature  $t_{\text{Alert}}$  is exceeded, a malfunction has occurred (e.g. inadmissible contamination / ochre build-up on the motor housing). Initiate corrective action.  
  
Setting:  

$$t_{\text{Alert}} = t_{\text{Operating}} + (t_{\text{Cut-out}} - t_{\text{Operating}}) / 2$$

$$t_{\text{Operating}} = \text{normal operating temperature after approximately 1.5 operating hours}$$
- Cut-out temperature  $t_{\text{Cut-out}}$**   
If the cut-out temperature  $t_{\text{Cut-out}}$  is reached, the motor must be tripped. It must not be re-started until the malfunction has been remedied.  
  
Setting:  
 Submersible motors with J1 winding (PVC):  $t_{\text{Cut-out}} = 55\text{ }^{\circ}\text{C}$   
 Submersible motors with J2 winding (VPE):  $t_{\text{Cut-out}} = 75\text{ }^{\circ}\text{C}$









#### NOTE


For the winding type, refer to the motor designation. ( $\Rightarrow$  Section 4.3, Page 19)  
UMA-S 150, UMA 200, UMA-S 200, UMA 300 and 14D submersible motors are fitted with a J2 winding.

## 6 Commissioning/Start-up/Shutdown


### 6.1 Commissioning/Start-up

#### 6.1.1 Start-up


	<div data-bbox="507 394 683 439"> <b>DANGER</b></div> <div data-bbox="496 456 951 486"><b>Start-up with defective earth conductor</b></div> <div data-bbox="496 495 892 524">Personal injury from electric shock!</div> <div data-bbox="517 533 1394 591"> <ul style="list-style-type: none"> <li>▶ Never switch on a pump set without an earth conductor or with a defective earth conductor.</li> </ul> </div>
	<div data-bbox="507 629 639 667"><b>CAUTION</b></div> <div data-bbox="496 692 1007 721"><b>Starting the pump set against an empty pipe</b></div> <div data-bbox="496 728 571 757">Noise!</div> <div data-bbox="496 766 1104 795">Vibrations of the pump set and the connected piping!</div> <div data-bbox="517 804 1445 833"> <ul style="list-style-type: none"> <li>▶ During start-up make sure that any air contained can escape to the atmosphere.</li> </ul> </div>
	<div data-bbox="507 875 639 913"><b>CAUTION</b></div> <div data-bbox="496 938 983 967"><b>Starting up the pump set outside the fluid.</b></div> <div data-bbox="496 974 893 1003">Pump damage and motor damage!</div> <div data-bbox="517 1012 1398 1070"> <ul style="list-style-type: none"> <li>▶ Only start up the pump set when its motor is filled and the pump set is fully submerged or flooded!</li> </ul> </div>
	<div data-bbox="507 1111 639 1149"><b>CAUTION</b></div> <div data-bbox="496 1173 949 1202"><b>Operation with closed shut-off element</b></div> <div data-bbox="496 1209 861 1238">Damage to motor and bearings!</div> <div data-bbox="517 1247 1442 1305"> <ul style="list-style-type: none"> <li>▶ Never let the pump set run against a closed shut-off element for more than five minutes.</li> </ul> </div>
	<div data-bbox="507 1346 639 1384"><b>CAUTION</b></div> <div data-bbox="496 1408 1163 1438"><b>Continuous operation against a throttled shut-off element</b></div> <div data-bbox="496 1444 831 1473">Damage to pump and motor!</div> <div data-bbox="517 1482 1390 1541"> <ul style="list-style-type: none"> <li>▶ In continuous operation against a throttled shut-off element, the flow rate must not fall short of <math>Q_{min}</math> (see name plate).</li> </ul> </div>

	<p><b>NOTE</b></p> <p>Only <b>VDS-approved switchgear</b> shall be used for pump sets in sprinkler installations.</p> <p>Due to the special conditions of pumps in fire protection applications, switchgear with overcurrent relay must not be used, for example.</p>
---	---

- ✓ The pump set has been assembled as described in this manual.
- ✓ The pump set has been installed as described in this manual.
- ✓ The electric cables including control and measuring cables have been fastened and connected in the control unit.
- ✓ The control unit and protective equipment have been installed and set properly.
- ✓ The pump set is completely submerged or flooded.
  1. Slightly open the shut-off element on the discharge side.
  2. Start up the pump set.
  3. Slowly open the shut-off element until the duty point is reached.


	<p><b>NOTE</b></p> <p>It is not necessary to delay the start-up of a shut-off element with electric actuator, as the run-up time of the pump is shorter than the dead time of the shut-off element.</p>
---	---



#### 6.1.1.1 Information on commissioning

	<p><b>CAUTION</b></p> <p><b>Excessive sand content in the fluid handled</b></p> <p>Damage to the pump set!</p> <ul style="list-style-type: none"> <li>▷ If the sand content equals 50 g/m<sup>3</sup> or more, switch off the pump set.</li> <li>▷ Inform the well building company.</li> </ul>
---	---

1. When commissioning pump sets in new boreholes, initially only operate the pump set for approximately 10 minutes with the shut-off element slightly open.
2. Check escaping fluid for any sand content.
  - ⇒ Sand content 50 g/m<sup>3</sup> - Switch off the pump set. Inform the well building company.
  - ⇒ Sand content decreases - Slowly open the shut-off element further until the duty point is reached.


#### 6.1.2 Checking the direction of rotation

	<p><b>⚠ DANGER</b></p> <p><b>Uncontrolled backflow of the fluid handled turning the magnet rotor in the UMA-S 150, UMA-S 200 and UMA-S 250 submersible motor</b></p> <p>The rotating permanent magnet rotor may generate an electric current at the motor lead ends!</p> <p>Danger of death from electric shock!</p> <ul style="list-style-type: none"> <li>▷ Take suitable precautions to prevent any inadvertent rotation caused by uncontrolled backflow of the fluid handled.</li> <li>▷ Make sure the motor cannot be rotated inadvertently.</li> <li>▷ Observe the safety regulations that apply to work involving electrical hazards. Verify that the equipment is de-energised.</li> </ul>
---	--


	<p><b>CAUTION</b></p> <p><b>Wrong direction of rotation</b> Damage to the motor!</p> <ul style="list-style-type: none"> <li>▷ Do not run the pump set for more than two minutes when checking the direction of rotation.</li> </ul>
	<p><b>CAUTION</b></p> <p><b>Uncontrolled backflow of the fluid from the riser</b> Damage to the pump set!</p> <ul style="list-style-type: none"> <li>▷ Prevent any <b>uncontrolled</b> backflow of the fluid handled with suitable means.</li> <li>▷ Make sure that backflow of the fluid handled is <b>slow</b> and <b>controlled</b>, so that the pump rotor does not start to rotate, e.g. by throttling the discharge-side gate valve accordingly.</li> </ul>


- ✓ The back-up name plate has been attached at the place of installation of the submersible borehole pump. (⇒ Section 4.8, Page 24)
  - ✓ The pump set has been installed completely.
  - ✓ The power cable and, if applicable, the measuring cable and control cable have been connected in the control cabinet.
  - ✓ The shut-off element in the discharge line is slightly open.
1. Switch on the motor at the control cabinet. (⇒ Section 6.1.1, Page 54)
  2. As soon as the system has reached a steady state, read off the pressure and/or flow rate from the pressure gauges.
  3. Verify the read data against the data on the back-up name plate.
    - ⇒ If the values are almost identical, the direction of rotation is correct.
    - ⇒ If the read values are too low, the direction of rotation is incorrect.
  4. If the direction of rotation is incorrect, switch the motor off at the control cabinet.
  5. Have a trained electrician correct the phase sequence (U, V, W) on the motor connection side in the control cabinet or, in case of frequency inverter operation, change the direction of rotation by adjusting the parameters.

## 6.2 Operating limits

	<p><b>CAUTION</b></p> <p><b>Non-compliance with operating limits</b> Damage to the pump set!</p> <ul style="list-style-type: none"> <li>▷ Comply with the operating data indicated on the data sheet.</li> <li>▷ Avoid operation against a closed shut-off element.</li> <li>▷ Never operate the pump set outside the limits specified below.</li> </ul>
---	--

### 6.2.1 Frequency of starts

	<p><b>CAUTION</b></p> <p><b>Excessive frequency of starts</b> Risk of damage to the motor!</p> <ul style="list-style-type: none"> <li>▷ Never exceed the specified frequency of starts.</li> </ul>
---	--

	<div style="background-color: #FFD700; padding: 5px;"><b>CAUTION</b></div> <p><b>Delay before re-starting too short</b> Damage to the motor!</p> <p>▷ Always observe the specified standstill periods.</p>
---	--

To prevent inadmissible heat build-up in the motor, the following max. number of starts or minimum standstill periods must be complied with:

**Table 21:** Frequency of starts and delay before re-starting

Motor size	Max. No. of starts	Min. delay before re-starting
	[Starts/hour]	[min]
DN 100	20	1
UMA 150	15	2
UMA-S 150	15	2
UMA 200	10	3
UMA-S 200	10	3
UMA 250	10	3
UMA-S 250	10	3
UMA 300 - 2 poles	5	6
UMA 300 - 4 poles	5	6
14D - 2 poles	5	6
14D - 4 poles	5	6

### 6.2.2 Supply voltage

Observe the permissible voltage/frequency fluctuations to DIN EN 60034-1 section A;  $V_N \pm 5\%$ ,  $f_N \pm 2\%$ .

The limits may differ if specified in the order, see order confirmation.

### Star point displacement

Operation with displaced star point must not exceed the value  $V_0 > 0.2 \times V_N$  and must be limited to one operating hour.

### 6.2.3 Immersion depth

Do not exceed a maximum immersion depth of 250 m.


For submergence or larger immersion depths refer to the data sheet or the general arrangement drawing.

### 6.2.4 Fluid handled

#### 6.2.4.1 Flow rate of pump sets in VdS-approved sprinkler installations

Due to the special conditions of pump sets in fire protection applications, these pumps can be operated at up to 1.2 times the maximum flow rate  $Q_{\text{permissible}}$  indicated on the name plate of the sprinkler.

#### 6.2.4.2 Minimum submergence

	<div style="background-color: #0070C0; color: white; padding: 5px;"><b>NOTE</b></div> <p>Special conditions apply to pump sets in VdS-approved sprinkler installations. (⇒ Section 6.2.4.3, Page 59)</p>
---	--

The submergence  $X$  of the pump sets must be  $\geq 0.5$  m for the following examples of vertical and horizontal installation.  
A higher submergence may be required by the NPSH value specified in the order documentation or the value indicated in the following diagram.

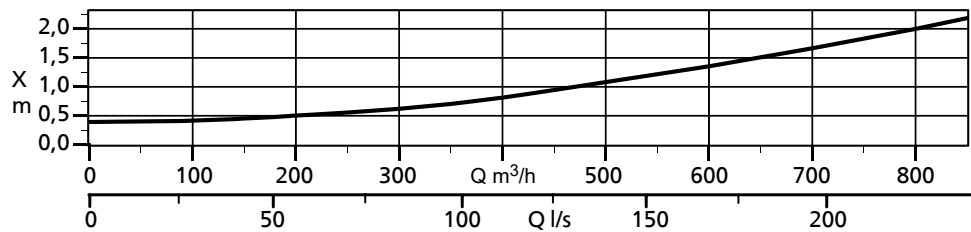


Fig. 24: Minimum submergence depending on the flow rate

The values in the above mentioned diagram apply to submersible borehole pumps up to size UPA 350.

For larger pump sets refer to the value  $X$  in the order documentation or the data sheet. Contact the manufacturer, if required.



#### NOTE

The fluid level in the well is usually measured with a water level contact meter (well dipper).

**Vertical installation** Measurement for vertical installation:  
upper edge of the pump to lowest (dynamic) fluid level  
 $X = H_e - H_t$

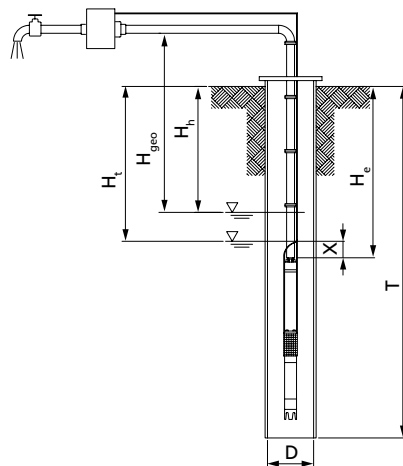


Fig. 25: Minimum submergence for vertical installation

T	Well depth	$H_h$	Static fluid level
D	Well diameter	$H_t$	Dynamic fluid level
$H_e$	Installation depth of the pump set	$H_{geo}$	Height of switchgear above the static water level in the well
X	Minimum submergence		

**Horizontal installation** Measurement for horizontal installation:  
upper edge of the suction strainer to lowest (dynamic) fluid level

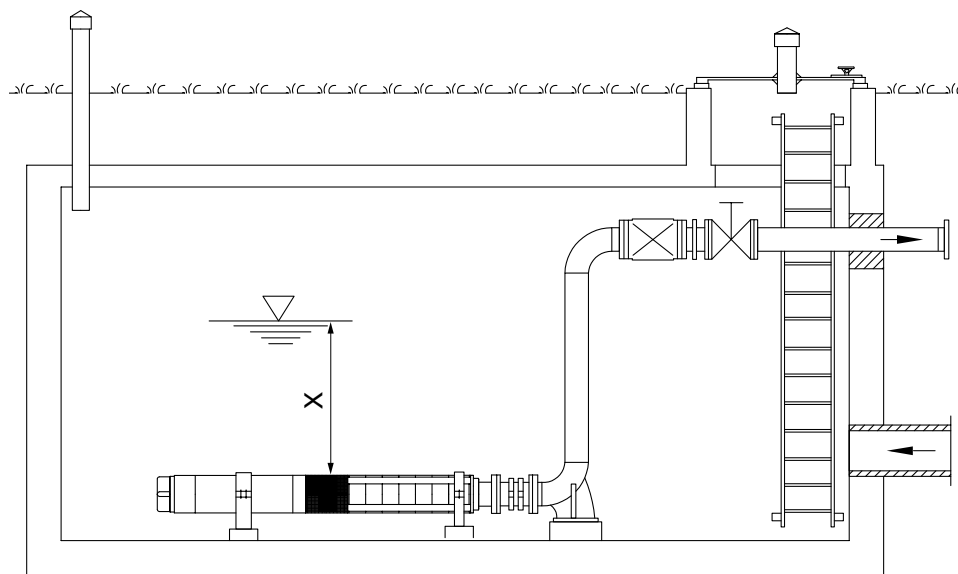


Fig. 26: Minimum submergence for horizontal installation

X	Minimum submergence
---	---------------------

#### 6.2.4.3 Minimum submergence for pump sets in VdS-approved sprinkler installations

Horizontal installation  
without suction hood

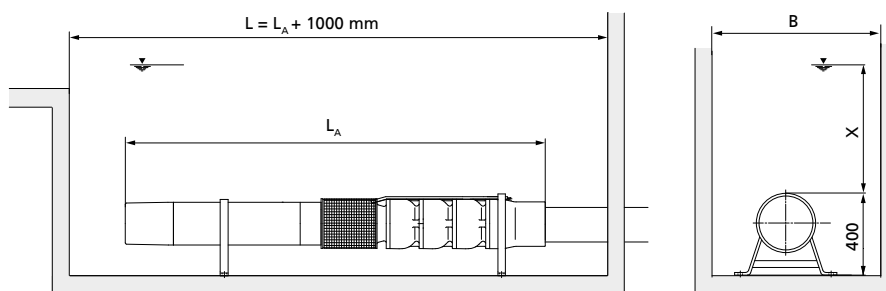


Fig. 27: Illustration without suction hood

Table 22: Dimensions, installation without suction hood

Size	B [m]	X [m]
UPA 250C - 150	1,00	See diagram.
UPA 300 - 65	1,00	
UPA 300 - 94	1,50	
UPA 350 - 128	1,50	

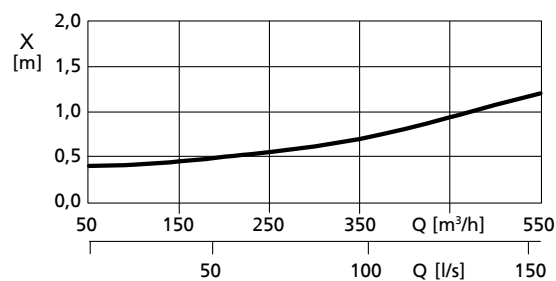


Fig. 28: Minimum submergence of pump sets without suction hood

### Horizontal installation with suction hood

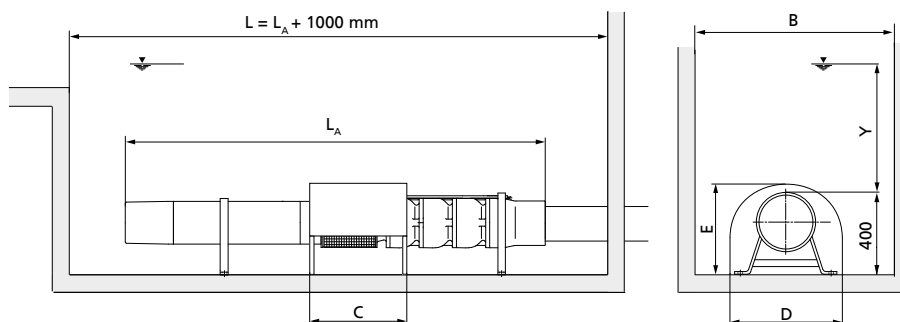


Fig. 29: Illustration with suction hood

Table 23: Dimensions, installation with suction hood

Size	B	C	D	E	Y
	[m]	[m]	[m]	[m]	[m]
UPA 250C - 150	1,00	0,60	0,50	0,45	See diagram.
UPA 300 - 65	1,00	0,60	0,50	0,45	
UPA 300 - 94	1,50	0,80	0,50	0,50	
UPA 350 - 128	1,50	0,80	0,50	0,50	

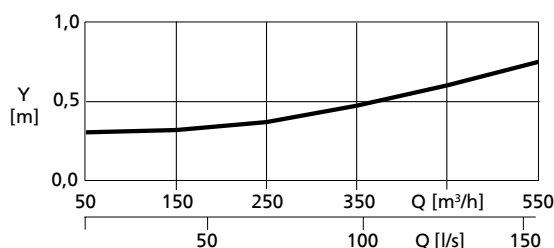


Fig. 30: Minimum submergence of pump sets with suction hood

#### 6.2.4.4 Sand content

Make sure the maximum sand content of 50 g/m<sup>3</sup> is not exceeded.

#### 6.2.4.5 Temperature of the fluid handled

	<b>CAUTION</b>
	<p><b>Excessive temperature of fluid pumped</b></p> <p>Damage to the pump set, especially to the motor!</p> <ul style="list-style-type: none"> <li>▶ Never operate the pump set at product temperatures exceeding those specified in the data sheet or on the name plate.</li> <li>▶ Increase the flow velocity past the motor.</li> </ul>

The limits stated on the name plate or in the order documentation must not be exceeded.

#### 6.2.4.6 Flow velocity past the motor

To ensure sufficient cooling of the motor, the required flow velocity past the motor must be observed.

For the required flow velocity  $v_{min}$  refer to the name plate or order documentation. **This value must be met at all times by providing suitable installation conditions or devices guiding the flow (e.g. cooling shroud, hood, etc).**

**Flow velocity past the motor**  
 $v = 0 \text{ m/s}$

The flow velocity past the motor is not defined. The heat is dissipated freely. This heat dissipation must not be influenced or hindered by any structures, and a supply of fresh water must be provided at all times.

- Example: pump set freely suspended in a vertical position inside a large tank



**Flow velocity past the motor**  
**v > 0.2 m/s**  
**v > 0.5 m/s**

The flow velocity past the motor is defined for the installation conditions, see table below. Decisive factors are the inside well diameter or the inside shroud diameter, the operating data and the outside dimensions of the pump




- Example: pump set installed in a vertical position above the screen/filter in a well; values in accordance with the table below.
- Example: pump set installed in a horizontal position in a tank, fitted with a cooling shroud, or pump set installed in a vertical position in a pump sump, fitted with a cooling shroud; values in accordance with the table below

**Table 24:** Maximum permissible well diameter or inside shroud diameter

Flow rate	Flow velocity	Well diameter or inside shroud diameter [mm]				
Q [m³/h]	v [m/s]	UMA 150 UMA-S 150	UMA 200 UMA-S 200	UMA 250 UMA-S 250	UMA 300	14D
15	≥ 0,2	≤ 215	-	-	-	-
	≥ 0,5	≤ 175	-	-	-	-
25	≥ 0,2	≤ 255	-	-	-	-
	≥ 0,5	≤ 195	-	-	-	-
50	≥ 0,2	≤ 330	≤ 350	-	-	-
	≥ 0,5	≤ 235	≤ 265	-	-	-
75	≥ 0,2	≤ 390	≤ 410	≤ 430	-	-
	≥ 0,5	≤ 270	≤ 300	≤ 330	-	-
100	≥ 0,2	≤ 445	≤ 460	≤ 480	-	-
	≥ 0,5	≤ 300	≤ 325	≤ 355	-	-
125	≥ 0,2	≤ 490	≤ 510	≤ 525	-	-
	≥ 0,5	≤ 330	≤ 350	≤ 380	-	-
150	≥ 0,2	≤ 535	≤ 550	≤ 565	≤ 590	-
	≥ 0,5	≤ 355	≤ 380	≤ 400	≤ 430	-
175	≥ 0,2	≤ 575	≤ 590	≤ 605	≤ 625	-
	≥ 0,5	≤ 380	≤ 400	≤ 420	≤ 450	-
200	≥ 0,2	≤ 615	≤ 625	≤ 640	≤ 660	≤ 690
	≥ 0,5	≤ 405	≤ 420	≤ 445	≤ 470	≤ 510
250	≥ 0,2	≤ 680	≤ 690	≤ 705	≤ 725	≤ 750
	≥ 0,5	≤ 445	≤ 460	≤ 480	≤ 505	≤ 540
300	≥ 0,2	≤ 745	≤ 755	≤ 765	≤ 780	≤ 800
	≥ 0,5	≤ 485	≤ 500	≤ 515	≤ 540	≤ 570
350	≥ 0,2	-	≤ 810	≤ 820	≤ 835	≤ 860
	≥ 0,5	-	≤ 530	≤ 550	≤ 570	≤ 600
400	≥ 0,2	-	≤ 865	≤ 875	≤ 890	≤ 910
	≥ 0,5	-	≤ 565	≤ 580	≤ 605	≤ 630
500	≥ 0,2	-	≤ 960	≤ 970	≤ 985	≤ 1000
	≥ 0,5	-	≤ 625	≤ 640	≤ 660	≤ 690
600	≥ 0,2	-	≤ 1050	≤ 1055	≤ 1070	≤ 1090
	≥ 0,5	-	≤ 680	≤ 695	≤ 710	≤ 740
800	≥ 0,2	-	≤ 1205	≤ 1215	≤ 1225	≤ 1240
	≥ 0,5	-	≤ 775	≤ 790	≤ 805	≤ 830
1000	≥ 0,2	-	≤ 1345	≤ 1350	≤ 1360	≤ 1370
	≥ 0,5	-	≤ 865	≤ 875	≤ 890	≤ 910
1200	≥ 0,2	-	-	-	≤ 1485	≤ 1500
	≥ 0,5	-	-	-	≤ 965	≤ 980
1400	≥ 0,2	-	-	-	≤ 1600	≤ 1610
	≥ 0,5	-	-	-	≤ 1030	≤ 1050

Flow rate	Flow velocity	Well diameter or inside shroud diameter [mm]				
Q [m³/h]	v [m/s]	UMA 150 UMA-S 150	UMA 200 UMA-S 200	UMA 250 UMA-S 250	UMA 300	14D
1600	≥ 0,2	-	-	-	≤ 1705	≤ 1720
	≥ 0,5	-	-	-	≤ 1100	≤ 1120
1800	≥ 0,2	-	-	-	≤ 1805	≤ 1820
	≥ 0,5	-	-	-	≤ 1165	≤ 1180
2000	≥ 0,2	-	-	-	≤ 1900	≤ 1910
	≥ 0,5	-	-	-	≤ 1225	≤ 1240

### 6.3 Shutdown

	<b>⚠ DANGER</b>
	<p><b>Electrical equipment overloaded by uncontrolled rotation of the magnet rotor of a UMA-S 150, UMA-S 200 or UMA-S 250 submersible motor</b></p> <p>Danger of death from electric shock!</p> <ul style="list-style-type: none"> <li>▷ Take suitable precautions to prevent any inadvertent motor rotation caused by uncontrolled backflow of the fluid handled.</li> <li>▷ As an option, provide electrical protection devices between the motor and the frequency inverter, such as fuses or circuit breakers.</li> </ul>
	<b>CAUTION</b>
	<p><b>Surge pressure caused by sudden stopping of the pump set</b></p> <p>Damage to the machinery right through to the pump set falling down!</p> <ul style="list-style-type: none"> <li>▷ <b>Slowly</b> close the shut-off element on the discharge side.</li> </ul>
	<b>CAUTION</b>
	<p><b>Uncontrolled backflow of the fluid from the riser</b></p> <p>Damage to the pump set!</p> <ul style="list-style-type: none"> <li>▷ Prevent any <b>uncontrolled</b> backflow of the fluid handled with suitable means.</li> <li>▷ <b>Control</b> the fluid backflow, e.g. by throttling the gate valve in the discharge line.</li> </ul>

#### Clean water / drinking water

1. Slowly close the shut-off element on the discharge side.
2. Switch off the motor immediately after closing the shut-off element.
3. Start up the pump set every two weeks for approximately five minutes during prolonged shutdown periods. (⇒ Section 6.1, Page 54)

#### Corrosive fluids (e.g. salt water), contaminated water:

1. Slowly close the shut-off element on the discharge side.
2. Switch off the motor immediately after closing the shut-off element.
3. Start up the pump set every 48 hours for approximately 5 minutes during prolonged shutdown periods. (⇒ Section 6.1, Page 54)

## 7 Servicing/Maintenance

### 7.1 Servicing/inspection

Submersible borehole pumps are generally maintenance-free.

The following changes may result in damage. Checking the values regularly is recommended.

- Temperature rise of the fluid handled
- Increased sand content of the fluid handled
- Change in current input
- Change in head and/or flow rate
- Change in frequency of starts
- Increase in noise and vibration levels

The submersible borehole pump need not be removed from the well/tank regularly for inspection.

For any queries, repeat orders and/or spare parts orders specify the following information. (⇒ Section 4.5, Page 21)

- Type series and size of pump and/or motor
- Operating data
- Order number or material number





For information concerning repair jobs and spare parts please contact your nearest KSB service centre.









#### Pump set for sprinkler applications

Pump sets for sprinkler applications are maintenance-free.



1. To make sure the pump set is ready for operation, start up the pump set every 14 days for 5 minutes.

### 7.2 Removing the pump set

	<div style="background-color: #e67e22; color: white; padding: 5px;"> <b>DANGER</b></div> <p><b>Electrical connection work by unqualified personnel</b>            Danger of death from electric shock!</p> <ul style="list-style-type: none"> <li>▸ Always have electrical work performed by a trained and qualified electrician only.</li> <li>▸ Observe regulations IEC 60364 and HD 637 S1.</li> </ul>
	<div style="background-color: #e67e22; color: white; padding: 5px;"> <b>DANGER</b></div> <p><b>Uncontrolled backflow of the fluid handled turning the magnet rotor in the UMA-S 150, UMA-S 200 and UMA-S 250 submersible motor</b>            The rotating permanent magnet rotor may generate an electric current at the motor lead ends!            Danger of death from electric shock!</p> <ul style="list-style-type: none"> <li>▸ Take suitable precautions to prevent any inadvertent rotation caused by uncontrolled backflow of the fluid handled.</li> <li>▸ Make sure the motor cannot be rotated inadvertently.</li> <li>▸ Observe the safety regulations that apply to work involving electrical hazards. Verify that the equipment is de-energised.</li> </ul>


	<div data-bbox="507 197 683 241">  <b>DANGER</b> </div> <p><b>Supply frequency inverter switched on or frequency inverter not discharged</b> Electric shock by electrical voltage at the motor lead ends and at the inverter terminals and filter terminals!</p> <ul style="list-style-type: none"> <li>▷ Observe the safety regulations which apply to work involving electrical hazards. Verify that the equipment is de-energised.</li> </ul>
	<div data-bbox="507 456 703 501">  <b>WARNING</b> </div> <p><b>Persons could fall into unsecured wells/reservoirs/tanks</b> Risk of personal injury!</p> <ul style="list-style-type: none"> <li>▷ During installation work, take suitable precautions to protect anyone from falling into an open well/reservoir/tank.</li> <li>▷ Suitably fence off the work area.</li> </ul>
	<div data-bbox="507 736 703 781">  <b>WARNING</b> </div> <p><b>Uncontrolled lifting of the pump (set) or drive</b> Risk of injury!</p> <ul style="list-style-type: none"> <li>▷ Maintain adequate safety distance during lifting operations (load may swing when being lifted).</li> </ul>
	<div data-bbox="507 972 703 1016">  <b>WARNING</b> </div> <p><b>Pump set tilting</b> Risk of squashing hands and feet!</p> <ul style="list-style-type: none"> <li>▷ Suspend or support the pump set.</li> </ul>

- ✓ Suitable lifting equipment for the total weight has been selected and is on hand. (⇒ Section 5.2.6, Page 30)
  - ✓ Suitable dismantling equipment, e.g. supporting clamps or mounting plate are available.
1. Disconnect the pump set from the power supply and secure it against unintentional start-up.
  2. For removing the pump set refer to the assembly/dismantling instructions of the corresponding riser.

	<div data-bbox="507 1467 703 1512">  <b>WARNING</b> </div> <p><b>Placing down a pump set with pipe sections of extensive length</b> Impermissible bending of the pump set when setting it down!</p> <ul style="list-style-type: none"> <li>▷ The length of the last pipe section flanged to the pump set must not exceed 2 metres.</li> </ul>
---	--



3. Place the pump set in a horizontal position on a solid and level surface and secure it against rolling off.

### 7.3 Separating pump and motor

	<b>WARNING</b>
	<p><b>Pump set tilting or rolling off</b> Risk of personal injury!</p> <ul style="list-style-type: none"> <li>▷ Always secure vertically positioned pump sets against tipping over.</li> <li>▷ Always secure horizontally positioned pump sets against rolling off.</li> </ul>



- ✓ The power supply has been disconnected and the pump set has been secured against unintentional start-up.
- ✓ The pump set has been pulled out of the well or removed from the tank.
- ✓ The pump set has been disconnected from the piping.
- ✓ Lifting equipment of sufficient load-carrying capacity is on hand.
  1. Attach the pump set to suitable lifting equipment.
  2. Pull the pump set upright and make sure it cannot tip over.
  3. Remove the cable guard. Observe the minimum bending radius for the cable<sup>18)</sup>.
  4. Remove the suction strainer.
  5. Remove the grub screw and the additional securing pin/bolt<sup>19)</sup> from the sleeve coupling at the motor end.
  6. Undo the assembly studs between pump and motor.
  7. Use the lifting equipment to lift the pump off the motor in a vertical position. Then place it on a clean and level surface and secure it against rolling off.
  8. Secure the key in the shaft stub, e.g. with adhesive tape.
  9. Place the motor on a clean and level surface. Secure it against tipping over and rolling off.

### 7.4 Motor fill

	<b>WARNING</b>
	<p><b>Drinking water/antifreeze mixture could escape</b> Hazardous to persons and the environment!</p> <ul style="list-style-type: none"> <li>▷ Wear safety glasses and protective gloves when topping up, checking and draining the motor fill.</li> <li>▷ Observe the national health and safety regulations.</li> <li>▷ Observe all legal regulations on the disposal.</li> </ul>
	<b>CAUTION</b>
	<p><b>Incorrect motor fill</b> Winding damage! Corrosion damage!</p> <ul style="list-style-type: none"> <li>▷ Observe the information sticker on the motor and top up the motor fill as instructed.</li> </ul>

<sup>18</sup> See cable manufacturer's documentation or DIN VDE 0298-3.

<sup>19</sup> If any

	<b>CAUTION</b>  <b>Unfilled or insufficiently filled motor</b> Damage to the motor winding! <ul style="list-style-type: none"> <li>▷ Never install and run the motor without sufficient motor fill.</li> <li>▷ Observe the information sticker on the motors and top up the motor fill as instructed.</li> </ul>
	<b>CAUTION</b>  <b>Freezing of motor fill</b> Motor damage! <ul style="list-style-type: none"> <li>▷ Match the mixing ratio of drinking water / antifreeze agent to the expected temperatures.</li> <li>▷ Always protect water-filled motors against frost.</li> <li>▷ Provide frost-proof storage.</li> </ul>

#### Information sticker / motor fill

Submersible motors are filled with a liquid based on drinking water. A distinction is made between filled and unfilled motors, marked by a colour-coded information sticker attached to the motor.

Motors which are supplied filled with a mixture of drinking water / antifreeze agent must not be filled with pure drinking water at a later stage without prior consultation with the manufacturer.

**Table 25:** Type of motor fill

Motor type series	Supplied condition	Sticker colour	Motor fill
DN 100	Filled	--	Drinking water / antifreeze mixture (1,2 propylene glycol)
UMA 150	Filled	--	
UMA-S 150	Filled	--	
UMA 200	Filled	--	
UMA-S 200	Filled	--	
UMA 250	Filled	--	
UMA-S 250	Filled	--	
UMA 300	Filled	Green	Drinking water or drinking water / antifreeze mixture (1,2-propylene glycol)
14D	Unfilled	Red	

#### Mixing ratio / purpose

- The motors must only be filled with an antifreeze agent on a 1,2 propylene glycol basis which has been approved by KSB.
- The drinking water / antifreeze mixture supplied by the factory is intended for operation as well as storage, transport and preservation. It protects the motor down to temperatures of -15 °C. Permissible deviations see other applicable documents.
- The percentage of antifreeze agent must always be selected for the expected temperatures below 0 °C at the place of installation/transport/storage.
- The motor fill must be prepared with clean drinking water. The mixing ratio and total quantity must be observed.

Table 26: Mixing ratios

Temperatures down to	Percentage of drinking water	Percentage of antifreeze agent	Use			
			Operation	Storage	Transport	Preservation
- 10 °C	75 %	25 %	✗	✗	✗	✗
- 15 °C <sup>20)</sup>	66 % <sup>20)</sup>	34 % <sup>20)</sup>	✗	✗	✗	✗
- 20 °C	62 %	38 %	<sup>21)</sup>	✗	✗	✗
- 25 °C	57 %	43 %	<sup>21)</sup>	✗	✗	✗
- 30 °C	53 %	47 %	<sup>21)</sup>	✗	✗	✗
Below - 30 °C	Consult the manufacturer.					

### Motor fill quantity

Refer to the following table for the motor fill quantity.

Table 27: Motor fill quantity [litre]

Motor size		Motor fill quantity
UMA 150	5 / 21	3,2
	7 / 21	3,3
	9 / 21	3,4
	13 / 21	3,6
	15 / 21	3,7
	18 / 21	3,9
	22 / 21	4,0
	26 / 21	4,2
	30 / 21	4,3
	37 / 22	4,5
UMA-S 150	18 / 42	3,6
	37 / 42	4,0
UMA 200	37 / 21	10,0
	45 / 21	10,3
	55 / 21	10,7
	65 / 21	11,1
	75 / 21	11,4
	90 / 21	12,0
UMA-S 200	75 / 42	10,2
	100 / 42	10,5
	150 / 42	11,4
UMA 250	85 / 21	19,7
	110 / 21	19,8
	132 / 21	20,0
	160 / 21	20,2
	190 / 21	20,3
UMA-S 250	185 / 42	20,0
	200 / 42	20,0
	230 / 42	20,2
	250 / 42	20,2
UMA 300	... / ..	32
14D	... / ..	45

<sup>20</sup> Drinking water / antifreeze mixture filled in at the factory

<sup>21</sup> Operation only if explicitly approved in the order confirmation.

#### 7.4.1 Motor fill - DN 100

The DN 100 motor is supplied filled with drinking water / antifreeze mixture, providing protection for temperatures down to -15 °C. Usually, the fill liquid does not need to be topped up or replaced.



#### NOTE

The loss of a few drops of liquid fill will not impair the motor function. If any larger amounts of leakage are suspected, the motor fill must definitely be checked.

#### 7.4.2 Motor fill – UMA 150, UMA-S 150, UMA 200, UMA-S 200, UMA 250, UMA-S 250

UMA 150, UMA-S 150, UMA 200, UMA-S 200, UMA 250 and UMA-S 250 submersible motors are supplied filled with a drinking water/antifreeze agent mixture, providing protection for temperatures down to -15 °C.

1. If the submersible motor has been stored or out of service for more than one year, check the motor fill.

##### 7.4.2.1 Checking the motor fill of UMA 150, UMA-S 150, UMA 200, UMA-S 200, UMA 250 or UMA-S 250 submersible motors



#### WARNING

##### Pump set tilting or rolling off

Risk of personal injury!

- ▷ Always secure vertically positioned pump sets against tipping over.
- ▷ Always secure horizontally positioned pump sets against rolling off.

A special test pin is required to check the motor fill. This test pin can be ordered as an accessory<sup>22)</sup>.

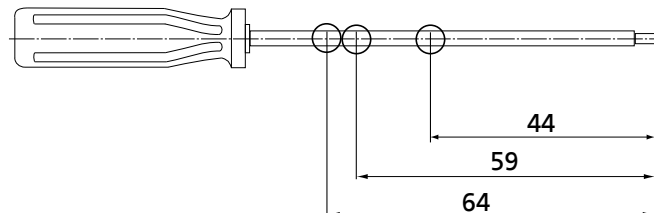


Fig. 31: Drawing of the test pin, dimensions in [mm]

Table 28: Diaphragm distances

Motor type series	Material variant	Distance required (A)
UMA 150	E, C, D	44 mm +/- 2 mm
UMA-S 150	E, C, D	44 mm +/- 2 mm
UMA 200	G, C, D	44 mm +/- 2 mm
UMA-S 200	G, C, D	44 mm +/- 2 mm
UMA 250	G, C, D	64 mm +/- 2 mm
UMA-S 250	G, C, D	64 mm +/- 2 mm

<sup>22)</sup> Fill check kit



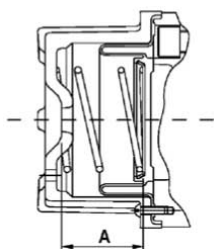


Fig. 32: Measuring the distance for sizes UMA 150, UMA-S 150

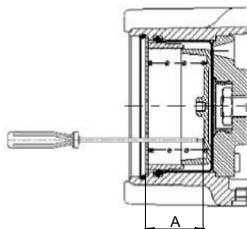


Fig. 33: Measuring the distance for sizes UMA 200, UMA-S 200, UMA 250, UMA-S 250

To check the fill level measure the distance A between the diaphragm housing and the diaphragm position.

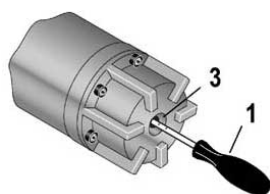


Fig. 34: Example of checking the motor fill with the test pin

✓ The test pin has been ordered and is on hand.

1. Place the pump set or motor down in a horizontal position. Secure it against rolling off.
  2. Insert the test pin (1) carefully through the hole (3) in the diaphragm housing <sup>23)</sup> until resistance can be felt.
  3. Measure the distance between the diaphragm and the edge of the hole in the diaphragm housing.
  4. Compare the result with the required distance A given in the table.
- ⇒ If the measured value is not identical with the required value, top up (⇒ Section 7.4.2.2, Page 69) or drain some of the motor fill. Then check the fill level again.

#### 7.4.2.2 Topping up the motor fill of UMA 150, UMA-S 150, UMA 200, UMA-S 200, UMA 250, UMA-S 250 submersible motors

The motor fill of the UMA 150, UMA-S 150, UMA 200, UMA-S 200, UMA 250 and UMA-S 250 submersible motor is pressurised, which means that the pressure inside the motor is slightly above atmospheric pressure.

Valves (inlet valve and output valve) are fitted for controlling the pressure. They vary as follows:

<sup>23</sup> The hole in the diaphragm housing of UMA 200, UMA-S 200, UMA 250 and UMA-S 250 submersible motors is off centre.

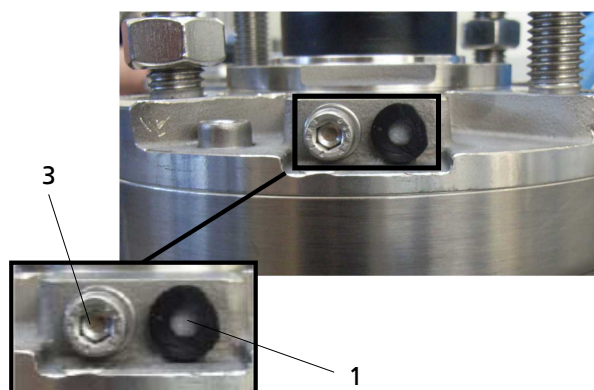


Fig. 35: Sizes UMA 150, UMA-S 150 in material variant E

1	Inlet valve <b>with</b> filter plug
3	Earthing bolt

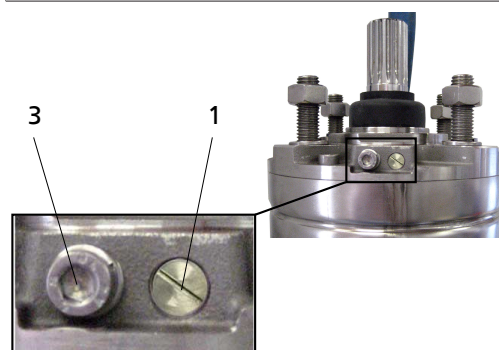


Fig. 36: Sizes UMA 150, UMA-S 150 in material variants C, D

1	Inlet valve
3	Earthing bolt

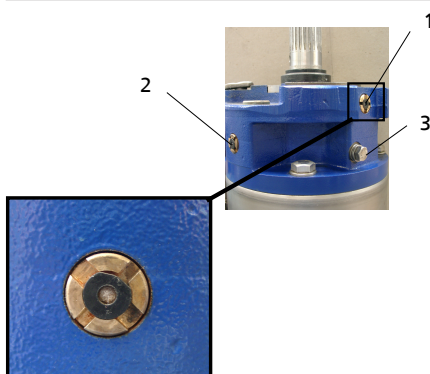


Fig. 37: Sizes UMA 200, UMA-S 200, UMA 250, UMA-S 250 in material variant G

1	Inlet valve <b>with</b> filter plug
2	Outlet valve <b>with</b> filter plug
3	Earthing bolt

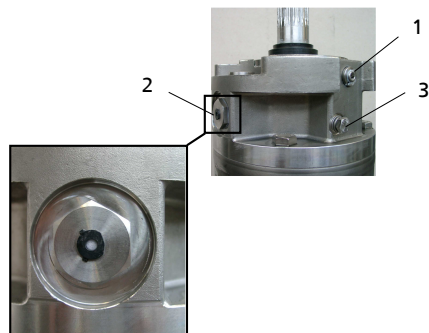


Fig. 38: Sizes UMA 200, UMA-S 200, UMA 250, UMA-S 250 in material variants C, D

1	Inlet valve <b>with</b> screw plug
2	Outlet valve <b>with</b> filter plug
3	Earthing bolt



**WARNING**

**Pump set tilting or rolling off**

Risk of personal injury!

- ▷ Always secure vertically positioned pump sets against tipping over.
- ▷ Always secure horizontally positioned pump sets against rolling off.

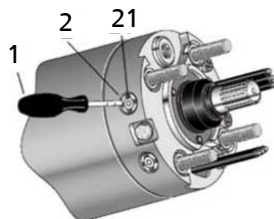


Fig. 39: Venting sizes UMA 150, UMA-S 150

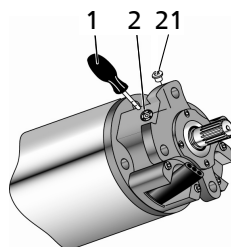



Fig. 40: Venting sizes UMA 200, UMA-S 200, UMA 250, UMA-S 250

- ✓ The fill level has been checked.
  - ✓ Sufficient liquid of the specified concentration is available for filling the motor.
  - ✓ A drain pan for any escaping fill is available.
1. Place the pump set or motor down in a horizontal position. Support it in such a way that the inlet valve is at the highest point. Secure the pump set or motor against rolling off.
  2. Remove the filter plug or screw plug <sup>24)</sup> from the inlet valve.
  3. Gently insert the test pin into the inlet valve until air and some bubble-free liquid escape.
  4. Press the filling syringe against the inlet valve and top up the motor fill until the diaphragm distance measured is smaller than the required distance A.
  5. Adjust the diaphragm distance to the required distance A by draining (venting) or topping up the motor fill as required.
  6. Insert the filter plug or screw plug <sup>24)</sup> into the inlet valve.

<sup>24)</sup> On UMA 150 submersible motor in material variants C, D.







### 7.4.3 Motor fill – UMA 300 and 14D

	<b>NOTE</b>
	<p>The motor fill must be checked prior to installation.</p> <p>If the submersible motor needs to be filled completely, fill it 12 hours prior to mounting it.</p>

On UMA 300 and 14D submersible motors, a colour-coded information sticker indicates the motor fill.

- Green information sticker = motor pre-filled
  - Check the fill level. If required, top it up with filling liquid of the specified concentration.
- Red information sticker = motor unfilled
  - Completely fill the motor with filling liquid of the specified concentration or drinking water.

#### 7.4.3.1 Checking and filling UMA 300 and 14D

	<div> <b>WARNING</b></div> <p><b>Drinking water/antifreeze mixture could escape</b> Hazardous to persons and the environment!</p> <ul style="list-style-type: none"><li>▷ Wear safety glasses and protective gloves when topping up, checking and draining the motor fill.</li><li>▷ Observe the national health and safety regulations.</li><li>▷ Observe all legal regulations on the disposal.</li></ul>
	<div> <b>WARNING</b></div> <p><b>Internal pressure might have built up inside the motor.</b> Risk of injury!</p> <ul style="list-style-type: none"><li>▷ Observe the applicable accident prevention regulations.</li><li>▷ Take care when opening the first screw plug.</li><li>▷ Wear protective clothing.</li></ul>
	<div> <b>WARNING</b></div> <p><b>Pump set tilting or rolling off</b> Risk of personal injury!</p> <ul style="list-style-type: none"><li>▷ Always secure vertically positioned pump sets against tipping over.</li><li>▷ Always secure horizontally positioned pump sets against rolling off.</li></ul>

### Checking the fill level / topping up a pre-filled motor

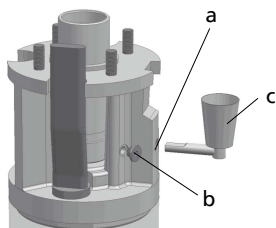


Fig. 41: Size UMA 300

a	Screw plug of the filler opening
b	Screw plug of the vent opening
c	Filling funnel

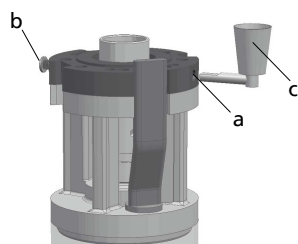



Fig. 42: Size 14D

a	Screw plug of the filler opening
b	Screw plug of the vent opening
c	Filling funnel

- ✓ The information sticker has been checked.
  - ✓ A drain pan for any escaping fill is available.
  - 1. Place the motor or pump set down in a vertical position. Secure it against tipping over.
  - 2. Undo the two screw plugs (a and b) and remove them together with the sealing elements.
    - ⇒ If the liquid level is visible in one of the two openings, the motor fill is sufficient.
    - ⇒ If the liquid level is not visible, insert the filling funnel (c) horizontally into one of the two adapter openings. Depending on the sticker colour, fill in or top up fill liquid until a continuous flow escapes from both openings.
  - 3. Screw the screw plugs (a and b) back in together with the sealing elements. Check that the screw plugs are fitted tightly. Make sure that the contact faces are clean and that the joint ring is inserted and free from damage.
- Checking the screw plugs**
1. Suspend the motor or pump set from a crane. Locate the motor or pump set in position on the floor and secure it against slipping.
  2. Carefully lower the crane to slightly tilt the motor or pump set.
  3. Monitor the screw plugs for any escaping liquid.
  4. Replace the sealing elements if required.

### Filling an unfilled motor




- ✓ The information sticker has been checked.
- ✓ Sufficient liquid of the specified concentration is available for filling the motor.
- ✓ A drain pan for any escaping fill is available.
- ✓ The motor or pump set is positioned vertically and secured against tipping over.
  1. Undo the two screw plugs (a and b) and remove them together with the sealing elements. This results in a filler opening and a vent opening.
  2. To fill the motor, insert the filling funnel (c) horizontally into one of the two adapter openings. Depending on the sticker colour, fill in or top up fill liquid until a continuous flow escapes from both openings.
  3. Wait at least 12 hours to allow the air to escape. During this period, move the motor or pump set suspended from the crane slightly to and fro if possible. Then continue filling it slowly. Wait another 30 minutes.
  4. Check the fill level again.
  5. Screw the screw plugs (a and b) back in together with the sealing elements. Check that the screw plugs are fitted tightly. Make sure that the contact faces are clean and that the joint ring is inserted and free from damage.

	NOTE
	<p>Fill in the fill liquid slowly.</p> <p>Fill in with pauses to allow air to escape.</p> <p>Check the drain plug at the bottom of the motor for tightness.</p>

#### Checking the screw plugs

1. Suspend the motor or pump set from a crane. Locate the motor or pump set in position on the floor and secure it against slipping.
2. Carefully lower the crane to slightly tilt the motor or pump set.
3. Monitor the screw plugs for any escaping liquid.
4. Replace the sealing elements if required.

### 7.5 Storage and preservation

	 <b>WARNING</b>
	<p><b>Pump set tilting or rolling off</b></p> <p>Risk of personal injury!</p> <ul style="list-style-type: none"> <li>▷ Always secure vertically positioned pump sets against tipping over.</li> <li>▷ Always secure horizontally positioned pump sets against rolling off.</li> </ul>
	<b>CAUTION</b>
	<p><b>Improper storage</b></p> <p>Damage to the electric cables!</p> <ul style="list-style-type: none"> <li>▷ Observe the minimum bending radius<sup>25)</sup> of the electric cables.</li> <li>▷ Only remove the protective caps from the electric cables at the time of installation.</li> </ul>

<sup>25)</sup> Observe the cable manufacturer's documentation, DIN VDE 0298-3 and/or the general arrangement drawing.

### 7.5.1 Storing new submersible borehole pumps

For prolonged storage of pump sets / motors that have not been in operation proceed as follows:

1. Remove the pump set / motor from its packaging.
2. Vertical (motor below)
3. In a dry environment
4. Protected against direct sunlight and heat
5. Protected against dirt and dust
6. Protected against freezing
7. Protected against vermin

Motors that are supplied filled are stored with the motor fill, i.e. a mixture of drinking water / antifreeze agent.

Store unfilled motors in unfilled condition.

If motors that were supplied unfilled are then filled e.g. for a functional test, the motor fill required for storage must correspond with that used for motors that are supplied filled, i.e. a mixture of drinking water / antifreeze agent providing protection down to -15 °C.



#### NOTE

Antifreeze concentration gradually decreases over time. Therefore, the antifreeze level must be checked with a spindle. If the anticipated temperature is below the antifreeze value, either increase the antifreeze concentration in the motor accordingly or store the pump set in a frost-free location.

### 7.5.2 Storing submersible borehole pumps that have been removed from the system

Pump sets / motors which have been operated must be overhauled. This must be performed by qualified specialist personnel, for example from a service workshop authorised by KSB. After the pump set / motor has been overhauled, fill the motor with drinking water/antifreeze mixture providing protection down to -15 °C, and store it. Motors must only be stored in unfilled condition if, in addition to the above, the inside of the motor has been preserved against corrosion. Store as described in this manual. (⇒ Section 7.5.1, Page 75)

## 7.6 Reassembling the pump set

### 7.6.1 Mounting the motor




#### ⚠ WARNING

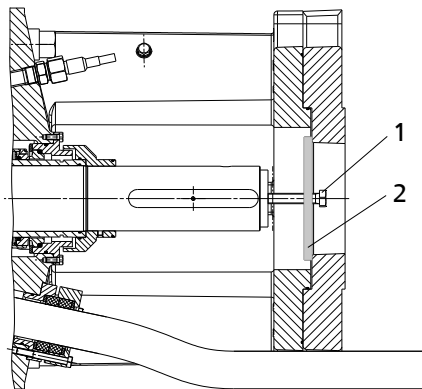
##### Pump set tilting or rolling off

Risk of personal injury!

- ▷ Always secure vertically positioned pump sets against tipping over.
- ▷ Always secure horizontally positioned pump sets against rolling off.

	NOTE
	<p>The submersible motors, with the exception of the 14D type series, are designed with a CrNi steel shaft end and do not need to be protected against corrosion. The 14D submersible motor is supplied with a sealed sleeve coupling that protects the motor shaft from contact with the fluid handled.</p> <p>If a submersible motor is supplied without a pump, a sealed sleeve coupling must be used for mounting the pump on the motor.</p> <p>Make sure this protection is also maintained when the pump is dismantled or replaced.</p>

- ✓ Lifting equipment of sufficient load-carrying capacity is available.  
(⇒ Section 5.2.6, Page 30)
  - ✓ A mounting flange or mounting bracket and lifting straps are available to aid assembly.
  - ✓ Loctite 242 has been prepared.
  - ✓ The cleaning agent (e.g. acetone made by Rhinix or similar) has been prepared.
  - ✓ Grease (approved for drinking water) is available.
  - ✓ A torque wrench is on hand.
  - ✓ Common assembly tools are on hand.
  - ✓ The general assembly drawings are on hand.
1. If already assembled, remove the suction strainer and cable guard from the pump.
  2. Clean all locating surfaces, contact surfaces and threads with a cleaning agent. Thoroughly remove any residues of the preservative.
  3. Grease the shaft stub of the motor and the sleeve coupling of the pump.
  4. Apply a thin layer of grease to the locating surfaces and contact surfaces.
  5. On new motors, remove the transport lock from the shaft.



**Fig. 43:** Transport lock

- ⇒ UMA 300 and 14D submersible motors: Remove the screw (1) and strap (2).
  - ⇒ UMA 150, UMA-S 150, UMA 200, UMA-S 200, UMA 250 and UMA-S 250 submersible motors: Remove the transport support from the shaft. Pull off the protective cap.
6. Position the motor vertically and secure it against tipping over.
  7. Suspend the pump from the crane and align it so that the cable recess, coupling sleeve and screws/bolts are in the correct position.
  8. Centre the pump, fit the sleeve coupling around the shaft end, and lower the pump.
  9. Fit nuts on the pump/motor assembly studs. Apply Loctite 242 and tighten the nuts by hand.



10. Insert the grub screw and/or anti-lift device including securing screw into the coupling sleeve. Apply Loctite 242. Gently screw in the screw until it will not go any further, back it off  $\frac{1}{8}$  of a turn. In the case of a splined shaft end, back off the screw  $\frac{1}{2}$  of a turn.

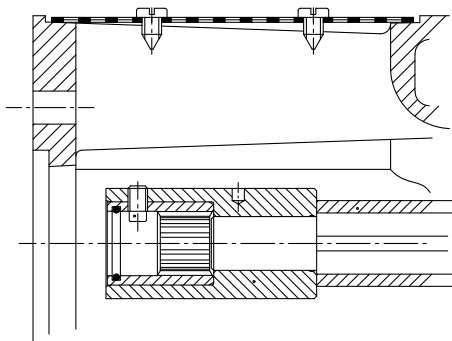


Fig. 44: UMA 150, UMA-S 150

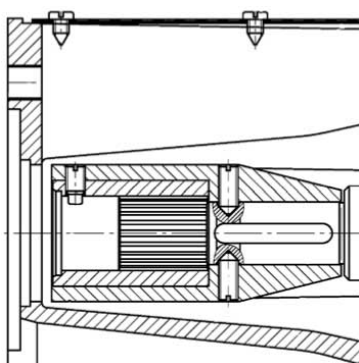


Fig. 45: UMA 200, UMA-S 200, UMA 250, UMA-S 250

	CAUTION
	<p><b>Incorrect fitting of the grub screw</b> Damage to the submersible motor!</p> <p>▷ Make sure the fitted grub screw does not touch the rotor.</p>

11. Use a torque wrench to tighten the assembly studs; alternate sides after each stud. Observe and check the tightening torque (⇒ Section 7.6.2, Page 77) .
12. Fasten the electric cables to the pump set together with the suction strainer and the cable guard.


### 7.6.2 Tightening torques

Table 29: Tightening torques for bolted/screwed connections at the pump/motor

Material / property class		A4 - 50	A4 - 70	A4 - 80	1.4462
Rp 0,2 [N/mm <sup>2</sup> ]		210	450	600	450
Metric thread		Tightening torque M <sub>A</sub> [Nm]			
Coarse-pitch thread	Fine-pitch thread				
M4	-	1,0	2,15	2,9	2,15
M5	-	2,0	4,25	5,7	4,25
M6	-	3,4	7,3	9,75	7,3
M8	-	8,3	17,7	23,7	17,7
-	M8 × 1	8,9	19,1	25,5	19,1
M10	-	16,2	34,8	46,4	34,8
-	M10 × 1,5	17,3	36,9	49,2	36,9
M12	-	28,0	59,9	79,8	59,9
-	M12 × 1,5	29,4	62,9	83,9	62,9

Material / property class		A4 - 50	A4 - 70	A4 - 80	1.4462
Rp 0,2 [N/mm <sup>2</sup> ]		210	450	600	450
-	M12 × 1,25	30,8	66,0	88,0	66,0
M16	-	69,2	148,0	197,0	148,0
-	M16 × 1,5	74,3	159,0	211,0	159,0
M20	-	135,0	290,0	386,0	290,0
-	M20 × 1,5	151,0	324,0	432,0	324,0
M24	-	233,0	278,0	665,0	500,0
-	M24 × 2	256,0	305,0	731,0	548,0
M27	-	343,0	409,0	984,0	736,0
-	M27 × 2	372,0	443,0	1060	797,0
M30	-	466,0	554,0	1330	1000
-	M30 × 2	519,0	618,0	1480	1110
M33	-	636,0	-	1820	1360
-	M33 × 2	700,0	-	2000	1500
M36	-	812,0	-	2325	1740
-	M36 × 3	863,0	-	2465	1850

## 8 Trouble-shooting

	<b>⚠ WARNING</b>
	<b>Improper work to remedy faults</b> Risk of injury! <p>► For any work performed to remedy faults, observe the relevant information given in this operating manual and/or in the product literature provided by the accessories manufacturer.</p>

If problems occur that are not described in the following table, consultation with the KSB service is required.

- A Pump is running, but does not deliver
- B Insufficient flow rate
- C Insufficient discharge head
- D Vibrations and noise during pump operation
- E Overcurrent relay has tripped
- F Fuses have blown
- G Pump set cannot be switched on
- H Pump set cannot be switched off

Table 30: Trouble-shooting

A	B	C	D	E	F	G	H	Possible cause	Remedy <sup>26)</sup>
-	X	-	-	-	-	-	-	Pump delivers against an excessively high pressure.	Re-adjust to duty point by opening the shut-off element accordingly.
-	-	X	-	-	-	-	-	Pump delivers against an excessively low pressure.	Re-adjust to duty point by closing the shut-off element accordingly.
-	-	X	X	-	-	-	-	Deposits in the impellers	Remove deposits. Contact KSB.
-	X	X	-	-	-	-	-	Wrong direction of rotation (three-phase units)	Interchange two of the phases of the power cable.
-	X	X	-	-	-	-	-	Wear of internal components	Replace worn parts by new ones. Contact KSB.
-	X	-	-	X	-	-	-	Two-phase operation	Replace defective fuse. Check cable connections.
X	-	-	-	-	-	X	-	No power supply	Check electrical installation. Inform electric utility company.
X	-	-	-	X	-	-	-	Pump clogged by sand	Clean suction casing, impellers, stage casings and check valve. Request particulars.
X	-	-	-	X	X	X	-	Motor winding or power cable are defective.	Contact KSB.
X	X	X	-	-	-	-	-	Defective or clogged riser (pipe and sealing elements)	Replace defective pipes. Replace sealing elements.
-	X	-	-	-	-	-	-	Water level lowered too much during operation	Contact KSB.
X	-	X	X	-	-	-	-	Impermissible air/gas content in the fluid handled	Contact KSB.
-	-	-	X	-	-	-	-	Mechanical defect of pump or motor	Contact KSB.
-	-	-	X	-	-	-	-	System-induced vibrations	Contact KSB.
-	X	-	X	-	-	-	-	NPSHavailable (positive suction head) is too low.	Submerge pump deeper.

<sup>26)</sup> Release pump set pressure before attempting to remedy faults on parts which are subjected to pressure.

A	B	C	D	E	F	G	H	Possible cause	Remedy <sup>26)</sup>
-	X	X	-	-	-	-	-	Speed is too low.	Check electrical voltage and increase if necessary. Contact KSB.
-	-	-	-	-	X	-	-	Wrong fuse size	Fit correct fuse size.
-	-	-	-	X	-	X	X	Defective overcurrent relay	Check and replace if necessary.
-	-	-	-	X	-	-	-	Motor winding not suitable for operating voltage available	Replace the pump set. Contact KSB.

## 9 Related Documents

### 9.1 General arrangement drawings with list of components

#### 9.1.1 UPA S 250, standard design

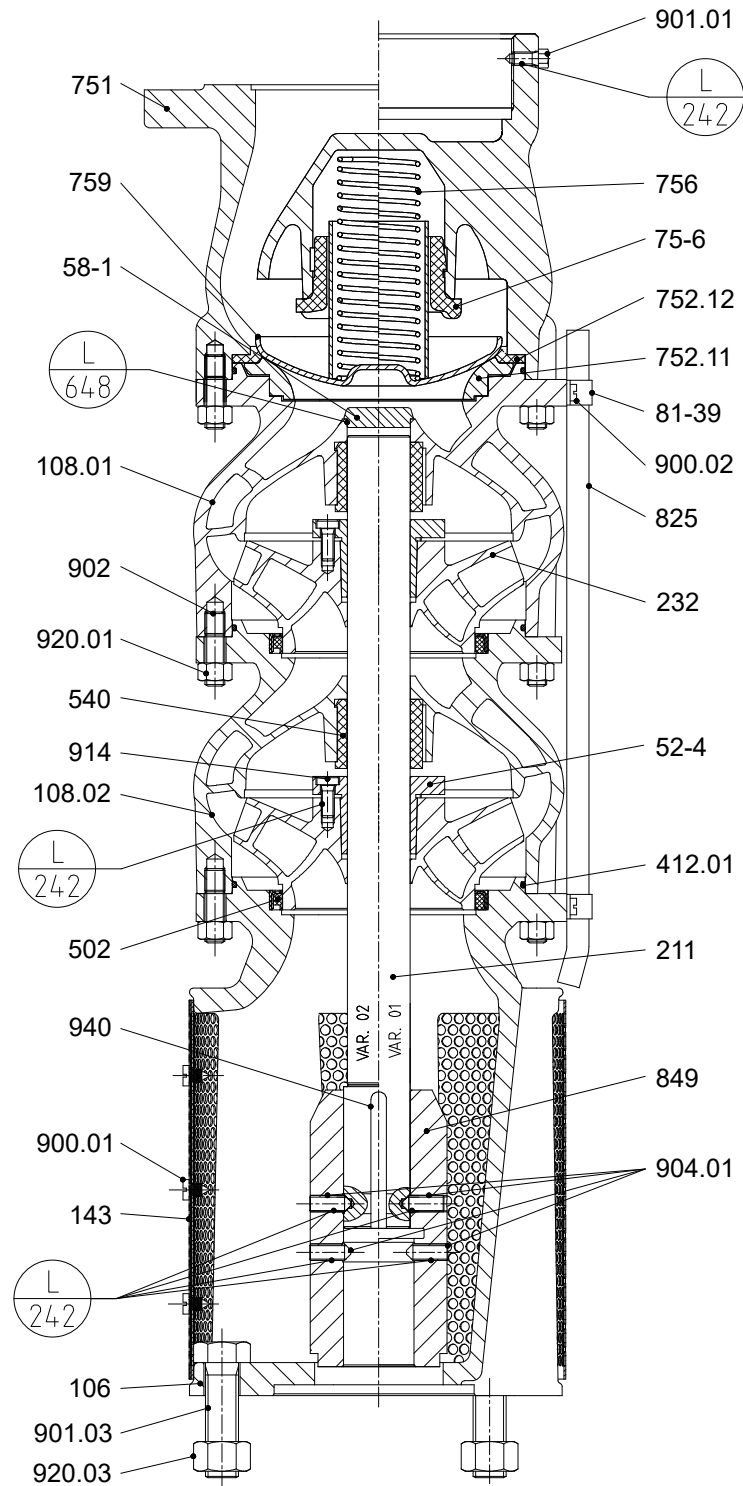


Fig. 46: UPA S 250 with connection for UMA 250 or UMA-S 250 motor

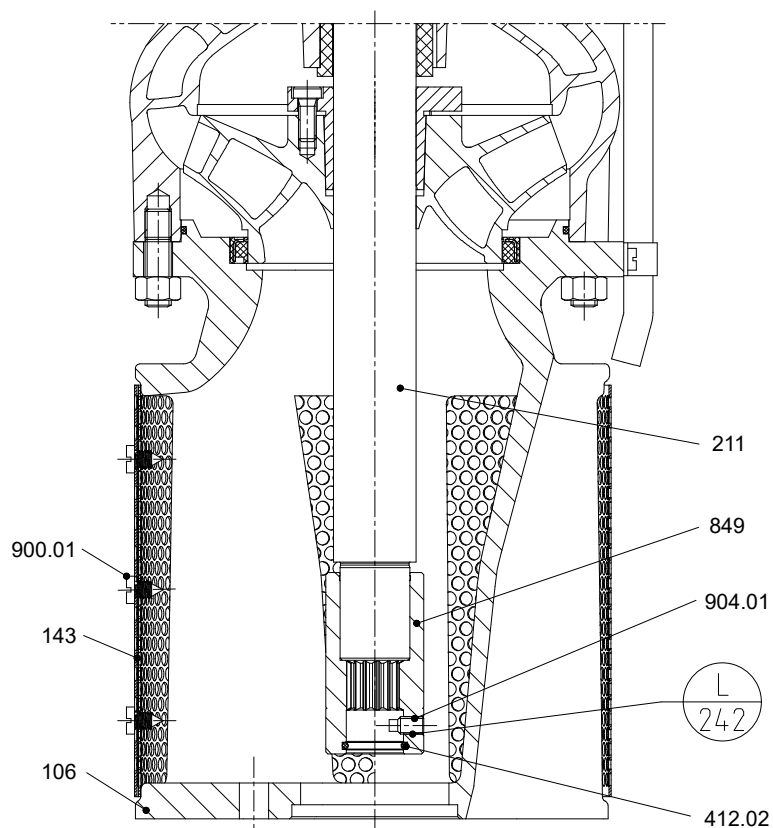


Fig. 47: UPA S 250 with connection for UMA 150 or UMA-S 150 motor

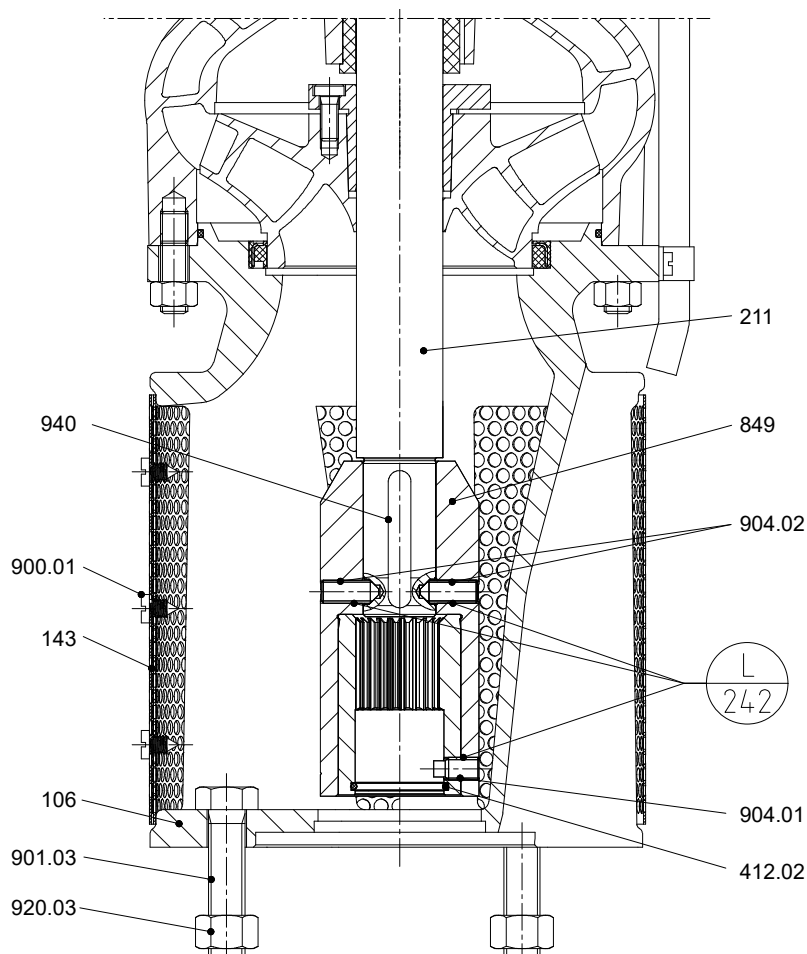


Fig. 48: UPA S 250 with connection for UMA 200 or UMA-S 200 motor

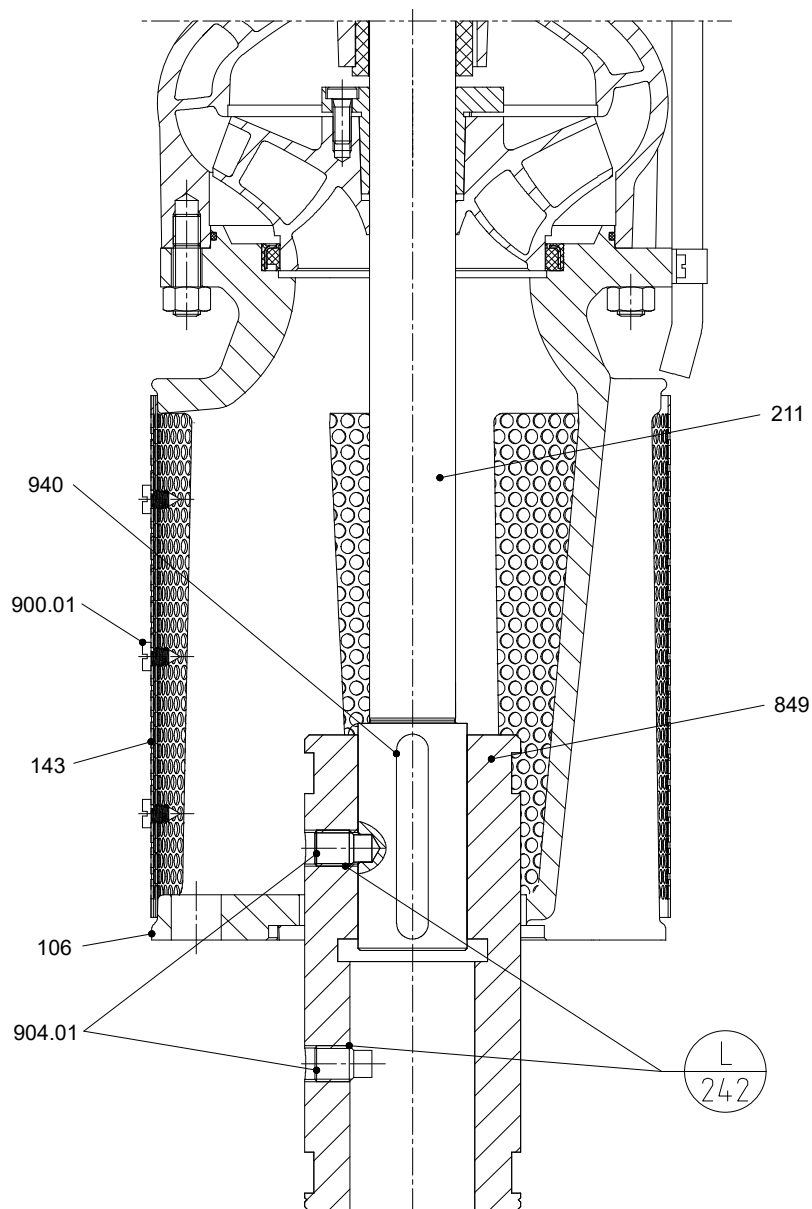


Fig. 49: UPA S 250 with connection for UMA 300 motor

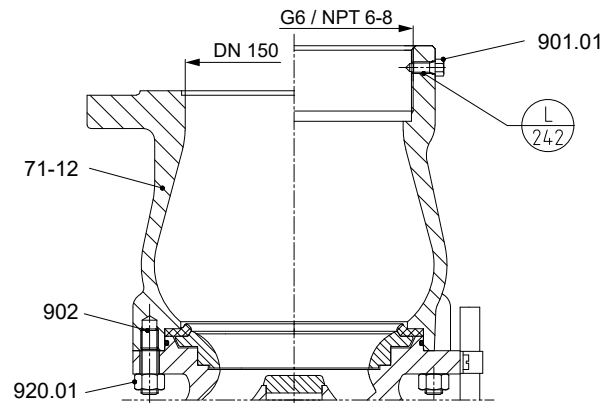


Fig. 50: Types of connection

Table 31: Symbols key



Symbol	Description
	Always secure screwed connections marked with this symbol with <b>Loctite 242</b> .
	Always secure screwed connections marked with this symbol with <b>Loctite 648</b> .

Table 32: List of components for UPA S, standard design

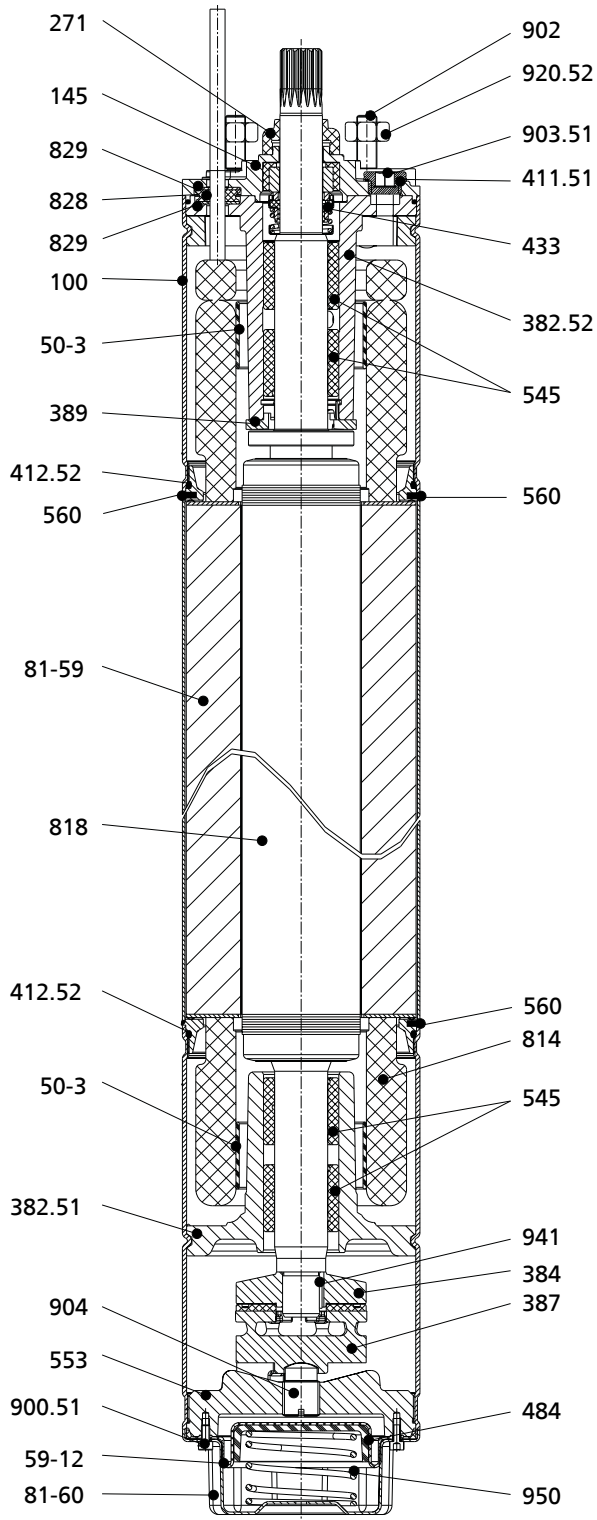
Quantity	Part No.	Description	Motor size				Scope of supply
			6 inch UMA 150, UMA-S 150	8 inch UMA 200, UMA-S 200	10 inch UMA 250, UMA-S 250	12 inch UMA 300	
1	106	Suction casing	✓	-	-	✓	143, 412.01, 502, 900.01
			-	✓	✓	-	143, 412.01, 502, 900.01, 901.03, 920.03
1	108.01	Stage casing (last stage)	✓	✓	✓	✓	58-1, 412.01, 540, 902, 920.01
1 per stage -1	108.02	Stage casing	✓	✓	✓	✓	412.01, 502, 540, 902, 920.01
1	143 <sup>27)</sup>	Suction strainer	✓	✓	✓	✓	900.01
1	211	Pump shaft	✓	-	-	-	412.02, 540, 849, 904.01
			-	✓	-	-	412.02, 540, 849, 904.01, 904.02, 940
			-	-	✓	✓	540, 849, 904.01, 940
1 per stage	232	Clockwise impeller	✓	✓	✓	✓	52-4, 914
1 per stage +1	412.01 <sup>27)</sup>	O-ring	✓	✓	✓	✓	-
1	412.02 <sup>27)</sup>	O-ring	✓	✓	-	-	-
1 per stage	52-4 <sup>27)</sup>	Locking sleeve	✓	✓	✓	✓	914
1	58-1	Protecting plug	✓	✓	✓	✓	-
1 per stage	502 <sup>27)</sup>	Casing wear ring	✓	✓	✓	✓	-
1 per stage	540 <sup>27)</sup>	Bush	✓	✓	✓	✓	-
1	71-12	Connection nozzle, flanged	✓	✓	✓	✓	902, 920.01
		Connection nozzle, threaded	✓	✓	✓	✓	901.01, 902, 920.01

<sup>27)</sup> Recommended spare part

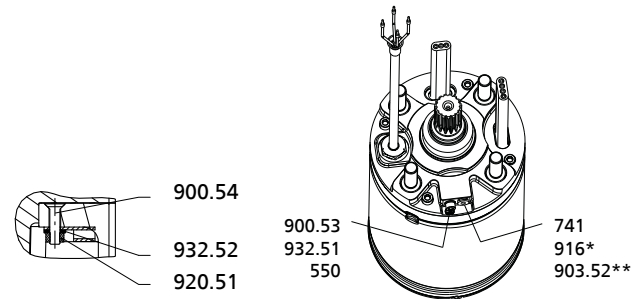


Quantity	Part No.	Description	Motor size				Scope of supply
			6 inch UMA 150, UMA-S 150	8 inch UMA 200, UMA-S 200	10 inch UMA 250, UMA-S 250	12 inch UMA 300	
1	75-6 <sup>27)</sup>	Valve disc guide	✓	✓	✓	✓	-
1	751	Valve body, flanged	✓	✓	✓	✓	75-6, 752.11, 752.12, 756, 759, 902, 920.01
		Valve body, threaded	✓	✓	✓	✓	75-6, 752.11, 752.12, 756, 759, 901.01, 902, 920.01
1	752.11	Valve seat	✓	✓	✓	✓	752.12
1	752.12 <sup>27)</sup>	Valve seat	✓	✓	✓	✓	-
1	756 <sup>27)</sup>	Valve spring	✓	✓	✓	✓	-
1	759	Valve disc	✓	✓	✓	✓	752.12, 756
2 per electric cable	81-39	Clamp	✓	✓	✓	✓	-
1 per electric cable	825	Cable guard	✓	✓	✓	✓	-
1	849	Sleeve coupling	✓	-	-	-	412.02, 904.01
			-	✓	-	-	412.02, 904.01, 904.02, 940
			-	-	✓	✓	904.01, 940
3	900.01	Bolt/screw	✓	✓	✓	✓	-
4 per electric cable	900.02	Bolt/screw	✓	✓	✓	✓	-
2	901.01	Hexagon head bolt	✓	✓	✓	✓	-
4	901.03	Hexagon head bolt	-	✓	✓	-	-
(1 per stage +1) × 12	902	Stud	✓	✓	✓	✓	-
1	904.01	Grub screw	✓	✓	-	-	-
4		Grub screw	-	-	✓	-	-
2		Grub screw	-	-	-	✓	-
2	904.02	Grub screw	-	✓	-	-	-
1 per stage × 4	914	Hexagon socket head cap screw	✓	✓	✓	✓	-
(1 per stage +1) × 12	920.01	Nut	✓	✓	✓	✓	-
4	920.03	Nut	-	✓	✓	-	-
1	940 <sup>27)</sup>	Key	-	✓	✓	✓	-

### 9.1.2 UMA 150 submersible motor

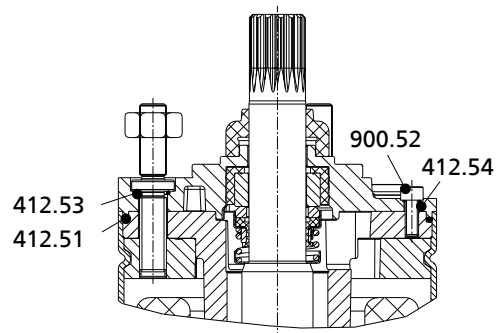


General assembly drawing, example UMA 150 > 30 kW

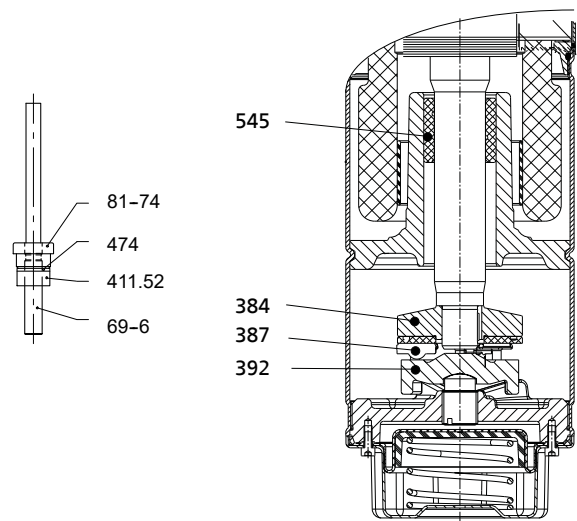


Fastening of earth conductor

Filler opening  
\* For material variant E  
\*\* For material variant C and D



Sectional view of the motor shaft, UMA 150 < 26 kW



Temperature sensor

Sectional view of thrust bearing, UMA 150


**Table 33:** List of components of UMA 150, material variants E, C, D

Qty/ motor	Part No.	Description	Scope of supply	Note
1	100	Casing	-	-
1	145	Adapter	-	-
1	271	Sand guard	Kit 3	-
1	382.51	Bearing carrier (bottom)	-	-
1	382.52	Bearing carrier (top)	-	-
1	384	Thrust collar	Kit 1a for UMA 150 5/2. to 26/2. Kit 1b for UMA 150 30/2. to 37/22	-
3 or 6	387	Thrust bearing segment	Kit 1a for UMA 150 5/2. to 26/2. Kit 1b for UMA 150 30/2. to 37/22	-
1	389	Counter thrust bearing ring	Kit 1a for UMA 150 5/2. to 26/2. Kit 1b for UMA 150 30/2. to 37/22	-
1	392	Bearing segment carrier	Kit 1a for UMA 150 5/2. to 26/2. Kit 1b for UMA 150 30/2. to 37/22	-
1	411.51	Joint ring	Kit 3	-
1	411.52	Joint ring	Kit 7a (E, C), Kit 7b (D)	-
1	412.51	O-ring	Kit 3	-
2	412.52	O-ring	Kit 1a and 1b Kit 3	-
4	412.53	O-ring	Kit 3 Kit 4a (E, C), 4b (D)	-
4	412.54	O-ring	Kit 3 Kit 4a (E, C), 4b (D)	-
1	433	Mechanical seal	Kit 3	-
1	474	Thrust ring	Kit 7a (E, C), Kit 7b (D)	-
1	484	Spring plate	-	-
2	50-3	Backing ring	-	-
2 or 4	545	Bearing bush	Kit 2a for UMA 150 5/2. to 26/2. Kit 2b for UMA 150 30/2. to 37/22	Qty. of 2/4 available as Kit 2a/2b with bearing sleeve 529
1	550	Disc	Kit 4a (E, C), 4b (D)	-
1	553	Thrust insert	-	-
3	560	Pin	Kit 3 Kit 4a (E, C), 4b (D)	-
1	59-12	Diaphragm	Kit 3	-
1	69-6	Temperature sensor	Kit 7a (E, C), Kit 7b (D)	-
1	741	Valve (filling)	Kit 5	-
1	81-59	Stator	-	-
1	81-60	Diaphragm housing	-	-
1	81-74	Pressure screw	Kit 7a (E, C), Kit 7b (D)	-
1	814	Winding	-	-
1	818	Rotor	-	-
1 or 2	828	Cable grommet	Kit 6a, b, c, d, e	For versions with either one or two cables
2 or 4	829	Cable gland ring	Kit 6a, b, c, d, e	-
6	900.51	Bolt/screw	Kit 4a (E, C), 4b (D)	-
4	900.52	Bolt/screw	Kit 4a (E, C), 4b (D)	-
1	900.53	Bolt/screw	Kit 4a (E, C), 4b (D)	-
1	900.54	Bolt/screw	Kit 4a (E, C), 4b (D)	-
4	902	Stud	Kit 4a (E, C), 4b (D)	-
1	903.51	Screw plug	-	With integrated joint ring 411.51
1	903.52	Screw plug	Kit 5	Only in material variants C and D
1	904	Grub screw	Kit 1a and 1b	-
1	916	Plug	Kit 5	Only in material variant E

Qty/ motor	Part No.	Description	Scope of supply	Note
1	920.51	Nut	Kit 4a (E, C), 4b (D)	-
4	920.52	Nut	Kit 4a (E, C), 4b (D)	-
1	932.51	Circlip	Kit 4a (E, C), 4b (D)	Only in material variants E and C
1	932.52	Circlip	Kit 4a (E, C), 4b (D)	-
1	941	Key	Kit 1a and 1b	-
1	950	Spring	-	-

## 9.2 Mating dimensions for the motors

### 9.2.1 UMA 150, UMA-S 150 mating dimensions

	<b>CAUTION</b>
	<p><b>Incorrect pump connection</b> Damage to the pump set!</p> <p>► The pump shaft must rest on the motor shaft.</p>

Observe the following dimensions:

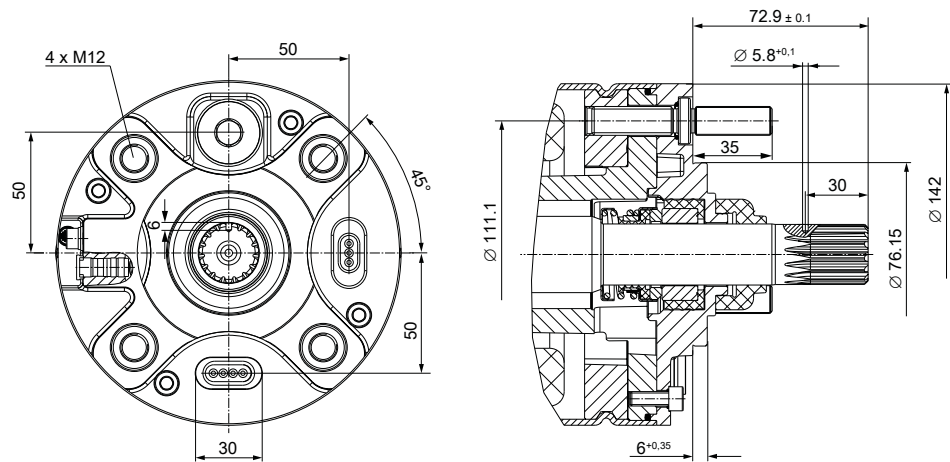


Fig. 51: UMA 150, UMA-S 150 mating dimensions in [mm]

### 9.2.2 UMA 200, UMA-S 200 mating dimensions

	<b>CAUTION</b>
<b>Incorrect pump connection</b>	<b>Damage to the pump set!</b>
▷ The pump shaft must rest on the motor shaft.	

Observe the following dimensions:

1. Axial tolerance:  $1.2 \pm 0.6$  mm
2. Dimension to be set:  $101.5 \pm 0.1$  mm

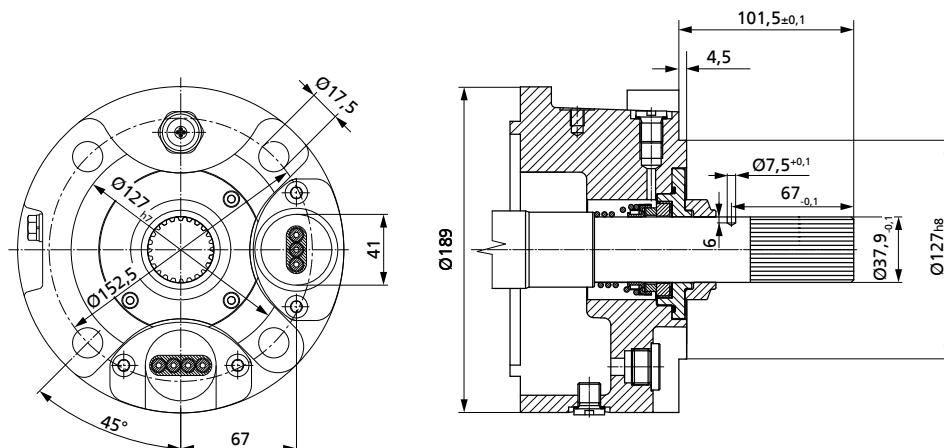


Fig. 52: UMA 200, UMA-S 200 mating dimensions in [mm]

### 9.2.3 UMA 250, UMA-S 250 mating dimensions

	<b>CAUTION</b>
<b>Incorrect pump connection</b>	<b>Damage to the pump set!</b>
▷ The pump shaft must rest on the motor shaft.	

Observe the following dimensions:

1. Axial tolerance:  $1.0^{+0.7} / -0.6$  mm
2. Dimension to be set:  $101.5 \pm 0.1$  mm

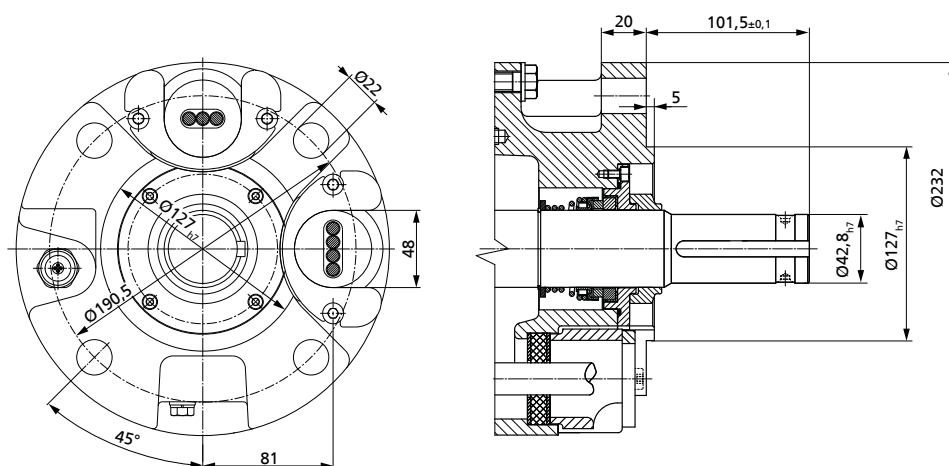



Fig. 53: UMA 250, UMA-S 250 mating dimensions in [mm]

### 9.2.4 UMA 300 (2-pole) mating dimensions

	<p style="background-color: yellow; text-align: center;"><b>CAUTION</b></p> <p><b>Incorrect pump connection</b> Damage to the pump set!</p> <p>► The pump shaft must rest on the motor shaft.</p>
---	---

Observe the following dimensions:

1. Axial tolerance:  $1.5_{-0.3}$  mm
2. Dimension to be set:  $4.5 \pm 0.1$  mm

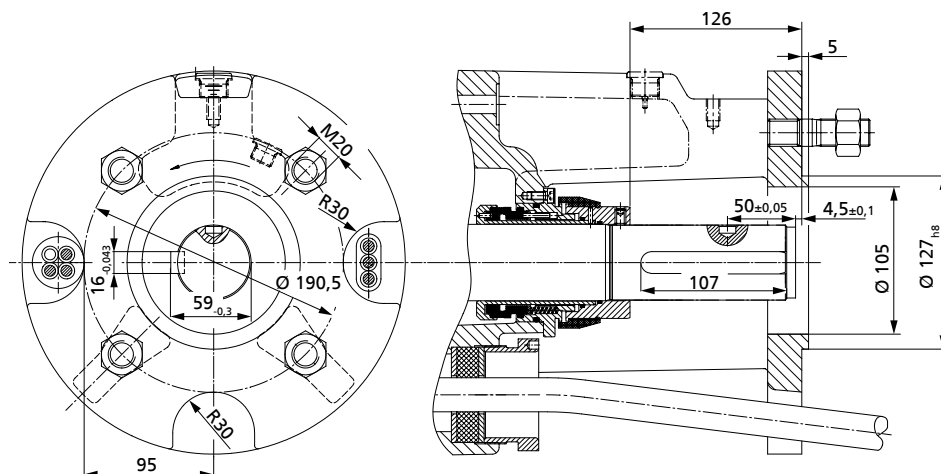



Fig. 54: UMA 300 (2-pole) mating dimensions in [mm]

### 9.2.5 UMA 300 (4-pole) mating dimensions

	<p style="background-color: yellow; text-align: center;"><b>CAUTION</b></p> <p><b>Incorrect pump connection</b> Damage to the pump set!</p> <p>► The pump shaft must rest on the motor shaft.</p>
---	---

Observe the following dimensions:

1. Axial tolerance:  $1.5_{-0.3}$  mm
2. Dimension to be set:  $4.5 \pm 0.1$  mm

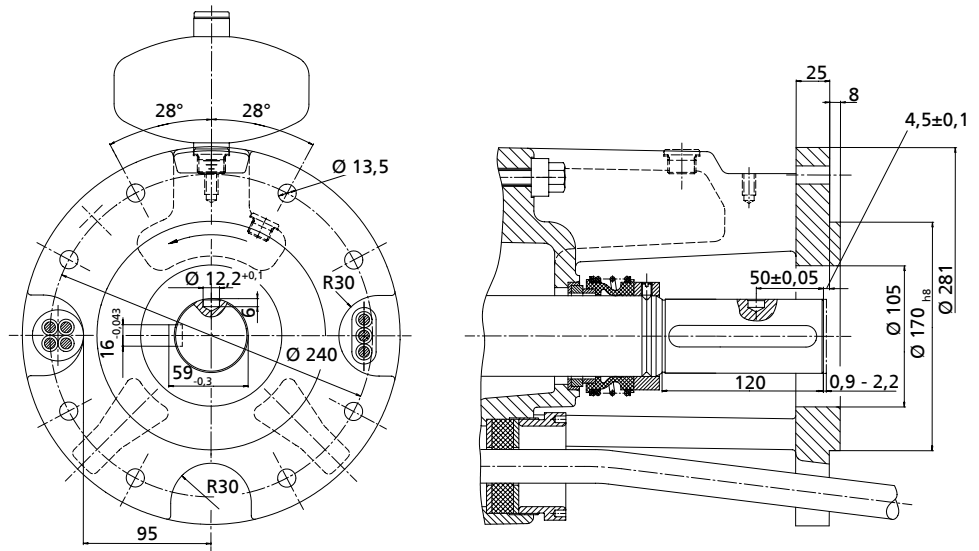


Fig. 55: UMA 300 (4-pole) mating dimensions in [mm]

### 9.2.6 Mating dimensions 14D

	<b>CAUTION</b>
	<b>Incorrect pump connection</b> Damage to the pump set!
	▷ The pump shaft must rest on the motor shaft.

Observe the following dimensions:

1. Axial tolerance: A = 1.2 to 1.5 mm
2. Dimension to be set: B = 72 ± 0.1 mm

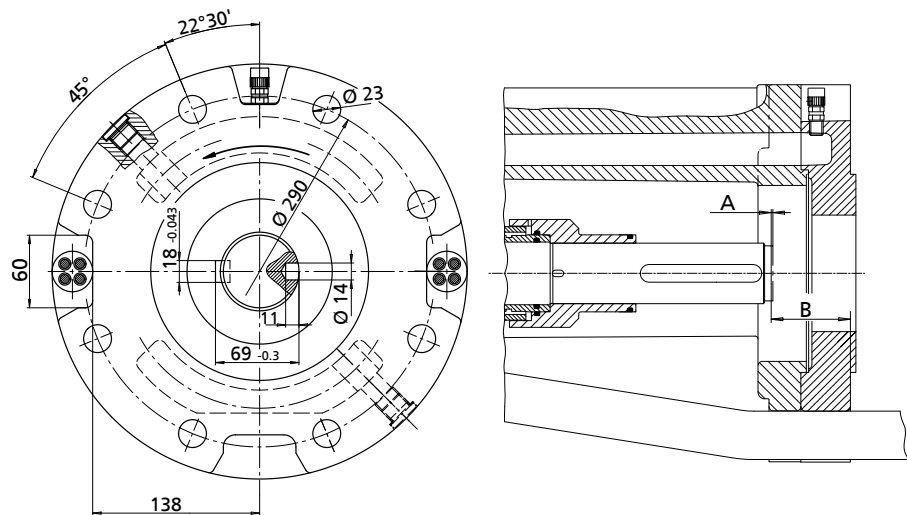


Fig. 56: Mating dimensions 14D, dimensions in [mm]



## 10 EU Declaration of Conformity

Manufacturer:

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

The manufacturer herewith declares that the product:

### **UPA + UMA, UMA-S** **UPA S + UMA, UMA-S**

- is in conformity with the provisions of the following directives / regulations as amended from time to time:
  - 2006/42/EC: Machinery Directive
  - Electrical components<sup>28)</sup>: 2011/65/EU Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

The manufacturer also declares that

- the following harmonised international standards have been applied:
  - ISO 12100
  - EN 809
  - EN 60034-1, EN 60034-5/A1

Person authorised to compile the technical file:

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

The EU Declaration of Conformity was issued in/on:

Place, date

.....<sup>29)</sup>.....

Name  
Function  
Company  
Address

---

<sup>28</sup> Where applicable

<sup>29</sup> A signed, legally binding EU Declaration of Conformity is supplied with the product.

## 11 Certificate of Decontamination

Type: .....  
Order number /  
Order item number<sup>30)</sup>: .....  
Delivery date: .....  
Application: .....  
Fluid handled<sup>30)</sup>: .....

Please tick where applicable<sup>30)</sup>:



Corrosive



Oxidising



Flammable



Explosive



Hazardous to health



Seriously hazardous to health



Toxic



Radioactive



Bio-hazardous



Safe

Reason for return:<sup>30)</sup> .....  
Comments: .....  
.....

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

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

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

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

- ☐ No special safety precautions are required for further handling.  
☐ The following safety precautions are required for flushing fluids, fluid residues and disposal:

.....  
.....

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

.....  
Place, date and signature

.....  
Address

.....  
Company stamp

<sup>30)</sup> Required field

## Index

### A

Applications 9

### B

Bearings 23

### C

Certificate of Decontamination 94

Connections 22

### D

Delay before re-starting 57

Design 22

Designation 19, 20

Disposal 17

Drive 22

### E

Event of damage 6

### F

Faults

Causes and remedies 79

Frequency of starts 57

### I

Impeller type 22

Intended use 9

### K

Key to safety symbols/markings 8

### M

Magnetic field 11

### O

Order number 6

Other applicable documents 7

### P

Preservation 15

Product description 18

### R

Return to supplier 16

### S

Safety 9

Safety awareness 10

Scope of supply 24

Shaft seal 23

Storage 15

### T

Tightening torques 77

Type of installation 22

### W

Warnings 8

Warranty claims 6







**KSB SE & Co. KGaA**

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

Tel. +49 6233 86-0

[www.ksb.com](http://www.ksb.com)

3400.86/17-EN (01463323)