

Grey Water and Condensate Pump

Rotex

Installation/Operating Manual



CE

KSB 

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Installation/Operating Manual Rotex

Original operating manual

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Glossary

Certificate of decontamination

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

Discharge line

The pipeline which is connected to the discharge nozzle

Pump

Machine without drive, additional components or accessories

Pump set

Complete pump set consisting of pump, drive, additional components and accessories

Waste water

Water consisting of a combination of water discharged from households, industrial and other businesses as well as surface water.

1 General

1.1 Principles

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

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

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

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

1.2 Installation of partly completed machinery

To install partly completed machinery supplied by KSB refer to the sub-sections under Servicing/Maintenance.

1.3 Target group

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

1.4 Other applicable documents

Table 1: Overview of other applicable documents

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

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

¹ If included in agreed scope of supply

1.5 Symbols

Table 2: Symbols used in this manual

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

1.6 Key to safety symbols/markings

Table 3: Definition of safety symbols/markings

Symbol	Description
 DANGER	DANGER This signal word indicates a high-risk hazard which, if not avoided, will result in death or serious injury.
 WARNING	WARNING This signal word indicates a medium-risk hazard which, if not avoided, could result in death or serious injury.
 CAUTION	CAUTION This signal word indicates a hazard which, if not avoided, could result in damage to the machine and its functions.
	General hazard In conjunction with one of the signal words this symbol indicates a hazard which will or could result in death or serious injury.
	Electrical hazard In conjunction with one of the signal words this symbol indicates a hazard involving electrical voltage and identifies information about protection against electrical voltage.
	Machine damage In conjunction with the signal word CAUTION this symbol indicates a hazard for the machine and its functions.



2 Safety

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

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

2.1 General

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

2.2 Intended use

- The pump (set) must only be operated in the fields of application and within the use limits specified in the other applicable documents.
- Only operate pumps/pump sets which are in perfect technical condition.
- Do not operate the pump (set) in partially assembled condition.
- Only use the pump to handle the fluids described in the data sheet or product literature of the pump model or variant.
- Never operate the pump without the fluid to be handled.
- Observe the minimum flow rates indicated in the data sheet or product literature (to prevent overheating, bearing damage, etc).
- 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).
- 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.

2.2.1 Prevention of foreseeable misuse

- Never exceed the permissible application and operating limits specified in the data sheet or product literature regarding pressure, temperature, etc.
- Never open the discharge-side shut-off elements further than permitted.
 - The maximum flow rate specified in the technical product literature would be exceeded.
 - Risk of cavitation damage
- Observe all safety information and instructions in this manual.

2.3 Personnel qualification and training

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

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

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

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

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

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

2.5 Safety awareness

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

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

2.6 Safety information for the operator/user

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

2.7 Safety information for maintenance, inspection and installation

- Modifications or alterations of the pump (set) are only permitted with the manufacturer's prior consent.
- Use only original spare parts or parts/components authorised by the manufacturer. The use of other parts/components can invalidate any liability of the manufacturer for resulting damage.
- The operator ensures that maintenance, inspection and installation are performed by authorised, qualified specialist personnel who are thoroughly familiar with the manual.
- Only carry out work on the pump (set) during standstill of the pump.
- Only perform work on the pump set when it has been disconnected from the power supply (de-energised).
- The pump (set) must have cooled down to ambient temperature.
- Pump pressure must have been released and the pump must have been drained.
- When taking the pump set out of service always adhere to the procedure described in the manual. (⇒ Section 6.3, Page 29)
- 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 25)

2.8 Unauthorised modes of operation

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

The warranty relating to the operating reliability and safety of the pump (set) supplied is only valid if the equipment is used in accordance with its intended use. (⇒ Section 2.2, Page 8)

3 Transport/Storage/Disposal

3.1 Checking the condition upon delivery

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

3.2 Transport

	 DANGER
	<p>The pump (set) could slip out of the suspension arrangement Danger to life from falling parts!</p> <ul style="list-style-type: none"> ▷ Observe the information on weights, centre of gravity and fastening points. ▷ Observe the applicable local accident prevention regulations. ▷ Use suitable, approved lifting accessories.

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

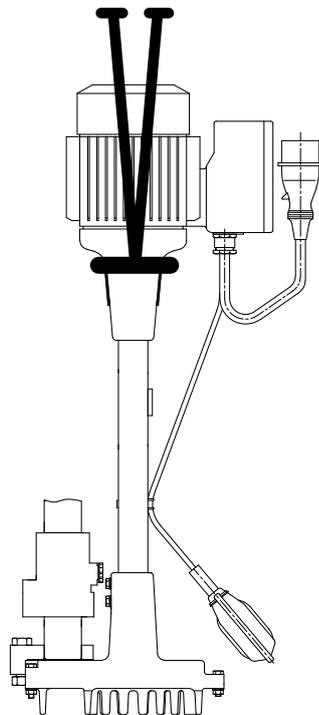


Fig. 1: Transporting a Rotex pump set with a rope looped around the bottom of the motor

3.3 Storage/preservation

	<p>CAUTION</p>
	<p>Damage during storage due to humidity, dirt or vermin Corrosion/contamination of pump (set)!</p> <ul style="list-style-type: none"> ▷ For outdoor storage cover the pump (set) and accessories with waterproof material and protect against condensation.
	<p>CAUTION</p>
	<p>Wet, contaminated or damaged openings and connections Leakage or damage to the pump!</p> <ul style="list-style-type: none"> ▷ Clean and cover pump openings and connections as required prior to putting the pump into storage.

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

- Store the pump (set) in a dry, protected room where the atmospheric humidity is as constant as possible.
- Rotate the shaft by hand once a month, e.g. via the motor fan.

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

For storing a pump (set) which has already been operated, the shutdown measures must be adhered to. (⇒ Section 6.3.1, Page 29)

3.4 Return to supplier

1. Drain the pump as per operating instructions.
2. Flush and clean the pump, particularly if it has been used for handling noxious, explosive, hot or other hazardous fluids.
3. If the pump has handled fluids whose residues could lead to corrosion damage in the presence of atmospheric humidity or could ignite upon contact with oxygen, the pump must also be neutralised, and anhydrous inert gas must be blown through the pump to ensure drying.
4. Always complete and enclose a certificate of decontamination when returning the pump.
Indicate any safety measures and decontamination measures taken.
(⇒ Section 11, Page 45)

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

3.5 Disposal

	 WARNING
	<p>Fluids handled, consumables and supplies which are hot and/or pose a health hazard</p> <p>Hazard to persons and the environment!</p> <ul style="list-style-type: none">▷ Collect and properly dispose of flushing fluid and any fluid residues.▷ Wear safety clothing and a protective mask if required.▷ Observe all legal regulations on the disposal of fluids posing a health hazard.

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

4 Description of the Pump (Set)

4.1 General description

- Grey water and condensate pump

Pump for handling chemically neutral, slightly contaminated waste water.

- Rotex 10, 20:
 - For fluid temperatures ≤ 90 °C
- Rotex 70:
 - For fluid temperatures ≤ 70 °C
 - Not suitable for pumping condensate!

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

For information as per European chemicals regulation (EC) No. 1907/2006 (REACH) see <https://www.ksb.com/en-global/company/corporate-responsibility/reach>.

4.3 Designation

Example: Rotex 10 / 100 D

Table 4: Designation key

Code	Description	
Rotex	Type series	
10	Size	
	10	<ul style="list-style-type: none"> ▪ Heavy-duty design Rp 1 1/4, Rp 2 ▪ Two-channel impeller ▪ Level control with displacement weight
	20	<ul style="list-style-type: none"> ▪ Heavy-duty design Rp 2 ▪ Three-channel impeller ▪ Level control with displacement weight
	70 ²⁾	<ul style="list-style-type: none"> ▪ Light-duty design Rp 1 1/4, Rp 2 ▪ Open radial impeller ▪ Level control with float switch
100	Installation depth [cm]	
	100, 170 ³⁾	
D	Drive	
	D	Three-phase motor
	E	Single-phase AC motor

²⁾ Rotex size 70 cannot be used for condensate.

³⁾ Rotex size 70 is only available up to an installation depth of 100 cm.

4.4 Name plate



Fig. 2: Rotex name plate (example)

1	Type series, size	2	Flow rate ($Q_{min.} - Q_{max.}$)
3	Principles of construction and testing	4	Year/week of construction
5	Head ($H_{max.} - H_{min.}$)	6	Total weight

4.5 Design details

Design

- Centrifugal pump
- Single-stage
- To EN 12050-2
- Pump foot designed as inlet strainer
- Discharge to the top, parallel to the pump shaft
- Pump and motor rigidly connected via a support column
- Ready to be plugged in
- 1.5 m power cable

Installation

- Vertical installation

Drive

- Surface-cooled three-phase motor
- Enclosure IP55
- AC motor
- IP54 enclosure

Impeller type

Rotex 10:

- Two-channel impeller
- Free passage= 13 mm

Rotex 20:

- Three-channel impeller
- Free passage= 18 mm

Rotex 70:

- Open radial impeller
- Free passage= 10 mm

Bearings

- Product-lubricated plain bearing
- Grease-packed deep groove ball bearings sealed for life

Automation

- Level control
- Pump started/ stopped automatically depending on the fluid level

Rotex 10, 20:

- Displacement weight with cable pull float switch control

Rotex 70:

- Float switch

4.6 Configuration and function

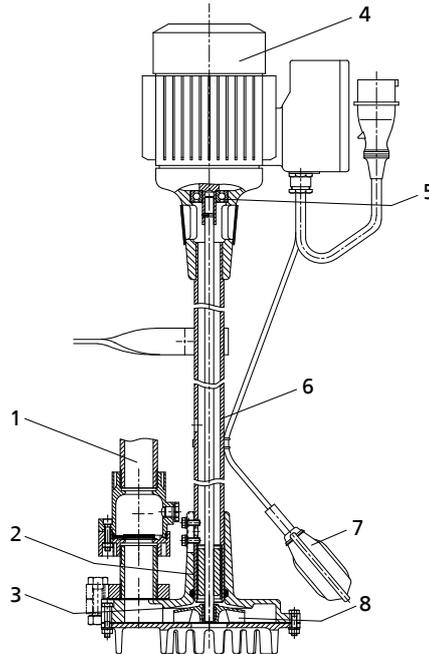


Fig. 3: Rotex

1	Discharge pipe	2	Bearing bush
3	Volute casing	4	Motor
5	Radial ball bearing	6	Shaft
7	Float switch	8	Impeller

Design The vertical non-self-priming submerged pump in single-stage, single-entry design features an axial fluid inlet and an axial fluid outlet. The rotor is directly connected to the motor shaft and radially supported by a product-lubricated bearing bush at the impeller end. At the motor end, the motor shaft is supported by deep groove ball bearings greased for life. The required radial bearings are lubricated internally by the fluid handled. The pump set can also be installed with a cover plate.

Function The pump is started up / stopped automatically depending on the fluid level.

Rotex 10/20:

The pump is started up / stopped by a microswitch fitted inside the terminal box. The microswitch is connected to the displacement weights. When the displacement weights float up, the pump starts up. When the fluid level drops, the pump stops.

Rotex 70:

The pump is started up when the float switch reaches its required upper angular position. When the fluid level drops and the float reaches its bottom angular position, the pump stops.

The uniformly rotating impeller of the submerged pump transfers mechanical energy to the fluid passing through.

The fluid enters the pump set vertically via the suction nozzle and is accelerated outward by the rotating impeller. In the flow passage of the volute casing the kinetic energy of the fluid handled is converted into pressure energy. The fluid leaves the

pump set via the discharge nozzle. The clearance gap minimises the fluid flowing back from the volute casing into the suction nozzle. On the rear side of the impeller, the shaft enters the casing via the radial bearing with bearing bush.

Sealing The pump set is seal-less. The shaft is supported by a plain bearing. The gap between the shaft and the plain bearing is designed as a clearance gap. A small amount of leakage flows into the support column at the shaft passage and through the overflow opening back into the tank.

4.7 Noise characteristics

Sound pressure level < 70 dB(A)

4.8 Scope of supply

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

- Pump
- Drive

Accessories

- Cover plate
- Level control
- Alarm switchgear
- Other accessories on request

4.9 Dimensions and weights

Dimensions

Refer to the Dimensions section for information on the dimensions.
(⇒ Section 9.3, Page 42)

Weights

Table 5: Weight [kg]

Rotex	[kg]
10/100 D	25
10/100 E	26
10/170 D	34
10/170 E	35
20/100 D	26
20/170 E	35
70 D	16
70 E	17

5 Installation at Site

5.1 Safety regulations

	 DANGER
	<p>Unsuitable electrical installation Danger to life!</p> <ul style="list-style-type: none"> ▷ Make sure the electrical installation meets the VDE 100 installation rules (sockets with earthing terminals). ▷ Make sure the electric mains is equipped with a residual current device of max. 30 mA. ▷ Always have the electrical connections installed by a trained electrician. ▷ Only use the plug and power cable supplied.
	 DANGER
	<p>Use in an outdoor area Danger of death from electric shock!</p> <ul style="list-style-type: none"> ▷ Any extension cables must match the quality of the supplied power cable. ▷ Never expose electrical connections to any moisture.
	 DANGER
	<p>Continuous pump operation in swimming pools, garden ponds or similar Danger of death from electric shock!</p> <ul style="list-style-type: none"> ▷ Make sure that nobody is in the water while the pump is in operation. ▷ Only use the pump for draining swimming pools, garden ponds, etc. (It is impermissible to use this pump as a recirculation pump, for example.)

5.2 Checks to be carried out prior to installation

- Check the structural requirements.
All structural work must have been prepared in accordance with the Dimensions and weights section. (⇒ Section 4.9, Page 17)
- Check the operating data of the pump set.
The data on the name plate of the pump must match the data on the purchase order.
- Check that pump shaft can be easily rotated by hand.
To do so, rotate the impeller at the suction opening of the pump casing.
- The tanks should have vent lines with twice the nominal diameter of the inlet lines. As a minimum, the nominal diameter of the vent lines must match that of the inlet lines.

5.3 Mounting the cover plate (optional, only available for Rotex 70)

1. Fix the angular frame into the wall of the pit near the edge.
2. Insert one half of the cover plate into the frame. Bolt it to the frame.
3. Place the pump with support column 712 into the central recess in the cover plate.
 - ⇒ The float switch connection cable must point to the small opening.
4. Screw in the discharge pipe.
 - ⇒ Prior to mounting the second half of the cover plate, install and connect the pump set, fit and set the level switch and check the direction of rotation.

5. Place the second half of the cover plate with the profile seal on the pump and discharge pipe. Press it into the angular frame. Bolt it to the frame.

5.4 Installing the pump set

- ✓ The second half of the cover plate has not been mounted yet.
(⇒ Section 5.3, Page 18)
- ✓ The installed motor is protected against flooding.
- ✓ Motor and float switch are located outside the pit or tank.
- ✓ Motor and float switch are vented and protected against moisture.
 1. Remove the transport plugs from the volute casing and the discharge pipe.
 2. Place the pump set on the floor of the pit or tank.
 3. Fasten the pump set to the pit/tank wall with pipe clamp 733 without transmitting any stresses or strains.

5.5 Connecting the piping

	⚠ DANGER
	<p>Impermissible loads acting on the pump nozzles Danger to life from leakage of hot, toxic, corrosive or flammable fluids!</p> <ul style="list-style-type: none"> ▷ Do not use the pump as an anchorage point for the piping. ▷ Anchor the pipes in close proximity to the pump and connect them properly without transmitting any stresses or strains. ▷ Take appropriate measures to compensate for thermal expansion of the piping.
	CAUTION
	<p>Incorrect earthing during welding work on the piping Destruction of rolling element bearings (pitting effect)!</p> <ul style="list-style-type: none"> ▷ Never earth the electric welding equipment on the pump or soleplate. ▷ Prevent current flowing through the rolling element bearings.
	NOTE
	<p>Installing check and shut-off elements in the system is recommended, depending on the type of plant and pump. However, such elements must not obstruct proper drainage or hinder disassembly of the pump.</p>
	NOTE
	<p>If the pump is used for automatic drainage, fit a non-return or check valve.</p>

- ✓ The nominal diameters of the pipelines are equal to or greater than the nominal diameters of the pump nozzles.
- ✓ Adapters to larger nominal diameters are designed with a diffuser angle of approx. 8° to avoid excessive pressure losses.
- ✓ A flow velocity of 2-3 m/s is recommended.
- ✓ The pipelines have been anchored in close proximity to the pump and connected without transmitting any stresses or strains.
 1. Thoroughly clean, flush and blow through all vessels, pipelines and connections (especially of new installations).
 2. Before installing the pump in the piping, remove the flange covers on the suction and discharge nozzles of the pump.

	CAUTION
	<p>Welding beads, scale and other impurities in the piping Damage to the pump!</p> <ul style="list-style-type: none"> ▷ Free the piping from any impurities.

3. If required, fit a suction strainer upstream of the pump nozzle.
4. Connect the discharge-side pump nozzle with the piping.

	CAUTION
	<p>Aggressive flushing liquid and pickling agent Damage to the pump!</p> <ul style="list-style-type: none"> ▷ Match the cleaning operation mode and duration of flushing and pickling to the casing materials and seal materials used.

5.6 Permissible forces and moments at the pump nozzles

No piping-induced forces and moments (from warped pipelines or thermal expansion, for example) must act on the pump.

5.7 Electrical system

5.7.1 Electrical connection

The available mains voltage must correspond to the voltage stated on the name plate.

Table 6: Fuses for the power cable [A]

Rotex	Fuse size
	[A]
10 D, 20 D	6
10 E, 20 E	10
70 D	4
70 E	6

The pump set is supplied complete with power cable and plug. It simply needs to be plugged into a suitable socket.

	⚠ DANGER
	<p>Electrical connection work by unqualified personnel Danger of death from electric shock!</p> <ul style="list-style-type: none"> ▷ Always have the electrical connections installed by a trained and qualified electrician. ▷ Observe regulations IEC 60364 .

	⚠ WARNING
	<p>Incorrect connection to the mains Damage to the power supply network, short circuit!</p> <ul style="list-style-type: none"> ▷ Observe the technical specifications of the local energy supply companies.

	CAUTION
	<p>Improper routing of electric cables Damage to the electric cables!</p> <ul style="list-style-type: none"> ▷ Never move the electric cables at temperatures below -25 °C. ▷ Never kink or crush the electric cables. ▷ Never lift the pump set by the electric cables. ▷ Adjust the length of the electric cables to the site requirements.

For any work on the electrical connection observe the wiring diagrams.
 (⇒ Section 9.2, Page 40)

5.7.2 Motor protection

	NOTE
	<p>If the thermal motor protection trips the pump several times in a row, contact KSB Service.</p>

Rotex D

The motor is protected by temperature switches installed in the winding. They interrupt the current when the maximum permissible winding temperature is reached and thus trip the pump. After the pump set has cooled down, the temperature switch will automatically re-start the pump.

	CAUTION
	<p>Short circuit of a phase Damage to the machinery!</p> <ul style="list-style-type: none"> ▷ Set the automatic circuit breaker so all three phases are tripped when one phase is short-circuited.

Rotex E

The motor is protected against overloading by an overcurrent circuit breaker. The motor protection device will not be automatically reset after the motor has cooled down. To reset it, press the reset button at the terminal box.

5.8 Fitting and setting the level control equipment

5.8.1 Displacement weights (Rotex 10, 20)

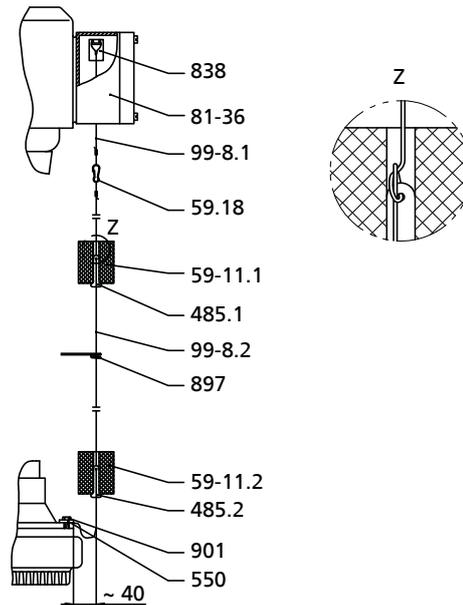


Fig. 4: Fitting the level control equipment

- ✓ Microswitch 838 and thread 99-8.1 have been fitted in terminal box 81-36 at the factory.
- 1. Attach hook 59-18, which is connected to thread 99-8.2, to the loop of thread 99-8.1.
- 2. Feed thread 99-8.2 through the drilled hole in weight 59-11.1.
- 3. Hold weight 59-11.1 in position on the thread with tappet 485.1. To do so, feed the thread through the drilled hole in tappet 485.1. Tie a knot at the required fastening height.
 - ⇒ The fastening height you select will determine the pump's start-up level. The start-up level must be set so the pump starts up before the water level reaches the upper edge of the sump. Make sure that the weights cannot get caught on any projecting parts, juts or similar in the sump.⁴⁾
- 4. Slide weight 59-11.1 onto tappet 485.1.
- 5. Fasten guide piece 897 to support column 712. Feed the thread through the hole in the guide piece.
- 6. Hold the second weight 59-11.2 in position with tappet 485.2. To do so, feed the thread through the drilled hole in tappet 485.2. Tie a knot at the required fastening height.
 - ⇒ The fastening height you select will determine the pump's stop level. When setting the switching levels see to it that the pump stops before the water level drops down to the suction openings of discharge casing 107. (⇒ Section 6.2.1.2, Page 26) Make sure that the weights cannot get caught on any projecting parts, juts or similar in the sump.
 - ⇒ Also ensure that the weights are only moved slightly by the inflowing water. If required, take suitable measures to calm the water in the sump.

⁴ For pumps with an installation depth of 170 cm with intermediate bearing (part No. 303, radial bearing) the start-up level must be above this bearing. This ensures that the bearing bush is lubricated by the fluid handled when the pump is started up.

7. Run the end of thread 99-8.2 between disc 550 and discharge casing 107 and tie a knot into it.
Make sure that the thread has sufficient slack (approx. 40 mm) for the actuation of microswitch 838.
8. Cut off the excess length of thread 99-8.2.

5.8.2 Float switch (Rotex 70)

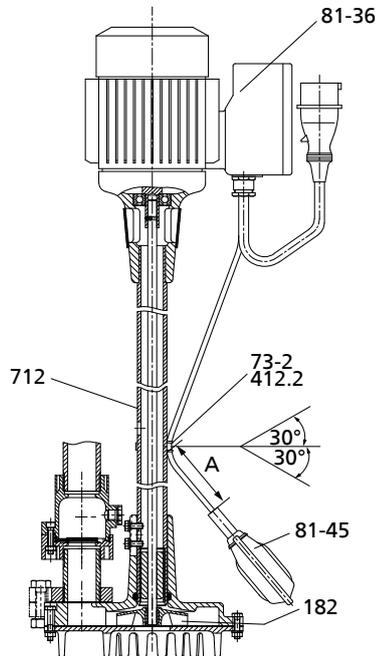


Fig. 5: Setting the float switch

A	≥ 100 mm
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The switching level is set by selecting the height at which the float switch cable is fastened to support column 712 with clip 73-2 and O-ring 412.2 and by the free cable length of the float switch.

- ✓ The second half of the cover plate has not been mounted yet.
(⇒ Section 5.3, Page 18)
 - ✓ Float switch 81-45 has been fitted in terminal box 81-36.
1. Fasten float switch 81-45 with clip 73-2 and O-ring 412.2 to support column 712. The cable length should not be shorter than distance "A".
 - ⇒ The fastening height you select will determine the pump's start-up level. When selecting the start-up level bear in mind that the pump set is started up when the float switch reaches an upper angular position of approx. 30° and that the pump set needs to start up before the water level reaches the upper edge of the sump. Make sure that the float switch cannot get caught on any projecting parts, juts or similar in the sump.
 - ⇒ The fastening height you select will determine the pump's stop level. When selecting the switching levels bear in mind that the pump set is stopped when the float switch reaches its bottom angular position of approx. 30° and that it needs to be stopped before the water level reaches the suction openings of foot 182. (⇒ Section 6.2.1.2, Page 26) Make sure that the float switch cannot get caught on any projecting parts, juts or similar in the sump.
 - ⇒ Make sure that the difference between the switching levels measures 400 mm as a minimum.

5.9 Checking the direction of rotation

Rotex E

The pump set is supplied for the correct direction of rotation. The direction of rotation need not be checked.

Rotex D

The pump set is wired at the factory in such a way that the direction of rotation of the pump is correct provided that the mains' phase sequence (building supply mains) is correct. The rotary field is correct when the socket has a clockwise rotary field. This can be verified by means of a phase sequence indicator.

	<p style="background-color: #f4a460; padding: 5px;">⚠ WARNING</p> <p>Hands inside the pump casing Risk of injuries, damage to the pump!</p> <ul style="list-style-type: none"> ▷ Always disconnect the pump set from the power supply and secure it against unintentional start-up before inserting your hands or other objects into the pump.
	<p style="background-color: #f4d03f; padding: 5px;">CAUTION</p> <p>Drive and pump running in the wrong direction of rotation Damage to the pump!</p> <ul style="list-style-type: none"> ▷ Refer to the arrow indicating the direction of rotation on the pump. ▷ Check the direction of rotation. If required, check the electrical connection and correct the direction of rotation.

The correct direction of rotation of the motor and pump is clockwise (seen from the motor end).

- ✓ The second half of the cover plate has not been mounted yet.
(⇒ Section 5.3, Page 18)
- 1. Start the motor and stop it again immediately to determine the direction of rotation of the fan impeller by looking through the fan hood.
- 2. Check the direction of rotation.
The motor's direction of rotation must match the arrow indicating the direction of rotation on the fan hood of the motor.
- 3. If the motor is running in the wrong direction of rotation, check the electrical connection of the motor and the control system, if any.

6 Commissioning/Start-up/Shutdown

6.1 Commissioning/Start-up

6.1.1 Prerequisites for commissioning/start-up

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

- The operating data has been verified.
- The pump (set) has been installed and connected as described in this manual.
- The pump set has been properly connected to the power supply and is equipped with all protection devices.
- The direction of rotation has been checked.

6.1.2 Start-up

	⚠ DANGER
	<p>Non-compliance with the permissible pressure and temperature limits if the pump is operated with the suction and discharge lines closed. Leakage of hot or toxic fluids!</p> <ul style="list-style-type: none"> ▷ Never operate the pump with the shut-off elements in the suction line and/or discharge line closed. ▷ Only start up the pump set with the discharge-side gate valve slightly or fully open.
	⚠ DANGER
	<p>Excessive temperatures due to dry running or excessive gas content in the fluid handled Damage to the pump set!</p> <ul style="list-style-type: none"> ▷ Never operate the pump set without liquid fill. ▷ Prime the pump as per operating instructions. ▷ Always operate the pump within the permissible operating range.
	CAUTION
	<p>Abnormal noises, vibrations, temperatures or leakage Damage to the pump!</p> <ul style="list-style-type: none"> ▷ Switch off the pump (set) immediately. ▷ Eliminate the causes before returning the pump set to service.

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

	CAUTION
	<p>Start-up against open discharge line Motor overload!</p> <ul style="list-style-type: none"> ▷ Make sure the motor has sufficient power reserves. ▷ Use a soft starter. ▷ Use speed control.

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

6.2 Operating Limits

6.2.1 Fluid handled

6.2.1.1 Fluid properties

	! WARNING
	<p>Pumping of impermissible fluids Hazardous to persons and the environment!</p> <ul style="list-style-type: none"> ▷ Only discharge permissible fluids into the public sewer system. ▷ Check the suitability of pump/system materials.

	CAUTION
	<p>Unsuitable fluids Damage to the pump!</p> <ul style="list-style-type: none"> ▷ Never use the pump to handle corrosive, combustible or explosive fluids. ▷ Never use the pump to transport waste water from toilets and urinal systems. ▷ Do not use the pump for foodstuff applications.

6.2.1.2 Minimum level of fluid handled

	CAUTION
	<p>Fluid level below the specified minimum Damage to the pump set by cavitation!</p> <ul style="list-style-type: none"> ▷ Never allow the fluid level to drop below the specified minimum.

- Minimum** Rotex 10, 20: 150 mm above the bottom edge of the casing; if handling condensate 400 mm
 Rotex 70: 100 mm above the bottom edge of the casing
- Maximum** 100 mm below the plate
- Before start-up, the pump set must always be immersed in the fluid to be handled so it is above the minimum stop level.

6.2.1.3 Flow rate

Unless specified otherwise in the characteristic curves or in the data sheets, the following applies:

- Short-time operation: $Q_{\min}^{5)} = 0.1 \times Q_{\text{BEP}}^{6)}$
- Continuous operation: $Q_{\min}^{5)} = 0.3 \times Q_{\text{BEP}}^{6)}$
- 2-pole operation: $Q_{\max}^{7)} = 1.1 \times Q_{\text{BEP}}^{6)}$
- 4-pole operation: $Q_{\max}^{7)} = 1.25 \times Q_{\text{BEP}}^{6)}$

The data refer to water and water-like fluids. Longer operating periods with these fluids and at the flow rates indicated will not cause an additional increase in the temperatures on the pump surface. However, if the physical properties of the fluids handled differ from those of water, the calculation formula below must be used to check if an additional heat build-up may lead to a dangerous temperature increase at the pump surface. If necessary, the minimum flow must be increased.

$$T_o = T_f + \Delta \vartheta$$

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

Table 7: Key

Symbol	Description	Unit
c	Specific heat capacity	J/kg K
g	Acceleration due to gravity	m/s ²
H	Pump discharge head	m
T _f	Fluid temperature	°C
T _o	Temperature at the casing surface	°C
η	Pump efficiency at duty point	-
Δϑ	Temperature difference	K

6.2.1.4 Temperature of fluid handled

	CAUTION
	<p>Incorrect fluid temperature Damage to the pump (set)!</p> <p>▷ Only operate the pump (set) within the temperature limits indicated.</p>

Table 8: Temperature of fluid handled

Rotex	Temperature	
	Min.	Max.
	[°C]	[°C]
10, 20	-10	90
70	-10	70

When pumping fluids with a temperature exceeding 70 °C, a minimum head of 8 m (pressure gauge reading) must be ensured to prevent cavitation and thus premature wear of the bearings. When the pump is used for pumping condensate, the height of the stop level should equal 400 mm as a minimum.

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⁵ Minimum flow rate
⁶ Flow rate at best efficiency point
⁷ Maximum flow rate

6.2.1.5 Density of the fluid handled

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

	CAUTION
	<p>Impermissibly high density of the fluid handled Motor overload!</p> <ul style="list-style-type: none"> ▷ Observe the information about fluid density in the data sheet. ▷ Make sure the motor has sufficient power reserves.

6.2.1.6 Abrasive fluids

Do not exceed the maximum permissible solids content specified in the data sheet. When the pump handles fluids containing abrasive substances, increased wear of the hydraulic system and shaft seal are to be expected. In this case, reduce the commonly recommended inspection intervals.

6.2.2 Frequency of starts

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

To prevent high temperature increases in the motor, do not exceed the following number of starts per hour.

Table 9: Frequency of starts

Interval	Maximum frequency of starts
	[Start-ups]
Per hour	30

These values apply to mains start-up.

	NOTE
	<p>For systems which are rarely in service, we recommend operating the pump for a short period (approx. 1 minute) every 2 - 3 months to flush impeller and bearings. Fill in more fluid as required. (⇒ Section 6.2.1.2, Page 26)</p>

6.2.3 Operation on the power supply network

	CAUTION
	<p>Wrong supply voltage Damage to the pump (set)!</p> <ul style="list-style-type: none"> ▷ The maximum permissible deviation in supply voltage is 10 % of the rated voltage indicated on the name plate. ▷ The maximum permissible voltage difference between the individual phases is 1 %.

6.3 Shutdown/storage/preservation

6.3.1 Measures to be taken for shutdown

	WARNING
	<p>Unintentional starting of the pump set Risk of injury by moving components and shock currents!</p> <ul style="list-style-type: none"> ▷ Ensure that the pump set cannot be started unintentionally. ▷ Always make sure the electrical connections are disconnected before carrying out work on the pump set.

	WARNING
	<p>Fluids handled, consumables and supplies which are hot and/or pose a health hazard Risk of injury!</p> <ul style="list-style-type: none"> ▷ Observe all relevant laws. ▷ When draining the fluid take appropriate measures to protect persons and the environment. ▷ Decontaminate pumps which handle fluids posing a health hazard.

1. Disconnect the pump from the power supply and protect it against start-up.
2. Wait until the pump has cooled down (10 minutes), then remove it.
3. Properly flush the pump.
Point the water jet on the pump's discharge nozzle.
4. Leave the pump to dry.
5. Store the pump vertically in a dark, dry and frost-proof room.

6.4 Returning to service

For returning the equipment to service observe the sections on commissioning/start-up and the operating limits. (⇒ Section 6.1, Page 25)

In addition, carry out all servicing/maintenance operations before returning the pump (set) to service. (⇒ Section 7, Page 30)

	WARNING
	<p>Failure to re-install or re-activate protective devices Risk of injury from moving parts or escaping fluid!</p> <ul style="list-style-type: none"> ▷ As soon as the work is completed, properly re-install and re-activate any safety-relevant devices and protective devices.

	NOTE
	<p>If the equipment has been out of service for more than one year, replace all elastomer seals.</p>

7 Servicing/Maintenance

7.1 Safety regulations

The operator ensures that maintenance, inspection and installation are performed by authorised, qualified specialist personnel who are thoroughly familiar with the manual.

	<p>⚠ WARNING</p> <p>Unintentional starting of the pump set Risk of injury by moving components and shock currents!</p> <ul style="list-style-type: none"> ▷ Ensure that the pump set cannot be started unintentionally. ▷ Always make sure the electrical connections are disconnected before carrying out work on the pump set.
	<p>⚠ WARNING</p> <p>Fluids handled, consumables and supplies which are hot and/or pose a health hazard Risk of injury!</p> <ul style="list-style-type: none"> ▷ Observe all relevant laws. ▷ When draining the fluid take appropriate measures to protect persons and the environment. ▷ Decontaminate pumps which handle fluids posing a health hazard.
	<p>⚠ WARNING</p> <p>Insufficient stability Risk of crushing hands and feet!</p> <ul style="list-style-type: none"> ▷ During assembly/dismantling, secure the pump (set)/pump parts to prevent tilting or tipping over.

A regular maintenance schedule will help avoid expensive repairs and contribute to trouble-free, reliable operation of the pump, pump set and pump parts with a minimum of servicing/maintenance expenditure and work.

	<p>NOTE</p> <p>All maintenance work, service work and installation work can be carried out by KSB Service or authorised workshops. For contact details refer to the enclosed "Addresses" booklet or visit "https://www.ksb.com/en-global/contact" on the Internet.</p>
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Never use force when dismantling and reassembling the pump set.

7.2 Servicing/inspection

7.2.1 Supervision of operation

	<p>⚠ DANGER</p> <p>Excessive temperatures as a result of bearings running hot or defective bearing seals Fire hazard! Damage to the pump set!</p> <ul style="list-style-type: none"> ▷ Regularly check the rolling element bearings for running noises.
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	<p>⚠ DANGER</p> <p>Excessive temperatures as a result of bearing bushes running hot Fire hazard! Damage to the pump set!</p> <ul style="list-style-type: none"> ▷ Make sure the bearing bushes are properly lubricated. ▷ Regularly check the bearing bushes for correct lubrication.
	<p>CAUTION</p> <p>Increased wear due to dry running Damage to the pump set!</p> <ul style="list-style-type: none"> ▷ Never operate the pump set without liquid fill. ▷ Never close the shut-off element in the suction line and/or supply line during pump operation.
	<p>CAUTION</p> <p>Fluid level below the specified minimum Damage to the pump set by cavitation! Dry running of the plain bearings!</p> <ul style="list-style-type: none"> ▷ Never allow the fluid level to drop below the specified minimum.
	<p>CAUTION</p> <p>Impermissibly high temperature of fluid handled Damage to the pump!</p> <ul style="list-style-type: none"> ▷ Prolonged operation against a closed shut-off element is not permitted (heating up of the fluid). ▷ Observe the temperature limits in the data sheet and in the section on operating limits.

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

- The pump must run quietly and free from vibrations at all times.
- Check the shaft seal.
- Check the static seals for leakage.
- Check the rolling element bearings for running noises.
 Vibrations, noise and an increase in current input occurring during unchanged operating conditions indicate wear.

7.2.2 Visual inspection

Inspect the inside of the pit/tank twice a year⁸⁾, especially the area of the level switch. Check for any deposits. Clean it as required. Make sure that the overflow hole A 17 at support column 712 is free at all times and not clogged or covered with incrustations. (⇒ Section 9.1, Page 38)

⁸ More often if required and depending on the application

7.3 Drainage / cleaning

	<p>⚠ WARNING</p>
	<p>Fluids, consumables and supplies which are hot or pose a health hazard Hazard to persons and the environment!</p> <ul style="list-style-type: none"> ▷ Collect and properly dispose of flushing fluid and any residues of the fluid handled. ▷ Wear safety clothing and a protective mask, if required. ▷ Observe all legal regulations on the disposal of fluids posing a health hazard.

The pump will be automatically drained when it is taken out of the fluid handled. Always flush and clean the pump before transporting it to the workshop. Provide a certificate of decontamination for the pump set.

7.4 Reassembling the pump set

7.4.1 General information/Safety regulations

	<p>⚠ WARNING</p>
	<p>Improper lifting/moving of heavy assemblies or components Personal injury and damage to property!</p> <ul style="list-style-type: none"> ▷ Use suitable transport devices, lifting equipment and lifting tackle to move heavy assemblies or components.

	<p>CAUTION</p>
	<p>Improper reassembly Damage to the pump!</p> <ul style="list-style-type: none"> ▷ Reassemble the pump (set) in accordance with the general rules of sound engineering practice. ▷ Use original spare parts only.

Sequence Always reassemble the pump in accordance with the corresponding general assembly drawing.

- Sealing elements**
- **Gaskets**
 - Always use new gaskets, making sure that they have the same thickness as the old ones.
 - Always fit gaskets of asbestos-free materials or graphite without using lubricants (e.g. copper grease, graphite paste).
 - **O-rings**
 - Never use O-rings that have been glued together from material sold by the metre.
 - **Packing rings**
 - Always use pre-compressed packing rings.

	<p>CAUTION</p>
	<p>Contact of O-ring with graphite or similar material Fluid could escape!</p> <ul style="list-style-type: none"> ▷ Do not coat O-ring with graphite or similar material. ▷ Use animal fats or lubricants based on silicone or PTFE.

- **Assembly aids**

- For gaskets, avoid the use of assembly adhesives, if possible.
- If assembly adhesives are required, use a commercially available contact adhesive (e.g. Pattex).
- Only apply adhesive at selected points and in thin layers.
- Never use quick-setting adhesives (cyanoacrylate adhesives).
- Coat the locating surfaces of the individual components and screwed connections with graphite or similar before reassembly.
- Prior to reassembly, screw back any forcing screws or alignment screws.

Tightening torques For reassembly, tighten all screws and bolts as indicated.

7.4.2 Reassembling the pump section

7.4.2.1 Reassembling the pump section (Rotex 10, 20)

1. Fasten discharge casing 107 with casing wear ring 502 to bearing housing 350.
2. Tighten hexagon head bolts 901 fastening discharge casing 107.

7.4.2.2 Reassembling the pump section (Rotex 70)

1. Place foot 182 on volute casing 102.
2. Tighten hexagon head bolts 901.

7.5 Dismantling the pump set

7.5.1 General information/Safety regulations

	<p>! WARNING</p>
	<p>Improper lifting/moving of heavy assemblies or components Personal injury and damage to property!</p> <ul style="list-style-type: none"> ▷ Use suitable transport devices, lifting equipment and lifting tackle to move heavy assemblies or components.
	<p>! WARNING</p>
	<p>Unintentional starting of the pump set Risk of injury by moving components and shock currents!</p> <ul style="list-style-type: none"> ▷ Ensure that the pump set cannot be started unintentionally. ▷ Always make sure the electrical connections are disconnected before carrying out work on the pump set.
	<p>! WARNING</p>
	<p>Components with sharp edges Risk of cutting or shearing injuries!</p> <ul style="list-style-type: none"> ▷ Always use appropriate caution for installation and dismantling work. ▷ Wear work gloves.

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	CAUTION
	<p>Improper reassembly Damage to the pump!</p> <ul style="list-style-type: none"> ▷ Reassemble the pump (set) in accordance with the general rules of sound engineering practice. ▷ Use original spare parts only.

Sequence Always reassemble the pump set in accordance with the corresponding general assembly drawing.

- Sealing elements**
- O-rings
 - Check O-rings for any damage and replace by new O-rings if required.
 - Never use O-rings that have been made by cutting an O-ring cord to size and gluing the ends together.
 - Assembly adhesives
 - Avoid the use of assembly adhesives if possible.

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

7.5.2 Removing the pump set from the piping

1. De-energise the pump set and secure it against unintentional start-up.
2. Disconnect the motor from the power supply.
3. Disconnect and remove all auxiliary pipework.
4. Unbolt the discharge nozzle from the pipeline.
5. Lift the pump set with support column 712 and the cover plate out of the tank or pit.

7.5.3 Dismantling the pump section

7.5.3.1 Dismantling the pump section (Rotex 10, 20)

- ✓ The pump set has been removed from the system. (⇒ Section 7.5.2, Page 34)
- ✓ The pump set has been placed in a clean and level assembly area.
 1. Undo hexagon head bolts 901.
 2. Remove discharge casing 107 with casing wear ring 502.

7.5.3.2 Dismantling the pump section (Rotex 70)

- ✓ The pump set has been removed from the system. (⇒ Section 7.5.2, Page 34)
- ✓ The pump set has been placed in a clean and level assembly area.
 1. Undo hexagon head bolts 901.
 2. Remove foot 182.

7.6 Spare parts stock

7.6.1 Ordering spare parts

Always quote the following data when ordering replacement or spare parts:

- Order number
- Order item number
- Type series
- Size
- Material variant
- Year of construction

Refer to the name plate for all data.

Also specify the following data:

- Part No. and description
- Quantity of spare parts
- Shipping address
- Mode of dispatch (freight, mail, express freight, air freight)

7.6.2 Recommended spare parts stock

It is not necessary to keep spare parts on stock.

8 Trouble-shooting

	 WARNING
	<p>Improper work to remedy faults</p> <p>Risk of injury!</p> <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 does not start up
- B Pump is running, but does not deliver
- C Insufficient flow rate
- D Excessive current/power input
- E Vibrations during pump operation
- F Excessive wear on bearings

Table 10: Trouble-shooting

A	B	C	D	E	F	Possible cause	Remedy ⁹⁾
-	-	-	X	X	-	Wrong direction of rotation	<ul style="list-style-type: none"> ▪ Check the electrical connection of the pump set and the control system, if any.
-	-	-	X	X	-	Wear of internal components	<ul style="list-style-type: none"> ▪ Replace worn components by new ones.
X	-	X	X	-	-	Motor is running on two phases only.	<ul style="list-style-type: none"> ▪ Check the electrical cable connections. ▪ Replace the defective fuse.
X	-	-	-	-	-	Motor is not running because of lack of voltage.	<ul style="list-style-type: none"> ▪ Check electrical connections. ▪ Notify the energy supply company.
X	-	-	-	-	-	Motor is not running because the level control equipment is defective/has jammed.	<ul style="list-style-type: none"> ▪ Check the level control equipment. ▪ Contact KSB Service, if necessary.
X	-	-	-	-	-	Motor is not running because the winding or power cable are defective.	<ul style="list-style-type: none"> ▪ Contact KSB Service.
-	-	-	X	-	-	Operating voltage is too low.	<ul style="list-style-type: none"> ▪ Check the mains voltage. ▪ Check cable connections.
-	X	-	-	-	-	Pump delivers against an excessively high pressure.	<ul style="list-style-type: none"> ▪ Fully open the shut-off element.
-	-	-	X	X	X	Pump is warped or sympathetic vibrations in the piping.	<ul style="list-style-type: none"> ▪ Check pipeline connections and secure fixing of pump; if required, reduce the distances between the pipe clamps. ▪ Fix the pipelines using anti-vibration material.
-	-	-	-	X	X	Rotor is out of balance, shaft is warped	<ul style="list-style-type: none"> ▪ Clean the impeller. ▪ Re-balance the impeller. ▪ Fit a new shaft.
-	-	-	-	X	-	Cavitation (rattling noise)	<ul style="list-style-type: none"> ▪ Check steam trap. ▪ Increase suction head. ▪ Reduce condensate temperature. ▪ Increase back pressure by throttling.
X	-	-	X	-	-	The overcurrent circuit breaker has tripped the pump set (for E).	<ul style="list-style-type: none"> ▪ Press reset button at the terminal box.

⁹⁾ Pump pressure must be released before attempting to remedy faults on parts which are subjected to pressure.

A	B	C	D	E	F	Possible cause	Remedy ⁹⁾
X	-	-	X	-	-	The temperature switch monitoring the winding temperature has tripped the pump set (for D).	<ul style="list-style-type: none"> The motor will restart automatically once the winding has cooled down.
-	-	-	X	-	X	Pump running in off-design conditions (low flow / overload)	<ul style="list-style-type: none"> Check the pump's operating data.
-	X	-	X	X	X	Pump clogged by sand, dirt in the installation pit, insufficient inflow.	<ul style="list-style-type: none"> Clean the intake, sand trap, screen at the volute casing, pump components and check valve. Drain and clean the pit. Replace worn components by new ones.
-	-	-	-	X	-	Dirt/fibres in the clearance between the casing wall and impeller; sluggish rotation.	<ul style="list-style-type: none"> Check that the impeller can be rotated easily. If required, clean the hydraulic system.
-	X	-	-	X	-	Defective riser (pipe, sealing element and, if applicable, check valve)	<ul style="list-style-type: none"> Replace defective piping elements.
-	-	-	-	X	-	Excessive temperature of the fluid handled	<ul style="list-style-type: none"> Reduce temperature.
-	-	-	X	X	X	Defective radial bearing in the motor.	<ul style="list-style-type: none"> Contact KSB Service.
-	-	-	-	-	X	Impermissible air or gas content in the fluid handled	<ul style="list-style-type: none"> Contact KSB.
-	-	-	-	-	X	Aggressive or abrasive fluid	<ul style="list-style-type: none"> Contact KSB.

9 Related Documents

9.1 Exploded views with list of components

9.1.1 Rotex 10, 20

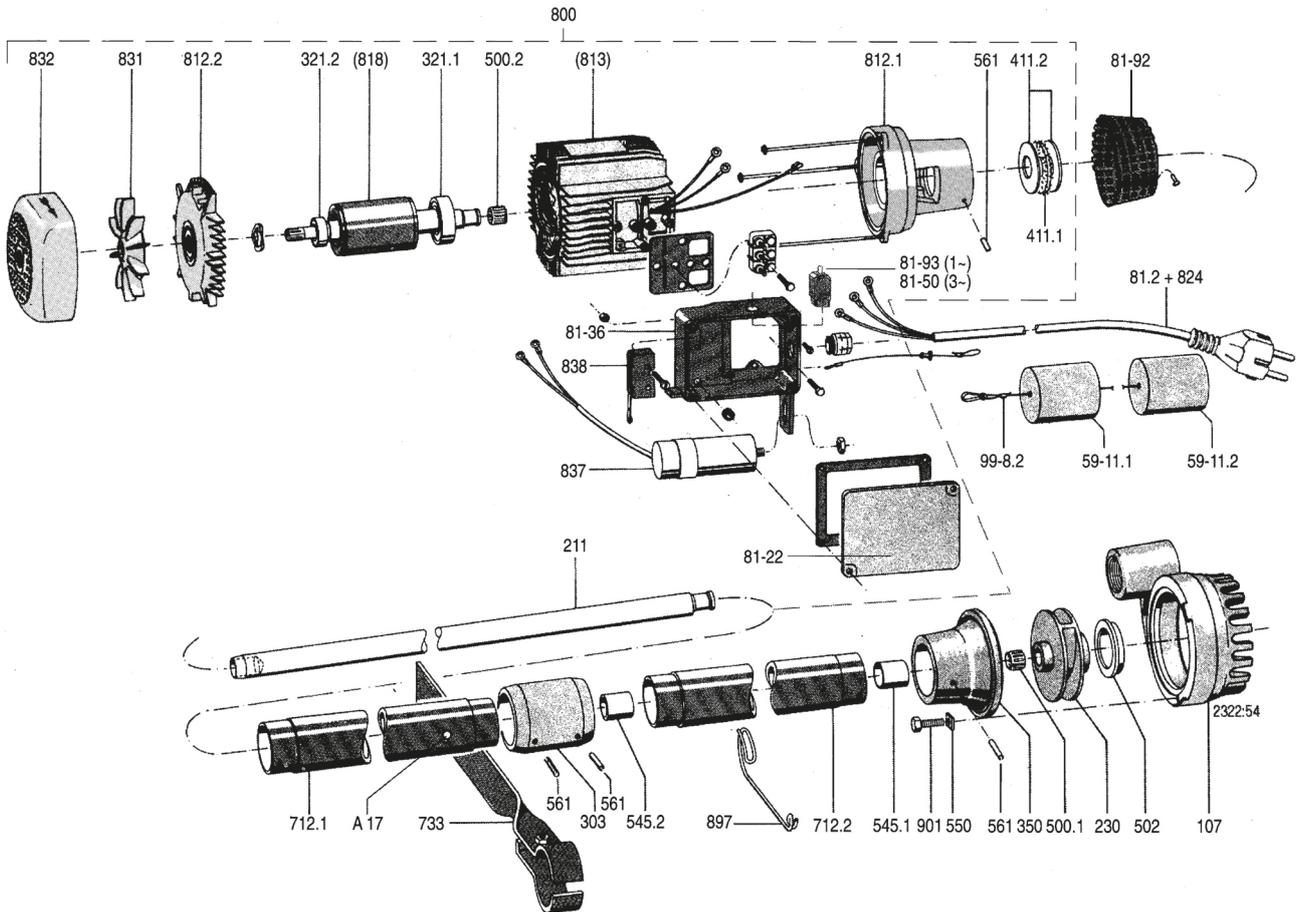


Fig. 6: Exploded view - Rotex 10, 20 () = Not available as a separate spare part

Table 11: List of components

Part No.	Description	Part No.	Description
107	Discharge casing	81-22	Terminal box cover
211	Pump shaft	81-36	Terminal box base
230	Impeller	81-50	Contactora
303 ¹⁰⁾	Thrust and radial bearing	81-92	Cover plate
321.1/2	Radial ball bearing	81-93	Protective switch
350	Bearing housing	812.1/2	Motor housing cover
411.1/2	Joint ring	813	Stator core pack
500.1/2	Ring	818	Rotor
502	Casing wear ring	824	Cable
545.1/2 ¹⁰⁾	Bearing bush	831	Fan impeller
550	Disc	832	Fan hood
561	Grooved pin	837	Capacitor
59-11.1/2	Weight	838	Switch
712.1/2 ¹⁰⁾	Support column	897	Guide piece
733	Pipe clamp	901	Hexagon head bolt

¹⁰⁾ Only included for installation depth 170 cm.

Part No.	Description	Part No.	Description
800	Motor	99-8.2	Thread
81-2	Plug	A 17	Overflow hole

9.1.2 Rotex 70

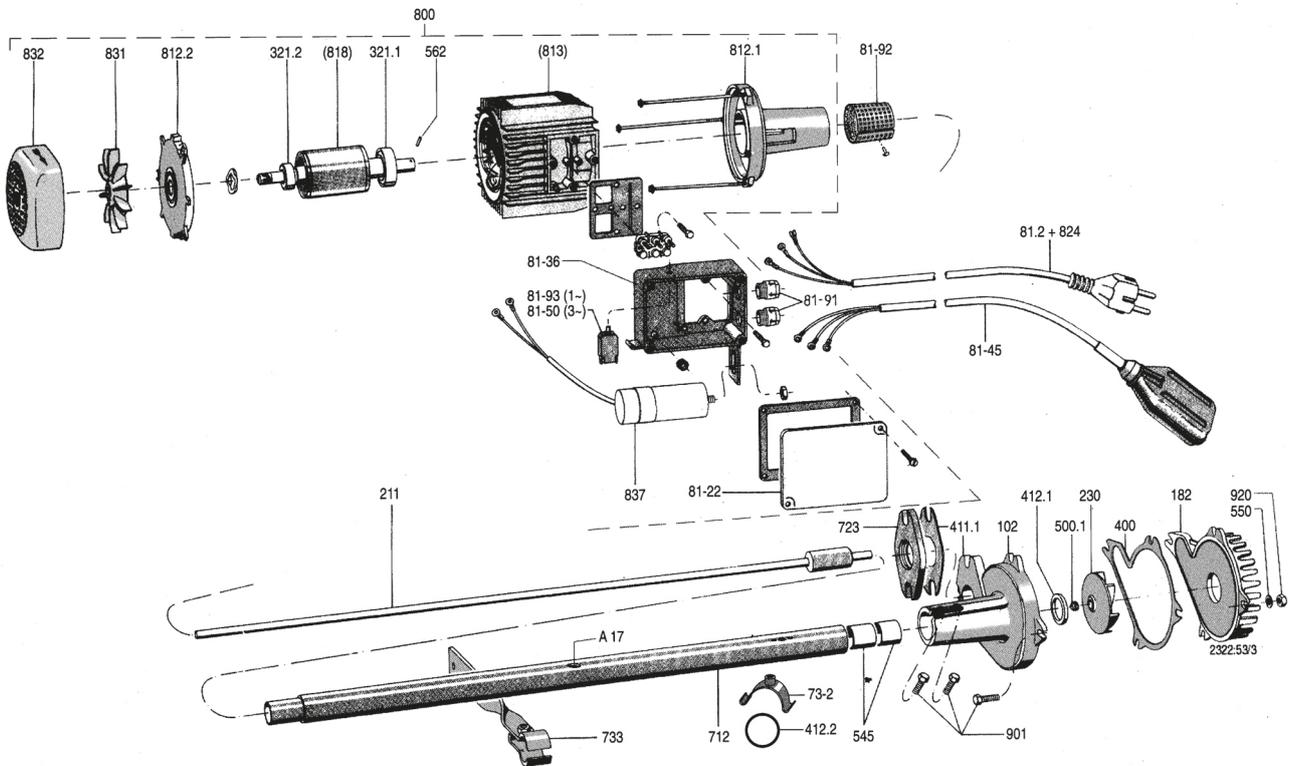


Fig. 7: Exploded view - Rotex 70 () = Not available as a separate spare part

Table 12: List of components

Part No.	Description	Part No.	Description
102	Volute casing	81-22	Terminal box cover
182	Foot	81-36	Terminal box base
211	Pump shaft	81-45	Float switch
230	Impeller	81-50	Contactor
321.1/2	Radial ball bearing	81-91	Cable gland
400	Gasket	81-92	Cover plate
411.1	Joint ring	81-93	Protective switch
412.1/2	O-ring	812.1/2	Motor housing cover
500.1	Ring	813	Stator core pack
545	Bearing bush	818	Rotor
550	Disc	824	Cable
562	Parallel pin	831	Fan impeller
712	Support column	832	Fan hood
723	Flange	837	Capacitor
73-2	Hose connection	901	Hexagon head bolt
733	Pipe clamp	920	Nut
800	Motor	A 17	Overflow hole
81-2	Plug		

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9.2 Wiring diagrams

9.2.1 Rotex D

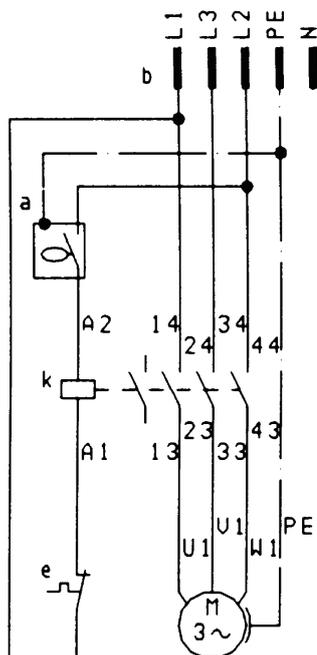


Fig. 8: Wiring diagram Rotex D

a	Microswitch or float switch
b	CEE plug
e	Klixon
k	Contactor

9.2.2 Rotex E

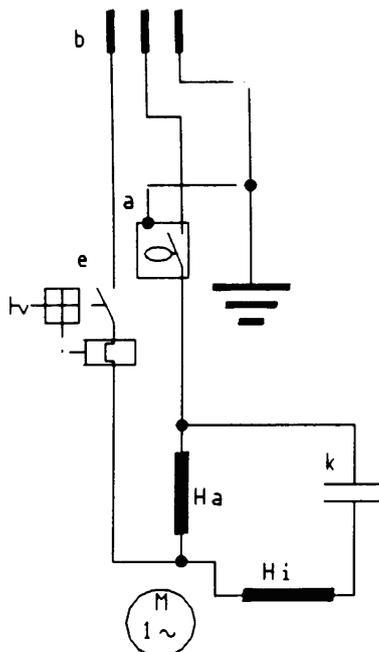


Fig. 9: Wiring diagram Rotex E

a	Microswitch or float switch
b	Shockproof plug

e	Overcurrent circuit breaker
k	Run capacitor
H _A	Main winding
H _i	Auxiliary winding

9.3 Dimensions

9.3.1 Rotex 10, 20, 70

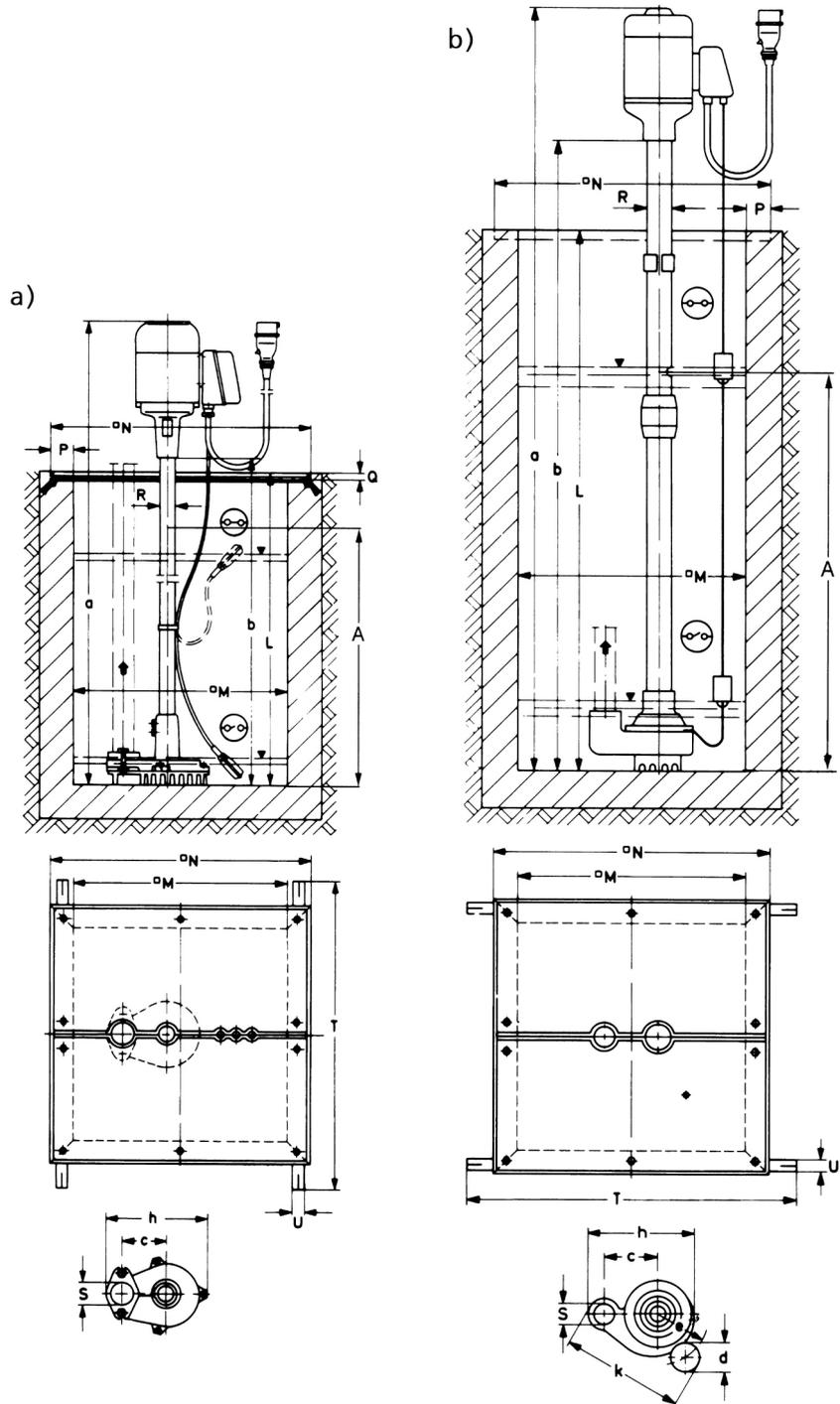


Fig. 10: Dimensions a) Rotex 70 b) Rotex 10, 20

Minimum water level (stop level)	Rotex 10, 20: 150 mm ¹¹⁾ Rotex 70: 100 mm
Maximum water level (start-up level)	Rotex .../170: ≥ 1000 mm

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¹¹⁾ If handling condensate: 400 mm

Table 13: Dimensions

Size	 ISO 7/1	a	b	c	d	e	h	k	A	L	M	N	P	Q	R	T	U
		[mm]															
10/100	Rp 1 1/4	1363	1069	106	60	110	220	242	180	1000	500	560	30	20	60	660	20
10/170	Rp 1 1/4	2085	1791	106	60	110	220	242	1050	1700	500	560	30	20	60	660	20
20/100	Rp 2	1370	1076	117	60	110	240	270	180	1000	500	560	30	20	60	660	20
20/170	Rp 2	2092	1798	117	60	110	240	270	1050	1700	500	560	30	20	60	660	20
70	Rp 1 1/4	1342	1046	97	-	-	215	-	590	1000	500	560	30	20	33,8	660	20

10 EU Declaration of Conformity

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

The manufacturer herewith declares that the product:

Rotex 70/10/20

Serial number: 2022w01 - 2024w52

- is in conformity with the provisions of the following directives / regulations as amended from time to time:
 - 2006/42/EC: Machinery Directive
 - Electrical components¹²⁾: 2011/65/EU Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

The manufacturer also declares that

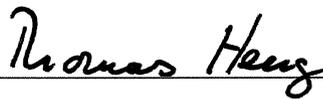
- the following harmonised international standards¹³⁾ have been applied:
 - ISO 12100
 - EN 809

Person authorised to compile the technical file:

Enrico Müller
Head of Submersible Units, Non-clog & Horizontal Split Pumps
KSB SE & Co. KGaA
Turmstraße 92
06110 Halle (Germany)

The EU Declaration of Conformity was issued in/on:

Frankenthal, 3 January 2022



Thomas Heng
Head of Product Development Series & Heavy Duty Pumps
KSB SE & Co. KGaA
Johann-Klein-Straße 9
67227 Frankenthal (Germany)

¹² Where applicable

¹³ Apart from the standards listed here referring to the Machinery Directive, further standards are observed for explosion-proof versions (ATEX Directive) as applicable and are listed in the legally binding EU Declaration of Conformity.

11 Certificate of Decontamination

Type:
 Order number /
 Order item number¹⁴):
 Delivery date:
 Application:
 Fluid handled¹⁴):

Please tick where applicable¹⁴:



Corrosive



Oxidising



Flammable



Explosive



Hazardous to health



Seriously hazardous to health



Toxic



Radioactive



Bio-hazardous



Safe

Reason for return¹⁴):

Comments:

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

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

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

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

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

.....

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

.....
 Place, date and signature

.....
 Address

.....
 Company stamp

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¹⁴ Required field

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