

Submersible Waste Water Pump

Ama-Drainer 80/100

Installation/Operating Manual



Legal information/Copyright

Installation/Operating Manual Ama-Drainer 80/100

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 08/01/2020

Contents

	Glossary	5
1	General.....	6
	1.1 Principles	6
	1.2 Installation of partly completed machinery.....	6
	1.3 Target group.....	6
	1.4 Other applicable documents.....	6
	1.5 Symbols	6
	1.6 Key to safety symbols/markings.....	7
2	Safety	8
	2.1 General.....	8
	2.2 Intended use	8
	2.3 Personnel qualification and training.....	9
	2.4 Consequences and risks caused by non-compliance with this manual	9
	2.5 Safety awareness	9
	2.6 Safety information for the operator/user	9
	2.7 Safety information for maintenance, inspection and installation	10
	2.8 Unauthorised modes of operation	10
3	Transport/Temporary Storage/Disposal.....	11
	3.1 Checking the condition upon delivery	11
	3.2 Transport.....	11
	3.3 Storage/preservation	11
	3.4 Return to supplier.....	11
	3.5 Disposal	12
4	Description of the Pump (Set)	13
	4.1 General description	13
	4.2 Product information as per Regulation No. 1907/2006 (REACH).....	13
	4.3 Designation.....	13
	4.4 Name plate.....	14
	4.5 Design details.....	14
	4.6 Configuration and function.....	15
	4.7 Noise characteristics	17
	4.8 Scope of supply.....	17
	4.9 Dimensions and weights	17
	4.10 Accessories	17
5	Installation at Site	18
	5.1 Safety regulations.....	18
	5.2 Checks to be carried out prior to installation.....	18
	5.3 Installing the pump set	19
	5.4 Connecting the piping	20
	5.5 Electrical connection	20
	5.5.1 Setting the overload protection device.....	22
	5.5.2 Setting the switching points for the level control system (for Ama-Drainer ... S only).....	23
	5.6 Checking the direction of rotation.....	24
6	Commissioning/Start-up/Shutdown	26
	6.1 Commissioning/Start-up	26
	6.1.1 Prerequisites for commissioning/start-up	26
	6.1.2 Start-up.....	26
	6.2 Operating limits.....	27
	6.2.1 Frequency of starts.....	27
	6.2.2 Fluid handled	27
	6.3 Shutdown/storage/preservation	29

6.3.1	Stopping	29
6.3.2	Measures to be taken for shutdown	29
6.4	Returning to service	30
7	Operation.....	31
7.1	Controlling an Ama-Drainer 80	31
8	Servicing/Maintenance	32
8.1	Safety regulations.....	32
8.2	Maintenance/inspection.....	32
8.2.1	Lubrication and lubricant change.....	33
8.3	Drainage/disposal	34
8.4	Dismantling the pump set.....	35
8.4.1	General information/Safety regulations.....	35
8.4.2	Dismantling the pump section	35
8.4.3	Dismantling casing insert 13-6 (variant B/BH only).....	35
8.4.4	Removing the mechanical seal.....	36
8.4.5	Removing the ball bearings	36
8.5	Reassembling the pump set.....	36
8.5.1	General information/Safety regulations.....	36
8.5.2	Installing the ball bearings.....	37
8.5.3	Installing the mechanical seal	37
8.5.4	Fitting casing insert 13-6 (variant B/BH only).....	37
8.5.5	Installing the pump section.....	38
8.6	Recommended spare parts stock	38
9	Trouble-shooting.....	39
10	Related Documents	41
10.1	Exploded view and list of components	41
10.2	Dimensions.....	43
10.2.1	Ama-Drainer 80.....	43
10.2.2	Ama-Drainer 100.....	44
10.3	Installation example	45
10.3.1	Single pump (installation example)	45
10.3.2	Dual-pump station (installation example).....	46
10.4	Wiring diagrams	47
10.4.1	Ama-Drainer 80.....	47
10.4.2	Ama-Drainer 100.....	48
11	EU Declaration of Conformity	50
12	Certificate of Decontamination.....	51
	Index	52

Glossary

Backflow

Waste water flowing back from the sewer into the connected drainage piping

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.

Close-coupled design

Motor directly fitted to the pump via a flange or a drive lantern

Discharge line

Pipe for transporting waste water to a level above the flood level into the sewer system

EN 12050-2

European Standard for waste water lifting units which are used to dispose of faeces-free waste water occurring below the flood level of buildings and sites. It defines general requirements as well as principles of construction and testing.

Flood level

Maximum backflow level of waste water in a drainage system

Hydraulic system

The part of the pump in which the kinetic energy is converted into pressure energy

Pump

Machine without drive, additional components or accessories

Pump set

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

Submersible motor pump

Submersible motor pumps are floodable, close-coupled units which are not self-priming. The pumps are usually operated completely submerged. They may be operated outside the fluid for short periods of time, until the minimum fluid level has been reached.

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, the main operating data and the serial number. The serial number uniquely describes the product and is used as identification in 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
Sub-supplier product literature	Operating manuals and other product literature describing accessories and integrated machinery components

For accessories and/or integrated machinery components observe the product literature of the relevant manufacturer.







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.

2.3 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 shutting down 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.
- Make sure the system cannot be accessed by unauthorised persons (e.g. children).

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 26)

2.8 Unauthorised modes of operation

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

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

3 Transport/Temporary 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

	<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 transport Damage to the pump (set)!</p> <ul style="list-style-type: none"> ▷ To transport the pump / pump set always use the handle. ▷ Never suspend the pump (set) from the float switch or power cable to lift it up or transport it. ▷ Prevent the pump (set) from getting knocked or dropped.

3.3 Storage/preservation

	<p>CAUTION</p>
	<p>Damage during storage due to frost, humidity, dirt, UV radiation or vermin Corrosion/contamination of the pump!</p> <ul style="list-style-type: none"> ▷ Store the pump (set) in a dry, dark, frost-proof room not exposed to sunlight where the atmospheric humidity is as constant as possible.



Store the pump (set) vertically in a dry, dark, frost-proof room not exposed to sunlight. Under these conditions it does not need additional preservation.

3.4 Return to supplier

1. Drain the pump as per operating instructions. (⇒ Section 8.3, Page 34)
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 also neutralise the pump and blow through with anhydrous inert gas to ensure drying.
4. Always complete and enclose a certificate of decontamination when returning the pump.
Indicate any safety measures and decontamination measures taken.
(⇒ Section 12, Page 51)

	<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

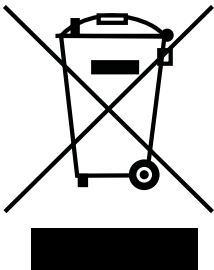
	 WARNING
	<p>Fluids, consumables and supplies posing a health hazard Hazard to persons and the environment!</p> <ul style="list-style-type: none"> ▷ Collect and dispose of any preservatives, flushing liquids and fluid residues. ▷ Wear safety clothing and a protective mask, if required. ▷ Observe all legal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

1. Dismantle the product.
Collect greases and other lubricants during dismantling.
2. Separate and sort the 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

- Submersible waste water pump (see submersible motor pump)

Standard design

- Chemically neutral waste water
- Slightly contaminated waste water
- Solid particles with a particle size of up to 12 mm

Variants B / BH

In addition to the standard design:

- Abrasive fluids
- Water containing sand

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

For information as per chemicals Regulation (EC) No. 1907/2006 (REACH), see <http://www.ksb.com/reach>.

4.3 Designation

Example: Ama-Drainer B 80-40 S

Table 4: Designation key

Code	Description	
Ama-Drainer	Type series	
B	Design	
	B	Wear-resistant variant
	BH	Wear-resistant variant with impeller made of Norihard white cast iron
	- ¹⁾	Variant for waste water (standard design)
80	Nominal discharge nozzle diameter	
	80	80 mm
	100	100 mm
40	Motor rating [kW x 10]	
	40	4.0 kW
	75	7.5 kW
S	Float switch	
	S	With float switch
	N	Without float switch

1) Blank

4.4 Name plate

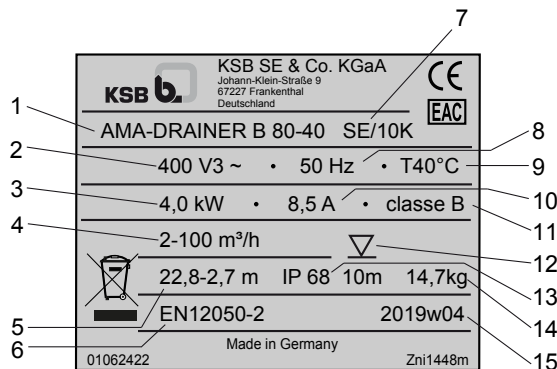


Fig. 1: Name plate (example)

1	Type series, size	9	Maximum fluid temperature
2	Rated voltage	10	Rated current
3	Rated power	11	Thermal class of winding insulation
4	Flow rate ($Q_{min.} / Q_{max.}$)	12	Maximum immersion depth
5	Head ($H_{min.} / H_{max.}$)	13	Enclosure
6	Principles of construction and testing	14	Total weight
7	Power cable version (e.g. E = single-phase)	15	Serial number (year of production, week of production)
8	Rated frequency		

4.5 Design details

Design

- Fully floodable submersible motor pump
- Close-coupled design
- Single-stage
- To EN 12050-2
- Vertical discharge nozzle
- With or without level control
- Wetted parts made of materials coated with anti-corrosive

Installation

- Vertical installation
- Wet-installed transportable model
- Wet-installed stationary model

Drive

- Surface-cooled three-phase motor
- DOL starting or star-delta starting
- Motor winding to IEC 60038
- Motor design to EN 60043 T1/IEC 34-1
- Thermal class B
- Enclosure IP68 (permanently submerged) to EN 60529 / IEC 529
- Integrated temperature switches

Shaft seal

- Pump end: 1 mechanical seal
- Drive end: 1 mechanical seal
- Liquid reservoir between the seals for cooling and lubrication

Impeller type

- Open multi-vane impeller

Bearings

- Maintenance-free
- Grease-packed rolling element bearings sealed for life

Electrical connection

Ama-Drainer 80:

- Ready to be plugged in
- Power cable and CEE plug with phase inverter
- Phase sequence indicator
- Over-current trip

Ama-Drainer 100:

- Power cable with free cable ends
- Control unit available as an accessory

Standard design:

- 10-metre power cable

Variants B / BH

- 20 m power cable

4.6 Configuration and function

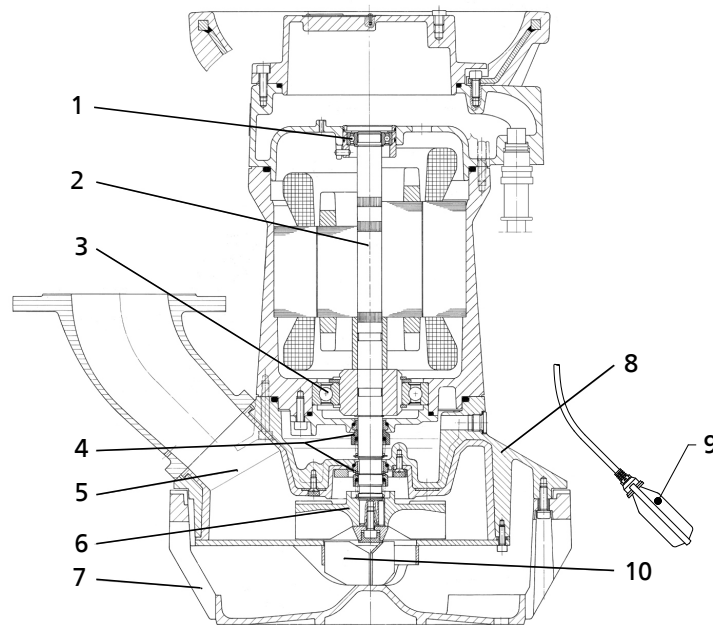


Fig. 2: Sectional drawing

1	Bearing, motor end	6	Impeller
2	Shaft	7	Foot
3	Bearing, pump end	8	Volute casing

4	Shaft seal	9	Float switch ²⁾
5	Discharge nozzle	10	Suction nozzle

Design The pump is designed with a vertical fluid inlet and a vertical outlet. The hydraulic system sits on the extended motor shaft. The shaft runs in common bearings.

Function The fluid handled enters the pump axially via the suction nozzle (10). The rotating impeller (6) accelerates the fluid handled outward. In the flow passage of the volute casing (8) the kinetic energy of the fluid handled is converted into pressure energy and the fluid handled is pumped to the discharge nozzle (5). The fluid handled leaves the pump via the discharge nozzle.

At the rear side of the impeller, the shaft (2) enters the hydraulic system via the volute casing (8). The shaft passage through the volute casing is sealed to atmosphere with two bi-directional shaft seals (4) in tandem arrangement. A lubricant reservoir between the seals ensures cooling and lubrication of the shaft seals. The shaft runs in rolling element bearings (1) and (3).

2) For Ama-Drainer ... S only

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 set
- 10-metre power cable

For variant B/BH:

- 20 m power cable

For Ama-Drainer ... S:

- Float switch

4.9 Dimensions and weights

For dimensions and weights refer to the general arrangement drawing/outline drawing or data sheet of the pump set.

4.10 Accessories

- Control unit
- Pipe connection

Table 5: Pipe connection



Pipe connection	Size	Ama-Drainer (B)	
		80	100
Special connection elbow made of grey cast iron	Rp 2 1/2	X	-
Flange ³⁾	DN 65	X	-
	DN 80	X	-
	DN 100	-	X
Internal thread to DIN 2999/1 ⁴⁾	Rp 4	-	X

Further required accessories can be purchased from our distributors.

3) Drilled to DIN 2501, PN 16
 4) To be indicated in the order

5 Installation at Site

5.1 Safety regulations

	<p style="background-color: #e67e22; color: white; padding: 5px;">⚠ DANGER</p> <p>Unsuitable electrical installation Danger to life!</p> <ul style="list-style-type: none"> ▷ Make sure the electrical installation meets the VDE 0100 installation rules (i.e. sockets with earthing terminals). ▷ Make sure the electric mains is equipped with a residual current device of maximum 30 mA. ▷ Always have the electrical connections installed by a trained and qualified electrician.
	<p style="background-color: #e67e22; color: white; padding: 5px;">⚠ DANGER</p> <p>Use in an outdoor area Danger of death from electric shock!</p> <ul style="list-style-type: none"> ▷ Any extension cords must match the quality of the supplied pump cable (10-metre cable length). ▷ Do not expose electrical connections to any moisture.
	<p style="background-color: #e67e22; color: white; padding: 5px;">⚠ DANGER</p> <p>Faulty power cable Danger of death from electric shock!</p> <ul style="list-style-type: none"> ▷ Have the power cable replaced by a trained electrician.
	<p style="background-color: #e67e22; color: white; padding: 5px;">⚠ DANGER</p> <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

Before beginning with the installation check the following:

- The pump set can be operated on the power supply network according to the data on the name plate.
- The fluid to be handled matches the description of suitable fluids.
- All structural work required has been checked and prepared in accordance with the dimensions in the outline drawing.

5.3 Installing the pump set

	<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 transport Damage to the pump (set)!</p> <ul style="list-style-type: none"> ▷ To transport the pump / pump set always use the handle. ▷ Never suspend the pump (set) from the float switch or power cable to lift it up or transport it. ▷ Prevent the pump (set) from getting knocked or dropped.

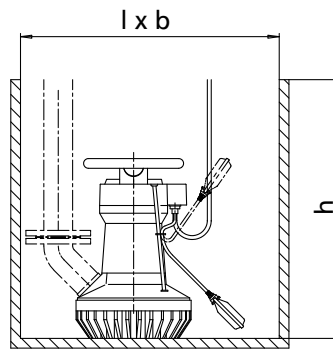


Fig. 3: Installing the pump set

Table 6: Recommended installation dimensions

$l \times b^{5)}$	$h^{5)}$
[mm]	[mm]
800 × 800	800

- ✓ Transport equipment/lifting equipment suitable for the corresponding weight has been selected and is available. (⇒ Section 4.9, Page 17)
- ✓ The place of installation is solid and level.
- ✓ The piping / hose has been properly connected. (⇒ Section 5.4, Page 20)
 1. If the place of installation is difficult to access, attach lifting equipment to the handle of the pump set.
 2. Lower the pump set. Carefully guide the piping / hose down with it.
 3. Place down the pump set. Ama-Drainer ... S: The float switch must be able to move freely.
 4. Run the lifting equipment and piping / hose directly upwards without slack, and fasten them.

2331.823/07-EN

5) Minimum values

5.4 Connecting the piping

	⚠ DANGER
	<p>Impermissible loads acting on the pump nozzles Danger to life from escaping 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. ▷ Observe the permissible forces and moments at the pump nozzles. ▷ Take appropriate measures to compensate for thermal expansion of the piping.
	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>The highest point of the discharge line must be above the flood level (usually street level) to prevent any backflow from the sewage system.</p>

Stationary installation

1. Connection as per installation examples. (⇒ Section 10.3, Page 45)




Transportable model

1. Connect the special connection elbow to the hose with an adapter, e.g. Storz coupling.

5.5 Electrical connection

	⚠ DANGER
	<p>Operating a pump set that has not been fully connected Explosion hazard! Damage to the pump set!</p> <ul style="list-style-type: none"> ▷ Never start up a pump set with power cables that have not been fully connected or non-operational monitoring devices.
	⚠ 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 mains network, short circuit!</p> <ul style="list-style-type: none"> ▷ Observe the technical specifications of the local energy supply companies.

2331.823/07-EN



	<p style="background-color: #FFD700; margin: 0;">CAUTION</p> <p>Flow-induced motion Damage to the power cable!</p> <ul style="list-style-type: none"> ▷ Run the power cable upwards without slack.
	<p style="background-color: #FFD700; margin: 0;">CAUTION</p> <p>Improper routing of power cable Damage to the power cables!</p> <ul style="list-style-type: none"> ▷ Never move the power cables at temperatures below - 25 °C. ▷ Never kink or crush the power cables. ▷ Never lift the pump set by the power cables. ▷ Adjust the length of the power cables to the site requirements.
	<p style="background-color: #FFD700; margin: 0;">CAUTION</p> <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 %.

For the electrical connection observe the circuit diagrams (⇒ Section 10.4, Page 47) in the Annex and the information for planning the control system .

The pump set is supplied complete with power cables. Always use all cables provided and connect all marked cores of the control cable.

1. Run the power cable upwards without slack and fasten it.
2. Only remove the protective caps from the power cable immediately before connection.
3. If necessary, adjust the length of the power cable to the site requirements.
4. After shortening the cable, correctly re-affix the markings of the individual cores at the cable end.

5.5.1 Setting the overload protection device

	<p style="background-color: #FFD700; margin: 0;">CAUTION</p> <p>Motor overload Damage to the motor!</p> <ul style="list-style-type: none"> ▷ Protect the motor by a thermal time-lag overload protection device in accordance with IEC 60947 and local regulations.
	<p style="background-color: #FFD700; margin: 0;">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. ▷ Only operate the pump set with dry running protection.

The drive is protected by thermal circuit breakers installed in the stator winding. When the maximum permissible winding temperature is reached, the thermal circuit breakers stop the pump set. When the drive has cooled down, the thermal circuit breakers automatically start up the pump set again. If the thermal circuit breakers trip the pump set several times in a row, the KSB inspection service must be informed.

1. Fit an external 3-pole, mechanically interlocked protective device.
2. Set the overload protection device to the nominal motor current. Refer to the name plate for the setting value. (⇒ Section 4.4, Page 14)

Overload protection for Ama-Drainer 80

If the thermal circuit breakers in the motor have tripped the pump, the red lamp at the multi-functional plug will be lit until the drive has cooled down. The drive restarts automatically.

The multi-functional plug comprises a motor protection relay that protects the motor against overcurrent but not against short circuit. If the motor protection relay in the multi-functional plug has tripped the motor, the red lamp will be lit until the reset key is pressed. The manual-0-automatic selector switch at the motor protection relay must always be set to manual.

Overload protection for Ama-Drainer 100 ... N with LevelControl Basic 2 control unit

The thermistor motor protection relay in the control unit is without function. To prevent the thermistor motor protection relay from tripping remove the thermistor motor protection relay from the printed circuit board in the control cabinet and fit a bridge on the printed circuit board in the control cabinet. (⇒ Section 10.4.2.1, Page 49)

- 1 pump set: bridge on terminals 121-122
- 2 pump sets: bridge on terminals 121-122 and 221-222

5.5.2 Setting the switching points for the level control system (for Ama-Drainer ... S only)

	<p>CAUTION</p>
	<p>Fluid level below the specified minimum Damage to the pump set by cavitation!</p> <p>▷ Never allow the fluid level to drop below the specified minimum.</p>
	<p>NOTE</p>
	<p>The pump set is switched ON/OFF with the float switch at an UPWARD/ DOWNWARD slant of approximately 40° of the float housing (clearly audible switching noise in the float housing).</p>

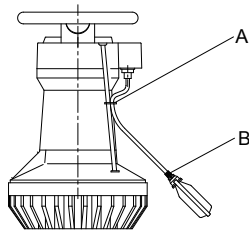


Fig. 4: Setting the switching points for the level control system

A	Fastening point (example)	B	Antikink bush
---	---------------------------	---	---------------

Level control system for one pump set

General information:

- The pump set must stop before the water level falls to the level of the pump foot's suction openings.
- The pump set must start up before the water level reaches the upper edge of the tank.
- The float switch must be able to move freely; it must not rest at the bottom or bump against anything at the top.

- ✓ The minimum level of fluid handled is observed. (⇒ Section 6.2.2.4, Page 28)
 1. Choose an appropriate height for attaching the float switch cable.
 2. Fasten the float switch cable to the discharge line or another suitable point. The distance between fastening point (A) and antikink bush (B) must be 100 mm as a minimum.

Level control system for two pump sets with control unit for dual-pump stations




General information:

- When two pump sets are used, Ama-Drainer 80 ... N and two float switches must be used.
- Arrange the two float switches in a cascade. This configuration permits the following switching functions:
 - Alternating start-up of the two pump sets at each switching cycle.
 - Additional start-up of the stand-by pump at peak load.
 - Start-up of the stand-by pump should the duty pump fail.
- The pump set must stop before the water level falls to the level of the pump foot's suction openings.
- The pump set must start up before the water level reaches the upper edge of the tank.
- The float switch must be able to move freely; it must not rest at the bottom or bump against anything at the top.

2331.823/07-EN

- ✓ Two Ama-Drainer 80 ... N pumps and two float switches are available.
- ✓ The minimum level of fluid handled is observed. (⇒ Section 6.2.2.4, Page 28)
 1. Arrange the two float switches in a cascade.
 2. Choose an appropriate height for attaching the float switch cable.
 3. Fasten the float switch cable to the discharge line or another suitable point. The distance between fastening point (A) and antikink bush (B) must be 100 mm as a minimum.

5.6 Checking the direction of rotation

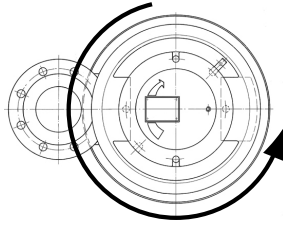
	<p>⚠ WARNING</p> <p>Hands inside the pump casing Risk of injuries, damage to the pump!</p> <ul style="list-style-type: none"> ▸ Always disconnect the pump set from the power supply and secure it against unintentional start-up before inserting your hands or other objects into the pump.
	<p>CAUTION</p> <p>Pump set running dry Increased vibrations! Damage to mechanical seals and bearings!</p> <ul style="list-style-type: none"> ▸ Never operate the pump set for more than 60 seconds without the fluid handled.
	<p>CAUTION</p> <p>Wrong direction of rotation Damage to the pump!</p> <ul style="list-style-type: none"> ▸ Follow the step-by-step instructions given for checking the direction of rotation.

Ama-Drainer (B) 80 The power cable (CEE plug) has been connected in the factory so that the pump will have the correct direction of rotation, provided that the mains' phase sequence (building supply mains) is correct.

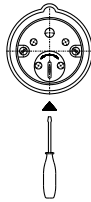
If the direction of rotation is incorrect the yellow indicator lamp at the CEE plug is lit.

1. Start up the pump.

⇒ If the direction of rotation is correct, the pump should show a start reaction in the direction indicated.



2. If the direction of rotation is incorrect, press in the phase inverter in the CEE plug with an appropriate screwdriver and turn it by 180°.

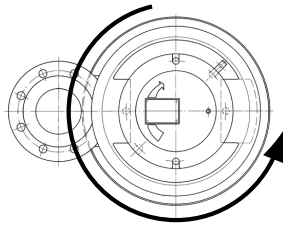


3. If the pump set is connected via a control unit, interchange wires 1 and 2 of the 7-wire cable.

Ama-Drainer (B) 100 Electrical connection is effected via a switchgear (YΔ-starting). If the direction of rotation is incorrect, interchange wires L1 and L2 of the power cable.

1. Start up the pump.

⇒ If the direction of rotation is correct, the pump should show a start reaction in the direction indicated.



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. (⇒ Section 5.5, Page 20)
- The direction of rotation has been checked. (⇒ Section 5.6, Page 24)

6.1.2 Start-up

Ama-Drainer ... N (without float switch)

The pump set starts up automatically via the control unit.

Ama-Drainer ... S (with float switch)

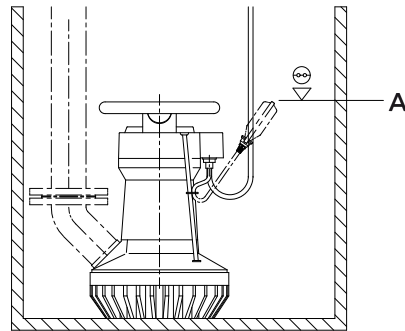



Fig. 5: Start-up level

A	Start-up level
---	----------------

The pump set starts up automatically when the float switch has reached start-up point A.

6.2 Operating limits


6.2.1 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 and excessive loads on the motor, seal elements and bearings, the frequency of starts must not exceed 20 start-ups per hour.

6.2.2 Fluid handled

6.2.2.1 Permissible fluids to be handled

	! 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.

Standard design

- Chemically neutral waste water
- Slightly contaminated waste water
- Solid particles with a particle size of up to 12 mm

Variants B / BH

In addition to the standard design:

- Abrasive fluids
- Water containing sand

6.2.2.2 Fluid temperature

	CAUTION
	<p>Incorrect fluid temperature Damage to the pump (set)!</p> <ul style="list-style-type: none"> ▷ Only operate the pump (set) within the temperature limits indicated.

Table 7: Fluid temperature depending on the duty cycle

Duty cycle	Standard design	Variants B / BH
	[°C]	[°C]
Continuous duty	50 max.	40 max.
Short-time duty ⁶⁾	90 max.	90 max.

6.2.2.3 Density of the fluid handled

	CAUTION
	<p>Permissible fluid density exceeded Risk of motor overload!</p> <ul style="list-style-type: none"> ▷ Verify the density data against the order data. ▷ Make sure the motor has sufficient power reserves.

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

The pump set is suitable for fluids not containing coarse substances or faeces.

Maximum particle size: 12 mm

6.2.2.4 Minimum fluid level / maximum fluid level

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.

Table 8: Minimum fluid level / maximum fluid level

Minimum level of fluid handled $W_{T \min.}$	Maximum fluid level $W_{T \max.}$ / Maximum immersion depth	
	Standard design	Variants B / BH
[mm]	[m]	[m]
80	7	10

6) $t \leq 3$ minutes

6.3 Shutdown/storage/preservation

6.3.1 Stopping

Ama-Drainer ... N (without float switch)

The pump set stops automatically via the control unit.

Ama-Drainer ... S (with float switch)

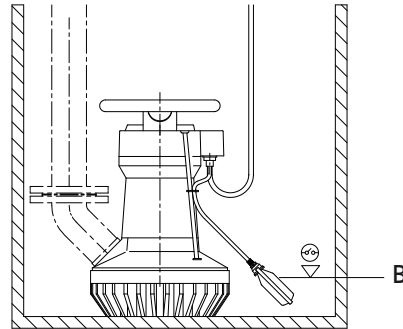


Fig. 6: Stop level

B	Stop level
---	------------

The pump set stops automatically when the float switch reaches stop point B.

6.3.2 Measures to be taken for shutdown

	<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.

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


**NOTE**

On pumps/pump sets older than 5 years we recommend replacing all elastomer seals.

For returning the equipment to service, observe the sections on commissioning/start-up (⇒ Section 6.1, Page 26) and the operating limits (⇒ Section 6.2, Page 27) .



In addition carry out all servicing/maintenance operations before returning the pump set to service. (⇒ Section 8, Page 32) .

7 Operation



	CAUTION
	<p>Incorrect operation Damage to the pump system!</p> <ul style="list-style-type: none"> ▷ Make sure to comply with all local regulations, particularly the EC Machinery Directive and the EC Directive on Low-Voltage Equipment. ▷ Check all electric cables prior to commissioning/start-up.

7.1 Controlling an Ama-Drainer 80

Variant N:

Switch position		Pump ON (the green equipment-on lamp is lit)
Switch position	0	Pump OFF
Switch position		No function

Variant S:

Switch position		Pump manually ON (The green equipment-on lamp is lit)
Switch position	0	Pump OFF
Switch position		Pump automatically ON/OFF via float switch (The green equipment-on lamp is lit as long the float switch is in upper float position)

8 Servicing/Maintenance

8.1 Safety regulations

	⚠ DANGER
	<p>Power supply not disconnected Danger to life!</p> <ul style="list-style-type: none"> ▷ Pull the mains plug or disconnect all electrical connections and secure against unintentional start-up.
	⚠ DANGER
	<p>Work on the pump set by unqualified personnel Danger of death from electric shock!</p> <ul style="list-style-type: none"> ▷ Have pump components modified and dismantled by authorised personnel only.
	⚠ 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.
	⚠ WARNING
	<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.

8.2 Maintenance/inspection

The pump (set) is practically maintenance-free. Slight wear of the mechanical seal is unavoidable. This will be aggravated by abrasive substances contained in the fluid handled.

KSB recommends the following regular servicing schedule:

Table 9: Overview of maintenance work

Maintenance interval	Maintenance work
Every 2,000 operating hours	Check the lubricant in the lubricant chamber.
	Check the mechanical seal.

The operating reliability will be improved if proper functioning is checked and verified at regular intervals (EN 12056-4).

8.2.1 Lubrication and lubricant change

8.2.1.1 Lubricant quality

The lubricant reservoir is filled at the factory with environmentally-friendly, non-toxic lubricant of medical quality.

The following oils can be used for lubrication:

Recommended quality of lubricant

- Merkur white oil Pharma 70; producer: DEA
- Thin-bodied paraffin oil; producer: Merck, No.: 7174
- Or an equivalent brand of medical quality, non-toxic

	NOTE
	<p>Only use motor oil if there is no risk of the lubricant contaminating the fluid handled and if the motor oil can be disposed of properly.</p>

8.2.1.2 Lubricant quantity

Table 10: Lubricant quantity

Size	Lubricant quantity
	[l]
80-40	0,8
100-75	1,0

8.2.1.3 Changing the lubricant

	⚠ WARNING
	<p>Lubricants posing a health hazard and/or hot lubricants Hazard to persons and the environment!</p> <ul style="list-style-type: none"> ▸ When draining the lubricant take appropriate measures to protect persons and the environment. ▸ Wear safety clothing and a protective mask if required. ▸ Collect and dispose of any lubricants. ▸ Observe all legal regulations on the disposal of fluids posing a health hazard.

	⚠ WARNING
	<p>Excess pressure in the lubricant reservoir Liquid spurting out when the lubricant reservoir is opened at operating temperature!</p> <ul style="list-style-type: none"> ▸ Open the screw plug of the lubricant reservoir very carefully.

Draining the lubricant 1. Position the pump set as illustrated.

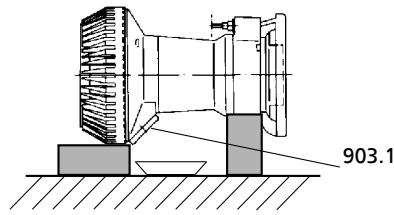


Fig. 7: Draining the lubricant

- 2. Place a suitable container under the screw plug.
 - 3. Undo screw plug 903.1 and drain off the lubricant.
- Checking the lubricant**
- 1. Rub the lubricant between your fingers and check its lubricating properties. If the lubricant is dull in appearance or contains grinding particles, the lubricant has to be replaced.
A water-oil emulsion (white colour) is of no concern as it is normal for the mechanical seal to leak slightly.
- Filling in the lubricant**
- 1. Position the pump set as illustrated.

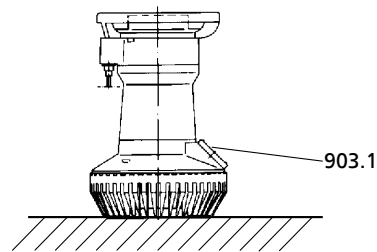


Fig. 8: Filling in the lubricant

- 2. Fill the lubricant through the lubricant filler opening into the lubricant reservoir.
- 3. Replace joint ring 411.1, if required.
- 4. Insert and tighten screw plug 903.1.




8.3 Drainage/disposal

	<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.

8.4 Dismantling the pump set

8.4.1 General information/Safety regulations

	<p>⚠ DANGER</p> <p>Power supply not disconnected Danger to life!</p> <ul style="list-style-type: none"> ▶ Pull the mains plug or disconnect all electrical connections and secure against unintentional start-up.
	<p>⚠ DANGER</p> <p>Work on the pump set by unqualified personnel Danger of death from electric shock!</p> <ul style="list-style-type: none"> ▶ Have pump components modified and dismantled by authorised personnel only.
	<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.

8.4.2 Dismantling the pump section

Dismantle the pump section in accordance with the relevant exploded view.

1. Undo socket head cap screws 914.22 and remove duckfoot bend P3.
2. Undo socket head cap screws 914.21.
3. Remove discs 550.3.
4. Remove foot 182.
5. Undo socket head cap screw 914.6.
6. Remove suction cover 162 (for size 100: suction cover with inlet ring 131), profile joint 410.2 and bush 540.1.
7. Pull plug 916.2 out of impeller hub cap 260.
8. Undo socket head cap screw 914.41.
9. Remove impeller hub cap 260.
10. Pull off impeller 230.
 (If the impeller is hard to pull off, use a puller with claws.)

8.4.3 Dismantling casing insert 13-6 (variant B/BH only)

1. Remove seven plugs 916.1.
2. Unscrew countersunk screws 900.
3. Remove retaining ring 506.
4. Lift the sealing protuberance of casing insert 13-6 off at the discharge nozzle and press it into the discharge nozzle.
5. Pull the casing insert out of volute casing 102.1.

8.4.4 Removing the mechanical seal

- ✓ The lubricant has been drained. (⇒ Section 8.2.1.3, Page 33)
- ✓ The pump section has been dismantled. (⇒ Section 8.4.2, Page 35)
 1. Remove key 940 and circlip 932.4.
 2. Pull out mechanical seal 433.2.
 3. Unscrew socket head cap screws 914.5.
 4. Remove volute casing 102.1.
 5. Remove circlip 932.11 and adjusting washer 550.2.
 6. Pull off mechanical seal 433.1.
To prevent any damage to the shaft surface caused by the spring when pulling off mechanical seal 433.1, it is recommended to use a special KSB assembly sleeve.

8.4.5 Removing the ball bearings

- ✓ The mechanical seals have been removed. (⇒ Section 8.4.4, Page 36)
 1. Undo three socket head cap screws 914.23.
 2. Take off bearing cover 360.
 3. Pull out the complete rotor assembly.
 4. Remove circlip 932.12.
 5. Pull off ball bearing 321.2 and shaft sleeve 523.
 6. Remove circlip 932.31 or 932.32.
 7. Pull ball bearing 321.1 and bearing sleeve 529 off the shaft.
 8. Remove circlip 932.2.
 9. Press the ball bearing out of the bearing sleeve.

8.5 Reassembling the pump set

8.5.1 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>⚠ 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.

- General**
- Always reassemble the pump in accordance with the corresponding exploded view.
 - Clean all dismantled components and check them for signs of wear.
 - Damaged or worn components are to be replaced by new ones.
 - Always use new tolerance rings.
 - Make sure that the seal faces are clean and that O-rings or gaskets are properly fitted.

- Sealing elements**
- **Gaskets**

2331.823/07-EN

- Always use new gaskets, making sure that they have the same thickness as the old ones.
- Always fit gaskets of asbestos-free materials or graphite without using lubricants (e.g. copper grease, graphite paste).

- **Assembly adhesives**

- 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.

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

8.5.2 Installing the ball bearings

1. Insert tolerance ring 500.22 into the shaft.
2. Press ball bearing 321.1 into bearing sleeve 521.
3. Fit circlip 932.2.
4. Press ball bearing 321.1 and bearing sleeve 529 onto the shaft.
5. Insert tolerance ring 500.21 into the shaft.
To protect the shaft surface use the special KSB assembly sleeve.
6. Fit ball bearing 321.2 on shaft sleeve 523 and insert circlip 932.31 or 932.32.
7. Fit circlip 932.12.
8. Insert the complete rotor assembly. Make sure grooved pin 561.2 (anti-rotation device) is fitted properly.
9. Fit bearing cover 360 with O-ring 412.3.
10. Screw in three socket head cap screws 914.23.

8.5.3 Installing the mechanical seal

- ✓ The ball bearings have been installed. (⇒ Section 8.5.2, Page 37)
 - ✓ Use the special KSB assembly sleeve for installing the mechanical seal.
1. Fit mechanical seal 433.1.
 2. Insert adjusting washer 550.2 and circlip 932.11.
 3. Place O-ring 412.4 on motor housing 811.
 4. Fit volute casing 102.1.
 5. Screw in socket head cap screws 914.5.
 6. Fit mechanical seal 433.2.
 7. Fit circlip 932.4.

8.5.4 Fitting casing insert 13-6 (variant B/BH only)

1. Place casing insert 13-6 in volute casing 102.1.
Make sure that the sealing protuberance sits in the recess of the discharge nozzle.
2. Fit retaining ring 506.
3. Screw in countersunk screws 900.
4. Insert seven plugs 916.1.

8.5.5 Installing the pump section

1. Insert key 940.
2. Insert impeller 230.
3. Fit impeller hub cap 260.
4. Screw in socket head cap screw 914.41.
5. Insert plug 916.2 into impeller hub cap 260.
6. Insert profile joint 410.2 as well as bushes 540.1 (for Ama-Drainer B/BH only insert bushes 540.1).
7. Fit suction cover 162 (for size 100 with inlet ring 131).
8. Screw in socket head cap screw 914.6.
9. Fit foot 182.
10. Insert discs 550.3.
11. Screw in socket head cap screws 914.21.
12. Insert duckfoot bend P3.
13. Screw in socket head cap screws 914.22.

8.6 Recommended spare parts stock

It is not necessary to keep spare parts on stock.

9 Trouble-shooting

	<p>⚠ WARNING</p>
	<p>Improper work to remedy faults Risk of injury!</p> <p>▷ For any work performed to remedy faults, observe the relevant information given in this instruction manual and/or in the product literature provided by the accessories manufacturer.</p>
	<p>NOTE</p>
	<p>Please contact KSB Service before carrying out any work on the pump's internal parts during the warranty period. Non-compliance will lead to forfeiture of warranty cover and of any and all rights to claims for damages.</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 Excessive current/power input
- D Insufficient discharge head
- E Vibrations and noise during pump operation

Table 11: Trouble-shooting

A	B	C	D	E	Possible causes	Remedy ⁷⁾
-	X	-	-	-	Pump delivers against an excessively high pressure.	Fully open the gate valve.
-	X	-	-	-	Gate valve in the discharge line is not fully open.	Fully open the gate valve.
-	-	X	-	X	Pump running in off-design conditions (low flow / overload)	Check the pump's operating data.
X	-	-	-	-	Pump or piping are not completely vented.	Clean vent bore E in duckfoot bend P3.
X	-	-	-	-	Pump intake clogged by deposits	Clean the intake, pump components and lift check valve.
-	X	-	X	X	Supply line or impeller clogged	Remove deposits in the pump and/or piping.
-	-	X	-	X	Dirt/fibres in the clearance between the casing wall and impeller of a sluggish rotor.	Check whether the impeller can be easily rotated; clean the hydraulic system, if required.
-	X	X	X	X	Wear of internal components	Replace worn components by new ones.
X	X	-	X	-	Defective riser (pipe and sealing element)	Replace defective riser pipe and sealing elements.
-	X	-	X	X	Impermissible air or gas content in the fluid handled	Contact KSB.
-	X	X	X	X	Wrong direction of rotation	If the pump set is running in the wrong direction of rotation, check the electrical connection and the control system, if necessary.
-	-	X	-	-	Operating voltage is too low.	Check mains voltage. Check cable connections.
X	-	-	-	-	Motor is not running because of lack of voltage.	Check electrical installation, inform electric utility company.
X	X	-	X	-	Motor is running on 2 phases only.	Replace defective fuse. Check cable connections.
X	-	-	-	-	Motor winding or electric cable are defective.	Contact KSB's pump service.
-	-	X	-	X	Defective radial bearing in the motor.	Contact KSB.

7) The pump pressure must be released before attempting to remedy faults on parts which are subjected to pressure. Disconnect the pump from the power supply and let it cool down before working on it.

A	B	C	D	E	Possible causes	Remedy ⁷⁾
-	X	X	-	-	Pump clogged by sand, dirt in the pump sump, insufficient inflow.	Clean the intake, sand trap, pump components and check valve. Drain and clean the pump sump.
X	-	-	-	-	Temperature control device monitoring the winding has tripped the pump as a result of excessive winding temperatures.	The motor will restart automatically once the unit has cooled down. Investigate the cause.

10 Related Documents

10.1 Exploded view and list of components

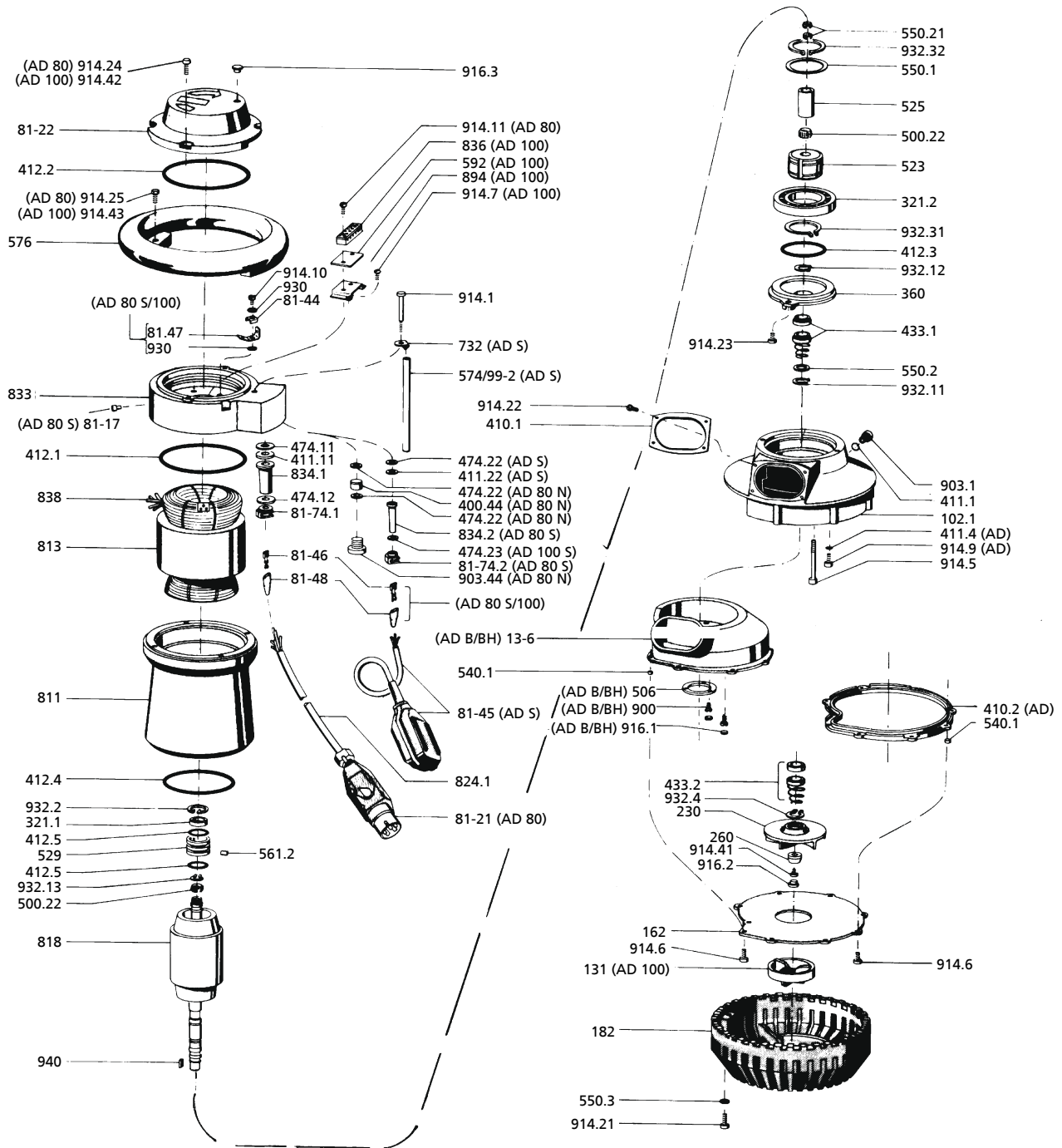


Fig. 9: Exploded view

Table 12: List of components

Part No.	Description	Part No.	Description
102.1	Volute casing	732	Holder
13-6	Casing insert	81-17	End connector
131	Inlet ring	81-21	CEE motor protection plug
162	Suction cover	81-22	Terminal box cover
182	Pump foot	81-44	Terminal clamp
230	Impeller	81-45	Float switch

2331.823/07-EN

Part No.	Description	Part No.	Description
260	Impeller hub cap	81-46	Plug-in sleeve
321.1/.2	Deep groove ball bearing	81-47	Flat connector
360	Bearing cover	81-48	Coupling connector
400.44	Gasket	81-74.1/.2	Pressure screw
410.1/.2 ⁸⁾	Profile seal	811	Motor housing
411.1/.4 ⁸⁾	Joint ring	813	Stator core pack
411.11/.22	Joint ring	818	Pump rotor
412.1-.5	O-ring	824.1	Cable
433.1/.2	Mechanical seal	833	Terminal box
474.11/.12	Thrust ring	834.1/.2	Cable gland
474.22/.23	Thrust ring	836	Terminal strip
500.21/.22	Tolerance ring	838	Temperature switch
506	Retaining ring	894	Mounting bracket
523	Shaft sleeve	900	Countersunk head screw
525	Spacer sleeve	903.1/.44	Screw plug
529	Bearing sleeve	914.1/.5/.6/.7/.9 ⁸⁾ /.10/ .11/.21/.22/.23/.24/.25	Hexagon socket head cap screw
540.1	Bush	914.41/.42	Hexagon socket head cap screw
550.1	Support disc	914.43/.5	Hexagon socket head cap screw
550.2	Adjusting washer	916.1/.2/.3	Plug
550.3	Disc	930	Lock washer
561.2	Grooved pin	932.2/.4/.11/.12/.13/.31/ .32	Circlip
574	Rod	940	Key
576	Handle	99-2	Holder
592	Shim		

8) Not for variants B / BH

10.2 Dimensions

10.2.1 Ama-Drainer 80

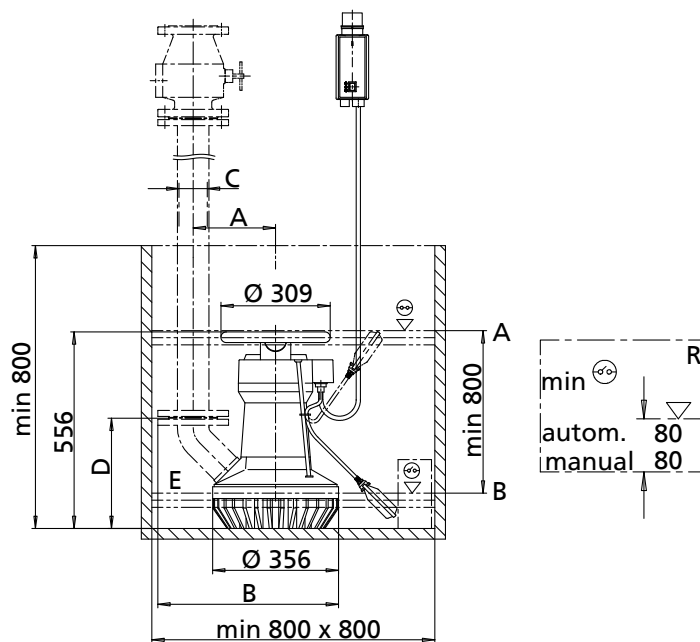


Fig. 10: Outline drawing Ama-Drainer 80

A	Start-up level	B	Switch-off level
E	Vent hole	R	Residual water level

Type series	A	B	C	D	Weight
	[mm]				[kg]
Ama-Drainer 80 Duckfoot bend with internal thread Rp 2 1/2	223	445	Rp 2 1/2	314	68
Ama-Drainer 80 Duckfoot bend with flange DN 80	233	511	80	312	70

10.2.2 Ama-Drainer 100

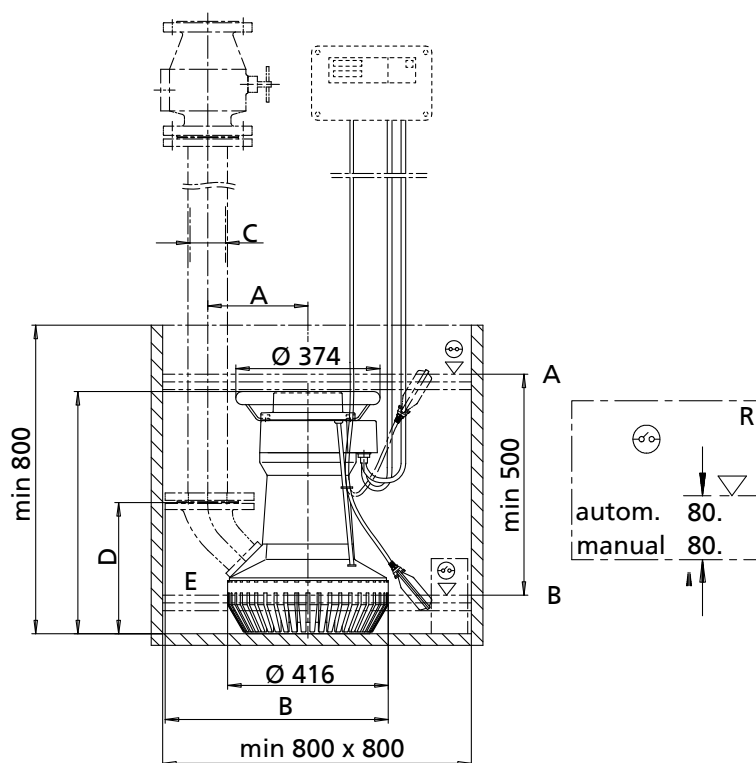


Fig. 11: Outline drawing Ama-Drainer 100

A	Start-up level	B	Switch-off level
E	Vent hole	R	Residual water level

Type series	A	B	C	D	Weight
	[mm]				[kg]
Ama-Drainer 100 Duckfoot bend with internal thread Rp 4	275	546	Rp 4	383	110
Ama-Drainer 100 Duckfoot bend with flange DN 100	260	578	100	340	119

10.3 Installation example

10.3.1 Single pump (installation example)

Suggested connection 1

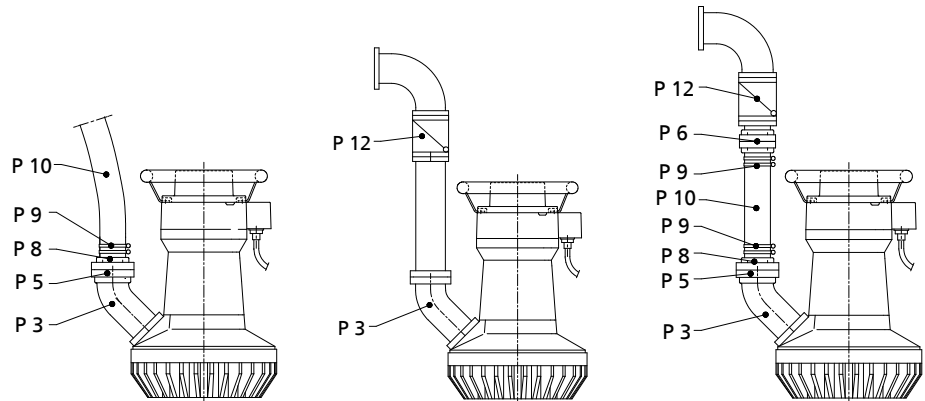
Hose connection for transportable use (quick connection with Storz coupling)

Suggested connection 2

Connection via flanged pipes for stationary use

Suggested connection 3

Hose connection for stationary use (quick connection with Storz coupling)



P 3	Connection elbow
P 5	Storz rigid coupling with external thread
P 6	Storz rigid coupling with flange
P 8	Storz hose coupling
P 9	Hose clip
P 10	Plastic hose
P 12	Check valve

10.3.2 Dual-pump station (installation example)

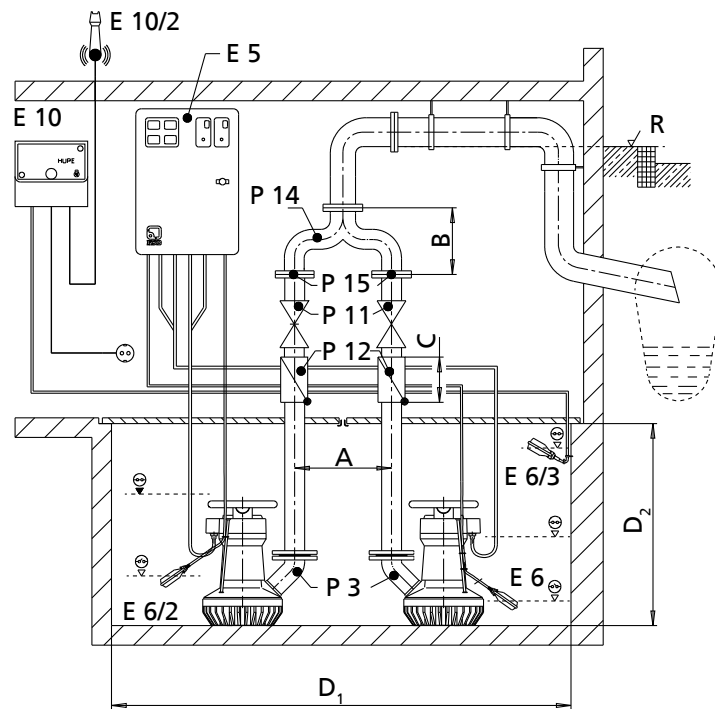


Fig. 12: Installation example in dual-pump station

P 3	Connection elbow				
P 11	Gate valve				
P 12	Swing check valve				
P 14	Y-pipe				
P 15	Threaded flange				
E 5	Control unit				
E 6	Float switch normal water (base load)				
E 6/2	Float switch normal water (peak load)				
E 6/3	Float switch, high water level				
E 10	AS 5 alarm switchgear				
E 10/2	Horn				
R	Flood level				
Size	A	B	C	D ₁	D ₂
	[mm]				
Ama-Drainer 80	350	260	260	1690 x 800	1000
Ama-Drainer 100	325	295	300	1690 x 800	1000

10.4 Wiring diagrams

10.4.1 Ama-Drainer 80

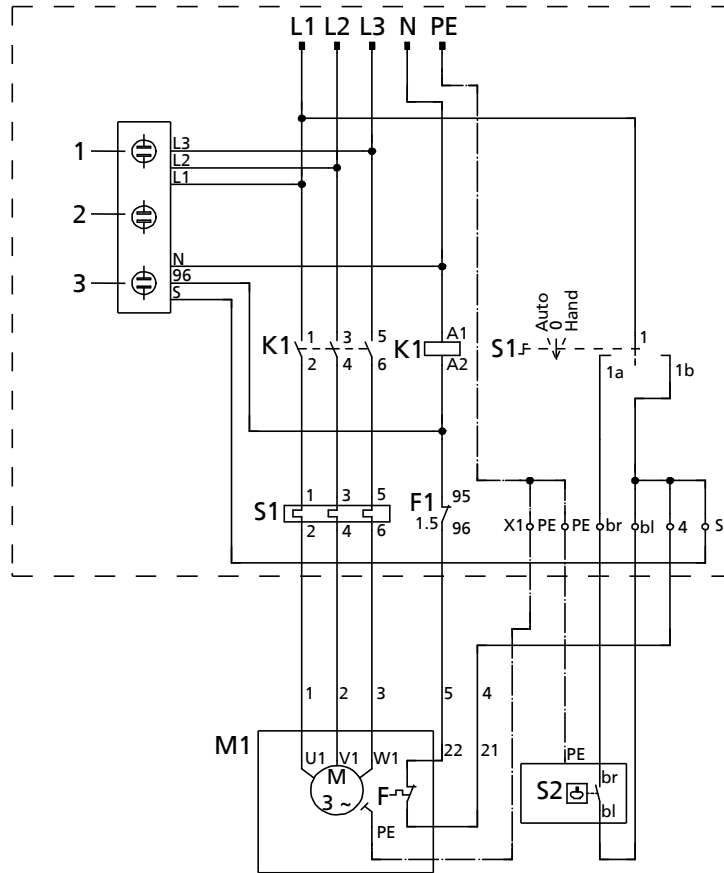


Fig. 13: Wiring diagram Ama-Drainer 80

1	Direction of rotation
2	Operation
3	Fault
K1	Contactor
S1	Manual-0-automatic selector switch
F1	Motor protection relay
X1	Terminal strip
M1	Motor
F	Thermal circuit breaker
S2	Float switch (for Ama-Drainer ... S only)
PE	Green/yellow
br	Brown
bl	Blue

10.4.2 Ama-Drainer 100

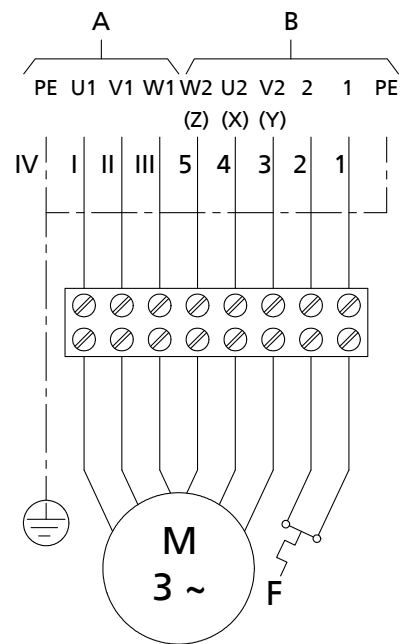


Fig. 14: Wiring diagram Ama-Drainer 100

A	Cable 1
B	Cable 2
M	Motor
F	Thermal circuit breaker
I	Black
II	Brown
III	Grey
IV	Green/yellow

10.4.2.1 Overload protection for Ama-Drainer 100 ... N with LevelControl Basic 2

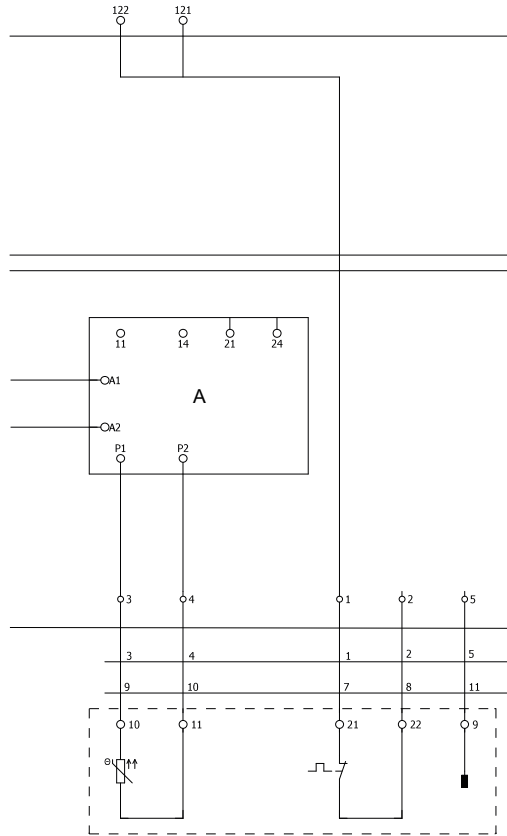


Fig. 15: Printed circuit board in the control cabinet: Overload protection for Ama-Drainer 100 ... N with LevelControl Basic 2

A	Thermistor motor protection relay
---	-----------------------------------

11 EU Declaration of Conformity

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

The manufacturer herewith declares that the product:

Ama-Drainer (B) 80/100

Serial number range: S2001-S2452

- is in conformity with the provisions of the following Directives as amended from time to time:
 - Pump set: 2006/42/EC Machinery Directive
 - Electrical components⁹⁾: 2011/65/EU Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)
 - 2014/30/EU: Electromagnetic Compatibility (EMC)

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:

Hugues Roland
Head of Design/Engineering
KSB S.A.S.
128, rue Carnot,
59320 Sequedin (France)

The EU Declaration of Conformity was issued in/on:

Frankenthal, 1 January 2020



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

9) Where applicable

12 Certificate of Decontamination

Type:

Order number/

Order item number¹⁰⁾:

Delivery date:

Applications:

Fluid handled¹⁰⁾:

Please tick where applicable¹⁰⁾:



Corrosive



Oxidising



Flammable



Explosive



Hazardous to health



Seriously hazardous to health



Toxic



Radioactive



Bio-hazardous



Safe

Reason for return¹⁰⁾:

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, 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

10) Required fields

Index

B

Bearings 15

C

Certificate of Decontamination 51

Commissioning 26

Commissioning/start-up 26

D

Design 14

Designation 13

Disposal 12

Drive 14

E

Electrical connection 21

Event of damage 6

Explosion protection 20

F

Faults

Causes and remedies 39

Fields of application 8

Fluid handled

Density 28

G

General assembly drawing 41

I

Impeller type 15

Installation 14

Installation at site 18

Intended use 8

K

Key to safety symbols/markings 7

N

Name plate 14

O

Other applicable documents 6

P

Partly completed machinery 6

R

Return to supplier 11

Returning to service 30

S

Safety 8

Safety awareness 9

Scope of supply 17

Shaft seal 15

Shutdown 29

Start-up 26

Stopping 29

T

Transport 11, 19

W

Warnings 7

Warranty claims 6



KSB SE & Co. KGaA

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

Tel. +49 6233 86-0

www.ksb.com