

Rainwater Harvesting System

Hya-Rain/Hya-Rain N

Installation/Operating Manual



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Installation/Operating Manual Hya-Rain/Hya-Rain N

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.

Noise characteristics

The noise emission to be expected, indicated as sound pressure level L_{pA} in dB(A)

1 General

1.1 Principles

This operating manual is supplied as an integral part of the type series and variants indicated on the front cover. The manual describes the proper and safe use of this equipment in all phases of operation.

The name plate indicates the type series/size and main operating data. The serial/series number uniquely identify the system and serve as identification in all further business processes.

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

Noise characteristics (⇒ Section 4.6, Page 14)

1.2 Symbols

Table 1: 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

1.3 Target group

This operating manual is aimed at the target group of trained and qualified specialist technical personnel. (⇒ Section 2.4, Page 8)

1.4 Other applicable documents

Table 2: Overview of other applicable documents

Document	Contents
Sub-supplier product literature	Operating manuals, logic diagram and other product literature of accessories and integrated machinery components



2 Safety

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

2.1 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.
	Explosion protection This symbol identifies information about avoiding explosions in potentially explosive atmospheres in accordance with Directive 2014/34/EU (ATEX).
	General hazard In conjunction with one of the signal words this symbol indicates a hazard which will or could result in death or serious injury.
	Electrical hazard In conjunction with one of the signal words this symbol indicates a hazard involving electrical voltage and identifies information about protection against electrical voltage.
	Machine damage In conjunction with the signal word CAUTION this symbol indicates a hazard for the machine and its functions.

2.2 General

This 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.

The safety information in all sections of this manual must be complied with.

The operating manual must be read and fully understood by the specialist personnel/operators responsible prior to installation and commissioning.

The contents of this operating manual must be available to the specialist personnel at the site at all times.

Instructions attached directly to the system must always be complied with and be kept in a perfectly legible condition at all times. This applies to, for example:

- Arrow indicating the direction of rotation
- Markings for connections
- Name plate

The operator is responsible for ensuring compliance with all local regulations not taken into account in this manual.

2.3 Intended use

- The system must only be operated within the operating limits described in the other applicable documents.
- Only operate systems which are in perfect technical condition.
- Do not operate partially assembled systems.
- The system may only handle the fluids described in the product literature of the relevant design variant.
- Never operate the system without the fluid to be handled.
- Observe the information on minimum flow rates specified in the product literature (to prevent overheating, bearing damage, etc).
- Observe the information on maximum flow rates specified in the 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 system.
- Consult the manufacturer about any other modes of operation not described in the product literature.

Prevention of foreseeable misuse

- Never exceed the permissible operating limits (pressure, temperature, etc.) specified in the product literature.
- Observe all safety information and instructions in this manual.

2.4 Personnel qualification and training

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

Personnel responsibilities, competence and supervision must be clearly defined by the operator for installation, operation, maintenance and inspection.

Deficits in knowledge must be rectified by sufficiently trained specialist personnel training and instructing the personnel who will carry out the respective tasks. If required, the operator can commission the manufacturer/supplier to train this personnel.

Training on the system must always be supervised by the technical specialist personnel.

2.5 Consequences and risks caused by non-compliance with these operating instructions

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

2.6 Safety awareness

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

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

2.7 Safety information for the operator/user

- Eliminate all electrical hazards. (In this respect refer to the applicable national safety regulations and/or regulations issued by the local energy supply companies.)

2.8 Safety information for maintenance, inspection and installation

- Modifications or alterations of the system require the manufacturer's prior consent.
- Use only original spare parts or parts authorised by the manufacturer. The use of other parts can invalidate any liability of the manufacturer for resulting damage.
- The operator ensures that maintenance, inspection and installation is performed by authorised, qualified specialist personnel who are thoroughly familiar with the manual.
- Only carry out work on the system during standstill, with the system de-energised and secured against unintentional start-up.
- When taking the system out of service always adhere to the procedure described in the manual.
- As soon as the work has been completed, re-install and/or re-activate any safety-relevant and protective devices. Before returning the system to service, observe all instructions on commissioning.
- Make sure the system cannot be accessed by unauthorised persons (e.g. children).

2.9 Unauthorised modes of operation

Always observe the limits stated in the product literature.

The warranty relating to the operating reliability and safety of the system supplied is only valid if the system 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

	DANGER
	<p>System falling off the pallet Risk of injury by falling system!</p> <ul style="list-style-type: none"> ▷ Always transport the system in vertical position. ▷ Never suspend the system by its power cable. ▷ Use suitable, approved transport equipment, e.g. crane, forklift or pallet trucks.

- ✓ The system is shipped secured to a small wooden pallet and covered with a cardboard box.
The accessories are packed in the same box (see sticker on cardboard box).
The box is provided with two carrying handles arranged on the sides to allow transport.

1. To unpack the system cut the packing straps.
2. Take the accessories and padding out of the box
3. Lift off the box.
 - ⇒ This exposes the system secured to the wooden pallet.
4. Check the box contents for completeness.
5. Check the system for any in-transit damage.
6. Select suitable transport equipment.
7. Transport the system to the place of installation.

3.3 Storage/preservation

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

	CAUTION
	<p>Damage during storage by frost, humidity, dirt, UV radiation or vermin Corrosion/contamination of the rainwater harvesting system!</p> <ul style="list-style-type: none"> ▷ Store the system in a frost-proof, roofed area.
	CAUTION
	<p>Wet, contaminated or damaged openings and connections Leakage or damage of the rainwater harvesting system!</p> <ul style="list-style-type: none"> ▷ Only open the openings of the rainwater harvesting system at the time of installation.

Store the rainwater harvesting system in a dry, protected room where the atmospheric humidity is as constant as possible.

3.4 Return to supplier

1. Drain the system as per operating instructions.
2. Always flush and clean the system.
3. In addition, anhydrous inert gas must be blown through the system to ensure drying.
4. Always complete and enclose a certificate of decontamination when returning the system.
Always indicate any safety and decontamination measures taken.



NOTE

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

3.5 Disposal

1. Dismantle the system.
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

4.1 General description

- Rainwater harvesting system

System for handling clean to slightly contaminated water not containing aggressive, abrasive or solid substances.

4.2 Designation

Table 4: Key to the designation

Designation	Description
Hya-Rain	Rainwater harvesting system with float switch
Hya-Rain N	Rainwater harvesting system with level sensor and control system with level indication in % and automatic mains water replacement

4.3 Name plate

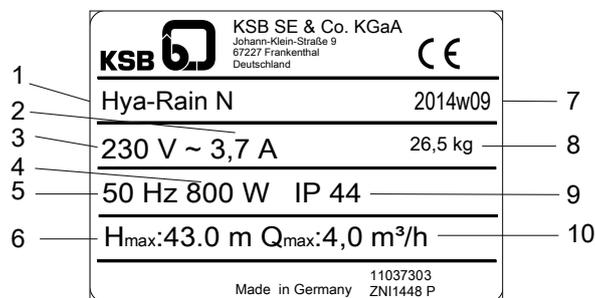


Fig. 1: Name plate (example)

1	Type series/ Size	2	Rated current
3	Rated voltage	4	Rated power
5	Rated frequency	6	Maximum head
7	Year/week of construction	8	Total weight
9	Enclosure	10	Maximum flow rate

4.4 Design details

Design

- Angled tank designed for wall mounting
- Mains water storage tank
 - Material: PE-LLD, dark
 - Storage volume approx. 13 l
- Float valve for mains water supply (approx. 2.7 m³/h)

Pump:

- Enclosure IP44

System:

- IP42 enclosure

Electrical connection

- 230 V, 50 Hz, 800 W
- Power input in stand-by mode: 2.5 - 3 Watt
- 1.5 m power cable with shockproof plug

Drive

- 230 V ± 10 %
- DOL starting
- Thermal class F
- Enclosure IP44
- Thermal motor protection with automatic reset and start-up

Bearings

- Grease-packed deep groove ball bearings sealed for life

4.5 Configuration and function

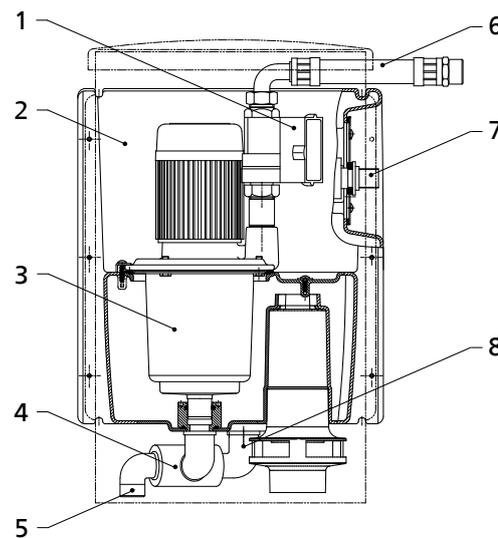


Fig. 2: Sectional drawing

1	Pump control unit	2	Angled tank
3	Pump	4	Three-way valve
5	Suction nozzle, rainwater storage tank	6	Discharge outlet
7	Mains water supply	8	Suction nozzle, mains water storage tank

Design A multi-stage high-pressure pump is installed in an angled tank designed for wall mounting. Via a three-way valve the high-pressure pump is connected to a suction nozzle leading to the outside.

Function The self-priming pump withdraws fluid from the rainwater storage tank via the suction nozzle.

If the rainwater storage tank is empty, the pump can withdraw water from the mains water storage tank. To this end, the pump is fitted with a three-way valve providing it with a second suction nozzle towards the mains water storage tank.

The mains water storage tank contains a water volume of approximately 13 litres, which is automatically replenished from the public water supply system or from other (service water) pressure lines via a float valve.

If a sensor indicates that the rainwater storage tank is empty, the system will automatically switch to the mains water storage tank from which it will withdraw water until the rainwater storage tank contains a sufficient amount of water again.

Once the rainwater storage tank contains enough water again, this condition is signalled to the system, which will then automatically switch back to rainwater mode.

The pump is started and stopped automatically when a consumer installation is opened and closed.

Monitoring equipment For monitoring purposes, the system is equipped with a pump control unit in the discharge line, which starts the pump as soon as the pressure drops below 2.5 bar (factory setting) and stops it (with an after-run time of approx. 10 seconds) when the consumer installation is closed. At the same time, this device protects the pump against dry running. A lift check valve fitted in the control unit prevents the pumped water from flowing back. The pressure is indicated by a fitted pressure gauge.

4.6 Noise characteristics

Depending on the operating data of the system, the noise level will be approximately 49 - 50 dB(A).

4.7 Dimensions and weights

Dimensions For the dimensions refer to the outline drawings of the system.
(⇒ Section 10.3, Page 51)

Weights **Hya-Rain**

- Without water fill: approx. 26 kg
- With water fill: approx. 42 kg

Hya-Rain N

- Without water fill: approx. 27 kg
- With water fill: approx. 43 kg

4.8 Commissioning/Start-up

4.8.1 Prerequisites for commissioning/start-up

Before commissioning/start-up of the system make sure that the following requirements are met:

- The system has been properly connected to the electric power supply and is equipped with all protection devices.
- All relevant VDE standards and/or regulations applicable in the country of use are complied with.

4.8.2 Priming and venting the system

- Priming**
- ✓ The connection of the mains water back-up system has been connected to the mains water supply.
 - ✓ The system has been properly connected to the electric power supply.
1. Set the operating mode selector switch to "mains water mode" for approximately 15 seconds. (⇒ Section 7.1, Page 31)

⇒ The system tank will fill automatically.

Venting ✓ The system tank has been filled.

1. Insert the vent hose into the tank.



2. Open a consumer installation.

3. Briefly start up the system via the pump master switch. (⇒ Section 7.1, Page 31)

⇒ The system will be vented automatically.



NOTE

After commissioning, we recommend closing the automatic vent valve.

4.8.3 Setting the level control system (for Hya-Rain N only)

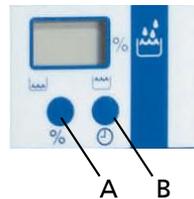


Fig. 3: Level control system

A	Percentage key	B	Timer key
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Calibrating the level display

1. To calibrate the level display keep the Percentage key pressed for 10 seconds.

Setting for automatic switching to mains water mode

1. Press the Timer key twice.
 - ⇒ The display shows a changeover interval of 10-60 days. (Factory setting = 60 days)
2. Press the Percentage key to change this value.
3. Press the Timer key three times.
 - ⇒ The display shows the replacement time in minutes. (The replacement time is the time the pump requires to pump the tank empty. This time depends on the consumption. If only toilet flush boxes are connected it will take longer; if a garden tap is connected, the tank will be emptied in a shorter time. Factory setting 3 minutes.)
4. Press the Percentage key to change this value.
5. Press the Timer key four times or wait for 20 seconds.
 - ⇒ The display changes back to display mode "Fill level in %".

4.8.4 Start-up

The system is in operating mode as soon as it is plugged into the mains.

4.8.5 Functional test

Checking the dry running protection function

- ✓ The system has been properly set up, installed, connected and commissioned.
 1. Close the suction-side water supply (from the rainwater storage tank).
 - ⇒ The pump control unit permanently monitors the system for dry running. Should insufficient fluid be fed into the system from the suction side (no flow), the pump control unit will trip after 10 to 15 seconds. This after-run time can be repeated by pressing the reset key.

Checking the modes of operation

- ✓ The system has been properly set up, installed, connected and commissioned.
 1. Check that the indicator lamps light up.

	Rainwater storage tank	This indicator lamp lights up when the pump withdraws water from the rainwater storage tank.
	Mains water mode	This indicator lamp lights up when the pump withdraws water from the mains water storage tank and the mains water back-up system is activated.
	Automatic mode	This indicator lamp lights up when the pump automatically switches to the available water tank.

4.9 Operating limits

Table 5: Operating limits

Characteristic	Hya-Rain / Hya-Rain N
Operating pressure	max. 6 bar ¹⁾
Inlet pressure for mains water supply	max. 4 bar
Start-up pressure	max. 2.5 bar
Suction lift	max. 7 m
Fluid temperature	max. 35 °C
Ambient temperature	max. 40 °C
Atmospheric humidity	max. 50 % at 40 °C
Voltage/frequency	230 V ± 10 % / 50 Hz

4.10 Shutdown/storage/preservation

4.10.1 Measures to be taken for shutdown

	⚠ WARNING
	<p>Unintentional start-up of the rainwater harvesting system</p> <p>Risk of injury by moving parts!</p> <ul style="list-style-type: none"> ▷ Only carry out work on the rainwater harvesting system after checking that the system has been disconnected from the power supply. ▷ Secure the rainwater harvesting system against unintentional starting.

1. Disconnect the system from the power supply and protect it against start-up.
2. Remove the system as per operating instructions.
3. Shut off the mains water supply and the discharge line.
4. Flush the system as per operating instructions.
5. Leave the system to dry.

1) Inlet pressure and pump discharge pressure must not exceed 6 bar.

**NOTE**

To drain the tank, disconnect the suction line from the rainwater harvesting system and set the three-way valve to the middle position.

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 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.

5.2 Checks to be carried out prior to installation

Before installing the pump make sure that the following requirements are met:

- Check the data on the name plate of the system to make sure it can be operated on the available mains.
- The fluid to be handled matches the description of suitable fluids.
- The above safety instructions have been complied with.
- The installed room is dry, frost-free and well-ventilated.
- Ambient temperature < 40 °C.
- Maximum atmospheric humidity 50 %.

5.3 Setting up and installing the system

The system must be installed in a dry, frost-free and ventilated room.

1. Ideally, it should be mounted on an exterior wall.
 The wall must be suitable to accept four Ø 10 mm plug fixings and to support the system weight.
2. Mark the 4 fastening points with the help of the enclosed drilling template.
3. Drill 4 x Ø 10 mm anchoring holes.
4. Insert the four plug fixings.
5. Mount and align the two lower hanging brackets.
6. Remove the cover from the system.
7. Place the system on the two lower hanging brackets.
8. Fit the upper hanging brackets.
9. Fit the cover on the system.

5.4 Connecting the piping

5.4.1 Connecting the system to the mains water supply

	CAUTION
	<p>Excessive bend of connection line System defect due to impermissible loads on the system! Reduced service life!</p> <ul style="list-style-type: none"> ▷ Connect the connection line without transmitting any stresses or strains. No forces must act on the connection nozzles and the system.

	<p style="background-color: #FFD700; margin: 0;">CAUTION</p> <p>Pressure higher than mains water back-up limit of 4 bar System defect due to impermissible load!</p> <ul style="list-style-type: none"> ▷ Install pressure reducers upstream of the system to make sure that the inlet pressure of the mains water supply does not exceed 4 bar.
	<p style="background-color: #FFD700; margin: 0;">CAUTION</p> <p>Solid substances in the drinking water (stones, sediments, limescale deposits) System defect due to impermissible loads! Reduced service life!</p> <ul style="list-style-type: none"> ▷ If used in areas where the drinking water quality is affected by the above, provide a drinking water filter.
	<p style="background-color: #0070C0; color: white; margin: 0;">NOTE</p> <p>Fitting a shut-off valve at the site is recommended.</p>

1. Connect the tank (R 3/4") to the mains water supply line via the float valve.
 2. Fill the angled tank with water.
 3. Open the mains water supply line.
- ⇒ The tank will fill automatically once the mains water supply line is opened.

5.4.2 Suction-side connection

	<p style="background-color: #0070C0; color: white; margin: 0;">NOTE</p> <p>The suction-side inlet line must be tightly sealed to allow self-priming of the pump.</p>
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1. Connect the suction hose or line (min. Ø 1") coming from the rainwater storage tank (cistern) to the bottom suction nozzle with a screwed pipe fitting, so that the system can be removed, if necessary.
Always lay the suction hose/line with a rising slope towards the pump.



2. Fit a lift check valve at the end of the suction line/hose.

5.4.3 Connecting the discharge line

	<p style="background-color: #FFD700; padding: 5px;">CAUTION</p> <p>Excessive bend of connection line System defect due to impermissible loads on the system! Reduced service life!</p> <ul style="list-style-type: none"> ▷ Connect the connection line without transmitting any stresses or strains. No forces must act on the connection nozzles and the system.
	<p style="background-color: #0070C0; color: white; padding: 5px;">NOTE</p> <p>Fitting a shut-off valve at the site is recommended.</p>

1. By means of the flexible discharge hose the system can be connected to the rainwater piping either on the right or on the left. Excessive bending of the flexible connecting lines will reduce service life and cause impermissible forces on the connection nozzles.



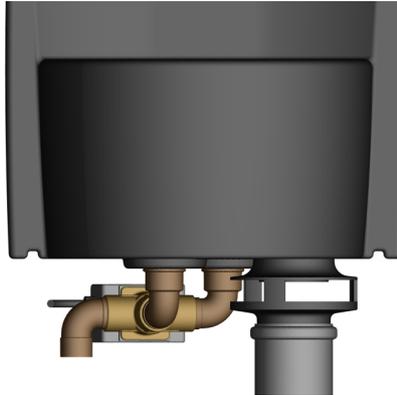
5.4.4 Overflow

EN 1717 stipulates that an overflow must be provided to allow discharge into a sewer system. This system is designed with a 70 mm diameter overflow. In the event of leakage of the mains water back-up system, the water will be discharged via the overflow as soon as it rises above the maximum fluid level.

	<p style="background-color: #0070C0; color: white; padding: 5px;">NOTE</p> <p>This system is only DVGW-approved if backflow from the sewage system is prevented! If no overflow funnel is fitted to the system, the system must be connected to the sewage system with an overflow syphon, which is available as accessory. Make sure that the overflow syphon is not rigidly connected to the system and is installed to DIN 1986-100, EN 1717.</p>
	<p style="background-color: #0070C0; color: white; padding: 5px;">NOTE</p> <p>For permanent connection to the sewage system we recommend the use of a siphon trap to prevent bad odours.</p>

If no drain pipe is installed, the overflow can be discharged into an open tank fitted with a water level indicator.
In this case, adequate monitoring by the user/operator is required.

1. Connect the overflow.



5.5 Electrical connection

	<div style="background-color: #e67e22; color: white; padding: 5px;">⚠ DANGER</div> <p>Electrical connection work by unqualified personnel Risk of fatal injury due to 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 and, for explosion-proof models, EN 60079.
	<div style="background-color: #f1c40f; color: white; padding: 5px;">⚠ WARNING</div> <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.
	<div style="background-color: #2980b9; color: white; padding: 5px;">NOTE</div> <p>A motor protection device is recommended.</p>

5.5.1 Connecting the float switch

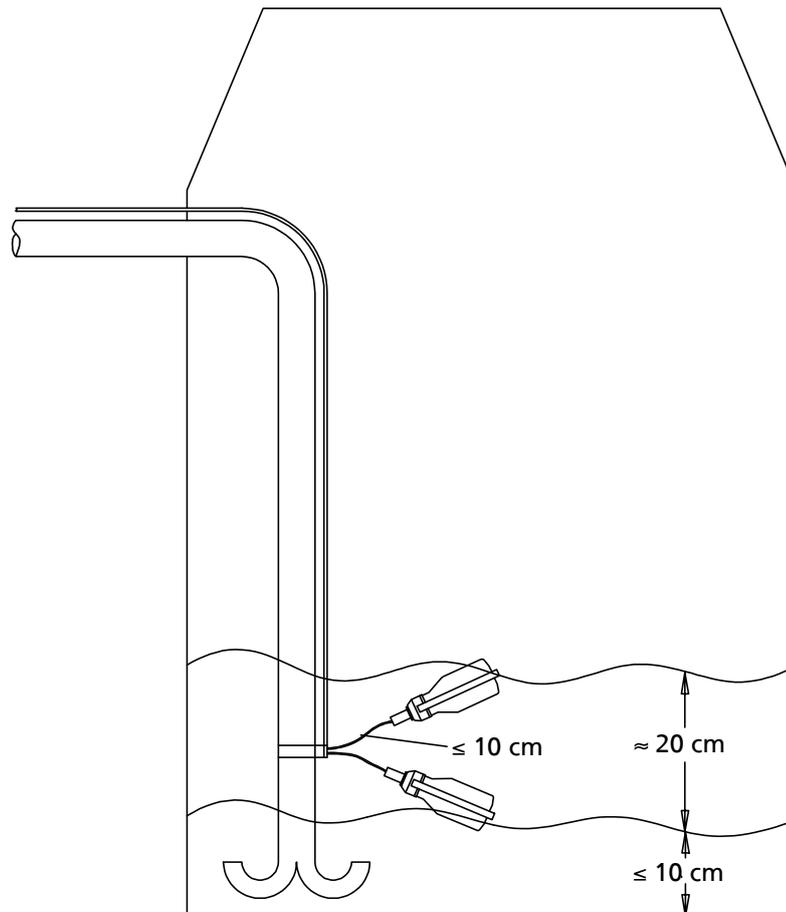
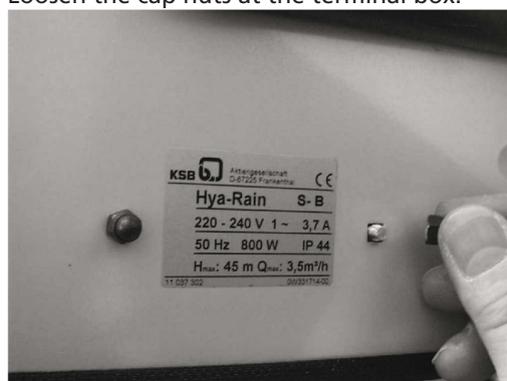
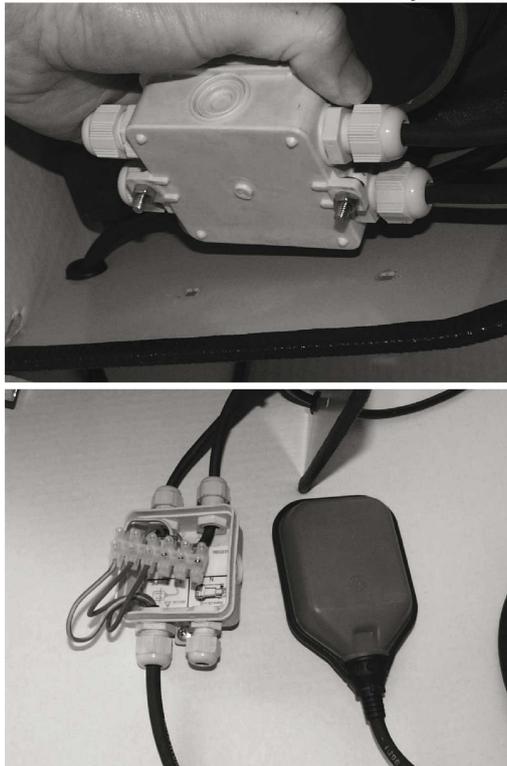


Fig. 4: Connecting the float switch

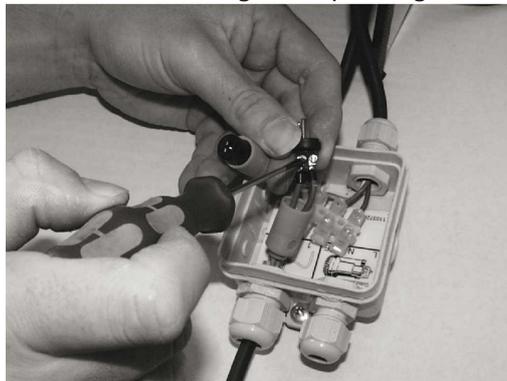
- ✓ The supplied float switch in the rainwater storage tank is fastened in such a way that the system switches to mains water mode as soon as the water level in the rainwater storage tank has dropped to 10 cm.
 - ✓ The power cable of the float switch must be routed to the system in an empty conduit.
1. Loosen the cap nuts at the terminal box.



2. Remove the terminal box from the system and open it.



3. Insert the power cable of the float switch into the provided cable gland. Make sure the cable gland is pointing down and fasten it in this position.



4. Tighten the screwed connection.
5. Connect the cable.
6. Close the terminal box.
7. Re-fit the terminal box.

5.5.2 Connecting the level control system

5.5.2.1 Connecting the sensor

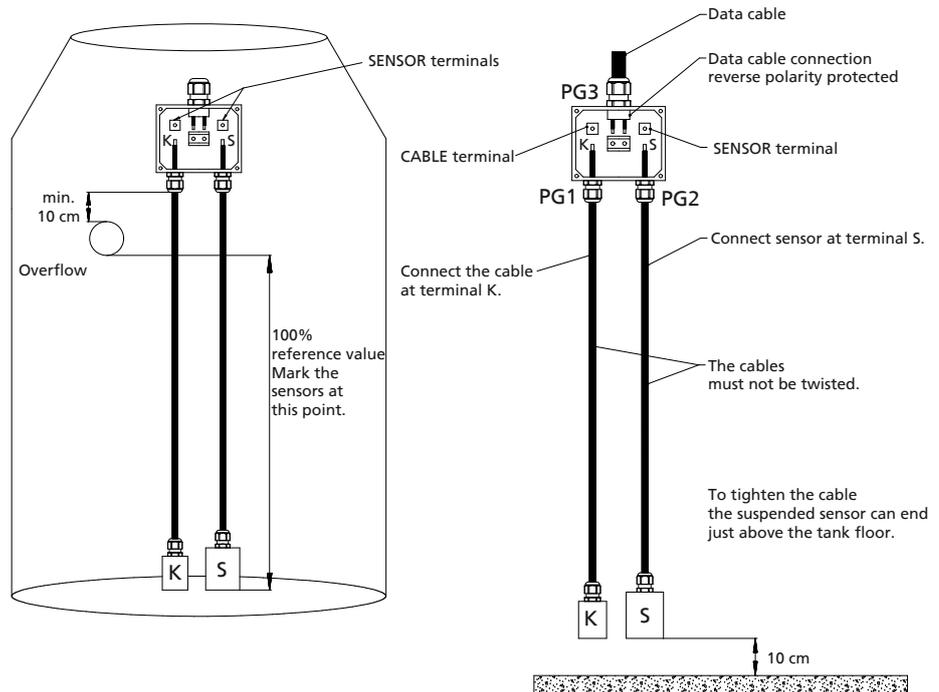


Fig. 5: Connecting the sensor

	CAUTION
	<p>Fluid entering the terminal box Damage to the sensor! Defective system!</p> <p>► Install the terminal box approximately 10 cm above the overflow of the rainwater storage tank.</p>

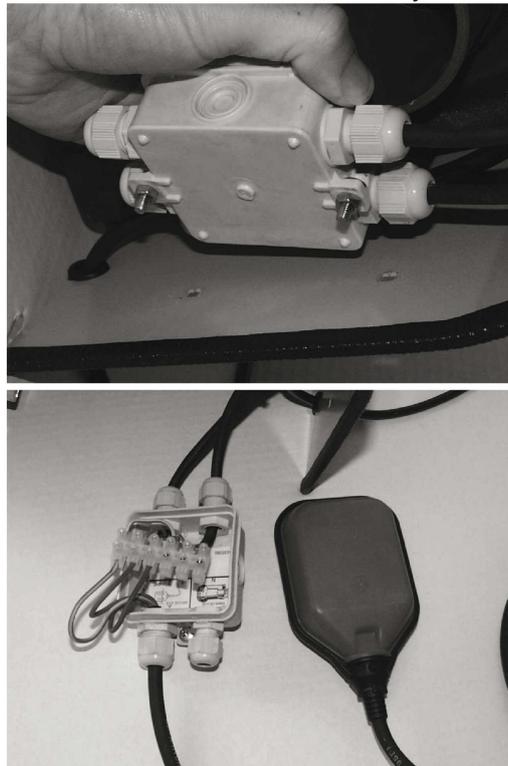
1. Fasten the switch box (included in the scope of supply) to the tank wall or a pipe approx. 10 cm above the overflow. Make sure that the two sensors hang perpendicular and can move freely.
2. Cut the two sensor cables to the appropriate length ensuring that the weights hang approximately 10 cm above the floor so that approx. 10 cm of water will remain in the rainwater storage tank.
3. Strip the cable ends and connect them to terminals K and S.
4. Tighten the cable glands.

5.5.2.2 Connecting the power cable

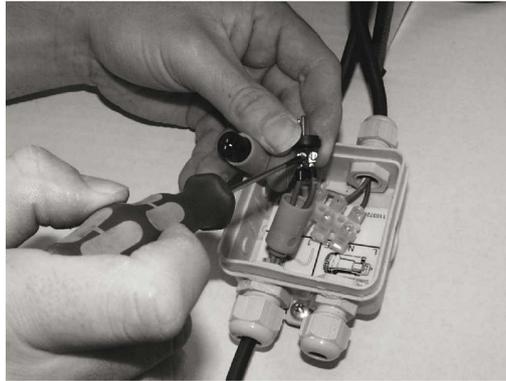
1. Undo the cap nuts at the terminal box.



2. Remove the terminal box from the system and open it.



3. Insert the stripped end of the power cable into the provided cable gland. Make sure the cable gland is pointing down!



4. Tighten the cable gland.
5. Close the terminal box.
6. Re-install the terminal box.

5.5.3 Connecting a booster pump (optional)

If the suction lift or suction losses are larger than 7 m of water or the suction line has not been laid with a continuously rising slope, a booster pump can be connected to the Hya-Rain system. To do so, the power cable of the booster pump has to be connected to the terminals L, N and PE in the same terminal box as the float switch and/or level control system.

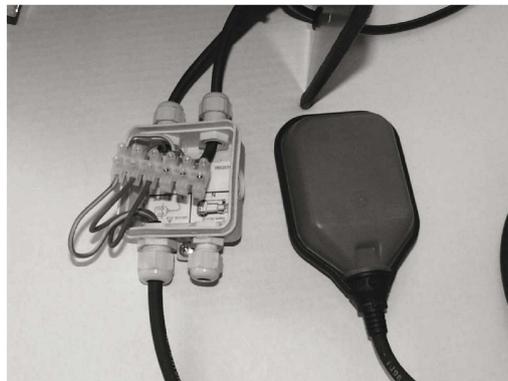
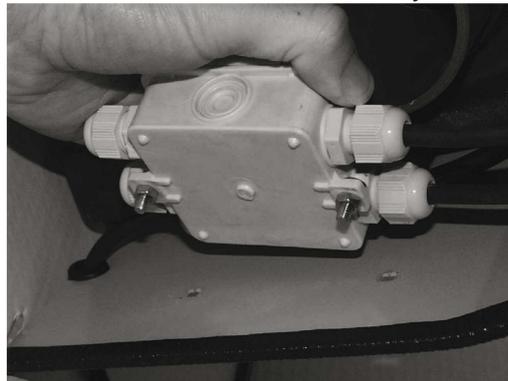
Maximum rated power requirement 800 W, 230 V.

The booster pump exclusively runs in rainwater mode and only when the pump of the Hya-Rain system is running.

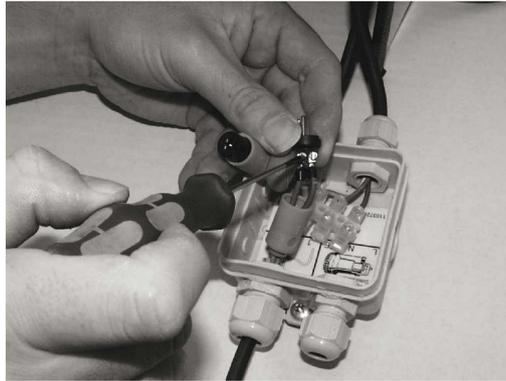
1. Loosen the cap nuts at the terminal box.



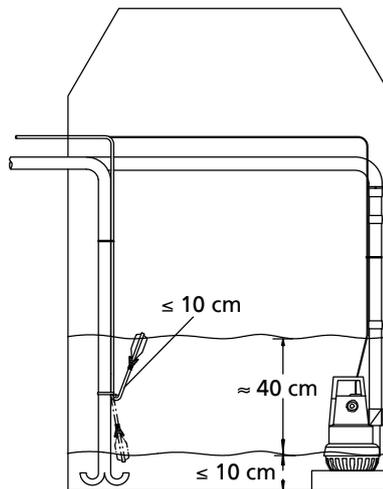
2. Remove the terminal box from the system and open it.



3. Insert the booster pump connection into the provided cable gland. Make sure the cable gland is pointing down and fasten it in this position.



4. Tighten the screwed connection.
5. Close the terminal box.
6. Re-fit the terminal box.
7. Connect the booster pump directly to the suction line. Fasten the suction line to the wall with pipe clamps spaced at 15 - 20 cm.



5.5.4 Connecting the system

1. Check the available mains voltage against the data on the name plate.
2. Plug the system into the mains.

6 Commissioning/Start-up/Shutdown

6.1 Commissioning/Start-up

6.1.1 Prerequisites for commissioning/start-up

Before commissioning/start-up of the system make sure that the following requirements are met:

- The system has been properly connected to the electric power supply and is equipped with all protection devices.
- All relevant VDE standards and/or regulations applicable in the country of use are complied with.

6.1.2 Priming and venting the system

- Priming**
- ✓ The connection of the mains water back-up system has been connected to the mains water supply.
 - ✓ The system has been properly connected to the electric power supply.
1. Set the operating mode selector switch to "mains water mode" for approximately 15 seconds. (⇒ Section 7.1, Page 31)
 - ⇒ The system tank will fill automatically.

- Venting**
- ✓ The system tank has been filled.
1. Insert the vent hose into the tank.



2. Open a consumer installation.
3. Briefly start up the system via the pump master switch. (⇒ Section 7.1, Page 31)
 - ⇒ The system will be vented automatically.

	NOTE
After commissioning, we recommend closing the automatic vent valve.	

6.1.3 Setting the level control system (for Hya-Rain N only)

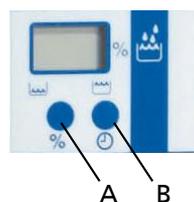


Fig. 6: Level control system

A	Percentage key	B	Timer key
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Calibrating the level display

1. To calibrate the level display keep the Percentage key pressed for 10 seconds.

Setting for automatic switching to mains water mode

1. Press the Timer key twice.
 - ⇒ The display shows a changeover interval of 10-60 days. (Factory setting = 60 days)
2. Press the Percentage key to change this value.
3. Press the Timer key three times.
 - ⇒ The display shows the replacement time in minutes. (The replacement time is the time the pump requires to pump the tank empty. This time depends on the consumption. If only toilet flush boxes are connected it will take longer; if a garden tap is connected, the tank will be emptied in a shorter time. Factory setting 3 minutes.)
4. Press the Percentage key to change this value.
5. Press the Timer key four times or wait for 20 seconds.
 - ⇒ The display changes back to display mode "Fill level in %".

6.1.4 Start-up

The system is in operating mode as soon as it is plugged into the mains.

6.1.5 Functional test

Checking the dry running protection function

- ✓ The system has been properly set up, installed, connected and commissioned.
 1. Close the suction-side water supply (from the rainwater storage tank).
 - ⇒ The pump control unit permanently monitors the system for dry running. Should insufficient fluid be fed into the system from the suction side (no flow), the pump control unit will trip after 10 to 15 seconds. This after-run time can be repeated by pressing the reset key.

Checking the modes of operation

- ✓ The system has been properly set up, installed, connected and commissioned.
 1. Check that the indicator lamps light up.

	Rainwater storage tank	This indicator lamp lights up when the pump withdraws water from the rainwater storage tank.
	Mains water mode	This indicator lamp lights up when the pump withdraws water from the mains water storage tank and the mains water back-up system is activated.
	Automatic mode	This indicator lamp lights up when the pump automatically switches to the available water tank.

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 System control

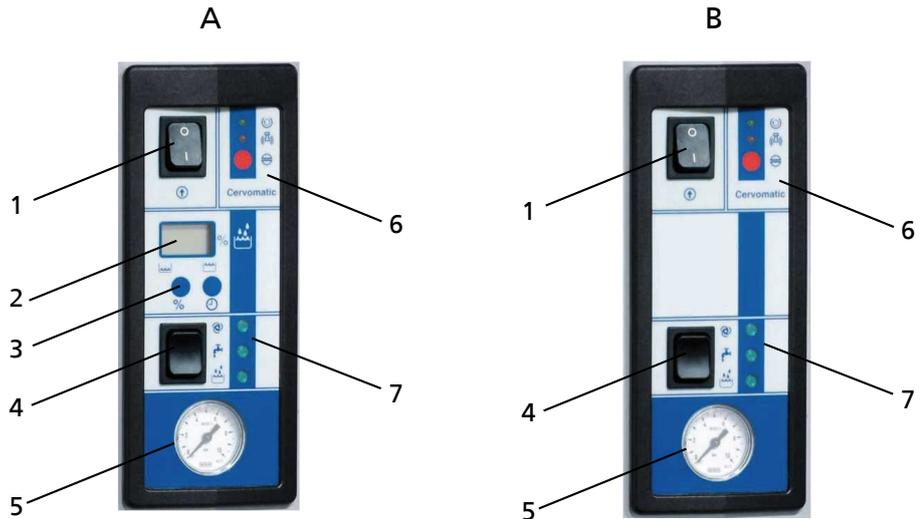


Fig. 7: Hya-Rain, Hya-Rain N system control panel

A	Hya-Rain N system control panel	B	Hya-Rain system control panel
1	Master switch	2	Indication of water level in rainwater storage tank
3	Setting keys	4	Operating mode selector switch
5	Actual pressure indication	6	Cervomatic ME (pump control panel)
7	Operating mode indication		



Fig. 8: Operating mode selector switch

1	Automatic operation	2	Manual mains water mode
3	Manual rainwater mode		

 Automatic mode

The pump withdraws water from the rainwater storage tank and pumps it into the consumer system through the pump control unit (green "rainwater mode" LED is lit). The pump is in operation as long as the consumer installations (toilet flush box, washing machines, garden watering systems) are open. When they are closed, the pump will continue to run for approximately 10 - 15 seconds and will then automatically stop. When the rainwater storage tank is empty, the control unit will switch the pump to mains water mode (green "mains water mode" LED is lit). As long

7.3 Level control system

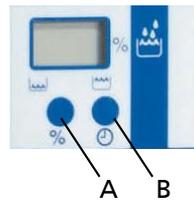


Fig. 10: Level control system

A	Percentage key	B	Timer key
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Level control and measurement are effected by a capacitive system. The sensor delivered is supplied with a voltage of 12 V by means of the optional connection cable; this voltage is not hazardous to humans. A 2-wire rubber-sheathed cable of 1 mm² to 1.5 mm² is appropriate as connection cable. Already routed float switch cables of up to max. 50 m length can be used for retrofitting. The signals of the two sensors are analysed in steps of 1 % via a digital control's capacitive resistance. Pressing the % key will adjust the system to the plant-specific conditions. The sensor cable length immersed in the fluid will be calibrated to 100 %. Once the water level has dropped from 100 % to 5 %, the system's level control will switch to mains water mode. If the water level in the rainwater storage tank rises above 7 % again, e.g. after rainfall, the system will automatically return to rainwater mode. In case of any connection or sensor failure, the message FE (failure) will be displayed. To set the system to switch automatically to mains water mode, press the Timer key to open the relevant menu. This function allows automatic replacement of the water stored in the mains water storage tank every 10 - 60 days. This function is only enabled if the pump withdraws water from the rainwater storage tank.

8 Servicing/Maintenance

8.1 General information/Safety regulations

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

	⚠ DANGER
	Unintentional start-up of the rainwater harvesting system Danger to life from live parts! <ul style="list-style-type: none"> ▷ Always disconnect the rainwater harvesting system from the power supply before repair or maintenance work is carried out. ▷ Disconnect the plug from the electric mains. ▷ Secure the system against unintentional starting.
	⚠ WARNING
	Unintentional start-up of the rainwater harvesting system Risk of injury by moving parts! <ul style="list-style-type: none"> ▷ Only carry out work on the rainwater harvesting system after checking that the system has been disconnected from the power supply. ▷ Secure the rainwater harvesting system against unintentional starting.
	⚠ WARNING
	Work on the rainwater harvesting system by unqualified personnel Risk of personal injury! <ul style="list-style-type: none"> ▷ Always have repair and maintenance work performed by specially trained, qualified personnel.
	⚠ WARNING
	Insufficient stability Risk of crushing hands and feet! <ul style="list-style-type: none"> ▷ During assembly/dismantling, secure the pump (set)/pump parts to prevent tilting or tipping over.

Observe the general safety instructions and information.

In the event of damage you can always contact our service staff.

A regular maintenance schedule will help avoid expensive repairs and contribute to trouble-free, reliable operation of the rainwater harvesting system with a minimum of maintenance expenditure and work.

Never use force when dismantling and reassembling the rainwater harvesting system.

8.2 Servicing/inspection

KSB recommends the following regular maintenance schedule:

Table 6: Overview of maintenance work

Maintenance interval	Maintenance work
Monthly	Replacing the stored mains water
Every 6 months	Checking the mains water back-up system
	Checking the pump control unit
	Checking the discharge hoses

Maintenance interval	Maintenance work
Annually	Checking the mechanical seal leakage
Every 8,000 operating hours (approx.)	Replacing the rolling element bearings

8.2.1 Inspection work

8.2.1.1 Replacing the stored mains water

Hya-Rain

We recommend replacing the stored mains water once a month.

1. Set the operating mode selector switch to mains water mode.
(⇒ Section 7.1, Page 31)
2. Flush the toilet or activate another consumer installation 2 or 3 times.
⇒ The noise of the mains water flowing into the tank can be heard.
3. Set the operating mode selector switch back to automatic mode.
(⇒ Section 7.1, Page 31)

Hya-Rain N

	NOTE
	In Hya-Rain N systems, the stored mains water is replaced automatically.

8.2.1.2 Checking the mains water back-up system

1. Check if any water escapes through the overflow pipe.
⇒ Water escaping through the overflow pipe may be due to a defective float valve. If required, replace the float valve as follows:
2. Close the mains water supply.
3. Undo the four screws at the side cover.
4. Remove the cover.
5. Pull out the float valve.
6. Fit a new float valve with new sealing elements.
7. Fit the cover.
8. Screw the four screws into the side cover and tighten them.

8.2.1.3 Checking the pump control unit

1. Open a consumer installation.
2. Close it again and make sure that all consumer installations are closed.
3. The pump must stop 10 - 15 seconds after the consumer installations have been closed.

8.2.1.4 Checking the discharge hoses

1. Check the discharge hoses to ensure that they do not leak and the metal braiding is undamaged.
Replace the hoses if you detect visible leakage or major damage to the metal braiding.

8.2.1.5 Checking the mechanical seal leakage (only for pump sets with reinforced bearings)



NOTE

Slight wear of the mechanical seal is unavoidable. This will be aggravated by abrasive substances contained in the fluid handled.

- ✓ The pump set has been placed in vertical position.
- 1. Check the area between motor and pump casing for leakage.
- 2. If any leakage is detected, replace the mechanical seal.

8.2.2 Replacing the stored mains water

Hya-Rain

We recommend replacing the stored mains water once a month.

1. Set the operating mode selector switch to mains water mode.
(⇒ Section 7.1, Page 31)
2. Flush the toilet or activate another consumer installation 2 or 3 times.
⇒ The noise of the mains water flowing into the tank can be heard.
3. Set the operating mode selector switch back to automatic mode.
(⇒ Section 7.1, Page 31)

Hya-Rain N



NOTE

In Hya-Rain N systems, the stored mains water is replaced automatically.

8.2.3 Checking the mains water back-up system

1. Check if any water escapes through the overflow pipe.
⇒ Water escaping through the overflow pipe may be due to a defective float valve. If required, replace the float valve as follows:
2. Close the mains water supply.
3. Undo the four screws at the side cover.
4. Remove the cover.
5. Pull out the float valve.
6. Fit a new float valve with new sealing elements.
7. Fit the cover.
8. Screw the four screws into the side cover and tighten them.

8.2.4 Checking the pump control unit

1. Open a consumer installation.
2. Close it again and make sure that all consumer installations are closed.
3. The pump must stop 10 - 15 seconds after the consumer installations have been closed.

8.2.5 Checking the discharge hoses

1. Check the discharge hoses to ensure that they do not leak and the metal braiding is undamaged.
Replace the hoses if you detect visible leakage or major damage to the metal braiding.

8.2.6 Checking the mechanical seal leakage (only for pump sets with reinforced bearings)

	NOTE
	<p>Slight wear of the mechanical seal is unavoidable. This will be aggravated by abrasive substances contained in the fluid handled.</p>

- ✓ The pump set has been placed in vertical position.
 1. Check the area between motor and pump casing for leakage.
 2. If any leakage is detected, replace the mechanical seal.

8.3 Drainage/disposal

	⚠ WARNING
	<p>Fluids, consumables and supplies which are hot and/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.

1. Flush the system.

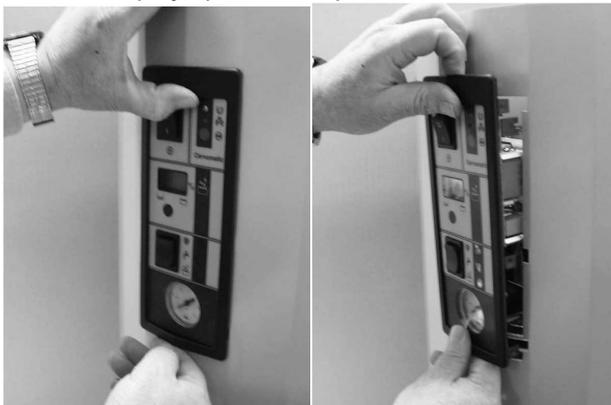
8.4 Dismantling the system

	⚠ DANGER
	<p>Work on the rainwater harvesting system by unqualified personnel Hazard from live parts!</p> <ul style="list-style-type: none"> ▷ The system must only be dismantled and reassembled by a trained and qualified electrician. ▷ The system must be de-energised before any work is carried out. ▷ Secure the system against unintentional starting.

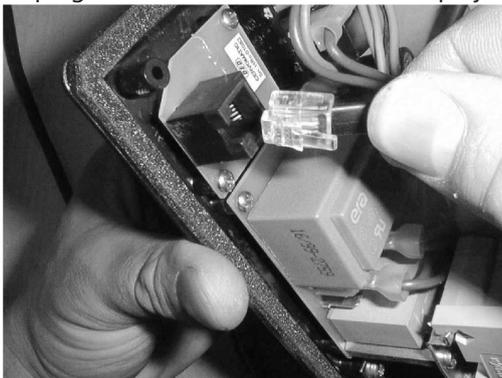
8.4.1 Removing the pump set from the piping

1. Set the pump master switch to "0". (⇒ Section 7.1, Page 31)
2. Unplug the system from the electric mains.
3. Shut off the mains water supply and the discharge line.
4. Disconnect the suction line and set the three-way valve to the middle position to pump the tank empty.
5. Remove the locking pin from the upper end of the display.

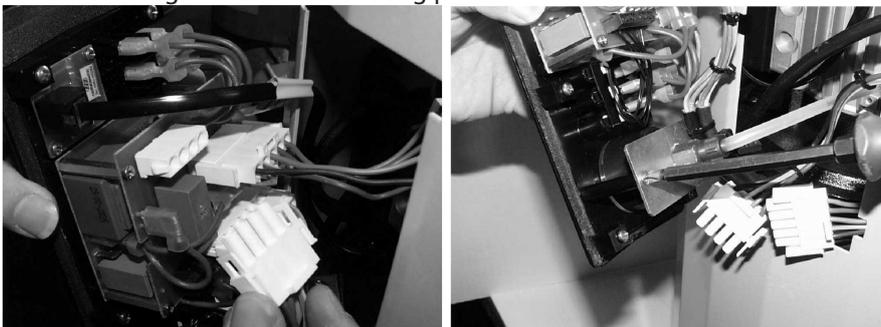
6. Push the display up hard and pull out it towards the front.



7. Unplug the connection cable at the display.



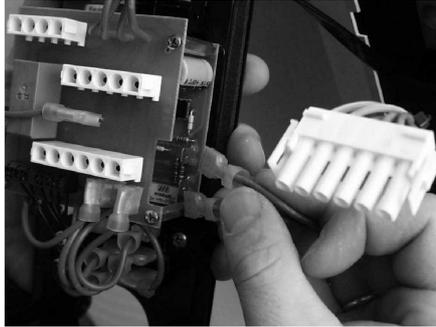
8. Undo the fixing stud of the mounting plate.



9. Pull the plate with pressure gauge and hose out sideways.



10. At Hya-Rain N systems, also unplug the power cable at the display panel.



11. Undo the 6 cap nuts and remove the hood.

⇒ You can now see the pump and the Cervomatic.



12. Disconnect the discharge line.



NOTE

Grip tightly or use two wrenches.

13. Undo the pump securing screws.

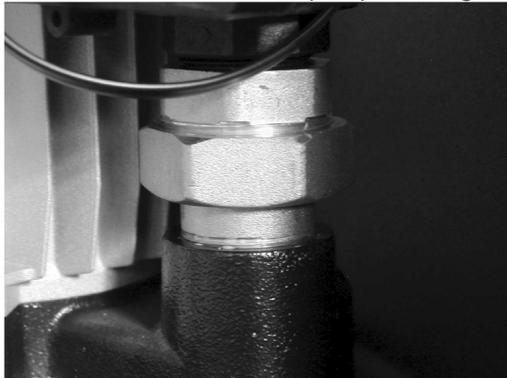


14. Lift out the pump.



8.4.2 Removing the pump control unit

1. Disconnect the cable connections.
2. Undo the union nut at the pump discharge nozzle.



8.4.3 Removing the mechanical seal

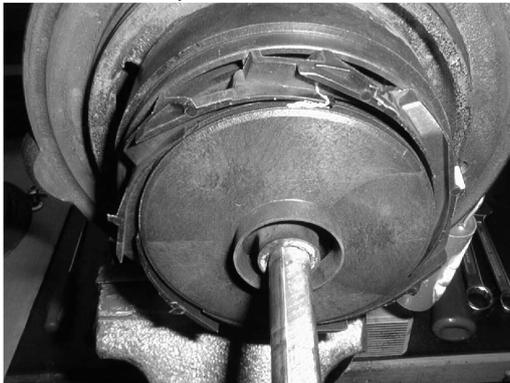
- ✓ The pump has been properly removed from the system.
- 1. Place the pump with the motor below in a clean assembly area.
- 2. Undo the screws at the suction casing.



- 3. Remove the suction casing.
- 4. Undo the impeller nut.



- 5. Remove one impeller after the other until the mechanical seal is accessible.



- 6. Take off the circlip.



7. Pull out the mechanical seal.
8. Clean the disassembled parts and check them for wear. Replace them, if required.

8.5 Reassembling the system

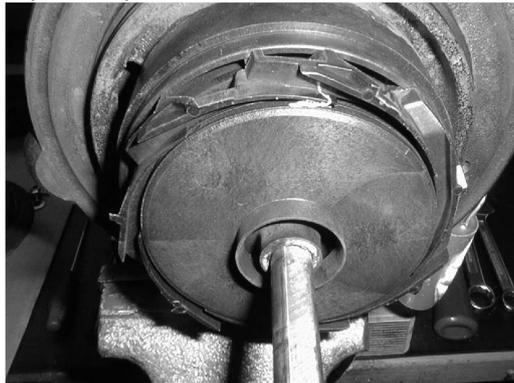
	 DANGER
	<p>Work on the rainwater harvesting system by unqualified personnel Hazard from live parts!</p> <ul style="list-style-type: none"> ▸ The system must only be dismantled and reassembled by a trained and qualified electrician. ▸ The system must be de-energised before any work is carried out. ▸ Secure the system against unintentional starting.

8.5.1 Installing the mechanical seal

- ✓ All parts have been cleaned, checked for wear and replaced, if required.
1. Slip the mechanical seal onto the shaft.
Make sure that the mechanical seal elastomers are not damaged by burrs.
 2. Fit the circlip.



3. Slip the impeller onto the shaft.



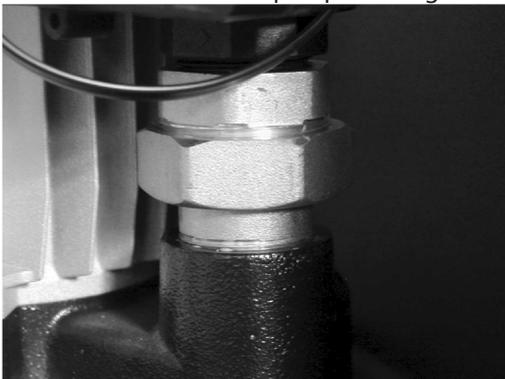
4. Screw on the impeller nut and tighten it.



5. Fit an O-ring flush on the motor.
6. Fit the suction casing on the motor.

8.5.2 Installing the pump control unit

1. Fit the union nut at the pump discharge nozzle.



2. Connect the plug-type cable connections.

8.5.3 Installing the pump set

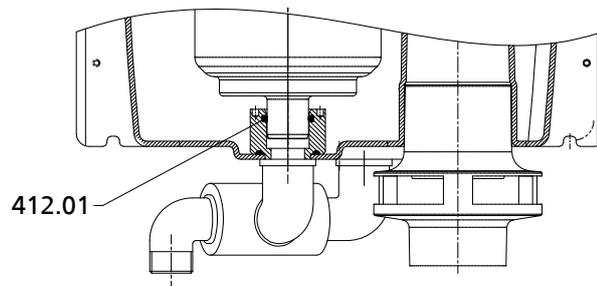
1. Insert the pump.



2. Fasten the pump.

When inserting the pump into the tank introduce the inlet section into the fitting on the tank bottom.

To prevent any damage to O-ring 412.01, grease it before inserting the pump.



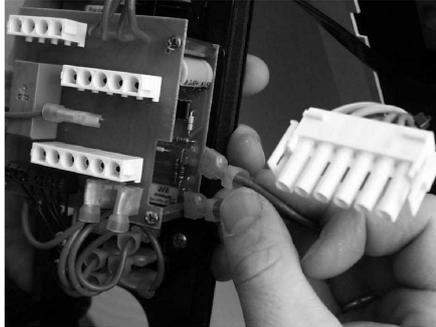
3. Insert and tighten the pump securing screws.



4. Connect the discharge line.



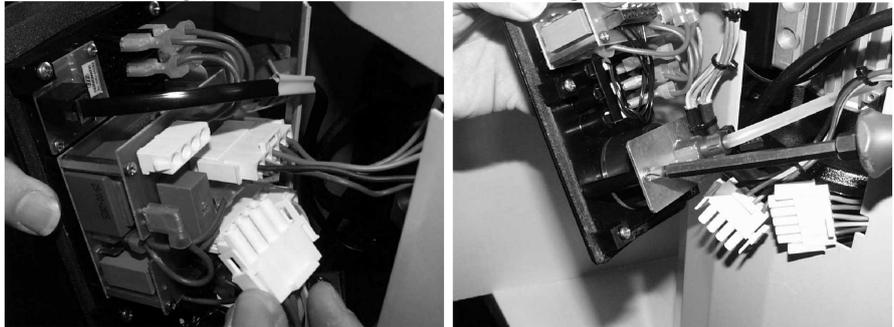
5. Fit the hood and secure it with cap nuts.
6. For Hya-Rain N systems plug in the power cable of the display panel.



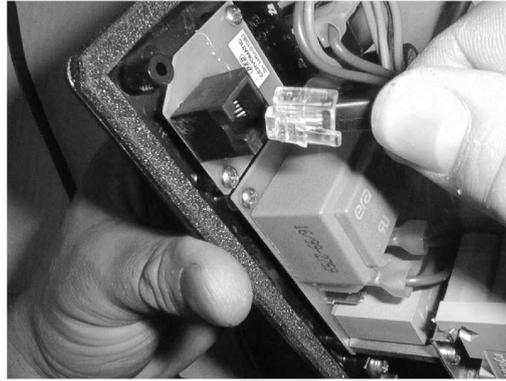
7. Insert the plate with pressure gauge and hose from the side.



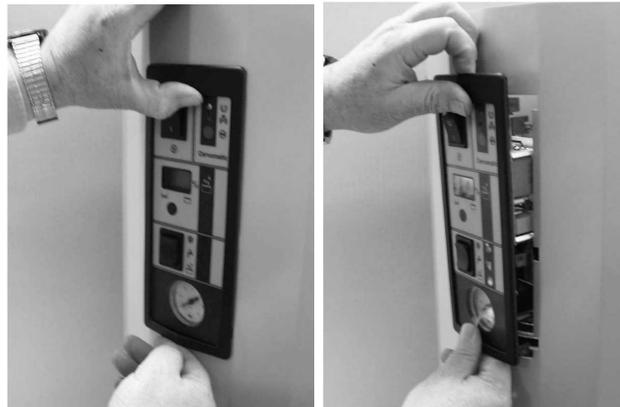
8. Fit the mounting plate and secure it with the fixing stud.



9. Plug the connection cable into the socket of the display.



10. Fit the display.



11. Insert the locking pin and check that the display cannot be removed.
 12. Connect the suction line and set the three-way valve to automatic position.
 13. Connect and open the mains water supply and the discharge line.
 14. Plug the system into the electric mains.
 15. Set the pump master switch to "1". (⇒ Section 7.1, Page 31)

9 Trouble-shooting

	 WARNING
	<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 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 customer service is required.

Table 7: Trouble-shooting

Fault/malfunction	Possible cause	Remedy
Pump is running, but does not deliver.	Pump has not been primed. Excessive suction losses	Prime the pump. Reduce suction head. Choose larger cross-sections.
	Leaking suction line	Eliminate leakage.
	Air pocket in suction line	Fill suction line or lay with rising slope.
	Suction strainer clogged	Clean the suction strainer.
	Discharge line shut off	Open discharge line.
Excessive start-up frequency of the pump	Leaking consumer installation	Eliminate leakage in consumer installation.
	Swing check valve leaks.	Fit new swing check valve or new pump control unit.
	Very low level of consumption, minimum flow rate not achieved.	Increase toilet flush volume (clean strainer in toilet cistern, if necessary).
Pump is running but delivering insufficient flow rate or pressure.	Pump takes in air.	Check suction line.
	Suction strainer clogged	Clean the suction strainer.
Pump stops during operation.	Power failure or undervoltage	Check power supply.
	Thermal switch tripped because of overheating	Check the pump for smooth operation.
	Earth leakage circuit breaker tripped	Have the insulation resistance checked by a trained electrician.
Pump stops during operation; "fault" is indicated.	Air in suction line	Flush the suction line by opening several consumer installations and pressing the reset key for approx. 3-5 minutes.
System does not start.	Pump control unit indicates "fault".	Press the reset key or interrupt the mains voltage.
System does not stop.	Foreign object in pump control unit	Clean pump control unit and replace it if required.
Excessive noise level	Pump in contact with securing screws	Align the pump manually ensuring that it does not come into contact with the screws.
Tank overflowing	Dirt deposits in valve	Remove dirt/limescale deposits in valve; replace float, if necessary.

How to avoid pressure surges

Increasing the suction line diameter DIN 1988, Part 3, stipulates that for withdrawal rates $> 0.5 \frac{1}{s}$, an inside pipe diameter of at least 20 mm must be selected.

Setting of the pressure reducer If the pressure gauge indicates a pressure of 5 bar with the valve closed, and this pressure drops to 2.5 bar when the valve is opened, the pressure applied when the valve is closed must be reduced by at least 1 bar. Pressure surges occur whenever the pressure differences exceed 2 bar.

Eliminating pressure surges by throttling the flow If an isolating valve or a pressure reducer is fitted in the mains water supply line upstream of the system, the valve/reducer must be throttled until the pressure surge is eliminated. The drawback of this method is the low mains water back-up flow rate.

It must be checked if the flow rate is still adequate to meet standard consumption requirements. The lack-of-water monitoring equipment must not trip in mains water mode when the max. quantity of water that can be withdrawn is withdrawn. If the lack-of-water monitoring equipment does trip, the discharge side flow rate must also be throttled.

Membrane-type accumulator

Fit an 8-litre membrane-type accumulator in the line upstream of the system inlet. Such an accumulator will attenuate extreme pressure drops in small-diameter pipes and absorb surges without throttling the flow rate.

10 Related Documents

10.1 General assembly drawing with list of components

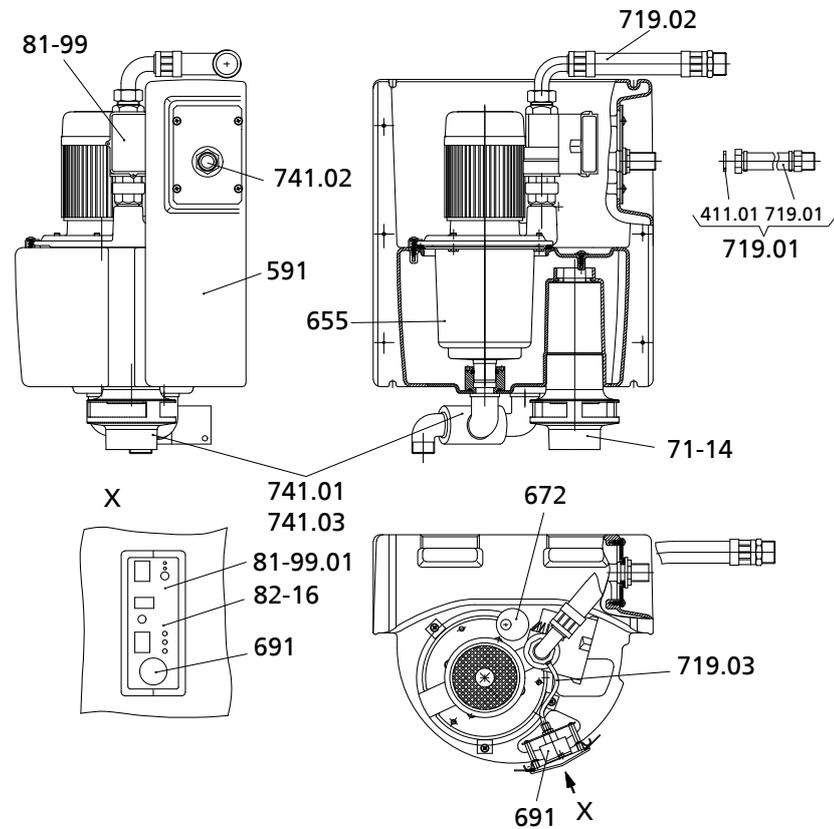


Fig. 11: Sectional drawing of the system

Table 8: Spare parts list for the system

Part No.	Spare parts
411.01	Profile joint for Cervomatic
62-12	Level control for rainwater storage tank
655	Spare pump complete with set of sealing elements, pump parts see Multi Eco 35 E
672	Valve (vent valve)
691	Pressure gauge 0 - 6 bar
71-14	Pipe with sealing element
719.01	Flexible hose (inlet side)
719.02	Flexible hose (discharge side)
719.03	Flexible hose with hose clip
741.01	Three-way valve with tank
741.02	Float valve, complete
741.03	Three-way valve
800	Actuator for three-way valve
81-45	Float switch
81-9	Relay
81-99	Cervomatic complete
81-99.01	Electric part (printed circuit board for Hya-Rain N)
82-16	Hya-Rain control system
82-16	Hya-Rain N control system
99-9	Set of sealing elements

10.2 Exploded view with list of components (pump)

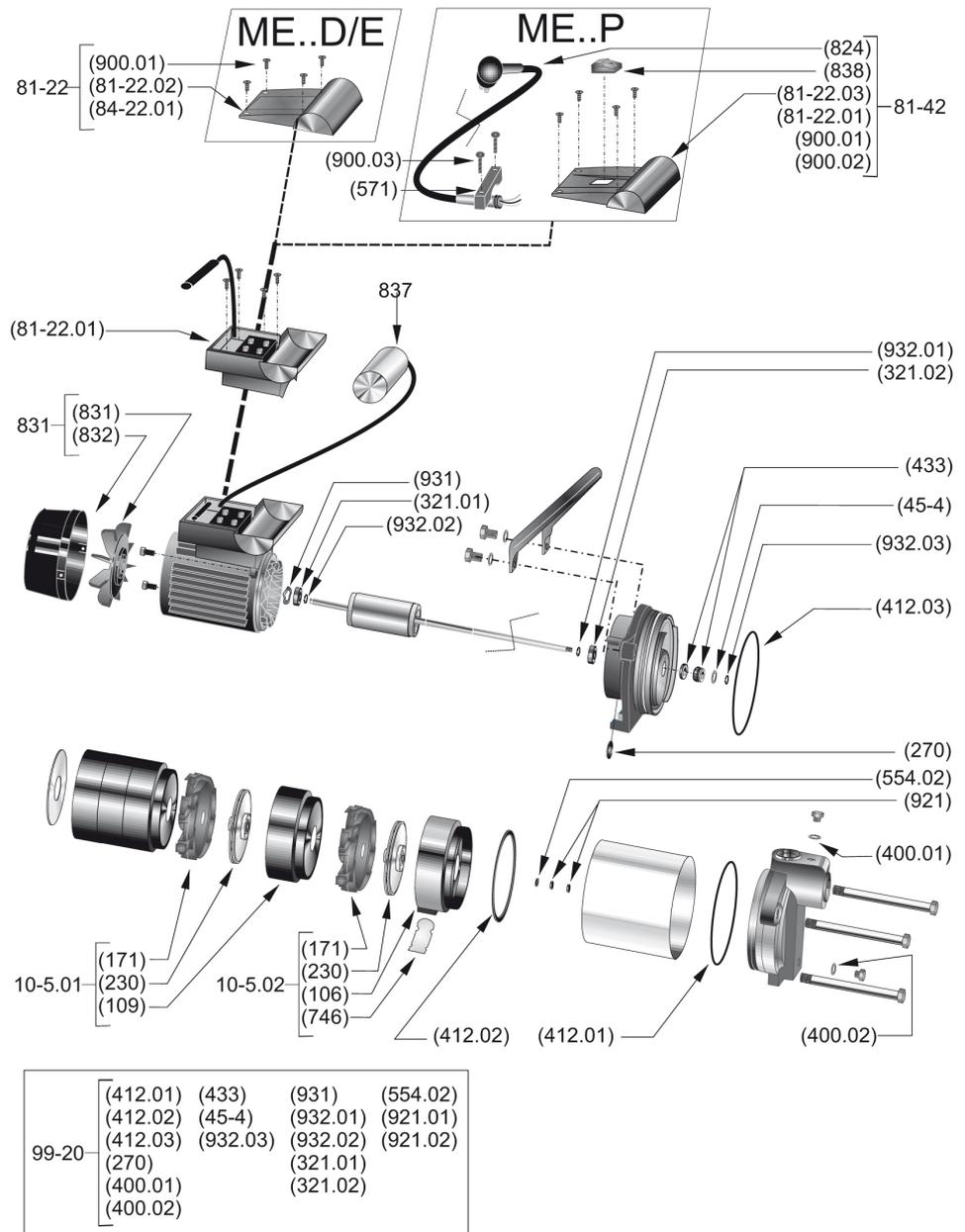


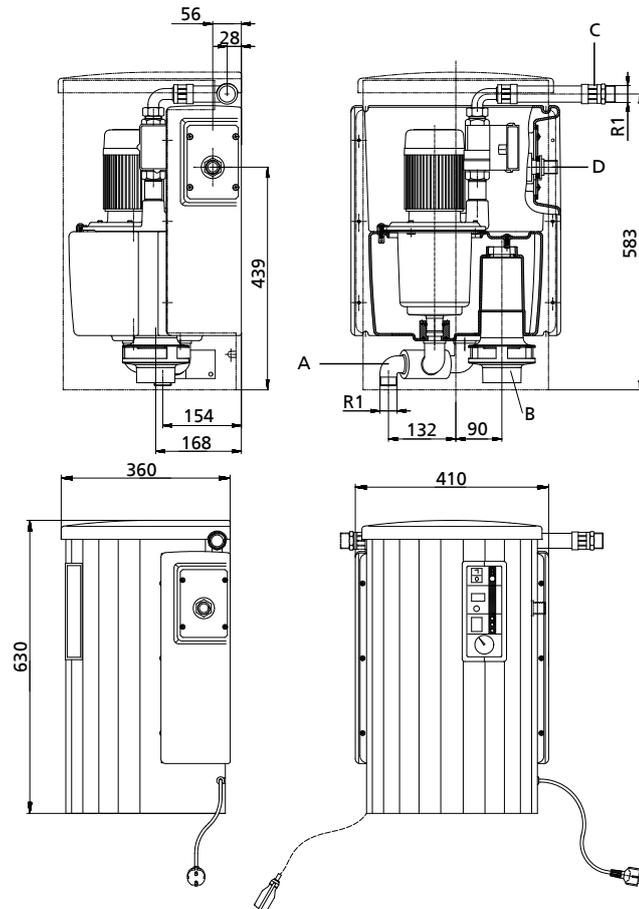
Fig. 12: Exploded view of the pump

Table 9: Spare parts list for the pump

Part No.	Description
10-5	Pump
81-22	Terminal box cover
81-42	Terminal box
831	Fan
837	Capacitor
99-20	Repair kit

10.3 Dimensions

Table 10: Dimensions [mm]



A	Suction side
B	Overflow DN 70 drain pipe
C	Discharge side
D	Mains water connection

i Allow 200 mm clearance in all directions for servicing!

10.4 Drilling pattern for wall mounting



Fig. 13: Dimensions in mm

10.5 Connections

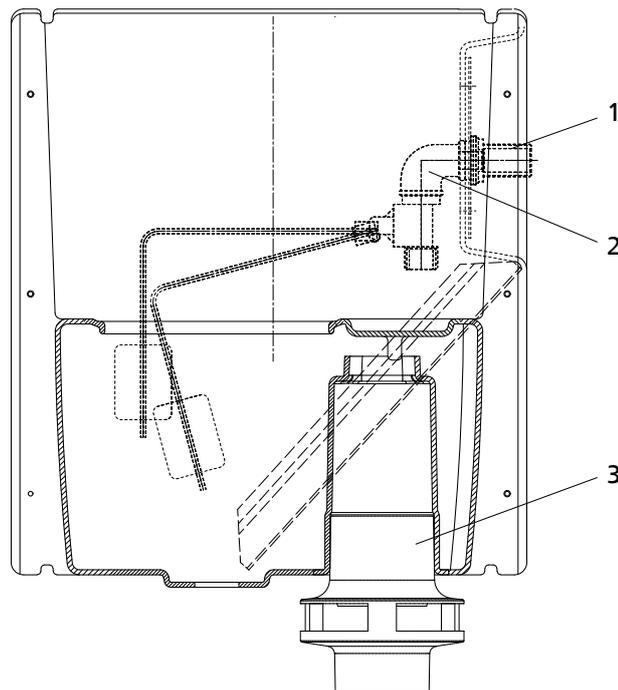


Fig. 14: Connections

1	Mains water connection, with air gap inside the tank
2	Mechanical float valve
3	Overflow for direct connection of DN 70 drain pipes in acc. with EN 12056. The overflow must be connected via an air gap to EN 1717, otherwise the DVGW-approval is void.

11 EU Declaration of Conformity

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

The manufacturer herewith declares that the product:

Hya-Rain **Hya-Rain N**

Serial number range: 2018w01 to 2019w52

- is in conformity with the provisions of the following Directives as amended from time to time:
 - Pump set: EC Machinery Directive 2006/42/EC
 - Pump set: Electromagnetic Compatibility Directive 2014/30/EU

The manufacturer also declares that

- the following harmonised international standards have been applied:
 - ISO 12100
 - EN 809
- Applied national technical standards and specifications, in particular:
 - DIN 1988-100,
 - EN 1717

Person authorised to compile the technical file:

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Johann-Klein-Straße 9
67227 Frankenthal (Germany)

The EU Declaration of Conformity was issued in/on:

Frankenthal, 1 February 2018



Joachim Schullerer
Head of Product Development Pump Systems and Drives
KSB SE & Co. KGaA
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67227 Frankenthal

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