

Automatic Control Unit

Controlmatic E

Installation/Operating Manual



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Installation/Operating Manual Controlmatic E

Original operating manual

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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 Target group

This operating manual is aimed at the target group of trained and qualified specialist technical personnel.

1.3 Other applicable documents

Table 1: Overview of other applicable documents

Document	Contents
Operating manual	Description of the proper and safe use of the pump in all phases of operation
Wiring diagram	Description of the electrical connections
Supplementary operating manual ¹⁾	Description of the proper and safe use of supplementary product components

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

1.4 Symbols

Table 2: Symbols used in this manual

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

¹ Optional

1.5 Key to safety symbols/markings

Table 3: Definition of safety symbols/markings

Symbol	Description
	DANGER This signal word indicates a high-risk hazard which, if not avoided, will result in death or serious injury.
	WARNING This signal word indicates a medium-risk hazard which, if not avoided, could result in death or serious injury.
	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 EU 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 Safety

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

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

2.1 General

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

2.2 Intended use

- The values specified in the technical product literature for the mains voltage, mains frequency, ambient temperature, and motor current must not be exceeded. The automatic control unit must only be operated in accordance with the instructions provided in the other applicable documents (⇒ Section 1.3, Page 4) .

2.3 Personnel qualification and personnel training

All personnel involved must be fully qualified to install, operate, maintain and inspect the equipment 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 automatic control unit must always be supervised by specialist technical 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

3 Transport/Storage/Disposal

3.1 Checking the condition upon delivery

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

3.2 Transport

The automatic control unit must be shut down for transport.

Table 4: Ambient conditions for transport

Ambient condition	Value
Relative humidity	Max. 80% (no condensation)
Ambient temperature	-10 °C to + 70 °C

	CAUTION
	<p>Improper transport Damage to the automatic control unit!</p> <ul style="list-style-type: none"> ▸ The automatic control unit must always be transported properly and in its original packaging. ▸ For transport, observe the transport instructions on the original packaging. ▸ Do not throw the automatic control unit.

1. Unpack the automatic control unit upon receipt and check for in-transit damage.
2. Report any in-transit damage to the manufacturer immediately.
3. Dispose of packaging material in accordance with local regulations.

3.3 Storage

If the ambient conditions for storage are met, the automatic control unit will give reliable service even after a prolonged period of storage.

	CAUTION
	<p>Damage during storage due to humidity, dirt or vermin Corrosion/contamination of automatic control unit!</p> <ul style="list-style-type: none"> ▸ For outdoor storage, cover the (packed or unpacked) automatic control unit and accessories with waterproof material.

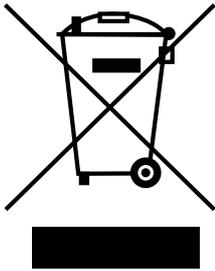
Table 5: Ambient conditions for storage

Ambient condition	Value
Relative humidity	Max. 80% (no condensation)
Ambient temperature	-10 °C to + 70 °C

- Store the automatic control unit under dry and vibration-free conditions, if possible in its original packaging.
- Store the automatic control unit in a dry room where the level of atmospheric humidity is as constant as possible.
- Prevent excessive fluctuations in atmospheric humidity (see table on ambient conditions for storage).

If properly stored indoors, the equipment is protected for a maximum of 12 months.

3.4 Disposal



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.

	<p>NOTE</p> <p>Due to certain components it contains, the device is classified as special waste and meets RoHs 2011/65/EC requirements.</p> <p>Once decommissioned, the device must be properly disposed of in accordance with local regulations.</p>
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4 Description

4.1 General description

- Automatic control unit for automatically starting and stopping a pump

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

For information as per chemicals Regulation (EC) No 1907/2006 (REACH), see https://www.ksb.com/ksb-de/konzern/Unternehmerische_Verantwortung/reach/

4.3 Designation

Example: Controlmatic E

Table 6: Designation key

Code	Description
Controlmatic	Type series
E	Single-phase alternating current

4.4 Name plate

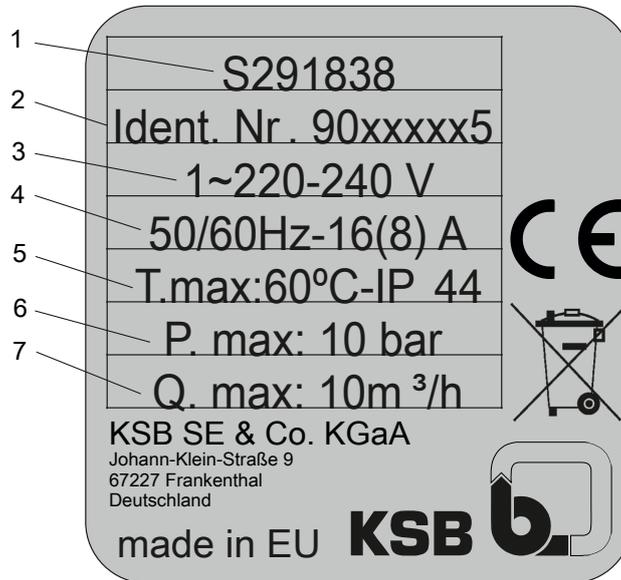


Fig. 1: Name plate (example)

1	S serial number, 28 device version, 16 year of construction 2016, 29 calendar week	2	Mat. number
3	Control voltage	4	Frequency, max. amperage
5	Max. fluid temperature, enclosure	6	Max. operating pressure
7	Max. flow rate		

4.5 Design details

Design

- Automatic control unit
- Pressure-controlled starting and flow-controlled stopping
- Enclosure IP44
- 1~230 VAC, 50 Hz/60 Hz

- 1.5 m power cable with shockproof plug
- Integrated dry running protection
- Integrated check valve

4.6 Configuration and function

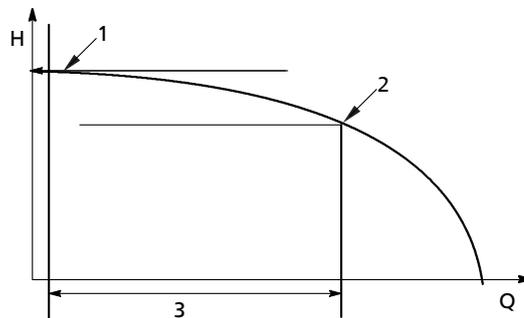


Fig. 2: Design of Controlmatic E

1	Housing	5	Green signal lamp - Ready for operation
2	Pressure gauge	6	Yellow signal lamp - Pump running
3	Plug socket (IP44)	7	Red signal lamp - Fault or lack of water
4	Power cable with shockproof plug		

Function The pump can be connected via the socket (3) of the automatic control unit. Once the power cable with shockproof plug (4) has been connected to the power supply, the automatic control unit is ready for operation. The green signal lamp (5) is lit. When a shut-off valve in the piping is opened, the system pressure decreases and the pump is started up. The system pressure is indicated at the pressure gauge (2). The pump starts to deliver fluid and the yellow signal lamp (6) lights up. When the shut-off valve has been closed and the flow rate is zero, the pump is stopped after 5 seconds.

An integrated check valve prevents the built-up pressure in the discharge line from decreasing again.



1	Consumer installation closes (zero flow)
2	Consumer installation opens (start-up pressure) Factory-set to 1.5 bar Can be set at up to 2.5 bar
3	Operating range of pump

i The automatic control unit cannot be used for pressure boosting. The outlet pressure is identical to the pump discharge pressure.

Protective functions

- The pump is protected against dry running by simultaneous monitoring of pressure and flow rate. If there is a lack of water, the automatic control unit stops the pump and the red signal lamp (7) is lit.

4.7 Technical data

Table 7: Performance data

Characteristic	Value
Maximum operating pressure	10 bar
Maximum amperage	10 A
Fluid temperature	0 - +60 °C
Maximum flow rate	10 m ³ /h
Minimum flow rate	0,09 m ³ /h
Minimum start-up pressure	1,5 bar
Maximum start-up pressure	2,5 bar

4.8 Displays and indicator lamps

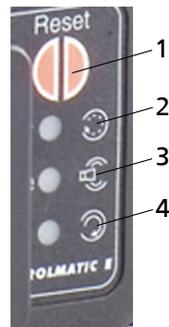


Fig. 3: Indicator lamps

1	Reset button	2	Ready for operation (green)
3	Fault (red)	4	Operation (yellow)

4.9 Fluids handled

- Drinking water
- Service water
- Stormwater
- Fire-fighting water
- Cooling water

5 Installation at site

5.1 Safety regulations

	 DANGER
	<p>Incorrect installation Danger to life!</p> <ul style="list-style-type: none"> ▷ Install the automatic control unit in a flood-proof location. ▷ Never install the automatic control unit in potentially explosive atmospheres. ▷ The automatic control unit is not suitable for controlling pumps in potentially explosive atmospheres.

5.2 Checks to be carried out prior to installation

The place of installation must meet the following requirements:

- Dry
- Frost-proof
- Well ventilated
- Lockable; unauthorised access must be prevented.
- Flood-proof
- Installation in potentially explosive atmospheres is not permitted.

Ambient conditions

The ambient conditions specified in the following table must be observed:

Table 8: Ambient conditions

Characteristic	Value
Temperature during operation	0 °C to +50 °C
Relative humidity	Non-condensing
Installation altitude	Max. 1,000 m above MSL

5.3 Connecting the automatic control unit

	 DANGER
	<p>Automatic control unit lifted by the cable Damage to automatic control unit!</p> <ul style="list-style-type: none"> ▷ Do not lift the automatic control unit by the cable.

- Remove the automatic control unit from the original packaging.
- Mount the automatic control unit in the vertical position directly on the pump.
- For wet-installed pumps, mount the automatic control unit to the rigid discharge pipe in a flood-proof location. (⇒ Section 5.4.2, Page 15)
- Connect the lateral discharge nozzle (1") to the piping system.
- The automatic control unit comes with a screwed-on pressure gauge.

Relocating the pressure gauge

The pressure gauge can be relocated to the opposite side if necessary.

- Unscrew the pressure gauge.
- Mount on the opposite side by screwing in screws 1 and 2.
- Seal off the original assembly location using screw plug 3 without a sealing element.

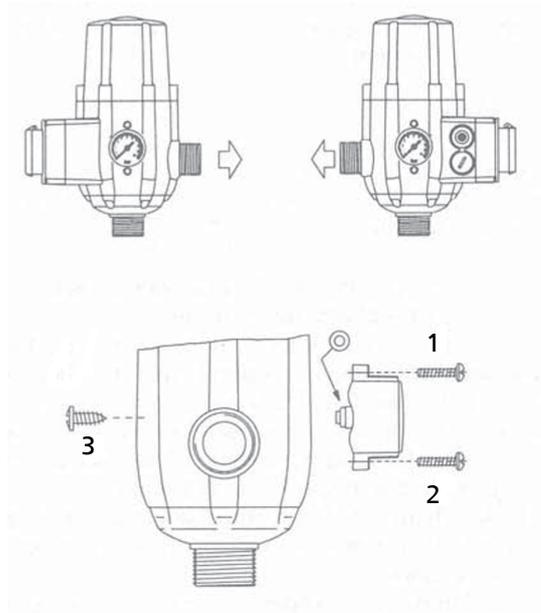


Fig. 4: Rotating the pressure gauge

5.4 Connecting the piping

Connect all piping without transmitting any stresses or strains.

5.4.1 Connecting the piping (dry installation)

- The automatic control unit can be connected directly to the pump discharge nozzle.
- Always mount the automatic control unit in the vertical position.

	CAUTION
	<p>Plastic threaded connections sealed with hemp Stresses/strains and leaks in the plastic piping!</p> <p>▸ Use Teflon tape for sealing.</p>

Automatic control unit connection between pump and consumer installation

- Route connecting line between pump and automatic control unit.
- The diameter of the connecting line must at least equal the diameter of the pump discharge line.
- Observe the direction of fluid flow (see arrow on automatic control unit).

5.4.2 Connecting the piping (wet installation)

	 DANGER
	<p>Automatic control unit submerged Danger to life!</p> <p>▸ Never submerge the automatic control unit.</p>

- Use suitable connecting elements to connect the pump's discharge line directly to the pump discharge nozzle.
- The diameter of the connecting line must at least equal the diameter of the pump discharge line.
- Observe the direction of fluid flow (see arrow on automatic control unit).
- Always mount the automatic control unit in the vertical position.
- The pump has an integrated vent valve.
 For submersible borehole pumps, the automatic venting function facilitates priming under back pressure.

	CAUTION
	<p>Plastic threaded connections sealed with hemp Stresses/strains and leaks in the plastic piping!</p> <p>▸ Use Teflon tape for sealing.</p>

5.5 Electrical connection

Connection to power supply is effected by means of a 230 V plug in accordance with VDE 0100.

Site-supplied fusing: 16 A (max).

6 Commissioning/Start-up/Shutdown

6.1 Prerequisites for commissioning/start-up

Ensure that the following requirements are met prior to commissioning/start-up:

- The rainwater harvesting 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.

6.2 Commissioning/Start-up

6.2.1 Commissioning

Dry installation

- Check whether the suction line of the pump is equipped with a suction strainer.
- Prime the pump and suction line with the fluid to be handled.
- Plug in the mains plug of the automatic control unit.
- Plug in the mains plug of the pump.
The green indicator lamp lights up permanently.
- Open a consumer installation.
If the red indicator lamp lights up, press and hold the red reset button until priming of the system has been completed.
The red indicator lamp then extinguishes and the pump starts pumping.
Close the consumer installation.
If the red indicator lamp lights up again, repeat the above procedure.
- The pump stops after 5 seconds.
The system will now start up automatically as soon as a consumer installation is opened.
- Comply with the operating manual of the respective pump.

Wet installation

- Install the pump in the well or sump.
The pump fills with the fluid to be handled.
- Plug in the mains plug of the automatic control unit.
- The green indicator lamp lights up permanently.
- Open a consumer installation.
If the red indicator lamp lights up, press and hold the red reset button until priming of the system has been completed.
The red indicator lamp then extinguishes and the pump starts pumping.
Close the consumer installation.
If the red indicator lamp lights up again, repeat the above procedure.
- The pump stops after 5 seconds.
The system will now start up automatically as soon as a consumer installation is opened.
- Comply with the operating manual of the respective pump.

6.2.2 Setting the start-up pressure

The automatic control unit is factory-set to 1.5 bar. It can be set to between 1.5 and 2.5 bar if required.

- Disconnect the system from the mains.
- Turn the setting screw of the automatic control unit using a screwdriver.
To increase pressure: Turn in clockwise direction.
To decrease pressure: Turn in anti-clockwise direction.

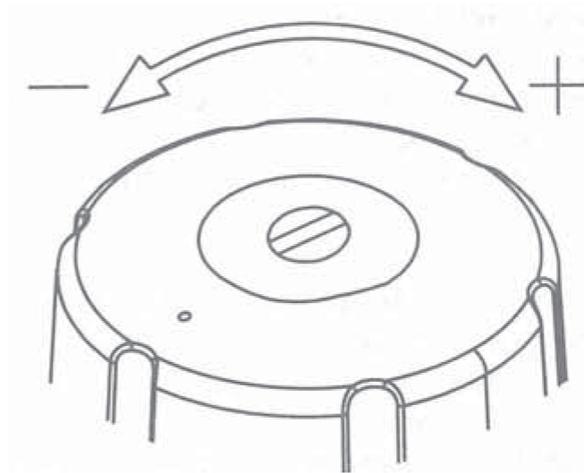


Fig. 5: Setting screw for adjusting the start-up pressure

- Start up the automatic control unit.
Check the pressure at the pressure gauge.
Repeat this procedure until the required pressure is reached.

	NOTE
	The head between the highest consumer and the pump must always be lower than the pressure set at the automatic control unit.

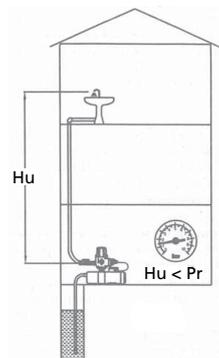


Fig. 6: Setting the start-up pressure

Table 9: Relationship of H_u [m] to P_r [bar]

H_u [m]	P_r [bar]
12	1,5
18	2,0
23	2,5

	NOTE
	The shut-off head of the pump must be 0.7 bar higher than the pressure set at the automatic control unit.

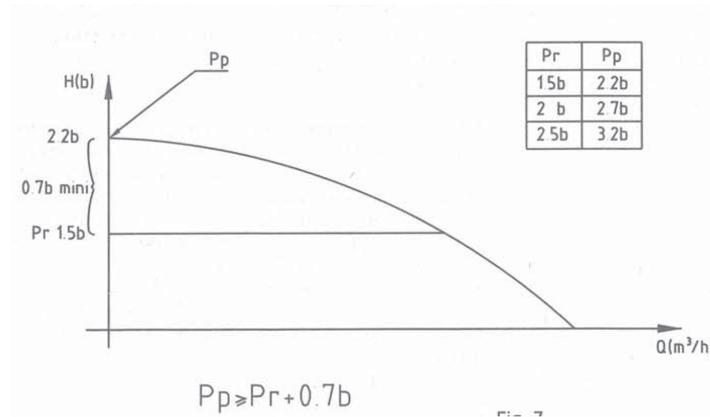


Fig. 7: Shut-off head and start-up pressure

6.3 Shutdown/storage/preservation

- Pull the pump plug.
- Remove the automatic control unit from the piping.
- Rinse off with clean water.
- Press in the check valve at the automatic control unit and shake water out of the automatic control unit.
- Leave the automatic control unit to dry and store in a dry, dark and frost-proof room.
- Special preservation measures are not required.

6.4 Returning to service

For returning the equipment to service, observe the items on commissioning/start-up.

7 Maintenance

Check the proper functioning of the automatic control unit once per year.

8 Trouble-shooting

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

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

- A Pump does not start
- B Pump delivers, pressure unstable
- C Pumps keeps starting and stopping
- D Pump does not stop although consumer installations are closed

Table 10: Trouble-shooting

A	B	C	D	Indicator lamps	Possible cause	Remedy
X	-	-	-	No indication	The system is not energised.	Check mains connection.
X	-	-	-	Green indicator lamp is lit (ready for operation). Red indicator lamp is lit (fault). 	The piping between the pump and the consumer installations is clogged.	Eliminate clogging.
					The automatic control unit is frozen.	Defrost.
					The electronic control system is blocked.	Unplug and re-plug the unit. The pump must start up within 5 seconds.
					Operating pressure of automatic control unit is lower than pump discharge pressure.	Set start-up pressure (from 1.5 to 2.5 bar).
X	-	-	-	Green indicator lamp is lit (ready for operation). 	Lack of water	Check water level; the end of the pump suction line must be submerged in the water. Press and hold down the reset button until the pump has primed.
					The pump is not connected to the automatic control unit.	Check connection between pump and automatic control unit.
					The pump motor has been connected incorrectly.	Plug the pump plug into the automatic control unit socket.
					The suction line is clogged or defective.	Clean or repair.
					The pump is blocked or defective.	See pump operating manual.
					Pump discharge pressure is lower than start-up pressure of automatic control unit.	Unsuitable pump (pump pressure must be 0.7 bar higher than the start-up pressure).
-	X	-	-	Green indicator lamp is lit (ready for operation). Yellow indicator lamp is lit (operation). 	Air intake on the pump's suction side. Seal the connections. Install suction strainer further down; it must not be located in the immediate vicinity of the water surface. Reduce air content in fluid handled (waterfall).	

A	B	C	D	Indicator lamps	Possible cause	Remedy
-	-	X	-	<p>Green indicator lamp is lit (ready for operation). Yellow indicator lamp is lit (operation).</p> 	Minor leakage in the system	Eliminate leakage at the consumer installations and pipe unions.
-	-	-	X	<p>Green indicator lamp is lit (ready for operation). Yellow indicator lamp is lit (operation).</p> 	<p>Severe leakage</p> <p>Reset button is jammed.</p> <p>Flow detection is prevented by sand or other solids blocking the check valve.</p> <p>Electronic components defective</p>	<p>Check the shut-off valves and the piping, and repair.</p> <p>Call in customer service.</p> <p>Disconnect the automatic control unit from the power supply and flush it through to remove any solids. Call in customer service if necessary.</p> <p>Call in customer service.</p>

9 EU Declaration of Conformity

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

The manufacturer herewith declares that the product:

Controlmatic E

Serial number range: 2021w01 to 2022w52

- is in conformity with the provisions of the following directives / regulations as amended from time to time:
 - 2014/30/EU: Electromagnetic Compatibility (EMC)
 - 2014/35/EU: Electrical Equipment Designed for Use within Specific Voltage Limits (Low Voltage)
 - Electrical components: 2011/65/EU Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

The manufacturer also declares that:

- The following harmonised international standards have been applied:
 - EN 60730-1, EN 60730-2
 - EN 61000-6-1, EN 61000-6-3

The EU Declaration of Conformity was issued in/on:

Frankenthal, 1 January 2021



Jochen Schaab
Head of Product Development Pump Systems and Drives
KSB SE & Co. KGaA
Johann-Klein-Straße 9
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