Control Unit

MSE/MSD

Installation/Operating Manual

CE

KSB

Legal information/Copyright

Installation/Operating Manual MSE/MSD

Original operating manual

Subject to technical modification without prior notice.

Contents

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
Pump operating manual	Proper and safe use of the pump in all phases of operation
Wiring diagram	Description of 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

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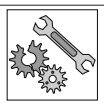
1 If included in agreed scope of supply

1.5 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 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

DANGER

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 control unit must only be operated in accordance with the instructions provided in the operating manual and 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 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 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

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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

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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

CAUTION

Improper transport

Damage to the device!

- ▷ Always transport the device properly and in its original packaging.
- ▷ For transport, observe the transport instructions on the original packaging.
- ▷ Do not throw the device.

1. Upon receipt, unpack the device 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

CAUTION

Damage during storage due to humidity, dirt or vermin

Corrosion/contamination of the control unit!

- ▷ For outdoor storage cover the (packed or unpacked) control unit and accessories with water-proof material.

If the ambient conditions for storage are met, the function of the control unit is safeguarded even after a prolonged period of storage. If properly stored indoors, the equipment is protected for a maximum of 12 months.

- Store the control unit in dry, vibration-free conditions and, if possible, in its original packaging.
- Store the control unit in a dry room at constant atmospheric humidity.
- Prevent excessive fluctuations in atmospheric humidity.

Table 4: Ambient conditions for storage

Ambient condition	Value
Relative humidity	Max. 85 % (no condensation)
Ambient temperature	-10 °C to + 70 °C

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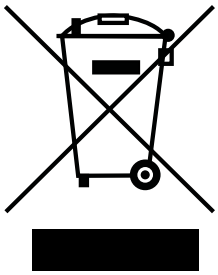
3.4 Disposal



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.

NOTE

Due to certain components it contains, the device is classified as special waste and meets RoHs 2011/65/EC requirements.

Once decommissioned, the device must be properly disposed of in accordance with local regulations.

4 Description

4.1 General description

- Control unit for level-dependent control of a single-phase AC motor or a three-phase motor

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

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

4.3 Designation

Table 5: Designation key

Code	Description
M	Motor
S	Protection relay
E/D	Single-phase alternating current Three-phase current
16.	Max. amperage x 10
1	Code number

4.4 Name plate

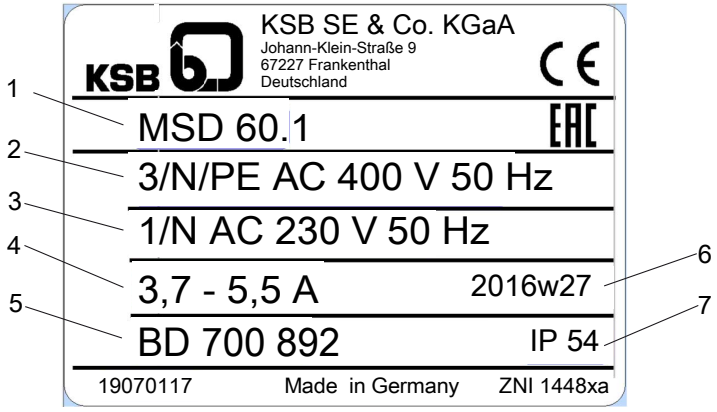


Fig. 1: Name plate (example)

1	Type series	2	Rated voltage
3	Control voltage	4	Rated current
5	Circuit diagram number	6	Year/week of construction
7	Enclosure		

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4.5 Design details

Design

- Control unit
- Level-dependent control
- Protection of a pump with single-phase AC motor (MSE) or three-phase motor (MSD)
- The pump is started and stopped as a function of the fill level.
- Level measurement via float switch
- DOL starting

4.6 Technical data

Table 6: Electrical data

Characteristic	Value
Rated operating voltage	
MSE	1/N/PE 230 V AC, 50 Hz
MSD	3/N/PE 230 / 400 V AC, 50 Hz
Setting range up to	
MSE	1,2 A, 1,8 A, 2,6 A, 3,7 A, 5,5 A, 8,0 A, 11,5 A
MSD	0,16 A, 0,23 A, 0,36 A, 0,54 A, 1,2 A, 1,8 A, 2,6 A, 3,7 A, 5,5 A, 8,0 A, 11,5 A
Rated insulation voltage	690 V AC
Enclosure	IP54
Mains type	TN-C-S mains
Dimensions H × W ×D [mm]	170 × 100 × 85
Weight [kg]	1

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5 Installation at Site

5.1 Safety regulations

DANGER

Incorrect installation

Danger to life!

- The control unit must be installed in a flood-proof location.
- Never install the control unit in potentially explosive atmospheres.
- Do not use the control unit for controlling pumps in potentially explosive atmospheres.
- For integration in an external control system observe the directives for low-voltage switchgear and controlgear assemblies.

5.2 Checks to be carried out prior to installation

Before beginning with the installation check the following:

- The place of installation is dry.
- The place of installation is frost-free.
- The place of installation is protected against flooding.
- The place of installation is well-ventilated.
- The place of installation is not potentially explosive.
- The specified ambient conditions are met.

Table 7: Ambient conditions

Characteristic	Value
Temperature during operation	-10 °C to +50 °C
Relative humidity	Non-condensing
Installation altitude	1000 m above MSL (max.)

5.3 Installing the control unit

The control unit must be handled with care to prevent damage to the components.

✓ The place of installation meets the requirements indicated.

1. Remove the control unit from its original packaging.
2. Install the control unit on a stable base (e.g. wall, bracket, etc.).

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5.4 Electrical connection

DANGER

Unintentional contact with live parts

Danger of death from electric shock!

- ▹ De-energise the mains connection.
- ▹ Take steps to ensure that the mains connection cannot be re-energised unintentionally.

CAUTION

Improper electrical connection

Damage to the control unit / control cabinet!

- ▹ Check the type of current and voltage of the mains.
- ▹ For connecting pump power cables with flexible cores, attach wire end sleeves to the core ends that are to be connected to the control unit.
- ▹ Observe the wiring diagrams. (⇨ Section 9.1, Page 19) .

CAUTION

Technical pump data not taken into account

Damage to the control unit!

- ▹ Connect only pumps with technical data (particularly rated current) that matches this control unit.

NOTE

Connect the thermal circuit breaker with the corresponding cores of the pump power cable. On pumps without a thermal circuit breaker a bridge must be inserted into the control unit.

✓ The mains voltage at the site has been verified against the data on the name plate.

✓ The wiring diagram is on hand.

1. Guide the power cables through the corresponding cable glands.
2. Make sure that the sealing elements are properly positioned. Tighten the cable glands (strain relief).
3. Connect the control unit in accordance with the wiring diagram.
4. Set the motor protection relay to the rated current.
5. For three-phase motors, connect the power cable available on site so as to ensure a clockwise rotating field.
6. For single-phase AC motors, ensure that phase and neutral are connected correctly.

5.4.1 Setting the level-dependent control

CAUTION

Obstructed float switch

Flooding caused by pump not stopping!

Dry running caused by pump not stopping!

- ▷ The float switch must be fitted in such a way that it is able to move freely.
- ▷ The pump must be started up before the fluid handled reaches the upper edge of the tank.
- ▷ The pump must be stopped before the fluid handled drops down to the suction openings.

Setting the switching points

The pump is started and stopped by a float switch or level sensor. The float switch closes the circuit in upper float position.

- When the fluid handled reaches the start-up level or the float switch reaches an upper angular position of 30°, the pump starts up.
- When the fluid handled reaches the stop level or the float switch reaches a lower angular position of 30°, the pump stops.
- The switching points are indicated by a clearly audible switching noise in the float housing.
- The switching points must be at least 40 cm apart.

Routing the float switch cable

✓ The switching level is set at the site.

1. Determine the fastening height of the float switch cable at the discharge line, handle or other suitable points.
2. Observe the required free cable length of the float switch.
3. The minimum free float switch cable length measured from the antikink bush is 10 cm.
4. Fasten the float switch cable with suitable fasteners.

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6 Commissioning/Start-up/Shutdown

6.1 Prerequisites for commissioning/start-up

Before commissioning/starting up the control unit, make sure the following conditions are met:

- The VDE standards and regulations applicable in the country of use are complied with.
- The power cable of the pump has been connected.
- The thermal circuit breaker has been connected.
- The power cable has been connected correctly (clockwise rotating field for three-phase motors).
- The electric cable of the float switch has been connected.

6.2 Start-up

CAUTION

Switching to manual mode with water level not reaching the start-up level

Damage to the pump!

▷ Only operate the pump in manual mode when the water level is above the start-up level.

For commissioning/start-up set the switch to **automatic**.
Exception: When the switch is set to **manual** the pump can be started up directly. Select manual mode for emergencies only (e.g. floods, fire-fighting water) or for checking the direction of rotation.

Table 8: Description of the manual-0-automatic selector switch

Setting	Function
Manual	The motor is started up manually.
0	The motor is OFF.
Automatic	The float switch starts and stops the motor.

✓ The operating manual of the pump is on hand and is observed.

✓ The float switch has been installed properly.

✓ The housing is open.

1. Set the manual-0-automatic-selector switch to **0**.
2. Check the setting of the motor protection relay against the rated current of the motor; adjust the motor protection relay if required.
3. Set the motor protection relay to **I** .
4. Close the housing.
5. To establish the power supply connect the control unit and set the site-supplied safety device to **ON**.
6. If three-phase motors are used, check the direction of rotation.
   ⇨ To do so, briefly set the manual-0-automatic selector switch to **manual**.
7. Set the manual-0-automatic selector switch to **automatic**.

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6.3 Shutdown

DANGER

Unintentional contact with live parts

Danger of death from electric shock!

- ▷ De-energise the mains connection.
- ▷ Take steps to ensure that the mains connection cannot be re-energised unintentionally.

1. Set the manual-0-automatic-selector switch to **0**.
2. Before opening the control cabinet and the motor terminal box, make sure to de-energise the system.
3. Set the motor protection relay to **0**.
4. Prior to any work on the control cabinet, use a voltmeter to verify that all phases are dead.

6.4 Returning to service

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

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7 Maintenance

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

8 Trouble-shooting

⚠ WARNING

Improper work to remedy faults

Risk of injury!

- ▷ 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.

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 Fault indication lamp is lit

C Pump has started, but stops above stop level

D Fault indication lamp is lit after pump start-up

E Pump does not stop.

Table 9: Trouble-shooting

A	B	C	D	E	Possible cause	Remedy
✘	-	-	-	-	Manual-0-automatic selector switch set to **0**.	Set manual-0-automatic switch to **automatic**.
✘	-	-	-	-	Amber lamp at motor protection relay is lit.	Press the reset key of the motor protection relay.
✘	-	-	-	-	Thermal circuit breaker not connected or not provided	Connect the thermal circuit breaker; if it is not provided, connect supplied bridge to 1 and 2.
✘	-	-	-	-	Water level below start-up level	Wait for inflow, then check again.
✘	-	-	-	-	Power cable of control unit does not supply power.	Check power supply.
-	✘	-	-	-	Motor protection relay has tripped.	Check pump.
-	✘	-	-	-	Thermal circuit breaker not connected or not provided	Connect the thermal circuit breaker. If no thermal circuit breaker is provided, connect supplied bridge to 1 and 2.
-	✘	✘	-	-	Thermal circuit breaker has tripped.	Pump will re-start after cooling down. If the thermal circuit breaker trips repeatedly, have the pump and motor mechanically and electrically checked by KSB Service.
-	-	-	✘	-	Incorrect setting of motor protection relay	Set it to the rated current of the motor.
-	-	-	✘	-	Thermal circuit breaker has tripped.	Pump will re-start after cooling down. If the thermal circuit breaker trips repeatedly, have the pump and motor mechanically and electrically checked by KSB Service.
-	-	-	✘	-	Phase failure	Check power cable.
-	-	-	-	✘	Float switch is stuck.	Release and check for free movement.
-	-	-	-	✘	Incorrect pump selection	Have it checked by KSB Service.
-	-	-	-	✘	Manual-0-automatic selector switch is set to **manual**.	Set the manual-0-automatic selector switch to **automatic**.

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9 Related Documents

9.1 Wiring diagram

To connect the pump and float switch, refer to the enclosed circuit diagrams.

10 EU Declaration of Conformity

Manufacturer:

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

The manufacturer herewith declares that **the product**:

MSE / MSD

Serial number range: 2022w01 to 2024w52

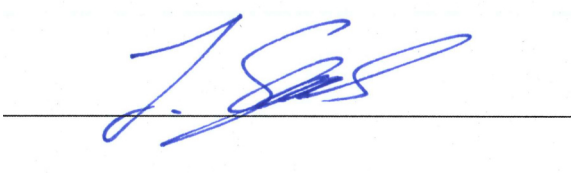
- is in conformity with the provisions of the following directives / regulations as amended from time to time:
  - 2014/30/EU: Electromagnetic Compatibility (EMC)
  - 2014/35/EU: Electrical Equipment Designed for Use within Specific Voltage Limits (Low Voltage)
  - Electrical components: 2011/65/EU Restriction 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 60204-1
  - EN 61000-6-2, EN 61000-6-3

The EU Declaration of Conformity was issued in/on:

Frankenthal, 1 January 2022



Jochen Schaab

Head of Product Development Pump Systems & Drives

KSB SE & Co. KGaA
Johann-Klein-Straße 9

67227 Frankenthal (Germany)

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KSB SE & Co. KGaA
Johann-Klein-Straße 9 • 67227 Frankenthal (Germany)
Tel. +49 6233 86-0
www.ksb.com