MAYSER®

Innovative by tradition.

Control unit SG-SLE X4-0X1

EN | Operating instructions

Version 1

PCB in plastic housing

1000305	SG-SLE 04-051	DC 24 V
1000303	SG-SLE 04-021	AC 230 V

PCB without plastic housing

100309	SG-SLE 14-051	DC 24 V
100307	SG-SLE 14-021	AC 230 V

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Original instructions

Safety first!

- Read the manual carefully before use.
- Warning signs in the manual warn of unexpected dangers. Always observe warning signs.
- Retain the manual throughout the service life of the product.
- Pass the manual on to every subsequent owner or user of the product.
- Insert every supplement received from the manufacturer into the manual.
- **Observe chapter on Safety starting on page 5.**

Conformity

CE

The design type of the product complies with the basic requirements of the following directives:

- 2006/42/EC (Safety of Machinery)
- 2011/65/EU (RoHS)
- 2014/30/EU (EMC)

The Declaration of Conformity is available in the download section of the website: www.mayser.com/en/downloads

Contents

About this manual

This manual is an integral part of the product.
Mayser will assume no liability and provide no guarantee whatsoever for damages and consequential damages resulting from failure to comply with the manual.

Validity

This manual is valid only for the product specified on the title page.

Target group

This manual is intended for the owner and electricians. The electrician must be familiar with the installation and commissioning.

Other applicable documents

➔ Also observe the following documents:
- Drawing of the sensor system (optional)
- Wiring diagram (optional)
- Installation instructions of the sensors used

Symbols used

Symbol	Meaning
➔ ...	Action with one or more steps whose order is not relevant.
1. ...	Action with several steps whose order is relevant.
• ... - ...	Bullets first level Bullets second level
(see Section *Installation*)	Cross-reference

Danger symbols and information

Symbol	Meaning
⚠ **DANGER**	Immediate danger leading to death or serious injury.
⚠ **WARNING**	Imminent danger which may lead to death or serious injury.
⚠ **CAUTION**	Possible danger which may lead to minor or moderate injuries.
NOTE	Potential danger of property damage or environmental degradation. Information on easier and safer working practices.

Dimensions in drawings

Unless otherwise indicated, all dimensions are stated in millimetres (mm).

Safety

Intended use

The control unit is designed for signal processing of a pressure-sensitive protective device. It evaluates the output signals of sensors with monitoring resistor 22k1. The integrated output signal switching device (OSSD) transmits the evaluated safety signals directly to the downstream control.

The product complies with ISO 13849-1:2015 Category 3 PL e. So that the safety classification is retained, the downstream control must be of the same or a higher category.

Safety instructions

For your **own safety** the following safety instructions apply.

➔ **Prevent electric shock**
When working on electrical systems, always disconnect them from the power supply and secure them against being switched on again, to prevent injuries from electric shock.

➔ **Ensure careful configuration of interface**
The quality and reliability of the interface between the safety device and the machine affects the overall safety. Take special care when setting up this interface.

➔ **Prevent restarting of the machine**
As long as a hazard continues to exist, take measures to prevent the machine from restarting, for example by means of a startup lockout.

➔ **Disable in case of error**
Disable the safety device in case of malfunctions or visible damage.

➔ **Do not use in ATEX zones**
Do not use the Control Unit in potentially explosive environments (ATEX). The control unit is not authorised for use in these zones.

To prevent irreparable damage to the **product**, the following safety instructions apply.

➔ **Do not modify the control unit**
Never manipulate or make changes to the control unit.

➔ **Observe degree of protection (only with SG-SLE 14-0X1)**
Only use the control unit in rooms with a minimum degree of protection of IP54 (e.g. switch cabinet).

➔ **Maintain distance**
When installing in the switch cabinet, ensure sufficient distance from heat sources (at least 2 cm).

➔ **Check supply voltage**
Check supply voltage. It must correspond with the connecting voltage U_S on the type plate.

➔ **Observe pin assignment**
Observe pin assignment when connecting the supply voltage.

➔ **Do not exceed the maximum number of sensors**
Do not connect more sensors on the control unit, than the number specified in the installation instructions of the sensors.

➔ **Protect relay contacts**
Risk of welding: Protect the relay contacts externally.

➔ **Do not overload control unit**
Ensure that the specified switching current is not exceeded.

➔ **Fit spark absorbers**
When connecting inductive loads, fit spark absorbers (RC modules) to the consumer.

➔ **Do not cross link control unit**
Do not cross link the control unit with other control units.
Terminals 14, 15 and 16, 17 and 18, 19 and 20, 21 are not potential-free.

➔ **Continue redundancy**
Make sure you wire the unit directly in the control circuit or that the downstream control is also in dual channel mode.

Residual dangers

There are no known residual dangers associated with this product.

Parts supplied

Control unit SG-SLE 04-0X1

1× Control unit
Enclosure with electronics module.
1× Operating instructions
1× Declaration of conformity

Control unit SG-SLE 14-0X1

1× Control unit
PCB with 4× screws M4 and 4× spacers
1× Operating instructions
1× Declaration of conformity

➔ Upon receipt of the parts supplied, check immediately for completeness and good condition.

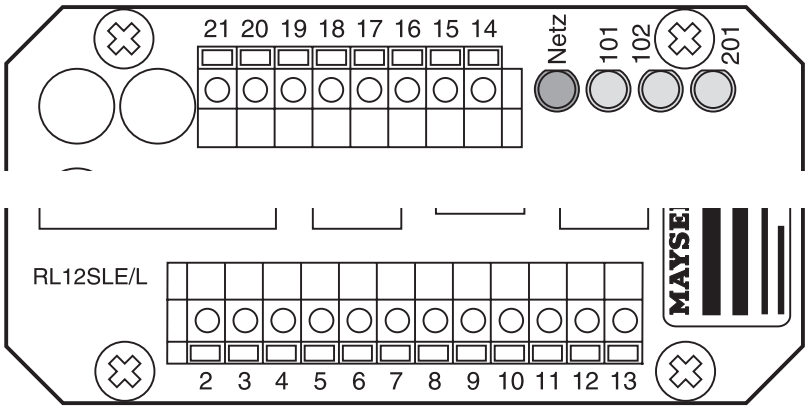
Storage

➔ Store the control units in the original package, in a dry place.

➔ Comply with the storage temperature specified in the technical data.

Product overview

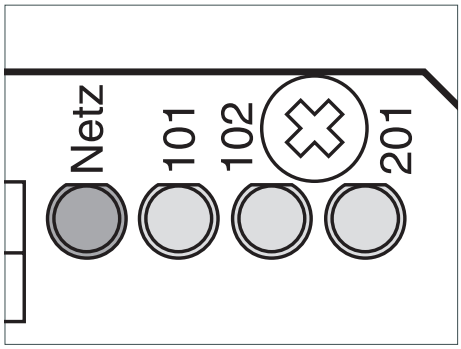
Connections



Connections:	**Terminals:**
Supply voltage	2 or 3, 4
Switching channel 1	12, 13, (11)
Switching channel 2	6, 7, (5)
Reverse travel	8, 9, 10
Sensor 1	14, 15,
Sensor 2	16, 17
Sensor 3	18, 19
Sensor 4	20, 21

LED indicators

- green LED „Netz“
  Supply voltage connected
- yellow LED „101“
  Sensor not activated
- yellow LED „102“
  Sensor not activated
- yellow LED „201“
  Reverse travel activated



Operation

The single-fault-safe electronics module has dual channels (redundant). Each channel controls a forceguided relay and additionally monitors the relay of the other channel. The electronic system monitors the electrical resistance of the sensor with a defined zero signal current.
The control unit is operated with DC 24 V or AC 230 V. If the supply voltage is connected, the green LED “Netz” is lit. If the sensor is not activated, relay K101 and K201 are energised. The yellow LEDs ”101“ and “201“ light up, the switching channels 1 and 2 are closed and relay K102 is de-energised. When the sensor is actuated, the K101 and K201 relays are de-energised The yellow LEDs ”101“ and “201“ go out and the switching channels 1 and 2 are open. The relays remain de-energised and switching channels 1 and 2 remain open until the sensor is enabled and a delay t_w of approx. 1.8 s has expired there after.

Reverse travel

Approx. 0.8 s following de-energisation of relay K101 and K201 the reverse travel relay energises for approx. 2 s.

Automatic Reset

The control unit works without a reset function. If the sensor is enabled after actuation, relays K101 and K201 are energized again with a delay t_w. (see reactivation time t_w in the chapter *Technical data*)

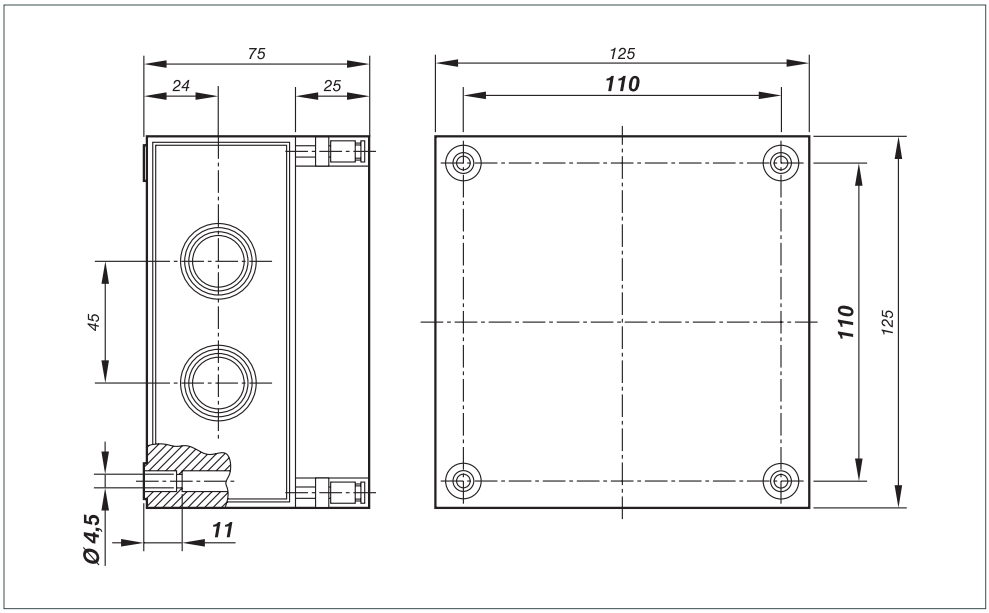
Installation

For your safety, the generally accepted safety rules also apply for assemeln:

- Disconnect all devices and live parts in the immediate vicinity from the power supply.
- Ensure that all devices and live parts cannot be switched back on.
- Test to ensure that all devices and live parts are disconnected from the power supply.

Control unit SG-SLE 04-0X1

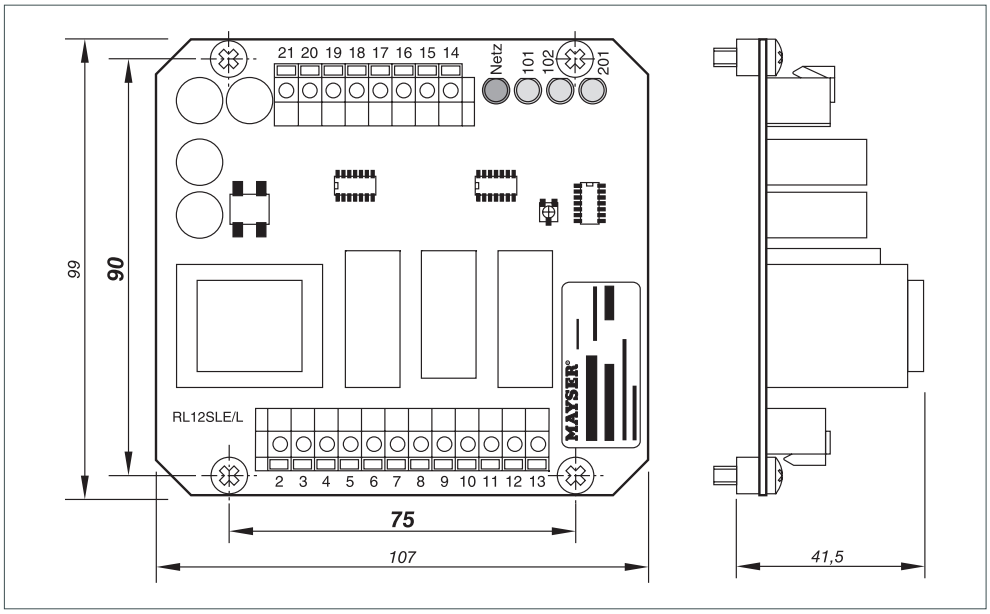
1. Mount the control unit in any position with screws Ø 4 mm. For this, remove the enclosure cover.



3. Wire the sensors, relay contacts and supply voltage to the cable terminals.

Control unit SG-SLE 14-0X1

1. Using the screws and spacers, mount the PCB in any position.

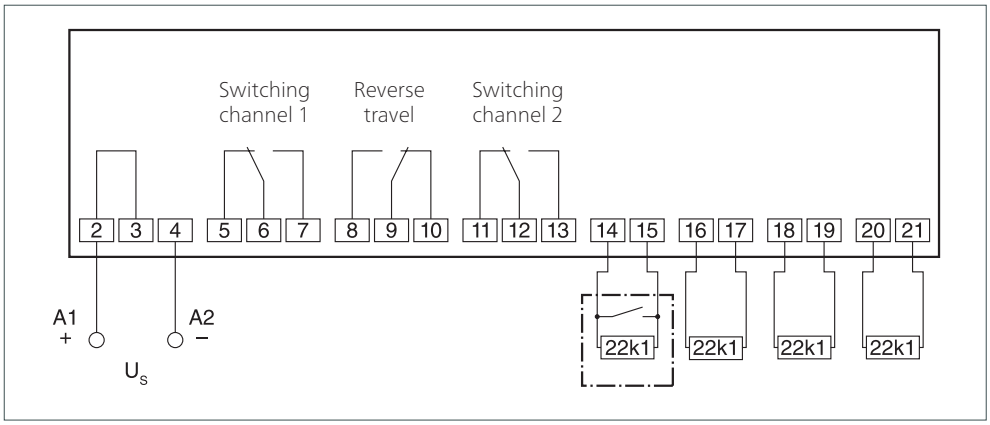


2. Wire the sensors, relay contacts and supply voltage to the cable terminals.

Inputs

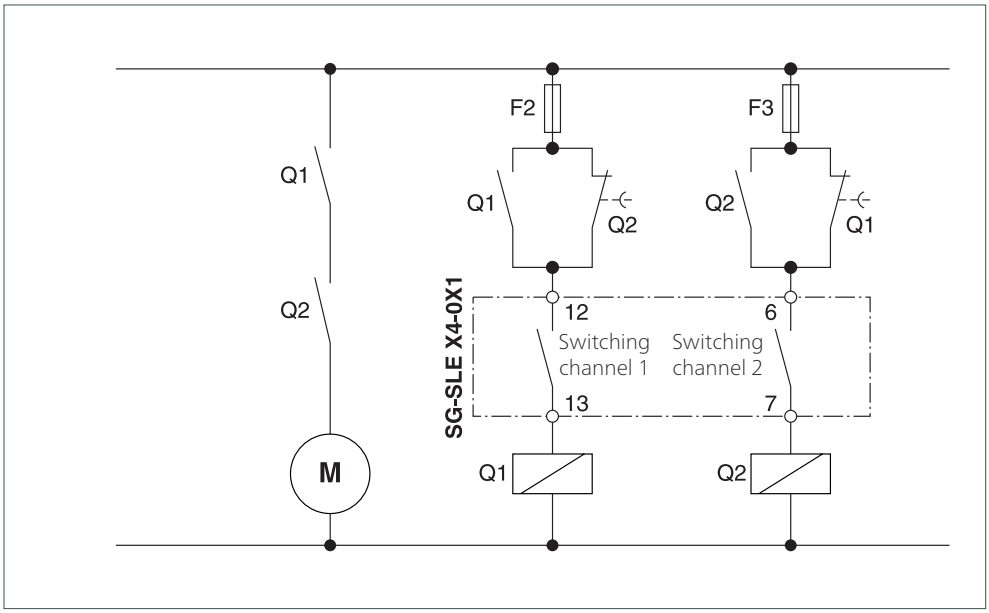
The control unit SG-SLE has 4 sensor inputs.
Single terminating sensors or appropriate combinations of terminating and through sensors are connected here.

➔ Check that unused sensor inputs are bridged with a 22k1 resistor.

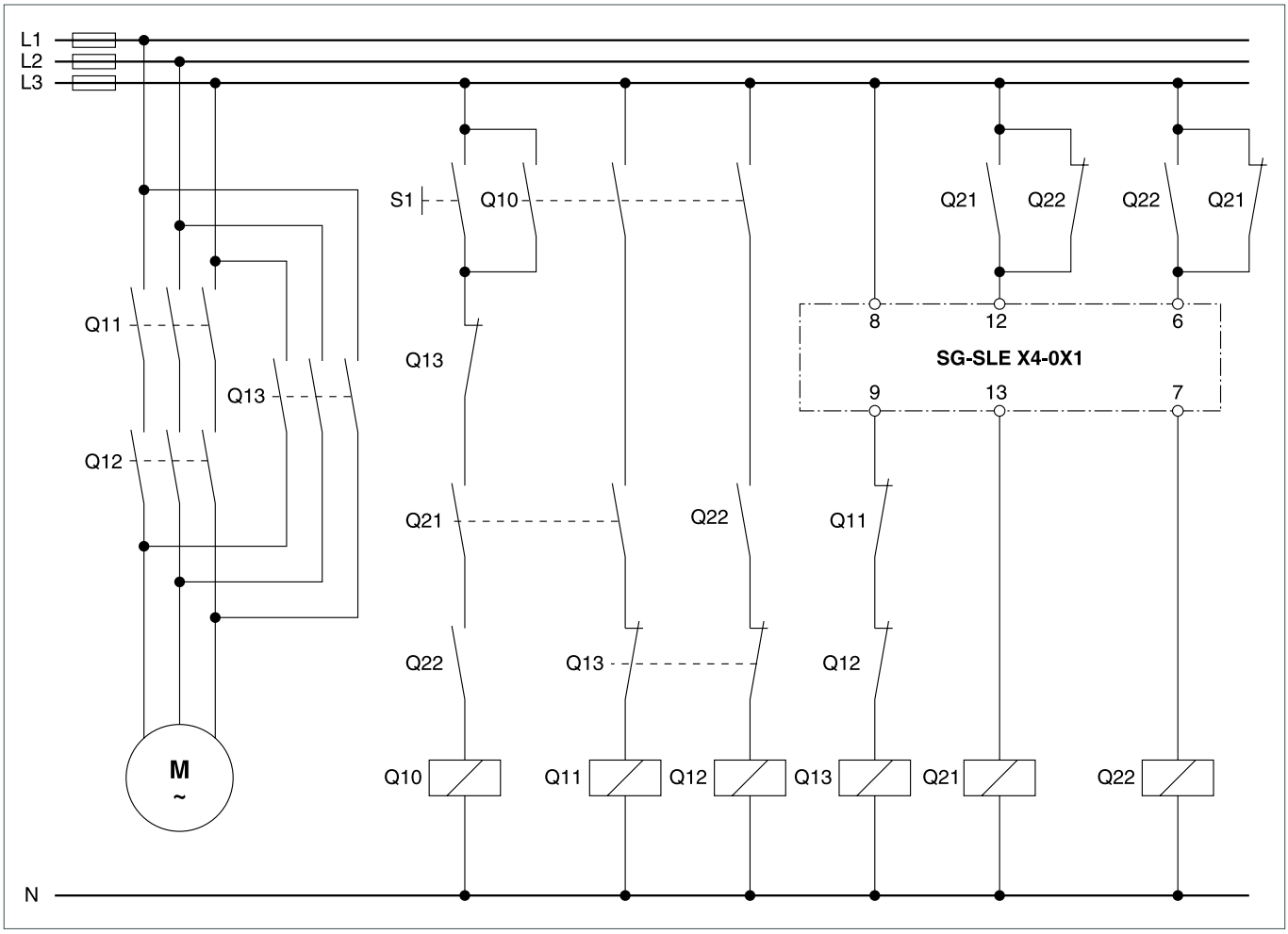


Connection examples

Contacts continued in two-channel mode



Excerpt from connection schematics of a gate



Inbetriebnahme

1. Reinstall the enclosure cover (does not apply to SG-SLE 14-0X4).

2. Connect the supply voltage.

Testing

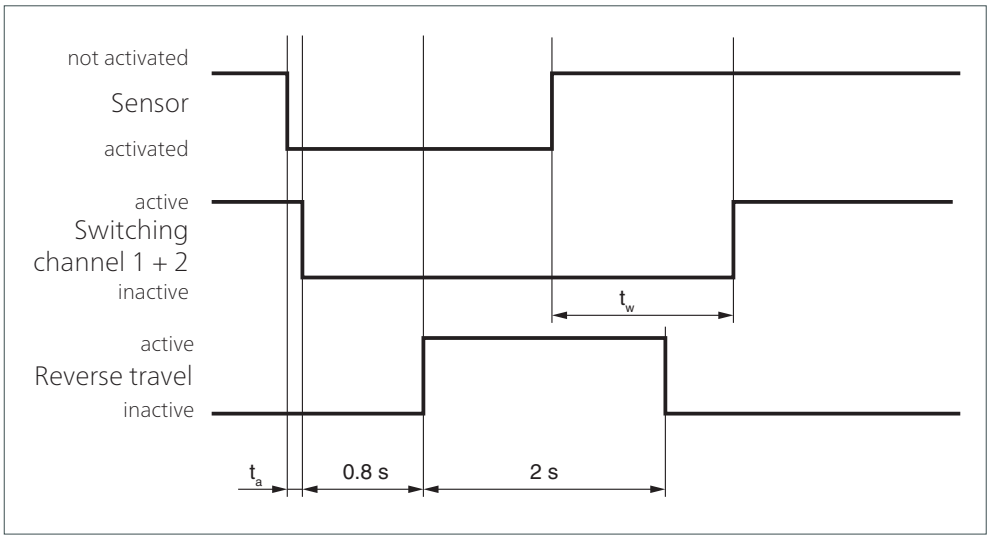
1. Ensure that no sensor is activated.
   - Yellow LEDs „101“ and „201“ are on
   - Contacts of switching channels 1 and 2 are closed
   - Contact 9, 10 of the reverse travel closed (Cotact 8, 9 open)

2. Activate the sensor.
   - Yellow LEDs „101“ and „201“ go off
   - Yellow LED „102“ light up for approx. 2sec.
   - Contacts of switching channels 1 and 2 are open
   - Contact 9, 10 of the reverse travel open following 0.8 s for a period of 2 s, (Contact 8, 9 remain closed so long)

3. Enable sensor or the sensors.
   - Yellow LEDs „101“ and „201“ light up again after approx. 1.8 s
   - Yellow LED „102“ is off
   - Contact of switching channels 1 and 2 close again following approx. 1.8 s
   - Contact 9, 10 of the reverse travel is closed (Contact 8, 9 is open)

4. Disconnect a sensor.
   - Yellow LEDs „101“ and „201“ go off
   - Yellow LED „102“ light up for 2 s and then goes off
   - Contacts of switching channels 1 and 2 are open
   - contact 9, 10 of reverse travel opens following 0.8 s for a period of 2 s, (contact 8, 9 closed so long)

Flowchart



Pressure-sensitive protection device actuated

As long as the pressure-sensitive protection device remains actuated, the output signal switching devices of the control unit remain in the safe OFF state.

The control unit operates without a reset function. If the pressure-sensitive protection device is no longer actuated, the output signal switching device of the control unit automatically changes from the OFF state to the ON state. Without additional start interlock, the machine would start up again immediately.

Correlations

LEDs				Outputs		Meaning
Power green	101 yellow	102 yellow	201 yellow	6, 7, 12,13	8, 9	LED off: ○ LED on: ●
○	○	○	○	open	open	no supply voltage
●	●	○	●	closed	open	Control unit ready for operation
●	○	○	○	open	open	Sensor activated
●	○	●	○	open	closed	Sensor actuated, return flow activated

Decommissioning

➔ Switch off the pressure-sensitive protection device and safeguard it from being switched back on unintentionally.

➔ Affix a clear warning on the pressure-sensitive protection device warning that states it is temporarily or definitively decommissioned.

Recommissioning

➔ Recommission the pressure-sensitive protection device as specified in the chapter Commissioning (see chapter *Commissioning*).

Maintenance and cleaning

Maintenance

The control unit is maintenance-free.

➔ Repeat the operational test monthly.

Cleaning

Control unit SG-SLE 04-0X1

➔ Clean the outside of the enclosure with conventional cleaning products.

➔ Allow the enclosure to dry before recommissioning.

Control unit SG-SLE 14-0X1

➔ Do not clean the PCB.

Troubleshooting and remedies

Prerequisite: the control unit is connected to the supply voltage and sensor. No sensor is activated.

Fault display	Possible cause	Remedy
green LED „Netz" is off	No or incorrect supply voltage	1. Check supply voltage, compare with type plate 2. Check terminal connections
	With correctly connected supply voltage: Control Unit faulty	➔ Replace control unit
yellow LEDs „101" and „201" are off	Incorrect monitoring resistor on sensor	➔ Connect sensor to monitoring resistor 22k1
	With correct monitoring resistor: sensor faulty	➔ Replace sensor
	No sensor connected	➔ Connect sensor
	Sensor incorrectly connected	➔ Check terminal connections
	Cable break	➔ Replace sensor
only one yellow LED „101 or „201" lights up	Control unit is faulty	➔ Replace control unit
yellow LED „102" lights up continuously	Control unit is faulty	➔ Replace control unit

The fault can still not be removed?

➔ Contact Mayser support: Phone +49 731 2061-0.

➔ In case of queries, have the information on the type plate at hand.

Type plate

A type plate for identification of the control unit is affixed to the enclosure cover. (only in the case of SG-SLE 04-0X1)
The type plate of the SG-SLE 14-0X1 is on the package. On the PCB itself there is a label with basic information (manufacturer, serial number, etc.).

Replacement parts

⚠ **CAUTION Overall safety endangered**
If the sensor is not replaced with original Mayser parts, operation of the protective device may be impaired.
➔ Only use original parts from Mayser.

Disposal

Control unit

The devices produced by Mayser are professional electronic tools exclusively intended for commercial use (so-called B2B devices). Unlike devices mainly used in private households (B2C), they may not be disposed of at the collection centres of public sector disposal organisations (e.g. municipal recycling depots). At the end of their useful life, the devices may be returned to us for disposal.
WEEE reg. no. DE 39141253

Packaging

- Wood, cardboard, plastics

➔ Observe the following with respect to disposal:
- Comply with the relevant national disposal regulations and legal stipulations for these materials.
- If you enlist the services of a disposal company, the company will need the aforementioned list of materials.
- Materials should be recycled or disposed of in an eco-friendly manner.

Technical data

SG-SLE X4-0X1	DC 24 V	AC 230 V
Testing basis	EN 12978, ISO 13849-1, ISO 13856-2	
Supply voltage U_s		
Nominal voltage Voltage tolerance Nominal current Nominal frequency External protection Power consumption	DC 24 V -15 % to +10 % 210 mA / 90 mA 48 bis 62 Hz 250 mA slow-acting < 3 W	AC 230 V -15 % to +10 % 42 mA / 21 mA 48 bis 62 Hz 125 mA slow-acting < 5 VA
Times		
Reaction time t_a Re-start time t_w	< 14 ms < 1.8 s	< 14 ms < 1.8 s
Safety classifications		
ISO 13856: Reset function ISO 13849-1:2015 $MTTF_D$ DC_{avg} B_{10D} (Load: DC-13 24 V / 1 A) n_{op} (Estimate) CCF IEC 60664-1: Creep distance and air gap IEC 61140:2001+A1:2004 SG-SLE 04-0X1 SG-SLE 14-0X1	without Category 3 PL e 279 a 90 % 2× 10^6 52560/a Requirements fulfilled soiling degree 2, overvoltage category II / 230 V Protection class II -	without Category 3 PL e 279 a 90 % 2× 10^6 52560/a Requirements fulfilled soiling degree 2, overvoltage category II / 230 V Protection class II -
Inputs		
Sensor Monitoring resistor Short-circuit resistance Line resistance Line length (max.) Switching thresholds Sensor activated Cable break	14, 15 / 16, 17 / 18, 19 / 20, 21 22k1 Ohm ≤ 400 Ohm ≤ 100 Ohm 100 m < 5.2 kOhm > 150 kOhm	14, 15 / 16, 17 / 18, 19 / 20, 21 22k1 Ohm ≤ 400 Ohm ≤ 100 Ohm 100 m < 5.2 kOhm > 150 kOhm

SG-SLE X4-0X1	DC 24 V	AC 230 V
Outputs		
Switching channel 1 and 2 (NO contact)	12, 13 and 6, 7	13, 14 and 23, 24
Utilization category according to EN 60947-5-1	DC-13: 24 V / 1 A	DC-13: 24 V / 1 A
Switching voltage (max.)	DC 24 V	DC 24 V
Switching current (max.)	2 A	2 A
Switching current (min.)	10 mA	10 mA
Switching capacity (max.)	48 W	48 W
Switching operations, mechanical	> 5× 10^7	> 5× 10^7
Switching operations, electrical	> 3× 10^5	> 3× 10^5
Contact fuse protection external	2 A quick-acting	2 A quick-acting
Return flow (changeover)	8, 9, 10	8, 9, 10
EN 60947-5-1: Utilization category	DC-13: 24 V / 1 A	DC-13: 24 V / 1 A
Switching voltage (max.)	DC 24 V	DC 24 V
Switching current (max.)	2 A	2 A
Switching capacity (max.)	48 W	48 W
Switching operations, mechanical	> 5× 10^6	> 5× 10^6
Switching operations, electrical	> 8× 10^5 (AC 250 V / 2 A)	> 8× 10^5 (AC 250 V / 2 A)
Contact fuse protection external	2 A quick-acting	2 A quick-acting
Mechanical operating conditions		
Cable terminals		
solid wire	1 x 1.5 mm^2	1 x 1.5 mm^2
strand without sheath	1 x 1.5 mm^2	1 x 1.5 mm^2
strand with sheath	1 x 0.75 mm^2	1 x 0.75 mm^2
IEC 60529: Degree of protection		
SG-SLE 04-0X1	IP65	IP65
SG-SLE 14-0X1	IP00	IP00
max. humidity (23 °C)	95 %	95 %
Operating temperature	-20 °C to +55 °C	-20 °C to +55 °C
Storage temperature	-20 °C to +55 °C	-20 °C to +55 °C
Impact resistance in operation	2.5 g	2.5 g
Impact resistance transport	10 g	10 g
Dimensions (W × H × D)		
SG-SLE 04-0X1	125 x 125 x 75 mm	125 x 125 x 75 mm
SG-SLE 14-0X1	107 x 99 x 33 mm	107 x 99 x 41.5 mm
Weight		
SG-SLE 04-0X1	420 g	560 g
SG-SLE 14-0X1	140 g	280 g