

MAYSER®

Polymer Electric



Operating Instructions



Control Unit SG-TRS 3X8

Version 1

1005297 SG-TRS 318 110 V=
1005296 SG-TRS 328 24 V=

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Original instructions

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About these operating instructions

These operating instructions are part of the product.

Mayser Polymer Electric accepts no responsibility or warranty claims for damage and consequential damage due to failure to observe the operating instructions.

➔ Read operating instructions carefully before use.

➔ Keep operating instructions for the complete service life of the product.

➔ Pass operating instructions on to every subsequent owner or user of the product.

➔ Add any supplement received from the manufacturer to the operating instructions.

Validity

These operating instructions are only valid for the products specified on the title page.

Target group

The target group of these operating instructions are operators and trained specialist personnel who are familiar with installation and commissioning.

Other applicable documents




➔ In addition to the operating instructions, 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 step or with more than one step where the order is not relevant.
1. ... 2. ... 3. ...	Action with more than one step where the order is relevant.
• ... - ...	Bullets first level Bullets second level
(see <i>Assembly</i>)	Cross-reference

**Danger symbols and
information**

Symbol	Meaning
DANGER 	Immediate danger leading to death or serious injury.
CAUTION 	Possible danger which may lead to slight injury or damage to property.
	Information on easier or safer working practices.

Intended use

The Control Unit is designed for signal processing of a pressure-sensitive protective device (PSPD) for buses and trains. It evaluates the output signals of sensors with transponder technology as well as sensors with monitoring resistor 1k2. The integrated output signal switching device (OSSD) transmits the evaluated safety signals directly to the downstream control.

The Control Unit complies with IEC 61508 SIL2 and IEC 62061 SIL2.

When used in conjunction with a TRS transponder system the Control Unit functions as a radio module per the R&TTE Directive 1999/5/EEC.

Safety instructions

➔ **Do not modify Control Unit**

Never manipulate or modify the Control Unit.

➔ **Check supply voltage**

Check supply voltage. It must correspond with the connecting voltage U_s on the type plate.

➔ **Maintain distance**

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

➔ **Protect from sunlight**

In the case of surface installation, ensure that the Control Unit is protected from direct sunlight.

➔ **Observe pin assignment**

Observe pin assignment when connecting the supply voltage.

➔ **Protect relay contacts**

Risk of welding: Protect the relay contacts externally.

➔ **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 ANT1, ANT2 and Y1, Y2 are not voltage free.

➔ **Do not overload Control Unit**

Ensure that the specified switching current is not exceeded.

➔ **Continue redundancy**

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

➔ **In the event of a fault, put out of operation**

In the event of malfunctions and visible damage, put the Control Unit out of operation.

➔ **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.

Parts supplied

1x Control Unit

Enclosure with electronics module

1x Operating Instructions

1x Declaration of Conformity

Check the scope of supply for completeness and the perfect condition of the product immediately after receipt.

You also require

1x round plug connector set M23, 9-poles, socket (Part No. 1005325)

Transport and storage

Packaging and transport

The Control Units are packed individually in cardboard boxes. Several Control Units are stacked in one large cardboard box.

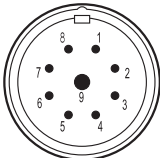

The documents are enclosed separately.


Storage

- ➔ Store the Control Units in the original packaging in a dry place.
- ➔ Observe the storage temperatures given in the technical specifications.

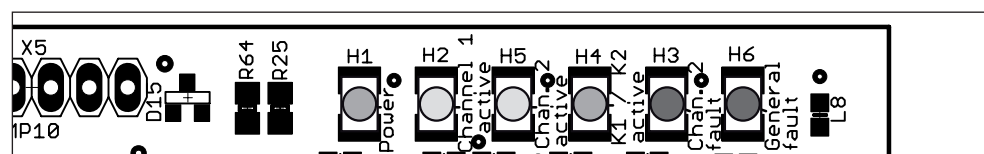
Product overview

Connections

Plug X1	Signal	PIN	Round connector
Supply voltage	A1 A2	1 2	 M23
Sensor	Y1 Y2	4 3	
Switching channel 1	13 14	7 8	
Switching channel 2	23 24	6 5	
Equipotential bonding		9	

Socket X2	Signal	PIN	Round connector
Transmitting antenna	ANT1 ANT2	1 2	 M16

LEDs information



- green LED “Power“:
supply voltage connected
- yellow LED “Channel 1 active“:
channel 1 activated
- yellow LED “Channel 2 active“:
channel 2 activated
- green LED “K1/K2 active“:
switching channel 1 and 2 closed
- red LED “Channel 2 fault“:
channel 2 fault
- red LED “General fault“:
internal fault

Operation, installation and commissioning

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 sensor on channel 2 (= sensor 2) and the sensor with integrated transponder chip (= sensor 1).

The control unit is powered with DC 110 V or DC 24 V. When the supply voltage is connect-ed, the green "Power" LED is lit up.

When both sensors are not activated, relays K1 and K2 energise , channel 1 and 2 are closed.

If one of the sensors is activated, relays K1 and K2 de-energise. Green LED "K1/K2 active" go off, yellow LED "Channel 1 active" or/and yellow LED "Channel 2 active" are lit, Channel 1 and 2 are open.

The unit does not work if channel 1 is not connected. Channel 2 can be bridged with a resistor if it is not required.

Installation

DANGER



Danger of injury due to electrocution!

- ➔ Disconnect all devices and live parts in the immediate environment of the power supply and protect them against being switched on again (see relevant operating instructions)
 - ➔ Check that all devices and parts are disconnected from the power supply
-

CAUTION

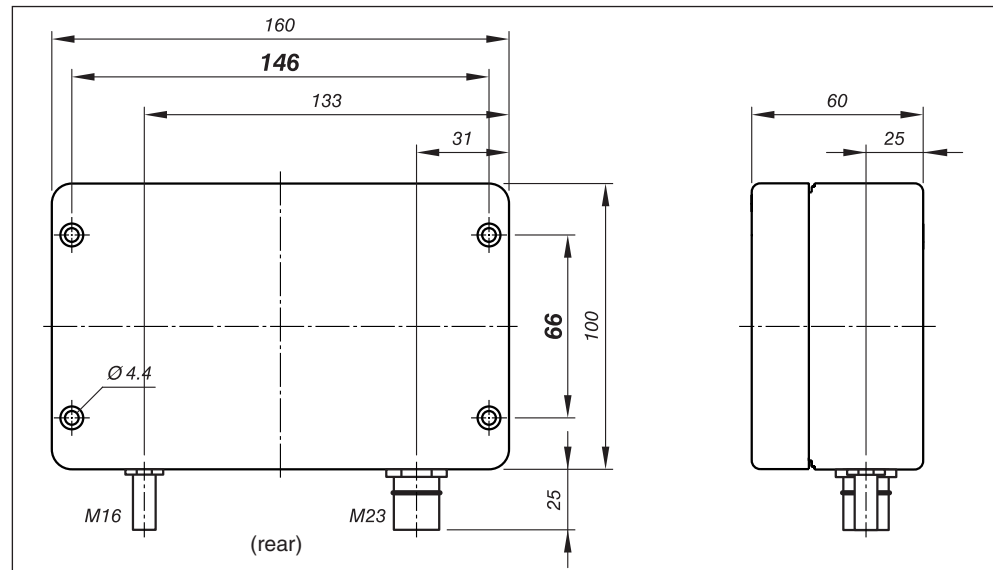


Impaired operation due to overheating

The operation of the protective device may be impaired due to overheating of the Control Unit.

- ➔ When installing in the switch cabinet, ensure sufficient distance from heat sources (at least 2 cm)
 - ➔ In the case of surface installation, ensure that the Control Unit is protected from direct sunlight.
-

- ➔ Mount the Control Unit in any position with screws Ø 4 mm. For this, remove the enclosure cover.



CAUTION

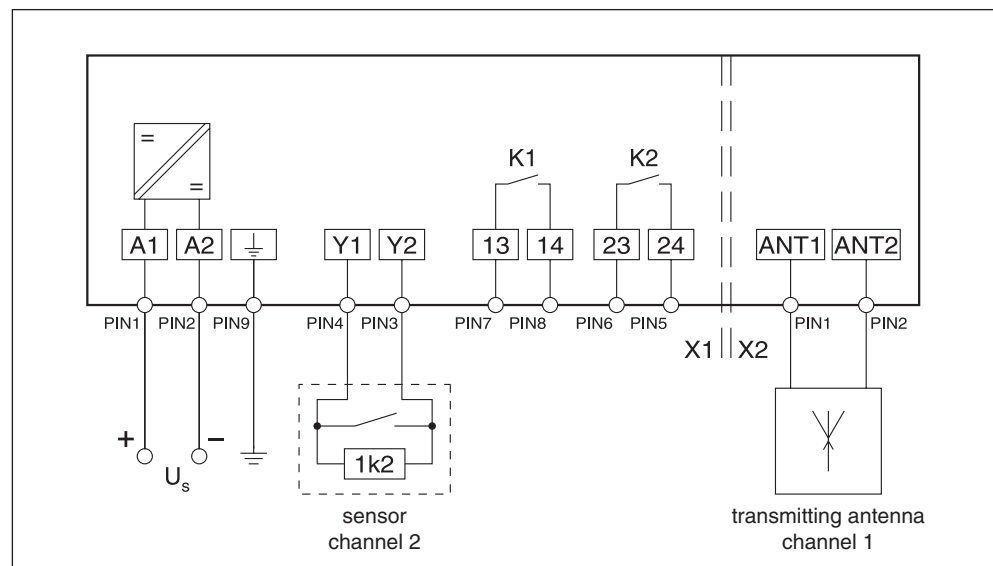


Overall safety endangered

The quality and reliability of the interface between the protective device and the machine influences the overall safety.

➔ Install the interface very carefully

1. Wire the transmitting antenna, sensor, relay contacts as well as supply voltage and equipotential bonding at the round connectors.



CAUTION



Protection class can decrease

The quality of the round plug connections on X1 and X2 affect the protection class of the Control Unit.

➔ Take special care when carrying out the screw connections

Commissioning



1. Reinstall the enclosure cover.

The screws used to fix the lid of the enclosure also ensure the equipotential bonding to the lower part of the enclosure.

➔ Tighten all screws well.

2. Connect the supply voltage.



Danger of injury due to electrocution!

➔ Never unplug plug connections with the power on.










Check operation

1. Make sure no sensors are activated and transponder antenna is in field.
 - green LED "Power" is lit
 - green LED "K1/K2 active" is lit
 - contacts of switching channels 1 and 2 closed
2. Activate sensor 1.
 - green LED "Power" is lit
 - yellow LED "Channel 1 active" is lit
 - green LED "K1/K2 active" go off
 - contacts of switching channels 1 and 2 open
3. Repeat step 1.
4. Activate sensor 2.
 - green LED "Power" is lit
 - yellow LED "Channel 2 active" is lit
 - green LED "K1/K2 active" go off
 - contacts of switching channels 1 and 2 open
5. Repeat step 1.
6. Remove the transponder antenna from the field. Alternately place a metal plate between the transponder antenna and the transmitting antenna.
 - green LED "Power" is lit
 - yellow LED "Channel 1 active" is lit
 - green LED "K1/K2 active" go off
 - contacts of switching channels 1 and 2 open
7. Repeat step 1.

8. Disconnect sensor 2.
 - green LED "Power" is lit
 - red LED "Channel 2 fault" is lit
 - green LED "K1/K2 active" go off
 - contacts of switching channels 1 and 2 open

9. If the result of the operational test is positive, enter the date on the type plate under "installation date"

Correlation

LEDs						Remedy
Power	Channel 1 active	Channel 2 active	K1/K2 active	Channel 2 fault	General fault	LED off: ○ LED on: ●
green	yellow	yellow	green	red	red	
		○	○	○	○	Supply voltage connected, Control Unit ready: (1) transponder antenna not in field, sensor 2 not activated, switching channels open (2) transponder antenna in field, sensor 1 activated, sensor 2 not activated, switching channels open
	○	○		○	○	Transponder antenna in field, sensor 1 and 2 not activated, switching channels closed
	○		○	○	○	Transponder antenna in field, sensor 1 not activated, sensor 2 activated, switching channels open
			○	○	○	(1) Transponder antenna not in field, sensor 2 activated switching channels open (2) Transponder antenna in field, sensors 1 and 2 activated, switching channels open

Recommissioning

DANGER



Danger of injury!

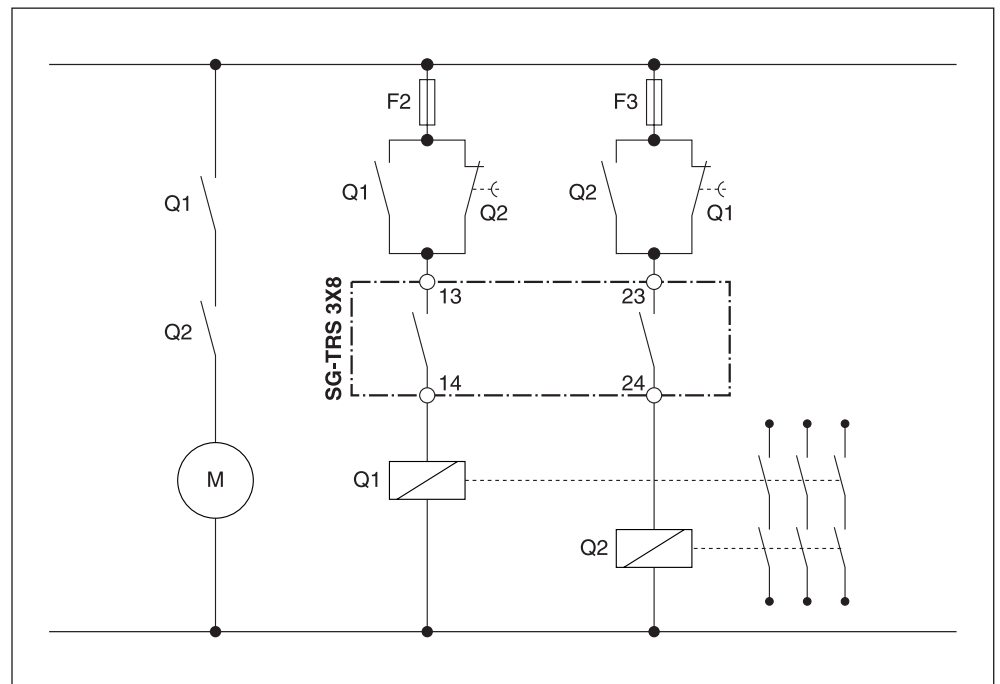
➔ Never start your machine as long as the danger remains.

Automatic reset

The Control Unit works without a reset command. If the sensor is enabled after actuation, relays K1 and K2 re-energise after a delay t_w

➔ Check for proper functioning after recommissioning (see section *Commissioning*)

Connection examples



Maintenance and cleaning

Maintenance

The Control Unit is maintenance-free.

➔ Repeat the operational test monthly.

Cleaning

DANGER



Danger of injury due to electrocution!

➔ Disconnect the Control Unit as well as all devices and live parts in the immediate environment of the power supply and protect them against being switched on again (see relevant operating instructions).

➔ Check that all devices and parts are disconnected from the power supply.

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

➔ Allow the enclosure to dry before recommissioning.

Troubleshooting and remedies

Prerequisite: The Control Unit is connected to the supply voltage and sensor. The sensor is not activated.

























































Fault display	Possible cause	Remedy
green LED "POWER" off	No or incorrect supply voltage	<ol style="list-style-type: none"> 1. Check supply voltage, compare with type plate. 2. Check terminal connections
	If supply voltage is correctly connected: Control Unit is faulty.	➔ Replace Control Unit
green LED "K1/K2 active" off	Channel 1: Fault on transponder side	<ol style="list-style-type: none"> 1. Check whether transponder antenna is in field and that sensor 1 not activated 2. Take transponder antenna out of field and place reference transponder T02 (Part. No 1004458) in the field 3. Check if switching channels energise 4. If yes: Replace entire transponder side
	Channel 1: Fault on Control Unit side	<ol style="list-style-type: none"> 1. Measure voltage on terminals 1 and 2: set value > AC 25 V / 125 kHz 2. Actual value < AC 25 V: Replace transmitting antenna 3. Fault still exists: Control Unit faulty
	Channel 2: Fault on sensor 2	<ol style="list-style-type: none"> 1. Check if yellow LED "Channel 2 active" or red LED "Channel 2 fault" on 2. Connect resistor 1k2 instead of sensor 2 3. Fault eliminated: Replace sensor 2 4. Fault still exists: Control Unit faulty
yellow LED "Channel 2 active" on and sensor 2 not activated	Sensor or supply line faulty (line disconnection)	<ol style="list-style-type: none"> 1. Measure resistor on sensor 2 : set value = 1k2 ±5% 2. Actual value ≠ set value: Replace Sensor 2 3. Connect resistor 1k2 instead of sensor 2 4. Fault eliminated: Replace sensor 2 5. Fault still exists: Control Unit faulty

Fault display	Possible cause	Remedy
red LED "Channel 2 fault" on and sensor 2 not activated	Sensor or supply line faulty (cable break)	<ol style="list-style-type: none"> 1. Measure resistor on sensor 2: set value = $1k2 \pm 5\%$ 2. Actual value \neq set value: Replace sensor 2 3. Connect resistor $1k2$ instead of sensor 2 4. Fault eliminated: Replace sensor 2 and supply line 5. Fault still exists: Replace Control Unit
red LED "General fault" on	Control Unit faulty	➔ Replace Control Unit

Fault can still not be detected?

➔ Contact Mayser-Support: Tel. +49 731 2061-0.

Correlation

LEDs						Meaning
Power	Channel 1 active	Channel 2 active	K1/K2 active	Channel 2 fault	General fault	LED off:  LED on: 
green	yellow	yellow	green	red	red	
						CPU fault
						RAM fault
						ROM fault
						Relay fault
						Program run fault
						Fault during test "SL-Betätigt" (transponder antenna in field)
						Fault during test "SL-Störung" (transponder antenna in field)
						Fault during test "SL-Betätigt" (transponder antenna not in field)
						Fault during test "SL-Störung" (transponder antenna not in field)

Replacement parts

CAUTION



Overall safety endangered

If the sensor and Control Unit are not replaced with original parts from Mayser, operation of the protective device may be impaired.

➔ Only use original parts from Mayser.

Disposal

The Control Units 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

Conformity



The product design fulfils the fundamental requirements of the R&TTE Directive 1999/5/EEC.

The Declaration of Conformity is available in the Downloads section of the website: www.mayser-sicherheitstechnik.de/english/index.asp

EC Design Test

The product was tested by an independent institute.

An EC design type test certificate confirms conformity.

The EC design type test certificate is available in the Downloads section of the website:

www.mayser-sicherheitstechnik.de/english/index.asp

Technical Data

SG-TRS 3X8	DC 24 V	DC 110 V
Test principles	EN 1760-2, EN 50155, IEC 61508, IEC 62061	
Connecting voltage U _s		
Voltage tolerance	-30% to +25%	-30% to +25%
Nominal current	95 mA	20 mA
External protection	500 mA T	500 mA T
Power consumption	< 3 W	< 3 W
Times		
Reaction time t _a	< 150 ms	< 150 ms
Re-start time t _w	< 200 ms	< 200 ms

SG-TRS 3X8	DC 24 V	DC 110 V
Safety classifications		
EN 1760: Reset IEC 61508 IEC 62061 EN 50124-1: Creep distance and air gap	without SIL2 SIL2 for soiling degree 2, overvoltage category II / 110 V	without SIL2 SIL2 for soiling degree 2, overvoltage category II / 110 V
Control Unit Inputs		
Sensor 1 Voltage Line length (max.) transmitting antenna SL/TRS Sensor 2 Monitoring resistor short-circuit resistance Line resistance Line length (max.) Switching thresholds Sensor active cable break	1, 2 AC 120 V / 125 kHz 5.0 m 3.0 m Y1, Y2 1k2 Ohm ≤ 400 Ohm ≤ 10 Ohm 10 m < 600 Ohm > 1k8 Ohm	1, 2 AC 120 V / 125 kHz 5.0 m 3.0 m Y1, Y2 1k2 Ohm ≤ 400 Ohm ≤ 10 Ohm 10 m < 600 Ohm > 1k8 Ohm
Control Unit Outputs		
Switching channel 1 and 2 Relay Type Switching voltage (max.) Switching current (max.) Switching current (min.) Switching capacity (max.) Switching operations, mechanical Switching operations, electrical Contact fuse protection external	13, 14 / 23, 24 NO contact forceguided DC 110 V 0.1 A 10 mA 22 W > 2× 10 ⁷ > 2× 10 ⁷ (DC 24 V / 10 mA) > 1× 10 ⁶ (DC 110 V / 0.1 A) 200 mA quick-acting (13, 14) 200 mA quick-acting (23, 24)	13, 14 / 23, 24 NO contact forceguided DC 110 V 0.1 A 10 mA 22 W > 2× 10 ⁷ > 2× 10 ⁷ (DC 24 V / 10 mA) > 1× 10 ⁶ (DC 110 V / 0.1 A) 200 mA quick-acting (13, 14) 200 mA quick-acting (23, 24)
Mechanical operating conditions		
Round plug connectors X1: M23, 9-poles X2: M16, 3-poles IEC 60529: Degree of protection max. humidity (23 °C) Operating temperature Storage temperature EN 50155: temperature class IEC 61373: Schock and vibration Dimensions (W × H × D) Weight	X1, X2 Crimp bushings for strands without sleeve 8× 0.34 to 1.0 mm ² 1× 0.75 to 2.5 mm ² — IP65 95% -25 to +55 °C -25 to +55 °C T1 Category 1, class B 160 × 100 × 61 mm 850 g	X1, X2 Crimp bushings for strands without sleeve 8× 0.34 to 1.0 mm ² 1× 0.75 to 2.5 mm ² — IP65 95% -25 to +55 °C -25 to +55 °C T1 Category 1, class B 160 × 100 × 61 mm 850 g