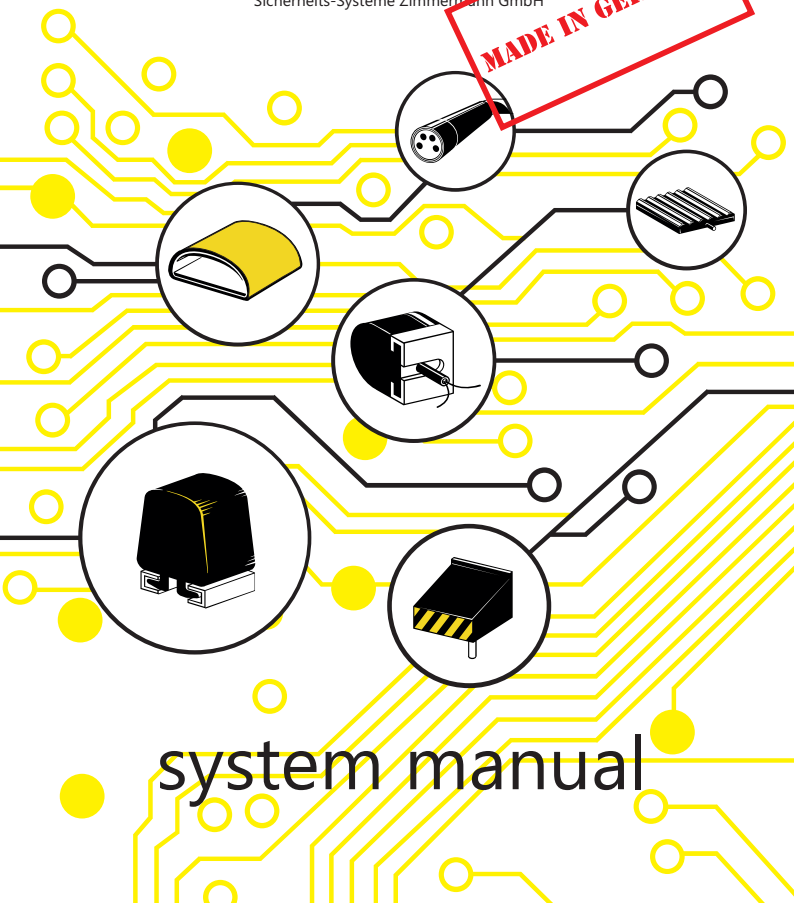




Sicherheits-Systeme Zimmermann GmbH

MADE IN GERMANY



system manual

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About these operating instructions

These operating instructions are part of the product.

It consists important information which have to be taken into consideration during the installation and use of the product. It is important to read the opearting instructions before use, from operators and trained personnel who are familiar with installation and commissioning.

In addition to the System manual, observe the following documents:

- Drawing of the sensor equipment (optional)
- Wiring schematics (optional)

SSZ-GmbH is not responsible and accepts no warranty claims for damages due to failure to observe the installation instructions.

1. Intended use

SSZ-Safety-Units are logic systems to assure safety functions (App. IV pos.21 MS Directive 2006/42/EC). Units of SSZ-Safety-Units type are used for stoppage of dangerous machines and other equipment, which functioning can be dangerous for people present in their hazardous zone. They can be also used for signaling and warning about danger for people who will be present in such zone directly or indirectly and their life or health would be at risk.

Units are designed for cooperation with 2-channel sensors which are placed in- Pressure Sensitive SSZ Safety Devices: SSZ-safety mat, SSZ-safety rail (SSZ-SSL 05 NBR, 06 NBR, 06 EPDM, 08 NBR, 08 EPDM, 10 NBR and 10 EPDM) and SSZ-safety bumper.

A short circuit, wire break or the actuated sensor is immediately recognized.

Units labeled 230/24 can be supplied by mains power 230V or (after switching position of an internal switch VH (Voltage High) or VL (Voltage Low) by AC/DC 24V. In both cases, polarity of plugged cables is not important.

2. Safety instructions

■ Do not modify the control unit

■ Check supply voltage

Supply voltage must correspond with the connecting voltage on the label.

■ Protect from sunlight

Protect from direct sunlight and from heat sources.

■ Observe pin assignment

When connecting the supply voltage.

■ Fit spark absorbers

When connecting inductive loads, fit spark absorbers (RC modules) to the user.

■ Do not cross link control unit with other control units

■ Do not overload control unit

Ensure that the specified switching current is not exceeded.

■ In the event of fault put out of operation

In case of malfunctions and visible damage, put the control unit out of operation.

■ Do not use in EX zones

Do not use the control units in potentially explosive environments (ATEX). The control unit is not authorized for using in these zones

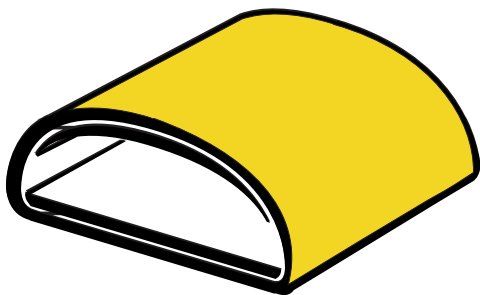
■ Installation: danger of injury due to electrocution!

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

■ Installation: impaired operation due to overheating

The operation of the protective device may be impaired due to overheating of the control unit.

System



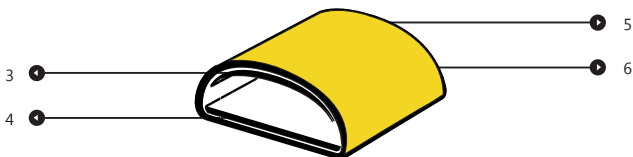
System

The sensor element is used for all transducers and is made out of a co-extruded, high elastic plastic.

Due to the hose shaped special profile the internal conductive layers are held at a distance.

However, due to the material used with these specific advantages the conductivity is limited. The result is that the transducer is operated in combination with a SSZ-controller.

Sensor element

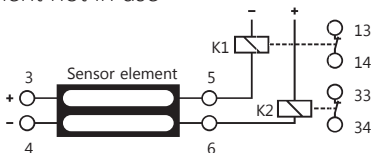


The conductive layers of the sensor element which are depicted in a dark colour in picture 1 can be regarded as non-isolated resistor.

These resistors are provided with connecting wires at the beginning and at the end of the sensor element. The connecting wires are lead to the controller by either 4-wire or 2-wire cables.

The „inlet“ of the sensor element which has been depicted as two opposite resistors in picture 2, is connected to the sensor output 3 and 4 of the controller.

Sensor element not in use



The „output“ is connected to the sensor inputs 5 and 6. Please ensure that the cables are connected correctly as 3 and 5 or 4 and 6 respectively form a signal path.



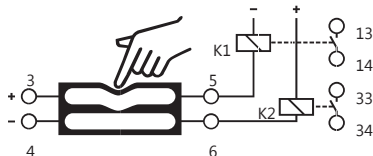
Parallel connecting of the transducers is not permitted!

If the sensor element is not in use current will flow from connection 3 to connection 5 as well as from connection 4 to connection 6. This leads the relay K1 and K2 to close their contact and therefore activate the output.

To obtain a secure output signal the contacts of relay K1 and K2 have to be switched in sequence.

If the sensor element is activated the current ratios at sensor inlets 5 and 6 of the controller change.

Activated sensor element



This change causes the relays to switch off and the output contacts are opened. A short circuit has the same effect on the transducer connection cable.

If a wire or a conductive stretch of the sensor element is cut, at least one relay is switched off. Due to the sequence switching of the relay contacts a cut-off of the electric circuit is ensured.

The transducer connections are marked and colour coded.

The following table shows which colours are assigned to which connections.

4-wire cable

Label	Rails Bumpers	Mats
3	GREEN	BLUE
4	BROWN	BROWN
5	YELLOW	BLACK
6	WHITE	WHITE

two 2-wire cable

Label	Colour
3	BROWN
4	WHITE
5	BROWN
6	WHITE

Several transducers can be connected to a SSZ-controller. To function correctly all transducers connected to one controller have to form a sequence.



If incorrect connections are made the device may not function correctly !

If the transducers are connected parallel a cable disconnection cannot be detected by the controller.

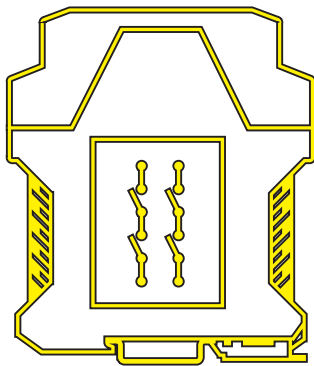
The controllers are constructed for 50 m sensor element which corresponds to the same length of safety edge or approx. 4.5 m² safety mat area.

For bumpers the number is according to the dimensions.

Note

- Only sequence switched safety transducers are permitted, as parallel connections can lead to system errors and the activation of individual transducers cannot be identified correctly.
- The controllers must only be used in a room with a minimum protection of IP54.
- The correct functioning of the systems must be checked at least once a day.
- The user must follow the valid safety regulations and accident prevention regulations.
- The controllers can only be used on currency circuits that have the same safety standards.
- To protect against independent restart after a power cut or an emergency stop the appropriate provisions have to be made.
- The deformation distance of the safety edges and safety bumpers must be longer than the stop path of the protected device.
- The ventilation gaps on the back of the bumper must not be covered.
- Walking sticks, crutches or zimmer frames may not trigger a switching command.
- The transducer should be kept clean to ensure a safe switching command.

Controllers



1. Technical parameters

SSZ-CVS/N/2/230/24 and Sensor SSZ-SG2, SSZ-SG3

Test principles EN ISO 13856, EN ISO 13849-1

Supply voltage	230V AC or 24V AC/DC
Load carrying capacity of safety circuits	2A
Operating temperature [°C]	0- +50
Can be used internally	Yes
Maximum resistance of single sensor's channel	250 kΩ
Maximal difference between resistances of channels	20%
Maximum time of actuation	<20 ms

Safety classifications

MTTF	17,17
MTTFd	34 (medium)
DC (Diagnostic Coverage)	90%
CCF (Common Cause Failure)	80
PFHd (according to IEC/EN 62061)	4.477 x 10⁻⁶
Nop	60.000
Category compatible with IEC/EN 62061	SIL1
Class of safety category according to EN 954-1	2
Performance Level acc. to EN ISO 13849-1	PL c
Power consumption	1.8 VA
Storage temperature [°C]	-10 - +70
Protection level	IP30

SSZ-CVS/N/3/230/24 and Sensor SSZ-SG2, SSZ-SG3

Test principles EN ISO 13856, EN ISO 13849-1

Supply voltage	230V AC or 24V AC/DC
Load carrying capacity of safety circuits	2A
Operating temperature [°C]	0- +50
Can be used internally	Yes
Maximum resistance of single sensor's channel	250 kΩ
Maximal difference between resistances of channels	20%
Maximum time of actuation	<20 ms

Safety classifications

MTTF	203,3
MTTFd	406 (high)
DC (Diagnostic Coverage)	90%
CCF (Common Cause Failure)	80
PFHd (according to IEC/EN 62061)	0.375 x 10⁻⁶
Nop	60.000
Category compatible with IEC/EN 62061	SIL2
Class of safety category according to EN 954-1	3
Performance Level acc. to EN ISO 13849-1	PL d
Power consumption	1.9 VA
Storage temperature [°C]	-10 - +70
Protection level	IP30
Dimension (H/W/D) [mm]	112x23x99

SSZ-RZ3 and Sensor SSZ-SG2, SSZ-SG3

Test principles EN ISO 13856, EN ISO 13849-1

Supply voltage	24V AC/DC and 230V AC
Load carrying capacity of safety circuits	2A
Operating temperature [°C]	0- +50
Can be used internally	Yes
Maximum resistance of single sensor's channel	250 kΩ
Maximal difference between resistances of channels	20%
Maximum time of actuation	<20 ms

Safety classifications

Lifecycles	20 years
MTTFd	100 (high)
DC (Diagnostic Coverage)	90%
CCF (Common Cause Failure)	75
PFHd (according to IEC/EN 62061)	4.33E-8
Nop	95.040
Category compatible with IEC/EN 62061	SIL2
Class of safety category according to EN 954-1	3
Performance Level acc. to EN ISO 13849-1	PL d
Storage temperature [°C]	-10 - +70
Protection level	IP30
Dimension (H/W/D) [mm]	112x23x99

SSZ-RZ4/SSZ-RZ4B and Sensor SSZ-SG 2, SSZ-SG 3

Testing basics EN ISO 13849-1/2; EN ISO 13856-1-3

Nominal supply voltage SSZ-RZ4 / SSZ-RZ4B	24V AC 50 Hz or 24 VDC
Allowable voltage	10.6 VDC - 36 VDC or 8 VAC - 24 VAC
Max. current consumption	290mA@12VDC; 135mA@24VDC; 250mA@24VAC
Rates current	100mA@24VDC
Power consumption P1	2,4 W
Internal fuse	1500 mA
Power circuit required fuse	2A
Working temperature range	0°C - +50° C
DIN Rail mount	Yes
Max. resistance of the sensor element channel 1 and 2	250 kOhm
Max. resistance difference between the channels 1 and 2	20%
Max. response time	<20ms
Performance Level acc. to EN ISO 13849-1	PL=d (Pl e)*
The service life	20 years
MTTFd in connection with SSZ-pressure equipment	74,1
DC (diagnostic coverage)	90%
CCF (common cause failure)	75
PFHd acc. to IEC/EN 62061 in connection with the SSZ-Pressure equipment	6.8^{E-8}
The category acc. to IEC/EN 62061	SIL 2
Safety category acc. to EN ISO 13849-1:2016-02	3

Contact rating acc. to EN 60947-5-1	15 VAC (50/60Hz) - 3A 13 VDC - 3A
Min. switching current I_{1s} , channel 9-10/11-12	5V/10 mA
Min. switching current I_{2s} , channel 9-10/11-12	2 A
Mechanical endurance channel 9-10/11-12	>10⁷
Electrical endurance channel 9-10/11-12	9-10/11-12 >3,6 x 10⁵ (DC24V/1A)
Rated operational power	800mW
Reset	automatic/manual
Storage temperature [°C]	-10 - +50
Grade of protection acc. to IEC 60529	IP30
Dimensions	112x23x99
Weight	180g

Comparison of SSZ-control units

Type of the control unit	SSZ-CVS/N/2	SSZ-CVS/N/3	SSZ-RZ3	SSZ-RZ4
Category	2	3	3	3
Performance Level	c	d	d	d
Power supply				
24V AC/DC	✓	✓	✓	✓
230V AC (for 24/230 version only)	✓ variable	✓ variable	✓ variable	
Reset				
Automatic/Manual	variable	variable	variable	variable
Outputs				
NC		1		1
NO		1	2	2
NO/NC	2			

2. Terminals

SSZ-CVS/N/24/230

R	12		○ POWER	6	Vh
R	11		○ OK 3/5	4	VL
14	10		○ OK 4/6	5	Vh
13	9			3	VL

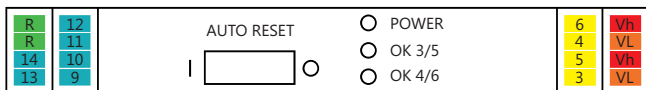
Terminal of
safety units

SSZ
CVS/N/2/230/24

SSZ
CVS/N/3/230/24

3	SSZ sensor, terminal 3	
4	SSZ sensor, terminal 4	
5	SSZ sensor, terminal 5	
6	SSZ sensor, terminal 6	
9	Relays output	Relays output
10	Relays output	Relays output
11	Relays output	Relays output
12	Relays output	Relays output
13	Relays output	-
14	Relays output	-
R	RESET Button	
R	RESET Button	
Vh	L (230V AC)	
Vh	N (230V AC)	
VL	+24V AC/DC	
VL	0V	

SSZ-RZ3



Terminal of
safety units

SSZ
SSZ - RZ3 230V AC

SSZ
SSZ - RZ3 24V AC/DC

3	SSZ sensor, terminal 3	
4	SSZ sensor, terminal 4	
5	SSZ sensor, terminal 5	
6	SSZ sensor, terminal 6	
9	Relays output	Relays output
10	Relays output	Relays output
11	Relays output	Relays output
12	Relays output	Relays output
13	External relay monitoring	or wire jumper
14	External relay monitoring	or wire jumper
R	RESET Button	
R	RESET Button	
Vh	L (230V AC)	-
Vh	N (230V AC)	-
VL	-+24V AC/DC	
VL	OV	

SSZ-RZ4

R	12	RESET AUTO MANUAL 	6	VL
nc	10		4	VL
R	11		5	32
nc	9		3	31

-  POWER
-  OK. 3/5
-  OK. 4/6

*Safety unit
terminal*

*SSZ - RZ4 / SSZ - RZ4B
24V AC/DC*

3	SSZ sensor, terminal 3
4	SSZ sensor, terminal 4
5	SSZ sensor, terminal 5
6	SSZ sensor, terminal 6
9	Relay outputs - 2 circuit
10	Relay outputs - 2 circuit
11	Relay outputs - 1 circuit
12	Relay outputs - 1 circuit
13	External safety circuit*
14	External safety circuit*
R	Manual RESET button
R	Manual RESET button
31	Potential free output
32	Potential free output
VL	+24V AC/DC
VL	OV

* Opening of the circuit will cause switching to safety mode

The SSZ-RZ4 and SSZ-RZ4B control units are factory set to operate with automatic reset.



Manual reset for SSZ-RZ4B control unit

The SSZ-RZ4B control unit is provided with automatic or manual reset functions. Regarding the automatic reset function, the functions are the same as in the SSS-R24 control unit. In case of manual reset operation of reset button has no effect on output of output signal switching device as long as force present on sensor. The output of output signal switching device remains in OFF state. After removing the actuating force from sensor, signal switching device remains in OFF state even though reset signal still present.

When releasing of reset button has no effect on output of output signal switching device.

Reset is achieved after another operation of reset button without actuating force on the sensor.

The SSZ-RZ4B is designed exclusively for use with safety bumper!

An SSZ-safety bumper is most often used to protect driverless vehicles. The use of an SSZ-RZ4B control unit protects against automatic movement, which may occur after incidental bridging or failure of the reset function with a simultaneous release of the bumper.

Manual reset control for SSZ-RZ4 and SSZ-RZ4B unit

1. Press the SSZ-pressure-sensitive device
2. Make sure that no one of the SSZ pressure-sensitive devices is pressed
 - The green LED's „OK 3/5“ and „4/6 OK“ are off
 - The relays contacts of the channel K1 & K2 are opened
3. Press the reset button
 - The „OK 3/5“ and „4/6 OK“ green LEDs are on
 - The relays contacts of the channel K1 & K2 are closed
4. Press the SSZ pressure-sensitive device
 - The „OK 3/5“ and „4/6 OK“ green LEDs are switch off
 - The relays contact of the channel K1 & K 2 are opened
5. Unlock the pressure-sensitive device
 - The „OK 3/5“ and „4/6 OK“ green LEDs are switched off
 - The relays of the contacts channel K1 & K2 are opened
6. Press the reset button, while the pressure-sensitive device should not be pressed
 - The „OK 3/5“ and „4/6 OK“ green LEDs are switched on
 - The relays contacts of the channel K1 & K2 are closed
 - The SSZ-pressure-sensitive device is unlocked and ready for operation

3. Function test

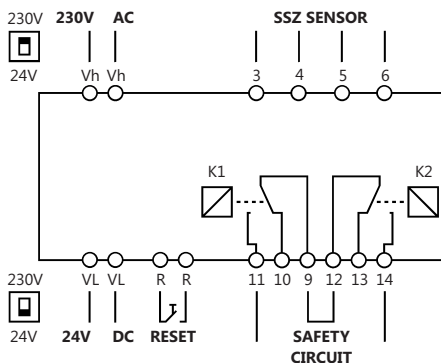
- Disconnect sensors on terminals 3, 4, 5 and 6
- Short terminals by leads. Short terminals 3 and 5 by one lead, and 4 and 6 by the second one. After switching on, two control lights will turn on green (OK 3/5 and OK 4/6) and output-relays will be activated.
- In case of safety units with manual blocking, only one light will turn on. Press RESET in order to reset the safety unit.
- If terminals 3 and 4 or 5 and 6 are short, then both channels (K1 and K2 releases) will be deactivated.
- If we break connection on 3/5 terminals, K1 relay will be deactivated.
- If we break connection on 4/6 terminals, K2 relay will be deactivated.

4. Connections

Exemplary connection of the category 2 unit

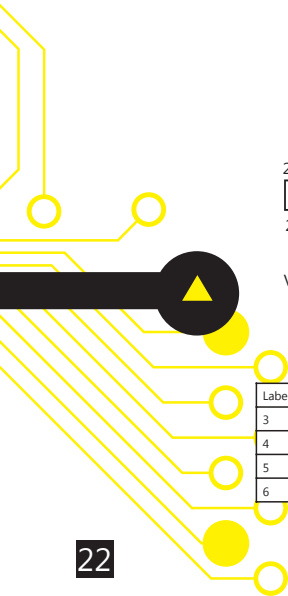
SSZ-CVS/N/2/230

Voltage operation switch in position „high voltage“



Voltage operation switch in position „low voltage“

SSZ-CVS/N/3/230

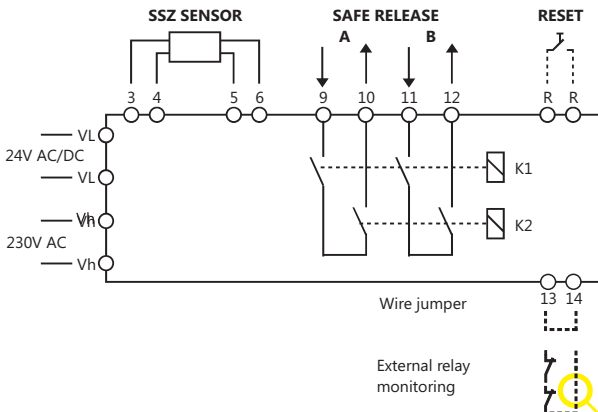


Label	Colour
3	BROWN
4	WHITE
5	BROWN
6	WHITE

Connections for control unit

SSZ-RZ3

Voltage operation switch in position „high voltage“



Voltage operation switch in position „low voltage“

For SSZ-RZ3 control unit only

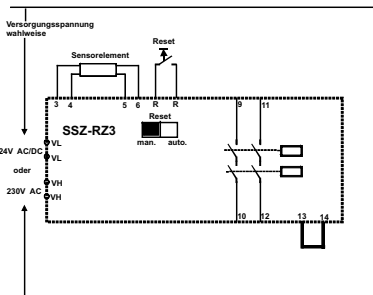
- Please note: when removing the wire jumper between terminals 13-14, are K1 and K2 deactivated and so, this way the external monitoring is controlled.

Einbindung in die
Maschinensteuerung
Sicherheitsauswertegerät
SSZ-RZ3

Sicherer Stopp durch die
internen Relaiskontakte
manueller Reset

Connection of the SSZ-RZ3
control unit into the
machine operating system

Safety stop over intern
contact relays
and manual reset

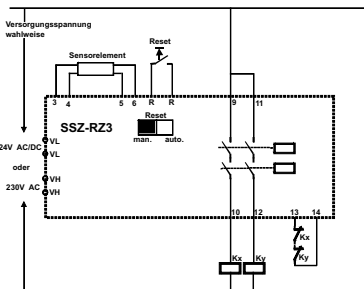


Einbindung in die
Maschinensteuerung
Sicherheitsauswertegerät
SSZ-RZ3

Sicherer Stopp durch
nachgeschaltete Leistungsschütze
manueller Reset

Connection of the SSZ-RZ3 control
unit into
the machine operating system

Safety stop over external devices –
manual reset

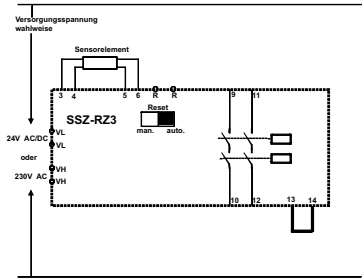


Einbindung in die
Maschinensteuerung
Sicherheitsauswertegerät
SSZ-RZ3

Sicherer Stopp durch die internen
Relaiskontakte
automatischer Reset

Connection of the SSZ-RZ3 control
unit into the machine operating
system

Safety stop over the intern contacts
– automatic reset

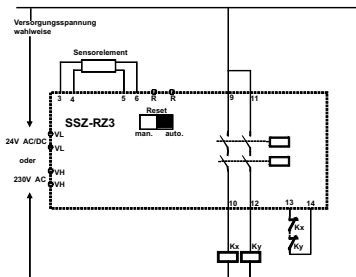


Einbindung in die
Maschinensteuerung
Sicherheitsauswertegerät
SSZ-RZ3

Sicherer Stopp durch nach-
geschaltete Leistungsschütze
automatischer Reset

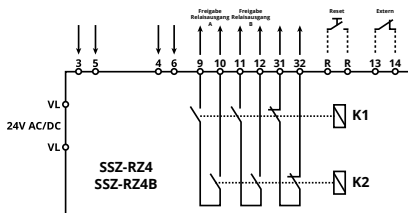
Connection of the SSZ-RZ3 control unit
into the machine operating system

Safety stop over the external devices –
automatic reset



Exemplary connection of

SSZ-RZ4 / SSZ-RZ4B



If the RESET switch is in position „I“, the safety unit works in the automatic reset mode. If the Reset switch is in position „O“ the SSZ-Control unit works in manual reset mode. In this case the Reset button connected on Terminals RR shall be pressed and released. To avoid any manipulation of the system the acknowledgment follows after release of the before pressed Reset button. The SSZ-RZ4B will be released after pressing the Reset button.

Reset options: automatic or via an external button, closing the R-R circuit

Sensor terminals 3, 5, 4 and 6

Colours of cables

- 3 = green
- 5 = yellow
- 4 = brown
- 6 = white

Colours in case of safety mats with connector

- 3 = blue
- 5 = black
- 4 = brown
- 6 = white

Safety circuit 9-10 and 11-12

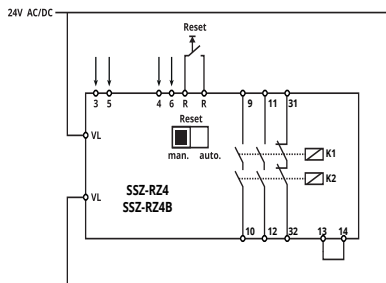


The safety of machine and proper functionality of the safety pressure devices depends on the correct installation of mutual connections.

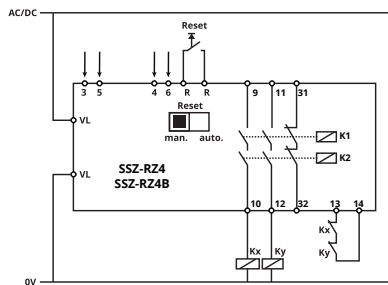
Controllers

SSZ-RZ4/RZ4B control unit connection
to machine operating system

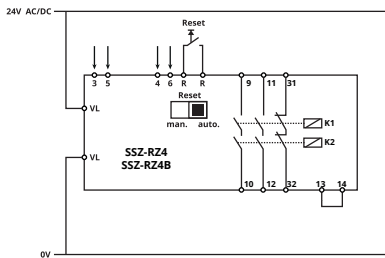
Safe stop by intern contacts
in manual reset



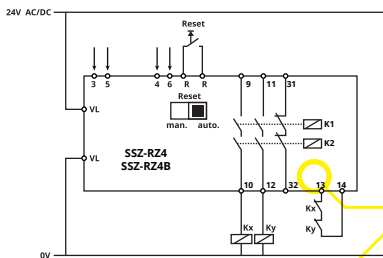
Safe stop by external devices
in manual reset



Safe stop by intern contacts
in automatic reset

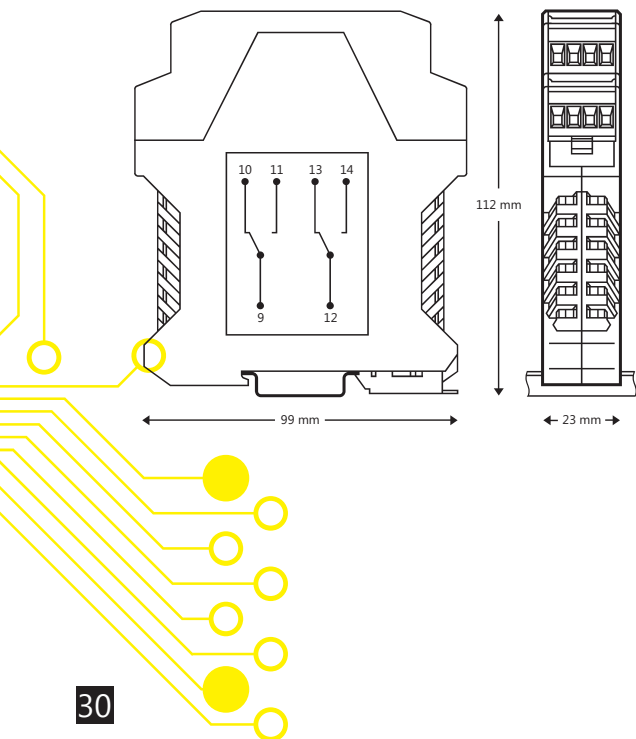


Safe machine stop by external
devices in automatic reset



5. Fixation

All control units are fixed at the DIN 435 mm rail as shown at the drawing.



6. Storage and transport

To protect the safety control units from damages these should be transported and stored in the primary packaging material.

Storage

In closed, dry and draughty, free of direct atmospheric influences places. The temperature of the store should be not lower than -10°C and not higher than 70°C . The relative air humidity not higher as 80%. Protection class: IP 30

7. Maintenance

The control unit is maintenance free. Repeat the operational test monthly.

8. Acceptance procedure

1. Pressure-sensitive device assembly and functionality check acc. to the requirements in the Operation Manual of the chosen SSZ pressure-sensitive device.
2. Checking for correct cabling from the control unit to the SSZ pressure-sensitive device; a particular attention shall be paid to redundancy preservation in the system!
3. Checking of the safety function - acc. to the safety documentation.
4. Measurement of the entire system's response time and „full time stop“, as well as functionality (lock or release) check, caused by the activation of an SSZ pressure-sensitive device. The results should be compared to the specification requirements. All results should be written into the documentation of the machine.
5. A special attention shall be paid to the signalling system in the SSZ control unit (one red and two green LEDs), indicating either normal operation or failure of the system!

If none of the LEDs is active, the supply of the control unit should be checked. If the supply connection to the control unit is correct, while its functionality still fails, it is necessary to contact the manufacturer.

The same acceptance procedure shall be valid when particular, individual components are replaced (either of SSZ pressure-sensitive device or a replacement of the SSZ control unit). The Installer shall be obliged to fill in an identification form of an installed device. In order to ensure a correct Identification, please enter in the form, the number from the hologram on the pressure-sensitive device and on the SSZ control unit.



The system does not have an auto-check function. According to the level of safety assurance - PLd, the system in the standby mode is controlled by the unit.

Do not switch on the machine as long as there is any risk!



Periodical inspections of the control unit should be carried out at least twice a month, while the functionality of signalling lights - LEDs - should be a subject of daily control. The frequency of the inspections should be estimated appropriate to the safety function activations.

The SSZ-control unit check shall include:

- Visual check of the housing for possible damages.
- Exclusion of possible manipulations. The SSZ hologram shall remain intact.
- Operation and functionality check executed acc. to this Operation Manual.
- Checking the correctness of the Installation in the electric box.
- Ensuring the correctness of connection to machine or device.

After completing the assembly and function requirements the system may be approved for use, according to the applicable standards and regulations of the country of use.



The user may replace parts, using exclusively their equivalents approved by the manufacturer! Any modifications or Installations of other components / devices in the system shall be prohibited. The SSZ control unit shall be the only device suitable for control of SSZ sensitive devices. Replacing SSZ control unit or pressure-sensitive devices by products of other vendors poses a risk of functionality failure or total collapse for the entire system!



No spare parts for the above-mentioned system. In case of any failure, replacement parts shall be sought from the manufacturer, including the control unit, the cable, the aluminium profile or the pressure-sensitive device.



In order to ensure proper functionality of a pressure-sensitive protective device, as well as its installation, adhering to the requirements of EN-ISO 13849-1-2 and EN ISO 13856-1-3 : 2013-1, the technical personnel shall be familiar with assembly techniques, as well as with gear and systems, supported by training at the SSZ-GmbH Company or at an agency, designated for the purpose by the manufacturer.

In case of any technical problems, it is recommended to contact the manufacturer or any responsible agency, representing the manufacturer at a given country.

See the manufacturer's homepage www.ssz-gmbh.de for the actual list of representatives.

9. Notes

NOTE

safety units are only a part of the safety system – one must design and construct safety system according to rules included in standards and directives for machines.

NOTE

switching currents of safety terminals can not exceeded nominal values in case of such situation, a system must be re-designed.

NOTE

all external leads should be shut by sleeves with side insulation.

NOTE

all electric connections should be properly tighten and checked. periodical control of electrical terminals is recommended.

NOTE

units are designed for work in places not endangered for external factors (e.g. rain) only.

NOTE

reset and supply switches should be sized by attached labels in order to prevent settings from interference of unauthorized person.

NOTE

it is forbidden to repair safety units or to bridge electric connections. in case of their failure it is necessary to send the unit to the authorized service or to the producer or seller.

NOTE

in case of any failure of safety system, it is forbidden to start any dangerous machine or movement.

NOTE

it is recommended to check the correctness of functioning of the safety system before every start of a dangerous machine or movement.

NOTE

regardless circumstances, it is always obligatory to obey safety rules and to have limited trust in safety systems.



Not obeying of the rules included in this manual can result in accident, health problems or death.



Picture 1.

Reset selector:

- I – Automatic Reset
- O – Manual Reset use terminals R-R

Operation voltage switch
Only 230 V-version!



Picture 2a.

Terminal blocks are moveable
for easy connection.



Picture 2b.

Terminal blocks are moveable
for easy connection.

Picture 3a.

For the installation on the rail pull the snapper.



Picture 3b.

For the installation on the rail pull the snapper.



Picture 4.

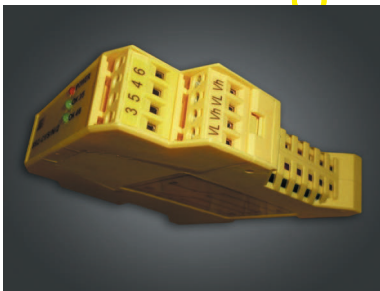
Attention

The terminals are **not** in chronological order !

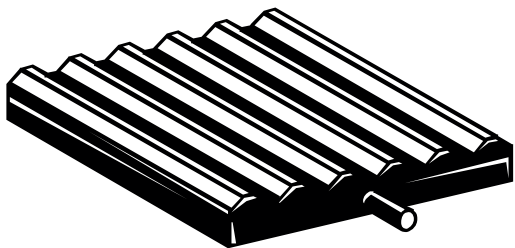
3-5, 4-6 (not 3-4 5-6)

Vh= Voltage HIGH = 230 V

VI =Voltage LOW = 24 V



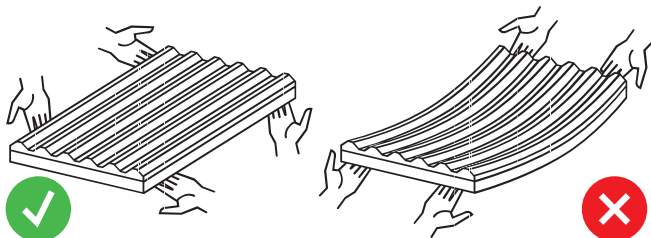
Safety mats



WARNING!

During transport, storage and installation please ensure that the safety mats do not sag.

Large safety mats should always be transported by two people.



Application

SSZ-safety mats are area coverage with integrated sensor element and can only be operated with SSZ-controllers.

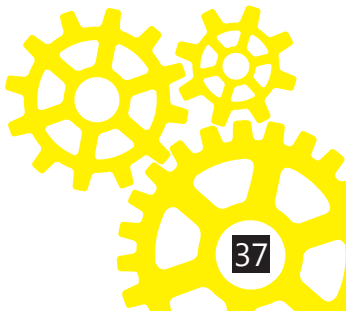
SSZ-safety mats safeguard dangerous working areas on machines and plants and prevent or at least reduce injuries and damages.

SSZ-safety mats are used to safeguard all dangerous area.

The system safety mat/controller complies to classification Plc or Pld acc. to ISO 13849-1: 2006

Areas of application

- for computer controlled devices
- for driverless vehicles
- for dangerous areas on machines and plants
- to safeguard shearing and crushing edges
- and many more.



Types

SSZ-safety mats are manufactured according to customer specification up to a maximum size of 4.5 m² (3000 mm x 1500 mm).

To safeguard a larger area than 4.5 m² it is possible to fit more than one SSZ safety mat together.

One controller can control a maximum of 4.5 m² safety mat area.

Installation

The SSZ-safety mat is laid where the machine is to be safeguarded and fixed with the supplied profile or the fixtures in the mat.

The controller must be installed in a control system housing, switch cabinet or the appropriate area of installation.

After the safety mat cables have been laid they are connected to the controller. The cables are number and colour marked.

The wires marked 3/4/5 and 6 must comply with the connection terminals 3/4/5 and 6 of the controller. If this is not the case the unit will not function correctly.

Standard M8 connector for safety mats



For further connections please see the chapter about controllers.

The output contacts, which are switched in sequence, must now be integrated in the emergency stop circle of the machine.

As long as the safety-mat is not activated these relay contacts and also the emergency stop circle is closed.

If the safety mat is activated the controller's relay contacts open and the dangerous movement is stopped.

If more than one safety mat has to be attached to the controller these have to be wired in sequence.

For further information about sequence switching, please see the connection examples in the annex.

After the device has been installed and before starting the machine every time the correct functioning of the safety device must be checked.

Function test

The safety mat can be tested with a multimeter or gauge.

To do a function test the mat has to be disconnected from the controller and further safety components.

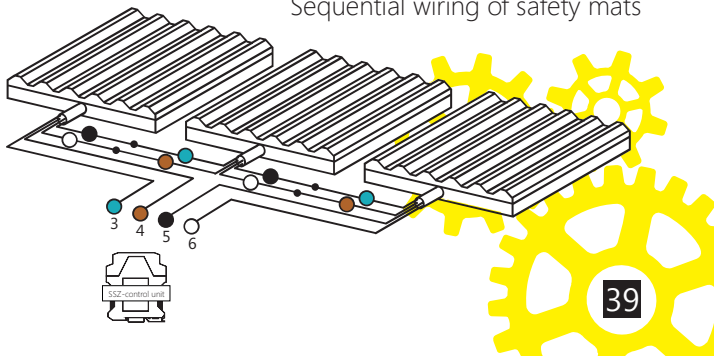
The test areas and results are in the following table.

<i>Test leads to wires</i>	<i>Meter range</i>	<i>Test result</i>
3 and 4 wires 5 and 6 open	20 MOhm	∞
3 and 4 wires 5 and 6 linked	400 KOhm	<280 KOhm
3 and 5	200 KOhm	<140 KOhm
4 and 6	200 KOhm	<140 KOhm

The test results from wire 3/ 5 and wire 4/ 6 are not the same however, the difference may not exceed 20%!

To test the controller, please see the chapter about controllers.

Sequential wiring of safety mats



Safety mat type SSZ-BAT

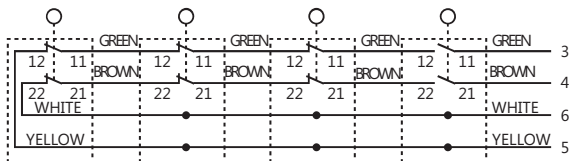
The safety mat type SSZ-BAT has been specially developed for heavy load applications where standard mats cannot be used.

Safetymats type SSZ-BAT cannot be used to safeguard children or people weighing below 40 kg.

The difference to a standard mat is the material used and the way the mat functions.

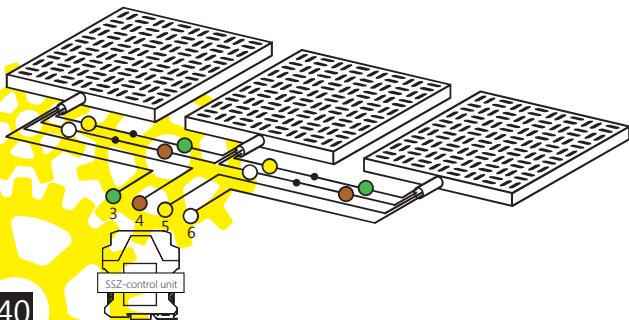
The safetymat type SSZ-BAT consists of two interlocking steel frames with switches as sensor elements.

When the mat is activated the contacts of these switches are opened and the output relay of the connected controller cannot be triggered.

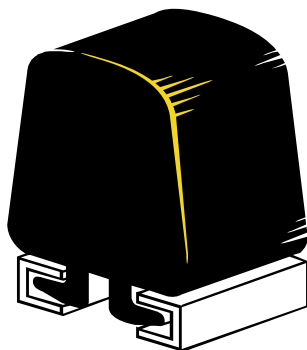


The SSZ-BAT safety mat is installed and connected in the same way as the standard safety mat.

Sequential wiring of safety mats Type SSZ-BAT



Safety rails



Application

SSZ-safety rails safeguard shearing and crushing edges with an integrated sensor element and can only be operated with SSZ-controllers.

Safety rails safeguard dangerous working areas on machines and plants and prevent or at least reduce injuries and damages.

Safety rails are used where small stop distances have to be safeguarded.

The system safety rail/controller complies to requirement classification Plc or Pld acc. to ISO 13849-1 :2006

Areas of application

- for computer controlled devices
- for driverless vehicles
- for dangerous areas on machines and plants
- to safeguard shearing and crushing edges
- to safeguard automatic windows, doors and gates
- and many more

Types

SSZ-safety rails are manufactured in various sizes.

The basic principle is however the same for all safety rails.

The difference in the safety rails is the Quality height, width and shape with therefore also different over-travels.

Up to 50 m of safety rails can be connected to one controller.

EPDM = ozon-resistend for outside application.

NBR = oil-resistend for machine application.

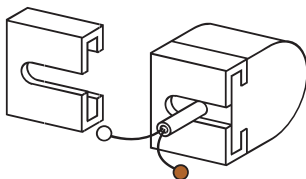
Installation

The SSZ-safety rails are installed to the certain area of the machine with an aluminium-C-profile. The controller must be installed in a control system housing, switch cabinet or the appropriate area of installation.

After the safety rail connections have been made, these have to be connected to the controller. The cables are number and colour marked.

The wires labelled 3/ 4/ 5 and 6 must comply with the connection terminals 3/ 4/ 5 and 6 of the controller.

If this is not the case the unit will not function correctly.



For further connections of the controllers, please see the chapter on controllers.

The output contacts of the controller, which are switched in sequence, now have to be included in the emergency stop circle of the machine.

As long as the safetyrail is not activated these relay contacts and the emergency stop circle are closed.

If the safety rail is activated the relay contacts of the controller open and the dangerous movement is stopped.

If more than one safety rail has to be connected to a controller these have to be wired in sequence.

After the device has been installed and before starting the machine every time the correct functioning of the safety device must be checked.



The SSZ- safety rail has to be fitted into the aluminium - profile by snapping. Not by pulling. As help you are advised to use glycerine or blunt tools. The deformation distance of the safety rail must be longer than the stop distance of the protected device.

Function test

The safety rail can be tested with a multimeter or a gauge. For a function test the safetyrail must be disconnected from the controller and all further safety components.

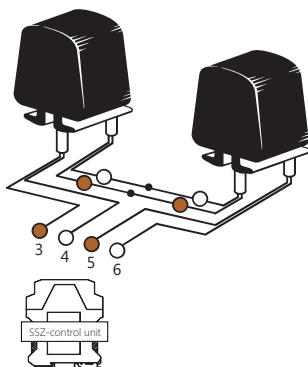
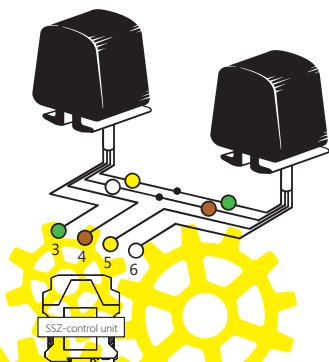
The test areas and results are in the following table.

<i>Testleads to wires</i>	<i>Meter range</i>	<i>Test result</i>
3 and 4 wires 5 and 6 open	20 MOhm	∞
3 and 4 wires 5 and 6 linked	400 KOhm	<280 KOhm
3 and 5	200 KOhm	<140 KOhm
4 and 6	200 KOhm	<140 KOhm

The test results from wire 3/ 5 and wire 4/ 6 are not the same however, the difference may not exceed 20%!

To test the controller, please see the chapter about controllers.

Sequential wiring of safety rails



Safety bumpers



Application

SSZ-safety bumpers are a bounce device with integrated transducer and must only be operated with SSZ-controllers.

Bumpers protect dangerous working areas on machines and plants and prevent or at least reduce injuries and damages.

Bumpers are used to safe guard large over-travels.

The system bumper / controller complies with requirement classification 2 or 3 acc. to EN 954-1 / PLc or PLd according to ISO 13849.

Areas of application

- for computer controlled devices
- for driverless vehicles
- for dangerous areas on machines and plants
- to safe guard shearing and crushing edges
- to safe guard automatic windows, doors and gates
- and many more

Types

SSZ-safety bumpers are manufactured in 4 different types:

- covered in polyurethane
- covered in artificial leather
- with glass fibre cover
- in tear and cut resistant material with polyurethane cover

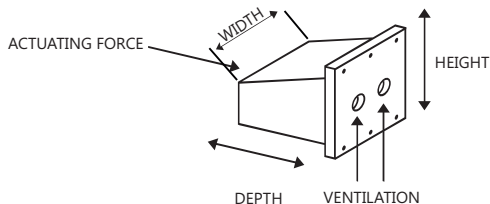
Installation

The SSZ-safety bumper is mounted to the part of the machine by using the customer specified fastening the (studs, threads, holes).

The controller must be installed in a control system housing, switch cabinet or the appropriate area of installation.

After the safety bumper connections have been made, these have to be connected to the controller. The cables are number and colour marked. The wires labelled 3/ 4/ 5 and 6 must comply with the connection clamps 3/ 4/ 5 and 6 of the controller.

If this is not the case the unit will not function correctly.



For further connections of the controllers, please see the chapter on controllers.

The output contacts of the controller, which are switched in sequence, now have to be included in the emergency stop circle of the machine.

As long as the bumper is not activated these relay contacts and the emergency stop circle are closed.

If the bumper is activated the relay contacts of the controller open and the dangerous movement is stopped.

If more than one bumper has to be connected to a controller these have to be wired in sequence.

For more information on sequence wiring, please see the connection examples in the annex.

After the device has been installed and before starting the machine every time the correct functioning of the safety device must be checked.

Function test

The SSZ-safety bumper can be tested with a multimeter or a gauge.

For a function test the bumper must be disconnected from the controller and all further safety components. The test areas and results are in the following table.

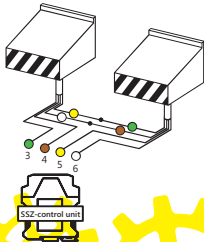
<i>Testleads to wires</i>	<i>Meter range</i>	<i>Test result</i>
3 and 4 wires 5 and 6 open	20 MOhm	∞
3 and 4 wires 5 and 6 linked	400 KOhm	<280 KOhm
3 and 5	200 KOhm	<140 KOhm
4 and 6	200 KOhm	<140 KOhm

The test results from wire 3/ 5 and wire 4/ 6 are not the same however, the difference may not exceed 20% !

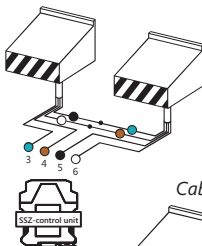
To test the controller, please see the chapter about controllers.

Sequential wiring of safety bumpers

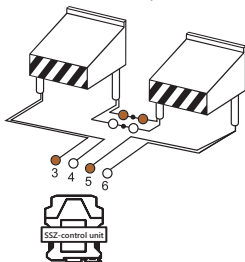
Fixed cable connection



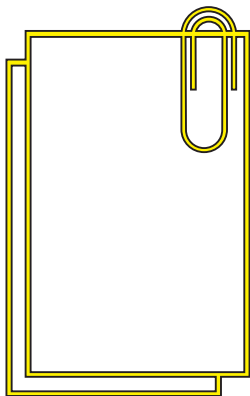
Cable output via connector



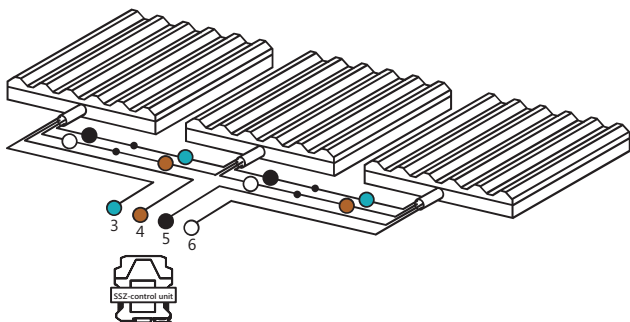
Cable output 2x2 wire



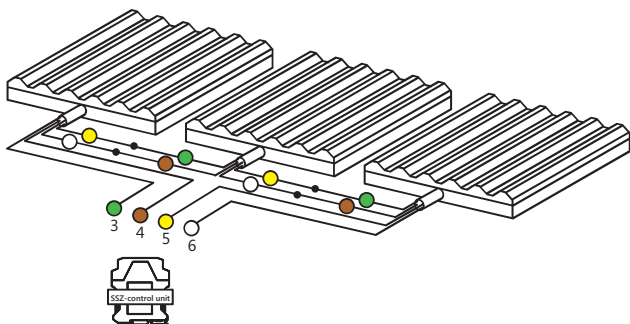
Annex



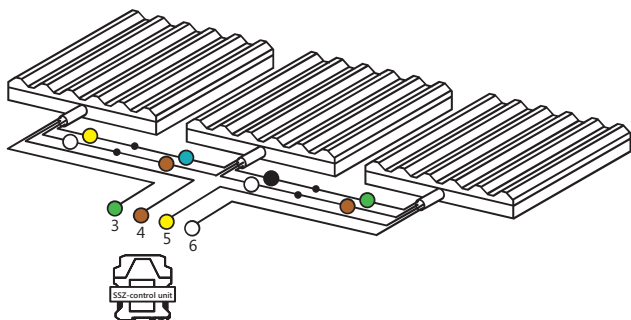
Sequential wiring of safety mats with M8 connector



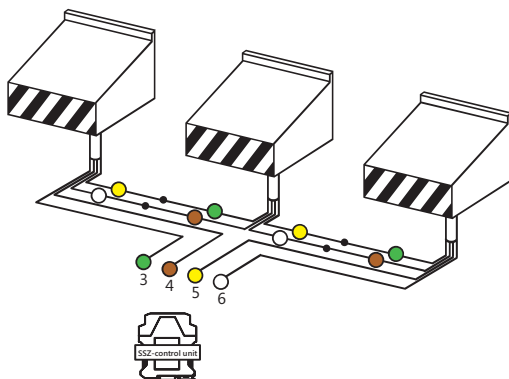
Sequential wiring of safety mats with fixed cable connection



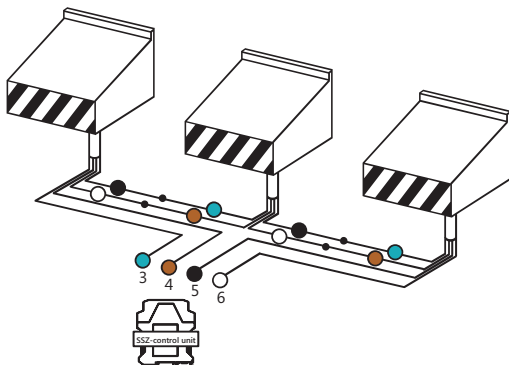
Sequential wiring of safety mats with various cable connection



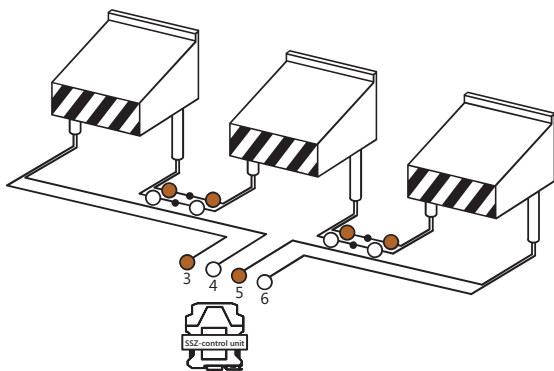
Sequential wiring of safety bumpers with fixed cable connection



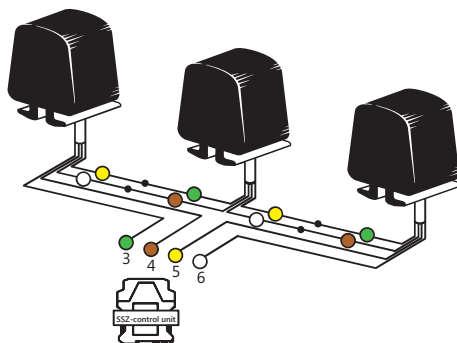
Sequential wiring of safety bumpers with connector



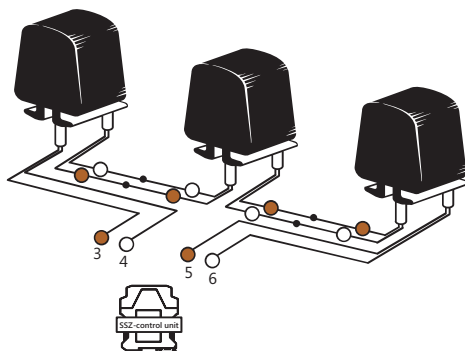
Sequential wiring of safety bumpers with 2 x 2-wire fixed cable connection



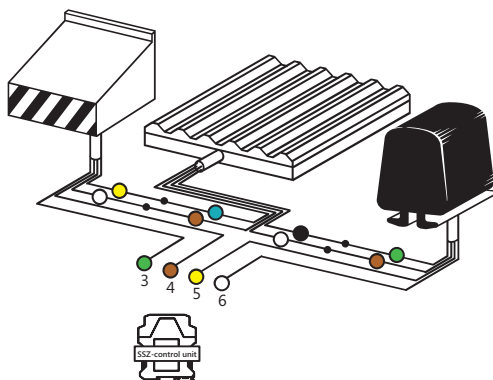
Sequential wiring of safety rails with fixed cable connection



Sequential wiring of safety rails with 2 x 2-wire fixed cable connection



Sequential wiring of various transducers



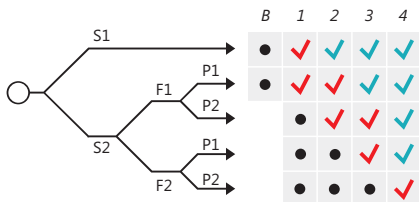


<i>Error</i>	<i>Possible cause</i>	<i>Help</i>
The diodes do not light up	No voltage supply	Check power supply Internal fuse activated (contact SSZ customer service)
One or both of the green LEDs don't light up	Break of the transducer cable	Check that the transducer is correctly connected Disconnect transducer and measure with a multimeter
	Transducer is continually activated	Remove cause of activation
	Wires 3/4 or 5/6 have been changed	Check correct connection of transducer
Transducer only activates in the front or back quarter	short circuit in transducer	Disconnect transducer and measure with a multimeter
	Wires 3/5 or 4/6 have been changed	Check correct connection of transducer

To measure the transducer the following table can be used!

To measure the transducer it must be removed from the controller!

<i>Testleads to wires</i>	<i>Meter range</i>	<i>Test result</i>
3 and 4 wires 5 and 6 open	20 MOhm	∞
3 and 4 wires 5 and 6 linked	400 KOhm	<280 KOhm
3 and 5	200 KOhm	<140 KOhm
4 and 6	200 KOhm	<140 KOhm



✓ Preferred category

● Possible category which requires further measures

✓ Category that can be over dimensional

■ Type of injury

S1 light injury

S2 heavy injury

■ Frequency and/or duration of danger

F1 rarely to often and/or only for a short period

F2 frequently to permanently and/or for a long period

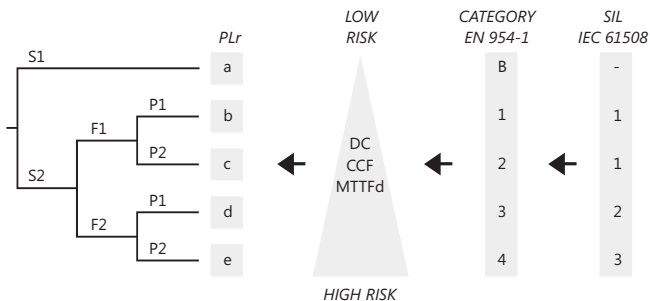
■ Possibility to avoid danger

P1 possible under certain circumstances

P2 virtually not possible

<i>Cat.</i>	<i>Abridged version of the requirement</i>	<i>system reaction</i>
B	The safety related parts of control systems and/or the protection devices and parts there of have to be built, chosen or assembled so that they comply with the appropriate regulations so that they can withstand all expected influences.	An error can lead to the loss of safety function.
1	The requirements of category B must be met. Approved parts and safety principles must be applied.	The occurrence of an error can lead to the loss of the safety function but the probability of the occurrence is less than in category B.
2	The requirements of category B and 1 must be met. The safety function must be tested at suitable time periods.	The occurrence of an error can lead to the loss of the safety function between the test distances. This is recognised by the test.
3	The requirements of category B and 1 must be met. Safety related parts have to be built so that an individual error in one of the parts does not lead to a loss of the safety function. The individual error is whenever recognised in an appropriate way.	If an individual error occurs the safety function always remains. Some but not all errors are recognised. An accrual of unrecognised errors can lead to the loss of the safety function.
4	The requirements of category B and 1 must be met. The safety related parts control system must be designed so that an individual error of any of the parts does not lead to a loss of the safety function and that the individual error is recognised during or before the next requirement to the safety function. If this is not possible, an accrual of errors must not lead to a loss of the safety function.	When errors occur the safety function always remains. The errors are of the recognised in time to prevent a loss of the safety function.

Risk graph, IEC 61508









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