INSTALLATION AND SYSTEM DESCRIPTION

FOR SSZ SAFETY BUMPERS

TYPE: SSZ- SSB/H
TYPE: SSZ-SSB/TH
TYPE: SSZ-SSB/StB

MADE IN GERMANY

BIBUS

BIBUS s.r.o.
+420 547 125 300
www.bibus.cz

Sicherheits-Systeme
Zimmermann GmbH

Thüringerstrasse 17, 46286 Dorsten

Tel: +49 236940 94

Fax: +49 23 69 - 2 15 97

E-mail: info@ssz-gmbh.de

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These operating instructions apply to the following safety bumpers:

- Type: SSZ- SSB/H
- Type: SSZ-SSB/TH
- Type: SSZ-SSB/StB

The safety category depends on the controller used.

- CAT2, Pl c with the controller SSZ-CVS/N/2 24/230, or
- CAT3, Pl d with the controllers SSZ-CVS/N/3 24/230, or SSZ-RZ3

Response time < 20 ms

Reset function - automatic or manual

The safety bumper is a pressure-sensitive safety device use to implement the emergency stop function.

The identification and specifications of the bumper (dimensions, cable outputs, labels on the machine or of the customers) can be obtained from the serial number in the hologram.

This hologram is generally located on the mounting side of the bumper.

To make identification later on easier, please note the serial number separately!

TABLE OF CONTENT

These instructions form an essential part of the product.

These instructions contain basic information that must be noted when installing the system. It is important that the personnel familiarize themselves with these instructions before installation and commissioning. The following documents from the purchaser also apply in addition to these instructions:

- The drawing of the configuration (optional)
- The cable diagrams (optional)

INFORMATION ON THE OPERATING INSTRUCTIONS

These operating instructions form is an essential part of the product. The SSZ GmbH is not liable for damage caused by or resulting from the use of the product when such use deviates from proper use as defined in these instructions. Before starting to use the product, user must be familiar in detail with the operating instructions. The operating instructions must be stored at a location easily accessible to all users for the entire lifetime of the product. The instructions should be provided to the following owners / users of the product.

All updates from the manufacturers must be published. The operating instructions only apply to the product stated. The target group for these operating instructions includes the users of the product as well as correspondingly trained personnel who are authorized to use this product. The bumper + controller must be connected to the machine by correspondingly trained technical personnel.

To ensure the proper function of the pressure-sensitive safety device and its installation according to the requirements in EN ISO 13856-3: 2013, the technical personnel must possess knowledge in the area of installation technology and of the operation of plants and safety systems.

In addition to the operating instructions, the information in the following should also be noted:

- The construction plan of the existing machine or plant of the customer (optional).
- The cable diagram
- The installation plan for the devices contained in the SSZ sensor.

Before installation and commissioning, you must familiarize yourself with the operating instructions as well as with the operating instructions of the individual controllers:

SSZ-CVS/N/2/3 operating instructions

SSZ-RZ3 operating instructions

NOTES

The safety devices may only be connected in series. Connecting the safety devices in parallel is NOT permitted!

The system must be checked for proper operation by the operator once per day.

The operator is required to follow the applicable safety rules of the accident prevention regulations.

The safety device may only be used in circuits that are classified in the same safety integrity level or a higher safety integrity level.

To ensure proper function, the safety device must be kept clean and free of dirt and grime.

IMPORTANT

The SSZ controllers only form one part of the overall safety system of the machine or plant. When designing, planning, and building the safety concept, the user must follow all applicable provisions of the machinery directives and machinery standards

The rated contact loads of the relay outputs must never be exceeded.

All supply cables must be equipped with strain reliefs and be routed so that they are protected against damage.

All electrical connections must be tightened and checked. The electrical connections must be checked regularly.

Opening the controller enclosure can result in a lower level of safety. The enclosure should never be opened. All warranty claims are invalid if the hologram is damaged.

In case of a defect, the unit should be sent back to the SSZ GmbH for repairs or to determine the amount of damage. The machine / system may not be operated (without safeguards) when defective.

Regardless of the circumstances, the occupational safety rules and all regulations must be followed at all times.

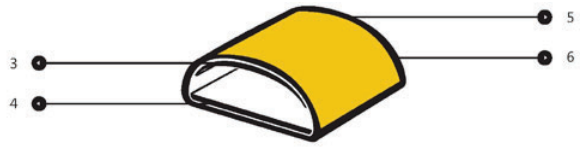
The machine may not be put into operation if there is a risk of denger.

Ignoring this information can result in a risk of injury or death.

The EC Declaration of Conformity becomes invalid immediately if other components, transducers, or controllers (not from SSZ) are connected inside the system.

The sensor used in all pressure-sensitive SSZ safety devices is manufactured from co-extruded, highly elastic plastic. For correct verification of the changes detected by the sensor, the SSZ transducer must be connected to an SSZ controller.

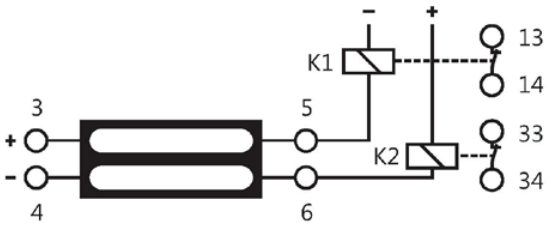
FIGURE 1. SENSOR ELEMENT



The conductive layers inside the sensor element that are separated from each other and kept a distance apart from each other, which are shown using a dark color in Figure 1, can be regarded as non-isolated resistors.

These resistors have connecting wires at the beginning and at the end of the sensor element. The connecting wires are routed to the controller user either 4-wire cables or two 2-wire cables. The "input" of the sensor element is connected to the controller using terminals 3 and 4 as shown in Figure 2.

FIGURE 2. DEACTIVATED SENSOR ELEMENT



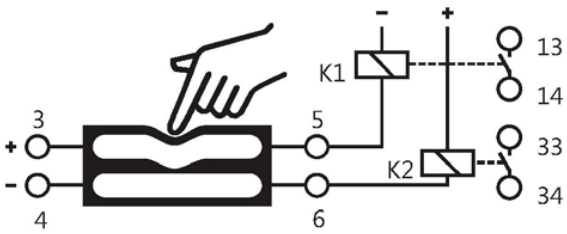
The "output" of the sensor element is connected to the controller using terminals 5 and 6. The user must ensure the cables are connected properly in this case. Wires 3 and 5 as well as 4 and 6 each form one signal path.

If the wires are connected incorrectly or improperly, then the correct function of the system cannot be guaranteed!

If the sensor element is not activated, then current flows from connection 3 to connection 5 and from connection 4 to connection 6, which causes relays K1 and K2 to close their contacts and thus activate the output. To obtain a reliable output signal, the contacts of relays K1 and K2 have to be connected in series.

If the sensor element is activated, then the voltage levels on sensor inputs 5 and 6 of the controller will change.

FIGURE 3. THE ACTIVATED SENSOR ELEMENT



These changes cause the voltage on both output relays to drop, which then causes the output contacts to open.

The same reaction is caused by cross-circuits/short-circuits in the connection wires of the transducer.

If wires or a conducting section of the sensor element is broken, then at least one relays switches off.Die Anschlüsse der SSZ Schaltelemente enthalten Ader-Kennzeichnungen und sind farblich kodiert. Die nachfolgende Tabelle informiert darüber, welche Farben welchen einzelnen Anschlüssen zugeordnet werden.

Since the contacts of relays K1 and K2 are connected in series, the corresponding integrated circuit is switched off.

The connections of the SSZ safety devices contain wire labels and are color-coded. The following table provides you with information on which colors are assigned to which connections.

ONE 4-WIRE CABLE

Label	Safety rails Safety bumpers	Safety mats
3	GREEN	BLUE
4	BROWN	BROWN
5	YELLOW	BLACK
6	WHITE	WHITE

TWO 2-WIRE CABLES

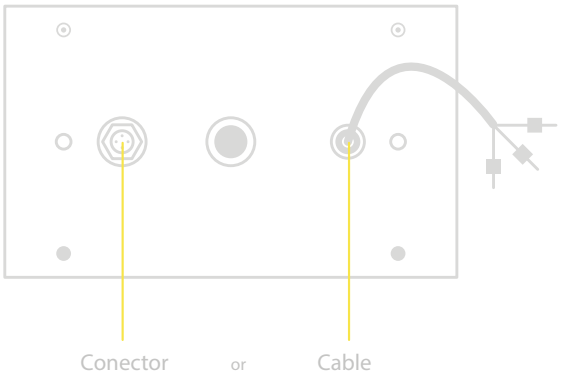
Label	Colors
3	BROWN
4	WHITE
5	BROWN
6	WHITE

SSZ SAFETY BUMPERS

The over-travel distance is the distance that the machine part to be protected will travel after the SSZ controller triggers the stop signal (braking distance). SSZ safety bumpers are used to protect driverless transport systems (DTS), for example.

SSZ safety bumpers can be manufactured in any shape and size according to customer specifications. Any edge radii, cuts, or angles can be manufactured. The surface of the bumper is covered with polyurethane and can be underlaid with a tear-resistant woven fabric to protect it from severe mechanical damage. The standard color is black, but other colors are available, and yellow warning stripes can be applied on request. For special applications, the bumper can also be sewed into a temperature-resistant fiberglass fabric cover. Company logos, pictograms, and text such as "Do not step", for example, are painted on using a template. The bumpers can be mounted using studs, threaded holes, or through holes. We can implement custom mounting methods as well.

The safety device may only be used in circuits that are classified in the same safety integrity level or a higher safety integrity level.



The length of deformation of the safety bumpers must be greater than the stopping distance of the device to be protected.

According to the declaration, the SSZ safety bumper is a pressure-sensitive safety device with a proximity function. The subsequent circuit must have the same safety level at a minimum!

SSZ safety bumpers are not suitable for use to protect fingers! Please use SSZ safety rails for this purpose.

When calculating the size of the bumper, please account for an inactive transition zone (dead zone) of 20 mm per bumper. If several bumpers are arranged next to each other, then the inactive zone between bumpers doubles to 40 mm. The joints between bumpers can be eliminated using longer, one-piece bumpers.

APPLICATION

SSZ safety bumpers protect people from injuries that can be caused by the dangerous movements of machines or (driverless) vehicles.

Typical areas of application of SSZ safety bumpers include:

- Computer-controlled devices
- Driverless vehicles (AGV-DTS)
- Hazardous areas on machines and systems
- To protect against shearing and crushing hazards
- To provide protection on automatic windows, doors and, gates

SELECTION OF AN SSZ SAFETY BUMPER

(TYPE: SSZ-SSB/H, TYPE: SSZ-SSB/TH, TYPE: SSZ-SSB/STB)

The selection of a suitable SSZ safety bumper depends on the application and the parts of the body exposed to the injury hazard. The SSZ safety bumpers are used in particular to protect the upper and lower extremities and the entire body, including the shoulders and the head. They are mounted wherever machine movements could lead to amputation of the limbs and/or serious general injuries.

When selecting an SSZ safety bumper, the inactive area on the edges (dead zones), which is 20 mm on both sides of the bumpers, must be taken into account.

ADDITIONAL CRITERIA ARE:

- Safety category according to the EN ISO 13849-1 standard (PFH value or B10d value).
- Performance level
- Temperature range
- Protection according to IEC 60529 (higher protection levels must be check individually)
- Environmental influences such as: Risk of damage, oil, coolant, atmospheric influences

ENVIRONMENTAL CONDITIONS

When using the SSZ safety bumpers, environmental influences that could impair the function of the system such as the following must be taken into account:

- Damage due to cold, heat, or other radiation
- Risk of heavy or sharp falling objects
- Spillage of hot and/or solidifying media
- Spillage of aggressive chemical compounds
- Constant or repeated contact with water or other liquids

INTEGRATION OF THE SYSTEM INTO THE MACHINE

The machine control system must fulfill the following conditions:

- The hazardous movements of the machine must be controlled electrically.
- The response time/time required to stop the machine must be sufficiently long.
- It must be possible to stop the hazardous movements of the machine at any time.
- The control system must be designed so that it is possible to estimate the risk (see the “Safety assessment” section of these instructions).

RISK ASSESSMENT

The people responsible for the selection of the protective equipment must consider the following:

- The severity of a potential injury.
- The frequency of occurrence of the risk.
- The possibilities for avoiding the risk.

The SSZ safety bumpers are intended for use in areas with a low or average risk where the following conditions are fulfilled:

- The severity of eventual injuries is determined to be low or the potential risk of injury is determined to be serious, but the risk does not occur often and can be further restricted through the use of other appropriate means.
- The dimensions of the bumper are specified after determining the type of aluminum panel. The “Depth” dimension is determined based on the calculation of the over-travel distance (see page 12 of these operating instructions).

CHEMICAL RESISTANCE OF THE SSZ SAFETY BUMPERS

SSZ bumper covered in polyurethane (PUR).

	PUR	Resistance	1h	24h
Water	+	1	1	1
Cleaning agents	+	1	1	1
Soda solution 10%	+	1	1	1
Ammonia	+	1	1	1
Vinegar 10%	+	1	1	1
Sulfuric acid 10%	+	1	1	1
Ethyl alcohol	+	1	1	1
Ethyl acetate	-	4	5	6
Acetone	-	4	5	6
Brake fluid	-	4	5	6
Diesel oil	+	1	1	1
Motor oil	+	1	1	1
Transmission oil	+	1	1	1

Resistance:

+ = resistant
+/- = conditionally resistant
- = not resistant
1= no reaction
2= slight reaction
3= relatively large reaction
4= unequivocal reaction
5= strong reaction
6= very strong reaction

The information specified is based on experience from the past. In case of doubt or depending on the application, we recommend you conduct your own tests.

CALCULATION OF THE BUMPER DEPTH

The depth of the SSZ safety bumper in the direction of actuation is determined by the sum of the stop distance of the machine (braking distance) as well as of the response distance and residual length of deformation of the SSZ safety bumper. The final calculation of the required bumper depth is performed by the SSZ GmbH based on our own experience and to the best of our knowledge. The stop distance of the machine must be determined and specified by the customer. The force FG is used as the basis for the determination of the depth of the SSZ safety bumper.

This force is a limit force that triggers the signal and causes the SSZ safety bumper to deform further. It is a standard value that protects against injuries, and FG = 250 N.

Calculation of the stop distance SV:

SV = 1 x v x t

v = velocity, t = time

Calculation of the length of deformation SG:

SG = SB+SV

SB = Response distance

Example:

A driverless vehicle with a width of 1.5 m that is moving forward at a speed of 0.3 m/s is to be protected. The time from the triggering of the signal to the complete stop of the vehicle is 2 seconds.

It is now possible to calculate the total stop distance of the vehicle:
Sv = 1 × v × t = 1 × 0,3 m / s × 2 s = 0,3 m = 300 mm

The response distance of the SSZ safety bumper is 25 mm.
SB = 25 mm.

The total length of deformation is calculated as follows.
SG = SB + SV = 300 mm + 25 mm = 325 mm

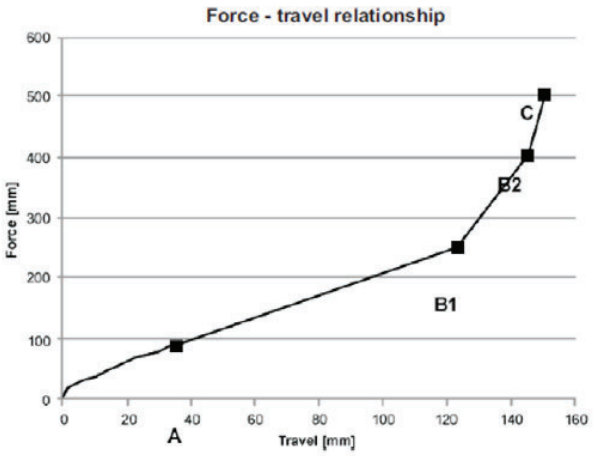
Taking the impact hardness and the weight per unit volume of the foam used into account and after calculation of the residual length of deformation, we can calculate the required depth of the SSZ safety bumper and obtain: 460 mm. This means that the force FG acting on a person or an object is a maximum of 250 N after an actuation distance of 325 mm.

The depth of the SSZ safety bumper X = 460 mm requires a corresponding height to guarantee geometrically stable form. In this case we calculate a value for Y = 200 mm.

The final dimensions of the SSZ safety bumper are then:

Width : 1500 mm
Height : 200 mm
Depth in the direction of actuation : 460 mm

KRAFT- WEG DIAGRAMM VERFORMUNGSTABELLE

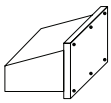
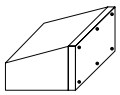
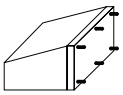


The diagram shows the dependency of the force on the travel. Point A: The smallest triggering force; point B1: length of deformation at 250 N; point B2: length of deformation at 400 N; point C: length of deformation at 500 N – at this point, no further deformation is possible.

INSTALLATION

The installation, wiring, and commissioning of the SSZ safety bumper and of the SSZ safety controller may only be performed by correspondingly trained technical personnel.

The SSZ safety bumper is mounted on the appropriate location on the machine using an aluminum panel. The controller must be installed in a control system housing, control cabinet, or an appropriate installation location. The following types are available depending on the mounting method:

TYPE SSB/H		The oversize panel with mounting holes
TYPE SSB/TH		Panel with threaded holes
TYPE SSB/StB		Panel with stud bolts

The following types of mounts are available depending on the mounting method:

- Mounted with screws
- Mounted with threaded sleeves, standard diameter M8
- Mounted with stud bolts, diameter M8

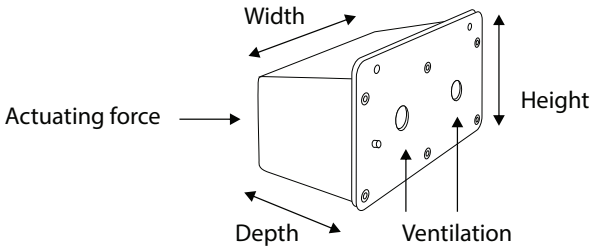
The thickness of the aluminum mounting plate of the bumper is 4 mm. Screws or threaded bolts may not be screwed into the bumper to a depth greater than a max. of 6 mm! Risk of damage!

The following tools are needed to mount the bumper: Drill, screwdriver / socket wrench (depending on the type of bumper) to screw in the screws, adjustable wrench, ratchet wrench to mount the bumper, level, tape measure, pencil to outline the correct mounting position. The bumpers are ready for immediate installation. Drilling of the mounting holds in the mounting surface ad attaching the bumper with the help of the screws or bolts mentioned above is needed only.

The user must make sure that the mounting surface is large enough for mounting the bumper with the specified dimensions. The surface must be stable. A steel construction is recommended.

The bumper can be mounted in a vertical or horizontal position depending on the requirements as well as the application. The bumpers are mounted in the same manner for every position.

During installation: Follow the occupational safety and ergonomics regulations.



The openings on the back for ventilation of the bumper may not be covered. After completing installation, the function of the bumper must be tested according to the description in the “Function test” section of these operating instructions.

The installer must document the mounting, installation, and commissioning procedures for the bumper. It is absolutely necessary to document the serial numbers of the bumper and of the controller, which can be found on the holograms.

After laying the connection cables of the SSZ safety bumper, the bumper is connected to the SSZ controller. The connection cables are color-coded, and the wires in the cables are labeled. The wires are labeled 3/4/5 and 6 and must match connection terminals 3/4/5 and 6 of the controller. If the system is not wired correctly, then it will not function properly.

SYSTEM CHECK AND APPROVAL

- Check the safety functions of the entire safety system including the SSZ safety bumpers and the SSZ controller based on the documentation.
- Ensure the bumper is mounted properly and in the right position
- Check the ohmic resistance of the bumper according to the “Function test” section of these instructions.
- Check the correct wiring of the bumper to the controller according to the “Connection of the controller” section.

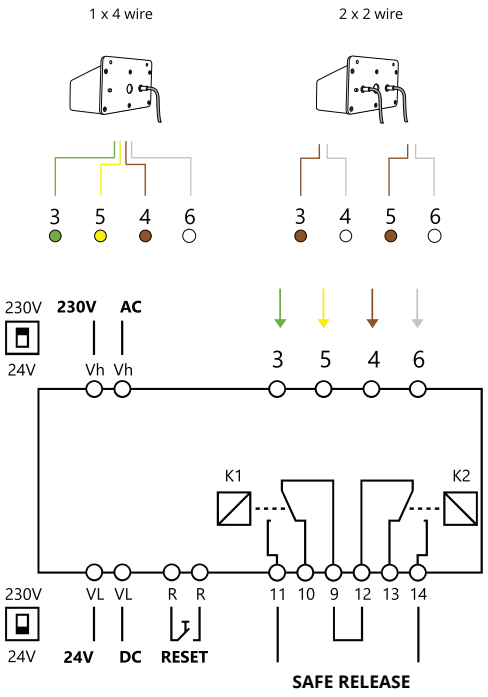
The user familiarize himself with the operating instructions of the corresponding SSZ controller.

- Check the safety bumper to ensure it is mounted properly according to the rules contained in the “Installation” section of these instructions.
- Execution and documentation according to these operating instructions and the required safety categories of: measurement of the response time of the overall system and the paths for the complete, automatic stopping caused by the actuation of the safety bumper, and comparison of the results obtained to the required values.

The same procedure applies when replacing individual components. The following also applies here: The installer must document the mounting, installation, and commissioning of the bumper. Document the serial numbers of the bumper and of the controller, which can be found on the holograms

CONNECTION TO THE CONTROLLER

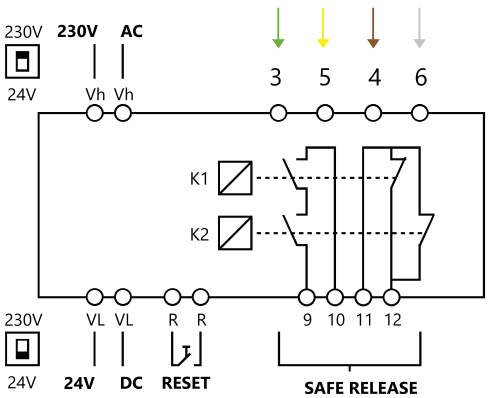
CONNECTION TO THE SSZ-CVS/N/2 24/230 CONTROLLER



To supply power at 24 V, set the voltage selector to 24V, and connect to VL (low voltage).

To supply power with 230 V, set the voltage selector to 230V, and connect to VH (high voltage).

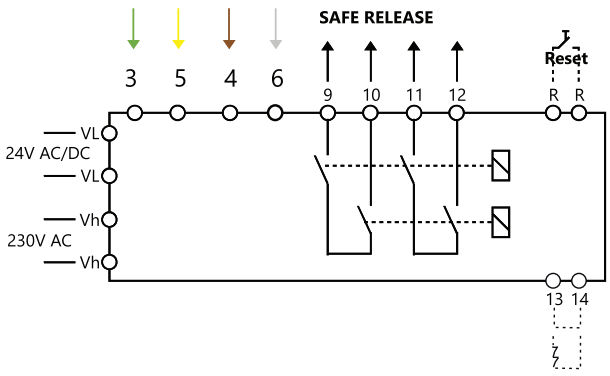
CONNECTION TO THE SSZ-CVS/N/2 24/230 CONTROLLER



To supply power at 24 V, set the voltage selector to 24V, and connect to VL (low voltage).

To supply power with 230 V, set the voltage selector to 230V, and connect to VH (high voltage).

CONNECTION TO THE SSZ-RZ3 24/230 CONTROLLER



To supply power at 24 V, set the voltage selector to 24V, and connect to VL (low voltage).

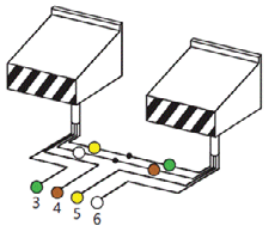
To supply power with 230 V, set the voltage selector to 230V, and connect to VH (high voltage).

The terminals are not in chronological order! (3-5; 3-6) NOT 3-4, 5-6 If the system is functioning properly, the following switsch on after connecting the SSZ transducer

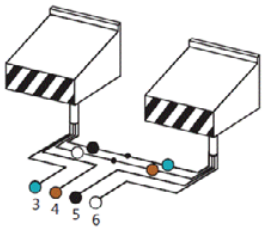
The 24V versions of the SSZ-CVS/N/2, SSZ-CVS/N/3, and SSZ-RZ3 controllers do not have a voltage selector!

CONNECTING MULTIPLE SSZ SAFETY BUMPERS

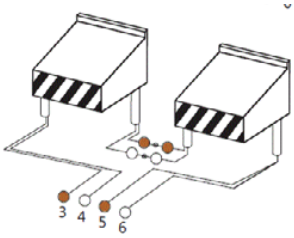
1 x 4.wire cable



Cable with connector



2 x 2-wire cable



After mounting, after installation, and before operating, you must check if the safety system is operating properly.

If the SSZ safety bumper has been removed and then remounted, then the installer must ensure that all parts (e.g. snap locks, clamps, housing, screws and bolts, cables) are in the same positions as before removal. If the instructions listed above are not followed, then the system will not work properly.

The installer should fill out a form identifying the device installed. To ensure proper identification, the serial number stated on the hologram should be noted accordingly.

The terminals are not in chronological order! (3-5; 3-6) NOT 3-4, 5-6

LED

POWER
OK 3/5
OK 4/6

INTEGRATION OF THE SSZ SYSTEM IN THE MACHINE/DEVICE CONTROLLER

The emergency stop circuit is connected in series by the two output contacts of the SSZ controller. As long as the SSZ safety bumper is not activated, the relay contacts, and therefore the emergency stop circuit, are closed. If someone activates the SSZ safety bumper now, the relay contacts of the SSZ controller open and the hazardous movement is stopped. The same occurs in the event of a fault, i.e. when a cable breaks, there is a cross-circuit, or the SSZ safety bumper is defective.

The SSZ safety system can be reset automatically or manually in this case. The reset mode is selected using a selector switch in the SSZ controller.

The controller is configured to reset automatically by default.

In some applications, it may be required to use the manual reset, which is why the reset button is located outside of the entire hazardous area. The fault can only be acknowledged, i.e. reset, after the operator has ensured that there are no people in the hazardous area any more. The operator of the machine is responsible for deciding when the machine should be restarted/reset.

Information on the scope, characteristics, and layout of all input/output contacts as well as on the automatic and manual reset procedures can be found in the operating instructions of the corresponding controllers:

- SSZ-CVS/N/2/3 operating instructions
- SSZ-RZ3 operating instructions

THE FUNCTION TEST

The SSZ safety bumpers can be checked to ensure they are functioning properly using a multimeter or an ohmmeter. To check the function, you must disconnect the SSZ safety bumper from the controller and the other safety components connected to it.

MESSPUNKTE UND DIE MESSERBEREICH:

3 and 4 wires 5 and 6 open	20 Megaohm	∞
3 and 4 wires 5 and 6 connected	400 Kilohm	<280 Kilohm
3 and 5	200 Kilohm	<140 Kilohm
4 and 6	200 Kilohm	<140 Kilohm

The results of the measurements on wires 3/ 5 and wires 4/ 6 are not the same, but the difference between the values measured may not exceed 20%!

To properly verify the function of the controller, the installer must be familiar with the operating instructions of the corresponding controller.

Description of the signal elements:

- If the system is functioning properly, the following switch on after connecting the SSZ transducer (using terminals 3,4,5,6):

  - rote Diode POWER
  - grüne Diode OK 3/5
  - grüne Diode OK 4/6

- After activating the SSZ transducer, the diodes will be in the following states:

  -red POWER diode - on
  -green OK 3/5 diode - off
  -green OK 4/6 diode - off

- This state indicates that the SSZ transducer is working properly in connection with the SSZ controller. If the states of the diodes do not change after the pressure on the transducer is released, then a manual reset is necessary. You must press the reset key in this case.
- If the device does not reset even though the pressure has been released and the reset button was pressed (or only one of the green diodes is lit), then the cable connections on terminals 3,4,5,6 should be checked, followed by the wiring between the SSZ transducer and the SSZ controller.
- If none of the diodes are lit, then the power supply of the SSZ controller should be checked. If the device still does not work properly even though the wiring is correct and the power supply is working properly, then please contact us.
- The system is not equipped with an automatic test function. In accordance with safety integrity level PL d, the system is permanently controlled by the control unit using the closed-circuit principle.

TECHNICAL DATA

SSZ SAFETY BUMPERS
TYPE: SSZ-SSB/H, TYPE: SSZ-SSB/TH, TYPE: SSZ-SSB/STB

Height	1500 mm max.
Width	3000 mm max.
Depth	750 mm max. depending on the height
Form	Any
Material	Polyethylene foam
Surface	Polyurethane cover, black, other colors available on request, yellow warning stripes, logos, and pictograms can be applied. An additional cover for the bumper is not necessary, but can be delivered upon request.
Number of activations	10^5
Length of deformation	Depending on the depth (about 2/3 of the depth)
Protection category	
IEC PN EN 60529:2003	IP:54
Operating temperature	+5 - +50°C
Max. Actuating force	500 N in the direction of actuation
Min. response rate	10 mm/s
Actuation angle	+- 45°
Mounting	Aluminum panel, 2 to 5 mm thick, with stud bolts, threaded holes, or through holes depending on the customer's requirements.
Mounting position	Any
Electrical connections	Standard: Cable length 2 meters, optional PVC cable 2 x 2-wire 0.38 mm2 or 1 x 4-wire, or M12 screw connector
Max. cable length from bumper to controller	100 m
Max. cable length between multiple bumpers (connected in series)	5 m
Weight	0.01 m3 (100 x 100 x 1000 mm) = 3.2 kg depending on the size of the bumper
Weight of the controller	180 g
Max. number of bumpers that can be connected to a controller (connected in series)	Max. 25 bumpers, each 100 x 100 x 1000 mm in size
Special applications	Special applications according to customer requirements are possible upon request.
Usage restrictions	The standard version may only be used in closed rooms. Only intended for industrial use. Not designed to protect children. Only series connections are permitted. Permanent deformations after long-term use were not detected.

SSZ SAFETY BUMPERS IN CONNECTION WITH THE SSZ CONTROLLER TYPE: SSZ-RZ3

Power supply	24V AC/DC or 230V AC
The test basis	EN ISO 13856-3, EN ISO 13849-1
Characteristics of switchover at V=100 mm/s	
Switching cycles	$>10^5$
Reset	manual/automatic
Effective actuation angle	+/- 45°
B10d	2×10^6
Load capacity of the output contacts	2A
Installation of the unit in the control cabinet	YES
Max. resistance of the 1 and 2 channels of the Bumpers	250kΩ
Max. difference in resistance between the channels	20%
Max. response time of the unit / system	<15 ms/<20ms
Mechanical conditions	
Static load	600 N
Minimum actuating force	<150 N
Safety category	Pld
Operating life	20 years
MTTFd	100 (and more)
DC (Diagnostic Coverage)	90%
CCF (Common Cause of Failure)	75
PFHd (acc. to IEC/EN 62061)	4.33 E-8
Nop	95040
Category acc. to IEC/EN 62061	SIL2
Category acc. to EN-ISO 13849-1	3
Performance level acc. to EN-ISO 13849-1	Pld
Protection class of the controller/bumper	IP30/IP54

SSZ SAFETY BUMPERS IN CONNECTION WITH THE SSZ CONTROLLER TYPE: SSZ-CVS/N2

Power supply	24V AC/DC or 230V AC
The test basis	EN ISO 13856-3, EN ISO 13849-1
Characteristics of switchover at V=100 mm/s	
Switching cycles	$>10^5$
Effective actuation angle	+/- 45°
B10d	2×10^6
Load capacity of the output contacts	2A
Installation of the unit in the control cabinet	YES
Max. resistance of the 1 and 2 channels of the bumpers	250kΩ
Max. difference in resistance between the channels	20%
Max. response time of the unit / system	<15 ms/<20ms
Mechanical conditions	
Static load	600 N
Minimum actuating force	<150 N
Operating life	20 years
MTTFd	high
DC (Diagnostic Coverage)	90%
CCF (Common Cause of Failure)	75
PFHd (acc. to IEC/EN 62061)	$2{,}29^{E-7}$
Category acc. to EN-ISO 13849-1	2
Performance level acc. to EN-ISO 13849-1	Plc
SIL acc. to IEC/EN 62061	1
Protection class of the controller/bumper	IP30/IP54

SSZ SAFETY BUMPERS IN CONNECTION WITH THE SSZ CONTROLLER TYPE: SSZ-CVS/N3

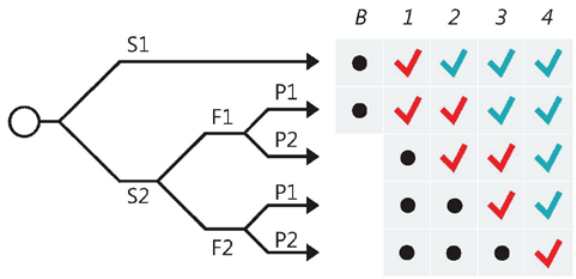
Power supply	Power supply 24V AC/DC or 230V AC
The test basis	The test basis EN ISO 13856-3, EN ISO 13849-1
Characteristics of switchover at V=100 mm/s Switching	
cycles	$>10^5$
Effective actuation angle	+/- 45°
B10d	2×10^6
Load capacity of the output contacts	2A
Installation of the unit in the control cabinet	YES
Max. resistance of the 1 and 2 channels of the bumper	250kΩ
Max. difference in resistance between the channels	20%
Max. response time of the unit / system	<15 ms/<20ms
Mechanical conditions	
Static load	600 N
Minimum actuating force	<150N
Operating life	20 years
MTTFd	high
Nop	60.000
DC (Diagnostic Coverage)	90%
CCF (Common Cause Failure)	80
PFHd (grm. IEC/EN 62061)	$4{,}29^{E-8}$
Category acc. to EN-ISO 13849-1	3
Performance Level gem. EN ISO 13849-1	Pld
SIL acc. to IEC/EN 62061	2
Protection class of the controller/bumper	IP30/IP54

SAFETY ASSESSMENT

The safety assessment was performed according to the EN ISO 13849-1 standard. In light of the fact that none of the elements of the system can function independently or in conjunction with elements currently available on the market (e.g. the SSZ safety bumpers with a controller from a different manufacturer), the overall system (bumper supply cable plus controller) were taken into account in the safety assessment.

Users must specify the safety integrity levels of their applications themselves.

The safety category and safety integrity level must be at least as high as the safety category and safety integrity level determined in the risk assessment.



✓ Preferred category

● Possible category requiring additional measures

✓ Category that can be implemented at a higher level

Severity of injury

- S1 Light injuries
- S2 Serious injuries

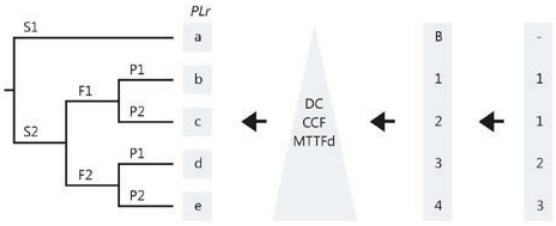
Frequency and/or duration of dangerous event

- F1 Rarely to more often and/or only for a short period
- F2 Frequently to permanently and/or for long periods

Possibility to avoid the danger

- P1 Possible under certain circumstances
- P2 Virtually impossible

THE RISK GRAPH, IEC 61508



Cat.	Requirement	Consequences for the system
B	The safety related parts of control systems and/or the protection devices and parts thereof must be designed, built, and selected so that they comply with the applicable standards and must be combined so that they can withstand all influences expected to be encountered.	An error can lead to the loss of the safety function.
1	The requirements of category B must be met. Proven components and safety principles must be used and applied, respectively.	The occurrence of an error can lead to the loss of the safety function, but the probability of occurrence of the error is lower than in category B.
2	The requirements of category B and 1 must be met. – The safety function must be tested at suitable intervals.	The occurrence of an error can lead to the loss of the safety function between the test intervals, but the error is detected by the test.
3	The requirements of category B and 1 must be met. Safety-related parts must be designed so that a single error in one of these parts does not lead to the loss of the safety function. The individual error, whenever it occurs, shall be detected using appropriate means.	When the single error occurs, the safety function remains intact. Some, but not all errors are detected. A series of undetected errors can lead to the loss of the safety function.
4	The requirements of category B and 1 must be met. Safety-related parts must be designed so that a single error in each of these parts does not lead to the loss of the safety function and the individual error is detected before or upon receiving the next request sent to the safety function. If this is not possible, then a series of errors may not lead to the loss of the safety function.	When errors occur, the safety function remains intact. The errors are detected promptly to prevent the loss of the safety function.

STORAGE AND TRANSPORT

The SSZ safety bumpers are packed in cardboard boxes. To prevent damage to the bumper, the product should only be transported and stored in its original packaging.

The packaging may not be opened using sharp tools! Risk of damage!

Store in dry, closed rooms with a maximum humidity of 80%. The maximum storage temperature is: -10°C to +60°C. Protect against moisture. Avoid direct sunlight. SSZ controllers have protection category: IP 30.

MAINTENANCE AND INSPECTION

The maintenance and function test guide must be read before beginning any maintenance tasks!

The bumper is maintenance-free. Monitoring is performed by the control unit using the closed-circuit principle. The function test must be executed manually and documented at least once per day. A visual inspection must be performed to detect any damage. Damage to the foam core can result in functional limitations. Please use damp cloths only when cleaning. The use of chemicals can impair functionality. The bumper does not need to be set up or adjusted any further.

The bumper must be tested for proper function at regular intervals at any location on the bumper with the help of a test specimen having a diameter of 80 mm. The interval between tests depends on the operating conditions in which the bumper is used. This interval must be specified by the owner according to the laws and safety regulations or requirements of the country in which it is used. We recommend performing a test at least every 3 months.

The regular tests must include the following at a minimum:

BUMPER

- Is the surface of the bumper damaged? (was the damage caused by mechanical, environmental, or chemical influences?)
- Is the bumper mounted correctly (are the mounting elements “loose”)?
- Has the foam core detached itself from the aluminum panel?
- Does the bumper function properly? (A function test according to the “Function test” section on page 20 of these operating instructions must be performed).

CONNECTIONS

- Is the connecting cable between the bumper and control unit damaged? (Are there cracks in the insulation, is the cable bent too far)?
- Is the cable output on the bumper still undamaged?

CONTROLLER

- Is the housing damaged?
- Has the control unit been manipulated? (The SSZ hologram should be checked to ensure it is intact).
- Does the control unit function properly? (A function test according to the “Function test” section of these operating instructions should be performed).
- Was the control unit mounted properly on the mounting rail in the control cabinet?
- Was the system connected correctly and according to the regulations to the machine or system?

After determining that the system functions properly without error and has been properly and correctly installed, the system: bumper + control unit can be approved for use (according to the applicable standards and regulations of the country of use).

There are no replacement parts for the system stated above. In the event of damage, the “solid parts”, meaning the control unit or the bumper, must be replaced.

The machine or system may not be operated without the safety device!

In case of a defect in the safety device or parts thereof, the MACHINE MUST BE SHUT DOWN!

Only parts approved by the manufacturer can be replaced by the user! Modification, i.e. the installation of other components in the system, is prohibited. Only SSZ controllers may be used to monitor the SSZ bumper. The use of components, bumpers, and/or controllers from other manufacturers will lead to technical safety hazards and personal injuries. Furthermore, the Declaration of Conformity becomes invalid immediately. The SSZ GmbH is not liable for any damage when components not approved by SSZ are used.

Modules can be replaced by the user. The modules should be replaced by correspondingly trained technical personnel who also have knowledge of technical safety issues relating to the installation and function of the corresponding machine or system.

All parts (e.g. the housing, snap locks, terminals, or fasteners) that were removed for maintenance purposes must be installed again after completing maintenance If the elements are not reinstalled or are installed improperly, then the system may operate unsafely or malfunction.

TROUBLESHOOTING

Error.	Possible cause	Solution
No LEDs light up	No power being supplied.	Check the power supply
The red diode and one green diode are lit	Broken cable connection	Check if the sensor is connected correctly. Disconnect the sensor and measure it with the aid of a multimeter.
	Wires 3/4 or 5/6 swapped	Check if the sensor is connected correctly.
	Short circuit in the sensor. caused by moisture penetration, for example.	Disconnect the sensor and measure it with the aid of a multimeter.
The red diode is lit. The two green diodes are off.	The sensor is permanently active or there is a broken wire in the supply cable.	Eliminate the permanent signal from the sensor. Fix the broken cable.
The sensor only switches partially.	Wires 3/5 or 4/6 are swapped	Check if the sensor is connected correctly

The table below can be used for the electrical measurement of the transducer! The transducer must be disconnected from the controller before taking measurements.

The meter on wires	Meter range	Result of the measurement
3 and 4 wires 5 and 6 open	20 Megaohm	∞
3 and 4 wires 5 and 6 connected	400 Kilohm	<280 Kilohm
3 and 5	200 Kilohm	<140 Kilohm
4 and 6	200 Kilohm	<140 Kilohm

Sicherheits-Systeme
Zimmermann GmbH

A: Thüringerstrasse 17, 46286 Dorsten-Wulfen

T: + 49 2369/4094

F: + 49 2369/21597

E: info@ssz-gmbh.de

W: ssz-gmbh.de

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