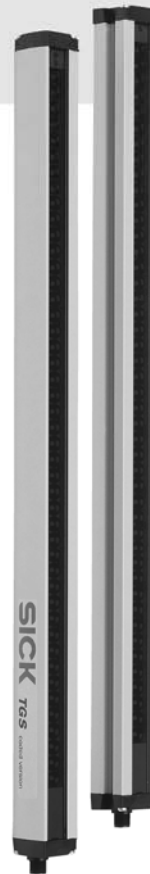


TGS



Testable Safety Light Curtain



GB

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Contents

1	About this document.....	4
1.1	Function of this document.....	4
1.2	Target group	4
1.3	Scope	4
1.4	Information depth	4
1.5	Abbreviations.....	5
1.6	Symbols used	5
2	On safety.....	6
2.1	Qualified safety personnel.....	6
2.2	Applications of the device.....	6
2.3	Correct use	7
2.4	General safety notes and protective measures	8
2.5	Test instructions.....	9
2.5.1	Pre-commissioning tests.....	9
2.5.2	Regular testing of the safety device by experts.....	9
2.5.3	Daily testing of the safety device by authorised personnel	9
2.6	Environmental protection	10
3	Product Description	11
3.1	Features.....	11
3.2	Mode of operation.....	11
3.3	Displays	12
3.4	Fault indication.....	13
3.5	Examples: Application area	14
3.6	Multiple safeguarding.....	14
4	Mounting	15
4.1	Mounting the sensors	15
4.2	Calculating the safety distance	15
4.3	Minimum distance to reflective surfaces	17
4.4	Steps for mounting the device	18
4.4.1	Mounting with sliding nuts.....	19
5	Electrical installation.....	20
5.1	Internal testing.....	21
5.2	External testing	22
5.3	Setting the beam coding.....	24
6	Maintenance	25
7	Technical Data	26
7.1	Overview of technical specifications.....	26
7.2	Dimensional Drawings	29
8	Ordering information	30
8.1	TGS selection table	30
8.2	Ordering information, accessories	31
9	Appendix.....	32
9.1	EC declaration of conformity	32
9.2	Checklist for the manufacturer	34
9.3	List of tables	35
9.4	List of illustrations.....	35

1 About this document

Please read this chapter carefully before working with the documentation and the TGS safety light curtain, also referred to in the following as TGS for short.

1.1 Function of this document

These operating instructions guide the technical personnel of the machine manufacturer or machine operator in the safe assembly, configuration, electrical installation, commissioning as well as operation and maintenance of the TGS testable safety light curtain.

These operating instructions do not assist in the operation of the machine into which the TGS testable safety light curtain is or will be integrated. The operating instructions for the machine will contain information on this.

1.2 Target group

These operating instructions are for use by designers, developers and operators of systems to be safeguarded by one or more TGS testable safety light curtain(s). They are also meant for persons integrating the TGS into a machine, performing its first commissioning or maintenance.

1.3 Scope

Note These operating instructions apply to the TGS testable safety light curtain with the following entry on the type label in the field *Operating Instructions*:

- 8010472
- 8010472/TA96

This document is part of SICK part number 8010472 (operating instructions “TGS Testable Safety Light Curtain” in all available languages).

This document is an original document.

1.4 Information depth

These operating instructions contain the following information on the TGS testable safety light curtain:

- mounting
- electrical installation
- commissioning and configuration
- care and maintenance
- fault diagnosis and troubleshooting
- part numbers
- conformity and approval

In addition, the planning and use of safety devices such as the TGS requires specialist technical knowledge not provided in this document.

The operation of the TGS must meet official and legal requirements.

General information on accident protection by means of optoelectronic safety devices is contained in the brochure entitled “Safe Machines with Optoelectronic Safety Devices”.

1.5 Abbreviations

Some information in these operating instructions is specially marked to ease rapid access to this information:

ESPE Electro-Sensitive Protectice Equipment

TGSE TGS receiver unit

TGSS TGS sender unit

OSSD (Output Signal Switching Device) Signal output selecting the safety circuit

Note A note provides information on special features of the device.

Explanation An explanation communicates basic knowledge.

Recommendation A recommendation assists in taking the best action.

1.6 Symbols used





Warning!

Always read warning notices carefully and follow them closely.

WARNING



This icon  identifies the sender, and the  icon identifies the receiver, in illustrations and connection diagrams.

2 On safety

This chapter deals with your own safety and the safety of the equipment operators.

- Please read this chapter carefully before working with the TGS or with the machine protected by the TGS.

2.1 Qualified safety personnel

The TGS testable safety light curtain must be installed, connected, commissioned and serviced only by qualified safety personnel. Qualified safety personnel are defined as persons who ...

- due to their specialist training and experience have adequate knowledge of the power-driven equipment to be checked

and

- have been instructed by the responsible machine owner in the operation of the machine and the current valid safety guidelines

and

- are sufficiently familiar with the applicable official health and safety regulations, directives and generally recognized engineering practice (e.g. DIN standards, VDE stipulations, engineering regulations from other EC member states) that they can assess the work safety aspects of the power-driven equipment

and

- have access to these operating instructions and who have read them.

As a rule these are qualified safety personnel from the ESPE manufacturer or also those persons who have been appropriately trained at the ESPE manufacturer, are primarily involved in checking ESPE and are allocated the task by the organisation operating the ESPE.

2.2 Applications of the device

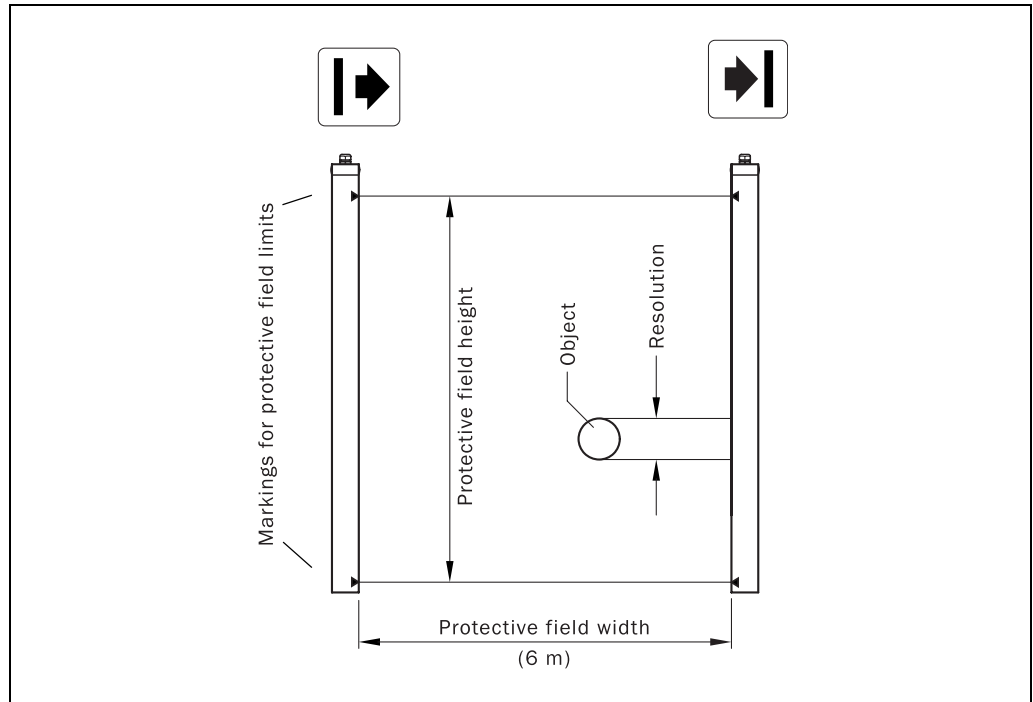
The TGS safety light curtain is a non-contact safety device with a resolution of 20, 30 or 40 mm. It is designed for hand protection on machines and systems and optimised for weaving machines. There are different safety distances, depending on the resolution.

The following criteria apply to its practical use (Fig. 1):

TGS

The following criteria apply to its practical use (Fig. 1):

Fig. 1: The criteria for a TGS Safety Light Curtain



Depending on where it is installed, the TGS safety light curtain alone may not offer sufficient protection. In this case it will be necessary to employ additional mechanical safety devices.

Hazardous points must only be reached through the protection field. The system must not start as long as there are persons within the danger area (Fig. 2).

Fig. 2: The mounting position must prevent the following: reaching over, under, around and stepping behind



2.3 Correct use

The TGS safety light curtain must be used only as defined in section 2.2 “Applications of the device”. It must be used only by qualified personnel and only on the machine where it has been installed and initialised by qualified safety personnel in accordance with these operating instructions.

If the device is used for any other purposes or modified in any way – also during mounting and installation – any warranty claim against SICK AG shall become void.

2.4 General safety notes and protective measures



WARNING

Safety notes

Please observe the following procedures in order to ensure the correct and safe use of the TGS safety light curtain.

- The usage of the safety light curtain requires a risk analysis. Check whether the safety light curtain can be used as the protective device or whether additional protective measures are necessary.
- The national/international rules and regulations apply to the installation, use and periodic technical inspections of the safety light curtain, in particular:
 - Machinery Directive 2006/42/EC (until 28.12.09 the Machinery Directive 98/37/EC)
 - Work Equipment Directive 89/655/EEC
 - the work safety regulations/safety rules
 - other relevant safety regulations

Manufacturers and operators of the machine on which the safety light curtain is used are responsible for obtaining and observing all applicable safety regulations and rules.

- The notices, in particular the test regulations (see chapter “Test instructions”) of these operating instructions (e.g. on use, mounting, installation or integration into the existing machine controller) must be observed.
- The organisation operating the machine on which the safety light curtain is used must prevent bypassing of the protective field using suitable additional measures
- Changing the configuration requires a separate risk analysis. Check in detail whether and where a configuration change is actually required.

Changes to the configuration of the devices can degrade the protective function. After every change to the configuration you must therefore check the effectiveness of the protective device.

The person who makes the change is also responsible for the correct protective function of the device. When making configuration changes, please always use the password hierarchy provided by SICK to ensure that only authorised persons make changes to the configuration. The SICK service team is available to provide assistance if required.

- The tests must be carried out by qualified safety personnel or specially qualified and authorised personnel and must be recorded and documented to ensure that the tests can be reconstructed and retraced at any time.
- The operating instructions must be made available to the operator of the machine where the TGS safety light curtain is fitted. The machine operator is to be instructed in the use of the device by qualified safety personnel and must be instructed to read the operating instructions.
- The external voltage supply of the devices must be capable of buffering brief mains voltage failures of 20 ms as specified in EN 60_204C1. The power supply unit must provide safe isolation (SELV/PELV). Suitable power supplies are available as accessories from SICK (see section “Ordering information, accessories”).

The checklist according to the use of the non-contact safety device is printed at the end of the English section of these operating instructions.

2.5 Test instructions

2.5.1 Pre-commissioning tests

- The inspection prior to placing in operation for the first time is used to confirm compliance with the safety requirements in national/international regulations, in particular the machinery safety regulations or the provision and use of work equipment regulations (EC-Declaration of Conformity).
- Inspection of the effectiveness of the protection equipment on the machine in all the operating modes in which the machine can be placed - according checklist page 34.
- Qualified personnel must, prior to starting work, instruct the personnel operating the machine protected by the safety device. The instruction is the responsibility of the machine operating company.

2.5.2 Regular testing of the safety device by experts

- The inspection should be carried out in accordance with valid national regulations at the intervals defined in the regulations. The intention of these inspections is to detect any changes or manipulations of the protective devices since the original commissioning.
- The inspections should also be carried out whenever major modifications are made to the machine or protection equipment, as well as after re-adjustment or repairs in the event of damage occurring to housing, front panel, etc.

2.5.3 Daily testing of the safety device by authorised personnel

Recommendation

The daily test ensures that the system is providing effective protection to personnel. This is necessary to detect any modifications to the mounting of the system since the last test. It could then be possible for the hazardous area to become unprotected and allow for example reach over or under.

Note

This is an important recommendation, the manufacturer may also take other (organisational) measures to ensure the correct function.

To check that undetected access to the hazardous area between the opto-electronic device and the mechanical guarding is not possible:

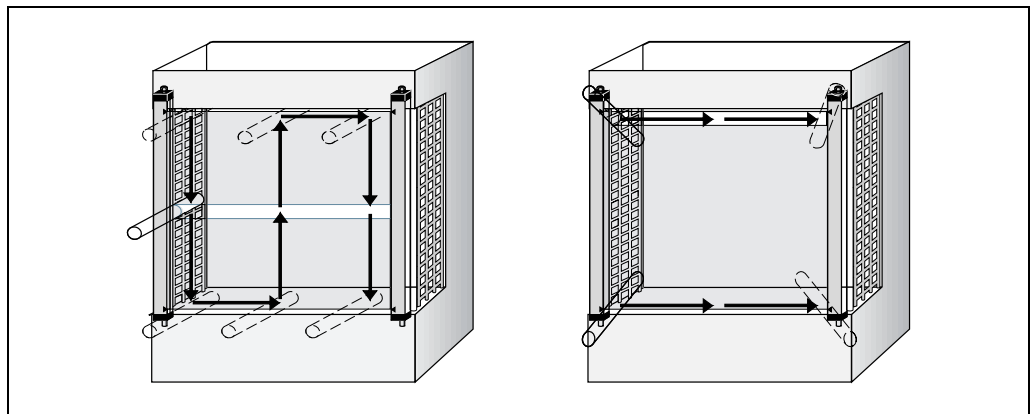
Move the test rod diameter 20 mm (resp. 30 or 40 mm as appropriate) slowly through the guarded access opening following the direction of the arrows, as shown in *the diagram on the left* (Fig. 3).

Then check *the diagram on the right* to make sure there is no risk that anyone may be able to reach over or under the danger zone.

Note

During this test procedure, only the red LED on TGSE should be illuminated.

Fig. 3: Daily check using the test rod



2.6 Environmental protection

The TGS safety light curtain has been designed to minimise environmental impact. It uses only a minimum of power and natural resources.

At work, always act in an environmentally responsible manner. For this reason please note the following information on disposal.

Disposal

➤ Always dispose of unserviceable or irreparable devices in compliance with local/national rules and regulations with respect to waste disposal.

Note We would be pleased to be of assistance on the disposal of these devices. Contact us.

3 Product Description

3.1 Features

Special features of the TGS safety light curtain:

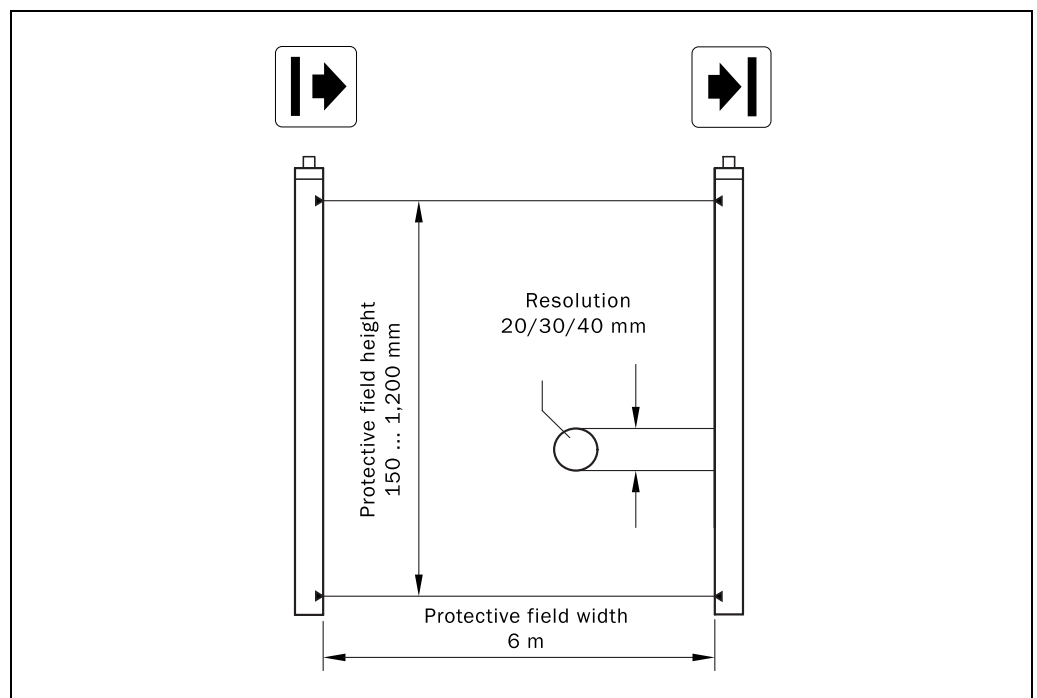
- Beam coding
- Self-testing
- Practical resolution 20, 30 and 40 mm
- Optical synchronisation

3.2 Mode of operation

The TGS safety light curtain comprises the sender unit and the receiver unit (Fig. 4). The protective field is the area between the two units defined by protective field and protective field width.

The protection field height determines the size of the particular system. The upper and lower limit of the protection field is identified on the system, via grey marks on the casing. The synchronisation between sender and receiver is optical, i.e. electric connections between both components are not required.

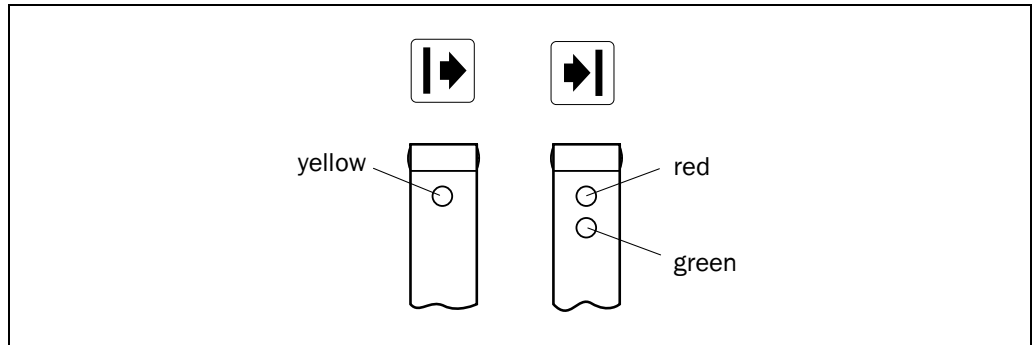
Fig. 4: Features of the TGS safety light curtain



3.3 Displays

LEDs on the units signal the different operating conditions.

Fig. 5: LED indication



Sender unit		Meaning/Function
LED yellow		
●		Operating voltage applied, Sender sending
●		Test active, Sender unit not sending
Immediately after power-up: Flashes 1, 2 or 3 times (display of set coding)		

Receiver unit		Meaning/Function
LED green	LED red	
●		Light path free Output active
☀		Light path free Output active Contamination
	●	Light path broken Output inactive
Immediately after power-up: Red LED flashes 1, 2 or 3 times (display of set coding)		

● illuminated ☀ flashes at 1/s

3.4 Fault indication

The yellow LED on the sender unit and the red LED on the receiver unit deliver diagnostic data in the event of a fault. The information is given in a flash mode defined below:

Fig. 6: Error display sender unit

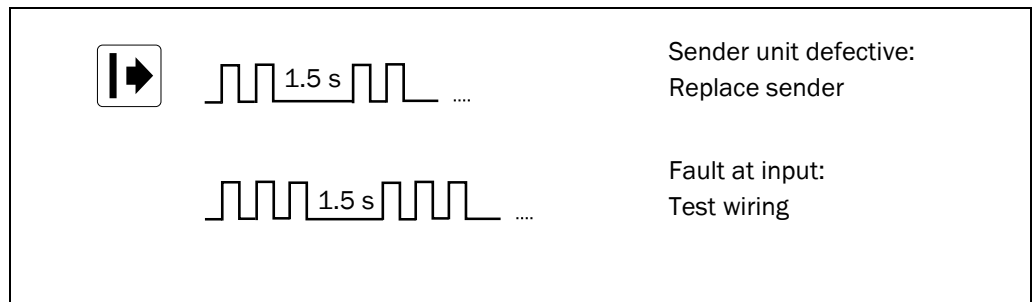
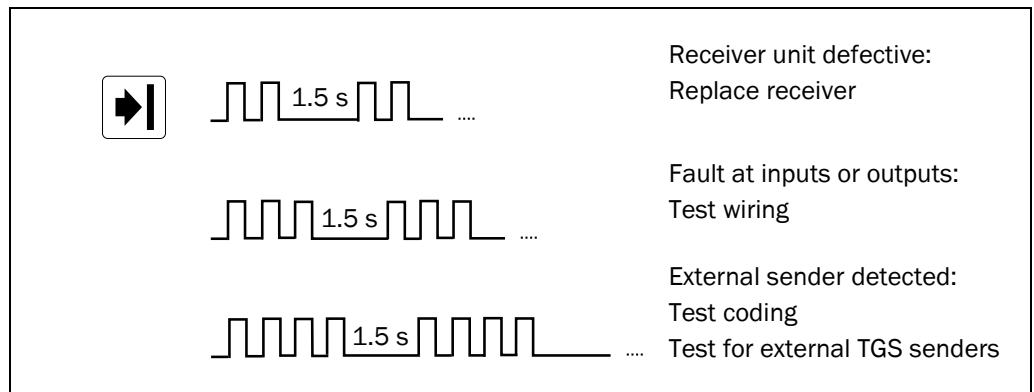


Fig. 7: Error display receiver unit

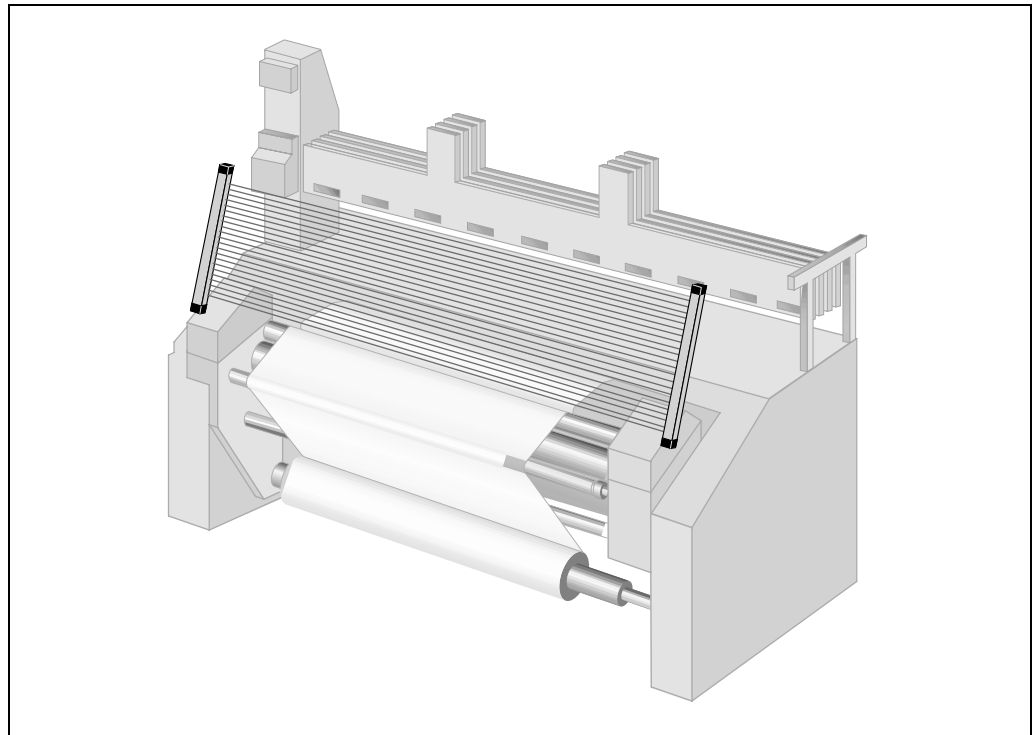


3.5 Examples: Application area

The protective function of the TGS testable safety light curtain is given when the following requirements are met:

- It must be possible to electrically affect the machine control.
- During mounting of the TGS, reaching over, reaching under, reaching around and stepping behind must be prevented.
- The relevant legal and official requirements apply to use and arrangement of the sensors. These requirements differ, depending on the area of application.

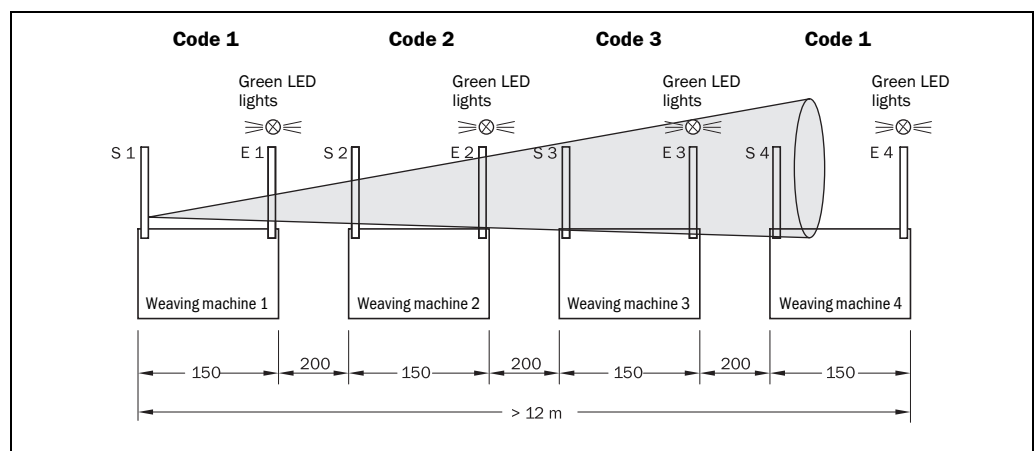
Fig. 8: Hazardous point safeguarding on a weaving machine with TGS safety light curtain



3.6 Multiple safeguarding

Beam coding provides a solution when using multiple guarding systems in which uncoded units would normally affect one another (Fig. 9). Three codes can be selected.

Fig. 9: Application with weaving machines: no mutual interference through beam coding



If an identical coding is used, the distance between receiver (E 4) and an external, identically coded sender (S 1) must be at least 12 m.

4 Mounting

4.1 Mounting the sensors

This chapter describes the preparation and completion of the mounting of the TGS safety light curtain. The mounting requires two steps:

- determining the necessary safety distance

The following steps are necessary after mounting:

- completing the electrical connections (chapter 5)
- aligning sender and receiver unit (section 4.4)
- testing the installation (section 2.5)

4.2 Calculating the safety distance

The safety light curtain must be mounted with sufficient safety distance:

- from the hazardous point
- from reflective surfaces



WARNING

No protective function without sufficient safety distance!

The reliable protective effect of the safety light curtain depends on the system being mounted with the correct safety distance from the hazardous point.

A safety distance must be maintained between the safety light curtain and the hazardous point. This safety distance ensures that the hazardous point can only be reached after the dangerous state of the machine has been completely stopped.

The safety distance as per EN 999+A1¹⁾ and EN ISO 13857 depends on:

- stopping/run-down time of the machine or system
(The stopping/run-down time is shown in the machine documentation or must be determined by taking a measurement.)
- response time of the protective device (response times see section 7.1)
- approach speed
- other parameters that are stipulated by the standard depending on the application

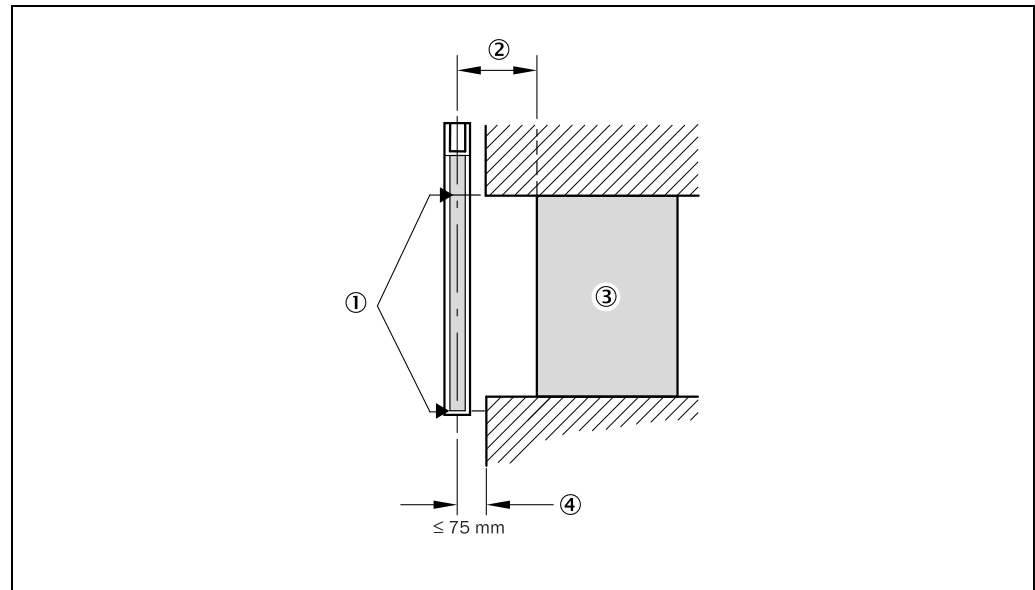
¹⁾ EN 999 will be replaced by EN ISO 13855.

The stopping time is a measured value of the machine. The approach speed is ...

... up to 500 mm safety distance: 2 m/s,

... above: 1.6 m/s.

Fig. 10: TGS, safety distance to danger zone



① = Protective field height

③ = Danger zone

② = Safety distance

④ = Max. distance to prevent access behind guard

How to calculate the safety distance S according to EN 999+A1¹⁾ et EN ISO 13 857:

Hinweis The following calculations show example calculations of the safety distance.

➤ First calculate S using the following formula:

$$S = 2000 \times T + 8 \times (d - 14) \text{ [mm]}$$

Where ...

T = Stopping/run-down time of the machine

+ Response time of the protective device after light path interruption [s]

d = Resolution of the safety light curtain [mm]

S = Safety distance [mm]

The reach/approach speed is already included in the formula.

➤ If the result S is ≤ 500 mm, then use the determined value as the safety distance.

➤ If the result S is > 500 mm, then recalculate S as follows:

$$S = 1600 \times T + 8 \times (d - 14) \text{ [mm]}$$

➤ If the new value S is > 500 mm, then use the newly determined value as the minimum safety distance.

➤ If the new value S is ≤ 500 mm, then use 500 mm as the minimum safety distance.

Example:

Stopping/run-down time of the machine = 290 ms

Response time after light path interruption = 30 ms

Resolution of the safety light curtain = 14 mm

$$T = 290 \text{ ms} + 30 \text{ ms} = 320 \text{ ms} = 0.32 \text{ s}$$

$$S = 2000 \times 0.32 + 8 \times (14 - 14) = 640 \text{ mm}$$

$S > 500$ mm, for this reason:

$$S = 1600 \times 0.32 + 8 \times (14 - 14) = \underline{512 \text{ mm}}$$

¹⁾ EN 999 will be replaced by EN ISO 13855.

Borderline case

Note Due to the differentiation of two approach speeds there can be the borderline case that the safety distance for

- 2000 mm/s approach speed > 500 mm
- 1600 mm/s approach speed < 500 mm

In this case, the safety distance is 500 mm exactly.

4.3 Minimum distance to reflective surfaces

The light beams of the sender can be deflected by reflective surfaces. This can lead to non-detection of an object. Therefore, all reflective surfaces and items (e.g. material containers) must maintain minimum distance **a** to the system's protection field (Fig. 11). The minimum distance **a** depends on the distance **D** between sender and receiver (Fig. 12).

Fig. 11: Minimum distance to reflective surfaces

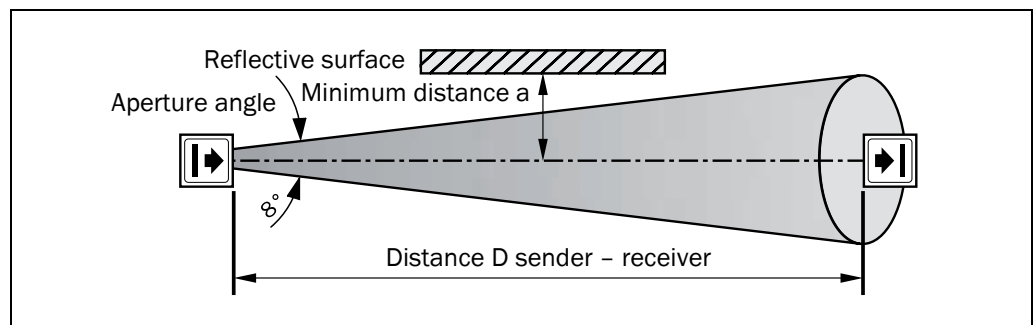
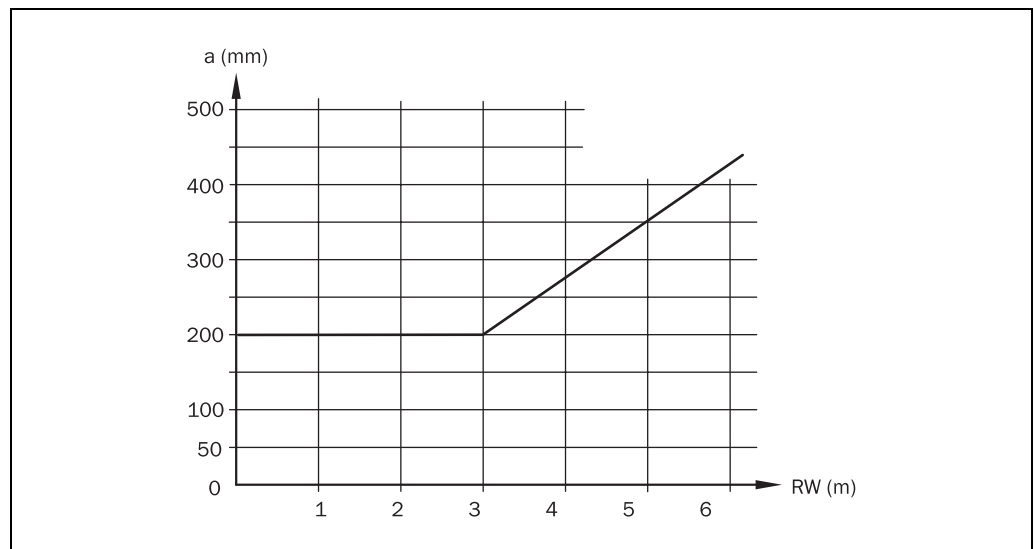


Fig. 12: Distance **a** depending on scanning range [RW]



4.4 Steps for mounting the device

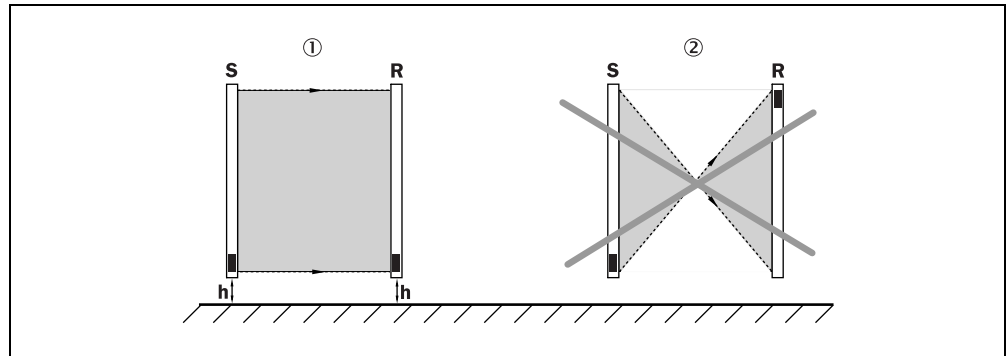


WARNING

Special features to note during mounting:

- Always mount the sender and receiver parallel to one another.
- During mounting, ensure that sender and receiver are aligned correctly. The optical lens systems of sender and receiver must be located in exact opposition to each other. The system plugs of both devices must point in the same direction.

Fig. 13: TGS mounting direction



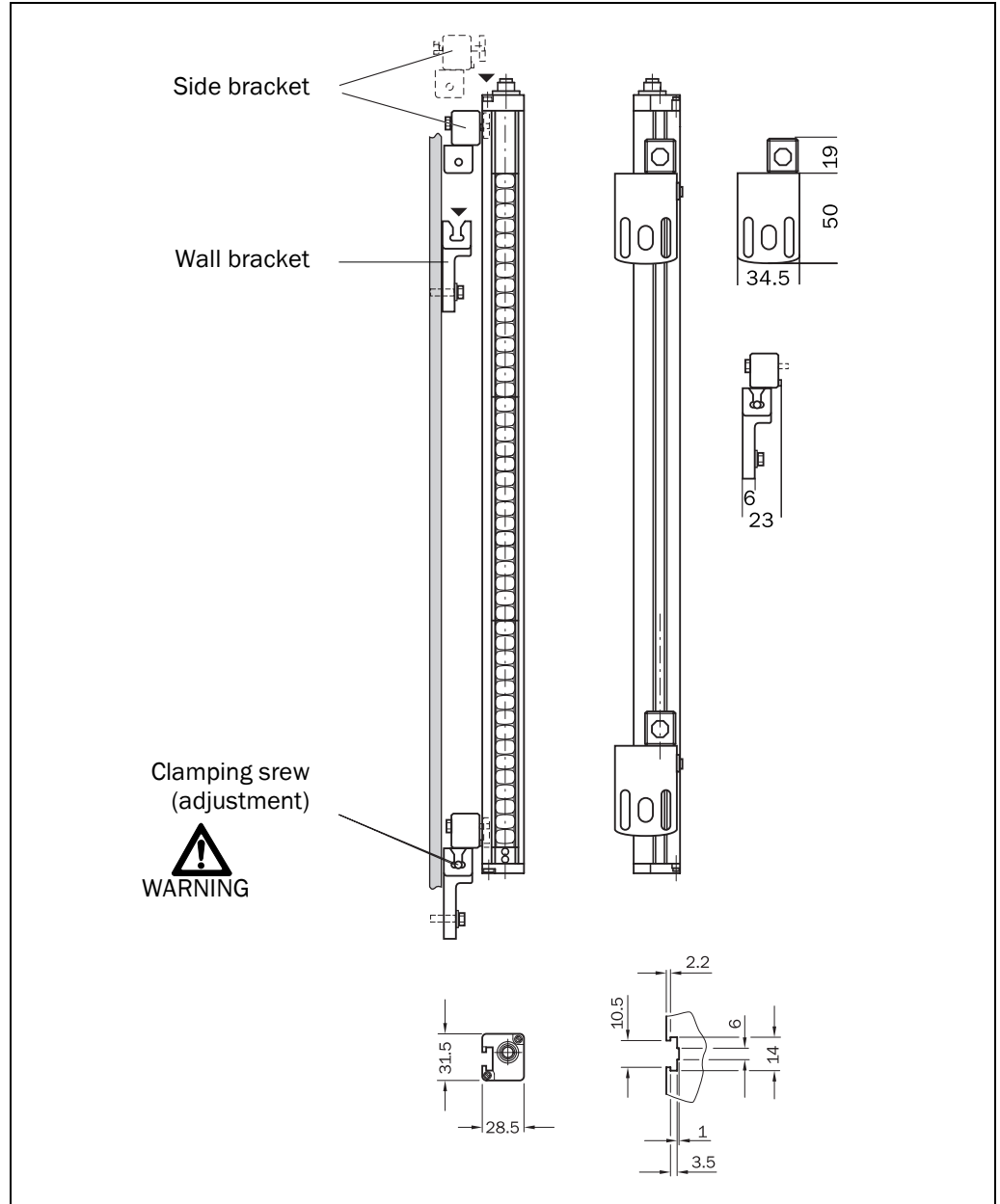
① = right ② = wrong **S** = Sender **R** = Receiver **h** = Height

- Observe the safety distance of the system during mounting. On this subject read chapter Calculating the safety distance on page 15.

4.4.1 Mounting with sliding nuts

To mechanically mount the TGS, the base version always has 2 sliding brackets for the sender unit and 2 sliding brackets for the receiver unit both with M5 thread (Fig. 14). These sliding brackets are pushed into the slot of the housing; the side bracket can be attached to this.

Fig. 14: Mechanical mounting options for TGS Testable Safety Light Curtains



WARNING

Prevent the light curtains from moving!

To prevent the mounted light curtains from moving, the sliding brackets of the side brackets shall be attached at the beginning and end of the slot (channel). Alternatively, mount suitable devices in order to prevent possible movements.

Recommendation

When aligning installations with a large scanning range or with deflector mirror it is recommended to use the laser alignment aid AR 60.



5 Electrical installation

Note The TGS safety light curtain meets the interference suppression requirements (EMC) for industrial use (interference suppression class A). When used in residential areas it can cause interference.

The sender and receiver unit of the TGS can be directly integrated into the machine control. Additional evaluation is not required.

Sender and receiver have a 7-pin plug (Fig. 15).

Fig. 15: Unit plug pin out

	Pin	Colour	Function	Designation
	1	white	beam coding	Sel 1
	2	brown	supply voltage	+ 24 V
	3	green	beam coding	Sel 2
	4 ^{*)}	yellow	functional earthing	Shield
	5	grey	test	
	6	-	-	
	7	blue	0 V	0 V
	1	white	beam coding	Sel 1
	2	brown	supply voltage	+ 24 V
	3	green	beam coding	Sel 2
	4 ^{*)}	yellow	functional earthing	Shield
	5	grey	output	OSSD
	6	pink	signal output	
	7	blue	0 V	0 V

^{*)} As an alternative, earthing can also be effected via a sliding claw bracket at the machine, order no. 4031411

- Notes**
- The maximum cable cross-section, which can be connected, is 0.25 mm. Both units shall be supplied with 24 V DC ($\pm 20\%$).
 - The external voltage supply of the devices must be capable of buffering brief mains voltage failures of 20 ms as specified in EN 60_204C1. The power supply unit must provide safe isolation (SELV/PELV). Suitable power supplies are available as accessories from SICK (see section "Ordering information, accessories" page 31.)

TGS

5.1 Internal testing

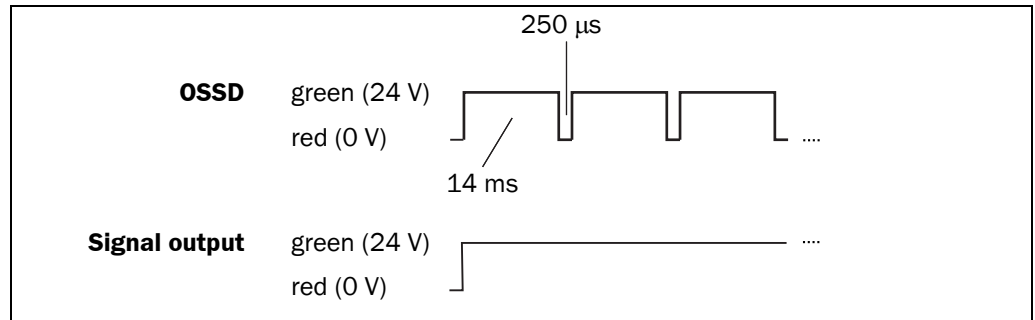
The TGS has internal testing; therefore, externally initiated testing is not required.

The TGS usually works in connection with a programmable logic control (PLC). In addition to the **OSSD switching output, the signal output must also be used.**

The OSSD output is cyclically tested in its active state (short pulse to LOW), see Fig. 16.

When selecting the control elements, ensure that the test pulses – for the parameters above – do not lead to the control elements switching off.

Fig. 16: Test signal for the OSSD switching output for cross-circuit monitoring



Notes The signal output

- is not monitored
- works like the OSSD switching output
- is to facilitate the 2-channel integration in order to give an off signal to the PLC, in case the OSSD develops a fault (e.g. short circuit).

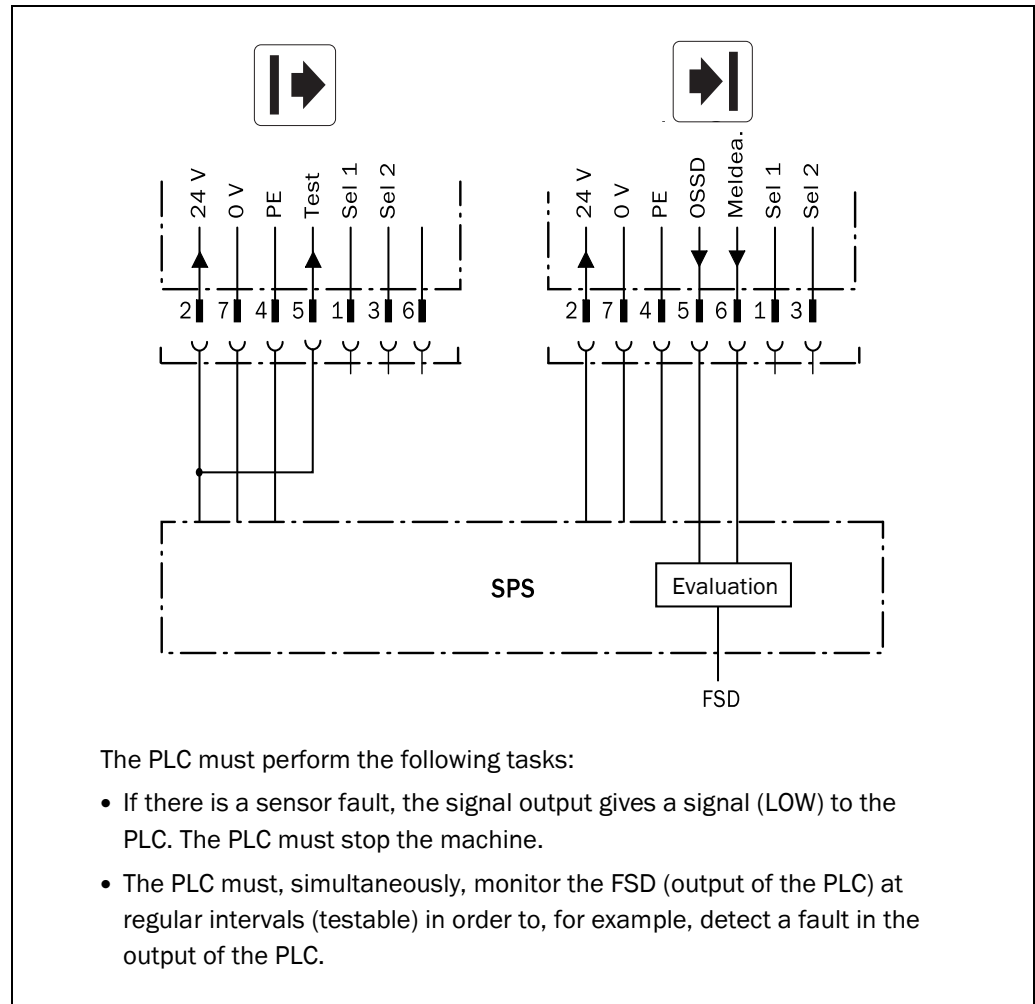
Important note:

The test input must be connected to +24 V, for the sender to transmit light pulses.

Fig. 17 and Fig. 18 show sample circuits in connection with a PLC. The PLC must perform the following tasks:

- The switching output (OSSD) sent by the receiver into the PLC must, at the output of the PLC, again be monitored in a failsafe way. Otherwise, for instance, a fault at the output of the PLC would not be recognised.

Fig. 17: Connection diagram for monitoring the output using the signal output



5.2 External testing

If the 2-channel connection is not possible, the unit shall be cyclically tested (external test). The generation of the test signal and the checking of the OSSD state is then performed by an evaluation circuit (Fig. 18), which switches the sender off and then on again and in doing so, checks the switching on and off of the receiver.

In this test, device faults must be recognised by the master control.

If the system test takes longer than 150 ms, the restart lock of the master evaluation circuit must be activated (Fig. 19). If the system test takes less than 150 ms, the restart lock does not need to be activated. The testing must be performed in a non-dangerous state of the machine.

If the test is unsuccessful (OSSD at the receiver does not respond), the PLC must be guaranteed to effect switch-off. In this case, the signalling output does not need to be wired.

TGS

Fig. 18: Wiring the test input.
Contact closed: sender transmits, contact open: sender does not transmit

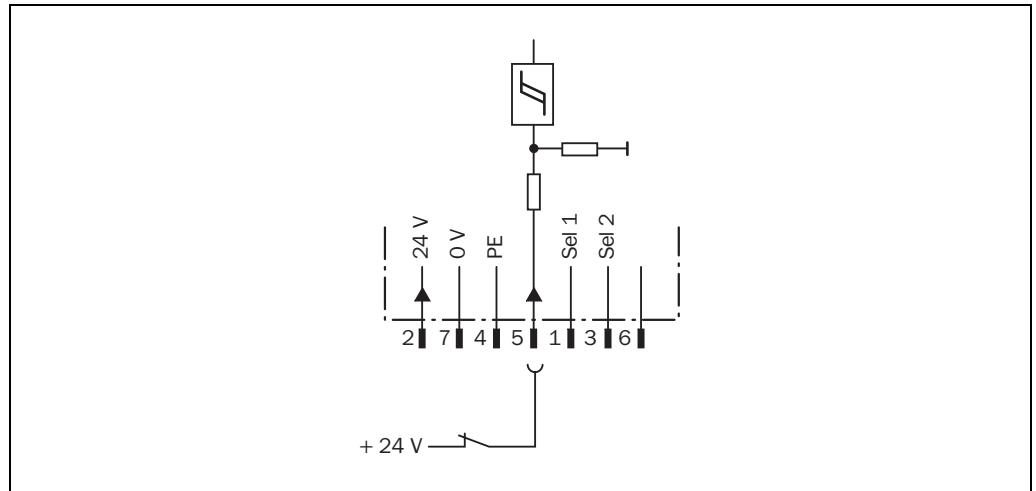
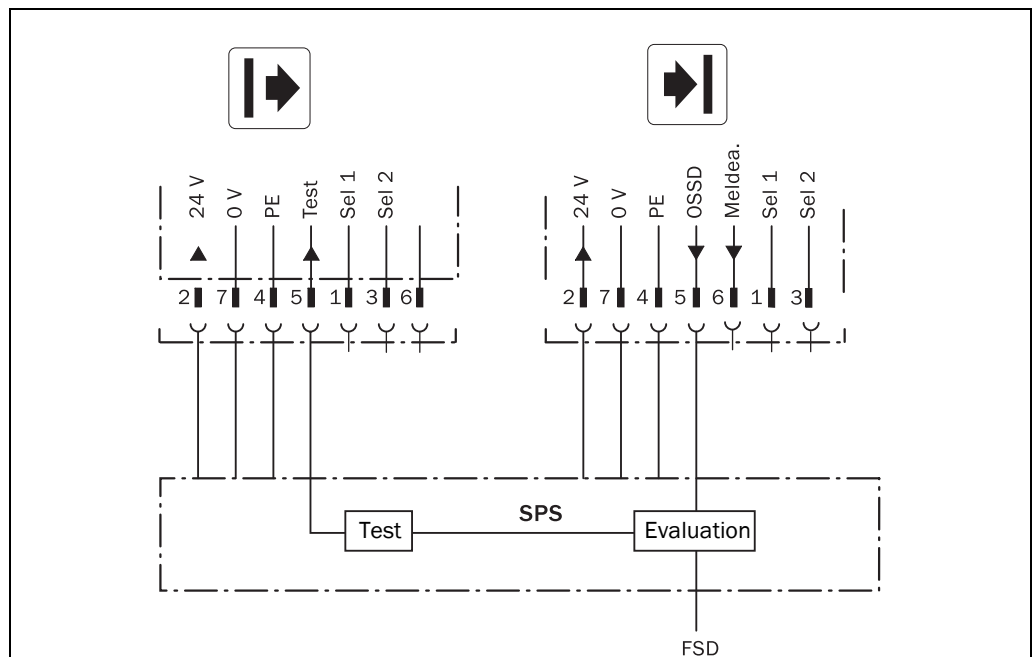


Fig. 19: Connection diagram for external testing



Test cycle:

- When triggering a test pulse to the sender through the machine control, the output of the PLC switches off. This switch-off is only cancelled again when the evaluation (PLC) detects a response at the OSSD of the receiver.
- During the test cycle, the PLC must simultaneously monitor the FSD of the PLC (e.g. detecting a fault at the output of the PLC).

5.3 Setting the beam coding

The coding of the TGS can be adjusted at the terminal block of the machine control. Thus, the pre-set coding is always retained when units are exchanged:

Sel1	Sel 2	Adresse
0 V	0 V	Coding 1
24 V	0 V	Coding 2
0 V	24 V	Coding 3
24 V	24 V	invalid ¹⁾

¹⁾ The receiver switches to lockout mode. The condition can be rectified by correct configuration and switching the power off and on again.

6 Maintenance

The TGS testable safety light curtain requires no operational maintenance. The front screen should be cleaned regularly and if dirty.

- Do not use any aggressive cleaning agents
- Do not use any abrasive cleaning agents

Note Static charges cause dust particles to be attracted to the front screen. You can prevent this effect by using the antistatic plastic cleaner (SICK part number 5600006) and the SICK lens cloth (part number 4003353).

How to clean the front screen and/or the additional front screen (accessories):

- Use a clean and soft brush to remove dust from the front screen.
- Now wipe the front screen with a clean and damp cloth.

Note ➤ After cleaning, check the position of sender and receiver to ensure that the protective device cannot be bypassed (reaching over, reaching under or standing behind).

7 Technical Data

7.1 Overview of technical specifications

Tab. 1: Data sheet TGS

	min.	typ.	max.
General system data			
Protective field height (type-dependent)	150 mm		1050 mm
Protective field width	0.3 m		6 m
Resolution (type-dependent)	20, 30, 40 mm		
Wave length of the sender		880 nm	
Protection class	III		
Enclosure rating	IP 54		
Operating mode	Guard only without start and restart inhibit		
Supply voltage U_s ¹⁾	19.2 V	24 V	28.8 V
Ripple ²⁾			2.4 V _{SS}
Synchronization	Optical, without separate synchronization between sender and receiver		
Type	Type 2 (EN 6 1496-1)		
Category	Category 2 (EN ISO 13 849) Category 2 (EN 954-1) ³⁾		
Test rate ⁴⁾	0.55 1/s (internal test, every 1.8 s)		
Maximum demand rate ⁵⁾	> 3 min		
Performance Level ⁶⁾	PL d (EN ISO 13 849) ⁷⁾		
Safety integrity level ⁸⁾	SIL 2 (IEC 61 508) SILCL 2 (EN 62 061)		
PFHd (mean probability of a dangerous failure per hour)	5.3×10^{-8} 1/h		
T_M (mission time)	20 years (EN ISO 13 849)		
On-transition time OSSD after applying the supply voltage of sender and receiver (light path clear)		3 s	

¹⁾ The external voltage supply must, in accordance with EN 60 204, bridge a short-term supply failure of 20 ms. Suitable power supplies are available from SICK, as accessories.

²⁾ The voltage must not exceed or fall below the limit values.

³⁾ Only valid for the assumption of conformity until 28.12.2009. From then on it will only be allowed to use the successor EN ISO 13 849-1:2006.

⁴⁾ Internal test. If an external test is performed, the test rate must not be exceeded.

⁵⁾ Between two demands for a safety-related reaction from the device, at least 100 internal or external tests must be performed.

⁶⁾ For detailed information on the exact design of your machine/system, please contact your local SICK representative.

⁷⁾ Pay attention to optical characteristics! More information at www.sick-safetyplus.com/Safety-Know-how

⁸⁾ For detailed information on the exact design of your machine/system, please contact your local SICK representative.

	min.	typ.	max.
--	------	------	------

Sender unit

Test input			
Input resistance (HIGH)	5 kΩ (at 0 V)		
Sender, inactive (Test)	0 V		12 V
Sender, active	17 V		28.8 V
Reaction time on test ¹⁾			37 ms
Power consumption			3 W

Receiver unit

Supply connections			
OSSD	2 PNP semiconductors, active monitored, short-circuit protected ²⁾ (2.2 kΩ against 0 V in unit)		
Signal output	PNP semiconductor, short-circuit protected ²⁾ (2.2 kΩ against 0 V in unit)		
OSSD and signal output:			
Switching voltage HIGH active (U_{eff})	$U_V - 2.25 V$		U_V
Switching voltage LOW	0 V		5 V
Switching current			20 mA
Leakage current ³⁾			< 40 μA
Load capacity			3 nF
Test impulse data ⁴⁾			
Test impulse width	240 μs	250 μs	260 μs
Test impulse rate (type-dependent)	9.5 ms	14 ms	18.5 ms
Permissible cable resistance between unit and load ⁵⁾			100 Ω
Response time, type-dependent (see table)	7.5 ms		18 ms
On-transition times after light beam interruption		2 x response time	200 ms ⁶⁾
Power consumption			5 W
Voltage in DC • Reference point for measured values: equipment plug			

¹⁾ The time is rated from the activation of the test input to switching off the OSSD output

²⁾ Applies for voltages between U_V and 0 V (2.2 kΩ against 0 V in the device)

³⁾ In the case of an error (interruption of the 0 V cable) the outputs behave like a resistor > 480 kΩ against U_V . The downstream control element must identify this state as LOW.

⁴⁾ In the active state, the outputs are tested in a cycle (switch LOW briefly). When selecting the downstream control elements ensure that the test impulses with the parameters listed above do not lead to a shutdown.

⁵⁾ The individual conductor resistor to the downstream control element must be limited to this value so that a crossed connection between the outputs can be identified. (EN 60 204 Electrical Equip. of Machines, Part 1: General Requirements must be observed.)

⁶⁾ This value applies if the synchronization beam is interrupted (1st beam below the connector).

min.	typ.	max.
------	------	------

Operating data

Connection	Device plug M12, 7-pin		
Ambient operating temperature	0 °C		+55 °C
Air humidity (non-condensing)	15 %		95 %
Storage temperature	-20 °C		+70 °C
Housing cross section	28.5 mm x 31.5 mm		
Vibration resistance	1)		
Shock resistance	10 g, 16 ms as per IEC 68-2-29		

Response times

Tab. 2: Response time of the OSSD in ms (response time of the signal output is 50 % greater)

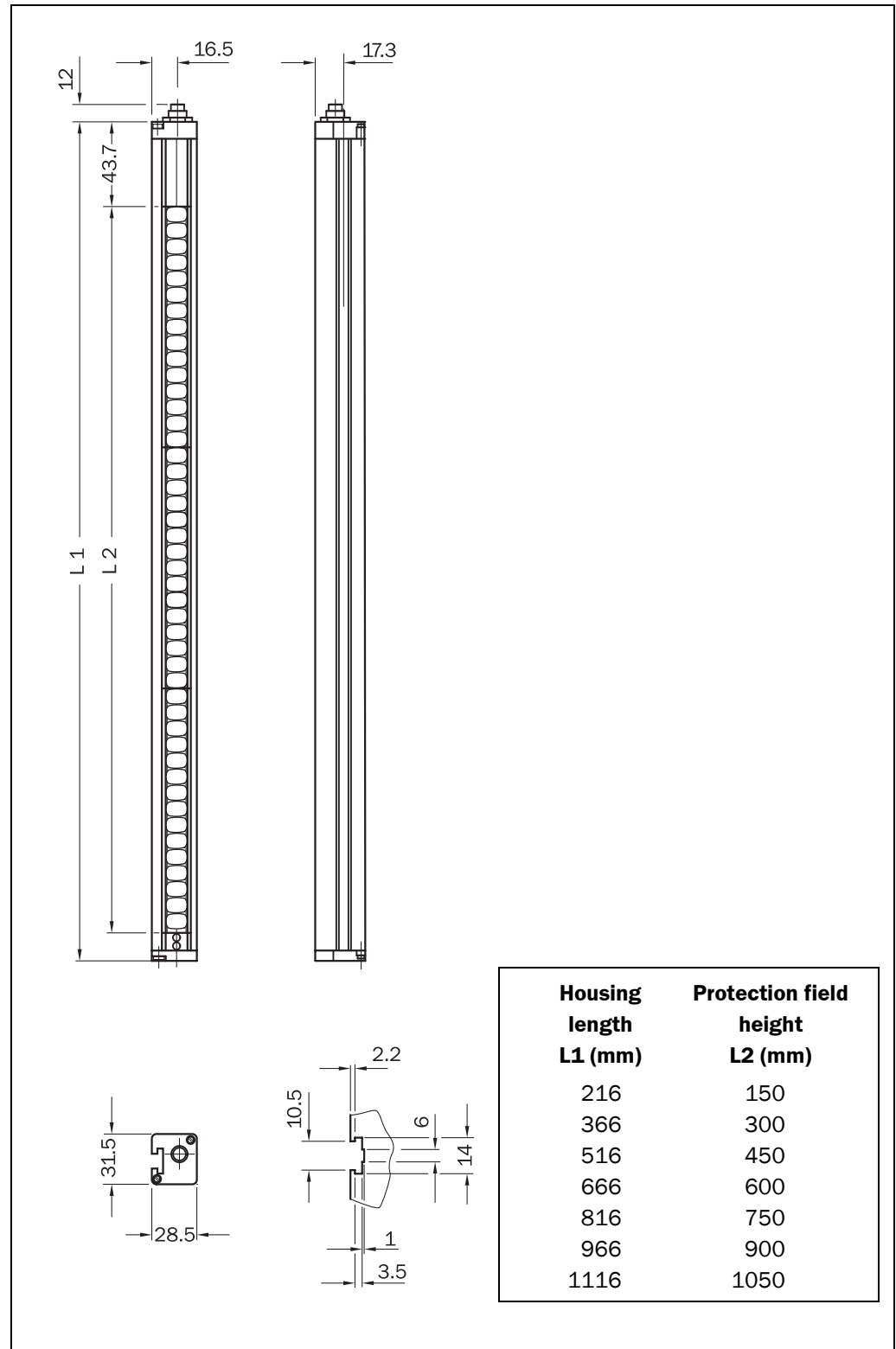
Protective field height [mm]	Resolution		
	20 mm	30 mm	40 mm
Response time	in ms	in ms	in ms
150	10	8	7.5
300	10	8.5	8.5
450	14	8.5	10
600	18	10.5	9.5
750	-	12.5	9
900	-	15	10
1050	-	17	17

1) The TGS is specially matched to the vibration requirements of weaving machines. Due to special assembly technology, the TGS is designed for up to 600 mm protection field height, for the following maximum vibration values at the sensor:
 10 ... 200 Hz ± 20 g
 200 ... 400 Hz ± 15 g
 The following applies to protection field heights over 600 mm: 5 g, 10 ... 55 Hz to IEC 68-2-6, higher values on request.

TGS

7.2 Dimensional Drawings

Fig. 20: TGS dimensional drawings



8 Ordering information

8.1 TGS selection table

Tab. 3:TGS selection table

Resolution 20 mm				
Protection field height	Sender	Part number	Receiver	Part number
150 mm	TGSS 15-111111	1016353	TGSE 15-111111	1016354
300 mm	TGSS 30-111111	1016280	TGSE 30-111111	1016281
450 mm	TGSS 45-111111	1016319	TGSE 45-111111	1016320

Resolution 30 mm				
Protection field height	Sender	Part number	Receiver	Part number
150 mm	TGSS 15-121111	1016355	TGSE 15-121111	1016356
300 mm	TGSS 30-121111	1016229	TGSE 30-121111	1016230
450 mm	TGSS 45-121111	1016231	TGSE 45-121111	1016232
600 mm	TGSS 60-121111	1016408	TGSE 60-121111	1016409

Resolution 40 mm				
Protection field height	Sender	Part number	Receiver	Part number
150 mm	TGSS 15-131111	1017804	TGSE 15-131111	1017805
300 mm	TGSS 30-131111	1016795	TGSE 30-131111	1016796

Special solution				
Protection field height	Sender	Part number	Receiver	Part number
300 mm	TGSS-S0 1	1018357	TGSE-S0 1	1018358
450 mm	TGSS 45-161511	1018572	TGSE 45-161511	1018573
450 mm	TGSS 45-161111	1015704	TGSE 45-161111	1015705

TGS

Tab. 4: Ordering information, accessories

8.2 Ordering information, accessories

Item	Part number
Cable receptacle M12, 8-pin, straight	
with 2.5 m cable length	6020537
with 5.0 m cable length	6020354
with 7.5 m cable length	6020353
with 10 m cable length	6020352
with 15 m cable length	6020872
Cable receptacle M12, 8-pin, angled	
with 5 m cable length	6021343
with 15 m cable length	6021342
Relay module	
with screw terminals	1019772
with spring terminals	2019771
without terminals	6020342
Mounting	
Sliding claw brackets (1 piece)	4031411
Sliding nuts for side bracket (4 pieces)	2017750
Other accessories	
Power supply 24 V, 2,1 A, 100/240 V AC, 50 W	7028789
Power supply 24 V, 3,9 A, 120/240 V AC, 95 W	7028790
Test rod with diameter corresponding to the physical resolution of the safety light curtain	
Resolution 20 mm	2022600
Resolution 30 mm	2022602
Resolution 40 mm	2022604
Operating instructions for TGS on CD-ROM	2026782

9 Appendix

9.1 EC declaration of conformity

<h1 style="margin: 0;">SICK</h1>	
TYPE: TGS	Ident-No.: 9140806
<p>EC declaration of conformity The undersigned, representing the following manufacturer herewith declares that the product is in conformity with the provisions of the following EC directive(s) (including all applicable amendments), and that the respective standards and/or technical specifications have been applied.</p> <p>EG-Konformitätserklärung Der Unterzeichner, der den nachstehenden Hersteller vertritt, erklärt hiermit, dass das Produkt in Übereinstimmung mit den Bestimmungen der nachstehenden EG-Richtlinie(n) (einschließlich aller zutreffenden Änderungen) ist, und dass die entsprechenden Normen und/oder technischen Spezifikationen zur Anwendung gelangt sind.</p> <p>ЕС декларация за съответствие Подписалият, който представя допусоменатия производител, обявява, че продуктът съответва на разпоредбите на долуизброените директиви на ЕС (включително на всички действащи изменения) и че отговаря на съответните норми и/или технически спецификации за приложение.</p> <p>ES prohlášení o shodě Níže podepsaný, zastupující následujícího výrobce, tímto prohlašuje, že výrobek je v souladu s ustanoveními následující(Ch) směrnice (směrnic) ES (včetně všech platných změn) a že byly použity odpovídající normy a/nebo technické specifikace.</p> <p>EF-overensstemmelseserklæring Undertegnede, der repræsenterer følgende producent erklærer hermed at produktet er i overens-stemmelse med bestemmelserne i følgende EF-direktiv(er) (inklusive alle gældende ændringer) og at alle tilsvarende standarder og/eller tekniske specifikationer er blevet anvendt.</p> <p>EE-Δήλωση συμμόρφωσης Ο Υπογράφων, εκπροσωπών τον ακόλουθο κατασκευαστή δηλώνει με το παρόν έγγραφο ότι το προϊόν συμμορφώνεται με τους όρους της (των) ακόλουθης (-ων) Οδηγίας (-ών) της ΕΕ (συμπεριλαμβανομένων όλων των εφαρμοζόμενων τροποποιήσεων) και ότι έχουν εφαρμοστεί τα αντίστοιχα πρότυπα και/ή οι τεχνικές προδιαγραφές.</p> <p>Declaración de conformidad CE El abajo firmante, en representación del fabricante indicado a continuación, declara que el producto es conforme con las disposiciones de la(s) siguiente(s) directiva(s) de la CE (incluyendo todas las modificaciones aplicables) y que las respectivas normas y/o especificaciones técnicas han sido aplicadas.</p> <p>EÜ vastavusdeklaratsioon Allakirjutanu, kes esindab järgmist tootjat, kinnitab käesolevaga, et antud toode vastab järgneva(te) EÜ direktiivi(de) sätetele (kaasa arvatud kõikidele asjakohastele muudatustele) ja et on kohaldatud vastavaid nõudeid ja/või tehnilisi kirjeldusi.</p> <p>EY-vaatimustenmukaisuusvakuutus Allekirjoittanut, joka edustaa alla mainittua valmistajaa, vakuuttaa täten, että tuote on seuraavan (-ien) EU-direktiivin (-ien) vaatimusten mukainen (mukaan lukien kaikki sovellettavat muutokset) ja että vastaavia standardeja ja teknisiä erittelyjä on sovellettu.</p> <p>Déclaration CE de conformité Le soussigné, représentant le constructeur ci-après, déclare par la présente que le produit est conforme aux exigences de la (des) directive(s) CE suivantes (y compris tous les amendements applicables) et que les normes et/ou spécifications techniques correspondantes ont été appliquées.</p> <p>EK megfeleléségi nyilatkozat Alulírott, az alábbi gyártó képviselője ezenel kijelenti, hogy a termék megfelel az alábbi EK-irányelv(ek) követelményeinek (beleértve azok minden vonatkozó módosítását) és kijelenti hogy a megfelelési szabványokat és/vagy műszaki előírásokat alkalmazta.</p> <p>EB-samræmisýfirlýsing Undirritaður, fyrir hönd framleiðandans sem nefndur er hér að neðan, lýsir því hér með yfir að varan er í samræmi við ákvæði eftirtalinnna EB-tilskipana (að meðtöldum öllum breytingum sem við eiga) og að varan er í samræmi við viðeigandi staðla og/eða tækniforskriftir.</p> <p>Dichiarazione CE di conformità Il sottoscritto, rappresentante il seguente costruttore dichiara qui di seguito che il prodotto risulta in conformità a quanto previsto dalla(e) seguente(i) direttiva(e) comunitaria(e) (comprese tutte le modifiche applicabili) e che sono state applicate tutte le relative norme e/o specifiche tecniche.</p> <p>EB atitikties deklaracija Pasirašiusysis, atstovaujantis šiam gamintojui deklaruoja, kad gaminys atitinka šios (-ių) EB direktyvos (-ų) reikalavimus (įskaitant visus taikytinus keitinius) ir kad buvo taikomi antrajame puslapyje nurodyti standartai ir (arba) techninės specifikacijos.</p>	<p>en</p> <p>de</p> <p>bg</p> <p>cs</p> <p>da</p> <p>el</p> <p>es</p> <p>et</p> <p>fi</p> <p>fr</p> <p>hu</p> <p>is</p> <p>it</p> <p>lt</p>

SICK

TYPE: TGS

Ident-No.: 9140806

EK atbilstības deklarācija

Apakšā parakstījies persona, kas pārstāv zemāk minēto ražotāju ar šo deklarē, ka izstrādājums atbilst zemāk minētajai (-ām) EK direktīvai (-ām) (ieskaitot visus atbilstošos grozījumus) un ka izstrādājumam ir piemēroti attiecīgie standarti un/vai tehniskās specifikācijas.

lv

EG-verklaring van overeenstemming

Ondergetekende, vertegenwoordiger van de volgende fabrikant, verklaart hiermee dat het product voldoet aan de bepalingen van de volgende EG-richtlijn(en) (inclusief alle van toepassing zijnde wijzigingen) en dat de overeenkomstige normen en/of technische specificaties zijn toegepast.

nl

EF-samsvarserklæring

Undertegnede, som representerer nedennevnte produsent, erklærer herved at produktet er i samsvar med bestemmelsene i følgende EU-direktiv(er) (inkludert alle relevante endringer) og at relevante normer og/eller tekniske spesifikasjoner er blitt anvendt.

no

Deklaracja zgodności WE

Niżej podpisany, reprezentujący następującego producenta niniejszym oświadczam, że wyrób jest zgodny z postanowieniami następujących dyrektyw WE (wraz z odnośnymi poprawkami) oraz, że zastosowano odpowiednie normy i/lub specyfikacje techniczne.

pl

Declaração CE de conformidade

O abaixo assinado, que representa o seguinte fabricante, declara deste modo que o produto está em conformidade com as disposições da(s) seguinte(s) diretiva(s) CE (incluindo todas as alterações aplicáveis) e que foram aplicadas as respectivas normas e/ou especificações técnicas.

pt

Declaratie de conformitate CE

Semnatarul, în calitate de reprezentant al producătorului numit mai jos, declară prin prezenta că produsul este în conformitate cu prevederile directivelor CE enumerate mai jos (inclusiv cu toate modificările aferente) și că s-au îndeplinit normele și/sau specificațiile tehnice corespunzătoare.

ro

ES vyhlásenie o zhode

Dolu podpísaný zástupca výrobcu týmto vyhlasuje, že výrobok je v súlade s ustanoveniami nasledujúcej (nasledujúcich) smernice (smerníc) ES (vrátane všetkých platných zmien) a že sa použili príslušné normy a/alebo technické špecifikácie.

sk

Izjava ES o skladnosti

Podpisani predstavnik spodaj navedenega proizvajalca izjavljam, da je proizvod v skladu z določbami spodaj navedenih direktiv ES (vključno z vsemi ustreznimi spremembami) in da so bili uporabljeni ustrezni standardi in/ali tehnične specifikacije.

sl

EG-försäkran om överensstämmelse

Undertecknad, som representerar nedanstående tillverkare, försäkras härmed att produkten överensstämmer med bestämmelserna i följande EU-direktiv (inklusive samtliga tillämpliga tillägg till dessa) och att relevanta standarder och/eller tekniska specifikationer har tillämpats.

sv

AB-Uygunluk Beyanı

Aşağıdaki üreticiji temsil eden imza sahibi böylelikle, ürünün aşağıdaki AB-Yönergesinin(lerin) direktifleri ile (tüm ilgili değişiklikleri kapsayacak şekilde) uyumlu olduğunu ve ilgili normların ve/veya teknik spesifikasyonların uygulandığını beyan eder.

tr

Directives used:


 MAS-DIRECTIVE 2006/42/EC
 EMC-DIRECTIVE 2004/108/EC

 You can obtain the EC declaration of conformity with the standards used at: www.sick.com
SICK AG

 Erwin-Sick-Straße 1
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2009-11-17

Date


 ppa. Dr. Georg Plasberg
 Management Board
 (Industrial Safety Systems)
 authorized for technical documentation


 ppa. Birgit Knobloch
 Division Manager Production
 (Industrial Safety Systems)

Note You can obtain the complete EC declaration of conformity via the SICK homepage on the Internet at: www.sick.com

9.2 Checklist for the manufacturer

SICK

Checklist for the manufacturer/installer for the installation of electro-sensitive protective equipment (ESPE)

The details on the items listed below must be available at least during initial commissioning, depending, however, on the respective application, the requirements of which must be reviewed by the manufacturer/installer.

This checklist should be retained and kept with the machine documentation to serve as reference during recurring tests.

- | | | |
|--|------------------------------|-----------------------------|
| 1. Have the safety rules and regulations been observed in compliance with the directives/standards applicable to the machine? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 2. Are the applied directives and standards listed in the declaration of conformity? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 3. Does the protective device comply with the required category according to EN 954-1 ¹⁾ /EN ISO 13849-1? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 4. Is the access to the hazardous area/hazardous point only possible through the protective field of the ESPE? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 5. Have appropriate measures been taken to prevent (mechanical protection) or monitor unprotected presence in the hazardous area when protecting a hazardous area/hazardous point and have these been secured against removal? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 6. Are additional mechanical protective measures fitted and secured against manipulation which prevent climbing over or crawling beneath the ESPE? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 7. Has the maximum stopping and/or stopping/run-down time of the machine been measured and has it been entered and documented (at the machine and/or in the machine documentation)? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 8. Has the ESPE been mounted such that the required safety distance from the nearest hazardous point has been achieved? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 9. Are the ESPE devices correctly mounted and secured against manipulation after adjustment? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 10. Are the required protective measures against electric shock in effect (protection class)? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 11. Is the control switch for resetting the protective device (ESPE) or restarting the machine present and correctly installed? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 12. Are the outputs of the ESPE (OSSDs) integrated in compliance with the required category according to EN 954 ¹⁾ /EN ISO 13849-1 and does the integration comply with the circuit diagrams? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 13. Has the protective function been checked in compliance with the test notes of this documentation? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 14. Are the given protective functions effective at every setting of the operating mode selector switch? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 15. Are the switching elements activated by the ESPE, e.g. contactors, valves, monitored? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 16. Is the ESPE effective over the entire period of the dangerous state? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 17. Once initiated, will a dangerous state be stopped when switching the ESPE on or off and when changing the operating mode, or when switching to another protective device? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 18. Has the information label for the daily check been attached so that it is easily visible for the operator? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |

This checklist does not replace the initial commissioning, nor the regular inspection by qualified safety personnel.

¹⁾ Only valid for the assumption of conformity until 28.12.2009. From then on it will only be allowed to use the successor EN ISO 13849-1.

9.3 List of tables

Tab. 1:	Data sheet TGS.....	26
Tab. 2:	Response time of the OSSD in ms (response time of the signal output is 50 % greater)	28
Tab. 3:	TGS selection table.....	30
Tab. 4:	Ordering information, accessories.....	31

9.4 List of illustrations

Fig. 1:	The criteria for a TGS Safety Light Curtain.....	7
Fig. 2:	The mounting position must prevent the following: reaching over, under, around and stepping behind.....	7
Fig. 3:	Daily check using the test rod.....	9
Fig. 4:	Features of the TGS safety light curtain.....	11
Fig. 5:	LED indication.....	12
Fig. 6:	Error display sender unit.....	13
Fig. 7:	Error display receiver unit.....	13
Fig. 8:	Hazardous point safeguarding on a weaving machine with TGS safety light curtain	14
Fig. 9:	Application with weaving machines: no mutual interference through beam coding.....	14
Fig. 10:	TGS, safety distance to danger zone.....	16
Fig. 11:	Minimum distance to reflective surfaces.....	17
Fig. 12:	Distance a depending on scanning range [RW].....	17
Fig. 13:	TGS mounting direction.....	18
Fig. 14:	Mechanical mounting options for TGS Testable Safety Light Curtains	19
Fig. 15:	Unit plug pin out	20
Fig. 16:	Test signal for the OSSD switching output for cross-circuit monitoring	21
Fig. 17:	Connection diagram for monitoring the output using the signal output	22
Fig. 18:	Wiring the test input. Contact closed: sender transmits, contact open: sender does not transmit.....	23
Fig. 19:	Connection diagram for external testing.....	23
Fig. 20:	TGS dimensional drawings.....	29

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