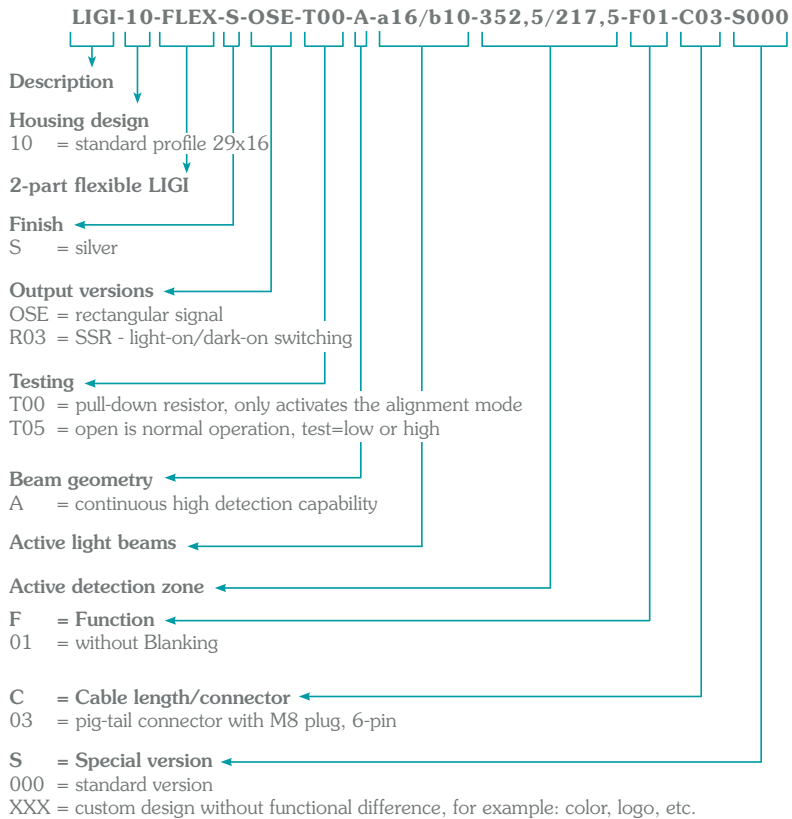


Safety light curtain LIGI-10 FLEX



Order code LIGI - safety light curtain



Key to symbols



Recommendation for optimal procedure.



Risk of death in the case of non-observance.

Safety instructions



- The safety instructions in the operating manual must be observed.
- Installation and electrical connection may only be carried out by trained personnel.
- The safety light curtain complies with the requirements of Category 2 and PL=d as per EN 13849-1 and must be integrated into the operating procedure in a fault-free manner in accordance with the applicable regulations and standards in order to achieve proper protective functioning.
- In accordance with EN 12978, the safety light curtain is suitable for all door types apart from sluice and dock gates, lift doors, vehicle doors, gates used mainly in animal husbandry, textile theatre curtains, railway level-crossing barriers, barriers that are used solely for vehicle traffic, and dangerous machines that are not doors.
- During mounting, installation and commissioning, it must be ensured that the photo switch system cannot be influenced by other photo switch systems or sources of infrared light.
- The applicable standards and regulations – particularly EN 12453 (Safety in use of power operated doors) – are to be observed during mounting, installation, commissioning, maintenance and repair.
- Strictly observe the regulations of the EN12978 when connecting safety devices on power operated doors.
- The manufacturer assumes no liability for damage caused by operation and connection errors, non-observance of the operating manual or lack of maintenance or care; the manufacturer wishes to draw attention again to the possible hazardous situations that can arise in this way.
- Notwithstanding conformity with harmonised standards, it is not possible to foresee every potential risk. For this reason, persons should only be present in the hazardous area when necessary.

Purpose



The safety light curtain (LIGI) consists of a transmitter and receiver and is suitable for all automatic door types with a minimum door width of 1.6m. The LIGI complies with the following regulations: EN 12978, EN 12445 and EN 12453. The closing speed of the door is to be selected in such a way that the force limit values as per EN 12453 are adhered to. Only objects that are 5mm larger than the beam separation distance can be detected.

Mounting, installation and commissioning



Mounting, installation and commissioning of safety light curtains may only be carried out by trained personnel in accordance with the specifications of the door manufacturer. The specifications in this operating manual are also to be adhered to. Operation under conditions other than those intended and modifications to the optics and casing are not permitted and result in loss of EC conformity.

When installing SSR (solid state relay) versions, it must be ensured that the door control system checks the safety light curtain versions with a test input once per door cycle. To do so, the control system must trigger the test input on the transmitter for at least 100ms and monitor the reaction behaviour of the output of the receiver. If the time behaviour corresponds to the technical data, the test is successful. Testing by briefly switching off the supply voltage is not suitable.

The safety light curtains are designed in such a way that sunlight and light from halogen lamps and fluorescent tubes (see IEC 61496-2) do not lead to undesired activation.

In rare cases, other photo switches or sources of infrared light can lead to undesired activation. These sources of light interference must be dealt with in such cases by switching off, blocking or removing them.



If two light curtains (in front of and behind the door) are to be used to provide protection, the separation distance between the light curtain and door should be small enough that persons cannot be present undetected between the door and the detection zones that are created. For this application, the two transmitter of the light curtains should be mounted on opposite sides of the door.

Mounting, installation and commissioning

When the light curtain is being mounted, it is to be placed on a stable subsurface. Ensure that the ground is sufficiently level so that the sensor function can work at all points.

Optical components (transmitters, receivers, LEDs) must not be covered.

A risk assessment in accordance with the machinery directive is the basis for deciding on the selected safety method.

The alignment of the light curtain should be optimised after it has been mounted. If the test input of the light curtain is activated for longer than 15s, the light curtain switches into alignment mode. The signal reserve can be optimised in alignment mode by alternately rotating the LIGI transmitter and LIGI receiver.

If the signal reserve is less than 2, the green receiver LED flashes in this mode. The green LED remains on for signal reserves greater than 2 and the red receiver LED flashes with increasing flash frequency when the signal reserve increases. The signal reserve should be a factor of 2 or greater to ensure fault-free operation as well as to tolerate a certain amount of dirt.

As soon as the test input is deactivated for a short period, the light curtain returns to normal mode.



After installation and fine adjustment the light curtain should be switched off and back on again before the performance test. The transmitter is then self adjusting the optimum power.

Electrical connection:



The connections are made depending on the version according to the supplied circuit diagram.

Important note: The sync cable (white wire, or yellow wire for OSE) is an internal connection between the transmitter and receiver which must not be connected in the controller!

Alignment mode:

This mode allows for optimum alignment of the LIGI based on a variable flash frequency of the LEDs on the receiver.

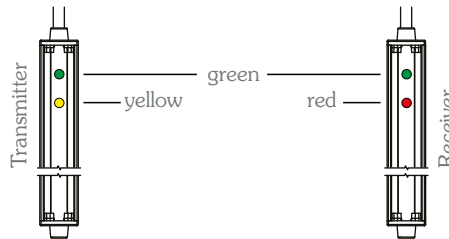
Error messages:













The LIGI has an internal error diagnosis function which indicates errors by means of an LED code depending on the type of error. In the event of an error, the LIGI switches to safe mode and the door can then only be operated in “dead man” mode.













Operating mode

Legend

-  LED lit
-  LED flashing
-  LED off



Transmitter	
power supply = OK dark-on switching	 
power supply = OK light-on switching	 
Test (LEDs flashing alternately)	       

























Receiver	
Free detection zone	 
Interrupted detection zone	 
Test (LEDs flashing alternately)	       

Alignment mode

Legend

-  LED lit
-  LED flashing
-  LED off



Transmitter	
Alignment mode (LEDs flashing alternately)	       
Receiver	
Excess gain less than 2	       
Excess gain greater than 2	       
	Flash frequency of red LED increases with signal reserve

Alignment mode is accessed by activating test or alignment mode for at least 15s and for the duration of alignment.

For SSR (solid state relay) output versions, the test input must now be disconnected from the fixed potential again and connected to the test input of the controller.










The test input (T00 version) is only required for alignment when using the OSE output versions. Connect to 0V/GND in normal operation.

Error mode

Legend

-  LED lit
-  LED flashing
-  LED off



	Transmitter	Error mode	Receiver	
No supply voltage				Check supply voltage
Receiver polarity reversed		Yellow LED flashes 3x, long pause		Check receiver operating voltage
Short at output		Red LED flashes 2x, long pause		Check output cable, overload, wrongly connected, cable defective, output on light curtain defective
Error in sync cable		Yellow LED flashes 3x, long pause		Check sync cable (white), may only be connected between transmitter and receiver
Internal device error		All LEDs flashing		Light curtain must be replaced

Light control

Installation options	Notes
Installation in front of door noncritical standard doors (without door function)	Door and floor have matt surfaces.
Installation in front of door critical doors; critical floors (without door function)	<p>Critical points: Part or all of the door has a highly reflective surface.</p> <p>Increased functional safety can be achieved by programming the signals when the door is open (see descriptions below).</p>

Installation steps (critical doors and floors / without door function):

For increased functional security when installing in front of the door, the reception signals (reference values) must be programmed into the light curtain when the door is open and the area to be protected is clear.





















- The LIGI is installed as explained in the operating instructions, i.e. the transmitter is connected as indicated in the table above (bottom row).
- **When the door is open and the area to be protected is clear, the sync connection between the transmitter and receiver is connected/hot-wired with 10-30 V DC using a short filament for a very short period of time (less than 1s). Everything else will now happen automatically.**
- If the previous step has been carried out correctly, the green LED on the receiver will be continuously on and the red LED will flash. The reference values will then be programmed. It is essential to keep the area to be protected clear during this time. This programming process will take 10s and the red LED will then go out.

Installation and starting up with light control

Legend





















-  LED lit
-  LED flashing
-  LED off



Receiver	
Area to be protected clear	 
Programming phase after connection for 1s	        for 10s        
Programming phase complete	 

Additional information:

- If something went wrong during the programming process explained above (e.g. accidental interruption of light beam or if the adjustment was subsequently changed), the programming process can be repeated as often as required.
- If the sync connection between the transmitter and receiver is connected with 10-30 V DC for longer than 15s and less than 25s, all the saved reference values from the programming process will be actively deleted, i.e. the factory settings are restored. Once the above connection has been disconnected, the green and red LEDs on the receiver will illuminate for 2s; this confirms that the reference values have been deleted. At this setting the light curtain is typically used for uncritical ambient conditions.

Receiver	
Connect sync 15s to 25s with 10-30 V DC.	                 
Connection to sync disconnected again.	 for 2s 

Testing

The operation of the light curtain is to be tested as follows once it has been mounted.

1. A test rod with a diameter of 28mm must be continuously detected over a range of 0mm to 500mm above the ground.

Top view:

Door and recommended light curtain layout of T=transmitter and R=receiver

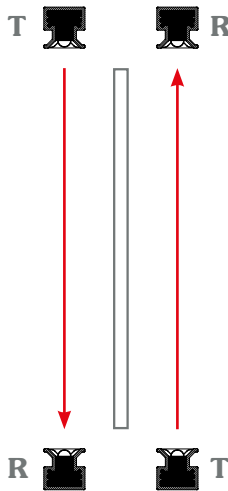


Figure 1
Without door function
(Blanking function)

Maintenance and repair



The safety light curtain does not have any wearing parts that need to be maintained.

The light entry and exit openings are to be cleaned regularly, depending on the dirt that occurs. Use a cloth with soapy water or a water jet for this purpose. High-pressure cleaners, abrasives and organic solvents must not be used.

Check regularly whether the light curtains are correctly aligned. Adjust the alignment if necessary. The light curtain casing, the optics areas, the plug and the connection cable are to be checked regularly for damage. Parts with significant damage must be replaced.

Furthermore please check detection ability on a regular basis as per manual page 11.

If light curtains are replaced, they must only be replaced by identical light curtains or by other safety light curtains that are intended for the relevant door by the door manufacturer.



Transmitter and receiver light curtains must only be replaced in pairs so as to ensure that the same software and hardware status is present.

Repairs must only be carried out by trained personnel.

Versions

Number of channels: From 14 to 70 channels

Connection:

Connection cables 5m and 15m, the total length must not exceed 25m

Connection plug Pig-tail connector with M8 plug, 6-pin, L=130mm

Technical data

Safety parameters	ESPE type 2 as per IEC 61496-2 MTTF _D > 100 years; DC _{AVG} > 99% Category 2; PL d (PFH=7.33·10 ⁻⁹ 1/h) as per EN 61508-2; Category 2 for LIGI-xx-Pxx with only one suitable external control system for testing
Door widths	1.6 to 10m
Rated voltage	24V DC -58% +25% (10 to 30V DC)
Current consumption	Transmitter: Approx. 30mA (24V DC) Receiver: Approx. 20mA (24V DC)
Power consumption	Approx. 1.2W
Detection zone height	Max. 1523mm
Channel count	Max. 70
Type of light	Modulated infrared
Type of switching:	Light switching, i.e. the following applies for free detection zones: OSE output = Alternating signal (approx. 950Hz) solid state relay SSR = low resistance
Aperture angle	Approx. ±5°
Detection capability	detection object ≥ 28mm
OSE output	Approx. 950Hz, alternating signal, 4V 20mA, short proof, reverse polarity protection, max. 100nF, max. 30µA leakage current, integrated pull-down 220Ω
SSR output	100mA, short proof, max. 220nF, max. 30VDC, max. 21VAC R on < 35Ω, leakage current < 100µA

Technical data

Ambient light safety	≥100klux
Housing material	Aluminium profile, fully filled, with 2K epoxy resin
Connection	Pig-tail M8 plug 4-pin, L=130mm
Degree of protection	IP67 as per EN 60529
Operating temperature	-20 to +60°C
Storage temperature	-30 to +70°C
Air humidity	Max. 95%
Weight	versions dependent
Dimensions	versions dependent

Test input

Version	Normal operation	Test/alignment	Internal input wiring
T00	<2V	>7V	10kΩ pull-down resistor to 0V
T05	open	0V...4V or supply voltage -4V	

Testing

Reaction of the output after activation of the test input for a free detection zone

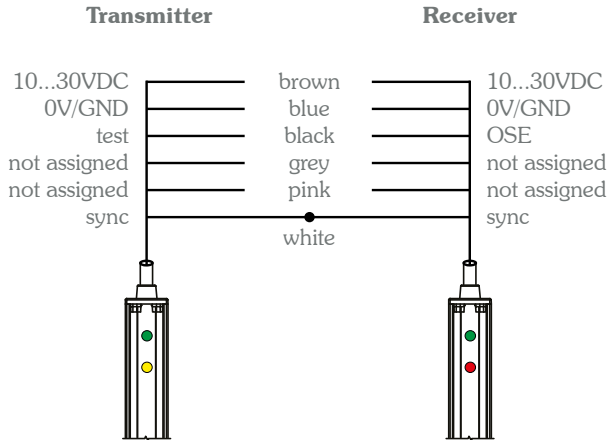
Version	Reaction of the output
OSE	This version is not tested.
solid state relay SSR	after max. 100ms change from low resistance (<35Ω) to high resistance

Reaction of the output after deactivation of the test input for a free detection zone

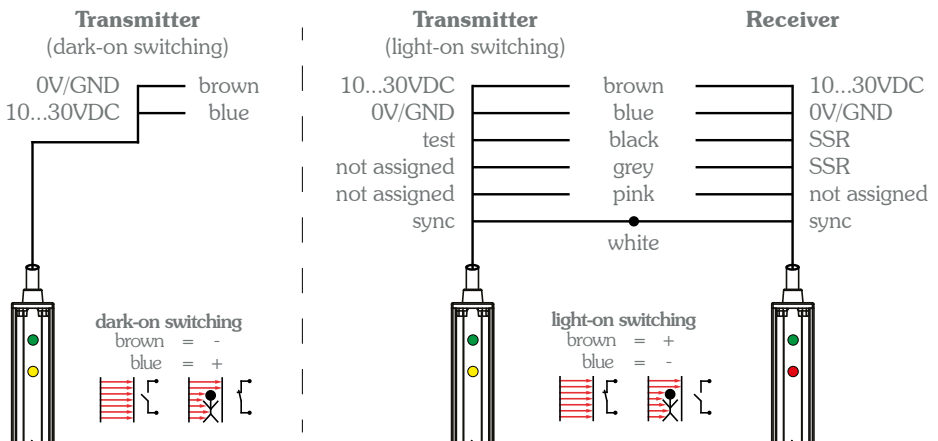
Version	Reaction of the output
OSE	Diese Variante wird nicht getestet.
solid state relay SSR	after max. 100ms change from high resistance to low resistance(<35Ω)

switching time	Definition
t (turn on delay) ≤ 100ms	light beam interruption
t (turn off delay) ≤ 800ms	uninterrupted detection zone

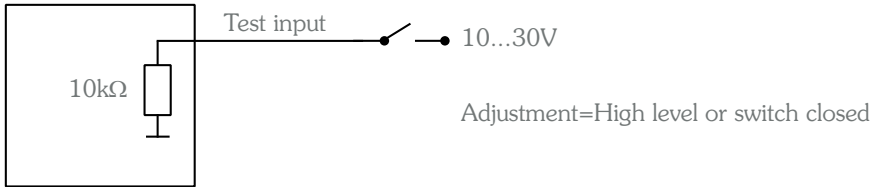
Connection scheme, OSE output



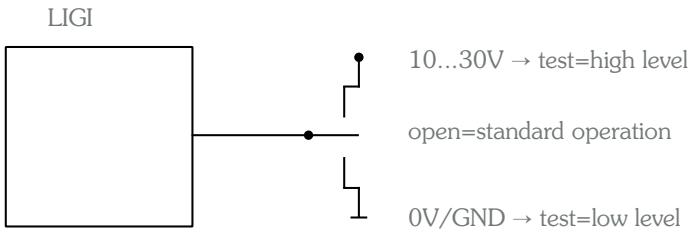
Connection scheme, SSR output (R03)



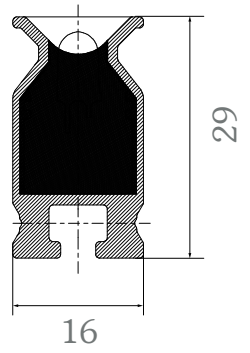
Connection scheme, test input T00



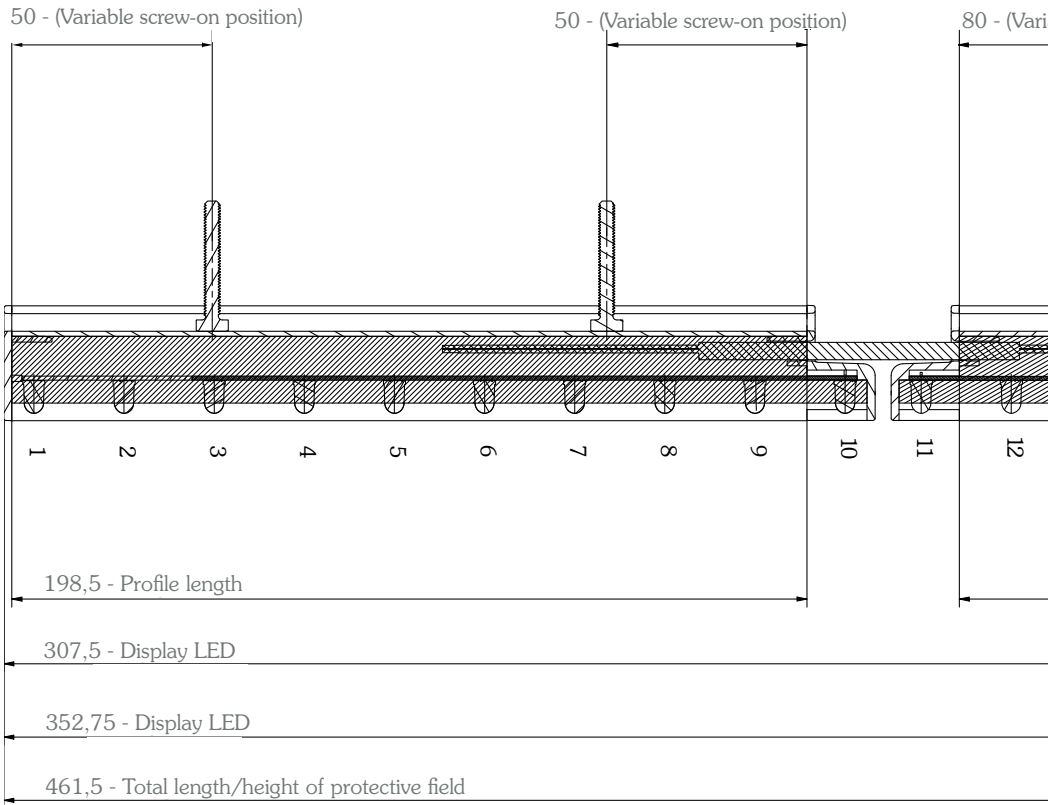
Connection scheme, test input T05



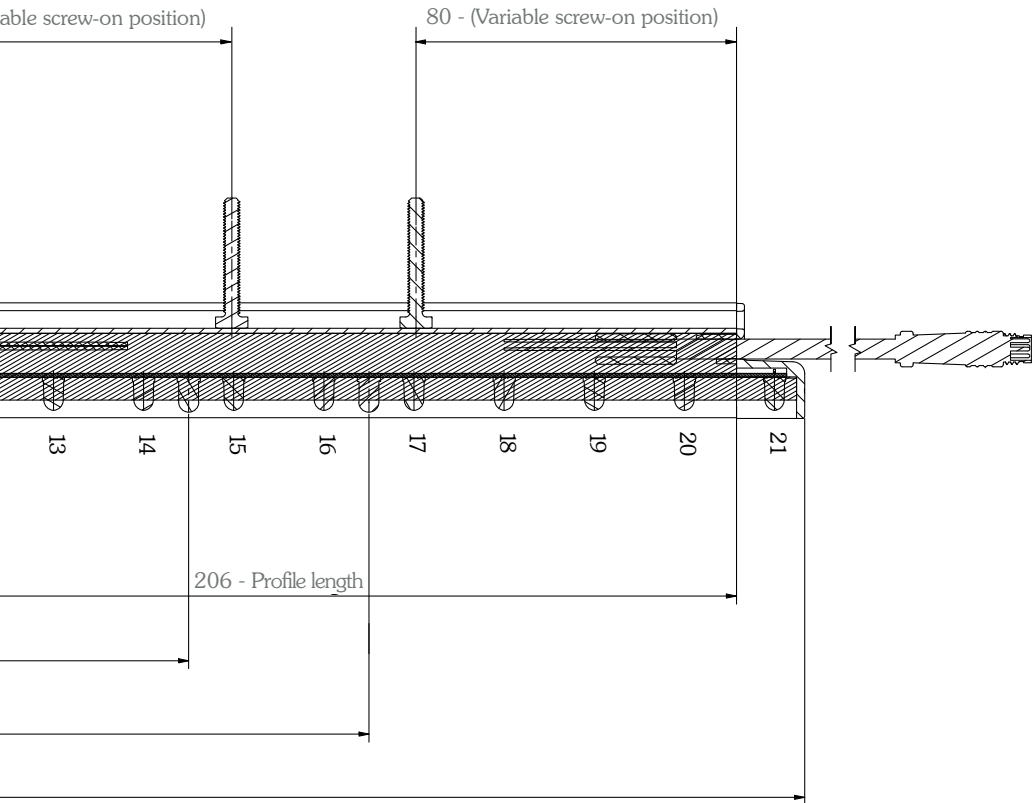
Mounting materials



Channel selection



Version A



EG-Konformitätserklärung EC Declaration of conformity



Wir als Hersteller und Bevollmächtigter für die Zusammenstellung der technischen Unterlagen:

We, the manufacturer and authorized representative to compile the technical documents:

Witt Sensoric GmbH, Ernst-Lau-Str. 12, 12489 Berlin, Germany

erklären hiermit in alleiniger Verantwortung, dass folgende Produkte:

hereby declare under our sole responsibility, that following products:

Lichtgitter LIGI mit den folgenden Bezeichnungen

Light curtain LIGI with the following designation

Name	Geh.	Ausg.	Test	Strahl- typ	Kanal- anzahl	Schutzfeld- höhe	Torfunktion mit / ohne	Kabel	Sonder- ausf.
LIGI	01 07 08 10	OSE	T00	A C F K	11..70	495..2520mm	F00 F01 F04 F05 F06 F07 F08 F09 F10	C00 C01 C02 C03	Sxxx
		P01	T01						
		P02	T02						
		P03	T03						
		N01	T04						
		N02	T05						
		N03							
		R01							
		R02							
		R03							

allen einschlägigen Anforderungen der folgenden EG-Richtlinien entsprechen:

fulfill all relevant requirements of the following EC directives:

RoHS-Richtlinie 2011/65/EU
EMV-Richtlinie 2014/30/EU
Maschinenrichtlinie 2006/42/EG

RoHS Directive 2011/65/EU
EMC Directive 2014/30/EU
Machinery Directive 2006/42/EC

Folgende Normen oder Teile dieser Normen wurden angewendet:

Following standards or parts of these were applied:

EN 12978

Schutzeinrichtungen für kraftbetätigte Türen und Tore

Safety devices for power operated doors and gates

EN ISO 13849
Cat. 2, PL-d

Sicherheit von Maschinen – Sicherheitsbezogene Teile von Steuerungen

Safety of machinery - Safety-related parts of control systems

IEC 61496-2
Typ 2

Sicherheit von Maschinen – Berührungslos wirkende Schutzeinrichtungen

Safety of machinery – Electro-sensitive protective equipment

EN 61000-6-3

Elektromagnetische Verträglichkeit (EMV) – Teil 6-3: Fachgrundnormen – Störaussendung für Wohnbereich, Geschäfts- und Gewerbebereiche sowie Kleinbetriebe

Electromagnetic compatibility (EMC) – Part 6-3: Generic standards – Emission standard for residential, commercial and light-industrial environments

EN 61000-6-2

Elektromagnetische Verträglichkeit (EMV) – Teil 6-2: Fachgrundnormen – Störfestigkeit für Industriebereiche

Electromagnetic compatibility (EMC) - Part 6-2: Generic standards – Immunity standard for industrial environments

Berlin, 06.03.2018

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