GENERAL PRODUCT CATALOGUE

www.grein.it

APPLICATIONS

THE COMPANY

GREIN was founded in 1965 as a commercial organization for the sale of electronic industrial equipment. In 1970 we set up a laboratory in order to better support our clients and in 1978 we started manufacturing our own safety equipment products.

In addition to safety barriers, **GREIN** manufactures a series of products which complement the barriers, such as electrosensitive sensors, strips, borders, mats and bumpers, all of which have various applications in the same sector.

In recent years **GREIN** has become a global leader in the industrial safety sector, thanks to high quality standards and constant commitment to the research and development of new products. To guarantee the quality during the development and commercialization of our products, **GREIN** has an ISO 9001 certification. Our safety barriers are also TUV certified and our edges, safety mats and bumpers have been tested by an Italian company that specializes in the validation of safety products.

AID ORGANISMO DI CERTIFICAZIONE
AZIENDA CERTIFICATA
ISO 9001:2015

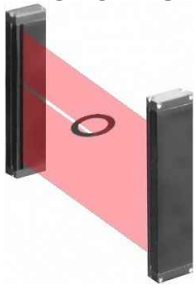
CE

INDEX OF PRODUCTS BY CATEGORY

SAFETY BARRIERS SERIES EFESTO4 EFESTO SZ AND KEEPER

EFESTO AND KEEPER ACCESSORIES

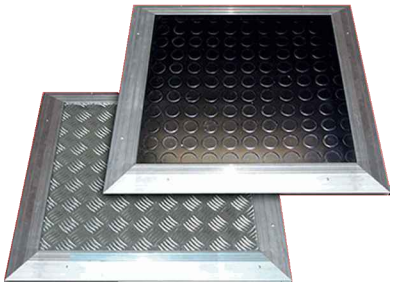
BARRIERS FOR AUTOMATION



ELECTROSENSITIVE SENSORS – SAFETY EDGES

SAFETY EDGES

SAFETY MATS



SAFETY BUMPERS

CONTROL UNIT FOR RIBBON SWITCH, EDGES, MATS, BUMPERS

INTRODUCTION

The EFESTO4, EFESTO SZ and KEEPER safety barriers are multi-beams optoelectronic systems (Electro Sensitive Protective Equipment) for the protection of people exposed to dangerous machinery in accordance with current international legislation on industrial safety.
All models are equipped with a transmitter and a receiver, which are synchronized via an optical link.
Safety outputs are in a solid state with the possibility to convert them into safety contacts by using relay modules.
The wide range of models permits their use in all fields of automation, providing protection for fingers, hands, limbs and bodies.
All the series of barriers come in different models depending on the required functionalities. This allows clients to choose the model which best suits their needs.

To complete the range, interconnection modules are available to enable direct interfacing of the barrier with the machine, whilst bypassing the control unit.

STANDARD REFERENCE

2006/42/EC	Machine Directive
2014/30/EC	Electromagnetic compatibility Directive
EN 61496-1/2	Safety of machinery - Electro-sensitive protective equipment
EN 13849-1/2	Safety of machinery - Safety-related parts of control systems
EN 62061	Safety of machinery - Functional safety
EN 61508	Functional safety of electrical/electronic/programmable electronic
EN 61000	Electromagnetic compatibility EMC

EFESTO4 EFESTO SZ
Main field of application

- Press Brakes and Forming Machines
- Laser Cutting Machines
- Die Cutting Machines
- Punching Machines
- Shearing Machines and Guillotines
- Robotic Areas
- Assembly Lines

KEEPER
Main field of application

Advanced muting capabilities make it ideal for the following field of application:

- Automated material handling and storage systems
- Robotic Areas
- Palletizers
- Assembly lines
- Automated warehouses
- AGV crossings

OVERVIEW OF AVAILABLE FUNCTIONS

TEST

The test function, which is located on the transmitter, simulates the interruption of the barrier's beams. It facilitates the control of the machine's safety chain.

BARGRAPH ALLIGNMENT

The three alignment indicators allow for a simpler alignment process for difficult installations, for example when using mirrors or covering long distances. A percentage of aligned beams is associated with each indicator.

MASTER-SLAVE (Anti-entrapment systems)

When the safety distance is particularly high, (for example with large presses) the operator must be guaranteed to be detected even when fully crossing the vertical barrier.

MUTING WITH EXTERNAL SENSORS

The muting function allows the temporary suspension of the barrier's protective function to guarantee passage of goods through the protected zone without deactivating the OSSD safety outputs.

To signal the activation of the MUTING function, the barrier is equipped with a static PNP output, which supplies 24V when the system is active. In the event of a blockage of the machine, caused by an incorrect activation of the MUTING function, the GUARD OVERRIDE can activates the restart of the machine.

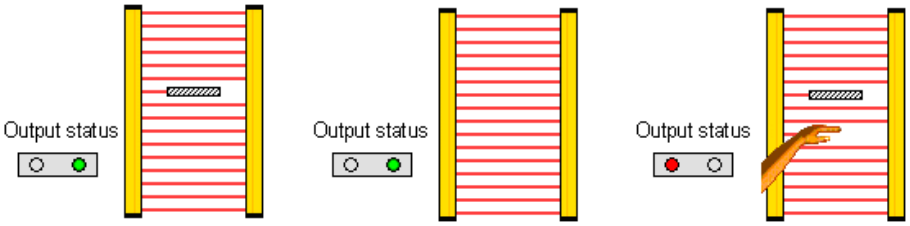
BLANKING

This function is only present in the EFESTO4 series and allows the deactivation of one to three beams without deactivating the OSSD outputs. The configuration can be modified via three wires located on the receiver's connector and is memorized when the barrier is switched on.

There are two types of blanking:

Blanking without object presence requirement

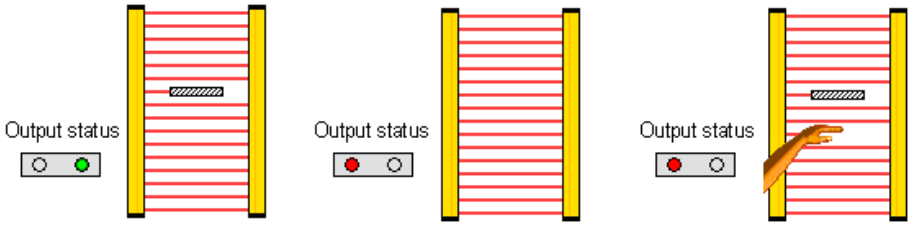
This function allows the introduction of an object into the danger area without deactivating the output of the barrier. The following images show an example with one beam selected.



Blanking with object presence requirement

This function allows an object (mobile or fixed) to be kept inside the hazardous area without causing the barrier outputs to be deactivated.

Here is an example with a selection of one beam.



TECHNICAL CHARACTERISTICS

TYPE (in agreement with EN 61496-1)	TYPE 4
SIL (in agreement with EN 61508)	SIL 3
SILCL (in agreement with EN 62061)	SILCL 3
PL (in agreement with EN ISO 13849-1)	PL e
Synchronization of transmitter/receiver	Optic
Power	24 Vdc ±10%
Resolution	14, 20, 30, 40, 55, 65, 125, 135, 306, 315 mm
Maximum range (depending on resolution)	6, 15, 30, 60 m
Height protected	From 200 mm to 3000 mm
Response time	From 5 to 30 ms depending on the number of rays
Static safety outputs	2 PNP-500 mA protected from short-circuit and overload
Static signalling output	1 PNP-500 mA protected from short-circuit and overload
Maximum length of connections	100 m
Casting dimensions	Section 36 X 50 mm yellow RAL 1021
Level of protection	IP65
Relative humidity	5 - 95 %
Operating temperature	-10 .. 65 °C Non condensing

All models are provided with:

- Transmitter with M12 four-pole connector with test function input.
- Bargraph with three indicators for alignment and signalling.
- Automatic reset.

Depending on the chosen model, the following functions are available.

Model	Available function					Receiver connectors	
	RM	EDM	BLNK	MUTE	O-S	M12 5P	M12 8P
EF- a						●	
EF- b	●	●					●
EF- c			●				●
EF- d	●	●	●		●	●	●
EF- e	●	●		●		●	●

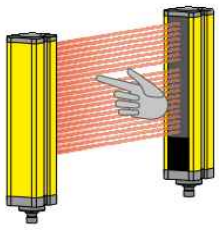
RM	Manual reset function.
EDM	External contactor monitoring function.
BLNK	Blanking function.
MUTE	2 external MUTING input functions, guard override and light output.
O-S	Static output for safety output status.
M12-5 P	Connector M12 - 5 pole – male for the receiver
M12-8 P	Connector M12 - 8 pole – male for the receiver

IDENTIFICATION CODE

EF – a 450 B - J

Model	see table pag 9		
Height of detection area	see table pag 10-15		
Optic code	see table pag 10-15		
Master / Slave *	optional	**M** = Master	**S** = Slave
Additional indicators	optional	**J** = LED end cup	**D** = Display slave

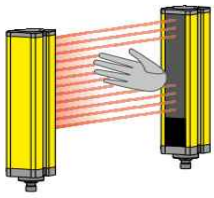
* Suffix only present in Master / Slave versions



FINGER DETECTION

Resolution 14mm Range 0,5 .. 6m Optic code "A"

Model	N° beams	Protected height PH mm	Sensitive height SH mm	Barrier height H mm	Weight Tx + Rx Kg	Response time ms	Response time with blanking ms	MTTFd years	PL
EF -x - 0180 A	18	194	174	276	0.9	6	7.5	100	e
EF -x - 0240 A	24	254	234	330	1.1	6	7.5	100	e
EF -x - 0300 A	30	314	294	390	1.4	11	15	100	e
EF -x - 0360 A	36	374	354	450	1.7	11	15	100	e
EF -x - 0420 A	42	434	414	510	1.9	11	15	100	e
EF -x - 0480 A	48	494	474	570	2.1	11	15	100	e
EF -x - 0540 A	54	554	534	630	2.3	11	15	100	e
EF -x - 0600 A	60	614	594	690	2.5	11	15	100	e
EF -x - 0600 A	60	614	594	690	2.5	11	15	93.8	e
EF -x - 0660 A	66	674	654	750	2.7	11	15	88.7	e
EF -x - 0700 A	72	734	714	810	3.0	16	22.5	84.1	e
EF -x - 0780 A	78	794	774	870	3.2	16	22.5	80.1	e
EF -x - 0850 A	84	854	834	930	3.4	16	22.5	76.1	e
EF -x - 0900 A	90	914	894	990	3.7	16	22.5	72.6	e
EF -x - 0950 A	96	974	954	1050	3.8	16	22.5	69.5	e
EF -x - 1100 A	108	1094	1074	1170	4.2	16	22.5	64.0	e
EF -x - 1200 A	120	1214	1194	1290	4.7	21	30	59.2	e
EF -x - 1300 A	132	1334	1314	1410	5.1	21	30	55.1	e
EF -x - 1400 A	144	1454	1434	1530	5.5	21	30	51.6	e
EF -x - 1500 A	156	1574	1554	1650	5.9	26	37.5	48.5	e
EF -x - 1700 A	168	1694	1674	1770	6.4	26	37.5	45.7	e
EF -x - 1800 A	180	1814	1794	1890	6.8	26	37.5	43.2	e
EF -x - 1900 A	192	1934	1914	2010	7.2	31	45	41.0	e
EF -x - 2000 A	204	2054	2034	2130	7.6	31	45	39.0	e
EF -x - 2200 A	216	2174	2154	2250	8.1	31	45	38.5	e
EF -x - 2300 A	228	2294	2274	2370	8.5	31	45	35.6	e

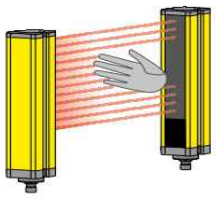


HAND DETECTION

Resolution 20mm	Range 2 .. 15m	Optic code "AL"							
Model	N° beams	Protected height PH mm	Sensitive height SH mm	Barrier height H mm	Weight Tx + Rx Kg	Response time ms	Response time with blanking ms	MTTFd years	PL
EF -x - 0180 AL	18	200	180	276	0.9	6	7.5	100	e
EF -x - 0240 AL	24	260	240	330	1.1	6	7.5	100	e
EF -x - 0300 AL	30	320	300	390	1.3	11	15	100	e
EF -x - 0360 AL	36	380	360	450	1.7	11	15	100	e
EF -x - 0420 AL	42	440	420	510	1.9	11	15	100	e
EF -x - 0480 AL	48	500	480	570	2.1	11	15	100	e
EF -x - 0540 AL	54	560	540	630	2.3	11	15	100	e
EF -x - 0600 AL	60	620	600	676	2.5	11	15	93.8	e
EF -x - 0660 AL	66	680	660	736	2.8	11	15	88.7	e
EF -x - 0700 AL	72	740	720	796	3.0	16	22.5	84,0	e
EF -x - 0780 AL	78	800	780	856	3.2	16	22.5	80,1	e
EF -x - 0850 AL	84	860	840	916	3.4	16	22.5	76,1	e
EF -x - 0900 AL	90	920	900	976	3.7	16	22.5	72.6	e
EF -x - 0950 AL	96	980	960	1036	3.8	16	22.5	69,5	e
EF -x - 1100 AL	108	1100	1080	1156	4.2	16	22.5	63,9	e
EF -x - 1200 AL	120	1220	1200	1276	4.7	21	30	59,2	e
EF -x - 1300 AL	132	1340	1320	1396	5.1	21	30	55,1	e
EF -x - 1400 AL	144	1460	1440	1516	5.5	21	30	51,6	e
EF -x - 1500 AL	156	1580	1560	1636	5.9	26	37.5	48,5	e
EF -x - 1700 AL	168	1700	1680	1756	6.4	26	37.5	45,7	e
EF -x - 1800 AL	180	1820	1800	1876	6.8	26	37.5	43,2	e
EF -x - 1900 AL	192	1940	1920	1996	7.2	31	45	41,0	e
EF -x - 2000 AL	204	2060	2040	2116	7.6	31	45	39,0	e
EF -x - 2200 AL	216	2180	2160	2236	8.1	31	45	38,5	e
EF -x - 2300 AL	228	2300	2280	2356	8.5	31	45	35,6	e

Resolution 30mm	Range 0,5 .. 15m	Optic code "B"							
Model	N° beams	Protected height PH mm	Sensitive height SH mm	Barrier height H mm	Weight Tx + Rx Kg	Response time ms	Response time with blanking ms	MTTFd years	PL
EF -x - 0150 B	6	174	126	272	0,8	6	7.5	100	e
EF -x - 0210 B *	8	222	174	272	0,9	6	7.5	100	e
EF -x - 0240 B *	9	246	198	296	1,0	6	7.5	100	e
EF -x - 0300 B	12	318	270	368	1,2	6	7.5	100	e
EF -x - 0360 B *	14	366	318	416	1,3	6	7.5	100	e
EF -x - 0390 B *	15	390	342	440	1,4	6	7.5	100	e
EF -x - 0450 B	18	462	414	512	1,6	6	7.5	100	e
EF -x - 0540 B *	21	534	486	584	1,8	6	7.5	100	e
EF -x - 0600 B	24	606	558	656	2,0	6	7.5	100	e
EF -x - 0680 B *	27	678	630	728	2,4	11	15	100	e
EF -x - 0750 B	30	750	702	800	2,4	11	15	100	e
EF -x - 0820 B *	33	822	774	872	2,6	11	15	100	e
EF -x - 0900 B	36	894	846	944	2,8	11	15	100	e
EF -x - 0970 B *	39	966	918	1016	3,0	11	15	100	e
EF -x - 1050 B	42	1038	990	1088	3,2	11	15	100	e
EF -x - 1100 B *	45	1110	1062	1160	3,4	11	15	100	e
EF -x - 1200 B	48	1182	1134	1232	3,6	11	15	100	e
EF -x - 1250 B *	51	1254	1206	1304	3,8	11	15	100	e
EF -x - 1350 B	54	1326	1278	1376	4,0	11	15	100	e
EF -x - 1400 B *	57	1398	1350	1448	4,2	11	15	100	e
EF -x - 1500 B	60	1470	1422	1520	4,4	11	15	100	e
EF -x - 1650 B	66	1614	1566	1664	4,8	11	15	100	e
EF -x - 1800 B	72	1758	1710	1808	5,2	16	22.5	100	e
EF -x - 1950 B	78	1902	1854	1952	5,6	16	22.5	100	e
EF -x - 2100 B	84	2046	1998	2096	6,0	16	22.5	100	e
EF -x - 2200 B	90	2190	2142	2240	6,4	16	22.5	100	e
EF -x - 2300 B	96	2334	2286	2384	6,8	16	22.5	100	e
EF -x - 2450 B	102	2478	2430	2528	7,2	16	22.5	100	e
EF -x - 2650 B	108	2622	2574	2672	7,6	16	22.5	99,1	e
EF -x - 2750 B	114	2776	2718	2816	8,0	21	30	97,1	e
EF -x - 2900 B	120	2910	2862	2960	8,4	21	30	95,2	e
EF -x - 3000 B	126	3054	3006	3104	8,8	21	30	93,3	e

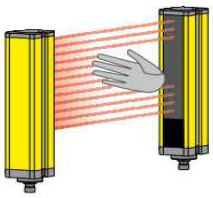
* The indicated models cannot implement the blanking function.



HAND DETECTION

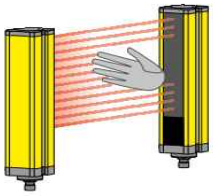
Resolution 40mm	Range 6 .. 30m	Optic code "BL"							
Model	N° beams	Protected height PH mm	Sensitive height SH mm	Barrier height H mm	Weight Tx + Rx Kg	Response time ms	Response time with blanking ms	MTTFd years	PL
EF -x - 0150 BL	6	185	135	272	0,8	6	7.5	100	e
EF -x - 0210 BL *	8	233	183	272	0,9	6	7.5	100	e
EF -x - 0240 BL *	9	257	207	296	1,0	6	7.5	100	e
EF -x - 0300 BL	12	329	279	368	1,2	6	7.5	100	e
EF -x - 0360 BL *	14	377	327	416	1,3	6	7.5	100	e
EF -x - 0390 BL *	15	401	351	440	1,4	6	7.5	100	e
EF -x - 0450 BL	18	473	423	512	1,6	6	7.5	100	e
EF -x - 0540 BL *	21	545	495	584	1,8	6	7.5	100	e
EF -x - 0600 BL	24	617	567	656	2,0	6	7.5	100	e
EF -x - 0680 BL *	27	689	639	728	2,4	11	15	100	e
EF -x - 0750 BL	30	761	711	800	2,4	11	15	100	e
EF -x - 0820 BL *	33	833	783	872	2,6	11	15	100	e
EF -x - 0900 BL	36	905	855	944	2,8	11	15	100	e
EF -x - 0970 BL *	39	977	927	1016	3,0	11	15	100	e
EF -x - 1050 BL	42	1049	999	1088	3,2	11	15	100	e
EF -x - 1100 BL *	45	1121	1071	1160	3,4	11	15	100	e
EF -x - 1200 BL	48	1193	1143	1232	3,6	11	15	100	e
EF -x - 1250 BL *	51	1265	1215	1304	3,8	11	15	100	e
EF -x - 1350 BL	54	1337	1287	1376	4,0	11	15	100	e
EF -x - 1400 BL *	57	1409	1359	1448	4,2	11	15	100	e
EF -x - 1500 BL	60	1481	1431	1520	4,4	11	15	100	e
EF -x - 1650 BL	66	1625	1575	1664	4,8	11	15	100	e
EF -x - 1800 BL	72	1769	1719	1808	5,2	16	22.5	100	e
EF -x - 1950 BL	78	1913	1863	1952	5,6	16	22.5	100	e
EF -x - 2100 BL	84	2057	2007	2096	6,0	16	22.5	100	e
EF -x - 2200 BL	90	2201	2151	2240	6,4	16	22.5	100	e
EF -x - 2300 BL	96	2345	2295	2384	6,8	16	22.5	100	e
EF -x - 2450 BL	102	2489	2439	2528	7,2	16	22.5	100	e
EF -x - 2650 BL	108	2633	2583	2672	7,6	16	22.5	99,1	e
EF -x - 2750 BL	114	2777	2727	2816	8,0	21	30	97,1	e
EF -x - 2900 BL	120	2921	2871	2960	8,4	21	30	95,2	e
EF -x - 3000 BL	126	3065	3015	3104	8,8	21	30	93,3	e

* The indicated models cannot implement the blanking function.



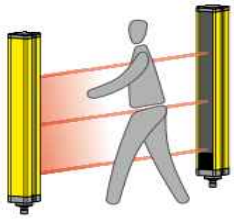
ARM DETECTION

Resolution 55mm	Range 0,5 .. 15m	Optic code "C"							
Model	N° beams	Protected height PH mm	Sensitive height SH mm	Barrier height H mm	Weight Tx + Rx Kg	Response time ms	Response time with blanking ms	MTTFd years	PL
EF -x - 0150 C	3	200	102	272	0,8	6	7.5	100	e
EF -x - 0250 C	5	296	198	296	1,1	6	7.5	100	e
EF -x - 0300 C	6	344	246	368	1,2	6	7.5	100	e
EF -x - 0400 C	8	440	342	440	1,5	6	7.5	100	e
EF -x - 0450 C	9	488	390	512	1,6	6	7.5	100	e
EF -x - 0600 C	12	632	534	656	2,0	6	7.5	100	e
EF -x - 0750 C	15	776	678	800	2,4	6	7.5	100	e
EF -x - 0900 C	18	920	822	944	2,8	6	7.5	100	e
EF -x - 1050 C	21	1064	966	1088	3,2	6	7.5	100	e
EF -x - 1200 C	24	1208	1110	1232	3,6	6	7.5	100	e
EF -x - 1350 C	27	1352	1254	1376	4,0	11	15	100	e
EF -x - 1500 C	30	1496	1398	1520	4,4	11	15	100	e
EF -x - 1650 C	33	1640	1542	1664	4,8	11	15	100	e
EF -x - 1800 C	36	1784	1686	1808	5,2	11	15	100	e
EF -x - 1950 C	39	1928	1830	1952	5,6	11	15	100	e
EF -x - 2100 C	42	2072	1974	2096	6,0	11	15	100	e
EF -x - 2200 C	45	2216	2118	2240	6,4	11	15	100	e
EF -x - 2300 C	48	2360	2262	2384	6,8	11	15	100	e
EF -x - 2450 C	51	2504	2406	2528	7,2	11	15	100	e
EF -x - 2650 C	54	2648	2550	2672	7,6	11	15	100	e
EF -x - 2750 C	57	2792	2694	2816	8,0	11	15	100	e
EF -x - 2900 C	60	2936	2838	2960	8,4	11	15	100	e
EF -x - 3000 C	63	3080	2982	3104	8,8	11	15	100	e



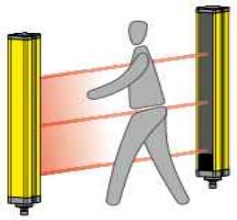
ARM DETECTION

Resolution 65mm	Range 6 .. 30m	Optic code "CL"							
Model	N° beams	Protected height PH mm	Sensitive height SH mm	Barrier height H mm	Weight Tx + Rx Kg	Response time ms	Response time with blanking ms	MTTFd years	PL
EF -x - 0150 CL	3	211	111	272	0,8	6	7.5	100	e
EF -x - 0250 CL	5	307	207	296	1,1	6	7.5	100	e
EF -x - 0300 CL	6	355	255	368	1,2	6	7.5	100	e
EF -x - 0400 CL	8	451	351	440	1,5	6	7.5	100	e
EF -x - 0450 CL	9	499	399	512	1,6	6	7.5	100	e
EF -x - 0600 CL	12	643	543	656	2,0	6	7.5	100	e
EF -x - 0750 CL	15	787	687	800	2,4	6	7.5	100	e
EF -x - 0900 CL	18	931	831	944	2,8	6	7.5	100	e
EF -x - 1050 CL	21	1075	975	1088	3,2	6	7.5	100	e
EF -x - 1200 CL	24	1219	1119	1232	3,6	6	7.5	100	e
EF -x - 1350 CL	27	1363	1263	1376	4,0	11	15	100	e
EF -x - 1500 CL	30	1507	1407	1520	4,4	11	15	100	e
EF -x - 1650 CL	33	1651	1551	1664	4,8	11	15	100	e
EF -x - 1800 CL	36	1795	1695	1808	5,2	11	15	100	e
EF -x - 1950 CL	39	1939	1839	1952	5,6	11	15	100	e
EF -x - 2100 CL	42	2083	1983	2096	6,0	11	15	100	e
EF -x - 2200 CL	45	2227	2127	2240	6,4	11	15	100	e
EF -x - 2300 CL	48	2371	2271	2384	6,8	11	15	100	e
EF -x - 2450 CL	51	2515	2415	2528	7,2	11	15	100	e
EF -x - 2650 CL	54	2659	2559	2672	7,6	11	15	100	e
EF -x - 2750 CL	57	2803	2703	2816	8,0	11	15	100	e
EF -x - 2900 CL	60	2947	2847	2960	8,4	11	15	100	e
EF -x - 3000 CL	63	3091	2991	3104	8,8	11	15	100	e



BODY DETECTION

Resolution 125mm	Range 0,5 .. 15m	Optic code "D"						
Model	N° beams	Sensitive height SH mm	Barrier height H mm	Weight Tx + Rx Kg	Response time ms	Response time with blanking ms	MTTFd years	PL
EF - x - 0350 D	4	366	465	1,6	6	7.5	100	e
EF - x - 0600 D	6	606	705	2,8	6	7.5	100	e
EF - x - 0850 D	8	846	945	3,2	6	7.5	100	e
EF - x - 1050 D	10	1086	1185	4,2	6	7.5	100	e
EF - x - 1350 D	12	1326	1425	4,8	6	7.5	100	e
EF - x - 1550 D	14	1566	1665	5,4	6	7.5	100	e
EF - x - 1800 D	16	1806	1905	6,0	6	7.5	100	e
EF - x - 2050 D	18	2046	2145	6,6	6	7.5	100	e
EF - x - 2250 D	20	2286	2385	7,2	6	7.5	100	e
EF - x - 2550 D	22	2526	2625	7,8	6	7.5	100	e
EF - x - 2750 D	24	2766	2865	8,4	6	7.5	100	e
EF - x - 3050 D	26	3006	3105	9,0	11	15	100	e



BODY DETECTION

Resolution 135mm	Range 6 .. 30m	Optic code "DL"						
Model	N° beams	Sensitive height SH mm	Barrier height H mm	Weight Tx + Rx Kg	Response time ms	Response time with blanking ms	MTTFd years	PL
EF - x - 0350 DL	4	375	465	1,6	6	7.5	100	e
EF - x - 0600 DL	6	615	705	2,8	6	7.5	100	e
EF - x - 0850 DL	8	855	945	3,2	6	7.5	100	e
EF - x - 1050 DL	10	1095	1185	4,2	6	7.5	100	e
EF - x - 1350 DL	12	1335	1425	4,8	6	7.5	100	e
EF - x - 1550 DL	14	1575	1665	5,4	6	7.5	100	e
EF - x - 1800 DL	16	1815	1905	6,0	6	7.5	100	e
EF - x - 2050 DL	18	2055	2145	6,6	6	7.5	100	e
EF - x - 2250 DL	20	2295	2385	7,2	6	7.5	100	e
EF - x - 2550 DL	22	2535	2625	7,8	6	7.5	100	e
EF - x - 2750 DL	24	2775	2865	8,4	6	7.5	100	e
EF - x - 3050 DL	26	3015	3105	9,0	11	15	100	e

Resolution 306mm	Range 0,5 .. 15m	Optic code "E"						
Model	N° beams	Sensitive height SH mm	Barrier height H mm	Weight Tx + Rx Kg	Response time ms	Response time with blanking ms	MTTFd years	PL
EF -x - 0300 E	2	306	457	1,5	6	7.5	100	e
EF -x - 0650 E	3	606	757	1,9	6	7.5	100	e
EF -x - 0900 E	4	906	1057	3,0	6	7.5	100	e
EF -x - 1200 E	5	1206	1357	4,1	6	7.5	100	e
EF -x - 1550 E	6	1506	1657	5,2	6	7.5	100	e
EF -x - 1800 E	7	1806	1957	6,3	6	7.5	100	e
EF -x - 2250 E	8	2106	2257	7,4	6	7.5	100	e
EF -x - 2400 E	9	2406	2557	8,5	6	7.5	100	e
EF -x - 2750 E	10	2706	2857	9,6	6	7.5	100	e
EF -x - 3000 E	11	3006	3157	10,7	6	7.5	100	e

Resolution 315mm	Range 6 .. 30m	Optic code "EL"						
Model	N° beams	Sensitive height SH mm	Barrier height H mm	Weight Tx + Rx Kg	Response time ms	Response time with blanking ms	MTTFd years	PL
EF -x - 0300 EL	2	315	457	1,5	6	7.5	100	e
EF -x - 0650 EL	3	615	757	1,9	6	7.5	100	e
EF -x - 0900 EL	4	915	1057	3,0	6	7.5	100	e
EF -x - 1200 EL	5	1215	1357	4,1	6	7.5	100	e
EF -x - 1550 EL	6	1515	1657	5,2	6	7.5	100	e
EF -x - 1800 EL	7	1815	1957	6,3	6	7.5	100	e
EF -x - 2250 EL	8	2115	2257	7,4	6	7.5	100	e
EF -x - 2400 EL	9	2415	2557	8,5	6	7.5	100	e
EF -x - 2750 EL	10	2715	2857	9,6	6	7.5	100	e
EF -x - 3000 EL	11	3015	3157	10,7	6	7.5	100	e

EFESTO SZ

The EFESTO SZ series barriers, based on the EFESTO4 series, have been developed to minimize mechanical size by eliminating the dead zone usually dedicated to indicator LEDs.

OVERVIEW OF AVAILABLE FUNCTIONS

TEST

The test function, which is located on the transmitter, simulates the interruption of the barrier's beams. It facilitates the control of the machine's safety chain.

BARGRAPH ALLIGNMENT

The three alignment indicators allow for a simpler alignment process for difficult installations, for example when using mirrors or covering long distances. A percentage of aligned beams is associated with each indicator.

MASTER-SLAVE (Anti-entrapment systems)

When the safety distance is particularly high, (for example with large presses) the operator must be guaranteed to be detected even when fully crossing the vertical barrier.

TECHNICAL CHARACTERISTICS

Type (in agreement with EN 61496-1)	Type 4
SIL (in agreement with EN 61508)	SIL 3
SILCL (in agreement with EN 62061)	SILCL 3
PL (in agreement with EN ISO 13849-1)	PL e
Transmitter/receiver synchronization	Optic
Power	24 Vdc ±10%
Resolutions	14, 20, 30, 40, 55, 65, 125, 135, 306, 315 mm
Maximum range (depending on resolution)	6, 15, 30, 60 m
Height protected	From 200 mm to 3000 mm
Response time	From 5 to 30 ms depending on the number of rays
Static output	2 PNP-500 mA protected from short-circuit and overload
Maximum length of connection	100 m
Casting dimensions	Section 36 X 50 mm yellow RAL 1021
Protection level	IP65
Relative humidity	5 .. 95 %
Operating temperature	-10 .. 65 °C Non condensing

All models are provided with:

- Transmitter with M12 four-pole connector with test function input.
- Bargraph with three indicators for alignment and signalling.
- Automatic reset.

Depending on the chosen model, the following functions are available:

Model	Available function		Receiver connectors	
	RM	EDM	M12 5P	M12 8P
EFSZ- a			•	
EFSZ- b	•	•		•

RM	Manual reset function.
EDM	External contactor monitoring function.
M12-5 P	Connector M12 - 5 pole – male for the receiver
M12-8 P	Connector M12 - 8 pole – male for the receiver

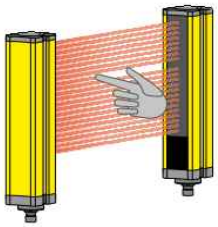
IDENTIFICATION CODE

EFSZ – a 450 B - J

Model	see table pag 17		
Detection area height	see table pag 18-23		
Optic code	see table pag 18-23		
Master / Slave *	optional	**M** = Master	**S** = Slave
Additional indicator	optional	**J** = LED end cup	**D** = Display slave

* Suffix only present in Master / Slave versions

EFESTO SZ

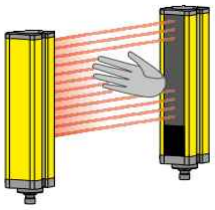


FINGER DETECTION

Resolution 14mm	Range 0,5 .. 6m	Optic code "A"						
Model	N° beams	Protected height PH mm	Sensitive height SH mm	Barrier height H mm	Weight Tx + Rx Kg	Response time ms	MTTFd years	PL
EFSZ -x - 0180 A	18	194	174	218	0.9	6	100	e
EFSZ -x - 0240 A	24	254	234	280	1.1	6	100	e
EFSZ -x - 0300 A	30	314	294	340	1.4	11	100	e
EFSZ -x - 0360 A	36	374	354	400	1.7	11	100	e
EFSZ -x - 0420 A	42	434	414	460	1.9	11	100	e
EFSZ -x - 0480 A	48	494	474	520	2.1	11	100	e
EFSZ -x - 0540 A	54	554	534	580	2.3	11	100	e
EFSZ -x - 0600 A	60	614	594	640	2.5	11	100	e
EFSZ -x - 0660 A	66	674	654	700	2.7	11	96.2	e
EFSZ -x - 0700 A	72	734	714	760	3.0	16	90.8	e
EFSZ -x - 0780 A	78	794	774	820	3.2	16	85.9	e
EFSZ -x - 0850 A	84	854	834	880	3.4	16	81.6	e
EFSZ -x - 0900 A	90	914	894	940	3.6	16	77.6	e
EFSZ -x - 0950 A	96	974	954	1000	3.8	16	74.1	e
EFSZ -x - 1100 A	108	1094	1074	1120	4.2	16	67.8	e
EFSZ -x - 1200 A	120	1214	1194	1240	4.7	21	62.5	e
EFSZ -x - 1300 A	132	1334	1314	1360	5.1	21	58.0	e
EFSZ -x - 1400 A	144	1454	1434	1480	5.5	21	54.1	e
EFSZ -x - 1500 A	156	1574	1554	1600	5.9	26	50.7	e
EFSZ -x - 1700 A	168	1694	1674	1720	6.4	26	47.7	e
EFSZ -x - 1800 A	180	1814	1794	1840	6.8	26	45.0	e
EFSZ -x - 1900 A	192	1934	1914	1960	7.2	31	42.6	e
EFSZ -x - 2000 A	204	2054	2034	2080	7.6	31	40.4	e
EFSZ -x - 2200 A	216	2174	2154	2200	8.1	31	38,5	e
EFSZ -x - 2300 A	228	2294	2274	2320	8.5	31	36.7	e

HAND DETECTION

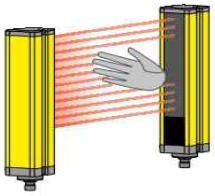
Resolution 20mm	Range 2 .. 15m	Optic code	"AL"					
Model	N° beams	Protected height PH mm	Sensitive height SH mm	Barrier height H mm	Weight Tx + Rx Kg	Response time ms	MTTFd years	PL
EFSZ -x - 0180 AL	18	200	180	218	0.9	6	100	e
EFSZ -x - 0240 AL	24	260	240	280	1.1	6	100	e
EFSZ -x - 0300 AL	30	320	300	340	1.3	11	100	e
EFSZ -x - 0360 AL	36	380	360	400	1.7	11	100	e
EFSZ -x - 0420 AL	42	440	420	460	1.9	11	100	e
EFSZ -x - 0480 AL	48	500	480	520	2.1	11	100	e
EFSZ -x - 0540 AL	54	560	540	580	2.3	11	100	e
EFSZ -x - 0600 AL	60	620	600	640	2.5	11	100	e
EFSZ -x - 0660 AL	66	680	660	700	2.7	11	96.2	e
EFSZ -x - 0700 AL	72	740	720	760	3.0	16	90.8	e
EFSZ -x - 0780 AL	78	800	780	820	3.2	16	85.9	e
EFSZ -x - 0850 AL	84	860	840	880	3.4	16	81.6	e
EFSZ -x - 0900 AL	90	920	900	940	3.6	16	77.6	e
EFSZ -x - 0950 AL	96	980	960	1000	3.8	16	74.1	e
EFSZ -x - 1100 AL	108	1100	1080	1120	4.2	16	67.8	e
EFSZ -x - 1200 AL	120	1220	1200	1240	4.7	21	62.5	e
EFSZ -x - 1300 AL	132	1340	1320	1360	5.1	21	58.0	e
EFSZ -x - 1400 AL	144	1460	1440	1480	5.5	21	54.1	e
EFSZ -x - 1500 AL	156	1580	1560	1600	5.9	26	50.7	e
EFSZ -x - 1700 AL	168	1700	1680	1720	6.4	26	47.7	e
EFSZ -x - 1800 AL	180	1820	1800	1840	6.8	26	45.0	e
EFSZ -x - 1900 AL	192	1940	1920	1960	7.2	31	42.6	e
EFSZ -x - 2000 AL	204	2060	2040	2080	7.6	31	40.4	e
EFSZ -x - 2200 AL	216	2180	2160	2200	8.1	31	38,5	e
EFSZ -x - 2300 AL	228	2300	2280	2320	8.5	31	36.7	e



HAND DETECTION

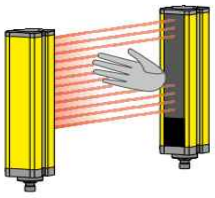
Resolution 30mm	Range 0,5 .. 15m	Optic code "B"						
Model	N° beams	Protected height PH mm	Sensitive height SH mm	Barrier height H mm	Weight Tx + Rx Kg	Response time ms	MTTFd years	PL
EFSZ -x - 0150 B	6	174	126	215	0,8	6	100	e
EFSZ -x - 0210 B	8	222	174	225	0,9	6	100	e
EFSZ -x - 0240 B	9	246	198	250	1,0	6	100	e
EFSZ -x - 0300 B	12	318	270	322	1,2	6	100	e
EFSZ -x - 0360 B	14	366	318	370	1,3	6	100	e
EFSZ -x - 0390 B	15	390	342	394	1,4	6	100	e
EFSZ -x - 0450 B	18	462	414	466	1,6	6	100	e
EFSZ -x - 0540 B	21	534	486	538	1,8	6	100	e
EFSZ -x - 0600 B	24	606	558	610	2,0	6	100	e
EFSZ -x - 0680 B	27	678	630	682	2,4	11	100	e
EFSZ -x - 0750 B	30	750	702	754	2,4	11	100	e
EFSZ -x - 0820 B	33	822	774	826	2,6	11	100	e
EFSZ -x - 0900 B	36	894	846	898	2,8	11	100	e
EFSZ -x - 0970 B	39	966	918	970	3,0	11	100	e
EFSZ -x - 1050 B	42	1038	990	1042	3,2	11	100	e
EFSZ -x - 1100 B	45	1110	1062	1114	3,4	11	100	e
EFSZ -x - 1200 B	48	1182	1134	1186	3,6	11	100	e
EFSZ -x - 1250 B	51	1254	1206	1258	3,8	11	100	e
EFSZ -x - 1350 B	54	1326	1278	1330	4,0	11	100	e
EFSZ -x - 1400 B	57	1398	1350	1402	4,2	11	100	e
EFSZ -x - 1500 B	60	1470	1422	1474	4,4	11	100	e
EFSZ -x - 1650 B	66	1614	1566	1618	4,8	11	100	e
EFSZ -x - 1800 B	72	1758	1710	1762	5,2	16	100	e
EFSZ -x - 1950 B	78	1902	1854	1906	5,6	16	100	e
EFSZ -x - 2100 B	84	2046	1998	2050	6,0	16	100	e
EFSZ -x - 2200 B	90	2190	2142	2194	6,4	16	100	e
EFSZ -x - 2300 B	96	2334	2286	2338	6,8	16	100	e
EFSZ -x - 2450 B	102	2478	2430	2482	7,2	16	100	e
EFSZ -x - 2650 B	108	2622	2574	2626	7,6	16	99,1	e
EFSZ -x - 2750 B	114	2776	2718	2770	8,0	21	97,1	e
EFSZ -x - 2900 B	120	2910	2862	2914	8,4	21	95,2	e
EFSZ -x - 3000 B	126	3054	3006	3058	8,8	21	93,3	e

EFESTO SZ



HAND DETECTION

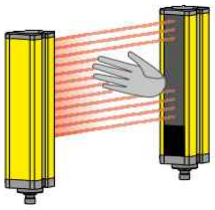
Resolution 40mm	Range 6 .. 30m	Optic code "BL"						
Model	N° beams	Protected height PH mm	Sensitive height SH mm	Barrier height H mm	Weight Tx + Rx Kg	Response time ms	MTTFd years	PL
EFSZ -x - 0150 BL	6	185	135	215	0,8	6	100	e
EFSZ -x - 0210 BL	8	233	183	225	0,9	6	100	e
EFSZ -x - 0240 BL	9	257	207	250	1,0	6	100	e
EFSZ -x - 0300 BL	12	329	279	322	1,2	6	100	e
EFSZ -x - 0360 BL	14	377	327	370	1,3	6	100	e
EFSZ -x - 0390 BL	15	401	351	394	1,4	6	100	e
EFSZ -x - 0450 BL	18	473	423	466	1,6	6	100	e
EFSZ -x - 0540 BL	21	545	495	538	1,8	6	100	e
EFSZ -x - 0600 BL	24	617	567	610	2,0	6	100	e
EFSZ -x - 0680 BL	27	689	639	682	2,4	11	100	e
EFSZ -x - 0750 BL	30	761	711	754	2,4	11	100	e
EFSZ -x - 0820 BL	33	833	783	826	2,6	11	100	e
EFSZ -x - 0900 BL	36	905	855	898	2,8	11	100	e
EFSZ -x - 0970 BL	39	977	927	970	3,0	11	100	e
EFSZ -x - 1050 BL	42	1049	999	1042	3,2	11	100	e
EFSZ -x - 1100 BL	45	1121	1071	1114	3,4	11	100	e
EFSZ -x - 1200 BL	48	1193	1143	1186	3,6	11	100	e
EFSZ -x - 1250 BL	51	1265	1215	1258	3,8	11	100	e
EFSZ -x - 1350 BL	54	1337	1287	1330	4,0	11	100	e
EFSZ -x - 1400 BL	57	1409	1359	1402	4,2	11	100	e
EFSZ -x - 1500 BL	60	1481	1431	1474	4,4	11	100	e
EFSZ -x - 1650 BL	66	1625	1575	1618	4,8	11	100	e
EFSZ -x - 1800 BL	72	1769	1719	1762	5,2	16	100	e
EFSZ -x - 1950 BL	78	1913	1863	1906	5,6	16	100	e
EFSZ -x - 2100 BL	84	2057	2007	2050	6,0	16	100	e
EFSZ -x - 2200 BL	90	2201	2151	2194	6,4	16	100	e
EFSZ -x - 2300 BL	96	2345	2295	2338	6,8	16	100	e
EFSZ -x - 2450 BL	102	2489	2439	2482	7,2	16	100	e
EFSZ -x - 2650 BL	108	2633	2583	2626	7,6	16	99,18	e
EFSZ -x - 2750 BL	114	2777	2727	2770	8,0	21	97,15	e
EFSZ -x - 2900 BL	120	2921	2871	2914	8,4	21	95,21	e
EFSZ -x - 3000 BL	126	3065	3015	3058	8,8	21	93,35	e



ARM DETECTION

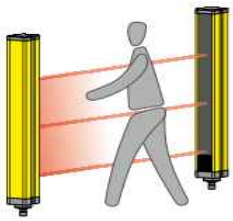
Resolution 55mm	Range 0,5 .. 15m	Optic code "C"						
Model	N° beams	Protected height PH mm	Sensitive height SH mm	Barrier height H mm	Weight Tx + Rx Kg	Response time ms	MTTFd years	PL
EFSZ -x - 0150 C	3	200	102	215	0,8	6	100	e
EFSZ -x - 0250 C	5	296	198	250	1,1	6	100	e
EFSZ -x - 0300 C	6	344	246	322	1,2	6	100	e
EFSZ -x - 0400 C	8	440	342	394	1,5	6	100	e
EFSZ -x - 0450 C	9	488	390	466	1,6	6	100	e
EFSZ -x - 0600 C	12	632	534	610	2,0	6	100	e
EFSZ -x - 0750 C	15	776	678	754	2,4	6	100	e
EFSZ -x - 0900 C	18	920	822	898	2,8	6	100	e
EFSZ -x - 1050 C	21	1064	966	1042	3,2	6	100	e
EFSZ -x - 1200 C	24	1208	1110	1186	3,6	6	100	e
EFSZ -x - 1350 C	27	1352	1254	1330	4,0	11	100	e
EFSZ -x - 1500 C	30	1496	1398	1474	4,4	11	100	e
EFSZ -x - 1650 C	33	1640	1542	1618	4,8	11	100	e
EFSZ -x - 1800 C	36	1784	1686	1762	5,2	11	100	e
EFSZ -x - 1950 C	39	1928	1830	1906	5,6	11	100	e
EFSZ -x - 2100 C	42	2072	1974	2050	6,0	11	100	e
EFSZ -x - 2200 C	45	2216	2118	2194	6,4	11	100	e
EFSZ -x - 2300 C	48	2360	2262	2338	6,8	11	100	e
EFSZ -x - 2450 C	51	2504	2406	2482	7,2	11	100	e
EFSZ -x - 2650 C	54	2648	2550	2626	7,6	11	100	e
EFSZ -x - 2750 C	57	2792	2694	2770	8,0	11	100	e
EFSZ -x - 2900 C	60	2936	2838	2914	8,4	11	100	e
EFSZ -x - 3000 C	63	3080	2982	3058	8,8	11	100	e

EFESTO SZ



ARM DETECTION

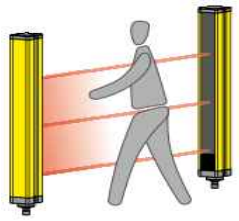
Resolution 65mm	Range 6 .. 30m	Optic code "CL"						
Model	N° beams	Protected height PH mm	Sensitive height SH mm	Barrier height H mm	Weight Tx + Rx Kg	Response time ms	MTTFd years	PL
EFSZ -x - 0150 CL	3	211	111	215	0,8	6	100	e
EFSZ -x - 0250 CL	5	307	207	250	1,1	6	100	e
EFSZ -x - 0300 CL	6	355	255	322	1,2	6	100	e
EFSZ -x - 0400 CL	8	451	351	394	1,5	6	100	e
EFSZ -x - 0450 CL	9	499	399	466	1,6	6	100	e
EFSZ -x - 0600 CL	12	643	543	610	2,0	6	100	e
EFSZ -x - 0750 CL	15	787	687	754	2,4	6	100	e
EFSZ -x - 0900 CL	18	931	831	898	2,8	6	100	e
EFSZ -x - 1050 CL	21	1075	975	1042	3,2	6	100	e
EFSZ -x - 1200 CL	24	1219	1119	1186	3,6	6	100	e
EFSZ -x - 1350 CL	27	1363	1263	1330	4,0	11	100	e
EFSZ -x - 1500 CL	30	1507	1407	1474	4,4	11	100	e
EFSZ -x - 1650 CL	33	1651	1551	1618	4,8	11	100	e
EFSZ -x - 1800 CL	36	1795	1695	1762	5,2	11	100	e
EFSZ -x - 1950 CL	39	1939	1839	1906	5,6	11	100	e
EFSZ -x - 2100 CL	42	2083	1983	2050	6,0	11	100	e
EFSZ -x - 2200 CL	45	2227	2127	2194	6,4	11	100	e
EFSZ -x - 2300 CL	48	2371	2271	2338	6,8	11	100	e
EFSZ -x - 2450 CL	51	2515	2415	2482	7,2	11	100	e
EFSZ -x - 2650 CL	54	2659	2559	2626	7,6	11	100	e
EFSZ -x - 2750 CL	57	2803	2703	2770	8,0	11	100	e
EFSZ -x - 2900 CL	60	2947	2847	2914	8,4	11	100	e
EFSZ -x - 3000 CL	63	3091	2991	3058	8,8	11	100	e



BODY DETECTION

Resolution 125mm	Range 0,5 .. 15m	Optic code "D"					
Model	N° beams	Sensitive height SH mm	Barrier height H mm	Weight Tx + Rx Kg	Response time ms	MTTFd years	PL
EFSZ - x - 0350 D	4	366	418	1,6	6	100	e
EFSZ - x - 0600 D	6	606	658	2,8	6	100	e
EFSZ - x - 0850 D	8	846	898	3,2	6	100	e
EFSZ - x - 1050 D	10	1086	1138	4,2	6	100	e
EFSZ - x - 1350 D	12	1326	1378	4,8	6	100	e
EFSZ - x - 1550 D	14	1566	1618	5,4	6	100	e
EFSZ - x - 1800 D	16	1806	1858	6,0	6	100	e
EFSZ - x - 2050 D	18	2046	2098	6,6	6	100	e
EFSZ - x - 2250 D	20	2286	2338	7,2	6	100	e
EFSZ - x - 2550 D	22	2526	2578	7,8	6	100	e
EFSZ - x - 2750 D	24	2766	2818	8,4	6	100	e
EFSZ - x - 3050 D	26	3006	3058	9,0	11	100	e

EFESTO SZ



BODY DETECTION

Resolution 135mm	Range 6 .. 30m	Optic code "DL"					
Model	N° beams	Sensitive height SH mm	Barrier height H mm	Weight Tx + Rx Kg	Response time ms	MTTFd years	PL
EFSZ - x - 0350 DL	4	375	418	1,6	6	100	e
EFSZ - x - 0600 DL	6	615	658	2,8	6	100	e
EFSZ - x - 0850 DL	8	855	898	3,2	6	100	e
EFSZ - x - 1050 DL	10	1095	1138	4,2	6	100	e
EFSZ - x - 1350 DL	12	1335	1378	4,8	6	100	e
EFSZ - x - 1550 DL	14	1575	1618	5,4	6	100	e
EFSZ - x - 1800 DL	16	1815	1858	6,0	6	100	e
EFSZ - x - 2050 DL	18	2055	2098	6,6	6	100	e
EFSZ - x - 2250 DL	20	2295	2338	7,2	6	100	e
EFSZ - x - 2550 DL	22	2535	2578	7,8	6	100	e
EFSZ - x - 2750 DL	24	2775	2818	8,4	6	100	e
EFSZ - x - 3050 DL	26	3015	3058	9,0	11	100	e

Resolution 306mm	Range 0,5 .. 15m	Optic code "E"					
Model	N° beams	Sensitive height SH mm	Barrier height H mm	Weight Tx + Rx Kg	Response time ms	MTTFd years	PL
EFSZ -x - 0300 E	2	306	408	1,5	6	100	e
EFSZ -x - 0650 E	3	606	708	1,9	6	100	e
EFSZ -x - 0900 E	4	906	1008	3,0	6	100	e
EFSZ -x - 1200 E	5	1206	1308	4,1	6	100	e
EFSZ -x - 1550 E	6	1506	1608	5,2	6	100	e
EFSZ -x - 1800 E	7	1806	1908	6,3	6	100	e
EFSZ -x - 2250 E	8	2106	2208	7,4	6	100	e
EFSZ -x - 2400 E	9	2406	2508	8,5	6	100	e
EFSZ -x - 2750 E	10	2706	2808	9,6	6	100	e
EFSZ -x - 3000 E	11	3006	3108	10,7	6	100	e

Resolution 315mm	Range 6 .. 30m	Optic code "EL"					
Model	N° beams	Sensitive height SH mm	Barrier height H mm	Weight Tx + Rx Kg	Response time ms	MTTFd years	PL
EFSZ -x - 0300 EL	2	315	408	1,5	6	100	e
EFSZ -x - 0650 EL	3	615	708	1,9	6	100	e
EFSZ -x - 0900 EL	4	915	1008	3,0	6	100	e
EFSZ -x - 1200 EL	5	1215	1308	4,1	6	100	e
EFSZ -x - 1550 EL	6	1515	1608	5,2	6	100	e
EFSZ -x - 1800 EL	7	1815	1908	6,3	6	100	e
EFSZ -x - 2250 EL	8	2115	2208	7,4	6	100	e
EFSZ -x - 2400 EL	9	2415	2508	8,5	6	100	e
EFSZ -x - 2750 EL	10	2715	2808	9,6	6	100	e
EFSZ -x - 3000 EL	11	3015	3108	10,7	6	100	e

OVERVIEW OF AVAILABLE FUNCTIONS

TEST

The test function, which is located on the transmitter, simulates the interruption of the barrier's beams. It facilitates the control of the machine's safety chain.

BARGRAPH ALIGNMENT

The three alignment indicators allow for a simpler alignment process for difficult installations, for example when using mirrors or covering long distances. A percentage of aligned beams is associated with each indicator.

MUTING WITH EXTERNAL SENSORS

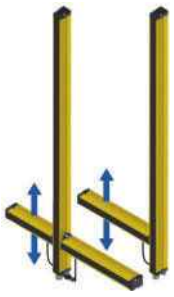
The muting function allows the temporary suspension of the barrier's protective function to guarantee passage of goods through the protected zone without deactivating the OSSD safety outputs. To signal the activation of the MUTING function, the barrier is equipped with a static PNP output, which supplies 24V when the system is active. In the event of a blockage of the machine, caused by an incorrect activation of the MUTING function, the GUARD OVERRIDE can activates the restart of the machine.

MUTING FUNCTION WITH INTEGRATED SENSORS IN THE ARM

This function, available only in the KEEPER version, allows the activation of the muting function by using external arms containing sensors with fixed detection geometries (xxM series). The arm can be adjusted vertically and angularly during installation.

The series xxi has the possibility of connecting external muting sensors chosen by the customer.

Serie TPM, TXM, LPM, LXM

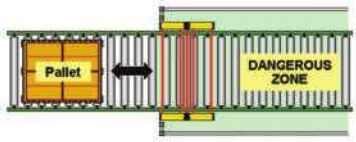


Serie TPi, TXi, LPi, LXi

The barriers can be supplied in a T configuration for entry and exit detection or in an L configuration only for exit detection.

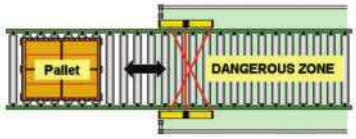
The sensors can be in a parallel or cross configuration.

In the parallel configuration the muting function is activated via an interruption of the correct sequence of the sensors. The maximum distance between TX and RX is 5m. In the T version, the passing object can interrupt the muting sensors in any direction of movement.



In the cross-beam configuration, the activation of the muting function is triggered by the simultaneous interruption of the sensors. Since the maximum distance between TX and RX is 2.5 m, the passing object will need to break the muting beams in the central area.

In the T version, the passing object can interrupt the muting beams in any position and direction of movement.



TIME FUNCTION

This function is only present in the KEEPER models e1, e2, e3. The time duration of the muting function can be selected. This setting is applied with two wires of the connector and allows for various time intervals: 1 minute, 90 minutes or 24 hours. At the end of the time interval the muting function disables.

TECHNICAL CHARACTERISTICS

Type(in agreement with EN 61496-1)	Type 4
SIL (in agreement with EN 61508)	SIL 3
SILCL (in agreement with EN 62061)	SILCL 3
PL (in agreement with EN ISO 13849-1)	PL e
Synchronization Receiver/Transmitter	Optic
Power	24 Vdc ±10%
Resolution	14, 30, 55, 125, 306 mm
Maximum range	0.5 –2.5 m crossed muting beams, 0.5 - 5 m parallel muting beams
Height protected	From 200 mm to 3000 mm
Detection angle	Independent of the angle of entry into the protected area
Response time	From 5 to 30ms depending on the number of beams
Static output	2 PNP-500mA protected from short-circuit and overload
Static exit reports	1 PNP-500mA protected from short-circuit and overload
Connectors	M12 5 - 8 poles depending on the model
Maximum length of connection	100 m
Casting dimensions	Section 36X50 mm yellow RAL 1021
Protection level	IP65
Relative humidity	5 .. 95 %
Operational temperature	-10 .. 65 °C non condensing

All models are provided with:
- Transmitter with M12 four (4) pole connector with test function input.
- Bargraph with 3 indicators for alignment and reports/warnings.
- Manual and automatic reset.
- External Device Monitor (EDM)
- Guard override for resetting the muting function (GOVR)
- Active muting indicator lamp output

Depending on the chosen model the following functions are also available:

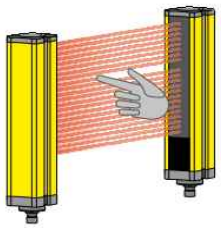
Model	Available function				Receiver connectors	
	TIME	MUTE-E	MUTE	M-F	M12 5P	M12 8P
KP- e			•		•	•
KP- e1	1 / 90 min			•	•	•
KP- e2	1 / 90 min	•			•	•
KP- e3	1 / 90 min 24 H				•	•

TIME	Selects the duration of the MUTING function.
MUTE	Input for two (2) external MUTING sensors.
MUTE-E	Input for the activation of the MUTING function.
M-F	Static output to signal the interruption of the vertical barrier during the MUTING phase
M12-5P	M12 connector - 5 poles - male
M12-8P	M12 connector - 8 poles - male

IDENTIFICATION CODE

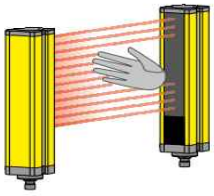
Kp – e | 900 | E | LXM1 | J

Model	See table pag 25	
Detection area height	See table pag 26-28	
Optic code	See table pag 26-28	
Muting	See table pag 29	
Additional indicators	optional	**J** = LED end cup



FINGER DETECTION

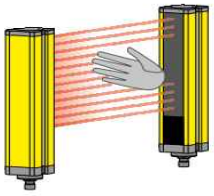
Resolution 14mm	Range 0,5 .. 6m		Optic code "A"					
Model	**N° beams**	**Protected height PH mm**	**Sensitive height SH mm**	**Barrier height H mm**	**Weight Tx + Rx Kg**	**Response time ms**	**MTTFd years**	**PL**
KP -x - 0240 A - yyyy	24	254	234	330	1.1	6	100	e
KP -x - 0360 A - yyyy	36	374	354	450	1.7	11	100	e
KP -x - 0480 A - yyyy	48	494	474	570	2.1	11	100	e
KP -x - 0600 A - yyyy	60	614	594	690	2.5	11	93.8	e
KP -x - 0700 A - yyyy	72	734	714	810	3.0	16	84,1	e
KP -x - 0850 A - yyyy	84	854	834	930	3.4	16	76,1	e
KP -x - 0950 A - yyyy	96	974	954	1050	3.8	16	69,5	e
KP -x - 1100 A - yyyy	108	1094	1074	1170	4.2	16	64.0	e



HAND DETECTION

Resolution 30mm	Range 0,5 .. 15m	Optic code "B"						
Model	**N° beams**	**Protected height PH mm**	**Sensitive height SH mm**	**Barrier height H mm**	**Weight Tx + Rx Kg**	**Response time ms**	**MTTFd years**	**PL**
KP - x - 0300 B - yyyy	12	318	270	368	1,3	6	100	e
KP - x - 0450 B - yyyy	18	462	414	512	1,7	6	100	e
KP - x - 0600 B - yyyy	24	606	558	656	2,1	6	100	e
KP - x - 0750 B - yyyy	30	750	702	800	2,4	11	100	e
KP - x - 0900 B - yyyy	36	894	846	944	2,8	11	100	e
KP - x - 1050 B - yyyy	42	1038	990	1088	3,2	11	100	e
KP - x - 1200 B - yyyy	48	1182	1134	1232	3,6	11	100	e
KP - x - 1350 B - yyyy	54	1326	1278	1376	4,1	11	100	e
KP - x - 1500 B - yyyy	60	1470	1422	1520	4,5	11	100	e
KP - x - 1650 B - yyyy	66	1614	1566	1664	4,9	11	100	e
KP - x - 1800 B - yyyy	72	1758	1710	1808	5,3	16	100	e
KP - x - 1950 B - yyyy	78	1902	1854	1952	5,7	16	100	e
KP - x - 2100 B - yyyy	84	2046	1998	2096	6,1	16	100	e
KP - x - 2200 B - yyyy	90	2190	2142	2240	6,5	16	100	e
KP - x - 2300 B - yyyy	96	2334	2286	2384	6,9	16	100	e
KP - x - 2450 B - yyyy	102	2478	2430	2528	7,3	16	100	e
KP - x - 2650 B - yyyy	108	2622	2574	2672	7,7	16	99,1	e

x = connection yyyy = muting type



ARM DETECTION

Resolution 55mm	Range 0,5 .. 15m	Optic code "C"						
Model	N° beams	Protected height PH mm	Sensitive height SH mm	Barrier height H mm	Weight Tx + Rx Kg	Response time ms	MTTFd years	PL
KP - x - 0300 C - yyyy	6	344	246	368	1,3	6	100	e
KP - x - 0450 C - yyyy	9	488	390	512	1,7	6	100	e
KP - x - 0600 C - yyyy	12	632	534	656	2,1	6	100	e
KP - x - 0750 C - yyyy	15	776	678	800	2,5	6	100	e
KP - x - 0900 C - yyyy	18	920	822	944	2,9	6	100	e
KP - x - 1050 C - yyyy	21	1064	966	1088	3,3	6	100	e
KP - x - 1200 C - yyyy	24	1208	1110	1232	3,7	6	100	e
KP - x - 1350 C - yyyy	27	1352	1254	1376	4,1	11	100	e
KP - x - 1500 C - yyyy	30	1496	1398	1520	4,5	11	100	e
KP - x - 1650 C - yyyy	33	1640	1542	1664	4,9	11	100	e
KP - x - 1800 C - yyyy	36	1784	1686	1808	5,3	11	100	e
KP - x - 1950 C - yyyy	39	1928	1830	1952	5,6	11	100	e
KP - x - 2100 C - yyyy	42	2072	1974	2096	6,0	11	100	e
KP - x - 2200 C - yyyy	45	2216	2118	2240	6,4	11	100	e
KP - x - 2300 C - yyyy	48	2360	2262	2384	6,9	11	100	e
KP - x - 2450 C - yyyy	51	2504	2406	2528	7,3	11	100	e
KP - x - 2650 C - yyyy	54	2648	2550	2672	7,7	11	100	e
KP - x - 2750 C - yyyy	57	2792	2694	2816	8,1	11	100	e
KP - x - 2900 C - yyyy	60	2936	2838	2960	8,5	11	100	e
KP - x - 3000 C - yyyy	63	3080	2982	3104	8,9	11	100	e

x = connection yyyy = muting type

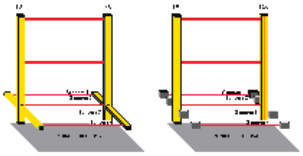
BODY DETECTION

Resolution 125mm	Range 0,5 .. 15m	Optic code "D"					
Model	N° beams	Sensitive height SH mm	Barrier height H mm	Weight Tx + Rx Kg	Response time ms	MTTFd years	PL
KP - x - 0350 D - yyyy	4	366	465	1,6	6	100	e
KP - x - 0600 D - yyyy	6	606	705	2,8	6	100	e
KP - x - 0850 D - yyyy	8	846	945	3,2	6	100	e
KP - x - 1050 D - yyyy	10	1086	1185	4,2	6	100	e
KP - x - 1350 D - yyyy	12	1326	1425	4,8	6	100	e
KP - x - 1550 D - yyyy	14	1566	1665	5,4	6	100	e
KP - x - 1800 D - yyyy	16	1806	1905	6,0	6	100	e
KP - x - 2050 D - yyyy	18	2046	2145	6,6	6	100	e
KP - x - 2250 D - yyyy	20	2286	2385	7,2	6	100	e
KP - x - 2550 D - yyyy	22	2526	2625	7,8	6	100	e
KP - x - 2750 D - yyyy	24	2766	2865	8,4	6	100	e
KP - x - 3050 D - yyyy	26	3006	3105	9,0	11	100	e

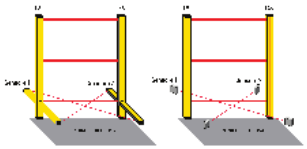
Resolution 306mm	Range 0,5 .. 15m	Optic code "E"					
Model	N° beams	Sensitive height SH mm	Barrier height H mm	Weight Tx + Rx Kg	Response time ms	MTTFd years	PL
KP -x - 0300 E - yyyy	2	306	457	1,5	6	100	e
KP -x - 0650 E - yyyy	3	606	757	1,9	6	100	e
KP -x - 0900 E - yyyy	4	906	1057	3,0	6	100	e
KP -x - 1200 E - yyyy	5	1206	1357	4,1	6	100	e
KP -x - 1550 E - yyyy	6	1506	1657	5,2	6	100	e
KP -x - 1800 E - yyyy	7	1806	1957	6,3	6	100	e
KP -x - 2250 E - yyyy	8	2106	2257	7,4	6	100	e
KP -x - 2400 E - yyyy	9	2406	2557	8,5	6	100	e
KP -x - 2750 E - yyyy	10	2706	2857	9,6	6	100	e
KP -x - 3000 E - yyyy	11	3006	3157	10,7	6	100	e

x = connection yyyy = muting type

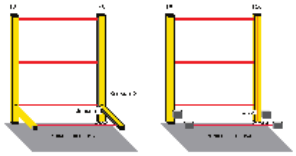
MUTING ARM CODE



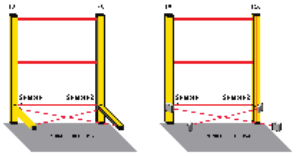
KEEPER P



KEEPER TX



KEEPER LP

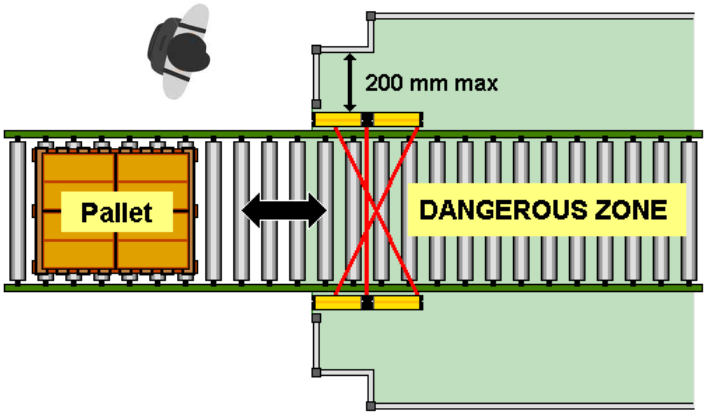


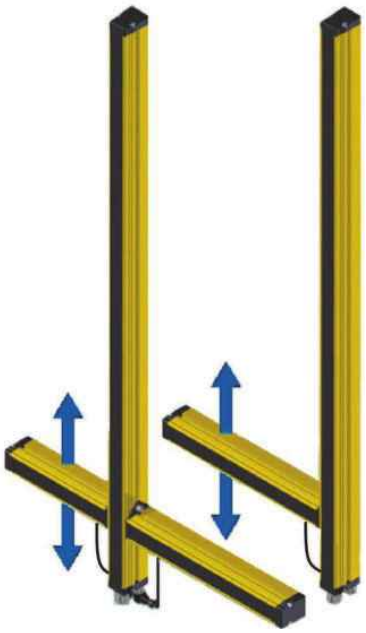
KEEPER LX

Muting type	Integrated muting arm
LPM1	L muting with two (2) parallel sensors, right receiver
LPM2	L muting with two (2) parallel sensors, left receiver
LXM1	L muting with two (2) crossed sensors, right receiver
LXM2	L muting with two (2) crossed sensors, left receiver
TXM1	T muting with two (2) mobile crossed sensors, right receiver
TXM2	T muting with two (2) mobile crossed sensors, left receiver
TPM3	T muting with four (4) mobile parallel sensors
Muting type	External muting arm
TPi3	T muting for four (4) parallel external sensors
TXi3	T muting for four (4) parallel external sensors
LPi3	L muting for two (2) parallel external sensors
LXi3	L muting for two (2) crossed external sensors

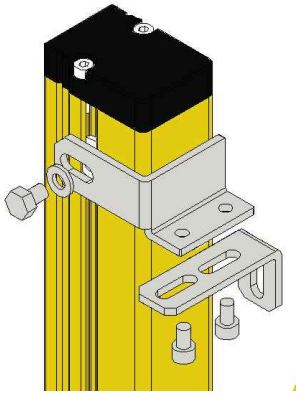
NOTE

Left and right receiver refer to the position of the receiver while observing the protected area from outside.





ACCESSORIES



A series of accessories which satisfy market demands is available

- Polycarbonate protections: splash-resistant shielding for operating in harsh operating environments where steam and water are present.
- Mirrors and supports, ideal for perimeter protection with angular adjustment through brackets.
- Connection cables from 5 to 30 m for TX/RX connections in different versions.
- Fixing brackets for barrier rotations and vertical and horizontal adjustment.
- Interfacing Modules for converting static outputs to relay power outputs.

POLYCARBONATE PROTECTIONS

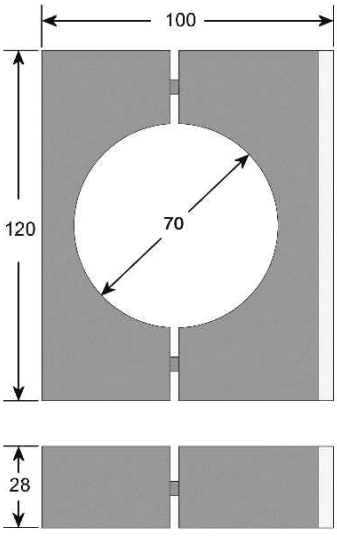
Models and identification codes

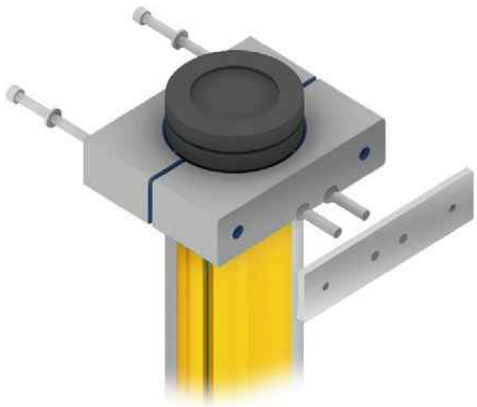
Polycarbonate tube protection for EFESTO4 and EFESTO SZ Diameter 60 / 70 mm with end cup and male M12 connection cable 5m	
	Code
VET- 1 for EF – 150 .. 240	D-15
VET- 2 for EF – 300 .. 390	D-25
VET- 3 for EF – 450 .. 750	D-35
VET- 4 for EF – 820 .. 1200	D-45
VET- 5 for EF – 1250 .. 1500	D-55
VET- 6 for EF – 1650 .. 1950	D-65
Bracket	
VET-70/60 complete kit with 4 support	D-05

For the dimension, please refer to the dimension tables for the barriers.
Add 90mm for the end cup and 25mm for the cable gland.

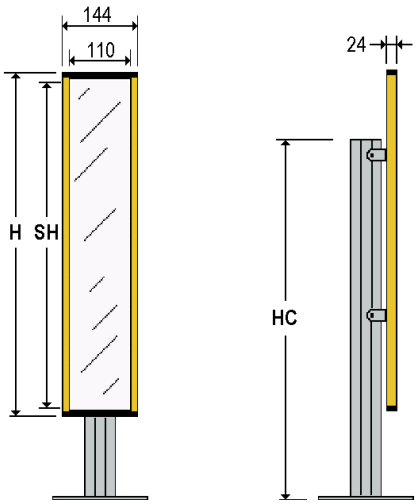
Bracket dimension

VET - 70/60



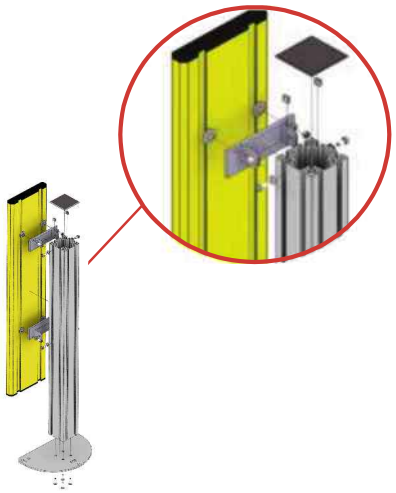


MIRRORS AND SUPPORTS



MIRRORS

TYPE	SH mm	H mm	Code
SCFS 3501	370	390	D-50
SCFS 3502	690	710	D-51
SCFS 3503	1010	1030	D-52
SCFS 3504	1330	1350	D-53
SCFS 3505	1650	1670	D-54
SCFS 3506	1810	1830	D-55
SCFS 3507	1970	1990	D-56



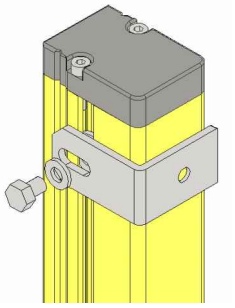
FLOOR SUPPORTS FOR MIRRORS / BARRIERS

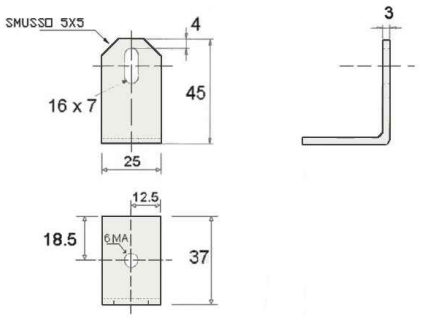
TYPE	HC mm	Code
SCFS-3021	385	D-60
SCFS-3022	705	D-61
SCFS-3023	1025	D-62
SCFS-3024	1325	D-63
SCFS-3025	1665	D-64
SCFS-3026	1905	D-65

FIXING BRACKETS

STGM brackets

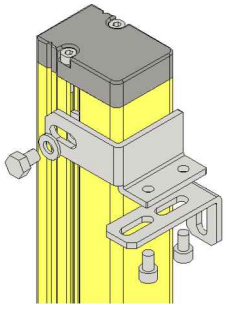
Simple L-shaped bracket which adjusts the angle of the barrier.
The sliding screw placed on the aluminium profiled section allows vertical movement to increase ease of placement.

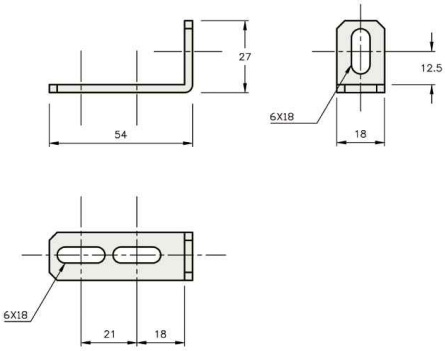




STDL brackets

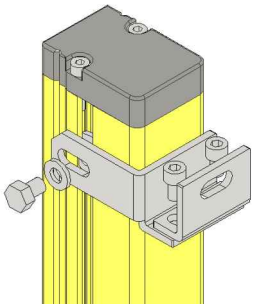
Double L-bracket used for lateral placement of barriers, which allows angular and lateral adjustment.

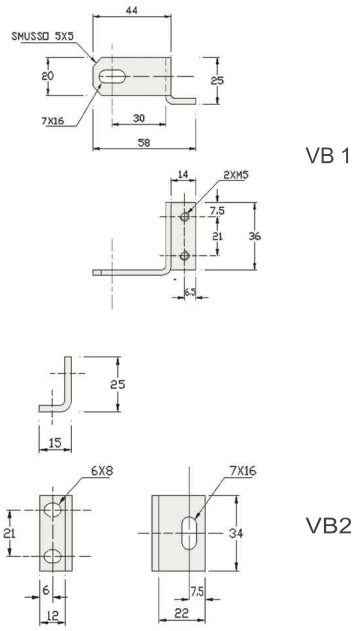




STVB brackets

A more compact bracket made of two pieces (VB1 - VB2) which reduce volume and make installation easier in smaller spaces, whilst maintaining adjustability to correctly align the units.

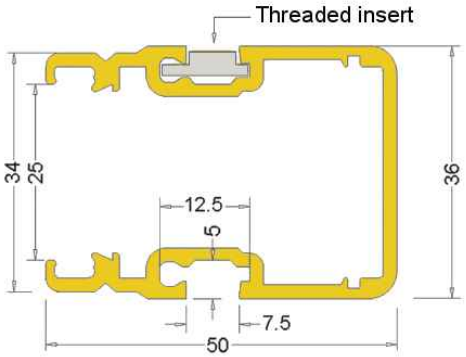




Cross section of the profile

Along the profile of the barriers there is a groove in which special threaded inserts can slide for fixing the brackets.

If it is necessary to remove them to insert them into the opposite groove, remove the black cap of the barrier without connector by unscrewing the two fixing screws.



RELAY INTERFACE MODULES

The following modules can be combined with EFESTO4, EFESTO-SZ and Keeper barriers to transform the static output into relay output. The REL02X series is a point of contact for the direct interface of the barrier to the machine without passing via the electrical cabinet.

REL 011 DIN rail relay module

REL 012 DIN rail relay module with muting lamp control

REL 013 DIN rail double relay module for two barriers

REL 021 B External relay module with reset key and output status lamp

For EFESTO4 and EFESTO-SZ barrier, connection **b**

REL 021 D External relay unit with reset key and output status indicator

For EFESTO4 barrier, connection **d**

REL 022 E, REL 022 E1, REL 022 E2, REL 022 E3

External relay modules with reset key, output status lamp, muting lamp, guard override.

For EF e, KP e, KP e1, KP e2, KP e3

LED END CUP

The integrated light inside the upper end cup of the barrier gives information regarding the safety outputs states and the MUTING function.
The settings on the MUTING function are supplied for the "**-e**" versions.
The state of the output and of the Muting function are explained in the following table:

BARRIER STATUS	COLOR
OSSD OFF	RED
OSSD ON	GREEN
MUTING ACTIVE	YELLOW

CABLE AND CONNECTORS FOR EFESTO4 EFESTO SZ AND KEEPER

Code	Description	
E-74-05	M12 four (4) poles PVC straight female cable 5m for TX	
E-74-10	M12 four (4) poles PVC straight female cable 10m for TX	
E-74-15	M12 four (4) poles PVC straight female cable 15m for TX	
E-74-20	M12 four (4) poles PVC straight female cable 20m for TX	
E-74-25	M12 four (4) poles PVC straight female cable 25m for TX	
E-74-30	M12 four (4) poles PVC straight female cable 30m for TX	
E-74S-05	M12 four (4) poles PVC female cable 90° 5m for TX	
E-74S-10	M12 four (4) poles PVC female cable 90° 10m for TX	
E-74S-05	M12 four (4) poles PVC female cable 90° 5m for RX a / d / e	
E-74S-10	M12 four (4) poles PVC female cable 90° 10m for RX a / d / e	
E-75-05	M12 five (5) poles PVC straight female cable 5m for RX a / d / e	
E-75-10	M12 five (5) poles PVC straight female cable 10m for RX a / d / e	
E-75-15	M12 five (5) poles PVC straight female cable 15m for RX a / d / e	
E-75-20	M12 five (5) poles PVC straight female cable 20m for RX a / d / e	
E-75-25	M12 five (5) poles PVC straight female cable 25m for RX a / d / e	
E-75-30	M12 five (5) poles PVC straight female cable 30m for RX a / d / e	
E-75S-05	M12 five (5) poles PVC female cable 90° 5m for RX a / d / e	
E-75S-10	M12 five (5) poles PVC female cable 90° 10m for RX a / d / e	
E-78-05	M12 eight (8) poles PVC straight female cable 5m for RX b / c / d / e	
E-78-10	M12 eight (8) poles PVC straight female cable 10m for RX b / c / d / e	
E-78-15	M12 eight (8) poles PVC straight female cable 15m for RX b / c / d / e	
E-78-20	M12 eight (8) poles PVC straight female cable 20m for RX b / c / d / e	
E-78-25	M12 eight (8) poles PVC straight female cable 25m for RX b / c / d / e	
E-78-30	M12 eight (8) poles PVC straight female cable 30m for RX b / c / d / e	
E-78S-05	M12 eight (8) poles PVC female cable 90° 5m for RX b / c / d / e	
E-78S-10	M12 eight (8) poles PVC female cable 90° 10m for RX b / c / d / e	
E-104-05	M12 (4) poles PVC fem + fem cable 5m for TX-Rel 021/ 022	
E-105-05	M12 (5) poles PVC fem + fem cable 5m for RX a/d/e -Rel 021/ 022	
E-108-05	M12 (8) poles PVC fem + fem cable 5m for RX b/c/d/e - Rel 021/ 022	
E-104-10	M12 (4) poles PVC fem + fem cable 10m for TX-Rel 021/ 022	
E-105-10	M12 (5) poles PVC fem + fem cable 10m for RX a/d/e -Rel 021/ 022	
E-108-10	M12 (8) poles PVC fem + fem cable 10m for RX b/c/d/e - Rel 021/ 022	
E-84-D	M12 female straight connector to cable 4 poles	
E-85-D	M12 female straight connector to cable 5 poles	
E-88-D	M12 female straight connector to cable 8 poles	
E-84-S	M12 female connector to cable 4 poles 90°	
E-85-S	M12 female connector to cable 5 poles 90°	
E-88-S	M12 female connector to cable 8 poles 90°	
E-75-Y	M12 double M 5 poles + 2F 4 poles cable for external muting photocells	

INTRODUCTION

The NS and NI series are **high performance** optoelectronic multi-bems barriers for automation in industrial and civil applications for the detection, measurement and recognition of objects of various shapes.

The NI series is used to detect the passage and presence of small objects (up to 0.9 mm small) at low and high speeds of movement. Detection does not depend on the material and colour of the passing object. Two counterphase push-pull exits are present. When the beams are interrupted one output is 24V,when the beams are free the output is 0V. The other output acts in the opposite way.

The NS series is used to measure size, areas, volumes, or to detect shapes.
Different types of outputs are available. The 0-10V or 4-20mA outputs supply a signal proportional to the number of beams obscured or the position of the first obscured beam. The RS485 MODBUS RTU digital protocol identifies the free / occupied state of each beam or the size and position of the objects in the detection area.

The fine auto-calibrate function allows detection of size, position or holes in **glass, light cloth, small nets, film and stretch film.**

NI SERIES APPLICATIONS

The main applications are:
- Part ejection control
- Output piece counting
- Presence control of materials exiting from painting, rolling and similar plants
- Detection of glass, fabrics, and transparent films

NS SERIES APPLICATIONS

The main applications are:
- Object measurement
- Loop control
- Edge control
- Hole inspection, even in transparent materials
- Detection for packaging systems

STANDARD REFERENCE

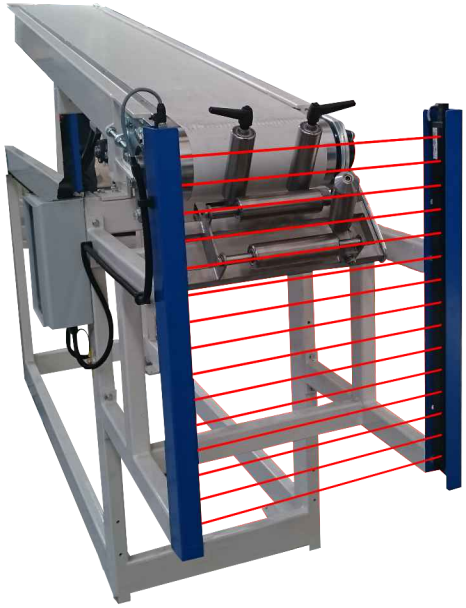
2014 / 30 / EC Electromagnetic compatibility Directive
IEC 60947-5-2 Low-voltage switchgear and controlgear

NI BARRIERS TECHNICAL CHARACTERISTICS

Resolution	0.9, 2, 4, 8, 12, 25 mm
Maximum range (depending on the resolution)	From 300 mm to 30 m
Protected height (depending on the model)	From 35 mm to 3500 mm
Power	24 Vdc ± 20%
Power consumption	300 mA excluding load
Response time	From 0.4 to 30ms depending on the number of beams
Exits	PNP / NPN Push pull
Cross section of the profile	Section 20X40 mm
Protection rating	IP65

NS BARRIERS TECHNICAL CHARACTERISTICS

Resolution	2.5, 5, 10, 12, 24, 48 mm
Maximum range (depending on the resolution	From 300 mm to 30 m
Protected height (depending on the model)	From 35 mm to 3500 mm
Power	24 Vdc ± 20%
Power consumption	300 mA max excluding load
Response time	From 1 to 17 ms depending on the number of beams
Output	RS 485 MODBUS RTU, 0-10V, 4-20mA, PNP/NPN
Cross section of the profile	Section 20X40 mm
Protection rating	IP65



RIBBON SWITCH

INTRODUCTION

Connections can be two-wire for non-safety applications, four-wire or two-wire with a terminating resistor for safety applications. Connections can be two-wire for non-safety applications, four-wire or two-wire with a terminating resistor for safety applications.

The connection can be either with an M12 connector or with flying leads. The connection cables are made in PVC or other materials if requested by the client. The ribbon switch with four exit wires combined with the PS3 control unit reaches Category 3, PLe according to EN ISO 13849-1.

APPLICATIONS

Some application include:

- Emergency switches on any type of machine
- Conveyor belt control.
- Protection for sliding doors and gates.
- Door opening signalling.
- Activation of chronometers in swimming pools.

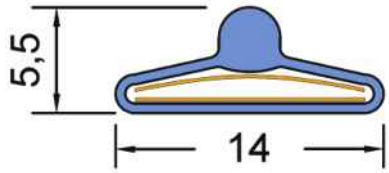
STANDARD REFERENCE

2006/42/EC	Machine Directive
2014/30/EC	Electromagnetic compatibility Directive
EN 13856-2	Machine safety – Pressure sensitive protection device Part 2

TECHNICAL CHARACTERISTICS

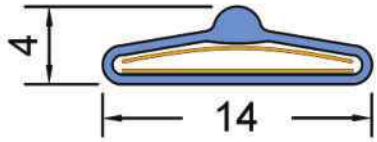
ELECTRIC CHARACTERISTICS COMMON TO ALL MODELS	
Maximum Allowable Voltage	32 Vdc
Maximum current	1A
Resistance	0.6 ohm / m
Operating temperature	-15 + 65 °C
Protection rating	IP65
Number of operations	3.000.000
Weight	45 g / m

Sensor 102-A



Actuation Force	3 N (0.3 Kg)
Bending radius minimum	15 mm
Applications	Sensor with a low profile for actuation by hands, feet, and mechanical devices

Sensor 102-B



Actuation Force	2 N (0.2 Kg)
Bending radius minimum	10 mm
Applications	Standard sensor suitable for use in tight spaces

IDENTIFICATION CODE

		Model	Length	Cable Exit	Exit Side	Cable Length	Sealing
Sensor	102-A 102-B						
Specified in mm							
4 wires, safety applications	F						
2 wires with R = 8,2 Kohm *	R						
2 wire, non safety applications	S						
On one side	O						
On two sides	E						
With terminal resistance	X						
500 mm	1						
2000 mm	2						
On request	L in mm						
Standard	LD						
With heat shrinkable	T						
With heat shrink protected from temporary immersion	T67						

* Note: the ribbon with terminal exit only has two wires for the exit

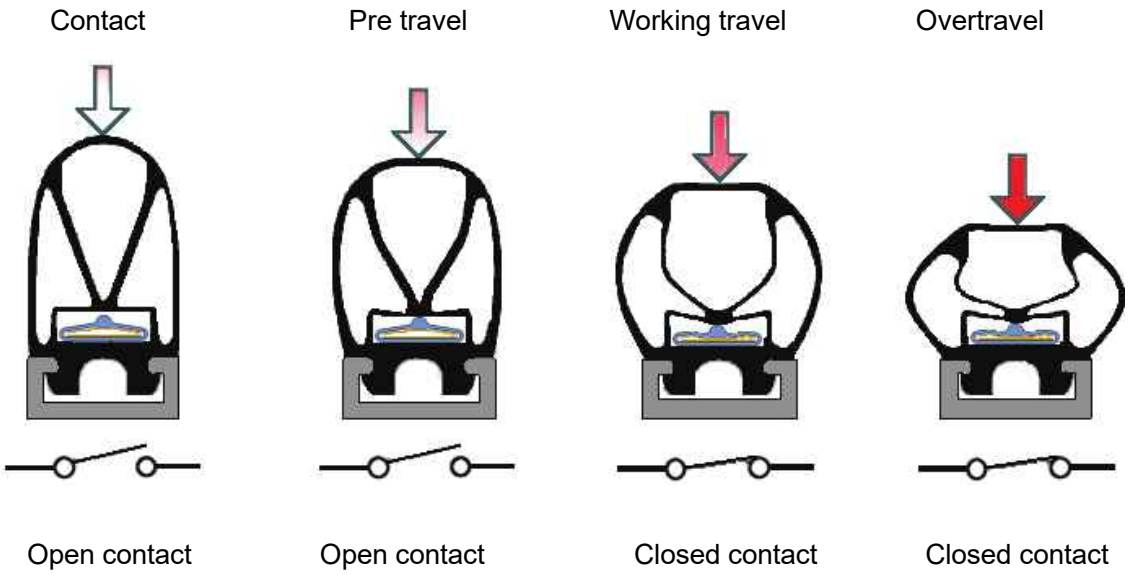
SAFETY EDGES

INTRODUCTION

Sensitive edges are made of a rubber sheath housing the sensitive element that provides an electrical signal when any external crushing action is exerted on the edge. A flat or angled aluminum profile completes the device for its attachment to the machine.
Edges can be supplied in any type of execution, perimeter, angular and curved, or according to customer's design. Connections can be two-wire for non-safety applications, four-wire or two-wire with a terminating resistor for safety applications. Safety edges with four output wires, used in conjunction with the PS3 control unit, achieve Category 3, PL e, according to EN ISO 13849-1.

Selection of the most suitable type of edge, factors to consider:

- Application: Finger detection or other.
- Compression force of the rubber before sensor contact closure.
- Contact activation via additional pressure.
- Additional compression distance after contact closure.



MAIN APPLICATIONS

- Emergency switches
- Protection for sliding doors and gates
- Door opening signalling
- Automated warehouses
- Elevator surfaces
- Conveyor systems
- Automated islands

STANDARD REFERENCE

2006/42/EC	Machine Directive
2014/30/EC	Electromagnetic compatibility Directive
EN 13856-2	Machine safety – Pressure sensitive protection device Part 2
EN 12978	General requirements for the design and construction of fixed and movable guards“

TECHNICAL CHARACTERISTICS

ELECTRICAL / MECHANICAL CHARACTERISTICS COMMON TO ALL MODELS	
Maximum Allowable Voltage	32 Vdc
Maximum electric current	1A
Resistance	0.6 ohm / m
Hardness	70 Shore
Internal electrical contact	Normally open
Operational temperature	-15 + 65°C @ 10mm/s, 0 +65°C @ 100mm/s
Protection level	IP55, IP65, IP67
Number of operations	3.000.000
Mechanical force	500 N (50Kg)
Cable material	PVC or others upon request
Assembly direction	A, B according to EN13852-2
Maximum length	60 metres
Dead zone	25 mm
Maximum cable length	250 metres copper 0.35mm^2
Maximum length between edges	Equal to maximum cable length

CHEMICAL COMPATIBILITY OF EPDM SAFETY EDGES

SUBSTANCE	EFFECTS	CONTACT
Alcohol	none	permanent
Water	none	permanent
Hydrocarbons	very serious	avoid
Diluted bases	few	infrequent
Diluted acid	few	infrequent
Vegetable oil	serious	short
Oxidized acid	noticeable	reduced
Non oxidized acid	few	infrequent

CHEMICAL COMPATIBILITY OF NBR SAFETY EDGES

SUBSTANCE	EFFECTS	CONTACT
Alcohol	none	permanent
Water	none	permanent
Hydrocarbons	very serious	avoid
Diluted base	few	infrequent
Diluted acid	few	infrequent
Vegetable oil	few	infrequent
Oxidized acid	noticeable	reduced
Non oxidized acid	few	infrequent

Stages

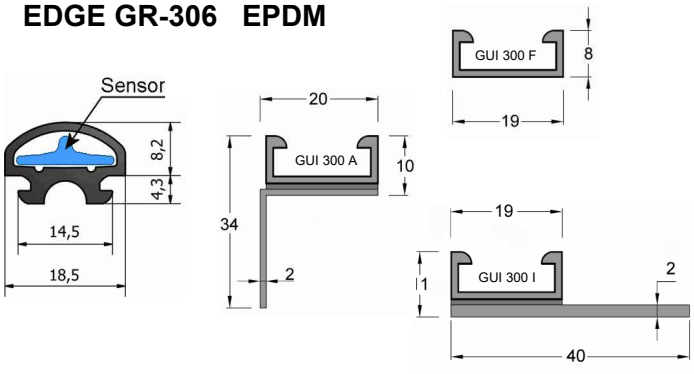
Medical equipment

Industrial machines

Transport of disabled people

SAFETY EDGES

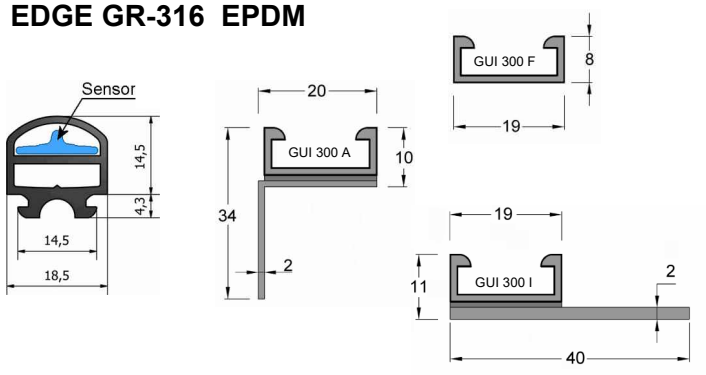
EDGE GR-306 EPDM



MECHANICAL CHARACTERISTICS

PARAMETERS	@ Speed 10 mm/s
Pre-travel	1.5 mm
Working travel 250N	3.4 mm
Working travel 400N	4.1 mm
Working travel 600N	4.8 mm
Overtravel 250N	1.9 mm
Overtravel 400N	2.6 mm
Overtravel 600N	3.3 mm
Actuation force, test rod 20mm	16 N (1.6Kg) @20°C
Actuation force, test rod 80mm	56 N (5.6Kg) @20°C
Edge weight	0.2 Kg/m
Application	Suitable for finger detection
Activation angle	20°

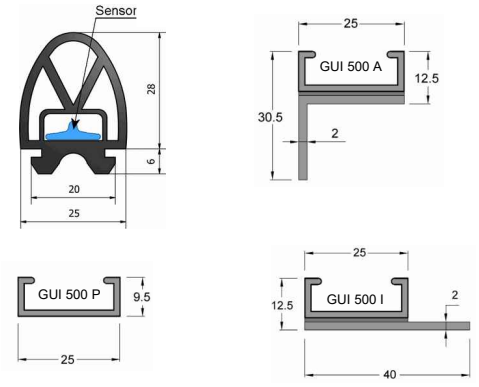
EDGE GR-316 EPDM



MECHANICAL CHARACTERISTICS

PARAMETERS	@ Speed 10 mm/s
Pre-travel	1.7mm
Working travel 250N	22.4 mm
Working travel 400N	26.2 mm
Working travel 600N	28.1 mm
Overtravel 250N	20.7 mm
Overtravel 400N	24.5 mm
Overtravel 600N	26.4 mm
Actuation force, test rod 20mm	11 N (1.1Kg) @ 20°C
Actuation force, test rod 80mm	36 N (3.6Kg) @ 20°C
Edge weight	0.3 Kg/m
Application	Suitable for finger detection
Activation angle	40°

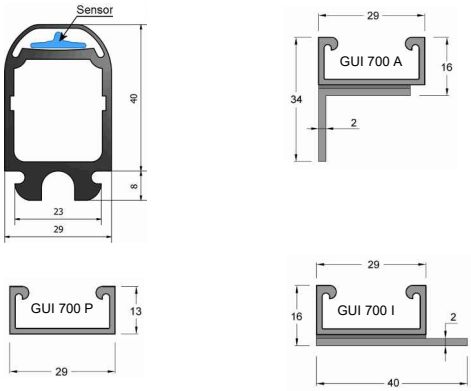
EDGE GR-503 EPDM



MECHANICAL CHARACTERISTICS

PARAMETERS	@ Speed 10 mm/s
Pre-travel	6.9 mm
Working travel 250N	11.6 mm
Working travel 400N	14.3 mm
Working travel 600N	16.1 mm
Overtravel 250N	4.7 mm
Overtravel 400N	7.4 mm
Overtravel 600N	9.2 mm
Actuation force, test rod 80mm	147 N(14.7Kg) @ 20°C
Edge weight	0,5 Kg/m
Application	Non suitable for finger detections
Activation angle	20°

EDGE GR-747 EPDM

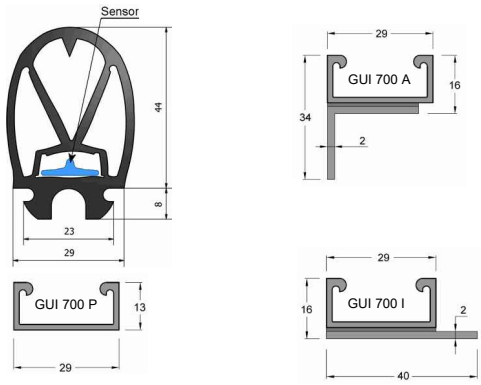


MECHANICAL CHARACTERISTICS

PARAMETERS	@ Speed 10 mm/s
Pre-travel	1.7mm
Working travel 250N	22.4 mm
Working travel 400N	26.2 mm
Working travel 600N	28.1 mm
Overtravel 250N	20.7 mm
Overtravel 400N	24.5 mm
Overtravel 600N	26.4 mm
Actuation force, test rod 20mm	11 N (1.1Kg) @ 20°C
Actuation force, test rod 80mm	36 N (3.6Kg) @ 20°C
Edge weight	0.6 Kg/m
Application	Suitable for finger detection
Activation angle	40°

SAFETY EDGES

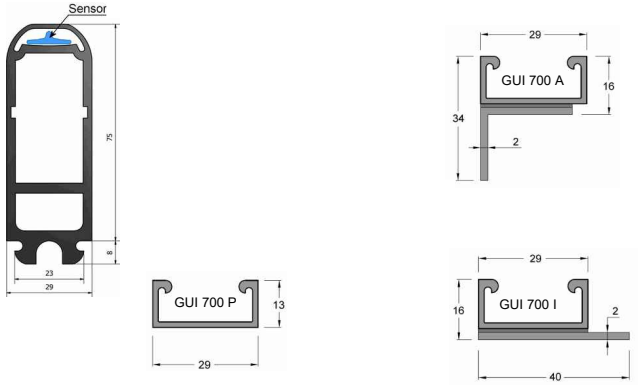
EDGE GR-748 NBR



MECHANICAL CHARACTERISTICS

PARAMETERS	@ Speed 10 mm/s
Pre-travel	2.5 mm
Working travel 250N	13 mm
Working travel 400N	20 mm
Working travel 600N	24 mm
Overtravel 250N	10.5 mm
Overtravel 400N	17.5 mm
Overtravel 600N	21.5 mm
Actuation force, test rod 80mm	116 N (11.6Kg) @ 20°C
Weight	0.9 Kg/m
Application	Non suitable for finger detection
Activation angle	40°

EDGE GR-757 EPDM



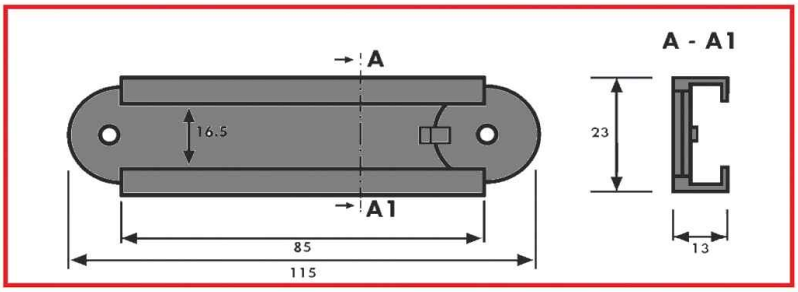
MECHANICAL CHARACTERISTICS

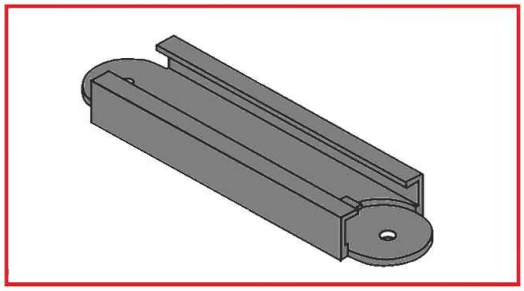
PARAMETERS	@ Speed 10 mm/s
Pre-travel	1.3 mm
Working travel 250N	36.7 mm
Working travel 400N	44.0 mm
Working travel 600N	47.4 mm
Overtravel 250N	35.4 mm
Overtravel 400N	42.7 mm
Overtravel 600N	46.1 mm
Actuation force, test rod 20mm	66 N (6.6Kg) @ 20°C
Actuation force, test rod 80mm	20 N (2.0Kg) @ 20°C
Weight	1.1 Kg/m
Application	Suitable for finger detection
Activation angle	20°

Curved edges

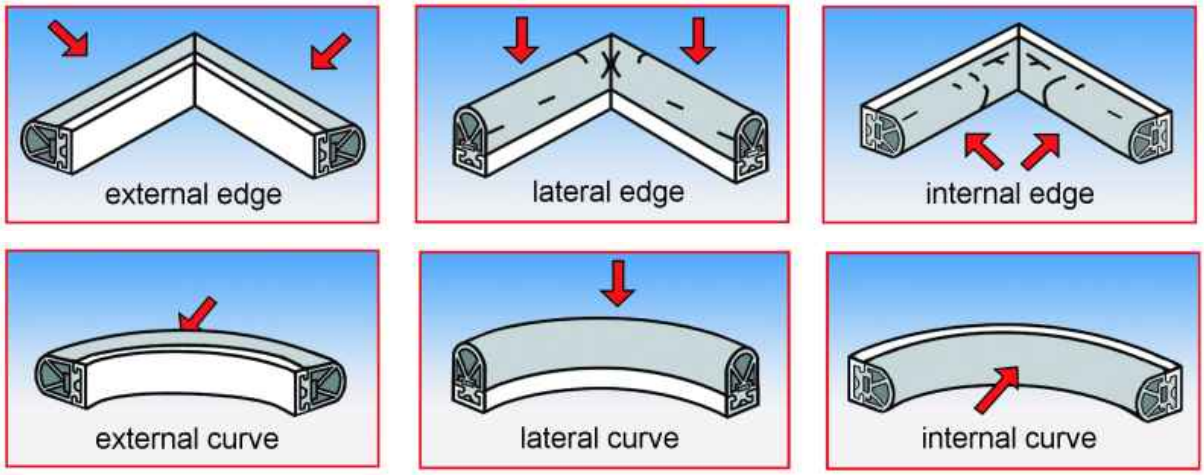
The BS-3 support solves the problem of the edge curvature regardless of the requested radius.
It can be applied to the GR- 503-747-748 model with a minimum curvature radius of 1.5m.
This solution easily adapts to the curvature required by the application.

Overall dimensions of the basic BS 3 element





SPECIAL EDGE CONFIGURATIONS

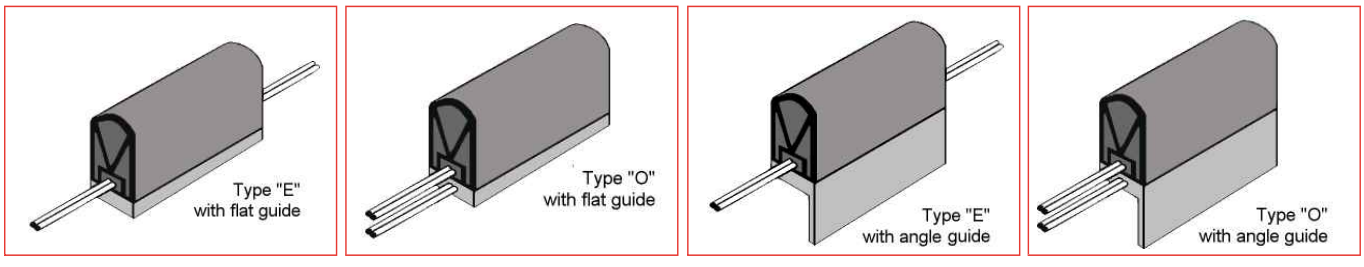


EDGE IDENTIFICATION CODE

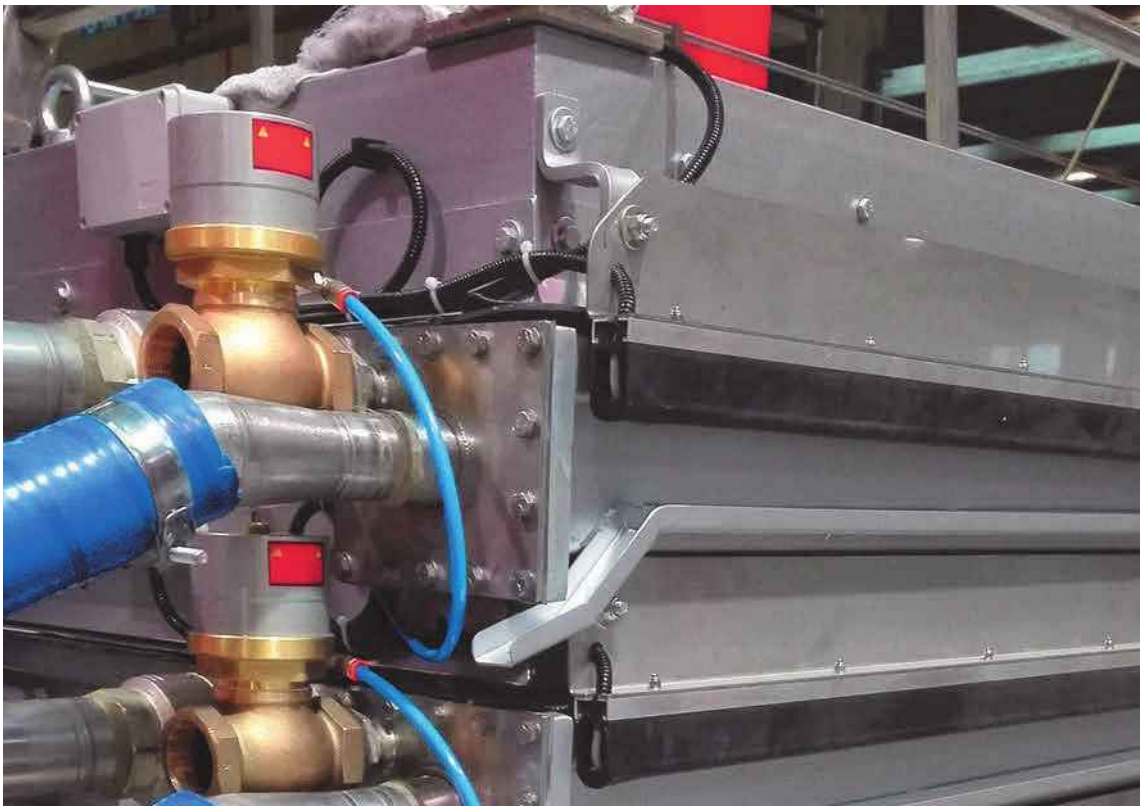
Model	Length	Guide type	Guide material	Cable	Cable exit	Cable length	End cup

GR-306 in EPDM	306
GR-316 in EPDM	316
GR-503 in EPDM	503
GR-747 in EPDM	747
GR-748 in NBR	748
GR-757 in EPDM	757
Edge length	L in mm
Flat guide	F
Angle guide	A
Straight guide	I
Curved guide	C
Aluminium guide	A
PVC guide for curved edges	P
4 wire, for safety applications	F
2 wire with R 8,2Kohm, for safety	R
2 wire, non safety application	S
Wire exit on one side	O
Wre exit on two sides	E
Exit with terminal resistance	X
Wire length 500 mm	1
Wire length 2000 mm	2
Custom legth	L in mm
With endcup	Y
Without endcup	N

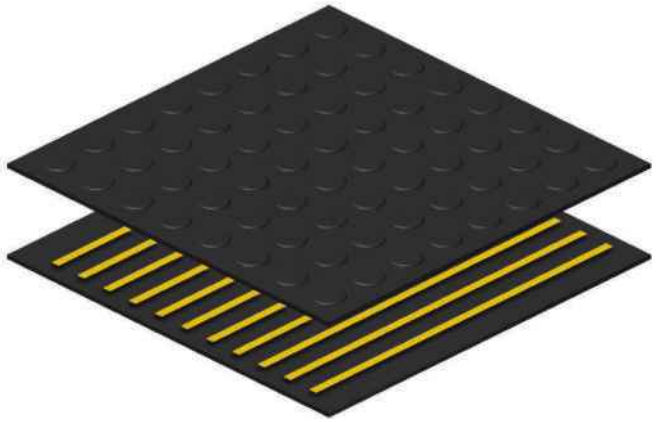
Connections are available with male or female M12 connectors or with flying leads
The end cup can close the entire edge or just the sensor area

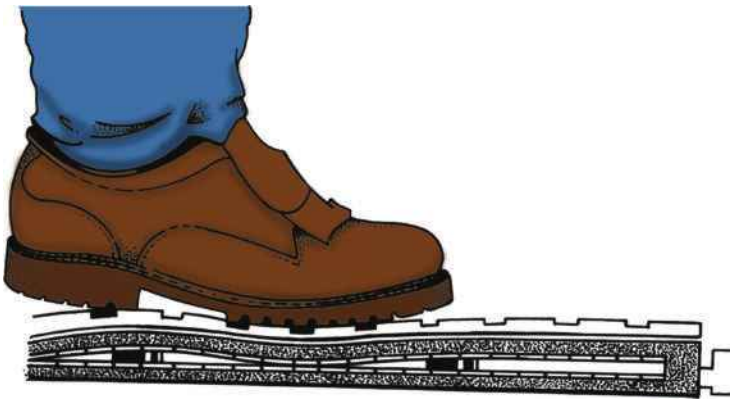


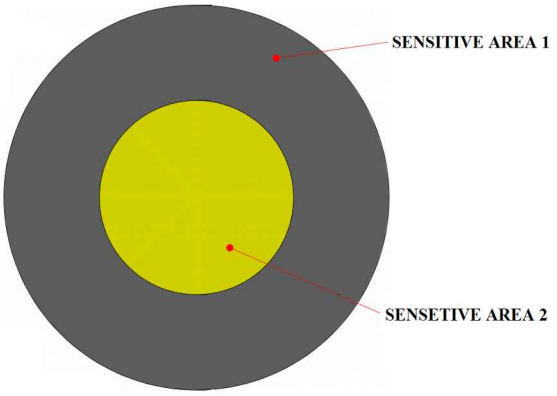
EDGE APPLICATIONS



SAFETY MATS







INTRODUCTION

Safety mats contain a pressure-sensitive component which is incapsulated between two layers of vinyl resin and have special carbon-based additives that ensure a greater resistance to wear and a IP65 level of protection. They are particularly resistant to impacts, vibrations and flames as they are a self-extinguishing product.
The safety mat is supplied in any shape and size (even circular) upon client request. An aluminium profile section with a 20° incline is used to anchor the device to the floor.
In non-safety applications the connections can be made up of two wires; in safety applications the connections can be made up of four wires or two wires with terminal resistance.
The connection cable can be with M8, M12 connector or with flying leads.

The TX type is used in circular doorways for banks, shopping centres or similar.

The mat can be supplied with one or two sensitive areas.

The available models are:

- TO – Standard version made in PVC with bubble surface.
- TX – Standard circular version made in PVC with bubble surface.
- MO – Standard version made with PVC covered with almond-shaped aluminium.
- MZ – Standard version made with PVC covered with almond-shaped aluminium and zinc-plated steel.

The MZ model is designed for use on irregular surfaces.
The safety mat with four exit wires combined with a PS3 control unit reaches category 3, PL e, according to EN ISO 13849-1.

MAIN APPLICATIONS

- Automated warehouses.
- Conveyor systems.
- Woodwork machinery.
- Automated painting plants.
- Assembly line gates.
- Escalators.
- Lifts.
- Robotized islands.
- Bank doors.
- Shopping centres.

STANDARD REFERENCE

2006/42/EC	Machine Directive
2014/30/EC	Electromagnetic compatibility Directive
EN 13856-1	Machine safety – design and testing of pressure-sensitive mats
EN 12978	General requirements for the design and construction of fixed and movable guards“

TECHNICAL CHARACTERISTICS

Safety level	PL e in combination with control module PS3
Maximum size of a single mat	1500 X 2500 mm
Top layer	4 mm thick black PVC
Bottom layer	2 mm thick black PVC
Thickness	9 mm
Weight	12 Kg / m^2
80 mm diameter test rod actuation force	250 N
200 mm diameter test rod actuation force	450 N
Static load	60 Kg / cm^2
Dead zone	30 mm from the perimeter
Operating temperature	-10° ..+60°C
Protection level	IP65
Mechanical duration of the B10d sensor	3 million operations
Response time	60 ms
Maximum Allowable Voltage	32 Vdc
Maximum current	100 mA
Internal electrical contact	Normally open
Maximum length of connection mat / control module	100 m, copper 0.35 mm^2

CHEMICAL COMPATIBILITY

SUBSTANCE	**EFFECTS** (note 1)	**COMPATIBILITY** (note 2)
Alcohol	few	satisfactory
Water	none	satisfactory
Liquified ammonia	few	to be avoided
Aliphatic hydrocarbons/benzene	serious	to be avoided
Weak acid	few	satisfactory
Hydrochloric acid	few	satisfactory
Trichloroethylene	serious	to be avoided
Ethyl	serious	to be avoided

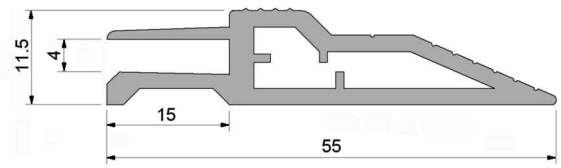
Nota 1 Effects on the mat surface after contact with the substance.
Nota 2 Type of contact that can occur between the mat and the substance.

The chemical compatibility table is only a guideline. The client must test the compatibility between the mat and the specific substance.

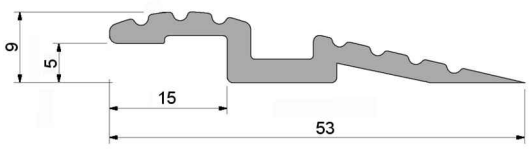
ACCESSORIES

The safety mat can be supplied with the following accessories.

ALUMINIUM PROFILE GUI-TP1 for MO 1, 2, 3 mats



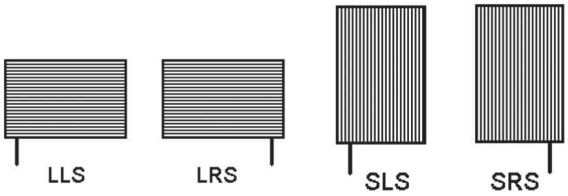
ALUMINIUM PROFILE GUI-TP2 for TO 1, 2, 3 mats



IDENTIFICATION CODE

DESCRIPTION	CODE
For surfaces up to 1 m², in PVC	T0-1
For surfaces up to 1 m², aluminium covered	M0-1
For surfaces up to 1 m², with a zinc-plated steel base	MZ-1
For surfaces 1 m high and up to 2,5 m long, in PVC	T0-2
For surfaces 1 m high and up to 2,5 m long, aluminium covered	M0-2
For surfaces 1 m high and up to 2,5 m long, with a zinc-plated steel base	MZ-2
For surfaces 1,5 m high and up to 2,5 m long, in PVC	T0-3
For surfaces 1,5 m high and up to 2,5 m long, aluminium covered	M0-3
For surfaces 1,5 m high and up to 2,5 m long, with a zinc-plated steel base	MZ-3
Mounted aluminium profile for TO MO MZ models	GUITP1
Aluminium profile for TO MO MZ models to be assembled by the client	GUITP2
Mat constructed without edges	SB
Mat constructed with assembled edges	BM
Mat constructed with loose edges	BS

Cable Exit Position



Standard length of the cable is 3000mm, 4 wires.

ORDER CODE

MODEL – LENGTH - WIDTH – CABLE LENGTH - CABLE EXIT - PROFILE – EXECUTION

EXAMPLE: TO-1 - 0800 - 0800 - 3000 - LLS - GUITP1 - BS

Mat model TO-1 of size 800 X 800mm, with exit cable of length 3000mm,
aluminium profile already assembled (GUITP1) and execution with assembled edges (BM)

SAFETY BUMPERS

INTRODUCTION

The safety bumper is used to protect people from collisions with vehicles or mechanical components in motion (i.e. AGV, wire-guided trolleys etc.). Their purpose is to absorb the impact and to generate a signal to stop the machine immediately. A minimum compression of the bumper due to a collision, after a pre-travel distance closes the electrical connection, generating a signal which produces a command signal to stop the machine.

After pre-travel, the bumper still allows a compression defined as over-travel, which varies depending on the depth of the BUMPER. The over-travel is required to reduce the impact of the person with the machine.

The bumper are made of a block of polyurethane foam and include electrosensitive ribbon switch. The outer covering, in black or yellow/black colours, can be made of standard fabric or waterproof PVC.

They are produced in standard parallelepiped shapes or according to the customer's design.

With four output wires connected with the PS3 control unit, they achieve Category 3, PLe, according to EN ISO 13849-1.

CHOICE CRITERIA

The depth must be chosen considering the stopping distance of the machine. The standard height-depth ratio is 1:2. The maximum length of the bumper is three metres. Further sizes can be achieved by combining more elements.

PRE-TRAVEL = 10% of the depth (up until the point of contact for the sensor).
OVER-TRAVEL = 60% of the depth (the maximum deformation of the bumper).
NON DEFORMABLE PART = 30% of the depth.

MAIN APPLICATIONS

- Lifting platforms for airplanes
- AGV carts
- Moving doors
- Mobile conveyors
- Telescopic arms
- Automated warehouses

STANDARD REFERENCE

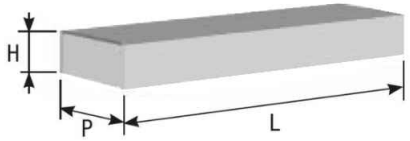
2006/42/EC	Machine Directive
2014/30/EC	Electromagnetic compatibility Directive
EN 13856-3	Machine safety – Pressure sensitive protection device Part 3

TECHNICAL CHARACTERISTICS

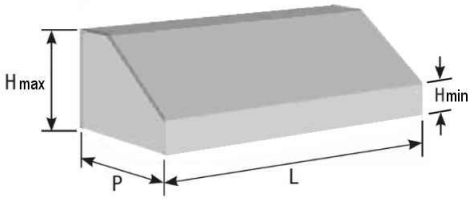
Safety level	Cat 3, PL e, connected with the PS3 control module
Operational temperature	-10° .. + 50°C
Protection level	IP54
Mechanical duration	10.000 operations
Minimum operational velocity	10 mm/s
Maximum operational velocity	100 mm/s
Response time	60 ms
Maximum Allowable Voltage	24 Vdc
Maximum current	100 mA
Output contact	Normally open, four (4) wires
Maximum length of bumper / control module	100 m, copper 0.35 mm^2

BUMPER SHAPE

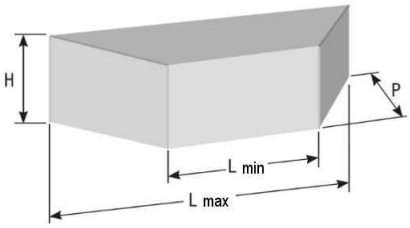
The commercially sold models are split into different categories, based on the shape of the object, the fixing system and the outer layer of polyurethane foam.



GR1
Rectangular shape



GR2
Tapered shape

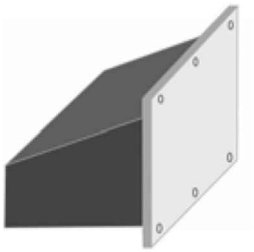


GR3
Trapezoidal shape

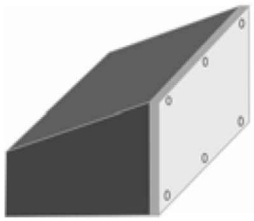
FIXING SYSTEMS

Three different fixing systems are available:

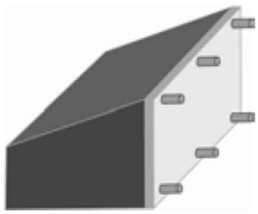
- **TYPE X** Fixing system with a frame with 8,5 mm holes.
  Length of the frame is specified by the client.
- **TYPE Y** Fixing system with a frame with threaded holes.
  Standard dimension of threaded holes is 6MA, or as specified by the client.
- **TYPE Z** Fixing system with a frame with M6 captive screw 30 mm long.



TYPE X



TYPE Y



TYPE Z

ORDER CODE

Rectangular shape	GR1 – L – H – P – Fixing system code
Tapered shape	GR2 – L – H max – H min – P – Fixing system code
Trapezoidal shape	GR3 – L max – L min – P – Fixing system code
	Dimensions in mm
Example	GR1 – 1000 – 100 – 200 – Z

CONTROL UNITS
FOR RIBBON SWITCH, EDGES, MATS, BUMPERS

PS3-AX

PS3-Ax series units are devices that constantly check the status and proper operation of the ribbon switch, edges, mats, and bumpers through the four-wire connection.
The PS3-AX is used for high-risk applications up to category 3, PL and in accordance with EN ISO 13849,
The control circuit deactivates the internal relays when the sensor is pressed, if the conductors are cut, if the internal sensor circuit is interrupted, in the event of a power failure and failure of the internal components of the safety circuit. Two N.O. safety contacts and one N.C. non-safety contact is provided for signals. Reset can be set automatic or manual. The control unit is protected against reverse polarity, short circuit and overload.

PS3-RS / RD

The PS3-RS and PS3-RD units are devices that constantly check the state and proper functioning of ribbon switch, edges, mats and bumpers via the 8K2 terminal resistances inside of the sensors.
The PS3-RS and PS3-RD modules are used for Category 2, PLd applications according to EN ISO 13849.
The control circuit deactivates the internal relays when the sensor is pressed, if the conductors are cut, if the internal sensor circuit is interrupted, in the event of a power failure and failure of the internal components of the safety circuit, and if the value of the connected terminal resistance is beyond the maximum allowable tolerance.
Two N.O. safety contacts and one N.C. non-safety contact is provided for signals. Reset can be set automatic or manual. The control unit is protected against reverse polarity, short circuit and overload.

The PS3-RS model controls a single electro-sensitive element.
The PS3-RD model controls two sensitive elements with separate output.

PS3 FIELD OF USE

PS3-AX TECHNICAL CHARACTERISTICS

GENERAL CHARACTERISTICS	
Safety level	Type 3 - PL e - Cat. 3
Supply voltage	24 Vdc ± 10% PELV / 24-115-230 Vac ± 10%
Absorbed current with unactivated sensor	55 mA
Absorbed current with pressed sensor	45 mA
Maximum current in the sensor	100 mA
Operating temperature	-5 ..+60 °C
Relative humidity	5 .. 95%
IP	20
Weight	190 grams
Maximum response time	action = 18 ms, restart = 280 ms
Maximum edge length	60 m
Maximum mat area	15 m^2
Maximum number of controllable edges	Equal to the maximum length of the single edge
Maximum number of controllable mats	Equal to the maximum area of the single mat
Maximum length of module/sensor connection	250 metres with copper wire - 0.35 mm_2
SAFETY RELAY– OUTPUT CONTACT	
Contact material	$AgSnO_2$
Voltage	AC 230V; DC 300V
Maximum commutable current	6A
Maximum continuative current	2A
Maximum commutable power	1500 VA
Mechanical duration of the contact	10^7
Electric duration of the contact	10^5

PS3-AX IDENTIFICATION CODE

Module IP20 for DIN rail		
CODE	MODEL	POWER SUPPLY
P-09	PS-3 / A1	24 Vac
P-10	PS-3 / A2	115 Vac
P-11	PS-3 / A3	230 Vac
P-12	PS-3 / A5	24 Vdc

Module IP56		
CODE	MODEL	POWER SUPPLY
P-13	PS-3-56 / A1	24 Vac
P-14	PS-3-56 / A2	115 Vac
P-15	PS-3-56 / A3	230 Vac
P-16	PS-3-56 / A5	24 Vdc

PS3-RS PS3-RD TECHNICAL CHARACTERISTICS

GENERAL CHARACTERISTICS	
Safety level	Cat. 2 PL d
Supply voltage	24 Vdc ± 10% PELV / 24 Vac ± 10%
Absorbed current with unactivated sensor	55 mA
Absorbed current with pressed sensor	45 mA
Maximum current in the sensor	100 mA
Operating temperature	-5 ..+60 °C
Relative humidity	5 .. 95%
IP	20
Weight	190 grams
Maximum response time	turn off = 18 ms, restart = 280 ms
Maximum edge length	60 m
Maximum mat area	15 m^2
Maximum number of controllable edges	Equal to the maximum length of the single edge
Maximum number of controllable mats	Equal to the maximum area of the single mat
Maximum length of module/sensor connection	250 m with copper wire - 0.35 mm^2
SAFETY RELAY– OUTPUT CONTACT	
Contact material	$AgSnO_2$
Voltage	AC 230V; DC 300V
Maximum commutable current	6A
Maximum continuative current	2A
Maximum commutable power	1500 VA
Mechanical duration of the contact	10^7
Electric duration of the contact	10^5

PS3-AX IDENTIFICATION CODE

Module IP20 for DIN rail		
CODE	MODEL	POWER SUPPLY
P-21	PS-3RS / A1	24 Vac
P-22	PS-3RS / A5	24 Vdc
P-23	PS-3RS / 56A1	24 Vac
P-24	PS-3RS / 56A5	24 Vdc

Module IP56		
CODE	MODEL	POWER SUPPLY
P-25	PS-3RD / A1	24 Vac
P-26	PS-3RD / A5	24 Vdc
P-27	PS-3RD / 56A1	24 Vac
P-28	PS-3RD / 56A5	24 Vdc

Industrial safety and control systems

Safety and automation barriers
Ribbon switch
Safety edges
Safety mats
Bumper
Control units

Commercial organization

Europe
Italy
Austria
Croatia
Finland
France
Poland
Portugal
Slovenia
Czech Republic
Romania
Slovakia
Spain
Switzerland
Turkey
Hungary

America
Brazil
Canada
Columbia

Asia
China
India

Grein S.p.A.
Tel +39 02 26 300 140
Via S.G.B. De La Salle, 4/a 20132
e-mail info@grein.it
Milano, Italy
www.grein.it