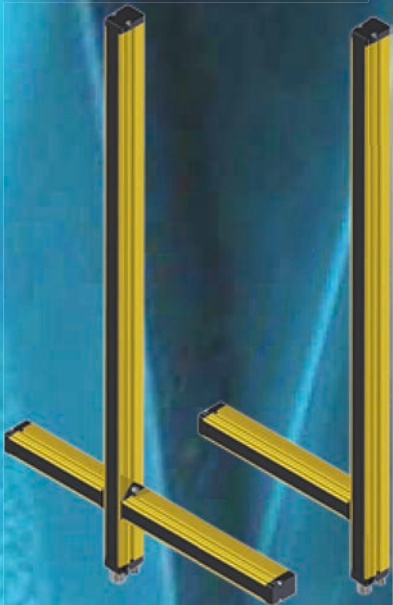
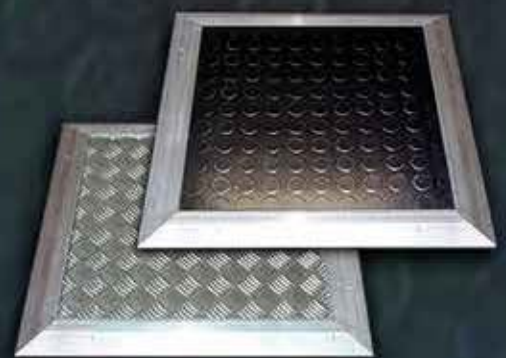


Safety protection



- Barriers
- Ribbon switches
- Edges
- Mats
- Bumpers



General catalogue

■ Our company

This catalogue provides an overview of our entire product range.

Two new barriers - EFESTO 4 and KEEPER - are introduced to complete the current line of ASTER and ARTscan models.

Further, a series of products including ribbon switches, edges, mats and bumpers completes the machinery safety package.

There is also a line of "NO SAFETY BARRIERS" offered for wider application in the fields of industrial automation, measuring control and counting systems.

GREIN has been operating on the world market for 45 years and is an established reference point for all potential customers and representatives in various countries whatever their requirement in this sector.

In response to market demand, our laboratory staff are continuously researching new products for new needs in various sectors. All our products are manufactured in compliance with European standards and directives on safety on the premises of machinery users and manufacturers.

On the case of futher details, see the web site www.grein.it



■ Contents, by product category

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■ New EFESTO 4 and KEEPER barriers

This new generation of barriers represent an ideal solution for safety problems on machinery and industrial plants. The range of different models permit the widest application of cat. 4 and are designed to conform to the following European directives:

- 2006/42/CE machinery directive
- 2006/95/CE directive low voltage
- 2004/108/CE electromagnetic compatibility directive

The elegant aesthetic form, the small dimensions of the cross section of the transmitter/receiver (enabling sure admission to the production process), as well as low pricing compared to the competition, have helped to extend the use of these units to wherever it's necessary to protect operators from the risks of using dangerous machinery.

Relevant to European standards:

IEC/EN 61496/1-2	electro-sensitive protective equipment
EN – ISO 13849-1	safety related parts of control systems
IEC/EN 62061	functional safety of programmable electrical/ electronic systems for machinery control
IEC 61508	functional safety of electrical/electronic safety systems

NOTE:

The EFESTO 4 curtains are normally employed as straight elements. They replace the ASTER models for their different characteristics. The KEEPER curtains are formed by a straight element plus lateral "T" and "L" profile arms containing the muting sensors. They replace the old ARTscan barrier models.



■ Technical characteristics

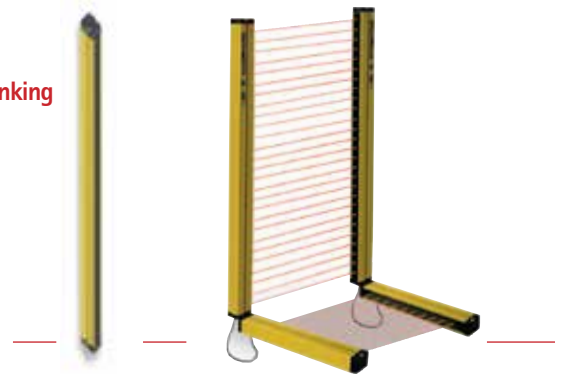
synchronization of signal TX/RX	optical system
emission angle of TX/RX	5° total
wave length	850 nm
resolutions	14, 20, 30, 40, 55, 65, 175, 185, 320, 330 mm
max. range	6 - 15 - 30 - 60m
output signal	2 PNP 500 mA protected against short circuit and overload
connectors	M12 5/8 poles or M23 17 poles (depending on model)
power supply	24 Vcc ± 10% PELV
response time	from 5 to 30 msec. on function of beams number
max. connection distance	100 metres
enclosure	extruded aluminium (section 36 x 50 mm), colour: RAL 1021 yellow
protection	IP 65
relative humidity	95%
working temperature	0 ÷ 65 °C
safety level	SIL 3 - SIL-CL3 - PL-e - Cat. 4

If a power output relay is required see pag. 29

■ Applications:

EFESTO 4 series straight or version master/slave (see pag. 8) – muting –blanking

- punch presses
- stamping presses
- die cutters
- robotic area
- assembly lines
- machinery for wood and ceramic
- packing and wrapping machinery
- automatic warehouse



KEEPER series with muting sensors inside the arm (T or L version) or external side

- palletizer machinery
- robotic area
- assembly line
- automatic industrial warehouse
- way for automatic AGV vehicle



■ Muting function

An optional muting system using sensor, is available to allow the temporary suspension of the safety function while the machinery is working or other material handling operation take place without switching off the machine. This is designed to facilitate applications during the return of the tool to the die position on the presses, or during the forming of metal to encrease productivity, or on the paletizzer or wrapping machine.

Each system consist of one set of barriers and sensors that must be activated within 2 sec. of each other to start the muting action otherways muting will not occur.

During the muting operation, other forms of protection must be utilized to prevent that the operators entering into dangerous area near the machine.

Any interruption of the sequence or malfunction of the sensors, will be detected and muting will not occur.

An override circuit to allow pallet removal is available in case of blockage inside the machine, power loss or not synchronization of the muting sensors.

During this operation the machinery must operate under max. safety, so that the operator cannot enter into dangerous area.



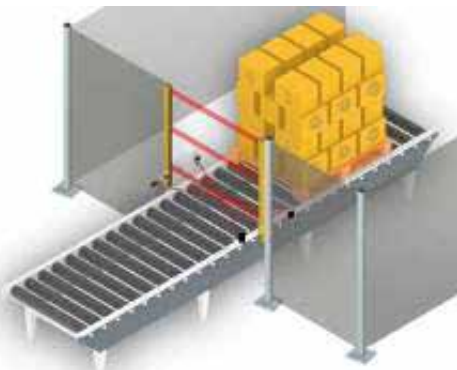
■ Muting MU with 2 separated sensors for Efesto 4 units

- Irrespective of the speed of movement of packing
- Any kind of sensor may be used, even no safety
- range 15 m.
- height protected 170 – 3050 mm.
- resolution 14 – 320 mm.
- signal simultaneity delay for sensors 2 sec. max.
- override circuit to bypass muting function



■ Muting with incorporated sensors on the arms or external for Keeper units

These barriers are designed to protect the entries and exits of machines with a high degree of automation, to permit admittance of material to be worked whilst keeping under control the entry to protect operators from involuntary movement in hazardous zones while the machine is working.



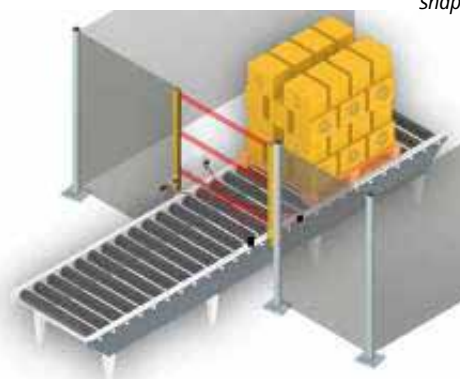
muting type with "T" shape at cross beams

Technical characteristics:

- self-control with signaling LED
- override system to bypass the muting control
- range (for across beams of the sensors) 0.8 – 2.50 m.
- range (for parallel beams of sensors) 0.8 – 5 m.
- working distance for straight units (without arms) 15 m.

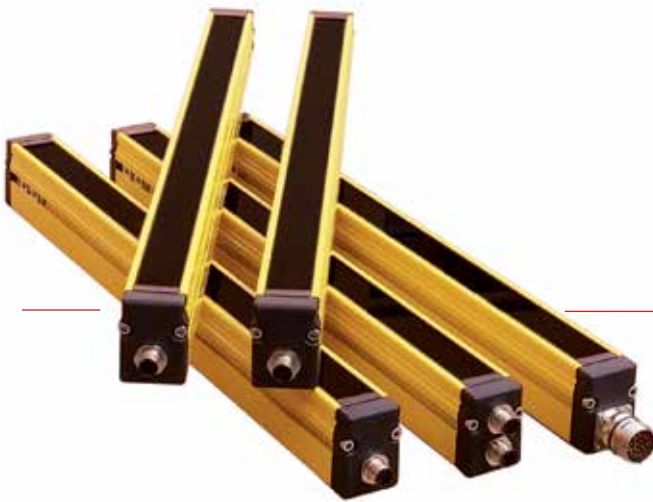
General characteristics:

- straight model with external sensors without arms
- "L" shape with incorporated muting sensors
- "T" shape with incorporated muting sensors
- Beams type of sensors: across or parallel



muting type with "L" shape at cross beams

■ Efesto 4 barriers



The new generation EFESTO 4 optic barriers are designed to protect fingers, hands and body. Resolution from 14 up to 330 mm. Height protected from 170 up to 3000 mm Cat. 4. Muting and blanking on request. They are widely used on all systems where it's necessary to protect operators working in dangerous areas.

■ Technical characteristics and codes

Emitter	with connector M12 4 poles male
TEST	simulation of beam interruption to facilitate machine safety chain control
Receiver	
Out put	2 x PNP protected from short circuit
BARGRAPH	3 LED for alignment indication and diagnostics

Other available characteristics, depending on the model

Reset	restarting of barrier
type	manual or automatic
Automatic restart time	100ms
Blanking	exclusion of a number of obstructed beams
beams	1 - 2 - 3
type	with or without obligatory presence of object
Configuration	by cable connections (no programming module needed)
height protected	from 100 up to 3000 mm.
INTEGRATED MUTING	
type of muting	with 2 sensors to control the simultaneity control
muting enable	enables/disables muting function
override	available in case of blockage of muting system
muting lamp	lamp 24 volt 500 mA max.
EDM	control for external power contactors
OSSD-S	signalling of OSSD output status
MUTE - F	signalling of barrier OFF in muting phase
BARGRAPH	3 LEDs for alignment indication and diagnostics

NOTE

The relay modules on page 29 change the solid state outputs into 3A 250V relays.



■ Main feature of AL barriers



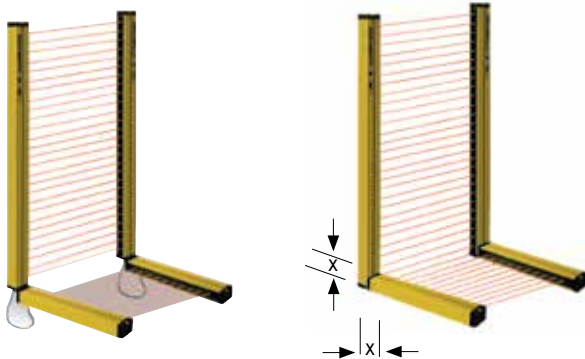
On large presses for moulding and bending (where vertical protection must be installed to a predefined distance from the danger zone) the presence of the operator must keep the machine constantly blocked even after having passed through the vertical barrier. There are therefore barriers consisting of a high resolution vertical unit (14 or 30 mm) and a higher resolution horizontal one connected in series to the vertical unit to be able to detect the presence of the operator generally by the legs.

Alignment system with LED indicator to facilitate the installation.

A LED system housed in the receiver facilitates alignment during installation.

Two connection systems are available:

- with a 500 mm cable
- with square connections to maintain constant resolution



N.B.

Vertical barriers must be identified as Master (M) and horizontal barriers as Slave (S).

■ Blanking system (optional)

This function makes it possible to blank from one to three beams. Their blanking does not deactivate the safety outputs and this particularly useful for those applications where, for example, materials under processing cross the protected zone and though interrupting the beams do not block the machine. The configuration is set by means of three wires on the receiver connector.

In any given configuration, the blanking function does not exclude the first beam next to the caps of the barrier, as this it is used for synchronism between emitter and receiver.

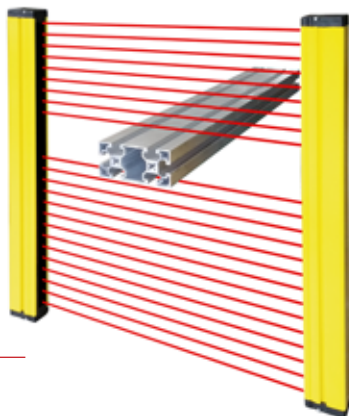
Two types of blanking are available:

blanking without presence of products :

this function makes it possible to introduce an object into a dangerous area without block the barrier.

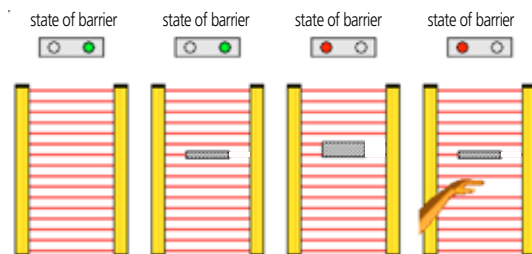
blanking with presence of products :

this function makes it possible to maintain the object inside the dangerous area without block barrier.



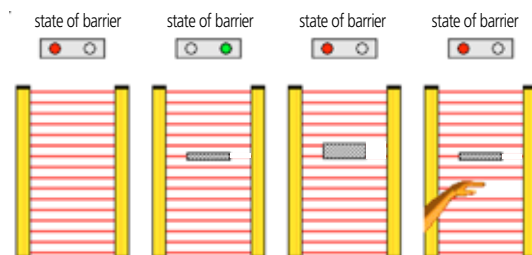
example: blanking of one beam without required presence of object :

- with all the free beams, the protected area is free
- with one beam OFF the area is considered free and the output signal are on ON state
- with two beams OFF the area is considered OFF and also the output signal are on OFF state.



example : blanking of one beam with required presence of object :

- if the movable object is not present, the OSSD are in OFF state
- with one beam OFF the area is considered free and the OSSD are on ON state
- with two beams OFF the area is considered OFF and also the OSSD are on OFF



■ Technical characteristics and codes

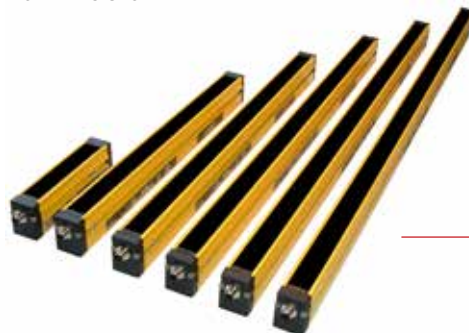
Resolution 14mm Range 6m							
optical code	n. beams	protected height PH (mm)	sensitive height SH (mm)	Height of barrier H (mm)	response time (ms)	Mtff (years)	PL
0240 A	24	254	234	326	6	100	e
0360 A	36	374	354	446	11	100	e
0480 A	48	494	474	566	11	100	e
0600 A	60	614	594	686	11	100	e
0700 A	72	734	714	806	16	84,06	e
0850 A	84	854	834	926	16	76,09	e
0950 A	96	974	954	1046	16	69,51	e
1100 A	108	1094	1074	1166	16	63,97	e
1200 A	120	1214	1114	1286	21	59,25	e
1300 A	132	1334	1314	1406	21	55,18	e
1400 A	144	1454	1434	1526	21	51,63	e
1500 A	156	1574	1554	1646	26	48,51	e
1700 A	168	1694	1674	1766	26	45,75	e
1800 A	180	1814	1794	1886	26	43,28	e
1900 A	192	1934	1914	2006	31	41,07	e
2000 A	204	2054	2034	2126	31	39,07	e
2200 A	216	2174	2154	2246	31	38,53	e
2300 A	228	2294	2274	2366	31	35,61	e

Resolution 20mm Range 15m							
optical code	n. beams	protected height PH (mm)	sensitive height SH (mm)	Height of barrier H (mm)	response time (ms)	Mtff (years)	PL
0240 AL	24	260	240	326	6	100	e
0360 AL	36	380	360	446	11	100	e
0480 AL	48	500	480	566	11	100	e
0600 AL	60	620	600	686	11	100	e
0700 AL	72	740	720	806	16	84,06	e
0850 AL	84	860	840	926	16	76,09	e
0950 AL	96	980	960	1046	16	69,51	e
1100 AL	108	1100	1080	1166	16	63,97	e
1200 AL	120	1220	1200	1286	21	59,25	e
1300 AL	132	1340	1320	1406	21	55,18	e
1400 AL	144	1460	1440	1526	21	51,63	e
1500 AL	156	1580	1560	1646	26	48,51	e
1700 AL	168	1700	1680	1766	26	45,75	e
1800 AL	180	1820	1800	1886	26	43,28	e
1900 AL	192	1940	1920	2006	31	41,07	e
2000 AL	204	2060	2040	2126	31	39,07	e
2200 AL	216	2180	2160	2246	31	38,53	e
2300 AL	228	2300	2280	2366	31	35,61	e

NOTE

Mtff = mean time to failure

PL = performance level in accordance with EN 13.849



■ Technical characteristics and codes

Resolution 30mm Range 15m							
optical code	n. beams	protected height PH (mm)	sensitive height SH (mm)	Height of barrier H (mm)	response time (ms)	Mtff (years)	PL
0150 B	6	174	126	273	6	100	e
0210 B	8	222	174	273	6	100	e
0240 B	9	246	198	297	6	100	e
0300 B	12	318	270	369	6	100	e
0360 B	14	366	318	417	6	100	e
0390 B	15	390	342	441	6	100	e
0450 B	18	462	414	513	6	100	e
0540 B	21	534	486	585	6	100	e
0600 B	24	606	558	657	6	100	e
0680 B	27	678	630	729	11	100	e
0750 B	30	750	702	801	11	100	e
0820 B	33	822	774	873	11	100	e
0900 B	36	894	846	945	11	100	e
0970 B	39	966	918	1017	11	100	e
1050 B	42	1038	990	1089	11	100	e
1100 B	45	1110	1062	1161	11	100	e
1200 B	48	1182	1134	1233	11	100	e
1250 B	51	1254	1206	1305	11	100	e
1350 B	54	1326	1278	1377	11	100	e
1400 B	57	1398	1350	1449	11	100	e
1500 B	60	1470	1422	1521	11	100	e
1650 B	66	1614	1566	1665	11	100	e
1800 B	72	1758	1710	1809	16	100	e
1950 B	78	1902	1854	1953	16	100	e
2100 B	84	2046	1998	2097	16	100	e
2200 B	90	2190	2142	2241	16	100	e
2300 B	96	2334	2286	2385	16	100	e
2450 B	102	2478	2430	2529	16	100	e
2650 B	108	2622	2574	2673	16	99,18	e
2750 B	114	2776	2718	2817	21	97,15	e
2900 B	120	2910	2862	2961	21	95,21	e
3000 B	126	3054	3006	3105	21	93,35	e

Resolution 40mm Range 30m							
optical code	n. beams	protected height PH (mm)	sensitive height SH (mm)	Height of barrier H (mm)	response time (ms)	Mtff (years)	PL
0150 BL	6	185	135	273	6	100	e
0210 BL	8	233	183	273	6	100	e
0240 BL	9	257	207	297	6	100	e
0300 BL	12	329	279	369	6	100	e
0360 BL	14	377	327	417	6	100	e
0390 BL	15	401	351	441	6	100	e
0450 BL	18	473	423	513	6	100	e
0540 BL	21	545	495	585	6	100	e
0600 BL	24	617	567	657	6	100	e
0680 BL	27	689	639	729	11	100	e
0750 BL	30	761	711	801	11	100	e
0820 BL	33	833	783	873	11	100	e
0900 BL	36	905	855	945	11	100	e
0970 BL	39	977	927	1017	11	100	e
1050 BL	42	1049	999	1089	11	100	e
1100 BL	45	1121	1071	1161	11	100	e
1200 BL	48	1193	1143	1233	11	100	e
1250 BL	51	1265	1215	1305	11	100	e
1350 BL	54	1337	1287	1377	11	100	e
1400 BL	57	1409	1359	1449	11	100	e
1500 BL	60	1481	1431	1521	11	100	e
1650 BL	66	1625	1575	1665	11	100	e
1800 BL	72	1769	1719	1809	16	100	e
1950 BL	78	1913	1863	1953	16	100	e
2100 BL	84	2057	2007	2097	16	100	e
2200 BL	90	2201	2151	2241	16	100	e
2300 BL	96	2345	2295	2385	16	100	e
2450 BL	102	2489	2439	2529	16	100	e
2650 BL	108	2633	2583	2673	16	99,18	e
2750 BL	114	2777	2727	2817	21	97,15	e
2900 BL	120	2921	2871	2961	21	95,21	e
3000 BL	126	3065	3015	3105	21	93,35	e

NOTE

Mtff = mean time to failure

PL = performance level in accordance with EN 13.849

■ Technical characteristics and codes

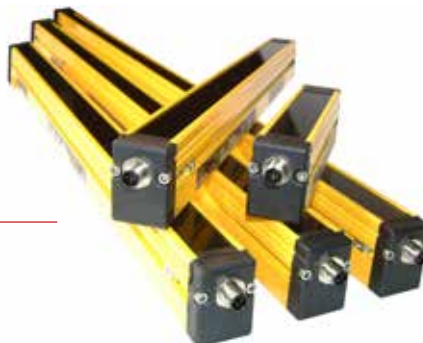
Resolution 55mm Range 15m							
optical code	n. beams	protected height PH (mm)	sensitive height SH (mm)	Height of barrier H (mm)	response time (ms)	Mtff (years)	PL
0150 C	3	200	102	273	6	100	e
0250 C	5	296	198	297	6	100	e
0300 C	6	344	246	369	6	100	e
0400 C	8	440	342	441	6	100	e
0450 C	9	488	390	513	6	100	e
0600 C	12	632	534	657	6	100	e
0750 C	15	776	678	801	6	100	e
0900 C	18	920	822	945	6	100	e
1050 C	21	1064	966	1089	6	100	e
1200 C	24	1208	1110	1233	6	100	e
1350 C	27	1352	1254	1377	11	100	e
1500 C	30	1496	1398	1521	11	100	e
1650 C	33	1640	1542	1665	11	100	e
1800 C	36	1784	1686	1809	11	100	e
1950 C	39	1928	1830	1953	11	100	e
2100 C	42	2072	1974	2097	11	100	e
2200 C	45	2216	2118	2241	11	100	e
2300 C	48	2360	2262	2385	11	100	e
2450 C	51	2504	2406	2529	11	100	e
2650 C	54	2648	2550	2673	11	100	e
2750 C	57	2792	2694	2817	11	100	e
2900 C	60	2936	2838	2961	11	100	e
3000 C	63	3080	2982	3105	11	100	e

Resolution 65mm Range 30m							
optical code	n. beams	protected height PH (mm)	sensitive height SH (mm)	Height of barrier H (mm)	response time (ms)	Mtff (years)	PL
0150 CL	3	211	111	273	6	100	e
0250 CL	5	307	207	297	6	100	e
0300 CL	6	355	255	369	6	100	e
0400 CL	8	451	351	441	6	100	e
0450 CL	9	499	399	513	6	100	e
0600 CL	12	643	543	657	6	100	e
0750 CL	15	787	687	801	6	100	e
0900 CL	18	931	831	945	6	100	e
1050 CL	21	1075	975	1089	6	100	e
1200 CL	24	1219	1119	1233	6	100	e
1350 CL	27	1363	1263	1377	11	100	e
1500 CL	30	1507	1407	1521	11	100	e
1650 CL	33	1651	1551	1665	11	100	e
1800 CL	36	1795	1695	1809	11	100	e
1950 CL	39	1939	1839	1953	11	100	e
2100 CL	42	2083	1983	2097	11	100	e
2200 CL	45	2227	2127	2241	11	100	e
2300 CL	48	2371	2271	2385	11	100	e
2450 CL	51	2515	2415	2529	11	100	e
2650 CL	54	2659	2559	2673	11	100	e
2750 CL	57	2803	2703	2817	11	100	e
2900 CL	60	2947	2847	2961	11	100	e
3000 CL	63	3091	2991	3105	11	100	e

NOTE

Mtff = mean time to failure

PL = performance level in accordance with EN 13.849



■ Technical characteristics and codes

Resolution 175mm		Range 30m				
Optical code	n. beams	sensitive height SH (mm)	Height of barrier H (mm)	response time (ms)	Mtff (years)	PL
0400 D	4	414	513	6	100	e
0700 D	6	702	801	6	100	e
1000 D	8	990	1089	6	100	e
1300 D	10	1278	1377	6	100	e
1600 D	12	1566	1665	6	100	e
1900 D	14	1854	1953	6	100	e
2200 D	16	2142	2241	6	100	e
2500 D	18	2430	2529	6	100	e
2800 D	20	2718	2817	6	100	e

Resolution 185mm		Range 30m				
Optical code	n. beams	sensitive height SH (mm)	Height of barrier H (mm)	response time (ms)	Mtff (years)	PL
0400 DL	4	423	513	6	100	e
0700 DL	6	711	801	6	100	e
1000 DL	8	999	1089	6	100	e
1300 DL	10	1287	1377	6	100	e
1600 DL	12	1575	1665	6	100	e
1900 DL	14	1863	1953	6	100	e
2200 DL	16	2151	2241	6	100	e
2500 DL	18	2439	2529	6	100	e
2800 DL	20	2727	2817	6	100	e

Resolution 320mm		Range 15m				
Optical code	n. beams	sensitive height SH (mm)	Height of barrier H (mm)	response time (ms)	Mtff (years)	PL
0600 E	4	558	657	6	100	e
1000 E	6	990	1089	6	100	e
1500 E	8	1422	1521	6	100	e
1900 E	10	1854	1953	6	100	e
2300 E	12	2286	2385	6	100	e
2800 E	14	2718	2817	6	100	e

Resolution 330mm		Range 30m				
Optical code	n. beams	sensitive height SH (mm)	Height of barrier H (mm)	response time (ms)	Mtff (years)	PL
0600 EL	4	567	657	6	100	e
1000 EL	6	999	1089	6	100	e
1500 EL	8	1431	1521	6	100	e
1900 EL	10	1863	1953	6	100	e
2300 EL	12	2295	2385	6	100	e
2800 EL	14	2727	2817	6	100	e

NOTE

Mtff = mean time to failure

PL = performance level in accordance with EN 13.849

Resolutions and codes

Model	Available functions							RX Connectors		
	RA	RM	EDM	BLNK	MUTE	O-S	M-F	M12 5P	M12 8P	M23-17P
EF-a...	•							•		
EF-b...	•	•	•						•	
EF-c...	•			•					•	
EF-d...	•	•	•	•		•		•	•	
EF-e...	•	•	•		•			•	•	
EF-f1...	•	•	•		•	•				•
EF-f2...	•	•	•		•		•			•

- RA automatic reset
- BLNK floating blanking
- O-S signalling output of OSSD
- M-F signalling output of vertical barrier in OFF condition during muting
- RM manual reset
- MUTE input 2 sensor external plus override plus lampe signal
- EDM monitoring of external contactors

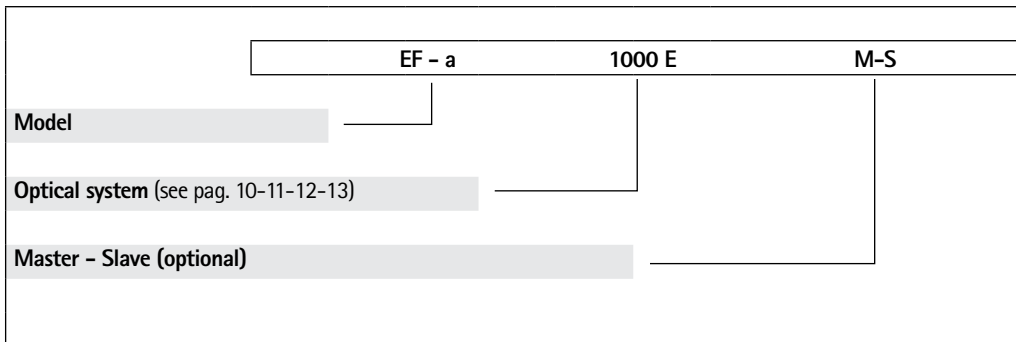
CONNECTIONS RX

- M12-5P Connector M12 - 5 Pole - male
- M12-8P Connector M12 - 8 Pole - male
- M23-17P Connector M23 - 17 Pole - male

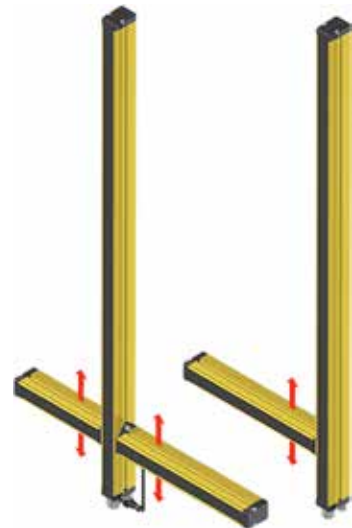
The emitter is always connected to 4 pole M12



Full barrier code



■ Keeper barriers



These barrier models have innovative characteristics compared to the old system. All units are available either with "T" and "L" shape arms containing muting sensors or in the straight version (on request) with external sensors.

Resolution from 14 to 320 mm. Protected height from 250 up to 3000 mm.

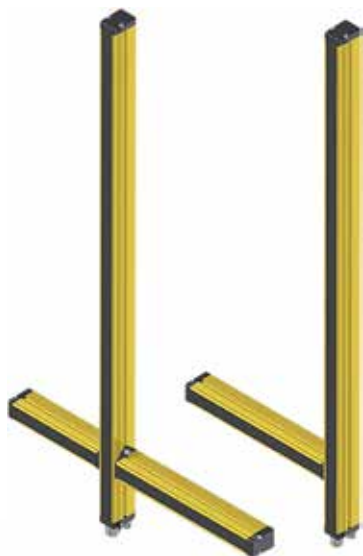
Applications include palletizers, automatic stores, robotic areas, etc.

■ General characteristics

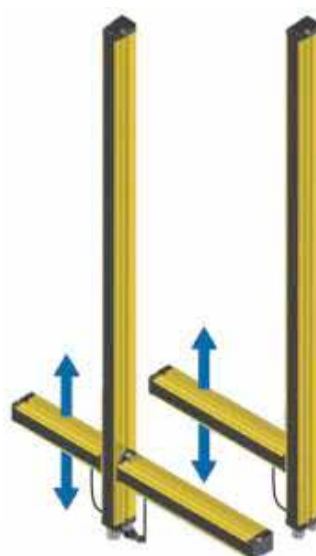
These units are very easy to connect and install thanks to M12 connector and the use of shielded cable of max 100 m. The relay module of pag. 29 change the solid state output into relay output, thus offering further function.

emitter	with connector M12 4 poles male
test	to simulate the beams OFF
receiver	
output	2 x PNP short circuit protection
Reset	starting of barrier
type	automatic or manual
restart automatic time	100msec.
EDM	control for external contactors
BARGRAPH	3 LED for different indication
MUTING	temporary exclusion of barrier
external muting	two sensors
arms muting	Parallel or across beams with 2 or 4 sensors
muting enable	ON /OFF the function of muting
override	function allows pallet removal in cases of blockage
lamp signalling	external lamp for signaling muting function
OSSD-S	signalling of OSSD output status
MUTE - F	signalling of barrier OFF in muting phase

Keeper with fixed arms



Keeper with movable arms



Keeper without arms



Description of other functions

Model	other functions			receiver connections		
	MUTE-E	O-S	M-F	M12 5P	M12 8P	M23 17P
KP- e				•	•	
KP-f1	•	•				•
KP-f2	•		•			•

- MUTE-E** ON/OFF function of muting
- O-S** signalling output for safety outputs state
- M-F** signal output for vertical barrier in OFF state during muting phase

CONNECTIONS RX

- M12-5P Connector M12 – 5 Poles – male
- M12-8P Connector M12 – 8 Poles – male
- M23-17P Connector M23 – 17 Poles – male

The emitter is always connected to M12 4 poles



type of muting	movable arms
LPM 1	Muting L with 2 parallel sensors /RX right
LPM 2	Muting L with 2 parallel sensors /RX left
LXM 1	Muting L with 2 across sensors / RX right
LXM 2	Muting L with 2 across sensors / RX left
TXM 1	Muting T with 2 across sensors /RX right
TXM 2	Muting T with 2 across sensors /RX left
TPM 3	Muting T with 4 parallel sensors
type of muting	fixed arms
LPF 1	Muting L with 2 parallel sensors /RX right
LPF 2	Muting L with 2 parallel sensors /RX left
LXF 1	Muting L with 2 across sensors / RX right
LXF 2	Muting L with 2 across sensors / RX left
TXF 1	Muting T with 2 across sensors /RX right
TXF 2	Muting T with 2 across sensors /RX left
TPF 3	Muting T with 4 parallel sensors
type of muting	external sensors
TPi 3	Muting T for 4 external parallel sensors
TXi 3	Muting T for 2 external across sensors
LPi 3	Muting L for 2 external parallel sensors
LXi 3	Muting L for 2 external across sensors

	Kp-e	1000E	LXF 1
model			
optic (see pag. 18)			
muting type			

Technical characteristics and code

Optical type "A" Resolution 14mm							
optical code	n. beams	protected height PH (mm)	sensitive height SH (mm)	Height of barrier H (mm)	response time (ms)	Mtff (years)	PL
0240 A	24	254	234	326	6	100	e
0360 A	36	374	354	446	6	100	e
0480 A	48	494	474	566	6	100	e
0600 A	60	614	594	686	11	100	e
0700 A	72	734	714	806	11	84,06	e
0850 A	84	854	834	926	11	76,09	e
0950 A	96	974	954	1046	11	69,51	e
1100 A	108	1094	1074	1166	11	63,97	e

Optical type "C" Resolution 55mm							
optical code	n. beams	protected height PH (mm)	sensitive height SH (mm)	Height of barrier H (mm)	response time (ms)	Mtff (years)	PL
0300 C	6	344	246	368	6	100	e
0450 C	9	488	390	512	6	100	e
0600 C	12	632	534	656	6	100	e
0750 C	15	776	678	800	6	100	e
0900 C	18	920	822	944	6	100	e
1050 C	21	1064	966	1088	6	100	e
1200 C	24	1208	1110	1232	6	100	e
1350 C	27	1352	1254	1376	11	100	e
1500 C	30	1496	1398	1520	11	100	e
1650 C	33	1640	1542	1664	11	100	e
1800 C	36	1784	1686	1808	11	100	e
1950 C	39	1928	1830	1952	11	100	e
2100 C	42	2072	1974	2096	11	100	e
2200 C	45	2216	2118	2240	11	100	e
2300 C	48	2360	2262	2384	11	100	e
2450 C	51	2504	2406	2528	11	100	e
2650 C	54	2648	2550	2672	11	100	e
2750 C	57	2792	2694	2816	11	100	e
2900 C	60	2936	2838	2960	11	100	e
3000 C	63	3080	2982	3104	11	100	e

NOTE

Mtff = mean time to failure

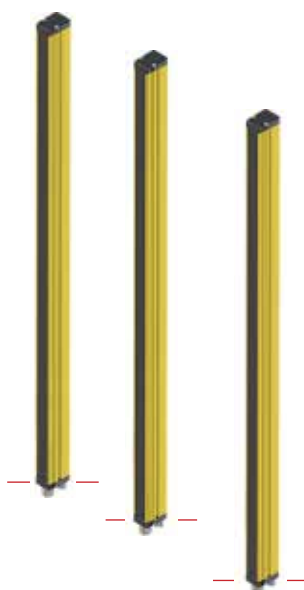
PL = performance level in accordance with EN 13.849

Optical type "B" Resolution 30mm							
optical code	n. beams	protected height PH (mm)	sensitive height SH (mm)	Height of barrier H (mm)	response time (ms)	Mtff (years)	PL
0300 B	12	318	270	368	6	100	e
0450 B	18	462	414	512	6	100	e
0600 B	24	606	558	656	6	100	e
0750 B	30	750	702	800	11	100	e
0900 B	36	894	846	944	11	100	e
1050 B	42	1038	990	1088	11	100	e
1200 B	48	1182	1134	1232	11	100	e
1350 B	54	1326	1278	1376	11	100	e
1500 B	60	1470	1422	1520	11	100	e
1650 B	66	1614	1566	1664	11	100	e
1800 B	72	1758	1710	1808	16	100	e
1950 B	78	1902	1854	1952	16	100	e
2100 B	84	2046	1998	2096	16	100	e
2200 B	90	2190	2142	2240	16	100	e
2300 B	96	2334	2286	2384	16	100	e
2450 B	102	2478	2430	2528	16	100	e
2650 B	108	2622	2574	2672	16	99,18	e

Optical type "D" Resolution 175mm							
Optical code	n. beams	sensitive height SH (mm)	Height of barrier H (mm)	response time (ms)	Mtff (years)	PL	
0400 D	4	414	512	6	100	e	
0700 D	6	702	800	6	100	e	
1000 D	8	990	1088	6	100	e	
1300 D	10	1278	1376	6	100	e	
1600 D	12	1566	1664	6	100	e	
1900 D	14	1854	1952	6	100	e	
2100 D	16	2142	2240	6	100	e	
2400 D	18	2430	2528	6	100	e	
2700 D	20	2718	2816	6	100	e	
3000 D	22	3006	3104	6	100	e	

Optic type "E" Resolution 320mm							
Optical code	n. beams	sensitive height SH (mm)	Height of barrier H (mm)	response time (ms)	Mtff (years)	PL	
0600 E	4	558	656	6	100	e	
1000 E	6	990	1088	6	100	e	
1500 E	8	1422	1520	6	100	e	
1900 E	10	1854	1952	6	100	e	
2200 E	12	2286	2384	6	100	e	
2700 E	14	2718	2816	6	100	e	

■ Aster barriers



This line of products is formed by two types of barriers: models BE and IN.

They both provide a relay power output of 3 A 250 volt.

The BE type is formed by an external box, while the IN type has the box incorporated in the receiver.

They are applied on all systems where it's necessary to protect operators in dangerous areas and are designed for cat. 2 and cat. 4.

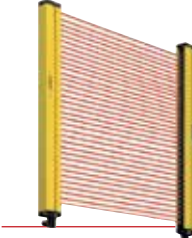
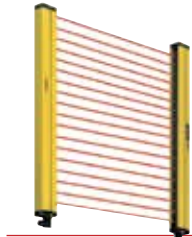
After a long period of production, the Aster line will gradually be replaced by the new EFESTO 4 models, which have new functions making them more functional and flexible for wider application.

Technical characteristics and code

Range 15 m.			Model		Range 30 m.					Model		Barrier height H	Response time																					
Resolution 30 mm	Protected height PH	Sensitive height PH	Type BE with external box	Type IN with integral box	Resolution 40 mm	Protected height PH	Sensitive height PH	Type BE with external box	Type IN with integral box	Resolution 55 mm	Protected height PH			Sensitive height PH	Type BE with external box	Type IN with integral box	Resolution 65 mm	Protected height PH	Sensitive height PH	Type BE with external box	Type IN with integral box	Resolution 175 mm	Protected height PH	Sensitive height PH	Type BE with external box	Type IN with integral box	Resolution 185 mm	Protected height PH	Sensitive height PH	Type BE with external box	Type IN with integral box	Resolution 320 mm	Protected height PH	Sensitive height PH
Series AST/B					Series AST/BL																													
AST-075/B	102 mm	54 mm	A-0011	A-1011	AST-075/BL	113 mm	63 mm	A-0012	A-1012																									
AST-150/B	174 mm	126 mm	A-0021	A-1021	AST-150/BL	185 mm	135 mm	A-0022	A-1022																									
AST-210/B	222 mm	174 mm	A-0031	A-1031	AST-210/BL	233 mm	163 mm	A-0032	A-1032																									
AST-240/B	246 mm	198 mm	A-0041	A-1041	AST-240/BL	257 mm	207 mm	A-0042	A-1042																									
AST-300/B	318 mm	270 mm	A-0051	A-1051	AST-300/BL	329 mm	279 mm	A-0052	A-1052																									
AST-360/B	366 mm	318 mm	A-0061	A-1061	AST-360/BL	377 mm	327 mm	A-0062	A-1062																									
AST-390/B	390 mm	342 mm	A-0071	A-1071	AST-390/BL	401 mm	351 mm	A-0072	A-1072																									
AST-450/B	462 mm	414 mm	A-0081	A-1081	AST-450/BL	473 mm	423 mm	A-0082	A-1082																									
AST-540/B	534 mm	486 mm	A-0091	A-1091	AST-540/BL	545 mm	495 mm	A-0092	A-1092																									
AST-600/B	606 mm	558 mm	A-0101	A-1101	AST-600/BL	617 mm	567 mm	A-0102	A-1102																									
AST-680/B	678 mm	630 mm	A-0111	A-1111	AST-660/BL	689 mm	639 mm	A-0112	A-1112																									
AST-750/B	750 mm	702 mm	A-0121	A-1121	AST-750/BL	761 mm	711 mm	A-0122	A-1122																									
AST-820/B	822 mm	774 mm	A-0131	A-1131	AST-820/BL	833 mm	783 mm	A-0132	A-1132																									
AST-900/B	894 mm	846 mm	A-0141	A-1141	AST-900/BL	905 mm	855 mm	A-0142	A-1142																									
AST-970/B	966 mm	918 mm	A-0151	A-1151	AST-970/BL	977 mm	927 mm	A-0152	A-1152																									
AST-1050/B	1038 mm	990 mm	A-0161	A-1161	AST-1050/BL	1049 mm	999 mm	A-0162	A-1162																									
AST-1100/B	1110 mm	1062 mm	A-0171	A-1171	AST-1100/BL	1121 mm	1071 mm	A-0172	A-1172																									
AST-1200/B	1182 mm	1134 mm	A-0181	A-1181	AST-1200/BL	1193 mm	1143 mm	A-0182	A-1182																									
AST-1250/B	1254 mm	1206 mm	A-0191	A-1191	AST-1250/BL	1265 mm	1215 mm	A-0192	A-1192																									
AST-1350/B	1326 mm	1278 mm	A-0201	A-1201	AST-1350/BL	1337 mm	1287 mm	A-0202	A-1202																									
AST-1400/B	1398 mm	1350 mm	A-0211	A-1211	AST-1400/BL	1409 mm	1359 mm	A-0212	A-1212																									
AST-1500/B	1470 mm	1422 mm	A-0221	A-1221	AST-1500/BL	1481 mm	1431 mm	A-0222	A-1222																									
AST-1650/B	1614 mm	1566 mm	A-0231	A-1231	AST-1650/BL	1625 mm	1575 mm	A-0232	A-1232																									
AST-1800/B	1758 mm	1710 mm	A-0241	A-1241	AST-1800/BL	1769 mm	1719 mm	A-0242	A-1242																									
AST-1950/B	1902 mm	1854 mm	A-0251	A-1251	AST-1950/BL	1913 mm	1863 mm	A-0252	A-1252																									
AST-2100/B	2046 mm	1998 mm	A-0261	A-1261	AST-2100/BL	2057 mm	2007 mm	A-0262	A-1262																									
Series AST/C					Series AST/CL																													
AST-100/C	152 mm	54 mm	A-0301	A-1301	AST-100/CL	163 mm	63 mm	A-0302	A-1302																									
AST-150/C	200 mm	102 mm	A-0311	A-1311	AST-150/CL	211 mm	111 mm	A-0312	A-1312																									
AST-250/C	296 mm	198 mm	A-0321	A-1321	AST-250/CL	307 mm	207 mm	A-0322	A-1322																									
AST-300/C	344 mm	246 mm	A-0331	A-1331	AST-300/CL	355 mm	255 mm	A-0332	A-1332																									
AST-400/C	440 mm	342 mm	A-0341	A-1341	AST-400/CL	451 mm	351 mm	A-0342	A-1342																									
AST-450/C	488 mm	390 mm	A-0351	A-1351	AST-450/CL	499 mm	399 mm	A-0352	A-1352																									
AST-600/C	632 mm	534 mm	A-0361	A-1361	AST-600/CL	643 mm	543 mm	A-0362	A-1362																									
AST-750/C	776 mm	678 mm	A-0371	A-1371	AST-750/CL	787 mm	687 mm	A-0372	A-1372																									
AST-900/C	920 mm	822 mm	A-0381	A-1381	AST-900/CL	931 mm	831 mm	A-0382	A-1382																									
AST-1050/C	1064 mm	966 mm	A-0391	A-1391	AST-1050/CL	1075 mm	975 mm	A-0392	A-1392																									
AST-1200/C	1208 mm	1110 mm	A-0401	A-1401	AST-1200/CL	1219 mm	1119 mm	A-0402	A-1402																									
AST-1350/C	1352 mm	1254 mm	A-0411	A-1411	AST-1350/CL	1363 mm	1263 mm	A-0412	A-1412																									
AST-1500/C	1496 mm	1398 mm	A-0421	A-1421	AST-1500/CL	1507 mm	1407 mm	A-0422	A-1422																									
AST-1650/C	1640 mm	1542 mm	A-0431	A-1431	AST-1650/CL	1651 mm	1551 mm	A-0432	A-1432																									
AST-1800/C	1784 mm	1686 mm	A-0441	A-1441	AST-1800/CL	1795 mm	1695 mm	A-0442	A-1442																									
AST-1950/C	1928 mm	1830 mm	A-0451	A-1451	AST-1950/CL	1939 mm	1839 mm	A-0452	A-1452																									
AST-2100/C	2072 mm	1974 mm	A-0461	A-1461	AST-2100/CL	2083 mm	1983 mm	A-0462	A-1462																									
Series AST/D					Series AST/DL																													
AST-450/D		414 mm	A-0501	A-1501	AST-450/DL		423 mm	A-0502	A-1502																									
AST-750/D		702 mm	A-0511	A-1511	AST-750/DL		711 mm	A-0512	A-1512																									
AST-1050/D		990 mm	A-0521	A-1521	AST-1050/DL		999 mm	A-0522	A-1522																									
AST-1350/D		1278 mm	A-0531	A-1531	AST-1350/DL		1287 mm	A-0532	A-1532																									
AST-1650/D		1566 mm	A-0541	A-1541	AST-1650/DL		1575 mm	A-0542	A-1542																									
AST-1950/D		1854 mm	A-0551	A-1551	AST-1950/DL		1863 mm	A-0552	A-1552																									
Series AST/E					Series AST/EL																													
AST-600/E		558 mm	A-0561	A-1561	AST-600/EL		567 mm	A-0562	A-1562																									
AST-1050/E		990 mm	A-0571	A-1571	AST-1050/EL		999 mm	A-0572	A-1572																									
AST-1500/E		1422 mm	A-0581	A-1581	AST-1500/EL		1431 mm	A-0582	A-1582																									
AST-1950/E		1854 mm	A-0591	A-1591	AST-1950/EL		1863 mm	A-0592	A-1592																									

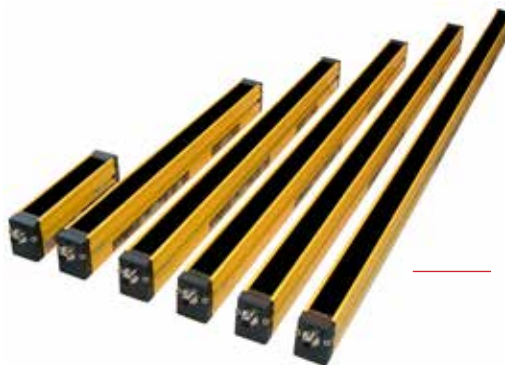
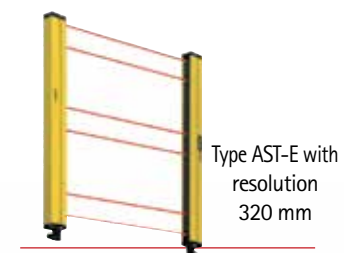
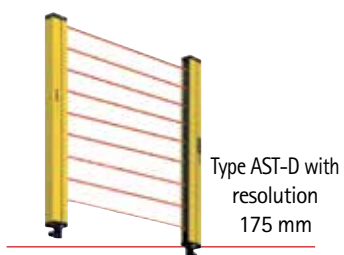
The model of barriers type IN with incorporated box have an extension of 165 mm (not sensitive)
All the units are delivered with connectors type C. If required the M12 connector see the code page 27.

■ Curtains identification codes

	Model	level	type	connection	alignment
 Type AST-B with resolution 30 mm	see table				
	category 2	=2			
	category 4	=4			
	single	=0			
	master	=1			
	slave	=2			
	connector type C	=0			
	type M12	=1			
 Type AST-C with resolution 55 mm	without display	=0			
	with display	=1			

To order the complete barrier please specify:

- Code of barrier
- Code of box (see pages 22-23)
- Code of brackets and accessory (see page 28)



Control units

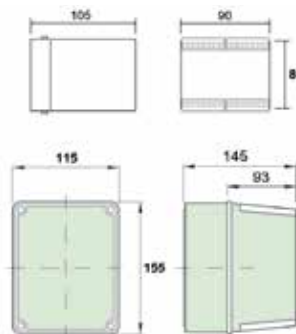
These units are only employed for BE/AL models and do not require any regulation.

3 models are available: BT - SB - DB

- LED signalling for power supply
- LED " " for the conditions of barrier
- LED " " for muting
- Connection through plug-in terminal block
- Output safety contacts 2NO + 1NC 3 Amp 250 Volt
- Power consumption 12 VA
- Automatic and manual reset

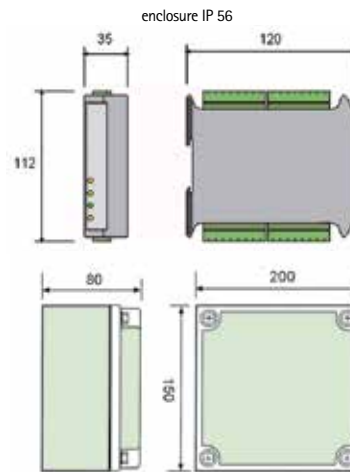
- Test circuit connection
- Feedback input for control of the machine's final switching device (FSD)
- Override circuit to bypass the muting function
- Enclosure in ABS IP 20. On request IP 56
- DIN rail mounting
- Connection with shielded cable to TX/RX up to 50 m
- Power supply: 24 volt d.c./a.c. 110-230 volt a.c. (to be specified when ordering)
- Muting circuit (optional):
 - Type MU with two sensors + override for BT box
 - Remote lamp for muting
 - Grey colour (only for BT serie) of enclosure for category 4
 - Green colour (only for BT serie) of enclosure for level 2

BT box series



Available at 24 Volt d.c. + muting MU (optional)
Available at 24-110-220 Volt a.c. without muting MU

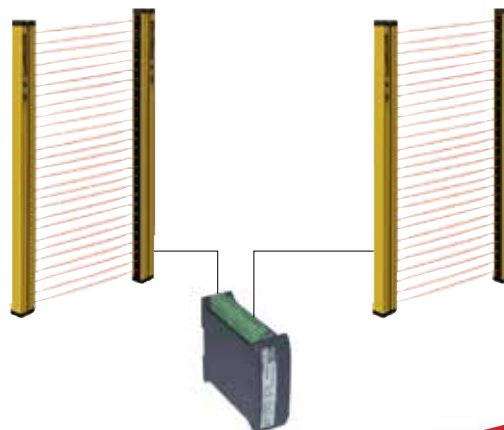
SB box series



Available at 24 Volt d.c. 24 - 110-220 Volt a.c.
No muting MU

DB box series to control two barriers

- Available at 24 Volt d.c. 24 - 110-220 Volt a.c.
- Adapt for front and rear protection of every machinery
- No muting MU
- Characteristics similar to the previous models



■ Identification code of boxes

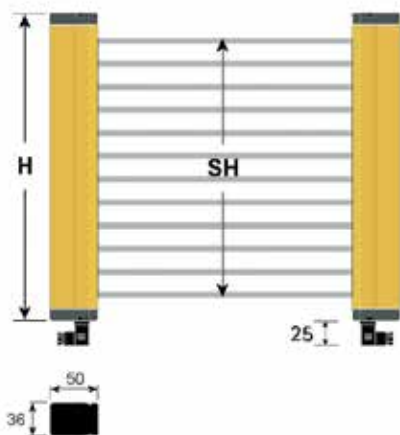
		Model	supply	category	enclosure	muting
box BT	= B01					
box SB	= B03					
box DB	= B04					
A1 - 24 V a.c.	= 1					
A2 - 110 V a.c.	= 2					
A3 - 230 V a.c.	= 3					
A5 - 24 V d.c.	= 5					
category 2	= 2					
category 4	= 4					
enclosure IP 20	= 2					
enclosure IP 56	= 5					
no muting	= 0					
muting MU	= 1					

NOTE: SB and DB boxes are only for the type A 5

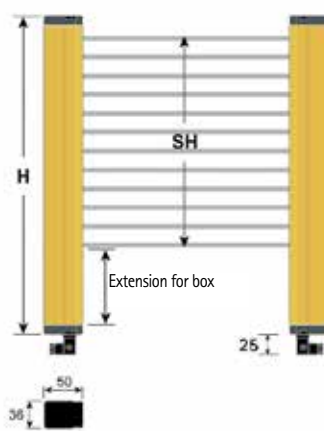


■ Barriers dimensions

Dimensions of BE series with external box

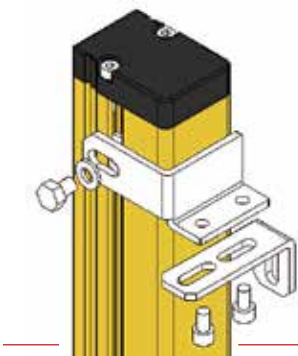


Dimensions of IN series with INCORPORATED box



The type with incorporated box series IN, have an extension of 165mm not sensitive

■ Accessories



This category includes a series of components to meet various other market requirements.

- acrylic protection to render watertight barriers (IP 67)
- mirrors and floor posts for perimeter protection
- connection cables from 3 to 20 m.
- brackets for installation of the curtains
- interface modules for transforming solid state into safety power relay outputs

■ Acrylic protection

To render barriers watertight (IP 67) for protection against the water jets; suitable for spray washing of machine.

Models and identification codes

Plexiglass tube (diam. 60/70 mm) complete with two caps, one blind and one with cable gland	Code		
	cable 3 metres	cable 5 metres	cable 10 metres
VET-1 for 075 - 150 - 210 - 240 (cut under-size)	D-13	D-15	D-110
VET-2 for 300 - 360 - 390 (cut under-size)	D-23	D-25	D-210
VET-3 for 450 - 540 - 600 - 680 - 750 (cut under-size)	D-33	D-35	D-310
VET-4 for 820 - 900 - 970 -1050 - 1200 (cut under-size)	D-43	D-45	D-410
VET-5 for 1250 - 1350 - 1400 -1500 (cut under-size)	D-53	D-55	D-510
VET-6 for 1650 - 1800 - 1950 (cut under-size)	D-63	D-65	D-610
Brackets			
VET-70/60 kit complete with 4 brackets	D-05		



■ Heated acrylic protection enclosure

Problems with barrier operation may occur in winter at low temperatures (ice or frost). This is remedied by fitting two elements (24 V DC/AC) to the sides of the tube with adhesive to produce enough heat (thermostat control) to eliminate the external film of moisture and ensure system operation down to -15° C. The output cable is formed by 6 wires: 4 for the barrier and 2 for resistance.

Models and identification codes

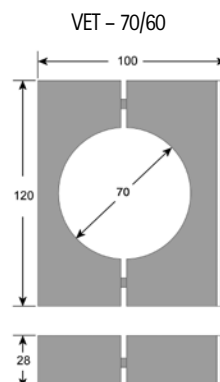
Heating tube (diam. 60/70 mm) complete with two caps, one blind and one with cable gland	Code		
	cable 3 metres	cable 5 metres	cable 10 metres
VETR-1 for 075 - 150 - 210 - 240 (cut to-size)	DR-13	DR-15	DR-110
VETR-2 for 300 - 360 - 390 (cut to-size)	DR-23	DR-25	DR-210
VETR-3 for 450 - 540 - 600 - 680 - 750 (cut to-size)	DR-33	DR-35	DR-310
VETR-4 for 820 - 900 - 970 -1050 - 1200 (cut to-size)	DR-43	DR-45	DR-410
VETR-5 for 1250 - 1350 - 1400 - 1500 (cut to-size)	DR-53	DR-55	DR-510
VETR-6 for 1650 - 1800 - 1950 (cut to-size)	DR-63	DR-65	DR-610
Brackets			
VET-70/60 kit complete of for 4 bracket	D-05		



■ Brackets

Protections dimensions

The dimensions of the barriers are reported at page 10-11-12-13 (for EFESTO 4) and page 20 (for ASTER) adding 90 mm due to the thickness of the caps plus 25 mm of cable gland.



■ Mirrors

By using mirrors in conjunction with a single barrier, an efficient and cost effective protection system can be provided around 2 or 3 sides of the area to be guarded.

When mirrors are used as part of multi-side barrier, it should be noted that each mirror will cause a range loss of approximately 25%. This range loss can be compensated by using special long range (60 metres) barriers. Particular care must be taken when installing mirrors and brackets in order to maintain beam alignment in the event of shock and vibration.

They are employed with ASTER - EFESTO4 barriers

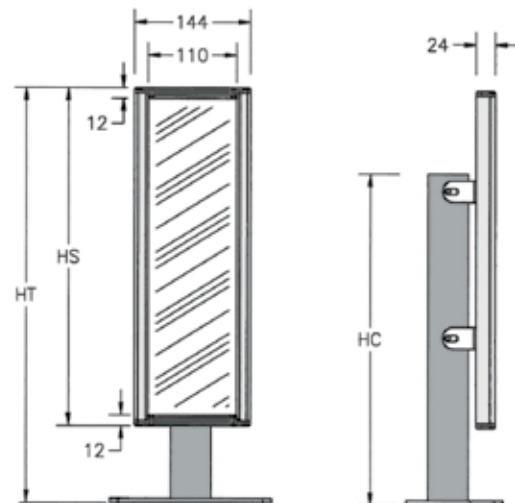
N.B.

The model WAB mirrors include also the floor post

Model	HS (mm)	HC (mm)	HT (min/max)	Code
WAB-501	390	385	400/570	D-50
WAB-502	710	705	720/1050	D-51
WAB-503	1030	1025	1040/1530	D-52
WAB-504	1350	1345	1360/2010	D-53
WAB-505	1670	1345	1680/2320	D-54
WAB-506	1830	1345	1840/2480	D-55
WAB-507	1990	1345	2000/2640	D-56

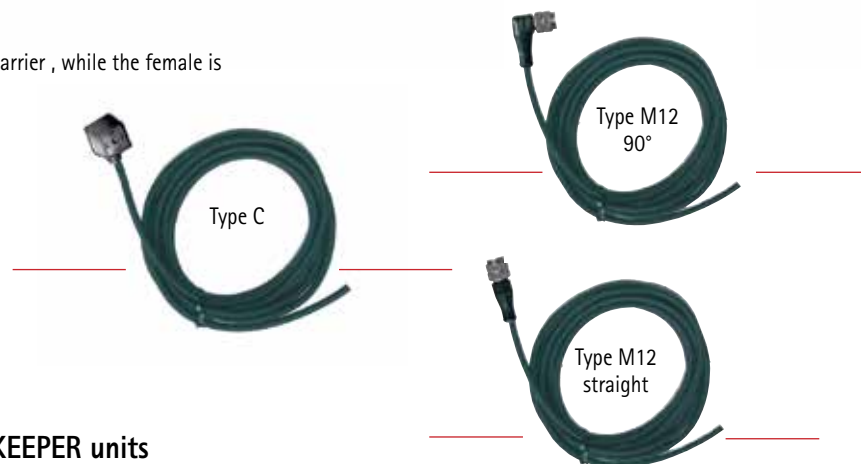
■ Floor post

Model	HC (mm)	Code
SCFS-3022	700	D-61
SCFS-3023	1020	D-62
SCFS-3024	1340	D-63



■ Connection cable

The male connector is mounted on the barrier, while the female is part of cable



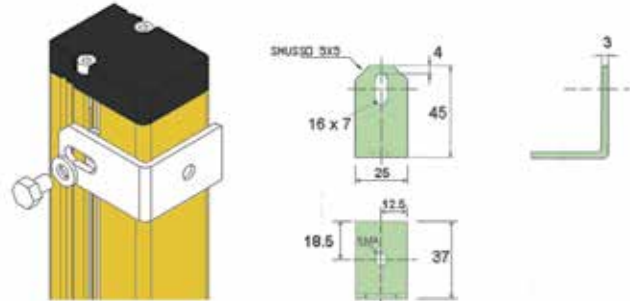
MODELS for EFESTO 4 and KEEPER units

for EFESTO / KEEPER barriers		Code
CAVM12-05F4/D	Cable M12 4 poles straight shielded female 5 m. for TX	E-84-5
CAVM12-10F4/D	Cable M12 4 poles straight shielded female 10m per TX	E-84-10
CAVM12-05F5/D	Cable M12 5 poles straight shielded female 5m per RX a / d / e (see pag. 14-17)	E-85-5
CAVM12-10F5/D	Cable M12 5 poles straight shielded female 10m per RX a / d / e (see pag. 14-17)	E-85-10
CAVM12-05F8/D	Cable M12 8 poles straight shielded female 5m per RX b / c / d / e (see pag. 14-17)	E-88-5
CAVM12-10F8/D	Cable M12 8 poles straight shielded female 10m per RX b / c / d / e (see pag. 14-17)	E-88-10
CAVM23-05F17/D	Cable M23 17 poles straight shielded female 5m per RX f 1 / f2 (see pag. 14-17)	E-817-5
EFESTO / KEEPER for connections to relays module 21-22 (see pag. 29)		
CAVM12-10FF4/D	Cable M12 4 poles female+female shielded 10m	E-94-10
CAVM12-10FF5/D	Cable M12 5 poles female+female shielded 10m	E-95-10
CAVM12-10FF8/D	Cable M12 8 poles female+female shielded 10m	E-98-10
CAVM23-10FF17/D	Cable M23 17 poles female+female shielded 10m	E-917-10
for ASTER TX RX for connections to relays module BT-SB-DB (see pag. 23)		
CAVM12-03/D	Cable 3m with M12 4 poles female straight	E-20
CAVM12-03/S	Cable 3m with M12 4 poles female 90°	E-21
CAVM12-05/D	Cable 5m with M12 4 poles female straight	E-22
CAVM12-05/S	Cable 5m with M12 4 poles female 90°	E-23
CAVM12-10/D	Cable 10m with M12 4 poles female straight	E-24
CAVM12-10/S	Cable 10m with M12 4 poles female 90°	E-25
CAVM12-15/D	Cable 15m with M12 4 poles female straight	E-26
CAVM12-20/D	Cable 20m with M12 4 poles female straight	E-27
for ASTER IN barriers for RX		
CAV05/14/P/FD	Cable 5m with connector 7/8" 14 poles Female	E-31
CAV10/14/P/FD	Cable 10m with connector 7/8" 14 poles Female	E-32
CAV20/14/P/FD	Cable 20m with connector 7/8" 14 poles Female	E-33
for ASTER BE barriers		
CAV03/C	Cable 3m with female connector type C	E-10
CAV05/C	Cable 5m with female connector type C	E-11
CAV10/C	Cable 10m with female connector type C	E-12

■ Brackets

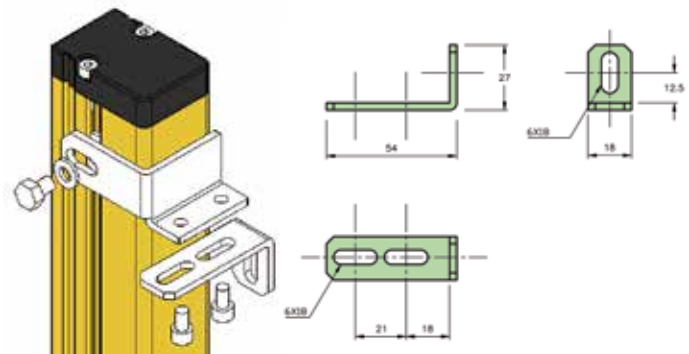
Bracket model STGM

Simple L bracket for easy adjustment of the curtain. The special nut inside the aluminium profile allows the barrier height to be easily adjusted.



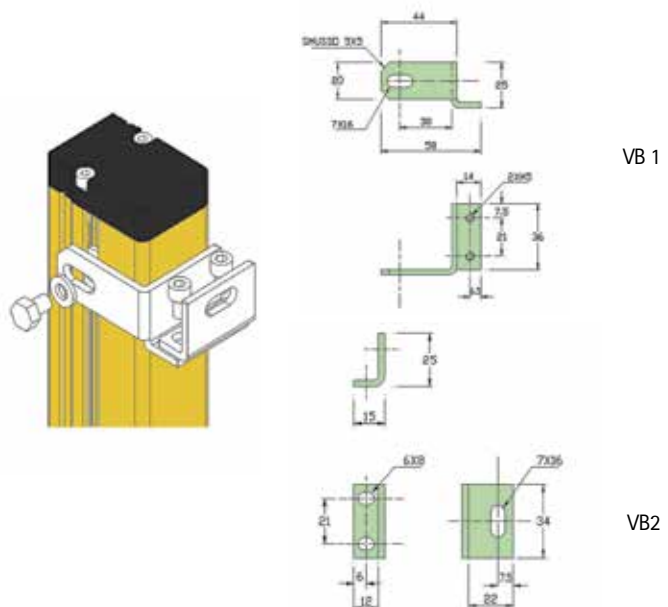
Bracket model STDL

Double "L" bracket for lateral fixing of the barrier with angular and lateral regulation.



Bracket model STVB

Compact bracket comprising two parts - VB1 and VB2 - allowing installation in confined space and easy adjustment on three axes.



Cross section of aluminium profile

Along the profile there is a channel in which threaded elements for fixing the brackets can slide. If they have to be removed to put them in the channel on the opposite side, remove the black cap of the barrier without a connector by removing the two anchor screws.



■ Module relay output 3 A 250 Volt

The following modules connected to EFESTO 4 and KEEPER curtains transform solid state into power relay outputs. They can be connected to the barrier versions with EDM, EF b, EF d, EF e, EF f, KP e, KP1, KP2

REL 011 module at DIN connection

REL 012 module at DIN connection with lamp for muting



REL 021 B module with reset key and lamp for out put state for barrier mod. EF b



REL 021 D module as above for barrier model EF d



REL 022 E module as above plus key for override for barriers model EF e and KP e



REL 022 F module as above for type EF - KP f1 - KP f2



■ No safety curtains



These are devices for industrial and civil applications requiring the detection, measurement and recognition of variously shaped objects.

There are two types: series NI for detecting the passage or presence of objects
series NS for measuring areas and dimensions

■ Type NI no safety barriers

These curtains are designed to detect the passage and presence of objects, also with small diameters (down to 0.9 mm) or foil of thickness nearing zero and passing at very high speeds.

Detection is not affected by the type of material or its colour.

Suitably deployed, these units are excellent for glass, fabrics and transparent film.

Their high optical immunity to fixed light, flashes and electrical interference and the robustness of the aluminium housings give these systems the necessary reliability for use in even the most demanding conditions.

The NI barrier is based on a close net of beams to scan the area in a number of directions.

The interruption even of only one beam blocks the system under control.

Detection of objects with a rectangular section is extremely effective. Glass plates, foil, washers and similar objects with thicknesses of only a few tenths of a millimetre can be laterally detected.

The high speed of detection and the high resolution of the system make the barriers ideal for:

- control of expulsion of pieces from presses
- counting pieces exiting production lines
- control of presence of materials exiting painting plant, rolling mills, drawing machines and similar.

All the circuits are housed inside the barriers, so no external modules are required.

To cover all connection requirements, two different outputs are supplied:

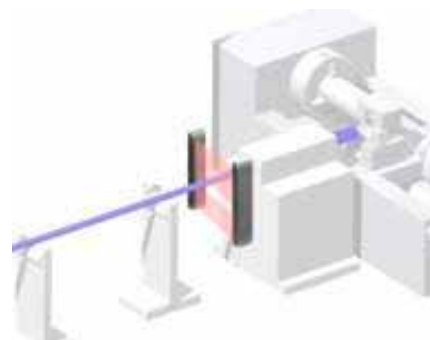
OUT A 24 volt with interrupted beams 0 volt with beam free

OUT B 0 volt with beams interrupted 24 volt with beam free

200 different models are available as following table :

Resolution	from model	to model	height from ... up to
0,9 mm	NI 01 - 40	NI-H 01 - 800	35 - 795 mm
2 mm	NI 02 - 40	NI-H 02 - 1280	35 - 1275 mm
4 mm	NI 04 - 40	NI-H 04 - 2560	35 - 2555 mm
8 mm	NI 08 - 80	NI-H 08 - 2900	70 - 2880 mm
12 mm	NI 12 - 100	NI-H 12 - 2900	95 - 2880 mm
25 mm	NI 25 - 100	NI-H 25 - 2900	95 - 2880 mm
Range	range : from 50 mm. up to 8 m. on function on type.		

For details see the site www.grein.it



■ Type NS no safety barriers

These curtains are designed to provide information on the dimensions, position and shape of the object detected. The NS system is formed by a transmitter and a receiver that generate a grid of parallel beams to detect the presence of objects determine their shape and position and communicate such information to the control system.

The interaxis of the beams can be from 5 to 12 mm interpolated 10 - 24 -48 mm parallel. The measurement heights of the curtains are between 80 to 2900 mm with range up to 10 m.

Different types of output and communication are supplied:

- Analog 0-10 volt or 4 - 20 mA
 - type A gives the position of first beam interrupted to detect the position of object
 - type B gives a proportional signal on the basis of the number of beams interrupted to measure the dimensions of the object
- serial RS 485 with protocol mod. BUS-RTU
 - indicates the free or engaged state of each beam

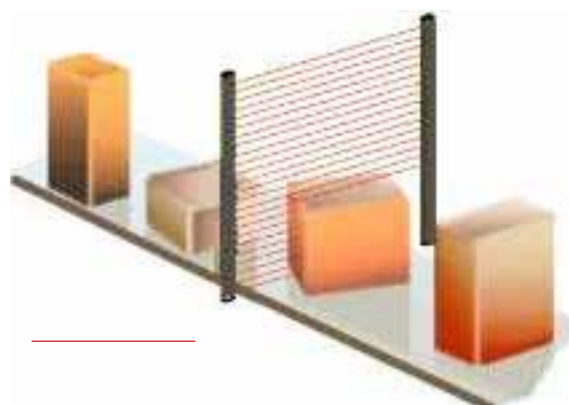
All the circuits are housed inside the barriers, so no external modules are required. This also reduces overall dimensions and installation costs and time.

Applications:

- dimensional measurement of objects
- recess control
- level control
- measuring for packaging systems
- shape detection for painting plants and similar
- automation in general

150 different models are available as in the following table :

Resolution	to model	up to model	detection height
5 mm interp.	NS-T 05- 80	NS-T 05- 1200	from 80 up to 1200 mm
12 mm interp.	NS-T 12- 095	NS-T 12- 2900	from 94 up to 2878 mm
10 mm	NS 10- 080	NS 10- 2400	from 92 up to 2412 mm
24 mm	NS 24- 095	NS 24- 2900	from 95 up to 2902 mm
48 mm	NS 48- 095	NS 48- 2900	from 142 up to 2926 mm



■ Pressure sensitive devices

conforming to EN-ISO 13856-2



Ribbon switches

These are electro-sensitive ribbon switches that are highly sensitive to pressure. Mounted with special rubber (EPDM) sheaths, they form edges to prevent accidents with sliding doors, gates, automatic storage systems, elevators, etc.

■ Principle of operation

The system uses pressure ribbon switches that offer a broad range of sheathing materials, switch lengths, exterior colour and lead wire combinations, as well as substantial resistance to moisture and chemicals.

They are employed to control the movement of machines or other moving parts, that can cause accidents.

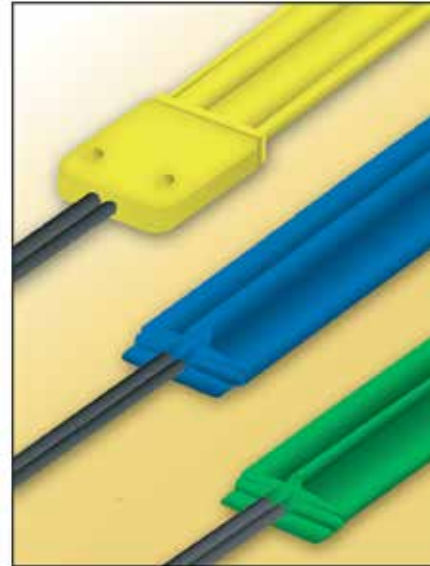
These ribbon switches are a continuous NO contact.

These ribbons have fail-safe wiring conform to category 3 of ISO-13849/1 when used in connection with our PS-3 controllers.

The elements are normally open, momentary contact, pressure actuated switches. They are available in lengths ranging from 0,2 m to 300 m. The conductors are made from a precisely formulated alloy which has a low resistance to produce a highly consistent switching action, together with an external long mechanical life expectancy. They are designed for more than 3 millions operations at any given point.

Self adhesive backing or foam tapes hold and position the switch. For permanent mounting in commercial vehicle or industrial use, we provide aluminium or PVC extruded channel.

They are also available in do-it-yourself kits for field fabrication and installation.



Applications

For industrial safety:

- switches of emergency on every type of machine
- control on conveyors
- for use 2 wires without resistor no safety are available
- for safety applications are models with:
 - 4 wires without resistor
 - 2 wires with resistor 8,2 kOhm

For not industrial uses:

- entry signalings for doors opening
- controls for disabled peoples
- alarms for banks
- drive chronometres trigger for swimming pools

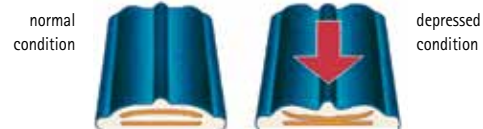
Chemical characteristic:

Optimal resistance to:

- oil-petro-kerosene
- acid and alkaline
- alcohol and tetrachloride

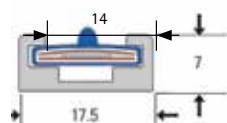
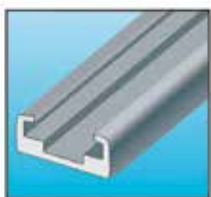
Specifications and ratings:

- Operating voltage	32 Vcc
- Operating current	1 A max.
- Dielectric resistance	1000 V / d.c.
- Electrical resistance	4 ohm / metres
- Cable connections	PVC normal
- Operating temperature	-15 +60°C
- Protection degree	IP 65
- Operating life	3 millions of operations
- Material covering	PVC
- Typical weight	45 gr. / m

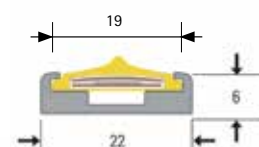
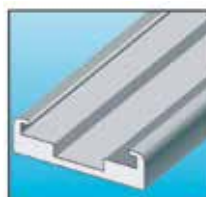


Aluminium channel

Type 404 (for 102-A and 102-F types)



Type 406 (for 202-L type) also in PVC plastic



Standard types

Ribbon	102-A	102-F	202-L
Profile			
Dimensions	14 x 4 mm	14 x 8,5 mm	19 x 5 mm
Actuating force	2 Newton (0,2 Kg)	15 Newton (1,5 Kg)	5 Newton (0,5 Kg)
Bend radius	10 mm	60 mm	15 mm
Description	Lowest profile for tight spaces or to prevent accidental actuation	Low profile contoured switch which can be bent around smoothly curved corners used as a hand or foot activated machine Stop/Start.	General purpose switch for industrial, medical, and transportation applications.

Terminals for 102/A and 102/F

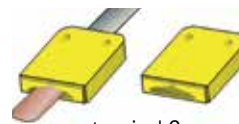
type LD with welded cable or terminal type D with cable 500mm



terminal D

Terminals with connector 202/L

type C for model 202-L with cable 500 mm



terminal C

Ribbon switches identification code:

	Model	lengths	cables	output side	cable lengths	sealing	aluminium channel
Ribbon blue color	102-A						
Ribbon red color	102-F						
Ribbon yellow color	202-L						
To specify in mm							
4 wires fail safe	F						
2 wires fail safe with R=8,2KOhm	R						
2 wires no safety	S						
Only one side	O						
From two sides	E						
From final sides (with R=8,2KOhm)	X						
500 mm	1						
2000 mm	2						
On request	3						
Sealing with connector	C						
Sealing with connector	D						
Sealing with welding	LD						
Aluminium channel type 404-406	Y						
No channel	N						

■ Pressure sensitive devices conforming to EN ISO 13856-2



■ General remarks

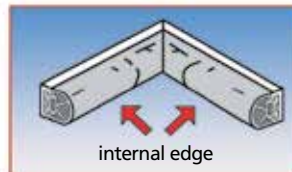
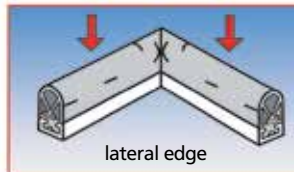
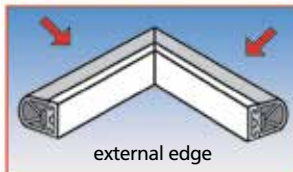
These edges are pressure sensitive devices designed to protect both personnel and equipment in industrial environments. They are in a range of different profiles and sensitivities to suit various applications. They have fail-safe wiring conforming to category 3 of ISO-13849/1 when used in conjunction with PS-3 controllers.

The construction of the sensing edge is based on a continuous length of ribbon encased in a durable housing material which is fitted into a choice of channel (see pages 38-39).

■ Main features

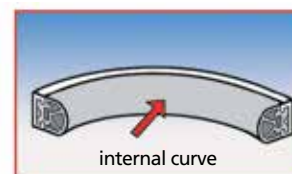
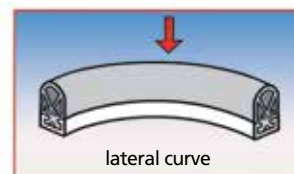
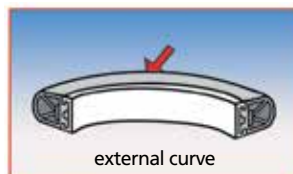
- Wide range of models
- Low pressure actuation
- Custom configuration
- Fail - safe operation
- Multiple sensors connected in series
- Operative angle more of 45 °
- Connection with 2 or 4 wires, with the use of 8,2kohm resistance with PS3/RS or PSE3RD control units
- Cable connection in PVC normal type
- Other for special applications

Right and angle edges



In case of special design for perimeter protection, specify on the drawing.

Curved edges

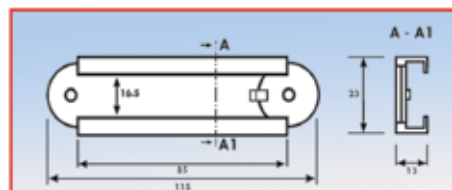


■ Curved edges flexible sensing for GR 503 – GR 747 –GR 748 – 757

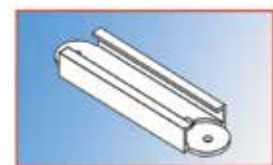
The BS-3 support is designed to solve the problem of curved edges in a very simple way irrespective of the radius required and only for GR 503 – GR 747 –GR 748 – 757.

The min. radius is 1.5 m.

This solution has big advantages in that the radius is not binding, so the customer can decide the bend value.



Overall dimensions of type BS 3



■ Guide to edges selection

To choose the right bump switch for the application required, consider the following three characteristics which define performance:

- Actuating force of the rubber before the contact closure
- Activation of the contact by further pressure
- Overtravel distance after the contact closure

These characteristics vary depending on the housing selected and the position of the sensor inside the rubber, as reported on the table to page 38

Housing type	Compliance	Activation	Overtravel
low profile	none	immediate	minimal
medium profile	some	after compliance	some
high profile T	minimal	immediate	maximun
high profile B	moderate	after compliance	maximun

- The high profile type T edge have the sensor cavity in the top part of the rubber
- The high profile type B edge have the sensor cavity on the bottom part of the rubber

■ Applications

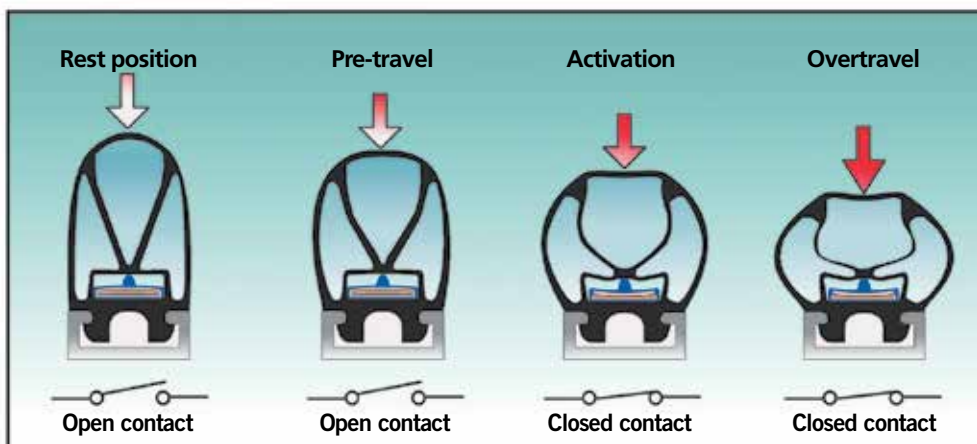
- doors and industrial gates
- personnel lifts
- automatic store
- conveyor systems
- robotics areas
- operating table

Features

- **Rest position**
the edge in normal condition is ready to work (with NO contact)
- **Pre-travel**
compression of the housing before contact closure occurs (with NO contact)

- **Activation**
the point at which contact closure occurs (with NC contact)

- **Overtravel**
the distance of the housing can compress after contact closure occurs (with NC contact)

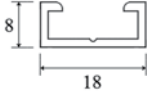
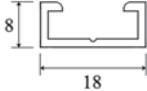
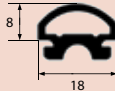
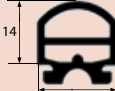
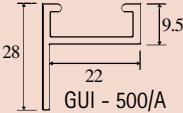

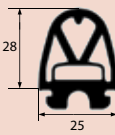
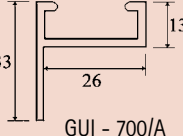

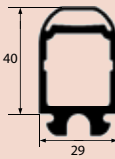
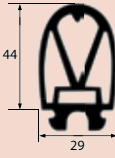
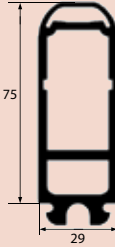


■ Specifications

Nitrilic rubber edge

Operating temperature
Protection class of the sensor
Max operating voltage
Max operating current
Hardness of rubber

- 10 +65 °C
IP 56 on request IP 65
32 volt d.c.
1 Ampere
70 Shore

Aluminium channel (angle or flat)		Drawing	Type	Material	weight/m	Colour
Angle	Flat					
 GUI - 300/A	 GUI - 300/P	 GR-306	EPDM	300	Black	
		 GR-316	EPDM	350	Black	
 GUI - 500/A	 GUI - 500/P	 GR-503	EPDM	600	Black	
 GUI - 700/A	 GUI - 700/P	 GR-747	EPDM	700	Black	
		 GR-748	NBR	900	Black	
		 GR-757	EPDM	1100	Black	

Edges available in lengths up to 5 meters

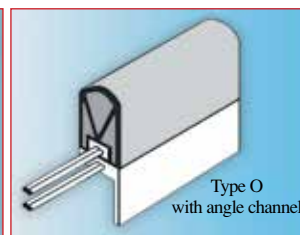
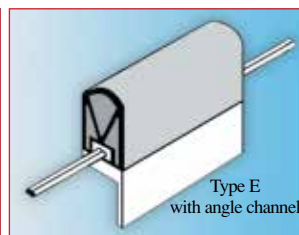
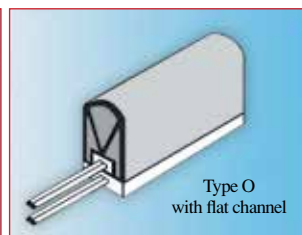
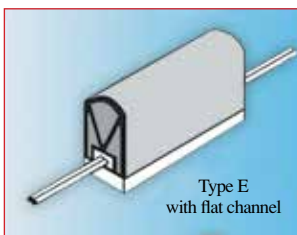
- Type NBR elastomery to resist lubricating oil and cooling liquid on tool machinery
- Type on etil-propilic resin EPDM to resist to acid and atmosferic agents

Pre-travel distance	Overtravel movement	Actuating force	Description	Applications
< 1,5 mm	2 mm	50 Newton < 5 Kg	Miniature edge for compact spaces working at minimum pressure.	<ul style="list-style-type: none"> - sliding doors - conveyors system - disable facility - operating tables
2 mm	2,8 mm	50 Newton < 5 Kg	Edge with low profile ideal for easy installation where space is restricted.	<ul style="list-style-type: none"> - sliding doors - robotic system - escalators - operating tables
< 7 mm	5 mm	100 Newton < 10 Kg	Compact edge ideal for a wide range of applications to satisfy most mounting arrangements in accordance to head-on side impact.	<ul style="list-style-type: none"> - big moving doors at high speed - lift door - mobile vehicle
< 1,7 mm	21 mm	40 Newton < 4 Kg	Edge at medium profile in accordance with the performance required. It works at minimum pressure	<ul style="list-style-type: none"> - moving door - lift door - public bus door - theatrical stage
< 6 mm	17 mm	65 NNewton < 6,5 Kg	Compact edge adapt for lateral pressure ideal for a lot of applications in particular used where is the presence of oil on tool machine.	<ul style="list-style-type: none"> - door of tool machine - lateral bumper - escalator mobile - lift door
< 1,5 mm	35 mm	58 Newton < 5,8 Kg	Sensing edge which is typically used where is immediate activation required with big overtravel.	<ul style="list-style-type: none"> - big mobile door at high speed - escalator mobile - lift door - rotating doors

test effected with test rod diam. 80 mm

Edges identification codes

	Model	length	type of channel	materials of channel	cable	cable output	cable lengths	caps fitted
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							
to specify in mm								
flat for every type	= F							
angle for GR-747-748-757	= A							
curve for GR-503-747-748-757	= C							
aluminium	= A							
PVC for curve edges	= P							
fail safe 4 wires	= F							
fail safe 2 wires (with R=8,2KOhm)	= R							
no safe 2 wires	= S							
output only one side	= O							
output on two sides	= E							
output with final resistor	= X							
500 mm	= 1							
2000 mm	= 2							
on request	= 3							
end cap for types GR-306-316-503-747-748-757	= Y							
no caps	= N							



Example of applications



Theater stage and auditorium



Medical equipment

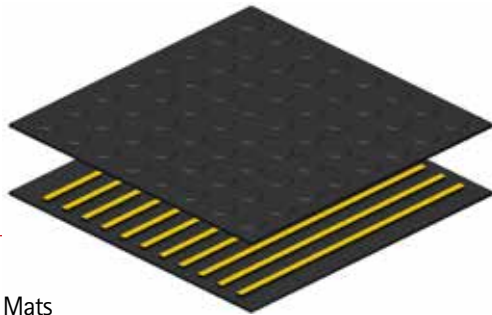


Factory automation

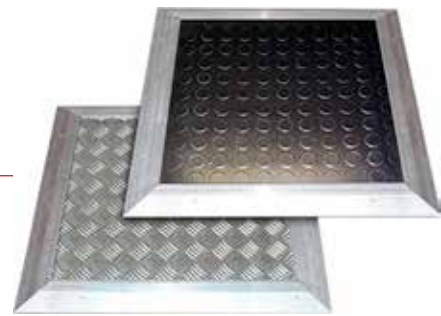


Transportation and disabled accessibility

■ Safety mats



Mats



Mats



Kiddie Rides



Mats

They are sensitive device to control the presence of body in dangerous area.
They operates when pressure is applied to the mat surface giving the block of the safety system.
Are used on wood – ceramics machines – mobile escalator – automatic store – robotic areas –
kiddie rides – etc.

■ Main features of mats conforming to EN-ISO 13856-1

■ Characteristics

Safety mats are devices which are used to guard the floor area around a dangerous zone. They can be used to provide primary guarding where other type of guarding may be inflexible or impractical and also to provide secondary guarding i.e. they can be used in conjunction with an interlocked fence or light curtain to protect awkward shaped machinery. In essence to provide presence-sensing of operators for as long as they remain inside a dangerous area.

A safety mat operates when pressure (usually from an operator's foot) is applied to the mat surface.

The result is a signal being to the safety mat controller which in turn will be send a stop to the machine control system. The dimensions and the positioning of the mats should be in accordance with the guidelines in EN 13855. The mat will be supplied for every form and dimensions. An aluminium edge is be used to fix the mats in position on the floor.



■ Technical characteristics

- Maximum dimension for single mat 1500 x 2500 mm
- Top on PVC of 4 mm thickness
- Bottom on PVC of 3 mm tickness
- Depht 9 mm
- Weight about 12 Kgs/sqm
- Actuation force 25 Kgs with test rod of 80 mm diam.
45 Kgs with test rod 200 mm "
- Operating voltage 32 volt d.c.
- Switching current 1 Ampere 24 volt
- Dead zone 30 mm around outer edge
- Operating temperature - 10 ° + 60 ° C
- Response time 40 msec.

Applications

- Dangerous area for operators
- Automatic stores
- Conveyor systems
- Wood machinery
- Assembling lines
- Mobile escalators
- Robotics area

Range of types

- Models TO/1 - 2 - 3 standard type in bull PVC
- Models MO/1 - 2 - 3 standard plus aluminium protection cover
- Models MZ/1 - 2 - 3 standard as MO plus zinc metal sheet on the bottom when the surface of the floor is not uniform
- Type 1 is intended for a surface up to 1 sqm
- Type 2 is intended for max width up to 1m and max length of 2.5m
- Type 3 is intended for max width up to 1.5 m and max length of 2.5m
- The cable of 4 wires are normally supplied for 3 metres

■ Identification codes

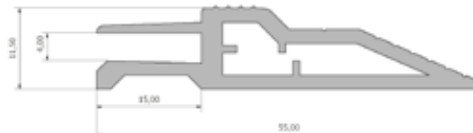
Type	Code
For surfaces in PVC up to 1 sqm.	TO-1 (+ size to specify)
For surfaces in alluminium up to 1 sqm.	MO-1 (+ size to specify)
For surfaces with zinc metal sheet up to 1 sqm.	MZ-1 (+ size to specify)
For surfaces width 1 m and lenght up to 2,5 m in PVC	TO-2 (+size to specify)
For surfaces width 1 m in alluminium and lenght up to 2,5 m	MO-2 (+ size to specify)
For surfaces width 1 m with zinc metal sheet lenght up to 2,5 m	MZ-2 (+ size to specify)
For surfaces width 1,5 m and lenght up to 2,5 m in PVC	TO-3 (+ size to specify)
For surfaces width 1,5 m in alluminium and lenght up to 2,5 m	MO-3 (+ size to specify)
For surfaces width 1,5 m with zinc metal sheet lenght up to 2,5 m	MZ-3 (+ size to specify)
Alluminium edging GUI-TP1	TP1
Alluminium edging GUI-TP2	TP2
Type of mat without aluminium edging	SB
Type of mat with aluminium edging fixed on the unit	BM
Type of mat with aluminium edging not fixed	BS

Example: MZ1-0800-0800-3000-AL12/2-BS

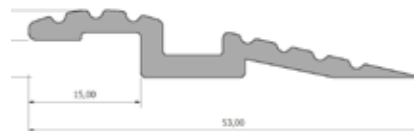
Mat 800 x 800 mm with cable L = 3000 mm. with aluminium protection cover plus zinc metal sheet on the bottom complete of aluminium edging supplied melted.

Accessoires

Type GUI-TP1 for mats type TO - MO 1-2-3



Type GUI-TP2 for mats type TO-1-2-3
(depletion phase)



■ Bumpers

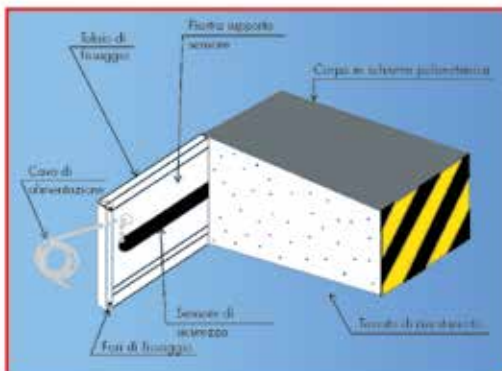
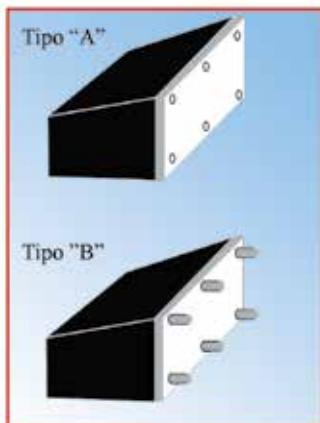


They are utilized to prevent collision of the operator against vehicles or movement machines. The bumper are able to absorb the impact and to produce a signal to stop the machine. They are used on AGV trolley – mobile platform for airplane – automatic store – etc.

■ Main features on bumper

The bumpers are the latest innovation for safety on transport vehicles or on moving machinery that can crash and harm personnel. This sensing device utilizes a highly durable and flexible thermoplastic material which when pressed, closes the internal sensors.

They are formed by a poliuretanic foam (designed under customer drawing) with ribbon switches incorporated inside. The bumper is designed for fail-safe circuit to ensure proper monitoring of the system.



■ Technical characteristics

- Zinc steel frame for fixing to the machine
- Aluminum plate to close the bumper and to fix the ribbons
- Corp on poliuretanic foam
- External housing:
 - Standard with water proof tissue
 - Special with anti-flame to resist to melting metal
 - Special design with PVC cover for out-side installation i.e. for tripod
- Colour black with oblique yellow lines on front
- Activation force 5-7 Kgs
- Electrical circuit 1 A 24 volt d.c.
- Chemical resistance: good for water - acid - base - alcohol - solvent ect.
- Cable for power 5 wires L = 3 m
- Water tight IP 65
- Temperature 0 - 55 C °
- Actuating distance about 10-30 mm (depending from dimensions)
- Compression of the housing before contact closure occurs: depending on depth of bumper. It is very important to avoid the collision with operators.

Applications

- Pallets wrap machinery
- Automatic guided vehicle
- Large moving equipments
- Work platform
- Telescopic arms
- Mobile platform for airplanes
- Other similar applications

Brackets system for installation:

The metal sheet can be supply on two different versions:

Type A)

sheet with holes 8.5 mm the number depend from the length.

Type B) sheet with captive screws M 6 L = 30 mm

Characteristics

Compression before contact closure:	10 % of the depth
Max compression	60 % " "
Indeformabile part	30 % " "
Height of bumper	0.5 of width
Max length	3 m

Remarks

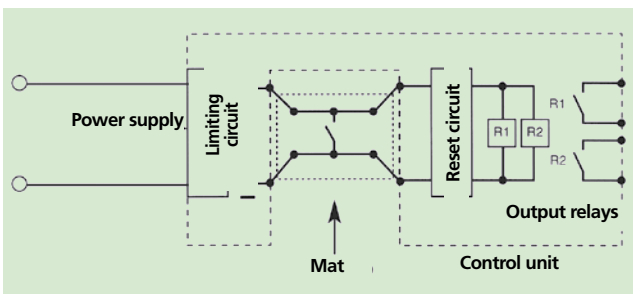
- This control units are designed to be used in conjunction with safety Mats, Sensing Edge, Ribbon Switches and Sensing Bumpers, to form a complete safety system. They exceed the levels of Category 3 as given by ISO 13849/1. Four versions of the PS controller are available, all with the same high level of safety integrity but varying in the type. The range of the control units is formed by 4 types:

- PS-1 for level 1 application's at low risk with 2 wires of connection (No safety)
- PS-3 for level 3 application's "Fail Safe" with 4 wires of connection without resistance
- PS-3/RS for level 3 application's "Fail Safe" with 2 wires with resistor of 8,2Kohm for 1 sensor or edge.
- PS-3/RD as above but for 2 sensors or edges.

General for safety model PS3 (with 4 wires) without resistor in accordance with category 3 EN 13849-1

The connections can be with 4 wires. All the control box are designed to supply safety to the plant against the short circuit or the cut of the connection cable.

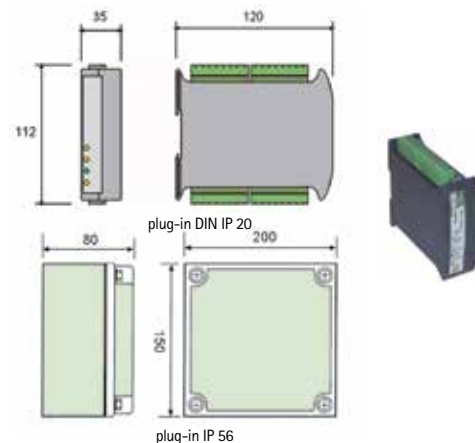
At open circuit (switch-edge-mat-bumper) on normal condition the two relays are supplied, while the pressure on the sensors (with NC contact) causes the relays to switch OFF. A limiting circuit prevents short circuit of the supply. The interruption of the cable or the sensors are detected in the OFF condition of two relays, as the short circuit on the contacts of relays.



Characteristics

- automatic and manual reset
- enclosure protection IP 20 or IP 66
- working temperature -10° + 65°
- output relè 2NO+1NC 2 A 230 V
- response time from 9 to 16 msec
- DIN rail mounting
- power supply see table
- power consumption 300 mA
- max controlled length for edges 60 m
- max controlled area for mats 15 sqm

Dimensions



Control PS 3/RS with 2 wires with resistor for 1 sensor

When are required the connection with 2 wires is necessary to connect a resistance of 8,2 kohm (inside the sensor) in order to guaranty the safety of level 3.

This type of box, control only 1 sensor.

Control PS 3/RS with 2 wires with resistor for 2 sensors

It is identical to the previous type with the difference that are controlled two independent sensors, particular applied for the frontal and the rear protection of the machine.

The technical characteristics are identical of PS3/RS with the difference of the output relè with contacts 2NO 2A 250 V as the wiring.

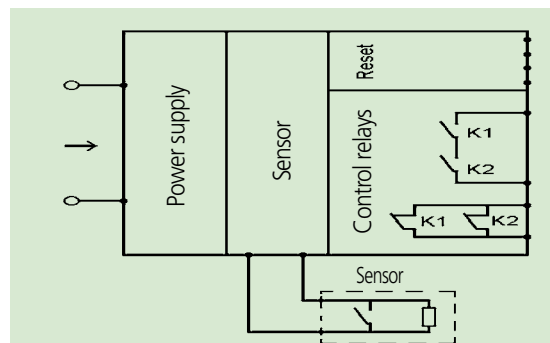
Dimensions and code identifications of the boxes

Level 3 with 4 wires		Code
PS-3 / A1 DIN box	24 V a.c.	P-09
PS-3 / A2 DIN box	110 V a.c.	P-10
PS-3 / A3 DIN box	220 V a.c.	P-11
PS-3 / A5 DIN box	24 V d.c.	P-12
PS-3-56 / A1 enclosure IP56	24 V a.c.	P-13
PS-3-56 / A2 enclosure IP56	110 V a.c.	P-14
PS-3-56 / A3 enclosure IP56	220 V a.c.	P-15
PS-3-56 / A5 enclosure IP56	24 V d.c.	P-16
Level 3 for 1 sensor with 2 wires with resistance		
PS-3RS / A1 DIN box	24 V a.c.	P-21
PS-3RS / A5 DIN box	24 V d.c.	P-22
PS-3RS / 56A1 enclosure IP56	24 V a.c.	P-23
PS-3RS / 56A5 enclosure IP56	24 V d.c.	P-24
Level 3 for 2 sensor with 2 wires with resistance		
PS-3RD / A1 DIN box	24 V a.c.	P-25
PS-3RD / A5 DIN box	24 V d.c.	P-26
PS-3RD / 56A1 enclosure IP56	24 V a.c.	P-27
PS-3RD / 56A5 enclosure IP56	24 V d.c.	P-28

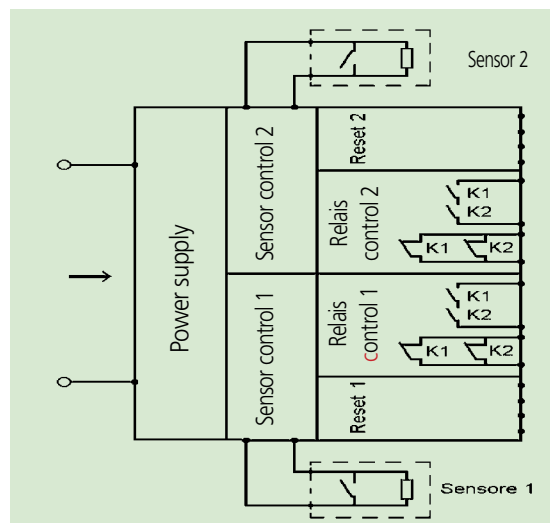
Technical characteristics

- automatic and manual reset
- enclosure protection IP 20 or IP 56
- working temperature -10° + 65°
- output relè 1NO/NC 2 A 230 V
- DIN rail mounting
- power supply see table
- power consumption 300 mA
- max controlled lenght for edges 60 m
- max controlled area for mats 15 sqm
- max lenght of connection wires 250m with the section of 0,35 sqmm

Wiring connection of PS3/RS



Wiring connection of PS3/RD





■ Commercial organization

Europe

Italy
Croatia
Finland
France
Poland
Czech Republic
Rumania
Slovakia
Slovenia
Spain
Switzerland
Turkey
Hungary

America

Brasil
Canada
Colombia

Asia

China
India

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