

Description



Pizzato Elettrica widens its own range of products with the new HX series of safety hinge switches, where safety and style are melted in one single product.

The electrical switch is completely integrated in the mechanical hinge, to result practically invisible to an inexpert eye. This guarantees a higher safety because a switch hard to identify is consequently also more difficult to defeat. The assembly without visible screws and the pleasant line, make the switch perfectly integrated also with guards of modern design machinery.

The hinge-shaped safety switches of the HX series, being made of stainless steel, can be used in any environment where particular attention is required for cleanliness and hygiene, therefore they are suitable for various applications ranging from the food to the pharmaceutical sectors, as well as the chemical or marine sector.

Maximum safety with a single device

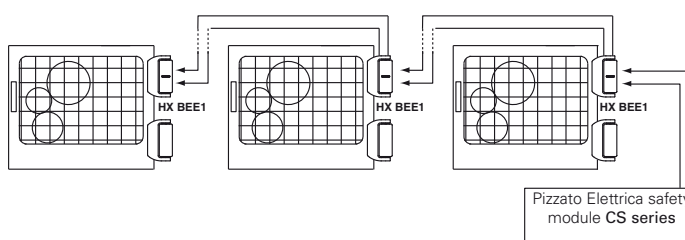
PL e + SIL 3 Constructed with redundant electronic technology, the HX BEE1 series hinge switches make it possible to create circuits having maximum PL e and SIL 3 safety levels by installing just one device on the protection. This avoids expensive wiring on the field and allows quicker installation. Inside the panel, the two electronic safety outputs must be connected to a safety module with OSSD inputs or to a safety PLC.

Connection of several switches in series

PL e + SIL 3 One of the most relevant features of the HX line is the optional connection in series of several switches, up to a maximum number of 32 devices, while maintaining the maximum PL e safety level prescribed by the EN 13849-1 standard and the SIL 3 safety level according to the EN 62061 standard.

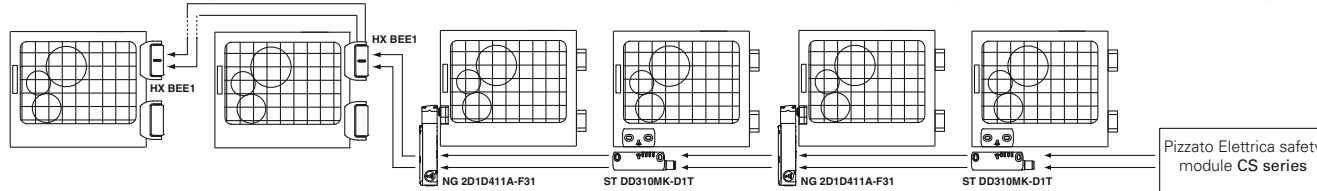
This connection method is permitted in safety systems which, at the end of the chain, feature a safety module evaluating the outputs of last HX switch.

The fact that the PL e safety level can be maintained even with 32 switches connected in series indicates the presence of an extremely safe structure inside each individual device.

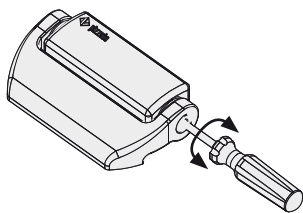


Series connection with other devices

PL e + SIL 3 The HX BEE1 series features two safe inputs and two safe outputs, which can be connected in series with other Pizzato Elettrica safety devices. This option allows the creation of safety chains containing various devices, for example the creation of circuits with connections in series, including stainless steel safety hinges (HX BEE1 series), transponder sensors (ST series) and door lock sensors (NG series), while maintaining maximum PL e and SIL 3 safety levels.



Adjustment of the operating point



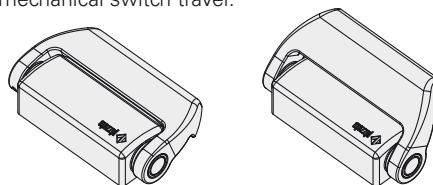
The switches operating point can be regulated through a flat-blade screwdriver.

The operating point regulation allows the setting possibility for large guards. After the setting, it's always necessary to seal the hole with the supplied safety seal plug.

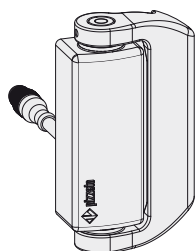
Variations of the activation base angle

New versions with the switch activation angle equal to a multiple of 15° (e.g. 45° or 90°) are available on request.

The different activation angle does not exclude the possibility of finely adjusting the operating point by means of the adjustment screw found in the switch. Any change in the base operating angle does not alter the maximum mechanical switch travel.



Cable with connector at the back

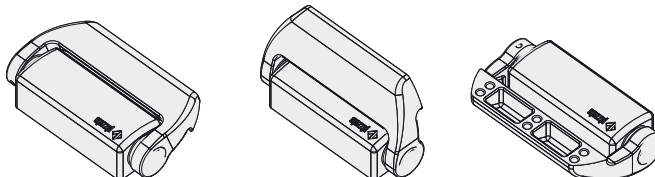


The version with a rear cable and M12 connector is the best combination between aesthetics and connection ease.

This solution makes it possible to hide the wiring and, at the same time, easily connect or disconnect it from inside the machinery.

Opening angle up to 180°

The mechanical design of the switch allows the application also on protections up to 180° opening angle.





Protection degrees IP67 and IP69K

IP69K IP67

These devices are designed to be used in the toughest environmental conditions and they pass the IP67 immersion test acc. to IEC 60529. They can therefore be used in all environments where the maximum protection of the housing is required. Special measures

also allow devices to be used even in machines which are subjected to washing with high pressure warm water jets. In fact these devices pass the IP69K test according to ISO 20653, using jets of water to 100 atmospheres at a temperature of 80°C.

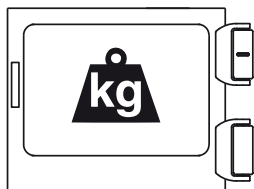
Materials

AISI 316L

With this new series in AISI316L stainless steel, Pizzato Elettrica offers a range of devices suitable for any environment where particular attention is required for cleanliness and hygiene.

Accurate surface finish makes it possible for these devices to be used in various applications ranging from the food to the pharmaceutical sectors, as well as the chemical or marine sector.

For heavy duty applications

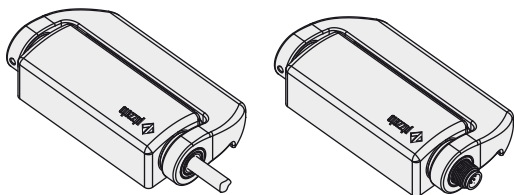


Specifically designed for heavy duty industrial applications, these hinges are made of precision cast materials with increased thickness and high strength mechanical characteristics. The maximum loads indicated in the technical data are those that the hinge supports with no lubrication, for one million opening and

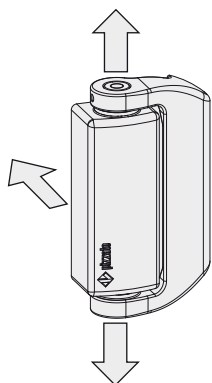
closing cycles, while maintaining its safety device characteristics with perfect efficiency.

With cable or connector

The electrical connection via integrated cable or M12 connector option makes the device suitable for the most diverse applications. The connector versions allow faster device replacement and installation, by making incorrect wiring connection impossible. The cable versions, on the other hand, offer the best value for money. Both cable and connector versions are available in mechanical or electronic contact block versions.

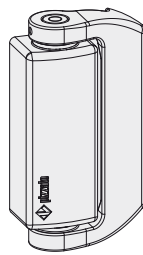


Three different output directions



Designed for flexibility, the HX series safety hinges are equipped with three different output directions for the electrical conductors. The "from bottom" or "from top" directions allow you to maintain the same output direction as the conductor, for both left- and right-facing doors. The "from back" direction obtains the most aesthetic, clean, and hygienic result. All three electrical conductor output directions are available with output cables in various lengths or with M12 connector.

Additional hinges



To complete installation, various types of additional hinges are available, varying in numbers depending on the protection guard weight.

These hinges keep the same aesthetics and mechanical structure but, having no electrical part, they cost less.

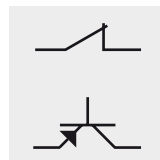
Laser engraving



Pizzato Elettrica has introduced a new laser marking for stainless steel switches of the HX series.

Thanks to this new system which excludes the use of labels, markings on the products are indelible.

Mechanical or electronic contact blocks



Internally equipped with innovative concepts, the HX series safety switches can be supplied both with electromechanical safety contacts with positive opening, or with self monitoring redundant electronic safety outputs. This allows the customer to choose between the most cost-effective solution (mechanical contacts) or a maximum security solution (electronic outputs).

Four LEDs for immediate diagnosis



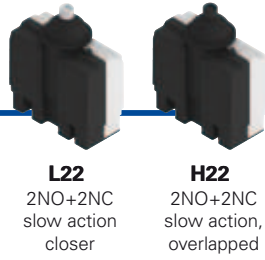
The versions with electronic contact block are equipped with four signalling LEDs. Each LED represents a specific hinge function, this greatly facilitates operating point adjustment via the immediate visual indication for the installer during the adjustment phase. There are also three separate LEDs available: one for input status, one for output status, and one for general device status. For serial applica-

tions, this independence enables identification of any interruptions in the safety chain and of any internal errors. All that in a straightforward way without needing to decode complex blinking sequences.

Selection diagram



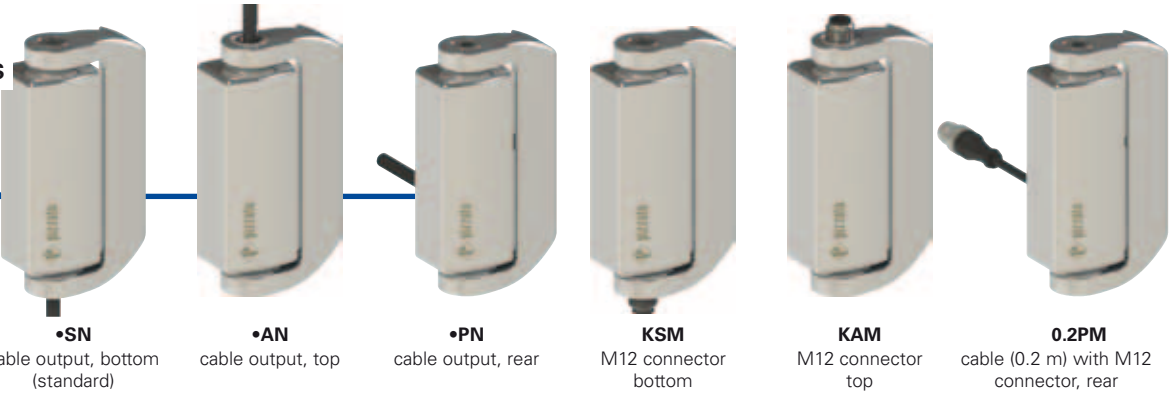
MECHANICAL CONTACT BLOCKS



L22
2NO+2NC
slow action
closer

H22
2NO+2NC
slow action,
overlapped

CABLES AND CONNECTORS



•SN
cable output, bottom
(standard)

•AN
cable output, top

•PN
cable output, rear

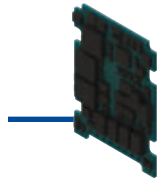
KSM
M12 connector
bottom

KAM
M12 connector
top

0.2PM
cable (0.2 m) with M12
connector, rear

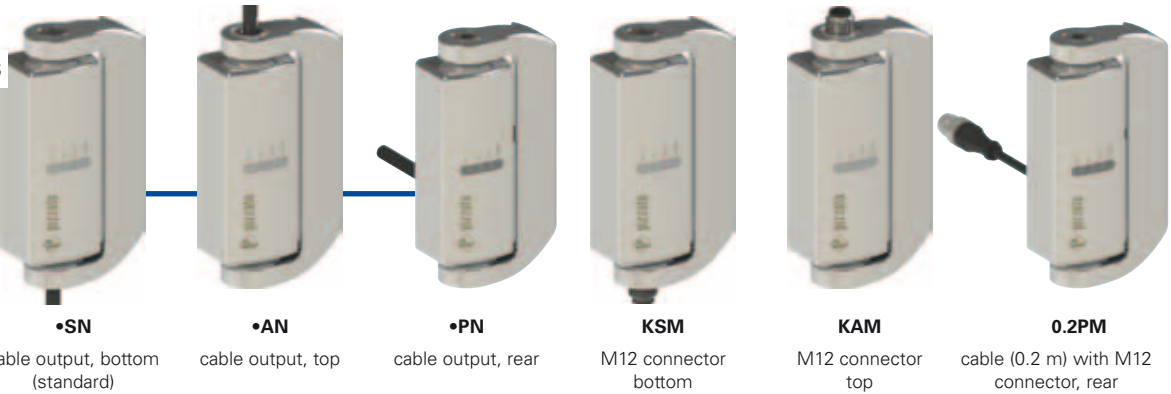


ELECTRONIC CONTACT BLOCKS



EE1
Electronic
contact block
with LED

CABLES AND CONNECTORS



•SN
cable output, bottom
(standard)

•AN
cable output, top

•PN
cable output, rear

KSM
M12 connector
bottom

KAM
M12 connector
top

0.2PM
cable (0.2 m) with M12
connector, rear

ADDITIONAL HINGES



HX CB

—●— product option



Main features

- AISI 316L stainless steel housing
- Protection degrees IP67 and IP69K
- Electronic contact block with LED
- Versions with M12 connector
- Additional hinges without contacts

In conformity with the requirements of:

Low Voltage Directive 2006/95/EC
Machinery Directive 2006/42/EC
EMC Directive 2004/108/EC

Positive contact opening in conformity with standards:

IEC 60947-5-1, EN 60947-5-1.

In conformity with standards:

IEC 60947-5-1, EN 60947-5-1, EN 60947-1, IEC 60204-1, EN 60204-1, EN ISO 14119, EN ISO 12100, IEC 60529, EN 60529, ISO 20653, IEC 61508-1, IEC 61508-2, IEC 61508-3, EN ISO 13849-1, EN ISO 13849-2, EN 62061, EN 61326-1, EN 61326-3-1, EN 61326-3-2, UL 508, CSA 22.2 No.14

Markings and quality marks:



UL approval: E131787
TÜV SÜD approval: Z10 14 03 75157 007
EAC approval: RU C-IT DM94.B.01024

Technical data

Housing

Metal housing, polished, AISI 316L stainless steel
Version with integrated cable, length 2 m, other lengths on request.
Versions with M12 connector
Versions with cable, length 0.2 m, M12 connector

Protection degree: IP67 acc. to EN 60529
IP69K acc. to ISO 20653
(Protect the cables from direct high-pressure and high-temperature jets)

General data

For safety applications up to: SIL 3 acc. to EN 62061
PL e acc. to EN ISO 13849-1
type 1 acc. to EN ISO 14119

Mechanical interlock, not coded:
Safety parameters HX B•22-•••
 B_{10g} : 5,000,000 for NC contacts
Safety parameters HX BEE1-•••
MTTF_d: 4018 years
PFH_d: 2.29E-11
DC: High
Service life: 20 years
Ambient temperature: see table on page 66
Max. actuation frequency: 600 operating cycles/hour
Mechanical endurance: 1 million operating cycles¹
Max. actuation speed: 90°/s
Min. actuation speed: 2°/s
Mounting position: any
Tightening torque, M6 screws: 10 ... 12 Nm

(1) One operation cycle means two movements, one to close and one to open contacts, as defined in EN 60947-5-1.

Electrical data (L22 - H22 mechanical contact blocks)

Rated impulse withstand voltage Uimp: 4 kV
Conditional short circuit current: 1000 A acc. to EN 60947-5-1
Pollution degree: 3

Electrical data (EE1 electronic contact block)

Rated operating voltage Ue: 24 Vdc -15% ... +10% SELV
Consumption at voltage Ue: < 1W
Rated impulse withstand voltage Uimp: 1.5 kV
Resettable internal protection fuse: 1.1 A
Overvoltage category: III

Inputs IS1/IS2

Rated operating voltage Ue: 24 Vdc
Rated current consumption: 5 mA

OS1/OS2 safety outputs

Rated operating voltage Ue: 24 Vdc
Output type: OSSD, PNP
Utilization category: DC12; Ue=24Vdc; Ie=0.25A
Short circuit detection: Yes
Protection against overcurrent: Yes
Time of deactivation impulses on safe outputs: < 300 µs
Permissible capacitance between outputs: < 200 nF
Permissible cap. between output and ground: < 200 nF

O3 signalling output

Rated operating voltage Ue: 24 Vdc
Output type: PNP
Utilization category: DC12; Ue=24Vdc; Ie=0.1A
Short circuit detection: No
Protection against overcurrent: Yes

⚠ If not expressly indicated in this chapter, for correct installation and utilization of all articles see chapter utilization requirements from page 297 to page 308 of the 2015-2016 catalogue.

⚠ Important: Switch off the circuit voltage before disconnecting the connector from the switch. The connector is not suitable for separation of electrical loads. According to EN 60204-1, versions with 8-pin M12 connector can be used only in PELV circuits.

Characteristics approved by UL

Utilization categories R300 pilot duty (28 VA, 125-250 Vdc)
B300 pilot duty (360 VA, 120-240 Vac)

Data of housing type 1, 4X "indoor use only", 12.
Housing data for versions with 2 contacts and type N cable
type 1, 4X "indoor use only"

In conformity with standard: UL 508, CSA 22.2 No.14

Please contact our technical service for the list of approved products.

Characteristics approved by TÜV SÜD

Supply voltage: 24 Vdc
Rated operating current (max.): 0.25 A
Ambient temperature: -25°C ... +70°C
Protection degree: IP67
PL, category: PL e, category 4

In conformity with standards: IEC 61508-1:2010 (SIL 3), IEC 61508-2:2010 (SIL 3), IEC 61508-3:2010 (SIL 3), IEC 61508-4:2010 (SIL 3), IEC 62061/A1:2012 (SIL CL 3), EN ISO 13849-1:2008 (PL e, Cat. 4), EN 60947-5-1/A1:2009, ISO 14119:2013

Please contact our technical service for the list of approved products.



Utilization temperatures and electrical data for L22 / H22 mechanical contact blocks

		Cable type N 9x0.34 mm ²	M12 connector 8 poles	
Ambient temperature	Cable, fixed installation	-25°C ... +80°C	-25°C ... +80°C	
	Cable, flexible installation	-5 °C ... +80 °C	-5 °C ... +80 °C	
	Cable, mobile installation	/	/	
Electrical data	Thermal current I _{th}	3 A	2 A	
	Rated insulation voltage U _i	250 Vac	30 Vac 36 Vdc	
	Protection against short circuits (fuse)	3 A 500 V type gG	2 A 500 V type gG	
	Utilization category DC13	24 V	2 A	2 A
		125 V	0.4 A	/
		250 V	0.3 A	/
	Utilization category AC15	24 V	3 A	2 A
		120 V	3 A	/
		250 V	3 A	/

Utilization temperatures and electrical data for EE1 electronic contact block

		Cable type N 8x0.34 mm ²	M12 connector 8 poles
Ambient temperature	Cable, fixed installation	-25°C ... +70°C	-25°C ... +70°C
	Cable, flexible installation	-5 °C ... +70 °C	-5 °C ... +70 °C
	Cable, mobile installation	/	/
Electrical data	Thermal current I _{th}	0.25 A	0.25 A
	Rated insulation voltage U _i	32 Vdc	32 Vdc
	Protection against short circuits (fuse)	1 A	1 A
	Utilization category DC12	24 V	0.25 A

Internal connections with cable

L22 / H22 mechanical contact blocks


cable colour	contacts
black	NC
black-white	
red	NC
red-white	
brown	NO
blue	
purple	NO
purple-white	
yellow/green	⏚

EE1 electronic contact block

cable colour	connection
brown	A1
red	IS1
blue	A2
red-white	OS1
black	O3
purple	IS2
black-white	OS2
purple-white	not connected


Internal connections with M12 connector

L22 / H22 mechanical contact blocks



pin	contacts
1	NC
2	
3	NC
4	
5	NO
6	
7	NO
8	
/	⏚

EE1 electronic contact block



pin	connection
1	A1
2	IS1
3	A2
4	OS1
5	O3
6	IS2
7	OS2
8	not connected

Legend

A1-A2	supply
IS1-IS2	safety inputs
OS1-OS2	safety outputs
O3	signalling output
NC	normally closed contact
NO	normally open contact
⏚	ground connection

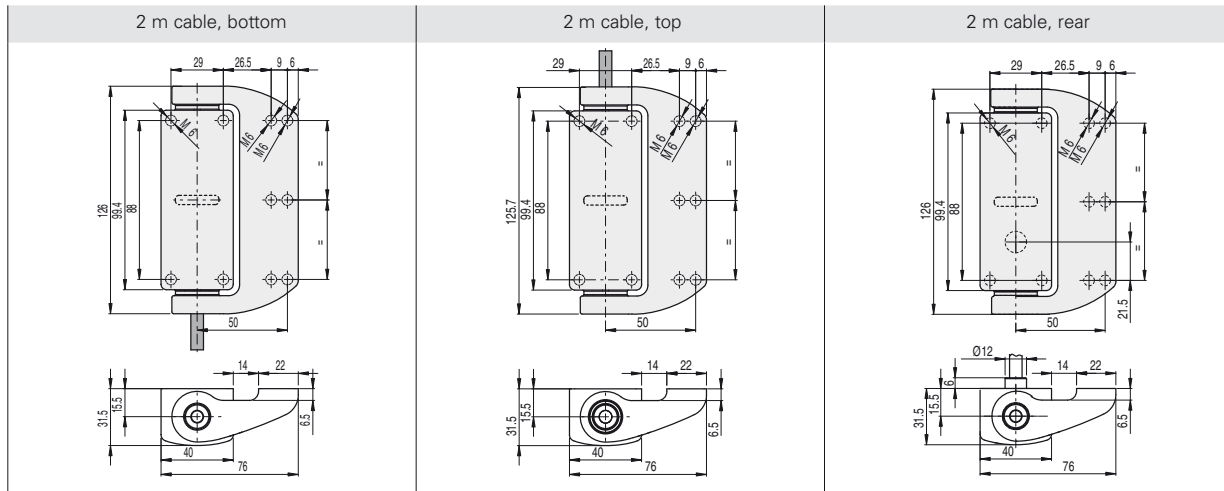
Sockets See page 287

Dimensional drawings

All measures in the drawings are in mm

Contact type:

- LA** = slow action closer
- LO** = slow action overlapped
- EE1** = electronic PNP

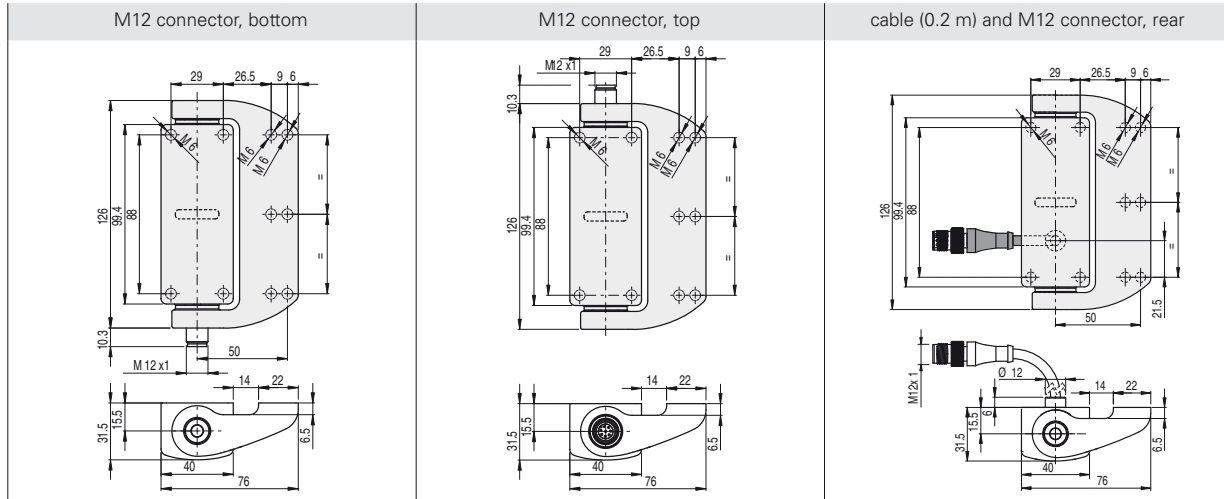


Contact blocks

L22	LA	HX BL22-2SN	⊕	2NO+2NC	HX BL22-2AN	⊕	2NO+2NC	HX BL22-2PN	⊕	2NO+2NC
H22	LO	HX BH22-2SN	⊕	2NO+2NC	HX BH22-2AN	⊕	2NO+2NC	HX BH22-2PN	⊕	2NO+2NC
EE1	EE1	HX BEE1-2SN		PNP	HX BEE1-2AN		PNP	HX BEE1-2PN		PNP
Min. force		0,3 Nm (0,65 Nm ⊕)			0,3 Nm (0,65 Nm ⊕)			0,3 Nm (0,65 Nm ⊕)		

Contact type:

- LA** = slow action closer
- LO** = slow action overlapped
- EE1** = electronic PNP



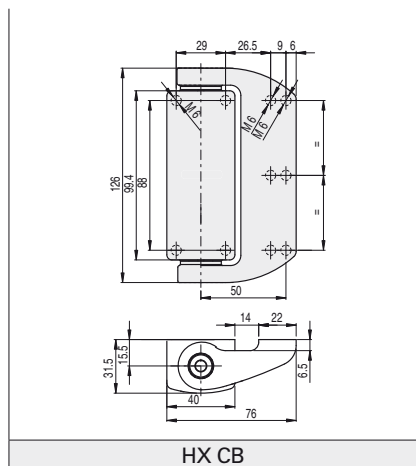
Contact blocks

L22	LA	HX BL22-KSM	⊕	2NO+2NC	HX BL22-KAM	⊕	2NO+2NC	HX BL22-0.2PM	⊕	2NO+2NC
H22	LO	HX BH22-KSM	⊕	2NO+2NC	HX BH22-KAM	⊕	2NO+2NC	HX BH22-0.2PM	⊕	2NO+2NC
EE1	EE1	HX BEE1-KSM		PNP	HX BEE1-KAM		PNP	HX BEE1-0.2PM		PNP
Min. force		0,3 Nm (0,65 Nm ⊕)			0,3 Nm (0,65 Nm ⊕)			0,3 Nm (0,65 Nm ⊕)		

To purchase a product with a movable part at the left replace P with Q in the codes shown above.

Example: HX BL22-2PN → HX BL22-2QN

Additional hinges



Travel diagrams

Contact blocks	Group 1
L22 2NO+2NC	
H22 2NO+2NC	
EE1 PNP	

The contact operating point indicated in the stroke diagrams can be adjusted to ± 1°.

All measures in the diagrams are in degrees

Legend

- Closed contact /Outputs OS1, OS2, O3 active
- Open contact /Outputs OS1, OS2, O3 not active
- Positive opening travel

Accessories See page 287

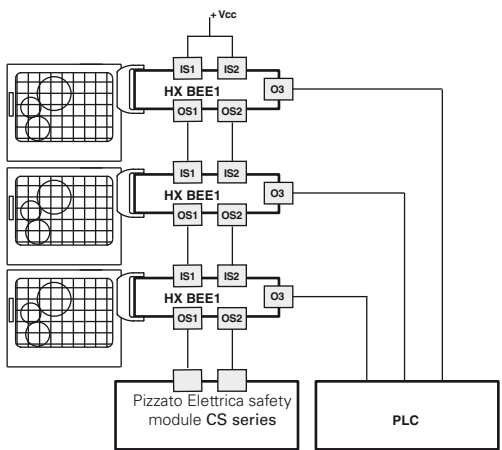
→ The 2D/3D files are available at www.pizzato.com



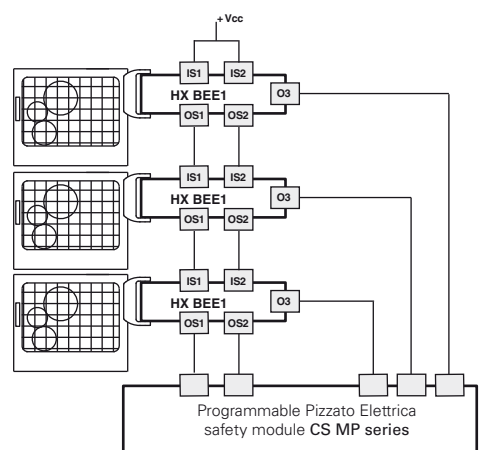
Complete safety system

The use of complete tested solutions means that the customer can be certain of the electrical compatibility between the ST series sensor and Pizzato Elettrica safety modules, thus ensuring greater reliability. In fact, these sensors have been tested for operation with the modules specified in the table shown on the side.

Switch	Compatible safety modules	Safety module output contacts		
		Instantaneous safety contacts	Delayed safety contacts	Signalling contacts
HX BEE1-...	CS AR-05	3NO	/	1NC
	CS AR-06	3NO	/	1NC
	CS AR-08	2NO	/	/
	CS AT-0	2NO	2NO	1NC
	CS AT-1	3NO	2NO	/
	CS MP	see page 243		
CS MF	see page 271			

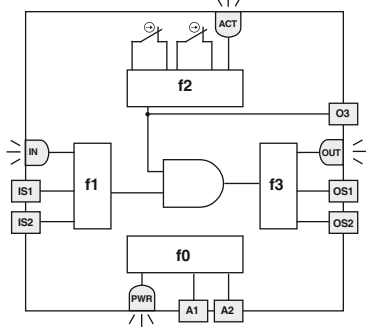


Possible connection in series of several hinges in order to simplify the safety system wiring, after evaluating the outputs from the last hinge in the chain by means of a Pizzato Elettrica safety module (table for safety modules to be combined). Each HX switch is provided with a signalling output, which is activated when the respective guard is closed. This piece of information can be managed by a PLC, depending on the specific requirements of the system installed.



Possible connection in series of several hinges in order to simplify the safety system wiring, after evaluating the outputs from the last hinge in the chain by means of a safety module from Pizzato Elettrica CS MP series, which allows management of both safety and signalling functions.

Internal diagram

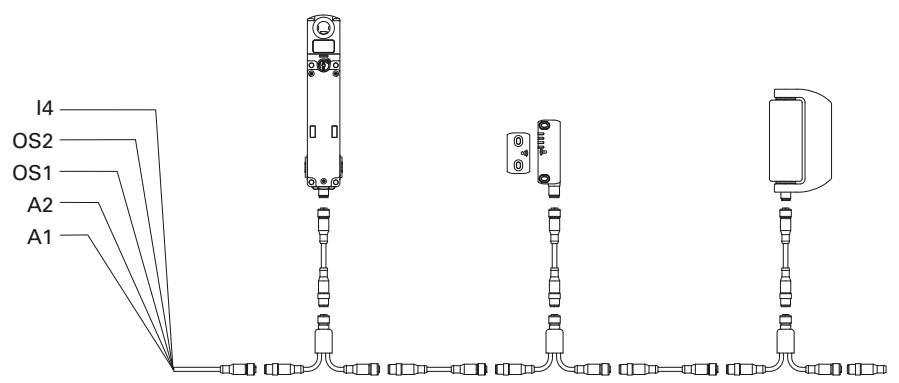


The side scheme shows the 4 logical functions interacting inside the switch. Function f0 is a global function which deals with the device power supply and the internal tests which it cyclically undergoes. The task of function f1 is to evaluate the status of the device inputs, whereas function f2 checks the opening of the guard. Function f3 is intended to activate or deactivate the safety outputs and check for any faults or short circuits in the outputs. The macro-function, which controls the above mentioned functions, enables the safety outputs only in presence of active inputs with the actuator within the safe zone limits. The status of each function is displayed by the corresponding LED (PWR, IN, ACT, LOCK, OUT), in such a way that the general device status becomes immediately obvious to the operator.

LED	Function
ACT	state of actuator / output O3
IN	status of safety inputs
OUT	status of safety outputs
PWR	power supply/self-diagnosis

Series connection

To simplify serial connections, a series of M12 connectors are available that allow complete wiring. This solution significantly reduces installation times, whilst maintaining the maximum PL e and SIL 3 safety levels. For further information see page 290.



Accessories

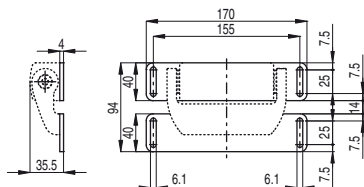
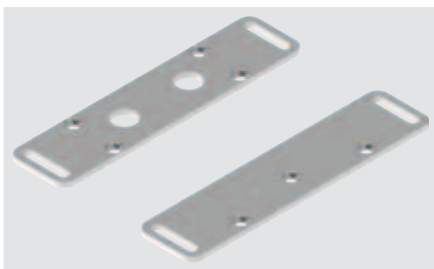
Article	Description
VF AC7032	Protection cap of regulation screw



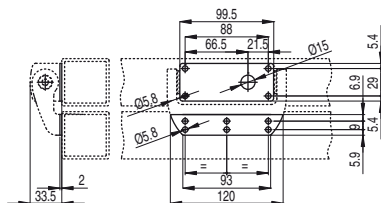
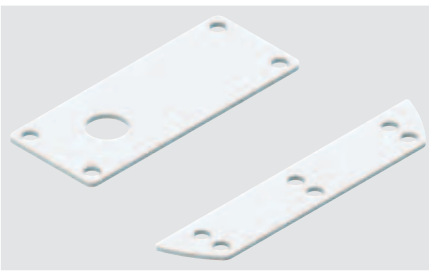
The plug is supplied with every hinge and must always be inserted after the operating point regulation. In case of loss or damage, the cap can be ordered separately.

Fixing plates

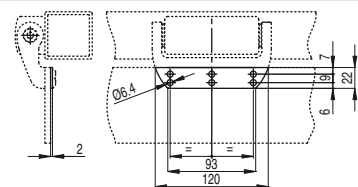
Article	Description
VFSFH10-TX	Couple of stainless steel plane supports supplied with fixing screws for switch



Article	Description
VF SFH9	Polyethylene packing for the food industry. Seals the contact surface between the hinge and the frame.



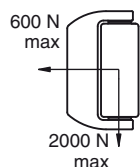
Article	Description
VF SFH8	Mobile part cover in stainless steel



Max. forces and loads HX

All measures in the drawings are in mm

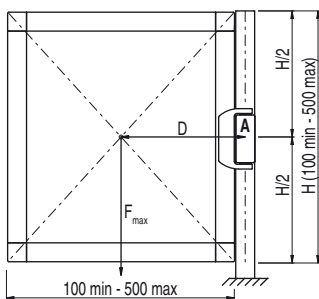
Admitted max. loads, independent of utilization conditions.



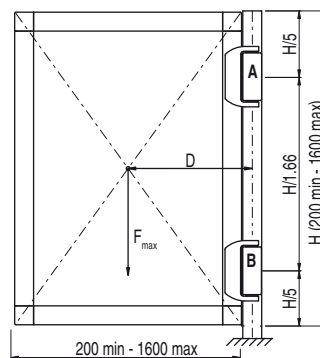
Attention: Never exceed the loads listed above under any circumstances.

The loads have been verified by a fatigue test of one million operating cycles with a 90° opening angle.

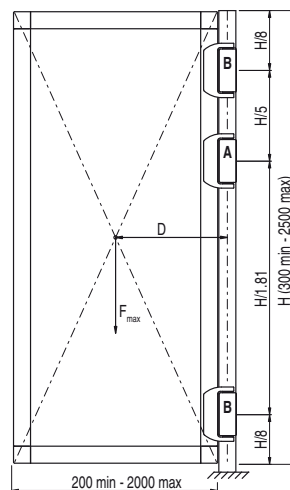
Doors with one safety hinge
 $F_{max} (N) = 50,000/D (mm)$



Doors with one safety hinge and one additional hinge
 $F_{max} (N) = 400,000/D (mm)$



Doors with one safety hinge and two additional hinges
 $F_{max} (N) = 500,000/D (mm)$



Legend

F_{max}	Force exercised by the door weight (N)
D	Distance from the door barycentre to the hinge axis (mm)
A	Safety hinge
B	Additional hinge

