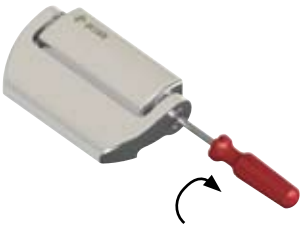
Safety hinge switches **HX** series

Application field

Pizzato Elettrica widens its own range of products making a new series of safety switches hinge-shaped HX series, where safety and style are melted in one single product.
The 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 aseptic 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.

Operating point regulation



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 close the hole through the suitable supplied safety seal plug.

Variations of the activation base angle

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 from the back

The version with a rear cable and M12 connector is used to obtain 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 onto protections up to 180° opening angle.

Protection degree IP67 and IP69K

IP69K
IP67

The HX series switches by Pizzato Elettrica, besides having an IP67 protection degree, have passed the test proving their IP69K protection degree according to the prescriptions established by the DIN 40050 standard.Therefore they are suitable for use in machineries subjected to intense washing with high pressure and high temperature water jets and for any condition or environment where a particular attention for cleanness and hygiene is required, such as in food or pharmaceutical industry.

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.

Materials

AISI
316L

With this new series in AISI316L stainless steel, Pizzato Elettrica offers a range of devices suitable for any environment where chemical and corrosive agents are found or for aseptic 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.

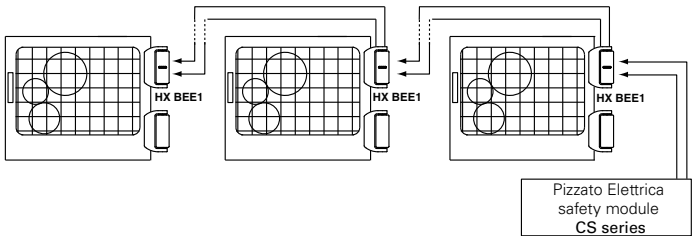
Laser marking

Pizzato Elettrica has introduced a new laser marking for switches of the HX series. Thanks to this new system which excludes the use of labels, markings on the products are indelible.
Furthermore, in case of machineries subjected to intense high pressure water jets, there is no risk of labels detaching from the product.

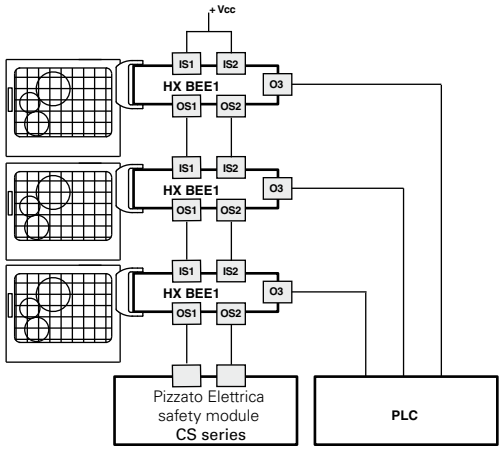
Version with electronic contacts (PL e / SIL 3)

The redundant internal structure of the HX hinged safety switch meets the characteristics required by the EN ISO 13489-1 and IEC 62061 standards, therefore the actual switch can be classified as a device of category 4, PL e and SIL 3.

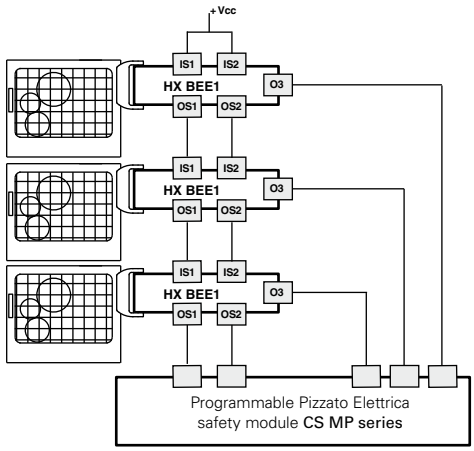
Its high diagnostic cover and high MTTF for each single channel make it possible for the HX switch not to lose its safety function even in the case of one single anomaly.



These are the reason why the switch can be used in series, while maintaining the PL e safety level, as long as it is connected to an appropriate module which controls its correct operation.



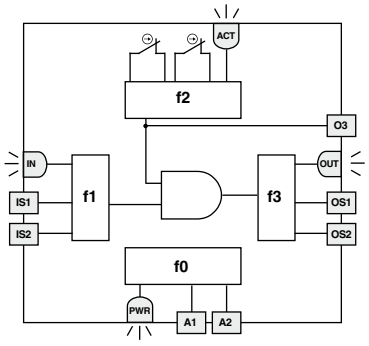
Possible connection in series of several switches in order to simplify the safety system wiring, after evaluating the outputs from the last switch in the chain by means of a Pizzato Elettrica safety module (table for safety modules to be combined). Each HX switch is provided with a signalling output, 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 switches in order to simplify the safety system wiring, after evaluating the outputs from the last switch in the chain by means of a safety module from Pizzato Elettrica CS MP series, which allows management of both safety and signalling functions.

Switch	Compatible safety modules	Safety module output contacts		
		Safety instantaneous contacts	Safety delayed contacts	Signaling contacts
HX BEE1-•••	CS AR-05••••	3NO	/	1NC
	CS AR-06••••	3NO	/	1NC
	CS AR-08••••	2NO	/	/
	CS AT-0•••••	2NO	2NO	1NO
	CS AT-1•••••	3NO	2NO	/
	CS MP••••••	see page 5/63		

Internal diagram

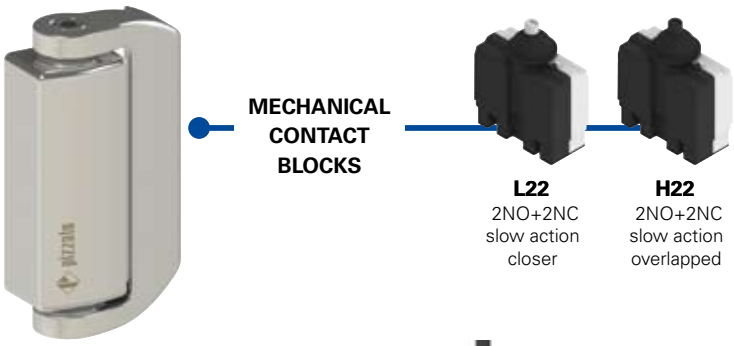


The side scheme shows the 4 logical functions interacting inside the switch.
F0 function has the fundamental task to control the sensor's power supply and the internal tests which the sensor cyclically undergoes.
F1 function has the task to control the status of the sensor's inputs, while F2 checks the actuator's presence within the activation zone limits.
F3 function has the task to enable the safety outputs and check their possible failure or short circuit. 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.

4 status-indicator LEDs

The version with electronic contacts in the HX series is provided with 4 LEDs which make it possible to quickly identify the status it is found in. Each LED is assigned a specific signalling function which makes it possible to immediately identify any wiring errors, circuit breaks or internal faults in the device. The status of each function is displayed by the corresponding LED (PWR, OUT, IN, ACT,), so that the switch condition becomes immediately evident to the operator. This avoids the need to decode troublesome blinking sequences in order to identify specific system faults.

Selection diagram



MECHANICAL CONTACT BLOCKS

L22
2NO+2NC
slow action
closer

H22
2NO+2NC
slow action
overlapped

CABLE AND CONNECTORS

•SN
cable output from bottom (standard)

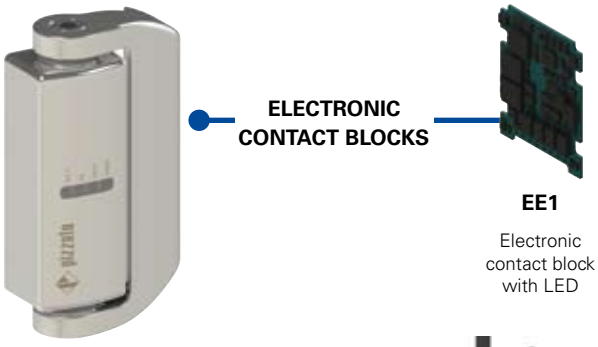
•AN
cable output from top

•PN
cable output from back

KSM
M12 connector from bottom

KAM
M12 connector from top

0.2PM
cable (0.2 m) with M12 connector from back



ELECTRONIC CONTACT BLOCKS

EE1

Electronic contact block with LED

CABLE AND CONNECTORS

•SN
cable output from bottom (standard)

•AN
cable output from top

•PN
cable output from back

KSM
M12 connector from bottom

KAM
M12 connector from top

0.2PM
cable (0.2 m) with M12 connector from back

COMPLEMENTARY HINGES

HX CB

product option

Code structure

Attention! The feasibility of a code number does not mean the effective availability of a product. Please contact our sales office.

article option

HX BL22-2PNGH15

Body and movable part dimensions	
B	126x76x31 mm

Contact block	
L22	2NO+2NC, slow action closer
H22	2NO+2NC, slow action overlapped
EE1	electronic contact block with LED 2 safety outputs PNP 1 auxiliary output PNP 2 safety inputs PNP

Type of connection	
0.2	cable length 0.2 m
...	.....
2	cable length 2 m (standard)
...	.....
10	cable length 10 m
K	with integrated connector

Other lengths on request.

Activation angle	
	0° activation angle (standard)
H15	15° activation angle
H30	30° activation angle
H45	45° activation angle
H60	60° activation angle
H75	75° activation angle
H90	90° activation angle

Contacts type	
	silver contacts (standard)
G	silver contacts gold plated 1 µm

Type of cable	
N	cable PVC IEC 60332-1 black (standard)
M	cable with M12 connector

Connection output direction and movable part	
S	movable part on the right and output from bottom
P	movable part on the right and output from back
A	movable part on the right and output from top
Q	movable part on the left and output from back

HX CB

Complementary hinges	
CB	126x76x31 mm movable part on the right
CD	126x76x31 mm movable part on the left

Main data

- AISI 316L stainless steel housing
- Protection degree IP67 and IP69K
- Electronic contact block with LED
- Two mechanical contact blocks with positive opening ⊖
- Complementary hinges without contacts

In conformity with requirements requested by:
Low Voltage Directive 2006/95/EC,
Machinery Directive 2006/42/EC
Electromagnetic Compatibility 2004/108/EC
Positive contact opening in conformity with standards:
IEC 60947-5-1, EN 60947-5-1, VDE 0660-206.

In conformity with requirements requested by:
IEC 60947-5-1, EN 60947-5-1, EN 60947-1, IEC 60204-1, EN 60204-1, EN 1088, ISO 14119, EN ISO 12100-1, EN ISO 12100-2, IEC 60529, EN 60529, DIN 40050, 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

Markings and quality marks:

CE PCT

UL approvals pending
TÜV approvals pending
Approval GOST: POCC IT.AB24.B04512

Technical data

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

Protection degree:	IP67 according to EN 60529 IP69K according to DIN 40050 (Protect the cables from direct high-pressure and high-temperature jets)

General data
For safety applications up to SIL 3 / PL e

Safety parameters:	see page 7/34
Ambient temperature:	see table on page 4/50
Max actuation frequency:	600 operations cycles[1]/hour
Mechanical endurance:	1 million operations cycles[1]
Max actuating speed:	90°/s
Min. actuating speed:	2°/s
Assembling position:	any
Max axial charge:	2000 N
Max radial charge:	2000 N
M6 screws max driving torque:	10 ... 12 Nm

(1) One operation cycle means two movements, one to close and one to open contacts, as foreseen by IEC 60947-5-1 standard.

Electrical data (L22 - H22 mechanical contact blocks)

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

Electrical data (EE1 electronic contact block)

Rated operational voltage Ue:	24 Vdc -15%...+10%
Rated operational current Ie:	0.25 A
Minimum working current:	0.5 mA
Maximum switchable load:	6 W
Voltage absorption (Ue):	< 1W
Rated impulse withstand voltage Uimp:	1.5 kV
Restorable internal protection fuse:	0.75 A
Overvoltage category:	III
Inputs IS1/IS2	
Rated operational voltage Ue:	24 Vdc
Absorbed rated current:	5 mA
Safety outputs OS1/OS2	
Rated operational voltage Ue:	24 Vdc
Type of output:	PNP
Maximum current for output Ie:	0.25 A
Short-circuit detection:	Yes
Protection against overcurrent:	Yes
Time of deactivation impulses on safe outputs:	< 300 us
Capacity admitted between output and output:	< 200 nF
Capacity admitted between output and earth:	< 200 nF
Auxiliary output O3	
Rated operational voltage Ue:	24 Vdc
Type of output:	PNP
Maximum current for output Ie:	0.1 A
Short-circuit detection:	No
Protection against overcurrent:	Yes

⚠ **If not expressly indicated in this chapter, for the right installation and the correct utilization of all articles see requirements indicated from page 7/1 to page 7/12.**

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

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

			Cable type N 9x0,34 mm²	8 poles M12 connector
Utilization temperatures	Fixed laying cable		-25°C ... +80°C	-25°C ... +80°C
	Flexible laying cable		-5°C ... +80°C	-5°C ... +80°C
	Dynamic laying cable		/	/
Electrical data	Thermal current Ith		3 A	2 A
	Rated insulation voltage Ui		250 Vac	30 Vac 36 Vdc
	Protection against short circuits (fuse)		3 A 500 V type gG	2 A 500V type gG
	Utilization categories DC13	24 V	2 A	2 A
		125 V	0,4 A	/
		250 V	0,3 A	/
	Utilization categories AC15	24 V	3 A	2 A
		120 V	3 A	/
		250 V	3 A	/

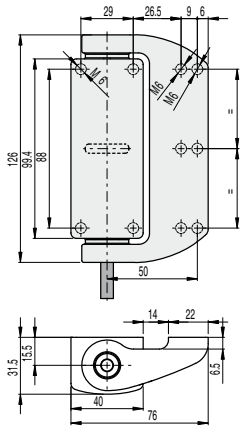
Working temperatures and electrical data for EE1 electronic contact block

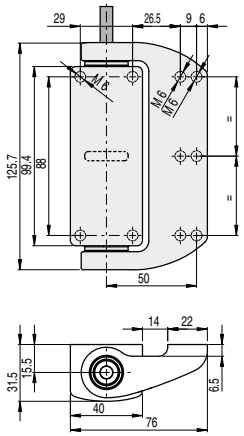
			Cable type N 8x0,34 mm²	8 poles M12 connector
Utilization temperatures	Fixed laying cable		-25°C ... +70°C	-25°C ... +70°C
	Flexible laying cable		-5°C ... +70°C	-5°C ... +70°C
	Dynamic laying cable		/	/
Electrical data	Thermal current Ith		0,25 A	0,25 A
	Rated insulation voltage Ui		32 Vdc	32 Vdc
	Protection against short circuits (fuse)		1 A	1 A
	Utilization categories DC12	24 V	0,25 A	0,25 A

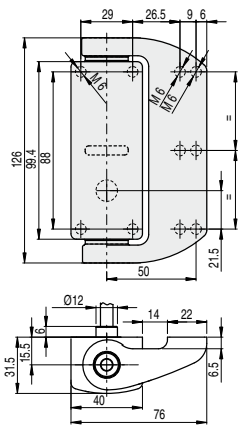
Dimensional drawings

Contacts type:

LO = slow action overlapped
LA = slow action closer
= electronic PNP



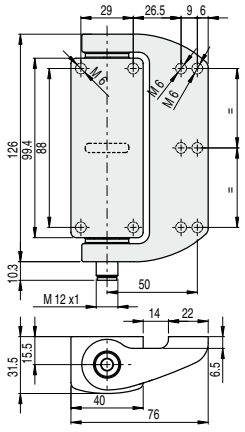


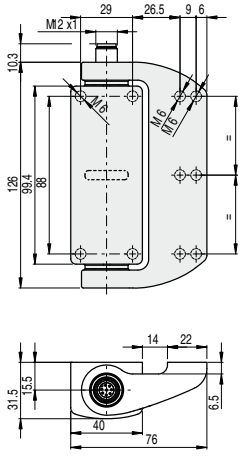


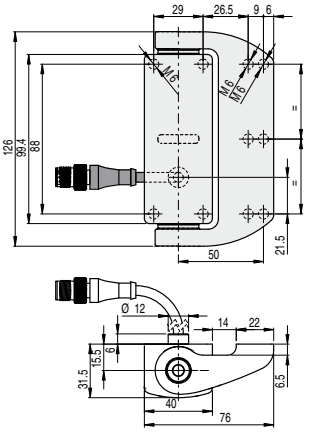
Contact blocks		2 m cable from bottom		2 m cable from top		2 m cable from back	
L22	LA	HX BL22-2SN	2NO+2NC	HX BL22-2AN	2NO+2NC	HX BL22-2PN	2NO+2NC
H22	LO	HX BH22-2SN	2NO+2NC	HX BH22-2AN	2NO+2NC	HX BH22-2PN	2NO+2NC
EE1		HX BEE1-2SN	PNP	HX BEE1-2AN	PNP	HX BEE1-2PN	PNP
Min. force		0,3 Nm (0,65 Nm)		0,3 Nm (0,65 Nm)		0,3 Nm (0,65 Nm)	

Contacts type:

LO = slow action overlapped
LA = slow action closer
= electronic PNP







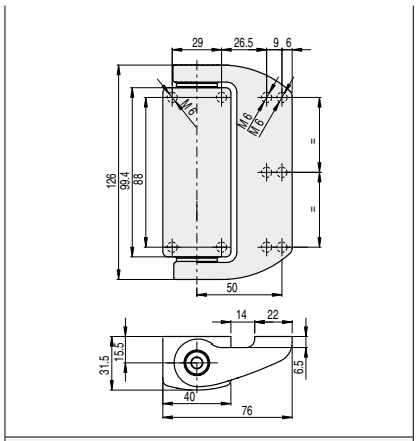
Contact blocks		M12 connector from bottom		M12 connector from top		0,2 m cable and M12 connector from back	
L22	LA	HX BL22-KSM	2NO+2NC	HX BL22-KAM	2NO+2NC	HX BL22-0.2PM	2NO+2NC
H22	LO	HX BH22-KSM	2NO+2NC	HX BH22-KAM	2NO+2NC	HX BH22-0.2PM	2NO+2NC
EE1		HX BEE1-KSM	PNP	HX BEE1-KAM	PNP	HX BEE1-0.2PM	PNP
Min. force		0,3 Nm (0,65 Nm)		0,3 Nm (0,65 Nm)		0,3 Nm (0,65 Nm)	

Accessories See page 6/1

To purchase a product with a movable part on the left replace letter P with letter Q in the codes mentioned above.
Example: HX BL22-2**P**N → HX BL22-2**Q**N

All measures in the drawings are in mm

Complementary hinges



HX CB

Internal connections

L22 / H22 mechanical contact blocks
Version with cable or M12 connector

connections	cable color	pin
NC	black	1
	black-white	2
NC	red	3
	red-white	4
NO	brown	5
	blue	6
NO	violet	7
	violet-white	8
⏚	yellow-green	/

EE1 electronic contact block
Version with cable or M12 connector

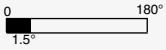
connections	cable color	pin
A1	brown	1
IS1	red	2
A2	blue	3
OS1	red/white	4
O3	black	5
IS2	purple	6
OS2	black/white	7
not connected	purple/white	8

Legend

A1-A2	power supply
IS1-IS2	safety inputs
OS1-OS2	safety outputs
O3	auxiliary output

Travel diagrams

All measures in the diagrams are in degrees

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°.

Legend

Contact closed /
OS1, OS2, O3 outputs active

Contact open /
OS1, OS2, O3 outputs not active

⊖ Positive opening stroke

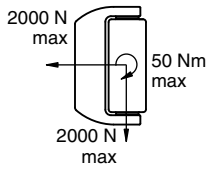
Accessories

Article	Description
VF AC7032	Protection plug 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 plug can be ordered separately.

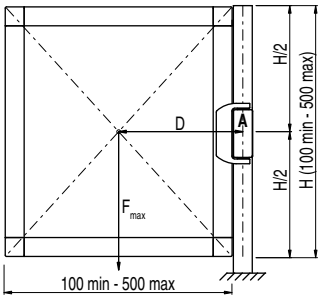
Article	Description
VF CA••••M	Female wired connectors
	**General data:** - Self locking ring nut - High flexibility wire suitable for dynamic laying applications (copper class 6) - Gold plated contact (resistance < 5 mΩ) - Connector body in polyurethane **See page 6/2**

Max forces and charges HX

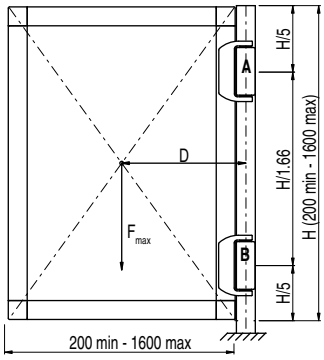
Admitted max charges independently from utilization conditions.



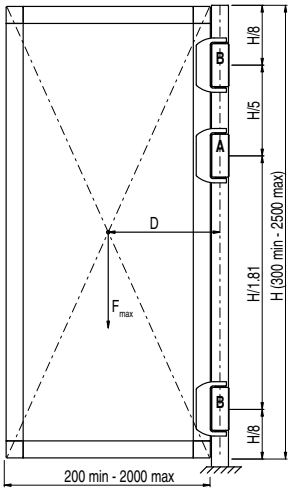
Doors with one safety hinge
F_{max} (N)=50.000/D (mm)



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

All measurements are in mm expressed.