Pizzato Elettrica srl
via Torino, 1
36063 MAROSTICA (VI)
ITALY
e-mail: info@pizzato.com
web site: www.pizzato.com
Phone: +39.0424.470.930

1 INFORMATION ON THIS DOCUMENT

1.1 Function

The present instruction manual provides information on installation, connection and safe use for the following articles: **FD ••93, FP ••93, FL ••93, FC ••93, FD ••R2, FP ••R2, FD ••99, FP ••99**

1.2 Target audience

The operations described in this instruction manual must be carried out by qualified personnel only, who are fully capable of understanding them, and with the technical qualifications required for operating the machines and plants in which the safety devices are to be installed.

1.3 Application field

These instructions apply exclusively to the products listed in paragraph Function, and their accessories.

1.4 Original instructions

The Italian language version is the original set of instructions for the device. Versions provided in other languages are translations of the original instructions.

2 SYMBOLS USED

This symbol indicates any relevant additional information.

Attention: Any failure to observe this warning note can cause damage or malfunction, including possible loss of the safety function.

3 DESCRIPTION

3.1 Device description

The safety devices described in this manual are defined as coded, type 2 mechanical interlocking devices acc. to EN ISO 14119.

The safety switches with separate actuator to which these usage instructions refer are safety devices designed and implemented for the control of gates, guards, enclosures, and doors in general, which are installed to protect dangerous parts of machines without inertia.
The actuator is installed on the moving part of the guard in such a way that it is extracted from the switch each time the guard is opened.
In FD ••99 and FP ••99 devices, the actuator can be extracted from the switch only after rotating the key in the lock (on the switch body) 180°.
In FD ••R2 and FP ••R2 devices, the actuator can be extracted from the switch only after rotating the knob on the switch body clockwise up to the stop.

3.2 Intended use of the device

- The device described in this manual is designed to be applied on industrial machines for state monitoring of movable guards.
- The direct sale of this device to the public is prohibited. Installation and use must be carried out by qualified personnel only.
- The use of the device for purposes other than those specified in this manual is prohibited.
- Any use other than as expressly specified in this manual shall be considered unintended by the manufacturer.
- Also considered unintended use:

a) using the device after having made structural, technical, or electrical modifications to it;
b) using the product in a field of application other than as described in paragraph TECHNICAL DATA.

4 INSTALLATION INSTRUCTIONS

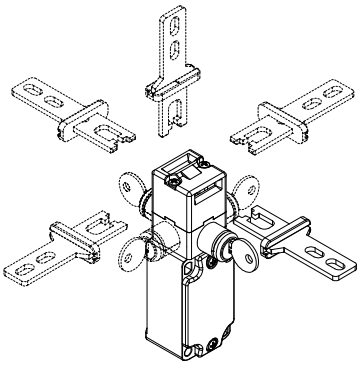
Attention: Installing a protective device is not sufficient to ensure operator safety or compliance with machine safety standards or directives. Before installing a protective device, perform a specific risk analysis in accordance with the key health and safety requirements in the Machinery Directive. The manufacturer guarantees only the safe functioning of the product to which this instruction manual refers, and not the functional safety of the entire machine or entire plant.

4.1 Selection of the actuator type

The switch is activated by a low level coded actuator. Please make sure to use only the actuator provided with the switch or use one of the following actuators: VF KEYF, VF KEYF1, VF KEYF2, VF KEYF3, VF KEYF7, VF KEYF8.
The use of any other actuator does not guarantee the safety of the system.

Attention: Any other actuators present in the same place where the device has been installed must be segregated and kept under strict control in order to avoid any bypassing of the safety device. If new actuators are fitted, the original low-level coding actuators must be disposed of or rendered inoperable.

4.2 Head and release device (where present) orientation



If necessary, it is possible to adjust the position of the head and the release device (if present), in 90° rotations, at the machine, in order to turn the device to the position best suited to the application.
Remove the 2 screws on the top of the head, and disconnect the head from the switch body.
Remove the 4 fixing screws from the auxiliary release device; rotate it to the desired position, and retighten the 4 screws.
Position the switch head, with the desired orientation, above the auxiliary release design device, and replace the 2 fixing screws on the holes provided.

Attention: tighten the head and auxiliary release device screws to a torque from 0.8 to 1.2 Nm.

The switch head has two actuator inputs: one perpendicular, and the other parallel to the device body. Once the actuator input direction has been selected, the unused input hole must be sealed, using the appropriate cap supplied. It is possible to use one single hole at a time, with one single actuator.

4.3 Fixing of the device

Attention: Always affix the device with a number of M5 screws equal to the number of holes on the housing. Always use screws with a resistance class of 8.8 or higher, and flat seating heads. Install the screws with medium resistance thread lock, and a number of threads engaged equal to or greater than the screw diameter. The device must never be fixed with fewer screws than holes available on the housing.
The tightening torque of the M5 screws must be between 2 and 3 Nm

It is advisable to install the device in the top part of the door, in order to prevent any dirt or work residues from getting inside the hole where the actuator is to be introduced.

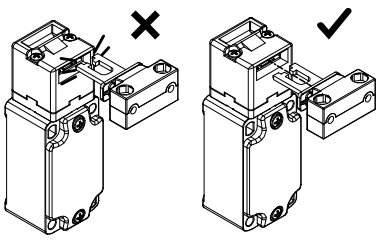
4.4 Fixing the actuator to the guard

Attention: As required by EN ISO 14119, the actuator must be fixed immovably to the door frame.

Install the actuator so that its edge does not protrude dangerously into the operator working area when the door is open.

Always affix the actuator with 2 M5 screws with resistance class 8.8 or higher, and flat seating heads. Install the screws with medium resistance thread lock, and a number of threads engaged equal to or greater than the screw diameter. The actuator must never be fixed with fewer than 2 screws. Tighten the M5 screws to a torque from 1.2 to 1.6 Nm
Do not deform or modify the actuator during installation for any reason.
For correct fixing, other means can also be used, such as rivets, non-removable security screws (one-way), or other equivalent fixing system, provided that it can ensure adequate fixing.

4.5 Switch-actuator alignment



Before commissioning the machine, and periodically, check that the alignment between switch and its actuator is correct. The actuator must not impact the inlet area on the switch, and must not be used as a centring device for the mobile guard.
Do not use a hammer for the adjustments, unscrew the screws and adjust the device manually, then tighten it in position.

4.6 Electrical connections

Attention: the safety circuit must be connected to the safety contacts (11-12, 21-22, 31-32). The auxiliary contacts (13-14, 23-24, 33-34) must be used for signalling only.

To gain access to the contact block terminals, open the cover on the front switch part, removing the fixing screws.
Once cabling work is complete, always re-close the cover; making sure that the seal gasket is correctly inserted in its seat.

5 OPERATION

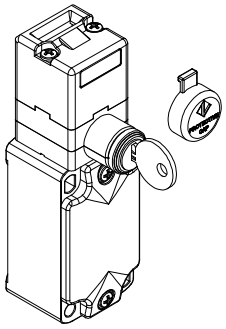
Once the device is installed on the machine and opening guard, and electrically connected (as described in paragraph "INSTALLATION INSTRUCTIONS"), extracting or releasing the switch actuator must initiate a stop of the machine and related dangerous moving elements.
Subsequent machine restart shall be possible only once the actuator has been reinserted to and blocked in the device (where the release mechanism is present).

5.1 Access monitoring

This switch alone is not sufficient to protect any operators or maintenance engineers in the event that they are able to physically enter the danger area with their whole body, since any unintentional closing of a guard behind them could allow the machine to be restarted. If this device is solely responsible for authorising machine re-start, additional protection systems must be provided (lock out/tag out) to mitigate risk; using for example the padlockable lock device to block the actuator input (item VF KB1), designed specifically for prevention of any unexpected unintentional machine start-up with the operator still inside it.
Please contact technical assistance for more information (see SUPPORT paragraph).

5.2 Using the release with lock

Items FD ••99 and FP ••99 are equipped with a release with lock, to allow the guard to be opened only by authorized personnel in possession of the appropriate key.



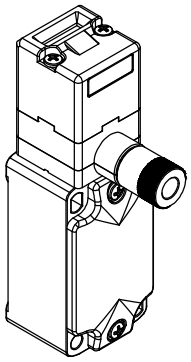
This mechanical device acts directly on the lock mechanism, and releases the actuator regardless of device state.
This release device may only be operated by a machine maintenance engineer who has received adequate training on the dangers deriving from its use.

How to use the auxiliary key release:
1) Open the protection cap.
2) Insert the key supplied with the switch and turn clockwise by 180°.
3) Do not force the key beyond 180°.
4) Extract the actuator from the device.
5) Do not turn the key with the actuator extracted.
6) Each time after the key is extracted, close the rubber cap.

⚠ Attention:- The release key must only be available to the machine maintenance engineer and kept in a secluded place.
- The release key must not be available to the machine operator.
- Never leave the release key inserted in the device during normal machine operation.

5.3 Using the release with manual mechanical delay

Items FD ••R2 and FP ••R2 are equipped with a release with manual mechanical delay, for use where the hazardous condition persists for a limited period, even after the machine stop command has been actuated.



This mechanical device acts directly on the lock mechanism, and releases the actuator regardless of device state.

How to use the auxiliary release with manual mechanical delay:
1) To release the actuator, rotate the knob clockwise as far as it will go up to the stop; only then extract the actuator.
2) To lock the actuator, insert it in the device; only then, rotate the knob anticlockwise as far as it will go up to the stop.
3) Never force the knob, by turning it anticlockwise with the actuator extracted.

6 INSTRUCTIONS FOR PROPER USE

6.1 Installation

- Tighten the fixing screws of electrical conductors to a torque from 0.6 to 0.8 Nm.
- Do not stress the device with bending and torsion.
- Do not modify the device for any reason.
- Do not exceed the tightening torques specified in the present manual.
- The device carries out an operator protection function. Any inadequate installation or tampering can cause serious injuries and even death, property damage, and economic losses.
- These devices must not be bypassed, removed, turned or disabled in any other way.
- If the machine where the device is installed is used for a purpose other than that specified, the device may not provide the operator with efficient protection.
- The safety category of the system (according to EN ISO 13849-1), including the safety device, also depends on the external components connected to it and their type.
- Before installation, make sure the device is not damaged in any part.
- Avoid excessive bending of connection cables in order to prevent any short circuits or power failures.
- Do not paint or varnish the device.
- Do not drill the device.
- Do not use the device as a support or rest for other structures, such as raceways, sliding guides or similar.
- Before commissioning, make sure that the entire machine (or system) complies with all applicable standards and EMC directive requirements.
- The fitting surface of the device must always be smooth and clean.
- The documents necessary for a correct installation and maintenance are always available in the following languages: English, French, German and Italian.
- Should the installer be unable to fully understand the documents, the product must not be installed and the necessary assistance may be requested (see paragraph SUPPORT).
- When the device is installed on a mobile frame and the actuator is installed on a mobile door, ensure that the device cannot be damaged by simultaneous opening of the frame and the door.
- Always attach the following instructions to the manual of the machine in which the device is installed.
- These operating instructions must be kept available for consultation at any time and for the whole period of use of the device.

6,2 Do not use in the following environments

⚠ Attention: Do not use in environments where dust and dirt may in any way penetrate the head and deposit there. Do not use in particular where metal dust, concrete or chemicals are spread.
- In environments where continual changes in temperature cause the formation of condensation inside the device.
- In environments where the application causes collisions, impacts or strong vibrations to the device.
- In environments with the presence of explosive or flammable dusts or gases. This limitation does not apply to devices declared compliant with ATEX Directive 2014/34/EU.
- In environments where ice can form on the device.
- In environments containing strongly aggressive chemicals, where the products used coming into contact with the device may impair its physical or functional integrity.

6.3 Mechanical stop

⚠ Attention: The door must always be provided with an independent end-limit mechanical stop at limit of travel.
Do not use the device as mechanical stop for the door.

6.4 Maintenance and functional tests

⚠ Attention: Do not disassemble or try to repair the device. In case of any malfunction or failure, replace the entire device.

⚠ Attention: In case of damages or wear it is necessary to change the whole device including its actuator. Correct operation cannot be guaranteed when the device is deformed or damaged.

- The installer is responsible for establishing the sequence of functional tests to which the device is to be subjected before the machine is started up and during maintenance intervals.
- The sequence of the functional tests can vary depending on the machine complexity and circuit diagram, therefore the functional test sequence detailed below is to be considered as minimal and not exhaustive.

- Perform the following sequence of checks before the machine is commissioned and at least once a year (or after a prolonged shutdown):

1) For FD ••93, FP ••93, FL ••93, FC ••93 articles:
   - Open the guard while the machine is moving. The machine must stop immediately. The stopping time of the machine must be always shorter than the time required by the operator for opening the guard and reaching the dangerous parts.

   For articles FD ••99, FP ••99:
   - Lock the guard and start the machine. It must be impossible to open the guard.
   - Release the guard with the appropriate key. The machine must stop immediately. The stopping time of the machine must be always shorter than the time required by the operator for opening the guard and reaching the dangerous parts.

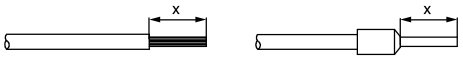
   For articles FD ••R2, FP ••R2:
   - Lock the guard and start the machine. It must be impossible to open the guard.
   - Start rotating the release knob clockwise. From the initial rotations, the machine must begin stopping. The machine must stop completely before the door is released by rotating the knob clockwise. The stopping time of the machine must be always shorter than the time required by the operator for opening the guard and reaching the dangerous parts.
2) Try to start the machine while the guard is open. The machine must not start.
3) Check correct actuator to device alignment. If the actuator inlet is worn, replace the entire device and actuator assembly.
4) All external parts must be undamaged.
5) If the device is damaged, replace it completely.
6) The actuator must be securely locked to the door; make sure that none of the machine operator's tools can be used to disconnect the actuator from the door.
7) If you have difficulty inserting the actuator in the switch, never apply oil or grease to the switch head; instead, check the actuator alignment as described in paragraph INSTALLATION INSTRUCTIONS. If it is still difficult to insert the actuator, replace the entire device.
8) The device has been created for applications in dangerous environments, therefore it has a limited service life. Although still functioning, after 20 years from the date of manufacture the device must be replaced completely. The date of manufacture is placed next to the product code (see paragraph MARKINGS).

6.5 Wiring

⚠ Attention: Check that the supply voltage is correct before powering the device.
- Keep the charge within the values specified in the electrical operation categories.
- Only connect and disconnect the device when the power is off.
- During and after the installation do not pull the electrical cables connected to the device.
- Always connect the protection fuse (or equivalent device) in series to the safety electrical contacts.
- At the end of the wiring, check that no contaminating element has been introduced inside the device.
- Before closing the device cover verify the correct positioning of the gaskets.
- Verify that the electrical cables, wire-end sleeves, cable numbering systems and any other parts do not obstruct the cover from closing correctly or if pressed between them do not damage or compress internal parts
- During and after the installation do not pull the electrical cables connected to the device. If traction is applied to the cables (not supported by an appropriate cable gland) internal parts of the device may be damaged.
- Adhere to the following minimum and maximum cross-sections of electrical conductors designed for screw terminals:

Contact blocks 20, 21, 22, 28, 29, 30, 33, 34	Contact blocks 5, 6, 7, 9, 18
min 1 x 0.34 mm^2 (1 x AWG 22) max. 2 x 1.5 mm^2 (2 x AWG 16)	min 1 x 0.5 mm^2 (1 x AWG 20) max. 2 x 2.5 mm^2 (2 x AWG 14)

- The stripping length of the cable or wire end sleeve (x) must be 7 mm (for contact blocks 20, 21, 22, 28, 29, 30, 33, 34) or 8 mm (for contact blocks 5, 6, 7, 9, 18).



6.6 Additional prescriptions for safety applications with operator protection functions

Provided that all previous requirements for the devices are fulfilled, for installations with operator protection function additional requirements must be observed.
- The utilization implies knowledge of and compliance with following standards: EN 60947-5-3, EN ISO 13849-1, EN 62061, EN 60204-1, EN ISO 14119, EN ISO 12100.

6.7 Limits of use

- Use the device following the instructions, complying with its operation limits and the standards in force.
- The devices have specific application limits (min. and max. ambient temperature, mechanical endurance, IP protection degree, etc.) These limitations are met by the device only if considered individually and not as combined with each other.
- The manufacturer's liability is to be excluded in the following cases:
  1) Use not conforming to the intended purpose;
  2) Failure to adhere to these instructions or regulations in force;
  3) Fitting operations not carried out by qualified and authorized personnel;
  4) Omission of functional tests.
- For the cases listed below, before proceeding with the installation contact our technical assistance service (see paragraph SUPPORT):
  a) In nuclear power stations, trains, airplanes, cars, incinerators, medical devices or any application where the safety of two or more persons depend on the correct operation of the device;
  b) Applications not contemplated in this instruction manual.

7 MARKINGS

The outside of the device is provided with external marking positioned in a visible place. Marking includes:
- Producer trademark
- Product code
- Batch number and date of manufacture. Example: A19 FD1-123456. The batch's first letter refers to the month of manufacture (A=January, B=February, etc.). The second and third letters refer to the year of manufacture (19 = 2019, 20 = 2020, etc…).

8 TECHNICAL DATA

8.1 Housing

FP series:	Housing made of glass fibre reinforced technopolymer, self-extinguishing, shock-proof and with double insulation 1 threaded conduit entry M20x1.5 (standard)
Series FD, FC:	Metal housing, baked powder coating 1 threaded conduit entry M20x1.5 (standard)
FL series:	Metal housing, baked powder coating 3 threaded conduit entries M20x1.5 (standard)
Head:	Metal head, baked powder coating
Protection degree:	IP67 acc. to EN 60529 with cable gland of equal or higher protection degree

8.2 General data

Interlock with mechanical lock, coded: type 2 acc. to EN ISO 14119

Coding level:	low acc. to EN ISO 14119
SIL (SIL CL):	up to SIL 3 acc. to EN 62061
Performance Level (PL):	Up to PL e acc. to EN ISO 13849-1

Safety parameters:

B10d (articles FD ••93, FL ••93, FP ••93, FC ••93):	2,000,000 for NC contacts
B10d (articles FD ••R2, FP ••R2, FD ••99, FP ••99):	1,000,000 for NC contacts
Mission time:	20 years
Ambient temperature:	-25°C … +80°C
Storage temperature:	-40°C … +80°C
Max. actuation frequency:	3600 operating cycles/hour
Mechanical endurance:	1 million operating cycles
Max. actuation speed:	0.5 m/s
Min. actuation speed:	1 mm/s
Mounting position:	any

Released actuator extraction force: max. 30 N

Maximum force before breakage F_{1max} (articles FD ••R2, FP ••R2, FD ••99, FP ••99):
1000 N acc. to EN ISO 14119

Max. holding force F_{Zh} (articles FD ••R2, FP ••R2, FD ••99, FP ••99):
770 N acc. to EN ISO 14119

8.3 Electrical data

8.3.1 Versions without connector:

Thermal current (I_{th}):	10 A
Rated insulation voltage (U_i):	500 Vac 600 Vdc 400 Vac 500 Vdc (contact blocks 20,21,22,28,29,30,33,34)
Rated impulse withstand voltage (U_{imp}):	6 kV 4 kV (contact blocks 20,21,22,28,29,30,33,34)
Conditional short circuit current:	1000 A acc. to EN 60947-5-1
Protection against short circuits:	type aM fuse 10 A 500 V
Pollution degree:	3

Utilization categories:

Alternating current: AC15 (50÷60 Hz)

U_e (V)	250	400	500
I_e (A)	6	4	1

Direct current: DC13

U_e (V)	24	125	250
I_e (A)	3	0.55	0.3

8.3.2 Versions with M12 connector, 4 or 5-pole:

Thermal current (I_{th}):	4 A
Rated insulation voltage (U_i):	250 Vac 300 Vdc
Protection against short circuits:	type gG fuse 4 A 500 V
Pollution degree:	3

Utilization categories:

Alternating current: AC15 (50÷60 Hz)

U_e (V)	24	120	250
I_e (A)	4	4	4

Direct current: DC13

U_e (V)	24	125	250
I_e (A)	3	0.55	0.3

8.3.3 Versions with M12 connector, 8-pole:

Thermal current (I_{th}):	2 A
Rated insulation voltage (U_i):	30 Vac 36 Vdc
Protection against short circuits:	type gG fuse 2 A 500 V
Pollution degree:	3

Utilization categories:

Alternating current: AC15 (50÷60 Hz)

U_e (V)	24
I_e (A)	2

Direct current: DC13

U_e (V)	24
I_e (A)	2

8.4 Compliance with standards

EN 60947-5-1, EN 60947-1, EN 60204-1, EN ISO 14119, EN ISO 12100, EN 60529, BG-GSET-15, UL 508, CSA 22.2 N. 14.

8.5 Compliance with standards

Machinery Directive 2006/42/CE, EMC Directive 2014/30/UE, RoHS Directive 2011/65/UE.

9 SPECIAL VERSIONS ON REQUEST

Special versions of the device are available on request.
The special versions may differ substantially from the indications in this instruction sheet.
The installer must ensure that he has received written information from the support service regarding installation and use of the special version requested.

10 DISPOSAL

At the end of service life product must be disposed of properly, according to the rules in force in the country in which the disposal takes place.

11 SUPPORT

The device can be used for safeguarding people's physical safety, therefore in case of any doubt concerning installation or operation methods, always contact our technical support service:

Pizzato Elettrica Srl
Via Torino, 1 - 36063 Marostica (VI) - ITALY
Telephone +39.0424.470.930
E-mail tech@pizzato.com
www.pizzato.com

Our support service provides assistance in Italian and English.

12 EC CONFORMITY DECLARATION

I, the undersigned, as a representative of the following manufacturer:
Pizzato Elettrica Srl - Via Torino, 1 - 36063 Marostica (VI) – ITALY
hereby declare that the product is in conformity with whatever prescribed by the 2006/42/EC Machinery Directive. The complete version of the present conformity declaration is available on our website www.pizzato.com
Marco Pizzato