

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 ••95, FL ••95, FC ••95, FR ••96, FM ••96, FX ••96, FZ ••96, FK ••96**.

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 non-coded, type 1 mechanical interlocking devices acc. to EN ISO 14119.

The safety hinge switches (device) 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 pin (actuator) on the head of the device must be connected to the guard hinge, so that each opening of the guard corresponds to one rotation of the pin on the device head.

3.2 Intended use of the device

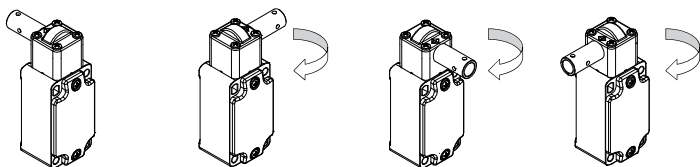
- The device described in this manual is designed to be applied on industrial machines for state monitoring of movable guards.
- The direct sale of this device to the public is prohibited. Installation and use must be carried out by qualified personnel only.
- The use of the device for purposes other 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 Device head orientation



If necessary, it is possible to adjust the position of the device head, in 90° rotations, at the machine, in order to turn the device to the position best suited to the application.

Carry out the following to modify device head orientation.

- 1) Remove the 4 screws from the top of the head.
- 2) Disconnect the head from the switch body.
- 3) Position the switch head in the desired orientation.
- 4) Replace the 4 fixing screws in the holes provided.



Attention: tighten the head screws to a torque between 0.8 and 1.2 Nm (for items **FD ••95, FL ••95, FC ••95**) or between 0.5 and 0.7 Nm (for items **FR ••96, FM ••96, FX ••96, FZ ••96, FK ••96**).

Once the device is in its definitive configuration, you must replace two of the head fixing screws on the body, with two one-way tamper-proof screws, provided with the device. The two tamper-proof screws must be screwed onto diametrically opposed holes on the head. This must be carried out before commissioning the machine.

4.2 Fixing of the device

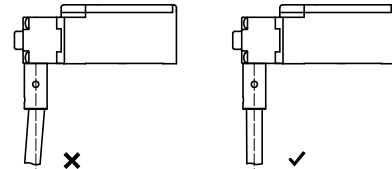


Attention: Always affix the device with at least 2 screws. Use M5 screws (for items **FD ••95, FL ••95, FC ••95**) or M4 screws (for items **FR ••96, FM ••96, FX ••96, FZ ••96, FK ••96**). Always use screws with a resistance class of 4.6 or higher, and flat seating heads. Install the screws with medium resistance thread lock, and a number of threads engaged equal to or greater than the screw diameter. The device must never be fixed with less than 2 screws. For items **FR ••96** and **FK ••96**, we recommend using under head washers for the fixing screws on the device body.

Adhere to the following minimum and maximum tightening torques:

| Articles | Screws | Tightening torque |
|----------------------------------|--------|-------------------|
| FD ••95, FL ••95, FC ••95 | M5 | 2 ÷ 3 Nm |
| FM ••96, FZ ••96 | M4 | 2 ÷ 3 Nm |
| FR ••96, FX ••96, FK ••96 | M4 | 2 ÷ 2,5 Nm |

Always install the device with its actuator perfectly aligned with the guard opening movement transmission system. Any misalignments can cause abnormal wear to the device interior, with likely loss of safety function.



4.3 Fixing the actuator and checking the switching point



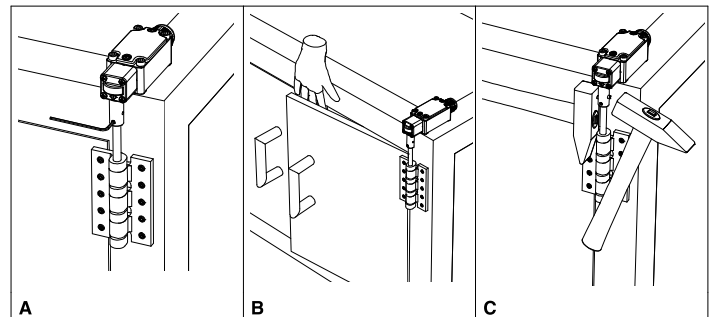
Attention: The fixing and connection options described below are minimal. As prescribed by EN ISO 14119, additional measures to counteract tampering with the device, must be carefully evaluated and applied, in accordance with how it is used.

Adhere strictly to the below method for making the mechanical connection between device and guard hinge.



Attention: The assembly, made up of device and mechanical connection means between device and mobile hinge part, must constitute an immovable, mechanically connected assembly, capable of transmitting the intended forces.

- 1) Fix the switch to the machine frame.
- 2) Mechanically connect the device actuator to the mobile hinge part, affixing it so that it cannot move.
- 3) If you are using a device with actuator with hole:
 - Lock the actuation pin on the device head temporarily, using the threaded stud screw supplied (figure A). Maximum stud screw tightening torque: 0.8 Nm.
 - Check the switching point of the device (figure B) and, if necessary, readjust by loosening the stud screw, positioning the guard correctly, and then re-tightening the fixing stud screw.
 - Once adjustment is complete, perforate the hinge pin through one of the two holes in the device actuator.
 - Insert the cylindrical mechanical pin provided in the new hole (figure C), so that actuator pin and switch are connected.



Attention: Always affix the actuator pin to the switch head with the cylindrical pin provided; using the threaded stud screw alone does not guarantee safe operation, and may cause the device to fail to operate when the guard is opened.



Attention: If the hollow pin on the switch head is perforated more than once to adjust the guard and the actuator pin does not pin effectively, do not try to repair the connection, but replace the entire device and actuator pin.



Attention: Check that the switching point of the switch is set so that no openings are large enough to allow upper or lower limbs, or other body parts, to be inserted and reach dangerous machine parts before they are stopped, or have otherwise entered a safe state. The dimensions of the openings on the guards, and the relative distances from the dangerous points requiring protection, must comply with the provisions of EN ISO 13857.

4.4 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.

5 OPERATION

Once the device is installed on the machine and opening guard, and electrically connected (as described in the "INSTALLATION INSTRUCTIONS" paragraph), every time the guard is opened, this must initiate an immediate machine stop. The machine may be restarted only with the guard fully closed.

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. Please contact technical assistance for more information (see SUPPORT paragraph).

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).
- 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

- 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 containing explosive or inflammable gases or dusts. The current limit does not apply to devices declared compliant with directive ATEX 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) 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.
 - 2) Try to start the machine while the guard is open at any angle. The machine must not start.
 - 3) All external parts must be undamaged.
 - 4) If the device is damaged, replace it completely.
 - 5) Check that the mechanical connections assembly between device and mobile hinge part is intact, and functioning perfectly.

- 6) Check the device switching point as described in the INSTALLATION INSTRUCTIONS paragraph.
- 7) If the actuator pin of the device is difficult to rotate, never apply oil or grease to the switch head, but 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

- Keep the charge within the values specified in the electrical operation categories.
- Only connect and disconnect the device when the power is off.
- 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, 33, 34 | Contact blocks 5, 6, 7, 9, 14, 18, 66 |
|--|---|
| 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, 33, 34) or 8 mm (for contact blocks 5, 6, 7, 9, 14, 18, 66).



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

- Series FD, FC, FM: Metal housing, baked powder coating
1 threaded conduit entry M20x1.5 (standard)
- FZ series: Metal housing, baked powder coating
2 threaded conduit entries M20x1.5 (standard)
- FL series: Metal housing, baked powder coating
3 threaded conduit entries M20x1.5 (standard)
- FR series: Housing made of glass fibre reinforced technopolymer, self-extinguishing, shock-proof and with double insulation
1 threaded conduit entry M20x1.5 (standard)
- FX series: Housing made of glass fibre reinforced technopolymer, self-extinguishing, shock-proof and with double insulation
2 knock-out threaded conduit entries M20x1.5 (standard)
- FK series: Housing made of glass fibre reinforced technopolymer, self-extinguishing, shock-proof and with double insulation
1 threaded conduit entry M16x1.5 (standard)
- Protection degree: IP67 acc. to EN 60529 with cable gland of equal or higher protection degree

8.2 General data

- Interlock with mechanical lock, not coded: type 1 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

B10d: 5,000,000 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: 180°/s
 Min. actuation speed: 2°/s
 Mounting position: any

8.3 Electrical data

8.3.1 Versions without connector:

Thermal current (I_{th}): 10 A
 Rated insulation voltage (U): 500 Vac 600 Vdc
 400 Vac 500 Vdc
 (Contact blocks 20, 21, 22, 33, 34)
 Rated impulse withstand voltage (U_{imp}): 6 kV
 4 kV
 (Contact blocks 20, 21, 22, 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): 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): 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, UL 508, CSA 22.2 N. 14.

8.5 Compliance with directives

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

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 Machine Directive. The complete version of the present conformity declaration is available on our website www.pizzato.com
 Marco Pizzato

DISCLAIMER:

Subject to modifications without prior notice and errors excepted. The data given in this sheet are accurately checked and refer to typical mass production values. The device descriptions and its applications, the fields of application, the external control details, as well as information on installation and operation, are provided to the best of our knowledge. This does not in any way mean that the characteristics described may entail legal liabilities extending beyond the "General Terms of Sale", as stated in the Pizzato Elettrica general catalogue. Customers/users are not absolved from the obligation to read and understand our information and recommendations and pertinent technical standards, before using the products for their own purposes. Taking into account the great variety of applications and possible connections of the device, the examples and diagrams given in the present manual are to be considered as merely descriptive; the user is deemed responsible for checking that the specific application of the device complies with current standards. This document is a translation of the original instructions. In case of discrepancy between the present sheet and the original copy, the Italian version shall prevail. The present manual may not be reproduced, in whole or in part, without the prior written permission by Pizzato Elettrica.

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