

1 INFORMATION ON THIS DOCUMENT

1.1 Function

The present operating instructions provide information on installation, connection and safe use for the following articles: **CS FS-1******

1.2 Target audience

The operations described in these operating instructions 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 device described in this manual is defined according to the Machinery Directive 2006/42/EC as logic component for safety functions.

The safety modules to which these usage instructions refer are devices specifically designed and manufactured for use on industrial machines. The safety function ensures that after the supply voltage is applied, the outputs are activated with a delay (switch-on delay). The safety function is only performed after an internal integrity test of the safety circuit and relay has been completed and if the feedback channel at Y1-Y2 is closed. If there is no supply voltage, the module deactivates the safety outputs within the specified release time.

3.2 Device functions

 This device is suitable for the following applications: as safety timer module in safety circuits up to category 4 and PL e acc. to EN ISO 13849-1 and SIL 3 acc. to EN 62061.

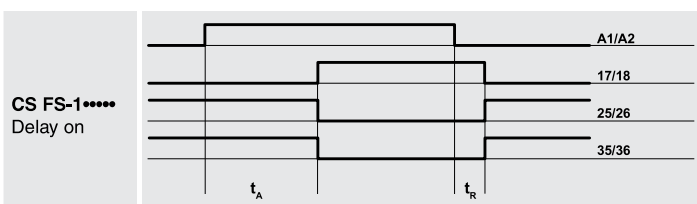
- Timing circuits by means of safety system with self-monitoring and redundancy.
- Release command for interlocked safety devices.
- Indicator LEDs for the switching state of channels 1 and 2 (CH1, CH2) and application of the supply voltage (PWR).
- In the event of a failure, the device switches to a safe state and deactivates the safety output.
- Without muting input, no bridging of the safety function.
- Screw terminals or plug-in terminals with screw connections or spring terminals (depending on the model).
- Snap-mounting on DIN rails.

3.3 Intended use of the device

- The device described in these operating instructions is designed to be applied on industrial machines.
- 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 these operating instructions is prohibited.
- Any use other than as expressly specified in these operating instructions shall be considered unintended by the manufacturer.
- Also considered unintended use:
 - using the device after having made structural, technical, or electrical modifications to it;
 - using the product in a field of application other than as described in paragraph TECHNICAL DATA.

4 OPERATION

4.1 Operating diagram



Legend:

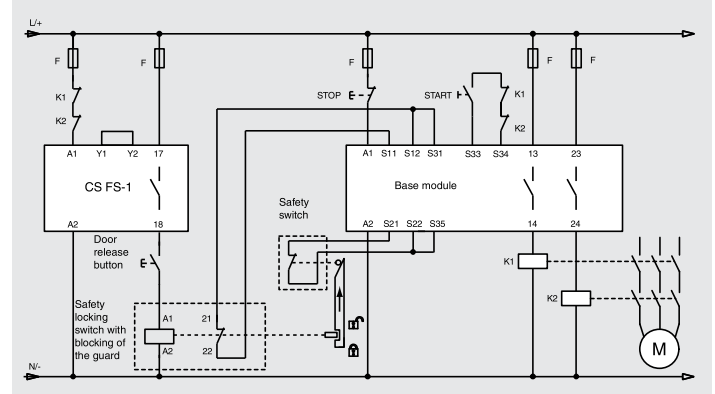
t_A : Adjustable response time: 0.3 ... 3 s, 0.3 s steps (articles CS FS-11****)
1 ... 10 s, 1 s steps (articles CS FS-12****)
3 ... 30 s, 3 s steps (articles CS FS-13****)
30 ... 300 s, 30 s steps (articles CS FS-14****)

t_R : Release time in absence of power supply

Note: For articles CS FS-10****-TFxx, the response time t_A is permanently set to xx seconds (xx is included in the code structure).

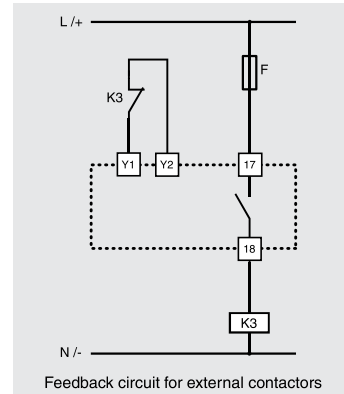
4.2 Application example

The diagram illustrates the working principle of a typical circuit for monitoring a safety device with guard locking in the de-energised state and manual release of the individual doors.

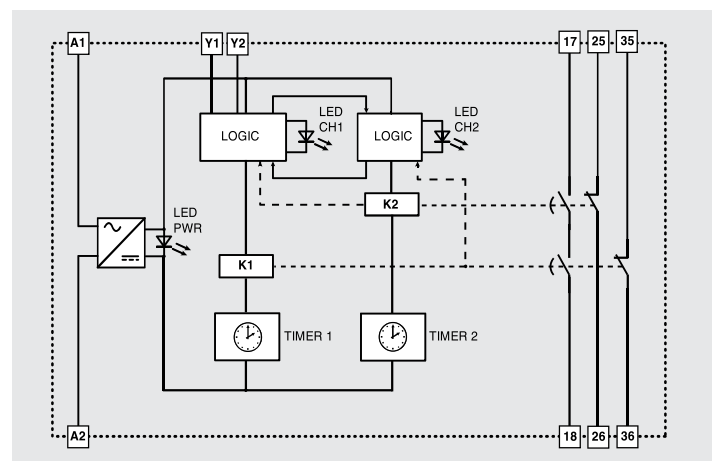


4.3 Increase of number and load capacity of contacts

If necessary the number and the load capacity of output contacts can be increased by using external contactors with forcibly guided contacts



5 INTERNAL WIRING DIAGRAM



Legend:

A1-A2: supply
17-18: NO safety contact
25-26, 35-36: NC auxiliary contacts
Y1-Y2: Feedback contact

6 FAULTS

LED state			Possible fault	Recommended action
PWR	CH1	CH2	- No power supply to the module. - Wrong wiring. - Power supply connections cut. - External fuse broken. - Internal module fault.	Check the wiring and check the fuse. If the fault persists, replace the module.
○	○	○		

LED state			Possible fault	Recommended action
PWR ●	CH1 ○	CH2 ●	Internal module fault.	Replace the module.
PWR ●	CH1 ●	CH2 ○	Internal module fault.	Replace the module.
PWR ●	CH1 ○	CH2 ○	Feedback circuit Y1-Y2 open. Internal module fault.	Check the wiring. If the fault persists, replace the module.

Legend: ● = led on; ○ = led off.

7 INSTRUCTIONS FOR PROPER USE

7.1 Installation

⚠ Attention: Do not exceed the tightening torque of the terminal screws specified in the present operating instructions.

⚠ Attention: Observe the wiring of the terminals: incorrect wiring can damage the device which may result in loss of the safety function.

- Install only inside a cabinet with protection degree not less than IP54 according to EN 60529.
- Always affix the device with the specific DIN rail adaptor acc. to EN 60715.
- Do not stress the device with bending and torsion.
- Do not modify or open the device for any reason.
- 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 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.
- Before commissioning, check the correct functioning of the module according to the instructions of the operating diagrams (see paragraph OPERATION).
- 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 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 from the manufacturer (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.

7.2 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 the device to be subjected to strong impacts or vibrations.
- In environments with the presence of explosive or flammable gases or dusts.
- In environments containing strongly aggressive chemicals, where the products used coming into contact with the device may impair its physical or functional integrity.

7.3 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.

- The device 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) Check that the safety module housing is undamaged and in good condition. If the housing is damaged, replace the entire device.
 - 2) Check that all signalling LEDs are working.
 - 3) Check that the electrical cables are firmly lodged inside the terminals and connectors.
 - 4) Check the proper mechanical and electrical function of the selector switch for the delay time (if present).
 - 5) Check that the timer module behaves during operation according to the operating diagrams provided in section OPERATION.
- 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).

7.4 Wiring

⚠ Attention: Do not install the safety module if voltage is present. Power the device

only when the electrical circuits have been completely realized according to the specifications indicated in the OPERATION paragraph. The first time you start the machine ensure that there are no people close to hazardous areas.

- 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.
- When using plug-in-type terminal blocks, they may only be plugged in or unplugged if no supply voltage is present.
- Discharge static electricity before handling the product by touching a metal mass connected to earth. Any strong electrostatic discharge could damage the device.
- Power the safety module and the other devices connected to it from a single SELV source and in accordance with the applicable standards (applies only to versions with supply voltage 12 V and 24 V).
- It is recommended that the supply voltage of the safety module be electrically isolated from the power section of the machine and the connection cables of the module be laid separately from the power cables.
- Always connect the protection fuse (or equivalent device) in series with the power supply for each device.
- Always connect the protection fuse (or equivalent device) in series to the safety electrical contacts.
- During and after the installation do not pull the electrical cables connected to the device. If excessive tension is applied to the cables, the device may be damaged.

7.5 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 ISO 13849-1, EN 62061, EN 60204-1, EN ISO 12100.
 - In the risk analysis, take into account that in manual start mode a possible sticking of the start button can lead to an immediate activation of the module.
 - If expansion modules or external contactors are used, make sure that they have forcibly guided contacts and connect in feedback an NC contact of each device.

7.6 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, maximum currents, IP protection degree, etc.) These limitations are met by the device only if considered individually and not as combined with each other.
- According to EU directives, this device is not intended for private use.
- 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 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.

8 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: CS1-123456 (A19). The last part of the production batch refers to the month of manufacture (A = January, B = February, etc.) as well as the year of manufacture (19 = 2019, 20 = 2020, etc.).

9 TECHNICAL DATA

9.1 Housing

Material: Polyamide PA 66, self-extinguishing V0 acc. to UL 94
 Protection degree: IP40 (housing), IP20 (terminal strip)
 Cable cross section: 0.2 ... 2.5 mm² (24 ... 12 AWG)
 Terminal tightening torque: 0.5 ... 0.6 Nm

9.2 General data

SIL (SIL CL): Up to SIL CL 3 acc. to EN 62061
 Performance Level (PL): Up to PL e acc. to EN ISO 13849-1
 Safety category: Up to cat. 4 acc. to EN ISO 13849-1
 MTTF_D: 404 years
 DC: High
 PFH_D: 5.06 E-10
 Mission time: 20 years
 Ambient temperature: -25°C ... +55°C
 Storage temperature: -25°C ... +70°C
 Mechanical endurance: > 10 million operating cycles
 Electrical endurance: > 100,000 operating cycles
 Pollution degree: external 3, internal 2
 Impulse withstand voltage U_{imp}: 4 kV
 Rated insulation voltage U_i: 250 V
 Overvoltage category: II
 Air and surface distances: acc. to EN 60947-1

9.3 Power supply

Rated supply voltage U_n: 24 Vac/dc; 50...60 Hz (articles CS FS-1**024)
 120 Vac; 50...60 Hz (articles CS FS-1**120)
 230 Vac; 50...60 Hz (articles CS FS-1**230)
 ±15% of U_n
 Supply voltage tolerance: ±15% of U_n
 Max. DC residual ripple in DC: 10%

Power consumption AC: < 5 VA
Power consumption DC: < 2 W

9.4 Control circuit

Protection against short circuits: PTC resistance, $I_h = 0.5 A$
PTC times: Response time > 100 ms, release time > 3 s
Response time t_A : See section OPERATION
Release time
in absence of power supply t_R : < 60 ms

9.5 Output circuit

Output contacts: 1 NO safety contact (17-18)
2 NC auxiliary contacts (25-26, 35-36)
Contact type: forcibly guided
Material of the contacts: gold-plated silver alloy
Maximum switching voltage: 230/240 Vac; 300 Vdc
Max. current per contact: 6 A
Conventional free air thermal current I_{th} : 6 A
Max. total current ΣI_{th}^2 : 36 A²
Minimum current: 10 mA
Contact resistance: $\leq 100 m\Omega$
External protection fuse: 4 A
Maximum switching load: 1380 VA/W
Utilization categories acc. to EN 60947-5-1:
AC15 (50 ... 60 Hz) $U_e = 230 V, I_e = 3 A$
DC13 (6 op. cycles/minute) $U_e = 24 V, I_e = 4 A$
Utilization category acc. to UL 508: C300

9.6 Compliance with standards

EN 60204-1, EN ISO 13855, EN ISO 14118, EN ISO 12100, EN ISO 13850, EN 60529, EN 61000-6-2, EN 61000-6-3, EN 61326-1, EN 60664-1, EN 60947-1, EN IEC 63000, EN ISO 13849-1, EN ISO 13849-2, EN 62061, UL 508, CSA C22.2 n° 14-95, GB/T14048.5-2017

9.7 Compliance with directives

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

10 SPECIAL VERSIONS ON REQUEST

Special versions of the device are available on request.
These special versions may differ substantially from the indications in these operating instructions.
The installer must ensure that he has received written information regarding the use of the special version requested (see paragraph SUPPORT).

11 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.

12 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.

13 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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