

### Module for emergency stops, end position monitoring for movable guards, safety mats and safety bumpers with 4-wire technology

#### Main features

- For safety applications up to SIL CL 3/PL e
- Input with 2 channels
- Choice between automatic start, manual start or monitored start
- Connection of input channels of opposite potentials
- Can be connected to electromechanical contacts, safety mats or safety bumpers with 4-wire technology
- Output contacts: 2 NO safety contacts,
- Supply voltage: 24 Vac/dc

#### Utilization categories

Alternating current: AC15 (50...60 Hz)

U<sub>e</sub> (V) 230

I<sub>e</sub> (A) 3

Direct current: DC13 (6 oper. cycles/min.)

U<sub>e</sub> (V) 24

I<sub>e</sub> (A) 4

#### Quality marks:



EC type examination certificate: IMQ CP 432 DM

UL approval: E131787

CCC approval: 2021000305000107

EAC approval: RU C-IT.YT03.B.00035/19

#### Compliance with the requirements of:

Machinery Directive 2006/42/EC,

EMC Directive 2014/30/EC,

RoHS Directive 2011/65/EU.

## Technical data

### Housing

Polyamide housing PA 66, self-extinguishing V0 acc. to UL 94

Protection degree acc. to EN 60529:

IP40 (housing), IP20 (terminal strip)

Dimensions:

see page 415, design A

### General data

SIL level (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

Safety parameters:

see page 481

Ambient temperature:

-25°C...+55°C

Mechanical endurance:

>10 million operating cycles

Electrical endurance:

>100,000 operating cycles

Pollution degree:

external 3, internal 2

Rated impulse withstand voltage (U<sub>imp</sub>):

4 kV

Rated insulation voltage (U<sub>i</sub>):

250 V

Overvoltage category:

II

### Supply

Rated supply voltage (U<sub>n</sub>):

24 Vac/dc; 50...60 Hz

Max. DC residual ripple in DC:

10%

Supply voltage tolerance:

±15% of U<sub>n</sub>

Power consumption AC:

< 5 VA

Power consumption DC:

< 2.5 W

### Control circuit

Protection against short circuits:

PTC resistance, I<sub>h</sub>=0.5 A

PTC times:

response time > 100 ms, release time > 3 s

Maximum resistance per input:

≤ 200 Ω

Current per input:

10 mA (typical)

Min. duration of start impulse t<sub>MIN</sub>:

> 150 ms

Response time t<sub>A</sub>:

< 120 ms

Release time t<sub>R1</sub>:

< 15 ms

Release time in absence of power supply t<sub>R</sub>:

< 120 ms

Simultaneity time t<sub>c</sub>:

unlimited

### In 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 No. 14, GB/T14048.5

### Output circuit

Output contacts:

2 NO safety contacts

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<sub>th</sub>:

6 A

Max. total current Σ I<sub>th</sub><sup>2</sup>:

36 A<sup>2</sup>

Minimum current:

10 mA

Contact resistance:

≤ 100 mΩ

External protection fuse:

4 A

The number and the load capacity of output contacts can be increased by using expansion modules or contactors. See pages 355-364.

## Code structure

# CS AR-51V024

### Connection type

**V** Screw terminals

**M** Connector with screw terminals

**X** Connector with spring terminals

### Supply voltage

**024** 24 Vac/dc

## Features approved by UL

Rated supply voltage (U<sub>n</sub>): 24 Vac/dc; 50...60 Hz

Power consumption AC: < 5 VA

Power consumption DC: < 4 W

Electrical ratings:

- NO contacts: 230/240 Vac, 6 A general use, C300 pilot duty

- NC contacts: 230/240 Vac, 6 A resistive, B300 pilot duty

Notes:

- Use 60 or 75°C copper (Cu) conductor and wire size No. 30-12 AWG, stranded or solid.

- The terminal tightening torque of 5-7 lb in.

- Only for 24 Vac/dc versions: supply from remote Class 2 source or limited voltage limited energy.

- Utiliser des conducteurs en cuivre (Cu) 60 ou 75°C rigides ou flexibles de section 30-12 AWG.

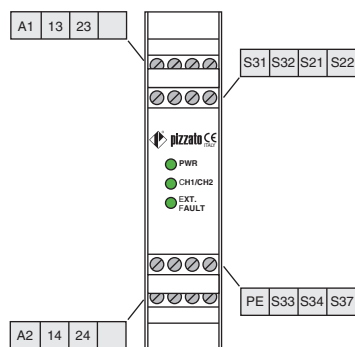
- Couple de serrage des bornes de 5-7 lb in.

- Seulement pour les versions 24 Vac/dc, alimenter avec sources de classes 2 ou avec tension limitée et énergie limitée.



## Safety module CS AR-51

### Pin assignment



The signal thereby generated causes the EXT.FAULT LED to illuminate and signal the short-circuit and the opening of the output contacts, resulting in the blocking of the control circuit and causing the machine to switch to the safety setting. The EXT. FAULT LED does not switch on if the wires or internal connections of the safety mat or safety bumper are interrupted.

#### PE terminal connection

The PE terminal has to be connected to the equipotential circuit of machine protection if it is necessary. This connection is made for functional reason, to reduce effects of an insulation fault on the machine operation. In particular, ground faults in control circuits must not cause unwanted start-up or dangerous movements or prevent the machine from stopping.

#### Function of "EXT. FAULT" LED

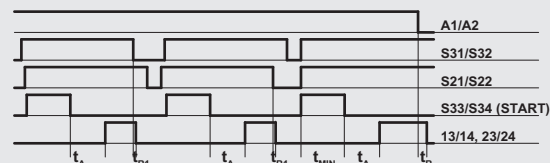
When a pressure is exerted on the surface of a safety bumper or safety mat, a short-circuit occurs between the two conductive elements, which constitute the apparatus and can be connected to the input channels of the safety module.

### Function diagrams

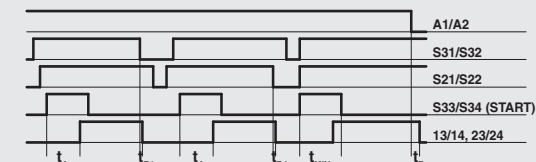
#### Configuration with automatic start



#### Configuration with monitored start



#### Configuration with manual start

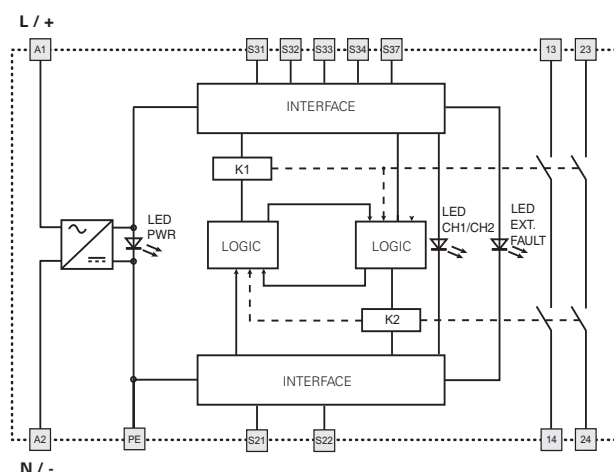


#### Legend:

$t_{MIN}$ : Min. duration of start impulse  
 $t_C$ : simultaneity time  
 $t_A$ : response time

$t_{R1}$ : release time  
 $t_{R2}$ : release time in absence of power supply

### Internal wiring diagram

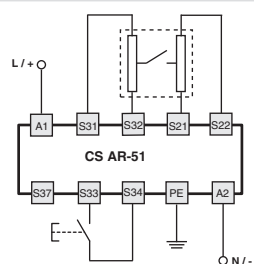


### Input configuration

#### Safety mats and safety bumpers

#### Input configuration with manual start

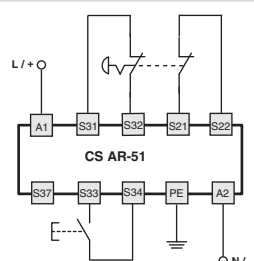
2 channels



#### Emergency stop circuits

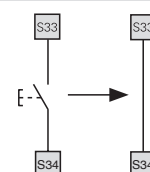
#### Input configuration with manual start

2 channels



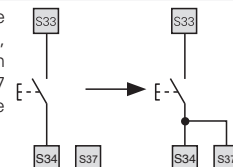
#### Automatic start

With regard to the indicated diagrams, bridge the start button between S33 and S34 in order to activate the automatic start module.



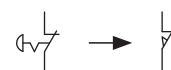
#### Monitored start

With regard to the indicated diagrams, establish the connection between S34 and S37 in order to activate the monitored start module.



#### Movable guard monitoring

The safety module can monitor emergency stop circuits and control circuits for movable guards. Replace the emergency stop contacts with the switch contacts.



The diagram does not show the exact position of the terminals in the product