



Safety modules for motor standstill monitoring

Main features

- For safety applications up to SIL CL 2/PL d
- Select from 10 different residual voltages on motor standstill.
- Galvanic separation between control circuit and measurement circuit.
- 45 mm housing
- 2 NO safety contacts
1 NC auxiliary contact
- 2 semiconductor outputs:
 - 1 signalling output for failure state
 - 1 signalling output for switching state of safety relays
- Possibility to connect single-phase or three-phase motors to measuring circuits.
- Supply voltages: 24 ... 230 Vac/dc

Utilization categories

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

U_e (V) 230

I_e (A) 3

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

U_e (V) 24

I_e (A) 4

Quality marks:



EC type examination certificate: IMQ CS 487 DM

UL approval: E131787

CCC approval: 2013010305640211

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 317, design C

General data

SIL level (SIL CL) up to:

SIL CL 2 acc. to EN 62061

Performance Level (PL) up to:

PL d acc. to EN ISO 13849-1

Safety category up to:

cat. 3 acc. to EN ISO 13849-1

Safety parameters:

see page 375

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_{imp}):

4 kV

Rated insulation voltage (U_i):

250 V

Overvoltage category:

II

Supply

Rated supply voltage (U_n):

24 ... 230 Vac/dc; 50...60 Hz

Max. DC residual ripple in DC:

10%

Supply voltage tolerance:

±15% of U_n

Power consumption AC:

< 6 VA

Power consumption DC:

< 2 W

Input circuit

Voltage between terminals L1-L2-L3:

0 ... 690 V

Frequency:

0 ... 3 kHz

Input impedance:

>1 MΩ

Started motor threshold voltage:

from 20 mV to 500 mV adjustable in 10 increments

Stopped motor threshold voltage:

half the motor threshold voltage with motor in operation

Maximum input impedance Y1-Y2:

< 20 Ω

Current in START Y1-Y2 circuit:

70 mA (typical)

RESET input voltage:

24 Vdc ± 20%

RESET input current:

10 mA (typical)

Control circuit

Response time t_A:

< 3 s

Release time t_R:

< 200 ms

Release time in absence of power supply t_R:

< 3 s

Simultaneity time t_{c1}, t_{c2}:

3 s

Test:

Self-test upon activation of the supply voltage and after activation of the RESET input.

Test duration:

2.5 s (During the test, the voltage in the measurement circuits must be less than the threshold voltage of the motor while at a standstill)

In compliance with standards:

EN 60204-1, EN ISO 13855, EN 1037, 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 50581, EN ISO 13849-1, EN ISO 13849-2, EN 62061, UL 508, CSA C22.2 n° 14-95, GB/T14048.5-2017

Output circuit

Output contacts:

2 NO safety contacts, 1 NC auxiliary contact

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 Σ I_{th}²:

36 A²

Minimum current:

10 mA

Contact resistance:

≤ 100 mΩ

External protection fuse:

4 A

Semiconductor outputs:

PNP outputs galvanically separated, overvoltage and short-circuit protected

Switching voltage:

24 Vdc

Switching current:

50 mA

External supply voltage:

24 Vdc ±20%

The number and the load capacity of output contacts can be increased by using expansion modules or contactors.

See pages 263-272.

Code structure

article options
CS AM-01VE01-TC00UR1

Threshold voltage for motor at standstill

20-500 mV (standard)

UR1 45-750 mV

Connection type

V Screw terminals

M Connector with screw terminals

X Connector with spring terminals

Simultaneity time (t_c)

3s (standard)

TC00 infinite at standstill (t_c)

TA00 infinite on startup and standstill (t_c)

TD0 infinite on standstill and minimum activation time (t_A)

Features approved by UL

Rated supply voltage (U_n): 24 ... 230 Vac/dc; 50 ... 60 Hz

Power consumption AC: < 9 VA

Power consumption DC: < 2 W

Relay output:

230/240 Vac

6 A general use

C300 pilot duty

Electrical ratings:

24 Vdc, 50 mA

Motor input: up to 600 V

Notes:

- For use in pollution degree 2 environment

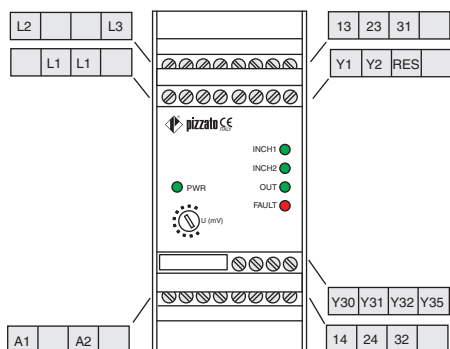
- Use 60 or 75°C copper (Cu) conductor and wire size No. 30-12 AWG, stranded or solid.

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

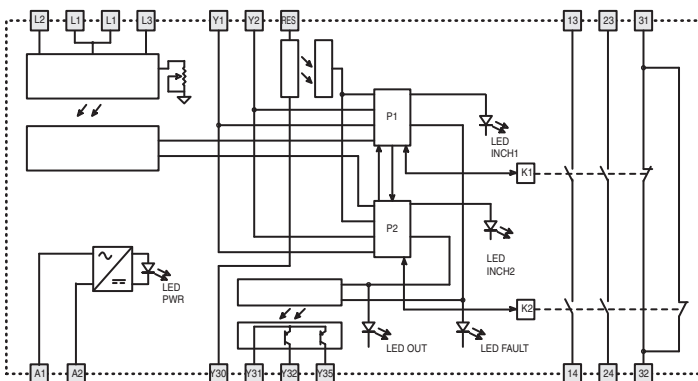


Safety module CS AM-0

Pin assignment

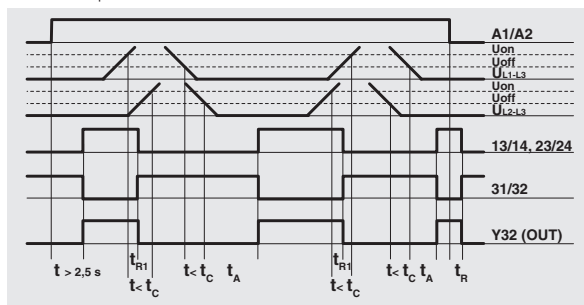


Internal block diagram

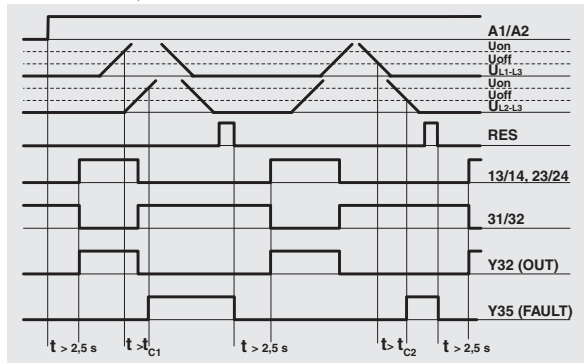


Function diagrams

Normal operation



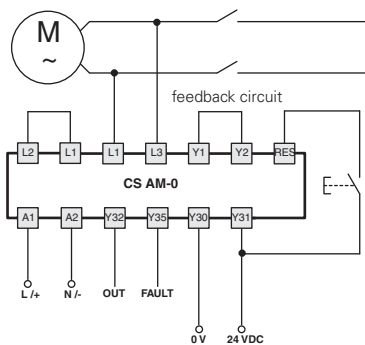
Reset (RES) operation



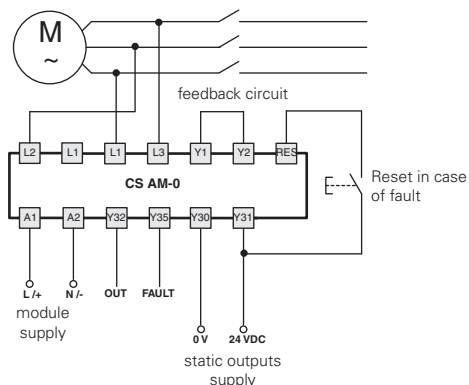
Legend:
 t_C : simultaneity time
 t_A : response time
 t_{R1} : release time
 t_R : release time in absence of power supply

Input configuration

Single-phase motor



Three-phase motor



In case of star/delta starting, connect the module to the ends of a single winding
 For dc motors connect + with L1 and - with L3.
 The diagram does not show the exact position of the terminals in the product

Application example on page 275.