

1. TECHNICAL CHARACTERISTICS

a. Supply circuit

Rated operational voltage U_n :	24 Vac/dc; 50+60Hz 120 Vac; 50+60Hz 230 Vac; 50+60Hz
Max. residual ripple in DC:	10%
Supply voltage tolerance	+/-15% di U_n
Rated power consumptions AC:	< 5VA
Rated power consumptions DC:	< 2W

b. Control circuit

Max. input resistance:	≤ 50Ω
Input current:	30mA
Min. period of start impulse t_{MIN} :	250ms
Operating time t_a :	200ms
Realising time t_r :	15ms
Realising time on de-energitation t_r :	70ms
Simultaneity time t_c :	infinite
Protection against short circuits:	resistance PTC, $I_h=0.5A$
Operating time of PTC:	intervention >100ms, reset >3s

c. Output circuit

Output contacts:	3 NO safety contacts 1 NC auxiliary contact
Contacts type:	forced guided contacts
Contacts material:	silver alloy
Max. switching voltage:	240Vac; 300Vdc
Max. switching current per contact:	6 A
Conventional free air thermal current I_m :	6 A
Contacts resistance:	≤ 100 mΩ
Protection fuse outside:	6 A
Max. switching capacity:	1380 VA/W
Utilization category acc. to EN60947-5-1:	AC15, $U_e=230V$, $I_e=3A$ DC13, $U_e=24V$, $I_e=6A(6 \text{ operations/minute})$

d. Caratteristiche generali

Ambient temperature:	-25 + +55 °C - operative -25 + +55 °C - storage
Mechanical endurance:	> 10.000.000 of operations
Electrical endurance:	> 100.000 operations
Pollution degree:	outside 3, inside 2
Rated impulse withstand voltage U_{imp} :	4KV
Rated insulation voltage U_i :	250V
Over-voltage category:	III

e. Caratteristiche meccaniche

Housing material:	Polyamide PA66 class Vo(UL94)
IP rating:	IP40(housing), IP20(terminal block),
Cross section of the conductors:	0.2 + 2.5mm 24 + 12 AWG
Terminals driving torque:	0.5 ± 0.6 Nm
Weight:	300g

f. Safety characteristics and approvals

Safety integrity level (SIL CL):	up to SIL3 according to EN62061
Performance level (PL):	up to PL e according to EN ISO 13849-1
Safety category:	4 according to EN ISO 13849-1
MTTFd:	147years (120Vac and 230Vac only) 218year (24Vac/dc only)
Diagnostic coverage:	High
PFHd:	6.61E-10/hours (120Vac and 230Vac only) 4.58 E-10/hours (24Vac/dc only)
Conforms to the standards:	EN60947-1, EN60947-5-1, EN61000-6-2, EN61000-6-4, EN61326-3-1, EN60529, EN60664-1, EN60204-1, EN ISO 13849-1, EN62061, EN ISO 12100-1, EN ISO 12100-2, EN 1037
Conforms to the directives:	2006 / 42 / EC - Machinery directive 2004 / 108 / EC - EMC directive 2006 / 95 / EC - Low voltage directive

g. Caratteristiche generali

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h. Caratteristiche meccaniche

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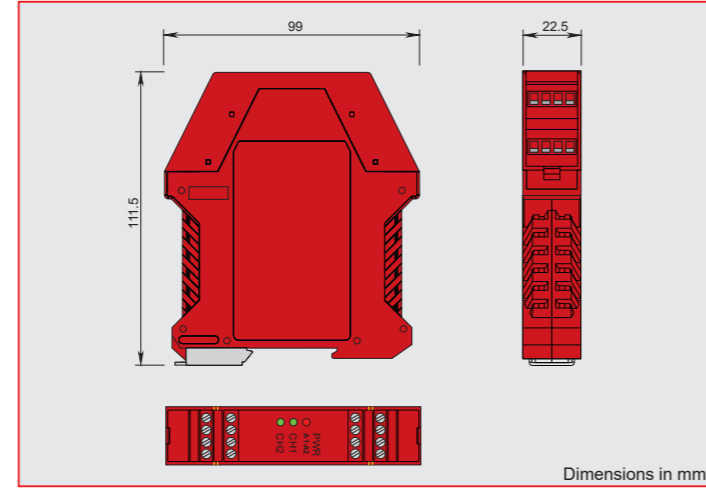
2. DESCRIPTION STRUCTURE

Symbols Example: **MS1A31** - **024**

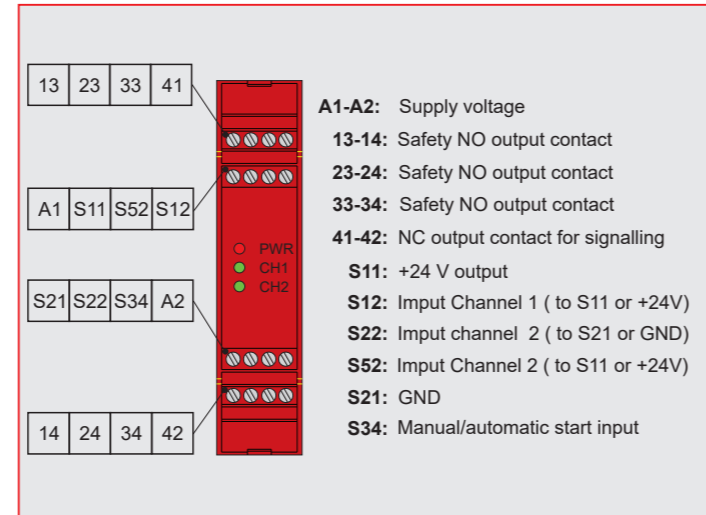
Structure: **MS1A31** - **024**

Supply voltage
 024: 24V AC/DC
 120: 120V AC
 230: 230V AC

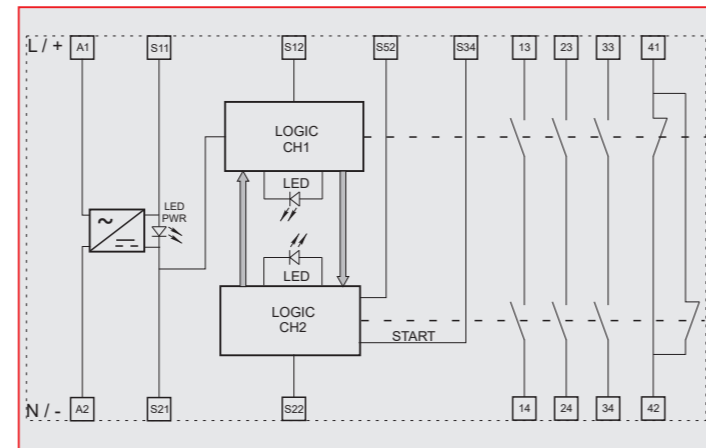
3. MECHANICAL DIMENSIONS



4. ELECTRICAL CONNECTIONS



5. WIRING DIAGRAMS



6. FUNCTIONS

- Input circuit with 1 or 2 channels.
- Safety category 4.
- Supply voltage 24Vac/dc, 120Vac, 230Vac.
- Choice between automatic start or manual start.
- Connection of the input channels to opposite potentials (see 4).
- Function of detection of short circuit in the control devices through safety system with self-monitoring and redundancy method.
- Output contacts: 3 NO safety contacts and 1 NC auxiliary contact.
- LED indicating the swithing state of the channels 1 and 2 and of the supply voltage.
- Small 22,5 mm housing with snap montage on DIN-rail

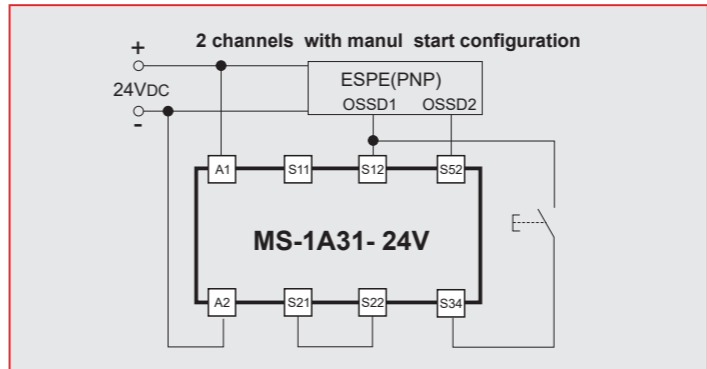
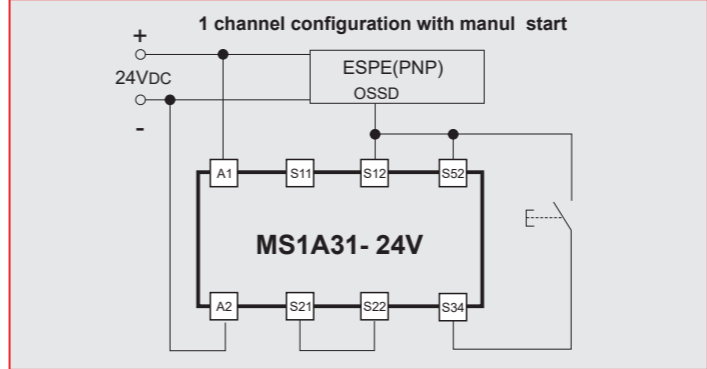
7. WARNING

- The installation and the wiring should be carried out only by professional workers.
- Before any kind of operation, it should be checked that this device is disconnect from power supply.
- The safety module should be installed and fixed in the DIN rail, inside an electric panel.
- Verify that the safety module is used inside the operating ranges.

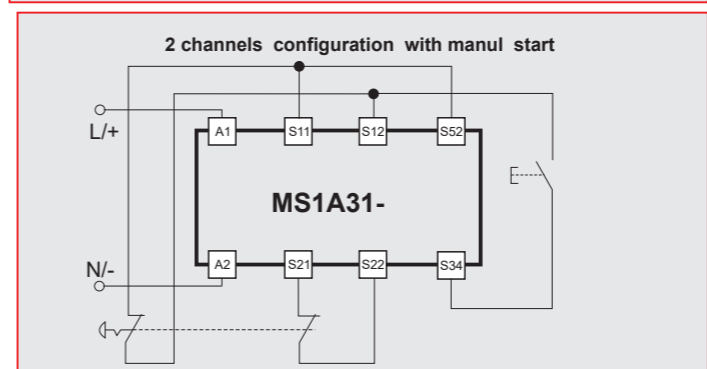
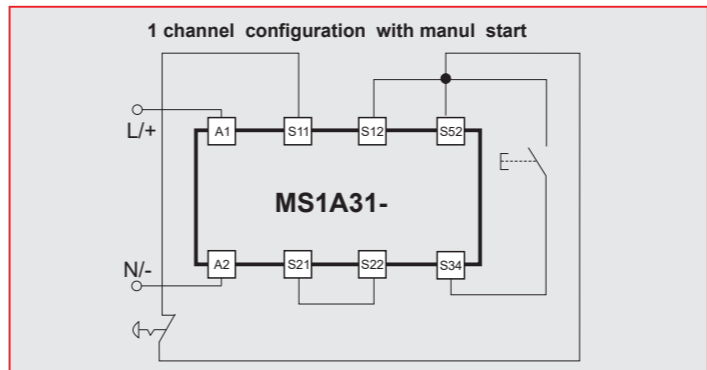
- Check that the safety module does not show evidence of damage suffered during the transport or incorrect storage.
- Install a 6A fuse in series to each output contact to avoid the contacts sticks.
- It is advisable to power the safety module with a separate source respect to the power supply of machine and keep separate the wiring connections of the module from the wiring of main power line.
- Verify the correct operation of the module following the instructions of the operations diagrams.
- If are installed external contactors, check that the contacts has forced guided con tacts and install in feedback function 1 contact NC for each device.
- The safety category, according to EN ISO 13849-1, achieved by the system including the safety module, depends also on the external circuit.
- The improper use of the safety module can lead to hazardous situation.

8. INPUT CONFIGURATIONS

a. Electro-sensitive protection devices ESPE



b. Emergency STOP

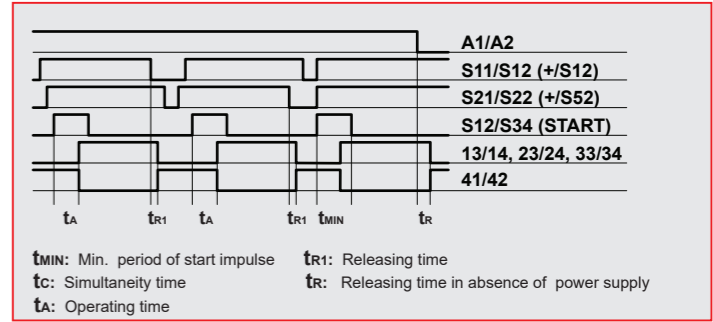


As regard the indicated diagrams, in order to activate the module with the automatic start, it is necessary to short the start button between S12 and S34 terminals.

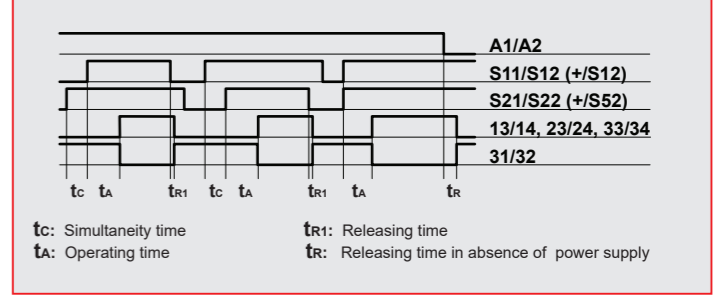
The safety module can control both emergency stop circuits, gate monitoring circuits or safety magnetic sensors. Replace the emergency stop contacts with switches contacts or with the sensors contacts.

9. OPERATION DIAGRAMS

a. 2 channels configuration with manual start



b. 2 channels configuration with automatic start



c. Note

The configurations with 1 channel are obtained taking into consideration only the S11/S12 (+S12) input. In this case it is necessary to think the t_{r1} time referred to S11/S12 (+S12) input, the t_r time referred to the supply, the t_a time referred to S11/S12 (+S12) input, to the start and t_{MIN} time referred to the start.

10. FAILURE

Led status			Possible failure
PWR Off	CH1 Off	CH2 Off	<ul style="list-style-type: none"> • Fail to power supply to safety module. • Wrong connection. • PWR wires cut down. • Breakdown of external fuses. • Short circuit between channels. • Failure of safety module.
PWR On	CH1 Off	CH2 On	<ul style="list-style-type: none"> • Wrong connection. • Stick contacts of emergency stop or the device of the safety gate monitoring connected to S21-S22. • Failure of safety module.
PWR On	CH1 On	CH2 Off	<ul style="list-style-type: none"> • Stick contacts on the emergency stop or on the device of the safety gate monitoring connected to S11-S12. • Failure of safety module.
PWR On	CH1 Off	CH2 Off	<ul style="list-style-type: none"> • Wrong connection. • External contactors stick or failure in the expansion module. • Input wires cut down. • Open circuit of one or both contacts of emergency stop of safety gate monitoring. • Missing automatic cycle for manual start (start impulse) or closure of both channels for the automatic start. • Failure of safety module.

11. EC DECLARATION OF CONFORMITY

COMPEPI

DECLARATION OF CONFORMITY

We, **COMPEPI s.r.l.**
 Via Novarino 9/L - 23899 Robbiate (LC) - Italy
 declare under our sole responsibility that the product:
SAFETY MODULE MS1A31
 (Product's name)
 to which this declaration relates is in conformity with the following standards
EN 60947-1, EN 60947-5-1, EN 60947-5-2, EN 61000-6-2, EN 61000-6-4, EN61326-3-1, EN 60529, EN60664-1, EN60204-1, EN62061, EN ISO 13849-1, EN ISO 12100-1, EN ISO 12100-2 and EN 1037
 according to the provisions of the European Directives
2004/108/EC - Electromagnetic directive
2006/42/EC - Machinery directive
2006/95/EC - Low voltage directive
 Robbiate: 2015/11/16 Mr. Ambrogio Comi

12. EC TYPE EXAMINATION CERTIFICATE

Ec type examination certificate N° **IMQ CR 476 DM Rev. 0**