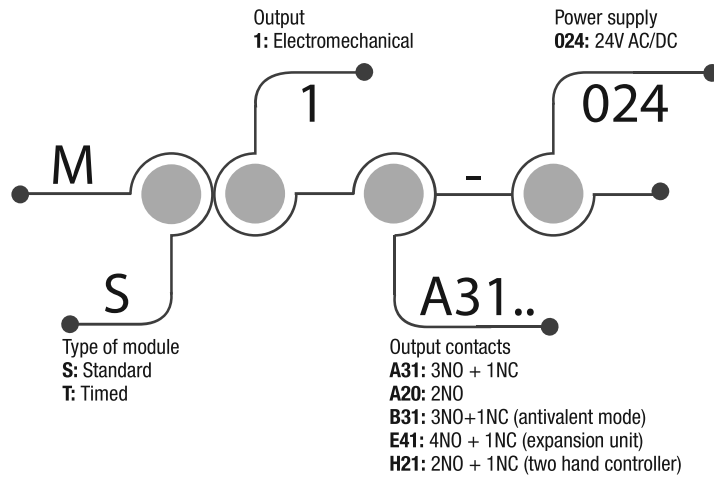


# Safety modules

## Electromechanical Safety modules

### APPROVALS:



### HOW IS IT MADE?

#### 01 Casing

- Indelible laser marking
- Plastic casing (IP40)
- Standard dimension 18 x 90 mm.

#### 02 DIN rail mounting

#### 03 Output contacts

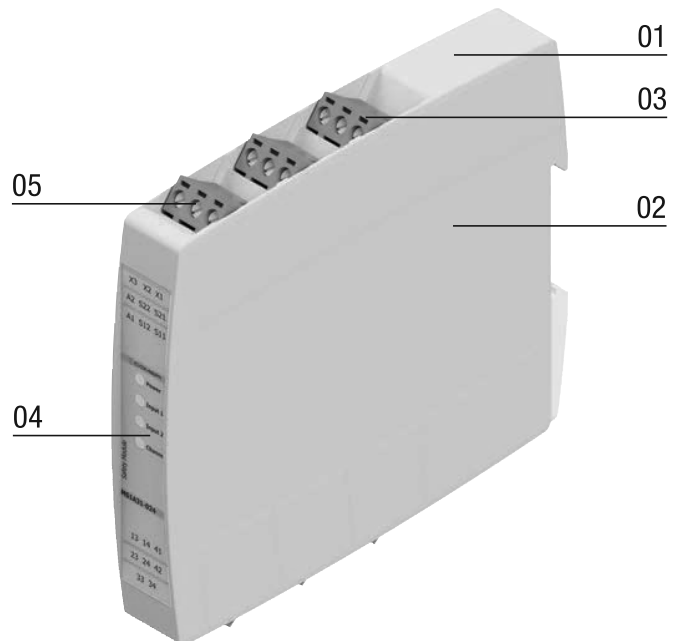
- Electromechanical
- NO for safety purpose
- NC for auxiliary signal

#### 04 LED indicators for status, supply and diagnostic

- Power
- Input 1
- Input 2
- Feedback on outgoing channels

#### 05 Electrical connection

- IP20 terminal blocks
- 1 or 2 x 0,75...1,5 mm<sup>2</sup>
- detachable coded terminals



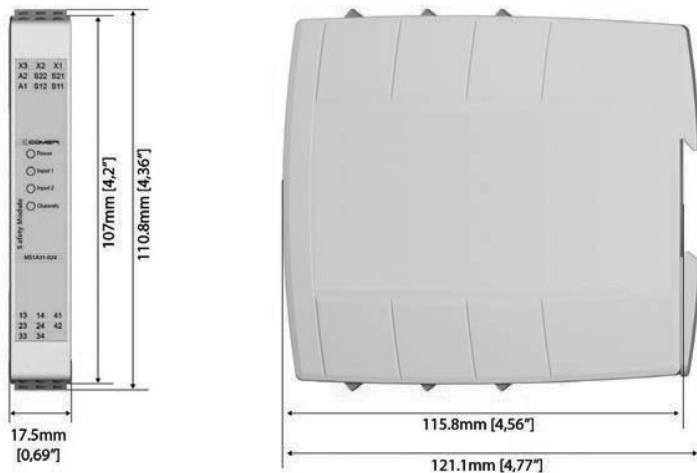
# Safety modules

## Electromechanical Safety modules

### DESCRIPTION

MS1 - Electromechanical Safety Modules 2 channels configuration for safety systems up to SIL 3 (according to EN62061) and PL e (according to EN ISO 13849-1). Suitable for control of limit switches for safety gates, safety magnetic sensors, and emergency stops

### DIMENSIONS




### MS1A31-024 / MS1A20-024

**MS1A31-24** and **MS1A20-024** safety modules are designed to provide interruption of safety circuits in applications with emergency stops, magnetic safety sensors, safety light curtains, safety switches and electromechanical interlocks.


They are also used to check the safety circuits of the cabin and inspection of the lifting pit, in compliance with lift standards EN81-20 and EN81-50.

### APPLICATIONS

- Industrial machinery
- Emergency stop monitoring
- Control of interlocks on safety gates
- Lift livelling
- Lift inspection and maintenance
- Car wash equipment
- Conveyour
- Recycling machinery

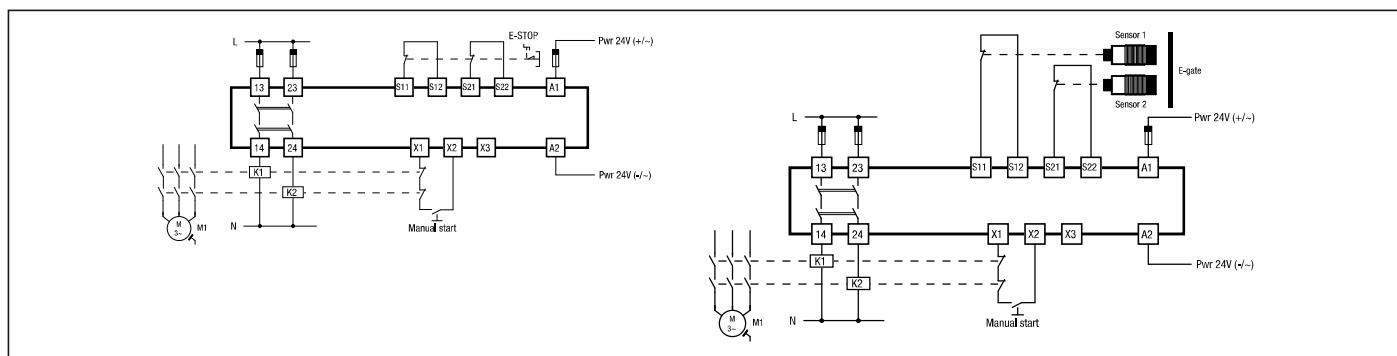


**MS1A20-024**  
**X1-X2:** manual start / automatic start  
**X1-X3:** monitored manual start S11-S12  
**S12:** channel 1 NO input  
**S21-S22:** channel 2 NO input  
**A1:** power supply 24 Vdc (+)/Vac(-)  
**A2:** power supply 24 Vdc (-)/Vac(-)  
**13-14:** NO safety output  
**23-24:** NO safety output



**MS1A31-024**  
**X1-X2:** manual start / automatic start  
**X1-X3:** monitored manual start S11-S12  
**S12:** channel 1 NO input  
**S21-S22:** channel 2 NO input  
**A1:** power supply 24 Vdc (+)/Vac(-)  
**A2:** power supply 24 Vdc (-)/Vac(-)  
**13-14:** NO safety output  
**23-24:** NO safety output  
**33-34:** NO safety output  
**41-42:** NC auxiliary output

### EXAMPLE OF APPLICATION



# Safety modules

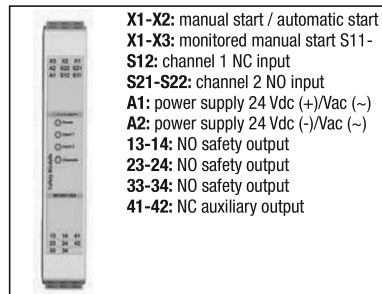
## Electromechanical Safety modules

### MS1B31-024

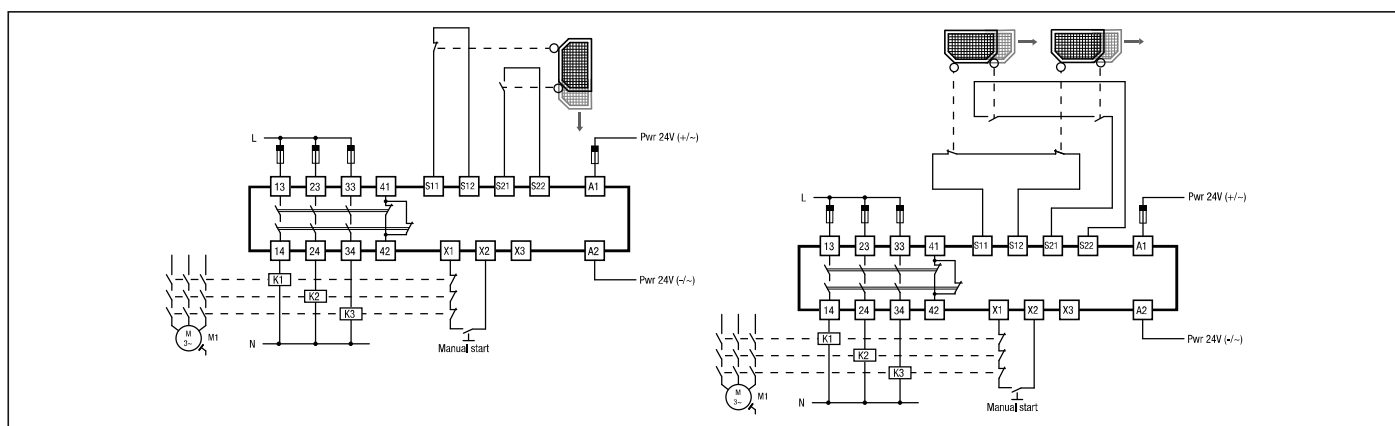
The **MS1B31-024** security module is designed to monitor and control the status of security gates, accesses single or multiple, equipped with magnetic switches and safety limit switches that perform the interlock function with antivalent principle (NO + NC signal).

#### APPLICATIONS

- Industrial machinery
- Car wash equipment
- Conveyour
- Recycling machinery



#### EXAMPLE OF APPLICATION

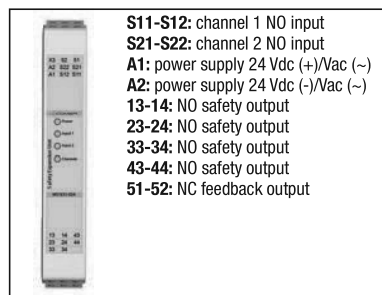


### MS1E41-024

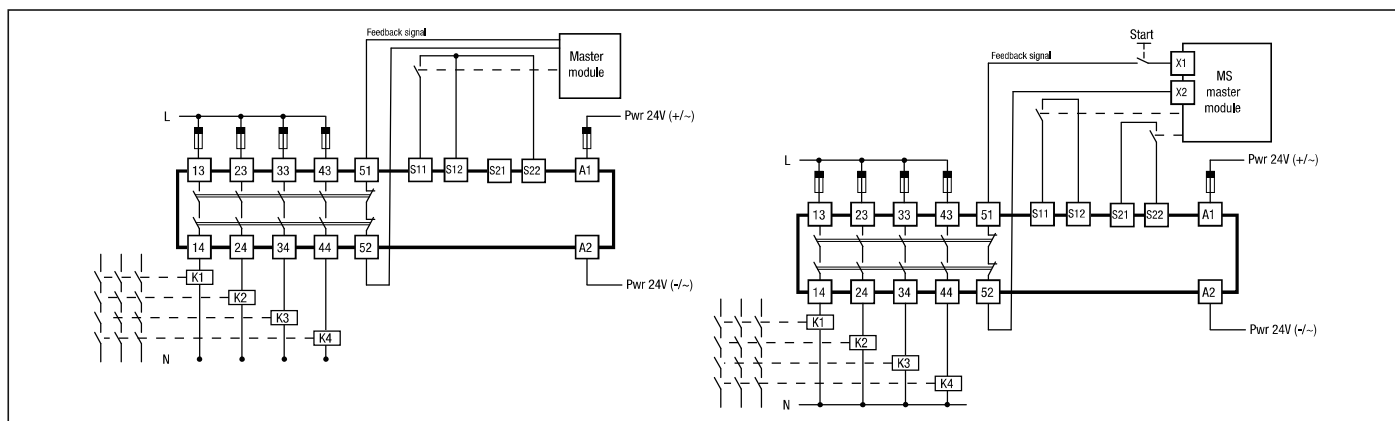
**MS1E41-024** is an expansion unit that allows to extend the number of electromechanical safety outputs, if controlled by a master safety module. It can work with safety modules with electromechanical relays MS1 series or with OSSD outputs MS2 and MT2 series.

#### APPLICATIONS

- Industrial machinery
- Car wash equipment
- Conveyour
- Recycling machinery



#### EXAMPLE OF APPLICATION



# Safety modules

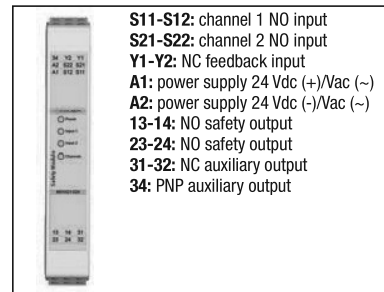
## Electromechanical Safety modules

### MS1H21-024

**MS1H21-024** is the solution to safely monitor and control the operation of two-hand control consoles (type III C according to EN ISO 13851). The device enables safety control outputs only if the two console buttons are activated by the operator simultaneously or with a maximum interval of 500ms from each button.

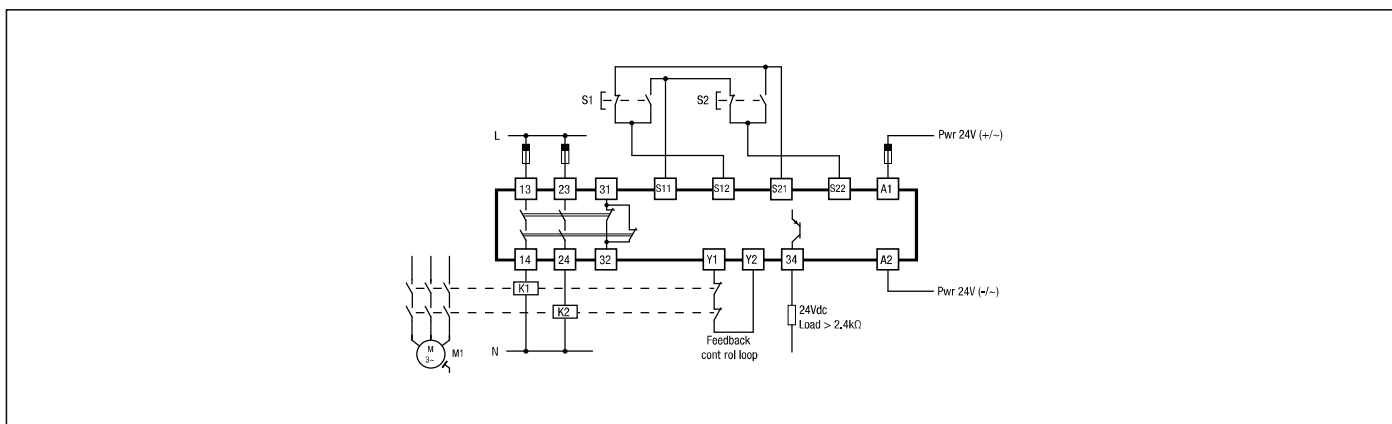
### APPLICATIONS

- Two-hand control consoles



**S11-S12:** channel 1 NO input  
**S21-S22:** channel 2 NO input  
**Y1-Y2:** NC feedback input  
**A1:** power supply 24 Vdc (+)/Vac (~)  
**A2:** power supply 24 Vdc (-)/Vac (~)  
**13-14:** NO safety output  
**23-24:** NO safety output  
**31-32:** NC auxiliary output  
**34:** PNP auxiliary output

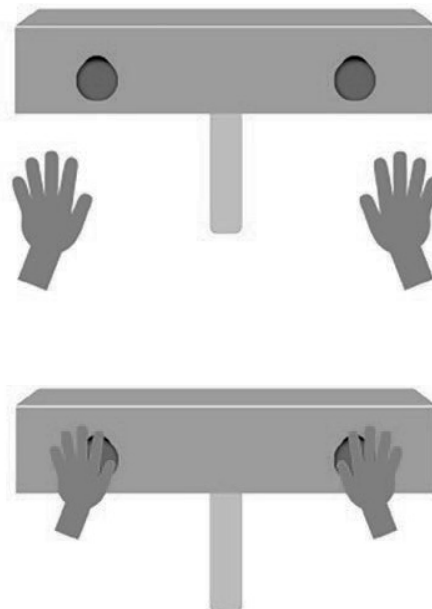
### EXAMPLE OF APPLICATION



### Functional description

**A**  
 1 (S11-S12) and channel 2 (S21-S22) inputs are open, while the NC contact of S1 (on the console) is closed between S11 and S22, and the NC contact of S2 (on the console) is closed between S12 and S21.

**B**  
 The NO safety outputs are switched off.



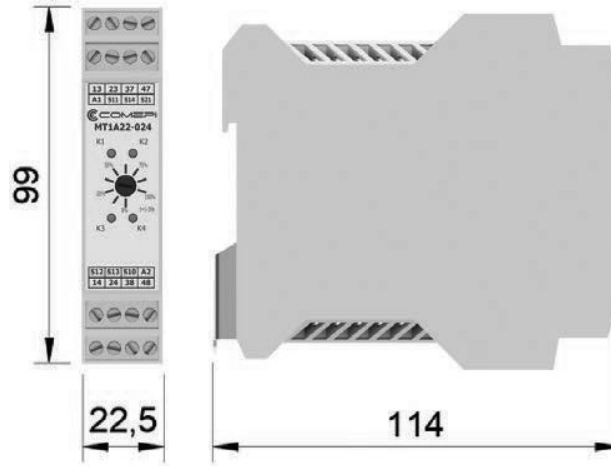
# Safety modules

## Electromechanical safety modules with delayed outputs

### DESCRIPTION

**MT1** - Electromechanical Safety Modules 2 channels configuration for safety systems up to SIL 3 (according to EN62061) and PL e (according to EN ISO 13849-1). Suitable for control of limit switches for safety gates, safety magnetic sensors, and E-STOP

### DIMENSIONS



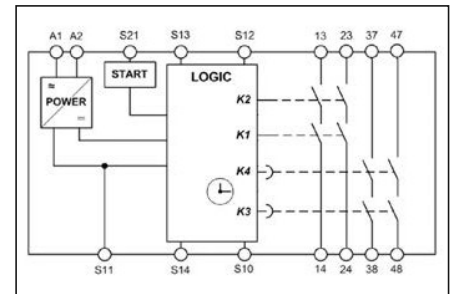
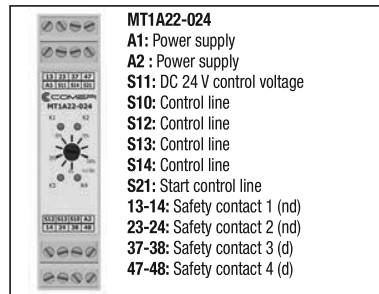
### MT1A22-024

**MT1A22-024** is an emergency stop safety relay combination that combines non-time-delayed and time-delayed contacts in a very compact housing. This permits dangerous components of a system to be switched off quickly and safely in an emergency situation.

At the same time, other circuits can continue to be supplied with voltage for up to 30 seconds to allow a tool to be moved to its idle position or to brake following parts, for example.

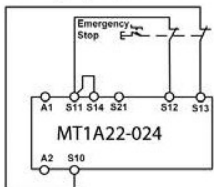
### APPLICATIONS

- Industrial machinery
- Emergency stop monitoring
- Control of interlocks on safety gates
- Lift levelling
- Lift inspection and maintenance
- Car wash equipment
- Conveyour
- Recycling machinery

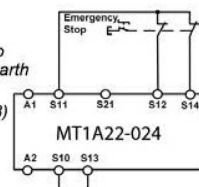


### EXAMPLE OF APPLICATION

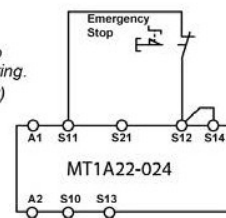
Depending on the application or the result of the risk assessment according to EN ISO 13849-1, the device must be wired as shown in Fig. 4 to Fig. 14. Non-time delayed contacts can be used up to category 4, PL e, time-delayed safety contacts up to category 3, PL e.



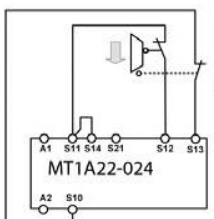
**Fig. 4:**  
Two-channel emergency stop circuit with short circuit and earth fault monitoring.  
(up to category 4, PL e, SIL 3)



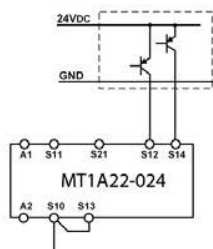
**Fig. 5:**  
Two-channel emergency stop circuit with earth fault monitoring.  
(up to category 3, PL d, SIL 2)



**Fig. 6:**  
Single-channel emergency stop circuit with earth fault monitoring.  
(up to category 1, PL c, SIL 1)



**Fig. 7:**  
Two-channel sliding guard monitoring with short circuit and earth fault monitoring.  
(up to category 4, PL e, SIL 3)



**Fig. 8:**  
Two-channel emergency stop circuit with pnp-outputs/OSSD-outputs with short circuit monitoring.  
(up to category 4, PL e, SIL 3)

# Safety modules

## Electromechanical Safety modules - Main features

The **MS1-MT1** range of multifunction safety modules, designed in Category 4, Performance level "e" in accordance with the Machine Directive EN ISO 13849-1, provides for safety control outputs with electromechanical forcibly guided relays and can monitor a vast range of electromechanical safety devices.

Overview	MS1A20-024	MS1A31-024	MS1B31-024	MS1E41-024	MS1H21-024	MT1A22-024
Safety functions	E-stop, safety magnetic sensors interlocks, limitswitches E-gate, lift levelling	E-stop, safety magnetic sensors interlocks, limitswitches E-gate, lift levelling	Safety magnetic sensors E-gate in antivalent mode	Relay expansion unit	Two-hand control device	E-stop, safety magnetic sensors interlocks, limitswitches E-gate, devices with OSSD outputs
Type of safety outputs	Voltage free contact output, relays with forcibly guided contacts	Voltage free contact output, relays with forcibly guided contacts	Voltage free contact output, relays with forcibly guided contacts	Voltage free contact output, relays with forcibly guided contacts	Voltage free contact output, relays with forcibly guided contacts	Voltage free contact output, relays with forcibly guided contacts
Number of safety outputs	2 NO	3 NO	3 NO	4 NO	2 NO	4NO (2nd/2d)
Auxiliary outputs	/	1 NC	1 NC	1 NC	1 NC + 1 PNP	/
Delayed contacts	NO	NO	NO	NO	NO	2NO adjustable from 0 to 30s
Start mode	Automatic, manual or monitored manual	Automatic, manual or monitored manual	Automatic, manual or monitored manual	-	Two-hand control device	Automatic or manual
Connection type	Pluggable screw terminals	Pluggable screw terminals	Pluggable screw terminals	Pluggable screw terminals	Pluggable screw terminals	Screw terminals
Safety parameters	Cat. 4, PL e, EN81-20, EN81-50	Cat. 4, PL e, EN81-20, EN81-50	Cat. 4, PL e	Cat. 4, PL e	Cat. 4, PL e	Cat. 4, PL e (nd) Cat. 3, PL e (d)
Approvals	CE, cULus EC type by TÜV	CE, cULus EC type by TÜV	CE, cULus EC type by TÜV	CE, cULus EC type by TÜV	CE, cULus EC type by TÜV	CE, cULus EC type by TÜV
Power supply	24Vdc ± 10% or 24 Vac -15/+10% 50 + 60 Hz	24Vdc ± 10% or 24 Vac -15/+10% 50 + 60 Hz	24Vdc ± 10% or 24 Vac -15/+10% 50 + 60 Hz	24Vdc ± 10% or 24 Vac -15/+10% 50 + 60 Hz	24Vdc ± 10% or 24 Vac -15/+10% 50 + 60 Hz	24Vdc ± 10% or 24 Vac ± 10% 50 + 60 Hz
Dimensions (H x W x D)	110,8x17,5x121,1 mm	110,8x17,5x121,1 mm	110,8x17,5x121,1 mm	110,8x17,5x121,1 mm	110,8x17,5x121,1 mm	99x22,5x114mm

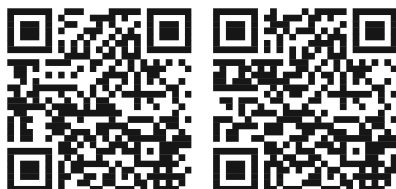
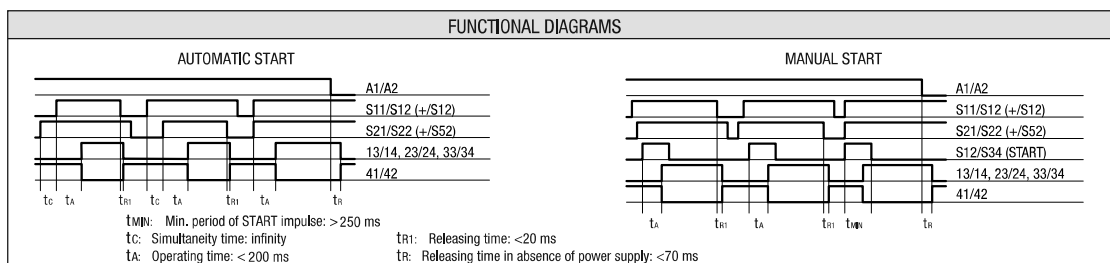
## Multifunction Safety modules - When to use our products

Overview	MS1A20-024	MS1A31-024	MS1B31-024	MS1E41-024	MS1H21-024	MT1A22-024
Emergency buttons	✓	✓				✓
Emergency gates	✓	✓				✓
Emergency gates with function antivalent (1NO 1NC)			✓			
Limit switches	✓	✓				✓
Limit switch with function antivalent (1NO 1NC)			✓			
Sensors	✓	✓				✓
Sensors with function antivalent (1NO 1NC)			✓			
Elevator leveling	✓	✓				
Two hand control devices				✓		
Expansion unit					✓	
Devices with OSSD outputs						✓

# Safety modules

## Electromechanical Safety modules - Technical Data

	Serie MS1	Serie MT1
<b>Standards</b>	EN60947-1, EN60947-5-1, EN61000-6-2, EN61000-4, EN61326-3-1, EN60204-1, EN ISO 13849-1, EN ISO 12100-1, EN ISO 12100-2 EN62061, EN1037, EN60664-1, EN60529	
<b>Directives</b>	2014/35/UE low voltage 2006/42/CE machinery 2014/30/UE electromagnetic CE - TUV - UL - EAC	
<b>Certifications - Approvals</b>		
<b>Air temperature</b> near the device		
– during operation	°C	– 25 ... + 55
– for storage	°C	– 25 ... + 55
<b>Protection against electrical shocks</b> (acc. to IEC 60536)	Class II	
<b>Degree of protection</b> (according to IEC 60529 and EN 60529)	Casing IP40 - Terminal blocks IP20	IP20
<b>Pollution degree</b>	3 external, 2 internal	
<b>Safety integrity level</b> (SIL CL) (according to EN IEC 62061)	Up to SIL 3	
<b>Performance level</b> (PL) (according to EN ISO 13849-1)	Up to PLe	
<b>Safety category</b> (according to EN ISO 13849-1)	Up to Cat 4	Up to Cat. 4 for instantaneous contacts Up to Cat. 3 for delayed contacts
<b>Mechanical durability</b>	10 millions of operations	
<b>Electrical durability</b>	100.000 operations	
<b>MTTFd</b>	218 (for 24 Vac/dc) 147 (for 120 Vac and 230 Vac)	62
<b>Diagnostic coverage</b>	99%	99% for non-delayed contacts 90% for delayed contacts
<b>PFHd</b>	4,58 E <sup>-10</sup> (for 24 Vac/dc) 6,61 E <sup>-10</sup> (for 120 Vac and 230 Vac)	8,84 E <sup>-8</sup> delayed contacts 84,22 E <sup>-8</sup> non-delayed contacts
<b>Electrical Data</b>		
<b>Rated insulation voltage U<sub>i</sub></b> (acc. to IEC/EN 60947-1)	250 V (degree of pollution 3)	
<b>Rated impulse withstand voltage U<sub>imp</sub></b> (acc. to IEC/EN 60947-1)	4 kV	
<b>Power supply</b>		
Rated operating voltage U <sub>N</sub> (±15%)	24 Vac/dc (10% max residual ripple in DC) - 120 Vac - 230 Vac	
Rated power consumption	max 5 VA (ac) - max 2 W (dc)	max 5.3 VA (ac) - max 4.7 W (dc)
<b>Control circuit</b>		
Protection against short circuits	Resistance PTC with intervention operating time >100ms, reset time >3s - I <sub>h</sub> =0,5A	
Input max resistance	50Ω	
Input max current	30mA	
<b>Output circuit</b>		
Utilization categories (according to EN 60947-1)	AC 15, U <sub>e</sub> = 230 V, I <sub>e</sub> = 3 A DC 13, U <sub>e</sub> = 24 V, I <sub>e</sub> = 6 A	AC: 250 V, 2000 VA, 8 A for ohmic load 250 V, 3 A AC-15 DC: 40 V, 320 W, 8 A for ohmic load 24 V, 3 A DC-13
<b>Max switching voltage</b>	240 Vac / 300 Vdc	
<b>Switching current range</b> (per contact)	min 10 mA - max 6A (external protection fuse 6A F type)	250 Vac 5 V, 10 mA
<b>Conventional free air thermal current I<sub>th</sub></b>	6A (max current sum: 64A2)	
<b>Max contact resistance</b>	100 mΩ	



**Download**  
Instruction sheet – Safety modules MS1  
CE declaration

