Technical Data

Original Instructions

Minotaur Safety Relay (MSR) Specifications

Bulletin 440R

Control units provide functions such as time delays, motion sensing, and two-hand control supervision.

The functional requirements for monitoring safety relays, such as the Guardmaster® Minotaur™ family, depends on their use in the system.

Their basic tasks include the following:

1. Detect faults on safety-related electrical control circuits (for example, faults in sensors, wiring, contactors, and so on).
2. Provide an ensured switching action (for example, to act as an intermediate relay to amplify a signal or distribute it to multiple devices).
3. Provide a manual reset facility. They achieve their function by using internal redundancy and monitoring.

Figure 1 - Without Safety Relay

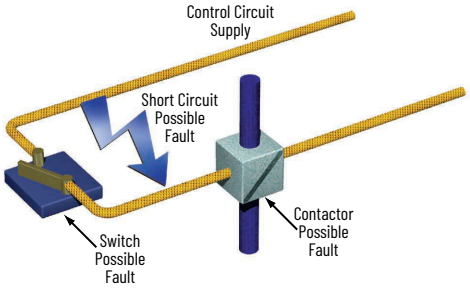
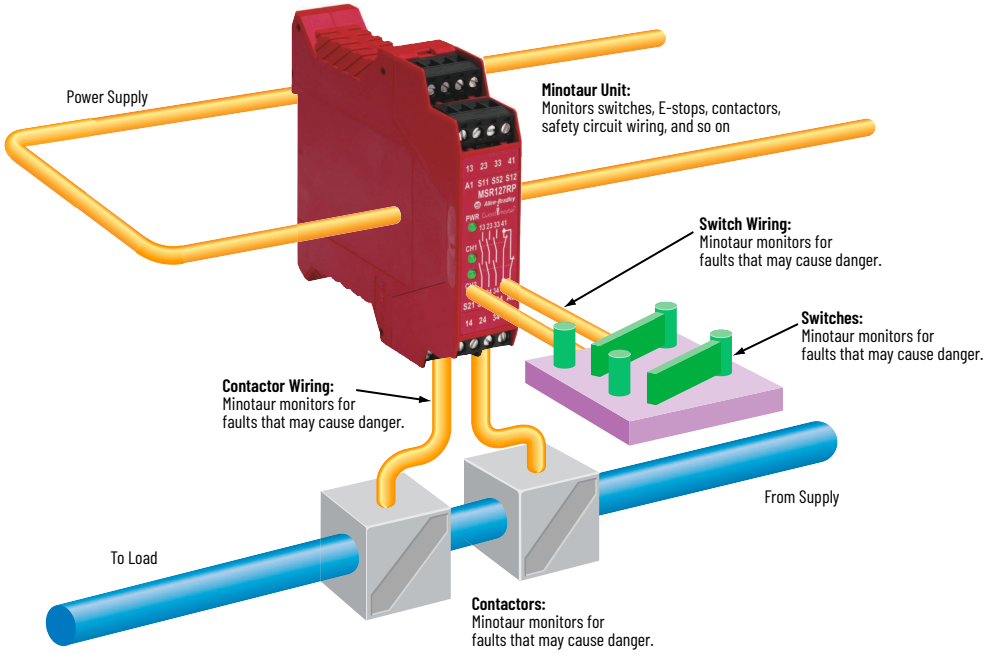


Figure 2 - With Safety Relay



Description

The MSR5T safety relay has one N.C. single-channel input for use with gate interlocks and E-stop buttons in lower risk applications. Two N.C. contacts, one on A1 and the second on A2, can be used to achieve a Cat. 4 PLe safety rating.

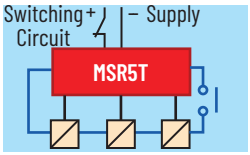
This safety relay has output monitoring that can accommodate an automatic/manual reset function. Automatic/manual reset can use a jumper or can be used to check operation of the contacts.

This safety relay has three N.O. safety outputs and one N.C. auxiliary output. The safety outputs have independent and redundant internal contacts to help ensure the safety function. The auxiliary contact is a nonsafety output that is intended to provide an external signal about the status of the safety outputs.

Features

- Category 4, PLe per ISO 13849-1
- SIL 3 per IEC 61508
- Stop category 0
- Single-channel or dual-channel input
- Three N.O. safety outputs
- One N.C. auxiliary output
- 22.5 mm (0.88 in.) wide housing
- Optional 110/230V AC input module

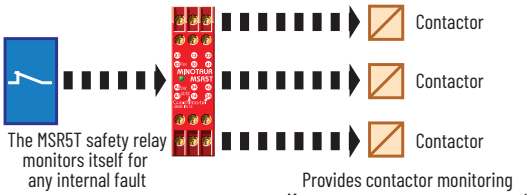
Applications



Contactor Monitoring Circuit
Contactor Switching Circuit
Supply Inclusive of Switching Circuit
Contactor
Monitored by Minotaur

Specifications

Attribute	MSR5T Monitoring Safety Relay
Safety Ratings	
Standards	ISO 13849-1, IEC 61508, IEC 62061, IEC 60664-1, Semi F47-0706
Category	• Cat. 4 PLe per ISO13849-1 • SIL 3 per IEC 61508, IEC 62062
Certifications	C-Tick, CE Marked for all applicable directives, UKCA Marked for all applicable regulations, cULus Listed, and TÜV certified
Power Supply	
Input power entry	24V AC/DC ±15% 50/60Hz
Power consumption	<4VA
Inrush current	13 A for 100 µs
Inputs	
Safety inputs	1 N.C., 2 N.C.
Input resistance, max	200 Ω
Reset	Automatic/Manual
Outputs	
Safety contacts	3 N.O.
Auxiliary contacts	1 N.C.
Output utilization per IEC 60947-5-1 (inductive)	B300 AC-15: 4A/250V AC, 4A/120V AC P300 DC-13: 3A/24V DC
Thermal current I_{th} (nonswitching)	4 A
Fuses, output	5 A quick acting
Switched current/voltage, min	10mA/10V
Dropout time, max	90 ms
Status indicators	Green = Output
Impulse withstand voltage	2500V
Installation group	C in accordance with VDE 0110
Environmental and Physical Characteristics	
Pollution degree	3
Operating temperature	-10…+55 °C (14…131 °F)
Relative humidity	90%
Enclosure protection	IP40 (NEMA 1), DIN 0470
Terminal protection	IP20, DIN 0470
Conductor size	1 x 2.5 mm^2 (14 AWG) stranded, 1 x 4 mm^2 (12 AWG) solid
Torque	Terminal screws: 1 N•m (8.85 lb•in)
Case material	Red Polycarbonate
Mounting	35 mm (1.38 in.) DIN rail
Weight	210 g (0.46 lb)
Electrical life (operations)	220V AC/4A/880VA cosφ= 0.35…0.1 M 220V AC/1.7A/375VA cosφ = 0.6…0.5M 30V DC/2A/60W = 1 M 10V DC/0.01A/0.1W = 2 M
Mechanical life	2,000,000 operations
Vibration	0.75 mm (0.30 in.) peak, 10…55 Hz
Shock	30 g, 11 ms half sine

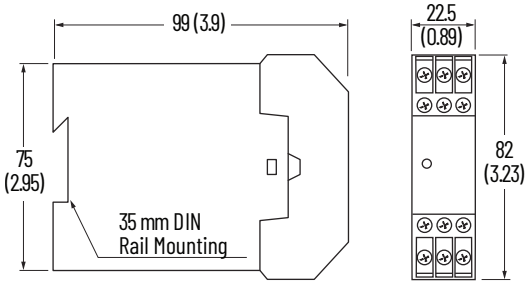


Product Selection

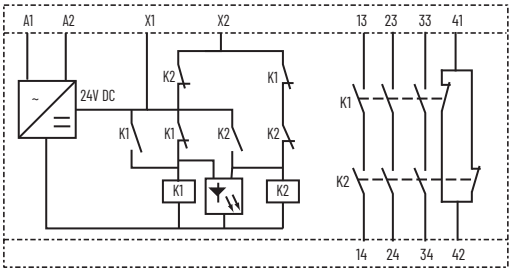
Inputs	Safety Outputs	Auxiliary Outputs	Power Supply	Cat. No.
1 N.C., 2 N.C.	3 N.O.	1 N.C.	24V AC/DC	440R-B23020

Approximate Dimensions

Dimensions are shown in mm (in.).



Block Diagram



Typical Wiring Diagrams

Figure 3 - Single-channel Gate Interlock, Automatic Reset, Single-channel Output, No Monitored Output

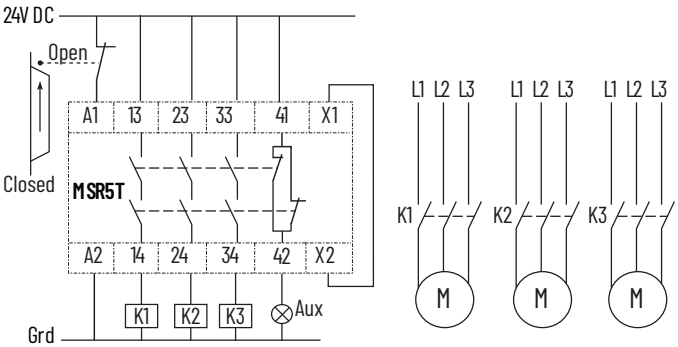
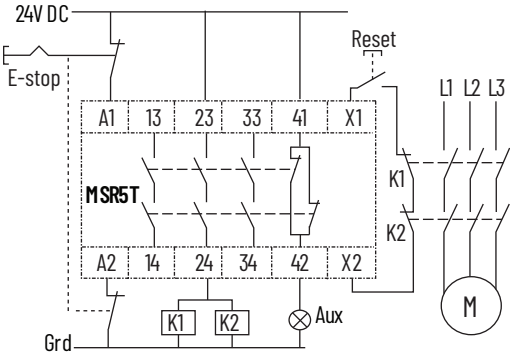
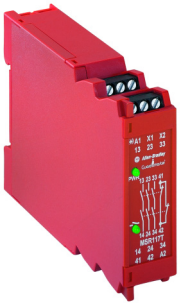


Figure 4 - Dual-channel E-stop, Manual Reset, Dual-channel Output, Monitored Output



Description



The MSR117T safety relay has one N.C. single-channel input for use with gate interlocks and E-stop buttons in lower risk applications. Two N.C. contacts (one connected to A1 and the second to A2) can be used to achieve a Cat. 4 PLe safety rating. This safety relay has output monitoring that can accommodate an automatic/manual reset function. Automatic/manual reset can use a jumper or can be used to check operation of the contacts.

This safety relay has three N.O. safety outputs and one N.C. auxiliary output. The safety outputs have independent and redundant internal contacts to help ensure the safety function. The auxiliary contact is a nonsafety output that is intended to provide an external signal about the status of the safety outputs.

This safety relay can be activated via the terminals A1-A2 and the feedback/reset loop X1-X2. Then the safety outputs 13-14, 23-24, and 33-34 close and enable operation.

Features

- Category 4 PLe per ISO 13849-1
- SIL 3 per IEC 61508
- Stop category 0
- Single-channel or dual-channel input
- Three N.O. safety outputs
- One N.C. auxiliary output
- 22.5 mm (0.88 in.) wide housing

Applications

Specifications

Attribute	MSR117T Single-function Safety Relay
Safety Ratings	
Standards	ISO 13849-1, IEC 61508, IEC 62061, IEC 60664-1
Safety Classification	• Cat. 4 PLe per ISO13849-1 • SIL 3 per IEC 61508, IEC 62061
Functional Safety Data [1] (For up-to-date information, see the Functional Safety Data Sheet, publication SAFETY-SR001)	PFHd: < 2.53 x 10^{-9} MTTFd: > 425 years Suitable for Performance Level PLe (according to ISO 13849-1) and for use in SIL 3 systems (according to IEC 61508) depending on the architecture and application characteristics
Certifications	CE Marked for all applicable directives, UKCA Marked for all applicable regulations, cULus Listed, and TÜV certified
Power Supply	
Input power entry	24V AC/DC
Power consumption	2 W
Inputs	
Safety inputs	1 N.C., 2 N.C.
Input resistance, max	25 Ω
Reset	Auto./Manual or Monitored Manual
Power on delay/recovery time	1 sec/110 ms
Response time	30 ms
Outputs	
Safety contacts	3 N.O.
Auxiliary contacts	1 N.C.
Thermal current I_{th}	2 x 5 A or 3 x 4 A
Rated impulse withstand voltage	2500V
Switching current @ voltage, min	10 mA @ 10V
Fuses, output	6 A slow blow or 10 A quick blow (external)
Electrical Life	230V AC/4 A/880V A cosφ=0.35...0.1 M 230V AC/1.7 A/375V A cosφ=0.6...0.5 M 30V DC/2 A/60 = 1 M 10V DC/0.01 A/0.1 W = 2 M
Mechanical life	2,000,000 cycles
Environmental and Physical Characteristics	
Enclosure type rating/ terminal protection	IP40 (NEMA 1), DIN 0470/IP20, DIN 0470
Operating temperature	-5...+55 °C (23...131 °F)
Vibration	10...55 Hz, 0.35 mm (0.01 in.)
Shock	10 g, 16 ms 100 shocks
Mounting	35 mm (1.4 in.) DIN Rail
Weight	180 g (0.37 oz)
Conductor size, max	0.2...4 mm^2 (24...12 AWG) wire size only

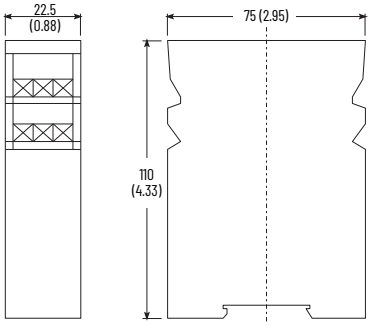
(1) Usable for ISO 13849-16 and IEC 61508. Data is based on the following assumptions:
• Mission time/Proof test interval of 20 years
• Functional test at least once within six-month period

Product Selection

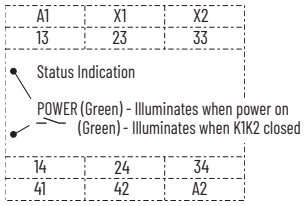
Inputs	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. No.
1 N.C., 2 N.C.	3 N.O.	1 N.C.	Fixed	Auto./Manual or Monitored Manual	24V AC/DC	440R-B23211

Approximate Dimensions

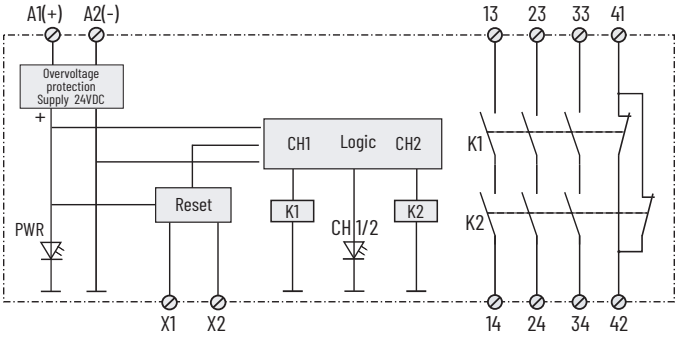
Dimensions are shown in mm (in.).



Connections



Block Diagram



Typical Wiring Diagrams

Figure 5 - Single-channel Gate Interlock, Automatic Reset, Single-channel Output, No Monitored Output

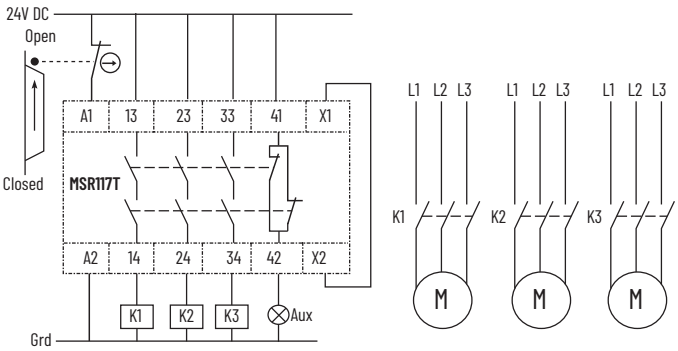


Figure 6 - Dual-channel E-stop, Automatic Reset, Single-channel Output, Monitored Output

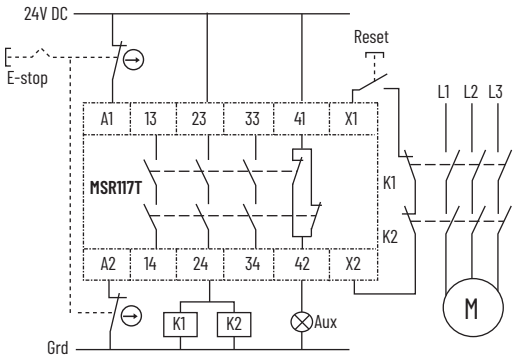


Figure 7 - Single-channel Gate Interlock, Automatic Reset, Single-channel Output Expansion

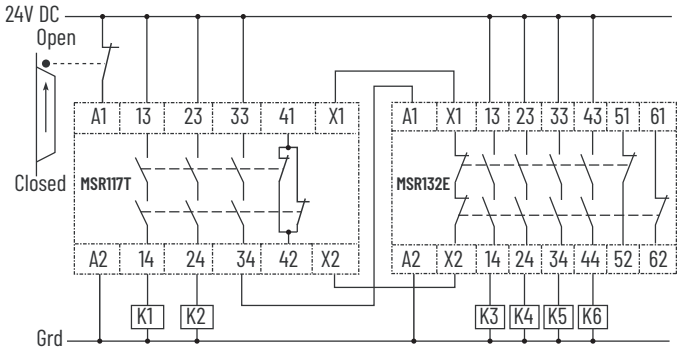
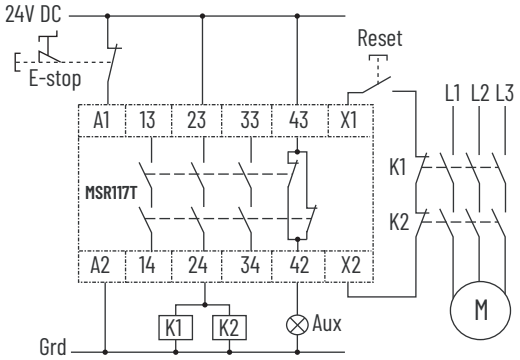
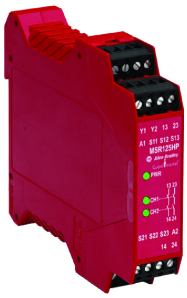


Figure 8 - Single-channel E-stop, Manual Reset, Single-channel Output, Monitored Output



Description



MSR125H/HP safety relays are logic units for monitoring and interfacing two-hand control devices with a safety-related circuit. These safety relays are for use with the Bulletin 800Z Zero-Force Touch Buttons™ and mechanical switches.

These safety relays have two N.O. safety outputs. The safety outputs have independent and redundant internal contacts to support the safety function.

These safety relays require the two switches to be operated within 0.5 seconds of each other and only authorize the ON state while both switches are held down. If one of the switches is released, the output goes to the OFF state and the machine cannot be restarted until both buttons are released and then operated simultaneously.

These safety relays conform to ISO 13851 Category IIIC, which gives specific requirements for two-hand control units and logic devices.

The MSR125H safety relay has fixed terminals and the MSR125HP safety relay has removable terminals.

Features

- Category 4, PLe per ISO 13849-1
- Safety category IIIC per ISO 13851
- Two-hand control unit
- Two N.O. safety outputs
- Fixed or removable terminals
- 22.5 mm (0.88 in.) wide housing

Status Indicators

Color	Description
Green	Power on
Green	CH1 Output Active
Green	CH2 Output Active

Specifications

Attribute	MSR125H/HP Two-hand Control Safety Relay
Safety Ratings	
Standards	ISO 13849-1, IEC 61508, IEC 62061, IEC 60664-1, ISO 13851
Safety Classification	• Cat. 4, PLe per ISO 13849-1 • SIL 3 per IEC 61508, IEC 62061 • Type IIIC per ISO 13851
Functional Safety Data [1] (For up-to-date information, see the Functional Safety Data Sheet, publication SAFETY-SR001)	PFHd: < 1.44 x 10^{-9} MTTFd: > 385 years Suitable for Performance Level PLe (according to ISO 13849-1) and for use in SIL 3 systems (according to IEC 61508) depending on the architecture and application characteristics, and Type IIIC according to ISO 13851, clause 6.
Certifications	CE Marked for all applicable directives, UKCA Marked for all applicable regulations, cULus Listed, C-Tick, and TÜV certified
Power Supply	
Input power entry	24V DC, 24V AC, 115V AC, 230V AC
Power consumption	2 W
Inputs	
Safety inputs	1 N.C. + 1 N.O.
Input simultaneity	<0.5 sec
Input resistance, max	40 Ω
Reset	Automatic
Power on delay/recovery time	1 second/500 ms
Response time	20 ms
Outputs	
Safety contacts	2 N.O.
Thermal current I_{th}	1 x 6 A or 2 x 4 A nonswitching
Rated impulse withstand voltage	2500V
Switching current @ voltage, min	10 mA/10V
Fuses, output	External 6 A slow blow or 10 A fast acting
Electrical life (operations)	(With surge suppression) 250V AC/6 A/1500VA cosφ = 0.35...0.1 M 250V AC/2.5 A/625VA cosφ = 0.6...0.5 M 250V AC/1.5 A/375VA cosφ = 0.35...0.3 M 250V AC/5 A/1250VA cosφ = 0.6...0.1 M 24V DC/2 A/48 W = 1 M 10V DC/0.01 A/0.1 W = 2 M
Mechanical life	2,000,000 operations
Utilization Category	
Resistive: AC-1	8 A @ 250V AC
Resistive: DC-1	6 A/24V DC
Inductive: AC-15	6 A @ 250V AC 6 A @ 125V AC
Inductive: DC-13	3 A/24V DC 6 A/24V DC @ 6 ops/min
Resistive UL	B300, R300, 8 A/250V AC, 6 A/24V DC, 30V DC Resistive
Environmental and Physical Characteristics	
Enclosure type rating/ terminal protection	IP40 (NEMA 1), DIN 0470/IP20, DIN 0470
Operating temperature	-5...+55 °C (23...131 °F)
Vibration	10...55 Hz, 0.35 mm (0.01 in.)
Shock	10 g, 16 ms, 100 shocks
Mounting	35 mm (1.4 in.) DIN Rail
Weight	24V DC: 210 g (0.46 lb) 115/230V AC: 260 g (0.57 lb)
Conductor size, max	0.2...4 mm^2 (24...12 AWG)

(1) Usable for ISO 13849-1 and IEC 61508. Data is based on the following assumptions:
• Mission time/Proof test interval of 20 years

Product Selection

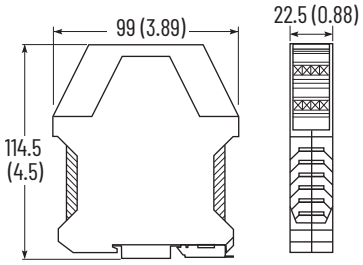
Inputs	Button Type	Safety Outputs	Terminals	Reset Type	Power Supply	Cat. No.
1 N.C. + 1 N.O. (Two-hand Control)	Mechanical or Bulletin 800Z	2 N.O.	Removable (MSR125HP)	Automatic	24V DC	440R-D23171
					24V AC	440R-D23170
					115V AC	440R-D23169
					230V AC	440R-D23168
			Fixed (MSR125H)		24V DC	440R-D23166
					115V AC	440R-D23164
					230V AC	440R-D23163

Accessories

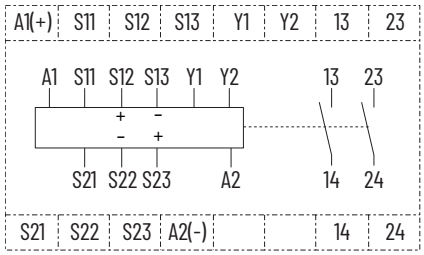
Description	Cat. No.
Bag of 4, 4-pin spring clamp terminal blocks	440R-A23228

Approximate Dimensions

Dimensions are shown in mm (in.).



Block Diagram



Typical Wiring Diagrams

Figure 9 - Two-hand Control, Dual-channel, Auto Reset, Output Monitoring

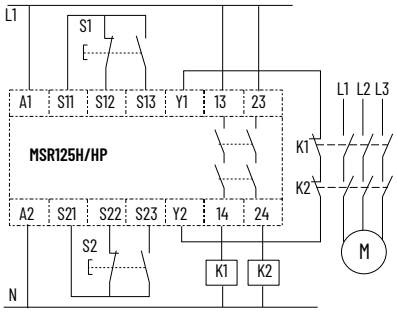
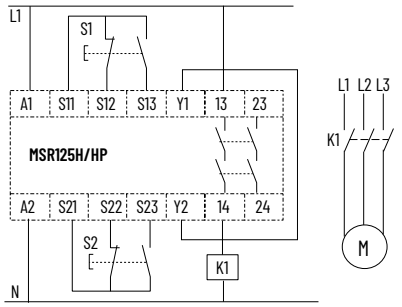
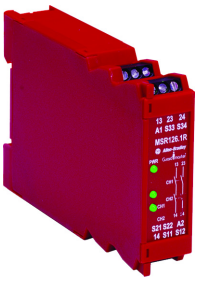


Figure 10 - Two-hand Control, Dual-channel, Auto Reset, No Output Monitoring



Description



MSR126R/T safety monitoring relays provide the basics for safety control systems in a 22.5 mm (1.4 in.) package.

These safety relays are designed for connection to a single-channel safety gate, a single-channel E-stop, or a light curtain that provides cross fault detection. The MSR126.1R/T is designed for connection to a dual-channel safety gate or E-stop, as it performs cross fault detection across the inputs.

The MSR126R and MSR126.1R safety relays are designed for applications where a monitored manual reset is required. Monitored manual reset requires the use of a momentary N.O. switch to activate the outputs.

The MSR126T and MSR126.1T safety relays are designed for applications where automatic/manual reset is required.

The outputs are only two N.O. safety-rated outputs. The safety outputs have independent and redundant internal contacts to support the safety function.

Features

- Category 4, PLe per ISO13849-1
- SIL 3 per IEC 61508
- Stop category 0
- Two safety contacts N.O.
- Single-/dual-channel operation
- Cross fault monitoring
- Monitored or automatic reset
- E-stop, safety gate, or light curtain applications

Status Indicators

Color	Description
Green	Power On
Green	K1 Closed
Green	K2 Closed

Specifications

Attribute	MSR126R/T Single-function Safety Relays
Safety Ratings	
Standards	ISO 13849-1, IEC 61508, IEC 62061, IEC 60664-1
Safety Classification	• Cat. 4 PLe per ISO 13849-1 • SIL 3 per IEC 61508, IEC 62061
Functional Safety Data [1] (For up-to-date information, see the Functional Safety Data Sheet, publication SAFETY-SR001)	PFHd: < 1.45 x 10^{-9} MTTFd: > 398 years Suitable for Performance Level PLe (according to ISO 13849-1) and for use in SIL 3 systems (according to IEC 61508) depending on the architecture and application characteristics
Certifications	CE Marked for all applicable directives, UKCA Marked for all applicable regulations, cULus Listed, C-Tick, and TÜV certified
Power Supply	
Input power entry	24V AC/DC, 115/230V AC
Power consumption	4 W
Inputs	
Safety inputs	1 N.C., 2 N.C., or LC
Input simultaneity	Infinite
Input resistance, max	90 Ω
Reset	Auto./Manual or Monitored Manual
Power on delay/recovery time	300 ms/100 ms
Response time	15 ms
Outputs	
Safety contacts	2 N.O.
Thermal current I_{th}	Max 6 A in one current path (nonswitching)
Rated impulse withstand voltage	2500V
Switching current @ voltage, min	10 mA @ 10V
Fuses, output	External 6 A slow blow or 10 A fast acting
Electrical life (operations)	(With surge suppression) 250V AC/6 A/1500VA cosφ = 1...0.1 M 250V AC/2.5 A/625VA cosφ = 1...0.5 M 250V AC/1.5 A/375VA cosφ = 0.35...0.3 M 250V AC/5 A/1250VA cosφ = 0.6...0.1 M 24V DC/2 A/48 W = 1 M 10V DC/0.01 A/0.1 W = 2 M
Mechanical life	2,000,000 operations
Utilization Category	UL: B300, 5 A/250V AC, 24V AC, 6 A/24V DC
Resistive: AC-1	6 A/250V AC
Resistive: DC-1	6 A/24V DC
Inductive: AC-15	6 A/250V AC 6 A/125V AC
Inductive: DC-13	3 A/24V DC 6 A/24V DC @ 6 ops/min
Environmental and Physical Characteristics	
Enclosure type rating/ terminal protection	IP40 (NEMA 1), DIN 0470/IP20, DIN 0470
Operating temperature	-5...+55 °C (23...131 °F)
Vibration	10...55 Hz, 0.35 mm (0.01 in.)
Shock	10 g, 16 ms 100 shocks
Mounting	35 mm (1.4 in.) DIN Rail
Weight	24V DC: 160 g (0.35 lb) 115/230V AC: 215 g (0.47 lb)
Conductor size, max	0.2...4 mm^2 (24...12 AWG)

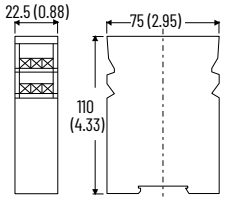
[1] Usable for ISO 13849-1 and IEC 61508. Data is based on the following assumptions:
- Mission time/Proof test interval of 20 years
- Functional test at least once within six-month period

Product Selection

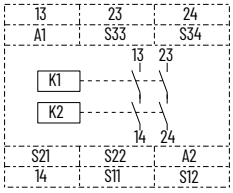
Inputs	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. No.
OSSD or single-channel (MSR126T)	2 N.O.	None	Fixed	Auto/Manual	24V AC/DC	440R-N23117
					115V AC	440R-N23116
					230V AC	440R-N23115
Dual-channel 2 N.C. (MSR126.IT)					24V AC/DC	440R-N23114
					115V AC	440R-N23113
					230V AC	440R-N23112
OSSD or single-channel (MSR126R)				Monitored Manual	24V AC/DC	440R-N23123
					115V AC	440R-N23122
					230V AC	440R-N23121
Dual-channel 2 N.C. (MSR126.IR)					24V AC/DC	440R-N23120
					115V AC	440R-N23119
					230V AC	440R-N23118

Approximate Dimensions

Dimensions are shown in mm (in.).



Block Diagram



Typical Wiring Diagrams

Figure 11 - 115/230V Supply, 24V DC Light Curtain, Monitored Manual Reset, Monitored Output

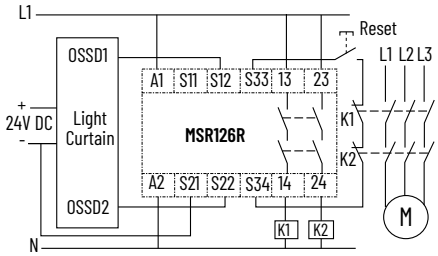


Figure 12 - Dual-channel E-stop Input, Monitored Manual Reset, Monitored Output

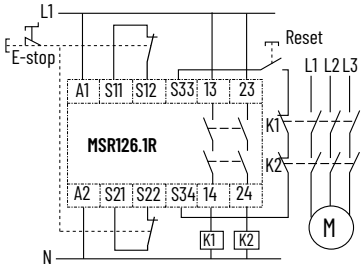


Figure 13 - Single-channel Safety Gate, Automatic Reset, No Output Monitoring

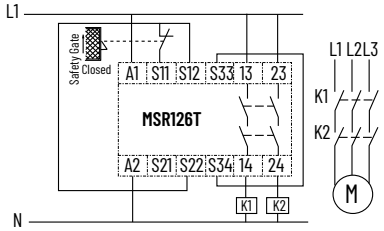
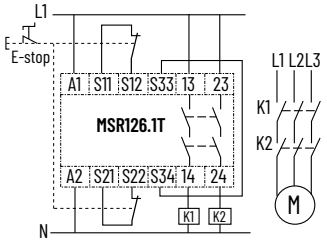


Figure 14 - Dual-channel E-stop, Automatic Reset, No Output Monitoring



Description

MSR127RP/TP safety relays can be connected in three different input wiring configurations: one N.C., two N.C., or two PNP connections from a light curtain or similar device with OSSD outputs.

When connected as two N.C. inputs, these safety relays check for cross faults across the two inputs. When connected to devices with OSSD outputs, those devices must perform the cross fault detection.

The MSR127RP safety relay has a monitored manual reset and the MSR127TP safety relay has an automatic/manual reset. Models with automatic/manual reset can have the reset jumpered or can be converted to an unmonitored manual reset by adding a N.O. switch in the monitoring loop. Models with monitored manual reset provide checking of the output monitoring circuit.

The outputs include three N.O. safety-rated outputs and one N.C. auxiliary output. The safety outputs have independent and redundant internal contacts to support the safety function. The auxiliary output is a nonsafety output that is intended to provide an external signal about the status of the safety outputs.

Features

- Category 4, PLe per ISO 13849-1
- SIL 3 per IEC 16508
- Stop category 0
- Three safety contacts
- One auxiliary contact
- Cross fault monitoring
- Monitored or automatic reset
- Removable terminals
- OSSD and mechanical contact applications

Status Indicators

Color	Description
Green	Power On
Green	CH1 Closed
Green	CH2 Closed

Specifications

Attribute	MSR127RP/TP Single-function Safety Relays
Safety Ratings	
Standards	ISO 13849-1, IEC 61508, IEC 62061, IEC 60664-1
Safety Classification	• Cat. 4, PLe per ISO13849-1 • SIL 3 per IEC 61508, IEC 62061
Functional Safety Data [1] (For up-to-date information, see the Functional Safety Data Sheet, publication SAFETY-SR001)	PFHd: < 1.45 x 10^{-9} MTTFd: > 398 years Suitable for Performance Level PLe (according to ISO 13849-1) and for use in SIL 3 systems (according to IEC 61508) depending on the architecture and application characteristics
Certifications	CE Marked for all applicable directives, UKCA Marked for all applicable regulations, cULus Listed, and TÜV certified
Power Supply	
Input power entry	24V AC/DC, 115V AC or 230V AC 50/60 Hz
Power consumption	2 W
Inputs	
Safety inputs	1 N.C. or 2 N.C. or OSSD
Input simultaneity	Infinite (ch2 before ch1) with Auto Reset
Input resistance, max	110 Ω
Reset	Auto./Manual or Monitored Manual
Power on delay/recovery time	1 second/100 ms
Response time	15 ms
Outputs	
Safety contacts	3 N.O.
Auxiliary contacts	1 N.C.
Thermal current I_{th}	• Units with 24V AC/DC supply: 3 x 4 A or 2 x 5 A nonswitching • Units with 115/230V AC supplies: 3 x 3 A or 2 x 4 A or 1 x 5 A nonswitching
Rated impulse withstand voltage	2500V
Switching current @ voltage, min	10 mA/10V
Fuses, output	External 6 A slow blow or 10 A fast acting
Electrical life (operations)	(With surge suppression) 250V AC/6 A/1500VA cosφ = 1...0.1 M 250V AC/2.5 A/625VA cosφ = 1...0.5 M 250V AC/1.5 A/375VA cosφ = 0.35...0.3 M 250V AC/5 A/1250VA cosφ = 0.6...0.1 M 24V DC/2 A/48 W = 1 M 10V DC/0.01 A/0.1 W = 2 M
Mechanical life	2,000,000 operations
Utilization Category	
Resistive: AC-1	5 A/250V AC
Resistive: DC-1	5 A/24V DC
Inductive: AC-15	5 A/250V AC
Inductive: DC-13	3 A/24V DC 5 A/24V DC @ 6 ops/min
UL	B300, R300 5 A/250V AC, 24V DC
Environmental and Physical Characteristics	
Enclosure type rating/ terminal protection	IP40 (NEMA 1)/IP20
Operating temperature	-5...+55 °C (23...131 °F)
Vibration	10...55 Hz, 0.35 mm (0.01 in.)
Shock	10 g, 16 ms 100 shocks
Mounting	35 mm (1.4 in.) DIN Rail
Weight	24V DC: 210 g (0.46 lb), 115/230V AC: 260 g (0.57 lb)
Conductor size, max	0.2...4 mm^2 (24...12 AWG)

(1) Usable for ISO 13849-1 and IEC 61508. Data is based on the following assumptions:
• Mission time/Proof test interval of 20 years
• Functional test at least once within six-month period

Product Selection

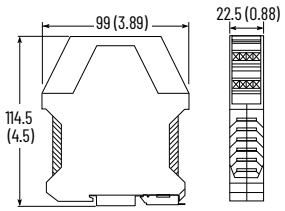
Inputs	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. No.
1 N.C., 2 N.C., OSSD	3 N.O.	1 N.C.	Fixed	Auto./Manual	24V AC/DC	440R-N23126
				Monitored Manual		440R-N23129
				Auto./Manual	115V AC	440R-N23125
				Monitored Manual		440R-N23128
				Auto./Manual	230V AC	440R-N23124
				Monitored Manual		440R-N23127
			Removable (screw)	Auto./Manual	24V AC/DC	440R-N23132
				Monitored Manual		440R-N23135
			Removable (spring clamp)	Auto./Manual	24V AC/DC	440R-N23132S
				Monitored Manual		440R-N23135S
			Removable (screw)	Auto./Manual	115V AC	440R-N23131
				Monitored Manual		440R-N23134
				Auto./Manual	230V AC	440R-N23130
				Monitored Manual		440R-N23133

Accessories

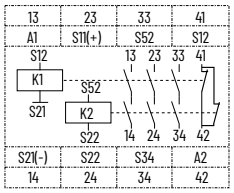
Description	Cat. No.
Bag of 4, 4-pin spring clamp terminal blocks	440R-A23228

Approximate Dimensions

Dimensions are shown in mm (in.).



Block Diagram



Typical Wiring Diagrams

Figure 15 - Light Curtain, Monitored Manual Reset, Monitored Output

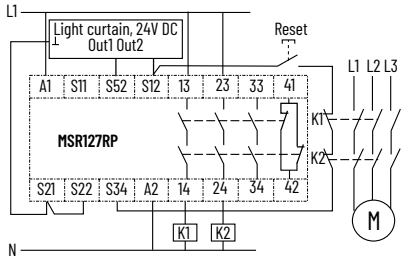


Figure 16 - Single-channel E-stop, Automatic Reset, No Output Monitoring

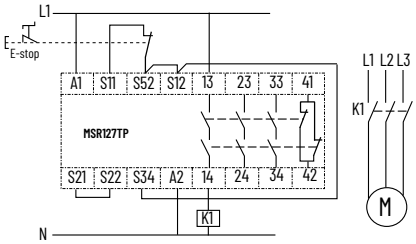


Figure 17 - Dual-channel E-stop, Monitored Manual Reset, Monitored Output

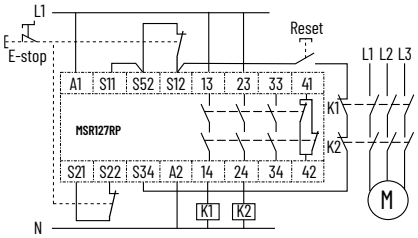
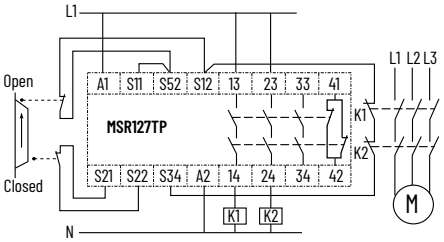
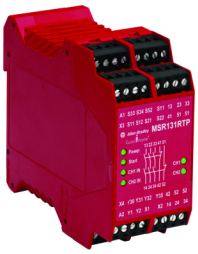


Figure 18 - Dual-channel Safety Gates, Automatic Reset, Monitored Output



Description



The versatile MSR131RTP monitoring safety relay can be connected in three different input wiring configurations: one N.C., two N.C., two OSSD inputs. When connected as two N.C. inputs, this safety relay checks for cross faults across the two inputs. When connected to devices with OSSD outputs, those devices must perform the cross fault detection.

This safety relay has output monitoring that can accommodate either automatic/manual reset or a monitored manual reset. When configured with automatic/manual reset (jumpers on X1-X2 and X3-X4), this safety relay can have the reset terminals S33-S34 jumpered or can be converted to an unmonitored manual reset by adding a N.O. switch in the monitoring loop (S33-S34). When configured as monitored manual reset, this safety relay checks the output monitoring circuit through the manual application of the reset switch.

The outputs include three N.O. safety-rated outputs, two N.C. auxiliary outputs, and two solid-state outputs. One solid-state output indicates that the inputs are closed. The second solid-state output indicates that the safety outputs are active.

The safety outputs have independent and redundant internal contacts to help ensure the safety function. The auxiliary output is a nonsafety output that is intended to provide an external signal about the status of the safety outputs.

Features

- Category 4, PLe per ISO 13849-1
- SIL 3 per IEC 61508
- Stop category 0
- OSSD, two N.C. inputs
- Three safety contacts
- Two auxiliary contacts
- Two solid-state outputs
- Cross fault monitoring
- Monitored or automatic reset
- Removable terminals

Status Indicators

Color	Description
Green	Power
Green	Start
Green	CH1 Input Closed
Green	CH2 Input Closed
Green	CH1 Output Active
Green	CH2 Output Active

Specifications

Attribute	MSR131RTP Single-function Safety Relays
Safety Ratings	
Standards	ISO 13849-1, IEC 61508, IEC 62061, IEC 60664-1
Safety Classification	• Cat. 4, PLe per ISO 13849-1 • SIL 3 per IEC 61508, IEC 62061
Functional Safety Data [1] (For up-to-date information, see the Functional Safety Data Sheet, publication SAFETY-SR001)	PFHd: < 1.67 x 10^{-9} MTTFd: > 389 years Suitable for Performance Level PLe (according to ISO 13849-1) and for use in SIL 3 systems (according to IEC 61508) depending on the architecture and application characteristics
Certifications	CE Marked for all applicable directives, UKCA Marked for all applicable regulations, cULus Listed, TÜV certified, and C-Tick
Power Supply	
Input power entry	24V AC/DC, 115V AC or 230V AC
Power consumption	4 W
Inputs	
Safety inputs	1 N.C., 2 N.C., OSSD
Input simultaneity	Infinite
Input resistance, max	45 Ω
Reset	Auto./Manual or Monitored Manual
Power on delay/recovery time	1 second/100 ms
Response time	15 ms
Outputs	
Safety contacts	3 N.O.
Auxiliary contacts	2 N.C.; 1 SS PNP inputs closed; 1 SS PNP outputs active; 30V DC/20 mA solid-state
Thermal current I_{th}	1 x 6 A or 3 x 5 A nonswitching
Rated impulse withstand voltage	2500V
Switching current @ voltage, min	10 mA @ 10V
Fuses, output	External 6 A slow blow or 10 A fast acting
Electrical life (operations)	(With surge suppression) 250V AC/6 A/1500VA cosφ = 1...0.1 M 250V AC/2.5 A/625VA cosφ = 1...0.5 M 250V AC/1.5 A/375VA cosφ = 0.35...0.3 M 250V AC/5 A/1250VA cosφ = 0.6...0.1 M 24V DC/2 A/48 W = 1 M 10V DC/0.01 A/0.1 W = 2 M
Mechanical life	2,000,000 operations
Utilization Category	
Resistive: AC-1	6 A/250V AC
Resistive: DC-1	6 A/24V DC
Inductive: AC-15	6 A/250V AC 6 A/125V AC
Inductive: DC-13	3 A/24V DC 6 A/24V DC @ 6 ops/min
UL	B300, R300, 1 x 6 A or 2 x 5 A resistive/250V AC, 24V DC
Environmental and Physical Characteristics	
Enclosure type rating/ terminal protection	IP40 (NEMA 1)/IP20
Operating temperature	-5...+55 °C (23...131 °F)
Vibration	10...55 Hz, 0.35 mm (0.01 in.)
Shock	10 g, 16 ms 100 shocks
Mounting	45 mm (1.8 in.) housing, 35 mm (1.4 in.) DIN Rail
Weight	24V DC: 320 g (0.71 lb) 115/230V AC: 450 g (0.99 lb)
Conductor size, max	0.2...4 mm^2 (24...12 AWG)

[1] Usable for ISO 13849-1 and IEC 61508. Data is based on the following assumptions:
• Mission time/Proof test interval of 20 years
• Functional test at least once within six-month period

Product Selection

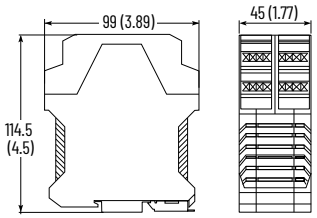
Inputs	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. No.
1 N.C., 2 N.C., OSSD	3 N.O.	2 N.C., 2 PNP solid-state	Removable (screw)	Auto./Manual or Monitored Manual	24V AC/DC	440R-C23139
			Removable (spring clamp)			440R-C23139S
			Removable (screw)		115V AC	440R-C23137
					230V AC	440R-C23136

Accessories

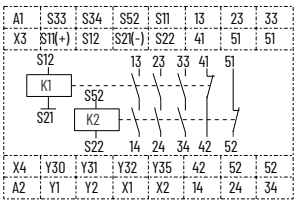
Description	Cat. No.
Bag of 4, 4-pin spring clamp terminal blocks	440R-A23228

Approximate Dimensions

Dimensions are shown in mm (in.).



Block Diagram



Typical Wiring Diagrams

Figure 19 - Light Curtain, Monitored Manual Reset, Monitored Output

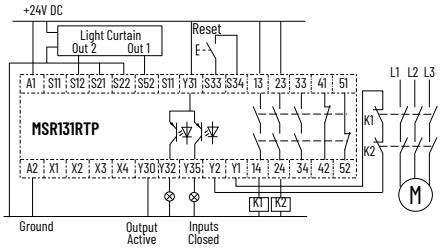


Figure 20 - Single-channel Safety Gate, Automatic Reset, No Output Monitoring

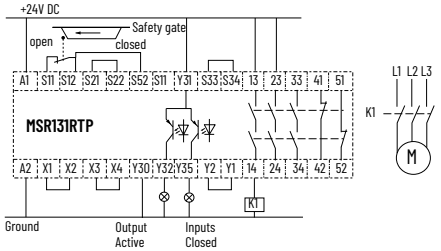


Figure 21 - Dual-channel E-stop, Monitored Manual Reset, Monitored Output

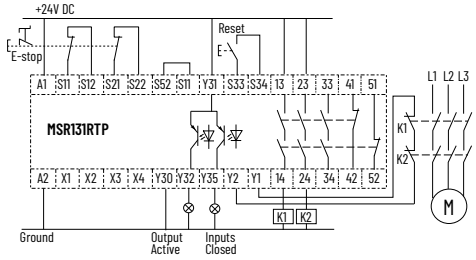


Figure 22 - 115/230V AC Supply, 24V DC, Light Curtain, Monitored Manual Reset, Monitored Output

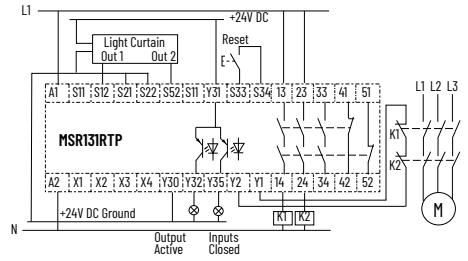
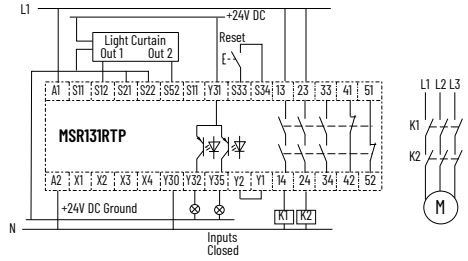
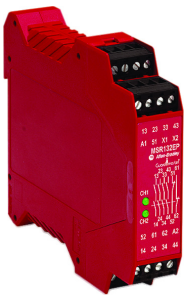


Figure 23 - 115/230V AC Supply, 24V DC, Light Curtain, Monitored Manual Reset, No Output Monitoring



Description



The MSR132E monitoring safety expansion relay unit has single- or dual-channel input and either immediate or timed off-delay outputs. It must be operated as an extension of a primary safety relay. When wired properly, the outputs of this safety relay mimic the outputs of the primary relay.

The outputs include four N.O. safety-rated outputs that are used to shut down the manufacturing system and two N.C. auxiliary outputs to indicate status of this safety relay. One additional N.C. output is available to allow the host relay to monitor the status of this safety relay. The safety, auxiliary, and monitoring outputs have independent and redundant internal contacts to support the safety function.

A delayed output version is also available (MSR132ED) that has off-delayed outputs with a fixed time without the need for an auxiliary supply during the off-delay time.

Features

- Category 4/3 per ISO 13849-1
- SIL 3 per IEC 61508
- Stop Category 0 or 1
- Four safety contacts N.O.
- Two auxiliary contacts N.C.
- One monitoring contact N.C.

Status Indicators

Color	Description
Green	K1 Closed
Green	K2 Closed

Specifications

Attribute	MSR132E/ED Expansion Safety Relays
Safety Ratings	
Standards	ISO 13849-1, IEC 61508, IEC 62061, IEC 60664-1
Safety Classification	• MSR132E (immediate outputs) Cat 4 PLe per ISO 13849-1 SIL e per IEC 61508, IEC 62061 • MSR132ED (delayed outputs) Cat 3 PLd per ISO 13849-1 SIL 2 per IEC 61508, IEC 62061
Functional Safety Data [1] (For up-to-date information, see the Functional Safety Data Sheet, publication SAFETY-SR001)	PFHd: < 0.46 x 10^{-9} MTTFd: > 417 years Suitable for Performance Level PLe/PLd (according to ISO 13849-1) and for use in SIL 3/SIL 2 systems (according to IEC 61508) depending on the architecture and application characteristics
Certifications	CE Marked for all applicable directives, UKCA Marked for all applicable regulations, cULus Listed, C-Tick, and TÜV certified
Power Supply	
Input power entry	24V AC/DC 50/60 Hz or 24V DC 0.8...1.1
Power consumption	1.5 W
Inputs	
Safety inputs	1 N.C. or 2 N.C.
Reset	Automatic
Power on delay/recovery time	100 ms/100 ms
Response time	50 ms
Outputs	
Safety contacts	4 N.O.
Auxiliary contacts	2 N.C.
Thermal current I_{th}	2 x 6 A or 3 x 5 A or 4 x 4 A nonswitching
Rated impulse withstand voltage I_{th}	2500V
Switching current @ voltage, min	10 mA @ 10V
Fuses, output	External 6 A slow blow or 10 A fast acting
Electrical life (operations)	(With surge suppression) 250V AC/6 A/1500VA cosφ = 1...0.1 M 250V AC/2 A/500VA cosφ = 1...0.5 M 250V AC/4 A/1000VA cosφ = 0.35...0.3 M 250V AC/1.5 A/1000VA cosφ = 0.6...0.1 M 24V DC/2 A/48 W = 1 M 10V DC/0.01 A/0.1 W = 2 M
Mechanical life	2,000,000 operations
Utilization Category	
Resistive: AC-1	6 A @ 250V AC
Resistive: DC-1	3 A @ 24V DC
Inductive: AC-15	6 A @ 250V AC 6 A @ 125V AC
Inductive: DC-13	3 A @ 24V DC
UL	B300, R300, 6 A/250V AC, 3 A/24V DC
Environmental and Physical Characteristics	
Enclosure type rating/ terminal protection	IP40 (NEMA 1), DIN 0470/IP20, DIN 0470
Operating temperature	-5...+55 °C (23...131 °F)
Vibration	10...55 Hz, 0.35 mm (0.01 in.)
Shock	10 g, 16 ms, 100 shocks
Mounting	35 mm (1.4 in.) DIN Rail
Weight	215 g (0.474 lb)
Conductor size, max	0.2...4 mm^2 (24...12 AWG)

[1] Usable for ISO 13849-1 and IEC 61508. Data is based on the following assumptions:
- Mission time/Proof test interval of 20 years
- Functional test at least once within six-month period

Product Selection

Inputs	Safety Outputs	Auxiliary Outputs	Time Delay	Terminals	Reset Type	Power Supply	Cat. No.
1 N.C. or 2 N.C.	4 N.O.	2 N.C.	0 s	Fixed	Automatic	24V AC/DC	440R-E23191 (1)
			0.5 s			24V DC	440R-E23192
			1 s				440R-E23193
			2 s				440R-E23194
			3 s				440R-E23195
			0 s	Removable		24V AC/DC	440R-E23097 (1)
			0.5 s			24V DC	440R-E23159
			1 s				440R-E23160
			2 s				440R-E23098
			3 s				440R-E23161
			4 s				440R-E23162 (2)

(1) Cat. 4 rated

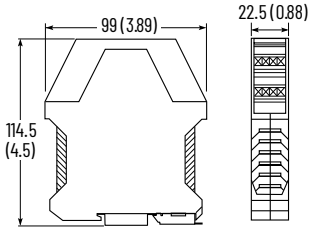
(2) 45 mm (1.8 in.) wide housing

Accessories

Description	Cat. No.
Bag of 4, 4-pin spring clamp terminal blocks	440R-A23228

Approximate Dimensions

Dimensions are shown in mm (in.).



Block Diagram

Figure 24 - Standard Module

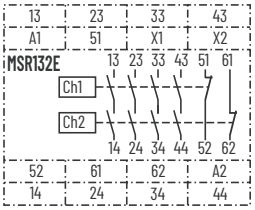
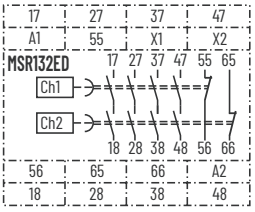
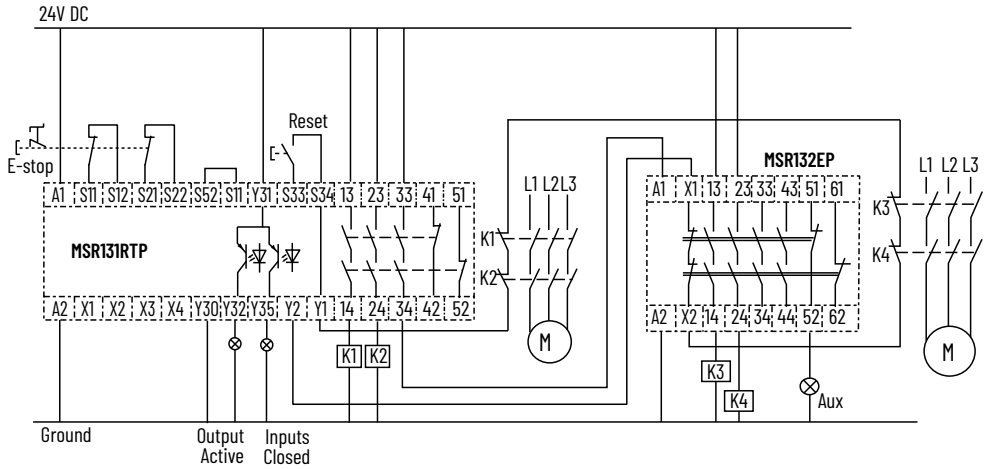


Figure 25 - Off-delayed Modules

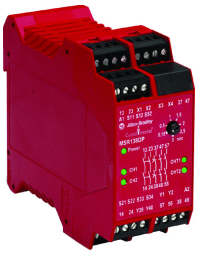


Typical Wiring Diagrams

Figure 26 - Dual-channel E-stop, Monitored Manual Reset, Dual-channel Output, Single-channel Delayed Expansion, Monitored Output



Description



MSR138DP safety relays can be connected in three different input wiring configurations: 1 N.C, 2 N.C, or 2 OSSD.

When connected as two N.C. inputs, these safety relays check for cross faults across the two inputs. When connected to light curtains, the light curtain must perform the cross fault detection.

These safety relays have output monitoring that can accommodate either automatic/manual reset or a monitored manual reset. When configured with automatic/manual reset (jumpers on X1-X2 and X3-X4), these safety relays can have the reset terminals S33-S34 jumpered or can be converted to an unmonitored manual reset by adding a N.O. switch in the monitoring loop (S33-S34). When configured as monitored manual reset, these safety relays check the output monitoring circuit through the manual application of the reset switch. The safety relay cannot be reset until the timing function has completed.

The outputs of the MSR138DP safety relay include two N.O. immediate safety outputs and three N.O. delayed safety outputs. The outputs of the MSR138.1DP safety relay include two N.O. immediate safety-rated outputs, two N.O. delayed safety outputs and one N.C. delayed safety output. The safety outputs have independent and redundant internal contacts to support the safety function. If a reset request is made during the time cycle, it causes a lockout condition. Cycle inputs after timing has completed and reset after the delay time has expired to clear lockout. To avoid this lockout, connect contacts 55-56 of the MSR138.1DP safety relay in series to Y1-Y2.

A N.C. timer reset switch can be added to force the delayed contacts open before the completion of the timing cycle.

Features

- Category 4/3, PL e/PL d per ISO13849-1
- SIL 3/2 per IEC 61508-1
- Stop category 0 and 1
- Light curtain, E-stop, safety gate inputs
- Two immediate safety outputs
- Delayed outputs: three N.O. safety or two N.C. safety and one N.C. auxiliary.
- Cross fault monitoring
- Monitored or automatic reset
- Removable terminals

Status Indicators

Color	Indicator	Description
Green	Power	Illuminates when power is on
Green	Start	Illuminates when S33-S34 is closed
Green	CH1 IN	Illuminates when channel 1 input is closed
Green	CH2 IN	Illuminates when channel 2 input is closed
Green	CH1	Illuminates when K1 is closed
Green	CH2	Illuminates when K2 is closed
Green	CHT1	Illuminates during timing period
Green	CHT2	Illuminates during timing period

Specifications

Attribute	MSR138DP Single-function Safety Relays with Delayed Outputs
Safety Ratings	
Standards	ISO 13849-1, IEC 61508, IEC 62061, IEC 60664-1
Safety Classification	• Immediate Outputs Cat. 4, PLe per ISO13849-1 SIL 3 per IEC 61508 • Delayed Outputs Cat. 3, PLd per ISO13849-1 SIL 2 per IEC 61508
Functional Safety Data [1] (For up-to-date information, see the Functional Safety Data Sheet, publication SAFETY-SR001)	PFHd: < 2.38 x 10^{-9} MTTFd: > 195 years Suitable for Performance Level PLe/PLd (according to ISO 13849-1) and for use in SIL 3/SIL 2 systems (according to IEC 61508) depending on the architecture and application characteristics
Certifications	CE Marked for all applicable directives, UKCA Marked for all applicable regulations, cULus Listed, C-Tick, and TÜV certified
Power Supply	
Input power entry	24V AC/DC, 115V AC or 230V AC
Power consumption	4 W
Inputs	
Safety inputs	1 N.C., 2 N.C. or OSSD
Input simultaneity	Infinite
Input resistance, max	135 Ω
Reset	Auto./Manual or Monitored Manual
Power on delay/recovery time	1 second/100 ms
Response time	15 ms
Outputs	
Safety contacts	2 N.O.
Auxiliary contacts	Delayed 3/2 N.O.
Thermal current I_{th}	5 x 2.5 A or 3 x 3.5 A nonswitching
Rated impulse withstand voltage	2500V
Switching current @ voltage, min	10 mA @ 10V
Fuses, output	External 6 A slow blow or 10 A fast acting
Electrical life (operations)	(With surge suppression) 250V AC/6 A/1500VA cosφ = 1...0.1 M 250V AC/2.5 A/625VA cosφ = 1...0.5 M 250V AC/1.5 A/375VA cosφ = 0.35...0.3 M 250V AC/5 A/1250VA cosφ = 0.6...0.1 M 24V DC/2 A/48 W = 1 M 10V DC/0.01 A/0.1 W = 2 M
Mechanical life	2,000,000 cycles

Attribute	MSR138DP Single-function Safety Relays with Delayed Outputs
Utilization Category	
Resistive: AC-1	7 A@ 250V AC
Resistive: DC-1	7 A/24V DC
Inductive: AC-15	6 A@ 250V AC 6 A @ 125V AC
Inductive: DC-13	3 A/24V DC 6 A/24V DC @ 6 ops/min
UL	B300, 5 A/250V AC, 24V DC
Environmental and Physical Characteristics	
Enclosure type rating/ terminal protection	IP40 (NEMA 1)/IP20
Operating temperature	-5…+55 °C (23…131 °F)
Vibration	10…55 Hz, 0.35 mm (0.01 in.)
Shock	10 g, 16 ms, 100 shocks
Mounting	35 mm (1.4 in.) DIN Rail
Weight	24V DC: 350 g (0.77 lb); 115/230V AC: 490 g (1.08 lb)
Conductor size, max	0.2…4 mm^2 (24…12 AWG)

(1) Usable for ISO 13849-1 and IEC 61508. Data is based on the following assumptions:
- Mission time/Proof test interval of 20 years
- Functional test at least once within six-month period

Product Selection

Inputs	Safety Outputs	Delayed Safety Outputs	Delayed Auxiliary Outputs	Time Delay	Terminals	Reset Type	Power Supply	Cat. No.
1 N.C., 2 N.C., OSSD	2 N.O. (1)	3 N.O. (MSR138DP) (2)	—	1.0 s, fixed	Removable	Auto./Manual or Monitored Manual	115V AC	440R-M23080
				0.15…3 s	Removable		24V AC/DC	440R-M23143
					Spring clamp			440R-M23143S
				0.15…3 s	Removable		115V AC	440R-M23141
							230V AC	440R-M23140
				0.5…10 s	Removable		24V AC/DC	440R-M23147
					Spring clamp			440R-M23147S
				0.5…10 s	Removable		115V AC	440R-M23145
							230V AC	440R-M23144
				1.5…30 s	Removable		24V AC/DC	440R-M23151
							115V AC	440R-M23149
							230V AC	440R-M23148
		2 N.O. (MSR138.1DP) (2)	1 N.C.	0.15…3 s	Removable	Auto./Manual or Monitored Manual	24V AC/DC	440R-M23084
							115V AC	440R-M23082
							230V AC	440R-M23081
				0.5…10 s	Removable		24V AC/DC	440R-M23088
							115V AC	440R-M23086
							230V AC	440R-M23085
				1.5…30 s	Removable		24V AC/DC	440R-M23092
							115V AC	440R-M23090
							230V AC	440R-M23089

(1) Instantaneous safety outputs Cat. 4

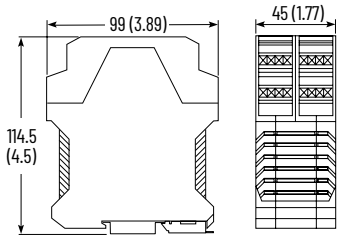
(2) Delayed safety outputs are Cat. 3

Accessories

Description	Cat. No.
Bag of 4, 4-pin spring clamp terminal blocks	440R-A23228

Approximate Dimensions

Dimensions are shown in mm (in.).



Block Diagram

IMPORTANT In applications with 24V AC supply: terminal S21 must not be connected to PE.

Figure 27 - MSR138DP

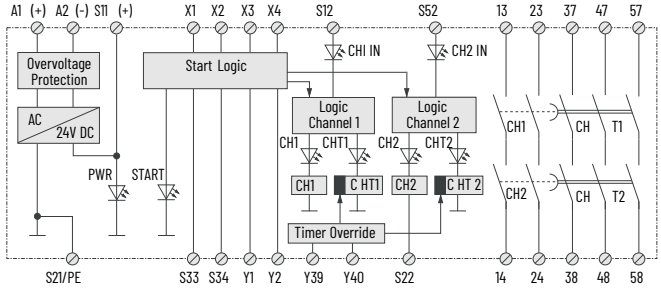
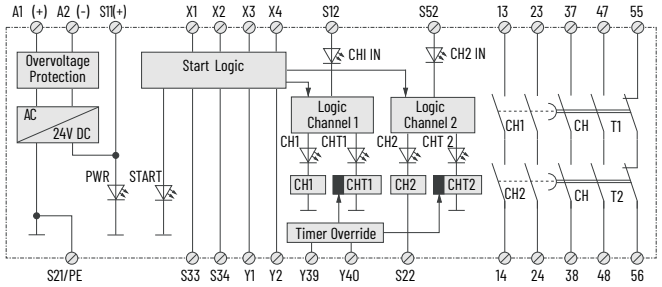


Figure 28 - MSR138.1DP



Typical Wiring Diagrams

Figure 29 - 24V DC Supply Dual-channel E-stop, Monitored Manual Reset, Monitored Output

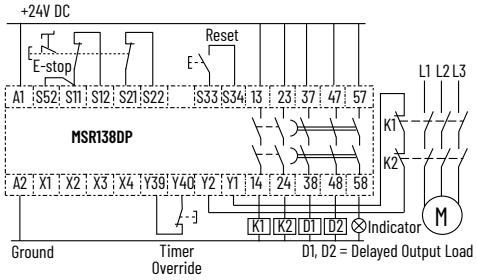
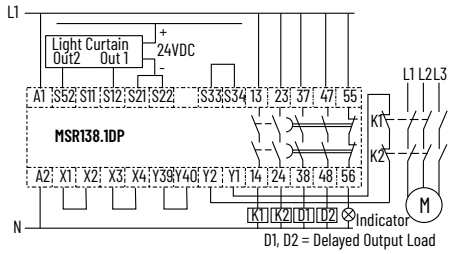


Figure 30 - 115/230V AC Supply, 24V DC Light Curtain, Automatic Reset, Monitored Output



Description

The versatile MSR142RTP monitoring safety relay can be connected in four different input wiring configurations: one N.C., two N.C., two PNP connections from a light curtain, or a SensaGuard™ interlock. When connected as two N.C. inputs, this safety relay checks for cross faults across the two inputs. When connected to light curtains (or other device with OSSD outputs), those devices must perform the cross fault detection.

This safety relay has output monitoring that can accommodate either automatic/manual reset or a monitored manual reset. When configured with automatic/manual reset (jumpers on X1-X2 and X3-X4), this safety relay can have the reset terminals S33-S34 jumpered or can be converted to an unmonitored manual reset by adding a N.O. switch in the monitoring loop (S33-S34). When configured as monitored manual reset, this safety relay checks the output monitoring circuit through the manual application of the reset switch.

The outputs include seven N.O. safety-rated outputs, four N.C. auxiliary outputs, and two solid-state outputs. One solid-state output indicates that the inputs are closed. The second solid-state output indicates that the safety outputs are active. The safety outputs have independent and redundant internal contacts to support the safety function. The auxiliary outputs are nonsafety outputs intended to provide an external signal about the status of the safety outputs.

Features

- Category 4, PLe per ISO13849-1
- SIL 3 per IEC 61508
- Stop category 0
- Light curtain, SensaGuard interlocks, E-stop inputs
- Seven electromechanical N.O. state safety outputs
- Four electromechanical N.C. auxiliary outputs
- Two solid-state auxiliary outputs
- Cross fault monitoring
- Monitored or automatic reset
- Removable terminals

Status Indicators

Color	Description
Green	Power
Green	Start
Green	CH1 IN
Green	CH2 IN
Green	CH1 output energized
Green	CH2 output energized

Specifications

Attribute	MSR142RTP Single-function Safety Relays
Safety Ratings	
Standards	ISO 13849-1, IEC 61508, IEC 62061, IEC 60664-1
Safety Classification	• Cat 4. PLe per ISO 13849-1 • SIL 3 per IEC61508, IEC 62061
Functional Safety Data [1] (For up-to-date information, see the Functional Safety Data Sheet, publication SAFETY-SR001)	PFHd: < 1.92 x 10^{-9} MTTFd: > 210 years Suitable for Performance Level PLe (according to ISO 13849-1) and for use in SIL 3 systems (according to IEC 61508) depending on the architecture and application characteristics
Certifications	CE Marked for all applicable directives, UKCA Marked for all applicable regulations, cULus Listed, TÜV certified, and C-Tick
Power Supply	
Input power entry	24V AC/DC, 115V AC or 230V AC 50/60 Hz
Power consumption	5 W
Inputs	
Safety inputs	1 N.C., 2 N.C., OSSD
Input simultaneity	Infinite
Input resistance, max	45 Ω
Reset	Auto./Manual or Monitored Manual
Power on delay/recovery time	1 s/100 ms
Response time	15 ms
Outputs	
Safety contacts	7 N.O.
Auxiliary contacts	4 N.C., 2 PNP
Rated impulse withstand voltage	2500V
Switching current @ voltage, min	10 mA @ 10V DC
Fuses, output	6 A slow blow or 10 A quick blow (external)
Electrical life (operations)	220V AC/4 A/880VA cosφ = 0.35...0.1 M 220V AC/1.7 A/375VA cosφ = 0.6...0.5 M 30V DC/2 A/60 W = 1 M 10V DC/0.01 A/0.1 W = 2 M
Mechanical life	2,000,000 operations
Utilization Category	
Inductive: Safety and Aux.: AC-15	6 A/250V AC
Inductive: AC-13	3 A/24V DC
Resistive: DC-13	20 mA/30V DC short-circuit protected
UL	4 x B300 or 7 x 4 A Resistive
Environmental and Physical Characteristics	
Enclosure type rating/ terminal protection	IP40 (NEMA 1), DIN VDE 0470-1/IP20
Operating temperature	-5...+55 °C (14...131 °F)
Vibration	10...55 Hz, 0.35 mm (0.01 in.)
Shock	10 g, 16 ms, 100 shocks
Mounting	35 mm (1.4 in.) DIN Rail
Weight	24V: 470 g (1.04 lb); 115/230V AC: 607 g (1.34 lb)
Conductor size, max	0.2...4 mm^2 (24...12 AWG)

[1] Usable for ISO 13849-1 and IEC 61508. Data is based on the following assumptions:
- Mission time/Proof test interval of 20 years
- Functional test at least once within six-month period

Product Selection

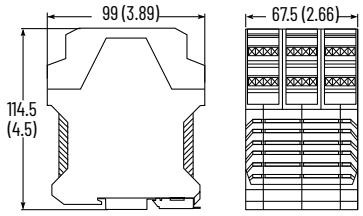
Inputs	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. No.
1 N.C., 2 N.C., OSSD	7 N.O.	4 N.C., 2 PNP, solid-state	Removable	Monitored Manual or Auto/Manual	24V AC/DC	440R-G23216
					115V AC	440R-G23215
					230V AC	440R-G23214

Accessories

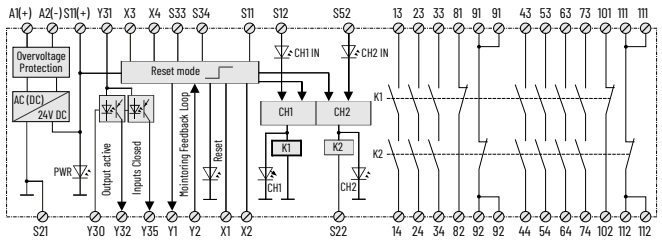
Description	Cat. No.
Bag of 4, 4-pin screw terminal blocks	440R-A23209
Bag of 4, 4-pin spring clamp terminal blocks	440R-A23228

Approximate Dimensions

Dimensions are shown in mm (in.).



Block Diagram



Typical Wiring Diagrams

Figure 31 - Light Curtain, Monitored Manual Reset, Monitored Output

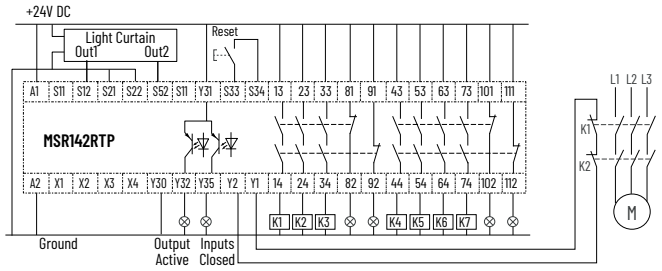


Figure 32 - Single-channel Safety Gate, Auto Reset, No Output Monitoring

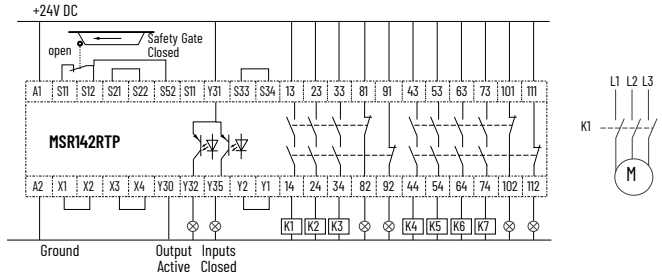
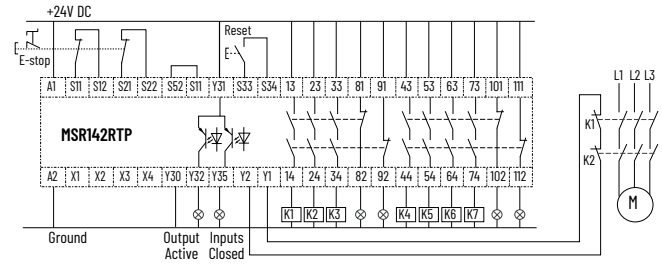


Figure 33 - Dual-channel E-stop, Monitored Manual Reset, Monitored Output



Description

The CU4 off-delay timing relay can be operated standalone or as an extension of a host relay. The timed outputs are used in applications where power must be maintained for a fixed duration after an input signal is received. For example, driving a Power to Lock TLS2-GD2 safety switch to maintain a guard door in the locked position for a fixed duration after a Stop button is pressed. Another example is maintaining the connection of a drive to a motor until the braking function is achieved, and then dropping out a contactor to remove power to the motor.

The inputs can be connected in either a single-channel or dual-channel configuration. The inputs must remain open during the complete timing cycle. If the contacts are closed before the timing cycle completes, the timer is reset to zero.

This timing relay has a redundant structure with two independent safe timer circuits. The outputs include two N.O. safety-delayed outputs and one N.C. auxiliary output. The safety outputs have independent and redundant internal contacts to support the safety function. When used as an extension of a host relay, the N.C. contacts must be used in the feedback loop of the host relay. If used in standalone application, the N.C. contacts can be used to signal an auxiliary device or PLC.

A typical operation starts with power that is applied to A1/A2 and the input circuits open.

1. Close the B11/B12 and B21/B22 circuits.
   a. The safety outputs (17/18 & 27/28) close immediately.
2. Open the B11/B12 or B21/B22 circuits.
   a. The timing process starts.
   b. The safety outputs (17/18 & 27/28) open after the time expires.
3. Go to step 1.

Features

- Category 3, PLd per ISO 13849-1
- SIL 2 per IEC 61508
- Stop category 1
- Timed off-delay 0.15...30 s
- Two safety contacts
- One auxiliary contact

Status Indicators

Color	Description
Green	Power
Green	CH1 t1 Active
Green	CH2 t2 Active

Specifications

Attribute	CU4 Off-delay Timing Relays
Safety Ratings	
Standards	ISO 13849-1, IEC 61508, IEC 62061, IEC 60664-1
Safety Classification	• Cat. 3 PLd per ISO13849-1 • SIL 2 per IEC 61508, IEC 62061
Functional Safety Data [1] (For up-to-date information, see the Functional Safety Data Sheet, publication SAFETY-SR001)	PFHd: < 2.16 x 10^{-9} MTTFd: > 345 years Suitable for Performance Level PLd (according to ISO 13849-1) and for use in SIL 2 systems (according to IEC 61508) depending on the architecture and application characteristics
Certifications	CE Marked for all applicable directives, UKCA Marked for all applicable regulations, cULus Listed, C-Tick, and TÜV certified
Power Supply	
Input power entry	24V AC/DC, 50/60 Hz; 0.85...1.1 x rated voltage
Power consumption	2.5 W
Inputs	
Safety inputs	1 N.C. or 2 N.C.
Input simultaneity	Infinite
Reset	Automatic
Response time	30 ms
Outputs	
Safety contacts	2 N.O.
Auxiliary contacts	1 N.C.
Rated impulse withstand voltage	2500V
Switching current @ voltage, min	10 mA/10V
Fuses, output	External 6 A slow blow or 10 A fast acting
Electrical life (operations)	220V AC/4 A/880VA cosφ = 0.35...0.1 M 220V AC/1.7 A/375VA cosφ = 0.6...0.5 M 30V DC/2 A/60 W = 1 M 10V DC/0.01 A/0.1 W = 2 M
Mechanical life	2,000,000 operations
Utilization Category	
AC-15	5 A @ 250V AC 5 A @ 125V AC
DC-13	3 A/24V DC
UL	B300, 5 A/250V AC, 24V DC
Environmental and Physical Characteristics	
Enclosure type rating/ terminal protection	IP40, DIN 0470/IP20
Operating temperature	-5...+55 °C (23...131 °F)
Vibration	10...55 Hz, 0.35 mm (0.01 in.)
Shock	10 g, 16 ms, 100 shocks
Mounting	35 mm (1.4 in.) DIN Rail
Weight	165 g (0.36 lb)
Conductor size, max	0.2...4 mm^2 (24...12 AWG)

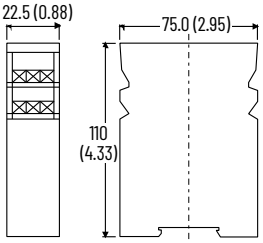
(1) Usable for ISO 13849-1 and IEC 61508. Data is based on the following assumptions:
• Mission time/Proof test interval of 20 years
• Functional test at least once within six-month period

Product Selection

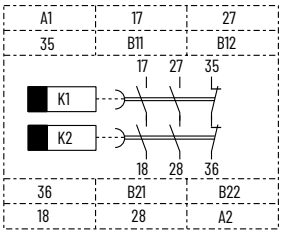
Inputs	Safety Outputs	Auxiliary Outputs	Time Range	Reset Type	Power Supply	Cat. No.
1 N.C. or 2 N.C.	2 N.O.	1 N.C.	0.15...3 s	Automatic	24V AC/DC, 50/60 Hz 0.85...1.1 x rated voltage	440R-S23173
			0.5...10 s			440R-S23174
			1.5...30 s			440R-S23175

Approximate Dimensions

Dimensions are shown in mm (in.).



Block Diagram



Typical Wiring Diagrams

Figure 34 - Dual-channel Wiring to CU4 Inputs

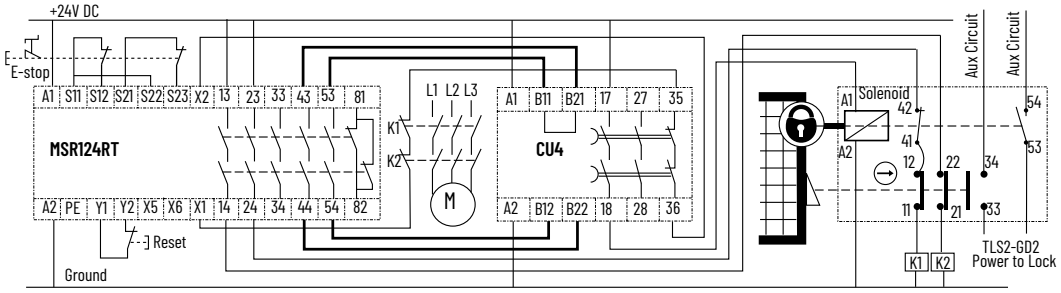
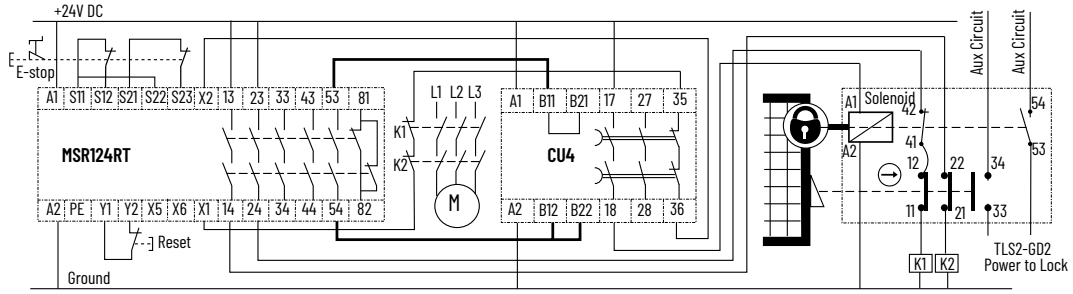


Figure 35 - Single-channel Wiring to CU4 Inputs



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