

Logic  
**Single-Function Safety Relays**  
 MSR126RT



**Description**

The Allen-Bradley Guardmaster Minotaur MSR126R/T is a safety monitoring relay that provides the very basics for safety control systems in a 22.5 mm package.

The MSR126R/T is 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 are designed for applications where a monitored manual reset is required. Monitored manual reset requires the use of a momentary normally open switch to activate the outputs.

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

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

**Features**

- Category 4 per EN 954-1
- 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

**LED Indicators**

Green	Power On
Green	K1 Closed
Green	K2 Closed

**Specifications**

<b>Safety Ratings</b>	
Standards	EN 954-1, ISO 13849-1, IEC/EN 60204-1, IEC 60947-4-1, IEC 60947-5-1, ANSI B11.19, AS 4024.1
Safety Classification	Cat. 4 per EN 954-1 (ISO 13849-1), SIL CL3 per EN IEC 62061, PLe per ISO 13849-1
Functional Safety Data * Note: For up-to-date information, visit <a href="http://www.ab.com/Safety/">http://www.ab.com/Safety/</a>	PFH <sub>D</sub> : < 1.45 x 10 <sup>-9</sup> MTTF <sub>d</sub> : > 398 years Suitable for performance levels Ple (according to ISO 13849-1:2006) and for use in SIL3 systems (according to IEC 62061) depending on the architecture and application characteristics
Certifications	CE Marked for all applicable directives, cULus, c-Tick, and BG
<b>Power Supply</b>	
Input Power Entry	24V AC/DC, 115/230V AC
Power Consumption	4 W
<b>Inputs</b>	
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
<b>Outputs</b>	
Safety Contacts	2 N.O.
Thermal Current/ <i>I<sub>th</sub></i>	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
<b>Utilization Category</b>	
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
<b>Environmental and Physical Characteristics</b>	
Enclosure Type Rating/Terminal Protection	IP40 (NEMA 1), DIN 0470/ IP20, DIN 0470
Operating Temperature [C (F)]	-5...+55 ° (23...131 °)
Vibration	10...55 Hz, 0.35 mm
Shock	10 g, 16 ms 100 shocks
Mounting	35 mm DIN Rail
Weight [g (lbs)]	24V DC: 160 (0.35); 115/230V AC: 215 (0.47)
Conductor Size, Max.	0.2...4 mm <sup>2</sup> (24...12 AWG)

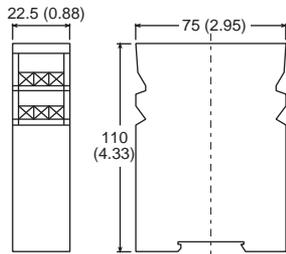
\* Usable for ISO 13849-1:2006 and IEC 62061. Data is based on the following assumptions:  
 - Mission time/Proof test interval of 20 years  
 - Functional test at least once within six-month period

**Product Selection**

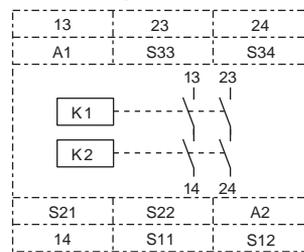
Inputs	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. No.			
Light Curtain or Single Channel (MSR126T)	2 N.O.	None	Fixed	Auto./Manual	24V AC/DC	<b>440R-N23117</b>			
					115V AC	440R-N23116			
					230V AC	440R-N23115			
Monitored Manual					24V AC/DC	<b>440R-N23114</b>			
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

**Approximate Dimensions**

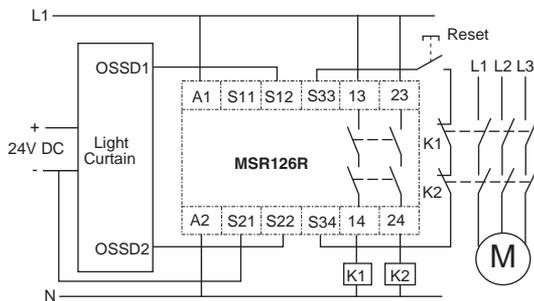
Dimensions are shown in mm (in.). Dimensions are not intended to be used for installation purposes.



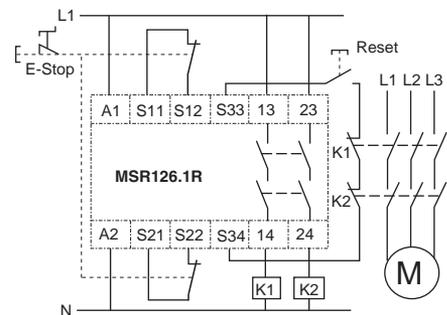
**Block Diagram**



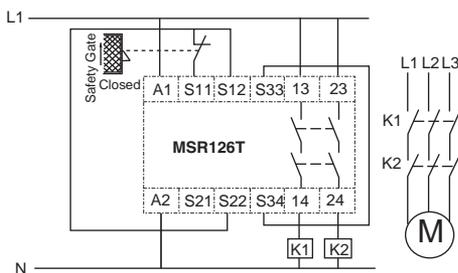
**Typical Wiring Diagrams**



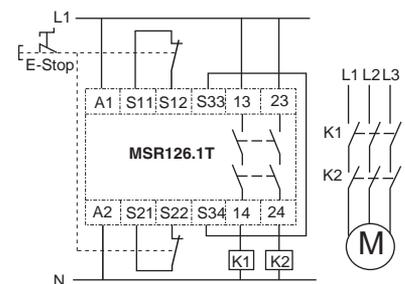
**115/230V Supply, 24V DC Light Curtain, Monitored Manual Reset, Monitored Output**



**Dual Channel E-Stop Input, Monitored Manual Reset, Monitored Output**



**Single Channel Safety Gate, Automatic Reset, No Output Monitoring**



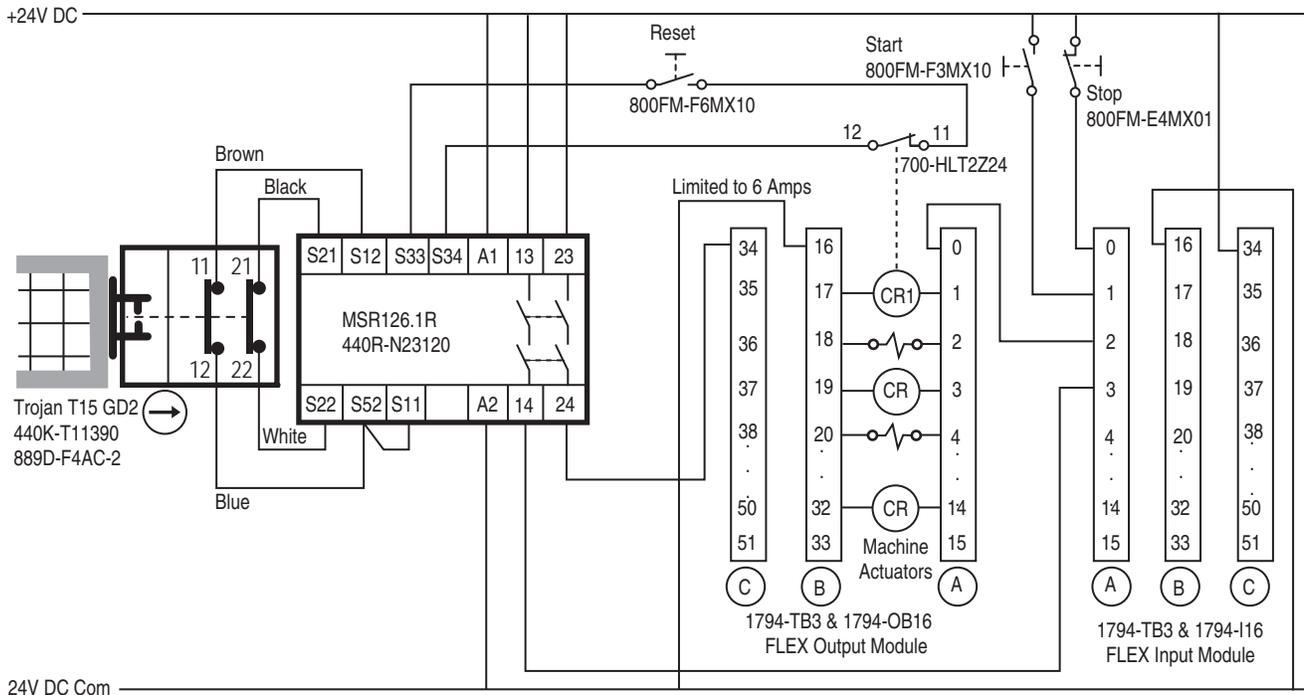
**Dual Channel E-Stop, Automatic Reset, No Output Monitoring**

**5-Safety Relays**

# Safety Applications and Wiring Diagrams

## Interlock Switch Gater with High Current Outputs

Trojan T15 GD2, 800F, MSR126, Flex I/O



### Circuit Status

The safety gate is closed. The outputs of the MSR126.1R safety relay are open and the machine actuators are off. Control Relay CR1 is de-energized and its 11/12 contact is closed.

### Operating Principle

The MSR126.1R is chosen for this application because its thermal (non-switching) current carrying capacity is 6 A in one circuit. The Flex output module performs the normal switching of the machine actuators during the manufacturing process. The safety system enables the machine functions by providing power to the FLEX Output Module. One of the Flex outputs must drive an electro-mechanical output whose normally closed contact is in the monitoring loop of the safety relay. The machine logic must energize this output while the machine is running, as it is used by the MSR126.1R to confirm that power is removed from the output module, before restarting.

**STARTING:** Press the reset button to energize the output contacts 13/14 of the MSR126.1R. This connects the 24V supply to terminal C34 of Flex 1794-OB16 output module and also sends a signal to the A3 terminal of the 1794-IB16. The logic system is informed that the gate is closed and the machine is ready to run. Press the Start button to start the machine process.

**STOPPING:** Press the Stop button to stop the machine. Then, open the gate to access the machine. While the gate is open, the machine actuators cannot operate because power is removed from the output module. If the gate is inadvertently opened while the machine is running, power will be removed from output module and the machine actuators will be de-energized.

### Fault Detection

Upon successful completion internal checks on power up, the MSR126.1R checks the input circuits. With the gates closed, the MSR126.1R checks the dual circuits and then waits for the reset signal. A single fault, a short from 24V to terminal 14 of the MSR126.1R, may lead to the loss of the safety function. With the MSR126.1R and Flex system mounted in the same cabinet and with proper validation, this fault may be excluded. If not mounted in the same cabinet, a signal from the output (A0) should be fed back into the input module (A2). The logic can perform a comparison of input A2 and A3, and turn the machine off if these signals are not in agreement. If CR1 is not de-energized when the gate is closed, the MSR126.1R will not close its outputs.

### Ratings

The safety function initiated by the Trojan T15-GD2 gate interlocks meets the safety performance requirements of SIL CL 2 per IEC 62061:2005 and has a Category 3 structure that can be used in systems requiring Performance Levels up to PLd per ISO 13849-1:2006. This circuit executes a Category 0 stop.

10-Safety Applications