

Logic
Single-Function Safety Relays
MSR142RTP



Description

The MSR142RTP is a versatile monitoring safety relay. It can be connected in four different input wiring configurations: one normally closed, two normally closed, two PNP connections from a light curtain, or a four-wire safety mat. When connected in the two normally closed fashion, the MSR142RTP checks for cross faults across the two inputs. When connected to light curtains, the light curtain must perform the cross-fault detection.

The MSR142RTP 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), the MSR142RTP can have the reset terminals S33-S34 jumpered or can be converted to an unmonitored manual reset by adding a normally open switch in the monitoring loop (S33-S34). When configured to monitored manual reset, the MSR142RTP checks the output monitoring circuit through the manual application of the reset switch.

The outputs include seven normally open safety-rated outputs, four normally closed 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 per EN 954-1
- Stop category 0
- Light curtain, safety mat, 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

LED Indicators

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

Specifications

Safety Ratings	
Standards	EN 954-1, ISO 13849-1, IEC/EN 60204-1, IEC 60947-5-1, AS 4042.1, ISOTR 12100, B11.19
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 http://www.ab.com/Safety/	PFH _D : < 1.92 x 10 ⁻⁹ MTTF _d : > 210 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, TÜV, 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., Light Curtain or 4-Wire Safety Mat
Input Simultaneity	Infinite
Input Resistance, Max.	45 ohms
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 & 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 [C (F)]	-5...+55 ° (14...131 °)
Vibration	10...55 Hz, 0.35 mm
Shock	10 g, 16 ms, 100 shocks
Mounting	35 mm DIN Rail
Weight [g (lbs)]	24V: 470 (1.04); 115/230V AC: 607 (1.34)
Conductor Size, Max.	0.2...4 mm ² (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

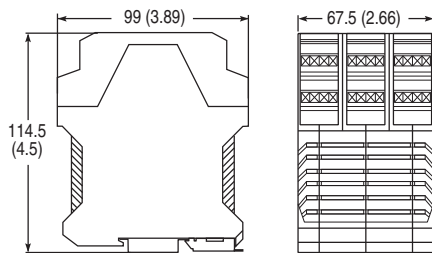
Inputs	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. No.
1 N.C., 2 N.C., Light Curtain, Safety Mat	7 N.O.	4 N.C., 2 PNP, Solid-state	Removable	Monitored Manual or Auto/Manual	24V AC/DC	440R-G23216
					115V AC	440R-G23215
					230V AC	440R-G23214

Accessories

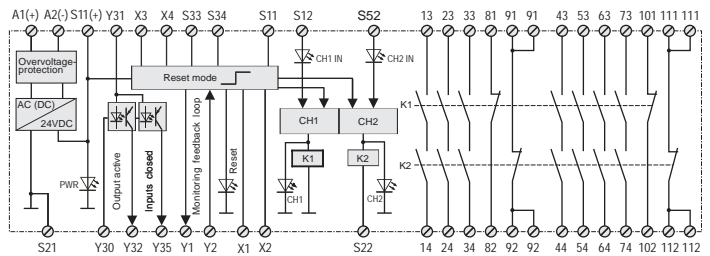
Description	Cat. No.
Bag of 4, 4-Pin Screw Terminal Blocks	440R-A23209
Bag of 4, 4-Pin Spring Clamp Terminal Blocks	440R-A23228

Approximate Dimensions

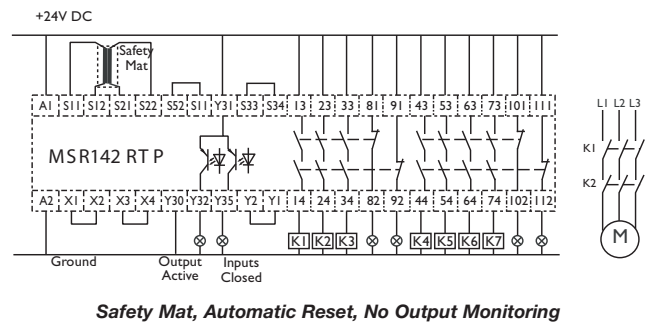
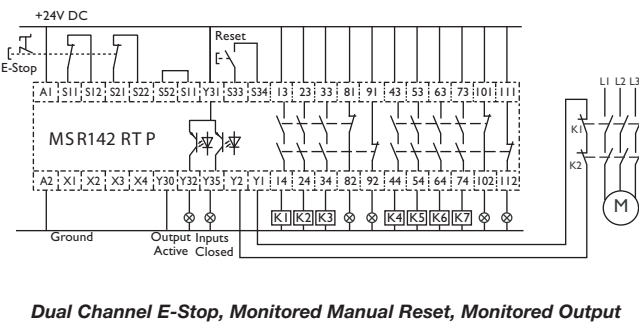
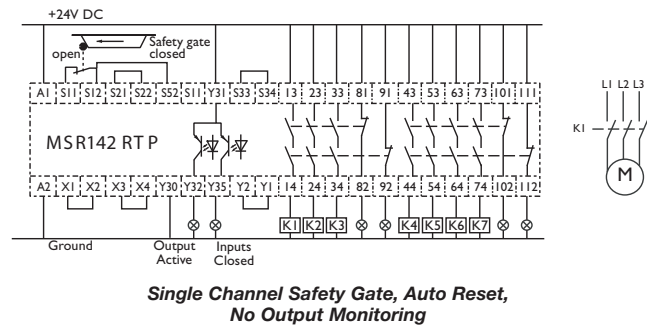
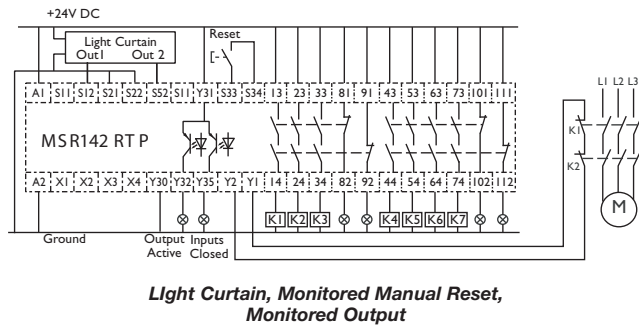
Dimensions are shown in mm (in.). Dimensions are not intended to be used for installation purposes.



Block Diagram



Typical Wiring Diagrams

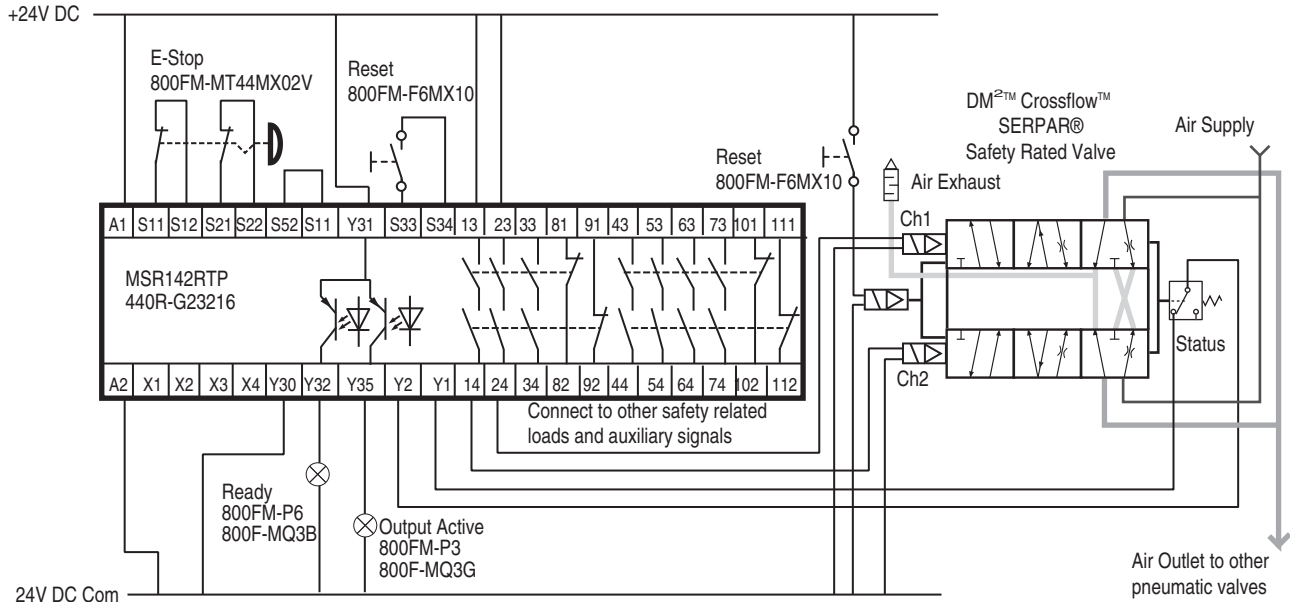


5-Safety Relays

Safety Applications and Wiring Diagrams

Safety Valve & E-Stop—Air Supply Release

800F, MSR142, Pneumatic Safety Valve



Circuit Status

The e-stop button is released, the MSR142 safety relay outputs are off and the pneumatic valve is closed.

Operating Principle

STARTING: Press the reset button to energize the output contacts of the safety relay. The two solenoids in the valve energize and allow air to flow from the Air Supply to the Air Outlet.

STOPPING: Pressing the e-stop button de-energizes the safety outputs of the MSR142, which in turn drops out the solenoids of the safety valve. The valve closes the Air Supply and releases the air pressure to the Air Exhaust. Releasing the e-stop button does not cause the valve to turn back on.

Fault Detection

Upon successful completion of internal checks on power up, the MSR142 checks the e-stop status. If an open or short circuit is detected, the MSR142 will not energize its outputs. If both input circuits are properly closed, the MSR142 checks the status of the safety valve. If one or both solenoids of the safety valve are energized, the Status contact will be open, and the MSR142 will not energize its outputs. If both solenoids are de-energized, Status contact will be closed and the MSR142 will turn on its Ready LED. Pressing the Reset button energizes the MSR142 safety outputs and opens the safety valve.

The safety valve performs its own internal checks. If one of the valves remains actuated, gets stuck or moves too slowly, the Air Outlet flow will be re-directed to the exhaust. To clear the fault condition, both valves must be de-energized and the valve reset button pressed.

Ratings

The safety function initiated by the 800F e-stop button meets the safety performance requirements of SIL CL 3 per IEC 62061:2005 and has Category 4 structure that can be used in systems requiring Performance Levels up to PLe per ISO 13849-1: 2006. The MSR142 has seven safety rated outputs. To maintain the highest safety levels, these outputs must drive redundant actuators which must be monitored for proper performance. This example circuit performs a Stop Category 0 function (coast to stop).