

Installation Instructions

Original Instructions



Allen-Bradley
by ROCKWELL AUTOMATION



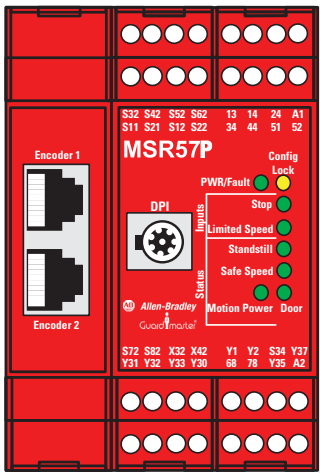
GuardMaster MSR57P Speed Monitoring Safety Relay

Catalog Number 440R-S845AER-NNL

Summary of Changes

This publication contains the following new or updated information. This list includes substantive updates only and is not intended to reflect all changes.

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Introduction

Retain these instructions for future reference. Rockwell Automation does not accept responsibility or liability for a failure of this device if the product is used outside the recommended specifications in this document.



ATTENTION: This device is intended to be part of the safety-related control system of a machine. Before installation, perform a risk assessment to determine whether the specifications of this device are suitable for all foreseeable operational and environmental characteristics for the machine to which it is to be fitted. At regular intervals during the life of the machine, check whether the foreseen characteristics remain valid.



ATTENTION: Safety Programmable Electronic Systems (PES) Train the personnel who are responsible for the installation and application of safety-related programmable electronic systems (PES) on how to use the system, and verify they are aware of the safety requirements in the application of the system.

Spacing Requirements

Provide adequate air space around the system (module cluster). Minimum recommended clearances:

- 15 mm (0.6 in.) above
- 15 mm (0.6 in.) below
- 2...3 mm (0.08...0.12 in.) between modules at ambient temperatures higher than 40 °C (104 °F).

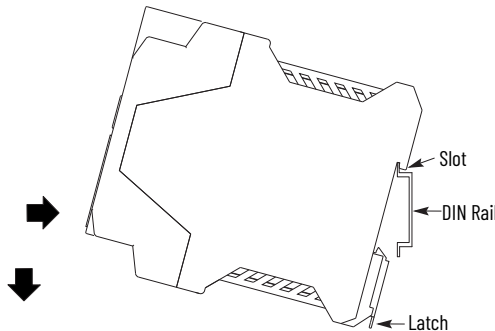
Mount the MSR57P Safety Relay

Follow these steps to mount the MSR57P safety relay to an EN50022-35 x 7.5 DIN rail.

1. Hook the top slot over the DIN rail.
2. Snap the bottom of the device into position while pressing the device down against the top of the rail.
3. Attach end plates on each end of the DIN rail.

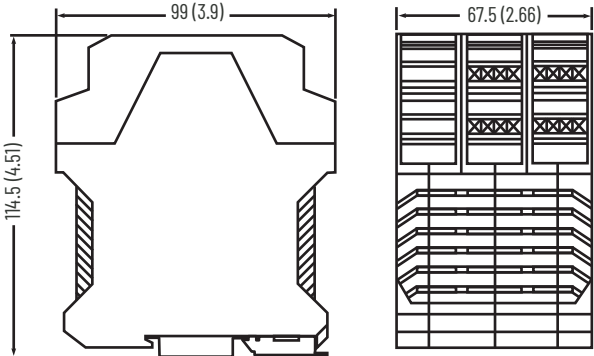
To remove the device from the DIN rail, use a screwdriver to pull down the latch and lift the device from the rail.

Figure 1 - Mount MSR57P Safety Relay to DIN Rail



Approximate Dimensions

Figure 2 - Dimensions [mm (in.)]



Wiring

Figure 3 - Circuit Diagram

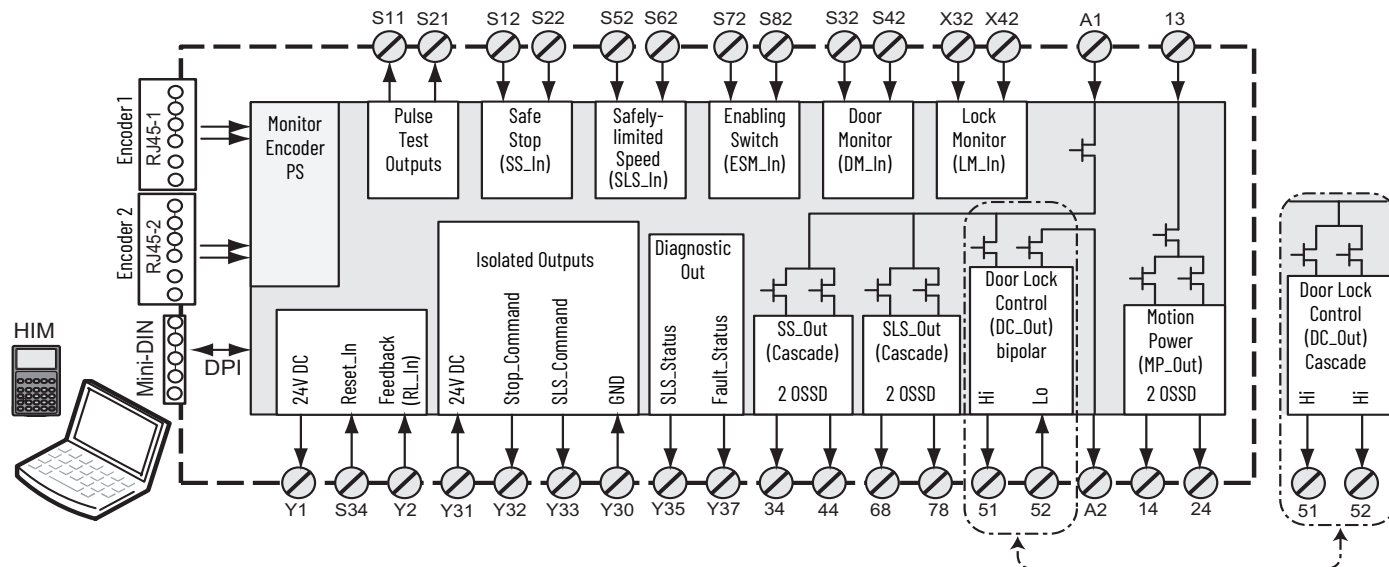


Table 1 - Terminal Connections

Terminal	Function
A1	+24V DC, user supply
A2	Common, user supply
S11, S21	Test_Out_0, Test_Out_1, pulse test outputs for safety functions
S12, S22	SS_In_Ch0, SS_In_Ch1, Safe Stop (SS) dual-channel input
S72, S82	ESM_In_Ch0, ESM_In_Ch1, Enabling Switch Monitor (ESM) dual-channel input
S52, S62	SLS_In_Ch0, SLS_In_Ch1, Safely-limited Speed (SLS) dual-channel input
S32, S42	DM_In_Ch0, DM_In_Ch1, Door Monitor (DM) dual-channel input
X32, X42	LM_In_Ch0, LM_In_Ch1, Lock Monitor (LM) dual-channel input, solenoid position
Y1	24V DC output for reset (S34) and for feedback (Y2)
S34	Reset_In
Y2	RL_In, feedback input
Y35	SLS_Status output
Y37	Fault_Status output
13	Supply power for Motion Power (MP) safety outputs 14 and 24
14, 24	MP_Out_Ch0, MP_Out_Ch1, Motion Power (MP) outputs
68, 78	SLS_Out_Ch0, SLS_Out_Ch1, Safely-limited Speed (SLS) outputs
51	DC_Out_Ch0 (High Side), Door Control output [door switch solenoid, bipolar or cascading ⁽¹⁾]
52	DC_Out_Ch1 (Low Side), Door Control output [door switch solenoid, bipolar or cascading ⁽¹⁾]
34, 44	SS_Out_Ch0, SS_Out_Ch1, cascading Safe Stop outputs
Y31	24V DC power for isolated outputs
Y32	Stop_Command, isolated output
Y33	SLS_Command, isolated output
Y30	GND for isolated outputs

(1) The DC_Out output can also be configured as cascading (2 Channel Source). For information on using this configuration in limited applications, see publication [440R-UM004](#).

Status Indicators

Table 2 - Status Indicator Description

Status Indicator	Illumination	Description
PWR/Fault ⁽¹⁾	Green on	The device is operating normally and is in Run mode.
	Red flashing	A recoverable fault has occurred.
	Red on	A nonrecoverable fault has occurred.
	Red/green flashing	The configuration is being downloaded or a firmware update is in progress.
Config Lock ⁽¹⁾	Yellow on	The device configuration is locked.
	Yellow flashing	The device configuration is unlocked.
Stop	Green on	The Safe Stop (SS) input is closed.
	Red on	The SS input is open or pressed.
	Red flashing	The SS input has a fault.
Limited Speed	Green on	The Safely-limited Speed (SLS) input is closed for normal Run operation.
	Green flashing	The SLS input is open for a safe speed request to allow access to the machine (maintenance operation).
	Off	The SLS function is not configured.
	Red flashing	The SLS input has a fault.
Motion Power	Green on	The Motion Power (MP) output is on.
	Off	The MP output is off.
	Red flashing	The MP output has a fault.
Door	Green on	The door is closed.
	Red on	The door is open.
	Red flashing	Door monitor or lock monitor input switch has a fault.
Safe Speed	Off	Door monitoring is not configured.
	Green on	Safely-limited Speed is being actively monitored and is below the configured Safely-limited Speed value after an SLS request has been made.
	Off	Safely-limited Speed is not being monitored.
	Red flashing	An SLS Speed Fault has occurred.
Standstill	Green on	Standstill Speed has been detected.
	Off	Speed is greater than the configured Standstill Speed.
	Red flashing	Motion has been detected after stopped condition or a Stop Speed Fault has occurred.

(1) PWR/Fault green status indicator and Config Lock status indicator flash in sync when the device is in Program mode.

When you apply power to the device, the red/green status indicators flash alternate colors twice and the Config Lock status indicator flashes on and off twice before all status indicators, except for PWR/Fault, turn off. The PWR/Fault status indicator remains flashing until the device enters Run or Program mode.

Specifications

Table 3 - GuardMaster MSR57P Speed Monitoring Safety Relay

Attribute	Value
Standards	IEC/EN60204-1, ISO12100, IEC 61800-5-2
Safety category	Cat. 4 and PL e per EN ISO 13849-1; SIL CL 1 to CL3 per IEC 61508/EN62061
Power supply	24V DC, 0.8...1.1 x rated voltage ⁽¹⁾ PELV/SELV
Aggregate current	10.4 A max at terminal A1 + I3
Power consumption	5 W
Outputs I4, 24, 68, 78	24V DC, 2 A, short-circuit protected
Outputs 34, 44	24V DC, 100 mA, short-circuit protected
Outputs Y35, Y37	24V DC, 50 mA, short-circuit protected
Door switches S1, S2 ⁽²⁾	24V DC, short-circuit protected 1.5 A, bipolar (Power to Release/Power to Lock) configuration 20 mA, cascading (2 Channel Source) configuration
Outputs Y32, Y33	24V DC, 100 mA, short-circuit protected
Output Y1	24V DC, 20 mA, short-circuit protected
Pulse outputs S11, S21	24V DC, 100 mA, short-circuit protected
Pulse inputs S12, S22, S32, S42, S52, S62, S72, S82, X32, X42	11 mA per input, max
Inputs S34, Y2	11 mA per input, max
Power-on delay, max	3 s
Response time	User-configurable ⁽³⁾
Pollution degree	2
Enclosure protection	IP40
Terminal protection	IP20
Wire type	Use copper that withstands 60/75 °C (140/167 °F)
Conductor size ⁽⁴⁾	0.2...2.5 mm ² (12...24 AWG)
Terminal screw torque	0.6...0.8 N-m (5...7 lb-in)
Case material	Polyamide PA 6.6
Mounting	35 mm (1.38 in.) DIN rail
Weight, approximate	350 g (0.77 lb)

- (1) Safety outputs need an additional fuse for reverse voltage protection of the control circuit. Install a 6 A slow-blow or 10 A fast-acting fuse.
 (2) For information on how to use these outputs in bipolar or cascading configurations, see publication [440R-UM004](#).
 (3) See publication [440R-UM004](#) for details.
 (4) See publication [1770-4.1](#).

Table 4 - Environmental Specifications

Attribute	Value
Temperature, operating	-5...+55 °C (23...131 °F)
Relative humidity	90% RH noncondensing
Vibration	10...55 Hz, 0.35 mm (0.1 in.) displacement
Shock, operating	10 g, 16 ms, 100 shocks
ESD immunity	4 kV contact discharges; 8 kV air discharges
Radiated RF immunity	10V/m from 80...1000 MHz 3V/m from 1.4...2.0 GHz 1V/m from 2.0...2.7GHz
EFT/B immunity	- Power, DC: ±2 kV - I/O signal lines: ±1 kV
Surge transient immunity	- Power, DC: ±0.5 kV line-line and ±0.5 kV line-earth - I/O signal lines: ±1 kV line-earth
Conducted RF immunity	10V rms from 150 kHz...80 MHz

Certifications

- cULus Listed Industrial Control Equipment, which is certified for US and Canada
- CE Marked for all applicable EU directives
- UKCA marked for all relevant statutory instruments
- TÜV Rheinland Certified for Functional Safety for applications up to SIL 3/ SIL CL 3 (EN 61508/EN 62061) and Cat. 4, PL e (EN ISO 13849-1) when used as described in publication [440R-UM004](#).

CE Conformity

The products that are shown in this document are approved for installation within the European Union and are in conformity with the provisions of the following EC directives (including all applicable amendments):

- 2014/30/EU EMC Directive (EMC)
- 2006/42/EC Machinery Directive (MD)

Respective standards and/or technical specifications apply.

UKCA Conformity

The products that are shown in this document are in conformity with the relevant UK Statutory Instruments (and their amendments):

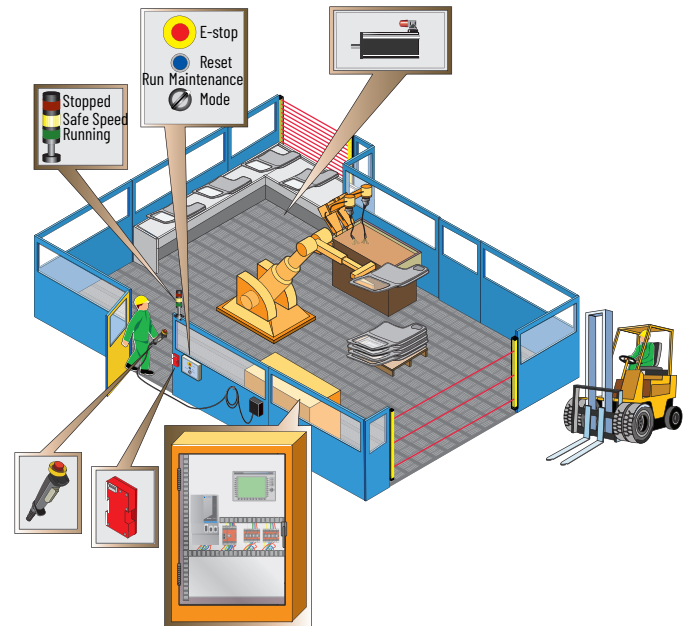
- 2016 No. 1091 - Electromagnetic Compatibility Regulations (EMC)
- 2008 No. 1597 - Supply of Machinery (Safety) Regulations (MD)

For a comprehensive Declaration of Conformity, and certification details visit: rok.auto/certifications.

Example Applications

Example 1

Figure 4 - PowerFlex 70 AC Drive Configuration



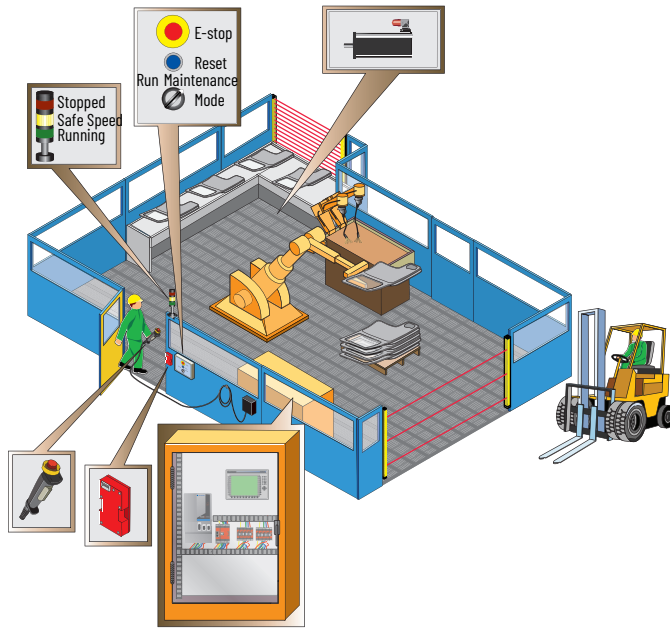
This example is configured for Safe Stop 1. The control cabinet contains an MSR57P safety relay, a PowerFlex® 70 AC Drive with Safe Torque Off (STO) function, and a PanelView™ terminal. The MSR57P safety relay monitors speed via a TTL encoder that is connected to the PowerFlex 70 drive.

The control panel lets the operator select run or maintenance speeds. The door has an interlock switch with guard locking to limit access to the machine when the machine is operating at normal run speed.

A tower light indicates machine status.

Example 2

Figure 7 - Kinetix 6000 Drive



This example is configured for Safe Stop 1. The control cabinet contains an MSR57P safety relay, a Kinetix® 6000 drive with Safe Torque Off (STO) function, and a PanelView terminal. The MSR57P safety relay monitors speed via a Sin/Cos encoder that is connected to the Kinetix 6000 drive.

The control panel lets the operator select run or maintenance speeds. The door has an interlock switch with guard locking to limit access to the machine when the machine is operating at normal run speed. In addition, an enabling switch is required to be held in the middle position while operators are within the machine environment to keep the machine running at safe speed.

A tower light indicates machine status.

Figure 8 - System Layout

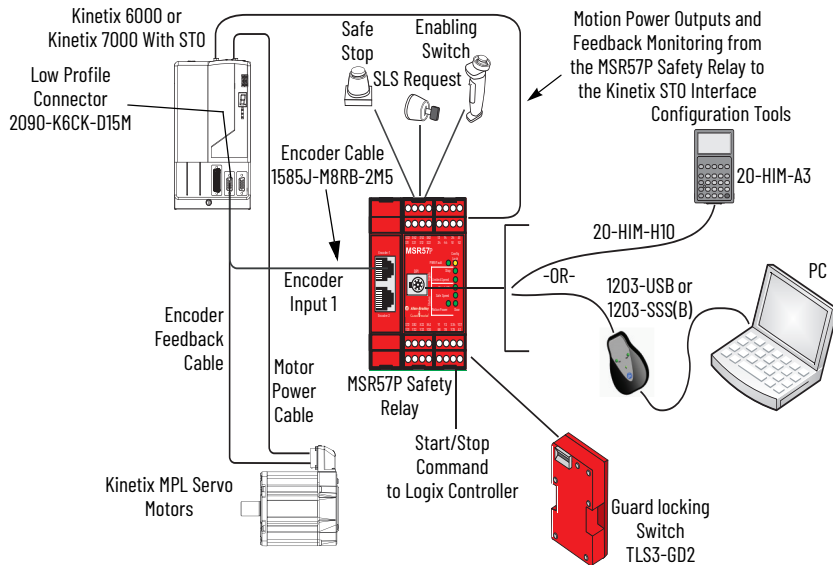
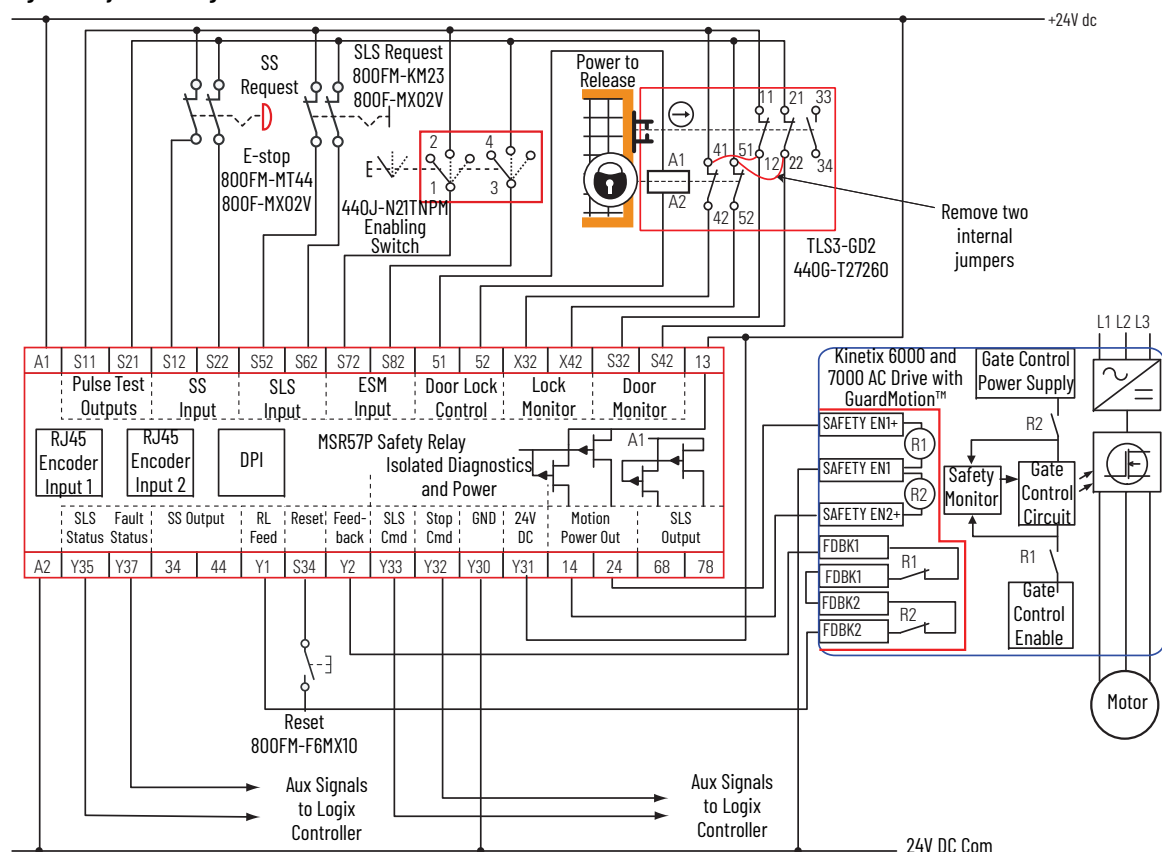


Figure 9 - System Wiring



Waste Electrical and Electronic Equipment (WEEE)



At the end of life, this equipment should be collected separately from any unsorted municipal waste.

Rockwell Automation maintains current product environmental compliance information on its website at rok.auto/pec.

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