POC Type 4 Safety Light Curtains

GuardShield

GuardShield with Integrated Laser Alignment and ArmorBlock Guard I/O Connectivity

Protected Height [mm (in.)]	Resolution [mm (in.)]	Number of Beams	Cat. No.	Protected Height [mm (in.)]	Resolution [mm (in.)]	Number of Beams	Cat. No.
320 (12.6)	14 (0.55)	32	440L-P4JL0320YA	320 (12.6)	30 (1.18)	16	440L-P4KL0320YA
480 (18.9)	14 (0.55)	48	440L-P4JL0480YA	480 (18.9)	30 (1.18)	24	440L-P4KL0480YA
640 (25.2)	14 (0.55)	64	440L-P4JL0640YA	640 (25.2)	30 (1.18)	32	440L-P4KL0640YA
800 (31.5)	14 (0.55)	80	440L-P4JL0800YA	800 (31.5)	30 (1.18)	40	440L-P4KL0800YA
960 (37.8)	14 (0.55)	96	440L-P4JL0960YA	960 (37.8)	30 (1.18)	48	440L-P4KL0960YA
1120 (44.1)	14 (0.55)	112	440L-P4JL1120YA	1120 (44.1)	30 (1.18)	56	440L-P4KL1120YA
1280 (50.4)	14 (0.55)	128	440L-P4JL1280YA	1280 (50.4)	30 (1.18)	64	440L-P4KL1280YA
1440 (56.7)	14 (0.55)	144	440L-P4JL1440YA	1440 (56.7)	30 (1.18)	72	440L-P4KL1440YA
1600 (63.0)	14 (0.55)	160	440L-P4JL1600YA	1600 (63.0)	30 (1.18)	80	440L-P4KL1600YA

Note: GuardShields are sold in pairs. To select a transmitter or receiver, replace the "P" in the cat. no. with an "R" for a receiver. The GuardShield standard transmitter is used in the pair. To order a transmitter, replace the "P" with a "T" and the "A" with a "D."

Cascadable GuardShield with Integrated Laser Alignment and ArmorBlock Guard I/O Connectivity

Protected Height [mm (in.)]	Resolution [mm (in.)]	Number of Beams	Cat. No.	Protected Height [mm (in.)]	Resolution [mm (in.)]	Number of Beams	Cat. No.
320 (12.6)	14 (0.55)	32	440L-C4JL0320YA	320 (12.6)	30 (1.18)	16	440L-C4KL0320YA
480 (18.9)	14 (0.55)	48	440L-C4JL0480YA	480 (18.9)	30 (1.18)	24	440L-P4KL0480YA
640 (25.2)	14 (0.55)	64	440L-C4JL0640YA	640 (25.2)	30 (1.18)	32	440L-C4KL0640YA
800 (31.5)	14 (0.55)	80	440L-C4JL0800YA	800 (31.5)	30 (1.18)	40	440L-C4KL0800YA
960 (37.8)	14 (0.55)	96	440L-C4JL0960YA	960 (37.8)	30 (1.18)	48	440L-C4KL0960YA
1120 (44.1)	14 (0.55)	112	440L-C4JL1120YA	1120 (44.1)	30 (1.18)	56	440L-C4KL1120YA
1280 (50.4)	14 (0.55)	128	440L-C4JL1280YA	1280 (50.4)	30 (1.18)	64	440L-C4KL1280YA
1440 (56.7)	14 (0.55)	144	440L-C4JL1440YA	1440 (56.7)	30 (1.18)	72	440L-C4KL1440YA
1600 (63.0)	14 (0.55)	160	440L-C4JL1600YA	1600 (63.0)	30 (1.18)	80	440L-C4KL1600YA

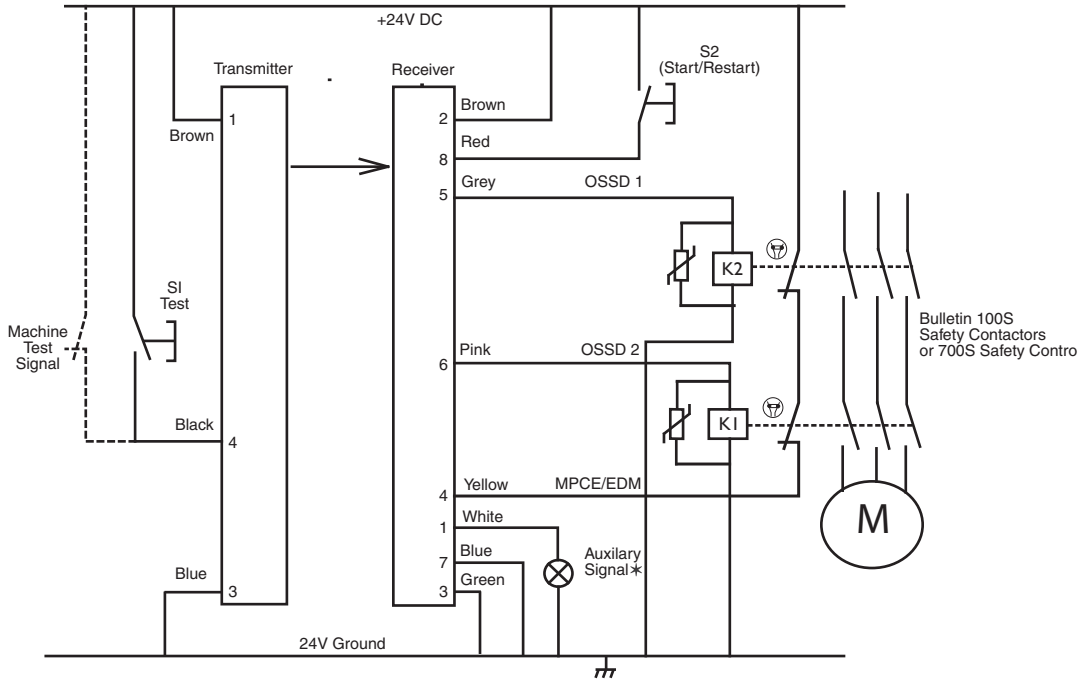
Note: Cascadable GuardShields are sold in pairs. To select a transmitter or receiver replace the "C" with an "F" for a cascadable receiver. The cascadable GuardShield standard transmitter is used in these pairs. To order a cascadable transmitter, replace the "C" with a "G" and the "A" with a "D" to specify the appropriate transmitter cat. no.

Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays for 2 N.C. Contact Switch							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-26	**440R-N23135**
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-26	**440R-N23132**
MSR126	2 N.O.	None	Fixed	Auto./Manual	24V AC/DC	5-24	**440R-N23117**
Modular Safety Relays							
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-82	440R-H23176
MSR211	2 N.O.	1 N.C.	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-84	440R-H23177
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-102	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-106	440R-W23218
Muting Modules							
MSR22LM	2 N.O.	1 N.C.	Removable	Auto./Manual	24V DC	5-48	**440R-P23071**
MSR42 (requires optical interface to configure 445L-AF6150	2 PNP	2 PNP, configurable	Removable	Auto./manual or manual monitored	24V DC	5-52	**440R-P226AGS-NNR**

Wiring Diagram for Connection of OSSDs Directly to Contactors (FSDs) with Restart Interlock

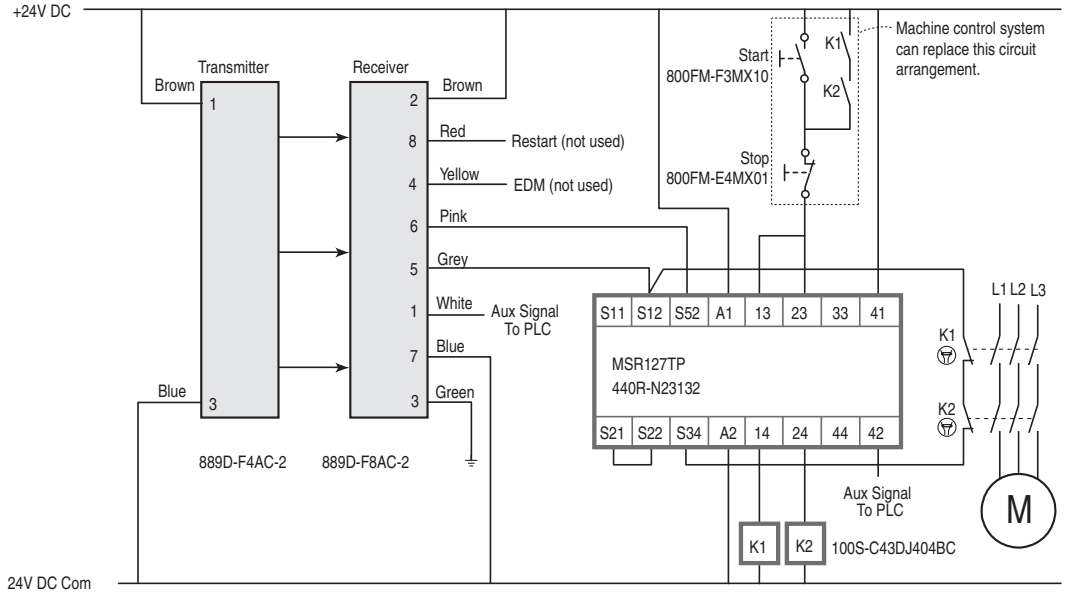
Wiring diagram is not intended to be used for installation purposes.



* Auxiliary output is nonsafety. Can be connected to a lamp, motor or status to a PLC.

K1, K2	Safety relay or safety contactor for OSSD 1 and OSSD 2 connection
S1	Switch for external system test (optional)
S2	Switch for reset of light curtain from start/restart interlock

Wiring Diagram for Connection of OSSDs Directly to a Safety Relay Module



POC Type 4 Safety Light Curtains

GuardShield Safe 4

Product Selection

Standard System

The Allen-Bradley Guardmaster GuardShield Safe 4 safety light curtains are offered in 14 mm and 30 mm resolutions, are ordered as pairs—transmitter and receiver—and are shipped under one cat. no. Each GuardShield Safe 4 pair is shipped with standard mounting brackets. After selecting the appropriate Safe 4 protected height and resolution, ensure that the appropriate cordsets, interfaces, and accessories are ordered.

Protected Height [mm (in.)]	14 mm (0.55 in.) Number of Beams	30 mm (1.18 in.) Number of Beams	Pair Weight [kg (lbs)]	Cat. No.	
				14 mm (0.55 in.)	30 mm (1.18 in.)
120 (4.7)	16	8	1.0 (2.2)	445L-P4L0120YD	445L-P4S0120YD
240 (9.4)	32	16	1.4 (3.1)	**445L-P4L0240YD**	445L-P4S0240YD
360 (14.2)	48	94	1.8 (4.0)	445L-P4L0360YD	445L-P4S0360YD
480 (19.9)	64	94	2.2 (4.9)	445L-P4L0480YD	445L-P4S0480YD
600 (23.6)	80	94	2.6 (5.7)	445L-P4L0600YD	**445L-P4S0600YD**
720 (28.3)	96	94	3.0 (6.6)	445L-P4L0720YD	445L-P4S0720YD
840 (33.1)	112	94	3.5 (7.7)	445L-P4L0840YD	445L-P4S0840YD
960 (37.8)	128	94	4.0 (8.8)	445L-P4L0960YD	**445L-P4S0960YD**
1080 (42.5)	144	94	4.0 (8.8)	445L-P4L1080YD	445L-P4S1080YD
1200 (47.2)	160	94	4.5 (9.9)	445L-P4L1200YD	**445L-P4S1200YD**
1320 (52.0)	176	94	5.0 (11.0)	445L-P4L1320YD	445L-P4S1320YD
1440 (56.7)	172	94	5.5 (12.1)	445L-P4L1440YD	445L-P4S1440YD
1560 (61.4)	188	102	6.0 (13.2)	445L-P4L1560YD	445L-P4S1560YD
1680 (66.1)	204	102	6.5 (14.3)	445L-P4L1680YD	445L-P4S1680YD
1800(70.9)	220	110	7.0 (15.4)	445L-P4L1800YD	445L-P4S1800YD
1920 (75.6)	236	118	7.5 (16.5)	445L-P4L1920YD	445L-P4S1920YD

Note: The cat. nos. listed above are pair cat. nos., to specify a transmitter or receiver only, replace the "P" in the cat. no. with a "T" for transmitter or an "R" for receiver.

Required Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays for 2 N.C. Contact Switch							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-26	**440R-N23135**
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-26	**440R-N23132**
MSR126	2 N.O.	None	Fixed	Auto./Manual	24V AC/DC	5-24	**440R-N23117**
Modular Safety Relays							
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-82	440R-H23176
MSR220P Input Module	—	—	Removable	—	24V DC	5-86	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-102	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-106	440R-W23218
Muting Modules							
MSR22LM	2 N.O.	1 N.C.	Removable	Auto./Manual	24V DC	5-48	**440R-P23071**
MSR42 (requires optical interface to configure 445L-AF6150	2 PNP	2 PNP, configurable	Removable	Auto./manual or manual monitored	24V DC	5-52	**440R-P226AGS-NNR**

POC Type 4 Safety Light Curtains

GuardShield Micro 400

Micro 400 IP69K Light Curtains

The GuardShield Micro 400 is offered with the transmitter and receiver sealed in clear acrylic tubes with an environmental rating of IP69K. These IP69K Micro 400 light curtains are factory sealed and are ordered as pairs. They are offered in a 14 mm resolution in protected heights of 300 mm (11.8 in.), 600 mm (23.6 in.), 900 mm (35.4 in.) and 1200 mm (47.2 in.) with an operating range of five meters.

The required MSR 41 or MSR42 controllers maintain the IP20 rating and must be mounted in a suitable enclosure.

The Micro 400 IP69K transmitter and receiver are both offered with eight pin M12 connectors at the end of 500 mm (19.8 in.) integrated cables. The patchcords to connect the transmitter and receiver to the controller are the same cat. no. and are offered in 3 m (9.8 ft), 5 m (16.4 ft), and 8 m (26.2 ft) lengths.

These patchcords are configured on one end with M12 connectors, which mate to the integrated pigtail connectors and RJ45 connectors on the opposite end. These connectors plug into the MSR41 or MSR42 controller.

Areas of Use

- Light assembly machines/equipment
- Semi-conductor
- Micro-electronics
- Pharmaceutical
- Filling systems
- Clean rooms
- Food processing

Protected Height [mm (in.)]	Resolution [mm (in.)]	Number of Beams	Cat. No.
300 (11.8)	14 (0.55)	30	445L-P4C0300KD
600 (23.6)	14 (0.55)	60	445L-P4C0600KD
900 (35.4)	14 (0.55)	90	445L-P4C0900KD
1200 (47.2)	14 (0.55)	120	445L-P4C1200KD

Required Micro 400 Controller—Select One

	Mounting	Size	Cat. No.
 *MSR41—ON/OFF*	35 mm DIN Rail	22.5 mm	**440R-P221AGS**
 *MSR42—Multi-functional module*	35 mm DIN Rail	22.5 mm	**440R-P226AGS-NNR**

Optional Safety Relay Interfaces

Relay	Input Voltage	Reset	Outputs	Cat. No.
 MSR45E Safety Relay Expansion Model	Supplied by MSR41 or MSR42	Determined by MSR41 or MSR42	2 N.O.	**440R-P4NANS**

Possible Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays for 2 N.C. Contact Switch							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-26	**440R-N23135**
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-26	**440R-N23132**
MSR126	2 N.O.	None	Fixed	Auto./Manual	24V AC/DC	5-24	**440R-N23117**

POC Type 2 Safety Light Curtains

GuardShield Type 2

Product Selection

Standard System

The Allen-Bradley Guardmaster GuardShield safety light curtains are ordered as pairs—transmitter and receiver—and are shipped under one part number. Each GuardShield Type 2 transmitter and receiver is packaged with two right angle mounting brackets. After selecting the appropriate light curtain pair, ensure that required interfaces and accessories are ordered.

Resolution [mm (in.)]	Number of Beams	Protective Height—mm (in)	Pair Weight [kg (lb)]	Cat. No.	
				Guard Only	Restart Interlock with EDM
30 (1.18)	8	160 (6.3)	0.9 (1.9)	440L-P2KA0160YD	440L-P2KD0160YD
30 (1.18)	16	320 (12.6)	1.1 (2.4)	440L-P2KA0320YD	440L-P2KD0320YD
30 (1.18)	24	480 (18.9)	1.6 (3.5)	**440L-P2KA0480YD**	440L-P2KD0480YD
30 (1.18)	32	640 (25.2)	2.0 (4.4)	**440L-P2KA0640YD**	440L-P2KD0640YD
30 (1.18)	40	800 (31.5)	2.5 (5.5)	440L-P2KA0800YD	440L-P2KD0800YD
30 (1.18)	48	960 (37.8)	2.9 (6.4)	440L-P2KA0960YD	440L-P2KD0960YD
30 (1.18)	56	1120 (44.1)	3.4 (7.5)	440L-P2KA1120YD	440L-P2KD1120YD
30 (1.18)	64	1280 (50.4)	3.8 (8.4)	440L-P2KA1280YD	440L-P2KD1280YD
30 (1.18)	72	1440 (56.7)	4.3 (9.5)	440L-P2KA1440YD	440L-P2KD1440YD
30 (1.18)	80	1600 (63.0)	4.7 (10.4)	440L-P2KA1600YD	440L-P2KD1600YD
30 (1.18)	88	1760 (69.1)	5.2 (11.5)	440L-P2KA1760YD	440L-P2KD1760YD

Note: The GuardShield transmitter requires a 4-pin cable and the receiver requires an 8-pin cable.

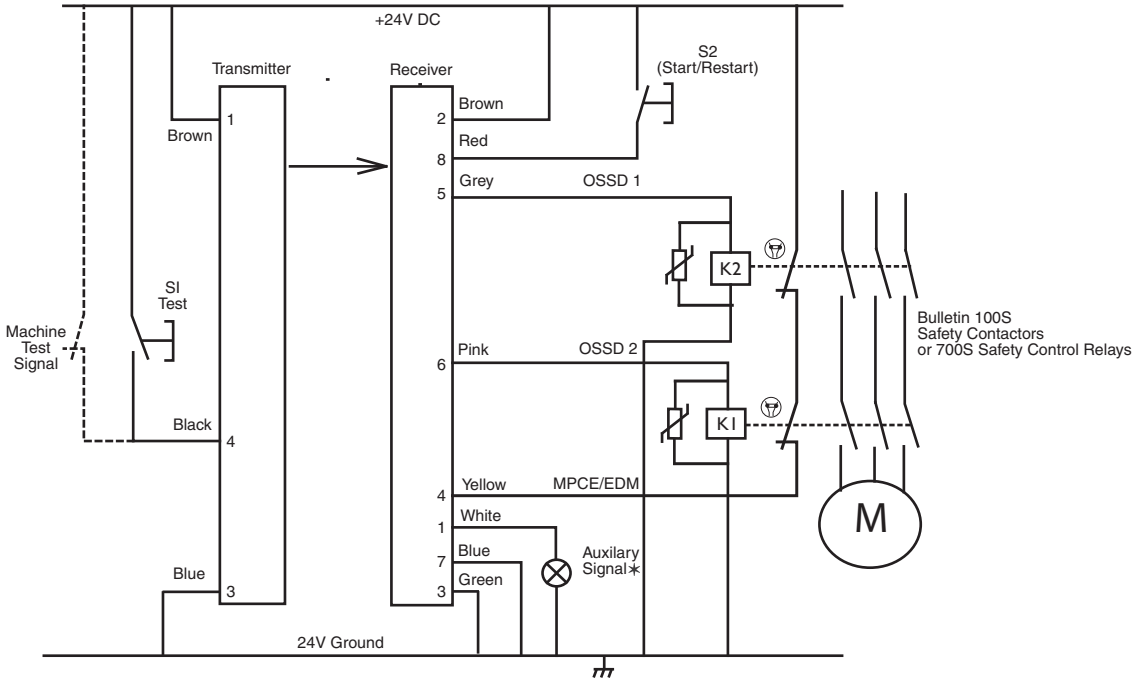
Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays for 2 N.C. Contact Switch							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-26	**440R-N23135**
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-26	**440R-N23132**
MSR126	2 N.O.	None	Fixed	Auto./Manual	24V AC/DC	5-24	**440R-N23117**
Modular Safety Relays							
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-82	440R-H23176
MSR220P Input Module	—	—	Removable	—	24V DC	5-86	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-102	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-106	440R-W23218
Muting Modules							
MSR22LM	2 N.O.	1 N.C.	Removable	Auto./Manual	24V DC	5-48	**440R-P23071**
MSR42 (requires optical interface to configure 445L-AF6150	2 PNP	2 PNP, configurable	Removable	Auto./manual or manual monitored	24V DC	5-52	**440R-P226AGS-NNR**

Note: The use of a category 4 safety relay module does not improve the category rating of the safety system beyond the category 2 rating of the Type 2 GuardShield light curtain.

Wiring Diagram for Connection of OSSDs Directly to Contactors (FSDs) fpr GuardShield Type with EDM and Restart Interlock

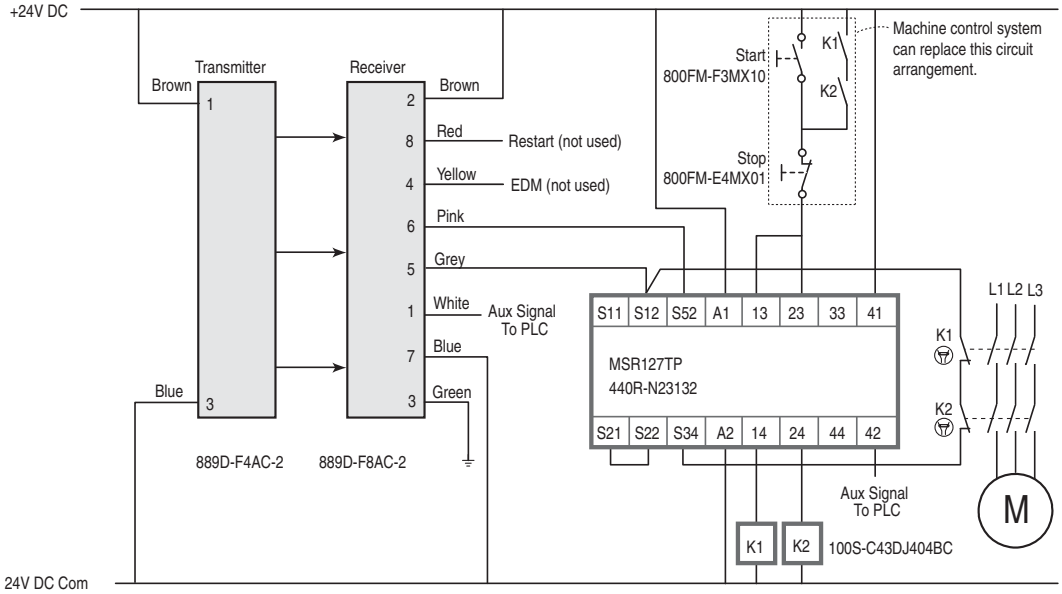
Wiring diagram is not intended to be used for installation purposes.



* Auxiliary output is nonsafety. Can be connected to a lamp, motor or status to a PLC.

K1, K2	Safety relay or safety contactor for OSSD 1 and OSSD 2 connection
S1	Switch for external system test (optional)
S2	Switch for reset of light curtain from start/restart interlock

Wiring Diagram for Connection of OSSDs Directly to a Safety Relay Module



Product Selection

Standard System Safety Light Curtain

The Allen-Bradley Guardmaster GuardShield Safe 2 safety light curtains are offered in 30 mm resolution, are ordered as pairs—transmitter and receiver—and are shipped under one cat. no. Each GuardShield Safe 2 pair are shipped with 180° mounting brackets. After selecting the appropriate light curtain pair, ensure that the appropriate cables, interfaces, and accessories are ordered.

Protected Height [mm (in.)]	Resolution [mm (in.)]	Number of Beams	Pair Weight [kg (lbs)]	Cat. No.
120 (4.7)	30 (1.18)	8	1.0 (2.2)	445L-P2S0120YD
240 (9.4)	30 (1.18)	16	1.4 (3.09)	445L-P2S0240YD
360 (14.2)	30 (1.18)	24	1.8 (3.97)	445L-P2S0360YD
480 (19.9)	30 (1.18)	32	2.2 (4.85)	445L-P2S0480YD
600 (23.6)	30 (1.18)	40	2.6 (5.73)	445L-P2S0600YD
720 (28.3)	30 (1.18)	48	3.0 (6.61)	445L-P2S0720YD
840 (33.1)	30 (1.18)	56	3.5 (7.72)	445L-P2S0840YD
960 (37.8)	30 (1.18)	64	4.0 (8.82)	445L-P2S0960YD
1080 (42.5)	30 (1.18)	72	4.0 (8.82)	445L-P2S1080YD
1200 (47.2)	30 (1.18)	80	4.5 (9.92)	445L-P2S1200YD
1320 (52.0)	30 (1.18)	88	5.0 (11.02)	445L-P2S1320YD
1440 (56.7)	30 (1.18)	86	5.5 (12.13)	445L-P2S1440YD
1560 (61.4)	30 (1.18)	94	6.0 (13.23)	445L-P2S1560YD
1680 (66.1)	30 (1.18)	102	6.5 (14.33)	445L-P2S1680YD
1800 (70.9)	30 (1.18)	110	7.0 (15.43)	445L-P2S1800YD
1920 (75.6)	30 (1.18)	118	7.5 (16.53)	445L-P2S1920YD

Note: The cat. nos. listed above are pair cat. nos., to specify a transmitter or receiver only, replace the "P" in the cat. no. with a "T" for transmitter or an "R" for receiver.

Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays for 2 N.C. Contact Switch							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-26	**440R-N23135**
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-26	**440R-N23132**
MSR126	2 N.O.	None	Fixed	Auto./Manual	24V AC/DC	5-24	**440R-N23117**
Modular Safety Relays							
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-82	440R-H23176
MSR220P Input Module	—	—	Removable	—	24V DC	5-86	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-102	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-106	440R-W23218
Muting Modules							
MSR22LM	2 N.O.	1 N.C.	Removable	Auto./Manual	24V DC	5-48	**440R-P23071**
MSR42 (requires optical interface to configure 445L-AF6150	2 PNP	2 PNP, configurable	Removable	Auto./manual or manual monitored	24V DC	5-52	**440R-P226AGS-NNR**

Note: The use of a category 4 safety relay module does not improve the category rating of the safety system beyond the Category 2 rating of the Type 2 light curtain in use.

PAC Type 4 Safety Light Curtains

GuardShield PAC

Product Selection

PAC Safety Light Curtains—Standard

The Allen-Bradley Guardmaster GuardShield PAC safety light curtains are ordered as a pair—transmitter and receiver—and are shipped under one Cat. No. After selecting the appropriate Cat. No. ensure that the required interfaces and accessories are ordered as well.

Protected Height [mm (in.)]	Beam Spacing	Number of Beams	Cat. No.
520 (20.4)	500 mm (19.7 in.)	2	440L-P4A2500YD
820 (32.3)	400 mm (15.7 in.)	3	**440L-P4A3400YD**

Note: The GuardShield transmitter requires a 4-pin cable and the receiver requires an 8-pin cable.
Note: To select a transmitter or receiver substitute the "P" in the above cat. nos. with a "T" for a transmitter or an "R" for a receiver.

GuardShield PAC with Integrated Laser Alignment

Protected Height [mm (in.)]	Beam Spacing	Number of Beams	Cat. No.
520 (20.4)	500 mm (19.7 in.)	2	440L-P4AL2500YD
820 (32.3)	400 mm (15.7 in.)	3	440L-P4AL3400YD

Note: The GuardShield transmitter requires a 4-pin cable and the receiver requires an 8-pin cable.
Note: GuardShields are sold in pairs. To select a transmitter or receiver, replace the "P" in the cat. no. with a "T" for a transmitter or an "R" for a receiver.

GuardShield PAC with Integrated Laser Alignment and I/O Connectivity

Protected Height [mm (in.)]	Beam Spacing	Number of Beams	Cat. No.
520 (20.4)	500 mm (19.7 in.)	2	440L-P4AL2500YA
820 (32.3)	400 mm (15.7 in.)	3	440L-P4AL3400YA

Note: GuardShields are sold in pairs. To select a transmitter or receiver, replace the "P" in the cat. no. with an "R" for a receiver. PAC with integrated laser alignment and I/O connectivity uses a standard transmitter. To order a transmitter, replace the "P" with a "T" and the last "A" with a "D" (example: 440L-T2500YD).

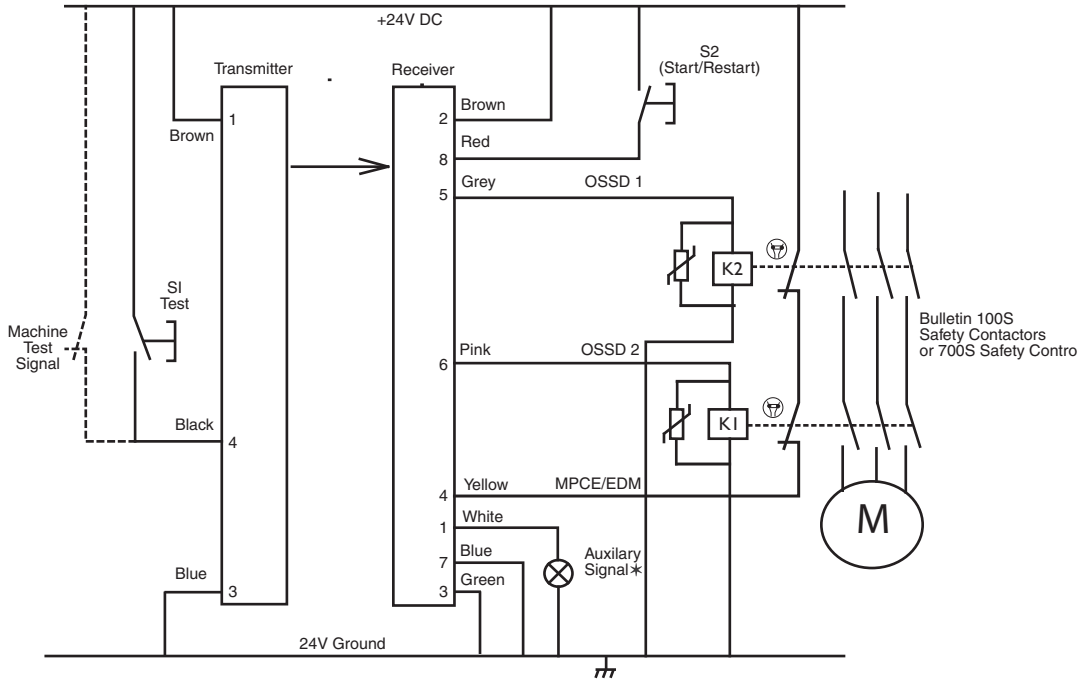
Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays for 2 N.C. Contact Switch							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-26	**440R-N23135**
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-26	**440R-N23132**
MSR126	2 N.O.	None	Fixed	Auto./Manual	24V AC/DC	5-24	**440R-N23117**
Modular Safety Relays							
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-82	440R-H23176
MSR220P Input Module	—	—	Removable	—	24V DC	5-86	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-102	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-106	440R-W23218
Muting Modules							
MSR22LM	2 N.O.	1 N.C.	Removable	Auto./Manual	24V DC	5-48	**440R-P23071**
MSR42 (requires optical interface to configure 445L-AF6150	2 PNP	2 PNP, configurable	Removable	Auto./manual or manual monitored	24V DC	5-52	**440R-P226AGS-NNR**

Note: The use of a category 4 safety relay module does not improve the category rating of the safety system beyond the Category 2 rating of the Type 2 light curtain in use.

Wiring Diagram for Connection of OSSDs Directly to Contactors (FSDs)

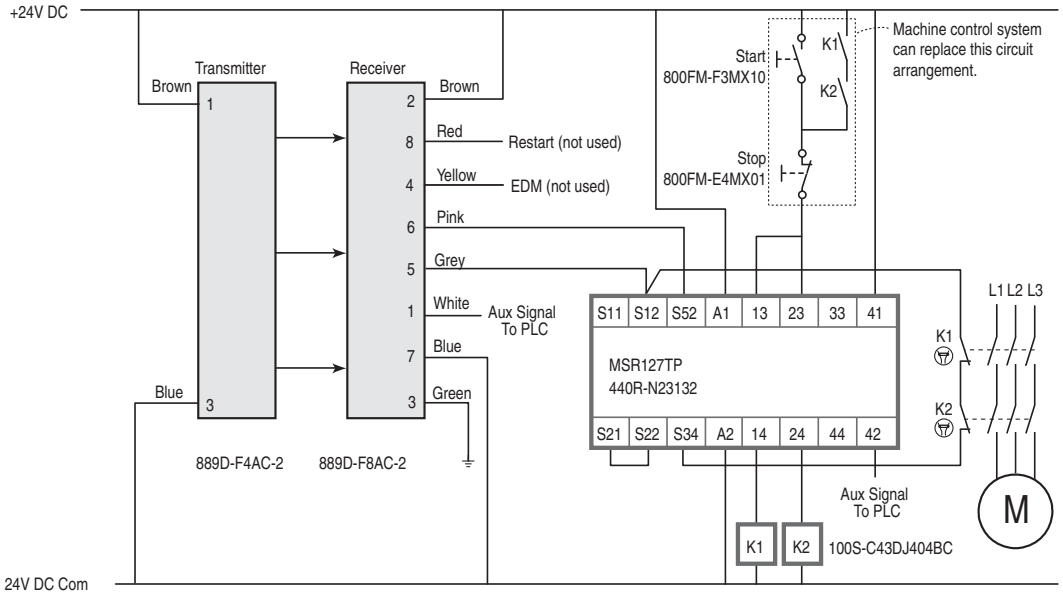
Wiring diagram is not intended to be used for installation purposes.



* Auxiliary output is nonsafety. Can be connected to a lamp, motor or status to a PLC.

K1, K2	Safety relay or safety contactor for OSSD 1 and OSSD 2 connection
S1	Switch for external system test (optional)
S2	Switch for reset of light curtain from start/restart interlock

Wiring Diagram for Connection of OSSDs Directly to a Safety Relay Module



Product Selection

Safety Light Curtain—Standard PAC System

The Allen-Bradley Guardmaster GuardShield Safe 4 PAC safety light curtains are offered with two or three modules with various spacing for whole body detection. These are ordered as pairs (transmitter and receiver) and are shipped under one catalog number. Each GuardShield Safe 4 PAC pair is shipped with mounting brackets. After selecting the appropriate Safe 4 PAC, ensure that the appropriate cordsets, interfaces and accessories are ordered.

Protected Height [mm (in.)]	Number of Beams	Beam Spacing	Pair Weight [kg (lbs)]	Cat. No.
600 (23.6)	2	500 mm	4.0 (8.8)	445L-P4S2500YD
840 (33.0)	3	400 mm	4.5 (9.9)	445L-P4S3400YD

Note: The cat. nos. listed above are pair cat. nos. designated by the "P" in the cat. no. To specify a transmitter or receiver, replace the "P" with a "T" for transmitter and "R" for a receiver. The GuardShield Safe 4 PAC requires a 5-pin M12 cordset for the transmitter and the receiver.

Required Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays for 2 N.C. Contact Switch							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-26	**440R-N23135**
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-26	**440R-N23132**
MSR126	2 N.O.	None	Fixed	Auto./Manual	24V AC/DC	5-24	**440R-N23117**
Modular Safety Relays							
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-82	440R-H23176
MSR220P Input Module	—	—	Removable	—	24V DC	5-86	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-102	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-106	440R-W23218
Muting Modules							
MSR22LM	2 N.O.	1 N.C.	Removable	Auto./Manual	24V DC	5-48	**440R-P23071**
MSR42 (requires optical interface to configure 445L-AF6150	2 PNP	2 PNP, configurable	Removable	Auto./manual or manual monitored	24V DC	5-52	**440R-P226AGS-NNR**

Note: The use of a category 4 safety relay module does not improve the category rating of the safety system beyond the Category 2 rating of the Type 2 light curtain in use.

Product Selection

Selection Guide for Receiver

Operating Range	Connection Type	Cat. No.
0.5…20 m (1.64…65.5)	Terminal chamber with cable gland (PG13.5 thread)	**440L-R4F0020Q**
15…70 m (49.2…300 ft)		**440L-R4F1570Q**

Selection Guide for Transmitter

Operating Range	Connection Type	Cat. No.
0…70 m (0…300 ft)	Terminal chamber with cable gland (PG13.5 thread)	**440L-T4F2070Q**

Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays for 2 N.C. Contact Switch							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-26	**440R-N23135**
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-26	**440R-N23132**
MSR126	2 N.O.	None	Fixed	Auto./Manual	24V AC/DC	5-24	**440R-N23117**
Modular Safety Relays							
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-82	440R-H23176
MSR220P Input Module	—	—	Removable	—	24V DC	5-86	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-102	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-106	440R-W23218
Muting Modules							
MSR22LM	2 N.O.	1 N.C.	Removable	Auto./Manual	24V DC	5-48	**440R-P23071**
MSR42 (requires optical interface to configure 445L-AF6150	2 PNP	2 PNP, configurable	Removable	Auto./manual or manual monitored	24V DC	5-52	**440R-P226AGS-NNR**

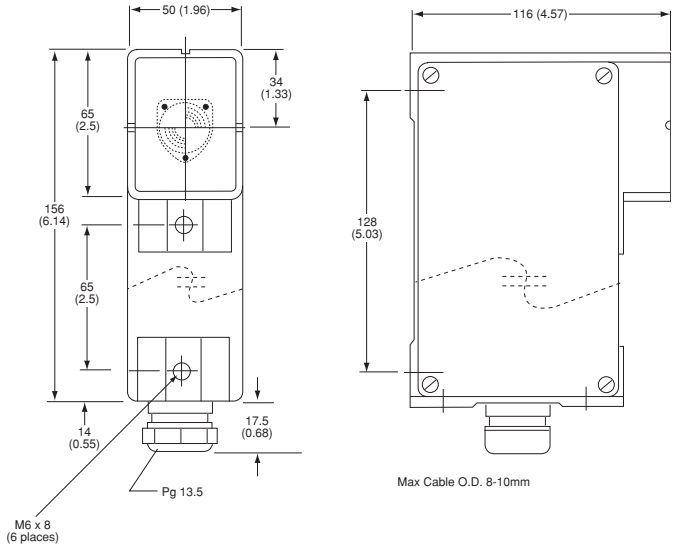
Note: The use of a category 4 safety relay module does not improve the category rating of the safety system beyond the Category 2 rating of the Type 2 light curtain in use.

Accessories

	Description	Cat. No.
	Laser alignment tool	**440L-ALAT**
	Adaptor for alignment aid on AAC	440L-ALBRK1
	Mounting bracket for AAC	**440L-AMBRK4**
	Corner mirror for scanning range 0…30 m	440L-AMIRR1
	Mounting kit for 440L-AMIRR1	440L-AMKIT
	Mounting bracket for mirror 440L-AMIRR1	440L-AMBRK1
	Glass corner mirror, 45° angle 0…30 m	**440L-AMIRR2**

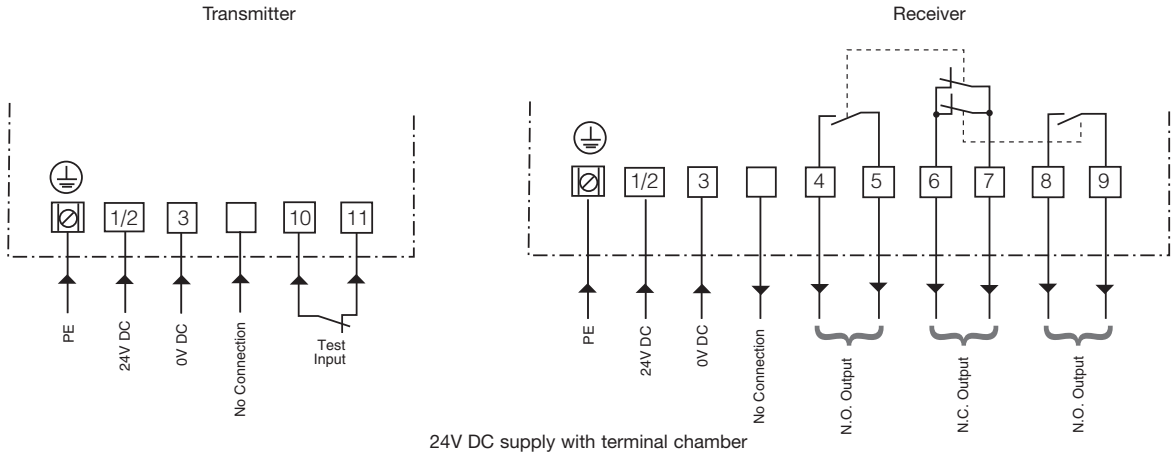
Approximate Dimensions

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



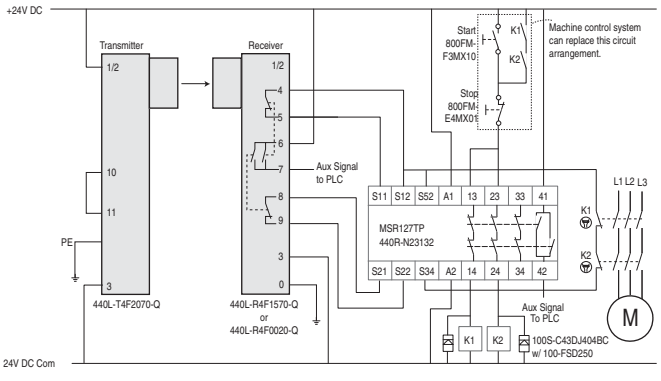
Typical Wiring Diagrams

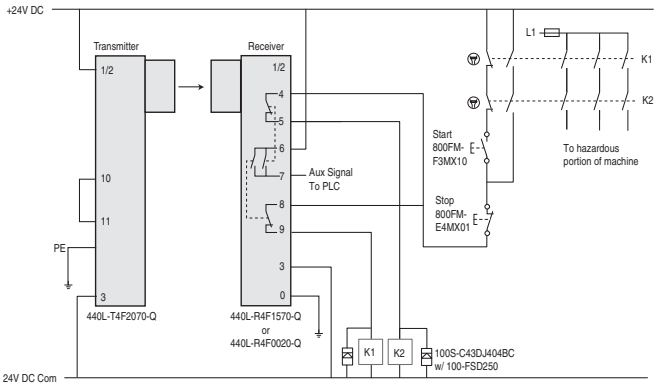
Wiring diagram is not intended to be used for installation purposes.



24V DC supply with terminal chamber

Transmitter





Product Selection

Singlezone Safety Laser Scanner System Components

Item	Description		Cat. No.
1		Scan head and I/O module assembly	**442L-SFZNSZ**
2		Prewired 13 conductor cable with memory module (10 or 20 m (32.8 or 65.6 ft) required)	**442L-CSFZNMZ-10** 442L-CSFZNMZ-20
3	2 m (6.56 ft) RS232 program cable (required) or		**442L-ACRS232**
	10 m (32.8 ft) RS232 program cable		442L-ACRS232-8

Multizone Safety Laser Scanner System Components

Item	Description		Cat. No.
1		Scan head and I/O Module (required)	**442L-SFZNMZ**
2		Prewired 13 conductor cable with memory module (10 or 20 m (32.8 or 65.6 ft) required)	**442L-CSFZNMZ-10** 442L-CSFZNMZ-20
3	2 m (6.56 ft) RS232 program cable (required)		**442L-ACRS232**
	10 m (32.8 ft) RS232 program cable		442L-ACRS232-8

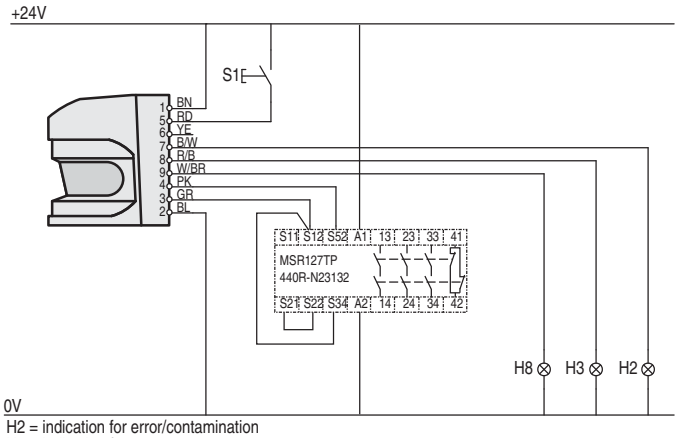
Note: A SafeZone safety laser scanner system requires the scan head and I/O module assembly (1) with either a 10 or 20 meter prewired memory module (2) and a programming cable (3).

Recommended Logic Interfaces

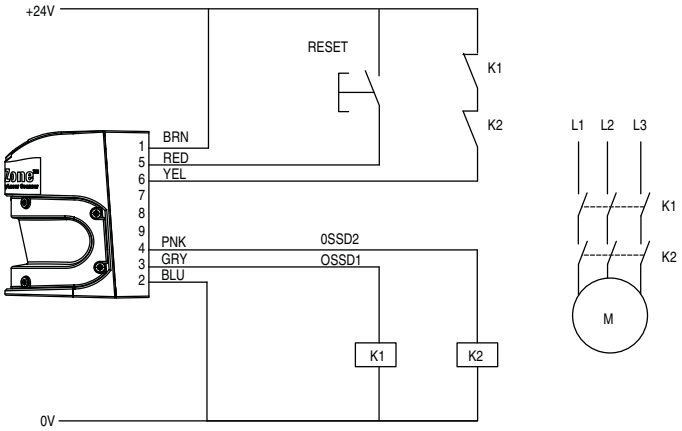
Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays for 2 N.C. Contact Switch							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-26	**440R-N23135**
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-26	**440R-N23132**
MSR126	2 N.O.	None	Fixed	Auto./Manual	24V AC/DC	5-24	**440R-N23117**
Modular Safety Relays							
MSR211P Base 2 N.C. only	2 N.O.	1 N.C.	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-84	440R-H23177
MSR221P Input Module	—	—	Removable	—	24V DC from the base unit	5-88	440R-H23179
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-102	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-106	440R-W23218
Muting Modules							
MSR22LM	2 N.O.	1 N.C.	Removable	Auto./Manual	24V DC	5-48	**440R-P23071**
MSR42 (requires optical interface to configure 445L-AF6150	2 PNP	2 PNP, configurable	Removable	Auto./manual or manual monitored	24V DC	5-52	**440R-P226AGS-NNR**

Typical Wiring Diagram

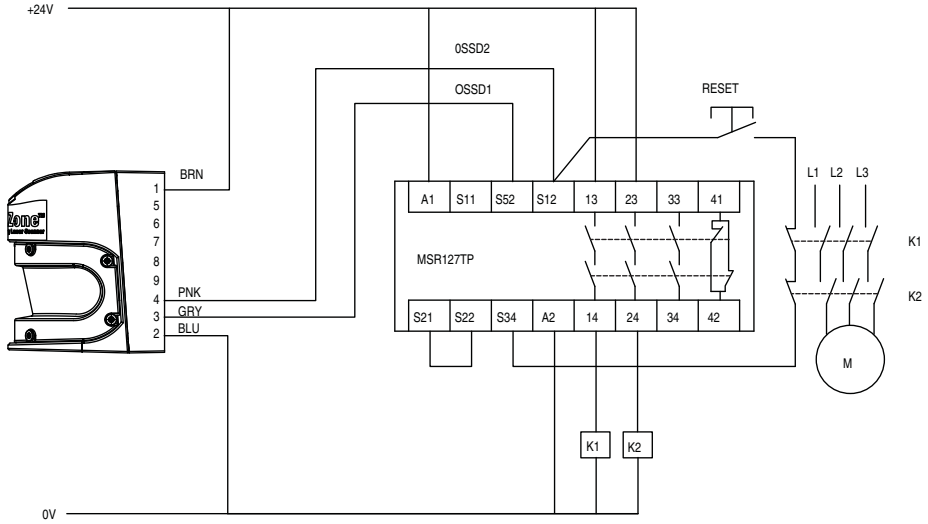
Wiring diagram is not intended to be used for installation purposes.



SafeZone with Restart Interlock to MSR127



SafeZone with EDM and Restart Interlock



SafeZone to MSR127

Description

The Allen Bradley Guardmaster GuardShield Safe 4 is an economical two box, Type 4 safety light curtain with ON/OFF functionality. This basic, guard-only operating mode, safety light curtain has an Integrated Laser Alignment system that simplifies the alignment of each pair of light curtains. Visible laser beams are activated by touching the laser at the finger symbol on front face of the light curtains. Positioning of the transmitter and receiver laser beams to their respective targets facilitates optimal alignment of each Safe 4 pair. The Integrated Laser Alignment system also quickly helps with the re-alignment of pairs when units are knocked out of alignment during the course of the work process or when corner mirrors are used.

The GuardShield Safe 4 is designed to be used in a variety of applications across a broad range of industries in medium to heavy industrial environments. Offered with shock isolator kits for shock and vibration applications and protective heights from 120…1920 mm in 120 mm increments assures that the correct size of safety light curtain is available to suit the application requirement.

The GuardShield Safe 4, with an environmental rating of IP65, meets all applicable global standards and can be used on or around industrial machinery and equipment anywhere in the world.

Features

- M12 connectors
- Optically synchronized
- Integrated laser alignment system
- IP65 enclosure rating
- Simple installation
- cULus Listed and CE Marked for all applicable directives

Applications

- Metal working
- Shears
- Punch presses
- Robot cells
- Automated processes

Specifications

Safety Ratings	
Standards	EN/IEC 61496 Parts 1 and 2, UL 61496 Parts 1 and 2, UL1998
Safety Classification	Type 4 per IEC/EN61496. Category 4 device per EN 954-1, SIL 3 per IEC 61508, PLe per EN/ISO 13849, EN/IEC 61496-1, -2, UL 61496-1, -2, UL 1998
Certifications	cULus Listed and CE Marked for all applicable directives
Power Supply	
Input Power, Max.	24V DC ± 20%
Maximum Residual Ripple	< 10% of U_{sp}
Power Consumption	<500 mA (no load)
Outputs	
Safety Outputs	2 PNP OSSD. 0.3 A, short-circuit protected
Output Voltage	>U_{sp} (at load = 0.1 A)
Switching Current @ Voltage, Min.	300 mA @ 24V DC
Operating Characteristics	
Response Time	Varies by protective height, see Installation Manual
Indicator LEDs	ON -State, OFF-State, internal error
Protected Height [mm (in.)]	120…1920 mm (4.7…75.6 in.) in 120 mm (4.7 in.) increments
Resolution [mm (in.)]	14 mm (0.55 in.) 30 mm (1.18 in.)
Scanning Range	14 mm: 0…9 m (0…29.7 ft) 30 mm: 0…18 m (0…59 ft)
Synchronization	Optical, first beam adjacent to LEDs
Wavelength	950 nm
Environmental	
Enclosure Type Rating	IP65
Relative humidity	15…95% (noncondensing)
Operating Temperature [C (F)]	0…55° (0…131°)
Vibration	IEC 60068-2-6 frequency 10…55 Hz; amplitude 0.35 mm (0.01 in.)
Shock	IEC 60068-2-29; acceleration 10 g, pulse duration 16 ms 10…55 Hz; amplitude 0.35 mm (0.01 in.)
Physical Characteristics	
Mounting	Rear mounting, standard and adjustable (180°)
Weight	Varies by protective height, see Installation Manual
Housing Cross Section	30 x 40 mm (1.18 x 1.57 in.)
Connection Type	Transmitter: 5-pin M12 micro QD Receiver: 5-pin M12 micro QD
Cable Length	30 m (98.4 ft) max.
ILAS Laser Class	Class 2, IEC 60825-1

Product Selection

Contact			Actuator Type	Cat. No.			
				M16 Conduit		Connector§	
Safety	Auxiliary	Action		M16	1/2 inch NPT Adaptor	Connect to Distribution Box 6-Pin Micro (M12)	Connect to ArmorBlock Guard I/O 5-Pin Micro (M12)♣
3 N.C.	—	—	Flat	440K-C21096	440K-C21048	440K-C21090	440K-C2NNFPS
			90°	440K-C21097	440K-C21057	440K-C21091	—
			GD2 Metal alignment guide w/semi-flex actuator	—	440K-C21062	440K-C21092	440K-C2NNAPS
			—	440K-C21070	—	—	—
2 N.C.	1 N.O.	BBM	Flat	440K-C21098	440K-C21050	440K-C21054	—
			90°	**440K-C21061**	440K-C21058	440K-C21067	—
			GD2 Metal alignment guide w/semi-flex actuator	—	**440K-C21074**	**440K-C21088**	—
			—	440K-C21055	—	—	—
		MBB	Flat	440K-C21052	440K-C21093	440K-C21060	—
			90°	440K-C21065	440K-C21094	440K-C21068	—
			GD2 Metal alignment guide w/semi-flex actuator	—	440K-C21095	440K-C21089	—
			—	440K-C21080	—	—	—

§ For connector ratings see page 3-9.
§ With a 5-pin micro (M12) connector, not all contacts are connected. See *Typical Wiring Diagram* on page 3-17 for wiring details.

Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-24	440R-N23135
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-24	440R-N23132
MSR126T	2 N.O.	None	Fixed	Auto./Manual	24V AC/DC	5-22	440R-N23117
MSR30RT	2 N.O. Solid State	1 N.O. Solid State	Removable	Auto./Manual or Monitored Manual	24V DC	5-16	440R-N23198
Modular Safety Relays							
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-74	440R-H23176
MSR220P Input Module	—	—	Removable	—	24V DC	5-78	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-94	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-98	440R-W23218

Note: For additional Safety Relays connectivity, see the Safety Relays section (page 5-8) of this catalog.
For additional Safety I/O and Safety PLC connectivity, see the Programmable Safety System section (page 5-107) of this catalog.
For application and wiring diagrams, see the Safety Applications section (page 10-1) of this catalog.

Connection Systems

Description	6-Pin Micro (M12)	5-Pin Micro (M12)
Cordset	889R-F6ECA-✶	—
Patchcord	889R-F6ECRM-❄	889R-F5ECRM-✶
Distribution Box	898R-P68MT-A5	—
Shorting Plug	898R-P61MU-RM	—
T-Port	NA	—

✶ Replace symbol with 2 (2 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
❄ Replace symbol with 1 (1 m), 2 (2 m), 3 (3 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
Note: For additional information, see the Safety Connection System section (page 7-1) of this catalog.

Product Selection

Type	Contact		Contact Action	Actuator Type	Cat. No.			
					M20 Conduit		Connector§	
	Safety	Auxiliary			M20	1/2 inch NPT Adaptor	Connect to Distribution Box 4-Pin Micro (M12)	Connect to ArmorBlock Guard I/O 5-Pin Micro (M12)
Trojan T15 Standard	2 N.C.	—	—	Standard	440K-T11303	440K-T11267	440K-T11307	440K-V2NNSPS
				Fully-Flex	440K-T11395	440K-T11273	440K-T11384	440K-V2NNBPS
				—	**440K-T11269**	—	440K-T11385	—
	1 N.C.	1 N.O.	BBM	Standard	440K-T11305	440K-T11268	440K-T11386	—
				Fully-Flex	440K-T11396	440K-T11276	440K-T11387	—
				—	440K-T11270	—	440K-T11388	—
Trojan T15 GD2	2 N.C.	—	—	GD2 Standard	440K-T11463	440K-T11288	440K-T11389	440K-V2NNGPS-NG
				Fully-Flex	440K-T11397	440K-T11287	440K-T11390	—
				—	440K-T11280	—	440K-T11391	—
	1 N.C.	1 N.O.	BBM	GD2 Standard	440K-T11398	440K-T11284	440K-T11392	—
				Fully-Flex	440K-T11399	440K-T11283	440K-T11393	—
				—	440K-T11279	—	440K-T11394	—

§ For connector ratings see page 3-9.

Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays for 2 N.C. Contact Switch							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-24	440R-N23135
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-24	440R-N23132
MSR30RT	2 N.O. Solid State	1 N.O. Solid State	Removable	Auto./Manual or Monitored Manual	24V DC	5-16	440R-N23198
Single-Function Safety Relays for 1 N.C. & 1 N.O. Contact Switch							
MSR9T	2 N.O.	1 N.C.	Fixed	Auto./Manual	24V AC/DC	5-14	440R-F23027
MSR33RT	2 N.O. Solid State	1 N.O.	Removable	Auto. or Monitored Manual	24V DC SELV	5-18	440R-F23200
Modular Safety Relays							
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-74	440R-H23176
MSR220P Input Module	—	—	Removable	—	24V DC	5-78	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-94	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-98	440R-W23218

Note: For additional Safety Relays connectivity, see the Safety Relays section (page 5-8) of this catalog.
For additional Safety I/O and Safety PLC connectivity, see the Programmable Safety System section (page 5-107) of this catalog.
For application and wiring diagrams, see the Safety Applications section (page 10-1) of this catalog.

Connection Systems

Description	Connection to Distribution Box 4-Pin Micro (M12)		Connection to ArmorBlock Guard I/O 5-Pin Micro (M12)
	2 N.C.	1 N.C. & 1 N.O.	2 N.C.
Cordset	889D-F4AC-∗	889D-F4AC-∗	—
Patchcord	889D-F4ACDM-❄	889D-F4ACDM-❄	889D-F5ACDM-∗
Distribution Box	898D-4‡LT-DM4	898D-P4‡KT-DM4	—
Shorting Plug	898D-41LU-DM	898D-41KU-DM	—
T-Port	898D-43LY-D4	898D-43KY-D4	—

∗ Replace symbol with 2 (2 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
❄ Replace symbol with 1 (1 m), 2 (2 m), 3 (3 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
‡ Replace symbol with 4 or 8 for number of ports.
Note: For additional information, see the Safety Connection System section (page 7-1) of this catalog.

Tongue Switches

Trojan™ 5 & 6

Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-24	440R-N23135
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-24	440R-N23132
MSR126T	2 N.O.	None	Fixed	Auto./Manual	24V AC/DC	5-22	440R-N23117
MSR30RT	2 N.O. Solid State	1 N.O. Solid State	Removable	Auto./Manual or Monitored Manual	24V DC	5-16	440R-N23198
Modular Safety Relays							
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-74	440R-H23176
MSR220P Input Module	—	—	Removable	—	24V DC	5-78	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-94	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-98	440R-W23218

Note: For additional Safety Relays connectivity, see the Safety Relays section (page 5-8) of this catalog.
For additional Safety I/O and Safety PLC connectivity, see the Programmable Safety System section (page 5-107) of this catalog.
For application and wiring diagrams, see the Safety Applications section (page 10-1) of this catalog.

Connection Systems

Description	Trojan 5		Trojan 6
	5-Pin Micro (M12)	6-Pin Micro (M12)	8-Pin Micro (M12)
Cordset	—	889R-F6ECA-✶	889D-F8AB-✶
Patchcord	889R-F5ECRM-✶	889R-F6ECRM-❄	889D-F8ABDM-❄
Distribution Box	—	898R-F68MT-A5	—
Shorting Plug	—	898R-P61MU-RM	—
T-Port	—	—	—

✶ Replace symbol with 2 (2 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
❄ Replace symbol with 1 (1 m), 2 (2 m), 3 (3 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
‡ Replace symbol with 4 or 8 for number of ports.
Note: For additional information, see the Safety Connection System section (page 7-1) of this catalog.

Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-24	440R-N23135
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-24	440R-N23132
MSR126T	2 N.O.	None	Fixed	Auto./Manual	24V AC/DC	5-22	440R-N23117
MSR30RT	2 N.O. Solid State	1 N.O. Solid State	Removable	Auto./Manual or Monitored Manual	24V DC	5-16	440R-N23198
Modular Safety Relays							
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-74	440R-H23176
MSR220P Input Module	—	—	Removable	—	24V DC	5-78	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-94	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-98	440R-W23218

Note: For additional Safety Relays connectivity, see the Safety Relays section (page 5-8) of this catalog.
For additional Safety I/O and Safety PLC connectivity, see the Programmable Safety System section (page 5-107) of this catalog.
For application and wiring diagrams, see the Safety Applications section (page 10-1) of this catalog.

Connection Systems

Description	4-Pin Micro (M12)	5-Pin Micro (M12)	8-Pin Micro (M12)	12-Pin M23
Cordset	889D-F4AC-✶	—	889D-F8AB-✶	889M-FX9AE-✶
Patchcord	889D-F4ACDM-❄	889D-F5ACDM-✶	889D-F8ABDM-❄	—
Distribution Box	898D-P4‡LT-DM4	—	—	—
Shorting Plug	898D-41LU-DM	—	—	—
T-Port	898D-43LY-D4	—	—	—

✶ Replace symbol with 2 (2 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
❄ Replace symbol with 1 (1 m), 2 (2 m), 3 (3 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
‡ Replace symbol with 4 or 8 for number of ports.
Note: For additional information, see the Safety Connection System section (page 7-1) of this catalog.

Product Selection

Solenoid Voltage	Contact			Actuator Type	Cat. No.			
					M20 Conduit		Connector§	
	Safety	Auxiliary	Action		M20	1/2 inch NPT	12-Pin M23	8-Pin Micro (M12)♣
24V AC/DC	3 N.C.	1 N.O.	BBM	GD2 standard	**440G-MT47037**	440G-MT47039	440G-MT47041	440G-M3NBGDH-AC
				Fully-flexible	440G-MT47038	440G-MT47040	440G-MT47042	440G-M3NBBDH-AC
				—	440G-MT47007	440G-MT47008	**440G-MT47043**	—
	2 N.C.	2 N.O.	BBM	GD2 standard	440G-MT47044	440G-MT47046	440G-MT47048	—
				Fully-flexible	440G-MT47045	440G-MT47047	440G-MT47049	—
				—	440G-MT47010	440G-MT47011	440G-MT47050	—
24V DC with diagnostic function and metal override key	3 N.C.	1 N.O.	BBM	GD2 standard	440G-MT47149	440G-MT47150	440G-MT47151	—
				Fully flexible	440G-MT47152	440G-MT47153	440G-MT47154	—
				No actuator	440G-MT47155	440G-MT47156	440G-MT47157	—
	2 N.C.	2 N.O.	BBM	GD2 standard	440G-MT47158	440G-MT47159	440G-MT47160	—
				Fully flexible	440G-MT47161	440G-MT47162	440G-MT47163	—
				No actuator	440G-MT47164	440G-MT47165	440G-MT47166	—
110V AC/DC	3 N.C.	1 N.O.	BBM	GD2 standard	440G-MT47070	440G-MT47073	—	—
				Fully-flexible	440G-MT47071	440G-MT47074	—	—
				—	440G-MT47013	440G-MT47009	—	—
	2 N.C.	2 N.O.	BBM	GD2 standard	440G-MT47077	440G-MT47079	—	—
				Fully-flexible	440G-MT47078	440G-MT47080	—	—
				—	440G-MT47012	440G-MT47014	—	—
230V AC/DC	3 N.C.	1 N.O.	BBM	—	440G-MT47016	440G-MT47017	—	—
	2 N.C.	2 N.O.		—	440G-MT47015	440G-MT47024	—	—

§ For connector ratings see page 3-9.
♣ With an 8-pin micro (M12) connector, not all contacts are connected. See page 3-39 for wiring details.

Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Time Delay	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays								
MSR127RP	3 N.O.	1 N.C.	—	Removable (Screw)	Monitored Manual	24V AC/DC	5-26	**440R-N23135**
MSR127TP	3 N.O.	1 N.C.	—	Removable (Screw)	Auto./Manual	24V AC/DC	5-26	**440R-N23132**
MSR126T	2 N.O.	None	—	Fixed	Auto./Manual	24V AC/DC	5-24	**440R-N23117**
MSR30RT	2 N.O. Solid State	1 N.O. Solid State	—	Removable	Auto./Manual or Monitored Manual	24V DC	5-16	440R-N23198
Specialty Safety Relays								
MSR178	3 N.O.	2 N.C.	0.5 s…30 min	Removable	Automatic	24V AC/DC, 115V AC or 230V AC	5-40	440R-M23227
CU2	2 N.O.	1 N.C.	0.1 s…40 min	Fixed	—	24V AC/DC	5-56	440R-S07281
CU3	2 N.O.	1 N.C.	—	Fixed	Automatic/Manual	110V AC	5-64	440R-S35002
Modular Safety Relays								
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	—	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-82	440R-H23176
MSR220P Input Module	—	—	—	Removable	—	24V DC	5-86	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	—	Removable	Auto./Manual Monitored Manual	24V DC	5-102	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	—	Removable	—	24V DC from the base unit	5-106	440R-W23218

Note: For additional Safety Relays connectivity, see page 5-12.
For additional Safety I/O and Safety PLC connectivity, see page 5-116.
For application and wiring diagrams, see page 10-1.

Guard Locking Switches

TLS-GD2

Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Time Delay	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays								
MSR127RP	3 N.O.	1 N.C.	—	Removable (Screw)	Monitored Manual	24V AC/DC	5-26	**440R-N23135**
MSR127TP	3 N.O.	1 N.C.	—	Removable (Screw)	Auto./Manual	24V AC/DC	5-26	**440R-N23132**
MSR126T	2 N.O.	None	—	Fixed	Auto./Manual	24V AC/DC	5-24	**440R-N23117**
MSR30RT	2 N.O. Solid State	1 N.O. Solid State	—	Removable	Auto./Manual or Monitored Manual	24V DC	5-16	440R-N23198
Specialty Safety Relays								
MSR178	3 N.O.	2 N.C.	0.5 s…30 min	Removable	Automatic	24V AC/DC, 115V AC or 230V AC	5-40	440R-M23227
CU2	2 N.O.	1 N.C.	0.1 s…40 min	Fixed	—	24V AC/DC	5-56	440R-S07281
CU3	2 N.O.	1 N.C.	—	Fixed	Automatic/Manual	110V AC	5-64	440R-S35002
Modular Safety Relays								
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	—	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-82	440R-H23176
MSR220P Input Module	—	—	—	Removable	—	24V DC	5-86	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	—	Removable	Auto./Manual Monitored Manual	24V DC	5-102	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	—	Removable	—	24V DC from the base unit	5-106	440R-W23218

Note: For additional Safety Relays connectivity, see page 5-12.
For additional Safety I/O and Safety PLC connectivity, see page 5-116.
For application and wiring diagrams, see page 10-1.

Connection Systems

Description	8-Pin Micro (M12)	12-Wire, 12-Pin M23	9-Wire, 12-Pin M23§
Cordset	889D-F8AB-✶	889M-F12AH-✶	889M-FX9AE-✶
Patchcord	889D-F8ABDM-❄	889M-F12AHMU-‡	—

✶ Replace symbol with 2 (2 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
❄ Replace symbol with 1 (1 m), 2 (2 m), 3 (3 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
‡ Replace symbol with 0M3, (0.3 m), 0M6 (0.6 m), 1 (1 m), 2 (2 m) or 3 (3 m) for standard lengths.
§ The 9-wire cordset can be used only with the TLS3 versions.
Note: For additional information, see page 7-1.

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Product Selection

Module Type	Actuator Type	Contact		Solenoid Contacts	Solenoid Voltage	Cat. No.			
						M20 Conduit		Connector§	
		Safety	Auxiliary			M20	1/2 inch NPT Adaptor	12-Pin M23	8-Pin Micro (M12)♣
Standard	Standard	2 N.C.	1 N.O.	2 N.C. & 1 N.O.	24V AC/DC	440G-L07264	440G-L07258	440G-L07298	440G-L2NNSDH-3N
					110V AC/DC	440G-L07263	440G-L07257	—	—
					230V AC/DC	440G-L07262	440G-L07256	—	—
LH Key Lock					24V AC/DC	440G-L07255	440G-L07249	440G-L07301	440G-L2NNSDH-38
					110V AC/DC	440G-L07254	440G-L07248	—	—
					230V AC/DC	440G-L07253	440G-L07247	—	—

§ For connector ratings, see 3-9.
♣ With an 8-pin micro connector, not all contacts are connected. See page 3-49 for wiring details.

Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Time Delay	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays								
MSR127RP	3 N.O.	1 N.C.	—	Removable (Screw)	Monitored Manual	24V AC/DC	5-26	**440R-N23135**
MSR127TP	3 N.O.	1 N.C.	—	Removable (Screw)	Auto./Manual	24V AC/DC	5-26	**440R-N23132**
MSR126T	2 N.O.	None	—	Fixed	Auto./Manual	24V AC/DC	5-24	**440R-N23117**
MSR30RT	2 N.O. Solid State	1 N.O. Solid State	—	Removable	Auto./Manual or Monitored Manual	24V DC	5-16	440R-N23198
Specialty Safety Relays								
MSR178	3 N.O.	2 N.C.	0.5 s…30 min	Removable	Automatic	24V AC/DC, 115V AC or 230V AC	5-40	440R-M23227
CU2	2 N.O.	1 N.C.	0.1 s…40 min	Fixed	—	24V AC/DC	5-56	440R-S07281
CU3	2 N.O.	1 N.C.	—	Fixed	Automatic/Manual	110V AC	5-64	440R-S35002
Modular Safety Relays								
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	—	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-82	440R-H23176
MSR220P Input Module	—	—	—	Removable	—	24V DC	5-86	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	—	Removable	Auto./Manual Monitored Manual	24V DC	5-102	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	—	Removable	—	24V DC from the base unit	5-106	440R-W23218

Note: For additional Safety Relays connectivity, see page 5-12.
For additional Safety I/O and Safety PLC connectivity, see page 5-116.
For application and wiring diagrams, see page 10-1.

Connection Systems

Description	8-Pin Micro (M12)	12-Pin M23
Cordset	889D-F8AB-✶	889M-F12AH-✶
Patchcord	889D-F8ABDM-❄	889M-F12AHMU-‡

✶ Replace symbol with 2 (2 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
❄ Replace symbol with 1 (1 m), 2 (2 m), 3 (3 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
‡ Replace symbol with 0M3, (0.3 m), 0M6 (0.6 m), 1 (1 m), 2 (2 m) or 3 (3 m) for standard lengths.
Note: For additional information, see page 7-1.

Product Selection

Type	Assured Sensing Distance	LED Door Indication/ Diagnostic	Margin Indication	Magnetic Hold	Actuator Code Type	Cat. No.		
						Cable		Connector
						3 m	10 m	6 inch Pigtail, 8-pin Micro (M12)
18 mm plastic barrel/18 mm actuator	15 mm (0.59 in.)	Yes	—	—	Standard	440N-Z21S16A	440N-Z21S16B	**440N-Z21S16H**
					Unique	440N-Z21U16A	440N-Z21U16B	440N-Z21U16H
18 mm plastic barrel/30 mm actuator	25 mm (0.98 in.)	Yes	—	—	Standard	440N-Z21S26A	440N-Z21S26B	**440N-Z21S26H**
					Unique	440N-Z21U26A	440N-Z21U26B	440N-Z21U26H
18 mm stainless steel barrel/18 mm actuator	10 mm (0.39 in.)	Yes	—	—	Standard	440N-Z21S17A	440N-Z21S17B	**440N-Z21S17H**
					Unique	440N-Z21U17A	440N-Z21U17B	440N-Z21U17H
Plastic rectangular/ rectangular actuator	18 mm (0.71 in.)	Yes	—	—	Standard	440N-Z21SS2A	440N-Z21SS2B	**440N-Z21SS2H**
					Unique	440N-Z21US2A	440N-Z21US2B	440N-Z21US2H
			Yes	—	Standard	440N-Z21SS2AN	440N-Z21SS2BN	**440N-Z21SS2HN**
					Unique	440N-Z21US2AN	440N-Z21US2BN	440N-Z21US2HN
			Yes	Yes (9 N)	Standard	440N-Z21SS2AN9	440N-Z21SS2BN9	440N-Z21SS2HN9
					Unique	440N-Z21US2AN9	440N-Z21US2BN9	440N-Z21US2HN9
Plastic housing with integrated latch	Contact/ latched	Yes	—	Adjustable 20…60 N	Standard	440N-Z21SS3PA	440N-Z21SS3PB	440N-Z21SS3PH
					Unique	440N-Z21US3PA	440N-Z21US3PB	440N-Z21US3PH

Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-26	**440R-N23135**
MSR127TP				Auto./Manual		5-26	**440R-N23132**
Modular Safety Relays							
MSR211P Base 2 N.C. only	2 N.O.	1 N.C.	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-84	440R-H23177
MSR220P Input Module	—	—	Removable	—	24V DC	5-86	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-102	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-106	440R-W23218

Note: For additional Safety Relays connectivity, see page 5-12.
For additional Safety I/O and Safety PLC connectivity, see page 5-116.
For application and wiring diagrams, see page 10-1.

Connection Systems

Description	Cat. No.
Cordset	889D-F8AB-✶
Patchcord	889D-F8ABDM-❄
Safety Wired T-Port	898D-438Y-D8
Safety Wired Shorting Plug	898D-418U-DM

✶ Replace symbol with 2 (2 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
❄ Replace symbol with 1 (1 m), 2 (2 m), 3 (3 m), 5 (5 m), or 10 (10 m) for standard lengths.
Note: For additional information, see page 7-1.

Product Selection

Type	Operating Voltage/Input Current	Safety Outputs	Auxiliary Outputs	Status Indicator	Connection	Cat. No.
MC1	—	2 N.C. REEDS	—	No	—	**440N-Z2NRS1C**
					—	**440N-Z2NRS1A**
					10 m Cable	440N-Z2NRS1B
MC2	24V DC, +10%/-15%/50 mA max.	2 N.C. Solid-State Relays	1 x PNP, 0.2 A max.; Status: OFF (0V DC)	Yes	8-Pin Micro (M12)	440N-Z21W1PH
					—	440N-Z21W1PA
					—	440N-Z21W1PB

Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays for 2 N.C. Contact Switch							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-26	**440R-N23135**
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-26	**440R-N23132**
Modular Safety Relays							
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-82	440R-H23176
MSR220P Input Module	—	—	Removable	—	24V DC	5-86	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-102	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-106	440R-W23218

Note: For additional Safety Relays connectivity, see page 5-12.
For additional Safety I/O and Safety PLC connectivity, see page 5-116.
For application and wiring diagrams, see page 10-1.

Connection Systems

Description	Connection to Distribution Box 4-Pin Micro (M12)	8-Pin Micro (M12)
	2 N.C.	2 N.C. & 1 N.O.
Cordset	889D-F4AC-✶	889D-F8AB-✶
Patchcord	889D-F4ACDM-❄	889D-F8ABDM-❄
Distribution Box	898D-4‡LT-DM4	—
Shorting Plug	898D-41LU-DM	—
T-Port	898D-43LY-D4	—

✶ Replace symbol with 2 (2 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
❄ Replace symbol with 1 (1 m), 2 (2 m), 3 (3 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
‡ Replace symbol with 4 or 8 for number of ports.
Note: For additional information, see the page 7-1.

Accessories

Description	Cat. No.
MC1 Spare Actuator	440N-A17233
MC2 Spare Actuator	440N-A32114

Non-Contact Switches

Ferrogard™ 1, 2, 20 & 21

Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays for 2 N.C. Contact Switch							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-26	**440R-N23135**
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-26	**440R-N23132**
MSR30T	2 N.O. Solid State	1 N.O. Solid State	Removable	Auto./Manual or Monitored Manual	24V DC	5-16	440R-N23198
Single-Function Safety Relays for 1 N.C. & 1 N.O. Contact Switch							
MSR9T	2 N.O.	1 N.C.	Fixed	Auto./Manual	24V AC/DC	5-14	440R-F23027
MSR33RT	2 N.O. Solid State	1 N.O.	Removable	Auto. or Monitored Manual	24V DC SELV	5-18	440R-F23200
Modular Safety Relays							
MSR211P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-84	440R-H23176
MSR220P Input Module	—	—	Removable	—	24V DC	5-86	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-102	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-106	440R-W23218

Note: For additional Safety Relays connectivity, see page 5-12.
For additional Safety I/O and Safety PLC connectivity, see page 5-116.
For application and wiring diagrams, see page 10-1.

Connection Systems

Description	Connection to Distribution Box 4-Pin Micro (M12) 1 N.C. & 1 N. O.	6-Pin Micro (M12) 2 N.C. & 1 N.O.
Cordset	889D-F4AC-∗	889R-F6ECA-∗
Patchcord	889D-F4ACDM-❄	889R-F6ECRM-❄
Distribution Box	898D-P4‡KT-DM4	898R-F68MT-A5
Shorting Plug	898D-41KU-DM	898R-P61MU-RM
T-Port	898D-43KY-D4	—

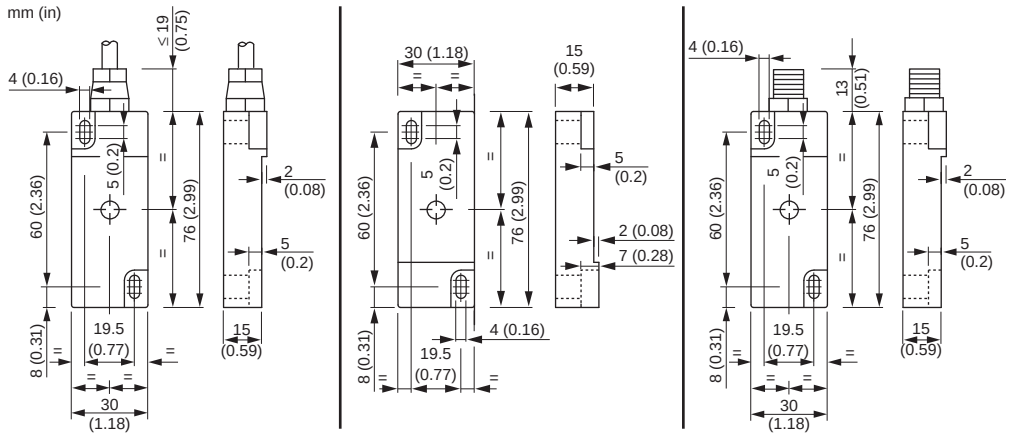
∗ Replace symbol with 2 (2 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
❄ Replace symbol with 1 (1 m), 2 (2 m), 3 (3 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
‡ Replace symbol with 4 or 8 for number of ports.
Note: For additional information, see the Safety Connection System section (page 7-1) of this catalog.

Accessories

Description	Cat. No.
Replacement Actuator	440N-A02005

Approximate Dimensions

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



Product Selection

Safety Contact Switching Capability	Connection Type	Housing Material	Safety Contacts	Auxiliary Contacts	Type	Cat. No.
250V AC 2 A max	Terminals	Red Molded ABS Plastic	1 N.C.	1 N.C.	FRS 3	440N-G02003
				1 N.O.	FRS 4	440N-G02008
				—	FRS 5	440N-G02009

Note: Contacts are described with the guard door closed, that is, actuator in place.

Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-26	**440R-N23135**
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-26	**440R-N23132**
MSR126T	2 N.O.	None	Fixed	Auto./Manual	24V AC/DC	5-24	**440R-N23117**
MSR30T	2 N.O. Solid State	1 N.O. Solid State	Removable	Auto./Manual or Monitored Manual	24V DC	5-16	440R-N23198
Modular Safety Relays							
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-82	440R-H23176
MSR220P Input Module	—	—	Removable	—	24V DC	5-86	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-102	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-106	440R-W23218

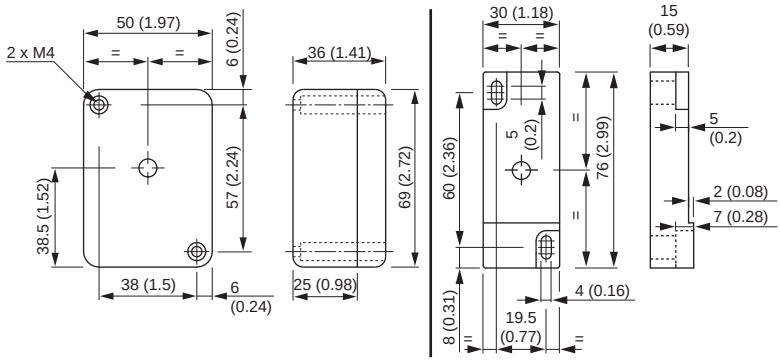
Note: For additional Safety Relays connectivity, see page 5-12.
For additional Safety I/O and Safety PLC connectivity, see page 5-116.
For application and wiring diagrams, see page 10-1.

Accessories

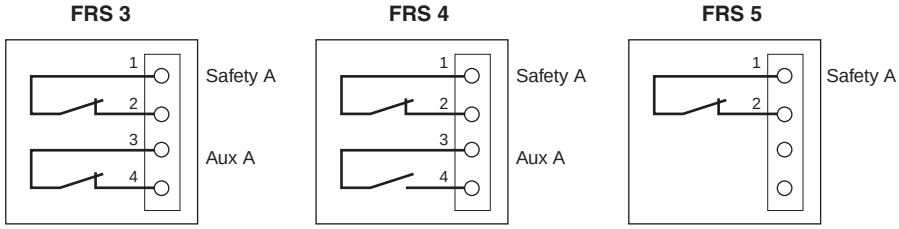
Description	Cat. No.
Replacement Actuator	440N-A02005

Approximate Dimensions

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



Typical Wiring Diagrams



3-Interlock Switches

Product Selection

Safety Contact Switching Capability	Safety Contacts	Auxiliary Contacts	Housing Material	Type	Connection	Cat. No.
250V AC, 2 A	1 N.C.	—	Red Molded ABS Plastic	FRS 6	2 m Cable	**440N-G02023**
					4 m Cable	440N-G02028
					6 m Cable	440N-G02032
					10 m Cable	440N-G02013
					4-Pin Micro QD	440N-G02095
24V DC, 1 A				FRS 9	2 m Cable	**440N-G02044**
					4 m Cable	440N-G02075
					6 m Cable	440N-G02082
					10 m Cable	440N-G02089
					4-Pin Micro QD	440N-G02096
110V AC, 3 A				FRS 10	2 m Cable	440N-G02045
					4 m Cable	440N-G02088
250V AC, 2 A		1 N.C.	Stainless Steel	FRS 13	2 m Cable	440N-G02154
					4 m Cable	440N-G02155
					4-Pin Micro QD	440N-G02160
24V DC, 1 A				FRS 14	2 m Cable	440N-G02156
					4 m Cable	440N-G02157
					4-Pin Micro QD	440N-G02161

Note: Contacts are described with the guard door closed, that is, actuator in place.

Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-26	**440R-N23135**
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-26	**440R-N23132**
MSR126T	2 N.O.	None	Fixed	Auto./Manual	24V AC/DC	5-24	**440R-N23117**
MSR30T	2 N.O. Solid State	1 N.O. Solid State	Removable	Auto./Manual or Monitored Manual	24V DC	5-16	440R-N23198
Modular Safety Relays							
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-82	440R-H23176
MSR220P Input Module	—	—	Removable	—	24V DC	5-86	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-102	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-106	440R-W23218

Note: For additional Safety Relays connectivity, see page 5-12.
For additional Safety I/O and Safety PLC connectivity, see page 5-116.
For application and wiring diagrams, see page 10-1.

Connection Systems

Description	4-Pin Micro (M12)
Cordset	889D-F4AC-∗
Patchcord	889D-F4ACDM-❄

∗ Replace symbol with 2 (2 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
❄ Replace symbol with 1 (1 m), 2 (2 m), 3 (3 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
Note: For additional information, see page 7-1.

Accessories

Description	Cat. No.
FRS 6, 9, 10 Plastic Replacement Actuator	440N-A02025
FRS 13, 14 Stainless Steel Replacement Actuator	440N-A02165

Product Selection

Safety Contact Switching Capability	Safety Contacts	Auxiliary Contacts	Connection	Type	Cat. No.
250V AC, 2 A max.	2 N.C.	—	3 m Cable	FRS 20 GD2	440N-G02113
	1 N.C.	1 N.O.	3 m Cable	FRS 2 GD2	440N-G02112
	2 N.C.		3 m Cable	FRS 21 GD2	440N-G02117
24V DC, 1 A max.	1 N.C.	1 N.O.	3 m Cable	FRS 2 GD2	440N-G02118
			10 m Cable	FRS 2 GD2	440N-G02147
	2 N.C.	—	3 m Cable	FRS 20 GD2	440N-G02119
	2 N.C.	1 N.O.	3 m Cable	FRS 21 GD2	**440N-G02123**
			6 m Cable	FRS 21 GD2	440N-G02143
			10 m Cable	FRS 21 GD2	440N-G02137
			8-Pin Micro (M12)	FRS 21 GD2	**440N-G02149**

Note: Contacts are described with the guard door closed, that is, actuator in place. Switch is shipped with complete actuator.

Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-26	**440R-N23135**
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-26	**440R-N23132**
MSR126T	2 N.O.	None	Fixed	Auto./Manual	24V AC/DC	5-24	**440R-N23117**
MSR30T	2 N.O. Solid State	1 N.O. Solid State	Removable	Auto./Manual or Monitored Manual	24V DC	5-16	440R-N23198
Modular Safety Relays							
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-82	440R-H23176
MSR220P Input Module	—	—	Removable	—	24V DC	5-86	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-102	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-106	440R-W23218

Note: For additional Safety Relays connectivity, see page 5-12.
For additional Safety I/O and Safety PLC connectivity, see page 5-116.
For application and wiring diagrams, see page 10-1.

Connection Systems

Description	8-Pin Micro (M12)
Cordset	889D-F8AB-✶
Patchcord	889D-F8ABDM-❄

Accessories

Description	Cat. No.
Actuator	440N-A02128

✶ Replace symbol with 2 (2 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
❄ Replace symbol with 1 (1 m), 2 (2 m), 3 (3 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
Note: For additional information, see page 7-1.

Product Selection

Safety Contact Switching Capability	Safety Contacts	Auxiliary Contacts	Connection	Housing Material	Type	Cat. No.
250V AC, 2 A	1 N.C.	None	2 m Cable	Brass	GS 1	440N-G02048
				Stainless Steel		440N-G02049
			3 m Cable	Brass	GS2-Ex (brass)	440N-H02046
				Stainless Steel	GS2-Ex (stainless steel)	440N-H02047

Note: Contacts are described with the guard door closed, that is, actuator in place. Switch is shipped with complete actuator.

Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-26	**440R-N23135**
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-26	**440R-N23132**
MSR126T	2 N.O.	None	Fixed	Auto./Manual	24V AC/DC	5-24	**440R-N23117**
MSR30T	2 N.O. Solid State	1 N.O. Solid State	Removable	Auto./Manual or Monitored Manual	24V DC	5-16	440R-N23198
Modular Safety Relays							
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-82	440R-H23176
MSR220P Input Module	—	—	Removable	—	24V DC	5-86	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-102	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-106	440R-W23218

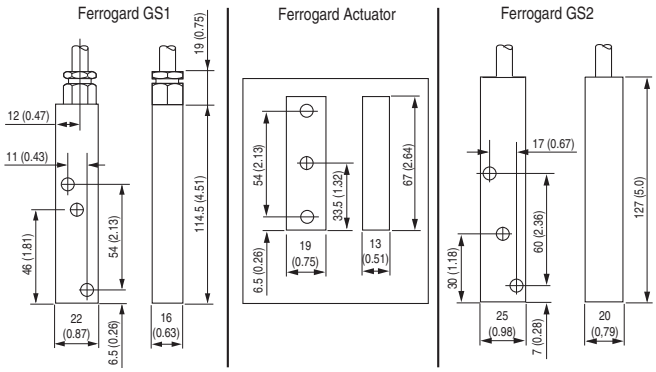
Note: For additional Safety Relays connectivity, see page 5-12.
For additional Safety I/O and Safety PLC connectivity, see page 5-116.
For application and wiring diagrams, see page 10-1.

Accessories

Description	Used with	Cat. No.
Actuator, Alnico	Brass Switch	440N-A02056
Actuator, Epoxy-painted	Stainless Steel	440N-A02057

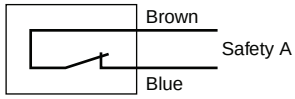
Approximate Dimensions

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



Typical Wiring Diagrams

Cable



External Fuse Safety Contacts

WARNING: All safety contacts fitted with internal non-resettable fuse and must be fused externally as detailed.

GS1 GS2	AC ≤ 1.6 A* (F) IEC 60127-2

Recommended:
*Bussman BK/GDA-1.6 A

Product Selection

Contact			Shaft Type	Actuator Shaft Dimensions—mm (in)	Cat. No.			
					M16 Conduit		Connector§	
Safety	Auxiliary	Action			M16	1/2 inch NPT Adaptor	4-Pin Micro (M12)	Connect to ArmorBlock Guard I/O 5-Pin Micro (M12)
2 N.C.	—	—	Solid	80 x Ø10 (3.14 x 0.39)	440H-S34019	440H-S34023	440H-S34027	—
				60 x Ø8 (2.36 x 0.31)	440H-S34020	440H-S34024	440H-S34028	—
				50 x Ø10(1.96 x 0.39)	440H-S34010	440H-S34017	440H-S34014	440H-S2NNPPS
			Pre-Bored	30 x Ø16 (1.18 x 0.63) bore Ø9.5 (0.37)	440H-S34033	440H-S34034	440H-S34035	440H-S2NNHPS
1 N.C.	1 N.O.	BBM	Solid	80 x Ø10 (3.14 x 0.39)	440H-S34021	440H-S34025	440H-S34029	—
				60 x Ø8 (2.36 x 0.31)	440H-S34022	440H-S34026	440H-S34030	—
				50 x Ø10(1.96 x 0.39)	440H-S34012	440H-S34018	440H-S34015	—
			Pre-Bored	30 x Ø16 (1.18 x 0.63) bore Ø9.5 (0.37)	440H-S34036	—	—	—

§ For connector ratings, see page 3-9.

Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-26	**440R-N23135**
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-26	**440R-N23132**
MSR9T	2 N.O.	1 N.C.	Fixed	Auto./Manual	24V AC/DC	5-14	440R-F23027
MSR30RT	2 N.O. Solid State	1 N.O. Solid State	Removable	Auto./Manual or Monitored Manual	24V DC	5-16	440R-N23198
MSR33RT	2 N.O. Solid State	1 N.O.	Removable	Auto. or Monitored Manual	24V DC SELV	5-18	440R-F23200
Modular Safety Relays							
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-82	440R-H23176
MSR220P Input Module	—	—	Removable	—	24V DC	5-86	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-102	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-106	440R-W23218

Note: For additional Safety Relays connectivity, see page 5-12.
For additional Safety I/O and Safety PLC connectivity, see page 5-116.
For application and wiring diagrams, see page 10-1.

Connection Systems

Description	4-Pin Micro (M12)		5-Pin Micro (M12) for ArmorBlock Guard I/O
	2 N.C.	1 N.C. & 1 N.O.	2 N.C.
Cordset	889D-F4AC-✶	889D-F4AC-✶	—
Patchcord	889D-F4ACDM-❄	889D-F4ACDM-❄	889D-F5ACDM-✶
Distribution Box	889D-4‡LT-DM4	898D-F4‡KT-DM4	—
Shorting Plug	889D-41LU-DM	898D-41KU-DM	—
T-Port	889D-43LY-D4	898D-43KY-D4	—

✶ Replace symbol with 2 (2 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
❄ Replace symbol with 1 (1 m), 2 (2 m), 3 (3 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
‡ Replace symbol with 4 or 8 for number of ports.
Note: For additional information, see the Safety Connection System section (page 7-1) of this catalog.

Product Selection

Contact			Actuator Shaft Dimensions— mm (in)	Shaft Type	Cat. No.			
					M16 Conduit		Connector❄	
Safety	Auxiliary	Action			M16	1/2 inch NPT Adaptor	6-Pin Micro (M12)	Connect to ArmorBlock Guard I/O 5-Pin Micro (M12) ✶
3 N.C.	—	—	80 x Ø10 (3.14 x 0.39)	Solid	440H-E22025	440H-E22050	440H-E22059	—
			60 x Ø8 (2.36 x 0.31)		440H-E22031	440H-E22051	440H-E22060	—
			50 x Ø10 (1.96 x 0.39)		440H-E22047	440H-E22052	440H-E22061	440H-E2NNPPS
			30 x Ø16 (1.18 x 0.63) bore Ø9.5 (0.37)	Pre-bored	440H-E22067	440H-E22068	440H-E22069	440H-E2NNHPS
2 N.C.	1 N.O.	BBM	80 x Ø10 (3.14 x 0.39)	Solid	440H-E22027	440H-E22053	440H-E22037	—
			60 x Ø8 (2.36 x 0.31)		440H-E22033	440H-E22054	440H-E22039	—
			50 x Ø10 (1.96 x 0.39)		440H-E22048	440H-E22055	440H-E22062	—
			30 x Ø16 (1.18 x 0.63) bore Ø9.5 (0.37)	Pre-bored	440H-E22064	440H-E22065	440H-E22066	—
		MBB	80 x Ø10 (3.14 x 0.39)	Solid	440H-E22029	440H-E22056	440H-E22038	—
			60 x Ø8 (2.36 x 0.31)		440H-E22035	440H-E22057	440H-E22040	—
			50 x Ø10 (1.96 x 0.39)		440H-E22049	440H-E22058	440H-E22063	—
			30 x Ø16 (1.18 x 0.63) bore Ø9.5 (0.37)	Pre-bored	440H-E22070	440H-E22071	440H-E22072	—

✶ With a 5-pin micro (M12) connector, not all contacts are connected. See page 3-97 for wiring details.
❄ For connector ratings, see 3-9.

Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-26	**440R-N23135**
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-26	**440R-N23132**
MSR126T	2 N.O.	None	Fixed	Auto./Manual	24V AC/DC	5-24	**440R-N23117**
MSR30RT	2 N.O. Solid State	1 N.O. Solid State	Removable	Auto./Manual or Monitored Manual	24V DC	5-16	440R-N23198
Modular Safety Relays							
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-82	440R-H23176
MSR220P Input Module	—	—	Removable	—	24V DC	5-86	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-102	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-106	440R-W23218

Note: For additional Safety Relays connectivity, see page 5-12.
For additional Safety I/O and Safety PLC connectivity, see page 5-116.
For application and wiring diagrams, see page 10-1.

Connection Systems

Description	6-Pin Micro 3 N.C.-2 N.C. & 1 N.O.	Connections to ArmorBlock Guard I/O 5-Pin Micro (M12) 3 N.C.
Cordset	889R-F6ECA-‡	—
Patchcord	889R-F6ECRM-§	889D-F5ACDM-‡
Distribution Box	898R-P68MT-A5	—
Shorting Plug	898R-P61MU-RM	—

‡ Replace symbol with 2 (2 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
§ Replace symbol with 1 (1 m), 2 (2 m), 3 (3 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
Note: For additional information, see page 7-1.

Product Selection

Safety Contacts	Auxiliary Contacts	Contact Action	Shaft Dimensions	Operating Shaft Type	Cat. No.		
					M20 Conduit		Connector§
					M20	1/2 inch NPT Adaptor	8-Pin Micro (M12)
2 N.C.	1 N.O.	BBM	L = 30 (1.18) D = 16 (0.63)	Pre-Bored	440H-R03074	440H-R03078	440H-R03111
			L = 85 (3.35) D = 12.7 (0.5)	Solid	440H-R03079	440H-R03088	440H-R03112

§ For connector ratings, see 3-9.

Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-26	**440R-N23135**
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-26	**440R-N23132**
MSR126T	2 N.O.	None	Fixed	Auto./Manual	24V AC/DC	5-24	**440R-N23117**
MSR30RT	2 N.O. Solid State	1 N.O. Solid State	Removable	Auto./Manual or Monitored Manual	24V DC	5-16	440R-N23198
Modular Safety Relays							
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-82	440R-H23176
MSR220P Input Module	—	—	Removable	—	24V DC	5-86	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-102	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-106	440R-W23218

Note: For additional Safety Relays connectivity, see page 5-12.
For additional Safety I/O and Safety PLC connectivity, see page 5-116.
For application and wiring diagrams, see page 10-1.

Connection Systems

Description	8-Pin Micro (M12)
	2 N.C. & 1 N.O.
Cordset	889D-F8AB-∗
Patchcord	889D-F8ABDM-❄
Distribution Box	—
Shorting Plug	—
T-Port	—

∗ Replace symbol with 2 (2 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
❄ Replace symbol with 1 (1 m), 2 (2 m), 3 (3 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
Note: For additional information, see page 7-1.

Product Selection

Contacts		Cat. No.				
		Conduits		Connectors✶		
Safety	Auxiliary	M20	1/2 inch NPT	12-Pin M23	8-Pin Micro (M12)❄	Connect to ArmorBlock Guard I/O 5-Pin Micro (M12)‡
2 N.C.	2 N.O.	**440E-D13118**	**440E-D13120**	440E-D13132	440E-D21BNYH	440E-D2NNNYS
3 N.C.	1 N.O.	**440E-D13112**	440E-D13114	440E-D13124	—	—

✶ For connector ratings, see page 3-9.
❄ With an 8-pin micro (M12) connector, not all contacts are connected. See *Typical Wiring Diagram* on page 4-9 for wiring details.
‡ For connection to ArmorBlock Guard I/O. With a 5-pin micro (M12) connector, not all contacts are connected. See *Typical Wiring Diagram* on page 4-9 for wiring details.

Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays for 2 N.C. Contact Switch							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-26	**440R-N23135**
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-26	**440R-N23132**
MSR126T	2 N.O.	None	Fixed	Auto./Manual	24V AC/DC	5-24	**440R-N23117**
MSR30RT	2 N.O. Solid State	1 N.O. Solid State	Removable	Auto./Manual or Monitored Manual	24V DC	5-16	440R-N23198
Modular Safety Relays							
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-82	440R-H23176
MSR220P Input Module	—	—	Removable	—	24V DC	5-86	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-102	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-106	440R-W23218

Note: For additional Safety Relays connectivity, see the Safety Relays section (page 5-8) of this catalog.
For additional Safety I/O and Safety PLC connectivity, see the Programmable Safety System section (page 5-115) of this catalog.
For application and wiring diagrams, see the Safety Applications section (page 10-1) of this catalog.

Connection Systems

Description	5-Pin Micro (M12)⌘	8-Pin Micro (M12)	12-Pin M23
Cordset	—	889D-F8AB-§	889M-FX9AE-§
Patchcord	889D-F5ACDM-♣	889D-F8ABDM-♣	889M-F12AHMU-➢

§ Replace symbol with 2 (2 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
♣ Replace symbol with 1 (1 m), 2 (2 m), 3 (3 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
➢ Replace symbol with 0M3 (0.3 m), 0M6 (0.6 m), 1 (1 m), 2 (2 m) or 3 (3 m) for standard lengths.
⌘ To connect to ArmorBlock Guard I/O.

Product Selection

Cable Span	Safety Contacts	Auxiliary Contacts	Cat. No.				
			Conduits		Connectors✶		
			M20	1/2 inch NPT	12-Pin M23	8-Pin Micro❄	Connect to ArmorBlock Guard I/O 5-Pin Micro (M12)‡
75 m (246 ft)	2 N.C.	2 N.O.	**440E-L13137**	**440E-L13133**	440E-L13140	440E-L21BNYH	440E-L2NNNYS
	3 N.C.	1 N.O.	**440E-L13042**	**440E-L13043**	440E-L13141	—	—
75…125 m (146…410 ft)	2 N.C.	2 N.O.	440E-L13153	440E-L13155	440E-L13163	440E-L21BTYH	—
	3 N.C.	1 N.O.	440E-L13150	440E-L13152	440E-L13164	—	—

✶ For connector ratings, see page 3-9.
❄ For connection to ArmorBlock Guard I/O. With a 5-pin micro (M12) connector, not all contacts are connected. See page 4-15 for wiring details.
‡ With an 8-pin micro (M12) connector, not all contacts are connected. See page 4-15 for wiring details.

Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays for 2 N.C. Contact Switch							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-26	**440R-N23135**
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-26	**440R-N23132**
MSR126T	2 N.O.	None	Fixed	Auto./Manual	24V AC/DC	5-24	**440R-N23117**
MSR30RT	2 N.O. Solid State	1 N.O. Solid State	Removable	Auto./Manual or Monitored Manual	24V DC	5-16	440R-N23198
Modular Safety Relays							
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-82	440R-H23176
MSR220P Input Module	—	—	Removable	—	24V DC	5-86	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-102	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-106	440R-W23218

Note: For additional Safety Relays connectivity, see page 5-4.
For additional Safety I/O and Safety PLC connectivity, see page 5-116.
For application and wiring diagrams, see page 10-1.

Connection Systems

Description	5-Pin Micro (M12)	8-Pin Micro (M12)	12-Pin M23
Cordset	—	889D-F8AB-§	889M-FX9AE-§
Patchcord	889D-F5ACDM-✶	889D-F8ABDM-♣	889M-F12AHMU-➢

✶ Replace symbol with 0M3 (0.3 m), 1 (1 m), 2 (2 m), 3 (3 m), 5 (5 m), or 10 (10 m) for standard lengths.
§ Replace symbol with 2 (2 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
♣ Replace symbol with 1 (1 m), 2 (2 m), 3 (3 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
➢ Replace symbol with 0M3 (0.3 m), 0M6 (0.6 m), 1 (1 m), 2 (2 m) or 3 (3 m) for standard length.

Product Selection

Cable Span	Safety Contacts	Auxiliary Contacts	Cat. No.		
			Conduits		Connectors§
			M20	1/2 inch NPT	12-Pin M23
Up to 75 m (246 ft)	2 N.C.	2 N.O.	**440E-L22BNSM**	**440E-L22BNST**	440E-L22BNSL

§ For connector ratings, see 3-9.

Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays for 2 N.C. Contact Switch							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-26	**440R-N23135**
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-26	**440R-N23132**
MSR126T	2 N.O.	None	Fixed	Auto./Manual	24V AC/DC	5-24	**440R-N23117**
MSR30RT	2 N.O. Solid State	1 N.O. Solid State	Removable	Auto./Manual or Monitored Manual	24V DC	5-16	440R-N23198
Modular Safety Relays							
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-82	440R-H23176
MSR220P Input Module	—	—	Removable	—	24V DC	5-86	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-102	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-106	440R-W23218

Note: For additional Safety Relays connectivity, see page 5-4.
For additional Safety I/O and Safety PLC connectivity, see page 5-116.
For application and wiring diagrams, see page 10-1.

Connection Systems

Description	12-Pin M23
Cordset	889M-FX9AE-✶
Patchcord	889M-F12AHMU-❄

✶ Replace symbol with 2 (2 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
❄ Replace symbol with 0M3 (0.3 m), 0M6 (0.6 m), 1 (1 m), 2 (2 m) or 3 (3 m) for standard length.

Product Selection

Description	Cat. No. M20 Conduit with Cable Strain Relief
Standard Switch (No additional buttons)	440J-N21TNPM
Switch with Jog Button	440J-N21TNPM-NP
Switch with Emergency Stop Button	440J-N2NTNPM-NE

Note: Base plate included with all switches.

Recommended Logic Interfaces

Description	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. Page No.	Cat. No.
Single-Function Safety Relays for 2 N.C. Contact Switch							
MSR127RP	3 N.O.	1 N.C.	Removable (Screw)	Monitored Manual	24V AC/DC	5-26	**440R-N23135**
MSR127TP	3 N.O.	1 N.C.	Removable (Screw)	Auto./Manual	24V AC/DC	5-26	**440R-N23132**
Modular Safety Relays							
MSR210P Base 2 N.C. only	2 N.O.	1 N.C. and 2 PNP Solid State	Removable	Auto./Manual or Monitored Manual	24V DC from the base unit	5-82	440R-H23176
MSR220P Input Module	—	—	Removable	—	24V DC	5-86	440R-H23178
MSR310P Base	MSR300 Series Output Modules	3 PNP Solid State	Removable	Auto./Manual Monitored Manual	24V DC	5-102	440R-W23219
MSR320P Input Module	—	2 PNP Solid State	Removable	—	24V DC from the base unit	5-106	440R-W23218

Note: For additional Safety Relays connectivity, see page 5-4.
For additional Safety I/O and Safety PLC connectivity, see page 5-116.
For application and wiring diagrams, see page 10-1.

Connection Systems

Description	Cat. No. 4-Pin Micro (M12) Quick Disconnect	5-Pin Micro (M12) Quick Disconnect‡	8-Pin Micro (M12) Quick Disconnect
Cordset	889D-F4AC-♣	889D-F5AC-♣	889D-F8AB-♣
Patchcord	889D-F4ACDM-§	889D-F5ACDM-§	889D-F8ABDM-§

♣ Replace symbol with 2 (2 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
§ Replace symbol with 1 (1 m), 2 (2 m), 5 (5 m), or 10 (10 m) for standard cable lengths.
‡ To connect to ArmorBlock Guard I/O.

Product Selection

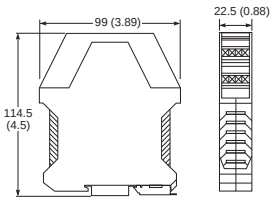
Inputs	Safety Outputs	Auxiliary Outputs	Terminals	Reset Type	Power Supply	Cat. No.
1 N.C., 2 N.C., Light Curtain	3 N.O.	1 N.C.	Fixed	Auto./Manual	24V AC/DC	**440R-N23126**
				Monitored Manual		440R-N23129
				Auto./Manual	115V AC	440R-N23125
				Monitored Manual		440R-N23128
				Auto./Manual	230V AC	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

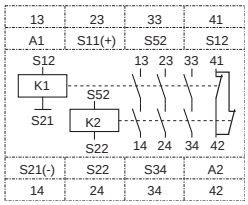
Description	Cat. No.
4 Replacement 4-pin Terminals (screw)	440R-A23209
4 Replacement 4-pin Terminals (spring clamp)	440R-A23228

Approximate Dimensions

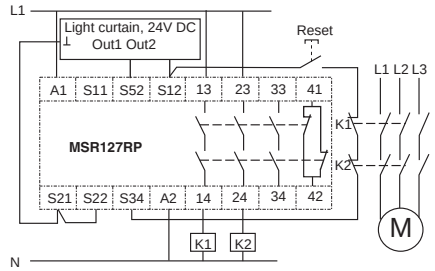
Dimensions are shown in mm (in.). Dimensions are not intended to be used for installation purposes.



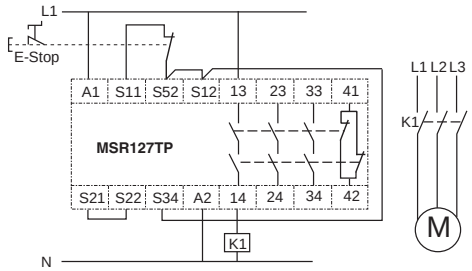
Block Diagram



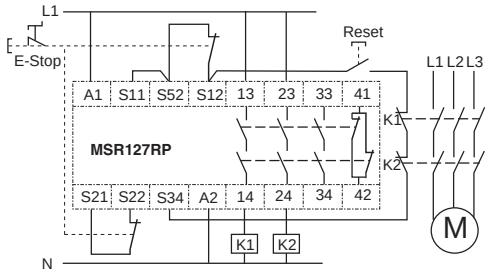
Typical Wiring Diagrams



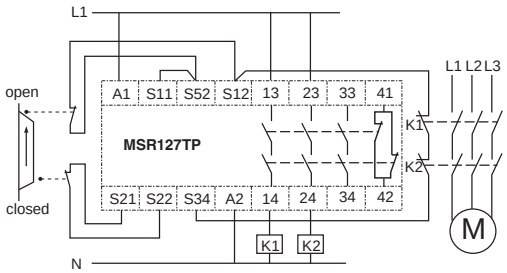
Light Curtain, Monitored Manual Reset, Monitored Output



Single Channel E-Stop, Automatic Reset, No Output Monitoring



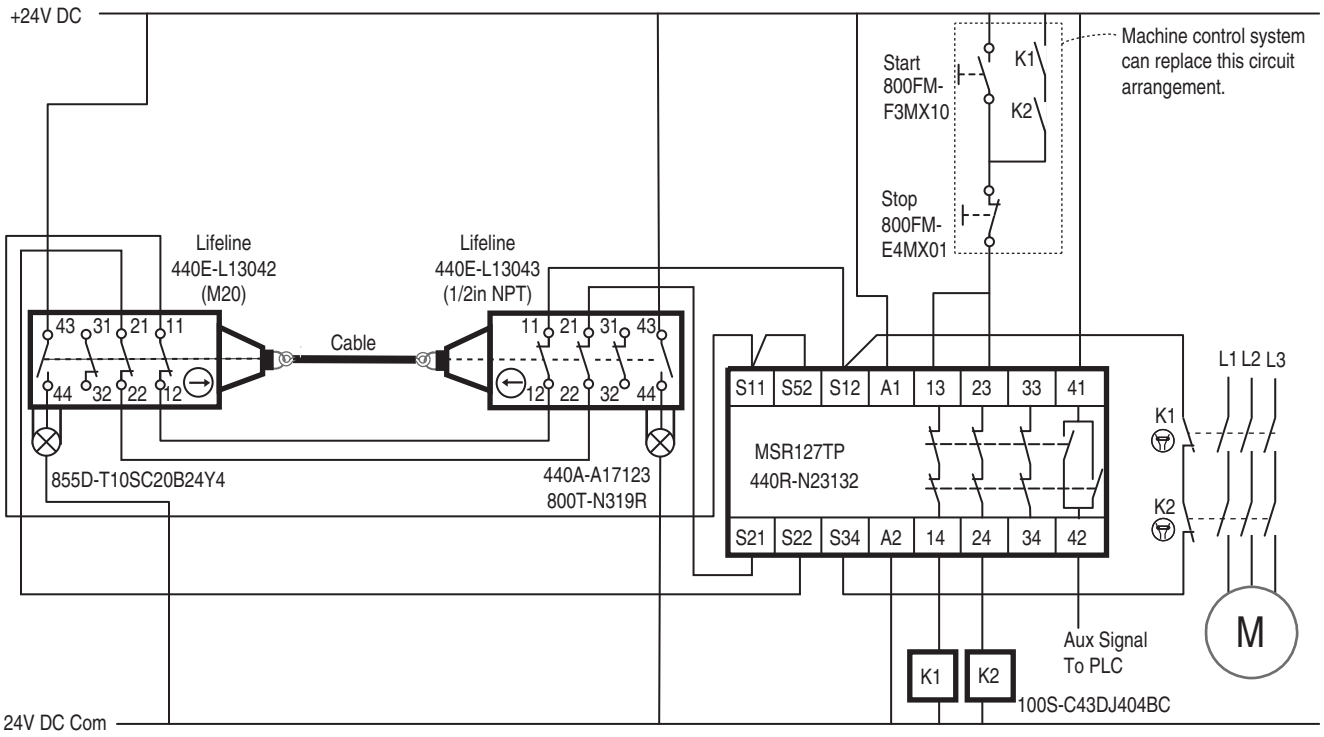
Dual Channel E-Stop, Monitored Manual Reset, Monitored Output



Dual Channel Safety Gates, Automatic Reset, Monitored Output

Cable Pull

Lifeline, 800F, MSR127, 100S



Circuit Status

Both Lifeline cable pull switches are taut and reset; their contacts are closed. The MSR127 safety relay is energized, as its inputs and monitoring circuits are satisfied. The motor is off and ready to run.

Operating Principle

Two cable pull switches are used to protect an area over 10 meters in length. Auxiliary lights provide indication as to which switch has been actuated to stop the motor. The difference between the two switches is the conduit thread and is shown for example purposes.

STARTING: Press the Start button to energize contactors K1 and K2. The motor starts and the two normally open contacts of K1 and K2 close to hold the circuit energized across the Start button.

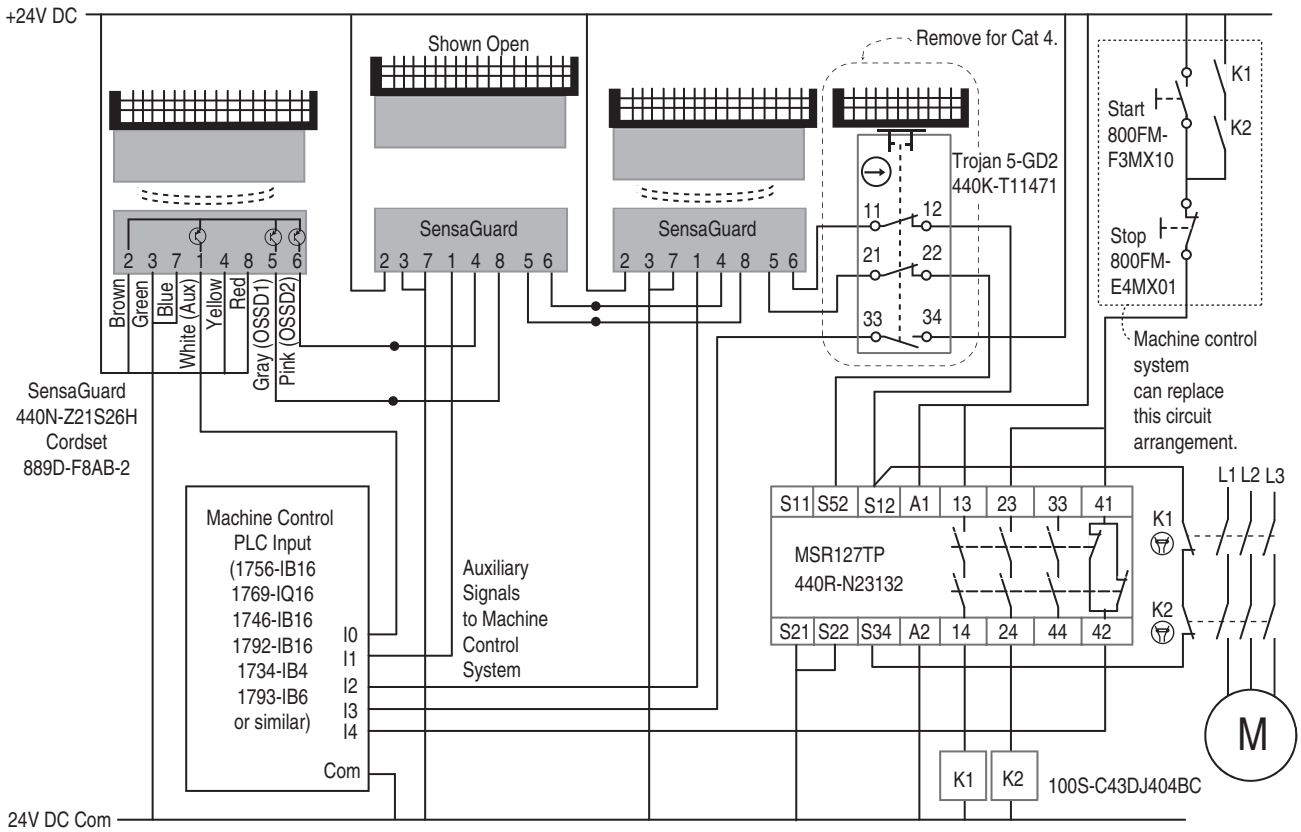
STOPPING: Pull the Lifeline cable or press the e-stop button on the Lifeline switch to de-energize the outputs of the MSR127 and turn off the motor. To restart the motor, make sure the area is clear of hazards, pull out the e-stop button (if pressed) and rotate the reset knob on the Lifeline 4 to the Run position. Then press the Start button to start the motor. As an alternative, the motor can be stopped by pressing the Stop pushbutton. It can then be restarted by pressing the Start pushbutton.

Fault Detection

Upon successful completion of internal checks on power up, the MSR127 checks its input circuits. With both Lifeline switches reset, the MSR127 checks the output contactors through the S12/S34 circuit. If the contactors are off, the MSR127 energizes its outputs and turns on the contactors which turn on the motor. A short or open circuit fault in the Lifeline cable pull switches will be detected by the MSR127. If either the K1 or K2 faults in the energized state, the motor will be stopped by the other contactor and the fault will be detected by the MSR127 on the next attempt to restart. An internal fault in the MSR127 will be detected by itself. Depending on the type of fault, the result will be de-energization of the K1 and K2 contactors or prevention of re-start.

Ratings

The safety function initiated by the Lifeline cable pull switches meets the safety performance requirements of SIL CL 2 per IEC 62061:2005 and has Category 3 structure that can be used in systems requiring Performance Levels up to PLd per ISO 13849-1: 2006. The series connection of the Lifeline cable switches limits the circuit to SIL CL2 and Category 3. This circuit executes a Category 0 stop.



Circuit Status

The first, third and fourth gates are closed. The second gate is open. The MSR127 safety relay S12 and S52 inputs are open due to the open gate, and therefore, the MSR127 safety outputs are open. The machine control PLC has a 24V auxiliary signal at terminal I1 from the second gate because the gate is open. The 1st, 3rd and 4th auxiliary signals are off, as their gates are closed. The PLC also has an auxiliary signal from the MSR127 indicating that the safety system is not ready. The motor is off.

Operating Principle

STARTING: Closing the second gate satisfies the input of the MSR127. The MSR127 verifies that both K1 and K2 contactors are off and energizes its safety outputs. Pressing the start button energizes the motor. The Stop/Start circuit is not part of the safety system and can be replaced by the machine control system (e.g., a PLC).
STOPPING: Press the Stop button to turn the motor off, without affecting the status of the safety system. Opening any of the gates will cause the safety system to stop the motor.

Fault Detection

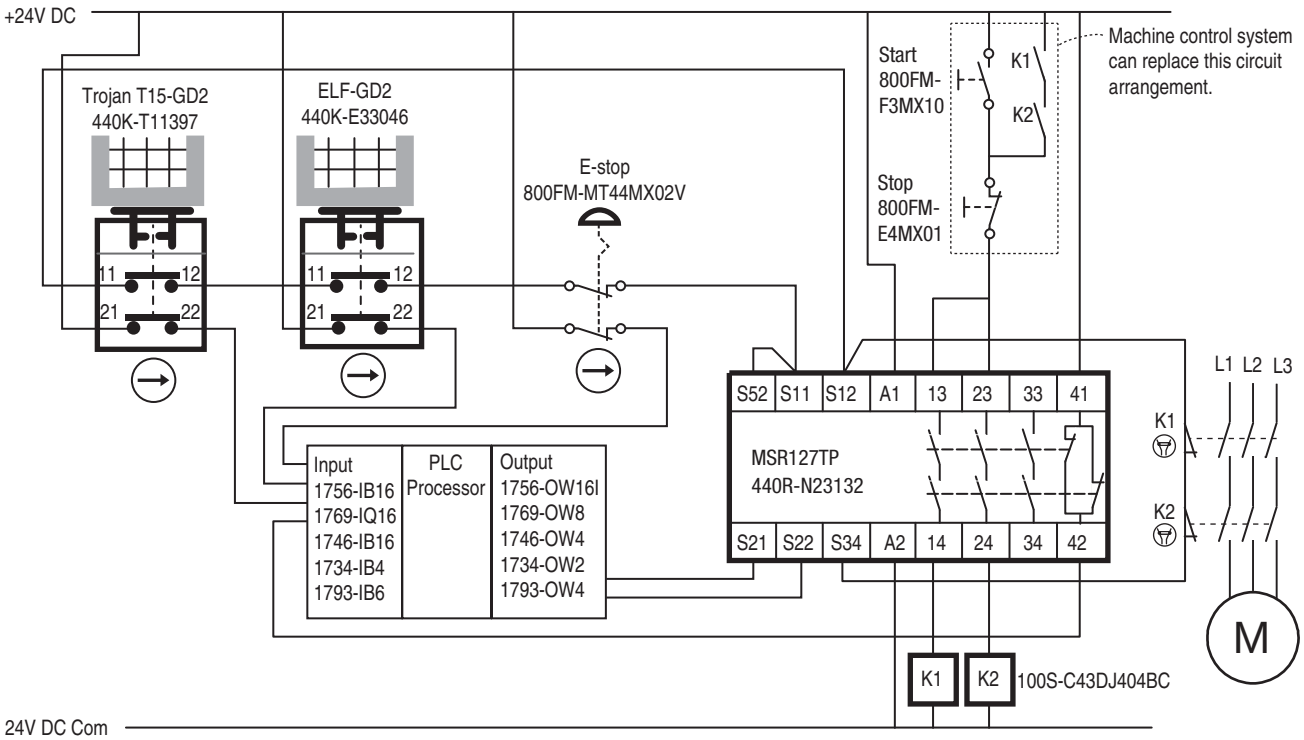
Upon successful completion of internal checks on power up, the SensaGuard interlocks check for 24V at pins 4 and 8. If the actuator is within range, the SensaGuard will activate its OSSD outputs. The OSSD outputs perform continuous checking for short circuits to 24V, ground and crossfaults. Upon detection of a fault, the OSSD outputs turn off. The MSR127 also performs internal checks on power-up. It then checks for input signals. If okay, the MSR127 checks the S12/S34 monitoring circuit to determine whether both contactors are off. If one of the contactors gets stuck on, the other contactor will de-energize the motor, and the MSR127 will detect the fault at the next attempt to start the motor. The contactors have mechanically linked auxiliary contacts to help ensure fault detection of the contactors. Contactors K1 and K2 are controlled by the safety system. Contactor K2 is controlled by both the machine control system and the safety system. This increases the probability of performance of the safety function because K1 is significantly less likely to weld at the same time as K2 due to the diversity of expected wear out times.

Ratings

The safety function initiated by the Lifeline cable pull switches meets the safety performance requirements of SIL CL 2 per IEC 62061:2005 and has Category 3 structure that can be used in systems requiring Performance Levels up to PLd per ISO 13849-1: 2006. When a device with two mechanically operated contacts is connected in series with the SensaGuard, the maximum rating is Category 3. If the Trojan 5 GD2 were removed from the circuit, the safety performance meets the requirements of Category 4. The SensaGuard interlocks are designed to meet Category 4 when connected in series. The MSR127 is rated to Category 4. The design and connection of the contactors meets category 4. This example circuit performs a Stop Category 0 function (coast to stop).

Interlock Switches—Multiple Gate Access

Trojan T15, Elf-GD2, 800F, MSR127, 100S



Circuit Status

Circuit shown with the safety gates closed and e-stop released. The safety relay is de-energized. The motor is off.

Operating Principle

With 2 N.C. + 1 N.O. interlocks, a potential exists for the gate to be slightly open which results in the auxiliary contact being closed and the safety being open. The machine cannot start and the PLC does not know which gate is open. By sending the second safety channel through the PLC, the machine control system knows which door is open, when the safety system is off due to a gate that may be slightly open. The infinite simultaneity feature of safety relays like the MSR127 allow enough time for the PLC to process all the gates and close the second channel of the safety relay without creating a lockout condition.

When a safety gate is opened, the interlock opens Ch1 directly to the safety relay and opens Ch2 which is connected to the input of a PLC. The PLC must then open Ch2 of the safety relay. The logic in the PLC must open the Ch2 signal if any one or more of the safety gates are open and must only close the Ch2 circuit when all of the safety gates and e-stop are closed. The PLC can also use the information on the inputs on PanelView or similar device. The auxiliary signal (41/42) from the MSR127 must be an input to the PLC. This PLC program must only close its output when all the safety inputs are closed and the auxiliary signal from the MSR127 is closed. This allows the PLC to indirectly confirm that its own output is working properly.

STARTING: Channel 1 input (S11/S12) of the MSR127 is satisfied. Using isolated relay contacts in its output module, the PLC closes the second safety channel (21/22 of the MSR127). The safety outputs of the MSR127 close. Press the Start button to start the motor.
STOPPING: Opening any one of the safety gates or pressing the e-stop causes the motor to turn off. Closing the gate or releasing the e-stop does not cause the motor to start due to the start-stop interlocking circuit. To restart the motor, close the safety gate or release the e-stop. Then press the start button.

Fault Detection

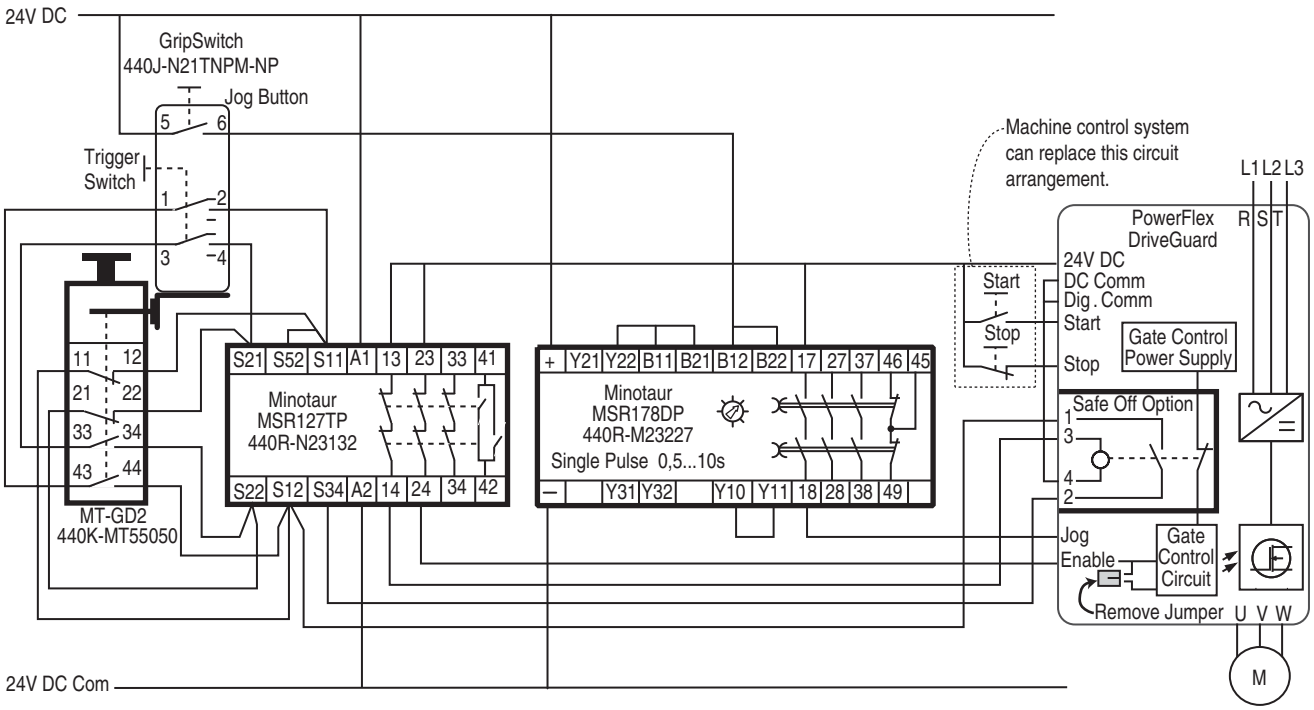
If the PLC fails with its output closed, the safety relay will detect the difference between the safety gate and the PLC and stop the motor. A single fault (open or short) across one of the interlocks will be detected by the safety relay and the motor will be turned off. The motor will remain off until the fault is corrected or power is cycled. If either contactor K1 or K2 sticks ON—the motor will stop on command due to the other contactor, but the MSR127 cannot be reset (thus the fault is revealed to the operator). A single fault detected on the MSR127 input circuits will result in the lock-out of the system to a safe state (OFF) at the next operation of the safety gate or e-stop device.

Ratings

The safety function initiated by the Trojan T15 safety gate interlocks and the 800F e-stop 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.

Enabling Device & Drive—Safe Jog

440G-MT, GripSwitch, MSR127, MSR178, PowerFlex DriveGuard



Circuit Status

The 440J GripSwitch is held by the MT-GD2. The MSR127 safety outputs are closed. The PowerFlex Enable and Safe-off option are energized. The MSR178 safety outputs are de-energized. The motor is ready to run.

Operating Principle

The MSR178 is chosen for its ability to perform timing functions. In this case, the MSR178 is set up to jog the PowerFlex drive with a single pulse having a duration set between 0.5 to 10 s (no jumpers form Y10 to Y31 or Y32 and fine adjustment made by potentiometer on front of MSR178). While in the MT-GD2 holder, the GripSwitch is disabled, and the drive can be controlled by the machine control system (not shown).

STARTING: Close the three-position trigger switch to the mid-position. Remove the enabling switch from the MT-GD2 holder. Press and hold the Jog button on the GripSwitch to initiate the operation of the MSR178. The MSR178 closes its safety outputs for the set duration.

STOPPING: The jog function stops after the set time expires. To restart, momentarily release the jog button and then re-close it to repeat the jog. Releasing or squeezing the three-position switch opens the outputs of the MSR127, and the PowerFlex drive executes a coast to stop.

Fault Detection

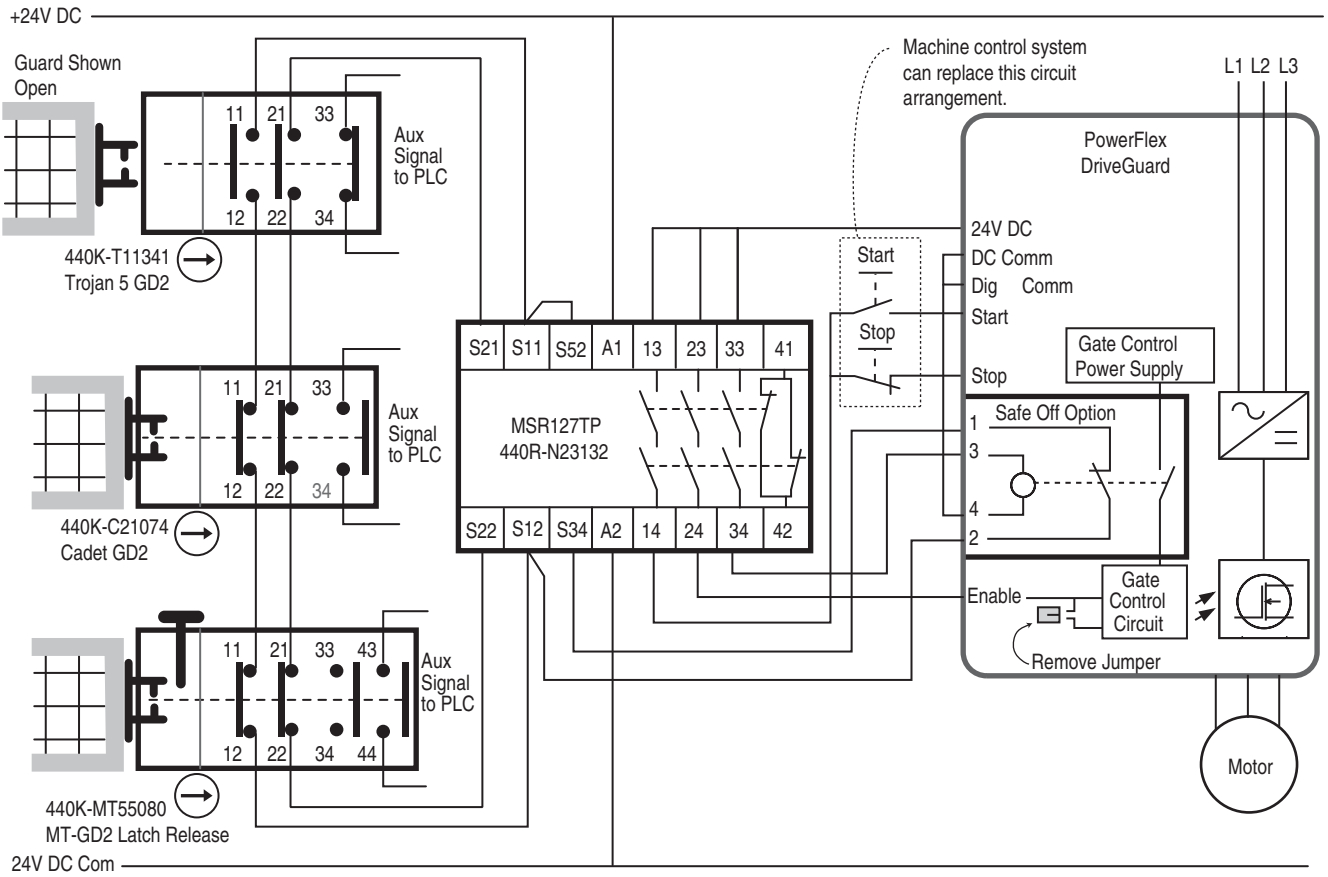
Upon successful completion of internal checks by the MSR127, MSR178 and the PowerFlex drive, the drive awaits the closure of the MSR127 safety outputs. If the MSR127 fails, the drive will not energize the motor and the fault will be detected by non-operation of the motor. The MSR127 uses dual channel to detect faults to power, ground and cross channel faults on the GripSwitch or the MT-GD2. A short across the jog switch will be detected as a subsequent jog attempt will be prevented by the MSR178. A fault in the Safe-Off option of the drive will be detected by the MSR127 on the next attempt to restart the drive. Internal faults in the MSR127 will result in non-operation of the motor. Internal faults of the MSR178 will result in non-operation of the jog function.

Ratings

The safety function initiated by GripSwitch enabling device meets the safety performance requirements of SIL CL 2 per IEC62061:2005 and has a Category 3 structure that can be used in systems requiring Performance Levels up to PLd per ISO13849-1:2006. This circuit executes a Category 0 stop.

Drive—Multiple Gate Access

Trojan 5 GD2, Cadet GD2, MT-GD2, MSR127, PowerFlex DriveGuard



Circuit Status

One of the gates is open. The safety outputs of the MSR127 are de-energized. The PowerFlex with DriveGuard is de-energized and not enabled. The motor is off.

Operating Principle

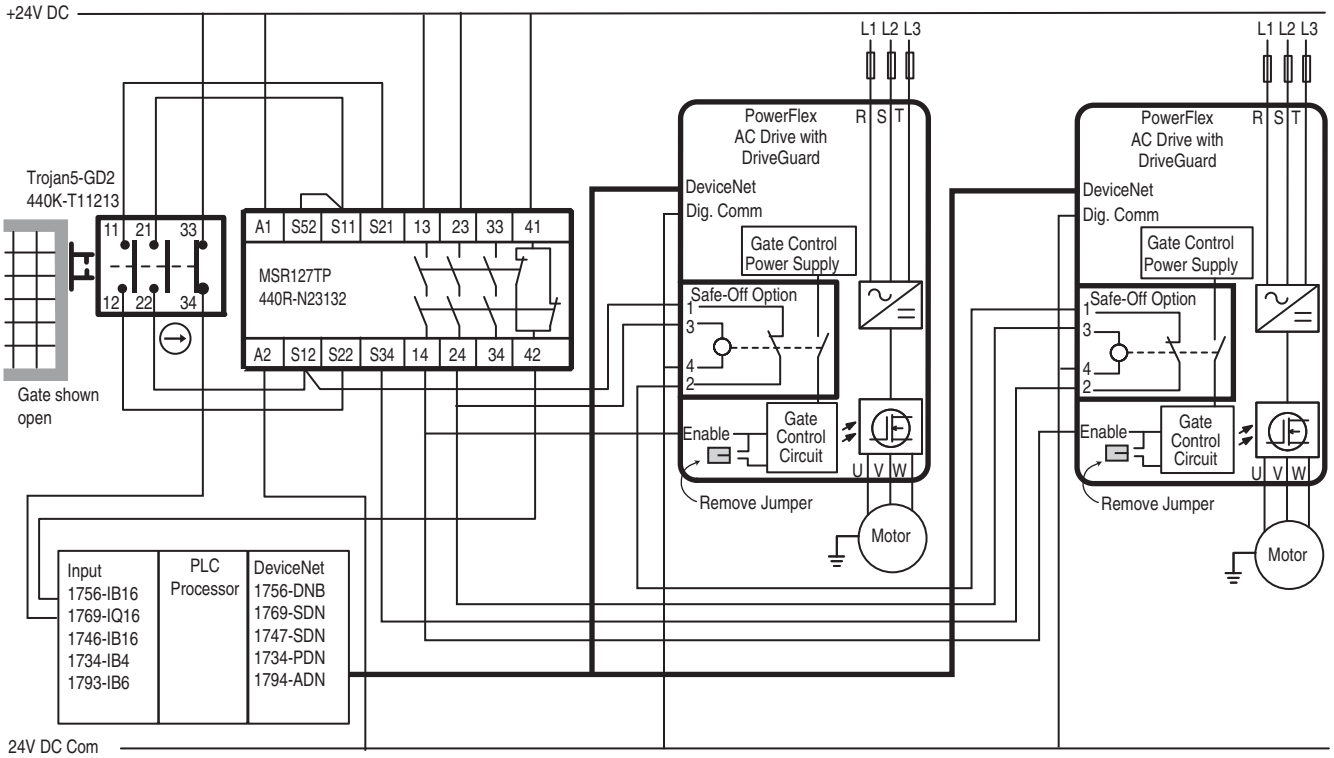
STARTING: When the last gate closes, the safety outputs of the MSR127 close and apply power to the drive enable circuit, Safe-Off option, Start and Stop buttons. Pressing the Start and Stop buttons turns the motor on and off. The motor is controlled by parameters set within the PowerFlex drive.
STOPPING: Opening any of the guard doors causes the MSR127 safety outputs to de-energize. This removes power to the PowerFlex enable, Safe-Off, Start, and Stop circuits. The motor performs a coast to stop.

Fault Detection

Upon power-up the PowerFlex drive and MSR127 perform internal checks. The MSR127 then looks for dual signals from the gate interlocks. With the gates closed, the MSR127 checks the wiring of the drive Safe-Off option. If closed, then the MSR127 energizes its outputs and the motor can be started. A single open circuit fault at the gate interlocks will be detected immediately, and the motor will coast to a stop. A crossfault (channel 1 to channel 2) at the gate interlocks will be detected immediately. A short across one gate interlock contact will be detected when an attempt to re-start is made. This type of short can be masked by opening and closing another gate interlock and may result in a loss of the safety function due to an accumulation of contact shorts. The MSR127 is rated for Category 4 and will not lose the safety function due to an accumulation of faults. The PowerFlex 70 DriveGuard is rated at Category 3, as it will perform the safety function in the presence of a single internal fault.

Ratings

The safety function intiated by 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.



Circuit Status

The safety gate is open. The MSR127TP safety outputs (13/14, 23/24, 33/34) are open. The Enable and Safe-Off Option on both PowerFlex drives are off. Auxiliary signals from the Trojan 5 GD2 (33/34) and the MSR127 (41/42) inform the PLC that the safety system is OFF. The motors of both drives are off.

This circuit is intended to show that multiple drives can be connected in parallel. The number of drives that can be connected in parallel is dependent on: the load (the safe-off option plus the enable of each drive), appropriate de-rating to prevent early wear out of the MSR127TP contacts, the application requirements (e.g., zoning) and the risk assessment (e.g., some drives may require separate safety systems).

Operating Principle

STARTING: Upon closing the gate, the Trojan 5 GD2 closes the safety inputs of the MSR127TP (S11/S12 and S21/S22) and opens the signal to the PLC. The safety outputs of the MSR127TP close and enable both PowerFlex drives. The auxiliary signal of the MSR127TP opens. The PLC compares the gate and safety relay auxiliary signals. When both signals are open, the PLC knows that the safety system is ready. The PLC can now start and control the drives over the DeviceNet network. The PLC must ensure that the drives are not started upon the closing of the gate; a separate, intentional action must initiate the motor movement (this is not shown in the diagram).
STOPPING: Normal stopping is performed by the PLC. If the gate is opened, the input signals to the MSR127TP open. The MSR127TP opens its safety outputs which disable all the drives connected to them via the Safe-Off option. The drives perform an immediate coast to stop.

Fault Detection

Upon power-up, the MSR127TP performs internal checks. The MSR127TP then looks for dual signals from the Trojan5-GD2. If only one signal is present, or a crossfault exists, the MSR127TP assumes a fault is present and does not energize its safety outputs. With the gate closed, the MSR127TP checks the S12/S34 monitoring circuit. If the Safe-Off options are de-energized, the MSR127TP assumes the drives are off and are ready to be enabled. The MSR127TP energizes its safety outputs. If the monitoring circuit remains open, the MSR127TP will assume a fault is present and not allow its safety outputs to energize. Single point failures related to the tongue interlock are excluded if actuator speed, alignment and mechanical stops meet installation instruction requirements, and a periodic proof test confirms proper operation.

Ratings

The safety function intiated by the Trojan 5-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.