NHP ELECTRICAL ENGINEERING PRODUCTS

Smart Machine Safety Selection Guide

A tool for selection of integrated and reliable machine safety components

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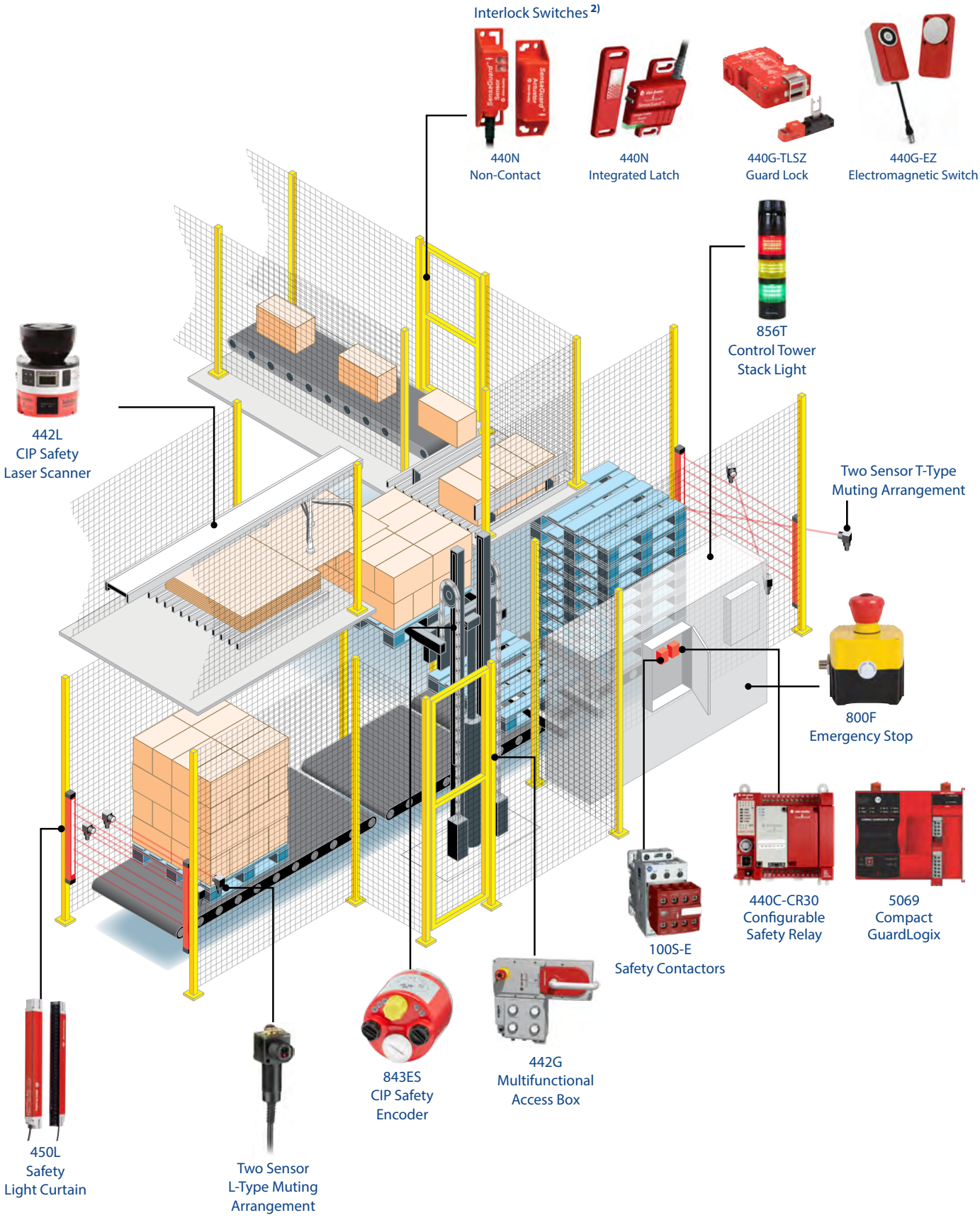
Smart Palletiser Safety System

Functional Safety System [1)]

SMSSG HOT TIPS to look for

1) Click on 'text boxes' to utilize web-linked content. ex 'User Manuals' & 'Installation Instructions'
2) Click on images to be directed to Product website Landing Pages.
3) Product Catalogue Numbers with underlines, link to relevant 'Installation Instructions'.



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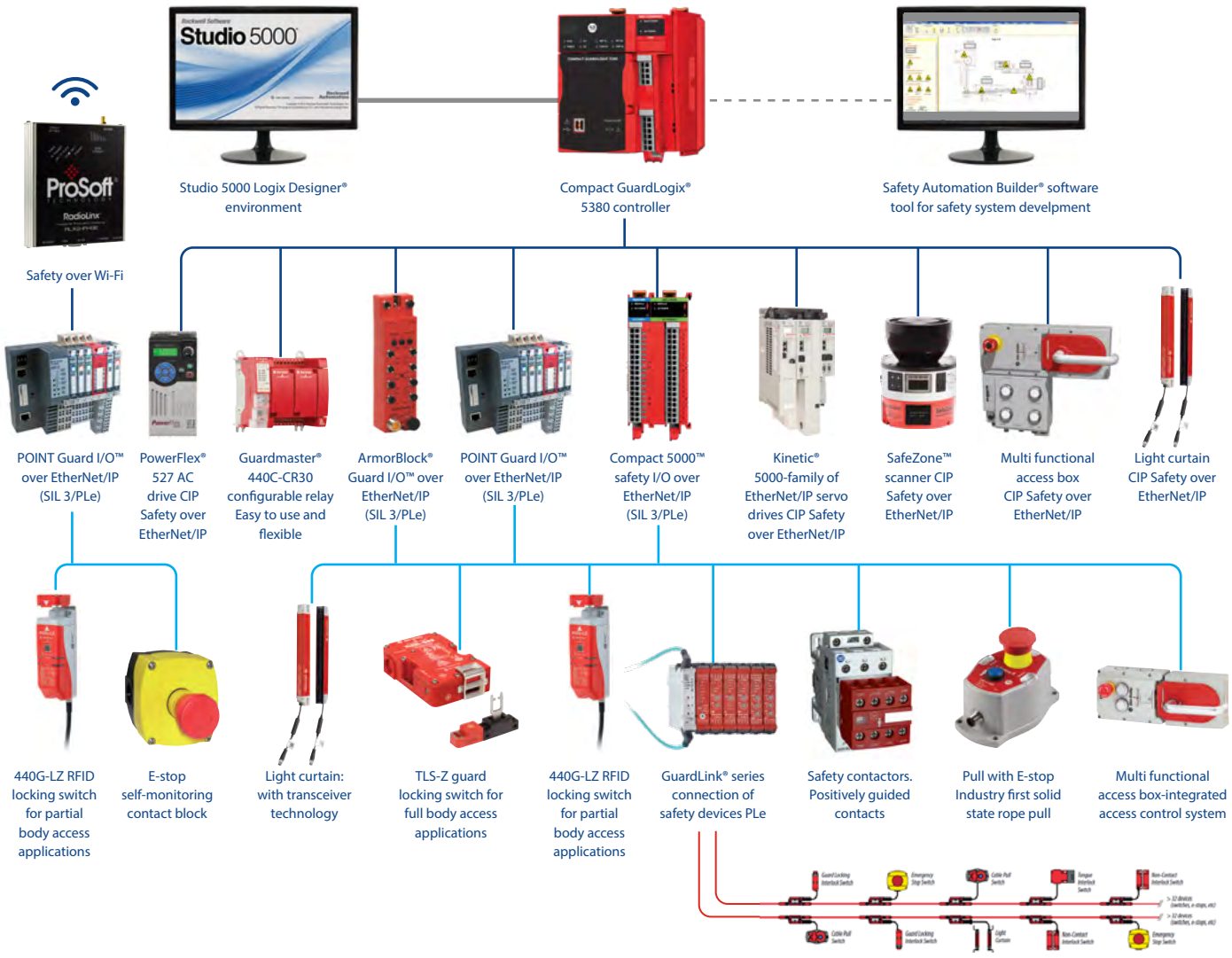
The complete solution

A solution incorporating Smart Safety devices enables safety professionals to transform the way they monitor and manage safety. NHP provides a complete Smart Safety solution to meet safety requirements, covering safety input devices, safety logic and safety output devices.



Step 1 Conduct a Risk Assessment as per AS / NZS 4024 -2014 standard. The risk assessment documentation provides the framework for the product selection for steps 2 - 6

Step 2 Select the appropriate safety switches and / or presence sensing devices

Step3 Select suitable safety controller to monitor the input and output devices. Controllers are categorised from basic to advance based on the functionality of the controller

Step 4 Select the appropriate output devices - Safety Contactors, Safety Control Relays and Safety enabled drives (embedded safe torque off)

Step 5 Select any additional products required for a safety solution as per the risk assessment. These products include Signalling devices, Connection Systems, Software, HMIs and Networks.

Step 6 Once the system has been installed conduct a validation to as per AS / NZS 4024 - 2014 standard to ensure that the safety system meets the requirements and specifications listed in the risk assessment.

Safety categories explained

Standards are available to help with a safety system design – however there are a few around which are currently in use in Australia/New Zealand and around the world.

All three are perfectly valid for use in Australia and New Zealand for machine safety applications.

These standards can be categorised into two types: Qualitative, and Quantitative, and this depends on the methods used to determine how a safety control system is designed to ensure an adequate level of risk reduction.

Category AS/NZS 4024.1501 / EN 954	Performance Level AS/NZS 4024.1503 / ISO 13849	Safety Integrity Level AS 62061 / IEC 62061
Category B	PL a	-
Category 1	PL b	SIL 1
Category 2	PL c	
Category 3	PL d	SIL 2
Category 4	PL e	SIL 3

Note: Intended to show approximate equivalency for guidance only; attaining the corresponding PL or SIL requires more information and calculation based on several additional factors.

Qualitative
Category Levels

The Qualitative standard is based on Safety Categories, and there are 5 of them between Category B and Category 4.

What makes this a Qualitative standard is that it is based around the behaviour of a safety control system and how it responds to faults – in other words, the "Quality" of the safety control system.

It does not address the probability of faults occurring, or the time taken for them to occur.

The categories are scaled from least effective to most effective in reducing risk.

Category Level	Safety Function
B	Standard product not designed specifically for safety application.
1	Product designed using reliable components and well tried safety principles. Can still fail but is less likely to. In practice Category 1 is regarded as the minimum Category for safety.
2	Product designed using reliable components and well tried safety principles, plus a periodic manual of automatic check of safety function.
3	A single fault shall not cause the loss of the safety function and that fault should be detected at or before next demand on the safety function.
4	A single fault must be detected before the next demand on the safety function. An accumulation of non-detected single faults shall not cause the loss of the safety function (in practice, 2 or 3 faults).

Quantitative
Safety Integrity Level (SIL) and Performance Level (PL)

The Quantitative standards consider not only the behaviour of the system with respect to faults, but also consider calculated probabilities, which include the likelihood of a failure occurring, the failure being dangerous or safe and the likelihood of detecting failures.

Both ratings are based on calculations of the performance of the individual components in the safety control system and how they are arranged; and ultimately are a function of the probability of dangerous failure in any given hour.

For example, PLe and SIL 3 are defined by the probability of a dangerous fault in any given hour of between 10^{-8} and 10^{-7} – you could also look at this as the reciprocal, which is roughly the equivalent of once every 1,000 to 10,000 years. Considering the defined expected lifetime of the machine is 20 years, you can see how effective a high integrity safety control system to PLe or SIL3 can be.

Performance Level	Average probability of dangerous failure per hour	Safety Integrity Level (SIL)	Average probability of dangerous failure per hour
a	$\geq 10^{-5}$ to $< 10^{-4}$		
b	$\geq 3 \times 10^{-6}$ to $< 10^{-5}$		
c	$\geq 10^{-6}$ to $< 3 \times 10^{-6}$	1	$\geq 10^{-6}$ to $< 10^{-5}$
d	$\geq 10^{-7}$ to $< 10^{-8}$	2	$\geq 10^{-7}$ to $< 10^{-6}$
e	$\geq 10^{-8}$ to $< 10^{-7}$	3	$\geq 10^{-8}$ to $< 10^{-7}$

GuardLink Technology

Video

GuardLink 1.0

User Manual | Installation Instructions

GuardLink 2.0

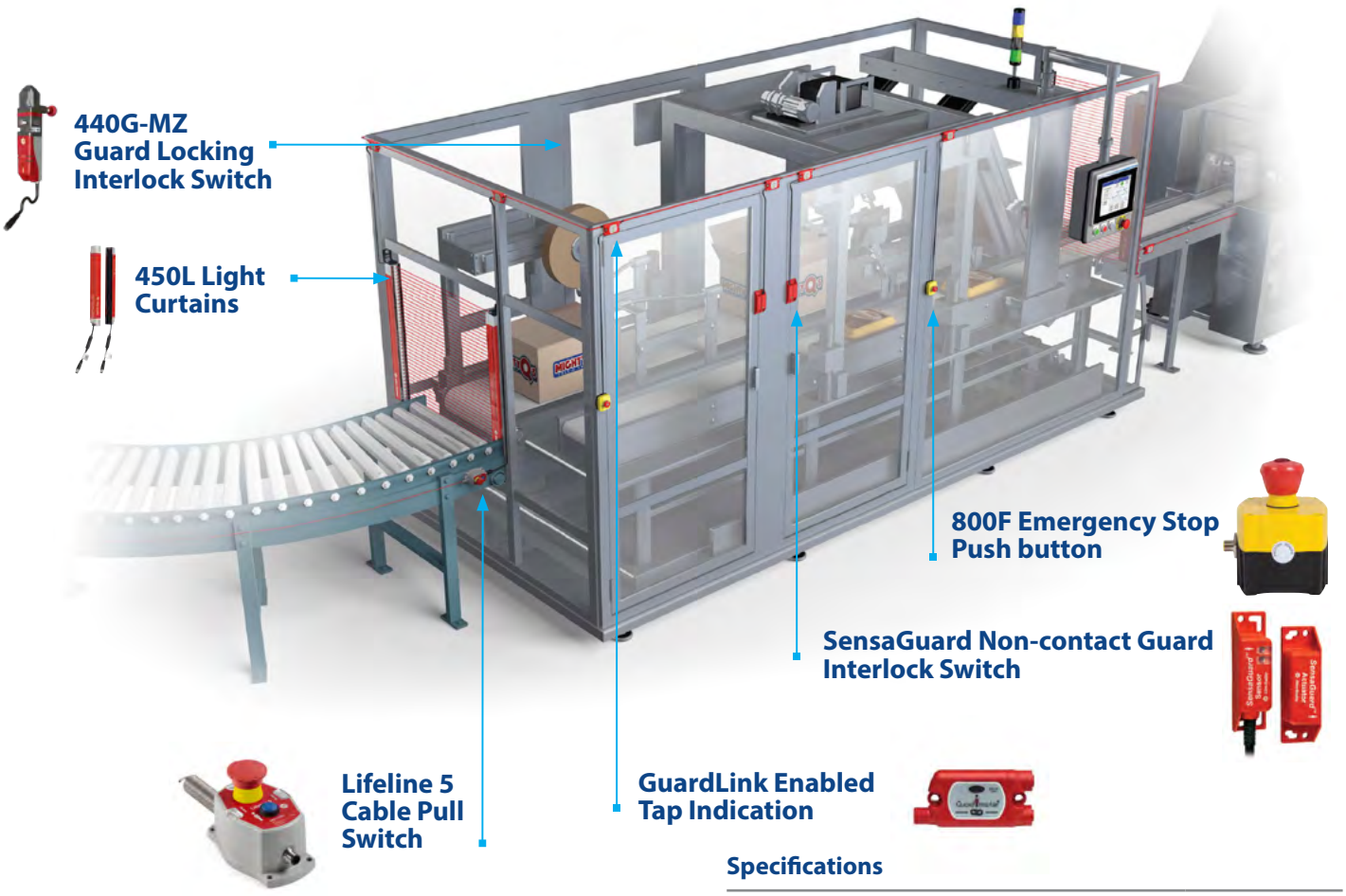
User Manual | Installation Instructions

Why choose GuardLink?

Series connection of safety input devices is common practice in safety-related control systems. However, when the system trips, fault finding can be difficult due to the lack of diagnostic information. Providing diagnostics historically meant connecting auxiliary contacts from each safety input device to the PLC increasing costs due to the need for additional input cards, and increased installation time to hard wire each auxiliary contact to the allocated input.
GuardLink provides both safety information and diagnostics through the same cable, with the diagnostics available via EtherNet/IP™, reducing the amount of wiring required for the safety system, and the cost and time to install the solution.

Features

- Remote lock/unlock and fault reset of safety input devices can be achieved
- Up to 32 devices per safety channel (guardlocking, light curtains and e-stops)
- Up to 1000m link total distance
- Up to 30m(with-guardlocking) &100m (without-guardlocking) between Taps
- Up to 10m from Tap to Safety Device)
- No configuration required, with wiring achieved through use of M12 connecting cables
- CIP Safety over EtherNet/IP



Specifications

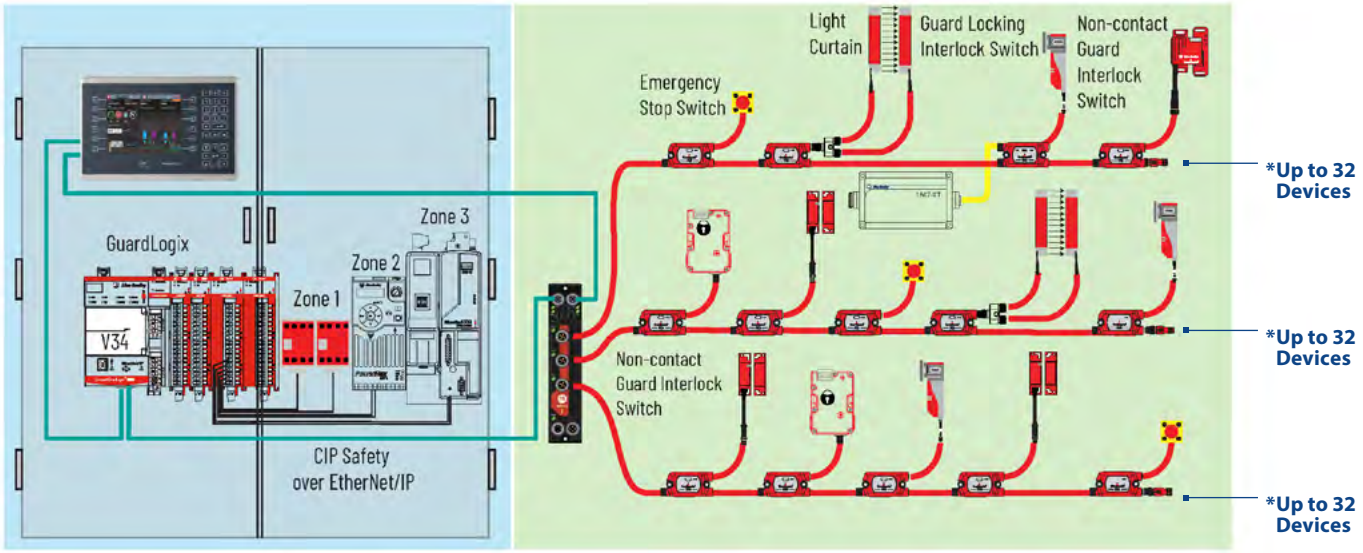
Safety Rating	CAT 4, SIL 3, PLe
Ingress Protection	IP66/67/69k
Operating Voltage	24V DC

System Examples

GuardLink 2.0

In-Cabinet	On-Machine

432ES GuardLink EtherNet/IP Interface (432ES-IG3)

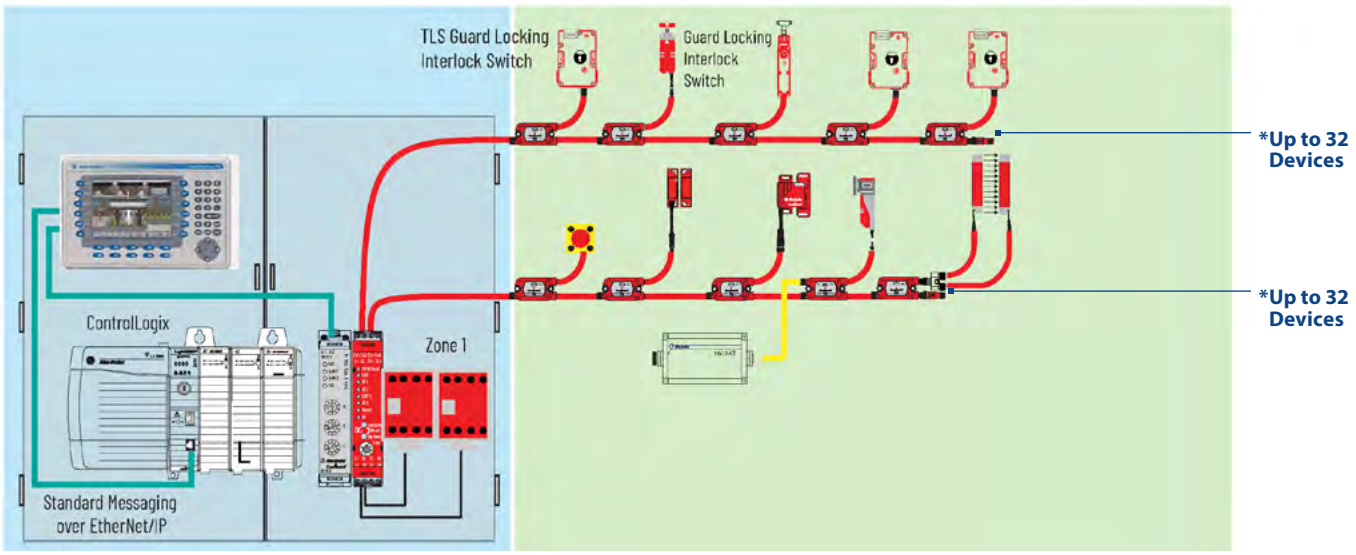


Three independent GuardLink channels controlling **three machine zones** with a 1756 Control GuardLogix 5580 or 5069 Compact GuardLogix 5380.

GuardLink 1.0

In-Cabinet	On-Machine

Dual GuardLink Relay with GuardLink EtherNet/IP Interface (44OR-DG2R2T (DG) with 44OR-ENETR)

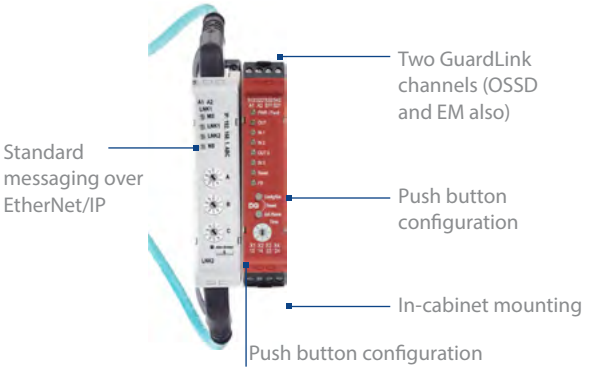


Two GuardLink channels controlling **one machine zone**, with lock control from a GuardLogix® controller.

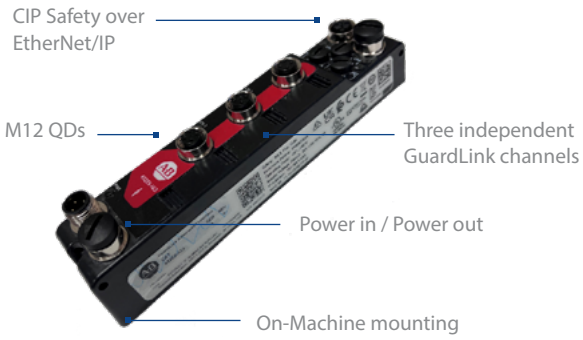
Product selection

Step 01: Select either 01a) In-Cabinet, or, 01b) On-Machine EtherNet/IP Communication module

01a) GuardLink 1.0
Dual GuardLink Relay with GuardLink EtherNet/IP Interface (440R-DG2R2T (DG) with 440R-ENETR)



01b) GuardLink 2.0
432ES GuardLink EtherNet/IP Interface (432ES-IG3)



Step 01a: GuardLink 1.0 In-Cabinet Safety Relay

Guardmaster Ethernet Interface Communication Relay	440R-ENETR
In-Cabinet Unshielded Teal Ethernet Cordset RJ45 straight to RJ45 Right Angle	1585J-M8TBJM-*

Replace * with 0M15(.15m), 0M2(.2m) 0M3(.3m), 0M6(.6m), 1(1m), 2(2m), 3(3m), 4(4m), 5(5m), 10(10m), 15(15m), 20, (20m), 30(30m), 40(40m)

Guardmaster Safety Relay Dual GuardLink Master	440R-DG2R2T
DC Micro 4-Pin (M12) Red Cordset (30m max)	889D-F4NE*

Replace * with 2(2m), 5(5m), 10(10m, 15(15m), 20(20m, 30(30m)

Step 01b: GuardLink 2.0 On-Machine CIP Safety Interface Module

CIP SAFETY EtherNet/IP Network Interface module	432ES-IG3
Module to Tap - DC Micro 4-Pin Red Patchcord	889D-F4NEDM*
Module to Power Supply - DC Micro 4-Pin Yellow Cordset(M12>Flying Lead)	889D-F4AE-*
Module to Power Supply - DC Micro 4-Pin Yellow Patchcord(M12>M12)	889D-F4AEDM-*
Unshielded Teal Ethernet patchcord (M12>RJ45)	1585D-M4TBJM-*
Unshielded Teal Ethernet patchcord (M12>M12)	1585D-M4TBDM-*

Replace * with 0M15(.15m), 0M2(.2m) 0M3(.3m), 0M6(.6m), 1(1m), 2(2m), 3(3m), 4(4m), 5(5m), 10(10m), 15(15m), 20, (20m), 30(30m), 40(40m)

Step 02:

Step 02a: Select GuardLink Enabled Tap

5-Pin EMSS (Electromechanical Safety Switch) GuardLink Enabled Tap PTR (Power to Release)	440S-MF5D
8-Pin EMSS (Electromechanical Safety Switch) GuardLink Enabled Tap PTR (Power to Release)	440S-MF8D
5-Pin OSSD (Output Signal Switching Device) GuardLink Enabled Tap PTR (Power to Release)	440S-SF5D
8-Pin OSSD (Output Signal Switching Device) GuardLink Enabled Tap PTR (Power to Release)	440S-SF8D
8-Pin EMSS (Electromechanical Safety Switch) GuardLink Enabled Tap PTL (Power to Lock)	440S-MLF8D
8-Pin OSSD (Output Signal Switching Device) GuardLink Enabled Tap PTL (Power to Lock)	440S-SLF8D

Step 02b: Select GuardLink Passive Tap

GuardLink Power Tap (for extended length applications with Voltage drop requirements)*	440S-PF5D4
5-Pin GuardLink Passive Tap (Only for use with GuardLink Embedded Devices Ex. 440G-MZ)	440S-PF5D

Note* Armor Block on Machine IP67 Power Supply 1607-XT100D1A
Connecting cable 889D-F4AENM-1

Step 03:

Step 03a: Select Patchcord (M12 to M12) from Tap to Safety Device

DC Micro 5-Pin Red Patchcord (10m max)	889D-F5NCDM*
DC Micro 8-Pin Red Patchcord (10m max)	889DF8NBDM*

Replace * with 0M3(.3m), 0M6(.6m), 1(1m), 2(2m), 5(5m), 10(10m)

Step 03b: Select Patchcord (M12 to M12) from Tap to Tap

DC Micro 4-Pin Red Patchcord (30m max)	889D-F4NEDM*

Replace * with 0M3(.3m), 0M6(.6m), 1(1m), 2(2m), 5(5m), 10(10m, 15(15m), 20(20m, 30(30m)

Step 04 & Step 05:

Step 04: Select required GuardLink Tap Mounting Bracket

GuardLink Enabled Tap Mounting Bracket - QTY 1	440S-GLTAPBRK1
GuardLink Enabled Tap Mounting Bracket - QTY 5	440S-GLTAPBRK5

Step 05: Select required GuardLink Tap Terminator Plug

GuardLink Terminator Plug for last Guardlink Enabled Tap	898D-418U-DM2

Step 06: Select optional Accessories

GuardLink Shorting Plug (When no input safety device at Tap)	898D-41KU-DM2
T-Port for 450L 5-Pin Light Curtains	1485P-RDR5
GuardLink Voltage Calculator Spreadsheet - FREE	440S-TVC
GuardLink Enabled Tap Interoperability List - FREE	440S-TIL

Note: Guard Switches Locking and Unlocking functions must be configured in controller via the 440R-ENETR network interface module.
The 440R-ENETR is not safety rated and only for resets, monitoring and status, diagnostics and Lock/ Unlock functions.

Step 01a

Step 01b

Cordset,
Relay to 1st Tap
01a) 889D-F4NE-*
01b) 889D-F4NEDM*

Step 02a

440S-MF5D
GuardLink enabled tap PTR
5-Pin M12 EM Contacts
(Electromechanical)

Step 03a

Compatible 5-Pin EMSS Devices

800F E-Stop

440P
Limit Switches

Patchcord
Tap 01 to Tap 02
889D-F4NEDM*

Step 03b

440S-MF8D
GuardLink enabled tap PTR
8-Pin M12 EM Contacts
(Electromechanical)

Compatible 8-Pin EMSS Devices

440G-TLS-GD2
Guard Lock

Patchcord
Tap 02 to Tap 03
889D-F4NEDM*

440S-SF5D
GuardLink enabled tap PTR
5-Pin M12 SS Contacts
(Solid State)

Compatible 5-Pin OSSD Devices

440E
Pull Wire

440N
Non-Contact

440N
Latch Actuator

440N
Non-Contact

450L
Light Curtain

Patchcord
Tap 03 to Tap 04
889D-F4NEDM*

440S-SF8D
GuardLink enabled tap PTR
8-Pin M12 SS Contacts
(Solid State)

Compatible 8-Pin OSSD Devices

440E
Pull Wire

440N
Non-Contact

440N
Latch Actuator

440G-TLS-Z-GD2
Guard Lock

440G-LZ
Bolt Lock

Patchcord
Tap 04 to Tap 05
889D-F4NEDM*

440S-MLF8D
GuardLink enabled tap PTL
8-Pin M12 EM Contacts
(Electromechanical)

Compatible 5-Pin EMSS Devices

440G-TLS-GD2
Guard Lock

Patchcord
Tap 05 to Tap 06
889D-F4NEDM*

440S-SLF8D
GuardLink enabled tap PTL
8-Pin M12 SS Contacts
(Solid State)

Compatible 8-Pin OSSD Devices

440G-EZ
Electromagnetic
Lock

440G-LZ
Bolt Lock

Step 05

898D-418U-DM2
Terminator Plug

440G-MZ
Guard Lock

440S-PF5D
GuardLink Passive
Tap M12 5-Pin

Patchcord
Tap 06 to Tap 07
889D-F4NEDM*

Power
Supply

440S-PF5D4
Power Tap

Step 2b

Patchcord
Tap 06 to Tap 07
889D-F4NEDM*

440G-MZ
Guard Lock

Guardshield POC/PAC Safety Light Curtains 450L

User Manual | POC Installation Instructions | PAC Installation Instructions

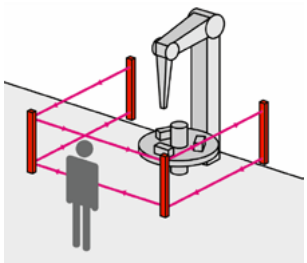
POC

PAC

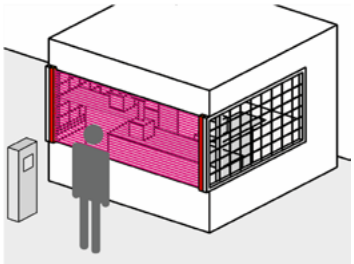
Overview

The 450L GuardShield™ POC and PAC safety light curtains features patented technology allowing each transceiver stick to be used as a transmitter or receiver via an plug-in module. The 450L-B is a basic model with on/off functionality. The 450L-E in a enhanced model featuring integrated laser alignment, cascading, and integrated muting. This advanced technology greatly reduces stock and provides a flexible, cost-effectivey solution.

PAC



POC



Features

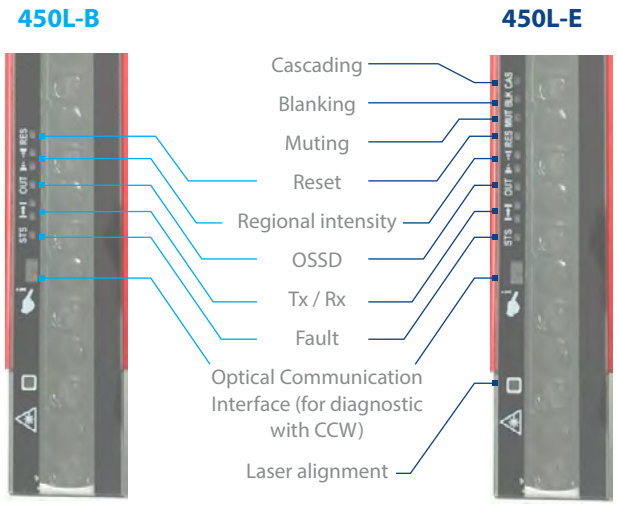
- Point of Operation Control (POC) for finger (14mm) or hand (30mm) protection
- Perimeter Access Control (PAC) covering 1, 2, 3 or 4-beam hight models
- Innovative plug-in modules for application flexibility and reduced inventory costs
- Integrated laser alignment system helps provide quick and more reliable installation
- CIP Safety over EtherNet/IP

POC (Point of Operation Control)

A safety light curtain designed for partial-body detection close to the hazard where personnel interact with a machine as part of the process.

PAC (Perimeter Access Control)

A safety light curtain designed for whole-body detection to create a safety perimeter around a machine.



Function	POC 450L-B	POC 450L-E	PAC 450L-E
Operating Range 14mm Res.	0.5 .. 4m	0.5 .. 9m	n/a
Operating Range 30mm Res.	0.9 .. 7m	0.9 .. 16.2m	0.9 .. 16.2m
Reset	✔	✔	✔
External Device Monitoring	✔	✔	✔
Low Operating Range	✔	✔	✔
Muting	–	✔	✔
Blanking	–	✔	–
Cascading	–	✔	✔
CIP Safety over EtherNet/IP	✔	✔	2024 release
Laser Alignment	External	Integrated	Integrated

Specifications

Safety Rating	Type 4, PLe, CAT 4, SIL3
Enclosure Rating	IP65
Cross Section	30 x 30mm
Power Supply & Current	24V DC ±15%
Safety Output	2 OSSDs max .5A

Product selection

Step 01

- Select 2 Transceiver sticks of the same functionality, resolution and height

A) Determine Functionality:	B) Determine Resolution:	C) Determine Protected height:
POC 450L-Basic or 450L-Enhanced PAC 450L-Enhanced	Hand Protection (30mm) or Finger Protection (14mm)	From 150mm to 1950mm in 150mm increments
	1-Beam, 2-Beam, 3-Beam, 4-Beam	150mm, 600mm, 900mm, 1050mm

POC: Point of Operation Control

Basic	Catalogue No.
Transceiver Stick with 14 mm Finger Resolution (mounting kit included)*	450L-B4FNxxxxYD
Transceiver Stick with 30 mm Hand Resolution (mounting kit included)*	450L-B4HNxxxxYD
Enhanced	
Transceiver Stick with 14 mm Finger Resolution (mounting kit included)*	450L-E4FLxxxxYD
Transceiver Stick with 30 mm Hand Resolution (mounting kit included)*	450L-E4HLxxxxYD

xxxx: 0150 … 1950 mm in increments of 150 mm (150, 300, 450, 600, 750, **900**, 1050, 1200, 1350, 1500, 1650, 1800, 1950).
For example: "450L-E4FL0900YD" indicates an order for **900 mm** finger detection light curtain transceiver stick.
* Mounting Brackets included. For optional side mounting bracket kit see Step 05: Accessories.

PAC : 450L-Enhanced

Description	1-Beam (150mm)	2-Beam (600mm)	3-Beam (900mm)	4-Beam (1050mm)
PAC (short 0.9 ... 16.2m)*	450L-E4A1L0150YD	450L-E4A2L0600YD	450L-E4A3L0900YD	450L-E4A4L1050YD
PAC (5 ... 30m)*	2024 release			

* Mounting Brackets included. For optional side mounting bracket kit see Step 05: Accessories.

Step 02

- Select a Transmitter Plug-in module for one Transceiver stick

Transmitter plug-in

Catalogue No.	Pins	Function	POC 450L-B	POC 450L-E	PAC 450L-E
450L-APT-PW-5	5	Transmitter	✔	✔	✔
450L-APT-PW-8	8	Transmitter	✔	✔	✔
450L-APU-UN-8	8	Universal Transmitter/Receiver	✔	✔	✔

Step 03

- Select a Receiver Plug-in module for one Transceiver stick

Receiver plug-in

Catalogue No.	Pins	Function	POC 450L-B	POC 450L-E	PAC 450L-E
450L-APR-ON-5	5	Auto reset	✔	✔	✔
450L-APR-ED-8	8	Reset, EDM, Range	✔	✔	✔
450L-APR-BL-5	5	Blanking, Range	n/a	✔	n/a
450L-APR-MU-8	8	Muting & Blanking	n/a	✔	✔
450L-APU-UN-8	8	Universal Transmitter/Receiver	✔	✔	✔
450L-APC-IO-8	8	Cascading & Muting I/O	n/a	✔	✔
450L-APR-EN-8	8	EtherNet IP Module	✔	✔	2024 release

Step 04

- Select cordset based on the number of pins on Plug-in modules

889D-F5BC-*

Cordset

Description	Catalogue No.
Cordset - connector to flying lead DC Micro (M12), Female, Straight, 5-Pin, PVC Cable, Black, Unshielded	889D-F5BC-*
Cordset - connector to flying lead DC Micro (M12), Female, Straight, 8-Pin, PVC Cable, Black, Unshielded	889D-F8AB-*

Note: For CIP Safety over EtherNet/IP Light Curtain System it's recommended to use a Red Patchord as displayed on next page 889D-F8NBDM-*. Replace * with 2, 5, 10, 15, 20 for required length

Step 05

- Select optional accessories

450L-AD-OID

800F-MUT-2-MS

450L-AMOD-MUT-8

450L-AM-SM

450L-ENETR

Accessories

Description	Catalogue No.
Optical interface tool (required for diagnostics on Connected Components Workbench software v12 onwards)	450L-AD-OID
Weld shield kit (xxxx = 0150 … 1950 mm in increments of 150 mm)	450L-AW-xxxx
Laser alignment tool for 450L-B (Requires 450L-ALAT-C)	440L-ALAT
Mounting bracket for laser alignment tool 440L-ALAT	450L-ALAT-C
Side mounting bracket kit	450L-AM-SM
Shock mounting bracket kit (1 Stick)	445L-AF6142
Termination plug, M12 8-pin for cascading plug-in	898D-81CU-DM
CIP Safety over EtherNet/IP Module	450L-ENETR

Muting Accessories

Description	Catalogue No.
Muting distribution block	450L-AMOD-MUT-8
Muting Indication and Reset Block	800F-MUT-2-MS
Muting Lamp	450L-AMUT-IL
Photoelectric Polarised Retroreflective Sensor 11-30VDC 25mm-3m sensing range (Requires 92-90 Reflector)	42EF-P2MPB-F4
Reflector Cube 86mm diameter	92-90

Safety Relays (for more information see pages 92-90)

Description	Catalogue No.
Guardmaster (SI) Single Input Safety Relay	440R-S12R2
Guardmaster (DI) Dual Input Safety Relay	440R-D22R2
Guardmaster CR30 Configurable Relay	440C-CR30-22BBB

Guardlink Smart Taps (for more information see pages 6-7)

Description	Catalogue No.
GuardLink Enabled Tap 5-pin OSSD Input device	440S-SF5D
T Connector M12-5 Pin (Two Transceiver sticks into single GuardLink Tap)	1485P-RDR5
GuardLink Red Patchcord to device 5-Pin	889D-F5NCDM-*
GuardLink Red Patchcord to device 8-Pin	889D-F8NBDM-*
GuardLink Red Patchcord from Tap to Tap	889D-F4NEDM-*
GuardLink Red Patchcord from Tap to Safety Relay	889D-F4NE-*

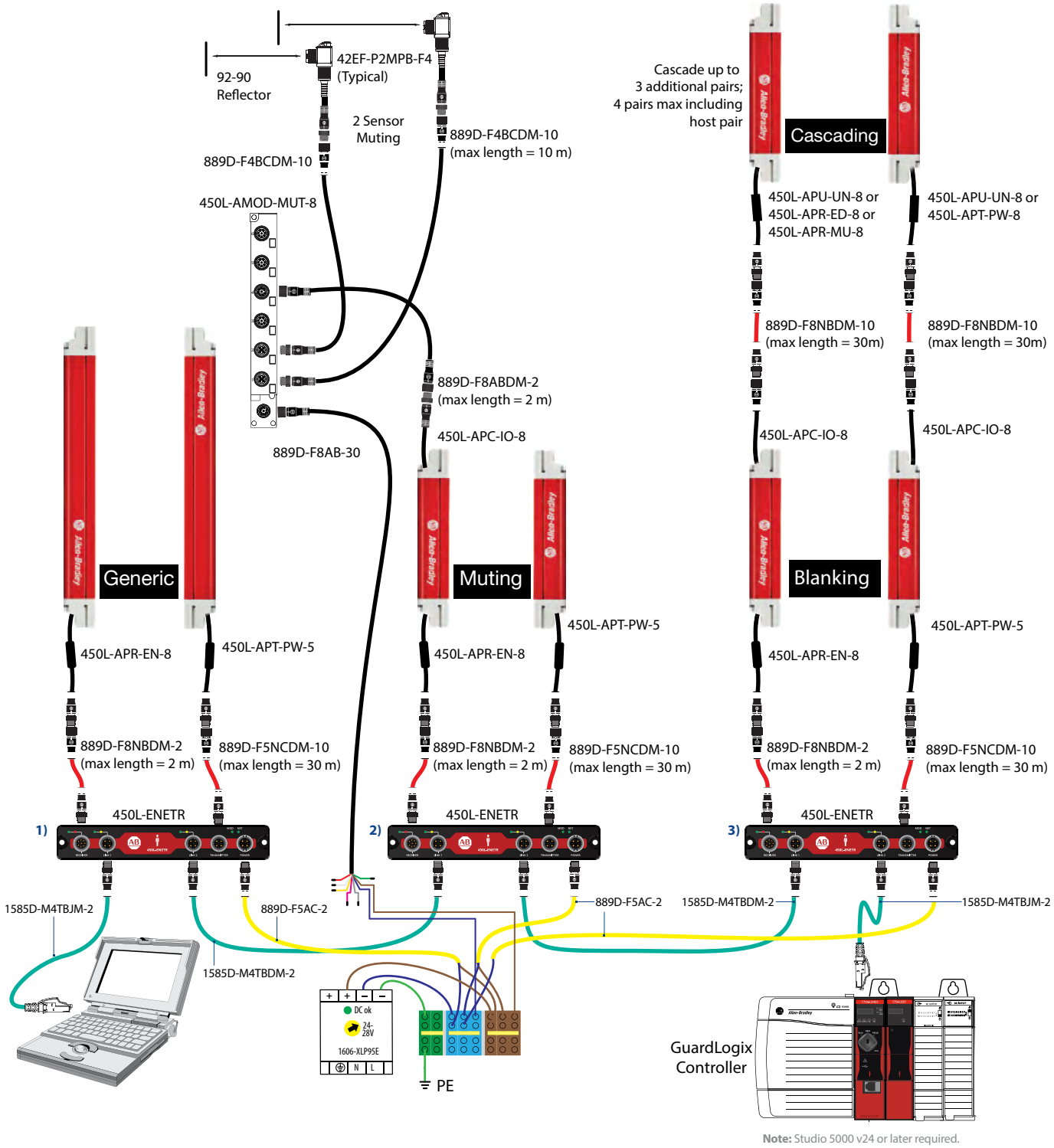
Note: Replace * with 0M3 (0.3m), 0M6 (0.6m), 2 (2m), 5 (5m), 10 (10m), 15 (15m), 20 (20m) for required length.

CIP Safety Light Curtain System

User Manual

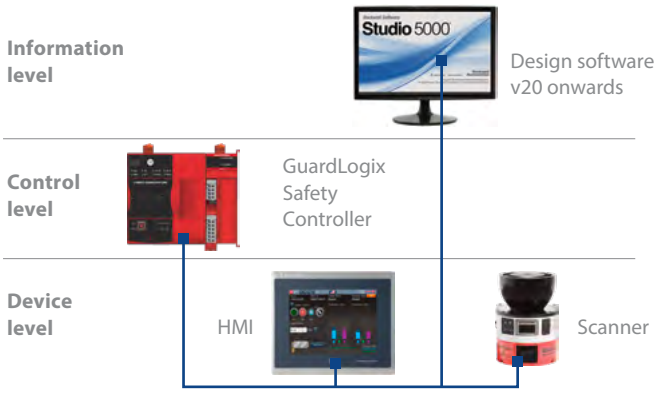
The 3 examples below illustrate how a

1) Generic Light curtain system is configured
2) Muting Light curtain system is configured
3) Cascading/Blanking system is configured



Note: Studio 5000 v24 or later required.

SafeZone 3 CIP Safety Laser Scanner 442L

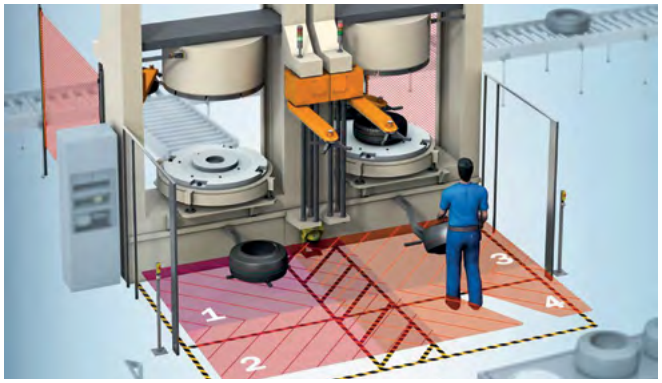


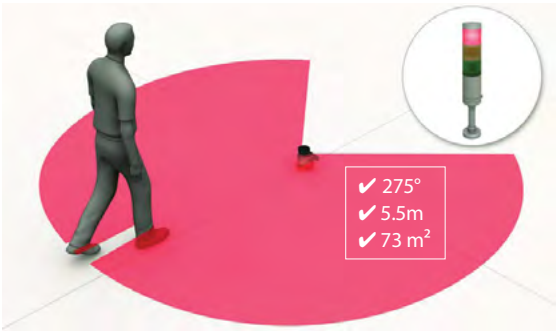
Bright multicolor text display
Easy-to-understand displays, providing current status and diagnostic information.

Features

User Manual | Installation Instructions

- EtherNet/IP connectivity can help improve installation time
- Easy integration using an add-on profile in Studio 5000 Logix Designer
- Supports Device Level Ring (DLR) network topology
- High definition distance measurement scanning technology helps prevents dust, smoke and optical interferences
- Multi-coloured display and push buttons offer device settings and diagnostic information
- MultiZone safety field is 5.5 m, 8 fields
- Wide 275° scanning angle





New Generation of Safety Laser Scanner

Using Common Industrial Protocol (CIP) Safety over Ethernet/IP, the SafeZone3 laser scanner adds the advantage of integration with a GuardLogix control system using Studio 5000 Logix Designer. Along with supporting Device Level Ring (DLR) network topology which helps increase network resiliency. The scanner also Features high definition distance measurement scanning technology with a substantial increase in the number of pulses per scan along with two scan cycle settings which result in improved performance in dusty environments and increased immunity to optical interference.

Specifications

Safety Rating	SIL2, PLd
Enclosure Rating	IP65
Dimensions	135 x 110 x 110
Power Supply	24VDC
Temperature Range	-10…+50C
Safety Field Range	5.5m
Scanning Angle	275
Resolution	30/40/70/150/200mm
Fields	8
Monitoring cases Simultaneously	8 4

Product selection

Step 01

- Select SafeZone 3 Safety Laser Scanner

SafeZone 3 Safety Laser Scanner

Description	Catalogue No.
SafeZone 3 Multizone CIP Safety Laser Scanner 5.5 Meter, 8 Fields	442L-SZNMZCP

Step 02

- Select Required System Plug

442L-SZNCPMOD

System Plug

Description	Catalogue No.
SafeZone 3 System Plug (stores configuration memory)	442L-SZNCPMOD

Note: A complete SafeZone 3 system consists of the multizone scanner with a SafeZone 3 system plug

Step 03

- Select Required Mounting brackets

Bracket 1

Bracket 2

Bracket 3

Bracket 4

Mounting brackets

Description	Catalogue No.
Mounting Bracket 1 - Most commonly used	442L-AMBSZCP1
Mounting Bracket 2 - Provides protection for Optics Cover	442L-AMBSZCP2
Mounting Bracket 3 - When system plug installed on the bottom (connects to bracket 1 or 2)	442L-AMBSZCP3*
Mounting Bracket 4 - When system plug installed at rear and right angled connectors used	442L-AMBSZCP4*

* Connects to mounting bracket 1 or 2

Step 04

- Select Required Power Cable

Power cable

First End Connector	Second End Connector	Cable Type	Catalogue No.
Straight Female	Straight Male	Braided shield 4-pin M12 Yellow	889D-F4ECDM-*
Straight Female	Flying leads		889D-F4EC-*
Straight Female	Straight Male	Foil and braided shield 4-pin M12 Yellow	889D-F4FCDM-*
Straight Female	Flying leads		889D-F4FC-*

Note: Replace * with 0M3(.3m), 0M6(.6m), 1(1m), 2(2m), 5(5m), 10(10m), 15(15m), 20(20m), 30(30m)

Step 05

- Select Required Ethernet Cables

Ethernet Cable

First End Connector	Second End Connector	Cable Type	Catalogue No.
Male M12 D-Code, straight	Flying leads	Foil and braided shield, 4 conductor, teal PUR, flex rated, halogen-free	1585D-M4UB-*
Male M12 D-Code, straight	Male M12 D-Code, straight		1585D-M4UBM-*
Male M12 D-Code, straight	Female M12 D-Code, straight		1585D-M4UBDF-*
Male M12 D-Code	RJ45		1585D-M4UBJM-*

Note: Replace * with 0M3(.3m), 0M6(.6m), 1(1m), 2(2m), 3(3m), 5(5m), 10(10m), 15(15m), 20(20m), 30(30m).

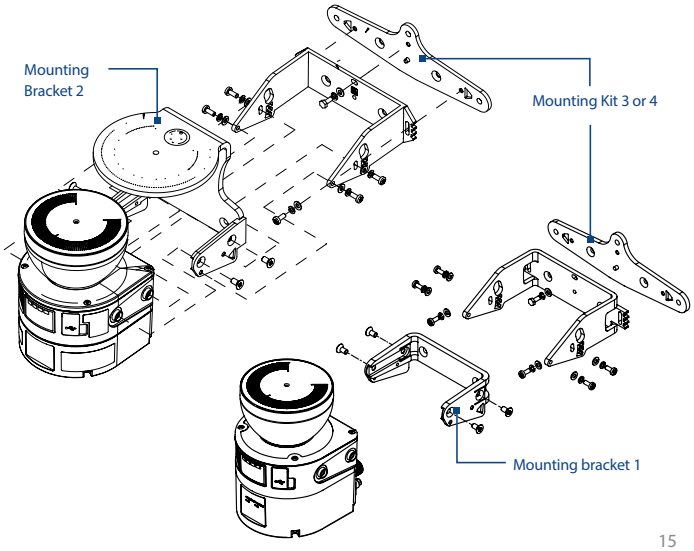
Step 06

- Select optional accessories

442L-ASZNCPW

Accessories

Description	Catalogue No.
SafeZone 3 CIP Laser Scanner Replacement Optics Cover	442L-ASZNCPW
SafeZone 3 CIP Laser Scanner Replacement Cover Plate	442L-ACVR



SafeZone Mini, Single, Multi Zone Laser Scanners 442L

SafeZone Mini
- User Manual
- Installation Instructions

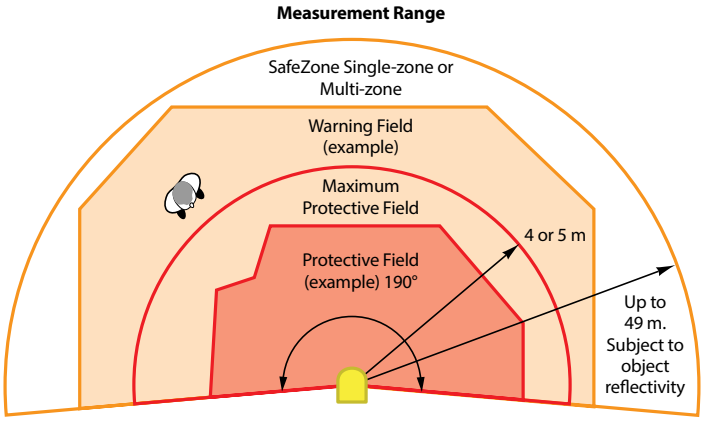
SafeZone Single/Multi
- User Manual
- Software Manual
- Software Download

A flexible, easy-to-use machine safeguarding solution

SafeZone safety laser scanners are Type 3 optoelectronic devices that use reflection of emitted infrared laser light to sense a person or object within a user-defined area.

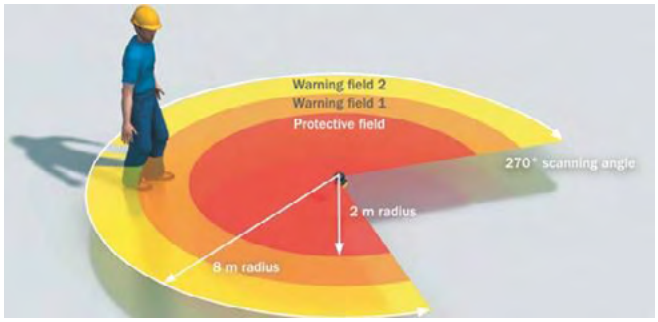
The Class 1 (eye safe) infrared laser scans a 190° or 270° angular area to create a two-dimensional detection field. Light reflected off an object or person in the field is processed by the SafeZone, which sends a stop signal to the machine.

SafeZone single-zone scanners feature one user configured sensing field, while multi-zone versions provide four switchable, configurable field sets (warning and safety).



Features

- Single-zone, multi-zone, and mini versions
- Selectable resolutions of 30, 40, 50, 70, and 150 mm
- Horizontal or vertical mounting
- Stationary or mobile applications
- Class 1 laser (eye safe)
- Easy-to-use configuration wizard
- Seven-segment diagnostic display, rotatable by 180°



Specifications

Safety Rating	Type 3, PLd, CAT 3, SIL2
Enclosure Rating	IP65
Cross Section	30 x 40mm
Power Supply	24V DC ±20%30%
Power Consumption	55W with max output load, 19W without output load

Product selection

Step 01

- Select SafeZone safety scanner

442L-SFZNSZ

442L-SFZNMN3

SafeZone safety scanner

Model	Application specific resolutions	Safety outputs	Auxiliary outputs	Angular scanning range	Safety field range	Catalogue No.
SafeZone Mini, 3 m	30, 40, 50, 70 and 150 mm	2 PNP	2 (configurable)	270°	3 m	442L-SFZNMN3
SafeZone Single-zone	30, 40, 50, 70 and 150 mm	2 PNP	1	190°	4 m	442L-SFZNSZ
SafeZone Multi-zone*	30, 40, 50, 70 and 150 mm	2 PNP	1	190°	5 m	442L-SFZNMZ

Note: V3.0.0 operating software CD ships with each SafeZone safety laser scanner and also contains pdf files of the Installation and Software manuals.
*Multi Zone has FOUR configurable switchable field sets

Step 02a
SafeZone Mini

- Select cable

442L-ACABL10

SafeZone Mini M12 shielded 8-conductor cordset

Cable Length	Catalogue No.
2 m	442L-ACABL2
10 m	442L-ACABL10
20 m	442L-ACABL20

Step 02b
SafeZone Single and Multi-zone

- Select Prewired I/O connector cable and Memory Module

442L-CSFZNMZ-10

Prewired I/O connector cable and memory module

Cable Length	Catalogue No.
10 m	442L-CSFZNMZ-10
20 m	442L-CSFZNMZ-20

Step 03
SafeZone Mini, Single and Multi-Zone

- Select Suitable RS232 USB Service Programing Cable

442L-ACUSB-2

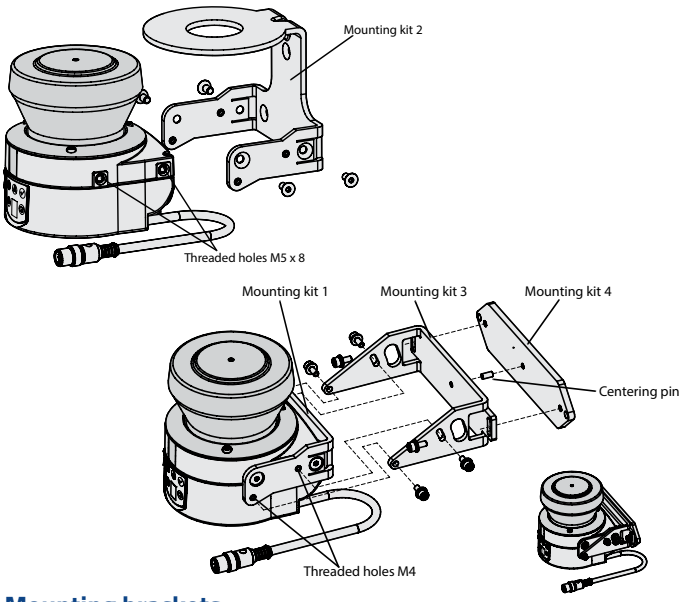
RS232 USB

Cable Length	Catalogue No.
2 m	442L-ACUSB-2
10 m	442L-ACUSB-10

Note
Only one cable required if multiple safety Laser Scanners are selected

Step 04a
SafeZone Mini

- Select Mounting Brackets

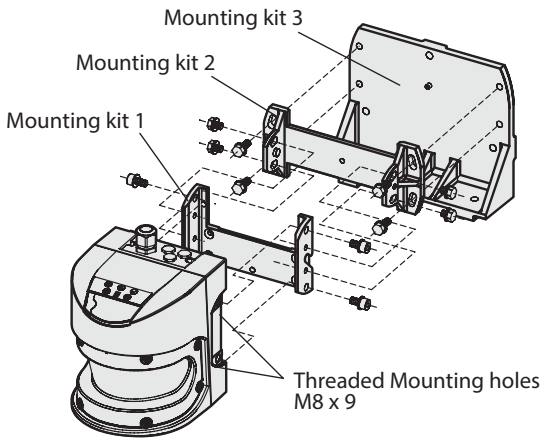


Mounting brackets

Description	Catalogue No.
SafeZone Mini Mounting Bracket 1 for direct mounting	442L-AMBSZMN1
SafeZone Mini Mounting Bracket 2 for optical cover protection	442L-AMBSZMN2
SafeZone Mini Mounting Bracket 3 longitudinal and cross wise adjustment possible (requires bracket 1 or 2)	442L-AMBSZMN3
SafeZone Mini Mounting Bracket 4 backplane mounting (requires brackets 2 and 3	442L-AMBSZMN4

Step 04b
SafeZone Single and Multi-Zone

- Select Mounting Brackets



Mounting brackets

Description	Catalogue No.
SafeZone Mounting Bracket 1 For mounting the back of the scanner to a solid surface without adjustment	442L-AMBSFZNMZ1
SafeZone Mounting Bracket 2 For +/- 4 degrees of adjustability (requires bracket 1)	442L-AMBSFZNMZ2
SafeZone Mounting Bracket 3 Used for floor mounting (requires brackets 1 or 2 and 3)	442L-AMBSFZNMZ3

Step 05

- Select optional accessories


442L-SZMNW

Accessories

Description	Catalogue No.
SafeZone Mini Replacement window kit	442L-SZMNW
SazeZone Single and MultiZone window kit	442L-SFZNMZW
USB to Serial Port Adaptor Cable	9300USBS
100 Meter Cable Spool 13 conductor (Step 02b)	442L-C13GD-S100
Power Supply	1606-XLP72E

Safety Relays (for more information see pages 62-69)

Description	Catalogue No.
Guardmaster (SI) Single Input Safety Relay	440R-S12R2
Guardmaster (DI) Dual Input Safety Relay	440R-D22R2
Guardmaster (CI) Compatible Input Relay	440R-S13R2
Guardmaster CR30 Configurable Relay	440C-CR30-22BBB

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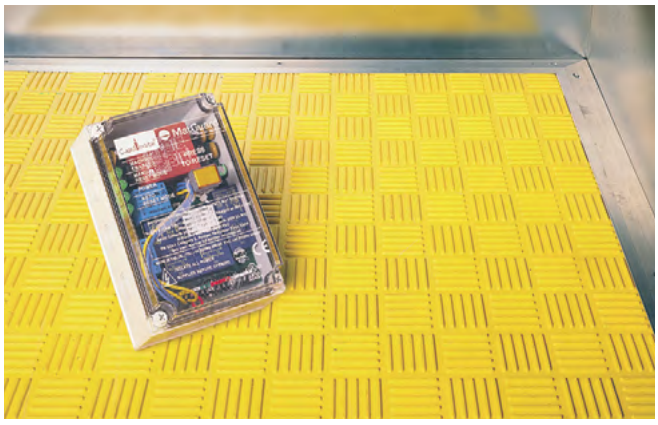
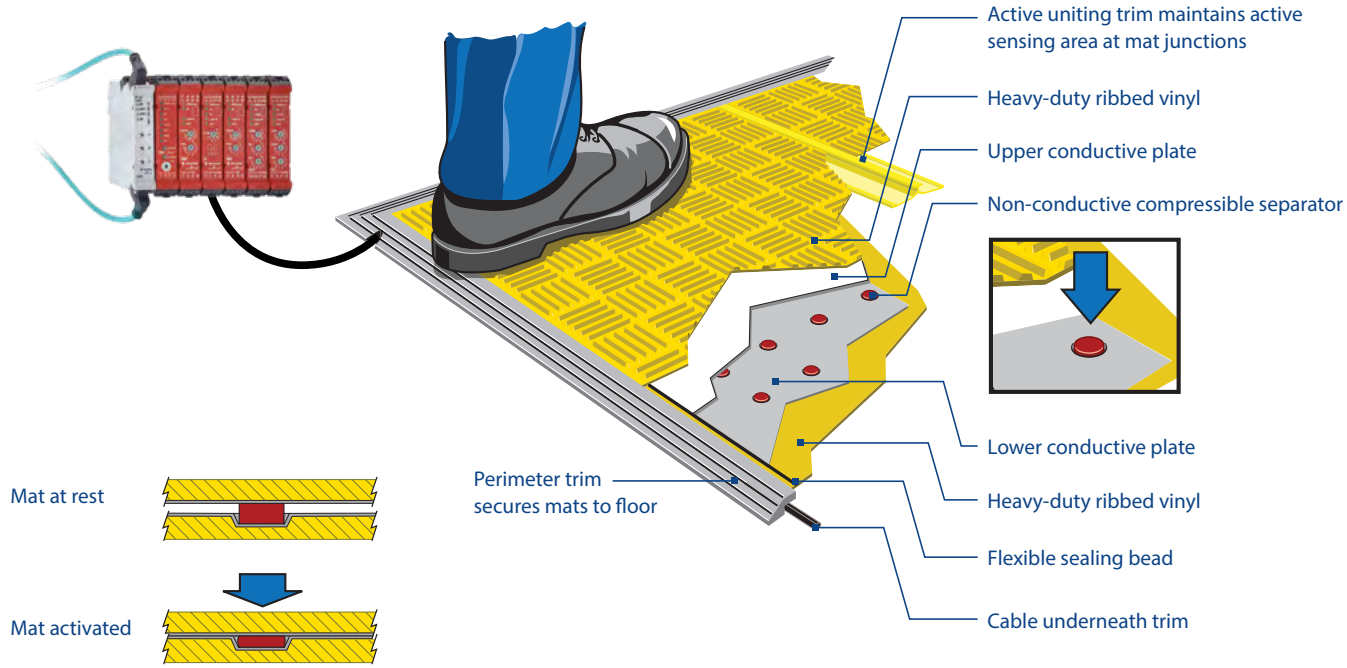
Safety Mat System 440F

User Manual

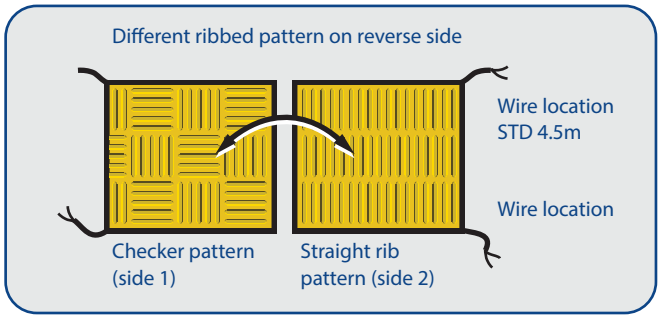


Features

- Pressure-sensitive protective device per ISO 13856 for machine safeguarding
- Hardened steel plate construction
- No dead spots
- Four-wire system to detect opens and shorts
- Withstands 4500 psi static pressure



When the mat is activated, the non-conductive compressible separators (shown in red) compress into their recess allowing the two plates to make contact giving all over sensitivity.



Anatomy of a Safety Mat System

When integrated to a suitable safety mat controller, it detects a presence on the mat, a short circuit, or an open circuit. Under each of these conditions, the safety control issues a stop command. Multiple mats can be combined into one safety mat system with the use of joining trim.

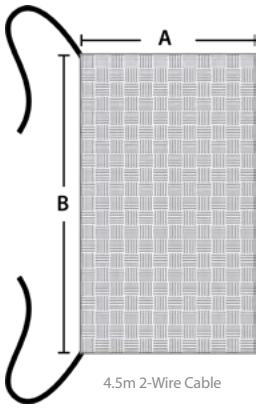
Specifications

Safety Rating	CAT 1
Enclosure Rating	IP67
Power Supply	24V DC -20% + 10%
Mechanical Life	10,000,000

Product selection

Step 01

- Select dimensions for "A" and "B"



4.5m 2-Wire Cable

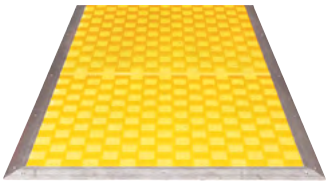
Preferred availability

A (mm)	B (mm)
750	750, 1500
1000	1250, 1500

Note
Length "A" options available in 50mm increments from 150mm to 1000mm
Length "B" options available in 50mm increments from 200mm to 1800mm.
Single or Double Cable entries can be selected with Safety mats (see ProposalWorks)

Step 02

- Select Trim Kit
- When selecting trim for a single mat, ensure that the dimensions are the same as the safety mat


440F-M1515BYNN


440F-T1515

Trim Kit

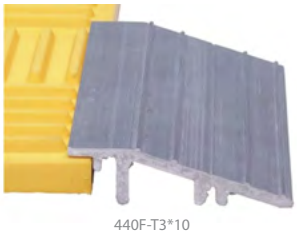
Mat Size (mm)	Step 01	Step 02
	Safety Mat	Standard Perimeter Trim Kit
750 x 750	440F-M1515BYNN	440F-T1515
750 x 1500	440F-M1530BYNN	440F-T1530
1000 x 1250	440F-M2025BYNN	440F-T2025
1000 x 1500	440F-M2030BYNN	440F-T2030

Step 03

- Select accessories


440F-T3012


440F-T3013


440F-T3*10

Perimeter trim options

Description	Catalogue No.
Aluminium Perimeter Trim (3 cables), Straight piece (Replace * with 2, 3 for required m length)	440F-T3*10
Aluminium Perimeter Trim (8 cables), Straight piece (Replace * with 2, 3, 4 for required m length)	440F-T3*11
Aluminium Perimeter Trim, 90° Right Angle (Replace * with 2, 3 for required m length)	440F-T3*16
Aluminium Perimeter Trim (3 cables), External Corner	440F-T3012
Aluminium Perimeter Trim (3 cables), Internal Corner	440F-T3013
Vinyl Wire Guide 2m (protect cables from trim outwards)	440F-T3230
Active Uniting Trim (joining mats) (Replace * with 1(1m), 0(1.5m) 2(2m) , 3(3m) for required m length)	440F-T3*20

Safety Relays (for more information see pages 62-69)

Description	Catalogue No.
Guardmaster (SI) Single Input Safety Relay	440R-S12R2
Guardmaster (DI) Dual Input Safety Relay	440R-D22R2
Guardmaster CR30 Configurable Relay	440C-CR30-22BBB

Guard Locking Switches 440G

Guard Locking Switches protect hazardous areas where a danger is not immediately removed after a stop request. On many machines, removing power to the motor or actuator will not immediately stop the dangerous motion. Typical applications are high inertia rotating machines, fast rotating machines, and machines where high pressure needs to be released from pneumatic valves.

Features	440G-MZ	440G-TLSZ	440G-LZ	440G-EZ	440G-TLS
					
Dimensions (H x W x D)	182.7 x 45.2 x 50	126 x 86 x 39	33 x 86 x 126	17 x 60 x 120	135 x 45 x 50
Holding Force	2500N	2000N	1300N	500N	1500 or 2000N
Safety Outputs	OSSD or GuardLink	OSSD	OSSD	OSSD	Dual Channel EMSS
Available types[1)]	PTR or PTL	PTR or PTL	PTR or PTL	PTL only	PTR or PTL
Suitable for Whole Body Access	Yes	Yes	No	Interlocking Only	Yes
Misalignment tolerance	+/- 5mm	N/A	+/-2.5mm	+/- 5mm	N/A
Actuator coding	Standard or High	Unique	Standard or High	Standard or High	Standard
Integrated latch	No	Yes	No	Yes	Yes
Escape release	Optional	No	No	No	Optional
Connection Options	5-Pin only	8-Pin Only	5-Pin, 8-Pin, Cable	5-Pin and 8-Pin	Conduit, 8-Pin, 12-Pin
Material	ABS	Glass-filled PBT	Glass-filled PBT	Anodised Aluminium	ABS
Safety Function					
Door position monitoring	Yes	Yes	Yes	Yes	Yes
Guard locking	Yes	Yes	Yes	Process Protection	Yes

Power to release (PTR) must be used for personnel protection unless otherwise dictated by a risk assessment as per regulations

440G-MZ Guard Locking Switch

Features

- Optimized for full body access
- Provides holding force of 2500 N for guard locking a full-size door
- Tongue actuator movement in multiple axes +/-5 mm misalignment
- Network integration via EtherNet/IP adapter with safety relay
- RFID unique (high) or standard (low) coded actuators
- Features Highly visible 270° wrap-around LEDs for LINK/DEVICE status
- Operate as a standalone device (5-pin OSSD) or GuardLink
- Includes mounting with three entry points on hinged or sliding door

Switch helps protect personnel and is suitable for use with many types of guard doors, including full-sized guard doors, which allow full body access to the safeguarded area, where a high holding force and a wide tolerance to guard misalignment are commonly required. Typical applications include machines which are surrounded by perimeter fences with guard doors for full body access (for example, robotic assembly or packaging machines), machines with built-in full-size doors (for example, bottling machines) and small to medium CNC machines.

Specifications

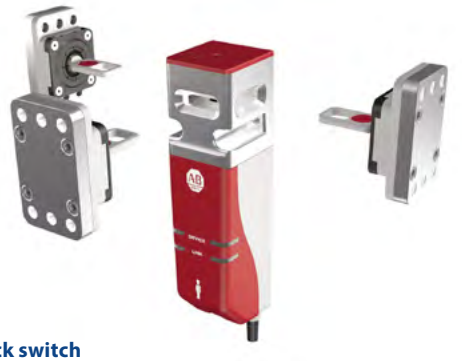
Safety Rating	Type 4, PLe, CAT 4 , SIL3
Enclosure Rating	IP65, IP66, IP67, IP69, IP69K
Safety/Auxiliary outputs	2 x PNP (0.2 mA max) No Aux
Power Supply	24V DC +10%/-15% Class 2
Holding Force	2500N

Product selection Step 01

User Manual

Installation Instructions

- Select Guardlock switch with actuator type



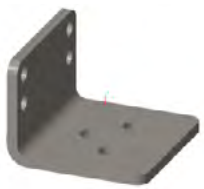
Guardlock switch

Model type	Actuator	Catalogue No.*
Power to release	RFID standard	440G-MZS20SNRJ
	RFID unique	440G-MZS20UNRJ
Power to lock	RFID standard	440G-MZS20SNLJ
	RFID unique	440G-MZS20UNLJ

*** Add an 'E' to the end of the catalogue no. to order escape release version**

Step 02

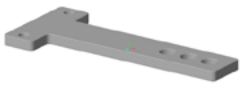
- Select cordset and optional accessories



440G-MZAM1

440G-MZAM2

440G-MZAM3



440G-MZAM4

Cordset and accessories

Description	Catalogue No.
Actuator Mounting bracket L- shaped	440G-MZAM1
Actuator Mounting bracket Z- shaped	440G-MZAM2
Switch Mounting bracket	440G-MZAM3
Padlock accessory	440G-MZAL
DC Micro M12 to flying lead 5-Pin yellow cordset	889D-F5AC*

Note: Replace * with 2, 5, 10, 15, 20 for required length

Safety Relays (for more information see pages 62-69)

Guardmaster (SI) Single Input Safety Relay	440R-S12R2
Guardmaster (DI) Dual Input Safety Relay	440R-D22R2
Guardmaster CR30 Configurable Relay	440C-CR30-22BBB

Guardlink (for more information see pages 6-7)

GuardLink Enabled Tap 5-pin Passive Input device	440S-PF5D
Guardlink Red patchord to device 5-Pin	889D-F5NCDM-*
Guardlink Red patchord from Tap to Tap	889D-F4NEDM-*
Guardlink Red patchord from Tap to Relay	889D-F4NE-*

Note: Replace * with 0M3 (0.3m), 0M6 (0.6m), 2 (2m), 5 (5m), 10 (10m), 15 (15m), 20 (20m) for required length

TLS-Z GD2 Guard Locking Switch

Features

- Guard locking plus RFID technology for full body access
- Provides holding force of 2000 N for guard locking a full-size door
- Tongue actuator movement in multiple axes +/-5 mm misalignment
- Built in uniquely coded RFID door sensor
- Auxiliary functionality either lock status (locked/unlocked) or door position status (door open/closed)
- Operate as a standalone device (8-pin OSSD) or GuardLink

The TLS-Z GD2 Guard Locking Switch is an interlock switch that has a uniquely coded RFID door sensor with inductive door position sensing technology. This switch can detect if an actuator key breaks or becomes separated from its door mounted position. Built with the same solid-state technology as the TLS GD2, this switch supports the highest level of safety – Performance Level "e" (PLe) to EN ISO 13849-1.

Specifications

Safety Rating	Type 4, PLe, CAT 4
Enclosure Rating	IP66, IP67, IP69K
Safety Outputs	2 x PNP (0.2 mA max) Status: ON
Auxiliary Outputs	1 x PNP (0.2 mA max) Status:)OFF
Power Supply	24V DC +10%/-15% Class 2
Holding Force	2000 N

Product selection Step 01

User Manual

Installation Instructions

- Select Guard Locking Switch with actuator

Guardlock switch with actuator

Model type	Catalogue No.
Power to release	440G-TZS21UPRH
Power to lock	440G-TZS21UPLH

Note: For auxilary output type, replace P (lock status) with T for door status.

Step 02

- Select cordset optional accessories

440G-A27371

440G-A27356

440G-A36026

Cordset and accessories

Description	Catalogue No.
DC Micro M12 to flying lead 5-Pin yellow cordset	889D-F8AB*
DC Micro M12 to M12 8-Pin black patchcord	889D-F8ABDM*
Fully Flexible Actuator	440G-A27143
Cover with external overide Key	440G-A27371
Cover with overide Key attached	440G-A27373
Emergency Overide Key	440G-A36026
Flexible Release cable 1m	440G-A27356
Flexible Release cable 3m	440G-A27357

Note: Replace * with 2, 5, 10, 15, 20 for required length

Safety Relays (for more information see pages 62-69)

Guardmaster (SI) Single Input Safety Relay	440R-S12R2
Guardmaster (DI) Dual Input Safety Relay	440R-D22R2
Guardmaster CR30 Configurable Relay	440C-CR30-22BBB

Guardlink (for more information see pages 6-7)

GuardLink Enabled Tap 8-pin OSSD PTL	440S-SLF8D
GuardLink Enabled Tap 8-pin OSSD PTR	440S-SF8D
Guardlink Red patchord to device 8-Pin	889D-F8NBDM-*
Guardlink Red patchord from Tap to Tap	889D-F4NEDM-*
Guardlink Red patchord from Tap to Relay	889D-F4NE-*

Note: Replace * with 0M3 (0.3m), 0M6 (0.6m), 2 (2m), 5 (5m), 10 (10m), 15 (15m), 20 (20m) for required length

440G-LZ Guard Locking Bolt Switch

Features

- Optimized for partial body access
- Provides holding force of 1300 N for guard locking a full-size door
- Tongue actuator movement in multiple axes +/-5 mm misalignment
- RFID unique (high) or standard (low) coded actuators
- Features Highly visible 270° wrap-around LEDs for LINK/DEVICE status
- Operate as a standalone device (8-pin OSSD) or GuardLink
- Includes mounting with three entry points on hinged or sliding door

The 440G-LZ Guard Locking Switch is designed for partial body access guard doors. This switch combines microprocessor technology with an RFID coded actuator, and it features a locking bolt drive mechanism that locks only when the correct actuator is detected. With this functionality, the switch is TÜV certified to PLe, Cat. 4 (EN/ISO 13849-1) which is the highest level of safety for guard door position and lock monitoring.

Specifications

Safety Rating	Type 4, PLe, CAT 4
Enclosure Rating	IP66, IP67, IP69K
Safety Outputs	2 x PNP (0.2 mA max) Status: ON
Auxiliary Outputs	1 x PNP (0.2 mA max) Status: OFF
Power Supply	24V DC +10%/-15% Class 2
Holding Force	1300 N

Product selection Step 01

User Manual

Installation Instructions

- Select Guardlock switch with actuator type

Guardlock switch with actuator

Model type	Actuator	3m lead	10m lead
Power to release	Standard	440G-LZS21SPRA	440G-LZS21SPRB
	Unique	440G-LZS21UPRA	440G-LZS21UPRB
Power to lock	Standard	440G-LZS21SPLA	440G-LZS21SPRB
	Unique	440G-LZS21UPLA	440G-LZS21UPLB

Model type	Actuator	6in Pigtail M12 5-Pin QD	6in Pigtail M12 8-Pin QD
Power to release	Standard	440G-LZS21SJRJ	440G-LZS21SPRH
	Unique	440G-LZS21UJRJ	440G-LZS21UPRH
Power to lock	Standard	440G-LZS21SJLJ	440G-LZS21SPLH
	Unique	440G-LZS21UJLJ	440G-LZS21UPLH

Note: For auxilary output type, replace P (lock status) with T for door status.

Step 02

- Select optional accessories

Cordset and accessories

Description	Catalogue No.
DC Micro M12 to flying lead 8-Pin black cordset	889D-F8AB*
DC Micro M12 to M12 8-Pin black patchcord	889D-F8ABDM*
Standard power to release actuator	440G-LZASPR
Unique power to release actuator	440G-LZAUPR
Standard power to lock actuator	440G-LZASPL
Unique power to lock actuator	440G-LZAUPL
Actuator mounting bracket	440G-LZAM1
Switch body mounting bracket	440G-LZAM2

Note: Replace * with 2, 5, 10, 15, 20 for required length

Safety Relays (for more information see pages 62-69)

Guardmaster (SI) Single Input Safety Relay	440R-S12R2
Guardmaster (DI) Dual Input Safety Relay	440R-D22R2
Guardmaster CR30 Configurable Relay	440C-CR30-22BBB

Guardlink (for more information see pages 6-7)

GuardLink Enabled Tap 8-pin OSSD PTL	440S-LF8D
GuardLink Enabled Tap 8-pin OSSD PTR	440S-SF8D
Guardlink Red patchord to device 8-Pin	889D-F8NBDM-*
Guardlink Red patchord from Tap to Tap	889D-F4NEDM-*
Guardlink Red patchord from Tap to Relay	889D-F4NE-*

Note: Replace * with 0M3 (0.3m), 0M6 (0.6m), 2 (2m), 5 (5m), 10 (10m), 15 (15m), 20 (20m) for required length

440G-EZ Electromagnetic Switch

Features

- Process and machine protection per ISO 14119
- Non-contact interlocking device with a power-to-lock (PTL) electromagnetic locking function for process protection
- Switches can be connected in series
- High tolerance to door offset within 5 mm in all directions
- Reduced long-restart delays

440G-EZ Interlocking switch is designed to enhance machine safety as well as reliably help protect a working process from unplanned downtime, which will help improve productivity and increase efficiency. This safety switch combines a Power to Lock (PTL) magnetic locking function with a 500 N holding force and generous 5 mm tolerance to misalignment.

Specifications

Safety Rating	PLe, CAT 4 , SIL3
Enclosure Rating	IP67, IP69K
Safety Outputs	2 x OSSDs 2 PNP, max
Auxiliary Outputs	25mA max
Power Supply	24V DC
Holding force with power	500N
Holding force without power	25N
Temperature	-25 … +70C

Product selection Step 01

User Manual

Installation Instructions

- Select Magnetic switch

Magnetic switch

Description	Catalogue No.
5-pin Micro QD version	440G-EZS21STL05J
8-pin Micro QD version	440G-EZS21STL05H

Step 02

- Select cordset and optional accessories

Cordset and accessories

Description	Catalogue No.
DC Micro M12 to Flying Lead 5-Pin black cordset	889D-F5BC*
DC Micro M12 to M12 5-Pin black patchcord	889D-F5BCDM*
DC Micro M12 to Flying Lead 8-Pin black cordset	889D-F8AB*
DC Micro M12 to M12 8-Pin black patchcord	889D-F8ABDM*
Replacement Actuator	440G-EMAS

Note: Replace * with 2, 5, 10, 15, 20 for required length

Safety Relays (for more information see pages 62-69)

Guardmaster (SI) Single Input Safety Relay	440R-S12R2
Guardmaster (DI) Dual Input Safety Relay	440R-D22R2
Guardmaster CR30 Configurable Relay	440C-CR30-22BBB

Guardlink (for more information see pages 6-7)

GuardLink Enabled Tap 8-pin OSSD PTL	440S-LF8D
Guardlink Red patchord to device 5-Pin	889D-F5NCDM-*
Guardlink Red patchord from Tap to Tap	889D-F4NEDM-*
Guardlink Red patchord from Tap to Relay	889D-F4NE-*

Note: Replace * with 0M3 (0.3m), 0M6 (0.6m), 2 (2m), 5 (5m), 10 (10m), 15 (15m), 20 (20m) for required length

TLS-GD2 Guard Locking Switch

Features

Installation Instructions

- Plastic enclosure with stainless steel actuator guide
- High locking force ≤ 2000 N
- Rotatable head: Four actuator entry points
- Five contacts: 2 NC & 1 NO for door position monitoring

The TLS-GD2 is for demanding full-body access guard locking applications where "zero volt" connectivity is needed. A stainless steel actuator guide is fitted to protect the unit from actuator damage due to poor guard alignment or guard wear. The TLS-GD2 is available in two versions: TLS-3 GD2 is power-to-release while the TLS-2 is power-to-lock. Each product has five sets of contacts of various forms. Four actuator entry points are possible; two manual release points. Optional key release and escape release versions are available. An ingress rating of IP69K makes TLS-GD2 suitable for washdown applications.

Specifications

Safety Rating	Type 2
Enclosure Rating	IP66, IP67, IP69K
Safety Outputs	2 x N/C
Auxiliary Outputs	1 x N/O
Power Supply	24V DC +10%/-15% Class 2
Holding Force	2000 N

Product selection

Step 01

Type	Solenoid contacts	Voltage	M20	8-Pin Micro (M12)
TLS-1 GD2 Power to Release	1 NO 1 NC	24V AC/DC	440G-T27121	440G-T2NBBPH-1R
		230V AC/DC	440G-T27123	–
TLS-2 GD2 Power to Lock	1 NO 1 NC	24V AC/DC	440G-T27127	440G-T2NBBPH-1L
		230V AC/DC	440G-T27129	–
TLS-3 GD2 Power to Release	2 NC	24V AC/DC	440G-T27134	440G-T2NBBPH-2R
		230V AC/DC	440G-T27136	–
TLS-1 GD2 Power to Release Escape Release	1 NO 1 NC	24V AC/DC	440G-T21BNPM-1B	440G-T2NBNPH-1B
TLS-3 GD2 Power to Release Escape Release	2 NC	24V AC/DC	440G-T21BNPM-2B	440G-T2NBNPH-2B

Step 02

Actuator
GD2 Standard 440G-A27011
or
Fully Flexible 440G-A27143

Step 03

- Select optional accessories

Cordset and accessories

Description	Catalogue No.
DC Micro M12 to flying lead 8-Pin black cordset	889D-F8AB*
DC Micro M12 to M12 8-Pin black patchcord	889D-F8ABDM*
Cover for TLS-3 external override key	440G-A27372
Cover for TLS-3 override key attached	440G-A27374
Sliding bolt actuator	440K-AMDS

Note: Replace * with 2, 5, 10, 15, 20 for required length

Safety Relays (for more information see pages 62-69)

Description	Catalogue No.
Guardmaster (SI) Single Input Safety Relay	440R-S12R2
Guardmaster (DI) Dual Input Safety Relay	440R-D22R2
Guardmaster CR30 Configurable Relay	440C-CR30-22BBB

Guardlink (for more information see pages 6-7)

GuardLink Enabled Tap 8-pin	440S-MF8D
Guardlink Red patchord to device 8-Pin	889D-F8NBDM-*
Guardlink Red patchord from Tap to Tap	889D-F4NEDM-*
Guardlink Red patchord from Tap to Relay	889D-F4NE-*

Note: Replace * with 0M3 (0.3m), 0M6 (0.6m), 2 (2m), 5 (5m), 10 (10m), 15 (15m), 20 (20m) for required length

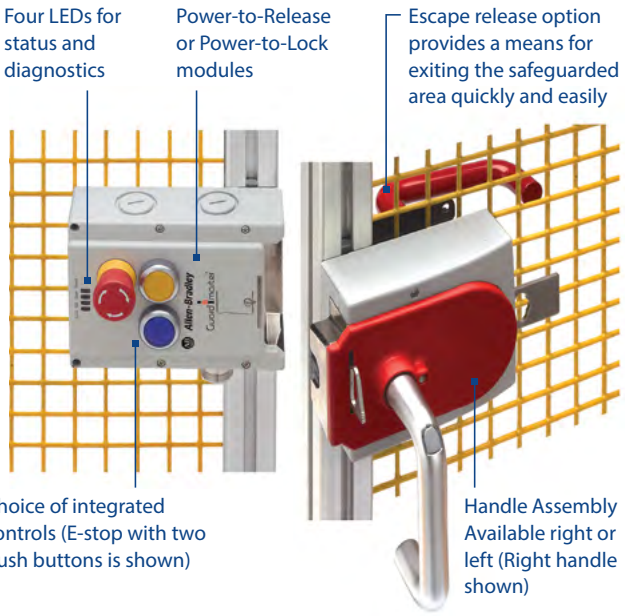
Multifunctional Access Box 442G

Standard
- User Manual
- Installation Instructions

Ethernet
- User Manual
- Installation Instructions

Features

- High holding force of 2000 N per ISO 14119
- Power-to-Release or Power-to-Lock modules
- Diagnostic outputs for door position, bolt position, and lock status are available to the control system
- Standard models can be operated as a standalone device or in series with other devices, maintaining a PLe Cat 4 safety rating
- Ethernet models enable easy integration in a networked automation control system using Studio 5000 Logix Designer



EtherNet/IP

Multifunctional Access Box with CIP Safety over EtherNet/IP Interface

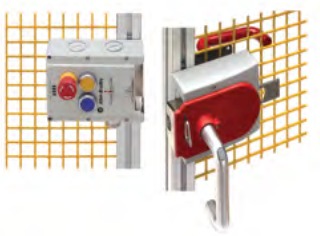
The Guardmaster® 442G Multifunctional Access Box, is an integrated access control and guard locking device which provides a complete safeguarding solution for full body access applications.

Specifications

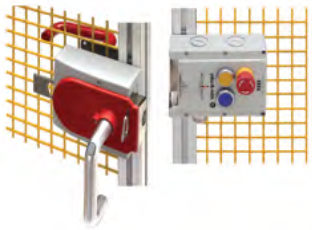
Safety Rating	Type 4, PLe, CAT 4
Enclosure Rating	IP65
Power Supply & Current	24V DC ±10/-15% required
Holding Force Fzh	2000N
Safety Outputs	Semiconductor outputs, PNP

Product selection
Step 01

- Select handle assembly



Right hand orientation



Left hand orientation

Handle assembly

	Description	Catalogue No.
	Right handle	442G-MABH-R
	Left handle	442G-MABH-L
	Handle assembly mounting plate[1)]	442G-MABAMPH

1) Handle Assembly mounting plate is required for Ethernet versions, optional for standard

Step 02

- Select Standard (02a) or Ethernet/IP (02b) Lock Module

Step 02a

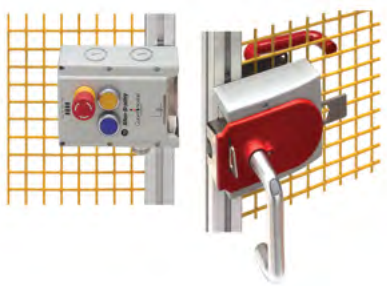
Standard Lock Module

Lock Type	Connector	Catalogue No.
Power to Release	M23 (19-pin)	442G-MABR-U⊗M-***
	M20 cable entry	442G-MABR-UT-***
Power to Lock	M23 (19-pin)	442G-MABL-U⊗M-***
	M20 cable entry	442G-MABL-UT-***

Replace ⊗ with R for use with right handle or L for use with left handle. Replace the *** with the code for the selected cover controls below.
Note: M23 19 Pin Cordset available in step 03 Accessories 889M-F19M-2

Example

442G-MABR-U**R**M-**C03**
Lock Module Power To Release **Right** Hand,
E-Stop with two illuminated push button



Cover controls

	Description	Catalogue No.
	Blank Cover	C00
	E-stop only	C05
	One illuminated push button	C01
	Two illuminated push buttons	C02
	E-stop with two illuminated push buttons	C03
	E-stop with three illuminated push buttons	C04

Step 02b

CIP safety over Ethernet/IP lock module

Description	Lock Type	Catalogue No.
Two push buttons	Power to Release	442G-MABRB-U⊗-P49
	Power to Lock	442G-MABLB-U⊗-P49
E-Stop, two push buttons	Power to Release	442G-MABRB-U⊗-E0P49
	Power to Lock	442G-MABLB-U⊗-E0P49
E-Stop, Four push buttons Enabling Connector	Power to Release	442G-MABRB-U⊗-E0JP4679
	Power to Lock	442G-MABLB-U⊗-E0JP4679

Replace ⊗ with R for use with right handle or L for use with left handle.
Covers with pushbuttons are supplied with coloured lens blue, green, red, yellow and white.

Example

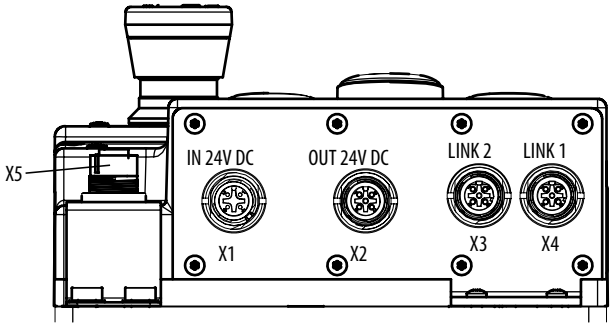
442G-MABRB-U**R**-E0JP4679
Lock Module Power To Release **Right** Hand,
E-Stop with four illuminated push button
Enabling connector

Step 03a

- Select Standard Lock Modules required cable

Standard lock module power and communication cable

Description	Catalogue No.
19-pin M23 black unshielded cordset with flying lead (Replace * with 2, 5, 10, 15, 20, 30 for required length)	889M-F19RM-*



Power Connections - Step 03b Ethernet/IP example
The bus module includes the EtherNet/IP connections (X3 and X4, M12 D-coded) and the power supply connections (X1 and X2) and the Enabling Connector Switch (X5).

Step 03b

- Select Ethernet/IP Lock Modules required cables

CIP safety lock module power cable

Description	Catalogue No.
Micro Straight 4-pin Female to Flying Lead yellow cordset (Replace * with 2, 5, 10, 15, 20, 30 for required length)	889D-F4AC-*
Micro Straight 4-pin Male to Flying Lead yellow cordset (Replace * with 2, 5, 10, 15, 20, 30 for required length)	889D-M4AC-*

CIP Safety Communications EtherNet/IP Cable

M12 D-coded straight to RJ45 Teal patchcord	1585D-M4UBJM*
M12 D-coded straight to flying lead Teal cordset	1585D-M4UB*
M12 D-coded straight to M12 straight Teal patchcord	1585D-M4UBDM*

(Replace * with 1, 2, 3, 4, 5, 10, 15, 20, 30 for required length)

Step 04

- Select optional accessories

442G- MABE1

442G-MABASHFT

442G-MABAMPE

Optional escape release

Description	Catalogue No.
Escape Release assembly (standard 150mm shaft)	442G-MABE1
Escape release extended shaft (250mm shaft)	442G-MABASHFT
Escape release mounting plate (Required with escape release)	442G-MABAMPE

Enabling Switch

Enabling Switch Standard No additional buttons (See next page)	440J-N21TNPM
Enabling switch micro straight male to flying lead cordset (Replace * with 2, 5 or 10 for required length)	889D-M4AC-*

Note: Enabling Switches connector only available on Four push button CIP safety over Ethernet/IP lock modules

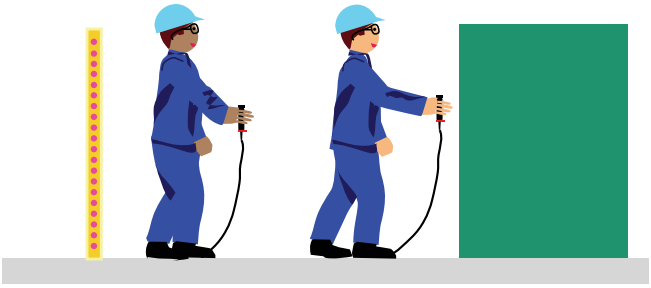
Logic interfaces (for more information see pages 62-69 and 69-73)

Guardmaster (SI) Single Input Safety Relay	440R-S12R2
Guardmaster (DI) Dual Input Safety Relay	440R-D22R2
Guardmaster Ethernet Interface	440R-ENETR
Guardmaster CR30 Configurable Relay	440C-CR30-22BBB

Grip Enabling Switches 440J

Multiple Personnel Access

When more than one person must access the hazard, all persons utilize their own enabling device.



Features

Installation instructions

- Three position enabling switch
- Lightweight and easy-to-use
- Optional jog and e-stop functions
- M20 conduit

Overview

The 440J is a three position enabling switch that can be used to reduce risks when working inside a machine guard, The standard model includes two independent three-position switches which are actuated by squeezing the trigger. The trigger switch has three positions. The mid-position is the "enabled" position.

Position 1 – there is no pressure on the trigger switch, and the safety contacts are open.

Position 2 – the trigger switch is squeezed to the mid-position, and the safety contacts are closed. This mid-position is the "enabled" position.

Position 3 – the trigger switch is fully pressed and the safety contacts are open.

When the trigger switch is released from position three back to position one, the safety contacts remain open, as it passes through position two

Specifications

Enclosure Rating	IP66 Standard switch IP65 job button/E-STOP
Thermal current	3 A
Switch current @ Voltage, min	5 mA @ 3V AC/DC
Safety Outputs	Semiconductor outputs, PNP

Product selection

Step 01

- Select Desired Enabling switch

Description	Main contacts	Monitoring contacts	Jog contacts	Emergency stop contacts	Connection type	Catalogue No.
Switch with Jog Pushbutton	2 N/C	2 N/O	1 N/O	-	M20 Conduit + Cable Strain	440J-N21TNPM-NP
Standard Switch	2 N/C	2 N/O	-	-	M20 Conduit + Cable Strain	440J-N21TNPM
Switch with E-Stop Pushbutton	2 N/C	-	-	2 N/C	M20 Conduit + Cable Strain	440J-N2NTNPM-NE

Step 02

- Select optional accessories

440J-A00N

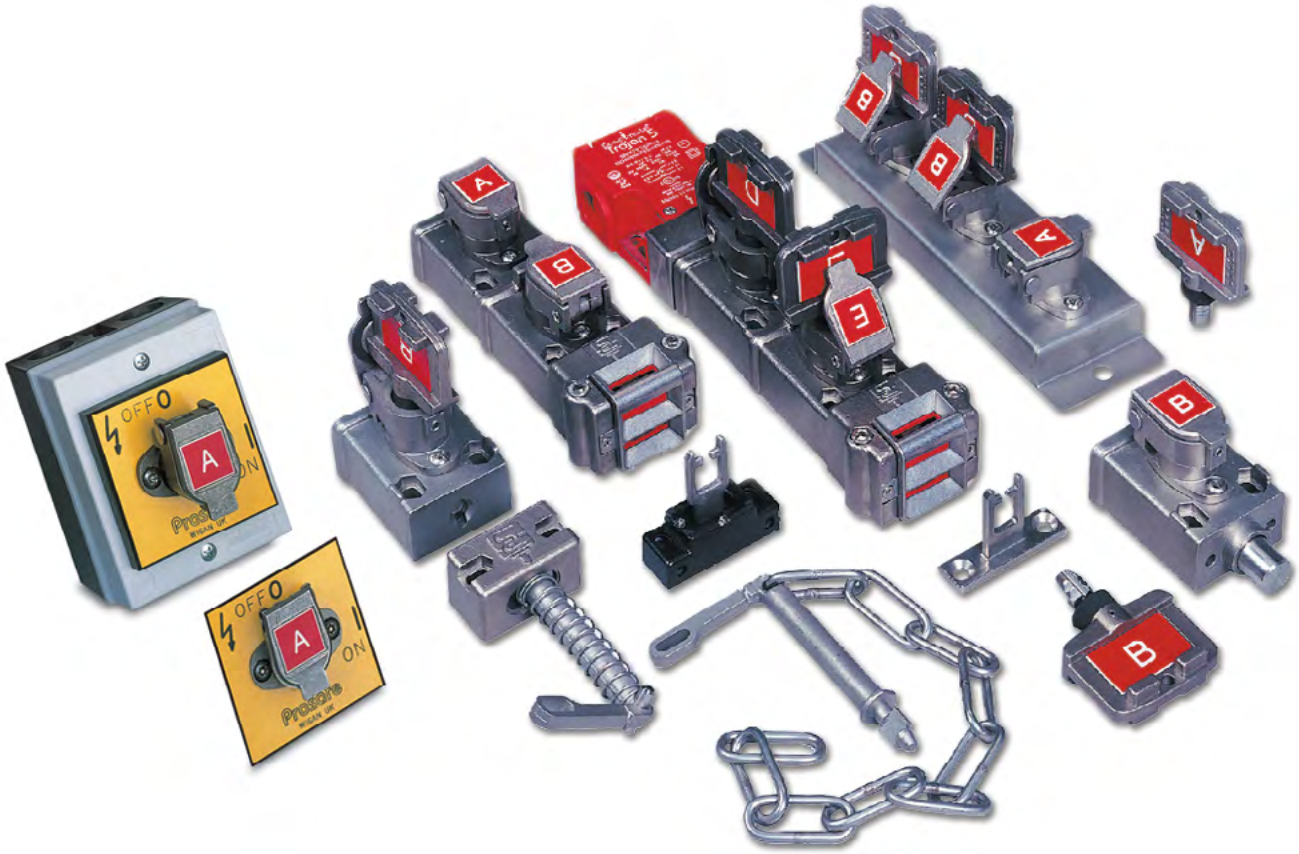
Accessories

Description	Catalogue No.
Mounting Bracket for Single Enabling Switch	440J-A00N
Mounting Bracket for Single Enabling Switch and Safety Interlock Switch	440J-A02N
Mounting Bracket Suitable for Single Enabling Switch and Two Safety Interlock switches	440J-A04N
Rubber Boot Kit(Silicone Free)	440J-A10N

Prosafe Trapped Key Systems 440T

Features

- Interlocking for pre-determined sequence of events
- All stainless interlocking and coded parts
- Weather cap as standard
- Standard red colour-coded key and ID tags
- A complete range of isolators, gate (guard) interlocks, key exchange units and specialty devices



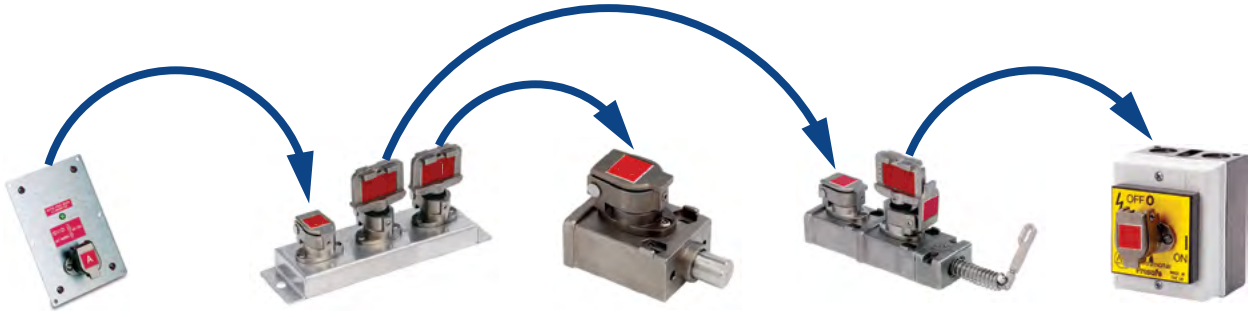
Trapped key interlocking systems are based upon the premise that one key cannot be in two places at the same time. These systems can be configured to ensure that a predetermined sequence of events takes place or that hazards have been reduced before operators can become exposed to them. They are mechanical systems, which makes them suitable for applications where the location of the plant, environment or explosive atmospheres make the use of electrical interlocking systems unsuitable or expensive to install. Unique key coding allows for a high degree of security and tamper-resistance.

Specifications

Safety Rating	Type 3, PLd, CAT 3
Enclosure Rating	IP65

Design suggestions for an interlocking system

Plant and machinery interlocking



AA
440T-MSRUE10AA
Solenoid Release Unit (SRU) key release

AA AB AB
440T-MKEXE11AAABAB
Trapped key 'AA' Locking off SRU, Release access door lock, key 'AB'

AB
440T-MSBLE10AB
'AB' key in to retract bolt from guard door

AB AC
440T-MDALE10ABAC
AB' key in then 'AC' key out to open guard door

AC
440T-MRKSE10AC
To energize robot teach mode

Sequence of operation

1) The Solenoid Release Unit (SRU) is used for electrical isolation of machinery to improve safe access. It consists of a rotary power switch and a solenoid. The trapped key can be removed once an external signal is given to its internal solenoid locking mechanism. An indicator light on the solenoid release unit indicates when the trapped key "AA" key can be removed. Insert the "AA" key into the Key Exchange Unit (KEX) and turn it 90°.

2) Turn one of the "AB" keys 90° and remove it from the KEX. This traps the "AA" key in the KEX and prevents the restarting of the machine.

3) Insert the "AB" key into the Single-key Bolt Lock (SBL) and turn it 90° to gain partial body access to the machine.

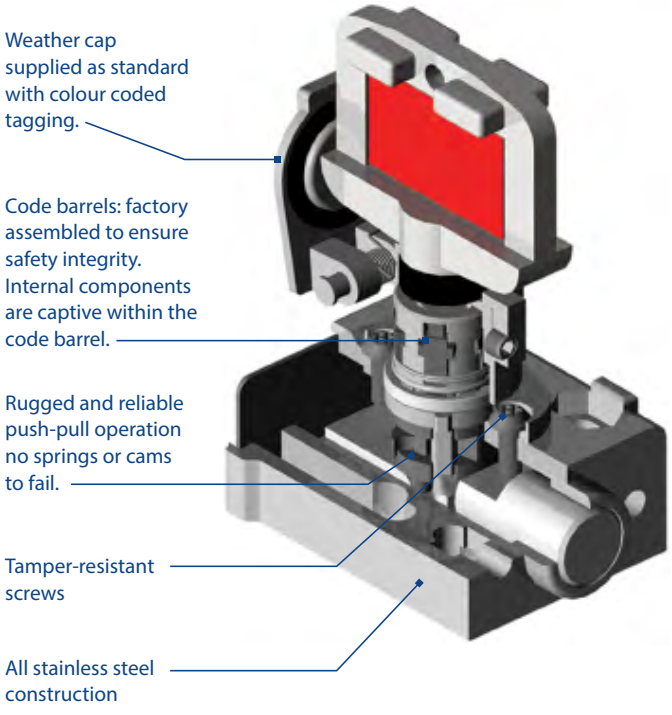
4) Turn the second "AB" key 90° and remove it from the KEX. Removal of this key also traps the "A" key in the KEX and prevents the restarting of the machine.

5) Insert the "AB" key into the Dual-key Access Lock (DAL) and turn it 90°.

6) Turn the "AC" key 90° and remove the "C" key. Rotate the access handle to allow full body entry into the hazard zone.

7) Take the "AC" key into the hazard zone, insert it into the rotary key switch (RKSE) and turn it 90° to send a signal to the machine control system, to allow the machine to operate in a slow or teach mode.

8) Reverse the process to return the machine to full operational mode.



Product selection

Step 01a

- Select the Primary Key for your isolating unit (Start devices)
- Primary key can be used with your Isolating unit, alternatively where an Isolating device is not required you can use the Primary Key for your Key Exchange Unit (Step 02)

Preferred key codes

	A	B	C	D	E	F	G
0	A	B	C	D	E	F	G
A	AA	AB	AC	AD	AE	AF	AG
B	BA	BB	BC	BD	BE	BF	BG
C	CA	CB	CC	CD	CE	CF	CG
D	DA	DB	DC	DD	DE	DF	DG
E	EA	EB	EC	ED	EE	EF	EG
F	FA	FB	FC	FD	FE	FF	FG
G	GA	GB	GC	GD	GE	GF	GG

Note: These codes are readily available and will typically result in the quickest delivery

440T-AKEYE100A

Primary key

Description	Base Catalogue No.
Trapped key	440T-AKEYE10 _ _

Note: Replace _ _ with key code required.
Example: For a Key bearing code "**0A**", you would select Trapped Key catalogue number 440T-AKEYE10**0A**

Step 01b

- Select the isolating unit (start devices)
- These are the devices that isolate power to the hazard. Once the power is isolated, the trapped key can then be removed and used in a key exchange unit or an access device

440T-MRPSE110A

440T-MRKSE110A

Rotary switches

Rotary switches are electrical isolators which directly remove power to the hazard.

Application

- Disconnecting power to a device

Description	Base Catalogue No.	Required Key Codes
Panel mounted, 2NO/2NC, 20 A	440T-MRPSE11	Primary code _ _*
Enclosed (IP65), 2NO/2NC, 20 A	440T-MRKSE11	Primary code _ _*

Example: For a Key bearing code "**0A**", you would select Panel Mounted Rotary Switch catalogue number 440T-MRPSE11**0A**
* Key not supplied (Selected in Step 01a)

Installation instructions:
Panel Mounted | Enclosed

440T-MSRUE110A

Solenoid release units

Solenoid release units will release a trapped key upon receiving an external electrical signal indicating that the hazard has been isolated.

Applications

- Integrating auxiliary feedback from another field device into the trapped key system
- Releasing a key based on a control signal from a PLC

Description	Base Catalogue No.	Required Key Codes
24V DC, 2NO/2NC, 20 A	440T-MSRUE11	Primary code _ _*
230V AC, 2NO/2NC, 20 A	440T-MSRUE33	Primary code _ _*

Note: For more barrels replace 'RUE' in catalogue number with – 2097 for dual key, 3417 for Triple key, 3418 for Quad key
Example: For a Key bearing code "**0A**", you would select Solenoid Release Unit catalogue number 440T-MSRUE11**0A**
* Key not supplied (Selected in step 01a)

Installation instructions

440T-MDTUE110A0A

Electronic time delay units

Time delay units include an electrical isolator and a timing unit. Once the isolator has been switched off, the timer counts down the specified time before releasing the trapped keys.

Application

- High-inertia machines with some run-down time

Description	Base Catalogue No.	Required Key Codes
Single key 24 V DC, 2NO/1NC, 20 A	440T-MSTUE11	Primary code _ _*
Single key 230 V AC, 2NO/1NC, 20 A	440T-MSTUE33	Primary code _ _*
Dual key 24 V DC, 2NO/1NC, 20 A	440T-MDTUE11	Primary code _ _*
Dual key 230 V AC, 2NO/1NC, 20 A	440T-MDTUE33	Primary code _ _*

Example: For a Key bearing code "**0A**", you would select Dual Key ETDU catalogue number 440T-MDTUE11**0A0A**
* Key not supplied (Selected in step 01a)

Installation instructions

Step 02

- Select a Key Exchange Unit (Middle Devices)
- This is required if more than one isolating unit or access device is being used. The key from the isolating unit is placed into the vacant barrel of the exchange unit. This key is referred to as the primary key. This allows the trapped keys, known as secondary keys, to be removed from the unit. The secondary keys can then be used in access devices.

Applications

- Multiple isolating devices
- Multiple access devices

440T-MKEXE110A0B0B

440T-MKEXE140A0B0B0B0B0B

Key exchange unit

Description	Base Catalogue No.	Required Primary Key Codes (= no. of keys in)	Required Secondary Key Code (= no. of keys out)
2 way: 1 key in, 1 key out	440T-MKEXE10		
3 way: 1 key in, 2 keys out	440T-MKEXE11		
4 way: 1 key in, 3 keys out	440T-MKEXE12		
4 way: 2 keys in, 2 keys out	440T-MKEXE15		
5 way: 1 key in, 4 keys out	440T-MKEXE13		
5 way: 2 key in, 3 keys out	440T-MKEXE16		
6 way: 1 key in, 5 keys out	440T-MKEXE14	Primary code _ _*	Secondary code _ _**
6 way: 2 key in, 4 key out	440T-MKEXE17		
6 way: 3 key in, 3 key out	440T-MKEXE18		
7 way: 1 key in, 6 keys out	440T-MKEXE19		
8 way: 1 key in, 7 keys out	440T-MKEXE20		
9 way: 1 key in, 8 keys out	440T-MKEXE22		
10 way: 1 key in, 9 keys out	440T-MKEXE23		

Note: Available in upto 25 way Key Exchange Units (9 way and upwards contain only 1 Key in)
* Primary key not supplied (Selected in step 01a)
** Secondary key supplied

Installation instructions:
2-6 Way | 7-11 Way | 12-15 Way | 16-25 Way

Example

To order a 6 way: 1 key in and 5 keys out, order catalogue number 440T-MKEXE14**0A0B0B0B0B0B** to get a key exchange unit with **'0A' primary** code and **five '0B' secondary codes**. The '0A' key is not included. The five '0B' keys, which are trapped in the secondary code barrels are included.

440T	M	KEXE	14	0A	0B	0B	0B	0B	0B
Bulletin Number (T= Trapped Key)	M= Machine Interlock	Product Type (Dual-key Access Lock)	Product Feature	Two character Primary Code (key not included)	Two character Secondary Code (key included)	Two character Secondary Code (key included)	Two character Secondary Code (key included)	Two character Secondary Code (key included)	Two character Secondary Code (key included)

Step 03

- Select the Access Devices (End Devices)

- These are the devices that allow access to the hazard. They can be single key or dual key units. Single key units contain only a primary key. Dual key units contain a primary key and a secondary key. When the primary key is inserted into a dual key access device, the secondary key is released as a personnel key, which an operator takes with them into the hazardous area. The primary key remains trapped until the personnel key is replaced by the operator. This prevents the access device from being locked and power being restored to the hazard while an operator is in the area.

440T-MSALE100A

440T-MDALE100C0B

Access locks

Access locks are used to prevent access to a door, gate or hinged guard.

Applications

- Lever actuators: Sliding/ Hinged Guards
- Chain actuators: Misaligned Sliding/Hinged Guards
- Dual key option: Improved safety for personnel working inside hazardous area

Description	Base Catalogue No.	Required Key Codes	Required Secondary Key Codes
Single key, key trapped to release actuator, lever actuator	440T-MSALE10	Primary code _ _*	N/A
Single key, key trapped to release actuator, chain actuator	440T-MSCLE10	Primary code _ _*	N/A
Dual key, primary key trapped and secondary key free to release actuator, lever actuator	440T-MDALE10	Primary code _ _*	Secondary code _ _**
Dual key, primary key trapped and secondary key free to release actuator, chain actuator	440T-MDCLE10	Primary code _ _*	Secondary code _ _**

Example: For a Key bearing code "**0A**", you would select Single Key Access Lock catalogue number 440T-MSALE10**0A**
* Primary key not supplied
** Secondary key supplied

Installation instructions

440T-MDSLE100A0B

Slamlock mechanical

Mechanical slamlocks feature a tongue actuator similar to a standard safety interlock switch.

Applications

- Hinged/Sliding Guards
- Dual key option: Improved safety for personnel working inside hazardous area

Description	Base Catalogue No.	Required Primary Key Codes	Required Secondary Key Codes
Single key, key trapped to release actuator	440T-MSSLE10	Primary code _ _*	N/A
Dual key, primary key trapped and secondary key free to release actuator	440T-MDSLE10	Primary code _ _*	Secondary code _ _**

Note: To change actuator type update '10' in catalogue number with – 11 Flexible type, 12 Flat type
Example: For a Key bearing code "**0A**", you would select Slamlock catalogue number 440T-MSSLE10**0A**
* Primary key not supplied
** Secondary key supplied

Installation instructions

Slamlock electrical

440T-MDSSE100A0E

Electrical slamlocks feature a tongue actuator similar to a standard safety interlock switch. They also include safety and auxiliary output electrical contacts.

Applications

- Hinged/Sliding Guards
- Dual key option: Improved safety for personnel working inside hazardous area

Description	Base Catalogue No.	Required Primary Key Codes	Required Secondary Key Codes
Single key, key trapped to release actuator, 2NC/1NO	440T-MSSSE10	Primary code _ _*	N/A
Dual key, primary key trapped and secondary key free to release actuator, 2NC/1NO	440T-MDSSE10	Primary code _ _*	Secondary code _ _**

Note: To change actuator type update '10' in catalogue number with – '11' Flexible type, '12' Flat type
Example: For a Key bearing code "**0A**", you would select Dual Key Electrical Slamlock catalogue number 440T-MDSSE10**0A**0E
* Primary key not supplied
** Secondary key supplied

Installation instructions

Bolt interlocks

440T-MSSSE100A

Bolt interlocks are used to interlock an operator handle or control element of a switching device as the extended bolt blocks operator movement. Bolt interlocks should not be used on hinged doors or guards as it is possible to extend the bolt and remove the trapped key without actually closing the door, therefore bypassing the safety system.

Application

- Switchgear interlocking

Description	Base Catalogue No.	Required Primary Key Codes	Required Secondary Key Codes
Single key, key trapped to retract bolt	440T-MSBLE10	Primary code _ _*	–
Dual key, primary key trapped and secondary key free to retract bolt	440T-MDBLE14	Primary code _ _*	Secondary code _ _**

Note: To change actuator type update '10' in catalogue number with – '11' Flexible type, '12' Flat type
Example: For a Key bearing code "**0A**", you would select Bolt Interlock catalogue number 440T-MSBLE10**0A**
* Primary key not supplied
** Secondary key supplied

Installation instructions

Step 04

- Add any trapped keys or other accessories required
- Check that these keys are not already included with another product in the system. (e.g. a key exchange unit).

440T-AKITE45ER

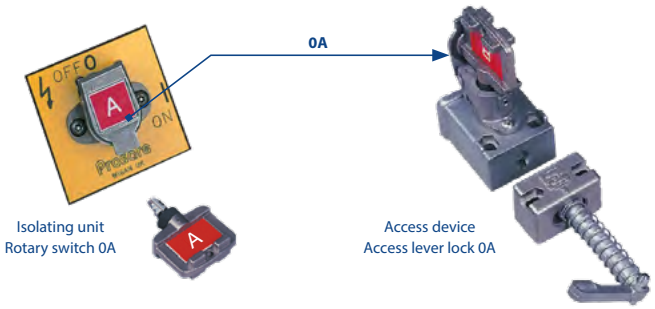
Description	Base Catalogue No.	Required Primary Key Codes
Trapped key	440T-AKEYE10	Primary code _ _
Trapped ejector key	440T-AKEYE13	Primary code _ _
Spare weatherproof dust cap	440T-ASFC10	Primary code _ _
Emergency Repair Kit for code barrels	440T-AKITE45ER*	–

Note: Replace * with ER Code barrels required 1, 2, 3, 4, 5, 6, 7, 8, 9.
Example: for single barrel use 440T-AKITE45ER1

Example systems

One access device

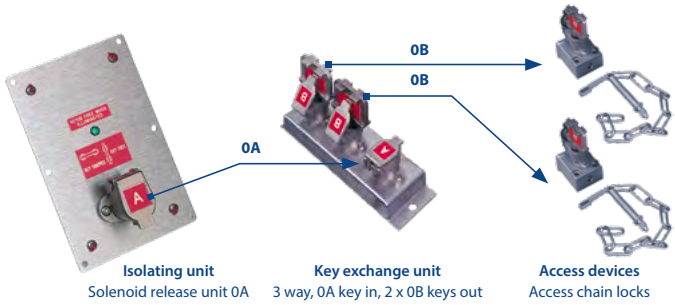
- The rotary switch disconnects power to the machine.
- The key is released from the switch and can be used to open a hatch on the machine.



Steps	Description	Base Catalogue No.	Required Key Codes	Complete Catalogue No.	Quantity
Step 01a	Trapped key	440T-AKEYE10	0A	440T-AKEYE100A	1
Step 01b	Panel mounted rotary switch, 2NO/2NC, 20 A	440T-MRPSE11	0A	440T-MRPSE110A	1
Step 03	Single key access lock, lever actuator	440T-MSALE10	0A	440T-MSALE100A	1

Two access devices

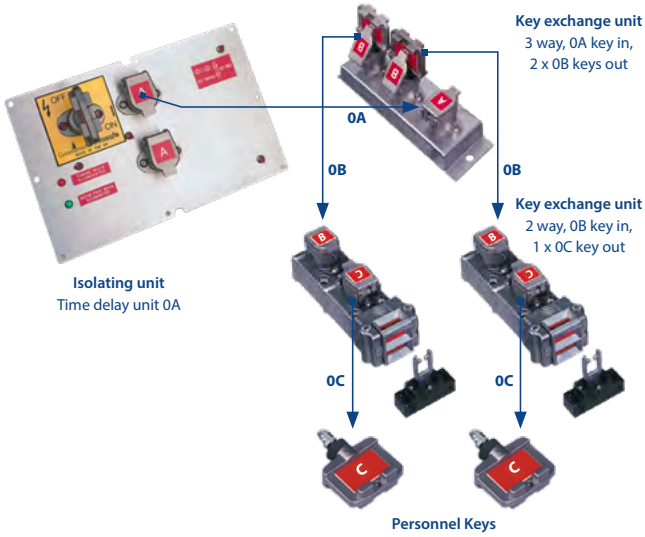
- The solenoid release unit is energised upon receiving a signal from a PLC. The key from the solenoid goes into a 3-way key exchange unit, releasing the two trapped keys. These can then be used to open access gates



Steps	Description	Base Catalogue No.	Required Key Codes	Complete Catalogue No.	Quantity
Step 01a	Trapped key	440T-AKEYE10	0A	440T-AKEYE100A	1
Step 01b	Solenoid release unit 24 V DC	440T-MSRUE11	0A	440T-MSRUE110A	1
Step 02	3-way key exchange unit	440T-MKEXE11	0A, 0B, 0B	440T-MKEXE11AA0B0B	1
Step 03	Single key access lock, chain actuator	440T-MSCLE10	0B	440T-MSCLE100B	2

Two access devices with personal Keys

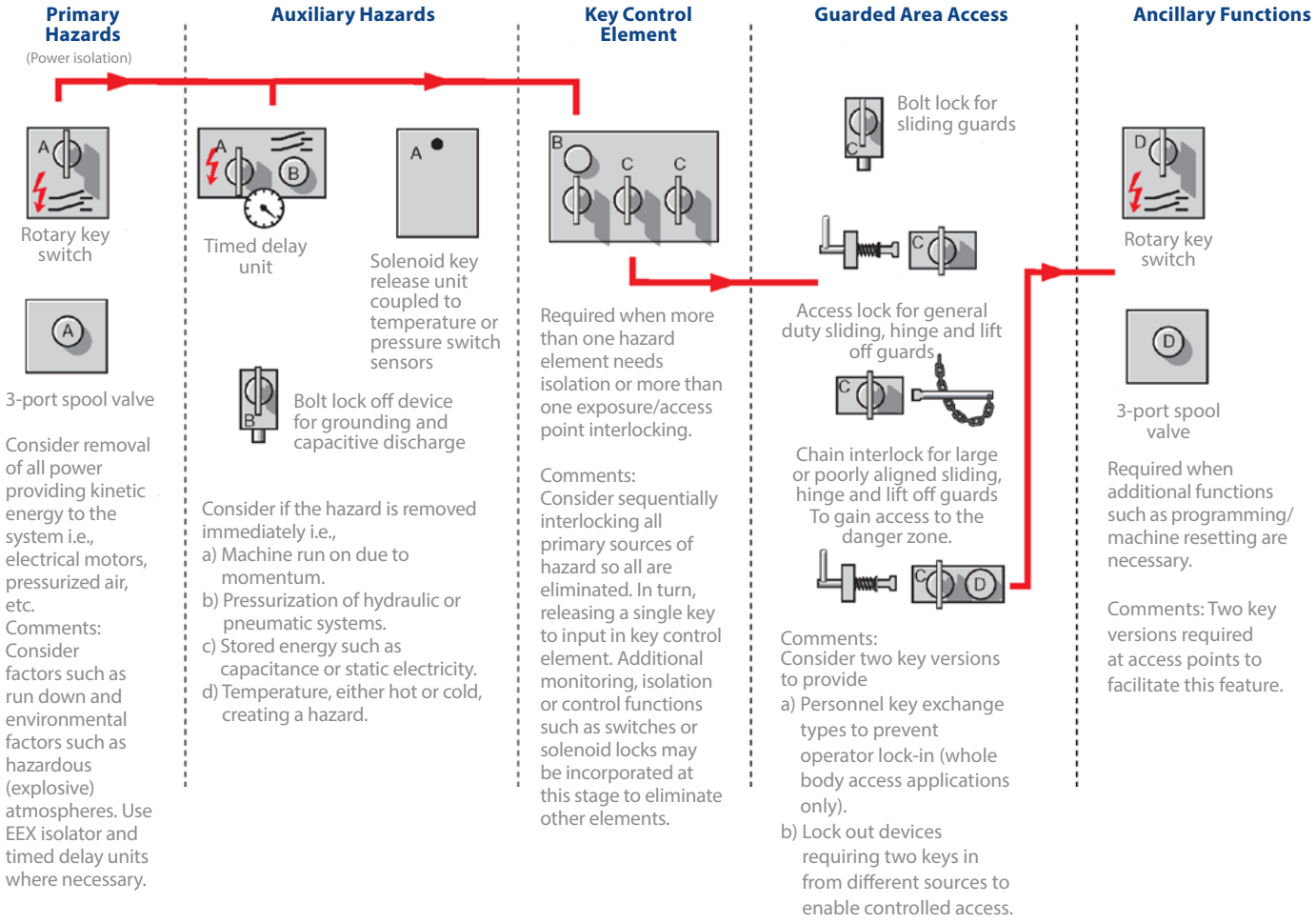
- Power to the machine is switched off using the timed isolator unit. The timer begins timing to allow the machine to slow down to a safe state. After the time delay, the key is released. This then goes into the key exchange to release the keys to the two access devices. When a key is inserted into an access device, the gate can be opened and a secondary personnel key is released. The operator takes this key with them when they enter the gated area. The removal of the personnel key traps the primary key in the access device, which prevents the operator from being locked inside the gated area and the machine being restarted.



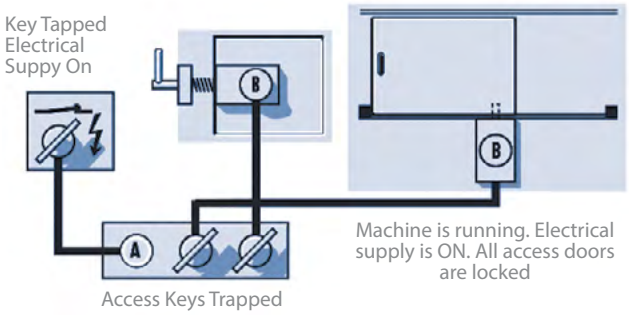
Steps	Description	Base Catalogue No.	Required Key Codes	Complete Catalogue No.	Quantity
Step 01a	Trapped key	440T-AKEYE10	0A	440T-AKEYE100A	1
Step 01b	Electronic time delay unit 24 V DC 2NO/1NC	440T-MSTUE11	0A	440T-MSTUE110A	1
Step 02	3-way key exchange unit	440T-MKEXE11	0A, 0B, 0B	440T-MKEXE110A0B0B	1
Step 03	Dual key slamlock	440T-MDSLE10	0B, 0C	440T-MDSLE100B0C	2

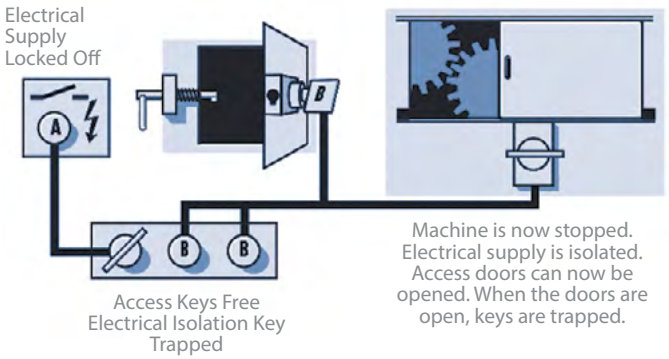
Example Systems

Plant and Machinery Interlocking

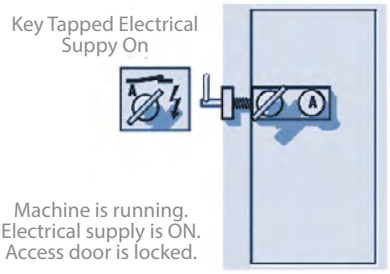


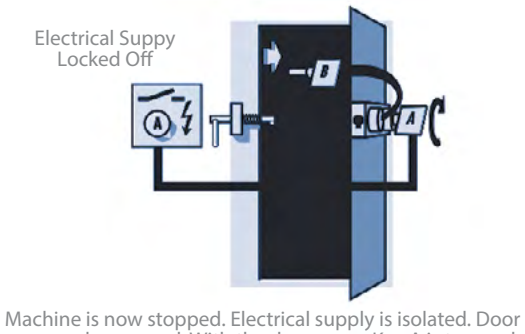
Part Body Access





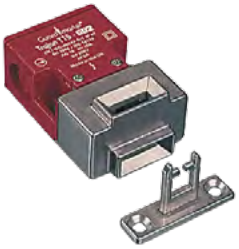
Full Body Access





Tongue Interlock Switches 440K

Tongue Interlock Switches allow the head of the switch to rotate, offering different options on how you can operate the switch and mount it on the guard. This flexibility offers the best fit for your applications.

Features	Trojan™ T15	Trojan T5 and T6[1)]	Elf™	Cadet™	MT-GD2
					
Dimensions (H x W x D)	75 x 31 x 52 mm	95 x 32 x 52 mm	75 x 25 x 29 mm	90.5 x 31 x 30.4 mm	116.5 x 38 x 40 mm
Holding Force	30 N	T5: 12 N typical, max. 30 N T6: 20 N	6 N	15 N	12, 32, 40 N
Safety / Auxiliary Contacts	2 N/C 1 N/C / 1 N/O	T5: 2 N/C / 1 N/O T6: 3 N/C / 1 N/O T6: 2 N/C / 2 N/O	2 N/C 1 N/C / 1 N/O	3 N/C 2 N/C / 1 N/O	3 N/C / 1 N/O 2 N/C / 2 N/O
Material	Plastic with plastic or metal head (GD2)	Plastic with plastic or metal head (GD2)	Plastic with optional metal alignment guide	Plastic with optional metal alignment guide	Metal
Actuator Options	Standard and fully flexible	Standard, semi-flexible and fully flexible	Flat, 90°, and semi-flexible	Flat, 90°, and semi-flexible	Standard, semi-flexible and fully flexible

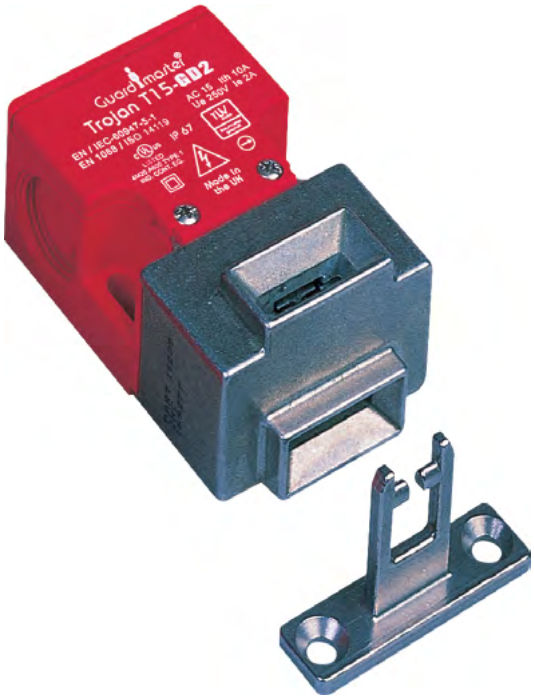
1) Four-contact models are available (Trojan 6).

Trojan T15
Trojan T15-GD2
Tongue Interlocks

Features

Installation Instructions

- GD2 (metal head) style available for demanding applications
- Three M20 conduit entries
- Optional catch mechanism help keep doors shut on vibrating machinery



The Trojan™ T15 & T15-GD2 Tongue Interlock Switches are compact universal tongue- or key-operated safety interlock switches that fit at the leading edge of sliding, hinged or lift-off guards. With dual entry slots and rotatable heads, movable only by releasing the cover screws, these switches offer four different options for actuator entry.

Specifications

Safety Rating	Type 2 interlocking device
Enclosure Rating	IP67
Operating Voltage	120V AC – 600V AC 24V DC
Holding Force	30 N
Housing Material	Glass Filled PBT

Product selection

Step 01

Type	Safety	Auxiliary	M20 Conduit	4-Pin Micro M12
Trojan T15 Standard	2 NC	–	440K-T11269	440K-T11385
	1 NC	1 NO	440K-T11270	440K-T11388
Trojan T15 GD2 (metal head)	2 NC	–	440K-T11280	440K-T11391
	1 NC	1 NO	440K-T11279	440K-T11394

Step 02

Actuator
Standard 440K-A11238
Standard GD2 440G-A27011 or Fully Flexible GD2 440K-A27010 or Flat GD2 440K-A11112

Step 03

- Select optional accessories

Cordset and accessories

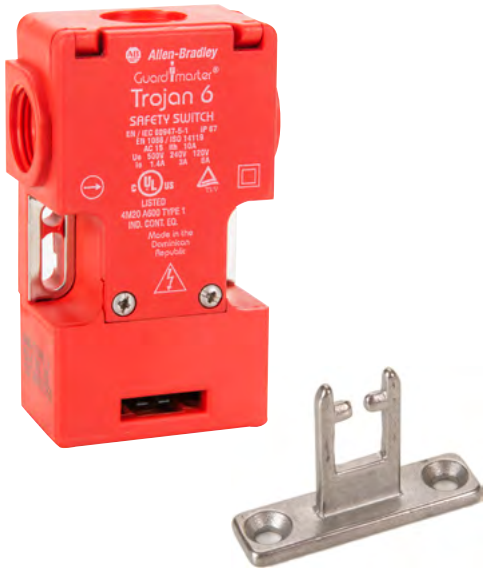
Description	Catalogue No.
DC Micro M12 to flying lead 4-Pin black cordset	889D-F4BC*
DC Micro M12 to M12 lead 4-Pin black patchcord	889D-F4BBDM*
Sliding bolt actuator	440G-A27010
Dust Cover	440K-A17180

Note: Replace * with 2, 5, 10, 15, 20 for required length

Safety Relays (for more information see pages 62-69)

Description	Catalogue No.
Guardmaster (SI) Single Input Safety Relay	440R-S12R2
Guardmaster (DI) Dual Input Safety Relay	440R-D22R2
Guardmaster CR30 Configurable Relay	440C-CR30-22BBB

Trojan T5/6 Universal Tongue Interlocks



Features

Installation Instructions

- Strong and versatile, can be used in most applications
- Self-ejecting tamper resistant actuator, only operates when mounted to the guard (not with GD2 models
- 30 N actuator retention force
- GD2 (metal head) style available for demanding applications
- Four M20 conduit entries

The Trojan 5 & 6 Universal Tongue Interlock Switches are universal tongue -or key-operated safety interlock switches. They fit at the leading edge of sliding, hinged or lift-off guards. With dual key entry slots and rotatable heads, movable only by releasing the cover screws, these switches offer four actuator entry options.

Specifications

Safety Rating	Type 2 interlocking device
Enclosure Rating	IP67
Operational Voltage	T5: 120V AC – 240V AC/24V DC T6 : 120V AC – 600V AC/24V DC
Holding Force T5	30 N
Holding Force T6	20N
Housing Material	Glass Filled PBT

Product selection

Step 01

Type	Safety	Auxiliary	M20 Conduit	6-Pin Micro M12
Trojan 5 Standard	2 NC	1 NO	440K-T11089	440K-T11129
Trojan 5 GD2	2 NC	1 NO	440K-T11147	440K-T11226
Trojan 5 30 N	2 NC	1 NO	440K-T11333	440K-T11492

Type	Safety	Auxiliary	M20 Conduit	8-Pin Micro M12
Trojan 6 Switch	3 NC	1 NO	440K-T11449	–
	2 NC	2 NO	440K-T11452	440K-W21BNPH
Trojan 6 GD2 (metal head)	3 NC	1 NO	440K-T11188	–
	2 NC	2 NO	440K-T11459	440K-W21BNPH-NG

Step 02

Actuator
Standard 440K-A11095
Standard GD2 440G-A27011 or Fully Flexible GD2 440K-A27010 or Flat GD2 440K-A11112

Actuator
Standard - 440K-A11095
Standard GD2 440G-A27011 or Fully Flexible GD 2440K-A27010 or Flat GD2 440K-A11112

Step 03

- Select optional accessories

Cordset and accessories

Description	Catalogue No.
DC Micro M12 to flying lead 6-Pin yellow cordset	889R-F6ECA*
DC Micro M12 to M12 8-Pin black patchcord	889D-F8AB*
Sliding bolt actuator (GD2)	440G-A27163
Dust Cover	440K-A17180

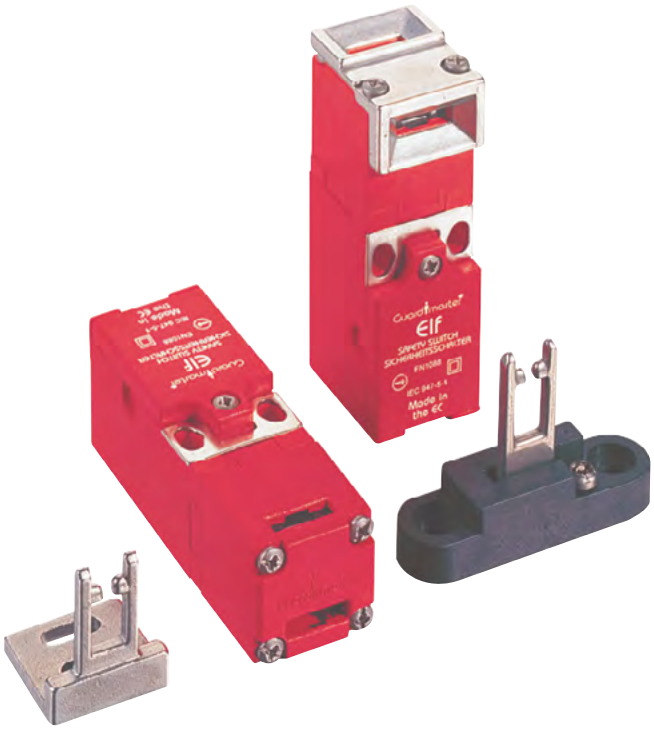
Note: Replace * with 2, 5, 10, 15, 20 for required length

Safety Relays (for more information see pages 62-69)

Description	Catalogue No.
Guardmaster (SI) Single Input Safety Relay	440R-S12R2
Guardmaster (DI) Dual Input Safety Relay	440R-D22R2
Guardmaster CR30 Configurable Relay	440C-CR30-22BBB

Elf Miniature Tongue Interlocks

Installation Instructions



Features

- Ideal for small, lightweight guards
- The smallest interlock switch available
- Eight possible actuator entry points, easy to install
- GD2 (metal head) style available for demanding applications

The Elf™ Miniature Tongue Interlock Switches are tongue- or key-operated safety interlock switches that fit at the leading edge of sliding, hinged or lift-off guards. The unique miniature housing makes the Elf interlock switch one of the smallest of its kind currently available. This switch is ideal for smaller machines such as printers, copiers and domestic machinery which, until now, have been unable to use safety interlocks due to space restrictions.

Specifications

Safety Rating	Type 2 interlocking device
Enclosure Rating	IP67
Operational Voltage	120V AC – 600V AC/24V DC
Holding Force	6 N
Housing Material	Glass-filled PBT

Product selection

Step 01

Safety	Auxiliary	M16 Conduit	4-Pin Micro M12
1 NC	1 NO	440K-E33014	440K-E33076
2 NC	–	440K-E33047	440K-E33079

Step 02

Actuator
Flat 440K-A21014 or 90° Angle 440K-A21006 or Semi-Flexible 440K-A21030

Step 03

- Select optional accessories

Cordset and accessories

Description	Catalogue No.
DC Micro M12 to flying lead 4-Pin yellow cordset	889R-F4AC*
DC Micro M12 to M12 4-Pin yellow patchcord	889D-F4ACDM*
Metal Alignment Guide	440K-A21069
Dust Cover	440K-A17182

Note: Replace * with 2, 5, 10, 15, 20 for required length

Safety Relays (for more information see pages 62-69)

Description	Catalogue No.
Guardmaster (SI) Single Input Safety Relay	440R-S12R2
Guardmaster (DI) Dual Input Safety Relay	440R-D22R2
Guardmaster CR30 Configurable Relay	440C-CR30-22BBB

Cadet 3
Tongue Interlocks

Installation Instructions

Features

- Compact size
- Ideal for small, lightweight guards
- Eight possible actuator entry points
- GD2 (metal head) style available for demanding applications

The Cadet 3 Tongue Interlock Switches are tongue- or key-operated safety interlock switches that fit at the leading edge of sliding, hinged or lift-off guards. With dual entry slots and rotatable head, the versatile Cadet 3 offers up to eight different actuator entry options.

Specifications

Safety Rating	Type 2 interlocking device
Enclosure Rating	IP67
Operational Voltage	120V AC – 600V AC/24V DC
Holding Force	15 N
Housing Material	Glass Filled PBT

Product selection

Step 01

Safety	Auxiliary	M16 Conduit
3 NC	–	440K-C21070
2 NC	1 NO	440K-C21055
2 NC	1 NO	440K-C21080

Step 02

Actuator
Flat 440K-A21014 or 90° Angle 440K-A21006 or Semi-Flexible 440K-A21030

Step 03

- Select optional accessories

Accessories

Description	Catalogue No.
Replacement Cover	440A-A21115
Dust Cover	440K-A17182

Safety Relays (for more information see pages 62-69)

Description	Catalogue No.
Guardmaster (SI) Single Input Safety Relay	440R-S12R2
Guardmaster (DI) Dual Input Safety Relay	440R-D22R2
Guardmaster CR30 Configurable Relay	440C-CR30-22BBB

MT-GD2 Metal Tongue Interlocks

Installation Instructions

Features

- Strong and versatile, can be used in most applications
- Eight possible actuator entry points
- Optional latch release styles

The MT-GD2 Tongue Interlock Switches are tongue- or key-operated safety interlock switches that fit at the leading edge of sliding, hinged or lift-off guards. With dual entry slots and rotatable head, the MT-GD2 offers eight different options for actuator entry.

Specifications

Safety Rating	Type 2 interlocking device
Enclosure Rating	IP67
Operational Voltage	120V AC – 600V AC/24V DC
Holding Force	32N
Housing Material	Painted Zinc

Product selection

Step 01

Type	Safety	Auxiliary	M20 Conduit
MT-GD2	3 NC	1 NO	440K-MT55002
	2 NC	2 NO	440K-MT55005
MT-GD2 Latch Release	3 NC	1 NO	440K-MT55039

Step 02

Actuator
GD2 Standard 440G-A27011 or GD2 Flat 440K-A11112 or Fully-Flexible 440G-A27143

Step 03

- Select optional accessories

Cordset and accessories

Description	Catalogue No.
Dust Cover	440K-A17180
Sliding Bold Actuator	440G-A27143

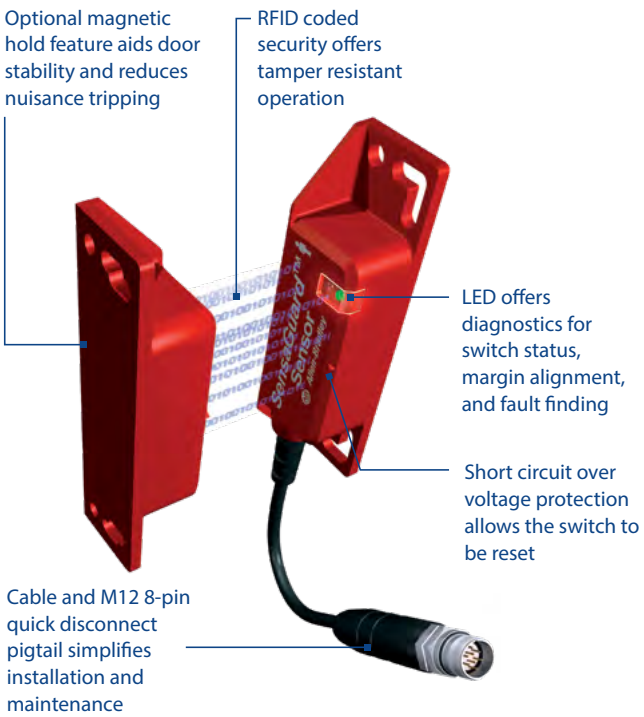
Safety Relays (for more information see pages 62-69)

Description	Catalogue No.
Guardmaster (SI) Single Input Safety Relay	440R-S12R2
Guardmaster (DI) Dual Input Safety Relay	440R-D22R2
Guardmaster CR30 Configurable Relay	440C-CR30-22BBB

Sensaguard Non-Contact Interlock Switches

Features

- RFID unique (high) or standard (low) coded actuators
- Flat pack and barrel (plastic housings)
- Heavy-duty stainless-steel barrel models
- Standard, magnetic hold, and integrated latch versions
- Assured ON 10…25 mm
- LED located on the switch for door status and troubleshooting



Non-contact Machine Safeguarding with RFID Technology

Featuring RFID technology for coding, inductive technology for sensing and combining a large sensing range with optimal operation and a generous tolerance to misalignment, SensaGuard switches offer a cost-effective solution that is ideally suited to a wide range of safety applications and is intended for use with all types of guard doors.

Specifications

Safety Rating	Type 4, PLe, CAT 4
Enclosure Rating	IP69k
Power Supply & Current	24V DC ±10/-15%; Class 2
Safety Outputs	2 x PNP 0.2A Status ON
Auxiliary Outputs	1 x PNP 0.2A Status OFF

Product selection

Step 01

Type	Sensing Distance	Margin Indication	Magnetic Hold
18 mm plastic barrel 18 mm actuator  440N-Z21S16H	On: 15 mm Off: 25 mm	–	–
18 mm plastic barrel 30 mm actuator  440N-Z21S26A	On: 25 mm Off: 35 mm	–	–
18 mm stainless barrel 18 mm actuator  440N-Z21S17A	On: 10 mm Off: 20 mm	–	–
Plastic rectangular rectangular actuator  440N-Z21SS2AN	On: 15 mm Off: 35 mm	– Yes Yes	– – Yes (9 N)
Plastic housing with integrated latch  440N-Z21SS3PH	On: latched Off: 35 mm	–	Adjustable 20…60 N

Installation Instructions

Step 02

Actuator
Standard
Unique
Standard
Unique
Standard
Unique
Standard
Unique
Standard
Unique
Standard
Unique
Standard
Unique

Step 03

3 m Cable	10 m cable	6 inch Pigtail 8-pin (M12)*
440N-Z21S16A	440N-Z21S16B	440N-Z21S16H
440N-Z21U16A	440N-Z21U16B	440N-Z21U16H
440N-Z21S26A	440N-Z21S26B	440N-Z21S26H
440N-Z21U26A	440N-Z21U26B	440N-Z21U26H
440N-Z21S17A	440N-Z21S17B	440N-Z21S17H
440N-Z21U17A	440N-Z21U17B	440N-Z21U17H
440N-Z21SS2A	440N-Z21SS2B	440N-Z21SS2H
440N-Z21US2A	440N-Z21US2B	440N-Z21US2H
440N-Z21SS2AN	440N-Z21SS2BN	440N-Z21SS2HN
440N-Z21US2AN	440N-Z21US2BN	440N-Z21US2HN
440N-Z21SS2AN9	440N-Z21SS2BN9	440N-Z21SS2HN9
440N-Z21US2AN9	440N-Z21US2BN9	440N-Z21US2HN9
440N-Z21SS3PA	440N-Z21SS3PB	440N-Z21SS3PH
440N-Z21SU3PA	440N-Z21SU3PB	440N-Z21SU3PH

Step 04

- Select optional accessories

889D-F8AB-*

Cordsets

Description	Catalogue No.
Cordset - connector to flying lead DC Micro (M12), Female, Straight, 8-Pin, PVC Cable, Black, Unshielded	889D-F8AB-*
Patchcord - connector to connector lead DC Micro (M12), Female, Straight, 8-Pin, PVC Cable, Black, Unshielded	889D-F8ABDM-*

Note: Replace * with 2, 5, 10, 15, 20 for required length

871A-BP18

871A-BRS18

871A-SCBP18

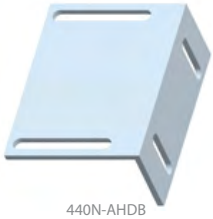
Accessories

Description	Catalogue No.
Mounting Bracket for Tubular Sensors - Right Angle Style (18mm barrel models)	871A-BRS18
Mounting Bracket for Tubular Sensors - Clamp Style (18mm barrel models)	871A-BP18
Snap Clamp Mounting Bracket (18mm barrel models)	871A-SCBP18
18 mm Swivel/tilt mounting bracket Mounting Bracket for Tubular Sensors - Clamp Style	60-2649
Mounting Plate for vertically hinged doors (Integrated Latch version)	440N-AHDB
Mounting Plate for slide and gull wing doors (Integrated Latch version)	440N-ASDB
18 mm Plastic Actuator for Series "B" Standard Coded Models	440N-Z18PTB
30 mm Plastic Actuator for Series "B" Standard Coded Models	440N-Z30PTB
18 mm Stainless Steel Actuator for Series "B" Standard Coded Models	440N-Z18SSTB
Rectangular Plastic Actuator for Series "B" Standard Coded Models	440N-ZPRECB
Rectangular Plastic Actuator for Margin Indication/Magnetic Field Hold for Series "B" Standard Coded Models	440N-ZPRECMB
Integrated Latch Actuator for Series "B" Standard Coded Models	440N-ZLPRECB

440N-ASDB

Safety Relays (for more information see pages 62-69)

Description	Catalogue No.
Guardmaster (SI) Single Input Safety Relay	440R-S12R2
Guardmaster (DI) Dual Input Safety Relay	440R-D22R2
Guardmaster CR30 Configurable Relay	440C-CR30-22BBB



440N-AHDB

Guardlink Smart Taps (for more information see pages 6-7)

Description	Catalogue No.
GuardLink Enabled Tap 5-pin OSSD Input device	440S-SF5D
GuardLink Enabled Tap 8-pin OSSD Input device	440S-SF8D
GuardLink Red Patchcord to device 8-Pin	889D-F8NBDM-*
GuardLink Red Patchcord from Tap to Tap	889D-F4NEDM-*
GuardLink Red Patchcord from Tap to Safety Relay	889D-F4NE-*

Note: Replace * with 0M3 (0.3m), 0M6 (0.6m), 2 (2m), 5 (5m), 10 (10m), 15 (15m), 20 (20m) for required length

60-2649

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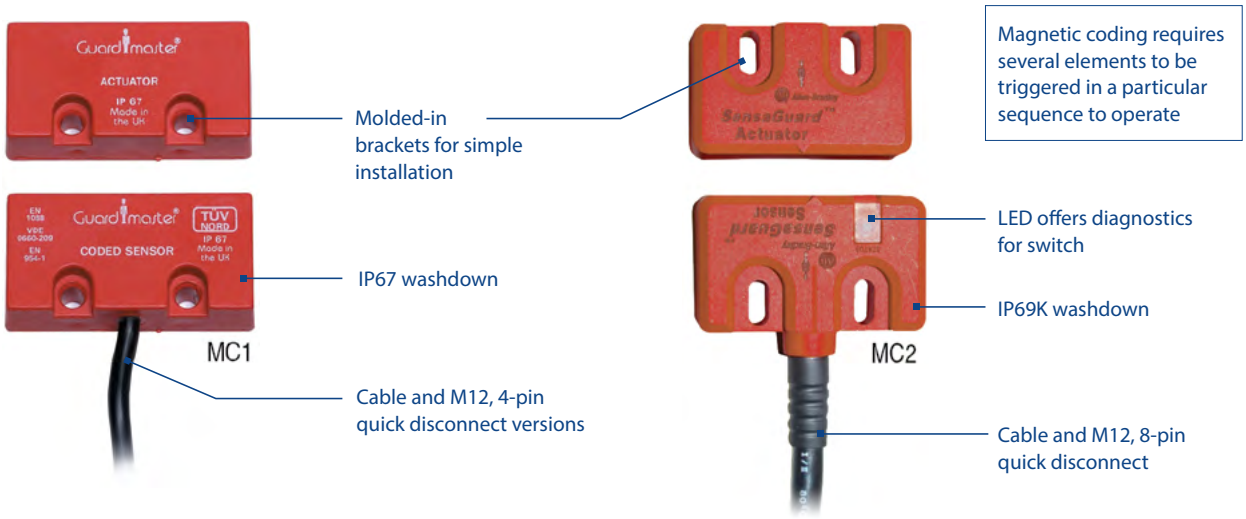
Magnetically Coded Non-Contact Interlock Switches

MC1 Installation Instructions

MC2 Installation Instructions

Features

- Magnetic coded sensing
- Compact enclosure
- Molded-in mounting brackets
- High tolerance to misalignment
- Type 4 interlocking device per ISO 14119 with low coded actuators



With the increasing speed and complexity of applications, a simple magnetic switch may be insufficient to meet the increased risks. The Magnetically Coded MC1 and MC2 non-contact switches incorporate several magnetically sensitive elements, which must be triggered in a particular sequence to operate correctly.

The sensor with its molded-in brackets and diminutive size, is extremely versatile and simple to install.

Specifications

Safety Rating	Type 4
Enclosure Rating	MC1: IP67
	MC2: IP69k
Power Supply and Current	24V DC ±10/-15%
Safety Outputs Auxiliary Outputs	MC1 : 2 NC Reeds/No Safety
	MC2 : 2 NC SSR/1 x PNP, 0.2A max
	Status: OFF (0V DC)

Product selection

Step 01

Step 02

Type	Operating Voltage/ Input Current	Safety Outputs	Auxiliary Outputs	Status Indicator	Connection	Catalogue Number	Recommended Cordset
MC1	–	2 NC REEDS	–	No	4-pin micro (M12)	440N-Z2NRS1C	889D-F4AC-*
					3 m cable	440N-Z2NRS1A	–
					10 m cable	440N-Z2NRS1B	–
MC2	24 V DC, +10% / 15% / 50 mA max.	2 NC Solid- State Relays	1 x PNP, 0.2 A max.; Status: OFF (0V DC)	Yes	8-pin micro (M12)	440N-Z21W1PH	889D-F8AB-*
					3 m cable	440N-Z21W1PA	–
					10 m cable	440N-Z21W1PB	–

Note: Replace * with 2, 5, 10 for required length

Step 03

- Select optional accessories

440N-A17233

Spare actuators

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

Safety Relays (for more information see pages 62-69)

Description	Catalogue No.
Guardmaster (SI) Single Input Safety Relay	440R-S12R2
Guardmaster (DI) Dual Input Safety Relay	440R-D22R2
Guardmaster CR30 Configurable Relay	440C-CR30-22BBB

440P Safety Limit Switches

Features

Technical Data

- 30 mm metal, 22 mm metal and plastic, and 15 mm plastic body styles
- Flexible installation, wide range of actuator and contact configurations
- Safety Rated, Positive opening-action contacts (Slow Acting)

Actuator Head Types

Note: Adjustable actuators cannot be used in Safety applications (Adjustable Roller Lever, Spring Rod, Telescopic Arm).


Short roller lever


Adjustable roller lever


Dome plunger


Roller plunger


Panel mount roller plunger


Rod lever


Spring rod


Adjustable Rubber Roller


Hinge lever

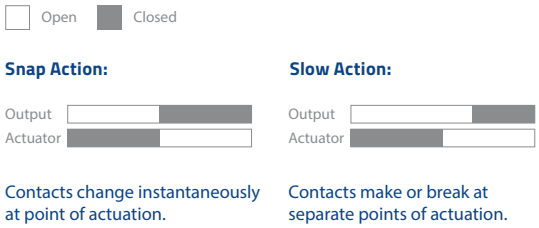

Telescopic arm


Offset hinge


Cross roller plunger

A full line of IEC safety switches

The 440P limit switch family offers a full range of international-style solutions for both safety and standard sensing applications. Available in four different body styles – 30 mm metal, 22 mm metal and plastic, and 15 mm plastic – with a broad selection of operator types, circuit arrangements and connection options, the 440P is ideal for a wide variety of applications. These include material handling, packaging, elevators, escalators, scissor lifts, industrial trucks and tractors, cranes and hoists, overhead door as well as general safety guarding applications.



Specifications

	30mm Metal	22mm Plastic	22mm Metal	15mm Plastic
Dimensions (H x W x D) mm	76.5 x 40 x 45	68 x 31 x 30	34 x 35 x 16	37.7 x 25.1 x 23.3
Safety Rating	Type 1, CAT 1	Type 1, CAT 1	Type 1, CAT 1	Type 1, CAT 1
Enclosure Rating	IP66	IP66	IP66, IP67, IP69K	IP30
Safety outputs	1NC, 2 NC, 3NC, 4NC	1NC, 2NC, 3NC	1NC, 2NC, 3NC, 4NC	1NC
Auxiliary outputs	1NO (with 2NC)	1NO	1NO, 2NO	1NO
Operational Voltage	240V / 3A	240V / 3A	240V / 3A	240V / 3A
	Installation Instructions	Installation Instructions	Installation Instructions	Installation Instructions

Product selection

Step 01

Housing Type

30 mm metal

440P-MALS11B

22 mm plastic

440P-CALS11B

Step 02

Actuator Head

- Short Roller Lever
- Adjustable Roller Lever
- Dome Plunger
- Roller Plunger
- Adjustable Rod Lever
- Spring Rod
- Telescopic Arm
- Adjustable Rubber Roller
- Short Roller Lever
- Adjustable Roller Lever
- Dome Plunger
- Plastic Roller Plunger
- Hinge Lever
- Adjustable Rubber Roller

Step 03

Safety Contacts	Auxillary Contacts	Contact Type
1 NC	1 NO	Snap acting
2 NC	2 NO	Slow acting
1 NC	1 NO	Snap acting
2 NC	2 NO	Slow acting
1 NC	1 NO	Snap acting
2 NC	2 NO	Slow acting
1 NC	1 NO	Snap acting
2 NC	2 NO	Slow acting
1 NC	1 NO	Snap acting
2 NC	2 NO	Slow acting
1 NC	1 NO	Snap acting
2 NC	2 NO	Slow acting
1 NC	1 NO	Snap acting
2 NC	2 NO	Slow acting
1NC	1NO	Snap acting
2NC	2NO	Slow acting
1 NC	1 NO	Snap acting
2 NC	2 NO	Slow acting
1 NC	1 NO	Snap acting
2 NC	2 NO	Slow acting
1 NC	1 NO	Snap acting
1 NC	1 NO	Snap acting
2 NC	2 NO	Slow acting
1 NC	1 NO	Snap acting
2 NC	2 NO	Slow acting
1NC	1NO	Snap acting
2NC	2NO	Slow acting

Step 04

M20 Conduit	Quick Disconnect [1]
440P-MSLS11B	440P-MSLS11N5
440P-MSLB22B	440P-MSLB22M9
440P-MALS11B	440P-MALS11N5
440P-MALB22B	440P-MALB22M9
440P-MDPS11B	440P-MDPS11N5
440P-MDPB22B	440P-MDPB22M9
440P-MRPS11B	440P-MRPS11N5
440P-MRPB22B	440P-MRPB22M9
440P-MARS11B	440P-MARS11N5
440P-MARB22B	440P-MARB22M9
440P-MSRS11B	440P-MSRS11N5
440P-MSRB22B	440P-MSRB22M9
440P-MTAS11B	440P-MTAS11N5
440P-MTAB22B	440P-MTAB22M9
440P-MRRS11B	440P-MRRS11N5
440P-MRRS11N5	440P-MRRB22M9
440P-CSLS11B	440P-CSLS11D4
440P-CSLB12B	440P-CSLB12R6
440P-CALS11B	440P-CALS11D4
440P-CALB12B	440P-CALB12R6
440P-CDPS11B	440P-CDPS11D4
440P-CRPS11B	440P-CRPS11D4
440P-CRPB12B	440P-CRPB12R6
440P-CHLS11B	440P-CHLS11D4
440P-CHLB12B	440P-CHLB12R6
440P-CRRS11B	440P-CRRS11D4
440P-CRRB12B	440P-CRRB12R6

1) 30mm Metal
For contacts 1NC 1NO use patchcord 889N-F5AE-6F
For contacts 2NC 2NO use patchcord 889M-FX9AE-2

22mm Plastic
For contacts 1NC 1NO use patchcord 889D-F4AB-2
For contacts 2NC 2NO use patchcord 889R-F6ECA-2

Housing Type	Description	Safety Contacts	Auxillary Contacts	Contact Type	2 m Bottom Cable	2 m Side Cable
22 mm metal with flying lead  440P-ASLS11C	Short Roller Lever	1 NC	1 NO	Snap acting	440P-ASLS11C	440P-ASLS11CS
	Adjustable Roller lever	1 NC	1 NO	Snap acting	440P-AALS11C	440P-AALS11CS
	Dome Plunger	1 NC	1 NO	Snap acting	440P-ADPS11C	440P-ADPS11CS
	Metal Roller Plunger	1 NC	1 NO	Snap acting	440P-ARPS11C	440P-ARPS11CS

Housing Type	Description	Safety Contacts	Auxillary Contacts	Contact Type	1/2 in' NPT
15 mm plastic  440P-M18001	Roller Plunger	1 NC	1 NO	Snap acting	440P-M18001
	Cross Roller Plunger	1 NC	1 NO	Snap acting	440P-M18002

Lifeline Cable Pull Switches 440E

Technical Data


Lifeline 3


Lifeline 4


Lifeline 4 SS


Lifeline 5

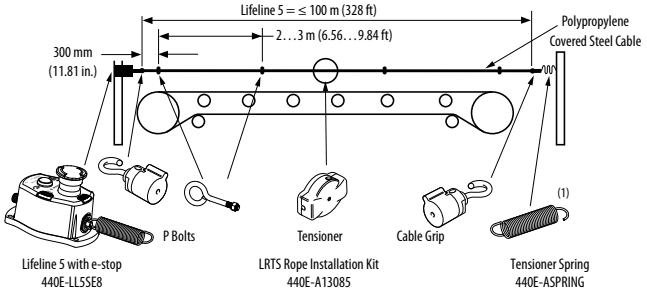

Lifeline 5


Lifeline 5 SS

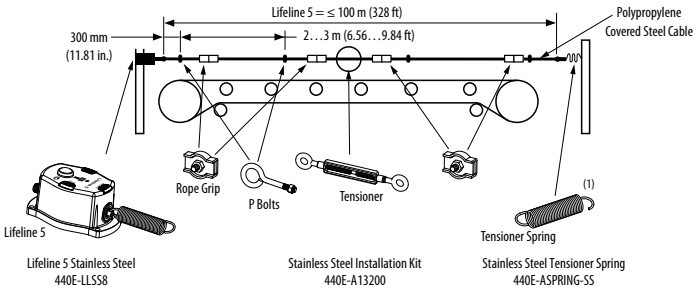
Features

- Up to 125 m cable span
- Universal mounting and operation
- Lid mounted emergency stop button
- Switch latches when cable is pulled, or cable is slack
- Cable status indicator on switch lid
- Lifeline Rope Tensioner System (LRTS) speeds installation

Typical Mounting Example with One Switch Using Lifeline Rope Tensioner System (LRTS)

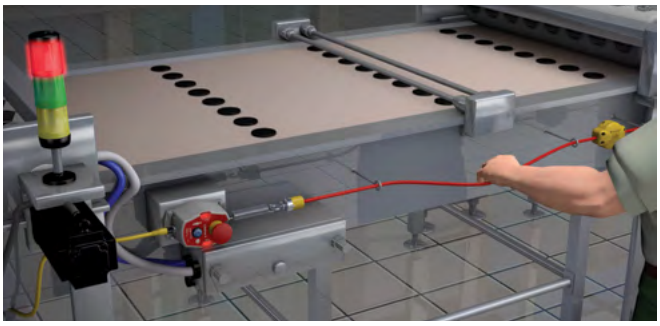


Typical Mounting Example with One Switch Using the Stainless Steel Installation Kit



Cable pull switches overview

The patented Lifeline 5 Cable Pull Switch is a microprocessor-based solution that brings advanced features and diagnostics that help enhance safety while improving productivity. The Lifeline 5 offers features and functions that simplify setup and allow for more efficient maintenance and troubleshooting, making it the most advanced switch on the market today.



Specifications

	Lifeline 5	Lifeline 4	Lifeline 3
Safety Rating	PLe, CAT4, SIL3	CAT3	CAT3
Enclosure Rating	IP66,IP67, IP69K	IP66, IP67, IP69K	IP67
Material	Die Cast and Stainless Steel	Painted Alloy and Stainless Steel	Painted Zinc Alloy
Reset	Yes	Yes	Yes
E-stop	Yes	Yes	No
Cable Span	100m	75m and 125m	30m
	Installation Instructions	Installation Instructions	Installation Instructions

Product selection

Step 01

Model	Cable Span
Lifeline 5	≤100 m
Lifeline 5 with e-stop	
Lifeline 5 stainless steel[1)]	
Lifeline 4	≤75 m
	75…125 m
Lifeline 4 stainless steel[1)]	≤75 m
Lifeline 3	≤30 m

Step 02

Safety Outputs	Auxiliary Outputs
2 OSSDs	1 Aux
2 OSSD Outputs 2 OSSD Inputs	1 Aux, 1 Tension
2 OSSDs	1 Aux
2 OSSD Outputs 2 OSSD Inputs	1 Aux, 1 Tension
2 OSSDs	1 Aux
2 OSSD Outputs w/ 2 OSSD Inputs	1 Aux, 1 Tension
2 NC	2 NO
3 NC	1 NO
2 NC	2 NO
3 NC	1 NO
2 NC	2 NO
2 NC	
3 NC	

Step 03

Catalogue No.		
M20	5-pin Micro (M12)	8-pin Micro (M12)
–	440E-LL5SN5	–
–	–	440E-LL5SN8
–	440E-LL5SE5	–
–	–	440E-LL5SS8
–	440E-LL5SS5	–
–	–	440E-LL5SS8
440E-L13137	–	–
440E-L13042	–	–
440E-L13153	–	–
440E-L13150	–	–
440E-L22BNSMNH		
440E-D13118	–	–
440E-D13112	–	–

Step 04

Required Cordset
889D-F5AC-*
889D-F8AB-*
889D-F5AC-*
889D-F8AB-*
889D-F5AC-*
889D-F8AB-*
–
–
–
–
–
–

Note: Replace * with 2 (2m), 5 (5m), 10 (10m), 15 (15m), 20 (20m) for required length

1) A dedicated stainless steel installation kit must be used with the stainless steel Lifeline instead of the LRTS.

Step 05

- Select Installation Kits and Accessories

440E-A13080

440E-A13194

LRTS Standard Rope Tension Installation Kits

Description	Catalogue No.
5m	440E-A13079
10m	440E-A13080
15m	440E-A13081
20m	440E-A13082
30m	440E-A13083
50m	440E-A13084
75m	440E-A13085

Note: LRTS System contains 1 x length of cable (rope), 2 x grippers, 1 x tensioner and quantity of eyebolts

Installation instructions

Stainless Steel Installation Kits

Description	Catalogue No.
5m	440E-A13194
10m	440E-A13195
15m	440E-A13196
20m	440E-A13197
30m	440E-A12198
50m	440E-A13199
75m	440E-A13200

Note: Installation Kits include 1 x length of cable (rope), 1 x turnbuckle tensioner, 4 x thimbles, 8 x rope grips and eyebolts, nuts and washers depending on the length of the rope.

Step 06

- Select optional accessories

440E-A13227

440E-A17105

440E-A13205

440E-A13206

Lifeline 5
440E-ASPRING

Lifeline 3/4
440E-A13078

Accessories

Description	Catalogue No.
LRTS Tensioner and Allen key	440E-A17105
Gripper 2 Pack	440E-A17107
Gripper 20 pack	440EA17106
Lifeline 3 / 4 Tensioner Spring	440E-A13078
Lifeline 4 Tensioner Spring Stainless Steel	440E-A13202
Lifeline 5 Tensioner Spring	440E-ASPRING
Lifeline 5 Tensioner Spring Stainless Steel	440E-ASPRING-SS
Turn Buckle Kit Stainless Steel	440E-A13227
Inside Corner Pulley	440A-A17101
Outside Corner Pulley	440A-A17102
Inside Corner Pulley Stainless Steel	440E-A13205
Outside Corner Pulley Stainless Steel	440E-A13206
Lifeline Eyebolt M8 x 1.25 thread 58mm thread length	440E-A17003
Lifeline Stainless Steel Eyebolt M8 x 1.25 thread 58mm thread length	440E-A13201

Safety Relays (for more information see pages 62-69)

Description	Catalogue No.
Guardmaster (SI) Single Input Safety Relay	440R-S12R2
Guardmaster (DI) Dual Input Safety Relay	440R-D22R2
Guardmaster CR30 Configurable Relay	440C-CR30-22BBB

Guardlink Smart Taps (for more information see pages 6-7)

Description	Catalogue No.
GuardLink Enabled Tap 5-pin OSSD Input device	440S-SF5D
GuardLink Red Patchcord to device 5-Pin	889D-F5NCDM-
GuardLink Enabled Tap 8-pin OSSD Input device	440S-SF8D
GuardLink Red Patchcord to device 8-Pin	889D-F8NBDM-*
GuardLink Red Patchcord from Tap to Tap	889D-F4NEDM-*
GuardLink Red Patchcord from Tap to Safety Relay	889D-F4NE-*

Note: Replace * with 0M3 (0.3m), 0M6 (0.6m), 2 (2m), 5 (5m), 10 (10m), 15 (15m), 20 (20m) for required length

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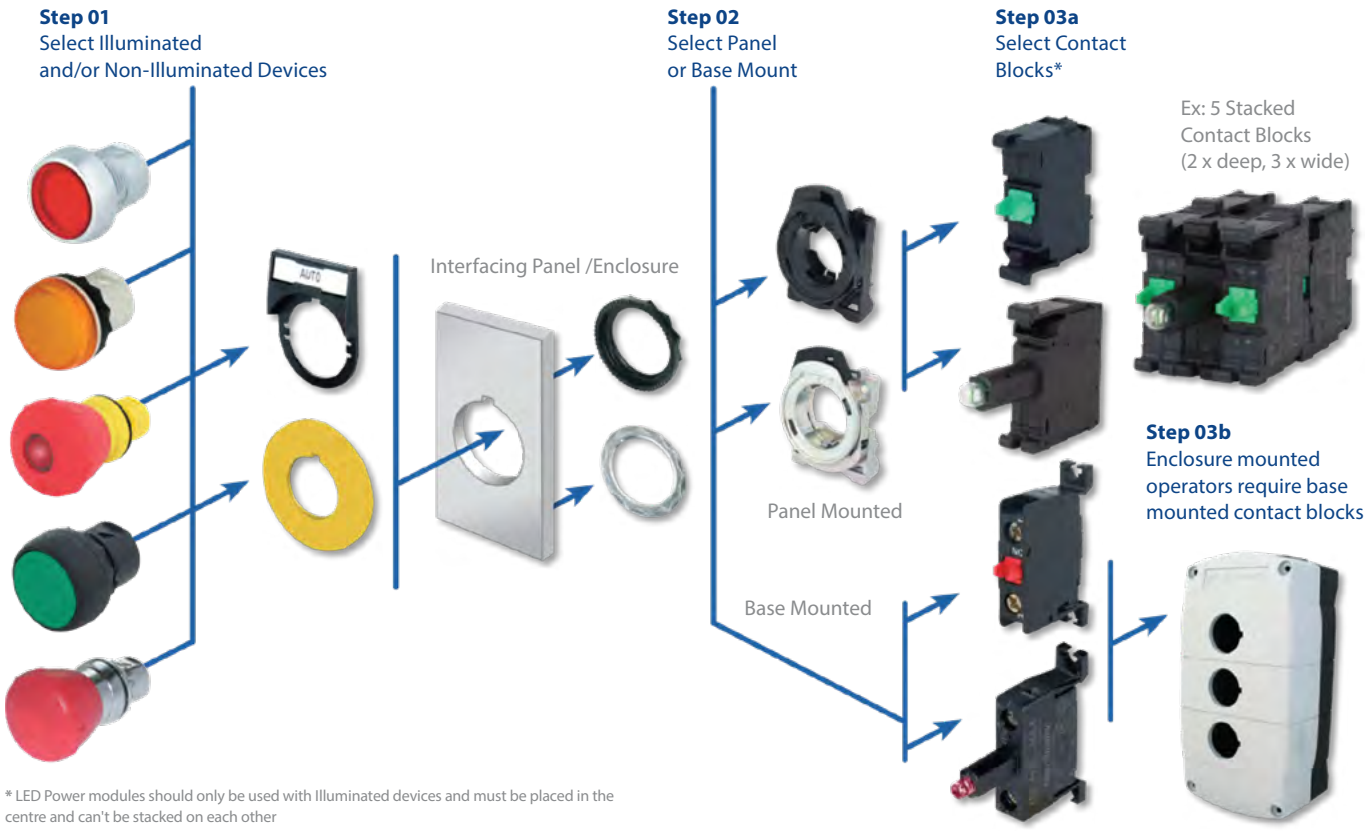
Operator Devices 800F

Features

- 22.5 mm mounting hole
- Self-monitoring contact blocks for increased safety
- Engineering grade thermoplastics
- Die-cast metal construction
- Illuminated and non-illuminated options
- With or without key operation



* LED Power modules should only be used with Illuminated devices and must be placed in the centre and can't be stacked on each other

Note: Base Mounted back of panel components must be selected for Enclosure type installations
Panel Mounted back of panel components must be selected for Panel type installations

The 800F line of 22 mm push buttons is designed and manufactured to demanding performance specifications. Using state-of-the-art solid modelling techniques and finite element analysis, every component built into 800F Push Buttons is optimized for durability and performance.

Specifications

Material	Plastic	Glass-filled Polyamide
	Metal	Chromated Zinc
Ingress Protection	Plastic	IP65/66(Type 3/3R/4/4X/12/13), IP69K
	Metal	IP65/66(Type 3/3R/4/12/13)
Operational Temperature	-25….+70 OC	

Note: IP69K applies to specific complete units of 800F Operator devices and Enclosures, contact NHP for more information

Product selection

Step 01

- Select Operator Devices

Step 01a

- Select complete assembled E-Stop Station

800F-1YM2

800F-1YMD51

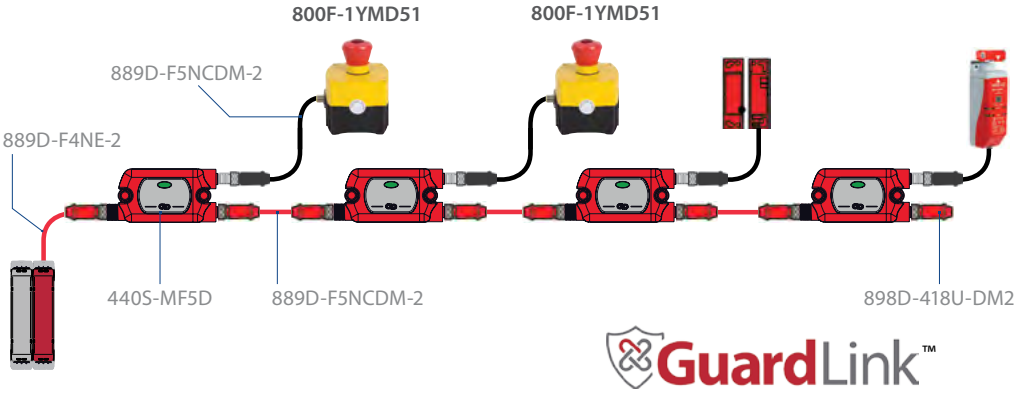
Assembled E-Stop Operators

Description	Contact Configuration	Pins	SensaGuard/ GuardLink	Catalogue No.
Unwired	1NC	–	–	800F-1YM1
Unwired	1NC/1NO	–	–	800F-1YM2
Unwired	1NC/1NO Keyed	–	–	800F-1YM5
Unwired	2NC	–	–	800F-1YM3
End Station (1 x M12)	2NC/1NO, 24V DC Illuminated	5	Y	800F-1YMD51
T-Port Station (2 x M12)	2NC/1NO, 24V DC Illuminated	5	Y	800F-1YMD52

Note: Complete E-stop station does not require contact blocks or adapter plates

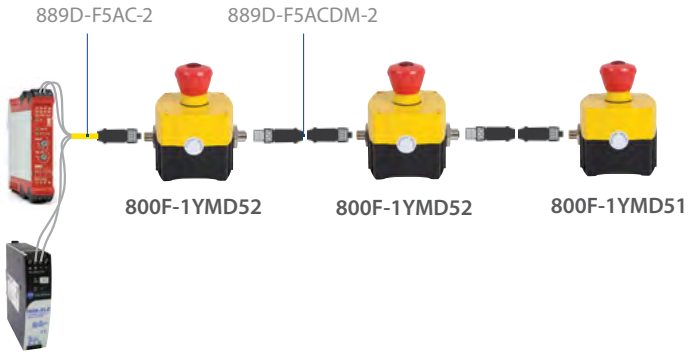
800F-1YMD51

- For use with GuardLink enabled taps
- Illuminated when activated
- 2 N.C. circuits (safety)
- 24V AC/DC
- External panel mounting holes



800F-1YMD52

- Illuminated when activated
- 2 N.C. circuits (safety)
- 1 N.O. circuit (illumination)
- 24V AC/DC
- External panel mounting holes



Step 01b

- Select Front of panel operator devices

800F Momentary Pushbutton Operators

Type of Operator		Colour	Text	Flush Operator
Non-Illuminated	 800FP-F3	Green	START	800F*-F301
		Green	I	800F*-F306
		Green	–	800F*-F3
		Red	STOP	800F*-F402
		Red	O	800F*-F405
		Red	–	800F*-F4
	 800FP-F611	Blue	R	800F*-F611
		Blue	–	800F*-F6
		Orange	–	800F*-F0
		White	–	800F*-F1
		Black	–	800F*-F2
		Yellow	–	800F*-F5
Illuminated	 800FM-LF4	Green	–	800F*-LF3
		Red	–	800F*-LF4
		Blue	–	800F*-LF5
		Orange	–	800F*-LF0
		White	–	800F*-LF1
		Black	–	800F*-LF2
		Yellow	–	800F*-LF5

Replace * with "P" for Plastic Operator and "M" for Metal Operator
Note: Text colour is white


800FP-P4


800FD-P7N3

800F Pilot Light Operators

Colour	Catalogue No.	
	Plastic	Metal
Green	800FP-P3	800FM-P3
Red	800FP-P4	800FM-P4
Yellow	800FP-P5	800FM-P5
Amber	800FP-P0	800FM-P0
Blue	800FP-P6	800FM-P6
Clear	800FP-P7	800FM-P7

800F Pilot Light Operators (Monolithic)

Colour	Catalogue No.	Voltage
Green	800FD-P3N3	24V AC/DC
Red	800FD-P4N3	
Yellow	800FD-P5N3	
Amber	800FD-P0N3	
Blue	800FD-P6N3	
Clear	800FD-P7N3	


800FP-MT34


800FP-MT44


800FP-LMT44


800FP-MK44

E-stop operators

	Size (mm)	Non-Illuminated		Illuminated	
		Plastic	Metal	Plastic	Metal
Twist-to-release	30	800FP-MT34	800FM-MT34	-	-
	40	800FP-MT44	800FM-MT44	800FP-LMT44	800FM-LMT44
	60	800FP-MT64	800FM-MT64	800FP-LMT64	800FM-LMT64
	40 keyed	800FP-MK44	800FM-MK44	-	-
Push-Pull	40	800FP-MP44	800FM-MP44	800FP-LMP44	800FM-LMP44

Step 02

- Select suitable Adapter Plates

800F-ALP

800F Adapter Plates

Material	Catalogue No.
Plastic	800F-ALP
Metal	800F-ALM

Step 03a

- Select Back of panel components

800F-X01

800F-BX10

800F-BN3R

800F Contact Blocks

Type	Mounting Type	Catalogue No.
NO - Normally Open	Panel Mount	800F-X10
NO/NC - Normally Open/Normally Closed	Panel Mount	800F-X11D
NC - Normally Closed	Panel Mount	800F-X01
NC - Self Moitoring	Panel Mount	800F-X01S
NO - Normally Open	Base Mount	800F-BX10
NC - Normally Closed	Base Mount	800F-BX01

Note: Base mounted contact blocks are used only with enclosures

800F LED Power Modules

Colour	Mounting Type	Catalogue No.	Voltage
Green	Panel Mount	800F-N3G	24V AC/DC
Red	Panel Mount	800F-N3R	
Clear	Panel Mount	800F-N3W	
Green	Base Mount	800F-BN3G	
Red	Base Mount	800F-BN3R	
Clear	Base Mount	800F-BN3W	

Note: Base mounted contact blocks are used only with enclosures

Step 03b

- Select optional enclosure

800F3PM-C

800F5MM-C

Enclosures

Holes	Gray Plastic	Yellow Plastic	Metal
1	800F-1PM	800F-1YM	800F-1MM
2	800F-2PM	–	800F-2MM
3	800F-3PM	–	800F-3MM
4	800F-4PM	–	–
5	–	–	800F-5MM
6	800F-6PM	–	–

Note: Through holes are metric for enclosures.
IP69K applies to specific complete units of 800F Operator devices and Enclosures, contact NHP for more information.

Step 04

- Select optional accessories

800F-15YSE112

800F-12WE100

Legend Plates

Description	Catalogue No.
"EMERGENCY STOP"	800F-15YSE112
"EMERGENCY STOP", 90mm wide	800F-16YE112
Blank	800F-15YS
30 x 40 mm 2-piece Snap-in Plate and Frame, White text	800F-11WE100
31 x 50 mm 2-piece Snap-in Plate and Frame, White text	800F-12WE100
32 x 40 mm 1-piece Snap-in Plate and Frame, White text	800F-34WE100

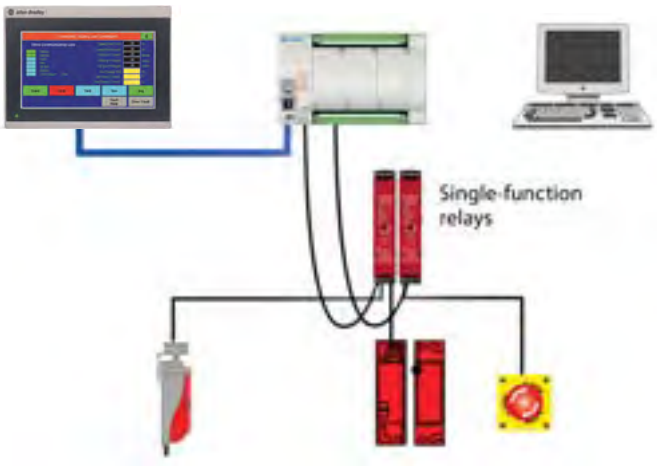
Safety Relays (for more information see pages 62-69)

Description	Catalogue No.
Guardmaster (SI) Single Input Safety Relay	440R-S12R2
Guardmaster (DI) Dual Input Safety Relay	440R-D22R2
Guardmaster Ethernet Interface	440R-ENETR
Guardmaster CR30 Configurable Relay	440C-CR30-22BBB

Logic Devices

Basic

Guardmaster Safety Monitoring Relays 440R



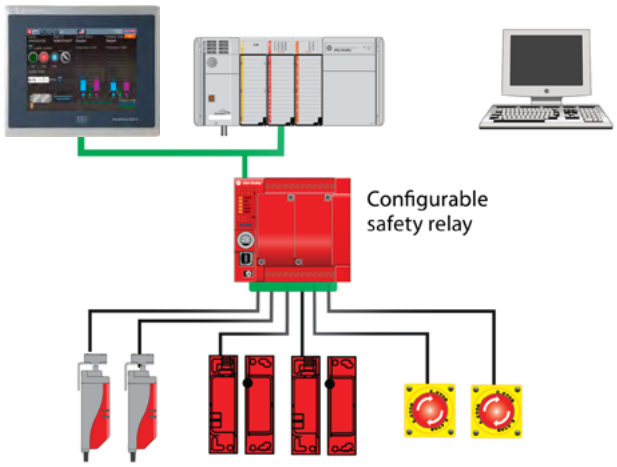
Basic safety relays should be considered for single zone control, with a minimal number of input devices. Safety relays simply monitor the status of input devices, and when an unhealthy condition is observed will de-energise safety outputs – this de-energises the intended system. They do offer more advanced features such as timed responses and guard locking with standard proximity inputs – these features are highly brand dependant.

You would typically expect the following basic features as a minimum on a safety relay:

- dual-channel inputs
- 2x safety outputs
- A non-safety rated auxiliary output for system monitoring
- Auto / manual reset feature

Intermediate

Software Configurable Safety Relay 440C-CR30

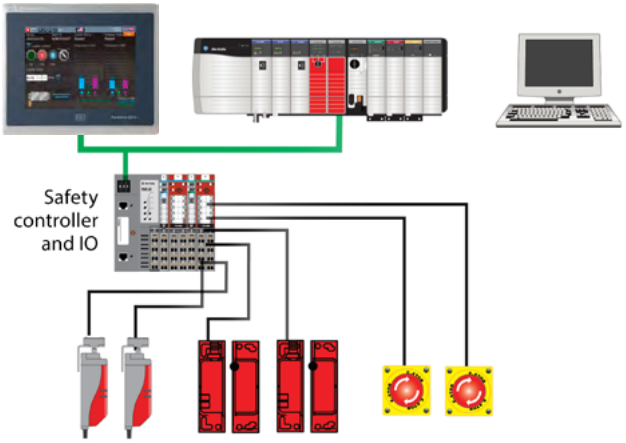


Simplified safety PLC, ideal for applications requiring many dual-channel safety circuits. Can be configured via software selecting TUV certified safety function blocks. 440C-CR30

- Useful for higher concentration of I/O (22-point embedded safety I/O included)
- Expandable via Micro800 plug-in modules
- Extra input, output or Ethernet
- Communication via USB or RS-232 serial
- Single-wire safety I/O for cascading with GSR series and other 440C-CR30
- Built-in redundancy, diversity and diagnostics. Suitable for CAT4, PLe, SIL3 applications

Advanced

Safety Programmable Controllers
Control GuardLogix 5580
Compact GuardLogix 5380



Safety PLC systems bring the benefits of traditional PLC systems to complex safety applications. Allow standard and safety-related programs to reside in a single controller chassis, providing flexibility in programming.

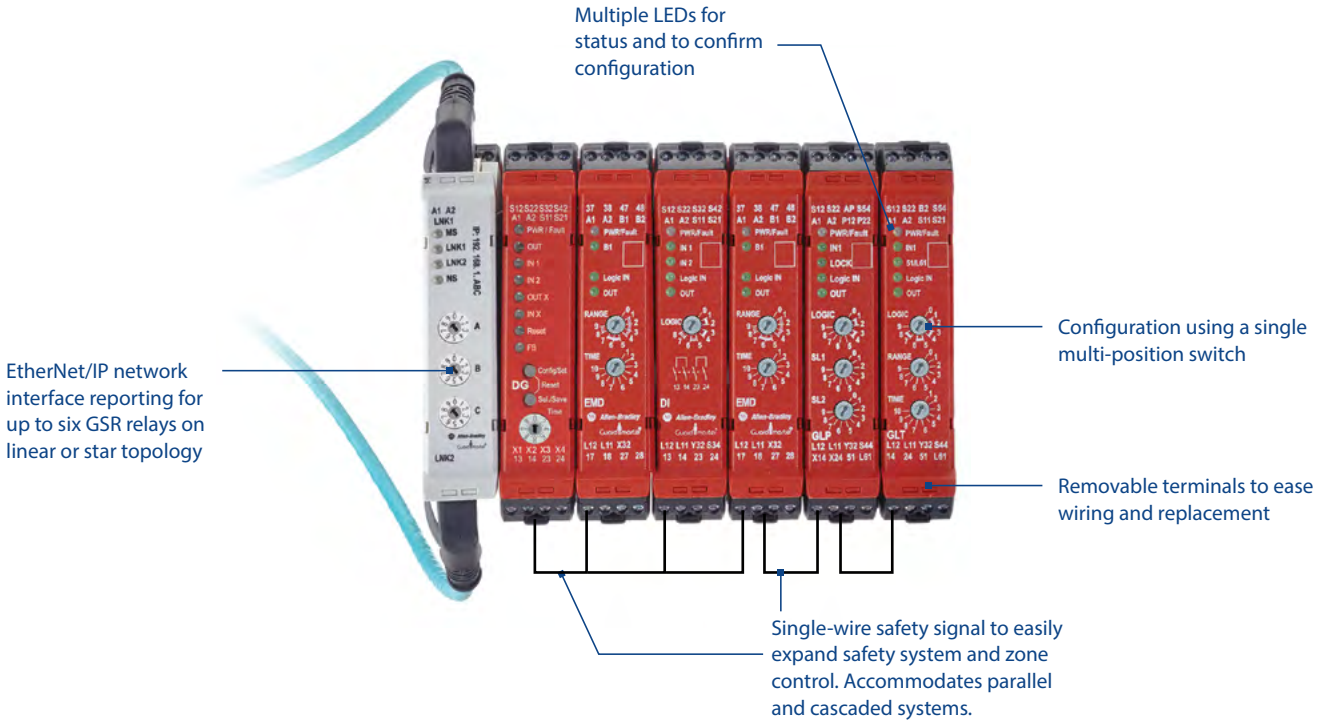
- Standard control and safety control in one controller
- One common chassis
- Standard and safety control on common networks
- Processor redundancy, diversity and diagnostics. Some suitable for CAT4, PLe, SIL3 applications
- Integrated architecture combining safety and non-safety systems over a single network

User Manual

Guardmaster Safety Relays 440R

Features

- A broad range of safety functions
- Simple logic, reset, and timing configurations
- Single-wire safety relay connection
- Universal inputs
- Compact 22.5 mm housings
- Optional EtherNet/IP network interface



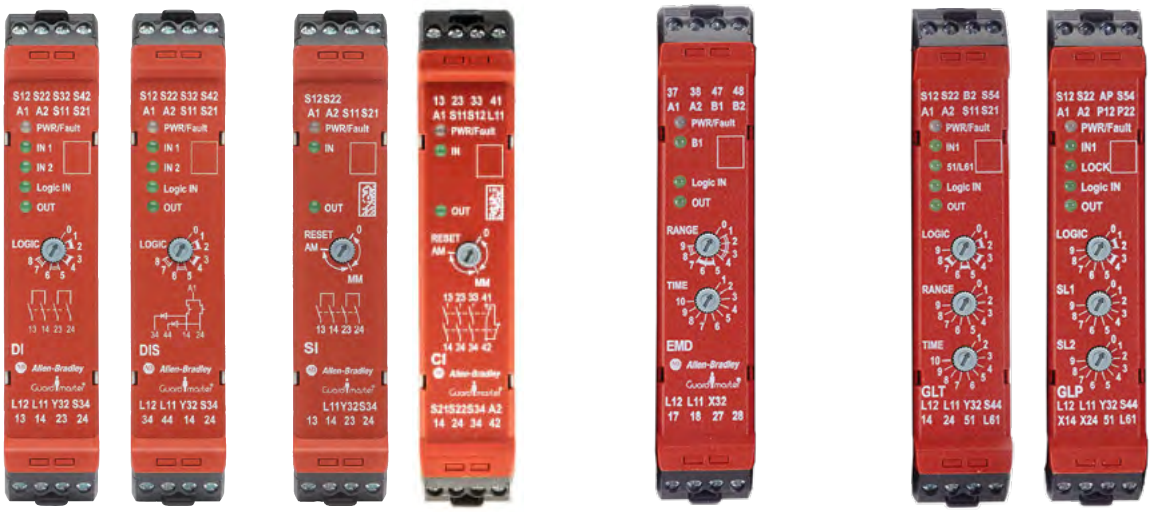
The Allen-Bradley Guardmaster Safety Relays include units capable of monitoring a broad range of safety devices in a variety of applications. These units can achieve most of the functions safety systems require, helping simplify purchasing and parts management. The family is designed to meet new functional safety standards, such as EN ISO 13849-1 or IEC/EN 62061 and offers key functions to simply installations and system complexity.

Specifications

Power Supply	24VDC
Safety Rating	PLe, CAT4, SIL3
Operating Temperature	-5….+55 °C
Conductor Size	0.2…4mm

Guardmaster Safety Monitoring Relay Comparison

Example Wiring Diagrams



	Safety Relays				Expansion Modules		Access Control	
	Guardmaster DI/DIS		Guardmaster SI/CI		Guardmaster EM/EMD		Guardmaster GLT/GLP	
	Consolidates functionality of two safety relays into a single electromechanical relay (DI) or solid state (DIS) outputs		Ideal for safety functions using one dual or single channel safety device. Ideally suited for global E-stop function in combination with another GSR relay		Easily add 4 N.C. instantaneous (EM) or delayed (EMD) outputs to a system		Developed for applications requiring access control monitoring the stop time, standstill or safe limited speed to unlock guards when equipment reaches a safe condition.	
Model	**DI**	**DIS**	**SI**	**CI**	**EM**	**EMD**	**GLT**	**GLP**
Catalogue No.	440R-D22R2	440R-D22S2	440R-S12R2	440R-S13R2	440R-EM4R2	440R-EM4R2D	440R-GL2S2T	440R-GL2S2P
Features	- Two Dual Channel inputs - Rotary switch configures auto/ manual or monitored manual reset or logic of inputs - Universal inputs are compatible with interlocks, light curtains, safety mats, E-stops, and SensaGuard - Single wire safety input and output to cascade safety relays and expand with output modules while maintaining SIL 3, PLe		- Rotary switch configures auto or manual or monitored manual reset - Universal inputs are compatible with interlocks, light curtains, safety mats, E-stops, and SensaGuard - Single wire safety output connects to control other safety relays e.g. as Global E-Stop and expand with output modules while maintaining SIL 3, PLe		- Four instantaneous or delayed safety outputs and one auxiliary PNP output - Controlled by single wire safety to expand outputs of a GSR module while maintaining SIL 3, PLe - Timer version provides on-delay, off-delay and jog outputs that can be configured via rotary switches		- Applicable for Stop Category 0 and 1 - Rotary switch configures reset type and speed monitoring mode (GLP) or time delay (GLT)	
							- Allow access when maximum stop time of equipment has lapsed & reaches standstill - Combinations of two instantaneous & two delayed switching output	- 2 PNP proximity sensor inputs for standstill or slow-speed monitoring to allow access when equipment reaches safe speed - Supports standard proximity switches while maintaining PLd, SIL 2
Input Type	2 Universal Safety Inputs, 1 Single Wire Safety		1 Universal Safety Inputs, 1 Single Wire Safety		1 Single Wire Safety	1 Single Wire Safety Jog Input	Universal Safety Input, 1 Single Wire Safety Time based Stop monitoring	1 Universal Safety Input, 1 Single Wire Safety 2 Proximity Switch Inputs for speed monitoring
Safety Outputs	2 NO 1 Single wire safety	2 PNP 1 Single wire safety	2 NO	3 NO	4 NO 1 Single Wire Safety	4 NO delayed 1 Single Wire Safety	2 PNP 2 Lock 1 Single Wire Safety	
Diagnostics	LED indicators, 1 PNP Aux, optical bus			LED indicators 1 NC	Led indicators, 1 PNP Aux, optical bus			
Utilization category	AC15 - 3A/250V AC	14, 24: 1.5 A each	AC15 - 1.5 A/250V AC		AC15 - 1.5 A/250V AC		–	X14, X24: 0.5 A each
	DC13 - 4A/24V DC	34, 44: 0.5 A each	DC13 - 2 A/24V DC (0.1Hz)		DC13 - 2 A/24V DC			51, L61: 0.3 A each

Product selection
Step 01

- Select Safety Relay

Relay Type	Number of inputs	Input Type	Immediate off Safety Outputs	Delayed Safety Outputs	Time Delay	Immediate Auxiliary Outputs	Catalogue No.
DG Dual Guardlink	2 dual-channel 1 Single Wire Safety	1 NC 2NC OSSD, Guardlink	Single Wire Safety	2 NO	0ms…30s	up to 1 Solid State	440R-DG2R2T
DI Dual Input		1 NC 2NC OSSD Light Curtain, Safety Mat	2 NO	–	–	1 Solid State	440R-D22R2
DIS Dual Input Solid State			2 Solid State			1 Solid State	440R-D22S2
SI Single Input	1 dual-channel		2 NO	–	–	1 Solid State	440R-S12R2
CI Compatible Input			3 NO			1 Solid State	440R-S13R2
GLP Guard Locking Proximity	1 dual-channel 2 PNP 1 Single Wire Safety	2 NC OSSD	2 Solid State	–	–	1 Solid State	440R-GL2S2P
GLT Guard Locking Time Delay	1 dual-channel 1 SWS	2 NC or OSSD	2 Solid State	2 Solid State	100ms… 30min	1 Solid State	440R-GL2S2T
EM Expansion Module	1 Single Wire Safety (on top of above relays)		4 NO	–	–	1 Solid State	440R-EM4R2
EMD Expansion Module Time Delay			**DI/SI:** 2 NO **CI:** 3 NO **DIS:** 2 PNP **EM:** 4 NO **EMD:** 4NO delay **DIS/GLP:** 2 PNP lock	4 NO	100ms…300s on/off delay 100ms…20s jog		440R-EM4R2D
Ethernet Module	For interfacing between GSR module and Safety Controller						440R-ENETR

Note: For 440R-ENETR Select suitable E/net cable from accessories

Step 02

- Select Required cordset and Accessories

1585J-M8TBJM-2

Description	Catalogue No.
Straight male RJ45 to straight male RJ45 ethernet patchcord, 8-conductor (4 pair), Cat 5e, TPE, 2meter	1585J-M8TBJM-2[1)]
Right angle male RJ45 to straight male RJ45 ethernet patchcord, 8-conductor (4 pair), Cat 5e, TPE, 2meter [2)]	1585J-E8TBJM-2[1)]
Left angle male RJ45 to straight male RJ45 ethernet patchcord, 8-conductor (4 pair), Cat 5e, TPE, 2 meter [3)]	1585J-L8TBJM-2[1)]
GSR Replacement Screw Terminal kit, 4 pcs	440R-ATP4
GSR Replacement Spring Clamp Terminal kit, 4 pcs	440R-ATSC4
Proximity sensor for GLP - Nickel/Brass 18mm 10-30VDC 8mm Unshielded NO PNP 3WIRE DC-MICRO-4	872C-D8NP18-D4
DC Micro 4 cable to suit Proximity sensor for GLP	889D-F4AC-2[1)]

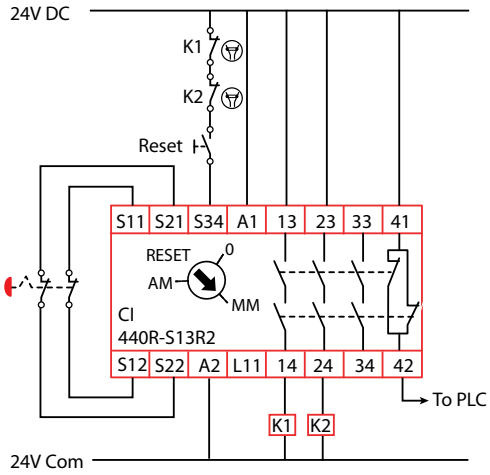
1) In catalogue number, replace 2(2m) with 1(1m), 5(5m), or 10(10m)
2) Recommended for RJ45 connection located at the top of the Guardmaster EtherNet/IP network interface.
3) Recommended for RJ45 connection located at the bottom of the Guardmaster EtherNet/IP network interface.

Typical Applications

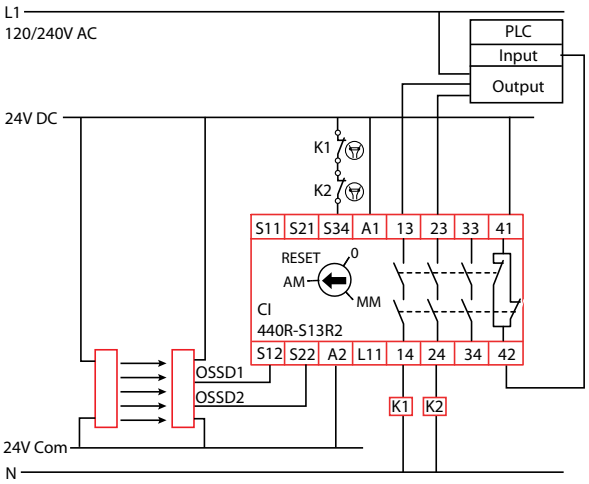
CI Safety Relay (440R-S13R2)

User Manual | Installation Instructions

Mechanical Contacts with Monitored Manual Reset



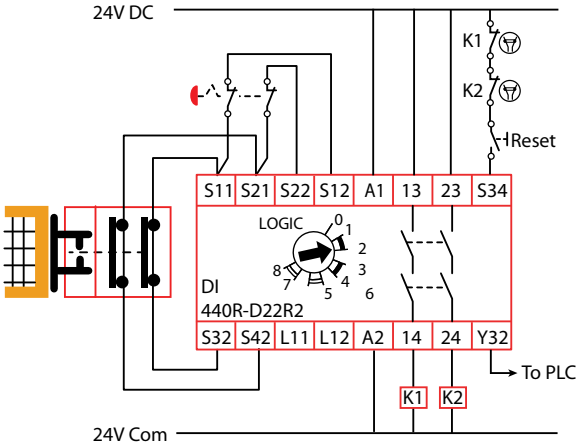
With Device Using OSSD Outputs, Automatic Reset, AC Load Voltage



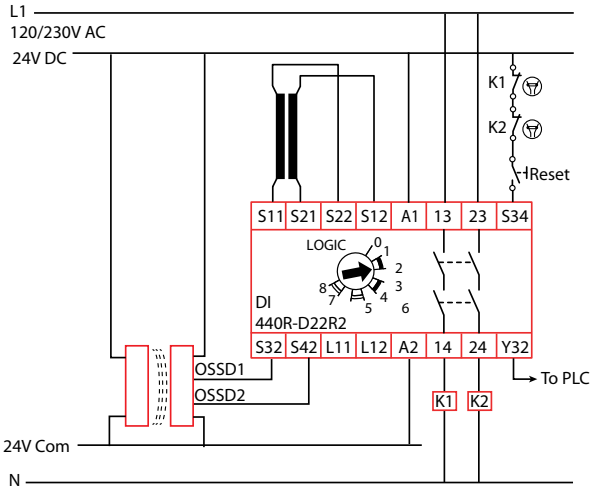
DI Safety Relay (440R-D22R2)

User Manual | Installation Instructions

With Two Devices with Mechanical Contacts and Monitored Manual Reset



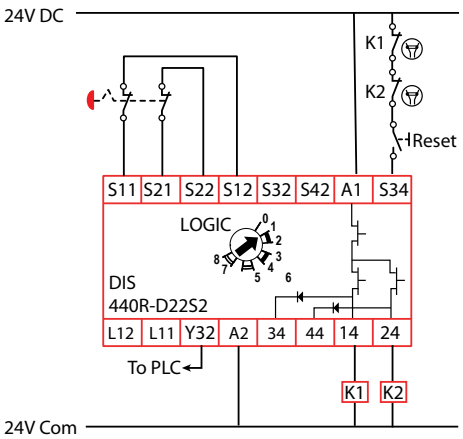
With a Safety Mat and Device with OSSD Outputs, Monitored Manual Reset, AC Loads



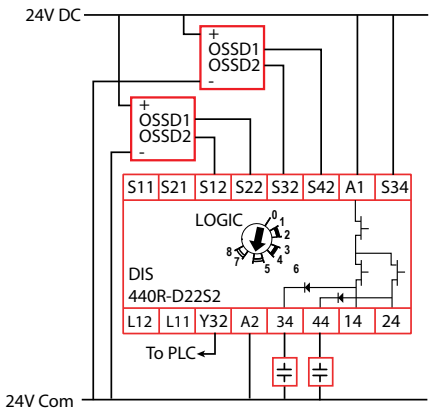
DIS Safety Relay (440R-D22S2)

User Manual | Installation Instructions

Single Input, Monitored Reset



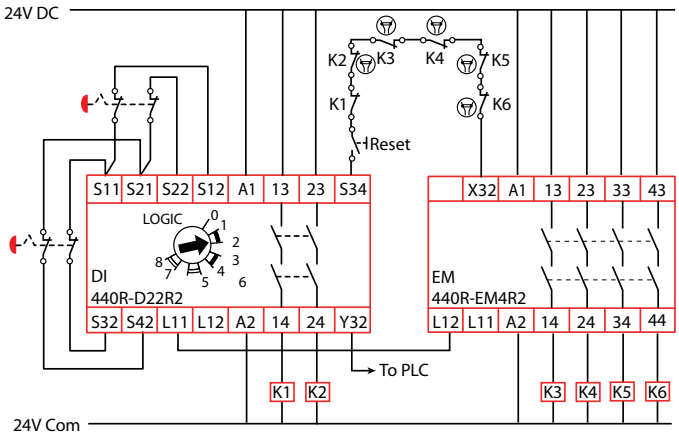
High Capacitive Load



EM Safety Relay (440R-EM4R2)

Expansion of Immediate Safety Outputs

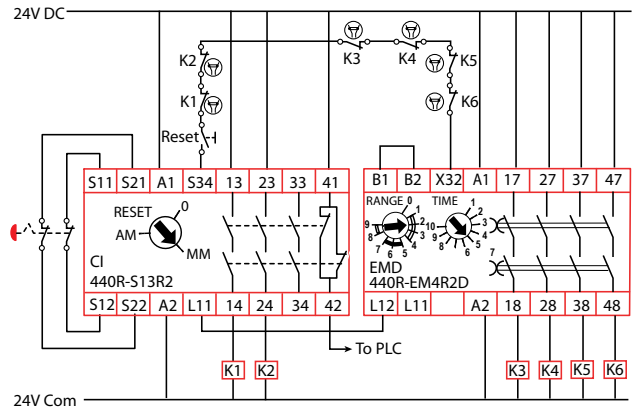
User Manual | Installation Instructions



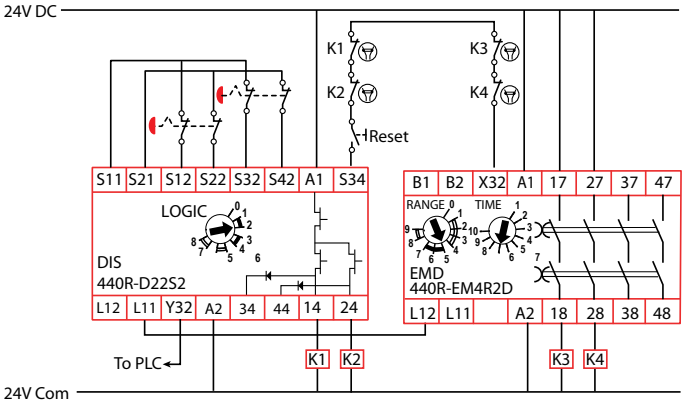
EMD Safety Relay (440R-EM4R2D)

User Manual | Installation Instructions

EMD - Off Delay



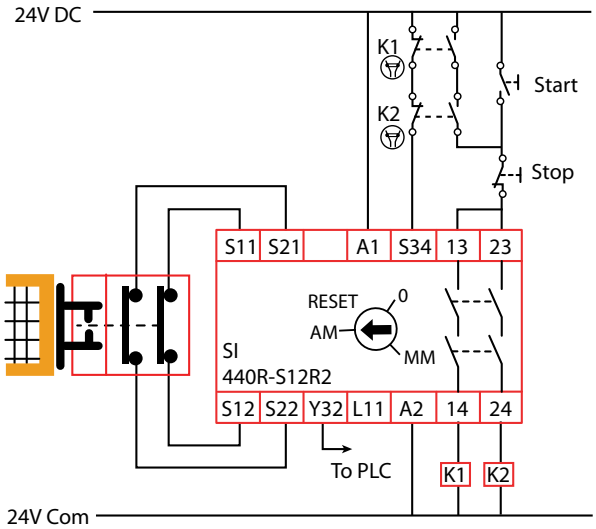
EMD - On Delay



SI Safety Relay (440R-S12R2)

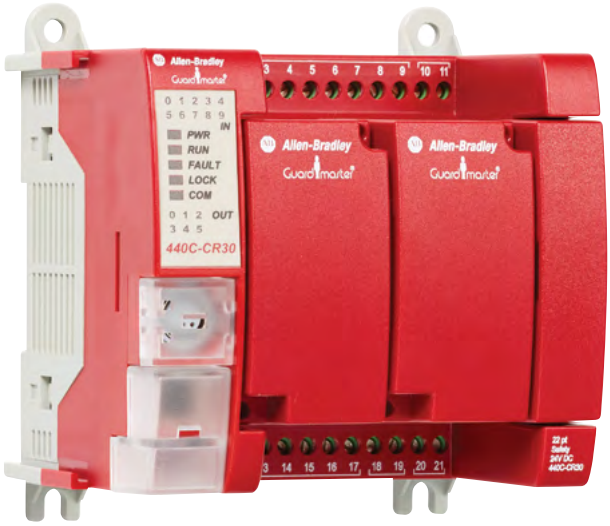
User Manual | Installation Instructions

EMD - Off Delay



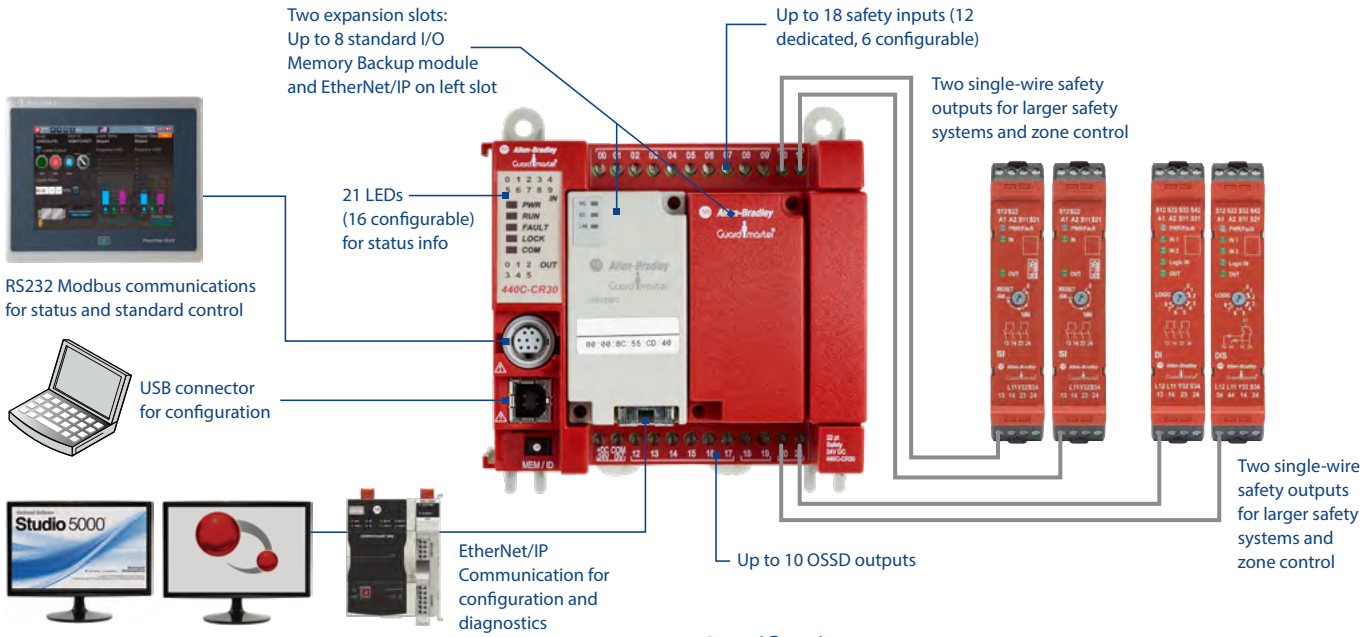
CR30 Configurable Safety Relay 440C

User Manual | Installation Instructions



Features

- Monitoring and Configuration from Studio 5000 Logix Designer® or Connected Components Workbench software
- Predefined function blocks • AND, OR, NAND, NOR, XOR Logic functions
- 22-point embedded safety I/O
- Expandable via two Micro800® Plug-in I/O Modules
- Expandable with EtherNet/IP™ plug-in
- Embedded communication via USB programming port and non-isolated RS-232 serial port
- Two single-wire safety input/output points



Specifications

Safety Rating	SIL3, CAT4, PLe
Operating Temp	-5…+55C
Power Consumption	5.28W
Response Times	Safety inputs <45 ms Safety mats < 70 ms Single-wire safety output <60 ms
Dimensions	90 x 100 x 80 mm
Communication ports	USB 2.0 (non-isolated) RS232 non-isolated serial
Base programming cable	USB 2.0 (non-isolated)
Number of I/O	22 (plus 16 additional on plug in modules)
Plug in modules	2
Software	Studio 5000 Logix Designer or Connected Components Workbench

The Guardmaster® 440C-CR30 Software Configurable Safety Relay is flexible, cost-effective, and easy to use. This relay is ideal for applications requiring as many as ten dual-channel safety circuits and controlling as many as five output zones. You can configure this relay by selecting certified safety function blocks to rapidly build your applications. This relay is completely integrated with AllenBradley Logix controllers and can be configured using Studio 5000 Logix Designer® software or Connected Components Workbench software. The 440C-CR30 relay can share information with the control system through the optional EtherNet/IP plug in module which increases uptime and enables The Connected Enterprise.

Product selection

Step 01

- Select Configurable Relay

Relay Type	No. of Inputs	Type of Inputs	No. of Outputs	Catalogue No.
Software configurable	Up to 18	1 NC, 2 NC, 3 NC, 10 SSD, 20 SSD, 20 SSD, Mat, 2-hand control	Up to 10	440C-CR30-22BBB

Step 02

- Select Required Power Supply

Relay Type	No. of Inputs
M800 Power supply, 120/240VAC to 24VDC 1.6A	2080-PS120-240VAC

Step 03

User Manual

- Select Plug-in Modules

Plug in Modules

Description	Catalogue No.
Ethernet Plug-in Module, Slot 1 only	440C-ENET
8-pt Combo: 4-pt Digital Input, 12/24VDC, Sink/Source, Type3, and 4-pt Digital Output, 12/24VDC, Source	2080-IQ4OB4
4-pt Digital Input, 12/24VDC, Sink/Source, Type3	2080-IQ4
4-pt Digital Output, 12/24VDC, Source	2080-OB4
4-pt Relay Output, Individually Isolated, 2A	2080-OW4I
Project Backup and Restore module	2080-MEMBAK-RTC

Step 04

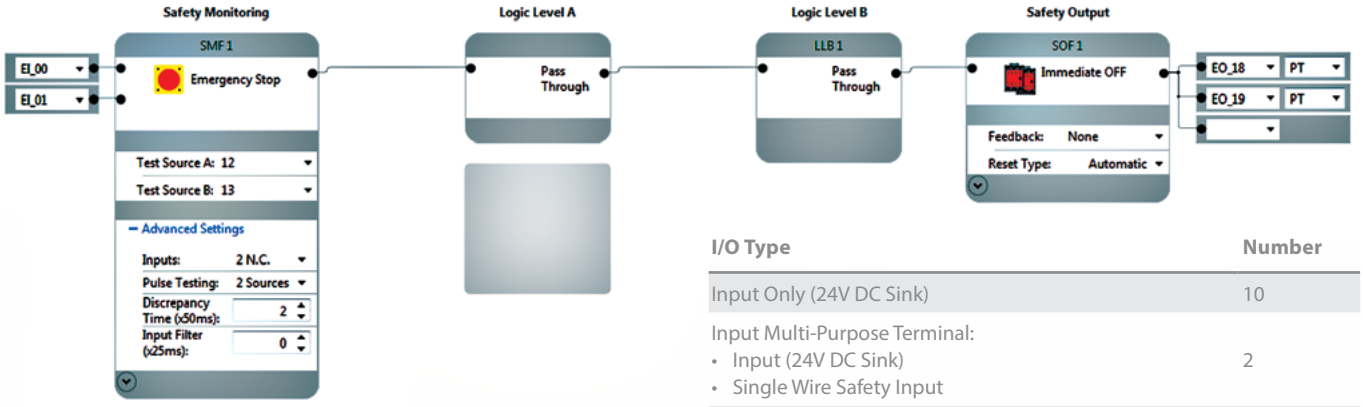
- Select optional accessories

Accessories

Description	Catalogue No.
8-pin mini DIN to 8-pin mini DIN 0.5 m (440C-CR30 to Micro830/850)	1761-CBL-AM00
8-pin mini DIN to 8-pin mini DIN 2 m (440C-CR30 to Micro830/850)	1761-CBL-HM02
8-pin mini DIN to 9-pin D shell 0.5 m (CR30 to PanelView Component)	1761-CBL-AP00
8-pin mini DIN to 9-pin D shell 2 m (CR30 to PanelView Component)	1761-CBL-PM02
Straight male RJ45 to straight male RJ45 ethernet patchcord, 8-conductor (4 pair), Cat 5e, TPE, 2m length	1585J-M8TBJM-2
Right angle male RJ45 to straight male RJ45 ethernet patchcord, 8-conductor (4 pair), Cat 5e, TPE, 2m length	1585J-M8TBJM-2
Left angle male RJ45 to straight male RJ45 ethernet patchcord, 8-conductor (4 pair), Cat 5e, TPE, 2m length	1585J-M8TBJM-2

Configuration with Connected Components Workbench

Standard Edition Free Software Download



I/O Type	Number
Input Only (24V DC Sink)	10
Input Multi-Purpose Terminal: • Input (24V DC Sink) • Single Wire Safety Input	2
Multi-Purpose Terminal: • Input (24V DC Sink) • Test Output • Output (24V DC Source)	6
Output Only (24V DC Source)	2
Output Multi-Purpose Terminal: • Output (24V DC Sink) • Single Wire Safety Output	2

MSR55P Back EMF Speed Monitoring Safety Relay

User Manual | Installation Instructions

Features

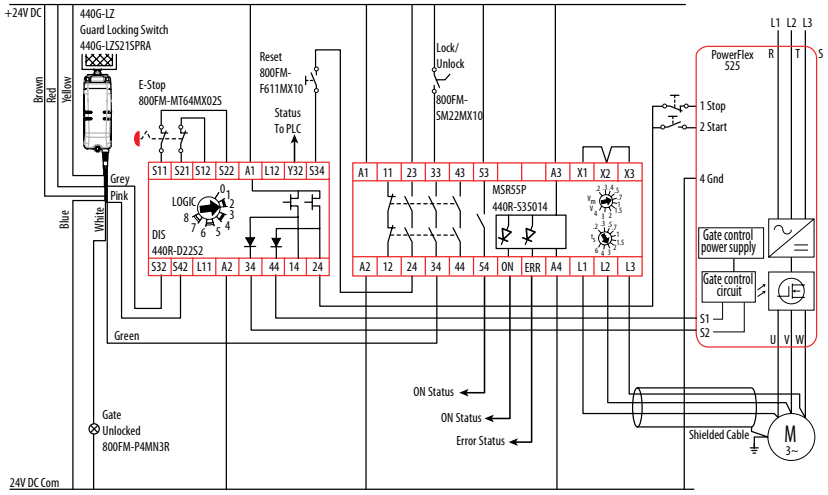
- Offers safe standstill detection on single and three phase motors
- Needs no external sensors
- Independent of direction
- Broken wire detection
- Provides 45mm housing

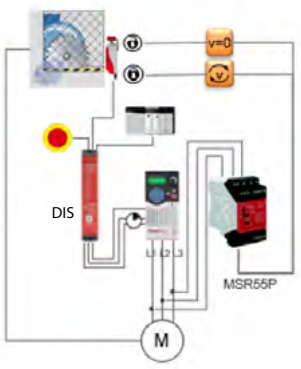
MSR55P Speed Monitoring Safety Relays are used for standstill detection on single and three phase motors without the need for sensors.

Specifications

Safety Rating	PLe, CAT4, SIL3
Enclosure Protection	IP40
Operating Temp	-25….+60 °C
Conductor Size	0.2…2.5mm

MSR55P safe motor feedback to safety logic device





A PowerFlex 525 drive controls the speed and direction of the motor. The MSR55P allows access to the hazard after the motor has achieved its standstill settings. The GSR DIS monitors the guard locking switch and the E-stop.

The DIS relay enables the drive to restart after the gate is closed, locked and the E-stop is released.

Product selection

Description	A1/A2 Voltage	Standstill Monitoring Voltage	Typical Applications	Catalogue No.
Back EMF monitoring relay, 45mm wide, 3 NO contacts, 1 NC contact AC 250 V, 3 status outputs (2 semiconductor and 1 NO contact)	24VDC	20…400 mV	Induction motors	440R-S35011
	24VDC	200 mV…4V	Servo motors (permanent magnet)	440R-S35014

Note: 110/240V AC versions available

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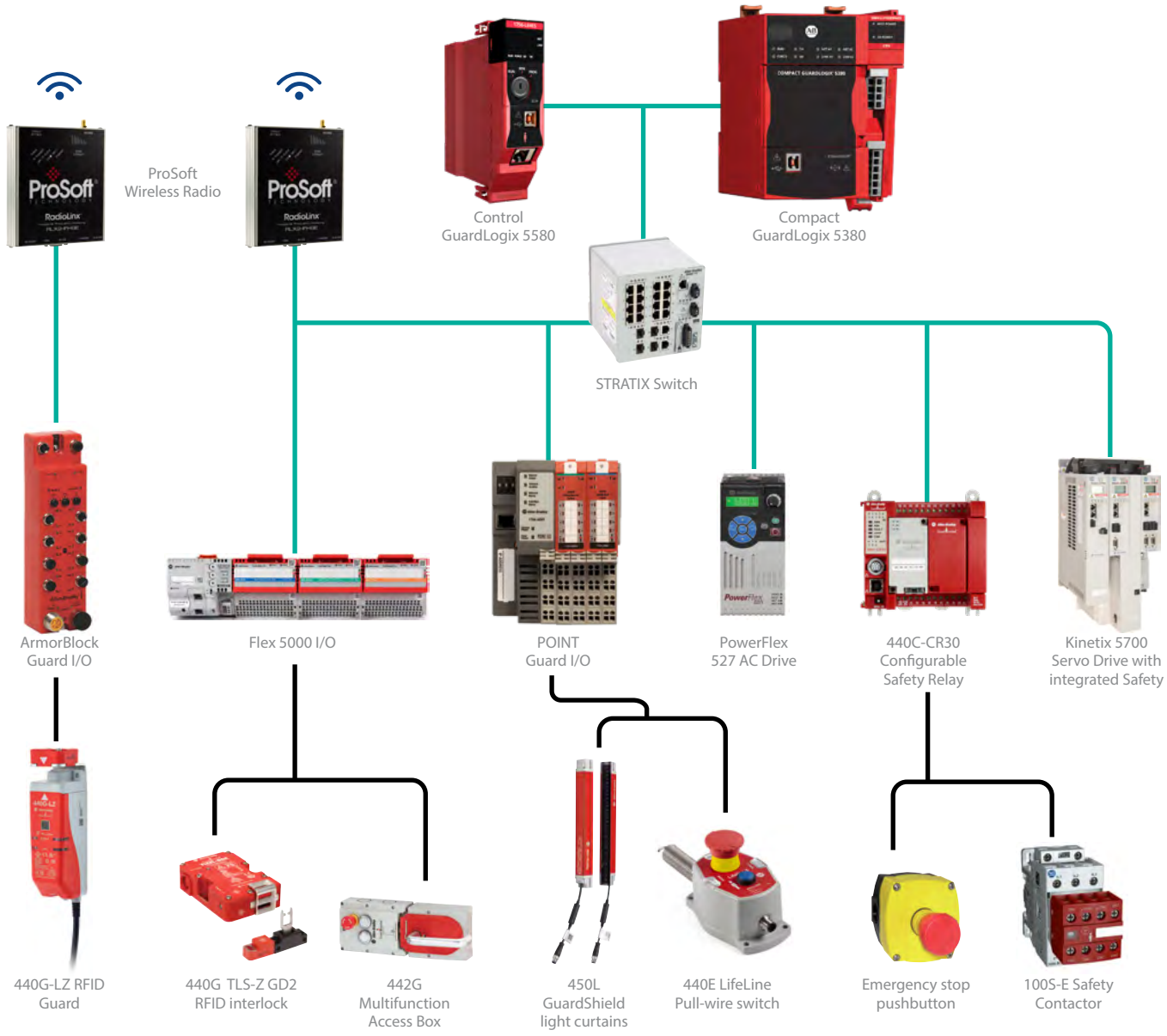
Safety PLCs



	Control GuardLogix 5580	Compact GuardLogix 5380
Overview	ControlLogix controllers are ideal for more demanding applications and can perform standard and safety control in the same chassis for a truly integrated system and leverage the high-availability and extreme environment capabilities to meet your application needs.	CompactLogix controllers are ideal for small to mid-size machines and provide the benefits of Integrated Architecture for lower-cost machines in both standard and safety options.
Built in Memory	Up to 40 MB GuardLogix: Up to 5 MB safety memory	Up to 10 MB Compact GuardLogix 5380 up to 5 MB safety memory
Motion Control	Up to 256 axes Integrated Motion EtherNet/IP	Up to 32 axes of Integrated Motion on EtherNet/IP
	Typical controller performance 32 axes/ms	Typical controller performance 32 axes/ms
Safety Level	SIL 2, PLd, Cat. 3	SIL 2, PLd, Cat. 3
	SIL 3, PLe, Cat. 4	SIL 3, PLe, Cat. 4
Language Support	Ladder Logic, Structured Text, Function Block, Sequential Function Chart	
Communications	Embedded USB and 1 Gb Ethernet port	• Embedded USB and Ethernet with DLR/Dual IP • 1 Gb Ethernet port
Environmental	0-60 °C	0-60 °C

Compact GuardLogix 5380 Safety Controllers

Features

- Achieve up to SIL 2/PLd with 1oo1 architecture or up to SIL 3/PLe with 1oo2 architecture
- Offer standard memory options from 0.6…10 MB
- Offer safety memory options from 0.3…5 MB
- Offer 1 gigabit (Gb) embedded Ethernet port
- Support communication options for up to 180 EtherNet/IP nodes
- Offer conformal coated options for harsh environments
- Provide single controller/software/network for standard and safety control
- Ability to mix and match safety and standard I/O
- Provide integrated safety functions with drives and motion

Manufacturers are continually looking for control solutions that adhere to the latest global safety standards while dealing with competitive pressures to reduce costs and improve productivity. As the latest addition to the CompactLogix 5380 family of controllers, the Compact GuardLogix 5380 delivers scalable options for high performance, integrated safety in standard and conformally coated formats.

Greatness of CompactLogix 5380

+

Integrated with safety

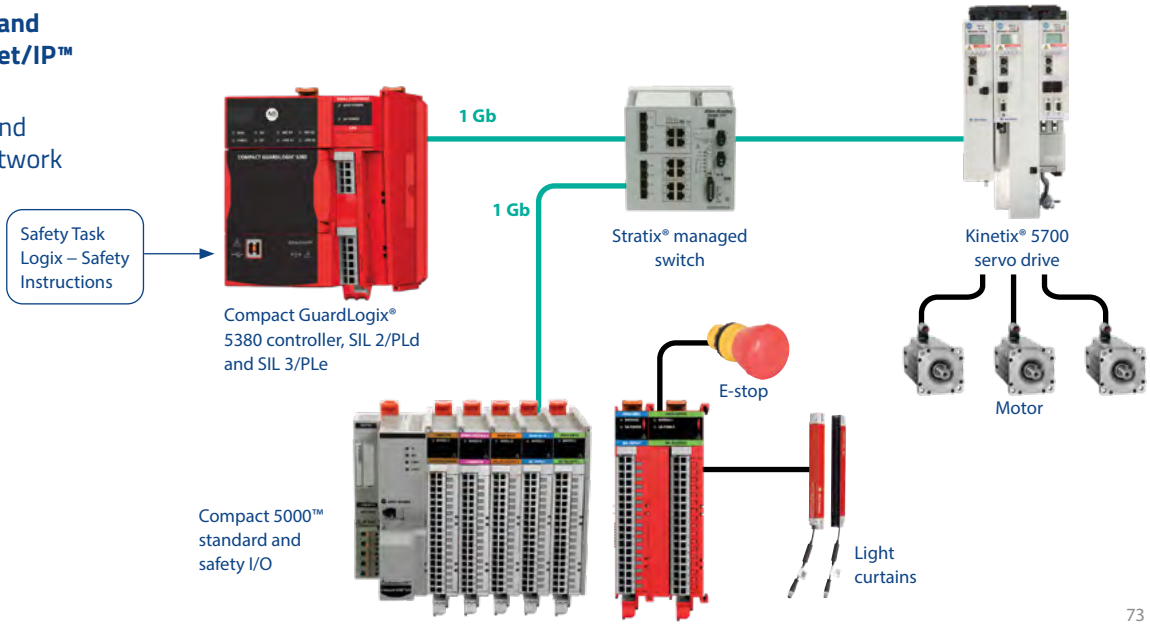
=

Compact GuardLogix® 5380 SIL 2

Compact GuardLogix® 5380 SIL 3

Integrated motion and safety over EtherNet/IP™

Simplifying multi-disciplined design and control with one network



Product selection
Step 01

- Select Compact GuardLogix Controller

5069-L306ERS2

Compact GuardLogix 5380 SIL2 controller

Installation Instructions

Catalogue Number*	Memory Size		I/O Expansion	Motion Axes	EtherNet/IP Nodes
	Standard	Safety			
5069-L306ERS2	0.6 MB	0.3 MB	8	-	16
5069-L306ERMS2	0.6 MB	0.3 MB	8	2	16
5069-L310ERS2	1 MB	0.5 MB	8	-	24
5069-L310ERMS2	1 MB	0.5 MB	8	4	24
5069-L320ERS2*	2 MB	1 MB	16	-	40
5069-L320ERMS2*	2 MB	1 MB	16	8	40
5069-L330ERS2*	3 MB	1.5 MB	31	-	60
5069-L330ERMS2*	3 MB	1.5 MB	31	16	60
5069-L340ERS2	4 MB	2 MB	31	-	90
5069-L340ERMS2	4 MB	2 MB	31	20	90
5069-L350ERS2*	5 MB	2.5 MB	31	-	120
5069-L350ERMS2*	5 MB	2.5 MB	31	24	120
5069-L380ERS2	8 MB	4 MB	31	-	150
5069-L380ERMS2	8 MB	4 MB	31	28	150
5069-L3100ERS2	10 MB	5 MB	31	-	180
5069-L3100ERMS2	10 MB	5 MB	31	32	180

*Conformally Coated options available by adding 'K' to the end of catalogue number

5069-L306ERMS3

Compact GuardLogix 5380 SIL3 controller

Installation Instructions

Catalogue Number*	Memory Size		I/O Expansion	Motion Axes	EtherNet/IP Nodes
	Standard	Safety			
5069-L306ERMS3	0.6 MB	0.3 MB	8	2	16
5069-L310ERMS3	1 MB	0.5 MB	8	4	24
5069-L320ERMS3*	2 MB	1 MB	16	8	40
5069-L330ERMS3*	3 MB	1.5 MB	31	16	60
5069-L340ERMS3	4 MB	2 MB	31	20	90
5069-L350ERMS3*	5 MB	2.5 MB	31	24	120
5069-L380ERMS3	8 MB	4 MB	31	28	150
5069-L3100ERMS3	10 MB	5 MB	31	32	180

*Conformally Coated options available by adding 'K' to the end of catalogue number

Step 02

- Select required Power Terminal

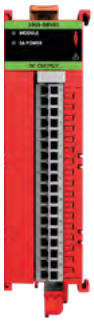
Power Terminal

Description	Catalogue No.
5069 Compact I/O Power Terminal RTB kit (4 & 6 Pin) Screw	5069-RTB64-SCREW
5069 Compact I/O Power Terminal RTB kit (4 & 6 Pin) Spring	5069-RTB64-SPRING

Step 03

- Select optional Chassis I/O

5069-IB8S



5069-OBV8S

Compact 5000 Chassis Based I/O Safety Modules

Step 03a Catalogue No.	Description	Step 03b Terminal Block
5069-IB8S*	18…32V DC 8-point, safety sinking input module	5069-RTB18-SPRING 5069-RTB18-SCREW
5069-OBV8S*	18…32V DC 8-point, safety output module that can be used as a Bipolar output module or sourcing output module	

* Conformally Coated options available by adding 'K' to the end of catalogue number.
Note: For distributed in cabinet Safety I/O see page 78

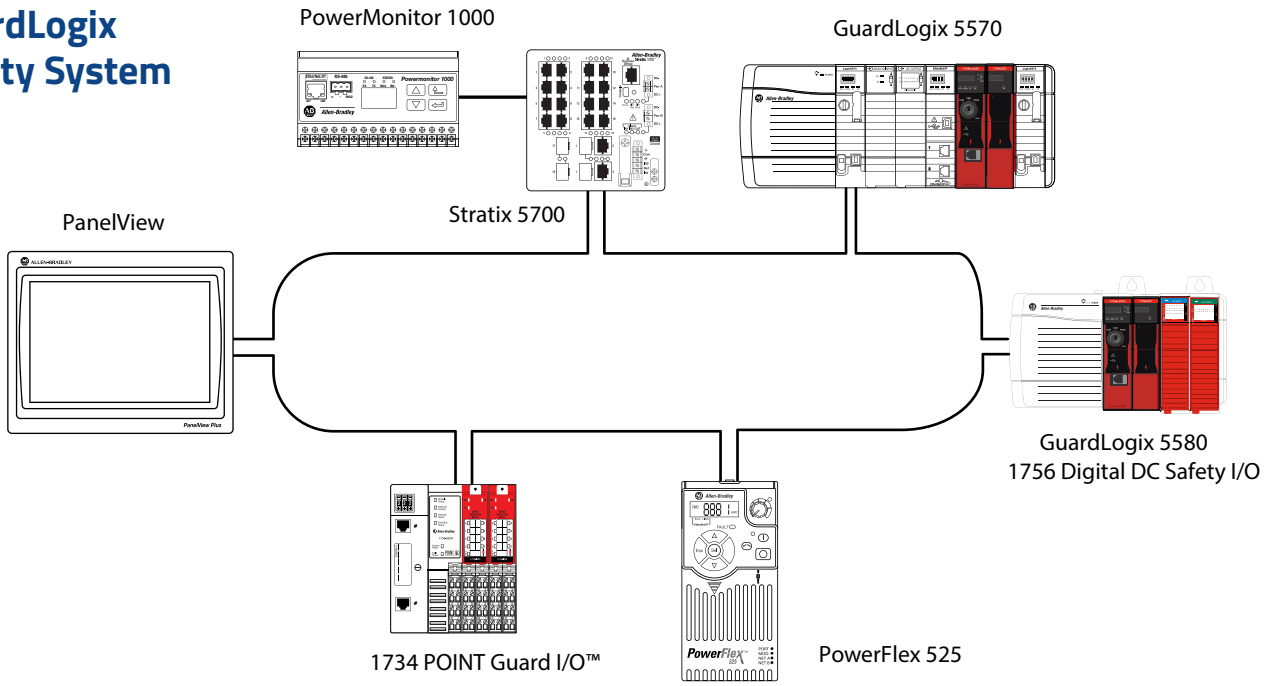
Control GuardLogix 5580 Safety Controllers

Features

User Manual | Installation Instructions

- Achieves SIL CL 2 / PLd with primary controller
- Achieves SIL CL 3 / PLE with primary controller plus safety partner
- Optimized for faster safety reaction time to achieving protective device coverage and reducing the risk of injury
- Offers Standard memory options from 3...20 MB
- Offers safety memory options from 1.5...6 MB
- Offers communication options from 100...250 EtherNet/IP nodes
- Offers conformal coated options for harsh environments
- Provides single controller/software/network for standard and safety control
- Includes mix and match safety and standard I/O
- Provides networked safety functions with motion and the following drives: Kinetix® 5700 with Advanced Safety and PowerFlex® 755 with Advanced Safety

GuardLogix Safety System



The Allen-Bradley GuardLogix® 5580 controllers provide increased performance, capacity, productivity, and security to help meet the growing demands of smart machines and equipment for manufacturing. These controllers use the Studio 5000® design environment as the standard framework that optimizes productivity, reduces time to commission. This framework manages Integrated Motion over EtherNet/IP for high-speed motion applications and SIL2/PLd and SIL3/PLe safety solutions. These controllers are ideal for applications that require high-performance communications, I/O, and motion control for up to 256 axes.

Product selection

Step 01

- Select GuardLogix Controller

1756-L84ES

GuardLogix Controller

GuardLogix 5580 Controllers	Memory Size		Safety Communication options	Network connections, per network module	EtherNet/IP nodes supported, max*
	Standard	Safety			
1756-L81ES	3 MB	1.5 MB	EtherNet/IP ControlNet DeviceNet	Not Applicable	100
1756-L82ES	5 MB	2.5 MB			175
1756-L83ES	10 MB	5 MB			250
1756-L84ES	20 MB	6 MB			250

Note: A node is an EtherNet/IP device that you add directly to the I/O configuration, and counts toward the node limits of the controller.

Step 02

- Select optional Safety Partner if SIL 3 is required

1756-L8SP

Safety Partner

Description	Catalogue No.
Safety Partner for SIL3 applications	1756-L8SP

Note: In SIL 3 applications, one safety partner is required for each GuardLogix 5580 controller

Step 03

User Manual

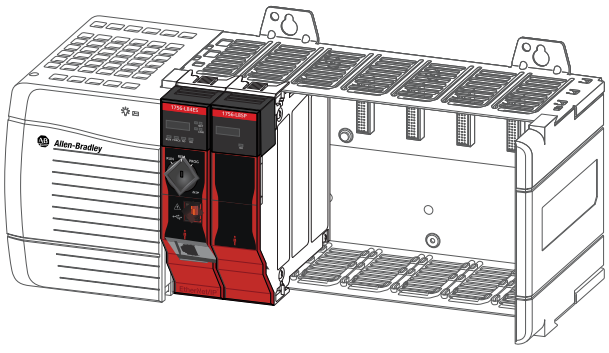
- Select Required Chassis based I/O

1756-TBS6HS

ControlLogix Chassis Based I/O Safety Modules

Step 03a Module base	Description	Step 03b Removable Terminal Block
1756-IB16S	10…32V DC 16-channels, safety sinking input module (36Pin)	1756-TBCHS (screw) 1756-TBS6HS (spring)
1756-OBV8S	18…32V DC 8-point, safety output module (20Pin)	1756-TBNHS (screw) 1756-TBSHS (spring)

Note: 1756-IB16S and 1756-OBV8S modules are only compatible with GuardLogix 5580 controllers as local or remote I/O, and Compact GuardLogix 5380 controllers as remote I/O.
1756-IB16S and 1756-OBV8S modules are only compatible with a 1756 ControlLogix Chassis, Series C.



Note: To use the controller, a chassis and power supply are required. The GuardLogix 5580 controllers are compatible with these chassis and power supplies.

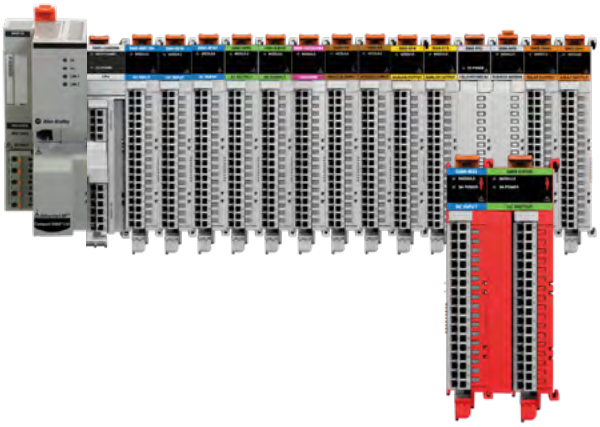
Chassis, Series C and Series B: 1756-A**
Power Supply, Standard : 1756-P***
Power Supply, Redundant: 1756-P***"

In Cabinet Modular Safety Distributed I/O Modules




	Compact 5000	Flex 5000	Point	ArmorBlock
Overview	Machine Focus. The Compact 5000 I/O platform offers high performance communication in a compact design and includes SIL-rated safety modules.	Disrtibuted and Harsh Duty Focus. The FLEX 5000 I/O is a flexible and reliable I/O solution that is modular and easy to install. It is also designed for use in extreme or hazardous environments, and includes fail-safe SIL 3 rated Safety modules.	Ideal for applications requiring flexibility and low-cost of ownership. Granularity of 1 to 8 points lets you buy only the I/O you need. The compact design makes installation easier in limited panel space. POINT I/O is the only IP20-rated modular I/O solution compliant with ODVA requirements for Linear, Star and Ring EtherNet/IP architectures.	ArmorBlock I/O Modules are low-cost, hardened I/O that can be mounted on machines to help reduce wiring cost and enable easier maintenance. ArmorBlock I/O can be used for automotive, material handling and packaging applications or for machinery applications where diagnostics and local control are not needed
I/O Types Offered	**Digital** • 4 to 16 points per module • Offers a variety of AC and DC V. • Include contact output modules • Isolated and non-isolated modules • Enhanced built-in capabilties; event triggers, simple counter, time stamping, schedule output **Analog** • Universal analog input modules • Analog output modules • High resolution fast conversion rates **Specialty** • Serial communication • Address reserve, high speed counter, field power distribution **Safety** • Safety digital input module single-channel PLd, dual-channel PLe • Configurable safety output module (sourcing/bipolar) Sourcing Mode: single channel PLe, dual channel PLe, Bipolar Mode: PLe	**Digital** • 16-point input and output modules - High current output module - 8-channel relay output module **Analog** • 8-channel analog input module supporting Voltage, Current, RTD, and TC inputs • 8-channel input/output **Safety** • 16-point digital input and output modules • 4-point isolated relay output module	**Digital** • Input, output, and relay output modules • Wide variety of voltages Analog • Up to eight single inputs or outputs per module • 4-channel input/output • Thermocouple and RTD modules **Specialty** • Counter and encoder modules • Serial synchronous interface Absolute Encoder module • Serial interface modules • Address Reserve Module (ARM) • IO-Link master module POINT Guard I/O **Safety** • Digital input, digital output, and analog input modules and bipolar output modules • TUV-certified for functional safety up to and including SIL 3, Cat. 4, PLe • Can be used side-by-side in a standard POINT I/O system	**ArmorBlock I/O** • Input, output and combination modules, up to 16 points per block • Available with CIP Sync • 4-point analog, thermocouple and RTD I/O blocks • Supports connection to IO-Link devices with IO-Link master module • Available with Quick Connect • IP69K **Armor WeldBlock** • 16-points • Resists the effects of weld slag and magnetic fields • Aluminum metal housing **ArmorBlock Guard I/O Safety** • 16-point combined I/O blocks • PLd-rated, single channel safety inputs • PLe-rated, dual channel, safety inputs • Safety outputs rated up to PLe • Dual IP65 and IP67 ratings
Communications	Local chassis CompactLogix 5380 CompactLogix 5480 controllers Distributed on EtherNet/IP to ControlLogix 5580 controller	Distributed on EtherNet/IP to CompactLogix 5380, CompactLogix 5480 or ControlLogix 5580 controllers	EtherNet/IP, ControlNet, DeviceNet, PROFIBUS DP	DeviceNet or EtherNet/IP

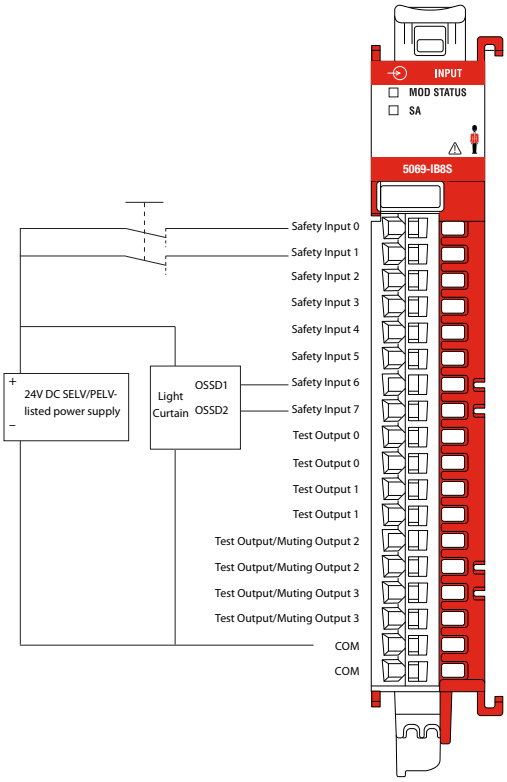
Compact 5000 Safety I/O Modules

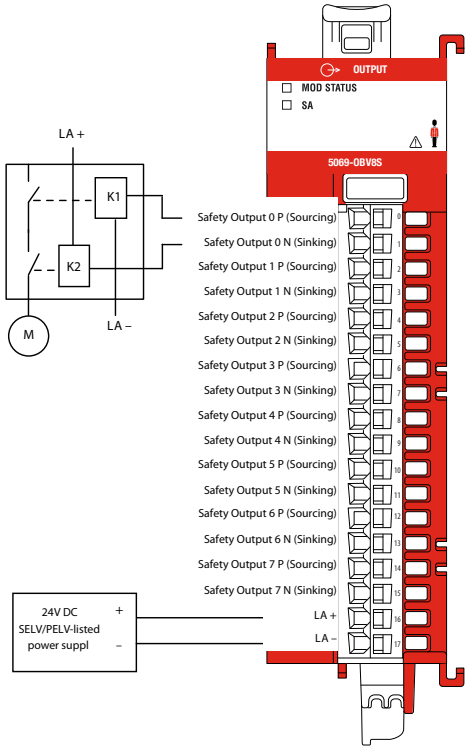


Features

Technical Data

- Provide a local safety connectivity to the Compact GuardLogix 5380
- Provide distributed I/O to the Compact GuardLogix 5380 and GuardLogix 5580, which is accessible via a 5069-AEN2TR or 5069-AENTR over an EtherNet/IP
- Support up to 31 I/O modules per controller or adapter
- Provide faster safety reaction time
- Provide enhanced diagnostics information
- Rated up to SIL3/PLe





Product selection Step 01

- For remote compact 5000 I/O select Slim EhterNet/IP Adaptor

User Manual

Safety Partner

Step 01a Catalogue No.	Description	Step 01b Removable Terminal Block
5069-AENTR*	Dual-Port Ethernet/IP Adaptor	5069-RTB5-SPRING 5069-RTB5-SCREW

Step 02

- Select Safety I/O

Safety I/O

Step 02a Catalogue No.	Description	Step 02b Removable Terminal Block
5069-IB8S*	18…32V DC 8-point, safety sinking input module	
5069-OBV8S*	18…32V DC 8-point, safety output module that can be used as a Bipolar output module or sourcing output module	5069-RTB18-SPRING 5069-RTB18-SCREW

* Conformally Coated options available by adding 'K' to the end of catalogue number.

Flex 5000 Safety I/O Modules

Features

User Manual | Technical Data

- Offers true integrated safety with discrete fail-safe I/O modules, TÜV certified up to SIL 3/PLe/Cat. 4
- Enhances communication with 1 Gb EtherNet/IP connectivity through copper or fiber, with SFP adapters
- Supports a wide range of network topologies: DLR, Star, Linear and PRP
- Allows users to replace modules while system is in operation with easy snap-on installation via Removal and Insertion Under Power (RIUP)
- Offers flexible and modular capability to support up to 32-channel digital and 8-channel analog input/output
- -40…70 °C temperatures and in hazardous areas in Class I, Division 2, Zone 2, Groups A, B, C,D
- Allows for use in extreme environments with XT version up to G3 with conformal coating
- Functions as remote I/O modules with ControlLogix 5580, CompactLogix 5380/5480 controllers-
- Supports ControlLogix 5580 controller redundancy for high availability applications from Studio 5000 application, V33 or later

Product selection Step 01

- Select Adaptor

5094-AENSFPR

Adaptor

Description	Catalogue No.	
	Non-Extreme Environment	Extreme Environment (XT)
EtherNet/IP adapter, 2 RJ45 ports, up to 8 FLEX I/O modules	5094-AENTR	5094-AENTRXT
EtherNet/IP adapter, 2 RJ45 ports, up to 16 FLEX I/O modules	5094-AEN2TR	5094-AEN2TRXT
EtherNet/IP adapter, 2 SFP slots, up to 8 FLEX I/O modules*	5094-AENSFPR	5094-AENSFPRXT
EtherNet/IP adapter, 2 SFP slots, up to 16 FLEX I/O modules*	5094-AEN2SFPR	5094-AEN2SFPRXT

*Small form factor pluggable (SFP) transceivers sold separately

Step 02

- Select Mounting Base and Terminal Block

5094-MB

5094-RTB3T

02a Mounting Base

Description	Catalogue No.	
	Non-Extreme Environment	Extreme Environment (XT)
Mounting base	5094-MB	5094-MBXT

02b Terminal Block

Removable terminal block spring	5094-RTB3S	5094-RTB3SXT
Removable CJC terminal block screw	5094-RTB3T	5094-RTB3TXT
Removable relay terminal block screw	5094-RTB3W	5094-RTB3WXT
Removable isolated terminal block screw	5094-RTB3I	5094-RTB3IXT

Step 03

- Select Safety I/O Module

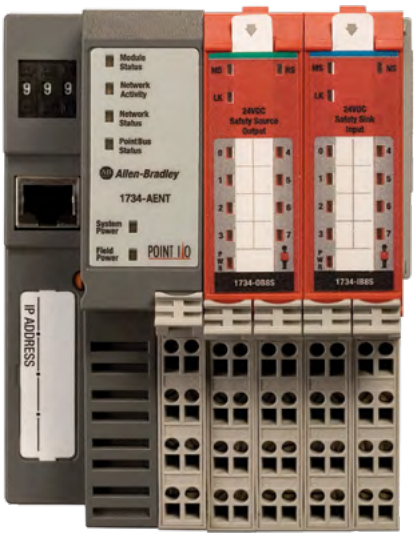
5094-OB16S

Safety I/O Module

Description	Catalogue No.	
	Non-Extreme Environment	Extreme Environment (XT)
Safety digital 16 input 24V DC	5094-IB16S	5094-IB16SXT
Safety digital 16 output 24V DC	5094-OB16S	5094-OB16SXT
Safety relay 4 output isolated	5094-OW4IS	5094-OW4ISXT
Safety analog 4 input isolated HART	5094-IF4IHS	5094-IF4IHSXT
Safety analog 4 output isolated HART	5094-OF4IHS	5094-OF4IHSXT
Safety analog 8 input RTD/TC	5094-IRT8S	5094-IRT8SXT
Safety frequency 2 input isolated	5094-IJ2IS	5094-IJ2ISXT

Point Guard Safety I/O Modules

User Manual



Product selection Step 01

- Select Adaptor

1734-AENTR

Adaptor

Description	Catalogue No.
24V DC EtherNet/IP Adapter	1734-AENT
24V DC Dual Port Ethernet/IP Adapter	1734-AENTR

Features

- For use with standard POINT I/O system
- Communicates by using the CIP Safety protocol over EtherNet/IP for Compact GuardLogix or GuardLogix controllers
- For EtherNet/IP connectivity, use a POINT I/O EtherNet/IP adapter (1734-AENT, 1734-AENTR)
- Supports 24V DC I/O circuits
- Includes analog input circuits

Step 02

- Select Point Guard I/O Safety Module

1734-IE4S

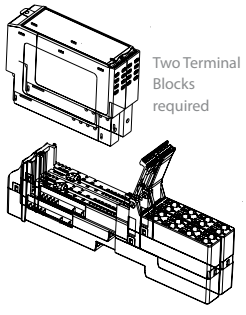
Point Guard I/O Safety Module

Description	Catalogue No.
Safety IO 8 Digital Input (Compatible with terminal bases with 8 terminations)	1734-IB8S
Safety IO 4 Analog Input (Compatible with terminal bases with 12 terminations)	1734-IE4S
Safety IO 8 Digital Output (Compatible with terminal bases with 8 terminations)	1734-OB8S
Safety IO 2 Digital Output	1734-OBV2S

Step 03

- Select Terminal Block and Base

1734-TB



Terminal Block and Base

Description	Catalogue No.
Point I/O One-Piece Terminal Base With Screw Clamp, 8 Terminations	1734-TOP
Point I/O One-Piece Terminal Base With Spring Clamp, 8 Terminations	1734-TOPS
Module Bases with Removable IEC Screw Terminals, 8 Terminations	1734-TB
Module Bases with Removable IEC Spring Terminals, 8 Terminations	1734-TBS

Note: Two Terminal Blocks and bases must be selected for Safety I/O Modules(Step 02)

ArmorBlock Safety I/O Modules

Features

User Manual | Installation Instructions

- Used only with GuardLogix®, Compact GuardLogix, and Armor™ GuardLogix, configurable with a module-specific profile in Studio 5000 Logix Designer® software
- Provides PLd-rated, single channel safety inputs and PLe-rated, dual channel, safety inputs; safety outputs rated up to PLe
- Available in bipolar and sourcing safety output configurations
- Includes dual Ethernet ports for Linear and Device Level Ring topologies
- Provides rotary switches to set the IP address
- Mounts on the machine with an IP67-rated package for dust and wash-down protection
- Provides standardized M12 connectors to wire your field devices

Product selection Step 01

- Select ArmorBlock Guard I/O

1732ES-IB8XOB8

ArmorBlock Guard I/O

Description	Catalogue No.
24V DC, 16-Input EtherNet/IP Safety	1732ES-IB16
24V DC, 8-Input/8-Sourcing Out EtherNet/IP Safety	1732ES-IB8XOB8
24V DC, 8-Input/4-Bipolar Pair Out EtherNet/IP Safety	1732ES-IB8XOBV4
24V DC, 12-Input/2-Bipolar Pair Out EtherNet/IP Safety	1732ES-IB12XOBV2
24V DC, 12-Input/4-Sourcing Out EtherNet/IP Safety	1732ES-IB12XOB4

Step 02

- Select Mating Cable

889D-F5ACDM-*

Mating Cables

Description	Catalogue No.
Patchcord (Double-Ended), Straight 5-Pin Micro Female to Straight 5-Pin Micro Male	889D-F5ACDM-*

Note: Replace * with 1 (1m), 2 (2m), 5 (5m), 10 (10m) for required length

Step 03

- Select Network Connection

Network Connection

Description	Catalogue No.
M12 to RJ45 Patchcord, Unshielded Twisted Pair, TPE Cable	1585D-M4TBJM-*
M12 to RJ45 Patchcord, Shielded - Braided with Foil shielded, PUR Cable	1585D-M4UBJM-*

Note: Replace * with 1 (1m), 2 (2m), 5 (5m), 10 (10m) for required length

Step 04

- Select Auxiliary Power

889N-F4AFNM-*

Auxiliary Power

Description	Catalogue No.
Thick Round Patchcord, Straight 4-Pin Mini Female to Straight Mini Male	889N-F4AFNM-*

Note: Replace * with 1 (1m), 2 (2m), 5 (5m), 10 (10m) for required length

CIP Safety Ethernet/IP Absolute Encoders 843ES

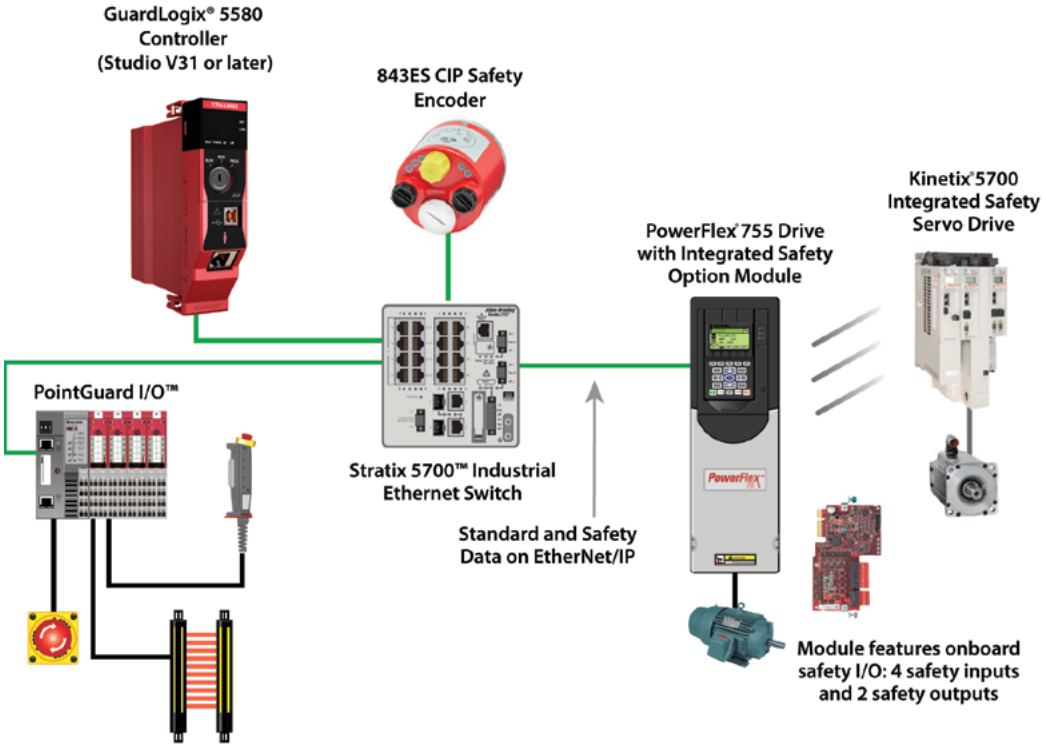
Features

User Manual | Installation Instructions

- Offers 15-bit single-turn safety resolution and 27-bit multi-turn safety resolution
- Offers 18-bit single-turn standard resolution and 30-bit multi-turn standard resolution
- Features feather key solid shaft to prevent relative rotation
- Blind-hollow shaft available with stator coupling
- Offers clamping, synchro, and square flange options for solid shaft
- Includes dual Ethernet ports to support linear and Device Level Ring topologies

Designed for safety applications that require speed, direction, or position monitoring safety functions. These encoders support the GuardLogix controller-based safety functions, in the Studio 5000 Logix Designer application. By providing auxiliary feedback directly through an EtherNet/IP network on CIP Safety, it makes it easier to achieve the desired safety integrity or performance level by reducing the number of components needed and utilizing the already available advanced drive safety instructions.

Integrated Safety Solutions for AC and Servo Drives



Specifications

Safety Rating	CAT3, SIL3, PLe
Communication Rate	10/100 Mbit/s Studio 5000 Logix Designer v31 or later
Code Direction	CW or CCW programmable
Operating Voltage Range	10…30VDC(±5%)
No. of Revolutions, Max.	4096 turns (12 bit)
Rotational Speed, max	9000 RPM, max (<10 min)
	6000 RPM (typical operation)

Housing Material	Aluminum
Shaft Material	Stainless Steel
Operating Temperature	-40…+100°C
Enclosure Type Rating	IP67
CIP Safety	ODVA CIP Volume 5
Shaft Loading	80 N (17.9 lb) radial
	40 N (9 lb) axial

Note: A GuardLogix 5580/Compact GuardLogix 5380 safety controller is required for integrated safety control.

Product selection

Solid shaft with Synchro flange

Hollow shaft

Solid shaft with square flange

Solid shaft with clamping flange

Step 01

Number of Turns

Code	Description
M	Multi Turn (4096 turns)
S	Single Turn (1 turn)

Step 02

Shaft

Code	Description
7	Hollow shaft 9.52 mm (3/8 in.)
8	Hollow shaft 10 mm (0.39 in.)
9	Hollow shaft 12 mm (0.47 in.)
10	Hollow shaft 12.7 mm (1/2 in.)
11	Hollow shaft 14 mm (0.55 in.)
12	Hollow shaft 15 mm (0.59 in.)
14	Solid shaft 10 mm (0.39 in) with key
15	Solid shaft 12 mm (0.47 in.) with key
16	Solid shaft 9.52 mm (3/8 in.) with key

Step 03

Flange

Code	Description
1	Clamping flange 58 mm (2.28 in.)
4	Synchro flange 58 mm (2.28 in.)
6	Diameter flange 63 mm (2.48 in.)
7	Square flange 63.5 mm (2.5 in.)

Step 04

- Select encoder catalogue number

843ES	M	IP	7	BA	6
	Step 01		Step 02		Step 03
Example	Multi-Turn		Hollow Shaft 9.52mm		Diameter Flange 63mm

Step 05

- Select Required Power Cable

889D-F4ECDM-2

Power Cable

First End Connector	Second End Connector	Cable Type	Catalogue No.
Straight Female	Straight Male	Braided shield 22 AWG 4-pin M12 Yellow	889D-F4ECDM-*
Straight Female	Right Angle Male		889D-F4ECDE-*
Right Angle Female	Straight Male		889D-R4ECDM-*
Right Angle Female	Right Angle Male		889D-R4ECDE-*
Straight Female	Flying leads		889D-F4EC-*
Right Angle Female	Flying leads		889D-R4EC-*
Straight Female	Straight Male	Foil and braided shield 22 AWG 4-pin M12 Yellow	889D-F4FCDM-*
Straight Female	Right Angle Male		889D-F4FCDE-*
Right Angle Female	Straight Male		889D-R4FCDM-*
Right Angle Female	Right Angle Male		889D-R4FCDE-*
Straight Female	Flying leads		889D-F4FC-*
Right Angle Female	Flying leads		889D-R4FC-*

Note: Replace * with 0M3(.3m), 0M6(.6m), 1(1m), 2(2m), 5(5m), 10(10m), 15(15m), 20(20m), 30(30m)

Step 06

- Select Required Ethernet Cables

1585D-M4TBJM-2

Ethernet Cable

First End Connector	Second End Connector	Cable Type	Catalogue No.
Male M12 D-Code, straight	Flying leads	Foil and braided shield, 4 conductor, teal PUR, flex rated, halogen-free	1585D-M4UBDM-*
Male M12 D-Code, straight	Male M12 D-Code, straight		1585D-M4UBM-*
Male M12 D-Code, right angle	Male M12 D-Code, right angle		1585D-E4UBDE-*
Male M12 D-Code, straight	Male M12 D-Code, right angle		1585D-M4UBDE-*
Male M12 D-Code, straight	Female M12 D-Code, straight		1585D-M4UBDF-*
Male M12 D-Code	RJ45		1585D-M4UBJM-*

Note: Replace * with 0M3(.3m), 0M6(.6m), 1(1m), 2(2m), 3(3m), 5(5m), 10(10m), 15(15m), 20(20m), 30(30m)

EtherNet/IP Absolute Encoders 842E

Features

User Manual | Installation Instructions

- Single-turn 18-bit resolution and multi-turn 30-bit resolution
- Supports endless shaft functionality
- Dual Ethernet ports to support linear and Device Level Ring topologies 842E EtherNet/IP Absolute Encoders
- Includes dual Ethernet ports to support linear and Device Level Ring topologies 842E-CM Integrated Motion on EtherNet/IP Absolute Encoders
- Supports integrated motion on EtherNet/IP as a feedback only axis

Product selection

Step 01

Encoder Type

Code	Description
842E-CM	CIP Motion

Step 02

Number of turns

Code	Description
S	Single Turn (1 turn)
M	Multi Turn (4096 turns)

Step 03

Shaft

Code	Description
1	Solid Shaft 3/8 in.
2	Solid shaft 3/8 in. with flat
3	Solid shaft 10 mm
4	Solid shaft 10 mm with flat
5	Hollow shaft 1/4 in.
6	Hollow shaft 8 mm
7	Hollow shaft 3/8 in
8	Hollow shaft 10 mm
9	Hollow shaft 12 mm
10	Hollow shaft 1/2 in
11	Hollow shaft 14 mm
12	Hollow shaft 15 mm

Step 04

- Select encoder catalogue number

	842E-CM	M	IP	12	BA
	Step 01	Step 02		Step 03	
Example	CIP Motion	Multi-Turn		Hollow Shaft 15mm	

Step 05

- Select Power Cable Required

889D-F4ACDM-2

Power Cable

Female First End Connector	Male Second End Connector	Cable	Yellow PVC Cable Unshielded
Straight Female	Flying Lead	4 Pin M12	889D-F4AC-*
	Straight Male		889D-F4ACDM-**
	Right Angle Male		889D-F4ACDE-**
Right Angle Female	Flying Lead		889D-R4AC-*
	Straight Male		889D-R4ACDM-**
	Right Angle Male		889D-R4ACDE-**

Note: Replace * with 0M3(.3m), 2(2m), 5(5m), 10(10m), 15(15m), 20(20m), 30(30m)
Replace ** with 0M3(.3m), 0M6(.6m), 1(1m), 2(2m), 5(5m), 10(10m), 15(15m), 20, (20m), 30(30m)

Step 06

- Select Ethernet Cable Required

1585D-M4TBJM-2

Ethernet Cable

First End Connector	Second End Connector	Cable	Teal Unshielded
Straight Male	Flying Lead	4 Pin M12	1585D-M4TB-*
	Straight Male		1585D-M4TBDM-*
	Female Straight		1585D-M4TBDF-*
	Right Angle Male		1585D-M4TBDE-*
	RJ45		1585D-M4TBJM-*
Right Angle Male	Right Angle Male		1585D-E4TBDE-*

Note: Replace * with 0M15(.15m), 0M2(.2m) 0M3(.3m), 0M6(.6m), 1(1m), 2(2m), 3(3m), 4(4m), 5(5m), 10(10m), 15(15m), 20, (20m), 30(30m), 40(40m)

Step 07

- Select Accessories

845-FC-T-T

Accessories

Description	Catalogue No.
3/8inch .. 3/8inch Flexible Coupling (32mm length)	845-FC-B-B
10mm ... 10mm Flexible Coupling (32mm length)	845-FC-T-T

Note: For diifferent size Couplings replace the last two letters in catalogue number with A(1/4Inch), B(3/8Inch), R(6mm), T(10mm).
Example: 845-FC-A-B 1/4inch … 3/8inch Flexible Coupling (32mm length)

EtherNet/IP Absolute Encoders 843E

Features

User Manual | Installation Instructions

- Single-turn 18-bit resolution and multi-turn 30-bit resolution
- Supports endless shaft functionality
- Dual Ethernet ports to support linear and Device Level Ring topologies 843E EtherNet/IP Absolute Encoders
- Automatic diagnostics available from version 33 Studio 5000, enabling information sent to FatoryTalk version 12 display without additional programing

Solid Shaft
Clamping Flange

Solid Shaft
Square Flange

Solid Shaft
Synchro Flange

Hollow Shaft
Stator Coupling

Hollow Shaft Flange
150mm Torque Arm

Step 01

Number of Turns

Code	Description
M	Multi Turn (4096 turns)
S	Single Turn (1 turn)

Step 02

Shaft

Code	Description
2	Solid shaft with flat, 3/8"
4	Solid shaft w/flat, 10 mm (.39in)
5	Hollow shaft, 1/4"
6	Hollow shaft, 8 mm (0.31in.)
7	Hollow shaft, 3/8"
8	Hollow shaft 10 mm (0.39 in.)
9	Hollow shaft 12 mm (0.47 in.)
10	Hollow shaft, 1/2"
11	Hollow shaft, 14 mm (0.55in)
12	Hollow shaft 15 mm (0.59 in.)
13	Solid shaft w/flat, 6 mm (0.27in.)
17	Solid shaft w/flat, 12 mm (0.47in.)

Step 03

Flange

Code	Description
1	Clamping flange 58 mm (2.28 in.)
2	Flange w/spring element 150 mm
4	Synchro flange 58 mm (2.28 in.)
6	Diameter flange 63 mm (2.48 in.)
7	Square flange 63.5 mm (2.5 in.)

Step 04

- Select encoder catalogue number

843E	M	IP	7	BA	6
Example	Step 01		Step 02		Step 03*
			Hollow Shaft, 3/8"		Diameter Flange 63mm

Note: * Add 'C' to end of catalogue number for 'Nano Coating'

Step 05

- Select Required Power Cable

889D-F4ECDM-2

Power Cable

First End Connector	Second End Connector	Cable Type	Catalogue No.
Straight Female	Straight Male	Braided shield 22 AWG 4-pin M12 Yellow	889D-F4ECDM-*
Straight Female	Right Angle Male		889D-F4ECDE-*
Right Angle Female	Straight Male		889D-R4ECDM-*
Right Angle Female	Right Angle Male		889D-R4ECDE-*
Straight Female	Flying leads		889D-F4EC-*
Right Angle Female	Flying leads		889D-R4EC-*

Note: Replace * with 0M3(.3m), 0M6(.6m), 1(1m), 2(2m), 5(5m), 10(10m), 15(15m), 20(20m), 30(30m)

Step 06

- Select Required Ethernet Cables

1585D-M4TBJM-2

Ethernet Cable

First End Connector	Second End Connector	Cable Type	Catalogue No.
Male M12 D-Code, straight	Flying leads	Foil and braided shield, 4 conductor, teal PUR, flex rated, halogen-free	1585D-M4UBDM-*
Male M12 D-Code, straight	Male M12 D-Code, straight		1585D-M4UBM-*
Male M12 D-Code, right angle	Male M12 D-Code, right angle		1585D-E4UBDE-*
Male M12 D-Code, straight	Male M12 D-Code, right angle		1585D-M4UBDE-*
Male M12 D-Code, straight	Female M12 D-Code, straight		1585D-M4UBDF-*
Male M12 D-Code	RJ45		1585D-M4UBJM-*

Note: Replace * with 0M3(.3m), 0M6(.6m), 1(1m), 2(2m), 3(3m), 5(5m), 10(10m), 15(15m), 20(20m), 30(30m)

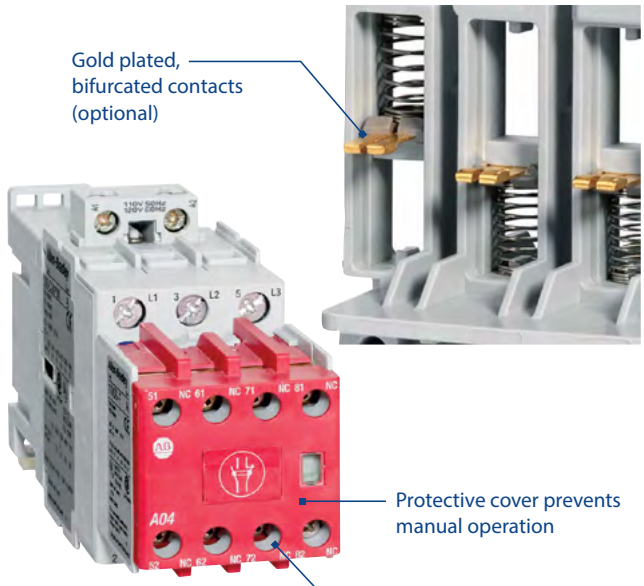
Safety Contactors

Features

Technical Data

- Positively guided/mechanically linked auxiliary contacts
- SUVA third party certification
- Red contact housing for easy identification
- Mechanically linked or mirror contact performance
- AC/DC Operating Coils

100S/104S IEC Safety Contactors provide mechanically linked, or mirror contact, performance up to 750 A, which is required in feedback circuits for modern safety applications. Our Bulletin 100S Safety Contactors use mirror contacts to provide safe isolation of hazardous motion loads. Mirror contacts provide reliable indication about the open or closed status of the main power poles.



100S-C Safety Contactor

100S-E Safety Contactor

Specifications

	100S-C	100S-E
Screw Terminals	3	Thru-hole
Current Rating	9…97 A	9…750 A
Contacts	3 main poles with N.C. mechanically linked or mirror feedback contacts	3 main poles with N.C. mirror feedback contacts
Coil Voltages	AC = 12…600V, 50/60Hz DC = 12…250V	20…500V 50/60 Hz/DC
Features	• Positively guided/mechanically linked auxiliary contacts • Front-mounted auxiliary contacts: – Permanently fixed – Protective cover to prevent manual operation – Red contact housing for easy identification – Incorporates IEC 947-5-1 "Mechanically Linked" symbol – Optional gold-plated bifurcated versions • AC and DC operating coils • SUVA third-party certification	• Mirror contact performance on auxiliary contacts • Red N.C. low-power auxiliary contacts used for feedback circuit • SUVA third-party certification • AC/ DC operating coils • "Mirror Contact" symbol on front

100S-E Safety Contactors

AC-1: Non Inductive or slightly inductive loads, example: resistive furnaces, Heaters(kW rating is not considered for Contactors)

AC-3: Squirrel-cage motors: starting, switches off motors during running time Most typical industrial application for motors (kW rating must be considered for contactors)

100S-E09

100S-E80

100S-E116

Product selection

Step 01a

Rated Operational Current / I_e[A]

40°C	60°C
AC-1 (690V)	AC-3 (400V)
25	9
28	12
30	16
45	26
50	32
50	38
70	40
100	52
105	65
125	80
130	96
160	116
225	146
275	190
350	205
400	265
500	305
600	370
600	400
700	460
800	580
1050	750

Step 01b

(Applies when AC-3 Utilisation Category is selected)

Ratings for switching AC motors - AC-2, AC-3

kW (50Hz)			
380 – 400V	415V	690V	1000V
4	4	5.5	-
5.5	5.5	7.5	-
7.5	9	9	-
11	11	15	-
15	15	18.5	-
18.5	18.5	22	-
18.5	22	22	-
22	30	30	-
30	37	37	-
37	45	45	35
45	55	55	40
55	55	55	55
75	75	90	75
90	90	132	110
110	110	160	132
132	132	200	132
160	160	250	132
200	200	315	132
200	200	315	220
250	250	355	280
315	355	500	355
400	425	600	400

Step 02

Auxiliary contacts per contactor

NO	NC	NC	Catalogue No.
1	0	4	100S-E09*14C
1	0	4	100S-E12*14C
1	0	4	100S- E16*14C
1	0	4	100S- E26*13C
1	0	3	100S-E30*13C
1	0	3	100S- E38*13C
1	0	3	100S-E40*13C
1	0	3	100S- E52*13C
1	0	3	100S-E65*13C
1	0	3	100S-E80*13C
1	0	3	100S-E96*13C
1	1	1	100S-E116*12C [1]
1	1	1	100S-E146*12C [1]
1	1	1	100S-E190*12C
1	1	1	100S-E205*12C
1	1	1	100S-E265*12C
1	1	1	100S-E305*12C
1	1	1	100S-E370*12C
1	1	1	100S-E400*12C
1	1	1	100S-E460*12C
1	1	1	100S-E580*12C
1	1	1	100S-E750*12C

1) To order with built-in terminal lugs, add the letter "L" to the end of the catalogue number (example: 100S-E116*12CL)

Step 03

- Replace * from Catalogue Number with Coil Code

Electronic Coils	Voltage 50/60Hz	24-60V AC, 20-60V DC	48-130V AC/DC	100-250V AC/DC	250-500V AC/DC
100S-E09...100S-E370	Standard AC/DC	KJ	KY	KD	KN
100S-E116...100S-E370	Standard AC/DC with 24V DC PLC Interface	–	–	ED	EN
100S-E400...100S- E750, 100S-E1260		EJ	EY	ED	EN

Step 04

- Select 100S-E Accessories

Description	Contacts	For use with	Catalogue No.
Auxilliary Contact Side Mount	1NO	100-E09…100-E96	100-EFA10
Auxilliary Contact Side Mount	1NC	100-E09…100-E97	100-EFA01
Auxilliary Contact Side Mount 2-Pole	1NO 1NC	100-E116…E370	100-ES1-11
Mechanical Interlock	–	100-E116...100-E370	100-EM1-00
		100-E116...100-E205	100-EM4-00
		100-E190...100-E370	100-EM5-00
		100-E400…100-E750	100-EM2-00

100S-C Safety Contactors

100SC-09

Product selection

Step 01a

Rated Operational Current / I_e[A]

40°C	60°C
AC-1 (690V)	AC-3 (400V)
32	9
32	12
32	16
32	23
65	30
65	37
85	43
85	55
100	60
100	72
100	85
130	97

Step 01b

(Applies to when AC-3 Utilisation Category is selected)

Ratings for switching AC motors - AC-2, AC-3

3-Phase kW (50Hz)			
230V	400-415V	500V	690V
3	4	4	4
4	5.5	5.5	5.5
5.5	7.5	7.5	7.5
7.5	11	13	10
10	15	15	15
11	18.5/20	20	18.5
13	22	25	22
15	30	30	30
18.5	32	37	32
22	40	45	40
25	45	55	45
30	55	55	55

Step 02

Auxiliary contacts per contactor

NO	NC	NC [1]	Catalogue No. [1]
1	0	4	100S-C09*14BC
1	0	4	100S-C12*14BC
1	0	4	100S- C16*14BC
1	0	4	100S- C23®14BC
1	0	3	100S-C30*14BC
1	0	3	100S- C37*14BC
1	0	3	100S-C43*14BC
1	0	3	100S- C55*14BC
1	0	3	100S-C60*14BC(2)
1	0	3	100S-C72*14BC(2)
1	0	3	100S-C85*14BC(2)
1	0	1	100S-C97*14BC(2)

1) If front-mount auxiliary contacts are required, remove the letter "B" from catalogue number Example: Cat. No. 100S-C09*05BC becomes 100S-C09*05C
2) Front- and side-mount auxiliary contacts on Cat. Nos. 100S-C60…C97 conform to mirror contact performance only

Step 03

- Replace * from Catalogue Number with Coil Code

Electronic Coils	24V DC	24V AC	110V AC	240V AC	415V AC
100S-C09...100S-C55	EJ	K	D	T	G
100S-C60…100S-C97	DJ	K	D	T	G

Step 04

- Accessories 100SC

100-SA10

100-MCA00

Auxilliary Contact Blocks

Description	Contacts	Catalogue No.
Standard Aux Contact Side Mount	1NC	100-SA01
Standard Aux Contact Side Mount	1NO	100-SA10
Standard Aux Contact Side Mount	2NC	100-SA02
Mechanical Interlock, No Aux contacts	–	100-MCA00
Mechanical/Electrical Interlock w/2NC Contacts		100-MCA02
Protective Cover		100-SCCA

Select overload Required
E100/E200/E300 Electronic Overload Relays

Protection Features	Bimetallic	E100	E200	E300
Overload	Yes	Yes	Yes	Yes
Phase Loss	-	Yes	Yes	Yes
Ground Fault	Yes	Yes	Yes	Yes
Current Imbalance	-		Yes	Yes
Jam	-	Yes	Yes	Yes
Over/ Under Voltage	-	-	Yes	Yes
Voltage Imbalance	-	-	Yes	Yes
Over/ Under Power	-	-	Yes	Yes

Diagnostics Features				
% Full Load Amperes (FLA)	-	Yes	Yes	Yes
% Thermal Capacity Utilization (TCU)	-	Yes	Yes	Yes
Voltage	-	-	Yes	Yes
Power	-	-	Yes	Yes
Energy	-	-	Yes	Yes

Integration Features				
DeviceLogix™	-		Yes	Yes
Logix Controller	-	-	-	Yes
Connected Components Workbench Software	-	-	Yes	-
EtherNet/IP™	-	-	-	Embedded (dual-port)
DeviceNet™	-	-	-	Embedded (single-port)
Local Programming Method	-	-	USB Type B	EtherNet/IP or DeviceNet(2)

E100 Electronic Motor Protection Relay

The E100 overload relay is part of the Rockwell Automation integrated motor control system. It can mount directly to bulletin 100S-C IEC contactors up to 100 A. The E100 basic model has two user-adjustable trip class settings of 10 and 20.

Features

User Manual

- Electronic overload detection
- Selectable trip class
- Adjustable trip current
- External current transformer configurations
- Integration with both IEC contactors
- Direct and pass-through mounting options

Specifications

Utilisation Category	AC-15/DC-13
Contact Type	AgNi
Ingress Protection	IP20

Basic

Current Range (A)	Catalogue Number
0.1 - 0.5	193-1EEAB
0.2 - 1	193-1EEBB
1 - 5	193-1EECB
3.2 - 16	193-1EEDB
5.4 - 27	193-1EEEB
5.4 - 27	193-1EEED
11 - 55	193-1EEFD
20 - 100	193-1EEGE

Advanced

Current Range (A)	Catalogue Number
0.1 - 0.5	193-1EFAB
0.2 - 1	193-1EFBB
1 - 5	193-1EFCB
3.2 - 16	193-1EFDB
5.4 - 27	193-1EFEB
5.4 - 27	193-1EFED
11 - 55	193-1EFFD
20 - 100	193-1EFGE

E300/E200 Electronic Overload Relays

User Manual Installation Instructions

The E300/E200 relay consists of three modules: Sensing, Control, and Communications. You have choices in each of the three with additional accessories to tailor the electronic overload for the exact needs of your application. The communication module determines whether the complete assembled device is an E300 or an E200 overload relay.

The modular design, communication options, diagnostic information, simplified wiring, and integration into Logix technology make it the ideal overload for motor control applications in an automation system.

These modules are to be used with 100S-E116 and above.

Features

- Includes Smart Motor Control (EtherNet/IP, DeviceNet, and non-networked options available)
- Offers a modular solution with a wide current range and adjustable trip class
- Provides enhanced diagnostic information for single and three phase applications
- Includes integrated I/O (additional expansion I/O available)
- Offers simplified wiring and easy integration into Logix

Specifications

Utilisation Category	AC-15/DC-13
Contact Type	AgNi
Ingress Protection	IP20
Safety Rating	SIL2

Product selection

1 Communication module

193 | **ECM** | **ETR**

BULLETIN NUMBER
193 Overload relay

MODULE TYPE
ECM Communication module

COMMUNICATION TYPE
ETR EtherNet/IP with dual ethernet ports
DNT DeviceNet
PCM Parameter configuration module E200

2 Control module

193 | **EIO** | **43** | **120**

BULLETIN NUMBER
193 Overload relay

MODULE TYPE
EIO I/O only control module
EIOGP I/O and protection control module (external ground fault sensing and PTC)

I/O COUNT
63 6 inputs / 3 relay outputs
43 4 inputs / 3 relay outputs
42 4 inputs / 2 relay outputs
22 2 inputs / 2 relay outputs

CONTROL VOLTAGE
24D 24 V DC
120 110...120 V AC, 50/60 Hz
240 220...240 V AC, 50/60 Hz

3 Sensing module

193 | **ESM** | **VIG** | **30A** | **C23**

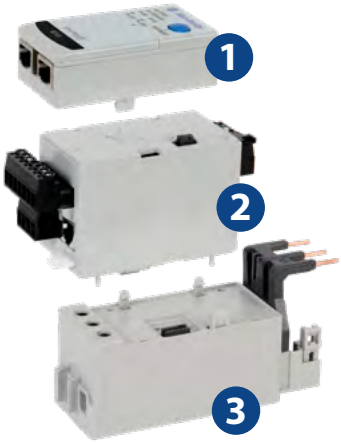
BULLETIN NUMBER
193 Overload relay

MODULE TYPE
ESM Sensing module

SENSING MODULE TYPE
VIG Current, Ground fault current, Voltage and power
IG Current and Ground fault current

SENSING CURRENT RANGE
30A 0.5...30A
60A 6..60A
100A 10...100A
200A 20...200A

SENSING MODULE MOUNTING STYLE
C23 Mounts to 100-C09...C23 Contactor
C55 Mounts to 100-C30...C55 Contactor
C97 Mounts to 100-C60...C97 Contactor
E146 Mounts to 100-E116...E146 Contactor
E205 Mounts to 100-E190...E205 Contactor
E3T Replacement DIN Rail / Panel mount with Power terminals for an E3 Plus Panel Mount Adapter
CT DIN Rail / Panel mount with Pass-through Power Conductors (used with External CTs)
T Din Rail/Panel mount with Power Terminals
P Din Rail/Panel mount with Pass-thru Power Conductors



1 **Step 1**
Select a communication module

2 **Step 2**
Select control module

3 **Step 3**
Select a sensing module

Step 01

E300 Communication Modules

Description	Catalogue No.
E200 parameter configuration module	193-ECM-PCM
E300 communication module DeviceNet	193-ECM-DNT
E300 communication module Ethernet/IP with dual ethernet ports	193-ECM-ETR

Step 03

E300 Sensing Module

Mounting	Contactor	Overload Range (A, min-max)	Catalogue No.
Contactor Mount	100-E116...E146	20 - 200	193-ESM-VIG-200A-E146
	100-E190...E205	20 - 200	193-ESM-VIG-200A-E205
	100-C09...23	0.5 - 30	193-ESM-VIG-30A-C23
	100-C30...55	0.5 - 30	193-ESM-VIG-30A-C55
	100-C30...55	6 - 60	193-ESM-VIG-60A-C55
	100-C60...97	10 - 100	193-ESM-VIG-100A-C97

Step 02

I/O Modules

Inputs / Outputs (qty)	Control Voltage (V AC / V DC)	Catalogue No.
2 in / 2 out	110 - 120V AC	193-EIO-22-120
2 in / 2 out	24V DC	193-EIO-22-24D
4 in / 3 out	110 - 120V AC	193-EIO-43-120
6 in / 3 out	24V DC	193-EIO-63-24D

I/O and Protection modules

2 in / 2 out	110 - 120V AC	193-EIOGP-22-120
2 in / 2 out	220 - 240V AC	193-EIOGP-22-240
4 in / 2 out	24V DC	193-EIOGP-42-24D

Control Tower Stack Lights 856T

Features

IO-LINK Technical Data

- Up to 7 modules in a single stack
- Light modules with multi-function capabilities available in seven colours
- Choice of piezoelectric, transducer and recordable sound modules
- Beacon shaped light modules available for low profile signalling applications

Specifications

Materials	Bases/Modules	Polycarbonate
	Tube/Pole Bases	Aluminum
	Gaskets O-rings	Nitrile rubber
Ingress Ratings	IP66 IP67	
Operating Temperature Range	-30° to +70° C	
Flashing Frequency Multi-function Module	Flashing mode 2 Hz Single Strobe mode (1.4 Hz)	
	Double Flash Strobe mode (1.4 Hz)	
Sound Module dB Rating	Piezo Top sounder (105 dB) In-line Piezo sounder (102 dB) Transducer sounder (105 dB)	
Diameter	70mm	
Operating Voltage	24V AC/DC (Converted at base for 240VAC)	
Luminous Intensity	42Cd	

Component Selection

4 Select Top Sounder or Beacon
(if top cap not used)

3 Select the Light Modules or In-Line Sounders
(top cap from step 2 will seal top)

2 Select the Power Module
(top cap included with each module)

Top cap | IO Link, 7 circuits | 24 V AC/DC, 7 circuits | 240 V AC, 3 circuits | 240 V AC, 7 circuits

1 Select the Base Mounting Adaptor

Vertical Mount | Surface Mount 1/2 NPT w/screws | M12 | Tube mount | Pole mount

Product selection

Step 01

Base Style	Base Adaptor
	Catalogue No.
Surface Mount 1/2 NPT	856T-BMASN
Surface Mount 1/2 NPT w/screws	856T-BMASH
Vertical Mount	856T-BMAVM
Tube Mount	856T-BMAT*
Pole Mount	856T-BMAP*
M12 5-pin connector 2	856T-B24QD5C
M12 8-pin connector 2	856T-B24QD8C

Step 02

Power Module 24 V AC/DC up to 7 circuits	Power Module 240 V AC up to 3 circuits	Power Module 240 V AC up to 7 circuits	IO-Link Power Module up to 7 circuits
Catalogue No.	Catalogue No.	Catalogue No.	Catalogue No.
856T-B24C	856T-BAC3C	856T-BAC7C	856T-B24LC
–	–	–	–
–	–	–	–

Note: Replace * for length required 10, 25, 40, 60cm. example 856T-BMAP10 – 10cm Pole mount
IO-Link Power Module requires 889D-F5ACDM4M-10-SW Patchcord connected to an 1732E-8IOLM12R IO-Link Master

Step 03

- Select In-Line Modules (Sound and Light modules)

856T-BB4

856T-BPL1

Light Modules

Description	Catalogue No.
LED Steady (ON/OFF)	856T-BT*
LED Multi Function (Steady/Flashing/Strobing via DIP switch)	856T-BB*
LED Rotating (90 or 180 rpm via DIP switch)	856T-BR*
Seven Colour RGB LED Module (Steady)	856T-BMC

Sound Module

Description	Catalogue No.
Piezo Sounder In Line (8 tones/single circuit/102dB)	856T-BPL1

Note: Replace * with 3=Green, 4=RED, 5=Amber, 6=Blue, 7=White, 8=Yellow, 9=Magenta
Example: 856T-BB4 - Red LED Multifunction in-line module

Step 04

- Select Top Mount Beacon Shape Modules

856T-BGB5

856T-BTR3

Light Modules

Description	Catalogue No.
LED Steady/Flashing	856T-BGB*
LED Strobe (one or two pulses)	856T-BSB*
LED Rotating	856T-BRB*
Seven Colour RGB LED Module (Steady)	856T-BMB

Sound Module

Description	Catalogue No.
Piezo Sounder TopMount (8 tones/single circuit/105dB)	856T-BP1
Transducer Sounder TopMount (16 tables/7 tones per table/3 circuits/105dB)	856T-BTR3
Voice Recordable Sounder TopMount (7 channels pre-recorded voice 90mins/3 circuits/95dB)	856T-BH3

Note: Replace * with 3=Green, 4=RED, 5=Amber, 6=Blue, 7=White, 8=Yellow, 9=Magenta
Example: 856T-BGB5 - Amber LED Steady/Flashing

Step 05

- Select optional accessories

856T-ASFG

Accessories

Description	Catalogue No.
Replacement O RING For LIGHT/Power ModuleBase Adaptor	856T-ARNG
Replacement Flat Gasket For Surface Mount Base Adaptor	856T-ASFG
Replacement Flat Gasket For Vertical Mount Base Adaptor	856T-AVFG
Replacement Black Cap	856T-ABCAP
Replacement Lens Diffuser KIT	856T-ADK
Replacement Screws For Pole Connection Boxes	856T-AJBS
Transition Module 855T DeviceNet Base to 856T Stack Lights (5 circuit)	856T-ATM
Vertical Mount Bracket for Tube Mount	855T-AVM

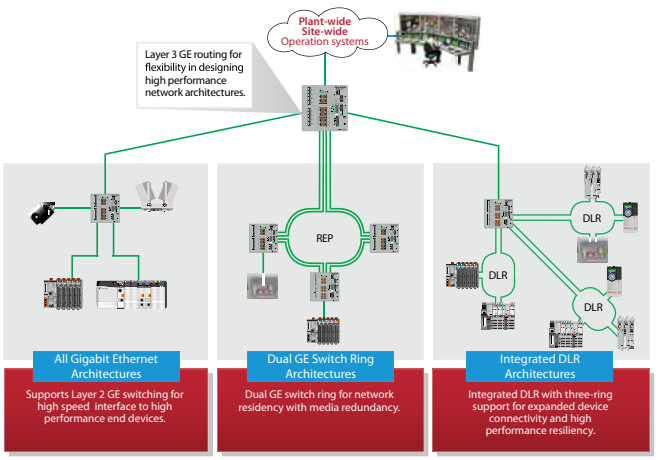
Stratix Ethernet Switches




	Stratix 2000 Unmanaged Switch	Stratix 2500 Lightly Managed Switch	Stratix 5700 Managed Switch	Stratix 5400 Managed Switch
Ports	5,8,10,16,18 versions	5 and 8 versions	6,10,18,20 versions	8,12,16,20 versions
Fiber Ports	up to 2	-	up to 6 SFP	up to 12 SFP
Copper Ports	up to 16	Up to 8	6 to 18	8 to 20
1G Ports	up to 8 copper 2 SFP slots	–	up to 2 copper or 2 SFP slots	up to all
Fiber Support	100Mbs 1G Fiber	–	100Mbs 1G Fiber	100Mbs 1G Fiber
Power over Ethernet	–	–	up to 4	up to 8
Flash Memory	–	–	Internal Flash and SD Card Option	Internal Flash and SD Card Included
Operating Temperature	-40 to 70 °C	-20 to 60°C	-40 to 60 °C	-40 to 70 °C
Environment Rating	IP30	IP30	IP31	IP32
Dimensions	115 to 135 mm H 30 to 88 mm W 68 to 106 mm D	130 mm H 38 to 46 mm W 117 mm D	130 mm H 75 to 127 mm W 117 to 128 mm D	160 mm H 150 mm W 129 mm D
Power	18-60V DC 18-30V AC	12-24V DC 0.3-2.0A	12V/24V/48V DC	12V-54V DC
Cisco	–	–	IOS	IOS
Device Level Ring (DLR)	–	–	Yes (single Ring)	Yes (three rings)
VLANs	–	Yes with trunking	Yes with trunking	Yes with trunking
Network Address Translation (NAT)	–	–	Yes	Yes
Port Control in Logix	–	Yes	Yes	Yes
Access Control Lists (ACL)	–	–	Yes	Yes
AOP (CIP)	–	Yes	Yes	Yes
Smart Ports	–	Yes	Yes	Yes
DHCP per port	–	Yes	Yes	Yes
Broken Wire Detection	–	Yes	Yes	Yes

Device Level Ring (DLR)	Device Level Ring (DLR) Allows establishment of a resilient ring network at the device level without the need of external switching hardware. The fast network recovery rate makes the protocol ideal for real-time control applications. The DLR protocol is a standard protocol supported and maintained by ODVA.
Network Address Translation (NAT)	Network Address Translation (NAT) provides 1:1 translations of IP addresses from one subnet to another. Can be used to integrate machines into an existing network architecture.
VLANs	VLANs with Trunking is a feature that allows you to group devices with a common set of requirements into network segments. VLANs can be used to provide scalability, security and management to your network
Access Control Lists (ACL)	Access Control Lists (ACL) allow you to filter network traffic. This can be used to selectively block types of traffic to provide traffic flow control or provide a basic level of security for accessing your network.
DHCP	DHCP per port allows you to assign a specific IP address to each port, ensuring that the device attached to a given port will get the same IP address. This feature allows for device replacement without having to manually configure IP addresses.
Smartports	Smartports provide a set of configurations to optimize port settings for common devices like automation devices, switches, routers, PCs and wireless devices. Smartports can also be customized for specific needs
CIP SYNC	CIP SYNC (IEEE1588) is the ODVA implementation of the IEEE 1588 precision time protocol. This protocol allows very high precision clock synchronization across automation devices. CIP SYNC is an enabling technology for time-critical automation tasks such as accurate alarming for post-event diagnostics, precision motion and high precision first fault detection or sequence of events

Stratix 5400 configuration options



Product selection

Stratix 2000 Unmanaged Switches

Ideal for small control networks. These industrial-grade switches do not require any configuration and use simple cable connections for easy connection with Logix-based controllers.

1783-US7T1F

User Manual

Installation Instructions

Switch	Ports			Catalogue No.
	Copper	Fibre	SFP	
5 Port	5 FE	0	–	1783-US5T
5 Port	5 FE	1	1 FE multimode	1783-US4T1F
5 Port	4 FE	1	1 FE singlemode	1783-US4T1H
8 Port	8 FE	0	–	1783-US8T
8 Port	6 FE	2	2 FE multimode	1783-US6T2F
8 Port	6 FE	2	1 FE singlemode	1783-US6T2H
8 Port	7 FE	1	1 FE multimode	1783-US7T1F
16 Port	16 FE	0	–	1783-US16T

Stratix 2500 Lightly Managed Switch

Enable network connectivity in applications where traditional unmanaged switches lack the ability to provide diagnostics and security. This connectivity helps you achieve higher productivity and network reliability.

1783-LMS5

User Manual

Installation Instructions

Switch	Description	Catalogue No.
5 Port	5x10/100BaseT	1783-LMS5
8 Port	8x10/100BaseT	1783-LMS8

Stratix 5700 Managed Switches

Uses the current Cisco Catalyst switch architecture and feature set. They are designed to meet your switching capability needs, from smaller applications to IT-ready integration with plantwide infrastructure. Configuration and monitoring tools provide secure integration to the enterprise network and allow easy setup and diagnostics with our Integrated Architecture system.

1783-BMS20CA

User Manual

Installation Instructions

Switch	Ports		Slots	Switch Type	IEEE 1588		NAT	DLR	Catalogue No.
	Copper	Combo*	SFP		PTP	CIP Sync			
6 Port	4 FE	0	2 FE	LITE	-	-	-	-	1783-BMS06SL
6 Port	6 FE	0	0	LITE	-	-	-	-	1783-BMS06TL
6 Port	4 FE	0	2 GE	FULL	-	-	-	-	1783-BMS4S2SGA
10 Port	8 FE	2 FE	0	LITE	-	-	-	-	1783-BMS10CL
10 Port	8 FE	2 FE	0	FULL	-	-	-	-	1783-BMS10CA
10 Port	8 FE	2 GE	0	LITE	-	-	-	-	1783-BMS10CGL
10 Port	8 FE	2 GE	0	FULL	-	-	-	-	1783-BMS10CGA
10 Port	8 FE	2 GE	0	FULL	-	Yes	-	Yes	1783-BMS10CGP
10 Port	8 FE	2 GE	0	FULL	Yes	Yes	Yes	Yes	1783-BMS10CGN
20 Port	16 FE	2 FE	2 FE	LITE	-	Yes	-	Yes	1783-BMS20CL
20 Port	16 FE	2 FE	2 FE	FULL	-	Yes	-	Yes	1783-BMS20CA
20 Port	16 FE	2 GE	2 FE	LITE	-	Yes	-	Yes	1783-BMS20CGL
20 Port	16 FE	2 GE	2 FE	FULL	-	Yes	-	Yes	1783-BMS20CGP
20 Port	16 FE	2 GE	2 FE	FULL	Yes	Yes	Yes	Yes	1783-BMS20CGN

* Combo ports can be either copper or SFP

Stratix 5400 Managed Switches

Support layer 2 switching and layer 3 routing using a combination of Gigabit Ethernet (GE), Power over Ethernet (PoE) and GE fiber ports to help offer enhanced scalability. In addition, this switch offers DLR with three-ring support, which allows more connected devices at the Cell/Area Zone level for increased network design flexibility.

1783-HMS16TG4CGN

User Manual

Installation Instructions

Switch	Ports		Slots	Switch Type	IEEE 1588	NAT	DLR	Catalogue No.
	Copper	Combo*	SFP		PTP			
12 Port	8 FE	4 GE	0	2	Yes	Yes	Yes	1783-HMS8T4CGN
20 Port	16 FE	4 GE	0	2	Yes	Yes	Yes	1783-HMS16T4CGN
20 Port	16 GE	4 GE	0	2	Yes	Yes	Yes	1783-HMS16TG4CGN

* Combo ports can be either copper or SFP

Ethernet cables

Product selection

On-Machine Ethernet M12 D Code 1585D

First End Connector	Second End Connector	Cable Type	Catalogue No.	
			Unshielded	Braided Shield
Straight Male	Flying Lead	4 Pin M12	1585D-M4TB-*	1585D-M4UB-*
	Straight Male		1585D-M4TBDM-*	1585D-M4UBDM -*
	Female Straight		1585D-M4TBDF-*	1585D-M4UBDF-*
	Right Angle Male		1585D-M4TBDE-*	1585D-M4UBDE-*
	RJ45		1585D-M4TBJM-*	1585D-M4UBJM-*
Right Angle Male	Right Angle Male		1585D-E4TBDE-*	1585D-E4UBDE-*

Note: Replace * with 0M15(.15m), 0M2(.2m) 0M3(.3m), 0M6(.6m), 1(1m), 2(2m), 3(3m), 4(4m), 5(5m), 10(10m), 15(15m), 20, (20m), 30(30m), 40(40m)

1585D-M4DC-SH

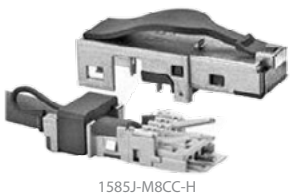
Accessories

Description	Catalogue No.
4-Pin M12 Straight Through Male Shielded	1585D-M4DC-SH
4-Pin M12 Straight Through Female Shielded	1585D-F4DC-SH
4-Pin M12 Straight Through Male Unshielded	1585D-M4DC-H

In-Cabinet Ethernet RJ45 1585J

First End Connector	Second End Connector	Cable Type	Catalogue No.	
			Unshielded	Braided Shield
RJ45 Straight	Flying Lead	4 conductors (2 Pair)	1585J-M4TB-*	1585J-M4UB-*
	RJ45 Straight		1585J-M4TBJM-*	1585J-M4UBJM-*
	RJ45 Right Angle		1585J-E4TBJM-*	1585J-E4UBJM-*
	RJ45 Left Angle		1585J-L4TBJM-*	1585J-L4UBJM-*
	Flying Lead	8 conductors (4 Pair)	1585J-M8TB-*	–
	RJ45 Straight		1585J-M8TBJM-*	1585J-M8CBJM-*
	RJ45 Right Angle		1585J-E8TBJM-*	1585J-E8CBJM-*
	RJ45 Left Angle		1585J-L8TBJM-*	1585J-L8CBJM-*

Note: Replace * with 0M15(.15m), 0M2(.2m) 0M3(.3m), 0M6(.6m), 1(1m), 2(2m), 3(3m), 4(4m), 5(5m), 10(10m), 15(15m), 20, (20m), 30(30m), 40(40m)



1585J-M8CC-H

Accessories

Description	Catalogue No.
RJ45 Straight Through Male	1585J-M8CC-H

Specifications

Coupling Nut	Nickel-plated brass
Material	Polyurethane (PUR)
Contact Material	Gold-plated brass
Bend Radius	10 x cable diameter
Enclosure Rating	IP67
Temperature	-20…+105 °C

DC Micro M12 Cables

889 DC Micro (M12) Cordsets & Patchcords provide secure connections for proximity sensors, limit switches, photoelectric sensors and other field devices. Available with straight or right-angle 4- or 5-pin overmolded connectors, these cables feature a choice of materials and jacket colors, including red to identify safety applications. Some models include braided shielding for noise reduction and status indicators for power and output status indication.

Features

Technical Data

- Multiple jacket types: PVC, PUR, TPE, Toughlink™ and Toughweld™
- Offers standard 16, 18, 22 and 24 AWG cable
- Includes ratcheting coupling nut for added vibration resistance
- Offers DC micro-to-mini and DC micro-to-pico cable models
- Offers red cable jackets to identify safety networks on your machines

Specifications

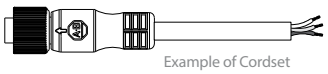
Coupling Nut	Epoxy-coated zinc
Material	Molded oil-resistant PUR
Contact Material	Gold over nickel-plated brass
Bend Radius	10 x cable diameter
Enclosure Rating	IP69K
Temperature	-20…+105 °C
Rating	250V, 4A

Product selection

On-Machine DC Micro M12 889D

Female First End Connector (Sensor End)	Male Second End Connector (I/O End)	Cable	PVC Cable, Unshielded			PVC Braided Shield
			Yellow	Black	Red (Guardlink)	Yellow
Straight Female	Flying Lead	4 Pin M12	889D-F4AC-*	889D-F4BC-*	889D-F4NE-*	889D-F4EC-*
	Straight Male		889D-F4ACDM-**	889D-F4BCDM-**	889D-F4NEDM-**	889D-F4ECDM-**
	Right Angle Male		889D-F4ACDE-**	889D-F4BCDE-**	889D-F4NEDE-**	889D-F4ECDE-**
Right Angle Female	Flying Lead		889D-R4AC-*	889D-R4BC-*	889D-R4NE-*	889D-R4EC-*
	Straight Male		889D-R4ACDM-**	889D-R4BCDM-**	889D-R4NEDM-**	889D-R4ECDM-**
	Right Angle Male		889D-R4ACDE-**	889D-R4BCDE-**	889D-R4NEDE-**	889D-R4ECDE-**
Straight Female	Flying Lead	5 Pin M12	889D-F5AC-*	889D-F5BC-*	889D-F5NC-*	889D-F5EC-*
	Straight Male		889D-F5ACDM-**	889D-F5BCDM-**	889D-F5NCDM-**	889D-F5ECDM-**
Straight Female	Flying Lead	8 Pin M12	–	889D-F8AB-*	889D-F8NB-*	889D-F8FB-*
	Straight Male		–	889D-F8ABDM-**	889D-F8NBDM-**	889D-F8FBDM-**

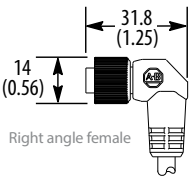
Note: Replace * with 0M3(.3m), 2(2m), 5(5m), 10(10m), 15(15m), 20(20m), 30(30m)
Replace ** with 0M3(.3m), 0M6(.6m), 1(1m), 2(2m), 5(5m), 10(10m), 15(15m), 20, (20m), 30(30m)



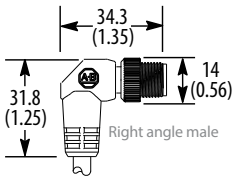
Example of Cordset

Example of Patchcord

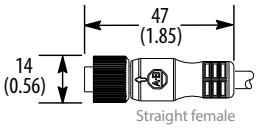
871A-TS4-DM



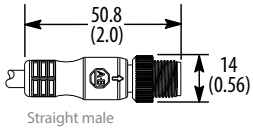
Right angle female



Right angle male



Straight female



Straight male

Accessories

Description	Catalogue No.
4-Pin M12 Straight Male (4-6mm Cable diameter)	871A-TS4-DM
4-Pin M12 Straight Female (4-6mm Cable diameter)	871A-TR4-D
5-Pin M12 Straight Male (4-6mm Cable diameter)	871A-TS5-DM
5-Pin M12 Straight Female (4-6mm Cable diameter)	871A-TS5-D
8-Pin M12 Straight Male (6-8mm Cable diameter)	871A-TS8-DM1
8-Pin M12 Straight Female (6-8mm Cable diameter)	871A-TS8-D1

Machine Safety Services

What is the Safety Lifecycle?

The Safety Lifecycle helps maximize productivity and improve safety by identifying the steps required to assess and mitigate machinery risks. The steps of the Safety Lifecycle include:

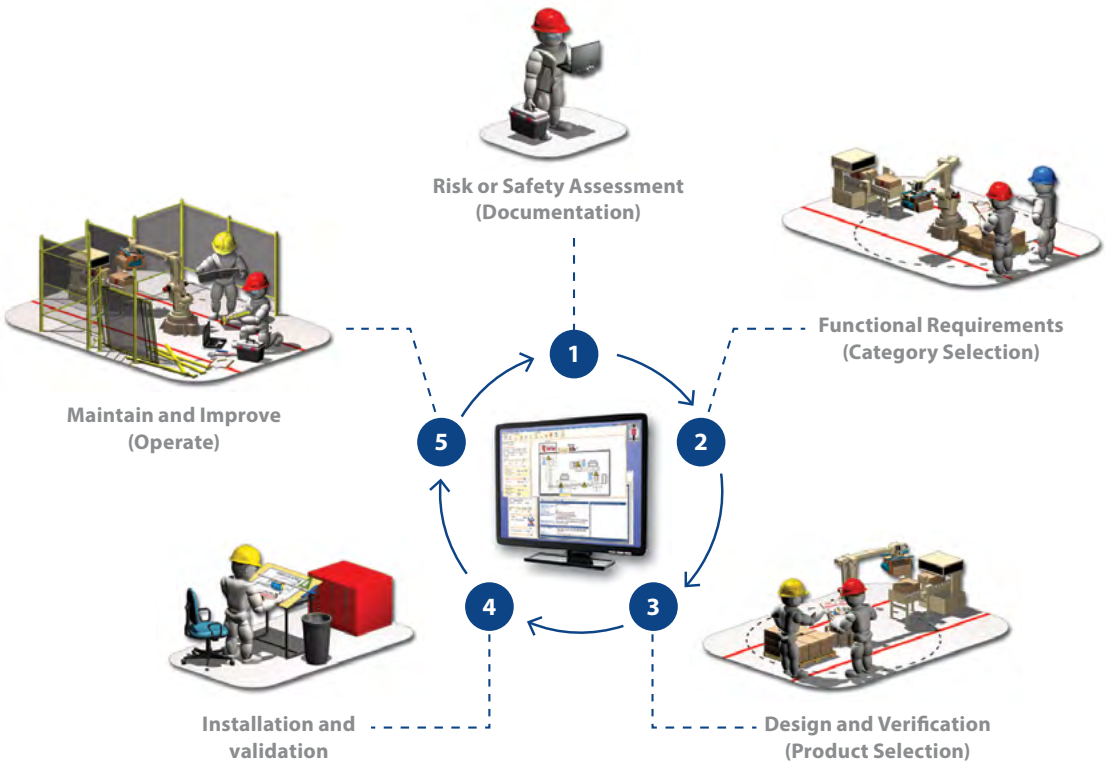
1) **Perform a hazard or risk assessment**
   Identify hazards and estimate the associated risk.

2) **Determine the functional safety system requirements**
   Evaluate safeguarding options based on industry acceptable solutions and select mitigation techniques.

3) **Design and verify the system**
   Design system architecture, document safety circuit design, procure materials.

4) **Install and validate the system**
   Verify systems are operating with in defined parameters and applicable standards have been satisfied.

5) **Maintain and improve the system**
   Verify that system requirements operate within specified parameter for production and safety preventative maintenance and system upgrades.



Scalable Assessment Solutions

NHP, an Australian owned company providing power/ control solutions for over 50 years, has the experience and expertise to provide you with the most appropriate audit solution for your application and can assist with:

- Reducing unscheduled downtime
- Stabilising maintenance budgets
- Maximising productivity
- Improving security and safety
- Increase reliability Contact your local sales representative or the NHP Services and Training team for more details. Better understand and pinpoint your lifecycle risk through a comprehensive analysis of your critical plant assets and their condition

Product selection

Description	Catalogue No.
Audit On-Site Rockwell Machine Safety	SAT-AUD-R02

Scalable Assessment Solutions

Conformity Audits	Guarding Evaluation	Risk Assessments
Multiple machines/ plant-wide machine audit	Identifies primary guarding hazards	Risk Assessment or Team-Based Risk Assessment (TBRA)
Provides a high-level analysis of specific safety areas	Identifies guarding hazards for immediate plant actions	Risk Assessment – provides analysis using limited customer personnel Team-Based Risk Assessment – In-depth analysis from a multidisciplinary team, required for critical or complex machines
Provides a high-level safety analysis of machine: • Conformity audit that analyses guarding, components that perform a safety function, E-stops, lockout/tagout and/or isolation devices are identified and labelled • Existing safety circuit estimation • Prioritizes machines for further assessment	Provides a rapid approach to identifying point-of-operation and power transmission hazards and identifying appropriate and effective safeguarding measures for reducing risk and exposure Generates report identifying: • Hazard exposure • Category/performance level per standards • Potential safeguard or risk mitigation solution	Risk Assessment (Standard): • Evaluation by Rockwell Automation safety engineer/consultant, limited customer involvement (typically operations/maintenance) • Evaluation report includes: – Documentation of participants – Identification of primary hazards/tasks – Risk-in/risk-out rating – Recommendations for safety improvements, such as: protective guarding; electrical safety controls; pneumatic/fluid power safety controls • Safety circuit performance requirements • Photograph of critical identified hazards (based on customer approval) Team-based Risk Assessment: All features of the standard Risk Assessment (above) with the following additional features: • Team-based assessment facilitated by Rockwell Automation safety engineer/consultant • Customer team typically consists of operations, maintenance, engineering, technicians, cleaning, sanitation and safety personnel • Basic risk assessment training • Hazard identification during setup, normal and abnormal operation, sanitation/cleaning, maintenance (under limited energy), emergency conditions • Report documentation includes all elements from safety evaluation with additional information: – Plan view machine layout with recommended safety improvements – Limits of machine – Incident/accident history – This service can satisfy the risk assessment requirements of safety standards

SAF-TUV0T – Functional Safety for Machinery Technician Certification Course

Course Purpose

The standards regarding functional safety and relevant laws and directives demand that people and organizations performing responsible tasks during relevant life cycle phases of a machine must achieve and prove required competencies.

In this training, students will learn how the current standards dictate the selection, assembly, installation, validation, and maintenance of safety devices and components to reduce hazards from machinery and ensure the safety of people and the environment. Practical examples will demonstrate possibilities regarding machine protection.

This training will also cover safety topics, such as: redundancy, testing, distance calculations, assigning required level of risk reduction as PL, monitoring moveable guard positions, and fault avoidance for relevant life cycle phases.

After completing this course, students should understand and be able to use ISO 12100, IEC 60204-1 and other relevant machine functional safety standards.

Who Should Attend

Machine technicians, application engineers, safety specialists, and those responsible for repairing and maintaining machine safety should attend this course.

Certificate Eligibility Requirements

Requirements to receive the Functional Safety for Machinery Technician Certificate (TÜV Rheinland):

- Before taking the course, an eligibility form from TÜV Rheinland must be completed and approved, proving:
  - Minimum of 1 year experience working on industrial machinery
  - Documented education, high school diploma or global equivalent or
  - Experience in machinery maintenance and operation verified by employer
- Attended complete two-day course
- Passing grade of 75% or higher on the exam

Course Agenda

Day 1

- Understanding the Functional Safety for Machinery Technician Certification (TÜV Rheinland)
- Defining Legal Guidelines and Standards
- Defining Risk Analysis and Processes(ISO 12100:2010)
- Defining Basic Electrical Safety Principles (IEC 60204-1)
- Defining Basic Safety Principles
- Defining Machine Guarding Principles

Day 2

- Identifying Safety Functions
- Identifying Safety Devices
- Identifying Circuits, Schematics, and Examples
- Defining New Standards Regarding Safety of Machinery
- Evaluating Machine Safety Using a Practical Example
- Exam (1 hour)

Product selection

Description	Catalogue No.
Training Rockwell TUV Functional Safety Technician	SAF-TUV0T

SAF-TUV1 – Functional Safety for Machinery Introduction Course

Course Purpose

This is an introduction to functional safety for machinery standards and is highly recommended to prepare students for the Rockwell Automation/TÜV Rheinland engineer certification course.

This course will define the design and proof requirements for functional safety of machines, according to current standards and guidelines. Practical examples will demonstrate possible techniques for machine guarding and protection.

This course will also introduce organizational measures that can be instituted to protect employees and equipment. The organizational measures include quality assurance techniques and documentation for lifecycle design and validation.

After completing this course, you should understand how safety devices and components are assembled and applied to reduce hazards from machinery so the necessary safety for people and the environment is achieved.

Who Should Attend

Application engineers, system integrators, developers, safety specialists, and authorized experts in machinery should attend this course.

Standards Required

- IEC 60204-1
- IEC 62061
- ISO 12100: 2010
- ISO 13849 part 1 and part 2

Course Agenda

Day 1

- Understanding the Functional Safety for Machinery Certification (TÜV Rheinland)
- Defining European Guidelines and Requirements
- Defining OSHA Guidelines and Requirements
- Defining Risk Analysis and Processes (ISO 12100:2010)
- Defining ISO 13849-1
- Identifying Safety Devices

Day 2

- Identifying Safety Functions of Machines
- Identifying Circuits, Schematics, and Examples
- Defining New Standards Regarding Safety of Machinery

Day 3

- Defining ISO 13849-1/2
- Defining IEC 62061
- Defining Basic Electrical Safety Principles (IEC 60204-1)
- Performing ISO 13849/IEC 62061 calculations

Product selection

Description	Catalogue No.
TÜV Functional Safety for Machinery - Introduction	SAF-TUV1

SAF-TUV2T – Functional Safety for Machinery Engineer Certification

Course Purpose

The standards regarding functional safety and relevant laws and directives demand that people and organizations performing responsible tasks during all life cycle phases of a machine must achieve and prove required competencies.

In this training, students will learn how current standards dictate the design and proof of functional safety for machines. The participant will learn how safety devices and components are assembled and applied to reduce hazards from machinery so the necessary safety for people and environment is achieved. Practical examples will demonstrate possibilities regarding machine protection.

In addition to the technical requirements, students will learn about organizational measures, quality assurance techniques, and documentation for lifecycle design and validation.

After completing this course, students should understand and be able to use IEC 60204-1, IEC 62061, ISO 12100, ISO 13849-1, -2, and other relevant machine functional safety standards.

Who Should Attend

Application engineers, system integrators, developers, safety specialists, and authorized experts in machinery should attend this course.

Prerequisites

- **Required:** A completed and approved eligibility form to receive certification
- **Strongly Recommended:** Functional Safety for Machinery Introduction (Course No. SAF-TUV1)

Certificate Eligibility Requirements

Requirements to receive the Functional Safety for Machinery Engineer Certificate (TÜV Rheinland):

- Before taking the course, an eligibility form from TÜV Rheinland must be completed and approved, proving:
  - Minimum of 3 years of experience in the field of functional safety
  - University engineering degree (Master's or Bachelor's) or global equivalent or
  - Equivalent engineer level responsibilities status certified by employer
- Attended full SAF-TUV2T course
- Passing grade of 70% or higher on the exam

Participant Must Bring copies of Standards

IEC 60204-1	ISO 12100: 2010
IEC 62061	ISO 13849 part 1 and part 2

Course Agenda

Day 1

- Understanding the Functional Safety for Machinery Engineer Certification (TÜV Rheinland)
- Defining Legal Guidelines and Standards
- Defining Risk Analysis and Processes(ISO 12100:2010)
- Defining Basic Electrical Safety Principles (IEC 60204-1)
- Identifying Safety Devices

Day 2

- Identifying Safety Functions of Machines
- Identifying Circuits, Schematics, and Examples
- Defining New Standards Regarding Safety of Machinery

Day 3

- Defining ISO 13849-1
- Defining ISO 13849-2

Day 4

- Defining IEC 62061
- Performing ISO 13849/IEC 62061 calculations

Day 5

- Exam (4 hours)

Product selection

Description	Catalogue No.
TÜV Functional Safety Engineer	SAF-TUV2

Resources

Safebook 5

Principals, standards and implementation

https://literature.rockwellautomation.com/idc/groups/literature/documents/rm/safebk-rm002_-en-p.pdf

Safety Functions Documents

Common application examples by product and safety rating

https://www.rockwellautomation.com/en-us/support/documentation/technical-data/functionalsafetydocum20180905-1614.html

Wiring Diagrams

GSR Safety Relays

https://literature.rockwellautomation.com/idc/groups/literature/documents/wd/safety-wd001_-en-p.pdf

Smart Safety - Whitepaper

https://literature.rockwellautomation.com/idc/groups/literature/documents/wp/smart-wp001_-en-p.pdf

Smart Safety

https://www.rockwellautomation.com/en-au/capabilities/smart-manufacturing/smart-devices/smart-safety.html

EtherNet/IP Device Level Ring

Application Technique

https://literature.rockwellautomation.com/idc/groups/literature/documents/at/enet-at007_-en-p.pdf

CIP Safety

ODVA

https://www.odva.org/technology-standards/distinct-cip-services/cip-safety/

CIP Safety Technology overview

ODVA Networking

https://www.odva.org/wp-content/uploads/2020/11/PUB00110R4_CIP_Safety.pdf

Machinery Safety Solutions

https://literature.rockwellautomation.com/idc/groups/literature/documents/qr/safety-qr003_-en-p.pdf

CIP Safety Networking - White Paper

https://literature.rockwellautomation.com/idc/groups/literature/documents/wp/safety-wp038_-en-p.pdf

Rockwell Safety Products

https://www.rockwellautomation.com/en-au/products/hardware/allen-bradley/safety-products.html

CCW Software

https://www.rockwellautomation.com/en-us/capabilities/industrial-automation-control/design-and-configuration-software.html

Safety Automation Builder

Software Safety System Development Tool

https://www.rockwellautomation.com/en-au/capabilities/industrial-safety-solutions/safety-automation-builder.html

Rockwell Safety Maturity

Improve Safety, Productivity and Compliance

https://www.rockwellautomation.com/en-au/capabilities/industrial-safety-solutions/safety-maturity.html

Safety ROI Tool

http://safetyroi.aquentstudioscle.com/php/index.php

NHP - Safety

https://www.nhp.com.au/Industries-and-Solutions/Solutions/Connected-Enterprise/SMART-Safety

Presence Sensing Safety Devices

https://literature.rockwellautomation.com/idc/groups/literature/documents/br/glsafe-br001_-en-p.pdf

Safety Standards Overview

https://literature.rockwellautomation.com/idc/groups/literature/documents/qr/safety-qr004_-en-p.pdf

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