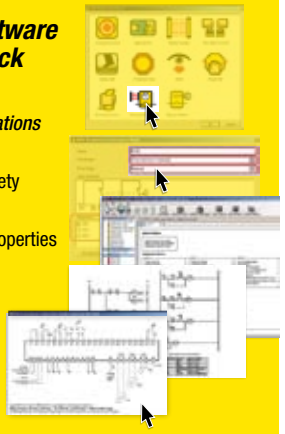
Safety is easier than you think.

Banner SC22-3 Safety Controller is Less Costly and Less Complex than Multiple Safety Modules or Safety PLCs.

The flexible, easy-to-configure safety module solution from Banner

- Configurable monitoring of multiple safety devices including E-stop buttons, interlocking switches, safety light screens, two-hand controls, muting, safety mats and rope pull switches
- 3 pairs of independent solid-state safety outputs
- Configurable auxiliary outputs for tracking inputs, outputs, lockout, I/O status and other functions
- Reduces the complexity of interfacing multiple safety functions and devices
- Front panel control for configuration and real-time system status without a PC
- Configure offline using PC; replicate configuration to memory card, email or export as PDF or DXF files
- Meets Safety Integrity Level (SIL) 3 per IEC 62061 and IEC 61508, and Category 4 Performance Level (PL e) per ISO 13849-1

Intuitive free software for point-and-click configuration



Create or edit configurations in minutes:

1. Select the type of safety input device
2. Map functions and properties from a pull down list
3. Wiring and ladder logic diagrams autopopulate along with configuration summary

- View and track status using front panel display or PC "Live Display"
- Includes fault history with time/date stamp
- Use INFO button to link to software and manual for quick reference to devices and safety category 2, 3 or 4 hookup

FREE DEMO and PCI Software Download at

www.bannerengineering.com/SC22

1.888.373.6767

BANNER®

more sensors, more solutions

SAFETY CONTROLLERS & MODULES

SC22-3/-3E Safety Controller page 526

- 22 input terminals for monitoring of both contact-based or solid-state outputs from Banner devices or any other manufacturer
- Three pairs of independent solid-state safety outputs
- Configurable auxiliary outputs for tracking inputs, outputs, lockout, I/O status and other functions
- Reduces the complexity of interfacing multiple safety functions and devices

PICO-GUARD™ page 530

- Features non-contact fiber optic technology for personnel safety and equipment protection
- Monitors multiple safety points
- Replaces mechanical safety interlock switches
- Eliminates electrical wiring to switchpoints

E-Stop & Interlocked Guard page 531

- Monitors contact failure or wiring fault
- Self-monitors to eliminate risk if module fails
- Installs easily

Universal Input page 539

- Monitors contact failure or wiring fault
- Used with one or two solid-state PNP or hand/relay contact safety or non-safety devices

Safety Mat Monitoring page 541

- Monitors a single mat or a series of connected mats
- Used with any standard 4-wire safety mat or edge triggered by a short in a contact plate or strip

Muting page 544

- Suspends safeguarding during hazard-free times in the machine's cycle
- Allows material to move into or from the process, without tripping the primary safeguard
- Monitors two or four hard-relay contact safety devices

Safe Speed Monitoring page 548

- Monitors two sensors with PNP outputs for rotation and linear movements
- Allows safety switches to release and safety gates to be opened when the speed drops below the dangerous level

Extension Relay page 550

- Provides additional safety outputs for a primary safety device with relay outputs
- Offers two hookup options, depending on model: one channel, or one or two channel
- Models with stop category 1 (OFF Delay)

Interface Relay page 552

- Increases the switching current capacity of low voltage primary safety devices to 6 amps
- Serves as a relay for primary safety devices with solid-state or hard contact outputs and external device monitoring

		Catalog Page	Model	Safety Category	Functional Stop Category	Input Device	Supply Voltage
Safety Controller		526	SC22-3-... SC22-3E-...	2, 3 or 4	0 & 1	Electromechanical & Solid Sate	24V dc
Fiber Optic		530	SFCDT-4A1 SFCDT-4A1C SFCDT-4A1CM1	4	0	Optical, Electromechanical & Solid State	24V dc
E-Stop & Interlocked Guard Safety Modules		531	GM-FA-10J	2 or 4	0	Magnetic & Electromechanical	24V ac/dc
		531	ES-FA-9AA ES-FA-11AA	2 or 4	0	Electromechanical	24V ac/dc
		531	ES-UA-5A ES-VA-5A	2 or 4	0	Electromechanical	115V ac & 12-24V dc 230V ac & 12-24V dc
		531	ES-TN-1H1 to ES-TN-1H12	2 or 4	0 & 1	Electromechanical	24V dc
		531	ES-TN-14H5 ES-TN-14H6	2 or 4	0 & 1	Electromechanical	24V dc
		531	ES-FA-6G	2	0	Electromechanical	24V ac/dc
UM Modules		539	UM-FA-9A UM-FA-11A	2, 3 or 4	0	Electromechanical & Solid Sate	24V ac/dc
Safety Mat Modules		541	SM-GA-5A SM-HA-5A	3 (with mat)	0	Safety Mat & Safety Edge (4-wire)	115V ac & 12-24V dc 230V ac & 12-24V dc
Muting Modules		544	MMD-TA-12B MMD-TA-11B	2, 3 or 4	0	Electromechanical & Solid State	24V dc
Safe Speed Modules		548	SSM-FM-11A10 SSM-FM-11A20	3	0	Solid Sate	24V ac/dc
Extension Modules		550	EM-T-7A EM-F-7G EM-FD-7G2 EM-FD-7G3 EM-FD-7G4	2, 3 or 4	0 1	Safety Output	24V dc 24V ac/dc
Interface Modules		552	IM-T-9A IM-T-11A	2, 3 or 4	0	Safety Output	24V dc

NC = Normally Closed Relay, NO = Normally Open Relay

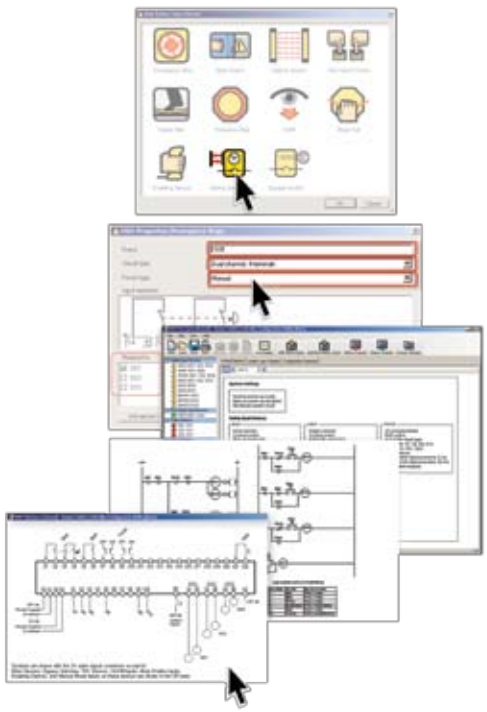
Inputs	Safety Outputs	Output Rating	Auxiliary Outputs	Output Response Time	Delay	Housing Width
22 Safety & Non-Safety	6 PNP (3 pair)	0.75 amps ea.	10 Discrete Status Outputs	10 ms	ON-delay: 5 min max OFF-delay: 5 min max	131 mm
		0.5 amps ea.	10 Discrete Status Outputs, EtherNet/IP & Modbus TCP			
4 Optical Channels & 2 NC USSI (dual) x2	2 PNP OSSD	0.5 amps	3 Solid-State (Aux., Fault, Weak)	13 ms (optical channels) 7 ms (USSIs)	—	132 mm
			7 Solid-State (Aux., Fault, Weak & Ch 1-4)			
4 Optical Channels, 1 Mute Device, 1 Mute Enable			7 Solid-State (Aux./Mute lamp, Fault, Weak & Ch 1-4)	13 ms (optical channels)		
1 NC & 1 NO (single or dual)	2 NO	6 amps	—	35 ms	—	22.5 mm
1 NC (single) or 2 NC (dual)	3 NO	6 amps	—	25 ms	—	22.5 mm
	2 NO	7 amps	1 NC			
1 NC (single) or 2 NC (dual)	4 NO	6 amps	1 NC & 2 PNP	25 ms	—	45 mm
1 NC (single) or 2 NC (dual)	2 NO & 2 NO w/delay	4 amps	1 NC (immediate) & 1 NC (delayed)	50 ms	OFF-delay 0 - 200 sec., depending on model	45 mm
1 NC (single) or 2 NC (dual)	4 NO & 4 NO w/delay	4 amps	1 NC (immediate) & 1 NC (delayed)	50 ms	OFF-delay 0 - 20 sec.	67.5 mm
					OFF-delay 0-200 sec.	
1 NC (single)	3 NO	6 amps	1 NC	35 ms	—	22.5 mm
1 NC (single) or 2 NC (dual)	3 NO	6 amps	—	25 ms	—	22.5 mm
	2 NO		1 NC			
1 (or multiple in series) 4-wire Safety Mat	4 NO	6 amps	1 NC & 2 PNP	50 ms	—	45 mm
2 NC Muteable (dual) & 2 NC SSI (dual)	2 PNP OSSD	0.5 amps	1 PNP	10 ms	—	67.5 mm
	2 NO	6 amps	1 NC	20 ms		
2 PNP	2 NO	4 amps	1 NC	700 ms	—	45 mm
				350 ms		
1 NC (single) or 2 NC (dual)	4 NO	6 amps	—	20 ms	—	22.5 mm
1 NC (single)				35 ms	—	22.5 mm
	4 NO w/delay			30 ms	OFF-delay 0.5 sec.	
					OFF-delay 1.0 sec.	
					OFF-delay 2.0 sec.	
1 NC (dual)	3 NO	6 amps	—	20 ms	—	22.5 mm
	2 NO		1 NC			

ACCESSORIES page 529

SC22-3/-3E
Safety Controller

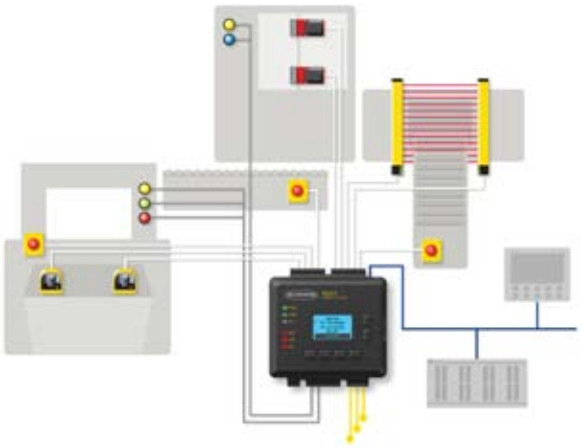
- Totally configurable and flexible safety controller that can easily replace multiple dedicated safety modules
- Controller monitors up to 22 inputs for proper operation
- Each input can be configured for Control Reliability for Category 2, 3 or 4 safety circuit performance per OSHA/ANSI or ISO 13849-1, or for a non-safety input
- Input terminals can monitor both contact-based or PNP solid-state outputs
- 3 pairs of solid-state safety outputs with ON-Delay, OFF-Delay and cancel OFF-Delay
- 10 configurable auxiliary status outputs track inputs, outputs, lockout, I/O status and other functions
- SC22-3E models provide diagnostic information using EtherNet/IP, Modbus TCP and PCCC
- Configuration is extremely intuitive with the built-in front panel LCD display or using a PC Interface (download free at www.bannerengineering.com/sc22)
- Controller can be configured offline using a PC; replicate configuration to memory card, email or export as PDF or DXF files
- Controller is designed to meet stringent standards including Safety Integrity Level (SIL) 3 per IEC 61508, SIL CL 3 per IEC 62061 and Category 4 Performance Level (PL e) per EN ISO 13849-1

Intuitive free software for point-and-click configuration



1. Select the type of safety input device
2. Map functions and properties from a pull down list
3. Wiring and ladder logic diagrams autopopulate along with configuration summary
   - View and track status using front panel display or PC “Live Display”
   - Includes fault history with time/date stamp
   - Use INFO button to link to software and manual for quick reference to devices and safety category 2, 3 or 4 hookup

22 input terminals for monitoring safety and non-safety devices



Versatile input circuitry accommodates a wide range of inputs from Banner devices or any other manufacturer, including:

- E-stop Buttons
- Two-Hand Controls
- Safety Light Screens
- Rope Pulls
- Safety Mats and Edges
- Enabling Devices
- Muting Sensors
- Bypass Switches
- Interlocking Switches
- Laser Scanners
- Value monitoring

ACCESSORIES page 529

ONLINE
AUTOCAD, STEP, IGES & PDF

SC22-3/-3E Safety Controller, 24V dc

Terminal Type	Safety Outputs	USB Cable	Output Rating	Aux. Outputs	XM Card	XM Programming Tool	Communication Protocol	Model
Screw	6 PNP (3 pairs)	1.8 m	0.75 amps each output	10 status (I/O, mute, lockout, fault and reset)	Yes	Yes	—	SC22-3-SU1
Clamp								SC22-3-CU1
Screw		—				—	—	SC22-3-S
Clamp								SC22-3-C
Screw		1.8 m	0.5 amps each output	10 status (I/O, mute, lockout, fault and reset) plus 32 virtual status		Yes	EtherNet/IP & Modbus TCP	SC22-3E-SU1
Clamp								SC22-3E-CU1
Screw		—				—	EtherNet/IP & Modbus TCP	SC22-3E-S
Clamp								SC22-3E-C

SC22-3/-3E Safety Controller Specifications

Power	24V dc, ± 20% **SC22-3 models:** 0.4 A (controller only), 5.9 A (all outputs ON @ full rated load) **SC22-3E models:** 0.4 A (controller only), 4.9 A (all outputs ON @ full rated load) **The Controller should be connected only to a SELV (safety extra-low voltage, for circuits without earth ground) or a PELV (protected extra-low voltage, for circuits with earth ground) power supply.**
Safety and Non-Safety Inputs (22 terminals)	**Input ON threshold:** > 15V dc (guaranteed on), 30V dc max. **Input OFF threshold:** < 5V dc (guaranteed off with any 1 fault), –3V dc min. **Input ON current:** 8 mA typical @ 24V dc, > 2 mA (guaranteed with 1 fault) 50 mA peak contact cleaning current @ 24V dc **Sourcing current:** 30 mA minimum continuous (3V dc max. drop) **Input lead resistance:** 300 Ω max. (150 Ω per lead) **Input requirements for a 4-wire safety mat:** **Max. capacity between plates:** 0.5 µF **Max. capacity between bottom plate and ground:** 0.5 µF **Max. resistance between the 2 input terminals of one plate:** 20 Ω
Safety Outputs (6 terminals, 3 redundant outputs)	**Rated output current: SC22-3 models:** 0.75 A max. each output (1.0V dc max drop) **SC22-3E models:** 0.5 A max. each output (1.0V dc max drop) **Output OFF threshold:** 0.6V dc typical (1.2V dc max. guaranteed with 1 fault) **Output leakage current:** 50 µA max. with open 0V **Load:** 0.1 µF max., 1 H max., 10 Ω max. per lead

More on next page

SC22-3/-3E Safety Controller Specifications (cont'd)

Status Outputs (10 terminals)	**Rated output current:** 0.5A @ 24V dc (individual), 1.0 A @ 24V dc (total of all outputs) **O1 to O8 (General Purpose) — Output OFF voltage:** < 0.5V dc (no load), 22 KΩ pull down to 0V **O9 and O10 (General Purpose or Monitored Mute Lamp) —** **Output OFF voltage:** Internal 94 KΩ pull up to 24V dc supply **Output ON/OFF threshold:** 15V dc +/−4V dc @ 24V dc supply NOTE: For O9 and O10 (if configured as monitored mute lamp output only), if a short circuit or other fault condition causes the output to drop below this threshold while the output is ON, a lockout will occur. If an open circuit or other fault condition causes the output to rise above this threshold while the output is OFF, a lockout will occur.
Network Interface (SC22-3E only)	Ethernet 10/100 Base-T/TX, RJ45 modular connector Selectable auto negotiate or manual rate and duplex Auto MDI/MDIX (Auto cross) **Protocols:** EtherNet/IP (with PCCC), Modbus TCP **Data:** 32 configurable virtual status outputs; fault diagnostic codes and messages; access to fault log
Response and Recovery Times	**Response time (ON to OFF):** 10 milliseconds max. (with standard 6 milliseconds debounce; this can increase if debounce time increases. Refer to the configuration summary for actual response time.) **Recovery time (OFF to ON):** 400 milliseconds max. (with manual reset option) **Recovery time (OFF to ON):** 400 milliseconds max. plus input debounce time (auto reset)
Onboard LCD Information Display— Password Requirements	**Password is not required:** Run mode (I/O status) Fault (I/O fault detection and remedial steps) Review configuration parameters (I/O properties and terminals) **Password is required:** Configuration mode (create/modify/confirm/download configurations)
Environmental Rating	NEMA 1 (IEC IP20), for use inside NEMA 3 (IEC IP54) or better enclosure
Operating Conditions	**Temperature range:** 0° to +55° C
Mechanical Stress	**Shock:** 15g for 11 milliseconds, half sine, 18 shocks total (per IEC 61131-2) **Bump:** 10g for 16 milliseconds, 6000 cycles total (per IEC 61496-1) **Vibration:** 3.5 mm occasional / 1.75 mm continuous @ 5Hz to 9Hz, 1.0g occasional and 0.5g continuous @ 9Hz to 150Hz: (per IEC 61131-2) and 0.35 mm single amplitude / 0.70 mm peak-to-peak @ 10 to 55Hz (per IEC 61496-1), all @ 10 sweep cycles per axis
EMC	Meets or exceeds all EMC requirements in IEC 61131-2, IEC 61496-1 (Type 4), and IEC 62061 Annex E, Table E.1 (increased immunity levels)
Removable Terminals	**Screw terminals** **Wire sizes:** 16, 18, 20, 22 or 24 AWG (0.20 – 1.31 mm^2) **Tightening torque:** 0.23 Nm (2 in. lbs) nominal **Wire strip length:** 5.00 mm **Tightening torque:** 0.34 Nm (3.0 in. lbs) maximum **Clamp terminals** **Wire size:** 16, 18, 20, 22, or 24 AWG (0.20 – 1.31 mm^2) **Wire strip length:** 9.00 mm **Important: Clamp terminals are designed for 1 wire only. If more than 1 wire is connected to a terminal, a wire could loosen or become completely disconnected from the terminal, causing a short.**
Design Standards	• SIL CL 3 per IEC 62061 Safety of Machinery – Functional Safety of Safety-Related Electrical, Electronic and Programmable Electronic Control Systems. • SIL 3 per IEC 61508 Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems • Category 4 per ISO 13849-1 (1999) • Category 4 Performance Level (PL) e per ISO 13849-1 (2006) • Complies with Machinery Directive 2006/42/EC • IEC 61131-2 Programmable Controllers, Part 2: Equipment Requirements and Tests • UL 508 Industrial Control Equipment • UL 1998 Software in Programmable Components • ANSI NFPA 79 Electrical Standards for Industrial Machinery • IEC 60204-1 Electrical Equipment of Machines: General Requirements • ISO 13851 (EN574) Safety of Machinery – Two-Hand Control Devices – Functional Aspects and Design Principles • ISO 13850 (EN418) Emergency Stop Devices
Certifications	CE, UL LISTED, c UL LISTED Auxiliary Device US
Wiring Diagrams	WD029, WD030, WD031, WD031, WD032 (pp. 791-793).

SC22-3/-3E Interface Modules

Description	Supply Voltage	Inputs (Safety Controller Outputs)	Safety Outputs	Output Rating	EDM Contacts	Model
For use with 1-dual channel SC22-3 safety output	24V dc (Controller supplied)	2 (SO1)	3 NO	10 amps	1 NC pair per output	**SC-IM9A**
For use with 2-dual channel SC22-3 safety outputs		4 (SO1 and SO2)	Total of 6 (3 NO per output)			**SC-IM9B**
For use with 3-dual channel SC22-3 safety outputs		6 (SO1, SO2 and SO3)	Total of 9 (3 NO per output)			**SC-IM9C**

NOTE: External device monitoring (EDM) is required to be wired separately to the NC contacts to comply with ISO 13849-1 categories and ANSI/OSHA control reliability.

Additional Interfacing Products

		Description	Models	Product Information
Interface Modules		• Interface modules provide two or three normally open force-guided relay outputs rated at 6 A. • Convenient plug-in terminal blocks on a 22.5 mm DIN-rail mountable housing are included.	**IM-T-9A** (3 NO)	Page 552
			IM-T-11A (2 NO/1 NC)	
Mechanically Linked Contactors		• Contactors add 10 or 18 amp current carrying capability to any safety system. • Suppressors extend the life of an actuating device that uses a contactor. • Modular design simplifies assembly and installation.	**11-BG00-31-D-024**	Page 742
			BF1801L-024	

NC = Normally closed, NO = Normally open
NOTE: External device monitoring (EDM) is required to be wired separately to the NC contacts to comply with ISO 13849-1 categories and ANSI/OSHA control reliability.

Miscellaneous

Description	Model
SC22-3 replacement controller (without terminals)	**SC-SC22-3**
SC22-3E replacement controller (without terminals), Ethernet compatible	**SC-SC22-3E**
External memory card (XM card)	**SC-XM1**
Bulk pack of 5 XM Cards	**SC-XM1-5**
Screw terminal replacement set	**SC-TS1**
Clamp terminal replacement set	**SC-TC1**
USB A/B cable, 1.8 m	**SC-USB1**
XM card USB programming tool	**SC-XMP**

Cordsets

Ethernet Communication

See page 703

Length	Shielded	Shielded Crossover
2.13 m	**STP07**	**STPX07**
7.62 m	**STP25**	**STPX25**
15.2 m	**STP50**	**STPX50**
22.9 m	**STP75**	**STPX75**

Additional cordset information available. See page 679.

Brackets

SC22-3

pg. 628

DIN-35..

Additional bracket information available. See page 620.

PICO-GUARD™
Fiber Optic Controllers page 508

- Flexible and easy to install, the controller is a low-cost alternative to cumbersome and costly methods required for machine safeguarding.
- Four optical channels to protect personnel from hazardous equipment and to protect critical tooling or processes.
- Controller signals the machine control circuit to stop when the system detects a loss in light signal or receives a safety stop request from its Universal Safety Stop Interface (USSI) input.
- Each channel can control several optical elements in the same fiber loop.
- Each channel can monitor a separate part of a machine, such as doors, points of entry and sensors.
- USSI connects multiple PICO-GUARD Controllers and other safety devices in a single safety circuit, when required.
- Models with muting suspend safeguarding during hazard-free time in the machine's cycle.
- Diverse-redundant and self-checking design exceeds OSHA/ANSI Control Reliability and meets Category 4 per ISO 13849-1 (EN 954-1) and IEC 61496-1 Type 4 requirements.

Advanced solid-state controller with four optical channels.

Use with optical elements including:

Point Systems

- 12 or 30 mm threaded barrel housings
- Use multiple points for a customized grid system
- Three integral fiber types in five lengths
  Page 511

Grid Systems

- 2-, 3- or 4-beam systems
- Protected heights of 500 to 1066 mm
- Five lengths of fiber
  Page 511

Interlock Systems

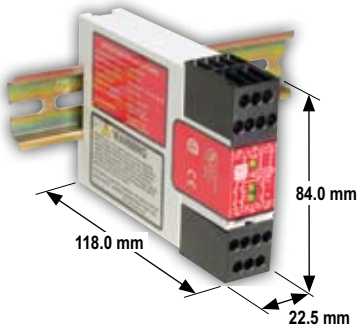
- Six housing styles
- Non-contact fiber optic safety switches
- Models with integral fibers or quick-release fiber connectors
  Page 515

PICO-GUARD™ Optical E-Stop Buttons

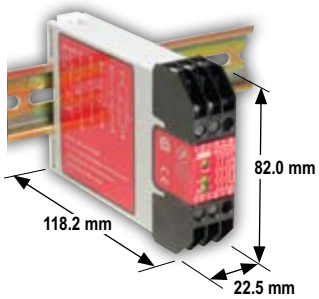
- Push-to-stop, twist-to-release optical E-Stop button
- IP65-rated housing
- Fiber connection ports (same side or opposite sides, depending on model)
  Page 518

E-Stop & Interlocked Guard
Safety Modules

- Modules monitor external devices for proper operation, contact failure or wiring faults.
- Module goes into lockout mode if fault is detected.
- Available voltages include 24V ac/dc; 24V dc; 115V ac or 12-24V dc; or 230V ac or 12-24V dc.
- Modules serve to monitor positive-opening E-stop and interlocking switches.
- Non-safety outputs are available on most modules.
- Modules are available with an adjustable output delay of 0-20 or 0-200 seconds.
- Modules offer reset options: Automatic, manual and monitored manual (depending on model).
- Ratings are NEMA 1 and at least IEC IP20.
- Housings are rugged polycarbonate and mount to standard 35 mm DIN rail.

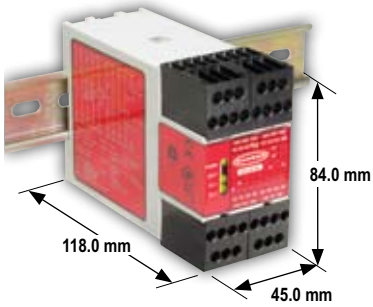


ES-FA-..AA & GM-FA-10J Models

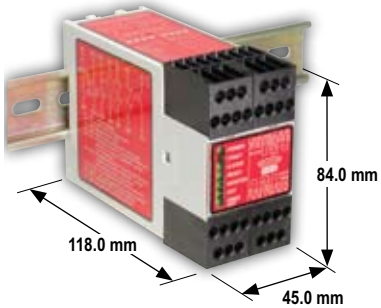


ES-FA-6G Models

ONLINE
AUTOCAD, STEP, IGES & PDF



ES-..A-5A Models



ES-TN-1H.. Models

ES-TN-14H.. Models

E-Stop & Guard Safety Modules

Functional Stop Category	Supply Voltage	Inputs	Safety Outputs	Aux. Outputs	Output Rating	Output Response Time	Delay	Model
0	24V ac/dc	1 NC & 1 NO (single or dual)	2 NO	—	6 amps	35 ms	—	**GM-FA-10J**
0	24V ac/dc	1 NC (single) or 2 NC (dual)	3 NO	—	6 amps	25 ms	—	**ES-FA-9AA**
			2 NO	1 NC	7 amps			**ES-FA-11AA**
0	115V ac & 12-24V dc	1 NC (single) or 2 NC (dual)	4 NO	1 NC & 2 PNP	6 amps	25 ms	—	**ES-UA-5A**
	230V ac & 12-24V dc							**ES-VA-5A**
0 & 1	24V dc	1 NC (single) or 2 NC (dual)	2 NO (immediate) & 2 NO (delayed)	1 NC (immediate) & 1 NC (delayed)	4 amps	50 ms	0 - 20 sec.	**ES-TN-1H5**
							0 - 200 sec.	**ES-TN-1H6**
							0.25 sec.	**ES-TN-1H1**
							0.5 sec.	**ES-TN-1H2**
							1.0 sec.	**ES-TN-1H3**
							2.0 sec.	**ES-TN-1H4**
							4.0 sec.	**ES-TN-1H7**
							6.0 sec.	**ES-TN-1H8**
							8.0 sec.	**ES-TN-1H9**
							10.0 sec.	**ES-TN-1H10**
							15.0 sec.	**ES-TN-1H11**
							20.0 sec.	**ES-TN-1H12**
0 & 1	24V dc	1 NC (single) or 2 NC (dual)	4 NO immediate & 4 NO (delayed)	1 NC (immediate) & 1 NC (delayed)	4 amps	50 ms	0 - 20 sec.	**ES-TN-14H5**
							0 - 200 sec.	**ES-TN-14H6**
0	24V ac/dc	1 NC (single)	3 NO	1 NC	6 amps	35 ms	—	**ES-FA-6G**

NC = Normally Closed Relay, NO = Normally Open Relay

GM-FA-10J Guard Monitoring Module Specifications

Supply Voltage and Current	24V dc ±15% @ 150 mA (SELV-rated supply according to EN IEC 60950, NEC Class 2) 24V ac ±15% @ 150 mA, 50-60 Hz +/- 5% (NEC Class 2-rated transformer) **Power consumption:** approx. 3 VA / 3 W To comply with UL and CSA standards, the isolated secondary power supply circuit in the installation must incorporate a method to limit the overvoltage to 0.8 kV
Supply Protection Circuitry	Protected against transient voltages and reverse polarity
Overvoltage Category	**Output relay contact voltage of 1V to 150V ac/dc:** Category III **Output relay contact voltage of 151V to 250V ac/dc:** Category II (Category III, if appropriate overvoltage reduction is provided, as described in data sheet.)
Pollution Degree	2
Output Configuration	Each normally open output channel is a series connection of contacts from two forced-guided (mechanically linked) relays, K1-K2. **Contacts:** AgNi, 5 µm gold-plated **Low Current Rating:** The 5 µm gold-plated contacts allow the switching of low current/low voltage. In these low-power applications, multiple contacts can also be switched in series (e.g., "dry switching"). **To preserve the gold plating on the contacts, do not exceed the following max. values at any time:** **Min. voltage:** 1V ac/dc **Min. current:** 5 mA ac/dc **Min power:** 5 mW (5 mVA) **Max. voltage:** 60V **Max. current:** 300 mA **Max. power:** 7 W (7 VA) **High Current Rating:** If higher loads must be switched through one or more of the contacts, the minimum and maximum values of the contact(s) changes to:

UL LISTED EMERGENCY STOP DEVICE 29YL	**Minimum:** **Voltage:** 15V ac/dc **Current:** 30 mA ac/dc **Power:** 0.45 W (0.45 VA)	**Maximum:** 250V ac/24V dc, 6A resistive B300, R300 per UL508
CE	**Minimum:** **Voltage:** 15V ac/dc **Current:** 30 mA ac/dc **Power:** 0.45 W (0.45 VA)	**Maximum:** 250V ac/24V dc, 6A resistive IEC 60947-5-1: AC15: 230V ac. 3 A; DC-13: 24V dc, 2A

Mechanical life: ≥ 50,000,000 operations
Electrical life (switching cycles of the output contacts, resistive load): 150,000 cycles @ 900 VA; 1,000,000 cycles @ 250 VA; 2,000,000 cycles @ 150 VA; 5,000,000 cycles @ 100 VA
NOTE: Transient suppression is recommended when switching inductive loads. Install suppressors across load. Never install suppressors across output contacts.

Output Response Time	35 milliseconds max.
Input Requirements	Each switch or sensor must have a normally closed contact and a normally open contact capable of switching 20 to 50 mA @ 15 to 30V dc. **Reset switch:** 20 mA @ 12V dc, hard contact only **Max. external resistance between terminals S11/S12, S11/S13, S21/S22 and S21/S23:** 270 ohms each.
Simultaneity Monitoring	**2-Channel operation:** 3 seconds **1-Channel operation:** infinite
Status Indicators	**4 green LEDs:** **Power:** power is supplied to Safety Module **Channel 1:** inputs satisfied (guard closed) **Channel 2:** inputs satisfied (guard closed) **Output:** K1 and K2 energized, safety outputs closed **1 red LED:** Fault
Construction	Polycarbonate housing
Environmental Rating	IEC IP20
Mounting	Mounts to standard 35 mm DIN rail track. Safety Module must be installed inside an enclosure rated NEMA 3 (IP54), or better.
Vibration Resistance	10 to 55 Hz @ 0.35 mm displacement per 60068-2-6
Operating Conditions	**Temperature:** 0° to +50° C **Relative humidity:** 90% @ +50° C (non-condensing)
Design Standards	CE: Cat. 4 PL e, per EN ISO 13849-1; SIL 3 per IEC 61508 and IEC 62061

More on next page

GM-FA-10J Guard Monitoring Module Specifications (cont'd)

Certifications	CE UL LISTED EMERGENCY STOP DEVICE 29YL
Wiring Diagrams	**1-Channel Coded Magnet Switches:** WD033 (p. 794) **2-Channel Positive Opening Switches:** WD034 (p. 794) **1-Channel (Multiple Guards):** WD035 (p. 795) **2-Channel (Multiple Guards):** WD036 (p. 795) **Guarded Machine:** WD037 (p. 796)

ES-FA-..AA Safety Module Specifications

Supply Voltage and Current	24V dc ±10% (SELV-rated supply according to EN IEC 60950, NEC Class 2) 24V ac ±10%, 50/60Hz (NEC Class 2-rated transformer) **Power consumption:** approx. 2 W/2 VA
Supply Protection Circuitry	Protected against transient voltages and reverse polarity
Overvoltage Category	**Output relay contact voltage of 1V to 150V ac/dc:** Category III **Output relay contact voltage of 151V to 250V ac/dc:** Category III, if appropriate overvoltage reduction is provided, as described in data sheet.
Pollution Degree	2
Output Configuration	**ES-FA-9AA:** 3 normally open (NO) output channels **ES-FA-11AA:** 2 normally open (NO) output channels and 1 normally closed (NC) auxiliary output Each normally open output channel is a series connection of contacts from two forced-guided (mechanically linked) relays, K1-K2. The normally closed Aux. output channel of the **ES-FA-11AA** is a parallel connection of contacts from two forced-guided relays, K1-K2. **Contacts:** AgNi, 5 µm gold-plated **Low Current Rating:** The 5 µm gold-plated contacts allow the switching of low current/low voltage. In these low-power applications, multiple contacts can also be switched in series (e.g., "dry switching"). **To preserve the gold plating on the contacts, do not exceed the following max. values at any time:** **Minimum:** **Voltage:** 1V ac/dc **Current:** 5 mA ac/dc **Power:** 5 mW (5 mVA) **Maximum:** **Voltage:** 60V **Current:** 300 mA **Power:** 7 W (7 VA) **High Current Rating:** If higher loads must be switched through one or more of the contacts, the minimum and maximum values of the contact(s) changes to: **Minimum:** **Voltage:** 15V ac/dc **Current:** 30 mA ac/dc **Power:** 0.45 W (0.45 VA) **Maximum:** **Voltage:** 250V ac/dc **Current:** **ES-FA-9AA:** 6A **ES-FA-11AA:** 7 A **Power:** **ES-FA-9AA:** 200 W (1,500 VA) **ES-FA-11AA:** 200 W (1,750 VA) **Mechanical life:** > 20,000,000 operations **Electrical life (switching cycles of the output contacts, resistive load):** 150,000 cycles @ 1,500 VA; 1,000,000 cycles @ 450 VA; 2,000,000 cycles @ 250 VA; 5,000,000 cycles @ 125 VA **NOTE: Transient suppression is recommended when switching inductive loads. Install suppressors across load. Never install suppressors across output contacts.**
Output Response Time	25 milliseconds typical
Input Requirements	**Safety input switch:** **Dual-Channel (contacts) hookup –** 10 to 20 mA steady state @ 12V dc NOTE: Inputs are designed with a brief contact-cleaning current of 100 mA when initially closed. **Single-Channel hookup –** 40 to 100 mA @ 24V ac/dc +/- 10%; 50/60 Hz **Reset switch:** 20 mA @ 12V dc, hard contact only
Minimum OFF-State Recovery Time	250 milliseconds
Status Indicators	**3 green LEDs:** Power ON K1 energized K2 energized
Construction	Polycarbonate housing
Environmental Rating	Rated NEMA 1; IP40, Terminals IP20

More on next page

ES-FA-..AA Safety Module Specifications (cont'd)

Mounting	Mounts to standard 35 mm DIN rail track. Safety Module must be installed inside an enclosure rated NEMA 3 (IP54), or better.
Vibration Resistance	10 to 55Hz @ 0.35 mm displacement per IEC 60068-2-6
Operating Conditions	**Temperature:** 0° to +50° C **Relative humidity:** 90% @ +50° C (non-condensing)
Design Standards	Cat. 4 PL e per EN ISO 13849-1; SIL 3 per IEC 61508 and IEC 62061
Certifications	CE, UL LISTED EMERGENCY STOP DEVICE 29YL
Wiring Diagrams	**1-Channel:** WD038 (p. 797) **2-Channel:** WD039 (p. 798)

ES-..A-5A Safety Module Specifications

Supply Voltage and Current

AI-A2: 115V ac (model **ES-UA-5A**) or 230V ac (model **ES-VA-5A**) ±15% , 50/60Hz
BI-B2: 11V dc – 27.6V dc
Power consumption: approx. 4W/7VA
The Safety Module should be connected only to a SELV (safety extra-low voltage, for circuits without earth ground) or a PELV (protected extra-low voltage, for circuits with earth ground) power supply.

Supply Protection Circuitry

Protected against transient voltages and reverse polarity

Overvoltage Category

Output relay contact voltage of 1V to 150V ac/dc: Category III
Output relay contact voltage of 151V to 250V ac/dc: Category III, if appropriate overvoltage reduction is provided, as described in data sheet.

Pollution Degree

2

Output Configuration

4 normally open (NO) output channels; 1 normally closed (NC) and 2 solid-state auxiliary outputs

Each normally open output channel is a series connection of contacts from two forced-guided (mechanically linked) relays, K1-K2. The normally closed Aux. output channel is a parallel connection of contacts from two forced-guided relays, K1-K2.

Contacts: AgNi, 5 µm gold-plated

Low Current Rating: The 5 µm gold-plated contacts allow the switching of low current/low voltage. In these low-power applications, multiple contacts can also be switched in series (e.g., "dry switching").
To preserve the gold plating on the contacts, do not exceed the following max. values at any time:

Minimum:	**Maximum:**
Voltage: 1V ac/dc	**Voltage:** 60V
Current: 5 mA ac/dc	**Current:** 300 mA
Power: 5 mW (5 mVA)	**Power:** 7 W (7 VA)

High Current Rating: If higher loads must be switched through one or more of the contacts, the minimum and maximum values of the contact(s) changes to:

UL LISTED EMERGENCY STOP DEVICE 29YL c UL LISTED IND. CONT. EQ. 447Y	**Minimum:** **Voltage:** 15V ac/dc **Current:** 250 mA ac/dc **Power:** 5 W (5 VA)	**Maximum:** **NO Safety Contacts (13-14, 23-24, 33-34, 43-44):** 250V ac/ 24V dc, 6A resistive B300, Q300 (UL508) **NC Auxiliary Contact (51-52):** 250V ac/ 24V dc, 5A resistive B300, Q300 (UL508)
CE	**Minimum:** **Voltage:** 15V ac/dc **Current:** 250 mA ac/dc **Power:** 5 W (5 VA)	**Maximum—IEC60947-5-1** **NO Safety Contact: AC-1:** 250V ac, 6A; **DC-1:** 24V dc, 6A **AC-15:** 230V ac, 3A; **DC-13:** 24V dc, 4A **NC Auxiliary Contact: AC-1:** 250V ac, 5A; **DC-1:** 24V dc, 5A **AC-15:** 230V ac, 2A; **DC-13:** 24V dc, 4A

Mechanical life: > 20,000,000 operations
Electrical life (switching cycles of the output contacts, resistive load): 150,000 cycles @ 1,500 VA; 1,000,000 cycles @ 450 VA; 2,000,000 cycles @ 250 VA; 5,000,000 cycles @ 125 VA
NOTE: Transient suppression is recommended when switching inductive loads. Install suppressors across load. Never install suppressors across output contacts.

Solid-State Monitor Outputs:
- Two non-safety solid-state dc outputs
- Output at Y32 monitors state of outputs – conducts (output high) when both K1 and K2 are energized
- Output at Y35 conducts (output high) when in normal operation (no lockout)
- Output circuits require application of +12-24V dc ±15% at terminal Y31; dc common at Y30
- Maximum switching current: 100 mA at 12-24V dc
- Both outputs are protected against short circuits

More on next page

ES-..A-5A Safety Module Specifications (cont'd)

Output Response Time	35 milliseconds max. (25 milliseconds typical)
Input Requirements	**E-stop switch** must have normally closed contacts each capable of switching 20 to 50 mA @ 12 to 30V dc; and must be open ≥15 milliseconds for a valid stop command. Maximum input resistance 250 ohms per channel @ 24V dc supply voltage. Maximum input resistance 25 ohms per channel @ 12V dc supply voltage. **Reset switch** must have one normally open contact capable of switching 20 to 50 mA @ 12 to 30V ac/dc.
OFF-State Recovery Time	350 milliseconds
Status Indicators	**3 green LEDs:** Power ON Channel 1 Channel 2 **1 red LED:** Fault Condition
Construction	Polycarbonate housing
Environmental Rating	Rated NEMA 1; IEC IP20
Mounting	Mounts to standard 35 mm DIN rail track. Safety Module must be installed inside an enclosure rated NEMA 3 (IP54), or better.
Vibration Resistance	10 to 60Hz @ 0.35 mm displacement per UL 991 60 to 150 Hz @ 5 g max.
Operating Conditions	**Temperature:** 0° to +50° C (surrounding air) **Relative humidity:** 90% @ +50° C (non-condensing)
Design Standards	Cat. 4 PL e per EN ISO 13849-1; SIL 3 per IEC 61508 and IEC 62061
Certifications	CE UL LISTED EMERGENCY STOP DEVICE 29YL c UL LISTED IND. CONT. EQ. 447Y
Wiring Diagrams	**1-Channel:** WD040 (p. 799) **2-Channel:** WD041 (p. 800)

ES-TN-1H.. Safety Module Specifications

Supply Voltage and Current	24V dc, ±20% **Power consumption:** approx. 5 W
Supply Protection Circuitry	Protected against transient voltages and reverse polarity
Output Configuration	**Outputs K1& K2:** Two redundant (total of four) safety relay (forced-guided) contacts – AgNi, gold flashed one auxiliary normally closed contact – AgNi, gold flashed **Outputs K3 &K4:** Two redundant (total of four) delayed relay (forced-guided) contacts – AgNi, gold flashed one auxiliary normally closed contact – AgNi, gold flashed **Contact ratings (all normally open and normally closed output contacts):** **Max. voltage:** 250V ac or 250V dc **Max. current:** 4 A ac or dc **Min. current:** 30 mA @ 24V dc **Max. power:** 1000 VA, 200 W **Mechanical life:** 50,000,000 operations **Electrical life:** 100,000 at full resistive load **NOTE: Transient suppression is recommended when switching inductive loads. Install suppressors across load. Never install suppressors across output contacts.**
Output Response Time	**K1 &K2:** 50 milliseconds typical **K3 &K4 (ES-TN-1H1):** 0.25 second **K3 &K4 (ES-TN-1H2):** 0.5 second **K3 &K4 (ES-TN-1H3):** 1.0 second **K3 &K4 (ES-TN-1H4):** 2.0 seconds **K3 & K4 (ES-TN-1H5):** 0, 0.5, 1, 2, 4, 6, 8, 10, 15, 20 seconds **K3 & K4 (ES-TN-1H6):** 0, 5, 10, 20, 30, 50, 70, 100, 150, 200 seconds **K3 &K4 (ES-TN-1H7):** 4.0 seconds **K3 &K4 (ES-TN-1H8):** 6.0 seconds **K3 &K4 (ES-TN-1H9):** 8.0 seconds **K3 &K4 (ES-TN-1H10):** 10.0 seconds **K3 &K4 (ES-TN-1H11):** 15.0 seconds **K3 &K4 (ES-TN-1H12):** 20.0 seconds **Delayed Output Timing Tolerance:** Set time ±100 milliseconds or ±2%, whichever is greater

More on next page

ES-TN-1H.. Safety Module Specifications (cont'd)

Input Requirements	**Input switch** must have a normally closed contact capable of switching 20 mA @ 24V dc. **Reset switch** must have one normally open contact capable of switching 20 mA @ 24V dc. NOTE: Inputs must be voltage-free, dry contacts.
ON-Time Delay	≥ 100 milliseconds; time from the E-stop contacts to close (Auto Reset) or the Reset button to open (Manual Reset) and the safety outputs to close.
Status Indicators	**6 green LEDs:** Power, E-Stop, Reset; Monitor, Out (K1 &K2 ON/OFF), Timed-Out (K3 & K4 ON/OFF) **1 red LED:** Fault
Construction	Polycarbonate housing
Environmental Rating	Rated NEMA 1; IP40, Terminals IP20, max. terminal torque 0.8 Nm
Mounting	Mounts to standard 35 mm DIN rail track. Safety Module must be installed inside an enclosure rated NEMA 3 (IP54), or better.
Vibration Resistance	10 to 55Hz @ 0.35 mm displacement per IEC 60068-2-6
Operating Conditions	**Temperature:** 0° to +50° C **Relative humidity:** 90% @ +50° C (non-condensing)
Certifications	c SA us (except ES-TN-1H1) CE (except ES-TN-1H1) **Important Notice:** **European Community Machinery Directive 2006/42/EC** The ES-TN-1H.. Modules comply with Machine Directive 98/37/EC and are certified to EN954-1(1996). After December 31, 2011, these safety devices can only be installed as a replacement component within the European Union (EU). For more information, please see www.bannerengineering.com/144763 or call 1-888-373-6767.
Wiring Diagrams	**2-Channel:** WD042 (p. 801)

ES-TN-14H.. Safety Module Specifications

Supply Voltage and Current	24V dc, ±20% **Power consumption:** approx. 5 W
Supply Protection Circuitry	Protected against transient voltages and reverse polarity
Output Configuration	**Outputs K1 & K2:** four redundant (total of eight) safety relay (forced-guided) contacts – AgNi, gold flashed one auxiliary normally closed contact – AgNi, gold flashed **Outputs K3 & K4:** four redundant (total of eight) delayed relay (forced-guided) contacts – AgNi, gold flashed one auxiliary normally closed contact – AgNi, gold flashed **Contact ratings (all normally open and normally closed output contacts):** **Max. voltage:** 250V ac or dc **Max. current:** 4 A ac or dc **Min. current:** 30 mA @ 24V dc **Max. power:** 1000 VA, 200 W **Mechanical life:** 50,000,000 operations **Electrical life:** 100,000 at full resistive load **NOTE: Transient suppression is recommended when switching inductive loads. Install suppressors across load. Never install suppressors across output contacts.**
Output Response Time	**K1 & K2:** 50 milliseconds typical **K3 & K4 (ES-TN-14H5):** 0, 0.5, 1, 2, 4, 6, 8, 10, 15, 20 seconds **K3 & K4 (ES-TN-14H6):** 0, 5, 10, 20, 30, 50, 70, 100, 150, 200 seconds **Delayed Output Timing Tolerance:** Set time ±100 milliseconds or ±2%, whichever is greater
Input Requirements	**Input switch** must have a normally closed contact capable of switching 20 mA @ 24V dc. **Reset switch** must have one normally open contact capable of switching 20 mA @ 24V dc. NOTE: Inputs must be voltage-free, dry contacts.
ON-Time Delay	≥ 100 milliseconds; Time from the E-stop contacts to close (Auto Reset) or the Reset button to open (Manual Reset) and the safety outputs to close
Status Indicators	**6 green LEDs:** Power, E-Stop, Reset; Monitor, Out (K1 &K2 ON/OFF), Timed-Out (K3 & K4 ON/OFF) **1 red LED:** Fault

More on next page

ES-TN-14H.. Safety Module Specifications (cont'd)

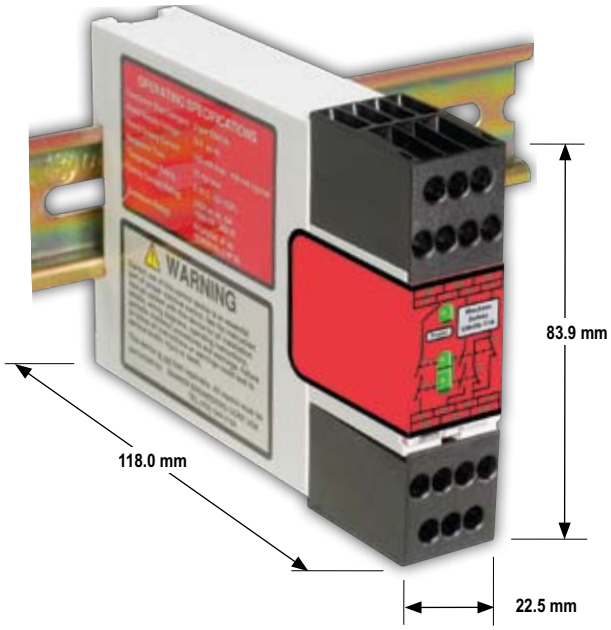
Construction	Polycarbonate housing
Environmental Rating	Rated NEMA 1; IP40, Terminals IP20, max. terminal torque 0.8 Nm
Mounting	Mounts to standard 35 mm DIN rail track. Safety Module must be installed inside an enclosure rated NEMA 3 or IP54, or better.
Vibration Resistance	10 to 55Hz @ 0.35 mm displacement per IEC 60068-2-6
Operating Conditions	**Temperature:** 0° to +50° C **Relative humidity:** 90% @ +50° C (non-condensing)
Certifications	**Important Notice:** **European Community Machinery Directive 2006/42/EC** The ES-TN-14H.. Modules comply with Machine Directive 98/37/EC and are certified to EN954-1(1996). After December 31, 2011, these safety devices can only be installed as a replacement component within the European Union (EU). For more information, please see www.bannerengineering.com/144763 or call 1-888-373-6767.
Wiring Diagrams	**2-Channel:** WD043 (p. 802)

ES-FA-6G Safety Module Specifications

Supply Voltage and Current	24V ac/dc, +/- 10%; 50/60Hz **Power consumption:** approx. 2 W/0.75 VA
Supply Protection Circuitry	Protected against transient voltages and reverse polarity
Output Configuration	**Outputs (K1& K2):** three redundant (total of six) safety relay (forced-guided) contacts – $AgSnO_2$ one auxiliary non-safety monitor output (open when both K1 and K2 are energized; closed when either K1 or K2 are de-energized) **Contact ratings:** **Max. voltage:** 250V ac or 250V dc **Max. current:** 6 A ac or dc **Min. current:** 30 mA @ 10V dc **Max. power:** 1500 VA, 150 W **Mechanical life:** 10,000,000 operations **Electrical life:** 100,000 at full resistive load **NOTE: Transient suppression is recommended when switching inductive loads. Install suppressors across load. Never install suppressors across output contacts.**
Output Response Time	35 milliseconds typical
Input Requirements	**Input switch** must have a normally closed contact capable of switching 40 to 100 mA @ 13 to 27V ac/dc. **Reset switch** must have one normally open contact capable of switching 20 to 30 mA @ 13 to 27V ac/dc.
Status Indicators	**3 green LEDs:** Power ON K1 energized K2 energized
Construction	Polycarbonate
Environmental Rating	Rated NEMA 1; IP40, Terminals IP20
Mounting	Mounts to standard 35 mm DIN rail track. Safety Module must be installed inside an enclosure rated NEMA 3 (IP54), or better.
Vibration Resistance	10 to 55Hz @ 0.35 mm displacement per IEC 60068-2-6
Operating Conditions	**Temperature:** 0° to +50° C **Relative humidity:** 90% @ +50° C (non-condensing)
Certifications	UL LISTED EMERGENCY STOP DEVICE 29YL CSA®
Wiring Diagrams	**1-Channel:** WD044 (p. 803)

Universal Input
Safety Modules

- Modules monitor one or two solid-state PNP outputs or relay contact outputs from safety or non-safety devices, such as sensors, safety light screens, or one or two electromechanical contacts.
- Category 2, 3 or 4 hookup of input devices is possible.
- Module offers two reset options: Automatic and Monitored Manual.
- Modules are an excellent choice for monitoring safety devices without external device monitoring (EDM) function.
- Module goes into lockout mode if fault is detected.
- Models are available with 3 normally open safety contacts, or 2 normally open safety and 1 normally closed auxiliary contact.
- Output contacts are rated 6 or 7 amps, depending on model.
- Housings are rugged polycarbonate and mount to standard 35 mm DIN rail.
- Modules are rated NEMA 1 and IP20.
- Module can be configured to monitor single or dual channel input devices using DIP switches under removable terminals.



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UM-FA-..A Models

Universal Safety Input Modules

Functional Stop Category	Supply Voltage	Inputs	Safety Outputs	Aux. Output	Output Rating	Output Response Time	Model
0	24V ac/dc	1 NC (single) or 2 NC (dual)	3 NO	–	6 amps	25 ms	**UM-FA-9A**
			2 NO	1 NC	7 amps		**UM-FA-11A**

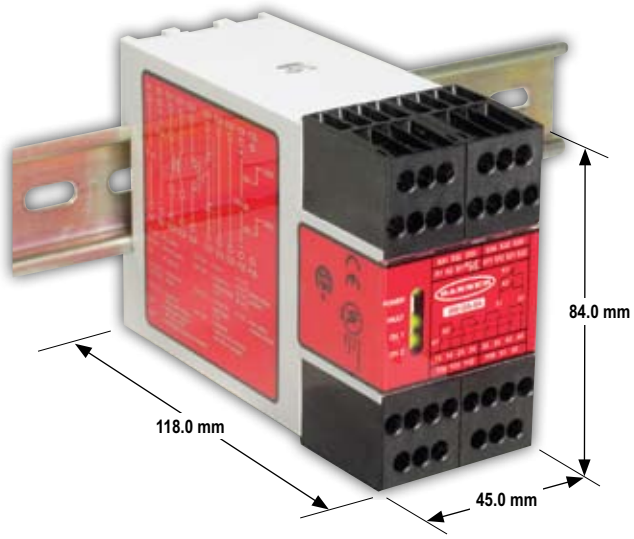
NC = Normally Closed Relay, NO = Normally Open Relay

Universal Safety Input Module Specifications

Supply Voltage and Current	24V dc ±10% (SELV-rated supply according to EN IEC 60950, NEC Class 2) 24V ac ±10% 50-60 Hz (NEC Class 2-rated transformer) **Power consumption:** approx. 2 VA / 3 W
Supply Protection Circuitry	Protected against transient voltages and reverse polarity
Overvoltage Category	**Output relay contact voltage of 1V to 150V ac/dc:** Category III **Output relay contact voltage of 151V to 250V ac/dc:** Category II (Category III if appropriate overvoltage reduction is provided, as described in data sheet.)
Pollution Degree	2
Output Configuration	**UM-FA-9A:** 3 normally open (NO) output channels **UM-FA-11A:** 2 normally open (NO) output channels and 1 normally closed (NC) auxiliary output channel Each normally open output channel is a series connection of contacts from two forced-guided (mechanically linked) relays, K1-K2. The normally closed Aux. output channel of the **UM-FA-11A** is a parallel connection of contacts from two forced-guided relays, K1-K2. **Contacts:** AgNi, 5 µm gold-plated **Low Current Rating:** The 5 µm gold-plated contacts allow the switching of low current/low voltage. In these low-power applications, multiple contacts can also be switched in series (e.g., "dry switching"). **To preserve the gold plating on the contacts, do not exceed the following max. values at any time:** **Min. voltage:** 1V ac/dc — **Max. voltage:** 60V **Min. current:** 5 mA ac/dc — **Max. current:** 300 mA **Min. power:** 5 mW (5 mVA) — **Max. power:** 7 W (7 VA) **High Current Rating:** If higher loads must be switched through one or more of the contacts, the minimum and maximum values of the contact(s) changes to: **Min. voltage:** 15V ac/dc — **Max. voltage:** 250V ac/dc **Min. current:** 30 mA ac/dc — **Max. current: UM-FA-9A:** 6 A — **UM-FA-11A:** 7 A **Min. power:** 0.45 W (0.45 VA) — **Max. power: UM-FA-9A:** 200 W (1,500 VA) — **UM-FA-11A:** 200 W (1,750 VA) **Mechanical life:** > 20,000,000 operations **Electrical life (switching cycles of the output contacts, resistive load):** 150,000 cycles @ 1,500 VA; 1,000,000 cycles @ 450 VA; 2,000,000 cycles @ 250 VA; 5,000,000 cycles @ 125 VA **NOTE: Transient suppression is recommended when switching inductive loads. Install suppressors across load. Never install suppressors across output contacts.**
Output Response Time	25 milliseconds typical
Input Requirements	**Safety input switch:** **2-Channel (contacts) hookup:** 10 to 20 mA steady state @ 12V dc NOTE: Inputs are designed with a brief contact-cleaning current of 100 mA when initially closed. **Solid-state Dual Channel hookup:** 5 to 20 mA steady state @ 18 to 28V dc sourcing (PNP), < 2 mA leakage current **Single-Channel hookup:** 40 to 100 mA @ 24V ac/dc ± 10%; 50/60 Hz **Reset Switch:** 20 mA @ 12V dc, hard contact only
Minimum OFF-State Recovery Time	250 milliseconds (When used with the AG4 Safety Laser Scanner; the "Restart delay time after PF release" must be configured 280 milliseconds or greater.)
Indicators	**3 green LEDs:** Power ON K1 energized K2 energized
Construction	Polycarbonate housing
Environmental Rating	Rated NEMA 1; IEC IP40, Terminals IP20
Mounting	Mounts to standard 35 mm DIN rail track. Safety Module must be installed inside an enclosure rated NEMA 3 (IP54), or better.
Vibration Resistance	10 to 55 Hz @ 0.35 mm displacement per IEC 60068-2-6
Operating Conditions	**Temperature:** 0° to +50° C — **Max. Relative Humidity:** 90% @ +50°C (non-condensing)
Design Standards	Cat. 4 PL e per EN ISO 13849-1; SIL 3 per IEC 61508 and IEC 62061
Certification	CE UL LISTED EMERGENCY STOP DEVICE 29YL
Wiring Diagrams	WD045, WD046, WD047, WD048 (pp. 804-807)

Safety Mat
Monitoring Modules

- Module monitors a single mat or a series of connected mats.
- Module is for use with standard 4-wire safety mat or edge triggered by a short in a contact plate or strip.
- Available voltages include 115V ac or 12-24V dc, and 230V ac or 12-24V dc.
- Output contacts are rated 6 A.
- Modules include non-safety auxiliary outputs.
- Reset options are Automatic or Monitored Manual.
- Housings are rugged polycarbonate and mount to standard 35 mm DIN rail.
- Ratings are NEMA 1 and IP20.
- LED indicators show power on, output and fault.



SM-..A-5A Models

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Safety Mat Monitoring Modules

Supply Voltage	Inputs	Safety Outputs	Aux. Outputs	Output Rating	Output Response Time	Model
115V ac & 12-24V dc	1 (or multiple in series) 4-wire Safety Mat	4 NO	1 NC & 2 PNP	6 amps	50 ms	**SM-GA-5A**
230V ac & 12-24V dc						**SM-HA-5A**

NC = Normally Closed Relay, NO = Normally Open Relay

Safety Mat Monitoring Module Specifications

Supply Voltage and Current	**AI-A2:** 115V ac (model **SM-GA-SA**) or 230V ac (model **SM-HA-5A**) ±15% , 50/60Hz **BI-B2:** 11V dc – 27.6V dc **Power consumption:** approx. 4W/7VA **The Safety Module should be connected only to a SELV (safety extra-low voltage, for circuits without earth ground) or a PELV (protected extra-low voltage, for circuits with earth ground) power supply, according to EN IEC 60950, NEC Class 2.**
Supply Protection Circuitry	Protected against transient voltages and reverse polarity
Overvoltage Category	**Output relay contact voltage of 1V to 150V ac/dc:** Category III **Output relay contact voltage of 151V to 250V ac/dc:** Category III, if appropriate overvoltage reduction is provided, as described in data sheet.
Pollution Degree	2
Output Configuration	4 normally open (NO) output channels; 1 normally closed (NC) and 2 solid-state auxiliary outputs Each normally open output channel is a series connection of contacts from two forced-guided (mechanically linked) relays, K1-K2. The normally closed Aux. output channel is a parallel connection of contacts from two forced-guided relays, K1-K2. **Contacts:** AgNi, 5 µm gold-plated **Low Current Rating:** The 5 µm gold-plated contacts allow the switching of low current/low voltage. In these low-power applications, multiple contacts can also be switched in series (e.g., "dry switching"). **To preserve the gold plating on the contacts, the following max. values should not be exceeded at any time:** **Minimum:** **Voltage:** 1V ac/dc **Current:** 5 mA ac/dc **Power:** 5 mW (5 mVA) **Maximum:** **Voltage:** 60V **Current:** 300 mA **Power:** 7 W (7 VA) **High Current Rating:** If higher loads must be switched through one or more of the contacts, the minimum and maximum values of the contact(s) changes to: EMERGENCY STOP DEVICE 29YL LISTED; IND. CONT. EQ. 447Y LISTED **Minimum:** **Voltage:** 15V ac/dc **Current:** 250 mA ac/dc **Power:** 5 W (5 VA) **Maximum:** **NO Safety Contacts (13-14, 23-24, 33-34, 43-44):** 250V ac/ 24V dc, 6A resistive B300, Q300 (UL508) **NC Auxiliary Contact (51-52):** 250V ac/ 24V dc, 5A resistive B300, Q300 (UL508) CE **Minimum:** **Voltage:** 15V ac/dc **Current:** 250 mA ac/dc **Power:** 5 W (5 VA) **Maximum—IEC60947-5-1** **NO Safety Contact: AC-1:** 250V ac, 6A; **DC-1:** 24V dc, 6A **AC-15:** 230V ac, 3A; **DC-13:** 24V dc, 4A **NC Auxiliary Contact: AC-1:** 250V ac, 5A; **DC-1:** 24V dc, 5A **AC-15:** 230V ac, 2A; **DC-13:** 24V dc, 4A **Mechanical life:** >20,000,000 operations **Electrical life:** 150,000 cycles @ 1500 VA; 1,000,000 cycles @ 450 VA; 2,000,000 cycles @ 250 VA; 5,000,000 cycles @ 125 VA **NOTE: Transient suppression is recommended when switching inductive loads. Install suppressors across load. Never install suppressors across output contacts.** **Solid-State Monitor Outputs:** - Two non-safety solid-state dc outputs - Output at Y32 monitors state of outputs – conducts (output high) when both K1 and K2 are energized - Output at Y35 conducts (output high) when in normal operation (no lockout) - Output circuits require application of +12-24V dc ±15% at terminal Y31; dc common at Y30 - Maximum switching current: 100 mA at +12-24V dc - Both outputs are protected against short circuits
Output Response Time	35 milliseconds max, 25 milliseconds typical
Input Requirements	**Safety mat normally open contact** must be capable of switching 20 to 100 mA @ 12 to 30V dc; and must be closed ≥ 25 ms for a valid stop command. **115/230V ac or 24V dc: Maximum input resistance** 250 ohms per lead; **maximum contact resistance:** 150 ohms. **12V dc Supply: Maximum input resistance** 25 ohms; **maximum contact resistance:** 10 ohms. **Reset switch:** must have one normally open contact capable of switching 20 to 50 mA @ 12 to 30V dc.
OFF-State Recovery Time	350 ms max.

More on next page

Safety Mat Monitoring Module Specifications (cont'd)

Status Indicators	**3 green LED indicators:** Power ON, Channel 1 (high side), Channel 2 (low side) **1 red LED indicator:** indicates a fault condition
Construction	Polycarbonate housing
Environmental Rating	Rated NEMA 1; IEC IP20
Mounting	Mounts to standard 35 mm DIN rail track. Safety Module must be installed inside an enclosure rated NEMA 3 (IP54) or better.
Vibration Resistance	10 to 60 Hz @ 0.35 mm displacement per UL 991 60 to 150 Hz @ 5 g max.
Operating Conditions	**Temperature:** 0° to +50° C **Relative humidity:** 90% @ +50° C (non-condensing)
Design Standards	Cat. 4 PL e per EN ISO 13849-1; SIL 3 per IEC 61508 and IEC 62061
Certifications	CE, UL Emergency Stop Device 29YL LISTED, c UL IND. CONT. EQ. 447Y LISTED
Wiring Diagrams	**4-Wire Safety Mat:** WD049 (p. 808)

Muting
Modules and Dual Controllers

- Suspends safeguarding during non-hazardous times in the machine's cycle
- Allows material to move into or from the process, without tripping the muted safeguard
- Monitors hard-relay contact or PNP output safety devices
- Includes one non-safety auxiliary output
- Available in models for Type 4 (Category 4) applications
- Offers two reset options: Automatic and Monitored Manual
- Uses diverse redundancy and self-checking for control reliability
- Installs easily with DIN-rail mounting
- Connects to supplemental safeguarding devices or E-stops
- Can be used as a Dual Controller for safety devices, such as two Safety Light Screens whether the muting function is used or not

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MMD-TA-11B & MMD-TA-12B Muting Modules (MMD-TA-12B shown)

Muting Modules

Safety Category	Input Device	Supply Voltage	Inputs	Safety Outputs	Aux. Outputs	Output Rating	Output Response Time	Model
2, 3 or 4	Mechanical & Solid State	24V dc	2 NC Muteable (dual) & 2 NC SSI (dual)	2 PNP OSSD	1 PNP	0.5 amps	10 ms	**MMD-TA-12B**
				2 NO	1 NC	6 amp	20 ms	**MMD-TA-11B**

NC = Normally Closed Relay, NO = Normally Open Relay

MMD-TA-12B & MMD-TA-11B Muting Modules Specifications

System Power Requirements	**MMD-TA-11B:** +24V dc ±15% @ 300 mA max (SELV/PELV) **MMD-TA-12B:** +24V dc ±15% @ 250 mA max (SELV/PELV) (not including draw of the MSSI power, AUX, ML, M1-M4 and OSSD connections). The external voltage supply must be capable of buffering brief mains interruptions of 20 milliseconds, as specified in IEC/EN 60204-1.
Overvoltage Category	III (IEC 60664-1)
Pollution Degree	2
Supply Protection Circuitry	All inputs and outputs are protected from short circuit to +24V dc or dc common.
Response Time (MSSI and SSI)	**MMD-TA-12B:** (solid-state output) 20 milliseconds max. **MMD-TA-11B:** (relay output) 10 milliseconds max.
Safety Outputs	**MMD-TA-11B:** **2 normally open contact output channels and 1 normally closed auxiliary contact output channel:** Each normally open output channel is a series connection of contacts from two forced-guided (positive-guided) relays, K1-K2. The normally closed AUX contact (non-safety) 31-32 is a parallel connection of contacts from K1-K2. **Contacts:** AgNi, 5 µm gold-plated **Low Current Rating:** **Caution: The 5 µm gold-plated contacts allow the switching of low current/low voltage.** In these low-power applications, multiple contacts can also be switched in series (e.g., "dry switching "). To preserve the gold plating on the contacts and also guarantee reliable switching, the following values should be kept within the min. and max. ranges shown below. **Min. voltage:** 1V ac/dc — **Max. voltage:** 60V **Min. current:** 5 mA ac/dc — **Max. current:** 300 mA **Min. power:** 5 mW (5 mVA) — **Max. power:** 7 W (7 VA) **High Current Rating:** If higher loads must be switched through one or more of the contacts, the minimum and maximum values of the contact(s) changes to: **Min. voltage:** 15V ac/dc — **Max. voltage:** 120V ac/dc **Min. current:** 30 mA ac/dc — **Max. current:** 6 A **Min. power:** 0.45 W (0.45 VA) — **Max. power:** 160 W (720 VA) **Mechanical life:** 50,000,000 operations **Electrical life:** 120,000 operations (typical at 144 W/[1380 VA] switched power, resistive load) **NOTE: Transient suppression is recommended when switching inductive loads. Install suppressors across load. Never install suppressors across output contacts** **MMD-TA-12B:** **Two diverse-redundant solid-state safety outputs:** 24V dc, 0.5 A sourcing OSSD (output signal switching device). **ON-State voltage:** ≥V in-1.5V dc **OFF-State voltage:** 1.2V dc max. (0-1 2V dc) **Max. load capacitance:** 0.1 µF **Max. load inductance:** 10 H **Leakage current:** 0.50 mA max. **Cable resistance:** 10 Ω max. **OSSD test pulse width:** < 100 microseconds **OSSD test pulse period:** > 100 milliseconds **Switching current:** 0-0.5 A

More on next page

MMD-TA-12B & MMD-TA-11B Muting Modules Specifications (cont'd)

Non-Safety Outputs	**Model MMD-TA-11B:** Aux. output 31–32 is a parallel connection of two N.C. contacts from internal relays K1 and K2. **Contact:** AgNi, 5 µm gold-plated **Low Current Rating:** **Caution: The 5 µm gold-plated contacts allow the switching of low current/low voltage.** To preserve the gold plating on the contacts and also guarantee reliable switching, the following values should be kept within the min. and max. ranges shown below: **Min. Voltage:** 1V ac/dc **Max. Voltage:** 24V ac/dc **Min. Current:** 5 mA ac/dc **Max. Current:** 250 mA ac/dc **Min. Power:** 5 mW (5 mVA) **Max. Power:** 6 W (6 VA) **High Current Rating:** For higher loads, the min. and max. values of the contact(s) changes to: **Min. Voltage:** 15V ac/dc **Max. Voltage:** 120V ac/dc **Min. Current:** 30 mA ac/dc **Max. Current:** 6 A **Min. Power:** 0.45 W (0.45 VA) **Max. Power:** 160 W/720 VA **Mechanical Life:** 50,000,000 operations **Electrical Life:** >10 x 10^6 cycles **Model MMD-TA-12B:** Z4–Z3 = Aux. 24V / 250 mA PNP output follows the two OSSD safety outputs.
Status Indicators	**3 Status LEDs (Red, Green and Yellow):** indicate waiting for Reset, Lockout, Override, and OSSD status **Yellow and Green LEDs** adjacent to individual inputs/interfaces indicate status (ON = active/closed)
Diagnostic Code Display	Diagnostic Display is a two-digit numeric display that indicates the cause of lockout conditions and the amount of time remaining for the backdoor timer.
Muting Lamp Output	A monitored or non-monitored (selectable) sinking output. If monitoring has been selected, the current draw must be 10 to 360 mA. Interconnect wire resistance < 30 Ω. **Max. switching voltage:** 30V dc **Max. switching current:** 360 mA **Min. switching current:** 10 mA **Saturation voltage:** ≤ 1.5V dc @ 10 mA; ≤ 5V dc @ 360 mA
Controls and Adjustments	**All configured on two redundant banks of DIP switches:** Manual/auto reset One-way/two-way muting Monitored/non-monitored mute lamp output One-channel/two-channel/no EDM Backdoor timer Mute on power-up enable
Inputs	The MSSI and the SSI can be interfaced with external safety devices that have either hard contact outputs or solid-state sourcing outputs. When connecting the MSSI (S11-S12, S21-S22) or SSI (X5-X6, X7-X8) inputs to safety relay outputs or hard contacts, these contacts must be capable of switching 15 to 30 V dc at 10-50 mA. **Operating Range for MSSI and SSI Inputs** **OFF State:** -3V to +5V, 0 to 2 mA **ON State:** 15-30V, 10-50 mA **Muteable Safety Stop Interface (MSSI)** This input consists of two channels (MSSI-A and MSSI-B), and can be muted when the requirements for a mute cycle have been met. When muted, the OSSDs remain ON, independent of the MSSI status. If not muted, when either or both channels open, the OSSD outputs will go OFF. *Maximum external resistance per channel must not exceed 400* Ω. **Safety Stop Interface (SSI)** This input consists of two channels (SSI-A and SSI-B), and is always active. When one or both channels open, the OSSD Outputs will go OFF. *Maximum external resistance per channel must not exceed 400* Ω.
External Device Monitoring (EDM)	Two pairs of terminals are provided to monitor the state of external devices controlled by the OSSD outputs. Each device must be capable of switching 15-30V dc at 10-50 mA.
Muting Device Inputs	The muting devices work in pairs (M1 and M2, M3 and M4) and are required to be "closed" within 3 seconds of each other (simultaneity requirement/synchronous actuation) to initiate a mute (assuming all other conditions are met). Each muting device must be capable of switching 15-30V dc at 10-50 mA.
Mute Enable Input	The mute enable input must have +24V dc applied in order to start a mute; opening this input after mute has begun has no effect. The switching device must be capable of switching 15-30V dc at 10-50 mA.

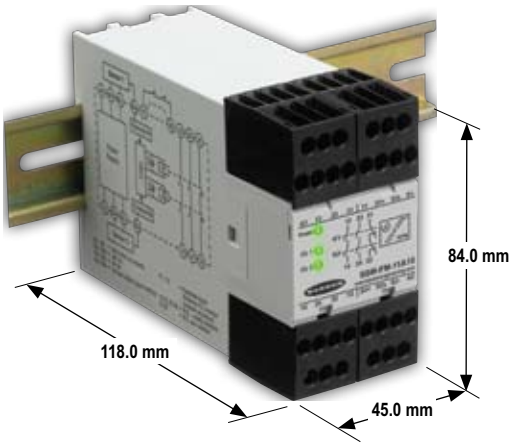
More on next page

MMD-TA-12B & MMD-TA-11B Muting Modules Specifications (cont'd)

Override Inputs	The two-channel inputs must be closed within 3 seconds of each other (simultaneity/synchronous action requirement) and held closed during the 30-second Override. To initiate a subsequent Override, open both channels, wait 3 seconds, and then re-close both channels (within 3 seconds). The switching devices must be capable of switching 15-30V dc at 10-50 mA.
Reset Input	Terminals must be closed for a minimum of 0.25 seconds and not more than 2.0 seconds in order to guarantee a reset. The switching device must be capable of switching 15-30V dc at 10-50 mA.
Mounting	Mounts to standard 35 mm DIN rail track. Safety Module must be installed inside an enclosure rated NEMA 3 (IP54), or better.
Vibration Resistance	10 to 55 Hz @ 0.35 mm displacement per IEC 68-2-6.
Construction	Polycarbonate housing
Connections	Removable terminal blocks
Environmental Rating	NEMA 1; IP20
Operating Conditions	**Temperature range:** 0° to +50° C **Relative humidity:** 95% (non-condensing)
Design Standards	Designed to comply with Safety Category 4 per SIL 3 (IEC 61508); SIL CL3 (IEC 62061); Category 4, Performance Level (PL) e (ISO 13849-1)
Certifications	CE c UL LISTED AOPD 10GH US
Wiring Diagrams	**MMD-TA-12B:** WD052, WD054, WD055 (pp. 810-813) **MMD-TA-11B:** WD053 (p. 811)

Safe Speed Monitoring
Safety Modules

- Monitors redundant devices, such as two sensors with PNP outputs, for rotation and linear movements.
- Allows locked gates or guards to be opened when speed drops below the dangerous speed
- Provides two normally open safety contacts and one normally closed auxiliary contact, each rated at 4 amps
- Offers choice of two models with adjustable RPM ranges
- Rated NEMA 1 and at least IP20
- Constructed of rugged polycarbonate with removable terminal blocks
- Mounts to standard 35 mm DIN rail



SSM-FM-11A... Models

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SSM Safe Speed Monitoring Modules

Functional Stop Category	Supply Voltage	Inputs	Safety Outputs	Aux. Outputs	Ranges (lpm)	Output Rating	Model
0	24V ac/dc	2 PNP	2 NO	1 NC	5 - 40, 35 - 340, 300 - 2700, 1200 – 10500	4 amps	**SSM-FM-11A10**
					10 - 80, 80 - 650, 600 - 5300, 2400 - 20000		**SSM-FM-11A20**

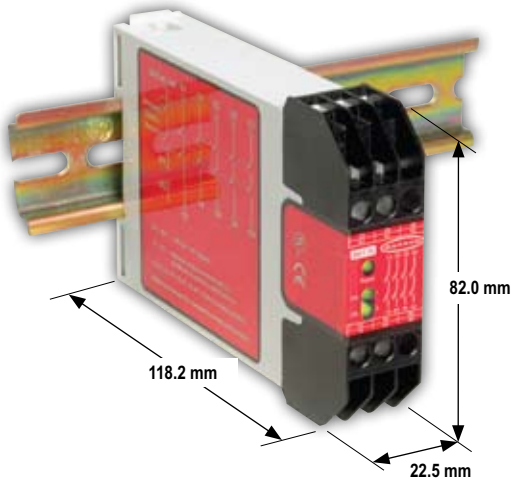
NC = Normally Closed Relay, NO = Normally Open Relay

SSM Safe Speed Monitoring Module Specifications

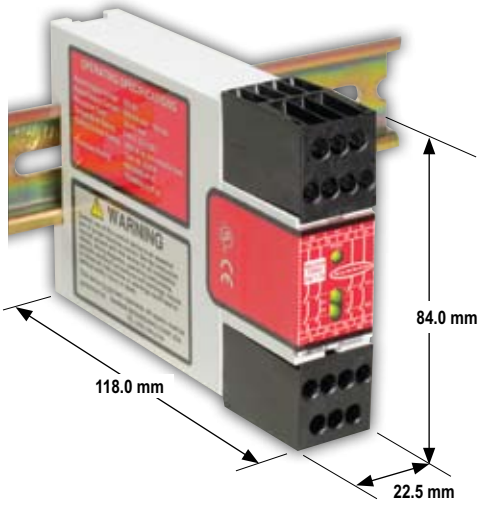
Supply Voltage and Current	24V ac/dc, 50-60 Hz, no polarity **AC:** 24V +10% / -15% **DC:** 24V ±10% **Power consumption:** approx. 4 VA/2.5 W
Start-up Reset Time	1.5 second
Hysteresis	6% typical
Input Requirements	**PNP-Input sensors:** 24V dc (terminals S1s and S2s) **Input current min.:** 3 mA **Input current max.:** 25 mA **Min. pulse time:** 1 millisecond ON; 1 millisecond OFF
Max. IPM at Inputs S1s and S2s	30,000
Adjustable Setting Ranges (Impulses per Minute)	**SSM-FM-11A10:** 5…40 ipm, 35…340 ipm, 300…2,700 ipm or 1,200…10,500 ipm **SSM-FM-11A20:** 10…80 ipm, 80…650 ipm, 600…5,300 ipm or 2,400…20,000 ipm
Output Response Time	**Standstill / Under-speed detection:** (60 seconds/adjusted IPM value) + 2.5 seconds = tDS tDS = output ON-delay after detection of standstill **Over-speed detection:** **SSM-FM-11A10:** Range 5…10,500: tR = 700 milliseconds typical **SSM-FM-11A20:** Range 10…20,000: tR = 350 milliseconds typical
Output Configuration	**Outputs K1 & K2: t**wo redundant (total of four) safety relay NO (forced-guided) contacts—AgNi, gold flashed; one auxiliary NC contact—AgNi, gold flashed **Contact ratings (all NO and NC output contacts):** 2 normally open (NO) output channels and 1 normally closed (NC) auxiliary output **Current Rating:** **Thermal Current Ith:** 4 A **Switching Capacity to AC 15:** 3 A / 230V ac for NO contacts (per IEC/EN 60947-5-1) 2 A / 230V ac for NC contact (per IEC/EN 60947-5-1) **Min. voltage:** 15V ac/dc **Max. voltage:** 230V ac/dc **Min. current:** 30 mA ac/dc **Max. current:** 4 A **Min. power:** 0.45 W (0.45 VA) **Max. power:** 100 W (920 VA) **Mechanical Life:** ≥50,000,000 operations **Electrical life (switching cycles of the output contacts, resistive load):** 350,000 cycles @ 920 VA; 1,000,000 cycles @ 440 VA; 2,000,000 cycles @ 250 VA; 5,000,000 cycles @ 125 VA **NOTE: Transient suppression is recommended when switching inductive loads. Install suppressor across load. Never install suppressor across output contacts.**
Indicators	**3 green LED indicators:** Power On, Channel 1 active, and Channel 2 active
Construction	Polycarbonate housing
Environmental Rating	Rated NEMA 1; IEC IP20 (IEC/EN 60529)
Mounting	Mounts to standard 35 mm DIN rail track. Safety Module must be installed inside an enclosure rated NEMA 3 (IEC IP54) or better.
Vibration Resistance	10 to 55 Hz @ 0.35 mm displacement per IEC 60068-2-6
Operating Conditions	**Temperature:** 0° to 50° C **Max. Rel. Humidity:** 90% @ +50° C (non-condensing)
Design Standards	Cat. 3 PL e per DIN EN ISO 13849-1; SIL CL 3 per IEC 62061
Certifications	Approvals are pending. This module was evaluated by UL to UL508 Industrial Control Equipment, which is not a certification relating to the safety performance of the module.
Wiring Diagrams	WD056 (p. 813)

Extension
Relay Modules

- Provides additional safety outputs for a primary safety device with relay outputs
- Offers four safety output channels
- Provides delayed or immediate outputs, depending on model
- Requires no adjustments
- If malfunctioning, signals primary safety device to react
- Responds in less than 35 milliseconds
- Mounts on DIN rail



EM-F..-7G Models



EM-T-7A Models

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Extension Modules

Supply Voltage	Inputs	Safety Outputs	Output Rating	Aux. Outputs	Output Response Time	Delay	Model
24V dc	1 NC (single) or 2 NC (dual)	4 NO	6 amps	—	20 ms	—	**EM-T-7A**
24V ac/dc	1 NC (single)	4 NO			35 ms	—	**EM-F-7G**
		4 NO w/delay			30 ms	0.5 sec.	**EM-FD-7G2**
						1.0 sec.	**EM-FD-7G3**
						2.0 sec.	**EM-FD-7G4**

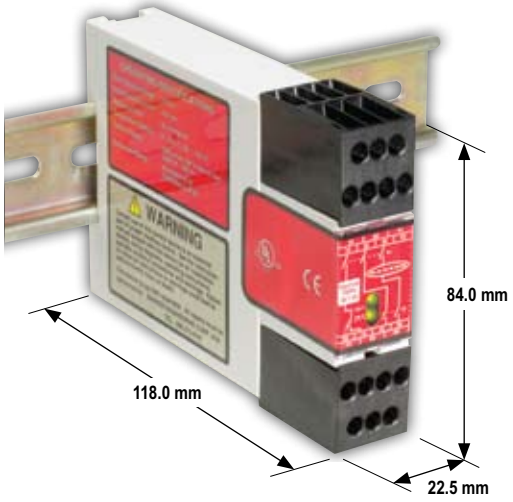
NC = Normally Closed Relay, NO = Normally Open Relay

Extension Module Specifications

Supply Voltage and Current	**EM-T-7A model:** A1-A2: 24V dc, +/-15%, 10% max. ripple **EM-F/FD-7G.. models:** A1-A2: 24V ac/dc, +/-10%, 10% max. ripple on dc
Supply Protection Circuitry	Protected against transient voltages and reverse polarity
Output Configuration	**Four output channels:** **EM-T-7A:** Each channel is a series connection of two forced-guided (positive-guided) relay contacts – AgNi, gold flashed **EM-F/FD-7G.. :** Each channel is a series connection of two forced-guided (positive-guided) relay contacts – $AgSnO_2$ **Contact ratings:** **Max. voltage:** 250V ac/dc **Max. current:** 6 A ac/dc **Min. current:** 30 mA @ 24V dc **Max. power:** 1500 VA, 200 W **Mechanical life: EM-T-7A model:** 50,000,000 operations **EM-F/FD-7G.. models:** 10,000,000 operations **Electrical life:** 100,000 at full resistive load **Feedback contact rating (Y1-Y2):EM-T-7A:** 24V dc @ 0.5A **EM-F/FD-7G..:** 250V ac/dc @ 3A **NOTE: Transient suppression is recommended when switching inductive loads. Install suppressors across load. Never install suppressors across output contacts.**
Output Response Time	**EM-T-7A:** 20 milliseconds max. (if channel u-k fails, maximum response time is 200 milliseconds) **EM-F-7G:** 35 milliseconds typical **EM-FD-7G..:** **Delay OFF:** 0.5 seconds ±30% for **EM-FD-7G2**, 1 seconds ±30% for **EM-FD-7G3**, 2 seconds ±30% for **EM-FD-7G4**, as measured from the time when the supply voltage to A1 is interrupted **Delay ON:** 30 milliseconds for all models
Input Requirements	**EM-T-7A:** Inputs from Primary Safety Device must each be capable of switching 30 to 250 mA @ 13 to 28V dc. **EM-F/FD-7G..:** Input from Primary Safety Device must be capable of switching 40 to 100 mA @ 13 to 27V ac/dc.
Status Indicators	**3 green LEDs:** Power ON K1 energized K2 energized
Construction	Polycarbonate housing
Environmental Rating	Rated NEMA 1; IP20
Mounting	Mounts to standard 35 mm DIN rail track. Extension Module must be installed inside an enclosure rated NEMA 3 (IP54), or better.
Vibration Resistance	10 to 55Hz @ 0.35 mm displacement per IEC 60068-2-6
Operating Conditions	**Temperature:** 0° to +50° C **Relative humidity:** 90% @ +50° C (non-condensing)
Design standards	Designed to comply with EN 292-1, ISO 12100-1, EN 292-2, ISO 12100-2, EN 954-1, EN 20604-1, EN 60335-1
Certifications	UL LISTED EMERGENCY STOP DEVICE 29YL
Wiring Diagrams	**EM-T-7A 1-Channel EDM:** WD057 (p. 814) **EM-T-7A 2-Channel EDM:** WD058 (p. 814) **EM-F-7G:** WD059 (p. 815) **EM-FD-7G:** WD060 (p. 815)

Interface
Relay Modules

- Increases the switching current capacity of low-voltage primary safety devices to 6 amps
- Serves as a relay for primary safety devices with OSSD solid-state or hard contact outputs and external device monitoring, such as the EZ-SCREEN®
- Uses two green LEDs to indicate the output status of internal relays K1 and K2
- Responds in 20 milliseconds maximum
- Mounts on DIN rail



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Interface Models

Interface Modules

Supply Voltage	Inputs	Safety Outputs	Aux. Outputs	Output Rating	Output Response Time	Models
24V dc	2 NC (dual)	3 NO	—	6 amps	20 ms	**IM-T-9A**
		2 NO	1 NC			**IM-T-11A**

NC = Normally Closed Relay, NO = Normally Open Relay

Interface Modules Specifications

Input Voltage and Current	24V dc, +/-15% no polarity, 10% max. ripple; 50 mA per input channel **Power consumption:** approx. 2.4 W
Supply Protection Circuitry	Protected against transient voltages.
Overvoltage Category	**Output relay contact voltage of 1V to 150V ac/dc:** Category III **Output relay contact voltage of 151V to 250V ac/dc:** Category II (Category III, if appropriate overvoltage reduction is provided, as described in data sheet.)

More on next page

Interface Modules Specifications (cont'd)

Pollution Degree	2
Output Configuration	**IM-T-9A:** 3 normally open output channels **IM-T-11A:** 2 normally open output channels and 1 normally closed auxiliary output channel. Each normally open output channel is a series connection of contacts from two forced-guided (mechanically linked) relays, K1-K2. The normally closed contact 31-32 is a parallel connection of contacts from K1-K2. **Contacts:** AgNi, 5 µm gold-plated **Low Current Rating:** The 5 µm gold-plated contacts allow the switching of low current/low voltage. In these low-power applications, multiple contacts can also be switched in series (e.g., "dry switching"). **To preserve the gold plating on the contacts, do not exceed the following max. values at any time:** **Min. voltage:** 1V ac/dc — **Max. voltage:** 60V **Min. current:** 5 mA ac/dc — **Max. current:** 300 mA **Min. power:** 5 mW (5 mVA) — **Max. power:** 7 W (7 VA) **High Current Rating:** If higher loads must be switched through one or more of the contacts, the minimum and maximum values of the contact(s) changes to: **Min. voltage:** 15V ac/dc — **Max. voltage:** 250V ac/dc, 6A resistive **Min. current:** 30 mA ac/dc — **Max. power:** 150 W (1,500 VA) **Min. power:** 0.45 W (0.45 VA) — IEC 60947-5-1: AC-15: 230V ac, 3A: DC-13: 24V dc, 4 A **Mechanical life:** 20,000,000 operations **Electrical life:** 150,000 cycles @ 1500 VA; 1,000,000 cycles @ 450 VA; 2,000,000 cycles @ 250 VA; 5,000,000 VA @ 125 VA **Feedback contact rating (Y1-Y2, Y3-Y4):** **Min. voltage:** 1V ac/dc — **Max. voltage:** 60V **Min. current:** 5 mA ac/dc — **Max. current:** 300 mA **Min. power:** 5 mW (5 mVA) — **Max. power:** 7 W (7 VA) **NOTE: Transient suppression is recommended when switching inductive loads. Install suppressors across load. Never install suppressors across output contacts.**
Output Response Time	20 milliseconds max.
Status Indicators	**2 green LED indicators:** K1 energized K2 energized
Construction	Polycarbonate housing
Environmental Rating	Rated NEMA 1; IEC IP20
Mounting	Mounts to standard 35 mm DIN rail track. Interface Module must be installed inside an enclosure rated NEMA 3 (IP54), or better.
Vibration Resistance	10 to 55Hz @ 0.35 mm displacement per IEC 60068-2-6
Operating Conditions	**Temperature:** 0° to +50° C — **Relative humidity:** 90% @ 50° C (non-condensing)
Design Standards	EN 60204-1, IEC 61810-1, EN 60255-1, EN 50205
Application Notes	There are no adjustments or user-serviceable parts.
Certifications	CE c UL us
Wiring Diagrams	**2-Channel, 2 OSSDs, 2-Channel EDM:** WD061 (p. 816) **2-Channel, 2 OSSDs, 1-Channel EDM:** WD062 (p. 816) **2-Channel, 2 FSDs, 2-Channel EDM:** WD063 (p. 817) **2-Channel, 2 OSSDs, 1-Channel EDM:** WD063 (p. 817) **1-Channel, 1 Relay, 1 EDM:** WD064 (p. 818)