

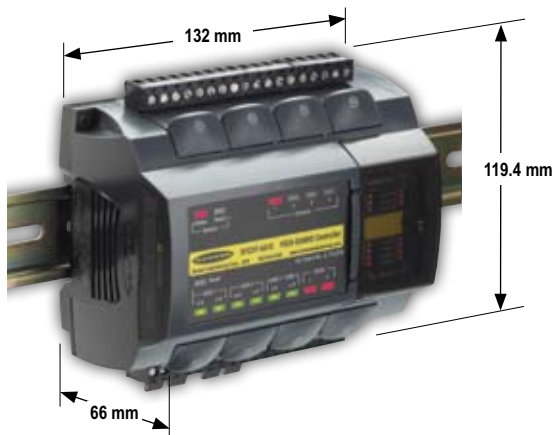
CONTROLLERS

PICO-GUARD™ Fiber Optic

- Four optical channels 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 E-stops.
- USSI connects multiple PICO-GUARD™ Controllers and other safety devices in a single safety circuit, when required.
- Controllers are available with optical channel auxiliary outputs and muting.
- Controllers interface with PICO-GUARD Grids, Points, Interlock Switches and Optical E-Stop Buttons to solve numerous applications.
- Diverse-redundant and self-checking design exceeds OSHA/ANSI Control Reliability requirements and meets Category 4 per ISO 13849-1(EN 954-1) and IEC 61496-1 Type 4 requirements.



ACCESSORIES
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PICO-GUARD™ Controller Models, 24V dc

Inputs	Safety Outputs	Output Rating	Aux. Outputs	Muting	Output Response Time	Models
4 Optical Channels & 2 NC USSI (dual)	2 PNP OSSD	0.5 amps	3 PNP (Aux., Fault, Weak)	—	13 ms (optical channels)	SFCDT-4A1
			7 PNP (Aux., Fault, Weak & Ch 1-4)	—	7 ms (USSIs)	SFCDT-4A1C
4 Optical Channels, Mute Inputs, Mute Enable			7 PNP (Aux./Mute lamp, Fault, Weak & Ch 1-4)	Yes	13 ms (optical channels)	SFCDT-4A1CM1

NOTE: A complete system requires a controller and optical elements, such as Interlocking Switches (see page 515), Grids and Points (see page 511), or E-Stop buttons (see page 518).






PICO-GUARD™ Controller Specifications	
System Power Requirements	24V dc ±15%, 10% max. ripple; 250 mA max., exclusive of output loads. External supply must be in accordance with IEC 61558.
Short Circuit Protection	All inputs and outputs are protected from short circuits to +24V dc or dc common.
Response Time	Optical Channel: 13 milliseconds max. (Time between the opening of an optical switch and the OSSD safety outputs turning off.) USSI Inputs: 7 milliseconds max. (Time between actuation of the safety stop input device and the OSSD safety outputs turning off.)
External Device Monitoring (EDM) Input	Two inputs for external device monitoring (EDM). Each input monitors the status of a normally closed, forced-guided monitor contact of an external safety device or MPCE. The EDM inputs must be high (10 to 30V dc) when the external device or MPCE is OFF, and must be low (less than 3V dc) when the external device or MPCE is ON. External devices or MPCEs must meet certain timing requirements, depending on the configuration setting.
System Reset Input	The Reset input must be high (10 to 30V dc) for 0.25 to 2 seconds and then low (less than 3V dc) to reset the system from a manual power-up, optical channel latch or system lockout condition.
USSI 1 Reset Input (Not available on SFCDT-4A1CM)	The Reset input must be high (10 to 30V dc) for 0.25 to 2 seconds and then low (less than 3V dc) to reset the system from a USSI 1 latch condition.
USSI 1 Input (Not available on SFCDT-4A1CM1)	Dual-channel, redundant inputs for monitoring output contacts or "handshake" compatible safety solid-state outputs of other safety stop devices. OFF (stop) signals cause the PICO-GUARD OSSDs to latch OFF (Latch condition).
USSI 2 Input (Not available on SFCDT-4A1CM1)	Dual-channel, redundant inputs for monitoring output contacts or "handshake" compatible safety solid-state outputs of other safety stop devices. OFF (stop) signals cause the PICO-GUARD OSSDs to turn OFF (Trip condition).
Muting Device Inputs (SFCDT-4A1CM1)	The muting devices work in pairs (MS1 and MS2, MS3 and MS4) and required to be "closed" within 3 seconds of each other (simultaneity requirement) to initiate a mute (assuming all other conditions are met). Muting device outputs must be hard contacts (electrical), capable of switching 15 to 30V dc at 10 to 50 mA.
Mute Enable Input (SFCDT-4A1CM1)	When Mute Enable is selected (functional), this input must have +24V dc applied in order to start a mute; opening this input after mute has begun has no effect.
Safety Outputs	Two redundant solid-state 24V dc, 0.5A max. sourcing OSSD (Output Signal Switching Device) safety outputs. (Use optional interface modules for ac or larger dc loads.) Capable of the Banner "Safety Handshake". ON-state voltage: ≥ Vin-1.5V dc OSSD test pulse width: 100 to 300 microseconds OFF-state voltage: 1.2V dc max. OSSD test pulse period: 6 milliseconds Max. load resistance: 1,000 Ω Max. load capacitance: 0.1 μF
Non-Safety Outputs	Solid state 24V dc (≥ Vin - 1.5V dc), 0.25A max. sourcing (PNP) non-safety outputs Non-muting: Aux., weak, fault, Ch 1-4 Muting: Aux./Mute temp, fault, Ch 1-4 (-4A1CM1 models only)
Remote Status Interface	Isolated RS-232 non-safety output (4800 Baud rate) for setup or monitoring the system status. Connections provided for a Remote Display unit. See Interfacing Products on page 501.
Controls and Adjustments	Redundant switches for Auto/Manual power-up, Trip/Latch output operation and 1- or 2-channel EDM operation. Redundant switches for ON/OFF of each optical channel. (NOTE: At least one optical channel must be ON.)
Ambient Light Immunity	> 10,000 lux at 5° angle of incidence
Strobe Light Immunity	Totally immune to one Federal Signal Corp. "Fireball" model FB2PST strobe
Emitter Element	Visible red LED, 660 nm at peak emission
Status Indicators	All models: System Status (bi-color Red/Green): overall status of the PICO-GUARD system System Reset (bi-color Yellow/Red): status of the input; indicates system reset needed Channel (4 bi-color Red/Green): each shows the status of one optical channel EDM (bi-color Red/Green): status of the EDM input channels OSSD (bi-color Red/Green): status of the OSSD outputs Config (bi-color Red/Green): status of the system configuration Non-Muting models: USSI (2 bi-color Red/Green): status of the USSI input channels (a-b and c-d) USSI 1 Reset (bi-color Yellow/Red): status of USSI 1 reset input; indicates USSI 1 reset needed EDM (bi-color Red/Green): status of the EDM input channels OSSD (bi-color Red/Green): status of the OSSD outputs Config (bi-color Red/Green): status of the system configuration Muting Models: Muting (4 bi-color Red/Green): status of the muting input Mute Enable (bi-color Yellow/Red): status of the EDM enable

- Photoelectrics
- Sensors
- Fiber Optic
- Sensors
- Special Purpose
- Sensors
- Measurement &
- Inspection Sensors
- Vision
- Wireless
- Lighting &
- Indicators
- Safety
- Light Screens
- Safety
- Laser Scanners
- Fiber Optic**
- Safety Systems**
- Safety Controllers &
- Modules
- Safety Two-Hand
- Control Modules
- Safety Interlock
- Switches
- Emergency Stop &
- Stop Control

- FIBER OPTIC**
- CONTROLLERS**
- GRID & POINTS
- INTERLOCKS
- E-STOP BUTTONS



PICO-GUARD™ Controller Specifications (cont'd)

Enclosure Rating	IEC IP20	
Operating Conditions	Temperature: 0° to +50° C	Relative humidity: 95% maximum (non-condensing)
Design Standards	Designed to comply with Type 4 per IEC 61496-1; Type 4 per UL 61496-1; Category 4 per EN 954-1	
Certifications	    	Important Notice: European Community Machinery Directive 2006/42/EC The PICO-GUARD Controllers 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	WD023, WD024, WD025, WD026, WD027, WD028 (pp. 788-791)	

WD023



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Models

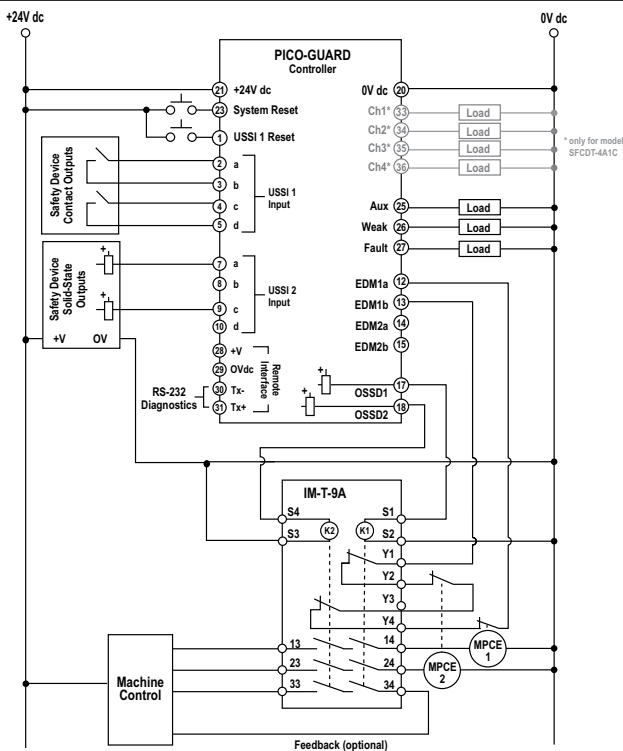
- SFCDT-4A1
- SFCDT-4A1C

IM-T-9A Terminal Locations



PICO-GUARD™ Controller

One PICO-GUARD System with 1-Channel EDM of IM-T-9A Interface Module



Wiring diagrams are for information only. See appropriate manuals for all specific warnings, cautions and information for use.

WD024



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Models

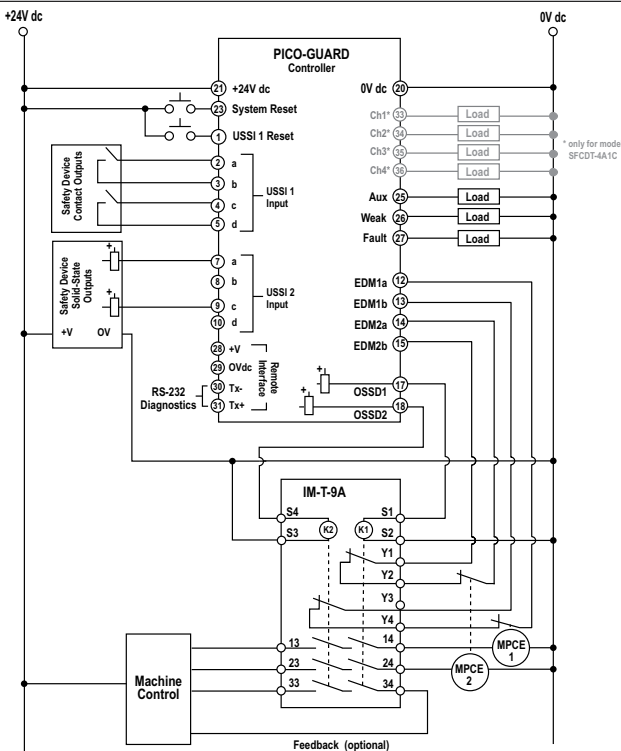
- SFCDT-4A1
- SFCDT-4A1C

IM-T-9A Terminal Locations



PICO-GUARD™ Controller

One PICO-GUARD System with 2-Channel EDM of IM-T-9A Interface Module



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More on next page

WD025

PICO-GUARD™ Controller

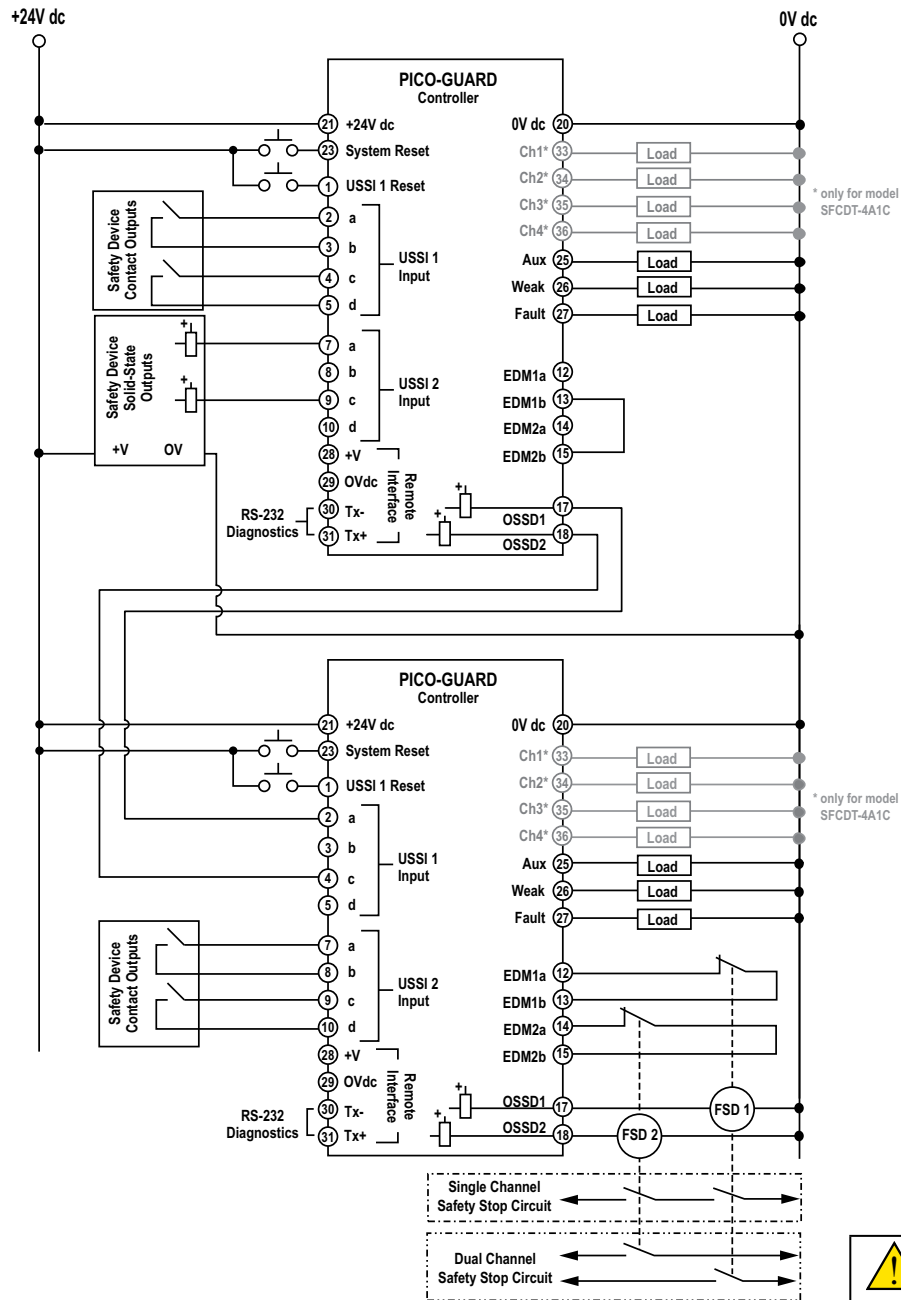
Two PICO-GUARD Systems with 2-Channel EDM



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Models

- SFCDT-4A1
- SFCDT-4A1C



! Wiring diagrams are for information only. See appropriate manuals for all specific warnings, cautions and information for use.

More on next page

- Accessories
- Reference
- Hookups
- Wiring Diagrams
- Glossary
- International Reps

WD026



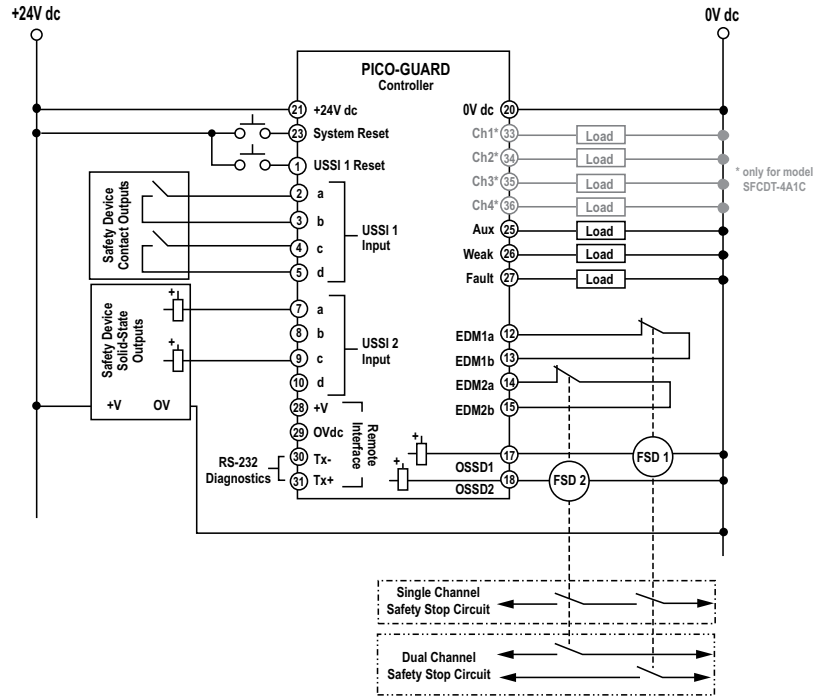
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Models

- SFCDT-4A1
- SFCDT-4A1C

PICO-GUARD™ Controller

One PICO-GUARD System with 2-Channel EDM and 2 Generic FSDs



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WD027



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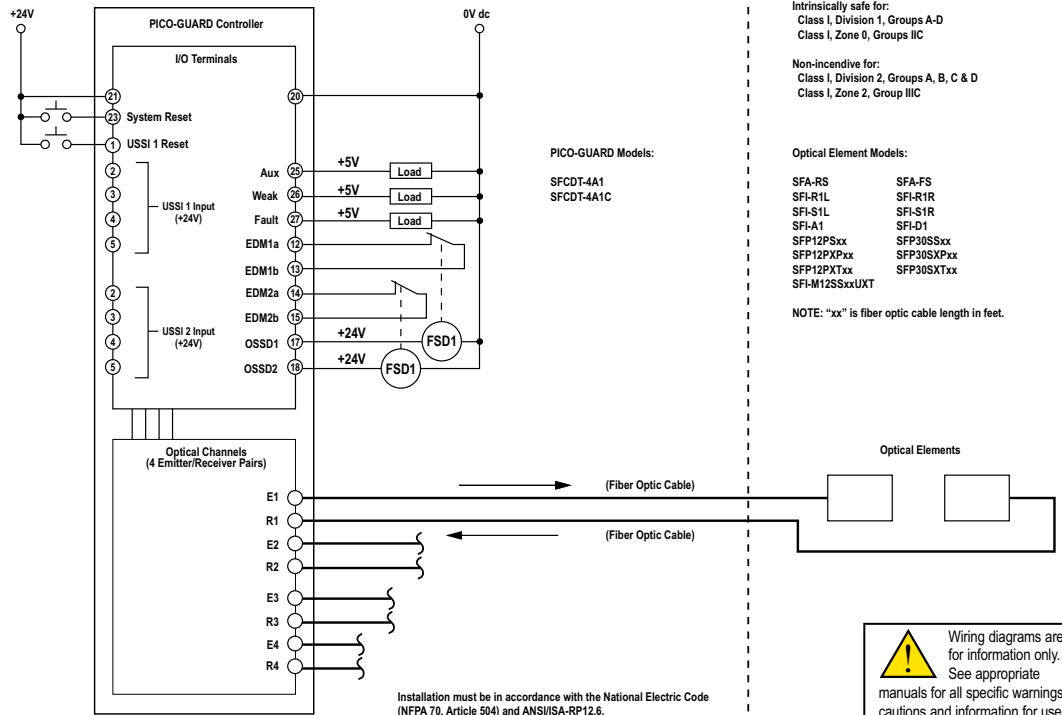
Models

- SFCDT-4A1
- SFCDT-4A1C

Unclassified or Class I, Division 2, Groups A, B, C and D Hazardous (Classified) Locations Class I, Zone 2, Group IIC. For information on compliance and classification according to Directive 94/9/EC (ATEX).

PICO-GUARD™ EXI/ATEX Controller

Hazardous Environment Application to Optical Elements



Intrinsically safe for:
Class I, Division 1, Groups A-D
Class I, Zone 0, Groups IIC

Non-incendive for:
Class I, Division 2, Groups A, B, C & D
Class I, Zone 2, Group IIC

- PICO-GUARD Models:**
- SFCDT-4A1
 - SFCDT-4A1C
- Optical Element Models:**
- SFA-RS
 - SFI-R1L
 - SFI-S1L
 - SFI-A1
 - SFP12PSxx
 - SFP12PXPxx
 - SFP12PXTxx
 - SFI-M12SSxxUXT
 - SFA-FS
 - SFI-R1R
 - SFI-S1R
 - SFI-D1
 - SFP30SSxx
 - SFP30SXxx
 - SFP30SXTxx

NOTE: "xx" is fiber optic cable length in feet.

Installation must be in accordance with the National Electric Code (NFPA 70, Article 504) and ANSI/ISA-RP12.6.

! Wiring diagrams are for information only. See appropriate manuals for all specific warnings, cautions and information for use.

More on next page

WD028

PICO-GUARD™ Controller with Muting

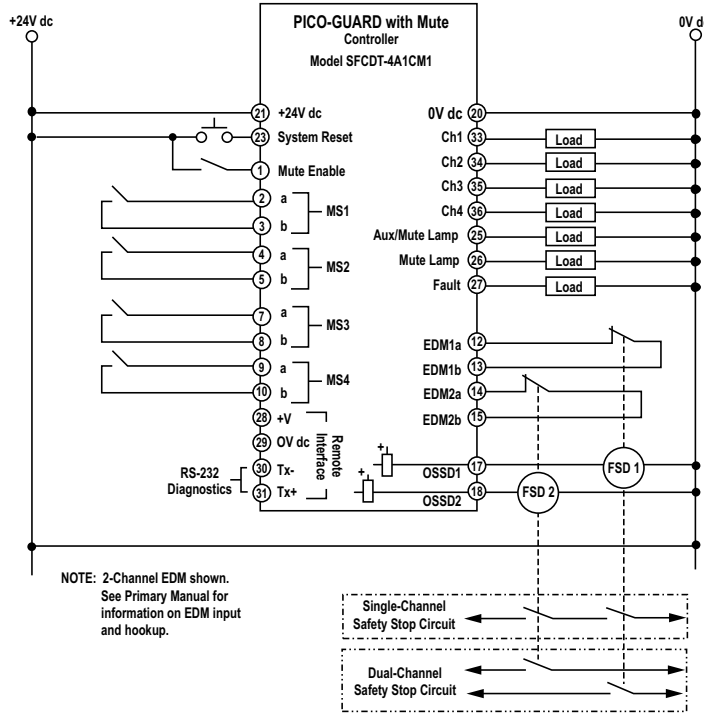
One PICO-GUARD with Muting and 2-Channel EDM and 2 Generic FSDs



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Models

- SFCDT-4A1CM1



NOTE: 2-Channel EDM shown. See Primary Manual for information on EDM input and hookup.

See Primary Manual for information on interfacing of safety stop circuits

Wiring diagrams are for information only. See appropriate manuals for all specific warnings, cautions and information for use.

WD029

SC22-3 Safety Controller

1-Channel, 2-Channel and No EDM



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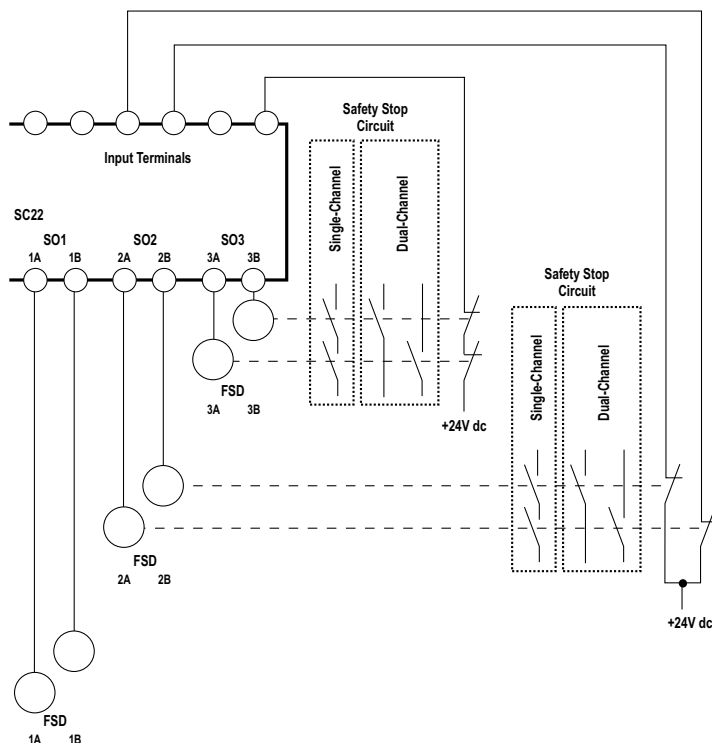
Models

- SC22-3
- SC22-3E

The figure shown is generic in nature and represents all three EDM options:

- Safety Output SO1 is shown with NO EDM configured (typically used with self-monitored devices).
- Safety Output SO2 is shown with Two-Channel EDM configured.
- Safety Output SO3 is shown with One-Channel EDM configured.
- Any particular Safety Controller configuration may use any combination of external device monitoring options, depending on the application.

See product manual for information on external device monitoring and interfacing safety circuits.



Wiring diagrams are for information only. See appropriate manuals for all specific warnings, cautions and information for use.

More on next page