Foxboro™ DCS

FBM242, Externally Sourced, Discrete Output Module

PSS 41H-2S242

Product Specification

May 2025

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Overview

The FBM242 Discrete Output Module contains 16 discrete output channels, which are sourced externally, rated up to 2 A at 60 VDC. Associated termination assemblies (TAs) provide for discrete outputs to loads of 2 A at 60 VDC, relay outputs (120 VAC/125 VDC, or 240 VAC), or relay outputs with power distribution and fusing. Each output is fully isolated from other channels and ground.

The module interfaces electrical output signals from a control processor to the field devices. It executes a digital I/O application program, with ladder logic support, and provides a Fail-Safe Configuration option for the outputs.

Features

- 16 discrete outputs
- Supports discrete output signals at voltages of:
  - 15 to 60 VDC
  - 120 VAC/125 VDC
  - 240 VAC
- Each input and output is galvanically isolated; group isolated when used with external excitation
- Rugged design suitable for enclosure in Class G3 (harsh) environments
- Executes the Discrete I/O or Ladder Logic program, with the following configurable options: Input Filter Time, Fail Safe Configuration, Fail-Safe Fall-Back, and Sustained or Momentary Outputs
- Various Termination Assemblies (TAs) that contain:
  - Current limiting devices
  - Fuses
  - Relay outputs with external power source, fusing, and power distribution
  - Solid state outputs
  - Redundant power distribution

Standard Design

The module has a rugged extruded aluminum exterior for physical protection of the circuits. Enclosures specially designed for mounting the Fieldbus Modules (FBMs) provide various levels of environmental protection, up to harsh environments (Class G3), per ISA Standard S71.04.

Visual Indicators

Green and red light-emitting diodes (LEDs) incorporated into the front of the module provide visual indication of the module operational status, as well as the discrete states of the individual output points.

Easy Removal/Replacement

The module can be removed/replaced without removing field device termination cabling, power, or communication cabling.

Fieldbus Communication

A Fieldbus Communications Module or a Control Processor interfaces to the redundant 2 Mbps module Fieldbus used by the FBMs. The FBM242 accepts communication from either path (A or B) of the redundant 2 Mbps Fieldbus. If one path is unsuccessful or is switched at the system level, the module continues communication over the active path.

Current Limiting

Field power for contacts or solid state switches is current limited.

Modular Baseplate Mounting

The module mounts on a DIN rail mounted Modular baseplate, which accommodates up to four or eight FBMs. The Modular baseplate is either DIN rail mounted or rack mounted, and includes signal connectors for redundant Fieldbus, redundant independent DC power, and termination cables.

Termination Assemblies (TAs)

Field I/O signals connect to the FBM subsystem via DIN rail mounted TAs. The TAs used with the FBM242 are described in Termination Assemblies, page 10.

Functional Specifications

Output Channels	16 isolated channels.
Applied Voltage	15 to 60 VDC (maximum)
Load Current	2.25 A (maximum) per channel
Load Current-In-Rush	8 A (maximum) for 20 ms per channel at 30°C. 6.4 A (maximum) for 20 ms per channel at 70°C.
On-State Voltage Drop	0.2 V (maximum) at 2.25 A
Off-State Leakage Current	0.1 mA (maximum)
Inductive Loads	Module output may require a protective diode or metal oxide varistor (MOV) connected across the inductive load.
Output Channel Isolation	Each channel is galvanically isolated from all other channels and earth (ground). The module withstands, without damage, a potential of 600 VAC applied for one minute between any channel and ground, or between a given channel and any other channel. **⚠⚠DANGER** **HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH** Although the module can withstand a maximum of 600 VAC applied for one minute between any channel, DO NOT apply voltages beyond the published input ranges. The channels are NOT intended for permanent connection to hazardous voltage circuits. Understand that connection of these channels to voltages greater than 30 VAC or 60 VDC violates electrical safety code requirements and may expose users to electric shock. **Failure to follow these instructions will result in death or serious injury.**
Communication	Communicates with its associated FCM or FCP via the redundant 2 Mbps module Fieldbus
Power Requirements	• Input Voltage Range (Redundant): 24 VDC +5%, -10% • Consumption (Maximum) 3 W (maximum) at 24 VDC • Heat Dissipation (Maximum) 6.5 W (maximum) at 24 VDC (with all outputs at 1.5 A each)
Calibration Requirements	Calibration of the module and termination assemblies are not required.
Regulatory Compliance: Electromagnetic Compatibility (EMC):	• *European EMC Directive 2004/108/EC (Prior to April 20, 2016) and 2014/30/EU (Beginning April 20, 2016)*: Meets: EN61326-1:2013 Class A Emissions and Industrial Immunity Levels

Regulatory Compliance: Product Safety	• *Underwriters Laboratories (UL) for U.S. and Canada*: UL/UL-C listed as suitable for use in UL/UL-C listed Class I, Groups A-D; Division 2; temperature code T4 enclosure based systems when connected to specified Foxboro DCS processor modules. Communications circuits also meet the requirements for Class 2 as defined in Article 725 of the National Electrical Code (NFPA No.70) and Section 16 of the Canadian Electrical Code (CSA C22.1). For more information, see the *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA). • *European Low Voltage Directive 2006/95/EC (Prior to April 20, 2016) and 2014/35/EU (Beginning April 20, 2016) and Explosive Atmospheres (ATEX) directive 94/9/EC (Prior to April 20, 2016) and 2014/34/EU (Beginning April 20, 2016)* DEMKO certified as Ex nA IIC T4 for use in certified Zone 2 enclosure when connected to specified processor modules as described in the *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA).
RoHS Compliance	Complies with European RoHS Directive 2011/65/EU, including amending Directives 2015/863 and 2017/2102
IECEx Certification	IECEx Certified

Environmental Specifications

	Operating	Storage
Temperature	• Module: -20 to +70°C (-4 to +158°F) • Termination Assembly – PA: -20 to +70°C (-4 to +158°F)	-40 to +70°C (-40 to +158°F)
Relative Humidity	5 to 95% (noncondensing)	5 to 95% (noncondensing)
Altitude	-300 to +3,000 m (-1,000 to +10,000 ft)	-300 to +12,000 m (-1,000 to +40,000 ft)
Vibration	0.75g (5 to 500 Hz)	
Contamination	Suitable for use in Class G3 (Harsh) environments as defined in ISA Standard S71.04, based on exposure testing according to EIA Standard 364-65, Class III.	

NOTE: The environment ranges can be extended by the type of enclosure containing the module. See the Product Specification Sheet (PSS) applicable to the enclosure that is to be used.

Physical Specifications

Mounting	• Module: FBM242 mounts on a Modular Baseplate. The baseplate can be mounted on a DIN rail (horizontally or vertically), or horizontally on a 19-inch rack using a mounting kit. See *Compact 200 Series 16-Slot Horizontal Baseplate* (PSS 41H-2C200) for details. • Termination Assembly: The TA mounts on a DIN rail and accommodates multiple DIN rail styles including 32 mm (1.26 in) and 35 mm 1.38 in)
Mass	• Module: 284 g (10 oz) approximate • Termination Assembly: ◦ Compression: 127 mm (5.02 in) – 272 g (0.60 lb, approximate) 148 mm (5.75 in) – 285 g (0.65 lb, approximate) 216 mm (8.51 in) – 320 g (0.70 lb, approximate)
Dimensions - Module	• Height: 102 mm (4 in),114 mm (4.5 in) including mounting lugs • Width: 45 mm (1.75 in) • Depth: 104 mm (4.11 in)
Dimensions - Termination Assemblies	See Dimensions - Nominal, page 16
Part Numbers	• Module: RH916TA • Termination Assemblies: See Functional Specifications - Termination Assemblies, page 12

Termination Cables	• Cable Lengths: Up to 30 m (98 ft) • Cable Materials: Polyurethane or Low Smoke Zero Halogen (LSZH) • Termination Cable Type: Type 4 or Type 4H - See Table 1 • Cable Connection: 37-pin male D-subminiature
Termination Assembly Construction	• Material: Polyamide (PA), compression • Terminal Blocks: Outputs - 2 tiers (switch and solid state), 3 tiers (relay), 16 positions Power Distribution - 2 tiers, 4 positions
Field Termination Connections	• Compression - Accepted Wiring Sizes: ◦ Solid/Stranded/AWG: 0.2 to 4 mm^2/0.2 to 2.5 mm^2/24 to 12 AWG ◦ Stranded with Ferrules: 0.2 to 2.5 mm^2 with or without plastic collar
Termination Assembly Switching Relays	• Electrical Service Life: 100,000 operations at rated resistive load 5,000,000 operations at no load. • 5 A Relay ◦ Type: Single-Pole, Double-Throw, Normally Open (SPDT_NO) ◦ Switching Current: 5 A at up to 120 VAC (see General Purpose Plug-In Relay Termination Assembly Specifications, page 18)

Termination Assemblies

Field I/O signals connect to the FBM subsystem via DIN rail mounted TAs. Multiple types of TAs are available with FBMs to provide I/O signal connections, signal conditioning, optical isolation from signal surges, external power connections, and/or fusing for protection of the FBM and/or field device as required by the particular FBM. Since these features are built into the TAs (where required), in most applications there is no need for additional termination equipment for field circuit functions such as circuit protection or signal conditioning (including fusing and power distribution).

The DIN rail mounted termination assemblies connect to the FBM subsystem baseplate by means of removable termination cables. The cables are available in a variety of lengths, up to 30 meters (98 feet), allowing the TAs to be mounted in either the enclosure or in an adjacent enclosure. See Functional Specifications - Termination Assemblies, page 12 for termination cable part numbers and specifications.

Discrete Outputs

Termination assemblies with discrete outputs support sixteen 2-wire discrete output signals at passive low voltages of less than 60 VDC and active high voltage levels of 120 VAC or 240 VAC. Active termination assemblies support output signal conditioning for FBMs. To condition signals, these termination assemblies provide fuse protection, relays, solid-state devices, and terminal blocks to connect externally supplied optional power distribution.

Low Voltage Discrete Outputs

The low voltage outputs (less than 60 VDC) use passive termination assemblies. These assemblies are available with and without output protection (fusing). Termination assemblies with protection have individual user serviceable fuses that are designed to limit the output current to 2 A. Sixteen vertically mounted, one per channel, 3.15 A sand filled fuses (temperature derated) allow a maximum of 2 A current per output channel. Termination assemblies without fusing (unprotected) are intended for use by Foxboro engineers or customers who are using interposing relays or fuse terminal blocks between the termination assembly and the field devices.

Power for the low voltage outputs can be supplied by the FBM +24 VDC auxiliary power supply (internally (FBM) sourced) or by a field voltage source (externally sourced).

High Voltage Discrete Outputs

The high voltage output (120 VAC or 240 VAC) termination assemblies use plug-in SPDT (Form C) electromechanical relays and solid-state switches. The plug-in sockets allow field replacement of individual relays. The relays and associated sockets are located under the component covers of the termination assemblies.The termination assembly's switched outputs use unsealed, general purpose relays.These assemblies are capable of providing mixed voltage and are designed to provide signal segregation by locating the low voltage inputs an the opposite side of the terminal assembly from the outputs. A solid-state output module is optionally available. High voltage discrete outputs are always externally sourced power.

The output termination assemblies come in either output or output with power distribution (user-supplied via terminals on the termination assembly). In both configurations, when the FBM output is on, the relay coil is energized and the relay contact is switched from normally closed (NC) position to the normally open (NO) position. The FBM +24 VDC auxiliary power supply is used to energize the relay coil.

Termination assemblies with power distribution have a dedicated terminal block which provides a connection to externally supplied power and distributed internally on the termination assembly to each of the output channels. The line or positive side of the supply is fused; the neutral or negative side of the supply is connected to the field.

Functional Specifications - Termination Assemblies

FBM Type	Output Signal[a]	TA Part Number[b] PA	Termination Type[c]	TA Cable Type[d]	TA Cert. Type[e]
FBM242	16 channel, switch (protected - fused outputs) 15 to 60 VDC (externally sourced) at 2 A maximum Channel isolation provided by FBM242	RH916JY	C	4, 4H	1,2
FBM242	16 channel, switch (unprotected - no fuses) 15 to 60 VDC (externally sourced) at 2 A maximum Channel isolation provided by FBM242	RH917XX	C	4, 4H	1,2
FBM242	16 channel, switch (protected - fused outputs) 15 to 60 VDC (externally sourced) at 2 A maximum with power distribution Current is limited to 12 A maximum for each group of 8 channels simultaneously Group isolation provided by termination assembly	RH917HX	C	4, 4H	1,4
FBM242	16 channel, switch (each channel is protected - fused) Redundant power 15 to 60 VDC (externally sourced) at 2 A maximum with power distribution Group isolation provided by termination assembly	RH923LH	C	4, 4H	1, 4
FBM242	16 channel, switch (externally sourced) SPDT (Form C) Relays with LED indicators <30 VDC at 5 A maximum, or 125 VDC at 600 mA w/ resistive load, or 125 VDC at 240 mA w/ inductive load Up to 250 VAC at 5 A maximum Channel isolation provided by termination assembly relays[f]	RH923LL	C	4	5

FBM242	16 channel, switch (externally sourced) SPDT (Form C) Relays <30 VDC at 5 A maximum, or 125 VDC at 600 mA w/ resistive load, or 125 VDC at 240 mA w/ inductive load Up to 250 VAC at 5 A maximum Channel Isolation provided by termination assembly relays(f)	RH916YY	C	4	5
FBM242	16 channel, switch (externally sourced) with power distribution SPDT (Form C) Relays(f) <30 VDC at 5 A maximum 125 VDC at 600 mA w/ resistive load, or 125 VDC at 250 mA w/ inductive load, or up to 250 VAC at 5 A maximum Total current is limited to 12 A maximum for each group of 8 channels simultaneously Group (two groups of eight) isolation provided by termination assembly	RH916YZ	C	4	5
FBM242	16 channel, switch (externally sourced - fused outputs) SPDT (Form C) Relays 125 VAC at 2 A /125 VDC at 0.6 A maximum Channel isolation provided by termination assembly relays(g)	RH926DV	Knife(g)	4	5
FBM242	16 channel, switch (externally sourced - fused outputs) Solid State Switch 125 VAC/125 VDC at 2 A maximum Channel isolation provided by termination assembly	RH926BE	Knife(g)	4	5

(a) Maximum current is limited to 12 A per 8 channels. Output inductive load limits based on current of 2 A. Inductance limit increases by a factor of 4, for each factor of 2 reduction in current. For an inductive load above stated limits, a snubber diode is required for a DC inductive load or a MOV (metal oxide varistor) is required for an AC inductive load. Diode current rating must be equal to the maximum load current and voltage rating equal to 1.3X maximum supply voltage. MOV must be rated for 120 VAC use and current rating must be equal to maximum load current.

(b) PA is polyamide rated from -20 to +70°C (-4 to +158°F).

(c) C = TA with compression terminals, RL = TA with ring lug terminals. Knife has compression terminals.

(d) See Table 2, page 15 for cable part numbers.

(e) See Table 1, page 14 for Termination Assembly certification definitions.

(f) See General Purpose Plug-In Relay Termination Assembly Specifications, page 18 for more detail on the relay contact rating.

(g) This is knife disconnect construction. Knives and test sockets provided for circuit validation only. Knife disconnects are not rated for interrupting loads. Power must be removed before disconnecting circuit.

Table 1 - Certifications for Termination Assemblies

Type	Certification
Type 1	TAs are UL/UL-C listed as suitable for use in Class I; Groups A-D; Division 2 temperature code T4 hazardous locations. They are DEMKO certified EEx nA IIC T4 for use in Zone 2 potentially explosive atmospheres.
Type 2	TAs are UL/UL-C listed as associated apparatus for supplying non-incendive field circuits Class I; Groups A-D; Division 2 hazardous locations when connected to specified 200 Series FBMs and field circuits meeting entity parameter constraints specified in *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA). They are also DEMKO certified as associated apparatus for supplying field circuits for Group IIC, Zone 2 potentially explosive atmospheres. Field circuits are also Class 2 limited energy (60 VDC, 30 VAC, 100 VA or less) if customer-supplied equipment meets Class 2.
Type 4	All field circuits are Class 2 limited energy (60 VDC, 30 VAC, 100 VA or less) if customer-supplied equipment meets Class 2 limits.
Type 5	The TA and its field circuitry are for use in only ordinary (non-hazardous) locations.

Table 2 - Cable Types and Part Numbers

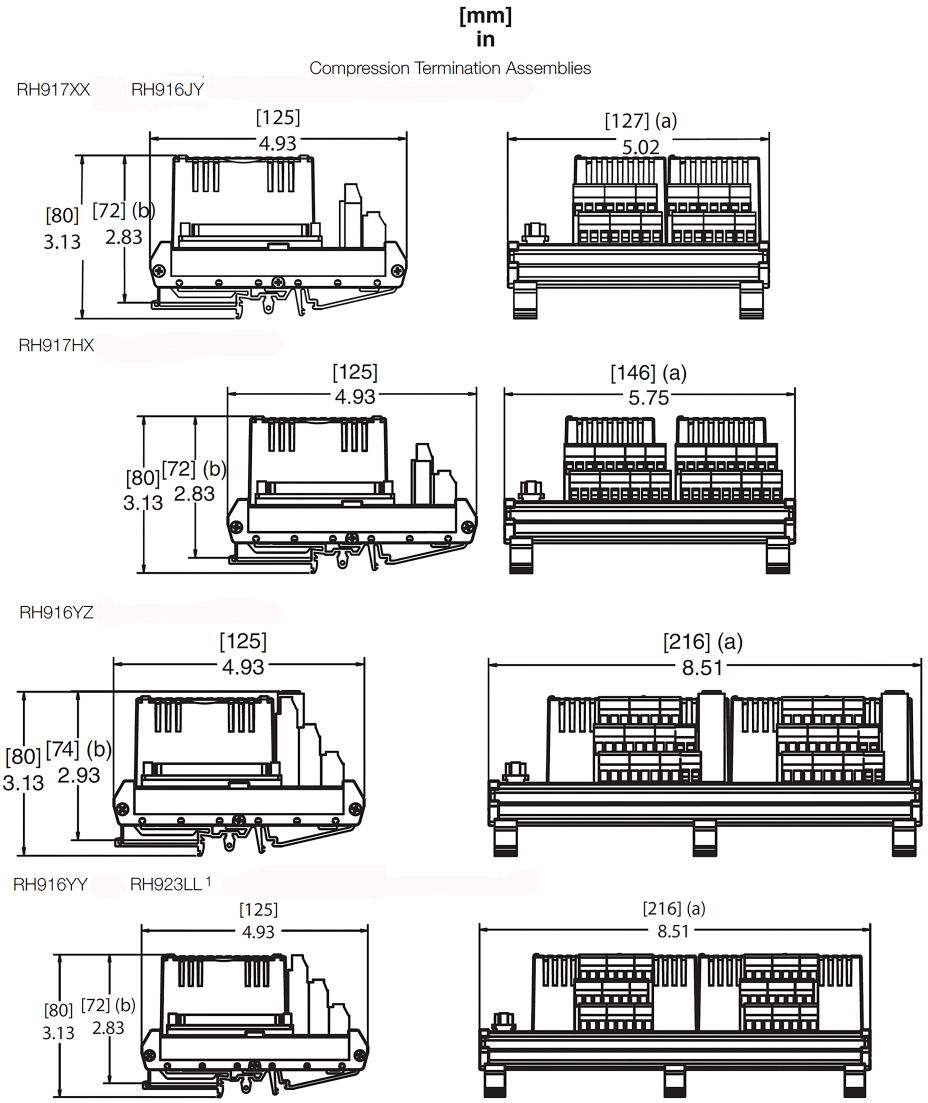
Cable Length m (ft)	Type 4 P/PVC[a]	Type 4H P/PVC[a][b]	Type 4 LSZH[c]	Type 4H LSZH[c]
0.5 (1.6)	RH916FG	–	RH928BA	–
1.0 (3.2)	RH916FH	–	RH928BB	–
2.0 (6.6)	RH931RQ	–	RH928BC	–
3.0 (9.8)	RH916FJ	–	RH928BD	–
5.0 (16.4)	RH916FK	–	RH928BE	–
10.0 (32.8)	RH916FL	RH916GE	RH928BF	RH928BW
15.0 (49.2)	RH916FM	RH916GF	RH928BG	RH928BX
20.0 (65.6)	RH916FN	RH916GG	RH928BH	RH928BY
25.0 (82.0)	RH916FP	RH916GH	RH928BJ	RH928BZ
30.0 (98.4)	RH916FQ	RH916GJ	RH928BK	RH928CA

(a) P/PVC cable assembles polyurethane outer jacket and semi-rigid PVC primary conductor insulation temperature range: -20 to + 70°C (-4 to 158°F).

(b) Type 4H cables are used to reduce voltage drop in long (greater than 5 m (15 ft)) cable run applications.

(c) Low smoke zero halogen or low smoke free of halogen (LSZH) is a material classification used for cable jacketing. LSZH is composed of thermoplastic or thermoset compounds that emit limited smoke and no halogen when exposed to high sources of heat. Temperature range: -40 to +105°C (-40 to +221°F).

Dimensions - Nominal



(a) Overall width — for determining DIN rail loading.

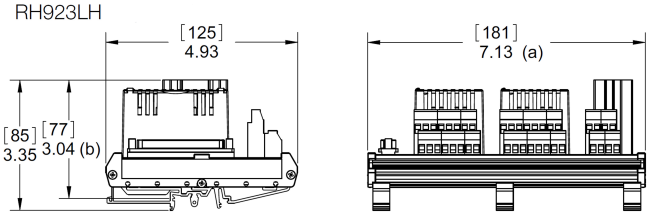
(b) Height above DIN rail (add to DIN rail height for total).

1 Dimensions shown are for the PVC versions. All dimensions for this polyamide termination assembly are smaller.

[mm]
in

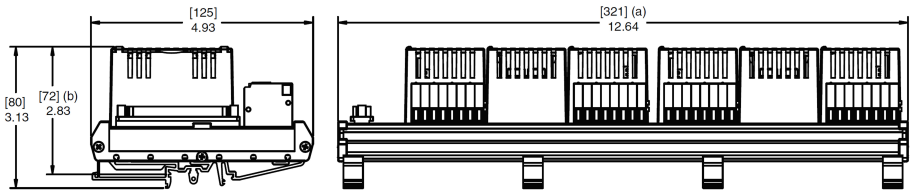
Compression Termination Assemblies (Continued)

RH923LH

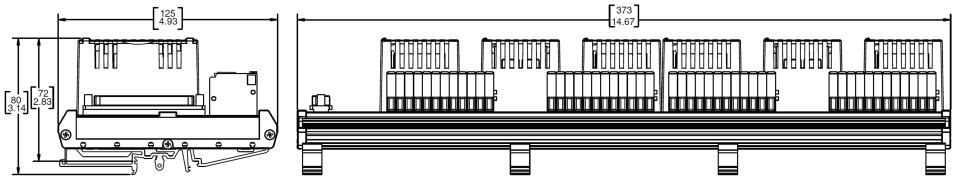


Ring Lug and Knife Switch Termination Assemblies

RH926BE



RH926DV



(a) Overall width — for determining DIN rail loading.

(b) Height above DIN rail (add to DIN rail height for total).

General Purpose Plug-In Relay Termination Assembly Specifications

Description	SPDT, plug-in, field replaceable
Rated Load(1)	• DC Resistive: 5 A at 30 VDC 0.6 A at 125 VDC • DC Inductive (L/R = 7 MS): 5 A at 30 VDC 0.4 A at 125 VDC • AC Resistive: 5 A at 240 VAC • AC Inductive (P.F. = 0.4): 2 A at 240 VAC
Carry Current(1)	5 A
Maximum Operating Voltage(1)	240 VAC, 125 VDC
Maximum Operating Current(1)	5 A
Maximum Switching Capacity	1200 VA, 150 W
Minimum Permissible Load	100 mA, 5 VDC
Contact Material	AgCdO
Contact Resistance	30 m Ω maximum
Life Expectancy	• Mechanical: 20 X 10^6 operations minimum • Electrical: 100 X10^3 (at rated load)
Response Time	• Operate: 15 ms maximum • Release: ◦ AC: 10 ms maximum ◦ DC: 5 ms maximum
(1) The manufacturer's rated load is derated; the Termination Assembly maximum rated load is 5 A at 240 VAC/5 A at 30 VDC per channel, or 12 A maximum per group of eight outputs. The relay load must be derated at higher DC voltages.	

Related Documents

Document Number	Description
PSS 41H-2SOV	*Standard 200 Series Subsystem Overview*
B0400FA	*Standard and Compact 200 Series Subsystem User's Guide*
PSS 41H-2CERTS	*Standard and Compact 200 Series I/O - Agency Certifications*
PSS 41S-3FCPICS	*Field Control Processor 280 (FCP280) Integrated Control Software*
PSS 41H-2SBASPLT	*Standard 200 Series Baseplates*

Proposition 65

WARNING: This product can expose you to chemicals including lead and lead compounds, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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As standards, specifications, and design change from time to time, please ask for confirmation of the information given in this publication.

PSS 41H-2S242, Rev B