Foxboro™ DCS

Compact Power Supply — FPS480-24

PSS 41H-2C480

Product Specification

August 2019

Legal Information

Overview

The Foxboro™ DCS Compact Power Supply (FPS480-24) provides 24 V dc to system loads such as the FCP280 and the Compact and Standard 200 Series I/O subsystem equipment. Additional power supplies can be used for other devices requiring 24 V dc power. The Model FPS480-24 is a 480 W power supply that is ATEX qualified, and agency certified for use in Class 1, Division 2, and Zone 2 applications.

The power supply is designed primarily for use in the K13 System Enclosure and K14 System and Termination Enclosure for the Compact 200 Series Fieldbus Modules (FBMs) and the FCP280 modules. It is available for custom configurations as well, provided that the proper power consumption and wattage requirements are taken into consideration.

Features

- Wide range of ac and dc input voltages
- Extremely high efficiency
- Power factor correction
- Dual stage current limiting
- Overvoltage shut down circuitry
- Transformer isolated 24 V dc output
- Class 1, DIV 2, Zone 2 applications
- UL®, UL-C and CENELEC Certifications
- G3 rating for harsh environments
- Power for external field devices
- Convection cooling (no fans)
- Horizontal DIN rail mounting
- “DC OK” relay contact status alarm output

Wide-Range Input Voltages

A high-efficiency input circuit automatically accepts either ac or dc input voltages. The 120/240 V ac or 125 V dc input circuit provides a range of 85 to 264 V ac at 47 to 63 Hz operation, or 120 to 264 V dc, 108 to 119 V dc (derates to 90%), to meet world-wide power requirements.

High Efficiency

The Compact power supply has exceptional efficiency (up to 94% at 230 V ac) resulting in high reliability and low failure rates. It has a return-on-investment (ROI) of less than two years based upon average electrical rates and load.

Power Factor Correction Circuitry

The advanced design for ac inputs provides an active sinusoidal current profile for near-unity controlled power factor.

Current Limiting

The Compact power supply operates as a constant voltage source with maximum load ratings as listed in the specifications. If load current attempts to exceed 105% of maximum current at the rated 25°C load for more than four seconds, the output current causes the Compact power supply to shut down.

Overvoltage Shutdown

Automatic shutdown occurs if operating conditions cause excessive output voltage. After the occurrence of an overvoltage shutdown, input power must be interrupted to re-establish the output. After the cause of the shutdown has been remedied, the shutdown circuit resets in less than 30 seconds after the removal of input power.

Division 2, Zone 2 Application

The power supply is UL and UL-C listed (to UL60950-1 and UL508) and has IEC/EN 60950 certifications. It can be used in Division 2 and Zone 2 applications.

Power for External Field Devices

The actual amount of power required in a Compact 200 Series I/O subsystem depends on the number of Compact 200 Series FBMs, FCP280s, and other modules being powered, the types of termination assemblies used, and whether internal or external powering is used for individual field device(s).

The FPS480-24 can also be used as a field power supply to power external field devices and FCP280s. However, for system integrity, non-system loads should be powered from separate power supplies.

Packaging

The vented open casing with conformal coating allows for corrosion protection and high reliability.

The power supply has a DIN rail mounting bracket for mounting on a horizontal DIN rail.

Status Alarms

Visual LED indicators for undervoltage and normal operating voltage output are contained on the power supply.

To indicate when the 24 V dc output dips to < 80% of its output for longer than 1 millisecond, a “DC OK” relay contact output is available to activate an externally powered alarm. A customer-supplied cable is required to connect the normally-closed relay contact (with screw terminals) to an external FBM or other contact sensing device. A Compact FBM207b may be used for this purpose, for example.

Functional Specifications

Output Voltage	24.0 V dc
Input Specifications	120/240 V ac OR 125 V dc Power Supply (RH101CR): • Input Voltage Range: 85 to 264 V ac or 120 to 264 V dc nominal 108 to 119 V dc (output derates to 90%) See *Table 1, page 8* • Input Frequency Range and Phase: Single Phase 47 to 63 Hz • Input Current (A): 4.5 A at 115 V ac 2.3 A at 230 V ac • Efficiency (At Maximum Output Power): 94% (typical) at 230 V ac • Inrush Current: < 20 A (first inrush), 40 A (second inrush) • Power Factor Correction: Typical at 115/230 V ac, Io = 100% 0.98/0.92 • Shut-Down Voltage: 66.7 V ac (typical) • Turn-On Voltage: 71.6 V ac (typical)
Output Specifications	• Output Voltage: 24.0 V dc, ±0.2 V dc nominal factory setting See *Table 1, page 8* • Voltage Line Regulation: 96 mV • Voltage Load Regulation: 240 mV • Output Current: ◦ Typical (Amps): 20 A ◦ At 85 V ac 60°C (140°F) (Amps): 20 A (480 W) ◦ Output Current or Output Power at 70°C (158°F): 360 W • Residual Ripple: 240 mVpp 600 mV; -25°C to 0°C (-13°F to 32°F)

Output Specifications (Continued)	• Temperature Coefficient: <0.02% per °C • Temperature Derating: 100% load (-25 to +60°C (-13 to +140°F)), derate linearly to 75% load from +60 to +70°C (+140 to +158°F) • Startup Time (Soft-Start): <1 s at 115 V ac • Load Transient Time: ±5% Load between 25% to 75% tr=tf=50 us • Holdup Time (Full Power, Typical): 14 ms at 115/230 V ac • Output Capacitance: 5000 µF
Protection Features	• Over Current Protection: Constant current limit with auto recovery. Over rated current (>105%) condition for more than four seconds will cause power supply to shutdown. Output may enter hiccup mode when the output voltage falls below approximately 20 V or at short circuit condition. • Overvoltage Protection: 28.2 V dc maximum 26.0 V dc minimum • Short-Circuit Current: Short circuit current @ 48 A (typical) Output constant current is set @ 32.5 A (typical) • Input Fuse, Integrated (Non-User Accessible): 12.5 A (10 A with dc input voltage) • Isolation Voltages: Input to output, output to chassis ground, input to chassis ground > 100 MΩ (DC 500 V)
Vibration	<19.6 m/s^2 (2G)
Calibration Requirements	Calibration or voltage adjustment of the power supply is not required.
Regulatory Compliance: Electromagnetic Compatibility (EMC)	• Supported Directives: IEC/EN 60950 UL60950-1 UL508 Semi F47 (ac 200 V ONLY) • ATEX with Conformal Coating: IECEx • AC Line Conducted Emissions: EN55022-B,CISPR22-B • Radiated RF Emissions: EN55022-B,CISPR22-B • Power line Harmonics: IEC61000-3-2 Class A

Regulatory Compliance: Electromagnetic Compatibility (EMC) (Continued)	• Power line Fluctuation/Flicker IEC61000-3-3 • Electrostatic Discharge IEC61000-4-2: ◦ Criterion A: 8 kV contact discharge 15 kV air discharge • RF Radiated Fields IEC 61000-4-3: ◦ Criterion A: Level 3 10 V/m 80 MHz to 2.7 GHz • Electrical Fast Transients IEC61000-4-4: ◦ Criterion A: Level 3 2 kV 5kHz • Lightning Surge IEC 61000-4-5: ◦ Criterion A: Level 3 2 kV Line to Neutral 4 kV Line to Ground • Conducted RF Common Mode IEC61000-4-6: ◦ Criterion A: Level 3 10 V • Power Frequency Magnetic Field EN 61000-4-8: ◦ Criterion A: 30 A/m Level4 • Voltage Dips/Short Variations IEC61000-4-11: ◦ Criterion C: 70%, 40%, 0%
Regulatory Compliance: Product Safety	• *Underwriters Laboratories (UL) for U.S. and Canada*: UL/UL-C listed as suitable for USA Class I, Zone 2, Aex nC IIC, and Class I, Division 2 Groups A, B, C, D Hazardous Locations, temperature code T3. These modules are also UL and UL-C listed as associated apparatus for supplying non-incendive communication circuits for Class I, Division 2, Groups A-D hazardous locations when connected to specified processor modules as described in the *DIN Rail Mounted Subsystem User's Guide* (B0400FA). • *European Low Voltage Directive 73/23/EEC and Explosive Atmospheres (ATEX) Directive 94/9/EC*: ENELEC (TUV) certified as Ex nA IIC T3 for use in CENELEC certified Zone 2 enclosure certified as associated apparatus for supplying non-incendive field circuits for Zone 2, Group IIC, potentially explosive atmospheres when connected to specified processor modules as described in the *DIN Rail Mounted Subsystem User's Guide* (B0400FA).

Table 1 - Nominal Input and Output

Input			Maximum Rated Output		
V	**A**	**Hz**	**V**	**A**	**W**
120 to 240 V ac	4.5/2.3	47 to 63	24	20	480
100 to 120 V ac	4.5	47 to 63	24	20	480
125 to 264 V dc	4.5		24	20	480
108 to 119 V dc	4.5		24	18	432

Environmental Specifications

	Operating	Storage
Temperature	-25 to 70°C (-13 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)

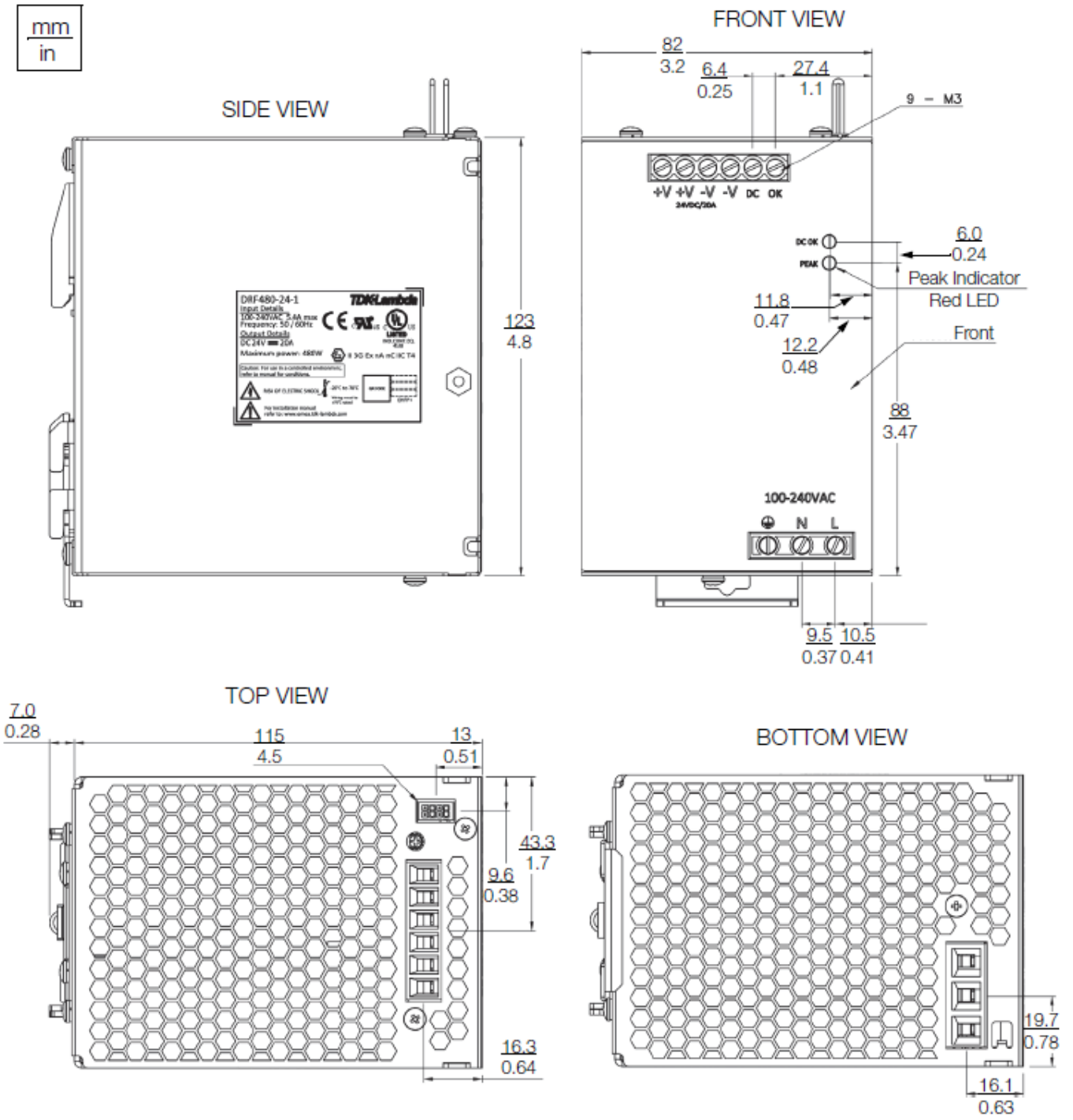
NOTE: See *Functional Specifications, page 5* for the appropriate temperature deratings for the power supplies.

Physical Specifications

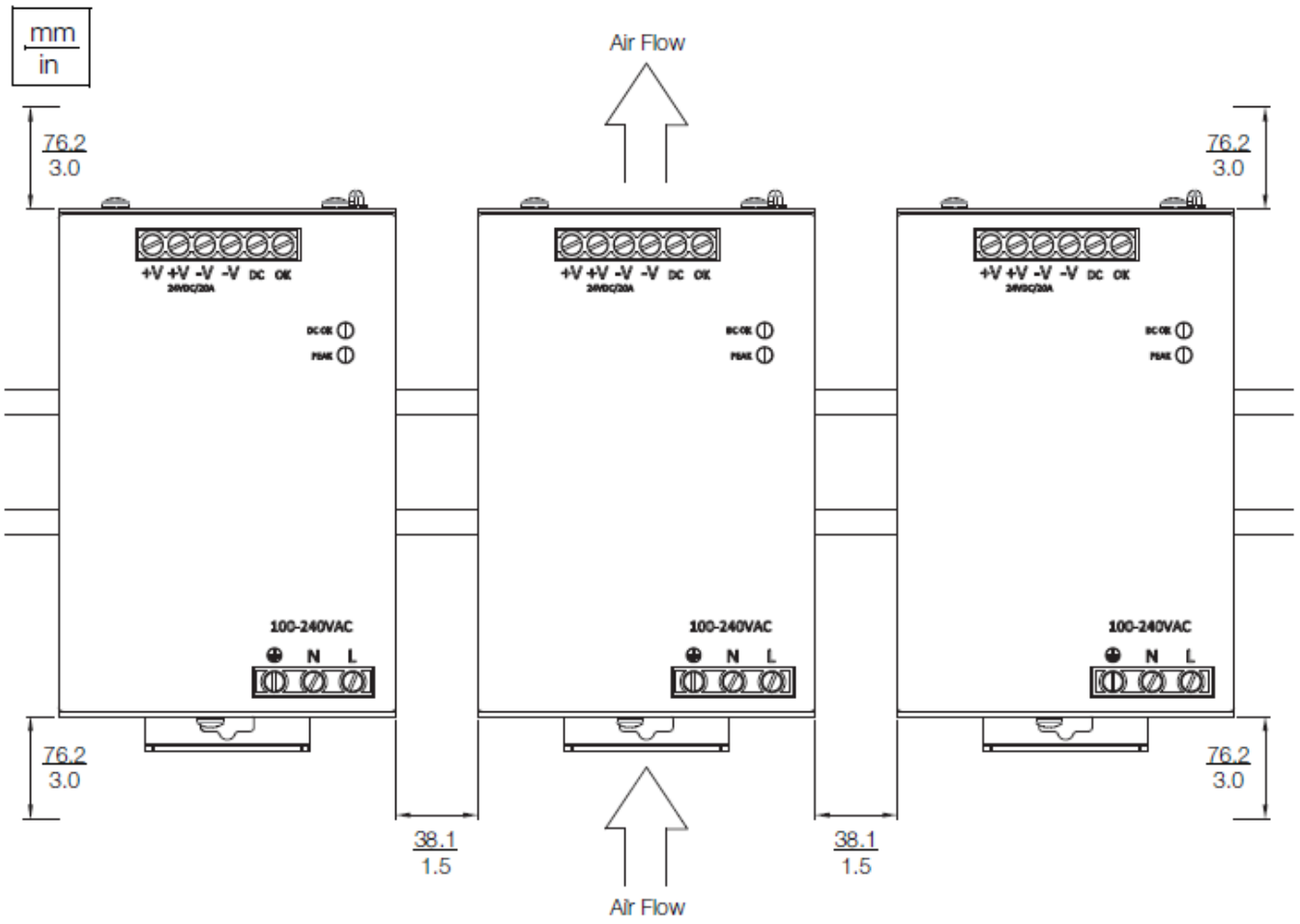
Mounting	Horizontal DIN-rail. Panel mount with DIN rail mounting bracket and DIN rail clamp removed.
Mass	• Net: 1.3 kg (2.87 lb) • Shipping: 1.45 kg (3.2 lb)
Dimensions	See *Dimensions — Nominal, page 12*
Cooling	Convection cooled (no fans)
Indicators	Green LED (DC OK) indicates when output voltage is 19.2 V Red LED (Peak) indicates peak mode when output voltage drops to <80% of rated output
Connection Type	M3 Screw connection
Finish	• Body and Front Cover: Blue - extruded aluminum • Top and Bottom Caps: Zinc coated sheet metal
Alarm Status Relay (DC OK)	• Rated Contact Load: 30 V dc, 1 A (Resistive Load) 110 V dc, 0.3 A (Resistive Load) 125 V ac, 0.5 A (Resistive Load) • Type: Normally Closed (NC) • Insulation Resistance: 1000 MΩ min. at 500 V dc • Dielectric Strength: 1,000 V ac 1 minute between open contacts 1,500 V ac 1 minute between coil and contact • Alarm Status Contact Voltage: 125 V ac, 110 V dc (maximum) Closes when the output voltage Vo is >80% of rated output • Normal Operation: Relay - Close (as Vo > 80%) Overload mode: (Red LED - Light) Relay - Close (if Vo > 80%) Relay - Open (if Vo < 80%) • Output Short Circuit: Relay - Open (as Vo < 80%)

Alarm Status Relay (DC OK) (Continued)	• Temperature Shutdown: Relay - Open (as Vo < 80%) • No Input Power: Relay - Open (as Vo < 80%) • Switching Current: 2 A (maximum) • Current Carrying: 2 A (maximum) • Minimum Load: 50 µV, 10 µA • Switching Power 62.5 VA, 30 W (maximum) • UL/CSA Rating: UL File No. E45026 CSA File No. LR35579
Part Numbers	• Power Supply: RH101CR • AC Input Terminal Block Cable: Connects Terminal Block to Compact Power Supply - Qty 1 required RH100DY - 3.7 m (12.1 ft) • Power Supply to Baseplate Cables: Typically, the Compact power supply (FPS480-24) is connected to its Compact and standard 200 Series baseplates via a dc distribution assembly. This distribution assembly is used when more than two baseplate connections are needed. These baseplate power supply cables and distribution assemblies are used: ◦ Power Supply FPS480-24 Cable to dc Distribution Assembly: RH100DZ - 0.6 m (2.0 ft), 24 V dc,14 AWG (Supports up to 20 A) RH100EA - 1.0 m (3.2 ft), 24 V dc,14 AWG (Supports up to 20 A) ◦ dc Distribution Assembly: RH101BY ◦ Power Cable for Baseplates (dc Distribution to Baseplate): RH100EB - 2.1 m (6.9 ft), 24 V dc, 18 AWG RH100EC - 3.0 m (9.8 ft), 24 V dc, 18 AWG Alternatively, if the power supply connects to no more than two baseplates, the RH100EB and/or RH100EC cables may be used for direct connections to the baseplates.

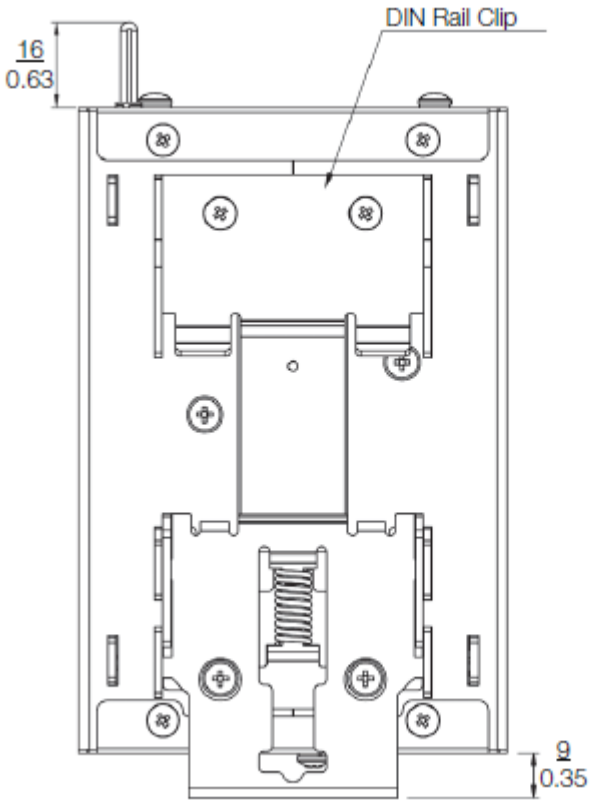
Dimensions - Nominal



Clearance - Nominal



DIN Rail Clip (Rear View)



Related Product Documents

Document Number	Description
B0400FA	*Compact 200 Series I/O Subsystem Overview*
PSS 41H-2COV	*Compact 200 Series I/O Subsystem Overview*
PSS 21H-2W1 B3	*DIN Rail Mounted FBM Subsystem Overview*
PSS 31H-2W12 B3	*DIN Rail Mounted Compact 200 Series I/O Equipment, Agency Certifications*
PSS 41H-2C200	*Compact 200 Series 16-Slot Horizontal Baseplate*
PSS 21H-2W3 B4	*DIN Rail Mounted Power Supply - FPS400-24*
PSS 31H-3W7 B4	*DIN Rail Mounted Power Supplies - FPS240-24 and FPS120-24*
PSS 41H-2K13	*K13 System Enclosure*
PSS 41H-2K14	*K14 System and Termination Enclosure*

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-2C480, Rev A