

Compact Power Supply - FPS480-24



Front and Left Side View (RH101CR)

The Foxboro Evo™ Process Automation System's Compact power supply provides 24 V dc to designated system loads such as FCP280, the Compact and standard 200 Series I/O subsystem equipment. The power supply is DIN rail mounted.

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.

OVERVIEW

The Foxboro Evo Process Automation System's Compact Power Supply (FPS480-24) provides 24 V dc to system loads such as the FCP280, the Compact and standard 200 Series I/O subsystem equipment⁽¹⁾. 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 G13 System Enclosure and G14 System and Termination Enclosure for the Compact 200 Series Fieldbus modules 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.

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 removed, 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.

(1) Additional power supplies can be used for other devices requiring 24 V dc power.

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

Maximum Ratings

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%)

(Refer to Table 1)

*Input Frequency Range**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, $I_o = 100\%$.

0.98/0.92

Output Specifications

OUTPUT VOLTAGE24.0 V dc, ± 0.2 V dc nominal factory setting

(Refer to Table 1)

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 (Cont.)

TEMPERATURE COEFFICIENT

<0.02% per °C

TEMPERATURE DERATING100% 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 $\pm 5\%$ Load between 25% to 75% $t_r = t_f = 50 \mu s$ **HOLDUP TIME (FULL POWER, TYPICAL)**

14 mS at 115/230 V ac

SHUT-DOWN VOLTAGE

66.7 V ac (typical)

TURN-ON VOLTAGE

71.6 V ac (typical)

OUTPUT CAPACITANCE5000 μ F

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 VOLTAGESInput to output, output to chassis ground,
input to chassis ground > 100M Ω (DC500V)**Vibration**<19.6m/s² (2G)

FUNCTIONAL SPECIFICATIONS (CONTINUED)

Startup Time (Soft-Start)

<1 s

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

Compliance to EN55022-B,CISPR22-B

Radiated RF Emissions

Compliance to EN55022-B,CISPR22-B

Power line Harmonics

Compliance to IEC61000-3-2 Class A

Power line Fluctuation/Flicker

Compliance to 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

ELECTROMAGNETIC COMPATIBILITY (EMC) (CONT.)

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%

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 Foxboro processor modules as described in the *DIN Rail Mounted Subsystem User's Guide* (Reference 1).

European Low Voltage Directive 73/23/EEC and Explosive Atmospheres (ATEX) Directive 94/9/EC

CENELEC (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 Foxboro processor modules as described in the *DIN Rail Mounted Subsystem User's Guide* (Reference 1).

Calibration Requirements

Calibration or voltage adjustment of the power supply is not required.

FUNCTIONAL SPECIFICATIONS (CONTINUED)

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

TEMPERATURE⁽²⁾

–25 to 70°C (–13 to +158°F)

RELATIVE HUMIDITY

+5% to +95% RH, noncondensing

ALTITUDE

–300 to +3,000 m (–1,000 to +10,000 ft)

Storage

TEMPERATURE⁽²⁾

–40 to +85°C (–40 to +185°F)

RELATIVE HUMIDITY

+5 to +95% (noncondensing)

ALTITUDE

–300 to +12,000 m (–1,000 to +40,000 ft)

(2) Refer to page 4 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" on page 9.

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

Invensys system blue - extruded aluminum

TOP AND BOTTOM CAPS

Zinc coated sheet metal

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)

Part Numbers (Cont.)

POWER SUPPLY TO BASEPLATES 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. The following 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.

PHYSICAL SPECIFICATIONS (CONTINUED)

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 M Ω min. at 500 V dc

DIELECTRIC STRENGTH

1000 V ac 1 minute between open contacts

1500 V ac 1 minute between coil and contact

ALARM STATUS CONTACT VOLTAGE

125 V ac, 110 V dc (maximum)

Closes when the output voltage V_o is >80% of rated output.

NORMAL OPERATION

Relay - Close (as $V_o > 80\%$)

Overload mode: (Red LED - Light)

Relay - Close (if $V_o > 80\%$)

Relay - Open (if $V_o < 80\%$)

OUTPUT SHORT CIRCUIT

Relay - Open (as $V_o < 80\%$)

TEMPERATURE SHUTDOWN

Relay - Open (as $V_o < 80\%$)

NO INPUT POWER

Relay - Open (as $V_o < 80\%$)

SWITCHING CURRENT

2 A (maximum)

CURRENT CARRYING

2 A (maximum)

MINIMUM LOAD

50 μ V, 10 μ A

SWITCHING POWER

62.5 VA, 30 W (maximum)

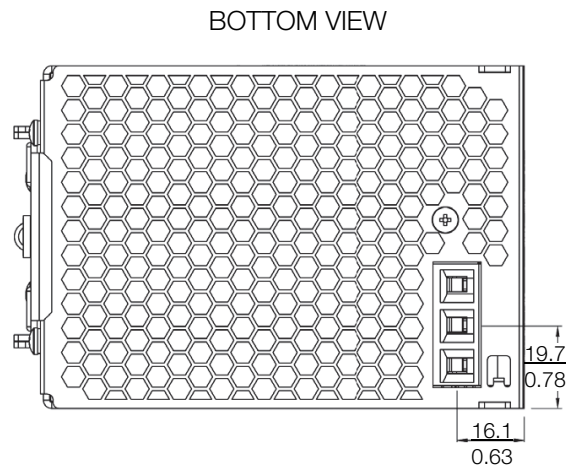
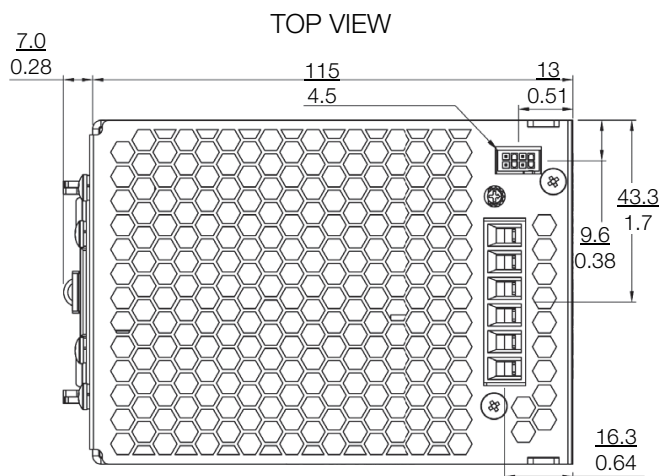
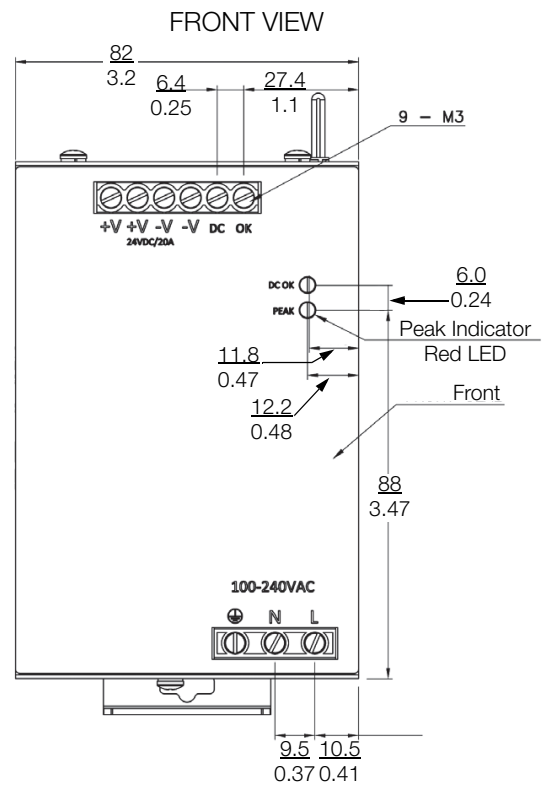
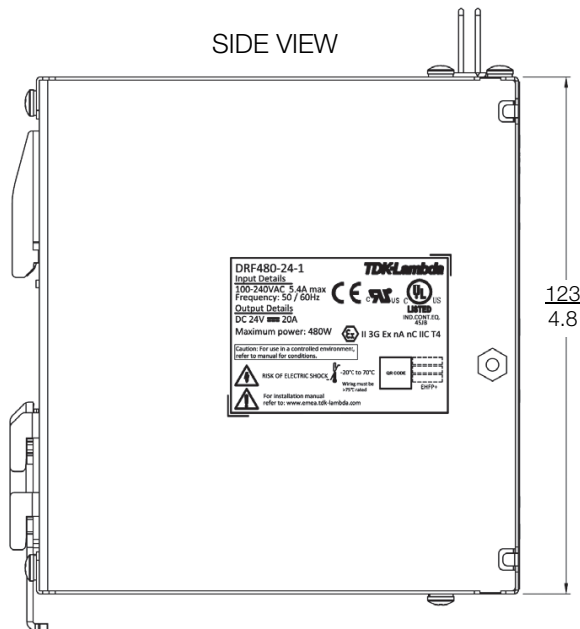
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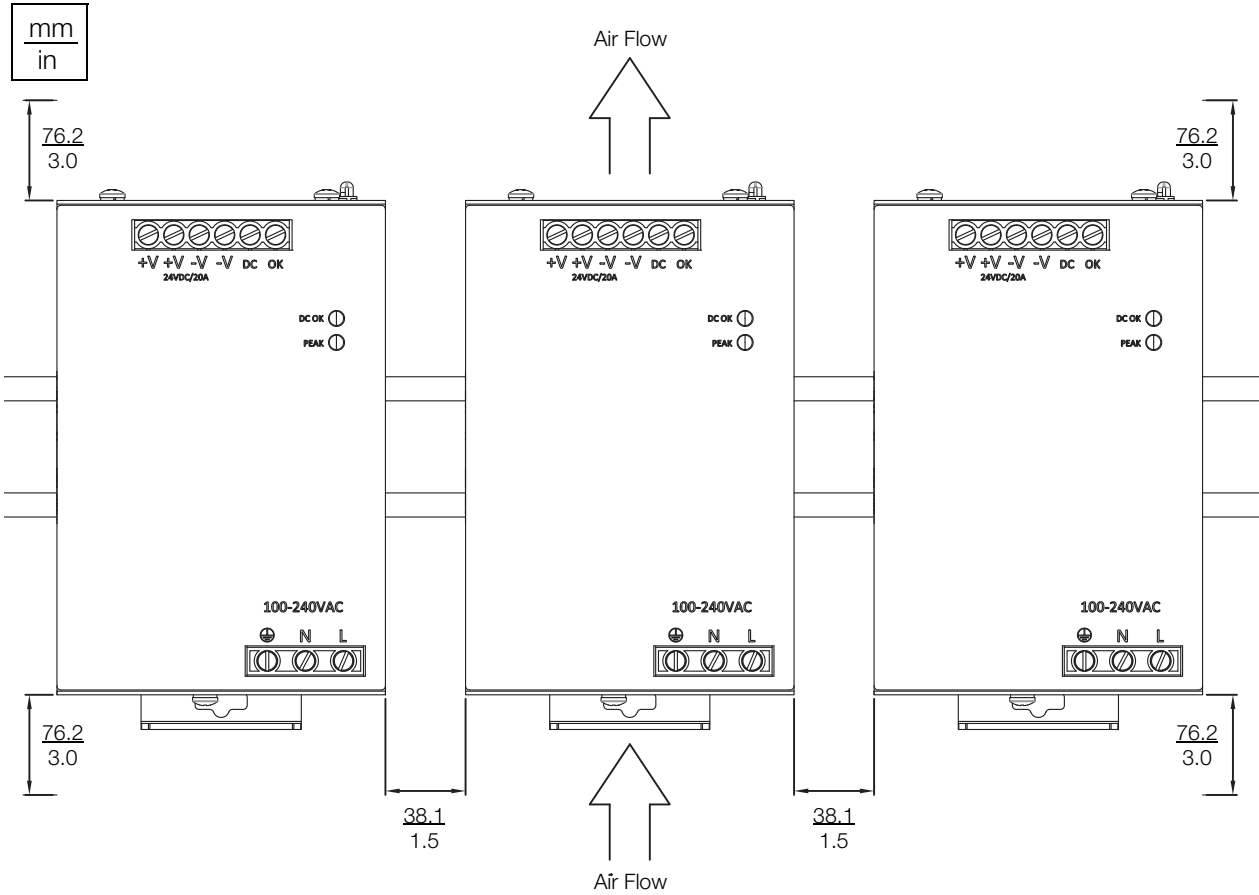
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DIMENSIONS-NOMINAL

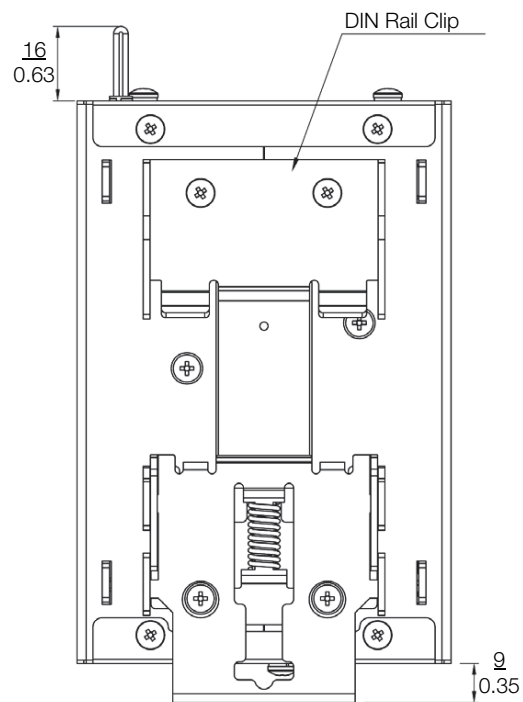
mm
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CLEARANCE-NOMINAL



DIN RAIL CLIP (REAR VIEW)



mm
in

RELATED PRODUCT DOCUMENTS

Table 2. Reference Documents

Reference	Document Number	Description
1	B0400FA	DIN Rail Mounted Subsystem User's Guide

Table 3. Other Related Documents

Document Number	Description
PSS 31H-2COV B3	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 31H-2C200 B4	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 31H-2G13 B4	G13 System Enclosure
PSS 31H-2G14 B4	G14 System and Termination Enclosure

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