Overview

The Foxboro™ DCS Standard 200 Series power supplies provide 24 V DC to standard 200 Series baseplates. The Model FPS400-24 is a 400 W power supply that is agency certified for use in Division 2 and Zone 2 applications. Different input voltage power supplies are offered:

- 120/240 V AC or 125 V DC input (P0922YU)
- 24 V DC input (P0922YC).

These power supplies are the only power supplies that have been tested and qualified by Foxboro DCS for use with 200 Series Fieldbus Modules (FBMs).

For sites where a lower-powered and/or smaller sized solution than the FPS400-24 power supply is desired, the FPS240-24 and FPS120-24 power supplies are available. They are discussed in *200 Series Power Supplies - FPS240-24 and FPS120-24* (PSS 41H-2FPS).

Features

- Wide range of AC and DC input voltages
- 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)
- Gasketed and sealed housing
- Horizontal or vertical DIN rail mounting
- Holes for bracket or wall mounting
- Relay (form C) 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 (P0922YU) provides a range of 85 to 265 V AC at 47 to 63 Hz operation (or 108 to 145 V DC) to meet world-wide power requirements.

The 24 V DC power supply input circuit (P0922YC) accepts a range of 18 V DC to 35 V DC.

High Efficiency

The sealed power supply has high efficiency (up to 95% for P0922YU and up to 81% for P0922YC) resulting in high reliability and low failure rates. They have 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 (P0922YU) provides an active sinusoidal current profile for near-unity controlled power factor.

Current Limiting

The power supply operates as a constant voltage source with maximum load ratings as listed in the specifications. If load current attempts to exceed greater than 110% of maximum current at the rated 25°C load, the output voltage begins to decrease toward zero, thereby limiting the current delivered to the load. Upon removal of overload, normal operation resumes.

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 operates as a constant voltage source with maximum load ratings as listed in the specifications. If load current attempts to exceed greater than 110% of maximum current at the rated 25°C load, the output voltage begins to decrease toward zero, thereby limiting the current delivered to the load. Upon removal of overload, normal operation resumes.

Power for External Field Devices

The actual amount of power required in a standard 200 Series subsystem depends on the number of FBMs/Fieldbus Communication Modules (FCMs)/Field Control Processors (FCPs) being powered, the types of termination assemblies used, and whether internal or external powering is used for the individual field device(s).

The FPS400-24 can also be used as a field power supply to power external field devices. However, for system integrity field devices and DIN rail baseplates should not be powered from the same FPS400-24.

Packaging

The robust gasketed design lends itself to minimal maintenance because the housing is sealed and there are no fans to wear out. The sealed gasketed design also provides protection for corrosive atmospheres such as hydrogen sulfides and chlorine, as found in many process control plants. The power supply has a DIN rail mounting bracket for mounting on a horizontal or vertical DIN rail. The bracket can be rotated for horizontal or vertical DIN rail mounting or removed for wall mounting of the power supply.

Status Alarms

Visual LED indicators for undervoltage and normal operating voltage output are contained on the power supplies. To indicate the absence of 24 V DC output, a form C relay output is available to activate an externally powered alarm.

Simplified Wiring

The power supply is designed to be used with special cables (ordered separately) to make installation easy and improve personal safety. See Physical Specifications, page 11.

Functional Specifications

Maximum Ratings	Output Voltage — Factory set at 24.0 V DC
Input Specifications	120/240 V AC or 125 V DC Power Supply (P0922YU) • Input Voltage Range: 85 to 265 V AC or 108 to 145 V DC, 125 V DC nominal (See Table 1, page 8 and Table 3, page 9) • Input Frequency Range: 47 to 63 Hz • Input Current: 5.6 A at 85 V AC input (RMS maximum) 2.5 A at 230 V AC input (RMS maximum) • Efficiency (at Maximum Power, 10A, 24V): 77% minimum at 85 V AC input 85% typical at 120 V AC input 92% typical at 230 V AC input 90% typical at 240 V AC input • Inrush Current: 20 A, at 110 V AC (peak at cold start) 40 A, at 220 V ac (peak at cold start) • Input Power: 453 W typical at 120 V AC, 50/60 Hz 439 W typical at 230 V AC, 60 Hz 441 W typical at 230 V AC, 50 Hz 24 V DC Power Supply (P0922YC) • Input Voltage Range: 18 to 35 V DC, 24 V DC nominal • Input Current: 19.5 A at 24 V DC input • Efficiency (at Maximum Output Power): 85% typical at 24 V DC input • Input Power: 468 W at 24 V DC input typical

Output Specifications	• Output Voltage: 24.0 V DC, ±0.2 V DC nominal factory setting (See Table 1 and Table 2) • Voltage Line Regulation: 2.0% of Vout • Voltage Load Regulation: 2.0% of Vout • Ripple and Noise at 20 MHz: 100 mV (peak-to-peak), 10 mV (RMS maximum) • Temperature Coefficient: 0.025% per °C • Startup Time (Soft-Start): 3 s typical at 110 V AC input or 24 V DC, 5 s maximum • Overshoot: No overshoot at turn on, turn off, power failure or removal of short circuit • Load Transient Response: 50 to 100% LOAD CHANGE Recovery to within regulation limits within 50 ms Maximum output voltage excursion less than 5%
Protection Features	• Over Current Protection: Current limiting to 110% of maximum at the rated 25°C load • Overvoltage Protection: Factory set at 28.0 V DC for DIN rail FBM/FCM/FCP applications • Fusing (Non-User Accessible): 10 A slow-blow 250 V AC/V DC internal fuse • Isolation Voltages: 500 V AC output to chassis ground 1,500 V AC input to chassis ground
Leakage Current	AC line to chassis ground is less that 1.6 mA when operated at 250 V AC (47 to 63 Hz) or lower voltages
Vibration	0.75 g (5 to 500 Hz)
Regulatory Compliance: Electromagnetic Compatibility (EMC)	• *European EMC Directive 2004/108/EC* 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 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 DCS processor modules as described in the *Standard and Compact 200 Series Subsystem User's Guide* (B0400FA). • *European Low Voltage Directive 2006/95/EC and Explosive Atmospheres (ATEX) Directive 94/9/EC*: 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 DCS 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
Calibration Requirements	Calibration or voltage adjustment of the power supply is not required.

Table 1 - Nominal Input and Output

Input			Maximum Rated Output	
V	**A**	**Hz**	**V**	**A**
120 to 240 V AC	4.5/2.3	47 to 63	24	16.7
100 to 120	4.5	47 to 63	24	14.4
125 V DC	4.5		24	16.7
24 V DC	19.5		24	16.7

Table 2 - Temperature Derating

Input Supply Voltage	Maximum Power (Watts) at Static Air Temperature (Static air temperature with zero air flow)					
	25°C	40°C	50°C	60°C	65°C	70°C
240 V AC	400	345	325	300	285	275
220 V AC	400	345	325	300	285	275
120 V AC	400	325	300	275	265	250
100 V AC*	345	315	300	275	265	250
120 V DC	400	330	300	280	270	250
24 V DC	400	330	300	280	270	250
* Below 100 V AC, derate 3 W per Volt						

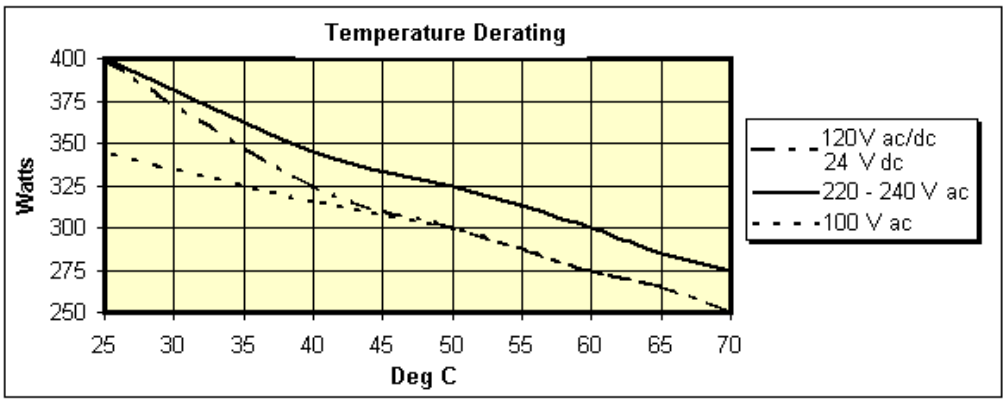


Table 3 - Regulatory Compliance

Input			Maximum Rated Output (+), dc	
V	A	Hz	V	W
120/240 V AC	4.5/2.3	47 to 63	24	325/345
125 V DC	4.5		24	330
24 V DC	19.5		24	330

Environmental Specifications

	Operating	Storage
Temperature(1)	-30 to 71°C (-58 to +160°F)	-55 to +85°C (-65 to +185°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)
(1) See Table 2 for the appropriate temperature deratings for the power supplies.		

Part Numbers	• Power Supply: P0922YU - 120/240 V AC or 125 V DC input P0922YC - 24 V DC input • Input AC/DC Terminal Block: Connects customer input power P0926DZ - Qty 1 required • AC Input Terminal Block Cable: Connects Terminal Block to P0922YU Power Supply - Qty 1 required ◦ RH923DA - 0.4 m (15 in) ◦ RH926CM - 0.8 m (33 in) ◦ RH927AQ -1.83 m (72 in) ◦ RH927AR - 2.44 m (96 in) • DC Input Terminal Block Cable: Connects Terminal Block to P0922YC Power Supply - Qty 1 required ◦ RH923DH - 0.4 m (15 in) ◦ RH923DG - 0.8 m (33 in) • Power Supply to Baseplates Cable: Connects power supply to baseplates. Up to six cables (16 AWG -shielded) of any length listed below can be used per power supply. The output power supply connector is compatible with both the newer and older version of cables. Newer version of baseplate power supply cables used with Modular Baseplates (P0926KE/HF/HJ/HM/HT/KH/HZ/JC/JF/JM): ◦ RH926KK - 0.4 m (16 in) ◦ RH923NG (Y-Cable) - 0.5 m (20.5 in) ◦ RH926KL - 0.9 m (3 ft) ◦ RH926KM - 1.2 m (4 ft) ◦ RH926KN - 1.5 m (5 ft) ◦ RH926KP - 1.8 m (6 ft) ◦ RH926KQ - 2.1 m (7 ft). ◦ RH931NC - 2.4 m (8 ft) ◦ RH931ND - 2.7 m (9 ft) ◦ RH931NE - 3.1 m 10 ft) ◦ RH931NF - 3.4 m (11 ft) ◦ RH931NG - 3.7 m (12 ft) Older version of baseplate power supply cables used with baseplates P0914XA/XB: ◦ RH926CA - 0.4 m (16 in) ◦ RH926CB - 0.9 m (3 ft) ◦ RH926CC - 1.2 m (4 ft) ◦ RH926CD - 1.5 m (5 ft) ◦ RH926CE - 1.8 m (6 ft) ◦ RH926CF - 2.1 m (7 ft)
Part Numbers (Continued)	• Alarm Status Relay Output Cable:

	Alarm status output with a DIN rail mounted terminal block to connect form C relay output (compression connector) to an external indicator - Qty 1 required ◦ RH923DD -1.8 m (6 ft)
Alarm Status Relay	• Type: SPDT; NC, NO, COM • Alarm Status Contact Threshold: <22 V DC, alarm, relay de energized >23.5 V DC, power OK, relay energized • Contact Rating ◦ 2A at 30 V DC maximum ◦ 2A at 42.5 V AC maximum