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Process Control Services, Inc.

User Guide

PCSPMU01
Bailey Power System

A Guide for Installation and Operations

PCS PROCESS® CONTROL SERVICES

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Overview

The PCS Power Module Unit (PCSPMU01) is a NEMA rack mount power supply system. It is designed to support the longevity of Bailey Systems migrated to the Invensys I/A Series system and replaces both Bailey bulk and modular power supply systems. The PCSPMU01 provides a cost effective way to make your power system and your process secure.

Features

The PCSPMU01 offers reduced maintenance cost and increased reliability by offering key features:

- Supports Bailey installations upgraded to I/A Series systems and original Bailey installations.
- N+1 Redundant Operation With Current Sharing
- Hot Swap Power Modules
- Directly replaces all Bailey power configurations including MPS01 and MPS02.
- Normally Open And Normally Closed External Status Contacts
- Dual AC Power Inputs for Non-stop Supply
- Automatic Input Voltage Selection
- Power Interlock To Prevent Module Removal When Under Load
- Front Panel Access For Servicing
- Front Panel Voltage And Current Meters

Security

The PCSPMU01 configuration provides redundant operation with N+1 module current sharing for each output voltage range to within 10%. This current sharing provides hot swap capability without the need for relays or switching units. Hot swap prevents impact on the process system if a power module requires maintenance. Current sharing increases system reliability by assuring operation of all power modules at all times.

Applications

The PCSPMU01 power unit supports typical cabinet configurations of currently installed Bailey Network90 and Infi90 systems. The power unit exceeds the power requirements of known applications. A spare power unit slot allows expansion with one additional power module which can double the power output of either 5 VDC or 15 VDC.

The PCSPMU01 configuration offers external power module status contacts for alarming purposes so you always know the state of your power system.

To ensure the integrity of AC supply voltage, the power unit input can be connected to two separate AC sources.

Input circuit configuration is automatically selected by internal circuitry for all input voltage

ranges. The input power is auto-selectable for the range 90 VAC through 264 VAC at 47 to 63 Hz.

The PCSMPU01 replaces the Module Power Panel (MPP) that leaves free cabinet space for other uses. It also fits into the space of a normal Module Mounting Unit. This means that MPS01 and MPS02 power systems are directly replaced by the PCSMPU01 without reconfiguring the system cabinet.

Maintenance

The PCSPMU01 uses plug in power modules that are accessible from the front of the unit. A power interlock secures each module in place while ensuring that a module is un-powered before being removed from the unit.

To aid periodic maintenance, a voltage and current meter is integral to the front panel construction. Maintenance personnel use a selector switch to choose the power module to be displayed. Each power module conveniently provides an output voltage adjustment on the module faceplate for periodic maintenance.

Enclosure Description

The enclosure is fabricated from 18-gauge cold rolled steel (CRS) and has a clear zinc chromate finish per ASTM B633 Type 1, to retard corrosion. Two mounting flanges, one on each side of the front opening, provide for mounting the enclosure into a standard 19 inch rack. All input and output power connections are on the bottom rear of the enclosure and are binding head screw terminal blocks requiring ring or spade type terminations on connecting wires. A signal connector is also provided which allows connection to PSM status signals from each PSM position in the enclosure.
The bottom front contains two circuit breakers and a meter panel. The left circuit breaker labeled “MAIN” provides AC power to slots 1,3 5 and 7 of the enclosure. The right circuit breaker labeled “AUX” provides AC power to slots 2, 4 and 6.

Supply Input

Input Power Circuit Breaker Sizing

Primary supply circuits must be sized according to their intended application, whether that is single feed or the non-stop dual feed. Table 1 provides circuit sizing guidelines.

Input Power Requirement	Input Circuit Breaker Rating Requirement			
	Single Input		Dual Input	
	Quantity	Rating	Quantity	Rating
120 Vac, Single Phase, 50/60 Hz	1	30 Amp	2	30 Amp
240 Vac, Single Phase, 50/60 Hz	1	20 or 30 Amp	2	20 or 30 Amp

Table 1. Input Circuit Sizing

Installation

The PCSPMU01 installation requires system, mounting and wiring considerations. As designed, the power supply will use existing cabinet space and wiring.

System Considerations

One PCSPMU01 power system provides more than enough power for a single cabinet of I/A Series Fieldbus Modules for Bailey Migration or a typical complement of original Bailey processing and I/O modules. It is designed as a complete powering system replacement. **This supply is not designed to operate in parallel with any other power supply.** Therefore, 'hot swap' of the PCSPMU01 to replace original Bailey power supplies is not recommended. Always install this power supply with the cabinet source power turned off.

Mounting

The PCSPMU01 is designed to fit into the space of one MMU card file. Any spare space in the cabinet may be used. Typically, the removal of an original Bailey bulk power supply provides plenty of room to mount this replacement. PCSPMU01 will also directly replace the newer Bailey modular power supply system.

The power system should be mounted either at the bottom of the cabinet or in a position where an MMU or other structures are below. Where vibration may be apparent, additional support is recommended for the rear of the PCSPMU01.

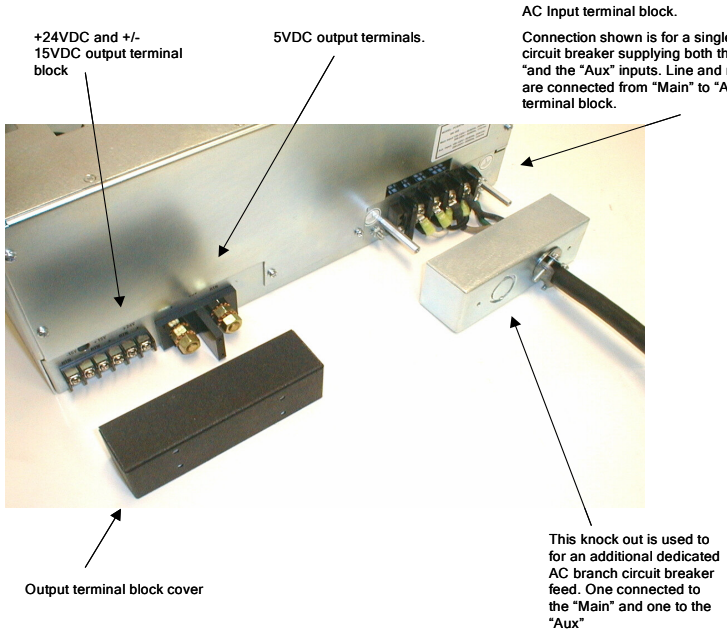

Figure 2. Rear View of PCS Power Enclosure

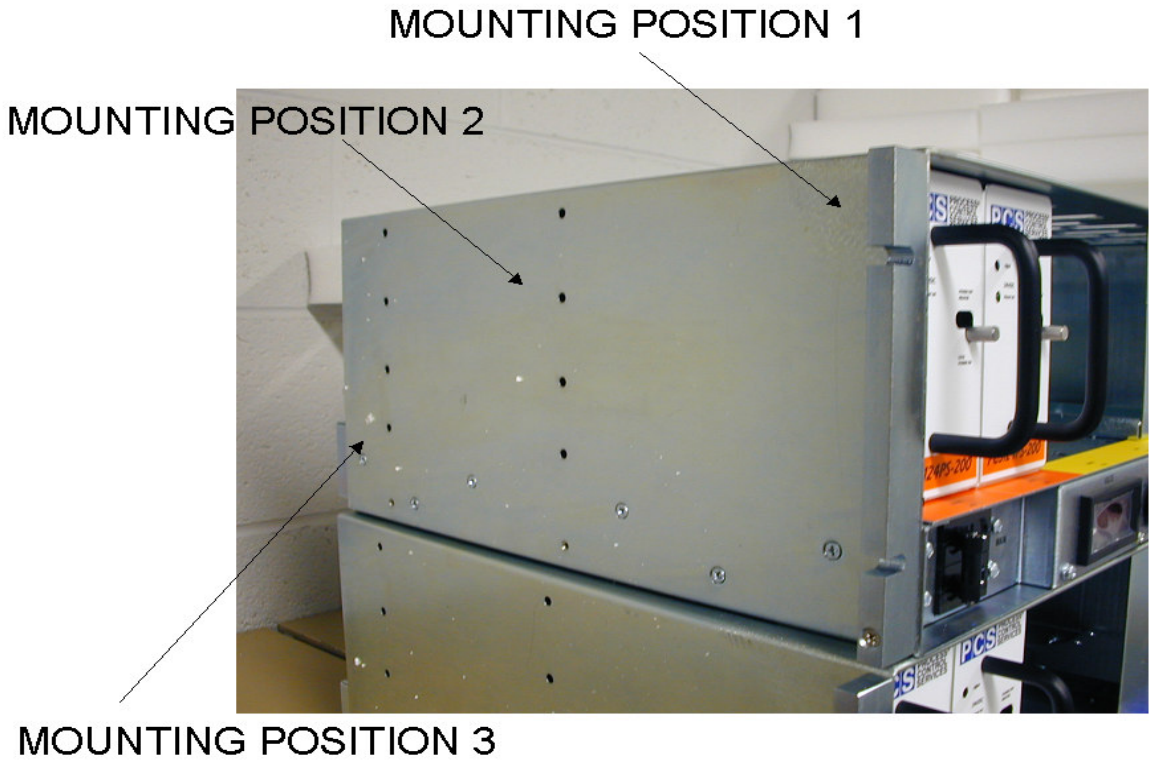

Figure 3. Mounting Tab Locations

Accomplish mounting by first removing the PCSPMU01 power modules from the enclosure. Mounting tabs may be repositioned to accommodate a wide range of installed cabinet arrangements. Remove four screws on each tab and re-install each at one of three positions indicated in Figure 3 that suit the cabinet layout. The factory default position is tat the front or Mounting Position 1.

Mount the enclosure in the Bailey cabinet using a quantity of 4 1" 10X32 stainless steel round head screws. Replace the power modules after mounting in the appropriate slots as indicated in Figure 1 on page 6.

AC Power Wiring

The AC power may be supplied by a single source or from two separate sources. An AC Input terminal block provides access for input power.

Use a controlled 30 amp circuit and appropriate conductor to supply source power. Remove the metal AC Input Terminal cover from the PCSPMU01 as shown in Figure 2 on page 11. Remove one knockout for a single AC source or two knockouts for dual AC source. Attach appropriate strain relief, clamps or other hardware to knockout access holes. Feed AC source

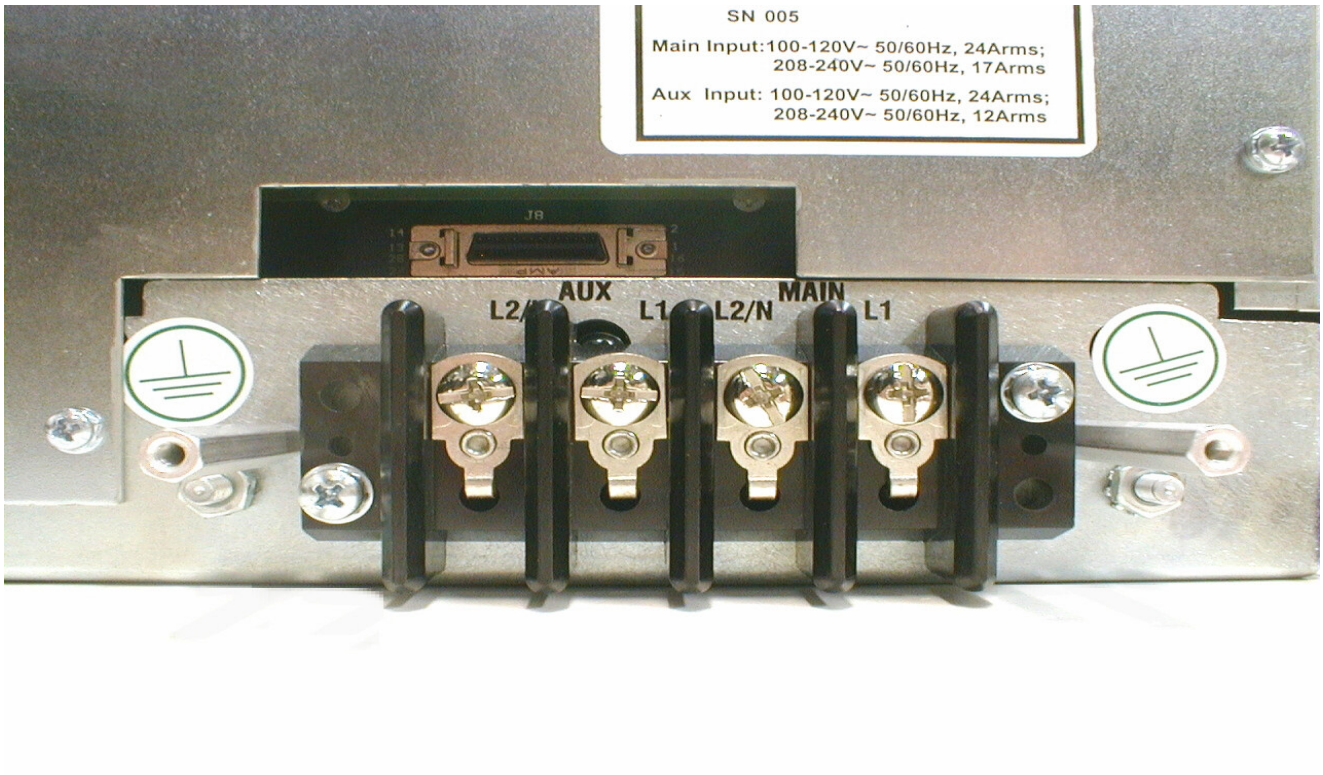

Figure 4. AC Input Terminal Block

conductors through access holes and attach to corresponding L1, L2/N and safety ground as indicated on terminal block. For single source AC, connect L1 MAIN to L1 AUX and L2/N MAIN to L2/N AUX as shown in Figure 4. Replace metal AC Input cover.

Caution: AC Input terminal box will contain more than one live circuit if using dual AC source.

DC Power Wiring

Access the DC power output at the left rear of the PCSPMU01 enclosure. A terminal block offers +5 Volts on two ¼ inch power studs. A terminal strip offers ±15 Volts and +24 Volts. See Figure 5 for details.

PCSPMU01 terminal locations are positioned to accommodate most known Bailey cabinet configurations, including horizontal and vertical power bus. Existing power wiring should be used whenever possible. Use appropriately sized cables when positioning the power supply in cabinet locations other than the original positions. Size cables to minimize voltage drop to less than 10% nominal. Consult AWG standard resistance tables to determine voltage drop.
Provide external strain relief for DC cables and replace terminal block cover after assembly.

Caution: PCSPMU01 is designed as a fully redundant, non-stop power supply system. It is not designed to be parallel connected to any other power supply of any type. Damage to power supplies and/or cabinet equipment may result from misapplication.

External Alarms

Each power module offers individual contact status indication. A connector, located above the AC input terminal, provides connection to annunciator or contact monitoring equipment using a supplied cable and terminal panel. These terminals may be wired individually to alarming equipment or connected in series for a single status indication. Refer to Figure 6 for connections. Mount terminal block in a convenient location. Standard cable length is 24 inches. Custom lengths may be ordered t additional charge.

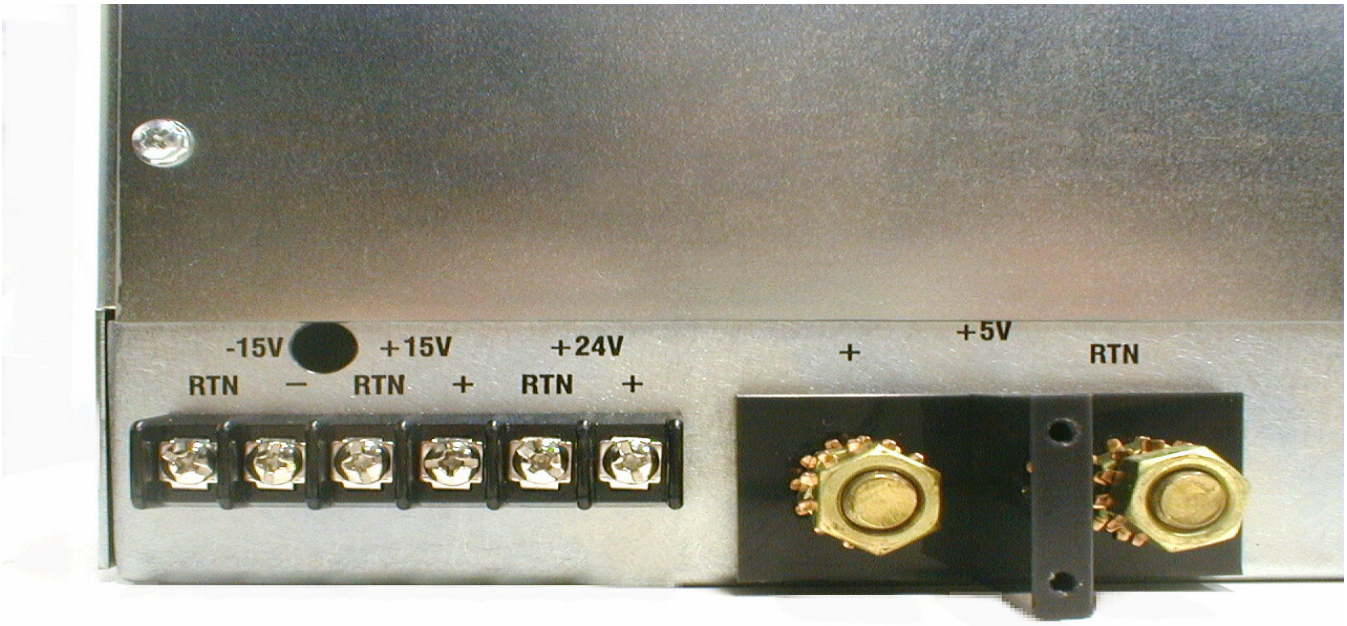

Figure 5. DC Output Terminal Blocks

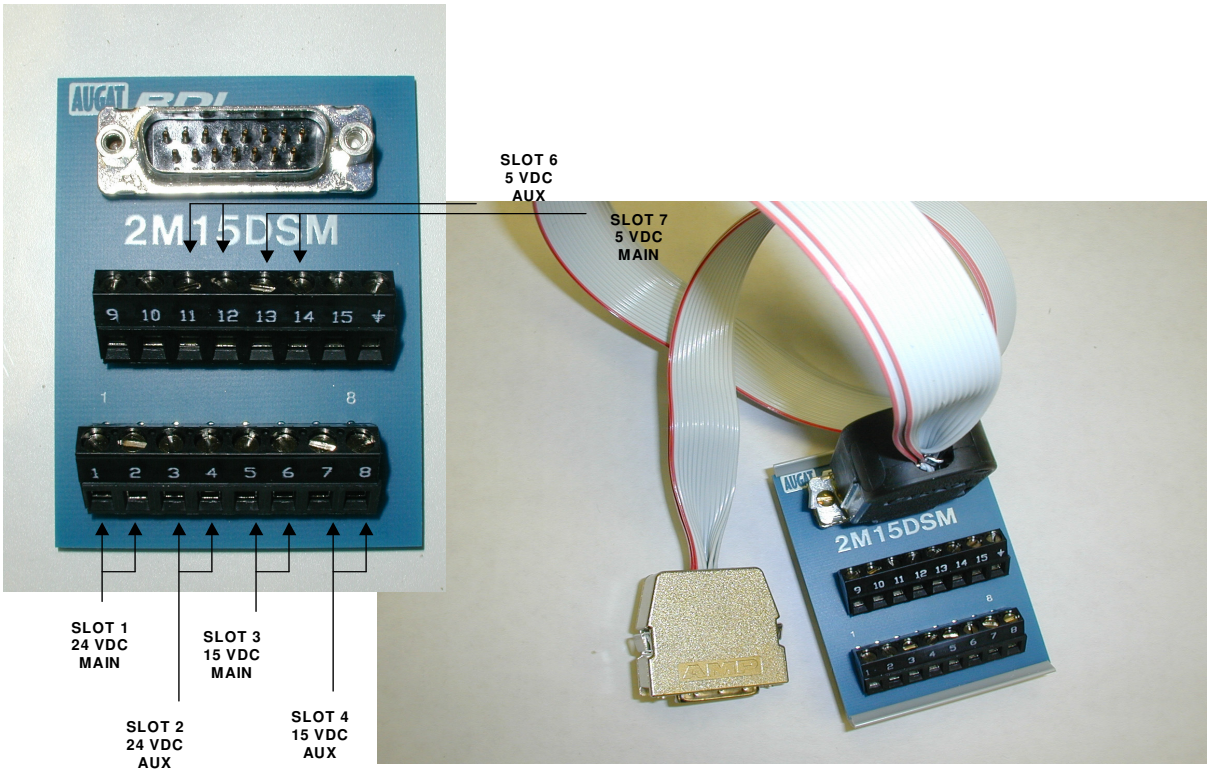

Figure 6. Alarm Cable and Terminal Block

Setup

Ensure that all power modules are fully engaged in the enclosure. Do this by operating the lever of each module to the “release” position and then to the “lock” position. The lever should freely snap into the lock position. Test by pulling slightly on the extraction handle. The module will stay in position if locked correctly. Refer to Figure 7.

PCSPMU01 setup consists of setting the operational voltage levels for the connected equipment. In order to compensate for cable and bus voltage drop, voltage adjustments should be performed with test equipment connected to an electrical point furthest from the PCSPMU01 terminal block.

Attach electronic voltage meter to appropriate cabinet test point for the 24 volt bus as described in the previous paragraph. Operate the MAIN circuit breaker (left lower front panel) to the ‘on’ position. Indicators should light on modules in slots 1, 3 and 7. If any do not light, remove and re-install the power module. Replace module if re-install does not correct the problem.

Figure 7. Locking Lever and Front Plate

Beginning with slot 1 (24 volts), turn adjustment marked 'voltage adjust' clockwise to increase voltage reading on the test meter (counterclockwise to decrease). Adjust the voltage to 24 volts. Turn the selector switch on the front panel to select slot 1 voltage and current. Note the voltage reading. This reading will always be higher than the test meter reading, but less than 10% of the desired nominal voltage.

Repeat the adjustment procedure for slot 3 (adjust to ±15 volts) and slot 7 (adjust to 5 volts). The procedure for slot 3 includes one step for +15 volts and another for -15 volts.

Once slots 1, 3 and 7 adjustments are complete, operate the AUX circuit breaker located in the right lower front corner of the PCSPMU01 to the 'on' position. Operate the selector switch to indicate slot 2. Adjust the 24 volt power module in slot 2 until the voltage indication on the meter matches the voltage indication noted for slot 1. Continue with matching slot 4 to slot 3 and slot 6 to slot 7.

Maintenance

PCSPMU01 requires little maintenance. Front panel controls provide indications of proper operation.

Periodic Checks

Periodically, check voltage and current levels with the front panel meters. Voltage levels should be within ±5% of nominal values noted at installation time. Adjust power modules as needed.

Note: Always measure proper voltage at the furthest electrical point from the power supply. Use panel meters for reference. The power module in the pair with the highest voltage determines bus voltage. It may be necessary to adjust both power modules to lower bus voltage. Always match voltage levels of power module pairs to ±1%.

Current draw indications are unreliable under no load conditions. Always test this device with at least 10% load on all voltage outputs.

Removal

Remove a power module by first operating the locking lever up and to the left to the 'release' position. The primary power will be disconnected upon release. Grasp the handle with the right hand and pull directly out. The module will release and easily slide out of the enclosure. Use the left hand to support the rear of the module as it clears the front panel.

Replacement

Grasp the handle with the right hand and lift the rear of the module with the left hand. Position the replacement module in alignment with the intended mounting slot. Rest the rear of the module on the front ledge of the front control panel. Lift the handle slightly and gently slide the power module into the slot until the rear positioner engages the power module.

Firmly push the module into the secured position. Operate the locking lever to the right and down to the 'lock' position. Spring action will assist the locking lever. The lever should completely seat in the lock position and the power indicator should illuminate.

If the power indicator does not illuminate, ensure that the power module is completely seated in the slot by firmly pushing on the module front plate. If the locking lever does not seat, adjust the front of the power module from side to side until the locking lever snaps into place and power is restored. Repeat the removal and replacement procedure if the module does not lock into place.

Appendix A—Electrical Specifications

Output Voltage	5	5 Vdc, ±0.1 Vdc
	15	±15 Vdc, ±0.3 Vdc
	24	24 Vdc, ±0.5 Vdc
Output Current	5 Vdc	70 A @ 40 °C
	±15 Vdc	13 A @ 40 °C
	24 Vdc	8 A @ 40 °C
Output Power	5 Vdc	400 W
	±15 Vdc	200 W
	24 Vdc	195 W
Input Voltage Range	Auto-select: 90-264 V ac	
Input Frequency Range	47 to 63 Hz	
Input Current	120 Vac	40 A (20A Main, 20A Aux)
	230 Vac	22 A (11A Main, 11A Aux)
Inrush Current	120 Vac	<60 A PEAK
	230 Vac	<30 A PEAK
Input Power	4800 W	
Load Regulation	0.1% of Vo	
Power Factor	0.60	
Ripple And Noise	5 Vdc	50 mv (peak-to-peak)
	±15 Vdc	150 mv (peak-to-peak)
	24 Vdc	240 mv (peak-to-peak)
Temperature Coefficient	0.025% per °C	
Isolation	1000 V ac input to chassis ground	

Electrical Safety

PRODUCT SAFETY
European Low Voltage Directive 73/23/EEC

SAFETY CERTIFICATION (UL, CSA, TUV)

INPUT POWER PROTECTION
IEEE 587-1980 Class A for branch circuits and outlets
Regulatory compliance is only applicable for line voltages between 90 and 127 V ac, and 180 to 250 V ac, and frequencies between 47 and 63 Hz.

Appendix B—Environmental Specifications

	Operating	Storage
Temperature	-10 to 50ºC (14 to +122ºF)	-55 to +85ºC (-65 to +185ºF)
Relative Humidity	5 to 95% (non-condensing)	5 to 95% (non-condensing)
Altitude	-300 to +3,000 m (-1,000 to +10,000 ft)	-300 to +12,000 m (-1,000 to +40,000 ft)

Appendix C—Physical Specifications

Mounting	NEMA 482.6 mm (19 in)
Mass	25 kg (55 lbs)
Shipping	27.2 kg (60 lbs)
Dimensions	171.45 mm (6.75 in) H X 482.6 mm (19 in) W X 392.11 mm (15.44 in) D

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