

LORAIN® PS 4810000

DC Power System

■ DC Power for
Business-Critical Continuity

Key Features

- **NEBS™ Level 3 certified**
- **Single frame design** provides power conversion, distribution, control and monitoring in a small footprint
- **Patented, laminated internal bus work** improves AC and DC cable routing options
- **Modular distribution design** includes built-in automatic monitoring for all distribution devices
- **Integrated Internal DC bus** eliminates costly overhead busses and eases plant expansion
- **Integrated LMS1000 design** features a distributed I/O architecture, an internet port and web page to simplify monitoring of internal/external equipment
- **Controller backplane** accepts plug-in alarm cards and LMS I/O cards
- **Optional integrated AC Power Distribution Service Cabinet (PDSC)** for protected bulk AC service feeds
- **TCP/IP, SNMP, Ethernet, modem, and RS232 compatible**
- **Supports distributed and bulk plant architectures**

Emerson Network Power's next generation power platform is now available with 208/240VAC rectifier, providing integrated power, distribution, control and monitoring.

Description

The LORAIN® Power System (LPS) utilizes a highly integrated revolutionary design to pack unparalleled capacity and features into a small footprint.

The LPS is a -48VDC digital power plant that operates with 200 amp Power Conversion Units (PCUs) powered from 480VAC or 208/240VAC. Each bay provides power conversion and distribution — up to ten PCUs (2000 amps total) along with 2400 amps of distribution. Adding additional bays creates larger plants, up to 10,000 amps.

Application

The LPS is ideal for use in central office, switch site, MSO, and data center applications. The LPS works in both centralized and distributed architecture plant layouts and is suitable for any -48VDC application with 3-Phase commercial AC service. The advanced monitoring and control features allow the LPS to fit into new office locations or simply be migrated into existing power plants. Due to the weight distribution of the LPS, an entire DC power plant can be installed in a raised floor environment, subject to floor loading limitations.



LPS, -48VDC, 10,000A Modular Power Plant


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Power Conversion Unit

Power Conversion Unit

The heart of this system is the LPS200 class PCUs. A true three-phase, four-wire rectifier, the unit operates at 0.998 power factor with less than 5% THD. It can deliver 110% of rated current up to 40°C, and a reduced amount up to 80°C by virtue of its thermal current limit feature. Designed for positive ground applications, the normal output voltage ranges from -47 to -58 volts, with a test voltage adjustable down to -45 volts.

AC service is wired internally to each PCU. A horizontal terminal strip is located on the left top of the bay. An optional Power Distribution Service Cabinet (PDSC) bolted to the left side of the bay facilitates bulk wiring in one or two AC branch circuit applications per bay. Each LSP200 PCU is equipped with individual alarm and status LEDs as well as a 10-segment output power LED display.



Distribution Cabinet

Distribution

Distribution is divided into two rows, top and bottom. Each row has a flexible design that accommodates any combination of breakers and fuses, up to a 1200 amp maximum per row. There can be up to 24 (1-100A) breakers/fuses or up to 12 (100-800A) devices, or any combination. Each distribution device used in the LPS is designed for complete plug-n-play and automatic registration with the system controller. This patented unique design allows total flexibility to configure each frame per required device without costly kits and restrictive panels.

Monitoring

All distribution elements of 100 amps and greater include a monitoring shunt, identification to the controller, and integrated alarming to the plant controller. The MCA consists of a multi-line vacuum fluorescent display, plus a removable CPU and alarm cards located in a shelf below the distribution. The shelf is dual-purpose and accepts

an LMS CPU for modem and Ethernet access, plus LMS I/O cards for other monitoring points. As a system, the MCA controls the steady state output voltage to within 0.05% of any setting, from no load to full load. The MCA also uses a patented algorithm to balance the PCU output currents to within 1% of their rated current.



MCA

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DC Power System

System Specifications

Operating Ambient Temperature Range	0°C to +40°C (+32°F to +104°F)
Storage Ambient Temperature Range	-40°C to +85°C (-40°F to +149°F)
Output Capacity	10,000A per System, 2000A per bay (Rectifiers), 2400A per bay (Distribution)
Primary/Secondary Frame Dimensions	24"W x 30"D x 84"H
Frame Weight	830 lbs. Per Frame (less PCUs)
PDSC Dimensions	10"W x 30"D x 84"H
PDSC Weight	190 lbs.
Safety	UL Listed (UL1801), CSA 22.2 (No. 225), c UL, NEBS™ Level 3

Power Conversion Unit Specifications

Input

Voltage	408VAC - 528VAC (480VAC nominal line) or 176VAC - 264VAC (208/240VAC nominal line)
Current	17.6A @ 480VAC nominal line, 35A @ 208VAC nominal line
Inrush	Not to exceed 6 time RMS input current at full load
Frequency	47-63 Hz.
Protection	Fused (internally)
Power Factor	>0.97 at nominal line, full load
Harmonic Content	<5% THD
Operating Efficiency	92% at >50% load (nominal input voltage)

Output

Voltage	42VDC - 60VDC
Current	2000A per bay (Power Conversion) 2400A per bay (Distribution) 6000A Inter-bay Bus 10,000A per System / 10 frames max
Regulation	+ 0.05% at output terminals
Altitude	0-10,000 feet (derated from 3000-10,000 feet)

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Power Conversion Unit Specifications (continued)

Ventilation	Forced air, front-to-back
EMI/RFI Suppression	Compliant to FCC Part 15, Subpart B, Class A
Audible Noise	65 dBA (full load operation)
Protection	
Current limiting	110% (Digitally controlled)
Status/Alarm Indicators and Monitoring	
Bays	LEDs (Green, Amber, Red)
PCU	10-segment LED output display (current), multi-function LEDs
Physical Characteristics	
Mounting	Frame mounted, 2 set screw secured, safety catch release
PCU Dimensions	3.5"H x 22"W x 20"D
PCU Weight	42 lbs. (17.7 kg.)
Safety Compliance	UL Recognized (1950), CSA 22.2 (cUL)

Additional Information

For additional specification, engineering installation information, specify 582140000 (power system), 486532600 (200 amp PCUs 480VAC) or 486534000 (200 amp PCUs 208/240VAC).

For ordering information, request SAG582140000.

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Key Features

- **Single point adjustment** — no tools required to make settings and adjustments
- **LMS1000 Remote Monitoring** — options allow users to view, control and interact with all power systems in a network from a remote location via TCP/IP, Modem, SNMP or Web
- **Plug'n'play** — add PCUs without adjustments and settings; no system shutdown
- **Front accessible** — easy installation, additions and maintenance
- **NEBS™ Level 3 compliant** — power bay (UL1950), distribution (UL1801)
- **Distribution** — distribution bays are available in 5000A capacities per bay
- **Modular design** — simple to install and operate; allows users to grow system in cost-effective increments
- **High density** — compact design takes up less floor space; power bay houses seven PCUs in a 18" x 24" (45.72cm x 60.96cm) footprint
- **Optional temperature compensation** — provides automatic adjustment of PCU output voltage when battery temperature increases or decreases
- **AC input protection** — single or dual feed circuit breakers with up to 65KA interrupt capacity, eliminating local PDSC's within the office

Description

Built on the heritage of the LORAIN® brand name, the Large Vortex® power platform, with 200 amp power conversion units (PCUs) is a modular power system providing up to 10,000 amps of power for -48 volt systems. The components of a Vortex® power system include the power bay, the meter-control-alarm microprocessor (MCA), LMS1000 Remote Monitoring, the PCUs and modular distribution.

Each power bay can accommodate up to seven PCUs and is capable of controlling the PCUs through the powerful microprocessor based MCA.

The front of the MCA panel provides a 16-character alpha-numeric display which can be activated at the touch of a keypad.

The Vortex® distribution is modular, expandable and offers a variety of fuse/circuit breaker distribution modules up to 600 amps. The system is designed to provide DC power to loads of up to 5,000 amps per bay. The Vortex® distribution main bay features a total system solution by providing a flexible, modular hardware design, along with a variety of monitoring and control options.

The LMS1000 is included in the main distribution frame, providing unparalleled monitoring and remote access capability. All branch loads are now factory connected to the LMS1000 chassis, ensuring rapid installation and ultimate user control over the power plant.

Application

The Vortex® power system, powered with 200 amp PCUs, is ideal for applications such as switch sites and large customer premise installations requiring up to 10,000 amps.



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MCA Module

MCA Module

The MCA module can be housed in the power bay or the main distribution bay. The MCA provides a single point of adjustment for such features as float voltage, test/equalize voltage, high voltage shutdown and current limit adjustments for all PCUs in the entire power system. The MCA allows users to view specific alarm conditions, system measurements and system settings. All adjustments can be performed locally via the alpha-numeric display panel or remotely via optional software and hardware. The MCA provides local indicators and the ability to transmit various alarm conditions such as PCU failure, high voltage shutdown and AC failure.



Distribution Unit



PCU

Power Bay

The modular, high frequency, switch-mode Vortex® PCUs are the foundation of the Vortex® platform. Plug'n'play technology allows for easy system configuration. System capacity can be increased by simply plugging an additional PCU into an existing mounting space in the power bay — no adjustments or setup are required. The PCUs allow the user to appropriately size a power plant (200 - 10,000 amps) to provide load power, battery float current and battery recharge current. An optional AC input feature provides a prewired input to a terminal block at the top of each cabinet and each rectifier is terminated with a circuit breaker. This design eliminates the cost of secondary AC distribution panels and saves installation costs. The power bay is 24" (60.96cm) wide x 84" (213.36cm) high x 18" (45.72cm) deep.

Distribution

- **Modular Design** — wide variety of distribution modules allows for maximum configuration flexibility
- **High Capacity** — offers up to 5,000 amp capacity per bay
- **Complete System Control** — full range of monitoring and control options available
- **System Interbay Bus** — modular external bus systems designed for incremental growth and minimal installation time
- **Fuse Protection** — utilizing TPL, TPJ, TPS and TPA type fuses protecting circuits up to 800 amps

The Vortex® distribution is a fully integrated modular solution that enables you to begin with the capacity you need today, and incrementally expand to meet future capacity requirements. The main bay can house up to six distribution modules, with eight modules for each supplemental bay. The vertical design results in ease of installation and cable flow with plant shunt, ground and battery termination bars internal or external to the bay. This results in further reduction in cable congestion, while facilitating expansion. The physical dimensions are 7' (213.36cm) high x 31.38" (79.69cm) wide x 24" (60.96 cm) deep.

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Power Conversion Unit Specifications

Input

Voltage	Nominal 208/240VAC, three phase, 50/60 Hz, with a range of 176 to 264 volts. Nominal 480VAC, three-phase, 50/60Hz, with a range of 408 to 530 volts.
Inrush Current	Peak does not exceed 4 times the RMS input at full load, under any conditions of input voltage within the rated input voltage range.
Frequency	47-63 Hz
Protection	Each PCU is individually wired and connections for individual AC input branch circuits are provided. If the AC input voltage decreases or increases beyond a non adjustable predetermined value, the PCU power conversion circuitry inhibits, disabling PCU output. The PCU will recover automatically when the AC input voltage is re-established within specifications limits.
Power Factor	Greater than or equal to 94% for any load greater than or equal to 50% of rated full load at nominal line.
Typical Operating Efficiency	90%

Output

Voltage	Nominal -48VDC, positive ground.
Current	200 amps per PCU, up to a total of 1,400 amps per power bay with seven PCUs installed.
Regulation	Steady state output voltage remains within $\pm 0.5\%$ of any voltage within the range of 45.0 to 58.0VDC.
Filtering	On or off battery
Voice Band Noise	Less than 22 dBnC
Wide Band Noise	Does not exceed 200 mv peak-to-peak, or 30 mv rms
Psophometric Noise	Does not exceed 1 mv

Protection

Current Limiting	Output current of each PCU is automatically limited to approx. 110% of full load current.
High Voltage Shutdown	If PCU output voltage exceeds an adjustable preset value, the PCU shuts down. After approximately four seconds, the PCU automatically restarts.
DC Output Breakers	Connects or disconnects PCU output power to/from the PCUs output terminals.

Metering

Status/Alarm Indicators	Extensive alarming and status indicators such as AC on/off, fan fail, PCU failure and open sense are displayed on the 16-character numerical display of the MCA module and on the PCUs within the cabinet.
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Environmental

Operating Temperature	0° C to +50° C (+32° F to +122° F)
Storage Temperature	-40° C to +85° C (-40° F to +185° F)
Humidity	0% to 95% relative humidity, non-condensing
Altitude	The maximum operating ambient temperature should be de-rated by +10°C (+50°F) at an elevation of 10,000' (3,048m) above sea level. For elevations between 3,000' (914m) and 10,000' (1,048m), de-rate the maximum operating ambient temperature linearly.
Ventilation	Fan-cooled front to rear
EMI/RFI Suppression	Conforms to FCC rules Part 15, Subpart B, Class A.
Audible Noise	3' (.91m) from any vertical surface does not exceed 65dBA.

Physical Characteristics

Mounting	Plug-in installation
Dimensions (H x W x D)	8.62" (21.89cm) x 23.37" (59.36cm) x 16.76" (42.57cm)
Weight	80 lbs. (36.29 kgs)

Safety Compliance	582121100, 582121300, 582121700 UL Listed (USA), CUL (Canada) to UL 1950, 582122100UL and CE
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LVPS Options

Option	Function
LMS1000	Remote monitoring and communication system
VLI	Vortex®-to-Legacy Interface
Vortex® MCA	Microprocessor based meter, control and alarm (if not provided in power bay)
Vortex® Win Link	Software and modem for remote Vortex® power system access
Pre-charge Unit	For use with TPS, TPJ and TPL type fuse modules and GJ breakers
OH Bus System	-48V battery and return bus bar kits, 10,000 amp rated
OH Bus Covers	Provides clear, non-conductive bus safety covers for 10,000 amp bus
AC Courtesy Panel	120VAC, 20A ground fault protected receptacle outlet panel

Distribution Modules

Quantity	Type	Description
5	GJ	125-250 amp circuit breakers with shunts
4	GJ	250-400 amp circuit breakers with shunts
3	GJ	600 amp circuit breakers with shunts
3	TPL	61-600 amp fuseholders
6	TPJ	60-150 amp fuseholders
12	TPS	0-70 amp fuseholders
16	TPA	0-50 amp fuseholders
16	AM1	0-100 amp circuit breakers
1	TPL	1,000 - 1,200 amp fuse holder
2	GJ	800 amp circuit breakers
1	BD	1,200 amp battery disconnect

Additional Information

For additional specification, engineering and installation information, specify spec. number 582121901 (distribution bay), 582121100 (208/240VAC) or 582121300 (480VAC) (power bays).

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