

■ DC Power for  
Business-Critical Continuity

*LORAIN® VPS 486000*  
DC Power System



### Key Features

- **Modular Design** — simple to install and operate; allows users to grow system in cost-effective increments
- **Single Point Adjustment** — no tools required to make settings and adjustments; the MCA controls up to 72 PCUs
- **Remote Access** — options allow users to view, control and interact with all power systems in a network from a remote location
- **Plug'n'Play** — add PCUs without adjustments and settings; no system interruption
- **Front Accessible** — allows for easy installation, additions and maintenance
- **High Density** — compact design takes up less floor space; houses four 85/105 amp 5,000 watt PCUs per rectifier shelf (3RU), system can be configured with up to three bays
- **Optional Temperature Compensation** — provides automatic adjustment of PCU output voltage when battery temperature increases or decreases
- **Safety Compliance** — NEBS Level 3 certified; UL listed to UL subject 1801

New 5,000 watt power conversion units provide 85 amps at 58.0VDC and 105 amps at 48.0VDC each with a constant power limiting feature. With four units per shelf, these rectifiers provide 340 to 420 amps in three rack units (5.25-in.) of space.

The LORAIN® VPS with 65 amp or 85/105 amp 5,000 watt power conversion units (PCUs) is a modular power system providing up to 6,000 amps of power for -48 volt systems.

The basic components of the power system include the meter-control alarm unit (MCA), rectifier shelves which house the PCUs and up to three modular distribution cabinets with rear copper bus inter-bay power connections, allowing the system to be expanded to either side of the main bay.

The LORAIN® VPS contains a powerful, microprocessor-based meter-control alarm system, capable of monitoring and controlling up to 72 PCUs. The MCA provides a 16-character alphanumeric display, which can be activated at the touch of a keypad.

Each rectifier shelf can accommodate up to four plug'n'play PCUs, which are controlled by the MCA. The shelves are modular, so additional shelves can be added as load requirements increase.



*-48VDC 1,600 amp LORAIN® VPS with +24VDC Converters and LMS1000 Monitoring System*

The VPS distribution cabinet is modular by row and position. Four distinct distribution cabinet sizes are available to accommodate from one to four distribution panels. This allows the system to be configured in relay racks of various heights for installation in low-profile sites or atop batteries or other equipment to make more effective use of floor space. Several distribution panels are available offering different combinations of distribution positions, low voltage disconnect and battery disconnect options.



### Distribution

The LORAIN® VPS includes a modular distribution product line that can be designed with one to three distribution cabinets – sized to accommodate from one to four distribution panels each. Each panel is rated at 500 amps load. The maximum load per distribution cabinet is 2000 amps. The two, three and four-row distribution cabinets can be interconnected via copper inter-bay bus bars for a total system capacity of up to 6,000 amps with three bays.

A wide variety of panels provide multiple combinations of distribution positions, low voltage disconnect and battery disconnect. Distribution cabinets are front accessible, modular in design and are initially configured in the factory. Circuit breakers and/or fuse modules plug into the multi-position distribution panels to provide for easy installation. Distribution device options include 1 to 250 amp plug-in circuit breakers, 3 to 100 amp TPS-style fuses, 100 to 600 amp GJ/218-style circuit breakers and 70 to 600 amp TPH-style fuses. These devices can be configured for both load and battery disconnect. A GMT fuse module is also available.

The system can also be expanded with additional bays that are not adjacent to each other via extended length communications cables and inter-bay power cabling. The distribution cabinet can be factory mounted in a relay rack or shipped loose for mounting in a customer supplied relay rack or cabinet rails.

## Application

The LORAIN® VPS is ideal for wireline and wireless applications such as switch sites, co-location, huts and large CUE sites.



*Modular Distribution Cabinets*



*Copper Inter-bay Bus Bars  
(shown with cover removed for detail)*

### Monitoring/Control

The MCA provides a single point of adjustment for such features as float voltage, test/equalize voltage, high voltage shut-down and current limit for all PCUs in the entire power system. The rugged, temperature hardened LED display allows users to view specific alarm conditions, system measurements and system settings. All measurements and adjustments can be performed locally via the alphanumeric display on the front of the MCA



MCA

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. Remote and local communication is available via an

ethernet, modem, RS-232 or RS-485 interface. In addition, the LMS1000 monitoring product can be configured into this system (refer to 586505000 documentation for specifications).



-48VDC 520 amp VPS with Battery Stand

### Battery Stand or Trays

The LORAIN® VPS can be configured with a NEBS Level 3 certified modular front access battery stand to provide an entire power plant in one bay. Available options include manual battery disconnect/ protection, low voltage battery disconnect, battery current monitoring and battery recharge current limit (refer to 588820000 documentation for specifications). Rack mount battery trays are also available with optional battery disconnect circuit breakers.



-48VDC 500 amp VPS with Battery Trays



+24V, 80 amp Converter Frame

### DC to DC Converters

A modular DC to DC converter system provides up to 320 amps at +24VDC via high frequency switch mode converters rated at 20 amps each. A unique frame design mounts into a slot in the rectifier

shelf and can accommodate four converter modules (260 amp rectifier shelf) or two converter modules (340/420 amp rectifier shelf). The system can also accommodate up to two rack-mount

shelves, each of which houses eight 20 amp modules. Distribution devices for the +24 volt output are located in the main distribution cabinet and are available in various quantities.



65 amp, -48 Power Conversion Unit



85/105 amp, 5000 watt,  
-48 Power Conversion Unit

### Power Conversion Unit

The modular, high frequency, switch-mode PCU is the foundation of the LORAIN® VPS platform. Plug'n'play technology allows for easy system configuration. System capacity can be increased by simply plugging an additional PCU into an existing rectifier shelf or a newly added expansion shelf — no adjustments or setup are required. The LORAIN® VPS can house up to 72 PCUs, which provide load power, battery float current and battery recharge current. The PCUs are monitored and controlled by the MCA. The PCUs allow the user to appropriately size a power plant to meet specific applications.

### Rectifier Shelf

The power conversion units are housed in modular rectifier shelves each of which accommodates four PCUs. The rectifier shelves are 23" (58.42cm) wide by 10.5" (26.67cm) high for 65 amp PCUs or 5.25" (13.33cm) high for 85/105 amp 5,000 watt PCUs. System capacity can be easily expanded with additional shelves. AC connection options are available to provide an AC feed for each rectifier or for each pair of rectifiers. Twist-lock line cords can be provided for the individual PCU AC feed option (65 amp PCUs only).

## 85/105 amp, 5000 watt, Power Conversion Unit Specifications

### Input

Voltage	Nominal 208/240 volts AC, single phase, 50/60 Hz, with a range of 176 to 264 volts. Extended range to 300 volt AC without damage.
Current	26.9 amps@208VAC, 23.3 amps@240VAC, 54.48VDC, 5000 watts output 33.0 amps @176VAC, 5000 watts output (worst case)
Inrush Current	Peak does not exceed 2 times the RMS input at full load, under any conditions of input voltage within the rated input voltage range.
Frequency	47-65 Hz
Protection	Each PCU is individually wired; 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	Typical power factor greater than or equal to 98% for any load greater than or equal to 50% of rated full load at nominal line. Meets IEC 1000-3-2.
Operating Efficiency	Typical operating efficiency 91% at full load

### Output

Voltage	Nominal -48 volts DC, positive ground, adjustable from -44.0 to -58.0 volts DC
Current	85 to 105 amps per PCU, up to a total of 340 to 420 amps per shelf with four PCUs installed.
Power	5,000 watts maximum. The PCU employs a constant power limiting feature which limits the maximum output power to 5,000 watts over the output voltage range of -47.6 to -58.0VDC.
Regulation	Steady state output voltage remains within $\pm 0.02\%$ of any voltage within the range of 44.0 to 58.0 volts DC for any combination of input voltage, input frequency and load from no load to full load
Filtering	On or off battery
Voice Band Noise	Less than 32 dBnC
Wide Band Noise	Does not exceed 250 mv peak-to-peak, or 30 mv rms
Psophometric Noise	Does not exceed 1 mv

## 85/105 amp, 5000 watt, Power Conversion Unit Specifications (continued)

### Protection

Current Limiting	Maximum output current of each PCU can be set from 8.5 to 105 amps.
High Voltage Shutdown	If PCU output voltage exceeds an adjustable preset value, the PCU shuts down. After approximately three seconds, the PCU automatically restarts.

### Monitoring

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 and on the PCUs in the shelf.
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### Environmental

Operating Temperature	-40°C to +50°C (-40°F to +122°F); -40°C to +65°C (-40°F to +149°F) derate linearly to 4,000 watts output at 65°C (149°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 derated by 10°C (18°F) at an elevation of 10,000 feet (3,048m) above sea level. For elevations between 3,000 feet (914m) and 10,000 feet (3,048m), derate the maximum operating ambient temperature linearly.
Ventilation	Fan-cooled front to rear
EMI/RFI Suppression	Conforms to FCC rules Part 15, Subpart B, Class B and EN55022 Class B, radiated and conducted
Audible Noise	2 feet from any vertical surface; does not exceed 77dBA, 65dBA with low fan speed selected.

### Physical Characteristics

Mounting	Plug-in installation
Dimensions (H x W x D)	5.10" (12.95cm) x 5.13" (13.02cm) x 14.5" (36.83cm)
Weight	17 lbs. (7.73 kg)
<b>Safety Compliance</b>	UL recognized (UL 1950), CSA 22.2, No.950, CE

## 65 amp Power Conversion Unit Specifications

### Input

Voltage	Nominal 208/240 volts AC, single phase, 50/60 Hz, with a range of 176 to 264 volts. Extended range to 290 volt AC without damage.
Current	19.3 amps@208VAC, 16.6 amps@240VAC, 54.48VDC, 65 amps output 25.1 amps@176VAC, 57VDC, 69 amps output (worst case)
Inrush Current	Peak does not exceed 2 times the RMS input at full load, under any conditions of input voltage within the rated input voltage range
Frequency	45-70 Hz
Protection	Each PCU is individually wired; 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	Typical power factor greater than or equal to 98% for any load greater than or equal to 50% of rated full load at nominal line. Meets IEC 1000-3-2.
Operating Efficiency	Typical operating efficiency 89% at full load

## 65 amp Power Conversion Unit Specifications (continued)

### Output

Voltage	Nominal -48 volts DC, positive ground, adjustable from -44.0 to -57.0 volts DC
Current	65 amps per PCU, up to a total of 260 amps per shelf with four PCUs installed.
Regulation	Steady state output voltage remains within $\pm 0.02\%$ of any voltage within the range of 44.0 to 57.0 volts DC for any combination of input voltage, input frequency and load from no load to full load
Filtering	On or off battery
Voice Band Noise	Less than 32 dBnC
Wide Band Noise	Does not exceed 250 mv peak-to-peak, or 25 mv rms
Psophometric Noise	Does not exceed 1 mv

### Protection

Current Limiting	Maximum output current of each PCU can be set from 10% to 105% of full load current.
High Voltage Shutdown	If PCU output voltage exceeds an adjustable preset value, the PCU shuts down. After approximately three seconds, the PCU automatically restarts.

### Monitoring

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 and on the PCUs in the shelf.
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### Environmental

Operating Temperature	-40°C to +50°C (-40°F to +122°F); -40°C to +65°C (-40°F to +149°F) at 55 amps output
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 derated by 10°C (18°F) at an elevation of 10,000 feet (3,048m) above sea level. For elevations between 3,000 feet (914m) and 10,000 feet (3,048m), derate 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, with an option for FCC and CISPR22 Class B emission ratings.
Audible Noise	3 feet from any vertical surface; does not exceed 65dBA, 55dBA with low fan speed selected.

### Physical Characteristics

Mounting	Plug-in installation
Dimensions (H x W x D)	9.88" (25.08cm) x 5.13" (13.02cm) x 14.5" (36.83cm)
Weight	18 lbs. (8.16kgs)

<b>Safety Compliance</b>	UL recognized (UL 1950), CSA 22.2, No.950, CE
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### Additional Information

For additional specification, engineering and installation information, specify spec. numbers 582125000 (power system), 588703600 (260 amp power shelf and 65 amp PCUs), 588704800 (340/420 amp shelf and 85/105 amp PCUs), 588249600 (80 amp converter frame and 20 amp modules), 588249700 (160 amp converter shelf and 20 amp modules), 588250100 (40 amp converter frame and 20 amp modules).

For ordering information, request SAG582125000, PD588703600, PD588704800.