

# LORAIN® CSP 48300 DC Power System

■ DC Power for  
Business-Critical Continuity

## Key Features

- **Compact flexibility** — provides more space for revenue generating equipment
- **Constant power** — delivers more current at lower voltages to meet load or recharge demand
- **Wide operating range** — operates in the most demanding environments with operating input voltage from 85VAC to 300VAC
- **Meets industry standards** — NEBS™ Level 3 certified and UL 1801
- **Eight binary inputs (5 user programmable)** — form C contacts for external alarm or control functions
- **Eight user programmable outputs** — eight sets of form C alarm relay contacts are available
- **Remote Access** — TCP/IP, web browser, SNMP compatible
- **Compliant with global standards** — delivers quality, performance and dependability no matter what the application or location demands



## Description

The LORAIN® CSP 48300 power system is a modular -48VDC power system available in various configurations and capacities up to 300 amps. A basic system consists of a power shelf that incorporates a basic or advanced controller and up to five 750W or 1500W plug-in rectifiers, and an initial distribution panel with 18 plug-in positions accommodating bullet nose type fuse holders rated 1 to 100 amps or circuit breakers rated 1 to 250 amps and 8 positions for connecting batteries with or without protection devices. For smaller loads, an optional plug-in 10 position fuse module is available occupying 3 mounting position, offering fuses rated 0.18 to 10 amps.

A second power shelf that accommodates up to six 750W or 1500W plug-in rectifiers and a second distribution panel with 26 plug-in positions for load protection devices can be added to increase the distribution position capacity. An optional low voltage disconnect can be configured for battery or load disconnect.



# LORAIN® CSP 48300 DC Power System

## Application

The LORAIN® CSP power system is a front access system designed to be mounted in standard 23" frames or used in embedded applications with standard 23" mounting, with or without batteries. The system is rated for full continuous operation from -40°C to +50°C (with excursions to 65°C) and is NEBS™ Level 3 certified and UL(60950 & 1801).

The system is designed to supply a filtered and regulated -48VDC source to any telecommunication equipment requiring up to 300 amps capacity such as POP sites, customer premises, outdoor cabinets, CEVs, vaults or shelters, and small Central Offices. Specific applications include: DLC, xDSL, DSLAM, broadband communications, multiplexers, radio base stations, microwave and PBX.



LORAIN® CSP power shelves

### Power Shelves

The LORAIN® CSP power shelves are 5.25" (3U) high, 13" deep and 23" wide. The initial power shelf mounts five rectifier modules and a controller module. The supplementary shelf mounts 6 rectifier modules. The shelves provide front to back ventilation with zero clearance required above or below.

Each rectifier position provides interconnection points for the AC input, the DC output, and the control and alarm data bus (CAN protocol). The total output capacity is 150 amps for the initial shelf and 180 amps for the supplementary shelf. Each shelf provides connecting points for dual single phase 110/120 and 208/240VAC

feeds, one for rectifiers 1, 3 and 5, and one for rectifiers 2, 4 and 6 (on the initial power shelf, position No. 6 is for the controller). The AC supply can be brought into the shelf through knockouts at the left rear side of the shelf, or through an optional AC interface box at the front left of the shelf for front access applications. DC output connection between shelves and distribution panels is made through internal bussing.

# LORAIN® CSP 48300 DC Power System



1500W Rectifier Module

## Rectifier Modules

The LORAIN® CSP system uses 1500W or 750W constant power switch mode rectifier modules. Both rectifiers have a DC operating range of -43.0 to -58.5VDC. The 1500W module provides 1500W from 200 to 300VAC with current limiting at 34 amps. Output power is de-rated to 90% from 176 to 200VAC, to 60% at 120VAC, and to 50% at 100VAC. The 750W module provides 750W from 100 to 300VAC with current limiting at 17 amps. Both rectifiers provide up to 100% of rated output up to 75°C.

In the typical operating range, the rectifiers have a power factor greater than .99, total harmonic distortion less than 5% and efficiencies of 91%. The rectifiers are hot swappable and have an integrated speed controlled field replaceable fan. Each rectifier can optionally be equipped with a field replaceable air filter. Three LED indicators provide visual status of normal operation, alarm, rectifier failure alarm, and fan failure alarm.

## Controller Modules

Two controller modules are available for use in the LORAIN® CSP system – a basic controller and an advanced controller. The System Manager SP is the advanced controller. It has a graphical LCD display with four navigation keys. The local alarm display uses LED indicators for controller status and system major and minor alarms. Eight user programmable input ports and eight user programmable output ports with form C contacts are included. In addition to traditional system alarms and controls, the System Manager SP provides event and alarm history logs, an inventory log, and delivered DC power calculation. The System Manager SP can be accessed locally or remotely using a built-in web based Graphical User Interface. Local connection is made through the Ethernet port using a computer equipped with a web browser and crossover cable. Remote connection is made through a dial up

network connection with a modem connected to the system's RS-232 port, or through a network LAN connection to the TCP/IP port (RJ45 jack). The following battery management capabilities are provided: battery database, temperature compensation, equalize, battery discharge test, and charge control.

The Controller SP is the basic controller available with the LORAIN® CSP system. The operational features of the Controller SP are as follows: local alarm display by means of three LED indicators, three alarm outputs (dry C contacts), and two sets of local test points for the measurement of the system's voltage and current. DIP switches are used to adjust float voltage, temperature compensation, and the optional low voltage disconnect.

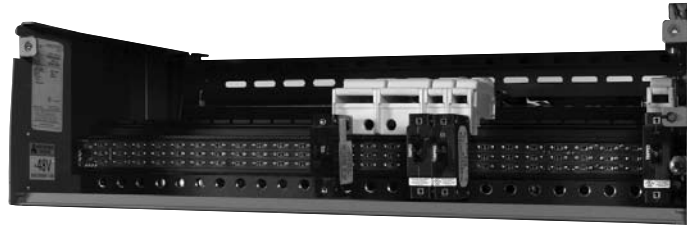


System Manager SP



Controller SP

# LORAIN® CSP 48300 DC Power System



Distribution Panel

## Distribution Panels

Two distribution panels are available for the LORAIN® CSP system. The initial panel is 5.25" (3RU) high, 13.5" deep and 23" wide, with a discharge capacity of 300 amps and a charge capacity of 330 amps. The panel is equipped with 18 positions for load protection devices (circuit breakers or fuses), 8 positions for battery protective devices or a battery connection kit, a battery current shunt, and an optional LVD circuit factory-wired for either load disconnect or battery disconnect. The supplementary panel has the same dimensions as the initial panel and is equipped with 26 positions for load protection devices (circuit breakers or fuses) and no battery positions. Both the initial and supplementary distribution panels provide local fuse and/or circuit breaker alarm indication by means of a red

LED indicator, and one side of the protection device plugs into a main rail bus, while the other side plugs into a removable load clip designed to facilitate cabling operations. Load clips are available in three sizes – single, double or quadruple position. The single position accommodates circuit breakers or fuse holders with TPS fuses from 1 to 60 amps. Double position load clips accommodate circuit breakers from 65 to 150 amps and fuses from 65 to 100 amps. Quadruple position load clips accommodate 225 & 250 amp circuit breakers.

## Batteries

The LORAIN® CSP system can be configured with a wide range of batteries to suit specific load and reserve requirements. Battery connections are made to the initial distribution panel through protection devices or directly using the factory installed Battery Connection Module.

## Temperature Probe Interface (TPI)

The Temperature Probe Interface is a module that can monitor an ambient temperature probe and up to eight battery temperature probes, then retransmit the ambient temperature and the highest battery temperature measurements to the controller. The added number of measuring points improves the accuracy of the temperature compensation function and the precision of the high battery temperature. The TPI has two visual indications, Power ON (green) and Probe Fail alarm (yellow), as well as one set of "fail safe" output relay contacts for the Probe Fail alarm.

# LORAIN® CSP 48300

## DC Power System

### LORAIN® CSP 48300 General Specifications

#### System Characteristics

Nominal system voltage	-48VDC
Rated output capacity	300 amps discharge, 330 amps charge
Rectifiers	Rectifier -48VDC, 1500W or Rectifier -48VDC, 750W
Controller	
Basic	Controller SP
Advanced	System manager SP
Distribution	Initial and Supplementary Distribution Panels

#### Environmental

Operating temperature	-40°F to 122°F (-40°C to 50°C) continuous operation
Storage and transportation	-40°F to 167°F (-40°C to 75 °C) Relative humidity below 95% (non-condensing)
Seismic rating	Telcordia GR-63-CORE, zone 4
NEBS™	Level 3 certified
Safety	UL per subject letter 1801, UL60950, CE marked, FCC part 15, subpart B and Telcordia GR-1089-CORE & Emissions for Class B, EN 300 386

### Rectifier -48VDC, 1500W Specifications

#### Electrical Specifications

##### AC input

Nominal Voltage	Single phase, 110/120VAC or 208/240VAC Can be used in the following AC configurations: <ul style="list-style-type: none"> <li>• phase-to-phase to 120/240V single phase AC source</li> <li>• phase-to-phase to a 120/208V 3-phase AC source</li> <li>• phase-to-neutral to a 220/380V, 230/400V, 240/415V, or 277/480V 3-phase AC source</li> <li>• phase-to-neutral to a 120/240V single phase AC source</li> <li>• phase-to-neutral to a 120/208V 3-phase AC source</li> </ul>
Operating Voltage Range	85VAC to 300VAC
Frequency	47 Hz to 63 Hz
Power factor (PF)	>0.99 from 80% to 100% load at 208 & 240VAC >0.97 from 50% to 80% load at 208 & 240VAC
Total Harmonic Distortion	<5% from 70% to 100% load at 208 & 240VAC Meets IEC 1000-3-2
Input Current	7.0 amp at 240VAC (Max 9.0 amp) 8.7 amp at 120VAC (Max 9.0 amp)
Inrush Current	Peak does not exceed 2.5 times the RMS input current at any load under input current within rated input voltage range.
Input Protection	If the input voltage decreases or increases beyond a non-adjustable predetermined value, the rectifier circuitry inhibits, disabling the output. The rectifier will recover automatically when the AC input is re-established within specification limits. Over current is protected by an internal fuse
Operating Efficiency	91.5% at 80% load and 240VAC >90% from 40% to 100% load at 240VAC

# LORAIN® CSP 48300

## DC Power System

### Rectifier -48VDC, 1500W Specifications (continued)

#### DC Output

Output Voltage Range	-43.0VDC to -58.5VDC
Output Power	Constant power limiting operation 1500W maximum from 200VAC to 300VAC 900W @ 120VAC 600W @ 85VAC
Output Current	25 to 34 amps
Regulation	Voltage is regulated within $\pm 0.5\%$ for all specified input and load variations Voltage drift $\pm 0.2\%$ in any eight-hour period, with constant input voltage, constant load, and less than $-5^\circ\text{C}$ change in ambient temperature
Voice Band Noise	The voice-frequency noise generated by a rectifier does not exceed 38dBnC output noise
Wide Band Noise	Wide band noise generated by a rectifier is less than 100mVrms in any 3 kHz band between 10kHz and 20MHz and less than 50mV rms over 20Mhz Peak to peak ripple voltage is less than 125mV from dc up to 100Mhz
Psophometric Noise	Does not exceed 1 mV
Protection	
Current Limiting	The output current is limited to 34 amp
Over current	Internal fuse
High Voltage Shutdown	If rectifier detects over voltage, it will turn off. After 10 seconds, it will restart and if it encounters an over voltage within 5 minutes it will turn off and remain off until reset.

#### Operating Specifications

Temperature	-40°F to 167°F (-40°C to 75°C) at full rated output
Altitude	-200 ft to 13,000 ft (-60 m to 4000 m)
Humidity	0 to 95% relative humidity (non-condensing)
Storage conditions	-40°F to 167°F (-40°C to 75 °C) Relative humidity below 95% (non-condensing)
Ventilation	Front to back speed-controlled fan (field replaceable)
Seismic	Telcordia GR-63-CORE for Zone 4
Electromagnetic Interference (EMI) and compatibility (EMC)	FCC part 15, subpart B, class B EN 300 386-2, class B
Audible noise	The rectifier does not produce sound levels above 60dBA, measured 1.5m above the floor and 0.5 m from the equipment
Operation without batteries	Yes

#### Status / Alarm Indicators and Monitoring

<i>Visual indicators</i>	<i>Status</i>	<i>Visual indicator color</i>
	Normal operation	Green
	Alarm	Yellow
	Rectifier failure alarm	Red
	Fan failure alarm	Flashing red
Rectifier alarms & Status Settings	Transmitted to System Manager SP or Controller SP on the communication bus using the CAN protocol The Controller SP or System Manager SP establishes all rectifier settings	
Miscellaneous data	Each rectifier provides the System Manager SP a complete set of identification information about itself (product code, serial number, alarm history, etc.)	

# LORAIN® CSP 48300

## DC Power System

### Rectifier -48VDC, 1500W Specifications (continued)

#### Rectifier Physical Specifications

Mounting	Plug-in installation
Dimensions (H x W x D)	5.25" (133mm) x 3.35" (85mm) x 11.00" (279mm)
Weight	5.5 lbs. (2.5kg)
Fire Resistance	All materials have flammability rating -UL 94 V0 or better All electrical components meet the Needle Flame Test per IEC 695-2-2
Safety	The rectifier is UL recognized (UL60950) for USA & Canada and is CE marked

### Rectifier -48VDC, 750W Specifications

#### Electrical Specifications

##### AC Input

Nominal Voltage	Single phase, 110/120VAC or 208/240VAC Can be used in the following AC configurations: <ul style="list-style-type: none"> <li>• phase-to-phase to 120/240V single phase AC source</li> <li>• phase-to-phase to a 120/208V 3-phase AC source</li> <li>• phase-to-neutral to a 220/380V, 230/400V, 240/415V, or 277/480V 3-phase AC source</li> <li>• phase-to-neutral to a 120/240V single phase AC source</li> <li>• phase-to-neutral to a 120/208V 3-phase AC source</li> </ul>
Operating Voltage Range	85VAC to 300VAC
Frequency	47 Hz to 63 Hz
Power Factor (PF)	>.99 from 40% to 100% load at 120V
Total Harmonic Distortion	>6% from 40% to 100% load at 120V Meets IEC 1000-3-2
Input Current	7.1 amp at 120VAC (Max 9.0 amp) 3.5 amp at 240VAC
Inrush Current	Peak does not exceed 2.5 times the RMS input at any load at 120VAC input voltage
Input Protection	If the input voltage decreases or increases beyond a non-adjustable predetermined value, the rectifier circuitry inhibits, disabling the output. The rectifier will recover automatically when the AC input is re-established within specification limits. Over current is protected by an internal fuse
Operating Efficiency	91.5% at 100% load and 240VAC 89% at 100% load and 120VAC

##### DC Output

Output Voltage Range	-43.0VDC to -58.5VDC
Output Power	Constant power limiting feature 750W maximum from 100VAC to 300VAC 600W at 85VAC
Output Current	12 to 17 amps
Regulation	Voltage is regulated within $\pm 0.5\%$ for all specified input and load variations Voltage drift $\pm 0.2\%$ in any eight-hour period, with constant input voltage, constant load, and less than $-5^\circ\text{C}$ change in ambient temperature
Voice-Frequency	The voice-frequency noise generated by a rectifier does not exceed 38dBnC output noise
High Frequency	Wide band noise generated by a rectifier is less than
Output Noise	100mVrms in any 3 kHz band between 10kHz and 20MHz and less than 50mV rms over 20MHz Peak to peak ripple voltage is less than 200mV from dc up to 100MHz
Psophometric Noise	Does not exceed 1 mV

# LORAIN® CSP 48300

## DC Power System

### Rectifier -48VDC, 750W Specifications (continued)

#### Protection

Current Limiting	The output current is limited to 17 amp
Over current	Internal fuse
High Voltage Shutdown	If rectifier detects over voltage, it will turn off. After 10 seconds, it will restart and if it encounters an over voltage within 5 minutes it will turn off and remain off until reset.

#### Operating Specifications

Temperature	-40°F to 167°F (-40°C to 75°C) at full rated power
Altitude	-200 ft to 13,000 ft (-60 m to 4000 m)
Humidity	0 to 95% relative humidity (non-condensing)
Storage conditions	-40°F to 167°F (-40°C to 75 °C) Relative humidity below 95% (non-condensing)
Ventilation	Front to back speed-controlled fan (field replaceable)
Seismic	Telcordia GR-63-CORE for Zone 4
Electromagnetic Interference (EMI) and compatibility (EMC)	FCC part 15, subpart B, class B EN 300 386-2, class B
Audible noise	The rectifier does not produce sound levels above 60dBA, measured 1.5m above the floor and 0.5 m from the equipment
Operation without batteries	Yes

#### Status / Alarm Indicators and Monitoring

Visual indicators	Status	Visual indicator color
	Normal operation	Green
	Alarm	Yellow
	Rectifier failure alarm	Red
	Fan failure alarm	Flashing red
Rectifier alarms & Status Settings	Transmitted to System Manager SP or Controller SP on the communication bus using the CAN protocol The Controller SP or System Manager SP establishes all rectifier settings	
Miscellaneous data	Each rectifier provides the System Manager SP a complete set of identification information about itself (product code, serial number, alarm history, etc.)	

#### Rectifier Physical Specifications

Mounting	Plug-in installation
Dimensions (H x W x D)	5.25" (133mm) x 3.35" (85mm) x 11.00" (279mm)
Weight	5.5 lbs. (2.5kg)
Fire Resistance	All materials have flammability rating -UL 94 V0 or better All electrical components meet the Needle Flame Test per IEC 695-2-2
Safety	The rectifier is UL recognized (UL60950) for USA & Canada and is CE marked



# LORAIN® CSP 48300

## DC Power System

### Power Shelf Specifications

Capacity	
Initial shelf	5 Rectifiers, Controller position, 150 amp
Supplementary Shelf	6 Rectifiers, 180 amp
Dimensions (H x W x D)	5.25" (133mm) x 23" (584mm) x 13" (330 mm)
Weight	Initial – 11.8 lbs. (5.35kg) Supplementary – 11.25 lbs. (5.1kg)
AC connections	Two connections per shelf (odd & even rectifiers)
Recommended AC Service input	30 amp, 2-pole AC breaker per 208/240V feed (3 rectifiers) 30 amp, 2-pole AC breaker per 110/120V feed (3 rectifiers)

### Controller Specifications

#### Controller SP

Display	LED status interface
Alarm output	3 dry C contacts outputs (Major, Minor, AC failure/BOD)
Alarm input	One external input for distribution and battery fuse alarm
Control of rectifiers	Digital CAN bus
System configuration	Dip switches for: System (float) voltage Temperature compensation battery charging Low voltage disconnect
Battery management	Low Voltage Disconnect (LVLD or LVBD) Temperature compensation battery charging

#### System Manager SP

Display	LCD display with four navigation buttons
Alarm output	8 dry C contacts (5 programmable) SNMP & Web (HTML)
Alarm input	8 programmable inputs
Control of rectifiers	Digital CAN bus
Battery management	Battery Discharge Test Charge Control Low Voltage Disconnect (LVLD or LVBD) Temperature compensation battery charging Equalize (boost)
System configuration	Embedded Web Browser (HTTP)
Communications ports	RJ45 jack for Ethernet port (TCP/IP) DB9 connector for RS-232
Remote access	All essential functions and operational parameters through RS-232 modem and TCP/IP Ethernet with password security

# LORAIN® CSP 48300 DC Power System

## Distribution Panel Specifications

<b>Capacity</b>	
Initial panel	18 load position, 8 battery connections, 300 amp Battery shunt, optional LVD (LVBD or LVLD)
Supplementary panel	26 load positions, 300 amp
<b>Protection devices</b>	
Circuit breaker	Bullet Nose type with load clip 1 to 60 amp use single position load clip 65 to 150 amp use double position load clip with spacing restrictions 225 and 250 amp use quadruple position load clip with spacing restrictions
<b>Fuses</b>	
	Bullet Nose type with load clip TPS type 1 to 60 amp use single load clip TPS & TLS Type 65 to 100 amp use double load clip SAN-O type 0.18 to 10 amp with 10 Position Fuse Block
<b>Battery connections</b>	
	Protected using circuit breakers up to 200 amp Hardwired using optional Battery Connection Kit
<b>Dimensions (H x W x D)</b>	
	7.0" (177.8mm) x 23.0" (584mm) x 13.5" (343mm)
<b>Weight</b>	
Initial panel	27.5 lbs. (12.5kg) with LVD 24.3 lbs. (11.0kg) without LVD
Supplementary panel	24.3 lbs. (11.0kg)

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