LINEAGE POWER™

Slimline Power System

48V DC Outside Plant and Customer Premise Solution

- Customer premise power for converged networks

- Large plant features in a small plant package

- 3000 Watts / 60 Amps single shelf capacity in 1RU

- 10.3 inches (264mm) depth is ideal where space is restricted

- Greater than 90% efficiency

Benefits

Reliability
– Simplified deployment
– Proven field performance
– Hardened for extreme environments

Intelligence
– Industry leading controller features
– Ethernet interface for remote access
– Centralized network management

Investment Protection
– Engineered to reduce installation time
– Versatile configurations
– Efficient operation

On Time Delivery
– Standard building blocks
– 4 - 6 week availability
– 24/7 support

Overview

The Slimline Power System provides advanced controller features in a compact, cost-efficient footprint. The SPS shelf is 1.75" high, 10.3" deep and mounts in 19-inch or 23-inch wide frames, with three power slots for rectifiers and distribution. The Pulsar Edge controller has Ethernet connectivity to facilitate remote network management to monitor and control rectifiers, batteries, and distribution. SPS is a reliable DC power solution where system height and depth are restricted.

Shelf Options

The Slimline Power System product line provides several shelf options equipped with Ethernet, alarm inputs/outputs, and 1-Wire™ connection for battery voltage and temperature monitoring. The rectifier-only shelf holds up to three 1000 Watt rectifier modules. Shelves can be deployed in parallel to increase output capacity. Other shelf configurations hold up to two 1000 Watt rectifier modules and include an integrated distribution module with circuit breakers, GMT fuse positions, and low-voltage battery disconnect circuit.

SPS Rectifier

This hardened rectifier is a single phase, hot pluggable, fan cooled rectifier that provides up to 1000 Watts of high availability DC power. The constant output power characteristics, extended temperature range, universal AC input, and compact size are key attributes that make this rectifier the right choice for your power needs.

Pulsar Edge Controller

SPS features the Pulsar Edge controller delivering large system intelligence in a small system form factor. Ethernet connectivity with SNMP facilitates remote network management.

Total Efficiency

The Lineage Power Total Efficiency(TM) (TE) architecture reduces energy loss and lowers cooling costs by 50-70%. TE products will prioritize sustainable energy sources like solar, wind, water and fuel cells over traditional utility grid or diesel generator sources – and they will intelligently respond to smart grid information to reduce consumption during peak demand periods. Active Rectifier Management (ARM) and Battery Charging Optimization (BCO) features increase efficiency on current and legacy power infrastructures. The Total Efficiency architecture addresses issues end-to-end based on our proven experience and expertise in batteries, power distribution, DC energy systems, AC/DC power supplies, and DC/DC board mounted power to deliver a solution that is more safe, reliable and energy efficient than alternatives from our competitors.

SPS Rectifiers

The SPS rectifiers are single phase, hot-pluggable, fan cooled rectifiers that provide highly reliable DC power. The SPS EP0800 and EP1000 rectifiers are cost-effective rectifiers that occupy just 1RU and it's shallow depth is an ideal power solution for space critical applications. The constant output power characteristics as well as the extended temperature range, universal AC input voltage range and compact size are key attributes that make this rectifier the right choice for your power needs.

These rectifiers are applicable for indoor and outdoor environments especially where equipment depth and height are restricted. The SPS rectifiers communicate digitally to the Pulsar Edge controller family over a RS485 bus to add extensive monitoring and alarm management facilities. Its flexible and sophisticated feature set makes this front-end supply an excellent choice for power in a variety of application spaces.

Applications

- Telecommunications networks
- Digital subscriber line (DSL)
- Indoor/outdoor wireless
- Routers/switches

- Fiber in the loop
- Transmission
- Data networks
- PBX

Key Features

- Extended temperature range
- Redundant fan cooling
- Front panel LED indicators
- 1U height, minimized depth

- Universal AC input
- Analog load sharing
- Hot pluggable
- RoHS compliant

Input	
Voltage Range – EP1000 - Low-Line - High-Line	90 – 175 Vac (500W) 176 – 290 Vac (1000W)
Voltage Range – EP0800 - Low-Line - High-Line	90-156* Vac (400W) 156*-290 Vac (800W) *150-180 Vac (500W)
Input Frequency	45-65 Hz
Input Current – EP1000	5.1 Arms @ 230 Vac (1000W) 6.5 Arms @ 90 Vac (500W)
Input Current – EP0800	5 Arms
Inrush Transient - EP1000 - EP0800	16 Apk 14.9 Apk
Total Harmonic Distortion (THD)	< 5 %
Power Factor	~1.0
Holdup Time	>10 ms full power

Output	
Voltage Nominal - EP1000 - EP0800	52 Vdc 54 Vdc
Voltage Adjust Range	42-58 Vdc (software control)
Rated Output Current – EP1000 - Low-Line - High-Line	10 Adc max 20 Adc max
Rated Output Current – EP0800 - Low-Line - High-Line	7.5 Adc max 15 Adc max
Rated Output Power – EP1000 - Low-Line - High-Line	500 Watts 1000 Watts
Rated Output Power – EP0800 - Low-Line - High-Line	400 Watts 800 Watts
Psophometric Noise	<2 mV max
Ripple	<200 mVpkpk
Overvoltage Protection	59.5 Vdc

Control and Monitoring	
Visual Status Indicators	Run, Alarm and Fault LEDs
Serial Interface	Half duplex RS485 (GP Protocol)

Environmental

Operating Temperature	-40°C to +65°C EP0800 -40°C to +75°C EP1000
Storage Temperature	-40°C to +70°C
Power Derating	> +55°C 2% per degree Celsius
Relative Humidity	95% max, non-condensing
Altitude	4000m max
Audible Noise	< 55dBA

Mechanical

Length (in./mm)	8.11 / 206.0
Width (in./mm)	4.98 / 126.5
Height (in./mm)	1.64 / 41.6
Weight (lb/kg)	3.08 / 1.4

General

Cooling	Redundant Fan Cooled
Efficiency	>90%
Heat Dissipation	97 W / 331 BTU

Safety and Standards Compliance

NEBs	Evaluated by independent NRTL test lab to Telcordia GR63 and GR1089-CORE, Issue 4
Safety	CE mark to Low Voltage Directive 2006/95/EC and EMC Directive 2004/108/E UL 609501-1 Recognized CSA C22.2 No. 60950-1-03 Certified VDE0805:200112 (EN 609501) Licensed
RoHS	Compliant to RoHS EU Directive 2002/95/EC
EMC	FCC and EN 55022, Class B; FCC, Class B
ESD	EN61000-4-2, Level 4

Outline Drawing

AIR FLOW DIRECTION (FRONT TO BACK)

FRONT VIEW

SIDE VIEW
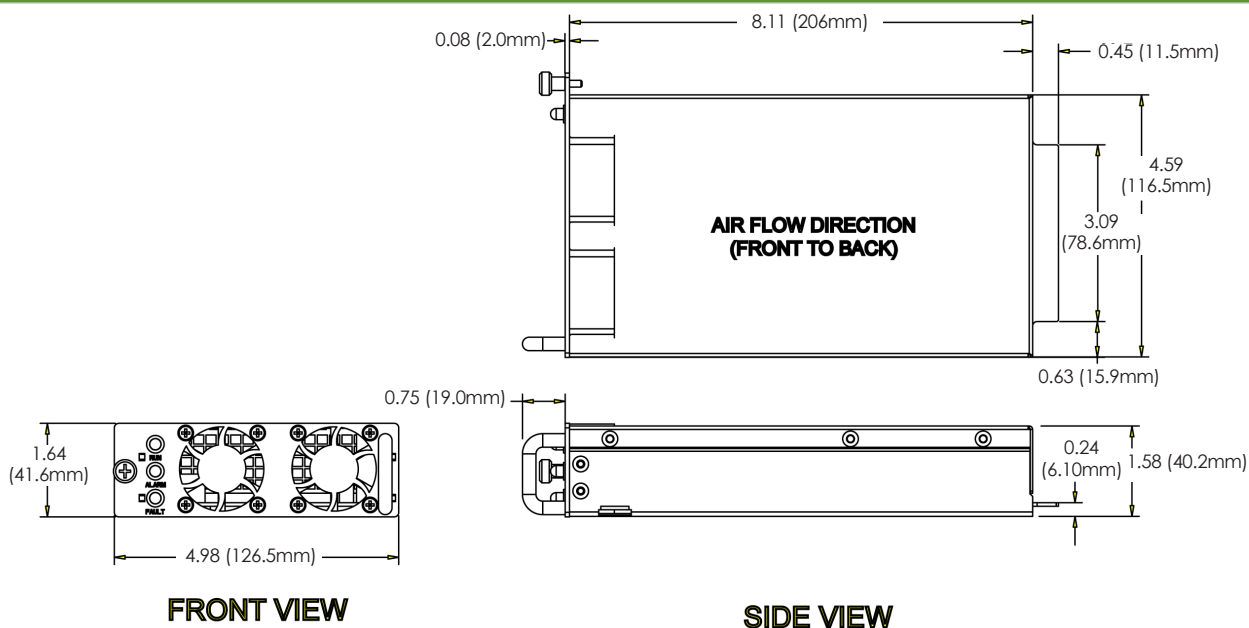
Pulsar Edge Controller

The SPS Pulsar Edge controller delivers large system intelligence in a small system form factor. This family of controllers functions as network interface cards (NIC) and as a full-featured battery plant controller. Its thin modular plug-in form factor minimizes shelf space consumption allowing maximum power module and distribution capabilities.

The controller is utilized in bulk power applications in data centers and enterprise applications. Ethernet connectivity with SNMP facilitates remote network management. Access through its front-accessible RS232 or USB port and aided by the EasyView2 graphical enables full user interface locally.

As a battery plant controller, it provides a complete set of features to monitor and control rectifiers, batteries, and distribution. A flexible set of configurable inputs allow the Pulsar Edge controller to monitor a wide variety of system equipment and incorporate appropriate state information enabling a centralized point of management.

The controller utilizes standard network management protocols allowing for advanced network supervision. Lineage Power Galaxy Manager™ software is the centralized visibility and control component of a comprehensive power management system designed to meet engineering, operations and maintenance needs. The Galaxy Manager client-server architecture enables remote access to system controllers across the power network.

Applications

- Telecommunications networks
- Digital subscriber line (DSL)
- Indoor/outdoor wireless
- Routers/switches
- Fiber in the loop
- Transmission
- Data networks
- PBX

Key Features

Remote Access and Features

- Integrated 10/100Base-T Ethernet Network
  - TCP/IP
  - SNMP V2c for management
  - SMTP for email
  - Telnet for command line interface
  - DHCP for plug-n-play
  - FTP for rapid backup and upgrades
  - HTTP for standard web pages and browsers
  - Compatible with Galaxy Manager and other management packages
  - Shielded RJ-45 interface referenced to chassis ground
- Password protected security levels: User, Super-User, Administrator for all access
- Ground-referenced RS232 system port
- ANSI T1.317 command-line interface
- Modem access support
  - Remote via external modem
  - Callback security
- EasyView2, Windows-based GUI software for local terminal or Modem access

Standard System Features

- Monitor and control of more than 40 connected devices
  - Maximum of 32 rectifiers
  - Maximum of 6 distribution control cards
  - Robust RS485 system bus
- Standard and user defined alarms
  - Alarm test
  - Assignable alarm severity: Critical, Major, Minor, Warning, and record-only
- Rectifier management features
  - Automatic rectifier restart
  - Adaptive Rectifier Management (energy efficiency)
  - Remote rectifier (on/off)
  - Reserve Operation
  - Automatic rectifier sequence control
  - N + X redundancy check
- Multiple Low Voltage Load and Low Voltage Battery Disconnect thresholds (4)
- Configuration, statistics, and history
  - All stored in non-volatile memory
  - Remote/local backup and restore of configuration data
- Industry standard defaults
  - Customer specific configurations available
- Remote/ local software upgrade
- Basic, busy hour, and trend statistics
- Detailed event history
- User defined events and derived channels

Standard Battery Management Features

- Float/boost mode control
  - Manual boost
  - Manual timed boost locally, T1.317, and remotely initiated
  - Auto boost terminated by time or current
- Battery discharge testing
  - Manual (local/remote)
  - Periodic
  - Plant Battery Test (PBT) input driven
  - Configurable threshold or 20% algorithm
  - Graphical discharge data
  - Rectifiers on-line during test
- Slope thermal compensation
  - High temperature
  - Low temperature
  - Step temperature
  - STC Enable/Disable, low temperature Enable/Disable
  - Configurable mV/°C slopes
- State of charge indication
- High temperature disconnect setting
- Reserve-time prediction
- Recharge current limit
- Emergency Power-Off input

Integrated Monitoring Inputs/Outputs

- System plant voltage (accuracy ±0.5%, resolution 0.01V)

- One system shunt (accuracy ±1% full scale, resolution 1A)
  - Battery or load
  - Mounted in the return side of DC bus

- Up to 15 binary inputs
  - Six inputs close/open to battery
  - 9 input close/open to return (number is dependent upon number of output alarms)
  - User assignable

- Up to 5 user assignable Form-C output alarms (50VDC @.3A)

- 1-Wire™ bus devices
  - Up to 16 temperature probes (QS873)
  - Up to 6 mid-string monitors (ES771)

Galaxy Manager Compatible

- Centralized web server and database with multiple user access to live or managed data with drill down to problem details

- Monitor and control of more than 40 connected devices

- Management information from polling or alarms received from alarm traps from multiple sites are available on one screen via the inter/intranet

- Trend user selected data over time

- Automatic or manual report generation

- Standard engineering tools like reserve time calculators and cable voltage drop analyzer

General	
Operating Voltage	±24 Vdc, ±48 Vdc (Range: ±18 to ±60 Vdc)
Input Power	Less than 7W
Operating Temperature Range	-40°C to +70°C (-40 to 167 °F)
Operating Relative Humidity	0 - 95% (non-condensing)
Storage Temperature Range	-40°C to +85°C (-40 to 185 °F)
Physical Specifications	1.75 in. H, 0.75 in. W, 8.00 in. D; 0.5lb
Display	8-line by 40-character backlit LCD
EMC	FCC/EN55022 Class A, CISPR22 Level A

Agency Certifications	
Electrostatic Discharge	EN 61000-4-2 level 4
Radiated Emissions	FCC, Class A; EN 55022, Class A
Safety	UL Unlisted Component as Part of CPL or SPS Power System

Ordering Information – Slimline Power System

48V DC Outside Plant and Customer Premise Solution

The Slimline Power System power shelf provides advanced controller features in a compact, cost-efficient footprint. The SPS shelf is 1.75" high, 10.3" deep and mounts in 19-inch or 23-inch wide frames, with three power slots for rectifiers and distribution. The Pulsar Edge controller has Ethernet connectivity to facilitate remote network management to monitor and control rectifiers, batteries, and distribution. SPS is a reliable DC power solution where system height and depth are restricted.

The SPS product line provides several shelf options equipped with Ethernet, alarm inputs/outputs, and 1-Wire™ connection for battery voltage and temperature monitoring. The rectifier-only shelf holds up to three 1000 Watt rectifier modules. Shelves can be deployed in parallel to increase output capacity. Other shelf configurations hold up to two 1000 Watt rectifier modules and include an integrated distribution module with circuit breakers, GMT fuse positions, and low-voltage battery disconnect circuit.

Features

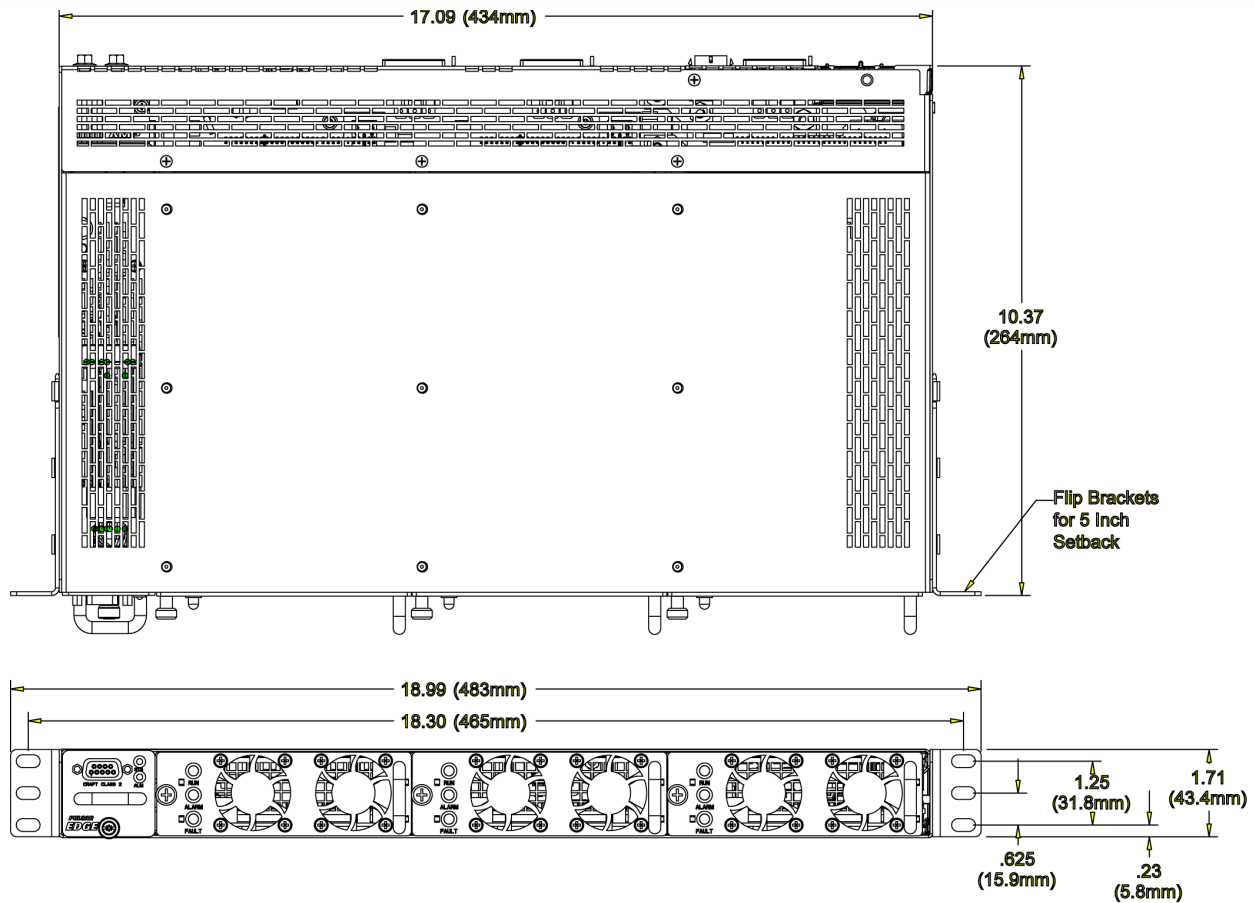- SPS rectifiers produce 42Vdc to 58Vdc output; up to 1000W high line

- Universal AC input: 90-290VAC

- AC input options: IEC-320 C13 or C19 style cords per rectifier or per shelf

- DC output bus is rated for 60A with two-hole lug landings for 2 AWG wire

- Temperature hardened harsh environments. (-40°C to +75°C)

- Compact size: 1U (1.75") high, 10.3" deep

- Adjustable mounting ears for either flush front or 5- inch set back position

- Two rectifier only shelves may be connected together for larger power requirements

- Plug-N-Play SPS841A controller with Web based interface for local (DB9 or USB craft port) and remote (LAN) access

- Distribution options include one or two 30A battery breakers, up to 10 GMT load fuses and Low Voltage Battery Disconnect (LVBD)

List 1 Power Shelf

List 2 Power Shelf w/Distribution

List 4 Power Shelf w/Distribution

Shelf Line Drawing - J2007003

17.09 (434mm)

10.37 (264mm)

Flip Brackets for 5 Inch Setback

18.99 (483mm)

18.30 (465mm)

1.25 (31.8mm)

1.71 (43.4mm)

.625 (15.9mm)

.23 (5.8mm)

Shelf Options

List 1 and 1A Power Shelf

- DC output buses are M6 studs on 5/8'' centers for up to 2gage cable pair, plastic cover provides touch proof protection

- AC input is single IEC-320 C19 style cord for List 1 or three C13 style cords for List 1A

- 1-Wire port for battery voltage and temperature monitoring, LAN port and alarm output connector

- Connector for LVD, shunt and fuse alarm monitoring of external distribution panel

Rear View List 1

DC   AC   1-Wire LAN   Control/Alarms

Rear View List 1 A

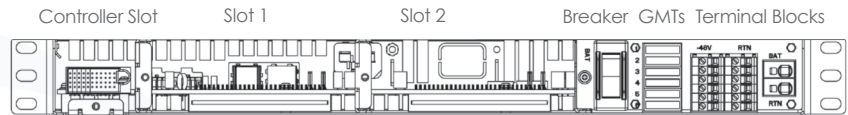DC   AC   AC   AC   1-Wire LAN   Control/Alarms
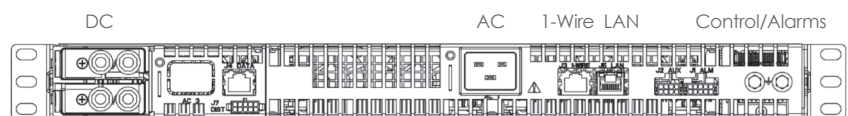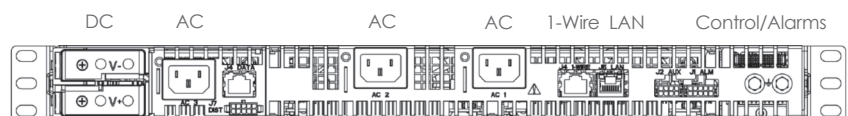
Shelf Options - continued

List 2 and 2A Power Shelf with Distribution

- Full front access for battery and load connections
- 30A battery breaker with terminal block input for 8 gage wire, LVBD
- Six GMT fuses with terminal block output for 12 gage wire, 10A max fuse size
- AC input is single IEC-320 C13 style cord for List 2 or two C13 style cords for List 2A
- 1-Wire port for battery voltage and temperature monitoring, LAN port and alarm input and output connectors
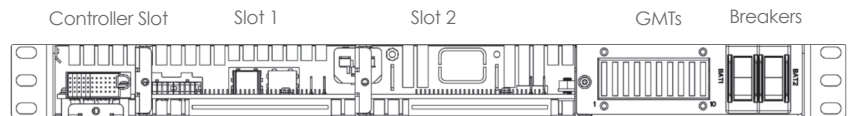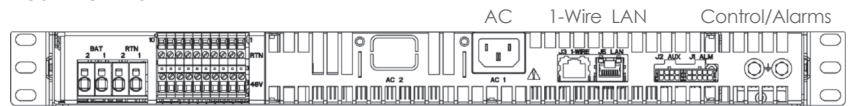- List 2 and 2A Power Shelves also available without LVBD

List 4 and 4A Power Shelf with Distribution

- Full rear access to all connections
- Two 30A battery breakers with terminal block inputs for 8 gage wire, LVBD
- Ten GMT fuses with terminal block output for 12 gage wire, 10A max fuse size
- AC input is single IEC-320 C13 style cord for List 4 or two C13 style cords for List 4A
- 1-Wire port for battery voltage and temperature monitoring, LAN port, alarm input and output connectors
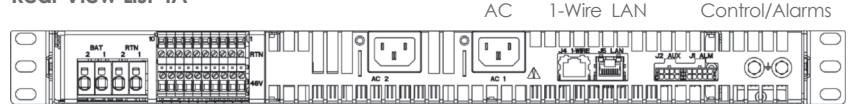- List 4 and 4A Power Shelves also available without LVBD

Front View List 2 and 2A

Controller Slot   Slot 1   Slot 2   Breaker GMTs Terminal Blocks

Rear View List 2

AC   1-Wire LAN   Control/Alarms

Rear View List 2A

AC   1-Wire LAN   Control/Alarms

Front View List 4 and 4A

Controller Slot   Slot 1   Slot 2   GMTs   Breakers

Rear View List 4

AC   1-Wire LAN   Control/Alarms

Rear View List 4A

AC   1-Wire LAN   Control/Alarms
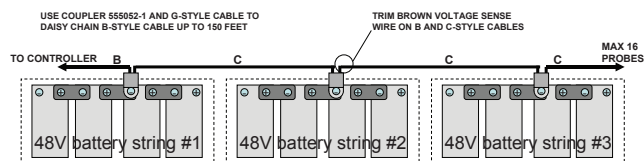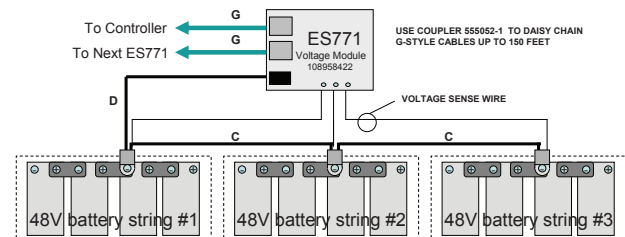
Battery Monitoring

Temperature/Voltage probes are needed for battery monitoring. They are connected to each battery or battery string to provide slope thermal compensation, temperature alarms and voltage imbalance alarms.

Temperature Measurement

Temperature/Voltage Measurement

Controller Options

- SPS841A plugs into shelf. A DB9 or USB craft port is on the front of the unit. Alarm inputs and outputs, and Ethernet connection are located on the back of the shelf.

- Web based interface for local (Craft Port) and remote (LAN) access

- Ethernet Interface – TCP/IP, FTP, Telnet, HTTP, SMTP support

- Alarm inputs and outputs are configurable with options for either 3 output alarm relays (SPS841A_3C3R controller) or 5 output alarm relays (SPS841A_0I5R controller).

- Advanced battery management

- Optional 2U high Display

Communication Signals

- J1 provides alarm outputs and inputs based on the controller installed (see table below). Inputs are "Dry", no voltage, contact Closures or Opens to a common return on pin 6. Outputs are relay contacts. Both input and output alarms are customer defined on the controller's web pages.

- J2 provides alarm inputs (see table below). Alarm inputs are contact Closures or Opens to the non-grounded side of the dc bus [-48V]. Pins 6, 7, 8 provide -48V for these alarm inputs.

- J3 battery thermal probe (QS873A) or battery mid-string voltage monitor (ES771) with battery thermal probe.

- J4 shelf to shelf communication connection (List1, 1A)

- J5 LAN/Ethernet.

- J7 provides distribution control for shelves with external distribution (List 1, 1A). See table below.
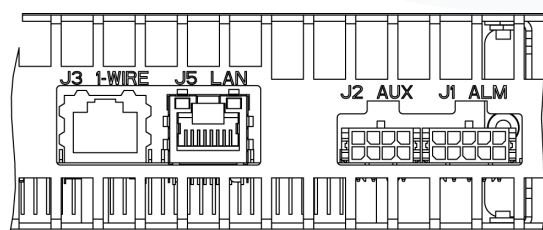
All Shelves
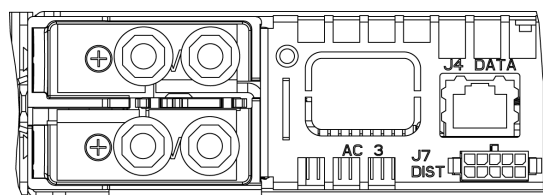
List 1 and 1A Shelves

J1 ALARM CONNECTOR		
Pin	Signals for SPS841A_3C3R	Signals for SPS841A_0I5R
1	ALM1 Input	Alarm Relay 3 Rtn
2	ALM2 Input	Alarm Relay 2 Rtn
3	Alarm Relay 1 Rtn	Alarm Relay 1 Rtn
4	Power Minor Rtn	Power Minor Rtn
5	Power Major Rtn	Power Major Rtn
6	ALM1, 2, 6C RTNS	Alarm Relay 3
7	ALM6 Input	Alarm Relay 2
8	Alarm Relay 1	Alarm Relay 1
9	Power Minor	Power Minor
10	Power Major	Power Major

J2 CONNECTOR	
Pin	Signal
1	ALM6 Input
2	—
3	ALM3 Input
4	ALM4 Input
5	ALM5 Input
6	-48V
7	-48V
8	-48V

J7 CONNECTOR	
Pin	Signal
1	FAJ
2	Coil Rtn
3	LVD_NC
4	LVD_NO
5	Shunt-
6	OS
7	Coil1
8	Coil2
9	LVD Status Rtn
10	Shunt+

LINEAGE POWER™

## AC Input, DC Output Cables

C13 plug with 5-15P plug, 10'	CC848776105
C13 plug with L6-20P plug, 10'	CC848820317
C13 plug, unterminated, 10'	847861192
C13 AC Cord Retaining Clamp	CC848885698
C19 plug, with 5-15P plug, 8'	CC848850792
C19 plug, with L6-20P plug, 8' (List 1 only)	CC848850842
C19 plug, unterminated, 8' (List 1 only)	CC848847368
C19 AC Cord Retaining Clamp	CC848887158
DC output cable 2 AWG, 10' (List 1, 1A only)	848748987

Alarm and Communication Cables

15' Alarm (J1) or distribution (J7) cable	CC848865980
50' Alarm (J1) or distribution (J7) cable	CC848817651
150' Alarm (J1) or distribution (J7) cable	CC848817668
15' Alarm input cable (J2)	CC848853614
Shelf to shelf communication cable (J4) (List 1, 1A only)	CC848847780

Mounting Brackets

1U bracket for 23" frame mount	CC848844803
Wall mount bracket	CC848864504
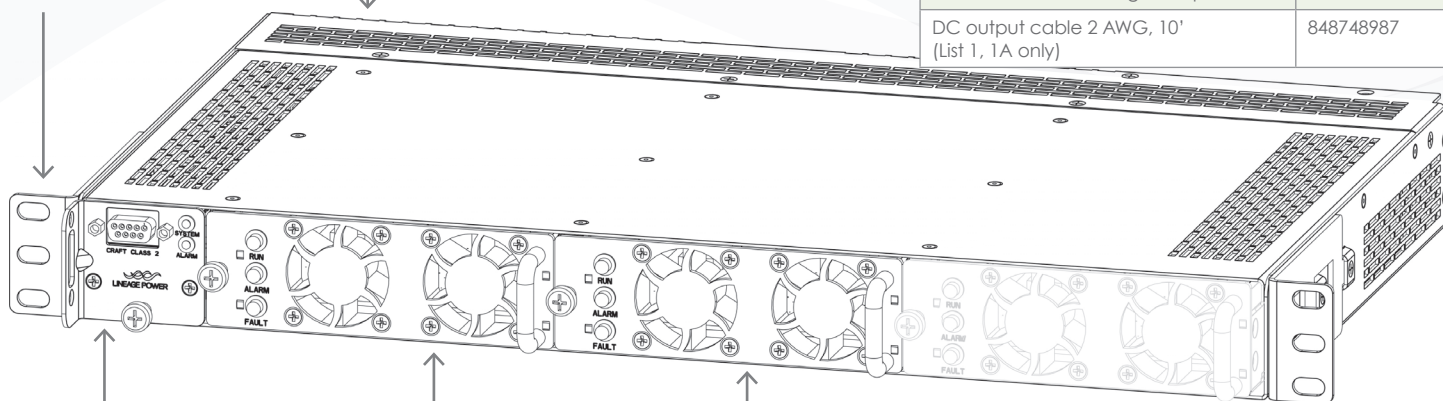
Controller

SPS841A_3C3R	CC109142238
SPS841A_0I5R	CC109152377
Slot Filler (List 1, 1A only)	CC848868554
2U High Display	CC109151783

Rectifier

EP0800_U 800W		CC109142304
EP1000_U 1000W		CC109153697
Slot Filler		CC848883297

Shelf Options

| Shelves with 3 rectifier slots, controller slot	
List 1 Rectifier Only	CC109148136
List 1A Rectifier Only	CC109146503

Shelves with 2 rectifier slots,1 slot for distribution, controller slot	
List 2 Rectifier/Distribution	CC109148144
List 2A Rectifier/Distribution	CC109151536
List 4 Rectifier/Distribution	CC109146511
List 4A Rectifier/Distribution	CC109151544
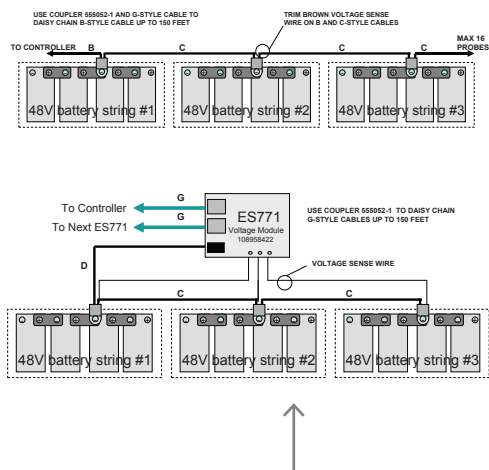
Battery Management Accessories

A: QS873A Thermal Probe	CC109142980
B: 10' probe to controller wireset	CC848817024
C: 1' probe to probe wireset	CC848822560
C: 5' probe to probe wireset	848719803
C: 10' probe to probe wireset	CC848822321
ES771A Voltage Monitor Card	108958422
D: 2 ½ ' ES771A to probe wireset	CC848791517
D: 6' ES771A to probe wireset	CC848797290
D: 10' ES771A to probe wireset	848719829
G: 4' ES771A to ES771A or controller wireset	CC848791500
G: 10' ES771A to ES771A or controller wireset	848652947
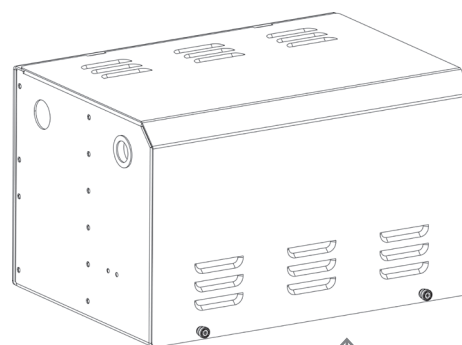
Battery Box and Accessories

Battery Box	CC848870832
IR-40 Battery	408538854
IR-40 cable, 3 1/2 ft., 10ga	CC848885715
ES12-12 Battery	CC408638183
Inter-battery bus bar	846861664
ES12-12 breaker wireset	C848873546
50A breaker disconnect	CC109153202

Shelf Specifications

Mechanical	
Height	1.71inches (43.4mm)
Width (with mounting ears)	19 inches (483mm)
Depth	10.37 inches (264mm)
Weight (without rectifiers)	6lbs/2.7kg
Environmental	
Operating Temperature Range	-40°C to 65°C EP0800 -40°C to +75°C EP1000
Operating Relative Humidity	0 - 95% (non-condensing)
Storage Temperature Range	-40°C to 75°C
Agency Certifications	
CSA	Canada/CSA C22.2 No. 60950-1-03 and UL60950-1
EMI/EMC	FCC Part 15, Class A; EN 55022, Class A (emission); EN 55024 (immunity); EN 55024, levels 3 (CI & RI) and level 4 (ESD)
CE	CE mark meets Low Voltage Directive 2006/95/EC and EMC Directive 2004/108/EC
NEBs	Level 3 certified

Management Visibility

Galaxy Manager™ software is the centralized visibility and control component of a comprehensive power management system designed to meet engineering, operations and maintenance needs. The Galaxy Manager client-server architecture enables remote access to system controllers across the power network.

- Dashboard display with one-click access to management information database
- Trend analysis
- Scheduled or on demand reports
- Fault, configuration, asset, and performance management

Training

Lineage Power offers on-site and classroom training options based on certification curriculum. Technical training can be tailored to individual customer needs. Training enables customers and partners to more effectively manage and support the power infrastructure. We have built our training program on practical learning objectives that are relevant to specific technologies or infrastructure design objectives.

Service & Support

Lineage Power field service and support personnel are trusted advisors to our customers – always available to answer questions and help with any project, large or small. Our certified professional services team consists of experts in every aspect of power conversion with the resources and experience to handle large turnkey projects along with custom approaches to complex challenges. Proven systems engineering and installation best practices are designed to safely deliver results that exceed our customers' expectations.

Warranty

Lineage Power is committed to providing quality products and solutions. We have developed a comprehensive warranty that protects you and provides a simple way to get your products repaired or replaced as soon as possible.

SPS comes with a two year hardware warranty.
For full warranty terms and conditions please go to www.lineagepower.com/warranty.

Contact Us

For more information, call Lineage Power toll free at **877-LINEAGE (877-546-3243)**, or +1 972 244 9288 and visit us on the Web at **lineagepower.com**

LINEAGE POWER