

# Teleline™

## Plug-in Power Supply Card, 48 Vdc to -24 Vdc model 751316 Description and Installation Guide

925W751026-05E





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# **Chapter 1**

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## **General Information**

## **1.1 Publication Information**

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**Teleline Plug-in Power Supply Card, 48 Vdc to -24 Vdc model 751316**

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### **Disclaimer Notice**

Although Positron Inc. has made every effort to ensure the accuracy of the information contained herein, this document is subject to change without notice.

## 1.2 About this Guide

This guide introduces you to the Teleline Plug-in Power Supply Card, 48 Vdc to - 24 Vdc model 751316, and describes how to install it in a Teleline shelf. This guide was designed to be read from beginning to end.

### 1.2.1 Related Documentation

For any other technical document relating this system installation or applications cards and shelves, please refer to the Positron Web site:  
[www.PositronPower.com](http://www.PositronPower.com).

### 1.2.2 Positron Products and Services

Positron engineers and manufactures high voltage isolation products to protect personnel and telecommunications circuits in high voltage areas that are susceptible to the effects of Ground Potential Rise (GPR).

Positron is the leader in isolation technology with its Teleline wireline products and TeleLite optical fiber wireline isolation/protection product families. Positron provides total flexibility in product configuration – from standalone units protecting a single circuit to high-capacity, multi-shelf HVI preconfigured systems.

Positron also provides a wide range of consulting, analysis and training services for communications companies and electrical utilities.

Full details and contact information are available at: [www.PositronPower.com](http://www.PositronPower.com)

## 1.3 Service and Support

### 1.3.1 Positron Contact Information

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<b>General information:</b>	Positron Inc. 5101 Buchan Street, Suite 220 Montreal, Quebec, Canada H4P 2R9 US and Canada: 1-888-577-5254 International: 1-514-345-2220 Fax: 514-345-2271 E-mail: <a href="mailto:info@positronpower.com">info@positronpower.com</a> Website: <a href="http://www.positronpower.com">www.positronpower.com</a>
<b>Customer Service and Repairs:</b>	US and Canada: 1-888-577-5254 International: 1-514-345-2220 E-mail: <a href="mailto:customerservice@positronpower.com">customerservice@positronpower.com</a>

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### 1.3.2 Technical Customer Support

Positron is committed to providing excellent ongoing technical support to its customers. A team of specialists is always available for telephone consultations or for on-site visits to assist in the maintenance and troubleshooting of Positron equipment.

For pricing information or assistance in the planning, configuration and implementation of the installation of equipment, contact Technical Customer Service.

### 1.3.3 Customer Training

Full customer training courses on High Voltage Interface (HVI) are also available. For more information, contact Positron.

### 1.3.4 Product Safety

This equipment is compliant with CSA CAN/CSA-C22.2 No. 60950-1-07.



### 1.3.5 Repair Service

All warranty repairs are performed at no cost. Positron reserves the right to repair or replace any equipment that has been found to be defective.

For information about out-of-warranty repairs, contact Positron's Repair Department. Due to the varied nature of repairs, no specific turnaround can be guaranteed, but average turnaround time is 20 working days from date of receipt. In emergency situations, special arrangements can be made. All repaired items are warranted for a period of 90 days.

Before returning any items to Positron for repair, warranty repair or replacement, call the Repair department to obtain a Return Material Authorization (RMA) number. Parts returned without RMA numbers cannot be accepted. The RMA number must always be clearly marked on all boxes, crates, and shipping documents. Bulk repairs (more than five items) will require additional processing time, so please take this into consideration when requesting an RMA number.

To accelerate the repair process, whenever possible, include a report detailing the reason for return with the unit(s). Also, please include the name and phone number of a person who can be contacted should our Repair department need further information.

When packing items being returned for repair, please ensure they are properly packed to avoid further damage. Plug-in cards should never be shipped while installed in a shelf; this will cause damage that can extend the repair period.

## **1.4 Teleline Warranty**

Subject to the provisions of this paragraph, Positron warrants that the equipment shall perform in accordance with Positron's specifications. The warranty remains valid for five (5) years from the date of shipment. The warranty fully covers workmanship, materials and labor. Positron shall, at its sole discretion, repair or replace the problem unit.

Freight costs to ship defective equipment to Positron are borne by the Customer, with return of replaced or repaired equipment to be at Positron's expense.

### **1.4.1 Limitation of Liability**

Subject to anything to the contrary contained herein, Positron's sole obligation and liability and the customer's sole remedy for Positron's negligence, breach of warranty, breach of contract or for any other liability in any way connected with or arising out of, the equipment or any services performed by Positron shall be as follows:

- In all situations involving performance or non-performance of the equipment or any component thereof, the customer's sole remedy shall be, at Positron's option, the repair or replacement of the equipment or said component.
- For any other claim in any other way related to the subject matter of any order under, the customer shall be entitled to recover actual and direct damages; provided that Positron's liability for damages for any cause whatsoever, and regardless of the form of the action, whether in contract or in tort (including negligence), shall be limited to the value of the order.

Positron shall not be obligated to repair or replace any item of the equipment which has been repaired by others, abused or improperly handled, improperly stored, altered or used with third party material or equipment, which material, or equipment may be defective, of poor quality or incompatible with the equipment supplied by Positron, and Positron shall not be obligated to repair or replace any component of the equipment which has not been installed according to Positron specifications.

IN NO EVENT SHALL POSITRON BE LIABLE FOR ANY INDIRECT, INCIDENTAL, SPECIAL, CONSEQUENTIAL, PUNITIVE, EXEMPLARY OR SIMILAR OR ADDITIONAL DAMAGES INCURRED OR SUFFERED INCLUDING

LOSS OF PROFITS, LOSS OF REVENUES, LOSS OF DATA, LOSS OF BUSINESS INFORMATION, LOSS OF GOODWILL, LOSS OF EXPECTED SAVINGS OR BUSINESS INTERRUPTION ARISING OUT OF OR IN CONNECTION WITH THE EQUIPMENT, A PURCHASE ORDER, SUPPLIES, MAINTENANCE SERVICES OR OTHER SERVICES FURNISHED HEREUNDER, EVEN IF POSITRON HAS BEEN ADVISED OR IS AWARE OF THE POSSIBILITY OF SUCH DAMAGES.

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#### **1.4.2 Cancellation and Rescheduling Charges**

Should the customer cancel, prior to shipment, any part of an order, the customer agrees to pay to Positron cancellation charges, not as a penalty, which shall total all expenses, including labor expenses, incurred by Positron prior to said cancellation. Equipment that has been specially developed for the customer's specific applications shall not be subject to cancellation. Cancellation or rescheduling is not permissible after shipment of the System.



# **Chapter 2**

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## **Overview**

## 2.1 Introduction to the Plug-in Power Supply Card

The Plug-in Power Supply Card, model 751316, is powered from a 48 Vdc source and provides -24 Vdc power to the Five-card Shelf, model 751112, or the Eight-card Shelf, model 751109. The card has a floating input, and does not ground the station batteries. It also offers the possibility of recharging the Plug-in Battery Backup Card, model 751312.

If the Plug-in Battery Backup Card is not used, then two Plug-in Power Supply Cards may be installed in the Five or Eight-card Teleline shelf for redundancy. Each card is capable of providing the power required by a fully loaded shelf. When two cards are available, the load is shared by the two cards. If one of them fails, the other one takes over the full load without interruption of power.

### NOTE

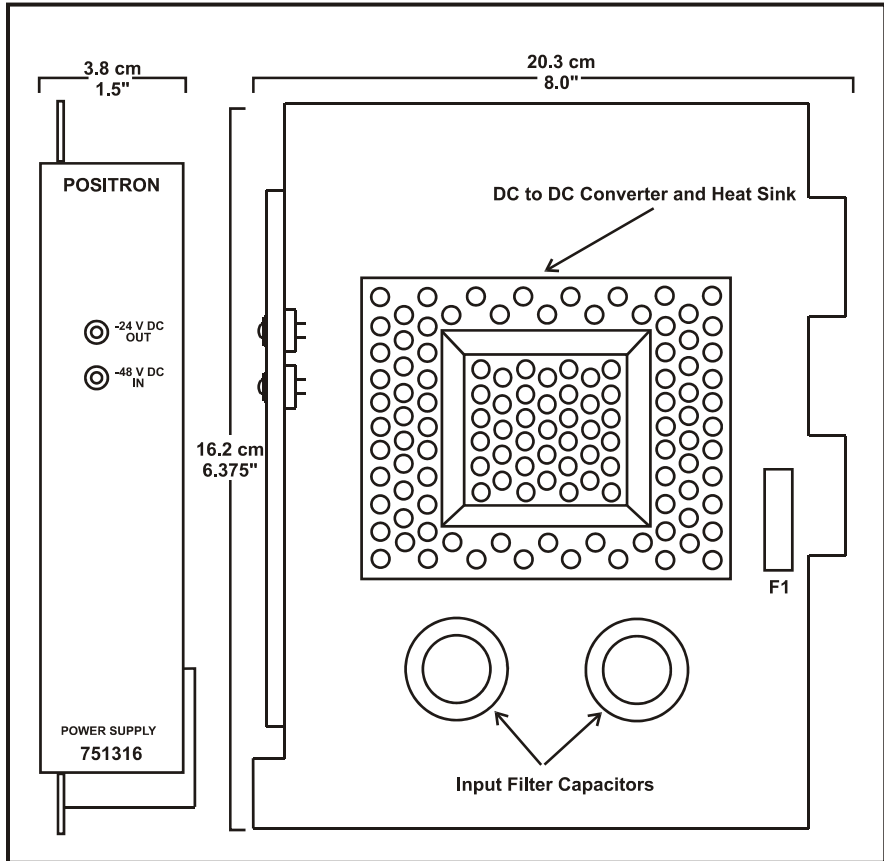
- With the two-card configuration, 2 to 5% more power is dissipated due to the reduced efficiency of the Power Supply Cards at lower loads. However, two cards will deliver more power to the load (27 V instead of 25 or 26 V).

Its features include the following:

- The card is thermally protected. In case of overloading, the Power Supply Card will stop when too high a temperature is reached and will restart once it cools off.
- The card allows for redundancy if two are connected in the shelf. If one card fails, the other takes over the full load.
- The card can be used in conjunction with the Plug-in Battery Backup Card, model 751312, to provide an uninterruptible power supply when operating from a 48 Vdc source that can be interrupted.
- A “Power In” LED and a “Power Out” LED allow easy assessment of power supply functionality.

For a view of the Plug-in Power Supply Card, see Figure 1 on page 15.

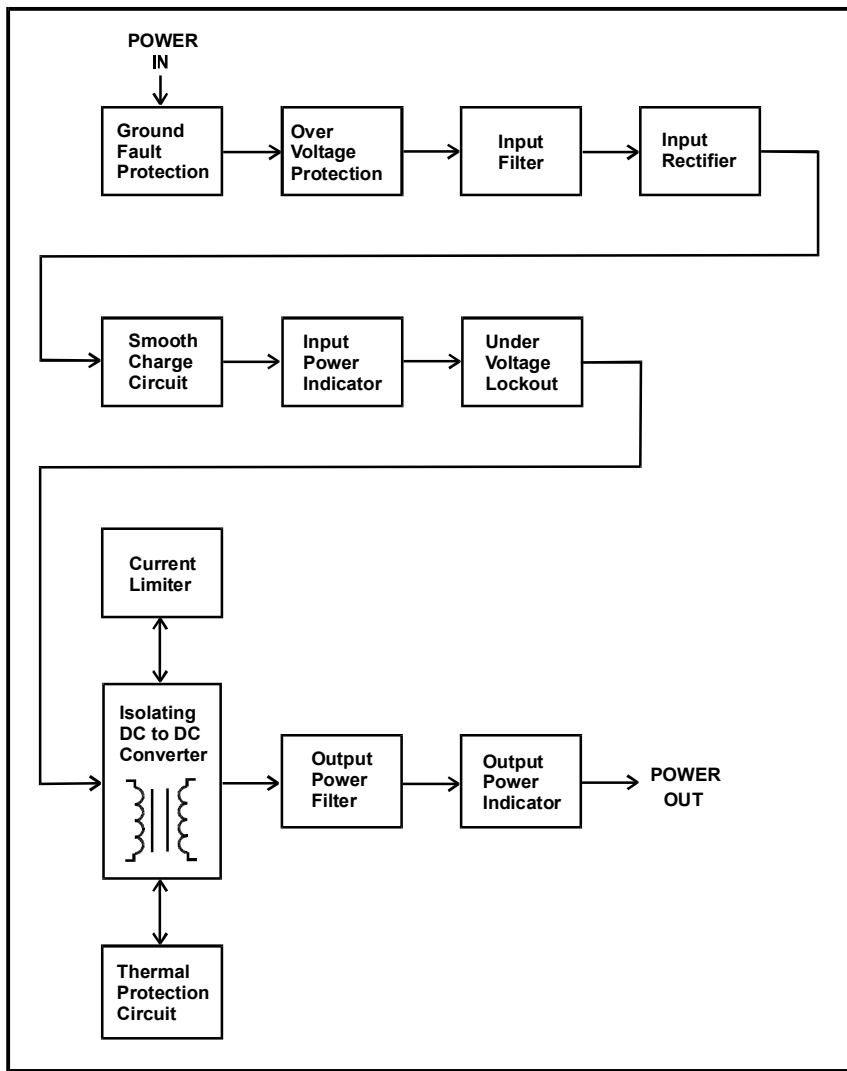
Figure 1: Model 751316 Component List



## 2.2 Hardware Description

For the card's block diagram, see Figure 2.

Figure 2: Model 751316 Block Diagram





## 2.2.1 Plug-in Power Supply Elements

The following is a description of the elements of the Plug-in Power Supply Card block diagram.

### 2.2.1.1 Power Input

The Power Input requirement for the Power Supply Card is 42 to 56 Vdc, at 2 A dc.

### 2.2.1.2 Ground Fault Protection

The Ground Fault Protection consists of fuse F1, and is designed to protect the power supply from severe station and Utility ground faults. Moreover, it protects floating input against common mode above 250 V<sub>rms</sub> using a varistor.

#### **WARNING**

- Fuse F1 is not user-replaceable. If damaged, return the unit to Positron for repair.

### 2.2.1.3 Over Voltage Protection

The Over Voltage Protection circuit is designed to blow the shelf's fuse in the event of a sustained overvoltage condition of 60 Vdc. Under such condition, the circuit momentarily shorts the input power lines together, thereby blowing the shelf's fuse.

### 2.2.1.4 Input Filter

The Input Filter smooths out the power input and prevents common mode noise from the power supply's switching circuitry from being introduced onto the power lines.

### 2.2.1.5 Input Rectifier

The Input Rectifier protects against polarity reversals.

### 2.2.1.6 Smooth Charge Circuit

The Smooth Charge Circuit protects the DC to DC converter from the large and potentially damaging current surges arising from the charging of the power filter capacitors on power-up.

**2.2.1.7 Input Power Indicator**

The Input Power Indicator (green LED) illuminates upon the presence of the minimum required input voltage of 42 Vdc.

For a view of the possible LED status indications, refer to Table 1 on page 19.

**2.2.1.8 Under Voltage Lockout**

The Under Voltage Lockout circuit shuts off the DC to DC converter if the input voltage falls below 42 Vdc. This is intended to extend the life of the converter.

**2.2.1.9 Current Limiter**

The Current Limiter (actually part of the DC to DC Converter) limits the output current to 2.5 A maximum.

**2.2.1.10 Isolating DC to DC Converter**

The Isolating DC to DC Converter converts a DC input of 42 to 60 Vdc to 27 Vdc  $\pm$  0.3 Vdc, and also provides insulation between input and output up to 250 V<sub>rms</sub>.

**2.2.1.11 Thermal Protection Circuit**

The Thermal Protection Circuit shuts down the Power Supply Card when the heat sink temperature exceeds 75°C (167°F), and reactivates it when the temperature falls to 70°C (158°F). This prevents the DC to DC Converter from overheating.

**2.2.1.12 Output Power Filter**

The Output Power Filter reduces to an acceptable level any switching noise from the Power Supply Card.

**2.2.1.13 Output Power Indicator**

The Output Power Indicator (a yellow LED) illuminates at -20 Vdc, indicating that output power is available.

For a view of the possible LED status indications, refer to Table 1 on page 19.

### 2.2.1.14 Power Output

The Power Output of the card is 2.5 A at -27 Vdc.

**Table 1: Battery Status LED Indications**

<b>Input LED (Green)</b>	<b>Output LED (Yellow)</b>	<b>Power Supply Card Status</b>
ON	ON	Both input and output power are available (normal condition)
ON	OFF	Input power is present but output power is not available, the output LED circuitry is not functioning, or the output voltage has been short-circuited.
OFF	ON	Both input and output power are available, but the input LED circuitry requires servicing by Positron.
OFF	OFF	Input power is not present, or a Battery Backup Card, model 751312, is powering the shelf (in which case the indicator on the right-hand side of the shelf should be lit)

## 2.3 Technical Specifications

**Table 2: Model 751316 Electrical Specifications**

(measured at 25°C or 77°F, 50% R.H.)

Parameter	Specifications
Input DC voltage	42 to 60 Vdc
Output DC voltage	-28 Vdc $\pm$ 3 Vdc (factory set to -27 Vdc)
Maximum output current	2.5 A at -27 Vdc
Maximum output power	75 W, derated at 0.344 W/°F (0.62 W/°C) above 113°F (45°C)
Power dissipation	25% of power to load, or 20% of input power
Output ripple voltage (120 Hz)	Less than 75 mV <sub>pp</sub>
Switching noise	Less than 0.2 V <sub>pp</sub>
Efficiency	80%
Load regulation	Better than 1%
Line regulation	Better than 0.1%
Overvoltage protection	60 Vdc
Thermal shutdown	75°C (167°F)
Soft start	2 A maximum

**Table 3: Model 751316 Physical Specifications**


Parameter	Specifications
Operating temperature range	-20°C to +65°C (-4°F to +149°F)
Height	16.2 cm (6.375")
Width	3.8 cm 1.5"
Depth	20.3 cm (8.0")
Weight	1.0 kg (2.2 lbs)

# **Chapter 3**

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## **Installation**

## 3.1 Installation

 <p><b>ATTENTION</b> ELECTROSTATIC SENSITIVE DEVICES HANDLE ONLY AT STATIC SAFE WORKSTATION</p>	<p style="text-align: center;"><b>ESD Precaution</b> INCORRECT HANDLING MAY VOID WARRANTY</p> <p>These procedures must be followed when handling an electrostatic sensitive device.</p> <ul style="list-style-type: none"><li>• A grounded wrist strap must be worn at all times during installation.</li><li>• When unpacking, place the antistatic bag containing the device on an electrostatic discharge (ESD) safe surface. An ESD safe surface is a conductive surface connected directly to an earth ground.</li><li>• When moving, carry the device in an ESD safe container or the antistatic bag, provided with the device.</li></ul>
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The Plug-in Power Supply Card plugs into its upper left-hand location on the 5- or 8-card Teleline Shelf.

**NOTE**

- When using an internal or an external power supply as part of a Teleline installation, the power leads feeding the shelf **MUST** be fed through disconnect devices rated at 3 A, 125 Vac.

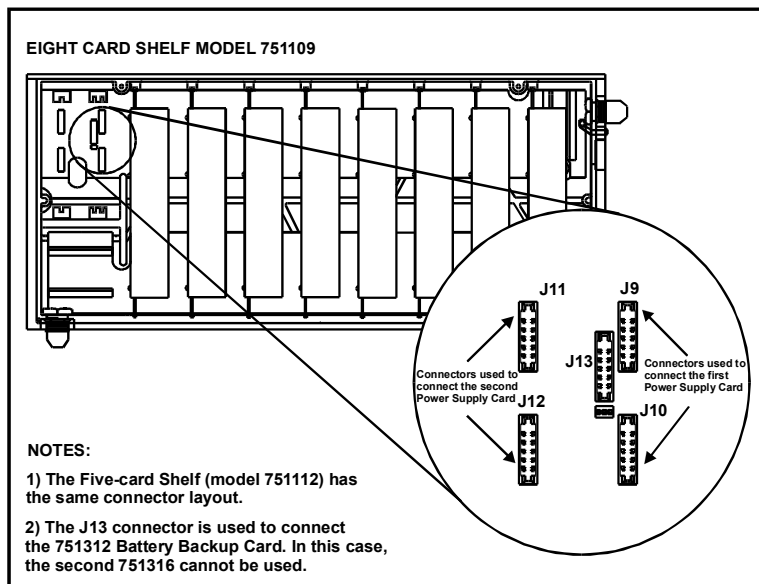
**CAUTION**

- Stand on a thick rubber mat and wear rubber gloves during the installation procedures. It is preferable to perform these procedures on a clear dry day when a Ground Potential Rise (GPR) or transients are less likely to occur.
- Grounding of the card is done through the shelf. See the grounding section of the shelf's installation manual for more information.

► To install the Power Supply Card:

1. Unpack the card from its protective box and anti-static bag.
2. Confirm that the unit is a Power Supply Card by identifying the name and model number on the faceplate of the card.
3. Install the five or eight card Teline shelf power cable as per its installation instructions. Refer to the Description and Installation documentation or the Five card shelf model 751112 or eight card shelf model 751109
4. The card must be inserted rightside up and may be plugged into the shelf with the power ON or OFF.
5. Slide the card into its designated shelf slot until the two card-edge connectors lock into the Teline shelf. For an illustration of its installation location, see Figure 3 below.

**Figure 3: Model 751312 Installation Location in Shelf**



Choose an installation option for the Power Supply Card from Table 4 below.

**Table 4: Installation Options**

<b>Option</b>	<b>Station Side Slot Connectors</b>
Single: one Power Supply Card	J9/J10
Redundant: two Power Supply Cards (Only possible if the Plug-in Battery Backup Card, model 751312, is not used.)	J9/J10 (primary card) and J11/J12 (second card)

6. If the redundant option is required, repeat step 5 and install the second Power Supply Card
7. Verify the installation by verifying that the “Power In” and the “Power Out” LEDs of the card, and the “Power Out” LED of the shelf are all lit.



# **Appendix A**

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## **Acronyms**

## **Acronyms**

<b>CSA</b>	Canadian Standards Association
<b>FCC</b>	Federal Communications Commission
<b>GND</b>	Ground
<b>GPR</b>	Ground Potential Rise
<b>HVI</b>	High-Voltage Interface
<b>LED</b>	Light-Emitting Diode
<b>PCB</b>	Printed Circuit Board
<b>RMA</b>	Returned Material Authorization
<b>RTU</b>	Remote Termination Unit
<b>SLA</b>	Sealed Lead-Acid Batteries
<b>UL</b>	Underwriter's Laboratories
<b>VRLA</b>	Valve Regulated Lead Acid Batteries