

# Teleline™

## Standalone Enhanced T1 with Span Power model 751228SP Description and Installation Guide

925W751053-01E





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# **Chapter 1**

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## **General Information**

## 1.1 Publication Information

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**Teleline Standalone Enhanced T1 with Span Power model 751228SP  
Description and Installation Guide**

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## 1.2 About this Guide

This guide introduces you to the Teleline Standalone Enhanced T1 with Span Power model 751228SP, its features and applications. 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 (TCS) at 1-888-577-5254 (US and Canada) or at 1-514-345-2220 (International).

### 1.3.3 Customer Training

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



### 1.3.4 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

The Teleline Standalone Enhanced T1 with Span Power model 751228SP provides high voltage isolation between an incoming 4-wire T1 carrier line and a data transmitting and receiving device located in the substation.

Model 751228SP is an enhanced T1 unit with span power providing power to the Network Interface Unit (NIU) through the Station side of the standalone unit. Its enhancement also consists of more effective use of SMT components for increased reliability and greater MTBF. With the Standalone span power unit, the T1 circuit NIU can be located where required, providing -48 Vdc at 60 mA to the NIU.

### NOTE

- Model **751228** has been manufacture discontinued and is replaced by the new enhanced T1 unit.
- This unit isolates a legacy T1 circuit. It is NOT compatible with T1 over HDSL circuits. To isolate T1 over HDSL, the Teleline Standalone 4-wire HDSL model 751239SP is required.

A standalone unit consists of an isolation card mounted inside a compact enclosure. The enclosure is molded from fiberglass, making it a lightweight and flame-retardant container of high-dielectric strength. The fiberglass body limits the possibility of many kinds of infiltration while providing reliable isolation from external ground potentials.

The standalone unit is shipped with an installation kit that includes a 12-conductor (6-pair) cable for connection to the Central Office (CO) incoming cable, and mounting hardware.

### 2.1.1 Features

Features for model 751228SP include the following:

- The unit is suitable for transmission at frequencies up to 5 MHz provided the data line is conditioned for operation.
- Isolation of 50 kV<sub>rms</sub> (70 kV peak) while maintaining full communication between terminals.

- Communication maintained across the gap by isolation transformers that provide low-loss low-distortion transmission.
- The card can be passive and does not require power to operate, except when the span power option is required.
- Operates from -48 Vdc supplied by an integrated, multi-input power supply
  - When operating from a -24 Vdc source, the power supply is polarity-sensitive
  - When operating from 42 Vdc to 130 Vdc, or from a 120 Vac source, the power supply is NOT polarity-sensitive.
- Simplex current termination is provided on the CO side. The current will not be transferred to the Station side.
- The enclosure resists the infiltration of dust, mist and water from sprinklers.

**Figure 1: Standalone Enhanced T1 model 751228SP**

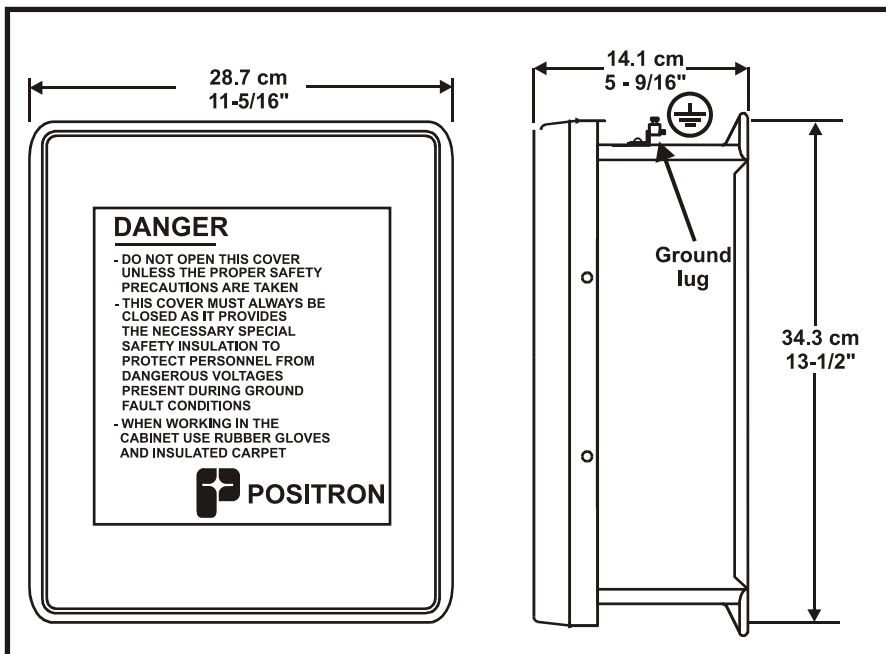
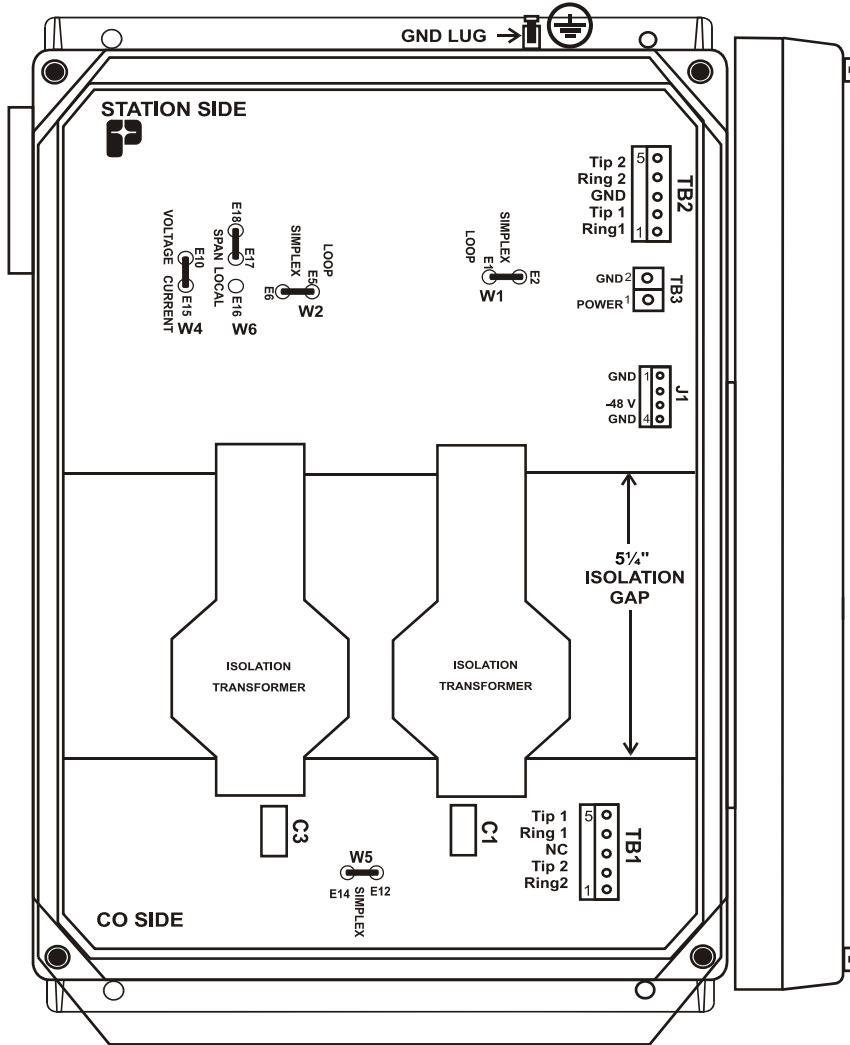


Figure 2: Model 751228SP Component Layout without Power Supply Piggyback (only major components shown)

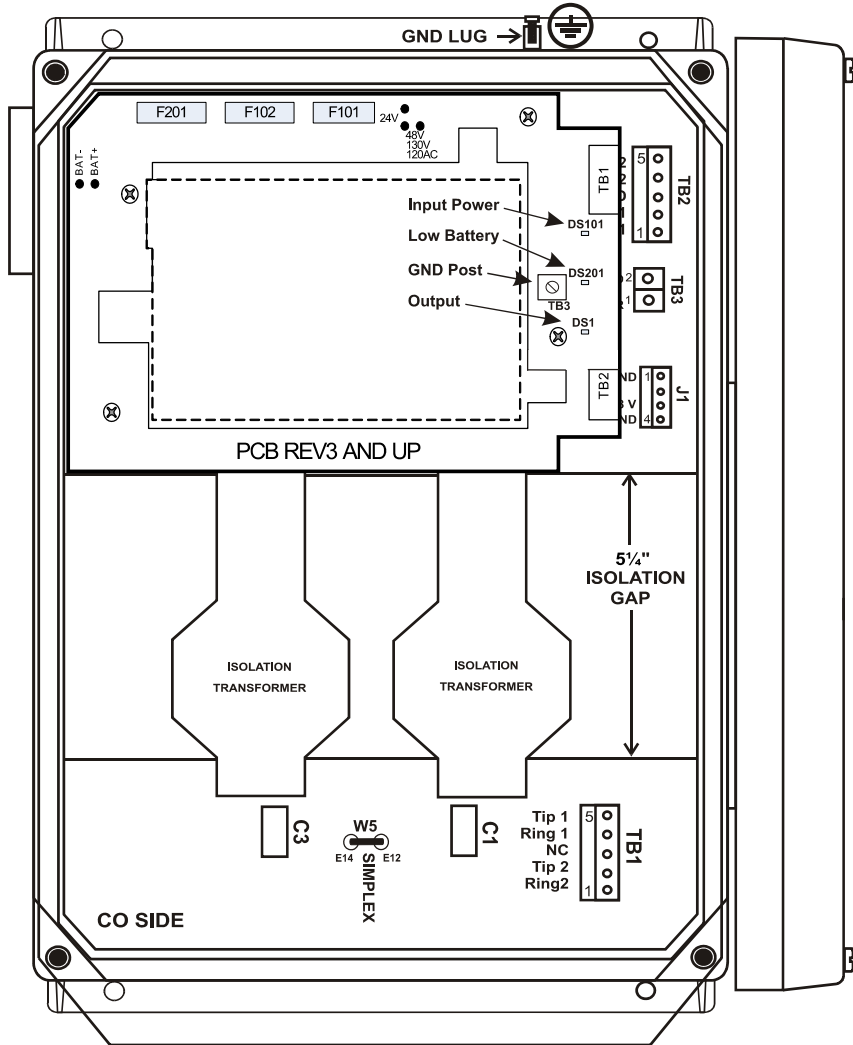


**NOTE**

- The layout shown above illustrates the default jumper settings for model 751228SP.
- This unit must be set in Simplex mode.



Figure 3: Model 751228SP Component Layout with Power Supply Piggyback (only major components shown)

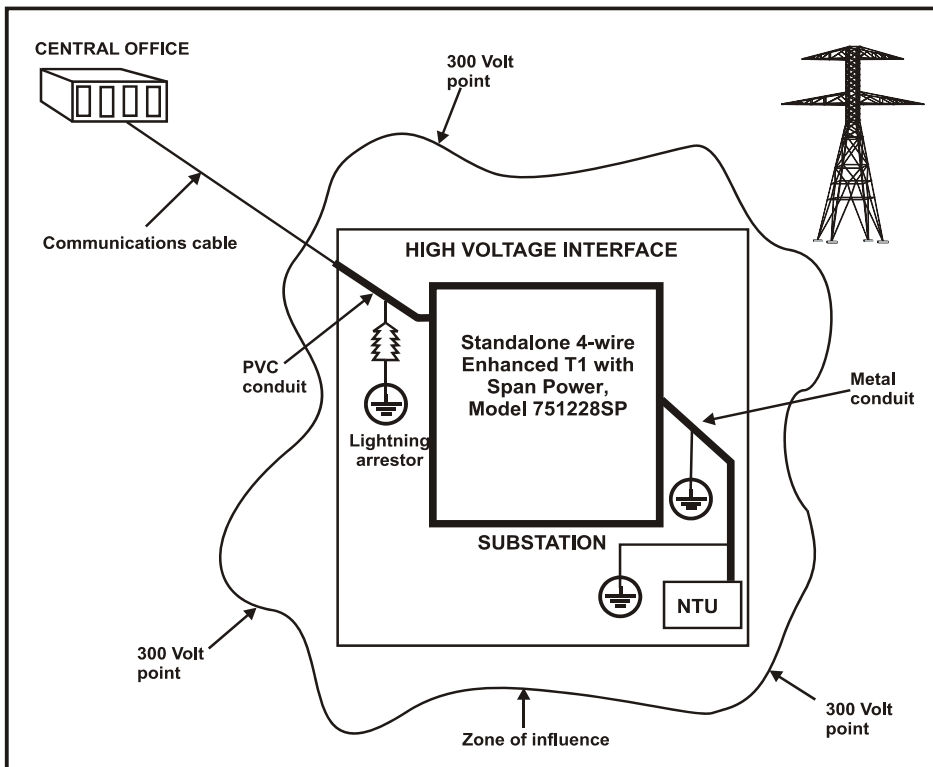


## 2.2 Applications

The applications of the Standalone Enhanced T1 model 751228SP unit include the following:

- T1 Carrier (1.544 Mb/s)
- E1 Carrier (2.048 Mb/s)
- Compatible with pure ADSL, ADSL2, ADSL2+ when NO telephone circuit is present

**Figure 4: High Voltage Interface**



**NOTE**

- When using model 751228SP with a power source, the NTU can be span powered and does not require local powering.

## 2.3 Hardware Description

The model 751228SP unit has two sides:

- The **Station side** is located on the upper portion of the unit.
- The **CO side** is located on the lower portion of the unit.

The isolation transformers separate the Station side from the CO side, creating a 14 cm (5¼") isolation gap.

- When W6 is set to **Local**, both transformer center taps are grounded.
- When W6 is set to **Span**, station side, the NIU's RX pair (Tip1 & Ring1) center tap is grounded, the NIU's TX pair (Tip2 & Ring2) center tap is connected to -48 Vdc via a 60 mA current source.

On the CO side, the TX and RX pair center taps are connected with an effective 200 ohm impedance to allow simplex current to flow across the pairs.

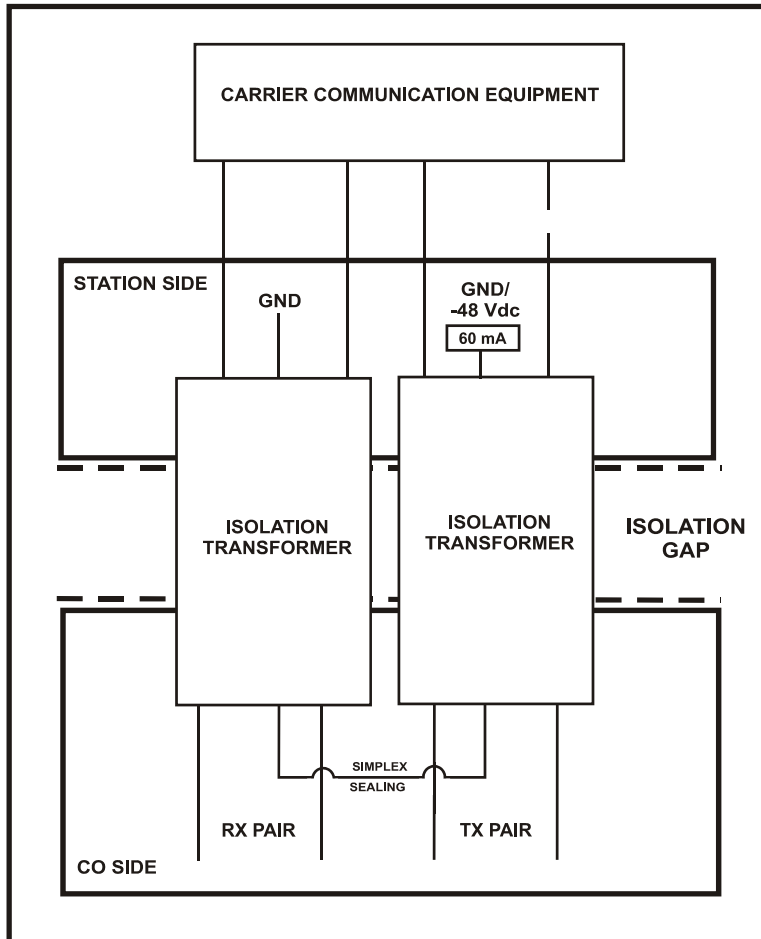
### 2.3.1 Power Supply LED Description

The Power Supply piggyback has three LEDs to facilitate troubleshooting of the unit. The LEDs are shown in Figure 3 on page 17. For a description of the LEDs see the table below.

**Table 1: LED Functions**

	State	Description
Input LED	OFF	No input power or input fuses damaged
	YELLOW	Input power present
Output LED	OFF	No output voltage
	GREEN	Output voltage present
Low Battery	OFF	With Input LED ON, means battery charged and normal operation With Input LED OFF, means operating from battery, battery charged
	OUTPUT GREEN	
	RED	With Input LED ON, means battery charging from input With Input LED OFF, means operating from battery, battery low and failure is approaching
	OUTPUT GREEN	
Low Battery	OFF	With Input LED Yellow, means defective unit
	OUTPUT OFF	With Input OFF means battery fully discharged
	RED	With Input LED Yellow, means defective unit
	OUTPUT OFF	With Input OFF means battery fully discharged

Figure 5: Block Diagram



## 2.4 Technical Specifications

**Table 2: Electrical Specifications for 751228SP**

(measured at 25°C or 77°F, 55% R.H.)

	Parameter	Specification
<b>Isolation Data:</b>	Isolation Resistance	100,000 MΩ
	Metallic Surge	1.5 kV maximum
	Insulation Voltage	50 kV <sub>rms</sub>
<b>Input Voltage:</b>	WITH Power Supply Installed	24 Vdc, 48 Vdc, 130Vdc or 120 Vac
	WITHOUT Power Supply Installed	-48 Vdc
<b>Transmission Data:</b>	Longitudinal Balance (CO side)	> 80 dB at 60 Hz
	Return Loss	> 25 dB, at 350 kHz
	Insertion Loss	< 1.0 dB at 350 kHz
<b>Signal:</b>	Frequency Response in 120 Ohms	-3 dB, 2.5 kHz to 5 MHz
	Total Harmonic Distortion at 22 dBm, 10 kHz	< 40 dB
<b>Power:</b> <b>(With Typical span-powered NTU:)</b>	Power Consumption	3 W
	Power Dissipation	2.5 W
	NOTE: WHEN CHARGING THE BATTERY: add 8 W to power dissipation and 13 W to power consumption	

**Table 3: Physical Specifications for 751228SP**

Parameter	Specification
Operating Temperature Range	
Without Battery	-20°C to 65°C (-4°F to 149°F)
With Battery	0°C to 40°C (32°F to 104°F)
Height	34.3 cm (13-1/2")
Width	28.7 cm (11-5/16")
Depth	14.1 cm (5-9/16")
Weight	4.1 kg (9.0 lbs)

# **Chapter 3**

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## **Installation**

## 3.1 Installation

**CAUTION**



- Stand on a thick rubber mat and wear rubber gloves during the installation procedure. Perform these procedures on a clear dry day when a Ground Potential Rise (GPR) or Transients are less likely to occur.
- When wiring a unit, keep the Station and CO cables at least 15.2 cm (6") apart to prevent an electric arc between the two, in the event of damage to or degradation of their insulation.

The Standalone 4-wire Enhanced T1 unit is used when the number of lines to be isolated does not justify the installation of a shelf. They will isolate one 4-wire T1 circuit (RX and TX).


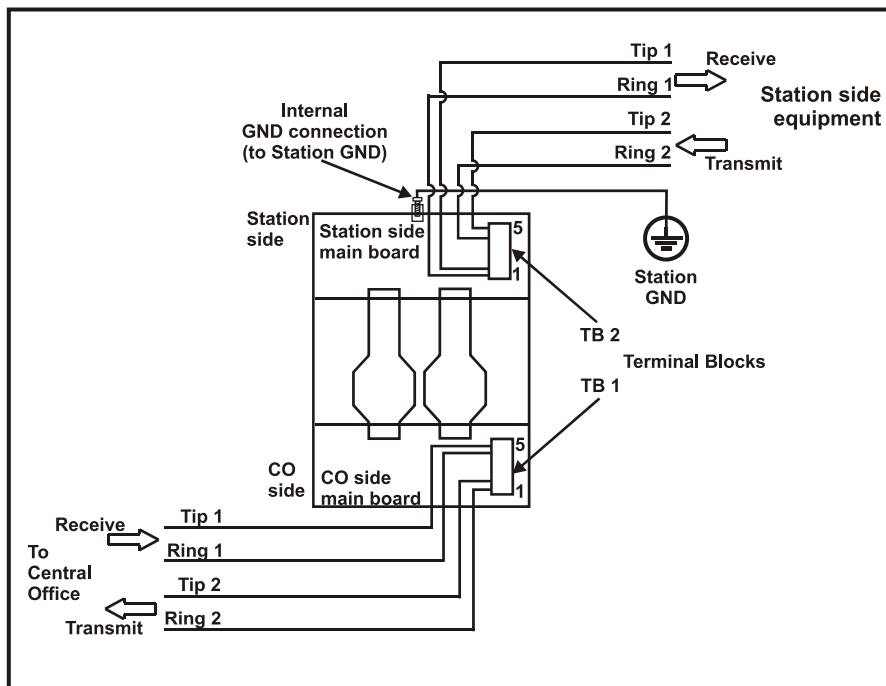
 <p><b>ATTENTION ELECTROSTATIC SENSITIVE DEVICES HANDLE ONLY AT STATIC SAFE WORKSTATION</b></p>	<p><b>ESD Precaution</b> <b>INCORRECT HANDLING MAY VOID WARRANTY</b></p>
	<p>These procedures must be followed when handling an electrostatic sensitive device.</p>
	<ul style="list-style-type: none"><li>• A 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>



Figure 6: Layout for model 751228SP



**CAUTION**

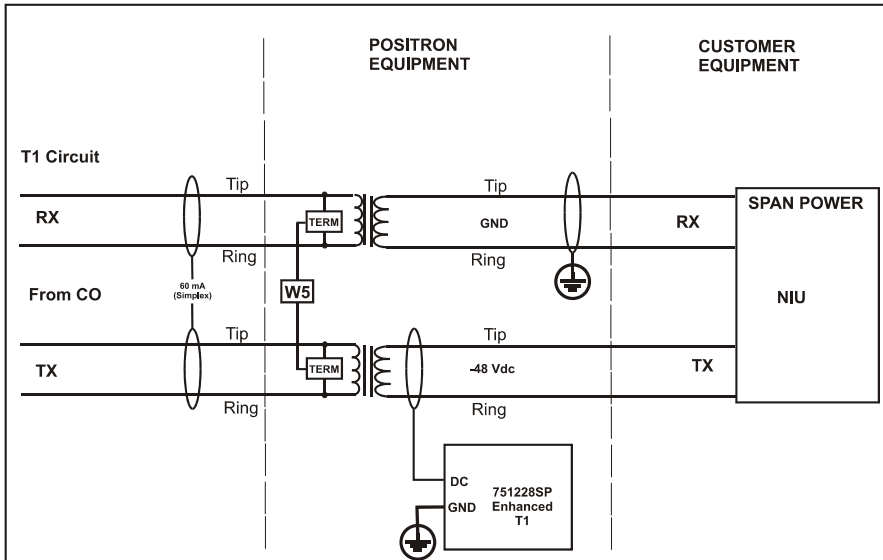


- Unit must be connected to the station ground by the ground lug connection using a #6AWG wire - green with yellow stripes.

**NOTE**

- Station side cable pairs are connected to the Station side terminal block.
- CO side cable pairs are connected to the CO side terminal block.

Figure 7: Setup for Model 751228SP Station Side Span Power



**► To Install a Standalone Unit**

1. Verify that you have the following customer-provided tools and hardware which are required to install the unit:
  - Station cable
  - Center punch
  - Electric drill with a 5/32" diameter bit
  - 7/16" hex wrench
  - 1/8" and 1/4" common blade screw drivers
  - Phillips screwdriver
  - 2.5 cm (1" thick) plywood backboard with appropriate mounting hardware
  - Cable clamps and mounting hardware for routing cables exterior to the shelf (quantity determined by the cable lengths involved)
2. Unpack the Standalone 4-wire T1 unit and its installation hardware from its protective box.
3. Check the contents of your Standalone 4-wire T1 unit kit. For kit content, see Table 4 on page 28 below.

**Table 4: Model 751228SP Installation Kit Contents**

<b>Description</b>	<b>Qty.</b>	<b>Part Number</b>
DESCRIPTION AND INSTALLATION GUIDE	1	925W751053 (this document)
CABLE, PWR SUP, 3 COND, 6 FT, GRAY	1	207-990000-020
CABLE, SHLD, SEALPIC, 6-PAIR, #22AWG	10 foot	207-990000-138
CABLE, 3X#18AWG, 300V, 60C, SJT PVC, BLACK	8 foot	207W000007-001
CON, CORD GRIP, HUB:1/2", BLK	1	230-990400-036
CON, CORD GRIP, HUB:1/2", BLK	1	230-990400-037
CON, CORD GRIP, HUB:1/2", BLK	1	230-990400-038
INSTRUCTION, STATION RELIEF:A	1	241-010016-001
SCREW, HEX W/WASHR, #14A X 1"L	4	724-990000-011
FASTENER, CABLE, NYL,.75" DIA.	5	706-990000-010
FUSE, 2A, 250VAC, FAST-ACTING, 5X20mm (Input)	2	294W000010-001
FUSE, 6.3A, 250VAC, SLO-BLO, 5X20mm (Battery)	1	294W000050-001

4. Confirm that the isolation unit is a model 751228SP unit by identifying the name located inside the cover, and the model number printed on a metallic label on the top right-hand portion of the unit.
5. Unfasten the unit's cover.
6. Insert jumpers according to your application. section 3.2 on page 33 for possible CO and Station side jumper settings.

The strain reliefs supplied each have a cable entry diameter appropriate for one of the three cables used in this installation. The CO cable strain relief is the largest, accommodating cable diameters from 0.40" to 0.56". (All measurements are outside cable diameters)

- The Station cable strain relief accepts cable diameters from 0.125" to 0.275".
  - The Power cable strain relief accommodates cables with diameters of 0.25" to 0.40".
7. Affix the three strain reliefs to the unit.

### 3.1.1 Installing the power supply

The Power Supply Piggyback board is not fastened to the main isolation card prior to shipment and requires installation.

8. If the unit will be powered from 24 V then set the jumper located near F101 to E104 - E105. If the unit is powered from 48 V, 130 V or 120 Vac, the jumper should be E105 - E106. For jumper settings refer to Figure 8 on page 32.
9. Run the T1(Station side) cable through the strain relief nearest the bottom of the enclosure to connector TB2.(See Figure 2 on page 16)
10. Remove the screws and lock washers from the standoff (spacers) mounted on the Station side circuit board.
11. Position the power supply board onto the spacers and align the board holes with the spacers. (See Figure 3 on page 17)
12. Secure the power supply to the standoffs using the four screws and lock washers.
13. Fasten the 1" thick plywood backboard to the wall.
14. Position the enclosure on the backboard with the air vent facing down or to the left, and mount it to the backboard using the four screws supplied.

### 3.1.2 Ground Connections

#### CAUTION



- The equipment ground must be connected before any other connection is made to the unit.
- Installations must conform to local electrical code.
- All units must be permanently connected to earth.
- There shall be no switching or disconnecting devices in the earthed circuit conductor between the unit and the earthing electrode conductor.

15. Connect the ground cable inside the unit to connector TB3 on the power supply. (See Figure 3 on page 17)
16. Connect the ground lug on the outside of the unit to Station ground using a #6 AWG stranded wire.

17. Using the supplied cable connect the power supply's output connector TB2 to J1 on the main isolation card. Refer to Figure 2 on page 16.

To prevent discharge during shipping, the power supply unit is shipped with both leads of the battery disconnected.

18. Route the power to the unit using one of the power cables provided with the kit. If powering the unit from 120 Vac, use the AC cable (with the prong plug) and if powering from DC (24 Vdc, 48 Vdc or 130 Vdc) use the unterminated cable. **MAKE SURE YOU HAVE SET THE INPUT JUMPER CORRECTLY** (see step 8) Refer to Figure 8 on page 32 for connections.

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**NOTE**

The Station side of the enclosure is the side connected to the external ground lug. Mount the unit with the air vent facing the bottom or left.

19. Make sure that there are no excess wires dangling into the 14 cm (5-1/2") isolation gap between the Station and CO side circuits inside the enclosure. If necessary, bundle the individual cable conductors with tie wraps to prevent them intruding into the isolation gap.
20. Route the Black PIC CO cable, and the Grey Station cable through the strain reliefs, allowing a length of 13 cm (5") per cable for the internal connections to the terminal blocks. Cut the excess wire once the exact internal length is established, and tighten the strain reliefs.
21. Strip back the outer jacket of each cable to a length of 2.5 cm (1"). Strip the inner insulating jacket of each conductor to a length of 3.2 mm (1/8)". Connect these stripped conductors to the designated terminal locations.
  - To locate connectors, see Figure 2 on page 16.
22. For a listing of terminal block connections, see Table 5 on page 31.

### 3.1.3 Connections

**Table 5: Model 751228SP Terminal Block Connections**

Cable	Signal	Color Coding	Connector Position
<b>Station</b>	Tip 1	Customer Determined	TB2-2
	Ring1	Customer Determined	TB2-1
	Tip 2	Customer Determined	TB2-5 On Main PCB
	Ring 2	Customer Determined	TB2-4
	Station Gnd	Customer Determined	TB2-3
<b>CO</b>	Tip 1	Any of the 12 conductors	TB1-5
	Ring1		TB1-4
	Tip 2		TB1-2 On Main PCB
	Ring 2		TB1-1
	Not Connected		TB1-3
<b>Power</b>	Live	Black	TB1-1
	Neutral	White	TB1-3 On Power Supply
	Ground	Green	TB1- 2

23. Bundle the cable conductors using the cable guide provided.

**CAUTION**



- Connect the ground lug to station ground, using a #6 AWG stranded wire.
- Ground wire should be Green with a Yellow stripe.

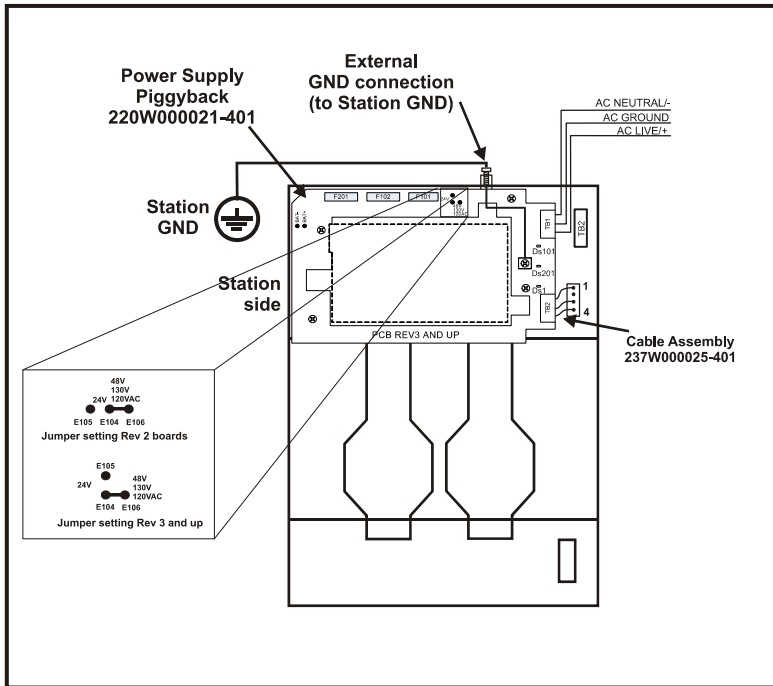
24. Ensure that there are no excess wires dangling into the isolation gap between the Station and CO side circuits.

25. Close and secure the shelf cover with the captive screws.

26. Connect the red battery cable to the red cable from the PCB and connect the black battery cable to the black cable from the PCB.

27. Verify the Power Supply Piggyback LED statuses as shown in Table 1 on page 20.

Figure 8: Power Supply connections and jumper settings





► **To verify the installation of a standalone unit:**

1. On the CO side, loopback the TX pair into the RX pair at the demarcation block.
2. On the Station side, using the Bit Error Rate Test unit, verify data transmission between the TX pair and RX pair at the punch block.

## 3.2 Settings

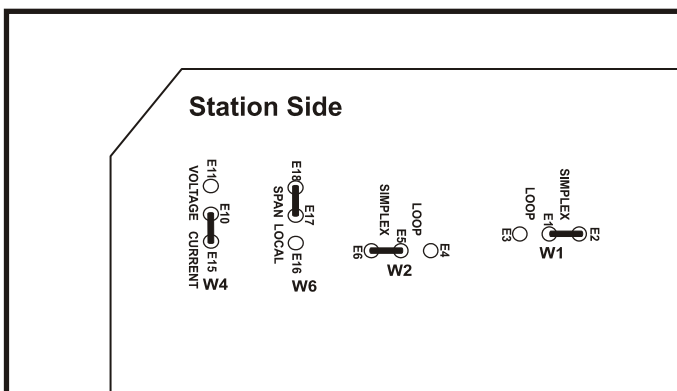
The Station side default jumper positions for the 751228SP are as follows (refer to the figure below):

- W1 pins (E1-E2)
- W2 pins (E5-E6)
- W4 pins (E10-E15)
- W6 pins (E17-E18)

The CO side jumper position for the 751228SP is:

- W5 pins (E12-E14)

**Figure 9: Station Side Jumper Settings for Model 751228SP**



## 3.3 Maintenance

NOTE

- Before maintenance, disconnect telecom lines on all cards being serviced in the CO splice case and on the station punch block. If not possible, stand on a thick rubber mat and wear gloves during maintenance. It is preferable to perform these procedures on a clear, dry day when a GPR (Ground Potential Rise) or transients are less likely to occur.

## 3.4 Battery replacement procedure

After its expected life of 5 years, the battery will need to be replaced.

### 3.4.1 Replacement Batteries

The battery has to be UL approved with a UL94V rated casing. The following sources are approved to be used as replacement:

- Power Sonic #PS1221S
- EnerSys #NP2-12FR
- Yuasa #NP2-12
- MK Battery #ES2-12SLM

### 3.4.2 Replacement procedure

1. Disconnect input power to the unit.
2. Disconnect the output cable of the power supply from the mainboard underneath.
3. Disconnect the black & red wires of the battery from the black and red wires of the PCB.
4. Remove the screws holding the Power Supply piggyback to the spacers, put the screws and lock washers aside.
5. Remove the Power Supply piggyback from the unit.
6. Remove the screws, lock washers and nuts (if applicable) holding the battery bracket (see Figure 3 on page 17), put them aside.
7. Remove the old battery from the power supply.

#### **NOTE**

- The power supply batteries contain lead and should be disposed of at a government approved site.
8. Move the wires from the old battery to the new battery. Be sure to install the black wire to the “-” and the red wire to the “+” of the new battery.

9. Install the new battery on the Power Supply piggyback in the same orientation as before (battery posts near the PCB wires location).
10. Put the battery holding bracket onto the battery and secure it using the screws, lock washers and nuts (if applicable).
11. Install the Power Supply piggyback into the unit, aligning it with the spacers from the mainboard underneath.
12. Secure the Power Supply piggyback using the four screws and lock washers.
13. Connect the output cable of the power supply to the connector of the telephone card underneath.
14. Connect the red wire from the battery to the red wire from the PCB (+) and the black wire from the battery to the black wire from the PCB (-).

**NOTE**

- Should the polarity of the battery be reversed when connection is made to the leads on the PCB, the fuse F201 of the Power Supply piggyback will blow to protect the Power Supply circuit. If this happens, correct the polarity of the red and black wires and replace the fuse using the spare fuse in the kit.

15. Connect the input power back to the unit.

**NOTE**

- The new battery might be partially discharged when you install it, leave it to charge for a couple of hours before verifying the LED statuses.
16. Verify the LEDs statuses using step 24 in the installation procedure on Table 1 on page 20.
  17. Reconnect the input power to the unit.
  18. Close and secure the cover.

# **Appendix A**

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## **Acronyms**

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<b>AWG</b>	American Wire Gauge
<b>CO</b>	Central Office
<b>CSA</b>	Canadian Standards Association
<b>CT</b>	Center Tap
<b>DTU</b>	Data Terminal Unit
<b>FCC</b>	Federal Communications Commission
<b>GND</b>	Ground
<b>GPR</b>	Ground Potential Rise
<b>MTBF</b>	Mean Time Between Failures
<b>NIU</b>	Network Interface Unit
<b>NTE</b>	Network Terminating Equipment
<b>NTU</b>	Network Terminating Unit
<b>RMA</b>	Return Material Authorization
<b>RMT</b>	Remote
<b>RX</b>	Receive
<b>SMT</b>	Surface Mount Technology
<b>TX</b>	Transmit
<b>UL</b>	Underwriters Laboratory