Teleline Isolator™

Non-Fragmenting Lightning Arrestor Unit with See-Through Door model 751126/1 & 751126/2 Description and Installation Guide

925W751050-02E

POSITRON

Positron Inc.

Contents

Chapter 1

General Information

1.1 Publication Information

Non-Fragmenting Lightning Arrestor Unit with See-Through Door model 751126/1 & 751126/2 Description and Installation Guide
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1.2 About this Guide

This guide introduces you to the Teleline Non-Fragmenting Lightning Arrestor Unit with See-Through Door model 751126/1 & 751126/2, and describes how to install it. 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.

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

1.3 Service and Support

1.3.1 Positron Contact Information

General information:	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: info@positronpower.com Website: www.positronpower.com
Customer Service and Repairs:	US and Canada: 1-888-577-5254 International: 1-514-345-2220 E-mail: customerservice@positronpower.com

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 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.

EXCEPT AS EXPRESSLY SET FORTH IN THIS AGREEMENT, POSITRON DISCLAIMS ANY FURTHER CONDITIONS, REPRESENTATIONS OR WARRANTIES, WHETHER WRITTEN OR ORAL, EXPRESSED OR IMPLIED, INCLUDING THE CONDITIONS AND WARRANTIES OF MERCHANTABILITY, MERCHANTABLE QUALITY, FITNESS FOR A PARTICULAR PURPOSE, TITLE, PERFORMANCE AND THOSE ARISING FROM STATUTE, TO THE EXTENT PERMITTED BY LAW. POSITRON DOES NOT WARRANT THAT THE SYSTEM WILL OPERATE WITHOUT INTERRUPTION OR THAT IT WILL BE ERROR FREE.

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

Overview

2.1 Introduction

The Teleline Non-Fragmenting Lightning Arrestor Unit with See-Through Door model 751126/1 & 751126/2 guards against the very high potential difference that may develop between a Central Office (CO) incoming cable sheath and station ground due to a lightning strike or Ground Potential Rise (GPR). In the event of an over voltage, the arrestor limits the voltage between the sheath and station ground to its breakdown voltage.

The unit consists of the non-fragmenting lightning arrestor, in a small, compact enclosure. The enclosure is molded from fiberglass, making it a lightweight, flame retardant product of high dielectric strength. Its fiberglass body limits the possibility of many kinds of infiltration (of dust, mist, and water from sprinklers) while providing reliable isolation from external ground potentials.

The unit's scratch-resistant polycarbonate window allows easy assessment of the arrestor's state. In the event of an arrestor failure, the core's polymer housing does not fragment as a porcelain housing would, resulting in less danger to adjacent personnel and equipment.

The unit is lightweight, and installs easily between the CO incoming cable and a Teleline Isolator shelf (or shelves).The unit is a 15 kV arrestor and is recommended where the incoming cable is a Polyolefin Insulated Cable (PIC) having a high breakdown voltage.

For a view of the Non-Fragmenting Lightning Arrestor Unit, refer to Figure 1 on page 15.

NOTE

- The lightning arrestor unit is intended to complement the protection provided by Teleline Isolator shelves by preventing surge voltages from rising higher than the rated voltage of the Teleline modules. Positron strongly recommends that a lightning arrestor be used on every incoming CO cable.

Figure 1: Model 751126/1 & 751126/2 Cover Closed

CAUTION

- There can be hazardous voltages on CO dedicated cable, lightning arrester. Do not touch unless proper precautions are taken including wearing rubber gloves and standing on a rubber mat.

2.2 Technical Specifications

Table 1: Electrical Specifications (measured at 25°C or 77°F, 50% R.H.)

Parameter	Specification
Rated Voltage	15 kV

Table 2: Physical Specifications

Parameter	Specification
Operating Temperature Range	-20°C to 65°C (-4°F to 149°F)
Height	49.2 cm (19.4”)
Width	44.1 cm (17.4”)
Depth	24.5 cm (9.6")
Weight	7.9 kg (17.4 lbs)

2.3 Manufacturer’s Technical Specifications for Arrestor Core

The tables below outline the specifications of the manufacturer.

NOTE

- The manufacturer’s specifications given below are subject to change without notice.

Table 3: Fault Current Withstand Ratings

Current Magnitude (Amps-Sym rms)	Test Duration (Cycles)
500	500
2,500	2,500
5,000	5,000
10,000	10,000

Table 4: Design Test Report Summary

Test	Results
High current, short duration	2 - 65 kA discharges
Low current, long duration	20 - 75A x 2,000 μsec discharges
Duty cycle	22 - 5 kA discharges

Table 5: Recommended Tightening Torques for Arrestor Fasteners

Fastener	Recommended Tightening Torque
3/8” Line terminal	20 Foot-pounds
3/8” Ground terminal	20 Foot-pounds
1/2” Fastener connecting base bracket to crossarm or transformer sidewall bracket	40 Foot-pounds

NOTE

- An access hole has been added below the lightning arrestor for the torque wrench. Please refer to Figure 2 on page 18.

Figure 2: Torque Wrench Access

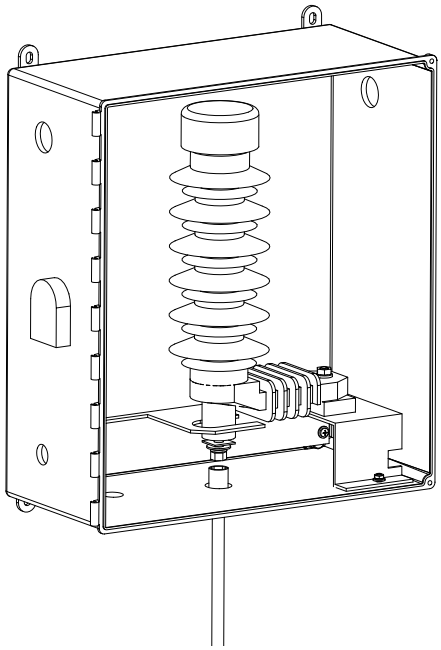


Table 6: Normal Duty Electrical Characteristics

Characteristic	Rated Voltage at 15 kV
MCOV (kV)	12.7 kV
0.5 μsec, 5kA max, IR-kV	54 kV
500 A switching surge	39.9 kV
8/20 MAXIMUM DISCHARGE VOLTAGE- kV	
1.5 kA	43.1 kV
3 kA	46.3 kV
5 kA	49.0 kV
10 kA	54.4 kV
20 kA	62.4 kV
40 kA	76.0 kV

Chapter 3

Installation

3.1 Installation

A lightning arrestor unit should be installed for each incoming CO cable. These units prevent any GPR, beyond the capability of the system, from damaging an installation.

CAUTION

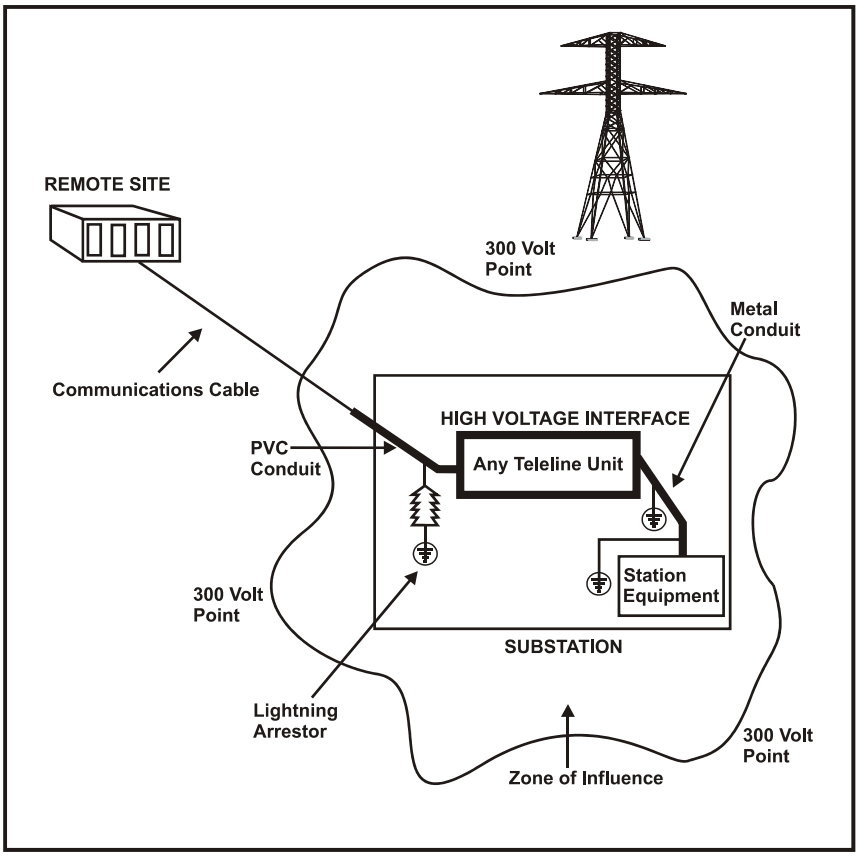
- Stand on a thick rubber mat and wear rubber gloves during the installation procedure. It is preferable to perform these procedures on a clear dry day when a GPR or transients are less likely to occur.

3.2 Applications

It is recommended that a Non-Fragmenting Lightning Arrestor be installed on every CO cable entering into a Teleline Isolator shelf.

For an illustration of the unit's application, refer to Figure 3 below.

Figure 3: High Voltage Interface Implementation



3.2.1 Installation Location

To view a typical installation of the Non-Fragmenting Lightning Arrestor Unit, refer to Figure 3.

➤ **To install the lightning arrestor:**

1. Verify that you have the following customer provided tools and hardware which are required to install the unit:
   - CO cable
   - #6 TWH AWG wire (length determined by distance to station grounding point)
   - Electric drill with a 5/32” diameter bit
   - 7/16”, 9/16” and 5/8” hex wrenches
   - 1” thick plywood backboard with appropriate mounting hardware
   - Cable clamps and mounting hardware for routing cables exterior to the unit (quantity determined by the cable lengths)
   - A cable ground clamp recommended by the cable manufacturer (the contact resistance must be lower than 5 milliohms, and the current carrying capacity must be at least equivalent to that of a #6 AWG copper conductor).
2. Unpack the Non-Fragmenting Lightning Arrestor Unit and its installation hardware from its protective box.
3. Check the contents of your Non-Fragmenting Lightning Arrestor Unit kit. For a listing of the items included in the kit, refer to Figure 7 below.
4. Fasten the 1” thick plywood backboard to the wall where the lightning arrestor assembly is to be installed.
5. Tape the drilling template provided to the backboard and drill four holes, as marked, using the 5/32” drill bit.
6. Remove the template, and position the arrestor enclosure so that its mounting holes line up properly. Fasten the enclosure to the backboard using the four hex screws and washers supplied.

Table 7: Model 751126/1 & 751126/2 Kit Contents

Items Included	Qty.	Part Number
Non-Fragmenting Lightning Arrestor Unit	1	244-751126-401
Description and Installation document (this document)	1	925W751050
Instruction sheet	1	925W000029-001
Drilling template	1	220-000156-201
Wire, #6 AWG, 1ft	1	832-990000-017
Strain relief (conn., cord grip, hub: 1/2”)	1	230-990400-034
Strain relief (conn., cord grip, hub: 1”)	2	230-990400-145
Nylon hex nut (1/2-14 NPT)	1	714-990000-005
Nylon lock nut (THD 1 NPT)	2	714-990000-025
Plastic plug for unused ground wire exit	1	701W000026-001
Hex screws with washers (#14A X 1” long)	4	724-990000-011

NOTE

- It is recommended that the lightning arrestor be installed horizontally below the Teleline Isolator(s) to simplify the routing of the CO cable.

7. Slide one of the 1” strain reliefs over the free end of the CO cable.
8. Temporarily feed the cable through opposing holes in the arrestor enclosure to the Teleline Isolator, using the route that the cable will follow in the actual installation. Make a mark on the CO cable directly above the lightning arrestor core, where its jacket will be stripped. For an illustration of the unit’s installation, refer to Figure 4 on page 25.
9. From the center of the CO cable, remove a minimum 4” strip of cable jacket and sheath. On the left side, leave a minimum of 6”, and on the right side of the cable, leave a minimum of 4” of jacketed cable. This isolates the sheath of the incoming cable from the portion going to the shelves.
10. The CO cable may now be fastened firmly in place using the strain reliefs and lock nuts. Ensure that the stripped portion of the cable is directly above the arrestor.
11. Cut open a short length of the jacketed sheath on the incoming cable side to facilitate the installation of the cable ground clamp (not provided). For an illustration, refer to Figure 4 on page 25.
12. Attach the cable ground clamp to the CO cable sheath.

13. Insert a short length of the jacket you stripped earlier between the cable ground clamp and the inner jacket. For an illustration, refer to Figure 4 on page 25 and Figure 5 on page 26.
14. Wrap electrical tape around the connection to isolate and solidly secure the connection.
15. Connect the cable ground clamp to the arrestor core using the supplied #TWH 75C 600V #6 wire. Use as short a section of this wire as possible. For a list of the recommended tightening torques, refer to Table 5 on page 17.
16. Connect the lower end of the arrestor core to station ground using a #TWH 75C 600V wire (not supplied), and fasten it in place using the 1/2” strain relief and nylon hex nut. Use whichever of the two bottom holes allows for the shortest ground wire.
17. When wiring CO cable and ground wire, always use a radius of 6” minimum when cable has to be bent.
18. Block the unused bottom hole with the plug provided.
19. Close and secure the lightning arrestor cover.

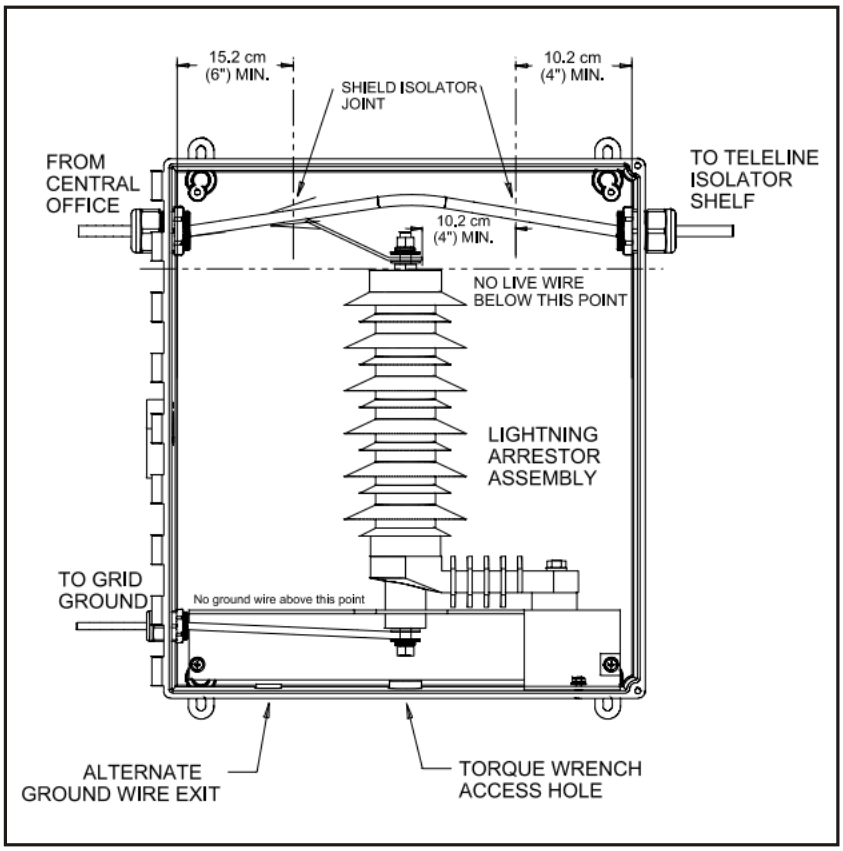
ATTENTION

- Care should be taken to make the wire connections from the arrestor to the ground and from the arrestor top clamp to the CO cable as short as possible, since every foot of wire adds 1.6 kV to the discharge voltage of the arrestor at 20 kA.

DANGER

- The cover must be kept closed and secured at all times in order to protect personnel from potentially hazardous voltages.

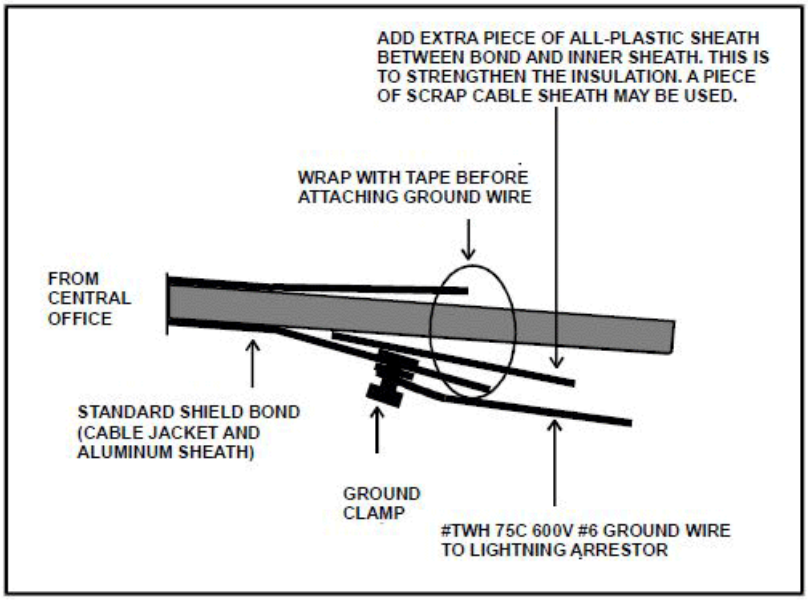
Figure 4: Non-Fragmenting Lightning Arrestor Unit Installation



CAUTION

- Unused ground wire exit must be blocked using the plug provided in the kit.

Figure 5: Detail of Bond Connection



Appendix A

Acronyms

Acronyms

AC	Alternating Current
AMP	Ampere
AWG	American Wire Gauge
CO	Central Office
GND	Ground
GPR	Ground Potential Rise
HVI	High Voltage Interface
MD	Manufacture Discontinued
MCOV	Maximum Continuous Operating Voltage
PIC	Polyolefin Insulated Cable
PVC	Polyvinyl Chloride
PWR	Power
R.H.	Relative Humidity
RMA	Return Material Authorization
RMS	Root Mean Square
SYM	Symmetrical
UL	Underwriters Laboratories