

## Power Isolator System

100W @ 48Vdc Floating Output

120Vac/130Vdc Input Source

Model # 725610 Power Output Unit

Model # 725611 Power Input Unit

Document #: 925W000149-10E

Preliminary



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## Positron Power Isolator

### 1.0 Abstract

The Positron Power Isolator is a system for delivering high-voltage isolated 100W @ 48Vdc within a 2000 foot or more distant from the power source.

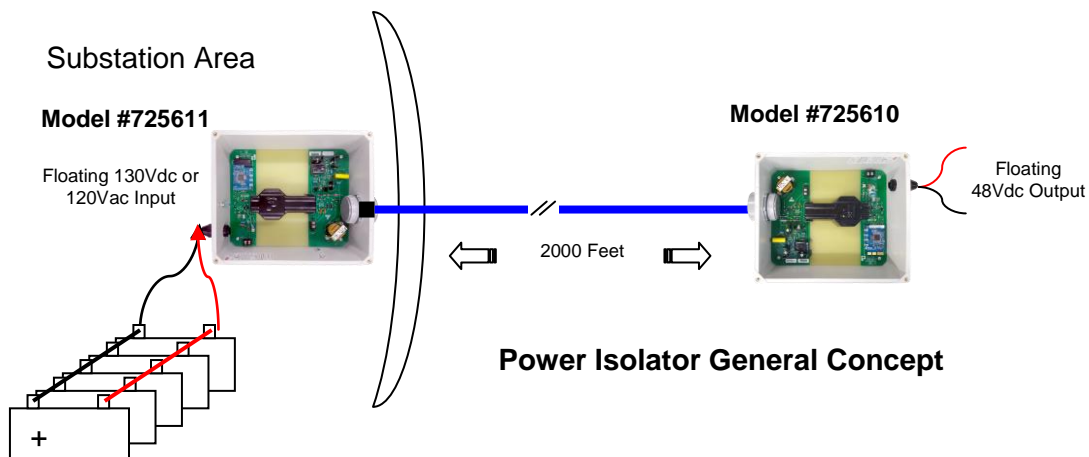
This unit accepts an input voltage of nominal 130Vdc or 120Vac and provides a regulated output of 100Watts @ (floating) 48Vdc.

### 2.0 Overview

The Power Isolator system consists of two fibreglass 12" x 14" x 6" NEMA 4X rated closures, each containing sophisticated power conversion electronics partnered with Positron's unique high-voltage isolation transformers, separated by as much as 2000 feet or more of 10 - 14AWG copper conductors.

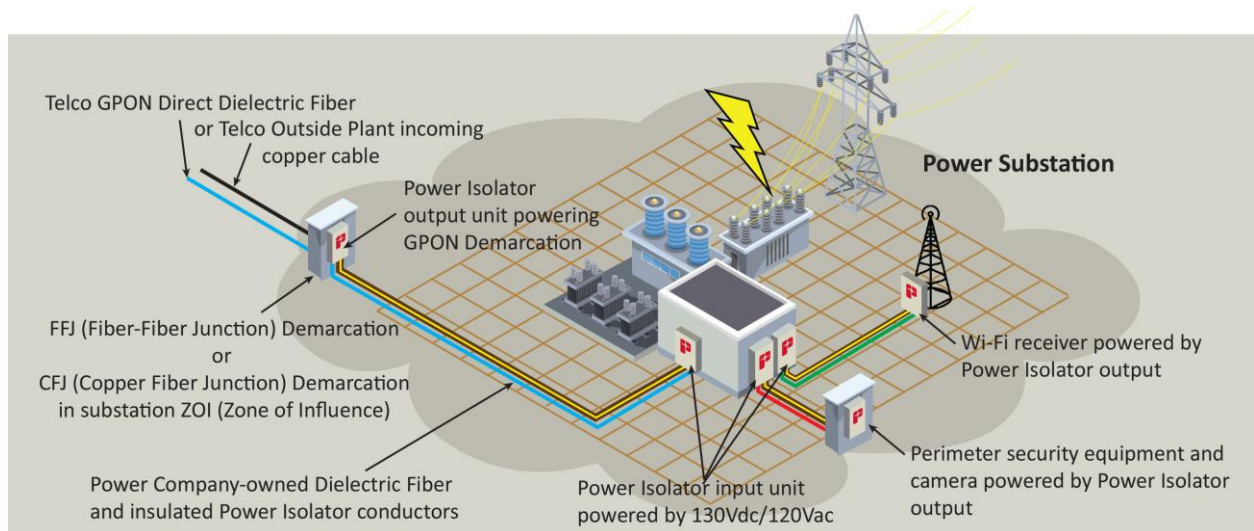
Isolation of  $50kV^{rms}$  (continuous) is achieved with the system when the 10 - 14AWG electrical conductors are contained in Schedule 80 PVC conduit between the Power Isolator's input and output units. Schedule 80 PVC conduit has an inherent dielectric strength of approximately 275kV (1.1kV/mil) and is suitable for direct burial. The Power Input and Power Output Units can be separated as little as 3 feet and by more than 2000 feet of 10 - 14AWG copper conductors in PVC Schedule 80 conduit.

The Positron Power Isolator can deliver an output of 100W @ 48Vdc that is fully isolated from any high-voltage influence or any remote ground influence from a source of either 120Vac or floating 130Vdc from a substation battery, enabling you to bring a 100W @ 48Vdc output power to any point, irrespective of the local ground potential.



### 3.0 Application

The Power Isolator system is suitable to provide isolated power to a Copper Fiber Junction (CFJ) of a hybrid-fiber high-voltage communications isolation installation, or an all-dielectric Fiber-Fiber Junction (FFJ) located either inside or outside of the Zone of Influence of a power station. The Model #725610 Power Output Unit provides a floating output of 100Watts @ 48Vdc. A local Ground reference for the Power Isolator Output Unit (Model #725610), if used, can be connected to the local equipment grounds of the equipment to be powered. In fact, the power isolator scheme can be used anywhere 100W @ 48Vdc power is needed, free from a remote ground influence. See Figure 1.



**Figure 1**

### 4.0 Isolation Verification

The unique isolation capabilities of the Power Isolator are due to the high level of isolation present at both the Power Input Unit and the Power Output Unit, respectively model numbers 725611 and 725610. The system has been designed so as to function only if both isolation units are present. The system cannot function correctly if one isolation unit is missing. If 120Vac or 130Vdc is fed directly to the Power Output Unit (Model #725610), the on-board Green LED of the Power Output Unit will not glow. See Figure 2.

Typically, there is substantial distance between the Power Input Unit and Power Output Unit. An LED system has been incorporated to verify the presence of an isolator at the power source and at the 48Vdc output location. A set of two on-board LEDs are present in each of the Power Input and Power Output Units. These status LEDs indicate correct application of input power and the presence of isolation at both ends of the system.

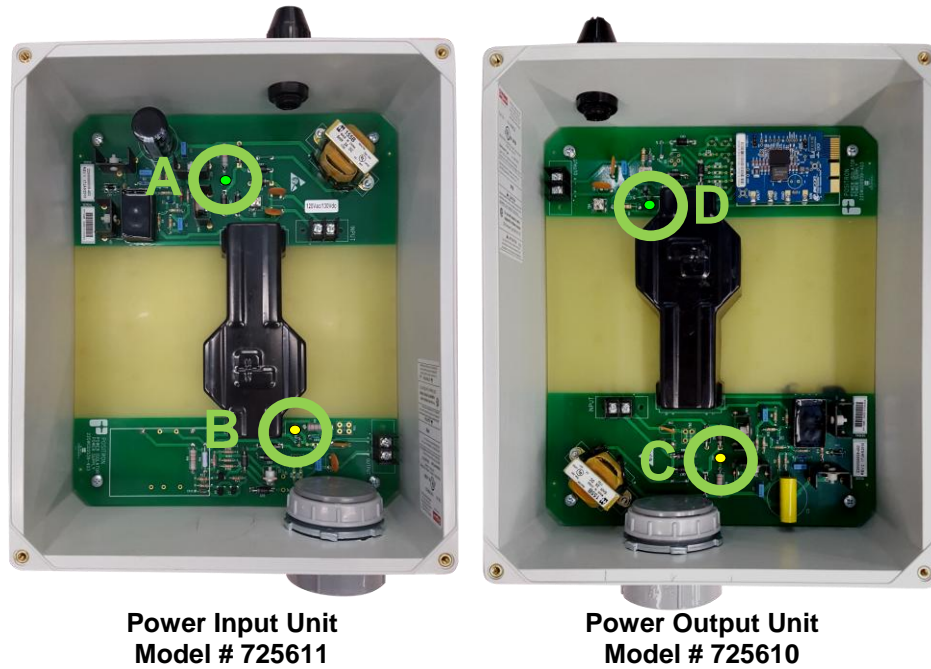


Figure 2

| Power Input Unit #725611 |                            | Color  | Power Output Unit #725610 |                                 | Color  |
|--------------------------|----------------------------|--------|---------------------------|---------------------------------|--------|
| A                        | Presence of Input voltage  | Green  | C                         | Presence of Input voltage       | Yellow |
| B                        | Presence of Output voltage | Yellow | D                         | Correct Input / Output voltages | Green  |



**NOTE** This means that if the Green LED of the Power Output Unit, Model #725610, is not glowing, there is an issue at the Power Input Unit, Model #725611. All LEDs report that the correct inputs and outputs are there. Example: If “C” not does glow Yellow, then “D” will NOT glow Green, etc.

**5.0 Power Isolator Dimensional Drawings**

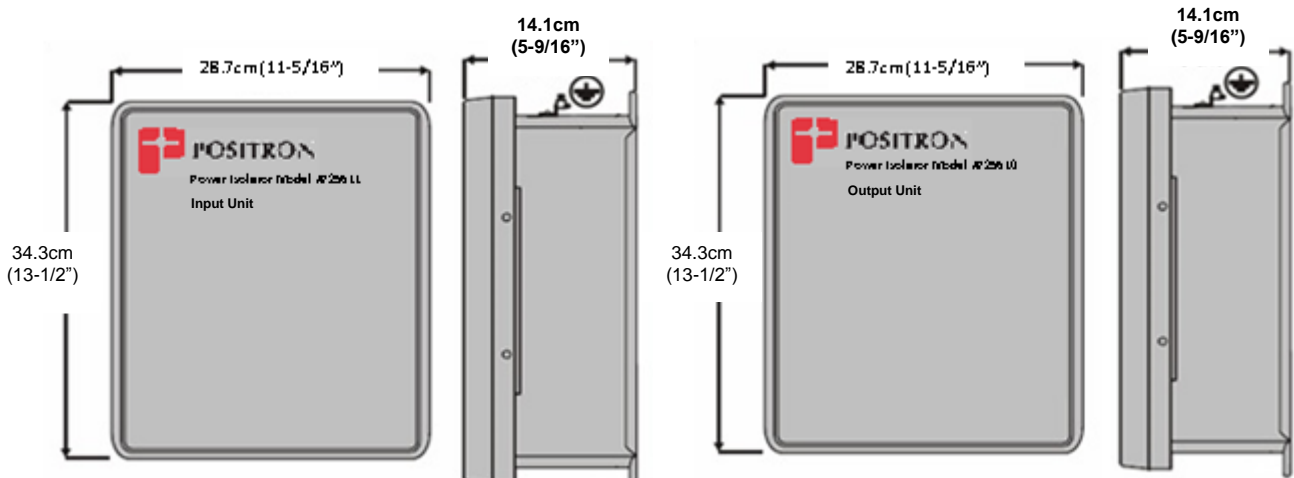


Figure 3

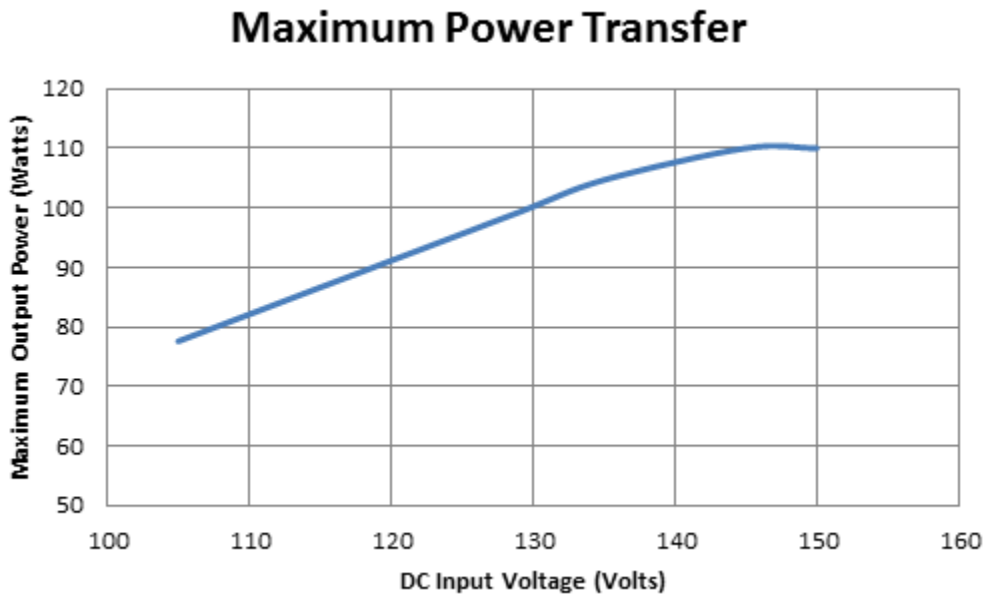
### 6.0 Short Circuit Protection

Both units are short circuit protected. Should a short circuit be presented on the 48Vdc output, or on the inter-unit conductors, both units will shut down automatically. Once the short has been removed, the units will resume power conversion and transmission.

### 7.0 Specifications

|                                 |   |
|---------------------------------|---|
| Maximum Power Transfer:         | 100 Watts @ 48Vdc output  |
| DC Input Voltage Range:         | 105Vdc to 150Vdc  |
| AC Input Voltage                | 110Vac to 125Vac  |
| Isolation resistance:           | 50kV <sub>rms</sub>   |
| Temperature:                    | -40C to +70C  |
| Mid-Span Voltage Characteristic | Variable from 146Vdc to 240Vdc  |
| Surge Withstand Capability      | Meets SWC IEEE 37.90 in Common and Differential Modes on all inputs and outputs |

#### 7.1 Power Output @48Vdc Versus Input Voltage



**Note:** The above **Maximum Output Power** is measured using a 3 foot (92cm) 10 AWG mid-span cable length

**Note:** The load on a 130Vdc battery will be 20% higher than the output power delivery of the 725610 unit.

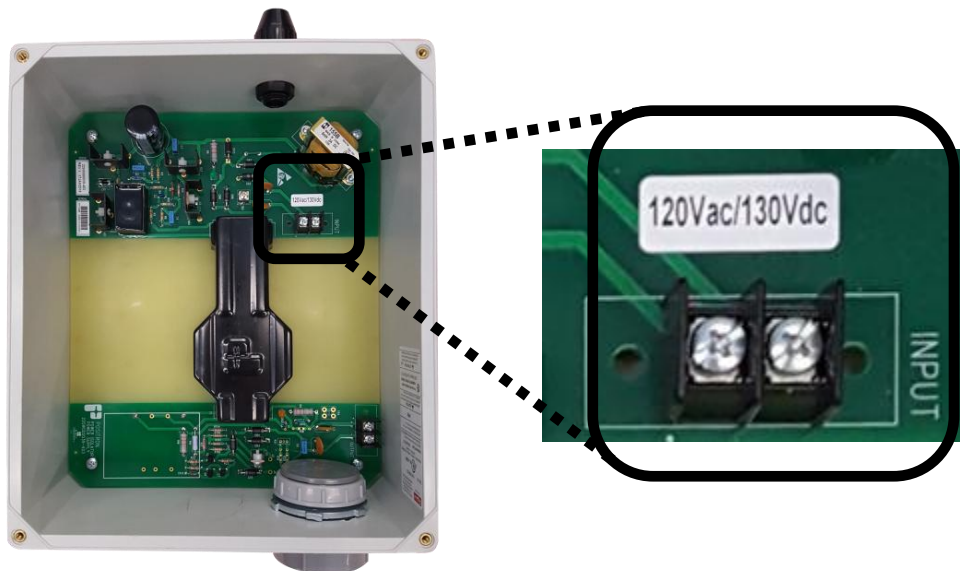
**7.2 Lower Output Power Scenarios**

| Cable length | Conductor Gauge | DC Input Voltage | Maximum Output Power |
|--------------|-----------------|------------------|----------------------|
| 1,000 feet   | 10AWG           | 105 Vdc          | 76 Watts             |
| 1,000 feet   | 14AWG           | 105 Vdc          | 75 Watts             |
| 2,000 feet   | 10AWG           | 105 Vdc          | 75 Watts             |
| 2,000 feet   | 14AWG           | 105 Vdc          | 74 Watts             |

**Note:** The Output Power is determined by the Input Voltage and length and gauge of intermediate conductors.

**8.0 Connections**

All input connections are non-polarity sensitive.

**8.1 Model #725611 Input Power Connections**


**Figure 4:** Model #725611 Power Input Unit screw terminal connectors for source input power



**8.2 Model #725611 Inter-unit Output Connection**

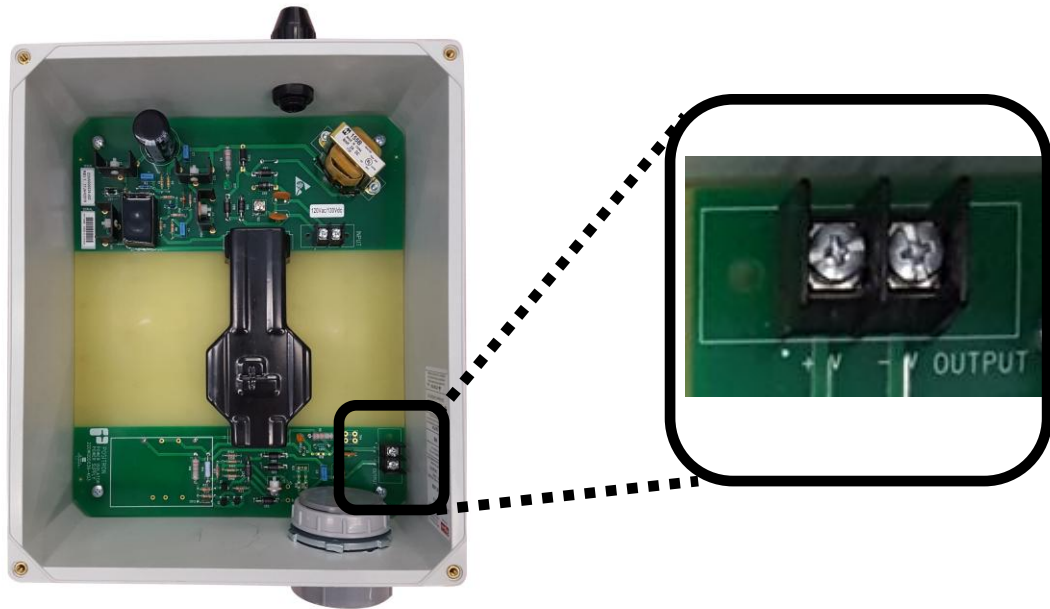


Figure 5: Model #725611 Power Input Unit screw terminal connector for Inter-Unit power output connections

**8.3 Model #725610 Inter-unit Input Connections**

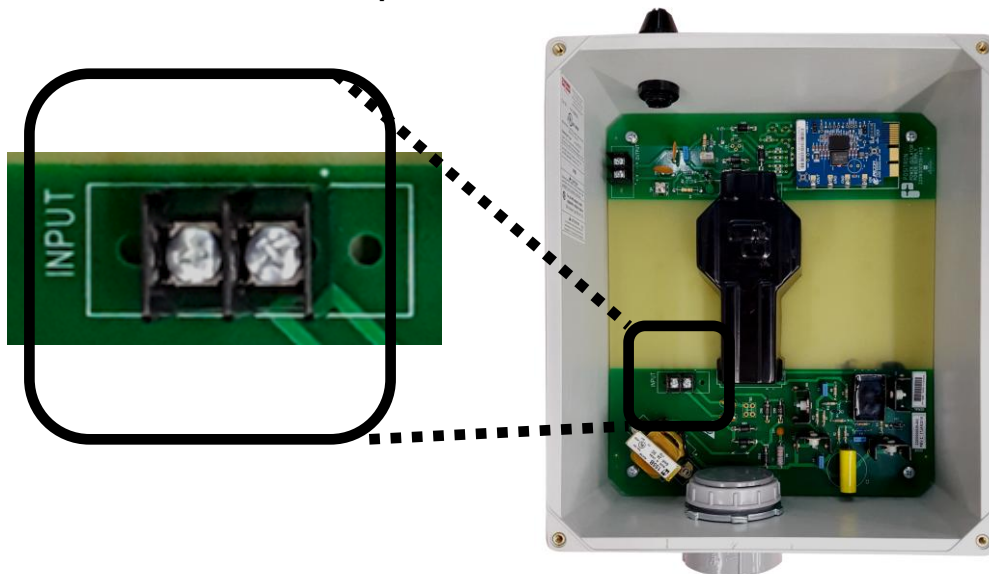


Figure 6: Model #725610 Power Output Unit screw terminal connector for Inter-Unit power input connections

8.4 Model #725610 Output Power Connections

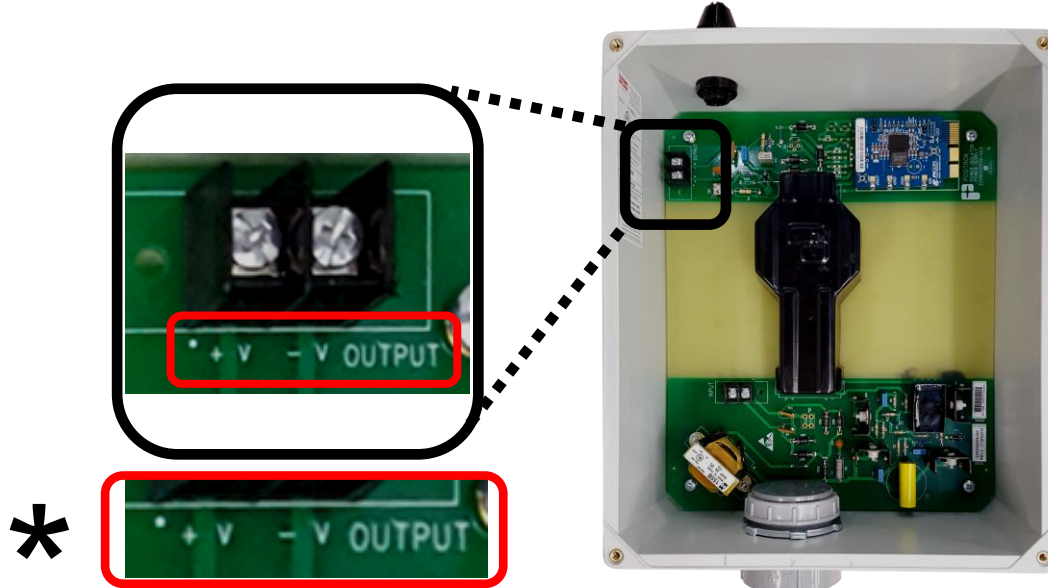


Figure 7: Model #725610 Power Output Unit screw terminal connector for Inter-Unit power output connections

**\* There are markings for minus and positive contacts on the power output connection. This is relevant to the equipment to be powered by the 48Vdc output.**

**9.0 GND Connection: Power Isolator Input Unit, Model #725611**

The Power Isolator Power Input Unit, Model #725611, should be connected to Substation Ground (GND). A ground lug has been provided for this. A #6AWG ground wire should be used from the external ground lug to a station ground connection.



**Figure 8: Model #725611 External Ground Lug**

The ground lug is pre-connected inside the unit.



**Figure 9: Model #725611 Internal Ground Connection**

**10.0 Reference GND for Power Isolator Output Unit, Model #725610**

The 48Vdc output is floating with respect to ground.

**NOTE**


When installing the Model 725610 Power Output Unit, should any generated noise affect the equipment to be powered, a separate #6 ground wire should be used to connect from the external ground lug of the Power Isolator Output Unit with the chassis ground (GND) of the terminal equipment. This ground connection does not change the nature of the floating output. The output is isolated from the ground reference connection.

10.1 FFJ Reference Ground Connection in a Fiber/Fiber Junction

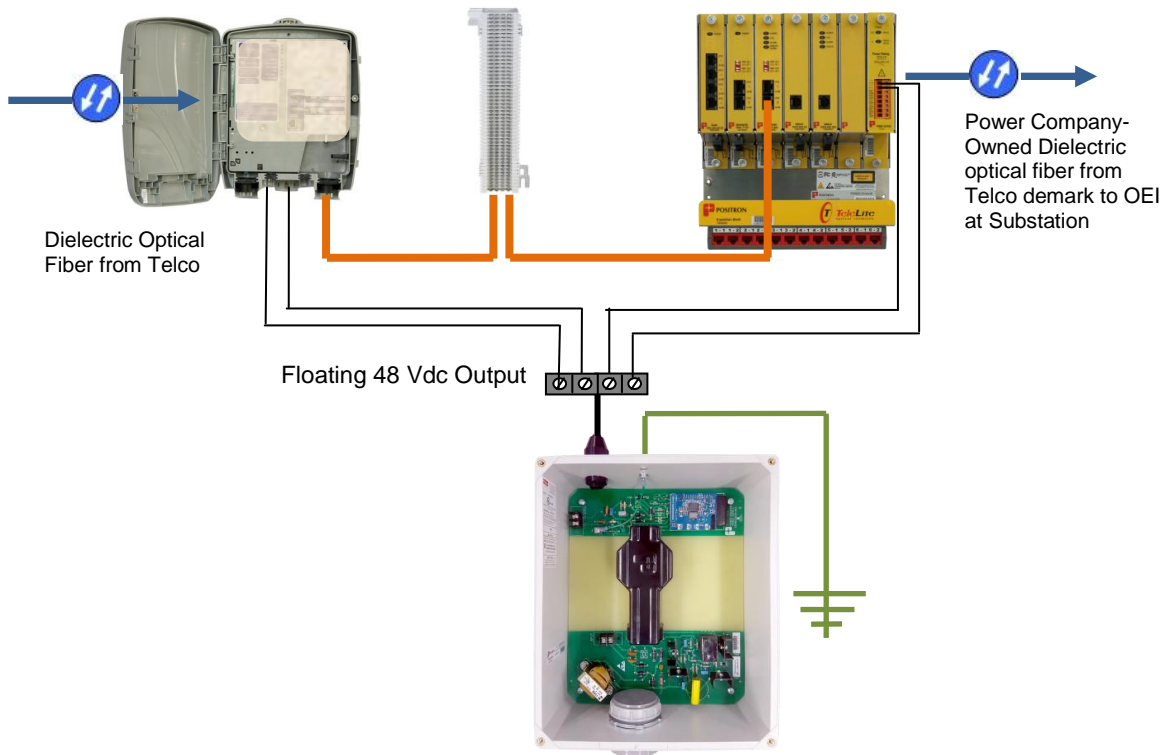


Figure 10: Power Isolator Output Unit in a FFJ (Fiber Fiber Junction) at edge of substation perimeter (fence)

10.2 CFJ Reference Ground Connection at 300V point of GPR Contour

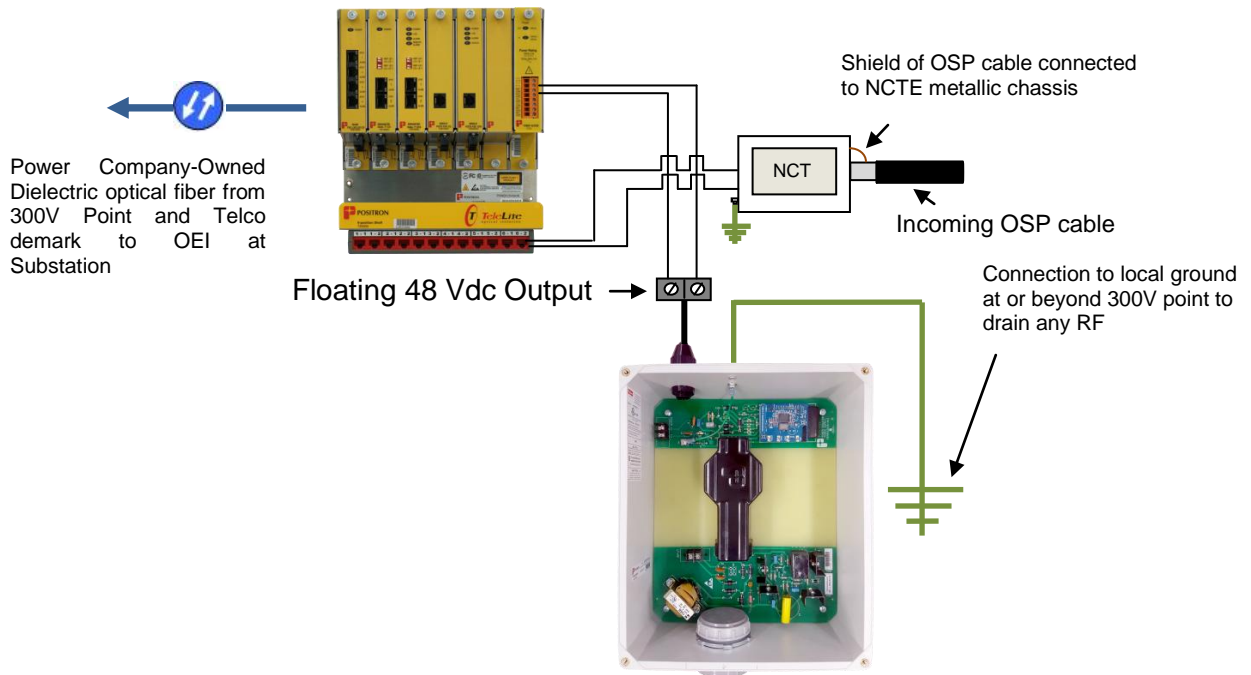
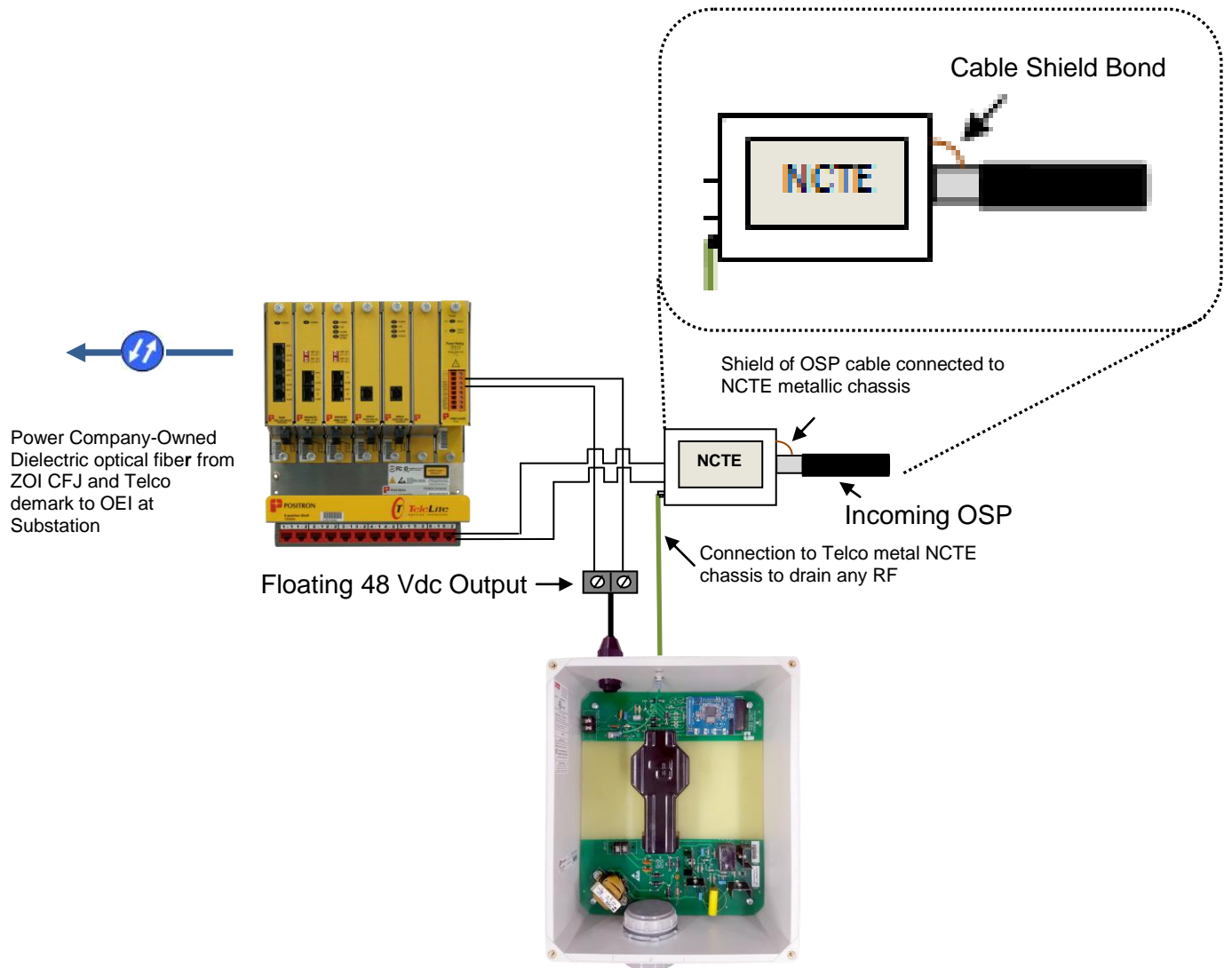


Figure 11: Power Isolator Power Output Unit 300V Point CFJ Configuration

**10.3 ZOI CFJ Reference Ground Connection Inside ZOI of GPR Contour**



**Figure 12: Power Isolator Power Output Unit  
ZOI CFJ Configuration**

### 11.0 Installation

The enclosure for the Power Isolators are rated NEMA 4X. With the vapor-tight conductor strain relief, the unit obtains a rating of NEMA 3R.

NEMA 3R rated enclosures are constructed for either indoor or outdoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects (falling dirt); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (rain, sleet, snow); and that will be undamaged by the external formation of ice on the enclosure.

The Power Input Unit, Model #725611, should be mounted on an internal plywood backboard not far from its power source.

The Power Output Unit, Model #725610 can be pole-mounted externally or mounted on a backboard in a protective field cabinet along with the equipment to be powered. The gauge of the conductors between the Power Isolator Power Input Unit Model #725611 and Power Isolator Power Output Unit Model #725610 should be between #10AWG to #14AWG. The conductors should be contained in 2" Schedule 80 PVC conduit. Each unit has a pre-installed PVC conduit bushing to accommodate the PVC conduit.

**Neither the Power Input Unit nor the Power Output Unit shall be mounted onto a metallic surface.**