

**Broadband Reach eXtender
Power Injector
(BRX-PWR)**

**Installation Guide
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Broadband Reach eXtender (BRX) Power Injector Quick Installation Guide

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1 Introduction

The Positron Broadband Reach eXtender (BRX) devices get their power from the -48Vdc sealing current usually found on DSL + POTS pairs. Due in part to the migration away from POTS to VoIP or data-only services (sometimes referred to as “naked DSL”), DSL pairs may lack a -48Vdc sealing current. The increased use of bonded xDSL pairs means that the second (2nd) pair is often without sealing current. Positron designed the BRX Power Injector to inject the -48Vdc sealing current to power the BRX devices installed on xDSL pairs requiring amplification.

The BRX Power Injector installs adjacent to the DSLAM where its power pairs connect to the POTS port of the DSLAM where the CO telephone pairs normally terminate. The DSLAM then acts as a combiner to overlay the -48Vdc sealing current onto the DSL pair. The BRX Power Injector is available in 8, 16 or 24 pair configurations packaged in a UL-rated IP65 enclosure as per Figure 1.



Figure 1: BRX Power Injector – high-level view

The approximate dimensions of the BRX Power Injector are: 16.35” High x 13.0” Wide x 3.85” Deep or 415 mm H x 333 mm W x 98 mm D. The enclosure includes flanges to easily mount the BRX Power Injector on a pole, stake or on the back of popular pedestals.

2 Principles of Operation and Specification Summary

The BRX Power Injector offers the following features:

- Wall-mount and Pole Mount options
- Can be ordered in 8, 16 or 24 pairs configurations
 - Field upgradable by installing up to a total of three (3) 8-pair power modules
- Flexible Power Input
 - Local -48Vdc, or
 - Local 110-220VAC with factory installed AC-DC Converter, or
 - Express (line) Powering: 1 or 2 pairs with factory installed: GE or ALPHA Down Converter ($\pm 190\text{Vdc}$ to -48Vdc)
- Output Pairs with BRX Power
 - Connected via standard 110 punch-down connectors
- Diagnostics:
 - Status LED per pair: indicates Power to the BRX and Error Condition (if any)

The following block diagram (figure 2) highlights the inside of the BRX Power Injector:

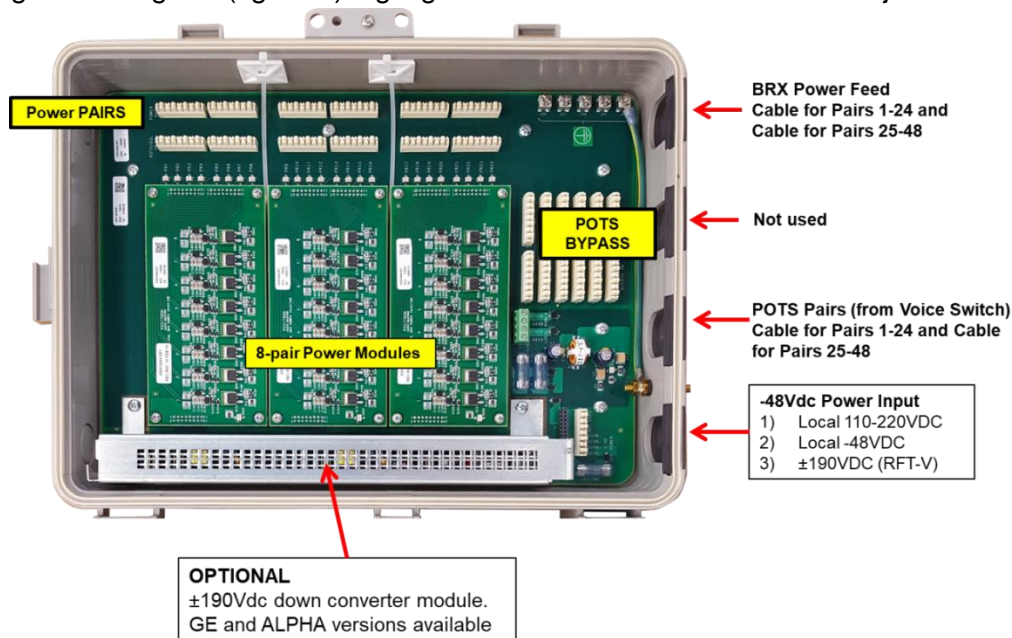


Figure 2: Inside the BRX Power Injector

The power source of the BRX Power Injector can either be a local -48Vdc source, a local 110-220Vac or express power pairs. A single express power pair is sufficient to power 24 pairs with BRX devices. Support for a second express power pair is included whenever redundancy is required. When using a local AC input, the BRX Power Injector is factory installed with a 110-220VAC to -48VDC power supply. When using express pairs, the BRX Power Injector is factory installed with a down converter module ($\pm 190\text{Vdc}$ to -48Vdc) from either Alpha Technologies or from GE Lineage. **Note:** You need to make sure to use the same brand of up converter (-48Vdc to $\pm 190\text{Vdc}$) and down converter for full

compatibility.

The BRX Power Injector delivers a -48Vdc (0.5w) sealing current for each pair where a BRX amplification device is installed. Looking at figure 2, there are three (3) 8-pair power modules installed. The output of these power modules connects to the pairs from the POTS port of the DSLAM via a standard 110 punch down block (top left section of the picture). It is possible to connect two (2) 24-pair cables from the DSLAM. The opening allow for up to two cables for a total of 24 pairs powered from the BRX Power Injector and the remaining pairs passed through untouched.

The BRX Power Injector typically connects to the DSLAM POTS port(s) via a nearby cross-connect box. Its flexible design also supports a direct connection to the DSLAM. It is also possible to use the BRX Power Injector as a basic cross-connect when having to combine POTS and BRX Power pairs on the same cable binder(s) and in the absence of a cross-connect.

2.1 Connecting the BRX Power Injector to the DSLAM via a cross-connect

When connecting the BRX Power Injector via an existing cross-connect, a single 24-pair cable connects to the BRX Power Injector since the cross-connect will then connect to the pairs that need the -48Vdc sealing current into the DSLAM.

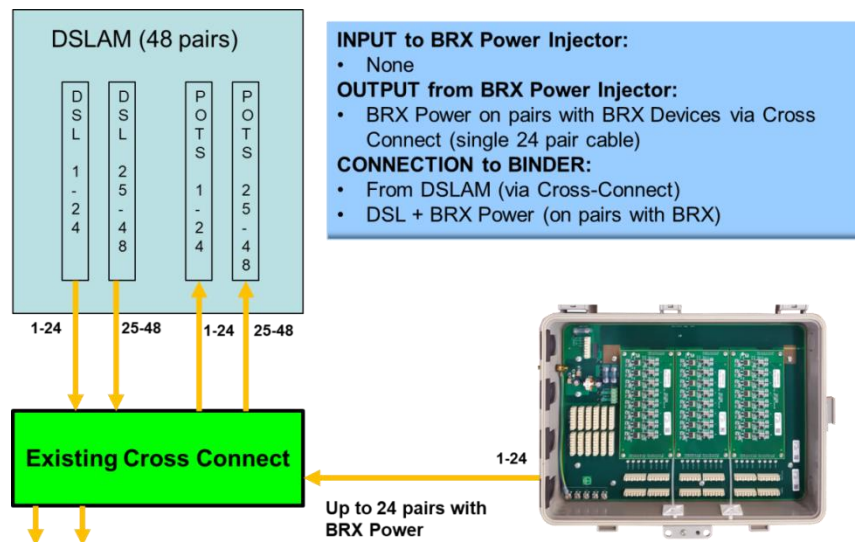


Figure 3: Connecting the BRX Power Injector to the DSLAM via a cross-connect

2.2 Connecting the BRX Power Injector Directly to the DSLAM

It is possible to connect the BRX Power Injector directly to the DSLAM where there is no cross-connect at the location. In this case, it is important to assign the power to those pairs where a BRX device is present. You will also need to make sure you select the proper cable binder matching each amplified DSL pairs.

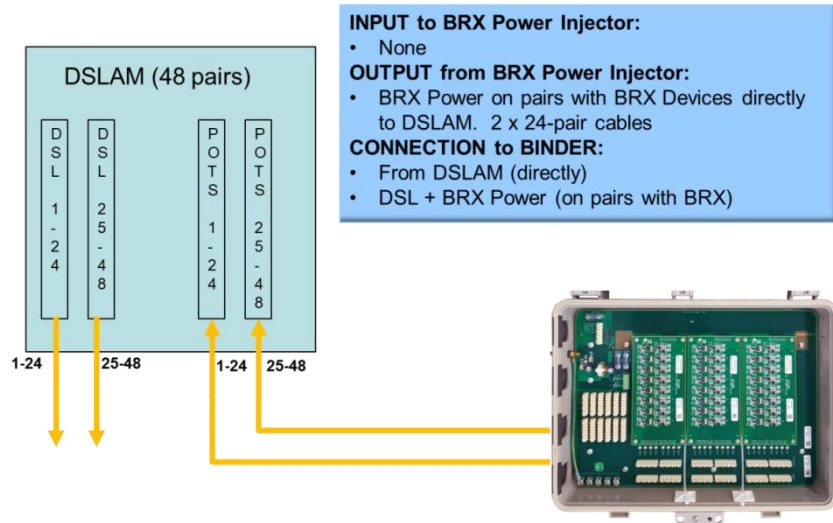


Figure 4: Connecting the BRX Power Injector directly to the DSLAM

2.3 Combining POTS pairs with BRX Power Injector pairs directly to the DSLAM

While it is preferable to use an available cross-connect the BRX Power Injector includes a simple cross-connect made up of 24 input pairs and 24 output pairs accessible via punch-down blocks. POTS pairs in input to the BRX Power Injector shall be punched into the bypass section. The output blocks of the bypass section allow you to mix POTS and BRX Power pairs into their respective binder cable that connect to the POTS ports of the DSLAM.

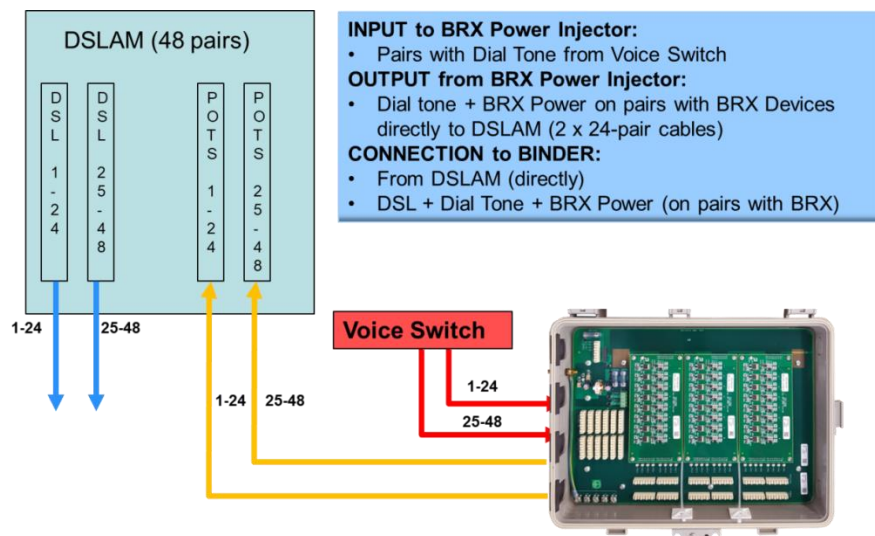


Figure 5: Using the BRX Power Injector to combine POTS and BRX Power pairs

Important Note: the BRX Power Injector supports a maximum of 24 POTS pairs as input to the bypass section. An external cross connect device shall be used when there are more than 24 POTS pairs to combine with the BRX Power pairs.

3 Quick Installation: Step-by-step Instructions

This section provides a detailed procedure to connect the power source to the BRX Power Injector. You will also find a procedure to connect POTS pairs directly to the BRX Power Injector in the absence of a nearby cross-connect. Finally, you will find a procedure to connect the BRX Power pairs to the cable binder(s) connecting to the POTS port of the nearby DSLAM.

3.1 Connecting the Power Source

The BRX Power Injector offers a choice of three (3) power source:

Power Source	BRX Power Injector Ordering Codes
Local -48Vdc	BRX-PWR-8: 8-pair BRX Power Injector with local -48Vdc input BRX-PWR-16: 16-pair BRX Power Injector with local -48Vdc input BRX-PWR-24: 24-pair BRX Power Injector with local -48Vdc input
Local 110-220Vac	BRX-PWR-8-AC: 8-pair BRX Power Injector with local 110-220Vac input BRX-PWR-16-AC: 16-pair BRX Power Injector with local 110-220Vac input BRX-PWR-24-AC: 24-pair BRX Power Injector with local 110-220Vac input
Express Pairs (RFT-V \pm 190V)	BRX-PWR-8-A: 8-pair BRX Power Injector with ALPHA Express Power input BRX-PWR-16-A: 16-pair BRX Power Injector with ALPHA Express Power input BRX-PWR-24-A: 24-pair BRX Power Injector with ALPHA Express Power input BRX-PWR-8-G: 8-pair BRX Power Injector with GE Express Power input BRX-PWR-16-G: 16-pair BRX Power Injector with GE Express Power input BRX-PWR-24-G: 24-pair BRX Power Injector with GE Express Power input
N/A	BRX-PWR-M: 8-pair BRX Power Module to increase the pair capacity to a maximum of 24 pairs (3 x BRX-XLR-M)

Table 1: BRX Power Injector Powering Options and Ordering Codes

3.1.1 Local -48Vdc Source

The BRX Power Injector gets its power from a local -48Vdc source. It operates from a single -48Vdc power source and supports a second (2nd) power feed for redundancy.

Using the leftmost opening, slice open the rubber grommet and insert one or two DC Power cable. Be careful when cutting an opening in the rubber grommet since you will need to apply a silicon sealant in step 2.

NOTE: you can refer to steps 7 to 12 for the installation of the AC Power Cable option for more details about inserting the cable through the rubber grommet.

Connect the black wire(s) to the screw-in terminal post(s) labeled as **-48Vdc**.

Connect the red wire(s) to the screw-in terminal post(s) labeled as **Return**.

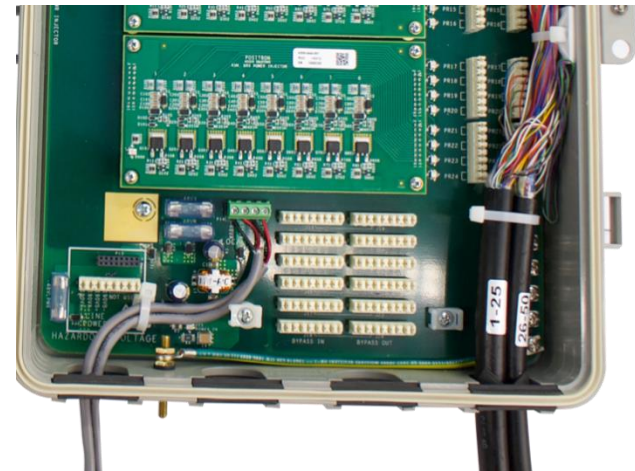


Table 2: Connecting a local -48Vdc power source to the BRX Power Injector

3.1.2 Local 110-220Vac Source

The BRX-PWR-xx-AC family integrates a 110-220Vac to -48Vdc power supply. The devices ship with a pre-installed 10 feet (3 meters) unterminated AC power cord to connect a nearby AC power source.

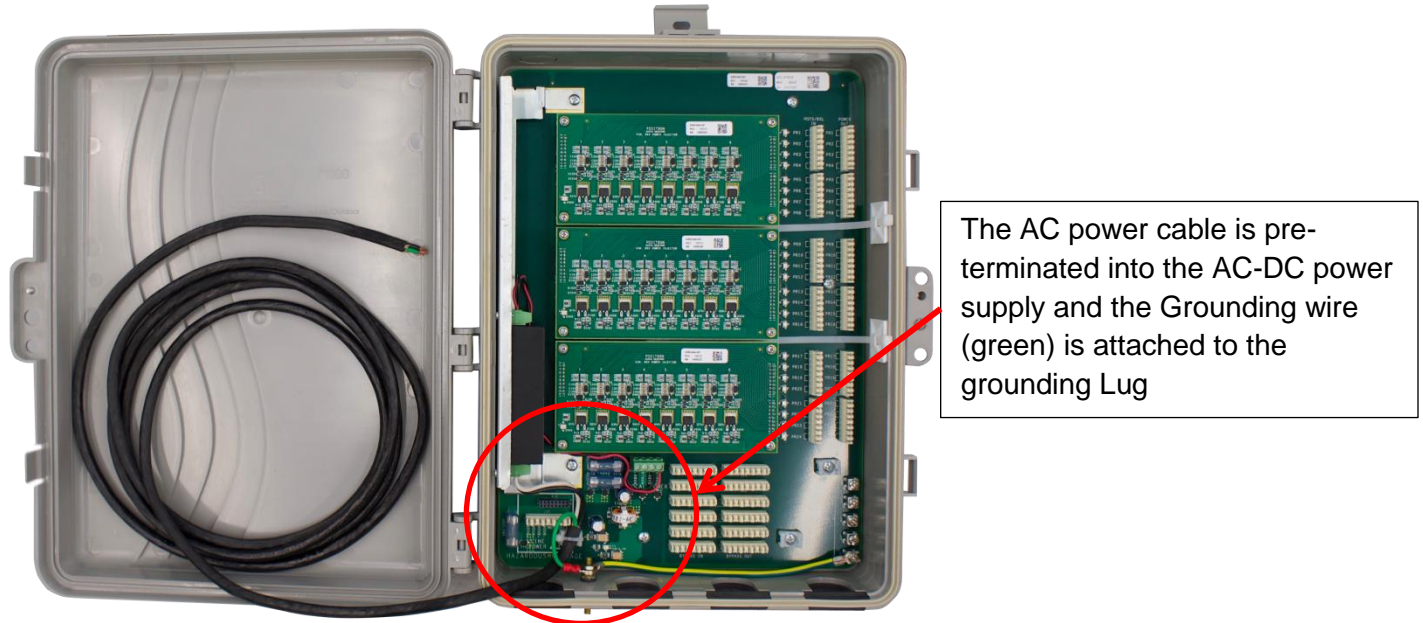
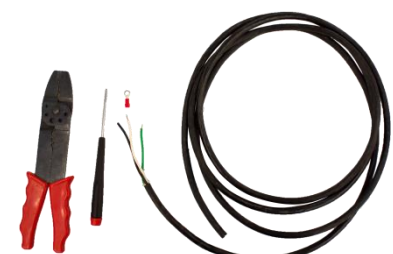

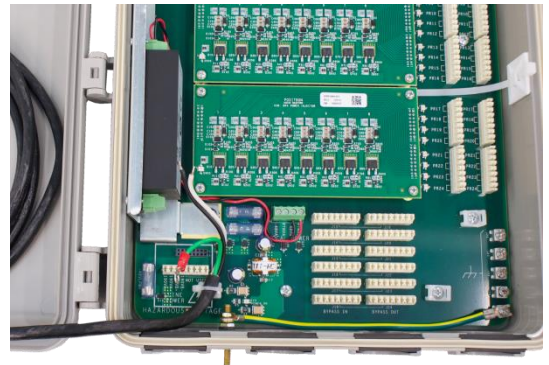


Figure 6: AC cable pre-installed and terminated in the BRX Power Injector

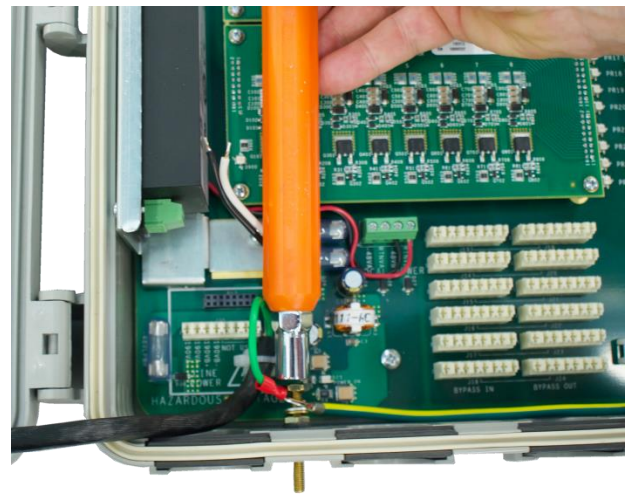
Here is the procedure to follow should you need to install a longer AC power cord.

<p>Step 1: You will need a set of pliers to splice the AC cable and attach a grounding lug to the green wire.</p>	
<p>Step 2: Use the plier to attach the grounding lug to the green wire</p>	

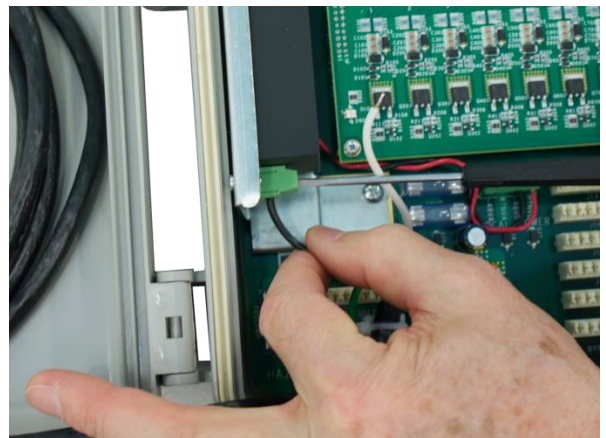
Step 3: use the pre-installed tie-wrap post to secure the AC Power Cable in the BRX Power Injector enclosure



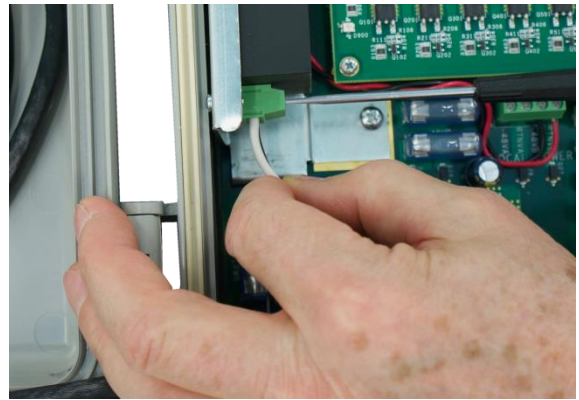
Step 4: secure the ground wire (green) to the pre-installed grounding lug of the BRX Power Injector enclosure. Do not over tighten.



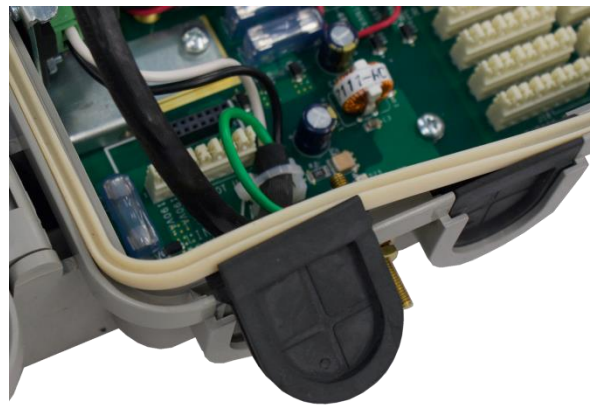
Step 5: attach the black wire (**live**) to the proper connector of the pre-installed 110-220Vac power supply.



Step 6: attach the white wire (**neutral**) to the proper connector of the pre-installed 110-220Vac power supply.



Step 7: carefully remove the leftmost rubber grommet from the enclosure of the BRX Power Injector. You will need to lift the light grey sealant of the enclosure to loosen the rubber grommet.



Step 8: using a sharp box cutter or similar tool, followed the markings at the center of the rubber grommet and cut an opening to insert the AC Power Cable. Make sure to minimize the size of the opening since you will have to seal it afterward (see step 12 below).




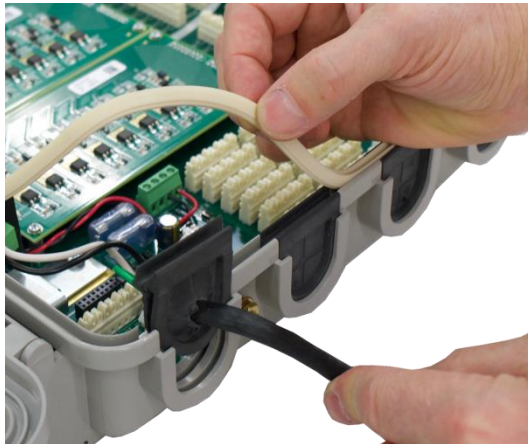
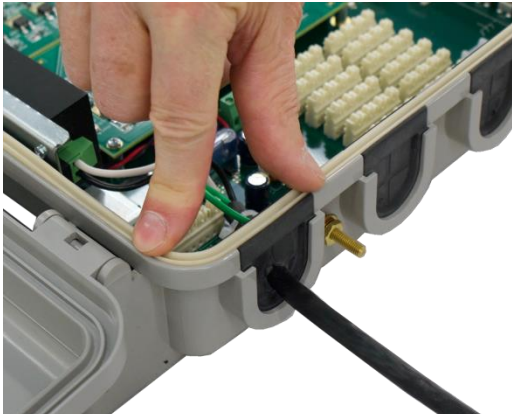
<p>Step 9: slide the AC Power Cable through the opening.</p>	
<p>Step 10: re-insert the rubber grommet back into its original position.</p>	
<p>Step 11: re-install the grey sealant gasket back into place to ensure the IP65 rating of the enclosure of the BRX Power Injector.</p>	

Table 3: Connecting a local 110-220Vac power source to the BRX Power Injector

3.1.3 Express (RFT-V) Power Pairs

The BRX Power Injector supports the use of RFT-V Express Powers. While a single RFT-V pair provide more than enough current to the BRX Power Injector, it supports an optional second RFT-V pair for redundancy. When ordering the BRX Power Injector, you should make sure to select the model that matches the RFT-V Up Converter (from -48Vdc to ± 190 Vdc). You can choose RFT-V Up Converter solutions from either ALPHA Technologies or GE Power.

Using the leftmost opening, slice open the rubber grommet and insert the binder cable with the dedicated RFT-V Express Power Pairs (± 190 Vdc). **IMPORTANT NOTE:** make sure the pairs are unpowered before manipulating them.

Be careful when cutting an opening in the rubber grommet since you will need to apply a silicon sealant in step 2. You can refer to steps 7 to 12 for the installation of the AC Power Cable option for more details.

Use the provided Tie-Wrap to secure the RFT-V power pairs. You can then connect the first RFT-V pair to the **190VA** punch-down block. Connect the second RFT-V pair to the **190VB** punch-down block.

NOTE: the RFT-V power supply is polarity insensitive.

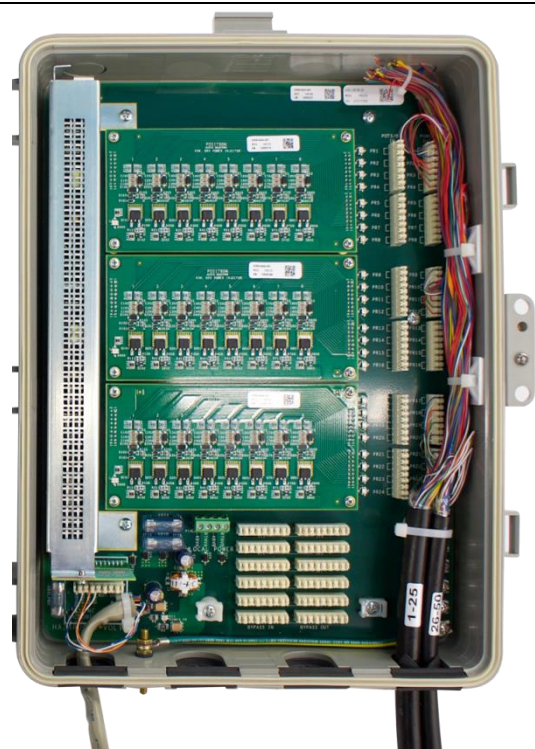


Table 4: Connecting RFT-V Express Power Pairs to the BRX Power Injector

3.2 Grounding the BRX Power Injector

For safety and proper operation of the BRX Power Injector, it is important to connect a solid ground wire (6 to 10 AWG) to the grounding lug of the BRX Power Injector enclosure.



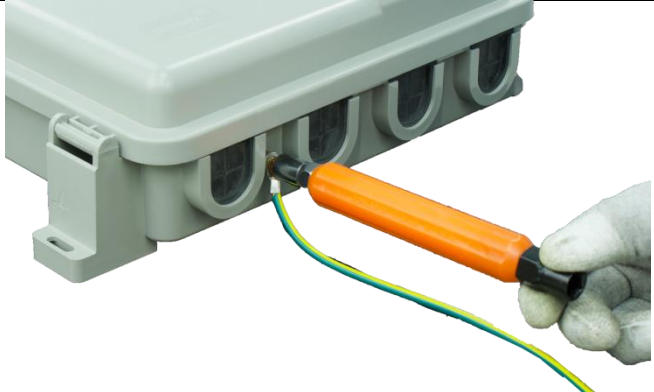

<p>Step 1: attach the grounding lug to the ground wire. You should use wire gauge of at least 10 AWG and up to 6 AWG.</p>	
<p>Step 2: Use the lock washer and nut pre-installed on the grounding post of the BRX Power Injector.</p>	
<p>Step 3: insert the grounding lug, the lock washer and the nut on the grounding post of the BRX Power Injector to secure the grounding wire in place.</p>	
<p>Step 4: make sure the ground wire connects to a solid ground as per local regulations and your company guidelines.</p>	

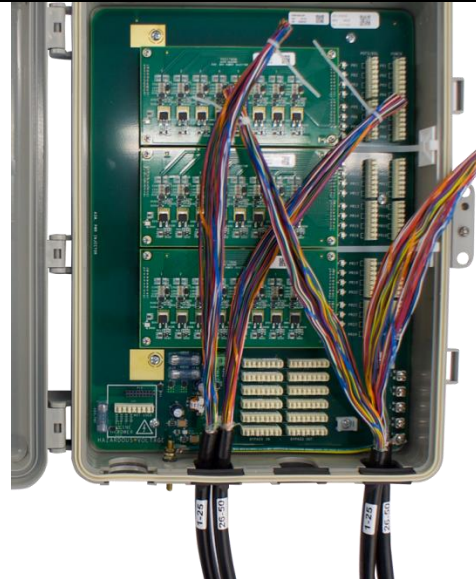
Table 5: Grounding the BRX Power Injector

3.3 Using Bypass Section for POTS pairs

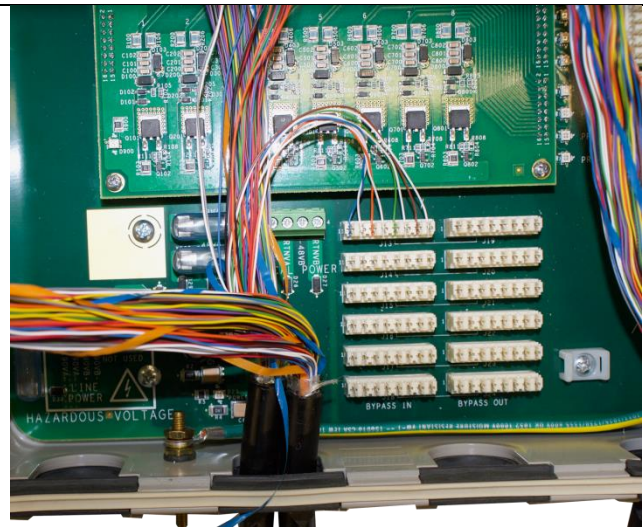
The POTS Bypass section of the BRX Power Injector allows you to combine POTS pairs and BRX Power pairs inside cable binders in the absence of a nearby cross-connect. These cable binders can then directly connect to the POTS port(s) of the DSLAM.

Step 1: insert the cable binders with the POTS pairs into the second from the left connector. As per the installation of the AC Power Cable, remove the rubber grommet and cut an opening large enough to insert one or two cable binder (as needed).

You can also insert the cable binders that will convey the POTS pairs and the BRX Power pairs in the same fashion. Use the rightmost opening for this.



Step 2: select the POTS pairs from the first (1st) cable binder and secure them in the left bank of punch-down blocks.



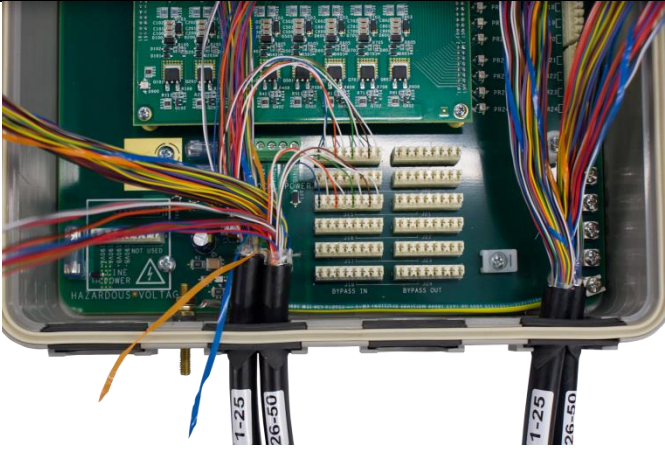
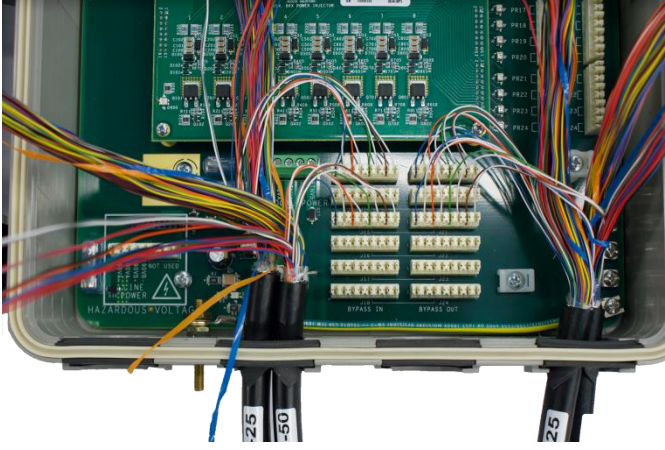
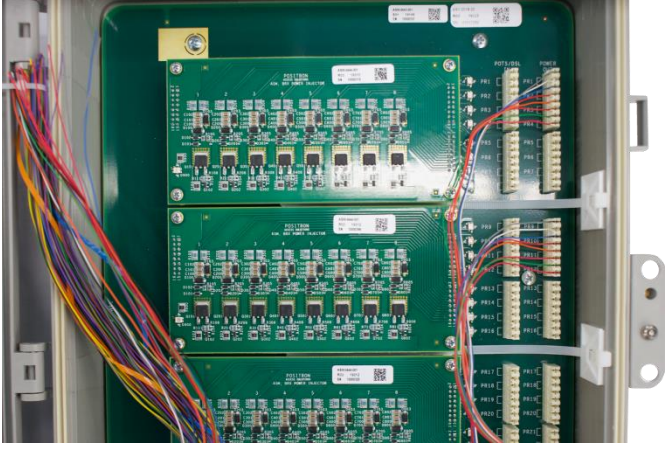
<p>Step 3: select the POTS pairs from the second (2nd) cable binder and secure them in the left bank (BYPASS-IN) of punch-down blocks.</p> <p>NOTE: These POTS pairs are duplicated into the corresponding punch-down block in the right bank (BYPASS-OUT).</p>	
<p>Step 4: you are now ready to attach the pairs of the cable binder connecting to the DSLAM that shall carry the POTS signal.</p>	
<p>Step 5: Use the row of punch-down blocks labeled as Power Out to connect the pairs of each cable binder that require the -48Vdc power to feed BRX devices on otherwise dry pairs.</p> <p>You are now ready to connect the binder cables of the rightmost opening to the nearby DSLAM.</p> <p>NOTE: use the provide Tie-Wrap to secure the BRX Power pairs inside the BRX Power Injector enclosure.</p>	

Table 6: Using the POTS Bypass section of the BRX Power Injector

3.4 Installing Copper Cables into BRX Power Injector

Now that the power source is connected to the BRX Power Injector, you can connect the BRX Power pairs to the cable binder(s) that then connect to the POTS connector of the DSLAM. This procedure is the same, whether there is a nearby cross-connect or not.

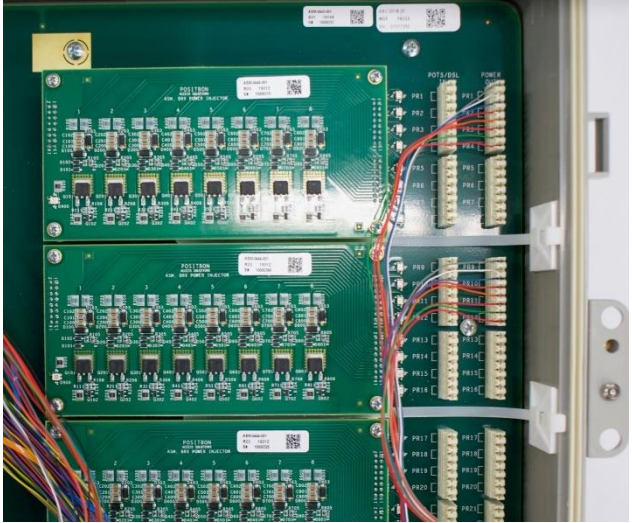
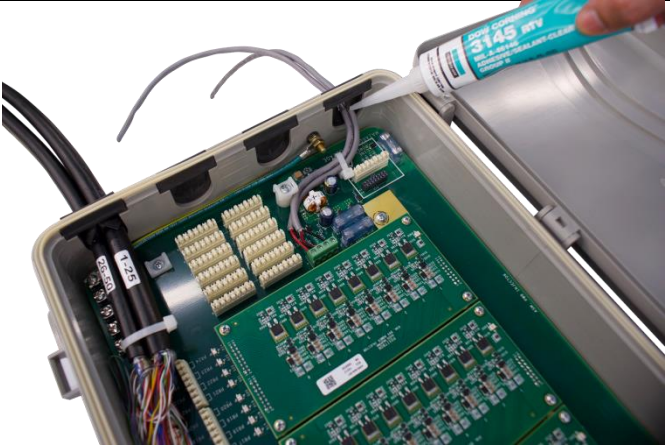
<p>Use the row of punch-down blocks labeled as Power Out to connect the pairs of each cable binder that require the -48Vdc power to feed BRX devices on otherwise dry pairs.</p> <p>NOTE: You should use the pre-installed tie-wraps to secure the cable binders in place once you are done with connecting the pairs to the POWER OUT punch-down blocks</p> <p>You are now ready to connect the binder cables of the rightmost opening to the nearby DSLAM.</p>	
--	--

Table 7: Connecting BRX Power Pairs to the Cable Binder feeding into POTS connector of DSLAM

3.5 Sealing the Rubber Grommets before Installation

Once you have mounted the BRX Power Injector in its final location, you will need to apply a silicon sealant to ensure the IP65 rating of the enclosure. We recommend the use of a sealant that meets the MIL-A-46146 standard such as Dow Corning 3145TV rated for use from -45°C to +200 °C.

NOTE: If you decide to apply the sealing silicone prior to the final installation of the BRX Power Injector, we strongly recommend you maintain the enclosure in the vertical position to ensure the sealant material adherence to the rubber grommet and around the power cable and copper binder cables.

<p>Step 1: apply a sealing silicone to prevent water infiltration through the opening of the rubber grommet used to insert the Power Cable (AC, DC or Express Power Pairs).</p>	
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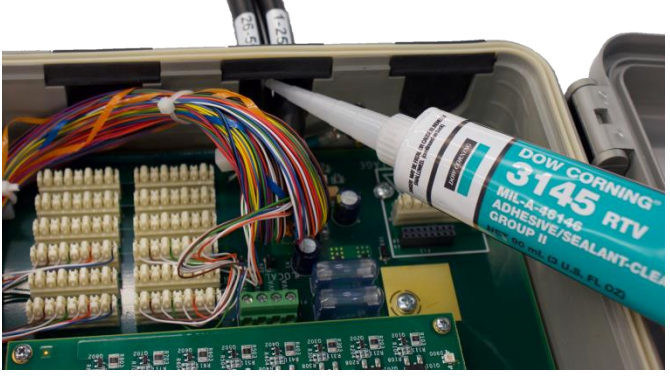
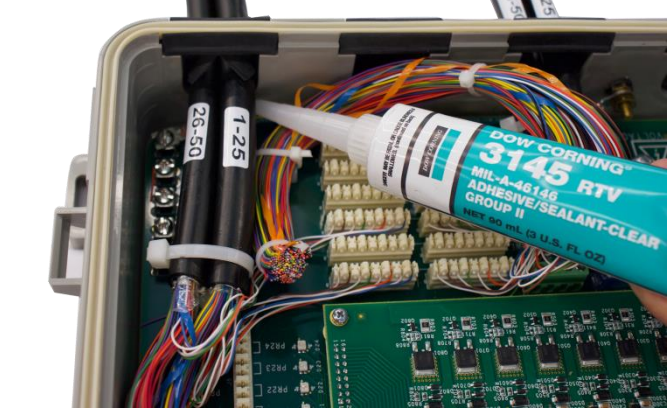



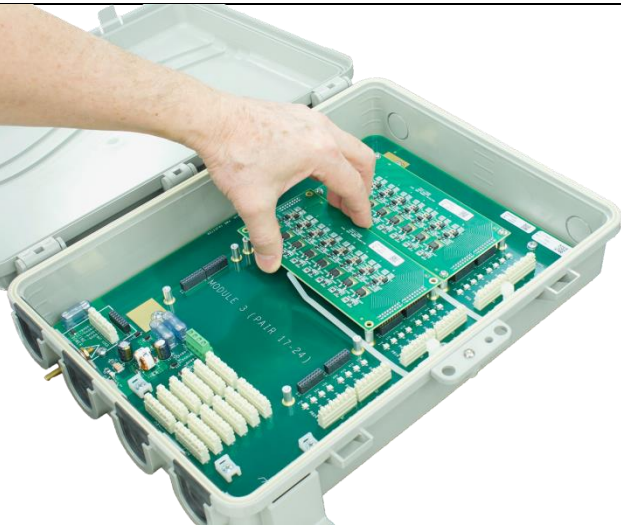
<p>Step 2: apply a sealing silicone to prevent water infiltration through the opening of the rubber grommet used for the cable binders with POTS pairs.</p>	
<p>Step 3: apply a sealing silicone to prevent water infiltration through the opening of the rubber grommet used for the BRX Power Pairs.</p>	

Table 8: Applying a Silicon Sealant to the rubber grommets in use

3.6 Installing additional BRX-PWR- M Module(s)

When initially installing an 8-pair or 16-pair version of the BRX Power Injector, it is possible to install one or two additional 8-pair BRX-PWR- M modules. The BRX-PWR-M can be “hot” inserted. There is no need to power down the BRX Power Injector.

<p>Step 1: The BRX Power Injector can house three (3) BRX-PWR-M modules. Each BRX-PWR-M provides power to 8 pairs. You can use the available slots labeled as Module 2 (Pair 9-16) and Module 3 (Pair 17-24) to install additional BRX-PWR-M module(s).</p>	
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<p>Step 2: the BRX-XLR-M module ships with four (4) mounting screws.</p>	
<p>Step 3: when installing the BRX-PWR-M module, make sure you align the connector on the bottom surface of the BRX-PWR-M with the connectors on the motherboard of the BRX Power Injector.</p>	
<p>Step 4: insert the BRX-PWR-M and make sure you line-up the mounting screw holes with the posts on the motherboard.</p>	

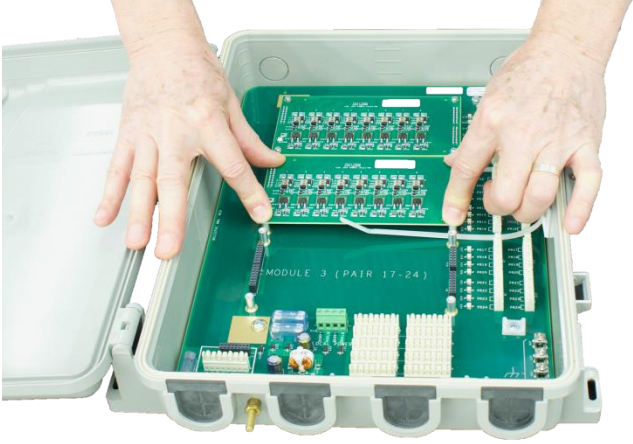
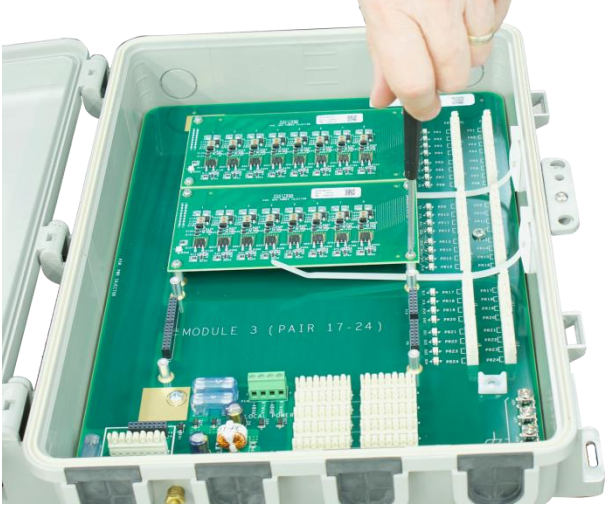
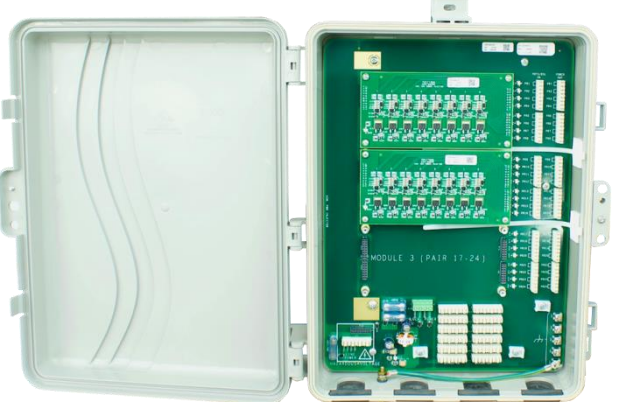
<p>Step 5: apply gentle pressure to make sure the BRX-PWR-M is making good contact with the matching connectors on the motherboard.</p>	
<p>Step 6: use the four (4) mounting screws to secure the BRX-PWR-M to the motherboard.</p>	
<p>Step 7: the newly installed BRX-PWR-M is now ready to power eight (8) additional pairs to the DSLAM.</p>	

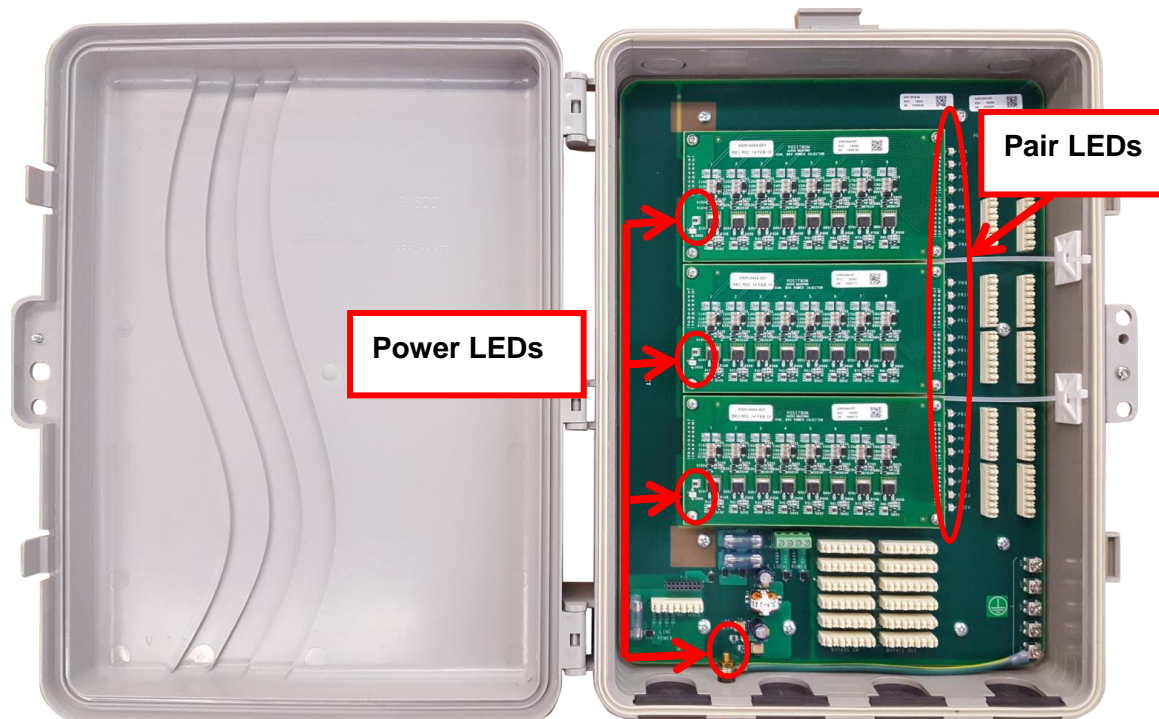
Table 9: Installing additional BRX-PWR-M modules in BRX Power Injector

4 BRX Power Injector Visual Indicators and Troubleshooting Guidelines

The BRX Power Injector incorporates Visual Indicators (or Status LEDs) to provide a quick indication about the operation of the device. This section incorporates troubleshooting guidelines to assist you in resolving issues that may arise.

4.1 LED Descriptions

The BRX Power Injector incorporates status LEDs to confirm its proper operation and report any problems with the loops.



Power LED (main board and modules)	
Off	No Power Source
Green	Power Source present

Table 10: Power LED

PAIR LED	
Off	No current (DC load), less than 2mA detected on the pair (no BRX present)
Green	Current (DC load) higher than 2mA but less than 35mA detected (BRX present)
Amber	Current overload (DC load), over 35mA detected
Red	Current overload protection activated (Pair short)

Table 11: BRX Power Pair Status LED

4.2 Troubleshooting Steps for the BRX Power Injector

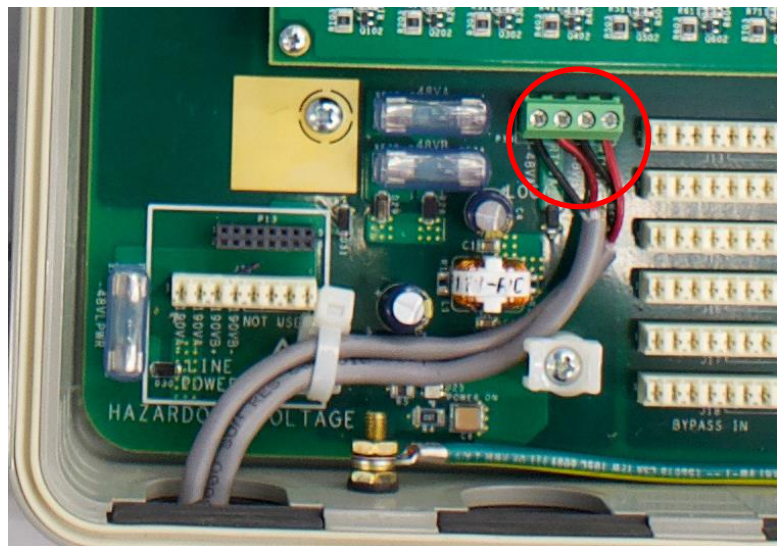
You can follow the following steps to troubleshoot problems with the BRX Power Injector.

SYMPTOM #1: The BRX Power Injector does not have power. This is indicated by the LED (Visual Indicator D25) being off.

Case #1: Local -48Vdc Power improperly wired

The BRX Power Injector supports a redundant -48Vdc power input. Make sure that the black (live) -48Vdc wire connects to the **-48VA** and that the red (return) wire connects to the **-48VRTNA** for the first DC Power Cable. For the optional second DC Power cable, make sure that the black (live) -48Vdc wire connects to the **-48VB** and that the red (return) wire connects to the **-48VRTNB**.

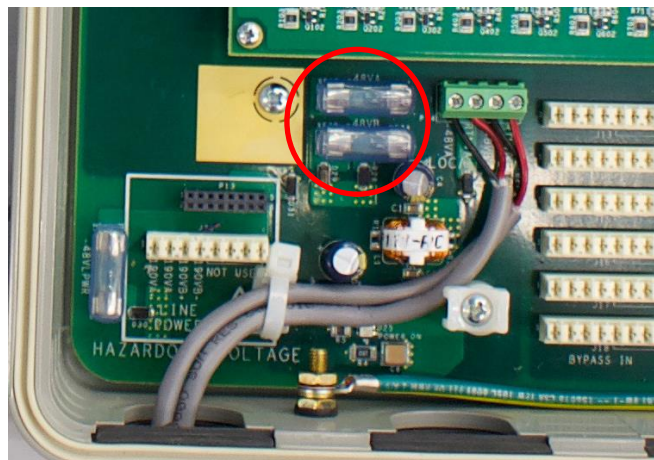
NOTE: There is a protection mechanism in place to prevent any damage to the circuitry of the BRX Power Injector if you inadvertently invert the wires.



Case #2: Local -48Vdc Power Protection Fuse blown:

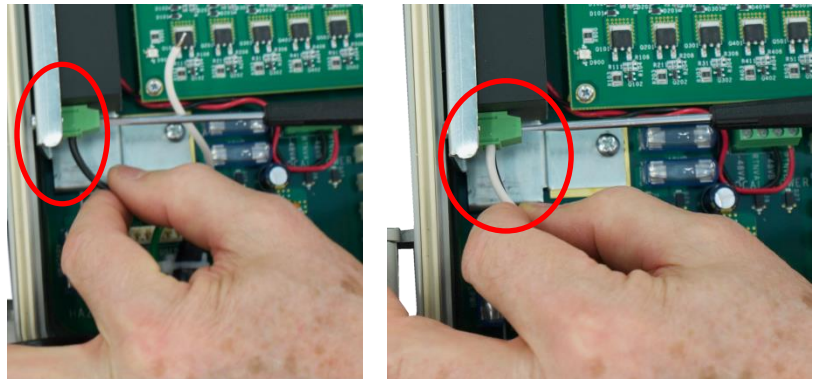
The first DC Power Input (**-48VA**) is protected by fuse **48VA** (F1) while the second DC Power Input (**-48VB**) is protected by Fuse **48VB** (F2).

You should inspect each fuse for damage. Replace with Cartridge Fuse 5 mm x 20 mm 1A/250V Fast Acting (Litefuse 0217001.MXP or similar)



Case #3: Local 110-220Vac Power: make sure the AC Power Cable is properly connected. The black wire (live) shall connect to the **AC/L** wiring post. The white wire (**neutral**) shall connect to the **AC/N** wiring post.

You should then make sure that the local AC power source is ON. If not, verify that the circuit breaker has not been tripped open. If in doubt, you should refer to a qualified electrician

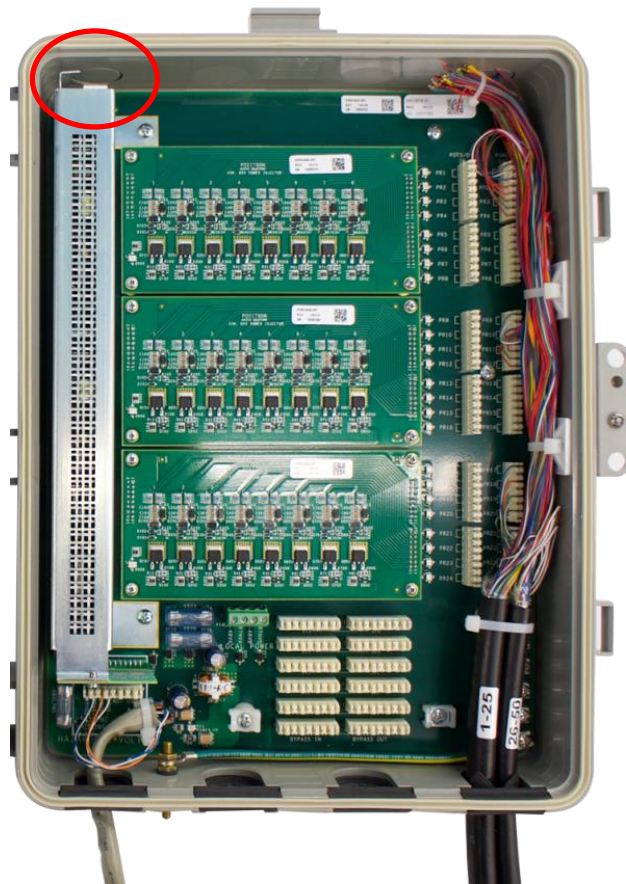


Case #4: Express Power Pairs ($\pm 190Vdc$):

Make sure that the Power Status LEDs at the top end of the factory-installed GE or ALPHA down converter module is ON. If it is OFF, you should inspect fuse F3 for damage and replace it with a Cartridge Fuse 5 mm x 20 mm 1A/250V Fast Acting (Lifefuse 0217001.MXP or similar).

If the fuse is OK, verify that the Express Power pairs are properly inserted in the punch-down block. When using two (2) Express Power pairs, make sure that the Tip & Ring signals of pair #1 are not mixed with pair #2.

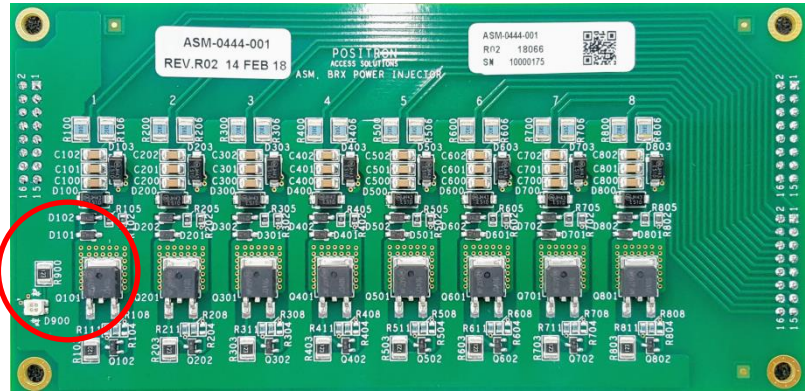
Otherwise, please review the installation step for the RFT-V Express Power feed in the previous section.



SYMPTOM #2: A BRX-PWR-M module is not functioning. This is indicated by the Power LED (D900) on the BRX-PWR-M off.

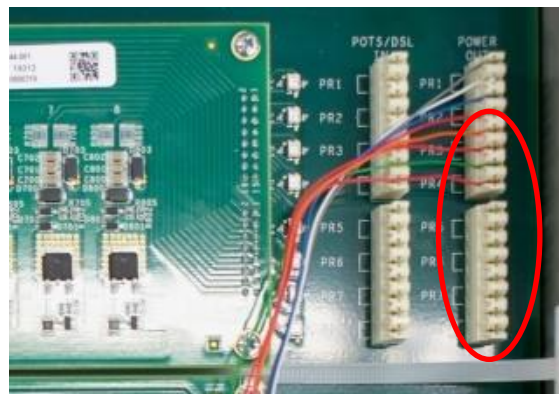
Case #5: No power to the BRX-XLR-M module

The Power Status LED (D900) on the BRX-PWR-M is off. Verify that the BRX-PWR-M is installed properly and secured with the four (4) installation screws. If this is the case, go to Symptom #1 above and make sure the power cabling to the BRX Power Injector is properly installed and that the local (-48Vdc or 112-220VAc) power source is activated. If using RFT-V, make sure there is current on the Express Power pairs.

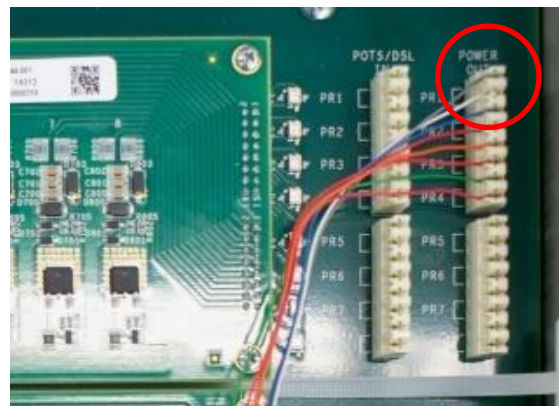


SYMPTOM #3: The status LED of a BRX Power Pair is OFF when it should be ON

Case #1: The pair is not properly inserted in the punch-down connector. Make sure the pair is pushed all the way into the punch-down block to make a solid contact with the BRX-PWR-M module pair.



Case #2: the pair is not punched in the right **POWER OUT** row. Do not punch-down blocks under the **POTS/DSL** header, this is reserved for a potential future enhancement.



Case #3: the pair has an **open** path in either the TIP or RING wire. Verify the pairs are properly inserted in the punch-down block. You should also verify the pairs are properly connected to the cross-connect and / or the POTS port of the DSLAM.

Case #4: the pair is mixed with a POTS pair that has -48Vdc battery on it. This may override the output from the BRX-PWR-M module. Make sure there is no wiring problem with the pair as it enters into the cross-connect or the DSLAM POTS port.

Case #5: the pair has its TIP and RING signal mixed with another pair. This is something referred to as a SPLIT pair. Make sure the pair is properly inserted in the punch-down block. You should also verify the pairs are properly connected to the cross-connect and / or the POTS port of the DSLAM.

SYMPTOM #4: The status LED of a BRX Power Pair is RED

Case #1: pair has a shorted path between TIP and RING. Make sure the pair is properly inserted in the punch-down block. You should also verify the pairs are properly connected to the cross-connect and / or the POTS port of the DSLAM.

Case #2: the pair has its RING signal shorted to the Ground (GND). Make sure the pair is properly inserted in the punch-down block. You should also verify the pairs are properly connected to the cross-connect and / or the POTS port of the DSLAM.

SYMPTOM #5: The status LED of a BRX Power Pair is AMBER

Case #1: pair sees an overload condition that makes it sink current higher than 35mA. This may be caused by the following:

- Damaged pair in the binder, potentially a bad insulation
- Bad Modem
- Bad Telephone
- Improper device on the pair

SYMPTOM #6: The status LED of a BRX Power Pair is ON (GREEN, AMBER or RED) and there is no pair connected

Case #1: The BRX-PWR-M appears to be defective and you need to replace it. Please contact Positron Access for a Return Merchandise Order (see procedure at the end of this document)

SYMPTOM #6: A POTS pair has lost its Dial Tone when connected via the BRX Power Injector POTS BYPASS connectors

Case #1: A POTS pair that used to have a Dial Tone before its connection to the POTS BYPASS connectors of the BRX Power Injector, no longer has a Dial Tone.

Make sure that the POTS pair from the Voice Switch (CO) is properly inserted in the Punch-down Block connector in the **BYPASS IN** (left section) You should then make sure the POTS pair is also properly connected in the corresponding Punch-down block in the **BYPASS-OUT** (right section).

You should also make sure the pair is properly connected into the RJ21 connector for the cable binder terminating in the POTS port of the DSLAM.

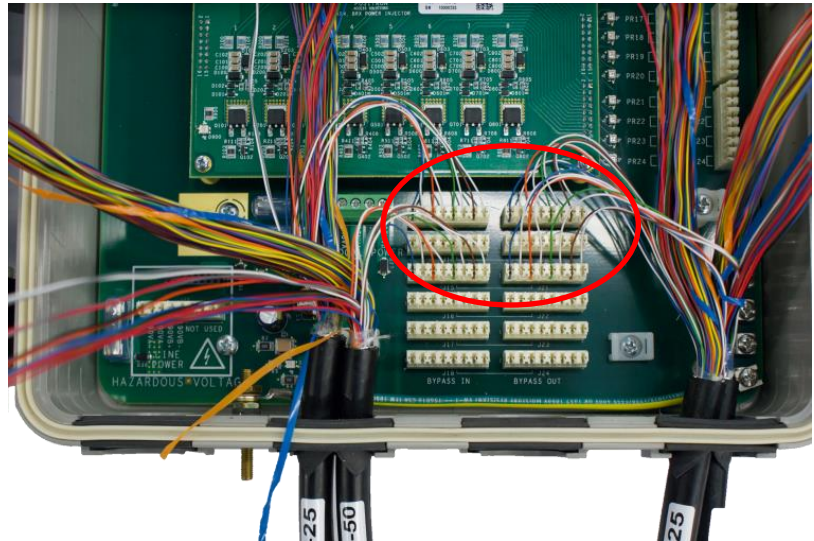


Table 12: Troubleshooting the BRX Power Injector

5 Using BRX Power Injector with Popular DSLAM Platforms

The BRX Power Injector is designed to connect seamlessly to the POTS ports of any 3rd party DSLAM platform. **NOTE:** You should be aware that the pin-out of the POTS Amphenol ports of 3rd party DSLAMs may be specific and differ from the standard pin-out.

Please contact Positron Access Solutions directly if you are planning to connect the BRX Power Injector to a DSLAM model not covered in this document.

NOTE: DSLAMs with combo ports will generate the POTS dial tone and the -48Vdc sealing current internally and do not require a BRX Power Injector.

5.1 Adtran 1148V

The Adtran 1148 family uses a pair of Amphenol connectors to connect to the telephone switch located at the CO that provides the dial tone on each pair along with the -48Vdc sealing current.

The POTS Splitter integrated in the Adtran 1148-series DSLAM will merge the -48Vdc from the POTS pairs with the DSL signal from the DSLAM onto the DSL ports.

NOTE: In order for the -48Vdc current to flow through the DSLAM, it is important to insert a 5-pin Gas Tube Discharge device (Bourns or similar) in the corresponding socket for each pair requiring BRX amplification.

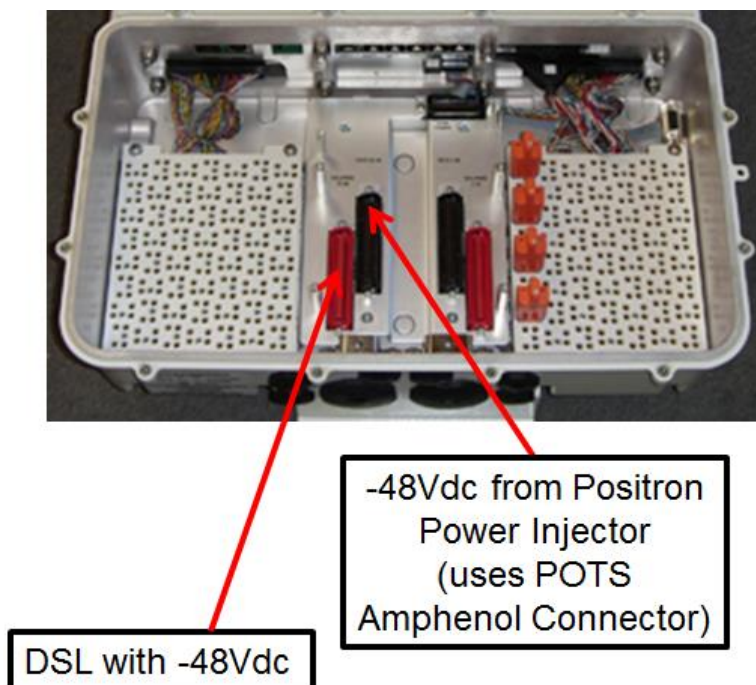


Figure 7: Connecting the BRX Power Injector to an Adtran 1148 series DSLAM

5.2 Calix E3-48-r2

The Calix E3-48 DSLAM family uses a pair of Amphenol connectors to connect to the telephone switch located at the CO that provides the dial tone on each pair along with the -48Vdc sealing current.

The POTS Splitter integrated in the Calix E3-48 series DSLAM will merge the -48Vdc from the POTS pairs with the DSL signal from the DSLAM onto the DSL ports.

NOTE: In order for the -48Vdc current to flow through the DSLAM, it is important to insert a 5-pin Gas Tube Discharge device (Bourns or similar) in the corresponding socket for each pair requiring BRX amplification.

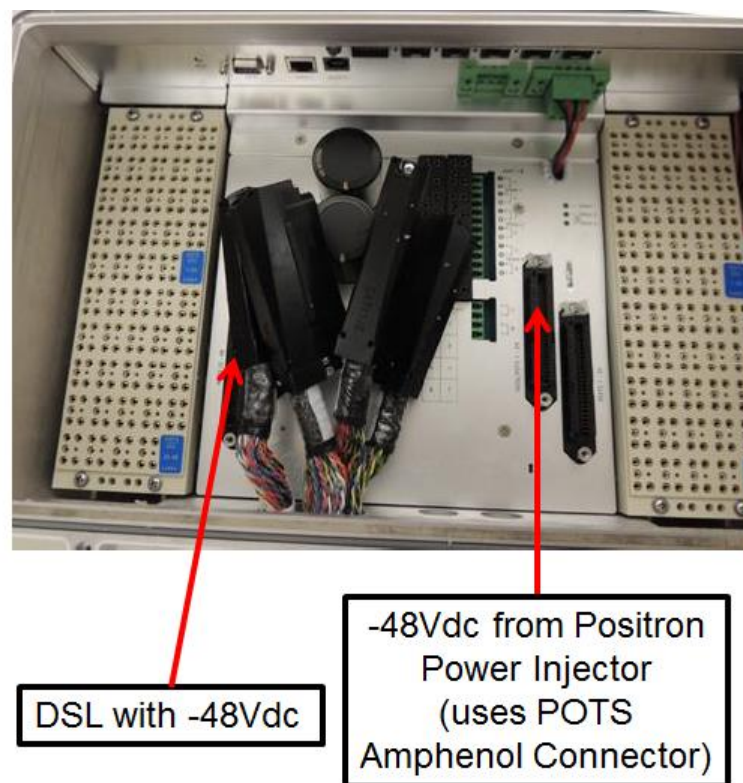


Figure 8: Connecting the BRX Power Injector to a Calix E3-48-r2 DSLAM

5.3 Nokia 7330 ISAM

The Nokia 7330 ISAM family uses a dedicated blade to act as the POTS splitter. The CO ports are used to connect to the telephone switch located at the CO that provides the dial tone on each pair along with the -48Vdc sealing current.

The POTS Splitter module of the Nokia 7330 ISAM will merge the -48Vdc on the CO pairs with the DSL signal from the DSLAM onto the DROP Ports.

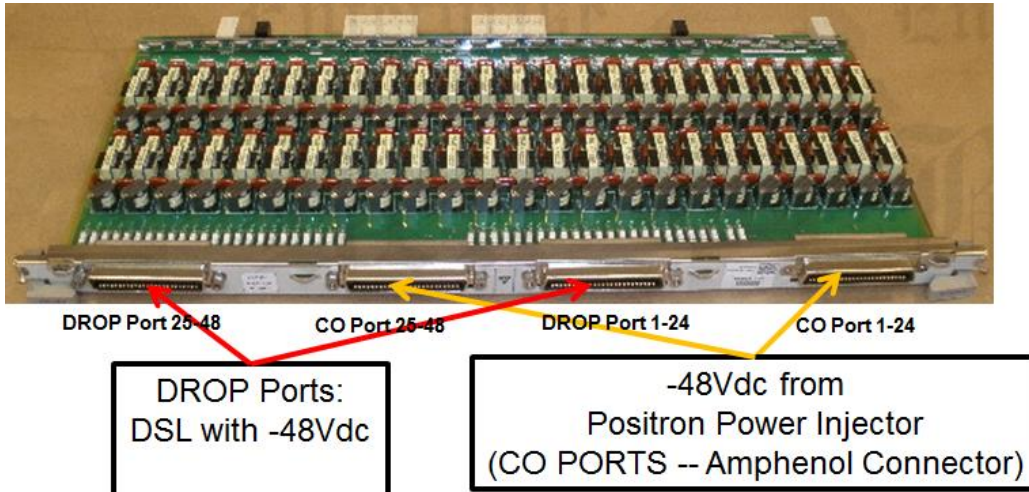


Figure 9: Connecting the BRX Power Injector to a Nokia 7330 ISAM POTS splitter

5.4 Huawei MA5116S

The Huawei MA 5116S DSLAM family uses a pair of Amphenol connectors to connect to the telephone switch located at the CO that provides the dial tone on each pair along with the -48Vdc sealing current.

The POTS Splitter integrated in the Huawei MA 5116S series DSLAM will merge the -48Vdc from the POTS pairs with the DSL signal from the DSLAM onto the DSL ports.

NOTE: In order for the -48Vdc current to flow through the DSLAM, it is important to insert a 5-pin Gas Tube Discharge device (Bourns or similar) in the corresponding socket for each pair requiring BRX amplification.

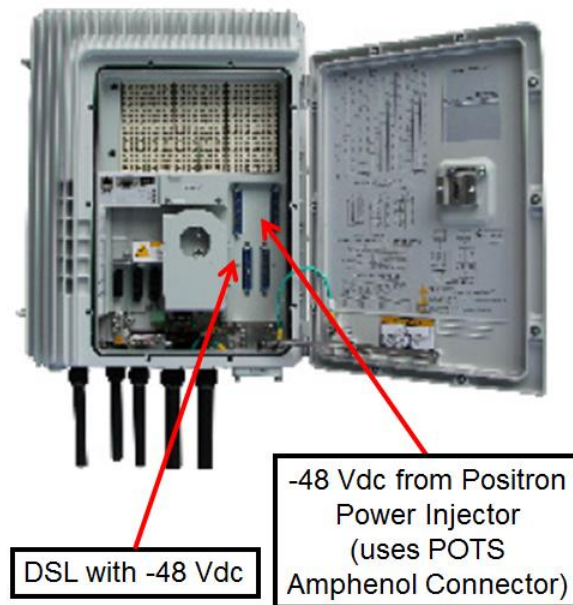


Figure 10: Connecting the BRX Power Injector to a Huawei MA5116S Series DSLAM

6 Regulatory Compliance and Safety

FCC Declaration of Conformance

The BRX Power Injector models comply with part 15 class A of the FCC Rules. Operation is subject to the following two conditions (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

15 Class A Information

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates; uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Industry Canada

The BRX Power Injector models comply with ICES-003 of the Industry Canada Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Les produits BRX Power Injector sont conformes à la norme NMB-003 d'Industrie Canada. Leur fonctionnement est sujet aux deux conditions suivantes: (1) le dispositif ne doit pas produire de brouillage préjudiciable, et (2) ce dispositif doit accepter tout brouillage reçu, y compris un brouillage susceptible de provoquer un fonctionnement indésirable.

Europe - EU Declaration of Conformity

The BRX Power Injector models comply with the essential requirements of the EMC Directive 2014/30/EU and Low Voltage Directive 2014/35/EU. The following test methods have been applied in order to prove presumption of conformity with the essential requirements of the EMC Directive 2014/30/EU and Low Voltage Directive 2014/35/EU:

CSA C22.2#60950-1: Issued: 2007/03/27 Ed: 2 (R2012) Information Technology Equipment Safety Part 1: General Requirements; Amendment 1: 2011, Amendment 2: 2014

UL 60950-1: Issued: 2007/03/27 Ed: 2 Rev: 2014/10/14 Information Technology Equipment Safety Part 1: General Requirements

IEC 60950-1: Issued: 2013/05/28 Ed: 2.2 Information Technology Equipment - Safety - Part 1: General Requirements; Consolidated Edition. Ed. 2: 2005

IEC 60950-22 Issued: 2005/10/20 Ed: 1 Information Technology Equipment -Safety -Part 22: Equipment to be Installed Outdoors

CSA 22.2 No. 60950-22-07 (R2016) Issued: 2007/04/23 Ed: 1 Information Technology Equipment - Safety -Part 22: Equipment to be Installed Outdoors (Bi-National standard, with UL 60950-22)

UL 60950-22 Issued: 2007/04/23 Ed: 1 Information Technology Equipment -Safety -Part 22: Equipment to be Installed Outdoors

EN 55022: 2010: Information technology equipment - Radio disturbance characteristics Limits and methods of measurement
 EN 55024: 2010: Information technology equipment - Immunity characteristics - Limits and methods of Measurement
 EN 55032: 2012: Electromagnetic compatibility of multimedia equipment - Emission Requirements

English	Hereby, Positron Access Solutions Corp. declares that the BRX Power Injector models are in compliance with the essential requirements and other relevant provisions of Directive 2014/30/EU and 2014/35/EU.
Français	Par la présente Positron Access Solutions Corp. déclare que les modèles BRX Power Injector sont conformes aux exigences essentielles et aux autres dispositions pertinentes selon les normes 2014/30/EU and 2014/35/EU.

Safety

The following BRX Power Injector models conforms to IEC 60950-1/UL 60950-1/CSA C22.2 #60950-1 and IEC 60950-22/UL 60950-22/CSA C22.2 #60950-22 standards:

- BRX-PWR-8, BRX-PWR-16, BRX-PWR-24, BRX-PWR-8-AC, BRX-PWR-16-AC, BRX-PWR-24-AC, BRX-PWR-8-A, BRX-PWR-16-A, BRX-PWR-24-A, BRX-PWR-8-G, BRX-PWR-16-G and BRX-PWR-24-G

Les modèles BRX Power Injector suivants sont conformes aux normes IEC 60950-1/UL 60950-1/CAN C22.2 #60950-1 et IEC 60950-22/UL 60950-22/CAN C22.2 #60950-22.

- BRX-PWR-8, BRX-PWR-16, BRX-PWR-24, BRX-PWR-8-AC, BRX-PWR-16-AC, BRX-PWR-24-AC, BRX-PWR-8-A, BRX-PWR-16-A, BRX-PWR-24-A, BRX-PWR-8-G, BRX-PWR-16-G et BRX-PWR-24-G

Precautions and warnings

Be careful when splicing the BRX Power Injector pairs to the twisted telephone cable pairs. Dangerous voltage can be present on the pairs. Splicing should be done by a qualified person. Never splice pairs during a lightning storm.

The equipment must be connected to a protective ground in accordance with the instructions provided in this manual. Always ensure that BRX Power Injector units are connected to a chassis ground path of 25 ohms or less to avoid damage to the equipment from lightning strikes and other electrical surges.

Use of this product in a manner other than defined in this installation guide may cause damage to equipment or injury to personnel.

The BRX Power Injector products are intended for installation in Restricted Access Locations only whether installed indoor or outdoor.

7 Warranty and Customer Service

Positron Access Solutions will replace or repair this product within the warranty period if it does not meet its published specifications or fails while in service. Warranty information can be found in your Positron Access customer web portal: <http://www.positronaccess.com/Portal.php>

Positron Access Solutions Sales Pricing/Availability and Technical Support

US and Canada: 1-888-577-5254

International: +1-514-345-2220

customerservice@positronaccess.com

Repair and Return Address

Contact Customer Service prior to returning equipment to Positron.

Telephone US and Canada: 1-888-577-5254 option 6

International: +1-514-345-2220 option 6