



PoE Extender

Hardware Manual



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Safety Notice

In support of the EC directive 2006/95.EC, this notice contains safety information important for the correct installation and operation of this equipment.

Note, the term SELV (Safety Extra Low Voltage) used in this addendum is defined strictly in accordance with EN 60950

Electrical Safety

1. This equipment is intended for installation by trained service personnel only.
2. The safety requirements for Information Technology equipment is only valid if the building installation is in compliance with relevant national or international safety standards and in accordance with good engineering practice.
3. Remove the DC supply from the supply cable at source before changing supply connections to this product.
4. For safety requirements it is necessary to connect the earth point on the product to a reliable earth. This is a discharge path in the event of surges or lightning events on the supply or Ethernet cables.
5. Unless otherwise specifically stated in the equipment installation manual, all data and control ports are connected to SELV/NEC Class 2 conformant circuits inside the enclosure. To maintain all the ports on the equipment at SELV/NEC Class 2, it is essential that if any connection is made to any of these ports by other equipment, the other equipment must maintain its relevant port at SELV/NEC Class 2.

For products that are rack mounted:

6. For a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Ensure that the equipment environmental temperature does not exceed the maximum ambient temperature specified by the manufacturer. Ensure that air flow required for safe operation of the equipment is not compromised.
7. Mounting of the equipment in the rack must not cause a topple or other mechanical hazard.
8. Ensure that the accumulative power requirements of equipment installed in the rack do not exceed the power supply wiring capacity of the rack. Use the equipment nameplate ratings to establish total requirements.
9. Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

General

10. Unless otherwise stated in the equipment manual, there are no user serviceable parts inside this equipment.
11. If this equipment has a laser, observe the precautions stated in the installation manual.
12. Ultimate disposal of this equipment must be carried out according to relevant national laws.
13. The equipment should be installed by suitably trained personnel, and installation should follow good working practice.

Consigne de sécurité

À l'appui de la directive de la Commission européenne n° 2006/95.EC, cet avis comporte des informations capitales pour procéder à une installation et à exploitation en bonne et due forme de cet équipement de sécurité.

À noter, le terme SELV (Safety Extra Low Voltage) utilisé dans le présent additif est défini le strict respect des exigences de la norme EN 60950.

Sécurité Electrique

1. Cet équipement doit être installé par du personnel d'entretien formé à la tâche.
2. Les exigences de sécurité équipements de technologies de l'information sont uniquement valables si l'installation du bâtiment est conforme aux normes de sécurité nationales ou internationales pertinentes et aux bonnes pratiques d'ingénierie.
3. Veuillez débrancher l'alimentation en c.c. du câble d'alimentation à la source avant de changer les raccordements d'alimentation à ce produit.
4. Pour les exigences de sécurité, il est nécessaire de connecter le point de mise à la terre au produit via une terre fiable. Il s'agit d'un trajet de décharge prévu en cas de surtensions ou de phénomènes de foudre sur l'alimentation ou les câbles Ethernet.
5. Sauf indication contraire figurant dans le guide d'installation de l'équipement, l'ensemble des données et ports de contrôle sont raccordés à des circuits conformes à la de classe 2 SELV/NEC à l'intérieur de l'enceinte. Pour maintenir tous les ports de l'équipement en classe 2 SELV/NEC, il est indispensable qu'en cas de raccordement établi vers l'un quelconque de ces ports par tout autre équipement, ce dernier puisse maintenir son port correspondant en classe 2 SELV/NEC.

Pour Les Produits Montés en Rack:

6. Pour un rack fermé ou dispositif à plusieurs racks, la température ambiante de fonctionnement de l'environnement du rack peut être supérieure à celle ce la température ambiante. Assurez-vous que la température de l'environnement de l'équipement ne soit pas supérieure à la température ambiante maximale indiquée par le fabricant. Veiller à ce que le débit d'air nécessaire au bon fonctionnement de l'équipement ne soit pas compromis.
7. Le montage du matériel dans le rack ne doit pas provoquer de basculement ni aucun autre danger mécanique.
8. Veiller à ce que les exigences d'alimentation cumulées de l'équipement installé dans le rack ne soient pas supérieures à la capacité de câblage d'alimentation du rack. Utilisez les cotes de la plaque signalétique de l'équipement pour mettre en place toutes les exigences.
9. Il convient de maintenir une mise à la terre fiable d'équipement monté en rack. Il convient de faire particulièrement attention aux raccordements d'alimentation autres que ceux directement en contact avec le circuit de dérivation (p. ex., utiliser des bars d'alimentation).

Dispositions Générales

10. Sauf indication contraire figurant dans le manuel de l'équipement, ce dernier ne comporte aucune pièce susceptible de réparation par l'utilisateur de l'équipement.
11. Si cet équipement comporte un dispositif laser, veuillez respecter les précautions indiquées à cet égard dans le guide d'installation.
12. La suppression définitive de cet équipement devra être effectuée conformément aux lois nationales pertinentes.
13. L'équipement doit être installé par du personnel parfaitement qualifié, et l'installation devra être conforme aux bonnes pratiques.

Sicherheitshinweis

Im Rahmen der EU-Richtlinie 2006/95.EC enthält dieser Hinweis wichtige Sicherheitsinformationen für die korrekte Installation und den Betrieb dieser Geräte.

Beachten Sie, dass der hier verwendete Begriff SELV (Safety Extra Low Voltage - Schutzkleinspannung) streng nach EN 60950 definiert ist.

Elektrische Sicherheit

1. Dieses Gerät ist ausschließlich für den Einbau durch geschultes Servicepersonal vorgesehen.
2. Diese Sicherheitsanforderungen für IT-Ausrüstung sind nur dann gültig, wenn die Gebäudeinstallation den einschlägigen nationalen und internationalen Sicherheitsstandards sowie den allgemein anerkannten Regeln der Technik entspricht.
3. Vor Änderung der Versorgungsanschlüsse dieses Geräts muss die DC-Stromversorgung zu den Versorgungskabeln getrennt werden.
4. Aus Sicherheitsgründen muss der Erdungspunkt des Produktes mit einer zuverlässigen Erde verbunden werden. Diese dient als Entladungsweg bei Überspannungen oder Blitzereignissen, die sich auf Versorgungs- oder Ethernet-Kabel auswirken.
5. Sofern im Installationshandbuch nicht ausdrücklich anders vermerkt, sind alle Datenschnittstellen und Steueranschlüsse mit SELV/NEC Class 2 konformen Schaltkreisen im Inneren des Gehäuses verbunden. Damit alle Ports des Geräts mit SELV/NEC Class 2 konform bleiben, ist es wichtig, dass die Ports verbundener Geräte ebenfalls SELV/NEC Class 2 entsprechen.

Für Geräte, die in einem Rack montiert werden:

6. Bei Einbau in eine geschlossene oder aus mehreren Geräten bestehende Rack-Einheit kann die Betriebsumgebungstemperatur im Rack höher als die Raumtemperatur sein. Stellen Sie sicher, dass die Umgebungstemperatur der Geräte die vom Hersteller angegebene maximale Umgebungstemperatur nicht überschreitet. Achten Sie darauf, dass der für den sicheren Betrieb des Geräts erforderliche Luftstrom nicht beeinträchtigt wird.
7. Bei Montage der Geräte in einem Rack darf keine Gefahr durch Kippen oder andere mechanische Einflüsse entstehen.
8. Stellen Sie sicher, dass der Gesamtleistungsbedarf der im Rack installierten Geräte die Stromversorgungskapazität des Racks nicht überschreitet. Nutzen Sie die Angaben auf den Typenschildern, um die Gesamtlast zu ermitteln.
9. Es muss eine zuverlässige Erdung der Rack-Geräte gegeben sein. Besondere Aufmerksamkeit gilt dabei der indirekten Anbindung an Zweigstromkreise (z. B. Verwendung von Mehrfachsteckerleisten).

Allgemeines

10. Sofern nicht anders im Gerätehandbuch angegeben, enthält dieses Gerät keine zu wartenden Teile.
11. Wenn dieses Gerät mit einem Laser ausgestattet ist, beachten Sie die in der Installationsanleitung angegebenen Vorsichtsmaßnahmen.
12. Die Entsorgung dieses Geräts muss nach den einschlägigen nationalen Rechtsvorschriften erfolgen.
13. Das Gerät muss durch entsprechend geschultes Personal installiert werden. Bei der Installation ist auf gute Arbeitspraxis zu achten.

CE NOTICE

Warning: This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

FCC NOTICE

Note: 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 their expense.

Modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment under FCC rules.

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la class A est conforme a la norme NMB-003 du Canada

Return Product Procedure

If the unit is found to be defective please contact the Technical Support Line on +44-1745-589223 or +44-1745-589345 FAX. An RMA number will be issued. The unit should be returned to CommScope for repair or replacement.

Product user Guide

This document details the physical features of the PoE Extender.

1. Introduction

The PoE Extender is a component of CommScope®'s powered fiber cable system, a hybrid optical fiber/copper cable system for remote powering of network access devices. It is designed to simply and easily function with the powered fiber cable system to extend the distance of PoE (Power over Ethernet) enabled devices. The PoE Extender encompasses four primary elements:

1. Environmentally sealed closure
2. Electrical power management
3. Circuit protection electronics
4. Optical to electrical Media Conversion

When coupled with any standard NEC Class II 48V DC power supply CommScope's Powered Fiber Cable system can power and communicate with PoE standard devices at far greater distances than "category style" copper cabling systems which are typically limited to 90 meters, and still meet NEC Class II and SELV standards, eliminating the need for qualified electricians during installation.

The PoE Extender also contains circuit protection and DC/DC conversion electronics which automatically condition electrical voltage to the correct level needed for PoE input to the device under load (such as a small cell, high definition security camera, Wi-Fi hot spot, etc).

Why Protect Remotely Powered Circuits?

Long length DC low voltage electrical systems are at increased risk of:

- AC cross from high voltage cables
- Higher current in the event of a short circuit
- Strong electrical surges due to lightning strikes or other EM events in close vicinity

The PoE Extender provides three levels of electrical protection:

1. Primary Protection:
 - Gas discharge tube - will activate for high voltage surges
 - Protects both differential and common mode
 - GDT component rated to 40kA surge protection
2. Secondary Protection:
 - Metal oxide varistors - operates for slower surges as well as fast surges
 - Protects both differential and common mode
 - MOV components rated to 4.5kA
3. Tertiary Protection:
 - Transient voltage suppressors - works at relatively low/slow surges, adds an extra layer of protection against voltage spikes
 - Protects differential mode only
 - Prevents the voltage from rising above 80-100V

Additional protection elements include:

- Cross-polarity protection to simplify installation - the circuit will work regardless of the input polarity
- AC cross protection:
 - 6A non replaceable fuses (TR5 package)
 - No exposed high voltage pads
- High power inductors used as coordinating elements to maximize energy efficiency
- Sealed enclosure for environmental protection

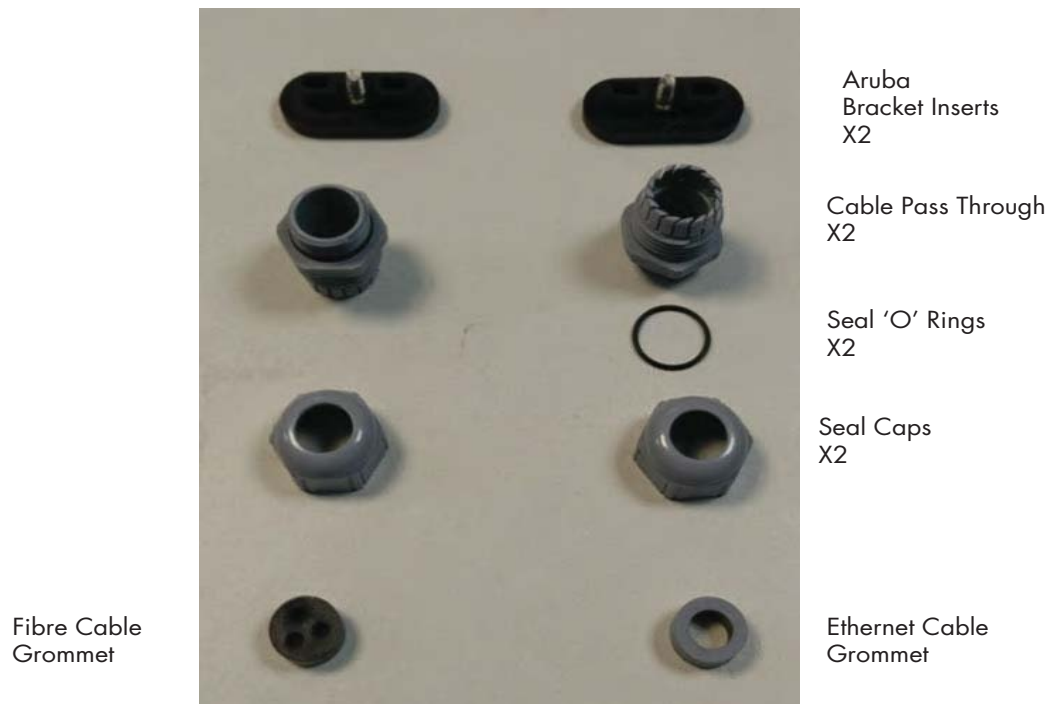
2. Package Contents

PoE Extender

The PoE Extender comes in two versions:

- PFU-P-A-O-001-01 - for use with the Aruba® Networks mounting bracket
- PFU-P-B-O-001-01 - supplied with a CommScope universal wall or pole mount plate

Connectors



Also Required (Not Included)

- 4mm Allen key
- Standard 1000Base-X SFP transceiver (Singlemode or Multimode)
- 20mm or adjustable spanner/wrench
- Phillips screwdriver
- Silicone grease
- Loctite 222
- Torque wrench
- Knife for splitting the fiber cable
- 12 AWG or 2mm diameter wire stripper for 12 AWG cable
- 16 AWG or 1.2mm wire diameter stripper for the 16 AWG cable

- Aruba Networks mounting bracket (AP-270-MNT-V1) - long mount kit for pole/wall mounting.
- Fastenings for CommScope Universal wall/pole mount plate

3. Installation

Installation of the PoE Extender should be completed in the following order.

Connect Ethernet Cable

1. Attach one of the supplied 'O' rings to the short thread on the pass through
2. Thread the seal cap, pass through and ethernet grommet on to the cable as below.

Note: If using a pre-terminated ethernet cable it may be necessary to remove the boot. Some connectors may require cutting and re-terminating after threading through the grommet.



3. Connect the RJ45 to the PoE Extender at the end with the earth connector, with the lock clip facing upwards, as below.



4. Note the Ethernet cable is still loose in the grommet as below.



5. Using the M20 or adjustable spanner/wrench, tighten the pass through against the PoE Extender. Tighten to torque 3.75Nm (33.2 in lbf).



6. Then tighten the cap against the pass through. The recommended torque is 2.50Nm (22.1 in lbf).



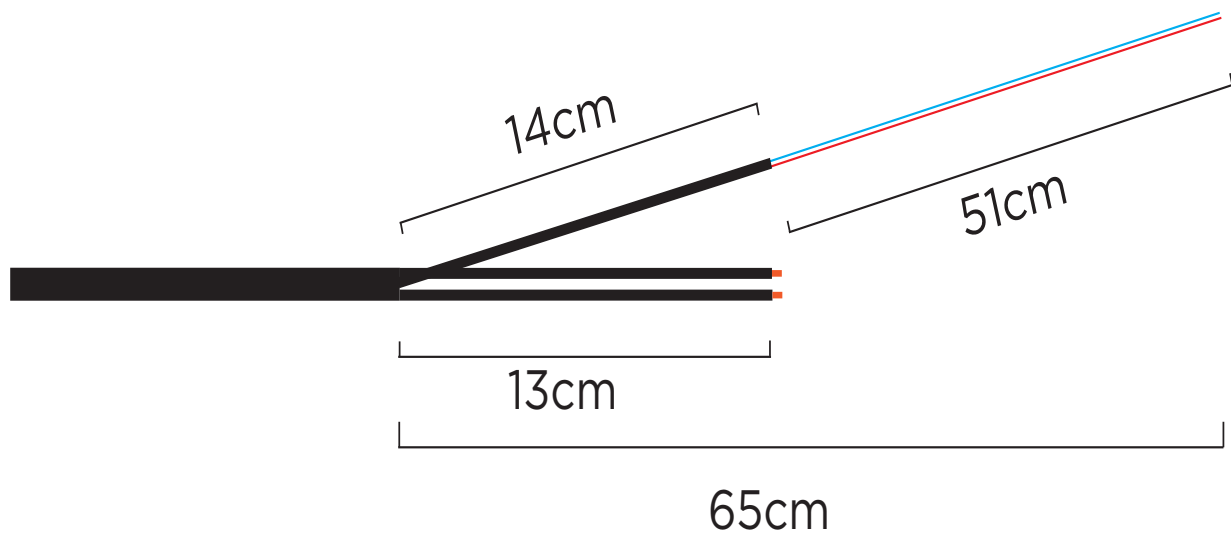
7. Note that the grommet is now tightened against the cable.



Splitting the Powered Fiber Cable

The CommScope Powered Fiber Cable consists of 2 copper power threads and a third containing the fiber threads. You need to separate the three cores to allow the power to be connected to the screw terminals, and the fiber thread to be connected to a fiber terminal, which is then inserted in to the SFP.

The Powered Fiber Cable is design to access using only a typical pair of wire strippers and, optionally, a wire cutter or snip. To split the cable successfully, follow this process:

Cable Split Dimensions**Figure: 3.1 Cable Split Dimensions**

1. Snip the cable end at the indentations in the cable jacket between the center fiber element and the two outer conductor elements.



2. Peel one conductor side away to the desired length (65cm) by hand. See Figure 3.1 for details.



3. While holding the center fiber element in as straight a line as possible, peel the second conductor element away to the desired length.



4. For the 12 AWG cable, use a proper 12 AWG or 2MM diameter wire stripper. For the 16AWG, use a 16 AWG or 1.2mm wire diameter stripper.
5. Use tape or heat shrink to prevent the cables splitting further than the required length.
6. Strip the two copper elements to an appropriate length, just as accessing any copper cable.
7. For the center fiber element, simply place the strippers at the desired strip location, close the wire strippers fully once, then open. Now, by hand you may pull the center element jacket off, revealing the aramid and optical fibers.
8. Remove excess aramid as desired for termination.

Connecting the Powered Fiber Cable to the PoE Extender

1. Attach one of the supplied 'O' rings to the short thread on the pass through.
2. Attach the pass through to the PoE Extender.



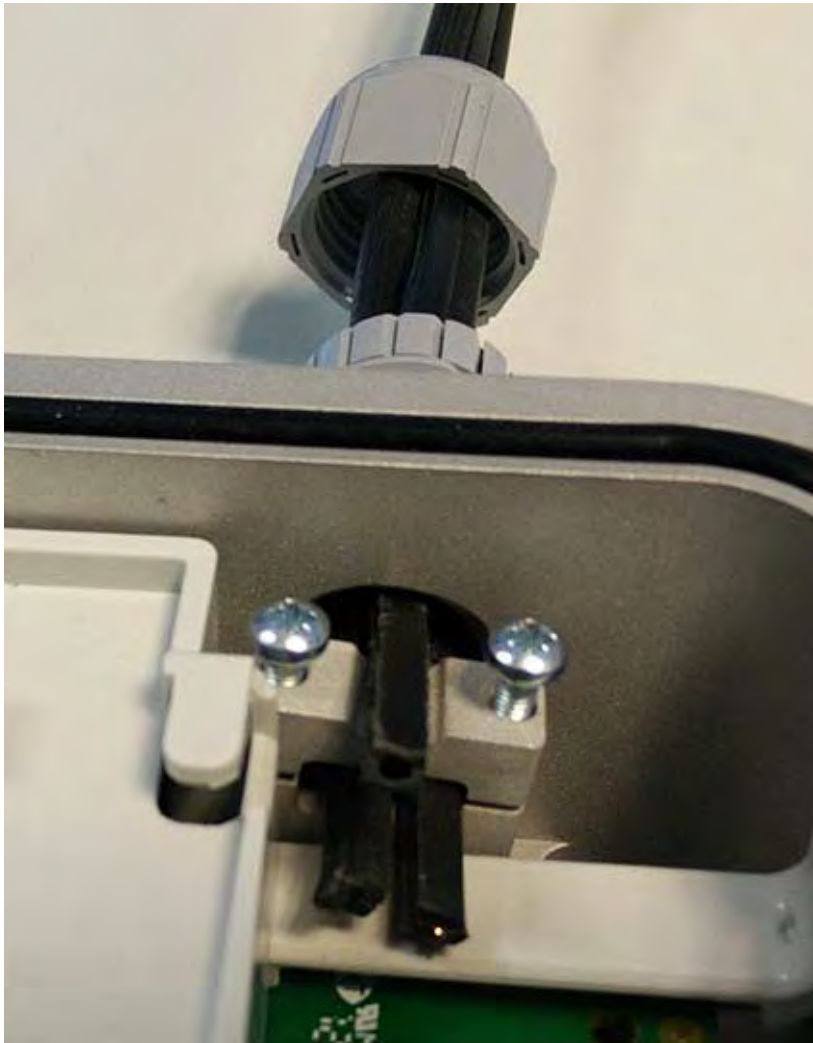
3. Using the M20 or adjustable spanner/wrench, tighten the pass through against the PoE Extender. Tighten to torque 3.75Nm (33.2 in lbf).



4. Thread the screw cap on to the strands, then thread the strands through the supplied grommet. Use some silicone grease on the grommet, which helps pulling the strands through the grommet, and provides a seal against water ingress.



5. When threading the cable through the pass through, ensure the fiber strand is uppermost when pushing the grommet in to the pass through.



6. Loosely screw the clamp over the two power strands, with the fiber strand resting on the top of the clamp.
7. After pulling the 65cm length of split cable through the pass through, tighten the screws on the power strands clamp, using a torque wrench to 1.5Nm (13.3 in lbf).
8. Use tape or heat shrink to prevent the cables splitting further than the required length.

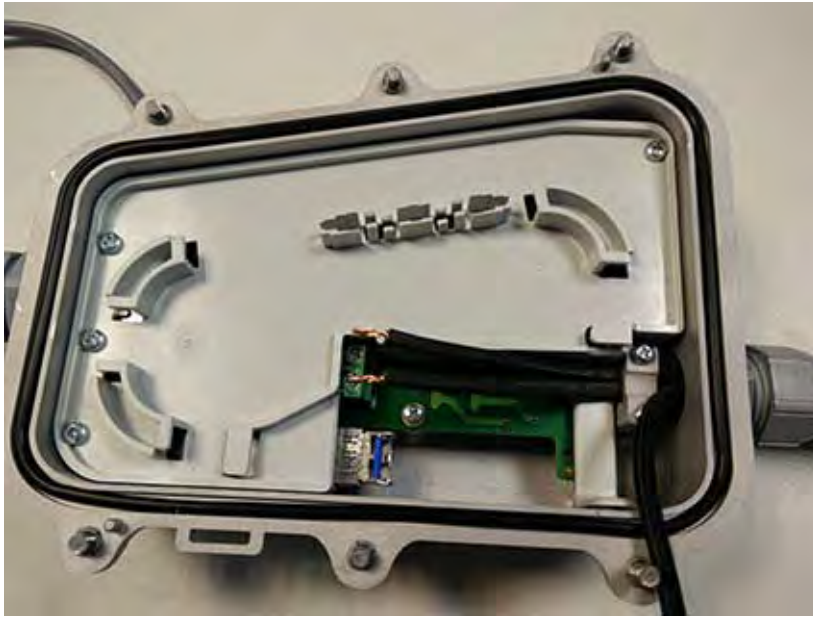
9. Using the M20 or adjustable spanner/wrench, tighten the pass through against the PoE Extender. Tighten to torque 1.75Nm (15.5 in lbf).



Connecting the Power Strands

1. Cut the two power strands to length (approximately 14cm). Remove 5mm of sheath from the two cables.
2. For the 12 AWG cable, use a proper 12 AWG or 2MM diameter wire stripper. For the 16AWG, use a 16 AWG or 1.2mm wire diameter stripper.

3. Use tape or heat shrink to prevent the cables splitting further than the required length.



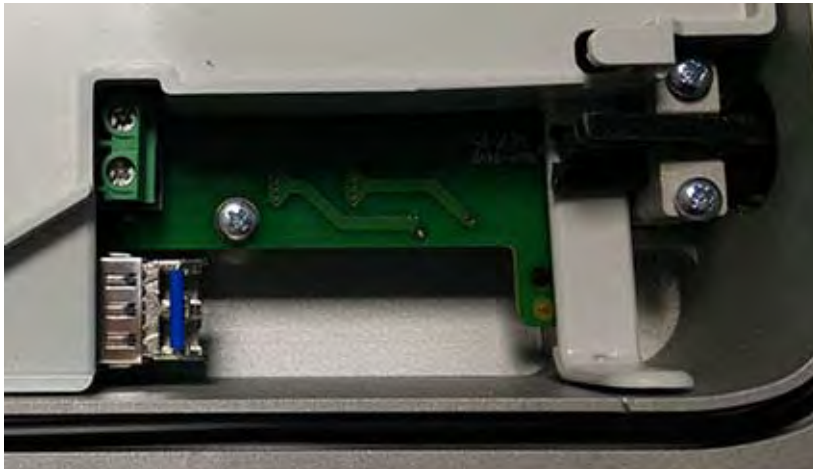
4. Thread the two cables in to the power connectors and tighten the screws.

Note: Due to the cross-polarity protection, the circuit will work regardless of the input polarity.

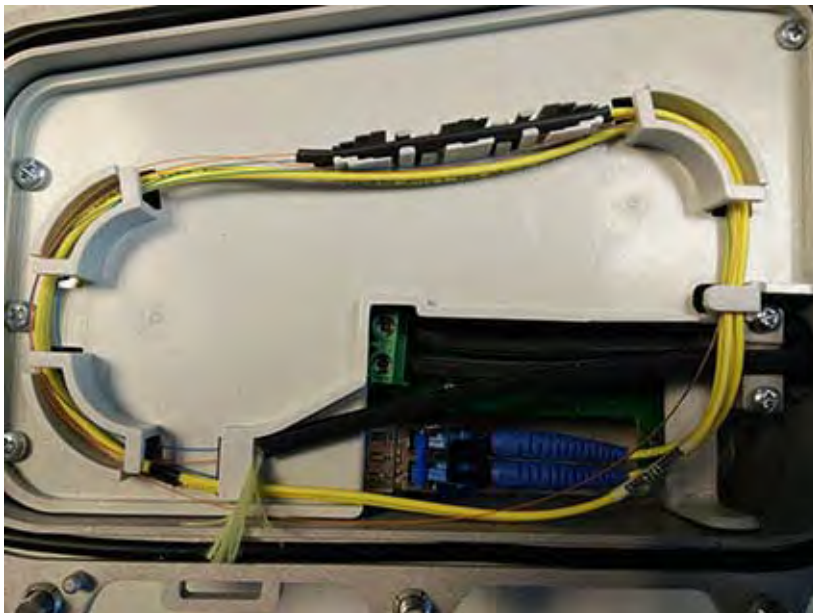


Connecting the fiber

1. Insert the SFP in place.



2. Remove the sheath from the fibers, Allowing 14cm of sheath from the initial cable split, as in Figure 3.1. Place the strippers at the desired strip location, close the wire strippers fully once, then open. Now, by hand you may pull the center element jacket off, revealing the aramid and optical fibers.
3. Remove excess aramid as desired for termination. This allows the sheath to rest on the beginning of the splice tray.
4. The fibers should wrap around the splice tray twice.
5. The splice to the fiber connectors should sit in the splice island in the tray as below.

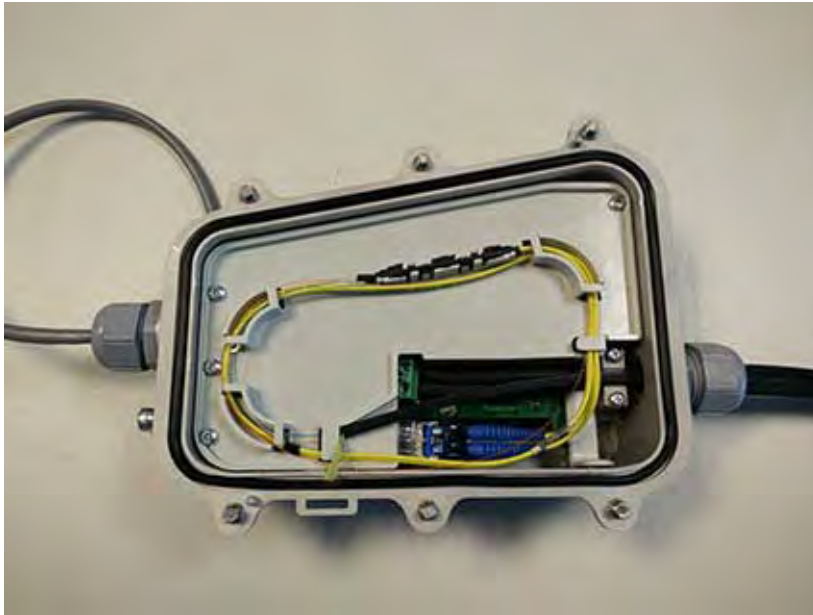


6. The fiber LC/UPC pigtailed should wrap around the splice tray once, then connect to the SFP as above.

Note: Field installable connectors such as LightCrimp Plus can be used. A clip to connect two LC simplex to one LC duplex is recommended.

Sealing the PoE Extender

1. Ensure the supplied seal ring is sat in the channel of the PoE Extender and all cables are secured.



2. Place either the Aruba bracket lid or the CommScope universal wall/pole mounting plate on the top of the unit. For the CommScope universal plate, it is recommended to apply some silicone grease to the four corners of the seal to hold it in place.



Aruba Bracket Lid



CommScope Universal Wall/Pole Mounting Plate

3. Tighten the screws to torque 2.5Nm (22.1 in lbf). It is recommended that you tighten the screws in the opposite corners first (for example, bottom left, then top right, bottom right then top left).
4. Apply Loctite 222 to all exterior bolts

Installation in an Aruba Bracket

1. Facing the Aruba mounting bracket, insert the supplied inserts on the left hand side with the retaining lugs facing down.



2. Align the PoE Extender and tighten the screws to torque 2.5Nm(22.1 in lbf). Apply Loctite 222 to the exterior bolts.



3. Ensure the CommScope Hybrid cable is looped as below. For guidance the loop should be a minimum of 40mm diameter.



4. Ensure the Ethernet cable is looped as below.



Attaching An Earth Point

Attach your earth connection to the earth point next to the Ethernet cable connection.



Installation with a CommScope Universal Wall/Pole Mount Plate



Figure: 3.1 PoE Extender with Universal Mounting Plate

1. Thread your fasteners if required (in this example, jubilee clips for pole mounting) to the mounting plate.



2. Attach to your pole or wall at an appropriate height for your installation.



Figure: 3.1 Universal Pole Mount (illustration purposes only)



Figure: 3.2 Universal Wall Mount (illustration purposes only)

Attaching An Earth Point

Attach your earth connection to the earth point next to the Ethernet cable connection.



Operating Temperature Advice

At the top of the PoE Extender's operating temperature range, the physical temperature of the PoE Extender may exceed 70°C. If the device is situated where it could potentially be touched, apart from by an installer, it should be protected by a suitable guard. See Table 4.2 on page 35 for operating temperature details.

4. Detailed Specifications

Table 4.1: Part Numbers

Version	Catalogue Number
PoE Extender Aruba version	PFU-P-A-O-001-01
PoE Extender Universal version	PFU-P-B-O-001-01

Table 4.2: Climatic Performance

Item	Specification
Storage Temperature	-40°C to +70°C
Installation Temperature	-5°C to +45°C
Operating Temperature	-40°C to +65°C
65°C assumes 45°C ambient air temperature, plus 20°C sun loading.	

Table 4.3: Physical Dimensions

Item	Specification
PoE Extender Aruba Version	
Dimensions	245mm x 159mm x 67mm
Weight	1.4kg
PoE Extender Universal Version	
Dimensions	245mm x 173mm x 74mm
Weight	2.34kg

Table 4.4: Electric Transmission

Input Voltage	Cable Gauge (AWG)	PoE/PoE+	Max Recommended Cable Length (m)
Minimum (40.5V)	12	PoE	1530
Minimum	12	PoE+	780
Minimum	16	PoE	600
Minimum	16	PoE+	310
Nominal (48V)	12	PoE	2150
Nominal	12	PoE+	1100
Nominal	16	PoE	850
Nominal	16	PoE+	430
Maximum (57V)	12	PoE	3040
Maximum	12	PoE+	1560
Maximum	16	PoE	1190
Maximum	16	PoE+	610

Maximum Output 30W at the PoE Extender to permit 25.5W with 90m of Cat 5 cable.

NEC Class 2 requires a power supply unit (PSU) limited to less than 60V DC. In practice, some commercial 48V power supplies may be configured to output from 48V up to about 57V.

A range of PSU voltage outputs is represented, along with the two Powered Fiber Cable copper gauge options, with supported maximum distances in meters.

Note: PoE standard (IEEE 802.3af) assumes 15.4W power consumption. PoE+ standard (IEEE 802.3at) assumes 25.5W power consumption.

Table 4.5: EMI/C & Safety

Item	Specification
EMC Emissions	CISPR 22/FCC CFR 47 Part 15/ICES-003
Immunity	EN300386/FCC CFR 47 Part 15/ICES-003
Safety	IEC60950-1, IEC60950-22
Compliance	CE/FCC/CSA/C-Tick
	SELV
	NEC Class 2
Environmental	EN 300.019-1-4 Class 4.1E
	REACH SVHC
	RoHS2 2011/65/EU
	IEC 60529, IP67

Table 4.6: Communications

Item	Specification
Optical Input	Accepts all MSA compliant 1000Base-X SFP transceivers
Optical Input Singlemode	ITU-T G657.A2
Optical Input 50um Multimode	OM3 or OM4
PoE+ Media Converter	Duplex OM3 = 100Mb @ 1km
	Simplex SMF = 1Gb @ 1km
RJ45 Connector Output	Half and Full Duplex Modes Supported. 10/100/1000Mb Ethernet

Table 4.7: Supported Fiber Cable Types

Cable	Catalogue Number
CommScope Outdoor 12 AWG Copper Fiber Hybrid 2 strand fiber - 1000m reel	PFC-S02O12-1000M
CommScope Outdoor 12 AWG Copper Fiber Hybrid 2 strand fiber - 2000m reel	PFC-S02O12-3000M
CommScope Outdoor 12 AWG Copper Fiber Hybrid 2 strand fiber - 4000m reel	PFC-S02O12-4000M

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