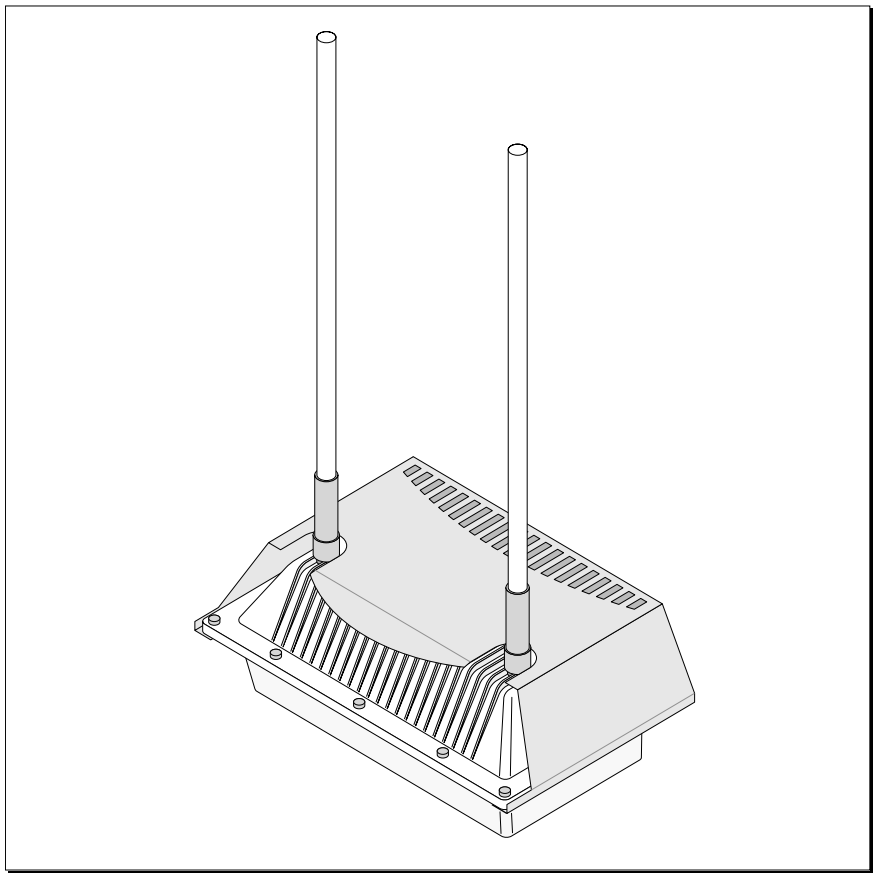
Tropos Networks Outdoor Wi-Fi Cell Installation Guide

Model 5210



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Copyright Notice

FCC Notice to Users and Operators

This equipment has been tested and found to comply with the limits for a Class B 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. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to correct the interference by using one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician.

This Part 15 radio device operates on a non-interference basis with other devices operating at this frequency. Any changes or modification to said product not expressly approved by Tropos Networks could void the user's authority to operate this device.

VCCI Notice to Users and Operators

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Translation: This is a Class B product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a Japanese domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

Taiwan DGT Telecommunications Act Notice to Users and Operators

低功率電波輻性電機管理辦法
第十四條經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。
第十七條低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。
前項合法通信，指依電信規定作業之無線電信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

Warning
It is illegal to modify the construction of this product. Modifying the operating frequency or enhancing the transmit output power through the use of external amplifiers or other equipment is specifically disallowed by the “Telecommunications Act.”

Warning
This device is for outdoor or indoor use with conditions that no harmful interference to authorized radio stations results from the operation of this device. This device shall not influence aircraft security and/or interfere with legal communications as defined in the “Telecommunications Act.” If this device is found to cause interference, the operator of this equipment shall cease operating this device immediately until no interference is achieved.

Note
This device must be installed by trained professional, value added reseller or systems integrator who is familiar with RF cell planning issues and the regulatory limits defined by the Taiwan government “Telecommunications Act” for RF exposure, specifically those limits outlined in Telecom Technical Regulations RTTE01 and LP002.

STOP!! STOP!! STOP!! STOP!!

READ THIS FIRST!

Warning

You can be killed installing this device!

You can be killed if the cell antennas come near electric power lines. Carefully read and follow all instructions in this manual. By nature of the installation, you may be exposed to hazardous environments and high voltage. Use caution when installing the outdoor system.

Caution

The Tropos 5210 Outdoor Wi-Fi cell may contain a lithium-ion battery. To avoid the possibility of an explosion, the Tropos 5210 Wi-Fi cell should **NOT** be exposed to any temperatures higher than 85 degrees C.

The RJ45 connectors of your Tropos 5210 Outdoor Wi-Fi cell may source DC power on pins 4,5 and 7,8. The IEEE 802.3 standards allow for pins 4,5 and 7,8 to be used for Power Over Ethernet. Some products may be incompatible with the Tropos Power Over Ethernet capability. If such problems occur, make sure that the unit is configured with the Power Over Ethernet capability set to Off (default setting). If problems persist, use Ethernet cables that have no connections to the unused pins 4,5 and 7,8.

The Tropos 5210 Outdoor Wi-Fi cell is installed in wet, outdoor locations. Make sure closure caps are installed and all cable connections are securely fastened and waterproofed.

The Tropos 5210 Outdoor Wi-Fi cell can only be used with approved antennas. See Appendix C, “Approved Antenna Configurations” for further information.

Contents

Installing the Tropos 5210 Wi-Fi Cell

This guide explains how to install the Tropos 5210 Wi-Fi cell safely and is intended for trained technical professionals. It covers the following topics:

Preparing for Installation

The Tropos 5210 Wi-Fi cell must be installed by a trained professional, value added reseller, or systems integrator who is familiar with RF cell planning issues and regulatory limits defined by the governing body of the country in which the unit will be installed. This section lists the required equipment and model numbers and explains how to prepare the installation site.

Model Numbers

An exploded view of the Tropos 5210 Wi-Fi cell assembly is shown in the next figure.

Note
Antenna(s) must be installed by a trained professional. Operating the unit with non-qualified antennas is a violation of U.S. FCC Rules Part 15.203(c), Code of Federal Regulations, Title 47. See Appendix C, “Approved Antenna Configurations,” for a listing of antenna options.

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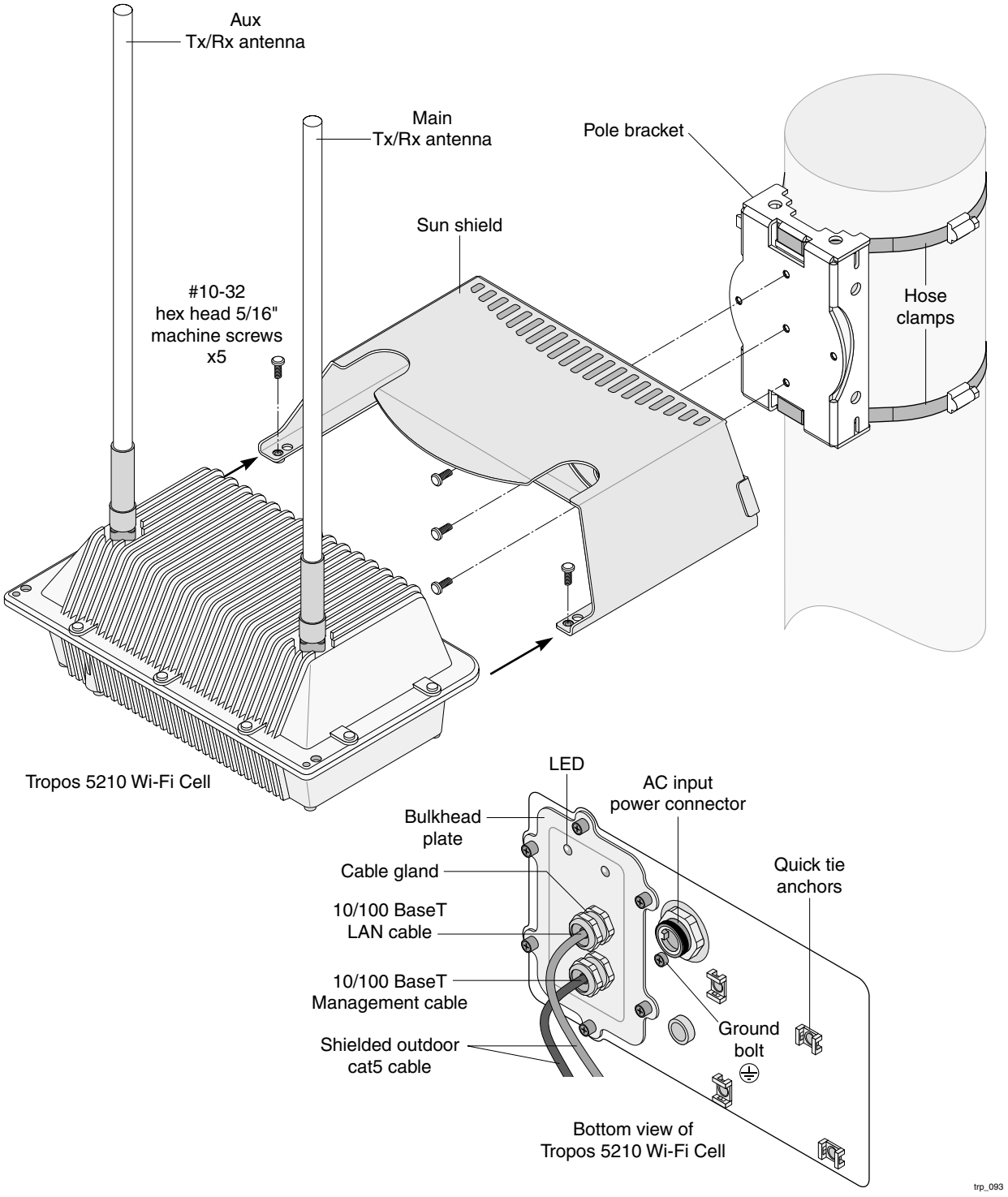
Figure 1 Tropos 5210 Wi-Fi Cell Exploded View



Installation Hardware and Tools

Tropos Networks provides the following accessories to install the Tropos 5210 Wi-Fi cell:

- One pole bracket
- One sun shield
- Two 4-inch diameter hose clamps
- Four 6-inch diameter hose clamps
- Five 5/16-inch #10-32 stainless steel hex head machine screws

You must supply the following tools:

- 5/16-inch nut driver
- 1/4-inch flat blade screwdriver
- Tower mounting only: supply stainless or galvanized steel channel stock and 1/2-inch or 5/8-inch nuts, bolts, and washers to connect to the tower arm.
- Wood pole mounting only: two 5/8-inch diameter, 3-inch long lag bolts

Site Planning

To ensure safe and durable wiring, installation of the Tropos 5210 Wi-Fi cell must follow appropriate electrical and building codes. Follow the National Electrical Code (NEC) requirements, unless local codes in your area take precedence over the NEC code.

The following distance limits apply to installations that have 10/100 Base-T Category 5 network cables attached to the Tropos 5210 Wi-Fi cell:

- 300 feet between devices for 100BaseT operation
- 1300 feet for 10BaseT operation.

The Ethernet duplex and speed setting is configurable.

Note
National Electrical Codes (NEC) Article 800 requires the use of Agency Listed (UL/CSA/TUV) Building Entrance Protector for all power and data communications cables entering a building. The NEC intends by Article 800 to protect the building and occupants from fires caused by transient voltage and current surges.

Note
Ethernet data cable installations having lengths greater than 140 feet in the outdoor environment must use a UL497 approved (UL/CSA/TUV Listed) primary protection device at the building entrance. Ethernet data cable installations having lengths less than 140 feet in the outdoor environment may use a UL497A (UL/CSA/TUV Listed) secondary protection device at the building entrance. Tropos Data Protection Device and Network Protection Units are UL497A secondary protection devices.

Location Guidelines

The Tropos 5210 Wi-Fi cell is a radio device and therefore susceptible to interference that can reduce throughput and range. Follow these guidelines to ensure the best performance:

- Install the unit in an area where trees, buildings, and large steel structures do not obstruct radio signals to and from the antenna. Direct line-of-sight operation is best.
- Install the unit away from microwave ovens or other devices operating in the 2.4 GHz frequency range.
- Install the units away from other possible sources of 2.4 GHz WLAN interference, such as cordless phones, home spy cameras, frequency hopping (FHSS) and DSSS LAN transceivers (non-802.11b), electronic news gathering video links, radars, amateur radios, land mobile radio services, local government sites (such as law enforcement), fixed microwave services, local TV transmission and private fixed point transmitters.

Antenna Options

You can purchase the Tropos 5210 Wi-Fi cell with an integrated omni-directional antenna, or use an approved external antenna. Omni-directional antennas are best for systems requiring a signal distribution in more than one direction. To comply with regulatory RF exposure limits, locate antennas a minimum distance of 7.9 inches (20cm) from people. For antenna model numbers, refer to Appendix B, “Product Specifications.”

Note
Antenna(s) must be installed by a trained professional. Operating the unit with non-qualified antennas is a violation of U.S. FCC Rules Part 15.203(c), Code of Federal Regulations, Title 47. See Appendix C, “Approved Antenna Configurations,” for a listing of antenna options.

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Site Surveys

Due to variations in component configuration, placement, and physical environment, each installation is unique. Before installing the Tropos 5210 Wi-Fi cell, perform a site survey to determine the optimum placement of units for maximum range, coverage, and network performance. Consider the following factors when performing a site survey:

- Data rates—Sensitivity and range are inversely proportional to data bit rates. The maximum radio range is achieved at the lowest workable data rate. A decrease in receiver threshold sensitivity occurs as radio data rate increases.
- Antenna type and placement—Proper antenna configuration is a critical factor in maximizing radio range. As a general rule, range increases in proportion to antenna height and gain.
- Physical environment—Clear or open areas provide better radio range than closed or filled areas. The less cluttered the operating environment, the greater the range.
- Obstructions—A physical obstruction, such as a building or tree, can block or hinder communication. Avoid locating antennas in a location where there is an obstruction between sending and receiving devices.
- Building materials—Radio penetration is influenced by the building material used in construction. For example, drywall construction permits greater range than concrete blocks.
- Diversity—The Tropos 5210 Wi-Fi cell supports transmit and receive diversity, which requires two antennas.

Power Source

The Tropos 5210 Wi-Fi cell supports two options for connecting to a power source:

- AC power source (3-wire service) — 3W(P+N+PE) or 3W(2P+PE); 90-480 VAC, 50/60 Hz
- NEMA plug, for streetlight photoelectric control power tap (2-wire service) —2W(2P) or 2W(P+N); 90-480 VAC 50/60 Hz

Warning
Connect the AC powered outdoor system only to 90-480 VAC power sources. Do not connect it to a power source of higher voltage.

Caution
You must install an external grounding wire if the Tropos 5210 Wi-Fi cell is installed on a non-metal pole or if the metal installation structure is not properly grounded. You must also ground the outdoor data protection device to a bonded pipe or ground rod. Make sure that grounding is complete before you connect power to the Tropos 5210 Wi-Fi cell.

Safety

Installing the Tropos 5210 Wi-Fi cell can pose a serious hazard. Be sure to take precautions to avoid the following:

- Exposure to high voltage lines during installation
- Falls when working at heights or with ladders
- Injuries from dropping tools and equipment
- Contact with AC wiring

Mounting Strategies

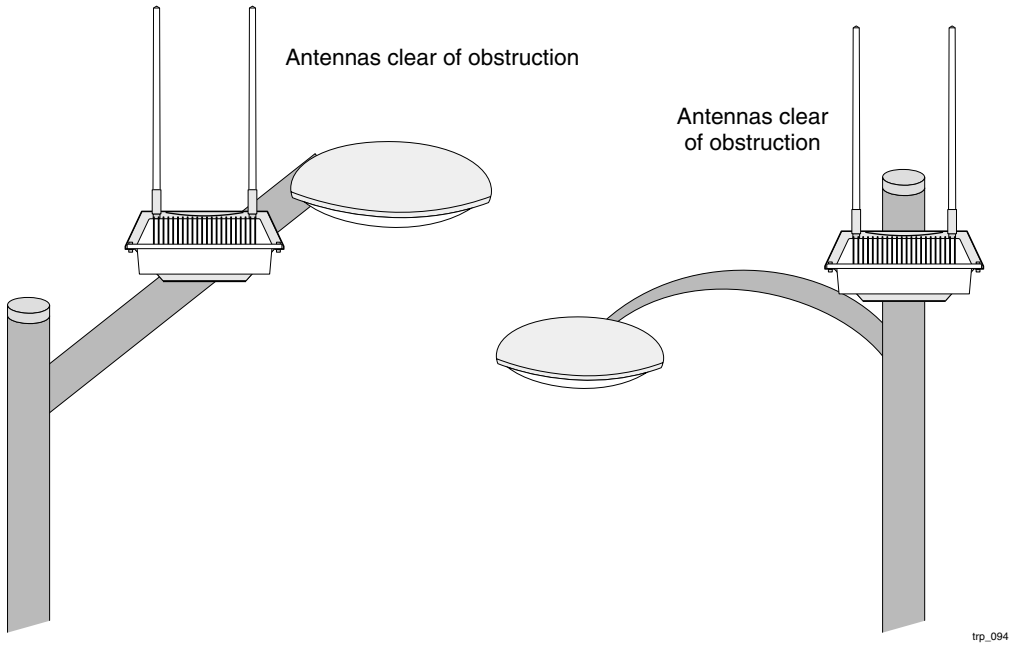
When choosing mounting locations, consider the available mounting structures and antenna clearance. The Tropos 5210 Wi-Fi cell should always be mounted with the top of the cell horizontal and level and with the antennas facing upward.

It is usually best to attach ground and data cables to the cell prior to mounting. Before mounting the cell, review the wiring instructions in "Grounding the Tropos 5210 Wi-Fi cell" on page 22 and "Connecting a Data Port" on page 30 to determine the best strategy for the selected location.

Note
Since the mounting structure itself is a potential obstruction, the cell should be mounted with at least 4 feet of clearance between the antennas and the mounting structure.

Acceptable options for mounting on a streetlight are shown in Figure 2. In each case the cell is mounted to assure clearance for the antennas above the height of the streetlight.

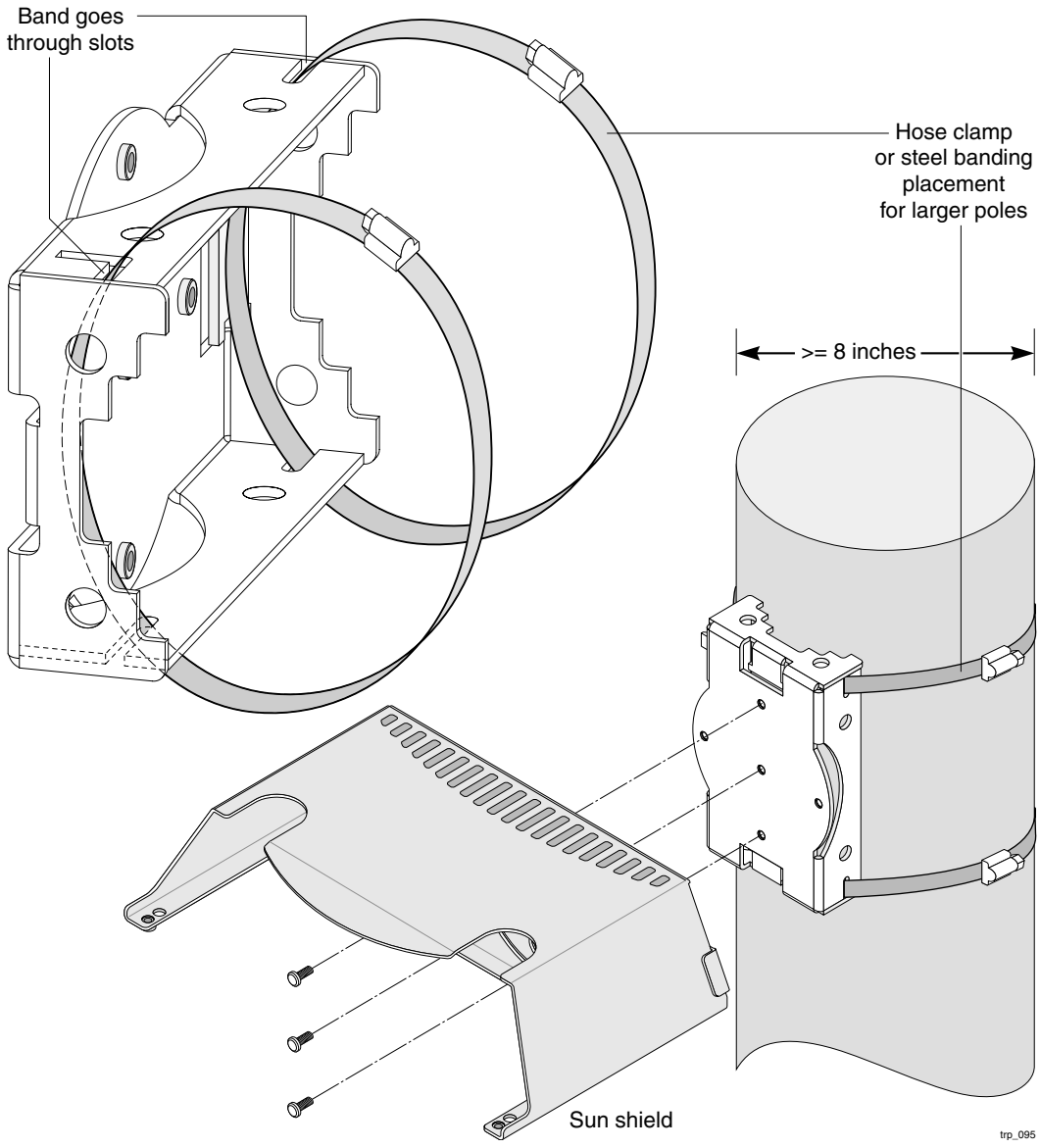
Figure 2 Example Mounting Location - Antennas Facing Upward



Proper Use of Hose Clamps

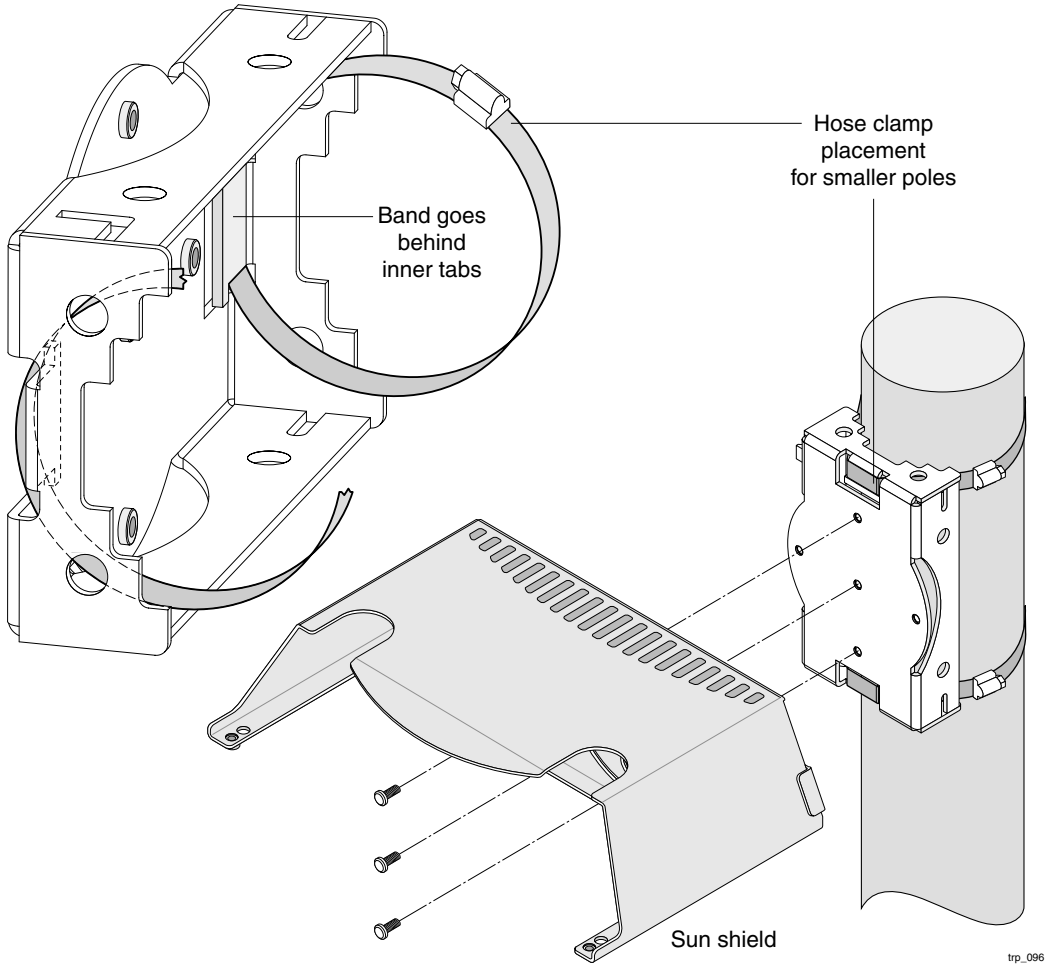
The mounting assembly for the Tropos 5210 Wi-Fi cell contains hose clamps to secure the cell to the mounting structure. Figure 3 illustrates the proper use of the hose clamps when mounting on large poles (≥ 8 inches). The clamps are routed through holes in the pole bracket as shown in the figure, and then attached to the pole and tightened.

Figure 3 Proper Use of Hose Clamps - Large Poles (>= 8 Inches)



The proper use of the hose clamps for small poles (< 8 inches) is shown in Figure 4. The clamps are routed behind the inner tabs in the pole bracket, and then attached to the pole and tightened.

Figure 4 Proper Use of Hose Clamps - Small Poles (< 8 Inches)



Mounting Instructions

This section explains how to mount the Tropos 5210 Wi-Fi cell on a pole, tower, or streetlight. It is best to mount the Tropos 5210 Wi-Fi cell to aluminum or galvanized steel structures. The mounting brackets are designed to pierce any oxidation layers that are on the outside of the pole, thereby assuring good quality connection to the grounded structure.

Note
The Tropos 5210 Wi-Fi cell should always be mounted with the top of the cell horizontal and level and with the antennas facing upward.

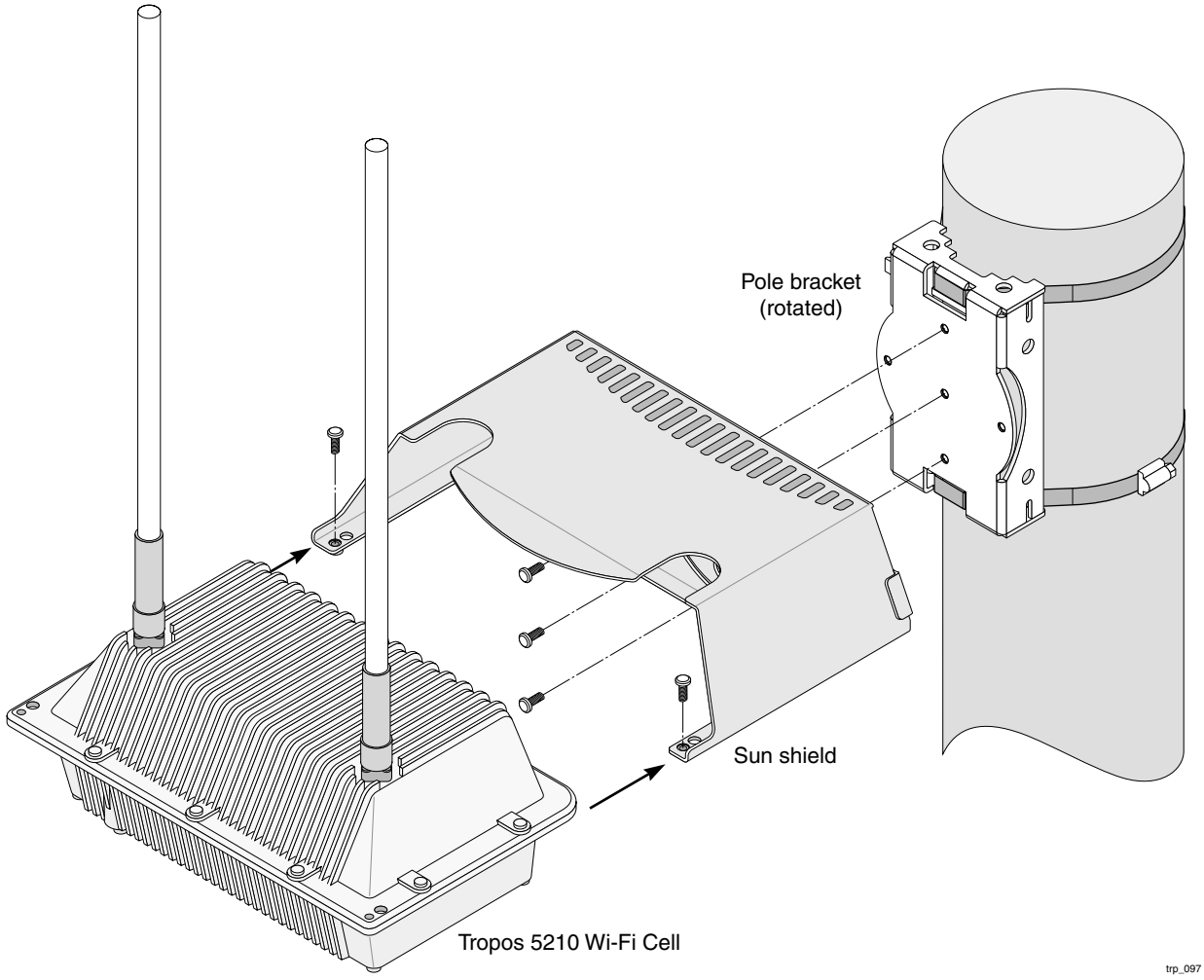
Note
It is best to attach ground and data cables to the cell before sliding the cell into the mounted sun shield, as explained in this section. Before mounting the cell, review the wiring instructions in "Grounding the Tropos 5210 Wi-Fi cell" on page 22 and "Connecting a Data Port" on page 30 to determine the best strategy for the selected location.

Note
Mounting to wood, concrete, or painted poles may require primary grounding for the unit. Check the national electrical codes in your area for specific rules.

Metal Pole Mounting

Figure 5 illustrates the proper method of mounting the Tropos 5210 Wi-Fi cell on an outdoor metal pole.

Figure 5 Metal Pole Mounting



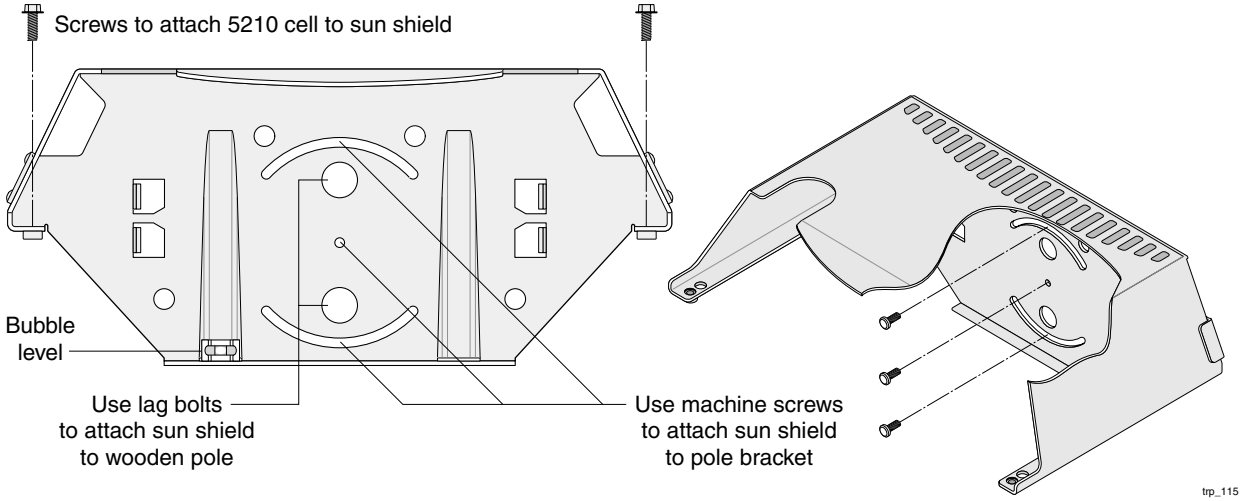
Mount the Tropos 5210 Wi-Fi cell on a metal pole:

1. Select a mounting location. You can attach the Tropos 5210 Wi-Fi cell to any pipe or pole with diameter between 1.7 inches and 10 inches.
2. Slip the flat portion of the hose clamps under the inside lips of the pole bracket.
3. Use the hose clamps to attach the pole bracket to the pole. Depending upon the diameter of the pole, you may need to use a single small clamp, single large clamp, or pair of large clamps joined together.

4. Attach the sun shield of the cell to the pole bracket with three 5/16-inch machine screws. Insert one screw through the hole in the center back of the sun shield and the other two screws through the curved slot tracks. Figure 6 shows the proper screw locations on the back of the sun shield.
5. Level the sun shield by rotating the unit along the curved slot tracks. A built-in level is located on the left side of the shield. Tighten the screws.
6. Slide the Tropos 5210 Wi-Fi cell into place with the antennas on top and secure it at the end with two #10-32 hex head machine screws.

To continue installing the outdoor system, see "Connecting Cable Attached Antennas" on page 17.

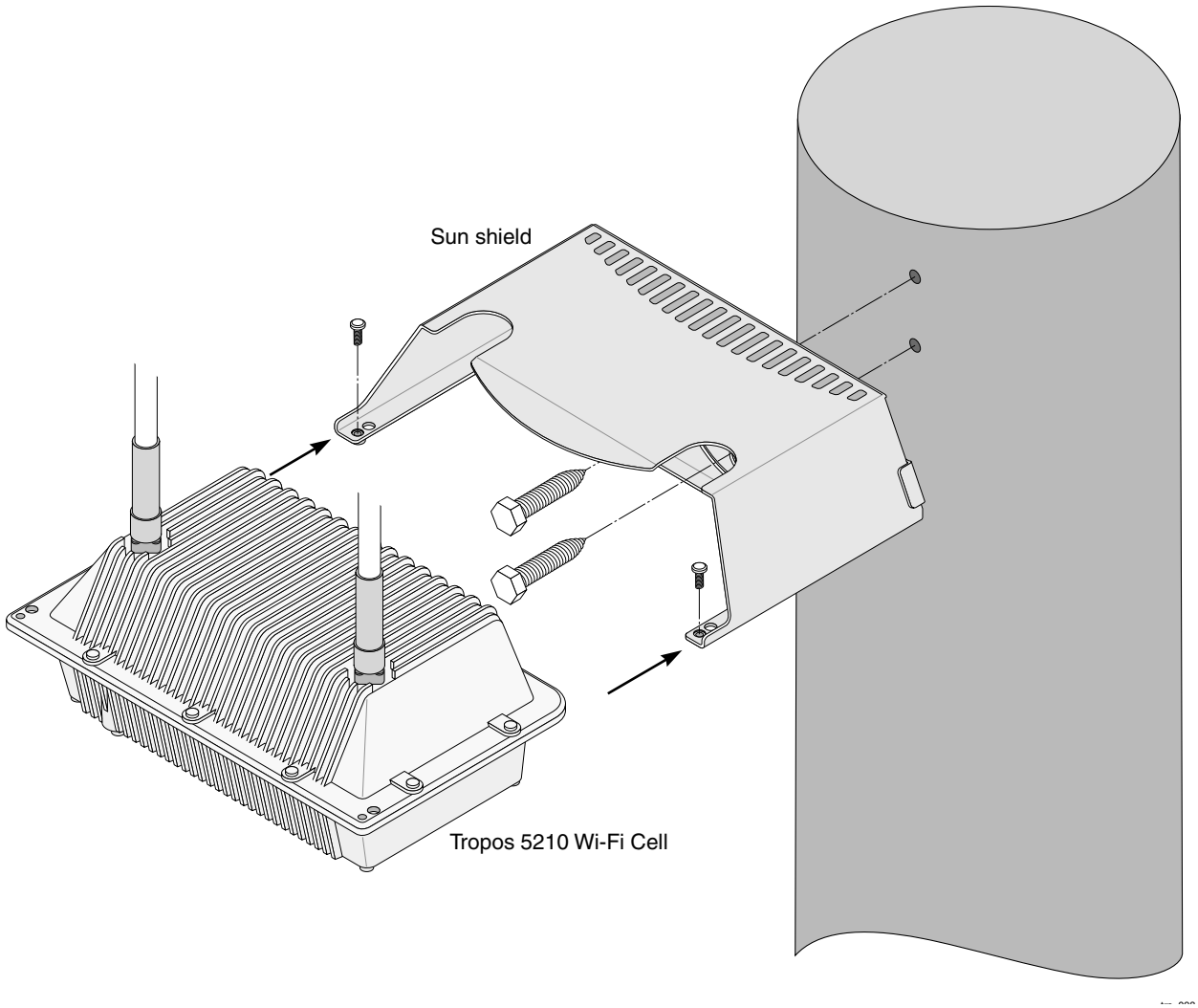
Figure 6 Sun Shield Connections



Wood Pole Mounting

Figure 7 shows a typical installation with the Tropos 5210 Wi-Fi cell mounted on an outdoor wood pole.

Figure 7 Wood Pole Mounting



Mount the Tropos 5210 Wi-Fi cell on a wood pole:

1. Select a mounting location. You can attach the Tropos 5210 Wi-Fi cell to any outdoor wood pole of diameter at least 1.75 inches.
2. Attach the sun shield of the cell to the pole with two 5/8-inch bolts, making sure that the shield is level. Figure 6 on page 13 shows the proper bolt locations on the back of the sun shield.
3. Slide the Tropos 5210 Wi-Fi cell into place and secure it at the end with two #10-32 hex head machine screws.

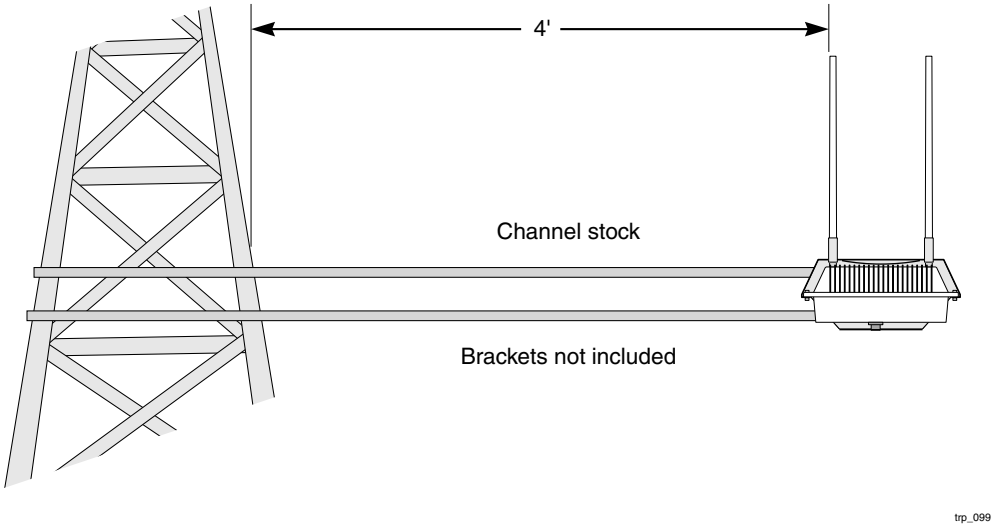
To continue installing the outdoor system, see "Connecting Cable Attached Antennas" on page 17.

Tower Mounting

You can mount the outdoor system to an outdoor tower.

Note
At the antenna level, the Tropos 5210 Wi-Fi cell must be free from metal obstruction within a 4-foot radius (Figure 8).

Figure 8 Tower Mounting



Mount the Tropos 5210 Wi-Fi cell on a tower:

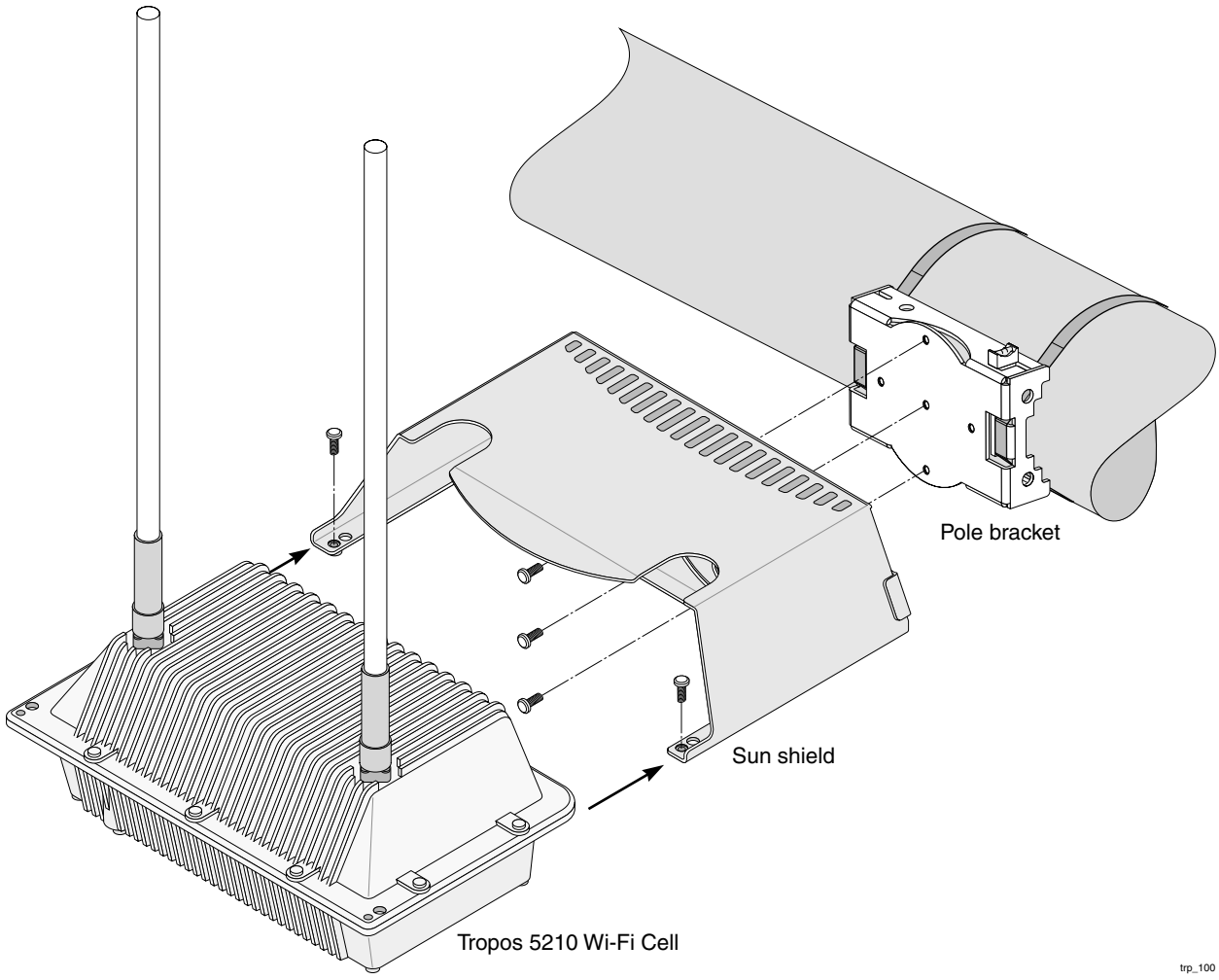
1. Remove the pole bracket from the sun shield.
2. Make a tower bracket by attaching the sun shield directly to any stainless steel or galvanized steel channel stock.
3. Attach the sun shield to the tower arm so that the top of the shield is horizontal and level.
4. Tighten the mounting bolts.
5. Slide the Tropos 5210 Wi-Fi cell into place and secure it at the end with two #10-32 hex head machine screws.

To continue installing the outdoor system, see "Connecting Cable Attached Antennas" on page 17.

Streetlight Mounting

The Tropos 5210 Wi-Fi cell can be mounted on the horizontal or angled arm of a streetlight. Figure 9 shows a typical streetlight mounting installation.

Figure 9 Streetlight Mounting



Mount the Tropos 5210 Wi-Fi cell on a streetlight:

1. Select a mounting location. You can attach the Tropos 5210 Wi-Fi cell to any streetlight arm with diameter 1.75” to 10”.
2. Slip the flat portion of the hose clamp under the inside lip of the pole bracket.
3. Use the hose clamps to attach the pole bracket to the streetlight. Depending upon the diameter of the pole, you may need to use 2 small clamps, 2 large clamps, or 2 pairs of large clamps joined together.

4. Attach the sun shield of the cell to the structure with three 5/16-inch machine screws. Insert one screw through the hole in the center back of the sun shield and the other two screws through the curved slot tracks.
5. Level the sun shield by rotating the unit along the curved slot tracks. A built-in level is located on the left side of the shield. Tighten the screws.
6. Slide the Tropos 5210 Wi-Fi cell into place and secure it at the end with two #10-32 hex head machine screws.

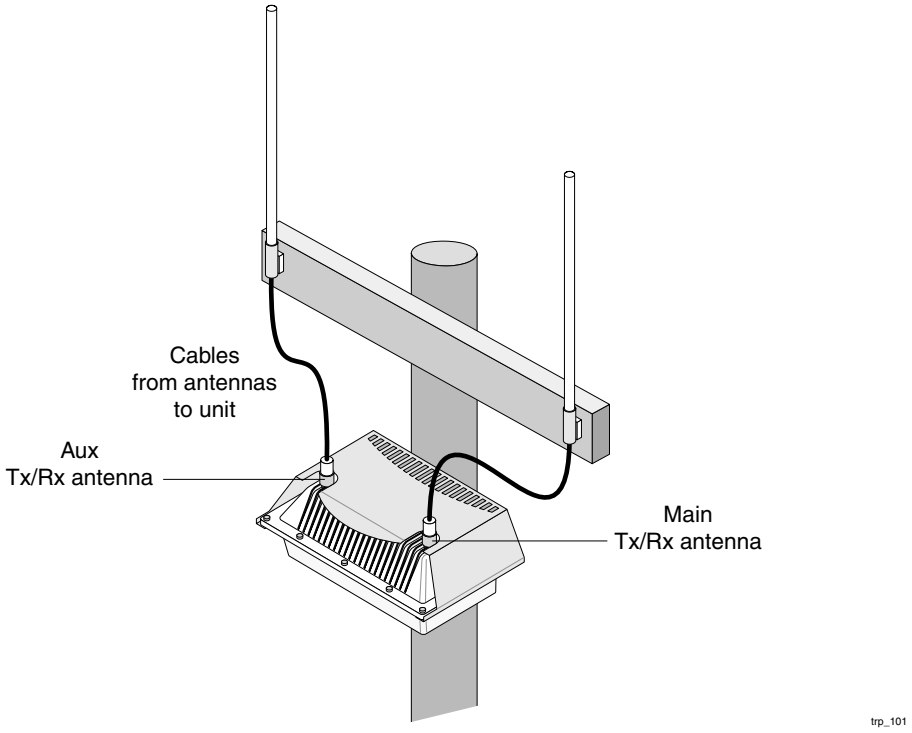
To continue installing the outdoor system, see "Connecting Cable Attached Antennas" on page 17.

Connecting Cable Attached Antennas

This section applies to external antennas used with Tropos 5210 Wi-Fi cell. You can mount the antenna on a structure and then use cables to attach it to the cell. After mounting, secure the antennas with ThreadLocker Loctite 242 and waterproof them using self-fusing EPR tape. (See Appendix D, "Installation Accessories" for part number.) Figure 10 shows an installation with external antenna cabling. The unit-attached antennas are sealed at the factory and must be resealed if they are removed.

Warning
Do not locate the antenna near overhead power lines or other electric light or power circuits, or where it can come into contact with such circuits. When installing the antenna, take extreme care not to come into contact with such circuits, as they can cause serious injury or death. For proper installation and grounding of the antenna, please refer to national and local codes (e.g. U.S.:NFPA 70, National Electrical Code, Article 810, in Canada: Canadian Electrical Code, Section 54).

Figure 10 Connecting External Antennas



Connect antenna cables:

1. Mount the antennas in a suitable location, following the instructions supplied with the antennas.
2. Perform a trial installation of the antenna cables.
3. When you are satisfied with the trial placement of the antenna cables, remove the antenna connections from the Tropos 5210 Wi-Fi cell and apply two drops of ThreadLocker Loctite 242 to the antenna connector thread (Figure 11 on page 20).
4. Install the antenna cables. Be sure to provide a drip loop to divert water away from the connector.

Note
To ensure good electrical contact with the antenna, do not get Loctite on the center conductor pin of the antenna cable or outdoor system connector.

Note
Antenna(s) must be installed by a trained professional. Operating the unit with non-qualified antennas is a violation of U.S. FCC Rules Part 15.203(c), Code of Federal Regulations, Title 47. See Appendix C, “Approved Antenna Configurations,” for a listing of antenna options.

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Waterproofing Antenna Connections

Figure 11 illustrates how to waterproof the antenna connections after they are installed.

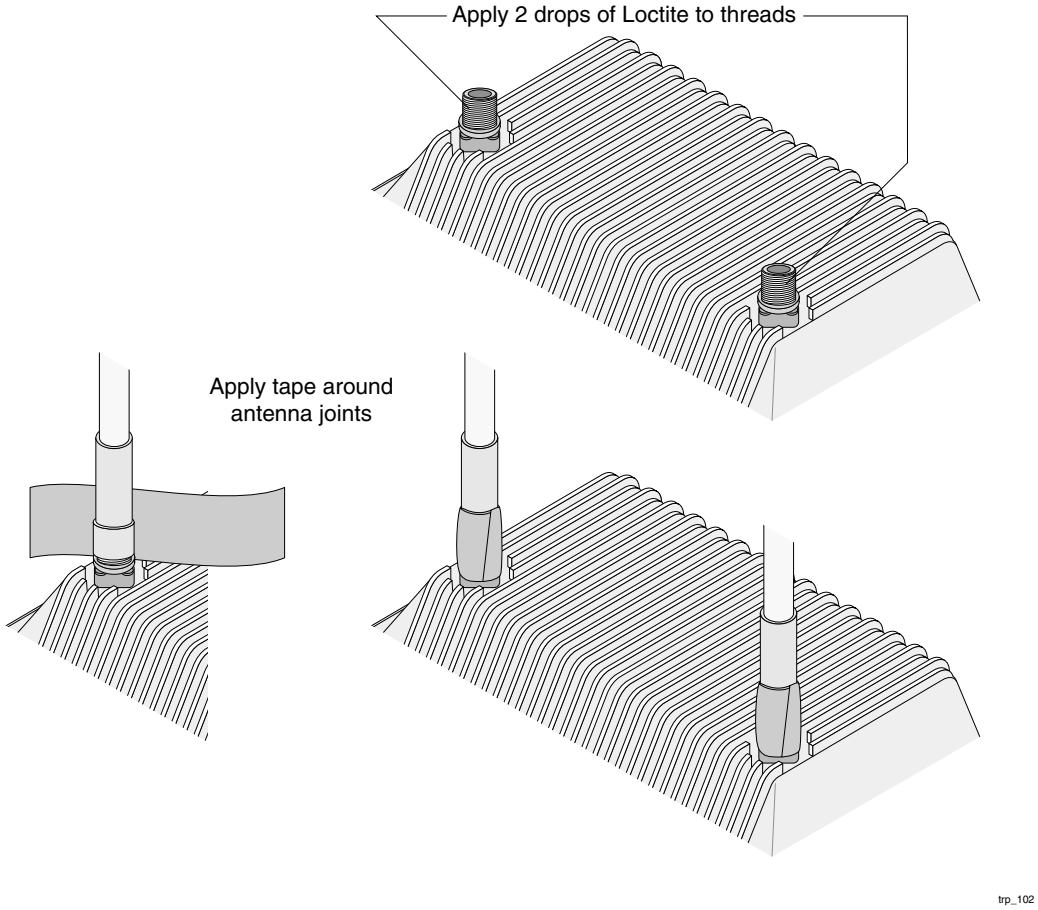
Waterproof the antenna connections:

1. Locate the self-fusing EPR waterproofing tape included in the antenna installation kit.
2. Separate the liner from the tape.

3. Pre-stretch the tape and wrap it tightly around the connector.

If you installed the antennas using antenna cables, be sure to waterproof those connections as well.

Figure 11 Waterproofing Antenna Connections



Installing Customer-Provided Antennas

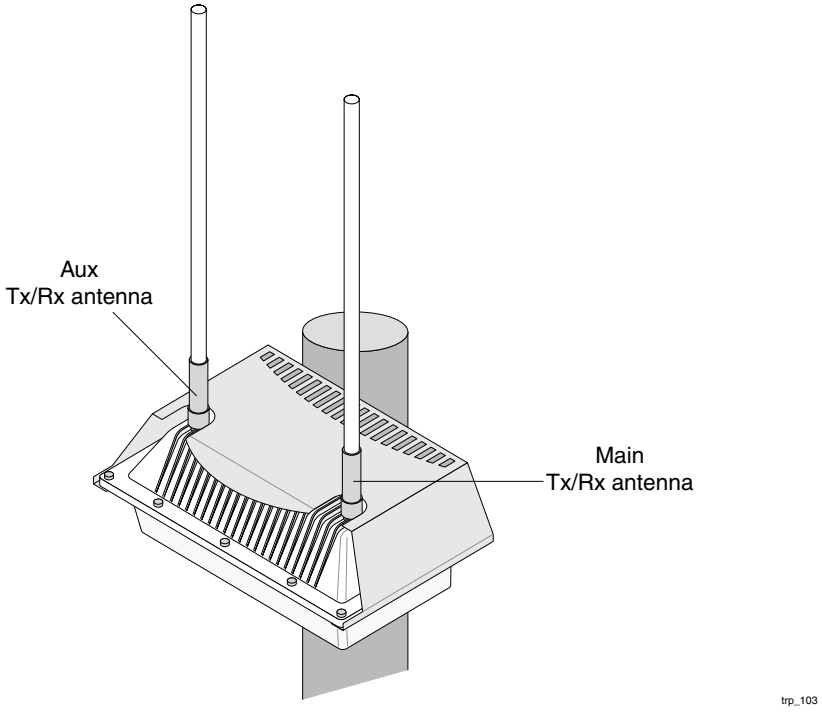
Figure 12 shows the location of the antennas installed with the Tropos 5210 Wi-Fi cell. The following steps explain how to install replace customer-provided antennas; factory-installed antennas should not be removed.

Replace the Tropos 5210 Wi-Fi cell antennas:

1. Turn power off to the Tropos 5210 Wi-Fi cell.
2. Remove the self-fusing EPR waterproofing tape from the antenna connections.
3. Unscrew the antennas.
4. Replace the antennas.

5. Apply two drops of Loctite Threadlocker 242 to the antenna connector thread.
6. Locate the self-fusing EPR waterproofing tape included in the antenna installation kit.
7. Separate the liner from the tape.
8. Pre-stretch the tape and wrap it tightly around the connector.

Figure 12 Replacing Tropos 5210 Wi-Fi cell Antennas

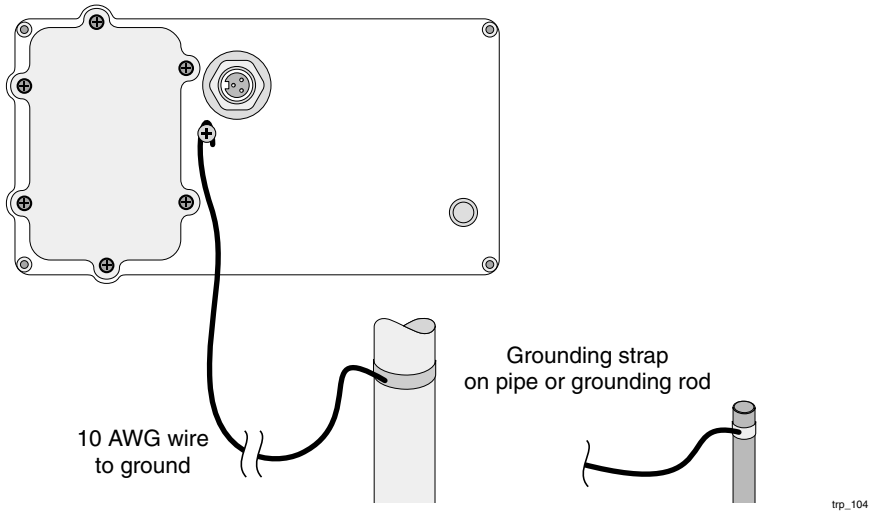


Grounding the Tropos 5210 Wi-Fi cell

Caution
You must install an external grounding wire if the Tropos 5210 Wi-Fi cell is installed on a non-metal pole or if the metal installation structure is not properly grounded. You must also ground the outdoor data protection device to a bonded pipe or ground rod. Make sure that grounding is complete before you connect power to the Tropos 5210 Wi-Fi cell.

The grounding arrangement for the Tropos 5210 Wi-Fi cell is shown in Figure 13.

Figure 13 Ground Arrangement



Ground the Tropos 5210 Wi-Fi cell:

1. Insert the grounding screw into the grounding screw hole on the bottom of the cell.
2. Connect a length of #10 AWG bare copper wire to the grounding screw and tighten.
3. Connect the other end of the grounding wire to a grounding strap that is attached to a grounded surface or other earth ground such as a grounding rod.
4. Secure the #10 AWG bare copper wire into the split-bolt connectors by first tightening the nuts finger tight and then tightening further by applying a 1/4 turn with an open-end wrench. ground stud and ground nut should be tightened to a torque of 20 ft-lbs.

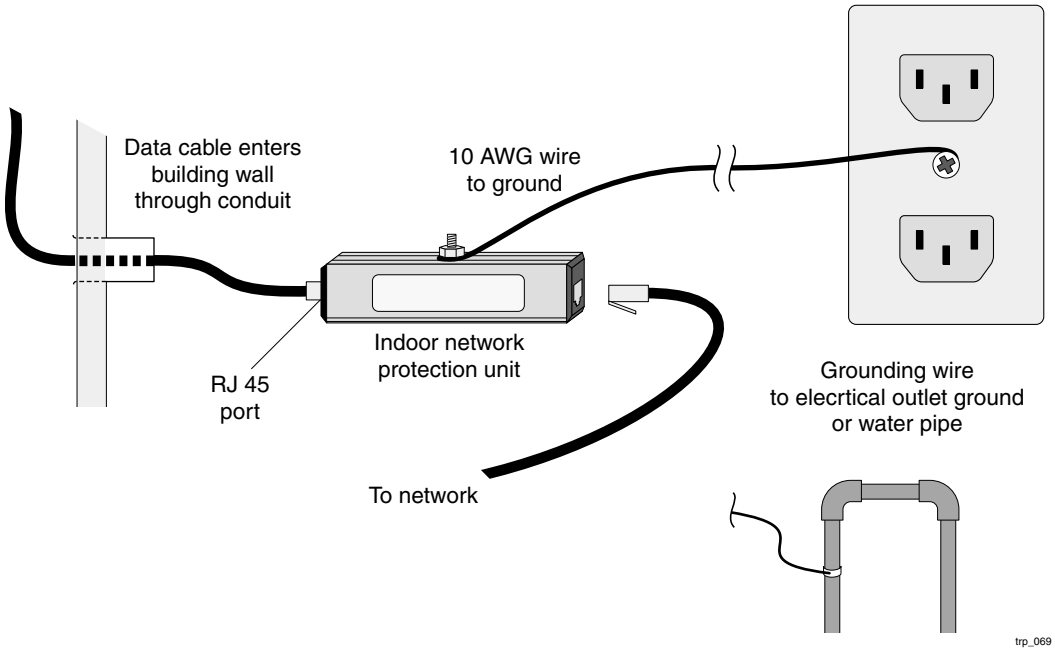
Grounding the Data Protection Device

The grounding arrangement for an indoor data protection device is shown in Figure 14.

Ground an indoor data protection device:

1. Place the protection device as close to the building entrance as possible.
2. Connect a length of #10 AWG bare copper wire to the ground post on the data protection device.
3. Connect the other end of the grounding wire to the ground connection of an electrical outlet or a grounded water pipe.

Figure 14 Grounding the Indoor Network Protection Unit



Connecting Power

This section explains the different categories of electrical power and provides procedures for connecting the outdoor system to power. There are two options for connecting the Tropos 5210 Wi-Fi cell to a power source:

- AC power source (3-wire service) — 3W(P+N+PE) or 3W(2P+PE); 90-480 VAC, 50/60 Hz
- NEMA plug, for streetlight photoelectric control power tap (2-wire service) —2W(2P) or 2W(P+N); 90-480 VAC 50/60 Hz

Warning
Before you work on an electrical circuit, make sure the power is off. Turn off the breaker to the circuit you plan to work on. Post a sign on the service panel so nobody tries to reconnect power while you are working on the circuits. Double-check the circuit with a circuit tester before you touch it to make sure the correct breaker has been disconnected.

Caution
You must install an external grounding wire if the Tropos 5210 Wi-Fi cell is installed on a non-metal pole or if the metal installation structure is not properly grounded. You must also ground the outdoor data protection device to a bonded pipe or ground rod. Make sure that grounding is complete before you connect power to the Tropos 5210 Wi-Fi cell.

Categories of Power

The IEEE/ANSI C62.41 standards (equivalent to the IEC Category IV standards) define Categories A-C. Equipment designed to a CAT C standard is resistant to much higher energy transients than one designed to CAT B or CAT A standards. Within a category, a higher voltage rating denotes a higher transient withstand rating.

Table 1 lists power types and Figure 15 shows hook-ups for the different power categories.

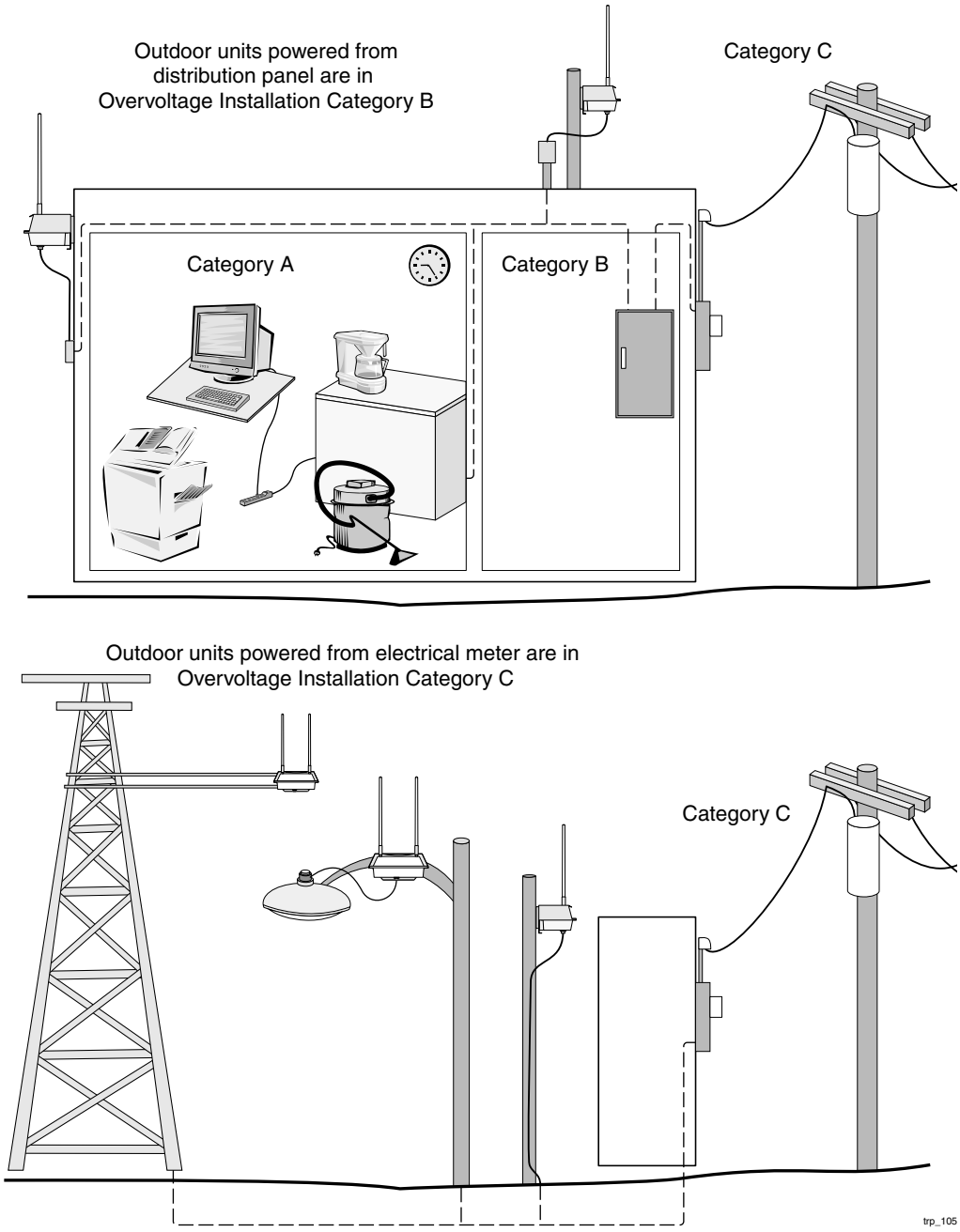
Table 1 IEEE/ANSI C62.41 Power Categories

Category	Summary	Examples
CAT C	Outside and service entrance	• Service drop from pole to building entrance • Run between meter and distribution panel • Overhead line to detached buildings • Underground lines to well pumps

Table 1 IEEE/ANSI C62.41 Power Categories

Category	Summary	Examples
CAT B	Major feeders and short branch circuits	• Distribution panel devices • Bus and feeder systems in industrial plants • Heavy appliance outlets with “short” connections to the service entrance • Lightning systems in commercial buildings
CAT A	Outlets and long branch circuits	• All outlets at more than 10 m (30 ft) from Category B with wires #14-10 • All outlets at more than 20 m (60 ft) from Category C with wires #14-10

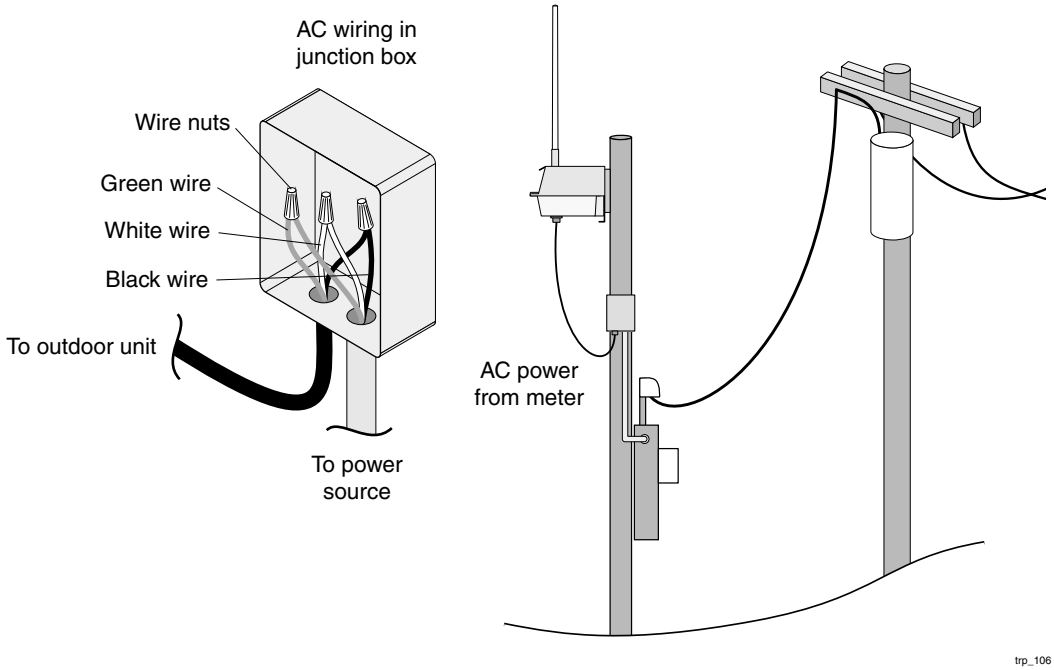
Figure 15 IEEE/ANSI C62.41 Power Categories



Connecting to AC Power (Category C)

The AC power connections for a Category C AC power source are shown in Figure 16.

Figure 16 Connecting Category C AC Power



Connect an AC power source:

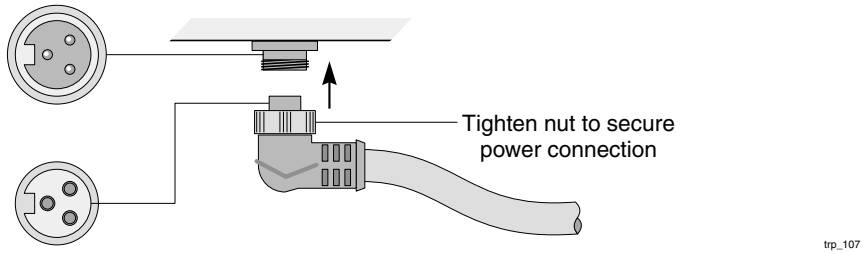
1. Verify that the service voltage is 90-480 VAC 50/60 Hz.
2. Verify that power is turned off on the designated circuits.
3. Install 1/2 inch liquid-tight conduit from the building entrance point to within 3 feet of the outdoor system.
4. Run 3-wire AC service through the conduit.
5. Connect the conduit to a junction box. The conduit and junction box must be IEEE/ANSI compliant and suitable for outdoor use.

Note
Data and power must never be enclosed in the same conduit.

6. Connect the AC cable to the cell and tighten the nut hand-tight. See Figure 17 on page 28.
7. Connect the Tropos 5210 Wi-Fi cell to a 90-480 VAC 50/60 Hz CAT C power source.
8. Reenergize the circuit and confirm that power to the Tropos 5210 Wi-Fi cell comes on.

Note
The Tropos 5210 Wi-Fi cell is equipped with additional AC surge protection and dual fuse branch circuit protection. Additional ISA branch circuit protection is not required in the upstream power distribution.

Figure 17 Connecting the AC Power Cable to the Cell

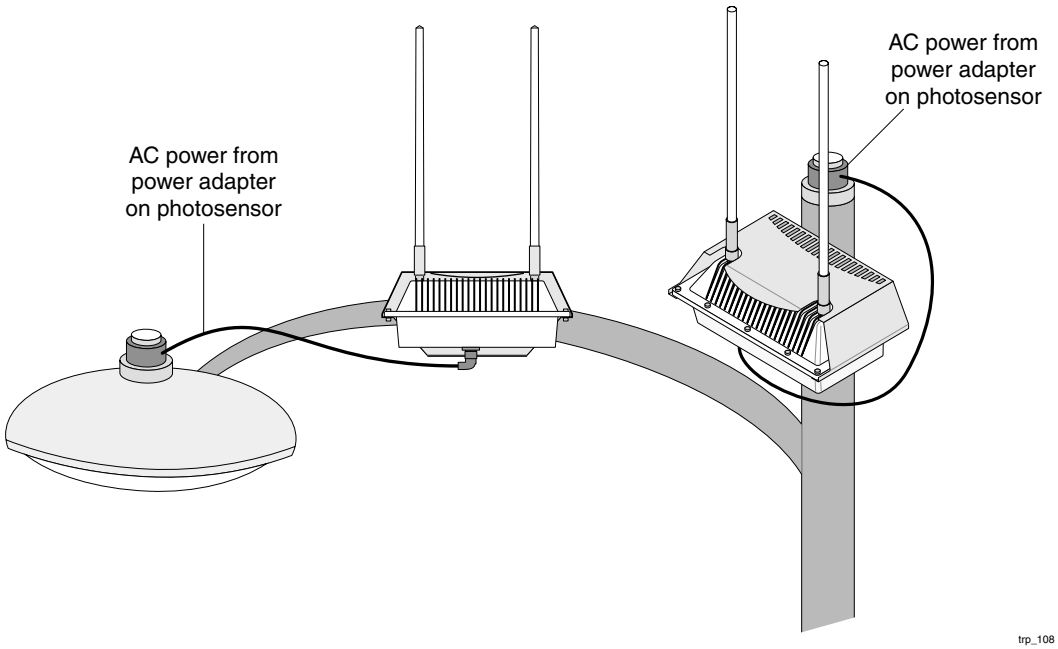


Connecting to Streetlight Power (Category C)

The power connections for Category C streetlight power are shown in Figure 18. Use the 3-prong NEMA twist-lock adapter with twist-lock style photoelectric controls for outdoor lighting commonly used by utilities. The NEMA twist-lock adapter can be used only with UL 773 listed outdoor lighting controls rated for and operated at 90 to 480 VAC 50/60 Hz.

Warning
Be extremely careful when connecting to Category C streetlight power.

Figure 18 Connecting Streetlight Power



Warning
Connect the outdoor system only to a twist-lock style outdoor lighting control powered by 90-480 VAC 50/60 Hz. Do not connect it to twist-lock style outdoor lighting controls powered by higher voltage.

Connect a streetlight power source:

1. Verify that the service voltage is 90-480 VAC 50/60 Hz.
2. Verify that power is turned off on the designated circuits.
3. Remove the photosensor from the streetlight.
4. Connect the NEMA 3 prong plug from the Tropos 5210 Wi-Fi cell to the photosensor connector on the street light.
5. Connect the photosensor to the top of the NEMA 3 prong plug.

6. Connect the AC plug to the Tropos 5210 Wi-Fi cell and tighten hand-tight.
7. Reenergize the circuit and confirm that power to the Tropos 5210 Wi-Fi cell comes on.

Note
The Tropos 5210 Wi-Fi cell is equipped with additional AC surge protection and dual fuse branch circuit protection. Additional ISA branch circuit protection is not required in the upstream power distribution.

Note
Do not leave connectors open to the environment. Connectors should be covered with closure caps when not in use. Closure caps should be tightened to be snug.

Connecting a Data Port

The Tropos 5210 Wi-Fi cell is equipped with two Ethernet ports that support RJ45 and punch down block termination options. Use either port for the wired connection to the Tropos 5210 Wi-Fi cell gateway. Use the Management port as the wired configuration interface. Use the Management or LAN port to attach wired peripherals such as a traffic camera or IP networking device.

Note
The Tropos 5210 Wi-Fi cell node comes pre-configured. For post-installation changes in configuration, you can communicate with the node by way of its wireless connection. For more information, see the *Tropos Networks Configuration Guide*.

Note
Only use shielded Cat5 cable rated for outdoor use. For protection against risk of fire, electrical hazard and to ensure the reliable operation of this equipment, the shields of the Cat5 cable must be properly terminated and bonded to the unit and to the protective earth (PE) at the building entrance.

Note
National Electrical Codes (NEC) Article 800 requires the use of Agency Listed (UL/CSA) Building Entrance Protector for all power and communications cables entering a building. The NEC intends by Article 800 to protect the building and occupants from fires caused by transient voltage and current surges.

Warning
DC voltage may be present on RJ-45 pins 4,5 (+) and 7,8 (-)

Note
This is not a mid-span powered device. Never attempt to daisy-chain Power Over Ethernet devices.

Figure 19 illustrates the options for routing cables for connection to the Tropos 5210 Wi-Fi cell. You can attached cable with exposed wires to punch down blocks or terminate the cables with an

RJ45 jack for port connection. Figure 20 shows the layered shield and jacket for the data cable, which must be removed to expose the inner cable and twisted pairs.

Figure 19 Options for Connecting a Data Port

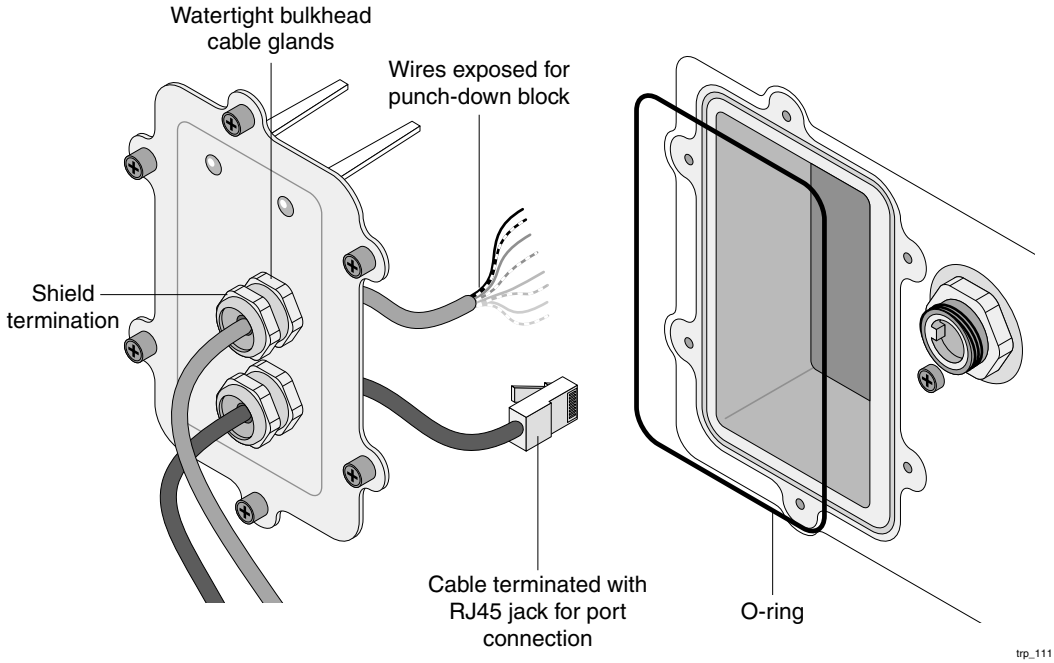
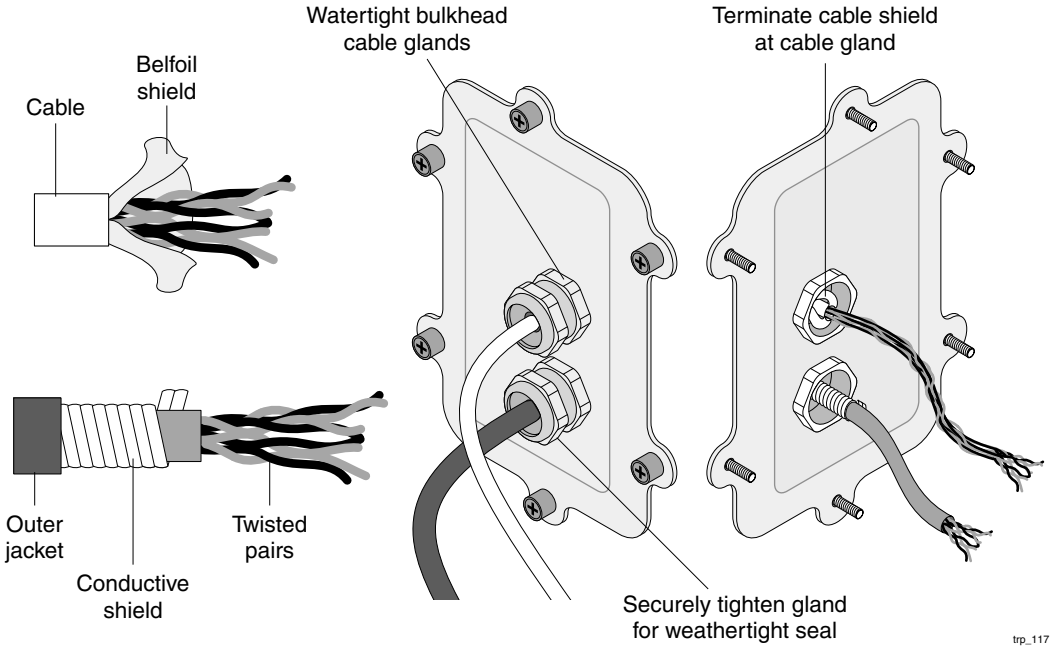


Figure 20 Data Cable Detail

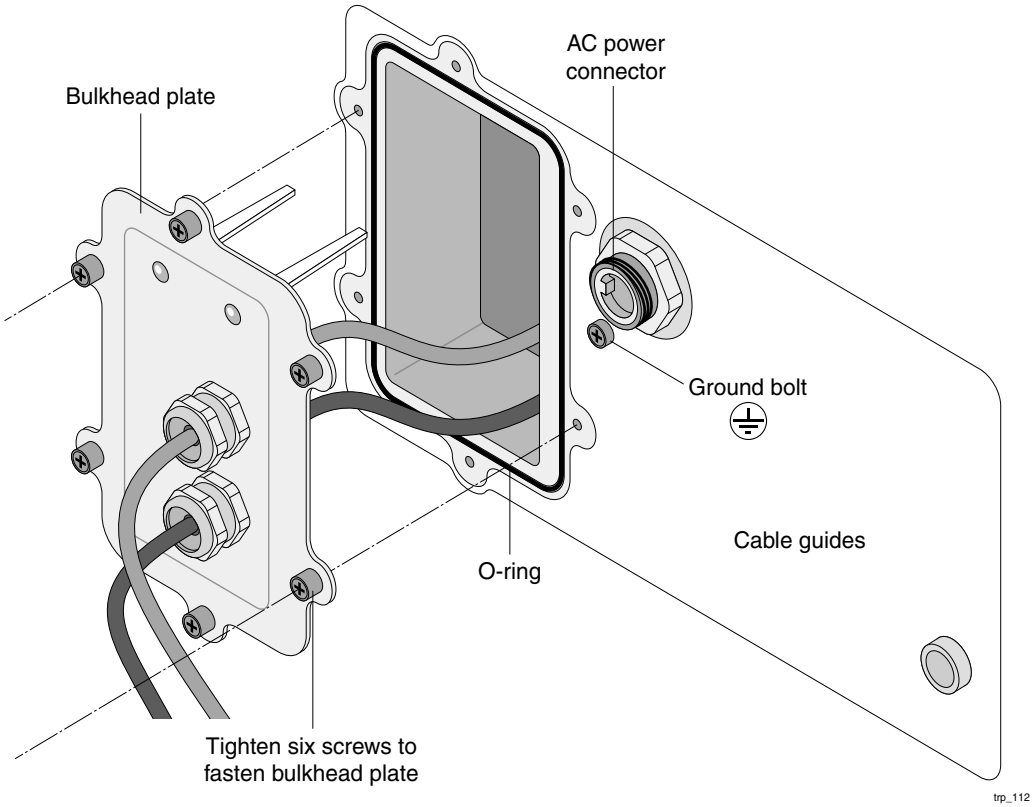


Note
Attach ground and data cables to the cell before sliding the cell into the sun shield.

Connect to the data port

1. Verify that power is turned off on the designated circuits.
2. Run shielded Category 5 Ethernet cable appropriate for outdoor use from a data protection unit to the Tropos 5210 Wi-Fi cell.
3. Connect one end of the Category 5 cable to the protection unit.
4. Remove the connector access cover on the bottom of the cell.
5. Run raw cables for the Management or LAN port, or both, through the bulk head openings, allowing sufficient length to terminate the cables without causing crowding in the connection area. See Figure 21.

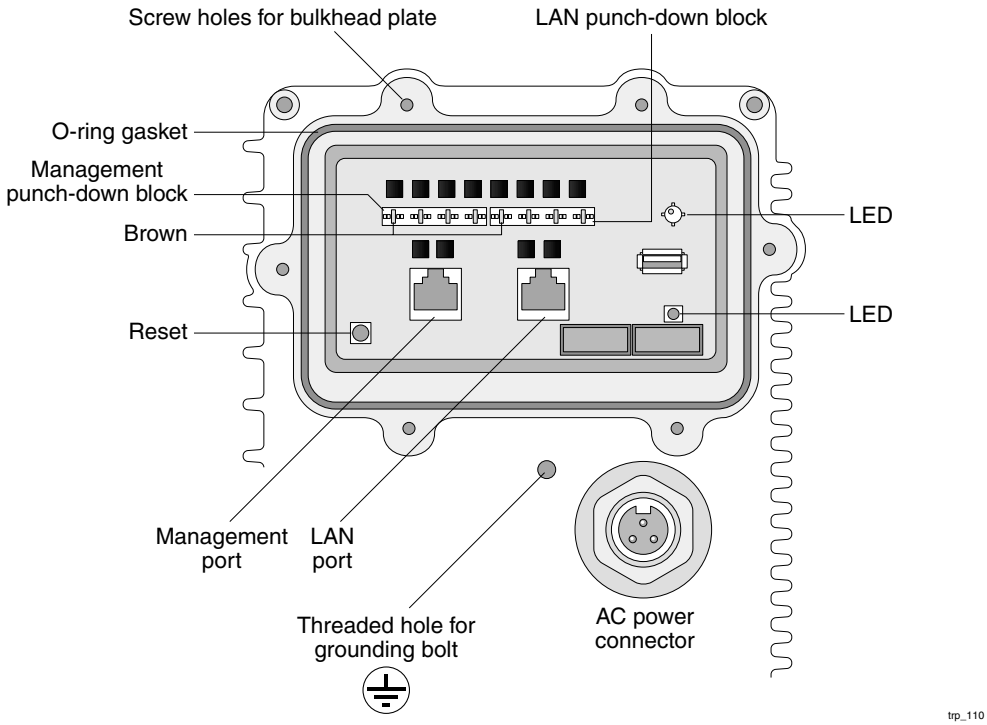
Figure 21 Data Port Connection



6. Connect the cable ends that were routed through the connector access cover to the LAN and Management ports on the cell. Attach the cables directly to the punch down block, or use an appropriate RJ45 8-pin modular plug to terminate the cables at the desired lengths. The outer jacket and conductive shield must be stripped to expose the twisted pairs for attachment, as

shown in Figure 20. The proper location of the connections on the cell circuit board is shown in Figure 22.

Figure 22 Circuit Board Connection Locations



7. Verify that the protection unit is properly grounded.
8. Reconnect the circuit and confirm that power to the Tropos 5210 Wi-Fi cell comes on.
9. If you are using external antennas, install the antenna cables. Be sure to provide a drip loop to divert water away from the connector.
10. Separate the liner from the self-fusing EPR waterproofing tape.
11. Pre-stretch the tape and wrap it tightly around the connector.

Resetting the Cell

You can use the Reset button on the circuit board to reset the hardware and software and to turn the cell off if it is operating on battery power.

Perform a hardware reset

- Press the reset button for one second.

Turn the battery-powered cell off

- Press and hold the Reset button for 3-5 seconds.

Connecting Peripherals

The Tropos 5210 Wi-Fi cell can be configured to source DC power on the Ethernet connector pins 4,5 and 7,8, This capability allows the cell to power remote peripherals such as backhaul point-to-point radios, video cameras, or fiber optic transceivers. The Tropos PoE power sourcing capability DC output is a fully isolated supply and may be used to power either positive or negative polarity peripherals.

The Tropos PoE power sourcing capability is not compliant with the IEEE 802.3af standard; however, many IEEE 802.3af-compliant power devices (PDs) will operate using the power sourcing equipment capabilities of the Tropos 5210 Wi-Fi cell.

The Tropos 5210 Wi-Fi cell can supply up to a total of 14W of DC power distributed to the LAN port, Management port, or both. Each port must be configured for the same voltage. To configure the voltage, use the Tropos Configuration Utility (see *Tropos Networks User Guide)* or an element management system such as Tropos Control EMS (see the *Tropos Control EMS Installation and User Guide*). The DC output voltage can be configured to 12Vdc, 24Vdc, 48Vdc, or to the Off state (0Vdc). Table 2 lists the maximum power output as a function of voltage.

Table 2 PoE Power Sourcing Power Output

Voltage	Max Power Output
12Vdc	14W
24Vdc	12W
48Vdc	10W

In the event of an over-current or short-circuit fault event, the Tropos 5210 Wi-Fi cell will remove PoE output for three to five seconds before attempting to resume sourcing power to the peripheral device.

The power sourcing feature is covered by battery backup ("Battery Backup Operation" on page 38). If the battery backup capability is installed, PoE output power is unaffected by the temporary loss of AC power.

Figure 23 shows the pin locations for the RJ45 connector, and Table 3 shows the associated pin descriptions.

Figure 23 RJ45 Pin Locations

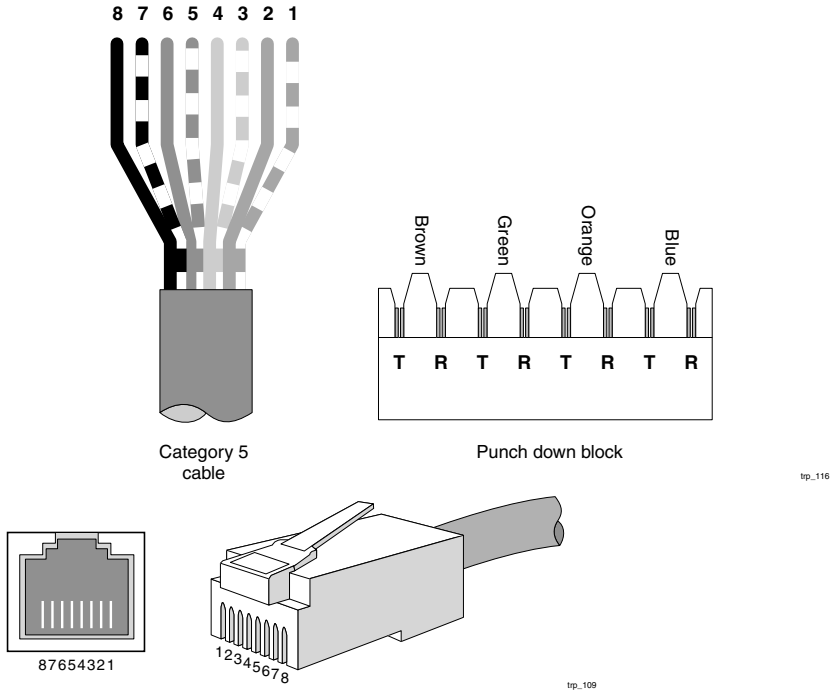


Table 3 RJ45 Pin Descriptions for Data Connection

Pin	T/R	Signal	Color	Description
1	T	TXD+	Orange-White	TX Data 10/100BaseT
2	R	TXD-	Orange	TX Data 10/100BaseT
3	T	RXD+	Green-White	RX Data 10/100BaseT
4	R	PoE+	Blue	Power output, 0, 12, 24, 48 Vdc (+)
5	T	PoE+	Blue-White	Power output, 0, 12, 24, 48 Vdc (+)
6	R	RXD-	Green	RX Data 10/100BaseT
7	T	PoE-	Brown-White	Power output, 0, 12, 24, 48 Vdc (-)
8	R	PoE-	Brown	Power output, 0, 12, 24, 48 Vdc (-)

Note
Only use shielded Cat5 cable rated for outdoor use. For protection against risk of fire, electrical hazard and to ensure the reliable operation of this equipment, the shields of the Cat5 cable must be properly terminated and bonded to the unit and to the protective earth (PE) at the building entrance.

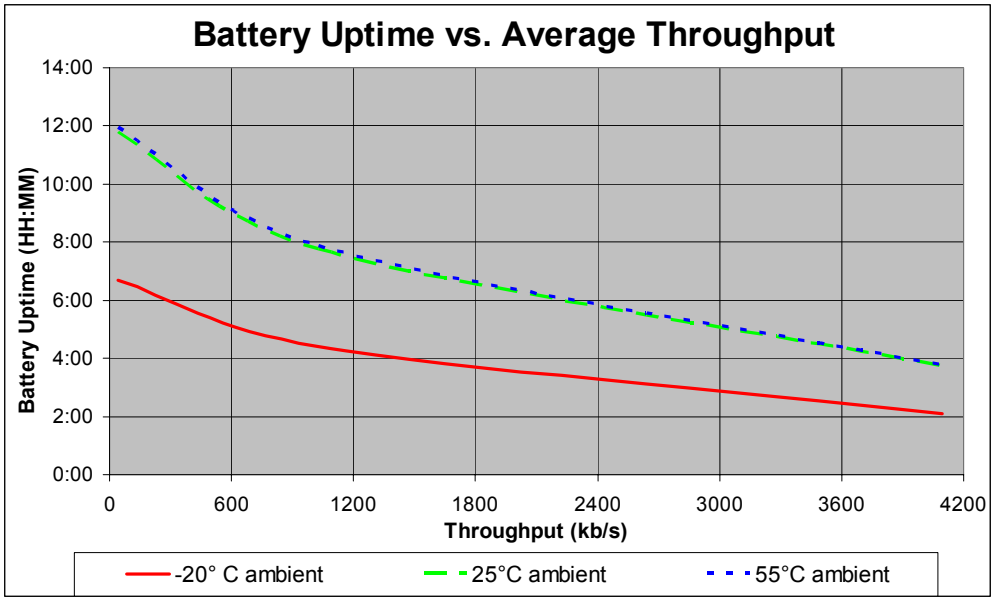
Note
Since peripheral connections require AC power, this configuration is not compatible with Power over Ethernet.

Battery Backup Operation

The Tropos 5210 Wi-Fi cell may contain an automatically recharging battery, which provides an integrated uninterruptible power supply (UPS). The available backup time depends upon the level of network traffic serviced by the cell and the ambient temperature. Figure 24 shows the relationship between average throughput and battery uptime.

Note
The internal battery is not field replaceable.

Figure 24 Average Battery Backup Time



Safety Information for the Tropos 5210 Wi-Fi Cells

The Federal Communications Commission (FCC) with its action in ET Docket 96-8 has adopted a safety standard for human exposure to RF electromagnetic energy emitted by FCC certified equipment. The Tropos 5210 products meet the uncontrolled environmental limits found in OET-65 and ANSI C95.1, 1991. Proper operation of this radio according to the instructions found in this manual and the hardware and software guides on the Tropos 5210 Wi-Fi cells result in user exposure that is substantially below the FCC recommended limits.

The following are guidelines to insure safe operation of the Tropos 5210 Wi-Fi cells:

- Do not touch or move the antenna(s) while the unit is transmitting or receiving.
- Do not hold any component containing a radio such that the antenna is very close to or touching any exposed parts of the body, especially the face or eyes, while transmitting.

- Do not operate the radio or attempt to transmit data unless the antenna is connected; otherwise, the radio may be damaged.
- Use in specific environments:
  - Do not operate a portable transmitter near unshielded blasting caps or in an explosive environment unless it is a type especially qualified for such use.
  - The use of wireless devices in hazardous locations is limited to the constraints posed by the safety directors of such environments.
  - The use of wireless devices on airplanes is governed by the Federal Aviation Administration (FAA).
  - The use of wireless devices in hospitals is restricted to the limits set forth by each hospital.
- Antenna use:
  - The Tropos 5210 Wi-Fi cells must only be used with Tropos-approved components and antennas. See Appendix B, “Product Specifications,” for details.
  - In order to comply with FCC RF exposure limits, dipole antennas should be located at a minimum distance of 7.9 inches (20 cm) or more from the body of all persons.
  - High-gain, wall-mount or mast-mount antennas are designed to be professionally installed and should be located at a minimum distance of 12 inches (30 cm) or more from the body of all persons. Please contact your professional installer, VAR, or antenna manufacturer for proper installation requirements.
- Battery backup:
  - The Tropos 5210 Wi-Fi cell may contain a lithium-ion battery. To avoid the possibility of an explosion, the Tropos 5210 Wi-Fi cell should **not** be exposed to any temperatures higher than 85 degrees C.

Service Instructions

This section contains service information for the Tropos 5210 Wi-Fi cells.

Note
The Tropos 5210 Wi-Fi cells have no user serviceable parts inside. The following information is intended for trained service personnel only.

Clock Battery

The Tropos 5210 Wi-Fi cells have a real-time clock which is powered by a small lithium rechargeable battery. If the real-time clock fails, return the unit to Tropos Networks for servicing.

Caution
There is a danger of explosion if the battery is incorrectly replaced. Replace the battery with only the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Caution
There is a risk of explosion if the battery is replaced by an incorrect type.

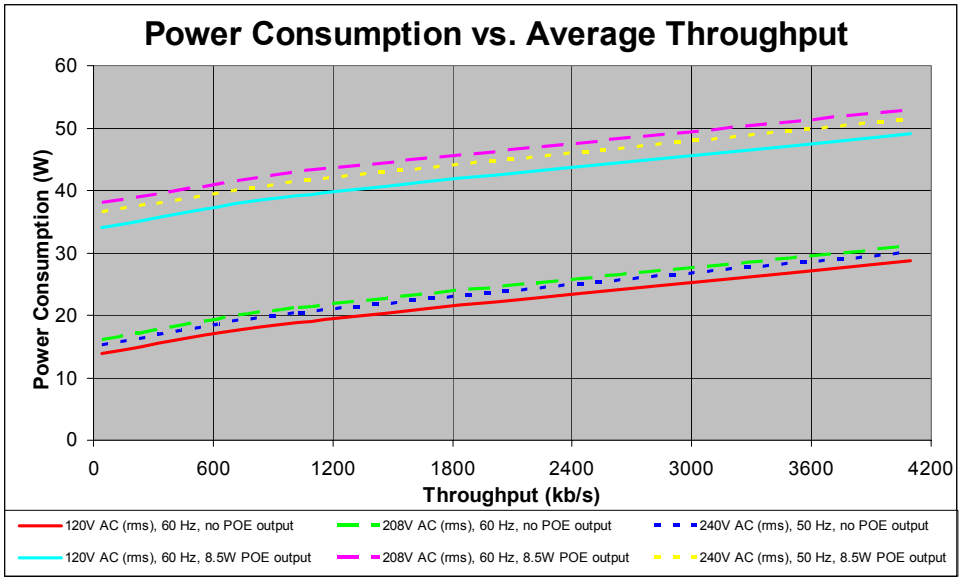
Caution
Dispose of batteries according to the manufacturer's instructions.

A Power Consumption

Several factors influence the power consumption at any given time, including the level of network traffic, temperature, and whether a powered peripheral device is connected to the LAN or Management port of the Tropos 5210 Wi-Fi Cell. Temperature influences power consumption due to the internal freeze protection capability of the Tropos 5210 Wi-Fi Cell.

Figure 25 shows the relationship between throughput and AC power consumption.

Figure 25 AC Power Consumption



B Product Specifications

This appendix contains the product specifications for the Tropos 5210 Wi-Fi Cell:

Table 4 Physical Specifications

Physical Dimensions	**Height**	**Width**	**Depth**
Inches	5.3	13.2	7.9
Centimeters	13.5	33.5	20.1
Weight			
lbs - maximum	14	Includes all brackets and sun shields	
Kg - maximum	6.35		
Mounting Pole Diameter	1.75" to 10"		
Temperature	**Min**	**Max**	
AC Powered Operating Range	-40C	55C	
Storage Range	-45C	85C	
Weather Rating	UL579/IEC 60529 IP67		
Corrosion Resistance	MIL-STD-810F 509.4 Salt Fog		
Color	Gloss white		
Shock and Vibration			
Operational:	ETSI 300-19-2-4 Specification T41.E, class 4M3		
Transportation:	ISTA 2A Random Bounce Random Vibration 6 Corner Drop Test		

Table 5 Interfaces

Data Interface	Distance (ft)	Connector
IEEE 802.3 10/100BaseT	1300 (10BaseT Duplex Setting) 300 (100BaseT Duplex Setting)	RJ45, type 110 punch down block
Management Interface	**Distance (ft)**	**Connector**
IEEE 802.3 10/100Base T	1300 (10BaseT Duplex Setting) 300 (100BaseT Duplex Setting)	RJ45, type 110 punch down block
Wireless Interface		
Standard	IEEE 802.11b/g Wi-Fi	
Frequency Range	2400 to 2485 MHz ISM Band	
Modulation	DSSS; DBPSK @ 1 Mbps, DQPSK @ 2 Mbps, CCK @ 5.5 and 11 Mbps OFDM @ 54, 48, 36, 24, 18, 12, 6	
	FCC/RSS210 **Models 5210XXX0**	
Rx Sensitivity	-98dBm (1 Mbps) -96dBm (2 Mbps) -95dBm (5.5 Mbps) -91dBm (11 Mbps) -93dBm (6 Mbps) -92dBm (9 Mbps) -90dBm (12 Mbps) -88dBm (18 Mbps) -85dBm (24 Mbps) -82dBm (36 Mbps) -77dBm (48 Mbps) -74dBm (54 Mbps)	

Table 5 Interfaces (*continued*)

	FCC/RSS210 Models 5210XXX0
Rx Saturation Maximum Power at Antenna Port	-5dBm (1 Mbps) -5dBm (2 Mbps) -5dBm (5.5 Mbps) -5dBm (11 Mbps) -5dBm (6 Mbps) -5dBm (9 Mbps) -5dBm (12 Mbps) -10dBm (18 Mbps) -30dBm (24 Mbps) -35dBm (36 Mbps) -35dBm (48 Mbps) -35dBm (54 Mbps)
Antennas	External
Antenna Diversity	Transmit/Receive
Impedance	50 ohms
VSWR	1.5 : 1
Connectors (two)	N (female)
Indicator - Status Lamp	Red/Green

Table 6 Power Options / Consumption

Single Phase VAC IEEE/ANSI C62.41 CAT C Power Source IEC Category IV Power Source	90-480 VAC 50/60 Hz	23W/60W	typical/max
Protection Circuits			
Antenna Protection	<= 0.5µJ for 3kA @ 8/20µS Waveform EN61000-4-2 Level 4 ESD Immunity EN61000-4-5 Level 4 Surge Immunity		
AC Input Protection	IEEE/ANSI C62.41 Category C 10kA @ 8/20uS Waveform; 36kA per phase L-L, L-N, L-PE EN61000-4-2 Level 4 ESD Immunity EN61000-4-5 Level 4 Surge Immunity EN61000-4-4 Level 4 EFT Immunity Integrated Branch Circuit Protection Class CC-Fuse: Littlefuse KLDR Time-Delay 20A		
Data Port Protection	EN61000-4-2 Level 4 ESD Immunity EN61000-4-5 Level 4 Surge Immunity		

Table 7 Power Over Ethernet - Power Sourcing

LAN or Management Port	+ on pins 4,5; - on pins 7,8		
DC Output Voltages	0 (Off), 12, 24, 48 Vdc		
Output Power	Total power on LAN and Management ports	**Voltage** 12Vdc 24Vdc 48Vdc	**Max Power Output** 14W 12W 10W
Over-Current Protection	1.6A Resettable dual fusing		
Over-Voltage Protection	90Vdc surge		
Output isolation	1500Vdc		

Table 8 Certifications, Other

Certifications	CFR 47 FCC Part 15.C; Class Industry Canada RSS210 EN60950 cTUVus Listed I.T.E. UL579/IEC 60529 IP67 Rated for Outdoor Use IEEE/ANSI C62.41 Category C AC Surge Immunity EN61000-4-5 Level 4 AC Surge Immunity EN61000-4-2 Level 4 ESD Immunity EN61000-4-4 Level 4 EFT Burst Immunity EN61000-4-3 EMC Field Immunity ISTA 2A VCCI Class B
Wind Survivability	> 165 mph
Wind Loading (165 mph)	< 500 newtons
Effective Projected Area	.59 sq. ft. (85.4 sq. in.)

C Approved Antenna Configurations

This appendix lists approved antenna configurations and ordering information for the U.S., Canada, and Taiwan regulatory domains and the Japan regulatory domain.

U.S. Antenna Configurations and Ordering Information

Table 9 lists approved antenna configurations for the U.S., Canada, and Taiwan, and Table 10 lists the Tropos ordering numbers for the antennas.

Table 9 U.S., Canada, and Taiwan Antenna Configurations

Order Number	Product Description		Certified Antenna Configurations	
USA FCC CFR 47 Part 15 Canada RSS - 210 Taiwan DGT		Peak Conducted Tx Output Power	Unit-Mounted 7.4dBi Omni: AN074077	Mast-Mounted Cable Attached 7.4dBi Omni: AN074088
52102100	Tropos 5210 (-40 to 55 deg C) N connectors, bracketry	28dBm		35.4dBm EIRP
52103000	Tropos 5210 (-40 to 55 deg C) 7.4 dBi omni unit attached antennas	28dBm	35.4dBm EIRP	
52102200	Tropos 5210 (-40 to 55 deg C) Battery backup, N connectors	28dBm		35.4dBm EIRP
52103100	Tropos 5210 (-40 to 55 deg C) Battery backup, 7.4 dBi omni unit attached antennas	28dBm	35.4dBm EIRP	

Table 10 Tropos Antenna Ordering Numbers for U.S., Canada, Taiwan

Part Number	Description
AN074077	One outdoor 7.4dBi omni unit-mounted antenna; N connector
AN074088	One outdoor 7.4dBi omni mast-mounted antenna; N connector; bracketry
AN120022	One outdoor 12.0dBi 90° sector; N connector with pole-mount bracketry; Sealing Materials (RF cable not included)
AN100022	One outdoor 9.9dBi omni mast-mounted antenna; N connector; Mounting Bracket; Sealing Materials
AN120044	One outdoor 12.0dBi omni mast-mounted antenna; N connector; Mounting Bracket; Sealing Materials

Attenuation with External Antennas

If external antennas are used, it is necessary to adjust the transmit power attenuation to provide the correct power level for the Tropos 5110 Wi-Fi cell. Use the following formula to compute the required attenuation level:

```
Antenna gain (dBi) - 7.4 dBi - Cable loss = Attenuation setting
```

The attenuation setting cannot be negative; therefore, a positive attenuation setting is only required if the antenna gain is greater than 7.4dBi. Table 11 shows the proper attenuation settings for the AN120022, AN100022, and AN120044 antennas, assuming that low-loss cable is used (1dBi). The attenuation should be rounded to the nearest half-integer value.

Table 11 Antenna Gain and Attenuation Settings

Model Number	Antenna Gain	Attenuation Setting (1dBi): Antenna gain - 7.4 - 1 (rounded)	Peak Conducted Power	EIRP
AN120022	12.0dBi, directional	4	24dBm	36.0dBm
AN100022	9.9dBi, omni	2	26dBm	35.9dBm
AN120044	12.0dBi, omni	4	24dBm	36.0dBm
AN70488	7.4dBi, omni	0	28dBm	35.4dBm

Japanese Antenna Configurations and Ordering Information

Table 12 lists the approved antenna configurations for Japan, and Table 13 lists the Tropos ordering numbers for the antennas

Table 12 Japanese TELEC Certified Antenna Configurations

Order Number	Product Description	TELEC Certified Antenna Configurations			
Japan TELEC (Tx Power 16 dBm		**Average Conducted Tx Output Power**	**Unit-Mounted 7.4dBi Omni: AN074077**	**Mass Mounted Cable Attached 7.4dBi Omni: AN074088**	**Mass Mounted Cable Attached Sector Antenna up to 12dBi: AN120022**
52102501	Tropos 5210 (-40 to 55 deg C) 7.4 dBi omni unit attached antennas, bracketry	16dBm 4.1dBm/MHz	23.4dBm 11.5dBm/MHz EIRP		
52102701	Tropos 5210 (-40 to 55 deg C) N connectors, bracketry; for use with directional antennas	16dBm 4.1dBm/MHz		23.4dBm 11.5dBm/MHz EIRP	28dBm 16.1dBm/MHz EIRP
52102601	Tropos 5210 (-40 to 55 deg C) Battery backup, 7.4 dBi omni unit attached antennas, bracketry	16dBm 4.1dBm/MHz	23.4dBm 11.5dBm/MHz EIRP		
52102801	Tropos 5210 (-40 to 55 deg C) Battery backup, N connectors, bracketry; for use with directional antennas	16dBm 4.1dBm/MHz		23.4dBm 11.5dBm/MHz EIRP	28dBm 16.1dBm/MHz EIRP

Table 13 Tropos Antenna Ordering Numbers for Japan

Part Number	Description
AN074077	One outdoor 7.4dBi omni unit-mounted antenna; N connector
AN074088	One outdoor 7.4dBi omni mast-mounted antenna; N connector; bracketry
AN120022	One outdoor 12.0dBi 90° sector; N connector with pole-mount bracketry; Sealing Materials (RF cable not included)

D Installation Accessories

Table 14 contains accessory ordering information for the Tropos 5210 Wi-Fi cell and Table 15 lists cable and related accessory ordering information.

Table 14 Installation Accessories

Description	Manufacturer	Part Number	Distributor	Contact Information	Order Number
Outdoor CAT5 4-Pair Data Cable	Belden	7929A	Anixter	www.anixter.com	
	Superior Essex	BBDG	Anixter	www.anixter.com	
Self-Fusing EPR Tape	3M	Scotch 23 Rubber Splicing Tape	McMaster Carr	www.mcmaster.com	7682A65
			Alameda Electric Distributors	www.alamedaelectric.com	
ThreadLocker LocTite 242 0.5 ml (0.017oz)	LocTite	242	McMaster Carr	www.mcmaster.com	91458A24
3 pin AC Male Plug (cord end) - 115 VAC 15A	Leviton	14W47-B	Alameda Electric Distributors	www.alamedaelectric.com	
3 pin AC Female Receptacle 115 VAC 15A	Leviton	15W47	Alameda Electric Distributors	www.alamedaelectric.com	
3 pin AC Plug Female (cord end) - Tropos 5210 cell	Remke	50982	DSC Technical Sales	www.dsctechnicalsales.com	
Data Protection Device	Polyphase	IX-2H1DC48/W	Electro-Comm	www.electro-comm.com	
	Cylix	MTJ-POE			

Table 15 Tropos Cable and Accessory Ordering Numbers

Part Number	Description
RC003400	3' N (male) to N (male) cable - LMR 400 DB
RC006400	6' N (male) to N (male) cable - LMR 400 DB
RC010400	10' N (male) to N (male) cable - LMR 400 DB
RC005000	50 ohm Terminator - N (male); Sealing Materials
RC008000	Sealing Kit - Loctite242, EPR Rubber Splicing Tape
RC009000	N adapter for 7.4dBi mast-mounted antenna to N (male) cable

E AC Wiring Diagrams

This appendix contains wiring diagrams for AC power:

- Figure 26 — Photoelectric Power Tap
- Figure 27 — AC Wiring Power Cable 120Vac 15A Plug

Figure 26 AC Wiring — Photoelectric Power Tap

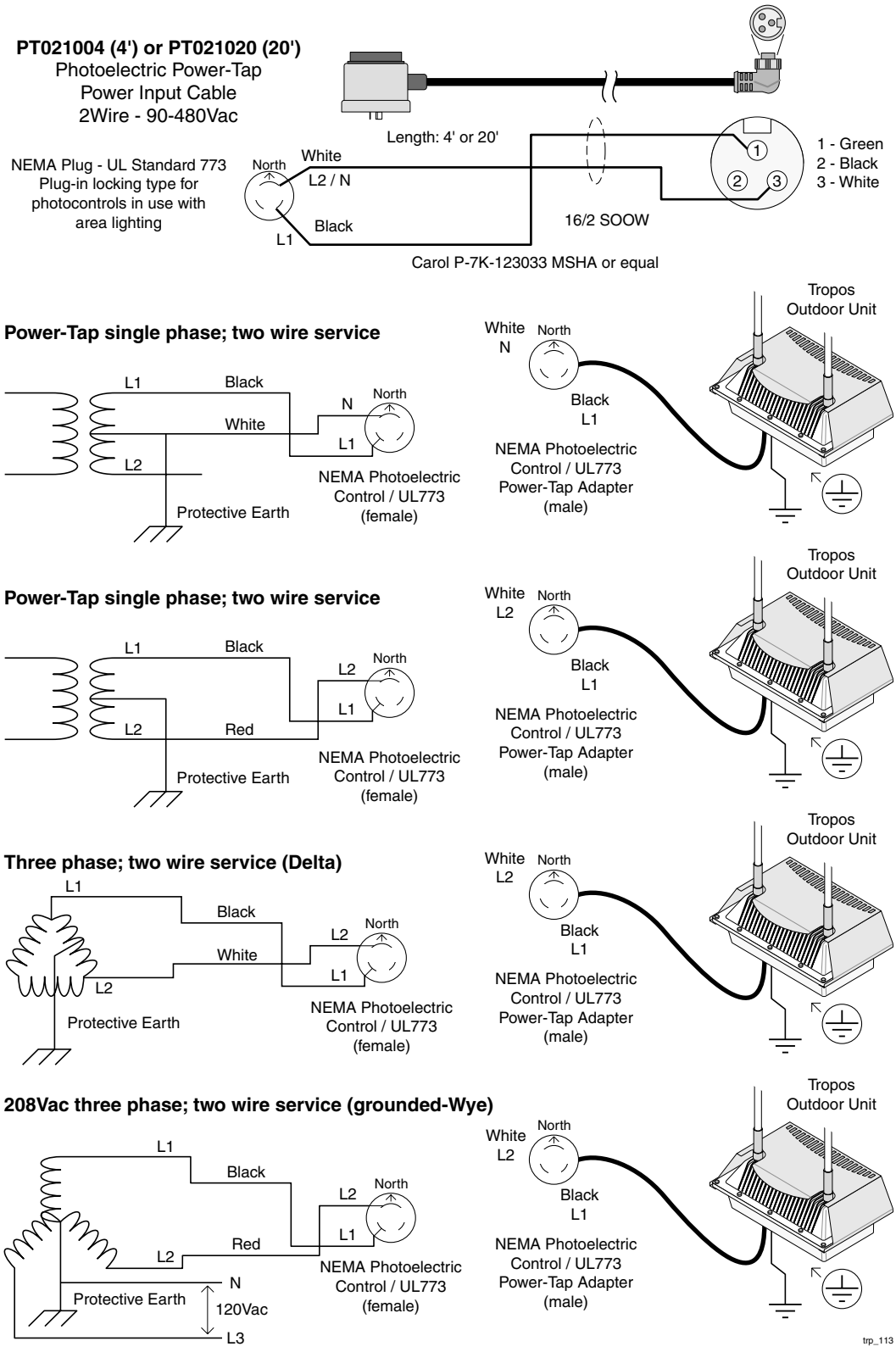
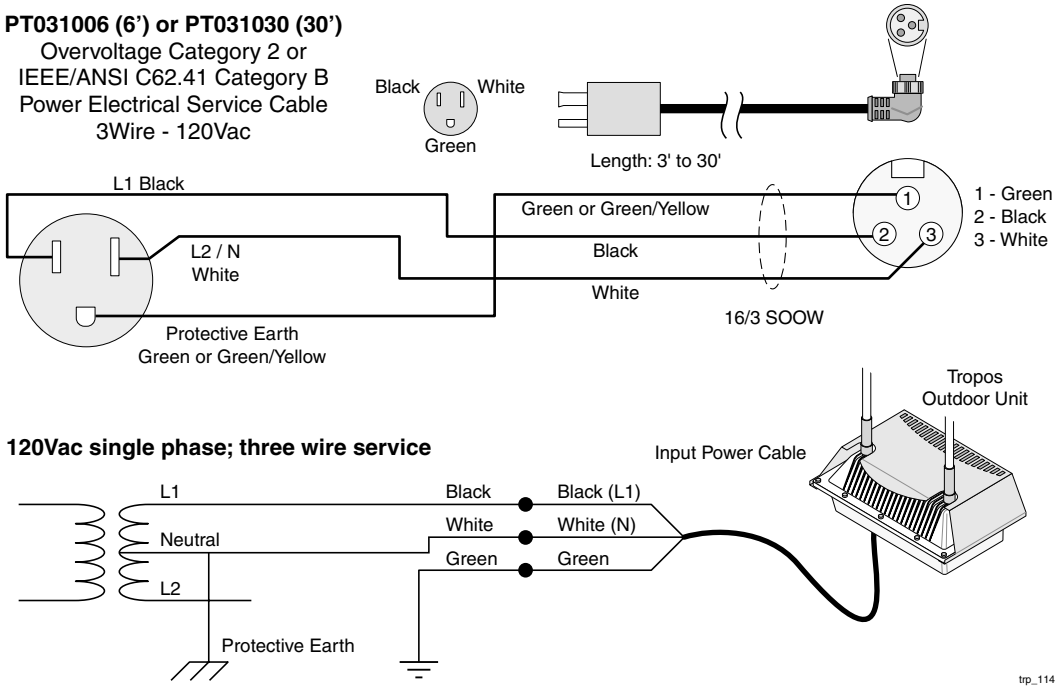


Figure 27 AC Wiring Power Cable 120VAC, 15A Plug



F Wind Loading Considerations

The American Association of State Highway and Transportation Officials (AASHTO) standards manual, “Standard Specifications for Structural Supports for Signs, Luminaires and Traffic Signals,” governs most structural support issues related to traffic lighting and controls. Many state and city public works departments site the AASHTO standard as the guide for their requirements. Local municipalities in coastal states, which experience frequent hurricanes, etc., may have exceptions to the AASHTO standard that require higher design limits for wind velocity or dead load.

Numerous pole and mast arm assemblies are used for traffic controls and traffic lighting. Each assembly and installation is unique and worthy of an evaluation of the static and dynamic load bearing capabilities; however, in most cases, the assembly will include a pole with a single 6', 9' or 12' mast arm holding a single luminaire. Many of these mast arms are typically designed to hold hundreds of pounds of static load and to carry several square meters of sail area in 80mph winds. The typical mast arm is capable of supporting a single traffic control (typically weighing around 160 lbs) and a single traffic sign (typically presenting a few square meters of sail area). A single luminaire typically weighs about 60 lbs and presents about 3 square feet of sail area.

Note
Each assembly and installation is unique and worthy of an evaluation of the static and dynamic load bearing capabilities. It is your responsibility to evaluate the load bearing capabilities of the structure.

The Tropos 5210 Wi-Fi cell weighs <14 lbs, including all mounting hardware. The Tropos 5210 Wi-Fi cell may be mounted to either the pole portion of the streetlight or to the mast arm portion. Many municipalities find mounting the Tropos 5210 Wi-Fi cell to the pole portion to provide better aesthetics in the public space.

When the Tropos 5210 Wi-Fi cell is mounted to the pole or mast arm, most of the unit is hidden by the pole or mast arm and therefore presents minimal additional sail area to the structure. When the Tropos 5210 Wi-Fi cell is mounted to the pole portion of the structure, the sail area of the cell is approximately 1 square foot. Pole manufacturers have advised Tropos Networks that small communications devices such as the Tropos 5210 Wi-Fi cell do not present any significant static or dynamic load to these structures.

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