AP240

Sensys Networks VDS240 Wireless Vehicle Detection System

AP240 Access Point Installation Guide

P/N 152-240-015-001, Rev H
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Document Properties

This document is reference material for the Sensys Networks VDS240 wireless vehicle detection system from Sensys Networks, Inc.

P/N 152-240-015-001 Rev H

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Regulatory Statements

FCC Compliance Statement

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference.

(2) This device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications to this product not authorized by Sensys Networks could void the EMC compliance and negate the authority to operate the product.

RF Exposure Statement

This device has been tested and meets the FCC RF exposure guidelines. It should be installed and operated with a minimum distance of 20 cm between the radiator of RF energy and the body of users, operators, or others.

Improper use or tampering with the device is prohibited and may not ensure compliance with FCC exposure guidelines.

Warnings

No Safety Switching

Sensys Networks **does not** allow its equipment to be used for safety applications such as controlling a mechanical gate or switching a train to avoid a collision.

Lithium Thionyl Chloride Batteries

Sensys Networks uses Lithium Thionyl Chloride batteries in the following products:

- Sensors (VSN240-F, VSN240-T, VSN240-S, VSN240-M, VSN240-F-2, VSN240-T-2)
- Repeaters (RP240-B, RP240-BH, RP240-B-LL, RP240-BH-LL, FLEX-RP-B)

Lithium batteries are widely used in electronic products because they contain more energy per unit -weight than conventional batteries. However, the same properties that deliver high energy density also contribute to potential hazards if the batteries are damaged. Improper use or handling of the batteries may result in leakage or release of battery contents, explosion, or fire.

Following are the recommendations of the battery manufacturer for proper use and handling of batteries in the Sensys Networks devices mentioned above:

- **DO NOT** charge or attempt to recharge the batteries (they are NOT rechargeable)
- **DO NOT** crush or puncture batteries
- **DO NOT** short-circuit the batteries
- **DO NOT** force over-discharge of the batteries
- **DO NOT** incinerate or expose batteries to excessive heating
- **DO NOT** expose battery contents to water
- **DO** dispose of batteries and devices containing batteries in accordance with local regulations

NOTE:

Sensys Networks wireless sensors contain no serviceable parts and should never be disassembled. Installation and removal of sensors from pavement should only be done by trained personnel and care should be taken to insure that the sensor casing is not punctured or crushed.

Additional safety information is available from the battery's manufacturer:

- Sensor battery cell: http://www.ultralifecorporation.com/download/308
- Repeater battery cell: http://www.ewtbattery.com/en/DownView.asp?ID=9

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Contents

Introduction

This guide provides information and procedures for installing Sensys Networks access points in conjunction with the Sensys Networks VDS240 wireless vehicle detection system. This document is intended to be used by Sensys Networks customers, consultants, partners, dealers, and those who are interested in the application of wireless communication technology to the challenges of traffic detection, management, and control.

What's Inside

This guide includes the following information:

- *Chapter 1: Introduction*, defines the purpose and scope of the guide.
- *Chapter 2: Overview*, reviews the operations of an access point and describes the contents of a product shipment.
- *Chapter 3: Installation Considerations*, notes key points for installing access points.
- *Chapter 4: Installation Procedures*, provides step-by-step instructions for installation.
- *Chapter 5: Cabling and Powering*, explains how to connect an access point and supply power to it.
- *Appendix A: Clamp Band User Guide*, provides clamp band usage and specifications.
- *Appendix B: EZ-RJ45/EZ-RJPRO User Guide*, provides crimp tool usage and specifications.

Overview

This chapter provides a short overview of an access point and describes the contents of an access point shipment.

Wireless Access Point

A Sensys Networks wireless access point collects event data from wireless sensors and repeaters, optionally aggregates it, and forwards it to local signal control equipment, traffic management systems, or a third-party application server.

Access points provide a central point of authority, device management, identification, and service definition for networks consisting of equipment from Sensys Networks including wireless sensors, repeaters, and/or contact closure cards.

Access points are installed at the road side in the proximity of wireless sensors whose data is collected and used in traffic applications such as freeway/arterial count stations, stop bar detection, and advance detection.

Event data is forwarded directly to a local traffic controller via interface equipment from Sensys Networks, routed (via an available IP network) to remote management systems, processed locally by the access point, or any combination of the forgoing.

Access Point Package Contents

Each access point is shipped with the items listed below. Verify that you have received all of them. In the event that some items are missing, contact Sensys Networks or the party that supplied the equipment to you.

The items in an access point shipment include:

- An access point (either Ethernet or serial port configuration)
- *Access Point Installation Guide* (this document)
- "Tool less" push/pull Ethernet bulkhead connector
- Power-over-Ethernet (PoE) injector
- 48V power supply
- Information sheet (one per device)

Item that is shipped seperately:

- Universal mounting kit (mounting kit can be purchased from Sensys Networks)

Access points are shipped with a factory default configuration suitable for bench-testing the device and applicable to many field environments. The information sheet details the physical attributes of the access point as well as key configuration elements.

Access point information sheets contain the following elements:

- *Serial number* – a globally unique identifier for the access point
- *Default RF channel* – a critical configuration property
- *Default IP address*
- *Firmware release version*

NOTE:

RF channel is essential for communicating and further configuring the wireless sensor network. Save all information sheets for the party who will configure and use the network after it is installed.

Universal Mounting Kit Contents

The following parts are included in the access point mounting kit:

- Access point ball plate (rectangular, attached to the access point at the factory, refer to Figure 2.1)

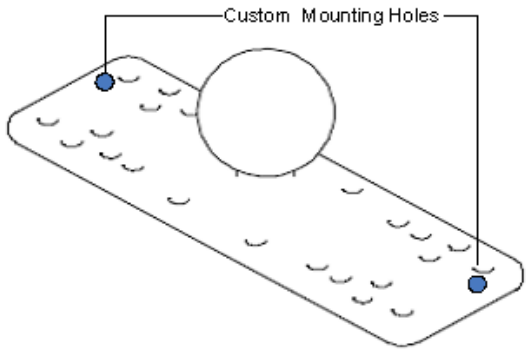


Figure 2.1. Factory installed access point ball plate (rectangular)

- Surface mounting ball plate (square, refer to Figure 2.2)

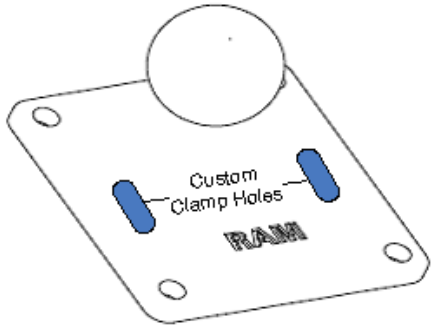


Figure 2.2. Surface (wall/beam/pole) mounting ball plate (square)

- Double socket arm (refer to Figure 2.3)

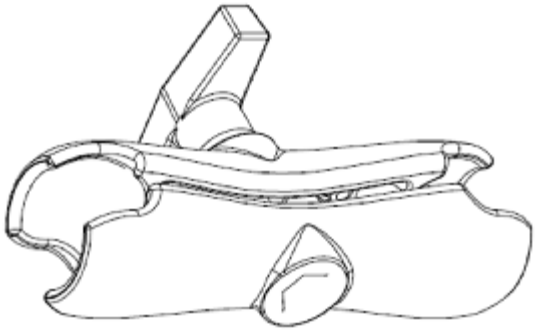


Figure 2.3. Double socket arm

- 5-foot clamp band
- Clamp fastener

Installation Considerations

This chapter provides information to consider before installing access points.

Powering the Access Point

The overall network design determines how the access point is powered; two general models are supported:

- Acquiring power from a traffic controller cabinet
- Acquiring power from another source

Acquiring Power From a Traffic Controller

An access point can be directly interfaced to a traffic signal controller through a *contact closure card*. When this is the case, power to the access point is drawn from the traffic controller backplane through the card and an intermediate device known as an AccessBox.

Acquiring Power From Another Source

In installations where the access point is not directly interfaced to a traffic controller via a contact closure card, power is supplied to the access point via another source such as a local solar system or other source. Power is conducted to the access point via a power-over-Ethernet (PoE) injector.

PoE or "Active Ethernet" eliminates the need to run a 110/220 VAC power cable to an access point. System installers need to run only a single CAT5 or better Ethernet cable to each access point; the cable carries both power and data. Each access point includes a 48V power supply and IEEE standard Power-over-Ethernet (PoE) injector.

In installations where the access point receives power via the PoE model, the power source may vary depending on site conditions as described in the following section.

Voltages

Access points use the following voltages drawn from one of the following sources:

- 36VDC – 58VDC (48VDC nominal) – typically supplied from a nearby traffic controller cabinet or power pole
- 10VDC – 20 VDC (12 VDC nominal) – typically supplied from a solar panel

Cabling

Standard Ethernet compatible, outdoor rated, 4-pair CAT5 or better cable is required. The maximum cable length is 328 feet (100 meters). The cable should be terminated with RJ45 connectors according to the TIA/EIA 568-B specification when it is installed.

NOTE:

The outside diameter of the cable is an important attribute. The cable's OD is used to select the proper bushing for the access point's bulk head connector on access points manufactured after May 2010.

Collecting Data From the Access Point

Access points automatically collect detection events and, depending on the network design, forward them to upstream traffic information systems and management servers via an IP network connection.

An on-board Ethernet network interface facilitates this. In situations where a wired network connection is not available, an integrated radio modem supporting either GSM-based or CDMA-based cellular services may be added.

The following connection models are supported for IP communications:

- *Connection via a wired network path* – for example, bench configuration prior to installation, field access based on patching a technician's laptop to the access point via an Ethernet cable, or an available wide area network connection.
- *Connection via a wireless network path* – for example, using GSM cellular networks (EDGE/GPRS data services) or CDMA cellular networks (1xRTT data services).

Additionally, event data may be forwarded to a local traffic signal controller via a contact closure card. This interface converts event data to the signal pattern required by the traffic controller.

Determining the Location of the Access Point

The physical location of the access point is the primary determinant of the wireless radio communications quality and, as such, the network's overall usefulness and reliability. Selecting a location involves several factors (including other local RF transmissions) that may make pre-assigned locations problematic.

Optimal Location Criteria

Optimal locations for access points meet all of the following criteria:

- are high enough to promote high quality RF communications on a sustained basis
- allow a line-of-sight path to all wireless sensors and repeaters
- are within recommended distances for wireless sensors and repeaters
- allow the access point to be mounted with its bulkhead connector and cellular antenna (if applicable) pointed toward the ground
- allow the access point to face the wireless sensors and repeaters
- are within specified cable length limits
- do not submit the access point to avoidable vibration, shaking, or movement
- are reasonably accessible to field support personnel

Installation Procedures

This chapter describes the tools required to install an access point and provides step-by-step procedures.

Tools Required for Access Point Installation

The following tools are required for installing an access point:

- *RJ45 crimp tool* – to terminate the access point cable. (Sensys Networks recommends the EZ-RJPRO P/N 100044 from Platinum Tools.)

Figure 4.1. EZ-RJPRO

- *RJ45 connectors* – rated Cat5e or better; to terminate the access point cable
- *Cat5e cable continuity line tester* – to validate cable continuity
- *Outdoor rated Cat5e Ethernet cable* – to build the access point cable; length is determined by the distance between the access point mounting location and the source of power (typically a controller cabinet, solar panel, or other available source)
- *2 straight-through Cat5 Ethernet cables* – each approximately three feet in length; used in installations where the access point is connected to a contact closure card in a controller cabinet.
- The cables connect the AccessBox to (*i*) field engineer's laptop (for access point configuration) and (*ii*) to the contact closure card in the cabinet.

- *Additional straight-through Cat5 Ethernet cables – optional*; each approximately one foot in length; these cables are used to daisy chain multiple contact closure cards. *Required only in the case of multiple CC/EX cards.*
- *1 cross-over Cat5 Ethernet cable – optional*; approximately three feet in length; used to connect an AccessBox to an Ethernet switch/hub that is local to the controller cabinet. *Required only when a connection to a local hub/ switch is specified.*
- *Lift truck* – to install the access point 16 – 30 feet above the road surface
- *Screwdriver* – combination flat and Phillips head ends
- *Universal mounting kit* – double-socket arm holds the access point. (*Kit can be purchased from Sensys Networks.*)
- *Clamp band kit* – for attaching double-socket arm to mounting pole. (*Kit supplied by Sensys Networks.*)
- *Pliers* – used to work the clamp band
- *Wire cutters* – used to cut the clamp band
- *Double-sided sticky tape* – attaches AccessBox to flat surface inside the controller cabinet

Step-by-Step Procedures

The square surface mounting ball plate can be installed on any available vertical surface sufficient to support the access point including poles, walls, or beams. This section provides procedures for pole installation; considerations for wall or beam mounting follow this section.

Installing the Mounting Plate on Poles

When attaching the square surface mounting ball plate to a pole, the clamp band is used to secure the ball plate to the pole. (Refer to *Appendix A: Clamp Band User Guide* for more information about working with the clamp band.)

Follow these steps to perform the installation:

1. Use the measuring tape to determine the circumference of the pole that will hold the ball plate.
2. Subtract four inches from the measured circumference and cut the band to that length. Cut the band through the center of the nearest round hole.
3. Feed the clamp band through the square ball plate using the custom clamp holes (Refer to figures below) until the square ball plate is at the center of the band. Attach the fastener to one end of the band by diagonally inserting the end.

Figure 4.2. Clamp band threading through surface mounting ball plate

4. Use the cloth to clean the area of the pole that will meet the ball plate. Remove the double stick tape cover from the back of the plate, wrap the clamp band around the pole, and attach the second (non-engaged) end of the fastener. Tighten the clamp to secure it.
5. Attach the double socket arm to the square ball plate.
6. Attach the access point ball plate to the other end of the double socket arm.

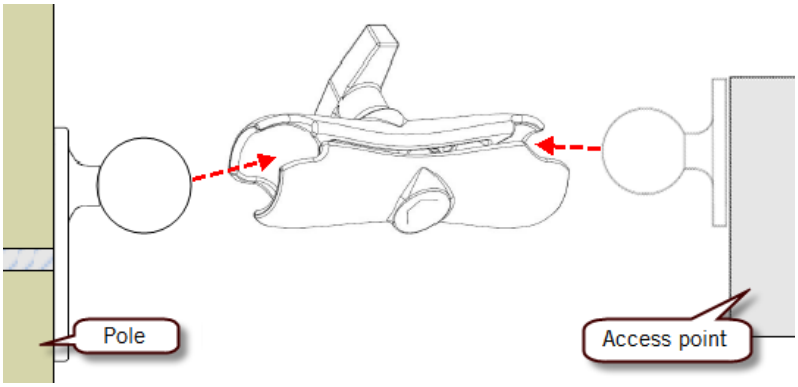


Figure 4.3. Double socket arm installation

7. Point the front of the access point toward the wireless sensors and tighten the double socket arm to secure the access point's position.

Installing the Mounting Plate on Walls

When attaching the square surface-mounting ball plate to a flat surface, the clamp band is not used. Instead, attach the ball plate to the surface with screws using each of the four corner holes.

Installing the Mounting Plate on Beams

When attaching the square surface-mounting ball plate to a beam, the clamp band is not used. Instead, attach the ball plate to the beam with beam clamps using two of the four corner holes. Beam clamps are available from Sensys Networks.

Cabling and Powering

This chapter describes the tasks required to cable and power an access point.

Required Components

The following components are used to cable and power a access point:

- Standard Ethernet compatible, outdoor rated, 4-pair CAT5 (or better) cable
- RJ45 jack kit and terminating implement
- Push-pull Ethernet coupling kit (provided with access point)
- Power-over-Ethernet (PoE) injector (supplied with the access point) or AccessBox (ordered separately)
- Grounding wire, cable ties

NOTE:

The network design determines whether a PoE injector or AccessBox is used. The optional step of connecting the components to an IP device may also be required in some installations depending on the design of the network. Refer to *Powering the Access Point* for more information.

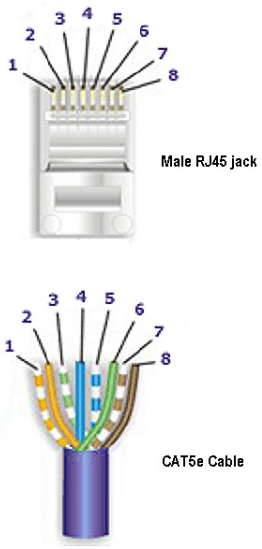


Figure 5.1. RJ45 jack and CAT5e cable

Pulling the CAT5 Cable

Sensys Networks recommends pulling the Ethernet cable through all conduits and cable ways prior to attaching the RJ45 terminating jack. This ensures the RJ45 termination is not compromised during the pulling procedure.

Measure out sufficient Ethernet cable to reach from the access point to the power source. Include a generous amount of safety slack. (If possible, include enough slack to perform the cable termination before ascending in the bucket truck.) Avoid sharp bends – a minimum bend radius of 4x the cable diameter should be observed.

Terminating the CAT5 Cable

Sensys Networks recommends terminating the Ethernet cable at the installation site after the cable has been pulled through all conduits and cable ways.

NOTE:

Most installers find it beneficial to terminate the cable **before** ascending in the bucket truck to the final access point location.

Use the RJ45 jack kit and crimp tool to terminate the cable as a standard, straight-through Ethernet cable according to the TIA/EIA 568-B pin-out table and the following figure. (Additional information can be found in the *Appendix B: EZ-RJ45/ EZ-RJPRO User Guide* section.)

Pin	Color
1	White – Orange stripe
2	Orange solid
3	White – Green stripe
4	Blue solid
5	White – Blue stripe
6	Green solid
7	White – brown stripe
8	Brown solid

Table 1. TIA/EIA 568-B ethernet pin assignments

NOTE:

Ensure that both ends of the cable are terminated with the same pin assignment.

Connecting the CAT5 Cable to an Access Point

The Ethernet cable is attached to the access point via a bulkhead connector found on the underside of the access point. The connection is made with a multi-part connector that includes a compression seal against moisture. (The connector kit is included with each access point.)

NOTE:

An improperly installed bulkhead connector may result in damage to the access point by allowing moisture into the access point. Failure to follow the connection and installation procedures described herein voids the access point product warranty.

Determining the Type of Access Point Bulkhead Connector

The bulkhead connector mechanism used on access points from Sensys Networks may be one of two types:

- *Hex-head type* – used on access points manufactured after June 2010
- *Four-screw type* – used on access points manufactured before June 2010

Refer to the following figures to determine which type of bulkhead connector your equipment uses, and to determine the proper installation procedures.

NOTE:

Always perform a visual inspection of your equipment to determine the type of bulkhead connector. Do not assume one type or the other based solely on the date of a design, shipment, receipt, or the kitting of parts.

Access Point Bulkhead Connectors

Figure 5.2. AP bulkhead connector types: (1) hex-head, (2) four-screw

In Figure 5.2, the connector labeled "1" is the hex-head connector. Follow the procedures in the section *Connecting the Cable to an Access Point with the Hex-head Connector* to connect the Ethernet cable to access points using this connector type.

In Figure 5.2, the connector labeled "2" is the four-screw connector. Follow the procedures in the section *Connecting the Cable to an Access Point with the Four-screw Connector* to connect the Ethernet cable to access points using this connector type.

Connecting the Cable to an Access Point with the Hex-head Connector

Follow the steps in this section to properly connect the cable to the access point via the hex-head bulkhead connector.

Components

Open the bulkhead connector kit and arrange the components as shown in the following figure. In the figure, the two principal connectors are labeled *A* and *B* respectively.

NOTE:

Two cable bushings are included; **choose one** to fit the outside diameter of the Ethernet cable being connected to the access point. Additionally, a **spare gasket** is included; use the gasket **only** if the factory installed gasket is lost or visibly damaged.

NOTE:

Figures in this section depict only one of the bushings. The procedures apply equally to **either** bushing.

Figure 5.3. Components used with the hex-head bulkhead connector

Step-by-Step Procedures

1. Remove the factory installed hex-head cap from the bottom of the access point and set it aside. The cap may be discarded after the cable has been completely connected.

Figure 5.4. Remove the factory-installed cap

2. Carefully inspect the factory installed gasket seated on the bulkhead connector. Ensure the gasket is seated smoothly and uniformly on the connector with the ridged edge of the gasket facing outward.

Figure 5.5. Inspect the factory-installed gasket

Replace the gasket if it does not uniformly seat or shows signs of fatigue or wear. (When replacing an access point, always use a new gasket.)

NOTE:

Use gaskets from Sensys Networks only. Never substitute a different gasket; doing so exposes the device to environmental risk and voids the product warranty.

Figure 5.6. Replace damaged or used gaskets

3. Thread the cable through the *Connector* A as shown in the following figure.

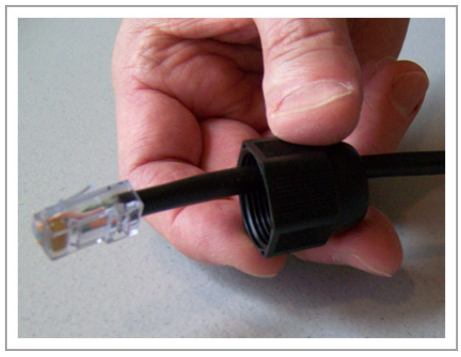


Figure 5.7. Thread cable through connector A

4. Thread the cable through *Connector* B as shown in the following figure.

Figure 5.8. Thread cable through connector B

5. Inspect the outer diameter (OD) of the Ethernet cable. Use the following chart to select one of the provided bushings based on the cable OD.

NOTE:

Use only one bushing. Discard the other bushing after the job is complete.

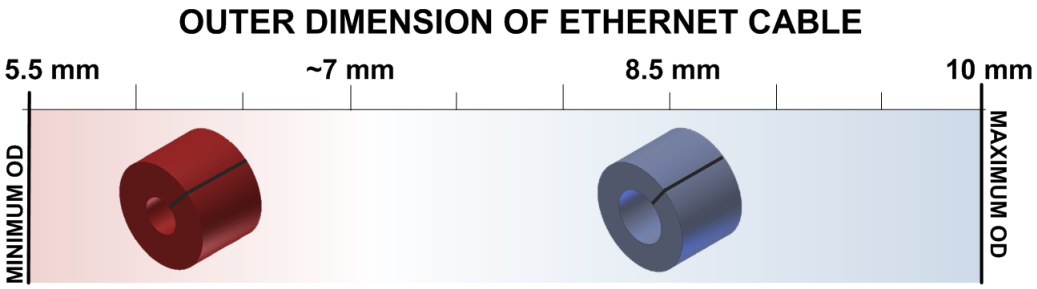


Figure 5.9. Ethernet cable bushing chart (not to scale)

6. Fit the bushing onto the cable between *Connectors A* and *B* as shown in the following figure. Proper fit is achieved when the bushing fully closes around the cable with no gap at the cut.

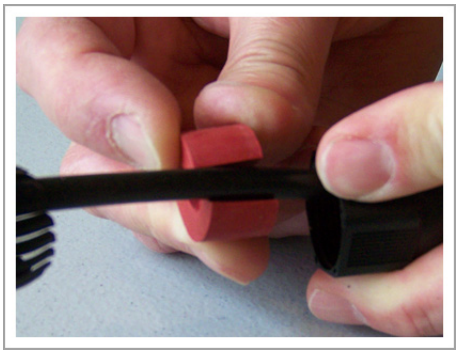


Figure 5.10. Fit bushing onto cable between connector A and connector B

Proper Fit (little to no gap between edges of cut)

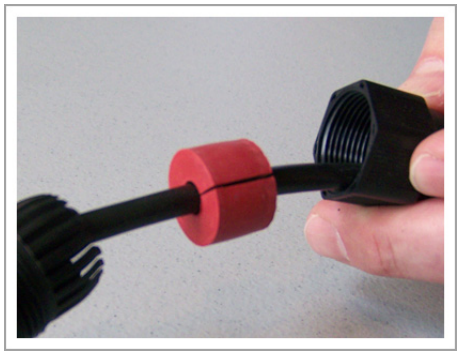


Figure 5.11. Correct fit: bushing closes fully around cable with little or no gap

Improper Fit (gap between edges of cut)

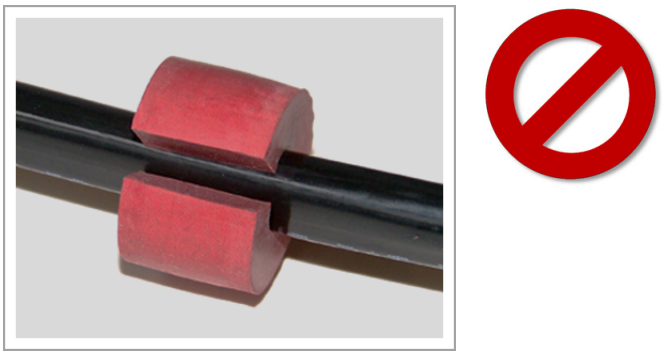


Figure 5.12. Incorrect fit: bushing does not close fully around cable leaving large gap

7. Connect the cable to the RJ45 input jack on the bottom of the access point.

Figure 5.13. Connect cable to input jack

8. Thread *Connector B* onto the hex-head nut on the bottom of the access point and tighten by hand until it no longer turns easily.

NOTE:

Snug Connector A down by hand. **Do not over-tighten or use tools.**

Figure 5.14. Thread connector B onto the access point and hand tighten

9. Slide the cable bushing toward the access point and fully insert it into the guide fingers on *Connector B* as shown in the following figure. Proper fit is achieved when the edge of the bushing is flush with the edge of the guide fingers.

Figure 5.15. Slide cable bushing fully into connector B

Proper Fit (bushing fully seated into guides)

Figure 5.16. Proper fit of cable bushing into connector B

Improper Fit (bushing poorly seated into guides)

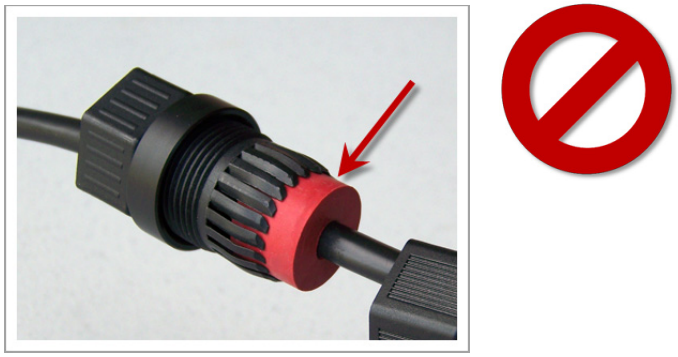


Figure 5.17. Improper fit of cable bushing into connector B

10. Thread Connector A onto Connector B and tighten by hand until it no longer turns easily.

NOTE:

Snug Connector A down by hand. *Do not over-tighten or use tools*.

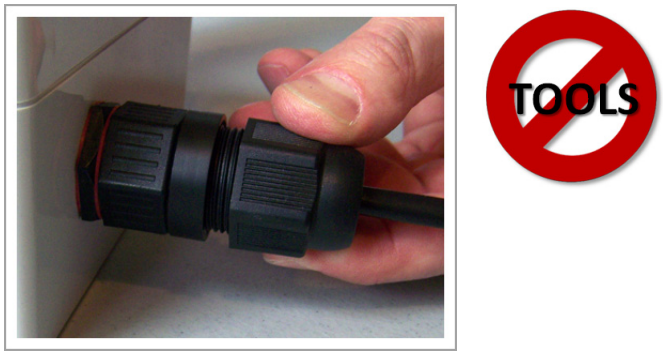


Figure 5.18. Thread connector A onto connector B and hand tighten

11. Inspect the seating of the bushing by looking at it from the exposed cable end of *Connector A*. Proper fit is achieved when all of the following conditions are met:
    - bushing edge is recessed 1/8” to 1/4” below the lip of *Connector A*
    - bushing face is smooth - not puckered or pinched
    - bushing face does not protrude out of *Connector A*

Proper Fit (recessed bushing, smooth face)

Figure 5.19. Proper fit of the cable bushing inside connector A

Improper Fit (bushing not recessed, pinched edge, mushroomed face)

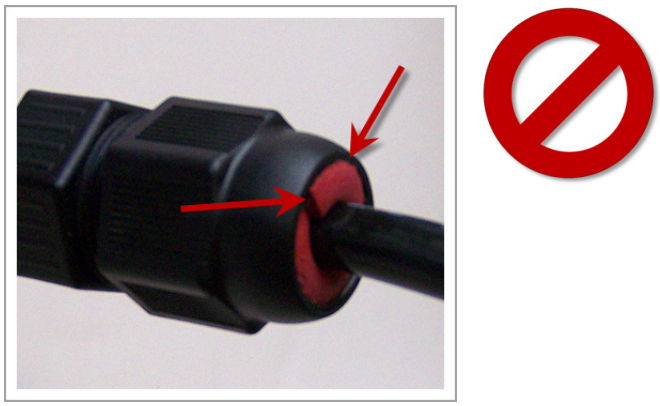


Figure 5.20. Improper fit of the cable bushing inside connector A

Connecting the Cable to an Access Point with the Four-screw Connector

Perform the following steps to properly connect the cable to the access point via the four-screw bulkhead connector.

Components

Open the bulkhead connector kit and arrange the components as shown in the following figure.

NOTE:

Not all components in the package are used. Discard unneeded components.

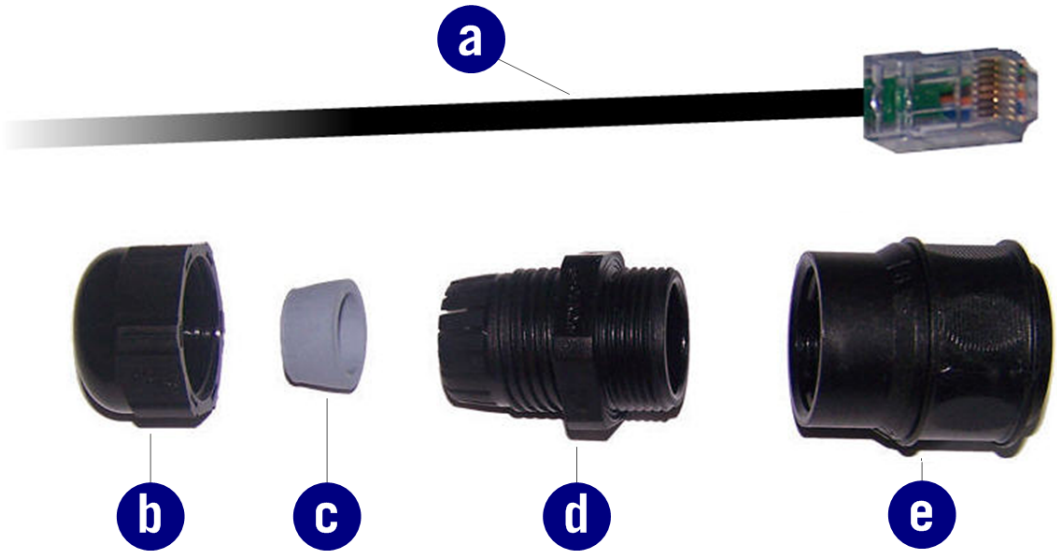


Figure 5.21. Components used with the four-screw bulkhead connector

a – Terminated Ethernet cable

b – Seal end connector

c – Compression seal

d – Double-threaded housing

e – Keyed bulkhead connector knob

Step-by-Step Procedures

1. Slide the seal-end connector (*b*) onto the cable (*a*).

Figure 5.22. Slide seal-end connector onto cable

2. Carefully slide the compression seal (*c*) over the RJ45 jack and onto the cable (*a*).

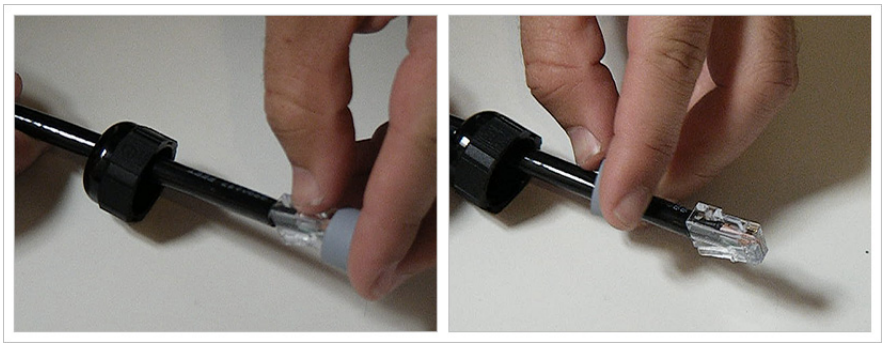


Figure 5.23. Slide compression seal onto cable

3. Slide the double-threaded housing (*d*) onto the cable (*a*). Carefully seat the compression seal (*c*) into the double-threaded housing (*d*). **Be certain that the seal is seated squarely and is not pinched or misaligned.**

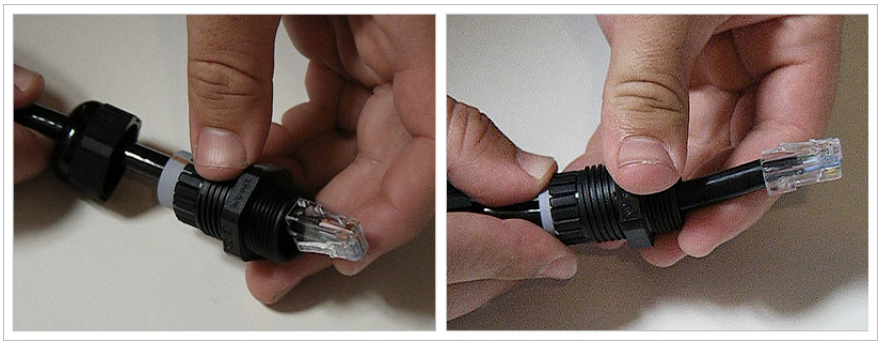


Figure 5.24. Slide double-threaded housing onto cable and seat compression seal

4. Slide the bulkhead connector knob (*e*) onto the cable. Thread the double-threaded housing (*d*) into the knob (*e*) by hand until snug. **Do not over-tighten the knob.**

Figure 5.25. Slide bulkhead connector knob onto cable; thread knob to housing

5. Thread the double-threaded housing (*d*) into the seal-end connector (*b*). Turn the connector (*b*) until a clicking sound is heard with each twist.

Figure 5.26. Thread double threaded housing into seal-end connector

6. Connect the cable to the RJ45 port on the bottom of the access point.

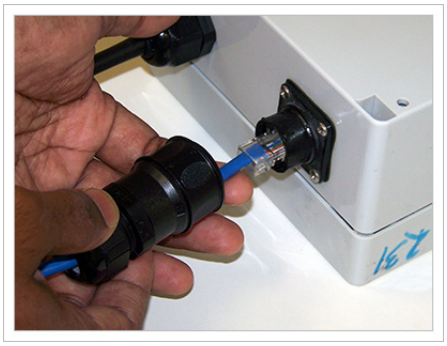


Figure 5.27. Connect cable to access point

7. Align the bulkhead connector knob (*e*) with the bulkhead connector jack on the underside of the access point.

   The bulkhead connector knob (*e*) and the bulkhead connector jack are keyed. Locate the alignment keys using the following diagram.

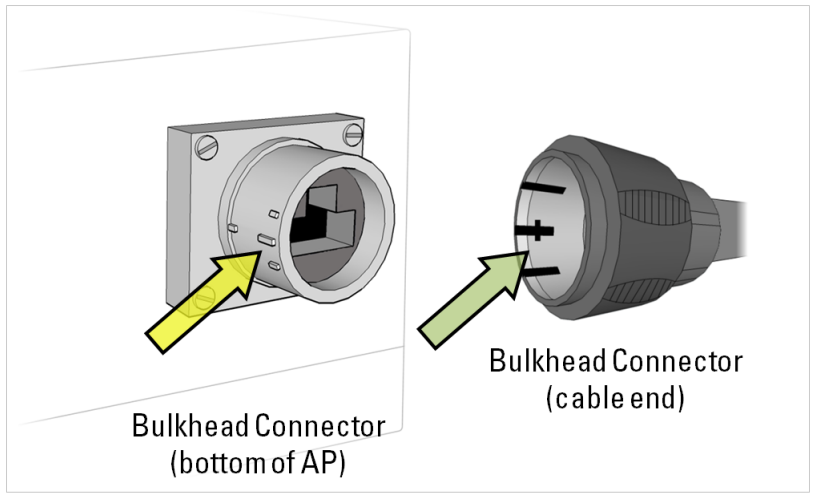


Figure 5.28. Four-screw bulkhead connector alignment keys (not to scale)

8. Lining up the keys, press the knob (*e*) firmly onto the access point to seat it.

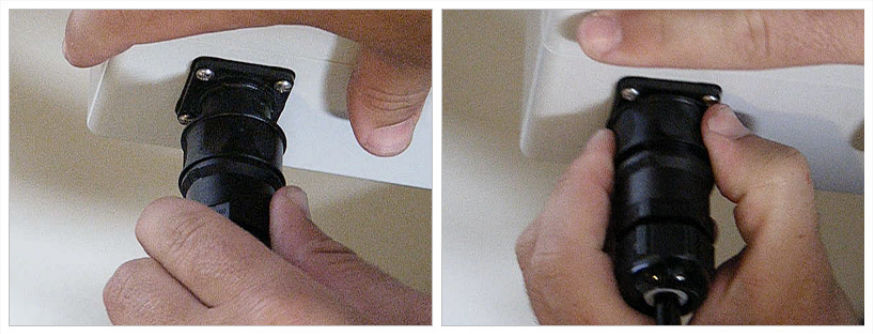


Figure 5.29. Snap on bulkhead connector and turn to seat

9. Hand tighten the seal-end connector (*b*) to compress the watertight seal.

NOTE:

Do ***not*** over-tighten the seal-end connector (*b*). Do ***not*** apply shearing force to the bulkhead connector.

10. Inspect the seal-end connector (*b*) from below to confirm a tight seal around the cable.

Figure 5.30. Inspect compression seal for tight fit on cable

Removing the Cable Connection

Perform either procedure above in reverse to remove the cable from the access point.

Connecting a PoE Injector or AccessBox to an Access Point

The CAT5 cable from the access point connects to either a PoE injector or a AccessBox depending on the network design:

- An AccessBox is required when the access point connects to a traffic signal controller via a contact closure card interface.
- A PoE injector is required for all other access point installations.

An AccessBox and PoE injector are *never* used together. This section provides installation procedures for installing each device.

Installing a AccessBox

Use the following steps to attach the CAT5 cable to the AccessBox:

1. Secure the AccessBox inside the cabinet. (Double-sided stick tape is provided with the AccessBox.)
2. Connect the CAT5 cable with the RJ45 terminator from the access point to the *AP* port of the AccessBox.

Installing a PoE Injector

Use the following steps to attach the CAT5 cable to the PoE injector:

1. Secure the PoE injector inside the cabinet, pedestal, or power panel.
2. Connect the CAT5 cable with the RJ45 terminator from the access point to the *P+ Data Out* port of the PoE injector.

Connecting to a Power Source

Power is supplied to the access point through the AccessBox or the PoE injector.

Connecting a AccessBox to a Power Source

An AccessBox draws its power from the traffic signal controller via a contact closure card (CC card) which, in turn, is installed into an available controller shelf slot.

Connect a standard CAT5 cable with the RJ45 terminator into the *CC* port on the AccessBox and into the *IN* port on the contact closure card as shown in the following diagram.

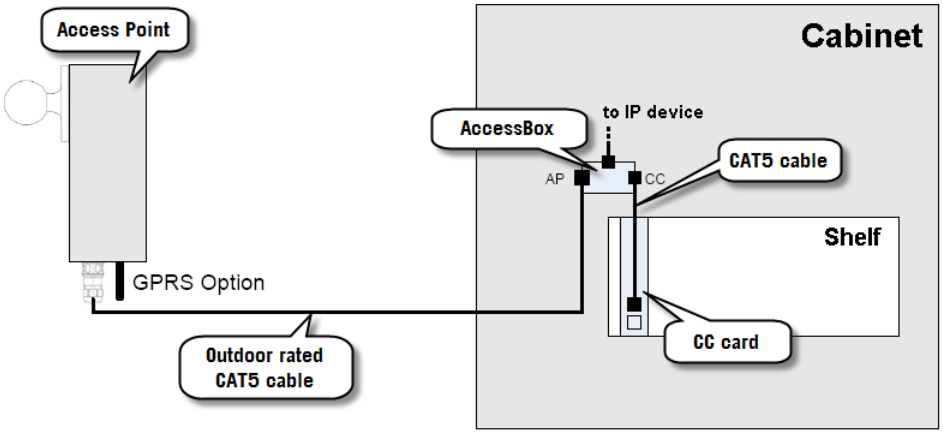


Figure 5.31. Access point, AccessBox, and contact closure card power model

Connecting a PoE Injector to a Power Source

PoE injectors are powered via the 48 VDC power supply (supplied with the access point) or from 9 VDC – 20 VDC supplied by solar panel systems.

Using a 48 VDC Power Supply

To use an available power source in the cabinet or pedestal as shown in the following diagram, and perform theses steps:

1. Plug the AC adapter into the cabinet outlet.
2. Plug the AC adapter into the *Power* port on the PoE injector.
3. Secure all cables with cable ties.

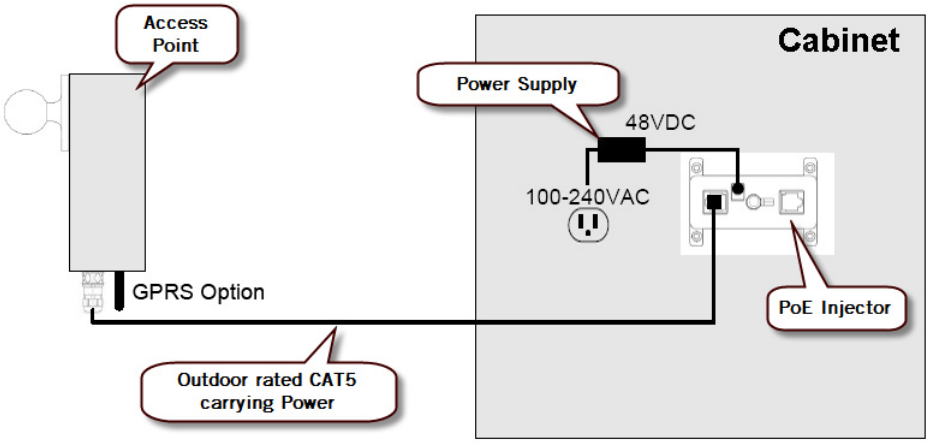


Figure 5.32. Standard 48VDC power model

Using a 12 VDC Power Supply

To use a low voltage power source such as a local solar panel, follow these steps:

1. Install a terminal block from the solar panel's battery.
2. Connect the terminal block to the *Power* port on the PoE injector.
3. Secure all cables with cable ties.

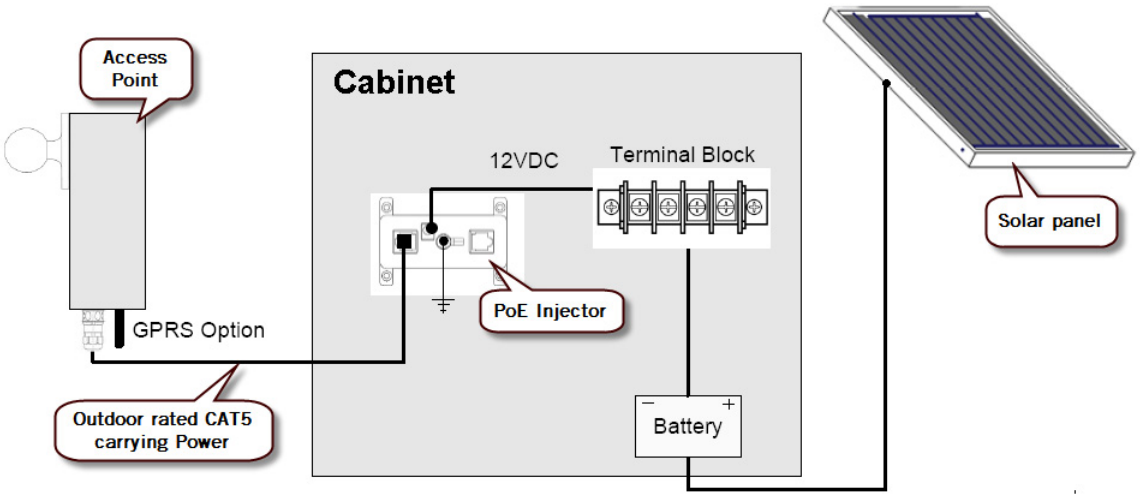


Figure 5.33. Low voltage (12 VDC) power model

Connecting an Access Point to an IP Network or PC

To manage a access point or work with the event data it stores, it must be connected to a data network or other IP device such as a PC. The connection is optional, and – if used – is made through either the AccessBox or the PoE injector.

Making a Connection Between an AccessBox and an IP Device

Connect the IP device to the *ACCESS* port of the AccessBox as shown in the figure in the following figure.

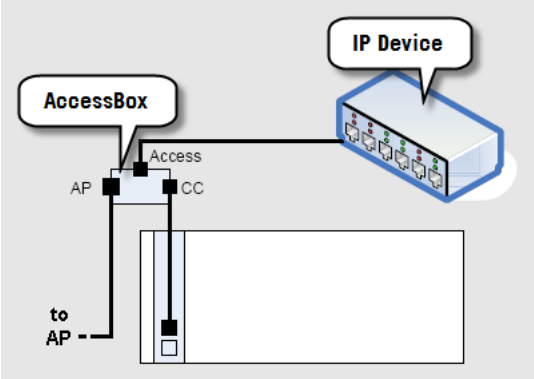


Figure 5.34. Connecting an IP device to an AccessBox

Use a *crossover* CAT5 Ethernet cable if the device is a network hub, switch, router or modem. Use a *straight-through* Ethernet cable if the device is a PC or laptop.

Making a Connection Between a PoE Injector and an IP Device

Connect the IP device to the *DATA IN* port of the PoE injector as shown in the following figure.

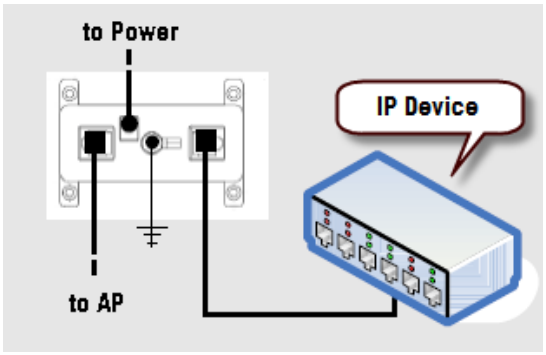


Figure 5.35. Connecting an IP device to a PoE injector

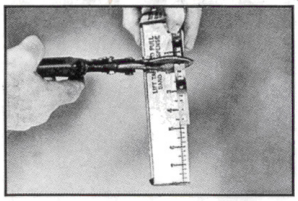
Use a *straight-through* CAT5 Ethernet cable if the device is a network hub, switch, router, or modem. Use a *crossover* Ethernet cable if the device is a PC or laptop.

Clamp Band User Guide

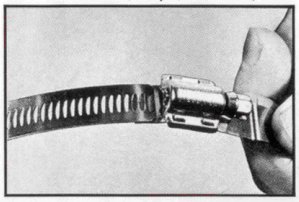
Make Any Size Clamp Easily

MakeAclamp

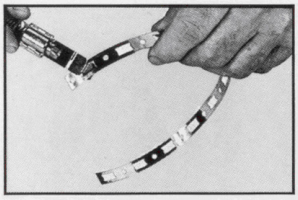
1 Determine proper band length one of two ways: (A) **if diameter is known,** refer to band length table below, or (B) **if diameter is not known,** measure circumference with string, twine, etc. and subtract 4" (to allow for length of fastener ends) to determine proper band length.



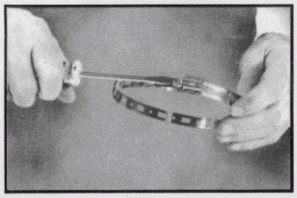
2 Measure band to proper length and cut through center of nearest **round** hole with shears, snips, hacksaw, etc.



3 Engage one screw housing end to one perforated end by turning screw three or four times.



4 Complete the clamp by diagonally inserting the ends of the engaged fastener assembly to the band through the tops of the square holes at each end of the band.



5 Tighten your finished clamp.

BAND LENGTH TABLE

Use this convenient table for cutting band to proper length.

Make-A-Clamp tightens and clamps around any shape rectangular or round.
Band should always be cut midway on small round hole for smooth fastener-fit.
This table is accurate for the diameters indicated.
(Allows for insertion of Fasteners)

Diameter	Length to Cut on Mark	Diameter	Length to Cut on Mark	Diameter	Length to Cut on Mark
2"	2-1/2"	22"	65-7/8"	60"	184-13/16"
3"	5-1/16"	24"	72-1/8"	62"	191-1/8"
4"	8-7/8"	26"	77-1/4"	64"	197-7/16"
5"	11-7/16"	28"	83-5/8"	66"	203-5/8"
6"	15-3/16"	30"	89-7/8"	68"	209-15/16"
7"	17-3/4"	32"	96-3/8"	70"	216-1/4"
8"	21-1/2"	34"	102-5/8"	72"	222-9/16"
9"	24-1/8"	36"	108-7/8"	74"	228-7/8"
10"	27-7/8"	38"	115-1/4"	76"	235-13/16"
11"	30-3/8"	40"	121-9/16"	78"	241-1/2"
12"	34-3/16"	42"	128"	80"	247-13/16"
13"	36-3/4"	44"	134-5/16"	82"	254-1/8"
14"	40-1/2"	46"	140-5/8"	84"	260-7/16"
15"	43-1/16"	48"	146-15/16"	86"	266-5/8"
16"	46-7/8"	50"	153-1/4"	88"	272-15/16"
17"	49-7/16"	52"	159-9/16"	90"	279-1/4"
18"	53-1/8"	54"	165-7/8"	92"	285-9/16"
19"	55-3/4"	56"	172-3/16"	94"	291-7/8"
20"	59-1/2"	58"	178-1/2"	96"	298-3/16"

To determine longer lengths of Make-A-Clamp band material, multiply diameter in inches x π (3.1416), minus 4.5" for the adjustable fastener end, or determine circumference by measurement, less 4.5" for adjustable fastener end.

BREEZE CLAMP PRODUCTS 3582 Tunnelton Road, Saltsburg, Pennsylvania 15681 • (724) 639-3571 • Fax: (724) 639-3020

EZ-RJ45/EZ-RJPRO User Guide

EZ-RJ45® Instructions
For use with EZ-RJ45®
Cat 5e & Cat 6 Connectors.

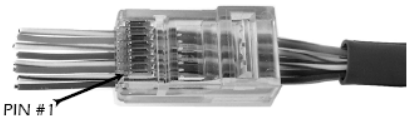
1. Strip off approximately two inches of outer cable jacket.

2. Untwist & straighten wires.

Place in desired order. See color code wiring chart. (5)

3. Trim wire ends so all conductors are equal length and uniform. Use built in wire cutter in EZ-RJ45® Crimp Tool.

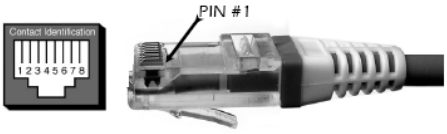
4. Insert wires into the EZ-RJ45® Connector and pull connector down over the cable jacket. Cable jacket should seat snugly in rear of connector.



5. Double check wiring sequence now.

T568A/T568B Wiring

Wire #	1	2	3	4	5	6	7	8
T568A	W/G	G	W/O	BL	W/BL	O	W/BR	BR
T568B	W/O	O	W/G	BL	W/BL	G	W/BR	BR



6. Push the EZ-RJ45® connector into the EZ-RJ45® Crimp Tool. Make sure the connector is fully seated in crimp cavity.

7. Actuate the EZ-RJ45® Tool to crimp and trim wires. Break off any remaining loose wires.

P/N 100044

P/N 100004

EZ-RJ45® is a registered trademark of Suilstar Technologies Inc.. Patented: 5,996,224, 6,017,237, & 6,105,229. Patents Insured.

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