P300 Wireless Bridge
Mounting Guide

Note: This Mounting Guide is designed to work with the *P300 Wireless Bridge Quick Setup Guide*. Complete the procedures in the Quick Setup Guide before continuing with this document.

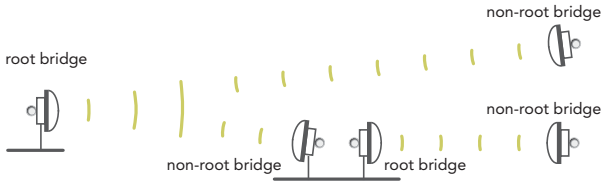
Note: The minimum software revision for the P300 is base image 100.1.0.9 or later. FlexMaster requires firmware 9.12 and later to manage the P300.

This Mounting Guide provides information on how to configure the Ruckus Wireless P300 802.11ac point-to-point and point-to-multipoint outdoor wireless bridge on the network. The P300 can use its internal 5GHz antennas, or can optionally use a two-port customer-ordered external 5GHz antenna. After completing the steps described in this Guide, you will be able to use the P300 wireless bridge. The rest of this guide refers to the P300 wireless bridge as the **P300**, **root bridge**, or **non-root bridge**.

The P300 can be ordered either as an unconfigured single P300, or as a pre-configured matched pair of P300s. These P300s are almost always installed in pairs, where one is configured as a root bridge and the other as a non-root bridge.

The P300 can be deployed as a root bridge connected to the Ethernet backhaul, or can be deployed as a non-root bridge connected to the root bridge via the wireless link. The P300 can be equipped with customer-purchased external 5GHz antennas to increase the root bridge-to-non-root bridge connectivity range, or to increase the number of non-root bridges that a root bridge can communicate with.

Figure 1. P300s deployed as root bridge and non-root bridge



Note 1: When deployed in the root bridge--non-root bridge -to- root bridge--non-root bridge configuration, the two wireless links must use different SSIDs.

Note 2: When two P300s are mounted closely together (for instance, on the same pole), make sure that the active antennas are mounted at least one meter (39.3 inches) apart. When there is more separation, it is less likely that either P300 will experience avoidable RF interference. If possible, the units should be on different channels, but this separation should be maintained even when the P300s are using different channels.

Before You Begin

Before deploying Ruckus Wireless products, please check for the latest software and the release documentation.

- User Guides and Release Notes are available at http://support.ruckuswireless.com/documents
- Software Upgrades are available at http://support.ruckuswireless.com/software
- Open Source information is available at http://opensource.ruckuswireless.com
- Software License and Limited Warranty are available at http://support.ruckuswireless.com/warranty

Safety Warnings

- **WARNING!** Only trained and qualified personnel should be allowed to install, replace, or service this equipment. The professional installer is responsible for the proper installation and configuration of this P300. The P300 installation must comply with local regulatory requirements, especially with those regulating operation near military and/or weather radar systems.
- **WARNING!** Installation of this equipment must comply with local and national electrical codes.
- **WARNING!** Ruckus Wireless strongly recommends that you wear eye protection before mounting the P300.
- **WARNING!** The Ruckus Wireless PoE injector (ordered separately) is for indoor use only. Never mount the PoE injector outdoors with the P300.
- **CAUTION:** Make sure that you form a 80mm - 130mm (3”-5”) drip loop in any cable that is attached to the P300 or the building. This will prevent water from running along the cable and entering the P300 or the building where the cable terminates.
- **CAUTION:** Be sure that grounding is available and that it meets local and national electrical codes. For additional lightning protection, use lightning rods and lightning arrestors.
- **NOTE:** Allowable external antenna types and antenna gains may be limited by local regulatory requirements.

Package Contents

Before deploying your P300, verify that all items listed below are included in the package. If any item is damaged or missing, notify your authorized Ruckus Wireless sales representative.

One or two P300 kits, depending on ordered part:

- 901-P300-xx01, P300, 802.11ac 5GHz point-to-point wireless bridge, includes one P300 kit
- 901-P300-xx02, P300, 802.11ac 5GHz point-to-point wireless bridge, pre-provisioned pair, includes two P300 kits

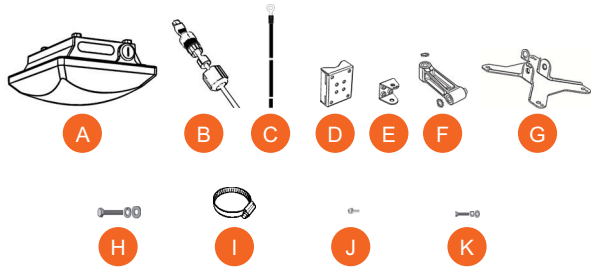
  where ‘xx’ is a country-specific code.

Each P300 kit contains:

- One P300, which includes a 12mm stainless steel M6x1 Phillips earth ground screw with split lock and flat washers (A in Figure 2)
- One M25 data cable gland (B in Figure 2)
- One green/yellow earth ground wire with ring terminal (C in Figure 2)
- One wall- or pole-mounting bracket (D in Figure 2)
- One U-joint bracket (E in Figure 2)
- One linkage bracket with two serrated external-tooth lock washers (F in Figure 2)
- One P300 bracket (G in Figure 2)
- Two sets 50mm stainless steel M8x1.25 hex bolt with split lock and flat washers (H in Figure 2)
- Four SAE32-sized stainless steel clamps, 38.1mm to 63.5mm (1.5" to 2.5") inner diameter (I in Figure 2)
- Four sets stainless steel 8mm M4x0.7 pan head Phillips screws with split lock and flat washers (J in Figure 2)
- Eight sets stainless steel 0.5-inch x 0.250-28 hex bolt with split lock and flat washers (K in Figure 2)
- Service Level Agreement/Limited Warranty Statement
- Regulatory Statement
- Declaration of Conformity, if required
- *P300 Wireless Bridge Quick Setup Guide*
- This *Mounting Guide*
- *N-Type Connector Sealing Instructions*

NOTE: *This kit includes extra bolts, nuts and washers. You may use the extras wherever required.*

Figure 2. P300 field-installation kit contents



LEDs and Indications

The P300 has five LEDs visible on the outside of the chassis. The LEDs have two different operating modes, and the LEDs can be manually turned on and off by the operator. Refer to Table 1 for a description of these LEDs and their operating modes.

Table 1. P300 LED indications

LED	Normal Mode	Aiming Mode (all green)
PWR	• Red = booting • Green = normal operation	Aiming Strength 4 • Solid: Min + 36 RSSI (RSSI >= 42) • Blinking: Min + 32 RSSI (42> RSSI >= 36)
CTL	• Off = standalone operation • Other modes = to be determined	Aiming Strength 3 • Solid: Min + 24 RSSI (36 > RSSI >= 30) • Blinking: Min + 18 RSSI (30 > RSSI >= 24)
ROOT	• Off = non root bridge • Solid green = root bridge	Aiming Strength 2 • Solid: Min + 12 RSSI (24 > RSSI >= 18) • Blinking: Min + 6 RSSI (18 > RSSI >= 12)
5G	• Off = radio down • Solid green = radio up & link up • Flashing green = radio up but no link	Aiming Strength 1 • Solid: RSSI >= Configured Minimum (12 > RSSI >= 6) • Blinking: RSSI < Configured minimum (Default: 6 which is configurable)

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Table 1. P300 LED indications

LED	Normal Mode	Aiming Mode (all green)
AIM	• Green = aiming mode • Off = normal mode	• Green = aiming mode (**Note**) • Off = normal operation mode
Note: The P300 remains in aiming mode for 15 minutes after aiming is started.		

Continue with the following:

- Configuring the P300
- Physical Installation
- Troubleshooting

Configuring the P300

Refer to the *P300 Wireless Bridge Quick Setup Guide*. After you have completed the procedures in that guide, continue with Physical Installation.

Physical Installation

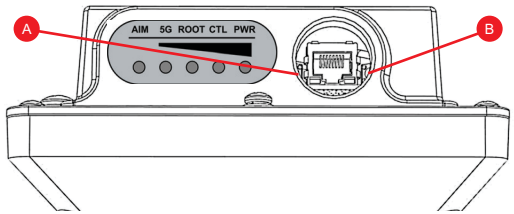
There are some information that you need to install the P300:

- Aiming and Reset Buttons
- Aiming Point-to-Point P300s
- Aiming Point-to-Multipoint P300s
- General Installation Notes
- Step 1: Verifying the Package Contents
- Step 2: Collecting Tools and Materials
- Step 3: Assembling the RJ-45 Cable and the Cable Gland
- Step 4: Attaching the U-Joint Bracket to the Mounting Bracket
- Step 5a: Attaching the Mounting Bracket to a Flat Surface
- Step 5b: Attaching the Mounting Bracket to a Metal Pole
- Step 6: Mounting the Linkage Bracket to the U-Joint Bracket
- Step 7: Assembling the P300 Bracket and the P300
- Step 8: Attaching the P300 Bracket and P300 to the Linkage Bracket
- Step 9: Mounting and Connecting a 5GHz External Antenna (optional)
- Step 10: Earth Grounding the P300 (optional)
- Step 11: Connecting and Sealing the RJ-45 Cable

Aiming and Reset Buttons

The P300 has two buttons inside the PoE IN port: the Aiming button and the Reset button. The Aiming button is inside the P300 closer to the P300 LEDs (A in Figure 3), and the Reset button is inside the P300 farther away from the P300 LEDs (B in Figure 3).

Figure 3. P300 Aiming and Reset buttons



- Press and hold the Aiming button (closer to the LEDs) to put the P300 into aiming mode, and then point the P300 antenna toward the far-end P300 antenna. **Note:** The P300 remains in aiming mode for 15 minutes after aiming is started.
- Press the Reset button (farther away from the LEDs) to reboot the P300.
- Press and hold the Reset button (farther away from the LEDs) for six seconds to reset the P300 to factory defaults.
  CAUTION: *DO NOT DO THIS UNLESS SO INSTRUCTED. Doing this resets the P300 IP address to 192.168.2.1.*

Aiming Point-to-Point P300s

The P300 throughput depends on an accurate alignment of the two communicating P300s, because the highest throughput is generally achieved with the strongest signal. The P300 is equipped with an internal aiming function that is based on the received signal strength indicator (RSSI) power measurement. **Note:** Table 1 lists the signal strengths associated with each of the LEDs.

1. Press and hold the Aiming button (closer to the LEDs) to put the P300 into aiming mode, and then point the P300 antenna toward the far-end P300 antenna. (The P300 remains in aiming mode for 15 minutes after aiming is started.)
2. Use the 5G through PWR LEDs to determine the signal strength. When all four 5G through PWR LEDs are solid green, the P300 is receiving the strongest signal possible. If some LEDs are flashing green or off, reposition the P300 antenna to achieve a better signal. When the highest number of LEDs are solid green, tighten the antenna or P300 mount to align the antenna with the strongest signal.
3. Repeat this procedure for the far-end P300.
4. Continue with the *P300 Wireless Bridge User Guide* to verify association between the P300s.

Aiming Point-to-Multipoint P300s

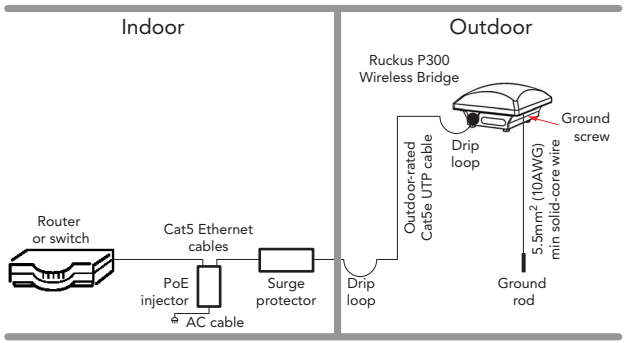
In a point-to-multipoint installation, the aiming procedure is slightly different.

1. Choose the “optimal pair” (one root bridge and one non-root bridge) for your network. The “optimal pair” can be determined by placement location, throughput requirements, or other factors.
   For example, if you are installing three non-root bridges spaced away from each other, you would likely want to choose the one closest to the middle of the root bridge coverage area. This can help provide an optimal balance of performance for all three non-root bridges.
2. Complete the aiming procedure for the selected “optimal pair” first, as described in Aiming Point-to-Point P300s.
3. Repeat the aiming procedure for each additional non-root bridge, while leaving the root bridge antenna fixed.
4. Continue with the *P300 Wireless Bridge User Guide* to verify association between the P300s.

General Installation Notes

- The P300 wireless links perform best when the P300s are mounted within line of sight of each other (see Figure 1). In general, Ruckus Wireless recommends installing P300s away from obstructions and sources of interference.
- Ruckus Wireless also recommends installing the root bridge on the network end of the bridged link and the non-root bridge on the remote end.
- In a point to multipoint configuration, there are many factors to consider. First, note that the maximum angle from the root bridge is 30 degrees when using the internal antenna, and is whatever angle is supported by an external antenna. As you get closer to the maximum angle supported by the antenna, throughput performance decreases.
  If you go beyond the supported antenna angle, performance is drastically impacted to the point that connectivity may be completely lost.
  Second, consider the difference in distance from the root bridge. If one non-root bridge is at placed at a great distance from the root bridge, and another non-root bridge is very close, performance may be impacted due to different time delays between the two transmission links.
- The P300 can use its internal 5GHz antennas, or can optionally use a two-port external 5GHz antenna.
- The minimum distance between P300 antennas is 1 meter (39.3 inches).
- See Figure 4 for installation components for a typical outdoor P300 installation.

Figure 4. Typical PoE installation components



Step 1: Verifying the Package Contents

Before deploying your P300 in the field, verify that all items listed in Package Contents are included in the package. If any item is damaged or missing, notify your authorized Ruckus Wireless sales representative.

Step 2: Collecting Tools and Materials

- Torque wrench or torque screwdriver with sockets and bits
- Adjustable wrench
- Customer-supplied outdoor-rated Cat5e UTP RJ-45 Ethernet cable with 4.0mm to 6.5mm (0.17" to 0.26") round cable sheath
- Thin probe

If you are mounting the P300 on a flat surface, then you will also need:

- Customer-supplied wall anchors with up to M6 or 0.25” stainless steel screws rated to withstand 128 N or 28.8 lbf (required to withstand wind loads of 266km/h or 165mph)
- Electric drill with drill bits and customer-supplied wall anchors

If you are mounting the P300 on a pipe or pole, then you will also need:

- A 38.1mm to 63.5mm (1.5" to 2.5") pipe or pole
- Four factory-supplied steel clamps

Continue with Step 3: Assembling the RJ-45 Cable and the Cable Gland.

Step 3: Assembling the RJ-45 Cable and the Cable Gland

The P300 uses one RJ-45 cable for data and Power over Ethernet (PoE) as shown in Figure 4. Assemble the P300 end of the cable and the M25 data cable gland as shown in Figure 5.

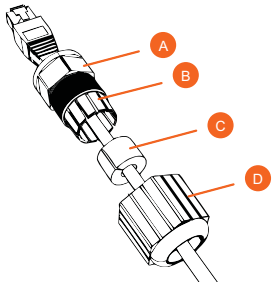
1. Using the adjustable wrench, remove the cable gland from the P300.

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2 Feed the end of the RJ-45 cable through the sealing nut (D in Figure 5), rubber sealing insert (C), clamping ring assembly (B) and cable gland base (A).

Figure 5. RJ-45 cable and cable gland assembly



3 Connect a PoE-powered cable to the Ethernet port in the P300.
4 After the P300 boots up, verify that the **PWR** LED on the P300 is a steady green.

NOTE: *The P300s at both end of each link need to be powered on to complete the aiming steps.*

NOTE: *DO NOT ASSEMBLE THE CABLE GLAND TO THE P300 AT THIS TIME!*

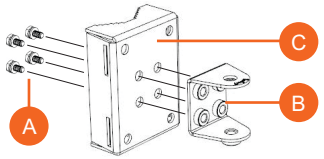
Continue with Step 4: Attaching the U-Joint Bracket to the Mounting Bracket.

Step 4: Attaching the U-Joint Bracket to the Mounting Bracket

1 Position the U-joint bracket on the mounting bracket.

NOTE: *Mount the U-joint bracket in any direction on the mounting bracket, preferably to allow P300 azimuth adjustments. Then the P300 bracket allows P300 elevation adjustments.*

Figure 6. U-joint bracket attached horizontally to the mounting bracket



2 Use four 0.250-28 hex bolt and washer sets (A) to mount the U-joint bracket (B) to the mounting bracket (C). Tighten the bolts to 9.5 N.m (7 ft-lbs).

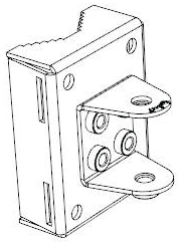
Continue with Step 5a: Attaching the Mounting Bracket to a Flat Surface or Step 5b: Attaching the Mounting Bracket to a Metal Pole.

Step 5a: Attaching the Mounting Bracket to a Flat Surface

Note: The minimum distance between P300 antennas is 1 meter (39.3 inches).

1 Place the mounting bracket at the location on the flat surface where you want to mount the P300. Use the holes on the mounting bracket as a template to mark the locations of the mounting holes.

Figure 7. Mounting bracket flat surface holes



2 Remove the mounting bracket from the flat surface.
3 Drill holes required for the mounting hardware.
4 Attach the mounting bracket to the flat surface using the mounting hardware.
5 Using the mounting hardware instructions, tighten the hardware to secure the mounting bracket.

Continue with Step 6: Mounting the Linkage Bracket to the U-Joint Bracket.

Step 5b: Attaching the Mounting Bracket to a Metal Pole

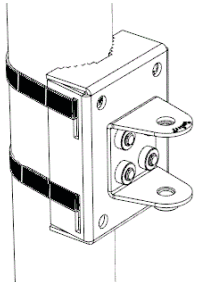
Note: The minimum distance between P300 antennas is 1 meter (39.3 inches).

1 Insert the open end of one steel clamp into the upper two slots on the mounting bracket.
2 Take the other steel clamp and insert it into the lower two slots on the mounting bracket.

NOTE: *The clamps can be daisy-chained together to accommodate larger poles.*

3 Use the clamps to attach the mounting bracket to the pole. Tighten the clamps to 3 N.m or 27 in-lbs, or per manufacturer's specifications.

Figure 8. Attaching the mounting bracket to a vertical pole



Continue with Step 6: Mounting the Linkage Bracket to the U-Joint Bracket.

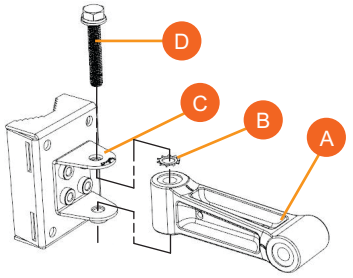
Step 6: Mounting the Linkage Bracket to the U-Joint Bracket

The linkage bracket attaches to the U-joint bracket using an M8 bolt and washer set. The linkage bracket is symmetrical, and either end can be attached to the U-joint bracket.

NOTE: *Make sure that linkage bracket is installed with its serrated external-tooth lock washer on the inside of the U-joint bracket flanges. This ensures that the azimuth adjustment does not change.*

1 Loosely assemble the linkage bracket (A), the U-joint bracket (B), one serrated external-tooth lock washer (C), and one M8 bolt and washer set (D).

Figure 9. Attaching the linkage bracket to the U-joint bracket



2 If the P300 is going to use its internal 5GHz antenna, then use the procedure described in Aiming Point-to-Point P300s to set the azimuth for the best P300 reception.
3 Tighten the M8 bolt to 13.6 N-m (10 ft-lbs).

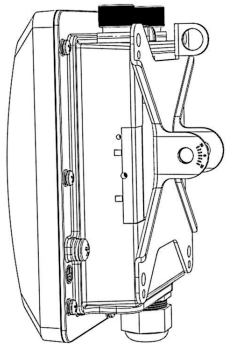
NOTE: *You may need to repeat this aiming procedure at the far end of the P300 link.*

Continue with Step 7: Assembling the P300 Bracket and the P300.

Step 7: Assembling the P300 Bracket and the P300

1 Place the P300 bracket onto the back side of the P300 so that the four larger screw holes on the bracket align with the four screw holes on the P300. Make sure that the end of the P300 bracket with the hoisting loop is on the same side as the P300 N-type antenna connectors.

Figure 10. Attaching the P300 bracket to the P300



2 Use four 8mm M4x0.7 pan head Phillips screw with split lock and flat washer sets to mount the P300 bracket to the P300. Tighten the screws to 2.5-3.0 N.m or 22-27 in-lbs.

CAUTION: *Make sure that the screws are no longer than 8mm. If a screw is longer than 8mm, it can damage the P300 chassis.*

Continue with Step 8: Attaching the P300 Bracket and P300 to the Linkage Bracket.

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Step 8: Attaching the P300 Bracket and P300 to the Linkage Bracket

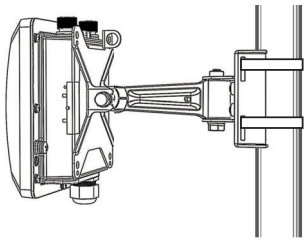
The P300 bracket attaches to the linkage bracket using an M8 bolt and washer set. The linkage bracket is symmetrical, and either end can be attached to the P300 bracket.

NOTE: *Make sure that linkage bracket is installed with its serrated external-tooth lock washer on the inside of the P300 bracket flanges. This ensures that the elevation adjustment does not change.*

1. If required, then suspend the P300 by attaching a carabiner to the hoisting loop on the P300 bracket.
2. As described in Step 6: Mounting the Linkage Bracket to the U-Joint Bracket, loosely assemble the P300 bracket (shown in Figure 10), the linkage bracket (A in Figure 9), the second serrated external-tooth lock washer (B), and the second M8 bolt and washer set (D).

CAUTION: *Make sure that the* **PoE IN** *port points downward to help prevent water intrusion.*

Figure 11. P300 bracket and P300 attached to the linkage bracket on pole



3. If the P300 is going to use its internal 5GHz antenna, then use the procedure described in Aiming Point-to-Point P300s to set the elevation for the best P300 reception.
4. Tighten the M8 bolt to 13.6 N-m (10 ft-lbs).

NOTE: *You may need to repeat this aiming procedure at the far end of the P300 link.*

CAUTION: If you are not connecting external antennas to the P300, then make sure that the metal caps remain installed and securely fastened to protect the interfaces from elements, such as water and dirt.

Continue with Step 9: Mounting and Connecting a 5GHz External Antenna (optional).

Step 9: Mounting and Connecting a 5GHz External Antenna (optional)

Note: The minimum distance between P300 antennas is 1 meter (39.3 inches).

1. Disconnect the P300 from the PoE power source.
2. Unscrew the metal caps that protect the P300 antenna connectors. Place the metal caps in a safe place for later use.
3. If the antennas come with RF coaxial cables (for example, a patch antenna), then physically mount the antennas at your desired location, preferably on the same mounting structure as the P300.

NOTE: Mount the external antennas at least 20cm (7.9") away from each other and other antennas.

4. Connect the 5GHz antenna(s) to one or both of the female N-type antenna connectors on the P300. Use a torque wrench to tighten the connectors to 1.58 N.m (14 in-lbs).
   If you are using a single-port antenna, then you can use either P300 antenna port.
5. Apply weatherproofing tape to the antenna connectors as described in the *N-Type Connector Sealing Instructions*.
6. Reconnect both P300s to their PoE power sources.
7. Using the procedure described in Aiming Point-to-Point P300s, set the azimuth and elevation for the best reception on both P300s.

CAUTION: If you are not connecting external antennas to the P300, then make sure that the metal caps remain installed and securely fastened to protect the connectors from elements, such as water and dirt.

Continue with Step 10: Earth Grounding the P300 (optional).

Step 10: Earth Grounding the P300 (optional)

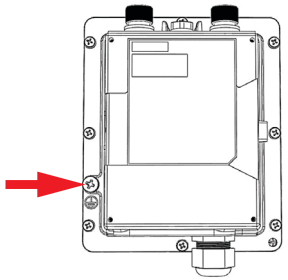
CAUTION: *Make sure that earth grounding is available and that it meets local and national electrical codes. For additional lightning protection, use lightning rods and lightning arrestors.*

NOTE: *The color coding of ground wires varies by region. Before completing this step, check your local wiring standards for guidance.*

- Using the factory-supplied ground wire and ground screw/washer set, connect a good earth ground to the P300 chassis ground point (see Figure 12).

CAUTION: *The P300 includes a 12mm stainless steel M6x1 earth ground screw with split lock and flat washers. Make sure that any replacement screw is no longer than 12mm. If a screw is longer than 12mm, it can damage the P300 chassis.*

Figure 12. Connect good earth ground to P300 here



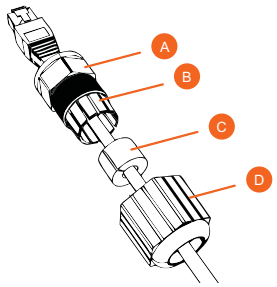
Continue with Step 11: Connecting and Sealing the RJ-45 Cable.

Step 11: Connecting and Sealing the RJ-45 Cable

The P300 uses one RJ-45 cable for Power over Ethernet (PoE). Connect and seal the cable using the M25 data cable gland.

1. If not already done, then use the instructions in Step 3: Assembling the RJ-45 Cable and the Cable Gland to assemble the RJ-45 cable, sealing nut (D in Figure 13), rubber sealing insert (C), clamping ring assembly (B) and cable gland base (A).

Figure 13. RJ-45 cable and cable gland assembly



2. If not already done, then connect the cable to the Ethernet port in the P300.
3. Tighten the cable gland base into the P300 chassis to 7 N.m or 62 in-lbs.
4. Wrap the clamping ring assembly around the rubber sealing insert. Make sure that the clamping ring assembly fully encloses the rubber sealing insert.
5. Seat the clamping ring assembly and rubber sealing insert in the cable gland base.
6. Tighten the sealing nut to 1.1 N.m or 10 in-lbs, or until the rubber sealing insert is compressed.

Congratulations! You have mounted your P300.

TROUBLESHOOTING

CAUTION: *If required, you can reset the P300 to its factory default settings by pressing and holding the reset button located inside the PoE IN port, on the side farther from the P300 LEDs, for six seconds. DO NOT DO THIS UNLESS SO INSTRUCTED. (Doing this resets the P300 IP address to 192.168.2.1.)*

NOTE: *After a reset, you can access the internal P300 web interface using* **https://192.168.2.1** *for a root bridge or* **https://192.168.2.254** *for a non-root bridge). Your device must use any other address from 192.168.2.2 through 192.168.2.253, with subnet mask 255.255.255.0. The username is* `super`*, and the password is* `sp-admin`*. Refer to the P300 Wireless Bridge User Guide available at* https://support.ruckuswireless.com.

NOTE: *After an P300 is removed from its mounting, it may drip some water from the channel surrounding the radome. As long as the P300 has been operating normally, this incidental water collection and dripping is normal, and is not service-affecting.*

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