OPW
FUEL MANAGEMENT SYSTEMS

M00-20-6020
Ethernet Radio
User's Guide

Copyright Information

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For technician registration, see
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Compliance Statement

Compliance Statement (Part 15.19)
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, and
2. This device must accept any interference received, including interference that may cause undesired operation.
Warning (Part 15.21)
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
RF Exposure (OET Bulletin 65)
To comply with FCC RF exposure requirements for mobile transmitting devices, this transmitter should only be used or installed at locations where there is at least 20cm separation distance between the antenna and all persons.
Information to the User - Part 15.105 (b)
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 in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
--Reorient or relocate the receiving antenna.
--Increase the separation between the equipment and receiver.
--Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
--Consult the dealer or an experienced radio/TV technician for help.

Table of Contents

Section 1 Operational Summary

Use the 20-6020 Radio to set up a long-range, wireless Ethernet network. The 20-6020 is made up of a pre-configured radio pair.

The access point (AP) automatically scans for the best of the 12 available radio frequency channels, encrypts Ethernet data received from the network, and transmits it wirelessly to the correct subscriber unit (SU). The AP is constantly monitoring the radio link and can automatically change the channel if performance is degraded due to interference. If two AP units are very close to one another, they may interfere if operating on adjacent frequency channels. Place them at least 10 feet apart and manually select non-adjacent channels for their operation. Also, the SU should be placed at least 10 feet from the AP to avoid overloading the radio's receiver.

1.1 General Information

The 20-6020 Ethernet Radio pairs are designed to supply a wireless Ethernet connection to the fuel island. They work up to 40 miles with line-of-site and directional antennas. They will also work non-line-of-site over shorter distances. Built-in link quality LEDs show the strength of the signal.

Units are setup as a matched pair. 128 bit data encryption ensures the data is secure.

The -EXT version comes with one weatherproof Access Point and one weatherproof Subscriber Unit. The Access Point is typically installed on a building where the Ethernet connection is located. The Subscriber Unit is typically installed on a pole at the fuel island where Ethernet access is needed. Each radio is powered by a wall pack using a PoE injector. Each comes with a mounting bracket and an omni-directional whip antenna (an optional directional Yagi antenna is also available).

The –INT version comes with one weatherproof Access Point and one board-level Subscriber Unit. The Access Point is typically installed on a building where the Ethernet connection is located. It is powered by a wall pack using a PoE injector. It comes with a bracket and an omni-directional whip antenna. (an optional directional Yagi antenna is also available). The Subscriber Unit is mounted on the FSC3000 circuit board. The FSC3000 is installed inside the Fuel Island Terminal. A weatherproof omni-directional panel mount antenna is installed in the top of the Fuel Island Terminal enclosure.

Section 2 Components

Please check your product packaging and make sure all components are included and not damaged.

20-6020-EXT	
Qty.	**Component**
2	75-0151 radio in extruded aluminum box (one [1] Access Point and one [1] Subscriber Unit - paired).
	Included with 75-0151: Two (2) AW2-900 2.5dBi omnidirectional antenna Two (2) AW-PoE Power Over Ethernet injectors Two (2) 110 VAC to 12 VDC power adapters
2	12-3003 25' Ethernet Cable

20-6020-INT	
Qty.	**Component**
1	75-0151-M radio in extruded aluminum box (Access Point)
	Included with 75-0151: One (1) AW2-900 2.5dBi omnidirectional antenna One (1) AW-PoE Power Over Ethernet injector One (1) 110 VAC to 12 VDC power adapter
1	12-3003 25' Ethernet Cable
1	20-6021 Radio Assembly (installed on internal w/terminal mounted antenna

75-0151 Components

- Radio
- Antenna
- Cable Gland

Power Over Ethernet Cable

110 VAC to 12 VDC Power Adapter
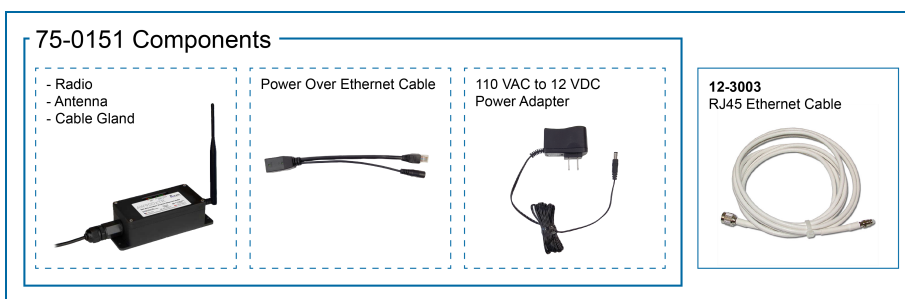
12-3003
RJ45 Ethernet Cable

Figure 2-1 75-0151 Components

Figure 2-2 75-2010 Directional Antenna Option

20-6021 Radio Assembly

The 20-6020-INT includes the 20-6021 Subscriber Unit that comes pre-installed with the internal FSC3000 of your purchased Fuel Island Terminal. The parts of this Subscriber Unit are shown below.
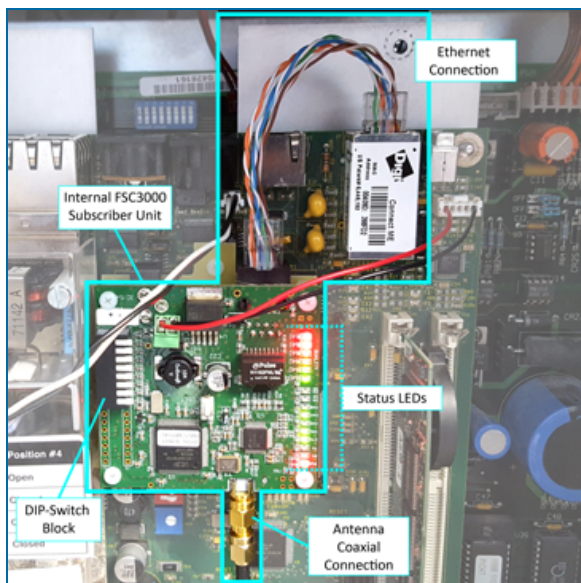

Figure 2-3 20-6021 Subscriber Unit

Section 3 Installation

This section outlines the details for component installation.

- Antenna Alignment and Orientation
- Mount the Access Point
- System Test

NOTE: The Access Point and Subscriber units included in both, 20-6020-EXT and 20-6020-INT have been paired at the factory. If it ever becomes necessary to pair the units because of lost communication (they have lost their pairing) or for a replacement unit, see Appendix A (for 20-6020-EXT) or Appendix B (for 20-6020-INT) for procedures on how to correctly pair the units.

3.1 Antenna Alignment and Orientation Guide

When you install the antennae, be sure the pairs are aligned and oriented correctly. Use the guide below:
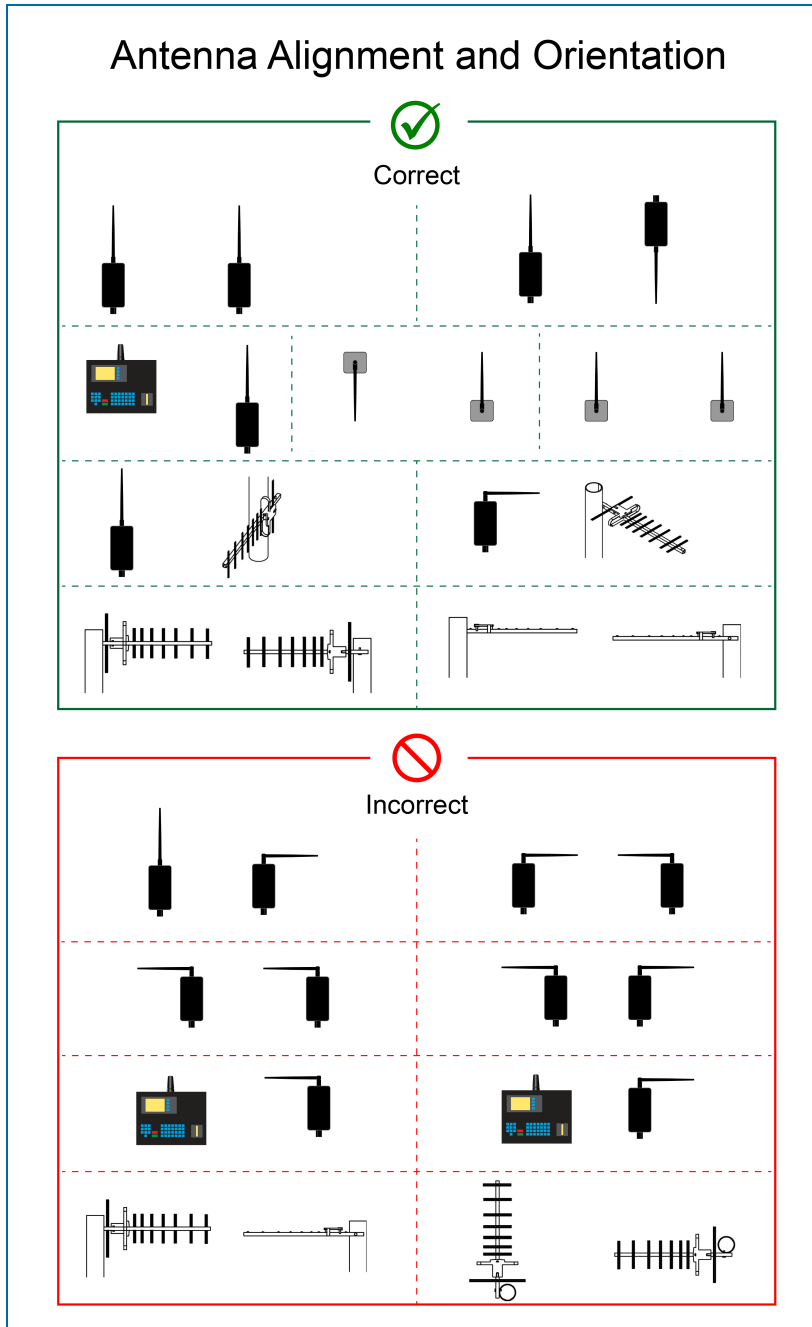

Figure 3-1 Antenna Alignment

3.2 Install the Access Point

1. Attach the **Access Point** to the building or pole.

2. Remove the weatherproof cable gland, push the **12-3003 RJ45 cable** through the cable gland, connect the RJ45 cable to the Access Point and screw the cable gland back into the housing.

3. Route the other end of the 12-3003 RJ45 cable into the building and plug it into the **Power over Ethernet (PoE)** cable.

4. Plug the PoE cable into the **RJ45 Ethernet** connection that exists in the building.

5. Plug the power pack into a receptacle and plug the power connector into the PoE cable.

3.2.1 External Version

Install the Subscriber Unit

1. Attach the **Access Point** to the building or pole.

2. Remove the weatherproof cable gland, push the **12-3003 RJ45 cable** through the cable gland, connect the RJ45 cable to the Access Point and screw the cable gland back into the housing.

3. Route the other end of the 12-3003 RJ45 cable into the terminal (or wherever the device's Ethernet connection is located), and plug it into the **PoE** cable.

4. Plug the PoE cable into the device's RJ45 Ethernet connector.

5. Plug the power pack into a receptacle and plug the power connector into the PoE cable.

3.2.2 Internal Version

- If you have the –INT version, use the M1700 FSC3000 Installation, Operation and Maintenance Guide to install the Fuel Control system. The Subscriber unit is pre-installed on the FSC3000 board so there will be no other steps necessary. To access the M1700 IOM scan or click the QR code below or go to http://www.opwglobal.com/docs/libraries/manuals/electronic-systems/opw-fms-manuals/M1700-FSC3000-Installation-Configuration-Manual.pdf?sfvrsn=12
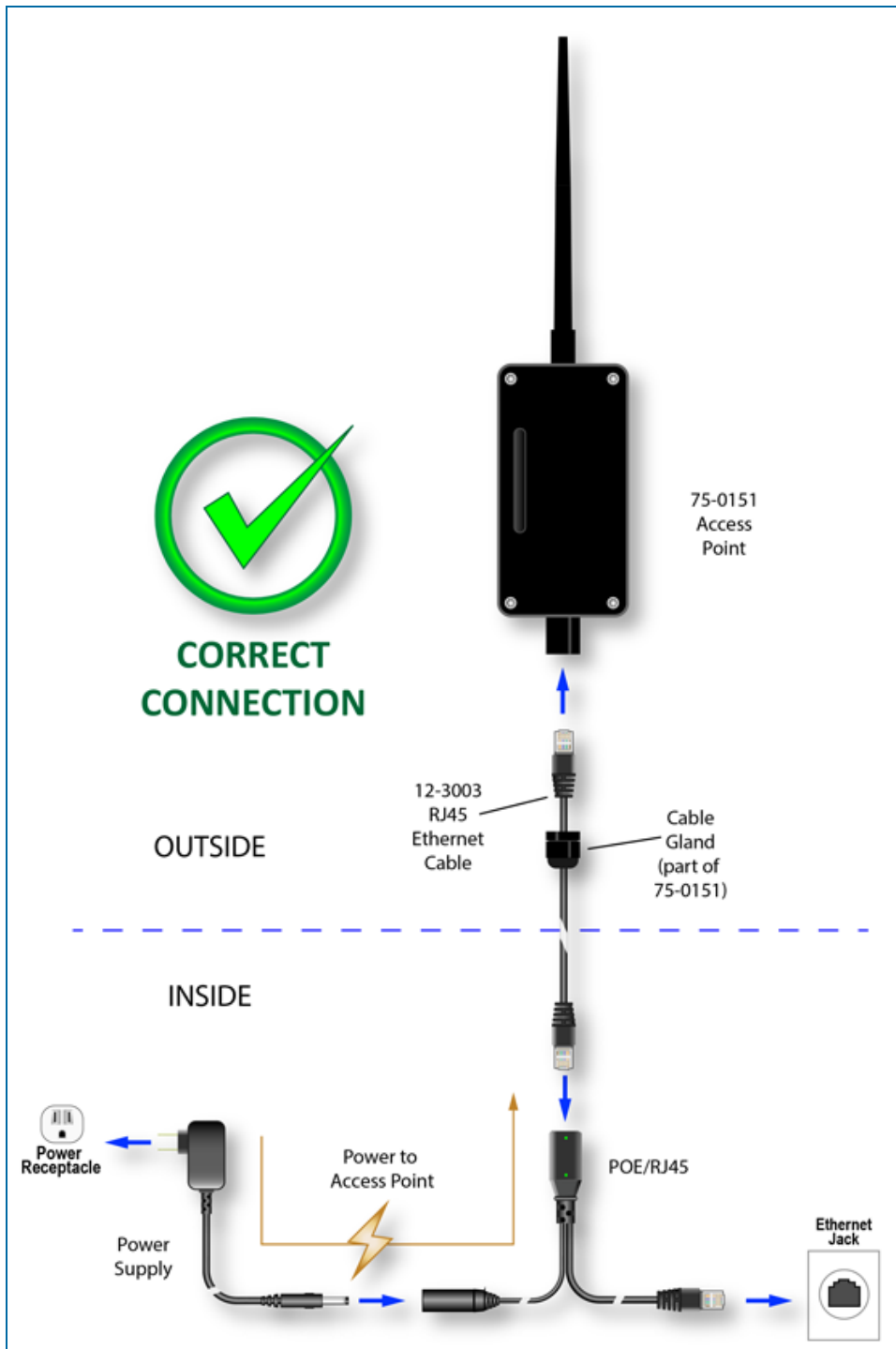
Figure 3-1 Access Point Cable Connections

> **IMPORTANT:** The POE cable only supplies power to the female connector. **DO NOT** plug the integrated RJ45 end of the POE cable into the Ethernet modem or it will not be powered!
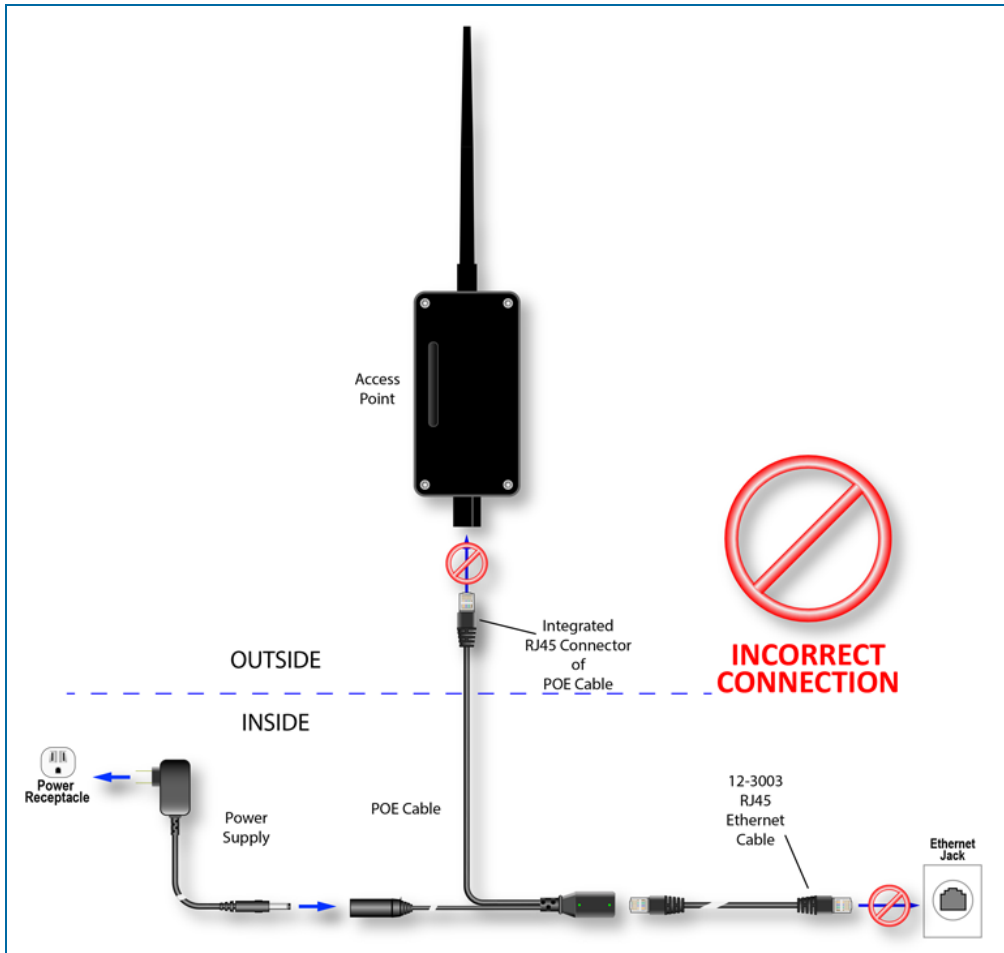

Figure 3-2 Incorrect Cable Connection

3.3 Test the System

The Wireless Ethernet Radios are preconfigured and paired to communicate with each other. When power is applied, the channel LEDs will search for the clearest channel and lock in on one. This indicates that the two units are communicating. The 6 link quality LEDs will indicate the relative strength of the signal.

Section 4 Abbreviation Guide

AP: Access Point

CH: Channel

DHCP: Dynamic Host Configuration Protocol

ECD: Ethernet Client Device

IP: Internet Protocol

LCD: Liquid-Crystal Display

RF: Radio Frequency

RP: Reversed Polarity

RX: Receive

SU: Subscriber Unit

TNC: Need name of plug

TX: Transmit

Appendix A - Pair the 20-6020-EXT

Work Instructions to configure and pair the 20-6020-EXT Ethernet Radio Modems

> **NOTE:** The Access Point and Subscriber units included in the 20-6020-EXT have been paired at the factory. If it ever becomes necessary to pair the units because of lost communication (they have lost their pairing) or for a replacement unit, use the procedure below on how to correctly pair the units.

> **IMPORTANT:** Do not apply power to either the Access Point or the Subscriber unit until instructed to do so. Refer to the instructions below.

1. Refer to the image "Pair the 20-6020-EXT Modems" on page 17 for connections and the steps shown below.

2. Use a 3mm Allen wrench (not supplied) to remove the cover from one of the units. This unit will be specified as the **Access Point**.

3. Make sure the Access Point and the Subscriber Unit are set at least **10 feet** apart.

4. Attach the **antennas** to both units.

5. Connect a **12-3003 Ethernet cable** from each radio modem to the female connector of its PoE cable.

> **NOTE:** To correctly pair the two (2) Ethernet radio units of the 20-6020-EXT, it will be necessary to have an RJ45 coupler. This is NOT a supplied component.
>
> RJ45 Coupler (NOT Supplied)
>
>

6. Use an **RJ45 coupler** (NOT supplied) to connect the RJ45 ends of both PoE cables together.

7. Connect the two power supply cords to their PoE cables. *Do not plug the power supplies into power outlets at this time*.

8. Turn switch "1" of the specified Access Point unit to the **ON** position (Switch 1 is toward the side of the board of the antenna coaxial connector).

9. Plug in the power supplies of both units to power outlets to turn the units on.

10. The **link quality LEDs** on both units will sequence up and down for 5 seconds (The LEDs of the Subscriber Unit can be seen through the LED view window on the cover of the unit).

11. If the units have been correctly paired and their encryption keys loaded, the condition of the **link quality LEDs** of both units should be as follows:

    a. The first green link quality LED on the Subscriber Unit will flash.

    b. The link quality LEDs on the Access Point continue to sequence up and down.

12. Unplug the power supplies of both units to turn them off.

13. Disconnect the RJ45 connector ends of both PoE cables from the RJ45 coupler.

14. Plug in the power supplies of both units to power outlets to turn the units back on.

15. The link quality LEDs on both units will sequence up and down for 5 seconds

16. The channel LEDs on both units will search and then lock-in on the clearest channel. If this does not occur, the units have not been correctly paired.

> **NOTE:** If pairing does not occur, redo the procedure from step 6.

17. The link quality LEDs will then light to show the signal strength.

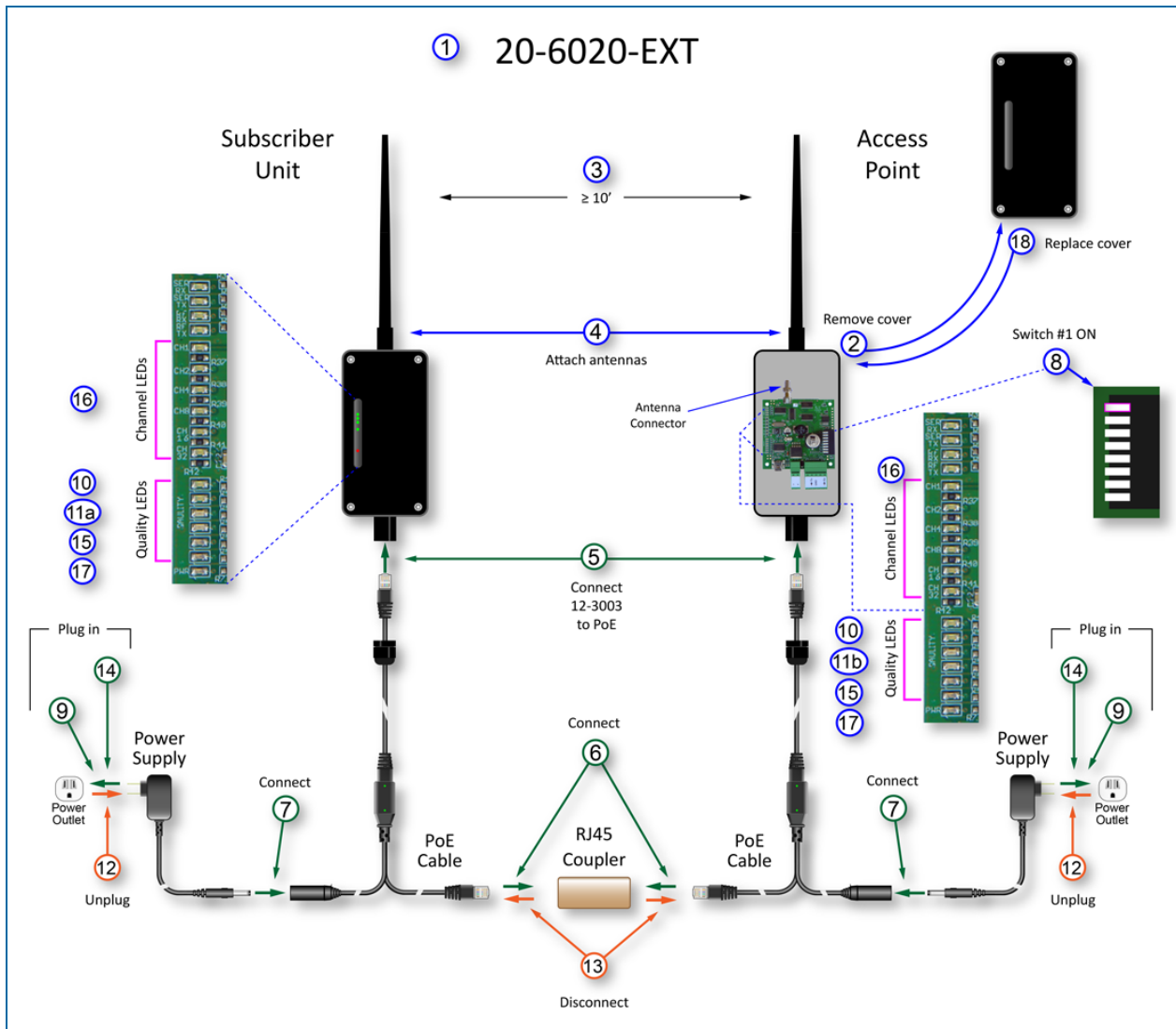18. Put the cover back on the Access Point.

Figure A-1 Pair the 20-6020-EXT Modems

Appendix B - Pair the 20-6020-INT

Work Instructions to configure and pair the 20-6020-INT Ethernet Radio Modems

> **NOTE:** The Access Point and Subscriber units included in the 20-6020-INT have been paired at the factory. If it ever becomes necessary to pair the units because of lost communication (they have lost their pairing) or for a replacement unit, use the procedure below on how to correctly pair the units.

> **IMPORTANT:** Do not apply power to either the Access Point or the FSC3000 until instructed to do so. Refer to the instructions below.

1. Refer to the image "Pair the 20-6020-INT Modems" on the next page for connections and the steps shown below.

2. Use a 3mm Allen wrench (not supplied) to remove the cover from the **Access Point**.

3. Make sure the two units are set at least **10 feet** apart.

4. Attach the **antenna** to the Access Point.

5. Connect the **12-3003 Ethernet cable** from the Access Point to the PoE cable.

6. On the Subscriber Unit, temporarily disconnect the short **Ethernet connection** coming from the FSC3000.

7. Plug the **PoE** cable into the **Ethernet port** of the Subscriber Unit on the FSC3000 board.

8. Connect the power supply cord to the PoE cable. *Do not plug the power supply into power at this time*.

9. Turn switch "1" of the Access Point unit to the **ON** position (Switch 1 is toward the side of the board of the antenna coaxial connector).

10. Plug in the power supply of the Access Point and plug in the FSC3000 power cord to turn them both on.

11. The **link quality LEDs** on both units will sequence up and down for 5 seconds

12. If the units have been correctly paired and their encryption keys loaded, the condition of the **link quality LEDs** of both units should be as follows:

    a. The first green link quality LED on the Subscriber Unit will flash.

    b. The link quality LEDs on the Access Point continue to sequence up and down.

13. Unplug the Access Point power supply and the FSC3000 power cord.

14. Disconnect the RJ45 connector end of the PoE cable from the Ethernet port of the Subscriber unit.

15. Reconnect the short Ethernet cable of the FSC3000 to the Ethernet port of the Subscriber Unit.

16.   Plug in the power supply of the Access Point and the FSC3000 power cord to power outlets to turn the units back on.

17.   The link quality LEDs on both units will sequence up and down for 5 seconds.

18.   The channel LEDs on both units will search and then lock-in on the clearest channel. If this does not occur, the units have not been correctly paired.

> **NOTE:** If pairing does not occur, redo the procedure from step 6.

19.   The link quality LEDs will then light to show the signal strength.
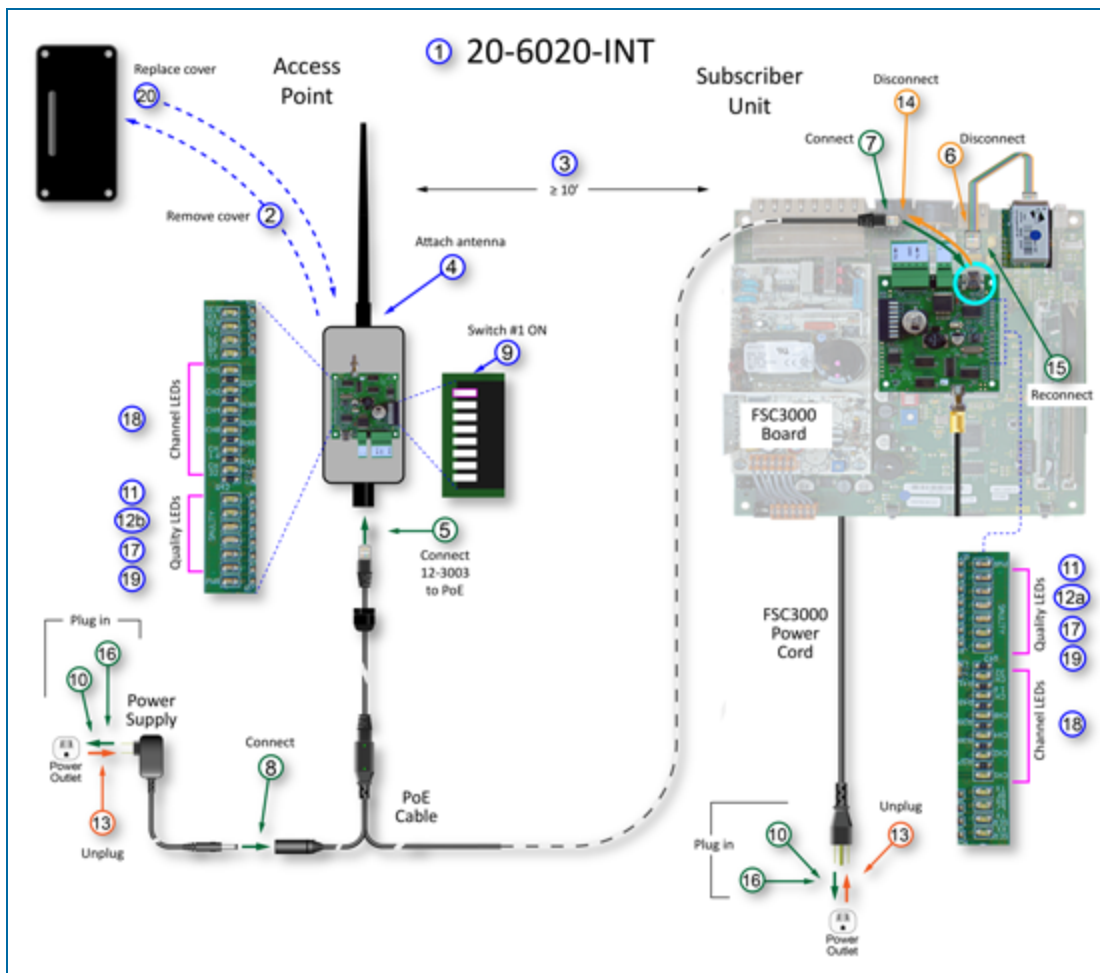
20.   Put the cover back on the Access Point.

Figure B-1 Pair the 20-6020-INT Modems

Warranty

OPW Fuel Management Systems warrants that all OPW Tank Gauge and Petro Vend Fuel Control systems supplied by OPW Fuel Management Systems to the Original Purchaser will be free from defects in material and/or workmanship under normal use and service for a period of 12 months from the date of installation or 15 months from the date of shipment from OPW. Additionally, OPW Fuel Management Systems warrants that all upgrades and replacement parts (new and remanufactured) supplied by OPW Fuel Management Systems will be free from defects in material and workmanship under normal use and serviced for a period of 90 days from the date of installation or for the remainder of the system's original warranty, whichever is greater, as set forth in the first sentence of this statement. The foregoing warranties will not extend to goods subjected to misuse, neglect, accident, or improper installation or maintenance or which have been altered or repaired by anyone other than OPW Fuel Management Systems or its authorized representative. The buyer's acceptance of delivery of the goods constitutes acceptance of the foregoing warranties and remedies, and all conditions and limitations thereof.

If a claim is made within the warranted time period that any equipment and/or remanufactured part is defective in material or workmanship under normal use and service, such equipment and/or remanufactured part shall be returned to OPW Fuel Management Systems, freight prepaid. If such equipment or remanufactured part is found by OPW Fuel Management Systems in its sole judgment to be defective in material or workmanship under normal use and service, OPW Fuel Management Systems shall, at its sole option, repair or replace such equipment and/or remanufactured part (excluding, in all instances, fuses, ink cartridges, batteries, other consumable items, etc.) OPW Fuel Management Systems shall not be held responsible for data loss or retrieval on returned products.

The warranties, as set forth above, are made expressly in lieu of all other warranties, either expressed or implied (including, without limitation, warranties of merchantability and fitness for any particular purpose and of all other obligations or liabilities on OPW Fuel Management Systems' part.) Further, OPW Fuel Management Systems neither assumes, nor authorizes any other person to assume for it, any other liability in connection with the sale of the systems, or any new/replacement part that has been subject to any damage from any act of nature or any force majeure. Any terms proposed by the Original Purchaser either orally or in writing are expressly rejected. The terms and conditions expressed in this document may only be changed upon the express written consent of OPW Fuel Management Systems.

The term "Original Purchaser" as used in these warranties shall be deemed to mean the authorized OPW Fuel Management Systems' distributor to which the system or any new/replacement part was originally sold. These warranties may be assigned by the original purchaser to any of its customers who purchase any OPW Fuel Management Systems' systems or new/replacement parts. This document shall be governed by and construed in accordance with the law of the State of Illinois. OPW Fuel Management Systems and Original Purchaser agree that any legal action or proceeding under or with respect to this document may ONLY be brought in the courts of the State of Illinois, or the United States District Court having jurisdiction in the City of Hodgkins, Illinois. Original Purchaser expressly consents to personal jurisdiction in any of the above-mentioned forums and agrees to waive all defenses based on improper venue or inconvenient form should an action be brought therein.

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TERMS

Ex-works our factory, Hodgkins, Illinois, USA
Installation not included.
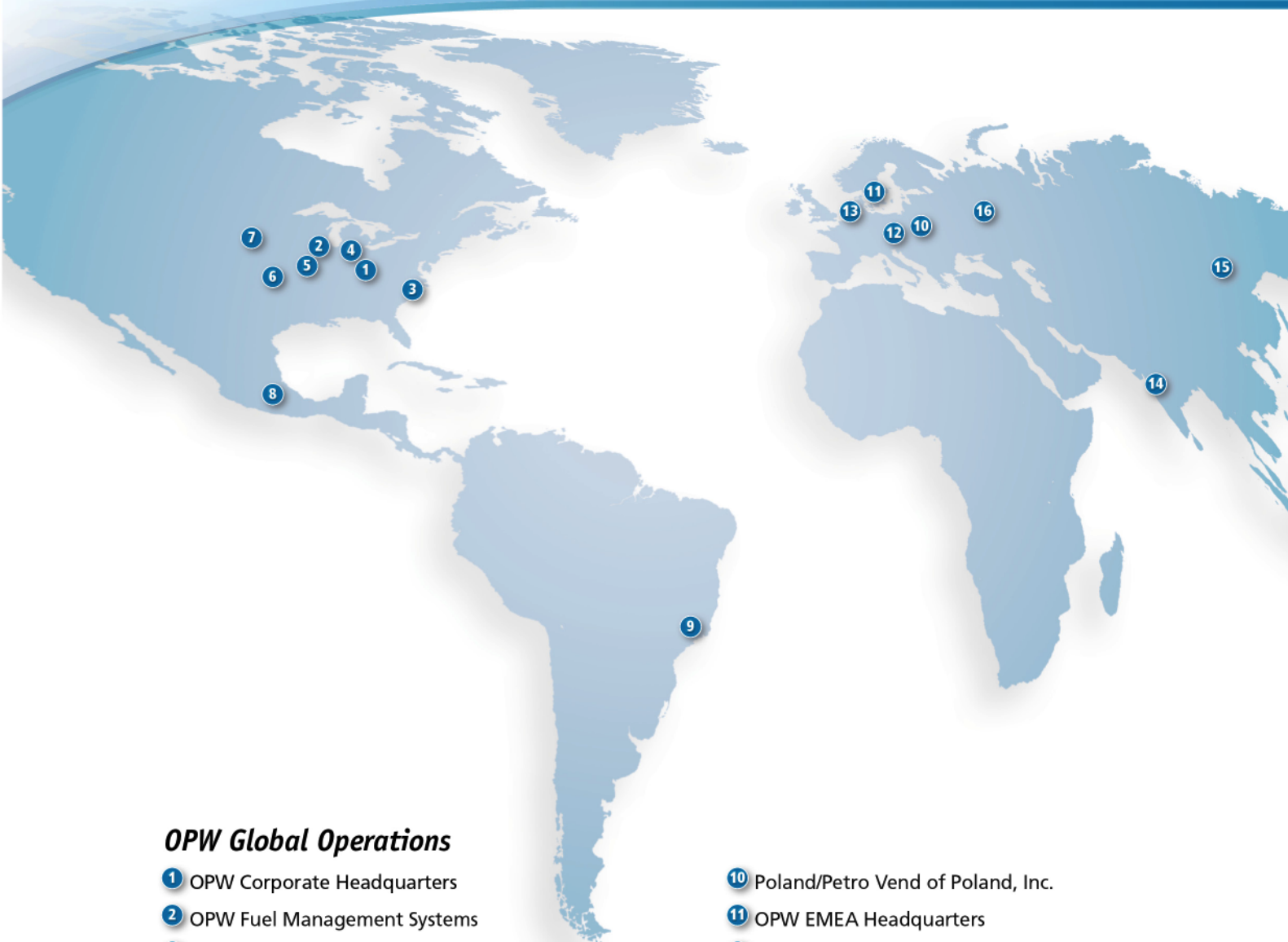All trade names are registered. Patents pending.
Subject to engineering improvement and/or other changes.

Revisions

Revision #	ECO	Effective	Software Version	Key Changes
0	919	3/9/16	na	Initial Release
1	1128	2/27/17	na	Added installation and pairing instructions for Internal and External versions

NOTE: It is possible that older software versions might not support all features

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