

CCU4 Collector

Field Installation and Service
Guide

D R A F T !

Identification

CCU4 Collector Field Installation and Service Guide
TDC-0359-000b 04/02

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Compliance Statements

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 or TV technician for help.

Warning

It is important that only authorized Itron personnel attempt repairs on Itron equipment as this might void any maintenance contract with your company. Unauthorized service personnel might be subject to shock hazard on some Itron equipment if removal of protective covers is attempted.

Suggestions

If you have comments or suggestions on how we may improve this document, send them to:
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Before You Begin

This document describes the physical installation and maintenance of the CCU4 collector at the site of installation and presumes any pre-installation configurations or modifications have already been performed at the meter shop. For more information about procedures performed prior to installation, see the CCU4 Collector Configuration Guide.

How This Book is Organized

- [Chapter 1, “CCU4 Collector Overview”](#) describes the features of the collector, its role in the fixed network, and its individual components.
- [Chapter 2, “Installation Considerations”](#) addresses several topics to consider before installing a CCU4 collector, including avoiding RF interference and calculating wind load. This chapter also describes installing a davit on a wood pole.
- [Chapter 3, “Installing the CCU4 Collector”](#) describes installing the collector either on the davit of a light pole or on a davit attached to a wood pole. This chapter also describes supplying power to the collector using either the photoelectric sensor of a light pole or the secondary power wires of a wood pole.
- [Chapter 4, “Servicing the CCU4 Collector”](#) describes replacing the antennas, the battery pack, and the entire collector.
- [Appendix A, “CCU4 Collector Specifications”](#) provides environmental, electrical, and physical specifications for the collector and its components.
- [Appendix B, “Troubleshooting”](#) provides possible solutions to problems that may occur while installing and servicing the CCU4 collector.

Conventions

Hypertext links are [blue](#). Example: See [“Conventions” on page xiii](#) for detailed information.

The last line in a table is defined by a thick gray line. If the table continues on another page, the table number, title, and column headings are repeated on each page.



Chapter 1

CCU4 Collector Overview

Itron's Cell Control Unit 4 (CCU4) collector is a self-contained device that collects energy consumption and tamper data from Itron Encoder Receiver Transmitters (ERTs) installed on commercial and residential utility meters, and then forwards this information over public networks to a central data collection site (the fixed network headend). The collector's modular design and ability to read water, electric and gas meter data with the same unit provides a scalable fixed network solution.

The CCU4 collector is installed outdoors on utility poles and is powered by a 120 VAC power line. If AC power fails, the collector continues to operate on battery power for up to four hours.

The collector reads ERT Standard Consumption Messages (SCMs) and Interval Data Messages (IDMs) at preset intervals on the 910-920 MHz unlicensed band (ISM) using a radio frequency (RF) receiver. It then transmits the data at specified times of day to the headend through existing telephone lines using a dial-up modem or through wireless transfer using a Cellular Digital Packet Data (CDPD) modem and antenna. The collector also has a MAS band (952 MHz– 957 MHz) transmitter to excite ERT modules programmed as wake-up devices.

Once configured and installed, the CCU4 collector requires no onsite visits while functioning normally. Changes to collection intervals or data transmission times, upgrades to software, and other functions are all configured remotely from the headend. For more information on the headend, see the Fixed Network 2.0 System Reference Guide.

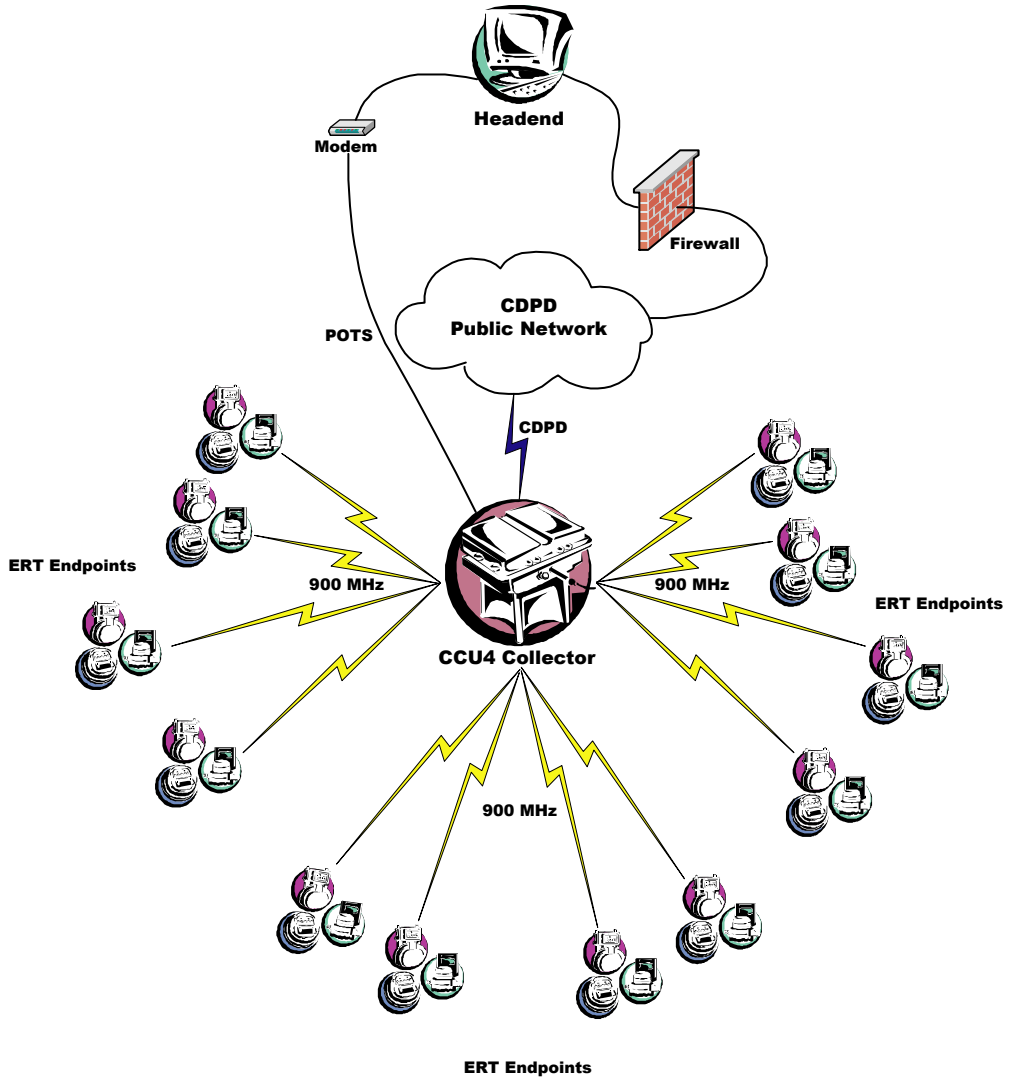
Features

- Transfers data to the central data collection site over public networks, instead of the proprietary Itron 1432 MHz network
- Internet Protocol (IP) interface provides access using standard internet-based software applications
- Advanced digital radio technologies and full duplex radio increases the number of readable endpoints
- Completely re-programmable from a remote location
- Scalable from a single device covering a few endpoints, to thousands of devices covering large metropolitan areas
- Modular design allows adding different options to suit the installation and allows increased functionality in the future
- Provides secure data transfer using standard encryption methods
- Includes 10 Base-T Ethernet interface for configuration, diagnostics, and high speed data transfer

Fixed Network Diagram

Figure 1 shows the role of the CCU4 collector in the overall fixed network. The collector reads and stores meter data from water, gas, and electric ERT endpoints. It then transmits this data via either POTS or the CDPD public network to the headend server.

Figure 1: Fixed Network with CCU4 Collector

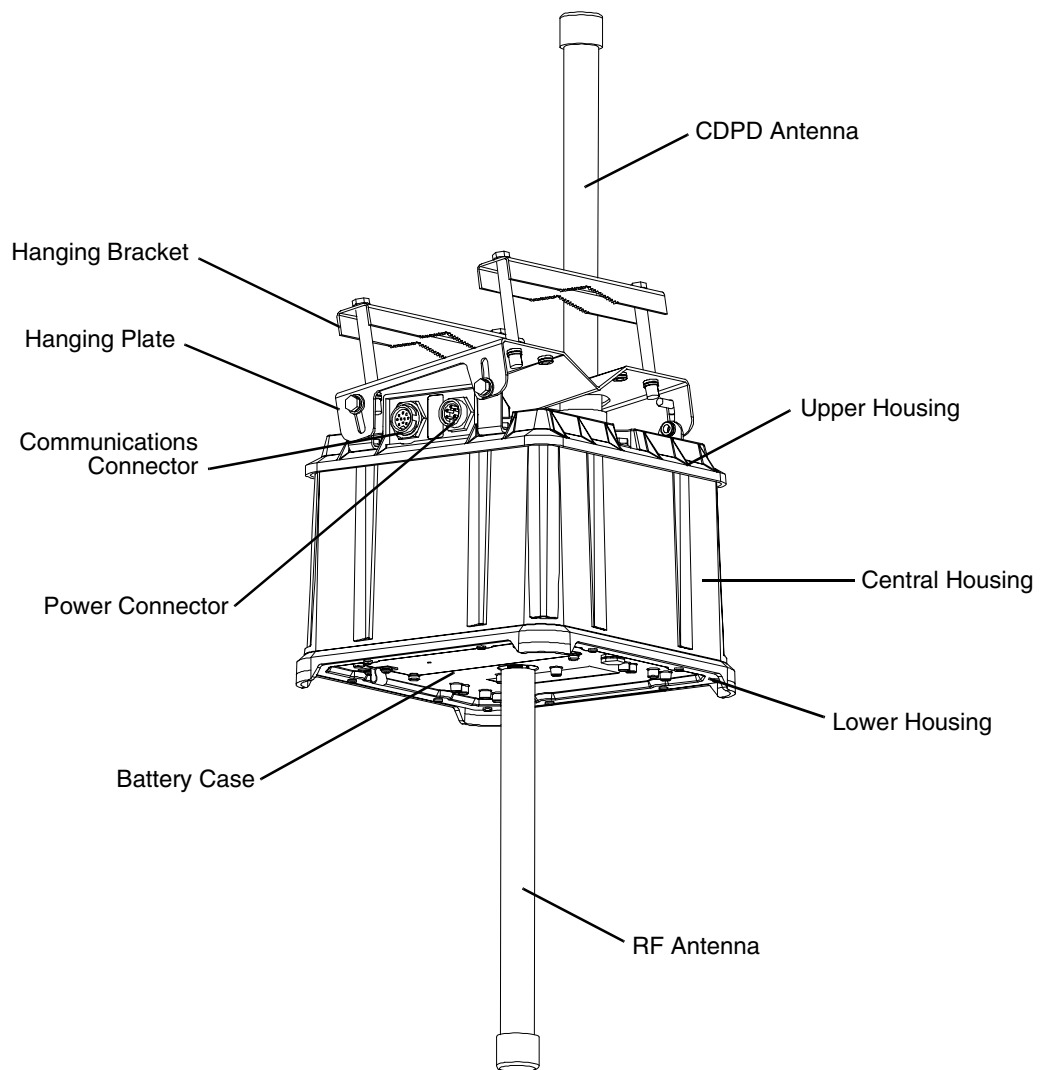


CCU4 Collector Components

The CCU4 collector's modular design consists of a number of components fixed together to form a single weatherproof device. The rugged, adjustable mounting bracket secures the device in high winds and under heavy ice loads. Electrical components are designed into a plastic enclosure that provides double insulation and a high level of safety while handling the device. All electrical connections from the collector are fully isolated, meaning it does not require a connection to earth ground.

If data is transferred over a wireless cellular public network, the collector requires only a power connection. If data is transferred over a land-based public network, a telephone line or Ethernet connection is also required.

Figure 2: CCU4 Collector Components



Upper Housing

The upper housing contains the public network interface modem and the external power and communications connectors. Each collector contains either a CDPD modem or a POTS (Plain Old Telephone Service) dial-up modem, but not both at the same time. The upper housing can be replaced to change the method of public network access.

CDPD Modem

The CDPD modem provides switched data communication services between the collector and the service providers internet connection/frame relay. CDPD communication provides two-way, fully digital, 19.2 KBPS packet data networking services. Due to protocol overhead and security, the effective data rate for CDPD is between 9 KBPS and 14 KBPS, and will drop during periods of interference and high network utilization. The antenna for the CDPD modem is integrated into the top cover of the collector. CDPD service is offered by major cellular vendors in most metropolitan areas of North America.

POTS Modem

The POTS modem is a dial-up modem operating at up to 56 KBPS. Electrical connection to the modem is through the same modem interface board as used by the CDPD modem. The modem is a transformer coupled device, which maintains the electrical isolation of the collector. Dial-up internet service is offered by Internet Service Providers (ISPs) in most areas of North America.

Communications Connector

The communications connector is a transformer coupled connection (maintaining electrical isolation) and is used on POTS versions of the collector to transmit data to the headend and download software through POTS lines. The same connector is used in the meter shop to establish an Ethernet connection, using different pins, during initial configuration and software download.

Power Connector

The collector input AC connector is a five position circular 3A/300V connector. Pins 2, 3 and 4 are voided for high voltage line to line clearance. The five position circular connector is mounted on the collector housing, providing a watertight connection point for external power sources.

Central Housing

The central housing is where the main processor, the compact flash memory, and the power supply reside. The housing is well shielded to prevent interference with the sensitive radio section.

Beneath the processor section, in the lower portion of the central housing, are the radio transmitter and receiver.

Compact Flash Memory

The compact flash memory is a solid state hard drive that stores the complete operating system and the collected data. It appears as a standard hard drive to the system. The compact flash memory two copies of the operating system, so the entire network can be switched to a new operating system at a scheduled time, but can still revert back to the earlier version if there is a problem with the new operating system. If it becomes corrupted (virus/lightning strike/etc), the entire compact flash drive can be formatted and reloaded over the public network.

Receiver and Transmitter

The receiver is a full duplex, enhanced version of the Itron G5 mobile radio receiver. A wideband receiver identifies the presence and timing of an incoming ERT transmission, and a narrowband digital Fast Fourier Transform (FFT) based decoder locates and decodes the ERT message.

The ERT wake-up transmitter is a modified version of the Itron G5 mobile transmitter. It operates over the same MAS band (952 MHz – 957 MHz) but is optimized for a fixed network installation.

Lower Housing

The lower housing protects the radio from the outside environment and is where the battery pack and the 900 MHz diplexer and are located. The diplexer controls transmitting to ERTs on the MAS band and receiving from ERTs on the ISM band. The 900 MHz ERT antenna and ground plane attach to the bottom of the lower housing, pointing down.

Battery Pack

The battery pack is sealed in its own compartment within the lower housing and is vented to the outside air for safety. The battery pack is a four-cell sealed lead acid battery pack (8.8V, 2.5 Amp hours / 22 WHr). It is field replaceable and designed to last 5 years. An automatically resetting fuse protects the battery from shorts.

If the AC power fails, the battery pack maintains system functions for 4 hours. **To conserve power, the collector may reduce processor speed, turn off all unused peripherals, put the CDPD modem into sleep mode (slowing web response time), and reduce the number of read cycles. This lower performance mode also occurs during the 16-hour initial charge of the battery after installation.**

The collector generates alarms at the headend when the battery fails or when low capacity values are detected.

Chapter 2

Installation Considerations

ERT Compatibility

The CCU4 collector reads the following types of Itron ERTs and messages:

- 25 Series
- 40 Series
- 41 Series
- 45 Series
- 50W
- SSD (Solid State Demand ERT)
- SCM and IDM messages- IDM first priority

Collector to ERT Ratio and Distance

Although the CCU4 collector potentially can read many more ERTs, to ensure all data is collected, place one collector for every 100 unique ERTs.

The collector reads ERTs within a maximum radius of 800 ft, although some environmental, weather, and terrain conditions can affect this distance.

Radio Frequency

To ensure RF signals are received, install the collector at elevations and locations where the greatest number of endpoints are in direct line of sight of the collector.

Avoid installing collectors in following ways:

- Adjacent to or between tall buildings, signs, towers, or bridges
- Within 500 ft of high power RF transmitters (such as paging transmitters, cellular transmitters, and municipal communications transmitters)
- Near potential broadband sources of radiated RF energy (such as power line transformers and neon or fluorescent signs)
- Near swaying limbs, branches, or cables that could strike the collector
- Between or beneath highway overpasses, elevated train platforms, or tunnels
- Near tunnel entrances
- Near objects or devices (such as solar panels and signs) attached to the same pole

Installing a Davit on a Wood Pole

The CCU4 collector is installed on the davit of a pole, which is the part of the pole that extends out, away from the pole and is parallel to the ground. A light pole has an existing davit that holds the light fixture, and the collector is installed about 6 in. behind the light fixture on the davit.

Wood poles do not usually have davits, but you can install one on the pole with a davit kit. If the wood pole already has a davit attached, you do not need to add another unless installing the collector on the davit exceeds the wind load rating of the davit, creates RF interference with other equipment on or near the pole, or places the collector too near tree branches or other environmental factors.

If you are installing the CCU4 collector on a wood pole without an existing davit you can install a davit using the Itron CCU Upsweep Davit Kit or the Itron CCU Downsweep Davit Kit. The upsweep and downsweep davit kits each contain a bracket with a davit and arm welded to it.

The davit arm protrudes away from the bracket either up (upsweep kit) or down (downsweep kit). Choose between the upsweep or downsweep kit to provide the collector with clearance from other equipment attached to the pole and from nearby tree branches or other environmental factors.

The davit kit attaches to the wood pole with a long bolt that goes through the pole and a lag bolt that goes into the pole. The bolts and washers required to install the davit are not included in the kit, since the length of the longer bolt varies depending on the thickness of the pole.

Required Tools and Hardware

You need the following tools and hardware to install the upsweep or downsweep davit kit on a wood pole:

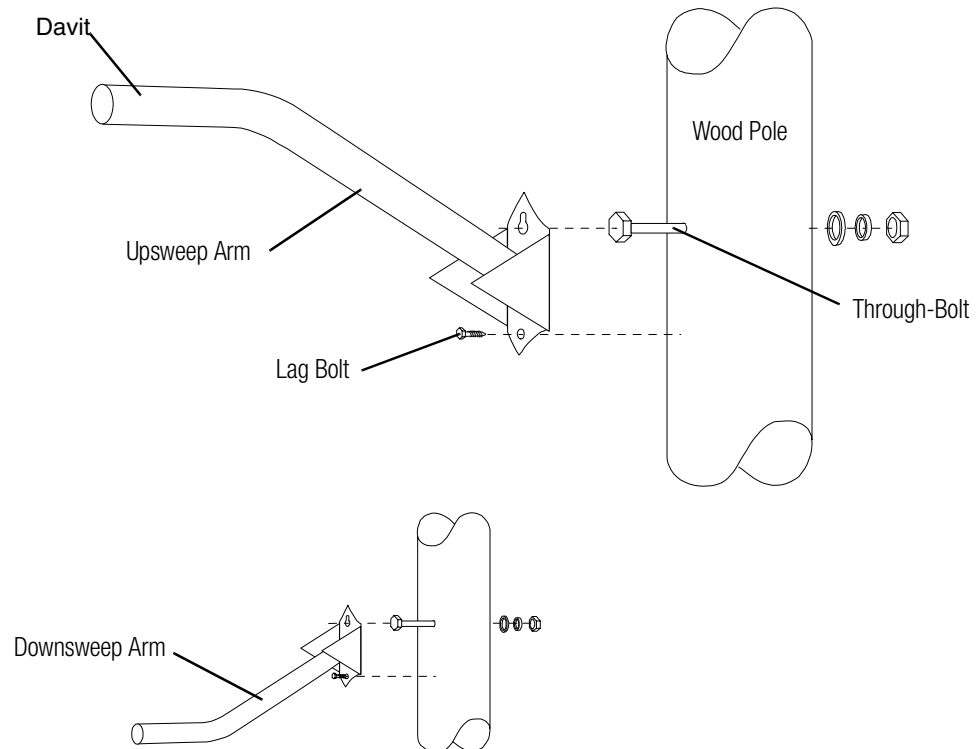
- 1/2-inch diameter bolt long enough to insert completely through the wood pole
- 1/2-inch diameter lag bolt
- 1/2-inch diameter washer, lock washer, and nut
- Drill with 1/2-inch diameter drill bit
- Nut driver, wrench, or ratchet-wrench

To Attach a Davit to a Wood Pole

1. Place the support arm against the pole and mark the position of the top slotted hole.
2. Drill a hole through the pole at the marked position.
3. Insert a bolt through the pole so that it protrudes 1/2 inch out the other side.
4. Insert the washer, lock washer, and nut onto the protruding tip of the through-bolt, and tighten the nut until the bracket is held in place.
5. Slip the slotted hole of the bracket over the head of the through-bolt, and slide the bracket down so that the head of the through-bolt is captured in the slot.
6. Insert the lag bolt through the bottom hole of the bracket and into the pole.

7. Tighten the through-bolt and the lag bolt until the bracket is firmly attached to the pole and the end of the support arm is parallel to the ground.

Figure 3: Attaching a Davit to the Wood Pole



Calculating Wind Load

Wind load is the combination of maximum weight and Effective Projected Area (EPA) that the davit or pole can withstand. EPA, the actual projected area of an object multiplied by its coefficient of drag, is expressed as a decimal, such as 1.3. The manufacturer of the davit or pole should provide wind load rating specifications.

Before mounting a CCU4 collector onto the davit of a pole, you must calculate the wind load and determine whether the combined weight and the combined EPA of the collector and any light fixture or other equipment already installed on the davit exceeds the limits for which the particular davit and pole are rated.

Follow the equations below to calculate wind load for each installation:

$$(\text{weight of light fixture, etc.}) + (\text{weight of CCU4 and mounting hardware}) = \text{total weight}$$

$$(\text{EPA of light fixture, etc.}) + (\text{EPA of CCU4 and mounting hardware}) = \text{total EPA}$$

The following example describes calculating the wind load for a light pole with one light fixture and one CCU4 collector.

Example: Aluminum Light Pole Wind Load

A G.E. Light Systems davit and pole support a maximum weight of 60 pounds and a maximum EPA of 1.5, rated at 100 MPH (Miles Per Hour Isotach). The existing light fixture weighs 35 pounds and has a .7 EPA. **The CCU4 collector (including mounting hardware) weighs 23 pounds and has a .7 EPA.** The combined weight of the collector and the light fixture is 58 pounds. The combined EPA of the collector and the light fixture is 1.4.

The following equation shows the calculations for this installation:

$$(35 \text{ lb}) + (23 \text{ lb}) = 58 \text{ lb}$$

$$(.7) + (.7) = 1.4$$

Since the combined totals are less than the maximum weight (60 pounds) and the maximum EPA (1.5) ratings of the davit, the installation is feasible.

RF Antenna Angle

Regardless of the specific attachment point, the collector antenna must be vertical (plumb), extending downward, perpendicular to the horizon.

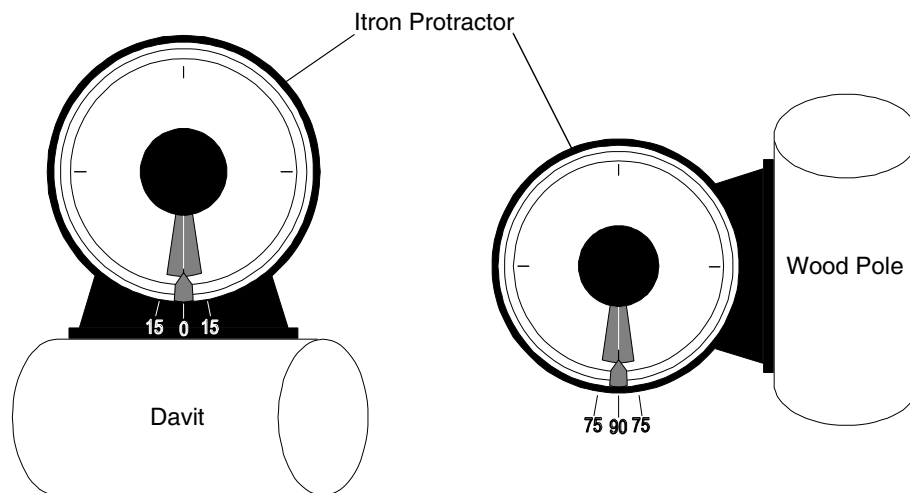
Measuring the Mounting Angle of a Pole or Davit

Two factors involved in achieving a plumb installation are the angles of the pole and the davit. Using an Itron Protractor, you can measure the angles of the pole and davit, as described below.

To measure the mounting angle of a davit, place the Itron Protractor on top of the davit above where the collector will be mounted. Verify the angle is no more than 15 degrees away from 0 degrees.

To measure the slant of a wood pole, place the Itron Protractor against the wood pole. Verify the angle is no more than 15 degrees away from 90 degrees.

Figure 4: Measuring the Mounting Angle of a Pole or Davit



If either angle is more than 15 degrees, adjust the angle of the collector when attaching it to the hanging plate by varying the connection points of the bolts connecting the hanging plate to the collector's L-brackets.

Grounding

The CCU4 collector does not require an earth ground connection because the unit is sealed and encased in plastic.

Unpacking the CCU4 Collector

Remove the CCU4 collector from its shipping container and verify the protective foam pieces are not severely damaged. If these pieces are damaged, and the collector has significant visible damage, it may not function correctly.

Important The collector must remain protected at all times prior to installation. After unpacking the collector to configure it prior to installation, save the packing container and packing materials to use again when transporting the unit to its location in the field. After installing the collector, save the container and materials for transport in the event the collector malfunctions and must be shipped to Itron for repair.

Packing Lists

The following parts are included in each container:

CDPD Version (part #CCU-4011-001)

Table 1: CDPD Version Packing List

Quantity	Part Description	Part Number
1	Battery pack	BAT-0019-001
1	CDPD antenna	MSE-0105-001
1	RF antenna	MSE-0104-001
1	CCU4 collector	CCU-4011-001

POTS Version (part # CCU-4012-001)

Table 2: POTS Version Packing List

Quantity	Part Description	Part Number
1	Battery pack	BAT-0019-001
1	POTS cable	CBA-0167-001
1	RF antenna	MSE-0104-001
1	CCU4 collector	CCU-4012-001

Additional Required Parts

In addition to the contents of the CCU4 container, you must have the Pole Mount Kit (part # CCU-4401-001, shipped separately), and one of the power cables (shipped separately) listed in the table below, depending on the type of installation.

Table 3: Required Power Cable by Installation

Type of Installation	Required Power Cable	Length	Part Number
Light Pole	Light Pole Power Cable	4 ft	CBA-0111-011
		8 ft	CBA-0111-012
		12 ft	CBA-0111-013
Wood Pole	Three-Conductor Power Cable	12 ft	CBL-0007-001

If anything is missing, contact your customer service representative immediately for a replacement part.

Chapter 3

Installing the CCU4 Collector

This installation involves attaching the CCU4 collector to either the davit (the arm holding the light fixture) of the light pole or to a davit that has been installed on a wood pole. In either case, a davit must already be available on which to install the collector. Once the collector is installed, you must supply it with power either from the photoelectric sensor of the street lamp or from the secondary power wires of the wood pole.

Required Tools

You need the following tools to install the CCU4 collector on a davit:

- 7/16-inch nut driver, wrench, or ratchet-wrench
- Inch-pound torque wrench with 7/16-inch socket
- Flathead screwdriver
- Itron bubble-level to check the plumb of the collector
- AC circuit tester or volt meter (if installing on a light pole)
- Wire stripper and wire cable sleeve (if installing on a wood pole)

Installation Procedure Summary

You must perform the following procedures to install the CCU4 collector on a davit:

1. Install the hanging plate.
2. Attach the collector to the hanging plate.
3. Attach the RF antenna.
4. Connect the means of transmitting to the headend.
5. Install the battery pack.
6. Supply power to the collector.
7. Verify the collector is operational.

Installing the Hanging Plate

The hanging plate attaches to the light pole davit with two brackets that have sharp teeth on the side that contacts the davit, keeping the hanging plate firmly in place. When replacing the collector with a new one, you can remove the old collector without removing the hanging plate, thus speeding the replacement and maintaining the general placement of the collector.

To Install the Hanging Plate

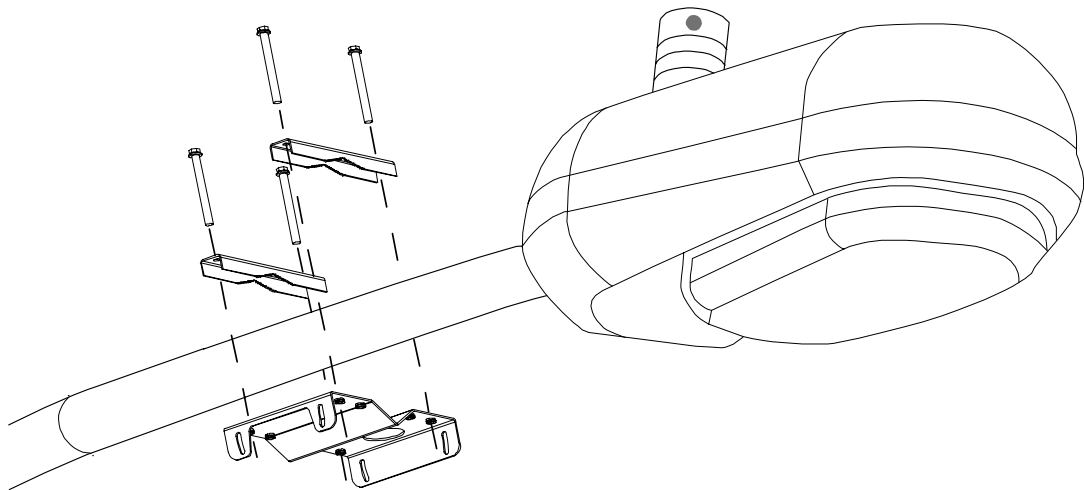
1. Using two of the 1/4-20 x 3-inch hex-head bolts, loosely bolt one end of each bracket onto the hanging plate so that the brackets swing.
2. With one hand, hold the hanging plate against the bottom of the davit at the place you are installing the collector, and with the other hand, swing the unsecured ends of the brackets over the davit.

Note Install the hanging plate at least six inches from the light fixture to ensure the light cover can open when the bulb is changed.

3. While still holding the hanging plate in place, insert the two remaining bolts through the unsecured ends of the brackets and into the hanging plate.
4. Tighten all four bolts with your fingers until the plate stays in place.
5. Moving in a cross (X) pattern, torque all four bolts to between 50- and 60-inch pounds.

Caution To achieve the clamping force needed to withstand 100 MPH winds, torque the four hex-head bolts to the specification listed. If the bolts are under-torqued, the necessary clamping force may not be achieved, and if they are over torqued, the brackets can become over-stressed, which may also reduce clamping force.

Figure 5: Installing the Hanging Plate on the Light Pole Davit



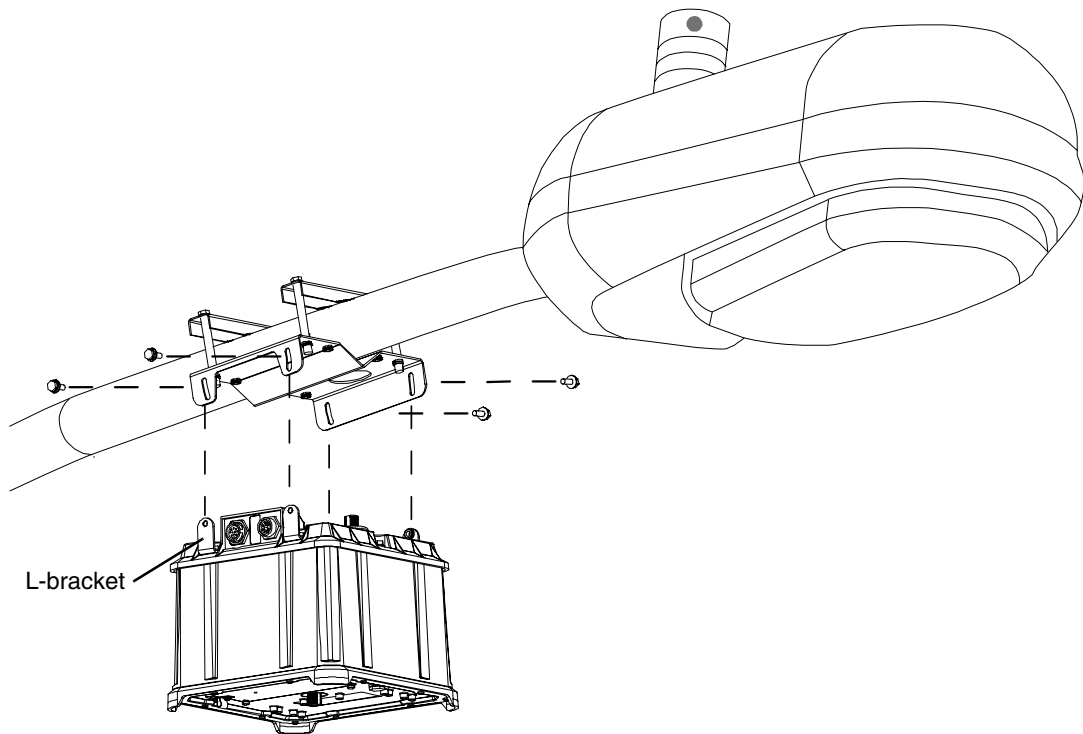
Attaching the Collector to the Hanging Plate

The collector attaches to the hanging plate with four bolts inserted through the slots in the plate and into holes in four L-brackets on the collector. You can adjust the collector so the RF antenna is plumb by sliding the bolts up and down in the slots and tightening the bolts when the antenna is perpendicular to the horizon.

To Attach the Collector to the Hanging Plate

1. With one hand, hold the collector below the hanging plate and align the L-bracket holes on the unit with the slots on the hanging plate.
2. Insert each of the four 1/4-20 x 3/4-inch hex-head bolts through a slot and into an L-bracket hole.
3. Tighten the bolts just enough that the unit hangs from the plate but is still loose enough that you can slide it up and down in the slots.

Figure 6: Attaching the Collector to the Hanging Plate



4. To adjust the unit for plumb, place the bubble-level tool on a flat surface of the collector and, with one hand, tilt the unit until the bubble in the leveling tool is away from the wall. It is not necessary to center the bubble in the circle.



Note If you do not have a bubble-level, adjust the unit so that the bottom is parallel with the ground. This ensures the antenna is plumb (perpendicular to the ground, pointing down) when you attach it in the next procedure.

5. With the other hand, move in a cross (X) pattern and torque all four bolts to between 50- and 60-inch pounds.

Caution To achieve the clamping force needed to withstand 100 MPH winds, torque the four hex-head bolts to the specification listed. If the bolts are under-torqued, the necessary clamping force may not be achieved, and if they are over torqued, the brackets can become over-stressed, which could also reduce clamping force.

Attaching the RF Antenna

Both the POTS version and the CDPD version of the collector have an RF antenna that attaches to the collector bottom. The CDPD version has a second antenna that attaches to the collector top. You will install the CDPD antenna in the next procedure if you are installing that version of the collector.

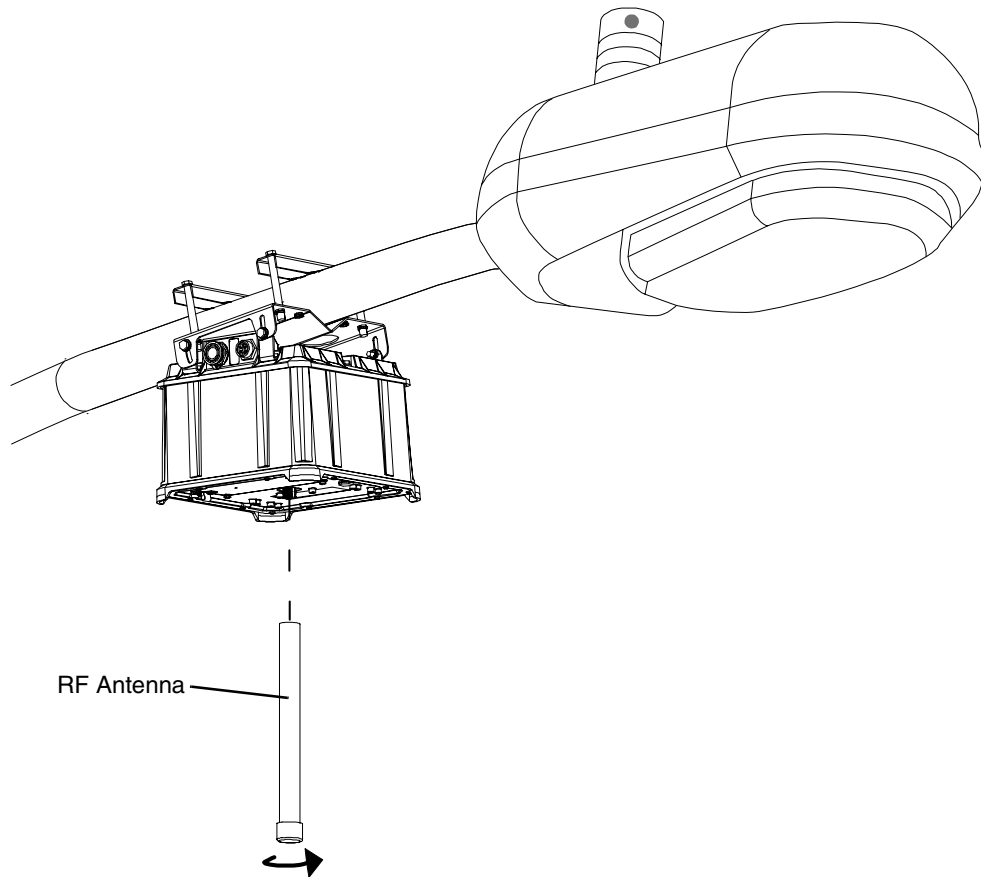
Caution The two antennas differ in appearance and function. You can distinguish the CDPD antenna from the RF antenna by the two additional knobs on the base of the CDPD antenna. Installing an antenna in the wrong place may damage the collector and will cause it to fail to work as intended.

To Attach the RF Antenna

1. Align the RF antenna with the N-connector on the bottom of the unit.

2. Press the antenna onto the connector and turn the antenna clockwise until it no longer turns and is firmly in place.

Figure 7: Attaching the RF Antenna



Connecting the Means of Transmitting to the Headend

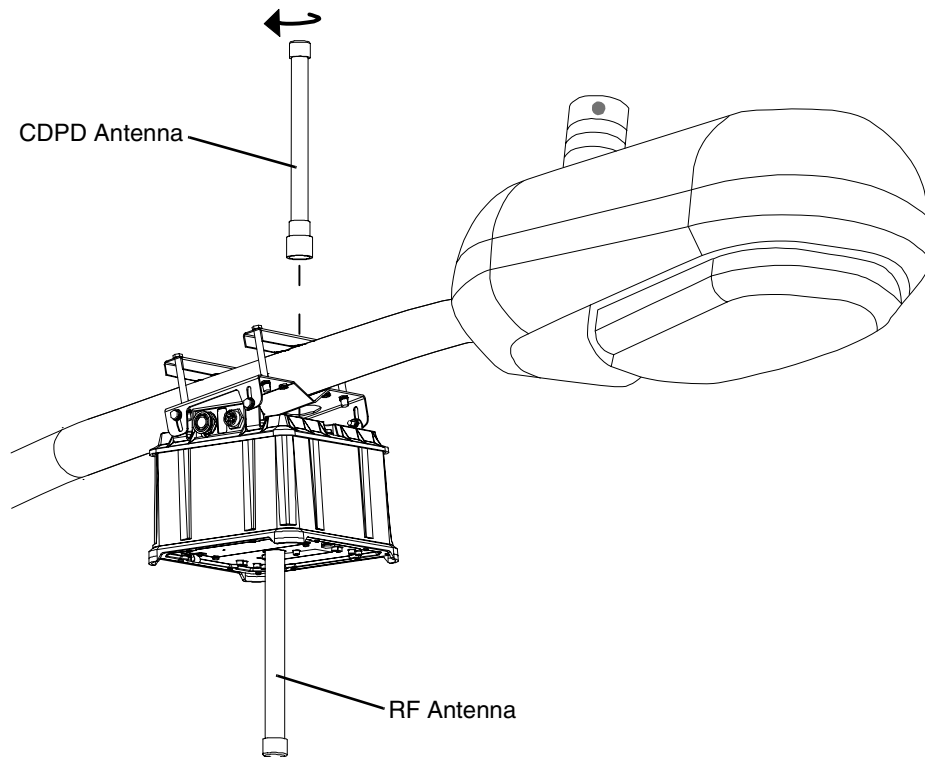
If you are installing the CDPD version, you must attach the CDPD antenna. If you are installing the POTS version, you must connect one end of the POTS cable to the communications connector on the collector and connect the other end to the POTS line nearest the pole.

To Attach the CDPD Antenna

1. Insert the antenna through the hole in the top of the hanging plate and align it with the N-connector on top of the unit.

2. Press the antenna onto the connector, and turn the antenna clockwise until it no longer turns and is firmly in place.

Figure 8: Attaching the CDPD Antenna



To Connect the POTS Cable

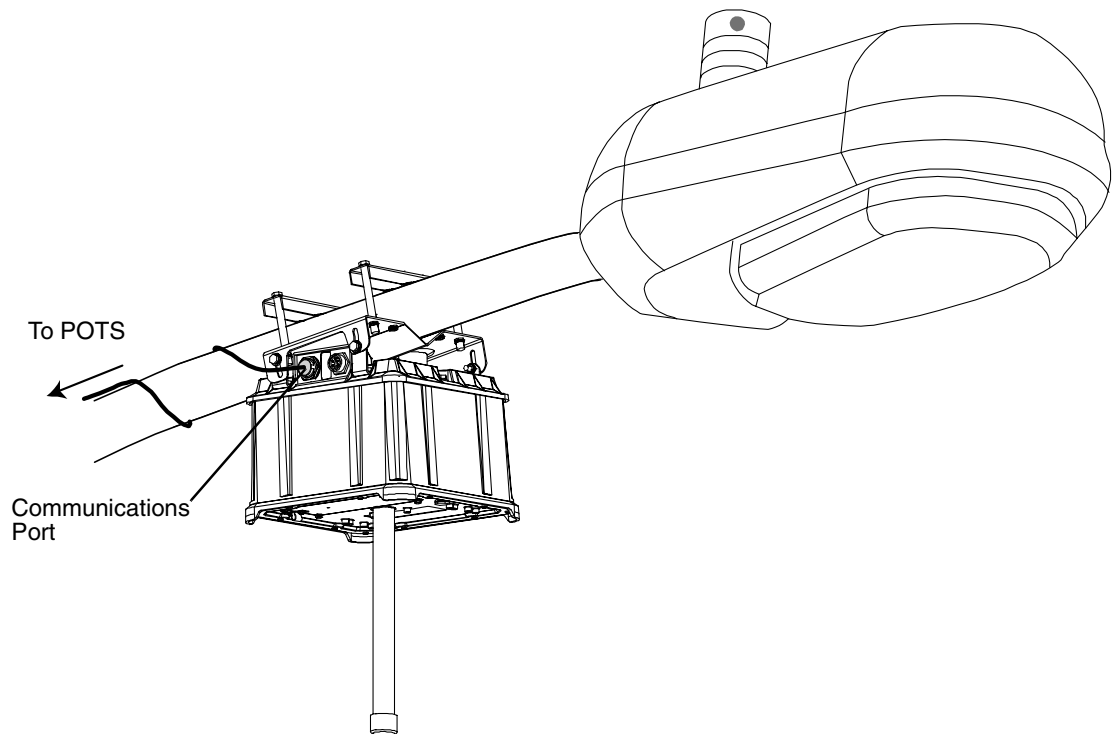
1. Determine the distance from the collector to the POTS port.
2. Cut the cable to the appropriate length, leaving enough cable for routing and slack.
3. Hard-wire the unterminated end of the cable to the POTS port. Refer to the table below to identify each wire.

Table 4: POTS Cable Wire Colors and Signal Names

Wire Color	Signal Name
Green	Tip
Red	Ring
Black	Ground
Yellow	no connection

4. Run the other end of the cable to the communication port on the CCU4 collector. Wrap any excess cable around the davit or use tie wraps (not included) to secure the cable.
5. Connect the cable to the communications port on the collector.

Figure 9: Connecting the POTS Cable



Installing the Battery Pack

The battery pack ships uninstalled in the same container as the collector. If the collector was configured at the depot, the battery pack may be stored in the battery compartment for transport.

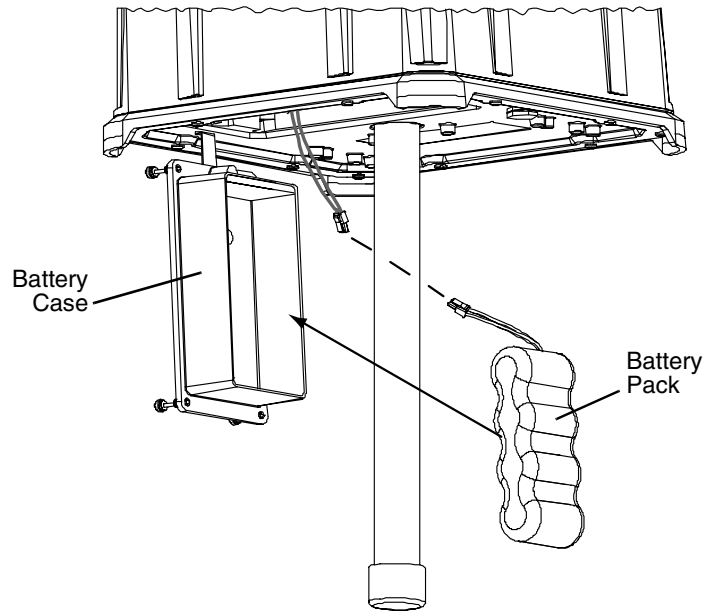
Caution Do not connect the battery pack to the collector until the collector is in place on the pole. If you connect the battery pack prior to installation, the collector may record erroneous data and the battery pack may completely lose power.

To Install the Battery Pack

1. Using a flathead screwdriver, loosen the four captive-screws holding the battery case in place.
2. Pull out the battery case.
The strap keeps the case connected to the bottom of the collector.
3. Connect the battery pack to the connector inside the battery compartment.
4. Place the battery pack inside the battery case and insert the case into the battery compartment.

5. While pressing the battery case into the battery compartment, finger-tighten the four captive-screws until the battery case is held in place.
6. Using the flathead screwdriver, tighten the four captive-screws until the battery case is firmly in place.

Figure 10: Installing the Battery Pack



Supplying Power to the Collector

Once the collector is installed on the davit, you must supply it with power either from the photoelectric sensor of the street lamp or from the secondary power wires of the wood pole.

Connecting the Collector to the Photoelectric Sensor

To power the collector when installing it on a light pole, you must remove the photoelectric sensor, insert the power adapter end of the power cable into the socket, and replace the photoelectric sensor.

To Connect the Collector to the Photoelectric Sensor

1. Verify power is available by using a voltmeter or AC circuit tester on the street lamp.

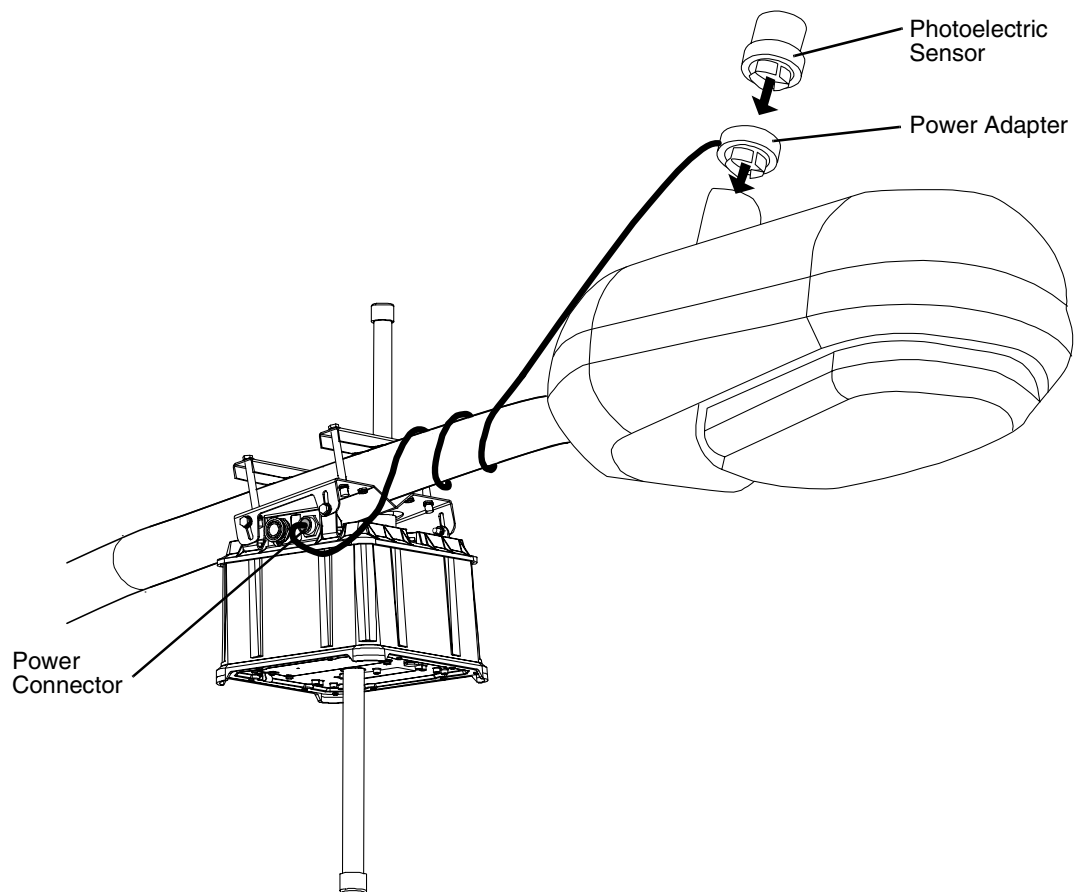
Note Before removing the photoelectric sensor, note the current orientation of the sensor window. You must restore the sensor window to the same orientation (usually north) when finished.

If you do not have a voltmeter or AC circuit tester, verify power by placing your hand over the photoelectric sensor window.

If power is available, the lamp lights after a brief delay.

2. If you did not already do so to verify power, remove the photoelectric sensor, and insert the power cable plug adapter into the socket.
3. Replace the photoelectric sensor, taking care to restore the sensor window to its original orientation.
4. Wrap any excess cable around the davit or use tie-wraps (not included) to secure the cable away from the unit.
5. Connect the other end of the power cable to the 5-pin power connector on the collector.
6. Verify the streetlight still works by covering the photoelectric sensor window with your hand.

Figure 11: Connecting the Collector to the Photoelectric Sensor



Connecting the Collector to the Secondary Power Wires

To power the collector when installing it on a wood pole, you must strip the power cable with wire strippers and connect the individual wires to the 120V and neutral wires on the pole. You do not need to connect the power cable to earth ground because the collector housing is sealed and plastic, and all electrical connections from the collector are fully isolated.

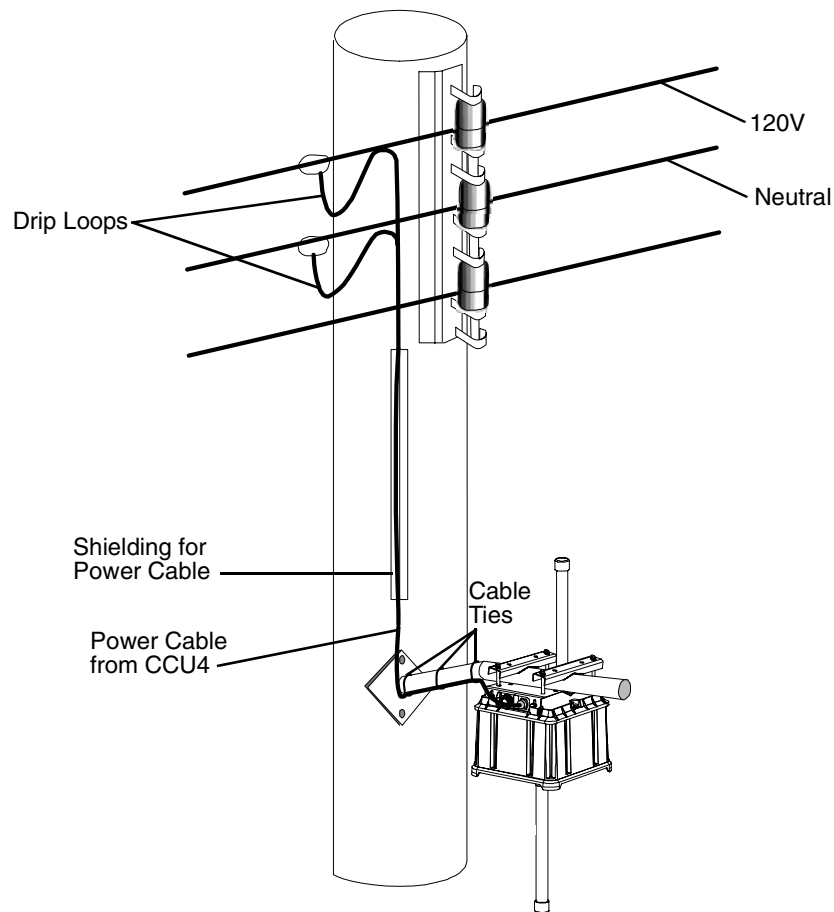
To Connect the Collector to the Secondary Power Wires

1. At the power line, connect the unterminated end of the cable to the power source on the pole, as shown below. Consult the following table for definitions of the wires in the AC power cable.

Table 5: AC Power Cable Wire Definitions

Wire	Description	Pin #
Black	Line side	5
White	Neutral	1

Figure 12: Connecting the Collector to the Secondary Power Wires



2. Wrap any excess cable around the davit or use tie-wraps (not included) to secure the cable away from the unit.
3. Connect the other end of the power cable to the 5-pin power connector on the collector.

Verifying the Collector is Operational

Once the collector is installed and receiving power, it should appear onscreen at the headend. To verify the collector is receiving power and the software is operating correctly, you must call the headend and give the administrator the IP address and the number of the collector. If the administrator identifies the collector onscreen, the installation is complete.

To Verify the Collector is Operational

1. Call the headend.
2. Give the administrator the ID number of the collector and its IP address.
3. Wait for the administrator to identify the collector onscreen.
 - If the administrator sees the collector, the installation is complete.
 - If the administrator does not see the collector, proceed to the troubleshooting section of this manual.

Chapter 4

Servicing the CCU4 Collector

Field Replaceable Parts

The following maintenance procedures are the only ones you can perform in the field:

- Replace an antenna
- Replace the battery pack
- Replace the collector

Each procedure is described on the following pages.

Replacing an Antenna

The POTS modem version has only one antenna, the RF antenna that attaches to the collector bottom. The CDPD modem version has two antennas: the RF antenna on the bottom of the collector and the CDPD antenna on the top.

Caution The two antennas differ in appearance and function. You can distinguish the CDPD antenna from the RF antenna by the two additional knobs on the base of the CDPD antenna. Be sure the new antenna is the same type as the one you are replacing. Installing an antenna in the wrong place may damage the collector and will cause it to fail to work as intended. Consult the following illustration to identify each antenna.

Required Hardware and Tools

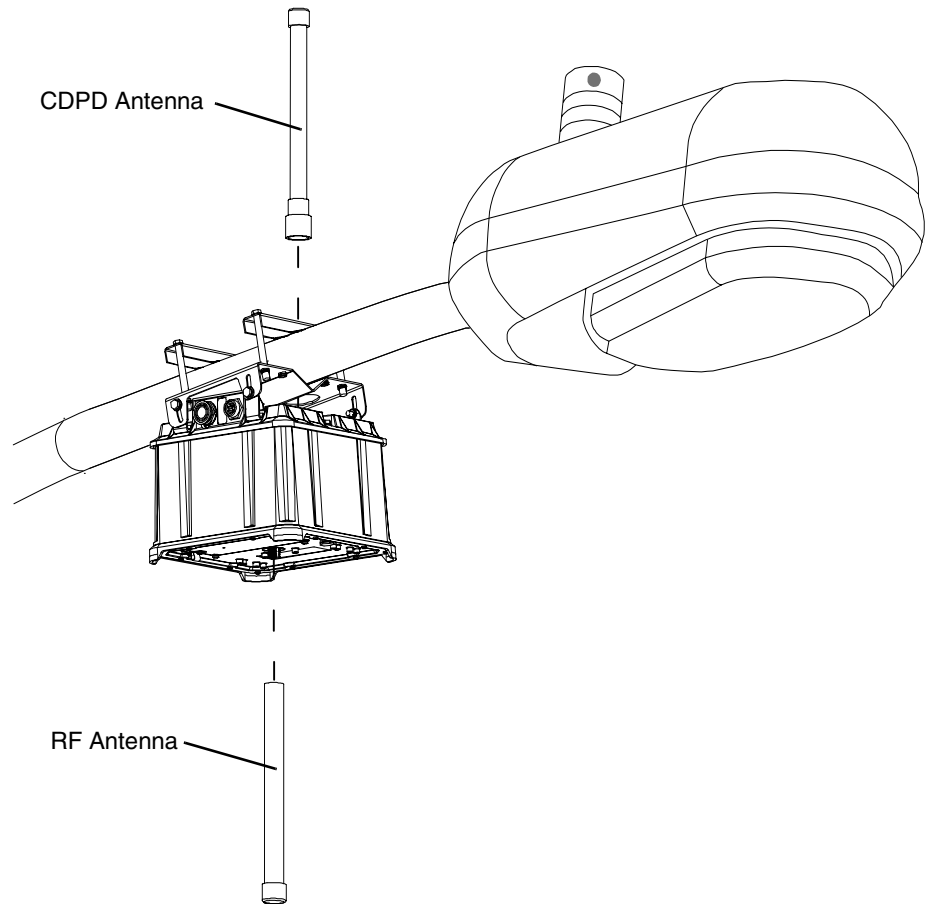
You do not need special tools to replace an antenna.

To Replace an Antenna

1. Turn the antenna counter-clockwise and unscrew it from the N-connector on the collector.
2. Align the new antenna with the N-connector.

3. Press the antenna onto the connector while turning the antenna clockwise until it no longer turns and is firmly in place.

Figure 13: RF and CDPD Antennas



Replacing the Battery Pack

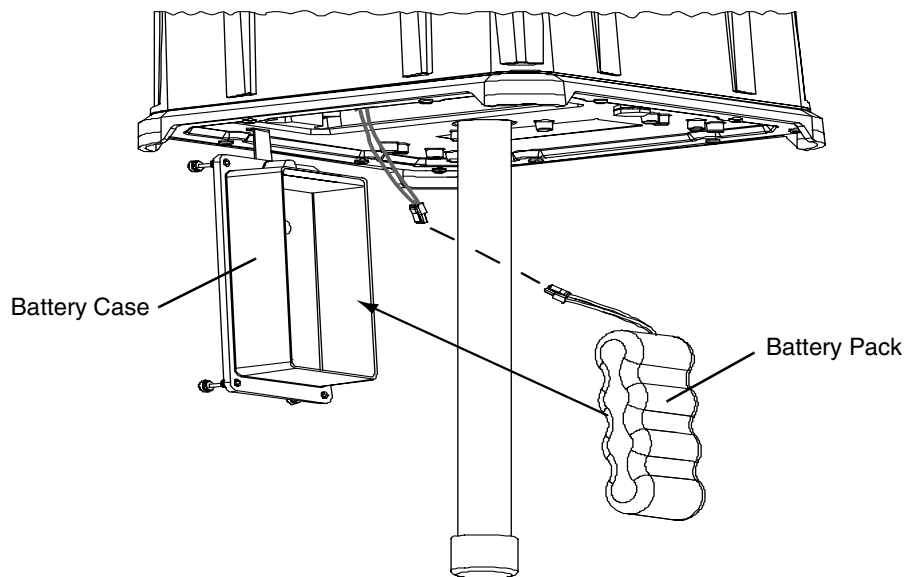
The power supply connected to the CCU4 collector charges the battery pack. The battery pack can power the collector for 4 hours after power is lost and should be replaced every 5 years. Once the new battery pack is installed, it must charge for 16 hours before it is fully powered.

Required Hardware and Tools

You need a flathead screwdriver to replace the battery pack.

To Replace the Battery Pack

1. Using a flathead screwdriver, loosen the four captive-screws holding the battery case in place.
2. Pull out the battery case.
The strap keeps the case connected to the bottom of the collector.
3. Disconnect the battery pack from the connector inside the battery compartment, and set the old battery pack aside.
4. Connect the new battery pack to the connector inside the battery compartment.
5. Place the battery pack inside the battery case and insert the case into the battery compartment.



6. While pressing the battery case into the battery compartment, finger-tighten the four captive-screws until the battery case is held in place.
7. Using the flathead screwdriver, tighten the four captive-screws until the battery case is firmly in place.
8. Recycle the old battery pack per office standards and local regulations.

Replacing the Collector

Required Tools

You need the following tools to replace the CCU4 collector:

- 7/16-inch nut driver, wrench, or ratchet-wrench
- Inch-pound torque wrench with 7/16-inch socket
- Flathead screwdriver
- Itron Bubble-level

Installation Procedure Summary

You must perform the following procedures to replace a CCU4 collector:

1. Remove the current collector.
2. Attach the new collector to the hanging plate.
3. Attach the RF antenna.
4. Reconnect the means of transmitting to the headend.
5. Install the battery pack.
6. Reconnect the power cable.
7. Verify the new collector is operational.

Removing the Current Collector

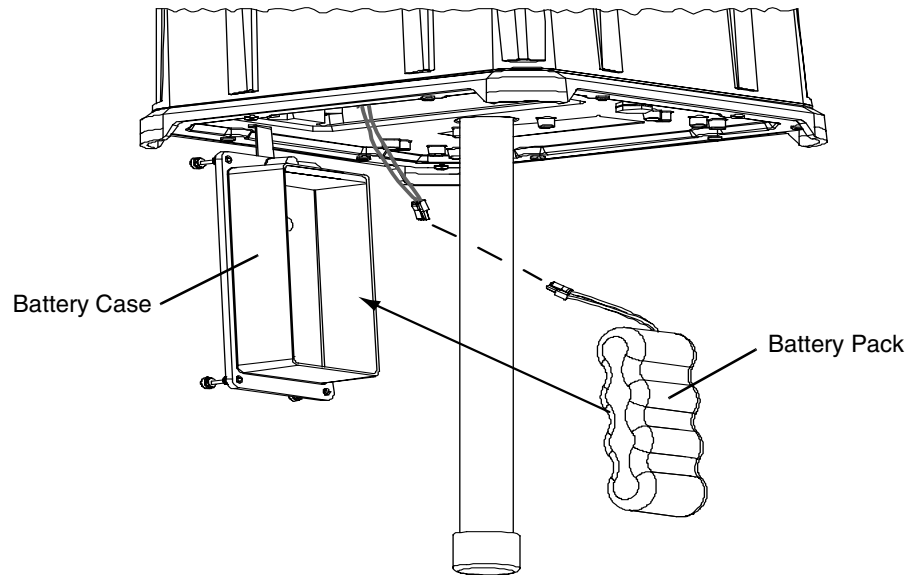
Because the collector attaches to the hanging plate, rather than directly to the davit, removing a collector is much simpler than installing one. To physically remove the collector, you need only remove the four bolts inserted through the L-brackets of the collector.

However, before actually removing the collector from the hanging plate, you must disconnect the battery and the power cable, remove the RF antenna, and remove the means of communicating with the headend. This last process involves either disconnecting the POTS cable or removing the CDPD antenna, depending on the version of the collector you are removing.

To Remove the Current Collector

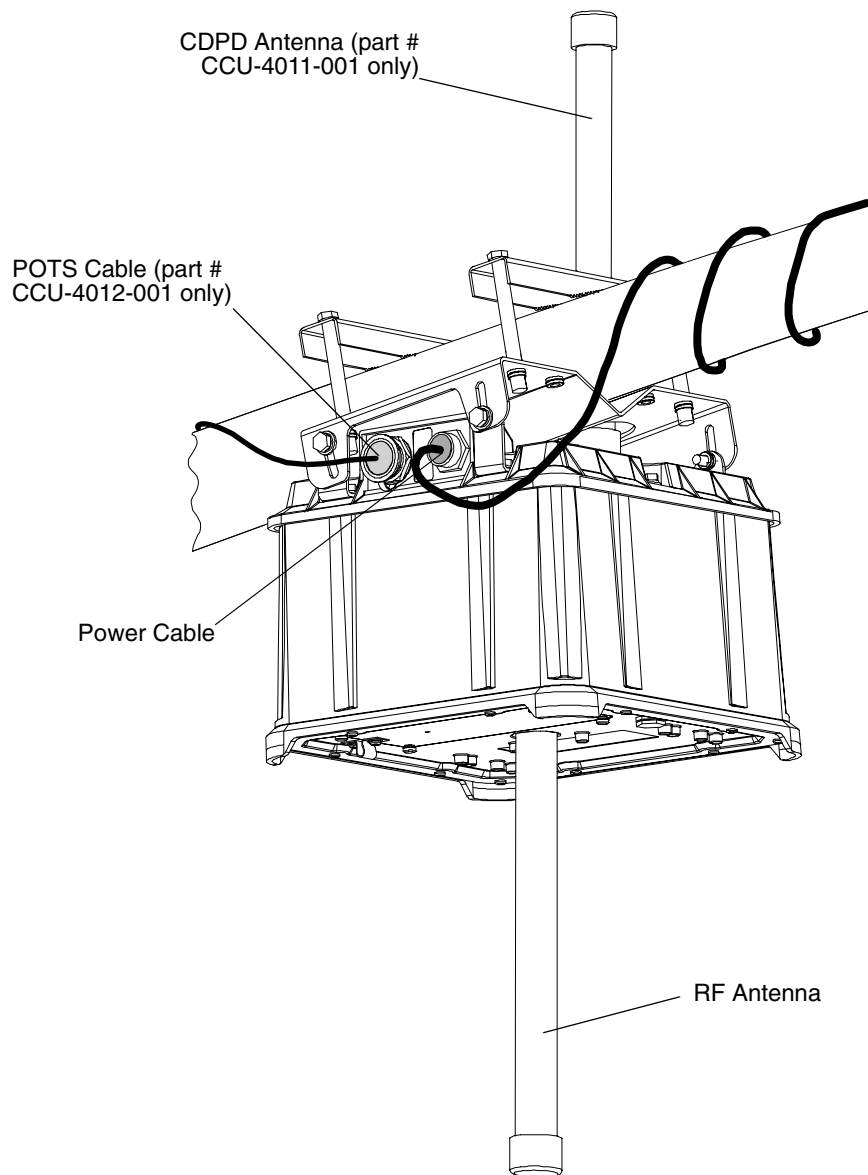
1. Using a flathead screwdriver, loosen the four captive-screws holding the battery case in place.
2. Pull out the battery case.
The strap keeps the case connected to the bottom of the collector.
3. Disconnect the battery pack from the connector inside the battery compartment.
4. Place the battery pack back inside the battery case and insert the case into the battery compartment.
5. While pressing the battery case into the battery compartment, finger-tighten the four captive-screws until the battery case is held in place.

- Using the flathead screwdriver, tighten the four captive-screws until the battery case is firmly in place.



- Disconnect the power cable from the 5-pin power connector on the collector.
- Turn the RF antenna on the bottom of the collector counter-clockwise, and unscrew it from the N-connector.
- Remove the means of communicating with the headend. This depends on which version of the collector you are removing.
 - If you are removing the POTS version (part # CCU-4012-001), disconnect the POTS cable from the communications port on the collector.

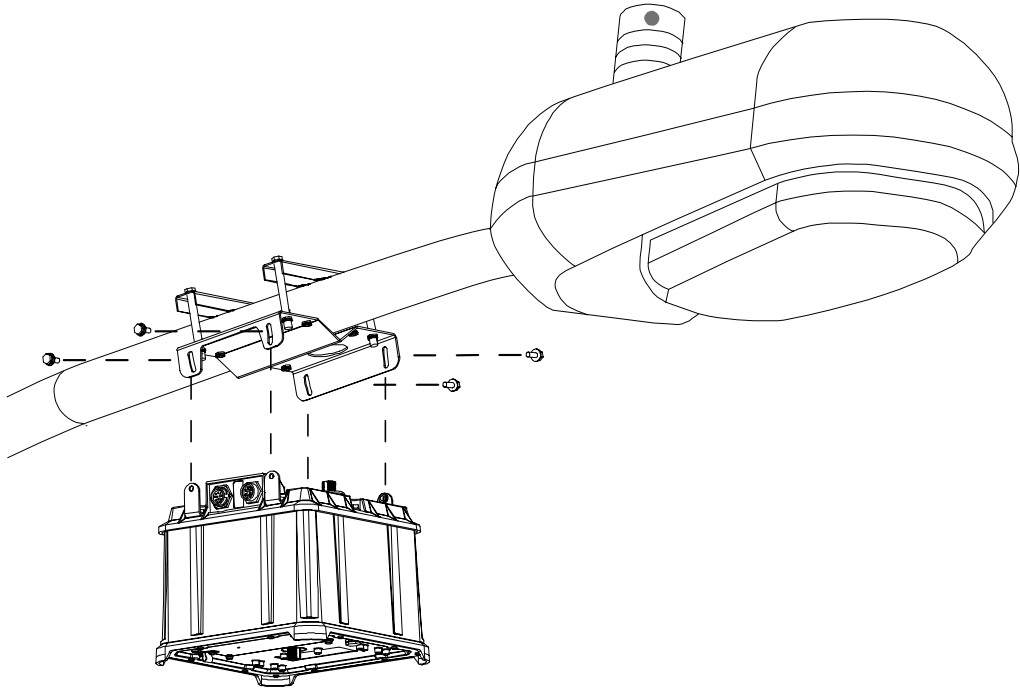
- If you are removing the CDPD version (part # CCU-4011-001), turn the CDPD antenna on top of the collector counter-clockwise, and unscrew it from the N-connector.



10. With one hand, hold the bottom of the collector.
11. With the other hand, use a 7/16-inch nut driver, wrench, or ratchet-wrench to remove the four bolts holding the collector to the hanging plate.

12. Lower the collector down and away from the hanging plate, and set it aside.

Figure 14: Collector Shown Detached from Hanging Plate



Attaching the New Collector to the Hanging Plate

To Attach the New Collector to the Hanging Plate

1. With one hand, hold the collector below the hanging plate and align the L-bracket holes on the unit with the slots on the hanging plate.
2. Insert each of the four 1/4-20 x 3/4-inch hex-head bolts through a slot and into an L-bracket hole.
3. Tighten the bolts just enough that the unit hangs from the plate but is still loose enough that you can slide it up and down in the slots.

- To adjust the unit for plumb, place the bubble-level tool on a flat surface of the collector and, with one hand, tilt the unit until the bubble in the leveling tool is away from the wall. It is not necessary to center the bubble in the circle.



Note If you do not have a bubble-level, adjust the unit so that the bottom is parallel with the ground. This ensures the antenna is plumb (perpendicular to the ground, pointing down) when you attach it in the next procedure.

- With the other hand, move in a cross (X) pattern and torque all four bolts to between 50- and 60-inch pounds.

Caution To achieve the clamping force needed to withstand 100 MPH winds, torque the four hex-head bolts to the specification listed. If the bolts are under-torqued, the necessary clamping force may not be achieved, and if they are over torqued, the brackets can become over-stressed, which could also reduce clamping force.

Attaching the RF Antenna to the New Collector

Both the POTS version and the CDPD version of the collector have an RF antenna that attaches to the collector bottom. The CDPD version has a second antenna that attaches to the collector top. You will install the CDPD antenna in the next procedure if you are installing that version of the collector.

Caution The two antennas differ in appearance and function. You can distinguish the CDPD antenna from the RF antenna by the two additional knobs on the base of the CDPD antenna. Installing an antenna in the wrong place may damage the collector and will cause it to fail to work as intended.

To Attach the RF Antenna to the New Collector

- Align the RF antenna with the N-connector on the bottom of the unit.
- Press the antenna onto the connector and turn the antenna clockwise until it no longer turns and is firmly in place.

Reconnecting the Means of Transmitting to the Headend

If you are installing the CDPD modem version (part # CCU-4011-001), you must attach the CDPD antenna. If you are installing the POTS modem version (part # CCU-4012-001), you must reconnect the POTS cable.

To Attach the CDPD Antenna to the New Collector

1. Insert the antenna through the hole in the top of the hanging plate and align it with the N-connector on top of the unit.
2. Press the antenna onto the connector, and turn the antenna clockwise until it no longer turns and is firmly in place.

To Reconnect the POTS Cable

1. Press the cable connector onto the communications port and seat it tightly in place.

Installing the Battery Pack in the New Collector

The battery pack ships uninstalled in the same container as the collector. If the collector was configured at the depot, the battery pack may be stored in the battery compartment for transport.

Caution Do not connect the battery pack to the collector until the collector is in place on the pole. If you connect the battery pack prior to installation, the collector may record erroneous data and the battery pack may completely lose power.

To Install the Battery Pack in the New Collector

1. Using a flathead screwdriver, loosen the four captive-screws holding the battery case in place.
2. Pull out the battery case.
The strap keeps the case connected to the bottom of the collector.
3. Connect the battery pack to the connector inside the battery compartment.
4. Place the battery pack inside the battery case and insert the case into the battery compartment.
5. While pressing the battery case into the battery compartment, finger-tighten the four captive-screws until the battery case is held in place.
6. Using the flathead screwdriver, tighten the four captive-screws until the battery case is firmly in place.

Reconnecting the Power Cable

To Reconnect the Power Cable

1. Press the power cable connector onto the 5-pin power connector on the collector and seat it tightly in place.

Verifying the New Collector is Operational

Once the collector is installed and receiving power, it should appear onscreen at the headend. To verify the collector is receiving power and the software is operating correctly, you must call the headend and give the administrator the IP address and the number of the collector. If the administrator identifies the collector onscreen, the installation is complete.

To Verify the New Collector is Operational

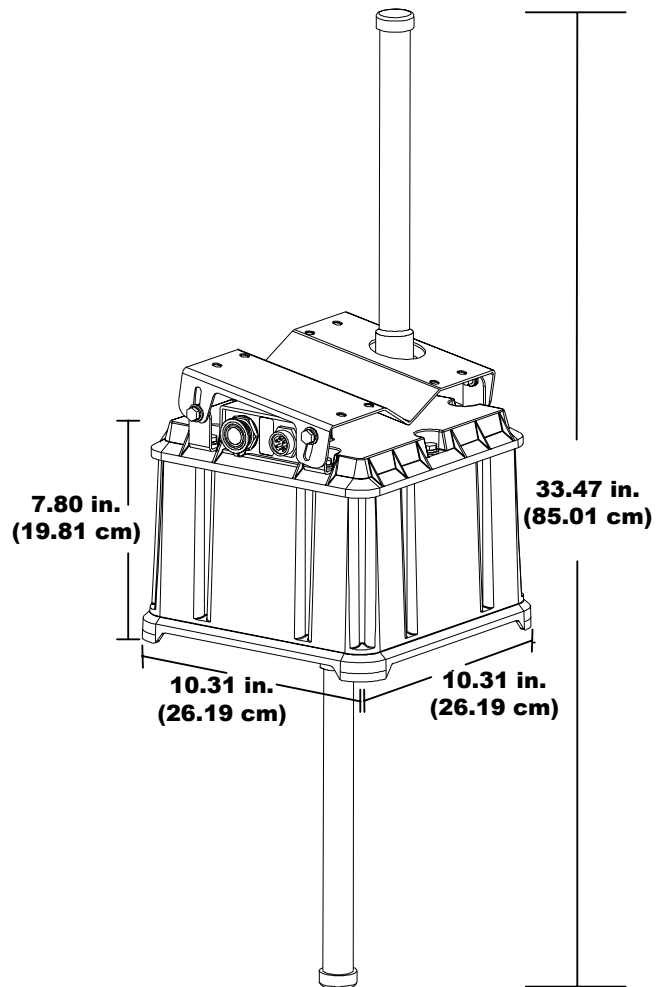
1. Call the headend.
2. Give the administrator the ID number of the collector and its IP address.
3. Wait for the administrator to identify the collector onscreen.
 - If the administrator sees the collector, the installation is complete.
 - If the administrator does not see the collector, proceed to the troubleshooting section of this manual.

Appendix A

CCU4 Collector Specifications

Dimensions and Weight

Figure 15: CCU4 Collector Dimensions



Weight

Environmental

Table 6: Environmental Specifications

Specification	Value
Operating Temperature, component	-40°C to +85°C (-40°F to + 185°F)
Operating Temperature, battery	-20°C to +60°C (-4°F to +140°F)
Storage Temperature	-40°C to +85°C (-40°F to + 185°F)
Humidity	Per MIL Standard 810
Solar Heat Load Exposure	?
UV Stability	?
Mechanical Vibration	Per ANSI Standard C12 Paragraph 4.7.3.20. 5-350 Hz (with a sweep time of one octave per minute at .5 g)
Drop Requirements	?
Salt Spray	Per ANSI Standard C12 Paragraph 4.7.3.23. Pass 25-hour salt spray test in accordance with ASTM B117-85
Rain Tightness	Per ANSI Standard C12 Paragraph 4.7.3.24
Weather Simulation	Test Per ANSI Standard C12 Paragraph 4.7.3.22

Power

AC Power

The CCU4 collector operates on a 120 VAC, 60 Hz supply only. The collector is double insulated and does not require an earth ground connection.

The collector input AC connector is a five position circular 3A/300V connector. Pins 2, 3 and 4 are voided for high voltage line to line clearance. The five position circular connector is mounted on the collector housing, providing a watertight connection point for external power sources.

Table 7: Power Specifications

Specification	Value
Voltage	96-144 VAC
Frequency	60 Hz

Table 7: Power Specifications continued ...

Specification	Value
Input Current	1.0 A _{RMS} Inrush
Power Conversion Efficiency	?
Surge & Transient Immunity	?

Battery

Table 8: Battery Specifications

Specification	Value
Type	Four-cell sealed lead acid battery pack
Power	8.8V, 2.5 Amp hours / 22 WHr
Life	4 hours after 5 years of typical use
Charge Time	16 hrs
Operating Temperature	-20°C to +60°C (-4°F to +140°F)
Storage Temperature	-40°C to + 60°C (-40°F to + 140°F)

Communications Connector

Table 9: Communications Connector Specifications

Specification	Value
Type	10 Base-T
Isolation	> 2000V
Operating Temperature	-40°C to +85°C (-40°F to + 185°F)
Surge / Lightning Immunity	Per Bellcore GR-1089 Intra Building

CDPD Modem

Table 10: CDPD Modem Specifications

Specification	Value
Serial Interface (DTE)	19200 bps
SLIP Interface	RFC1055
AT-Command Interface	Hayes Compatible with PCCA Wireless Extensions
Power Supply Requirements	+5 VDC \pm 5%
Transmitter Power	Nominal 600 mW into 50 Ω
CDPD Transmitting at Maximum Power	3.65W
Current Drain CDPD Mode	Transmit (full power): 850 mA Receive: 220 mA Sleep: 45 mA Deep Sleep: 35 mA

POTS Modem

Table 11: POTS Modem Specifications

Specification	Value
Serial Interface (DTE)	115 kbps
Modem Data Rate	Up to 56Kbps
AT-Command Interface	Hayes Compatible
Power Supply Requirements	+5V DC \pm 5%
Current Drain Mode	Sleep: ? Run: ?
Surge Immunity	FCC Part 68 Bellcore TR-NWT- 001089

POTS Cable

Table 12: POTS Cable Wire Specifications

Wire Color	Signal Name
Green	Tip
Red	Ring
Black	Ground
Yellow	no connection

Receiver

Table 13: Receiver Specifications

Specification	Value
Control Interface	Serial (TTL levels) 38400 bps
Command Interface	Custom Itron API
Power Supply Requirements	+5.5 VDC \pm 5%, +3.6 VDC
Current Drain	Sleep: < 5 mA Receive: ?
Operating Frequency	910 MHz – 920 MHz
Sensitivity (50% packets)	-112 dBm
Dynamic Range	Without Attenuation: 55 dB With Attenuation: 83 dB
Out-of-Band Rejection	< 825 MHz: ? dB < 890 MHz: ? dB > 952 MHz: ? dB > 1000 MHz: ? dB

Transmitter

Table 14: Transmitter Specifications

Specification	Value
Control Interface	Serial (I2C)
Command Interface	Custom Itron API
Power Supply Requirements	+5.5 VDC \pm 5%, +8V to +10 VDC (PA)
Transmit Power at Antenna	Up to +36 dBm (4.0W)
Current Drain	Transmit: ? Sleep: < 5 mA

Agency Approvals

- FCC Part 15, Class B
- FCC Part 94 (900 MHz communication)
- Canadian DOC



Appendix B
Troubleshooting

Index

C

Conventions [xiii](#)

