



DRAFT

Ampt Communications Unit Installation Manual

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Important Safety Information

Warnings

A warning identifies a hazard to equipment or personnel. It calls attention to a procedure or practice, which, if not correctly performed, could result in damage to or destruction of part or all of the Ampt equipment and/or other equipment connected to the Ampt equipment or personal injury.

The following boxes are used to alert you to important safety information.



Warning:

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.



Caution:

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.



Notice:

Indicates a situation that can result in property damage if not avoided.



Note:

This symbol accompanies notes that call attention to supplementary information that you should know and use to ensure optimal operation of the Ampt system.

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Chapter 1:

Introduction

General Description

The Ampt communications unit (Ampt-CU) provides wireless two-way communication with every Ampt converter

The Ampt-CU links to your SCADA or monitoring system via Modbus to provide highly accurate and synchronous data. This solution eliminates the need for smart combiners which lowers costs.

With Ampt communication, system designers, operators, owners, and financiers gain a level of transparency and predictability unmatched by conventional monitoring solutions.

This improved system planning and decision-making capability lowers PV project risk and increases return on investment.



Specifications

System Layout	
PV block size	Up to 3200 kWp DC
Ampt converters per Ampt-CU	Up to 2000
Example of layout	125 strings x 16 modules/string = 2000 Ampt converters
Maximum radio communications operating range	200 m radius
Data Communications	
Interface with data monitoring system	Modbus / TCP
Connection with data monitoring	Ethernet 10/100 Base T
Interface with Ampt converters	Two-way wireless
Resolution	
Measurement accuracy	Amperage: $\pm 0.25\%$
Reporting rate, typical	5 minutes, 2000 converters
Local data storage	45 day rolling buffer
Electrical	
Power supply	Power over Ethernet (PoE)
Power over Ethernet (PoE)	Class 0, 802.3af Modes A and B, 802.3at Type 1 (RJ-45 connector)
Mechanical	
Enclosure	IP-66
Dimensions	13.82" x 10.54" x 5.35" (35.10 cm x 26.77 cm x 13.59 cm)
Weight	5.6 lbs (2.5 kg)
Ambient temperature, operating	-40 °F to +185 °F (-40 °C to +85 °C)
General	
Compliance	FCC Part 15, class B IEC 60950-1, 61000-6-1, 61000-6-3

Modbus Register Map

Ampt StringView™ records use the SunSpec protocol for device ID and variable record length, enabling site-specific operation. The SunSpec Common Model precedes the map below. Contact Ampt or one of our monitoring partners for more information.

Start offset	Size	Name	Type	R/W	Description
1	1	ID	UInt16	R	Ampt SunSpec Vendor Code 64050
2	1	L	UInt16	R	Variable number of 16 bit registers to follow: 12+N*16
<i>Fixed Block (15)</i>					
3	1	DCA_SF	Int16	R	Current scale factor
4	2	<i>Reserved</i>	-	-	
6	1	DBWh_SF	Int16	R	Energy scale factor
7	1	<i>Reserved</i>	-	-	
8	1	N	UInt16	R	Number of strings
9	6	<i>Reserved</i>	-	-	
<i>Register blocks for string data follow. Repeat block for each string. Two strings are shown as an example.</i>					
15	1	String ID	Int16	R	The string number.
16	2	<i>Reserved</i>	-	-	
18	2	String data timestamp	UInt32	R	The UTC timestamp of the measurements.
20	1	OutDCA	Int16	R	String output current in mA
21	6	<i>Reserved</i>	-	-	
27	2	DCWh	UInt32	R	Daily integrated string output energy
29	2	<i>Reserved</i>	-	-	
31	1	String ID	Int16	R	The string number.
32	2	<i>Reserved</i>	-	-	
34	2	String data timestamp	UInt32	R	The UTC timestamp of the measurements.
36	1	OutDCA	Int16	R	String output current in mA
37	6	<i>Reserved</i>	-	-	
43	2	DCWh	UInt32	R	Daily integrated string output energy
45	2	<i>Reserved</i>	-	-	
<i>Repeat block for additional strings</i>					

Dimensional Drawing

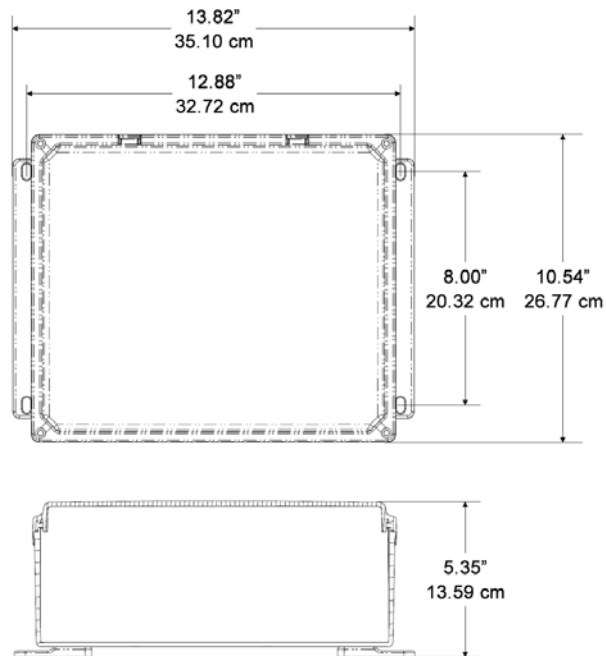


Figure 1: Ampt-CU dimensional drawing

Physical Overview

Labels



Figure 2: Serial number, model number, and MAC address labels

Internal



Figure 3: Interface panel

Component	Description
Ethernet port	RJ-45 connector for Power over Ethernet (PoE) and Ethernet communication.
RS-485 port	Reserved for engineering use
Termination switch	Reserved for engineering use.
Reset button	Pressing this button forces the Ampt-CU to reboot.
Restore button	This button restores the network settings and password back to their factory default values. See <i>Restoring Factory Defaults</i> on page 19 for more detail.
Power LED	This green LED is on continuously when the input voltage is above the minimum threshold.
Com LED	This LED displays boot status.
Fault LED	This red LED communicates fault conditions.
Cable locks	Route the input power and communication cables through these guides.

Understanding the Status LEDs

The Ampt-CU has three status LEDs. When input power is first applied to the Ampt-CU, all LEDs are on continuously for several seconds. Then the Com LED flashes amber while software is booting. Once boot up is complete and the Ampt-CU is operating normally, both the Power and Com LEDs are on solid green.

Name	State	Description
Power	Continuous Green	Input power supply voltage exceeds the minimum threshold.
Com	Flashing Amber	Software is booting up.
	Continuous Green	Boot process is complete.
Fault	Continuous Red	When this LED is on solid red after the boot up process, a fault condition has been detected. Cycle the input power. If this LED is still on after the Com LED finishes flashing (during the boot process), then contact Ampt support.



Chapter 2: Installing the Ampt-CU

This chapter addresses the following topics:

- Installing the Ethernet Cable Feed-through
- Mounting the Enclosure
- Connecting Power Over Ethernet
- Configuring the Field Computer Network Settings
- Restoring Factory Defaults

Installing the Ethernet Cable Feed-through

A liquid-tight wire grip is recommended for the Ethernet cable feed-through. The markings on the bottom of the unit show where to make a hole for the wire grip.



Figure 4: Bottom view of the communication unit

1. Make sure the communication unit is not powered up.
2. Use a drill or punch to create a hole for the wire grip within the marked area.



Notice:

Drilling outside of the designated area may damage internal electronic components.



Figure 5: Drill hole for the wire grip within the marked area

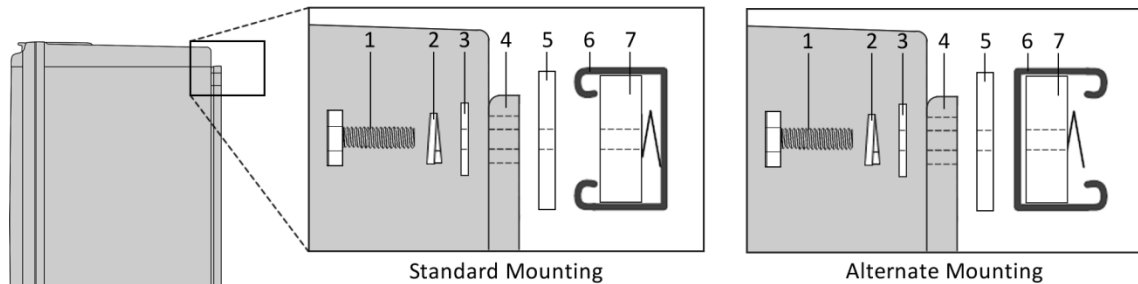
3. Install your wire grip. An example is shown below.



Figure 6: Example of an installed liquid-tight wire grip

Mounting the Enclosure

Connect the hardware as shown in the figure below, or using a similar method, to mount the Ampt-CU enclosure.



Note: Drawing is not to scale 1821 A

Figure 7: Mounting hardware for Ampt-CU



Note:

The 1-5/8" washer (number 5 above) is recommended for strut and uneven mounting surfaces.



Note:

If a vertical pole is used behind the Unistrut, it should be placed near the horizontal center of the Ampt-CU.

ID	Description
1	4 each 1/4-20 x 1.25" 18-8 SS Hex Head Cap Screw (McMaster Carr 92240A544 or equivalent)
2	4 each 1/4 STD split lock washer 18-8 SS (Grainger 1NY97 or equivalent)
3	4 each 1/4 STD flat washer 18-8 SS (Grainger 1NU48 or equivalent)
4	1 each Ampt-CU
5	4 each 1 hole washer, flat plate fitting (1-5/8" series) Unistrut P1062 EG or equivalent (McMaster Carr 3133T11 or equivalent)
6	2 each Unistrut or Kindorf 1-5/8" x 13/16" x 16" galvanized slotted channel
7	4 each 1/4-20 strut spring nut, galvanized (McMaster Carr 3259T17 or equivalent)

Connecting Power over Ethernet

You will need to use a PoE injector that meets the requirements in the *Specifications* section on page 8. The diagram below illustrates the basic installation of a PoE injector; however, be sure to follow the installation instructions that comes with your PoE device.



Caution:
Live voltages may be present on the PoE cables.

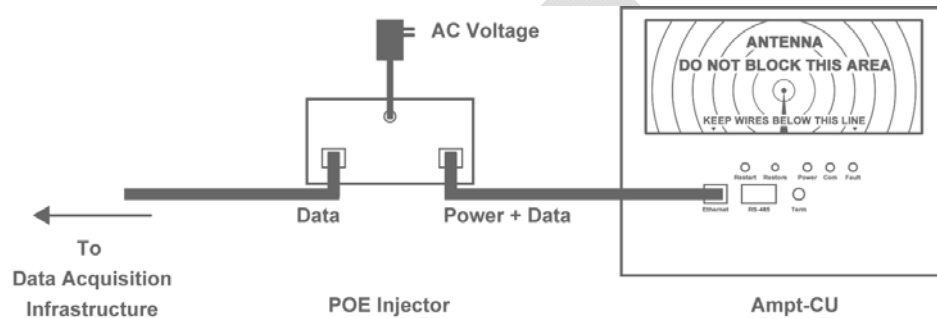


Figure 8: Generic Power over Ethernet (PoE) connection diagram – follow the instructions for your device

1. Route the Ethernet cable through the feed-through and cable locks. An example is shown below.



Figure 9: Ethernet cable routing and connection

2. Connect the cable to the Ethernet port.
3. Twist the ends of the cable locks together to hold the cable in place.



Note:
Keep wires out of the antenna area as noted on the panel.

Configuring the Ampt-CU Network Settings



Note:

Completing the tasks in this section should be completed by a Network Administrator.

Please note the following:

- Default IP address of the field computer is 192.168.1.249
- Web interface to configure the field computer is accessed via port 8080
- Modbus data is accessed via port 502

To configure the Ampt-CU network settings:

1. Configure the TCP/IP settings of your *laptop* to:
 - a. IP Address - 192.168.1.248
 - b. Netmask - 255.255.255.0
2. Ensure the Ampt-CU is powered up. The Power LED should be on and solid green.
3. Connect your laptop to the field computer using the Ethernet ports of each device. If using PoE, the PoE injector must be connected between the laptop and the Ampt-CU.
4. Open your web browser and enter the default IP address (<http://192.168.1.249:8080/>) in the address bar.
5. Complete the fields on the login page
 - a. Login: admin
 - b. Password: password
6. Once logged in, use the menu on the left to:
 - a. Change your password
 - b. Configure network settings
 - c. Set time zone and network time servers
 - d. Manage the layout file
 - e. Setup communications
 - f. Reference the Modbus map
 - g. View string/inverter currents, voltages, power
 - h. Download string data in CSV format - new hardware will not have any data available until it has been online at least a day with a live system.
 - i. Perform a system test
 - j. Enable Ampt support access
 - k. Reboot the system

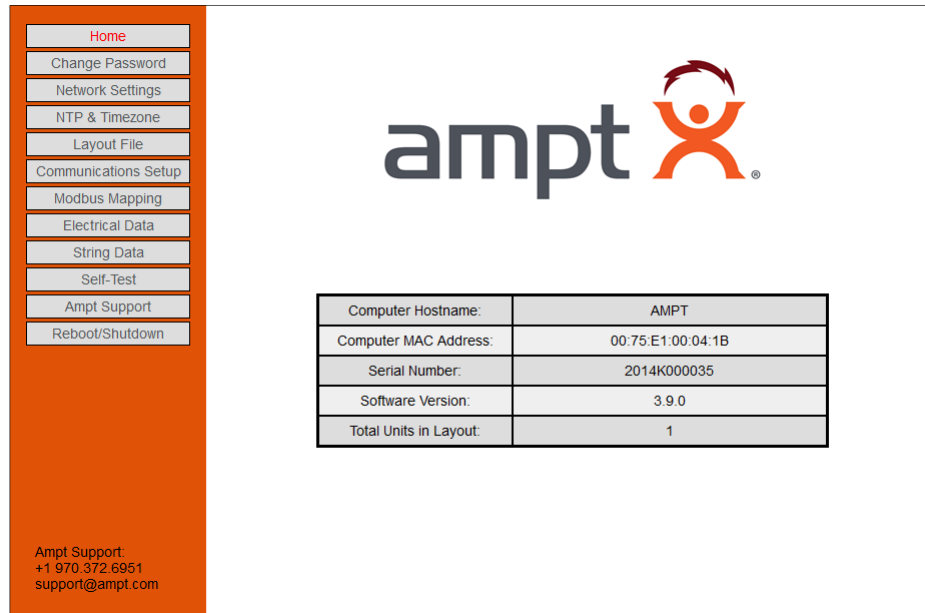


Figure 10: Network Settings Home Screen

7. Follow the onscreen directions for each task.

Restoring Factory Defaults

The network settings and password can be restored to factory default values by pressing and holding the *Restore* button during the boot process. If you are using this feature to restore the password, be sure to record your network settings first. See *Configuring the Ampt-CU Network Settings* on page 18 for more details.

To restore the network settings and password:

1. Press the *Restart* button
2. The LEDs will be on continuously for several seconds.
3. When the *Com* LED flashes, press and hold the *Restore* button until the *Com* and *Fault* LEDs alternate flashing.
4. The network settings and password are restored and the unit automatically reboots.

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Appendix

Compliance

FCC Compliance

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.

This equipment complies with radiation exposure limits set forth for uncontrolled environment. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons.

IMPORTANT! Changes or modifications not expressly approved by Ampt, LLC could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC ID # X3R-31570013

Model Number: 31570013



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