

## WIRELESS SMART POWER MONITOR

### Users Guide

Version 1.0



Wiring Device – Kellems  
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 **CAUTION**

- Read all instructions carefully prior to installation.
- The Power Monitoring Module should only be connected to the type of power source indicated on the label.
- Adhere to voltage and amperage guidelines and utilize a proper branch circuit protector.
- No field-serviceable parts. Do not attempt to disassemble the product as potentially severe electrical shock may result. Installation and maintenance must be performed by qualified personnel.
- Follow basic safety precautions to reduce the risk of electrical shock and damage to equipment.
- Store in a clean, dry location. Clean with a dry cloth.
- Intended for indoor use only, do not install in a wet location.
- Adhere to all local electrical codes and guidelines.
- Failure to use the product in the specified manner may lead to injury or death and damage to equipment.

## Safety summary and specifications

Hubbell assumes no liability for user's failure to comply with these safety guidelines. Please read this manual carefully before proceeding.



**This symbol is used throughout this manual to indicate critical safety information. Failure to observe the information following this symbol may result in injury or death.**

**CAUTION:** This PMM and the area it is installed in may contain life threatening voltages. Qualified personnel must disconnect all high voltage wiring before using or servicing the PMM.

- ⚠ PMM should only be connected to the type of power source indicated on the label.
- ⚠ Do not overload the PMM as this can result in a risk of fire or electrical shock.
- ⚠ PMM should be deployed in conjunction with proper branch circuit over-current protectors.
- The current transformer(s) used with the PMM must be appropriate to the amperage of the circuit(s) on which they will be used.
- Only current transformers approved by Hubbell should be connected to the PMM. Using unapproved current transformers could result in inaccurate readings and damage to the PMM device.
- Current transformers shall provide two means of isolation from hazardous voltages. When selecting a current transformer, the voltage and measurement category of the circuit to be measured must be considered to ensure that the current transformer is adequately insulated and rated. For 240 V circuits, insulation shall be at least 300 V rated.
- Adhere to all local electrical codes and guidelines.
- Prior to installation, check to make sure the PMM has not been damaged.
- Store in a clean, dry location.
- Use indoors only and do not install in a wet location.
- Clean with a dry cloth.
- Following installation in the final product, the connectors on the PMM must be fully enclosed and insulated from the external product enclosure in compliance with all relevant local electrical codes and regulations.
- ⚠ Failure to use the product in the specified manner may lead to injury or death and damage to equipment.



The PMM is a Class 2 electrical device and does not require a safety connection to electrical ground / earth.



The PMM will support three-phase or single-phase power. Please refer carefully to the detailed wiring diagrams below.



Do not apply or remove the current clamps from hazardous live conductors.

## Introduction

### Using this Manual

This manual contains information about the Hubbell Power Monitoring Module (“PMM”) and associated software. The specific PMM model number and associated information is noted on the product label. The manual is divided into sections covering the installation and connection of the PMM, basic software configuration and technical specifications.



## Power Monitoring Module Overview

### Service types

The PMM provides single and three-phase A/C energy consumption and quality monitoring and can monitor all power configurations including single phase line to neutral, line to line, three phase wye and three delta power sources. The PMM is directly connected to the monitored circuit for voltage monitoring and uses external current transformers (CTs) for current monitoring.

### Communication

All data is transmitted wirelessly to a Hubbell Gateway and can be acquired one of two ways:

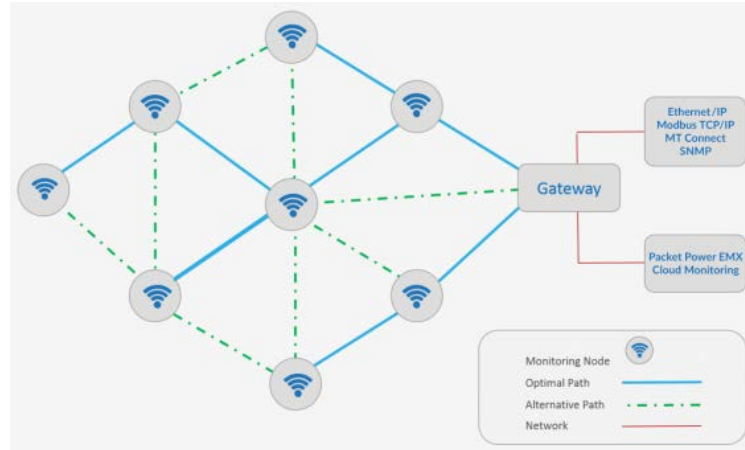
**Third Party Device Data Acquisition:** The Gateway can provide data to third party monitoring systems via SNMP or Modbus TCP/IP protocols.

**Cloud Based Data Acquisition:** Data can be simultaneously exported to any monitoring portal (local or cloud based).

The PMM incorporates Hubbell’s advanced zero-configuration wireless mesh networking technology which automatically connects the PMM to the Gateway when energized.

Each PMM is equipped with a wireless transceiver that is capable of broadcasting directly to the Gateway. If an optimal path is not available from the PMM to the Gateway, the PMM will relay it’s signal through any nearby Hubbell AC powered device (i.e. another PMM) forming a dynamic mesh network and creating an optimal path to the Gateway.

Each Gateway can support up to 150 wireless monitors; Additional Gateways can be added for capacity or redundancy.



## Enclosure

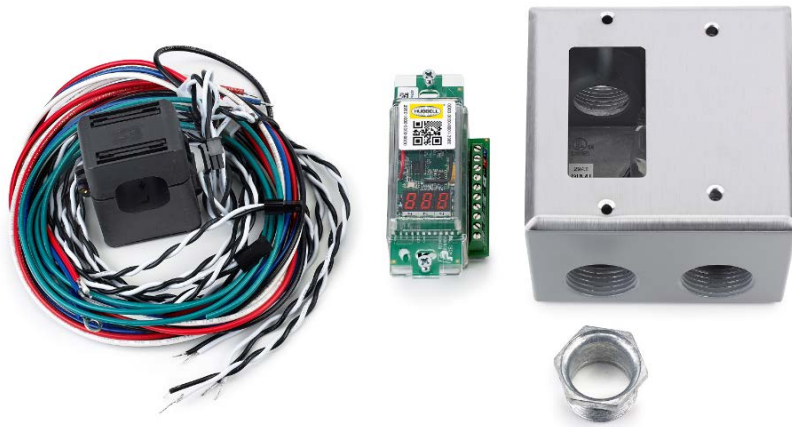
The PMM is supplied as OEM device for installation in third party enclosures as well as with a variety of enclosures.

**OEM Modules:** The PMM OEM module is designed to fit into a variety of standard electrical enclosures. The form factor is designed to allow for placement in standard gang boxes intended for North America switch and receptacle devices. The top cut out pattern conforms to a standard rectangular switch plate cover pattern. Refer to Hubbell for complete module dimensions.

In order to provide a reliable radio connection, the PMM is equipped with an internal radio antenna fully encased within the enclosure. To allow proper radio operation, the PMM must be housed such that the top portion of the unit is not fully enclosed in a metal housing.

## Module Dimensions and Mounting Instructions

The PMM must be housed in an enclosure that prevents access to the terminal strip and wires. The PMM is certified as a UL modular device. The PMM is configured to allow mounting into a standard NEMA gang box using the support fins as shown below.



## Installation

### Safety prerequisites

**!** The PMM should be installed only by qualified technicians with a solid understanding of electrical wiring and devices. Familiarity with and understanding of all terms used in this section is assumed. The user is responsible for ensuring that all electrical connections are safely performed in accordance with all applicable codes and regulations using appropriate tools and materials. The user is responsible for ensuring that all applicable codes and regulations are satisfied.

**!** The PMM requires that a proper, external power disconnect such as switch or circuit breaker be available upstream (on the supply side) from the unit. Power must be disconnected before the unit is installed.

**!** It is recommended that over current protection be used on all voltage sources feeding the PMM.

**!** Current transformers shall provide two means of isolation from hazardous voltages. When selecting a current transformer, the voltage and measurement category of the circuit to be measured must be considered to ensure that the current transformer is adequately insulated and rated. For 480 V circuits, insulation shall be at least 600 V rated. For 240 V circuits, insulation shall be at least 300 V rated.

**!** The PMM is a CAT II/CAT III measurement device. When the device is powered, line voltages may be present on all device terminals, including the C/T terminals IA, IB, and IC. All wiring and C/Ts connected to the device must meet the appropriate CAT II/CAT III standards.

Please note that exact line voltages vary with regions. “120V” is used to denote voltages in the 100-120V range. “208V” and “220V” are used to denote voltages in the 200-240V range.

## Wiring Guide

Before installing the PMM please determine the type of circuit being monitored, including:

1. Circuit type (single phase vs. three phase, Wye vs. Delta)
2. Line voltages. Please be careful not to confuse intra-phase (e.g. L-L) voltage with line-neutral (e.g. L-N) voltage.
3. Line current ratings.
4. Any space considerations that may affect the choice of C/T.

Models *HBLPG003S00010MM*, *HBLPG006S00010MM*

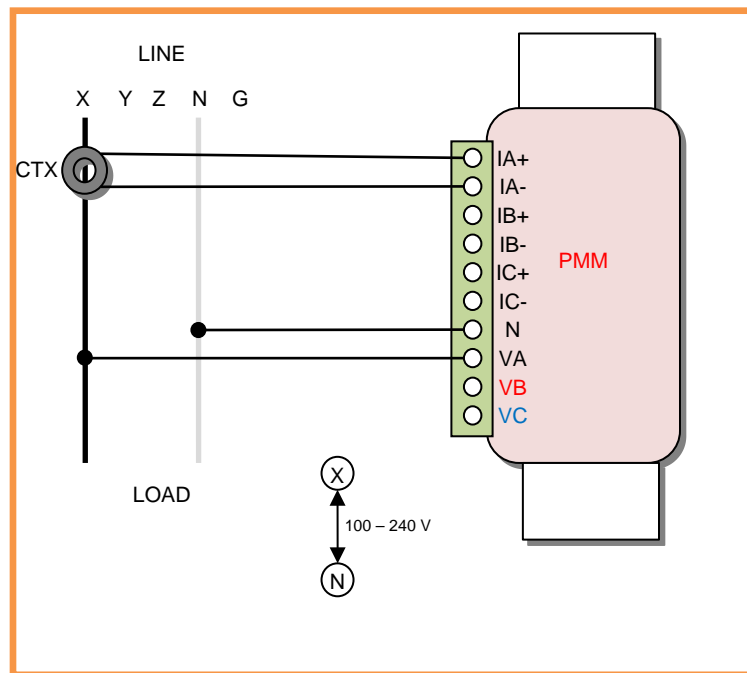


Figure 1. 1Ø L-N Wiring, L1



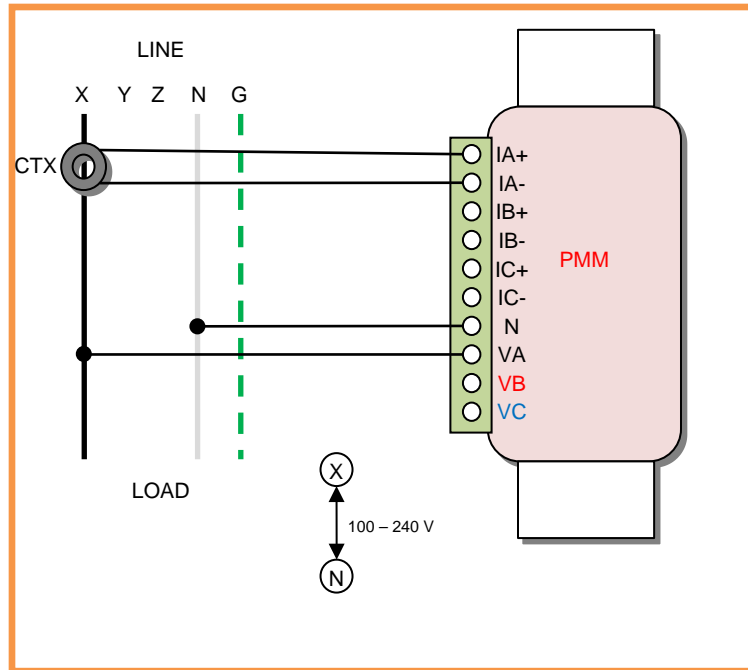


Figure 2. 1Ø L-N Wiring diagram with ground, L1

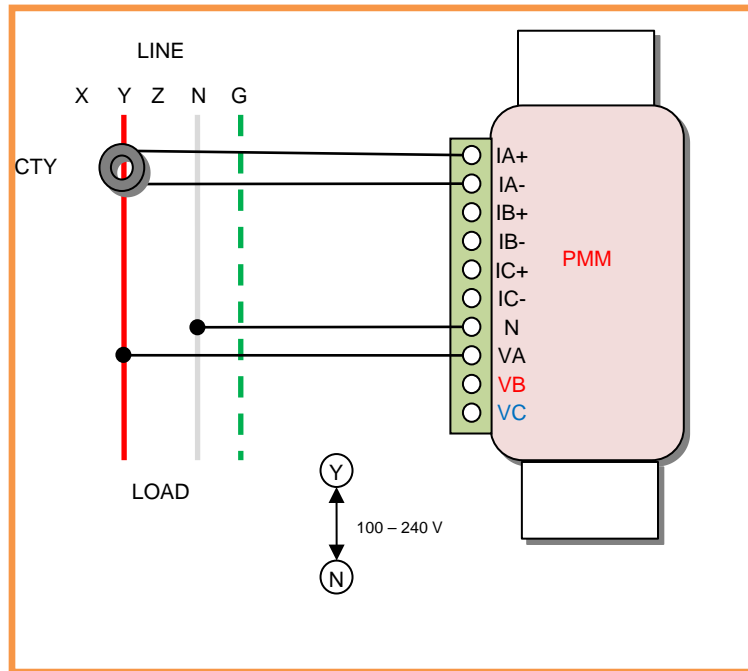


Figure 3. 1Ø L-N Wiring diagram, L2

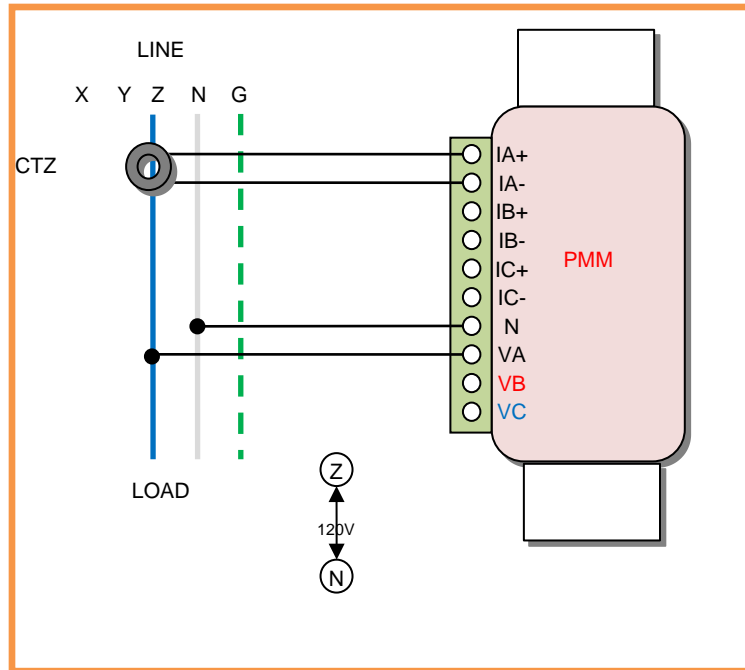


Figure 4. 1Ø L-N Wiring diagram, L3

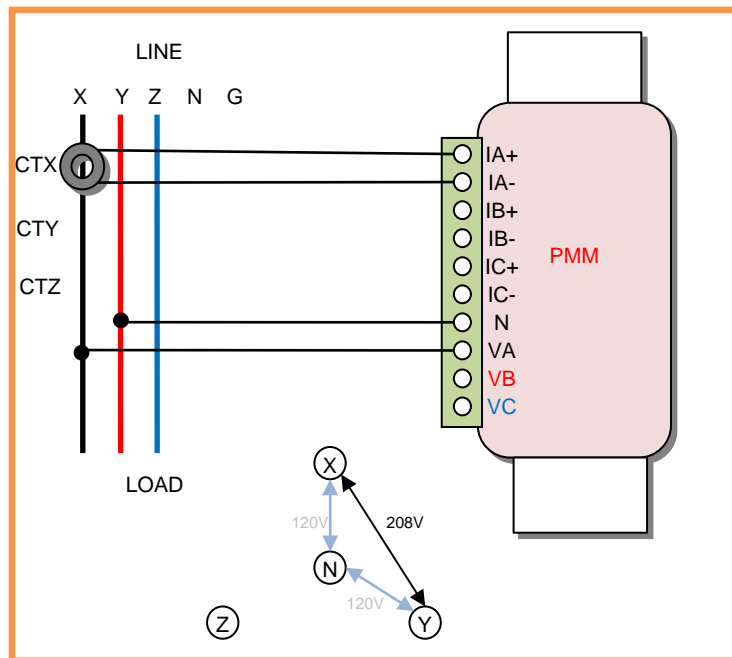


Figure 5. 1Ø 208V L-L wiring diagram, L1-L2 load

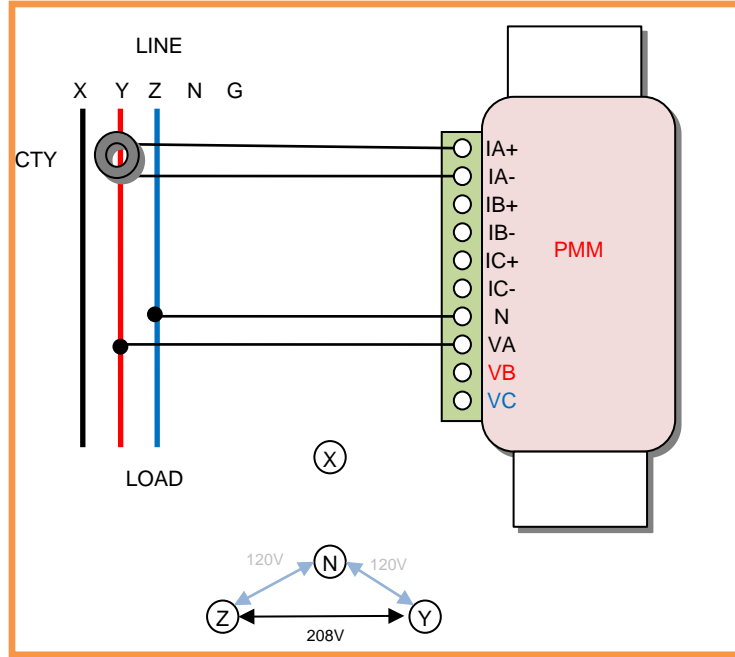


Figure 6. 1Ø 208V L-L wiring diagram, L2-L3 load

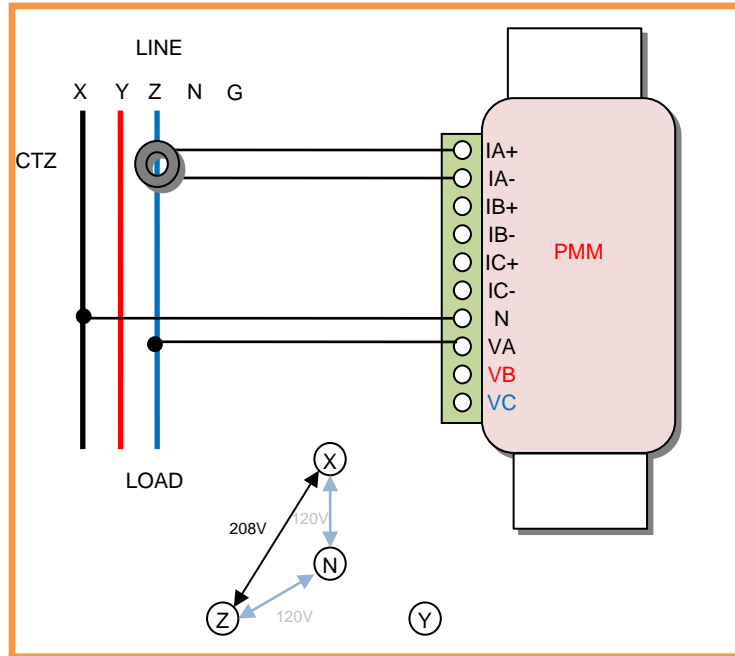


Figure 7. 1Ø 208V L-L wiring diagram, L1-L3 load

Models HBLPG020Y00024MM

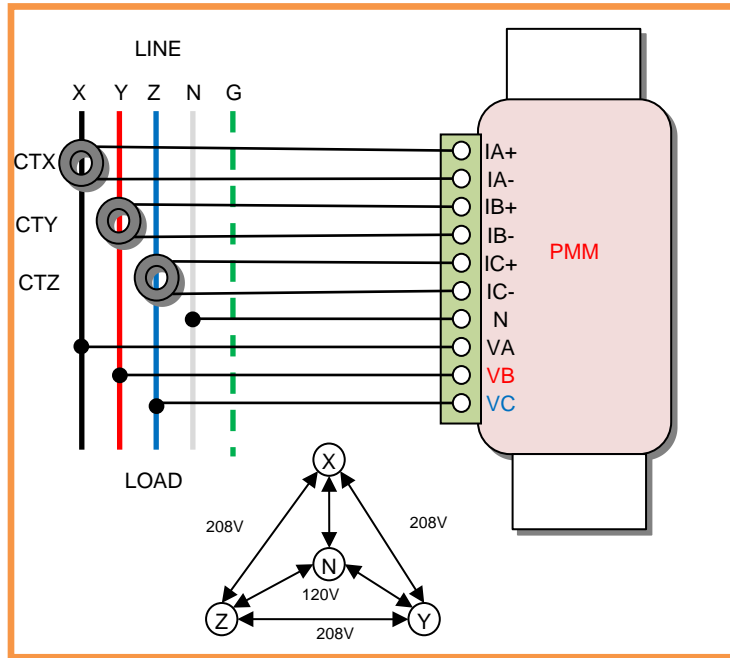


Figure 8. 3Ø Wye 120/208V L-N wiring diagram

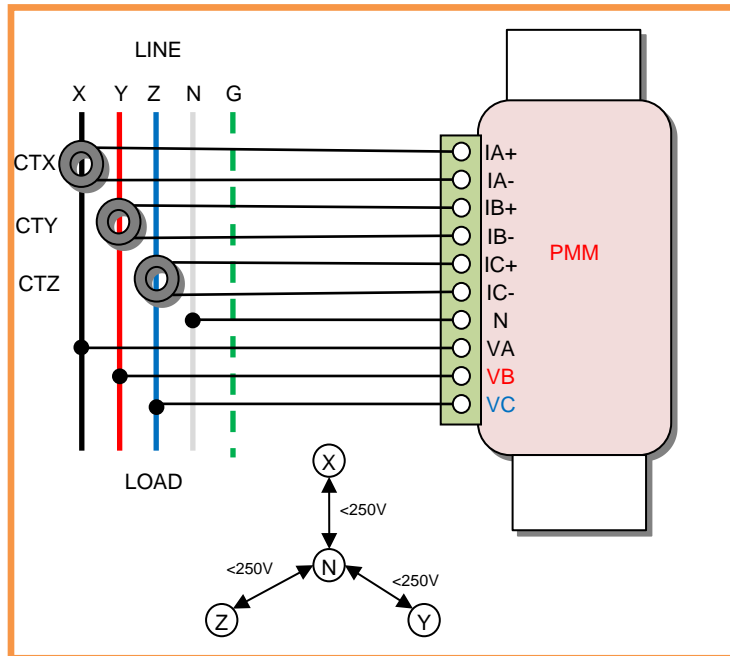


Figure 9. 3Ø Wye 240/415V L-N wiring diagram

Models HBLPG010D00016MM, HBLPG040D00036MM

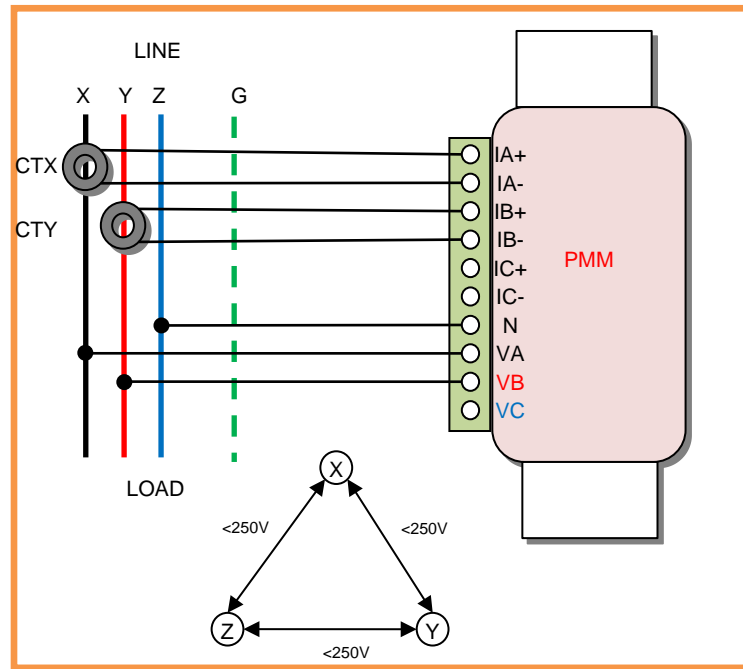


Figure 9. 3Ø Delta L-L wiring diagram

### Choosing the correct current transformers

The PMM can operate with a variety of standard current transformers (CTs). Any current transformers used with the PMM must satisfy the following criteria:

1. The CT must be supplied by Hubbell for use with the PMM.
2. The CT must be sized correctly for the maximum current of the circuit being measured.
3. The CT must meet all local and national safety requirements relevant to the installation, including but not limited to maximum voltage and any other relevant mechanical requirements.
4. The output of the C/T must be compatible with the PMM. In order to receive accurate readings, the PMM firmware must be programmed to match the exact specifications of the C/T that is being used.
5. Each CT input is fuse-protected with a 250mA safety fuse. Safety fuses are not field-replaceable.
6. Using the wrong CT can result in damage to the PMM and inaccurate measurement readings. Please use only the C/T's supplied by Hubbell with your PMM.
7. The current sensors shall be installed on insulated conductors providing basic insulation 300 V minimum.

Refer to the Hubbell CT specification sheet for CT details.

### Installing the current transformer connections

Once the appropriate current transformers have been chosen they should be installed over the appropriate load-carrying lines and connected to the PMM terminals according to the correct configuration diagram. Please note that current transformers are polarized (i.e. the two wires are not interchangeable) – if swapped, the PMM will detect energy as flowing in the opposite direction (“running the meter backwards”). Please refer to current transformer data sheet to determine the correct connection or contact Hubbell.

**Note:** You must ensure the current transformer(s) you have selected is approved by Hubbell and matched correctly to maximum rated load of the conductor on which it will be used. You are responsible for understanding how to correctly select and use the appropriate current transformers for the type of power you wish to monitor. Failure to correctly size and install the current transformers could result in product failure and hazardous operating conditions.

### Installing the voltage circuit connections

Please connect the appropriate monitored voltage lines to the appropriate PMM terminals using an approved wire that meets all relevant safety standards.

**Note:** You must ensure that all connections (“taps”) being made to the load-carrying lines satisfy relevant safety codes and local regulations. You are responsible for understanding how to perform this connection. Failure to correctly perform this connection could result in product failure and hazardous operating conditions.

Wire Size: 14-20 AWG

Wire Insulation Requirement: 600 VAC

Power (per module): 2 W / 0.01A @ 208 VAC

Recommended Fusing: 1.0 A @ 250 VAC / 0.5A @ 480 VAC

Input Voltage: 100-415 VAC 50/60 Hz

### Verifying PMM connections

Before mounting the PMM please verify that:

1. You are using the correct voltage version of the PMM for your configuration.
2. All current transformers have been correctly located over the load-carrying lines (please consult C/T documentation if necessary)
3. All current transformers have been correctly and securely connected to the PMM terminals
4. All voltage connections have been correctly and securely connected to the PMM terminals.

## LED readings and indicator lights

The PMM has 3 large alpha-numeric LEDs that provide for local display of monitoring data and 3 small lights adjacent to the LEDs that provide operating status information.

The PMM can be configured to display all or some of the following data via the numeric LEDs. The order of display can also be customized. The data type indicator is shown followed by the corresponding value, e.g. to show a reading of 10.1 amps on channel A, the PMM displays "A1" followed by "10.1".

- P5= XXX firmware version
- Id = ABC last 3 digits of the Hubbell node ID
- A1 / A2 / A3 = current on channel A, B or C in Amps
- U1 / U2 / U3 = voltage on channel A, B or C in Volts
- P1 / P2 / P3 = power on channel A, B or C in kilowatts
- F1 / F2 / F3 = power factor on channel A, B or C
- Fr= frequency in Hz

The 3 status lights are interpreted as follows (top, middle and bottom positions assume that the PMM is viewed such that the status lights are to the right of the large LEDs):

### Top small light (green)

- 900MHz radio activity
  - off: disabled
  - solid on: active, not connected
  - slow flashing: active, connected to the mesh network
  - very rapid flashing: test/configuration mode

### Middle small light (red)

- 2.4 GHz radio activity
  - off: disabled
  - solid on: active, not connected
  - slow flashing: active, connected to the mesh network
  - rapid flashing: connected in near communication mode
  - very rapid flashing: test/configuration mode

### Lower small light (green)

- Power monitoring activity
  - off: power monitor disabled or not functional
  - slow flashing: active, monitoring power
  - very rapid flashing: test/configuration mode



## Maintenance and Repair

### Maintenance

The PMM has no user-serviceable parts and requires no maintenance. If necessary, clean the outside of the PMM using a clean, dry cloth.

### Repair

The PMM contains no field-serviceable components. Failed products should be returned to Hubbell for replacement. For any service or repair information please contact Hubbell at [techserv@hubbell.com](mailto:techserv@hubbell.com). Please be sure to include the 16-character serial number.

## Technical Specifications

### Electrical

Power Sources Monitored	
Single Phase Line to Neutral	Three Circuits
Single Phase Line to Line	Two Circuits
Three Phase Wye	One Circuit
Three Phase Delta	One Circuit

Voltage Inputs	
Voltage rating	100-415 VAC
Current rating	10mA (max)
Frequency range	50-60Hz
Category	CAT II/CAT III

Current inputs	
Current rating	CTs producing 333mV output at full range (internally shunted). 250mA fuse protected.
Frequency range	50-60Hz
Category	CAT II/CAT III

Measurements	
Voltage [V]	3 channels, 1%
Current [A]	3 channels, 1%
True power [W]	3 channels, net metering, 1%,
Apparent power [VAR]	3 channels, 1%
Power factor [%]	3 channels, 1%
Energy [Wh]	3 channels, total, net metering, 1%
Phase shifts [deg]	2 channels (relative A-B, A-C, 1 deg)
Frequency [Hz]	1 channel (A), 0.1%
Net metering	Yes – 3 channels + total

### Mechanical

Enclosure	
Enclosure material	High-impact resistant Lexan, V0 flammability rating
Weight (w/out CTs)	3.6 oz / 105 g
Dimensions (core)	2.8 in x 1.6 in x 1.4 in 71 mm x 40 mm x 36 mm
Dimensions (including mounting tabs and connectors)	4.2 in x 1.6 in x 1.8 in 106 mm x 40 mm x 45 mm

### Environmental

Operating conditions	
Operating temperature	-7 to +75 C (+20 to +167F)
Humidity	5% to 95% non-condensing
Max. operating altitude	2000m (6561ft)
Pollution degree	2

## Communication

Information gathered by the PMM is transmitted via a Hubbell radio network and may use a radio operating at 2.4GHz, a radio operating in a subset of the range between 860 and 930MHz (the exact frequencies vary with region – please contact Hubbell for details), or both depending on how the firmware in the module is configured.

The network operates in a mesh topology. Each device in the network must be within range of at least one other device in the network. The effective range of the radio in the PMM varies depending on several factors, including the environment in which the product is used. Typically, the device has an effective range of 25 to over 100 feet. The PMM will not transmit effectively if it is installed in an enclosure that blocks radio signals.

Every site where the PMM is deployed must have installed at least one compatible Hubbell Ethernet Gateway device and associated software to collect data and prepare it for transmission to approved monitoring and analysis applications.

The rate at which monitoring information is gathered from a PMM depends primarily on the ratio of the number of PMMs to the number of gateways. It can range from every few seconds to 100 seconds or more.

**Note:** In the event of a loss of power to the PMM, energy consumption information (Wh) for all three channels and the total is retained in non-volatile memory and will be transmitted when power is restored.

## Regulatory Information



This product has been tested to the following requirements:

- CONFORMS TO UL/IEC STD 61010-01, 3rd ed. IEC 61010-2-030 ed. 1.0, EN 61010-1:2010, CSA C22.2 NO. 61010-1
- IEC 61010-2-032 - Edition 2 - Issue Date 2002/09/01, EN 61010-1:2001, IEC 61010-1, 3rd Edition
- Council Directive 1999/05/EC - European Union (EU) Radio & Telecommunications Terminal Equipment Directive (R&TTE) ETSI EN 300 220-2 v2.4.1, ETSI EN 300 328 V1.7.1 and ETSI EN 301 489-1 and 301 489-3, Issued:2002/08/01 V1.4.1, EN61326-1, EN6100-3-2, EN6100-3-3, EN301 489-17, AS/NZS CISPR 11
- IC RSS-210 Issue 8 Annex 8, RSS-GEN Issue 3
- FCC CFR 47.15(c), 15.247(a)

### Class B Device Statement:

Section 15.105(a) of the FCC Rules: 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 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.

Section 15.19 of the FCC Rules: 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.

## Safety Label

The safety label can be found on the metering unit itself. The required type of input power is indicated on the product safety label.

