



SAFETY PRECAUTIONS

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. In the USA, see NFPA 70E.
- Only qualified electrical workers should install this equipment. Such work should be performed only after reading this entire set of instructions.
- NEVER work alone.
- Before performing visual inspections, tests, or maintenance on this equipment, disconnect all sources of electric power. Assume that all circuits are live until they have been completely de-energized, tested, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of backfeeding.
- Turn off all power supplying the power meter and the equipment in which it is installed before working on it.
- Always use a properly rated voltage sensing device to confirm that all power is off.
- Before closing all covers and doors, carefully inspect the work area for tools and objects that may have been left inside the equipment.
- Use caution while removing or installing panels so that they do not extend into the energized bus; avoid handling the panels, which could cause personal injury.
- The successful operation of this equipment depends upon proper handling, installation, and operation. Neglecting fundamental installation requirements may lead to personal injury as well as damage to electrical equipment or other property.
- NEVER bypass external fusing.
- NEVER short the secondary of a PT.
- NEVER open circuit a CT; use the shorting block to short circuit the leads of the CT before removing the connection from the power meter.
- Before performing Dielectric (Hi-Pot) or Megger testing on any equipment in which the power meter is installed, disconnect all input and output wires to the power meter. High voltage testing may damage electronic components contained in the power meter.
- The power meter should be installed in a suitable electrical enclosure.

Failure to follow this instruction will result in death or serious injury

INSTALLATION

Box Contents

- One (1) power meter
- Two (2) retainer clips
- One (1) installation sheet
- One (1) RS485 Terminator (MCT2W)

Parts of the PM210

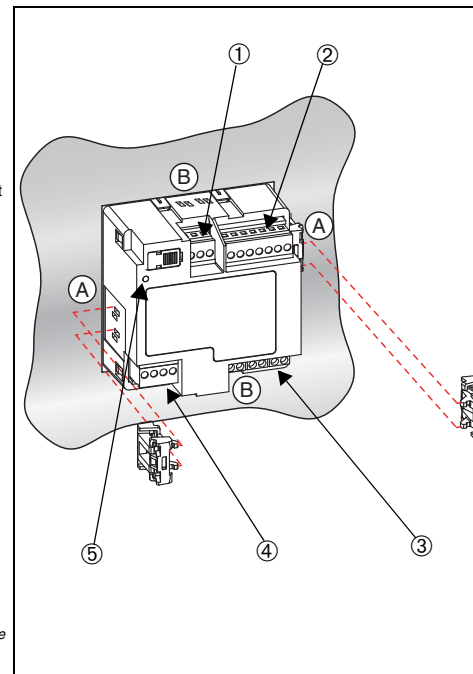
Figure 1: PM210

- ① Control Power.
- ② Voltage Inputs.
- ③ Current Inputs.
- ④ RS-485.
- ⑤ LED.
 - Regular flashing = functioning system.
 - Irregular flashing = communications indicator.
 - Steady OFF/ON = meter not functioning.

Mounting

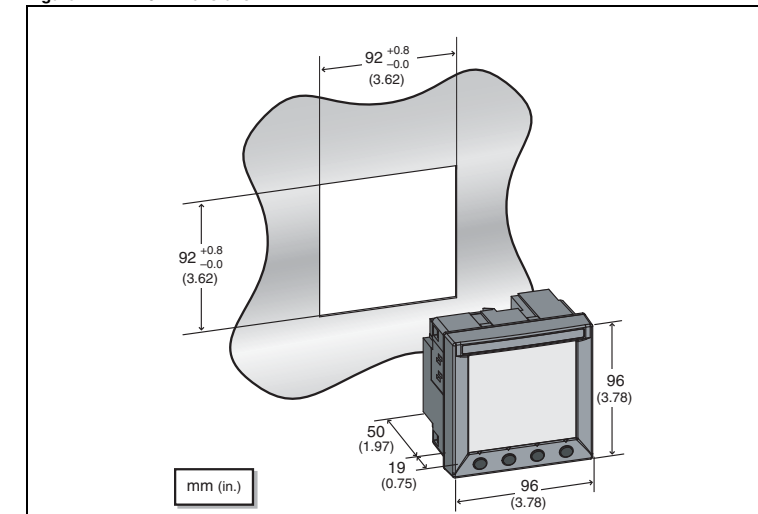
- Insert the power meter through the 92 mm x 92 mm (3.62 in. x 3.62 in.) cut-out (see Figure 2).
 - Attach the two retainer clips to the power meter using the retainer slots at position **A** or position **B** (shown in drawing on right).
- There are two sets of retainer slots on the left, right, top and bottom of the power meter. The first set is for installation locations thinner than 3 mm (1/8 in.). The second set is for installation locations 3 to 6 mm (1/8 in. to 1/4 in.).

NOTE: For use on a flat surface of a protective enclosure (for example, in the USA: NEMA 1 rated enclosure or better).



Dimensions

Figure 2: PM210 Dimensions



WIRING

Voltage inputs and control power for distribution systems up to 277 V L-N and 480 V L-L complies with metering category III. Also, terminal wiring should have a minimum temperature rating of 80° C.

Polarity marks must be followed as shown for CTs and PTs (■). See Tables 1 and 4 for connector specifications and wiring symbols.

Table 1: Connector Specifications for PM210

	Connection Number	Wire Dimensions	Torque	Insulation Strip Length	
Power Supply	1 and 2	12 to 24 AWG	2.5 to 0.2 mm ²	4 in • lb, 0.45 N • m	1/4 in, 6.0 mm
Voltage Inputs (PTs)	3, 4, 5, and 6	12 to 24 AWG	2.5 to 0.2 mm ²	4 in • lb, 0.45 N • m	1/4 in, 6.0 mm
RS485 Communications*	7, 8, and 9	12 to 24 AWG	2.5 to 0.2 mm ²	4 in • lb, 0.45 N • m	1/4 in, 6.0 mm
Current Input (CTs)	14, 15, 16, 17, 18, and 19	12 to 24 AWG	2.5 to 0.2 mm ²	3.54 to 4.43 in • lb, 0.4 to 0.5 N • m	1/4 in, 6.0 mm

* Connection number 10 is not used. Connections 11, 12, and 13 are not present on the power meter.
 NOTE: Order PM7AND2HWKIT for connectors replacement.

Supported System Types

Table 2: Voltages Less Than or Equal to 277 Vac L-N/480 Vac L-L, Direct Connect No PTs

Number of Wires	CTs		Voltage Connections			Meter Configuration		Figure Number
	Qty.	ID	Qty.	ID	Type	System Type	PT Primary Scale	
Single-Phase Wiring								
2	1	I1	2	V1, Vn	L-N	10	No PT	3
	1	I1	2	V1, V2	L-L	11	No PT	4
3	2	I1, I2	3	V1, V2, Vn	L-L with N	12*	No PT	5
Three-Phase Wiring								
3	2	I1, I3	3	V1, V2, V3	Delta	30	No PT	6
	3	I1, I2, I3	3	V1, V2, V3	Delta	31	No PT	7
	1	I1	3	V1, V2, V3	Delta (Balanced)	32	No PT	19
4	3	I1, I2, I3	3	V1, V2, V3, Vn	4-wire Delta	40	No PT	8
	3	I1, I2, I3	3	V1, V2, V3, Vn	Wye	40	No PT	8
1	I1	3	V1, V2, V3, Vn	Wye (Balanced)	44	No PT	20	

*System type 12 supports single phase circuits distributed from a 208/120 Vac 1-phase 3-wire service with no PTs. System 12 also supports single phase circuits distributed from a 480/277 Vac or 208/120 Vac 3-phase 4-wire service with no PTs. Any two of the three current channels can be used. Ensure that each phase is wired to the proper phase input. For example: Circuits from A-B—wire phase A voltage and current to V1 and I1 and wire phase B voltage and current to V2 and I2. Circuits from C-A—wire phase C voltage and current to V3 and I3 and wire phase A voltage and current to V1 and I1. Circuits from B-C—wire phase B voltage and current to V2 and I2 and wire phase C voltage and current to V3 and I3. **Note (Phases B-C):** Voltage input V1 must be connected to phase A voltage to obtain frequency lock.

Table 3: Voltages Greater Than 277 Vac L-N/480 Vac L-L

Number of Wires	CTs		Voltage Connections			Meter Configuration		Figure Number
	Qty.	ID	Qty.	ID	Type	System Type	PT Primary Scale	
3	2	I1, I3	2	V1, V3 (V2 to Ground)	Delta	30	Based on voltage	9
	3	I1, I2, I3	2	V1, V3 (V2 to Ground)	Delta	31	Based on voltage	10
	1	I1	2	V1, V3 (V2 to Ground)	Delta (Balanced)	32	Based on voltage	18
	3	I1, I2, I3	3	V1, V2, V3, (Vn to Ground)	Wye (Unbalanced)	40	Based on voltage	11
	2	I1, I3	3	V1, V2, V3, (Vn to Ground)	Wye (Unbalanced)	40	Based on voltage	12
1	I1	3	V1, V2, V3, (Vn to Ground)	Wye (Unbalanced)	44	Based on voltage	17	

Table 3: Voltages Greater Than 277 Vac L-N/480 Vac L-L

Number of Wires	CTs		Voltage Connections			Meter Configuration		Figure Number
	Qty.	ID	Qty.	ID	Type	System Type	PT Primary Scale	
4	3	I1, I2, I3	3	V1, V2, V3, (Vn to Ground)	Grounded Wye	40	Based on voltage	13
	3	I1, I2, I3	2	V1, V3 (Vn to Ground)	Wye	42	Based on voltage	14
	2	I1, I2	2	V1, V2, V3 (Vn to Ground)	Grounded Wye	40	Based on voltage	15
	1	I1	3	V1, V2, V3 (Vn to Ground)	Grounded Wye (Balanced)	44	Based on voltage	16

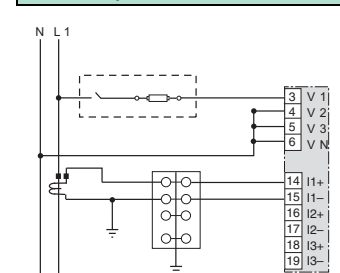
The following symbols are used in the wiring diagrams:

Table 4: Wiring Diagram Symbols

Symbol	Description
	Voltage disconnect switch
	Fuse
	Earth ground
	Current transformer. Polarity marks: ■ = S1.
	Shorting block
	Potential transformer. Polarity marks: ■ = X1.
	Protection containing a voltage disconnect switch with a fuse or disconnect circuit breaker (the protection device must be rated for the available short-circuit current at the connection point).
	In 2 PT systems, these connections are equivalent. Note: Pay attention to the polarity marks ■

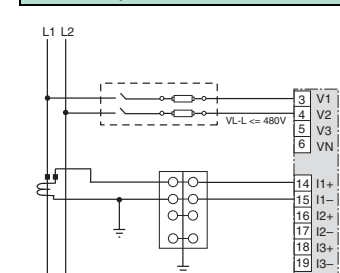
Wiring Diagrams

Figure 3: 1-Phase Line-to-Neutral 2-Wire System 1 CT



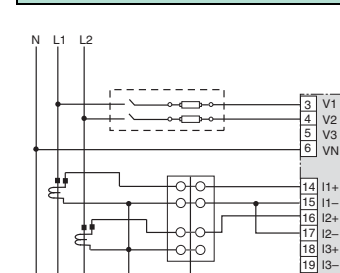
- Use System type 10.
- To avoid distortion, use parallel wires for control power and voltage inputs. Keep the fuse close to the power source.

Figure 4: 1-Phase Line-to-Line 2-Wire System 1 CT



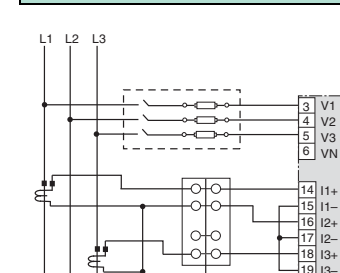
- Use System type 11.
- To avoid distortion, use parallel wires for control power and voltage inputs. Keep the fuse close to the power source.
- Use with 120/240 V systems.

Figure 5: 1-Phase Direct Voltage Connection 2 CT



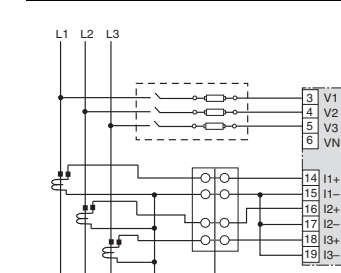
- Use System type 12.
- To avoid distortion, use parallel wires for control power and voltage inputs. Keep the fuse close to the power source.

Figure 6: 3-Phase 3-Wire 2 CT no PT



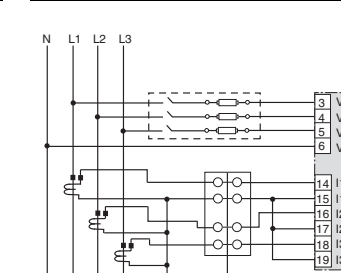
- Use System type 30.

Figure 7: 3-Phase 3-Wire 3 CT no PT



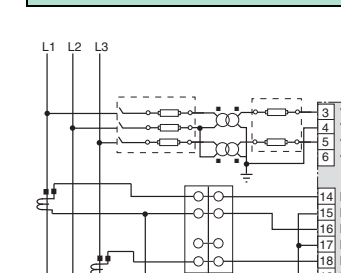
- Use System type 31.

Figure 8: 3-Phase 4-Wire Wye Direct Voltage Input Connection 3 CT



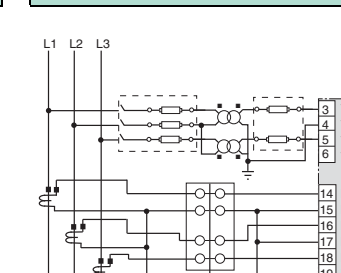
- Use System type 40.
- Use with 480Y/277 V and 208Y/120 V systems.

Figure 9: 3-Phase 3-Wire Delta Connection 2 CT 2 PT



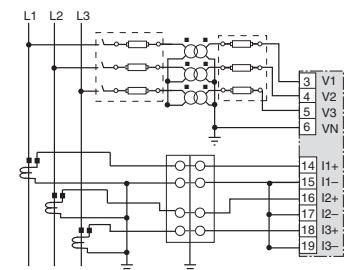
- For an open delta PT connection with 120 V L-L secondaries, use System type 30.

Figure 10: 3-Phase 3-Wire Delta Connection 3CT 2PT



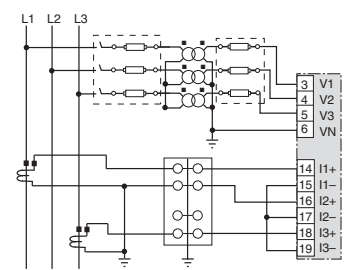
- Use System type 31.
- For an open delta PT connection with 120 V L-L secondaries, use System type 31.

Figure 11: 3-Phase 3-Wire Wye Connection 3 CT 3 PT (unbalanced)



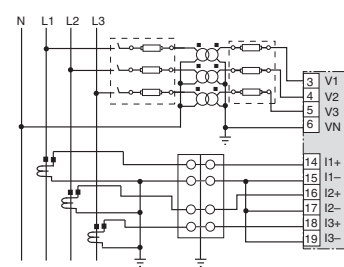
• Use System type 40.

Figure 12: 3-Phase 3-Wire Wye Connection 2CT 3PT (unbalanced)



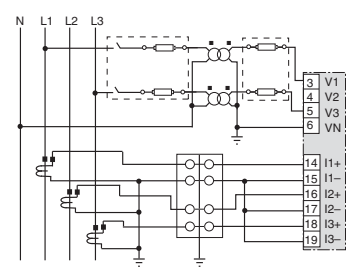
• Use System type 40.

Figure 13: 3-Phase 4-Wire Wye Connection 3 CT 3 PT



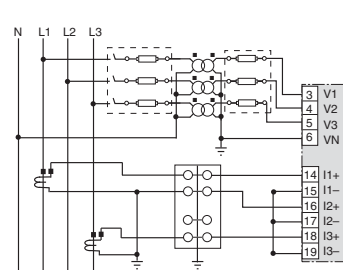
• Use System type 40.

Figure 14: 3-Phase 4-Wire Wye 3CT 2PT (balanced)



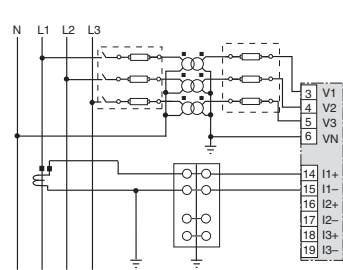
• Use System type 42.

Figure 15: 3-Phase 4-Wire Wye 2 CT 3 PT (for balanced 3-wire loads)



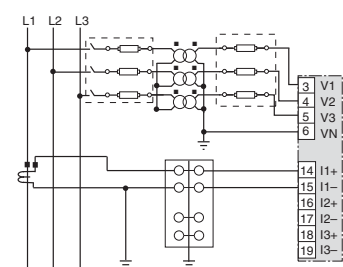
• Use System type 40.

Figure 16: 3-Phase 4-Wire Wye 1 CT 3PT (balanced)



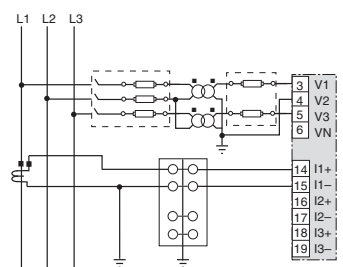
• Use System type 44.

Figure 17: 3-Phase 3-Wire Wye 1CT 3PT (unbalanced)



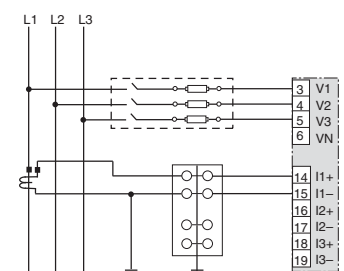
• Use System type 44.

Figure 18: 3-Phase 3-Wire 1 CT 2 PT (balanced)



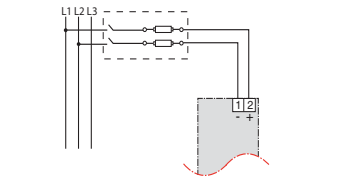
• Use System type 32.

Figure 19: 3-Phase 3-Wire Direct Voltage Input Connection 1 CT (balanced)



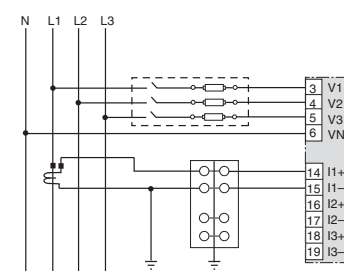
• Use System type 32.

Figure 21: Direct Connect Control Power (Phase to Phase)



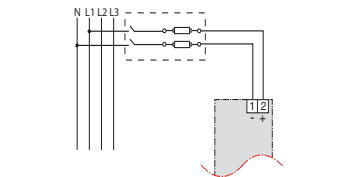
• Phase to Phase only when voltage < 415 + 10% Vac max.
• See Table 5.

Figure 20: 3-Phase 4-Wire Wye Direct Voltage Input Connection 1 CT (balanced)



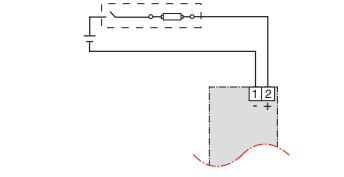
• Use System type 44.

Figure 22: Direct Connect Control Power (Phase to Neutral)



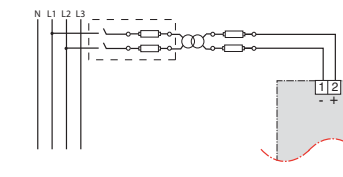
• Phase to Neutral only when voltage < 300 + 10% Vac max.
• See Table 5.

Figure 23: Direct Connect Control Power (DC Control Power)



• DC Control Power 100 Vdc < V < 300 Vdc
• See Table 5.

Figure 24: Control Power Transformer (CPT) Connection



• Control Power Transformer 120 or 240 Vac Secondary 50 Va max.
• See Table 5.

Table 5: Fuse Recommendation

Control Power Source	Source Voltage (V _S)	Fuse	Fuse Amperage
CPT	V _S ≤ 25 V	FNM or MDL	250 mA
CPT	125 < V _S ≤ 240 V	FNQ or FNQ-R	250 mA
CPT	240 < V _S ≤ 305 V	FNQ or FNQ-R	250 mA
Line Voltage	V _S ≤ 240 V	FNQ-R	250 mA
Line Voltage	V _S > 240 V	FNQ-R	250 mA
DC	V _S ≤ 300 V	LP-CC	500 mA

NOTES:

- See Figure 21 to Figure 24.
- Over current protection should be located as close to the device as possible.
- For selecting fuses and circuit breakers other than those listed above, use the following criteria:
 - Over current protection should be rated as listed above.
 - Current interrupt capacity should be selected based on the installation category and fault current capability.
 - Over current protection should be selected with a time delay.
 - The voltage rating should be based on the input voltage applied.
- If a 0.25 A fuse is not available with the required fault current capability, use a fuse rated at a maximum of 0.5 A.

COMMUNICATIONS CAPABILITIES

Table 6: RS485 Communications Distances

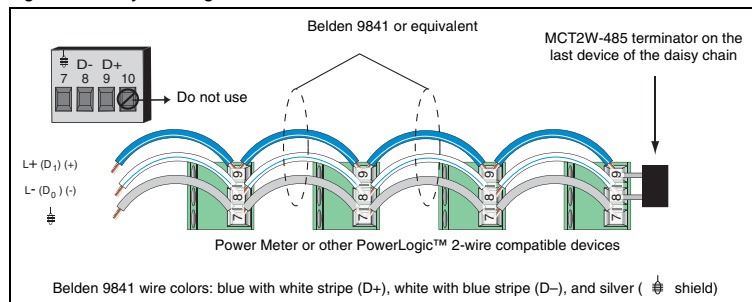
Baud Rate	Maximum Communication Distances 1 to 32 Devices	
	Feet	Meters
9600	8,000	2,438
19200	6,000	1,829

NOTE: Distances listed should be used as a guide only and cannot be guaranteed for non-PowerLogic™ devices. Refer to the master device's documentation for any additional distance limitations.

Daisy-Chaining Devices to the Power Meter

The RS485 slave port allows the power meter to be connected in a daisy chain with up to 31, 2-wire devices. In this document, communications link refers to a chain of devices that are connected by a communications cable.

Figure 25: Daisy-Chaining 2-Wire Devices



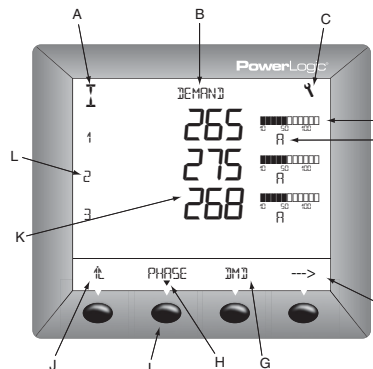
- If the power meter is the first device on the daisy chain, connect it to the host device using a RS232 to RS422/RS485 converter.
- If the power meter is the last device on the daisy chain, terminate it with the terminator provided.
- See Table 6 for the maximum daisy-chain communications distances for 2-wire devices.
- The terminal's voltage and current ratings are compliant with the requirements of the EIA RS485 communications standard.
- Connection number 10 is not used.

OPERATING THE DISPLAY

The power meter is equipped with a large, back-lit LCD display. It can display up to five lines of information plus a sixth row of menu options. Figure 26 shows the different parts of the power meter display.

Figure 26: Parts of PM210 Display

- A. Type of measurement
- B. Screen title
- C. Maintenance icon
- D. Bar Chart (%)
- E. Units
- F. Display more menu items
- G. Menu item
- H. Selected menu indicator
- I. Button
- J. Return to previous menu
- K. Values
- L. Phase



How the Buttons Work

Table 7: Button Symbols

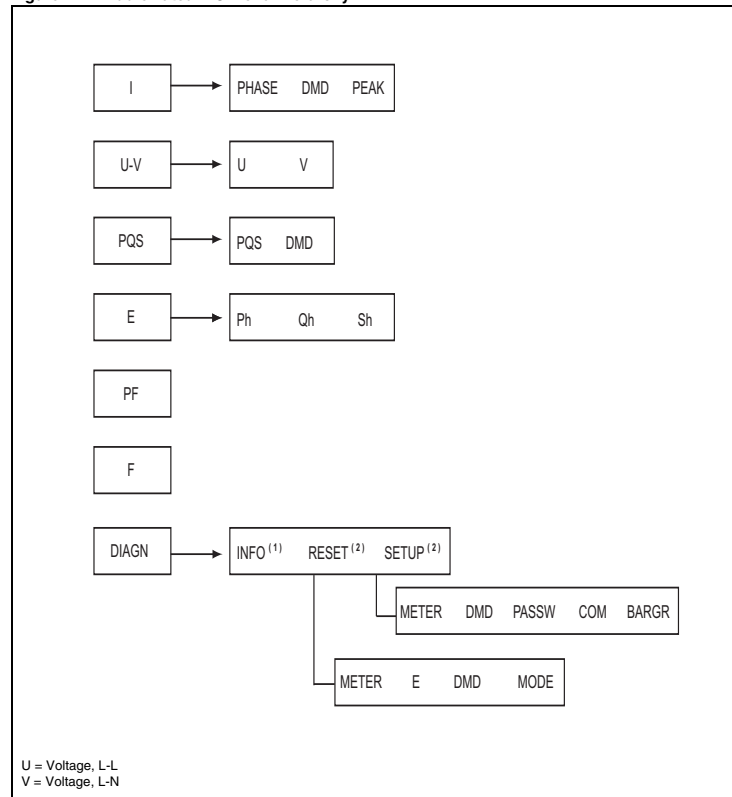
Navigation	
→	View more menu items on the current level.
⬅	Return to the previous menu level.
▼	Indicates the menu item is selected and there are no menu levels below the current level.
Change Values	
↕	Change values or scroll through the available options. When the end of a range is reached, pressing + again returns to the first value or option.
⬅	Select the next number of a series.
OK	Move to the next editable field or exits the screen if the last editable field is selected.

Set Up the Power Meter

Figure 27 shows abbreviated hierarchical relationships of the menu screens for the PM210. Using the Setup Example below in conjunction with the menu hierarchy (Figure 27), complete a minimum setup of the power meter. A minimum setup includes:

- Set up CTs.
- Set up PTs.
- Set up Communication.

Figure 27: Abbreviated IEC Menu Hierarchy*



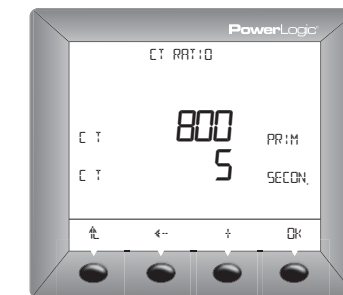
U = Voltage, L-L
V = Voltage, L-N

* The power meter can be configured to display either IEC or IEEE nomenclature. Figure 27 shows IEC nomenclature.

- (1) The INFO command includes model, firmware version, and serial number information.
- (2) Reset and Setup menu items require a password to navigate to the second level menu.

Setup Example: This example shows how to set up CTs. Use the same method to set up PTs and Communication.

1. Press → until you see DIAGN.
2. Press SETUP.
3. Enter your password. The default password is 00000.
4. Press OK.
5. Press METER.
6. Press CT.
7. Enter the PRIM CT (primary CT) number: 1 to 32762.
8. Press OK.
9. Enter the SEC. CT (secondary CT) number: 1 or 5.
10. Press OK.
11. Press ⬅ to return to the SETUP MODE screen.



See the online PM210 Reference Manual at www.powerlogic.com for more information on setting up the power meter.

Getting Technical Support

Please refer to the *Technical Support Contacts* provided in the power meter shipping carton or go to www.powerlogic.com.