

Wiring

Introduction

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This chapter explains how to make the wiring connections for the power meter.

Required Protection for CE Compliance

For CE compliance, use a CE-compliant protection device such as a Merlin Gerin Disconnect Circuit Breaker Type P25M #21104 (or IEC 947 equivalent), which must be connected directly to the metering voltage and control power inputs.

NOTE: The disconnect circuit breaker must be placed within reach of the power meter and labeled:

Disconnect Circuit Breaker for Power Meter.

Supported System Types

Table 4–1: Voltages Less Than or Equal to 347Vac L-N, Direct Connect No PTs

Single-Phase Wiring							
Number of Wires	CTs		Voltage Connections			Meter Configuration	
	Qty.	ID	Qty.	ID	Type	System Type	PT Priority Scale
2	1	I1	2	V1, Vn	L-N	10	No PT
2	1	I1	2	V1, V2	L-L	11	No PT
3	2	I1, I3	3	V1, V2, Vn	L-L with N	12	No PT
Three-Phase Wiring							
3	2	I1, I2	3	V1, V2, V3	Delta	30	No PT
	3	I1, I2, I3	3	V1, V2, V3	Delta	31	No PT
4	3	I1, I2, I3	3	V1, V2, V3, Vn	High Leg Delta	40	No PT
4	3	I1, I2, I3	3	V1, V2, V3, Vn	Wye	40	No PT

Wiring

Wiring Diagrams

Table 4–2: Voltages Greater Than 347 Vac L-N/600 Vac L-L

Three-Phase Wiring							
Number of Wires	CTs		Voltage Connections			Meter Configuration	
	Qty.	ID	Qty.	ID	Type	System Type	PT Priority Scale
3	2	I1, I3	2	V1, V3 (V2, Vn to Ground)	Open Delta	30	Based on voltage
	3	I1, I2, I3	2	V1, V3 (V2, Vn to Ground)	Open Delta	31	Based on voltage
4	3	I1, I2, I3	3	V1, V2, V3, (Vn to Ground)	Grounded Wye	40	Based on voltage
	3	I1, I2, I3	2	V1, V3 (Vn to Ground)	Open Wye	42	Based on voltage

Wiring Diagrams

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, BURN, OR EXPLOSION

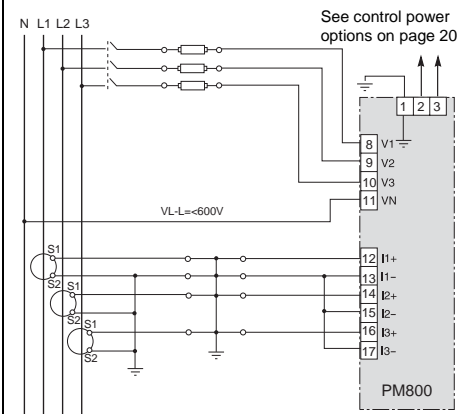
- Only qualified workers should install and wire the power meter. Perform this work only after completely reading the installation and wiring chapters.
- Turn off all power supplying the power meter and the equipment in which it is installed before working on it.
- Use a properly rated voltage testing device to verify that the power is off.

Failure to follow these instructions will result in death or serious injury.

Wiring

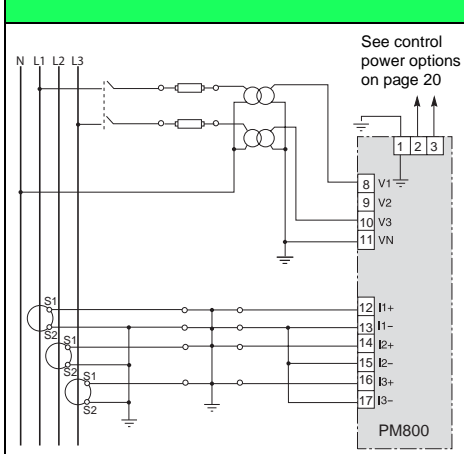
Wiring Diagrams

3-Phase 4-Wire Wye Direct Voltage Input Connection 3 CT



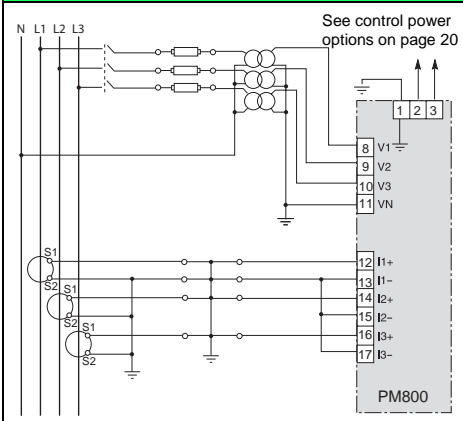
- NOTES:**
- Use with 480Y/277 V and 208Y/120 V systems.
 - Use system type 3Ø4W3CT.

3-Phase 4-Wire Wye 3CT 2PT (calculated neutral)



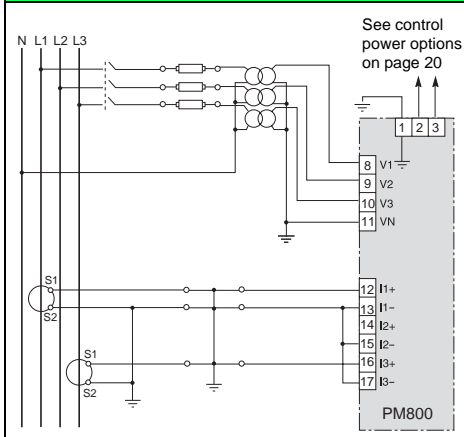
NOTE: Use system type 3Ø4W3CT2PT.

3-Phase 4-Wire Wye Connection 3 CT 3 PT



NOTE: Use system type 3Ø4W3CT.

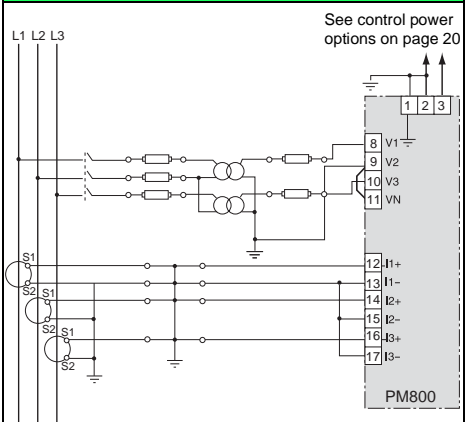
Balanced 3-Phase 4-Wire Wye 3-Wire 3 PT 2 CT



NOTE: Use system type 3Ø4W2CT.

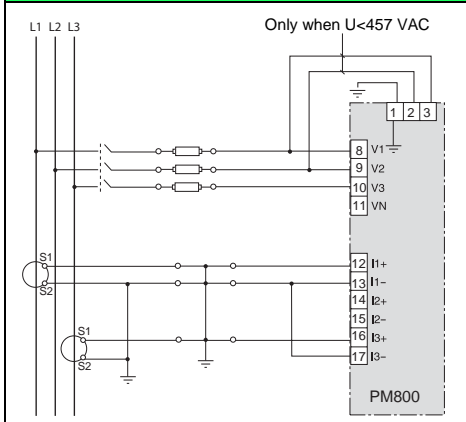
Wiring Wiring Diagrams

3-Phase 3-Wire Delta Connection 3CT 2PT



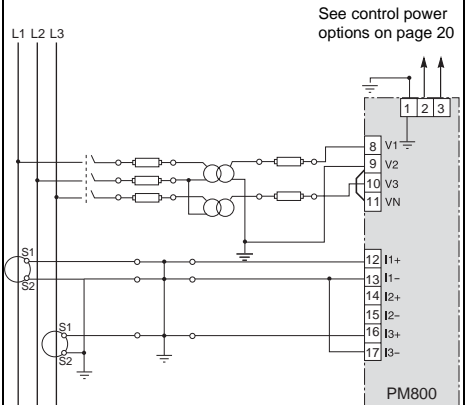
- NOTES:**
- Use System type 3Ø3W3CT.
 - Install the jumper between V₂ and V_N when using VTs on a 3-wire system. Do not use a jumper for a direct voltage connection (no VTs).
 - For an open delta PT connection with 120 V L-L secondaries, use system type 3Ø3W2CT.

3-Phase 3-Wire 2 CT no PT (Direct Voltage Connection) Voltage Phase-Phase ≤ 600 V Nominal



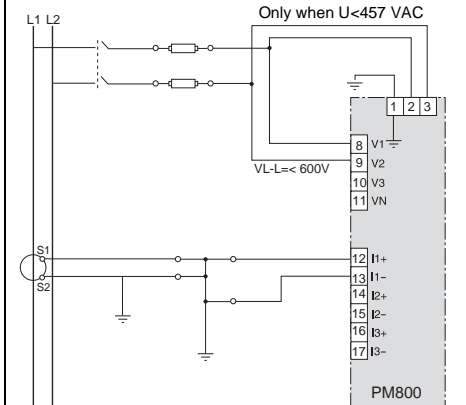
- NOTES:**
- Control power can be drawn from fused voltage inputs Phase-Phase or an external source.
 - For corner grounded delta applications, use PTs.
 - Use system type 3Ø3W2CT.

3-Phase 3-Wire Delta Connection 2 CT 2 PT



- NOTES:**
- Install the jumper between V₂ and V_N when using VTs on a 3-wire system. Do not use a jumper for a direct voltage connection (no VTs).
 - For an open delta PT connection with 120 V L-L secondaries, use system type 3Ø3W2CT.

1-Phase Line-to-Line 2-Wire System 1 CT

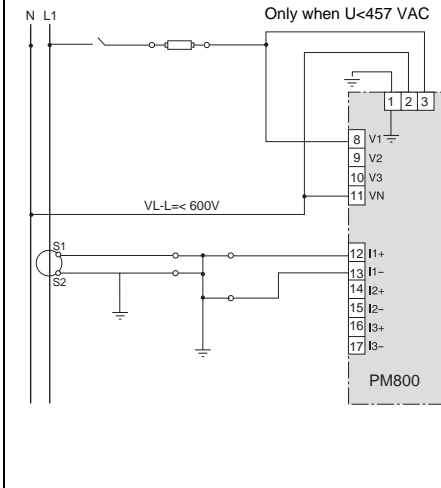


- NOTE:** The voltage input protection must be rated for the short circuit current at the connection points.

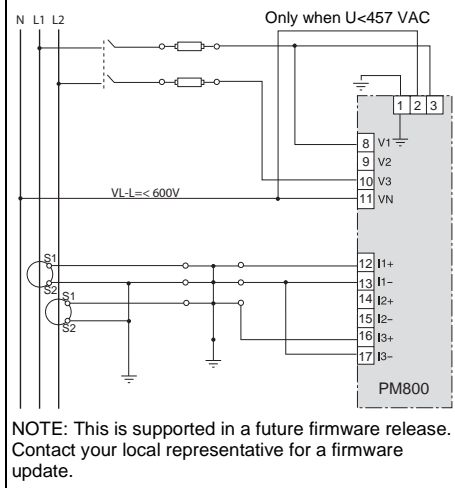
Wiring

Wiring Diagrams

1-Phase Line-to-Neutral 2-Wire System 1 CT



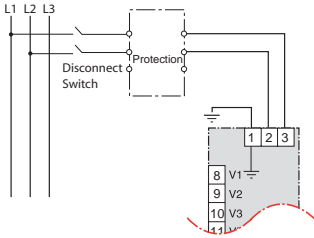
1-Phase 3-Wire Direct Voltage Connection 2 CT



Wiring Wiring Diagrams

Direct Connect Control Power (Phase to Phase)

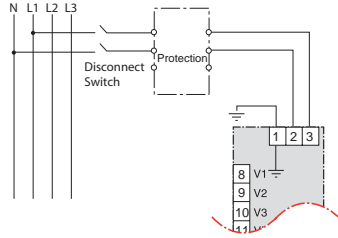
Phase to Phase
only when $U < 457 \text{ VAC}$



PM800

Direct Connect Control Power (Phase to Neutral)

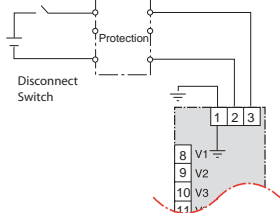
Phase to Neutral
only when $V < 457 \text{ VAC}$



PM800

Direct Connect Control Power (DC Control Power)

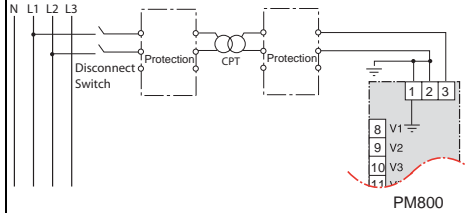
DC Control Power
 $100 \text{ Vdc} < V < 300 \text{ Vdc}$



PM800

Direct Connect Control Power (Control Power Transformer)

Control Power Transformer
120 or 240 VAC Secondary 50 VA max.



PM800

Table 4–3: Fuse Recommendation

Control Power Source	Source Voltage (V_S)	Fuse	Fuse Amperage
CPT	$V_S \leq 125 \text{ V}$	FNM or MDL	250 mA
CPT	$125 < V_S \leq 240 \text{ V}$	FNQ or FNQ-R	250 mA
CPT	$240 < V_S \leq 305 \text{ V}$	FNQ or FNQ-R	250 mA
Line Voltage	$V_S \leq 240 \text{ V}$	FNQ-R	250 mA
Line Voltage	$V_S > 240 \text{ V}$	FNQ-R	250 mA
DC	$V_S > 300 \text{ V}$	LP-CC	500 mA

Communications

Communications Capabilities

Communications Capabilities

Table 5–1: Communications Capabilities of the Power Meter

Communications Port	RS-485: <ul style="list-style-type: none"> • 2-wire with shield • EIA compliant • Allows the power meter to be connected to a daisy-chain of up to 32 devices
Baud Rate	9600 19200 38400
Communications Distances	See Table 5–2 on page 21
Protocols	MODBUS RTU JBUS
Parity	ODD EVEN NONE

Table 5–2: RS-485 Communications Distances

Baud Rate	Maximum Communication Distances			
	1 to 16 Devices		17 to 32 Devices	
	Feet	Meters	Feet	Meters
9600	10,000	3,050	4,000	1,220
19200	5,000	1548	2,500	762.5
38400	2,500	762.5	1,500	457

NOTES:

- Distances are for 2-wire devices and 4-wire devices configured for 2-wire operation, such as the Series 600 Power Meter and the Series 3000 and 4000 Circuit Monitor.
- Distances listed should be used as a guide only and cannot be guaranteed for non-POWERLOGIC devices.

Communications

Connecting to a PC Host Using the RS-485 Port

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, BURN, OR EXPLOSION

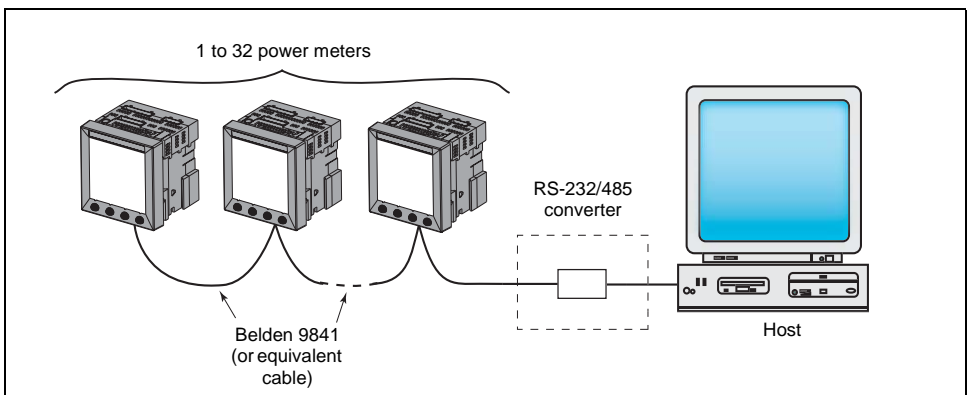
- Turn off all power supplying the power meter and the equipment in which it is installed before working on it.
- Use a properly rated voltage testing device to verify that the power is off.

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

Connecting to a PC Host Using the RS-485 Port

The RS-485 slave port allows the power meter to be connected to a daisy-chain of up to 31 devices to the serial communications port on a host device (see Figure 5–1). Refer to Table 5–2 on page 21 for cable distance limitations at varying baud rates. To make this type of connection, you must use a RS-232-to-RS-422/RS-485 converter. POWERLOGIC offers a converter kit for this purpose (part number MCI-101). For connection instructions, refer to the instruction bulletin included with the MCI-101 kit.

Figure 5–1: Power meters connected to a PC serial port through the RS-485 port on the power meter



Communications

Daisy-chaining Devices to the Power Meter

Daisy-chaining Devices to the Power Meter

The RS-485 slave port allows the power meter to be connected in a daisy chain with up to 31, 2-wire devices. In this bulletin, communications link refers to a chain of devices that are connected by a communications cable.

To daisy-chain devices to the power meter, use communications cable containing a twisted-shielded pair (Belden 9841 or equivalent) and the three-terminal connector of the RS-485 port on the power meter. ~~The terminals are labeled:~~

18 (shield)

19 —

20 +

To connect to the power meter, follow these steps:

1. Strip the cable wires and insert them into the holes in the connector.
2. On the top of the connector, torque the wire binding screws 5–7 in-lb (0.56–0.79 N•m).

Figure 5–2: RS-485 connection



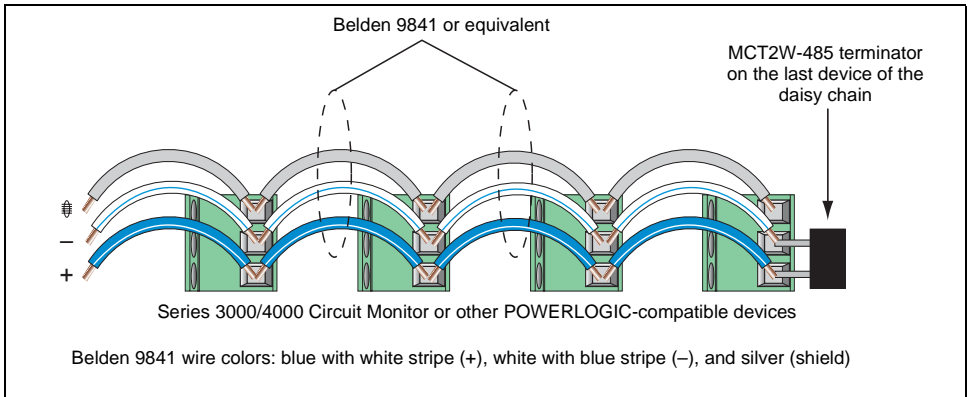
Daisy-chain 2-wire Devices

To daisy-chain the power meter to another 2-wire POWERLOGIC device, wire the power meter's RS-485 communications terminals to the matching communications terminals of the next device. In other words, wire the + terminal of the power meter to the + terminal of the next device, wire – to –, and shield to shield as shown in Figure 5–3.

Communications

Daisy-chaining Devices to the Power Meter

Figure 5–3: Daisy-chaining 2-wire devices



- If the power meter is the first device on the daisy chain, connect it to the host device using the MCI-101 kit (or equivalent RS-232 to RS-422/RS-485 converter). See “Connecting the First Device on the Daisy Chain” on page 26 in this chapter for instructions.
- If the power meter is the last device on the daisy chain, terminate it. See “Terminating the Communications Link” on page 27 in this chapter for instructions.
- See Table 5–2 on page 21 for the maximum daisy-chain communications distances for 2-wire devices.

Using the MCT2W-485 Terminator

To terminate the power meter using the MCT2WMCTAS-485 terminator (part no. 3090MCTAS485), insert the wires of the terminator directly into terminals 19 and 20 of the RS-485 communications connector on the power meter as shown in Figure 5–3.