1.03.2.10 Metering & 2.11 Current Transformers

Technical Data **TD150006EN**

Effective October 2013
Supersedes June 2013

Power Xpert Multi-Point Meter—high-density metering

Introduction

Eaton's Power Xpert™ Multi-Point Meter is an ANSI C12.20 revenue class Web enabled electronic submetering device that can be mounted in panelboards, switchboards, or enclosures. When mounted in a panelboard or a switchboard, the Power Xpert Multi-Point Meter provides customers with an integrated power distribution and energy metering solution that saves space, reduces installation labor, and lowers total cost.

The Eaton Power Xpert Multi-Point Meter (PXMP Meter) offers a highly modular approach to high-density metering applications in electrical power distribution systems. The PXMP Meter is compatible with most three-phase industrial, commercial, and single-phase residential low voltage electrical power systems. The PXMP is equipped with two Modbus® RTU communication ports for local display and remote serial communications. The PXMP also has optional pulse input and digital output modules along with one standard digital output and three digital inputs. The PXMP Energy Portal Module is Web enabled, making it suitable for use with Ethernet networks and modems.

Typical submetering applications

The Power Xpert Multi-Point Meter is ideally suited to handle submetering in low voltage power distribution equipment applications such as distribution boards in multi-tenant buildings, comprehensive main and feeder metering in commercial/industrial switchboards or medium voltage distribution equipment with the use of voltage and current transformers.

The Power Xpert Multi-Point Meter provides a cost-effective solution for residential or commercial metering installations. Typical installations include:

- High-rise buildings
- Government institutions
- K–12, universities and campuses
- Office buildings
- Medical facilities
- Apartment and condominium complexes
- Airports
- Shopping malls
- Industrial sites
- Mixed-use facilities

Product description

The Power Xpert Multi-Point Meter can measure up to any of the following number of circuits:

- Sixty single-phase, two-wire (single-pole)
- Thirty single-phase, three-wire (two-pole)
- Twenty three-phase, four-wire (three-pole)

The circuits listed above can be mixed provided that the total number of current sensors does not exceed 60. The meter provides current; voltage; power factor; demand and active, reactive, and real power (VA, VAR, kW); and active, reactive, and real energy (VA, VAR, kWh) measurements for each load. The unit also provides up to two years at 15-minute intervals or eight years at one-hour intervals of demand data logging storage in non-volatile memory for up to 60 submeters.

Powering Business Worldwide

The Power Xpert Multi-Point Meter can be used with three different ratings of current sensors: 100 mA, 10 mA, or 333 mV. Switchboard/panelboard applications will use the 100 mA current sensors, which are highly accurate, self-protecting in the event of an open circuit condition under load and are supplied with an integral plug-in connector. The PXMP automatically detects the rating of the current sensor that is connected.

The PXMP can also use 10 mA current sensors that were previously installed for IQMESII retrofit applications. Additionally the PXMP can use 333 mV split core current sensors for retrofit applications where metering has not previously existed. The 10 mA and 333 mV current sensors are also self-protecting in the event of an open circuit condition under load.

Features

- Monitors power and energy for up to 60 current sensors; space-saving modular design allows measurement from 1 to 60 circuits
- Built-in communication interfaces
- Monitors single-phase and three-phase loads from 120 to 600 Vac
- Monitors current, voltage, power factor, frequency, power, and energy
- Stores extensive energy profile data for each metering point; can be used to identify coincidental peak demand contribution
- LEDs provide status of unit communication activity and verify sensor connections
- Meets rigid ANSI C12.20 accuracy specifications for revenue meters
- Three standard digital inputs and eight pulse inputs per optional module to monitor WAGES (water, air, gas, electric, or steam)
- One standard digital output and eight digital outputs per optional module for alarm indication
- Three types of meter modules to support 10 mA, 100 mA, or 333 mV sensors
- Can be directly mounted in a UL Listed panelboard, switchboard, or enclosure
- 256 MB of memory in meter base for up to two years of 15-minute interval data (eight years of one-hour interval data) for eight demand values up to 60 submeters

Communication capabilities

With the Power Xpert Multi-Point Meter's built-in communication capabilities, remote meter reading and monitoring functions can be integrated into both new and retrofit applications.

- Standard Modbus® RTU
- Optional Modbus TCP / BACnet/IP / SNMP / HTTP / SMTP / NTP / SFTP communications

Software compatibility

The Power Xpert Multi-Point Meter:

- Can be used as part of an electrical energy monitoring and cost allocation system
- Can be remotely monitored via onboard Web pages with Eaton's optional Energy Portal Module
- Is compatible with third-party software platforms and interface devices

Configuration

- The Power Xpert Multi-Point Meter is fully configurable using Power Xpert Multi-Point configuration software that can be downloaded free from the Eaton website at www.eaton.com/meters
- Each Power Xpert Multi-Point Meter module can be configured for up to six metering points in any combination of single-phase and three-phase metering points corresponding to the voltage wiring of the meter base
- Power Xpert Multi-Point configuration software simplifies system commissioning and startup; PXMP configuration software supports both online and offline configurations

Easy to install

- UL Listed for mounting inside panelboards (e.g., PRL4), switchboards, and NEMA 12 enclosures
- Quick connect terminals for current sensors, Modbus communications, and bus voltages make wiring the unit quick and easy

Table 1. Features

Description	Main/Aggregate	Channel Data	Tenant
Instrumentation			
Current, per phase	■ ①	■	—
Voltage, per phase (L–L, L–N)	■	■	—
Frequency	—	■	■
Minimum/maximum readings, V	Per phase	—	—
Minimum/maximum readings, W, VAR, VA	Total and per phase	—	—
Minimum/maximum readings, PF, F	Total	—	—
Power			
Real, reactive, and apparent power (W, VAR, VA)	Total and per phase	Total and per phase	Total
Power factor	—	Average	Average
Demand			
Block interval (fixed, sliding)	■	—	—
Real, reactive, and apparent power demand	Total and per phase	—	—
Minimum/maximum readings, PF, W, VAR, VA	Total and per phase	Total	—
Energy			
Real, reactive, and apparent energy (Wh, VARh, VAh)	Total	—	Total
Real, forward and reverse, and total (Wh)	■	—	■

① Main only.

Mounting dimensions

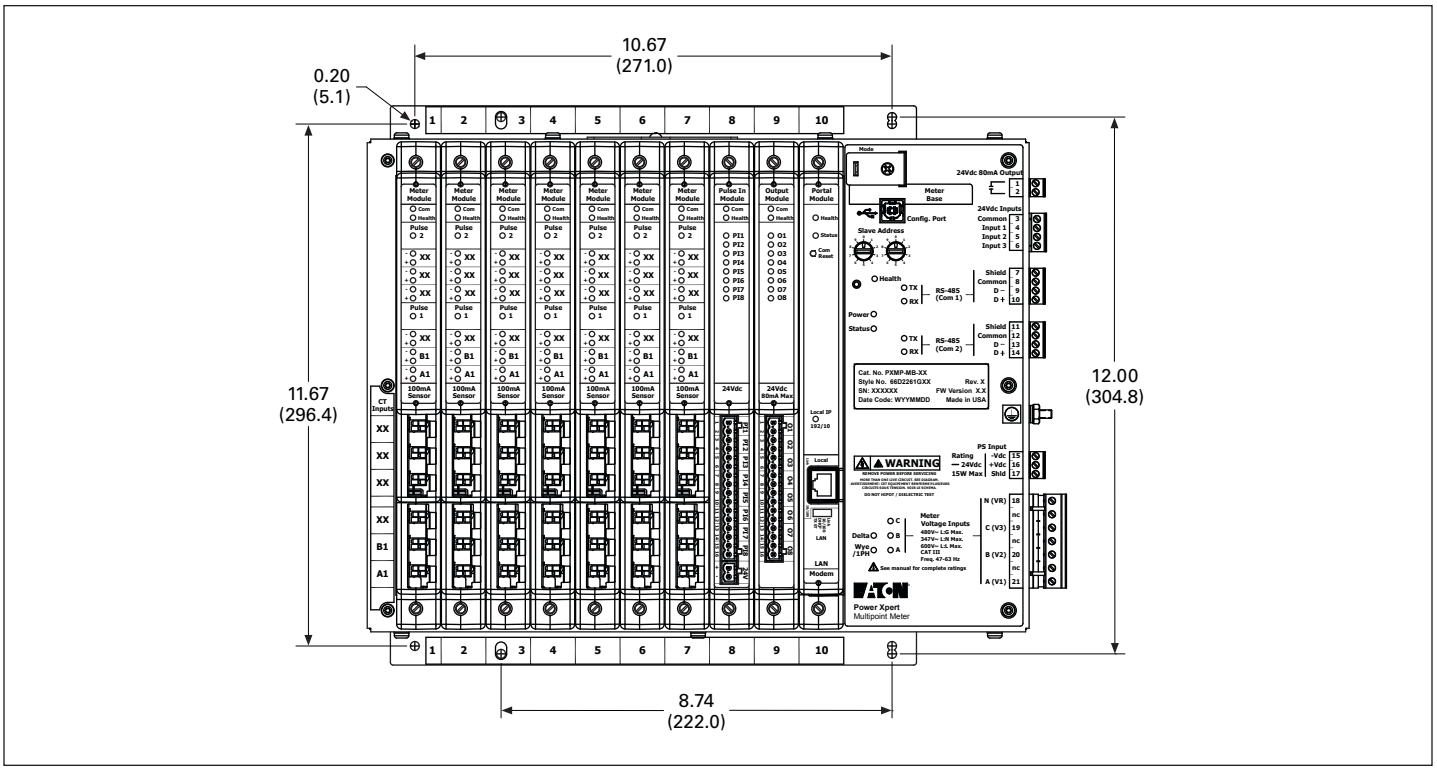

Figure 1. Single Unit—Front View

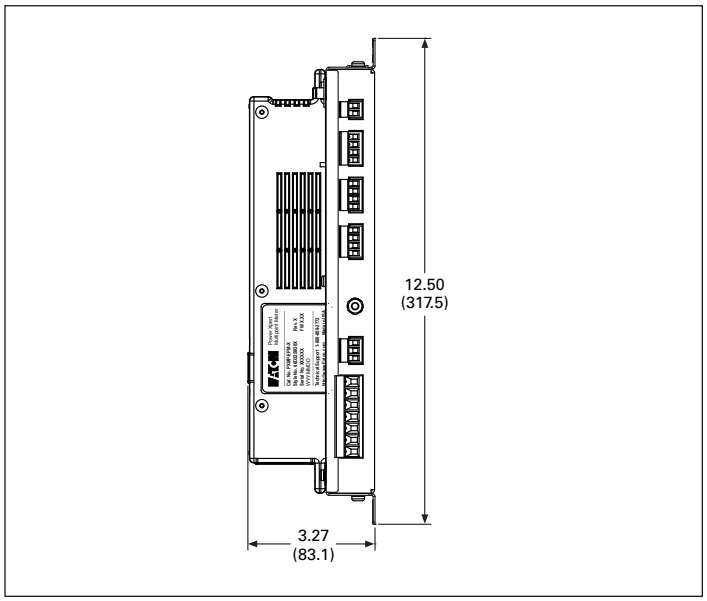

Figure 2. Single Unit—Side View

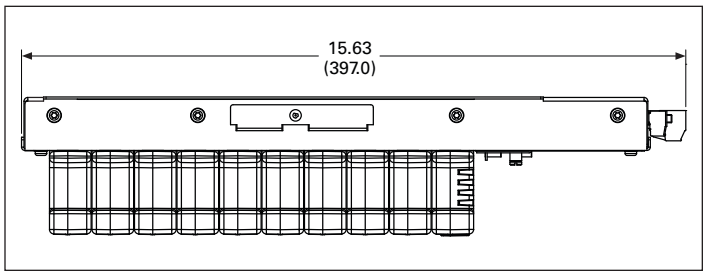

Figure 3. Single Unit—Top View

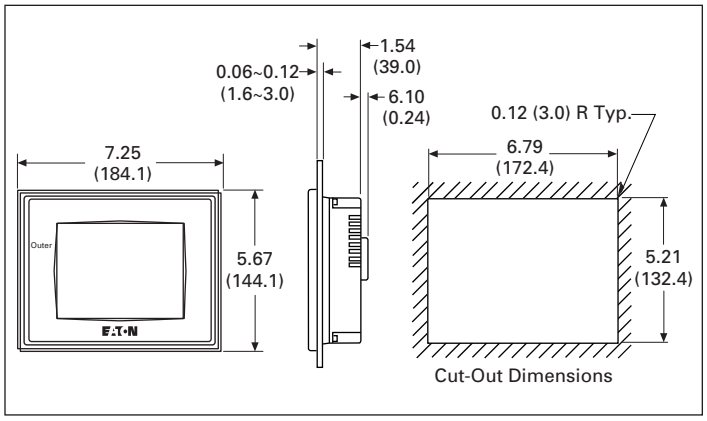

Figure 4. PXMP Color Touchscreen Display

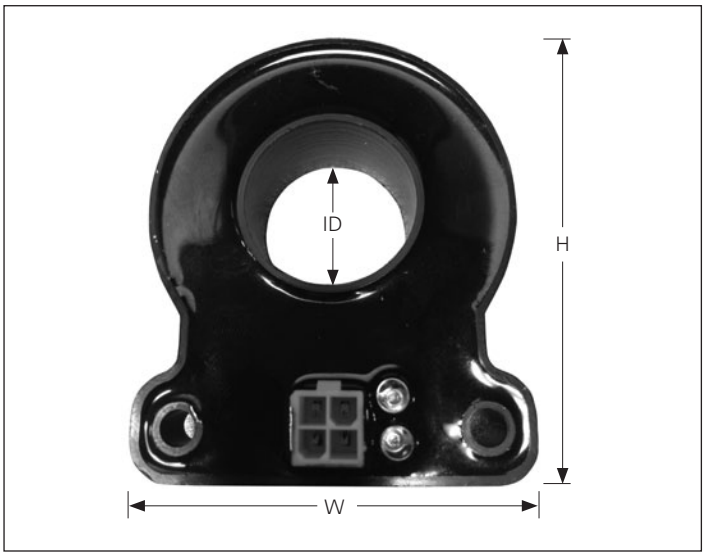

Figure 5. Current Sensor Dimensions

Table 2. Current Sensor Dimensions in Inches (mm)

Sensor	H	W	ID
PXMP-CS125	2.66 (67.6)	1.66 (42.1)	0.53 (13.5)
PXMP-CS250	2.96 (75.2)	2.42 (61.5)	1.12 (28.4)
PXMP-CS400	3.64 (92.5)	3.03 (73.2)	1.74 (44.2)

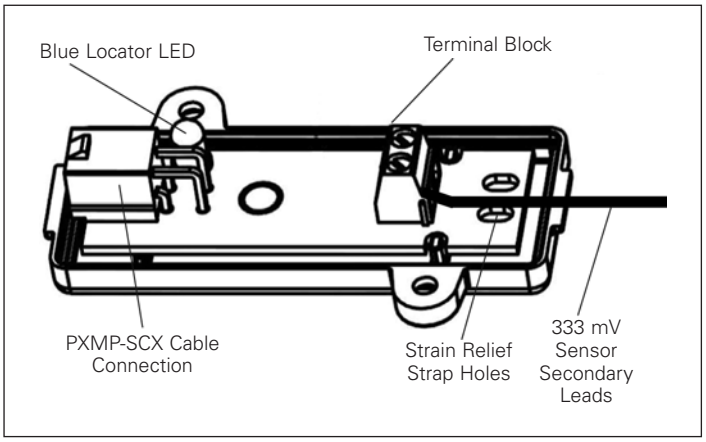

Figure 6. Open Interface Module (PXMP-IM333MV)

Wiring for PXMB-MB

Note: For all voltage connections—Fuses should be sized in accordance with best practices to protect the instrumentation wire.

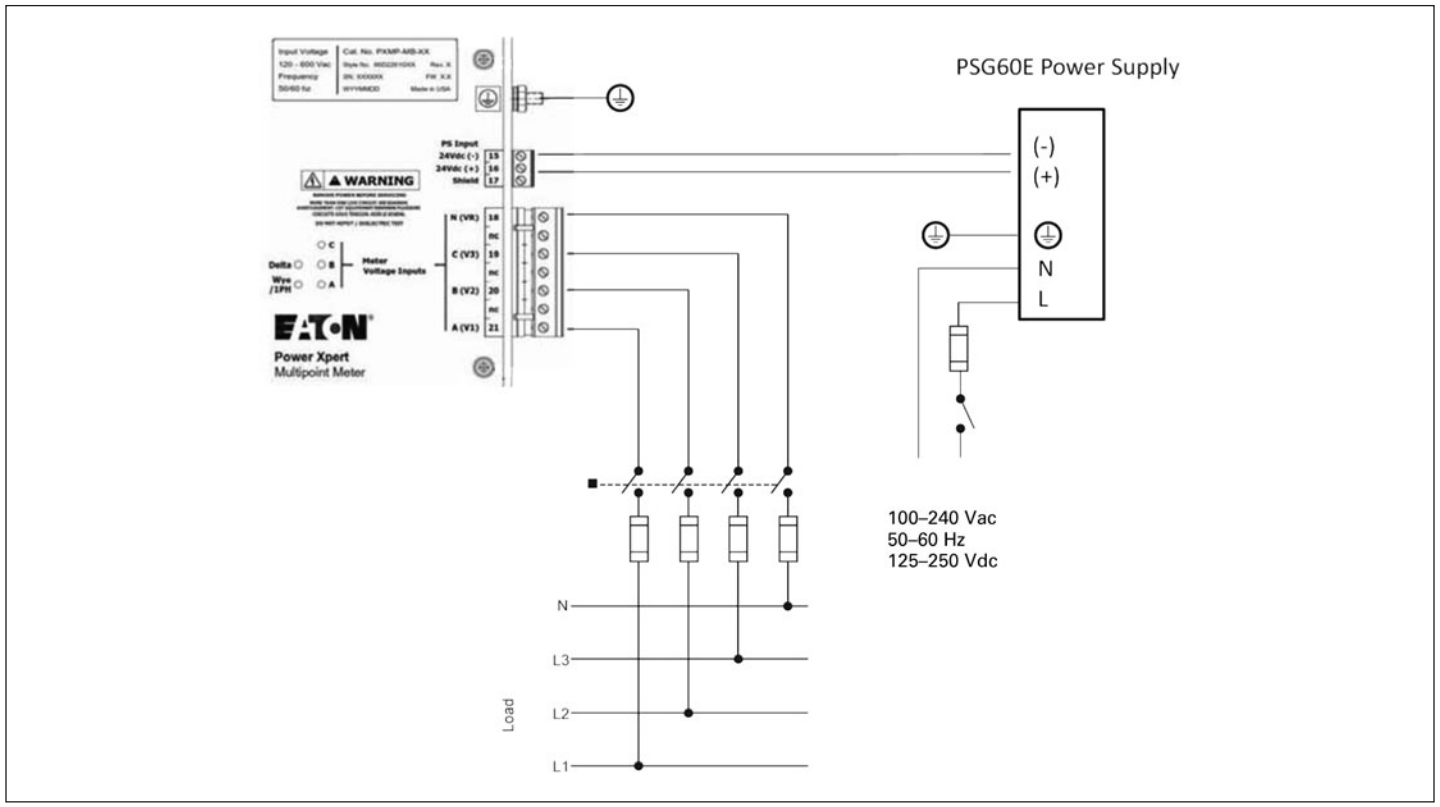

Figure 7. Four-Wire Wye Voltage Connection Inputs

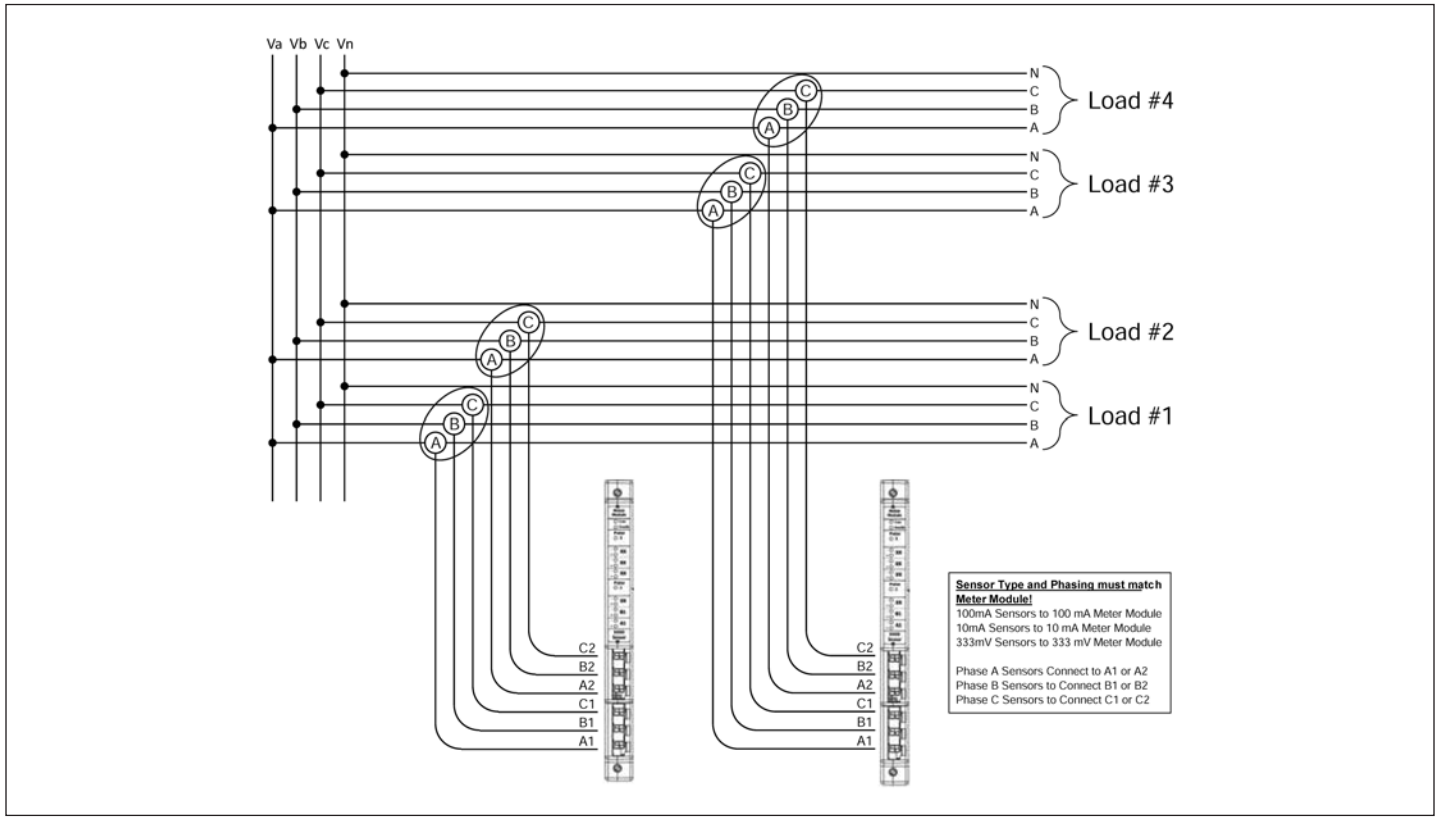

Figure 8. Three-Phase, Four-Wire Service Current Sensor Connections

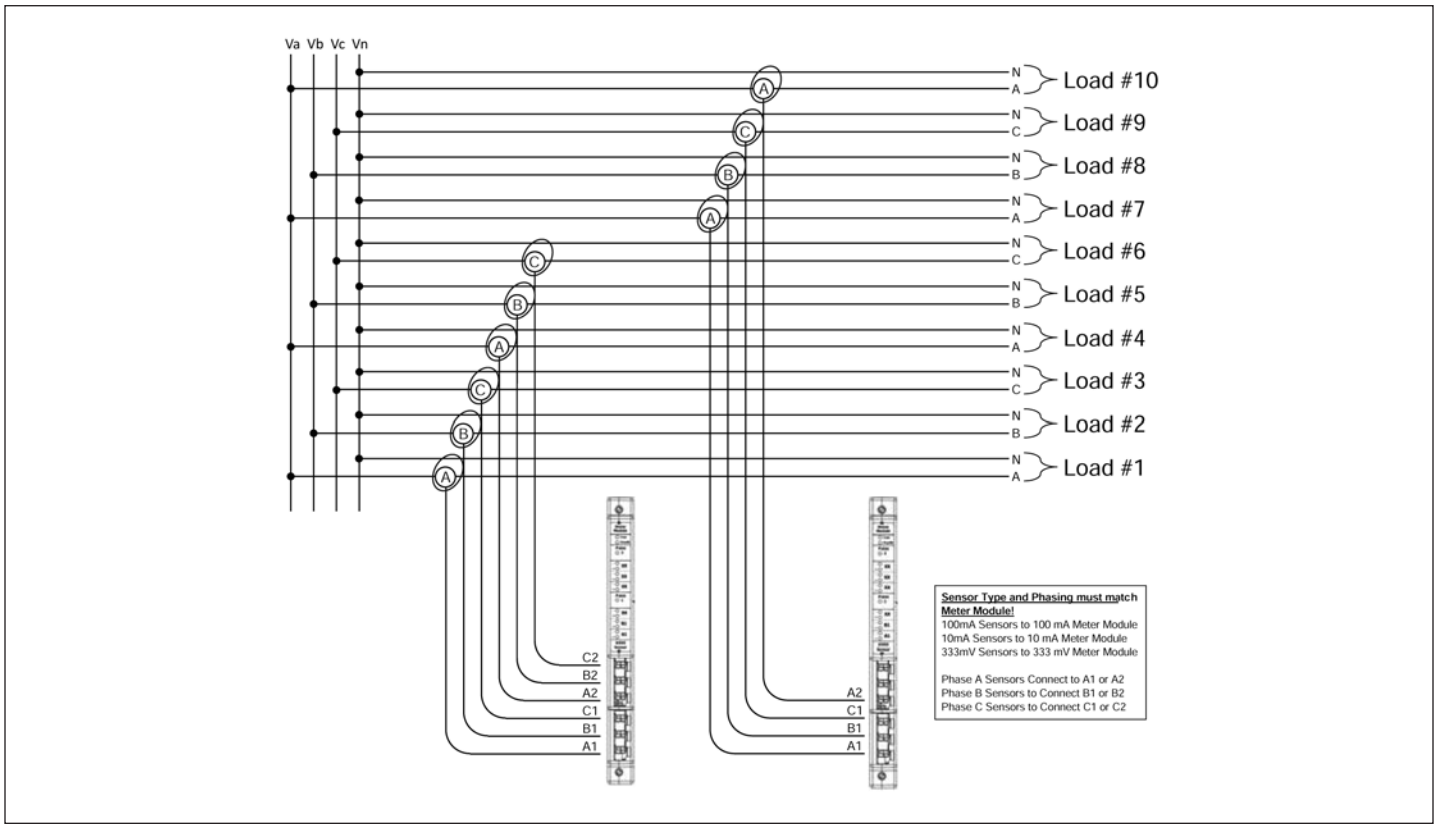

Figure 9. Three-Phase, Four-Wire Service (Ten Single-Phase, Single-Pole) Current Sensor Connections

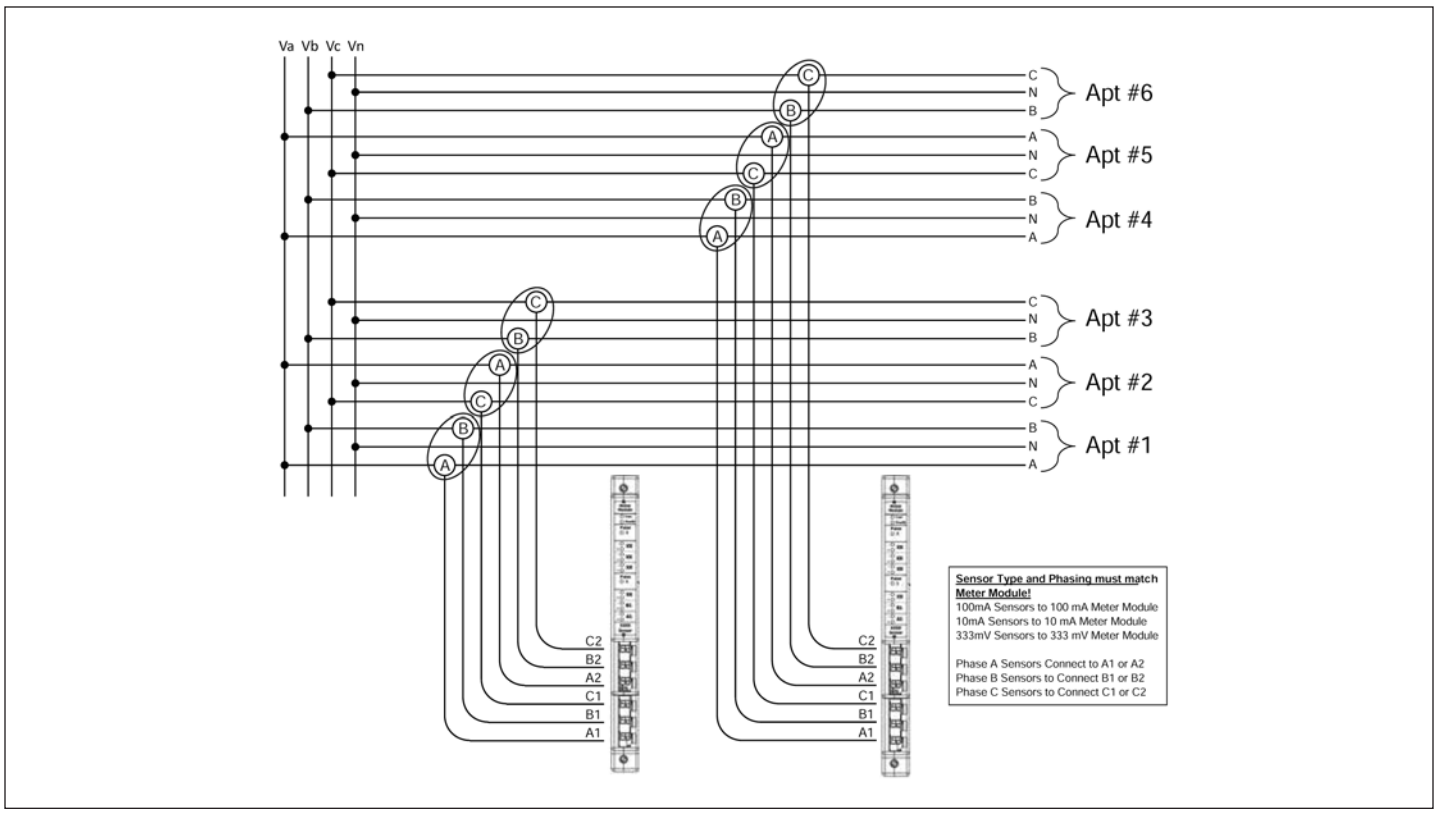

Figure 10. Network 120/208 Three-Wire Apartment Service Current Sensor Connections

Wiring for PXMB-MB-AB

Note: For all voltage connections—Fuses should be sized in accordance with best practices to protect the instrumentation wire.

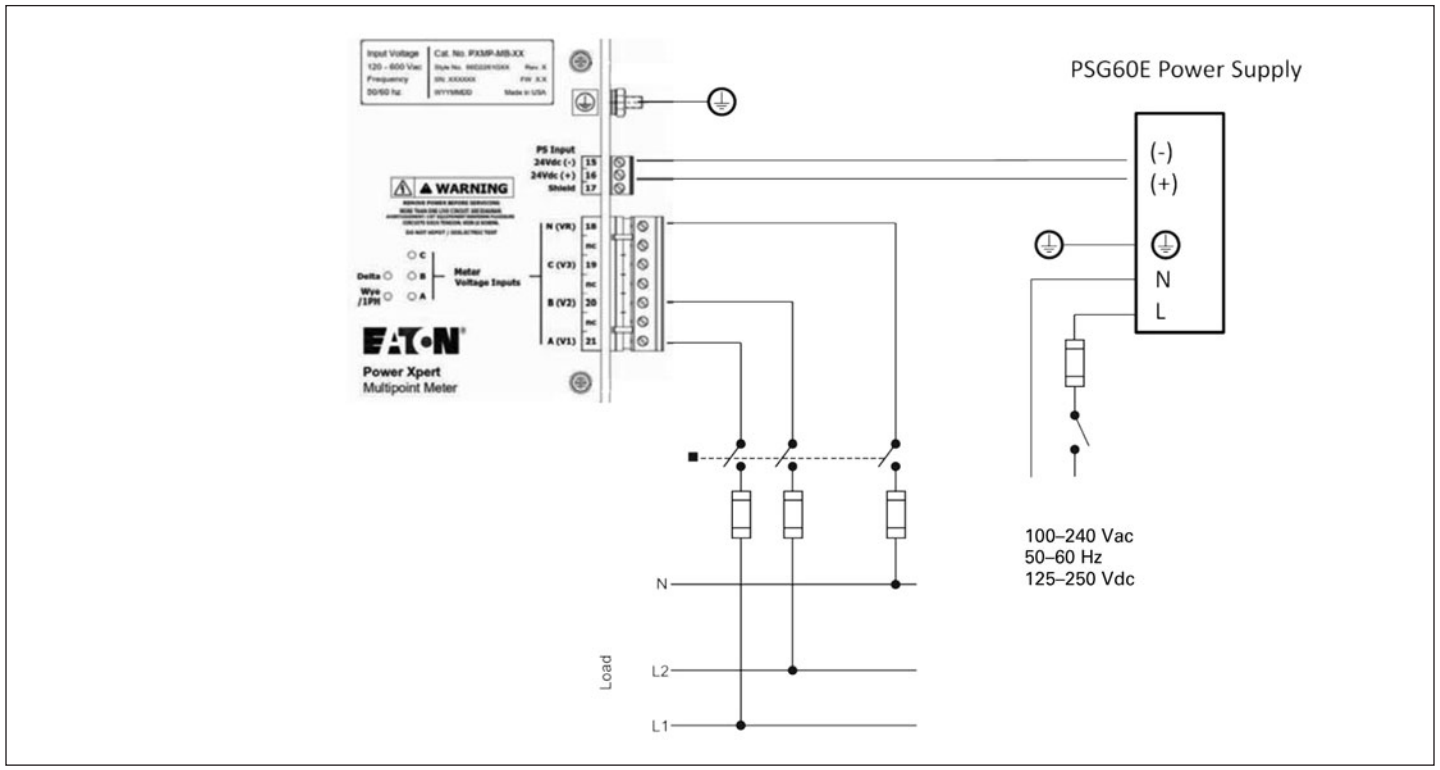

Figure 11. Single-Phase, Three-Wire 120/240 Voltage Connection Inputs

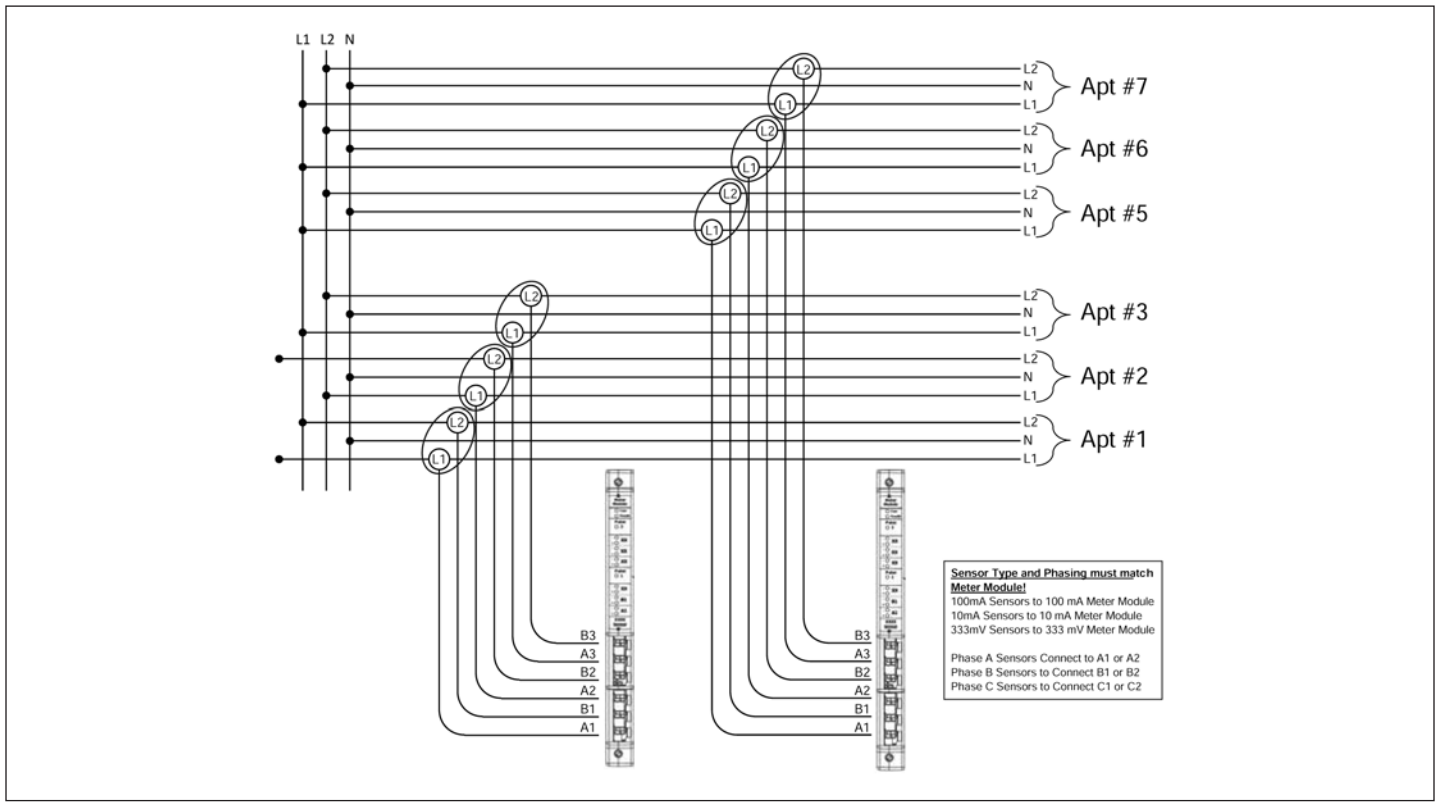

Figure 12. 120/240 Single-Phase, Three-Wire Service Current Sensor Connections

Specifications

Environmental

The PXMP Meter and current sensors must be housed in a NEMA or UL enclosure that keeps the internal environment within the PXMP's environmental specification ranges and provides suitable fire and mechanical protection in the end product installation.

- Temperature range: –20 to +70°C (–4 to +158°F)
- Storage temperature range: –40 to 85°C
- Humidity: 5–95% noncondensing environment
- Pollution degree: II
- Elevation: 0 to 9843 ft (0 to 3000m)
- Housing: IP20
- CE Mark
- EMC EN61326

Emissions conducted and radiated

- FCC part 15 class B
- CISPR 11 class B

Table 3. Electromagnetic Immunity

Standard	Description	Level
EN61000-4-2	ESD	3
EN61000-4-3	RF radiated	3
EN61000-4-4	Electrical fast transient	3
EN61000-4-5	Surge	3 ①
EN61000-4-6	RF conducted	3
EN61000-4-11	Volt sag/swell/variation	—

① 24 Vdc PXMP inputs are for a local bus that is surge level 2. PXG60E AC mains connection will support level 3.

Product safety

- IEC/EN61010-1
- UL 61010-1 File E185559
- CNL evaluation to CAN/C22.2 No 1010.1.92

Accuracy

- ANSI C12.20—Accuracy Class 0.5% with either CSXXX or PXMPCSXXX sensors
  - Measurement Canada Approval Pending

External circuit group specifications

PXMP-MB (-AB) meter base

Discrete output

- Quantity 1—solid-state relay Form A NO Bidirectional FET
- Polarity of external source is not important
- Isolation circuit to ground 2 kV/1 min.
- Maximum external source voltage 28 Vdc
- Line-to-line TVS clamp across switching element at 32 Vdc
- Solid-state relay on resistance 35 ohms maximum
- Maximum load current 80 mA
- Minimum pulse width 20 milliseconds
- Fixed 25 milliseconds for pulse initiator function
- Maximum pulse rate 25 Hz
- Wiring to two-position removable terminal plug
  - 12–18 AWG (3.31–0.82 mm^2), wire ferrules recommended
  - T1 (polarity not important)
  - T2 (polarity not important)

Discrete inputs

- Quantity 3, common circuits inputs 1–3
- Group isolation 2 kV
  - No input-to-input circuit isolation
- All inputs per module share a common external 24V (±10%) supply
  - 24V externally sourced between common and inputs
  - Design to interface with external dry contact
  - Input impedance ~2.2K ohms
  - Input current draw ~10 mA per input
- Minimum pulse width 10 milliseconds
- Maximum pulse rate 20 Hz
- Wiring to four-position removable terminal plug
  - 12–18 AWG (3.31–0.82 mm^2), wire ferrules recommended
  - T3—Common (connect ext. 24 common here)
  - T4—Input 1 (dry contact to 24V hot)
  - T5—Input 2 (dry contact to 24V hot)
  - T6—Input 3 (dry contact to 24V hot)

COM1 and COM2 RS-485 serial ports

- No D+/D– biasing reliance on fail-safe driver and biasing at Master
- Baud rate configurable between 9600–115K baud (default)
- Use cable designed for RS-485 communications
  - Low L:L capacitance
  - Impedance of ~100–120 ohms
  - Shield—Mylar for high frequency; Braid for low frequency
  - Separate common and shield for best noise immunity
  - Maximum cable length is 4000 ft (1219.2m) with 32 nodes at 19.2K baud increased data rates will reduce maximum cable distance
  - 2000 ft (609.6m) with 32 total nodes at 115.2K baud
- Isolation 300V to ground due to TVS diode clamps
- Modbus RTU slave protocol, address defined by rotary switch

- Green Rx and Red Tx LEDs per channel
- Data + > Data—during idle marked, logic 1 state
- End of Line Termination resistance should match cable impedance (typ. 100–120 ohms)
- Four-position removable terminal plug 18–22 AWG (0.82–0.33 mm^2) typical, wire ferrules recommended
  - COM1
    - T7—Shield
    - T8—RS-485 common
    - T9—Data –
    - T10—Data +
  - COM2
    - T11—Shield
    - T12—RS-485 common
    - T13—Data –
    - T14—Data +

PXMP-MB power supply input

- 24 Vdc ±20%
- 15W maximum load
- 1 kV isolation barrier internal to PXMP-MB
- Externally fuse circuit to protect wire
- Green power OK LED
- Three-position terminal block 16–12 AWG (1.31–3.31 mm^2), wire ferrules recommended
  - T15—24 Vdc – (common)
  - T16—24 Vdc + (Hot)
  - T17—Shield (optional) capacitively referenced to chassis ground for enhanced EMC performance

Meter voltage inputs

- Overvoltage CAT III
- Maximum voltage rating
  - 480VL:G (corner grounded delta)
  - 347VL:N
  - 600VL:L
- Frequency rating 47–63 Hz
- Metering range (temporary transitions)
  - 30–700VL:N
  - 30–700VL:L
- Abuse withstand rating 1000V sustained
- High pot withstand rating 2500V/1min
- Input impedance 4M ohms
- Fuse inputs rated to protect wiring to mains. External fuses must be installed between the meter voltage terminal and the mains disconnect switch to the main lines to protect the lines. 600V 1 A BUSS type KTK-R-1 Fast Acting or equivalent fuses are recommended.
- Wiring to removable terminal plug 10–18 AWG (5.26–0.82 mm^2), wire ferrules recommended
  - T18—N (VR)
  - T19—C (V3)
  - T20—B (V2)
  - T21—A (V1)

PXMP meter modules (PXMP-MMs)

Compatible with all PXMP Meter Base slots 1–10 LED indicators:

- Health and status green, blink to show activity
- Pulse energy output one red per group of three loads
- Load energy direction red/green pair per load

All variations support six load inputs.

Current sensor connection is one 2 x 2 connector per load.

Compatible with PXMP-SCXX sensor cables, total cable length to the sensor should not exceed 30 ft (1.94m).

Note that -AB suffix only affects what voltage channels the loads are paired with for metering purposes.

PXMP-MM10MA supports the CSXXX series of 10 mA maximum secondary output current transformers.

PXMP-MM100MA supports the PXMP-CSXXX series of 100 mA maximum secondary output current transformers.

PXMP-MM333MV supports 333 mV maximum secondary output current transformers with the use of the PXMP-IM333MV interface module.

PXMP digital output module (PXMP-DOM)

- Compatible with all PXMP-MB slots 1–10
- LED indicators
  - Health and status green, blink to show activity
  - Output On/Off status one green per output
  - Eight individual solid-state relay outputs
- Each circuit rated for 24 Vdc (±20%) with an 80 mA load maximum
- 24 Vdc is externally sourced
- Group isolation to ground 2 kV
- Each circuit has its own separate common, circuit-to-circuit isolation 120V
- 16-position removable terminal plug
- 12–18 AWG (3.31–0.82 mm^2), wire ferrules recommended

PXMP pulse input modules (PXMP-PIMs)

- Compatible with all PXMP-MB slots 1–10
- LED indicators
  - Health and status green, blink to show activity
  - Input On/Off status one green per pulse input
- Eight pulse inputs to external dry contacts
- Maximum pulse rate is 20 Hz
- Minimum pulse width is 20 milliseconds
- External circuit groups rated for 24 Vdc (±20%)
  - All circuits share the same electrical common
- External supply connects to the module with a two-position removable terminal plug
- The supply is internally fanned out to all circuits
- Group isolation limited to 300V to ground due to TVS diode clamp
- Input impedance ~2.2K causing a 10 mA load per input when energized
- External circuit groups connect with a 16-position removable terminal plug
  - Terminals support 12–18 AWG (3.31–0.82 mm^2), wire ferrules recommended

PXMP energy portal module (PXMP-EPM)

- Only functionally compatible with PXMP-MB slot 10
- LED indicators
  - Top health and status green, blink to show activity
  - Com. reset button—reset to defaults
  - Local IP 192/10
  - RJ45 front-facing Ethernet configuration port LEDs
    - Link (Tx/Rx blink)
    - 10/100 speed
- LED four-stack for bottom LAN/WAN Ethernet port
  - Link (Tx/Rx blink)
  - 10/100 speed
  - DHCP/Fixed
  - TX active
- Config. Ethernet RJ45 Cat5 STP/UTP
  - 10Base-T/100Base-Tx
  - Auto crossover capability supported
  - Java Web browser interface
- Bottom facing LAN/WAN Ethernet port
  - RJ45 Cat5 STP/UTP 10Base-T/100Base-Tx
  - STP required for full electromagnetic immunity
  - Auto crossover capability supported
  - Supports Modbus TCP and Java Web browser interface
- Bottom-facing telephone modem interface
  - Modem type V92/56K baud
  - RJ11 field interface

Table 4. Power Xpert Multi-Point Meter System—Hardware Specifications

Components	Field Circuit	Power Source	Rated Voltage	Rated Current	Circuit Impedance	Isolation	Note 1	Note 2
PXMP-MB PXMP-MB-AB	Digital output	External	24 ±20% ①	0.080A maximum	35 ohms maximum	2.0 kV	—	—
	Digital input	External	24 ±20% ①	0.01A	2.22K	2.0 kV	Opto drops supply by 2V	Group are electrically common
	COM1 RS-485	Internal	5V ①	—	50–60 ohms	300V	TVS diode clamped to PE	—
	COM2 RS-485	Internal	5V ①	—	50–60 ohms	300V	TVS diode clamped to PE	—
	Power supply input	External	24 ±20% ①	0.7A maximum	N/A	1.0 kV	Installation Class II input	15W maximum
	Voltage inputs A (V1)/ B (V2)/ C (V3)/ N (VR)	External mains	480V L:G ②	0.12 mA	4M ohms	N/A	Installation Class III	High pot 2500V/1 minimum
			347V L:N ②	0.09 mA	4M ohms	N/A	Installation Class III	High pot 2500V/1 minimum
			600V L:L ②	0.09 mA	4M ohms	N/A	Installation Class III	High pot 2500V/1 minimum
PXMP-MM100MA	CT secondary	External	N/A	100 mA	14.6 ohms	N/A	20% over-range	See sensor for primary isolation
PXMP-MM10MA	CT secondary	External	N/A	10 mA	67 ohms	N/A	20% over-range	See sensor for primary isolation
PXMP-MM333MV	CT secondary	External	0.333V ②	N/A	50,000 ohms	N/A	20% over-range	See sensor for primary isolation
PXMP-DOM	Digital output	External	24 ±20% ①	0.080A maximum	10 ohms maximum	2 kV group	120V isolation circuit-to-circuit	Isolation dependent on external source
PXMP-PIM	Pulse input	External	24 ±20% ①	0.01A	2.22K ohms	300V to ground	TVS diode clamped to PE; group isolated, all circuits common to 24V external source	Note: Opto creates 2.2V drop sourced by 2.2K ohms; isolation dependent on external source
PXMP-EPM	Ethernet 100 Bt	Internal	—	N/A	N/A	1 kV	—	—
	POT modem	Internal	—	N/A	N/A	—	—	—

① DC.

② AC RMS.

Catalog information

The Power Xpert Multi-Point Meter, current sensors, and other accessories can be ordered from Eaton distributors. Refer to the following catalog numbers when ordering.

Table 5. Power Xpert Multi-Point Meter Products

Product Description	Catalog Number
Meter Bases and Meter Modules with ABCN Voltage Inputs	
PXMP meter base—three-phase with ABCN voltage inputs	**PXMP-MB**
PXMP meter module with six 100 mA inputs for use with PXMP current sensors	**PXMP-MM100MA**
PXMP meter module with six 10 mA inputs for use with IQMESII current sensors	**PXMP-MM10MA**
PXMP meter module with six 333 mV inputs for use with 333 mV current sensors	**PXMP-MM333MV**
Meter Bases and Meter Modules with ABN Voltage Inputs	
PXMP meter base—single-phase, three-wire with ABN voltage inputs	**PXMP-MB-AB**
PXMP meter module with six 100 mA inputs for use with PXMP current sensors	**PXMP-MM100MA-AB**
PXMP meter module with six 10 mA inputs for use with IQMESII current sensors	**PXMP-MM10MA-AB**
PXMP meter module with six 333 mV inputs for use with 333 mV current sensors	**PXMP-MM333MV-AB**
IO Modules	
PXMP meter pulse input module with eight inputs	**PXMP-PIM**
PXMP meter digital output module with eight outputs	**PXMP-DOM**
Communication Module	
PXMP meter energy portal module	**PXMP-EPM**
Current Sensor Kits	
KIT, PXMP CS125 sensor, quantity of 3	**PXMP-CS125-3**
KIT, PXMP CS250 sensor, quantity of 3	**PXMP-CS250-3**
KIT, PXMP CS400 sensor, quantity of 3	**PXMP-CS400-3**
Current Sensor Cable Kits	
KIT, PXMP sensor cable, 4 ft (1.2m), quantity of 3	**PXMP-SC4-3**
KIT, PXMP sensor cable, 6 ft (1.8m), quantity of 3	**PXMP-SC6-3**
KIT, PXMP sensor cable, 8 ft (2.4m), quantity of 3	**PXMP-SC8-3**
KIT, PXMP sensor cable, 12 ft (3.7m), quantity of 3	**PXMP-SC12-3**
Current Sensor Extension Cable Kits	
KIT, PXMP sensor extension cable, 8 ft (2.4m), quantity of 3	**PXMP-SCE-8-3**
KIT, PXMP sensor extension cable, 16 ft (4.9m), quantity of 3	**PXMP-SCE-16-3**
Interface Modules	
PXMP current sensor interface module for 333 mV, kit X 3	**PXMP-IM333MV-3**

Note: Total sensor lead length must not exceed 28 ft (8.5m).

The Pulse Input Module (PXMP-PIM) can be used to totalize pulse outputs from water meters, gas meters, steam meters, or even old electrical meters with KZ pulse outputs. The PXMP-PIM can also be used for status monitoring in applications where status indication updates of 6 seconds over Modbus satisfies the application requirement.

Support products for the Power Xpert Multi-Point Meter include the HMI display, IMPCABLE, and power supplies as described in **Table 6**.

Table 6. Power Xpert Multi-Point Meter Support Products

Product Description	Catalog Number
Communication cable, 1000 ft (305m), 600V insulation	**IMPCABLE**
PXMP meter display—6-inch color touchscreen (with cable)	**PXMP-DISP-6**
Power supply—single-phase 90–264 Vac, 24 Vdc at 2.5A	**PSG60E**
Power supply—three-phase 360–575 Vac, 24 Vdc at 2.5A	**PSG60F**
Power supply—three-phase 600 Vac, 24 Vdc	**PSS55D**

Table 7. Meter Selection

	Meter Base		Typical Applications			
Meter Module	**Three-Phase Application or Single-Phase with ABCN**	**Single-Phase Application with ABN**	**New Switchboards PXMP Current Sensors, Solid Core, PXMP-CSXXX, Ampere Ratings**	**Retrofit Existing IQMESII Sensors, Solid Core, CS-XXX, Ampere Ratings**	**Enclosed PXMP 333MV Sensors, Split Core, CS-SP-X-XXXX-333MV, Ampere Ratings**	**Enclosed PXMP Interface Modules**
PXMP-MM100MA	**PXMP-MB**	—	125, 250, 400	—	—	—
PXMP-MM333MV	**PXMP-MB**	—	—	—	100, 200, 300, 400, 600, 800, 1000, 1200, 1600, 2000 ①	**PXMP-IM333MV**
PXMP-MM10MA	**PXMP-MB**	—	—	5, 50, 70, 125, 200, 400	—	—
PXMP-MM100MA-AB	—	**PXMP-MB-AB**	125, 250, 400	—	—	—
PXMP-MM333MV-AB	—	**PXMP-MB-AB**	—	—	100, 200, 300, 400, 600, 800, 1000, 1200, 1600, 2000 ①	**PXMP-IM333MV**
PXMP-MM10MA-AB	—	**PXMP-MB-AB**	—	5, 50, 70, 125, 200, 400	—	—

① For applications requiring more than 2000A current sensors, use a CS005 with 5A CT in conjunction with PXMP-MM10MA.

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Power Xpert Branch Circuit Monitor

Introduction

The Power Xpert® Branch Circuit Monitor (PXBCM) meter module strip provides ANSI C12.20 0.5% revenue class branch circuit metering in panelboard applications for 1-inch pole spacing branch circuit up to 100 A. Factory-installed meter module strips are available with 9, 15, and 21 CT assemblies, enabling ANSI C12.20 0.5% accuracy metering of branch circuits in 18, 30, or 42 circuit panels. Each meter module strip is equipped with four additional auxiliary 333 mV current sensor inputs with ANSI 0.5% metering accuracy for metering of additional circuits such as panelboard mains or other circuits with greater than 100 A or 1-inch pole spacing. Each PXBCM meter module can be used to meter circuits from separately derived voltage sources because each meter module has its own metering voltage inputs. The branch circuit monitor meter base supports up to four meter module strips (PXBCM-MMS), providing metering of 84 branch circuits and 16 auxiliary 333 mV sensors for a total of 100 metered poles.

The PXBCM meter base supports both RS-485 and ethernet communications. The meter base includes an embedded web server for user-friendly device configuration and graphical data display. Modbus® RTU, Modbus TCP, and BACNet/IP communications are supported for connection to communications gateways or host software. An optional graphics display can provide easy local access to metered data. When mounted in a panelboard or a switchboard, the PXBCM provides customers with an integrated power distribution and energy metering solution that saves space, reduces installation labor, and lowers total cost.

The Power Xpert BCM Meter Module External (PXBCM-MME) was designed for retrofit applications, or for installation in power distribution assemblies where 1-inch pole spacing 100 A CT strips cannot be applied. The PXBCM MME supports connection to either 25 333 mV sensors or 21 100 mA sensors and 4 333 mV sensors for power and energy metering. The meter module external is factory calibrated to meet the ANSI C12.20 0.5% accuracy limits for a transformer rated meter. When used with revenue accuracy 333 mV current sensors, the PXBCM MME measures energy consumption with ANSI C12 meter accuracy for transformer rated metering applications.

Eaton-recommended 100 mA current sensors make this version of the MME the preferred choice for regulated revenue metering applications.

Powering Business Worldwide

Product description

PXBCM overall product concept architecture

System features

Each PXBCM meter base, equipped with four meter modules, can measure up to any of the following number of circuits:

- 100, two-wire (single-pole)
- 48, three-wire (two-pole)
- 32, four-wire (three-pole)

The circuits listed above can be mixed provided that multipole circuits are configured to be on the same meter module. The meter provides current; voltage; power factor; demand and active, and real power (VA, kW); and active and real energy (VA, kWh) measurements for each load.

System communications

With the PXBCM's built-in communication capabilities, remote meter reading and monitoring functions can be integrated into both new and retrofit applications.

- Standard Modbus RTU and Modbus TCP / HTTP communications

System software capability

The PXBCM:

- Can be used as part of an electrical energy monitoring system using Modbus communications
- Can be remotely monitored and configured via onboard web pages
- Platform independent HTML5 web page technology allows remote configuration and monitoring on any browser equipped tablet or other mobile device
- Compatible with third-party software platforms and interface devices

How to configure and commission

The PXBCM is fully configurable using its own embedded web server.

- Web server configuration includes combining multiple poles into aggregated virtual meters
- Virtual meters can be assigned user names for easy identification

Metered values

Table 1. Metered values

	Main	Channel	Virtual meter (aggregated)
Current (I)	IA, IB, IC	Per pole	Average
	Minimum/maximum	Maximum	Maximum average
Real power (W)	A, B, C, total	Per pole	Total
	Minimum/maximum	Max	Max total
Apparent power (VA)	A, B, C, total	Per pole	Total
	Minimum/maximum	Maximum	Maximum total
Voltage L–N (V)	AN, BN, CN	N/A	Average
	Min/Max	N/A	Maximum average
Voltage L–L (V)	AB, BC, CA	N/A	Average
	Minimum/maximum	N/A	Maximum average
Frequency	System	N/A	Average
	Minimum/maximum	N/A	Maximum average
Power factor	System	Per pole	Total
	Minimum/maximum	N/A	N/A
Ampere demand	A, B, C	Per pole	N/A
	Peak A, B, C	Peak per pole	N/A
Forward watt demand	Total	Per pole	Total
	Peak Total	N/A	Peak total
Reverse watt demand	Total	Per pole	Total
	Peak Total	N/A	Peak total
Forward energy	System	Per pole	Total
Reverse energy	System	Per pole	Total

Typical submetering applications

The PXBCM is ideally suited to handle submetering in low-voltage power distribution equipment applications such as distribution boards in multi-tenant buildings, PDUs in data center applications, and separately installed enclosures for retrofit metering needs.

The PXBCM provides a cost-effective solution for residential or commercial metering installations. Typical installations include:

- High-rise buildings
- Government institutions
- K–12, universities, and campuses
- Office buildings
- Medical facilities
- Apartment and condominium complexes
- Airports
- Shopping malls
- Industrial sites
- Mixed-use facilities

Features

Each PXBCM meter base monitors power and energy from up to four meter modules, which represents a total of up to 100 current sensors.

- Built-in Modbus RS-485 and ethernet communication interfaces
- Monitors single-phase and three-phase loads from 120 to 347 Vac L–N (control power transformers required above 277 Vac)
- Monitors current, voltage, power factor, frequency, power, and energy

PXBCM components—meter base, MMS, MME, display

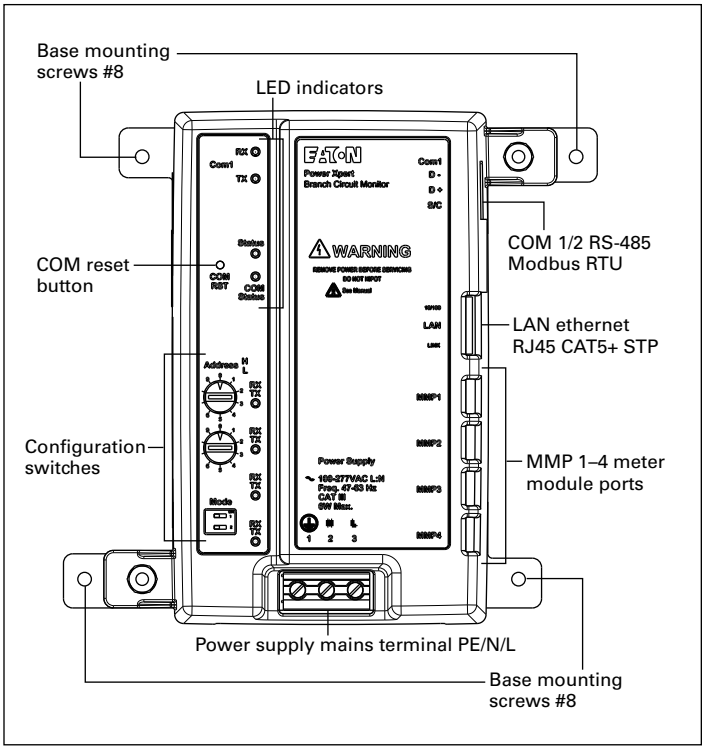


Figure 1. Meter base

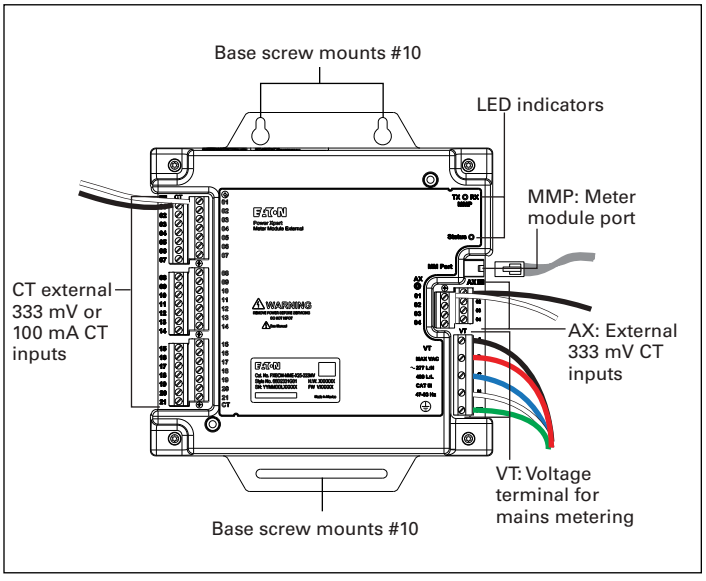


Figure 2. Meter module external

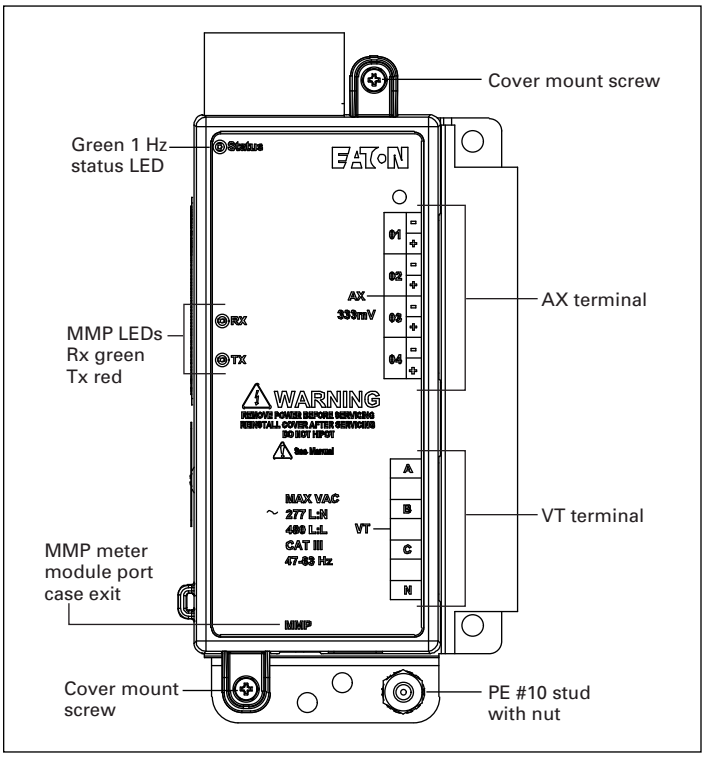


Figure 3. MMS left oriented strip

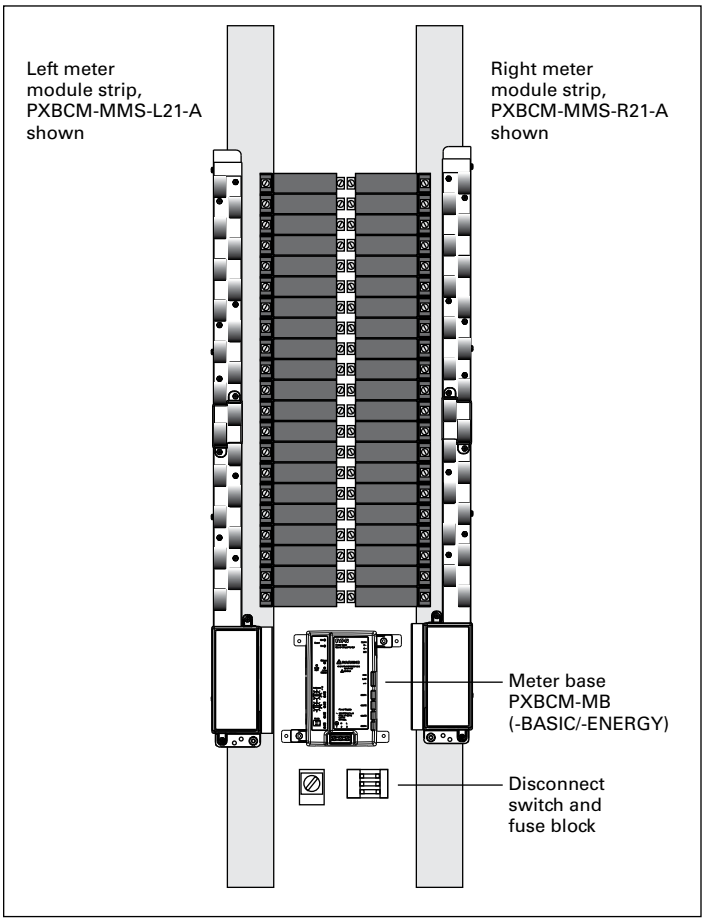


Figure 4. Typical OEM arrangement with meter base and meter module strips

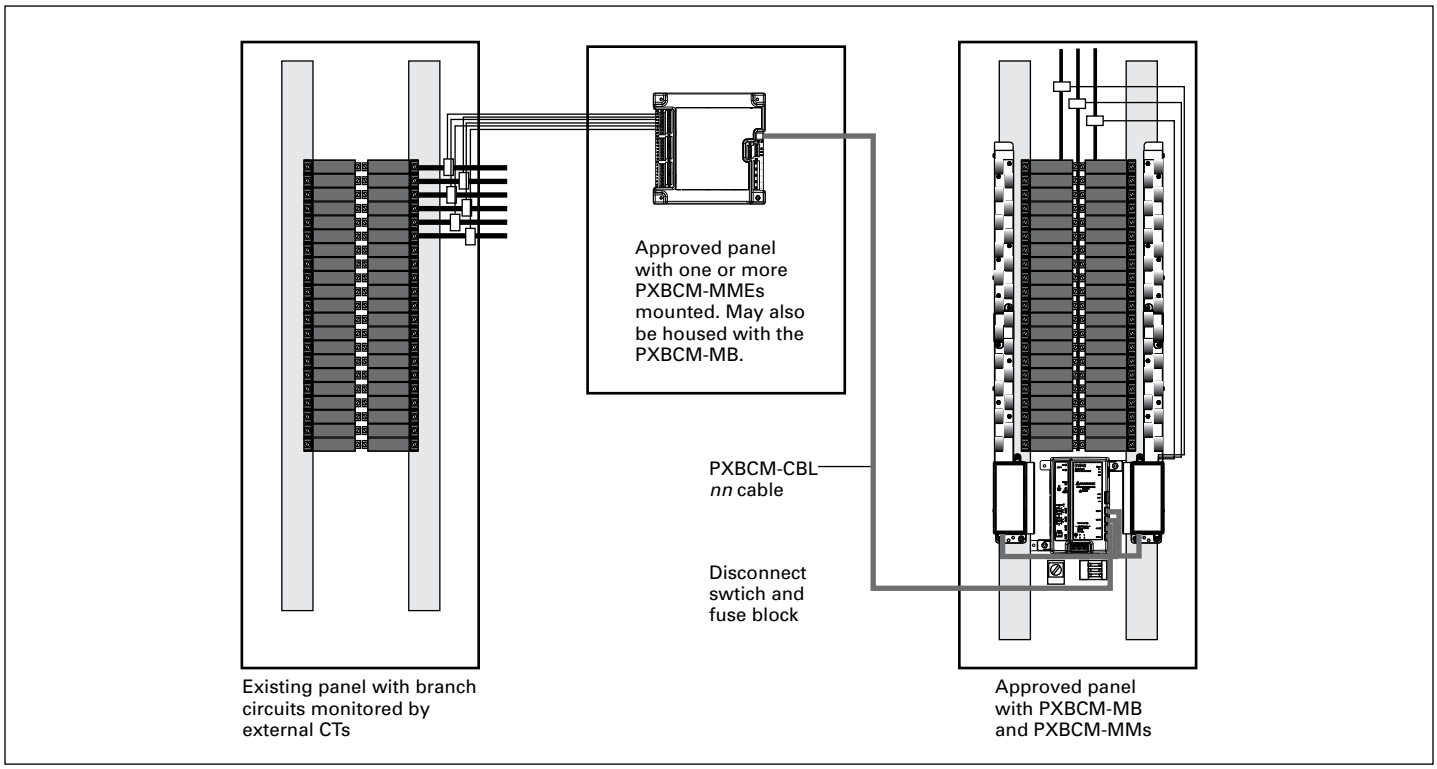


Figure 5. Hybrid system—retrofit of external meter module in existing panelboard tied to meter base in OEM panelboard with meter module strips

Dimensions

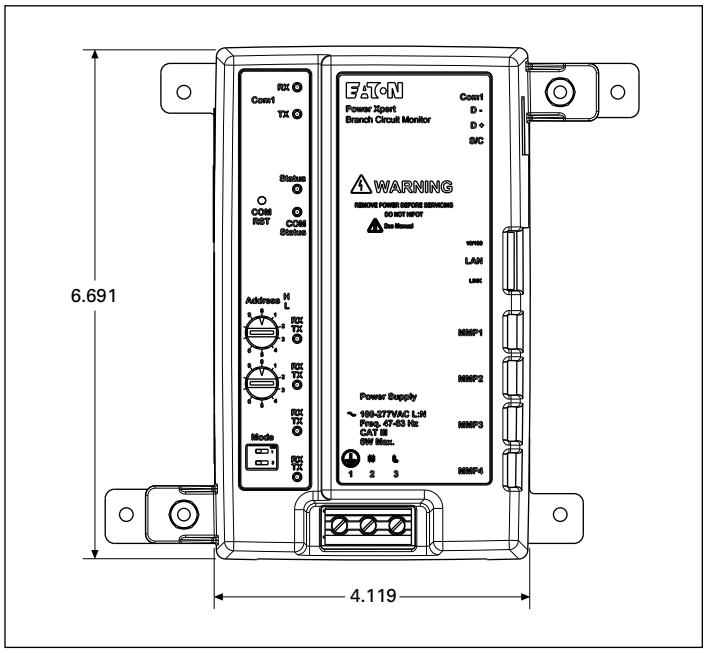


Figure 6. Meter base mounting dimensions

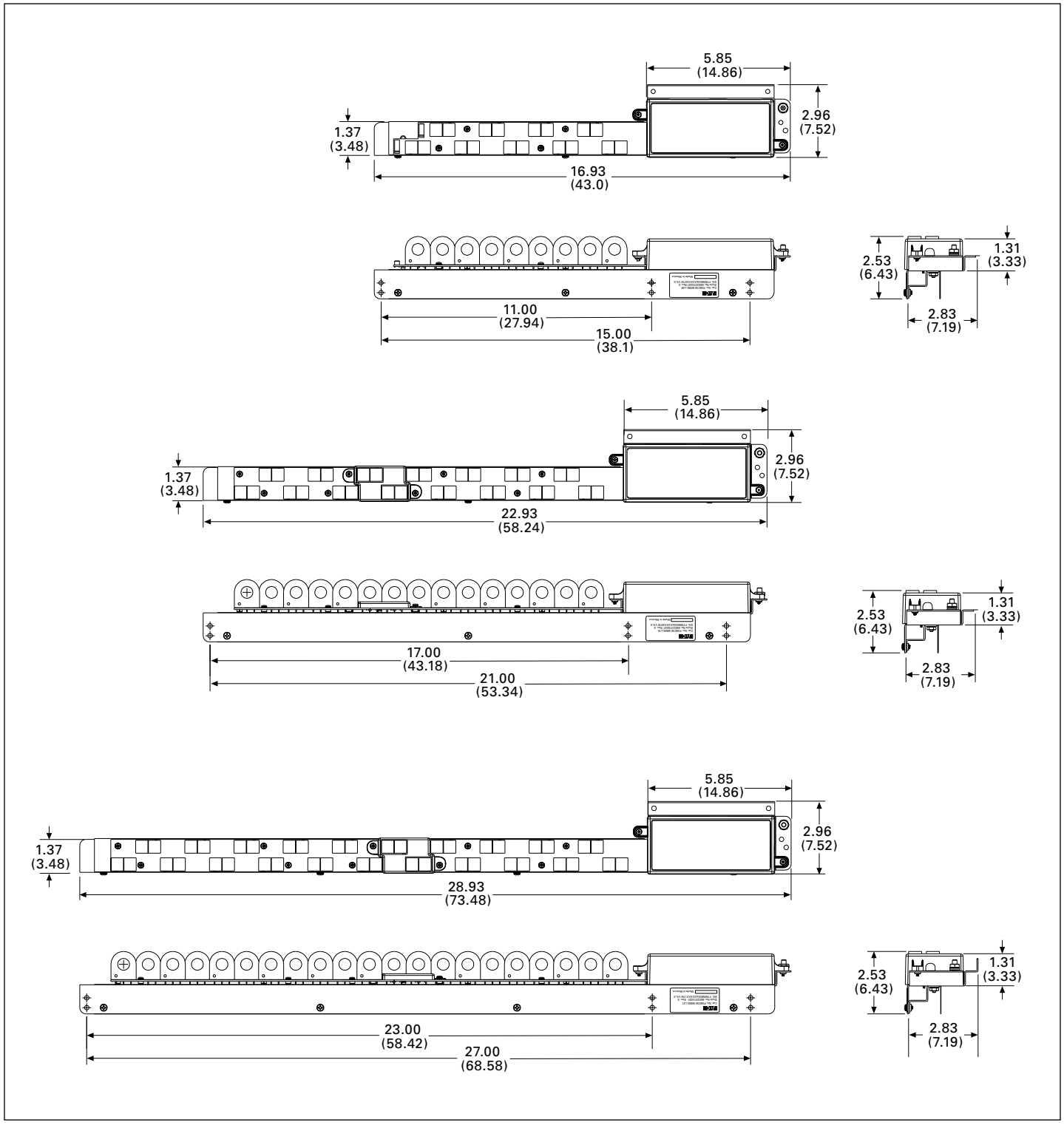


Figure 7. MMS mounting dimensions in inches (cm)

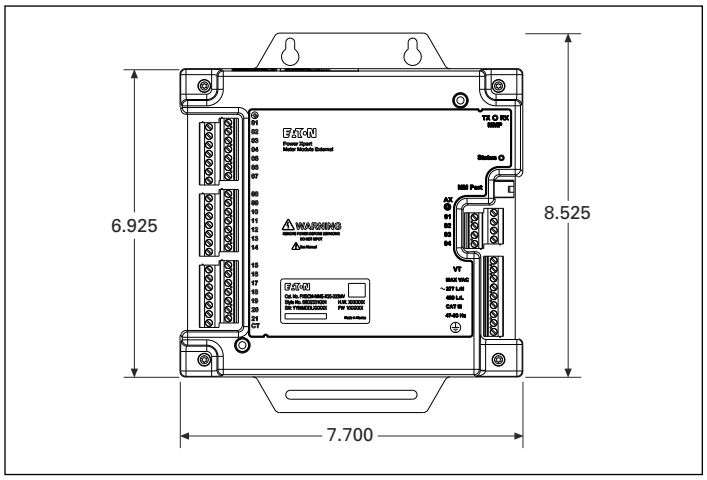


Figure 8. MME mounting dimensions

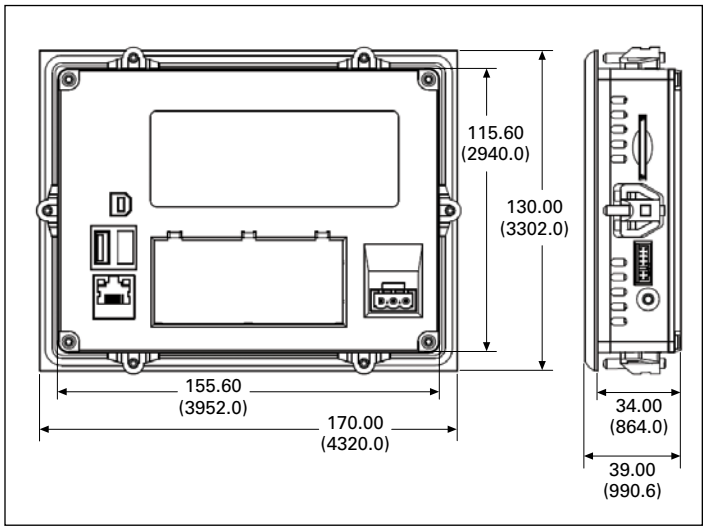


Figure 9. Display mounting dimensions

Wiring diagram examples

Shorting block recommended for 100 mA MME inputs.

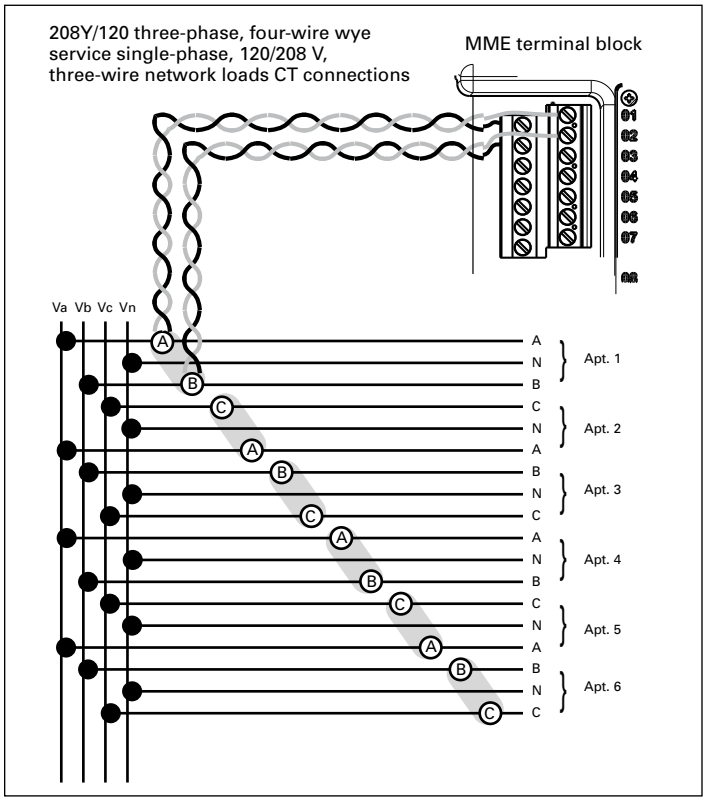


Figure 10. 120/208 V, three-wire apartment service

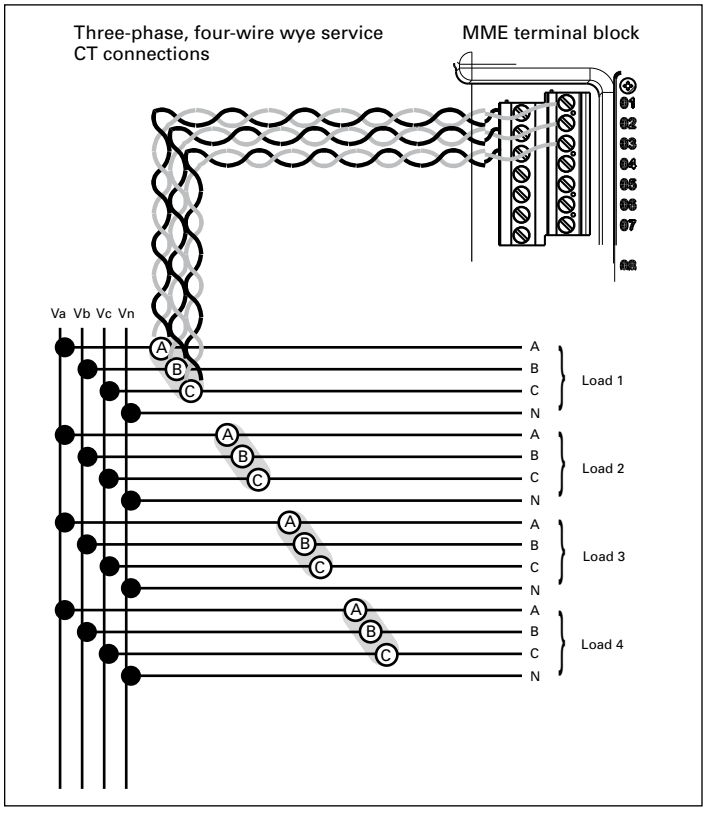


Figure 11. Three-phase, four-wire wye

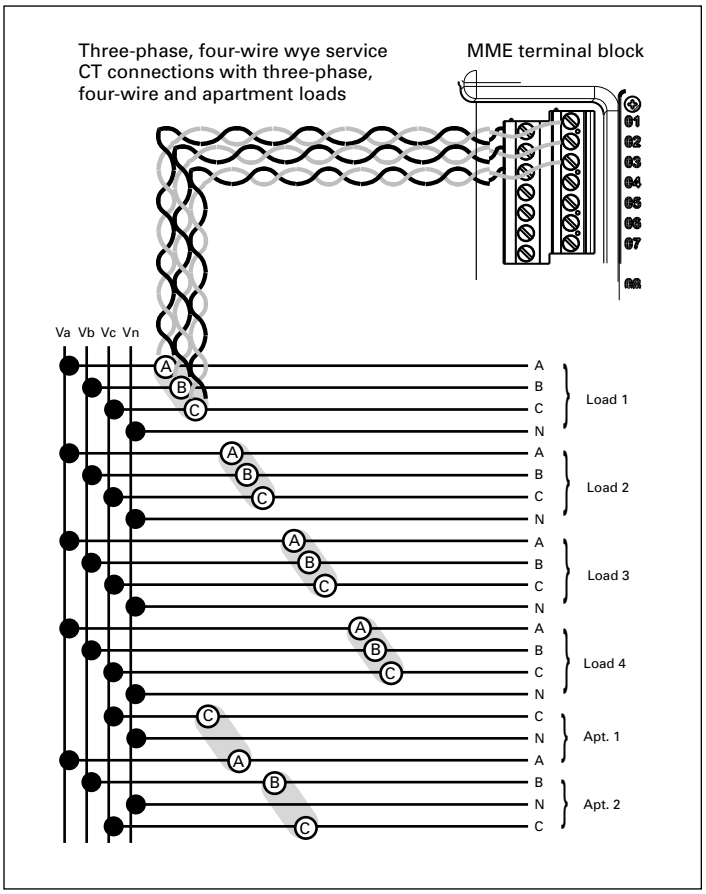


Figure 12. Three-phase, four-wire wye

Figure 10, **Figure 11**, and **Figure 12** are representative of wiring configurations that can be used with the PXBCM. **Table 2** shows the supported service voltage system types and corresponding meter load options.

Table 2. Service voltage system

Service voltage system type	Virtual meter load options
Three-phase, four-wire wye	Three-phase, four-wire wye
	Three-phase, three-wire delta
	120/208 three-wire apartment
	Single-phase, two-wire
Three-phase, three-wire delta	Three-phase, three-wire delta
Three-phase, four-wire delta	Three-phase, three-wire delta
	Single-phase, two-wire
	Single-phase, three-wire
Single-phase, three-wire	Single-phase, three-wire
	Single-phase, two-wire
Single-phase, two-wire	Single-phase, two-wire

Product specifications

PXBCM-MB(-BASIC/-ENERGY)

- Weight: 1 lb
- W/H/D: 7.0 in (17.6 cm) / 6.3 in (15.8 cm) / 2.6 in (6.6 cm)
- Each meter base can interface to 1–4 meter modules (–MMS and/or –MME)
- Housing: NEMA® 1, IP20
- Pollution degree 2
- Operational temperature range: –20 °C to +70 °C
- Storage temperature range: –45 °C to +85 °C
- Elevation: 0–3000 m up to 277 V L–N
  Humidity: 5–95% noncondensing
- Elevation: 0–2000 m up to 347 V L–N
  Humidity: 5–95% noncondensing
  - Requires control power transformer
- UL® file no. E185559, UL standard UL61010-1
- CNL evaluation to CAN/C22.2 No. 1010.1.92
- CE mark
- EMC EN61326–IEC61000-4-X level 3
  - Emissions conducted and radiated as part of PXBCM system, FCC part 15 class B
  - CISPR 11/22 class B

External circuit connections

- COM1/2 RS-485 Modbus Slave RTU:
  - 9600–115.2 K (default) baud
  - –D, +D, Com/Shield
  - Use RS-485 cable—4 K ≤19.2 Kb, 2 K
- LAN ethernet RJ45 CAT5 10/100BASE-T
  - Use STP Cat5+ for full EMC compliance
- MMP1-4 meter module ports:
  - 2 pair cable, 1 pair power, 2nd coms
  - Use PXBCM-MMP-CBLnn—CBLEnn cables
  - Each MMP is separately isolated
- Power supply mains 100–277 Vac L:N
  - ±10%, CAT III, 47–63 Hz, 6 W
  - Double insulated
  - 320 Vac surge filter clamp L:N, L:G, N:G—**Do not high pot**
  - Provide external line fuse or breaker sized to protect wiring
  - Three-position fixed terminal block 1/2/3 = PE/N/L, supporting 12 AWG (2.5 mm) wire

PXBCM-MMS

- Weight 09/15/21: 1.0/1.5/2.0 lb
- Width: 1.4–3.0 in (3.5–7.5 cm)
- Height 2.5 in (6.4 cm)
- Length 09/15/21: 16.9/22.9/28.9 in (43/58.2/73.5 cm)
- Housing NEMA 1, IP20, Pollution Degree 2
- Operational/storage temp.: –20 °C to +70 °C /–45 °C to +85 °C
- Elevation: 0–3000 m up to 277 V L–N
  Humidity: 5–95% noncondensing
- Elevation: 0–2000 m up to 347 V L–N
  Humidity: 5–95% noncondensing
  - Requires metering voltage transformers
- CE mark
- Safety: IEC/EN/UL61010-1, UL file no. E185559, CNL evaluation to CAN/C22.2 No. 1010.1.92
- EMC EN61326—IEC61000-4-X level 3
- Emissions conducted and radiated as part of PXBCM system—FCC part 15 and CISPR 11/22 class B
  - MMP meter module ports—2x2 connector, 2 pair cable, 1 pair power, 2nd data coms
  - Use PXBCM-MMP-CBLnn—CBLEnn cables

VT—Voltage terminal metering inputs

- 47–63 Hz, CAT III, 5 Mohm input impedance A/B/C/N
- Wye 277 Vac L:N(G) 480 V L:L maximum nominal rating
- Floating delta, corner grounded delta, and high-impedance wye not supported without the use of an interposing PT potential transformer
- Four-position fixed terminal block Va, Vb, Vc, Vn,
  - 24–12 AWG—ferrules recommended
- PE—protective earth grounding stud at base of MMS bracket—#8 stud

AX CT current terminal metering inputs

- 333 mV secondary CT input to MMS at maximum external CT primary rating
- Primary load rating determined by external CT
  - In-line terminal block 24–14 AWG ferrules recommended for stranded wire

PXBCM-MME

- Weight: 1 lb
- W/H/D: 7.7 in (19.5 cm) / 8.5 in (21.6 cm) / 1.6 in (4.1 cm)
- Housing NEMA 1, IP20, Pollution Degree 2
- Operational temperature range: –20 °C to +70 °C
- Storage temperature range: –45 °C to +85 °C
- Elevation: 0–3000 m up to 277 V L–N
  Humidity: 5–95% noncondensing
- Elevation: 0–2000 m up to 347 V L–N
  Humidity: 5–95% noncondensing
  - Requires metering voltage transformers
- CE mark
- UL file no. E185559, UL standard UL61010-1
- CNL evaluation to CAN/C22.2 No. 1010.1.92
- EMC EN61326—IEC61000-4-X level 3
  - Emissions conducted and radiated as part of PXBCM system, FCC part 15 class B
  - CISPR 11/22 class B

MMP meter module ports

- 2 pair cable, 1 pair power, 2nd data coms
- Use PXBCM-MMP-CBLnn—CBLEnn cables

VT—voltage terminal metering inputs

- 47–63 Hz, CAT III, 5 Mohm input impedance
- Wye 277 Vac L:N(G) 480 V L:L maximum nominal
- Floating delta, corner grounded delta, and high-impedance wye not supported without the use of an interposing PT potential transformer
- Five-position fixed terminal block Va, Vb, Vc, Vn, PE
  - 24–12 AWG—ferrules recommended

CT and AX CT current terminal metering inputs

- 333 mV secondary CT input to MME at maximum external CT primary rating
  - Primary load rating determined by external CT
- CT 21 and AX 4 pair dual tier terminal blocks
  - 24–12 AWG—ferrules recommended

Cables

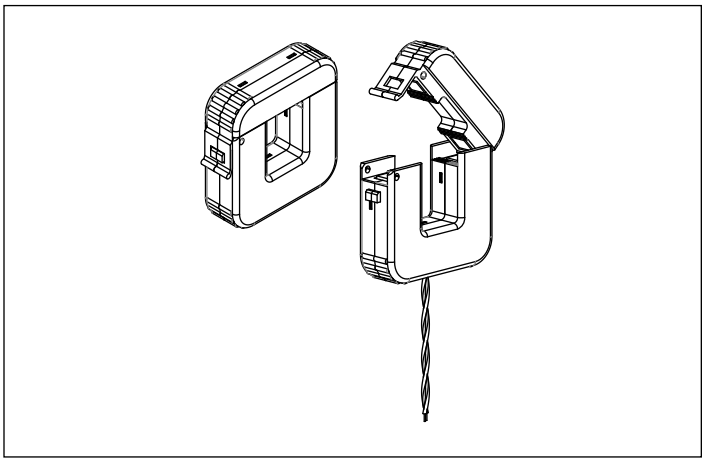
- ~1-inch bend radius required
- 600 V insulation rating
- 105 °C temperature rating
- UL 61010-1
- UL file no. E185559
- 2 twisted pair, PVC jacket 0.28 inches OD jacket

Product selection

Table 3. PXBCM component catalog numbers

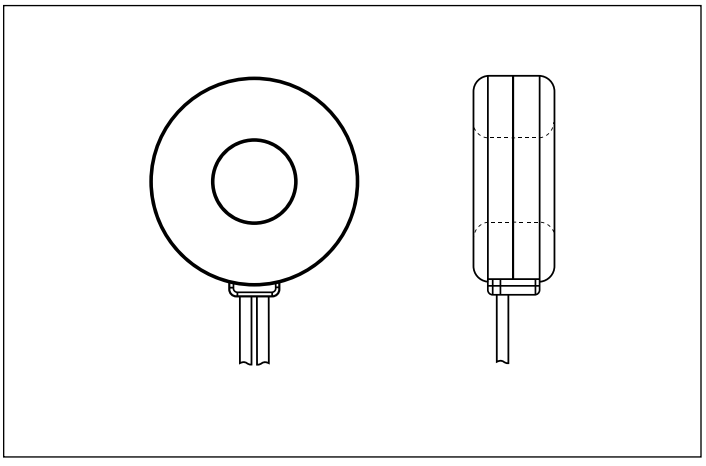
Description	Suffix description	Catalog number	Notes
Meter base	Basic series	**PXBCM-MB-BASIC**	
Meter base	Energy code series	**PXBCM-MB-ENERGY**	
Meter module strip	Left 9 CT	**PXBCM-MMS-L09-A**	A = 1-in pitch, 100 A
Meter module strip	Left 15 CT	**PXBCM-MMS-L15-A**	A = 1-in pitch, 100 A
Meter module strip	Left 21 CT	**PXBCM-MMS-L21-A**	A = 1-in pitch, 100 A
Meter module strip	Right 9 CT	**PXBCM-MMS-R09-A**	A = 1-in pitch, 100 A
Meter module strip	Right 15 CT	**PXBCM-MMS-R15-A**	A = 1-in pitch, 100 A
Meter module strip	Right 21 CT	**PXBCM-MMS-R21-A**	A = 1-in pitch, 100 A
Meter module external	21+4 external 333 mV CT	**PXBCM-MME-X25-333MV**	X = external CT
Meter module external	21 external 100 mA CT + 4 external 333 mV CT	**PXBCM-MME-X21-100MA**	X = external CT
Meter module port cable	Length 6 in	**PXBCM-MMP-CBL6I**	
Meter module port cable	Length 1 ft	**PXBCM-MMP-CBL01**	
Meter module port cable	Length 2 ft	**PXBCM-MMP-CBL02**	
Meter module port cable	Length 3 ft	**PXBCM-MMP-CBL03**	
Meter module port cable	Length 4 ft	**PXBCM-MMP-CBL04**	
Meter module port cable	Length 6 ft	**PXBCM-MMP-CBL06**	
Meter module port cable	Length 8 ft	**PXBCM-MMP-CBL08**	
Meter module port cable	Length 12 ft	**PXBCM-MMP-CBL12**	
Meter module port cable	Length 16 ft	**PXBCM-MMP-CBL16**	
Meter module port cable	Length 20 ft	**PXBCM-MMP-CBL20**	
Meter module port cable	Length 28 ft	**PXBCM-MMP-CBL28**	
Meter module port cable ext.	Length 8 ft	**PXBCM-MMP-CBLEX08**	
Meter module port cable ext.	Length 16 ft	**PXBCM-MMP-CBLEX16**	
BCM local display	5.7-in diameter display	**PXBCM-DISP-6-XV**	
BCM local display cable	Replacement display cable	**PXBCM-DISP6XV-DAT**	

333 mV current sensor



Split-core 333 mV sensors can be connected to the four auxiliary current inputs on the **BCM-MMS** or **BCM-MME** as well as any of the 21 current inputs on the **PXBCM-MME-X25-333MV**. A variety of window sizes and ratios are available. Refer to **TD121001EN** for ordering information.

100 mA current sensor



100 mA current sensors can be connected to any of the 21 current inputs on the **PXBCM-MME-X21-100MA**. A selection of solid core 100 mA sensors are available through the Eaton catalog. Refer to **TD150028EN** for ordering information.