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.
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

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

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
Approved panel with one or more PXBCM-MMEs mounted. May also be housed with the PXBCM-MB.

PXBCM-CBL nn cable

Disconnect switch and fuse block

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)
Wiring diagram examples

Shorting block recommended for 100 mA MME inputs.

208Y/120 three-phase, four-wire wye service single-phase, 120/208 V, three-wire network loads CT connections

MME terminal block

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

Three-phase, four-wire wye service
CT connections

MME terminal block

Figure 11. Three-phase, four-wire wye
**Technical Data**

**TD150021EN**

**Effective January 2020**

**Power Xpert Branch Circuit Monitor**

**www.eaton.com**

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**Three-phase, four-wire wye service**

CT connections with three-phase, four-wire and apartment loads

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**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

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**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**

<table>
<thead>
<tr>
<th>Service voltage system type</th>
<th>Virtual meter load options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three-phase, four-wire wye</td>
<td>Three-phase, four-wire wye</td>
</tr>
<tr>
<td></td>
<td>Three-phase, three-wire delta</td>
</tr>
<tr>
<td></td>
<td>120/208 three-wire apartment</td>
</tr>
<tr>
<td></td>
<td>Single-phase, two-wire</td>
</tr>
<tr>
<td>Three-phase, three-wire delta</td>
<td>Three-phase, three-wire delta</td>
</tr>
<tr>
<td>Three-phase, four-wire delta</td>
<td>Three-phase, three-wire delta</td>
</tr>
<tr>
<td></td>
<td>Single-phase, two-wire</td>
</tr>
<tr>
<td></td>
<td>Single-phase, three-wire</td>
</tr>
<tr>
<td>Single-phase, three-wire</td>
<td>Single-phase, three-wire</td>
</tr>
<tr>
<td>Single-phase, two-wire</td>
<td>Single-phase, two-wire</td>
</tr>
</tbody>
</table>

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**EATON www.eaton.com**
**Technical Data TD150021EN**  
**Effective January 2020**  

**Power Xpert Branch Circuit Monitor**

**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 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
  - 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

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

### 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.