

SECTION 262713
ELECTRICITY METERING – BUILDING METERING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Equipment for electricity metering (for use of the Owner, not the Electric Utility):
 - 1. Single circuit electricity meters.

1.2 RELATED REQUIREMENTS

- A. 230900S03 - INSTRUMENTATION AND CONTROL FOR HVAC UK Controls Standard
- B. UK Meter Identifier Naming Convention

1.3 REFERENCE STANDARDS

- A. ANSI C12.20 - American National Standard for Electricity Meters - 0.2 and 0.5 Accuracy Classes; 2015.
- B. IEC 62053-22 - Electricity Metering Equipment (A.C.) - Particular Requirements - Part 22: Static Meters for Active Energy (Classes 0,2 S and 0,5 S); 2016 (Corrigendum 2018).
- C. IEC 62053-23 - Electricity Metering Equipment (A.C.) - Particular Requirements - Part 23: Static Meters for Reactive Energy (Classes 2 and 3); 2016 (Corrigendum 2018).
- D. IEEE 1459 - Standard Definitions for the Measurement of Electrical Power Quantities Under Sinusoidal, Nonsinusoidal, Balanced, or Unbalanced Conditions; 2010.
- E. IEEE C57.13 - IEEE Standard Requirements for Instrument Transformers; 2016.
- F. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- G. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2018.
- H. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2017.
- I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. UL 61010, "Electrical Equipment for Measurement, Control, and Laboratory Use."

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- K. UL 61010-1, "Electrical Equipment for Measurement, Control, and Laboratory Use; Part 1: General Requirements."
- L. UL 508 Standard for Industrial Control Equipment
- M. UL508A Standard for Industrial Control Panels
- N. FCC 47 CFR Part 15 Class A, "Radio Frequency Devices"
- O. FCC 47 CFR Part 15 Class B, "Radio Frequency Devices"

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate work to provide equipment suitable for interface with electricity metering systems to be provided.
 - 2. Coordinate the work with other installers to provide communication lines required for electricity metering system interface.
 - 3. Notify Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years documented experience.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.
- B. Store products in manufacturer's unopened packaging, keep dry and protect from damage until ready for installation.

1.7 FIELD CONDITIONS

- A. Maintain field conditions within required service conditions during and after installation.

1.8 SPECIAL TOOLS AND SPARE PARTS

- A. The Contractor shall provide a recommended spare parts list with the following information provided as a minimum:
 - 1. Contact information for the closest parts stocking location to the Owner.

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2. Critical spare parts shall be identified as those parts being associated with long lead times and/or those being critical to the unit's operation.
 3. Maintenance spares shall be identified as being those parts required to regularly perform scheduled maintenance on the furnished equipment. These spares shall include, but shall not be limited to, consumable spares that are required to be exchanged during scheduled maintenance periods.
- B. Spare parts shall be provided for each type and size of unit furnished. At a minimum, the following shall be provided:
1. Provide the minimum spare parts recommended by the manufacturer.
 2. Provide one spare set of each type of power and control fuse installed within equipment.
- C. Any manufacturer specific special tool, not normally found in an electrician's toolbox, required to remove and install recommended or furnished spare parts shall be furnished. At a minimum the following shall be provided:
1. If available from manufacturer, provide PC-based configuration software tool and a minimum of one communication interface cable for each type of cable required to connect a PC-based computer to the devices specified herein for configuration and programming.
 2. Electronic configuration files, in a media format acceptable by the Owner (e.g. CD, USB stick, etc.), updated to an as-installed and commissioned state.
- D. Spare parts shall be properly marked and packaged for long term storage. Printed circuit boards shall be provided in separate anti-static containers.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Single Circuit Electricity Meters – Without exception, furnish either of the following products, unless approved as a substitute by addendum to the Contract Documents prior to the bid date:
1. Schneider Electric PowerLogic METSEPM5563RD
 2. Eaton PXM1100TA15 including:
 - a. PXM1K-ETHMULTI Communication Module
 - b. PXM1K-DISP-3 Remote Display

2.2 EQUIPMENT FOR ELECTRICITY METERING

- A. Provide microprocessor-based digital electricity metering systems including all instrument transformers, wiring, and connections necessary for measurements specified.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.

- C. Provide electricity metering systems and associated components compatible with the equipment and associated circuits to be metered.
- D. Service Conditions: Provide electricity meters suitable for operation under the service conditions at the installed location including altitude and ambient temperature.
- E. Enclosures:
 - 1. Where not furnished by manufacturer, provide required cabinets and enclosures in accordance with Section 260533.16.
 - 2. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1
 - 3. Finish: Manufacturer's standard unless otherwise indicated.
- F. Instrument Transformers:
 - 1. Comply with IEEE C57.13, where applicable.
 - 2. Select suitable ratio, burden, and accuracy as required for connected devices.
 - 3. Current Transformers
 - a. Current Transformers shall be sized appropriately for the service being monitored with consideration to future growth of the load.
 - b. Current transformer voltage class and geometry shall be appropriate for the insulated or non-insulated current-carrying conductor.
 - c. Current Transformers shall be revenue grade solid core with a 5 amp secondary and a minimum rating factor of 1.5 @ 30 °C. CT Accuracy shall be ANSI 0.3 Class.
 - d. When metering a Pad mount transformer, utilize CT's designed for installation over the low voltage secondary bushing such as Itron Type R6P and GE Model JAB-0C 600v or equal. Terminate metering CT secondary's using ring lugs on a vertically mounted 6 position short circuiting terminal block. CT secondary shall be ordered: Phase "A" Polarity, Phase "A" Non Polarity, Phase "B" Polarity, Phase "B" Non Polarity, Phase "C" Polarity, Phase "C" Non Polarity.
 - e. For connecting meter device current secondaries, a 6 post short-circuiting terminal block with color coded conductors in a cable shall be used. THHN or equal stranded copper wire shall be used for Current Transformer installation. For wire lengths 25 feet or less, 12 AWG shall be used. For wire length 25 feet to 50 feet, use 10 AWG. For lengths 50 feet to 80 feet, use 8 AWG. Lengths longer than 80 feet are not permitted without permission from the Utilities and Energy Management. Wire ends are to be appropriately terminated.
 - 4. Potential Transformers:
 - a. For voltages less than 600 VAC:
 - 1) Utilize direct voltage connection to the meter.
 - 2) Include fuses with disconnecting means.
 - b. For voltages at or above 600 VAC:
 - 1) Include primary and secondary fuses with disconnecting means.

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- 2) Utilize configurations consisting of 3 potential transformers.

2.3 SINGLE CIRCUIT ELECTRICITY METERS

- A. The metering device used to monitor circuits for purposes of network management, energy cost management, energy allocation, and operational efficiency shall provide the following minimum features:
 1. Connections and form factor - direct connect to circuits up to 600 VAC, eliminating the need for voltage (potential) transformers for low voltage applications; 5 A nominal current inputs. Removable connectors for voltage inputs, control power, communications, inputs and outputs; easily mountable in the pre-made cutout without tools; form factor will be ¼ DIN with 92 X 92 cut-out and 96 x 96 panel mount integrated display.
 2. Supported monitoring parameters—full range of 3-phase voltage, measure each phase and neutral current using 4 current inputs, power and energy measurements, power factor, frequency, total harmonic distortion (THD), individual power harmonics (up to 63rd order).
 3. Accuracy standards - use four-quadrant metering and sample current/voltage simultaneously without gaps with 64 samples per cycle (zero blind). Comply with the following standards for accuracy:
 - a. Measurement accuracy: IEC 61557-12 PMD/[SD|SS]/K70/0.2.
 - b. Active energy accuracy: IEC 62053-22 Class 0.2 S ANSI C12.20 Class 0.2.
 - c. Reactive energy accuracy: IEC 62053-23 Class 2.
 4. Display - Backlit dot-matrix LCD display, anti-glare and scratch resistant with a minimum of 128 x128 pixels, capable of displaying four values in one screen simultaneously; a summary screen to allow the user to view a snapshot of the system; support either integrated or remote display.
 5. Communications - serial RS-485 Modbus, Ethernet Modbus TCP, Ethernet BACnet IP (BTL listed), and EtherNet/IP; provide 2 Ethernet ports (single IP address) to allow wiring from meter to meter as a daisy-chain; be capable of serving data over the Ethernet network accessible through a standard web browser; the monitor shall contain default pages from the factory.
 6. Onboard data logging capabilities - to log data, alarms and events; logged information shall include data logs, minimum/maximum log files of selected parameter values, and alarm logs for each user defined alarm or event log; support the following on-board nonvolatile memory—14 parameters every 15 minutes for 90 days.
 7. Alarming capabilities - support 29 set-point driven alarms, 4 digital alarms, 4 unary alarms, 10 Boolean alarms and 5 custom alarms; user definable alarm events; set-point driven alarms shall be available for voltage/current parameters, input status, and end of interval status; shall send emails and/or text messages containing alarm condition indication via Simple Mail Transfer Protocol [SMTP]; Shall have the capability to manage and monitor devices on the IP network via Simple Network Management Protocol [SNMP]; Indication of an alarm condition shall be delivered by SNMP Traps.

8. Firmware-upgradeable to enhance functionality through the Ethernet or serial communication connection and shall allow upgrades of individual meters or groups.
9. Integrated converter functionality, enabling the capability to connect via Ethernet to downstream, serially connected devices.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings and configurations of metering systems and associated components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive meters.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Provide required support and attachment components in accordance with Section 260529.
- D. Provide grounding and bonding in accordance with Section 260526.
- E. Without exception, the power meter display shall be mounted between four (4) and six (6) feet above finished floor.
- F. Identify meters and associated wiring in accordance with Section 260553.
 1. The local meter/display shall be labeled in a durable method in accordance with
 - a. UK Meter Identifier Naming Convention.

3.3 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Meters: Perform inspections and tests listed in NETA ATS, Section 7.11.2.
- C. Instrument Transformers: Perform inspections and tests listed in NETA ATS, Section 7.10. The dielectric withstand tests on primary windings with secondary windings connected to ground listed as optional are not required.

- D. Correct deficiencies and replace damaged or defective metering system components.

3.4 ADJUSTING

- A. Program system parameters according to requirements of Owner.

3.5 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.6 CLOSEOUT ACTIVITIES

- A. Training: Train Owner's personnel on operation, adjustment, and maintenance of system.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 - 2. Provide minimum of two hours of training.
- B. Provide a complete set of system documentation in a digital format for library archival. Documentation to include installation, calibration, operation, maintenance and repair manuals of sufficient detail to enable customer to install, calibrate, operate, maintain and repair the complete system. Documentation also to include warranty details, circuit schematics, wiring interconnection diagrams and necessary mechanical drawings.
- C. Installer shall perform field verification to demonstrate accurate and reasonable data upon completion of installation.

3.7 FACILITY MANAGEMENT SYSTEM (FMS) & NETWORK CONNECTION

- A. Refer to Section, 230900S03 - INSTRUMENTATION AND CONTROL FOR HVAC UK Controls Standard.

3.8 PROTECTION

- A. Protect installed system components from subsequent construction operations.

END OF SECTION