

## SECTION 262913 – ELECTRICITY METERING

### PART 1 GENERAL

#### 1.1 SCOPE

- A. The work under this section includes electronic meters including test switch and instrument transformers as specified herein and shown on the Drawings.

#### 1.2 RELATED WORK

- A. Applicable provisions of Division 1 govern work under this Section.
  - 1. Section 26 05 500 – Basic Materials and Methods
  - 2. Section 26 20 00 – Low Voltage Electrical Transmission

#### 1.3 REFERENCES

- A. ANSI C57.13 - Instrument Transformers

#### 1.4 SUBMITTALS

- A. Provide product data showing model numbers, dimensions, mounting requirements, and parameters measured and displayed.
- B. OPERATION AND MAINTENANCE DATA
  - 1. All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

### PART 2 PRODUCTS

#### 2.1 ELECTRONIC METER at NEW PANELBOARDS (Non-Utility Metering)

- A. Electronic meter with 4-line by 20-character backlit digital display (LED or LCD), shall accept input from standard current transformers rated 5 amperes. Meters for systems operating at 480V and below shall measure circuit potential without the use of external potential transformers. Meter shall be suitable for connection to a three-phase, four-wire wye system or a three-phase, three-wire delta system.
- B. Meter accuracy shall meet or exceed ANSI C12.20 and MID accuracy standards.
- C. Meter shall be UL/CUL listed to latest applicable standards for safety.
- D. Meter shall provide non-volatile memory to maintain reading during power outages.
- E. Meter shall provide installation diagnostics on display.
- F. Meter shall store interval data for kWh and kVARh for up to 72 days in first-in first-out format. Interval data not available via BACnet.
- G. Meter shall be optionally available in single-phase, 3-wire configuration.

- H. Meter shall be capable of daisy-chain connection using RS-485 communications of Din-Mon D2 & D5, Class 3200s, 3400s, 5000s, IDR-8s, IDR-16s not to exceed 52 devices. Cabling shall be available through terminal block (3-conductor), 18-22 awg, up to 4,000 cable feet total.
- I. Meter shall display actual numeric values without requiring the use of a multiplier. Meter shall measure and display the following:
  - 1. Current: per phase
  - 2. Voltage: phase-to-phase and phase-to-neutral
  - 3. Real Power (kW): three-phase total
  - 4. Reactive Power (kVAR): three-phase total
  - 5. Apparent Power (kVA): three-phase total
  - 6. Power Factor: three-phase
  - 7. Real Energy (kWh): three-phase total
  - 8. Maximum Demand:
  - 9. Real Power (kW): three-phase total
  - 10. Apparent Power (kVA): three-phase total
- J. All meter potential leads and control power leads shall be fuse protected. Provide a fused disconnecting device or circuit breaker with downstream fuses in the main switchboard or panelboard for protection of the meter potential leads and control power leads. Fuses shall be sized per manufacturer's recommendations.
- K. Meter shall utilize 0-2 volt AC output current sensors to allow paralleling and/or mounting up to 500 feet from the meter. Sensors shall be of split-core configuration to allow installation without disconnecting cabling, etc. Sensors shall be available from 100 amp to 3200 amp. Sensors shall be available in solid-core configuration (100 & 200amp.)
- L. Meter shall be E-Mon D-Mon Class 3200, Advanced kWh/Demand Meters with Communication wiring from the interface gateway to the IT closet.
- M. The contractor shall be responsible for data wiring and jack termination as specified under division 27 and the paragraph below unless specified to be provided by the division 27 contractor.
- N. Building Automation System (BAS) data jacks will be installed according to the campus standard except that a data jack is not needed and a patch cord can be used between the utilizing equipment and the network switch port under the following exceptions:
  - 1. If the utilizing equipment is mounted on or within the vertical sides of the floor or wall rack.
  - 2. If the utilizing equipment is mounted within the same telecommunications room and can be reached with a 40 foot or shorter patch cord that is routed with existing cabling in the racks, trays, J-hooks, etc....and is not stretched tight.
    - a. NOTE: If a patch cord is used in exceptions A or B above, the patch cord must be labeled on each end listing the termination point on the opposite end.
    - b. EXAMPLE:

- 1) Switch name and port #.....to.....equipment name s-weeks-156-1-access, port 22.....MS-SECVT0 north wall
3. Provide a Meter Interface Gateway as described in the "Meter Interface Gateway" subsection of this specification.

## 2.2 METER TEST SWITCH

- A. Provide a 600 volt ten-pole (4 potential and 6 current shorting) test switch with cover, ABB Type FT-1, or approved equal, connected between each meter and the CT and potential leads. The six leads (2 per phase) from the CT's shall be connected to the current shorting terminal positions on the test switch. The four leads ((3) phase and (1) neutral) from the PT's or bus shall be connected to the potential terminal positions. The test switch shall be located on the face of the switchgear adjacent to the meter or behind a panel cover in an easily accessible location.
- B. Meter test switch is required on all meter installations at switchboards and main distribution panels. Meter test switch is not required for sub-meters, or meters installed at branch panels, automatic transfer switches, and other downstream locations.

## 2.3 SUB-METER(S) FOR EXISTING PANELBOARDS

- A. Electronic meter with digital display shall accept input from standard current transformers rated 5 amperes. Sub-meters may use 0-2V Current Sensors or 0-0.333V Current Transducers in lieu of Current Transformers. Meter shall be suitable for connection to a three-phase, four-wire wye system, a three-phase, three-wire delta system, or a 120/240V single-phase system.
  1. Meter specification is based on Electro Industries Shark 100.
  2. Provide approved equivalent acceptable to Owner.
- B. Meter accuracy shall be 1.0% of actual reading (not full scale measurement).
- C. Meter shall display actual numeric values without requiring the use of a multiplier. Meter shall measure and display the following:
  1. Current: per phase
  2. Voltage: phase-to-phase and phase-to-neutral
  3. Real Power (kW): three-phase total
  4. Reactive Power (kVAR): three-phase total
  5. Apparent Power (kVA): three-phase total
  6. Power Factor: three-phase
  7. Real Energy (kWh): three-phase total
  8. Maximum Demand:
  9. Real Power (kW): three-phase total
  10. Apparent Power (kVA): three-phase total
- D. Provide Meter Interface Gateway per the paragraph included in this specification section.

- E. Provide additional fusible disconnect switch(es)/circuit breaker(s) and enclosures per the PROVISIONS FOR SUB-METERS paragraph included in this specification section.

## 2.4 METER INTERFACE GATEWAY

- A. Provide a meter interface gateway to allow the meter(s) (daisy-chained to a single interface location) to communicate with the BAS system protocol listed below. The interface gateway shall convert the meter data from the meter's native language to the BAS protocol.
- B. If the meters can communicate with the BAS system without the use of an interface gateway, then no gateway is required.
- C. Building Automation System (BAS) communication protocol:
  - 1. BACnet/IP. Meters that have internal BACnet/IP communication interface: The Main Electric Service meter and all Sub-meters shall have a BACnet/IP interface (either on-board or a separate gateway) to the BAS system.
  - 2. Requires E-Mon Energy software for reading: EZ7 RS-232/RS-485 hard-wire connection (standard)
  - 3. Requires third-party EMS/BMS system supplied by others. E-Mon energy software not used: Modbus RTU Communications (Replace EZ7 in model with RTU when ordering).

BACnet MS/TP (Replace EZ7 in model with BAC when ordering).
- D. Manufacturers of gateway devices that can provide a BACnet interface for electrical meters with other native protocols: Industrial Control Communications, Inc. - Millennium Gateway Series, Real Time Automation – 460 Series, Delta Controls DSM-PWR, FieldServer, Tridium, or Johnson Controls. All programming of the gateway device to provide the BACnet objects to the building automation system shall be included.
- E. The interface gateway shall transmit all of the measured values listed under the meter descriptions in this specification section.

## 2.5 PROVISIONS FOR SUB-METERS

- A. OVERCURRENT PROTECTION FOR POTENTIAL LEADS AND CONTROL POWER LEADS
  - 1. If the sub-meter(s) are located in the main switchboard, provide a fusible disconnect or circuit breaker in the metering section of the switchboard for the protection of the potential transformers or potential leads as required for the sub-meter(s). If the sub-meter(s) are located adjacent to a panelboard, then the contractor must provide a 3-pole 15 amp circuit breaker in that panelboard as required for the potential transformers or potential leads for the sub-meter(s).
  - 2. All meter potential leads and control power leads shall be fuse protected. Provide fuses in the disconnecting device or downstream fuses from the circuit breaker for protection of the meter potential leads and control power leads. Fuses shall be sized per manufacturer's recommendations.
- B. ENCLOSURE(S)
  - 1. Meter shall be enclosed in an MMU-8 Cabinet, NEMA 4X JIC steel enclosure with padlocking hasp and mounting flanges for indoor/outdoor installation (stand alone) with one 1 1/16" KO on bottom of enclosure. Provide optional heavy duty JIC steel enclosure for indoor installation.

2.6 ACCESSORIES

- A. Provide shorting block(s) for the CT leads.

2.7 CURRENT TRANSFORMERS

- A. Current Transformers: ANSI C57.13; 5 ampere secondary, with primary/secondary ratio as shown on Drawings, burden and accuracy consistent with connected metering and relay devices, 60 Hz.
- B. Sub-meters may use 0-2V Current Sensors or 0-0.333V Current Transducers in lieu of Current Transformers.
- C. Mount and brace transformers to withstand 100,000 amp short circuit current.

2.8 POTENTIAL TRANSFORMERS

- A. Provide potential transformers (PT's) only if required by the meter manufacturer. Most meters can measure 480V potential and below without the use of external PT's.
- B. Potential Transformers: ANSI C57.13; 120 volt secondary, burden and accuracy consistent with connected metering and relay devices, 60 Hz.
- C. Potential transformers on 480/277 volt systems shall be rated 277 – 120 volts, connected phase-to-neutral, and installed on each phase.

PART 3 EXECUTION

3.1 INSTALLATION

- A. The meters shall be mounted in the locations indicated on the drawings. Mounting height shall be 5'-6" or less from finished floor.

3.2 CONSTRUCTION VERIFICATION

- A. Contractor is responsible for utilizing the construction verification checklists supplied under specification Section 26 08 00 in accordance with the procedures defined for construction verification in Section 01 91 01 or 01 91 02.

3.3 AGENCY TRAINING

- A. All training provided for agency shall comply with the format, general content requirements and submission guidelines specified under Section 01 91 01 or 01 91 02.

END OF SECTION 262913