

## SECTION 26 27 13 - ELECTRICAL METERING

### PART I - GENERAL

#### 1.1 SUMMARY

- A. Electric Substation Metering shall be provided for all major building primary electrical service entrance applications. Meter shall have a minimum Class 10 rating and mounted on the front door of metering compartment (or in a separate meter enclosure).
- B. The correct multiplier shall be clearly labeled on the front of the meter in the area provided by the manufacturer, protected by the outer meter cover.
- C. Meters shall be mounted at 5'-6" to center of meter above finished floor.
- D. Temporary/ Construction Metering: *[Note to PSC: For a temporary/construction service or self-contained application, a meter rated at 200 amperes or below may be allowed as follows. Include this paragraph only if applicable.]*
  - 1. Self-contained meter sockets shall be rated NEMA type 3R, equipped with lay-in-lugs, suitable for aluminum or copper conductors, a lever bypass with jaw release, and a cover with exactly one securely fastened hasp or stud for padlocking.
  - 2. Acceptable Manufactures
    - 1. Schlumberger Vectron with Electronic Demand Register and SiteScan (S-Base).
    - 2. General Electric EV with M-90PSC Electronic Demand Register and OPTOCOM port.
    - 3. See Self-contained meters below.

#### 1.2 CONTRACT DOCUMENTS AND SUBMITTALS

- A. *[Note to PSC: The Contract Documents shall provide complete information at not later than the 50% design review. This complete information shall include location, one line diagram, and specifications].*
- B. CT Current Rating Factor shall be highlighted in the shop drawings and must be reviewed and accepted by the Owner.

#### 1.3 WARRANTY

- A. Service Entrance Primary Substation Meters: Provide a 4 year warranty on material and service.
- B. Self-Contained Meters: Provide a 1 year warranty on material and service.

#### 1.4 SERVICE ENTRANCE PRIMARY SUBSTATION METERS

- A. The meter shall be one of these manufacturers, substitution is not allowed:
  - 1. Electro Industries, Nexus model # 1272-A-SWB2-20-60HZ-SE-INP200.
  - 2. General Electric, model EPM9800-6-E-SB-A-W-20.
- B. Included in the metering systems shall be the following:
  - 1. Provide three (3) metering class CT's (current transformers) with a ratio that is equal to one-half of bus rating, a 5 ampere secondary output, a service rating of 2.0, and an ANSI accuracy class of 0.3 or better. The CT's shall be sized to carry at rated accuracy 133 percent of the burden of all equipment being connected. The minimum burden rating shall be B0.5 (12.5VA). Current Transformers shall be capable of sustained primary current levels of 200% of nameplate rating.

CT Product data needs to be submitted, reviewed and accepted. The CTs need to be able to accurately meter the load down to 10% of the CT ratio up to the full rating of the circuit breaker or bus. Load calculations need to be submitted to ensure the minimum

load requirements are within the accuracy of the CT ratios (10% of CT ratio – 100% of CT ratio)

2. The Current transformer compartment shall be supplied with indoor metering class Current Transformers (CT's) and shall be located in the service entrance section of the switchboard, connected for hot sequence metering. Coordinate and drill all necessary holes and provide all mounting brackets for the current transformers.
3. Provide CT shorting terminal blocks within the metering compartment. Terminal blocks shall include an area to hold all unwed shorting screws, be easily accessible, and labeled.
4. Provide three (3) PT's (potential transformers) with a secondary voltage of 120 volts to ground and an ANSI accuracy class of 0.3. Potential taps to the bus shall be installed on the line or supply side of the current transformers.
5. Provide a fused disconnect for protection for of the potential meter control wiring.
6. Potential transformer leads shall contain current limiting fuses. The fuses shall be accessible so that they can be maintained without shutting down the substation. 208/120 volt substations do not require potential transformers, but shall be fused.
7. The meter shall be located on the face or cover of the metering section of the main service entrance switchboard or switchgear substation at 5' (60") above the finished floor.
8. The meter shall be mounted such that the infrared optical port is on the lower face to facilitate communication with the meter without having to open the metering section cabinet.
9. Nameplates shall be provided on all meters.
10. Meter Section shall contain shorting block, fuses, and switches mounted in this space.
11. Ethernet port for connection to the CITES network utilizing the Modbus/TCP protocol, including the software driver.
12. The meter shall have eight (8) KYZ pulse/status inputs and four (4) KYZ pulse/status outputs.
13. Minimum of six (6) simultaneous MODBUS/TCP sockets available for polling of metering data required.
14. Two (2) Ethernet connections to the U of I CITES campus network shall be provided in the metering section, one for the meter remote read-out and the other for user laptop connection.
15. RS-485 Serial port connection for back door connection to laptop.
16. AutoScroll display allowing user defined display screens.
17. Meter Security: Meter shall require password for configuration whether thru faceplate or any network means. Password shall be required on software input and on meter.
18. The meter shall not allow any default "backdoor" passwords to be used for the purpose of configuring the meter.
19. Trending configurations shall be set up in the meter Trend Logs to trend the following values:
  1. One Second Updated: Voltage A-N.
  2. One Second Updated: Voltage B-N.
  3. One Second Updated: Voltage C-N.
  4. One Second Updated: Current A.
  5. One Second Updated: Current B.

6. One Second Updated: Current C.
  7. One Second Updated: THD Volts A.
  8. One Second Updated: THD Volts B.
  9. One Second Updated: THD Volts C.
  10. Energy (Primary) Quadrant 1 + 4 Wh.
  11. One Second Updated: Watt Total.
  12. One Second Updated: VAR Total.
  13. One Second Updated: Power Factor Total.
  14. Interval Energy (Scaled): Quadrant 1 + 4 Wh.
  15. Interval Energy (Scaled): Quadrant 1 + 2 VARh.
  16. Interval Energy (Scaled): Quadrant 3 + 4 VARh.
  17. Max Block Window Average + Watt.
  18. Block Window Average Watt.
20. Shall include one of the following kwh test output capabilities on all meters whether main or sub-metering:
1. Pulse output KYZ.
  2. Infrared port output.
  3. Test LED light that blinks per kwh.

1.5 SUB-METERING METERS *[Note to PSC: Confirm referenced paragraph numbers below when this specification is edited to be project-specific.]*

- A. All sub-metering meters shall be of the same manufacturer as the main service entrance meter, and shall comply with all the provisions of *Section 26 27 13.1.4.B* with the exception of parts *B.8, 13*.
- B. AHU, Receptacle, and Lighting loads need to have loads combined and metered in as few meters as possible using Multi-point High Density Metering Systems within same surroundings. Metered loads in external surroundings not in close proximity to similar loads and not with same reference voltage need to use energy monitoring meters for single loads.
- C. If one of the meters specified in part *1.4.A*, of this standard section, is used, then the sub-metering meter shall be:
  1. Energy Monitor Shark model # 100S-60-10-V3-WIFI
  2. Multi-Point High Density Shark MP200-Y or S-60-10-V1-WIFI

1.6 SELF CONTAINED METERS:

- A. All self-contained meters shall be programmed according to each application's wiring configuration, and CT and PT ratios required to accurately meter each service.
- B. Shall include one of the following kwh test output capabilities
  1. Pulse output KYZ.
  2. Infrared port output.
  3. Test LED light that blinks per kwh.

## 1.7 BRANCH CIRCUIT METERING:

- A. Meter shall be able to communicate with MODBUS TC/IP protocol.
- B. A Gateway shall be required for Realtime Viewing via on-board web server.
- C. Metering shall include software and configuration diagnosis at no additional cost.
- D. Manufacturer shall be the same as the service entrance metering manufacturer.

## PART 3 - EXECUTION

### 3.1 EXECUTION

- A. Indoor metering and associated equipment shall be installed in a clean, dry, and safe place. The metering shall be located as close as possible to the service entrance and the center height of the meter shall be five (5) feet above final grade or floor surface.
- B. Metering equipment shall not be installed in locations where there is excessive heat, moisture, vibrations, fumes, a corrosive or explosive atmosphere or dust, or in locations subject to flooding.
- C. The taps from the potential transformers to the primary bus shall be connected on the line or supply side of the current transformers. Provide suitable lugs for terminating cable. The lugs shall be bolted-pressure and setscrew type as opposed to compression lugs.
- D. Provide ample terminating space within the switchgear for proper terminations.
- E. Label all wire terminations.

END OF SECTION **26** 27 13

This section of the *U of I Facilities Standards* establishes minimum requirements only.  
It should not be used as a complete specification.