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SECTION 26 27 13

LOW VOLTAGE ELECTICITY METERING

PART 1 GENERAL

1.1 SUMMARY

A. Scope: Provide labor, material, equipment, related services and including, but not limited to manufacturing and installation of a power quality and energy meter as detailed on the drawings and specified here.

B. Related Sections: Related sections include, but shall not be limited to, the following:

1. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

2. Applicable general requirements for electrical work specified within Division 26 Specification Sections apply to this section.

1.2 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The edition/revision of the referenced publications shall be the most current unless otherwise specified.

1. American National Standards Institute (ANSI):

a. ANSI C12.20, “Electricity meters—0.1, 0.2, and 0.5 Accuracy Classes.”

2. Canadian Standards Association (CSA):

 a. CAN/CSA-C22.2 No. 61010-1 “Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use—Part 1: General Requirements.”

 b. C22.1, “Canadian Electrical Code, Part I” (CEC).

3 International Electrotechnical Commission (IEC):

 a. IEC 62052-11, “Electricity metering equipment (AC)—General requirements, tests and test conditions—PART 11: metering equipment.”

 b. IEC 62053-22, “Electricity metering equipment (AC)—Particular requirements—Part 22: Static meters for active energy (classes 0.2 S and 0.5 S).”

 c. IEC 62586-1, “Power quality measurement in power supply systems—Part 1: Power quality instruments (PQI).”

d. IEC 61000-4-30 Ed3, “Testing and measurement techniques—Power quality measurement methods.”

 e. IEC 61000-4-7. “Testing and measurement techniques—General guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto.”

5. International Organization for Standardization (ISO):

 a. ISO 9001, “Quality Management Systems—Requirements.”

6. Underwriters Laboratories, Inc. (UL):

a. UL 61010, “Electrical Equipment for Measurement, Control and Laboratory Use.”

b. UL 61010-1, “Electrical Equipment for Measurement, Control, and Laboratory Use; Part 1: General Requirements.”

7. Federal Communications Commission (FCC):

a. 47 CFR 15 Subpart B Class A, “Radio Frequency Devices.”

8. National Fire Protection Association (NFPA):

a. NFPA 70, “National Electrical Code” (NEC).

b. NFPA 70E, “Standard for Electrical Safety Requirements for Employee Workplaces.”

1.3 SUBMITTALS

A. Submittals shall offer sufficient information to determine compliance with this specification. Submittal data shall be clearly marked to identify the specific model numbers, options, and features of equipment and work proposed.

B. Exceptions and deviations from this specification shall be indicated within the submittal. Each exception and deviation shall be accompanied by a detailed written justification for the deviation. If no exceptions or deviations are taken the bid should include the phase, “No exceptions or deviations have been taken.”

C. Standard product literature describing the complete system as described in this specification.

D. Standard warranty with extended warranty options and costs.

E. Current UL and CSA listing from a Nationally Recognized Testing Laboratory (NRTL).

F. Installation and operations manual.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall be a firm engaged in, and specializing in, electrical power quality and energy instrumentation for a minimum of 10 years.

1. The manufacturer shall have a valid ISO 9001 certification and an applicable quality assurance system. Manufacturing, inspection, and testing procedures shall be developed and controlled under the guidelines of the quality assurance system.

2. The manufacturer or their representative shall have service, repair, and technical support services on call and available during normal business hours.

B. Installer Qualifications: Installer shall be a firm having a minimum of five years’ successful electrical metering installation experience similar in type and scope to that required for this project.

C. All work performed, and all materials used shall be in accordance with all applicable electrical codes and other local regulations and ordinances. Equipment, assemblies and materials shall be listed and labeled by Underwriter’s Laboratories or by a testing agency acceptable to authorities having jurisdiction and marked for intended use.

1.5 DELIVERY, STORAGE AND HANDLING

A. Materials shall be protected during delivery and storage and shall not exceed the manufacturer stated storage requirements. As a minimum, store indoors in clean, dry space with uniform temperature to prevent condensation.

B. Deliver materials to the project site in supplier’s or manufacturer’s original wrappings and containers.

C. Inspect and report any concealed damage or violation of delivery storage, and handling requirements to the engineer.

1.6 WARRANTY

A. The manufacturer shall warrant products against defects in material and workmanship for a period of 24 months from the date of shipment to the original purchaser.

PART 2—PRODUCTS

2.1 MANUFACTURERS

A. The acceptable manufacturers shall be from this list. A substitute may be offered by addendum to the contract prior to the bid date. In all cases the manufacturer must be compliant with intent and letter of this specification:

1. Power Standards Lab DBA Powerside

2. [2nd manufacturer and model]

3. [3rd manufacturer and model]

2.2 POWER QUALITY AND ENERGY METER

A. Electrical components, devices, and accessories shall be listed and labeled by an inspecting and testing agency acceptable to authorities having jurisdiction and marked for intended use.

B. The power quality and energy meter shall meet the following environmental conditions:

1. Operating ambient temperature range shall be -4 °F (-20 °C) to 149 °F (65 °C) maximum.

2. Maximum Altitude without derating: 6562 feet (2000 m).

3. Humidity: 5 percent to 95 percent, non-condensing.

C. Mounting and Enclosures

1. The meter and all electrical options shall be DIN Rail mounted.

2. [Optional] A mounting bracket and bezel shall allow the meter to be panel mounted.

3. [Optional] The meter shall be provided in a NEMA 1 enclosure preconfigured and wired and ready to accept voltage, current inputs.

4. [Optional] The meter shall be provided in a portable case preconfigured and wired and ready to accept voltage, current inputs. Four voltage leads and four 3000-amp Rogowski current probes or split-core current transformers shall be included. Meter and accessories shall be provided in a rugged overpack as provided by Pelican Cases or equivalent.

D. Measured parameters

1. BASIC FUNCTION OF METER: The meter shall be a four-quadrant meter that can measure and record all commonly recorded power flow parameters, including Watts, VARs, true Power Factor, bidirectional Watt-hours, and VAR-hours. These measurements shall be made at least 5 times per second, and min/avg/max values shall be available at various intervals. The meter shall also capture power quality disturbances such as Total harmonic distortion (THD), provide individual voltage and current harmonic readings, individual inter-harmonic readings up to rank 50 on three current channels, frequency, short and long interruptions, temporary over voltages, current and voltage unbalance. Disturbance detection and recording: sag/swell on any current and voltage channel, alarm on disturbance event, waveform capture with per-event information. The meter shall also be capable of detecting and recording all standards-based electric power disturbances that can damage or disrupt sensitive loads, including both pre-trigger and post-trigger oscillograms where appropriate. On ordinary power quality events, the meter shall measure at 512 samples per cycle or more, and on impulse events the meter shall measure at 4 million samples per second or more, for a single channel. The meter shall communicate its results through standard Internet protocols.

2. The meter shall meet stringent IEC and ANSI measurement accuracy standards including ANSI C12.20 accuracy class 0.2,and IEC 62053-22 Class 0.2S and be fully compliant with Class A as per IEC.

3. The meter shall be capable of measuring conducted emissions in the range of 2 kHz-150kHz according to IEC 61000-4-30 Ed3.

E. Inputs and Outputs

1. CHANNELS: The meter shall be equipped with a minimum of 5 (five) voltage channels, each rated to measure ±1000 V, and also rated to measure standard impulses up to ±6 kV.

2. Eight (8) [or fourteen (14)] Current channels supporting current transformers with a 0.333 mV secondary output, 0–6000 Amp, capable of 0.2 Class revenue metering. The meter shall be capable of accepting Current Transformer Calibration Tables for magnitude and harmonics through at least 3 kHz.

3. Meter current channels shall be capable of being configured to measure multiple three-phase or single-phase loads.

4. The meter shall provide four (4) analog inputs, one (1) digital input and one (1) relay output.

5. [Optional] Module providing four current channels that will accept the output from a 5A secondary. High accuracy calibration ensures full IEC Class 0.2 and ANSI Class 0.2S accuracy compliance.

6. [Optional] Module providing four current channels that will accept the output from a 1A secondary. High accuracy calibration ensures full IEC Class 0.2 and ANSI Class 0.2S accuracy compliance.

7. [Optional] Meter shall be capable of accepting and measuring four analog voltage channels with a range of [100vdc] [600 Vdc] [1200 Vdc] (select one).

8. [Optional] Module shall be capable connecting directly to an additional 3-phase 600Vac source creating a dual power analyzer.

9. [Optional] Module shall provide an additional eight (8) individually programmed relays.

10. [Optional] Support two (2) remote environmental sensors providing the following measurement data: ambient temperature, ambient barometric pressure, humidity and X-Y-Z mechanical acceleration.

F. Communications and Control

1. Meter shall include a front panel, high-resolution, touchscreen, color display providing numeric data as well as oscillographic and phasor graphic data.

2. Support remote communications shall be via Ethernet TCP/IP configured fixed or via DHCP.

3. The meter shall support the following communications protocols natively: Modbus, BacNET, SNMP, DNP3.

4. Data shall be retrievable locally via a USB type A flash drive or removable micro SD card.

5. Data storage shall include a minimum of 32 GB of RAM.

6. Remote communications and control shall be available via an integrated, secure web server (HTTPS) and integrated FTP server (FTPS).

7. An integrated email client for both sending and receiving email.

8. Meter time synchronization shall be available natively via NTP, SNTP.

9. The meter shall produce (directly on the meter, and without external software or computing) all its results in one or more of the following file formats: CSV (Excel-compatible), GIF (visual display compatible), PQDIF (IEEE standard). No other file formats are permitted.

G. Meter power

1. The meter shall be capable as a standard feature of being powered by Power Over Ethernet (POE) and being powered by either 24 Vac or 24–48 Vdc.

2. [Optional] The meter shall offer an optional 100–240 Vac power supply module.

3. [Optional] The meter shall offer an optional battery module capable of providing from 30 minutes up to 3 hours of backup power for continuous meter operations.

H. External Current Transformer (CT):

1. Current transformer shall be provided in a location and at a rating as detailed in the site drawings.

2. The meter shall be able to use Rogowski coils without the need of an external integrator.

3. [Optional] The meter shall be able to connect to the secondary of CTs (5A or 1A).

PART 3. EXECUTION

3.1 GENERAL

A. Verification of Conditions: Examine areas and conditions under which the work is to be installed and notify the contractor, owner and engineer in writing any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

C. Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the installer.

D. Install equipment according to reviewed product data, manufacturer’s written instructions and recommendations and as indicated on the drawings.

END OF SECTION 26 35 33.16