SECTION 26 27 13

ELECTRICAL SUB-METERING

PART 1 - GENERAL

1.1   SECTION INCLUDES

    A.   Electrical sub-meters.

1.2   OPERATION AND MAINTENANCE DATA

    A.   Submit operation and maintenance data under provisions of Division 01.

    B.   Include spare parts data listing; source and current prices of replacement parts and supplies;
            and recommended maintenance procedures and intervals.

PART 2 - PRODUCTS

2.1   ELECTRICAL USE SUB-METERS

    A.   Acceptable Manufacturers:
            1.   *Electro Industries*, model Shark 100-S/Unicom 2500/CT200K
            2.   Substitutions: None permitted

    B.   General: Sub-meter for three phase energy use (kWH) at 120/208 volts.

    C.   Sub-meter shall be designed for Multifunction Electrical Measurement on 3 phase power
            systems.
            1.   Sub-meter shall support 3 element wye, 2.5 element wye, 2 element delta, 4 wire delta
                    systems.

            2.   The sub-meter shall accept universal voltage input suitable for 120, 220, and 277
                    power systems.

            3.   Surge withstand shall conform to IEEE C37.90.1

            4.   The sub-meter shall be user programmable for voltage range to any PT ratio.

                    a.   The sub-meter shall accept a voltage input range of up to 416 Volts Line to
                            Neutral, and a range of up to 721 Volts Line to Line.

    D.   The sub-meter shall have an accuracy of +/- 0.1% or better for volts and amps, and 0.2% for
            power and energy functions. The sub-meter shall meet the accuracy requirements of IEC687
            (class 0.2%) and ANSI C12.201(Class 0.2%).
            1.   The sub-meter shall provide true RMS measurements of voltage, phase to neutral and
                    phase to phase, current, per phase and neutral.

            2.   The sub-meter shall provide sampling at 400+ samples per cycle on all channel
                    measured readings simultaneously.

            3.   The sub-meter shall utilize 24 bit Analog to Digital conversion.

E.   Sub-meter shall provide Harmonics %THD (% of total Harmonic Distortion).

F.   The sub-meter shall include a three line, bright red, .56" LED display.
1.   The sub-meter shall fit in both DIN 92mm and ANSI C39.1 Round cut-outs.

2.   The sub-meter must display a % of Load Bar on the front panel to provide an analog feel. The % Load bar shall have no less than 10 segments.

a.   The sub-meter must have a programmable display, which allows for the following programming functions including automatic scroll, screen selection programming, and energy scaling.

G.   Sub-meter shall include virtual measurement upgrade packs, which shall allow user to upgrade in field without removing installed sub-meter.
1.   Two upgrade packs shall be:

a.   Volts, Amps, kw, kVAR, PF, kVA, Freq., kWh, kVAh, kVARh.

b.   Volts, Amps, kW, kVAR, PF, kVA, Freq., kWh, kVAh, kVARh, %THD Monitoring and Limit Exceeded Alarms.

2.   These virtual upgrade packs must be able to be updated without physically removing the installed sub-meter.

a.   Sub-meter shall be a traceable revenue sub-meter, which shall contain a utility grade test pulse, allowing power providers to verify and confirm that the sub-meter is performing to its rated accuracy.

H.   The sub-meter shall include two independent communication ports with advanced features:
1.   Port 1 shall provide an optical IrDA port (through the faceplate) which shall allow the unit to be set up and programmed using a PDA or remote laptop without need for a communication cable.

2.   Port 2 shall be selectable for RS485 communication, for 10 base T Ethernet or for 802.11 Wireless Ethernet.

3.   When in serial mode, the meter shall speak Modbus ASCII, Modbus RTU, or DNP 3.0 protocol up to 57.6K baud.

4.   When in Ethernet mode, the meter shall provide an 802.11 WIFI or an RJ45 Ethernet connection which shall allow the unit to be assigned an IP address and communicate Modbus protocol over Ethernet TCP/IP.

a.   The sub-meter shall have Pocket PC based software available for remote programming and integration.

I.   The sub-meter shall provide user configured fixed window or rolling window demand. This shall allow user to set up the particular utility demand profile.
1.   Readings for kW, kVAR, kVA and PF shall be calculated using utility demand features.
2.   All other parameters shall offer max and min capability over the user selectable averaging period.
3.   Voltage shall provide an instantaneous max and min reading, displaying the highest surge and lowest sag seen by the sub-meter.

4. The meter shall additionally measure accumulated energy in both generating and consuming quadrants with a programmable scaling that allow up to 8 digits of energy resolution.
   a. The meter shall also accumulate positive and negative VAR-hours and VA-hours. All readings shall be stamped with a positive and negative average demand.

J. The sub-meter shall support power supply and support direct wiring from 100 to 400 Volts AC or 100 to 370 Volts DC.
   1. Sub-meter power supply shall accept burden of 10VA max.

K. The sub-meter shall have a standard 4-year warranty.

L. Sub-meter shall be able to be stored in (-40 to +85) degrees C.

   1. Operating temperature shall be (-30 to +70) degrees C.
      a. NEMA 12 faceplate rating shall be available for the Sub-meter.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install sub-metering equipment in accordance with manufacturer's instructions.

B. Install sub-meters in surface mounted NEMA 1 enclosures. Install meters at 60 inches (maximum) above adjacent floor.

C. Provide a CAT6 communications cable between each electrical sub-meter and the closest local area network equipment rack.

END OF SECTION 26 27 13