PART 1

PART 2   PRODUCTS

2.01   MANUFACTURERS

A. Eaton products

B. ·_____

C. ·_____

The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the Engineer ten (10) days prior to bid date.

2.02   THE MICROPROCESSOR-BASED METERING EQUIPMENT.

A. The Power Xpert Meter 2000 series:

1. Where indicated on the drawings, provide a microprocessor based line of multifunction, power and energy meters, designated (MM2250/MM2260/MM2270/MM2280/MM2290) device equal to Eaton type PXM2250, PXM2260, PXM2270, PXM2280, or PXM2290 series. The meter device shall be UL listed. All meters shall have the following ratings, features, and functions, unless a specific meter type is designated.

2. Meter shall be designed for Multifunction Electrical Measurement on 3 phase power systems. The Meter shall support 3-Element Wye, 2.5 Element Wye, 2 Element Delta, 4 wire Delta systems.

3. Meter surge withstand shall conform to IEEE C37.90.1 and ANSI C62.41 (6KV)

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

5. The meter shall have a burden of up to .36VA per phase, Max at 600V, 0.014VA at 120 Volts.

6. The meter shall accept a direct voltage input range of up to 576 Volts Line to Neutral, and a range of up to 721 Volts Line to Line.

7. Meter shall accept a current input of up to 10 amps continuous. Start up current for a 5 Amp input shall be no greater than .005 Amps.

B. Power meter shall be capable of a dual input method for current inputs. As standard the meter shall be designed to allow the CT circuit to pass directly through the meter without

any physical termination on the meter, ensuring the meter cannot be a point of failure on the CT circuit. As an option where indicated on the drawing or required for the application, provide additional termination pass-through bars, allowing the CT leads to be terminated on the meter. The meter must be capable of supporting both termination methods.

C. The meter shall have the following additional ratings and features:

1. Fault Current Withstand shall be 100 Amps for 10 seconds, 300 Amps for 3 seconds, and 500 Amps for 1 second.

2. Meter shall be programmable for current to any CT ratio. The use of DIP switches for selecting fixed ratios shall not be acceptable

3. Meter shall have a maximum burden of 0.005VA per phase, at the maximum at 11 Amperes.

4. Meter to accept a pass through wire gauge dimension of 0.177" / 4.5 mm.

5. All inputs and outputs shall be galvanically isolated to 2500 Volts AC.

6. The meter shall accept current inputs of class 10: (0 to 10A), 5 Amp Nominal, and class 2 (0 to 2A), 1A Nominal Secondary.

D. The meter shall have an accuracy of +/- 0.1% or better for volts and amps, and 0.2% for power and energy functions. The meter shall meet the accuracy requirements of IEC687 (class 0.2%) and ANSI C12.20 (Class 0.2%).

1. The meter shall provide true RMS measurements of voltage, phase to neutral and phase to phase; current, per phase and neutral.

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

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

4. Type MM2250 meters shall provide Volts, Amps, kW, kVAR, PF, kVA, Frequency, kWh, kVAh, kVARh ,1 KYZ pulse output, and 256 Megabytes for data logging.

5. Type MM2260 meters shall provide per phase % THD (Total Harmonic Distortion) monitoring to the 40th order for voltage (reference to neutral only) and current , and shall provide Volts, Amps, kW, kVAR, PF, kVA, Frequency, kWh, kVAh, kVARh and 1 KYZ pulse output, on board meter limit exceeded alarms, and 512 Megabytes for data logging.

6. Type MM2270 meters shall provide per phase % THD (Total Harmonic Distortion) and individual harmonic monitoring to the 40th order for voltage (reference to neutral only) and current, and shall provide Volts, Amps, kW, kVAR, PF, kVA, Frequency, kWh, kVAh, kVARh, 1 KYZ pulse output, on board meter limit exceeded alarms, provide a waveform view of real time harmonic distortion on a PC from the embedded WEB server and 768 Megabytes for data logging.

7. Type MM2280 meters shall provide per phase % THD (Total Harmonic Distortion) and individual harmonic monitoring to the 40th order for voltage (reference to neutral only) and current, and shall provide Volts, Amps, kW, kVAR, PF, kVA, Frequency, kWh, kVAh, kVARh, 1 KYZ pulse output, on board meter limit exceeded alarms, provide a waveform view of real time harmonic distortion on a PC from the embedded WEB server, record waveforms up to 64 samples per cycle, and 768 Megabytes for data logging.

8. Type MM2290 meters shall provide per phase % THD (Total Harmonic Distortion) and individual harmonic monitoring to the 40th order for voltage (reference to neutral only) and current, and shall provide Volts, Amps, kW, kVAR, PF, kVA, Frequency, kWh, kVAh, kVARh, 1 KYZ pulse output, on board meter limit exceeded alarms, provide a waveform view of real time harmonic distortion on a PC from the embedded WEB server, record waveforms up to 512 samples per cycle, and 768 Megabytes for data logging.

E. Type MM2280 and MM2290 meters shall provide a simultaneous voltage and current waveform recorder.

1. Type MM2280 meter shall be capable of recording 64 samples per cycle for a voltage sag or swell or a current fault event.

2. Type MM2290 meter shall be capable of recording 512 samples per cycle for a voltage sag or sell or a current fault event.

3. The meter shall provide pre- and post-event recording capability.

4. The meter shall have a programmable sampling rate for the waveform recorder.

5. The meter shall have an advanced DSP design that allows power quality triggers to be based on a 1 cycle updated RMS.

6. The meter shall allow up to 1500 events to be recorded.

7. The meter shall store waveform data on the meter ftp server in COMTRADE format and be accessible via a web browser.

F. The meter shall be able to be configured and viewed from the on-board web server without the need for external software

G. The meter shall include a three-line, bright red, .56" LED display.

1. The meter shall fit in both DIN 92mm and ANSI C39.1 Round cut-outs.

2. The meter must display a % of Load Bar on the front panel to provide an analog feel. The % Load Bar shall have not less than 10 segments.

H. The meter shall be available in transducer only version, which shall not include a display. The transducer version shall mount directly to a DIN rail.

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

J. The meter shall include 2 independent communication ports on the back with multiple protocols, including the following minimum capability:

1. Serial Communication Format
    a. Connection Type: RS-485
    b. Protocols: Modbus RTU, Modbus ASCII, DNP 3.0
    c. Baud rates shall be from 9600 to 57,600 baud

2. Network Communication Format
    a. Connection Type: RJ-45 10/100 Base-T Ethernet Network port

b. Ethernet card shall allow auto transmit/receive detection for straight or null RJ45 cables.

c. Protocols: Ethernet TCP/IP, Modbus TCP, BACnet/IP, SNMP v1 & v3 (Network), SMTP (email), HTTP, HTTPS, Atom Feed

K. The meter shall provide user configured fixed window or sliding window demand. This shall allow the 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 meter.

L. The meter shall be capable of operating on a power supply of 90 to 265 Volts AC and 100 to 370 Volts DC. Universal Power AC/DC Supply shall be available and shall have a burden of less than 11VA. An option shall also be available to operate on a power supply from 18-60 VDC.

M. Meter shall provide update rate of 100msec for Watts, Var and VA. All other parameters shall be 1 second.

N. (MM2260/MM2270/MM2280/MM2290 only) The meter shall provide on board meter Limits Alarms and Control Capability as follows:

1. Limit ranges can be set for any measured parameter.

2. Up to 16 limit ranges can be set.

3. Limit ranges shall be based on % of Full Scale settings.

4. Manual relay control shall be available using Modbus RTU command when used with optional relay card

5. Relay set delays and reset delays shall be available

O. The PXM 2000 series shall provide the following advanced analysis features:

1. (MM2260/MM2270/MM2280/MM2290 only) Calculation of harmonic magnitudes and phase angle for each phase voltage and current through the 40th harmonic.

2. (MM2270/MM2280/MM2290 only) Waveform view of real time harmonic distortion and individual harmonic monitoring on a PC from the embedded WEB server

3. Historical Trending: Historical trend logging for graphical viewing from an embedded WEB server. The graphical views of historical data shall support both pan and zoom functions. All standard metering parameters (42 real-time measures) shall be logged as part of the standard meter functionality including minimum, maximum and average for

each metered parameter. The averages shall be calculated over the time interval period. Minimum storage capacity for standard trend plots shall be as follows for MM2250, MM2260, and MM2270/MM2280/MM2290, respectively:

    a. Five-minute intervals for 90, 180, 365 days.

    b. Fifteen-minute intervals for 1, 2, 3 years

    c. Sixty-minute intervals for 5, 10, 15 years

    d. Data storage up to 256, 512, 768 MB.

4. Event Triggers: The meter shall have a quantity of two (2) types of configurable event triggers consisting of:

    a. (MM2260/MM2270MM2280/MM2290 Only)On board meter out of limits, The on board meter out of limits can be set for any measured parameter, for up to 16 limits. If any of the 16 limits are exceeded, an alarm condition will be present and illuminate one of the LEDs on the meter faceplate. The on board meter out of limits can also be used to energize a relay output, if so equipped. These triggers shall permit pickup, reset and pickup delay to be user configurable.

    b. On board gateway card out of limits. The on board gateway limits can trigger an alarm off of any measured parameter on any of the PXM 2000 model series. Upper and lower cautionary and critical limits shall be available for each of the measured parameters.   On board Gateway card Out of limits – Up to One Hundred and Sixty Eight (168) triggers

5. Event Logging: The embedded WEB Server shall allow the user to view a list of triggered events along with event details. In addition, a separate system log shall store logging of activities including acknowledged triggers, and systems operations, such as resets. Storage shall be reserved for 100,000 events.

6. Minimum and Maximum values for the following parameters:

    a. Voltage L-L and L-N

    b. Current per phase

    c. Apparent Power Factor

    d. Real, Reactive, and Apparent total Power

    e. %THD voltage L-N

    f. %THD Current per phase

    g. Frequency

P. The WEB server shall provide the user with remote WEB access to all the metered and trend information. The WEB server shall include real time monitored information in both numeric and graphical visual formats.

Q. The meter shall have a real-time clock with the added capability to synchronize with a network time server to maintain time accuracy.

R. The meter shall have I/O expandability through one Option card slot on the back.

1. The card shall be capable of being installed in the field, without removing the meter from installation.

2. The meter shall auto-detect the presence of any I/O Option card.

3. The Option card slot shall accept I/O card in all of the following formats: Four channel bi-directional 0-1mA Output Card; Four Channel 4-20mA Output Card; Two Relay Outputs/2 Status Inputs Card; and Four KYZ Pulses/4 Status Inputs Card.

4. The 0-1mA Output Option Card shall provide the following features:
   a. Bi-directional from 0-1mA Outputs.
   b. Assignable to any measured parameter.
   c. 0.1% of full scale.
   d. Maximum load impedance to 10k Ohms, with no accuracy losses.

5. The 4-20mA Output Option Card shall provide the following features:
   a. Assignable to any measured parameter.
   b. 0.1% of full scale.
   c. Maximum load impedance to 500 Ohms, with no accuracy losses.
   d. Loop powered using up to 24 Volts DC.

6. The Two Relay Outputs/2 Status Inputs Option Card shall provide the following features:
   a. Status Inputs – Wet/Dry Auto Detect up to 300 VDC
   b. Trigger on User Set Limits/Alarms (with MM2260/2270/2280/2290)
   c. Set delays and reset delays

7. The Four KYZ Pulses/4 Status Inputs Option Card shall provide the following features:
   a. Programmable to any Energy parameter and pulse value
   b. Programmable to End of Interval Pulse
   c. Can function for manual relay control and limit based control (with MM2260/2270/2280/2290)
   d. 120mA continuous load current

S. Power meter shall be able to be stored in (-20 to +70) degrees C.

   1. Operating temperature shall be (-20 to +70) degrees C.

   2. A NEMA 12 faceplate rating shall be available for the meter.