Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 00 10 – General Instructions.

.2 Section 26 05 00 - Common Work Results for Electrical.

.3 Section 26 23 00 – Low Voltage Switchgear.

1.2 REFERENCES

.1 Canadian Standards Association, (CSA International)

.1 CAN3-C17-M84 (R2004), Alternating - Current Electricity Metering.

.2 CAN/CSA C22.2 No. 61010-1-2004 – Safety Requirements for Electrical Equipment for measurement control and Laboratory Use – Part 1: General Requirements. (Adopted IEC 1010-1:1990 with modifications), Includes Update No. 1 (2008).

.2 Institute of Electrical and Electronics Engineers (IEEE)

.1 IEEE C37.90.1-2002, Surge Withstand Capabilities (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus.

1.3 PRODUCT DATA

.1 Submit product data in accordance with Section 01 00 10 – General Instructions.

.2 Indicate meter, outline dimensions, and mounting arrangement.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 00 10 – General Instructions.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal all packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Divert unused metal and wiring materials from landfill to metal recycling facility as approved by Departmental Representative.

.5 Fold up metal banding, flatten and place in designated area for recycling.

Part 2 Products

2.1 CURRENT TRANSFORMERS L.V.

.1 Provide current transformers in accordance with the following:

.1 Current transformers for customer metering; one per phase and one on neutral. Window type mounted and connected on load side bus of main breaker.

.2 Vacuum impregnated core and coils, epoxy moulded, totally encapsulated construction.

.3 Rating Data:

.1 Voltage Class - 600 V.

.2 Primary Current as indicated.

.3 60 Hz metering accuracy - 0.3 to0.9 - for revenue class metering.

.4 Thermal continuous rating - 150%.

.5 1 minute primary - high pressure - 4.0 kV.

.6 1 minute secondary - 2.5 kV.

.7 Impulse - 10 kV full wave.

.8 One per phase and one for neutral.

2.2 POTENTIAL TRANSFORMERS – L.V.

.1 Open type, protected by HRC current limiting fuses.

.2 Three (3) per set, connected line to ground.

.3 Rating Data:

.1 Voltage Rating: 360 V primary, 120 V secondary - 60 Hz.

.2 Metering Accuracy: 0.5% or better.

.3 Primary insulation test: 4.0 kV.

.4 55^{o} C rise.

.5 Capable of withstanding 25% higher than nominal voltages.

.6 Thermal rating: 100 VA.

2.3 DIGITAL METER

.1 The Digital AC Instrumentation Package shall be capable of measuring, calculating and directly displaying on the front panel display the following information in user programmable groups:

.1 Voltage line-to-neutral and line-to-line for each phase and average of all three phases.

.2 % voltage unbalance.

.3 Current for each phase and average of all three phases.

.4 % current unbalance.

.5 Neutral or ground current.

.6 kW for each phase and total of all three phases.

.7 kVAR for each phase and total of all three phases.

.8 kVA for each phase and total of all three phases.

.9 kWh for total of all three phases, provided as accumulating import, export, net and total readings.

.10 kVARh for total of all three phases, provided as accumulating import, export, net and total readings.

.11 kVAh for total of all three phases, provided as an accumulating net reading.

.12 Power factor for each phase and total of all three phases.

.13 Frequency.

.14 Voltage for the auxiliary voltage input.

.15 Harmonic distortion for each voltage and current input, provided as individual harmonic magnitudes up to the 15th harmonic, and as total odd, total even and total overall harmonic distortion.

.16 K-Factor calculations of the first 15 harmonics for all voltage and current inputs.

.17 Thermal demands for all real-time parameters, including harmonic distortion, with user-programmable length of demand period to match local utility billing method.

.18 Sliding window demands for up to 10 user-programmable parameters with user-programmable length of demand period and number of sub-periods to match local utility billing method.

.19 Predicated demand calculations for sliding window demand parameters. User programmable predictive response characteristics.

.20 Minimums and maximums for all real-time, thermal demand, sliding window demand, predictive sliding window demand and harmonic distortion parameters.

.2 The instrumentation package shall include:

.1 True RMS measurement

.2 Connect directly to PTs and CTs. Provide current input overrange options from 125% to 1000%.

.3 Supplied with a fourth current input for measurement of neutral current.

.4 Four optically isolated, self-excited, dry contact digital (status) inputs, maximum 277 VAC/VDC.

.5 One auxiliary analog input rated 1.0 VAC/VDC nominal full scale input which can be used to measure an external variable.

.6 One auxiliary analog output (selectable 0-20 mA or 4-20 mA) proportional to any measured parameter.

.7 Three Form C dry contact electromechanical control relay outputs rated 277 VAC or 30 VDC @ 10 Amp maximum load current.

.8 Store in non-volatile memory the following:

.1 A time-stamped alarm and event log of up to 100 events which records event date, time, event type, and value for all over/under limit conditions, digital (status) input activity, relay operations, and self-diagnostics operations. Time stamps for each event shall be provided with a resolution of 1 millisecond.

.2 All setup data.

.9 System with waveform capture and recording capability allowing any of the eight (8) voltage and current input channels.

.10 Display with 3-field, 20 character, high visibility 10 mm character height vacuum-fluorescent display with a programmable time-out feature.

.11 Communications port with:

.1 RJ45 port for integration to EMCS via an Ethernet TCP/IP network.

.2 Communication in accordance with the ASHRAE Bacnet IP protocol.

.12 Field programmable as follows:

.1 Voltage input scale, voltage mode (wye, delta, single phase), current input scale, auxiliary input and output scales, and communications setup parameters are programmable from the front panel.

.2 All parameters in (.1) above, plus additional set point/relay and data log setup parameters may be programmed via the communications port using a portable or remotely located computer terminal.

.3 The programming shall be password protected.

.13 Meet the following standards:

.1 UL listed.

.2 CSA approved.

.3 Voltage, current, status, relay and power inputs pass the IEEE C.37.90.1, Surge Withstand Capabilities (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus.

.4 Certified to comply with FCC Part 15 Subpart J for Class A computing devices.

.14 Have surge protection of 300 Amps for one second on all four current inputs.

.15 Have the following accuracy, resolution, range, and power supply ratings specifications:

PARAMETER	**ACCURACY** (% full scale)
Phase Voltage	0.2%
Phase Current	0.2%
kW	0.4%
kVAR	0.4%
kVA	0.4%
kWh	0.4%
kVARh	0.4%

2.4 TEST TERMINAL BLOCKS

.1 Test terminal blocks: as required.

Part 3 Execution

3.1 METERING INSTALLATION

.1 Install meters current and potential transformers in switchgear as per drawings.

.2 Make connections in accordance with manufacturer’s diagrams.

3.2 FIELD QUALITY CONTROL

.1 Conduct tests in accordance with Section 01 00 10 – General Instructions and in accordance with manufacturer's recommendations.

.2 Perform simulated operation tests with metering, instruments disconnected from permanent signal and other electrical sources.

.3 Verify correctness of connections, polarities of meters, instruments, potential and current transformers, transducers, signal sources and electrical supplies.

.4 Perform tests to obtain correct calibration.

.5 Complete full setup and connection of meter communication to client network and configuration of IP address.

.6 Do not dismantle meters and instruments.

END OF SECTION