

PART 1 **GENERAL**

1.1 **SECTION INCLUDES**

- .1 ANSIC39.1-1981, Requirements for Electrical Analog Indicating Instruments.
- .2 CAN3-C17-M84 (R2004), Alternating – Current Electricity Metering.
- .3 The system shall be approved by Industry and Science Canada of Measurements Canada AE0763, AE0763 REV 1, Ae0819AE-97-0028, AE0818.

1.2 **PRODUCT DATA**

- .1 Submit product data in accordance with Division 01.
- .2 Indicate:
 - .1 Meter, outline dimensions, and enclosures.
 - .2 System riser, one line and panel wiring diagram.
- .3 Manufacturer's system and component connection diagram.
- .4 Measurement Canada approvals for meters and current transformers.

1.3 **RELATED WORK**

- .1 Section 26 05 34 – Conduits, Conduit Fastenings and Conduit Fittings.
- .2 Section 26 05 21 – Wires and Cables (0-1000V).
- .3 Section 26 05 28 – Grounding - Secondary

PART 2 **PRODUCTS**

2.1 **GENERAL**

- .1 Provide a fully digital electrical measurement system. The system shall have two major components:
 - .1 Metering module factory sealed for revenue metering.
 - .2 A set of current transformers sized to the individual loads.
- .2 The meter shall have its own display for reading.

2.2 **SUB-METERING SYSTEM**

- .1 To consist of Measurement Canada approved electronic multi-meters, socket meters, current transformers, and a communications system as shown on drawing and described herein.
- .2 Meters to be used for Revenue Billing of wharf receptacles electricity usage, demand and power factor.
- .3 The meters shall be capable of remote communication, utilizing one of or a combination of the following systems:
 - .1 Modem: 19k baud internal modem installed in metering cabinet
- .4 The Metering System shall have integral backup storage power to key components so that no data is lost during power outages. The system shall continue to function after resumption of power. Data to be retained for 8500 hours with a 20 year shelf life.
- .5 Failure of the building electrical normal power system shall not result in loss of data and will not require manual restarting of the metering system.

2.3 **METER**

- .1 Multi-Customer Meter:
 - .1 Voltage 120/240, single phase.
 - .2 Configured for combination of 2 and 1 meters as indicated on drawings.
- .2 Current Ranges: 15A, 30A 60A as indicated. System shall accommodate future installation of 100A 2 meter loads without modification of metering system excluding installation of alternate CT.
- .3 Accuracy: 0.5% of 100% registration @ 1.0 pf, 1% to 100% load to meet: ANCI 12.1 (USA) Measurement Canada.
- .4 Operating Temperature Range: -40 degrees to +50 degrees C.
- .5 Dimensions: as indicated.

2.4 **SYSTEM MEASUREMENT**

- .1 Meters to be complete with Liquid Crystal Display (LCD) to access all billing measurements and phase diagnostics.
- .2 Billing Parameters:
 - .1 KWHR real consumption
 - .2 KW average demand
 - .3 KW instantaneous demand

- .4 KVAH apparent consumption
- .5 KVA apparent demand
- .6 KVARH reactive consumption
- .7 KVAR reactive demand
- .8 TOU Time of use, up to 4 periods per day
- .3 Phase Diagnostics: Parameters to be displayed for each individual phase of each metered load:
 - .1 Voltage Phase to neutral for each phase
 - .2 Amps instantaneous amperage for each phase
 - .3 Frq Frequency
 - .4 KW Instantaneous real energy
 - .5 KVA Instantaneous apparent energy
 - .6 KVAR Instantaneous reactive energy
 - .7 Pf Instantaneous power factor
 - .8 Pa Phase angle
- .4 Data Logging
 - .1 Logging of kW, kVA, kVAR, Total Harmonic Distortion, Power Factor and Amperage in 15 minute intervals.

2.5 METER CABINET

- .1 Sheet steel CSA enclosure EEMAC 1 with meter back plate, to accommodate meters, test terminal block and associated equipment, factory installed and wired.

2.6 METERING INSTRUMENT TRANSFORMER CABINER

- .1 Sheet steel CSA enclosure EEMAC 1 to accommodate current transformers.

2.7 CURRENT TRANSFORMERS

- .1 Provide all current transformers associated with the metering system.
- .2 Loads shall have 100:5 precision current transformers with an accuracy exceeding that specified in ANSI C12.1 and Industry Canada approved.
- .3 5 Amp Secondary CTs, Measurement Canada Approved Models: Electro-Meters 2DARL-101 Solid Core CT, 100A-5A or approved equal for use with transformer rated meters.
- .4 Flexible leads are UL 1015 105oC, CSA approved, #16 AWG, 24: long.

2.8 METER COMMUNICATIONS

- .1 19k Baud Internal Modem, installed in a meter or in a Transponder. One required per metering system for future connection.

2.9 WARRANTY

- .1 Manufacturer shall warranty the products free from defect for a period of 3 years from the date of project Substantial Completion and owner acceptance.

2.10 STANDARD OF ACCEPTANCE

- .1 Quadlogic Controls Corporation Inc. Mini-closet -5C multi-tenant metering system or approved equal.

PART 3 EXECUTION

3.1 METERING INSTALLATION

- .1 Install meters and instruments in location free from vibration and shock.
- .2 Make connections in accordance with diagrams.
- .3 Install Current Transformers with a minimum ½ inch clearance to un-insulated live parts in subpanel, and without bearing against dead metal parts.
- .4 Connect meter and instrument transformer cabinet to ground.
- .5 Install enclosure on wall as indicated.
- .6 Wire CT leads, potential lead and neutral lead from cabinet to meter enclosure.
- .7 Install as per manufacturers' instructions.

3.2 CALIBRATION AND MAINTENANCE SERVICE

- .1 All meters shall be factory calibrated with precision test equipment and shall remain accurate for the life of the product eliminating the need for in-service calibration or adjustments. The manufacturer shall provide the Owner with repair or replacement service to the extent covered by the warranty.

3.3 FIELD QUALITY CONTROL

- .1 Conduct tests in accordance with Section 26 05 00 – Common Work Requirements – Electrical 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 Test terminal blocks: as required.
- .6 Do not dismantle meters and instruments.

3.4 COMMISSIONING AND TRAINING

- .1 Maintenance Training:
 - .1 Include in the tender cost, the services of skilled instructors to conduct on-site training for a minimum of four local harbour Authority Staff and Departmental Representatives on the operation of all metering components.
 - .2 The training shall include a detailed review of the maintenance manuals and a review of procedures of operation for configuring and using the metering system
- .2 Commissioning:
 - .1 Commissioning will be performed after substantial completion and will require the presence of trained technicians in accordance with Section 26 05 00 Common Work Requirements – Electrical to demonstrate operation and accuracy of the system and system components. Update as required.
 - .2 Verify system calibration and provide Departmental Representative.
- .3 Conduct tests in accordance with Section 26 05 00 – Common Work Requirements – Electrical and in accordance with manufacturer’s recommendations.
- .4 Perform test to obtain correct calibration.
- .5 Test terminal blocks: as required.
- .6 Do not dismantle meters and instruments.

END OF SECTION