

DIVISION 16 ELECTRICAL SPECIFICATIONS

ELECTRIC SUBMETERING

Available in MS Word format:
www.quadlogic.com
Click "Support" then
[Submetering Specifications](#)

PART 1 – GENERAL

1.01 DESCRIPTION

- A. Provide electric submetering to meter electric consumption for each tenant in accordance with the Contract Documents.

1.02 ELECTRONIC POWER METERING

- A. Provide electronic power metering where indicated complying with all requirements below. Meter(s) shall be Quadlogic Controls Corp. or approved equal.
- B. The meters shall be manually readable using local Liquid Crystal Display (LCD) via push-button and automatically readable utilizing Frequency Hopping Spread Spectrum Power Line Carrier Communication ("PLC").
- C. The metering system shall consist of the Quadlogic MiniCloset-5, MiniCloset-5c, RSM-5, RSM-5c, S-20, S-10 & Transponder(s) or equal.
- D. Meter shall be configured for [residential] [commercial] application and applied on [120/240V] [120/208V] [277/480V] [347/600V] [480V delta 3P3W] [600V delta 3P3W] nominal systems or as indicated on the drawings.
1. Residential Use (kWh):
 - a. 120/208V single phase, 3 wire (2 pole)
 - b. 120/240V split phase, 3 wire
 2. Commercial/Industrial Use (kWh and Demand):
 - a. 120/208V, 277/480V and 347/600V, 3 phase/4 wire
 - b. 480V and 600V Delta, 3 phase/3 wire
- E. **NOTE TO SPECIFIER: DELETE FOLLOWING PARAGRAPH IF METER IS CONFIGURED FOR RESIDENTIAL APPLICATION.** [kW Demand shall be measured and recorded every [15] minutes. (Demand is factory configured in block intervals. Rolling (overlapping) time interval demand shall also be configurable as an option.) Demand shall be recorded along with the time and date at which it occurs. The meter shall be classed as a mass memory interval meter (meters which record and store the energy use by time). The demand interval and optional time-of-use schedules shall be factory programmed and stored in each meter. Daily peak demands shall be capable of being read by a remote computer.]
- F. **NOTE TO SPECIFIER: DELETE FOLLOWING PARAGRAPH IF METER IS CONFIGURED FOR COMMERCIAL APPLICATION.** [kW Demand shall be measured and recorded every [60] minutes. (Demand is factory configured in block intervals. Rolling (overlapping) time interval demand shall also be configurable as an option.) Demand shall be recorded along with the time and date at which it occurs. The meter shall be classed as a mass memory interval meter (meters which record and store the energy use by time). The demand interval and optional time-of-use schedules shall be factory programmed and stored in each meter. Daily peak demands shall be capable of being read by a remote computer.]

DIVISION 16 ELECTRICAL SPECIFICATIONS

- G. The Meter shall have the following Testing and Certification:
1. UL/CUL recognized
 2. Meets or exceeds requirements of ANSI C12.1, ANSI/IEE C37.90.2. ANSI/IEEE C37.90.1, and Measurement Canada.
- H. Each meter shall interface to the electrical load being measured with a direct voltage tap, up to 600 VAC, and with 0.1Amp or 5.0A secondary for split and solid core current transformers.
- I. Monitoring
1. Provide true RMS measurement of current, volts, %THD, kW, kVA, kVAR, kWh, power factor.
 2. The Meter shall have an accuracy of $\pm 0.5\%$ or better.
- J. User Interface
1. Reading shall be accessible on a local LCD display. The display shall consist of two rows of 16 characters on each row. The consumption reading shall be up to six (6) digits.
 2. Provide an IEC type optical port capable of direct connection to a laptop.
- K. The system shall be a fully automated, microprocessor-based electric utility measurement system. The system shall be capable of measuring and recording the usage of electricity and shall be capable of communicating the reading to an optional on-site or remote computer (i.e. the billing computer) via modem or other means of communications.
- L. The meter shall not depend on battery power for maintaining functionality. Meter shall monitor all metering parameters and perform communication tasks using a non-volatile flash memory. On-board battery shall only be used in power failure to maintain time, log incoming pulses (if applicable) and to store the data acquired within the incomplete interval at the time of the power failure.
- M. Each meter shall be capable of reading minimum of four (4) dry contact, Form A pulse inputs to automate the reading of other utilities such as gas, water or BTU's. MiniCloset-5 and MiniCloset-5c shall be capable of reading up to 48 pulses.
- N. Each meter shall be equipped with a clock/calendar that automatically accommodates leap years. The clock/calendar shall be backed up by battery and continue operating during power outages. The time and date shall be automatically synchronized by the Scan Transponder(s) and capable of being reset by a remote computer.
- O. Each meter shall be complete with internal CT termination and shorting and fuse block <where applicable>.
- P. Revenue related metering parameters (i.e. demand intervals) shall be permanent and stored in each individual meter. It shall not be possible to change metering parameters through unauthorized access to the system.

DIVISION 16 ELECTRICAL SPECIFICATIONS

- Q. Provide Phase Diagnostic Registers that include multipliers for amperage, voltage, watts, and line frequency. On a per-phase basis Phase Diagnostics shall include voltage, VAR phase shift, accumulated kWh and kVARh and instantaneous amps, watts, VAR's, VA's, phase angle (degrees displacement between current and voltage waveforms), and Power Factor.
- R. Provide Event Diagnostic Registers that include time and date and the number of times the time has been changed, number of power downs, power ups and start ups with time and date of last occurrence, and the number of times the accumulated peak demand has been reset, also with the time and date of the last occurrence. Meters that communicate by Power Line Carrier Communications shall also include counts of properly received messages, rejected messages and the numbers of transmissions without replay.
- S. On-board Memory Storage
1. The meter shall maintain a minimum of 60-day log of daily Time-of-Use consumption, interval data and peak demand readings along with the time and date at which the daily peak demands occur. The consumptions recorded shall be the reading at the end of the Time-of-Use period of the end of the day. The peak demand recorded in the log shall be the peak demand for the Time-of-Use period for that day.
 2. Each meter shall maintain a minimum of 60-day date logging capacity consisting of fifteen (15) minute or hourly demands with time and date stamp.
 3. Memory shall be non-volatile.
- T. Control power for the meter shall be obtained via the monitored voltage connections. A separate control power input is not allowed.
- U. Communications Interface
1. Where indicated in the drawings, the system shall communicate with a remote computer using one or more of the methods noted below. Preferred method communications method shall be Power Line Carrier Communications.
 - a. The meter shall communicate over the electrical power wiring to a Scan Transponder via bi-directional, frequency hopping, spread spectrum power line carrier communications. These signals shall be capable of passing through a single 600/120V or 480/120V transformer. The Scan Transponder and each meter shall select the best available combination of phase, frequency range and baud rate for communication at any given time.
 - b. RS-485. Install per manufacture's guidelines and recommended wire specification.
 2. All meters shall have as an option a local RS-485 serial port for direct connection to the PC.
 3. Individual meters shall be capable of being equipped with a modem for direct connection to a telephone line if necessary.

DIVISION 16 ELECTRICAL SPECIFICATIONS

1.03 SCAN TRANSPONDER

- A. Scan Transponders shall be installed to collect data from meters on a daily basis and provide a centralized data access point.
- B. All communication shall be direct between a Scan Transponder and each meter, and under the control of the Scan Transponder. Meters will not repeat messages from other meters nor will message routing be determined by meters.
- C. A Scan Transponder shall be provided for every 240 electric metering points and one Scan Transponder shall be provided per utility transformer or electrical service. Contractor shall provide required location, quantities and voltage connections for Transponders based on manufacture's specifications and instructions.
- D. Scan Transponder shall begin each communication with a meter with verification of clock and meter ID to ensure date integrity.
- E. The Scan Transponder shall store downloaded meter values in flash memory and shall hold at least 30 days worth of records.
- F. All communication shall be direct between a Scan Transponder and each meter, and under the control of the Scan Transponder.
- G. Multiple Scan Transponders shall be connected by Data Link (RS-485).
- H. Where indicated on manufacturer's shop drawings, meter shall be connected to the Scan Transponder by Data Link (RS-485).
- I. Where indicated on manufacturer's shop drawings, provide a modem on a Scan Transponder for phone line connection to remote computer.
- J. Scan Transponder locations shall be approved by manufacture and installed per manufactures' guidelines. Upon request, manufacture shall provide a project specific design for Scan Transponder system.
- K. Owner shall provide a dedicated telephone line for remote access to the Transponder.

1.04 SOFTWARE

- A. Quadlogic's IQ software or comparable system shall be capable of reading the system, downloading the metered data, and generating energy bills for electricity. (System must also be capable of compiling data from other utility meters such as BTU, gas, water and steam.)
- B. Quadlogic's IQ software or comparable system shall be capable of producing graphs and charts for load profiling including intervals ranging from 5 through 60 minute time periods.
- C. Data collected through IQ software or comparable must be able to be uploaded to spreadsheet programs for analysis such as Microsoft Excel.

DIVISION 16 ELECTRICAL SPECIFICATIONS

PART 2 – EXECUTION

2.01 INSTALLATION

- A. A circuit breaker shall be provided at the metering location to allow safe access to metering components without powering down the entire panel. Where utilized, S-20 200A meters require tenant disconnect to be on the line side of the electric meter.
- B. All meters shall be installed to manufacture's installation instructions.

2.02 SYSTEM COMISSIONING AND START-UP

- A. Contractor to provide third party testing of power metering system or "commissioning". The owner's submetering service company or manufacturer's qualified service organization can provide third party testing. Testing shall be performed prior to tenant occupancy through the following process:
 - 1. Have the installation contractor record the "cross reference" or the meter serial number (unique ID), meter point, to apartment/unit relationship.
 - 2. Check for power to the meter.
 - 3. Check the serial number inside the meter.
 - 4. Open the panel so that all CT's are visible.
 - 5. Verify the CT ratio and write up the cross reference information for the meter.

NOTE TO SPECIFIER: ITEMS 6-8 BELOW APPLY TO RESIDENTIAL APPLICATIONS ONLY. DELETE IF METER/SYSTEM IS CONFIGURED FOR A COMMERCIAL APPLICATION.

- 6. Confirm the "cross reference". This can be accomplished by having one technician turn on a known load in the respective unit on each phase (hair dryer, electric heater, electric stove, etc)
 - 7. Have a second technician at the meter verify the meter's phase diagnostics for the assigned apartments/units. Confirm that there is a significant increase on the load for each phase of the meter point.
 - 8. Once all phases have been checked and loads are still running, turn off the breaker serving the apartment and confirm that all loads in the apartment are disconnected. This completes the verification of the cross-reference list.
- B. Test Results:
 - 1. Submit two draft copies of test results to the Owner for review.
 - 2. After approval by the Owner, submit the test results in two final printed copies and one computer readable copy.

DIVISION 16 ELECTRICAL SPECIFICATIONS

- C. Third party testing shall include testing of Power Line Carrier Communications between power meters and Transponders referred to as “start up”.
 - 1. Testing shall confirm that all power meters included in cross reference are properly communicating with the Transponders.
 - 2. Testing shall confirm that remote connection system via phone line is complete.
 - 3. Testing shall confirm that all Transponders on the RS-485 network are communicating properly.

END OF SECTION