System-20 - Master Specification

2.1 Thermal Energy Meters

1. SYSTEM-20 Thermal Energy (BTU) Meter
2. Basis of Design: **ONICON SYSTEM-20 BTU** Meter. Manufacturers approved to bid subject to compliance with requirements include:
	1. List additional manufacturers pre-approved to bid here
3. Description: Provide complete Thermal Energy (BTU) Measurement System including micro-processor based BTU meter, flowmeter, matched set of temperature sensors and mechanical installation hardware and cabling required for a complete system installation. BTU measurement system shall be configured for the specific application prior to delivery.
4. Application: The contractor shall be responsible for selecting the BTU meter options submitted based on the application. BTU meter shall be constructed, calibrated and scaled for the intended application in terms of pipe size, pipe material, installation requirements, expected energy rate, ambient conditions and fluid characteristics which include but are not limited to pressure, temperature and viscosity.
5. Design: Total thermal energy measurement (BTU) system to be provided by a single manufacturer, including flowmeter, temperature sensors and BTU meter.
	1. BTU Calculator: Computation error </= 0.09% @ 30-degree F delta T.
	2. Enclosure: NEMA 12K enclosure minimum, designed for wall or DIN rail mounting. Non-metallic enclosure materials of construction must meet UL 94 V-0 flammability requirements and be suitable for use in plenum spaces.
	3. Connections: Provide three (3) ½” conduit access holes minimum.
	4. Ratings:
		1. Pressure: N/A
		2. Temperature: -13 F to 140 F ambient
6. Operation and Configuration:
	1. Flow Meter Accuracy: See accuracy statement provided with the flow meter
	2. Temperature Sensor Accuracy:
		1. Current (mA) based sensors: Provide a matched pair of loop powered, current (mA) based temperature sensors, wet calibrated over the intended application range against NIST traceable standards. Current (mA) signal shall be unaffected by wire length. Differential temperature measurement uncertainty within calibrated range shall be </= to +/- 0.15-degree F.
		2. Resistance Temperature Device (RTD): Provide a matched pair of 1000 Ohm platinum RTDs, wet calibrated to a differential measurement uncertainty of +/- 0.18-degree F over the stated range. RTD’s must meet EN1434/C900 accuracy requirements for 3K sensors.
	3. Calibration and Configuration: Each thermal energy (BTU) metering system shall be factory programmed for the specific application and each metering system component, including temperature sensors and flow meter, shall receive a certificate of calibration, directly traceable to N.I.S.T.
	4. Transmitter and Display: Provide an operator interface consisting of four push-buttons and graphical interface. Display shall visually indicate total fluid volume in gallons, instantaneous flow rate, supply temperature, return temperature, thermal energy flow rate and thermal-energy flow total in kilowatts per hour or British thermal units (BTU). Output signals shall be RS485 serial network protocol, native BACnet MS/TP or MODBUS RTU, three (3) programmable pulse outputs and one (1) analog output signal. Meter shall have the capability to receive and totalize three (3) auxiliary input pulses which can be viewed locally and communicated over the RS485 network.
7. Listings and Certifications:
	1. Meter shall have FCC: Part 15, Subpart B
	2. Meter shall have CE approval
	3. Meter shall be UL listed
	4. Meters selected with BACnet shall have BTL Certification to ASHRAE 135:2009
8. Operation and Installation: Installation and operating instructions shall be provided for each BTU system.
9. Warranty: Each BTU meter shall be covered by the manufacturer’s three-year warranty.

**Part 3 EXECUTION**

3.1 Installation:

A. Meters shall be installed per manufacture’s recommendations.

3.2 Connections:

### Install meters and transmitters/displays adjacent to machines and equipment to allow service and maintenance.

### This contractor shall be responsible for connecting all flow meter-system elements.

### This contractor shall be responsible for connecting flow meter transmitters to meters.

### This contractor shall be responsible for connecting thermal-energy meter transmitters to flow meters.

3.3 Commissioning:

### After installation, commission all meters according to manufacturer's written instructions.

### Adjust faces of meters and transmitters/displays to proper angle for best visibility. Refer to manufacturers written instructions.

3.4 Schedule:

### The following applications shall be provided with a BTU meter where shown on the drawings:

#### Chilled Water Systems

#### Heating Hot Water Systems

#### Domestic Hot Water Systems

#### Condenser Water, Cooling Tower Systems

#### Condenser Water (Heat Loop) Systems