**FEATURES**

**MODBUS Compatible Serial Communications** - Provides complete energy, flow, and temperature data to the control system through a single MODBUS RTU network connection, reducing installation costs.

**Simple Installation and Commissioning** - Factory programmed and ready for use upon delivery. All process data and programming functions are accessible via front panel display and keypad.

**Single Source Responsibility** - One manufacturer is responsible for every aspect of the energy measurement process ensuring component compatibility and overall system accuracy.

**N.I.S.T. Traceable Calibration with Certification** - Each Btu measurement system is individually calibrated using application specific flow and temperature data and is provided with calibration certificates.

**Precision Solid State Temperature Sensors** - Custom calibrated and matched to an accuracy better than ±0.15° F over calibrated range.

**Highly Accurate Flow Meters** - ONICON offers a variety of insertion and inline flow meters including turbine, electromagnetic, and vortex sensing. Each type offers unique advantages. All ONICON flow meters are individually wet calibrated and operate over a wide flow range. Accuracies range from ±0.2% to ±2.0% of rate depending on the model.

**Complete Installation Package** - All mechanical installation hardware, color coded interconnecting cabling, and installation instructions are provided to ensure error-free installation and accurate system performance.

*HS version with restricted functions available for use in U.S. government facilities and other installations where enhanced security is required.

**DESCRIPTION**

The System-10 BTU Meter provides highly accurate thermal energy measurement in chilled water, hot water, and condenser water systems based on signal inputs from two matched temperature sensors (included) and any of ONICON’s insertion or inline flow meters (ordered separately). The System-10-MOD provides energy, flow, and temperature data on a local alphanumeric display and to the network via the MODBUS RTU RS485 or MODBUS TCP/IP communications adapter. An optional auxiliary input is also available to totalize pulses from another device and communicate the total directly to the network.

**APPLICATIONS**

Chilled water, hot water and condenser water systems for:
- Commercial office tenant billing
- Central plant monitoring
- University campus monitoring
- Institutional energy cost allocation
- Performance/efficiency evaluations
- Performance contracting energy monitoring

**ORDERING INFORMATION**

The System-10 BTU Meter is sold complete with temperature sensors. Thermowell installation kits and flow meters are purchased separately.

**ITEM #**

**DESCRIPTION**

<table>
<thead>
<tr>
<th>SYSTEM-10-MOD*</th>
<th>System-10 BTU Meter, MODBUS Compatible</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYSTEM-10-OPT8</td>
<td>High temperature sensors (over 200° F)</td>
</tr>
<tr>
<td>SYSTEM-10-OPT9</td>
<td>Add one analog output</td>
</tr>
<tr>
<td>SYSTEM-10-OPT10</td>
<td>Add four analog outputs</td>
</tr>
</tbody>
</table>

Choose from the following commonly used thermowell installation kits:

<table>
<thead>
<tr>
<th>SYSTEM-10-OPT4</th>
<th>Upgrade to outdoor thermwells (pair)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BTU-ST-INSTL32</td>
<td>Brass kit for welded steel pipe (¼” - 5”)</td>
</tr>
<tr>
<td>BTU-ST-INSTL52</td>
<td>Brass kit for threaded steel pipe (¼” - 2½”)</td>
</tr>
<tr>
<td>BTU-ST-INSTL34</td>
<td>SS kit for welded steel pipe (¼” and up)</td>
</tr>
<tr>
<td>BTU-ST-INSTL36</td>
<td>Brass kit for copper tube (¼” - 2”)</td>
</tr>
<tr>
<td>BTU-ST-INSTL37</td>
<td>Brass kit for copper tube (2½” - 3”)</td>
</tr>
</tbody>
</table>

Choose from the following flow meters:

| F-1100/F-1200 | Insertion Turbine Flow Meter (1¼” - 72”) |
| F-1300 | Inline Turbine Flow Meter (¼” - 1”) |
| F-3000 Series | Inline Electromagnetic Flow Meter (¼” - 48”) |
| F-3500 | Insertion Electromagnetic Flow Meter (3” - 72”) |
| F-4200 | Clamp-on Ultrasonic Flow Meter (¼” - 48”) |
| F-2000 Series | Inline Vortex Flow Meter (½” - 12”) |

Refer to catalog for flow meter installation kits. Consult with ONICON for additional thermowell installation kit and flow meter options.
SYSTEM-10-MOD BTU METER SPECIFICATIONS

CALIBRATION
Flow meters and temperature sensors are individually calibrated followed by a complete system calibration. Field commissioning is also available.

ACCURACY
TEMPERATURE
Overall differential temperature measurement uncertainty of ≤ ± 0.15° F over the stated range
(Includes uncertainty associated with the sensors, transmitters, cabling and calculator input circuitry)

Temperature sensors meet EN1434 / CSA C900.1 accuracy requirements for 1K sensors for cooling applications, 32 - 77° F
Temperature sensors meet EN1434 / CSA C900.1 accuracy requirements for 2K sensors for heating applications, 140 - 212° F

CALCULATOR
Computing nonlinearity within ±0.05%
Calculator meets EN1434 / CSA C900.1 class 1 accuracy requirements for 2K sensors for all applications

PROGRAMMING
Factory programmed for specific application
Field programmable via front panel interface

MEMORY
Non-volatile EEPROM memory retains all program parameters and totalized values in the event of power loss.

DISPLAY
Alphanumeric LCD displays total energy, total flow, energy rate, flow rate, supply temperature, return temperature, serial number and alarm status
Alpha: 16 character, 0.2” high
Numeric: 8 digit, 0.4” high
Rate Display Range: 0 - 9,999,999
Total Display Range: 0 - 9,999,999
The totals will roll over to zero when the maximum count is exceeded.

OUTPUT SIGNALS
Network Interface:
Protocol: MODBUS RTU
Connection: RS485: 2-wire (half duplex)
TCP/IP: 10 Base T, 10 Mbps, RJ45 Connection
Baud Rate for RS485: 9600, 19200, 38400, 57600 and 115200

Partial MODBUS Holding Register List:

<table>
<thead>
<tr>
<th>NAME</th>
<th>Available Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Energy</td>
<td>Btu, kw-hrs &amp; ton-hrs</td>
</tr>
<tr>
<td>Energy Rate</td>
<td>Btu/hr, kw &amp; tons</td>
</tr>
<tr>
<td>Total Flow</td>
<td>Gallons, liters &amp; meters³</td>
</tr>
<tr>
<td>Flow Rate</td>
<td>gpm, gph, m³/h, l/min, l/hr &amp; m³/hr</td>
</tr>
<tr>
<td>Supply &amp; Return Temperature</td>
<td>°F and °C</td>
</tr>
<tr>
<td>Operating Mode</td>
<td>Single, Dual or Bi-directional</td>
</tr>
<tr>
<td>Mode Status</td>
<td>Heating/Cooling or Forward/Reverse Flow</td>
</tr>
<tr>
<td>Auxiliary Input Total</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Energy Total Reset</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Flow Total Reset</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Auxiliary Total Reset</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>

Isolated solid state dry contact for energy total:
Contact rating: 100 mA, 50 V
Contact duration: 0.5, 1, 2, or 6 seconds
Optional analog Output(s) (4-20 mA, 0-10 V or 0-5 V):
One or four analog output(s) available for flow rate, energy rate, supply/return temps or delta-T.

LIQUID FLOW SIGNAL INPUT
0-15 V pulse output from any ONICON flow meter.

TEMPERATURE SENSORS
Solid state sensors are custom calibrated using N.I.S.T. traceable temperature standards.
Current based signal (mA) is unaffected by wire length.

TEMPERATURE RANGE
Standard liquid temperature range: 32° to 200° F
Optional extended temperature ranges available.
Ambient temperature range: -20° to 140° F

MECHANICAL
Electronics Enclosure:
Standard: Steel NEMA 13, wall mount, 8”x 10”x 4”
Optional: NEMA 4 (Not UL listed)
Approximate weight: 12 lbs

Temperature Sensor Thermowell Kits:
Thermowells and other kit components vary by fluid type, fluid temperature, pipe material and pipe size. Commonly used kits are listed on the previous page. Contact ONICON for additional thermowell kit options, including hot tap installation kits for retrofit installations.

ELECTRICAL
Input Power*:
Standard: 24 VAC 50/60 Hz, 500 mA
Optional: 120 VAC 50/60 Hz, 200 mA
230 VAC, 50 Hz, 150 mA
*Based on Btu meters configured for network connection without the optional analog outputs

Internal Supply:
Provides 24 VDC at 200 mA to electronics and flow meter

Wiring:
Temperature signals: Use 18-22 ga twisted shielded pair
Flow signals: Use 18-22 ga shielded - see flow meter specification sheet for number of conductors

Note: Specifications are subject to change without notice.

TYPICAL INSTALLATION