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MTSU Clean Energy Initiative Project Funding Request

There are five (5) sections of the request to complete before submitting.

| | |
|--|---------------------------|
| 1. General Information | |
| Name of Person Submitting Request Jeff McConnell | |
| Department/Office Facilities Services | Phone # (Office) 898.5883 |
| MTSU Box # 0032 | Phone # (Cell) |
| E-mail | Submittal Date 10/3/2017 |

| | | | |
|--|--------------------------------|--------------------------|--------------------|
| 2. Project Categories (Select One) | | | |
| Select the category that best describes the project. | | | |
| <input checked="" type="checkbox"/> | Energy Conservation/Efficiency | <input type="checkbox"/> | Sustainable Design |
| <input type="checkbox"/> | Alternative Fuels | <input type="checkbox"/> | Other |
| <input type="checkbox"/> | Renewable Energy | <input type="checkbox"/> | |

| | |
|--|--|
| 3. Project Information | |
| a. Please provide a brief descriptive title for the project. | |
| b. The project cost estimate is the expected cost of the project to be considered by the committee for approval, which may differ from the total project cost in the case of matching funding opportunities. Any funding request is a 'not-to-exceed' amount. Any proposed expenditure above the requested amount will require a resubmission. | |
| c. List the source of project cost estimates. | |
| 3a. Project Title: BTU meters for Chillers at Satellite Chiller Plant | |
| 3b. Project Cost Estimate \$4000 | |
| 3c. Source of Estimate | |
| Quote from Supplier, In house labor estimate | |

4. Project Description

(Completed in as much detail as possible.)

- a. The scope of the work to be accomplished is a detailed description of project activities.
- b. The benefit statement describes the advantages of the project as relates to the selected project category.
- c. The location of the project includes the name of the building, department, and/or specific location of where the project will be conducted on campus.
- d. List any departments you anticipate to be involved. Were any departments consulted in preparation of this request? Who? A listing may be attached to this form when submitted.
- e. Provide information for anticipated future operating and/or maintenance requirements occurring as a result of the proposed project.
- f. Provide any additional comments or information that may be pertinent to approval of the project funding request.

4a. Scope: Work to be accomplished

BTU meters for existing flowmeters at Satellite Chiller Plant

Installation of (2) BTU meters, one for each flowmeter to determine the amount of total flow produced by Satellite Chiller.

4b. Scope: Benefit Statement

Addition of these BTU meters will allow facilities to optimize the performance of the plant and control each Chiller for better efficiency. Will improve accuracy, speed and reliability of calculations. Will improve accuracy of supply-return temperature calculation. Single source responsibility for energy management. Simplify flow and energy reporting.

| |
|---|
| 4. Project Description (continued) |
| 4c. Location of Project (Building, etc.) Satellite Chiller Plant |
| 4d. Participants and Roles Facilities Engineer: Facilities Technician: Labor to install instrument Supplier: Purchase flowmeters for installation |
| 4e. Future Operating and/or Maintenance Requirements Facilities Technician: Mechanical adjustments to systems to optimize performance. |
| 4f. Additional Comments or Information Pertinent to the Proposed Project n/a |

5. Project Performance Information

Provide information if applicable.

- a. Provide information on estimated annual energy savings stated in units such as kW, kWh, Btu, gallons, etc.
- b. Provide information on estimated annual energy cost savings in monetary terms.
- c. Provide information on any annual operating or other cost savings in monetary terms. Be specific.
- d. Provide information about any matching or supplementary funding opportunities that are available. Identify all sources and explain.

5a. Estimated Annual Energy Savings (Estimated in kW, kWh, Btu, etc.)

TBD

5b. Annual Energy COST Savings (\$)

TBD

5c. Annual Operating or Other Cost Savings. Specify. (\$)

TBD

5d. Matching or Supplementary Funding (Identify and Explain)

n/a

• **SYSTEM-10-BAC BTU METER** •
BACnet MS/TP COMPATIBLE



PROCESS CONTROL EQUIPMENT
3GFS

FEATURES

BACnet Compatible Serial Communications - Provides complete energy, flow and temperature data to the control system through a single BACnet MS/TP 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 $\pm 0.15^\circ\text{F}$ over calibrated range.

Highly Accurate Flow Meters - ONICON offers a wide variety of insertion and inline type flow measurement technologies including turbine, electromagnetic and vortex sensing. Each type offers unique advantages depending on the application. All ONICON flow meters are individually wet calibrated and designed to operate over a wide flow velocity range with accuracies ranging from $\pm 0.2\%$ to $\pm 2.0\%$ 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.

DESCRIPTION

The System-10-BAC-MS/TP 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-BAC-MS/TP provides energy flow and temperature data on a local alphanumeric display and to the network via the BACnet communications MS/TP driver. An optional auxiliary input is also available to totalize pulses from another device and communicates the total directly to the BACnet MS/TP 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 |
|--|---|
| SYSTEM-10-BAC | System-10 BTU Meter, BACnet Compatible |
| SYSTEM-10-OPT8 | High temperature sensors (over 200°F) |
| SYSTEM-10-OPT9 | Add one analog output |
| SYSTEM-10-OPT10 | Add four analog outputs |
| Choose from the following commonly used thermowell installation kits: | |
| SYSTEM-10-OPT4 | Upgrade to outdoor thermowells (pair) |
| BTU-ST-INSTL32 | Brass kit for welded steel pipe (¾" - 5") |
| BTU-ST-INSTL52 | Brass kit for threaded steel pipe (¾" - 2½") |
| BTU-ST-INSTL34 | SS kit for welded steel pipe (¾" and up) |
| BTU-ST-INSTL36 | Brass kit for copper tube (¾" - 2") |
| BTU-ST-INSTL37 | Brass kit for copper tube (2½" - 3") |
| Choose from the following flow meters: | |
| F-1100/F-1200 | Insertion Turbine Flow Meter (1¼" - 72") |
| F-1300 | Inline Turbine Flow Meter (¾" - 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 (½" - 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. | |

11451 Belcher Road South, Largo, FL 33773 • USA • Tel +1 (727) 447-6140 • Fax +1 (727) 442-5699

www.onicon.com • sales@onicon.com

SYSTEM-10 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 $\leq \pm 0.15$ °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 / CSAC900.1 accuracy requirements for 2K sensors for heating applications, 140 – 212 °F

CALCULATOR

Computing nonlinearity within $\pm 0.05\%$
Calculator meets EN1434 / CSAC900.1 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, low rate, supply temperature and return temperature.
Alpha: 16 character, 0.2" high; Numeric: 8 digit, 0.4" high

OUTPUT SIGNALS

BACnet MS/TP Points List

| Name | BACnet Object Type | Units |
|-----------------------|--------------------|---|
| Total Energy | Analog Value | Btu, kW-hrs or ton-hrs |
| Energy Rate | Analog Input | Btu/hr, kW or tons |
| Total Flow | Analog Value | gallons, liters or meters ³ |
| Flow Rate | Analog Input | gpm, gph, mgd, l/s, l/m, l/hr or m ³ /hr |
| Supply Temperature | Analog Input | °F or °C |
| Return Temperature | Analog Input | °F or °C |
| Delta-T | Analog Input | °F or °C |
| Energy Total Reset | Binary Value | Not applicable |
| Flow Total Reset | Binary Value | Not applicable |
| Auxiliary Input Total | Analog Value | Pulse Accumulator |
| Auxiliary Input Reset | Binary Value | Not Applicable |



Baud Rate: 76,800, 38,400, 19,200 or 9,600 bps
Isolated solid state dry contact for energy total:
Contact rating: 100 mA, 50 V
Contact duration: 0.5, 1, 2, or 6 sec
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"x10"x4"
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

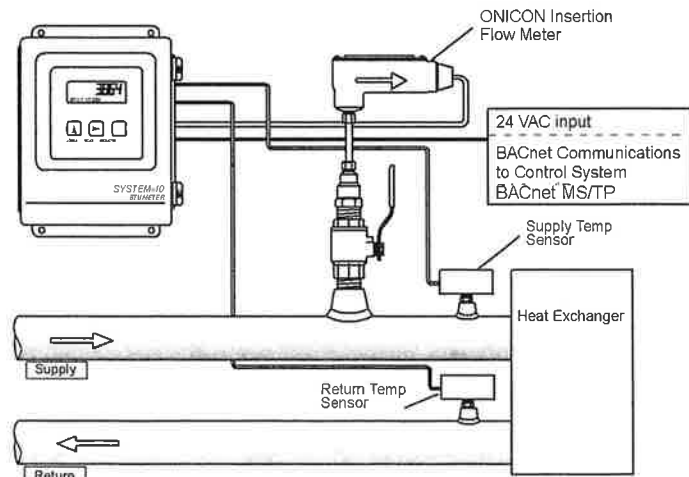
Wiring:

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

Note: Specifications are subject to change without notice.

TYPICAL SYSTEM-10-BAC-MS/TP INSTALLATION

Insertion turbine flow meter shown. Any ONICON flow meter may be used with the System-10 BTU Meter. Consult with ONICON for additional flow meter types.



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