SECTION 25 33 13
THERMAL UTILITY METERING INTERFACE

GENERAL

1.1 SUMMARY

A. Section includes metering and monitoring for interface points for utility chilled water, hot water, and steam fed to each building, and specifies interface valves.

B. Stanford University distributes chilled water, utility hot water, and steam from central production facilities on campus. This section describes the building level metering and interface control requirements for these respective utilities. Devices listed within this section are for utility metering & do not include building side instrumentation. Metering instrumentation will interface to a local Utility Interface panel within the building. The metering points as needed can be shared with the local building control system via a local network connection. Consult with Stanford’s Sustainability & Energy Management team for project specific requirements. Stanford will supply the Utility Interface enclosure, internal I/O and programming for field installation by the contractor.

C. See section 16211 for building level electrical metering requirements.

D. Related Sections
   1. 25 05 53 Identification

1.2 REFERENCES

A. Stanford FDG Drawing MS-10
B. Stanford FDG Drawing MS-11
C. Stanford FDG Drawing MS-17
D. Stanford FDG Drawing MS-68
E. Stanford FDG Drawing MC-01
F. Refer to 25 00 00 Integrated Automation

1.3 DEFINITIONS

A. Refer to 25 06 11 Integrated Automation Definitions

1.4 SYSTEM DESCRIPTION

A. Systems described below interface with the Thermal Utility Metering Interface Panel.

B. Systems include metering for:
   1. Chilled Water Metering
   2. Utility Hot Water Metering
   3. Steam Metering

C. Control valves for:
   1. Chilled Water Interface Control Valve
   2. Utility Hot Water to Heating Hot Water Interface Control Valve
   3. Utility Hot Water to Domestic Hot Water Interface Control Valve
   4. Steam to Hot Water Interface Control Valve
1.5 SUBMITTALS

A. Product data sheets including construction materials and assembly methods

B. Valve Schedule:
   1. Indicate size, location and model of each control valve.
   2. Indicate unique tag numbers for each device, equipment item or system served.
   3. Include shut-off head required, actuator air pressure or force required to meet shut-off head, torque requirements for rotary valves, actual flow requirements based on equipment shop drawings, and calculation of actual pressure drops.
   4. Include charts, graphics or similar items used in making selections.

1.6 QUALITY ASSURANCE

A. Obtain adequate system information necessary for valve and flow meter sizing.

B. Refer to section 25 00 00 for additional requirements.

PRODUCTS

2.1 CHILLED WATER BTU METER

A. Ultrasonic Flowmeter/Calculator
   1. Manufacturer: Kampstrup
      a. Multical-803 Select two communications modules, Modbus RTU and BACnet MSTP
      b. Include 4-wire temperature sensors with connection head
      c. Include 90mm sensor pockets
   2. Calibration and Sizing:
      a. Flow Tube size and calibration shall be approved by Stanford's Energy Operations team prior to ordering.

B. Power and Wiring Requirements:
   1. A dedicated 120 VAC power circuit is required to the Utility Interface Panel. (UIP) The circuit should be fed from emergency power if available.
   2. The Kamstrup 803 BTU meter will be installed inside the UIP and supplied 24VAC from the UIP.
   3. If the Chilled Water Interface valve requires 120V power, it may be fed from same circuit as the Utility Interface Panel, or may be a separate dedicated circuit fed from emergency power if available.
   4. A lockable power disconnect is required at the chilled water interface valve so that the devices can be safely serviced without having to shut off power to all components. Leviton Part Number LKOUT-40 may be used with Spec grade toggle switch.

C. Communications:
   1. The BTU meter will communicate with the Utilities Interface Panel via Modbus RTU and share the following points in real time:
      a. Demand (tons)
      b. Totalized consumption (ton-hours)
      c. Water flow (gpm)
      d. Supply temperature (deg F)
      e. Return temperature (deg F)
2.2 UTILITY HOT WATER BTU METER

A. Ultrasonic Flowmeter/Calculator
   1. Manufacturer: Kampstrup
      a. Multical-803 Select two communications modules, Modbus RTU and BACnet MSTP
      b. Include 4-wire temperature sensors with connection head
      c. Include 90mm sensor pockets
   2. Calibration and Sizing:
      a. Flow Tube size and calibration shall be approved by Stanford’s Energy Operations team prior to ordering.

B. Power and Wiring Requirements:
   1. A dedicated 120 VAC power circuit is required to the Utility Interface Panel. (UIP) The circuit should be fed from emergency power if available.
   2. The Kamstrup 803 BTU meter will be installed inside the UIP and supplied 24VAC from the UIP.

C. Communications:
   1. The BTU meter will communicate with the Utilities Interface Panel via Modbus RTU and share the following points in real time:
      a. Demand (btu/hour)
      b. Totalized consumption (btu)
      c. Water flow (gpm)
      d. Supply temperature (deg F)
      e. Return temperature (deg F)

2.3 UTILITY INTERFACE TEMPERATURE TRANSMITTERS

A. Manufacturers: Weed (by Ultra Electronics) or approved equivalent

B. Use 100 Ohm platinum RTD with a 4500H 2 wire, 4-20 mA current output signal proportional to specified temperature span of transmitter
   1. Accuracy: ..............± 0.12% at 32°F (Class B)
   2. Temperature Operating Range for Chilled Water..... -20 to 170°F
   3. Humidity Operating Range: ............. 0 to 99% RH
   4. Conformance:............................. DIN-IEC 751
   5. Range: ..........................Consult with Owner before ordering

C. Include thermowell with spring loaded sensor

D. Calibration and Sizing
   1. Calibrated range for chilled water service is 30 to 80°F
   2. Calibrated range for hot water service is 80 to 220°F

E. Weed Part Numbers:
   1. Head: 5A00A1
   2. Spring Loaded Sensor: 305-01B-A-4-C-xxx.x-z006 (xxx.x equals length to nearest 0.1")
   3. Thermowell: ¾-S260-Ux.x-Tx-316SS (x.x equals insertion length, x=lagging dimension)
   4. Transmitter: 4HQT4U+030+0080F (chilled water), 4HQT4U+080+0220F (hot water)

2.4 UTILITY INTERFACE PRESSURE TRANSMITTERS

A. Manufacturers: Setra, Ashcroft, Dwyer
B. Include pressure sensor and integral transmitter. Transmitters shall use capacitance sensing element.

C. Performance:
   1. Power ............24VDC loop powered (2-wire)
   2. Output ............Linear, 4-20mA (2-wire loop)
   3. Accuracy ............±0.25% of calibrated span
   4. Linearity ............±0.1% of calibrated span
   5. Hysteresis ............±0.05% of calibrated span

D. Calibration and Sizing
   1. Calibrated range for pressure transmitters shall be 0-150 psig.

E. Setra Part Number
   1. 2561-150P-G-xx-11-x (contractor will select x’s with their needs)

2.5 STEAM FLOW METER

A. Vortex Flow Meter with integrated Transmitter:
   1. Manufacturers: Rosemount, or approved equivalent.
   2. The following instruments shall be used:
      c. Pressure Transmitter Manifold: Rosemount Model No. 0306-R-T-2-2-BA-1-1.
      e. Temperature Element and Thermowell: Rosemount Model No. 0068-N-2-1-N-00-A-(immersion length)-T26-XA.
   3. Calibration and Sizing:
      a. Calibrated range for pressure transmitters shall be 0-300 psig.
      b. Calibrated range for the temperature transmitters shall be 200-400 degrees F.
      c. Flow meter size and calibration shall be approved by Stanford’s Facilities Energy Management team.
   4. Steam BTU Calculator
      a. The Vortex steam flow meter shall be configured for Volumetric flow.
      b. Flow meter, temperature and pressure transmitters shall be wired to a BTU calculator.
      Approved BTU Calculator is the Spirax-Sarco FP 93B flow computer.

2.6 CHILLED WATER INTERFACE CONTROL VALVE

A. The chilled water interface control valve shall be line sized with near zero pressure drop (< 1 PSI), normally closed (N.C.) and able to shut off against sixty (60) PSI differential pressure with no more than 0.1% of maximum flow leakage.

B. Manufacturer:
   1. For line sizes less than 3", Belimo Valves and actuators.
   2. For line sizes 3” or larger use a J-Flow DC9900 V-Ball valve fitted with a Jamesbury ADC actuator.

C. Characteristics:
   1. Turndown ratios..........................40:1
   2. Flow Characteristics ....................Modified equal percentage
   3. Body Type................................Threaded ends 2” and smaller, flanged 2.5” and larger
4. Body Material .......................... Stainless Steel  
5. Stem ................................. Stainless Steel

D. Valve Actuator
1. Actuators shall have fail closed return.
2. Actuator shall close against 125 percent of the maximum differential to which they are subjected.
3. Modulating actuator input signals shall be 4-20ma.
4. Actuators shall be Brushless DC Motor Technology with stall protection.
5. Actuators shall be protected from weather (water) as needed.

2.7 UTILITY HOT WATER TO HEATING HOT WATER HEAT EXCHANGER CONTROL VALVE

A. The utility hot water interface control valve shall be normally closed (N.C.) and able to shut off against sixty (60) PSI differential pressure with no more than 0.1% of maximum flow leakage.

B. Manufacturer: Belimo or approved equivalent

C. Shall be a characterized ball valve for valves up to 6”. For valves larger than 6”, contact Stanford’s Energy Operations department for job specific requirements.

D. Characteristics:
1. Turndown ratios ...................... 40:1
2. Flow Characteristics ............. Modified equal percentage
3. Body Type ............................. Threaded ends 2” and smaller, flanged 2.5” and larger
4. Body Material .......................... Stainless Steel
5. Stem ................................. Stainless Steel

E. Valve Actuator
1. Actuators shall have fail closed return.
2. Actuator shall close against 125 percent of the maximum differential to which they are subjected.
3. Modulating actuator input signals shall be 4-20ma.
4. Actuators shall be Brushless DC Motor Technology with stall protection.
5. Actuators shall be protected from weather (water) as needed.

2.8 UTILITY HOT WATER TO DOMESTIC HOT WATER HEAT EXCHANGER CONTROL VALVE

A. The DHW interface control valve shall be a 2-way valve configured to fail closed on loss of power or signal.

EXECUTION

3.1 Controls contractor to coordinate with piping trade for location and installation details.

3.2 If emergency power if furnished to the building, then power the Utility Interface Panel and associated devices to an emergency power circuit.

3.3 CHILLED WATER METER

A. The upstream and downstream runs of the flow meter shall be straight meter sized piping without taps, feed-ins, or thermowells for the following number of meter size pipe diameters:
1. Upstream - 10 pipe diameters, minimum.
2. Downstream - 5 pipe diameters, minimum.
B. Meter shall be installed on the supply line before any heat exchangers or building loads.

C. Pressure transmitters that have a sensing port greater than 6’ above ground shall be mounted on a wall or pipe stand. Process piping of pressure transmitters shall be as shown in MS-17.

D. Refer to MS-10 for further details.

3.4 UTILITY HOT WATER METER

A. The upstream and downstream runs of the flow meter shall be straight meter sized piping without taps, feed-ins, or thermowells for the following number of pipe diameters:
   1. Upstream - 10 pipe diameters, minimum.
   2. Downstream - 5 pipe diameters, minimum.

B. Meter shall be installed on the supply line before any heat exchangers or building loads.

C. Pressure transmitters that have a sensing port greater than 6’ above ground shall be mounted on a wall or pipe stand. Process piping of pressure transmitters shall be as shown in MS-17.

D. Refer to MS-68 for further details.

3.5 STEAM METER

A. The flow meter shall be installed before the pressure-reduction station. Refer to MS-20. The upstream and downstream runs of the flow meter shall be straight meter sized piping without taps, feed-ins, or thermowells for the number of diameters as follows:
   1. Upstream - 20 pipe diameters, minimum.
   2. Downstream - 5 pipe diameters, minimum.

B. Pressure transmitters shall be mounted on wall or pipe stand. Process piping of pressure transmitters shall be as shown in MS-17.

C. Refer to MS-68.

END OF SECTION