

 METERING**GENERAL INFORMATION**

- 1.1 These guidelines apply to all new and replacement meter installations.
- 1.2 Where Meters are Required
 - a. Provide building-level energy meters to measure whole-building consumption data (electricity, natural gas, chilled water, steam, fuel oil, etc.). Utility-owned meters capable of integration with Columbia's Utility Data Aggregator (UDA) system are acceptable.
 - b. Fit-outs and Partial Building Renovations
 1. Provide electrical submeters as required to measure the electricity consumed by the following end-uses contained within the project boundary:
 - a) Total HVAC equipment load (Fans, Pumps, AHU's, Chillers, Boilers, Split Systems, etc.)
 - b) Total lighting and receptacle loadIn general, individual panels and equipment may be grouped by end-use.
 2. Provide thermal meters as required to measure chilled water, heating hot water, or steam consumed by equipment installed by the project. In general, equipment consumption may be grouped by thermal utility.
 - c. Tenant Space, including tenant space that is part of a larger fit-out or building renovation
 1. Provide electrical submeters as required to measure the electricity consumed by the following end-uses contained within the tenant space:
 - a) Total HVAC equipment load (Fans, Pumps, AHU's, Chillers, Boilers, Split Systems, etc.)
 - b) Total lighting and receptacle loadIn general, individual panels and equipment may be grouped by end-use.
 2. Provide thermal meters as required to measure chilled water, heating hot water, or steam consumed by any equipment installed within the tenant space. In general, equipment consumption may be grouped by thermal utility.
 - d. Non-tenant space with a revenue recovery or utility monitoring requirement, including non-tenant space that is part of a larger fit-out or building renovation, e.g. spaces belonging to School A which reside in a building that is managed by School B.
 1. Follow the guidance for Tenant space above.

- 1.3 The project's meter design team shall review the metering strategy with the Columbia University Project Representative and the Energy & Engineering group.
- 1.4 All meters shall be connected to the Columbia network and integrated with Columbia's existing UDA system.

DESIGN REQUIREMENTS

2.1 Meter Requirements

a. Steam

1. Acceptable steam meters must be able to read flow, temperature, and pressure.
2. Local storage of the meter totalizer data is required to prevent complete loss of data during outages. Totalizer data must be viewable and cannot be exclusively stored as an internal register.
3. The required method of flow calculation is via Vortex measuring, be it In-Line or Insertion type.
4. Meters are to be supplied with the appropriate communication protocols depending on whether the meter is a new installation or a replacement for an existing meter.
 - a) New Install - Meter is to be provided with either BACnet IP or Modbus TCP capability to communicate back to the campus Utility Data Aggregator via the provided ethernet Campus IT Drops.
 - b) Meter Replacement - Contractor is to work with Columbia Facilities to determine if replacing the meter with Modbus RTU and re-using the existing communications or providing a new connection via BACnet IP or Modbus TCP is more appropriate.
5. The preferred manufacturer is Vortek, with the following approved model types:
 - a) Pro-V M23 - Insertion Type Steam Meter
 - b) Pro-V M24 - In-Line Type Line Reducing Steam Meter
 - c) Equivalent alternatives. These must be submitted to Columbia Energy and Engineering for approval prior to purchase.

b. Hot Water/Chilled Water

1. Acceptable thermal energy meters must be able to read volume flow, tonnage, and temperature differential.
2. Local storage of the meter totalizer data is required to prevent complete loss of data during outages. Totalizer data must be viewable and cannot be exclusively stored as an internal register.
3. The required method of flow calculation is via Ultrasonic measuring.
4. Meters must be provided with compatible surface mounted RTD elements for temperature measuring.
5. Meters are to be supplied with the appropriate communication protocols depending on whether the meter is a new installation or a replacement for an existing meter.

- a) New Install - Meter is to be provided with either BACnet IP or Modbus TCP capability to communicate back to the campus Utility Data Aggregator via the provided ethernet Campus IT Drops.
 - b) Meter Replacement - Contractor is to work with Columbia Facilities to determine if replacing the meter with Modbus RTU and re-using the existing communications or providing a new connection via BACnet IP or Modbus TCP is more appropriate.
- 6. The preferred manufacturers are Flexim and Siemens, with the following approved model types:
 - a) SIEMENS - SITRANS FS230
 - b) Flexim - FLUXUS F721
 - c) Equivalent alternatives. These must be submitted to Columbia Energy and Engineering for approval prior to purchase.
- c. Domestic Water
 - 1. Acceptable domestic water meters must be able to read volume flow.
 - 2. Local storage of the meter totalizer data is required to prevent complete loss of data during outages. Totalizer data must be viewable and cannot be exclusively stored as an internal register.
 - 3. The required method of flow calculation is via Ultrasonic measuring.
 - 4. Meters are to be supplied with the appropriate communication protocols depending on whether the meter is a new installation or a replacement for an existing meter.
 - a) New Install - Meter is to be provided with either BACnet IP or Modbus TCP capability to communicate back to the campus Utility Data Aggregator via the provided ethernet Campus IT Drops.
 - b) Meter Replacement - Contractor is to work with Columbia Facilities to determine if replacing the meter with Modbus RTU and re-using the existing communications or providing a new connection via BACnet IP or Modbus TCP is more appropriate.
 - 5. The preferred manufacturers are Flexim and Siemens, with the following approved model types:
 - a) SIEMENS - SITRANS FS230
 - b) Flexim - FLUXUS F721
 - c) Equivalent alternatives. These must be submitted to Columbia Energy and Engineering for approval prior to purchase.
- d. Electric
 - 1. Acceptable electric meters must be revenue grade and must be able to measure Voltage, Amperage, and Power Consumption.
 - 2. Local storage of the meter totalizer data is required to prevent complete loss of data during outages. Totalizer data must be viewable and cannot be exclusively stored as an internal register.

3. Meters must be supplied with compatible and appropriately sized Current Transformers (CTs) for the three-phase power supply to be measured. CT sizing must be indicated on all associated drawings and submittals for future reference and troubleshooting.
4. Meters are to be supplied with the appropriate communication protocols depending on whether the meter is a new installation or a replacement for an existing meter.
 - a) New Install - Meter is to be provided with either BACnet IP or Modbus TCP capability to communicate back to the campus Utility Data Aggregator via the provided ethernet Campus IT Drops.
 - b) Meter Replacement - Contractor is to work with Columbia Facilities to determine if replacing the meter with Modbus RTU and re-using the existing communications or providing a new connection via BACnet IP or Modbus TCP is more appropriate.
5. The preferred manufacturers are Schneider Electric, Leviton, and SATEC, with the following approved model types:
 - a) Schneider Electric - PowerLogic PM8000
 - b) Leviton - 3500 Series
 - c) SATEC BFM136 (Preferred for installations with greater than one system that needs to be metered)
 - d) Equivalent alternatives. These must be submitted to Columbia Energy and Engineering for approval prior to purchase.

2.2 Engineering

- a. Prior to installation, the following Engineering Documentation shall be updated or furnished to Columbia University
 1. Engineering Drawings including:
 - a) Floorplan Drawings
 - b) Installation Drawings and Details
 - c) Internal Panel Layout Drawings (Where applicable)
 - d) Panel Internal Power Drawings (Where applicable)
 - e) Electrical Single Line Drawings with CT locations (where applicable)
 2. Hardware Design Specification/Detailed Submittal:
 - a) Device Cutsheets
 - b) Device Calibration Certificates/Factory Documentation
 - c) Device Wiring Details
 - d) Modbus/BACnet mapping for the Device
- b. Floorplan drawings are to include all detail of the locations of hardware components, general conduit and cable path runs, and location of power source for the meter. All drawings are to be appropriately labeled to indicate new meters, existing meters, and what the downstream loads are for the utility that is being metered.

- c. Installation Drawings and Details must include all mounting and measurement requirements for each type of meter. These details include but are not limited to:
 - 1. Specific phase installation for CTs
 - 2. Direction of flow for steam or ultrasonic meters
 - 3. Insertion depth of steam meters
 - 4. Location of ultrasonic probes, Supply vs Return
 - 5. Minimum straight run requirements for steam or ultrasonic meters
- d. Meter names for any new meter installations will be determined by Columbia Facilities, and any new tag names will be consistent with this assigned ID.

CONSTRUCTION REQUIREMENTS

3.1 Meter Integrator

- a. The meter integrator will select, procure, furnish, set up, program, integrate, map and commission all new meters as a subcontract to the associated bidder.
- b. Columbia's preferred Meter Integrator is G7 Automation LLC:

G7 Automation LLC
104 Interchange Plaza, Suite 101
Monroe, NJ 08831
www.g7automation.com

Site Project Engineer
Joseph Gaidos
913-967-9472
joseph.gaidos@g7automation.com

or

Principal
Kerry Godfrey
609-325-6133
kerry.godfrey@g7automation.com

3.2 PLC and Meter Programming

- a. For any existing meter replacement, the necessary PLC and meter programming shall be completed by the contractor or subcontracted integrator to match the existing settings of the old meter.
- b. Replacement meter communication settings will be set to match the existing settings of the old meter.

- c. New meter communication settings will be set as defined by Columbia Facilities and Columbia IT. Typical will be DHCP. Contractor will provide MAC address, Modbus/BACnet Parameters, any other information required for the Utility Data Aggregator to communicate with the meter.
- d. Prior to completion of the project, proof of communication between the newly installed meter and the Utility Data Aggregator must be provided.
- e. In addition to the proof of communication, phasor diagrams for all newly installed electric meters must be provided to verify proper orientation and placement of meter CTs.

3.3 Coordination

- a. Mechanical
 - 1. Mechanical scope of work will be submitted to Columbia Facilities for pre-approval of all steam meters.
 - 2. Contractors/Subcontractors are responsible for all mechanical work necessary for the completion of the meter installation.
- b. Electrical
 - 1. Electrical scope of work will be submitted to Columbia Facilities for pre-approval of all meters.
 - 2. Contractors/Subcontractors are responsible for all electrical work necessary for the completion of the meter installation.
- c. Columbia IT
 - 1. All coordination related to Campus IT or communications will be managed through the Columbia Facilities Project Manager, who will coordinate with Campus IT on the contractor's behalf.
 - 2. Contractors are to provide Columbia Facilities with annotated floor plans to designate new communications conduit as well as desired locations for new IT drops.
 - 3. Contractors are responsible for the installation of all conduit leading up to any new or existing IT drops.
 - 4. Contractors are to provide Columbia IT with the MAC address for any new meter installations.
- d. Shutdowns
 - 1. All shutdown requests for electric or steam utilities prior to new meter installation are to be coordinated with the Columbia Facilities Project Manager, who will schedule the necessary utilities shutdowns.

3.4 Labor

- a. The contractor shall provide the necessary labor for the complete installation of the proposed meter(s) which is including but not limited to:
 - 1. Onsite Project Management.
 - 2. Attend schedule, shutdown, and coordination meetings with Columbia Facilities.

3. Engineering, Programming, and Drawing Updates.
4. Manage equipment removal and installation.
 - a) After removal, existing meters shall be turned over to Columbia Facilities for disposal or sent back to their manufacturer for failure analysis.
5. Project Closeout.

END OF SECTION