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|  | Title: YALE OFFICE OF FACILITIES PROCEDURE MANUAL Chapter: 01 – Yale Design Standard Division: Energy Metering Standards | Section: 33 62 00 Hydronic, Steam, and Electrical Energy Metering |
| | | Date: January 10, 2025 |
| | | Author: Yale Facilities |
| CC: Project Folder | | |

Thermal Energy Metering

YALE STANDARD FOR STEAM, STEAM CONDENSATE AND CHILLED WATER METERING

1. Scope

This standard provides basic schematics for use on all projects requiring connections to the Yale University Utilities distribution system. The schematics in this specification provide detailed requirements for these applications.

2. General

The project engineer shall use these documents as standard requirement on all applicable projects and shall include them in the project documentation. These documents are to be used as hook up diagrams and not piping arrangements. The project engineer shall design piping arrangement drawings, including plans, elevations or sections, and isometrics which are based on these documents. For all projects the engineer shall consult the distribution system drawings and other as built documentation available in the Facilities Engineering Archive.

3. Typical Installation Requirements

Refer to the Details in the supporting documents.

ENERGY FLOW METER DETAIL

NETWORK BOX PANEL ARRANGEMENT

CONDENSATE FLOW METER INSTALLATION FOR BLDG SYSTEMS


Standard Serial Communications Interface Cabinet (CIC). For description, see detail sheet.

Dedicated 120VAC circuit in raceway to CIC. Terminate at power receptacle within cabinet.

Network drop from Secure MaxNet Network on Yale NGN Network.

Ethernet patch cable from network drop to Moxa MB3170 to MB3180 Modbus Gateway within CIC.

RS 485 Serial Cable in raceway from Modbus Gateway within CIC to Meter Flow Controller. Use Belden 3106A, shielded twisted pair, cable or equal.

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4. Meters and Supporting Instrumentation

Note – All meters should be capable of Modbus 485 serial communications

Campus: Central – Science Medical West

Service device

| | | | |
|------------------------|---|--|--|
| Chill Water Flow Meter | GE Sensing DF 868 Dual Channel Energy Meter Flexim Fluxus F721 dual channel strap-on energy flow meter | Siemens FS230 & FEC920 Dual Channel Energy Meter Flexim Fluxus F721 dual channel strap-on energy flow meter | Flexim Fluxus F721 dual channel strap-on energy flow meter |
| Condensate Flow Meter | GE Sensing DF 868 Dual Channel Energy Meter Flexim Fluxus F721 dual channel strap-on energy flow meter | Siemens FS230 & FEC920 Dual Channel Energy Meter Flexim Fluxus F721 dual channel strap-on energy flow meter | Flexim Fluxus F721 dual channel strap-on energy flow meter |
| Hot Water Flow Meter | GE Sensing DF 868 Dual Channel Energy Meter Flexim Fluxus F721 dual channel strap-on energy flow meter | Siemens FS230 & FEC920 Dual Channel Energy Meter Flexim Fluxus F721 dual channel strap-on energy flow meter | Flexim Fluxus F721 dual channel strap-on energy flow meter |
| Pressure Transducer | | | |
| Temperature Transducer | RTD, 1,000 Ohm, with 6” well. Matched pair for chill water and hot water supply and return mains. | RTD, 1,000 Ohm, with 6” well. Matched pair for chill water and hot water supply and return mains. | RTD, 1,000 Ohm, with 6” well. Matched pair for chill water and hot water supply and return mains. |
| Steam Flow Meter | Veris Accelabar AFS Steam Mass Flow Meter | Veris Accelabar AFS Steam Mass Flow Meter | Veris Accelabar AFS Steam Mass Flow Meter |

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|------------------------------|--|---------|---------|
| | GE Sensing GS 868 Steam Mass Flow Energy Meter | | Siemens |
| Domestic Water Flow Meter | Neptune | Neptune | Neptune |

5. Quality Assurance

All metering shall be installed, functional and fully tested before services are turned on to the building.

Field and System Tests

CBUMs Interface Test

Test procedures are requested for metering interfaces as part of the project. The interface to CBUMs server shall be demonstrated by:

- (a) Communication verification to each field point shall be demonstrated.
- (b) Testing of communications at the campus level as well as all communications to third party systems must be witnessed and approved by Energy Management and Engineering.

Meter Data Confirmation

- (a) Verify flow through service line equates to meter reported values.
- (b) Verify flow data values received into metering database are substantiated by field results at meter.

Electrical Energy Metering

YALE STANDARD FOR ELECTRICAL METERING

1. Typical Installation Requirements

For Ethernet Communication with metering database


Network drop from Secure MaxNet Network to wall by electric meter in switchgear.

Ethernet patch cable from network drop to electric meter in switchgear.

For Serial Communication with metering database (for existing meter installations Only)

Standard Serial Communications Interface Cabinet (CIC). See Detail.

Hoffman Box,

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DIN rail mounting

Dual 120 VAC Power Receptacle

Moxa MB3180 Modbus Gateway

Power Supply for Gateway

Terminal blocks, fuses, etc. as needed)

Mount Box near flow controller.

Dedicated 120VAC circuit in raceway to CIC. Terminate at power receptacle within cabinet.

Network drop from Secure MaxNet Network to wall by mounted CIC.

Ethernet patch cable from network drop to Modbus Gateway within CIC

RS 485 Serial Cable in raceway from Modbus Gateway within CIC to Meter Flow Controller. Use Belden 3106A, shielded twisted pair, cable or equal.

2. Meters and Supporting Instrumentation

| Service | Meter Model | Communication scheme |
|--------------------------|-----------------------------------|----------------------|
| Normal Power | Schneider PM5560 or Eaton PXM1000 | Ethernet |
| Alternate Power (at ATS) | Schneider PM5560 or Eaton PXM1000 | Ethernet |

3. BAS Interface

For Ethernet Communication with BAS database


Network drop from Secure MaxNet Network to wall by electric meter in switchgear.

Ethernet patch cable from network drop to electric meter in switchgear.

4. Quality Assurance

All metering shall be installed, functional and fully tested before services are turned on to the building.

Field and System Tests

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CBUMs Interface Test

Test procedures are required for metering interfaces as part of the project. The interface to CBUMs servers shall be demonstrated by:

- (a) Communication verification to each field point shall be demonstrated.
- (b) Testing of communications at the campus level as well as all communications to third party systems must be witnessed and approved by Energy Management and Engineering.

Meter Data Confirmation

- (a) Verify load through service feeders equates to meter reported values.
- (b) Verify energy data values received into Metering database and into the BAS database are substantiated by field results at meter.

| Date | Description of Change | Pages / Sections Modified | ID |
|---------|-----------------------|---|-------|
| 6/15/16 | Entire document | - | knr2 |
| 6/24/24 | Entire document | pg1/sec3; pg2/sec4; pg3/sec5&1; pg4/sec 3&4 | tn296 |