

## 22 09 23 – Water Utility Metering

### 1. Introduction

- A. This Design Guideline covers utility metering and utility building entrance requirements for building water services.
- B. Designers should coordinate with Duke FMD on installation requirements where needed.

### 2. References

- A. Refer to the following Design & Construction Standard sections for reference, as needed:
  - a. 22 11 18 Plumbing Piping
  - b. 22 05 09 Meters and Gauges for Plumbing

### 3. General Requirements:

- A. The district energy and water utility metering equipment listed in this guideline are the only devices currently approved by Duke FMD for use in existing and new construction. Any variance in design, hardware, or equipment, other than those provided in this guideline must be approved by Duke FMD.
- B. For all applications, designers should take care not to oversize hardware based on extreme operating conditions or unnecessarily conservative load calculations; rather, selecting metering hardware that meets the normal minimum and maximum loads anticipated by the facility through a normal operating year. Under no circumstances will Duke FMD accept “line-sizing” as a justification for meter / sensor hardware selection.
- C. For all applications, designers shall follow manufacturer instructions for installation, grounding, termination, and maintenance.
- D. For all device / sensor applications as part of the utilities metering package, designers shall coordinate with Duke FMD on developing the list of point names, alarms, notification groups and classes, return-to-normal, conditional pre-requisites, and escalation requirements.
- E. For metering and valve elements of the utilities package, designers shall include instrumentation tagging, asset name and detail reporting, and designation of the parent asset to the owner project team.
- F. For all applications where utilities metering and valve equipment has power greater than 48V supplied, Designer will designate install of a manual switched disconnect mounted near the device, the rocker switch will have a weather resistant cover.
- G. The battery powered units will be required to have a minimum read rate set to conserve the battery. If readings are set to an interval shorter than 300 seconds, contact DUES to define an alternate meter type

### 4. Meter Applications

- A. Domestic Water Potable and Irrigation meters Automated meter reading (AMR) and advanced metering infrastructure (AMI)
- B. Domestic Water and Irrigation Water
  - a. Design & Installation
    - i. For water utility connections falling within the Duke University FMD owned utility system, all domestic water and irrigation water metering equipment should be installed within building mechanical rooms, as close as possible to piping entrance, backflow preventers, and isolation valves.
    - ii. For facilities connected to the Durham water utility, domestic water and irrigation water metering equipment should be installed per direction from the City of Durham Water Management Department. Typically, this will be an in-ground vault external to the building footprint.
    - iii. Designers should provide metering equipment for the main water service entering the building and any irrigation systems such that irrigation water can be sub-metered from a single take-off point.
    - iv. Domestic water connected to fire protection services is not typically metered.
    - v. All metering hardware are to be installed in locations and orientations that allow personnel simple access to calibrate, maintain, and replace these devices. Meters and other devices are to be located no higher than what is safely accessible with an 8 ft step ladder.
    - vi. Meter locations shall be shown by the Design Development submission at the latest to allow for review and input.
    - vii. All device displays will be located at eye level, easily readable and not blocked by piping or equipment.
  - b. Hardware
    - i. Duke University owned metering, installed inside building mechanical rooms
      - a) For water connections carried with less than 2" nominal pipe size, use Neptune T-10 positive-displacement nutating disc type meter equipped with E-CODER R900 with PIGTAIL register option for remote data collection. Provide register with digital face, measuring in units of cubic feet.
      - b) For water connections carried with 2" and greater nominal pipe size, use Neptune Tru/Flo compound/dual-register meter equipped with E-CODER R900 with PIGTAIL register option for remote data collection. Provide each register with digital face, measuring in units of cubic feet.
      - c) Output for Neptune meters shall use Scadameetrics model # EMP 4 to 20 mA / Pulse Signal Generator to collect data for trending. If the positive displacement meter is a dual compound meter with a low and high register, then two EMP devices are required.
    - ii. Duke University owned metering, installed outside connected to City of Durham water utility
      - a) For water connections carried in 2" and less nominal pipe size, use Neptune T-10 positive-displacement nutating disc type meter, "pit-set" version equipped with R900 "E-Coder" option for remote data collection. Provide with digital face, measuring in units of cubic feet, and remote antenna kit for mounting in the meter vault lid.
      - b) For water connections carried in greater than 2" nominal pipe size, use Neptune Tru/Flo compound/dual-register meter equipped with R900 "E-Coder"

option for remote data collection. Provide each register with digital face, measuring in units of cubic feet, and remote antenna kit for mounting in the meter vault lid.

c. Data Acquisition & BAS Integration

- i. Meters equipped with Neptune E-CODER and Scadametrics EMP pulse-output transmitter(s) should be connected to the Siemens building automation system prior to energizing water services. Designers, contractors, and integrators should discuss instantaneous and totalized data capture intervals, specific BAS programming coding requirements, and long-term data storage requirements with Duke FMD / DUES staff.
- ii. If the positive displacement meter has low and high registers, then the two EMP devices will be programmed in the BAS.

d. EMP devices require a 24V DC power source to function.

- i. Meters equipped with Neptune R900 "E-Coder" AMR transmitters should be integrated with FMD maintained Neptune software prior to energizing water services.

C. Instrument Identification – Field Mounted Tags (for devices in this standard)

a. Tags for Instruments (inclusive but not limited to control valves, meters and sensors:

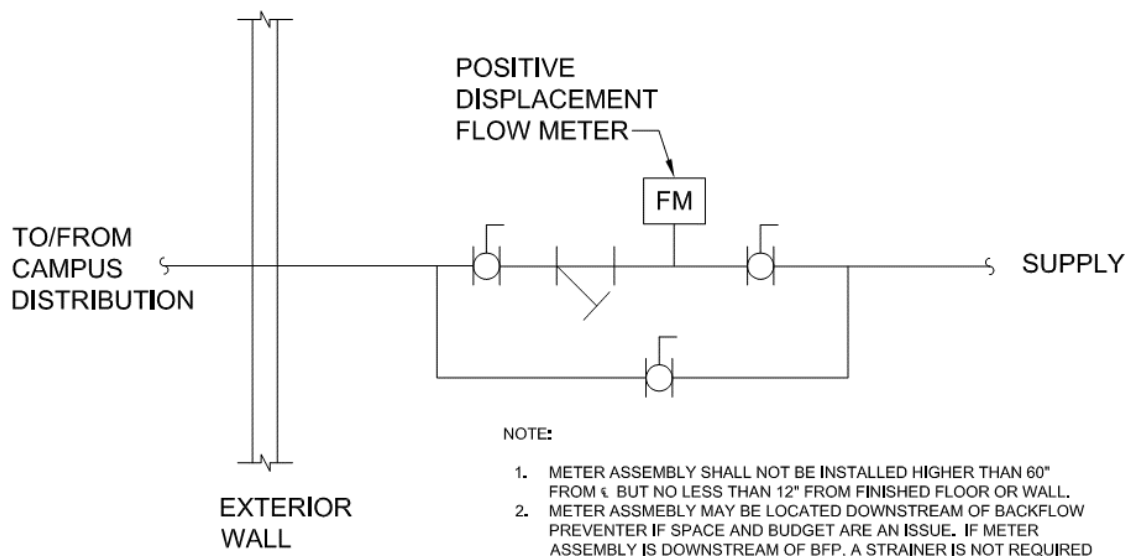
- i. Tags shall be stainless steel, AISI 300 or 400 series. These shall have nominal minimum size of 1.75 x 2.75 inch and be of 26 ga minimum thickness (This is the minimum size needed for vendor to install owner-provided CMMS sticker on reverse side of tag.). Size may be adjusted in accordance with the size of the device to be tagged. Initial size to be 3/16" with final size to be coordinated with Duke FMD. 5/64" mounting holes shall be punched 1/4" from each end for mounting.
- ii. Critical instrument tags (control valves and sensors used to control) shall be red. Utilize silver/metal color for monitoring only sensors.
- iii. See example tag below:



- b. Identify control valves, meter and instrumentation sensors with rectangular stainless (SS) tags bearing system identification number and panel that controls the device in 3/8" to 1/2" black characters on one side of tag only. Attach tag to instrument with SS jack chain, SS ring, or SS braided wires with swag sleeves and "S" hook. Non-metallic fasteners are not allowed. Unless otherwise noted, device numbering shall match the Schedule and / or Points List on the Drawings.
- c. Owner will provide the naming and asset template tracking spreadsheet to the designer.
- d. Owner will furnish CMMS (EAM) sticker, and the vendor will install stickers on the back side of the tag.
- e. Label all new utility metering, monitoring and control devices.
- f. Affix tag to permanent part or body of instrument, not to removable part such as lid, or as directed by Owner.
- g. Do not mark on instruments with permanent markers, i.e.: felt pens or paint sticks.

## 5. METER INSTALLATION

### A. Domestic & Irrigation Water – interior

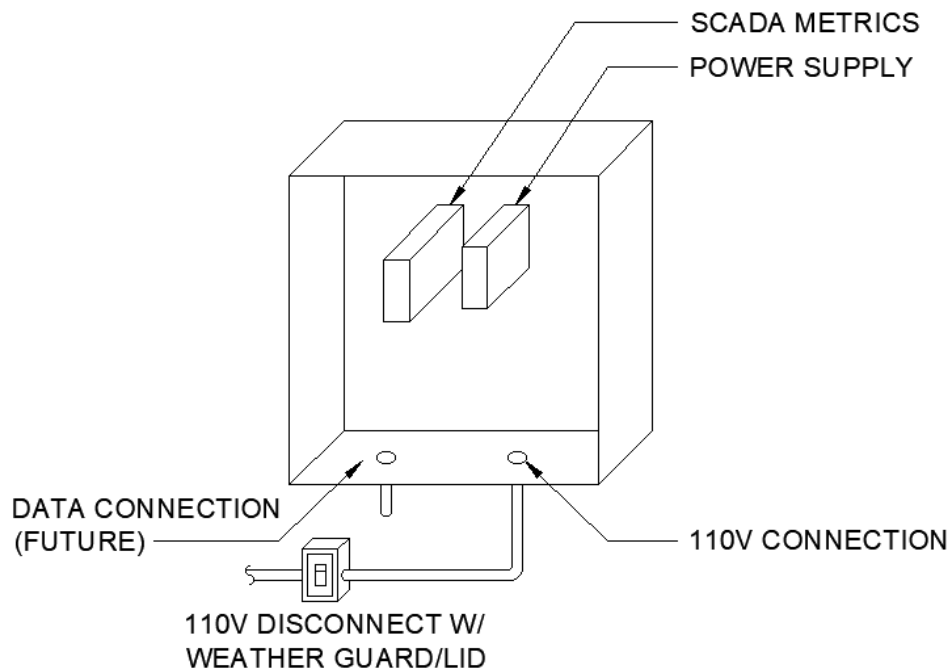


## DOMESTIC WATER BUILDING CONNECTION DETAIL

NOT TO SCALE

### B. Notes:

- a. For the EMP Scadametric device, see the following diagram for its protection, power, and future connection to the BAS as required.
- b. Follow manufacturers recommendations for meter installation & start up. Displacement meter can be damaged if manufacturer guidelines are not followed for startup.
- c. If The meter is an ultrasonic with a single output, then a single EMP device is required. Ultrasonic meters that are battery powered will be required to have a minimum read rate set to conserve the battery. If readings with an interval shorter than 300 seconds, contact DUES to define an alternate meter type.

C. EMP Scadametric Installation

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**EMP SCADAMETRIC INSTALL DETAIL**

NOT TO SCALE

1. Vendor will have to configure the scadamateritics EMP dip switches and terminal connections per the submittal approved meter, register, and manufacturer instructions.
2. Provide opening for antenna cable to connect to SCADAMETRIC and back out to the remote antenna location.