

**GENERAL:**

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1. The scope of this document is to provide instructions for water revenue metering installed at the University of Missouri.
2. As these meters will be used to measure building water usage for utility billing purposes, the meter shall be carefully sized considering the projected building utilization, number of fixtures and fixture flow quantities, process equipment, usage diversification and meter pressure loss. All capacities and selections must be approved by system owner before completing final selection.
3. Nutating disc meters are to be installed on applications requiring water flows equal to, or less than one-hundred (100) gallons per minute. Turbine meters are to be installed on applications requiring water flows more than one-hundred (100) gallons per minute. Compound meter are to be installed on applications that will see large peak flows over typical normal flows.

**DESIGN GUIDELINES:**

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## 1. Materials

- 1.1. The University of Missouri has standardized on bronze disc and turbine utility meters as manufactured by BadgerMeter, Milwaukee, WI. Substitutes will not be accepted.

## 1.2. Nutating Disc Meter

- 1.2.1. Construction shall comply with ANSI and AWWA C700 standards as required for domestic water metering applications.
- 1.2.2. Meter housing and housing top plate shall be cast bronze construction. The measuring chamber, disc, strainer, and generator housing shall be thermoplastic construction. Register lid and box shall be thermoplastic and bronze and trim shall be stainless steel or bronze.
- 1.2.3. Register shall be a straight-reading odometer-type totalization display (gallons), 360 degree test circle with center sweep hand and flow finder to detect leaks. Register shall be installed using TORX tamper resistant seal screws. Meters shall be provided with an integral strainer. A tamper resistant calibration plug seal shall also be provided to protect from unauthorized personnel.
- 1.2.4. Meters shall be Recordall disc models 35, 70, 120 and 170.

## 1.3. Turbine Meter

- 1.3.1. Construction shall comply with ANSI and AWWA C701 standards as required for domestic water metering applications.
- 1.3.2. Meter housing shall be cast bronze construction. Nose cone, straightening vanes and rotor shall be thermoplastic construction. Register lid and shroud shall be thermoplastic and bronze and trim shall be stainless steel.

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- 1.3.3. Register shall be a straight-reading odometer-type totalization display (gallons), 360 degree test circle with center sweep hand and flow finder to detect leaks. Register shall be installed using TORX tamper resistant seal screws. A tamper resistant calibration plug seal shall also be provided to protect from unauthorized personnel.
  - 1.3.4. Meters shall be provided with an integral 316 stainless steel strainer manufactured and installed into its inlet end complete with a removable cover plate which will permit easy access to the strainer for routine cleaning.
  - 1.3.5. Meters shall be Recordall Turbo Series 160, 200 450, 1000 and 2000.
- 1.4. Compound Meter
    - 1.4.1. Construction shall comply with ANSI and AWWA C702 standards as required for domestic water compound metering applications.
    - 1.4.2. Meter housing shall be cast bronze construction. Nose cone, straightening vanes, rotor, rotor and valve casing, measuring chamber and disc and high flow valve shall be thermoplastic construction. Register lid and shroud shall be thermoplastic and bronze and trim shall be stainless steel.
    - 1.4.3. Register shall be a straight-reading odometer-type totalization display (gallons), 360 degree test circle with dual center sweep hands. Register shall be installed using TORX tamper resistant seal screws. A tamper resistant calibration plug seal shall also be provided to protect from unauthorized personnel.
    - 1.4.4. Meters shall be Recordall Compound Series.
  - 1.5. Plate Strainers
    - 1.5.1. Plate strainers shall exceed AWWA standards. Double-flanged housing and cover shall be constructed of cast bronze. Strainer screen and housing bolts shall be stainless steel. Housing cover seal and flange gaskets shall be neoprene rubber. Screen shall have 3/16" perforations with a minimum straining area that is double the meter inlet size. Flange connections shall be elliptical (2" meters) or round. Plate strainers shall be as manufactured by BadgerMeter or approved equal.
2. Installation
    - 2.1. Installation of water meter, valving, bypass loop and water sampler/test outlet shall be in strict accordance with manufacturer's printed instructions and recommendations, applicable ANSI and AWWA requirements, and as detailed on "Bronze Disc Water Meter Installation Detail" and "Bronze Turbo Water Meter Installation Detail."
    - 2.2. The preferred location for water revenue meter installation is within a building mechanical room. In some cases, water meter may need to be installed in an exterior below-grade meter pit. These pit installations shall be installed in strict accordance with manufacturer's printed instructions and University of Missouri "Meter Box Pit Detail" drawing.
    - 2.3. Water meters shall be installed with a three-valve bypass design using ball valves (2" or less) or OS&Y rising stem gate valves (larger than 2"). The bypass valve shall be full-flow and capable of being locked. All other valves associated with the meter installation shall be ball valves. Turbine water meters shall be installed in a

straight run with no obstructions a minimum of ten diameters upstream and five diameters downstream.

- 2.4. Water meter shall be installed after the backflow prevention device but prior to any booster pumps or pressure reducing valves.
  - 2.5. Water meter shall be installed no greater than 4' from the floor. Variations from this requirement need prior approval from system owner. If this requirement is impossible or the meter is located in an inaccessible location, the meter shall be equipped with a Read-O-Matic remote read, and the register shall be mounted no greater than 4' from the floor.
3. Commissioning
    - 3.1. Water service will not be turned on until the water meter is fully installed and operating satisfactorily, the downstream water piping is successfully leak tested and secure (including freeze protection), and the necessary backflow preventer device is installed and successfully tested with the delivery of the test report to the Owner's Representative.
    - 3.2. MU Only: Only Energy Management Steam and Water Distribution personnel will be authorized to turn water service on or off.

## REFERENCES