

**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. Electromagnetic Meters are to be installed in all locations. Exception: Nutating disc meters may be installed in remote locations with no power sources close by.

**DESIGN GUIDELINES:**

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## 1. Materials

1.1. The University of Missouri has standardized on bronze disc, and electromagnetic 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 lead free 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. Electromagnetic Meter

1.3.1. Electromagnetic meter tube shall be constructed 316 Stainless Steel.

1.3.2. Metering tube end connections shall be carbon steel flanged, according to ANSI B16, Class 150.

1.3.3. Insulating liner material shall have a NSF lining.

1.3.4. Metering tube shall include two self-cleaning measuring electrodes. The electrodes shall be Alloy C.

1.3.5. Metering tube shall include a third "empty pipe detection" electrode located in the upper portion of the inside diameter of the flow tube.

1.3.6. Meter shall include a fourth, grounding electrode at the 5 o'clock position.

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Water Utilities Metering

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- 1.3.7. Meter shall include mounted amplifier.
- 1.3.8. Water meter shall be specified as DC powered, 10-36VDC.
- 1.3.9. Meter shall be Badger M2000 Electromagnetic Flow Meter with daughterboard for MODBUS RS485 communication, installed.
- 1.4. Water Pressure Sensor
  - 1.4.1.1. A water pressure sensor shall be installed and wired to the EM Process Control Panel.
  - 1.4.1.2. Keller Preciseline High Accuracy Pressure Sensor or approved equal. Pressure range of 0-200 psig. 4-20 + RS485 output, ½" NPT conduit fitting connector. - Part number 0308.01102.051903.13.
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 "Water\_Meter 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. Electromagnetic 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 in an accessible location. Variations from this requirement need prior approval from system owner.
3. Commissioning
  - 3.1. Water service will not be turned on until the water meter is fully installed, powered 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

**331233\_Detail-Water\_Meter.dwg**