

GENERAL:

The scope of this document is to provide instruction for the installation and testing of revenue class electric energy meters installed at the University of Missouri.

DESIGN GUIDELINES:

1. Materials

1.1. Meter

1.1.1. The kWh meter for all the new installations shall be Solid-State Polyphase Meter.

1.1.2. 3-Wire Delta Application

1.1.2.1. Type: Class 20, service 3Delta, wires 3, test amp 2.5, form 5S, standard nameplate

1.1.3. 4-Wire Wye Application

1.1.3.1. Type: Class 20, service Wye, wires 4, test amp 2.5, form 9S, standard nameplate

1.1.3.2. Type: Class 200, Service Wye, wires 4, form 6S, standard nameplate

1.1.4. Single Phase Application

1.1.4.1. Type: Class 100, Service 120V, wires 2, Form 1S, standard nameplate

1.1.4.2. Type: Class 200, service 120/208V or 277/480V, wires 3, form 25S, standard nameplate

1.1.5. MU Only: Meter shall be supplied by the System Owner.

1.2. Current Transformers

1.2.1. Current transformers shall only be installed on circuits rated larger than 200A. For circuits 200A and smaller, self-contained metering shall be used.

1.2.2. The Current Transformers (Instrument Transformers) shall meet the applicable provisions of ANSI C57.13-2016 and ANSI C12.11-2006 (R2019)

1.2.3. Current transformers (CT's) shall be of a design for indoor use suitable for electricity metering grade. The CT's shall be suitable for padmount distribution transformer installation. The current transformer body construction shall be of molded insulation. The preferred outside body shape or configuration shall be Grecian Urn style. The CT's shall be window-type with voltage application range of 1.2 to 15kV.

1.2.4. The combination of ratio and rating factor (RF) of selected CT's shall be chosen to pick up a small load. At service full load, meter current must not exceed 20 amperes or the CT's maximum rating whichever is smaller. Service full load shall be determined from the smaller of either the transformer secondary full load amps or the main service protective device. CT ratio and RF rating shall be chosen from the following table:

Service Full Load(s)	CT Ratio (CTR)	Minimum Rating Factor
200A<S≤600A	200:5	3 @ 55°C Ambient
600A<S≤800A	400:5	2 @ 55°C Ambient
800A<S≤1200A	600:5	2 @ 55°C Ambient
1200A<S≤1600A	800:5	2 @ 55°C Ambient
1600A<S≤1800A	1200:5	1.5 @ 55°C Ambient
1800A<S≤2250A	1500:5	1.5 @ 55°C Ambient
2250A<S≤3000A	3000:5	1 @ 55°C Ambient
3000A<S≤3900A	3000:5	1.33 @ 85°C Ambient
3900A<S≤4200A	4000:5	1 @ 85°C Ambient

1.2.5. CT's shall be sized with Rating Factors during design.

1.2.6. Other CT specifications shall be as follows

1.2.6.1. Meet or Exceed 0.3 ANSI Accuracy Class, 60Hz

1.2.6.2. B-0.5 Burdens per ANSI C57.13

1.2.6.3. Polarity permanently molded primary H1/H2 and secondary X1/X2

1.2.6.4. Stainless steel Name Plate shall carry all information prescribed by the ANSI standard and installed at easy to read location

1.3. Wiring

1.3.1. All secondary current circuit wiring shall be of pvc insulated, flexible, *multi-stranded* and colored (red, yellow, blue, white) wire with appropriate gauge as shown in the table, in section 2.3 below.

1.3.2. All potential wiring shall be #12 AWG pvc insulated, *solid* stranded and colored (red, yellow, blue, white) wires.

1.4. Meter Base (Socket)

1.4.1. The Meter Sockets shall conform to ANSI Standard C12.7-1993.

1.4.2. The acceptable meter sockets are:

1.4.2.1. Transformer rated, 20A, Durham #1007452 pre-wired with test switch or equal

1.4.2.2. Self-Contained, 200A, Clamping Lever Bypass

1.4.2.2.1. 4-Terminal, Milbank #U9801-RXL or equal

1.4.2.2.2. 5-Terminal, Milbank #U9551-RXL or equal

1.4.2.2.3. 7-Terminal, Milbank #U9701-RXL or equal

1.5. Fuse Blocks

1.5.1. Cooper Industries, Bussman Fuse Block #BCM603-3P, 30A, 600V

1.6. Fuse

1.6.1. Cooper/Bussmann KTK-2

1.6.2. Cooper/Bussmann KTK-15

2. Installation

- 2.1. The installation of energy meter shall be according to NEC, ANSI and IEEE C12 Electricity Metering standards, where applicable
- 2.2. The Contractor shall supply and install current transformers, fuse block and fuses, meter socket, , conduits, prescribed wires and other material and gadgets required to complete the job.
- 2.3. Meter Wiring
 - 2.3.1. The maximum distance in feet between CT and meter shall meet ANSI accuracy classification at B0.2 accuracy class

AWG Copper Wire Size	NO. 12 multi-stranded	NO. 10 multi-stranded	NO. 8 multi-stranded	NO. 6 multi-stranded
Max. Distance (in feet)	31	49	79	126

- 2.3.2. System Owner shall terminate all wires at the current transformers, fuse block, and the meter.
- 2.3.3. The wiring detail is shown in sketch 337173.33_Detail_Electric_Metering.dwg.
- 2.4. Meter Location
 - 2.4.1. The location of the meter shall be coordinated with system owner. Meter shall be installed in accessible location not more than 5.5’ high. The preferred location is on an exterior wall near the transformer.

3. Testing

3.1. Warranty and Other Requirements

- 3.1.1. MU Only: After the new installation is energized for the first time, the system owner shall perform an “in service” test in the presence of the contractor or his representative. All deficiencies other than the meter shall be corrected by the contractor.

4. Commissioning

- 4.1. MU Only: The meter shall be programmed and inserted into socket by system owner personnel.

REFERENCES