BTM Production Metering Requirements
for
DER Customer Interconnections

Revised 04/15/2024

These guidelines define:

- When a production meter is required in "Behind the Meter" (BTM) applications
- Ameren Illinois responsibilities and customer responsibilities
- Physical installation requirements for installation of the BTM cabinet

Behind the Meter (BTM) Generation Interconnections

BTM Production (aka Generation) Meter is required when customer aggregate generation is 200 KW or greater. At this time, Ameren cannot utilize customer inverter or customer meter data. The BTM production meter will communicate via SCADA for Operations monitoring and load planning only. The production meter data **shall not** be used for customer billing or credits.

> **An Ameren high-end meter is required for all BTM applications for production monitoring when the aggregate generation is 200 KW or greater, regardless of the customer voltage level at the system Point of Interconnection (POI).**
>
> A BTM Production meter is not required for single-phase metering because the maximum single-phase interconnection is 100 kVA (although more stringent limits apply depending on the scenario), nor is it required for a three-phase self-contained metering installation because the maximum installation capacity is limited to 133 kW (Three Phase: 200 A x 80% x 480 V x 1.73).

BTM Roles and Responsibilities:

Ameren will provide and retain ownership of:

- BTM Production Metering Diagrams
    - BTM Cabinet Layout & Diagram
    - Instrument Transformer Connections
    - Customer is still responsible for accurately representing the one-line of their proposed and as-built system.
- BTM Production Metering Enclosure (included in Interconnection Agreement estimate)
    - Meter socket
    - Meter test switch
    - Meter
    - Fuse holder and fuse
    - Communications equipment
    - Non-shorting terminal strip for Customer to land instrument transformer secondary wiring
    - Grounding termination bar
    - Case ground lug

Ameren will:

- Install items in metering enclosure identified in the "Ameren will provide" section above.
- Prewire from non-shorting terminal strip to equipment inside metering enclosure.
- Deliver assembled metering enclosure to construction site where customer will mount on approved structure. See below for specifics on what constitutes an approved structure.

Customer Responsibilities:

- Purchase and install current transformers (CTs) and potential transformers (PTs, also known as voltage transformers or VTs) in outdoor customer enclosure where all generation can be captured. This could be a customer disconnect enclosure or AC combiner panel.
- Provide CT and PT specifications prior to ordering for Ameren review and approval.
  - Send to AIC_Revenue_Metering_DER_Projects@ameren.com.
  - Display location & specs on the project one-line diagram.
    - CT polarity (• symbol or H1) should face towards the utility. If polarity is represented by an arrow, it shall face the generation source.
      - Verify at installation.
  - CT and PT test results if available.
- Potential Transformers (PT's)
  - Shall have 120 VAC secondary output and W, X, M, Y burden ratings.
  - Any accuracy class is acceptable with 0.3 metering accuracy preferred.
  - Industry standard 4-wire wye metering setup is required for a 4-wire wye metered service at voltages 15 kV and below. Ameren must review and approve 3-wire delta metered services on a case-by-case basis. DC-metered services and non-industry standard services are not permitted. To comply with Ameren systems, the following PT ratios shall be required:
  - 277/480 wye requires 288:120 phase to neutral (2.4:1)
  - 347/600 wye requires 360:120 phase to neutral (3.0:1)
  - 2,400/4,160 wye requires 2,400:120 phase to neutral (20:1)
  - 7,200/12,470 wye requires 7,200:120 phase to neutral (60:1)
  - 7,620/13,200 wye requires 7,620:120 phase to neutral (63.5:1)
- Current Transformers (CTs) with 5 Amp secondary output and 0.1 through 1.8 burden rating. A Rating Factor (RF) up to 2 is acceptable. (Example 600:5 with RF=2.0). Rating factors above 2.0 are not permitted. Any accuracy class is acceptable with 0.15 high accuracy extended range metering accuracy preferred. CT's can be bar, window, or rope type since this is not used for Ameren billing. CTs that output a secondary voltage, rather than a 5 amp secondary, are not allowed.
- If BTM production metering cannot be accomplished for the entire service with a single set of CTs and PTs at a common location, as may occur when two Main PV Disconnects are installed or a second Main PV Disconnect is added to a service with an existing Main PV Disconnect, the Customer will be required to install a PT control relay in a customer owned enclosure. The PT control relay allows the meter to see voltage if either one of the systems is offline. See PT Control Relay diagram attachment at the end of the document.
  - For this application, the CT ratios must match, including for the case of one system having lesser AC generation capacity than the other.
- With Ameren Meter Engineering approval, CT and PT sharing between the Ameren production meter and customer production meter is allowable as long as the requirements for CT & PT specs are followed. The customer meter must be located in a separate enclosure. If shared metering instruments are used, the Ameren meter will be connected electrically after the customer meter, and this should be drawn on the customer's one-line. See diagram attached to the end of this document.
- The Ameren metering enclosure is for Ameren use only and will be locked after the customer installs their secondaries to the non-shorting terminal strip.

- Customer CTs & PTs shall **NOT** be installed on the utility supply side of a main overcurrent protective device.
- It is recommended, although not an AIC requirement, that the customer install appropriately sized overcurrent protection on the primary and secondary sides of potential transformers. Suggest following manufacturer recommendations.
- For grounded-wye services, Customer is required to route the neutral conductor with the phase conductors to the enclosure housing the instrument rated transformers. The neutral shall be properly sized per the NEC. For parallel runs, it shall be no smaller than 1/0 AWG per 2023 NEC 310.10(G), but other articles that may require a larger size still apply. The neutral shall be properly terminated on a neutral lugging system. For locations downstream of the service disconnect, the neutral shall remain electrically isolated from the equipment grounding conductor.
- Install the Ameren BTM metering enclosure in an accessible ***outdoor*** location approved by Ameren.
    - Mounted on a sturdy exterior wall or on an H-frame with 3" galvanized RMC steel posts set in concrete and P1100T unistrut horizontals (refer to Ameren Electric Service Manual (ASM) Figure 700-11 at BuildWithAmerenIllinois.com). ***Wooden posts and cross members do not constitute a suitably durable structure and are not permitted.***
- Conduit from the enclosure housing the instrument transformers (oftentimes a disconnect enclosure) to the BTM production metering enclosure shall be rigid and sized at 1.5". Conduits shall enter/exit enclosures from the side or bottom panels. Entry / Exit through the top, back panel, or doors is not permitted.
    - *Exception: For enclosures mounted back-to-back (but not touching) on an approved ASM Figure 700-11 structure, the 1.5" conduit shall be permitted to be of flexible type if entering / exiting the bottom of enclosures.*
- Spacing between these enclosures shall be no less than 6".
- The area where these enclosures are mounted shall provide a minimum clear working space of:
    - The greater of 30" or the width of the enclosure for lateral movement
    - Depth of space in front of any part of these enclosures shall be no less than 42"
    - Headspace shall be no less than 78"
- The center of the Ameren BTM Production Metering cabinet shall be mounted at 66" above final grade.
- Connect secondary wiring from instrument transformers to non-shorting terminal strip inside Ameren metering enclosure.
    - #12 GA Cu up to 55 ft MAX. (recommended)
    - #10 GA Cu up to 90 ft MAX.
    - The CT secondary returns shall be connected together so that a single, common CT return lands in the BTM cabinet. (Exception for Shared CTs. Shared IT Metering 3P 4W Y Wiring.)
- A minimum 3 ft spherical radius shall be maintained from a natural gas relief vent for gas pipe risers with an outside diameter less than or equal to 2.375". A minimum of a 15 ft spherical radius shall be maintained from the relief vent for gas risers with outside diameter greater than 2.375".

- Minimum #10 AWG Cu equipment grounding conductor shall be routed with the CT & PT secondaries to the Ameren metering enclosure and be landed on the equipment ground bar.
- Label customer conductors with phase and instrument transformer type on non-shorting terminal strip as shown in attached BTM Cabinet Layout.

- Installation Pictures
  - Pictures are to be uploaded to PowerClerk during the Construction Complete phase.
  - Provide overall exterior view of the enclosure housing the CTs/PTs and the Ameren Production Meter Cabinet. This picture should encompass the entire area, at least 5 ft to the side of each cabinet, and at least 5 ft in front of each cabinet.
  - Provide overall view of the inside of the enclosure housing the CTs/PTs after customer wiring is installed.
  - Provide overall view of the outside of the Ameren BTM Production Meter Cabinet, including the mounting structure/securement.
  - Provide overall view of the inside of the Ameren BTM Production Meter Cabinet after customer wiring is installed.
  - CTs
    - Nameplates
    - Primary & secondary wiring.
    - Picture showing the polarity facing the utility. This could be a dot (•) or H1 that faces the utility, or if the CTs have arrows indicating the direction of flow, the arrows must face towards the DER production equipment. This is because generation should read as a negative value on the Ameren production meter.
  - PTs
    - Nameplate(s)
    - Primary & secondary wiring
  - If any additional cabinet is required for a non-standard production metering installation (must be pre-approved by Ameren Illinois Metering), pictures of the inside and outside of that cabinet are also required.

Appendix: Ameren Equipment Specifications

Double click on icons below to open files.

2 Door Cabinet (BTM generation location):

Ameren Item 6904611
32"W x 36"H x 13"D or 36"W x 36"H x 12"D
Mfr Item 507-2899 or C3RMC363612


2_Door_Cabinet_Wi
th_Wood_Backer_Bo


Hammond_Metal_B
acker_Plate_C3RMC3


Hammond_Installati
on_Guide_BUL10136

3 Phase, 4 Wire Wye Wiring and Color Code Standard

E-CID-20.0.2.7 IL - 3P, 4W Y Wiring and Color Code Standard


E-CID-20.0.2.7 IL -
3P, 4W Y Wiring and

BTM Cabinet Layout and Wiring Diagram

BTM Cabinet Layout 20200402


BTM Cabinet Layout
20200402.pdf

- Cabinet bonding is provided by #10 Cu equipment grounding conductor originating in customer enclosure. The ground rod in the BTM Cabinet Layout can be omitted.

PT Control Relay


PT Control Relay
20230707.pdf

- Required when Two Sets of CTs and PTs are needed for BTM Production Metering
- Customer Purchased and Installed Device

Shared IT Metering 3P 4W Y Wiring


Shared IT Metering
3P 4W Y Wiring 2023

- Diagram pertains to the scenario of the Customer feeding both a Customer Production Meter and the Ameren BTM Production Meter with a common set of CTs and PTs.
    - The Ameren BTM Production Meter must be installed last in this series arrangement.
    - The CT returns at the Customer Production Meter must be kept isolated.