SMART MICRO-METER (www.micro-meter.com)
Model: UM-3P-1000
Installation Instructions
Rev. B. Oct 2024

The Smart Micro-Meter is an accurate and utility grade energy metering device. It can be used to do sub-metering of any single phase or 3 phase facilities. It can also be used to meter the energy usage of any energy consuming device or equipment. The measure data are sent to the cloud using LoRawan network where the user can monitor and display the energy usage of a metered device. No Wi-Fi is needed. A publicly available or a private LoRawan gateway is needed for the Micro-meter to send the data to the cloud wirelessly via LoRawan networks. A typical outdoor LoRa gateway has a range of 3 miles, and any Micro-meters within the 3 miles radius of an outdoor LoRa (public or private) can connect to the gateway without any Wi-Fi or internet connection. The Micro-meter can be installed anywhere except inside the electrical control panel.

To install the Micro-meter to any device to be metered, the user needs to install external current transformers (CTs) that are suitable for the application. The Micro-meter needs the CTs to measure the current (amperage) on the power cables or wires into the device to be metered as shown below. The Micro-meter also need to detect the voltages into the device to be metered. This is done by connecting wires to the device wiring as shown below.

See connection diagrams below.

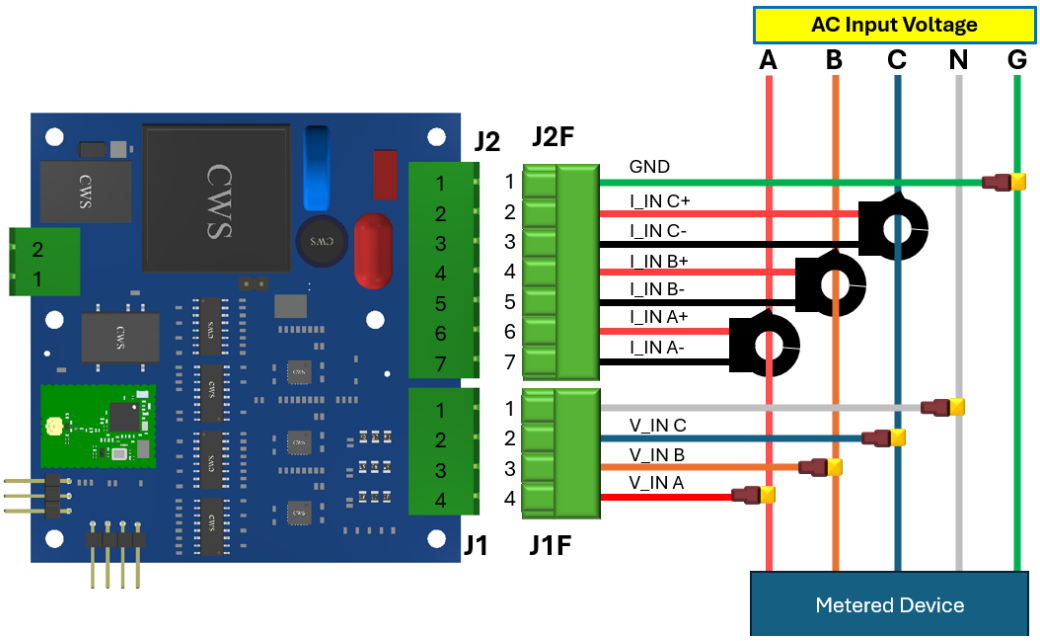

Figure 1. Connection Diagrams

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To begin installation, please follow the following steps: -

NOTE: DO NOT CONNECT THE CONNECTORS IN FIGURE 2 AND 4 TO THE MICRO-METER BEFORE THE MICRO-METER IS SECURELY FASTENED TO ITS LOCATION. SMART MICRO-METER UM-3P-1000 CANNOT BE INSTALLED INSIDE ANY 67 PANELS.

1) Identify the device or energy consuming equipment to be metered.
2) Turn OFF the main power to the device.
3) Locate the wirings to the device.
4) Identify the wires (or cables) powering the device along with the Neutral (N) and physical ground (Gnd)
5) The user selected current sense (CTs) transformers must meet the following requirements:
    a. Dielectric Isolation needs to be over 1000VAC between the CT case and the CT's internal winding. i.e., dielectric isolation needs to be greater than 1000V between the clamped-on power wire and CT's secondary wire.
    b. Do not use CTs that manage current above 50 amps. CTs that manage about 50 amps of current may not be sensitive enough to measure the lower current flow accurately.
    c. Select CTs with a 200:1 ratio.
    d. It is recommended that the Clamp-on type CTs be selected. However, a doughnut type CT can be used if the device power wires can be detached and re-connected easily.
    e. The CTs must be UL approved and recognized

6) To measure the current drawn by the metered device, connect the CT's build-in secondary wires to a 7-pin female connector (P/N 1986692-7 or equivalent) as shown below. The CTs will sense the current flow, and these are the current draw inputs into the Micro-meter. The orientation and polarity or sense of the wirings are especially important. Make sure that the Phase "A" CTs wirings are connected to positions 6 and 7 of P/N 1986692-7. See diagram below for the wiring connections for Phase "B" and "C."
   These connectors can purchased from the vendors below.
   1986692-7 TE Connectivity AMP Connectors | Connectors, Interconnects | Digi Key Marketplace

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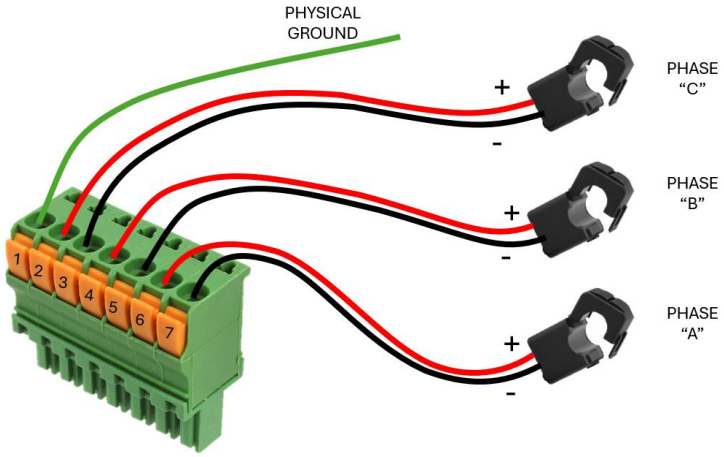

Figure 2. Current transformers connections to sense currents

7) To measure the voltages into the metered device, use Wirefy connectors or (UL approved equivalent type) as shown below to tap the voltages. See below a photograph of Wirefy and how to make the connection. The advantage of using Wirefy is to eliminate the need to remove any wires from the metered device.

T-Tap Connector and Spade insulated connector.

How to make a connection

Figure 3. Using Wirefy or equivalent

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Equivalent connectors:

P/N 22EW67 From Grainger
POWER FIRST, Yellow, T Tap, Insulation Displacement Connector - 22EW67|22EW67 - Grainger

P/N 69515K25 From McMaster
Quick-Disconnect T-Taps, for 12 Wire Gauge | McMaster-Carr

P/N 72625K74 From McMaster
Fully Insulated Heat-Shrink Quick-Disconnect Terminals, Male, for 22-18 Gauge, 0.25" Wide x 0.032" Thick Tab, Red | McMaster-Carr

8) Alternatively, find a way to tap the device voltages to be monitored by the Micro-meter. It is recommended that 4 different types of wires colors are used, using the same existing color as the power wires into the device. If possible, use white colored wire for the neutral. The length of these 4 wires should be long enough to reach the Micro-Meter. The wire gauge should be between AWG#18 and AWG #22, stranded wires with a minimum of 300 Volts and UL recognized.
9) Use a 4-pin female Connect (P/N 1986692-4 or equivalent) to connect the voltage sense wirings of Phase “A”, Phase “B”, Phase “C” and Neutral as shown below. It is especially important that the correct orientation or phases are connected to the correct positions of the P/N 1986692-4. Phase “A” must be connected to position 4, Phase “B” to position 3, phase “C” to position 2. Neutral wire to position 1. Suggested supplier for this connector is shown below.
   1986692-4 TE Connectivity AMP Connectors | Connectors, Interconnects | Digi Key

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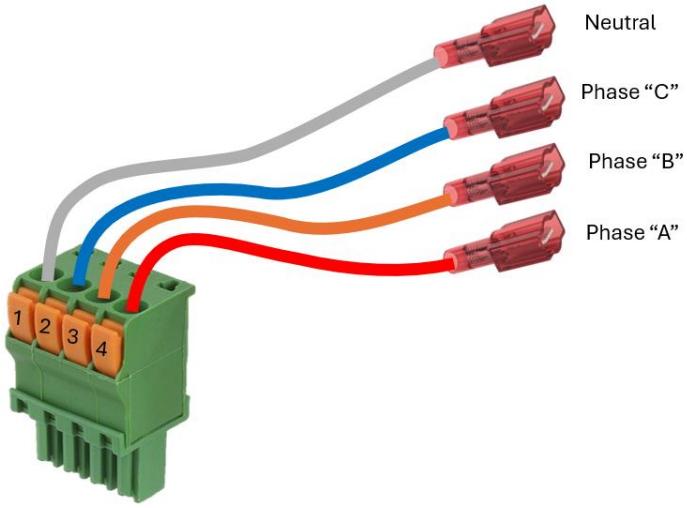

Figure 4: Voltage sense wiring

WIRES ORIENTATION and synchronization between Current and Voltages connections is especially important. Please make sure these connections are done correctly according to the phases:

10) For Phase "A," clamp the Phase "A" CT over the Phase "A" wire or cable and connect the secondary leads to position 6 and 7 of Figure 2. Connect the voltage tap of Phase "A" to position 4 of Figure 4.
11) For Phase "B," clamp the Phase "B" CT over the Phase "B" wire or cable and connect the secondary leads to position 4 and 5 of Figure 2. Connect the voltage tap of Phase "B" to position 3 of Figure 4.
12) For Phase "C," clamp the Phase "C" CT over the Phase "C" wire or cable and connect the secondary leads to position 2 and 3 of Figure 2. Connect the voltage tap of Phase "B" to position 2 of Figure 4.
13) For the neutral wire, connect the voltage tap of Neutral wire to position 1 of Figure 4.
14) For the physical ground wire, correct to the position 1 of Figure 2.
15) If the metered device is only using a single phase, then use Phase "A" and one CT in Phase "A." Leave the rest unconnected.
16) If the metered device has 2 phases, then use Phase "A" and Phase "B", one CT in Phase "A" and another CT in Phase "B".

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17) The SMART MICRO-METER UM-3P-1000 can be connected anywhere where the antenna is not blocked by metal enclosures. Use screws to tightened it.
18) If needed, the antenna can be located at a remote location away from the Micro-meter. In this case, it is necessary to add a small co-axial cable to it.

Suggested supply source: 89761-7851 Molex | Mouser

19) After the SMART MICRO-METER UM-3P-1000 and its antenna has been connected, the final step is to plug the connectors of Figure 2 and Figure 4 into the SMART METER UM-3P-1000. DO NOT CONNECT THE CONNECTORS IN FIGURE 2 AND 4 TO THE MICRO-METER BEFORE THE MICRO-METER IS SECURELY FASTENED TO ITS LOCATION.
20) Turn the Power ON. The SMART METER UM-3P-1000 will start Flashing indicating that it is waiting for connection to the LoRa gateway.
21) NOTE: SMART MICRO-METER UM-3P-1000 CANNOT BE INSTALLED INSIDE ANY 67 PANELS.