



Metering Note

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Contents

1	Overview	2
2	Purpose	2
3	Methods of Metering	2
4	Adding Meters	3
5	Adding a Pulse Counter	6

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1 Overview

This document is about metering for the Gridimp impHub system. It describes why we need metering and the different methods of metering you can use with the impHub. We then go onto describe specific options for metering. The meters recommended in this document are all field tested with the Gridimp impHub.

Note: When installing meters the CTs (Current Transformers) must all be installed in the same direction. The CTs and voltage reference phases must match. It is advisable to label the CT tails with the phase to aid in this matching.

2 Purpose

The Gridimp impHub Energy Management System requires metering data. This data is used for planning, live control and assessment of performance. We gather metering data on the following:

Grid Connection Point: The measures the energy imported and exported to the grid and is a critical real time data point for performing battery control.

Onsite Generation: The total site generation is needed to give a complete picture of the energy usage on site.

Battery Activity: The energy that is stored in the battery and released from the battery needs to be tracked for energy management.

Controlled Plant Activity: Each piece of controlled plant, such as heat-pumps, immersion heaters or electric vehicle chargers needs to be monitored, to show what effect the control actions are having.

3 Methods of Metering

Metering can be brought into the Gridimp platform via three key routes:

Meters: Connecting to compatible meters using Modbus to read the data. The compatible equipment list details which meters the impHub can talk to directly. The Synopsis SIP product can be added, with a huge range of compatible meters, to make data available via BACnet for the impHub.

Pulse Counter: Adding a pulse counter to read pulse output from existing metering. This is often done for existing generation meters. For pulse counting we recommend the Inveo Nano In device.

Existing Monitoring & Control Systems: Connecting to existing systems such as the BMS (Building Management System) to read existing metering via BACnet.

4 Adding Meters

When adding meters we recommend one of the following:

Main Meter

Janitza 604 UMG Pro. This is a high quality power meter, that is good for the metering the grid connection point, which comes with in-built ethernet.

The Janitza UMG 604-PRO complies with several energy metering and power quality standards, including:

- IEC 61000-4-30 (Class A): This standard ensures precision and consistency in power quality measurements, making the device suitable for professional power quality analysis.
- IEC 61000-4-7 and IEC 61000-4-15: These relate to harmonics and flicker measurement requirements, which the UMG 604-PRO fulfills for detailed power quality diagnostics.
- EN 50160: Used for power quality assessments based on defined voltage characteristics in public electrical distribution systems.
- ISO 50001: Supports energy management applications, aligning with this international energy efficiency standard.
- Additionally, the UMG 604-PRO is equipped with advanced features for harmonics analysis (up to the 40th harmonic), transient logging, and integration into modern communication systems using Ethernet and Modbus protocols
- Pro Series

For more specific compliance certificates or details, you may consult Janitza's official documentation or product certifications.

<https://www.janitza.com/products/umg-604-pro.html>



Device Meters

For industrial settings we recommend the Accuenergy Accuvim-II with the with the “AXM-WEB PUSH” module for ethernet access. This meter can be ordered in two variants either 333mV CTs or Regowski coils, which need to be ordered in addition to the meter. The coils are more expensive but are very versatile in terms of current range 1-1000A and they are also more flexible to fit around larger cables. Note that the separate display screen is not required.

Accuenergy are revenue grade meters complying with ANSI C12.20 class 0.1 & IEC 62053-22 class 0.1s.

<https://www.accuenergy.com/products/acuvim-ii-advanced-power-and-energy-meter/>
<https://www.accuenergy.com/products/axm-web2-multi-protocol-ethernet-ip-meter/>



Note that an additional relay module can be added to the Accuvim-II called the “AXM-IO1” to allow relay controlled load switching.

For smaller commercial installs, the Shelly products are a cheaper option and are also more compact. These are Accuracy Class B (IEC 62053-21) active energy, current accuracy is $\pm 1\%$ at 2-120 A and voltage $\pm 1\%$. The following links to the Shelly store:

<https://shellystore.co.uk/product/shelly-pro-3em/>

There are three sizes of Shelly with external CT clamps:

Product	Max Current	CT Aperture
Shelly Pro 3EM	50A	10mm
Shelly Pro 3EM – 120A	120A	16mm
Shelly Pro 3EM – 400A	400A	ellipse 36.2 x 34.9mm

These Shelly's also have an optional Switch Add-On for relay control.



The impHub is compatible with the full range of Shelly relays, the relays with the “PM” suffix also provide power monitoring of inline power, these may be suitable where the current carrying capacity of the switch is high enough.

Monitoring Multiple Loads

Where many loads need to be monitored from a single point, for example monitoring several circuits on a distribution board, the Accuenergy Accurev2100 is our recommended meter. This revenue grade meter can be used to monitor 18 single phase circuits or 6 3-phase circuits.

<https://www.accuenergy.com/products/acurev-2100-multi-circuit-submeter/>



5 Adding a Pulse Counter

Where there is an existing standard meter in place, which supports a pulse output, then a pulse counter can be added to record the energy readings.

We recommend the Inveo Nano In PEO variant.

https://www.audon.co.uk/ethernetrelay/nano_in_poe-ethernet-digital-input-unit-with-pulse-counting-web-snmp-modbus-tcp-led-display-poe.html



Details of how-to setup the Inveo Nano In to work with an impHub can be found in the “Gridimp EQN Nano In” on our website here:

<https://www.gridimp.com/help/equipment-notes/>