

ALPHA ESS TECHNICAL NOTICE

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Relevant to Models	All Multi-Phase Installs using CTs

CT PLACEMENT IN MULTI-PHASE HOUSES

CTs are often used in preference to hard-wired meters capturing in-line power flows data.

CTs are simpler and do not require the insertion of a relatively large meter into a specific location in a meter board.

CTs connected to Meters work by measuring the CURRENT through the CT and then comparing the Voltage to determine the Power flow.



On Multi-phase installations, it is critical that the CT be on the same phase as the Reference Voltage. This means that if phase A is connected to the metering device, the associated CT clamp must be clamped onto phase A.

WHAT DOES THIS MEAN?

Due to the phase angle between each Phase, **if an Installer clamps a CT onto a phase that does not match the phase reference, there will be an incorrect Power calculation.**

If an Installer gets this wrong, they will need to return to site and correct the CTs.

HOW TO AVOID SITE RE-VISITS AND THE ASSOCIATE LOST INCOME – TEST, TEST, TEST

The simplest method to avoid costly re-visits to installations is to **TEST the data before leaving site.**

Be very careful to ensure that Grid CT readings and PV Production readings are validated on multi-phase installs.

How to test for correct installation on 3-phase:

1. Check that the PV reading on the Inverter(s) Matches the PV reading on our monitoring portal/App.
2. Once the App and the PV Inverter(s) values agree, turn OFF the PV.
3. Watch the Load data on the Monitoring Portal and Turn on the Kettle.
4. Observe the Load reading – it should increase by 1.8kW-2.4kW.
5. NOTE down the value of this increase.

6. Find a different Phase and plug in the Kettle
7. Observe the Load reading again – it should increase by the same value as the previous test. If it does NOT, there is a crossed CT.

Other tests to see if phases are correct.

1. An easy test is to remove the *Service Fuse* of one phase and then check the voltage at the Meter connection. It should be zero. If it is ~240V then the Meter connection is NOT on the phase that the service fuse is on. Not every Electrician is licenced to touch Service Fuses.



2. If you can see the specific values of the CT readings, things become much easier. Installers can then use a *known load* to test each phase. Lots of installers carry a hair dryer and cut the cord and connect probes as Active and Neutral – they can then directly power the *hair dryer* from the main switch and watch the CT values. This way they do not need to wander around the house looking for a Power Outlet on a different phase. CT values can be seen on screen of the Meter.



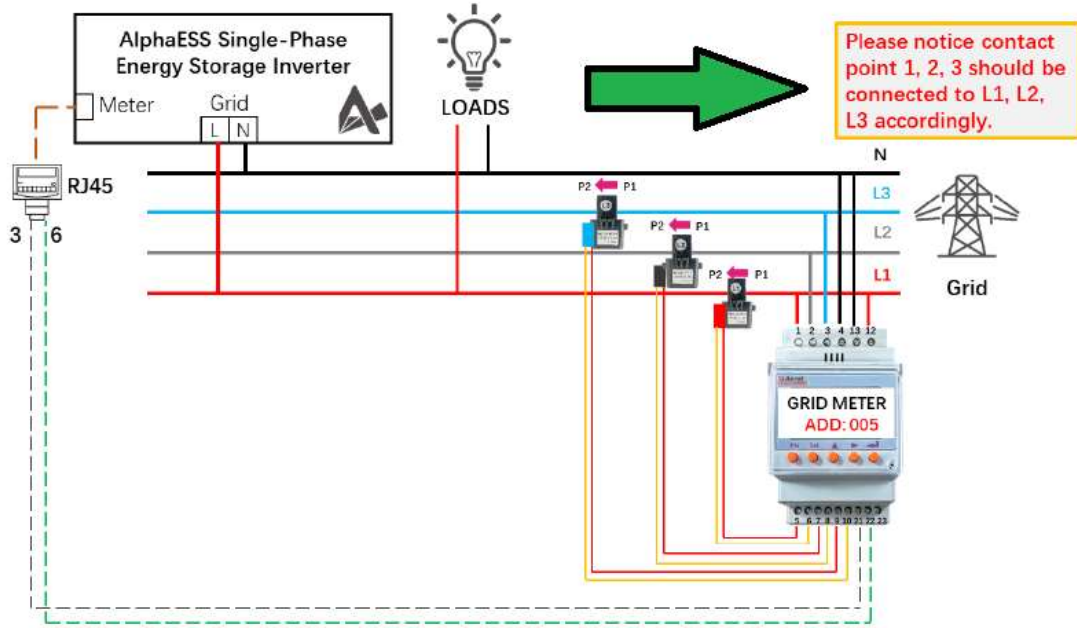
3. The same hairdryer can be used at the Main Switch if an installer is watching the Alpha Portal data. When the hairdryer is connected to each phase and turned on, the house Loads on the App should increase by the same value on each phase.

4. A *Clamp Meter* (a Current Meter) is another useful tool to double-check. Test the CTs one at a time by clamping the Clamp Meter on the same wire that the CT is clamping and refer to the PV or Grid readings on the App (depending on the CT being tested). Multiply the current on the Clamp Meter by the voltage on that phase and this should be the expected value for the Power reading. If the actual power reading on the App/Portal shows more than a 10-15% variation from the expected value, the CT is not on the same phase as the reference voltage.



REFERENCE & ADDITIONAL INFORMATION (IF INTERESTED):

Diagram for Alpha Meter Instructions:



Calculation for total Power across 3 -phase

$$P_{total} = V_a * I_a * \cos(\theta_A) + V_b * I_b * \cos(\theta_B) + V_c * I_c * \cos(\theta_C)$$