Best Practices for Using Enphase Current Transformers (CTs) in Australia and New Zealand

Introduction

A Current Transformer (CT) is a current measurement device used in conjunction with the Enphase Envoy-S Metered to measure power flowing through a cable. Enphase provides a proprietary CT solution.

Identifying the Correct CT

The Enphase Envoy-S Metered is supplied with two CTs: one to measure the solar generation current (production) and one to measure the consumption current. You can order additional CTs for monitoring multiphase systems. Confirm the Envoy model before ordering a compatible CT.

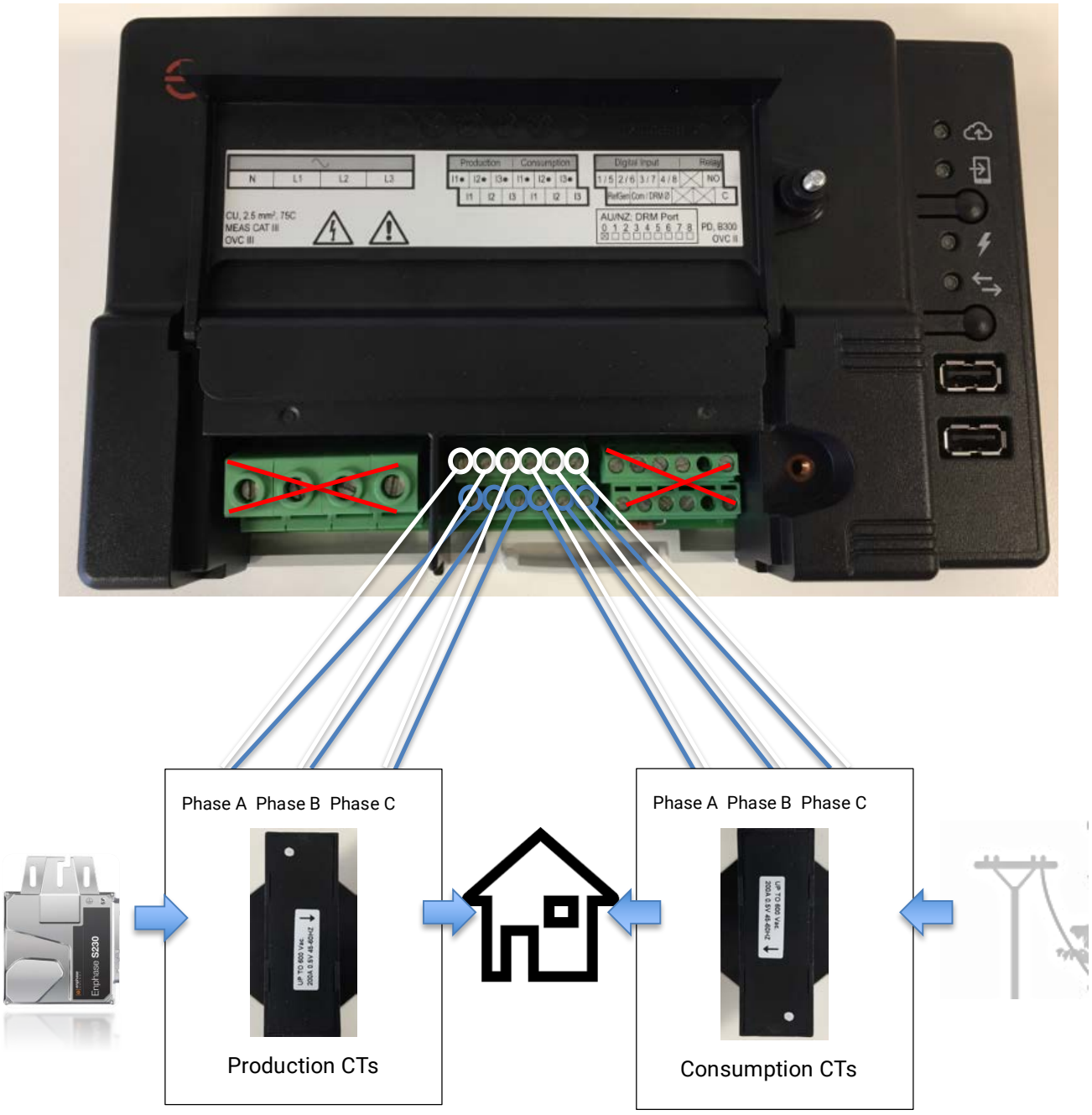
There are two CT models. The CTs are **not** interchangeable between Envoy-S models.

Envoy Type	Compatible CT
Envoy-S Metered SKU: ENV-S-WM1-230-M Note: Multiphase units have part number 880-00209. Single Phase units have part number 880-00121.	200A CT SKU: CT-200-SPLIT  
Envoy-S Metered + DRM SKU: ENV-S-WM-230-M Units have part number 880-00202. Note: All units are multiphase	100A CT SKU: CT-100-SPLIT  

Identifying the correct CT terminals on the Envoy-S Metered

Envoy-S Metered (SKU ENV-S-WM1-230-M, Part Number: 880-00209)

Envoy-S Metered + DRM (SKU ENV-S-230-WM-M)



Extending CT Wiring

Each CT includes a two meter flying lead for wiring the CT directly into the Envoy-S Metered terminals.

An electrician may add up to three Ohms round trip (both wires end to end) resistance to the consumption CT or up to 1.5 ohms per wire. The following list provides the extendable lengths with varied cable sizes.

Appropriately rated, 0.75 mm^2 to 1.5 mm^2, (up to 2.5mm^2 for Envoy-S Metered + DRM) twisted pair wire cable is required. Install in accordance with all applicable electrical codes and standards.

Some options:

Manufacturer	Cable Description	Max CT Extension
Belden	Belden 8471NH Unshielded Twisted pair cable (1.33mm^2)	75 m
Olex, General Cable, Electra Cables	Twin Active 1.5mm^2 TPS (AS/NZS 5000.2)*	80 m

*Must be twisted gently by hand, 20 twists per metre, V-90, PVC, 90°C.

Confirming CTs are Correctly Installed

Use Enphase Installer Toolkit to verify that the CTs are correctly installed and measuring accurately.

Check that Meters are enabled

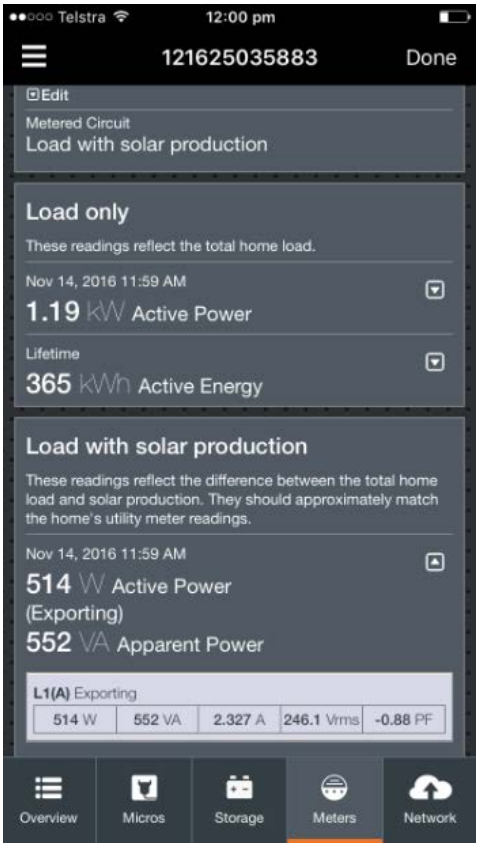
1. Connect the Enphase Installer Toolkit app to the Envoy via network or AP mode.
2. Select **Meters** from the menu.
3. Verify the required meters are enabled (indicated by the green ticks). If not select the meter, and enable them as described in the in-app help of Installer Toolkit.

Verify Production & Consumption Meter Readings

1. Select the **Production Meter**.
2. Verify the number of phases is correct.
    - Single Phase: L1(A)
    - Two Phase: L1(A) and L2(B)
    - Three Phase: L1(A), L2(B), and L3(C)
3. Expand the active power measurements by selecting the drop down arrow on the right.
4. Confirm that the power measurement is positive. In the example, this value is 557 W. If Installer Toolkit displays a negative power level, check that CT polarity is correct. The CT arrow should point from the microinverters to the switchboard.
5. Confirm that the CT is reading current correctly. In the example, 2.64 A is the current flowing from the inverters to the switchboard. Confirm this reading with an AC clamp meter. If this reading is not correct, check that the CT is closed and connected to the correct terminal of the Envoy.
6. Confirm that the Envoy has measured the correct AC voltage with an AC Voltmeter. In the example, the Envoy measured 239.8 V.
7. Confirm the power factor (PF) is correct. In the example, this value is 0.88 PF. Generally, the power factor will be in the range 0.7 to 1 when the production is at least 230W.

This example shows a single phase site.

8. Select the **Consumption Meter**.
9. Verify that the number of phases is correct.
10. Verify that the **Metered Circuit** is correct. If the CT is on the grid supply, select **Load with solar production**. Use **Load only** mode if the CT is installed only on the loads.
11. Scroll down to **Load with solar production.**
12. Expand the active power measurements by selecting the drop down arrow on the right.
13. Confirm power measurement is positive. In the example, this value is 514 W. If Installer Toolkit displays a negative power level, check that the consumption CT polarity is correct. The CT arrow should point from the grid supply on the street to the switchboard.
14. Use an AC current clamp to confirm that the consumption CT is reading current correctly. In the example, this value is 2.327 A. If this reading is not correct, check that the CT is closed and connected to the correct terminal of the Envoy.
15. Confirm that the Envoy has measured the correct AC voltage with an AC Voltmeter. In the example, the Envoy measured 246.1 V.
16. Confirm the power factor (PF) is correct. In the example, the value is 0.88 PF. Generally, the power factor for load will be in the range 0.5 to 0.99 when the load is at least 230 W. A very low power factor is possible when voltage is out of phase to current measurement. Ensure that CT's and Envoy voltage supplies match in multiphase sites.



This example shows a single phase site.

Tips for Installing CTs Safely and Successfully

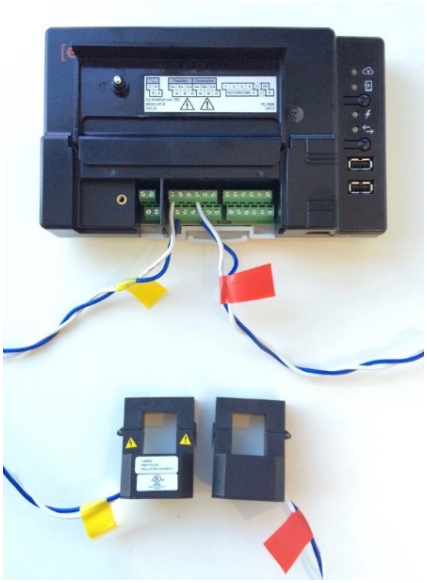
Install the CTs as directed in the *Envoy-S Metered Quick Install Guide,* following all safety instructions and warnings.

DANGER: Risk of electric shock. Always de-energise circuits before wiring for power and CTs.

DANGER: Risk of electrocution! Do not install CTs when current is flowing in the sensed circuit. Always install CT wires in the terminal blocks before energising the sensed circuit.

Mark Each End of the CT Wires

Colour code each end of the CT wiring so you can quickly identify the correct CT Envoy terminal. This can be especially helpful in a multiphase installation.


Colour coded CT Wires

Terminate the CT Wiring Before Closing the CT

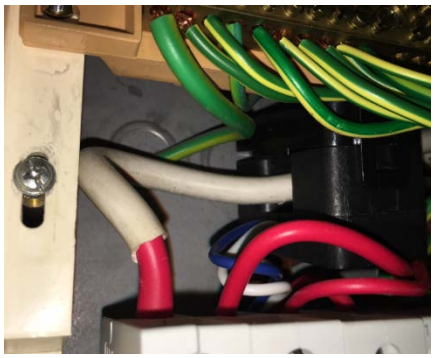
Remember, CTs can produce dangerous voltage and current if left unterminated while closed around an active conductor.

CT Noise

If the CT is making a buzzing noise, it has not been terminated to the Envoy correctly or there may be a break in the wiring. Open the CT and check the wiring.

Close the CT

If a CT is not fully closed, measurements will not be accurate. Always ensure that the CT is fully closed once fitted.



A closed CT

CT Polarity

Using Enphase Installer Toolkit, confirm that the CTs are enabled and measuring correctly. Confirm readings with an AC clamp meter. The arrows on an AC clamp meters indicate the direction of typical energy flow. For example, solar (production) energy should flow from the solar modules to the switchboard. Consumption energy should flow from the electricity supply to the switchboard.

Enphase Customer Support

Enphase Customer Support technicians can make some adjustments to the Envoy-S Metered remotely if an internet connection is in place. Adjustments that may be made remotely on request:

- Enabling CTs
- Number of Phases
- Metered Circuit

Call **1800 006 374** to reach Enphase Customer Support.