Enphase AC Battery

Technical Training

Martyn Berry
Enphase Service & Support

Enphase AC Batteries from Segen

Enphase AC Battery Storage Package - 2.4kWh

Part No: EN-STOR-2.4 Storage Systems - Self Consumption Packages

SPECIAL OFFER

This

Part

2 x EN

1 x EN

2 x EN

This Self Consumption

The Enphase batteries

Please note that currer

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Enphase AC Battery Storage Module - 1.2kWh

Part No: EN-STORAGE-AC-1.2 Storage Systems - Li-ion Battery Pack

Enphase AC Battery

The Enphase AC Battery is an integrated energy storage system that delivers high performance, superior reliability, modular architecture, and safety.

- Capacity: 1.2 kWh
- Depth of discharge: >95%
- Roundtrip cell efficiency: 96%
- Peak output power: 270 VA
- Chemistry: Lithium Iron Phosphate (LFP)
- Cell safety certifications: TUV Rheinland, UL

Please note, the Enphase Storage system is certified G83/2. It cannot be installed at sites in Northern Ireland or the Republic of Ireland.

On Special Offer!

EN-STOR-1.2 Enphase AC Battery Storage Package - 1.2kWh

EN-STOR-2.4 Enphase AC Battery Storage Package - 2.4kWh

EN-STOR-3.6 Enphase AC Battery Storage Package - 3.6kWh

EN-STOR-4.8 Enphase AC Battery Storage Package - 4.8kWh

EN-STOR-INTRO Enphase AC Battery Introduction Package

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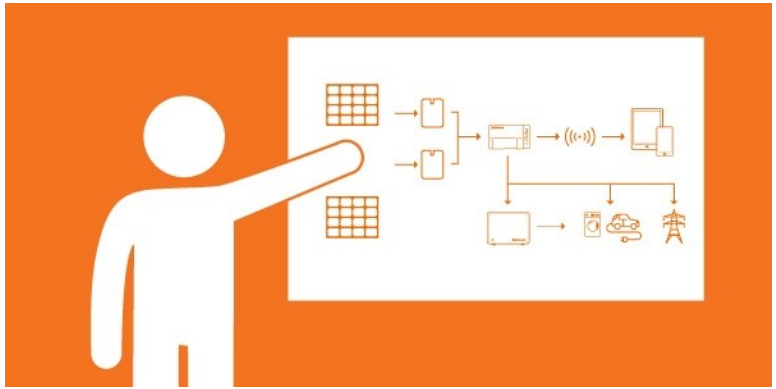
Welcome to Enphase AC Battery Training

- Introduction to the AC Battery
- System Overview
- Electrical Design
- Before going to site…
- Envoy-S & CT Installation
- AC Battery Location & Installation
- System Setup & Commissioning
- Most Important Small Print
- Help & Support



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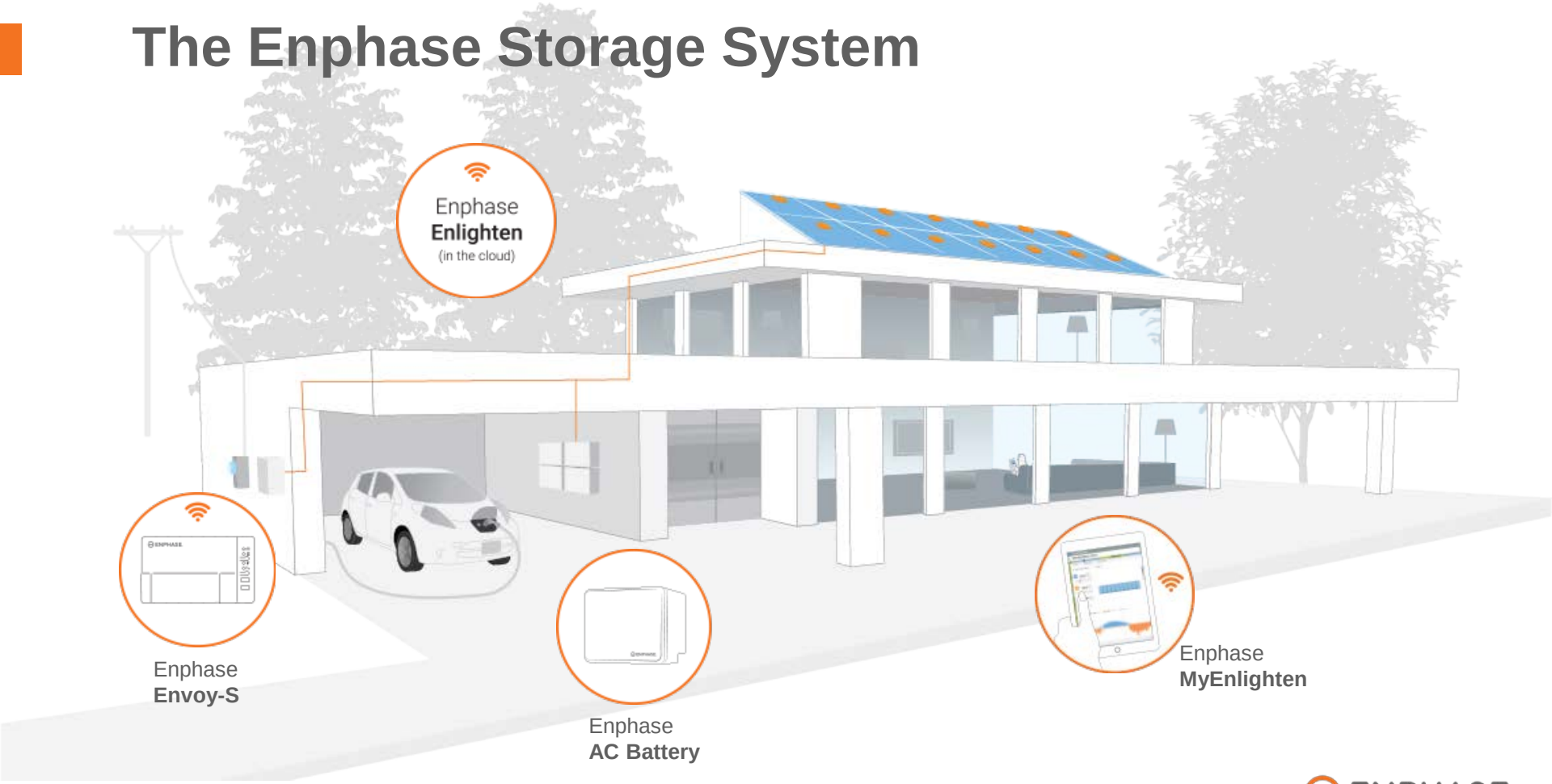
Introduction to the Enphase AC Battery

The Enphase Storage System



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Enphase AC Battery (ACB)

Features

- 1.2 kWh energy capacity, 270 W power
- Weight: 25 kg
- Embedded bi-directional microinverter
- Depth of discharge: >95%
- 96% round-trip efficiency for the battery
- LFP* chemistry: Safety certified by TÜV Rheinland
- IP 20 rated
- Warranty: 10 years or 7,300 cycles**
- UN38.3 certified

Notes: Actual cycle life depends on rate and depth of charge, and battery temperature
*Lithium Ferrous Phosphate
**1 cycle= 1 full charge and 1 full discharge

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Enphase ACB Wall Mount Brackets

Features

- Integrated junction box
- 2.5mm^2 to 4.0mm^2 wire
- 2 versions (450mm and 600mm)
- Can be pre-installed

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Envoy-S Metered

Features

- Data and management
- Monitoring and control
- Production and consumption metering with CTs
- ACB & microinverter connectivity
- Flexible internet connectivity & integrated Wi-Fi
- Single or multiphase (with additional CTs)
- Charge and discharge management, including phase balancing
- 5 year warranty

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Enlighten Monitoring Platform

Features

- Monitor energy consumption and production in one interface
- Quickly view net energy
- Manage ACB time of use and night time charging options

Enlighten Manager
for Installers & Maintainers

MyEnlighten
for System Owners

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Installer Toolkit App (ITK)

Features

- Accelerates Envoy and AC Battery commissioning
- Use phone camera to scan serial numbers
- Configure system and apply grid settings without a laptop
- View and email the status report to verify install success
- Available for iOS and Android
- Set ACB time of use and night time charging options

Download on the App Store

ANDROID APP ON Google play

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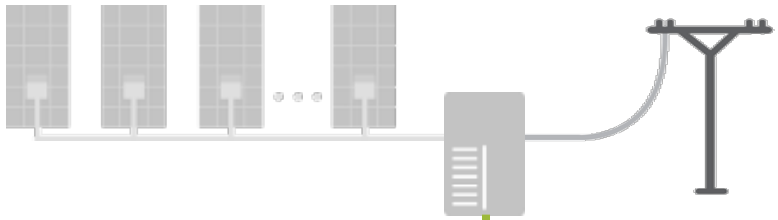
System Overview

Basic Enphase Microinverter Architecture

Independent Microinverters for every solar module



Enlighten

Internet

Envoy-S and ITK

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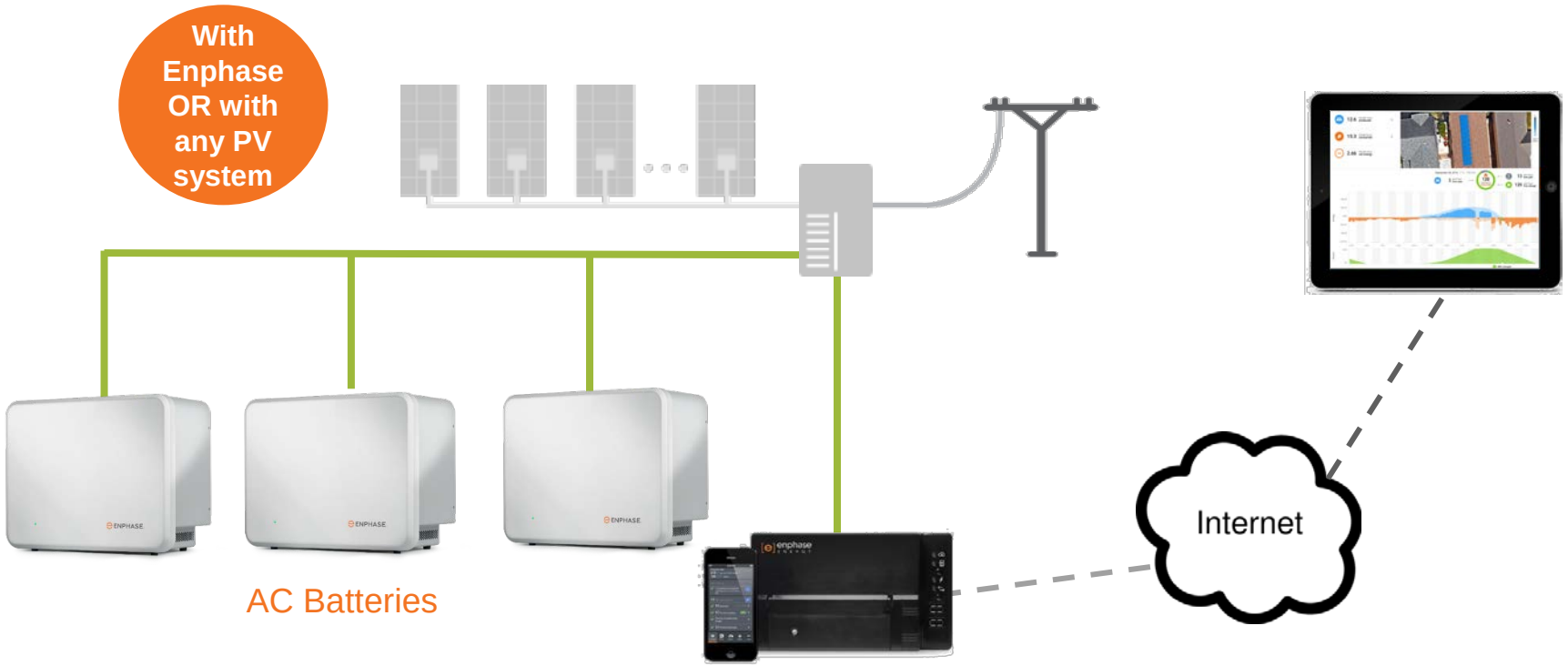
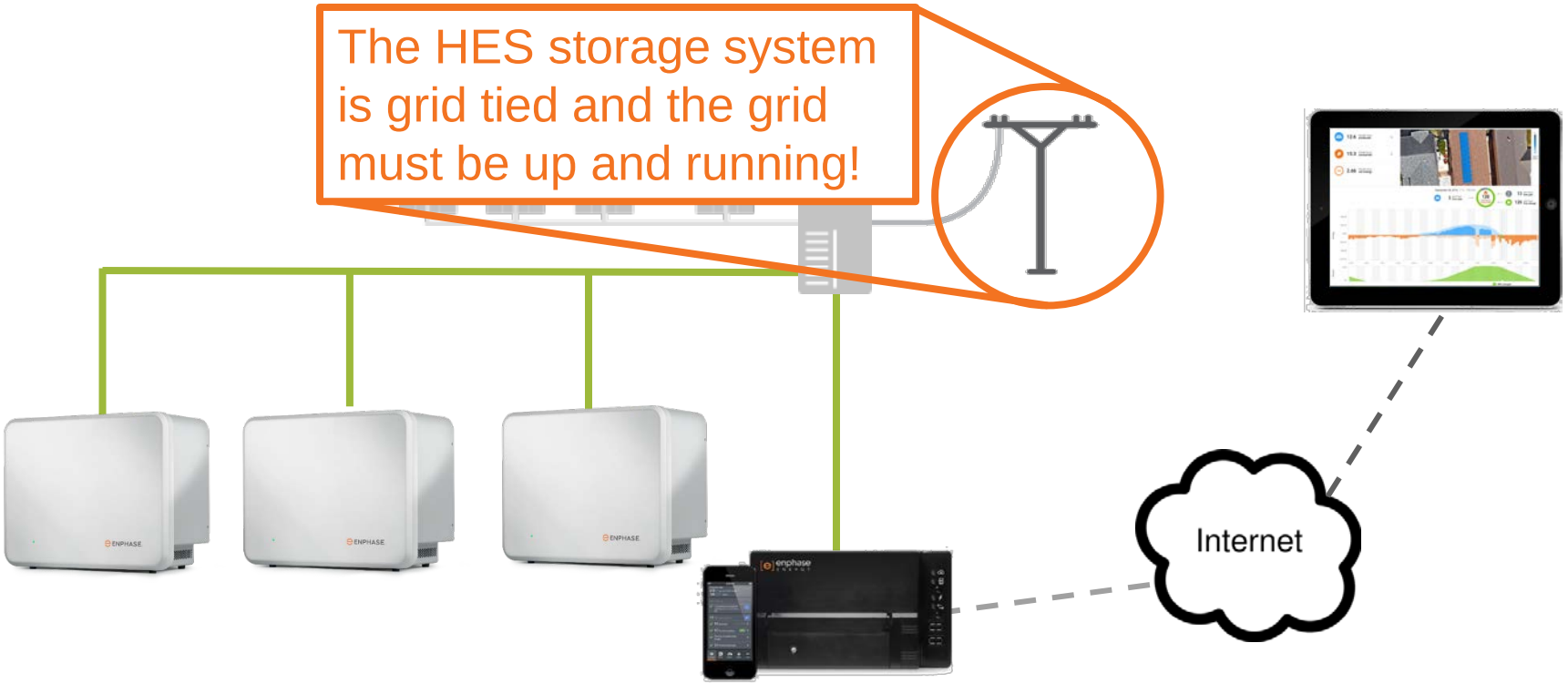
AC Battery System Architecture



How the AC Battery System Works



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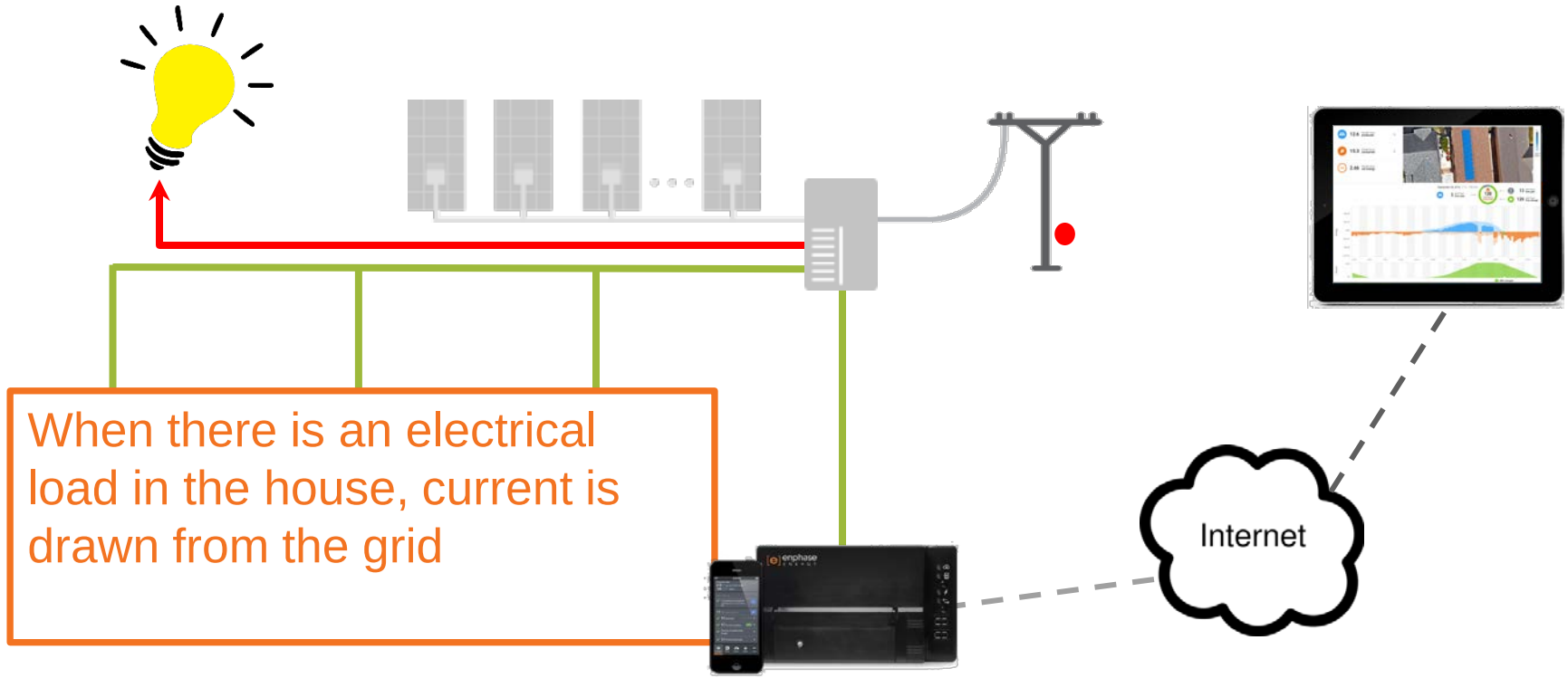
How the AC Battery System Works



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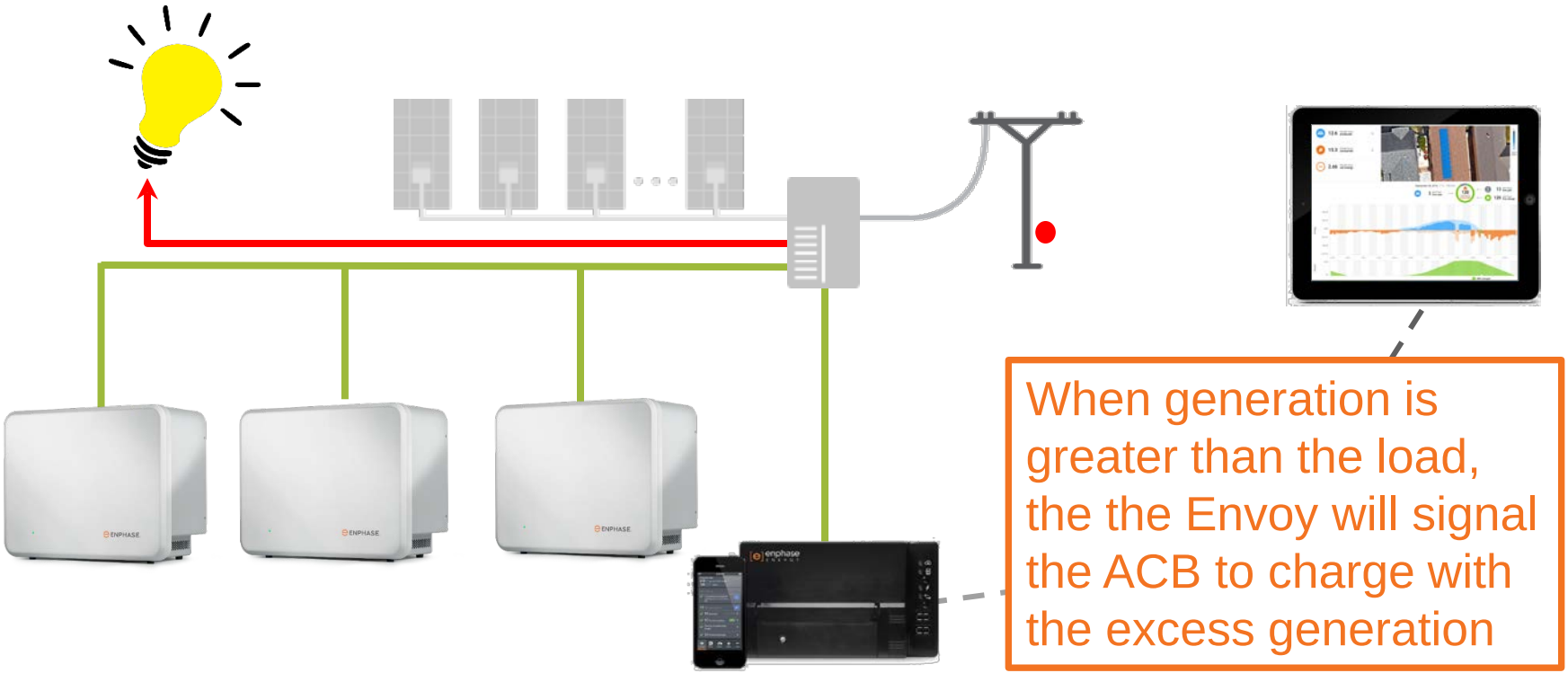
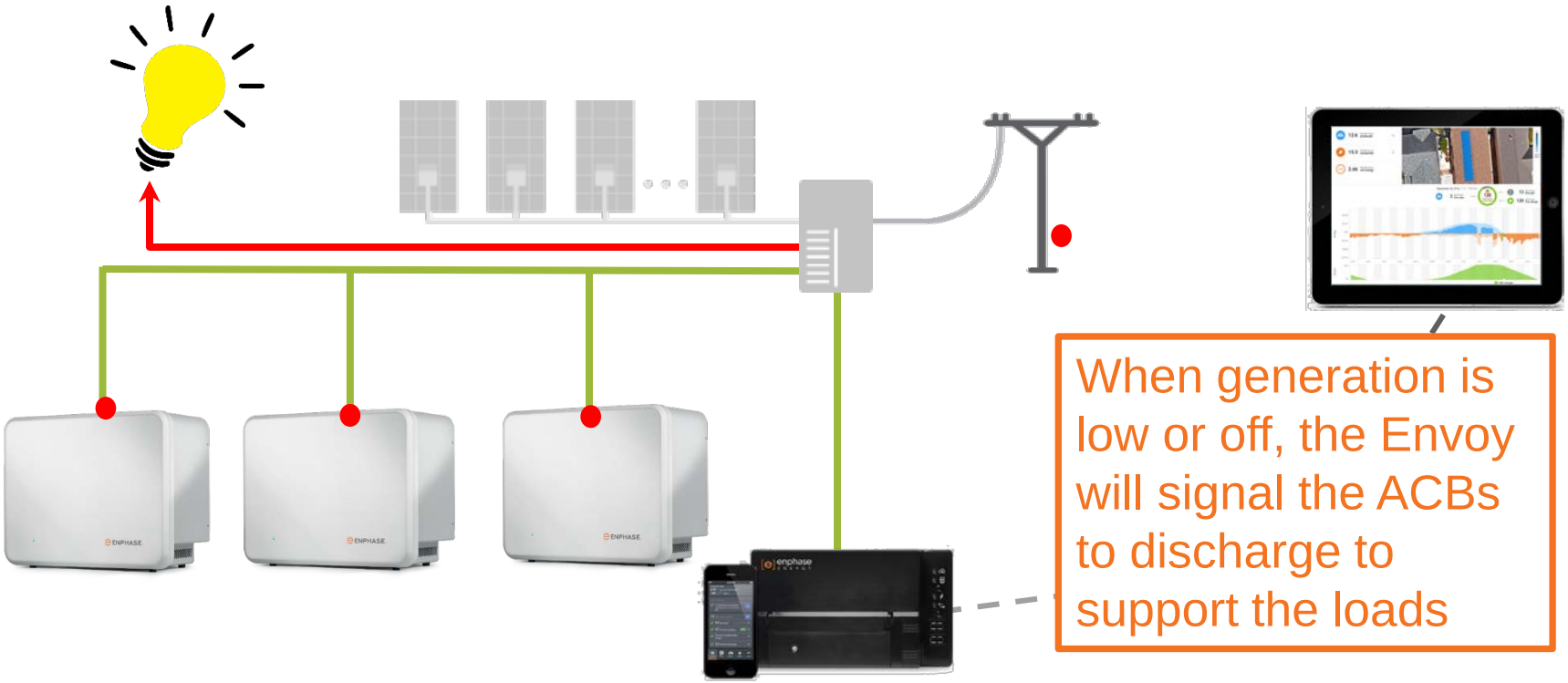
How the AC Battery System Works



When generation is greater than the load, the the Envoy will signal the ACB to charge with the excess generation

ENPHASE.

How the AC Battery System Works



When generation is low or off, the Envoy will signal the ACBs to discharge to support the loads

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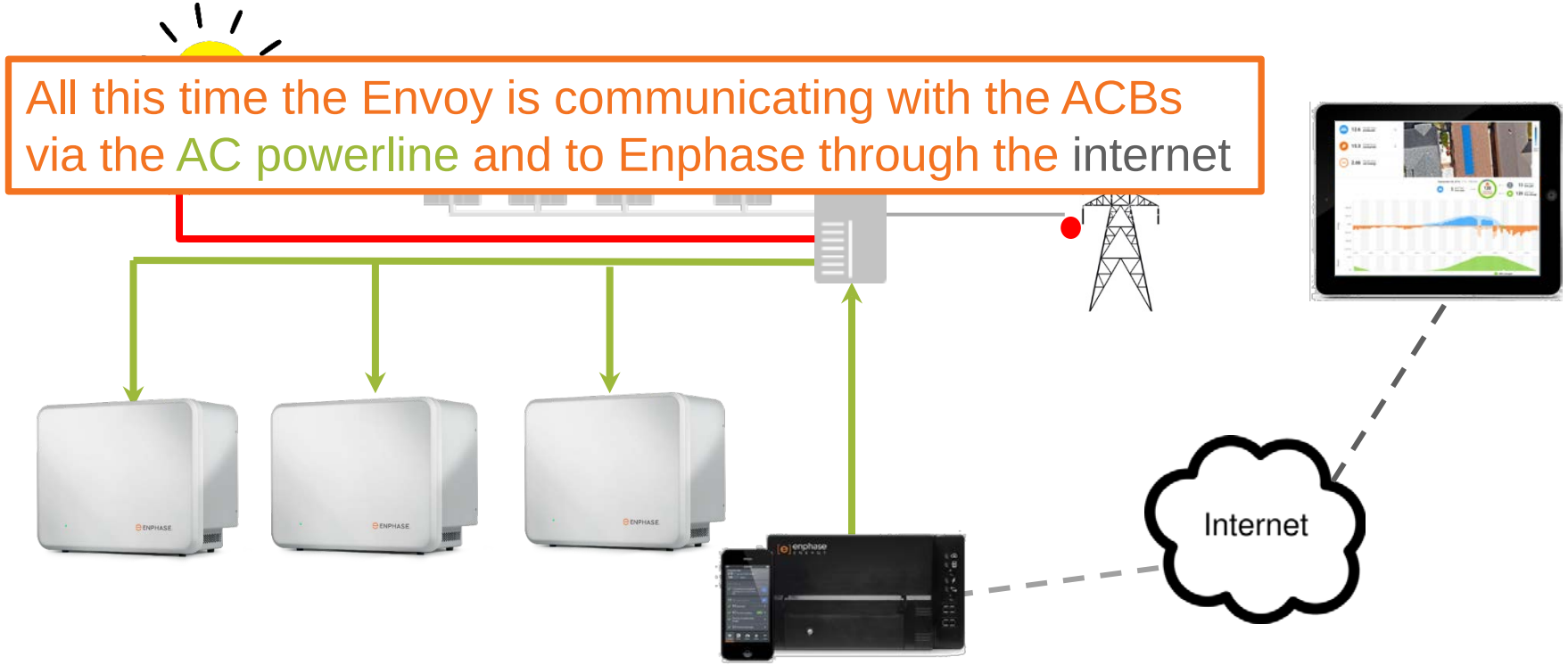
How the AC Battery System Works

All this time the Envoy is communicating with the ACBs via the AC powerline and to Enphase through the internet



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Electrical Design

Locating and Mounting the Envoy-S

- Location
- Powerline communiction
- Internet
- Switchboard device
- CT wiring

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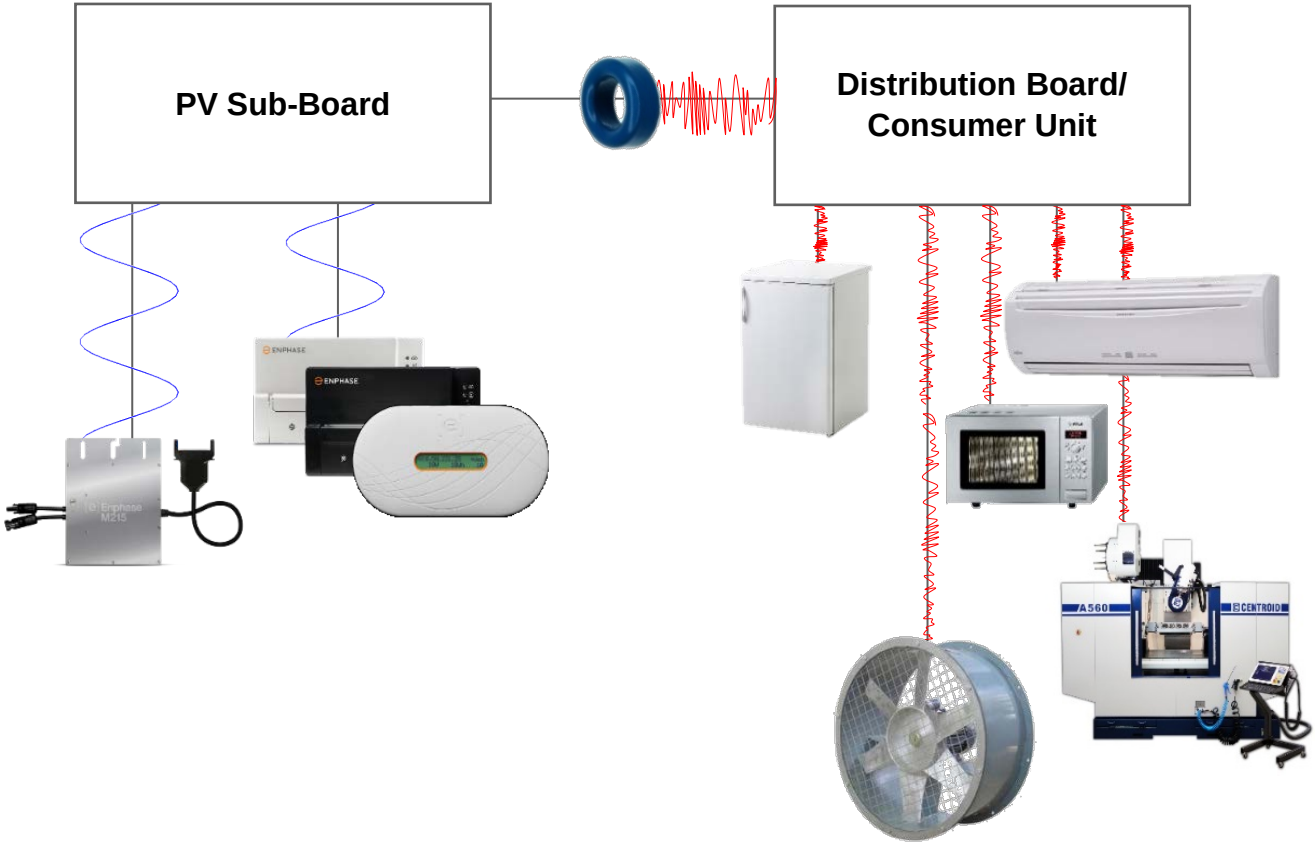
Things That Can Create Competing Noise



Also…

- String Inverters
- Solar iBoost
- Dimmer switches
- Pool pumps

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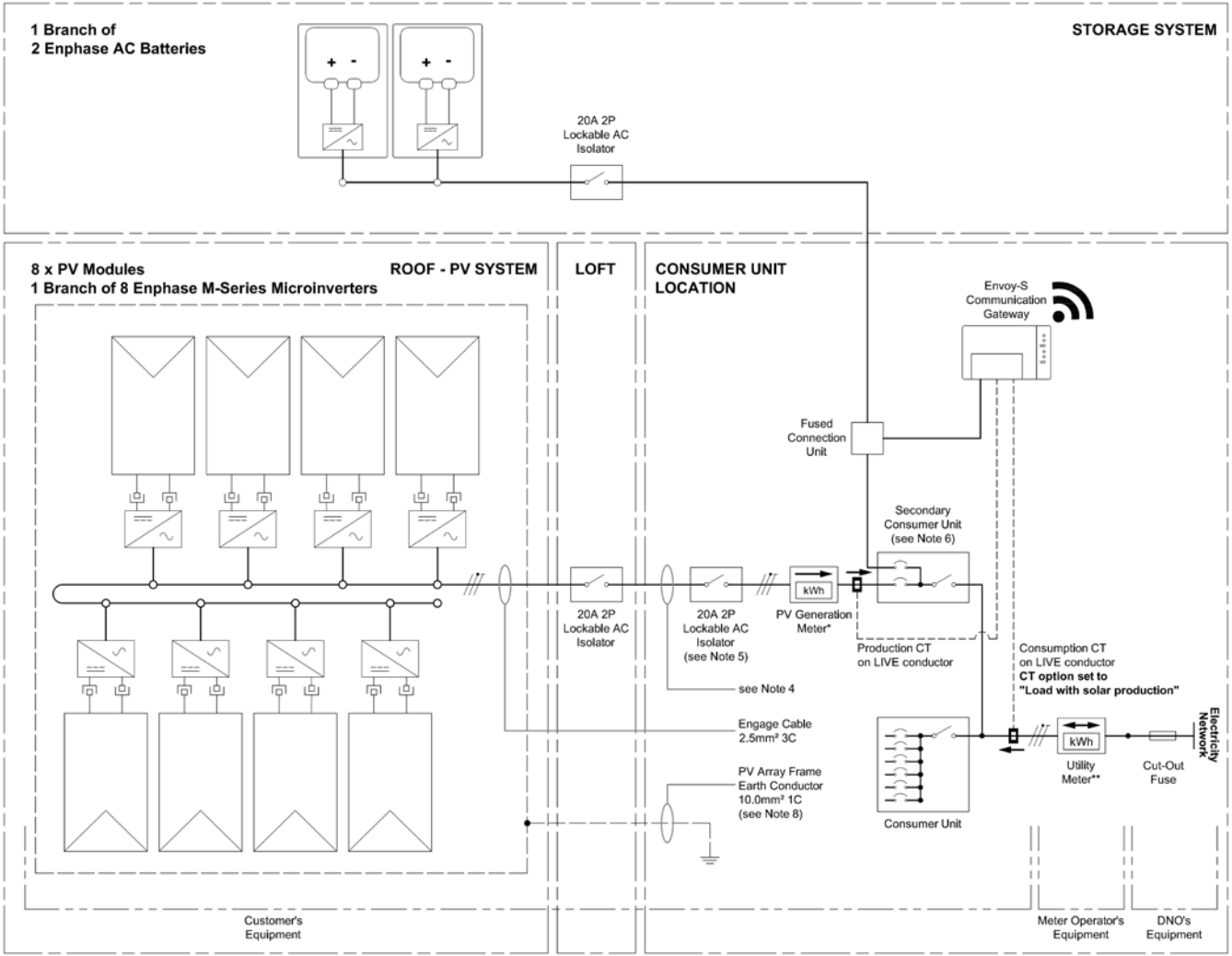
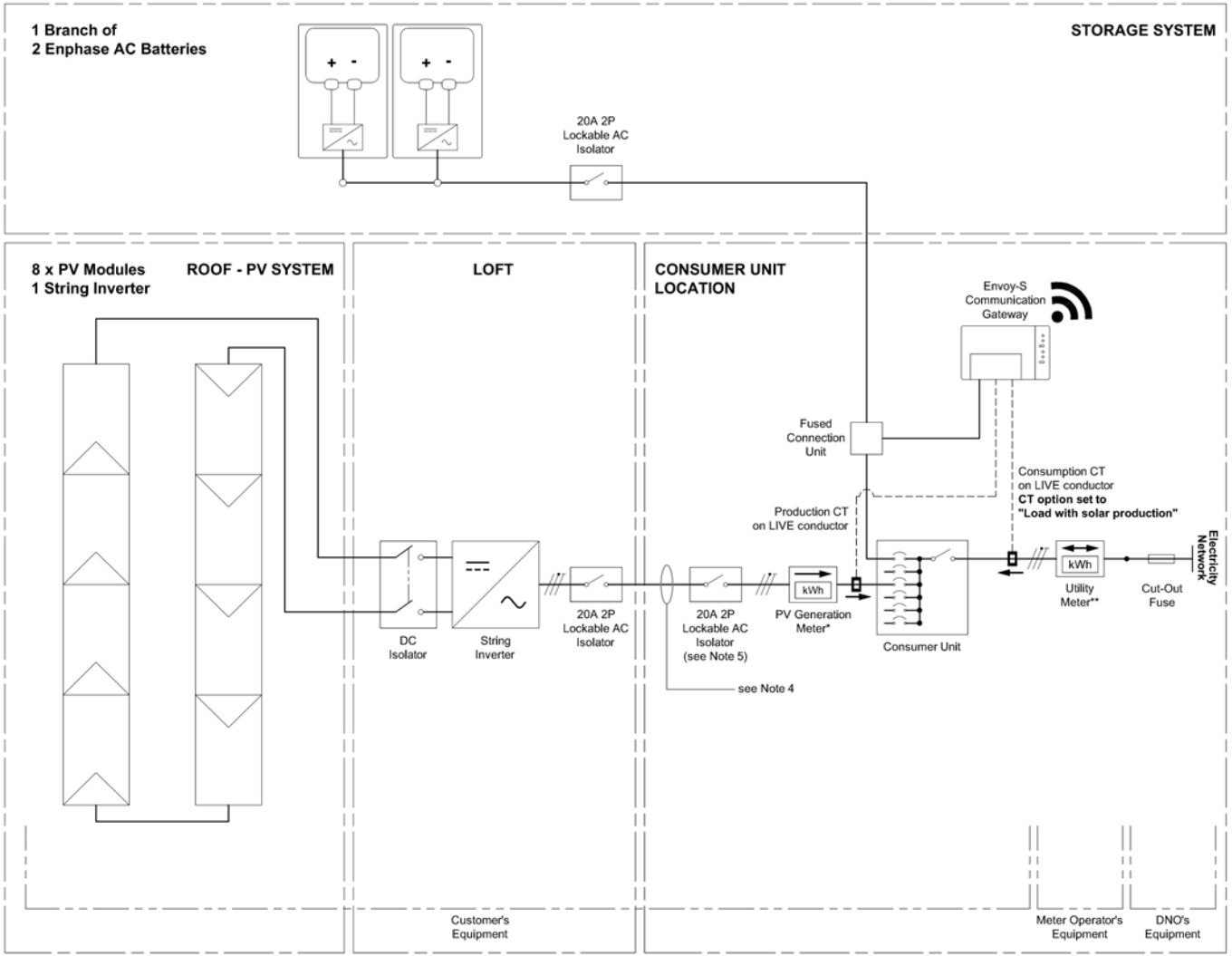
Example Schematic

Microinverter site



Example Schematic

String inverter site



Before going to site…

Get Online with ITK

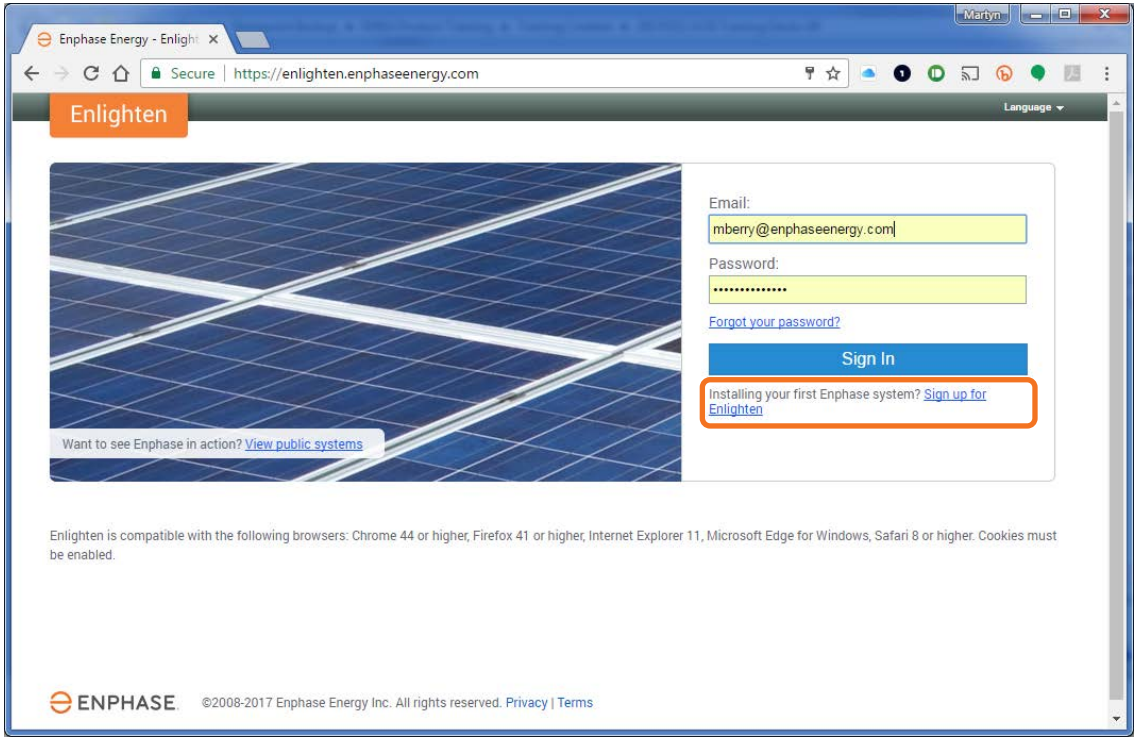
Features

- Make sure you know your Enlighten installer Login
- Installer the ITK App

Download on the App Store

ANDROID APP ON Google play

- Make sure your App is up-to-date before you leave your WiFi



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Site Assessment and Location Planning

- IP20 rated locations
  - Away from water
  - Indoor unoccupied space (garage)
  - Readily accessible

- Temperature considerations
  - -20ºC to +40ºC
    - Out of direct sunlight
    - Well ventilated

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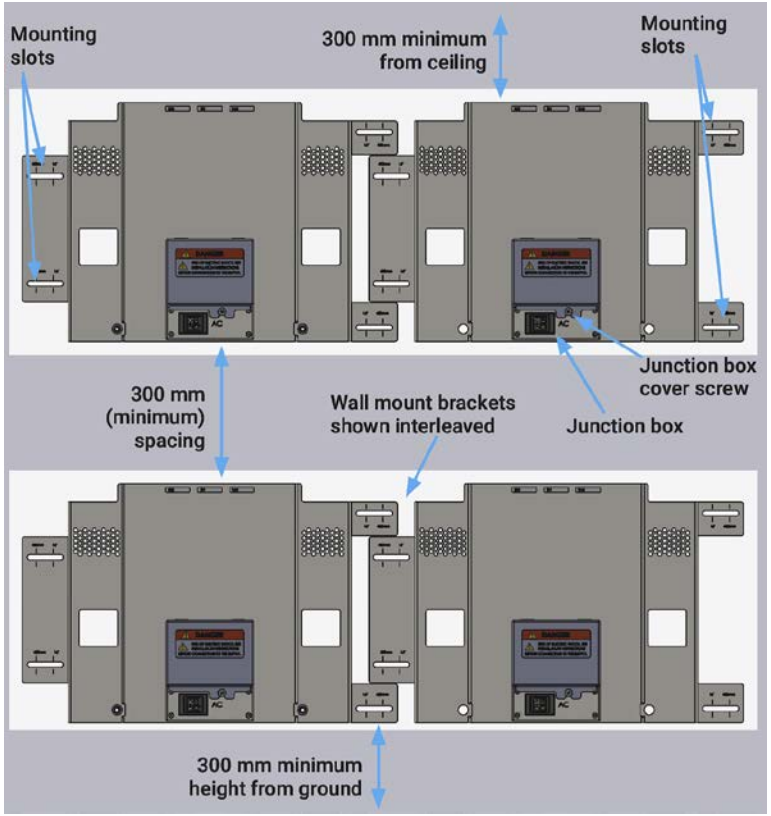
Site Assessment and Location Planning

- Approved clearances
  - Minimum 300mm above and below
- Physical mounting requirements
  - 25kg load capacity per unit
- Envoy Powerline Communications
  - Minimum cable run to Envoy
  - Shared sub board to minimize risk of noise



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Which Type of Envoy for AC Battery Sites?

Envoy

Envoy-S Standard

Envoy-S Metered

Only the Enphase AC Battery will only work with the Envoy-S Metered!!!

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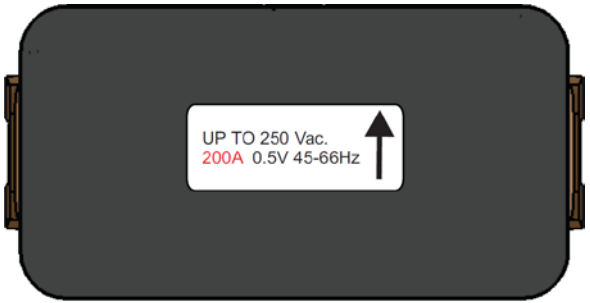
Envoy-S & CT Installation

Current Transformers (CTs)

- A CT is a device used to measure power flowing through a conductor.
- Enphase provides a proprietary CT : **do not use any other, you risk to damage the Envoy**
- CTs must be installed in specific direction, as indicated by arrow sticker.
- Terminate CT wiring Before closing CT.

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



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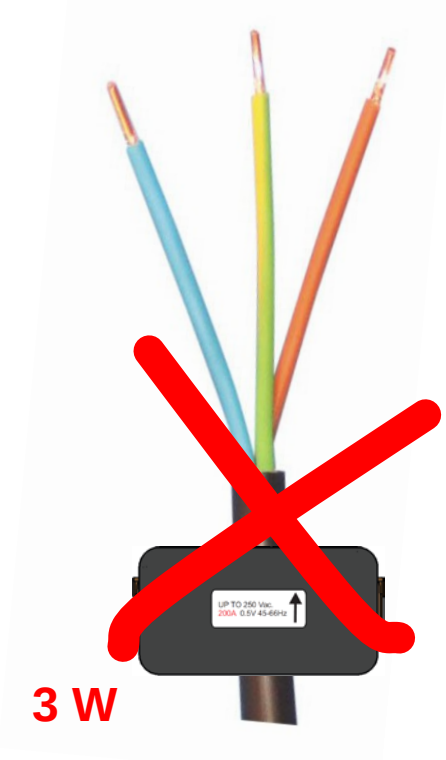
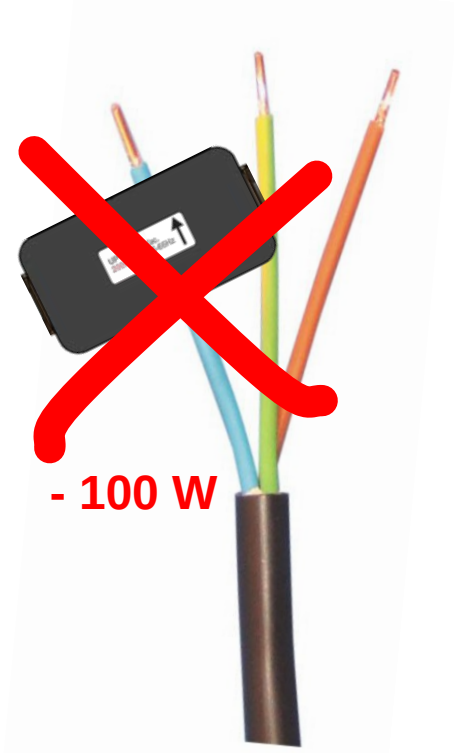
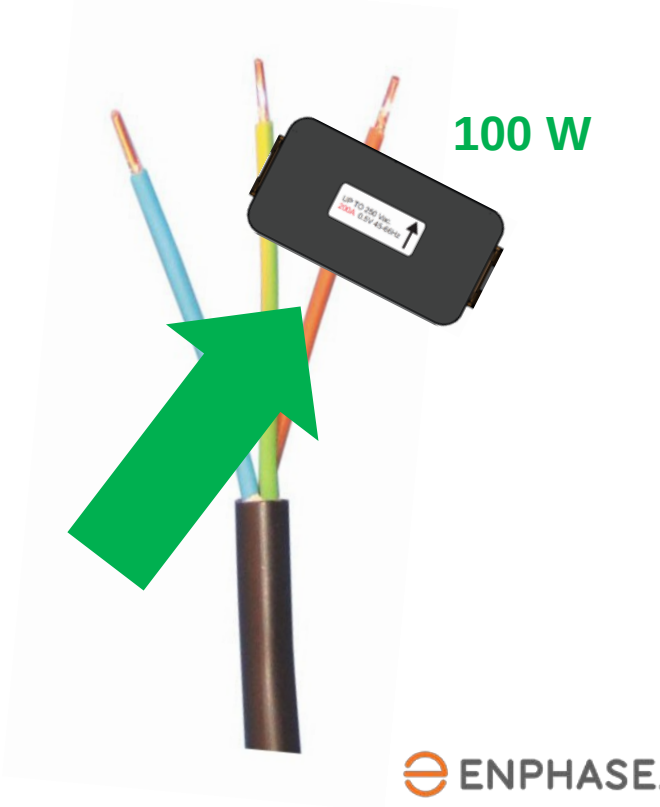
Current Transformers (CTs)

Must be installed on a phase conductor, not on a multicore cable, not on neutral







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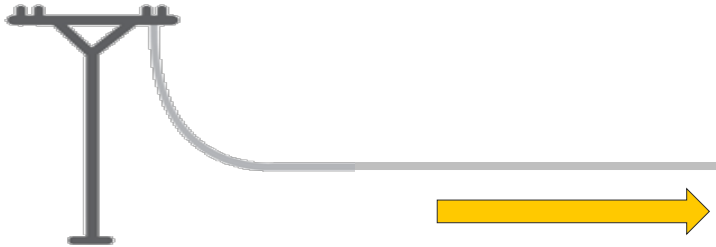
Current Transformers (CTs)

Energy flow from the PV system

PRODUCTION CT

CONSUMPTION CT



Energy flow from the grid

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Under the Hood

Power Supply
(N,L1)
&
Voltage
Reference
(N,L1,L2,L3)

Connection to
Enlighten

AP mode (Access Point)
for Installer Toolkit
LEDs & button

Communication (LED
Production (LED)
Scan Button for micros/ACB

Terminal blocks
for CTs

Terminal blocks not used
(Australian use only)

USB port for
Mobile connect

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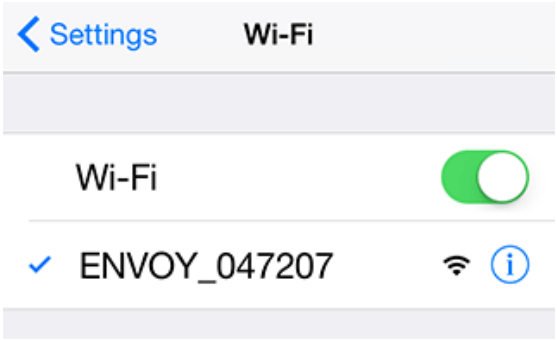
Configuration Meters in ITK

Connect to Envoy with AP (Access Point) Mode



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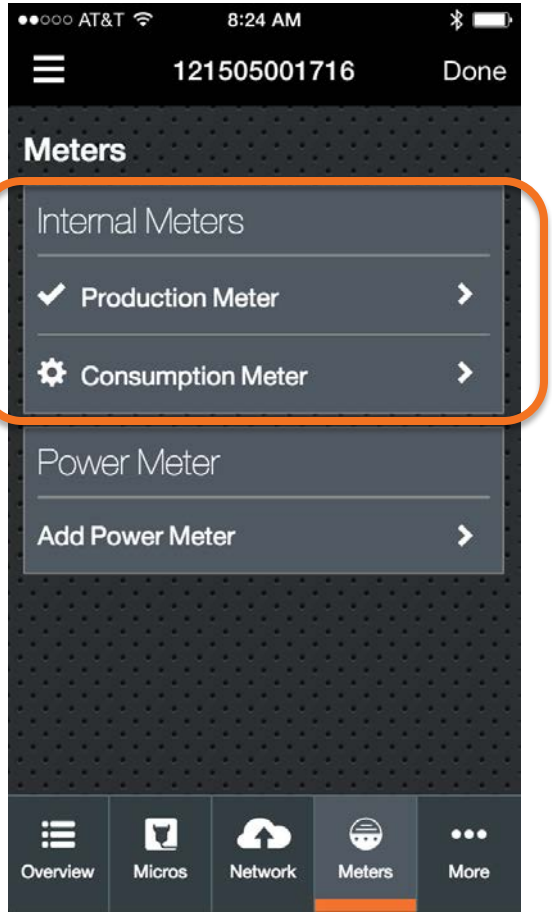
Configuration Meters in ITK

Configure the meters with The Enphase Installer Toolkit App.

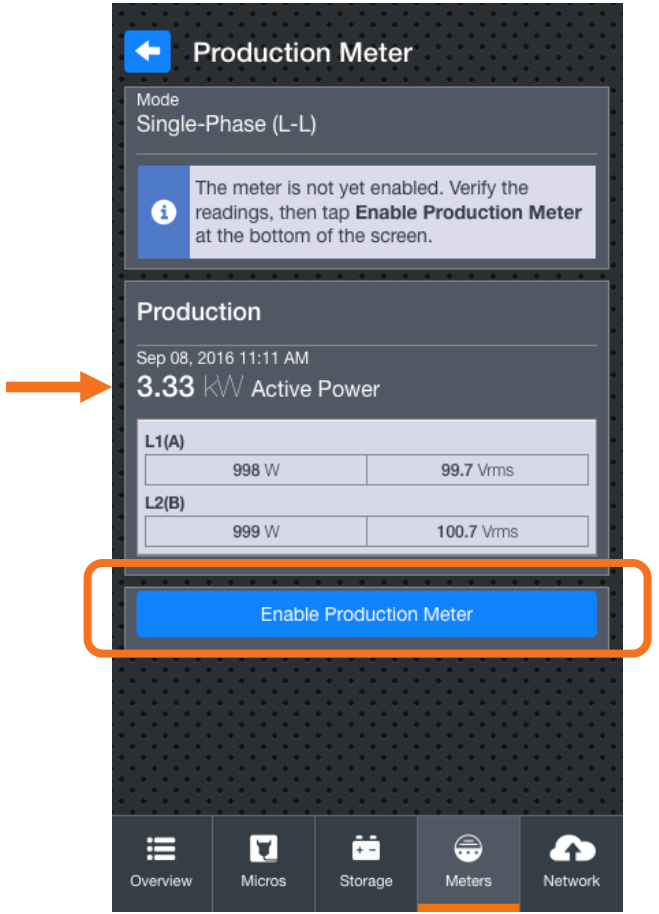


ENPHASE.

Configuration Meters in ITK

Do the readings make sense?

- Negative readings are a clear sign of incorrect polarity of the production CT
- Don’t install the production CT on a place where it could also measure the Envoy consumption
- Don’t forget to enable the meter



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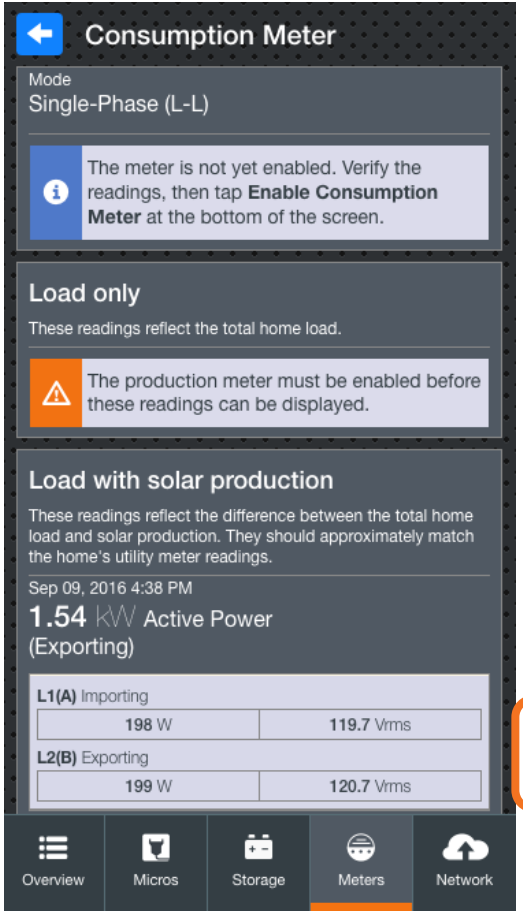
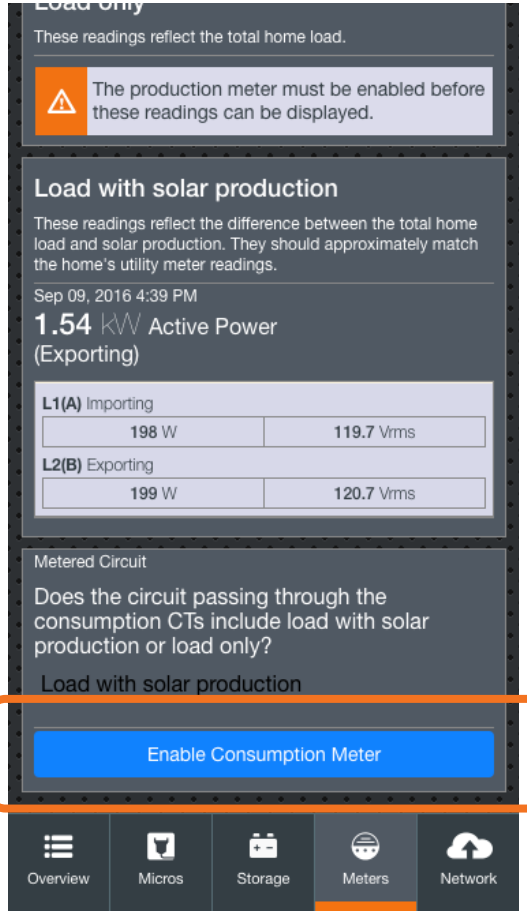
Configuring Meters

Complete Consumption Meter configuration

- Verify readings
- If the consumption meter selection is incorrect, now is the time to make the change
- Enable the meter





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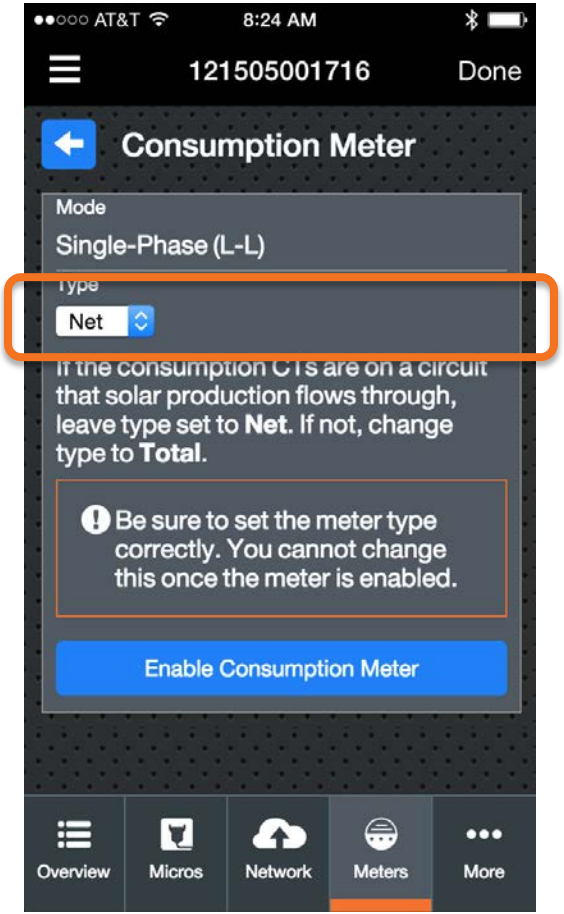
Configuration Meters in ITK



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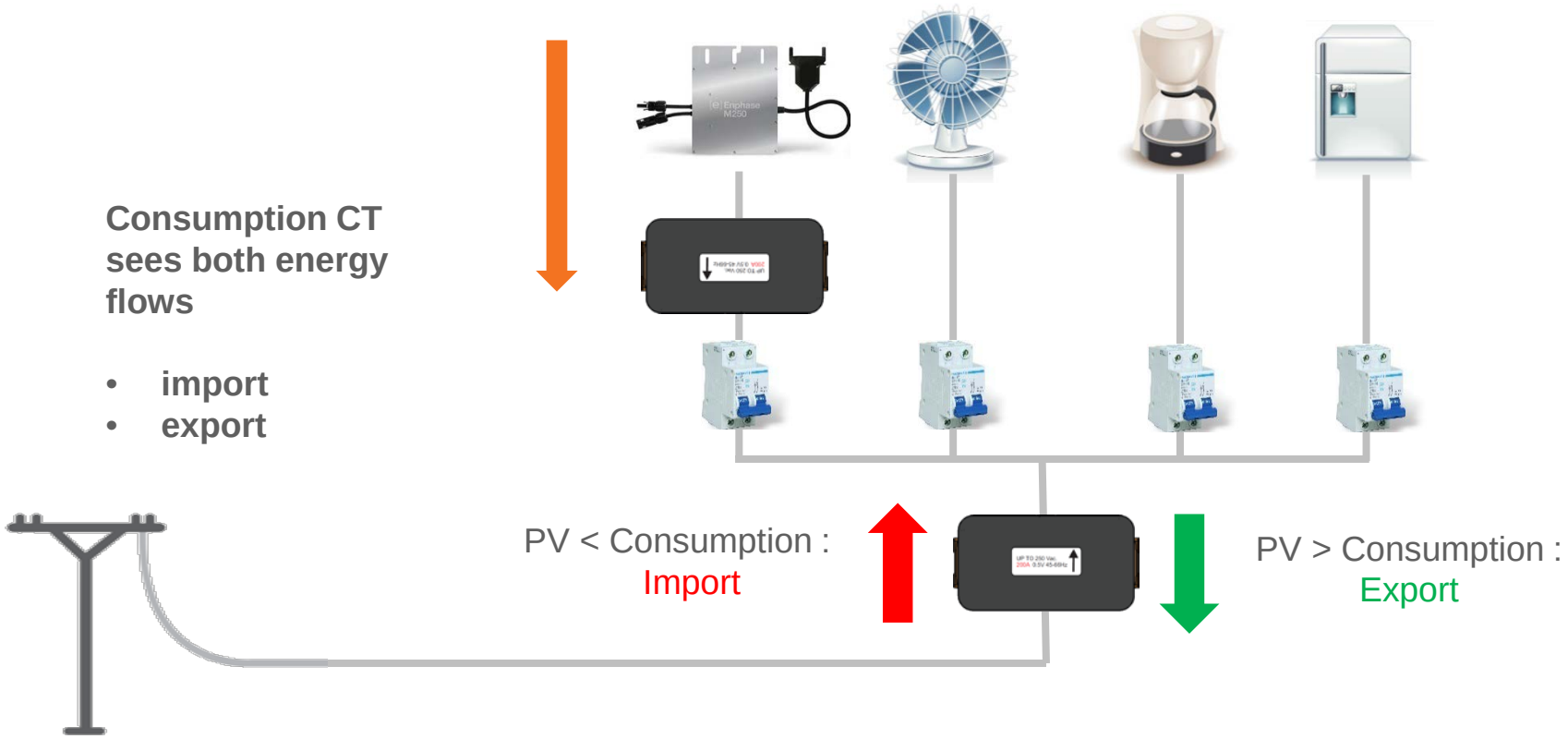
Configuring Meters : Load with PV (NET)

Consumption CT sees both energy flows

- **import**
- **export**



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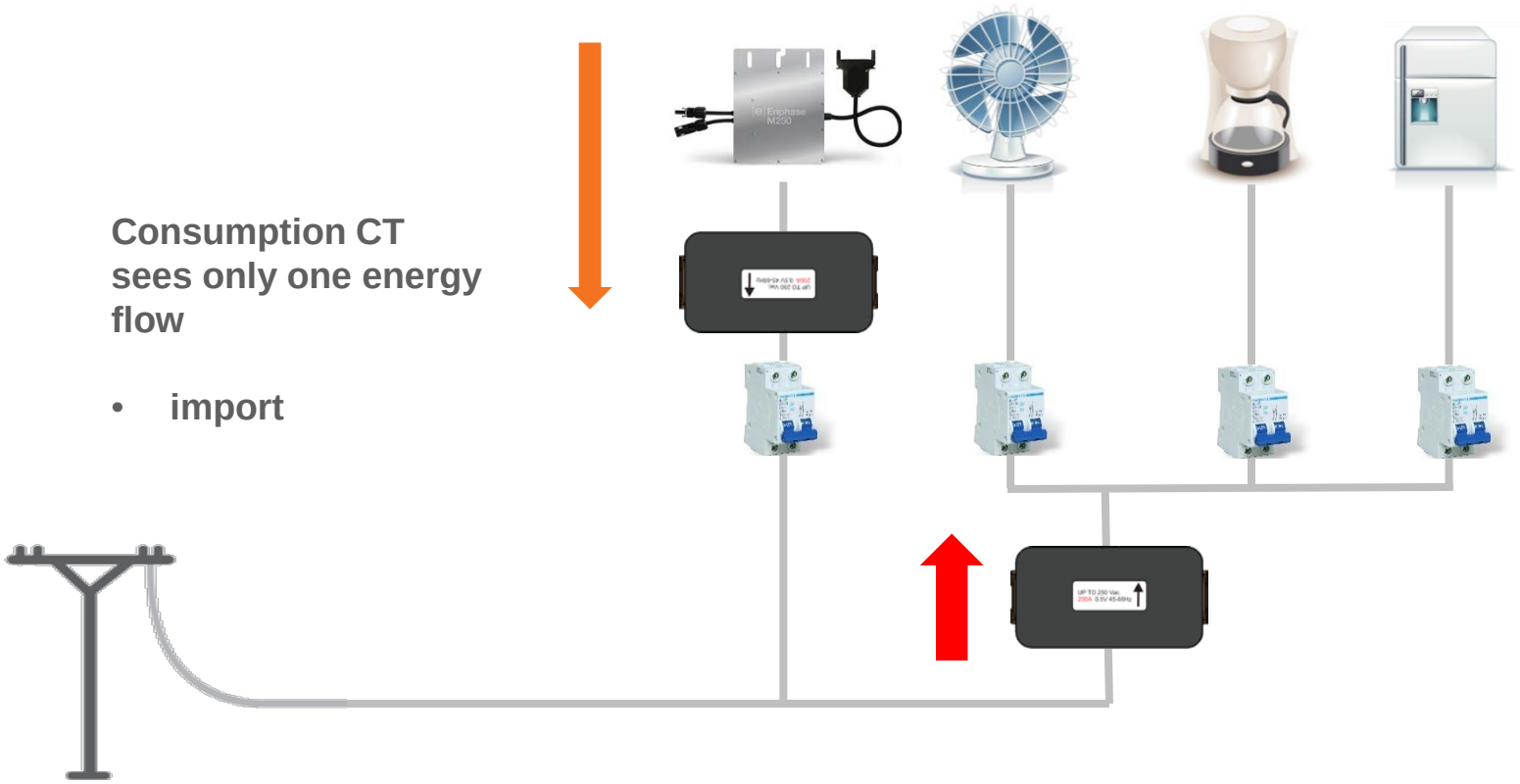
Configuring Meters : Load without PV (TOTAL)

Consumption CT sees only one energy flow

- **import**



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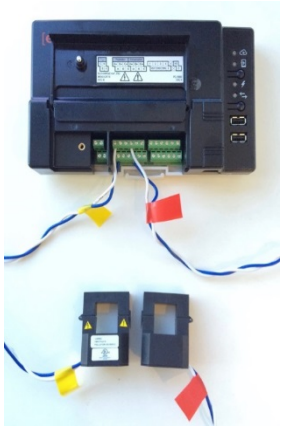
CT Installation Workflow



Install the Envoy

Install the CTs

Connect to the Envoy with ITK

Scan the micros & propagate the grid profile

Check the production meter and enable

Switch off the PV breaker

Check the consumption meter and enable

Switch on the PV breaker

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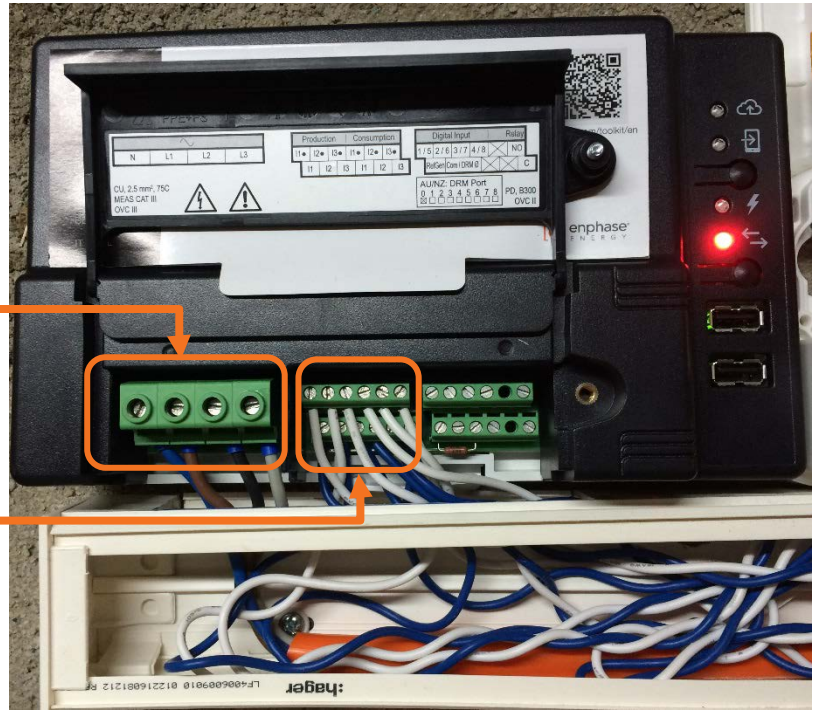
Common Mistakes

If the CTs are not correctly installed, the Envoy will read negative values that will not be used or seen on Enlighten and ACB will not function correctly.

- CTs installed in a correct direction : arrow to match energy flow measured.
- CTs correctly wired on the Envoy : BB => blue on bottom.
- Envoy Power supply : **Line & Neutral must be correctly terminated If reversed, all CT readings will be reversed !**
  (check with an electrical tester or measure the voltage)



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AC Battery Location & Installation

Junction Box Cable Entry

- Grommets, similar to a metal pattress box.
- Knock-outs in the rear cables to be hidden if desired.

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Mount to Wall

- 450mm and 600mm plates
- 25kg weight load
- 13 maximum AC Batteries / Circuit
- Use fasteners that ensure structural stability on mounting

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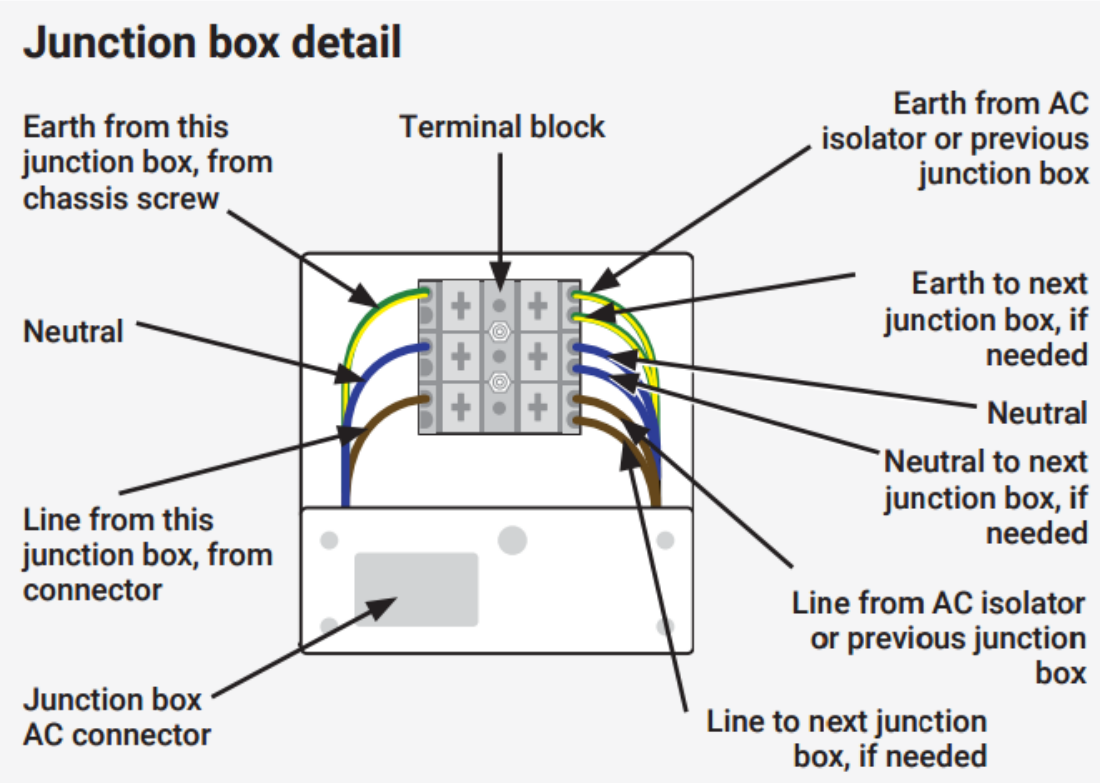
Terminate Wiring

- Remove junction box cover
- 2.5mm^2 to 4mm^2 wire
- Uses push connectors
- Route, secure and check all wires
- Replace box cover



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Unpacking the AC Battery

- Unpack the battery and check for damage.
- **Do not install if there are signs of mis-handling or damage!!**

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Unpacking the AC Battery

- Packaging opens to allow ACB units to be easily lifted.
- Packaging re-usable

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Unpacking the AC Battery

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Mounting the AC Batteries

- Hang ACB onto bracket on tabs
- Take care in lifting (25kgs)
- Ensure “bonding screws” on ACB align to bracket and are fully secured

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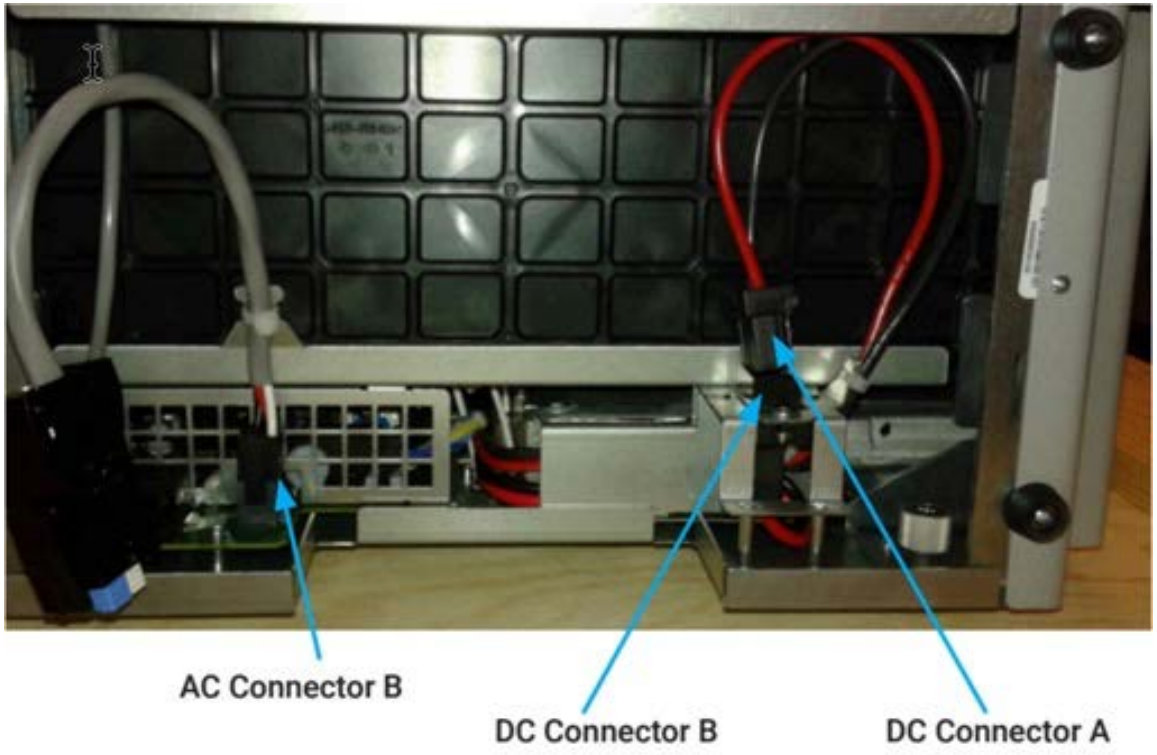
Connecting the AC Batteries – DC & AC!!!



- **FIRST Connect DC Connector (Click!)**
- Second Connect AC Connector (Click!)

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Completed Installation

- Installation almost complete, AC isolator as a point of emergency switching.
- Cover plate (shown below) is fitted to underside with two Allen bolts.

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Energising and Reading the Status Light

State	Description
Solid red	Starting up
Red flashes in sequences of 2	Error. See "Troubleshooting".
Solid amber	Not operating due to high temperature. See "Troubleshooting".
Solid blue or green	Idle - color transitions from blue to green as state of charge increases. You can check Enlighten for charge status.
Slowly flashing blue	Discharging
Slowly flashing green	Charging
Green one second flashing	Looking for noncommissioned unit
Off	Not operating. See "Troubleshooting".

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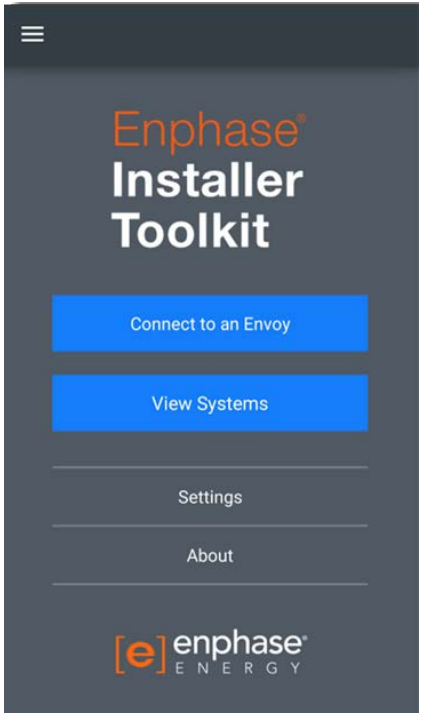
Installer Toolkit (ITK)

- **The commissioning tool for Enphase Microinverters and AC Batteries**
  - Metering configuration
  - ACB grid profile programming
  - Discharge time configuration option
  - System operation verification



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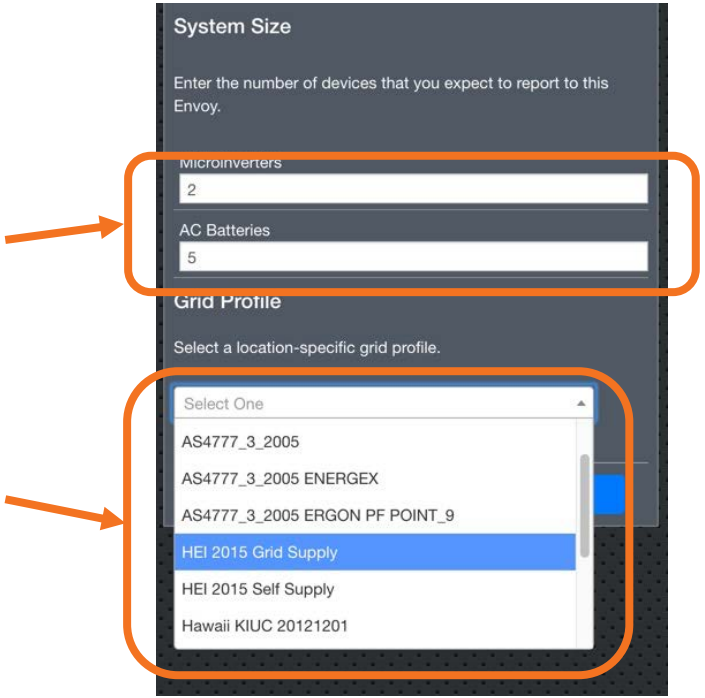
System Setup & Commissioning

Commissioning the AC Batteries

Things to know for ACB Commissioning

- How many microinverters (might be zero)
- How many AC batteries
- Setting Grid Profiles is required (G83/2, G59/3)



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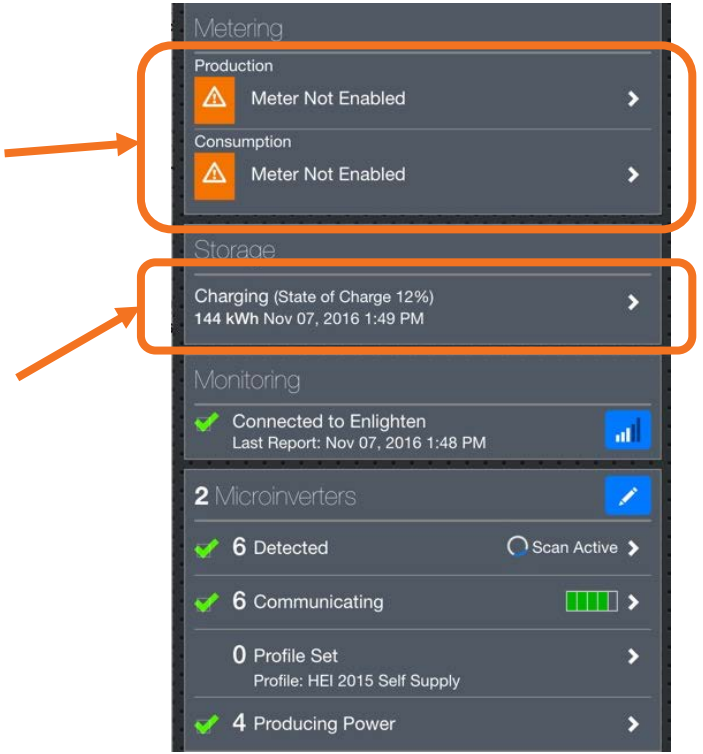
Commissioning the AC Batteries

Things to know for ACB Commissioning

- Meters must be enabled
- The Envoy depends on correct readings to control the battery
- ITK will display the ACB's state of charge



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Commissioning the AC Batteries

AC Batteries are successfully installed when all line items have green ticks

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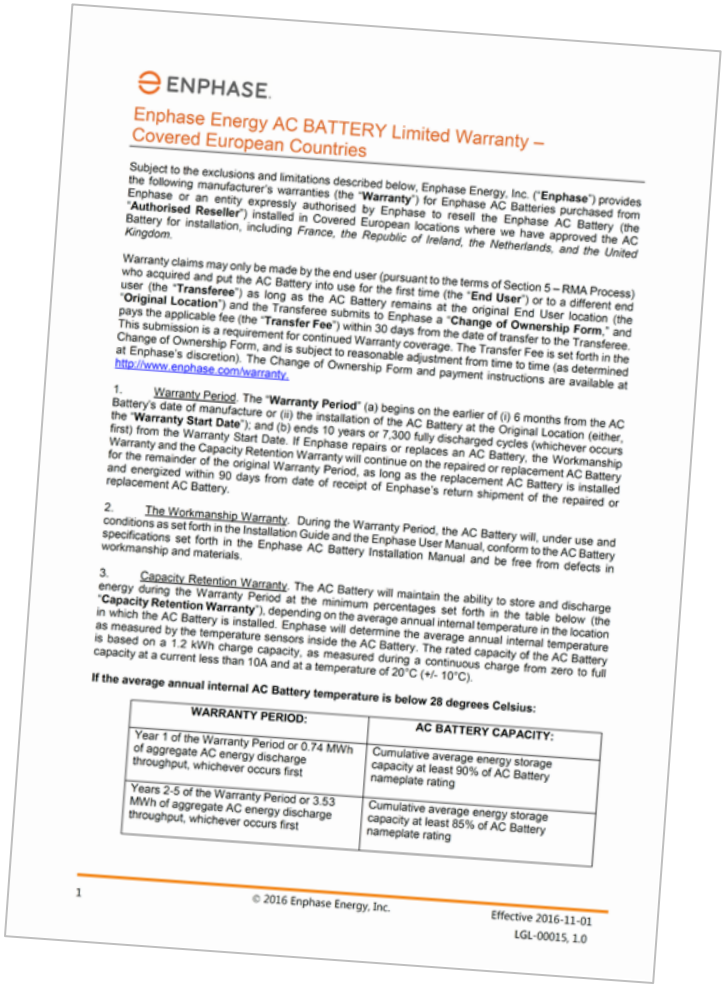
Most Important Small Print

AC Battery Warranty

- Period is **10 years** or **7300** cycles.
- Starts at **date of end user installation** or **6 months** after date of manufacture.
- Warranty is **void** if product is not registered or does not report to Enlighten for more than 45 days.

- European warranty document is published here: https://enphase.com/warranties



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Enphase Energy AC BATTERY Limited Warranty – Covered European Countries

Subject to the exclusions and limitations described below, Enphase Energy, Inc. ("**Enphase**") provides the following manufacturer's warranties (the "**Warranty**") for Enphase AC Batteries purchased from Enphase or an entity expressly authorised by Enphase to resell the Enphase AC Battery (the "**Authorised Reseller**") installed in Covered European locations where we have approved the AC Battery for installation, including *France, the Republic of Ireland, the Netherlands, and the United Kingdom*.

Warranty claims may only be made by the end user (pursuant to the terms of Section 5 – RMA Process) who acquired and put the AC Battery into use for the first time (the "**End User**") or to a different end user (the "**Transferee**") as long as the AC Battery remains at the original End User location (the "**Original Location**") and the Transferee submits to Enphase a "**Change of Ownership Form**," and pays the applicable fee (the "**Transfer Fee**") within 30 days from the date of transfer to the Transferee. This submission is a requirement for continued Warranty coverage. The Transfer Fee is set forth in the Change of Ownership Form, and is subject to reasonable adjustment from time to time (as determined at Enphase's discretion). The Change of Ownership Form and payment instructions are available at http://www.enphase.com/warranty.

1. Warranty Period. The "**Warranty Period**" (a) begins on the earlier of (i) 6 months from the AC Battery's date of manufacture or (ii) the installation of the AC Battery at the Original Location (either, the "**Warranty Start Date**"); and (b) ends 10 years or 7,300 fully discharged cycles (whichever occurs first) from the Warranty Start Date. If Enphase repairs or replaces an AC Battery, the Workmanship Warranty and the Capacity Retention Warranty will continue on the repaired or replacement AC Battery for the remainder of the original Warranty Period, as long as the replacement AC Battery is installed and energized within 90 days from date of receipt of Enphase's return shipment of the repaired or replacement AC Battery.

2. The Workmanship Warranty. During the Warranty Period, the AC Battery will, under use and conditions as set forth in the Installation Guide and the Enphase User Manual, conform to the AC Battery specifications set forth in the Enphase AC Battery Installation Manual and be free from defects in workmanship and materials.

3. Capacity Retention Warranty. The AC Battery will maintain the ability to store and discharge energy during the Warranty Period at the minimum percentages set forth in the table below (the "**Capacity Retention Warranty**"), depending on the average annual internal temperature in the location in which the AC Battery is installed. Enphase will determine the average annual internal temperature as measured by the temperature sensors inside the AC Battery. The rated capacity of the AC Battery is based on a 1.2 kWh charge capacity, as measured during a continuous charge from zero to full capacity at a current less than 10A and at a temperature of 20°C (+/- 10°C).

If the average annual internal AC Battery temperature is below 28 degrees Celsius:

WARRANTY PERIOD:	AC BATTERY CAPACITY:
Year 1 of the Warranty Period or 0.74 MWh of aggregate AC energy discharge throughput, whichever occurs first	Cumulative average energy storage capacity at least 90% of AC Battery nameplate rating
Years 2-5 of the Warranty Period or 3.53 MWh of aggregate AC energy discharge throughput, whichever occurs first	Cumulative average energy storage capacity at least 85% of AC Battery nameplate rating

1 © 2016 Enphase Energy, Inc. Effective 2016-11-01 LGL-00015, 1.0

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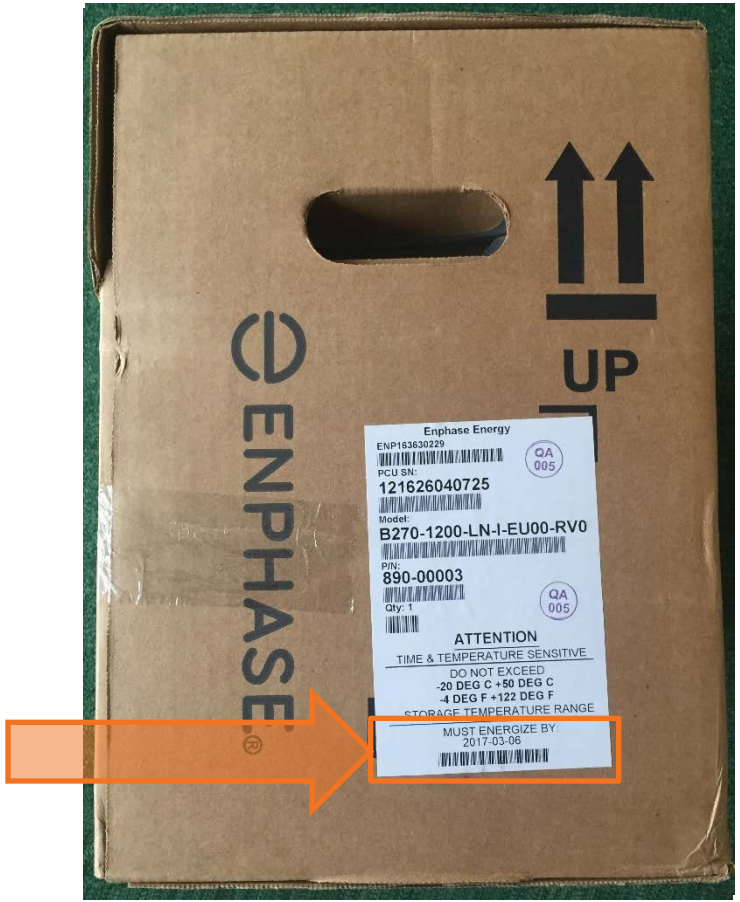
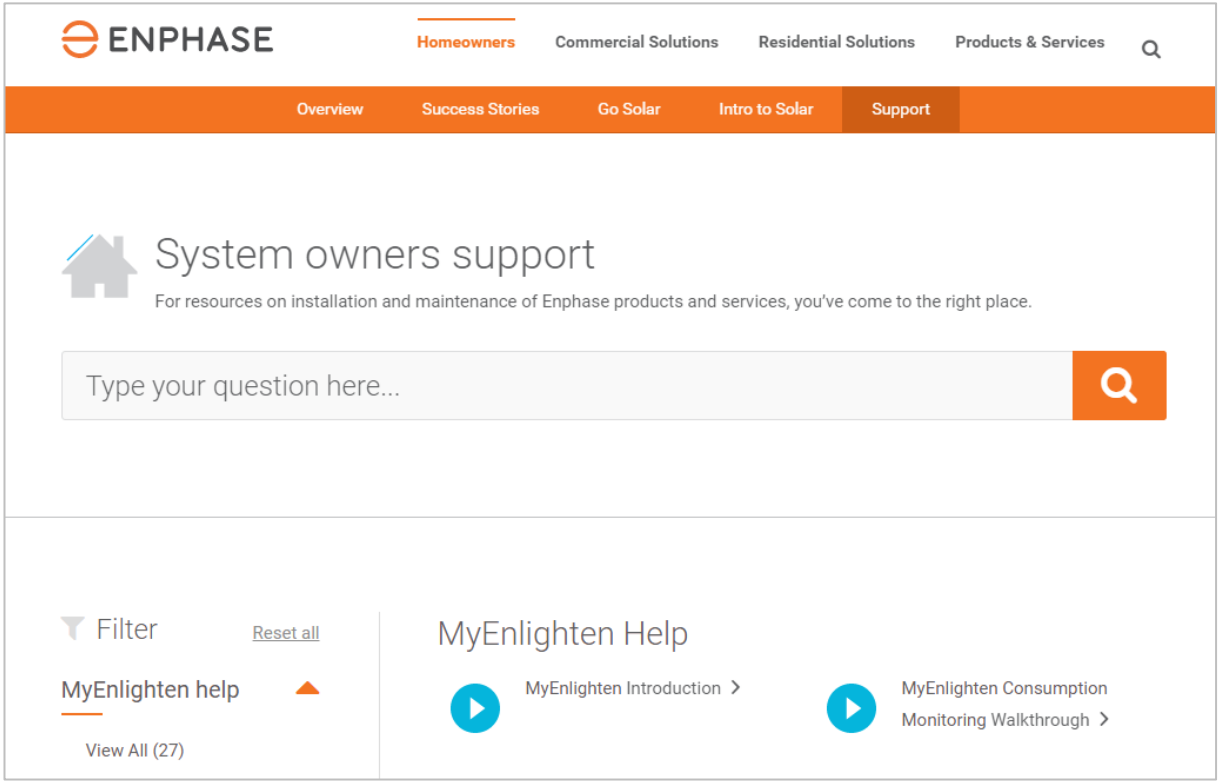
AC Battery Shelf-life

- All batteries are subject to shelf life due to internal self discharge.
- Shelf life is **6 months** from date of manufacture
- Each AC battery has a “**MUST ENERGIZE BY**” date on the carton label.



Help & Support

Support : Online Support Documents



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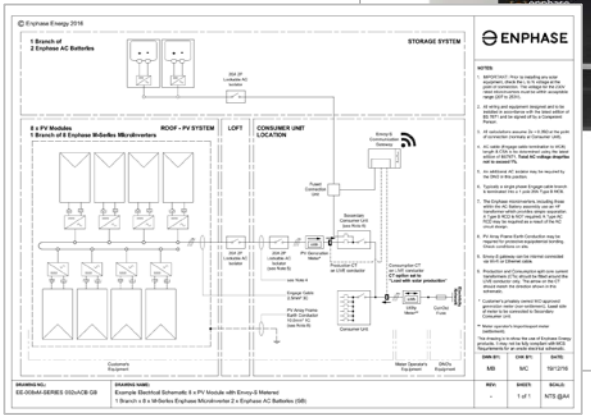
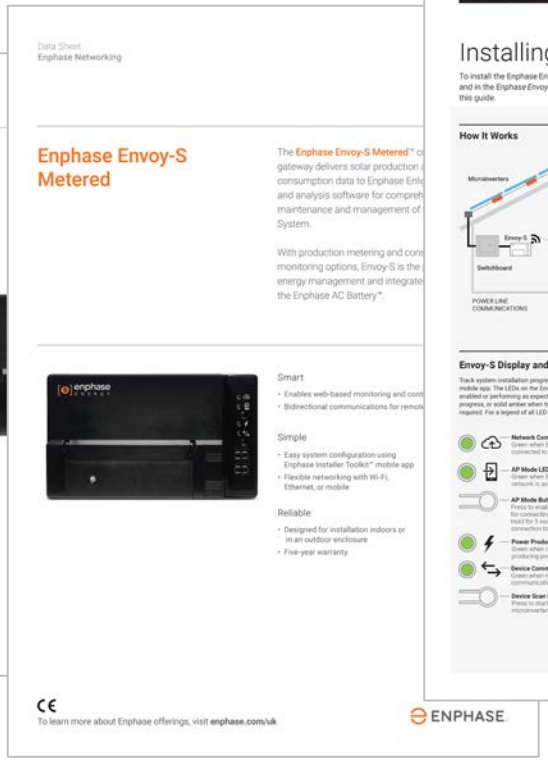
Envoy-S Resources for Installers

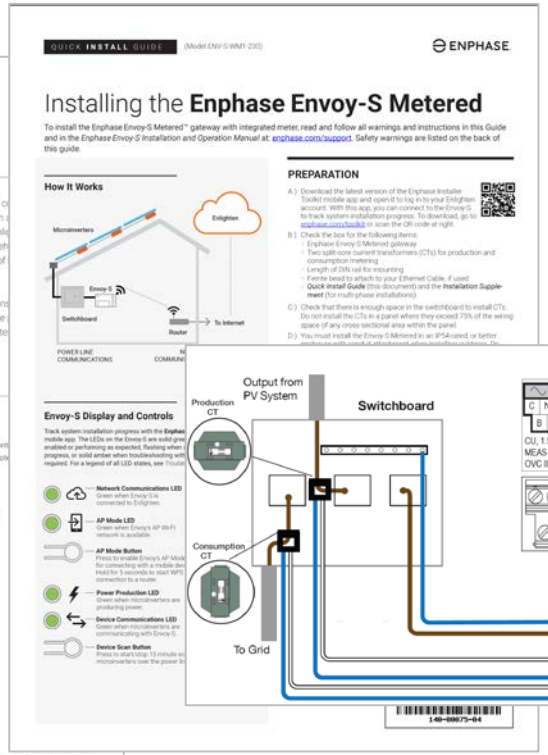
Full Manual



Example Schematics



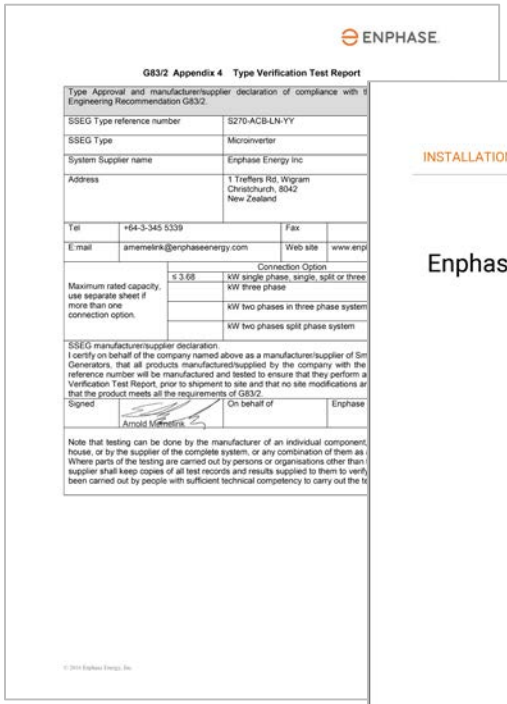
Datasheet



Quick Install Guide

ENPHASE

AC Battery Resources for Installers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G83/2 Appendix 4 Type Verification Test Report

Type Approval and manufacturer/supplier declaration of compliance with t
Engineering Recommendation G83/2.

SSEG Type reference number	S270-ACB-LN-YY
SSEG Type	Microinverter
System Supplier name	Enphase Energy Inc
Address	1 Treffers Rd, Wigram Christchurch, 8042 New Zealand

Tel	+64-3-345 5339	Fax	
E:mail	amemelink@enphaseenergy.com	Web site	www.enp

	Connection Option	
Maximum rated capacity, use separate sheet if more than one connection option.	≤ 3.68	kW single phase, single, split or three
		kW three phase
		kW two phases in three phase system
		kW two phases split phase system

SSEG manufacturer/supplier declaration.
I certify on behalf of the company named above as a manufacturer/supplier of Sm
Generators, that all products manufactured/supplied by the company with the
reference number will be manufactured and tested to ensure that they perform a
Verification Test Report, prior to shipment to site and that no site modifications ar
that the product meets all the requirements of G83/2.

Signed Arnold Memelink On behalf of Enphase

Note that testing can be done by the manufacturer of an individual component,
house, or by the supplier of the complete system, or any combination of them as
Where parts of the testing are carried out by persons or organisations other than
supplier shall keep copies of all test records and results supplied to them to verify
been carried out by people with sufficient technical competency to carry out the te

ENA Certificates


INSTALLATION MANUAL

ENP

Enphase **AC Battery**

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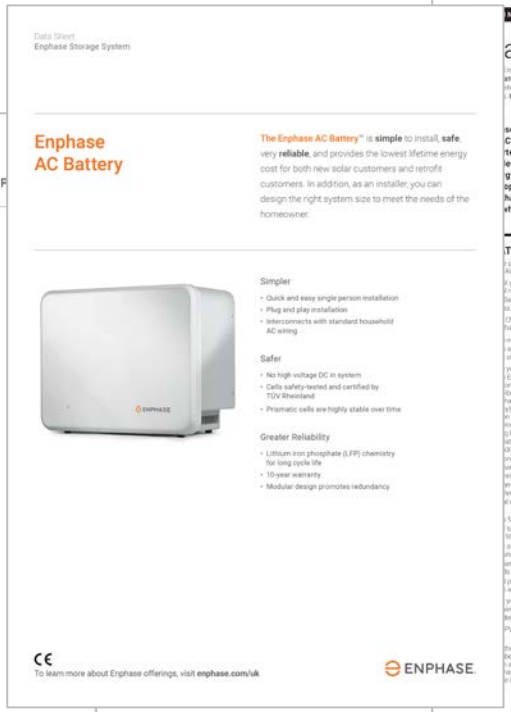
2016-11

141-00037, Rev 01

Full Manual


Data Sheet
Enphase Storage System

Enphase
AC Battery

The Enphase AC Battery™ is **simple** to install, **safe**, very **reliable**, and provides the lowest lifetime energy cost for both new solar customers and retrofit customers. In addition, as an installer, you can design the right system size to meet the needs of the homeowner.

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Simpler

- Quick and easy single person installation
- Plug and play installation
- Interconnects with standard household AC wiring

Safer

- No high voltage DC in system
- Cells safety-tested and certified by TÜV Rheinland
- Prismatic cells are highly stable over time

Greater Reliability

- Lithium iron phosphate (LFP) chemistry for long cycle life
- 10-year warranty
- Modular design promotes redundancy

CE

To learn more about Enphase offerings, visit **enphase.com/uk**

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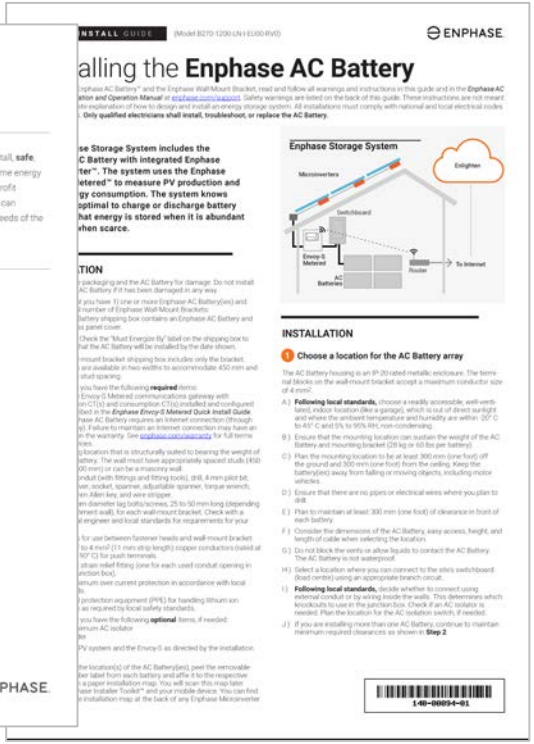
Datasheet


NSTALL GUIDE (Model B270-1200-LN-I-EU00-RV0)

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alling the **Enphase AC Battery**

Enphase AC Battery™ and the Enphase Wall-Mount Bracket, read and follow all warnings and instructions in this guide and in the *Enphase AC* ation and Operation Manual* at enphase.com/support. Safety warnings are listed on the back of this guide. These instructions are not meant te explanation of how to design and install an energy storage system. All installations must comply with national and local electrical codes. **Only qualified electricians shall install, troubleshoot, or replace the AC Battery.**

se Storage System includes the C Battery with integrated Enphase ter™. The system uses the Enphase etered™ to measure PV production and gy consumption. The system knows optimal to charge or discharge battery hat energy is stored when it is abundant hen scarce.

TION

Enphase Storage System

INSTALLATION

1 Choose a location for the AC Battery array

The AC Battery housing is an IP 20 rated metallic enclosure. The termi nal blocks on the wall-mount bracket accept a maximum conductor size of 4 mm².

A) **Following local standards,** choose a readily accessible, well-vent ilated, indoor location (like a garage), which is out of direct sunlight and where the ambient temperature and humidity are within -20° C to 45° C and 5% to 95% RH, non-condensing.

B) Ensure that the mounting location can sustain the weight of the AC Battery and mounting bracket (28 kg or 60 lbs per battery).

C) Plan the mounting location to be at least 300 mm (one foot) off the ground and 300 mm (one foot) from the ceiling. Keep the battery(ies) away from falling or moving objects, including motor vehicles.

D) Ensure that there are no pipes or electrical wires where you plan to drill.

E) Plan to maintain at least 300 mm (one foot) of clearance in front of each battery.

F) Consider the dimensions of the AC Battery, easy access, height, and length of cable when selecting the location.

G) Do not block the vents or allow liquids to contact the AC Battery. The AC Battery is not waterproof.

H) Select a location where you can connect to the site's switchboard (load centre) using an appropriate branch circuit.

I) **Following local standards,** decide whether to connect using external conduit or by wiring inside the walls. This determines which knockouts to use in the junction box. Check if an AC isolator is needed. Plan the location for the AC isolation switch, if needed.

J) If you are installing more than one AC Battery, continue to maintain minimum required clearances as shown in **Step 2**.

140-00034-01

Quick Install Guide

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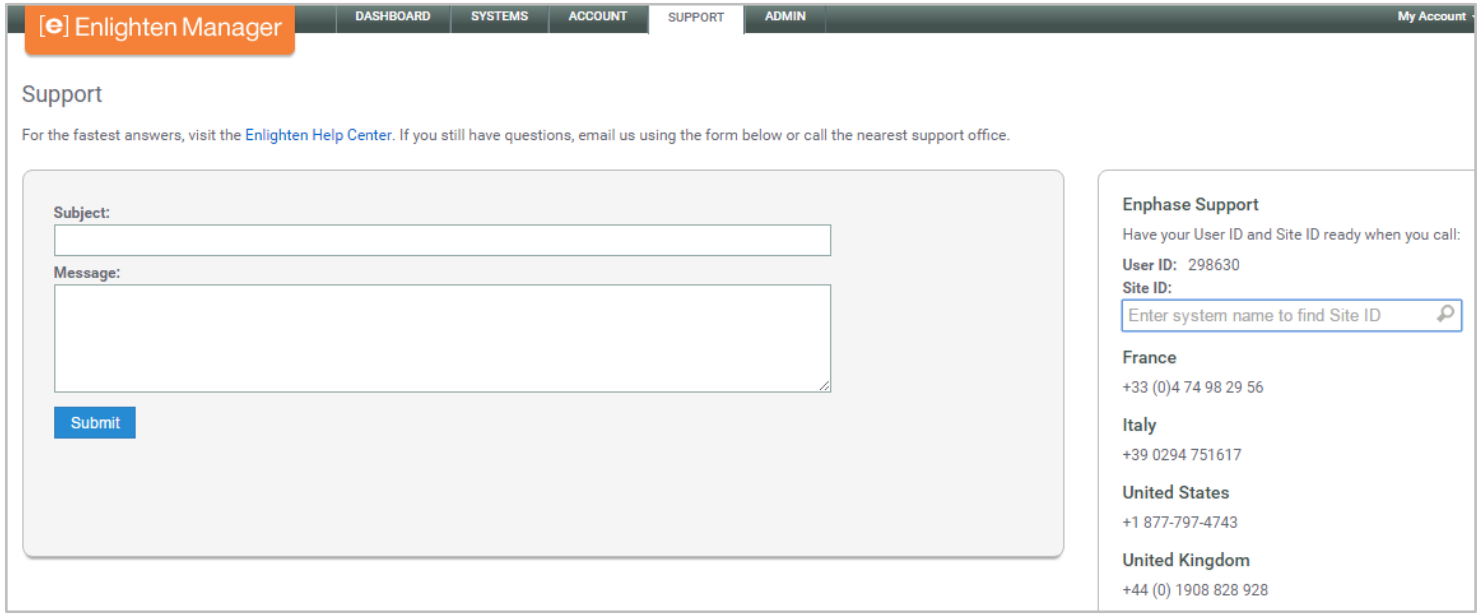
Support : Help on enphase.com



Contact Support via Enlighten site

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Help, Support & Further Training

Customer Support:
Team based in Milton Keynes office

01908 828 928
support_uk@enphase.com

Online Help:
Guides, Certificates, Videos & Advice

https://enphase.com/en-uk/support/

More Product Training:
Seminars, Webinars

https://enphase.com/en-uk/events

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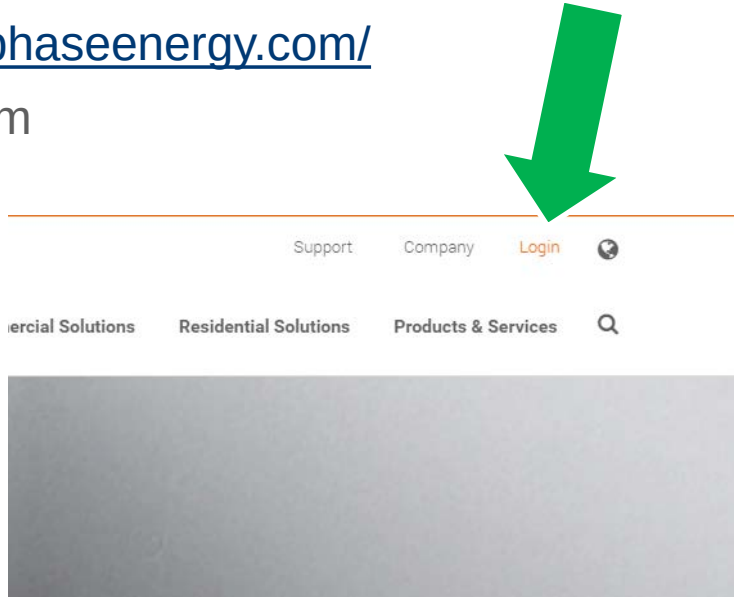
Enlighten Demo Account Login

- **Goto:** https://enlighten.enphaseenergy.com/
- **Email:** demo@enphase.com
- **Password:** Enlighten!



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Annex : Microinverters

Microinverter System Components

Microinverters

Envoy

Accessories

Enlighten

Installer Toolkit

Engage Cable

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Microinverter M215

- Peak Output Power: 225W AC
- Recommended max input power: 270W
- Operating Range: 16 - 48V
- Euro Efficiency: 95.7%
- Module Compatibility: 60-cell modules
- IP67 rated
- Warranty: 20 years

ENPHASE.

Microinverter M250

- Peak Output Power: 256W AC
- Recommended max input power: 310W
- Operating Range: 16 - 60V
- Euro Efficiency: 95.7%
- Module Compatibility: 60- and 72-cell modules
- IP67 rated
- Warranty: 20 years

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Engage Cable : Specifications

- Connectors at 1m Spacing for portrait
- 2.5mm^2, 3 core conductor
- Up-to 17 M215 on one branch
- 20A MCB Maximum
- Supplied with dust caps

More details: [datasheet link]

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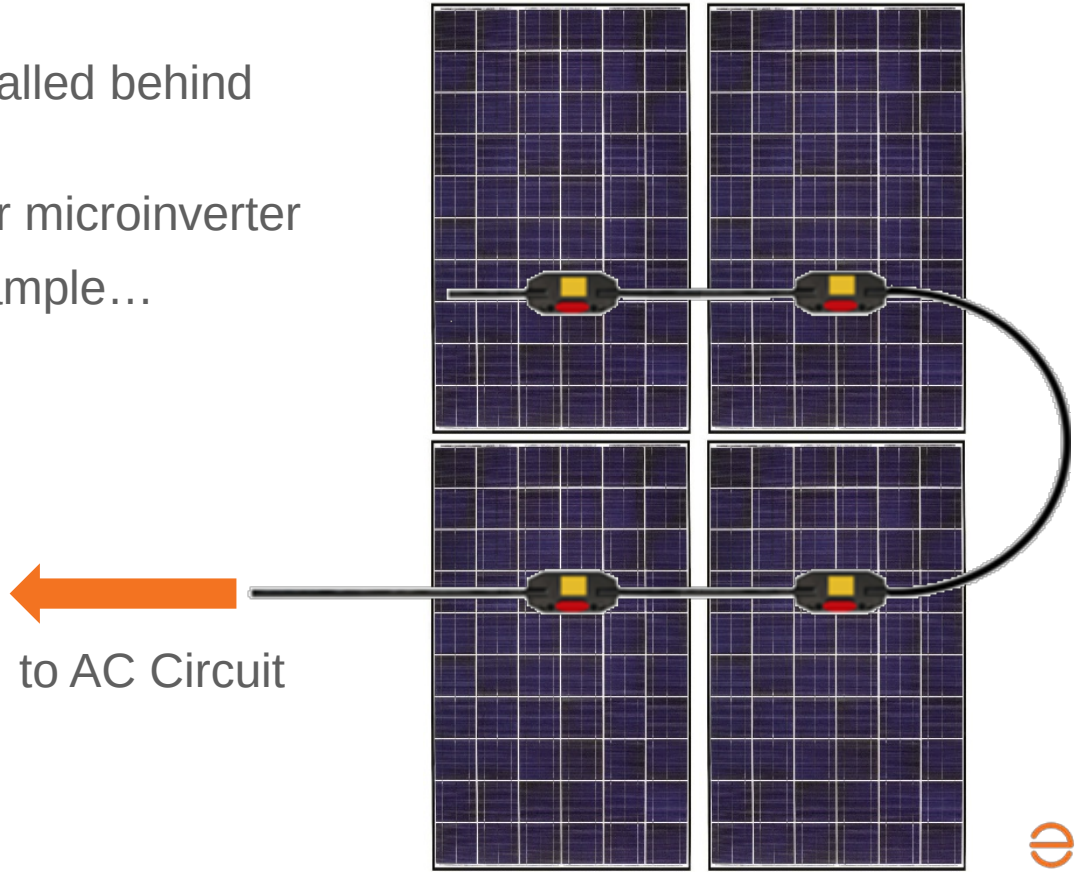
Engage Cable : Set out & Installation

- Engage cable installed behind modules
- One connector per microinverter
- 4x PV module example…



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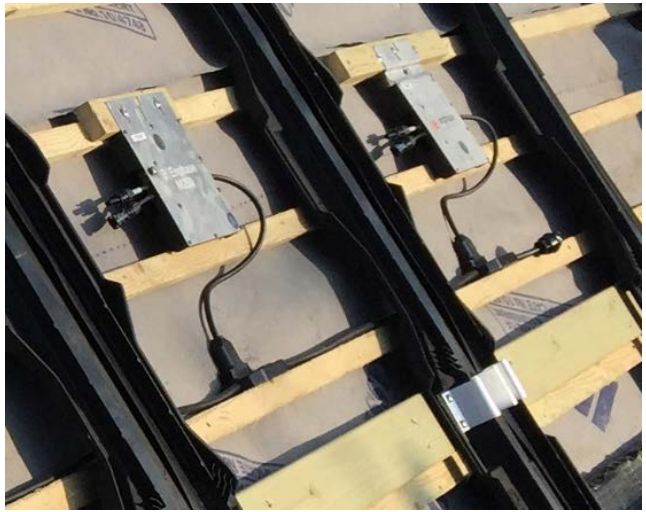
Engage Cable : Managing Cables

- With mounting rails use outdoor rated cable tiles

- With Inroof Integrations use the timber roof structure



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Engage Cable : Accessories

Branch terminator

- Fitted at the end of the Engage cable branch

Disconnect tool

- Disconnecting AC & DC connectors

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Engage Cable : Fitting Branch Terminator

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Engage Cable : Connecting to AC Circuit

- Terminate directly to AC isolator fitted in loft
- T&E to consumer unit

- Extend AC cable as required on roof using an inline coupler
- Use an outdoor rated coupler (IP67 or higher) & AC cable

Example from Hylec

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Connecting the Microinverters : DC

Connection with standard MC4 connectors

Check LED indicator after DC connection to PV module

- Six seconds after DC power is applied LED turns green
- Remains solid green for two minutes, followed by six green flashes
- After that, flashing red indicates that no grid is present

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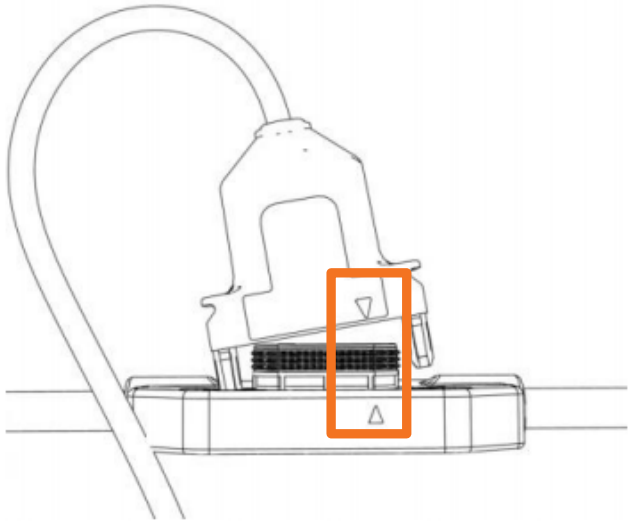
Connecting the Microinverters : AC

- Check arrows match up before plugging in… don't force it!



- Be sure AC connector clicks twice to make a good IP67 seal

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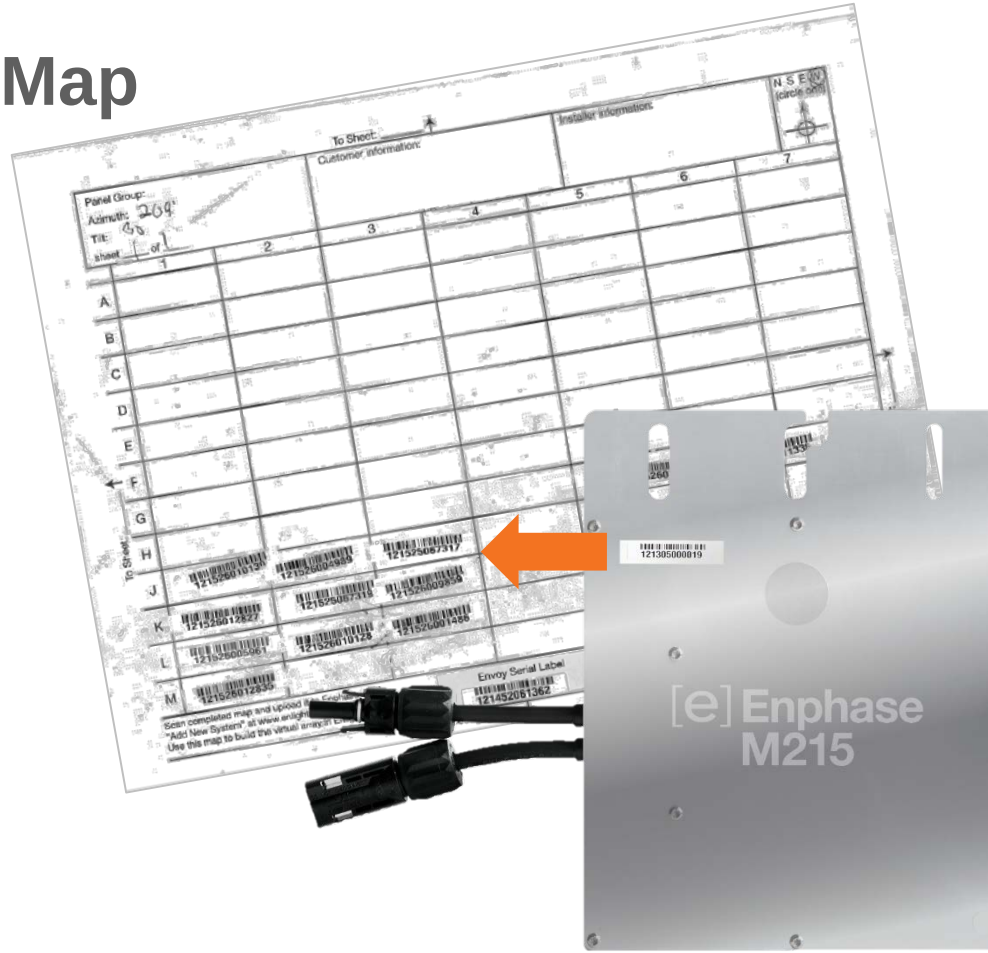
Admin : Make an Array Map

Record microinverter locations using Serial Numbers

- Know how to find a faulty inverter if you have one
- Prepare for future upgrades with larger systems and/or monitoring



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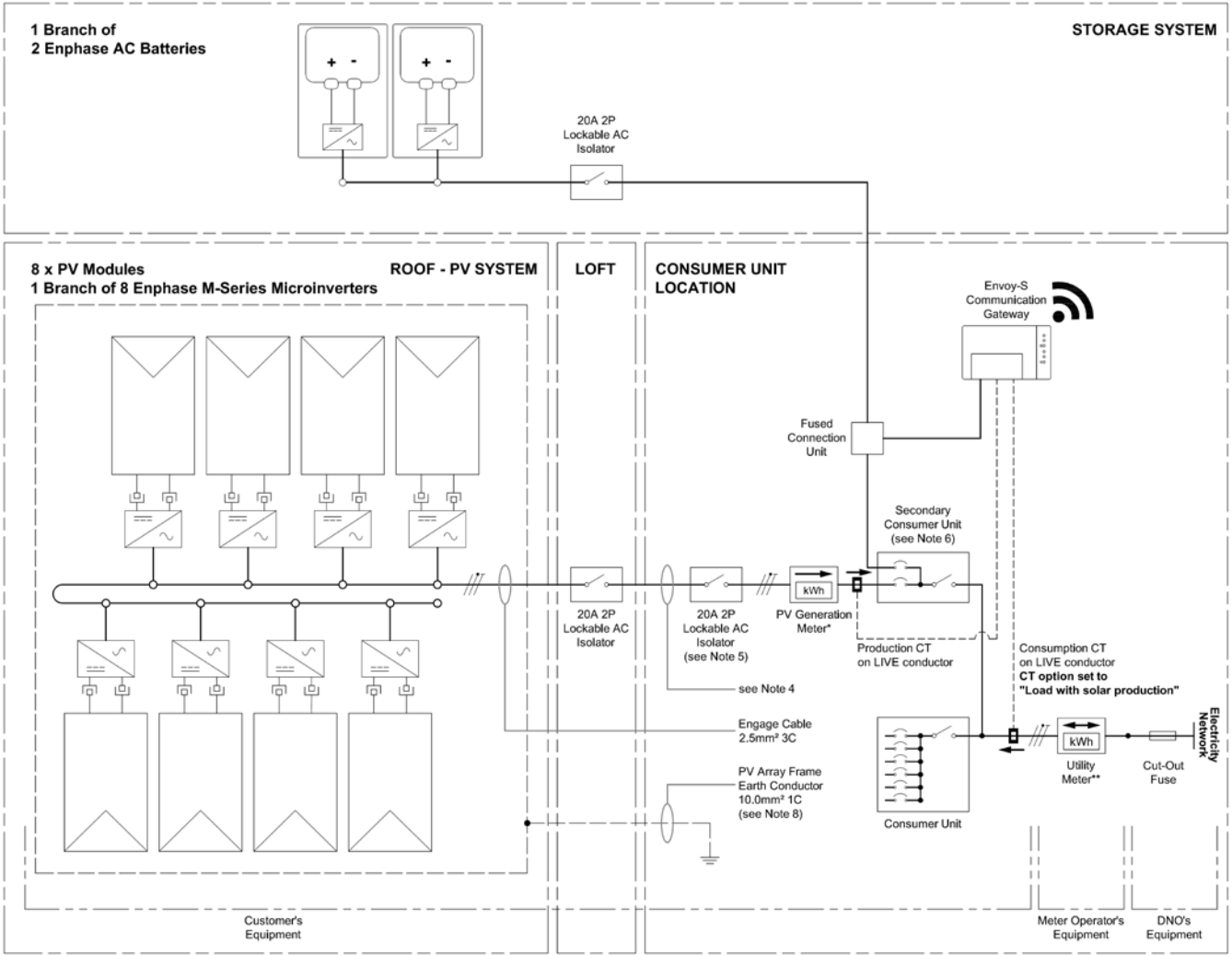
Example Schematic

Microinverter site

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