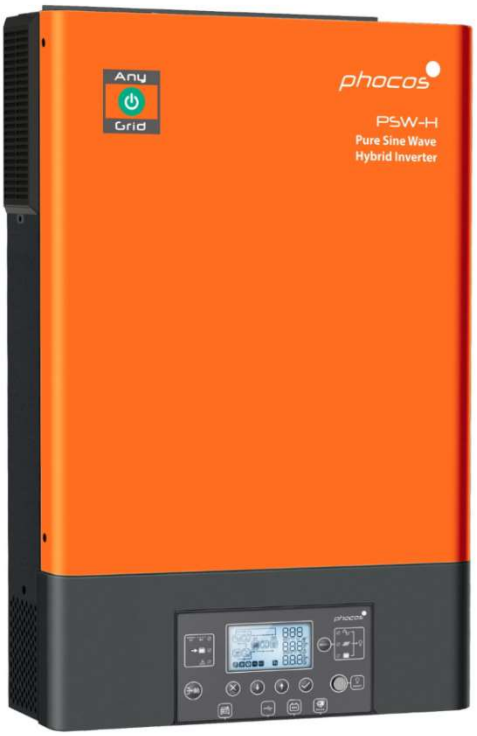
Phocos Any-Grid™ series

Any-Grid™ use with Lithium battery models:
Pylontech US2000(C), US3000(C), Phantom-S,
Force L1 and Force L2

Applicable for Any-Grid™
PSW-H-5kW-230/48V and PSW-H-5kW-120/48V

Recommended battery settings guide



1.0 Introduction

This guide outlines the recommended settings and establishing communication for operation of one or more Any-Grid™ PSW-H-5kW-230/48V or PSW-H-5kW-120/48V hybrid inverter chargers with Pylontech US2000, US2000C, US3000, US3000C, Phantom-S, Force L1 and Force L2 battery racks, referred to in this guide as "battery racks". The US2000C and US3000C batteries are referred to as "C models" in this guide. All connected batteries must be of the same model name.

Note that the charge/discharge settings are automatically negotiated with the battery if this guide is used and cannot be changed. If you wish to manually set these settings, then a communication cable between the PSW-H and batteries is not needed and the battery type in settings menu 05 of the PSW-H must be set to "User defined" (USE). In this case it is your responsibility to choose settings within the specifications of the battery to preserve the battery warranty.

The Any-Grid must be installed according to the Any-Grid "User and Installation Manual" included with every Any-Grid unit and available online at www.phocos.com. The battery terminals of the Any-Grid must be connected to the battery racks according to the Pylontech installation manual at the appropriate step mentioned in the chapter 5.0 of this manual.

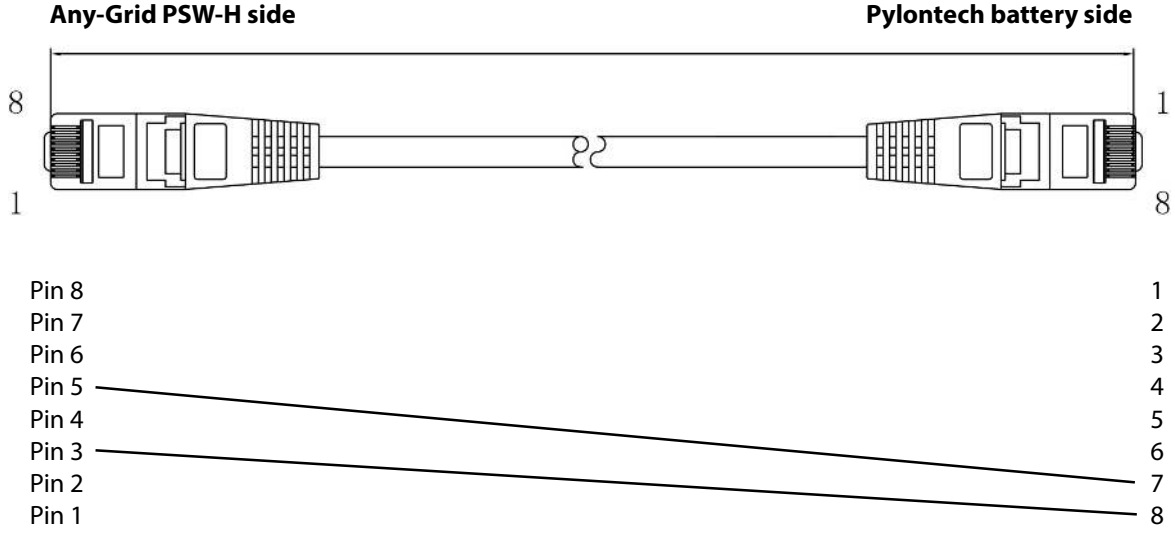
WARNING: Be sure to read and respect the warnings in the installation manuals of the Any-Grid, the battery racks and any other connected equipment. The installation must be conducted by a trained professional.

2.0 Requirements

The following is required to proceed with this guide:

- Any-Grid PSW-H-5KW-230/48V or PSW-H-5KW-120/48V
- Battery communication cable: PSW-H-BAT-CABLE-PYLON-2 (compatible with all listed batteries), or alternatively PSW-H-BAT-CABLE-PYLON (not compatible with C models, but all others).
  This cable can be purchased separately from your Phocos dealer.

  If it is not possible to obtain the cable from your dealer, the PSW-H-BAT-CABLE-PYLON-2 is made of two male RJ45 plugs with **only** the following pins connected:

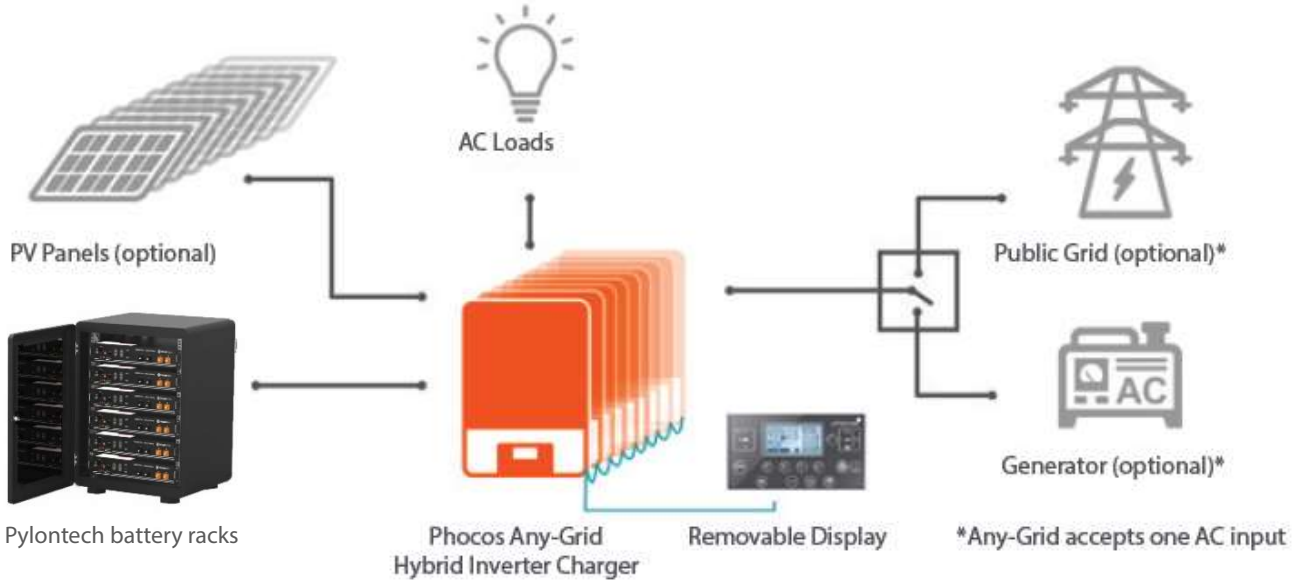


  Make sure the cable is correctly oriented between the battery and PSW-H unit when installing below.

  WARNING: Do not use the inverter cable included with your Pylontech batteries. Wiring your own cable according to the pinout above must be done at your own risk. Any damage to the PSW-H or battery due to incorrect wiring, cable orientation or use of an incorrect cable is not covered by any warranty.

- Pylontech battery rack(s)

3.0 System Overview



4.0 Battery Sizing

To maintain the full battery warranty, each battery rack should be sized not to exceed 25 Adc (37 Adc for the US3000(C), Force L1 and Force L2) continuous current and 100 Adc peak (105 Adc for the Force L1/L2, 200 Adc for the US3000C). It is thus strongly recommended to use at least 5 battery racks in parallel (4 for the US3000(C), Force L1/L2) to deliver both sufficient continuous current and peak current for a single PSW-H-5KW at full power. When using multiple Any-Grid units, be sure to have at least 5 battery racks (4 for the US3000(C), Force L1/L2) per Any-Grid to sustain the required currents. Using less batteries per inverter may void your Pylontech battery warranty.

The batteries must be wired in parallel to form a single large battery bank when using multiple Any-Grids. All Any-Grids must be connected to a single battery array made up of a maximum of two clusters / groups of battery racks. The maximum number of battery racks per group is 8 (it is not necessary to have the same number of batteries per group).

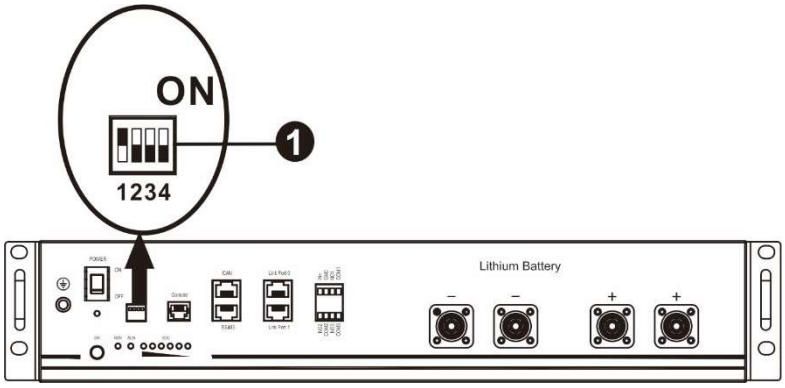
5.0 Battery Settings and Communication Cable Installation

CAUTION: Before connecting the battery racks to the Any-Grid(s), please follow the installation instructions in this chapter step by step. The battery, AC input source, AC output loads and PV input must remain disconnected until instructed otherwise.

The battery settings in this chapter are recommendations only. They are intended to keep the batteries within their operational limits. These settings can be adjusted to optimize the performance of your particular system, but must be kept within the limits of the battery specifications. If adjustments are made, the battery type (PSW-H settings menu 05) must be set to "USE", otherwise any changes will be over-written if "PYL" is selected.

1. Purchase the PSW-H-BAT-CABLE-PYLON-2 or PSW-H-BAT-CABLE-PYLON from a Phocos dealer. This cable is designed specifically for connecting the Any-Grid PSW-H to Pylontech battery racks.
2. Ensure the battery racks are all turned off.

3.



Dip Switches location (see note below table for US2000C/US3000C*)

Locate the four battery Dip switches as shown above at position ❶ (position may vary on different battery rack models). Each switch can be set ON in the top position or OFF in the bottom position*. Set the Dip switches as follows, depending on the number of battery clusters / groups:

Dip 1	Dip 2	Dip 3	Dip 4	Group address
ON RS-485 baud rate = 9600	OFF	OFF	OFF	<u>All models:</u> Single group only. The master battery rack must have this setting. Slave battery racks should have all Dip switches set to OFF. <u>Only C models:</u> Two-group configuration. The master battery rack in each group must have this setting. Slave battery racks should have all Dip switches set to OFF.
	ON	OFF	OFF	<u>Only non-C models:</u> Two-group configuration. The master battery rack in the first group must have this setting. Slave battery racks should have all Dip switches set to OFF.
	OFF	ON	OFF	<u>Only non-C models:</u> Two-group configuration. The master battery rack in the second group must have this setting. Slave battery racks should have all Dip switches set to OFF.

*** US2000C and US3000C batteries have their Dip switches mounted upside-down. So, while the table and settings above are valid, each switch's top position is OFF and the bottom position is ON. In this example Dip 1 is in the ON position and all others are set to the OFF position:**

4. Ensure the battery racks are still turned off. Connect the Any-Grid(s) to the battery power (positive and negative) terminals with the correct polarity.
CAUTION: If the correct polarity of the battery is not observed, the Any-Grid and the battery may be damaged, this is not covered by warranty.

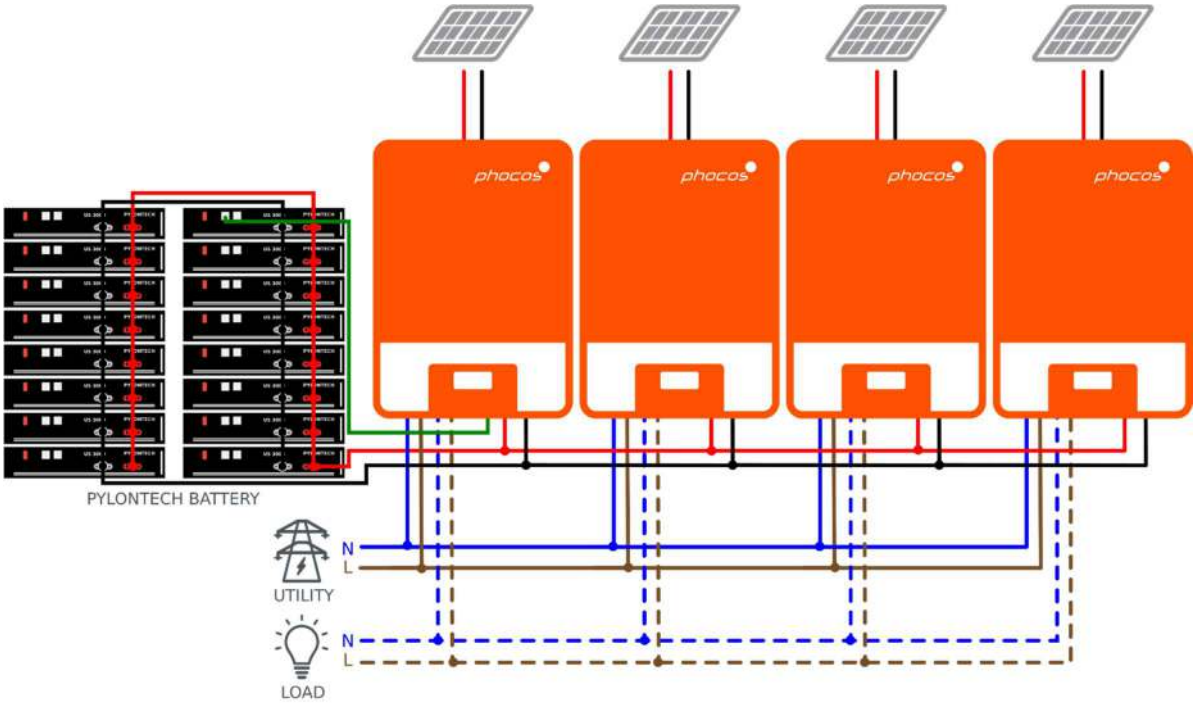
5. If you are using the PSW-H-BAT-CABLE-PYLON-2 cable, it is marked with a "PYLON" label on one of the two sides:

Connect this side to the master battery rack's "RS485" port (for C models use the "B/RS485" port) and the other side into the Any-Grid display panel's "BMS" port.

If instead you are using the PSW-H-BAT-CABLE-PYLON, it is not labelled on either side. For this cable it does not matter which orientation you choose, as it functions in both orientations (do not use for C models):

Any-Grid **Master Battery Rack**

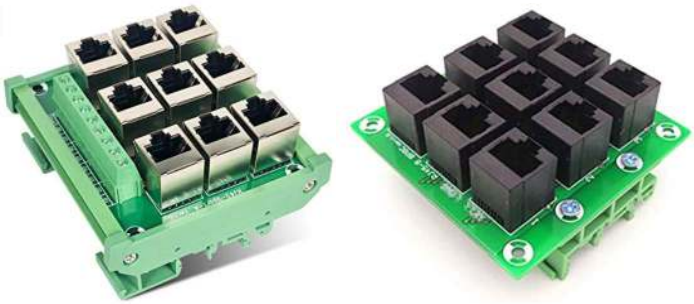
For systems with multiple Any-Grids, this connection (marked green) can be made with any of the inverters, but only a single unit. Remember, all Any-Grids in a synchronised system must be connected to a single battery bank as shown here for a system with 4 Any-Grids in parallel:



If using two battery clusters / groups (only necessary if using 9 to 16 batteries), for all batteries except the C models, the communication wiring is as follows:

- Master RS485 port from group 1 is connected via a standard straight Ethernet patch cable to a hub. This hub can be purchased from Pylontech (the Pylontech LV-HUB is not required):

Alternatively, any RJ45 hub that simply connects in parallel all pin 1 ports, connects in parallel all pin 2 ports etc. up to pin 8 is sufficient, such as this for example https://www.amazon.com/-/de/dp/B08BC4DGC5/ref=sr_1_14?dchild=1&keywords=ethernet+breakout+board&qid=1620131292&sr=8-14 or this https://www.amazon.com/-/de/dp/B07JH3LH2F/ref=sr_1_109?dchild=1&keywords=rj45+terminal+block&qid=1620132159&sr=8-109:



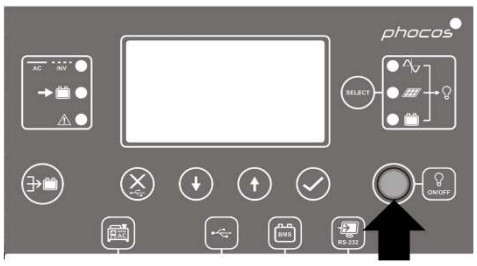
Please note that standard Ethernet splitters do not work, as they split the 8 pins into two groups of 4, they do not put all pins parallel as required here.

- Master RS485 port from group 2 is connected to the same hub as the master from group 1
- The PSW-H-BAT-CABLE-PYLON(-2) cable is connected to the hub on one side and the PSW-H on the other side. If using the PSW-H-BAT-CABLE-PYLON-2 cable, make sure the "PYLON" label is on the hub side, and the unlabeled end on the Any-Grid side.

If using two battery clusters / groups (only necessary if using 9 to 16 batteries), for US2000C or US3000C batteries, the communication wiring is as described in the Pylontech manual in chapter "Multi-group mode". For these C models, no RS-485 hub is required.

6. Ensure the battery racks are wired as outlined in the Pylontech battery manual. Turn on each of the battery racks with the power button and ensure the LED near the power button is green for all battery racks:

7. To supply the Any-Grid(s) with power, press the red START / SW on the master battery rack for more than 3 seconds.
8. Ensure the "ON/OFF" load power button of the Any-Grid(s) is in the ON position (depressed), but no loads are connected:



The Any-Grid(s) should now be running, the display(s) on.

9. Apply the following setting on the Any-Grid to which the Pylontech battery is connected. These settings refer to the Any-Grid manual, chapter **Operation → Device Operation Settings → Settings menus**.

- *Voltage set-point to switch from Off-Grid mode to Grid mode when "SBU priority" is selected in settings menu 01*
  Menu 12: 48 Vdc or higher
- *Voltage set-point to switch from Grid mode to Off-Grid mode when selecting "SBU priority" is selected in settings menu 01*
  Menu 13: 53 Vdc or lower
- *Battery equalization*
  Menu 33: Disabled
- *Battery type – change this setting last*
  Menu 05: Pylontech battery ("PYL")

05

PYL

Note: Settings menus 02, 26, 27 and 29 are over-written automatically once communication with the battery is established (see step 11). This is to ensure the maximum life expectancy of the battery and to maintain battery warranty. Therefore, these values cannot be changed once menu 05 is set to "PYL".

The maximum battery charging current in settings menu 02 is automatically calculated as follows, after communication with the battery is established (see step 11):

For example, if three US2000 batteries are used, their continuous allowed charge current is 25 A each (75 A total) to maintain full battery warranty. Therefore, the next-lower (or same, if available) value of 70 A will be used by the Any-Grid PSW-H in menu 02. If several PSW-H are used, then the total continuous battery current is divided by the number if PSW-H and the next-lower charge current is used. All PSW-H are automatically set to the same value in menu 02.

10. Once the settings have been applied, exit the settings menu by pressing to return to the main view.
11. Check that the battery icon outline is flashing permanently to indicate the communication connection between the Any-Grid(s) and battery racks is successfully established. This may take a few minutes.
12. If no warnings or errors are shown, proceed to check the successful communication connection:

    Press the or button on the Any-Grid to which the battery racks are connected to cycle through the screen views. The number of battery racks and battery groups are shown in the information screen view before the "Main unit firmware version (U1)" as shown below:

Information	Screen View Example
Battery rack and battery group quantity	Battery parallel rack quantity = 8*, battery group quantity = 2

***Note: US2000C and US3000C batteries do not show a battery rack quantity (middle field remains empty). This is normal. However, the group quantity should display as larger than zero, "G01" for example, after successful communication.**

If errors or warnings are shown, consult chapter 6.0 of this guide.

13. Activate the circuit breakers or insert the fuses to energize the various inputs and outputs on the Any-Grid in the following order (skip any that are not connected):
    a) AC input
    b) PV input
    c) AC output
14. If you are using more than one Any-Grid, this procedure ensures that the unit to which the Pylontech battery is connected, will communicate with the Pylontech battery BMS. Automatically, the battery type of all other connected Any-Grid units will be set to "User-defined", this is normal.

The commissioning and programming of the battery-related settings of the Any-Grid is now complete.

6.0 Warning Codes related to Pylontech Batteries

The following warning codes will be shown on the PSW-H display if the corresponding events are active.

Warning Code	Warning Event	Audible Alarm	Screen view
60	Battery charging and discharging temporarily disabled to protect Lithium battery.	Beeps once every second	
61	Battery communication lost. After 10 minutes of no communication charging and discharging will stop to protect Lithium battery.	Beeps once every second	
62	Communication interrupted between battery units / racks.	Beeps once every second	
69	Battery charging temporarily disabled to protect Lithium battery.	Beeps once every second	
70	Battery discharging temporarily disabled to protect Lithium battery.	Beeps once every second	

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