



LOW VOLTAGE HUB VALID FOR 5K3-XP and 4K4-LT



LV-HUB XP



ATTENTION: This is a CAN communication device, it is very sensitive to shocks and electromagnetic fields.

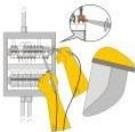


ATTENTION: This is a LOW VOLTAGE device and must be powered from the battery common power line



ATTENTION: This device can accumulate parasite current. Do not touch the B+ and B- terminals. Always check the B+ and B- terminals with a voltmeter.

Always ensure that there are ZERO volts present on the terminals before performing any operation.



ATTENTION: Always wear Individual protection devices, use insulated tools, and follow the safety plan of this manual.



At end of life, must be disposed of properly by a certified professional company.

Statement:

The information and guidance contained in this manual is related to the **LV-HUB- GEN2- EMEA version XP** Stackable model of battery. This manual contains one section:

LV-HUB STACK it is designed to be staked on a 5K3 XP or 4K4 LT type battery.

In case of product upgrades or other reasons, this document will be adjusted accordingly. Unless otherwise agreed, this document is intended to be used only as a guide, and all statements, information and advice in the documentation shall not constitute any express or implied action in contradiction to local regulations or standards.

For more information, please contact us.

The official information and the latest datasheet are available on www.wecobatteries.com.

It is essential that the device is equipped with the latest firmware version available on the website.

From time to time, firmware will be updated to improve the functionalities and battery capabilities. The latest version of the firmware is always available free of charge and can be updated by your local installer.

You can always contact WeCo for additional information on the upgrade procedure.



NOTICE:

This device is designed to be used indoors.

The STANDARD IP20 degree of protection does not allow installation in outdoor environments even if sheltered from the weather.

The Battery Modules must be stored indoors in a clean, dry, cool location in a limited access area.

Preface:

Thank you for choosing our product. We will provide you with a high-quality product as well as reliable after-sale service. To protect against harm to both personnel and the product, please read this manual carefully.

This manual provides detailed information on operation, maintenance and troubleshooting of the product as well as health and safety advice.

Declaration:

The manufacturer holds the right of final explanation of any content in this manual.

All trademarks shown in this manual belong to their legitimate owners; trademarks of third parties, product names, trade names, corporate names and companies mentioned may be trademarks owned by their respective owners or registered trademarks of other companies and are used purely for explanatory purposes and for the benefit of the owner, without any purpose of violation of the copyright in force.

System Design

System Design is the process of defining the architecture, components, modules, interfaces and load data for a system to satisfy specified requirements.

For a solar energy system, these components are the PV modules, inverter/charge controller & batteries, as well as the different interfaces of those components.

The LV-HUB GEN2 - EMEA version is designed to connect in parallel multiple clusters with a single CAN connection to the Hybrid Inverter.

Product Overview

The **LV-HUB** is a CAN communication Combiner and can be used to connect multiple master CAN communication addresses from multiple clusters that compose an LV system.

The LV-HUB-XP is not a power device.

LV-HUB-XP minimum startup voltage is 46 Vdc and max Input voltage is 60Vdc.

LV HUB-XP max current is 2A and it is equipped with built in fuse rated 5A.

Information in this Manual

About this Manual

Only trained and authorized personnel should install, repair or program this device.

This manual should be reviewed in its entirety for proper storage, installation and operation of the device.

Use Range

This device can be used only in low voltage applications.

Additional Information

Product specifications subject to change without notice.

Symbols Used

Symbol Meanings:



CAUTION:

CAUTION represents hazardous situations which can cause injuries if not avoided.



NOTICE:

NOTICE represents the situations which can cause damage to property if not avoided.

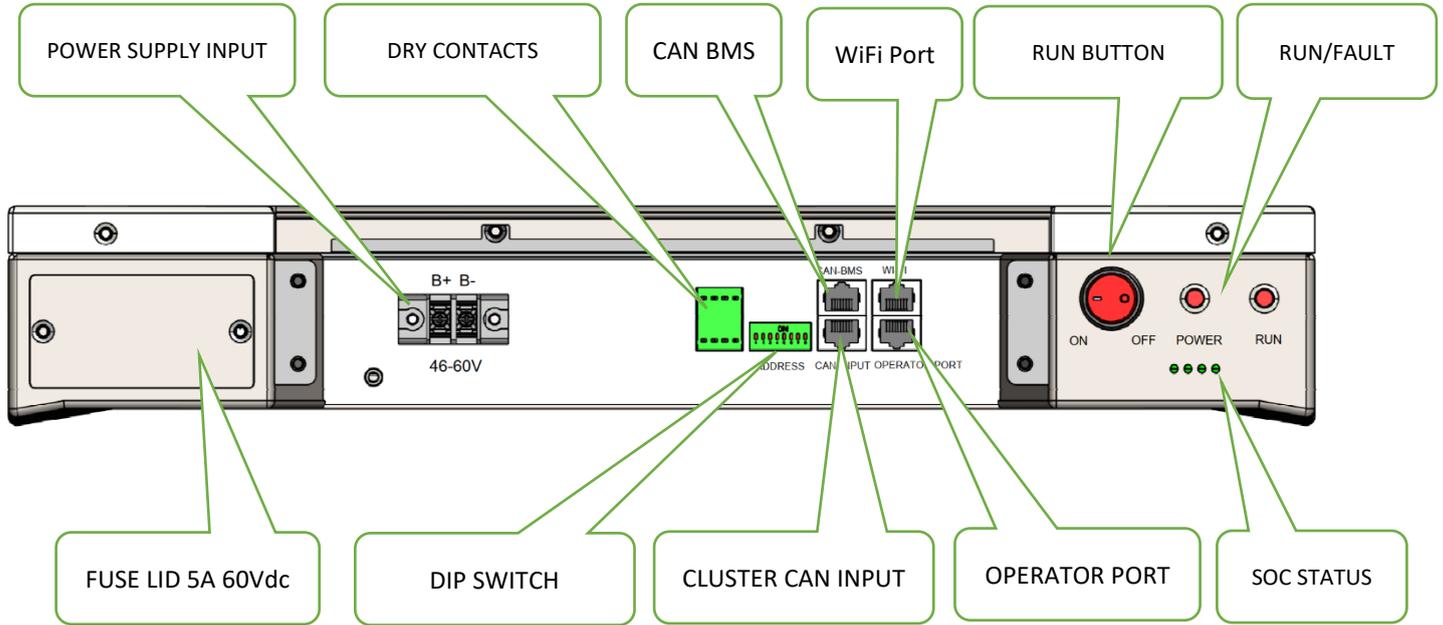


INFORMATION:

INFORMATION provides tips that are valuable for optimum installation and operation of the product.

LV HUB Overview

INFORMATION provides tips that are valuable for optimum installation and operation of the product.



SEE THE POWER/CURRENT CONFIGURATION

SET THE INVERTER POWER AS PER THE CABLES CAPABILITIES

Each battery pack and each cluster must have the same Voltage and Firmware.

All stack configurations must use the WeCo Bus Bar.

Each cluster must have the same number of battery packs.



This BMS BMU Master Hub is mandatory when more than one cluster is connected on a common bus bar.



The LV HUB works only with CAN communication-approved inverters.



ATTENTION

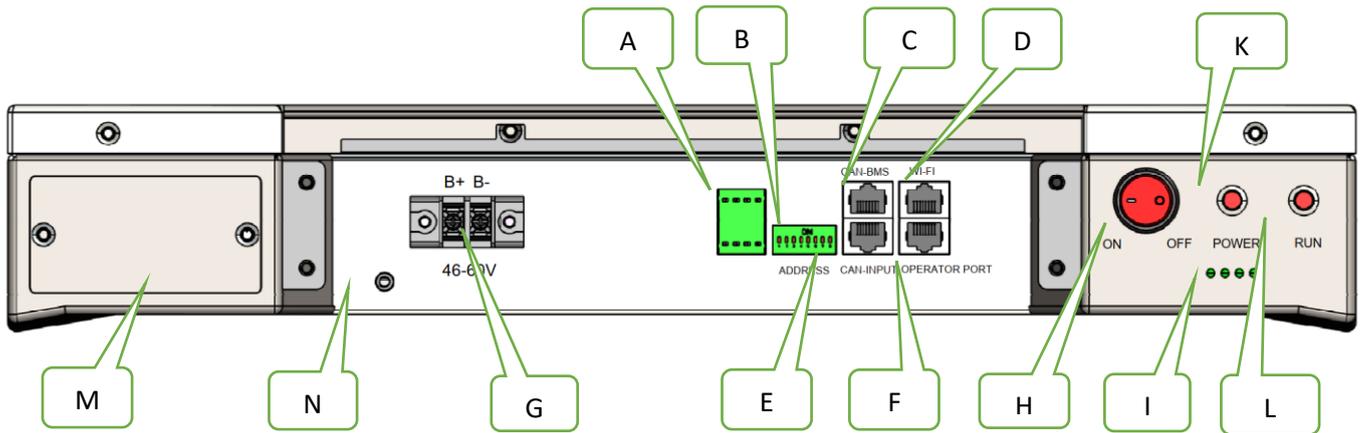
For the Above Models of batteries, the LV HUB XP can manage a maximum of 7 clusters composed of a maximum of 15 modules each.



ATTENTION

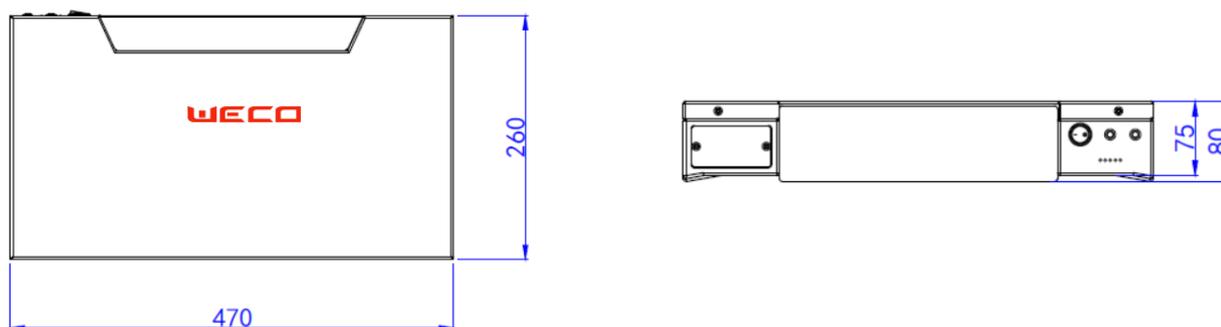
The HUB XP and batteries BMS must be equipped with the latest FW available on website
www.wecobatteries.com

LV HUB-XP DEVICE OVERVIEW



Interface Description and Connector		
A	I/O CONTACT 2X	Programmable closure/contact
B	DIP SWITCH	8 PIN DIP SWITCH
C	CAN BUS PORT	CAN / BMS Bus PORT for external solar – grid charger
D	WIFI PORT	EXTERNAL Wi-Fi PORT
E	CLUSTER CAN PORT	Master Cluster CAN from last master of the system
F	OPERATOR PORT	OPERATOR PORT FOR RS232/USB converter
G	INLET 46 Vdc	Connector for power input to connect to the bus bar (5A fuse inside)
H	ON OFF SWITCH	Internal Power Supply Switch
I	SYSTEM SOC	Show the system SOC, 0-25% ●, 25-50% ●●, 50-75% ●●●, 75-100% ●●●●.
K	POWER LED	RED > POWER ON No light > POWER OFF
L	RUN LED	Steady light > system normal Flashing > system failure
M	FUSE HOLDER	LV circuit Fuse
N	GND screw Connection	5mm Screw Terminal

Low Voltage CAN HUB Dimensions



Control Logic and Protection Limit

The inverter, if applicable, must be set with the below restrictions in addition to the BMS control logic.

MAX CURRENT CONTROL LOGIC (From LV HUB to certified inverters)

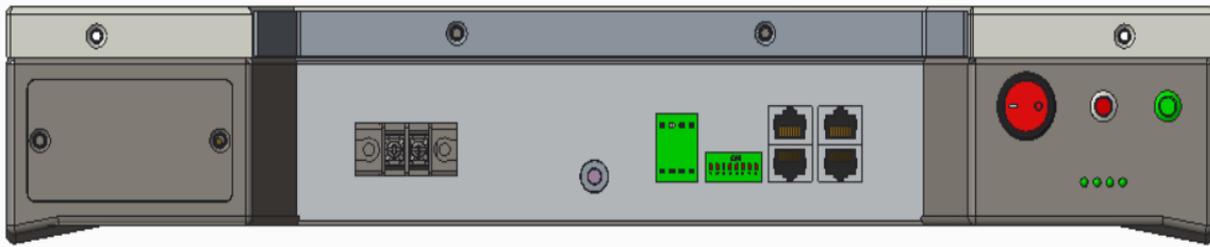
Modules \ Clusters	1	2	3	4	5	6	7
1	100	196	288	376	460	540	616
2	196	376	540	688	820	936	1036
3	288	540	756	936	1080	1188	1260
4	376	688	936	1120	1240	1296	1400
5	460	820	1080	1240	1300	1500	1750
6	540	936	1188	1296	1500	1800	2100
7	616	1036	1260	1400	1750	2100	2450
8	688	1120	1296	1600	2000	2400	2800
9	756	1188	1350	1800	2250	2700	3150
10	820	1240	1500	2000	2500	3000	3500
11	880	1276	1650	2200	2750	3300	3850
12	936	1296	1800	2400	3000	3600	4200
13	988	1300	1950	2600	3250	3900	4550
14	1036	1400	2100	2800	3500	4200	4900
15	1080	1500	2250	3000	3750	4500	5250

* Please refer to the above table according to the number of clusters and parallels applicable to the system.

- The charge current will be limited to zero Amps when the single module voltage has been reached 56.8V.
- The discharge current will be limited to zero Amps when the single module voltage has been discharged to 50.4V.
- The battery system will communicate with the inverter to limit the current.
- Each Battery Module will be protected by the same logic separately as per single module protection concept.
- If some modules, individually, reach any fault status, the single module will protect and disconnect from the system in less than 3 seconds.
- The current limit must be adjusted according to the real active batteries in system to restore the normal function.
- If the cluster is not balanced, the current limitation set from the HUB to the inverter will be sent to manage the rest of active modules and clusters. At the same time, the imbalanced modules or cluster will equalize in standby mode and will reconnect once in the normal range.
- If more than two batteries in one cluster are in protection mode, the entire cluster will protect by shutting down.
- If there are more than two clusters in protection mode, the full system will be protected.
- The battery sends information to the inverter to limit the charge/discharge current to zero Amps if the battery is detecting an over current.
- The protection built into the BMS will automatically disconnect the battery when it detects excess values. The BMS will attempt to reconnect up to three times to check if the excess values have returned to within the permitted range. After three attempts to reconnect, the BMS will not attempt any further reconnections. The Battery Module can be restarted using the module power switch and run button, however, if the external fault condition which caused the Battery Module to shut down is not rectified, the battery will continue to enter the shutdown mode.
- If the current of one cluster is larger than the current limit, the battery system will send a warning in accordance with the single module BMS logic.

CAN Hub General System Description

CAN Hub is Mandatory for Multiple Cluster Installation



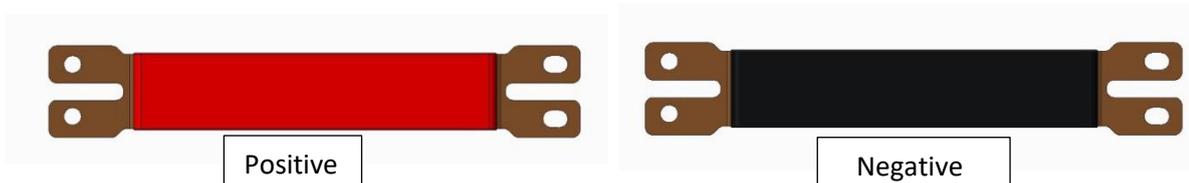
ATTENTION:

BEFORE PROCEEDING WITH THE 5K3-XP / 4K4-LT INSTALLATION IT IS MANDATORY TO READ THE INSTRUCTIONS BELOW AND THE LV HUB SPECIFIC MANUAL AVAILALE ON THE WEBSITE. HUB XP REQUIRES PC SOFTWARE AND RS232 CONVERTER FOR PROGRAMMING PURPOSES

Special BUS Bar for Parallel Configuration

(MODULES INTERCONNECTION BUS BAR MODEL – ACCESSORY* “WeCo LV BUS BAR -300A”)

*To be ordered Separately



ATTENTION

- Bus bars are recommended for stack system.
- The screw of the battery terminal Block needs to be replaced with a longer M6 screw (max 35mm) when bus bar are used (extra thickness).
- Bus bar rated current must be designed by the installer in accordance with the local standards and system power.
- Do not use different bus bar types/thickness or different types of cables in the same cluster.
- Each battery module and each cluster must have the same s SoC% and voltage.
- All the battery modules must have the same firmware.
- Close the inverter isolator before turning on the LV hub and each cluster.

(The battery pre-charge circuit is effective only if the inverter circuit is closed).

Multi Cluster Configurations for 5K3 XP/4K4 LT with HUB-XP

Before using the MASTER HUB device, make sure to update the modules with the latest updated Firmware available on www.wecobatteries.com.

To use and set up the HUB-XP, the installer must follow the instructions contained in this manual.

1. It is possible to stack from a minimum of three modules per cluster to a maximum of 15 modules.
2. It is possible to create up to 7 clusters with a maximum of 15 modules each for a total of 105 batteries.
3. All the battery modules of each cluster must have all the DIP Switches set to 00000000 **with the only exception of the master module that needs to be addressed with the specific cluster ID and the last module of each cluster that must have the DIP 6 ON.**
4. Each master battery of each cluster needs to be assigned with a unique and progressive ID as shown below.
5. The first cluster will have the ID 01, the second one will have the ID 02 and so on up to the last cluster (max. 7 clusters).
6. The master battery of the last cluster needs to be connected to the HUB from the CAN-A PORT to the CAN INPUT PORT of the HUB.
7. Now proceed with the daisy chain connection from the last master battery to the previous one, up to the first cluster.
For example, in case of a 7 clusters system after connecting the last master to the hub (as per point 6.) proceed to connect the CAN-B Port of the ID07 master battery to the CAN-B Port of the ID 06 master battery; then connect the CAN-A Port of the ID 06 to the CAN-A Port of the ID05 and so on up to the first master battery (ID 01).
8. The Connection of the power cables between HUBs must be executed in accordance with the previous instruction.
9. The LV HUB can be powered with 2 x 1,5mm² cables from the common bus bar to the INPUT terminal of the HUB.
10. The HUB is connected via CAN to the inverter from the HUB CAN BMS PORT.
11. When all the connections have been completed, it is possible to turn on the HUB with the POWER BUTTON.
12. Turn on all MODULES POWER SWITCHES.
13. Turn ON the RUN Button of the Master of each Cluster and wait for the auto wake-up of all the SUB modules.
14. According to the numbers of modules connected, the entire startup procedure could take up to 320 seconds to be completed.

Module Set Up

Each battery module must have the same Voltage, SOC% and Firmware.

The battery firmware must be the version "FW-V60.02" and above available on the web site:

<https://wecobatteries.com/download-area/>.

For this setting, use only the **WeCo RS 232 CONVERTER**.

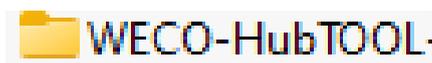
Launch the WeCo software > Select Module setting program > Select the Com port and connect to the battery get info >

Click Search new firmware > Select the firmware > Load Firmware > wait for the upgrade completion > The Green bar Show the upgrading status > Pop up the window show Upgrade success.

SOFTWARE FOR HUB SET



WeCo RS 232 CONVERTER



To Set up the HUX-XP it is necessary to use the PC software WECO MONITOR. Always use the latest version available on our website.

STEP BY STEP PROCEDURE

Do not turn on the batteries until the entire system has been connected with the BUS BAR between modules and the Power cable is connected to the common bus bar or to the inverter.

1. Stack all the modules in positions (Verify the load with a local civil engineer).
2. Connect each module to GND and to the Master GND node.
3. Assign each MASTER BATTERY with a progressive ID following the DIP settings (max 7 Clusters).
4. Connect the LAST MASTER from the CAN-A PORT to the CAN INPUT PORT of the HUB.
5. Connect the LAST MASTER from the CAN-B PORT to the CAN-B PORT of the previous master (ID 06) and so on up to the ID01 master.
6. Connect the HUB CAN-BMS PORT with the INVERTER CAN PORT (follow the PIN OUT provided by the Inverter manufacturer for CAN L CAN H).
7. Assign each SUB module with Address 00000000 except for the last module of each cluster that must have the DIP 6 ON.
8. Connect the RS485 from PORT B of the MASTER to the PORT A RS485 of the SUB1 and proceed in Daisy Chain up to the last module.
9. Set the HUB DIP Switches as 00000010 (DIP 7 ON).
10. Turn ON the HUB Switch.
11. Press the MASTER POWER BUTTON and each battery cluster will start up automatically.

BATTERY SOFTWARE SET UP PROCEDURE

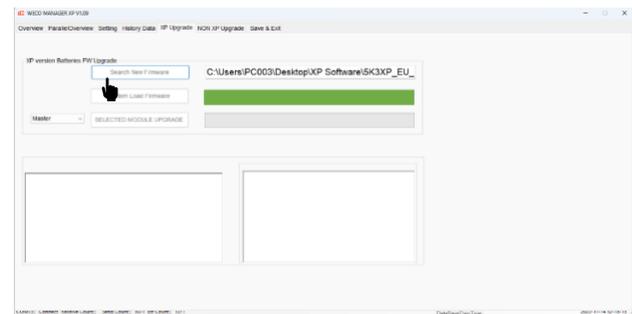
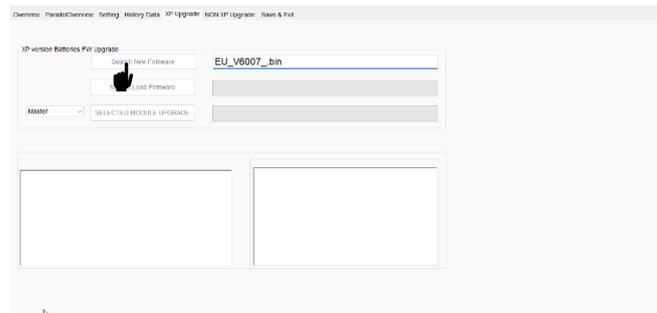
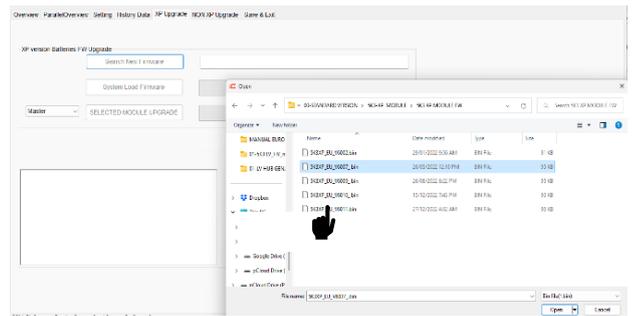
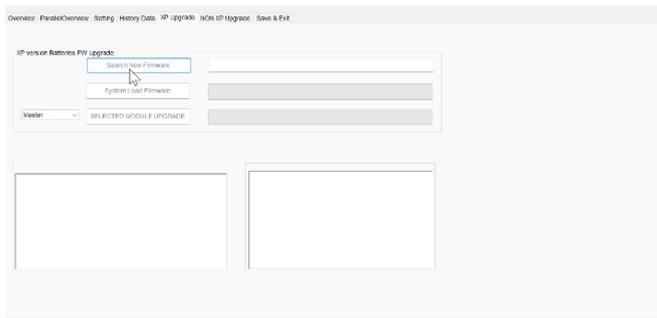
STEP 1, Upgrade all the batteries with the latest FW version.

- Access the Software and select the Low Voltage section, insert password 1010 and click on the “operator port” button.
- Select the Battery image “MODULE SETTING PROGRAM”.
- Set the COM port and Press CONNECT.
- Select SEARCH NEW FIRMWARE and LOAD the FW 60.02 or above, then Press UPGRADE FIRMWARE

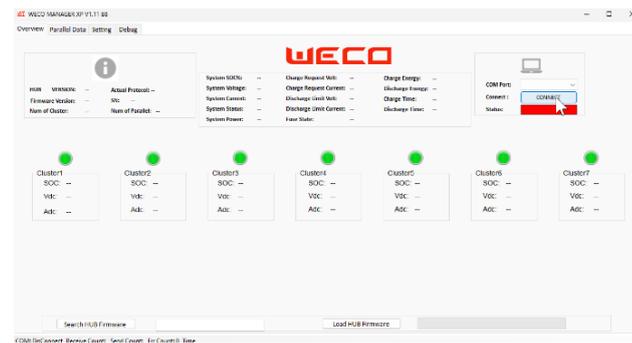
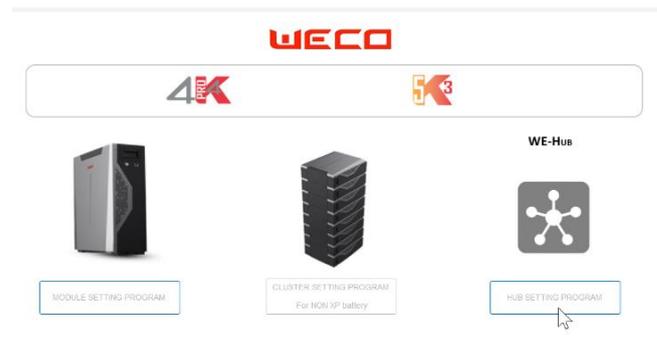
Repeat the same procedure for all the batteries of each cluster.



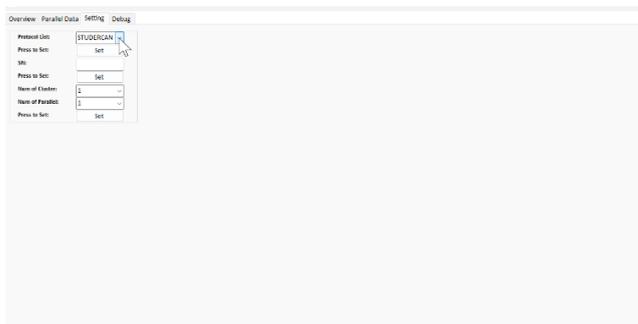
CONNECTING WITH THE BATTERY AND UPGRADE FIRMWARE CLUSTER



HUB SET UP (for FWupgrade follow the same procedure shown above from the WE-HUB setting page)



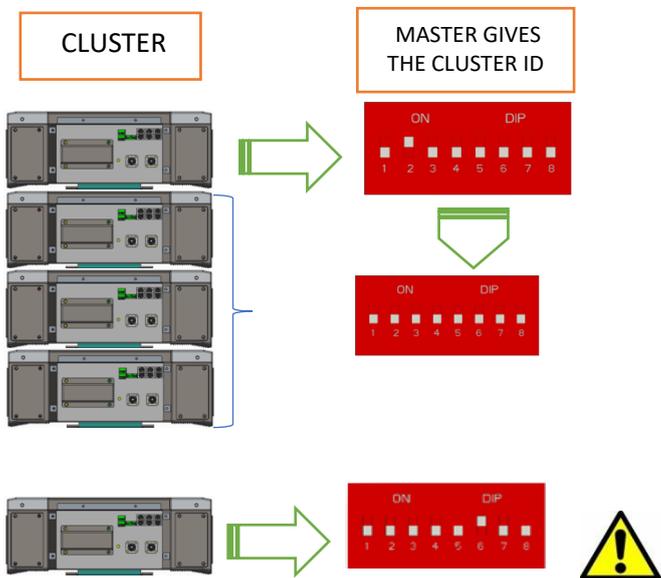
Setting the HUB protocol from the DROP LIST



Master battery ID Set Up (each master battery of the cluster needs to be set with reference ID, same for 5K3XP and 4K4LT)

Master ID configuration and connection diagram

It is important to follow the diagrams below to make the connections in the correct sequence.
 Each cluster must have its own unique address which will be assigned by the first battery of each cluster.
 All the batteries in the group except the first must have the DIP switches set to 00000000 (see picture):

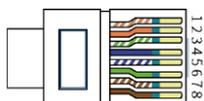
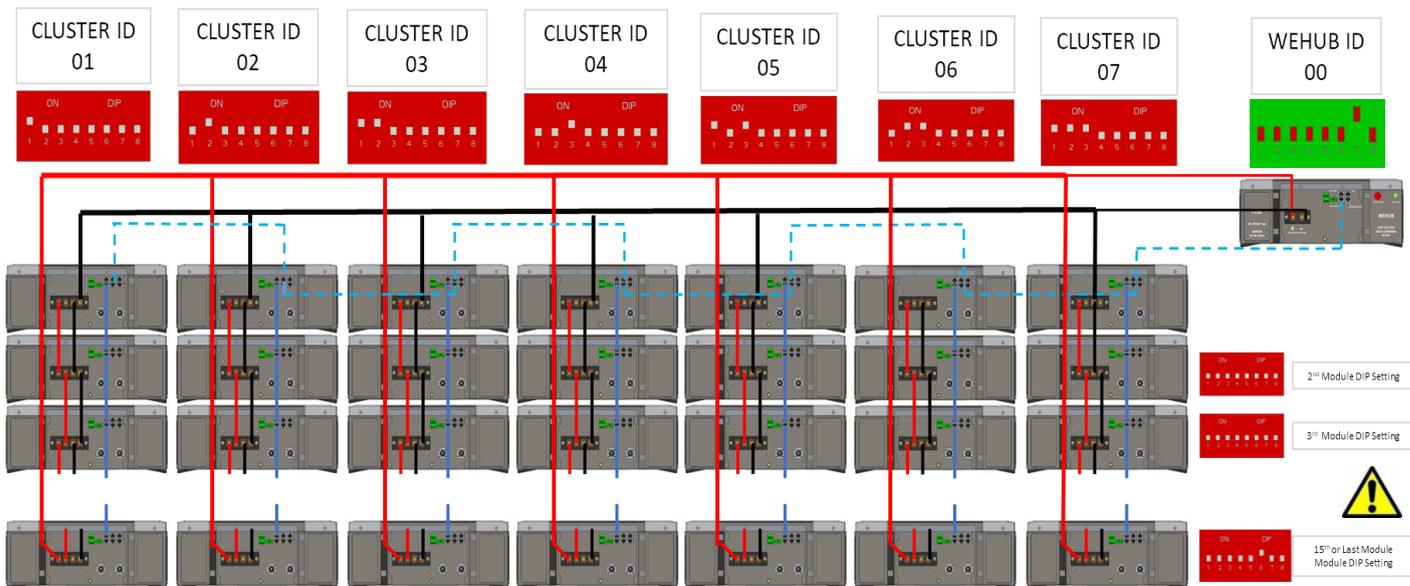


The First Battery of the cluster after being set with the ID (acting on the DIP switches) will auto assign all the sub-Module addressees.
 Example:
 The Master Module of the cluster ID01 will be:
 Master: **1**.01,
 SUB 01: **1**.02
 SUB 03: **1**.03 and so on up to the last module.
 The Master Module of the cluster ID02 will be:
 Master: **2**.01,
 SUB 01: **2**.02
 SUB 03: **2**.03 and so on up to the last module.

Only the first batteries of each cluster must be set following the sequence from ID 00 to ID 07 to allow the HUB to activate the related logic based on the number of modules present in each cluster (minimum 3, maximum 15), and based on the number of actual clusters connected to each other in a Daisy Chain (minimum 2 maximum 7).



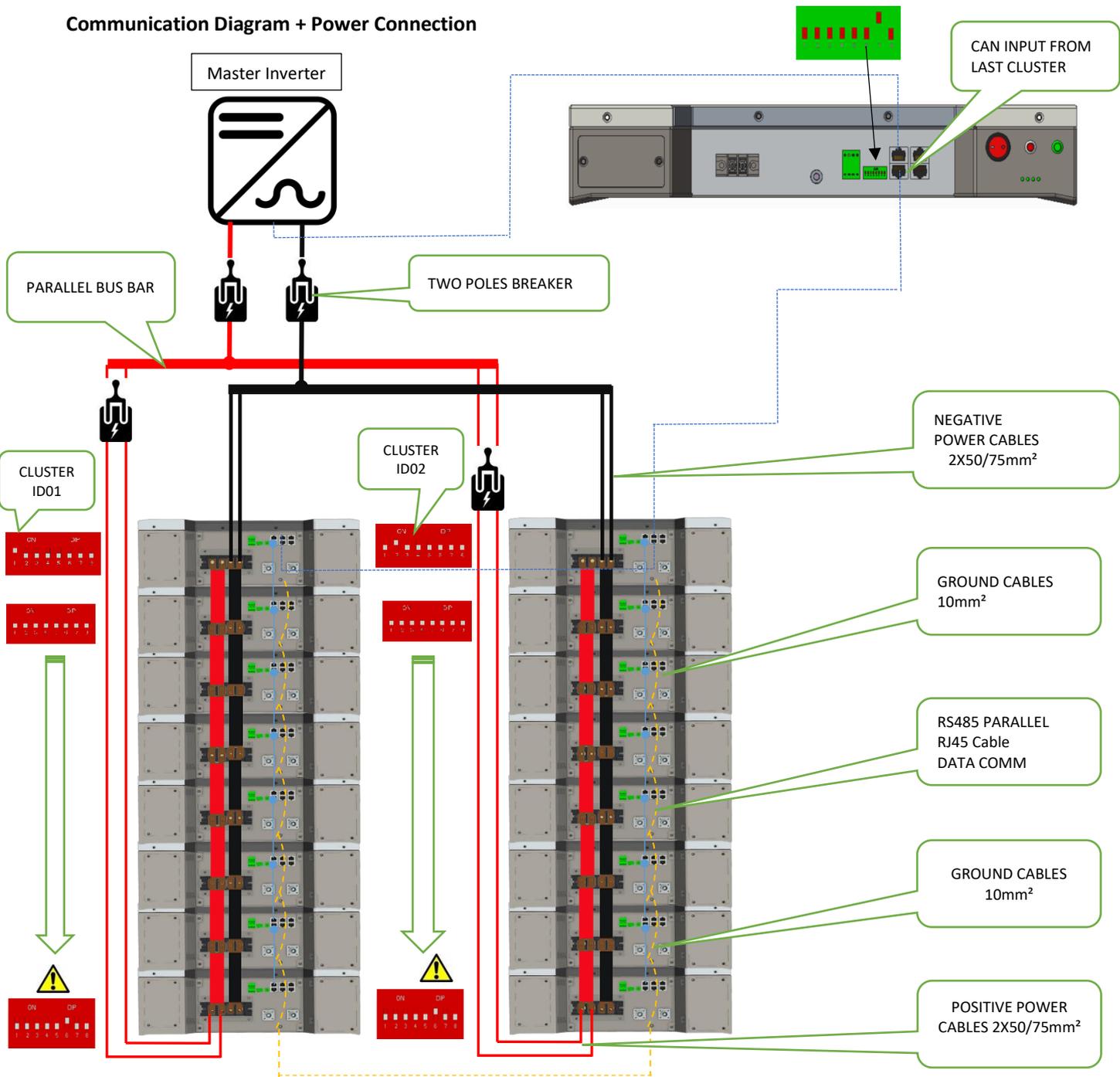
All the master batteries must be connected in Daisy Chain, start connecting the CAN-A Port of the last master battery to the CAN INPUT PORT of the HUB, then proceed connecting the CAN-B Port of the last master to the CAN-B port of the previous one and proceed up to the first master battery.



ALL RJ45 CABLES USED IN ANY CONFIGURATION ARE TYPE 568B

Connection Example of two clusters of 5K3 XP (MAX 15 modules in parallel in 7 clusters)

Communication Diagram + Power Connection



ATTENTION:

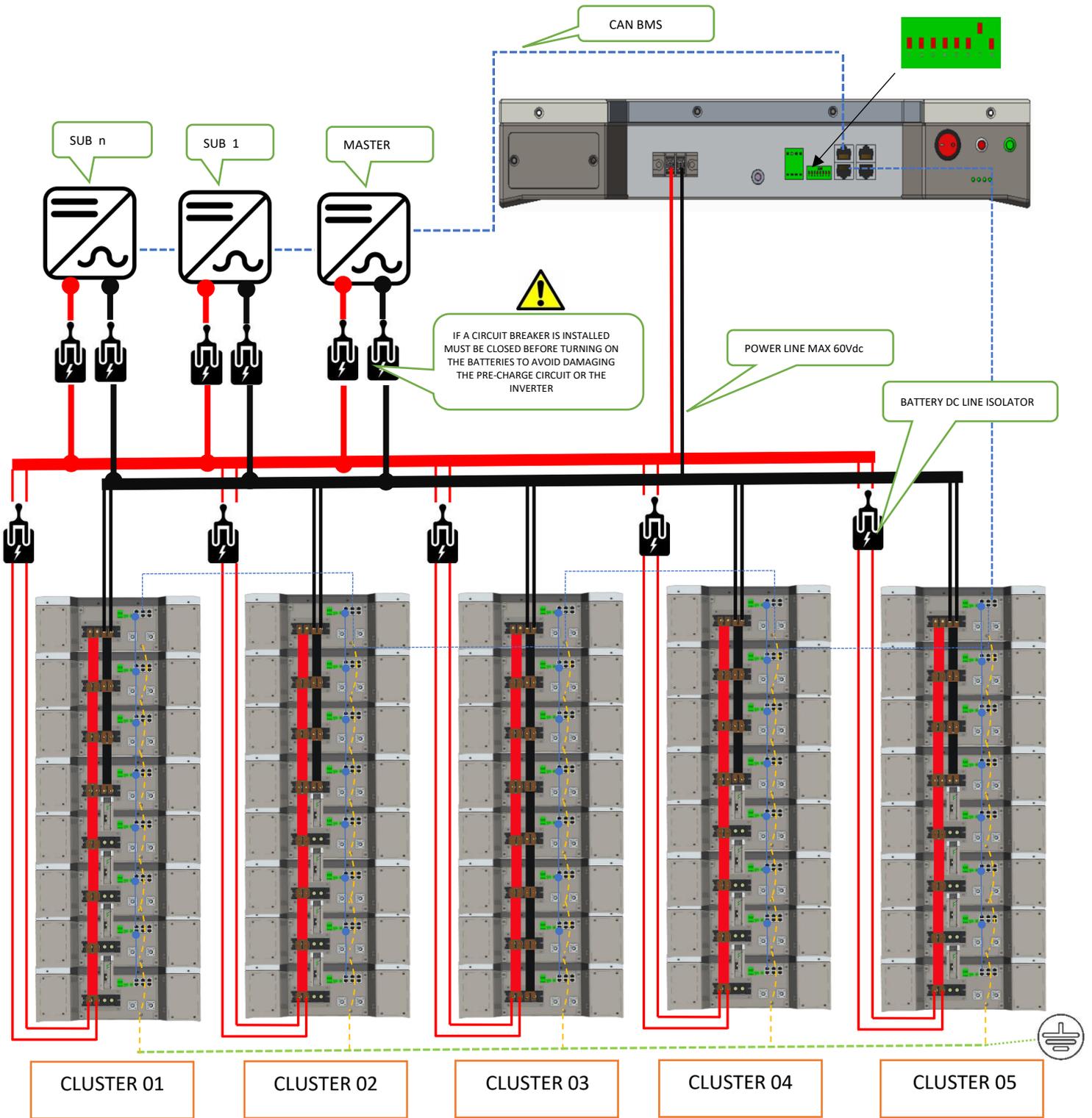
Each cluster must be equipped with an isolator to individually disconnect the battery tower from the parallel bus bar if required by your local rules. WECO suggest the installation (in any case) of a dual pole breaker on each line.



ATTENTION:

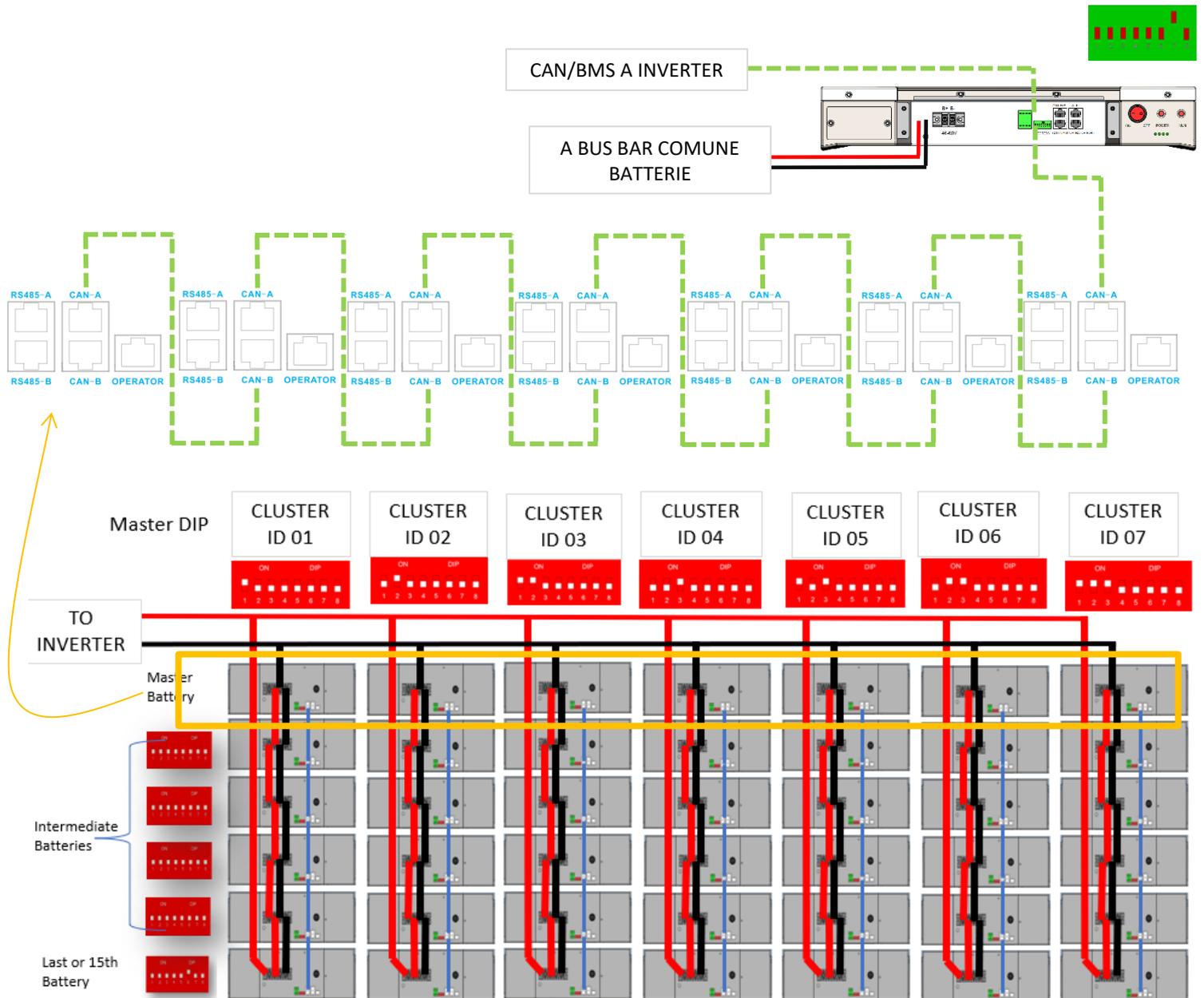
The circuit between the inverter and the parallel bus bar must be separated by a manual switch in accordance with UL regulations, however you need to refer to your local Standard for safety and electrical compliances.

Conceptual Diagram of a Cluster composed by 5 clusters of 8 5K3 XP batteries each.
Max 300A peak per Cluster (if using the 300A dc bus bars between batteries. Configuration example only)
 Note: It is possible to install up to 7 clusters composed of 15 batteries each for a total of 105 batteries.

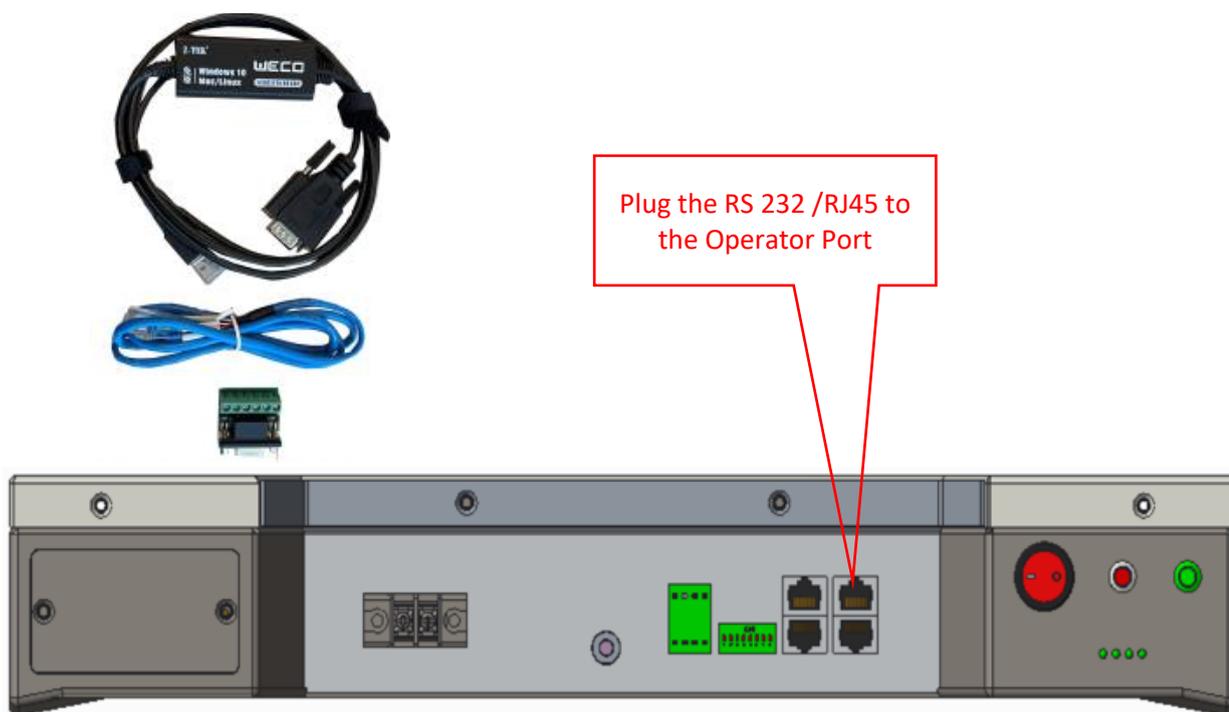


Conceptual Diagram of a cluster composed by 7 clusters of 6 4K4 LT batteries each. Configuration example only.

Note: It is possible to install up to 7 clusters composed of 15 batteries each for a total of 105 batteries.



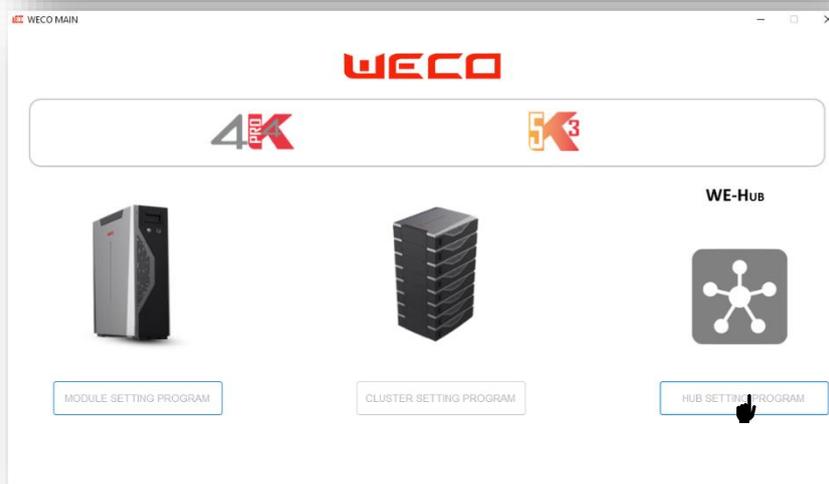
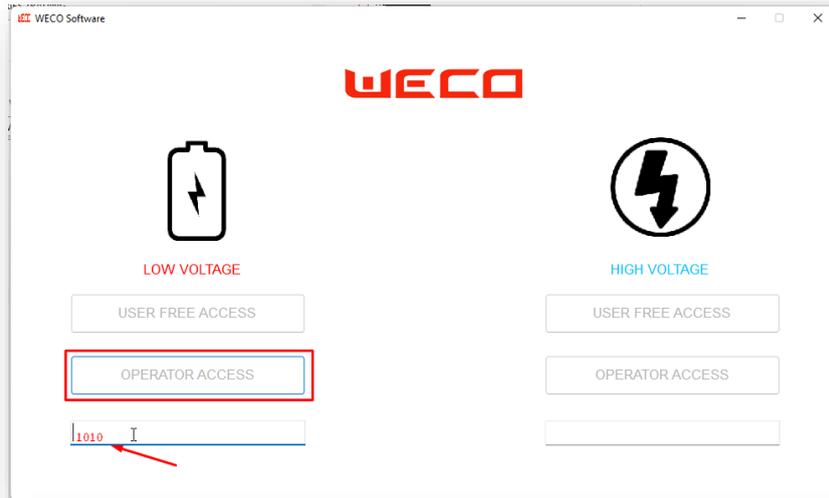
LV HUB CONNECTION



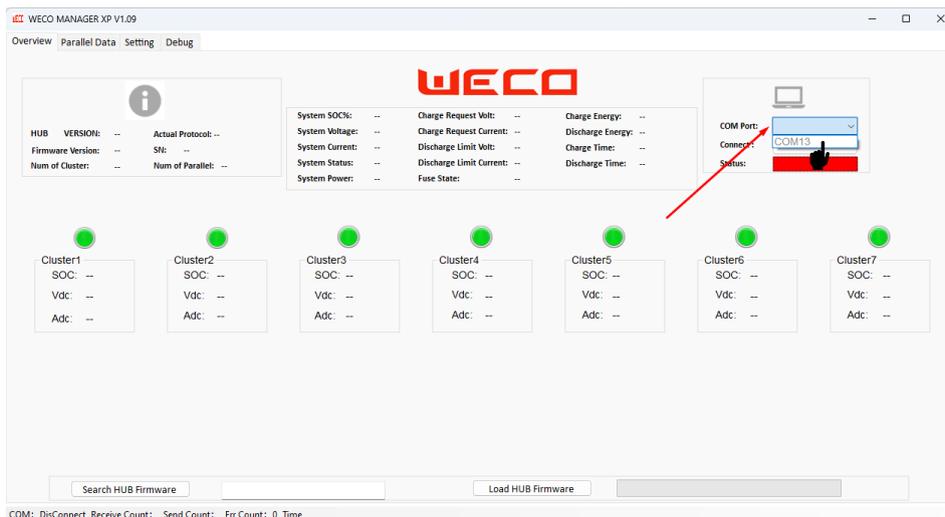
1. Plug the RS 232 / RJ 45 to the operator Port.
2. Connect the USB plug of the RS232 to your Laptop.
3. Start Up the HUB.
4. Open the Software and access to the LV section using the Password **1010**.
5. Select the HUB Icon.
6. Turn on the HUB by setting the rocker switch to (7) ON.
7. From the main page select the COM PORT and Press CONNECT.
8. Once the LED lights will turn ON it will be possible to program the HUB.
PS it is always suggested to upgrade the HB FW to the latest version.
9. Select the SETTING page (Upper right Corner).
10. Set the number of clusters you have in your system (from 2 to 7).
11. Set the Number of Modules per cluster (from 2 to 15).
12. Press SET to confirm the above selection.

STEP BY STEP PROCESS

Access the Software using the password 1010 + press OPERATOR ACCESS

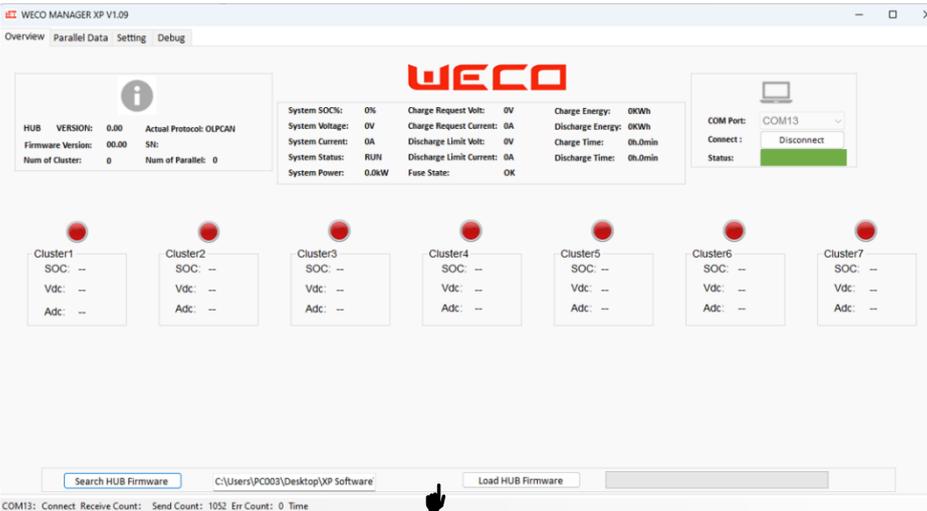
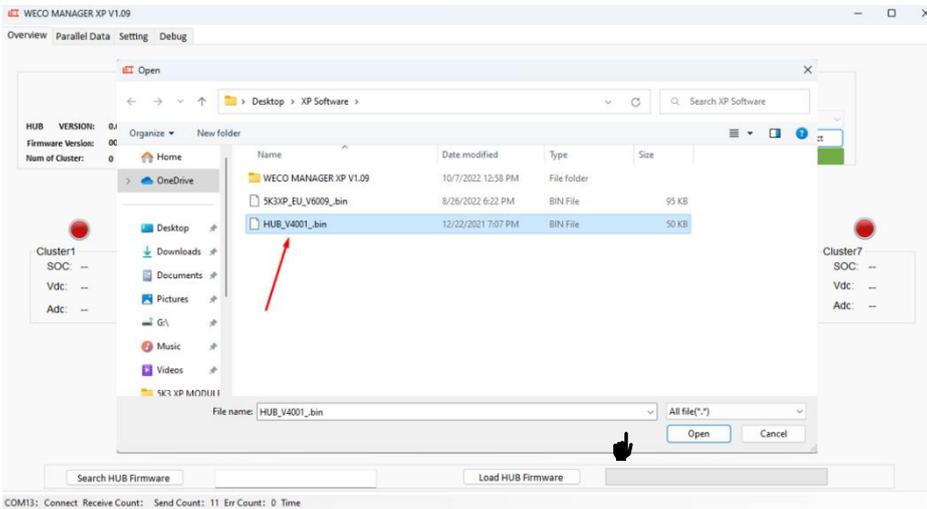


Select HUB SETTING tab
Select the COM PORT and press CONNECT

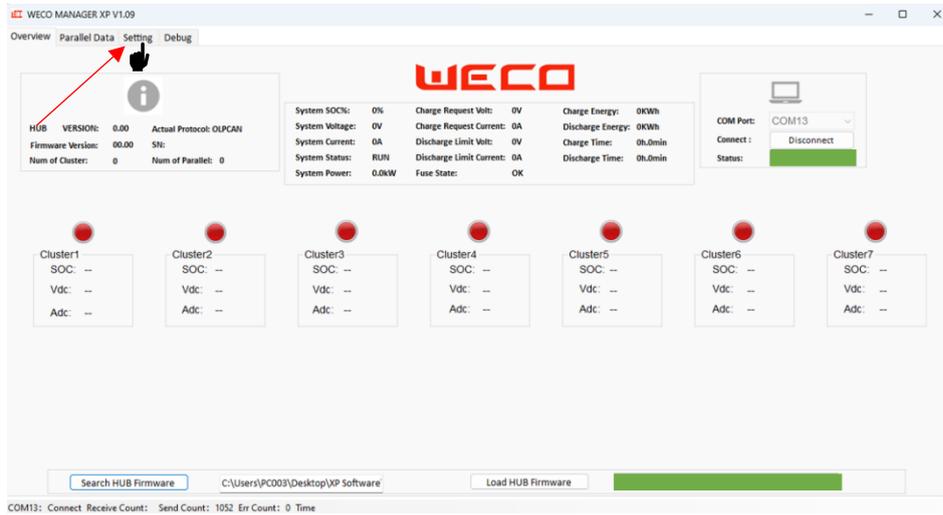


The Status bar below the Button Connect Must be GREEN after pressing CONNECT

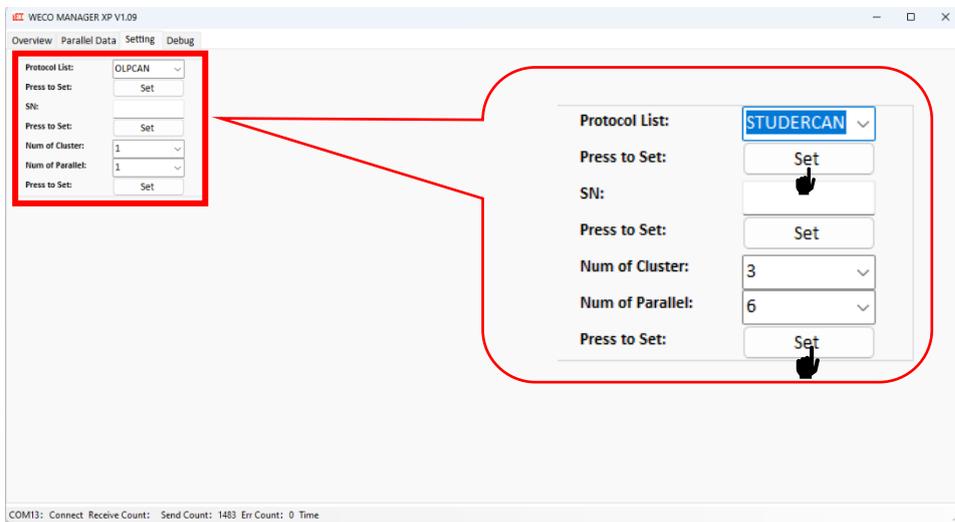
Press Search Hub Firmware and upload the Latest LV HUB FW
 At the date of the publication of this manual the most recent FW is: 60.13
 Press OK to Upload the FW and wait for the Upgrade process to be completed.



Select the SETTING page to program the Number of Cluster and number of batteries per cluster.



Select the number of clusters and the number of batteries each cluster and press SET to confirm. As last step it is mandatory to select the inverter protocol.



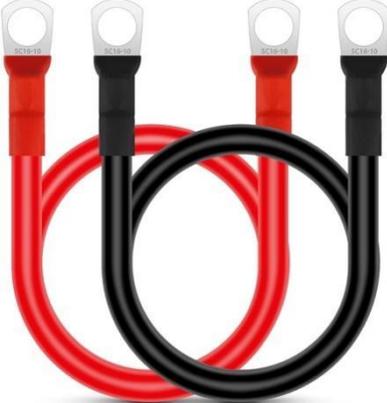
Turn on the inverter to enable the communication between LV HUB and Inverter, if the Inverter is not active or the communication cable (BMS /CAN) between the inverter and LV HUB is not connected, the LV HUB will display a FAULT and the Green Light will Blink.

Cluster Configuration Accessories

Single Cluster Configuration Kit

5K3-XP STANDARD LV BUS BAR 300A KIT		
<p>1 x Custom BUS BAR Insulated RED module connection. 1 x Custom BUS BAR Insulated BLACK module connection.</p> <p>ACCESSORY / NOT INCLUDED</p>		<p>Each kit includes 1 red + 1 black BUS BAR</p>

Multi Cluster Hub Device

CAN BUS COMBINER HUB		
<p>1 x Parallel Controller</p>		<p>Packed in Carton</p>
<p>1 x Cable Power Supply</p>		

Clusters, up to 15 modules with current above 300A.

When it is required to have an installation with more than 300A peak charging and discharging current (but still within the Battery maximum allowed current managed by the BMS or by the LV HUB), it is necessary to arrange the power connection from any individual battery to a common bus bar.

If required by your National or Local electrical laws, a breaker could be necessary in between the battery and the bus bar and in between the inverter poles and the bus bar.

The maximum allowed charging current is controlled by the BMS according with the number of modules connected.

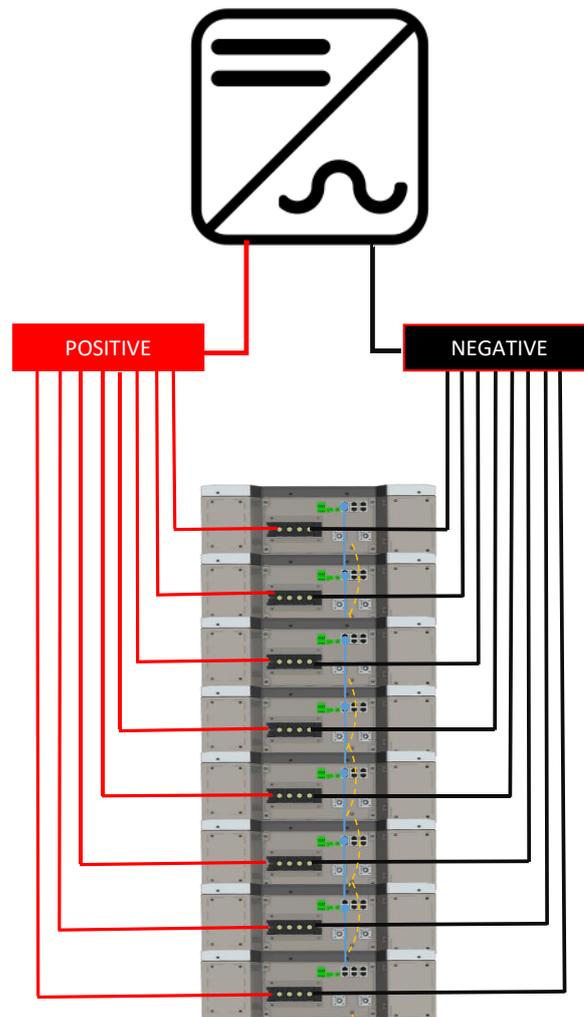
If more than one cluster it is present in your configuration, you need to use the LVHUB (CAN COMBINER) and composing the cluster power connection as per the below diagram.

Bus Bar as cascade connection are limited to 300A peak. Above such current is necessary to follow the below connection diagram.

Example of 8 modules connected individually to a common bus bar for charging /discharging current greater than 300A.

This concept can be repeated up to 15 modules when the inverter is greater than 300A.

Above 300A it is mandatory to individually connect each single module from the LV connection terminal to a common bar by using a cable properly sized.



Low Voltage Inverter Compatibility List

INVERTER BRAND		MODEL	WeCo Software Protocol Selection	Modules	Modules in Parallel with WeHub
	ZCS Azzurro	SP3000/HYD	WeCo CAN	15	105
	Studer Innotec	Xtender / NEXT	Studer CAN	15	105
	Deye	All	CAN00	15	105
	Ingecon	Play LV	WECO CAN	15	105
	MLT Invertes	Hybrid CAN	CAN00	15	105
	Schneider	XW+ / XW PRO	CONEXT CAN	15	105
	Solis	LV All	SOLIS CAN	15	105
	Growatt	SPH LV	GROWATT CAN	15	105
	SMA*	Sunny Island Single Phase	SMA CAN	15	105
	Goodwe	LV Hybrid	GOODWE CAN	15	105
	Sofar Solar	All	WeCO CAN	15	105
	Victron Energy	Via Colour Control	VICTRON CAN	15	105
	TBB	ALL	CAN00	15	105
	INVT-MEGA	LV All	INVT CAN	15	105
	Imeon Energy*	All	IMEON CAN	15	105
	Voltronic Power	LV All	VOLTRONIC CAN	15	105
	Morningstar	Open Loop	OPEN LOOP	15	/
	Kehua Tech	Hybrid LV All	CAN 00	15	105
	Must Solar	PH / PV	OLP CAN	15	105
	Lux Power Tek	LV Hybrid All	WECO CAN	15	105
	Solax Power	SKU-LV All	SOLAX CAN	15	105
	Sungrow	SH3K6/SH4K6	WECO CAN	15	105
	Steca	Open Loop	OPEN LOOP	5	/
	OutBack*	Open Loop	OPEN LOOP	5	/
	(No BMS/ Alpha CAN)				
	Magnum Inverters	Open Loop	OPEN LOOP	5	/
	TSUN	LV Hybrid All	WECO CAN	15	25
	MPP	LV ALL	OLP CAN	15	25

*WeCo Compatibility self assessed

Low Voltage Inverter Battery to Inverter CAN Terminal Pin Out

LOW VOLTAGE INVERTER CAN / BMS				
T568B <small>*Top View of Cable Plug Shown 1 2 3 4 5 6 7 8</small> 	CAN TERMINAL	Inverter Terminal Type	Inverter SIDE (PIN Number)	Battery SIDE RJ45 (PIN Number)
SMA SUNNY ISLAND	CAN L	RJ45	5	2
	CAN H		4	1
	GND			3
ZCS HYD / SP	CAN L	RJ9	2	2
	CAN H		1	1
	GND		3	3
KEHUA SPH	CAN L	RJ45	2	2
	CAN H		1	1
	GND			3
GROWATT	CAN L	RJ45	5	2
	CAN H		4	1
	GND		X	3
DEYE	CAN L	RJ45	5	2
	CAN H		4	1
	GND		2	3
VOLTRONIC	CAN L	RJ45	7	2
	CAN H		6	1
	GND			3
PHOCOS	CAN L	RJ45	7	2
	CAN H		6	1
	GND			3
TBB	CAN L	RJ45	5	2
	CAN H		4	1
	GND		2	3
VICTRON	CAN L	RJ45	8	2
	CAN H		7	1
	GND		3	3
SOLIS	CAN L	RJ45	5	2
	CAN H		4	1
	GND		2	3
SCHNEIDER	CAN L	GATEWAY	5	2
	CAN H		4	1
	GND			3
INGETEM PLAY 48/400V Single Phase	CAN L	SCREW TERMINAL	CAN H	2
	CAN H		CAN L	1
	GND			3