e-Wall

User Manual

i-G3N
INNOVATION GENERATION

CONTENTS

SPECIFICATIONS

Table 1 shows the specifications for the E-Wall for each additional Expansion Box.

Product Name (E-Stack)	**5**	**10**	**16**	**21**	**27**	**32**	**37**	**43**	**48**	**54**
Cell Type	Lithium-Iron Phosphate ($LiFePo_4$) battery									
Nominal Capacity [Ah]	105	210	315	420	525	630	735	840	945	1000
Module Voltage [V]	51.2 V_{DC} nominal									
Battery Nominal Capacity [kWh]	5.4	10.8	16.1	21.5	26.9	32.3	37.6	43.0	48.4	53.8
Capacity @ 80% DoD [kWh]	4.3	8.6	12.9	17.2	21.5	25.8	30.1	34.4	38.7	34.0
Design Life	>16 years (>5 500 cycles) expected life at 80% DoD									
Warranty	>10 years (4000 cycles)									
Max. Discharge Current (Continuous) [A]	100	200	300	400	500	600	700	800	900	1000
Max. Discharge Current (not Continuous – 3 sec) [A]	125	250	375	500	625	750	875	1000	1000	1000
Discharging cut-off voltage (LVD)	50V									
Operating Conditions										
Temperature range (recommended)	Charge – (0 °C ~ 55°C) Discharge – (-20 °C ~ 55°C)									
Protection Class	IP22 – no solid ingress and near vertical water droplets									
Dimensions										
E-Wall Storage Unit (L x H x W) [mm]	520 x 605 x 190									
E-Wall Control Box (L x H x W) [mm]	360 x 285 x 103									
E-Wall Storage Unit weight [kg]	45									
E-Wall Control Box weight [kg]	5									

INTRODUCTION

Thank you for trusting i-G3N as an alternative to your energy storage.

The elegant wall mounted design of the e-Wall supports two battery rack assemblies, which combined form the 5.6 kWh $LiFePo_4$ energy storage unit.

This manual offers relevant information to the proper installation and operation of the E-Wall energy storage system.

Please read the manual carefully before use for safety and as reference during operation.

The E-Wall is designed to operate in a master/secondary configuration, allowing additional battery expansion endeavors up to two years after the original unit was fitted. As each unit is capable of 1C output, it allows the end user to utilize a “start small” mentality upon initial installation.

Main Features

- **Quick charge enabled.**
  - Can be charged within 1 hour.

- **Long Life Span**
  - More than 4000 cycles, design life of 20 years, provided it is operated under the recommended charge and discharge conditions.

  - The system incorporates smart charging and battery protection technology to prolong battery life.

- **Highly scalable**
  - One Control Box can support up to 10 expansion units in parallel, depending on the user’s needs.

- **High level integration**
  - Suitable for most inverter-based systems with full monitoring and CANbus capabilities.

SAFETY PRECAUTIONS

The E-Wall energy storage system is designed with full consideration on safety.

However, all applications that have an electronic aspect can be dangerous if used incorrectly Fires and electric shock could be caused if used incorrectly, which leads to serious injury or death.

For your own safety, read the safety precautions thoroughly.

Precautions for use

1. No Battery Box may be connected directly to an inverter.
   The Control Box has built-in safety features that is necessary for a safe connection between the battery and the inverter.

2. IP22 Water and dustproof rating
   The units will be able to withstand near vertical water droplets, but prolonged exposure could lead to saturation of the ports which in turn could lead to a short or damage to some of the components.

3. Vents are clear
   During installation ensure that the vents underneath and on the right side of the Expansion Box are not covered. Proper ventilation is needed to ensure the cell temperature can be controlled.

4. Wiring and installation to be done per specifications
   Please follow the manual thoroughly to ensure the Control Box and the Battery Boxes are connected in a safe manner to guarantee longevity of the batteries.

PRODUCTION DESCRIPTION

System Introduction

The entire energy storage system consists of a Control Box and Expansion, or Battery Box. Figure 1 shows the Control Box and Figure 2 shows the Battery Box. One Control Box can control up to 10 Expansion boxes. Each box adds roughly 5 kWh to the system. The system specifications for the system, along with the amount of Expansion Boxes used, are shown in Table 1.

The Control Box and the Battery Box are connected using 35 mm^2 wiring. The Battery Boxes connect to the busbar provided on the Control Box with M8 bolts.

The dimensions for the Control Box are 360 x 285 x 103 (deep) and the Battery Box dimensions are 520 x 605x 190 (deep) (L x H x W). These sizes can be viewed in Figure 1 and Figure 2 respectively. These sizes can be viewed in Figure 1 and Figure 2 respectively (diagrams not to scale).

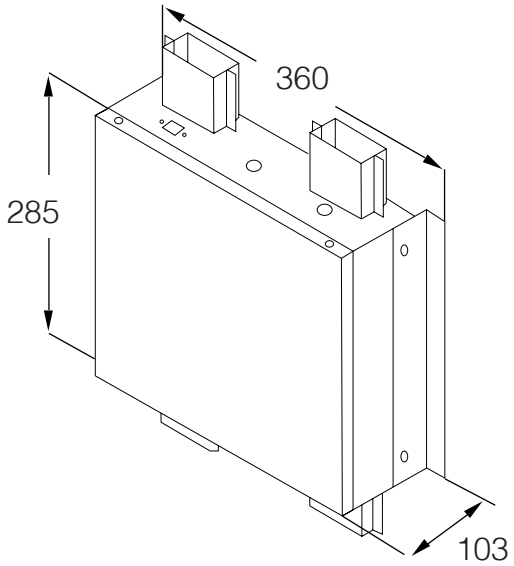

Figure 1: Dimensions of Control Box

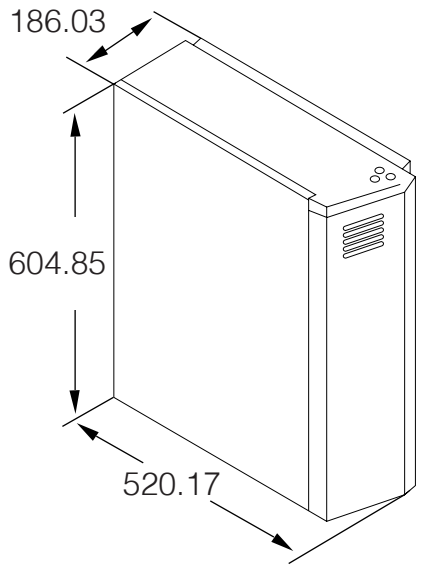

Figure 2: Dimensions of Expansion Box

Please take the size of the busbar covers on the Control Box into consideration (66 x 62 x 33). Figure 3 shows an estimation of the layout of the busbar covers. 2 x M8 holes are added to each busbar of the Control Box for lugs to be fixed.

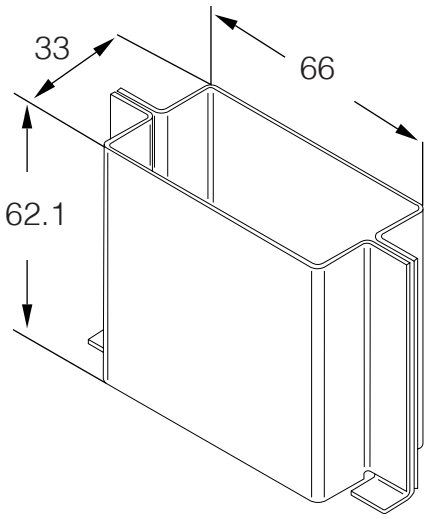

Figure 3: Control Box Busbar Covers

INSTALLATION

This section elaborates on the process to install the E-Wall energy storage system safely

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Tools and equipment required

- Hammer
- Phillips screw driver
- 13 socket
- 35 mm^2 cabling with 35 to 8 lugs (2 x Expansion Box)
- 70 – 95 mm^2 cabling with 70-95 to 8 lugs, wire size depending on inverter specifications
- M6 and M8 masonry drill bits
- Drill
- 4 x M6 fisher plugs per Control Box
- 8 x M8 rawlbolts per Expansion Box
- M8 nuts, bolts and washers to connect to the cables to the Control Box

QUICK INSTALLATION

Refer to Figure 9 and Figure 10 for the recommended layout configurations.

Control Box Mounting

1 Drill 4 x M6 holes in the wall at the correct spacing according to mounting plates.

2 Insert M6 fisher plugs with mounting plate.

3 Ensure bolts are tightly fastened when the Control Box is fitted

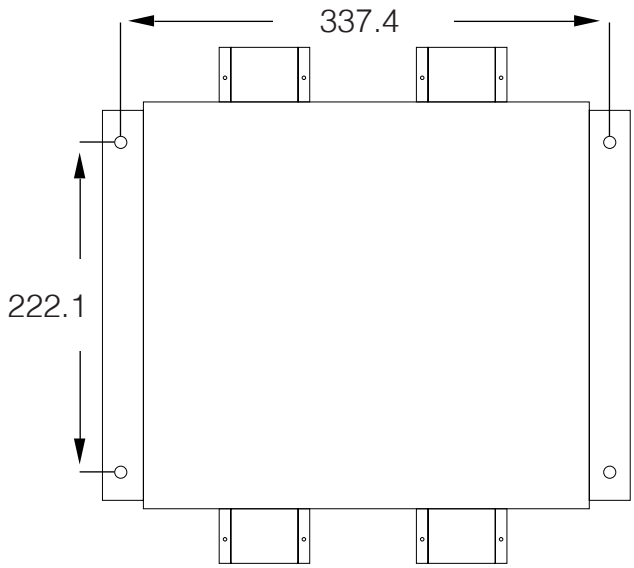

Figure 4: Control Box Mounting Plate Dimentions

Expansion Box Mounting

1 Drill 8 x M8 holes in wall at the correct spacing according to the mounting plate.

2 Insert M8 rawlbolts with mounting plate.

3 Ensure bolts are tightly fastened when the mounting plate is fitted.

4 Mount Battery Box on the mounting plate on the hinges.

5 The sides of the Battery Box sit flush with sides of the mounting plate as reference.

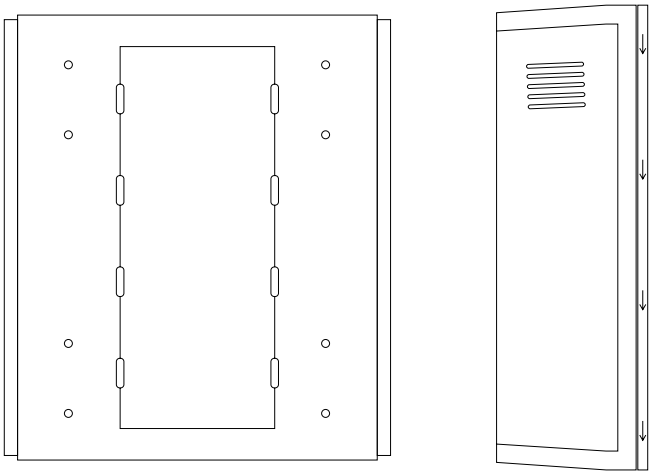

Figure 5: Battery Box Mounting Plate

Wire Connections

Before connecting any wires, ensure the Battery is switched off and all external breakers / fuses are open

35 mm^2 cable is the recommended size cable to connect the Battery Box terminal block to the busbar on the Control Box. It is important to use the same length of cable from each Battery Box to the Control Box.

1 Open the control panel of the Battery Box

2 Break the knockouts, either at the top or bottom of the Battery Box

3 Run the power cables and RJ45 communication cable through the knockout holes into the control panel

4 Connect the power cables to the negative and positive terminal blocks in the control panel of the Battery Box
- o Connect the other end of the positive and negative cable to the respective busbars on the battery side of the Control Box (35 x 8 lug size)

5 Connect the incoming RJ45 cable to the RJ45 port
- o Connect RJ45 Termination Plug to the exit port of last Battery Box in configuration

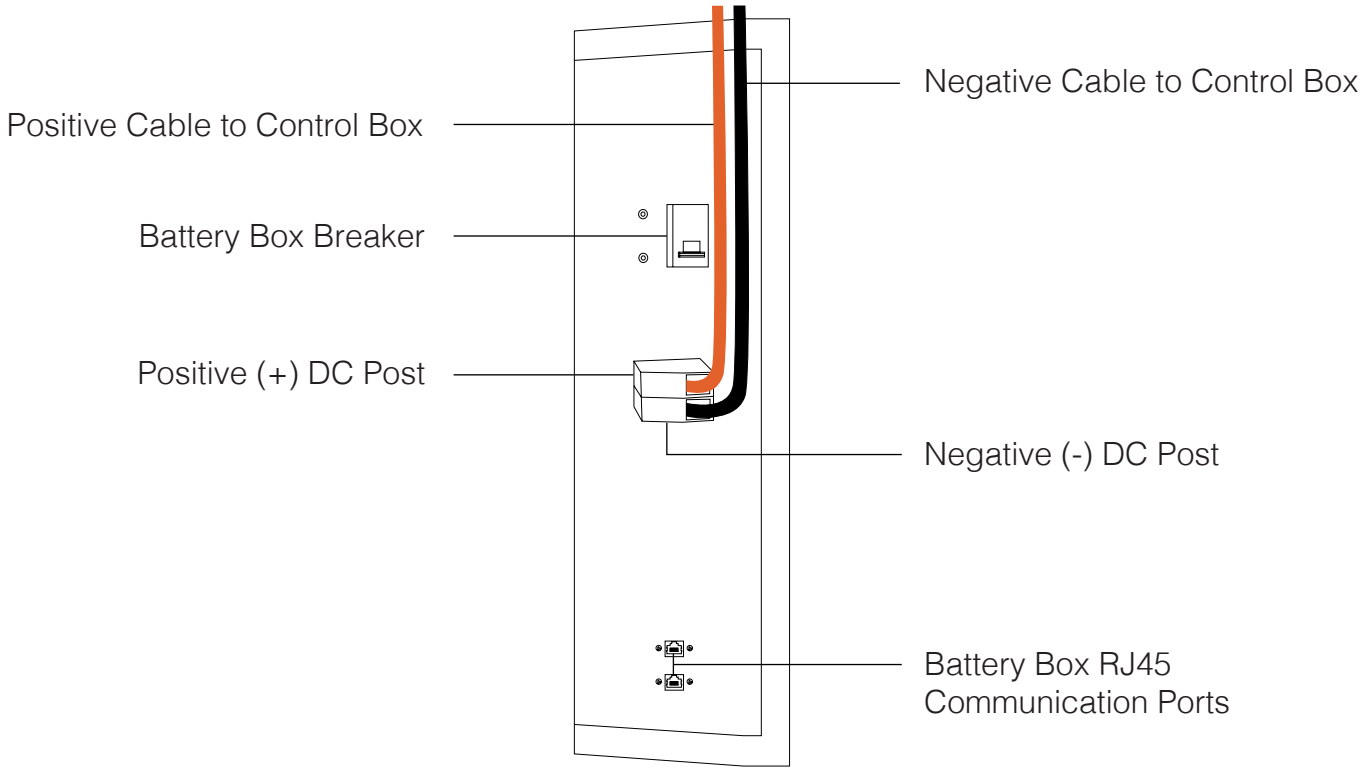

Figure 6: Battery Box Control Pannel Connections

Once all communication / power cables are connected, the start-up procedure can be followed to switch the battery on.

START-UP PROCEDURE

Follow the entire procedure closely before closing the fuses to the inverter
(See Figure 7 and 8 for a diagram showing the buttons used during the start-up procedure)

This procedure boots the BMS and runs a self-diagnostic procedure, including checks that the communication wires are connected correctly.

1 Verify polarity of connections between the units and the inverter

2 Close the breakers on the e-Wall to energise the battery inside the control panel of the Battery Box

3 Switch the ON/OFF button on the Control Box to ON
- o This brings the electronics out of storage mode / online

4 Press the “Start” button to initialise boot up.
- o The button can be pressed momentarily
  - - A yellow light will glow until the 48V relay is switched on. This will indicate if the Control Box receives power from the Battery Boxes.
- o A blue light on the “Fan Test” button will illuminate to indicate that the system is powered.

5 Should all be in order, a pre-charge sequence will be started and applied for 25 seconds after which the main contactor will be engaged
- o During this stage a small click will be heard, after which a loud audible click can be heard.

6 After this, the “Start” button should be pressed to unlatch the button.
- o The light should no longer be illuminated.

Additional:

1 Press the “Fan Test” button (inverter side) on the Control Box to check communication between the Control Box and the Battery Boxes.

2 The light on the “Fan Test” button is an indicator if the battery is on.

3 The yellow light should only be on pressed the Start-Up procedure
- o The light should not glow during normal battery operation

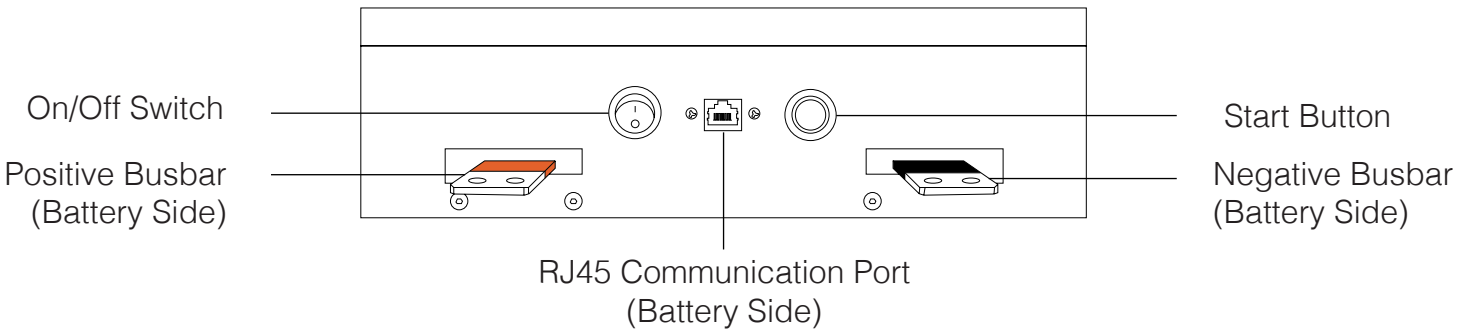

Figure 7: Buttons Used During Start-Up Procedure (Battery Side)

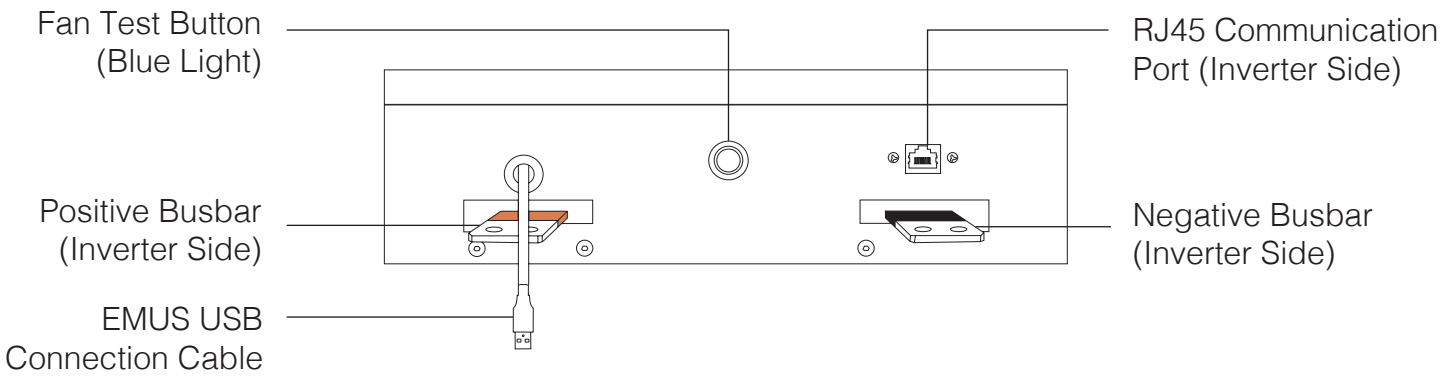

Figure 8: Buttons Used During Start-Up Procedure (Inverter Side)

Once a voltage of ± 54 V is measured on the inverter side of the Control Box can the inverter fuse be closed, and the inverter be switched on.

Restart Procedure for Fully Drained Battery

1 Switch off the system
- o Disconnect the MPPT (if applicable)
- o Isolate the battery from the inverter
  - - Open the fuse / breaker between the battery and the inverter
- o Switch off the battery

2 Disconnect all loads on the inverter
- o Switch off AC supply from inverter to DC board

3 Restart battery with the Start-up procedure

4 Once battery is ON, connect MPPT and allow battery to charge and keep the inverter OFF

5 If no MPPT is present, switch ON the inverter and connect the battery to the inverter.
- o Keep the loads disconnected during this stage

6 Loads can be added when the battery reaches 80% SOC

Control Box

M6 fisher plugs should be used to mount the Control Box on the wall. The recommended distance from the Control Box to Invertor should be less than 0.5 m.

The cabling between the Control Box and the inverter should be done to the inverter's specifications, depending on the amount of Battery Boxes.

The RJ45 port used for communication can be found on Control Box. UTP RJ45 cables will be used for communication between the Battery boxes and the Control Box. The Control Box will link with the Expansion Boxes in a daisy chain configuration, with the provided termination plug at the outlet of the final Battery Box to complete the loop. See Figure10 for referance.

The cable length is dependent on the mounting configuration and proximity of Battery Boxes to one another.

Battery Box

M8 rawlbolts should be used to mount the Battery Box on the wall.

The Battery Boxes must be mounted at a recommended proximity to the Control Box and one another, if more than 1 Expansion Boxes are installed. Figure 9 illustrates the recommended configuration of one Expansion Box and Figure 10 shows the configuration of 3 or more Expansion Boxes.

Ensure the vents on the Battery Box are not obstructed during operation.

The Battery Box wiring can exit either be above or below the Battery Box as there is a knockouts on either side of the control panel. Trunking of your choice can be used.

The Battery Boxes'communication is done in a daisy chain configuration, with the provided termination plug at the outlet of the final Battery Box to complete the loop.

35 mm2 cable is the recommended size cable to connect the Battery Box terminal block to the busbar on the Control Box. Ensure the cable lengths from the Battery Boxes to the Control box are the same.

Communication Connection

Battery communication is in a daisy chain methodology, with a termination at the very last unit. The blue line in Figure 9 illustrates the wiring for the RJ45 cable between the Control Box and one Battery Box. Figure 10 illustrates this concept for 3 or more Expansion Boxes.

Recommended Layout Configurations

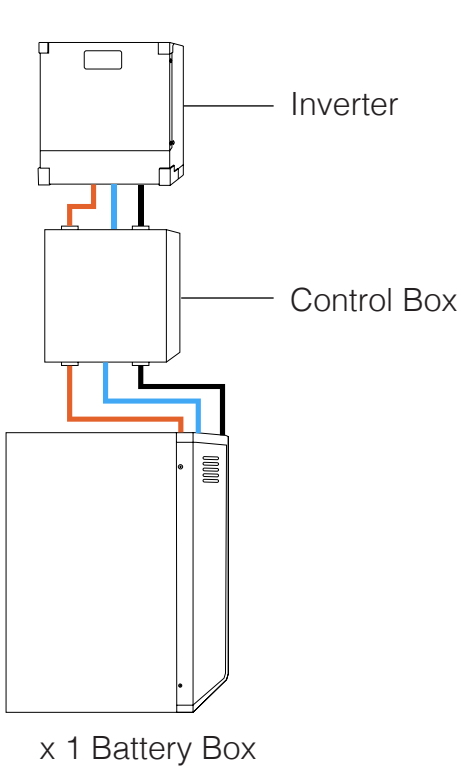

Figure 9: Illustration of mounting 1 x Expansion Box and Control Box

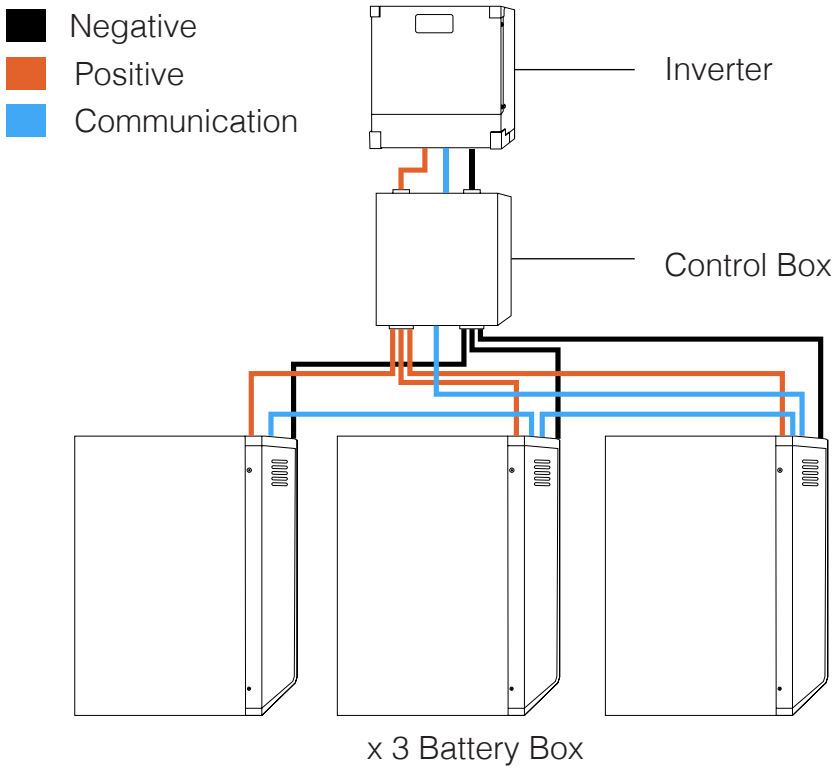

Figure 10: Illustration of mounting 3+ x Expansion Box and Control Box

TRANSPORTATION AND STORAGE

This section elaborates more on conditions which are suitable to transport the Control Box and Expansion Box, as well as storing the units while they are not in use.

Transportation

Avoid serious vibration or shock during transport.

Storage

It is recommended that the Battery Box be stored at room temperature in a dry environment for a maximum period of 6 months with the isolators switched off. If the units are not stored under the correct conditions i-G3n will not be held liable for any damage to the system.

If the units have been in storage for a while, it is recommended that the “Restart Procedure for Fully Drained Battery” procedure be followed.