

INSTALLATION GUIDE

GWU-GreenE SYSTEM



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1 About this Manual

1.1 Scope of Validity

This manual is an integral part of the GWU-GreenE system including GWU-HYB series / GWU-AC series inverter, battery and BI. It describes the assembly, installation, commissioning and maintenance. Please read it carefully before operating. Store this manual where it will be accessible at all times.

The installation and instructions in this manual will take GWU-GreenE system including GWU-HYB series inverter, battery and BI as an example.




WARNING!
Save these instructions-This manual contains important instructions for the GWU-GreenE system that shall be followed during installation of the system.

1.2 Target Group


This manual is for qualified electricians. The tasks described in this manual should only be performed by qualified electricians.

1.3 Symbols Used


The following types of safety instructions and general information appearing in this document are described below:




DANGER!
“Danger” indicates a hazardous situation which, if not avoided, will result in serious injury or death.



WARNING!
“Warning” indicates a hazardous situation which, if not avoided, could result in serious injury or death.



CAUTION!
“Caution” indicates a hazardous situation which, if not avoided, could result in minor to moderate injury.



NOTE!
“Note” provides tips for the optimal operation of our product.

1.4 About GWU-GreenE System

GWU-HYB series inverter is transformerless type without galvanic isolation. It is designed and certified to fulfill the directives of ANSI/NFPA 70, NEC 690.41, UL 1741, UL 1741 SA, IEEE 1547 and IEEE 1547.1. The inverter converts the DC power generated by PV strings into AC power and stores the energy into the battery bank or feeds the power into the power grid.

With the device, you have acquired the system that can be used to power critical loads during a grid outage by using a battery and realize automatic transfer from grid connection mode to off grid mode or from off grid mode to grid connection model by using backup interface (BI). The inverter also has the ability to use power generated from PV arrays along with other string inverter.

GWU-HYB series

The GWU-HYB series inverter manages battery and system energy.

PV Array

The PV array works in MPPT mode. For 3.8 kW, 5.0 kW and 6.0 kW inverter, the number of PV string is two. For 7.6 kW inverter, the number of PV string is three.

RSD

The RSD provides an automatic disconnect of residential or small commercial PV systems, fully compliant with the rapid shutdown requirements of National Electric Code (NEC), ANSI / NFPA 70 Sections 690.12.

Battery (Optional)

The GWU-HYB series inverter should be coupled a high voltage battery. The battery communicate with inverter via BMS and must comply with the specification of UL 1973.

Backup Interface (Optional)

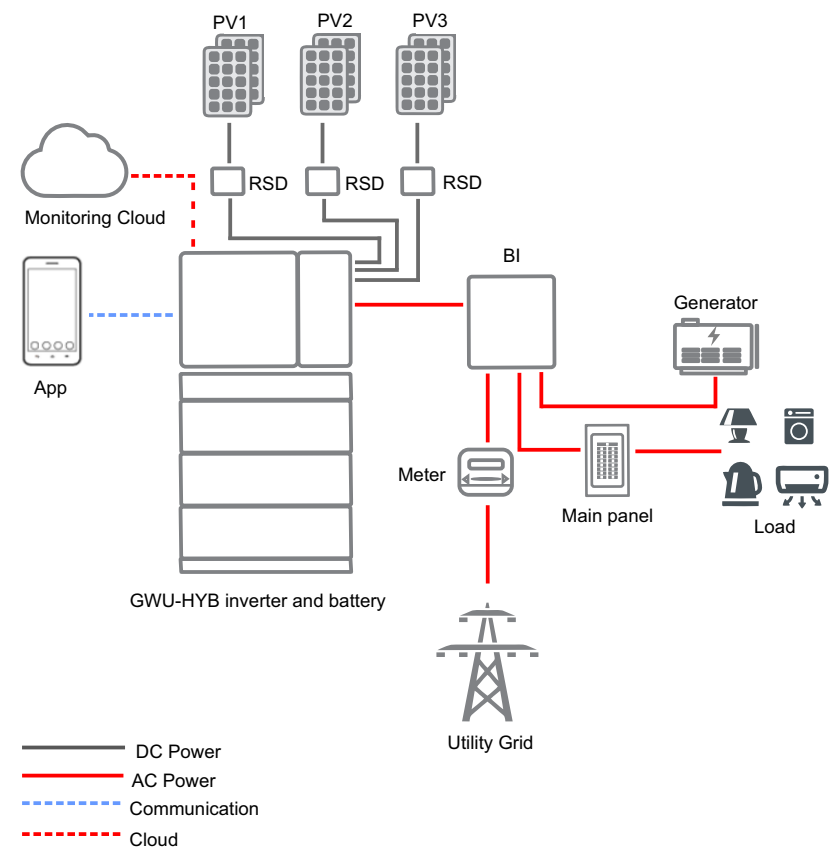
The backup interface supports multi-inverter parallel connection, controls disconnection of house loads from the grid in case of a power outage and integrates the energy meter, microgrid interconnection device and generator to enable grid-tied solar backup.

Monitoring Cloud

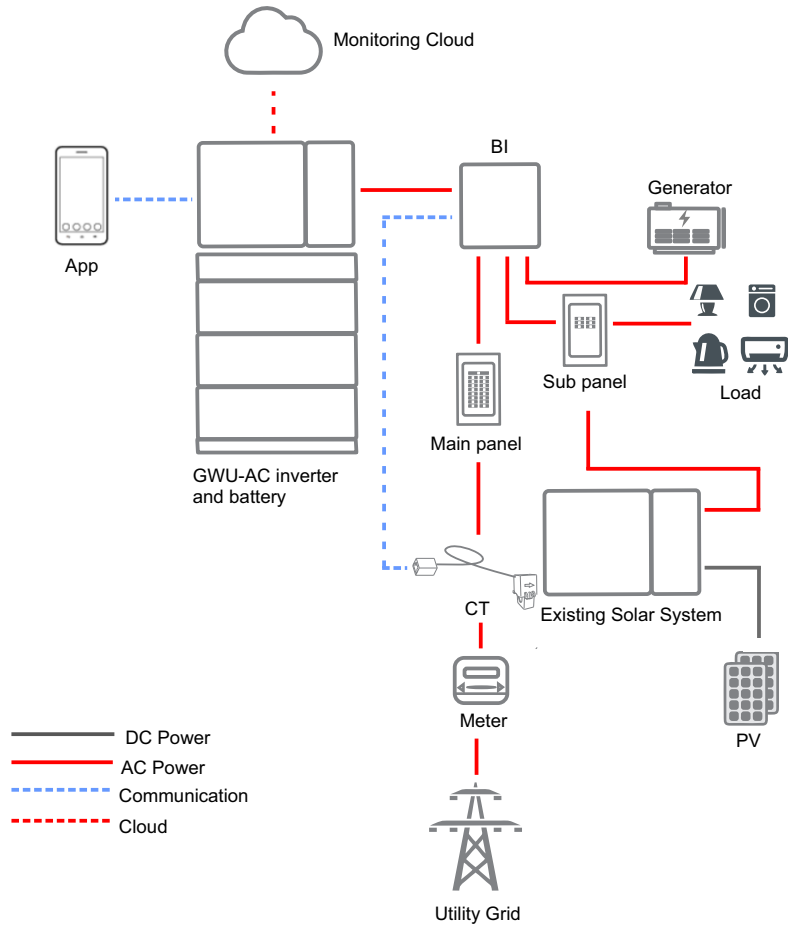
Monitoring Cloud is an intelligent, multifunctional monitoring platform that can be accessed either remotely or through a hard wired connection. With the Monitoring Cloud, the operators and installers can always view key and up to date data.

1.4.1 System Overview

System overview of GWU-HYB



System overview of GWU-AC



1.4.2 Solutions

- Whole home backup solution
 - Up to 4 GWU-HYB series inverter parallel
 - Up to 4 battery modules stackable per inverter
 - Homeowners are automatically provided with backup power in the event of grid interruption to whole home loads.
- Partial home backup solution
 - Up to 4 GWU-HYB series inverter parallel
 - Up to 4 battery modules stackable per inverter
 - Homeowners are automatically provided with backup power in the event of grid interruption to selected loads.
- Whole home backup solution with microgrid system
 - Up to 4 GWU-AC series inverter parallel
 - Up to 4 battery modules stackable per inverter
 - Friendly with existing PV system
 - Homeowners are automatically provided with backup power in the event of grid interruption to whole home loads.
- Partial home backup solution with microgrid system
 - Up to 4 GWU-AC series inverter parallel
 - Up to 4 battery modules stackable per inverter
 - Friendly with existing PV system
 - Homeowners are automatically provided with backup power in the event of grid interruption to selected loads.

2 Safety

2.1 General Safety Instructions

This manual contains important instructions for GWU-HYB series inverter that should be followed during installation and maintenance for the inverter.

GWU-HYB series inverter is designed and tested to meet all applicable North American and International safety standards. However, like all electrical and electronic equipment, safety precautions must be observed and followed during installation and operation of the GWU-HYB series inverter to reduce the risk of personal injury and to ensure a safe installation.

Installation, commissioning, service, and maintenance of GWU-HYB series inverter must only be performed by authorized personnel that are licensed and / or satisfy state and local jurisdiction regulations.

Before starting installation or commissioning, read the entire manual carefully to ensure correct and safe installation or commissioning. And keep the user manual in a safe place.

All US electrical installations must comply and be in accordance with all the state, local, utility regulations, and National Electrical Code ANSI/NFPA 70.

2.2 Important Safety Instructions



WARNING!

This document does not replace and is not intended to replace any local, state, provincial, including without limitation applicable in the jurisdiction of installation. Greenworks assumes no responsibility for the compliance or non-compliance with such laws or codes in connection with the installation of the product.



DANGER!

Danger to life due to high voltages in the product!

- Before installing or using the product, read all the instructions, cautions, and warnings in this manual. Failure to do so or to follow any of the instructions or warnings in this document can result in electrical shock, serious injury or death, or may damage the product.
- Before connecting the product to the electrical utility grid, contact the local utility company.
- All work must be carried out by a qualified electrician. Children should be supervised to ensure that they do not play with the appliance.



WARNING!

Do not install the system in a corrosive environment where it may be exposed to ammonia, corrosive gases, acids, or salts (eg: chemical plant, fertilizer storage areas, tanneries, near volcanic ash eruption).



WARNING!

Do not disassemble any parts of the product which are not mentioned in the installation guide. It contains no user-serviceable parts. See warranty for instructions on obtaining service. Attempting to service the device by yourself may result in a risk of electric shock or fire and will void your warranty.



WARNING!

The inverter input and output circuits are isolated from the enclosure. This system does not include an isolation transformer and should be installed with an ungrounded PV array in accordance with the requirements of ANSI / NFPA 70, NEC 690.41. Equipment grounding is the responsibility of the installer and must be performed in accordance with all applicable Local and National Codes.



WARNING!

Before operating the inverter, ensure that the inverter is grounded properly. This product must be connected to a grounded, metal, permanent wiring system, or an equipment-grounding conductor must be run with the circuit conductors and connected to the equipment grounding terminal or lead on the product.



WARNING!

When a ground fault is indicated, normally grounded conductors may be ungrounded and energized or normally ungrounded conductors may be grounded.

**WARNING!**

Do not operate the device when the device is running.

**CAUTION!**

Only accessories shipped with the product are recommended to use. Using other accessories may result in a fire or injury to the user.

**CAUTION!**

Possible damage to health as a result of the effects of radiation!
Do not stay closer than 7.87 in / 20 cm to system for a long time.

**CAUTION!**

Danger of burn injuries due to hot enclosure parts!
During operation, the enclosure may become hot.

**CAUTION!****Risk of electric shock from energy stored in the capacitor.**

Never operate on the inverter couplers, the Mains cables, battery cables, and PV cables when power is applied. After switching off the PV, battery and Mains, always wait for 5 minutes to fully discharge the intermediate circuit capacitors discharge before unplugging DC, battery and Mains couplers.

**CAUTION!**

GWU-HYB series only supports a certain type of lithium-ion battery (Manufacturer certified battery)!

**WARNING!**

Do not expose system to ambient temperatures above 140°F (60°C) or below -13°F (-25°C).

**WARNING!**

Do not attempt to open, disassemble, repair, tamper with or modify the product. The product and its components are not user serviceable.

Battery safety instructions

GWU-HYB Series inverter should be coupled with a high voltage battery.

The battery must comply with UL 1973 and must be Greenworks certified.

As accumulator batteries may contain potential electric shock and short-circuit current dangers, to avoid accidents that might be thus resulted, the following warnings should be observed during battery replacement:

- Risks of explosion:

Do not subject the battery module to heavy impacts.

Do not crush or puncture the battery module.

Do not dispose of the battery module in a fire.

- Risks of fire:

Do not expose the battery module to temperatures in excess of 140°F.

Do not place the battery module near a heat source, such as a fireplace.

Do not expose the battery module to direct sunlight.

Do not allow the battery connectors to touch conductive objects such as wires.

- Risks of electric shock:

Do not disassemble the battery module.

Do not touch the battery module with wet hands.

Do not expose the battery module to moisture or liquids.

Keep the battery module away from children and animals.

- Risks of damage to the battery module:

Do not expose the battery module to liquids.

Do not subject the battery module to high pressures.

Do not place any objects on top of the battery module.

3 Specification

3.1 Specification of GWU-HYB Inverter

PV Input

Model	GWU-HYB-3.8DH	GWU-HYB-5.0DH	GWU-HYB-6.0DH	GWU-HYB-7.6TH
Max.recommended PV power [W]	7600	10000	10000	15200
Max.MPPT power [W]	5700	7500	9000	11400
Max.DC voltage [V]	550			
Normal DC operating voltage [V]	360			
Max. input current [A]	A:16/B:16			A:16/B:16/C:16
Max. short circuit current [A]	A:20/B:20			A:20/B:20/C:20
MPPT voltage range [V]	90-500			
MPPT voltage range [V](full load)	176-500	232-500	278-500	235-500
Start input voltage [V]	120			
No. of MPP trackers	2			3
Strings per MPP tracker	A:1/B:1			A:1/B:1/C:1
DC disconnection switch	Yes			
AFCI	Yes			

AC Input/Output

Model	GWU-HYB-3.8DH	GWU-HYB-5.0DH	GWU-HYB-6.0DH	GWU-HYB-7.6TH
Nominal AC power [VA]	3816	5016	6000	7608
Max. apparent AC power [VA]	3816	5016	6000	7608
Rated grid voltage [V]	240			
Rated grid Frequency [Hz]	50/60			
Nominal AC current [A]	15.9	20.9	25	31.7
Max. AC current [A]	15.9	20.9	25	31.7
Maximum output fault current and duration [A/ ms]	48/90			
Maximum output fault peak current and duration [A/ ms]	515/5			
Displacement power factor	0.8 leading to 0.8 lagging			
Total harmonic distortion (THD, rated power)	<3%			
Parallel operation	Yes			

General Data

General	GWU-HYB-3.8DH	GWU-HYB-5.0DH	GWU-HYB-6.0DH	GWU-HYB-7.6TH
Dimensions with Safety Switch (WxHxD) [in(mm)]	33.1*15.7*5.7(840*400*145)			
Weight with Safety Switch [lb(KG)]	75 (34)			
Cooling concept	Natural convection with internal fan			
Topology	Transformerless			
Communication	RS485, CAN, WIFI (optional) / 4G (optional)			
Revenue Grade Data, ANSIC12.20	Optional			
Warranty [Years]	10			

Battery Input/Output

Model	GWU-HYB-3.8DH	GWU-HYB-5.0DH	GWU-HYB-6.0DH	GWU-HYB-7.6TH
Battery type	Li-ion			
Input/output voltage range [V]	75-450			
Rated input/output voltage [V]	150			
Maximum input power [W]	4060	5336	6383	8094
Maximum output power [W]	3816	5016	6000	7600
Maximum Input/output current [A]	54			
Reverse-Polarity Protection	Yes			
Cycle efficiency charging to discharging (PCS Only)	88.5%	90.5%	91.5%	92.5%

Efficiency, Power Consumption and Standard

Model	GWU-HYB-3.8DH	GWU-HYB-5.0DH	GWU-HYB-6.0DH	GWU-HYB-7.6TH
CEC Weighted Efficiency (PV to GRID)	97.0%	97.5%	97.5%	97.5%
Maximum Inverter Efficiency	98.0%	98.0%	98.0%	98.0%
Power consumption				
Internal consumption(night) [W]	<3W			
Standard				
Safety	UL1741,UL1741 SA,UL1699B, CSA C22.2 No. 107.1-16, CSA - C22.2 No. 292-18			
EMC	FCC part15 class B			
Certification	IEEE1547, Rule 21,Rule14 (HI)			
RoHS	Yes			

Environment Limit

Environment limit	GWU-HYB-3.8DH	GWU-HYB-5.0DH	GWU-HYB-6.0DH	GWU-HYB-7.6TH
Protection class	NEMA 4X			
Operating Temperature Range [°F (°C)]	-13 to +140 (-25 to +60)			
De-rating start temperature [°F (°C)]	113 (45) or above			
Storage temperature Range [°F (°C)]	-13 to +167(-25 to +75)			
Humidity [%]	0%~95% RH			
Altitude [ft (m)]	9843 (3000) MAX			
Noise emission(typical) [dBA]	< 30			
Over voltage category	IV (electric supply side), II (PV side)			

3.2 Specification of Battery

Model	GWU-BAT-10.0H	GWU-BAT-15.0H	GWU-BAT-20.0H
Nominal Voltage [Vdc]	102.4	153.6	204.8
Operating Voltage [Vdc]	90-116	135-174	180-232
Nominal Capacity [Ah]	100	100	100
Nominal Energy [kWh]	10	15	20
Usable Energy 90% DOD [kWh]	9.2	13.8	18.4
Max. Charge/Discharge Current (A)	54	54	54
Recommend Charge/Discharge Current (A)	50	50	50
Standard Power (kW)	5.12	7.68	10.24
Max. Power (kW)	5.5	8.3	11.1
Battery Roundtrip Efficiency(0.2C,25°C/77°F)	95%		
Expected Lifetime(25°C/77°F)	10 years		
Cycle Life90% DOD(25°C/77°F)	6000 cycles		
Charge Temperature	32°F~127.4°F/0°C~53°C		
Discharge Temperature	-14°F~127.4°F/-10°C~53°C		
Storage Temperature	-4°F~122°F/-20°C~50°C (3 months) 32°F~104°F/0°C~40°C (12 months)		
Ingress Protection	IP65		

3.3 Specification of Backup Interface

Grid Input / Output to Main Distribution Panel at Grid Tie	
AC Output Voltage (Nominal) [Vac]	120/240 Split Phase
AC Output Voltage Range [Vac]	105.5-132 / 211-264
AC Frequency (Nominal) [Hz]	50/60
AC Frequency Range [Hz]	47-53/59.3-60.5
AC Current Input [A]	160
Output to Main Distribution Panel at Backup Operation	
AC Output Voltage(Nominal) [Vac]	120/240 Split Phase
AC Output Voltage Range [Vac]	105.5-132 / 211-264
AC Frequency(Nominal) [Hz]	50/60
AC Frequency Range [Hz]	45-55/55-65
Split Phase Imbalance [A]	41.7
AC Current Output (Max) [A]	160

Input from Inverter	
Number of Inverter Inputs	4
Rated AC Power [W]	3800 / 5000 / 6000 / 7600
Maximum Continuous Input Current @240V [A]	15.9 / 20.9 / 25 / 31.7
Inverter Input AC Circuit Breaker [A]	20 / 30 / 35 / 40
Generator	
Maximum Rated AC Power [W]	15000
Maximum Continuous Input Current [Aac]	63
Auto Generator Start	Yes
Others	
Energy Meter	1% Accuracy
Communication	RS485
Number of Communication Ports	2
Manual Control Over Micro-grid Interconnection Device	Yes
LED Display	3
Standard Compliance	
Safety	UI1741, CSA 22.2 NO.107
Emissions	FCC part 15 Class B
Installation Specifications	
AC from Grid Conduit Size / AWG Range	2" Conduit / #0-4 / 0 AWG
AC Inverter Conduit Size / AWG Range	1" Conduit / 12-8 AWG
AC Generator Input Conduit Size / AWG Range	1" conduit / 8-4 AWG
Communication Conduit Size / AWG Range	1" conduit / 24-16 AWG
Maximum Elevation [ft/m]	9843 / 3000 MAX
Weight [lb/kg]	69.4/31.5
Cooling	Fan (user replaceable)
Noise [dBA]	>50
Operating Temperature Range [°F/°C]	-13 to +140/-25 to +60
Protection Rating	NEMA 3R
Dimensions (HxWxD) [in/mm]	17.7*27.8*7.3 / 450*706*185
Warranty [years]	10

4. Site Requirements and Pre-installation Guidance

4.1 Physical Requirements

The installation of GWU-GreenE system including GWU-HYB inverter, battery and BI must be done in accordance with local codes and the National Electric Code (NEC) ANSI / NFPA 70 or the Canadian Electrical Code CSA C22.1.

The whole system requires adequate clearance for the installation, cabling or conduit and airflow. Do not install anything above each unit that limits access to the unit or that might fall and damage the unit. Do not mount each unit upside down.

The inverter and battery in the system can be wall-mounted or floor-mounted. The BI in the system must be wall-mounted and installed on the right side of inverter. It needs to be configured for cable entry at the bottom and sides of the enclosure.

Each unit has mounting bracket to support it. Mounting requirements based on wall type are provided in Section 7.1.

4.2 Dimensions of the System

Figure 1 Dimensions of inverter

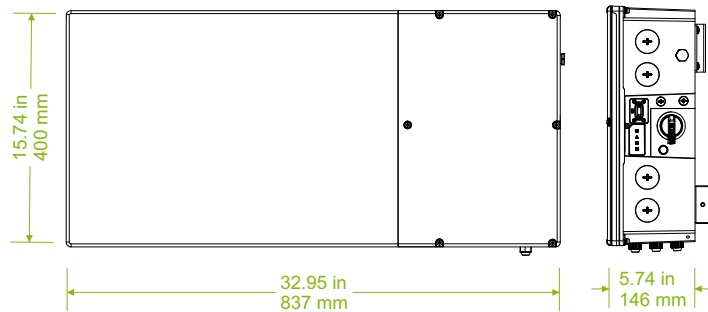


Figure 2 Dimensions of battery

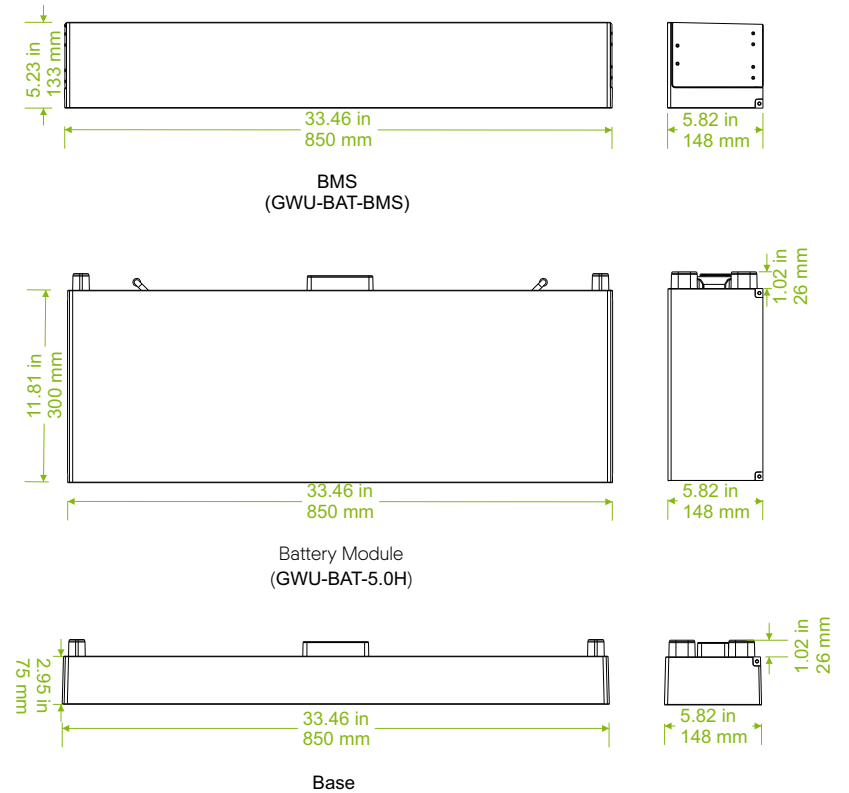
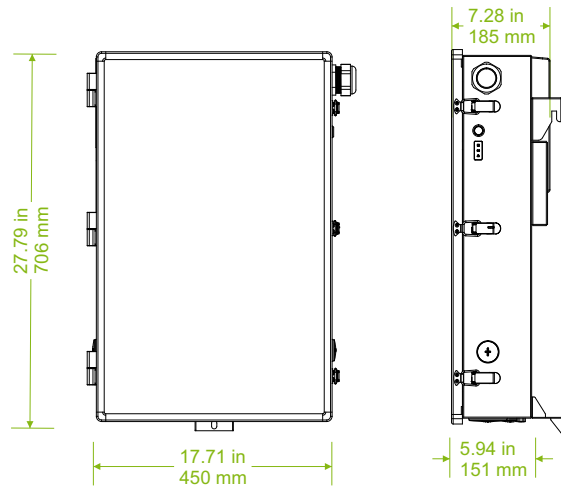
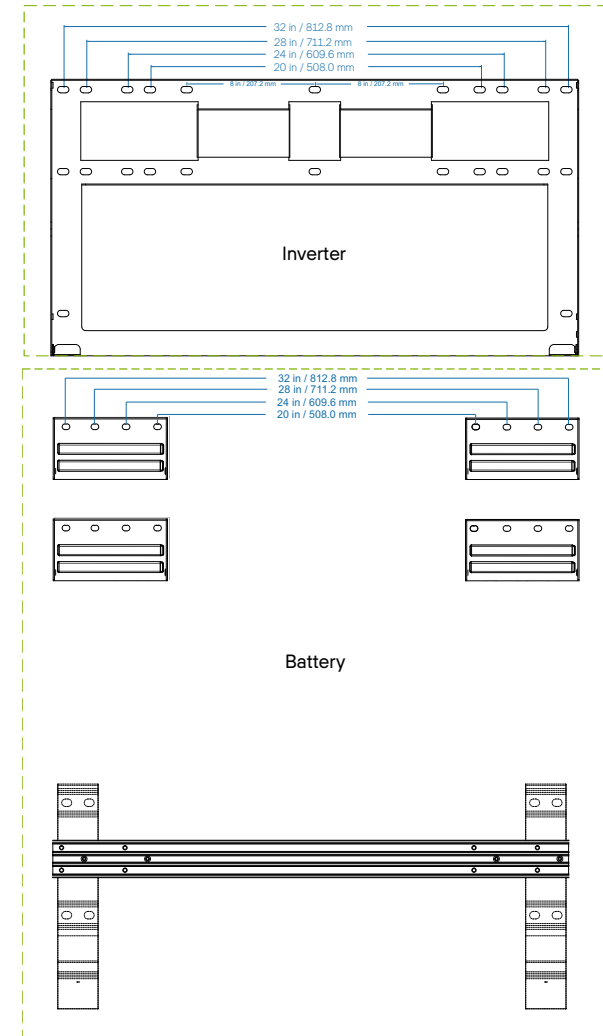


Figure 3 Dimensions of BI

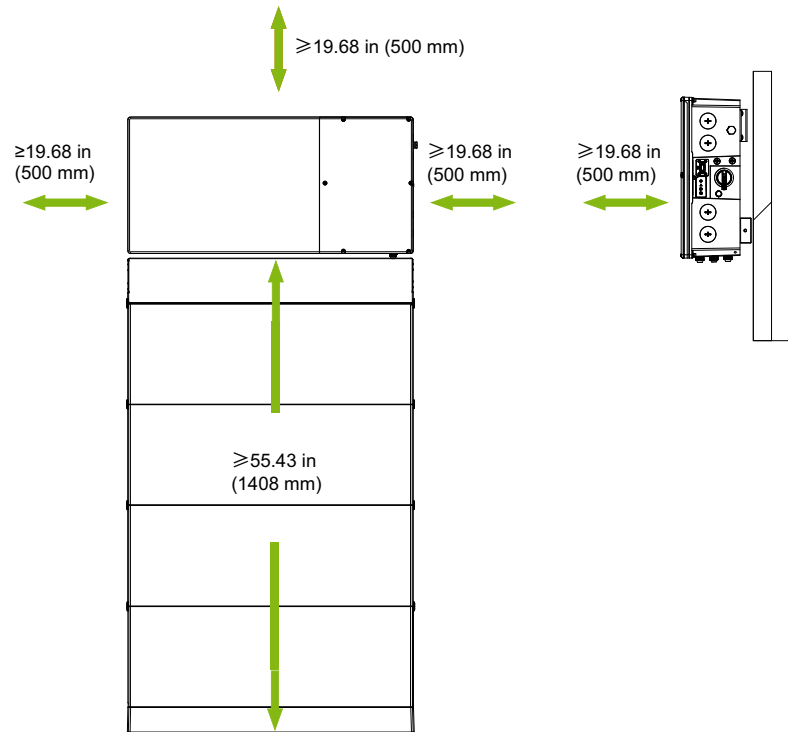


4.3 Installation Space Requirement

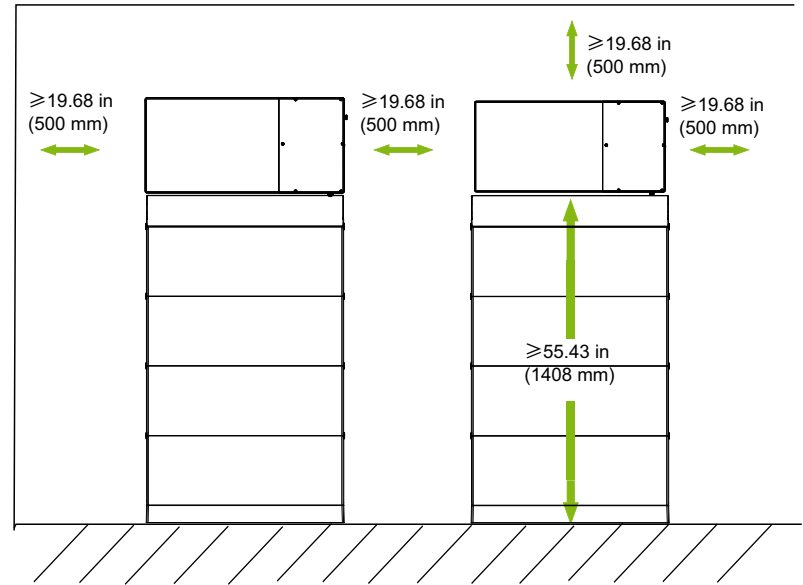
Inverter and battery space requirement



To ensure good heat dissipation and convenient disassembly of the inverter and battery, the minimum clearance around the inverter and battery shall not be less than the following values, as shown below. The height above the ground marked below is recommended assuming that four BATs are installed with floor-mounting.



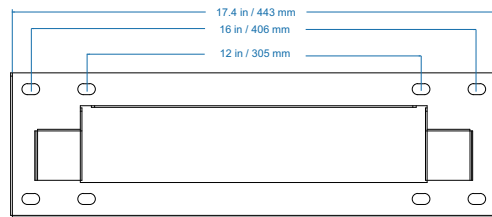
For multi-inverter installation, please reserve the space of 19.68 inch (500 mm) at least between each left and right inverter and at least 19.68 inch (500 mm) distance from the ceiling. If multiple inverter are mounted in areas with high ambient temperatures, increase the clearances between the inverter and batteries and ensure an adequate fresh-air supply if possible.



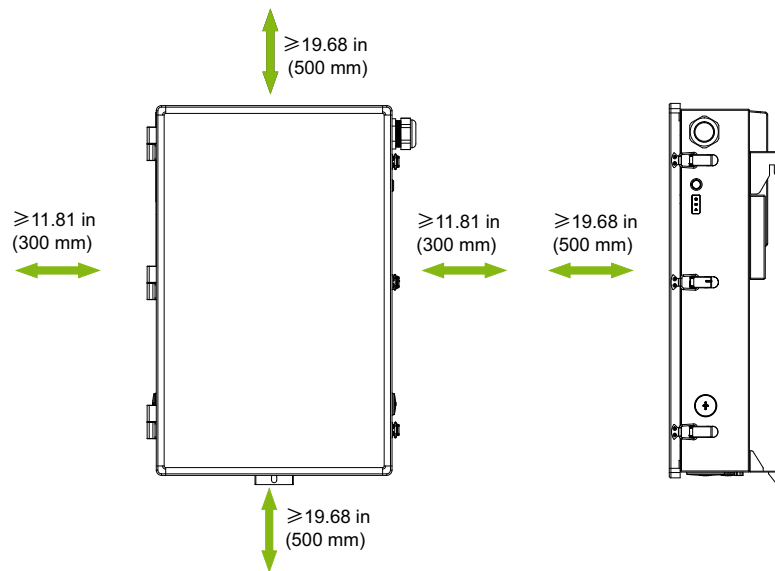
NOTE!

In case of wall-mounting, the distance from base to ground is decided according to the local regulations.

BI space requirement



To ensure good heat dissipation and convenient disassembly of the BI, the minimum clearance around the BI shall not be less than the following values, as shown below.



Mounting bracket anchoring details

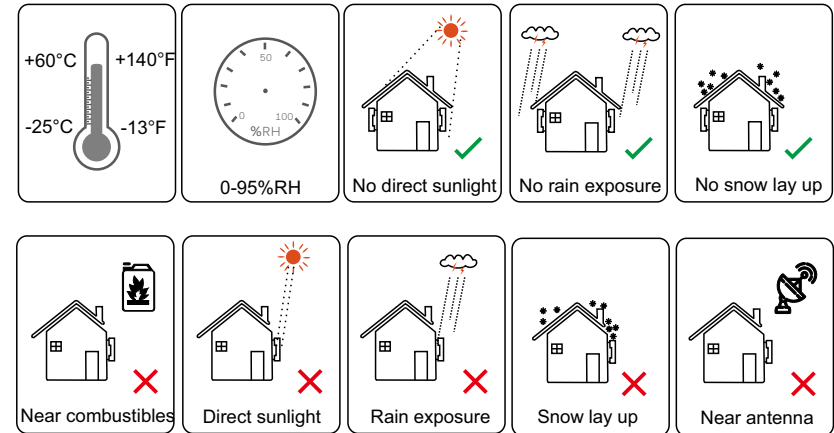
Please refer to the local building codes for actual anchoring conditions.

4.4 Installation Environment Requirement

The installation position shall be well ventilated.

Make sure the installation site meets the following conditions:

- Not be exposed to glare.
- Not in areas where highly flammable materials are stored.
- Not in potential explosive areas.
- Not near the television antenna or antenna cable.
- Not higher than altitude of about 9843 ft (3000 m) above sea level.
- Not in environment of precipitation.
- Be sure the ventilation is good enough.
- The ambient temperature in the range of -13°F (-25°C) to +140°F (+60°C).
- The slope of the wall should be within ±5°.
- Avoid direct sunlight, rain exposure, snow laying up during installing and operating.



5. Preparation before Installation

GWU-GreenE is 100% tested and packaged and visually inspected before leaving our manufacturing facility. Please make sure the inverter is intact during transportation. If there are some visible damages, such as cracks, please contact your dealer immediately.

Open the package and fetch out the product, firstly check the accessories. The packing list shows as below.



DANGER!

Before installation, please make sure the breaker of battery is in "OFF" position. During installation, make sure the battery terminal is not short-circuited.

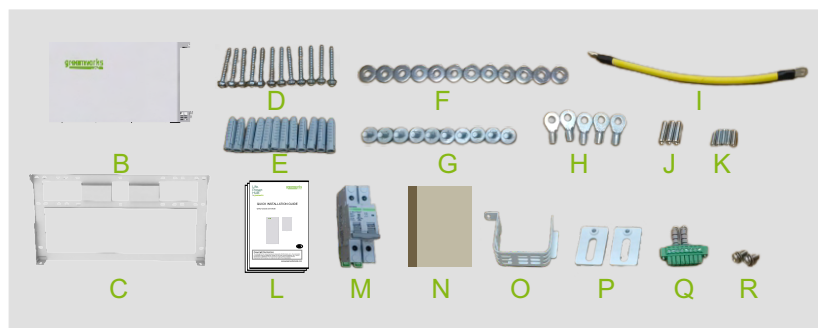
5.1 Packing Lists of Inverter

In the inverter box



A

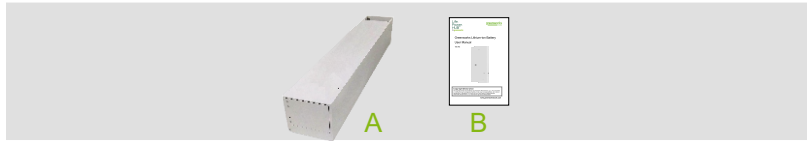
In the inverter accessory box



Item	Name	Description
A	Inverter X1	Product
B	Mental cover X1	Protect the inverter
C	Bracket X1	Support the inverter
D	Self-tapping screwX12	Fix the bracket
E	Expansion boltX12	Fix the bracket
F	WasherX12	Fix the bracket
G	M5X10 screwX10	Fix the cover, cable protective guard and cover fixing plate
H	Grounding terminalX5	For grounding
I	PE cableX1	Grounding cable between inverter and BMS
J	8 AWG ferrules X3	For AC cable
K	10 AWG ferrules X6	For PV cable
L	DocumentsX3	User Manual, installation guide and quick installation guide
M	Circuit breakerX1	Mount it on the BI
N	Communication dongleX1 (Optional)	For communication
O	Cable protective guardX1	Protect the cable between inverter and BMS
P	Fixing plate of coverX2	Connect the cover and the bracket
Q	8-pin female terminal block with terminating resistorX1	Additional 8-pin female terminal block with terminating resistor
R	M4X10 screwX2	Fix the fixing plate between inverter bracket and BMS

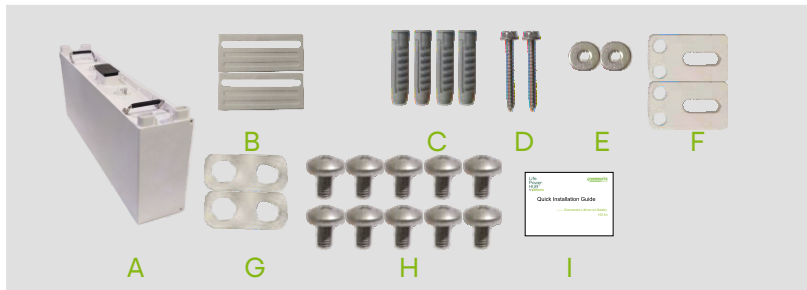
5.2 Packing Lists of Battery

BMS (GWU-BAT-BMS)



Item	Name and Quantity	Description
A	BMS	Product
B	User ManualX1	Guide the installation and maintenance

One Battery Module (GWU-BAT-5.0H×1):



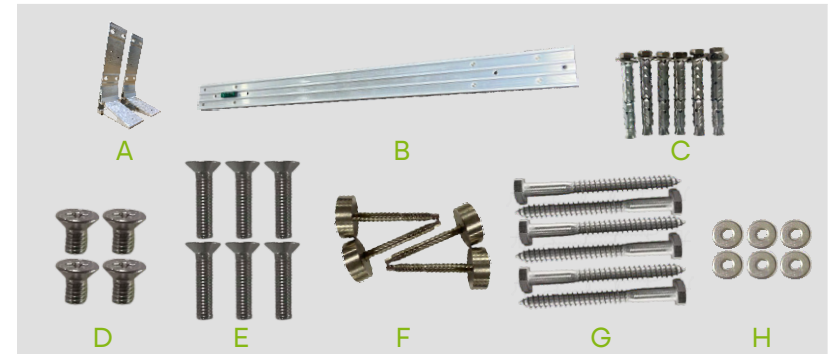
Item	Name and Quantity	Description
A	Battery moduleX1	Product
B	BracketX2	Support battery module to be mounted on the wall
C	Expansion boltX4	Fix the bracket
D	Expansion boltX2	Fix the bracket
E	WasherX2	Fix the bracket
F	Fixing plate (3 holes)X2	Connect two battery modules with bracket
G	Fixing plate (2 holes)X2	Connect two battery modules
H	M5*10 cross screwX10	Fix the fixing plate
I	Quick Installation GuideX1	Guide the installation



NOTE!

The above-mentioned accessories are only for one battery module.

Accessories for Both Floor and Wall Mounting (Separate Accessory Box)



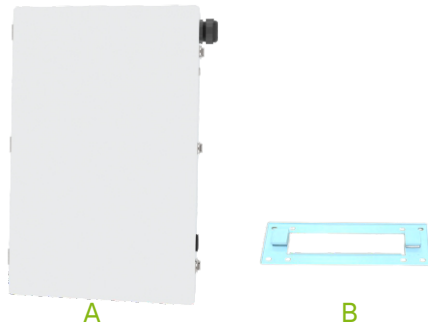
Item	Name and Quantity	Description
A	Base supportX2	Support the base
B	Transverse plateX1	Support the base
C	Expansion screwX6	Fix the base support in case of concrete wall
D	M5*8 countersunk screwX4	Fix the transverse plate with base support
E	M5*20 countersunk screwX6	Fix the two sides of base
F	Adjustment screwX2	Adjust the base to be leveled
G	Self-tapping screwX6	Fix the base support in case of wooden wall
H	WasherX6	Fix the base support in case of wooden wall

Base for Battery:

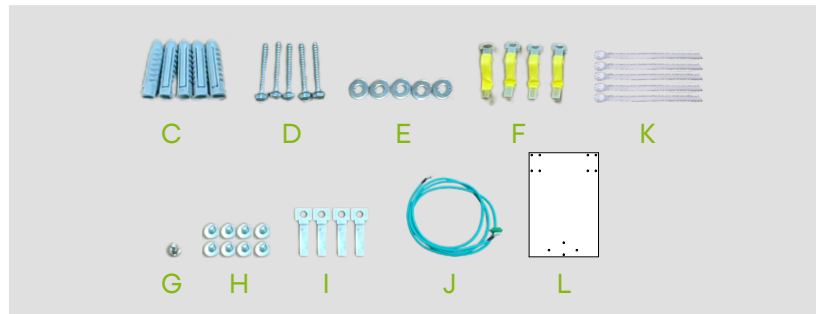


Item	Name and Quantity	Description
/	Base	Product

5.3 Packing Lists of BI In the BI box



In the BI accessory box



Item	Name and Quantity	Description
A	Backup interfaceX1	Product
B	BracketX1	Support the BI to be mounted on the wall
C	Expansion boltX5	Four for fixing the bracket and one for fixing the BI
D	Self-tapping screwX5	Four for fixing the bracket and one for fixing the BI
E	WasherX5	Four for fixing the bracket and one for fixing the BI
F	55*13*23.7mm Copper barX4	For parallel connection with inverter
G	M4*12 cross screwX1	Fix the circuit breaker
H	M5*12 cross screwX8	Fix the part when parallel connection with inverter
I	40*13*7.9mm Copper barX4	For parallel connection with inverter
J	Communication cableX1	Communicate with inverter
K	Cable tieX5	Fix the cable
L	Punching reference paperX1	For hole location

5.4 Tools Required

Tool equipment				
Type	Name	Image	Name	Image
Individual Protection Tool	Safety gloves		Safety shoes	
	Safety goggles		Anti-dust mask	
Machine Installation Tools	Drill		Multimeter	
	Crosshead screwdriver		Allen key	
	Wire stripper Crimping tool		Crimping tool for RJ45	
	Utility knife		MC4 crimping tool	
	Diagonal pliers		Marker	
	Mallet		Measuring tape	
	Spirit level		Hot-air blower	
	Electrical hex wrench		Flat-head screwdriver	

6. Plan the Installation Site

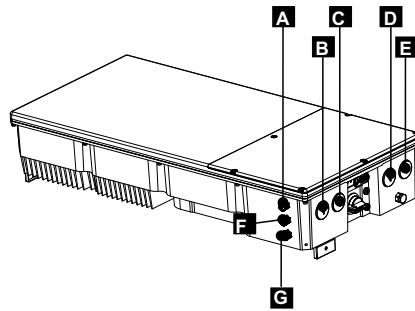
Choose a propriate location

Choose a wall capable of supporting the full weight of inverter, battery and BI. If floor-mounting inverter and battery, choose a level surface adjacent to the below wall.

- Wood studs spaced at 12, 16, 20, 24, 28 and 32 inch
- Steel material of sufficient thickness
- Solid concrete or masonry

Choose cable entry of inverter

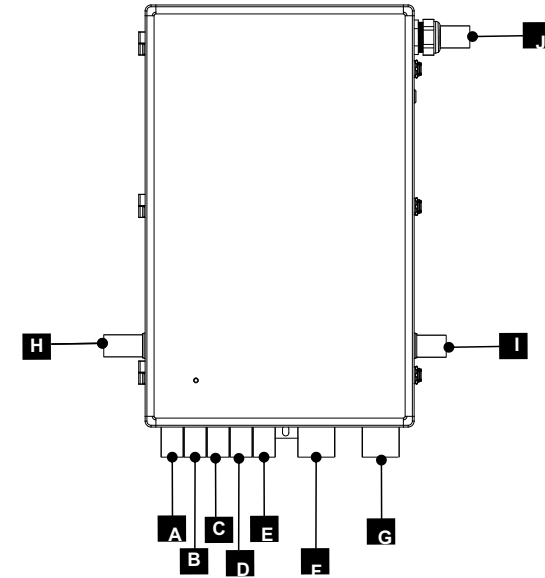
A conduit fitting or cable gland must be used when wiring connection. For the wiring connection of inverter, the cable is routed from the right side of inverter. Totally four 1 inch openings are available for connecting.



Item	Description
A	BAT+
B	AC conduit plug
C	Inverter communication connection
D	PV conduit plugs
E	PV conduit plugs
F	Battery communication connection
G	BAT-

Choose cable entry of BI

A conduit fitting or cable gland must be used when wiring connection. For the wiring connection of BI, the cable is routed from the bottom and sides of device. Totally two 2 inch (F and G), one 3/4 inch (J) and seven 1 inch openings are available for connecting.



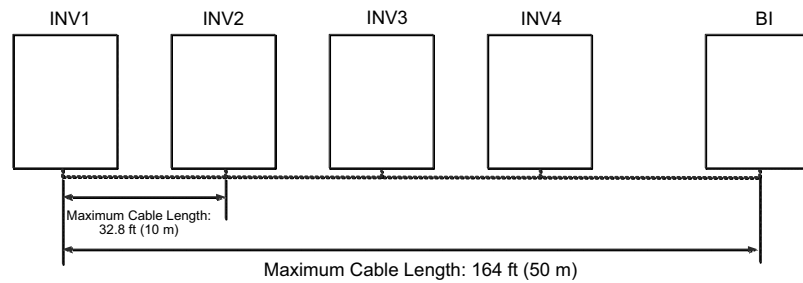
Item	Description
A	AC conduit plug for inverter
B	AC conduit plug for inverter
C	AC conduit plug for inverter
D	AC conduit plug for generator
E	AC conduit plug for inverter
F	Conduit plug for load connection
G	Conduit plug for grid connection
H	Reserved
I	Reserved
J	Communication conduit plug

Plan amount and size of conduit

Calculate the amount and size of conduit needed for the installation, based on fill limits and local code requirements. An adapter may be required between the entry into the wiring compartment and the conduit.

Plan the distance of each unit in the system

The figure below is for maximum distances between each system unit. Wire gauge must meet the local requirements and it changes based on distance. Please refer to "Appendix A Wiring and breaker reference".



7. Mechanical Installation

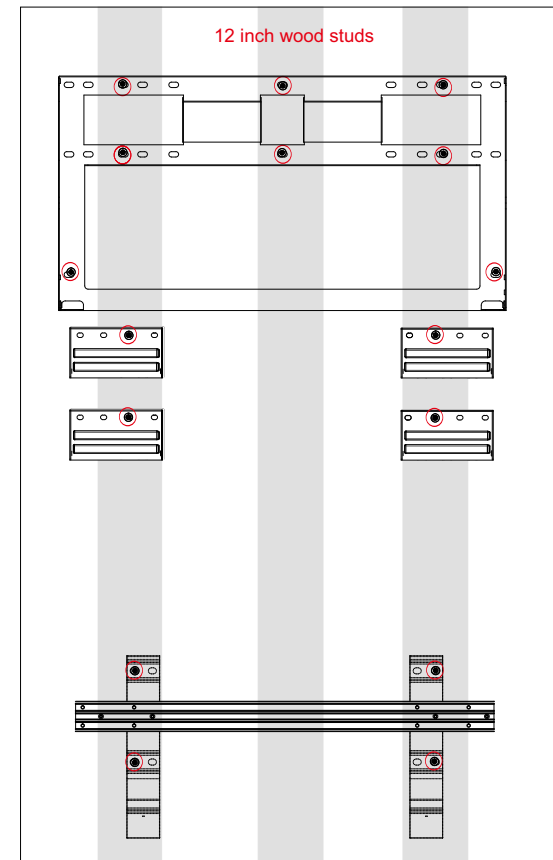
7.1 Overview of Installation Schemes

The anchoring details below is demonstrated assuming that four BATs are installed.

Scheme A

Wood Studs (spaced at 12 and 24 inches)

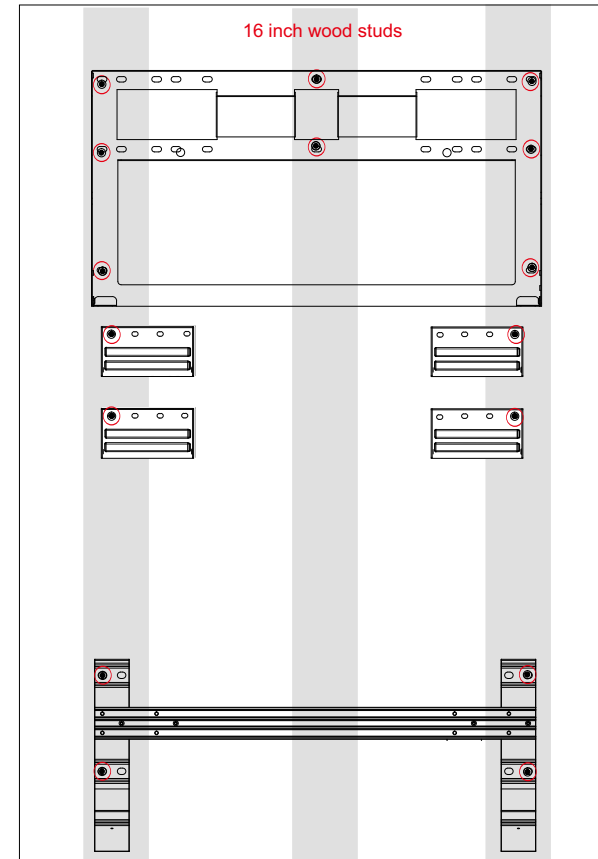
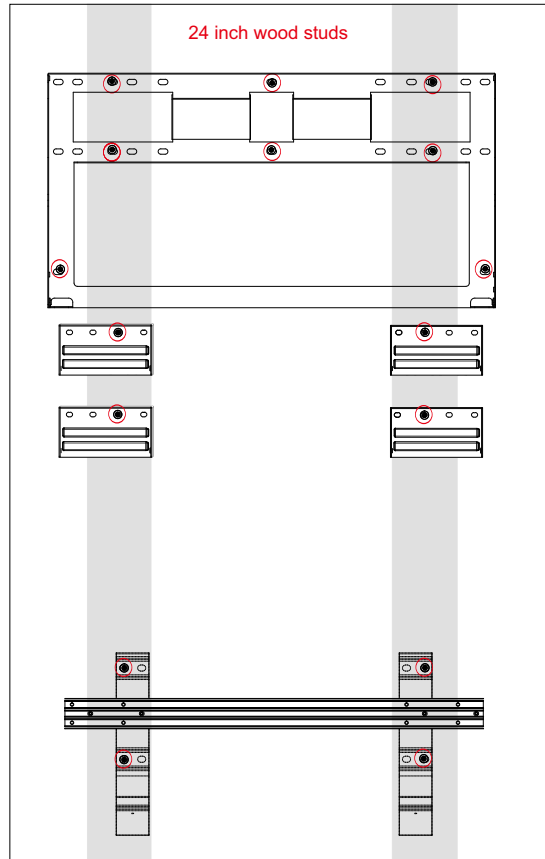
If anchoring directly into wood studs, use at least 8 screws with washers respectively for inverter and battery, of sufficient length into the studs.



Scheme B

Wood Studs (spaced at 16 and 32 inches)

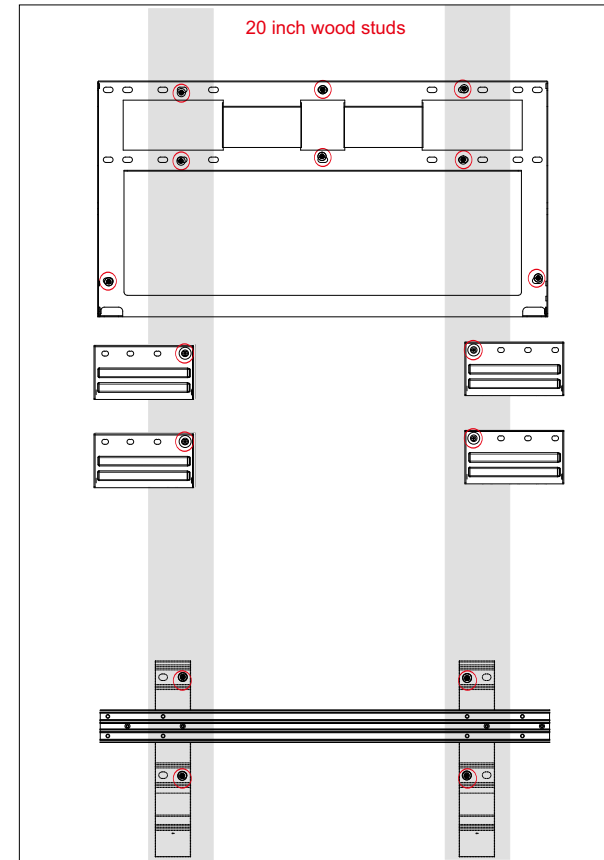
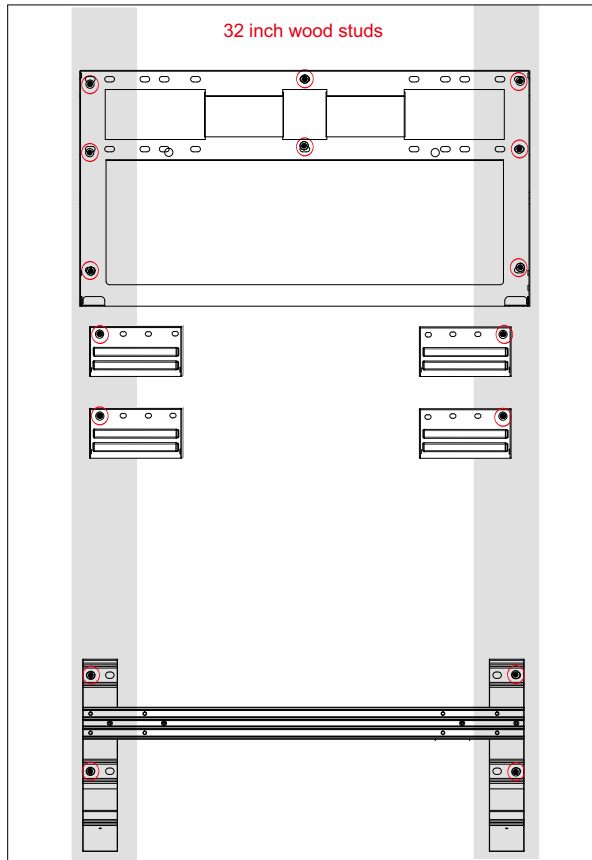
If anchoring directly into wood studs, use at least 8 screws with washers respectively for inverter and battery, of sufficient length into the studs.



Scheme C

Wood Studs (spaced at 20 inches)

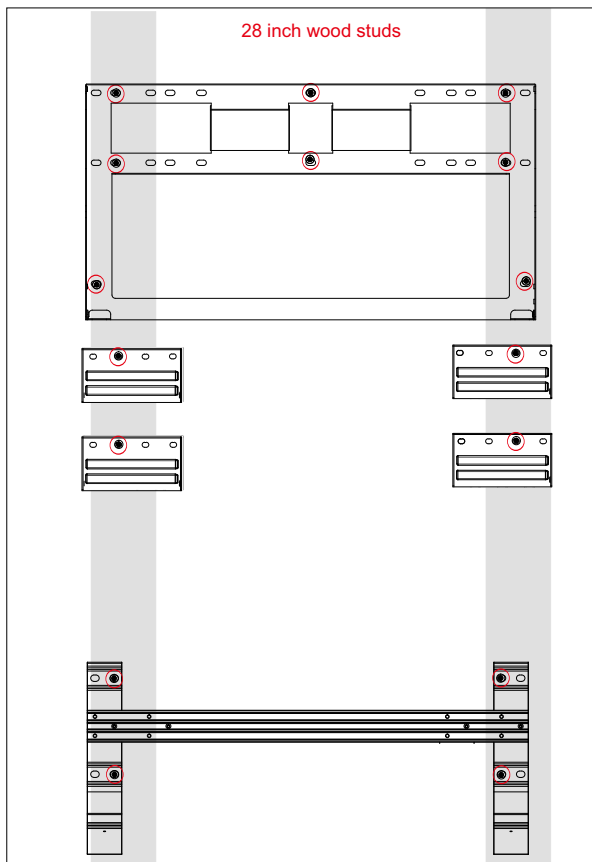
If anchoring directly into wood studs, use at least 8 screws with washers respectively for inverter and battery, of sufficient length into the studs.



Scheme D

Wood Studs (spaced at 28 inches)

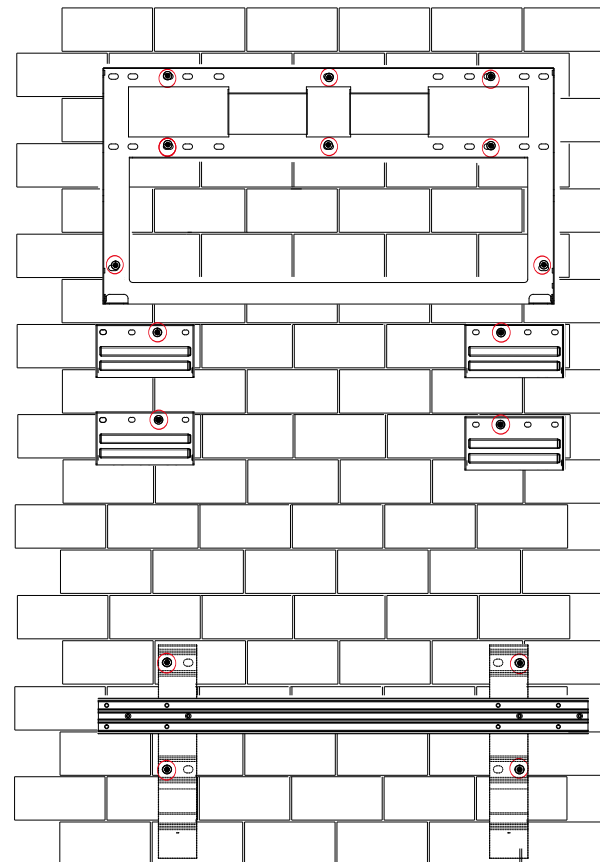
If anchoring directly into wood studs, use at least 8 screws with washers respectively for inverter and battery, of sufficient length into the studs.



Scheme E

Concrete or Masonry

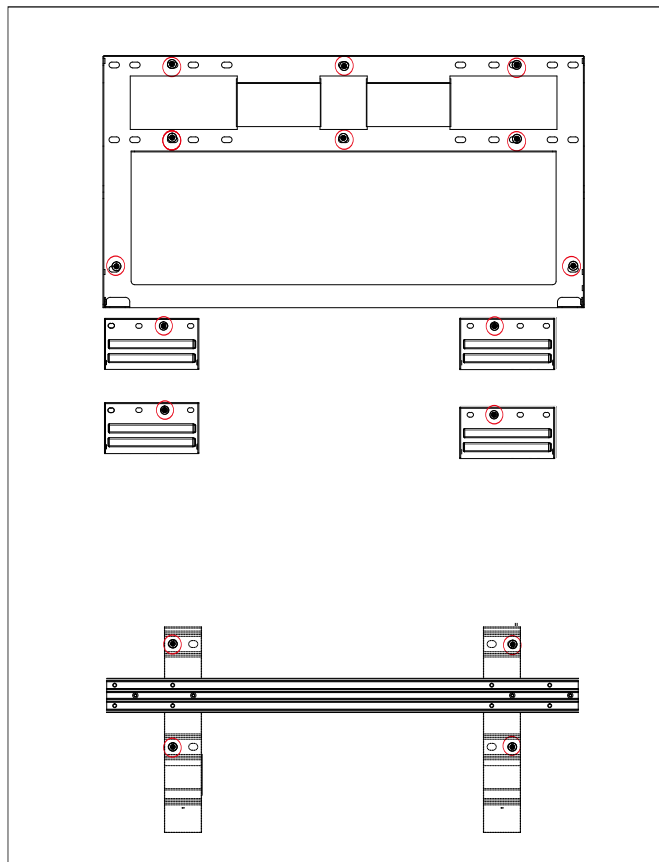
If anchoring to concrete or masonry wall, use 8 screws with washers respectively for inverter and battery and make sure the screws are at least 1.49 in (38 mm) away from the edge of bricks or blocks. Punching holes spaced at 24 inch is recommended.



Scheme F

Steel material of sufficient thickness

If anchoring to steel material, use 8 screws with washers respectively for inverter and battery. Punching holes spaced at 24 inch is recommended.



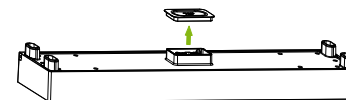
7.2 Installation Methods

There are two alternative installation methods (wall mounting and floor mounting) and several schemes available for users. For details, please refer to Section 7.1. The following installation will take Scheme “base+four batteries+BMS+inverter+BI” mounting on the wooden wall with studs spaced at 32 in / 812.8 mm as an example.

7.3 Floor-mounting

Step 1: Mount the battery

a) Remove the dust cover of the base;



WARNING!

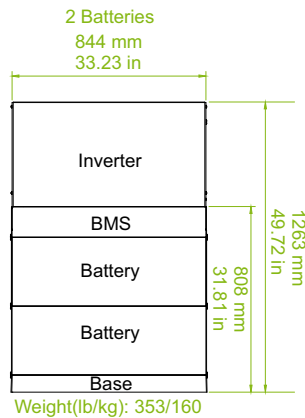
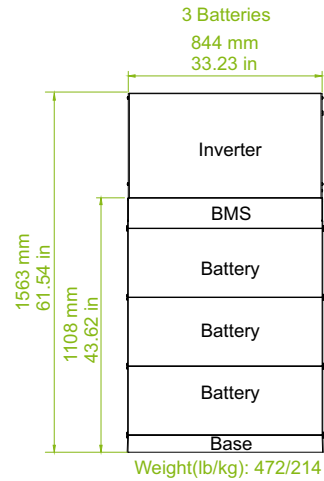
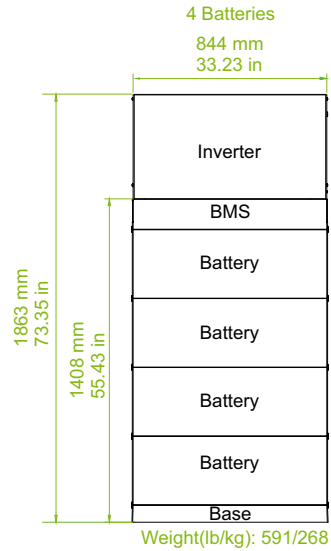
During installation, please make sure battery port is not short-circuited.



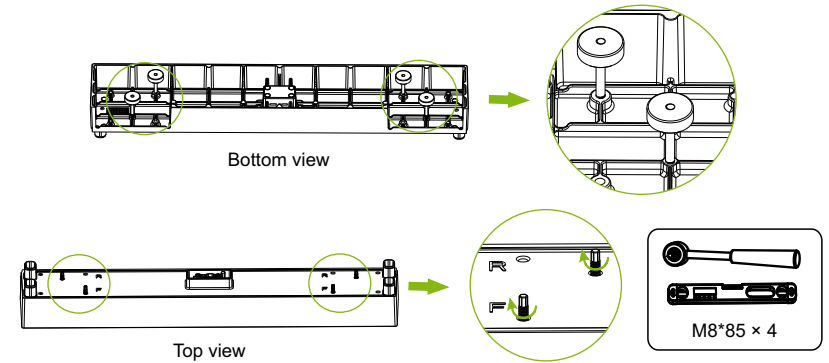
NOTE!

A distance of at least 19.68 in / 500 mm shall be set aside on both sides of the whole system.

Weight and mounting height instructions



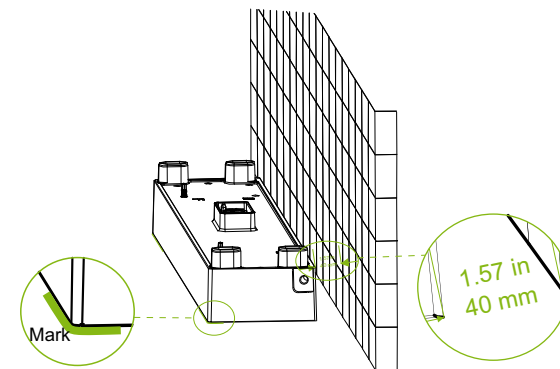
b) Insert the adjustment screw (2XM8 adjustment screws) from the bottom of base and clockwise / anticlockwise turn the adjustment screws by torque wrench to make the base leveled;



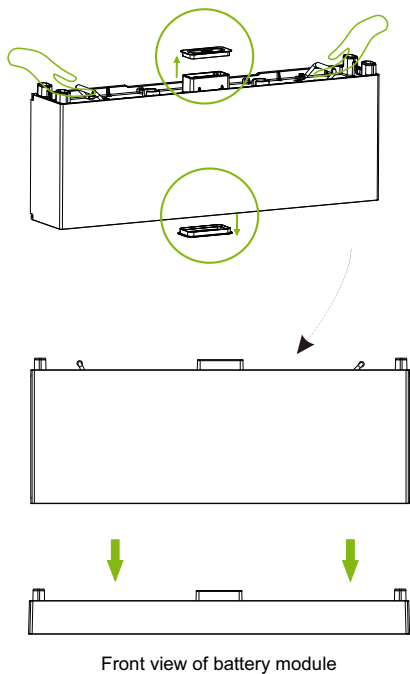
NOTE!
Use a spirit level to measure the sides of the Base to ensure they are even.

NOTE!
Clockwise turn the adjustment screws to lower down the base.
Anticlockwise turn the adjustment screws to lift up the base.

c) Locate the base 1.57 in / 40 mm away from the wall, accurately mark the location of the base on both sides with a marker;



d) Manual-remove the top and bottom dust cover of the battery module and catch hold of the handle to stack the battery module to the base. Make sure that each connecting pole of the battery module or base is well plugged into the slot of the next battery module which is on the bottom of the module;



WARNING!

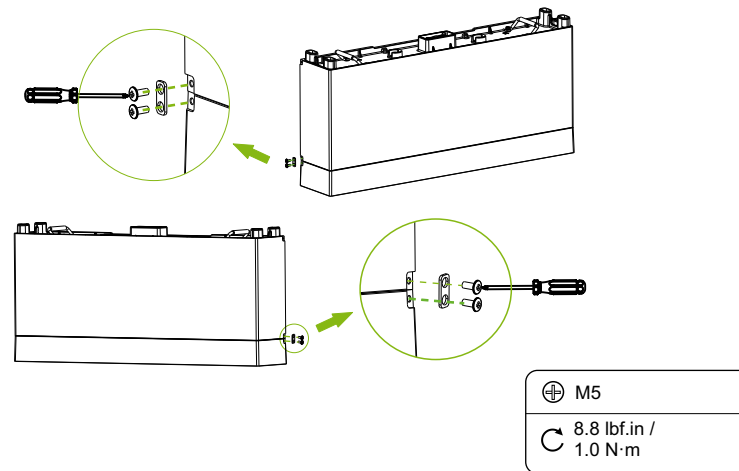
If the Base is shifted after placing a Battery Module, move it to its original location according to the mark previously drawn.



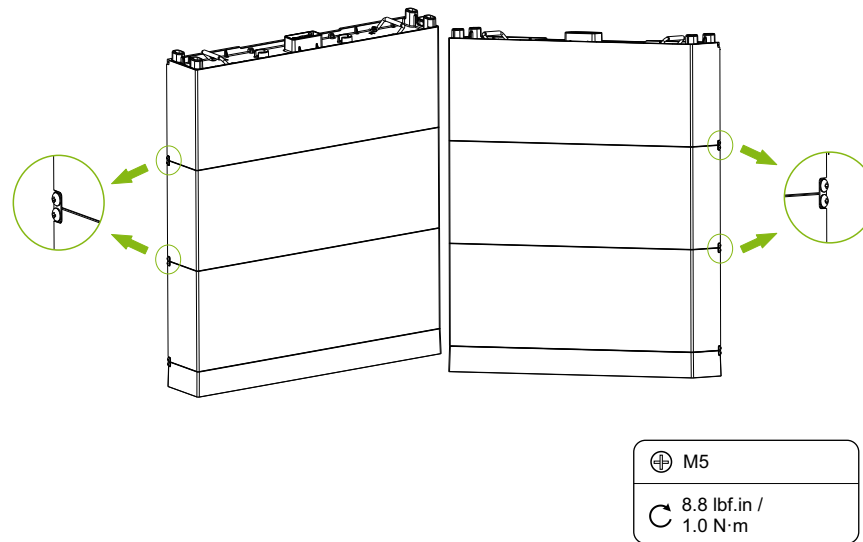
WARNING!

During installation, please make sure battery port is not short-circuited.

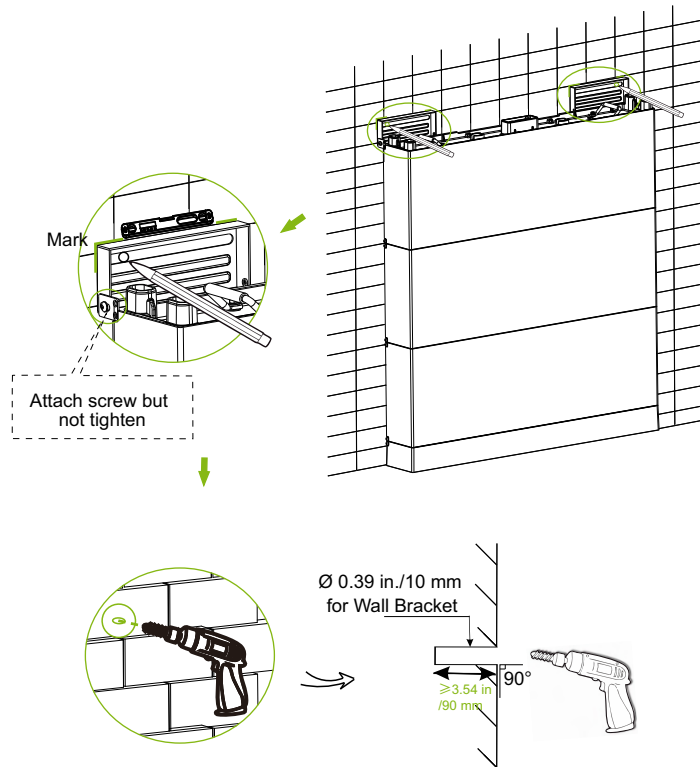
e) Mount the fixing plate (2 holes) using M5 * 10 cross screw, and secure M5*10 screws (2 for each side) to connect Base and Battery Module;



f) Place two battery modules in turn, and secure both left and right sides with screws (4×M5*10 countersunk screw);

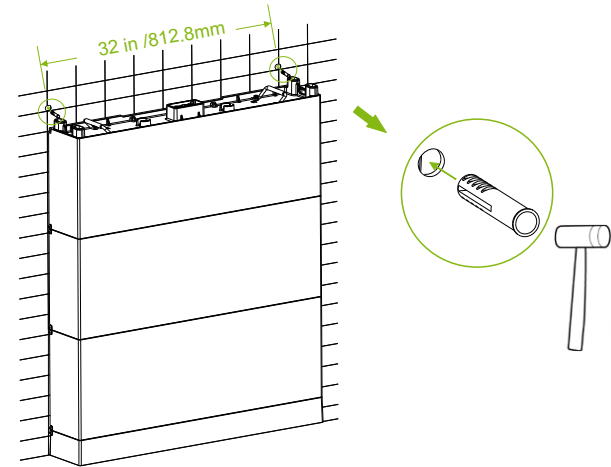


- g) Mount the bracket of the battery module;
- Screw in M5 * 10 screw to wall bracket but be sure not to tighten;
 - Place such wall bracket to the wall, align its holes to the holes on the battery module, and use a spirit level to measure the wall bracket to ensure it's even;
 - Accurately mark the location of the wall bracket on both sides with a marker;
 - Circle along the inner ring of the holes;
 - Remove the wall bracket, and then drill the two holes (at least 3.54 in / 90 mm) by a $\phi 10$ Drill. Electric drill dust collector is recommended.

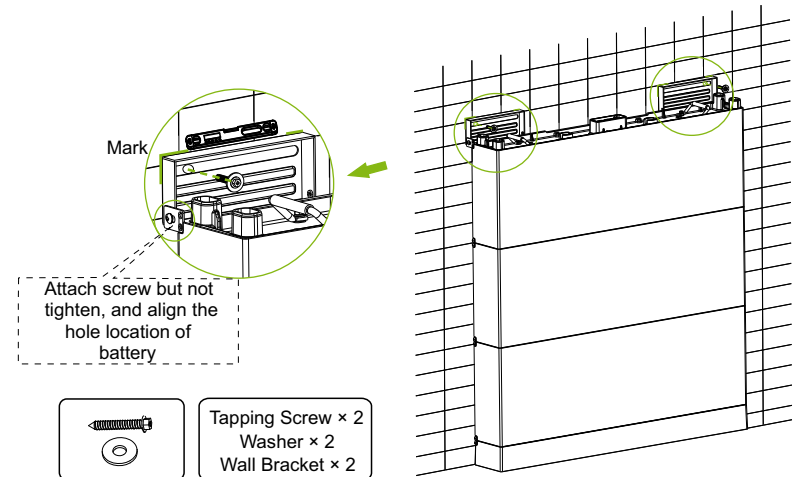


CAUTION!
 Please re-mount the dust cover to the battery module before drilling holes to avoid dust falling into the interface and do remember to remove the dust cover again after the installation of wall bracket completed.

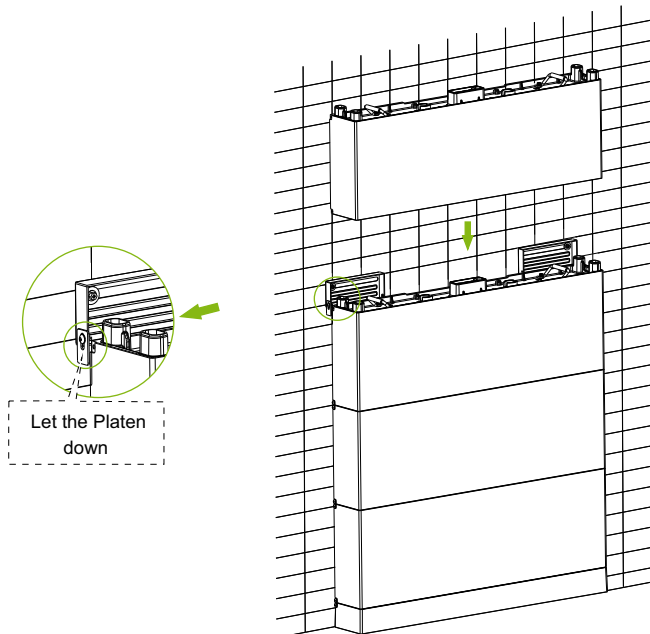
- h) Place expansion bolts into the two holes (the expansion bolt is not required in case of solid wood wall);



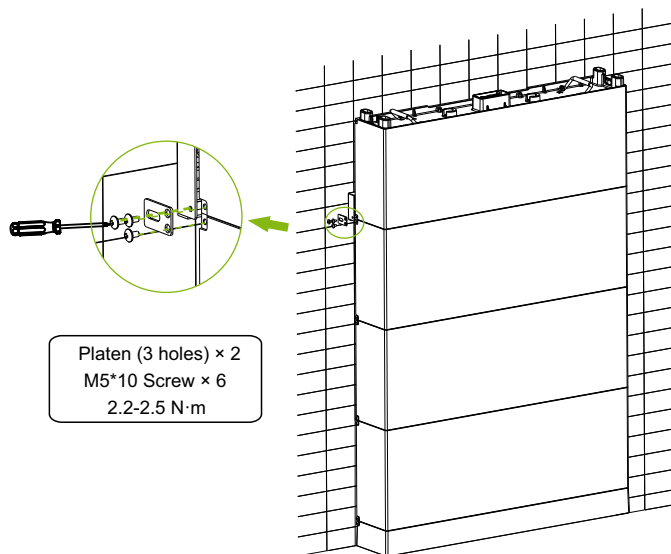
- i) Re-place the wall bracket on the wall where the mark is drawn previously, and then secure the wall brackets on the wall using tapping screws and washer;



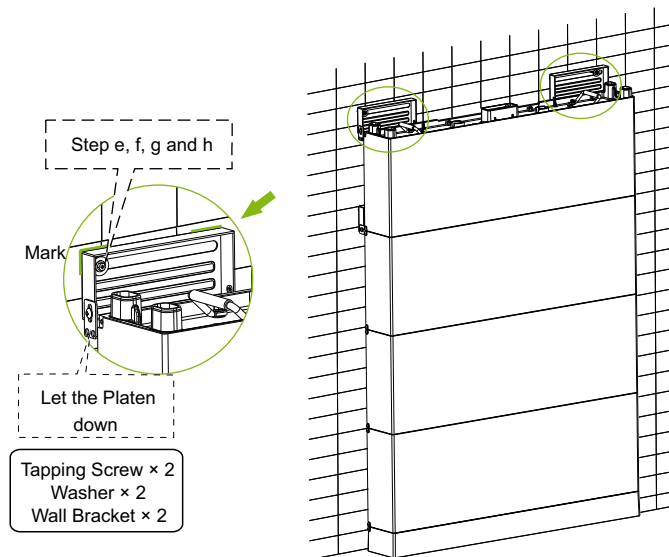
j) Let the fixing plate down and place the fourth battery module;



k) Fix the fixing plate (3 holes) on both sides of battery module using M5 * 10 cross screw, and then tighten M5*10 screws;



l) Mount the wall bracket for the four battery module and BMS. Please refer to Step g) for details;

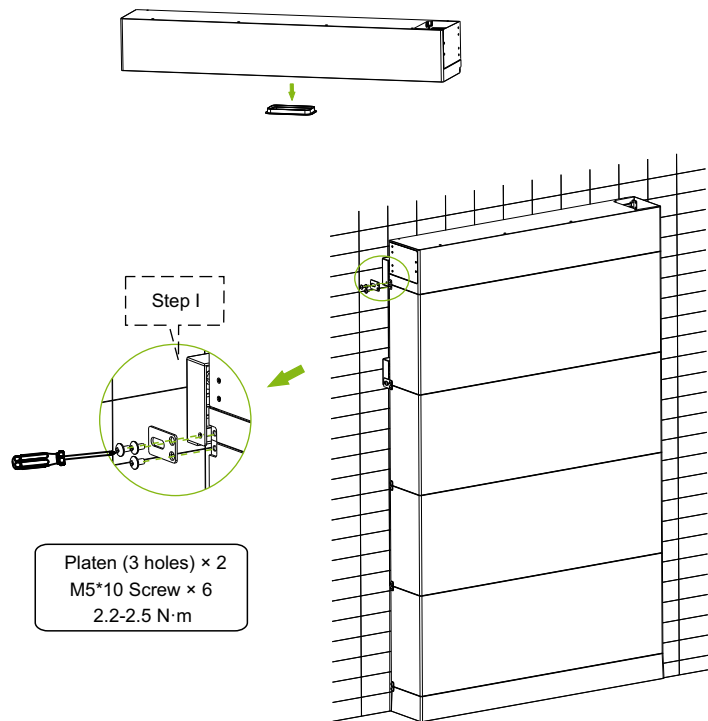


NOTE!
Electric drill dust collector is recommended.



CAUTION!
Please re-mount the dust cover to the battery module before drilling holes to avoid dust falling into the interface and do remember remove the dust cover again after the installation wall bracket completed.

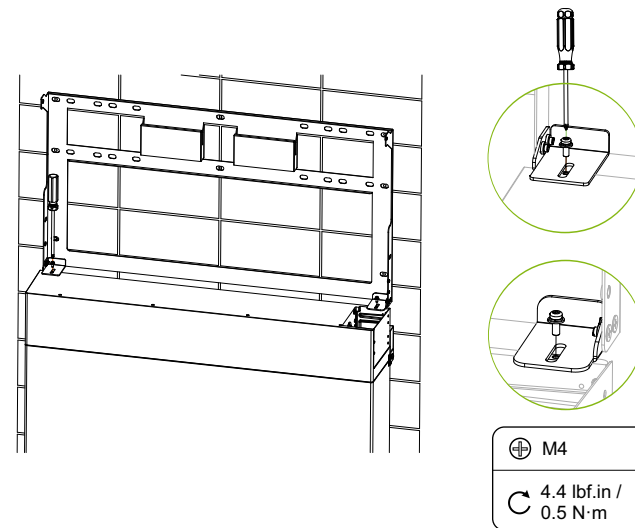
m) Remove the bottom dust cover of BMS and place the BMS on the top. Fix the fixing plate (3 holes) on both sides of battery module using M5 * 10 cross screw, and then tighten M5*10 screws.



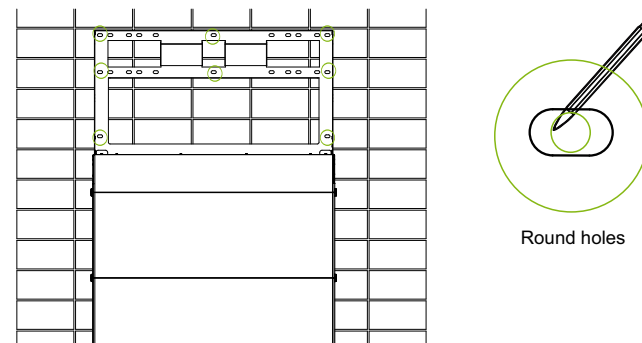
Step 2: Mount the inverter

a) Two M4 holes are reserved on the BMS for fixing the bracket of the inverter.

- Screw in M4 screws to pre-fix the bracket on the BMS but be sure not to tighten.
- Hold the bracket firmly to the wall surface.
- Tighten the M4 screws to fix the bracket on the BMS.



b) Use the bracket as the template to mark the screw hole location on the wall;

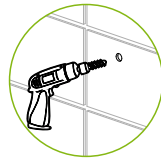
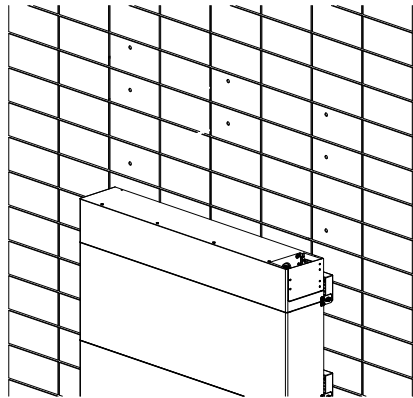


c) Unscrew the two M4 screws to disassemble the bracket. Drill holes with power drill, and make sure the holes are deep enough (2.16 in / 55 mm) to support the inverter.



NOTE!

The figure below is only used for showing the depth and location of holes. Make sure the holes are in the center of each stud and keep at least 1.49 in / 38 mm away from the edge of concrete bricks or studs before marking holes.



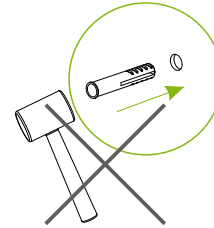
Φ4 drill
Depth:
2.16 in / 55 mm



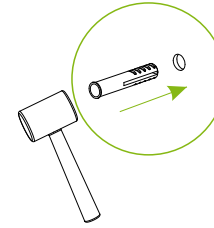
NOTE!

For solid concrete wall, please use Φ10 drill.

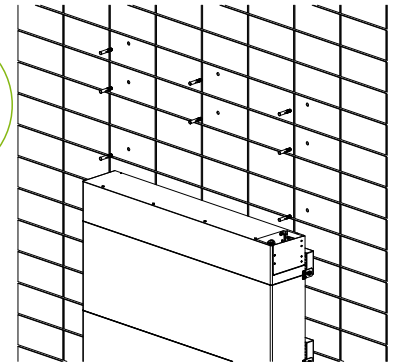
d) Insert the expansion tube into the hole and use rubber hammer to knock the expansion tube into the wall; (It can be ignored in case of wooden wall.)



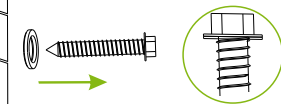
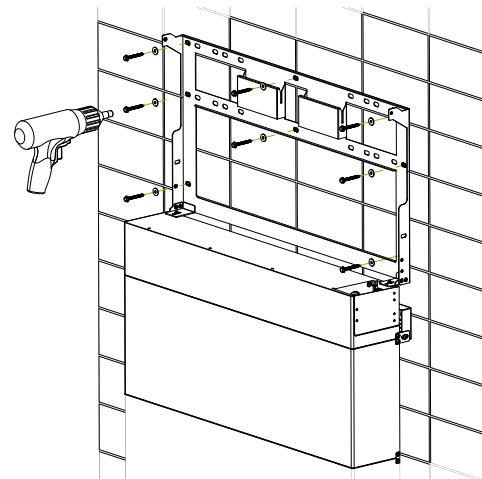
For wooden wall,
this step is not required



For solid concrete wall,
this step is required

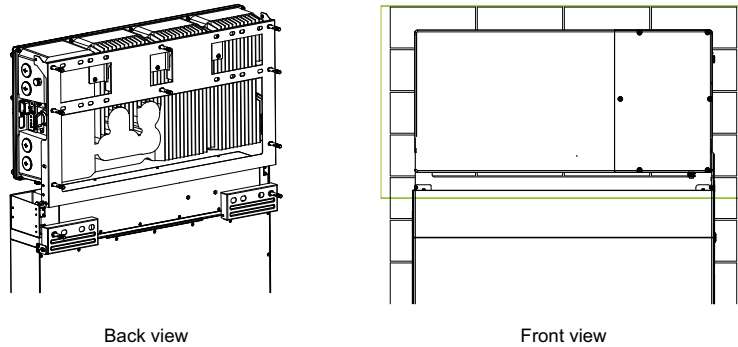


e) Align the bracket over the holes and re-fix the bracket on the BMS with screws. And set the tapping screw through the washer and secure the bracket with tapping screws. Please hold the bracket firmly to the wall surface before fixing it.

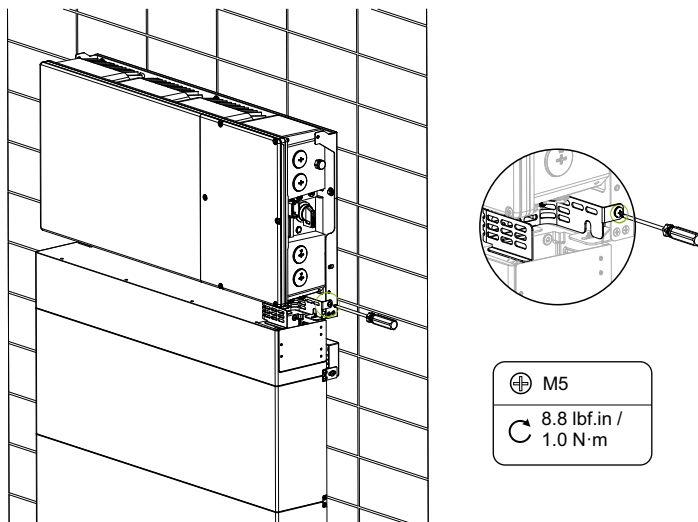


10
mm
26.5 lbf.in /
3.0 N·m

f) Place the inverter to be seated on the corresponding position of the bracket. As GWU-HYB series inverters are heavy, weigh 75 lbs / 34 Kg. They should be lifted up by two persons and placed carefully onto the bracket. Then adjust the inverter to be centered on the whole system;

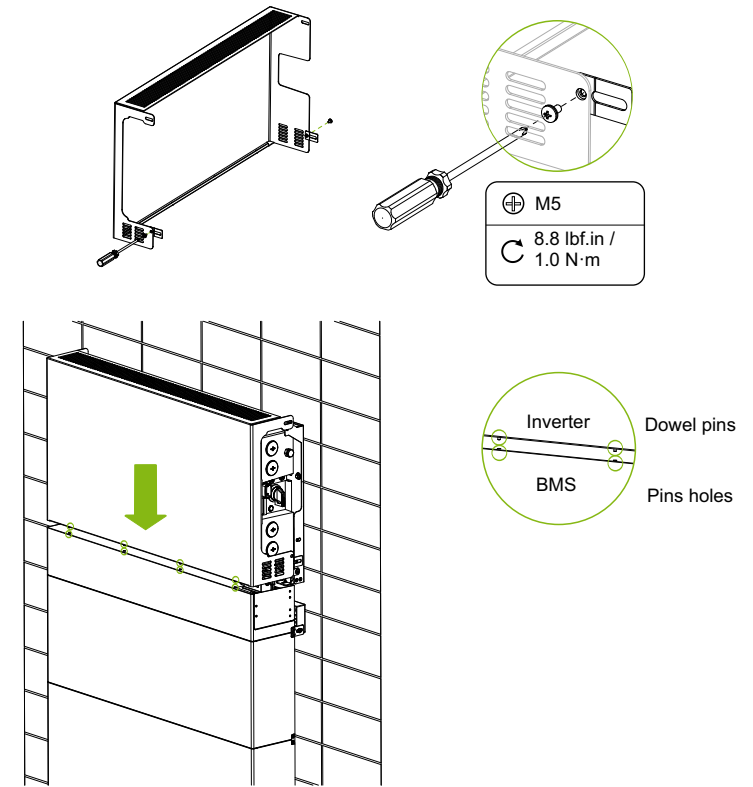


g) Place the protective guard on the correct position of battery's BMS prior to the wiring connection between inverter and battery and fix it with the inverter bracket with M5 screws;



⊕ M5
 ↻ 8.8 lbf.in / 1.0 N·m

h) Pre-mount the fixing plate on the two sides of metal cover and mount the metal cover on the inverter. Please make sure the four dowel pins are inserted into the holes of BMS and adjust the whole system (inverter and battery) to be leveled;



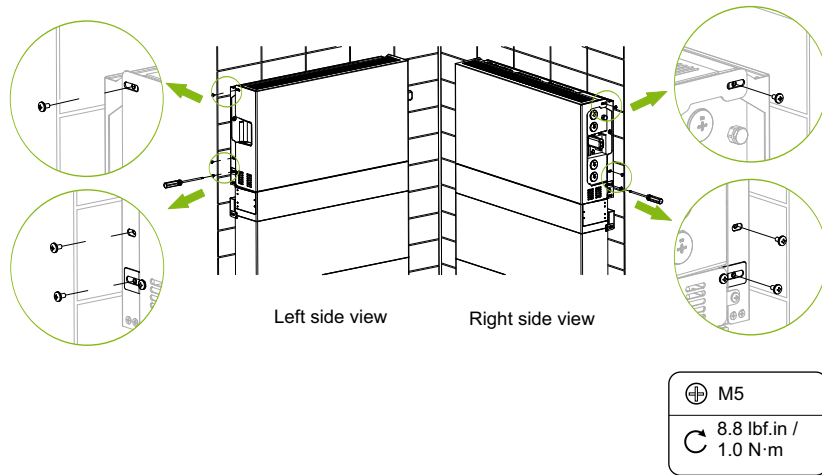
⊕ M5
 ↻ 8.8 lbf.in / 1.0 N·m

Inverter
 Dowel pins
 BMS
 Pins holes



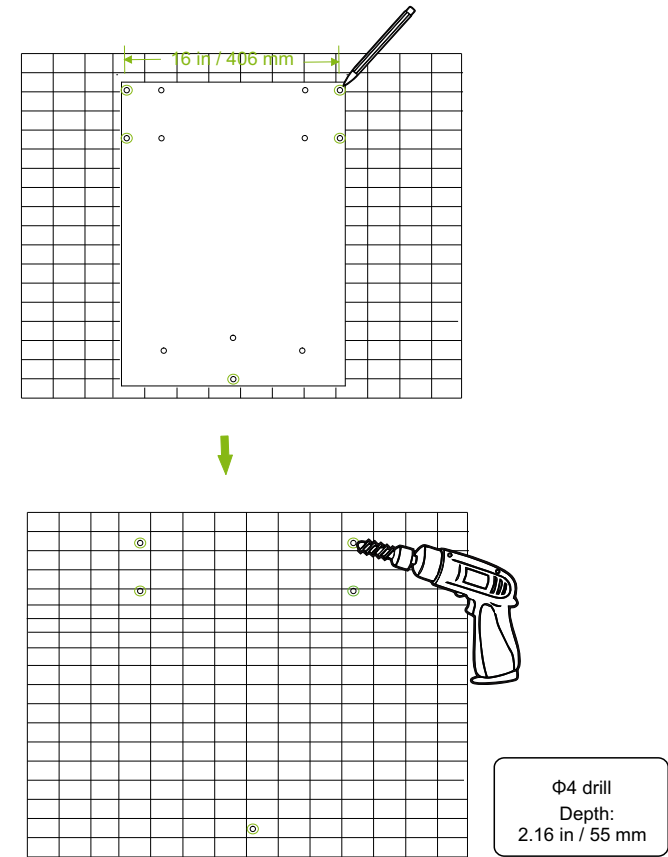
NOTE!
 Before mounting the metal cover, the wiring connection between battery and inverter must be completed. For detailed information about how to connect the battery to the inverter, please refer to Chapter 8 and 9 "Electrical Connection".

i) Fix the metal cover with six M5 screws.



Step 3: Mount the BI

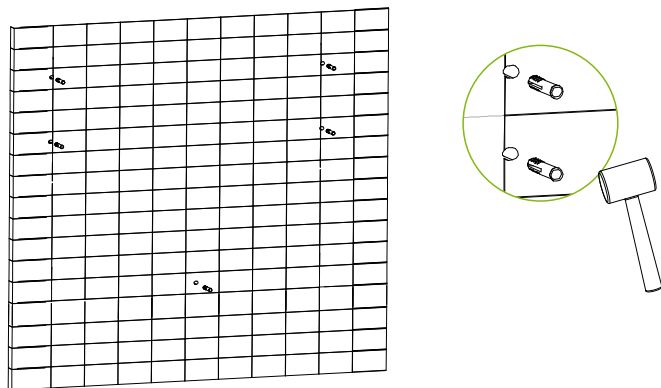
a) Use the mounting reference paper as a template to mark the screw hole location on the wall; And drill five holes on the wall.



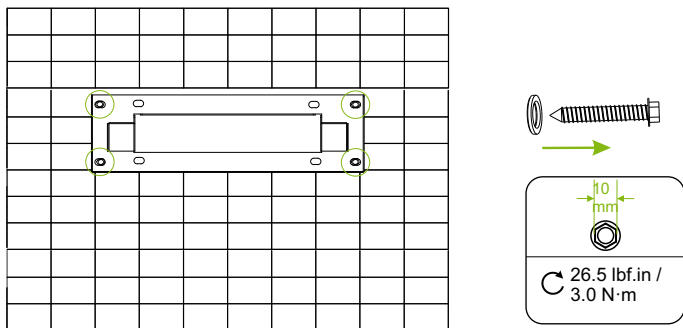
NOTE!
For solid concrete wall, please use Φ10 drill.

NOTE!
The inner-side hole of the bracket is 12 in / 305 mm.

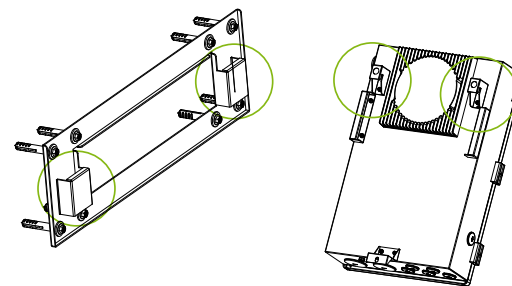
b) Use mallet to knock the five expansion tube into wall (This step can be ignored in case of wooden wall).



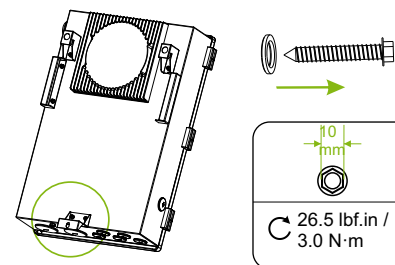
c) Secure the bracket on the wall with tapping screw and washer using torque wrench. Please hold the bracket firmly to the surface of the wall when fixing bracket.



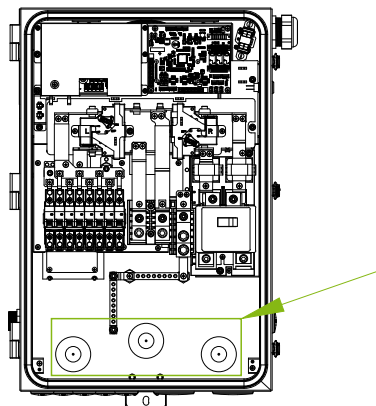
d) Hang the BI on the bracket. Please make sure the cleat is well seated on the bracket.



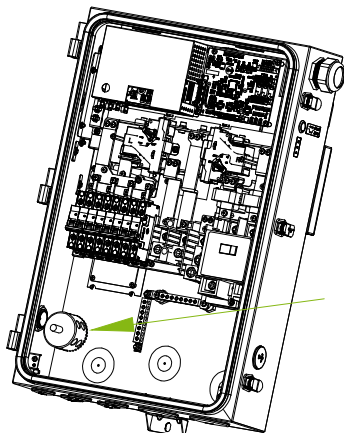
e) Secure the BI by screwing in the tapping screw with washer on the bottom of BI.



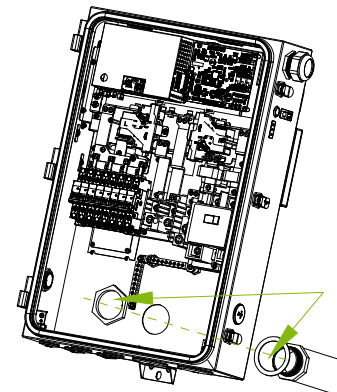
Drill a hole in the back (Not recommended)



a) These three holes correspond to the holes below the perforated paper.

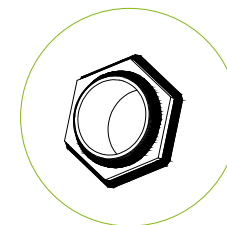
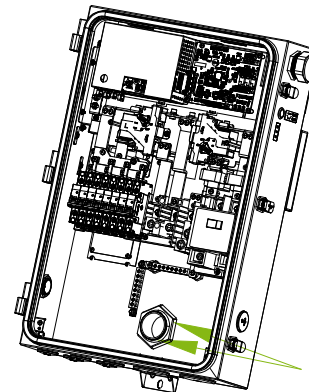


b) Drill the hole with a hole cutter. Choose 1 inch or 2inch size (Metal chips must be cleaned after drilling)



c) Lock nut, waterproof gasket(outside), conduit.

NOTE!
 Prohibit the flow of water inside the tubing water into the machine!



c) The top of the nut and contact surface of the threads must be cleaned after locking the nut, as well as the contact surface between the nut and the box. TSE-382 waterproof adhesive or a similar performance glue.

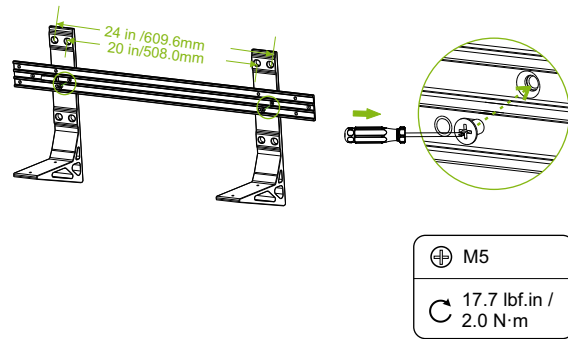
NOTE!
 Drilling a hole in the wall is required before cutting a hole in the rear. To guarantee easy installation of the conduit and sealing with the chassis, the hole's size must be greater than the conduit's outside diameter.

7.4 Wall-mounting

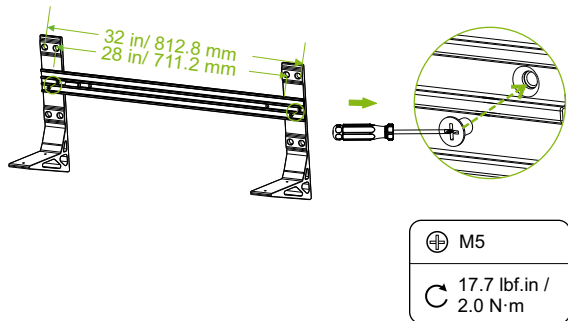
Step 1: Mount the battery

a) Take out of the accessories from a separate accessory box. Fix the base support on the transverse plate with M5 countersunk head screw.

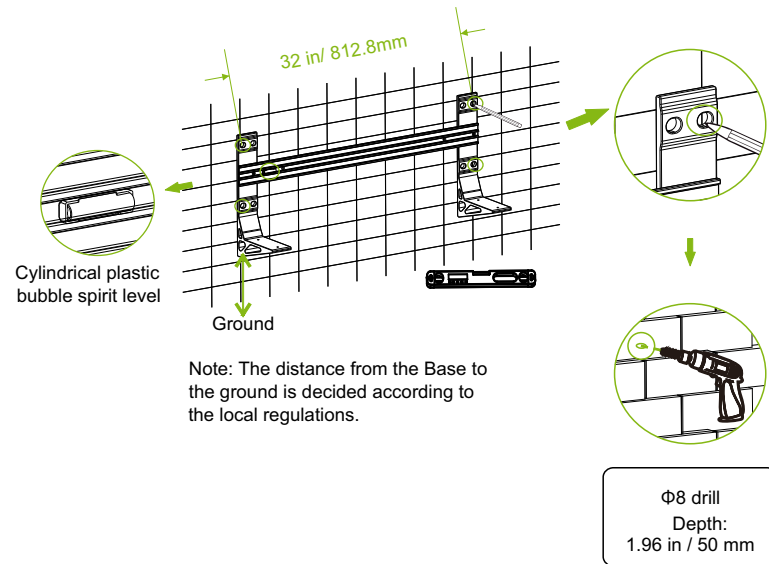
Studs spaced at 12, 20 and 24 inch: secure the transverse plate and base support using screws (2×M5*8 countersunk head screw), and tighten them. See figure below.



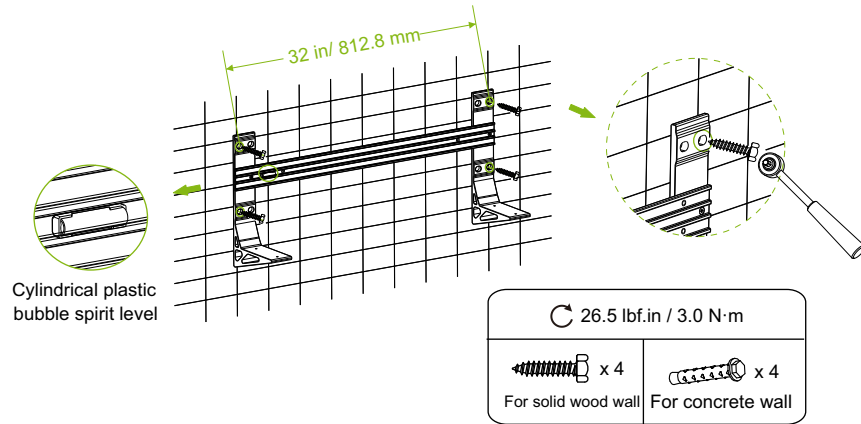
Studs spaced at 16, 28 and 32 inch: secure the transverse plate and base support using screws (2×M5*8 countersunk head screw), and tighten them (Tighten torque: 2.2-2.5 N·m). See figure below.



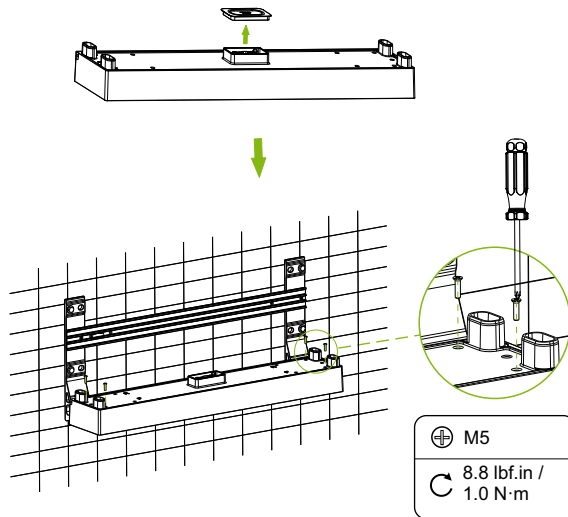
- b) Mark the hole location and drill holes;
- Place the assembled transverse plate and base support on the wall, look the cylindrical plastic bubble spirit level on the transverse plate. If the bubble isn't in the center, slightly bow it to the horizontal.
 - Then determine the position of holes.
 - Mark it with a marker.
 - Remove it and drill the four holes by Drill ($\phi 12$ for concrete wall at least 3.54 in / 90 mm, or $\phi 8$ for solid wood wall at least 1.96 in / 50 mm).



NOTE!
The bubble spirit level on the transverse plate can be used as an auxiliary tool. Additionally, please prepare a spirit level to measure whether the plate is even or not.



- d) Secure the base to the assembled base support;
- Remove the bottom cover of the base;
 - Place base on the base support and secure both left and right sides with screws (4 × M5*20 countersunk screw).



e) The steps of mounting battery modules, BMS and inverter are same as the floor-mounting's. Please refer to "7.3 Floor-mounting" for more details.

8. Wiring Connection on the Inverter

8.1 Overview of All Electrical Wiring Methods

All electrical wiring will be done in the wiring box, and all electrical wiring methods are similar. Therefore this section will introduce all electrical wiring steps and requirements.

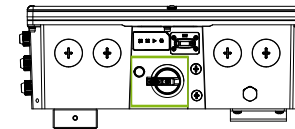
- **Opening the wiring box cover**



WARNING!

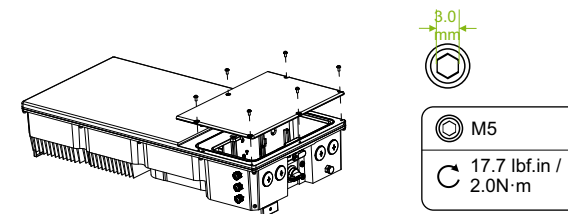
Before inverter wiring connection, Make sure no live voltages are present on PV input and AC output circuits, and make sure that the DC switch is in "OFF" position, meanwhile, the breaker of battery is in OFF position.

Step 1: Turn DC switch to "OFF" position. Note that the cover cannot be removed when the DC switch is in "ON" position.



Step 2: Make sure the breaker of battery is in OFF position.

Step 3: Remove the 6 cover screws using Allen key, then disassemble the cover.

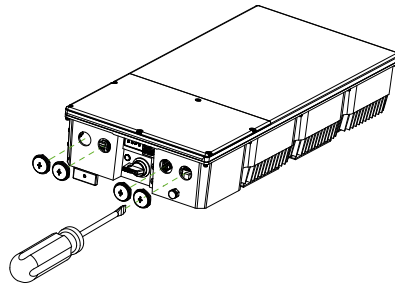


• Removing wiring box waterproof plugs

GWU-HYB series inverter is equipped with four 1 inch conduit fittings which are used for electrical wiring access. Four waterproof plugs have been installed on the inverter at the factory. Before wiring connection, these waterproof plugs should be removed by the operator.

Step 1: Remove the waterproof plugs by placing a flat blade screwdriver in the slot on the waterproof plug face and turning while gripping the nut on the inside of the enclosure to ensure it does not slip.

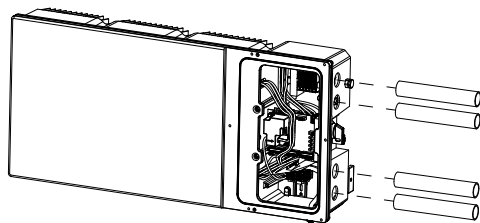
Step 2: Unscrew the nut from the waterproof plug and slip the conduit plug out of the waterproof opening.



• Conduit installation

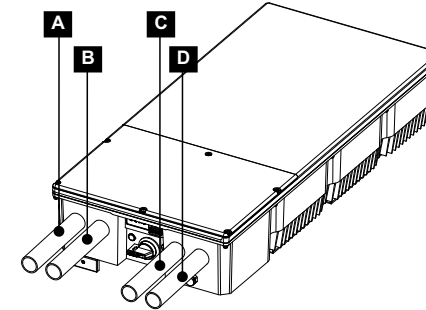
Operator should use the conduits and plugs with standard size which must fit with the holes on the right side of the inverter. Conduit fittings need to be water tight, and an insulated type is preferred.

Once conduit and fittings are installed, wires should go through the conduit and be locked into the corresponding terminals.



• Cable entry of inverter

A conduit fitting or cable gland must be used when wiring connection. The cable is routed from the right side of inverter.



Item	Type of Cable Entry
A	Conduit plug for AC connection
B	Conduit plug for communication connection
C	Conduit plugs for PV connection
D	Conduit plugs for PV connection

8.2 Power Connection

• General steps of connecting electrical wirings to terminals

Step 1: Choose the appropriate wire according to the specific connection.

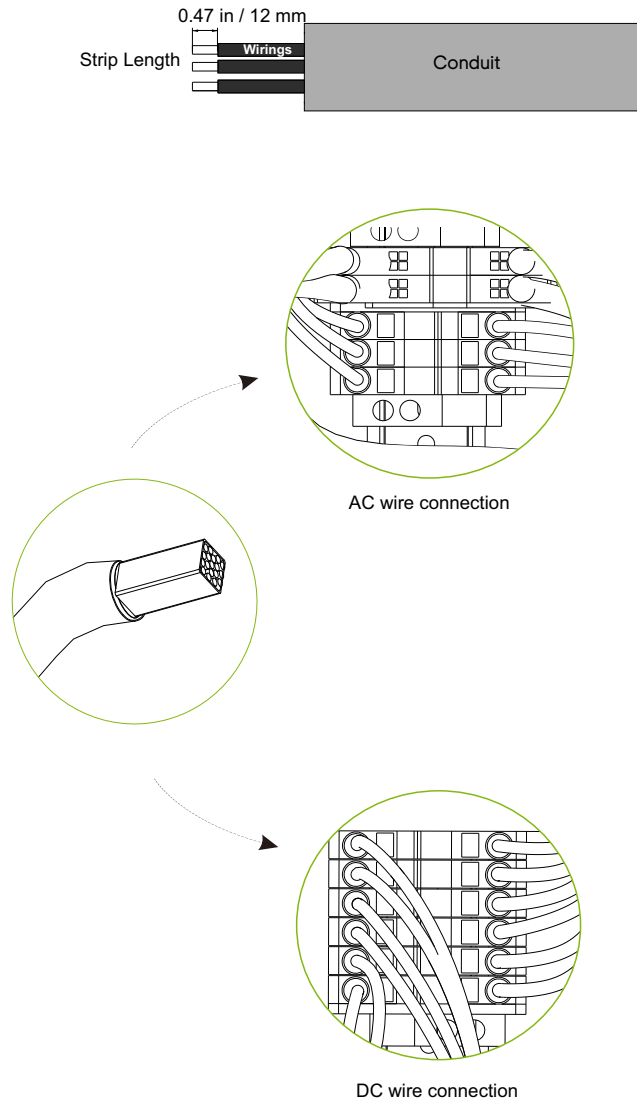
Step 2: Remove 0.47 in / 12 mm of insulation from the end of DC wire and the AC wire.

Step 3: Insert the end of wires into the Cord End Terminal, and then use the crimping tool to crimp the Cord End Terminal tightly (the shape will be square).

Step 4: Use the slot screwdriver to compress the orange button of the terminals. Then insert stripped wires into the terminal and ensure that all conductor strands are captured in the terminal.

Step 5: Loosen the slot screwdriver.

For the specific requirement of power cable, please refer to "Appendix A: Wiring and Breaker Requirement".



8.2.1 PV Connection



CAUTION!

Never reverse the polarity of the array string cables as it can cause damage to the inverter. Always ensure correct polarity.



WARNING!

Select PV modules with excellent functioning and reliable quality. Open-circuit voltage of module arrays connected in series should be less than the inverter Max. DC input voltage of 550 V. The inverter warranty is VOID if the DC input voltage is exceeded.



WARNING!

Ensure no live voltages are present on the PV input and AC output circuit, and verify that the DC disconnect, AC disconnect, and dedicated AC circuit breaker are in the "OFF" position before installation.



WARNING!

Use dark, opaque sheets to cover the PV solar panels before performing any wiring or connection.



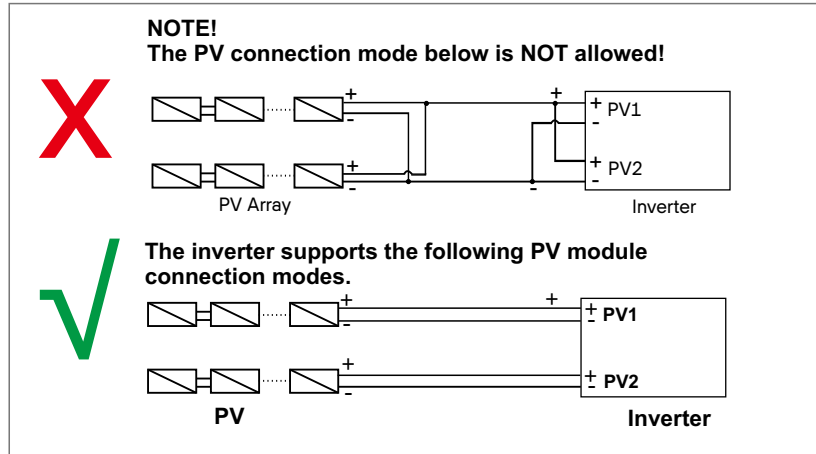
WARNING!

Power is fed from more than one source and more than one live circuit. Note that all DC and AC terminals may carry current even without connected wires.



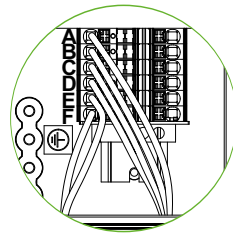
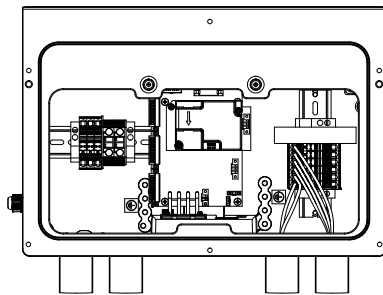
WARNING!

Ensure maximum protection against hazardous contact voltages while assembling PV panel installations. Both the positive and negative leads must be strictly isolated electrically from the protective ground potential (PE).



• **PV String Connection**

GWU-HYB Series inverter can be connected with PV modules in series with 2 MPPTs for GWU-HYB-3.8DH, GWU-HYB-5.0DH and GWU-HYB-6.0DH, 3 MPPTs for GWU-HYB-7.6TH.



A: PV1 Positive terminal
C: PV2 Positive terminal
E: PV3 Positive terminal

B: PV1 Negative terminal
D: PV2 Negative terminal
F: PV3 Negative terminal

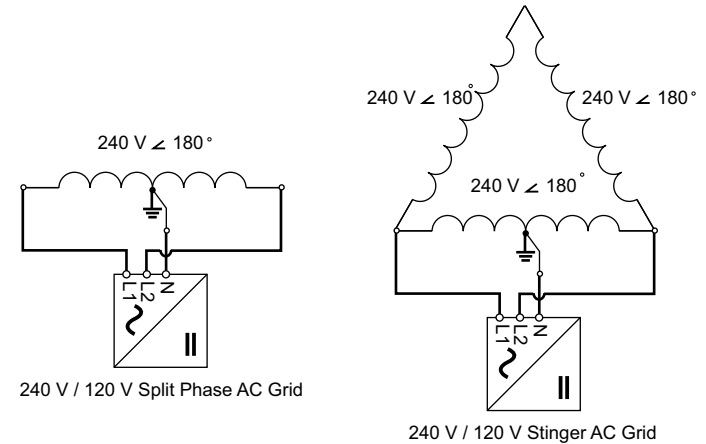
8.2.2 Grid Connection

CAUTION!
The installer is responsible for providing overcurrent protection. To reduce the risk of fire, only connect to a circuit provided with overcurrent protection in accordance with the National Electrical Code, ANSI/NFPA 70.

The connection procedure will vary depending on the grid configuration.

The following diagram provides an overview of the compatible grid configurations of which voltage limit, frequency limit and conductors have to be connected to the inverter to comply with the grid configuration.

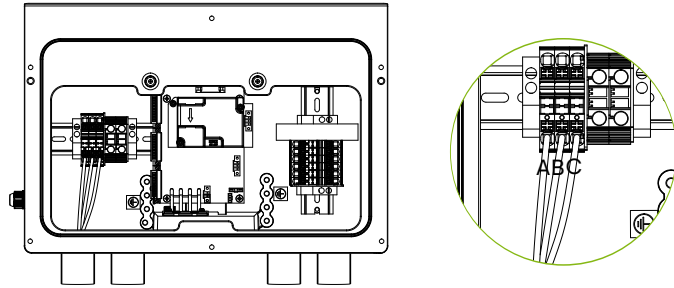
Public grid configuration allowed:



Grid terminal connection on the side of inverter

CAUTION!
DANGER — HIGH VOLTAGE!

For the specific requirement of power cable, please refer to “Appendix A: Wiring and Breaker Requirement”.



A: L1 terminal B: L2 terminal C: N terminal

AC circuit breaker requirements

The AC circuit breaker (not included in the GWU-HYB inverter) is required to protect each AC line (L1 and L2) of the HYB series inverter. The circuit breaker should be able to handle the rated maximum output voltage and current of the inverter.

Refer to the table below to determine the specific circuit breaker in order to avoid potential fire hazards. The AC circuit breaker selection and installation must follow the National Electrical Code(NEC), ANSI / NFPA 70 or local electrical codes.

Inverter model	Description	Source
GWU-HYB-3.8DH	2-pole, 20 A, 240 Vac	can be purchased from manufacturer
GWU-HYB-5.0DH	2-pole, 30 A, 240 Vac	
GWU-HYB-6.0DH	2-pole, 35 A, 240 Vac	
GWU-HYB-7.6TH	2-pole, 40 A, 240 Vac	



NOTE!

If the system is equipped with BI, connect another end of AC cable to BI. Please refer to “Chapter 9 Wiring Connection on the BI” for details.

8.2.3 Battery Connection



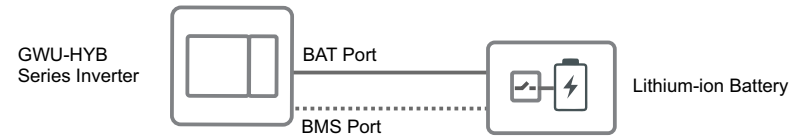
CAUTION!

Never reverse the polarity of the battery cables as this will result in inverter damage. Always ensure correct polarity.

Charging and Discharging system of GWU-HYB series inverter is designed for high-voltage lithium-ion battery.

As a Lithium-ion battery will be connected with HYB series inverter, the battery communication should be compatible with GWU-HYB series inverter and the BMS must be connected between inverter and battery.

Battery connection diagram for Lithium-ion battery



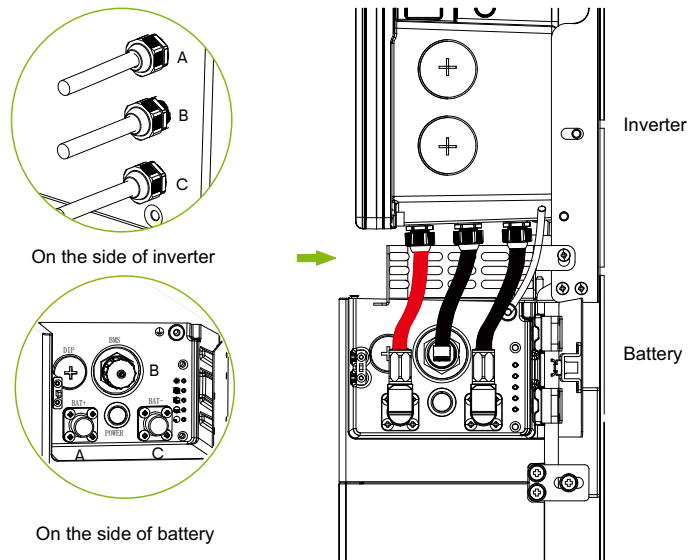
BAT terminal connection



CAUTION!

DANGER — HIGH VOLTAGE!

Make sure the breaker of battery is in OFF position.



A: BAT+ B: Communication connection C: BAT-

1 The BAT+ (red), communication cable and BAT- (black) cables have been already connected on the inverter's side. Only connecting the other end of the cables to the corresponding port of BMS is needed.

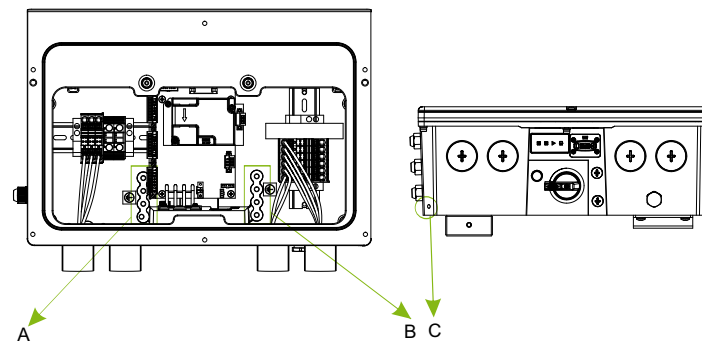
2 Make sure that both ends of the cables are connected correctly to the connector on the right side of the BMS module.

8.3 Ground Connection

Please additionally earth the inverter to the enclosure of a second earthing or equipotential bonding if it is required by local safety. This prevents electric shock if the original protective conductor fails.

- **Ground terminal**

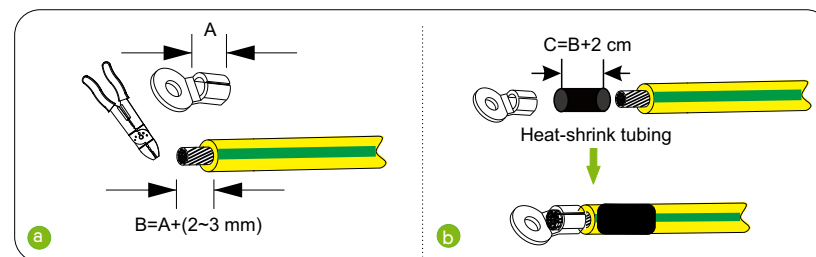
Ground terminals are as follows. Terminals on bus-bar A and B are for AC and DC ground connection. Ground terminal C is for ground connection between inverter and battery



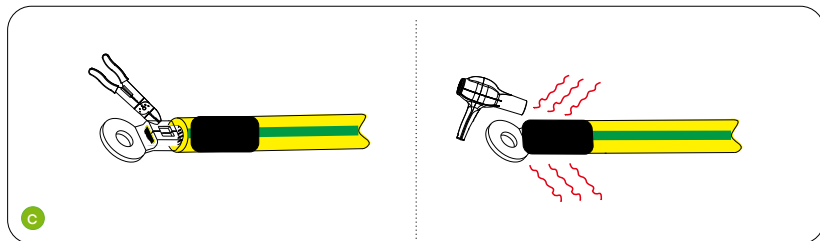
- **Steps of Ground Connection**

- Strip the insulation of conductor by wire stripper;
- Pull the heat-shrink tubing over the PE cable and insert the stripped section into the grounding terminal;

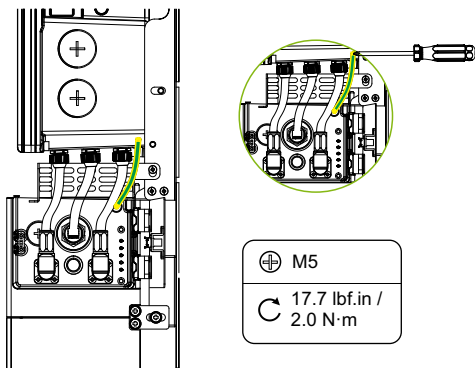
For the specific requirement of power cable, please refer to "Appendix A: Wiring and Breaker Requirement".



c) Crimp it with crimping tool, pull the heat-shrink tubing over the stripped section of the grounding terminal and use a hot-air blower to shrink it so that it can be firmly contacted with the terminal;



d) Connect the ground cable to the inverter and fix it with M4 screw.
 When PV connection, please connect the ground cable to B bus-bars.
 When grid connection, please connect the ground cable to A bus-bars.
 e) Connect the ground cable between the inverter and battery with M5 screws. For easier connection, please connect the grounding cable on the BMS first.



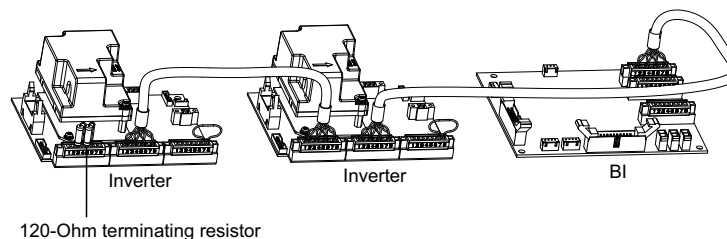
8.4 Communication Connection

All communication cables will be done on the communication board which is in the wiring box.

For the specific requirement of cable, please refer to “Appendix A: Wiring and Breaker Requirement”.

8.4.1 Make Communication Connection to Another Inverter/BI

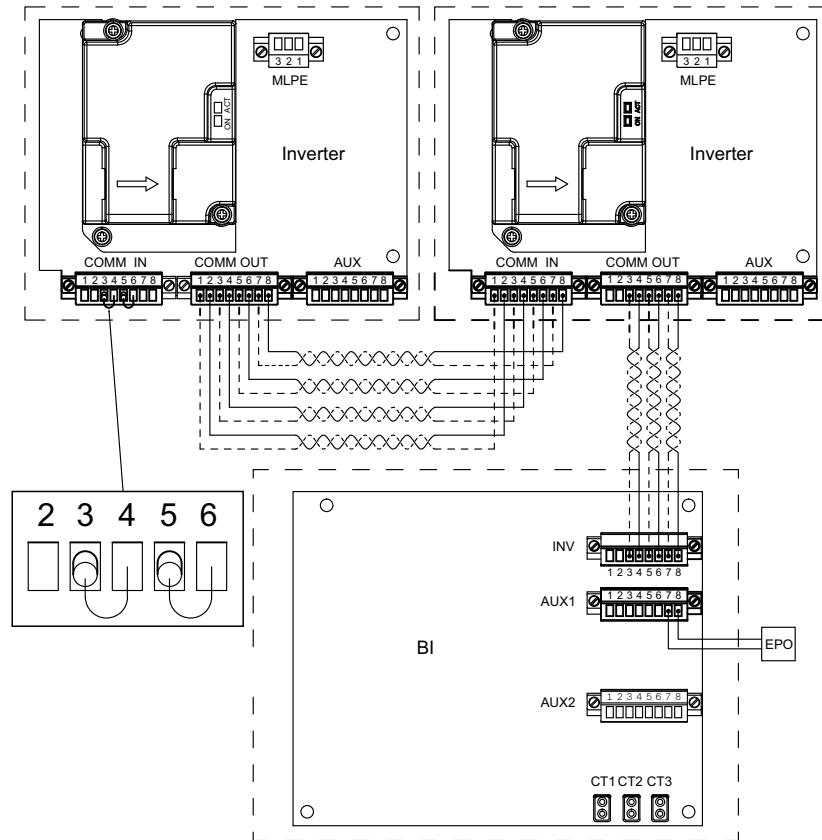
- Inverter communication system diagram



NOTE!

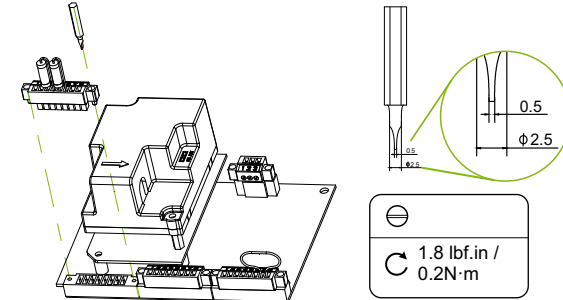
In the first inverter in the communication chain, plug the 8-pin female block with the terminating 120-Ohm resistor into the 8-pin male block. Maximum four inverters can be communicated via communication cable.

• Detailed communication connection diagram



• Connection steps of terminating resistor

Step 1: The 120-Ohm resistor has been pre-installed on the 8-pin female block before leaving factory. Take it out from the accessory box.
 Step 2: Install the 8-pin female block with resistor to the COMM in male terminal by using slot screwdriver.



• Connection steps of communication wire

Step 1: GWU-HYB series inverter supports to be connected with additional three inverters in maximum. Disassemble 8-pin female blocks prior to communication connection.

Step 2:
 Communication connection between inverters:

Pin 1-Pin 6: Select the CAT5 or better (24-18 AWG), use diagonal plier to cut off two wires and leave six wires for connection. Remove 0.24 in / 6 mm of insulation from the end of the six wires.

Pin 7-Pin8: Select two 18-16 AWG wires and remove 0.24 in / 6 mm of insulation from the end of the two wires.

Communication connection between inverter and BI:

Pin 3-Pin 6: Select the CAT5 or better (24-18AWG), use diagonal plier to cut off four wires and leave four wires for connection. Remove 0.24 in / 6 mm of insulation from the end of the four wires.

Pin 7-Pin8: Select two 18-16AWG wires and remove 0.24 in / 6 mm of insulation from the end of the two wires.

Step 3: Plug stripped wires into female terminal and ensure that all conductor strands are captured in the terminal.

Step 4: Screw down screw cap tightly.

Step 5:
Connection between inverters:

Plug the female terminal block into the COMM OUT male terminal block on the communication board of the first inverter and screw in each screw tightly. And plug another end of female terminal block into the COMM IN male terminal block on the communication board of the second inverter.

Connection between inverter and BI:

Plug the female terminal block into the COMM OUT male terminal block on the communication board of the inverter and screw in each screw tightly. And plug another end of female terminal block into the INV communication terminal of BI. For the specific communication terminal on the BI, please refer to "Chapter 9 Wiring Connection on the BI".

Diagram for communication connection steps between inverters

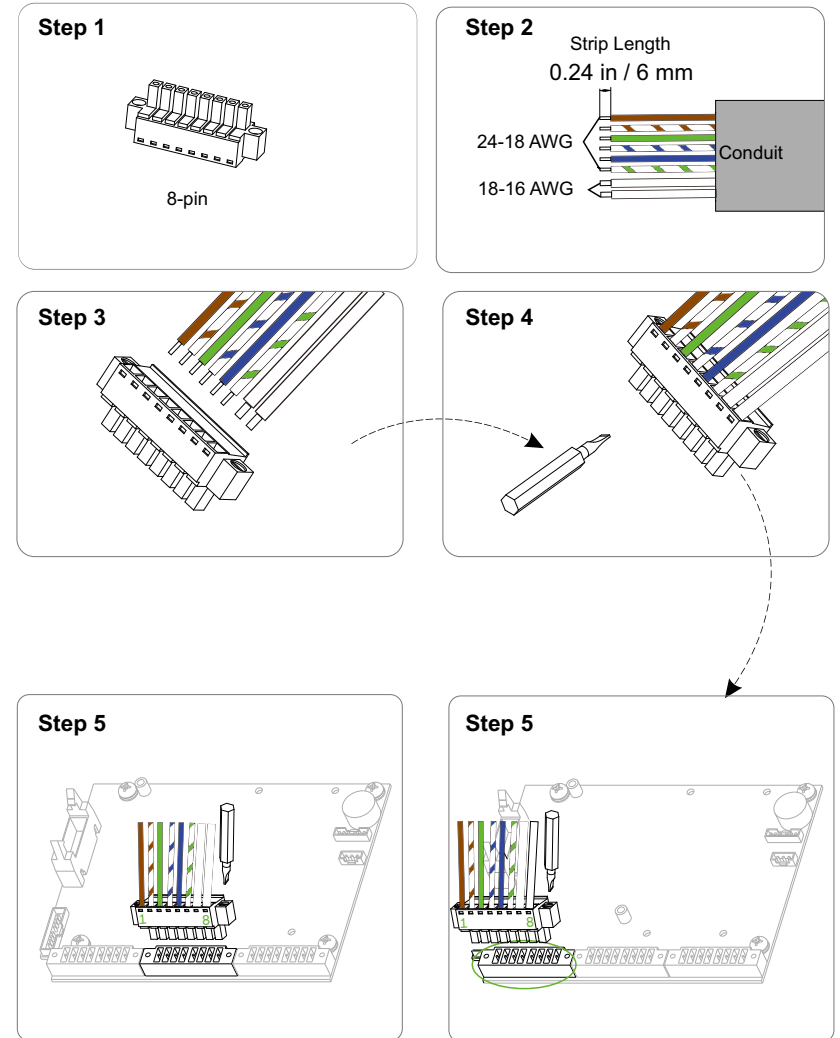
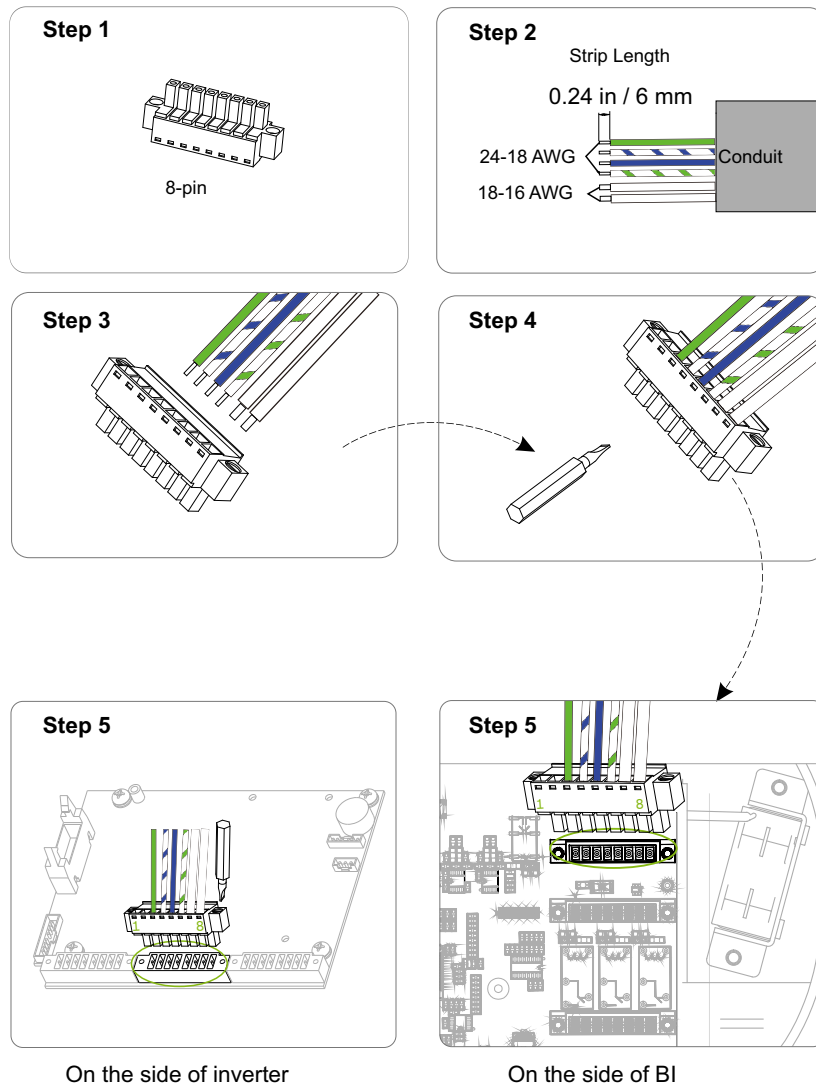


Diagram for communication connection steps between inverter and BI



8.4.2 EPO Connection

Generally, EPO is connected to backup interface to simultaneously command the whole system to become idle and enter a safe mode. While Greenworks GWU-HYB series inverter can be wired to include an emergency stop switch as well. EPO connects to inverter only if no backup interface is equipped. Please refer to "Appendix B EPO Connection Steps" for more details.

8.4.3 RGM (Meter X) Connection (Optional)

The RGM (Meter X) is used to get the information about the energy flow. If the Meter X has been purchased from Greenworks, it will be pre-mounted inside the inverter before leaving factory.

8.4.4 External Electricity Meter (Meter Y) Connection (Optional)

The external electricity meter (Meter Y) will be integrated in the backup interface if Meter Y has been purchased from Greenworks. It connects to inverter only if no backup interface is equipped in the whole system. Please refer to "Appendix C Meter Y Connection Diagram" for more details about meter connection on the inverter.

8.4.5 RSD Transmitter Connection

The APsmart Rapid Shutdown System Transmitter-PLC-1P is part of a rapid shutdown solution when paired with APsmart signal receiver (RSD-S-PLC-A, RSD-D15-1000 or RSD-D-25-1000), a PV module rapid shutdown unit. While powered on, the Transmitter-PLC-1P sends a signal to the signal receiver to keep their PV modules connected and supplying energy. The signal receiver automatically enter rapid shutdown mode when the Transmitter-PLC-1P is switched off and resume energy production when power is restored to the Transmitter PLC-1P. This solution complies with NEC 690.12 specifications for 2017&2020 and supports the SunSpec signal for rapid shutdown.



NOTE!
The RSD has been integrated in the inverter before leaving factory.



NOTE!
If an emergency stop switch is required, the customer needs to purchase and wire it.

8.4.6 Parallel Connection

GWU-HYB series same-power inverters support up to 4 parallel connection, Unified EMS management function by the primary machine. The primary and secondary machines are interconnected via CAN and RS485 buses. For detailed diagram, please see Appendix C: System Wiring Diagram.

- 1) All parallel solutions must be equipped with BI as standard, and GWU-HYB AC direct parallel external power meter solution is not supported.
- 2) The EMS under grid parallel can support the same modes as the stand-alone EMS mode, including:
 - Self-Use (default)
 - Backup mode
 - Time of Use mode
 - Feed in Priority
 - Demand mode
 - Constant power discharge mode

Concurrent Primary-Secondary role setting

- 1) All machines need to set parallel enable/ disable. Enabling parallel machine does not allow running standalone mode.
- 2) The Primary also needs to set the number of parallel machines.
- 3) Primary communication lost, system down waiting for human intervention to recover.
- 4) Loss of Secondary communication (CAN), the primary operates normally, but reports a "Loss of Secondary Communication Alarm". The lost Secondary stops and reports a parallel communication failure until the communication is restored and then tries to integrate into the system again.

For details, please refer to "Parallel Connection Guide".

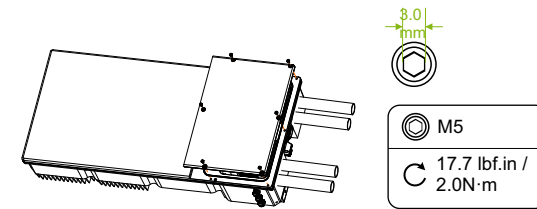
8.4.7 Monitoring Connection (Optional)

The inverter is equipped with monitoring port which can collect data and transmit it to monitoring-website via an external monitoring data collector.

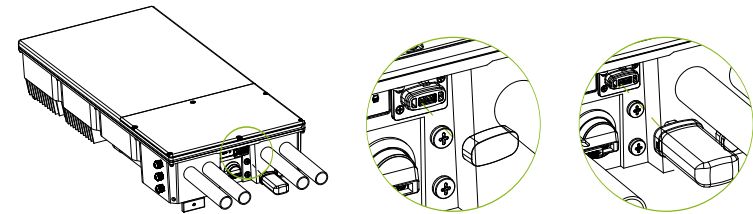
Greenworks may provide monitoring data collector, such as GWU-WIFI-1.0-P. Purchase the product from supplier if needed.

Installation instructions

- 1) Re-mount the cover of wiring box using Allen key before monitoring connection by using cross screwdriver.



- 2) Remove the cover of monitoring port and plug the communication module into the port.



9. Wiring Connection on the BI



WARNING!

To avoid shock hazard, never power on the system without a connection to Earth at BI.



CAUTION!

Before BI wiring connection, please make sure the BI is correctly wall-mounted and can be configured for cable entry at the bottom and sides of the enclosure.

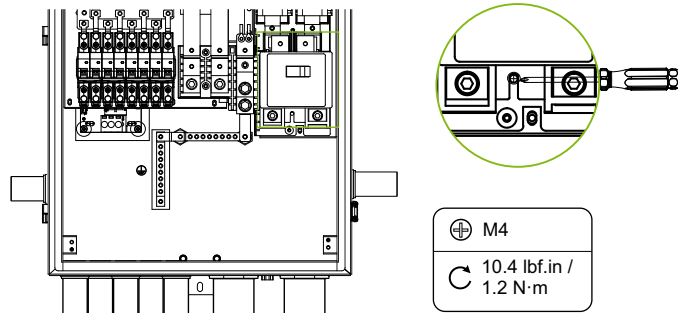
9.1 Install a Main Breaker (Purchased by Customer)

When installed as service equipment, a main breaker must be installed.

Step 1: Remove the two supply lugs which originally installed before leave-factory using hex socket.

Step 2: Install the main breaker using hex socket. Please note that main breaker wire lug cover caps are recommended any time a main breaker is installed in the BI.

Step 3: Fix the main breaker with M4*12 crosshead screw by using cross screwdriver.



NOTE!

After installing the main breaker, lugs feed opposite bus.

9.2 Make AC Connection to Inverter, Generator, Load and Grid



NOTE!

Before any wiring connection, the conduit must be installed according to the national and local requirement.



NOTE!

For the specific conductor requirement of size and torque, please refer to "Appendix A Wiring and Breaker Requirement".



WARNING!

The system supports to install four inverters in maximum. Never power on the system without a connection to Earth at the BI.



WARNING!

Incorrect wiring of AC conductors presents a risk of electrical shock or damage to the equipment. Before powering on the system, ensure all the connections are correctly made according instructions in this documents and in accordance with local wiring codes and regulations.

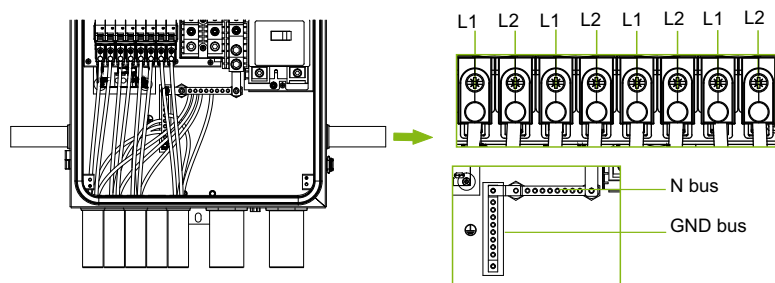
General steps:

1 Route AC wires through the conduit. Strip the ends of the wires and plug the corresponding terminal lugs.

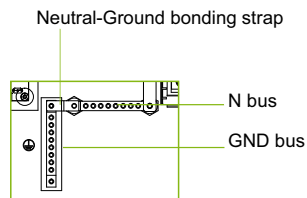
2 Use an appropriate torque tool to tighten the lugs according to Appendix A Wiring and Breaker Requirement.

3 Use copper wire only.

- Connect the inverter conductors to the BI terminals



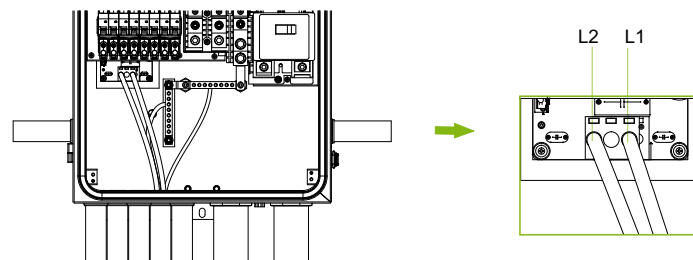
Remove Neutral-Ground bonding strap from BI if not installed as service equipment.
 Proper earth connection and Neutral-Ground bonding strap is required for safe operation of the system and for compliance with local code requirements.



For the specific requirement of cable and torque, please refer to "Appendix A: Wiring and Breaker Requirement".

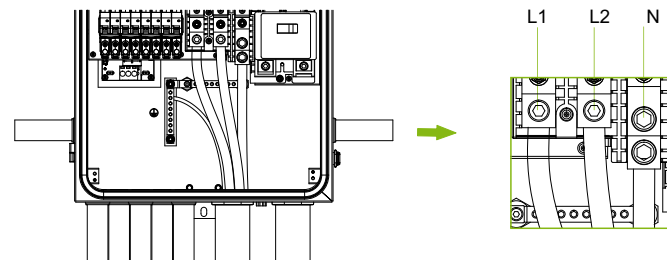
NOTE!
 Please refer to Appendix D: System wiring diagram for specific wiring diagram of each solution.

- Connect the generator conductors to the BI terminals



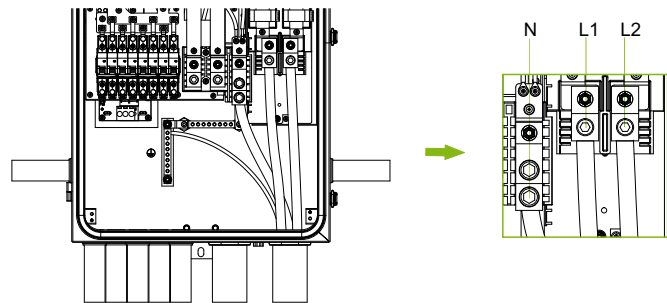
For the specific requirement of cable and torque, please refer to "Appendix A: Wiring and Breaker Requirement".

- Connect the load conductors to the BI terminals

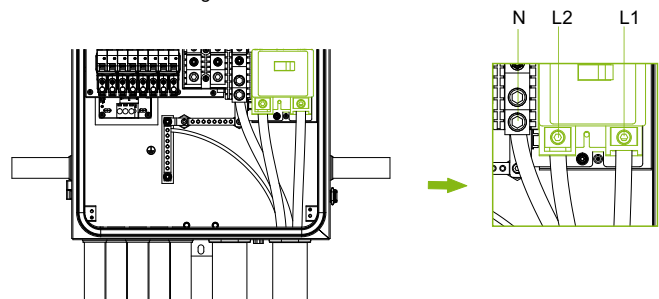


For the specific requirement of cable and torque, please refer to "Appendix A: Wiring and Breaker Requirement".

- Connect the grid conductors to the BI terminals



Before installing a main breaker



After installing a main breaker

For the specific requirement of cable and torque, please refer to "Appendix A: Wiring and Breaker Requirement".



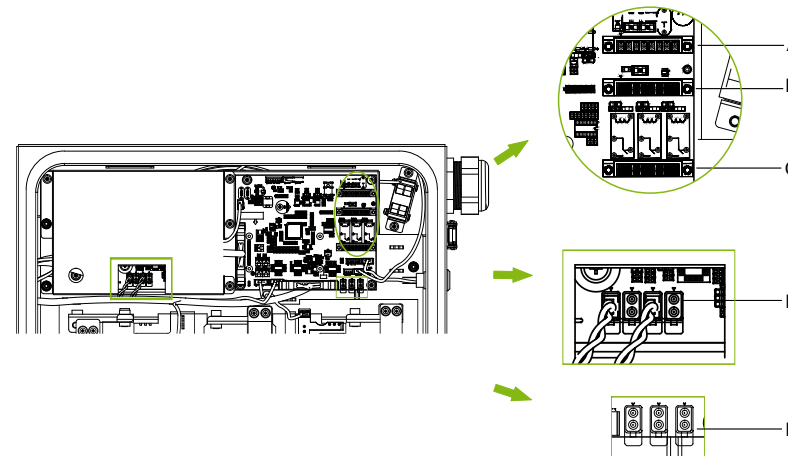
NOTE!

After installing the main breaker, lugs feed opposite bus.

9.3 Make Communication Connection

- Overview of all communication cables connection methods

All communication cables will be done on the communication board of BI. This section will introduce the steps and requirements for all communication cables connections.



Item	Terminals	Port Pin
A	INV communication terminal (for communication between inverter and BI)	Pin 1: RESERVE
		Pin 2: RESERVE
		Pin 3: CAN_L
		Pin 4: CAN_H
		Pin 5: RS485_BI_A
		Pin 6: RS485_BI_B
		Pin 7: +12V
		Pin 8: GND

Item	Terminals	Port Pin
B	AUX1 terminal (for communication between generator and BI, EPO and BI)	Pin 1: DRY_GEN
		Pin 2: GND_GEN
		Pin 3: RS485_RESERVE_A
		Pin 4: RS485_RESERVE_B
		Pin 5: RESERVE
		Pin 6: RESERVE
		Pin 7: STOP_NO+
		Pin 8: STOP_NO-
C	Reserved	Pin 1: NO_1
		Pin 2: COM_1
		Pin 3: NC_1
		Pin 4: NO_2
		Pin 5: COM_2/3
		Pin 6: NC_2
		Pin 7: NO_3
		Pin 8: NC_3
D	CT L1A terminal	Pin 1: CT L1A+
		Pin 2: CT L1A-
	CT L1B terminal	Pin 1: CT L1B+
		Pin 2: CT L1B-
	CT L2A terminal	Pin 1: CT L2A+
		Pin 2: CT L2A-
	CT L2B terminal	Pin 1: CT L2B+
		Pin 2: CT L2B-
E	CT1 terminal	Pin 1: CT 1+
		Pin 2: CT 1-
	CT2 terminal	Pin 1: CT 2+
		Pin 2: CT 2-
	CT3 terminal	Pin 1: CT 2+
		Pin 2: CT 2-

Communication connection between inverter and BI

Please refer to Section 8.4.1 Make communication connection to another inverter/BI for the detailed steps of connection.

- **Communication connection of EPO and generator**

The EPO and generator share the same AUX1 port.

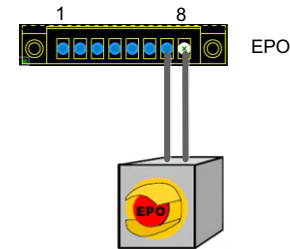
Install optional EPO

The BI can be wired to include an external emergency stop button that can switch off the whole system.

1 Remove the factory-installed jumper from Pin 7 and Pin 8 of the 8-position "AUX1" connector inside the BI.

2 Use minimum 24 AWG conductors (maximum 18 AWG) for EPO to connect Pin 7 and Pin 8.

3 Confirm the system will cease operation when the switch is open.



NOTE!

Turn the switch to OFF (open) position: The whole system will go to idle; turn the switch to ON (closed) position: The whole system will resume shortly.

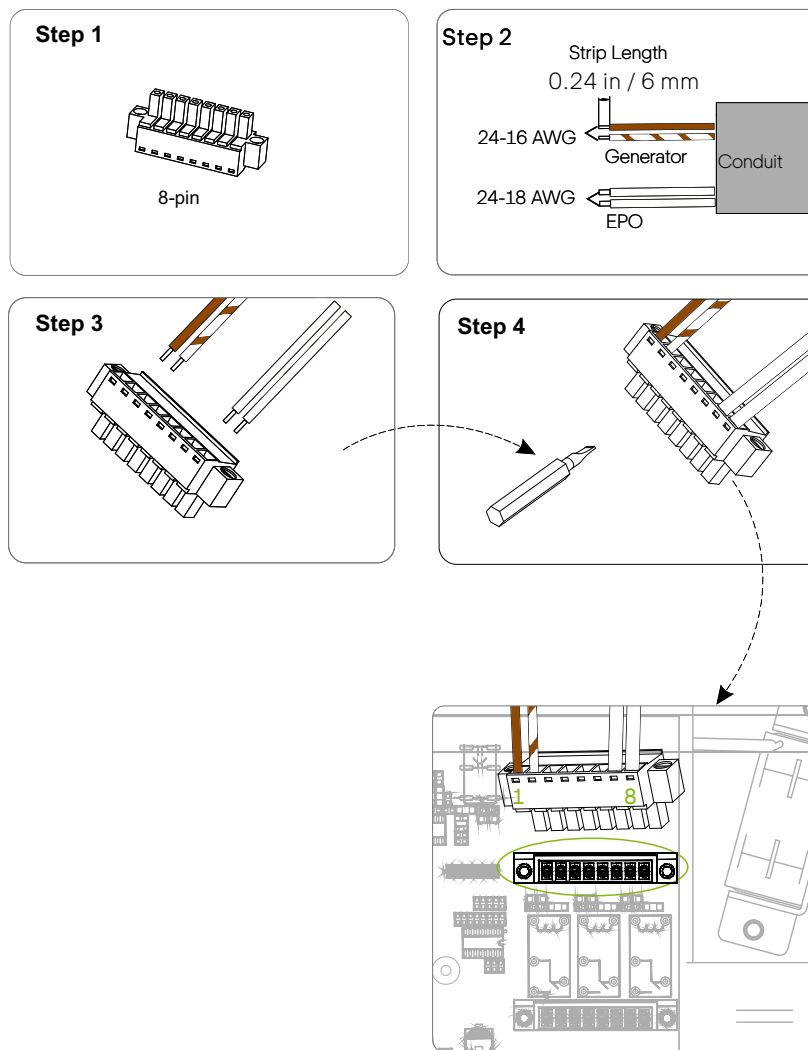
Install generator

Step 1: Use the same 8-Pin female terminal of EPO,

Step 2: Use minimum 24 AWG conductors (maximum 16 AWG) for generator to connect Pin 1 and Pin 2 (Pin 7 and Pin 8 for EPO). The rest pins are reserved.

Step 3: Remove 0.24 in / 6 mm of insulation from the end of the four wires.

Step 4: Insert the stripped wires into female terminal and ensure that all conductor strands are captured in the terminal. and plug the female terminal to AUX1 port.



On the side of BI

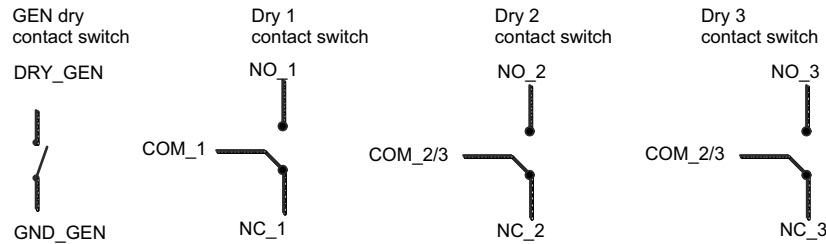
Dry contact switch

The GEN dry contact switch is used as a controller for an AC generator with a remote start function. The GEN dry contact switch may be used to start the generator by closing the appropriate circuit.



NOTE!

When using generation remote start function , the generator must be connected to the BI's GEN terminals.



Item	Value
GEN dry contact switch current/voltage rating	2 A / 30 VDC
DRY 1 contact switch current/voltage rating	3 A / 30 VDC
DRY 2 contact switch current/voltage rating	3 A / 30 VDC
DRY 3 contact switch current/voltage rating	3 A / 30 VDC

The dry 1 contact switch / dry 2 contact switch / dry 3 contact switch can be used to implement Load Shed function. Load Shed function can perform load management. It is intended to turn off designated loads during low battery periods to conserve remaining battery power.

• Connecting external CTs

CT placement locations include the following:

A set of CTs (CT L1A , CT L2A,200A) has been built in the BI. In some application scenarios ,it can measure both load and generation and there is no need to connect external CTs. But in some application scenarios, such as Partial-Home Backup solution, connecting external CTs (CT L1B , CT L2B) to measure total current both load and generation is needed. In addition, if the site includes solar equipment, a solar CT is placed after the solar inverter to measure the solar output.

CT L1A terminal and CT L1B terminal have been connected in parallel on PCB. CT L1A and CT L1B are used to measure total current both load and generation of the same phase L1.

CT L2A terminal and CT L2B terminal have been connected in parallel on PCB. CT L2A and CT L2B are used to measure total current both load and generation of the same phase L2.



NOTE!

For detailed information about how to configure external CT, please refer to “BI CT configuration for GWU-GreenE”.

10 Close Wiring Cover and Turn on the System

10.1 Check Below Steps before Turn on the System

- 1 Ensure the system is properly mounted.
- 2 Ensure all grounding wire to the grounding bus-bar are connected properly.
- 3 Ensure all the communication wirings are connected properly.
- 4 Ensure all the DC wirings and AC wirings are completed.
- 5 Ensure the CT is connected properly.
- 6 Ensure the battery is connected properly.
- 7 Ensure all loads are connected properly, and that the combined ratings of all backed-up loads are within the rating capacity of the system without grid support..
- 8 Ensure the PV arrays are connected properly.Ensure the battery has been turned off,and all the indicator light of the battery are off.

10.2 Turn on the System

- 1 Before closing any wiring cover, please take photos of the completed wiring in the inverter, battery and BI.
- 2 Install the wiring box cover of the inverter and secure it firmly with the original screw.
- 3 Install the internal cover of the BI.
- 4 Switch on the BI power button (turn to "AUTO").
- 5 Switch on the AC circuit breakers for the BI and inverter.
- 6 Make sure that the battery has been turned off,and all the indicator light of the battery are off.
- 7 Switch on the circuit breaker of battery.
- 8 Switch on the PV DC switch of the inverter(turn to "ON" position).
- 9 Press the battery POWER button to start the battery.
- 10 Install the outer cover of the BI.
- 11 The system will start up. Check the status of indicators on inverter, battery and BI for more information on the codes displayed for error and warning messages, refer to Chapter 12.
- 12 Download and configure the APP.



NOTE!

Before you switch on the circuit breaker of the battery, make sure that the battery has been turned off,and all the indicator light of the battery are off.If the battery has been turn on, then you switch on the circuit breaker of the battery, the inverter and the battery may be damaged.



NOTE!

If the left indicator do not turn green please check the below points:

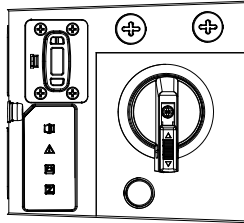
- All the connections are correct.
- All the external breakers are switched on.
- The DC switch on the inverter is in the "ON" position.

10.3 Shut Down the System

- 1 If the system is on, press the inverter POWER button for 1 second to turn off the inverter.
- 2 Switch off the PV DC switch of the inverter(turn to ""OFF" position).
- 3 Press the battery POWER button to turn off the battery.
- 4 Switch off the circuit breaker of the battery.
- 5 Switch off the AC circuit breakers for the BI and inverter.


11 Indicator Light and Button


Indicator light and button of inverter





Fault LED 1 and Fault LED 2




 LED1 flashes green (0.5s on, 0.5s off) and LED2 is red when arc fault occurs.

 LED1 flashes green (2s on, 2s off) and LED2 is red when ground fault occurs.

 LED1 flashes green (0.5s on, 0.5s off) and LED2 is off when PV voltage fault occurs.

 LED1 flashes green (2s on, 2s off) and LED2 is off when Grid error occurs.


 LED1 flashes green (0.5s on, 0.5s off) and LED2 flashes red (0.5s on, 0.5s off) when firmware upgrading is ongoing.


 LED1 is green and LED2 is red when other fault occurs.


 LED1 is off and LED2 is off when no fault occurs.



Operation LED (Free / Secondary)


 Green when the inverter is in normal status or in backup status.


 Flashing green (1s on, 1s off) when the inverter is in waiting or checking status.


 Off when the inverter has a fault.



Operation LED (Primary)

 Green for 2s and then quick flashing green for 1s (0.2s on, 0.2s off) when the inverter is in normal or backup status.


 Flashing green for 2s (1s on, 1s off) and then quick flashing green for 1s (0.2s on, 0.2s off) when the inverter is in waiting or checking status.


 Off for 2s and quick flashing green for 1s (0.2s on, 0.2s off) when the inverter has a fault.



BAT LED

 Green when the battery communication is normal and working.

 Flashing green (1s on, 1s off) when the battery communication is normal and the battery is in idle status.

 Off when the battery does not communicate with inverter.

All LEDs

All LEDs flash (0.5s on, 0.5s off) when firmware upgrading has been completed but the U drive is still connected . All LEDs will be back to the normal state if the U drive is unplugged after the upgrading finished.



Inverter power button

Press the button for 0.5 second: Clear EPS OverLoad Fault / EPS Bat Power Low / BI_TransformerImbalanceHighFault / BI_VoltImbalanceFault / BatBreakOpen Fault.

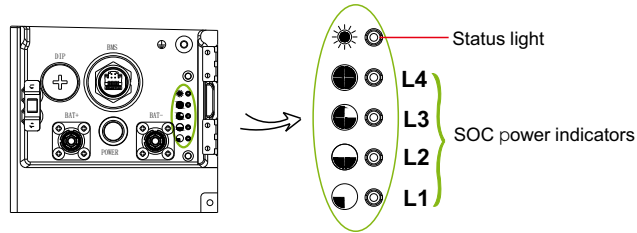
Press the button for 1 second: Turn on the inverter if it has been turned off.

Press the button for 1 second: Turn off the inverter if it has been turned on. The control circuitry remains powered up.

Press the button for 5 seconds: Run arc self-test if there is no arc fault.

Press the button for 5 seconds: Clear arc fault if arc fault occurs.

Indicator light and button of battery



Working:

When charging, status light will remain on solid green light; when discharging, status light will flash green every 0.5 sec.

Fault:

Status light begins on solid red; 10 mins later, the status light will flash red for 1 sec and turn off for 4 sec, and the SOC power indicators will flash to indicate a malfunction (for details, refer to the User Manual).

Upgrade:

Status light flashes green, red and yellow; SOC power indicators flash blue every 0.2 sec.

Idle State:

Status light begins on green for 1 sec and turns off for 4 sec; all SOC power indicators are off.

Power On:

Open air switch's guard, toggle switch (red background of inspection window), and press Power for 1 to 2 sec to start system.

Power Off:

Status light and SOC power indicators are off.

Indicator light and button of BI



Operation LED

- Green when the BI is in on-grid status.
- - - Flashing green (2s on, 2s off) when the BI is in backup status.
- - - Flashing green (0.5s on, 0.5s off) when the BI is in generator status.
- Off when the load port of the BI has no power.



Communication LED

- Green when the BI communication is normal.
- - - Flashing green (2s on, 2s off) when the BI RS485 fault occurs.
- Off when the BI communication fault occurs.



Fault LED

- Red when relay fault or over temperature fault occurs.
- - - Flashing red (2s on, 2s off) when other fault occurs.
- - - Flashing red (0.5s on, 0.5s off) when BI power button is off or EPO fault occurs.
- Off if no Fault occurs.

Color and Status			Message Explanation
Operation LED	Communication	Fault LED	
0.5s on, 0.5s off	0.5s on, 0.5s off	0.5s on, 0.5s off	Firmware upgrading
OFF	OFF	OFF	Upgrade 0%-29%
OFF	OFF	ON	Upgrade 30%-69%
OFF	ON	ON	Upgrade 70%-99%
ON	ON	ON	Upgrade 100%

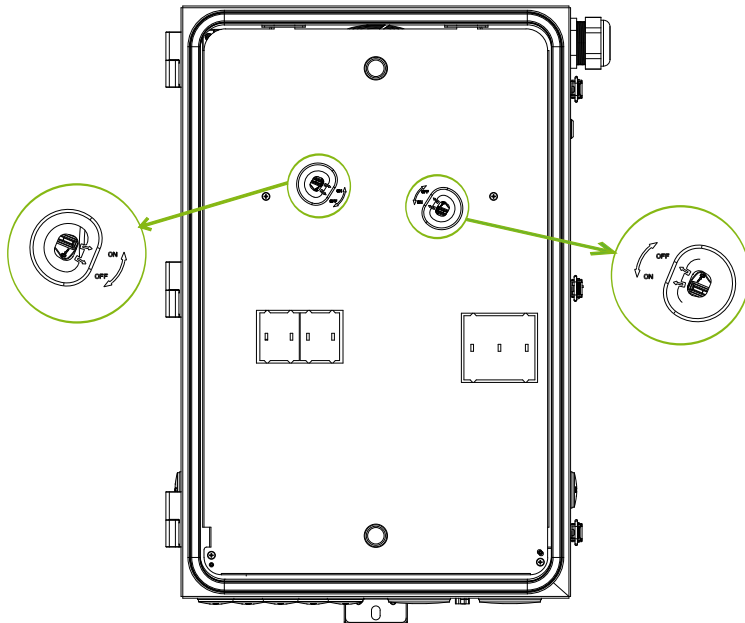
Cycle

BI power button

When ON, the GWU-GreenE system can intelligently switch between on-grid and off-grid without human intervention.

When OFF, manual control of the BI will be enabled when the internal relay is not switched automatically. When some unrecoverable failure is encountered, causing the system to stop running and the home load to lose power, the following operations can be performed:

1. Open the door of the BI.
2. Turn off the breaker between the inverter and the BI, as well as the breaker between the BI and the generator.
3. Turn off the main breaker on the grid side.
4. Wait for 60s.
5. Press the BI power button to enter manual maintenance mode.
6. Use the tool to turn the left and right relays to ON.
7. Turn on the main breaker to make the grid ready to power the home load.
8. Turn on the breaker between the inverter and the BI to make the inverter run again.
9. Close the door of the BI.



12 Troubleshooting

This section contains information and procedures for solving possible problems with GWU-GreenE system, and provides you with troubleshooting tips to identify and solve most problems that could occur with the system.

This section will help you narrow down the source of the problems you may encounter. Please read the following troubleshooting steps.

Check warnings or fault messages on the Monitoring Cloud. If a message is displayed, record it before doing anything further operation.

Troubleshooting for inverter

Faults	Diagnosis and solution
AFD Self Check Fault	<p>AFDI Model Self Check Fault</p> <ul style="list-style-type: none"> • Please check if the AFDI module connects normally • Or contact Greenworks Technical Support
Arc Detect Fault	<p>DC Arc occurs or DC Arc Check Fault</p> <ul style="list-style-type: none"> • Please check if there is any visible arc vestige firstly • Clear the PV input and solar battery board connects normally • If Arc is detected five times in one hour, please manually clear Arc. Otherwise, it will re-connect to grid in five minutes
PV Conn Dir Fault	<p>PV Reverse Connection Fault</p> <ul style="list-style-type: none"> • Re-connect the PV correctly
BAT Volt Fault	<p>Battery Voltage Over high or Over low Fault</p> <ul style="list-style-type: none"> • Check if the battery input voltage is within the normal range • Please contact Greenworks Technical Support
EPO Fault	<p>EPO Activated or Inverter Emergency Off</p>
BI Comm Fault	<p>Communication Fault between Inverter and BI</p> <ul style="list-style-type: none"> • Check if the RS485 communication cable of BI connects to communication board of inverter. • Please contact Greenworks Technical Support

Faults	Diagnosis and solution
Update File Fail	<p>File Upgrade Fault</p> <ul style="list-style-type: none"> • Check if the file and the folder are correct • Please contact Greenworks Technical Support
Udisk Update Fault	<p>U Disk Upgrade Fault</p> <ul style="list-style-type: none"> • Check if the U disk is correctly plugged and the file is correct • Please contact Greenworks Technical Support
Meter Fault	<p>Meter Communication Fault</p> <ul style="list-style-type: none"> • Check if the communication cable between inverter and BI connects normally or contact Greenworks Technical Support
BMS_Lost	<p>BMS Communication Lost</p> <ul style="list-style-type: none"> • Check the communication connection between the battery and the inverter • Please contact Greenworks Technical Support
Update Fault	<p>Software Upgrade Fault</p> <ul style="list-style-type: none"> • Check if the communication cable between inverter and BI and re-upgrade the software • Check the communication cable between control board and communication board and re-upgrade the software • Check the communication cable between inverter and battery • Or contact Greenworks Technical Support
PV Volt Fault	<p>PV Voltage Out of Normal Range</p> <ul style="list-style-type: none"> • Decrease the PV voltage • Or contact Greenworks Technical Support
DCI OCP Fault	<p>DCI over current protection Fault</p> <ul style="list-style-type: none"> • Please contact Greenworks Technical Support
DCV OVP Fault	<p>DCV EPS over voltage protection Fault</p> <ul style="list-style-type: none"> • Please contact Greenworks Technical Support
Bat Current Imbalance	<p>The Firmware Fault of Battery Charge</p> <ul style="list-style-type: none"> • Please contact Greenworks Technical Support
Bat ConDir Fault	<p>The Positive and Negative Pole of Battery Connected Reversely</p> <ul style="list-style-type: none"> • Re-connect the battery.

Faults	Diagnosis and solution
InvEEPROMFault	<p>Inverter EEPROM Fault</p> <ul style="list-style-type: none"> • Please contact Greenworks Technical Support
EPSBatPowerLow	<p>Battery Power Low in EPS Mode</p> <ul style="list-style-type: none"> • Turn off high power device and charge for the battery
EPS OverLoad Fault	<p>Over Load in EPS Mode.</p> <ul style="list-style-type: none"> • Turn off some device and clear the error
Grid Over Freq Fault	<p>Grid Frequency Out of Range</p> <ul style="list-style-type: none"> • System will reconnect if the utility is back to normal • Or please contact Greenworks Technical Support
Grid Over Volt Fault	<p>Grid Voltage Out of Range</p> <ul style="list-style-type: none"> • System will reconnect if the utility is back to normal • Or please contact Greenworks Technical Support
Grid Relay Fault	<p>GIRD Relay Fault</p> <ul style="list-style-type: none"> • Please contact Greenworks Technical Support
Grid Under Freq Fault	<p>Grid Frequency Out of Range</p> <ul style="list-style-type: none"> • System will reconnect if the utility is back to normal • Or please contact Greenworks Technical Support
Grid Under Volt Fault	<p>Grid Voltage Out of Range</p> <ul style="list-style-type: none"> • System will reconnect if the utility is back to normal • Or please contact Greenworks Technical Support
Bus Volt Fault	<p>Bus Voltage Out of Normal Range</p> <ul style="list-style-type: none"> • Please contact Greenworks Technical Support.

Faults	Diagnosis and solution
Sample Fault	Gird Frequency or Voltage Sample Fault <ul style="list-style-type: none"> • Please contact Greenworks Technical Support
Inter Com Fault	Internal Communication Fault <ul style="list-style-type: none"> • Check the connection between inverter and BI connects normally • Or contact Greenworks Technical Support
Isolation Fault	Isolation Fault <ul style="list-style-type: none"> • Check if the insulation of electric wires are damaged or too wet • Or contact Greenworks Technical Support
Mgr EEPROM Fault	Manager EEPROM Fault <ul style="list-style-type: none"> • Please contact Greenworks Technical Support
Other Device Fault	CPU Self-check Fault or Internal Flash Fault or RAM Fault <ul style="list-style-type: none"> • Please contact Greenworks Technical Support
UnderTemp Fault	Temperature Below the Limitation or Temperature Sensor Fault <ul style="list-style-type: none"> • Please contact Greenworks Technical Support
Over Temp Fault	Temperature over the limitation <ul style="list-style-type: none"> • Check if the environment temperature is over limitation • Check if the internal fan is fault • Or contact Greenworks Technical Support
RC OCP Fault	Leakage Current Fault <ul style="list-style-type: none"> • Check if the insulation of electric wires are damaged or too wet • Or contactGreenworks Technical Support
Bat Break Open Fault	Battery Break Open Fault <ul style="list-style-type: none"> • Check if the circuit break of battery is open.
Fan Fault	Inverter Internal Fan Fault <ul style="list-style-type: none"> • Please contact Greenworks Technical Support

Faults	Diagnosis and solution
SW OCP Fault	Battery Charge and Discharge Over Current Fault or PV Over Current Fault or Inverter Over Current <ul style="list-style-type: none"> • Please contact Greenworks Technical Support
RCD Fault	Residual Current Device Sensor Fault <ul style="list-style-type: none"> • Please contact Greenworks Technical Support
Rtc Fault	Rtc Fault <ul style="list-style-type: none"> • Please contact Greenworks Technical Support
SoftVerFault	Program Write Fails or Inccorrent Program Written in <ul style="list-style-type: none"> • Re-write the program • Or contact Greenworks Technical Support
Grid Lost Fault	Grid Lost Fault <ul style="list-style-type: none"> • System will reconnect if the utility is back to normal • Check if the grid is normal
TZ Protect Fault	The Firmware of PV or Inverter or Battery Over Current Fault <ul style="list-style-type: none"> • Please contact Greenworks Technical Support

Troubleshooting for battery

Faults	Diagnosis and solution
BMS_External_Err	Unable to establish communication with inverter. <ul style="list-style-type: none"> Restart BMS Contact Greenworks Technical Support
BMS_Internal_Err	Unable to establish communication among batteries. <ul style="list-style-type: none"> Restart BMS; Check if the connection among batteries is normal; Contact Greenworks Technical Support
BMS_OverVoltage	Overvoltage of single battery. <ul style="list-style-type: none"> Contact Greenworks Technical Support
BMS_LowerVoltage	Undervoltage of single battery. <ul style="list-style-type: none"> Battery is forced to charge through inverter; Contact Greenworks Technical Support
BMS_ChargeOver Current	Overcurrent charging of BMS. <ul style="list-style-type: none"> Restart BMS; Contact Greenworks Technical Support
BMS_Discharge OverCurrent	Discharge overcurrent of BMS. <ul style="list-style-type: none"> Restart BMS; Contact Greenworks Technical Support

Fault	Diagnosis and solution
BMS_TemHigh	The temperature of BMS is too high. <ul style="list-style-type: none"> Let BMS cool down to normal temperature and restart; Contact Greenworks Technical Support
BMS_TemLow	The temperature of BMS is too low. <ul style="list-style-type: none"> Warm up BMS and restart; Contact Greenworks Technical Support
BMS_CellImbalance	Inconsistency of battery. <ul style="list-style-type: none"> Restart BMS; Contact Greenworks Technical Support
BMS_Hardware_Protect	Hardware protection of BMS. <ul style="list-style-type: none"> Restart BMS; Contact Greenworks Technical Support
BMS_Circuit_Fault	Circuit fault of BMS. <ul style="list-style-type: none"> Restart BMS; Contact Greenworks Technical Support
BMS_Insulation_Fault	Insulation fault of BMS. <ul style="list-style-type: none"> Restart BMS; Contact Greenworks Technical Support
BMS_VoltSensor_Fault	Voltage sampling fault of BMS. <ul style="list-style-type: none"> Restart BMS; Contact Greenworks Technical Support
BMS_TempSensor_Fault	Temperature sampling fault of BMS. <ul style="list-style-type: none"> Restart BMS; Contact Greenworks Technical Support
BMS_TempSensor_Fault	Current sampling fault of BMS. <ul style="list-style-type: none"> Restart BMS; Contact Greenworks Technical Support
BMS_Relay_Fault	Relay contact adhesion fault of BMS. <ul style="list-style-type: none"> Restart BMS; Contact Greenworks Technical Support

Fault	Diagnosis and solution
BMS_Type_Unmatch	Different type of BMS. <ul style="list-style-type: none"> Restart BMS; Contact Greenworks Technical Support
BMS_Version_Unmatch	Different type of BMS. <ul style="list-style-type: none"> Restart BMS; Contact Greenworks Technical Support
BMS_Manufacturer_Unmatch	Different type of BMS. <ul style="list-style-type: none"> Restart BMS; Contact Greenworks Technical Support
BMS_SW&HW_Unmatch	Different type of BMS. <ul style="list-style-type: none"> Restart BMS; Contact Greenworks Technical Support
BMS_M&S_Unmatch	Different type of BMS. <ul style="list-style-type: none"> Restart BMS; Contact Greenworks Technical Support
BMS_CR_Unresponsive	Inverter does not respond the charging request. <ul style="list-style-type: none"> Restart BMS or inverter; Contact Greenworks Technical Support
S_Software_Protect	Software protection of battery module. <ul style="list-style-type: none"> Restart BMS; Contact Greenworks Technical Support
BMS_536_Fault	BMS voltage sampling fault. <ul style="list-style-type: none"> Restart BMS; Contact Greenworks Technical Support
BMS_Selfchecking_Fault	Self-test fault of BMS. <ul style="list-style-type: none"> Restart BMS; Contact Greenworks Technical Support
BMS_Tempdiff_Fault	BMS temperature varies greatly. <ul style="list-style-type: none"> Restart BMS; Contact Greenworks Technical Support

Fault	Diagnosis and solution
BMS_Break	BMS sampling fault. <ul style="list-style-type: none"> Restart BMS; Contact Greenworks Technical Support
BMS_Flash_Fault	Memory chip fault. <ul style="list-style-type: none"> Restart BMS; Contact Greenworks Technical Support
BMS_Precharge_Fault	External short circuit of BMS. <ul style="list-style-type: none"> Check the external connection and restart BMS; Contact Greenworks Technical Support
BMS_AirSwitch_Break	Disconnection of switch break of BMS. <ul style="list-style-type: none"> Restart BMS; Contact Greenworks Technical Support

Troubleshooting for BI

Faults	Diagnosis and solution
BI_InvCommFit	CAN Communication Fault between BI and Inverter <ul style="list-style-type: none"> • Check the communication cable between BI and inverter • Please Greenworks Technical Support
BI_EPO	Emergently switched off or Emergency stop activated
BI_ManualOverride	BI manual switch activatted
BI_GridRlyFit	Grid Relay Fault <ul style="list-style-type: none"> • Please contact Greenworks Technical Support
BI_OverTempFit	Parallel Relay Fault <ul style="list-style-type: none"> • Please contact Greenworks Technical Support
BI_AutoTxRlyFit	Autotransformer Temperature High <ul style="list-style-type: none"> • Check if two-phase imbalance is high in off-grid or ambient temperature is high • Or please contact Greenworks Technical Support
BI_PhsImblHigh	Two-phas with Load Imbalance High in Off-grid <ul style="list-style-type: none"> • Decrease the imbalance of two-phase with load in off-grid
BI_EEPROMFit	Internal EEPROM Read/Write Fault <ul style="list-style-type: none"> • Please contact Greenworks Technical Support
BI_IntMeterFit	Internal Meter Fault <ul style="list-style-type: none"> • Please contact Greenworks Technical Support
BI_GenOverLoad	Generator Overload Fault
BI_GenRlyFit	Generator Relay Fault <ul style="list-style-type: none"> • Please contact Greenworks Technical Support
BI_VoltImbalanceFit	Output Voltage Imbalance High in Off-grid <ul style="list-style-type: none"> • Decrease the imbalance of two-phase with load in off-grid

Faults	Diagnosis and solution
BI_PrllRlyFit	Parallel Relay Fault <ul style="list-style-type: none"> • Please contact Greenworks Technical Support
BI_AutoTxRlyFit	Transformer Relay Fault <ul style="list-style-type: none"> • Please contact Greenworks Technical Support
BI_AmbTempHigh	BI Ambient Temperature High
BI_AmbTempLow	BI Ambient Temperature Low
BI_485CommFit	RS485 Communication Fault between BI and Inverter <ul style="list-style-type: none"> • Check the RS485 communication cable between BI and Inverter • Please contact Greenworks Technical Support
BI_OverTempFit	Transformer Temperature High or Transformer with Load Imbalance in Off-grid <ul style="list-style-type: none"> • Check if the imbalance is over high in off-grid • Please contact Greenworks Technical Support
BI_InvEngyLow	Battery Energy Low in Off-grid Detected
BI_GridLost	Grid Lost Detected
BI_GridVolHigh	Grid Voltage High Detected
BI_GridVolLow	Grid Voltage Low Detected
BI_GridFreHigh	Grid Frequency High Detected
BI_GridFreLow	Grid Frequency Low Detected
BI_GenLost	No Generator Detected
BI_GenVolHigh	Generator Voltage High Detected

Faults	Diagnosis and solution
BI_GenVolLow	Generator Voltage High Detected
BI_GenFreHigh	Generator Frequency High Detected
BI_GenFreLow	Generator Frequency Low Detected
BI_Fan1StopRotor	Fan 1 Stop Detected
BI_Fan2StopRotor	Fan 2 Stop Detected

13 Maintenance

Maintenance of battery

- If the ambient temperature for storage is -4°F~122°F/-20°C~50°C, recharge the batteries at least once every 3 months.
- If the ambient temperature for storage is 32°F~104°F/0°C~40°C, recharge the batteries at least once every 12 months.
- If the battery(ies) has(have) not been used for more than 9 months, the battery(ies) must be charged to at least SOC 50 % each time.
- For the first installation, the interval among manufacture dates of batteries shall not exceed 3 months.
- If one of the batteries is replaced, the SOC of the battery after replacement shall be consistent with those of batteries that have not been replaced, with the maximum difference of between -5% and 5%.
- If users want to increase their battery system capacity, please ensure that the SOC of the existing system capacity is about 40%. The manufacture date of the new battery shall not exceed 6 months; in case of exceeding 6 months, please charge the new battery to around 40%.

Maintenance of inverter

Regular maintenance is required for the inverter.

The table below lists the operational maintenance for expressing the optimum device performance. More frequent maintenance service is needed in the worse work environment.

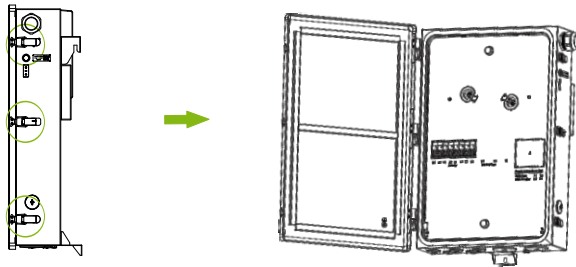
Please make records of the maintenance.

Item	Check Note	Maintenance Interval
Indicators / button	Check if the indicators and button of the inverter are in normal state	Every 6 months
Wires	Check that if the input and output wires are damaged or aged.	Every 6 months
DC switch	By operating the switch a few times (5x), the contacts will clean themselves and the switch will have a longer life.	/
Signs	Check the installation for signs of overload, overheating, and that the terminals do not exceed the limit of 167°F/75°C under full load.	/

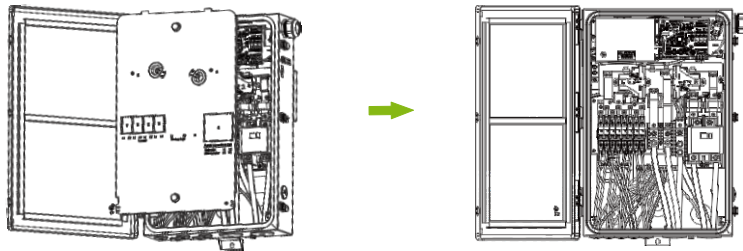
Maintenance of BI

The internal fan of BI needs to be replaced when BI prompts fan error. The replacement of fan shall be performed by professional electricians. Before replacement, make sure all the power of BI is switched off.

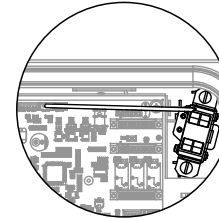
Step 1: First open the outer cover of BI;



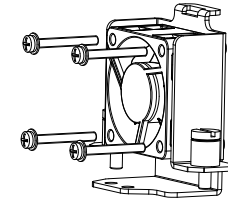
Step 2: Unscrew the two M4 screws below with crosshead screw driver to disassemble the internal cover of BI.



Step 3: Disconnect the fan cable, and unscrew the two M4 screws to disassemble the fan (pull out the fan). Please note that the fan cable is locked on the BI. Pinch and hold the buckle on the cable terminal to disconnect it.



Before



After

14 Commission the System

1 Select and scan the QR code below to download gPOWER APP. You can also find the QR code at the left top of the login page of <https://access.greenworkspower.com> or on the user manual of GWU-WIFI series communication module. In addition, you can search for the key word Cloud in APP store or Google Play to download it.



IOS



Google Play

2 Create a new account:

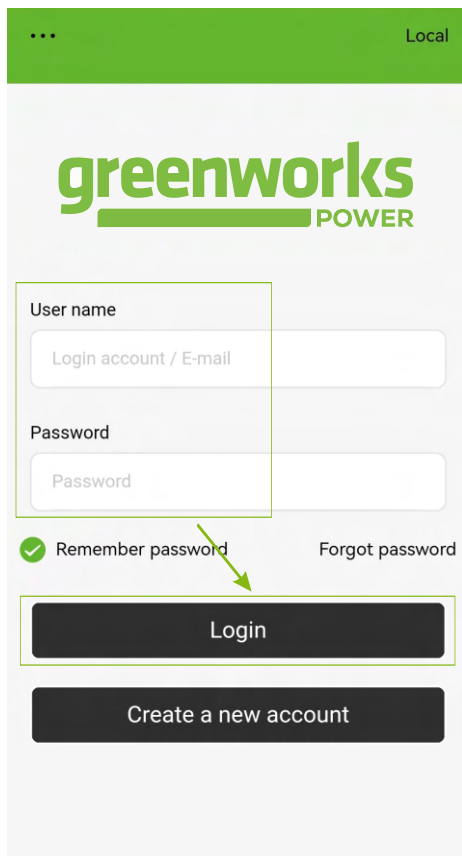
a) Touch "Create a new account" to start the registration.

b) Fill in your registration Email, input the Verification code, and enter your password to create the account.

*Note: If the registration fails, please repeat the above steps.

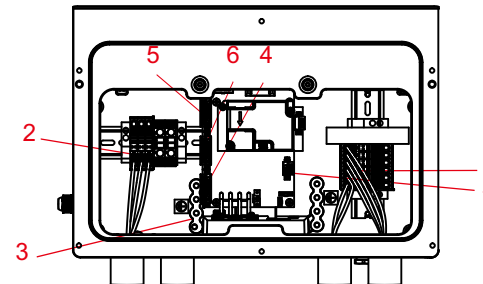
3 Log in

Open the gPOWER APP and fill in your login account and password, then touch Login to enter. It will be directly log in your account next time if you tick the "Remember password". Touch the "Forgot password" to refresh password through your E-mail.



Appendix A: Wiring and Breaker Requirement

Inverter wiring



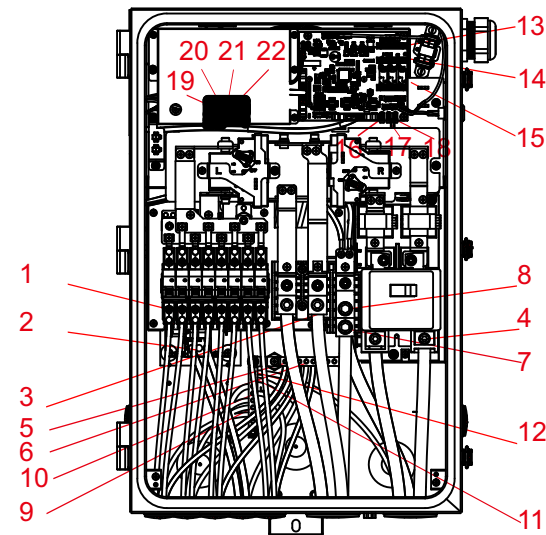
Inverter power terminal (Purchased by customer)

No.	Terminals	Type	Cross-sectional Area Range	Strip Length
1	PV terminals	90°C(194°F), 600 V, copper	10-8 AWG	0.47 in / 12 mm
2	AC terminals	90°C(194°F), 600 V, copper	12-8 AWG (3.8KW), 10-8 AWG (5/6/7.6KW)	0.47 in / 12 mm
3	Ground terminals	90°C(194°F), 600 V, copper	8 AWG	0.47 in / 12 mm

Inverter communication terminal (Purchased by customer)

No.	Terminals	Port Pin	Type	Range	Strip Length	Torque (in-lbs)
4	AUX terminal	Pin 1: RS485_METER_A	CAT5 or better	24-18 AWG	0.24 in. / 6 mm	1.8
		Pin 2: RS485_METER_B				
		Pin 3: GND				
		Pin 4: +12V_RELAY_OUT				
		Pin 5: DRM0				
		Pin 6: +12V_COM				
		Pin 7: STOP_NO+				
		Pin 8: STOP_NO-				
5	COMM in terminal	Pin 1: SYSR_L	CAT5 or better	24-18 AWG	0.24 in. / 6 mm	1.8
		Pin 2: SYSR_H				
		Pin 3: CAN_L				
		Pin 4: CAN_H				
		Pin 5: RS485_BI_A		18-16 AWG		
		Pin 6: RS485_BI_B				
		Pin 7: +12V				
		Pin 8: GND				
6	COMM out terminal	Pin 1: SYSR_L	CAT5 or better	24-18 AWG	0.24 in. / 6 mm	1.8
		Pin 2: SYSR_H				
		Pin 3: CAN_L				
		Pin 4: CAN_H				
		Pin 5: RS485_BI_A		18-16 AWG		
		Pin 6: RS485_BI_B				
		Pin 7: +12V				
		Pin 8: GND				
7	MLPE terminal	Pin 1: GND	CAT5 or better	24-18 AWG	0.24 in. / 6 mm	1.8
		Pin 2: RS485_MLPE_A				
		Pin 3: RS485_MLPE_B				

BI wiring



BI power terminal (Purchased by customer)

No.	Terminals	Cross-sectional Area Range	Strip Length	Torque (in-lbs)
1	INV terminals	12-8 AWG (3.8 KW), 10-8 AWG (5/6/7.6 KW)	0.67 in. / 17 mm	30
2	GEN terminals	8-4 AWG	0.67 in. / 17 mm	/
3	Load terminals	3 AWG-4/0 AWG	1.25 in. / 32 mm	275
4	Grid terminals	3 AWG-4/0 AWG	1.25 in. / 32 mm	275
5	INV Neutral terminals	12-8 AWG (3.8 KW), 10-8 AWG (5/6/7.6 KW)	0.79 in. / 20 mm	275
6	GEN Neutral terminals	8-4 AWG	0.79 in. / 20 mm	/
7	Load Neutral terminals	3 AWG-4/0 AWG	1.77 in. / 45 mm	275
8	Main Neutral terminals	3 AWG-4/0 AWG	1.77 in. / 45 mm	275
9	INV Ground terminals	8 AWG	0.79 in. / 20 mm	30
10	GEN Ground terminals	8-6 AWG	0.79 in. / 20 mm	30
11	Load Ground terminals	6-4 AWG	1.77 in. / 45 mm	30
12	Main Ground terminals	6-4 AWG	1.77 in. / 45 mm	30

* The type of BI power cable shall be 90°C(194°F), 600 V, copper.

BI communication terminal (Purchased by customer)

No.	Terminals	Port Pin	Type	Range	Strip Length	Torque (in-lbs)
13	INV Communication terminal	Pin 1: RESERVE	CAT5 or better	24-18 AWG	0.24 in / 6 mm	1.8
		Pin 2: RESERVE				
		Pin 3: CAN_L				
		Pin 4: CAN_H				
		Pin 5: RS485_BI_A				
		Pin 6: RS485_BI_B				
		Pin 7: +12 V	18-16 AWG			
		Pin 8: GND				
14	AUX1 terminal	Pin 1: DRY_GEN	CAT5 or better	24-16 AWG	0.24 in / 6 mm	1.8
		Pin 2: GEND_GEN				
		Pin 3: RS485_RESERVE_A	24-18 AWG			
		Pin 4: RS485_RESERVE_B				
		Pin 5: RESERVE				
		Pin 6: RESERVE				
		Pin 7: STOP_NO+				
		Pin 8: STOP_NO-				
15	AUX2terminal	Pin 1: NO_1	24-16 AWG	0.24 in / 6 mm	1.8	
		Pin 2: COM_1				
		Pin 3: NC_1				
		Pin 4: NO_2				
		Pin 5: CON_2/3				
		Pin 6: NC_2				
		Pin 7: NO_3				
		Pin 8: NC_3				
16	CT1 terminal	Pin 1: CT1+	Shielded, twisted pair	/	/	/
		Pin 2: CT1-				
17	CT2 terminal	Pin 1: CT2+	Shielded, twisted pair	/	/	/
		Pin 2: CT2-				
18	CT3 terminal	Pin 1: CT3+	Shielded, twisted pair	/	/	/
		Pin 2: CT3-				
19	CT L1A terminal	Pin 1: CT L1A+	Shielded, twisted pair	/	/	/
		Pin 2: CT L1A-				

No.	Terminals	Port Pin	Type	Range	Strip Length	Torque (in-lbs)
20	CT L1B terminal	Pin 1: CT L1B+	Shielded, twisted pair	/	/	/
		Pin 2: CT L1B-				
21	CT L2A terminal	Pin 1: CT L2A+	Shielded, twisted pair	/	/	/
		Pin 2: CT L2A-				
22	CT L2B terminal	Pin 1: CT L2B+	Shielded, twisted pair	/	/	/
		Pin 2: CT L2B-				

Inverter breaker and switch

No.	Component	Description	Source
1	AC Breaker	3.8 KW: Noark # B1N2C20: 20A Circuit Breaker; 2-Pole, 240V, 10kAIC 5 KW: Noark # B1N2C30: 30A Circuit Breaker; 2-Pole, 240V, 10kAIC 6 KW: Noark # B1N2C35: 35A Circuit Breaker; 2-Pole, 240V, 10kAIC 7.6 KW: Noark # B1N2C40: 40A Circuit Breaker; 2-Pole, 240V, 10kAIC	Can be purchased from the manufacture
2	Emergency stop switch	Normally closed (NC) contact The UL certification is required for the emergency stop switch.	Purchase by customer

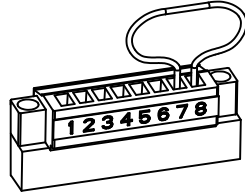
BI breaker and switch (Purchased by customer)

No.	Component	Description
1	Grid breaker	Amps Part Number Description
		100 CSR2100 Eaton # CSR2100: 100 A / 240 V, 25 kAIC, 2-Pole
		125 CSR2125N Eaton # CSR2125N: 125 A / 240 V, 25 kAIC, 2-Pole
		150 CSR2150N Eaton # CSR2150N: 150 A / 240 V, 25 kAIC, 2-Pole
		175 CSR2175N Eaton # CSR2175N: 175 A / 240 V, 25 kAIC, 2-Pole
		200 CSR2200N Eaton # CSR2200N: 200 A / 240 V, 25 kAIC, 2-Pole
		100 BW2100 Eaton # BW2100: 100 A / 240 V, 10 kAIC, 2-Pole
		125 BW2125 Eaton # BW2125: 125 A / 240 V, 10 kAIC, 2-Pole
		150 BW2150 Eaton # BW2150: 150 A / 240 V, 10 kAIC, 2-Pole
		175 BW2175 Eaton # BW2175: 175 A / 240 V, 10 kAIC, 2-Pole
		200 BW2200 Eaton # BW2200: 200 A / 240 V, 10 kAIC, 2-Pole
		100 BWH2100 Eaton # BWH2100: 100 A / 240 V, 25 kAIC, 2-Pole
		125 BWH2125 Eaton # BWH2125: 125 A / 240 V, 25 kAIC, 2-Pole
		150 BWH2150 Eaton # BWH2150: 150 A / 240 V, 25 kAIC, 2-Pole
		175 BWH2175 Eaton # BWH2175: 175 A / 240 V, 25 kAIC, 2-Pole
		200 BWH2200 Eaton # BWH2200: 200 A / 240 V, 25 kAIC, 2-Pole
2	Emergency stop switch	Normally closed (NC) contact The UL certification is required for the emergency stop switch.

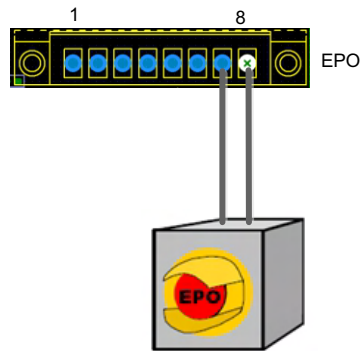
Appendix B EPO Connection Steps

For installing EPO on the inverter, follow the below installation instructions.

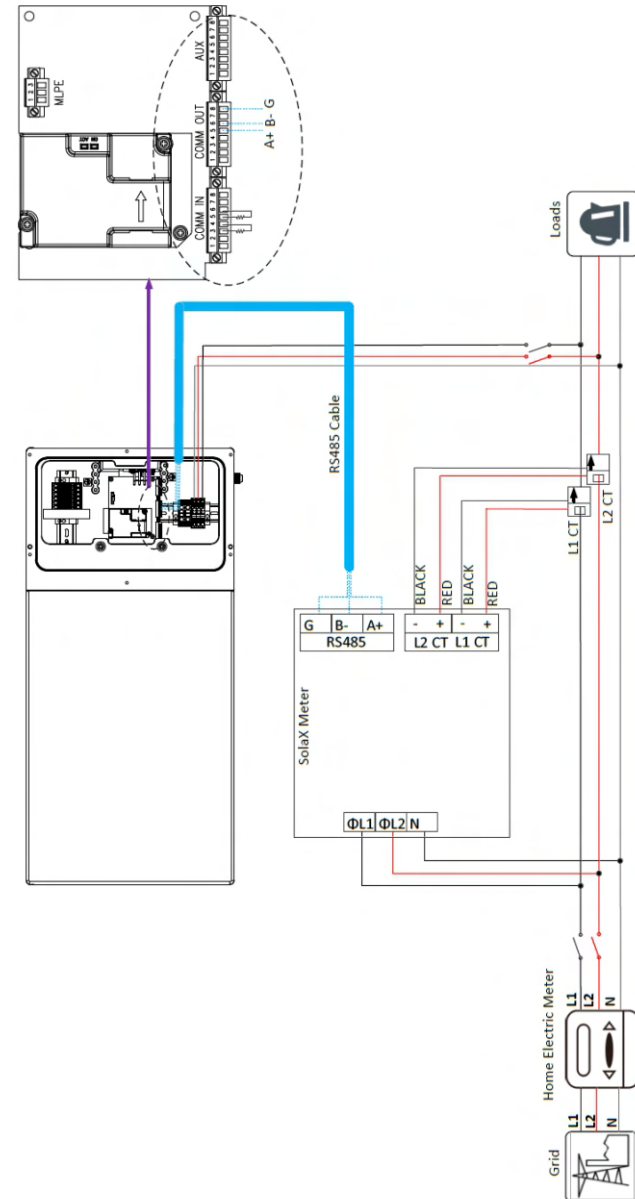
Step 1: Remove the factory-installed jumper from Pin 7 and 8 of the 8-position "AUX" connector inside the inverter.



Step 2: Use minimum 24 AWG conductors to connect Pin 7 and Pin 8 (labeled "12V" and "STOP_NO") to a suitable emergency stop switch.

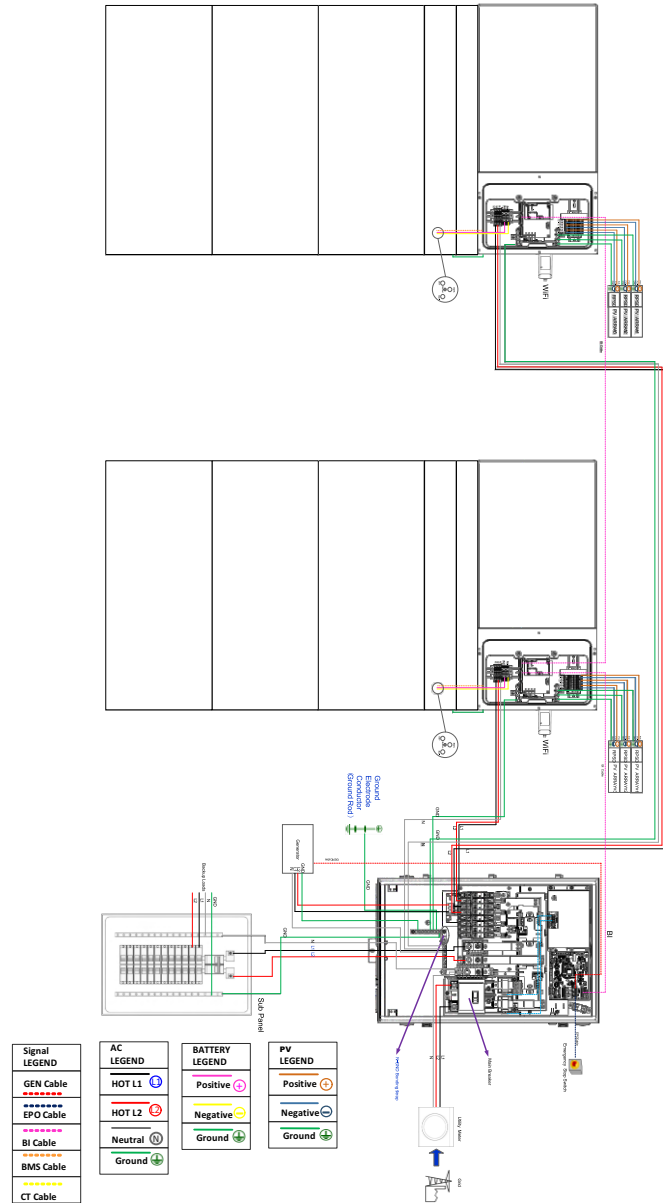


Appendix C Meter Y Connection Diagram

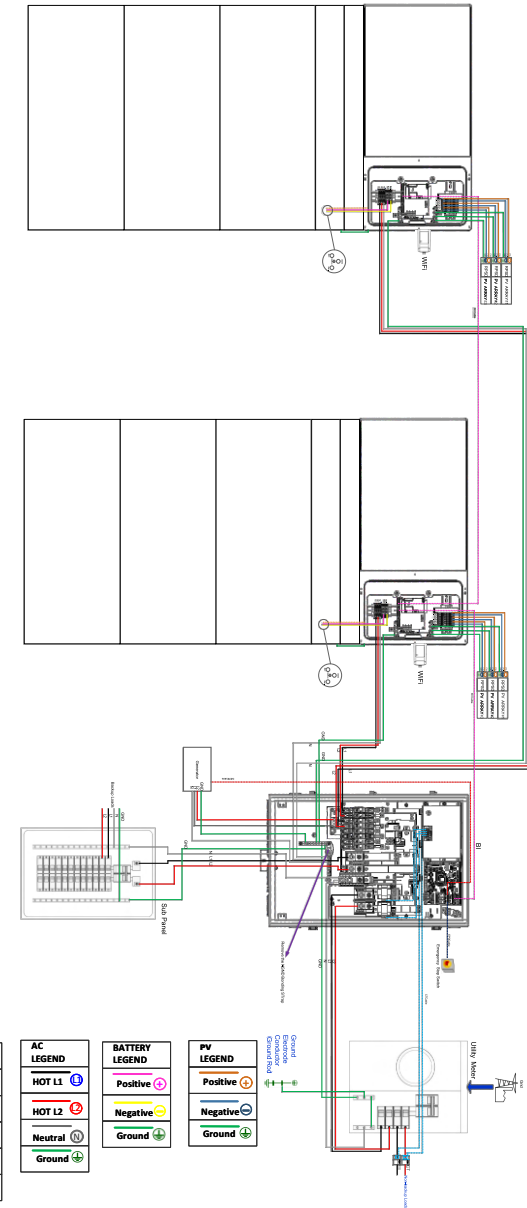


Appendix D: System Wiring Diagram

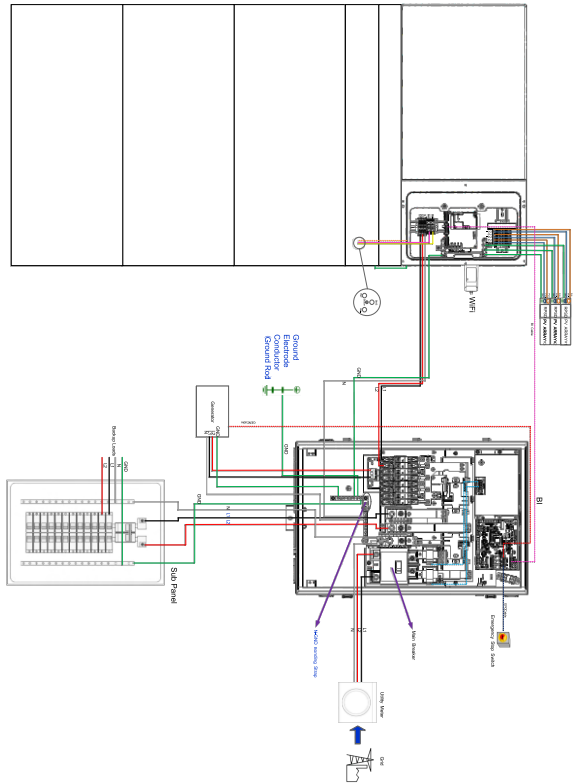
1 Whole home backup solution (Parallel operation)-with standalone meter



2 Partial home backup solution (Parallel operation) -with meter load center

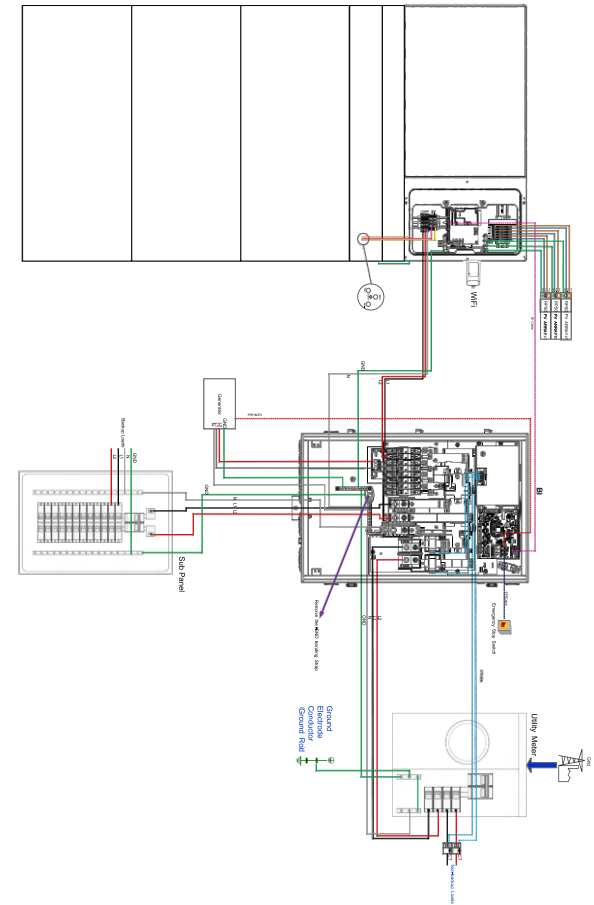


3 Whole home backup solution-with standalone meter



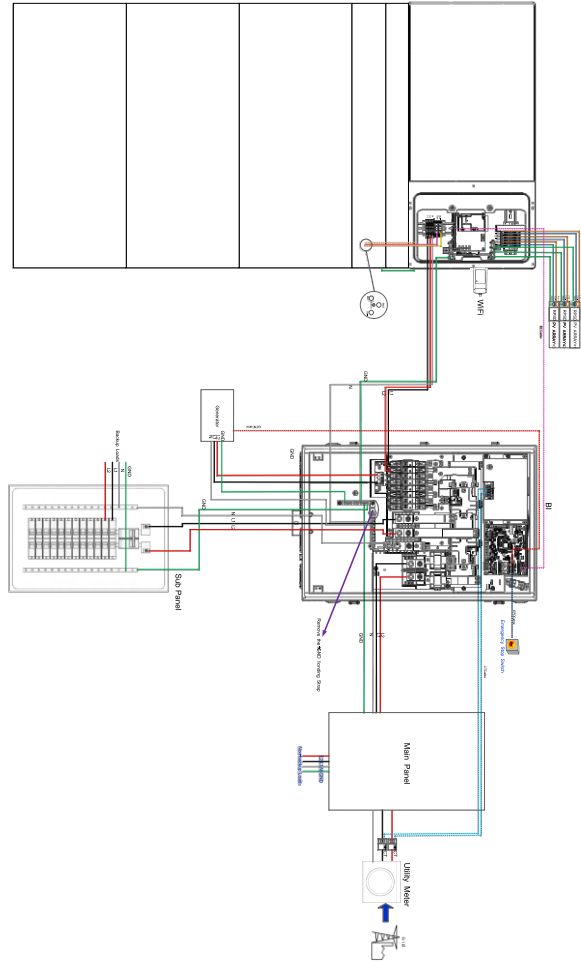
Signal LEGEND	AC LEGEND	BATTERY LEGEND	PV LEGEND
GEN Cable	HOT L1	Positive	Positive
EPO Cable	HOT L2	Negative	Negative
BI Cable	Neutral	Ground	Ground
BMS Cable	Ground		
CT Cable			

4 Partial home backup solution -with meter load center



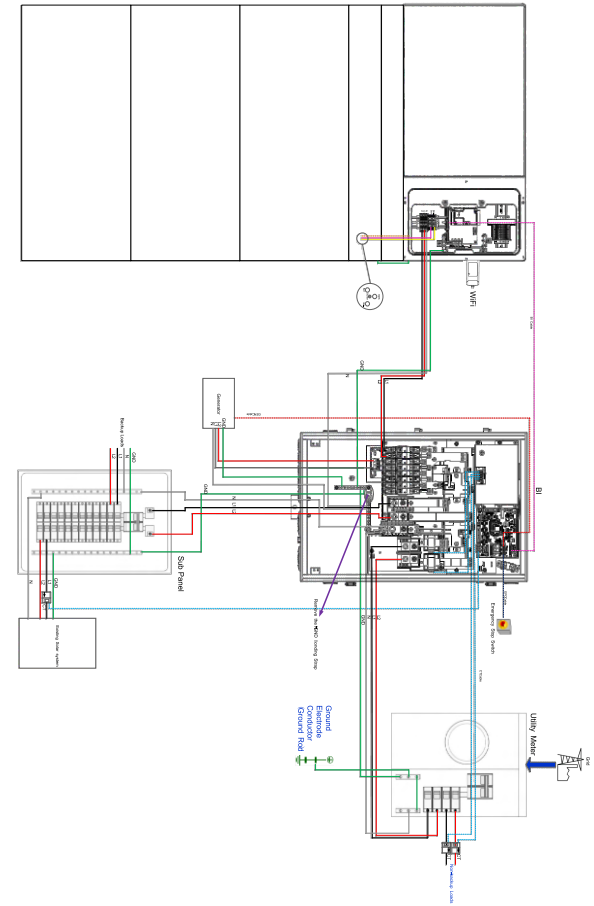
Signal LEGEND	AC LEGEND	BATTERY LEGEND	PV LEGEND
GEN Cable	HOT L1	Positive	Positive
EPO Cable	HOT L2	Negative	Negative
BI Cable	Neutral	Ground	Ground
BMS Cable	Ground		
CT Cable			

5 Partial home backup solution



Signal LEGEND	AC LEGEND	BATTERY LEGEND	PV LEGEND
GEN Cable	HOT L1	Positive	Positive
EPO Cable	HOT L2	Negative	Negative
BI Cable	Neutral	Ground	Ground
BMS Cable	Ground		
CT Cable			

6 Partial home backup solution-with meter load center & microgrid system



Signal LEGEND	AC LEGEND	BATTERY LEGEND	PV LEGEND
GEN Cable	HOT L1	Positive	Positive
EPO Cable	HOT L2	Negative	Negative
BI Cable	Neutral	Ground	Ground
BMS Cable	Ground		
CT Cable			

7 Partial backup solution & microgrid system

