

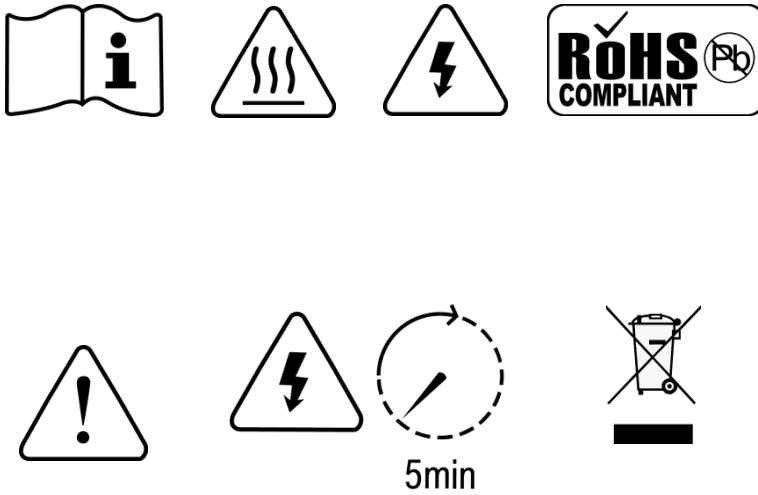
Energier Apollo series

ALL-IN-ONE for Solar Hybrid-system



Version A1.5

Date: March. 2018



WARNING : FIRE HAZARD

SUITABLE FOR MOUNTING ON CONCRETE OR OTHER

NON- COMBUS TIBLE SURFACE ONLY

CAUTION : THE DC AND AC BREAKER MUST HAVE BEEN

TURNED OFF BEFORE SERVICING

MADE IN CHINA

Disclaimer

Unless specially agreed in writing, TBB Power Co., Ltd

- Take no warranty as to the accuracy, sufficiency of suitability of any technical or other information provided in this manual or other documentation.
- Assumes no responsibility or liability for loss or damage, whether direct, indirect, consequential or incidental, which might arise out of the use of such information
- TBB offer standard warranty with its products, taking no responsibility for direct or indirect loss due to equipment failure.

About this Manual

This manual describes our product features and provides procedure of installations. This manual is for anyone intending to install our equipment.

General Instruction

Thanks for choosing our products and this manual were suitable for Energier Apollo. This chapter contains important safety and operation instructions. Read and keep this User Guide well for later reference.

The Energier Apollo needs to be installed by professionals and please pay attention to the following points prior to installation:

- 1> Please check the input voltage or voltage of battery is same to the nominal input voltage of this inverter.
- 2> Please connect positive terminal "+" of battery to "+" input of the inverter.
- 3> Please connect negative terminal "-" of battery to "-" input of the inverter.
- 4> Please connect positive terminal "+" of photovoltaic panel to "PV+" input of the inverter.
- 5> Please connect negative terminal "-" of photovoltaic panel to "PV-" input of the inverter.
- 6> Please use the shortest cable to connect and ensure the secure connection.
- 7> While connecting, please secure the connection and avoid short cut between positive terminal and negative terminal of battery, which will cause damage of battery.
- 8> Inverter will have high voltage inside. Only authorized electrician can open the case.
- 9> The inverter WAS NOT designed to use in any life retaining equipment.

Index

1.General Safety Instruction	1
1.1 Safety Instruction	1
1.2 General Precaution	1
1.3 Precaution regarding battery operation	1
2.Description of main Function	3
2.1 General Description.....	4
2.2 Inverter	5
2.3 Smart Battery Charger.....	5
2.4 Solar charge controller.....	7
2.5 Transfer.....	7
2.6 Multi battery chemical available	7
2.7 Manual Equalization	8
2.8 Settable Low voltage disconnect level	8
2.9 Weak Grid	8
2.10 Solar mode	8
2.11 Power Save Mode (PS mode).....	9
2.12 AEA – automatic energy allocation.....	9
2.13 Comprehensive Protection.....	9
2.14 RS485 communication	10
2.15 RCH remote module (optional device)	10
2.16 Digital Shunt (optional device)	10
2.17 Cyber (optional device) –System monitor.....	11
2.18 Software configuration.....	11
2.19 Naming rule.....	11
3.Structure	13
3.1 Product drawing	13

3.1.1 Energier Apollo.....	13
3.1.2 RCH remote.....	13
3.1.3 Cyber and Digital Shunt	13
3.2 Product size	14
3.2.1 Energier Apollo.....	14
3.2.2 RCH remote.....	14
3.2.3 Cyber	15
3.2.4 Digital Shunt	15
4.Pre-installation Configuration	16
4.1 Battery Capacity	18
4.2 Work Mode	20
4.3 Solar Mode	20
4.4 Low Voltage disconnect (LVD).....	21
4.5 Battery Type.....	21
4.6 Equalization (EQ).....	21
4.7 Power Save mode (PS mode)	22
4.8 Grid charger.....	22
4.9 AC input current setting	23
5. Pre-Installation.....	24
5.1 Material list	24
5.2 Location.....	24
5.3 Wiring recommendation	24
6. Installation and Connection	25
6.1 General advice.....	25
6.2 Fix the equipment	25
6.3 Connecting the cable.....	27
6.4 Install the temperature sensor	32
6.5 Install the voltage sensor	33
6.6 Install the RCH - remote controller.....	33

6.7 Install the Cyber	34
6.8 Install the Digital Shunt.....	34
6.9 Install the system.....	35
6.10 Install the dust-proof net.....	35
7.Operation.....	37
7.1 Double Checking.....	37
7.2 Set the AC input	37
7.3 Main switch function.....	37
7.4 Switch on the inverter.....	38
7.5 Switch on grid charger	38
7.6 Switch off grid charger	39
7.7 Switch on solar charge controller	40
7.8 Switch off solar charge controller	41
7.9 Power Saving mode	42
7.10 Performing De-sulphation Charging.....	42
8.Specification	46
9.Trouble Shooting	49
9.1 LED indicator on front panel and audible alarm	49
9.2 LED indicator on Remote.....	50
9.2.1 Operating status.....	50
9.2.2 Battery SOC bar	51
9.2.3 Load percentage bar	51
9.3 Common failure analysis	51
9.3.1 No output first power on.....	51
9.3.2 No output during operation.....	52
9.3.3 No charging delivered when you switch on grid input power	53
9.3.4 No charging delivered when you switch on PV input power	53
9.3.5 Normal mode and Power save mode keep changing over.....	54

1. General Safety Instruction

1.1 Safety Instruction

As dangerous voltages and high temperature exist within the Energier Apollo, only qualified and authorized maintenance personnel are permitted to open and repair it. Please make sure Energier Apollo is turned off before open and repair it.

This manual contains information concerning the installation and operation of the Energier Apollo. All relevant parts of the manual should be read prior to commencing the installation. Please follow the local stipulation meantime.

Any operation against safety requirement or against design, manufacture, safety standard, and are out of the manufacturer warranty.

1.2 General Precaution

- 1.2.1 Do not expose to dust, rain, snow or liquids of any type, it is designed for indoor use. DO NOT block off ventilation, otherwise the Energier Apollo would be overheating.
- 1.2.2 To avoid fire and electric shock, make sure all cables selected with right gauge and being connected well. Smaller diameter and broken cable are not allowed to use.
- 1.2.3 Please do not put any inflammable goods near to the unit
- 1.2.4 Never place unit directly above batteries, gases from a battery will corrode and damage it.
- 1.2.5 Do not place battery over the unit.

1.3 Precaution regarding battery operation

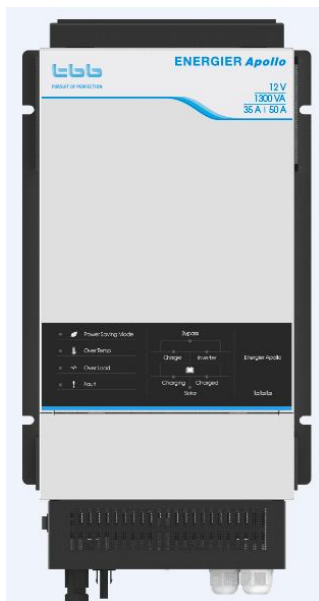
- 1.3.1 Use plenty of fresh water to clean in case battery acid contacts skin, clothing, or eyes and consult with doctor as soon as possible.
- 1.3.2 The battery may generate flammable gas during charging. NEVER smoke or allow a spark or flame in vicinity of a battery.
- 1.3.3 Do not put the metal tool on the battery, spark and short circuit might lead to explosion.

- 1.3.4 REMOVE all personal metal items such as rings, bracelets, necklaces, and watches while working with batteries. Batteries can cause short-circuit current high enough to make metal melt, and could cause severe burns.

2. Description of main Function

Thanks for choosing Energier Apollo, of which can be used to compose various hybrid power system. The product was delivered with following equipment:

- Energier Apollo
- User's manual
- VS - battery voltage sensor
- TS - battery temperature sensor
- RCH (Remote module, optional)
- Digital Shunt (optional)
- Cyber (optional)
- IP40 MESH - CHA (optional)
- PV EXTENSION - S (optional)
- PV EXTENSION - H (optional)



Energier Apollo



RCH

Remote Control Panel



Cyber



VS

Battery Voltage Sensor



TS

Battery Temperature Sensor

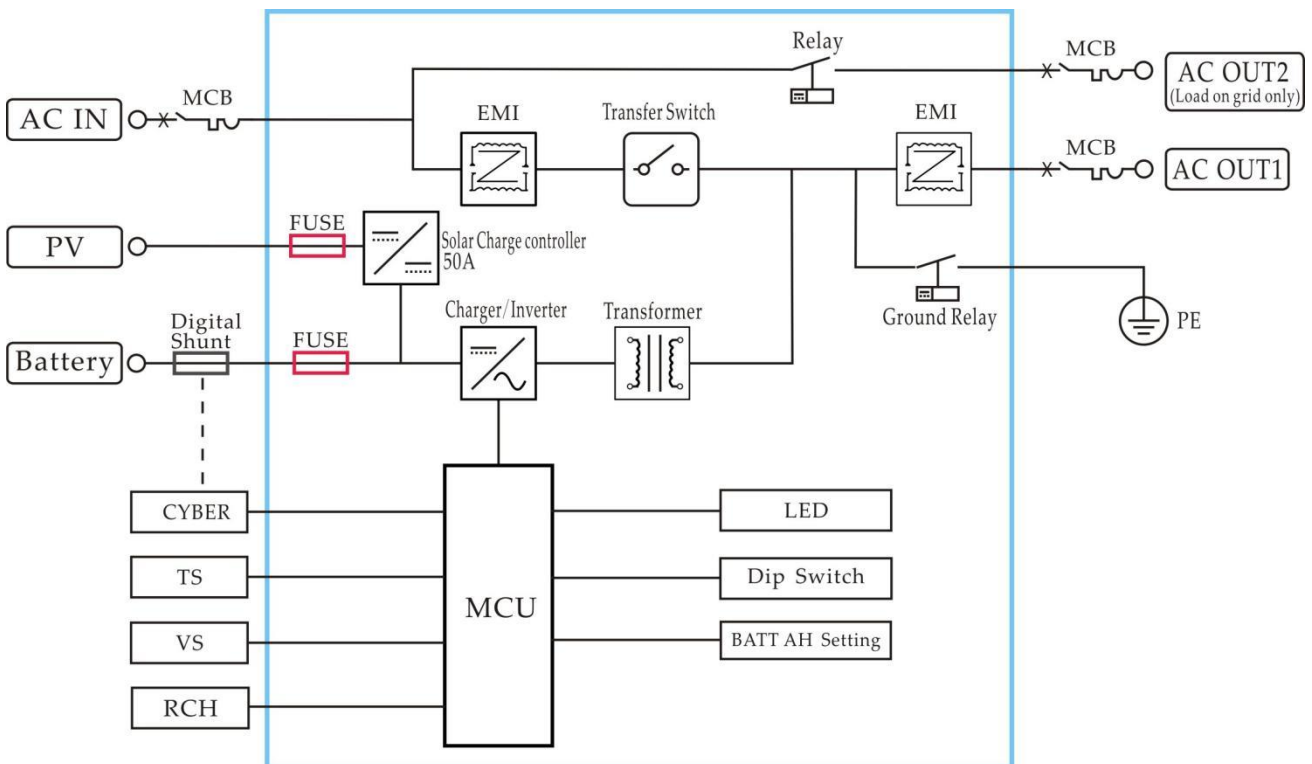


Digital Shunt

2.1 General Description

Energier Apollo is a powerful unit integrated multiple functions, including a high performance true sine wave inverter, a powerful battery charger, a solar charge controller, a high speed automatic transfer switch and function of load management, make it very convenient to compose different solar hybrid system.

++ Working principle



++ System Work Mode:

Power Backup Mode:

When Energier Apollo is set to “Power Backup Mode”, it will start charging in case AC input is present. When the AC input is not present, it will switch to inverter mode automatically.

Solar Mode:

When Energier Apollo is set to “Solar Mode”, you can compose a solar hybrid system for your house, of which solar energy will be used as primary.

2.2 Inverter

++ Pure Sine Wave

Energier Apollo is a sine wave inverter which generates a near perfect sinusoidal AC wave power output that is very similar or even better to what you could get from your utility grid. Pure sine wave can guarantee the correct function of sensitive equipment (computer, laser printer, TV etc) or most demanding inductive load. Also, your home appliances will work smoother, cooler and more efficient, such as fridge, microwave and power tools.

++ High surge power

Provided with outstanding surge power capability and low frequency transformer, Energier Apollo is suitable for heavy inductive load like refrigerator, coffee maker, microwave, power tools, air conditioner etc.

2.3 Smart Battery Charger

The built-in smart battery charger automatically starts up when qualified AC power is presented either from grid or generator, charging the battery connected.

++ Powerful Charger

The built-in charger of Energier Apollo was designed with high power, which can quickly charge a battery within 6-8hrs.

++ Multi stage sophisticated charging algorithm for lead acid battery

Fitted with multistage charging algorithm (bulk-absorption-float-recycle), the built-in charger of Energier Apollo is designed to charge battery quickly and fully. Microprocessor controlled charging algorithm with variable absorption charging timer guarantee the optimal charging for batteries of different discharged state.

Float charging and Recycle charging program guarantee your battery could get proper maintenance in case of long time connected.

++ Battery temperature compensation

Battery temperature is a key factor in correct charging, the charging formula must be adjusted (automatically and in real time) according to the actual battery temperature to ensure that battery are fully charged but not overcharged or undercharged. All charging voltages recommended by battery manufacture are in fact ONLY applied at 20°C-25°C.

The TS (battery temperature sensor) supplied with Energier Apollo measures the temperature of battery and automatically makes adjustments at real time to properly charge your batteries at compensation rate of $-4\text{mv}/^{\circ}\text{C}/\text{cell}$. In case of TS was not present, Energier Apollo will use 25°C as default setting.

++ Voltage compensated charging

Through separately installed the VS (battery voltage sensor), Energier Apollo could automatically adjust its output compensating the voltage drop on the cable assuring the full charging through delivering the right voltage to battery.

++ Charger capacity adjustable

Through the clock switch at central panel or through Cyber, user can choose the capacity of battery you want to charge. According to your choice, Energier Apollo will automatically adjust its output power makes it suitable the battery capacity selected. The charging current was set at threshold rate of 15% of battery capacity ($I = 0.15C$) being set.

++ Lithium battery charging

Energier Apollo can be configured to charge Lithium battery and charging parameter can be

programmed as well through PC with RapConfig software.

2.4 Solar charge controller

The built-in PWM solar charger controller automatically starts up when qualified PV voltage is presented from photovoltaic panel, charging the battery connected.

Energier Apollo can charge the battery via AC grid and PV energy at the same time.

- The total charging current doesn't exceed the max charging current you set for the battery connected.
- Charging from PV has higher priority.

2.5 Transfer

In case of voltage, frequency and waveform of AC input match the minimum quality, Energier Apollo will be switched directly to bypass working mode. Battery charger is switched on and loads are powered by AC input. You will have the same voltage at the output as AC input.

In case of AC input failure or exceeding the minimum requirement, Energier Apollo will initiate a quick switching to inverter mode (about 8ms), of which will guarantee an undisturbed power for majority of the appliance. Upon AC input resume or match the quality, it will switch back again within 8ms. With this mode (Power Backup Mode), Energier Apollo could be used as an UPS. Energier Apollo can also be configured working under Solar Mode, please refer to 2.10.

2.6 Multi battery chemical available

Commonly encountered lead acid battery chemicals include AGM, GEL/OPzV, Flooded and Lithium battery. The voltage required for a proper charging of different battery varies. Energier Apollo could offer premium charging for above commonly encountered battery categories, of which you can set through the DIP switch at central panel.

Through Rapconfig software, you could configure the appropriate charging voltage for the battery installed.

2.7 Manual Equalization

Over a period of time, the cells in the flooded and OPZS batteries can develop uneven chemical states. This will result in a weak cell which in turn can reduce the overall capacity of battery. To improve the life and performance of these types of battery, Energier Apollo includes a manual equalization program that can be used if recommended by battery manufacturer, to equalize the battery. For details, please refer to chapter 7.10.

This charging program can ONLY being applied to Flooded and OPZS batteries. As a protection, the EQ mode will automatically disable if you select either LFP、 GEL/OPzV or AGM as battery type.

2.8 Settable Low voltage disconnect level

Deep discharge of the lead acid battery leads to high losses in capacity and early aging. Energier Apollo continuously supervised and controlled battery condition.

For different application, the user intended to have different low voltage disconnection level. For example, for solar application, user intended to have less DOD to prolong the battery cycle life. But for mobile application, user intended to have more DOD to reduce battery capacity and on board weight.

Through DIP switches, Energier Apollo offer 2 levels of user's settable low voltage disconnect for user to configure.

2.9 Weak Grid

With setting at weak grid mode, Energier Apollo will reduce its requirements for AC input (voltage, frequency and waveform) and pass over the grid to power the load and meantime performing the charging. Meantime, this mode can be worked in system with generator connected. With this setting, Energier Apollo can work with majority of generator in the market.

2.10 Solar mode

Under SOLAR Mode, you can use Energier Apollo to compose a solar hybrid system, of which solar energy will be used as primary. There are two solar hybrid systems for user to choose by dip switch 2.

For details, please refer to chapter 4.3.

2.11 Power Save Mode (PS mode)

In Power Save mode, the no load power consumption will be reduced by approx 70%. Energier Apollo will switch off in case of load is less than preset level and will resume after the power reach the preset level.

2.12 AEA – automatic energy allocation

This function was designed for system with limited input (either grid or generator). It can automatic allocate the power available with AC source (either grid or genset) using whatever extra for charging, thus avoiding grid or generator to be overloaded.

2.13 Comprehensive Protection

The equipment is being protected against many failures through hardware and software making it robust and reliable.

++ Overload protection

Both of charger and output are being protected against overload by software.

In case of the Energier Apollo is too long or too heavily overloaded, it will switch off. After 60secs, it will switch on automatically. In case of 3times overload shutdown, it will not switch on automatically. In this case, you need to manually switch on Energier Apollo.

++ Overheat protection

In case of too high internal temperature was detected, Energier Apollo will switch off for overheat protection. After cooling down, it will switch on automatically.

++ Short circuit

The Energier Apollo will shut down and need manually start.

++ Battery over temp protection

During charging, Energier Apollo will keep monitoring battery temperature and will reduce charging rate or even shut down upon too high temperature detected. This will help to prevent

thermal runaway of battery. Energier Apollo will resume charging once the temperature fall into the scope.

++ Battery Low voltage

User can set its own preferred low voltage disconnect level. Energier Apollo will shut down upon battery voltage reach the preset level preventing battery to be over-discharged or discharged exceeding desired level. Once battery voltage raise, Energier Apollo will resume working.

2.14 RS485 communication

RS485/MODBUS was offered in this port. It can be connected to the computer running the configuration software.

2.15 RCH remote module (optional device)



Through RCH remote module, following information and function can be obtained.

- Load percentage monitor
- Battery State of Charge monitor
- Main switch (Solar Mode / OFF / Power Backup Mode)
- System info (Solar, AC input, Charger, Inverter, Fault)
- AEA function (AC input current setting)

2.16 Digital Shunt (optional device)

Digital shunt features microprocessor controlled combined with high resolution measuring system for battery voltage and charge/discharge current. With built in software, it can calculated consumed AH/KWH and remaining AH/KWH, and display battery voltage and battery current as well.

Apart from discharging and charging, multiple other factors are considered including battery size, age ratio of battery etc. With shunt, even the smallest leakage current can be detected and recorded to guarantee the accuracy.

2.17 Cyber (optional device) –System monitor

In together with Digital Shunt, Cyber can be bought to be connected to the Energier Apollo for abundant data.

- Monitoring : with all real time data
- Battery State of Charge monitor
- Configuration
- Active Alarm info

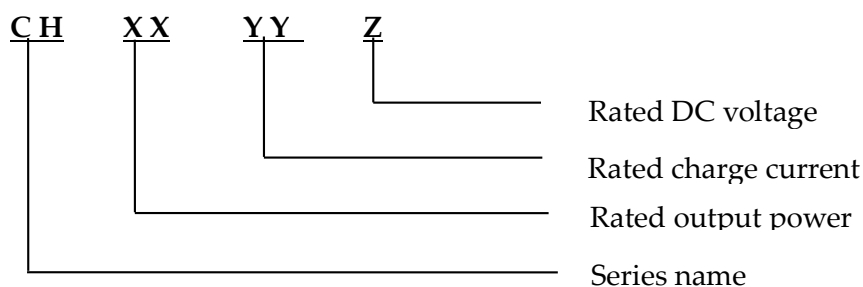


2.18 Software configuration

Energier Apollo was fully programmable through PC with RapConfig software, of which you could obtain from us

- System
- AC source
- Battery and Charging
- Inverter
- Automatic Generator Start
- Auxiliary output

2.19 Naming rule



field	figure	explanation	
	CH	series name	
XX	10	Rated Output Power	1000VA/900W
	13		1300VA/1200W
	16		1600VA/1500W
	20		2000VA/1700W
YY	30	Rated charge current	30A
	35		35A
	40		40A
	50		50A
Z	L	Rated DC voltage	12V
	M		24V

CH1350L: Energier Apollo series: Rated DC voltage 12V; Rated output power: 1300VA/1200W; Rated charge current:50A .

CH2040M: Energier Apollo series: Rated DC voltage 24V; Rated output power: 2000VA/1700W; Rated charge current:40A .

3. Structure

3.1 Product drawing

3.1.1 Energier Apollo

CH1035L, CH1350L, CH1630M, CH2040M



3.1.2 RCH remote



3.1.3 Cyber and Digital Shunt



Cyber

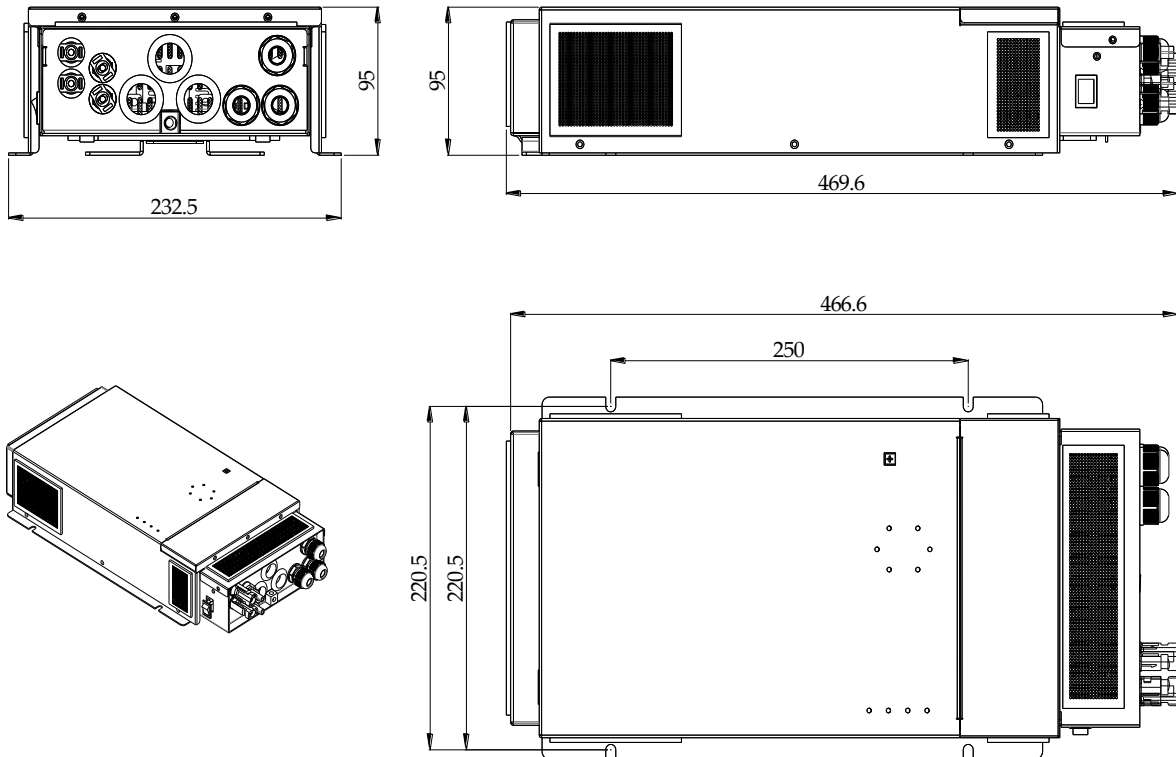


Digital Shunt

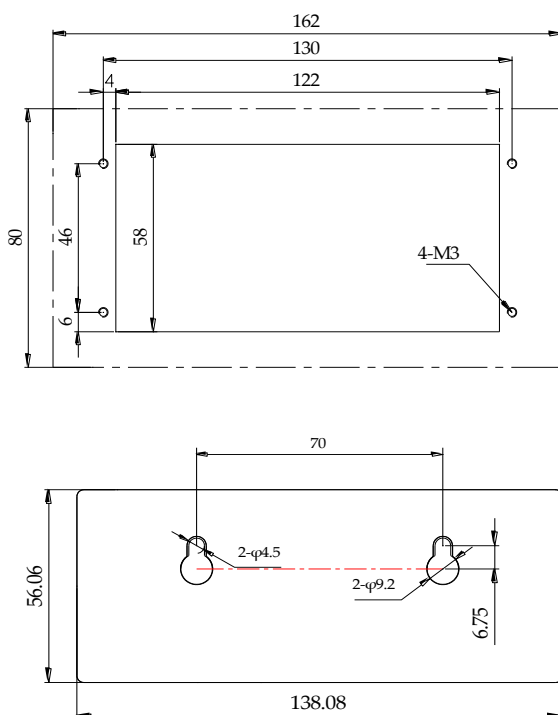
3.2 Product size

3.2.1 Energier Apollo

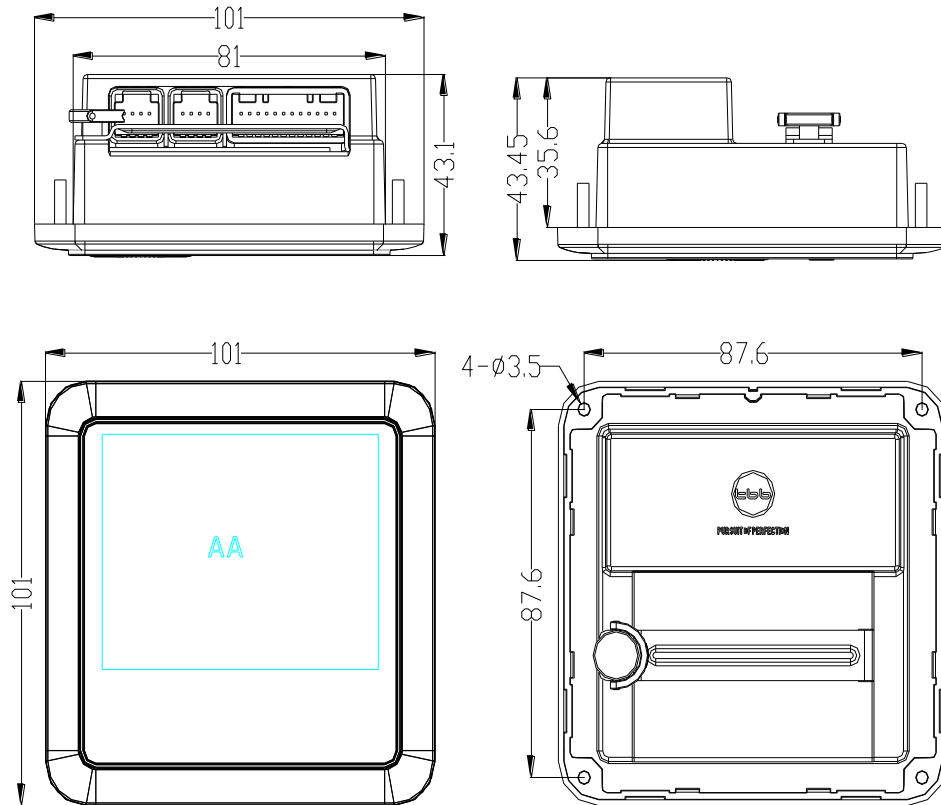
CH1035L, CH1350L, CH1630M, CH2040M



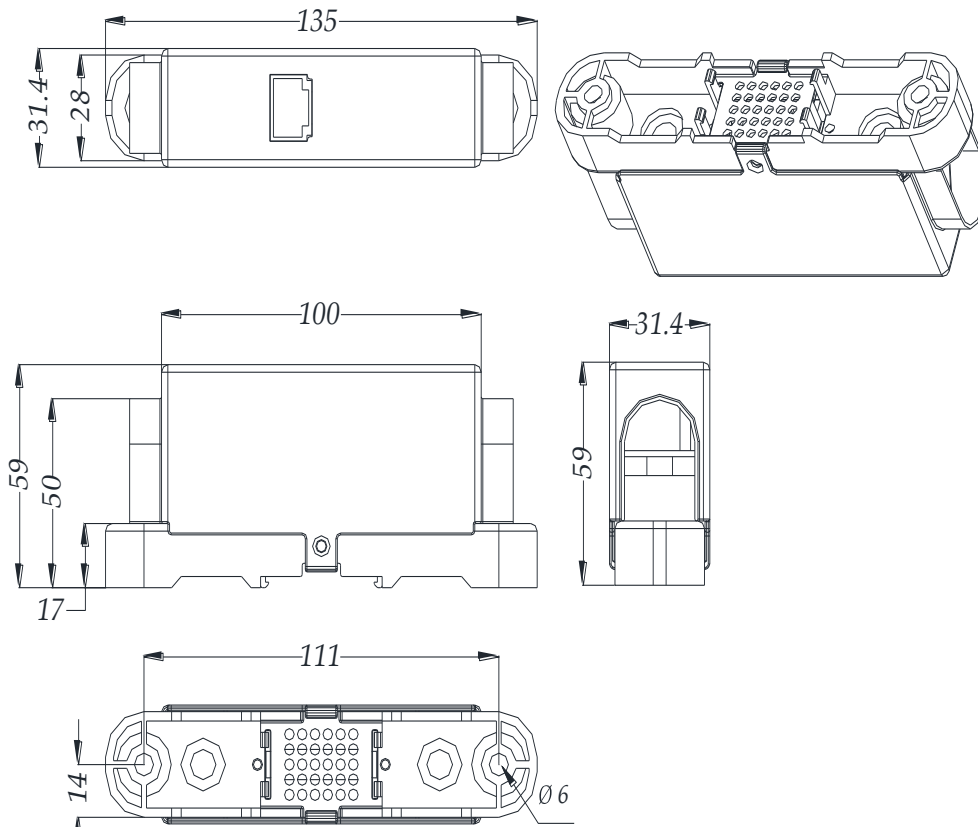
3.2.2 RCH remote



3.2.3 Cyber

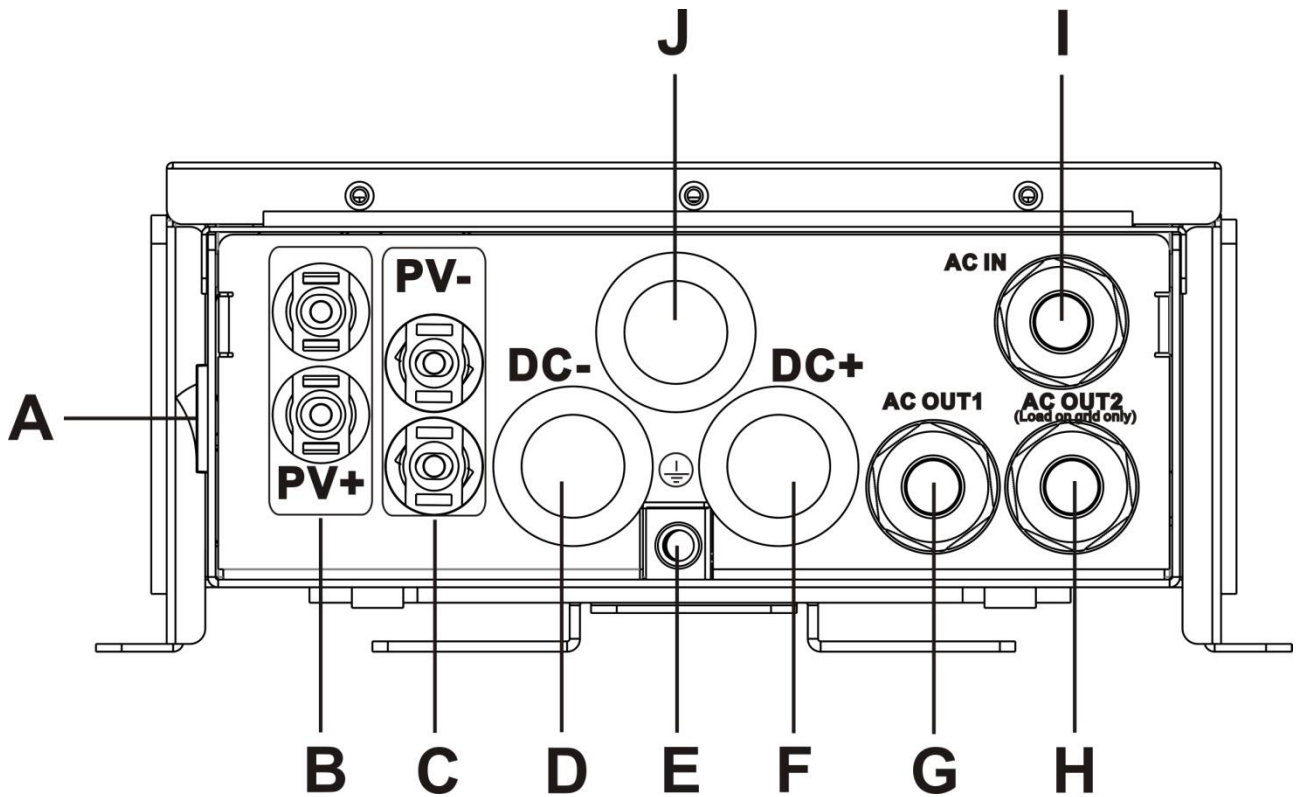


3.2.4 Digital Shunt



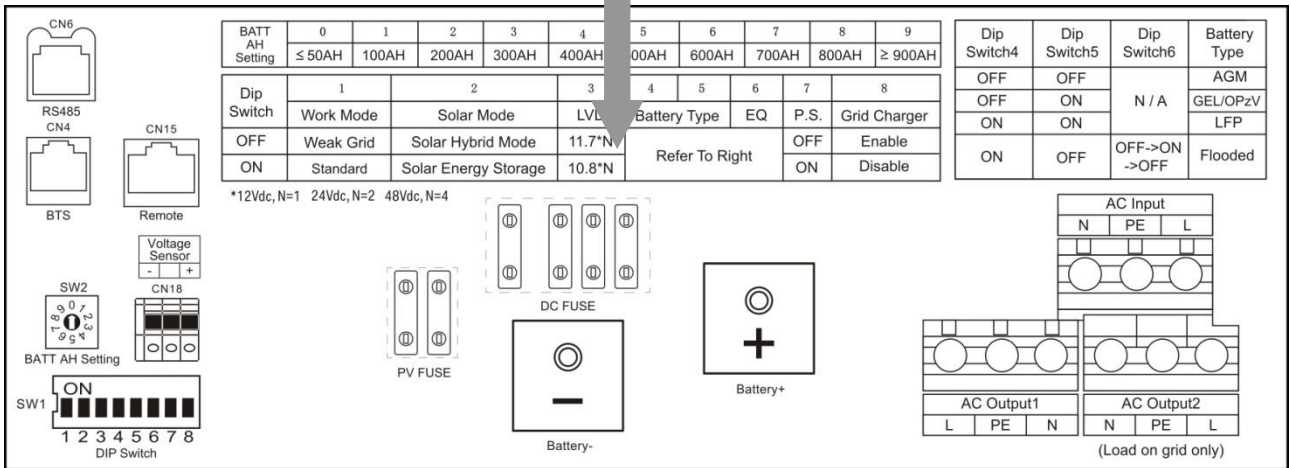
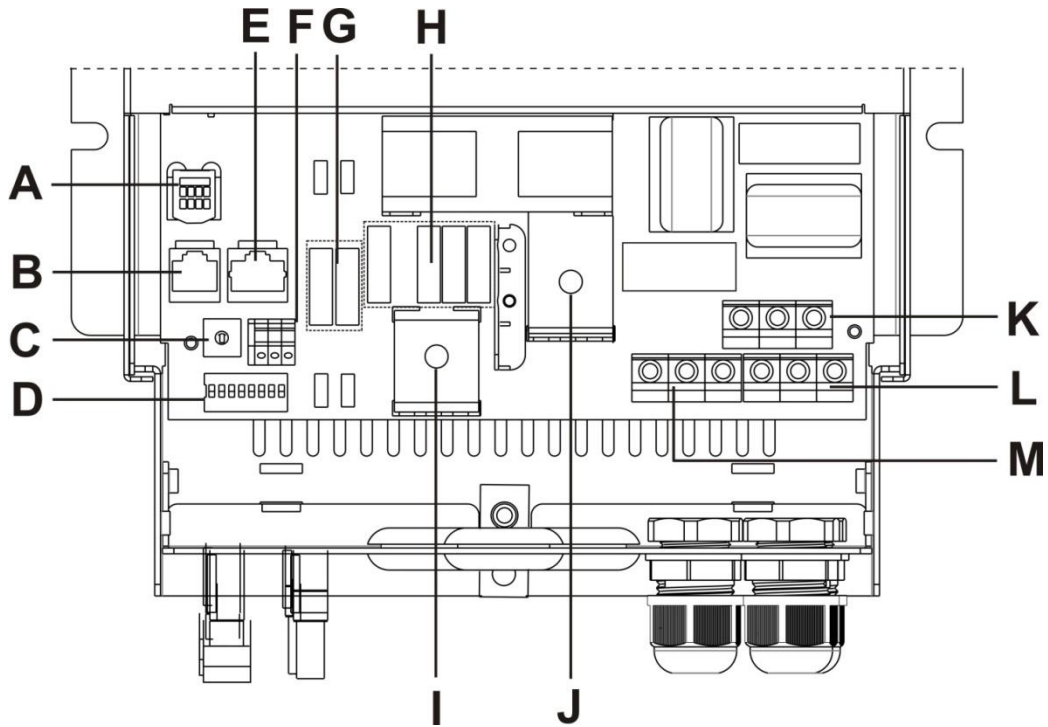
4.Pre-installation Configuration

Front Panel



A	Main switch
B	PV+ cable connector – MC4 connector
C	PV- cable connector – MC4 connector
D	Battery- cable through hole
E	Grounding terminal
F	Battery+ cable through hole
G	Gland for AC output1
H	Gland for AC output2 (Load on grid only)
I	Gland for AC input
J	Gland for remote control cable

Central Panel



A	RS485 Interface	H	DC Fuses
B	BTS Interface	I	Battery- terminal
C	Battery AH setting clock switch	J	Battery+ terminal
D	DIP Switches	K	AC Input terminals
E	Remote Interface	L	AC Output2 terminals

F	Voltage Sensor terminals	M	AC Output1 terminals
G	PV Fuses		

Before the installation, you need to do some basic configurations, of which can be done either by DIP switch or through Rapconfig software. The latest configuration will be saved in the Energier Apollo, no matter through which device.



If you perform the latest configuration through Rapconfig software, the setting will be saved in Energier Apollo, of which might not match the setting on DIP switch. Please always use Rapconfig software to read the latest configuration.

Loose screws and remove the top panel you will see the central panel where you can finish all the configurations.

4.1 Battery Capacity

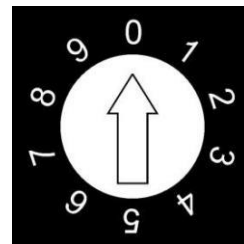
Through the clock switch, you can configure the battery you are going to connected for a premium charging current. The charger capacity in specification was the max charge current the model you selected could supply. Please refer to following fig of setting.

The charging current was set at following terms:

$I=0.15C$ (15% of the battery capacity you choose)

Or

Max Charger Capacity of the model you choose.



Position	Battery Capacity
0	≤50AH
1	100AH
2	200AH
3	300AH
4	400AH

5	500AH
6	600AH
7	700AH
8	800AH
9	≥900AH

- In case you choose ≤50AH, the charge current was 7.5A.
- In case you choose ≥900AH, the charge current was the max charging current.
- The max charging current of the model you are using can only deliver is its max charging current as specified in data no matter how big battery you selected.
- In case you want to charge your battery faster, you could set bank one gear larger to get higher charging current. However, please make sure the current did not exceed 0.2C (20% of battery capacity).

For example, for model CH1035L with battery capacity of 12V/200AH.

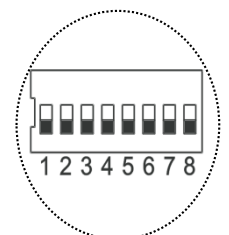
- If you choose battery capacity at 100AH, you could get charging current of 15%×100AH=15A
- If you want to charge faster, you could choose 200AH, you could get charging current 15%×200AH=30A.

For example, for model CH2040M with battery capacity of 24V/400AH.

- Since the max charging current of this model is 40A, you will get 40A. Not 0.15C, 60A.
- The default setting was position 0 (≤50AH)

Please refer to following chart for all setting of DIP Switch:

DIP Switch	1	2	3	4	5	6	7	8
	Work Mode	Solar Mode	LVD	Battery Type		EQ	P.S.	Grid Charger



4.2 Work Mode

The system default setting was weak grid mode. Through **DIP Switch 1**, you could configure the system in standard mode. Following please find the range for two setting:

Weak Grid mode:

Voltage range: 168VAC-276VAC

Frequency range: 40Hz-70Hz

Waveform: less sensitive

Standard mode:

Voltage range: 184VAC-264VAC

Frequency range: 45Hz-65Hz

Waveform: sensitive



Under weak grid mode, voltage or frequency variation might cause damage for particular load. Please refer to electrical rating of connected load. Failure to follow the instruction can cause damage over appliance connected.

4.3 Solar Mode

While the main dip switch is set as SOLAR MODE, **Dip Switch 2** can be used to set two different solar modes. Solar hybrid mode is the default.

++ Solar Hybrid Mode

Under this mode, Energier Apollo uses the solar energy as primary to power the loads and meantime performing the battery charging. Upon sunset with grid available, the Energier Apollo will charge the battery from grid. In case there is power blackout, system will automatically switch to battery.

++ Solar Energy Storage Mode

Under this mode, Energier Apollo uses the solar energy as primary to power the loads and meantime performing the battery charging. Battery will be discharged to power the load upon sunset. System will bring AC source in (either grid or generator) to power the load upon battery reached the preset Depth of Discharge level.

4.4 Low Voltage disconnect (LVD)

Through the **DIP Switch 3**, you could configure the premium low voltage protection level for your system. Following please find following the data.

The following DOD is ONLY estimation. The exact measure of the battery SOC is almost impossible with only electrical parameter.

It may vary according to discharge current, battery healthy etc.

DS3	12VDC model	24VDC model	est DOD
off	11.7VDC	23.4VDC	60%
on	10.8VDC	21.6VDC	90%

The default setting was OFF, 11.7VDC (12V model) / 23.4VDC (24V model).

4.5 Battery Type

Please select the battery type at the **DIP Switch 4-5**, following please find the list of available battery type and charging voltage.

DS4	DS5	Battery type	Absorption		Float	
			12vdc	24vdc	12vdc	24vdc
off	off	AGM	14.4	28.8	13.5	27
off	on	GEL/ OPzV	14.1	28.2	13.7	27.4
on	on	LFP	14.4	28.8	13.5	27
on	off	Flooded	14.8	29.6	13.5	27

The default setting was **AGM (OFF-OFF)**.

4.6 Equalization (EQ)

Through switch **Dip Switch 6** with a cycle from **OFF to ON to OFF**, you could choose Equalization program for your flooded battery, of which the charger will, after a normal charging cycle (bulk-absorption), raise the voltage to EQ level with a timer of 30mins after voltage reaching the EQ voltage

level.

DS6	Battery type	12Vdc model	24Vdc model
		EQ	EQ
X	AGM	N/A	N/A
X	GEL/OPzV	N/A	N/A
X	LFP	N/A	N/A
Off-On-Off	Flooded	16.2	32.4

The **field 'X'** means this program can not be applied on **AGM**, **GEL/OPzV** or **LFP** battery, it only be applied on **Flooded** battery.

As a protection, if you choose wrong battery type, Energier Apollo won't delivery equalization charging program and will only deliver the battery type you chose.

Please refer to **chapter 7.10** for details of performing equalization charging.

4.7 Power Save mode (PS mode)

Using **DIP Switch 7**, you could set the system in power save mode. Please refer to chapter 2.11 for explanation.

4.8 Grid charger

Through **DIP Switch 8**, you could control the built-in Grid charger

DS6	Grid charger control (Built-in Grid charger)
Off	Enable
On	Disable

++ Charger Enable

Under this setting, upon inverter working under bypass mode and qualified grid is available, the built in Grid charger will be activated and deliver charging to battery installed.

++ Charger Disable

Under this setting, upon inverter working under bypass mode and grid was powering the load, the built in Grid charger will not be activated. The battery will be charged only when solar is available.

The default setting was **Enable (OFF)**.

4.9 AC input current setting

Through RCH supplied or through Rapconfig software, you could set the AC input current. This configuration can be done only after Energier Apollo was switched on.

Please refer to chapter 7.2 for detail instruction.

5. Pre-Installation

5.1 Material list

The unit is packed with following materials. Please confirm the series number on Energier Apollo is same to that on outer carton.

- Energier Apollo
- User's manual
- VS – battery voltage sensor
- TS – battery temperature sensor

5.2 Location

Please install the equipment in a location of Dry, Clean, Cool with good ventilation.

- Working temperature : -10°C-50°C
- Storage temperature : -40-70°C
- Relative Humidity : 0%-95%, non-condensing
- Cooling : Forced air

5.3 Wiring recommendation

Please find the following minimum wire size. In case of DC cable longer than 1m and PV cable longer than 10m, please increase the cross section of cable to reduce the loss.

System capacity	AC wiring		DC wiring	PV wiring
	110VAC	230VAC		
CH1035L	2.5mm ²	2.5mm ²	16mm ²	4mm ² x2
CH1350L	4mm ²	2.5mm ²	25mm ²	4mm ² x2
CH1630M	4mm ²	2.5mm ²	25mm ²	4mm ² x2
CH2040M	4mm ²	2.5mm ²	25mm ²	4mm ² x2

6. Installation and Connection



For the user operation safety, cut off the power before installation.

6.1 General advice

- Ensure that the Energier Apollo has the correct DC voltage with your existing battery system.
- Install Energier Apollo as close to the batteries as possible reducing the voltage drop on cable for the better performance of the equipment.



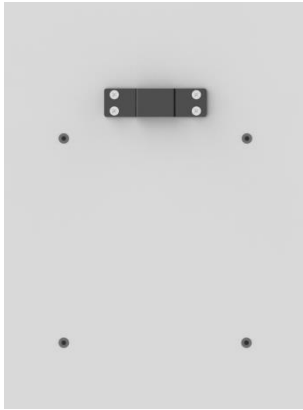
Do not connect the output of this equipment to your AC system at the same time as any other AC source such as the 230V external mains or a generator.

- On the AC output side, we recommend connecting the output from Energier Apollo to a suitable Residual Current Circuit Breaker and Circuit Breaker.
- The neutral of this equipment is not connected to the earth. If requested, additional devices need to be installed internally. Please contact your installer.

6.2 Fix the equipment

Energier Apollo could be installed either vertically on wall or horizontally on floor. Please follow the below steps for the wall mounting.

Step 1: Choose a flat wall, fix the brace supplied with 4*M6 screw.



Step 2: Hang on Energier Apollo.



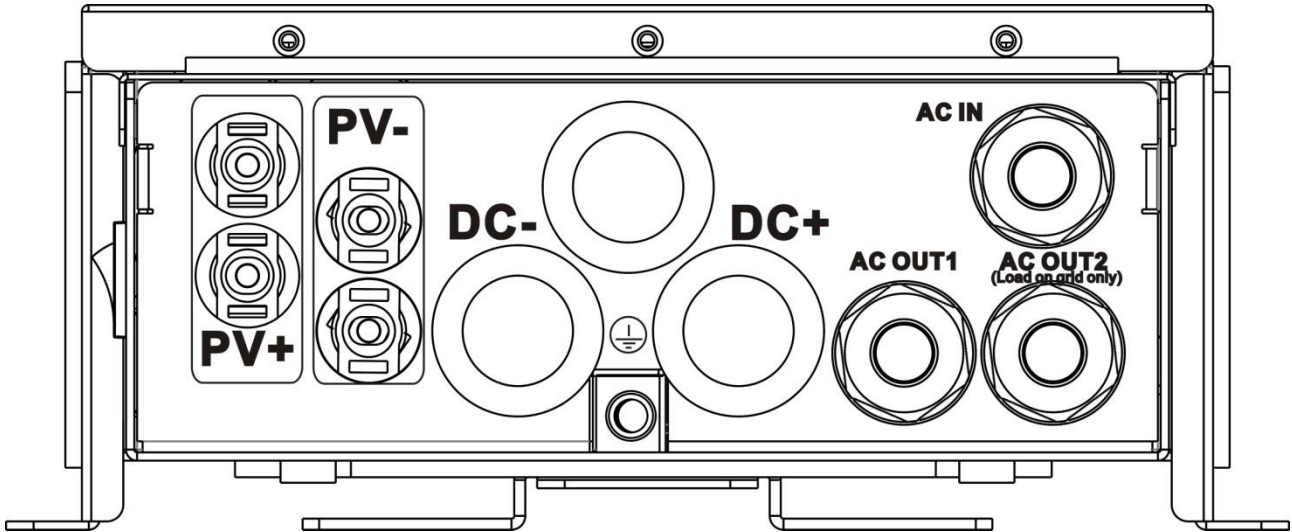
Step 3: Fix the unit on the wall with 4*M6 screw.



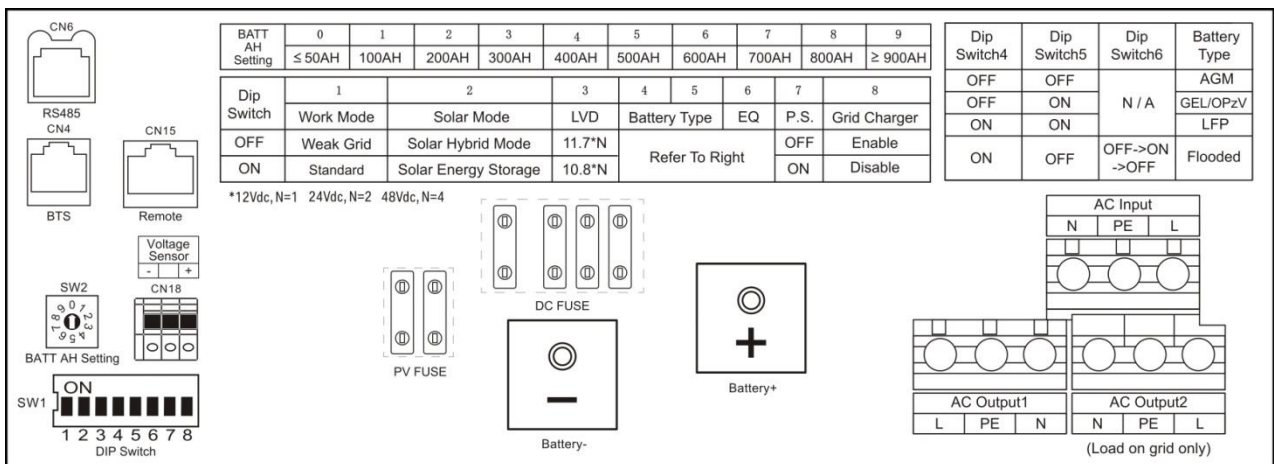
6.3 Connecting the cable



Please make sure Energier Apollo is turned off before connection. Otherwise, high voltage could be present.



- Loose the screw and remove the top panel.



Definition of Wiring Area

++ Connecting battery cable.



Please double check battery voltage match the model you are going to install, the wrong battery could destroy equipment and is out of warranty.



Please double confirm the polarity of battery input. Reverse polarity could cause permanent damage on equipment and it is out of warranty.

- Choose the right cable size (refer to 5.3) and follow polarity guide marked on the panel.
- Pull through the battery cables through the holes at front panel, clamping the cable terminal on cable.
- Secure the battery cable on DC+ and DC- terminals respectively making sure it is tightly screwed.

++ Connecting the PV cable



Please ensure the photovoltaic panel voltage matches the model you are going to install. The wrong photovoltaic panel voltage could destroy equipment and it is out of warranty.



Please double confirm the polarity of PV input.



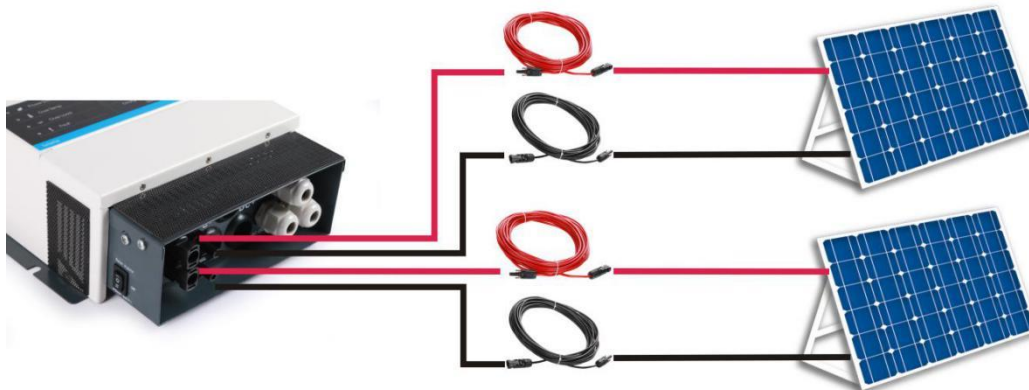
Please ensure the max current at each groups MC4 connectors does not exceed 25A.

- Recommended photovoltaic panel

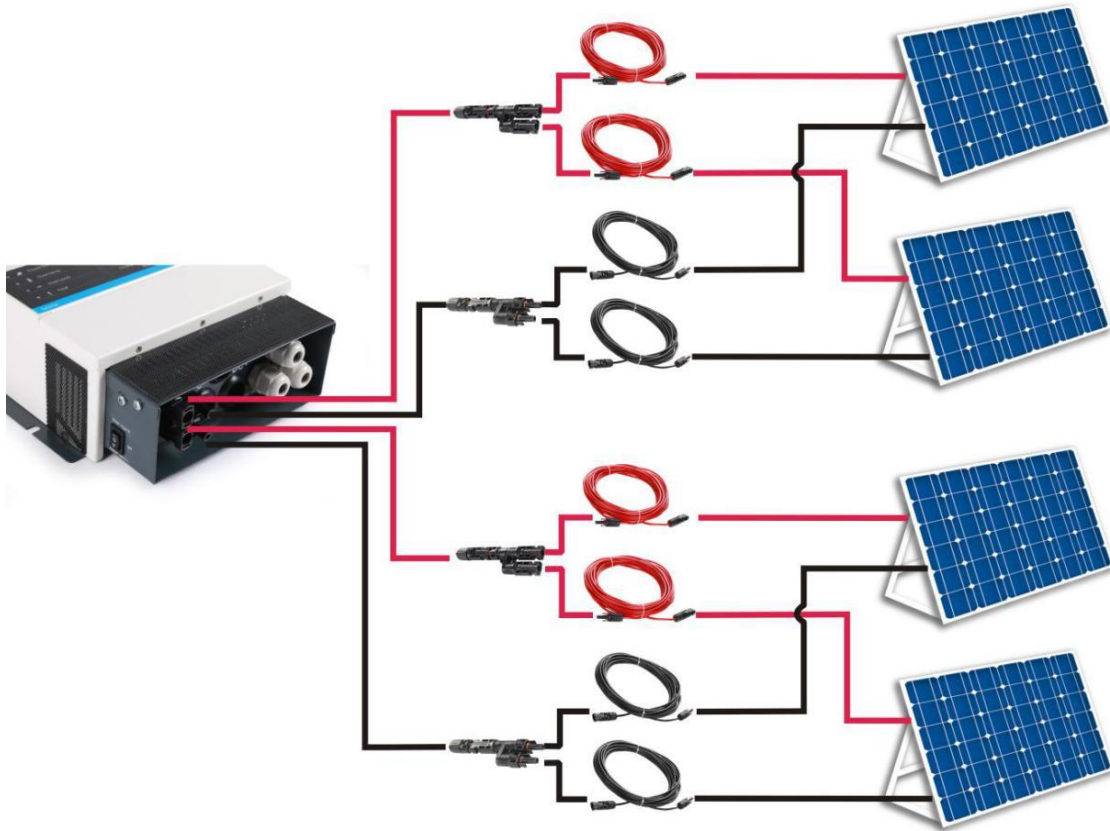
Model	Recommended PV (Vmpp)	Max PV open circuit voltage (Voc)	Max PV short circuit current(Isc)
CH1035L	16-19VDC	25VDC	50A

CH1350L	16-19VDC	25VDC	50A
CH1630M	32-37VDC	50VDC	50A
CH2040M	32-37VDC	50VDC	50A

- Choose the right cable size refer to 5.3 and ensure to follow the polarity guide marked on the front panel. Kindly be noted that the cable size mentioned in table 5.3 is based on the cable length between PV panel and the unit connector is less than 10M. If the length is more than 10M, please consider to extend the size of the cable to make sure the voltage decreasing caused by the cable length is less than 1Vdc.
- Connect the PV cables to the PV connectors at front panel. PV extension cable is highly recommended to reduce the voltage decreasing.

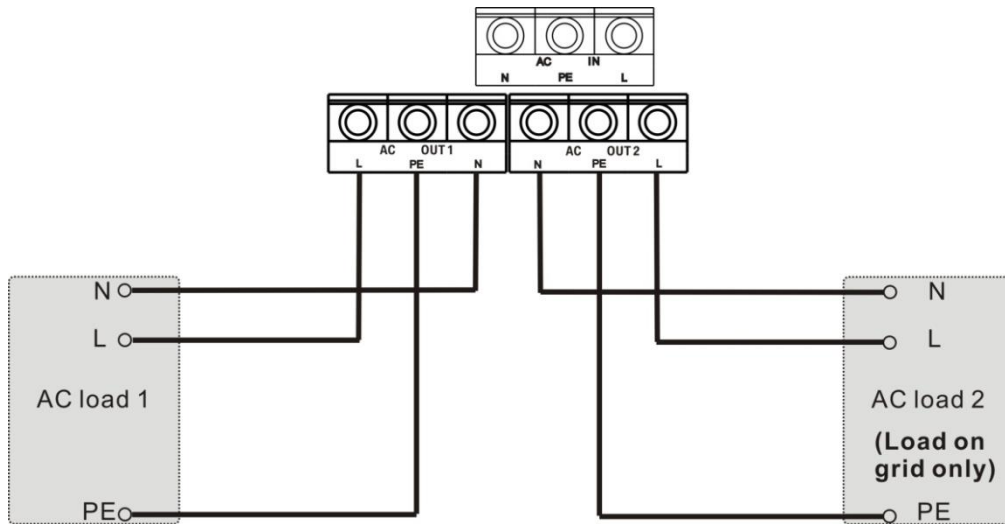


- PV extension cable H was designed for connection of two PV panel into one MC4 terminal of Energier Apollo. Please follow the below picture for the connection for 4pcs of PV panel into Energier Apollo.

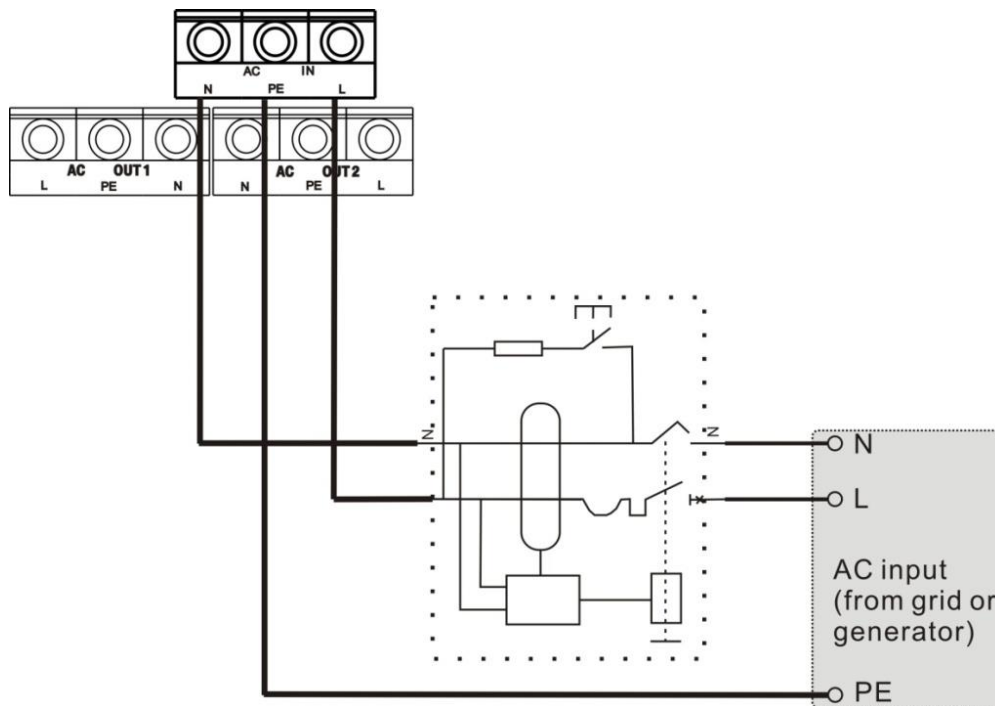


++ Connecting the AC cable

- AC output cable: choose the right cable size (refer to 5.3), pull through the AC output cables through corresponding Glands and connect it on AC output block. Terminals are marked as “L”-line, “N”-neutral and “PE”-earth. Making sure it is tightly screwed.
- There are two groups of AC output on Energier Apollo.
 - ✧ AC output 1 : load connected on this terminal will be powered by grid and inverter
 - ✧ AC output 2: load connected on this terminal will be powered only upon grid available



- AC input cable: choose the right cable size (refer to 5.3), pull through the AC input cable through corresponding Gland and connect it on AC input block. Terminals are marked as “L” - line, “N” -neutral and “PE” -earth. Making sure it is tightly screwed.

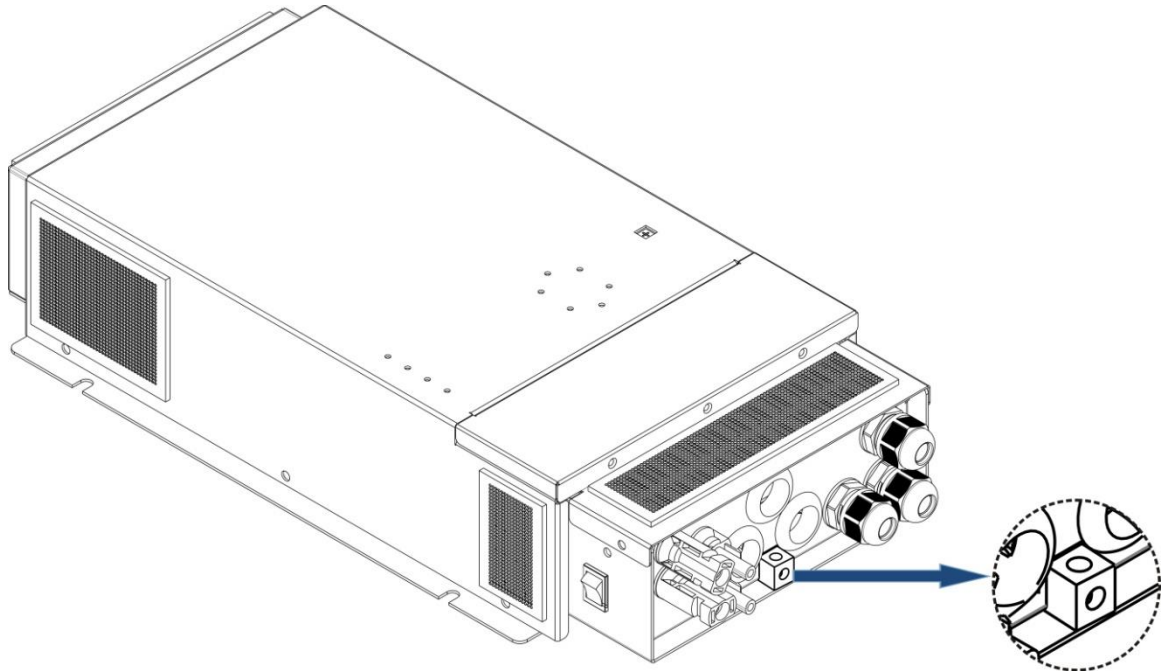


Please double check the AC input and AC output was right after connection. Wrong connection will cause permanent damage of equipment and it is out of warranty.

- The neutral output of Energier Apollo is automatically connected to earth upon no external sources is available. Once external AC sources present, the ground relay will open.

- For mobile application, the frame of this product must be connected to the frame of the vehicle or the ground plate of boat. See following the earth point of this product.

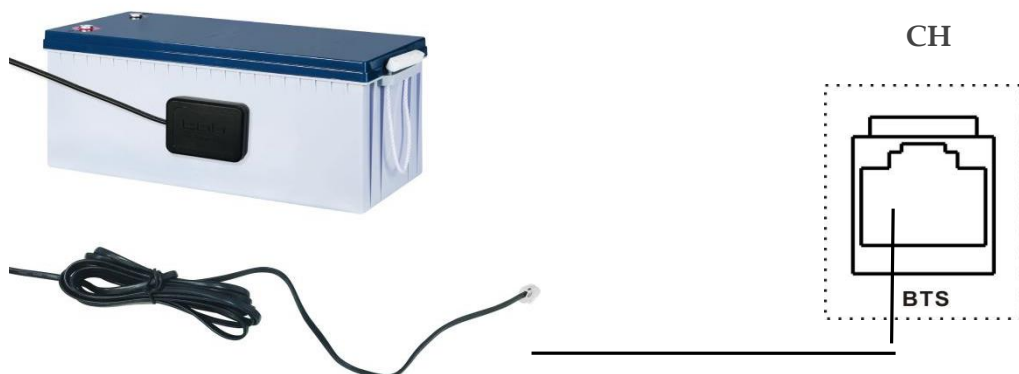
++Connecting the earth



- At the bottom of the connection cabinet showed as above, there is a ground terminal.
- Please connect it with EARTH or vehicle chassis by a proper gauge wire.

6.4 Install the temperature sensor

- Pull through the TS cable through gland and connect it on socket marked "BTS" Interface.
- Please glue the temperature sensor, which was plugged into BTS socket at central panel, on the SIDE of battery and secure the attachment.

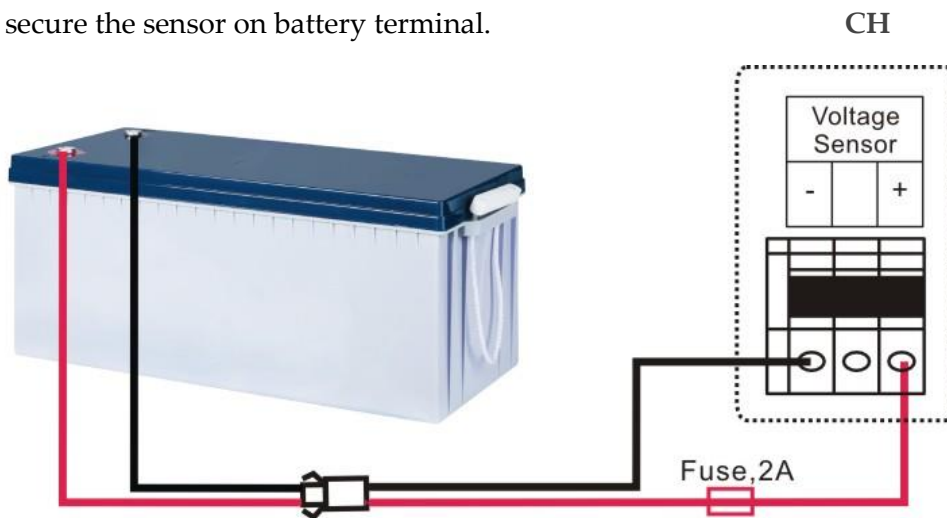




Please notice the cable supplied is around 300cm. Do not pull cable too hard avoid loose contact loose.

6.5 Install the voltage sensor

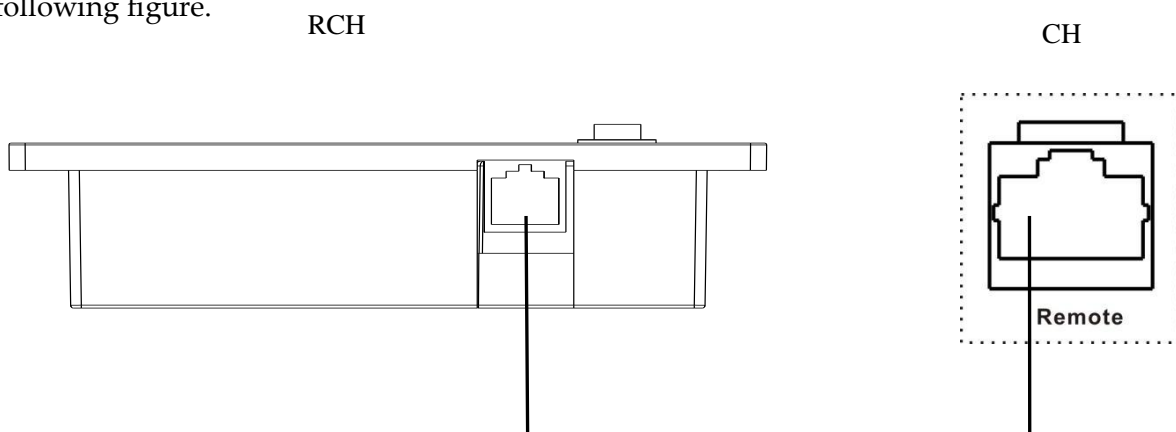
- Pull through the VS cable through gland and connect it on port marked "Voltage Sensor". Please refer to following fig.
- The minus (-) of voltage sensor should be connected to the minus (-) of service battery, and the positive (+) of voltage sensor should be connected to the positive (+) of service battery. Wrong connection will damage the Energier Apollo.
- Please secure the sensor on battery terminal.



6.6 Install the RCH - remote controller

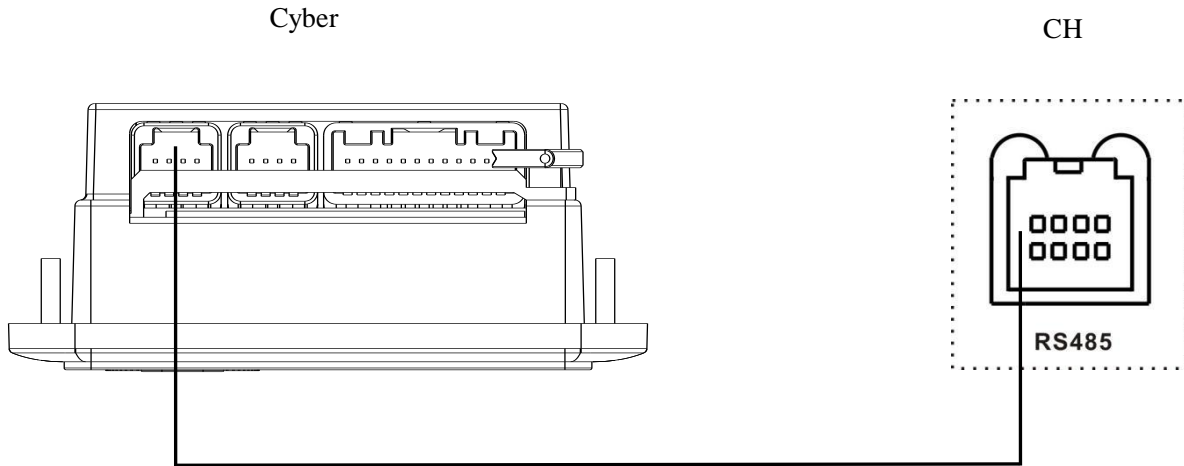
The RCH was dash mounting design. Please cut the hole (refer to 3.2.2) and screw the remote controller securely through four screws at corners and connected the cables.

Connect the RCH to the "Remote" interface of Energier Apollo with the cable, please refer to following figure.



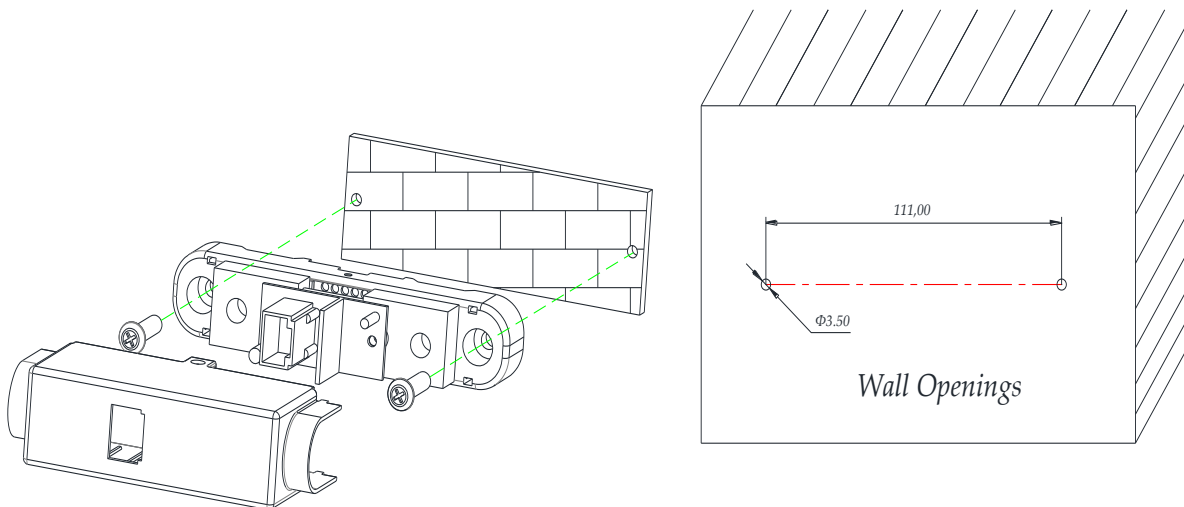
6.7 Install the Cyber

Connect the Cyber to the "RS485" interface of Energier Apollo with the cable, please refer to following figure.

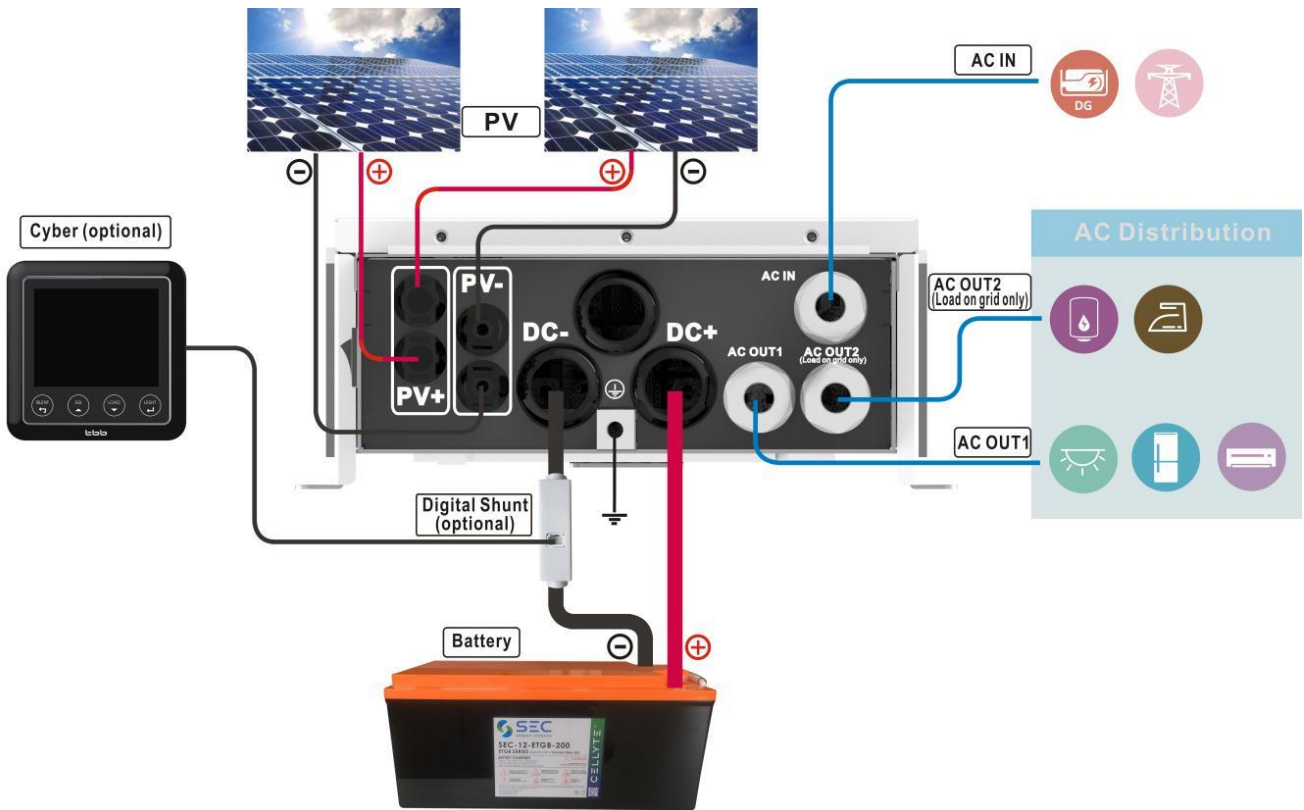


6.8 Install the Digital Shunt

Digital Shunt could be installed either vertically on wall or horizontally on floor, please refer to following figure for the wall mounting.



6.9 Install the system



6.10 Install the dust-proof net

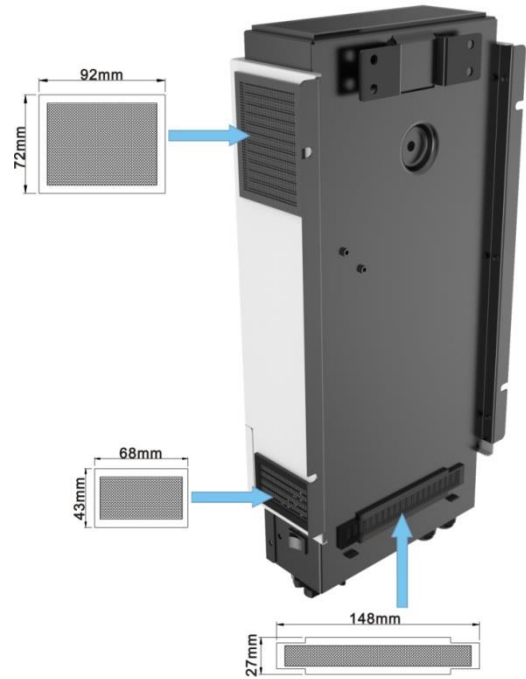
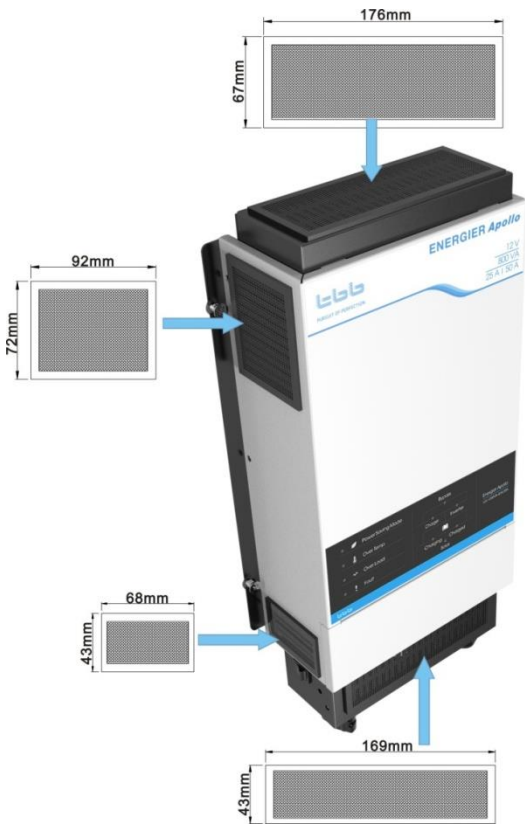
To help Energier Apollo to work in dusty environment, a set of net as optional was available to put on the inverter. Please refer to following picture of instruction.



Adding this net will deteriorate the heat radiating environment thus causing the rated power of inverter with de-rated about 5%. Please consult with manufacturer for accurate data.



ATTENTION: The dust-proof net should be regularly cleaned to avoid the impact on the the ventilation due to the dust.




7.Operation

○ : illuminate ● : extinguish ◐ : flash

7.1 Double Checking

- Check the DC input voltage of this Energier Apollo is same to your battery nominal voltage. NEVER try to connect different DC input to Energier Apollo.
- Inspect the right polarity of DC on service battery, otherwise unit can not power ON.
- Inspect AC input and AC output is correct, make sure unit is no short cut.

7.2 Set the AC input

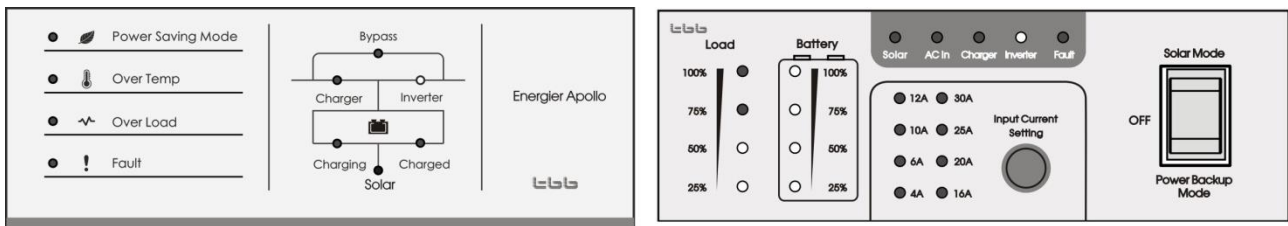
- Check the AC input limit of your system (either diesel generator or grid).
- On RCH connected, you can set the input. Total eight rating are available (4A, 6A, 10A, 12A, 16A, 20A, 25A, 30A).
- By pressing the button() until beep was heard, you can enter into setting.
- Pressing "Input Current Setting" button again to choose the rating you would like to set.
- After make the choice, press "Input Current Setting" button for about 5 seconds until beep was heard to save the change.

7.3 Main switch function

- With the switch the unit can be set to work under "Power Backup Mode" or "Solar Mode" mode. When the unit is switched "Power Backup Mode", Energier Apollo will start charging in case AC input is present. When the AC input is not present, Energier Apollo will go to inverter mode automatically.
- When the unit is switched "Solar Mode", you could compose a solar hybrid system either under Solar Hybrid mode or Solar Energy Storage mode. Energy from sun will be used as primary. Please ref to chapter 4.3 for detail explanation.

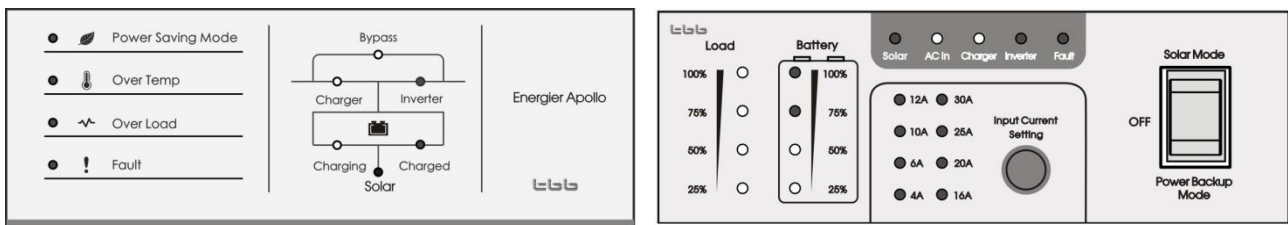
7.4 Switch on the inverter

- Disconnect the AC input power, switching on the unit, the LED will all illuminate for analysis then there should be AC available at inverter output. The inverter LED will illuminate. You could switch on the load which will be powered by inverter.
- The Load % LEDs on remote will reflect the load level connected.
- The Battery SOC LEDs on remote will reflect the battery condition, which are 25%-50%-75%-100% respectively from bottom.



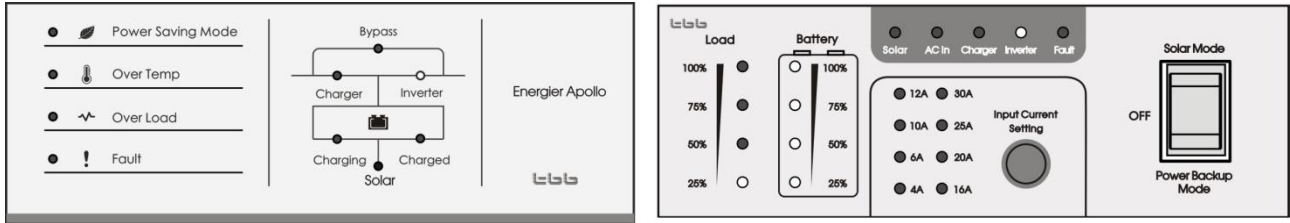
7.5 Switch on grid charger

- Then switch on the AC input power, Energier Apollo should go on bypass mode feeding the power to load and meantime battery charger will start work. The bypass LED and charger LED on front panel will illuminate.
- The AC in LED and Charger LED on remote will illuminate .
- The Load LEDs on remote will reflect the present charging power.
- The Battery SOC LEDs on remote will reflect the charging status.



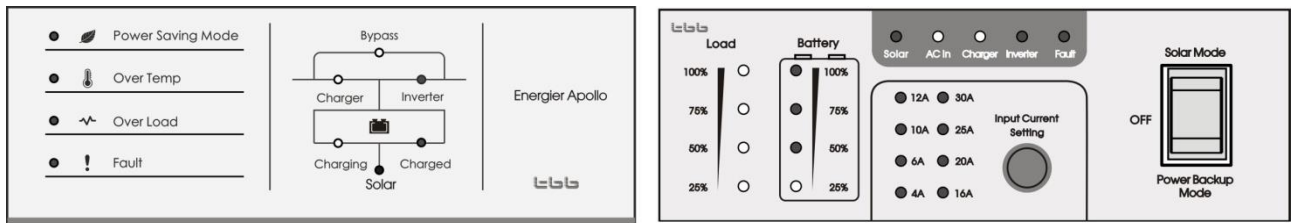
7.6 Switch off grid charger

- Remove the AC input, the Energier Apollo will transfer to inverter mode quickly and load should continue work without interruption. Inverter LED will illuminate.



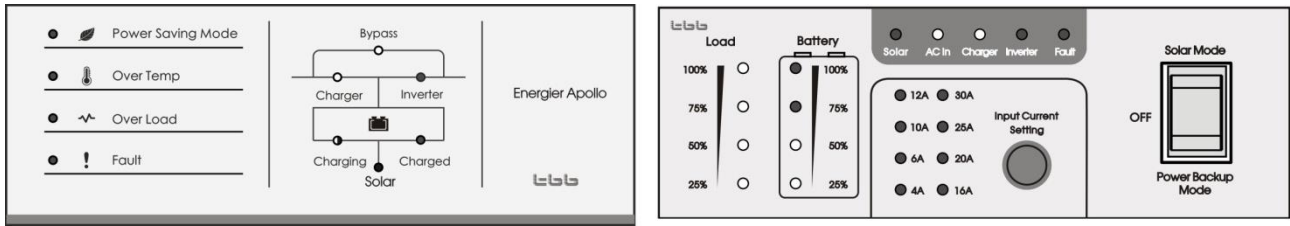
++ Battery Charging – Bulk

- Upon your AC input meet the minimum quality, the Energier Apollo will perform charging. Both LED charger and LED charging will illuminate on front panel.
- The charger LED and AC in LED on remote will illuminate.
- The Bulk LED (Battery SOC 25%) on remote will illuminate.



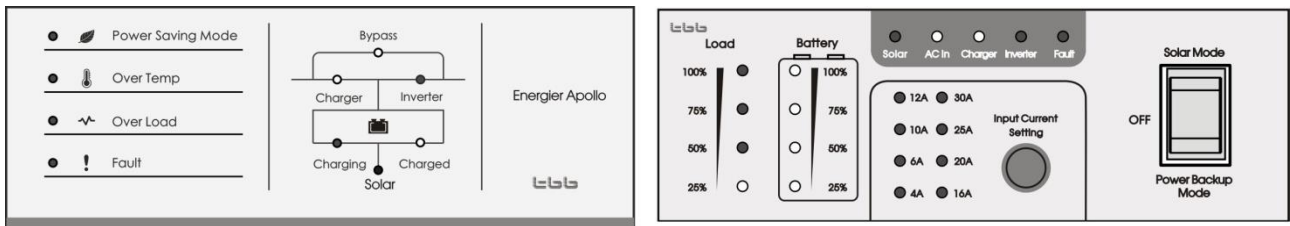
++ Battery Charging – absorption

- The charging LED on front panel will flash.
- The Bulk(Battery SOC 25%) LED and ABS(Battery SOC 50%) LED on remote will illuminate.
- Along with more energy being charged into battery, the 75% LED will illuminate reflecting the progress.



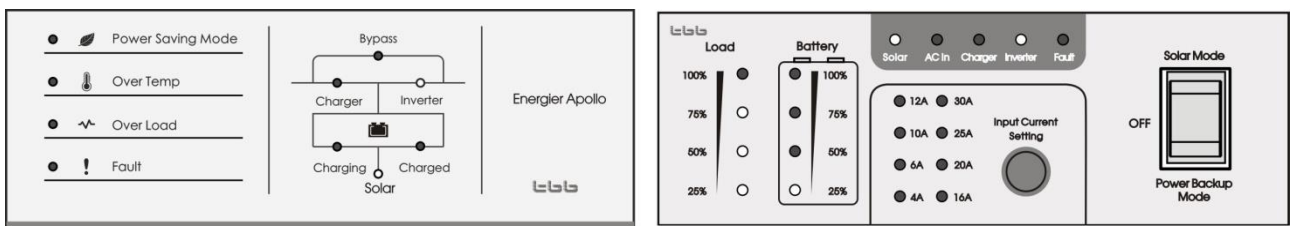
++ Battery charged – floating

- After coming into floating, the Battery Charged LED on front panel will illuminate.
- On remote panel, all Battery LED (25%-50%-75%-100%) will illuminate.



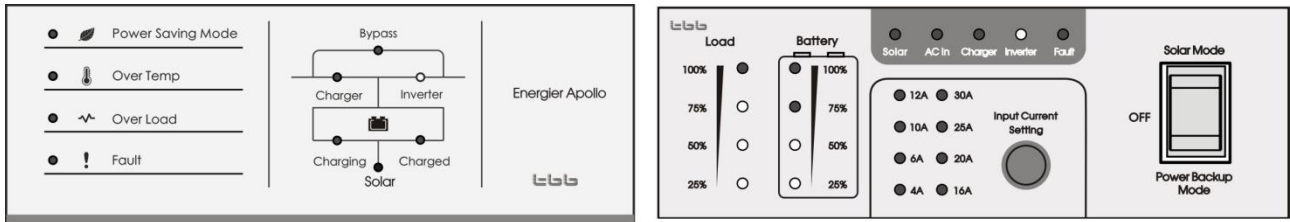
7.7 Switch on solar charge controller

- Switch on the unit and PV input power , the built-in solar charge controller will start work after 30 seconds. The Solar LED on front panel will illuminate.
- The Solar LED on remote will illuminate .
- The Load % LEDs on remote will reflect the load level connected.
- The Battery SOC LEDs on remote will reflect the battery condition, which are 25%-50%-75%-100% respectively from bottom.



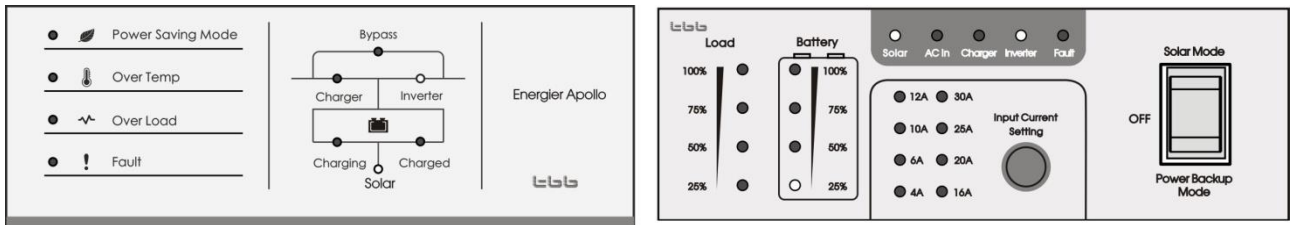
7.8 Switch off solar charge controller

- Remove the PV input power, the built-in solar charge controller will stop charging, Solar LED will extinguish.



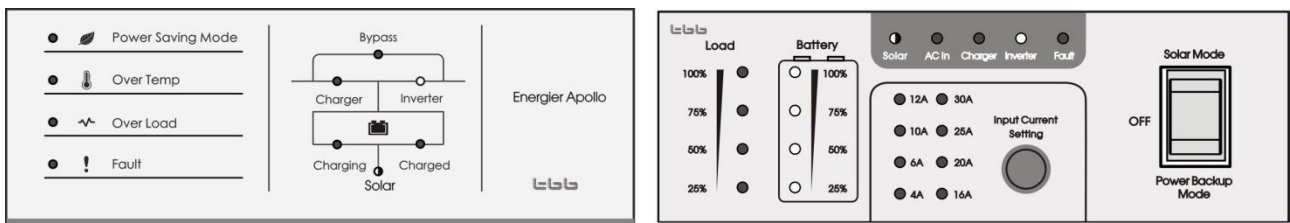
++ Battery Charging – Bulk

- Upon your PV input meet the minimum quality, the Energier Apollo will perform charging. Solar LED will illuminate on front panel.



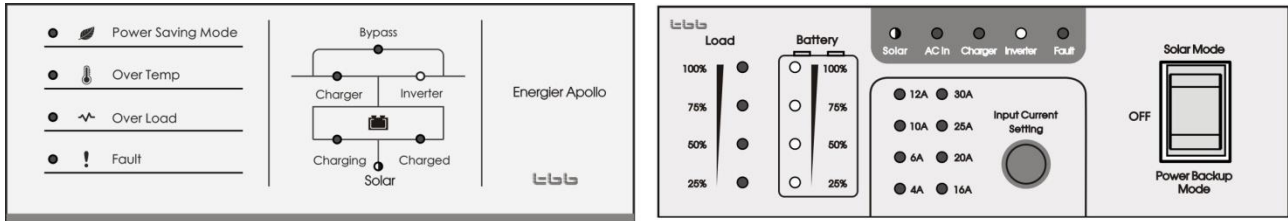
++ Battery Charging – absorption

- The Solar LED on front panel and remote will flash.



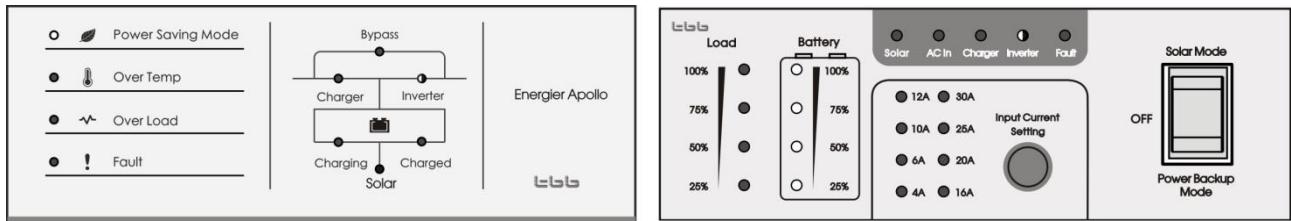
++ Battery charged – floating

- After coming into floating, the Solar LED on front panel and remote will slow flash.
- On remote panel, all Battery LED (25%-50%-75%-100%) will illuminate.



7.9 Power Saving mode

- You can set Energier Apollo working in power save mode by dip switch 7, in which the status consumption power can be dramatically reduced.
- Upon Energier Apollo being set in this mode, Power Save mode LED on front panel will illuminate.
- On remote, upon Energier Apollo enter into power saving, the Inverter LED on remote will flash. After resume normal output, it will illuminate.



7.10 Performing De-sulphation Charging



It is strongly recommended to read this section carefully before you set the de-sulphation charging and DO NOT leave battery unattended while performing de-sulphation.

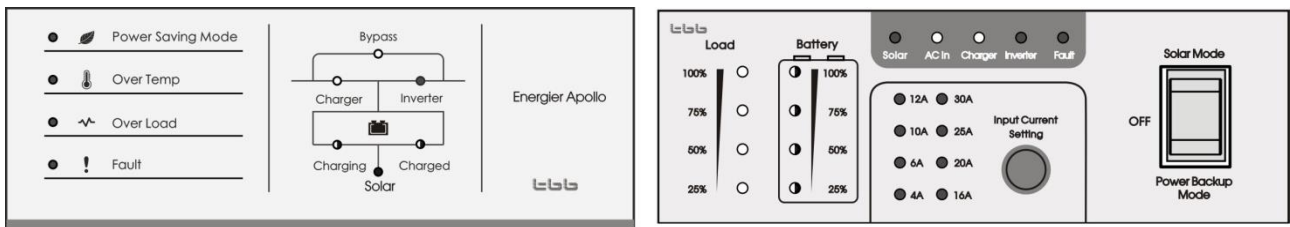


Always check if your battery supplier recommended de-sulphation charging. Only start when it is suitable.

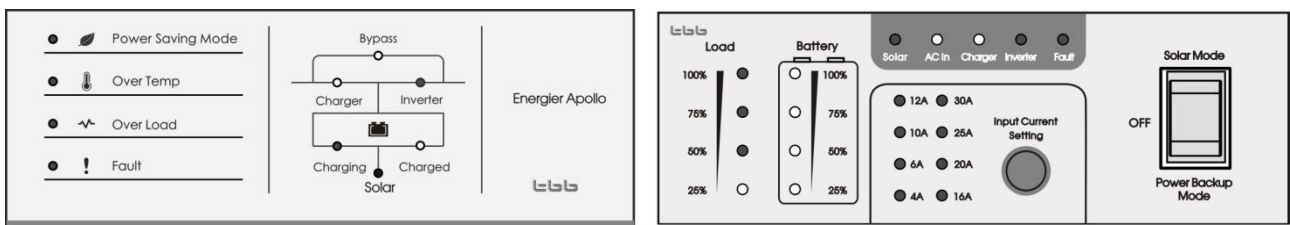
Over a period of time, the cells in flooded and OPZS batteries can develop uneven chemical states. This will result in a weak cell which in turn can reduce the overall capacity of battery. To improve the life and performance of these non sealed batteries, Energier Apollo includes a manual equalization program that can be used, if recommended by battery manufacturer.

Through the dip switch at central panel, you can initiate the de-sulphation program manually. Once you trigger on the EQ program, Energier Apollo will perform de-sulphation charging.

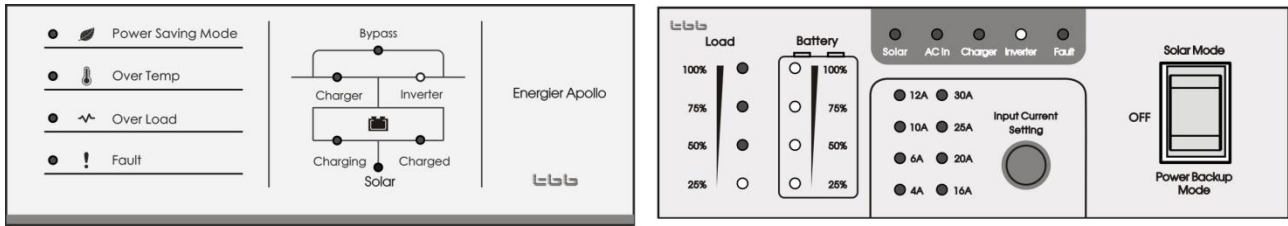
- After you choose this program, the charger will start an ordinary charging cycle, afterwards of which it will raise the voltage to EQ level on purpose. Both of the CHARGING and CHARGED will flash.
- On remote, all Battery SOC (25%-50%-75%-100%) LEDs will flash and Charger LED will illuminate.



- After 30mins, Energier Apollo will quit and come into floating upon it works on Power Backup Mode.



Or Energier Apollo will quit and stop charging and enter into inverter mode upon it works on Solar Mode.



- Check electrolyte level and refill battery with distilled water if necessary.



During equalization, the battery generates potentially flammable gases. Follow all the battery safety precautions listed in this guide. Ventilate the area around the battery thoroughly and ensure that there are no sources of flame or sparks in the vicinity.



Turn off or disconnect all loads on the battery during equalization. The voltage applied to the battery during equalization may be above the safe levels for some loads.

Frequency: Maximum once a month, for heavily used battery, you may wish to equalize your battery. For battery with light service only need to be equalized every 2-3months.

Important: Equalization can damage your batteries if it is not performed properly. Always check battery fluid before and after equalization. Fill batteries only with distilled water.

Always check the equalization switch is set back to OFF after each time's equalization.

Battery manufactures' recommendations on equalization vary. Always follow the battery manufacturer's instructions so batteries are properly equalized. As a guide, a heavily used battery may require equalization once a month while a battery in light duty service, only needs equalizing once every 2 to 4 months.

Battery type: ONLY perform equalization to flooded and OPZS batteries. Do not equalize GEL/OPzV, AGM or LFP batteries.

8.Specification

Model No.		CH1035L	CH1350L	CH1630M	CH2040M
Weak grid mode		yes	yes	yes	yes
Solar Hybrid mode		yes	yes	yes	yes
Solar Energy Storage mode		yes	yes	yes	yes
INVERTER					
Nominal Voltage		12Vdc		24Vdc	
Power 30mins @25°C (VA)		1000	1300	1600	2000
Power 30mins @25°C (W)		900	1200	1500	1700
Cont. power @25°C (VA) 【1】		800	1200	1300	1600
Cont. power @25°C (W)		750	1100	1200	1300
Cont. power @40°C (W)		700	1000	1100	1200
Output voltage 【2】		230VAC / 110VAC ± 2%			
Output frequency		50/60Hz ± 0.1%			
Cos φ		0.9-1			
Overload Capability 【3】	>125%	60s			
	>150%	20s			
Surge		300%			
Efficiency (MAX)		90.5%		93%	
Bypass range	Weak Grid	168VAC-276VAC/84VAC-138VAC			
	Standard	184VAC-264VAC/92VAC-132VAC			
THD 【4】		<3%			
Zero load power		10W	11W	12W	13W
Zero load power (power save mode)		2.5W	2.5W	3W	3W

Overload and overheat protection	auto disconnect with 3 times restart attempt
Shortcut protection	auto disconnect

Charger			
Nominal Output Voltage		12Vdc	24Vdc
Max Output current (A) - adjustable		35	50
AC Input range	Weak Grid	168VAC - 264VAC/84VAC-132VAC	
	Standard	194VAC - 250VAC/97VAC-125VAC	
Battery types		AGM / GEL/OPzV / LFP / Flooded	
Absorption time		variable	
Temperature compensation		-4mV / °C / cell	

Model No.	CH1035L	CH1350L	CH1630M	CH2040M
Solar charge controller				
Max PV open circuit voltage (Voc)	25VDC		50VDC	
Recommended PV (Vmpp)	16-19VDC		32-37VDC	
Current max	50A			
Temperature compensation	Automatic, -4mV / °C / cell			
Charging algorithm	TBB Premium II			
PV Fuse	40A x 2			
PV input terminal	MC4 x 2			

Other Data		
Typical transfer time	Weak Grid	8 ms

	Standard	8 ms			
Transfer switch		16A			
Battery connector		M6 x 2			
DC Fuse		40A x4	40A x4	40A x3	40A x4
AC terminal		M3			
Enclosure		Steel with powder paint			
Dimension (mm) (max)		470×233×95			
Net Weight (KGs)		10.5	11.6	11.7	12
Cooling		Forced fan			
Protection		IP20 / IP40 with optional dust-proof net			
Standard					
Safety		EN62109-1 , EN62109-2			
EMC		EN61000-3-2,EN61000-3-3,EN61000-6-1,EN61000-6-3			

- 【1】 None linear load, crest factor 3:1
- 【2】 Output voltage: 220VAC/60Hz for Philippines
- 【3】 Base on Cont. power @25°C
- 【4】 linear load, crest factor 1.4:1

9. Trouble Shooting

9.1 LED indicator on front panel and audible alarm

√ : ON x : OFF

Status	Function	LED on front panel										
		Bypass	Charger	Inverter	Charging	Charged	Solar	PS mode	Over temp	Over load	Fault	Audible alarm
Charge Function	Constant current	√	√	x	√	x	√	x	x	x	x	x
	Constant voltage	√	√	x	flash	x	flash	x	x	x	x	x
	Float	√	√	x	x	√	flash	x	x	x	x	x
	Stop charging	√	x	x	x	x	x	x	x	x	x	x
	EQ	√	√	x	flash	flash	flash	x	x	x	x	x
Inverter	Inverter on	x	x	√	x	x	x	x	x	x	x	x
	Power Save mode	x	x	flash	x	x	x	√	x	x	x	x
Alarm Mode	PV high voltage	x	x	√	x	x	x	x	x	x	x	beep continuously
	Battery low voltage	x	x	√	x	x	x	x	x	x	flash	beep 0.5s every 5s
	Battery overvoltage	x	x	√	x	x	x	x	x	x	flash	beep 0.5s every 1s
	Inverter overload	x	x	√	x	x	x	x	x	√	flash	
	Inverter overtemp	x	x	√	x	x	x	x	√	x	flash	
	Bypass overtemp	√	x	x	x	x	x	x	√	x	flash	
	Over charge	√	flash	x	x	x	x	x	x	x	flash	
	AEA limited	flash	x	x	x	x	x	x	x	x	flash	
	PV overvoltage	x	x	√	x	x	x	x	x	x	x	beep continuously
Fan block	x	x	x	x	x	x	x	x	x	√		

Protection mode	Battery overvoltage	x	x	x	√	x	x	x	x	x	√	
	Battery low voltage	x	x	x	x	x	x	√	x	x	√	
	Inverter overload	x	x	x	x	x	x	x	x	√	√	
	Overtemp	x	x	x	x	x	x	x	√	x	√	
	Charger fault	√	x	x	x	x	x	x	x	x	√	
	Short cut	x	x	√	x	x	x	x	x	x	√	beep continuously

9.2 LED indicator on Remote

9.2.1 Operating status

√ : ON x : OFF

Status	Function	LED on remote panel					
		Solar	AC in	Charger	Inverter	Fault	other
Charge Function	Constant current	√	√	√	x	x	
	Constant voltage	flash	√	√	x	x	
	Float	flash	√	√	x	x	
	EQ	flash	√	√	x	x	
Inverter	Inverter on	x	x	x	√	x	
	Power Save mode	x	x	x	flash	x	
Alarm Mode	Battery low voltage	x	x	x	√	flash	
	Battery overvoltage	x	x	x	√	flash	
	Inverter overload	x	x	x	√	flash	
	Inverter overtemp	x	x	x	√	flash	
	Bypass overload	x	√	x	x	flash	
	Bypass overtemp	x	√	x	x	flash	
	Over charging	x	√	flash	x	flash	SOC 100% flash

	AEA limited	×	flash			flash	
Protection mode	Fan block	×	×	×	×	√	
	Battery overvoltage	×	×	×	×	√	SOC 100% on
	Battery low voltage	×	×	×	×	√	SOC 25% on
	Inverter overload	×	×	×	×	√	Load 100% on
	Charger fault	×	√	×	×	√	
	Shortcut	×	×	×	√	√	

9.2.2 Battery SOC bar

	Battery SOC bar
Status of Charger	from bottom to top representing Bulk, Absorption, 75% SOC, Float (100% SOC)
Status of Inverter	from bottom to top representing 25%-50%-75%-100% battery SOC

9.2.3 Load percentage bar

	Load percentage bar
Status of Charger	representing 25%-50%-75%-100% of max preset charging power
Status of Inverter	representing 25%-50%-75%-100% load percentage of inverter

9.3 Common failure analysis

Following please find frequent common failure which no maintenance on Energier Apollo was needed.

9.3.1 No output first power on

Phenomenon 1: No output at inverter mode, No alarm.

Reason : Battery low voltage.

Solution : Check battery voltage; Check battery capacity; Check battery LVD setting.

Phenomenon 2: No output at inverter mode, No alarm, Burn smell.

Reason : DC input reverse polarity.

Solution : Replace DC fuses.

9.3.2 No output during operation

Phenomenon 1: No output at inverter mode upon load switch on, fault and power saving mode lights illuminate.

Reason : Battery low voltage.

Solution : Check battery voltage; Check battery capacity; Check battery LVD setting.

Phenomenon 2: No output, long beep, fault and inverter lights illuminate.

Reason : Output shortcut .

Solution : Remove output shortcut.

Phenomenon 3: No output, fault and charging lights illuminate.

Reason : High DC voltage.

Solution : Check DC voltage.

Phenomenon 4: No output, fault and overload lights illuminate.

Reason : Overload shutdown.

Solution : Reducing load and switch on again.

Phenomenon 5: No output, fault and overtemp lights illuminate.

Reason : Over temperature shutdown.

Solution : Check if there is good ventilation on installation site; check if fan was blocked.

Phenomenon 6: No output, long beep, fault light illuminate.

Reason : Fan failure/block.

Solution : Check if fan is blocked; check fan wire connection well.

9.3.3 No charging delivered when you switch on grid input power

Reason 1: AC input wire loose connection.

Solution : Secure the connection.

Reason 2: Wrong connection of N and PE of AC input.

Solution : Correct the connection.

Reason 3: Check if using Generator as AC input.

Solution : Change standard mode to weak grid mode through dip switch 1 at central panel.

9.3.4 No charging delivered when you switch on PV input power

Reason 1: PV input wire loose connection.

Solution : Secure the connection.

Reason 2: Wrong connection of positive and negative of PV input.

Solution : Correct the connection.

Reason 3: High PV voltage.

Solution : Check PV voltage.

Reason 4 : Over temperature protection.

Solution : Check if there is good ventilation on installation site; check if fan was blocked.

9.3.5 Normal mode and Power save mode keep changing over

Reason 1: Energier Apollo work in power save mode but the load was fluctuating .

Solution : Change power save mode to normal mode.

TBB Power GmbH

Web: www.tbbpower.de

Tel: +49-211-6413 7948

Fax: +49-211-6415 0003

Email: [info \(at\) tbbpower.de](mailto:info@tbbpower.de)

TBB Power Co., Ltd.

Web: www.tbbpower.com

Tel: +86-592-5212299

Fax: +86-592-5796070

Email: service@tbbpower.com



PURSUIT OF PERFECTION