



Residential AC storage system BX6.3_AC100

Operation and Installation Manual

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1 Safety

1.1 Information of the AC Storage System

1.1.1 Disclaimer

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This manual accompanies our product for use by the end users. The technical instructions and illustrations contained in this manual are to be treated as confidential and no part may be reproduced without the prior written permission of DELTA ELECTRONICS, INC. Service engineers and end users may not divulge the information contained herein or use this manual for purpose other than those strictly connected with correct use of the product. All information and specifications are subject to change without notice.

DELTA ELECTRONICS, INC. shall have no obligation to both personal injury and property damage hereinafter with respect to any actions -- (a) the product has been installed and repaired improperly; (b) the product has been misuse without following the instructions on this user manual; (c) the product has failed due to incorrect unpacking.

1.1.2 Target Group

This user manual of the AC Storage System is prepared for a person who is well-trained for installing, commissioning, using, and doing maintenance. The well-trained person must have the following basic and advanced skills:

- The fundamentals of electricity, wiring, electrical components and electrical schematic symbols.
- Knowledge of how a AC Storage System works and is operated.
- Training in the installation and commissioning of electrical devices and installations.
- Training in how to deal with the dangers and risks associated with installing and using electrical devices and installations.
- Compliance with this manual and all safety information.

Please read the user manual before working on the product.

1.2 General Safety

IMPORTANT SAFETY INSTRUCTIONS : SAVE THESE INSTRUCTIONS !



- Please read these instructions carefully and keep them for later use.

To prevent any personal injury and any property damage, also ensure long-term operation of the AC Storage System, you must read this section carefully and review all the safety instructions at all times before using this AC storage system. This user manual provides important instructions for DELTA BX6.3_AC100 AC storage system. The product is designed, tested, verified, and certified according to international safety requirements, regulations, and standards but precautions must be observed when installing and operating the product.

1.2.1 Condition of Use

The DELTA BX6.3_AC100 is a AC Storage System designed with two battery modules. In order to prolong Lithium-based batteries' life, 100% state of charge (SOC) shown on the device is actually within the range of 95%~100%.

The AC Storage System can be charged/discharged from grid, and provides electricity to household loads and electricity supply backup is available.

The DELTA BX6.3_AC100 AC Storage System is NOT to be used as a backup for any medical uses or life supporting uses.

Before battery module running one cycle, there might be some error in the SOC accuracy.

If DELTA BX6.3_AC100 has not used for more than six months, please connect to grid and check the SOC value via APP, if the SOC value is below 30%, please select "Charge first mode" to charge BX6.3_AC100, it should be charged to at least 30% SOC.

Utilize a brand new battery with used one may lead to reduction of battery lifetime and increase the safety risk. Therefore, we suggest the evaluation of the battery size have to be made thoroughly before installation.

Extend the battery size from 6.3kwh to 12.6kwh is not allowed.

1.2.2 Symbols

This section describes the definition of the symbols in this manual. In order to prevent both personal injury and property damage, and to ensure long-term operation of the product, please read this section carefully and follow all the safety instructions while you use the product.

DANGER!



- This warning indicates an immediate hazard which will lead to death or serious injury may occur.

WARNING !



- This warning indicates a possible hazard which may lead to death or serious injury may occur.

CAUTION !



- This warning indicates a possible hazard which may lead to minor injury may happen.

ATTENTION



- This warning indicates a possible damage to property and the environment might happen.

INFORMATION



- Additional information is indicated by an exclamation mark enclosed by double circle. This means the following section contains important information and user should follow the instruction to prevent any hazards.

DANGER : ELECTRICAL HAZARD!!



- This warning indicates an immediate electrical hazard which will lead to death or serious injury may occur.



- Equipment grounding conductor (PE)
- (PE) Équipement conducteur de terre

1.2.3 Safety Instructions

The AC Storage System should not be installed under direct sunlight or on flammable surfaces. Please make sure the AC Storage System is mounted tightly on a solid / smooth surface. The optimal temperature range for the AC storage system to operate is 10 to 30°C . The operating humidity is within the range from 0 to 95%. If the ambient temperature is outside the operating range, the AC storage system stops to protect itself from any unexpected damage.

This AC Storage System should be installed by a trained and experienced installer designated by the retailer. Having the product installed by a non-specialized installer is very dangerous and can cause damage or injury. The AC storage system is always installed by 2 or more people. (According to regional regulation, more people may be required.)

Please make sure all the breakers are turned off before connecting cables. Please note that the cable length must within 100 meters.

1.2.3.1 Handling of Prohibitions

The battery module contains flammable materials such as organic solvents. Mishandling the battery module may cause fire, smoke, or an explosion and the battery module's functionality will be seriously damaged. Protection circuits are designed into the AC Storage System via BMSS (PCB part inside the battery cabinet) to protect the battery modules.

Please read and check the following prohibited actions.

DANGER!



- This warning indicates an immediate hazard which will lead to death or serious injury may occur.

(1) Electrical Shock

Do not touch the terminals of the battery module without protectors.

Be grounded with the specified conditions.

High voltage may occur between the positive and the negative terminals.

Electric shock impairs health or may cause threat to life.

More than 2,000 meters higher, risks of an electric shock will be increased.

(2) Immersion

Do not immerse the battery module in liquid such as water, beverages, or other fluids.

Do not expose to corrosive substances such as sea breeze, steam or chemicals.

Do not install in the humid places or places to condensation.

Exposure to liquid may damage the battery module or the circuit board.

This may cause a battery module's damage to leak electrolyte, generate heat, smoke, catch fire, or explode.

(3) High Temperature

Do not use or place the battery module near an open flame, heater or high temperature. Subjecting the battery module to high temperature may damage the separator and cause internal short circuit.

This may cause the battery module's damage to leak electrolyte, generate heat, smoke, catch fire, or explode.

(4) Charge Conditions

Only charge the battery module within the specified conditions.

(e.g., temperature range, voltage, current and etc.)

Charging with unspecified conditions (e.g., over charge or abnormal current) may cause the battery module's damage to leak electrolyte, generate heat, smoke, catch fire, or explode.

(5) Reverse Polarity

Check the positive (+) and the negative (-) terminals.

If the battery module is connected with a reversed polarity, unexpected reactions may occur.

This may cause the battery module's damage to leak electrolyte, generate heat, smoke, catch fire, or explode.

(6) Direct Connection

Do not connect the battery module to AC power or unspecified DC power. This may cause the battery module's damage to leak electrolyte, generate heat, smoke, catch fire, or explode.

(7) Use in Other Equipment

Do not use the battery module for any other purposes or connecting unspecified equipment.

If the battery module is used with unapproved applications or systems, the battery module may be damaged, leak electrolyte, generate heat, smoke, catch fire, or explode.

(8) Incineration and Heat

Keep the battery module away from heat and fire.

Heating the battery module and may cause it to be damaged, leak electrolyte, generate heat, smoke, catch fire, or explode.

(9) Short-Circuit

Do not connect between the positive (+) and the negative (-) terminals with a conductive material (e.g., wire, a cable, etc.).

Do not carry or store the battery module with metal objects.

If the battery module is shorted, the battery module may be overheated.

This may cause the battery module's damage to leak electrolyte, generate heat, smoke, catch fire, or explode.

(10) Disassembly

Do not disassemble or modify the battery module.

Disassembly or modification of the battery module may damage the protection circuit.

This may cause the battery module's damage to leak electrolyte, generate heat, smoke, catch fire, or explode.

(11) Charge in High Temperatures

Do not charge the battery module in high temperature environment.

If the battery module is charged with exposing high temperature, the battery module's protection circuit may be activated and stop or fail the charging.

This may cause the battery module's damage to leak electrolyte, generate heat, smoke, catch fire, or explode.

(12) Open BX6.3_AC100 cover

To avoid risk of electrical shock, It is prohibited to open the front door. The unit contains no user-serviceable parts.

It may cause failure.

The warranty is void once the door is opened.

WARNING !



- This warning indicates a possible hazard which may lead to death or serious injury may occur.

(1) Magnetism

Do not place the battery module near strong magnetism. (e.g., electromagnetic cooker, etc.)

This may cause the battery module's damage to leak electrolyte, generate heat, smoke, catch fire, or explode.

(2) Mixed Use

Do not mix with other batteries.

The battery module should not be used with other batteries having a different capacity, chemistry, manufacturing date or manufacturer.

This could cause the battery module's damage to leak electrolyte, generate heat, smoke, catch fire, or explode.

CAUTION !



- This warning indicates a possible hazard which may lead to minor injury may happen.

(1) Exposure to Direct Sunlight

Do not use or leave the battery module in a location exposed to excessive heat, such as in direct sunlight or in a car. It could cause the battery module's damage to leak electrolyte, generate heat, smoke, catch fire, or explode. It may also cause the battery's performance and life to deteriorate.

(2) Charging Temperature Range

Only charge the battery module within operating temperature range.

Charging outside of this temperature range could cause the battery module's damage to leak electrolyte, generate heat.

It may also cause the battery module's performance and life to deteriorate.

(3) Manual

Please read the system manual before use.

Keep the system manual for future reference.

(4) Recycling

When disposing of the battery module, recycle it according to local rules and regulations.

2 Introduction

2.1 About this Manual

The user manual is valid for the following device types :

- DELTA BX6.3_AC100
- DELTA BX12.6_AC100

The DELTA BX6.3_AC100 Series have 2 models as shown in **Figure 2-1**.

Delta reserves the right to make modifications to the content and technical data in this user manual without prior notice.

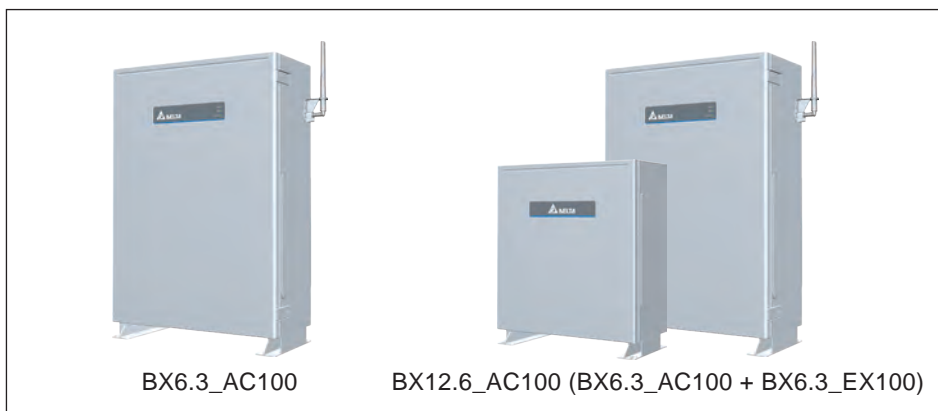


Figure 2-1 : The DELTA BX6.3_AC100 Series have 2 models

2.2 Product Description

This device is an ac coupling battery system with following features:

- Integrated energy management system
- Integrated charger controller and inverter
- Transformer-less

The system diagram of BX6.3_AC100 is shown as **Figure 2-2**. Delta's BX6.3/12.6_AC100 series with high reliability Li-ion battery is a home energy storage solution with 6.3/12.6 kWh capacity. It can be integrated with home PV system and can be scalable up to 12kWh for future expansion. With BX6.3/12.6_AC100, house owner can maximize the efficiency of home energy management by saving and managing excess solar energy from home PV system. Besides, it can be considered as the backup power during emergency or suffering a power outage.

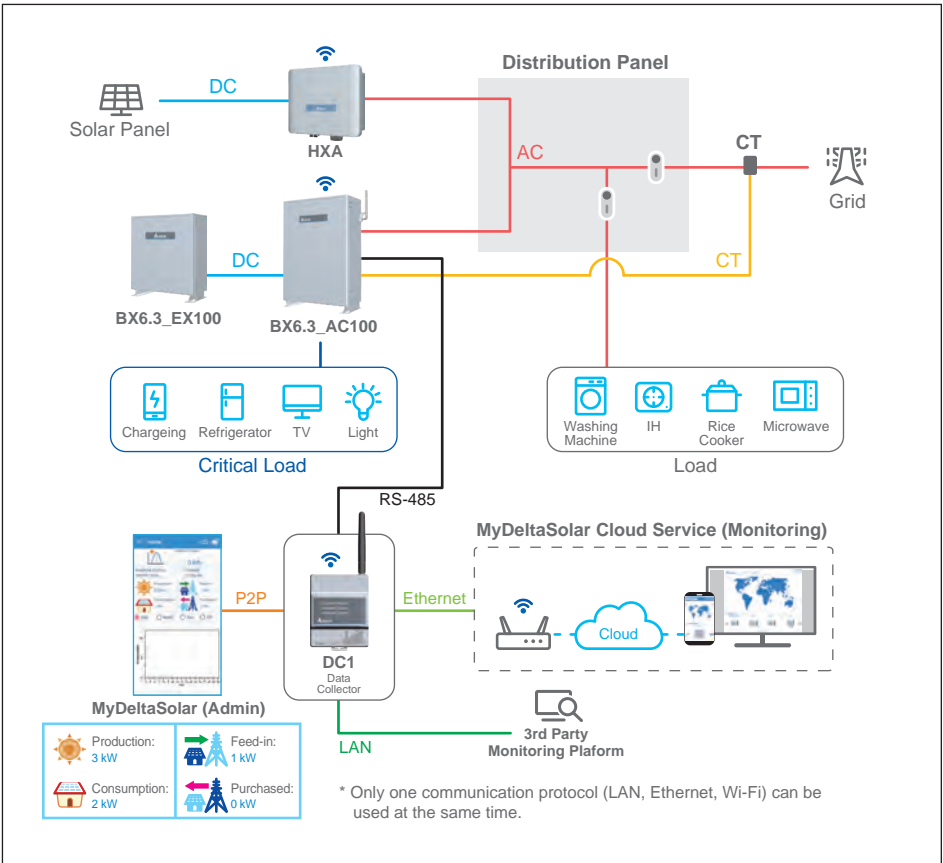


Figure 2-2 : System diagram of BX6.3_AC100 storage system

2.3 Additional Information

More details or related product information, please visit: <http://www.deltaww.com>

2.4 Product Overview

The shipping components of DELTA BX6.3_AC100 are shown as **Figure 2-3**.

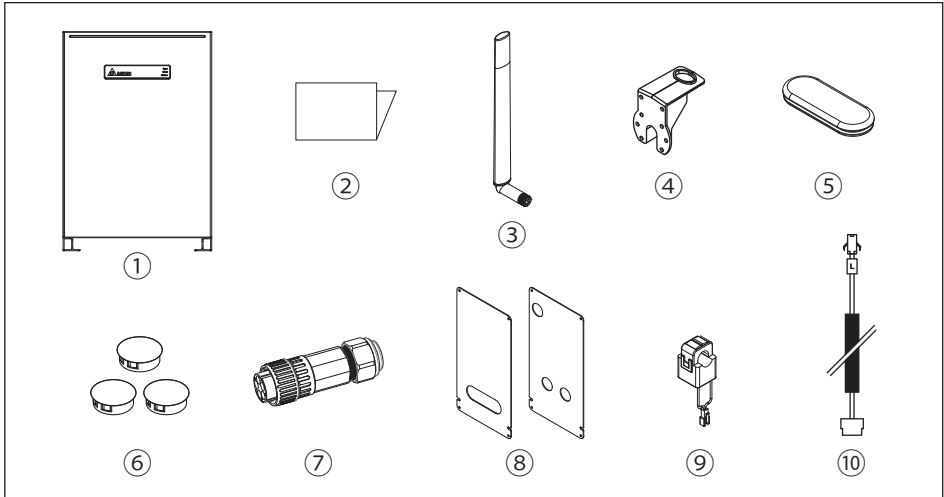


Figure 2-3 : Shipping Components

Table 2-1 : Packing list

	Object	Qty	Description
1	Delta BX6.3_AC100	1	Residential AC ESS
2	Quick Installation Guide	1	The Instruction to provide the information of safety, Installation and specification.
3	WiFi antenna	1	2.4Ghz Wi-Fi Antenna (IPX7)
4	Antenna Bracket	1	To support Wi-Fi antenna on BX6.3_AC100
5	Rubber cover	1	Protective cover for non-critical waterproof and dust prevent
6	Plastic cover	3	Protective cover for non-critical waterproof and dust prevent
7	AC Plug	1	Connector for AC connection
8	Wiring Cover	2	Protective cover to prevent users from touching the power cable
9	Current sensor	1	120A current transformer
10	CT cable	1	Cable for CT connection

Figure 2-4 shows the dimensions of DELTA BX6.3_AC100.
Figure 2-5 shows the details of interface.

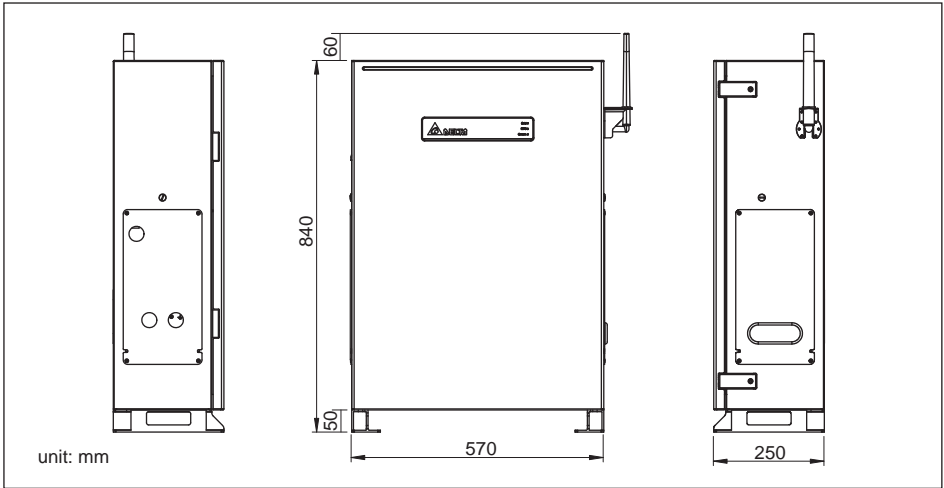


Figure 2-4 : Dimensions

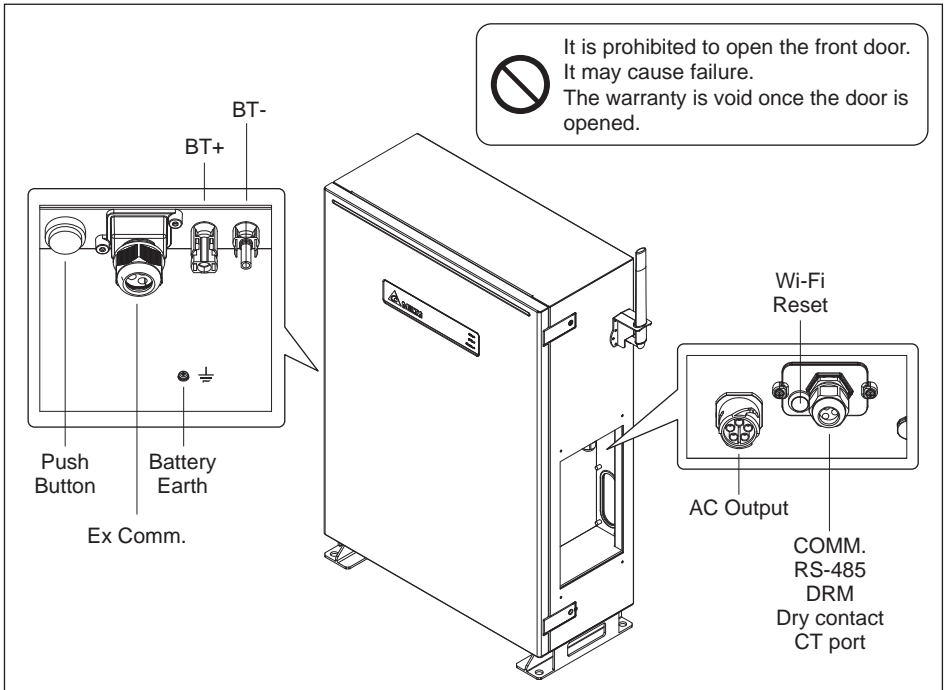


Figure 2-5 : Overview of interface

Please refer to **Figure 2-6** for the location of product label. You can identify the model number and the specifications by the information on the product label. In Australia and New Zealand, users can also identify the supported Demand Response Modes (DRMs) of BX6.3_AC100 here. The table (**Table 2-2**) along with these labels explains the definition of the specific mark.

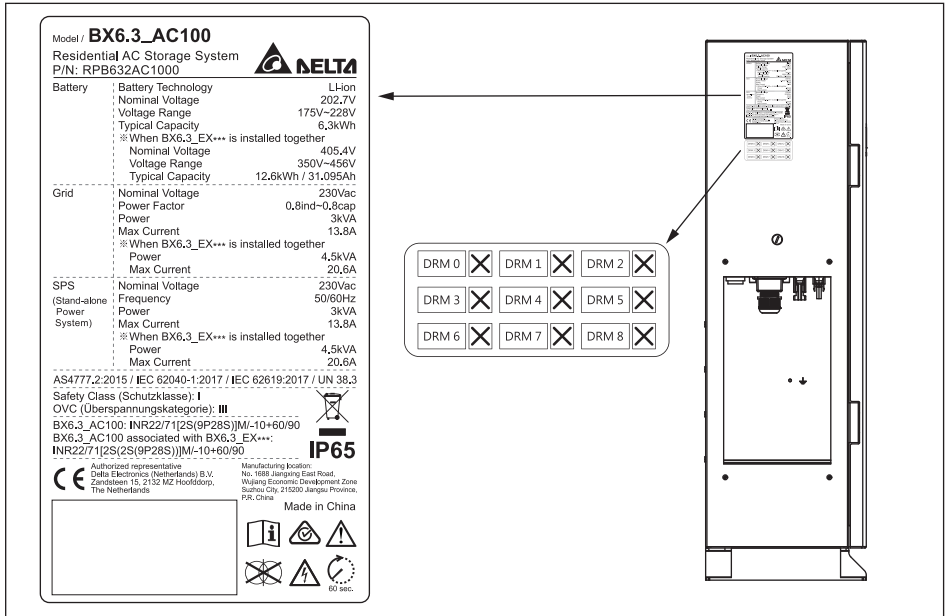


Figure 2-6 : Rating labels

Table 2-2 : Rating label explanation

Symbol	Definition
	Before working with the Battery Pack, you must read the supplied manual and follow the instructions contained therein.
	The housing of the Battery Pack must be grounded if this is required by local regulations.
	WEEE marking The Battery Pack must not be disposed of as standard household waste, but in accordance with the applicable electronic waste disposal regulations of your country or region.
	BX6.3_AC100 is not separated from the grid with a transformer.
	Danger to life through electric shock Potentially fatal voltage is applied to the unit during operation. This voltage persists even 60 seconds after disconnection of the power supply. Never open the unit. The unit contains no components that must be maintained or repaired by the operator or installer. Opening the housing will void the warranty.

2.5 LED Indicators

The DELTA BX6.3_AC100 has three different color LED notification on the front cover of the case that signal various system statuses:

Table 2-3 : LED Indicators

LED	LED Status	Definition
Grid	GREEN ON	On Grid mode
	GREEN FLASH 1s ON/OFF	On Grid count down
	GREEN FLASH 0.1s ON/OFF	Grid setting "default"
	RED ON	PCS Error
SPS (Stand-alone Power System)	GREEN ON	Standalone mode
	GREEN FLASH	Standalone count down
	RED ON	Battery Error
	RED FLASH	Battery Power OFF
Comm.	GREEN ON	Communicating
	OFF	No communication
Grid / SPS	GREEN FLASH Grid ON 1s ↔ SPS ON 1s	SBMS Balance mode SBMS Force_CHG Maintenance Mode

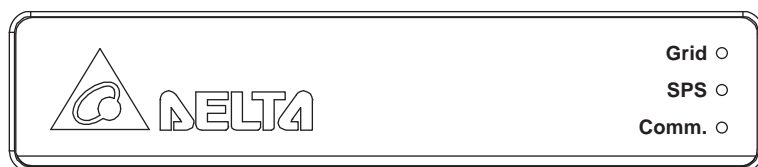


Figure 2-7 : LED indicators

2.6 Push Button

Use Push button to turn ON/OFF the unit, or start-up BX6.3_AC100 with AC supply.

Status	Operation	Action
BX6.3_AC100 power OFF	Grid supplied	Power ON the unit (AC start-up)
BX6.3_AC100 power OFF	Power button push > 20 sec (until grid green LED flash)	Power ON the unit (Cold start-up)
BX6.3_AC100 power ON already	Power button push > 1 sec	Power OFF the unit

3 Installation

WARNING !



- Do not install BX6.3_AC100 near or on flammable surfaces.
- Please mount BX6.3_AC100 tightly on a solid / smooth surface.
- Install BX6.3_AC100 in a location that prevents damage from flooding.
- Do not expose BX6.3_AC100 to ambient temperatures above 60°C or below -20°C.
- Operating or storing BX6.3_AC100 at the temperatures out of its specified range might cause damage to BX6.3_AC100.

The chapter contains instructions for (1) Installation environment
(2) Mechanical installation; (3) Electrical Installation; (4) Communication setup.

3.1 Installation Environment

CAUTION !



- The optimal operation temperature for BX6.3_AC100 is between 10 to 30°C.
- If the ambient temperature is out of the optimal operating range, BX6.3_AC100 will be de-rating.
- The operating humidity is within the range from 0 to 95%.
- BX6.3_AC100 may limit charge or discharge power based on battery cell temperature to improve battery lifespan.
- If the ambient temperature is out of the operating range, BX6.3_AC100 will stop operating to avoid any unexpected damage.

BX6.3_AC100 is designed to be waterproof and can be installed both indoors and outdoors. However, please avoid exposure to direct sunlight, high temperature and high humidity if installed outdoors.

Please avoid using BX6.3_AC100 under the following condition, otherwise the device may malfunction.

- Locations where IP65 isn't satisfied.
- Locations where temperature changes severely.
- Locations where the device is directly exposed to saltwater, sea breezes and high humidity.
- Locations that are or might be affected by explosive, combustible, corrosive and other poisonous gases.
- Location exposed dust and dirt.
- Location with poor ventilation.
- Locations with other special conditions.
- At altitude above 2000m.

3.2 Unboxing and Review

The unpacking procedure of BX6.3_AC100 is shown as **Figure 3-1**.

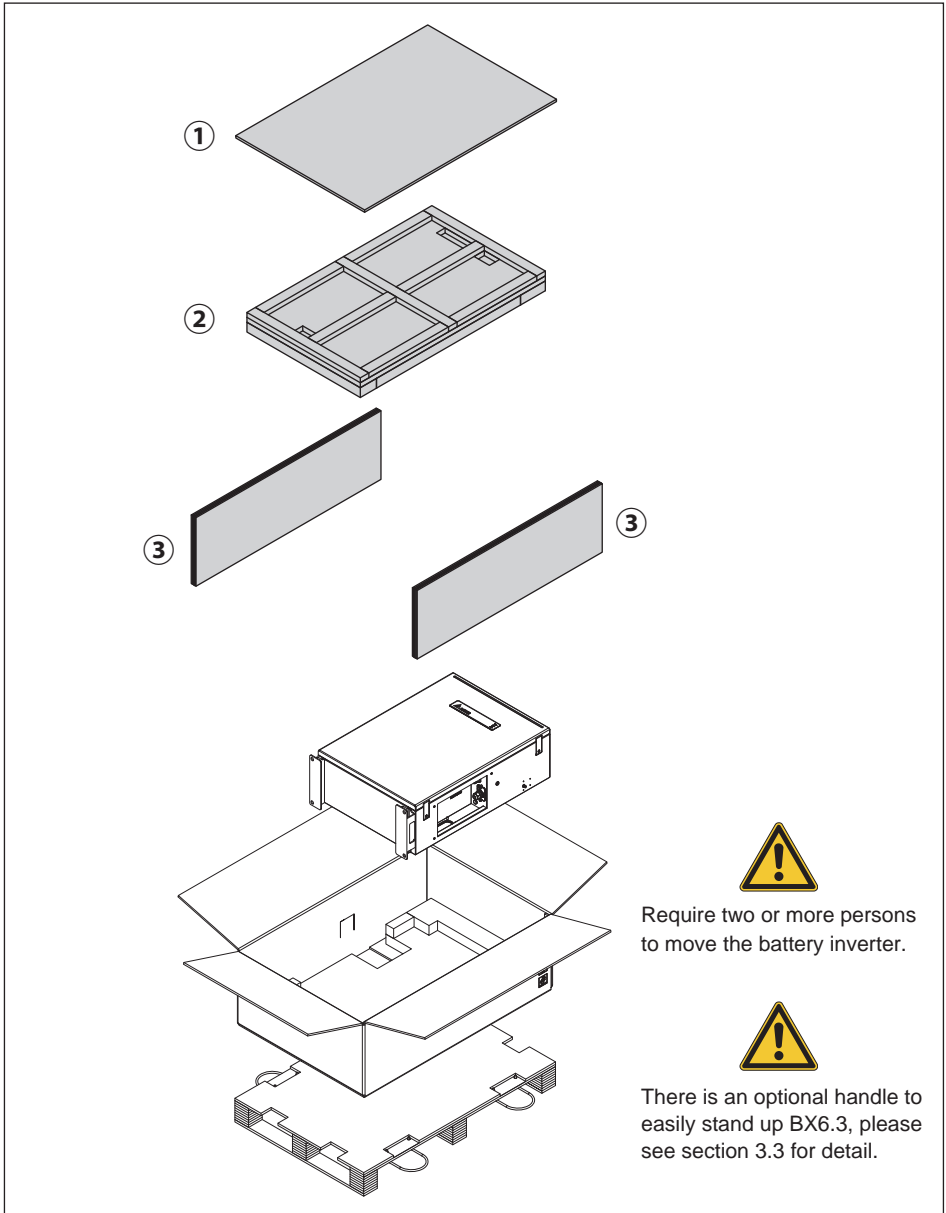
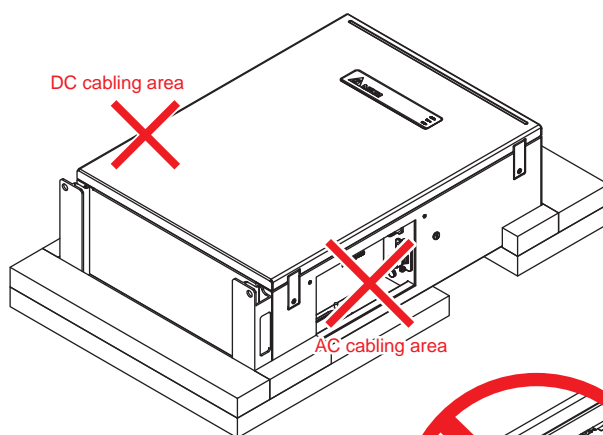
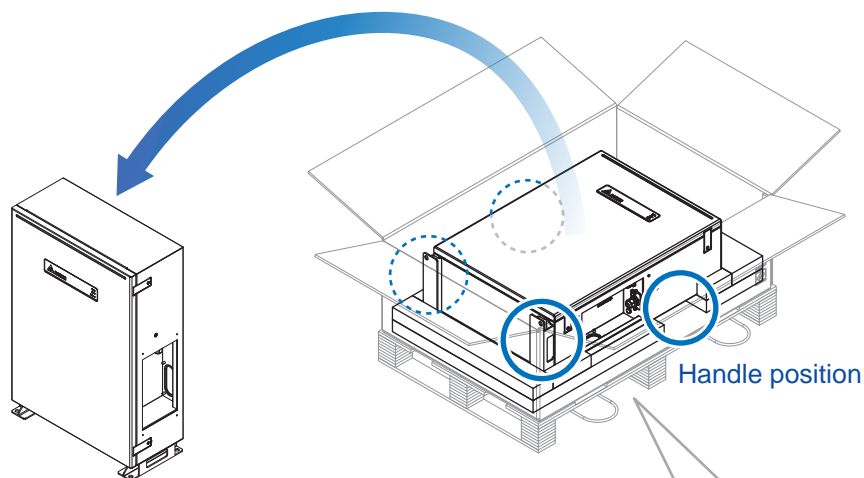


Figure 3-1 : Unpack



Prohibit to force with the DC/AC cabling area.



Require two or more persons to move the battery inverter.

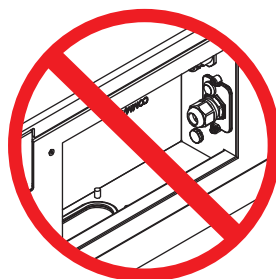
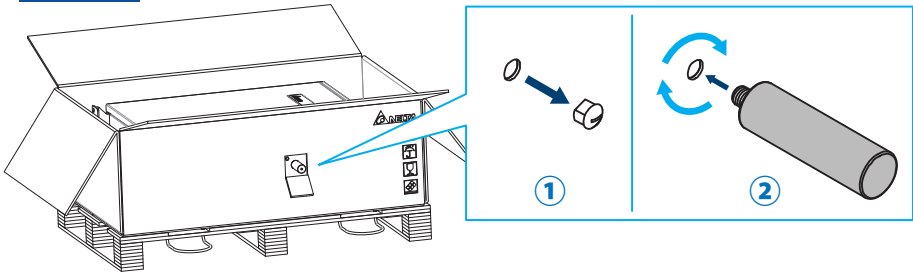


Figure 3-2 : General handling method

3.3 Handle (optional)

Step 1



Step 2

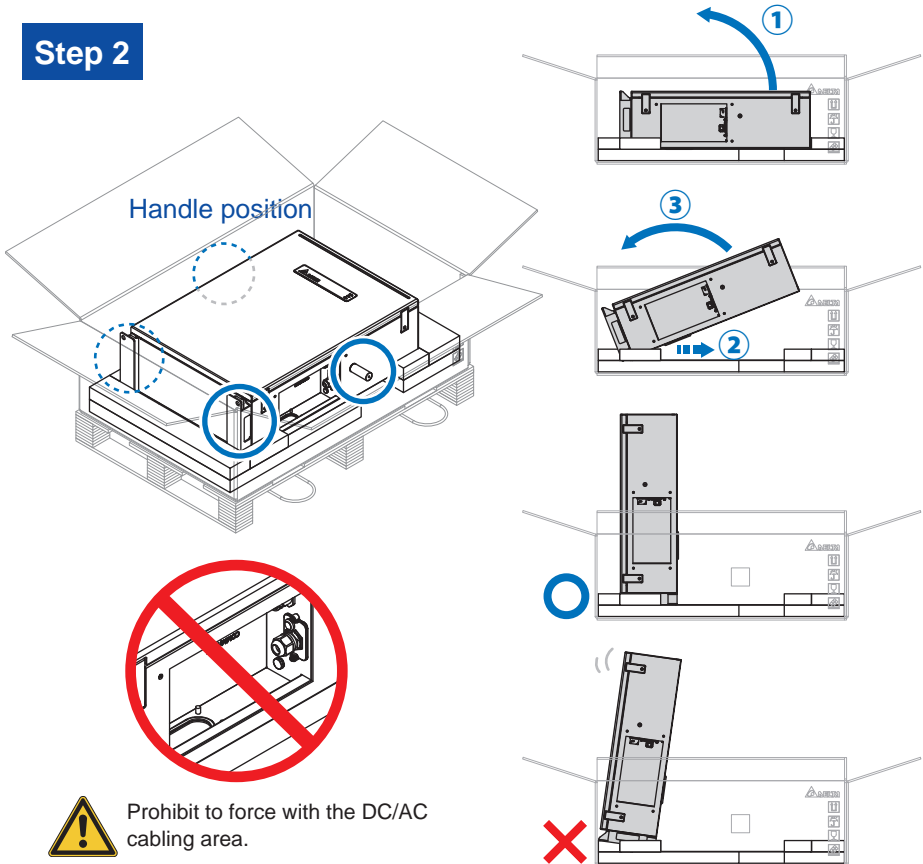
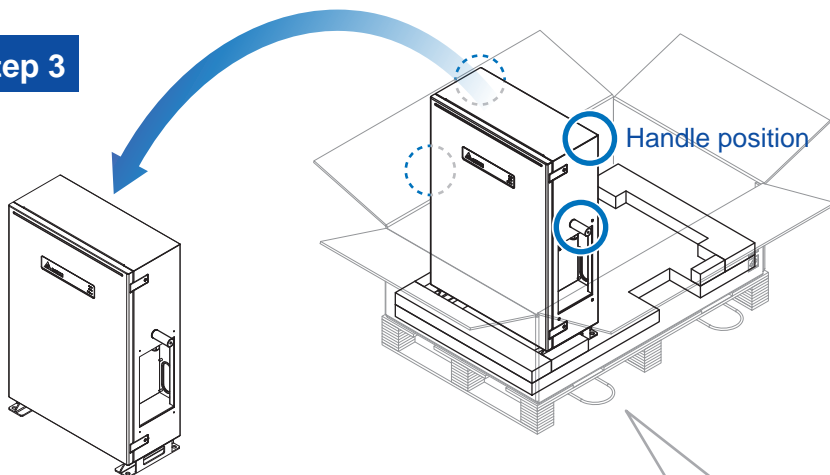


Figure 3-3 : Handling with optional transport handle

Step 3



DC
cabling area



AC
cabling area



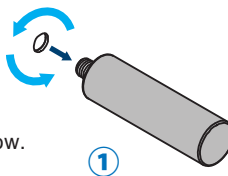
Prohibit to force with the DC/AC cabling area.



Require two or more persons to move the battery inverter.



Please lock screw (0.5N·m) plugs on the case after installation to avoid water inflow.



①



②

Figure 3-4 : Handling with optional transport handle_2

3.4 Mechanical Installation

WARNING !



- BX6.3_AC100 should be installed by a trained and experienced installer designated by the retailer.
- Having the product installed by a non-specialized installer is very dangerous and can cause damage or injury.

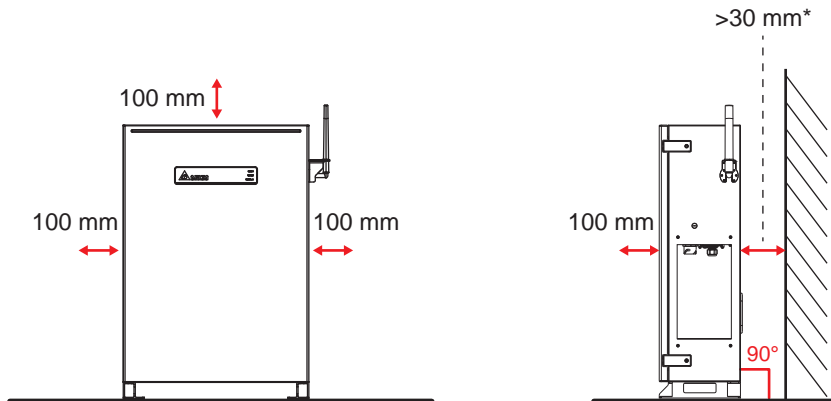
ATTENTION



- Please check the space for installation which meets the recommended location.
- Remember that DELTA will in not responsible for damage resulting from BX6.3_AC100 falling due to insufficient mounting strength.

This AC Storage System is designed for ground-mounted.
Please ensure that the installation is perpendicular to the floor.
Please follow the instructions as shown from **Figure 3-5** through **3-8**.

Please make sure there is enough space for the AC Storage System, especially reverse side of the AC Storage System (heatsink requirement).



* Please refer to regulation AS/NZS 5139:2019 for detail installation space requirement.
To avoid extra fireproof cement sheeting installation requirement, it is recommended to keep at least 300 mm between the wall and BX.

Figure 3-5 : Recommended Installation Space

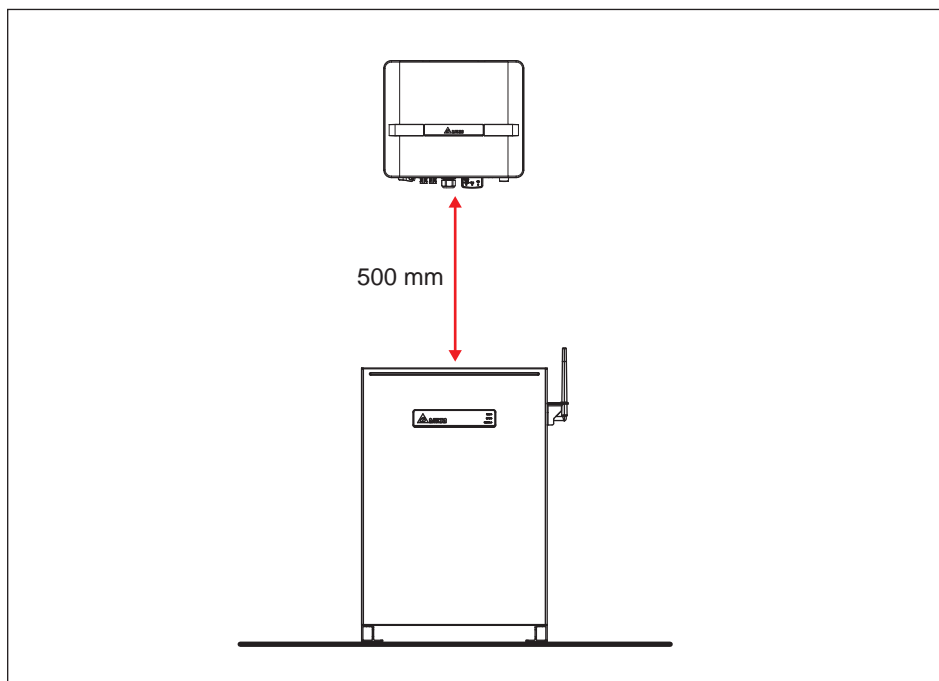


Figure 3-6 : Recommended Installation Space with Flex Inverter

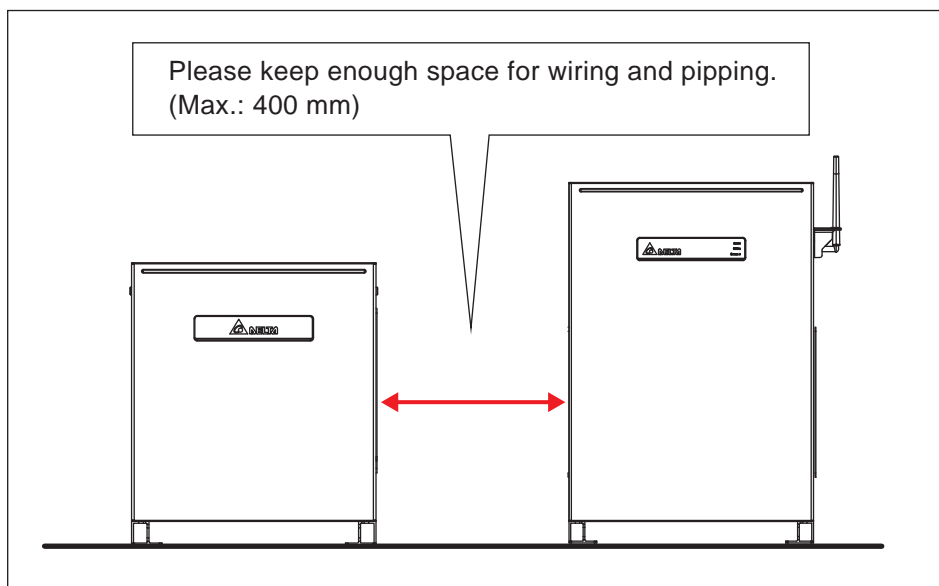
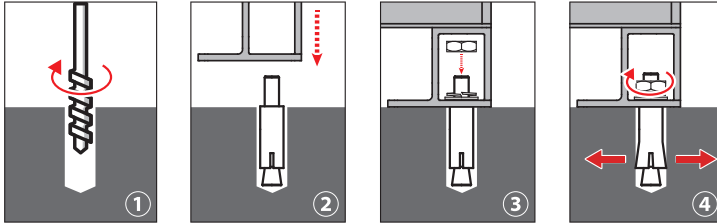


Figure 3-7 : Recommended Installation Space of BX12.6_AC100

The recommended spacing to wall is 100mm, please be sure the minimum space should more than 30mm. Be sure to select the flat floor surface for installation and strength can afford storage system weight.

The Power ON/OFF button is located at the left side of BX6.3_AC100, please make sure enough space is reserved to access this button.



1. Drill 4 holes with $\Phi 16$ mm diameter in dimension 540 mm x 220 mm
2. Insert Rawlplug into these hole
3. Put on and fix BX6.3_AC100 firmly

CAUTION !



- Please do not install the battery pack on uneven floor surfaces.
- Holes size is 16 mm diameter for attaching the battery pack.

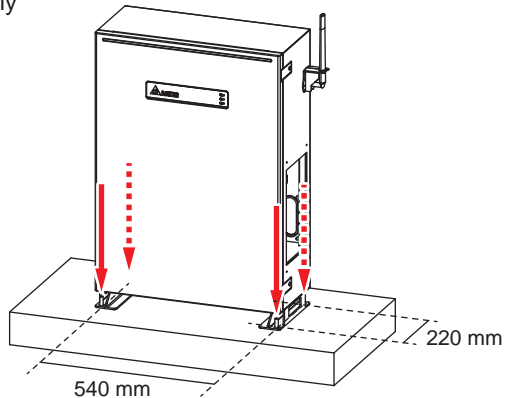


Figure 3-8 : Insert rawlplug

- To install the wiring cover on BX6.3_AC100, please follow the procedure below:
- BX6.3_AC100 has a $\Phi 38 \times 76$ backward hole for AC and COMM wiring, use 4 screws to fix side cover after wiring.
 - For BX12.6_AC100 model installation, please remove the plastic cover, pass the DC and COMM cables through pipe and attach the pipe to the wiring cover.
 - Recommend screw type/ PF pipe/ conduit are shown in **figure 3-9**.
 - It is recommended to install the wiring cover as it is used to prevent users from touching the electric cable.

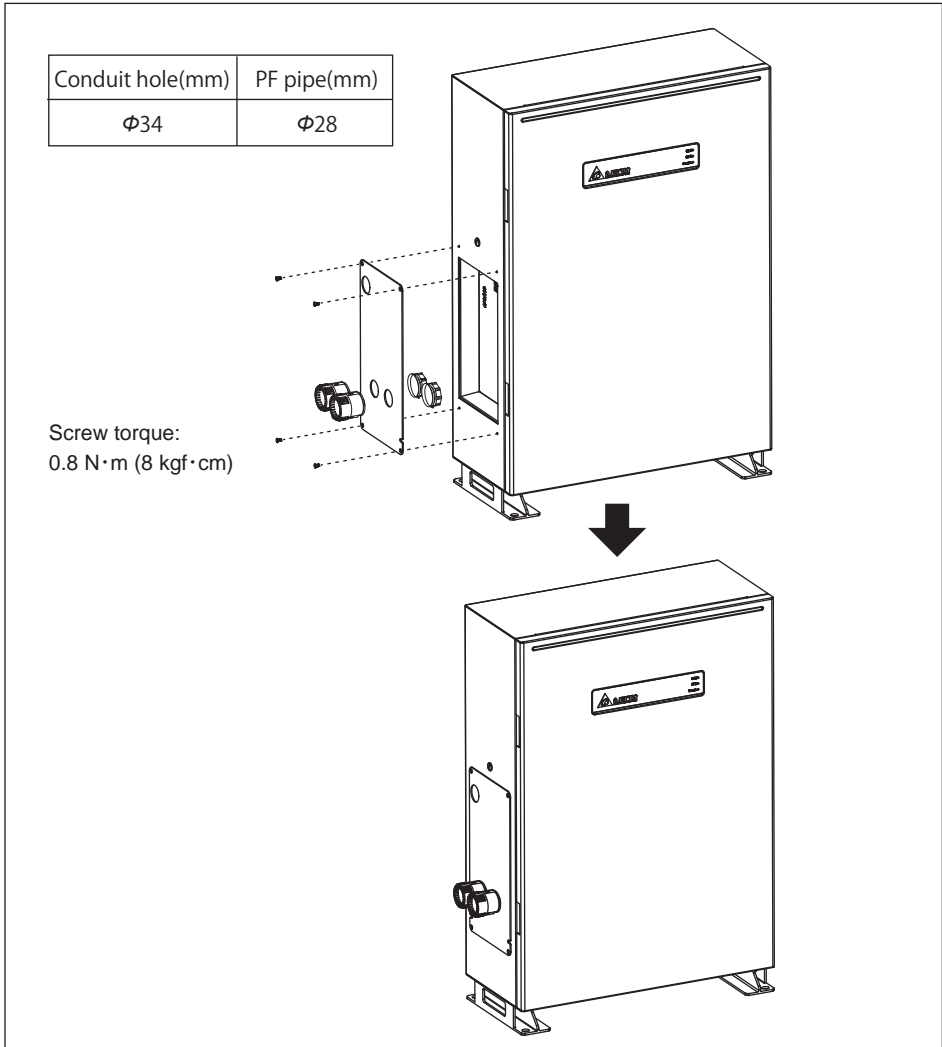


Figure 3-9 : Install the wiring cover

3.5 Electrical Installation for AC

Important information regarding safety

- Always follow the specific regulations of your country or region.
- Always follow the specific regulations of your energy provider.
- Install all stipulated safety and protective devices (e.g. automatic circuit breakers and/or surge protection devices).

3.5.1 Required Protective Devices and Cable Cross-sections

The AC cable must be jacked and meet the specifications in **Table 3-1**.

Table 3-1 : AC input cable requirement

Model	Current Rating	Wire Size
BX6.3/12.6_AC100	25 A	3 - 5 mm ²

Please use the proper upstream circuit breaker to protect the unit.

Table 3-2 : Upstream circuit breaker

Model	Current Rating
BX6.3_AC100	16 A
BX12.6_AC100	25 A

3.5.2 AC Connection

Areas outside Australia and New Zealand, it recommended to connect AC wiring as shown in **Figure 3-10**. The connection between Grid N and Load N is used to eliminate the floating voltage between Load N and PE.

However, BX6.3_AC100 can still works without the Grid N and Load N connection.

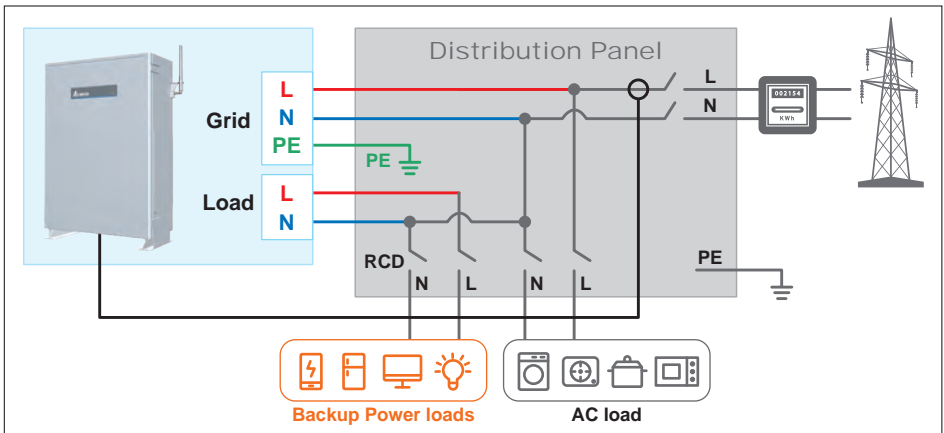


Figure 3-10 : Storage system operation illustration

In Australia and New Zealand, please connect the AC wiring as shown in **Figure 3-11**. The connection between Grid N and Load N is necessary due to the grid code requirement to ensure the continuity of the neutral conductor when inverter is in standalone mode.

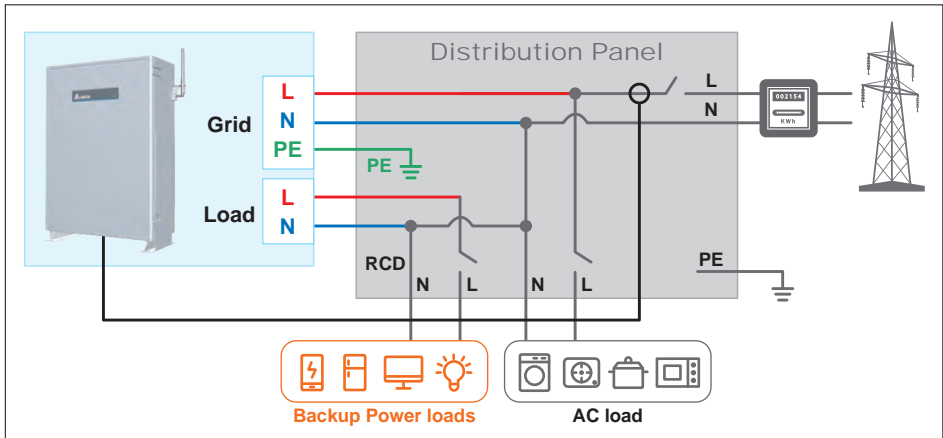


Figure 3-11 : AC connection in AU & NZ

The integrated all-pole sensitive RCMU provides additional safety. RCD Type A can be used for this unit. Minimum tripping current 30mA of the type A RCD is recommended for Load connection.

ATTENTION



- Short circuit occurred at the backup power load may cause damage to the unit.
- Motor and half-wave rectification Load is not suitable for backup power load, it will lead to error and cause unit shut down.

3.5.3 AC Plug Assembly

CAUTION: Machine And Equipment Damage May Occur!



- Please make sure to use the proper size AC cable.
- Please choose the terminals as shown below for wires crimping.
- Failed to follow these instructions may cause AC plug damage.



Follow the steps below to strip the wires before assembling the AC plug as shown in **Figure 3-12** :

- (1) Remove 55 mm (2.2 inch) of AC cable outer jacket.
- (2) Trim the L-N(Grid), L-N(Load) wire to 52.5 mm (2.0 inch).
- (3) Strip 12 mm (0.5 inch) of insulation from all wires ends.
- (4) Crimp terminals for all wires.

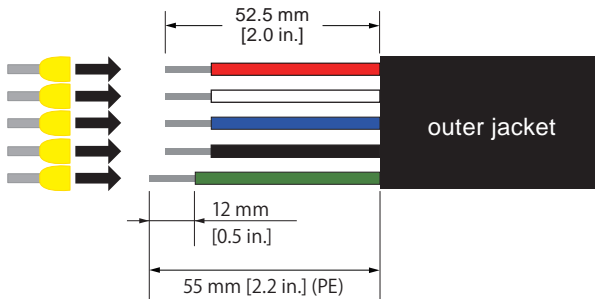


Figure 3-12 : Stripping the wires

DANGER: ELECTRICAL HARZARD!!



- Any electric power connected to the battery pack during cabling is prohibited.
- Please make sure any breaker is turned off before connecting cables.

Assemble the AC plug and wires as the procedures shown in **Figure 3-13**.
The AC wire must be connected to the AC plug according to the correct sequence.
The AC voltage should be L-N 230 Vac \pm 10%.

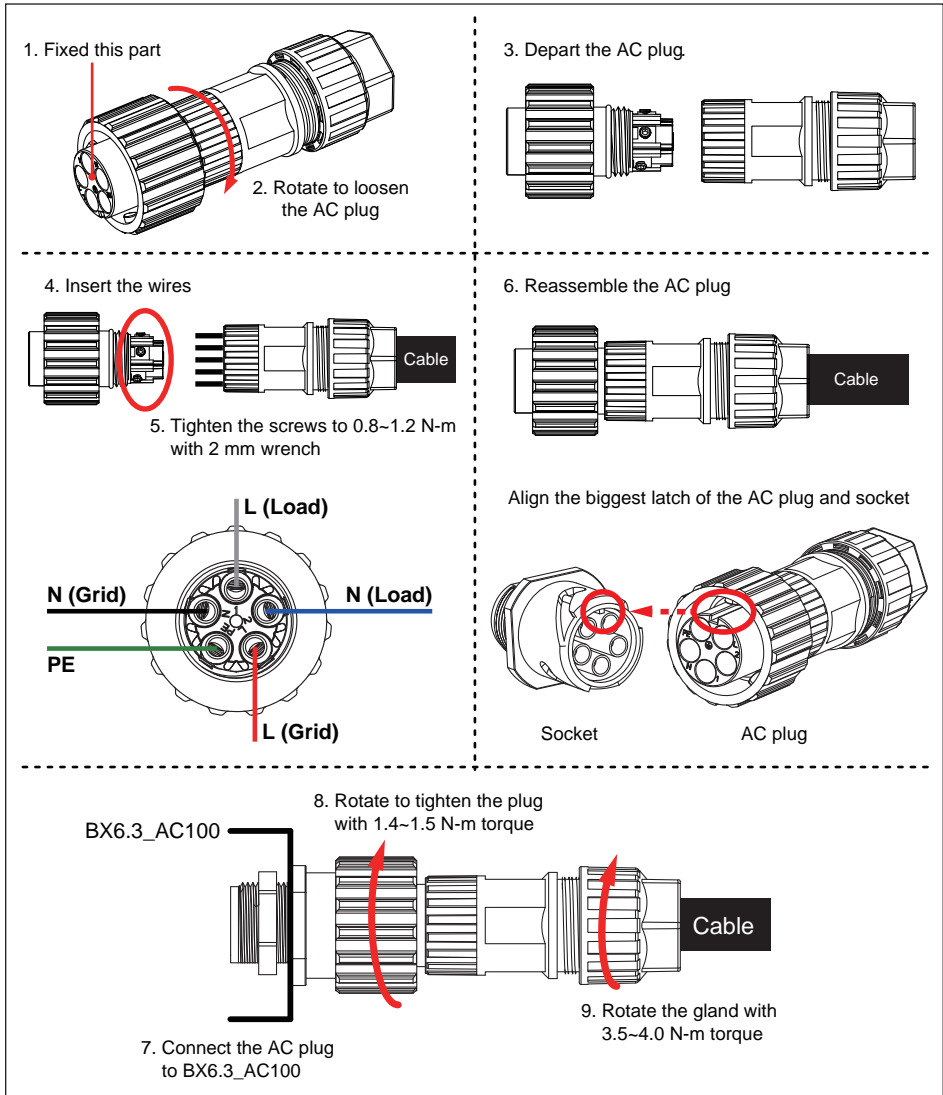


Figure 3-13 : AC plug illustration

3.6 Communication Module Connections

Please refer to **Figure 3-14** for the Communication Module illustration. The module provides VCC, RS-485, dry contact, and EPO terminals for different use. The maximum supply current of VCC(16V) is 0.8A. The maximum input rating of dry contact connector is 250Vac/12Vdc/10A.

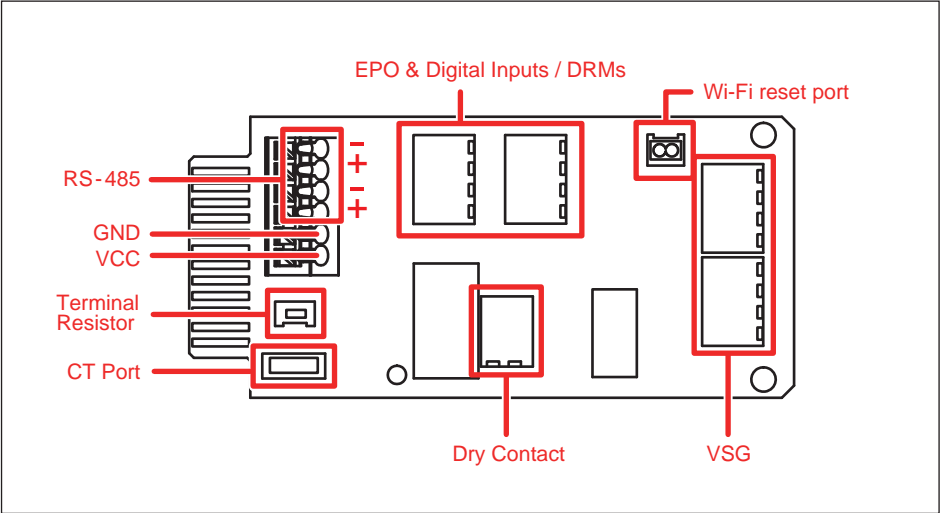



Figure 3-14 : Communication module

3.7 RS-485 Connection

The pin definition and data format of RS-485 is shown in **Table 3-3**. Installers should switch ON the terminal resistor when single inverter is installed.

Table 3-3 : Pin definition and data format of RS-485

PIN	Function		Data Format
1	VCC(+16V)		Baud rate: 19200 Data bits: 8 Stop bit: 1 Parity: N/A
2	GND		
3	DATA+		
4	DATA-		
5	DATA+		
6	DATA-		
Maximum supply current of VCC(+16V): 0.8A			

3.8 Digital Input / DRM & EPO Functions

Communication Module has 1 set of emergency power off function (EPO). When the VCC and INV OFF pins are short-circuited, inverter will shut down immediately. The module also provides 6 sets of digital input function (K1~K6). Please refer to **Table 3-4** for the digital input definition. The suitable wire size is 30-16 AWG.

Table 3-4 : Definition of digital input & EPO functions

Short	Inverter's action
VCC & INV OFF	Emergency power off (EPO)
VCC & K1	0% active power
VCC & K2	Maximum 30% active power
VCC & K3	Maximum 60% active power
VCC & K4	Maximum 100% active power
VCC & K5	Reserved
VCC & K6	Reserved

In Australia and New Zealand, the Demand Response Modes (DRMs) are also use digital input function to assert. The definition is different from normal digital input function; please refer to **Table 3-5** for the DRMs pin definitions.

Table 3-5 : Definition of digital input & EPO functions (AU / NZ)

Short	Inverter's action	
VCC & INV OFF	DRM 0 (Disconnect from grid)	Charge/Discharge mode
VCC & K1 & K5	DRM 1 (0%)	Charge mode
VCC & K2 & K5	DRM 2 (50%)	
VCC & K3 & K5	DRM 3 (75%)	
VCC & K4 & K5	DRM 4 (100%)	
VCC & K1	DRM 5 (0%)	Discharge mode
VCC & K2	DRM 6 (50%)	
VCC & K3	DRM 7 (75%)	
VCC & K4	DRM 8 (100%)	

3.9 Dry Contact Connection

Communication Module has 1 set of Dry Contact. The maximum input rating of dry contact connector is 250Vac/12Vdc/10A. The trigger condition of this function can be customized by Installer. When the function is triggered, the output two ports will be short-circuited.

It allows following configuration:

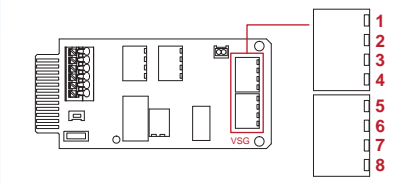
- Fault indicator or Grid status indicator
- Power production
- Control of external loads
- Fan control

3.10 Sync Signal connection of VSG function

For a higher backup output power application during off-grid, it is allowed to connect the STP port of multiple BX6.3 systems. For further information about this application, please refer to **Chapter 6 System Application**.

For this application, please follow the instruction below to connect the pins on the communication module of each BX6.3 _AC100.

Table 3-6 : Pin definition and data format of VSG port

PIN	Function	
1, 3	CAN_H	
2, 4	CAN_L	
5, 7	COM_S	
6, 8	SYNC	

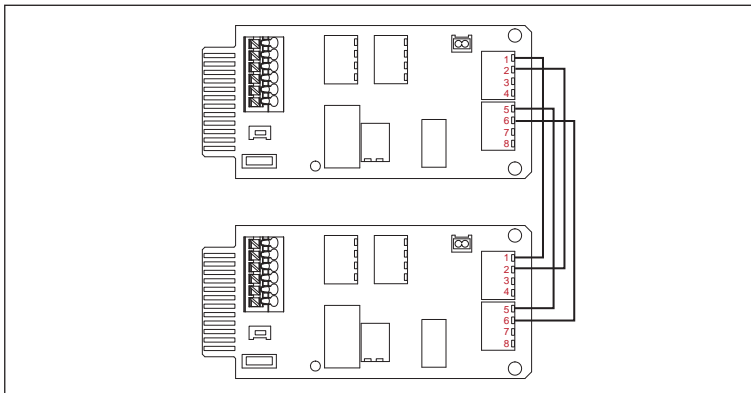


Figure 3-15 : Sync Signal connection of VSG function

3.11 Installation of External CT Clamp.

BX6.3_AC100 has an built-in power meter with an external CT clamp.

With this power meter, system can achieve the function bellows:

1. Measure the amount of feed-in power and the power-consumption of the house.
2. To perform the export control function in compatible with another PV inverter in the system.

DANGER : ELECTRICAL HAZARD!!



- The product is intended to be installed and operated by qualified personnel or service personnel only.
- Do not power up the device before installation is complete.
- All circuit breakers must be in the OFF position before commencing installation.

1. The CT can be opened.
2. Take the CT clip on the Line conductor wire.
3. Please refer to the symbol on the CT clamp and make sure the CT clamp is installed in the correct direction as the figure below.
4. Connect the CT wires to the device.
5. Connect the CT cable to the connector on the Comm. Module as the figure below.

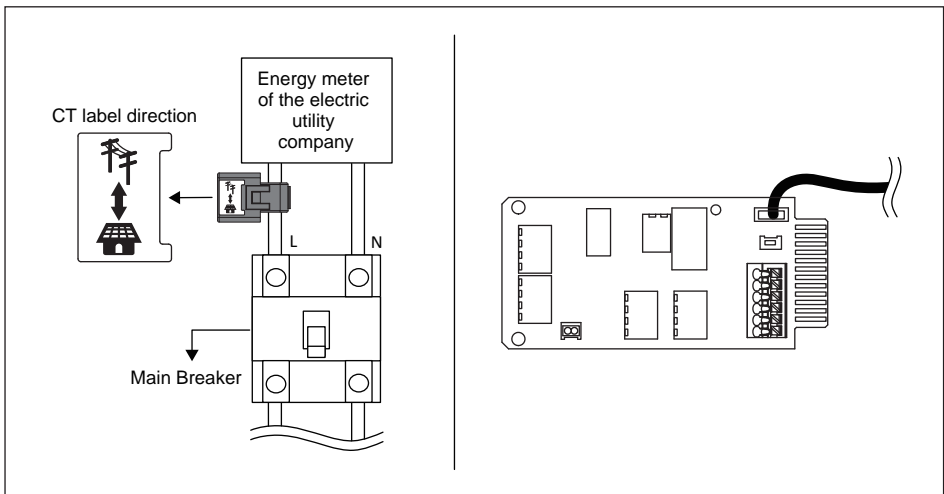


Figure 3-16 : Current Transformer installation

3.12 Installation of BX12.6_AC100

DANGER: ELECTRICAL HARZARD!!



- Before expansion battery pack, please power OFF the unit entirely to avoid risk of electrical shock.
- Please check the battery pack regularly. If there are any impaired or loose parts, please contact your installer. Ensure that there are no fallen objects.

For the higher capacity system - BX12.6_AC100, BX6.3_AC100 should be installed with the BX6.3_EX100 as the following instruction.

1. Connect positive/negative cable from BX6.3_EX100 to BX6.3_AC100
2. Connect Communication cable (3 wires) from BX6.3_EX100 to BX6.3_AC100
3. Connect grounding cable from BX6.3_EX100 to BX6.3_AC100

Please make sure the polarity is properly connected as shown below.

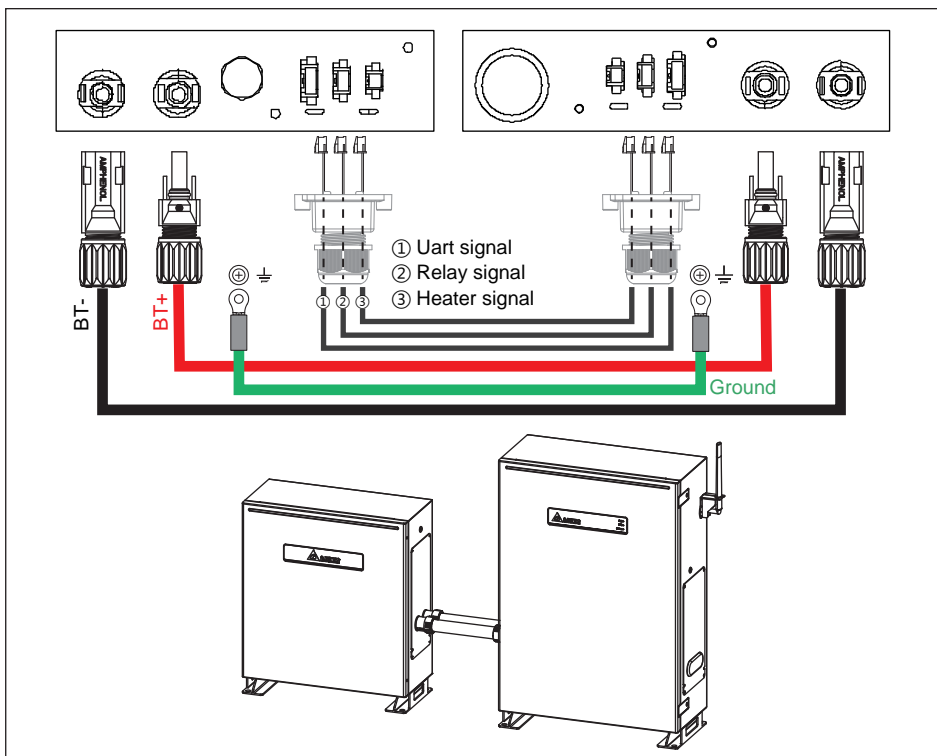


Figure 3-17 : Expanding the Battery Pack with DC(BT+/-) cables

ATTENTION



- Please do not remove all the rubber covers on BX6.3_AC100 if BX6.3_EX100 is not installed.

4 Startup

To startup BX6.3_AC100, please follow the steps below:

1. Turn ON the AC grid breaker.
2. Ensure the LED light-on, follow the "MyDeltaSolar" APP user's guide to operate the APP.
3. When DC1 is also in the system, please ensure the connection between DC1 and BX6.3_AC100 and check if DC1 is powered correctly.

How to make Wi-Fi communication with BX6.3_AC100:

1. Turn on the device's Wi-Fi function.
2. Select the Wi-Fi SSID: Delta-[serial number]
(e.g. Delta-O9J20500001W0; See rating label on the case as **Figure 2-6**)
3. Enter the Wi-Fi password: DELTASOL
4. Use the "MyDeltaSolar" APP (You can download the APP via google play or App Store)

Please note :

- (1) The product only support one device communicating at the same time.
- (2) If the Wi-Fi password is forgotten, press and hold the Reset Button more than 20s to return the Default password to "DELTASOL"

Due to the variety of installation environments, installation of the unit and start-up procedures must be carried out by an accredited technician. Incorrect settings may cause the inverter to malfunction.

ATTENTION



- Please refer the QR-code for the operation guideline of Wi-Fi and APP
https://mydeltasolar.deltaww.com/?p=product_manual



4.1 Operation Mode

BX6.3_AC100 has 6 normal operation modes for users to choose.

Each mode has different behavior between battery, grid, and home load.

The following are the description of these modes.

In some area, the detail behavior of each operation mode may be different due to the local electricity regulations.

4.1.1 Self-consumption mode

Self-consumption mode is standard mode when BX6.3_AC100 installed with another PV system.

In this mode, BX6.3_AC100 is operated in following priority :

1. Charge the battery with the excess PV energy which feed-in to the grid until the battery is fully charged.
2. Discharge the battery when the PV energy is insufficient to provide the home load consumption until the battery is fully discharged.

When there is no PV power, battery starts to discharge and supply home load until it's empty.

If the time setting function is enabled, the behavior of the BX6.3_AC100 will according to the time setting in priority. The detail operation of time setting function is described in Chapter 4.2.

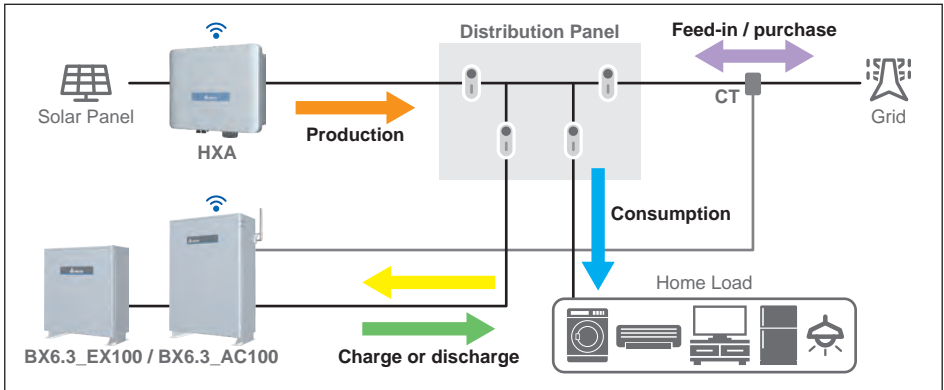


Figure 4-1 : Self-consumption mode current flows

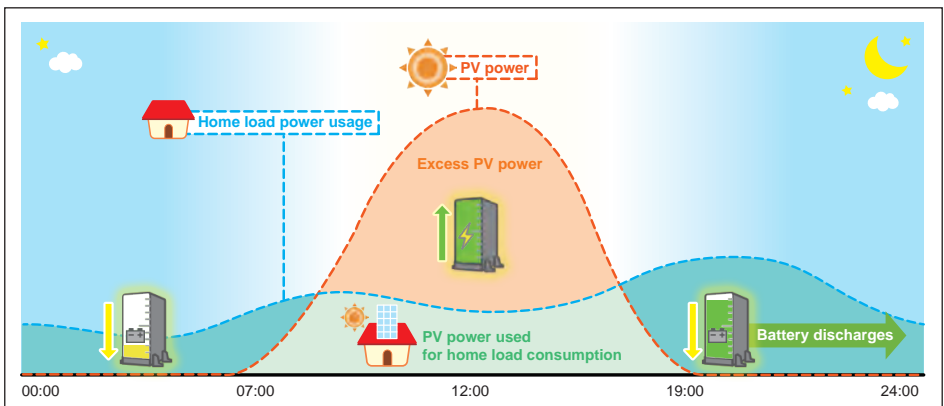


Figure 4-2 : Self-consumption mode behavior

4.1.2 Peak cut mode

In this mode, the home load will consume the power from the PV inverter in priority. When the home load consume more power than the power generated by the inverter, it will consume the power from the grid. Then, battery will only discharged to the supply the extra load after the power consume from the grid exceeds the “peak cut power” setting value. “Peak cut power” can be assigned in the Battery Control page.

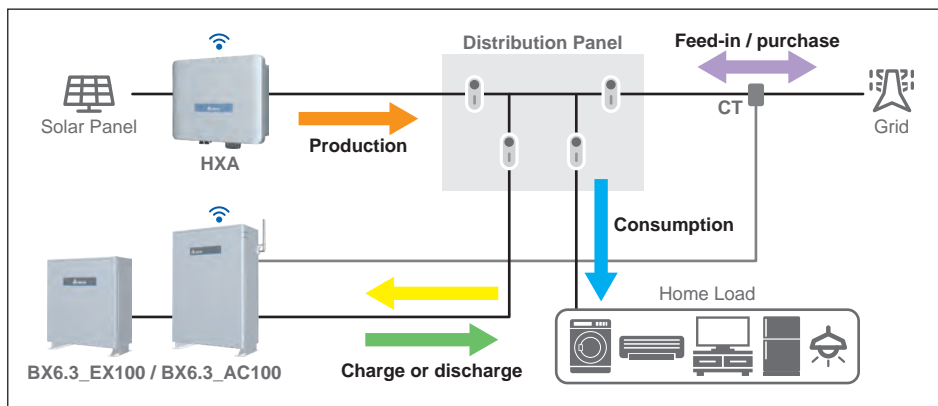


Figure 4-3 : Peak cut mode current flows

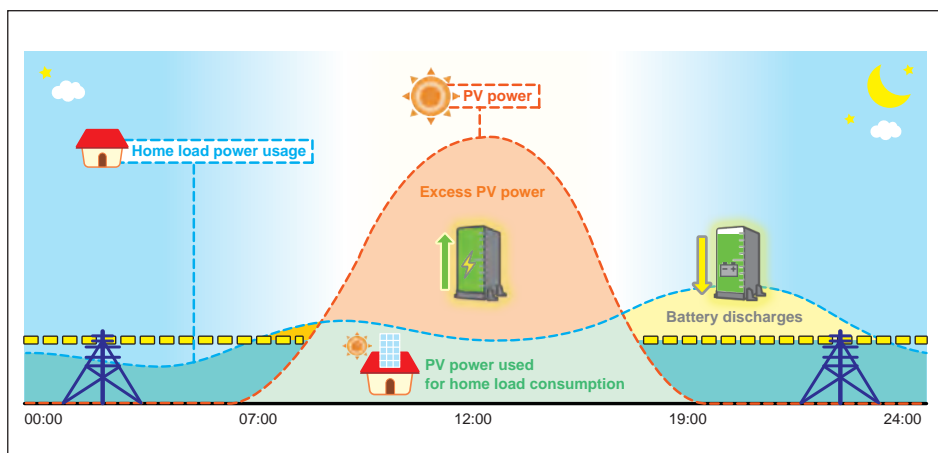


Figure 4-4 : Peak cut mode behavior

4.1.3 Selling first mode

Selling first mode is a standard mode combining with 6 time settings. In this mode, BX6.3_AC100 is operated in following priority:

1. If users have set the time settings, inverter will change behavior in these time intervals
2. Discharge the battery when purchased power from grid is detected until battery empty.

Please refer to 4.2 Function Setting chapter for more detail about time settings.

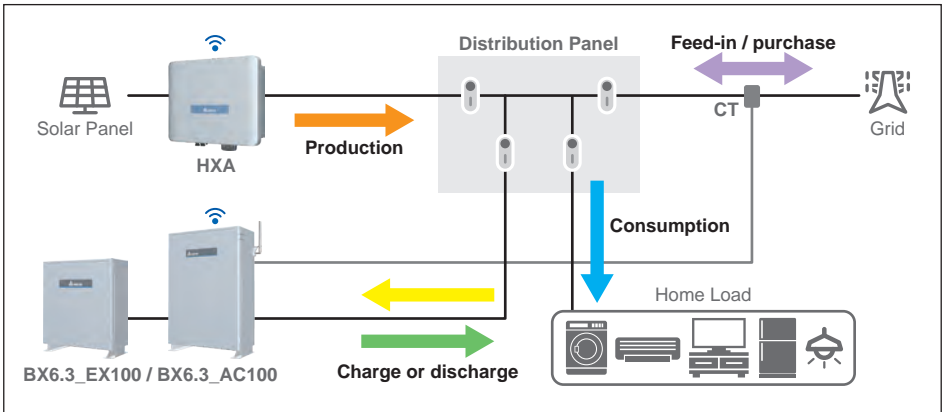


Figure 4-5 : Selling first mode current flows

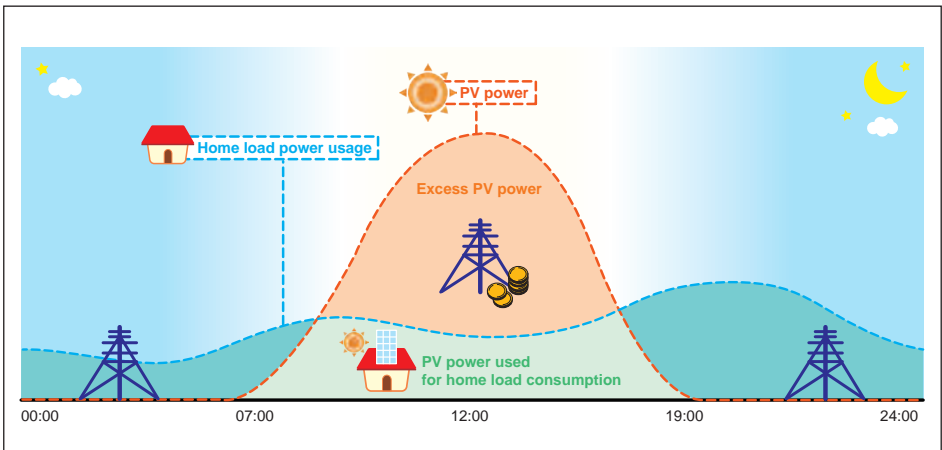


Figure 4-6 : Selling first mode behavior

4.1.4 Charge first mode

In this mode, battery will be charged by PV or grid in priority, after battery is fully charged, the remaining PV power then feed-in to home load and grid. Battery will not be discharged in this mode even there is demand in the home load.

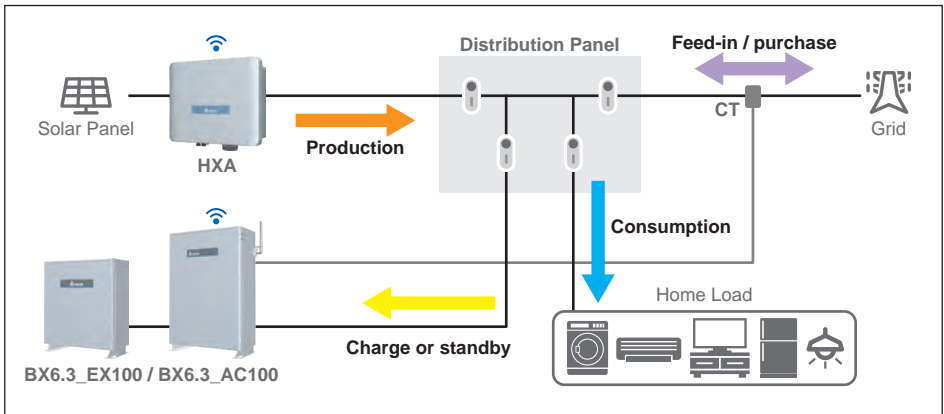


Figure 4-7 : Charge first mode current flows

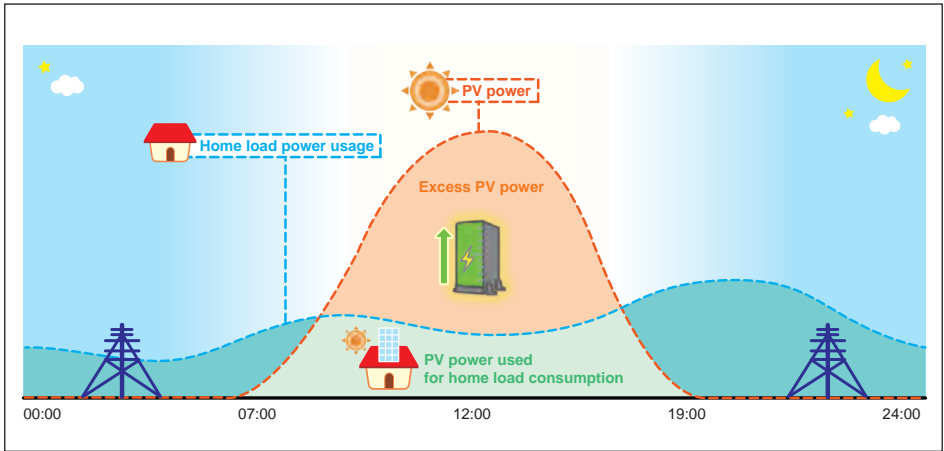


Figure 4-8 : Charge first mode behavior (general)

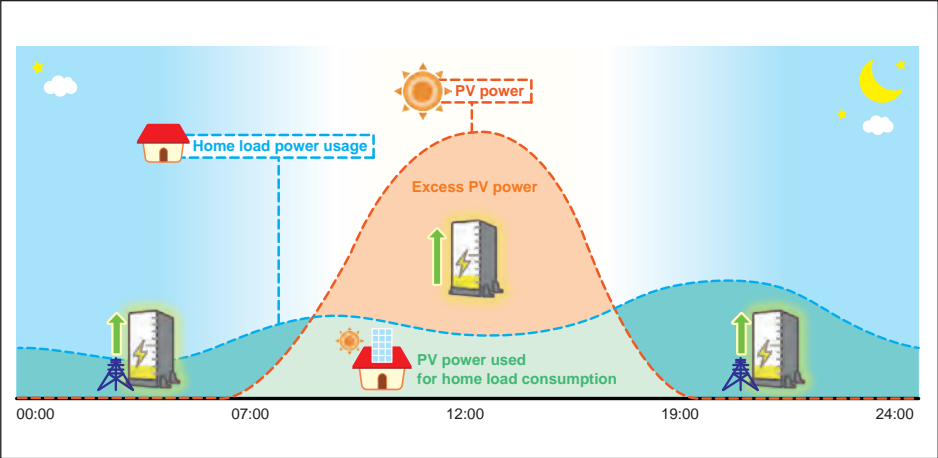


Figure 4-9 : Charge first mode behavior (for AU & NZ)

4.1.5 Discharge first mode

In this mode, the battery will only be discharged depends on the load consumption. It will not be charged even there is excess PV power.

All the PV power is feed-in to home load and grid. Battery will keep discharging when there is demand in the home load until it fully discharged.

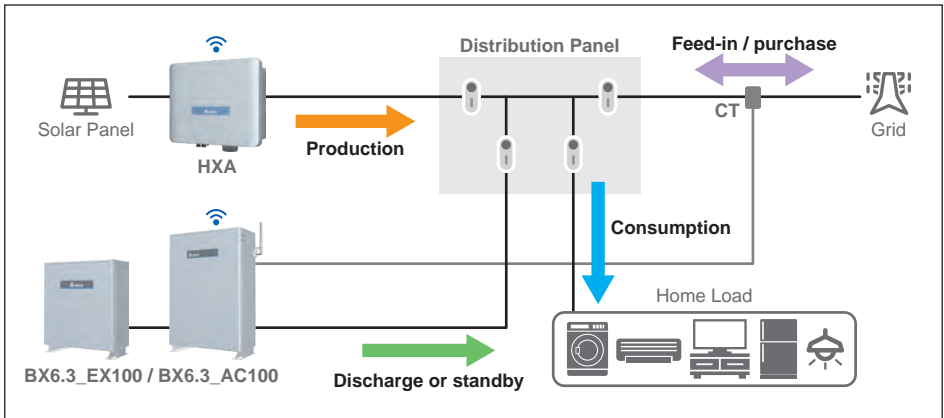


Figure 4-10 : Discharge first mode current flows

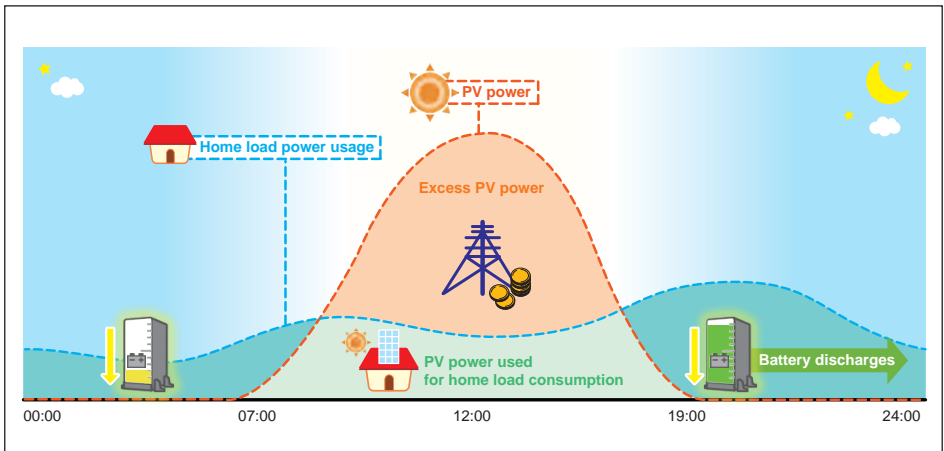


Figure 4-11 : Discharge first mode behavior

4.1.6 Special Modes

In addition to the modes mentioned above, there are three special modes in BX6.3_AC100. These are passive modes, they will be enabled automatically under special condition.

• **Standalone mode**

BX6.3_AC100 changes to standalone mode automatically during a power outage occur. At this time, grid side is disconnected and home load are supported by battery power as much as possible.

BX6.3_AC100 can be micro-grid under this mode, to provide simulated grid for load and PV inverter.

Model	Max charge / discharge load crrent
BX6.3_AC100	13 A
BX12.6_AC100	19.6 A

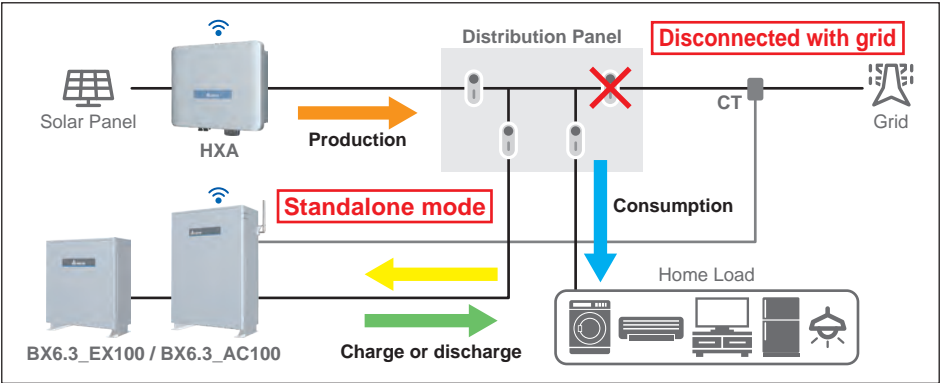


Figure 4-12 : Standalone mode current flows

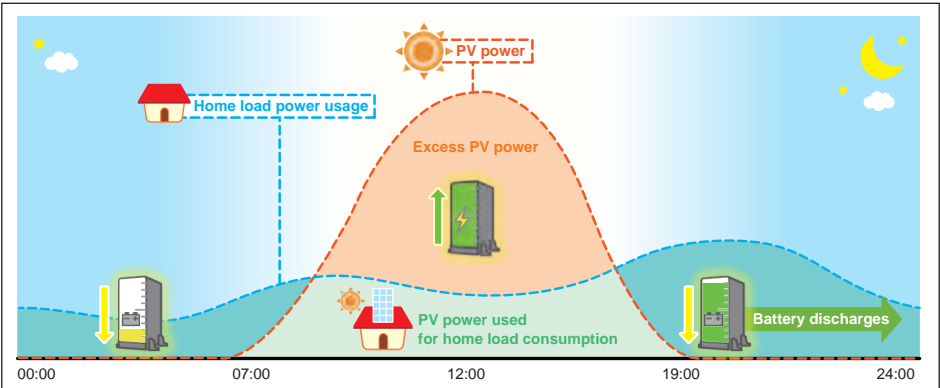


Figure 4-13 : Standalone mode behavior

• Forced charge mode

Although battery stops any action when SOC (state of charge) reach 0%, the self-discharge phenomenon may still causing SOC lower than 0%.

At this time, BX6.3_AC100 will force battery charging from PV power and grid power until the battery SOC reaching SOC limit setting (default is 30%).

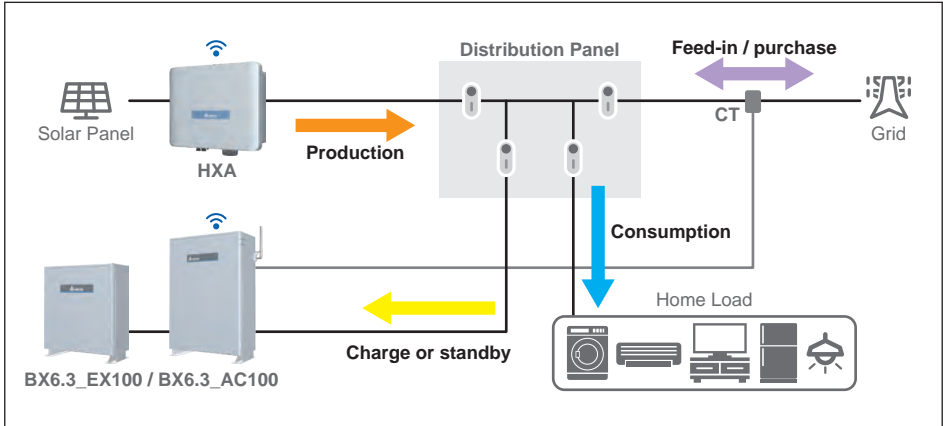


Figure 4-14 : Forced charge mode current flows

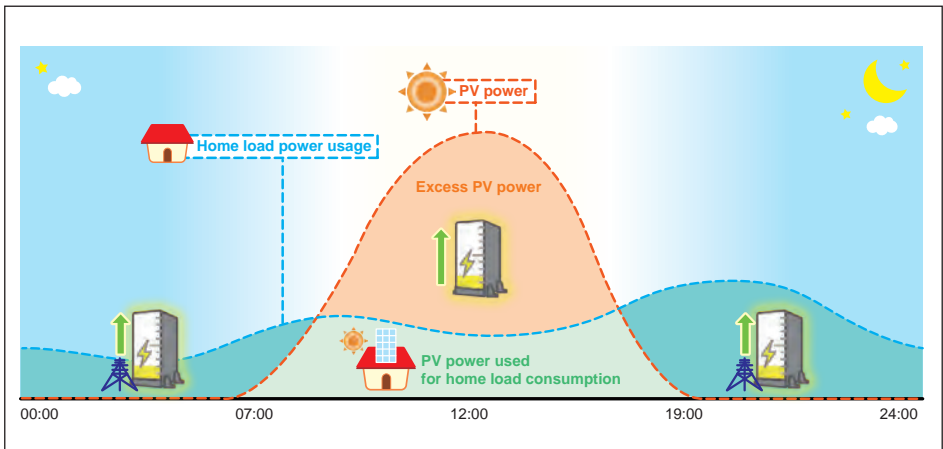


Figure 4-15 : Forced charge mode behavior

- **Balance mode**

This operation is only applied to BX12.6_AC100 system.

During the installation, the battery voltage of BX6.3 series might be different. Due to the specifications of the battery module, the system will be switched to this mode automatically to balance the voltage of BX6.3 series.

When the system is operating under this mode, the system will either discharge the battery with 3 kw power to the load and the grid or charge the battery with 3 kW power from the grid.

Once the battery voltage of BX6.3 series are balance, this balance mode will stop and the system will automatically be switched to the operational mode selected by the user.

4.2 Function Setting

In function settings page, you can assign SOC limit, peak cut power, and BT charge / discharge time interval.

- **SOC Limit**

You can assign the lower limit of battery SOC. Battery will stop discharging when its SOC reach this limit.

- **Peak Cut Power**

Peak cut power is used in peak cut mode. You can assign the peak power of home load usage from grid. When the home load consumption exceeds this value, battery will discharge to supply remaining power.

- **Time Settings**

Time settings can be separated into BT charge time and BT discharge time. Each setting has 3 time setting intervals. The time setting of all the intervals cannot overlap with each other.

Time setting function is only available under self-consumption mode and selling first mode. Under either mode, BX6.3_AC100 will automatically switched to charge first / discharge first mode according to the time setting function and switched back to the original mode when the time is out of the setting interval.

- **Main Supply Breaker Capacity**

Please set the current rating of the main supply breaker of the household. The system will refer to this setting to adjust its maximum charging power drawn from the grid during peak hours to avoid the unnecessary tripping of the breaker.

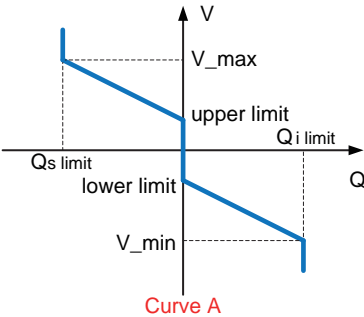
- **Time Schedule for SOH-cycle**

Once a year the BX6.3_AC100 and BX12.6_AC100 must do a FULL un-interrupted discharge and re-charge cycle. This will be completed and undertaken at a scheduled day and time as set by the user. Should the temperature of the battery be below 20 degrees Celsius the battery will postpone the process for 3 months.

4.3 Active & Reactive power control

4.3.1 Q(U) control

Q(U) is a control mode that inverter will provide reactive power according to grid voltage.



Grid Setting

REACTIVE POWER CONTROL

Mode: **Reactive power via Grid**

Delay Time (S): **4**

Upper limit(%): **Cap 30**

Lower limit(%): **Ind 30**

V_max (V): **265**

V_min (V): **207**

Lower limit(V): **220**

Upper limit(V): **250**

Lock-In Power (%): **20**

Lock-out Power (%): **5**

Hysteresis (V): **0**

Delay Time (S): **0**

K factor (%): **Ind 0**

Reactive power via Grid

Delay Time (S): **4**

Mode:

- Constant cos phi
- Cos phi via Active Power
- Constant Reactive Power
- Reactive power via Grid Voltage Q(V)**
- CosPhi of U

Lock-out Power (%): **5**

Hysteresis (V): **0**

4.3.2 P(U) control

When grid voltage rises up to a lock-in voltage(V lock-in) and inverter's present output power is greater than lock-in power(P lock-in), inverter will reduce the output power and keep it at a certain value(P lock-out) until grid voltage drop back to lock-out voltage(V lock-out) and passing a certain time(T recovery).

Grid Setting

P(U)

Mode: **OFF**

Recovery Time (S): **0**

Lock-in Power(%): **100**

Lock-out Power(%): **20**

Lock-in Voltage (V): **250**

Lock-out Voltage (V): **265**

P(U) Set

FRT

[HVRT MODE]

Mode: **Disable**

V1 (V): **125**

V2 (V): **120**

T1 Time (S): **0.15**

5 System application

ATTENTION



- Short circuit at the critical load may cause damage to the inverter.

1. Critical Load Backup Power

This system can provide power to the critical load once there is a power failure. The maximum power consumption for the critical load is 3 kVA for BX6.3_AC100 and 4.5 kVA for BX12.6_AC100.

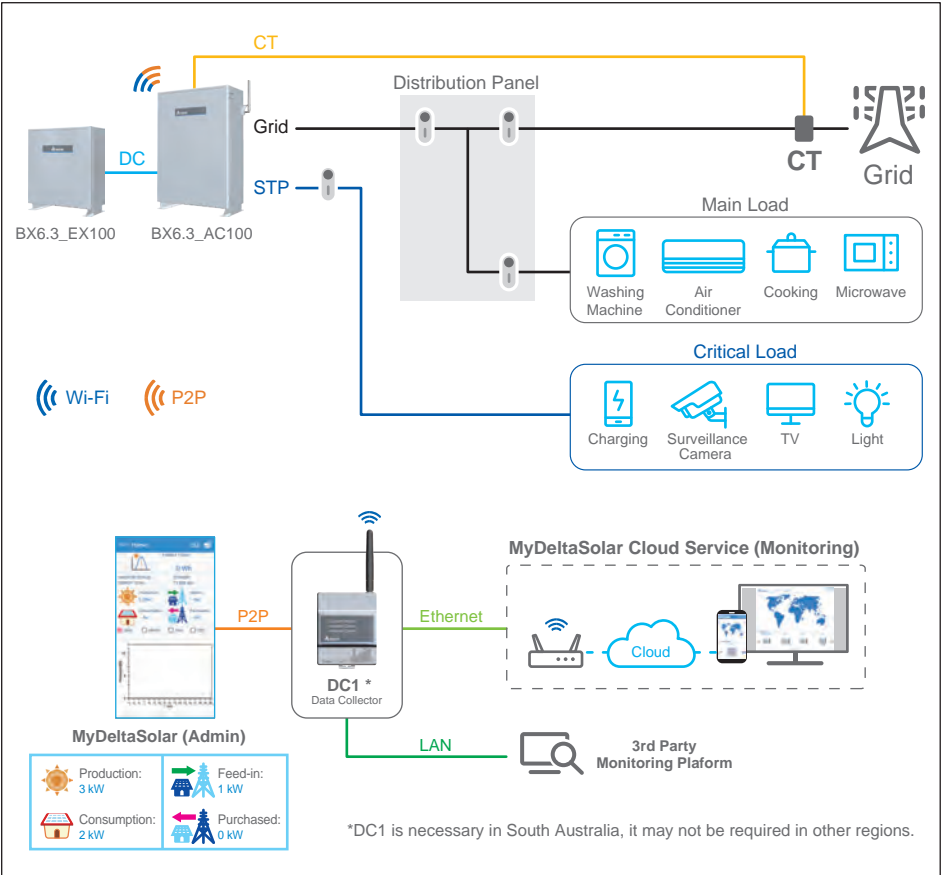


Figure 5-1 : Critical Load Backup Power

2. Hybrid Energy Storage System

This system is a combination of PV inverter and BX6.3_AC100, it can be considered as a hybrid energy storage system.

In this system, BX6.3_AC100 can store the excess PV energy during daytime and provide energy to the load when there is load demand.

This system can support multiple HxA PV inverters depends on the customer requirement. Other than Delta inverters, it is compatible with 3rd party PV inverter.

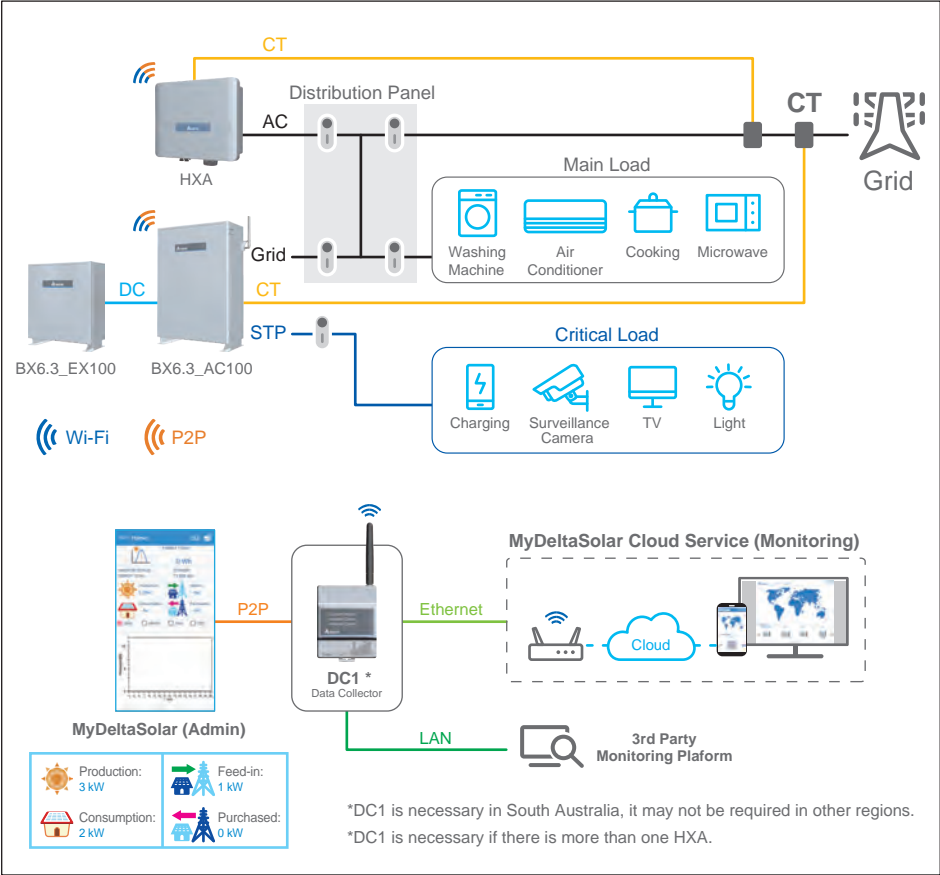


Figure 5-2 : Hybrid Energy Storage System

3. Off-Grid Support Hybrid Energy Storage System (Internal ATS Mode)

The key feature of this system is that it can support off-grid application and the PV inverter can continue generating power during power failure. In this application, the auto contactor is not necessary as it applies the internal contactor of BX6.3_AC100. Due to hardware limitation, this system can only provide max. power of 5 kVA to the main load. For the PV inverter connected at the STP port, not only support Delta PV inverters, 3rd party PV inverter is compatible. For Delta PV inverters, FW updates might be performed to get access to this function. Please refer to **Table5-1** for the requirements of inverter.

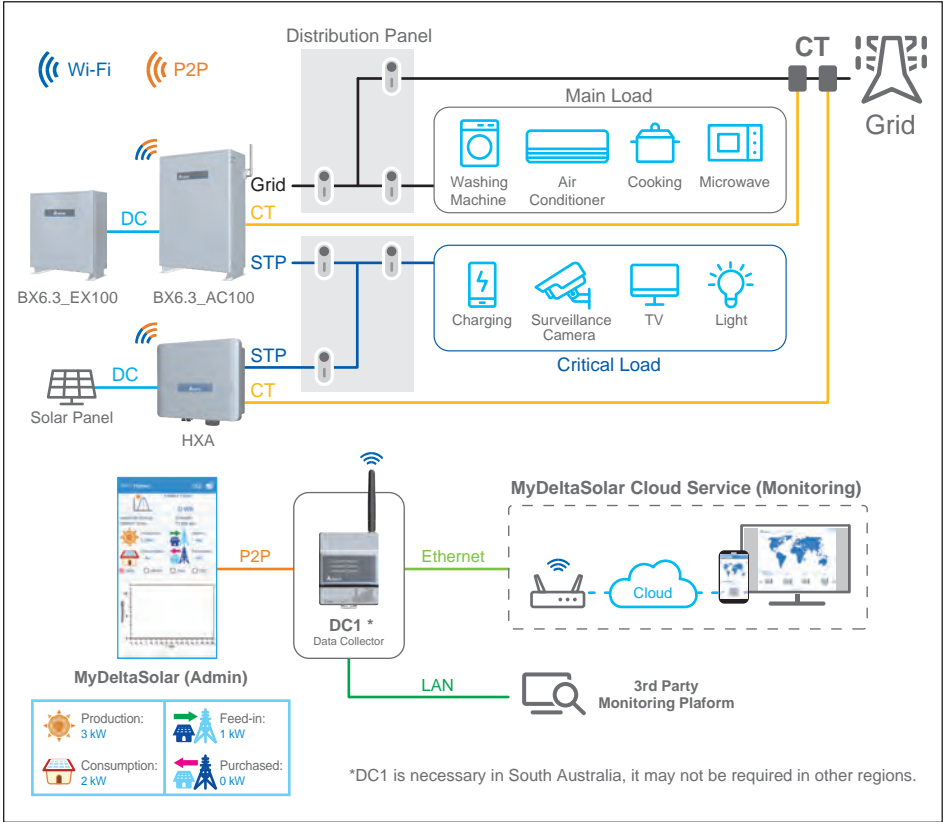


Figure 5-3 : Off-Grid Support Hybrid Energy Storage System (Internal ATS Mode)

Table 5-1 : Requirements for the PV inverter

Requirements for the PV inverter in application 3. and 4.			
1	Power rating should not exceed 5kVA.	2	Should compliant with regulation AS4777.2
3	P(f) function should be enabled all the time.	4	3rd party inverter with built-in external CT might need to be able to turn off its CT detection.

4. Off-Grid Support Hybrid Energy Storage System (External ATS Mode)

This system is similar to *application 3*, it can support off-grid application and the PV inverter can continue generating power during power failure. However, a time-delay external auto contactor is required in this system. The time-delay auto contactor will trip off immediately when power failure and closed after the grid is recovered for 3 seconds. The key benefit of this system is that it reduces the risk of causing damage to the inverter when short circuit occurred at the critical load during on-grid mode. This system can support Delta PV inverters and 3rd party PV inverters. Please refer to **Table5-1** for the requirements of inverter.

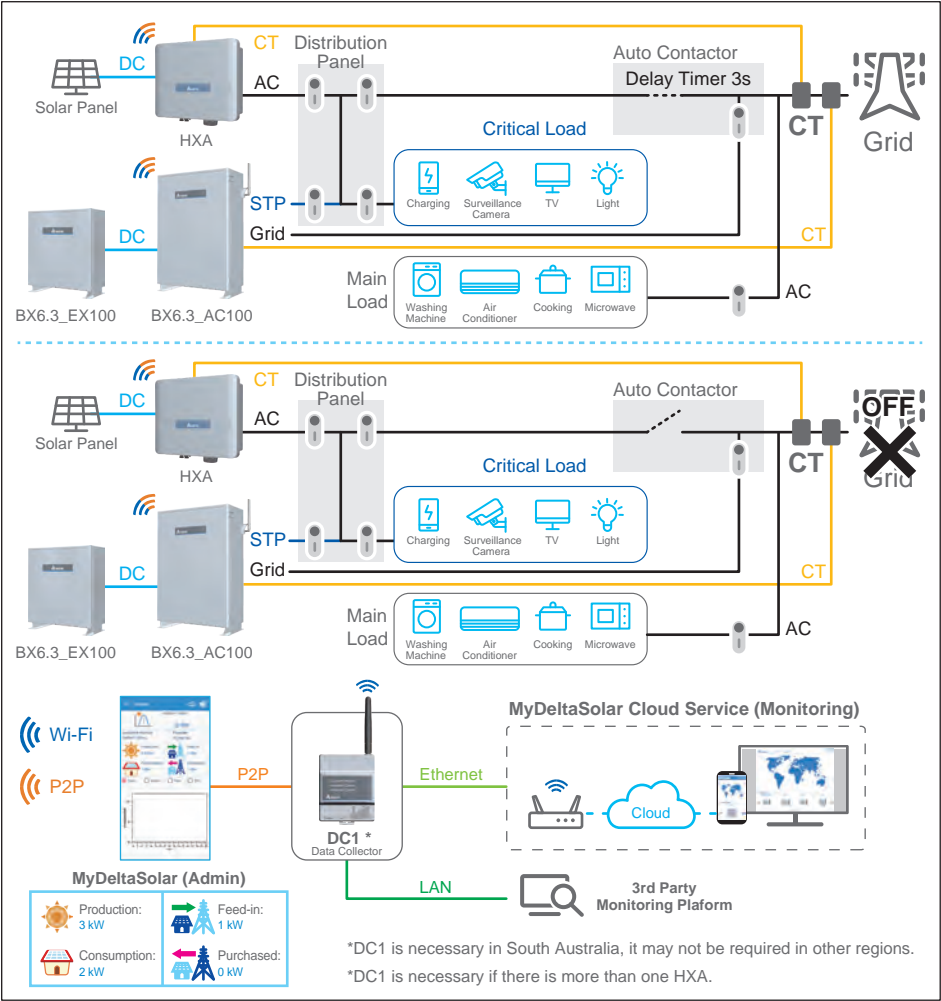


Figure 5-4 : Off-Grid Support Hybrid Energy Storage System (External ATS Mode)

5. Backup Power with Higher Standalone Power

This system can provide higher output power to the critical load once there is a power failure. To achieve a higher standalone power, the STP port of multiple BX6.3_AC100 should be connected together. The output power during power failure will depend on the number of BX6.3_AC100 connected. For example, the output power is 6 kVA for the system of 2*BX6.3_AC100 and 9 kVA for 2*BX12.6_AC100

Data Collector (DC1) and time-delay auto contactor is necessary in this system. The time-delay auto contactor will trip off immediately when power failure and closed after the grid is recovered for 3 seconds.

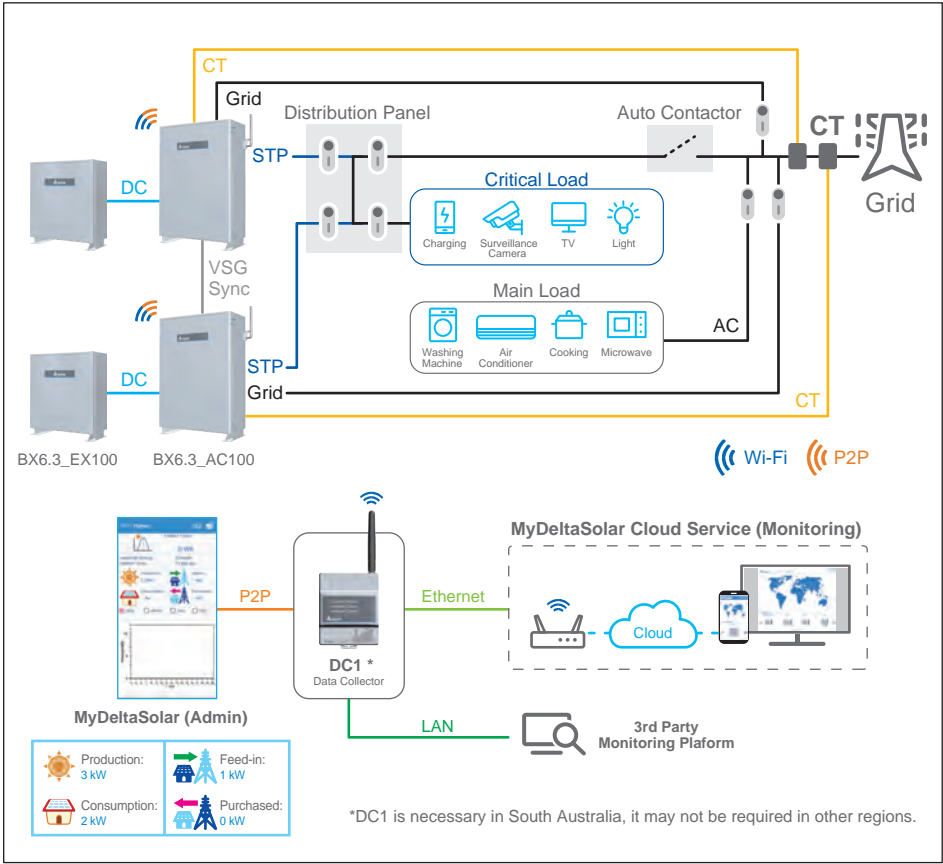


Figure 5-5 : Backup Power with Higher Standalone Power

6 Maintenance

DANGER : ELECTRICAL HAZARD!!



- Before any maintenance, please make sure you are well insulated to avoid risk of electric shock.

In order to ensure the normal operation of inverter, please check and clean the unit regularly. Once there are any impaired or loose parts, please contact your inverter installer.

7 Error message and Trouble Shooting

Table 7-1 : Error Message

ERROR			
Code	Message	Cause	Action
E01	AC Freq High	Grid frequency over the limit of electricity regulation.	Check the grid frequency. If grid frequency is not in acceptable range, contact the utility operator to modify it. If grid frequency lies in acceptable range but the error still exist, please contact your inverter supplier.
E02	AC Freq Low	Grid frequency under the limit of electricity regulation.	Check the grid frequency. If grid frequency is not in acceptable range, ask the utility operator to modify it. If grid frequency lies in acceptable range but the error still exist, please contact your inverter supplier.
E07	Grid Quality	Grid harmonic distortion >8.5% and >2.2s	Check AC wiring; keep the wire short and straight. Contact the utility operator to improve the grid quality. If the grid quality is good but the error still exist, please contact your inverter supplier.
E08	AC phase abnormal	Wrong connection at AC plug	Check the AC connection in accordance with the user manual.
E09	No Grid	Grid voltage <20V or voltage half-cycle > 50ms	Check the triggering of upstream circuit breaker. Check the wire connection between inverter side and grid side. Contact the utility operator for the information about power failure.
E10	AC Volt Low	Grid voltage under the limit of electricity regulation.	Check the grid voltage. If grid voltage is not in acceptable range, ask the utility operator to modify it. If grid voltage lies in acceptable range but the error still exist, please contact your inverter supplier.
E11	AC Volt High	Grid voltage over the limit of electricity regulation.	Check the grid voltage. If grid voltage is not in acceptable range, ask the utility operator to modify it. If grid voltage lies in acceptable range but the error still exist, please contact your inverter supplier.

ERROR			
Code	Message	Cause	Action
E12	AC Volt High	Grid voltage over the limit of electricity regulation.	Check the grid voltage. If grid voltage is not in acceptable range, ask the utility operator to modify it. If grid voltage lies in acceptable range but the error still exist, please contact your inverter supplier.
E13	AC Volt High	Grid voltage over the limit of electricity regulation.	Check the grid voltage. If grid voltage is not in acceptable range, ask the utility operator to modify it. If grid voltage lies in acceptable range but the error still exist, please contact your inverter supplier.
E34	Insulation (Insulation Fault)	BT to ground Impedance in either input < 550 kohm	Check the insulation of DC wiring. For Delta cloud registered user, system will send alarm message to your e-mail when this Error code occurred.

Table 7-2 : Fault Message

Fault			
Code	Message	Cause	Action
F01	DC Injection	DC component in grid current over the limit	Check the power supply line for direct current. Contact the utility operator to improve the grid quality.
F05	Temp High (Temperature High)	Internal temperature too high to cause power output < 5%	Check the temperature of installation environment. Contact your inverter supplier.
F06	HW NTC1 Fail (Amb Temp Fault)	Internal fault	Contact your inverter supplier.
F07	Temp Low (Temperature Low)	Internal temperature < -25°C	Check the temperature of installation environment. Contact your inverter supplier.
F08	HW NTC2 Fail (Boost Temp Fault)	Internal fault	Contact your inverter supplier.
F09	HW NTC3 Fail (Bidir. Temp Fault)	Internal fault	Contact your inverter supplier.
F10	HW NTC4 Fail (Inverter Temp Fault)	Internal fault	Contact your inverter supplier.
F13	HW RLY (AC RLY Fault)	Internal device fault	Contact your inverter supplier.
F15	HW DSP ADC1 (AC Sensor Fault)	Internal fault	Contact your inverter supplier.
F16	HW DSP ADC2 (Vdc Sensor Fault)	Internal fault	Contact your inverter supplier.
F17	HW DSP ADC3 (Idc Sensor Fault)	Internal fault	Contact your inverter supplier.
F18	HW Red ADC1 (AC Sensor Fault)	Internal fault	Contact your inverter supplier.
F19	HW Red ADC2 (Idc Sensor Fault)	Internal fault	Contact your inverter supplier.

Fault			
Code	Message	Cause	Action
F22	HW COMM2 (Red COMM Fault)	Internal fault	Contact your inverter supplier.
F23	HW COMM1 (DSP COMM Fault)	Internal fault	Contact your inverter supplier.
F24	Ground Cur. (Ground Cur. High)	Residual current over the limit DC > 150mA	Check the insulation of DC wiring.
F27	RCMU Fail (RCMU Fault)	Internal device fault	Contact your inverter supplier.
F28	RLY Short (AC RLY Short)	Internal device fault	Contact your inverter supplier.
F29	RLY Open (AC RLY Open)	Internal device fault	Contact your inverter supplier.
F30	Bus Unbal. (Bus Unbalance)	Internal fault	Contact your inverter supplier.
F31	HW Bus OVR (Bus Voltage High)	Internal fault	Contact your inverter supplier.
F33	HW Bus OVR (Bus Voltage High)	Internal fault	Contact your inverter supplier.
F35	HW Bus OVR (Bus Voltage High)	Internal fault	Contact your inverter supplier.
F36	AC Cur. High (AC Current High)	Grid current >135% rated and keep over 50ms	Contact your inverter supplier.
F37	AC Cur. High (AC Current High)	Grid current >125% rated and keep over 5s	Contact your inverter supplier.
F42	HW CT (AC CT Fault)	Internal device fault	Contact your inverter supplier.
F45	HW AC OCR (AC Current High)	AC current over the limit 20 times within 2s	Check AC and DC wiring for ground faults. Inverter may be struck by the lightning. Check the whole wiring of hybrid system. If this fault occurs often, please contact your inverter supplier.
F48	SA OPP (SA Over Load)	System overload	In standalone mode, PV and BT power is insufficient to supply the home load. Please reduce the load.

Fault			
Code	Message	Cause	Action
F50	HW ZC Fail (ZC Circuit Fault)	Internal fault	Contact your inverter supplier.
F97	BT OVP	Battery system internal fault	Contact your inverter supplier.
F98	BT UVP	Battery system internal fault	Contact your inverter supplier.
F99	BT OTP	Battery system internal fault	Contact your inverter supplier.
F100	BT UTP	Battery system internal fault	Contact your inverter supplier.
F101	BT OCP	Battery system internal fault	Contact your inverter supplier.
F102	BT CVI	Battery system internal fault	Contact your inverter supplier.
F103	BT TF	Battery system internal fault	Contact your inverter supplier.
F104	BT PF	Battery system internal fault	Contact your inverter supplier.
F112	HW COMM BT	Loss communication between inverter and battery over 10 seconds.	Check CAN connection between inverter and battery.
F113	BT EOL	Battery system SOH < 50%	Contact your inverter supplier.

8 De-Commissioning

WARNING !



- To avoid injuries, please follow the procedures to unload the inverter.

If it is necessary to put the device out of operation for maintenance or storage, please follow the procedures below:

At inverter side:

1. Push Power button until BX6.3_AC100 shutdown, all LED indicators will show "OFF" status.
2. Switch off AC power line breaker to disconnect from grid.
3. Wait for all LED indicator turning off.
4. Remove the AC and battery wiring.
5. Remove the communication module RS-485 connection from the computer connection.

Now you may unload the inverter.

9 Technical Data

Table 9-1 : Specifications for BX6.3_AC100










Model	BX6.3_AC100	BX12.6_AC100
GENERAL		
Enclosure	Aluminum with powder coating	
Operating temperature	-10°C* ~ 45°C	
Operating Altitude	0 to 2000m (0 to 6666 ft.)	
Relative humidity	0% – 95% non-condensing.	
Environmental category	Indoor / Outdoor	
Protection degree	IP65 (Electronics)	
Pollution degree	PD 2	
Overvoltage category	AC output :III	
Galvanic isolation	NO	
Safety class	Class I metal enclosure with protective earth	
Weight	77kg	77 kg (BX6.3_AC100) + 60 kg (BX6.3_EX100)
Dimensions(W*H*D)	570 × 840 × 250 mm	570 × 840 × 250 mm + 520 × 600 × 230 mm
Connectors	Weather resistant connectors	
Audible noise	< 40dB	
BT INPUT		
Type	Li-ion	
Battery Module	Samsung SDI 41J (21700)	
Typical Energy	6.3 kWh	12.6 kWh
Typical Voltage	DC 202.7 V	DC 405.4 V
Voltage Range	DC 175 - 228 V	DC 350 - 456 V

* 0 degree for the first time installation.

Model	BX6.3_AC100	BX12.6_AC100
AC INPUT / OUTPUT		
Nominal power	3000VA	4500VA
Maximum power	3000VA	4500VA
Voltage	According to country setting (Programmable 230Vac \pm 20%)	
On Grid Nominal current	13A	19.6A
Stand-Alone Nominal current	13A	19.6A
Inrush current	16A / 100us	
Maximum output fault current (rms)	25A	25A
Maximum overcurrent protection	25A	25A
Frequency	Rated 50/60 Hz (Programmable 45-65 Hz)	
Active anti-islanding method	Reactive power injection	
Total harmonic distortion	< 3 %	
Power factor	> 0.99 @ full power	
Output current DC component	< 0.5% rated current	
Tare loss	< 10 W	
Maximum efficiency	96.5%	
EU efficiency	96%	

Model		BX6.3_AC100	BX12.6_AC100
SYSTEM INFORMATION / COMMUNICATION			
User interface		Wi-Fi connection	
		365 days data logger and real time clock	
		30 events record	
External communication		2 RS-485 connections	
REGULATIONS & DIRECTIVES			
CE conformity		Yes	
Grid interface		AS/NZS 4777.2 :2015	
Emission		EN 61000-6-3	
Harmonics		EN 61000-3-2	
Variations and flicker		EN 61000-3-3	
Immunity		EN 61000-6-2	
Immunity	ESD	IEC 61000-4-2	
	RS	IEC 61000-4-3	
	EFT	IEC 61000-4-4	
	Surge	IEC 61000-4-5	
	CS	IEC 61000-4-6	
	PFMF	IEC 61000-4-8	
Electrical safety		IEC 62619:2017, IEC 62040-1:2017	

Model Listing

Model	Inverter	Battery	Wi-Fi
BX6.3_AC100	 (BX6.3_AC100)		 (BX6.3_AC100)
BX12.6_AC100 (BX6.3_AC100 associated with BX6.3_EX100)	 (BX6.3_AC100)	 (BX6.3_EX100)	 (BX6.3_AC100)
BX6.3_AC101	 (BX6.3_AC101)		
BX12.6_AC101 (BX6.3_AC101 associated with BX6.3_EX100)	 (BX6.3_AC101)	 (BX6.3_EX100)	
BX6.3_EX100*		 (BX6.3_EX100)	

* BX6.3_EX100 can only be used with the BX6.3_AC100 / BX6.3_AC101.

