



The power behind competitiveness

Grid-tie Transformerless Solar Inverter

H9E

Operation and Installation Manual

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1 General Information

1.1 Scope of delivery

Congratulations on the purchase of your Delta H9E grid-tied solar inverter. This manual will assist you in becoming familiar with this product. Please observe all safety regulations and take into account the connection requirements by your local grid utility.

1.2 General Warnings / Notes on Safety

Careful handling of the product will contribute to its service life durability and reliability. Both are essential to ensure maximum yield from your product. As some of the solar inverter models are heavy, two people may be required for lifting purposes.

CAUTION !



During operation of electrical devices, certain parts are under dangerous voltage. Inappropriate handling can lead to physical injury and material damage. Always adhere to the installation regulations. Installation may only be conducted by certified electricians.

WARNING !



Repair work on the device should **ONLY** be carried out by the manufacturer. The inverter contains no user serviceable parts inside. Please observe all points in the operation and installation manual. Isolate the device from the grid and the PV modules before undertaking work on the device.

DANGER!



To avoid risk of electrical shock, do not open the solar inverter. The inverter contains no user-serviceable parts. Opening the inverter will void the warranty. Dangerous voltage is present for 1 minute after disconnecting all sources of power, recommend 5 minutes for discharging. Remember that the unit has a high leakage current. The PE conductor **MUST** be connected prior to commencing operation.

WARNING !



The internal temperature may exceed over 70°C while operating. To avoid injury, do not touch the surface of the inverter whilst the unit is in operation.

ATTENTION



For operation and installation of inverter refer to the user manual. Failure to comply with the instructions in this manual may void the warranty.

1.3 Validity

This user manual describes the installation process, maintenance, technical data and safety instructions of the following solar inverter models under the DELTA brand.

- H9E

1.4 Product Description

This device is a single-phase grid-tie solar inverter. It converts direct current (DC) electricity from the PV array into single phase alternating current (AC) to supply power to the load and feed the excess generated power back to the local grid. This inverter allows for a wide voltage input range and has a high performance efficiency and user friendly operation. In addition, the special DSP

(Digital Signal Processor) design reduces the complexity of the circuit and electronic components. Please note that this device does not support off-grid function. The features for H9E are shown below.

Features

- Max Output Power Rating: 9kVA (H9E)
- Single-phase (L + N + PE), Grid-tie, transformerless solar inverter
- Maximum efficiency : >98.0%
- Europe efficiency : 97.3%
- Reactive power capability (Cap 0.85 – Ind 0.85)
- Total harmonic distortion (THD < 3%) @ full load

1.5 How it Works

The operation of a solar inverter is shown in **Figure 1-1**.

In order to save energy and electricity, the solar inverter converts the DC input power supplied from the PV Array into single-phase AC output power to Grid.

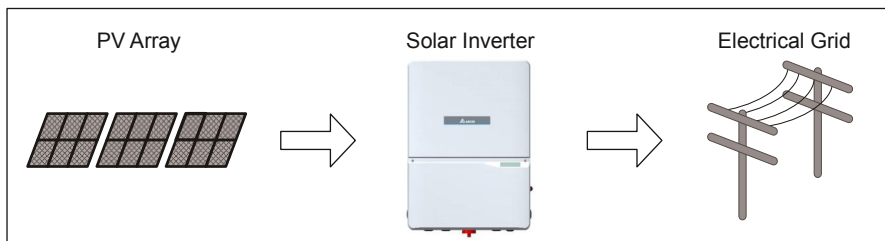


Figure 1-1: Solar system operation illustration

1.6 Additional Information

For more detailed information for H9E or other related product information, please visit : www.deltaww.com

2 Package Inspection

2.1 Unpacking

Unpacking process is shown as **Figure 2-1**.

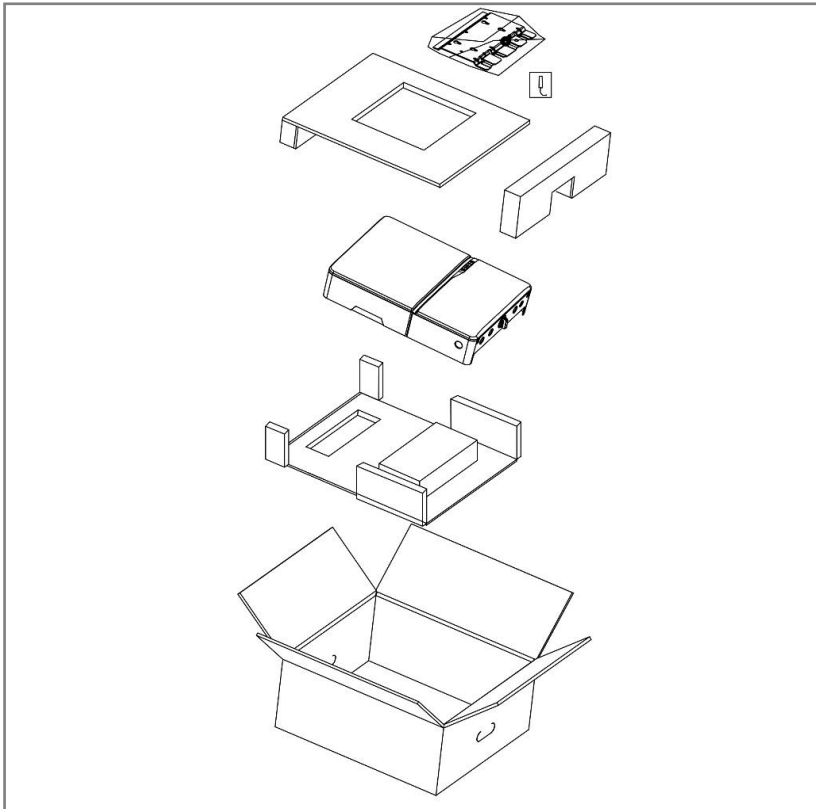


Figure 2-1 : Unpacking process

Upon receiving your brand new inverter, you will be required to remove its protective packaging. This packaging consists of various materials that will need to be disposed of according to the specific recycling marking printed on them.

2.2 Package Inspection

Unforeseeable events causing damage or movement may occur during shipment. Please check for damage on the packaging upon receiving your inverter. Please check the model number and the serial number on the packaging is identical with the model number and serial number on the unit itself.

Check if all the accessories are in the package, the standard accessories are listed as **Table 2-2**.

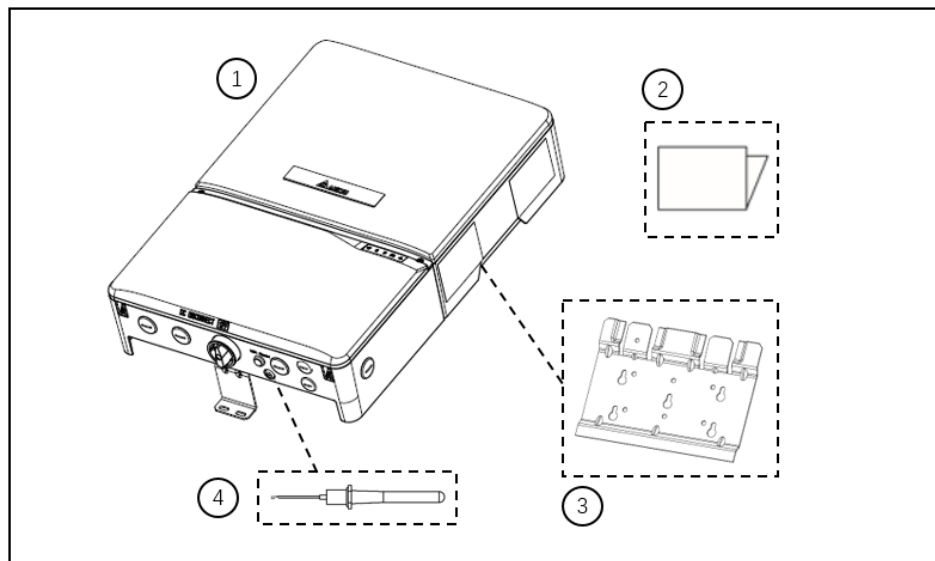


Figure 2-2: Components of H9E

H9E			
	Object	Qty	Description
①	PV Inverter	1	Solar inverter
②	Quick installation guide	1	Important safety instructions and technical specifications should be followed during installation.
③	Wall-Mount Bracket	1	To mount the solar inverter securely on the wall.
④	Antenna	1	For communication

Table 2-1: Packing list of H9E

Power meter is necessary function for H9E to meet the requirements of AS4777. The length of current sensor cable is available at 10m or 30m. The Meter needs to be purchased separately.

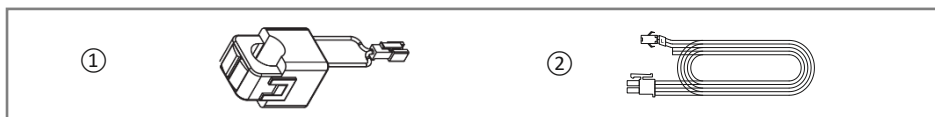


Figure 2-3: Components of Power meter

Power meter			
	Object	Qty	Description

①	Current Sensor	1	Current Sensor for power meter function
②	Current Sensor Cable	1	Cable for current sensor, length of 10m or 30m

Table 2-2: Packing list of Power meter

CAUTION !



If there is any visible damage to the inverter/accessories or any damage to the packaging, please contact your inverter supplier before installation.

2.3 Identification Label

Users can identify the model name by the information on the product label. The model name, serial number and other specifications can be located on the product label. For label location, please refer to **Figure 2-4**.

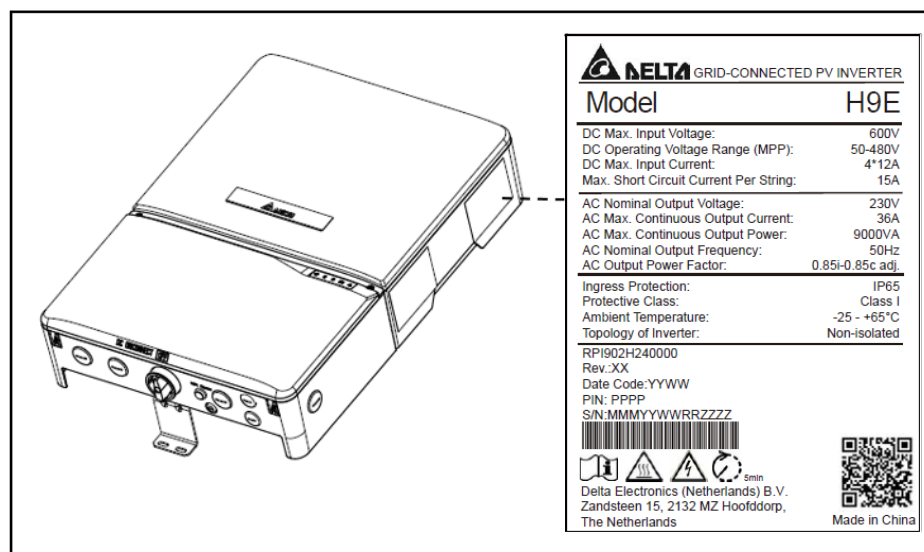


Figure 2-4: The identification label (H9E)

3 Product Overview

3.1 Dimensions

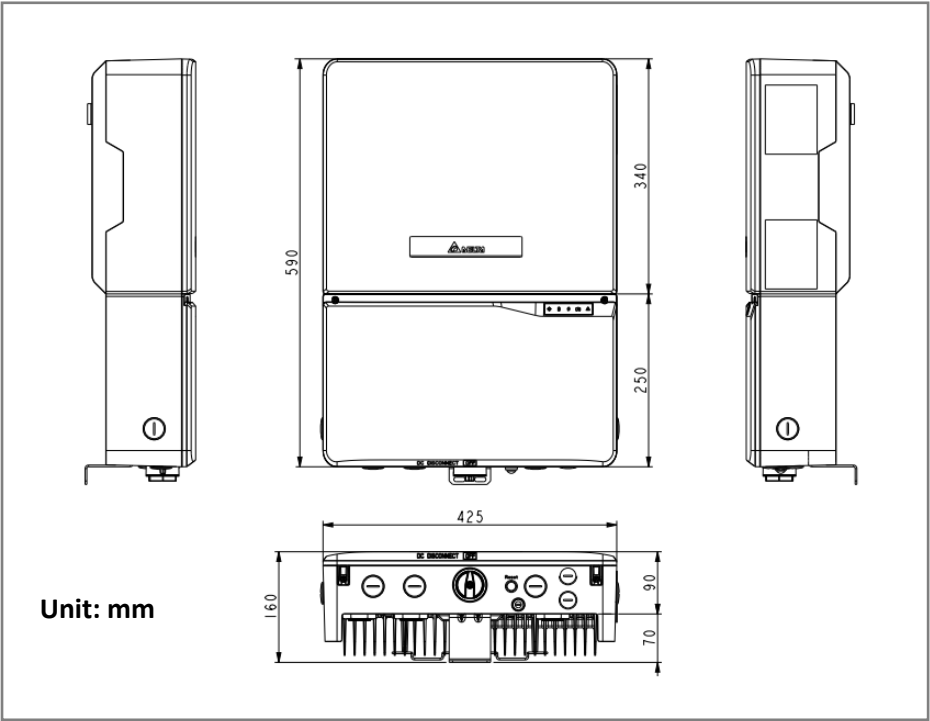


Figure 3-1: Dimensions of H9E

3.2 Function Introduction

The Inverter's exterior is shown in *Figure 3-2*.

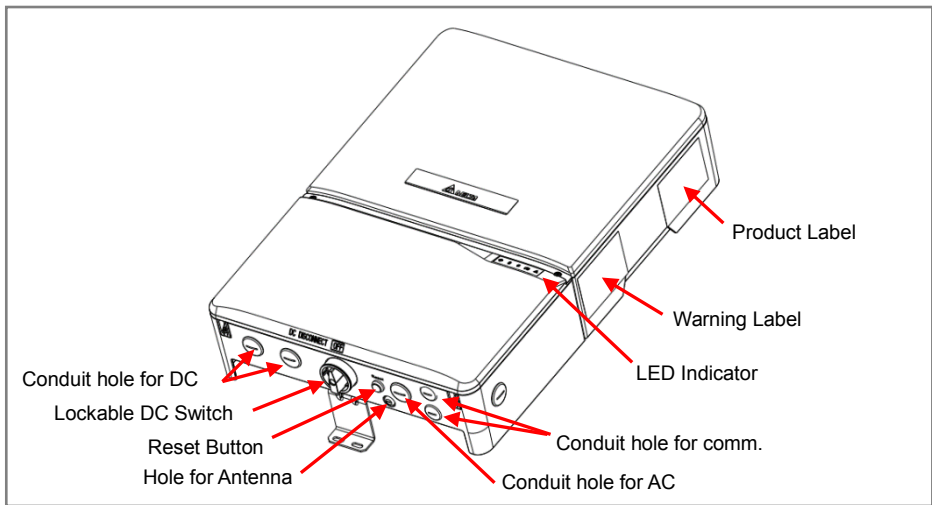


Figure 3-2 : Inverter exterior objects

3.3 LED Indicator

3.3.1 Introduction

There are five LEDs in the front side of the inverter, from left to right, it is used for indicating status of operation, battery, communication, information and fault.

Note: Battery LED is a reserved design for energy storage inverter. The status of this LED is meaningless for H9E.



3.3.2 LED Status






Label	Designation	Color
	Operation(OPER)	Red / Green
	Battery(BAT)	Red / Green
	Wireless Communication(COMM)	Red / Green
	Information(INFO)	Red / Green
	Fault(FAULT)	Red / Green

Table 3-1: LED indicator

3.3.3 LED Message

The LEDs indicate the operational status of the inverter.

Message Category	LED Signals				Message Explanation	Example
	LED	Color	Status	Behavior		
OPER Led						
Normal operation	OPER	Green	<ON>	Constant on	The inverter feeds in grid.	
Sync.	OPER	Green	<BAR>	Four LEDs form a progress bar.	The inverter is synchronizing with grid.	LED signals: OPER LED is ON, BAT LED is ON. COMM LED Blinks Message: Synchronization progress is 50%-75%.
	BAT	Green	<BAR>			
	COMM	Green	<BAR>			
	INFO	Green	<BAR>			
Night mode	OPER	Green	<BLINK>	1s on, 4s off	Grid is connected, but the inverter is unable to feed in grid because PV voltage is too low.	
BAT Led : <i>Meaningless for H9E</i>						
COMM Led						
BLE fail	COMM	Red	<ON>	Constant on	BLE is in fault mode	
APP Connected	COMM	Green	<ON>	Constant on	APP is connected	
BLE is running	COMM	Green	<BLINK>	1s on, 1s off	BLE is running	Only BLINK for 2 cycles in one minute
INFO Led						
Firmware upgrading	INFO	Yellow	<BLINK>	1s on, 1s off	Firmware upgrading is ongoing	
Receiving image	INFO	Green	<BLINK>	1s on, 1s off	Inverter is receiving image file	
Equipment alarm	INFO	Yellow	<ON>	Constant on	External event occurs and inverter is unable to run	
FAULT Led						
Ground fault	FAULT	Red	<BLINK>	1s on, 1s off	Ground fault occurs	
Other						
Initialization	OPER	Green	<ON>	On until done	Inverter initialization when grid is changing from disconnected into connected.	
	BAT	Green	<ON>	On until done		
	COMM	Green	<ON>	On until done		
	INFO	Green	<ON>	On until done		

Table 3-2: LED Message

3.4 Reset Button

There is button located inside the junction box, for this button, there are following functions.

Operation	Functions
Push 3s~10s	Reset Wi-Fi module
Push 10s~20s	Clear AFCI Fault
Push 20s~	Reset Wi-Fi module, and Wi-Fi password returns to the default: DELTASOL

Table 3-3: Reset button function

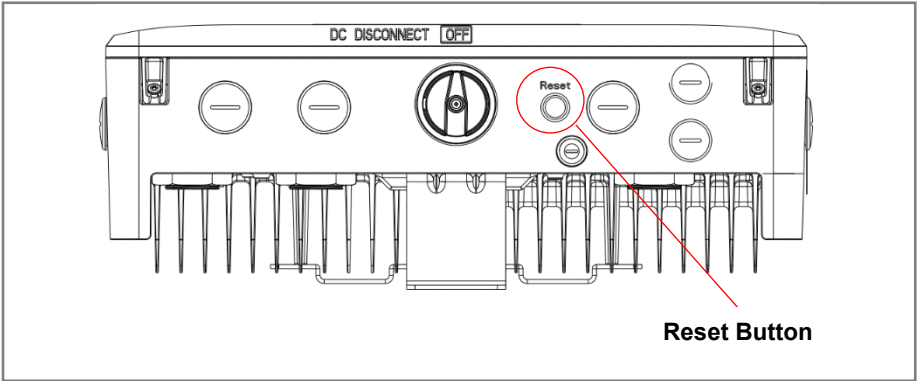


Figure 3-3 : Reset button

4 Installation

4.1 Instruction

Due to the variety of users and installation environments, you must read this manual thoroughly before installation. Installation of the unit and start-up procedures must be carried out by an accredited technician.

4.2 Installation Location

The inverter can be installed in indoors / outdoors.

WARNING !



Do not install the unit near or on flammable surfaces. Mount the unit tightly on a solid/smooth surface.

CAUTION !



The unit should not be installed in direct sunlight.

4.3 Mounting

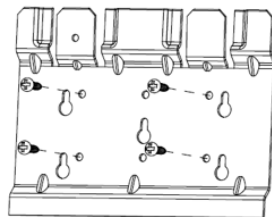
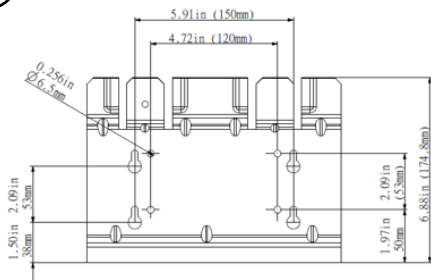
This unit is designed to be wall-mounted. Please ensure the installation is perpendicular to the floor and the AC plug located at the base of the unit. Do not install the device on a slanting wall. The dimensions of the mounting bracket are shown in the figure below.

To mount the inverter on the wall, please follow the procedure below:

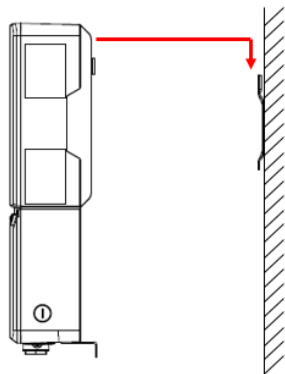
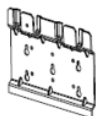
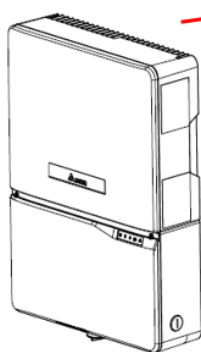
- 1) Screw the mounting bracket on the wall with 4 * $\Phi 6$ mm Phillips head screws.
- 2) Attach the inverter to the mounting bracket.
- 3) Use Hex Wrench fixing the inverter with 2 * $\Phi 6.0$ mm Hexagon Socket screw.

Please refer to **Figure 4-1** and **Figure 4-2**.

1



2



3

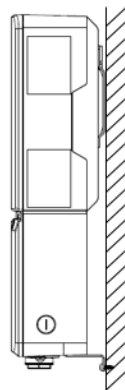
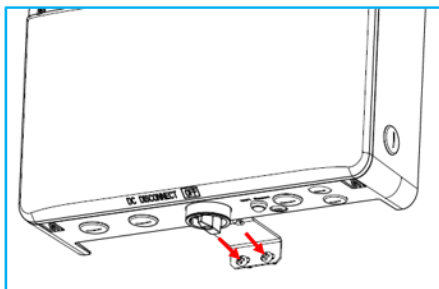


Figure 4-1 : Attaching the mounting bracket for H9E

Inverter must be installed vertically with a maximum incline of $\pm 5^\circ$ on a flat surface

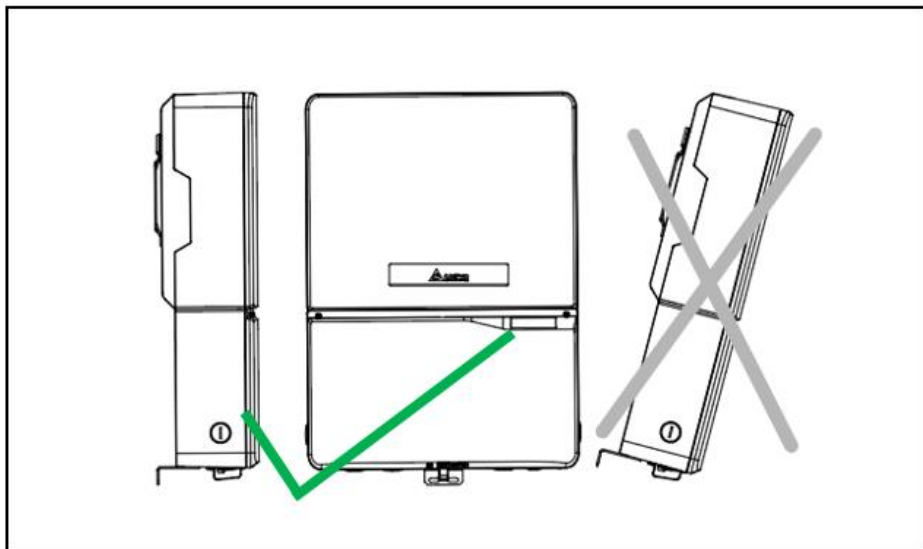


Figure 4-2 : Correct and incorrect installation illustration

CAUTION !



- The bracket supplied with the unit is specially designed and should be the only mounting device used for the unit.
- It is recommended to install the inverter in a suitable location which offers easy and safe access for service and maintenance.
- Please leave an appropriate gap in between units when installing multiple solar inverter systems.
- Please install solar inverter at eye level to allow easy observation for operation and parameter setting.
- Ambient temperature for operation: $-25^\circ\text{C} \sim +65^\circ\text{C}$ (power derating above 45°C).

Please ensure the spacing requirement to allow for sufficient convective cooling.

It is essential to ensure sufficient space for product operation as shown in **Figure 4-3**.

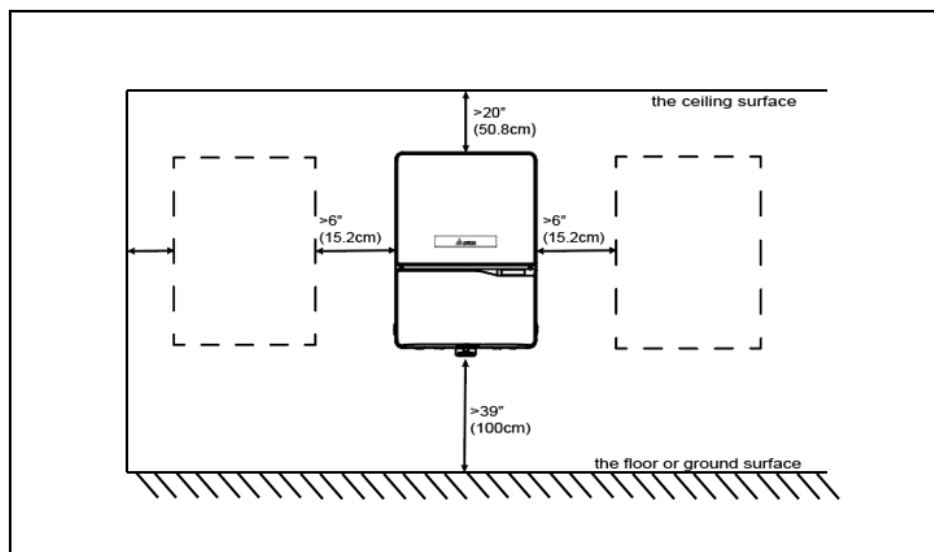


Figure 4-3 : Adequate installation gap

5 Wiring

5.1 Preparation before Wiring

- 1) Ensure voltage values and polarities are correct.
- 2) When grounding the solar array positive or negative terminal, an isolation transformer is required due to the H9E not having galvanic isolation between the DC-input and AC-output.
- 3) The ground fault detection is a fixed internal setting. It cannot be modified.
- 4) Please refer to **Figure 5-1** for connections. Inverter can accept DC inputs in parallel.
- 5) According to IEC 62109-2, the PV modules need to have an IEC 61730 Class A rating.

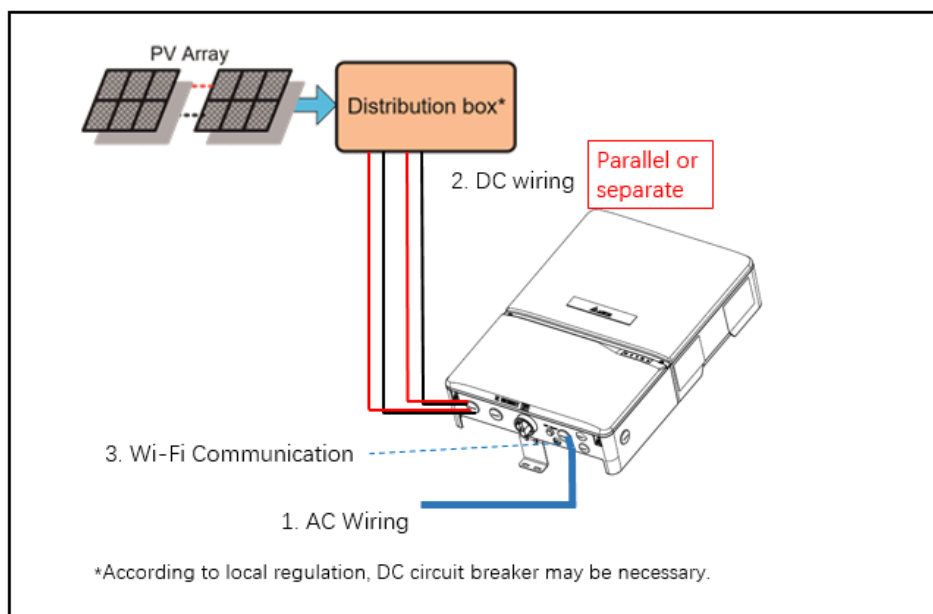


Figure 5-1: Connection of a system for floating solar array

WARNING! SHOCK HAZARD



When the photovoltaic array is exposed to light, it supplies a DC voltage to the Inverter, a shock hazard may exist due to output wires or exposed terminals.

To reduce the risk of shock during installation, cover the array with an opaque (dark) material and ensure that the Disconnect Device in the inverter is set to OFF before commencing any wiring.

5.2 Opening the wiring box cover

- 1) Place DC Disconnect switch in "OFF" position. Please note the cover cannot be removed when the DC Disconnect switch is in the "ON" position.
- 2) Remove the 4 cover screws indicated above with a T20 Torx screw driver
- 3) Lift the cover upward and place off to the side.

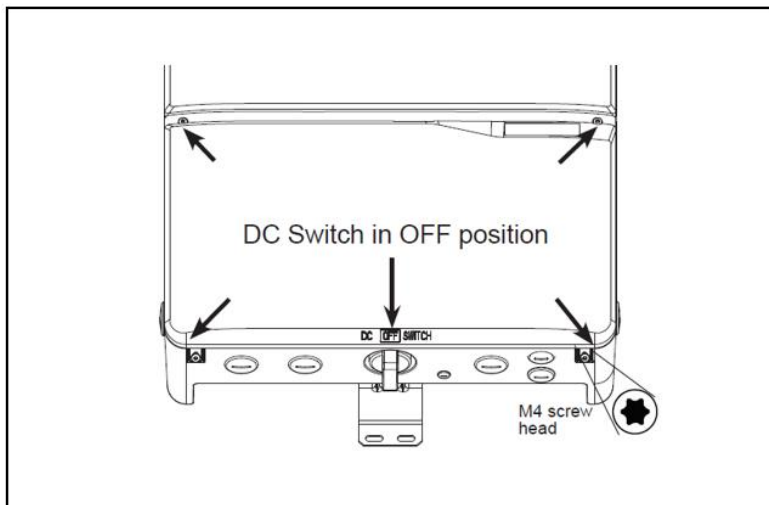


Figure 5-2: Removing the wiring box cover

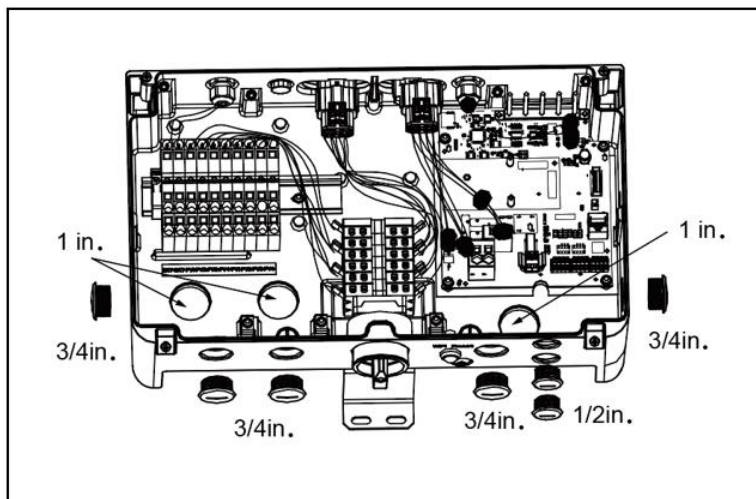


Figure 5-3: Locations of wiring box conduit plugs

Conduit plugs are provided for 1in, 3/4 inch and 1/2 inch conduit fittings. If conduit fitting not fit 1in, 3/4in or 1/2in, an appropriate conduit reducer or adapter should be used.

Caution: Do not enlarge the wiring compartment conduit openings as the wiring box enclosure will be damaged which will void the inverter warranty.

5.3 AC Grid Connection : L + N + PE

WARNING !



Before commencing AC wiring, please ensure all AC circuit breakers are switched off.

5.3.1 AC circuit breaker requirements

	Power rating	Upstream AC circuit breaker
H9E	9 kVA	45 A

Table 5-1: Recommended upstream protection

5.3.2 AC Connection

The AC compatible wiring gauge is 8(8mm²)-10(6mm²)AWG, should have an ampacity based on AS/NZS 4777.1, and it is recommended to use 90°C(194°F) copper wires. Please check local requirements if there are any additional requirements.

When calculating the cross section of the cable, consider:

- material used
- thermal conditions
- cable length
- type of installation
- AC voltage drop
- power losses in cable

Always follow the system installation requirements defined for your country!

Connection AC cables according to following:

- 1) Route AC wire through the conduit and strip the wire end to 0.7 inches.
- 2) Use 3/16 inch flat blade screw driver to push the spring of each terminal.
- 3) Connect the wires (L, N) to the connectors according to the marks. Connect the wire (GND) to the grounding terminal (Please see detail in “Grounding” section).

Note: Verify the connection is correct.

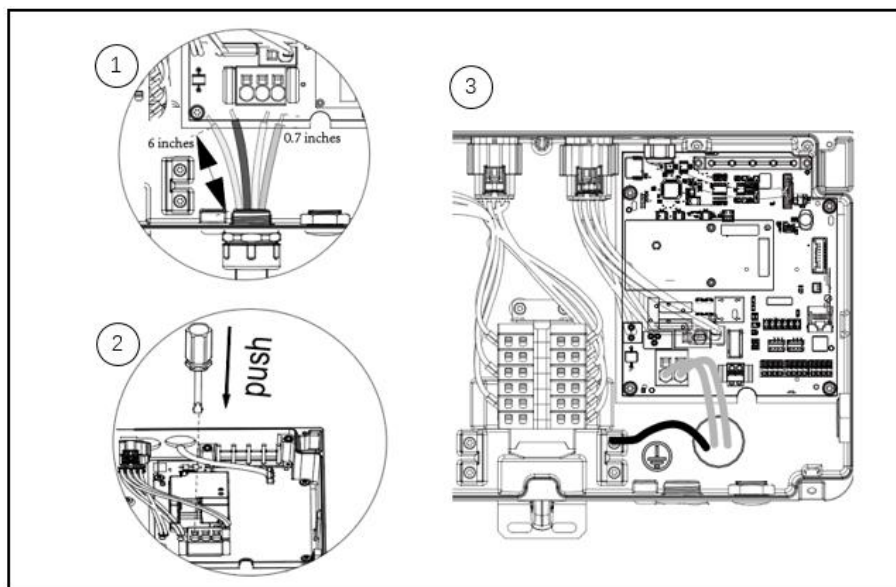


Figure 5-4: AC cable connection

5.4 DC Connection (from PV Array)

WARNING !



- When undertaking DC wiring, please ensure the correct polarities are connected.
- When undertaking DC wiring, please ensure that the DC isolator switch on the PV array is OFF.

CAUTION !



The maximum open circuit voltage of the PV Array must not exceed 600Vdc.

NOTE



The isolator installed between the PV Array and inverter must meet the rating of voltage higher than this device's maximum input voltage.

5.4.1 DC connector of H9E

The inverters operate using 4 separate MPP trackers that can handle both symmetrical and asymmetrical loads to allow for optimum adjustment. This allows for the requirements of complex PV system designs to be fulfilled.

5.4.2 DC cable connection

The DC compatible wiring gauge is 10(6mm²)-12(4mm²)AWG, should have an ampacity based on AS/NZS 4777.1, it is recommended to use 90°C(194°F)

Connection DC cables according to following:

- 1) Route the PV wires through the conduit, and strip the wire end to 0.5 inches.
- 2) Use 3/16 inch flat blade screw driver to push the spring of each terminal.
- 3) Connect the positive wires to PV+ terminals and connect the negative wires to PV- terminals .

Note: Verify the connection before power up the inverter.

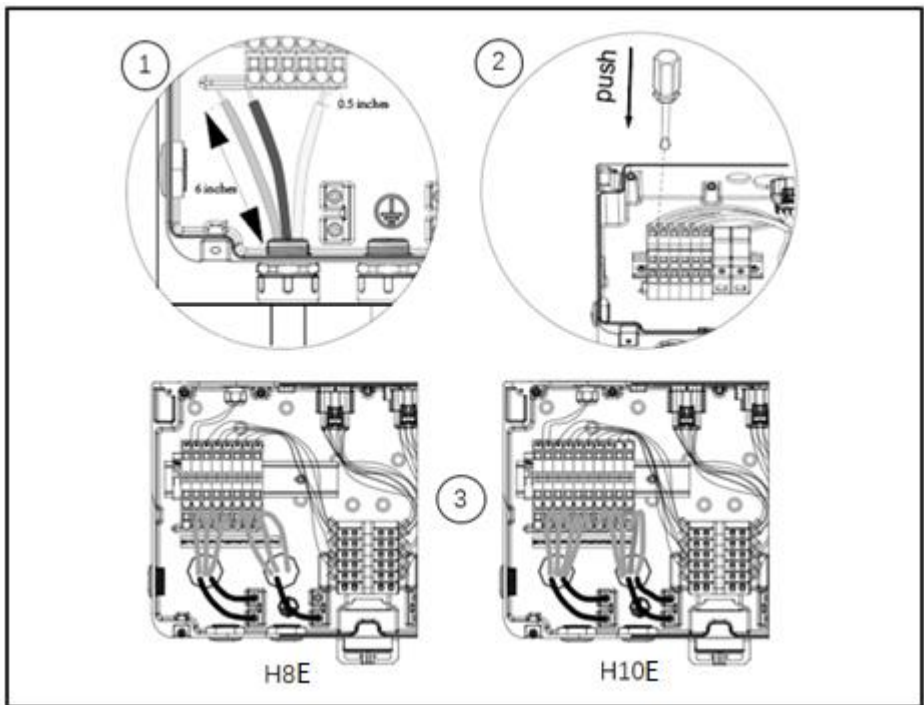


Figure 5-5: DC cable connection

5.5 Grounding

Six Grounding Electrode Conductors are installed inside the wiring box, They are torx head screw type connectors. The terminals accept solid or stranded copper 10(6mm²)-4(22mm²) AWG wire, recommend screw torque is 18 in-lbs (2Nm).

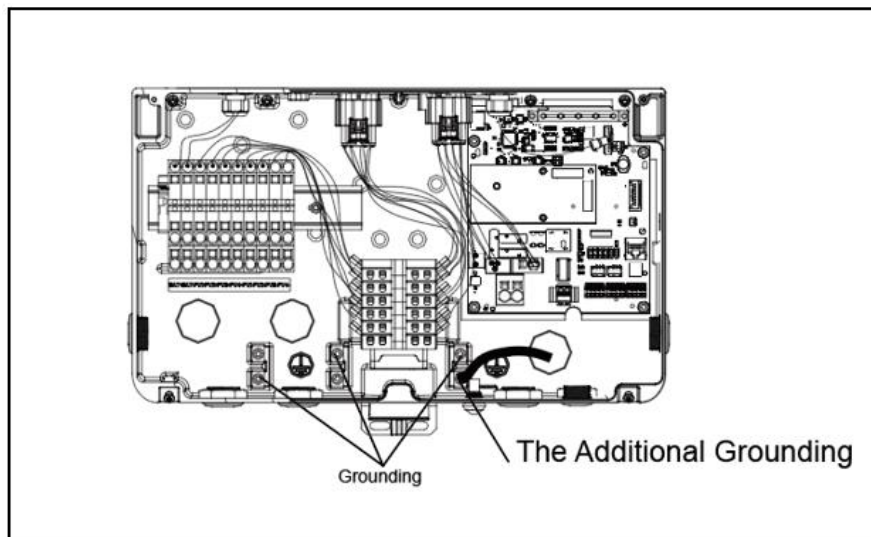


Figure 5-6: Ground cable connection

WARNING !



As the leakage current is too large, an additional grounding point is provided in the wiring box as below. The additional grounding point must be reliable grounding. The minimum size of the additional grounding wire is 10(6mm²)AWG.

5.6 Power meter

Connecting the current sensor in the following steps:

- (1) Attach a current sensor to the L cables of the main earth leakage circuit breaker, Clamp the current sensor and make sure that the direction is correct.
- (2) Connect one end of the current sensor cable to the current sensor connection terminal and the other end to the Meter terminal in the junction box of inverter.

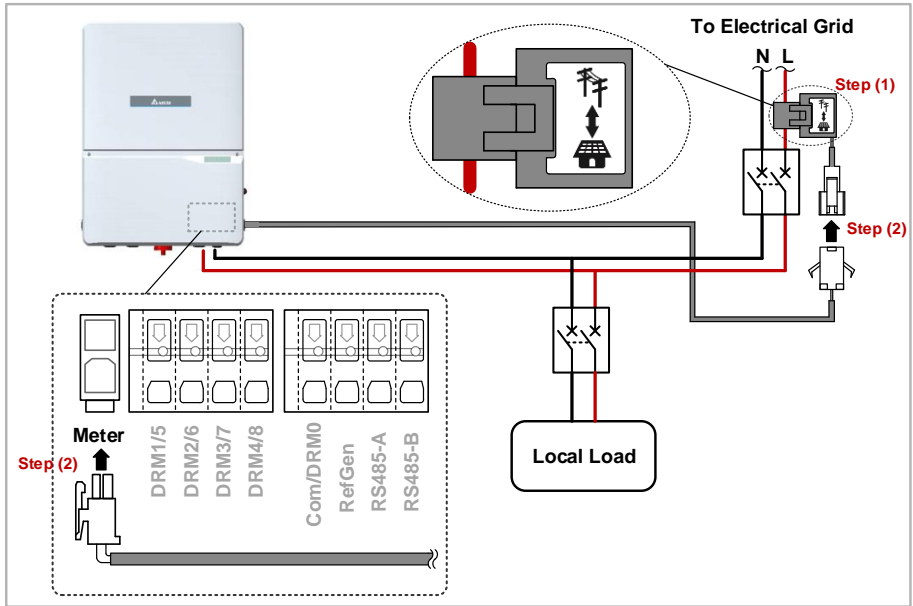


Figure 5-7: Power meter wiring

6 Turning the PV inverter on/off

WARNING !



The internal temperature may exceed over 70°C while operating. To avoid injury, do not touch the surface of the inverter whilst the unit is in operation.

After installation, please ensure the AC, the DC and communication connection are correct. When enough power is generated from the PV array, the device will operate automatically and will initial 'self-test'. This self-test takes approximately 2 minutes and will occur at first start-up of the day.

6.1 Start-up Procedures

6.1.1 PV Array DC Voltage Checking

Firstly, uncover the PV arrays and expose them to full sunlight. Please note, the sunlight must be intense enough to produce the required output voltage for the inverter to start up.

Measure the PV array open circuit DC voltage across the DC positive (+) and negative (-) terminals.

6.1.2 AC Utility Voltage Checking

Using an AC voltmeter, measure the AC open circuit utility voltage between L1 (L) and L2 (N). Ensure the voltage is at approximately the nominal value. The inverter operates with a line-to-line voltage range around the nominal value.

Refer to "11. Technical data" output section for the utility voltage operating range for your inverter model.

6.1.3 Starting up the Inverter

- 1) Switch on the PV Array switch and DC switch to connect PV Array.
- 2) Switch on AC circuit breaker to connect electricity grid.
- 3) Communication Module
- 4) Upon first start-up of the inverter, country selection is required, please contact your system installer to process the setting. More information please refer to "Get Started Register" guide.

The Communication Module supports the communication with the device with Wi-Fi function (e.g., smart phone, tablet ect.)

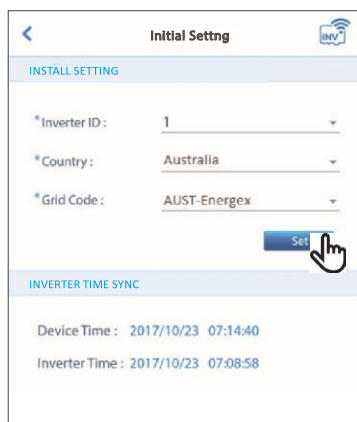
6.1.4 Wi-Fi communication

- 1) Turn on the device's Wi-Fi function.
- 2) Select the inverters' Wi-Fi SSID: Delta-[serial number]

- (e.g. Delta-O4L16A00001W0 ; See Inverter " The identification label")
- 3) Enter the Wi-Fi password: DELTASOL
(The Default password is also printed on the identification label)
 - 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").



6.2 Shut down Procedures

- 1) Switch off AC circuit breaker to disconnect electricity grid.
- 2) Switch off the PV Array switch and DC switch to disconnect PV Array.

CAUTION !



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

7 Active/Reactive Power Control

There are 2 settings for active power and 4 settings for reactive power control that can be configured based on the requirement of the local network operator.

ATTENTION



The parameters are set according to the requirements of the selected country. A change to the parameter settings may result in the approval being lost.

7.1 Active Power Control

7.1.1 Power vs. Voltage

According to AS/NZS 4777.2:2015 (6.3.2):

The volt-watt response mode varies the output power of the inverter in response to the voltage at its terminal. The inverter should have the volt-watt response mode. This mode is enabled by default.

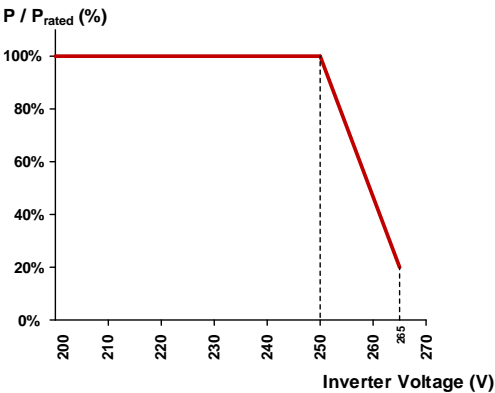


Figure 7-1: Power vs. Voltage (example for Australia)

7.1.2 Power vs. Frequency

According to AS/NZS 4777.2:2015 (7.5.3):

When a grid frequency disturbance results in an increase in grid frequency which exceeds 50.25 Hz, the inverter shall reduce the power output linearly with an increase of frequency until fstop is reached, where fstop lies in the range 51–52 Hz. The default set-point for fstop shall be 52 Hz.

The power level present at the time the frequency reaches or exceeds 50.25 Hz shall be held as the reference power level used to calculate the required response to the increasing frequency. This is expressed in the equation below:

$$P_{out} = P_{ref} \left[1 - \frac{(f - 50.25)}{(f_{stop} - 50.25)} \right]$$

User can set all necessary settings to meet the requirements from the network operator. Please refer to actual Power vs. Frequency shown in **Figure 7-2** for the settings procedure.

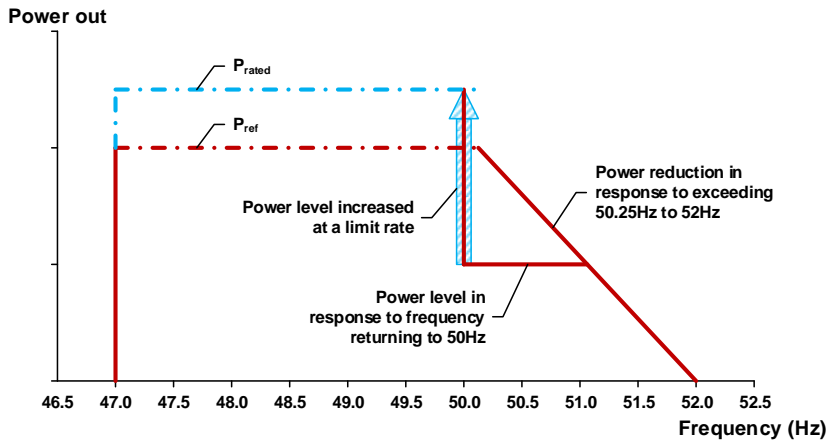


Figure 7-2: Power vs. frequency characteristic
(example for $f_{stop} = 52\text{Hz}$, Australia)

7.2 Reactive Power Control

7.2.1 Fixed Power Factor mode

Users can set the power factor from Cap 0.80 to Ind 0.80 (inverter would stop reactive power control if output power is below 25% rated power). This mode is disabled by default.

7.2.2 Fixed Reactive Power mode

Once user enables this method, the inverter will deliver reactive power (i.e. Q) consistent with that of the fixed reactive power setting. The setting range is from Cap 60% to Ind 60%. This mode is disabled by default.

7.2.3 $\cos\phi$ - P mode

Once user enables this method, the inverter will deliver reactive power according to output active power at that moment. This mode is disabled by default. **Figure 7-3** is an example.

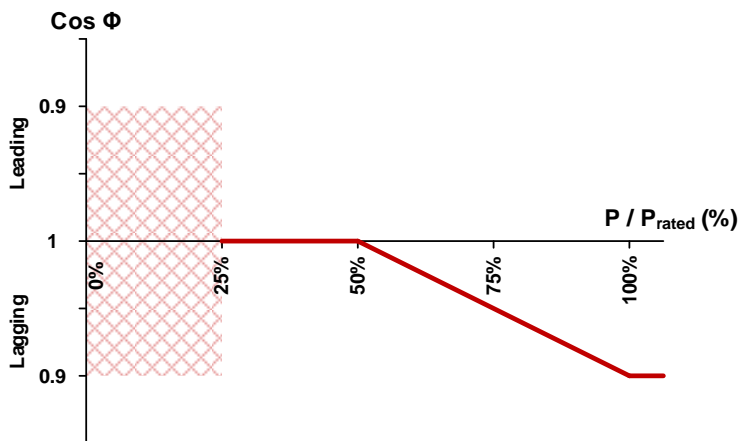


Figure 7-3: Example of $\cos\phi - P$ characteristic

7.2.4 Voltage – var response mode

Once the user enables this method, the user can set Q vs. Grid voltage operation curve as in Figure 7-4 below. This mode is disabled by default.

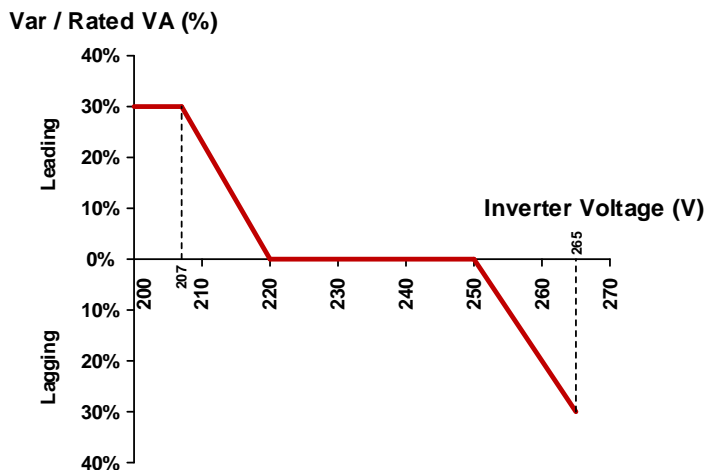


Figure 7-4: Example of Voltage - var characteristic (Australia)

7.3 Demand Response Mode

To implementation of power management, the digital input interface receives the specifications of the network operator via a DRED. H9E can access these command for power management.

- **Australia and New Zealand:**

The inverter support the demand response mode (DRMs).

DRM 0 - Operate the disconnection device.

DRM 5 - Do not generate power.

DRM 6 - Do not generate at more than 50% of rated power.

DRM 7 - Do not generate at more than 75% of rated power and sink reactive power.

DRM 8 - Increase power generation (subject to constraints from other active DRMs).

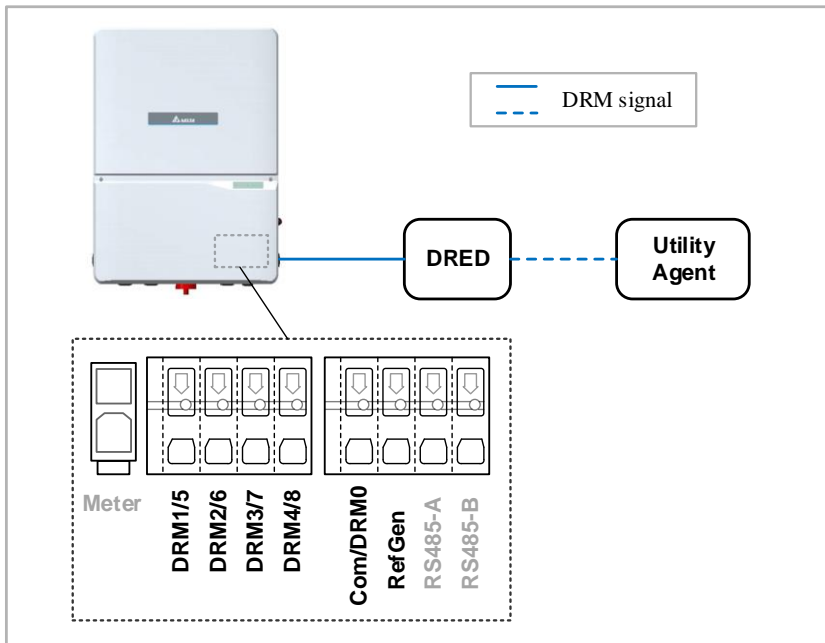


Figure 7-5: DRM mode diagram

8 Maintenance

In order to ensure normal operation of the inverter, please check the unit regularly. Check that all terminals, screws and cables are connected and appear as they did upon installation. If there are any impaired or loose parts, please contact your solar installer immediately. Ensure that there are no foreign objects in the path of the heat outlet and keep the unit and its surroundings clean and tidy at all times.

WARNING !



Before any maintenance, please switch AC and DC power off to avoid risk of electronic shock.

9 Error Message and Trouble Shooting

9.1 Error Message & Trouble Shooting

Error		
Message	Possible cause	Action
Aux Power Under Voltage (PWR)	The voltage of auxiliary power supply is lower than the software low voltage protection value	<ol style="list-style-type: none">1. Turn off DC switch of inverter.2. Turn off grid or AC breaker.3. Wait for 1 minute. During the process, you can see all LEDs of inverter are turned off.4. Turn on grid or AC breaker.5. Turn on DC switch of inverter.6. If the fault still occurs, please contact local customer service or installer.
Aux Power Voltage Abnormal (SAF)	The voltage of auxiliary power supply exceeds the software voltage protection value range	<ol style="list-style-type: none">1. Turn off DC switch of Inverter.2. Turn off grid or AC breaker.3. Wait for 1 minute. During the process, you can see all LEDs of Inverter are turned off.4. Turn on grid or AC breaker.5. Turn on DC switch of Inverter.6. If the fault still occurs, please contact local customer service or installer.
Backup Mode Setting Conflict	There is a conflict while setting operation mode to backup mode	Contact local customer service or installer.
Bus Over Voltage (HW)	The bus voltage is higher than the hardware high voltage protection value	<ol style="list-style-type: none">1. Turn off DC switch of inverter.2. Turn off grid or AC breaker.3. Wait for 1 minute. During the process, you can see all LEDs of inverter are turned off.4. Turn on grid or AC breaker.5. Turn on DC switch of inverter.6. If the fault still occurs, please contact local customer service or installer.
Bus Over Voltage (SW)	The bus voltage is higher than the software high voltage protection value	<ol style="list-style-type: none">1. Turn off DC switch of inverter.2. Turn off grid or AC breaker.3. Wait for 1 minute. During the process, you can see all LEDs of inverter are turned off.4. Turn on grid or AC breaker.5. Turn on DC switch of inverter.6. If the fault still occurs, please contact local customer service or installer.

Bus Under Voltage (SW)	The bus voltage is lower than the software low voltage protection value	<ol style="list-style-type: none"> 1. Turn off DC switch of inverter. 2. Turn off grid or AC breaker. 3. Wait for 1 minute. During the process, you can see all LEDs of inverter are turned off. 4. Turn on grid or AC breaker. 5. Turn on DC switch of inverter. 6. If the fault still occurs, please contact local customer service or installer.
DAC Comparator Fail	DAC comparator is failed	<ol style="list-style-type: none"> 1. Turn off DC switch of inverter. 2. Turn off grid or AC breaker. 3. Wait for 1 minute. During the process, you can see all LEDs of inverter are turned off. 4. Turn on grid or AC breaker. 5. Turn on DC switch of inverter. 6. If the fault still occurs, please contact local customer service or installer.
EEPROM Configuration Fail (PWR)	EEPROM configuration is failed	<ol style="list-style-type: none"> 1. Turn off DC switch of inverter. 2. Turn off grid or AC breaker. 3. Wait for 1 minute. During the process, you can see all LEDs of inverter are turned off. 4. Turn on grid or AC breaker. 5. Turn on DC switch of inverter. 6. If the fault still occurs, please contact local customer service or installer.
Flash Operation Fail	Flash operation is failed	<ol style="list-style-type: none"> 1. Turn off DC switch of inverter. 2. Turn off grid or AC breaker. 3. Wait for 1 minute. During the process, you can see all LEDs of inverter are turned off. 4. Turn on grid or AC breaker. 5. Turn on DC switch of inverter. 6. If the fault still occurs, please contact local customer service or installer.
Grid Configuration Ongoing	Grid configuration is unfinished	<ol style="list-style-type: none"> 1. Check the grid configuration by app. 2. If the grid type is not consistent with the actual grid, set grid type by app and wait for 5 minutes. 3. If the fault still exists, turn off DC switch of inverter. 4. Turn off grid or AC breaker. 5. Wait for 1 minute. During the process, you can see all LEDs of inverter are turned off. 6. Turn on grid or AC breaker. 7. Turn on DC switch of inverter. 8. If the fault still occurs, please contact local customer service or installer.

Grid Reconnection Fail	The reconnection of grid is failed	<ol style="list-style-type: none"> 1. Check the grid configuration by app. 2. If the grid type is not consistent with the actual grid, set grid type by app and wait for 5 minutes. 3. If the fault still exists, turn off DC switch of inverter. 4. Turn off grid or AC breaker. 5. Wait for 1 minute. During the process, you can see all LEDs of inverter are turned off. 6. Turn on grid or AC breaker. 7. Turn on DC switch of inverter. 8. If the fault still occurs, please contact local customer service or installer.
Ground Fault (ISO)	The impedance of isolation resistor detected in startup process is lower than the software protection value	<ol style="list-style-type: none"> 1. Check the humidity of PV panel: High humidity weather may cause ground fault, e.g., in the morning or rainy day. In this case, inverter will startup when weather becomes well. 2. If the fault still exists, turn off DC switch of inverter. 3. Turn off grid or AC breaker. 4. Wait for 1 minute. During the process, you can see all LEDs of inverter are turned off. 5. Turn on grid or AC breaker. 6. Turn on DC switch of inverter. 7. If the fault still occurs, please contact local customer service or installer.
Ground Fault (RCD)	The leakage current has a step change or exceeds the software protection value, resulting in RCD fault	<ol style="list-style-type: none"> 1. Check the humidity of PV panel: High humidity weather may cause ground fault, e.g., in the morning or rainy day. In this case, inverter will startup when weather becomes well. 2. If the fault still exists, turn off DC switch of inverter. 3. Turn off grid or AC breaker. 4. Wait for 1 minute. During the process, you can see all LEDs of inverter are turned off. 5. Turn on grid or AC breaker. 6. Turn on DC switch of inverter. 7. If the fault still occurs, please contact local customer service or installer.
Inverter Over Current (HW)	The inverter current is higher than the hardware high voltage protection value	<ol style="list-style-type: none"> 1. Turn off DC switch of inverter. 2. Turn off grid or AC breaker. 3. Wait for 1 minute. During the process, you can see all LEDs of inverter are turned off. 4. Turn on grid or AC breaker. 5. Turn on DC switch of inverter.

		6. If the fault still occurs, please contact local customer service or installer.
Inverter Type Configuration Fault	Machine type configuration is failed	Contact local customer service or installer.
Islanding Detected	Islanding is detected by inverter	<ol style="list-style-type: none"> 1. Turn off DC switch of inverter. 2. Turn off grid or AC breaker. 3. Wait for 1 minute. During the process, you can see all LEDs of inverter are turned off. 4. Turn on grid or AC breaker. 5. Turn on DC switch of inverter. 6. If the fault still occurs, please contact local customer service or installer.
L12 Over Voltage	L12 voltage is higher than the software high voltage protection value	<ol style="list-style-type: none"> 1. Check the grid configuration by app. 2. If the grid type is not consistent with the actual grid, set grid type by app and wait for 5 minutes. 3. If the fault still exists, please contact local customer service or installer.
L12 Over Voltage (PWR)	L12 voltage is higher than the software high voltage protection value	<ol style="list-style-type: none"> 1. Check the grid configuration by app. 2. If the grid type is not consistent with the actual grid, set grid type by app and wait for 5 minutes. 3. If the fault still exists, please contact local customer service or installer.
L12 Under Voltage	L12 voltage is lower than the software low voltage protection value	<ol style="list-style-type: none"> 1. Check the grid configuration by app. 2. If the grid type is not consistent with the actual grid, set grid type by app and wait for 5 minutes. 3. If the fault still exists, please contact local customer service or installer.
L12 Under Voltage (PWR)	L12 voltage is lower than the software low voltage protection value	<ol style="list-style-type: none"> 1. Check the grid configuration by app. 2. If the grid type is not consistent with the actual grid, set grid type by app and wait for 5 minutes. 3. If the fault still exists, please contact local customer service or installer.

L1N Over Voltage	L1N voltage is higher than the software high voltage protection value	<ol style="list-style-type: none"> 1. Check the grid configuration by app. 2. If the grid type is not consistent with the actual grid, set grid type by app and wait for 5 minutes. 3. If the fault still exists, please contact local customer service or installer.
L1N Under Voltage	L1N voltage is lower than the software low voltage protection value	<ol style="list-style-type: none"> 1. Check the grid configuration by app. 2. If the grid type is not consistent with the actual grid, set grid type by app and wait for 5 minutes. 3. If the fault still exists, please contact local customer service or installer.
L2N Over Voltage	L2N voltage is higher than the software high voltage protection value	<ol style="list-style-type: none"> 1. Check the grid configuration by app. 2. If the grid type is not consistent with the actual grid, set grid type by app and wait for 5 minutes. 3. If the fault still exists, please contact local customer service or installer.
L2N Under Voltage	L2N voltage is lower than the software low voltage protection value	<ol style="list-style-type: none"> 1. Check the grid configuration by app. 2. If the grid type is not consistent with the actual grid, set grid type by app and wait for 5 minutes. 3. If the fault still exists, please contact local customer service or installer.
Microelectronic Fault	Microelectronic fault	<ol style="list-style-type: none"> 1. Check the grid configuration by app. 2. If the grid type is not consistent with the actual grid, set grid type by app and wait for 5 minutes. 3. If the fault still exists, turn off DC switch of inverter. 4. Turn off grid or AC breaker. 5. Wait for 1 minute. During the process, you can see all LEDs of inverter are turned off. 6. Turn on grid or AC breaker. 7. Turn on DC switch of inverter. 8. If the fault still occurs, please contact local customer service or installer.
Neutral Line Detection Fail	The neutral line is detected failed	<ol style="list-style-type: none"> 1. Turn off DC switch of inverter. 2. Turn off grid or AC breaker. 3. Wait for 1 minute. During the process, you can see all LEDs of inverter are turned off. 4. Turn on grid or AC breaker. 5. Turn on DC switch of inverter.

		6. If the fault still occurs, please contact local customer service or installer.
Over Frequency	Grid frequency is higher than the software high frequency protection value	<ol style="list-style-type: none"> 1. Check the grid configuration by app. 2. If the grid type is not consistent with the actual grid, set grid type by app and wait for 5 minutes. 3. If the fault still exists, please contact local customer service or installer.
Over Temperature	The cabinet or heatsink temperature is higher than the software high temperature protection value	<ol style="list-style-type: none"> 1. Measure the ambient temperature. 2. If the temperature is higher than the maximum operating temperature, you need to check the heat dissipation to make sure the reasonable ventilation, and try to cool down the inverter, or wait for the temperature to decrease to the supported operating temperature range. 3. If the fault still exists, please contact local customer service or installer.
Phase-Locked Loop Fail	Phase-Locked loop is failed	<ol style="list-style-type: none"> 1. Check the grid configuration by app. 2. If the grid type is not consistent with the actual grid, set grid type by app and wait for 5 minutes. 3. If the fault still exists, turn off DC switch of inverter. 4. Turn off grid or AC breaker. 5. Wait for 1 minute. During the process, you can see all LEDs of inverter are turned off. 6. Turn on grid or AC breaker. 7. Turn on DC switch of inverter. 8. If the fault still occurs, please contact local customer service or installer.
PV Over Voltage	PV voltage is higher than the software high voltage protection value	Contact local customer service or installer.
PV Under Voltage	PV voltage is lower than the software low voltage protection value	<ol style="list-style-type: none"> 1. Usually it will not affect the normal operation of the system. When PV voltage rises, the alarm will be cleared automatically. 2. If the alarm is not cleared, please contact local customer service or installer.

PV1 Over Current (HW)	The PV1 current is higher than the hardware high voltage protection value	<ol style="list-style-type: none"> 1. Turn off DC switch of inverter. 2. Turn off grid or AC breaker. 3. Wait for 1 minute. During the process, you can see all LEDs of inverter are turned off. 4. Turn on grid or AC breaker. 5. Turn on DC switch of inverter. 6. If the fault still occurs, please contact local customer service or installer.
PV2 Over Current (HW)	The PV2 current is higher than the hardware high voltage protection value	<ol style="list-style-type: none"> 1. Turn off DC switch of inverter. 2. Turn off grid or AC breaker. 3. Wait for 1 minute. During the process, you can see all LEDs of inverter are turned off. 4. Turn on grid or AC breaker. 5. Turn on DC switch of inverter. 6. If the fault still occurs, please contact local customer service or installer.
PV3 Over Current (HW)	The PV3 current is higher than the hardware high voltage protection value	<ol style="list-style-type: none"> 1. Turn off DC switch of inverter. 2. Turn off grid or AC breaker. 3. Wait for 1 minute. During the process, you can see all LEDs of inverter are turned off. 4. Turn on grid or AC breaker. 5. Turn on DC switch of inverter. 6. If the fault still occurs, please contact local customer service or installer.
RCD self-test Fail	Residual current detection sensor self-test failed	<ol style="list-style-type: none"> 1. Turn off DC switch of inverter. 2. Turn off grid or AC breaker. 3. Wait for 1 minute. During the process, you can see all LEDs of inverter are turned off. 4. Turn on grid or AC breaker. 5. Turn on DC switch of inverter. 6. If the fault still occurs, please contact local customer service or installer.
Relay self-test Fail	Relay self-test failed	<ol style="list-style-type: none"> 1. Turn off DC switch of inverter. 2. Turn off grid or AC breaker. 3. Wait for 1 minute. During the process, you can see all LEDs of inverter are turned off. 4. Turn on grid or AC breaker. 5. Turn on DC switch of inverter. 6. If the fault still occurs, please contact local customer service or installer.
Remote Shutdown	The inverter is remotely shut down	<ol style="list-style-type: none"> 1. Check if the inverter is remotely shut down by cloud for some reasons, e.g., waiting for permission. If yes, please wait for activation by cloud. 2. Turn off DC switch of inverter.

		<ol style="list-style-type: none"> 3. Turn off grid or AC breaker. 4. Wait for 1 minute. During the process, you can see all LEDs of inverter are turned off. 6. Turn on grid or AC breaker. 6. Turn on DC switch of inverter. 7. If the fault still occurs, please contact local customer service or installer.
Safety Relative Function Fault	There is a fault in safety controller relative function	If other faults occurred simultaneously, please refer to the corresponding operation guideline for occurred faults. Otherwise, please contact local customer service or installer.
Software Version Conflict	There are conflicts between software versions	<ol style="list-style-type: none"> 1. Check if the firmware is newest by app. If not, upgrade firmware to newest version. 2. If the fault still exists, please contact local customer service or installer.
Synchronous Voltage Build Fail	There is a problem with inverter side drive, or the control loop parameter is not applicable	<ol style="list-style-type: none"> 1. Check if the firmware is newest by app. If not, upgrade firmware to newest version. 2. If the fault still exists, turn off DC switch of inverter. 3. Turn off grid or AC breaker. 4. Wait for 1 minute. During the process, you can see all LEDs of inverter are turned off. 5. Turn on grid or AC breaker. 6. Turn on DC switch of inverter. 7. If the fault still occurs, please contact local customer service or installer.
Temperature Sensor Abnormal (SAF)	The temperature sensor is out of work	<ol style="list-style-type: none"> 1. Turn off DC switch of inverter. 2. Turn off grid or AC breaker. 3. Wait for 1 minute. During the process, you can see all LEDs of inverter are turned off. 4. Turn on grid or AC breaker. 5. Turn on DC switch of inverter. 6. If the fault still occurs, please contact local customer service or installer.
Under Frequency	Grid frequency is lower than the software low frequency protection value	<ol style="list-style-type: none"> 1. Check the grid configuration by app. 2. If the grid type is not consistent with the actual grid, set grid type by app and wait for 5 minutes. 3. If the fault still exists, please contact local customer service or installer.

Under Temperature	The cabinet temperature is lower than the software low temperature protection value	<ol style="list-style-type: none"> 1. Measure the ambient temperature. 2. If the temperature is lower than the minimum operating temperature, try to warm the inverter, or wait for the temperature to increase to the operating temperature range. 3. If the fault still exists, please contact local customer service or installer.
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Table 9-1: Error Message

10 De-Commissioning

De-Commissioning Procedure:

If necessary to put the device out of operation for maintenance and/or storage, please follow the instructions below.

WARNING !



To avoid injuries, please follow this procedures

1. Switch off AC circuit breaker to disconnect from electricity grid.
2. Switch off the PV Array switch to disconnect from PV Array.
3. Use proper voltage meter to confirm that the AC and DC power are disconnected from the unit.
4. Remove the AC wiring immediately to completely disconnect from electricity grid.
5. Remove the DC wiring to disconnect from PV Array.
6. After completing all of the above steps, the inverter can be removed.

11 Technical Data

Model	H9E
PV INPUT	
Max. system voltage	600 V
Nominal voltage	380 V
Max. operating voltage	540 V
Start-up voltage	120 V
Operating MPPT voltage range	50 V to 480 V
Full power MPPT voltage range	280 V to 480 V
Max. input current per MPPT	12 A
Max. short circuit current per MPPT	15 A
Max. DC/AC ratio	1.3
DC disconnect	Integrated
MPP tracker	4
AFCI	Type 1 (UL1699B)
Max. inverter backfeed current to the Array	0 A
AC OUTPUT	
Nominal output power @ 230Vac	8280 W
Nominal output power @ 240Vac	8640 W
Max. output apparent power	9000 VA
Nominal output voltage	230 V / 240 V
Max. continuous current	36 A
Max. power export to Grid	5000 VA
Max. current export to Grid	21.7A
Nominal operating frequency	50 Hz
Night consumption	< 1.5 W ¹⁾
THD @ nominal power	< 3 %
Adjustable power factor range	0.85i to 0.85c
Inrush current	25.6 Apk, 1ms
Maximum output fault current	96.37 Apk, 1.3ms; 3.2Arms@ 3 cycles

Maximum output overcurrent protection	40 A	50 A
GENERAL SPECIFICATION		
Max. efficiency	98.0 %	
EU efficiency	97.3 %	
Operating Temp. range	-25 °C to 65 °C (derating above 45 °C)	
Storage Temp. range	-40 °C to 85 °C	
Humidity	0% to 95%	
Max. operating altitude	9,843 ft (3,000 m)	
Acoustic noise	< 45 dB(A) @ 3 ft (1m)	
Communication interface	WiFi, optional BLE, Ethernet, 3G / 4G cellular communication	
Inverter Topology	Non-isolated	
Active anti-islanding method	Reactive power variation ²⁾ , Comply with IEC 62116	
Residual Current Device (RCD)	integrated ³⁾	
Protective class	Class I	
Over voltage category	OVC II (PV) and OVC III (mains)	
MECHANICAL DESIGN		
Dimensions (W x H x D)	425 x 590 x 160 mm	
Display	LED indicators	
Weight	21.6 kg	
Cooling	Natural convection	
STANDARDS		
Enclosure protection rating	IP 65	
Safety	IEC 62109-1, IEC 62109-2	
EMC	EN 61000	
Grid support regulation	AS 4777-2, AS 4777-3	
WARRANTY		
Standard warranty	5 years, optional 10 years	

Table 11-1: Specifications

1) Without consumption of WiFi communication

- 2) Periodically inject reactive power variation to grid
- 3) This inverter includes an integrated residual current device (RCD). If an external residual current device (RCD) is used, a device of Type A should be used, with tripping current of 30mA.
- 4) Not support AS4777.2:2015 Single-phase inverters used in three-phase combinations