HICONICS
By Midea Industry Technology

USER MANUAL
HYBRID INVERTER

HEC1.5–T6Hr2 / T8Hr2 / T10Hr2 / T12Hr2 / T15Hr2

STATEMENT

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The contents of this manual have been checked for accordance with its described hardware and software. However, the contents of this manual may be subject to appropriate modification as a result of product upgrade, specification change and update of the manual, we cannot guarantee full accordance all the time. But the data in this manual are reviewed regularly and any necessary corrections are included in subsequent editions.

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CATALOG

1 Safe

1.1 Important Safety Instructions

This section gives an explanation of all the symbols shown on the inverter and on the type label.

Symbol	Explanation
	CE mark. The inverter complies with the requirements of the applicable CE
	TUV
	RCM remark
	SAA certification
	Beware of hot surface. The inverter can become hot during operation. Avoid contact during operation.
	Danger to life due to high voltages in the inverter!
	Danger Risk of electric shock!
	Please note the provisions of the instruction manual.
	The inverter can't be disposed together with the household waste.

	Disposal information can be found in the enclosed documentation. Do not operate inverter until it is isolated from battery, mains and on-site PV generation suppliers.
	Beware of hot surface. The inverter can become hot during operation. Avoid contact during operation.

1.2 Manual Description

This user manual presents a detailed description of HEC1.5-T series with respect to product features, structural characteristics, functions, installation, parameter settings, troubleshooting, commissioning and daily maintenance, etc. Before installation, wiring, operation, and repair to the inverter, please read carefully and strictly comply with all its Safety Precautions in this manual and keep it properly at a place for easy access.

If you have any question, or anything that it is not clear for you, or have some troubles during installation, wiring, and/or operation, you are suggested to contact HICONICS via its recommended contact.

information in this manual or contact its sales representatives or service engineers.

1.3 Cautions

1.3.1 Installation principles

The inverter must only be installed by professional technicians. The professional technician is required to meet requirements as follows:

- Know electronic, electrical wiring and mechanical expertise, and be familiar with electrical and mechanical schematics.
- Be familiar with local standards and relevant safety regulations of electrical systems.
- Have received professional training related to the electrical equipment installation and commissioning.
- Be able to quickly respond to hazards or emergencies that occur during installation and commissioning.

1.3.2 Security Precautions

Safety signs in this manual:

DANGER indicates high-risk potential hazards that, if not avoided, may lead to death or serious injury.

WARNING indicates moderate-risk potential hazards that, if not avoided, may lead to death or serious injury.

CAUTION indicates low-risk potential hazards that, if not avoided, may lead to minor or moderate injury.

NOTE provides valuable tips on the best operation of our products.

Important Safety Instructions

Danger to life due to a high voltage inside the inverter!

- All work must be performed by a qualified electrician.
- Children and persons with reduced physical sensory abilities, mental capabilities, or lack of experience and knowledge should not use this equipment unless supervised or instructed.

Danger of burns

- When the product is working, the upper of the enclosure and the enclosure body may become hot.
- During operation, only the touch screen needs to be operated.

Radiation may cause damage to health.

- Do not stay at a place less than 20cm away from the inverter for a long time.

Ground the PV generator.

- Comply with the local requirements for grounding the PV modules and the PV generator.
- It is recommended that generator frames and other conductive surfaces be connected in a manner that ensures continuous conduction and grounding for optimum protection of the system and personnel.

Make sure the input DC voltage is less than the maximum value. Over-voltage may cause permanent damage to the inverter or other losses, which will not be covered by the warranty!

Before attempting any maintenance, cleaning or working on any circuits connected to inverter, authorized service personnel must disconnect both AC and DC power from inverter.

Do not operate the inverter while the equipment is running.

Risk of electric shock!

- It is recommended to use only accessories that are compatible with the inverter, otherwise it may lead to the risk of fire, electric shock or personal injury.
- Make sure the existing wiring is in good condition, and the wires are not undersized.
- Do not disassemble any parts of inverter which are not mentioned in installation guide. It contains no user-serviceable parts. See Warranty for service. Unauthorized repairs may result in a risk of electric shock or fire and will void your warranty, and will void the warranty.
- Keep away from flammable, explosive materials to avoid fire disaster.
- The installation location should be away from humid or corrosive substance.

- Authorized service personnel must use insulated tools when installing or working with this equipment.
- PV modules should have IEC 61730 Class A rating.
- Do not touch either the positive or negative pole of PV connecting device. Strictly prohibit touching both of them at the same time.
- The unit contains capacitors that remain charged to a potentially lethal voltage when the MAINS , battery and PV supply has been disconnected.
- Hazardous voltages may remain present for up to 5 minutes after disconnection.
- CAUTION-The energy stored in the capacitor is a shock hazard, do not operate the inverter, coupler, power cable, battery cable, PV cable or PV generator while energized. After turning off the PV, battery and power supply, always wait 5 minutes to allow the intermediate circuit capacitors to discharge before unplugging the DC, battery and power coupler.
- When accessing the internal circuit of inverter, it is very important to wait 5 minutes before operating the power circuit or demounting the electrolyte capacitors inside the device. Do not open the device beforehand since the capacitors require time sufficiently discharge!
- Measure the voltage between terminals UDC+ and UDC- with a multi- meter(impedance at least 1Mohm) to ensure that the device is discharged (<35VDC) before starting to work inside the device.

Install surge protection devices (SPDs) for PV

- Over-voltage protection with surge arresters should be provided when installing PV power generation system.
- The grid connected inverter does not have SPDs installed on both PV input side and MAINS side.

- Lightning will cause a damage either from a direct strike or from surges due to a nearby strike.
- Induced surges are the most likely cause of lightning damage in majority or installations, especially in rural areas where electricity is usually provided by long overhead lines. Surge may be included on both the PV array conduction and the AC cables leading to the building.
- Specialists in lightning protection should be consulted during the end use application.
- Using appropriate external lightning protection, the effect of a direct lightning strike into a building can be mitigated in a controlled way, and the lightning current can be discharged into the ground.
- Installation of SPDs to protect the inverter against mechanical damage and excessive stress include a surge arrester in case of a building with external lightning protection system (LPS) when separation distance is kept.
- To protect the DC system, surge suppression device (SPD type2) should be fitted at the inverter end of the DC cabling and at the array located between the inverter and the PV generator, if the voltage protection level (VP) of the surge arresters is greater than 1100V, an additional SPD type 3 required for surge protection for electrical devices.
- To protect the AC system, surge suppression devices (SPD type2) should be fitted at the main incoming point of AC supply (at the consumer's cutout), located between the inverter and the meter/ distribution system; SPD (test impulse D1) for signal in according l to EN 61632-1.
- All DC cables should be installed to provide as short a run as possible, and positive and negative cables of the string or main DC supply should be bundled together. Avoiding the creation of loops in the system.

- Spark gap devices are not suitable to be used in DC circuits once conducting, they won't stop conducting until the voltage across their terminals is typically more than 30 volts.

Anti-Islanding Effect

The islanding effect is a special phenomenon where a grid-connected PV system still delivers power to the nearby grid when voltage losses occur in the power system. This can be dangerous for maintenance personnel and the public.The HEC1.5-T series inverters offer Active Frequency Drift (AFD) to prevent the islanding effect.

PE Connection and Leakage Current

- The end-use application shall monitor the protective conductor by residual current operated protective device (RCD) with rated fault current Ifn≤240mA which automatically disconnects the device in case of a fault.The device is intended to connect to a PV generator with a capacitance limit of about 700nf.

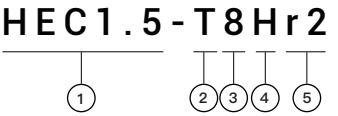
High leakage current!
Earth connection essential before connecting supply.

- Incorrect grounding can cause physical injury, death or equipment malfunction and increase electromagnetic.
- Make sure that grounding conductor is adequately sized as required by safety regulations.
- Do not connect the ground terminals of the unit in series in case of a multiple installation. This product can cause current with a DC component, Where a residual current operated protective (RCD) or monitoring (RCM) device is used for protection in case of direct or indirect contact, only an RCD or RCM of type B is allowed on the supply side of this product.

2 Introduction

2.1 Model Description

The model description is as follows (take HEC1.5-T8Hr2 as an example):



HEC1.5-T:HICONICS Generation1.5	①
T: Three phase	②
8: output power, 8kW	③
H: battery high voltage	④
r2: split system	⑤

2.2 Basic features

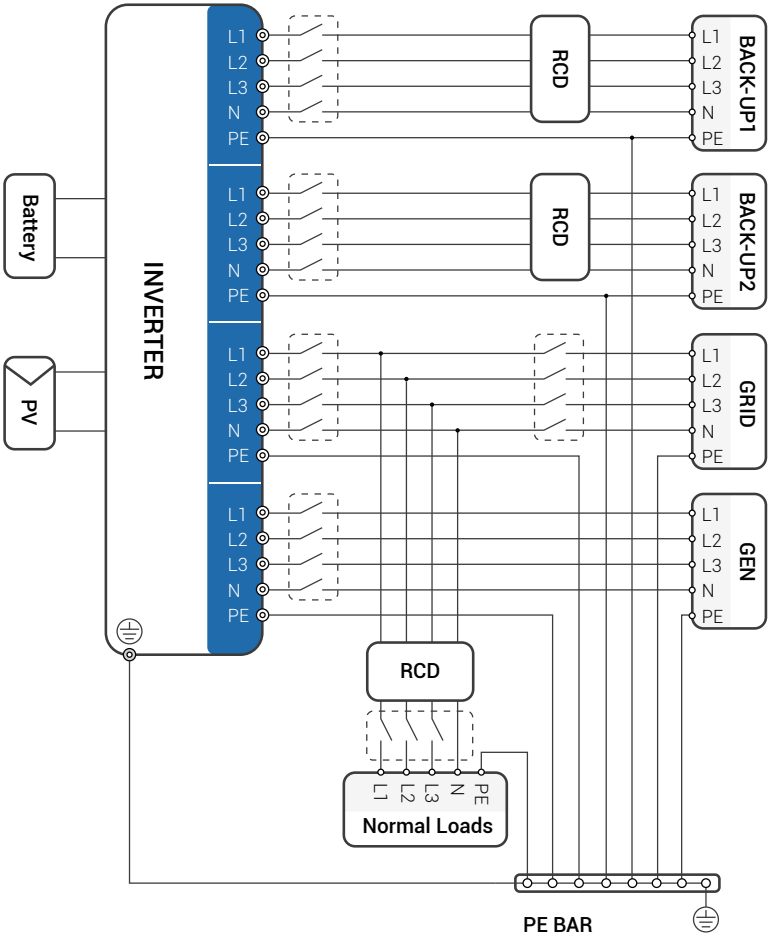
HEC1.5-T Hybrid Series is a high performance inverter that converts solar energy to DC power and stores the energy in batteries.

The inverter can be used to optimize its own energy consumption, to store energy in batteries for future use or to connect to the public grid. The mode of operation depends on the PV energy source and user preferences. It can use the energy from the batteries and the inverter (generated by the PV) to provide emergency power in case of grid outages.

HEC1.5-T Hybrid Series is designed in two EPS versions for customers to choose from based on local rules.

E-Version applies to wiring rules that require the N (neutral) wire of the EPS to be disconnected from the N (neutral) wire of the grid (applicable to most countries).

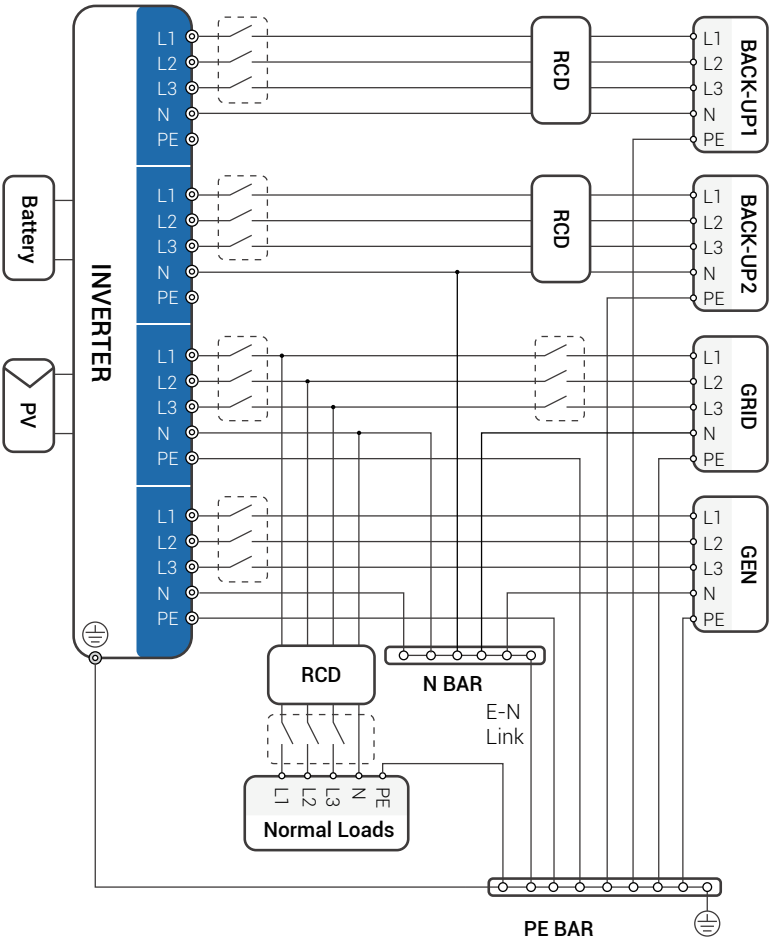
E-Version-system diagram



The grounding screw hole of inverter is at the lower right corner.

I-Version applies to wiring rules that require that the N (neutral) wire of other power sources must not be isolated or switched (applicable to Australian and New Zealand wiring rules AS/NZS_3000:2012).

I-Versionsystem diagram



The grounding screw hole of inverter is at the lower right corner.

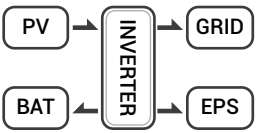
- Please control the household load and make sure it is within the "EPS output rating" in EPS mode, otherwise the inverter will shut down and issue an "overload fault" warning.
- Please check with the main grid operator for any special grid connection regulations.
- The wiring diagram is for reference only and the complete electrical connection should comply with the local regulations.
- Do not misconnect the phase sequence. Otherwise, the inverter will not operate properly.

2.3 Work Modes

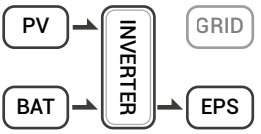
The inverter offers multiple working modes according to different requirements.

Work mode: self-use

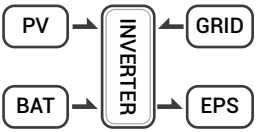
I. When PV, Grid, Battery is available:



Solar energy provides power to the loads as first priority. If solar energy is sufficient to power all connected loads, solar energy excess power will provides to charge battery,and then reduntant power will feed to grid.

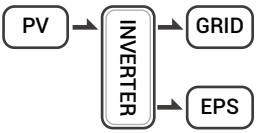


Solar energy provides power to the loads as first priority, if solar energy is not sufficient to power all connected loads, battery energy will supply power to the loads at the same time.

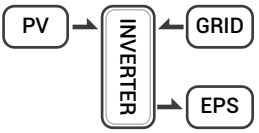


Solar energy provides power to the loads as first priority, if solar energy and battery are not sufficient to power all connected loads, utility energy (Main Grid) will supply power to the loads with solar energy at the same time.

II. When PV, Grid is available(without battery):

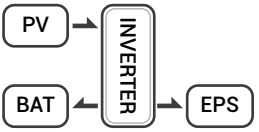


Solar energy provides power to the loads as first priority.if solar energy is Inverter sufficient,the excess power will feed to grid.

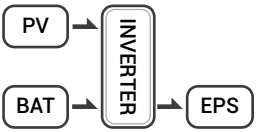


Solar energy provides power to the loads as first priority, if solar energy is not sufficient to power all connected loads, Grid energy will supply power to the loads at the same time.

III. When PV, Battery is available (Grid is disconnected):



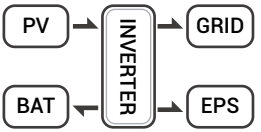
Solar energy provides power to the loads as first priority .if solar energy is sufficient to power all connected loads, solar energy will provides to charge battery.



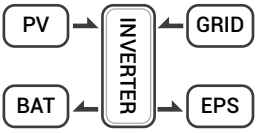
Solar energy provides power to the loads as first priority.if solar energy is not sufficient to power all connected loads, battery energy and solar energy will supply power to the loads at the same time.

Work mode: peak shift

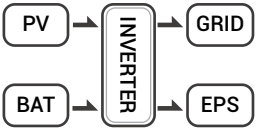
I. When PV, Grid, Battery is available:



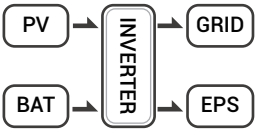
On charge time,solar energy will charge battery as first priority.The excess energy will supply power to the loads.If solar energy is sufficient to supply loads and charge battery.and If there's still some extra energy.then the excess power will feed the power to grid.



On charge time,solar energy will charge battery as first priority.then the excess solar energy will supply power to loads.If solar energy is not sufficient to charge battery and supply loads,grid will supply all the connected loads with solar energy together.

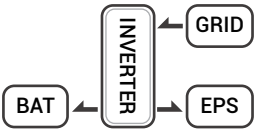


On discharge time,solar energy provides power to the loads as first priority.
if solar energy is sufficient to supply loads,and if there's still some extra energy from solar energy,then the excess power and battery will deliver the power to the grid at the same time.

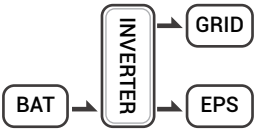


In the period of no charge or discharge,the solar power supply loads at first priority,excess energy to the grid.

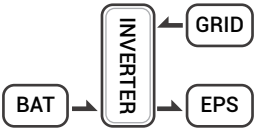
II. When Grid.Battery is available(PV is disconnected):



On charge time,grid will charge battery and supply power to the connected loads at the same time.



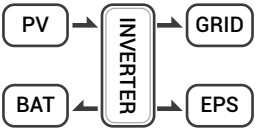
On discharge time,if load power is less than battery power,battery will supply power to loads as first priority.the excess power will be feed to grid.



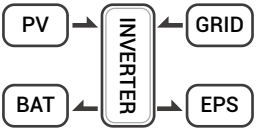
On discharge time,if load power is more than battery power.battery and grid will supply power to the loads at the same time.

Work mode: BAT priority

I. When PV, Grid, Battery is available:

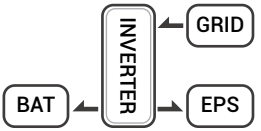


Solar energy will charge battery as first priority, if solar energy is excess.
the excess power will supply load. If there's still some extra energy. then the excess power will feed the power to grid.



Solar energy will charge battery as first priority, if solar energy is excess the excess power will supply load.If solar energy is not sufficient to charge battery and supply loads, grid will supply power to loads.

II. When Grid, Battery is available(PV is disconnected):

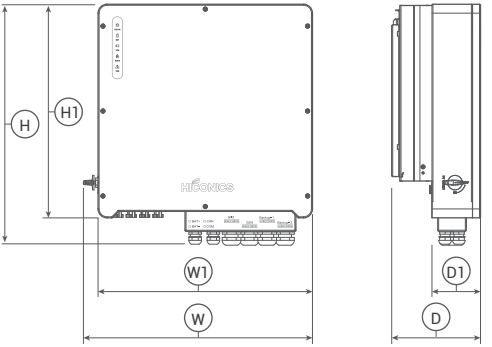


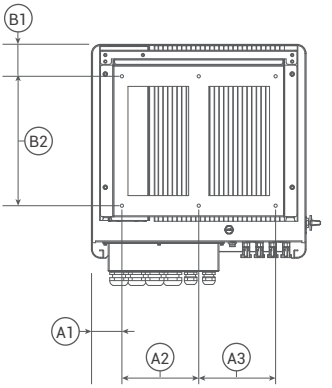
Grid will supply power to load and charge battery at the same time.

If the anti-reverse function is set to be allowable, the system will not feed power to grid in self-use, peak shift, battery priority modes.

2.4 Dimensions & Weight

Dimensions





HEC1.5-T6/8/10/12/15Hr2						
W	H	D	W1	H1	D1	Mounting hole dia.
566	596	200	530	528	120	8
A1	A2	A3	B1	B2		
75	190	190	79	320		

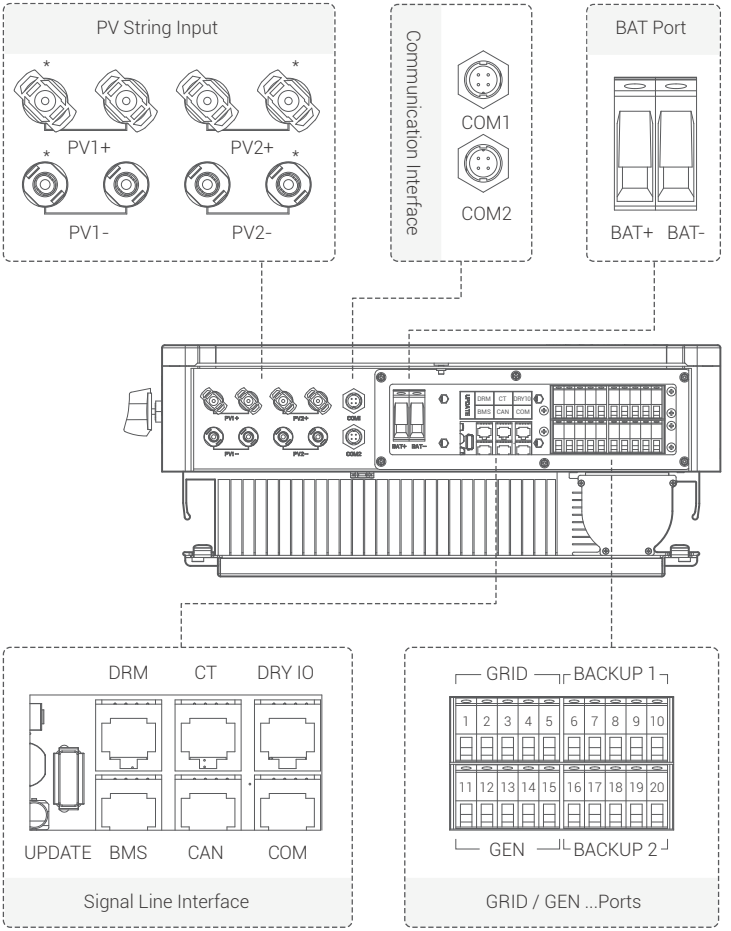
Unit, mm

HEC1.5-T6Hr2	T8Hr2	T10Hr2	T12Hr2	T15Hr2（Weight）
30	31	31	33	34

Unit,（Weight） kg

2.5 Interface Definition

Terminals



PV1+	PV string 1 positive input
PV1-	PV string 1 negative input
PV2+	PV string 2 positive input
PV2-	PV string 2 negative input
COM1	WIFI port 1 (optional)
COM2	WIFI port 2 (optional)
BAT+	Battery positive input
BAT-	Battery negative input
UPDATE	Port for upgrading software
DRM	Function temporarily retained
CT	Connect to CT (current transformer)
DRY IO	Dry contact
BMS	BMS communication with battery
CAN	CAN communication
COM	Modbus communication

**: Only R15KH3 will use these plugs, which are reserved for other models.*

GRID	(Diesel generator function is unreleased currently)
1	Grid line A phase
2	Grid line B phase
3	Grid line C phase
4	Grid line null line
5	Grid line ground electrode
GEN	
6	A phase
7	B phase
8	C phase
9	Null line
10	Ground electrode

Backup 1	
11	Backup1 line A phase
12	Backup1 line B phase
13	Backup1 line C phase
14	Backup1 line null line
15	Backup1 line ground electrode
Backup 2	
16	Backup2 line A phase
17	Backup2 line B phase
18	Backup2 line C phase
19	Backup2 line null line
20	Backup2 line ground electrode

2.6 Product Performance

Parameters

PV input

Model	T6Hr2	T8Hr2	T10Hr2	T12Hr2	T15Hr2
Max. power of PV array	9kW	12kW	15kW	18kW	22.5kW
Max. input voltage	1000 V				
MPPT voltage range	180 V~850 V				
Min. input voltage/start voltage	125 V/235 V				
No. of independent MPPT trackers per MPPT input	2				2
No. of independent MPPT strings per MPPT Input	1/1				2/2
Max. input current per MPPT tracker	13A/13A				20A/20A
Max. short-circuit current per MPPT tracker	16A/16A				30A/30A

Battery

Model	T6Hr2	T8Hr2	T10Hr2	T12Hr2	T15Hr2
Battery type	Lithium and Lead Acid Battery				
Battery voltage range	125V ~ 600 V				
Max. charging current / Max. discharging current	50 A / 50A				
Rated. charging current / Rated. discharging current	40A/40A				

AC output

Model	T6Hr2	T8Hr2	T10Hr2	T12Hr2	T15Hr2
Nominal AC voltage	3W+N+PE, 220 / 380 V; 230 / 400 V; 240 / 415 V				
AC voltage range	360V~440V				
Rated AC grid frequency	50 Hz / 60 Hz				
AC grid frequency range	50±5Hz / 60±5Hz				
Rated active power	6 kW	8 kW	10 kW	12 kW	15 kW
Rated apparent power	6kVA	8kVA	10kVA	12kVA	15kVA
Max. apparent power	6.6kVA	8.8kVA	11kVA	13.2kVA	16.5kVA
Rated grid output current (@400V)	8.7A	11.5A	14.4A	17.3A	21.7 A
Max. grid output current	9.5A	12.7A	15.9A	19.1A	23.8A
Harmonics THDI (@ Nominal power)	< 3%				

AC input

Model	T6Hr2	T8Hr2	T10Hr2	T12Hr2	T15Hr2
Rated grid voltage	3W+N+PE, 220 / 380 V; 230 / 400 V; 240 / 415 V				
Rated grid frequency	50Hz / 60Hz				
Rated active power	12 kW	16 kW	20 kW	24 kW	30 kW
Max. apparent input power from grid	13.2kVA	17.6kVA	22kVA	26.4kVA	33.3kVA
Rated input current from grid	17.3A	23.1 A	28.9A	34.7A	43.4A
Max. input current from grid	19A	25.5 A	31.9A	38.2 A	47.6A

Backup output

Model	T6Hr2	T8Hr2	T10Hr2	T12Hr2	T15Hr2
Nominal output voltage	3W+N+PE, 220 / 380 V; 230 / 400 V; 240 / 415 V				
Rated output frequency	50 Hz / 60 Hz				
Rated active power	6kVA	8kVA	10kVA	12kVA	15kVA
Max. apparent output power	6.6kVA	8.8kVA	11kVA	13.2kVA	16.5kVA
Peak active output power	6.6kVA	8.8kVA	11kVA	13.2kVA	16.5kVA
Rated Current (@400V)	8.7A	11.5 A	14.4A	17.3 A	21.7A
Max. output current	9.5A	12.7A	15.9A	19.1A	23.8A
Max. switch time	≤10ms				
Output THDI (@ Linear load)	<2%				

Efficiency

Model	T6Hr2	T8Hr2	T10Hr2	T12Hr2	T15Hr2
MPPT efficiency	≥99.5%				
Max efficiency	97.90%	97.90%	98.20%	98.20%	98.50%
Euro efficiency	97.20%	97.20%	97.50%	97.50%	97.6%
Max. battery to load efficiency	97.50%	97.50%	97.50%	97.60%	97.80%

Safety protection

Model	T6Hr2	T8Hr2	T10Hr2	T12Hr2	T15Hr2
DC-side disconnection device			○		
PV string reverse polarity protection			○		
All-pole sensitive residual current monitoring unit			○		
Anti-islanding protection			○		
AC output over current protection			○		
AC output short circuit current protection			○		
AC over voltage protection			○		
Protection class (as per IEC 62109-1)			I		
Over voltage category (as per IEC 62109-1)			AC: III; DC: II		

General data

Model	T6Hr2	T8Hr2	T10Hr2	T12Hr2	T15Hr2
Power factor at rated power / adjustable displacement	0.99 / 0.8 leading to 0.8 lagging				
Dimensions (W / H / D)	530 / 560 / 220 mm				
Installation	Wall-mounted				
Operating temperature range	-25 °C~+60 °C				
Noise emissions (typical)	< 35 dB(A)				
Standby consumption	< 15 W				
Cooling method	Natural convection				
Ingress protection rating (as per IEC 60529)	IP65				
Climatic category (according to IEC 60721-3-4)	4K4H				
Max. permissible value for relative humidity (non-condensing)	0~95%				
Max. operating altitude	4000m (>2000m power derating)				

Features

Model	T6Hr2	T8Hr2	T10Hr2	T12Hr2	T15Hr2
Inverter topology (PV / battery)	Transformer less / Transformer less				
User interface	LED & App				
Communication with BMS	RS485 / CAN				
Communication with meter	RS485				
Communication with portal	WIFI stick				
Integrated power control / Zero export control	○ / ○				

Standard Compliance

Model	T6Hr2	T8Hr2	T10Hr2	T12Hr2	T15Hr2
Safty	EN 62109-1, EN 62109-2				
EMC	IEC 61000-6-1/-2/-3/-4, IEC 61000-3-11, IEC61000-3-12				

3 Installation Instructions

3.1 Installation Preparation

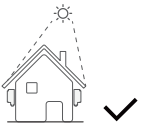
Please install the Product in strict accordance with steps in the Manual; otherwise, Hiconics does not bear any legal liability due to improper assembly and operation.

3.1.1 Environmental Conditions

HEC1.5-T Series inverter is designed for outdoor installation (IP 65). Please ensure that the installation location meets the following conditions:

- Not in direct sunlight.
- Not in areas where highly flammable materials are stored.
- Not in potential explosive areas.
- Not in the cool air directly.
- Not near the television antennas or antenna cables.
- Not higher than altitude of about 2000m above sea level.
- Not in environment of precipitation or humidity (>95%).
- Under good ventilation conditions.
- The ambient temperature is between -20℃ and +60℃ .
- The slope of the wall should be within ± 5°.
- The wall hanging the inverter should meet the following conditions:
    i. Solid brick/concrete, or a mounting surface of comparable strength;
    ii. Inverter must be supported or reinforced if the wall's strength isn't enough (such as wooden wall, the wall covered by a thick decorative layer)

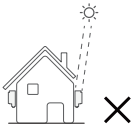
Please **AVOIDE** direct sunlight, rain exposure, snow accumulation during installation and operation.



No direct sunlight

No rain exposure

No snow accumulation

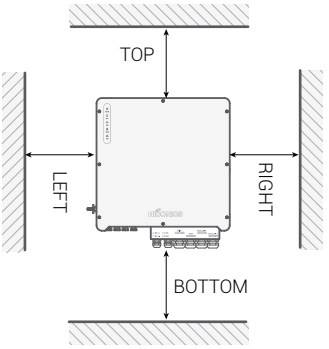


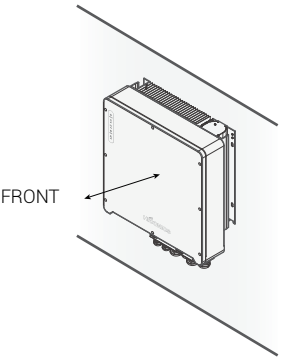
Direct sunlight

Rain exposure

Snow accumulation

Space requirement





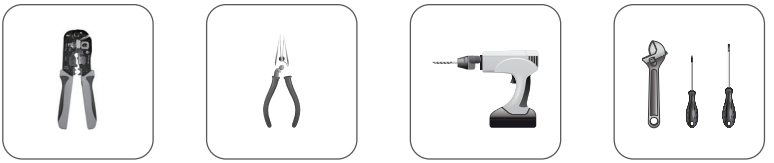
Directions	TOP	BOTTOM	LEFT	RIGHT	FRONT
Min. size (mm)	300	300	300	300	300

3.1.2 Unpack

Make sure that the inverter is intact during shipment. If there is any visible damage, such as cracks, please contact your dealer immediately.

3.1.3 Tool Preparation

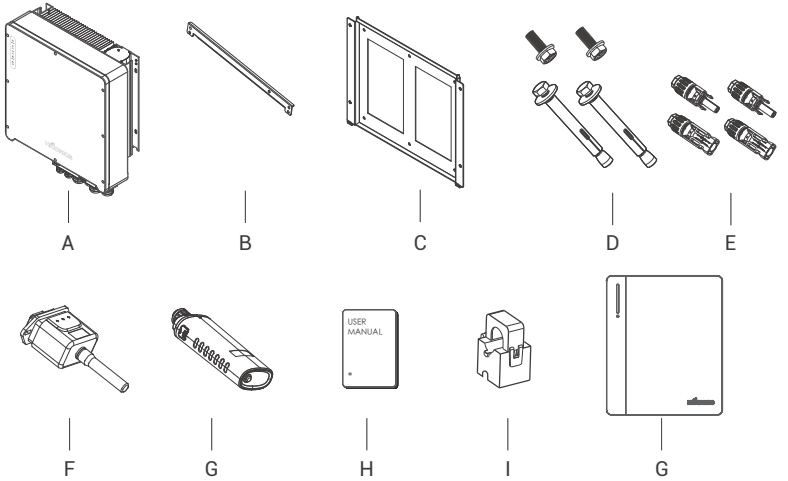
The following can be used for installing the battery pack. The tools below are for reference only. Tools which can reach the same effects shall prevail.



Terminal blocks, RJ45 crimping pliers, screwdrivers, hand wrenches and drills, etc.

3.1.4 Check Accessories

Open the package and take out the product, please check the accessories first. The package list is shown below.



Parts list

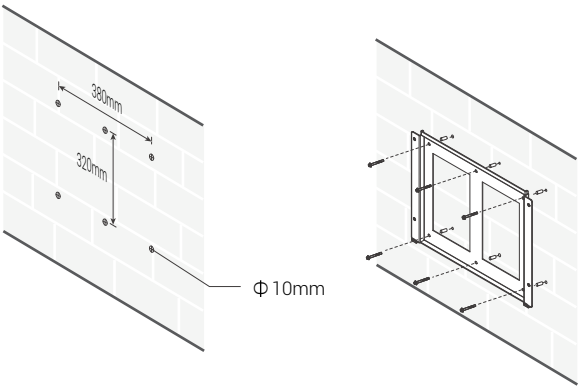
No.	Description	No.	Description
A	Inverter	F	WIFI module (optional)
B	Crossbar	G	GPRS module (optional)
C	Bracket	H	User manual
D	Expansion screws and pan-head screws	I	Current transformer(CT)
E	PV connectors (8K~12K: 2×positive, 2×negative; 15k: 4×positive, 4×negative)	G	Inverter covering piece

3.2. Installation

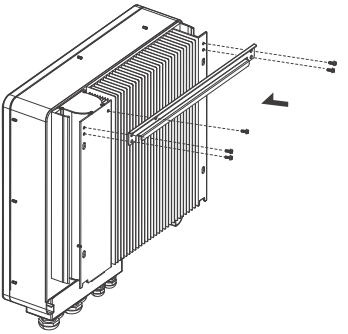
3.2.1 Structure Installation

Step 1: Mounting the wall bracket on the wall

1. Place the bracket on the wall, mark the location of the four holes and then remove it.
2. Drill holes with an drill, making sure they are deep enough (at least 60mm) to support the inverter.
3. Install the expansion tubes in the holes, and tighten them. Then install the wall bracket with the expansion screws.

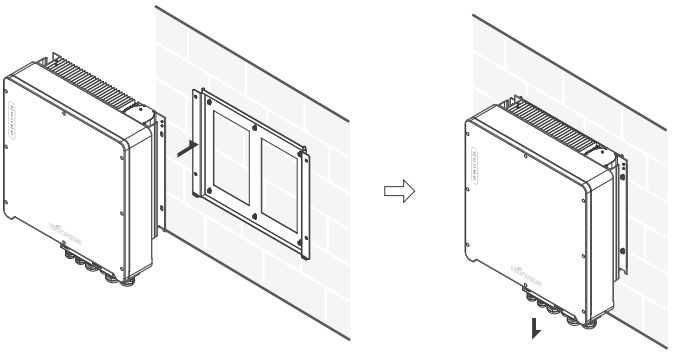


Step 2: Use the screws to fix the crossbar as shown in the figure below.



3.2.2 Inverter installation

Step 1: Place the inverter on the wall-mounted bracket by holding the handle on the side.



Step 2: Tighten the fixing screws on both sides of the inverter.

Step 3: If necessary, an anti-theft lock can be installed on the lower left side of the inverter.

3.3 Electrical Connection

3.3.1 PV connection

HEC1.5-T series Hybrid can be connected in series with 2-strings PV modules for 6KW, 8KW,10KW,15KW

Select PV modules with excellent function and reliable quality. The open circuit voltage of module arrays connected in series should be less than Max. DC input voltage. Operating voltage should be in accordance with MPPT voltage range.

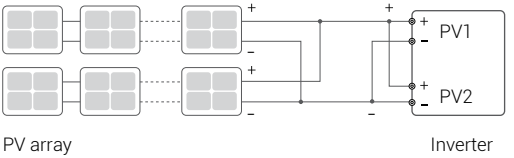
Max. DC Voltage Limitation

Model	HEC1.5-T6/8/10/12/15Hr1
Max. DC Voltage (V)	1000
MPPT Voltage Range (V)	180~850

- PV module voltage is very high, which already achieve dangerous voltage range, please comply with electric safety rules when connecting.
- **DO NOT** ground the PV positive and negative terminals.

- The following requirements of PV modules need to be applied for each input area.
- **DO NOT** ground the PV positive and (or) negative terminals.
- To save cables and reduce DC losses, it is recommended to install inverters near the PV modules.

The following PV connection mode is **NOT** allowed!

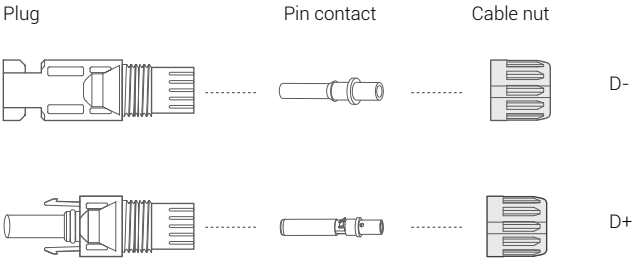


Connection steps:

Step 1 : Inspect PV modules

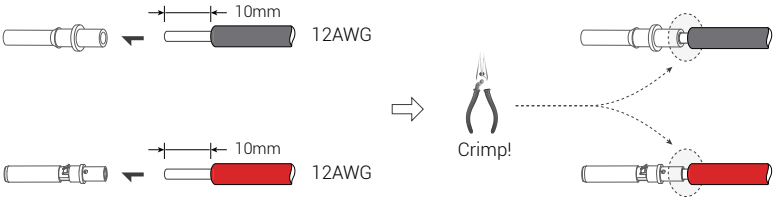
1. Measure the module array voltage with a voltmeter.
2. Check the PV+ and PV- from the PV string combiner box correctly.
3. Please make sure the impedance between the positive pole and negative pole of PV to ground should be MΩ level.

Step 2: Separate DC Connector

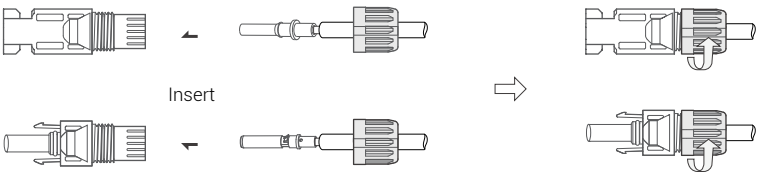


Step 3 : Wiring

1. Connect the 12 AWG wire to the cold crimp terminal.
2. Remove 10mm of insulation from the end of the wire.
3. Insert the insulator into the pin contact and clamp it with crimping pliers.



Step 4 : Insert the pin contact through the nut and into the male or female plug, when a "click" is felt or heard, the pin contact assembly is properly seated. Then tighten the nut.



Step5 : Plug the PV connector into the corresponding interface on the inverter.

3.3.2 Grid connection

The HEC1.5-T series inverters are designed for single-phase grids. The voltage is 220/230/240V and the frequency is 50/60Hz. Other technical requirements should be in accordance with the requirements of the local public grid.

Recommended cables and micro-breakers

Model	HEC1.5- T6Hr2	T8Hr2	T10Hr2	T12Hr2	T15Hr2
Cable (mm^2)	4~6			6~10	
Micro-breaker (A)	20		32		

Micro-breaker should be installed between inverter and grid, and no load

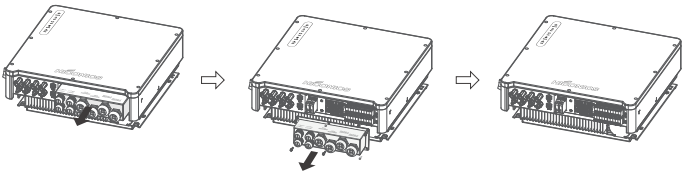
should be connected directly to the inverter.

Connection steps:

Step 1 : Check the grid voltage

1. Check the grid voltage and compare it with the allowed voltage range (Refer to technical data).
2. Disconnect the board from all phases and ensure that it is not reconnected.

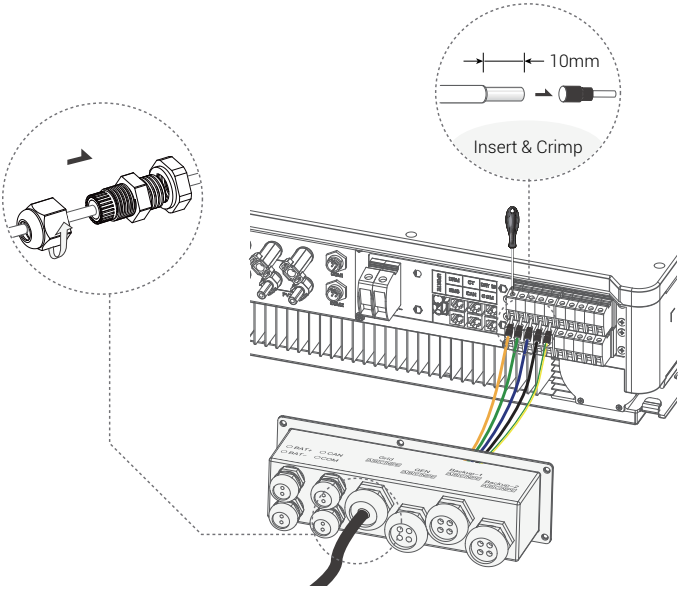
Step 2: Remove the waterproof lid from the grid port on the inverter.



Step 3 : Make the AC wires.

1. Select the appropriate wire (Cable size: refer to Table 4-2).
2. It is recommended to keep about 60mm length of cable for crimping.
3. Remove 10mm of insulation from the end of wire.
4. Thread the end of the wire into the tubular terminal and use crimping pliers to crimp it tightly.
5. Disassemble the waterproof connector and waterproof cover and thread the cable through the waterproof connector.

Step 4 : Insert the terminals into each of the three phase grid ports (loosen or tighten the crimp terminal screws with a one-way screwdriver).



3.3.3 EPS Connection (apply to I Version and E Version only)

The HEC1.5-T series hybrid inverters have both off-grid and on-grid functions.
The inverters output power through the AC port when the grid is on and through the EPS port when the grid is off.

I Version & E Version

HEC1.5-T series inverter provides two versions for customer to choose based on the local rules.

Version I applies to wiring rules that require EPS load-side ground to be isolated from grid-side ground (applies to wiring rules in Australia and New Zealand AS/NZS_3000:2012)

Version E applies to wiring rules that require the load-side ground of the EPS to be un-isolated from the grid-side ground (applicable in most countries).

Auto & Manual

For the "E version" inverters, the EPS function can be triggered automatically or manually, depending on the user's preference.
For the "I version" inverter, the EPS function can only be triggered automatically.
If the user wants to use this function manually, an external switch needs to be installed. Please refer to the specific wiring diagram below.
For solutions, please contact our sales.

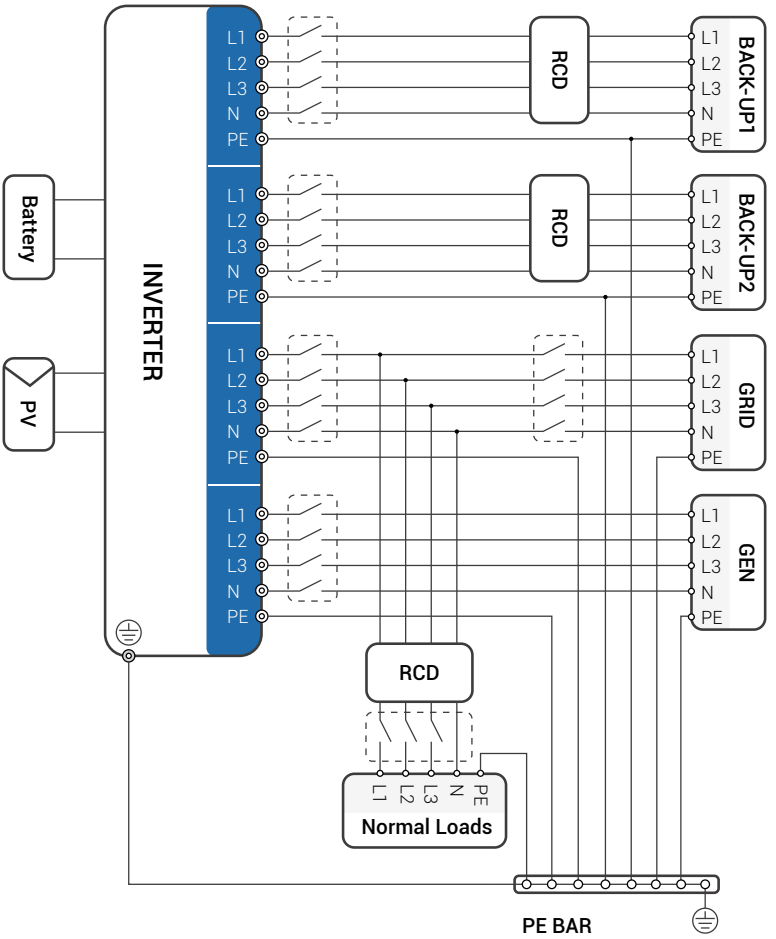
E Version Auto

Transfer switch required.

I Version Auto

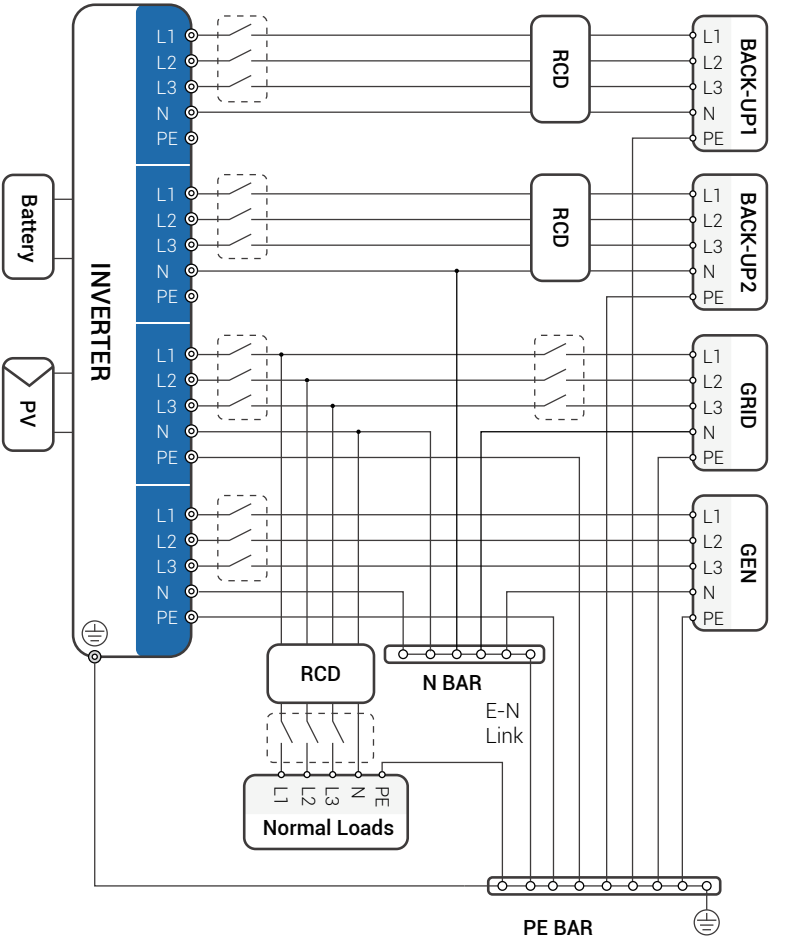
No transfer switch required.

E-Version-system diagram



The grounding screw hole of inverter is at the lower right corner.

I-Version system diagram



The grounding screw hole of inverter is at the lower right corner.

If you have a request for a compatible contactor, please contact our sales.

If local policies dictate a wiring pattern that is inconsistent with the above operating guidelines, especially for N (neutral) wire, earth and RCD, please contact us before operating! This wiring diagram is for reference only and complete electrical connections should be made in accordance with local regulations.

The HEC1.5-T series hybrid inverters have grid-on and grid-off functions. When the grid is on, the inverter will output power through the AC port, while when the grid is off, it will output power through the BACKUP ports. BACKUP1 for very important load, BACKUP2 for important or normal load. When there is a power outage or no grid,

- If the battery does not report low voltage or under voltage alarm, the inverter will supply power to both BACKUP1 and BACKUP2.
- If the battery has a low voltage or under voltage alarm, the inverter only supplies power to BACKUP1.
- The total output power of the BACK-UP1 and BACK-UP2 must not exceed the rated output power.

Recommended cables and Micro-breakers

Model	T6Hr2	T8Hr2	T10Hr2	T12Hr2	T15Hr2
Cable (mm^2)	4~6			6~10	
Micro-breaker (A)	20		32		

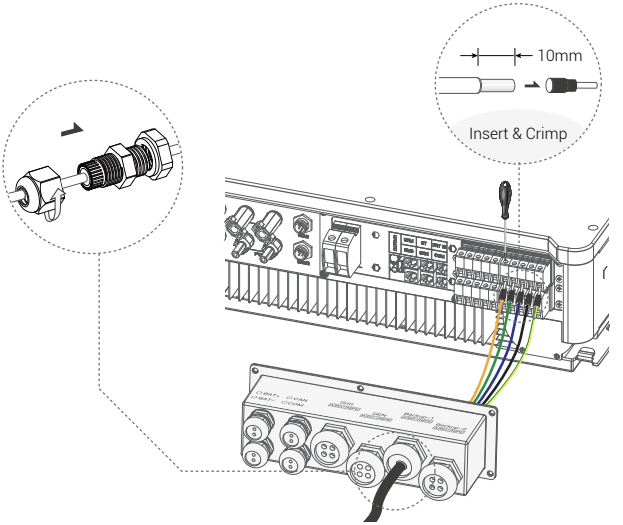
Connection steps:

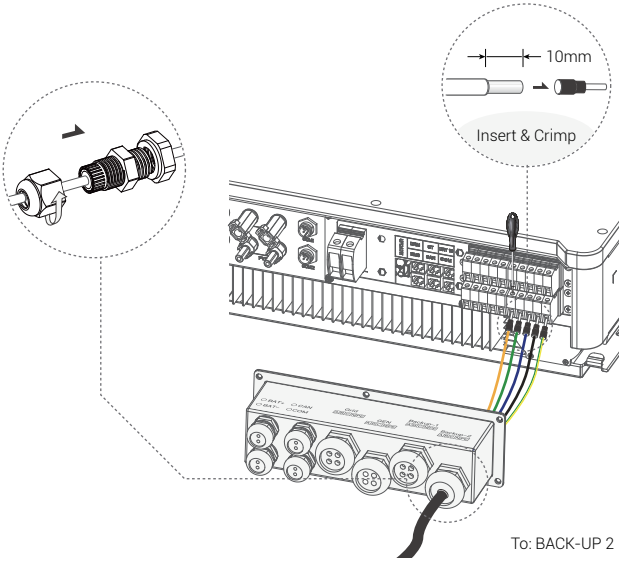
Step 1 : Make EPS wires.

1. Select the appropriate wire (Cable size: refer to Table 4-2).
2. It is recommended to keep about 60mm length of cable for crimping.
3. Remove 10mm of insulation from the end of wire.
4. Thread the end of the wire into the tubular terminal and use crimping pliers to crimp it tightly.

5. Disassemble the waterproof connector and waterproof cover and thread the cable through the waterproof connector.

Step 2 : Insert the terminals into the EPS port of the inverter (loosen or tighten the crimp terminal screws with a one-way screwdriver).





Requirements for EPS loads

WARNING

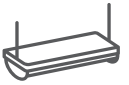
Make sure the rated load power of the EPS is within its rated output range, otherwise the inverter will shut down with an "overload" warning.

When an "overload" occurs, adjust the load power to ensure it is within the EPS output power range before turning on the inverter.

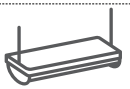
For non-linear loads, make sure that the surge power should be within the output power range of the EPS.

The following table shows some common feasible loads for your reference.

Common feasible loads for reference

Type	Power		Common equipment
	Start	Rated	
Resistive load	R1	R1	 Incandescent lamp  TV
Capacitive load	R2	R1.5	 Fluorescent lamp
Inductive load	R3~5	R2	 Fan  Fridge

For example:

Equipment	Power	
	Start	Rated
 Incandescent lamp : **100W**	100VA (W)	100VA (W)
 Fluorescent lamp: **40W**	80VA (W)	60VA (W)
 Fridge: **150W**	450~750VA (W)	300VA (W)

3.3.4 Battery Connection

The charge/discharge system of HEC1.5-T series hybrid inverters is designed for high voltage lithium batteries. Before selecting a battery, please note that the battery communication should be compatible with the HEC1.5-T series hybrid inverter.

Battery breaker

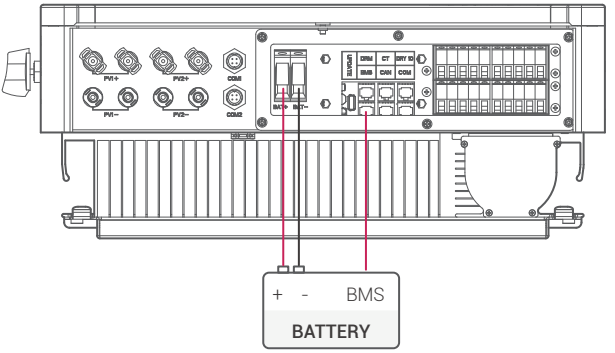
Before connecting to the battery, install a non-polarized DC circuit breaker to ensure that the inverter can be safely disconnected during maintenance.

Recommended non-polar DC breaker-breaker

Model	T6Hr2	T8Hr2	T10Hr2	T12Hr2	T15Hr2
Voltage	Nominal voltage of DC breaker should be larger than maximum voltage of battery				
Current (A)	60				

Battery connection diagram

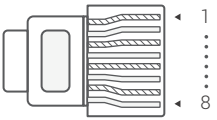
Battery connection



BMS PIN Defination

The communication interface between the inverter and the battery is RJ45, and its protocol is CAN.

BMS PIN definition



PIN	1	2	3	4	5	6	7	8
RS485	×	×	×	×	×	GND	BMS_485A	BMS_485B
CAN	×	×	×	BMS_CANH	BMS_CANL	×	×	×

When using RS485 protocol, please note that PIN2 must be disconnected.

The battery communication can only work when the battery BMS is compatible with the inverter.

Battery connection steps:

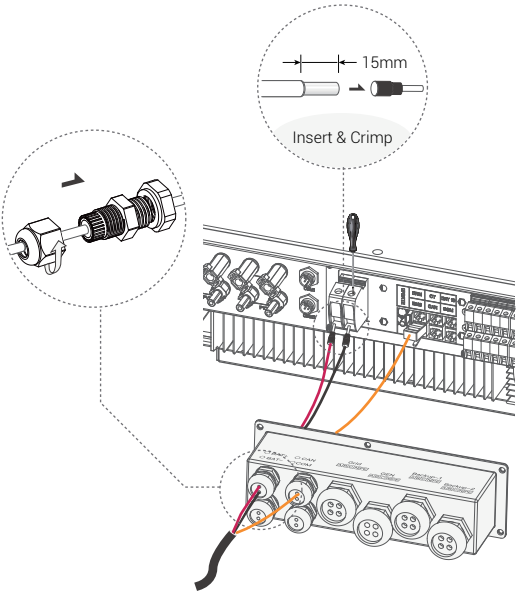
Step 1: Select the 10mm^2 wire and remove 15mm of insulation from the end of wire.

Step 2: Thread the end of the wire into the tubular terminal and use crimping pliers to crimp it tightly.

Step 3: Disassemble the waterproof connector and pass the cable through the waterproof connector.

Step 4: Insert the terminals into battery ports on the inverter.

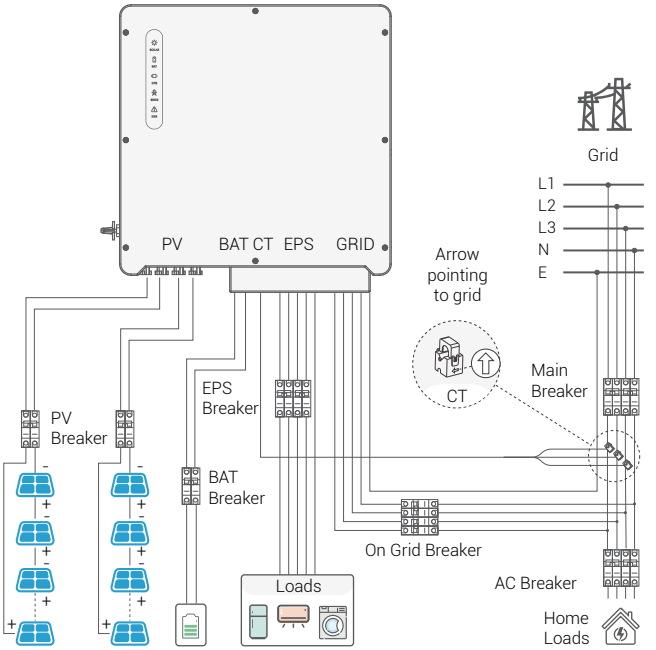
Step 5: Assemble waterproof connectors and waterproof cover.



3.3.5 CT Connection and Phase instruction

CT is used for monitoring the power usage for entire house, at the meantime, inverter will also need the data from Meter to achieve the Export Control Function.

CT connection and phase wiring diagram



The CT arrow points to the grid, otherwise the inverter will display wrong data or the machine will not work properly.

Pay attention to phase sequence when wiring. With incorrect phase sequence, the inverter will not operate properly.

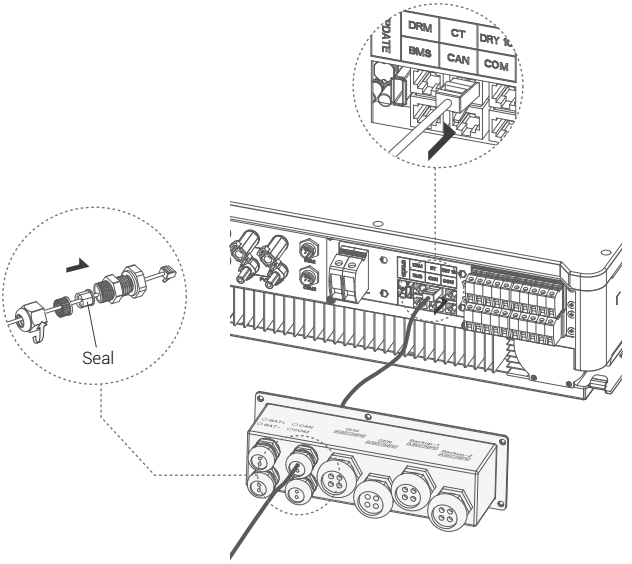
CT connection steps:

Step 1: Disassembly of waterproof connector and waterproof cover.

Step 2: Prepare a communication cable (without sheath) and pass the cable through the waterproof connector.

Step 3: Insert RJ45 end of the CT cable into the CT port of the inverter.

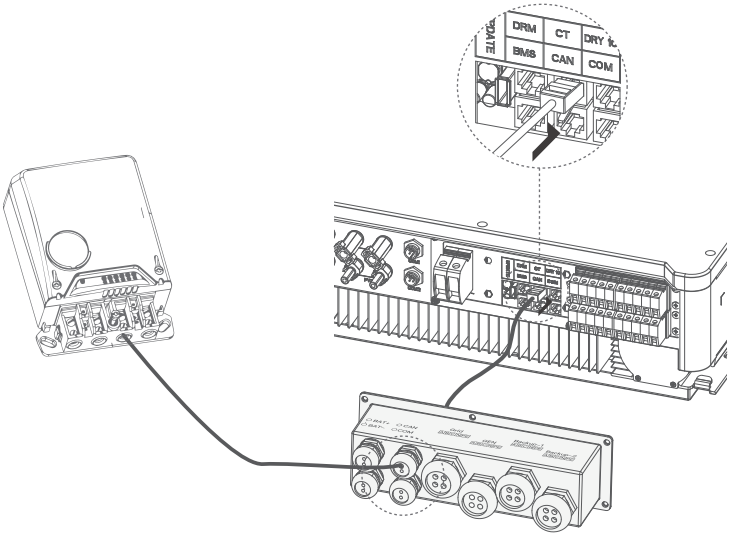
Step 4: Assemble waterproof connectors and waterproof cover.



The seal is for waterproofing. Please make sure it is put back in.

3.3.6 Meter installation (optional)

If you do not want to use a CT and wish to install a meter, we recommend installing a slide-in type. As shown in the picture below.

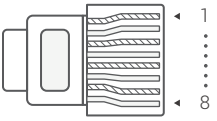


3.3.7 DRM Connection (Function temporarily retained)

The DRM supports several demand response modes by transmitting control signals as shown below.

> **NOTE**: Only PIN6 (DRM0) is available now, other PIN functions are under development.

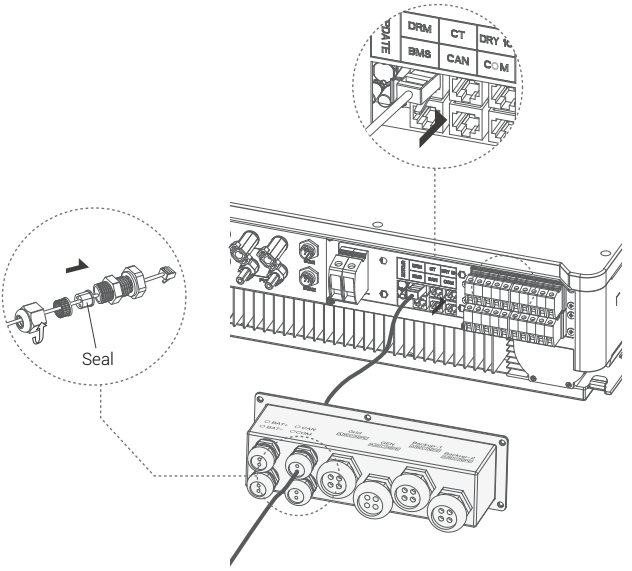
DRM PIN definition



PIN	1	2	3	4	5	6	7	8
Definition	DRM1/5	DRM2/6	DRM3/7	DRM4/8	+5V	DRM0	GND	GND

DRM connection steps:

Please refer to CT steps for DRM connection. Please kindly note that the definition of PIN and the location of the port will be slightly different.

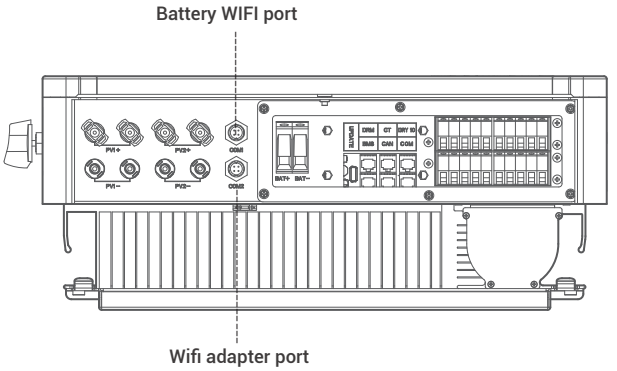


The seal is for waterproofing. Please make sure it is put back in.

3.3.8 WiFi Connection

The inverter provides a WIFI port that allows data to be collected from the inverter and transmitted to a monitoring website via WIFI.

WIFI connection diagram

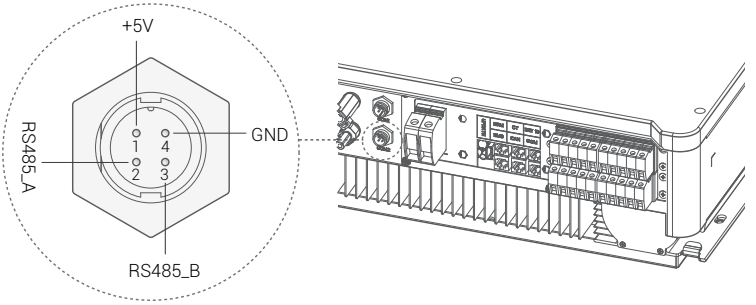


WIFI connection steps:

Step 1 Assemble WIFI Module to COM2port at the bottom of the inverter. Connect the battery pack WiFi harness to the COM1 connector on the bottom of the inverter.

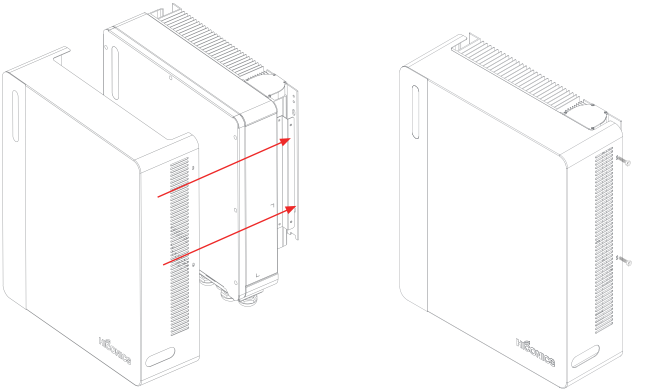
Step 2: Establish the connection between the WiFi Module and the router.

Step 3: Create a user account online. (Please check the " WIFI setup user manual" for more details).



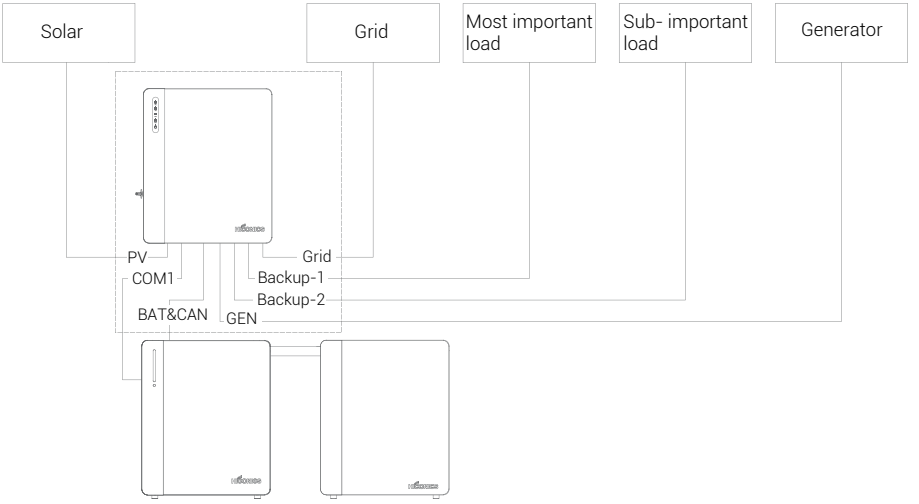
3.4 Cover installation

Assemble the trim cover to the inverter and bolt it in place as shown in the diagram below.



3.5 System Overview

The figure below shows the effect of a typical system application of inverter.



4 Product Debugging

4.1 Electrical inspection and start-up

Start inverter after checking all the following steps:

- ✓ Make sure the inverter is fixed well on the wall.
- ✓ Make sure all DC wiring and AC wiring is complete.
- ✓ Make sure the meter/CT is well connected.
- ✓ Make sure the battery is well connected.
- ✓ Make sure the external load contactor is well connected.
- ✓ (If needed) Turn on the AC switch and EPS switch.
- ✓ Turn on the PV/DC switch and the battery switch.

Check the inverter:

Step 1: Check the status of the indicators and the LCD screen. The screen should display the main interface.

Indicator	Status	Explanation
Solar	Blue on	PV active
	Blue blink	Self-check/Soft upgrade
	Blue off	PV not active
Bat	Blue on	Battery active
	Blue blink	Self-check/SOC low/ Soft upgrade
	Blue off	Battery not active
ERR	Yellow on	Communication fault
	Yellow blink	Warning
	Red on	Fault
	Off	Normal work
EPS	Blue on	EPS output with load
	Blue blink	EPS output without load
	Red on	EPS output fault
	Red blink	EPS output overload
	Off	EPS without output
GRID	Blue on	Grid is active and connected
	Blue blink	Grid is active and forced off grid
	Red on	Grid fault
	Off	Inverter shut down

If the light on the left is not blue, please check the following three items:

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

Step 2: If it is the first time to start, please follow this procedure. For specific settings, please refer to Section 5 (Setting).

Step 3: Set up the wifi according to the wifi user manual.

Step 4: Perform "self-test". (for Italy only). Self-test according to CEI 0-21 (only for Italy).

The self-test is only used for inverters that are operated and commissioned in Italy.

According to the Italian standard requirements, all inverters entering the utility grid are equipped with a self-test in accordance with CEI 0-21.

During the self-test, the inverters are continuously checked for protection response times and values for overvoltage, undervoltage, overfrequency and underfrequency.

4.2 Setting

For details on the settings, please refer to the product WiFi settings manual or consult your dealer.

5 Fault diagnosis and solutions

In case of malfunction, you can check and contact your salesman through the mobile app.

6 Product Maintenance

The inverter should be opened, repaired or dismantled by workers or personnel authorized by manufacturer only. For any consequences or liabilities due to violation against the safety operation, design, production and equipment safety standard, we do not bear any legal responsibilities.

7 Product Discontinuation

Move the inverter switch to the OFF position

Disconnect the inverter from the PV, grid and battery breakers

Disconnect all cables connected to the inverterPlease pack the inverter with original package.

If package is unavailable, please use the equivalent carton that conforms to the following requirements.

- Applies to load above 80kg
- With handle
- The product can be wrapped completely

8 Disclaimer

Hiconics will offer quality guarantee services within the warranty period if the Product is installed and used by the Manual.

The warranty will expire immediately if the Product's installation or operation violates against the Manual

For any direct or indirect losses and damages due to the followings, we shall not offer quality warranty services, nor undertake the direct or indirect liabilities.

- Force Majeure (earthquake, tsunami, fire hazard, etc.)
- Misuse or non-compliance with regulations
- Improper installation, debugging, startup or operation (violate against the detailed guidance principle in installation manual)

- The cooling and natural airflow are minimized due to insufficient ventilation and circulation
- Installed in corrosive environment
- Damage during transport
- Unauthorized maintenance
- External factors, including abnormal physical or electrical pressure (blackout surge, surge current, etc.)
- Incompatible frequency converter or device
- Connected to other brands of inverters without permission by Hiconics

HICONICS
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