HYD 3 …. 6K-EP

Installation and operating manual

Version 01 | May 2022

English

HYD 3000-EP, HYD 3680-EP, HYD 4000-EP, HYD 4600-EP, HYD 5000-EP, HYD 5500-EP, HYD 6000-EP

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1 About this manual

This manual contains important safety information that must be observed during installation and maintenance of the device.

Carefully read this manual before use and retain it for future reference!

This manual must be treated as an integral component of the device. The manual must be kept in close proximity to the device, including when it is handed over to another user or moved to a different location.

1.1 Copyright declaration

SofarSolar reserves the right to final interpretation. This manual may be amended following feedback from users or customers. Please consult our website at http://www.sofarsolar.com for the latest version.

The current version was updated on 06/02/2023.

1.2 Structure of the manual

This manual contains important safety and installation instructions that must be observed during installation and maintenance of the device.

1.3 Scope

This product manual describes the installation, electrical connection, commissioning, maintenance and fault elimination procedures of the HYD 3000 ... 6000-EP inverters.

1.4 Target group

This manual is intended for specialist electrical engineers who are responsible for the installation and commissioning of the inverter in the PV system, as well as the PV system operators.

1.5 Symbols used

This manual contains information on safe operation and uses symbols to ensure the safety of persons and property as well as the efficient operation of the inverter. Please read through the following symbol explanations carefully in order to prevent injury or property damage.

⚠ DANGER

Non-observance will result in death or serious injury.

- Follow the warnings in order to prevent death or serious injury!

⚠ WARNING

Non-observance may result in death or serious injury.

- Follow the warnings in order to prevent serious injury!

⚠ CAUTION

Non-observance may result in minor injury.

- Follow the warnings in order to prevent injury!

ATTENTION

Non-observance may result in property damage!

- Follow the warnings in order to prevent damage to or destruction of the product.

NOTE

- Provides tips essential to the optimal operation of the product.

2 Basic safety information

NOTE

- If you have any questions or problems after reading the following information, please contact SofarSolar

This chapter details the safety information pertaining to the installation and operation of the device.

2.1 Safety information

Read and understand the instructions within this manual and familiarise yourself with the relevant safety symbols in this chapter before beginning with the installation of the device and eliminating any faults.

Before connecting to the power grid, you must obtain official authorisation from the local power grid operator in accordance with the corresponding national and state requirements. Furthermore, operation may only be carried out by qualified electricians.

Please contact the nearest authorised service centre if any maintenance or repairs are required. Please contact your dealer to obtain information about your nearest authorised service centre. Do NOT carry out repairs on the device yourself; this may lead to injury or property damage.

Before installing the device or carrying out maintenance on it, you must open the DC switch in order to interrupt the DC voltage of the PV generator. You can also switch off the DC voltage by opening the DC switch in the Array junction box. Not doing this may result in serious injury.

2.1.1 Qualified personnel

Personnel tasked with the operation and maintenance of the device must have the qualifications, competence and experience required to perform the described tasks, while also being capable of fully understanding all instructions contained within the manual. For safety reasons, this inverter may only be installed by a qualified electrician who:

- has received training on occupational safety, as well as the installation and commissioning of electrical systems
- is familiar with the local laws, standards and regulations of the grid operator.

SofarSolar assumes no responsibility for the destruction of property or any injuries to personnel caused by improper usage.

2.1.2 Installation requirements

Please install the inverter according to the information contained in the following section. Mount the inverter to a suitable object with a sufficient load-bearing capacity (e.g. walls, PV frames etc.) and ensure that the inverter is upright. Choose a suitable place for the installation of electrical devices. Ensure that there is sufficient space for an emergency exit which is suitable for maintenance. Ensure sufficient ventilation in order to guarantee an air circulation for the cooling of the inverter.

2.1.3 Transport requirements

The factory packaging is specifically designed to prevent transport damage, i.e. violent shocks, moisture and vibrations. However, the

device must not be installed if it is visibly damaged. In this case, notify the responsible transport company immediately.

2.1.4 Labelling on the device

The labels must NOT be concealed by items and foreign objects (rags, boxes, devices, etc.); they must be regularly cleaned and kept clearly visible at all times.

2.1.5 Electrical connection

Observe all applicable electrical regulations when working with the inverter.

⚠ DANGER

Dangerous DC voltage

- Before establishing the electrical connection, cover the PV modules using opaque material or disconnect the PV generator from the inverter. Solar radiation will cause dangerous voltage to be generated by the PV generator!

⚠ DANGER

Danger through electric shock!

- All installations and electrical connections may only be carried out by trained electricians!

IMPORTANT

Authorisation for grid feed-in

- Obtain authorisation from the local power grid operator before connecting the inverter to the public power grid.

NOTE

Voiding of guarantee

- Do not open the inverter or remove any of the labels. Otherwise, SofarSolar shall assume no guarantee.

2.1.6 Operation

⚠ DANGER

Electric shock

- Contact with the electrical grid or the device's terminals may result in an electric shock or fire!
- Do not touch the terminal or the conductor which is connected to the electrical grid.
- Follow all instructions and observe all safety documents that refer to the grid connection.

⚠ CAUTION

Burning due to hot housing

- While the inverter is being operated, several internal components will become very hot.
- Please wear protective gloves!
- Keep children away from the device!

2.1.7 Repair and maintenance

⚠ DANGER

Dangerous voltage!

- Before carrying out any repair work, first switch off the AC circuit breaker between the inverter and power grid, and then the DC switch.
- After switching off the AC circuit breaker and the DC switch, wait a minimum of 5 minutes before starting any maintenance or repair work.

IMPORTANT

Unauthorised repairs!

- Following the elimination of any faults, the inverter should be fully functional once more. Should any repairs be required, please contact a local authorised service centre.
- The internal components of the inverter must NOT be opened without the relevant authorisation. Shenzhen SOFARSOLAR Co., Ltd. assumes no responsibility for any resulting losses or defects.

2.2 Symbols and signs

⚠ CAUTION

Beware of burning hazards due to the hot housing!

- While the inverter is in operation, only touch the display and the buttons, as the housing can become hot.

ATTENTION

Implement earthing!

- The PV generator must be earthed in accordance with the requirements of the local power grid operator!
- For reasons of personal safety, we recommend that all PV module frames and inverters of the PV system are reliably earthed.

⚠ WARNING

Damage due to overvoltage

- Ensure that the input voltage does not exceed the maximum permissible voltage. Overvoltage may cause long-term damage to the inverter, as well as other damage that is not covered by the warranty!

2.2.1 Symbols on the inverter

Several symbols pertaining to safety can be found on the inverter. Please read and understand the content of these symbols before starting the installation.

Symbol	Description
	Residual voltage is present in the inverter! Before opening the inverter, you should wait five minutes to ensure that the capacitor has been fully discharged.

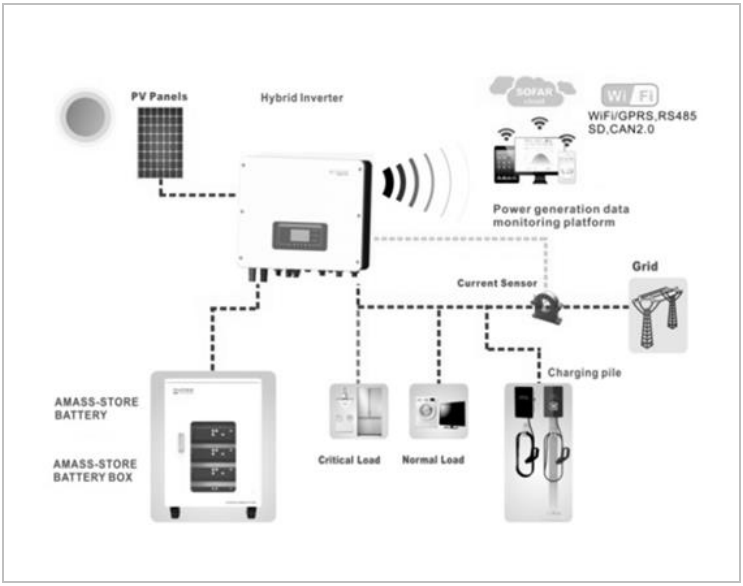
Symbol	Description
	Caution! Danger through electric shock
	Caution! Hot surface
	The product is compliant with EU guidelines
	Earthing point
	Please read the manual before installing the inverter
IP	Device degree of protection according to EN 60529
+ −	Positive and negative poles of the DC input voltage
	The inverter must always be transported and stored with the arrows pointing upward
	RCM (Regulatory Compliance Mark) The product meets the requirements of the applicable Australian standards.

3 Product features

This chapter describes the product features, dimensions and efficiency levels.

3.1 Product information

The HYD 3000 ... 6000-EP is a grid-coupled PV and energy storing inverter which can also supply energy in stand-alone operation. The HYD 3000 ... 6000-EP has integrated energy management functions which cover a diverse range of application scenarios.



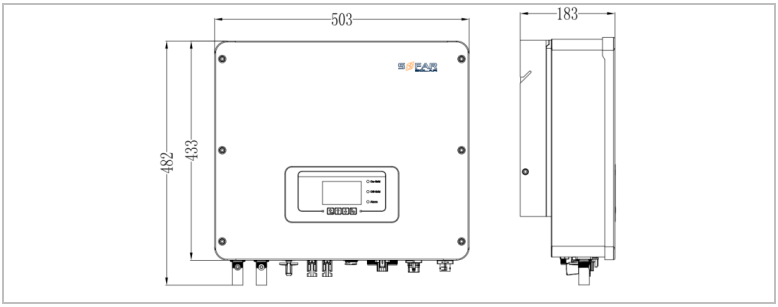
HYD 3000 ... 6000-EP inverters may only be used with photovoltaic modules which do not require one of the poles to be earthed. In normal

operation, the operating current must not exceed the limits specified within the technical data.

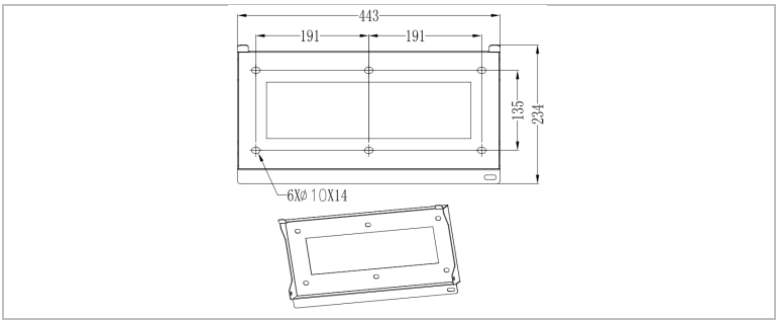
The selection of the optional inverter parts must be determined by a qualified technician who has good knowledge of the installation conditions.

Product dimensions

HYD 3...6K-EP:

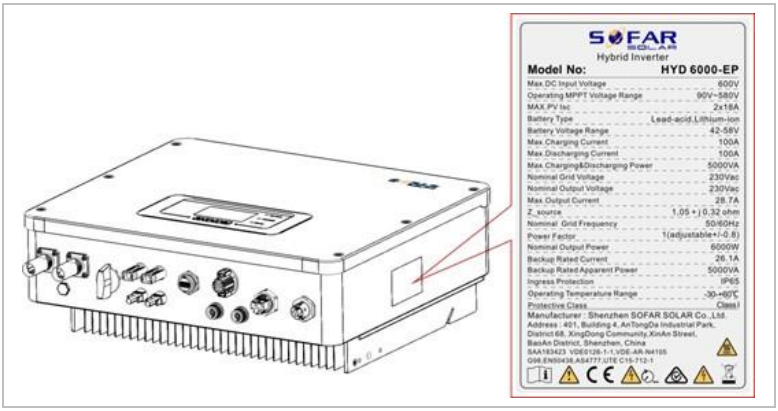


Wall bracket:



3.2 Labelling on the device

Labelling must not be covered or removed!



3.3 Functional features

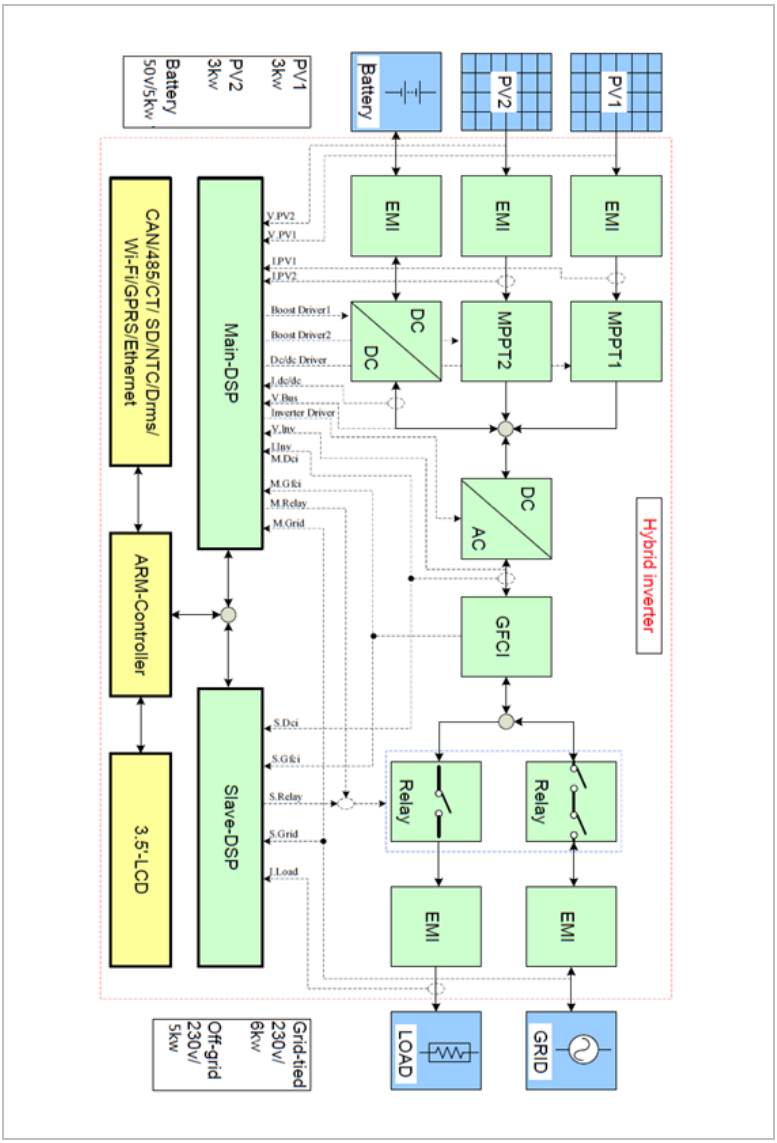
The DC output generated by the PV generator can be used for both grid feed-in and battery charging.

The battery can supply the energy to the grid or the consumer. The emergency current supply mode (EPS) can provide inductive loads such as air conditioning systems or refrigerators with an automatic switchover time of less than 10 milliseconds.

3.3.1 Functions

- Flexible switching between grid operation and energy storage operation
- Charging/discharging current up to 100 A
- Parallel operation with up to 10 units
- Monitoring via RS485/WiFi/Bluetooth, optional: GPRS

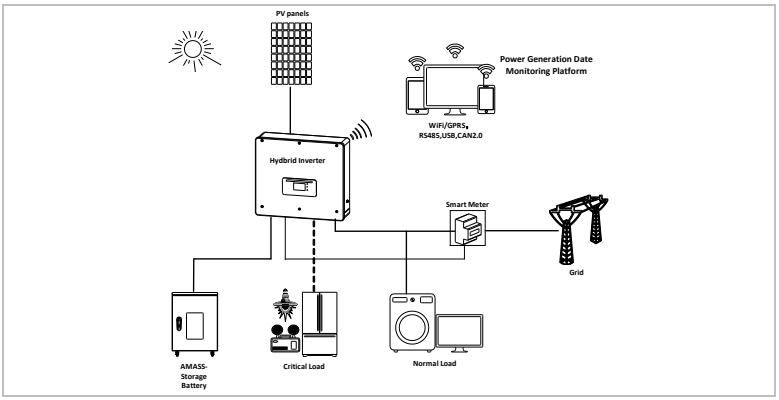
3.3.2 Electrical block diagram



3.4 Application modes

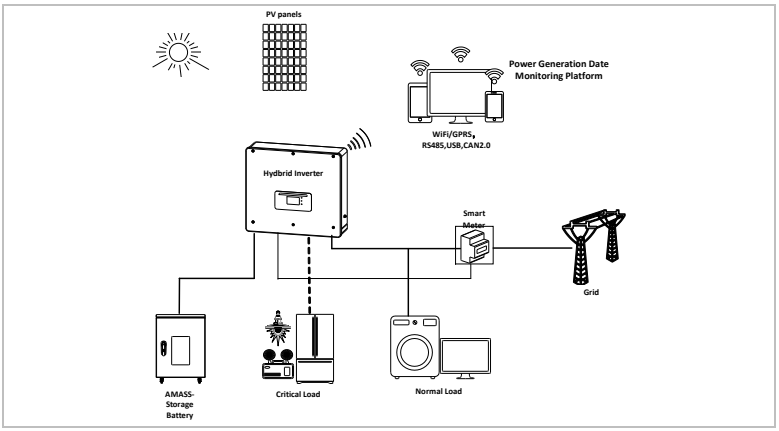
3.4.1 Typical energy storage system

A typical energy storage system with PV panels and battery unit(s), connected to the grid.



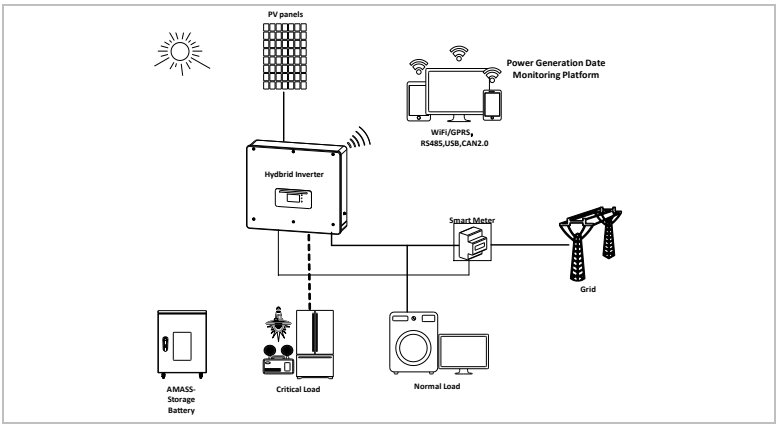
3.4.2 System without PV connection

In this configuration, there are no PV panels connected and the battery is charged through the grid connection.



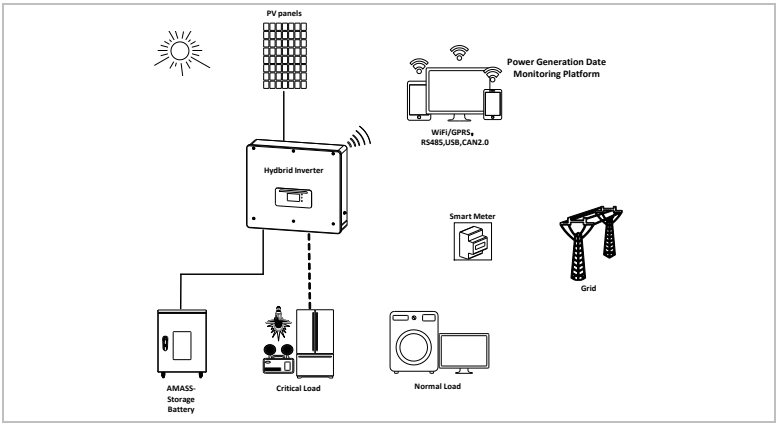
3.4.3 System without battery

In this configuration, the battery unit(s) can be added later.



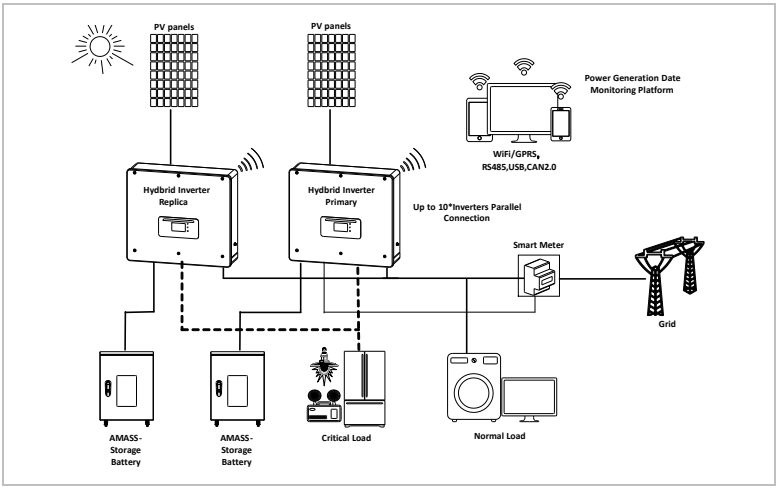
3.4.4 Back-up mode (off-grid)

When there is no grid connection, the PV panels and the battery will provide electricity to the critical load.



3.4.5 System with multiple inverters

Up to 10 inverters can be connected in parallel, resulting in an EPS output of up to 60 kVA.



NOTE

- For the parallel switching of several devices, it is recommended to use a joint AC load break switch for the connected loads both at the LOAD and GRID connection.
- In order to evenly distribute the loads among the inverters, the cable length between each output and the load must be the same.
- If the maximum apparent power of a load is greater than 110% of the inverter's rated output, the device must not be connected via the AC LOAD terminal, but rather directly to the grid.

4 Installation

4.1 Installation information

⚠ DANGER

Fire hazard

- Do NOT install the inverter on flammable material.
- Do NOT install the inverter in an area in which flammable or explosive material is stored.

⚠ CAUTION

Burning hazard

- Do NOT install the inverter in places where it can be accidentally touched. The housing and heat sink may become very hot while the inverter is in operation.

ATTENTION

Environment requirements

- Choose an easily accessible place that‘s dry, clean, and tidy.
- Ambient temperature range: -30℃–60℃.
- Relative humidity: 0–100% (non-condensed).
- The inverter should be installed in a well-ventilated location.
- Maximum altitude: 4000m.

IMPORTANT

Weight of the device

- Take into account the weight of the inverter when transporting and moving it.
- Choose a suitable installation location and -surface.
- Commission a minimum of two persons with the installation of the inverter.
- Do not set down the inverter upside-down.

4.2 Installation procedure

Mechanical installation is performed as follows:

1. Examine the inverter before installation
2. Prepare the installation
3. Select an installation location
4. Transport the inverter
5. Mount the rear panel
6. Install the inverter

4.3 Examination before installation

4.3.1 Checking the external packaging materials

Packaging materials and components may become damaged during transportation. Therefore, the external packaging materials must be examined before the inverter is installed. Check the external packaging material for damage, e.g. holes and cracks. If you discover any cases of damage, do not unpack the inverter and contact the transport company

and/or dealer immediately. It is recommended that the packaging material should be removed within 24 hours before installing the inverter.

4.3.2 Checking the delivery scope

After unpacking the inverter, check that the delivery items are both intact and complete. In the event of any damage or missing components, contact the wholesaler.

No.	Image	Description	Quantity
01		Inverter HYD 3000 ... 6000-EP	1
02		Wall bracket	1
03		PV+ input terminal	2
04		PV- input terminal	2
05		Crimp contact socket	2
06		Crimp contact pin	2
07		BAT- input terminal	1
08		BAT+input terminal	1
09		M6 hexagon screws	2
10		M8*80 Expansion bolts used to secure the wall-mount bracket to the wall	4
11		AC Grid connector	1
12		Load Output connector	1

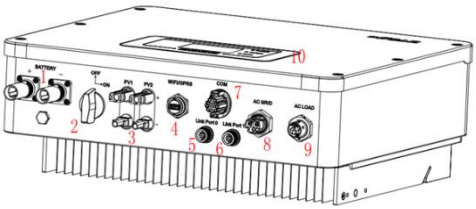
No.	Image	Description	Quantity
13		Link port connector	1
14		8 pin terminal	1
15		Split Core Current Transformer	1
16		COM 16pin connector	1
17		Communication cable	1
18		WiFi stick	1
19		Manual	1
20		The warranty card	1
21		Quality Certificate	1

4.4 Connections

⚠ CAUTION

Damage during transportation

- Please check the product packaging and connections carefully prior to installation.

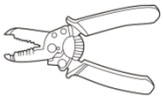
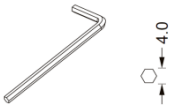
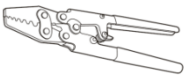
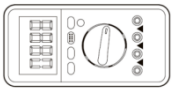
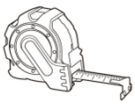
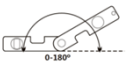


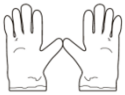
①	Battery input terminals	②	DC switch
③	PV input terminals	④	USB/WiFi
⑤	Link Port 0	⑥	Link Port 1
⑦	COM	⑧	Grid connection port
⑨	Load connection port	⑩	External LCD terminal

4.5 Tools

Prepare the tools required for the installation and the electrical connection.

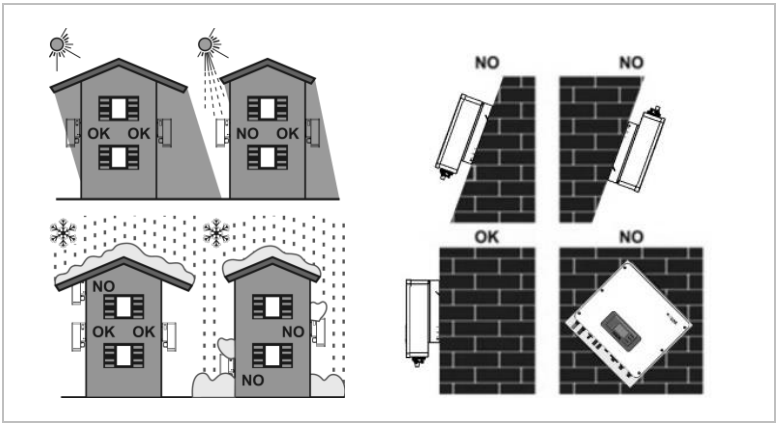
No.	Tool	Model	Function
01		Hammer drill Recommended drill diameter: 6mm	Used to drill holes in the wall.
02		Screwdriver	Wiring
03		Cross screwdriver	Used to remove and install the screws of the AC terminal

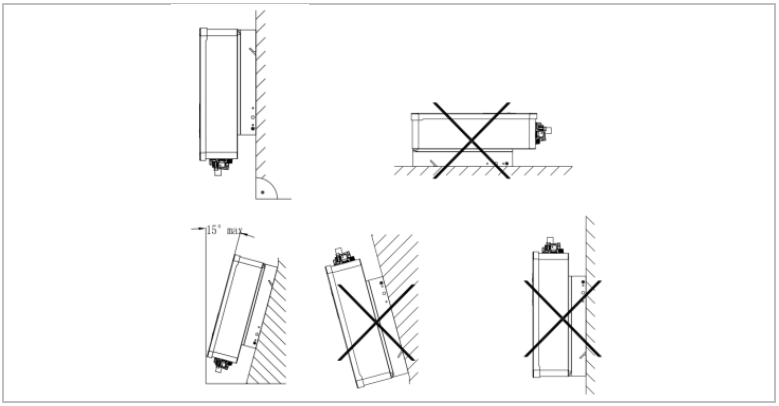
No.	Tool	Model	Function
04		Removal tool	Used to remove the PV terminal
05		Wire stripper	Used to strip the wire
06		4mm Allen key	Used to turn the screw to connect the rear panel to the inverter.
07		Crimping tool	Used to crimp power cables
08		Multimeter	Used to check the earthing
09		Wrench (≥ 32mm)	Used to tighten expansion bolts
10		Marker	Used for marking
11		Measuring tape	Used to measure distances
12		Spirit level	Used to align the wall bracket

No.	Tool	Model	Function
13		ESD gloves	for the installer
14		Safety goggles	for the installer
15		Anti-dust respiratory mask	for the installer

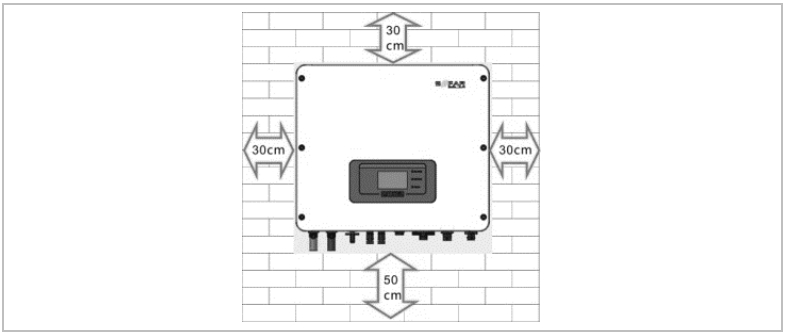
4.6 Installation location

Choose a suitable position for the installation of the inverter. Ensure that the following requirements have been fulfilled:

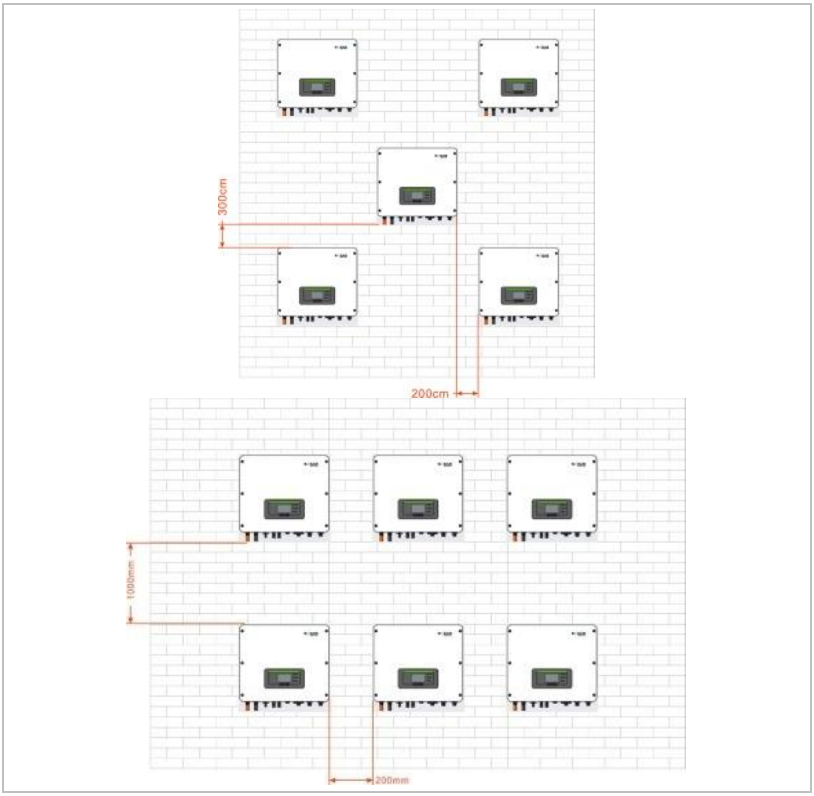




Minimum distances for individual HYD 3000 ... 6000-EP inverters:



Minimum distances for several HYD 3000 ... 6000-EP inverters:

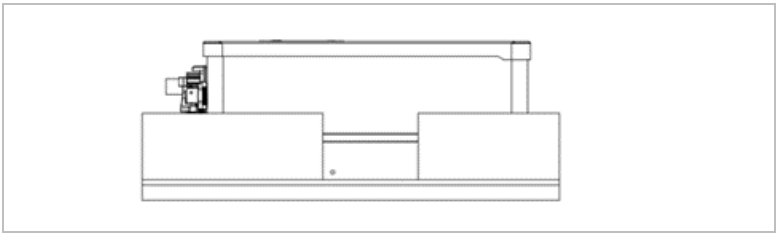


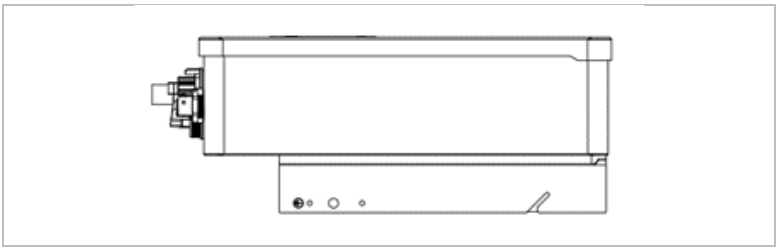
NOTE

- Choose an easily accessible place that‘s dry, clean, and tidy.
- Ambient temperature range: -30°C–60°C.
- Relative humidity: 0–100% (non-condensed).
- The inverter should be installed in a well-ventilated location.
- Maximum altitude: 4000m.

4.7 Unpacking the inverter

1. Open the packaging and grip underneath the inverter at the sides with both hands.





2. Lift the inverter out of the packaging and move it to its installation position.

ATTENTION

Mechanical damage

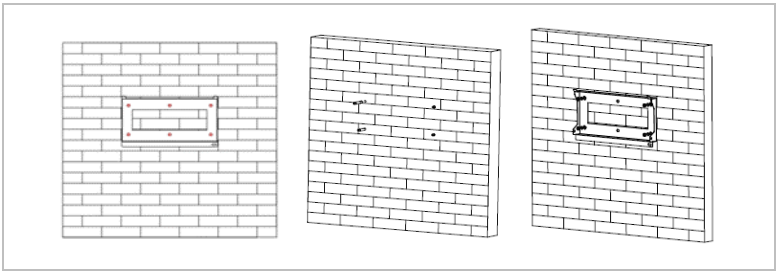
- In order to prevent injuries and damage to the device, ensure that the inverter is kept balanced while it is being moved - it is very heavy.
- Do not place the inverter on its connections, as these are not designed to bear its weight. Place the inverter horizontally on the ground.
- When you place the inverter on the ground, place foamed material or paper underneath it in order to protect its housing.

4.8 Installation of the inverter

1. Hold the wall bracket in the desired place and mark the three holes. Put the wall bracket aside and drill the holes.

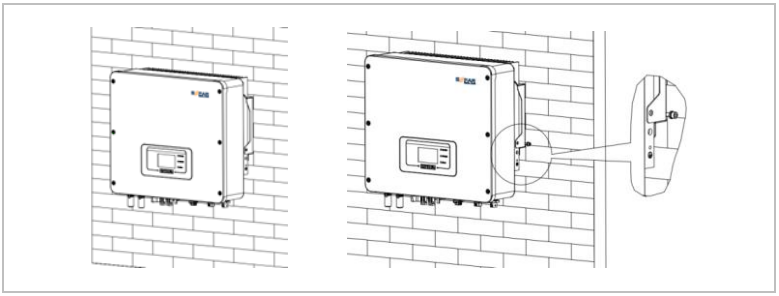
2. Insert the complete dowel into the hole vertically.

3. Fasten the rear panel to the wall using the four screws.



4. Place the inverter onto the wall bracket. Secure the inverter to the wall bracket M6 screws.

5. You can secure the inverter to the wall bracket using a lock.



5 Electrical connections

5.1 Safety instructions

This topic describes the electrical connections of the inverter HYD 3000 ... 6000-EP. Read this section thoroughly and carefully before connecting the cables.

⚠ DANGER

Electrical voltage at the DC connections

- Ensure that the DC switch is OFF before establishing the electrical connection. The reason is that the electrical charge remains in the capacitor after the DC switch has been switched off. Therefore, at least 5 minutes must pass before the capacitor has been electrically discharged.

⚠ DANGER

Electrical voltage

- PV modules generate electrical energy when exposed to sunlight, and this may present an electrical shock hazard. Therefore, cover the PV modules with an opaque sheet before connecting to the DC input power cable.

ATTENTION

Qualification

- The installation and maintenance of the inverter must be carried out by an electrician.

NOTE

- The open-circuit voltage of the modules connected in series must be lower than or equal to 600 Vdc.

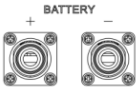
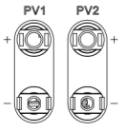
The connected PV modules must be compliant with IEC 61730 class A.

Isc PV (absolute maximum)		18,0 A / 18,0 A
Maximum AC overcurrent protection	HYD 3000-EP	15 A
	HYD 3680-EP	16 A
	HYD 4000-EP	20 A
	HYD 4600-EP	20,9 A
	HYD 5000-EP	21,7 A
	HYD 5500-EP	25 A
	HYD 6000-EP	27,3 A

The DVC (decisive voltage classification) is the circuit voltage which constantly occurs between two arbitrary live parts during proper use in a worst-case scenario:

Interface	DVC
DC input connection port	DVCC
AC connection port	DVCC
Battery connection port	DVCC
Load connection port	DVCC
USB/WiFi interface	DVCA
COM interface	DVCA
Link Port	DVCA

Wiring overview

Component	Description		Recommended cable type	Recommended cable size (mm^2)
	+ : Positive cable of the lithium battery - : Negative cable of the lithium battery		Outdoor multicore copper cable	16 – 20
	+ : Positive cable of PV module - : Negative cable of PV module		PV cable	4 – 6
	Load	L N PE	Outdoor multicore copper cable	4 – 6
	AC	L N PE	Outdoor multicore copper cable	5 – 8

5.2 Electrical connection

The electrical connection is established as follows:

1. Connect PE cable
2. Connect DC input cable

3. Connect AC output power cable
4. Connect communication cable (optional)

5.3 Connecting the PE cable

Connect the inverter to the equipotential bonding bar by using the protective earth cable (PE) for grounding.

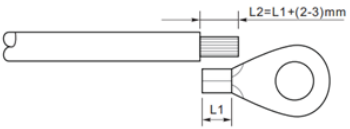
ATTENTION

Pole earthing not permissible!

- As the inverter is transformerless, the plus and minus poles of the PV generator must NOT be earthed. Otherwise, the inverter will malfunction. In the PV system, all non-current carrying metal parts (e.g. PV module frames, PV rack, combiner box enclosure, inverter enclosure, etc.) require earthing. The colour of the cable should be yellow-green.

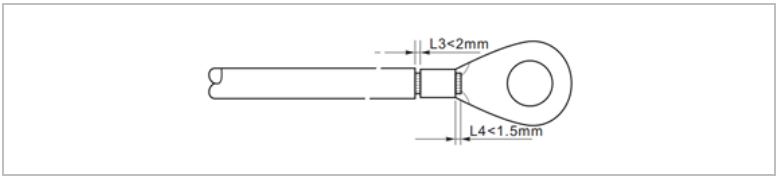
Please follow below steps to connect the PE cable.

1. Remove the insulation of the cable. For outside use, cables of ≥ 4mm² are recommended for earthing).

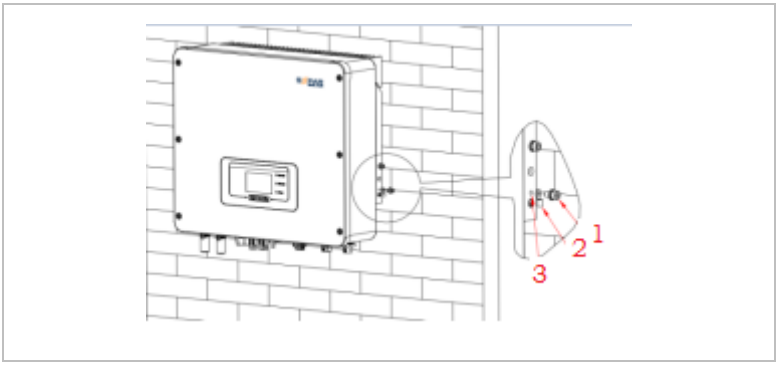


Note: L2 is 2 to 3 mm longer than L1

2. Crimp the cable to the ring terminal:



3. Install the crimped ring terminal and the washer with the M5 screw and tighten these with a torque of 3 Nm using an Allen key.



①	M5 screw	②	Ring terminal
③	Threaded hole		

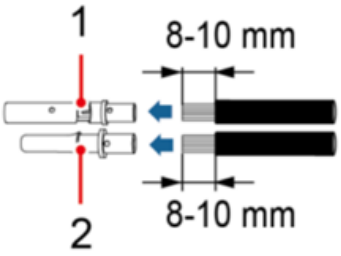
5.4 Connecting the DC cables

Please observe the recommended cable dimensions:

Cable cross-section (mm^2)		Outer diameter of cable (mm)
Range	Recommended value	
4.0 … 6.0	4.0	4.5 … 7.8

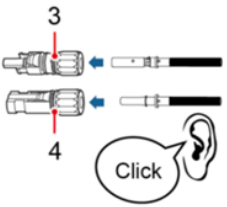
1. Remove the crimp contacts from the positive and negative connections.

2. Remove the insulation of the cables:



①	Positive DC cable	②	Negative DC cable

3. Insert the positive and negative DC cables into the corresponding cable glands.
4. Crimp the DC cables. The crimped cable must be able to withstand a tractive force of 400 Nm.



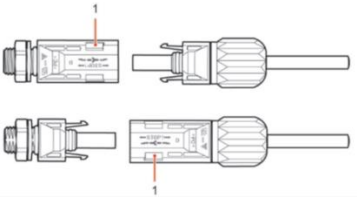
③	Positive power cable	④	Negative power cable

⚠ CAUTION

Danger of reverse polarity!

- Ensure that the polarity is correct before connecting the cables to the DC input ports!

5. Insert the crimped DC cables into the corresponding connector housing until you hear a “clicking” sound.
6. Re-screw the cable glands to the connector housing.
7. Insert the positive and negative connectors into the corresponding DC input terminals of the inverter until you hear a “clicking” sound.



① Locking

NOTE

- Put the protective caps on the unused DC connections.

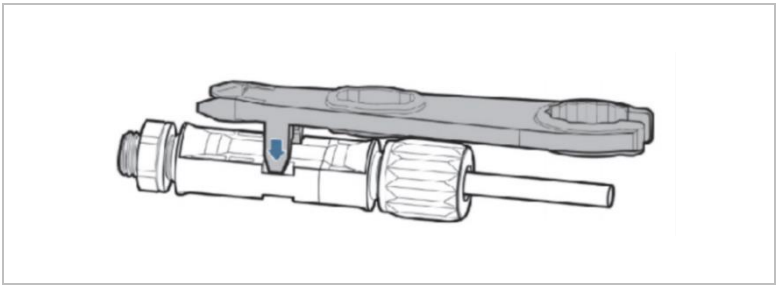
To remove the connector, please follow below instructions.

⚠ CAUTION

Danger of DC arcing

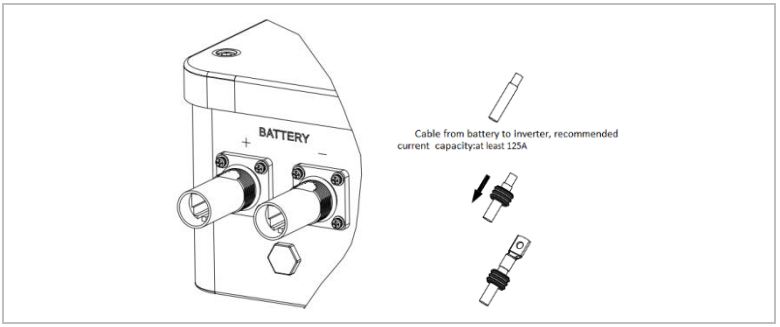
- Before removing the plus and minus connector, ensure that the DC switch has been set to OFF.

In order to remove the plus and minus connection from the inverter, insert a removal key into the locking and press on the key with the adequate force as shown in the following illustration:

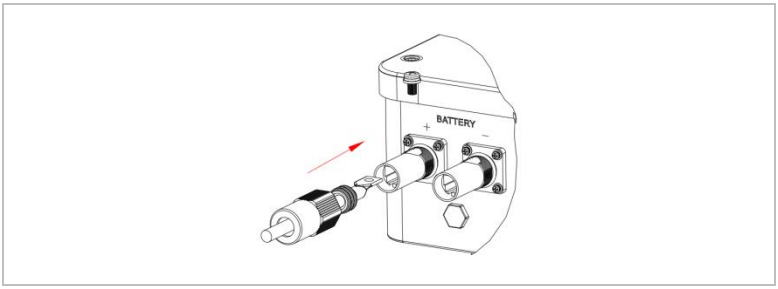


5.5 Connecting the battery

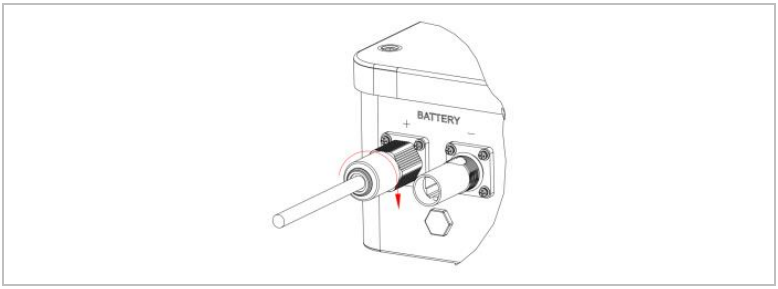
1. Insert the connectors into the battery ports, then select a suitable cable. The recommended current capacity of cable is at least 125 A.



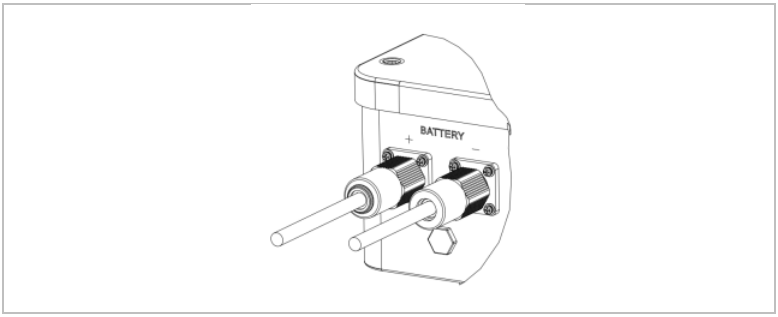
2. Connect the cable.



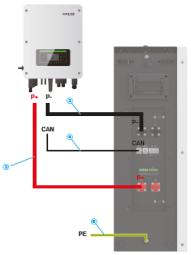
3. Turn the connector clockwise until it locks into place.



4. Connect the negative cable following the same steps.



5. Remove the connector by turning it anticlockwise.



No.			Qty.
1		GTX5000	1 pc
2		Cable for Inverter & Battery Connection	1 Set (Positive & negative)
3		Cable for Battery & Battery Connection	None
4		Cable for Inverter & Battery Communication	1 pc
5		Cable for Battery & Battery Communication	None
6		PE	Not Supplied

For batteries with a BMS (for example Li-Ion batteries), you need to connect either the CAN Bus or RS485 with the Battery Management system.

The inverter will use the CAN Bus or RS485 Bus based on the battery selection on the inverter LCD menu.

5.6 Connecting the AC power cables

Connect the inverter to the critical loads on the EPS port and the AC power distributor or the power grid using AC power cables.

⚠ CAUTION

AC connection

- Each inverter must have its own circuit breaker.
- Do not connect any consumers between the inverter and circuit breaker!
- The AC disconnecting device must be easily accessible.

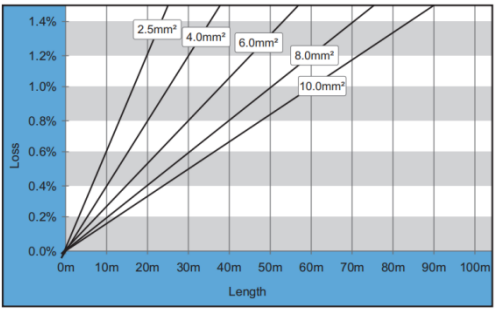
NOTE

- The inverter HYD 3000 ... 6000-EP has a built-in RCD (univ. sensitive residual current protection). If an external RCD is required, we recommend an RCD type A featuring a residual current of 300 mA or higher.
- Please follow the national rules and regulations for the installation of external relays or circuit breakers!

Dimensioning

The AC output cables are three-wire cables for outdoor areas. To simplify the installation process, use flexible cables. The recommended cable size is 4–6mm^2.

The AC cable should be correctly dimensioned in order to ensure that the loss of power in the AC cable is less than 1% of the rated output. If the AC cable resistance is too high, then the AC voltage will increase; this may cause the inverter to become disconnected from the power grid. The relationship between the leakage power in the AC cable and the cable length, the cable cross-section, is displayed in the following illustration:



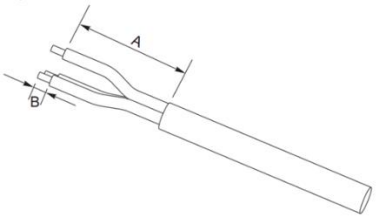
5.6.1 AC Load connector

⚠ CAUTION

Electrical voltage

- Ensure that the grid has been switched off before removing the AC connector.

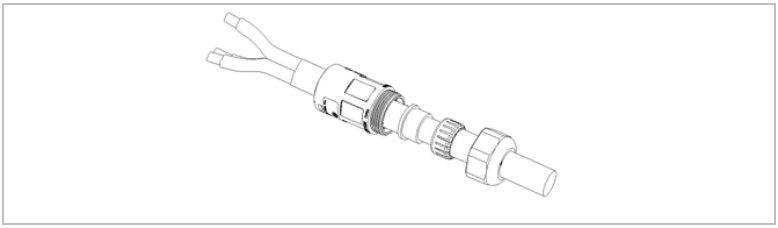
1. Select the suitable cable. Remove the insulating layer of the AC output cable using a wire stripper and in accordance with the following illustration:



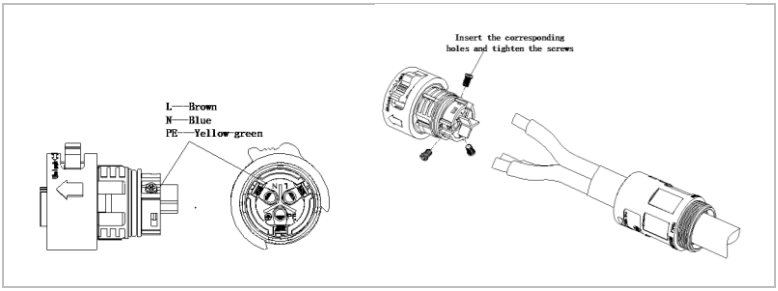
A = 15...25mm

B = 6...8mm

2. Disassemble the connector in accordance with the following illustration, guide the AC output cable through the cable gland;



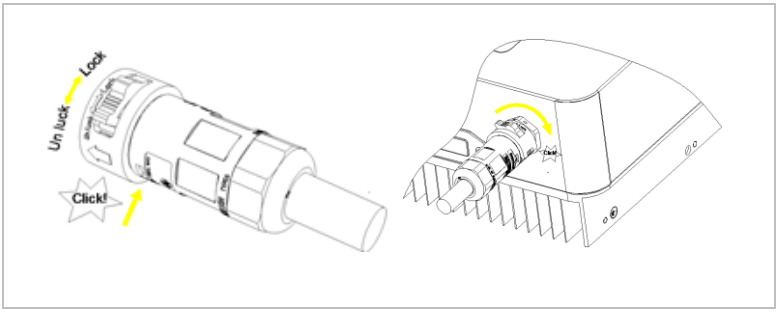
3. Connect the AC output cable in accordance with the following requirements and tighten the terminal using the Phillips screwdriver.



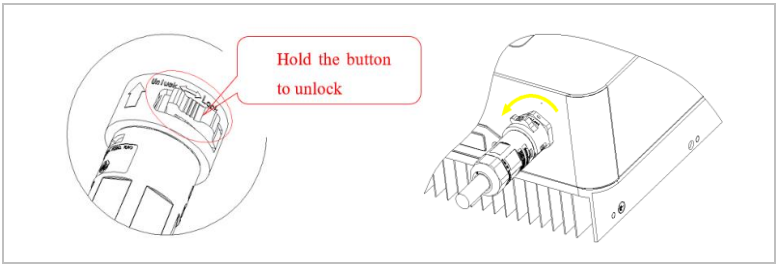
Connection	Cable
PE	Earthing cable (yellow-green)
L	Phase (brown)
N	Neutral conductor (blue)

4. Assemble the connector housing and screw the cable gland tight.

5. Connect the AC LOAD connector to the AC LOAD port of the inverter by turning it clockwise until it locks into place.



6. Remove the AC LOAD connector by holding the unlock button and turning the connecter anticlockwise to the “unlock” position.



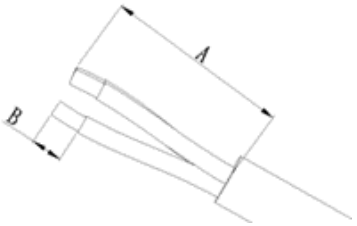
⚠ CAUTION

Electrical voltage

- Ensure that the grid has been switched off before removing the AC connector.

5.6.2 AC Grid connector

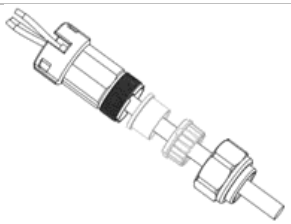
1. Select the suitable cable. Remove the insulating layer of the AC output cable using a wire stripper and in accordance with the following illustration.



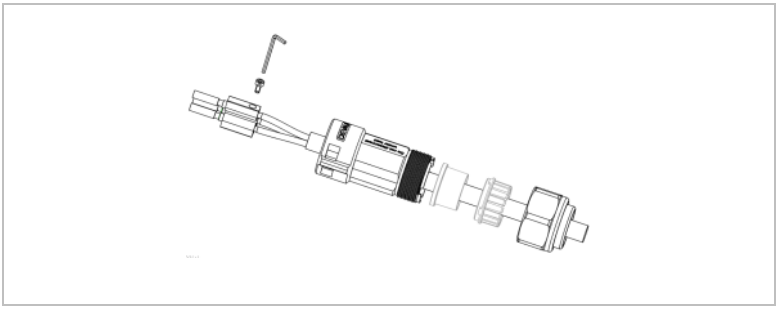
A = 30...50mm

B = 3...5mm

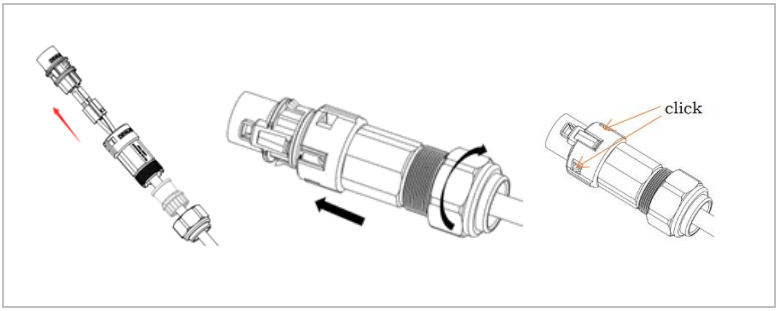
2. Pass the wires through the eye of the terminal;



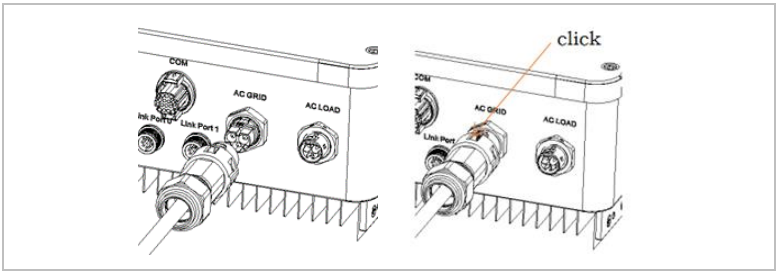
3. Lock the wires by tightening the screw using a hexagon socket wrench.



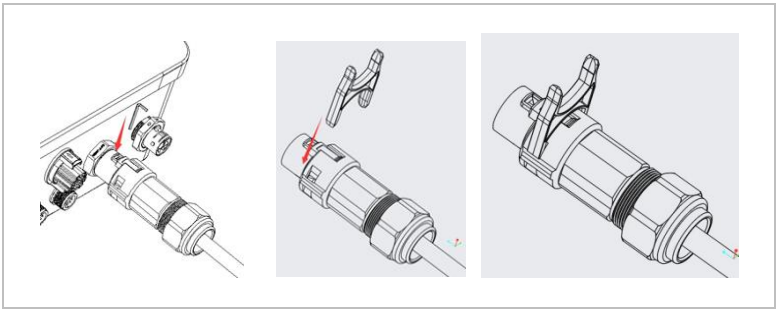
4. Push the terminal forward until a "click* sound is heard.



5. Connect the AC Load connector to the AC Load port.



To remove the connector, please use the removal tool and follow below steps.



5.7 Feed-in limitation function

The Anti-Reflux Power function refers to SOFARSOLAR's feed-in limitation function. When this function is enabled, the feed-in power of point of common coupling (PCC) will be limited to the set Reflux Power limitation.

Both the Hard Anti-Reflux Control and Anti-Reflux Control can be used together. However, when the Hard Anti-Reflux control is enabled, the Anti-Reflux power limitation cannot exceed the Reflux power limitation. If the Reflux power exceeds the Reflux power limitation, the overload protection will be triggered.

When the communication signal with the electricity meter is lost, the output power of the inverter is limited to the set value of the soft export limit and the fault protection will not be triggered. When the Hard Anti-Reflux Control is enabled, loss of signal with the meter triggers the inverter's fault protection.

The inverter output of HYD 5-20KTL-3PH series inverter has 4 sets of relays, which are electrically connected to the output end R/S/T/N respectively to ensure the continuity of the electrical connection of load R/S/T/N when the inverter is switched off the grid.

NOTE

- Anti-Reflux Function = Export Limit function
- Reflux Power = Export Power
- Hard Anti-Reflux control = Hard feed-in limitation control
- Anti-Reflux Control = Soft feed-in limitation control

5.8 System monitoring

The HYD 3000 ... 6000-EP inverters provide various communication methods for the system monitoring:

RS485 or WiFi stick (included in delivery)

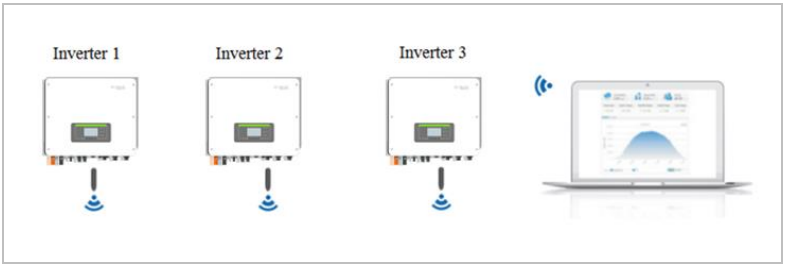
GPRS, Ethernet stick (optional)

5.8.1 RS485 network

You can connect RS485-linked devices to your PC or a data logger via an RS485 USB adapter.

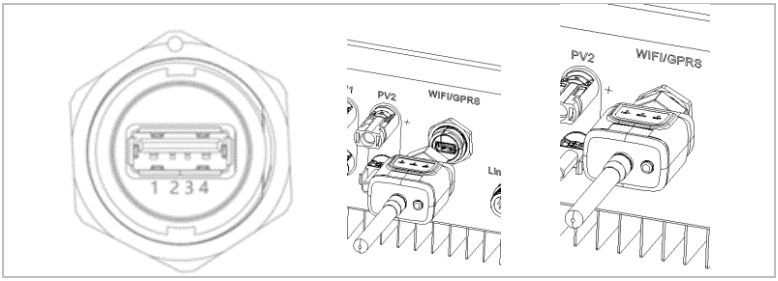
5.8.2 WiFi-, GPRS-, Ethernet stick

When you have installed the stick logger, the inverters can directly upload your operating, energy and alarm data in the SOLARMAN monitoring portal.



5.9 Installation of the WiFi-, GPRS or Ethernet stick

1. Remove the waterproof WiFi/GPRS cover using a screwdriver.
2. Install the WiFi/GPRS/Ethernet stick.
3. Fasten the WiFi/GPRS module with screws.



Pin	Definition	Function
1	GND.S	USB power -
2	DP	USB data +
3	DM	USB data -
4	VBUS	USB power +

5.9.1 Configuration of the WiFi stick via the web browser

Preparation: The WiFi stick is installed in accordance with the previous section and the SOFAR inverter must be in operation.

Carry out the following steps in order to configure the WiFi stick:

1. Connect your PC or smartphone with the WiFi network of the WiFi stick. The name of this WiFi network is “AP”, followed by the serial number of the WiFi stick (see rating plate). When you are prompted for a password, you can find it on the label of the WiFi stick (PWD).
2. Open an Internet browser and enter the address **10.10.100.254**.
3. Recommended browsers: Internet Explorer 8+, Google Chrome 15+, Firefox 10+
4. Enter the username and password, which are both set to **“admin”** by default. The “Status” page will be opened.
5. Click on the “Wizard” in order to configure the WiFi stick for Internet access.

Result The WiFi stick begins to send data to SolarMAN.

Register your system at the website home.solarmanpv.com. For this, enter the serial number found on the stick logger.

Installers use the portal at pro.solarmanpv.com

5.9.2 Setting up the WiFi stick with the app

To download the app, search for “SOLARMAN” in the Apple or Google Play store, or use the following QR codes:

- **SOLARMAN Smart** (for end customers):

- **SOLARMAN Business** (for installers):

Configuration steps

1. After starting the app, register as a new user or enter the current SOLARMAN access data.
2. Create a new system and save the system data.

3. Scan the barcode of the stick logger to assign an inverter to the system.
4. Go to the newly created system in order to configure the stick logger (device/logger)
5. Press the button on the WiFi stick for 1 second to activate the WPS mode of the stick so that the smartphone can be connected to the WiFi stick.
6. Now, select your local WiFi network for Internet access and enter your WiFi password.
7. The WiFi stick is configured with the access data.

WiFi stick status

The LEDs on the WiFi stick provide information regarding the status:

LED	Status	Description
NET:	Communication with the router	**On:** Connection to server successful
		Flashing (1 sec.): Connection to router successful
		Flashing (0.1 sec.): WPS mode active
		Off: No connection to router
COM	Communication with inverter	**Flashing** (1 sec.): Communication with inverter
		On: Logger connected to inverter
		Off: No connection to inverter

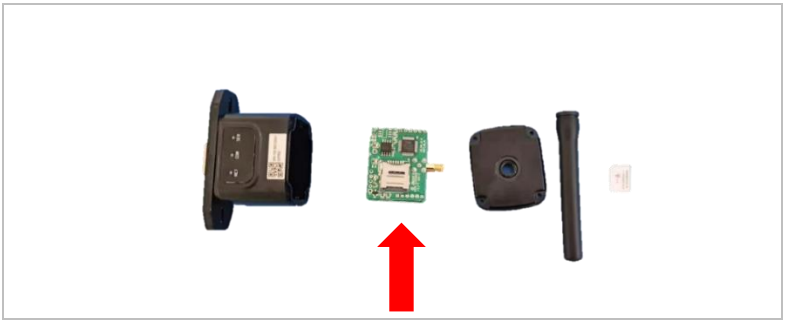
LED	Status	Description
READY	Logger status	**Flashing** (1 sec.): Normal status
		Flashing (0.1 sec.): Reset running
		Off: Error status

Reset button

Keystroke	Description
1 sec.	WPS mode
5 sec.	Restart
10 sec.	Restart (reset)

5.9.3 Setting up the GPRS stick

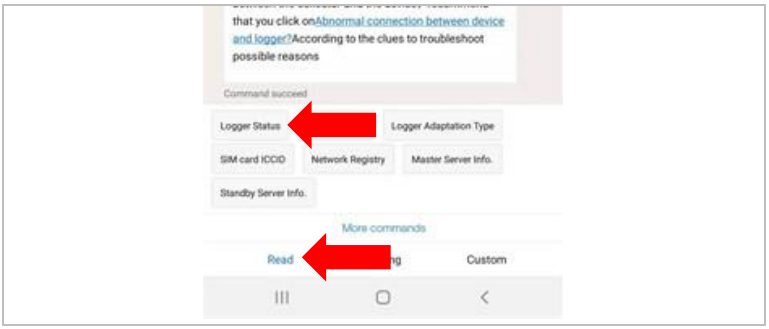
The GPRS stick must be equipped with a SIM card:



The GPRS stick must be set up via the SOLARMAN Business. Please follow below steps.

1. Open the app and call up the Bluetooth Tools menu item

2. Identify the WiFi stick with the serial number and select it.
3. Call up the “Custom” item
4. Enter the command AP+YZAPN= “APN name of your grid operator”
5. (e.g. for T-Mobile: AP+YZAPN=internet.v6.telekom)
6. To check the setting, call up AP+YZAPN
7. You can check the status via the “Logger Status” and “Read” menu item. Depending on the grid operator, wait several minutes until the connection has been established and the status is normal:



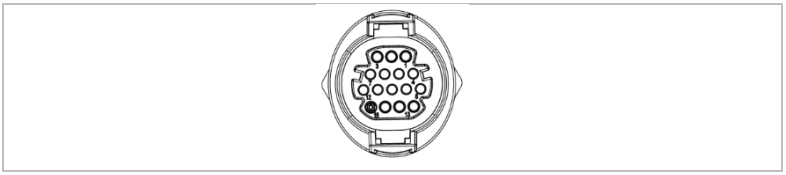
5.9.4 Setting up the Ethernet stick

The Ethernet stick is delivered with DHCP as standard, so it automatically gets an IP address from the router.

If you wish to set up a fixed IP address, connect a PC to the Ethernet stick and open the configuration page via the web address **10.10.100.254.**

5.10 Multifunctional COM Port

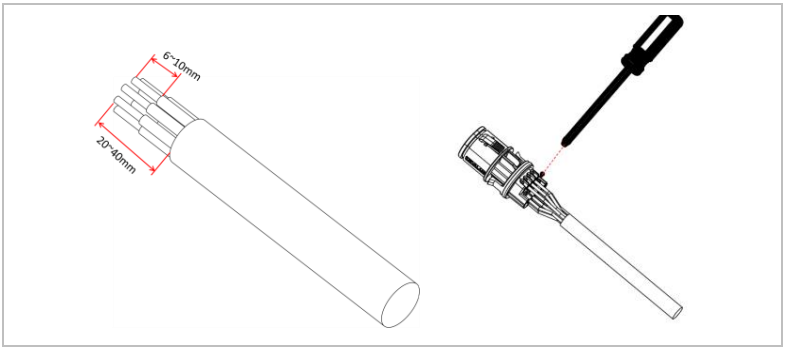
The COM Port interface of the HYD 3000 ... 6000-EP is displayed below:



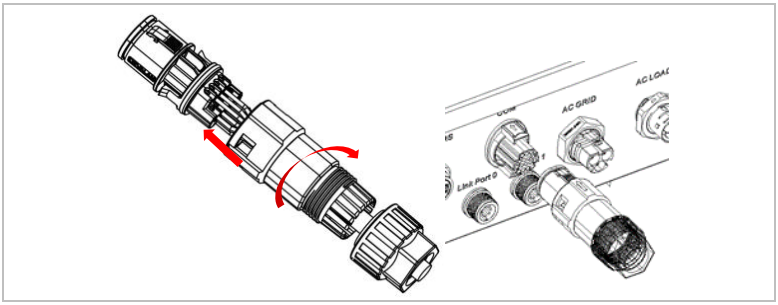
Pin	Definition	Function	Description
1	CANH	CAN high data	Communication with BMS
2	CANL	CAN low data	
3	485-2TX+	RS485 differential signal +	
4	485-2TX-	RS485 differential signal –	
5	485-1TX+	RS485 differential signal +	Wired or parallel system monitoring
6	485-1TX-	RS485 differential signal –	
7	GND-S	(DRMS) logic interfaces are applicable to the following safety standards: Australia (AS4777) European General (50549) Germany (4105)	Logic interface connections
8	DRMS1/5		
9	DRMS2/6		
10	DRMS3/7		
11	DRMS4/8		
12	DRMS0		
13	CT-	The current sensor outputs a negative electrode	CT connection
14	CT+	The current sensor outputs a positive electrode	
15	RS485-B	RS485 differential signal +	Inverter monitoring and system control
16	RS485-A	RS485 differential signal -	

Please follow below steps to connect the wiring.

1. Remove the cable sheath at a length of 20–40 mm, and the insulation of the cables at a length of 6–10 mm.



2. Connect the wires according to the required functions and pins.
3. Close the housing and secure the cable gland by turning clockwise. Finally, connect the connector.



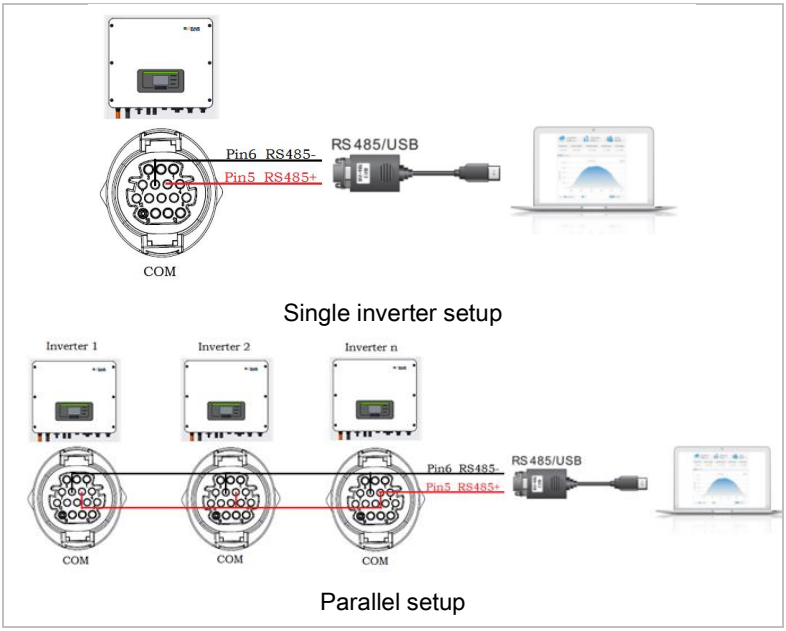
The functions of the communications interface must be set on the LCD display. Please refer to chapter 7.

5.10.1 RS485

For the monitoring and control of several inverters, you connect the RS485 wires in daisy-chain.

NOTE

- The RS485 line may not be any longer than 1000 m
- Assign each inverter its own Modbus address (1 to 31) via the LCD display



5.10.2 Logic interface (DRMs)

The pin definitions of the logic interface and the switching connections are as follows:

The function of the logic interface must be set on the LCD display; please observe the operating steps in chapter 7.

Logic interface pins are defined in accordance with various standard specifications.

Logic interface for AS/NZS 4777.2:2015

also known as Inverter Demand Response Modes (DRMs)

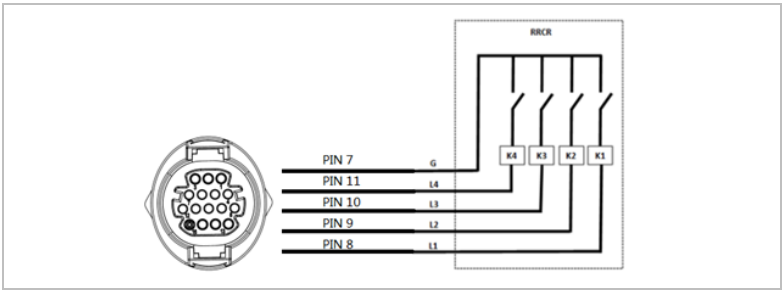
The inverter recognises all supported Demand Response commands and initiates the reaction within two seconds.

Pin	Function
8	DRM1/5
9	DRM2/6
10	DRM3/7
11	DRM4/8
12	DRM0
7	GND-S

Logic interface for VDE-AR-N 4105:2018-11

This function serves to control and/or limit the output power of the inverter.

The inverter can be connected to a radio ripple control receiver in order to dynamically limit the output power of all inverters within the system.



The inverter is preconfigured on the following power levels

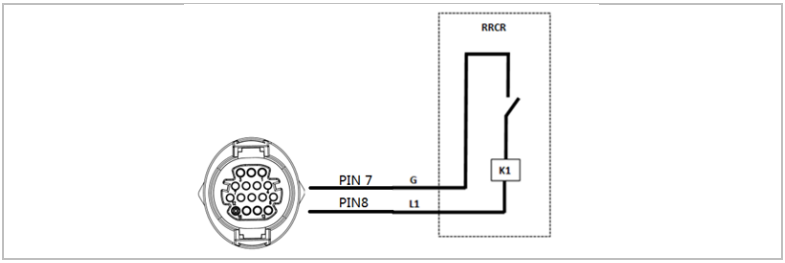
Pin	Name	Inverter	Radio ripple control receiver
8	L1	Relay 1 input	K1 - output relay 1
9	L2	Relay 2 input	K2 - output relay 2
10	L3	Relay 3 input	K3 - output relay 3
11	L4	Relay 4 input	K4 - output relay 4
7	G	Earth	Relay, common earth

Relay status: Closing is 1, opening is 0

L1	L2	L3	L4	Active power	Cos (φ)
1	0	0	1	0%	1
0	1	0	0	30%	1
0	0	1	0	60%	1
0	0	0	0	100%	1

Logic interface for EN50549-1:2019

The active power output can be ended within five seconds following a command to the input interface.



Functional description of the terminal

Pin	Name	Inverter	Radio ripple control receiver
8	L1	Relay 1 input	K1 - output relay 1
7	G	Earth	Relay, earth

The inverter is preconfigured on the following power levels.

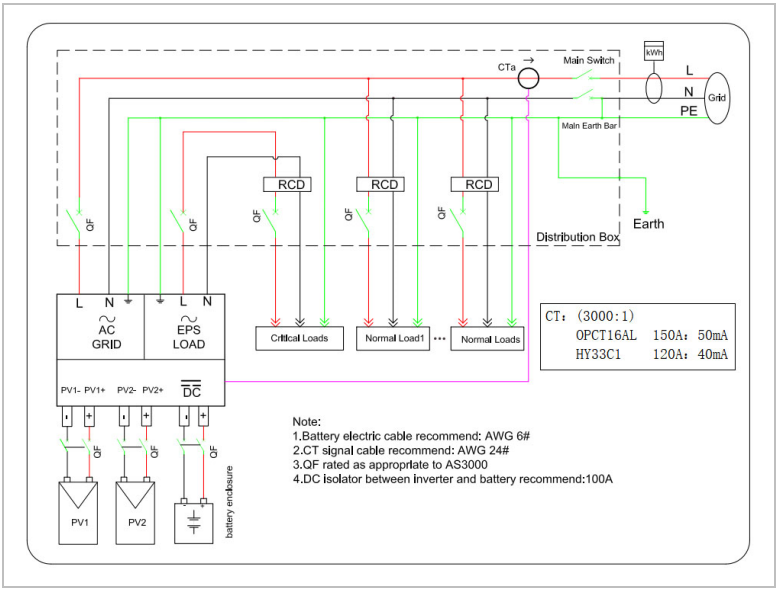
Relay status: Closing is 1, opening is 0

L1	Active power	Power drop rate	Cos (φ)
1	0%	< 5 seconds	1
0	100%	/	1

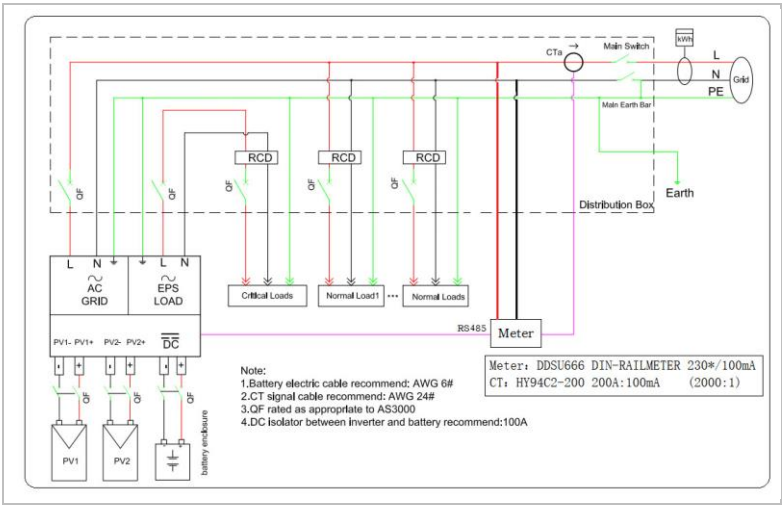
5.10.3 CT and smart meter

There are two different system configurations to get grid current information: using only a CT (System A) or a combination of a CT and an energy meter (System B). Please refer to the following diagrams.

System A: CT without an energy meter

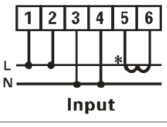


System B: CT with an energy meter

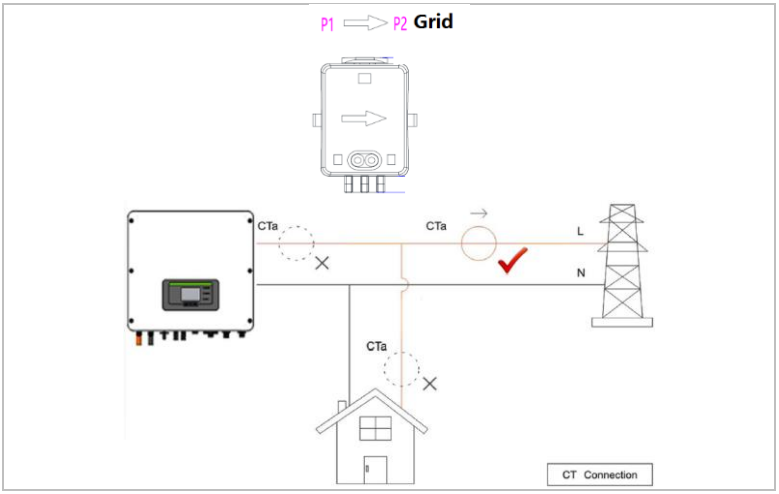


The HYD 3000 ... 6000-EP inverter is compatible with the DDSU666 single-phase smart meter. PIN 15 and PIN 16 are used for communication with the smart meter, which correspond to PIN 7 and PIN 8 on the electricity meter.

The 1/2 and 3/4 on the electricity meter are connected to voltage signals L and N respectively. The current needs to be connected to the CT, i.e. 5/6.



The direction of the CT should be as follows:



In a setup without a smart meter, connect the CT to Pin 13 and Pin 14.

NOTE

- To ensure that the CT is connected in the correct direction, please use the inverter's CT calibration function.

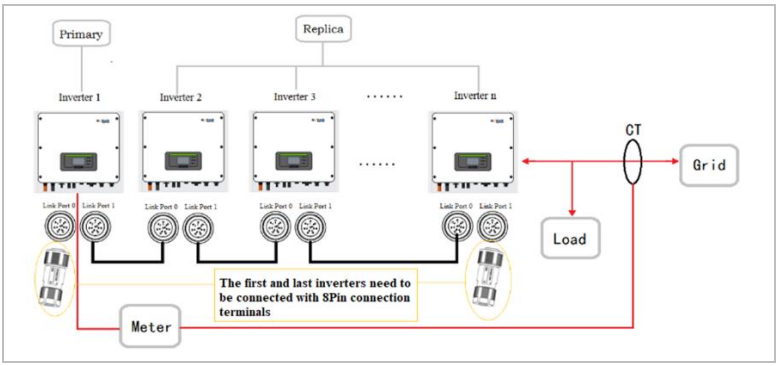
5.10.4 Link port

NOTE

- Up to 10 units can be connected in parallel.
- In a parallel setup, the AC load should also be connected in parallel.
- For the parallel switching of several devices, it is recommended to use a joint AC load break switch for the connected loads at both the LOAD and GRID connection.

- In order to evenly distribute the loads among the inverters, the cable length between each output and the load must be the same.
- If the maximum apparent power of a load is greater than 110% of the inverter's rated output, the device must not be connected via the AC LOAD terminal, but rather directly to the grid.
- The first and last inverters need to be connected with 8-pin connection terminals.

The Link Port is used to enable a parallel setup. The inverters can be connected in a Master/Slave configuration. In such a setup, only one energy meter is connected for measuring.



To ensure the correct operation of a parallel setup, set the correct parameters in the inverter's settings:

Entry	Description
Parallel Control	Enable/disable a parallel setup. Both the Master and Slave unit(s) must have this function enabled.
Parallel Primary-Replica	Set one inverter as the Master (Replica), and the others as Slave (Replica)
Parallel Address	Each inverter needs to be assigned a unique parallel address.

NOTE

- The parallel address is different from the communication address used for monitoring.

6 Commissioning the inverter

6.1 Safety test before commissioning

ATTENTION

Check the voltage range

- Ensure that the DC and AC voltages are within the permissible range of the inverter.

6.2 Check before turning on inverter

Please ensure that the inverter and all the wiring are installed correctly, securely, and reliably, and that all environment requirements are met.

1. the inverter is firmly fastened onto the mounting bracket on the wall;
2. the PV+ / PV- wires are firmly connected, and the polarity and voltage are correct;
3. the BAT+ / BAT- wires are firmly connected, and the polarity and voltage are correct;
4. the DC isolator is correctly installed between the battery and inverter, and it is turned OFF;
5. the GRID and LOAD cables correctly connected;
6. the AC circuit breaker is correctly installed between the inverter GRID port and GRID, and it’s turned OFF;
7. the AC circuit breaker is correctly installed between the inverter LOAD port and critical load, and it’s turned OFF;

8. the communication cable to the lithium battery has been correctly connected.

6.3 Starting the inverter

1. Switch on the DC switch.
2. Switch on the battery.
3. Switch on the DC isolator between the battery and inverter.
4. Switch on the AC circuit breaker between the inverter's GRID port and GRID.
5. Switch on the AC circuit breaker between the inverter's LOAD port and critical load.

When the DC output generated by the solar system is at a sufficient level, the inverter starts automatically. A correct operation is indicated by the screen displaying "normal".

NOTE

- Different distribution network operators in various countries have differing requirements for the grid connection of grid-coupled PV inverters.
- Ensure that you have selected the correct country code according to regional authority requirements, and consult a qualified electrician or employees of electrical safety authorities.
- SofarSolar is not responsible for the consequences of selecting the incorrect country code.

- The selected country code influences the device grid monitoring. The inverter continuously checks the set limits and, if required, disconnects the device from the grid.

6.4 Initial setup

You need to set the following parameters before the inverter starts to operate.

Parameter	Description
Language	Default language is English
Time	Set to the local time.
Safety	Download the corresponding safety parameters file for your country from our website, and import it to the inverter through a USB drive.
Battery	Configure the battery setup according to your demands.

Setting the country code

NOTE

- Different distribution network operators in various countries have differing requirements for the grid connection of grid-coupled PV inverters.
- Ensure that you have selected the correct country code according to regional authority requirements, and consult a qualified electrician or employees of electrical safety authorities.

- SofarSolar is not responsible for the consequences of selecting the incorrect country code.
- The selected country code influences the device grid monitoring. The inverter continuously checks the set limits and, if required, disconnects the device from the grid.

Country	Code	Standard
Australia	002-000	General
	002-001	AU-WA
	002-002	AU-SA
	002-003	AU-VIC
	002-004	AU-QLD
	002-005	AU-VAR
	002-006	AUSGRID
	002-007	Horizon
	002-008	AU-SA-HV
Belgium	008-000	General
	008-001	HV
Brazil	028-000	220 V grid
	028-001	LV
	028-002	230 V grid
	028-003	254 V grid
China	010-000	General
	010-001	Taiwan
	010-002	MV
	010-003	HV
Croatia	107-000	
Cyprus	024-000	

Denmark	005-000	General
	005-001	TR322
Dubai	046-000	DEWG
	046-001	DEWG MV
EU	018-000	EN50438
	018-001	EN50549
	018-002	EN50549-HV
Europe	022-000	
(general)	022-001	
France	011-000	VDE0126
	011-001	FAR Arrete23
	011-002	VDE0126-HV
Germany	000-000	VDE4105
	000-001	BDEW
	000-002	VDE0126
	000-003	VDE4105-HV
	000-004	BDEW-HV
Greece	006-000	Continent
	006-001	Islands
India	025-000	
Ireland	039-000	EN50438
Italy	001-000	CEI-021 Internal
	001-001	CEI-016 Italy
	001-002	CEI-021 External
	001-003	CEI-021 In Areti
	001-004	CEI-021 Internal-HV
Korea	020-000	
Lithuania	108-000	

Mexico	035-000	LV
Netherlands	007-000	General
New Zealand	027-000	
Philippines	026-000	
Poland	012-000	LV
	012-001	MV
	012-002	HV
Spain	003-000	RD1699
	003-001	RD1699-HV
Sweden	021-000	
Turkey	004-000	General
United Kingdom	009-000	G99
	009-001	G98
	009-002	G99-HV
Slovakia	029-000	VSD
	029-001	SSE
	029-002	ZSD
South Africa	044-000	
	044-001	HV
Thailand	040-000	PEA
	040-001	MEA
Ukraine	033-000	
	034-000	
IEC EN61727	019-000	
Wide range - 60 Hz	038-000	
LV range - 50 Hz	042-000	

7 Operation of the device

This chapter describes the LCD and LED displays of the HYD 3000 ... 6000-EP inverter.

7.1 Control panel and display field

7.1.1 Buttons and display lights

Button

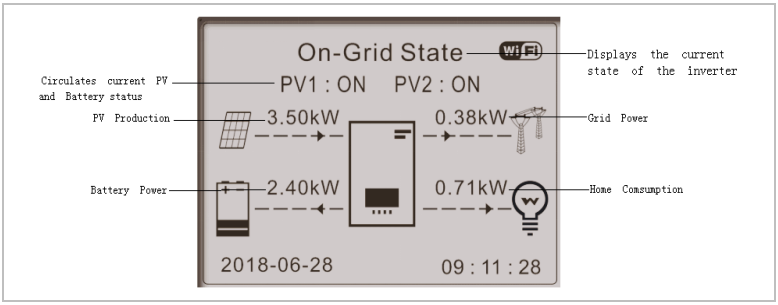
Button	Name	Description
	Back	Previous menu level, enter menu
	Up	Select previous menu entry, increase setting value
	Down	Select next menu entry, decrease setting value
	Enter	Enter Menu item, switch to next digit, confirm setting

LEDs

On-grid (green)	ON: “Normal” state
	Flashing: “Standby” mode
Off-grid (green)	ON: “Normal” state
	Flashing: “Standby” mode
ALARM (red)	ON: “Error”

7.2 Standard display

The display shows all relevant information of the inverter.



↑	Press UP button, to show PV parameters like current, voltage and power
↓	Press DOWN button to show GRID parameters such as voltage, current and frequency
↓	Press DOWN button again to show Battery 1 parameters like current, power, state of charge etc.
↓	Press DOWN button again to show Battery 2 parameters like current, power, state of charge etc.

7.3 Energy Storage Modes

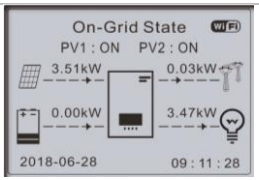
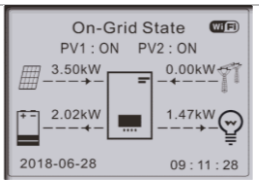
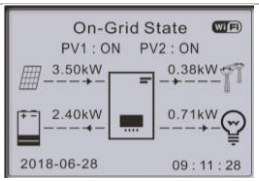
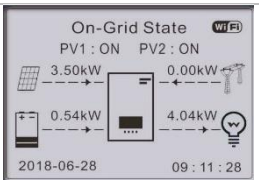
The HYD 3000 ... 6000-EP offers five operational modes which determine the way the inverter interacts with the battery.

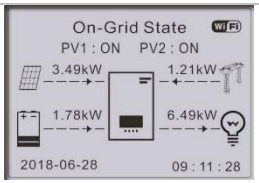
NOTE

- The default mode is the Self-use Mode.

7.3.1 Self-use Mode

The inverter automatically charges and discharges the battery according to the following rules:

	If PV generation equals the load consumption (ΔP < 100 W), the inverter won't charge or discharge the battery
	If PV generation is larger than the load consumption, the surplus power is stored in the battery
	If the battery is full or at maximum charging power, the excess power will be exported to the grid
	If the PV generation is less than the load consumption, it will discharge the battery to supply power to the load



If the load is more than PV generation plus battery, the inverter will import power from the grid

The priority of power supply: PV, Battery, Grid

The priority of power consumption: Loads, Battery, Grid

NOTE

- If it is not allowed to export power to the grid, an energy meter and/or CT needs to be installed, and the “Anti Reflux Control” function has to be turned ON.

7.3.2 Time-of-Use Mode

The user can set up to 4 rules on when the battery should be charged. Each rule can be enabled or disabled. The rules include:

- Time (from ... to ...)
- SOC (%)
- Charge
- Effective date
- Weekdays

In below example, the battery will be charged with 1 kW between 2–4am if the SOC is below 70%. This rule is active every day from 22nd December until 21st March.

Set Time-of-use Mode

Rule 0:	Enabled / Disabled		
From	To	SOC	Charge
02h00m -	04h00m	070%	01000W
Effective	date		
Dec.22	-	Mar.21	
Weekday	select		
Mon. Tue. Wed. Thu. Fri. Sat. Sun.			

7.3.3 Timing Mode

With the Timing Mode the user can define fixed times of the day to charge or discharge the battery with a certain power.

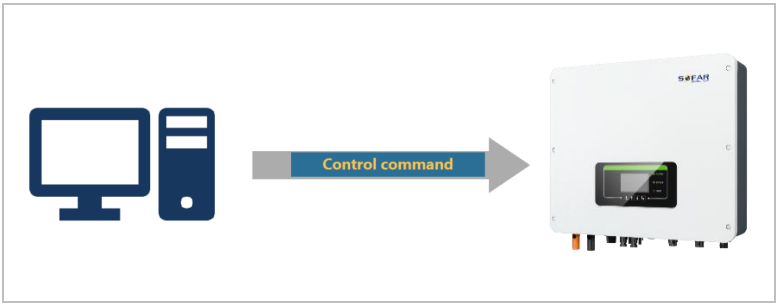
Up to 4 rules (rule 0, 1, 2 and 3) can be set. If more than one rule is valid for any given time, the rule with the lower number is active. Each rule can be enabled or disabled. The charging and discharging period for a rule can be enabled separately.

In below example, the battery will be charged with 2 kW between 22–4am, and discharged with 2,5 kW between 2–4pm:

Timing Mode	
Rule 0: Enabled / Disabled / Enabled charge / Enabled discharge	
Charge Start	22 h 00 m
Charge End	05 h 00 m
Charge Power	02000 W
DisCharge Start	14 h 00m
DisCharge End	16 h 00m
DisCharge Power	02500 W

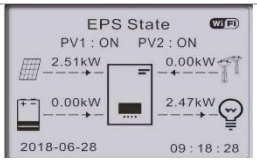
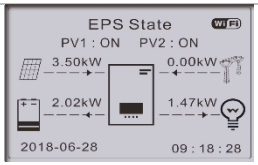
7.3.4 Passive Mode

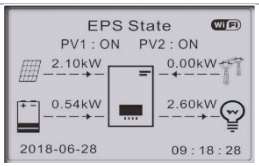
In systems with external energy management systems the passive mode should be used. The inverter's operation will be controlled by the external controller using the Modbus RTU protocol. Please contact SofarSolar if you need the Modbus protocol definition for this device.



7.3.5 EPS Mode

With the EPS Mode turned ON, the inverter provides energy to the load when it is off-grid, e.g. when there is no public grid connection or during grid outages.

	If PV generation equals the load consumption (ΔP < 100 W), the inverter won't charge or discharge the battery
	If PV generation is larger than the load consumption, the surplus power is stored in the battery. If the battery is fully charged or at maximum charging power, the PV

	generation is reduced by adjusting the MPPT
	If the PV generation is less than the load consumption, the battery will supply power to the load.

7.4 Menu structure

NOTE

- Several settings require a password to be entered (the standard password is 0001).

Press the button  to bring up the main menu.

Main menu

1. System Settings	See “System Settings menu”
2. Advanced Settings	See “Advanced Settings menu”
3. Energy Statistics	See "Energy Statistics menu“
4. System Information	See "System Information menu“
5. Event list	See “Set country codes”
6. Software update	See "Firmware update“

“System Settings” menu

1. Language Setting	Sets the display language of the inverter

2. Time	Sets the system time of the inverter
3. Safety Param.	Safety parameters are set by using a USB drive (see chapter 6.4)
4. Energy Storage Mode	Select the operation mode (default mode is Self-use Mode)
5. Auto Test	(Only for Italy)
6. EPS Mode	The Emergency Power Supply (EPS) mode is only available if a battery is connected.
7. Communication Addr.	Enter the Modbus address (when several inverters require simultaneous monitoring), standard: 01

NOTE

- EPS Mode, Anti Reflux, I/V Curve Scan and Logic Interface are turned OFF by default and have to be enabled by the user.

"Advanced Settings" menu

1. Battery Parameter	Set the battery parameters
2. Anti Reflux	Limit the power exported to the grid
3. IV Curve Scan	Find the maximum power point
4. Logic interface	Control logic interfaces
5. Factory Reset	Clear system data (energy/events data)
6. Parallel setting	Parallel system settings

7. Bluetooth Reset	Reset the Bluetooth connection
8. CT Calibration	Calibrate the direction and phase of the CT

Energy Statistics menu

This menu displays the PV system's energy statistics (in kWh) collected by the inverter, including PV generation, load, export, import, charge, and discharge.

Press the  DOWN button to cycle between TODAY, MONTH, YEAR, LIFETIME.

System Information menu

This menu displays information about the connected inverter, battery and the set safety parameters.

1. Inverter Info
2. Battery Info
3. Safety Param.

Event list menu

The event list is used to display the real time event recordings, including the total number of events and each specific ID no. and event time. The most recent events are listed at the top.

1. Current Event List

2. History Event List

Software update

The user can update the software via the USB flash drive. SofarSolar will provide the firmware update when it is required.

1. Switch the DC and AC switches off and then remove the communication cover. If an RS485 line has been connected, ensure that the nut is loosened. Ensure that the communication line is not energised. Remove the cover to prevent the connected communications connector from becoming loose.
2. Insert the USB stick into the computer.
3. SofarSolar will send the firmware update to the user.
4. Unzip the file and copy the original file to a USB stick. Attention: The firmware update file must be in the “firmware” subfolder!
5. Insert the USB flash drive into the USB interface of the inverter.
6. Switch on the DC switch and go to menu item “5. Software update” on the LCD display.
7. Enter the password (the standard password is 0715).
8. The system will then successively update the main DSP, auxiliary DSP and ARM processors. Pay attention to the displays.
9. If an error message appears, switch off the DC switch and wait until the LCD screen goes out. Then, switch the DC switch back on and proceed with the update from step 5.

10. After the update is complete, switch the DC switch off and wait until the LCD screen goes out
11. Re-establish a watertight communication connection
12. Switch the DC and AC circuit breaker back on
13. You can check the current software version in item “3. Software version” of the SystemInfo menu.

8 Troubleshooting handling

8.1 Troubleshooting

This section contains information and procedures pertaining to the remedying of potential problems with the inverter.

To carry out troubleshooting, proceed as follows:

- Check the warnings, error messages or error codes displayed on the screen of the inverter.

If no error information is displayed on the screen, check whether the following requirements have been fulfilled:

- Has the inverter been set up in a clean, dry, well-ventilated area?
- Is the DC switch set to ON?
- Are the cables sufficiently dimensioned and short enough?
- Are the input connections, output connections and the wiring all in good condition?
- Are the configuration settings for the relevant installation correct?
- Are the display field and the communication cables correctly connected and undamaged?

Please proceed as follows to display the recorded problems: Hold the button down to bring up the main menu of the standard interface. Select “2. Event list” and hold the button down to bring up the event list.

Earth fault alarm

This inverter is compliant with IEC 62109-2 Clause 13.9 for earth fault protection.

If an earth fault alarm occurs, the error is displayed on the LCD screen, the red light illuminates and the error can be found in the error history log.

NOTE

- In the case of devices equipped with a stick logger, the alarm information can be viewed on the monitoring portal and retrieved via the smartphone app.

Event list

Code	Name	Description	Solution
ID001	GridOVP	The voltage of the power grid is too high	If the alarm occurs occasionally, it may be due to the power grid. The inverter will automatically return to normal operation when the mains power returns to normal. If the alarm occurs frequently, check whether the mains voltage/frequency is within the permissible range. If so, check the AC circuit breaker and AC wiring of the inverter. If the alarm occurs repeatedly, contact technical support to adjust the voltage and frequency limits after obtaining approval from the local power grid operator.
ID002	GridUVP	The voltage of the mains is too low	
ID003	GridOFP	The mains frequency is too high	
ID004	GridUFP	The mains frequency is too low	

ID005	GFCI	Earth fault	If the error occurs occasionally, it may be due to external factors. The inverter will automatically return to normal operation. If the error occurs frequently and lasts for a long time, check whether the insulation resistance between the PV generator and earth (ground) is too low and check the insulation of the PV cables.
ID006	OVRT fault	OVRT function is faulty	ID006-041 are internal faults of the inverter. Turn the DC switch OFF, wait 5 minutes and then turn the DC switch ON. Check whether the error has been cleared. If not, please contact the technical support.
ID007	LVRT fault	LVRT function is faulty	
ID008	IslandFault	Island protection fault	
ID009	GridOVPInstant1	Transient overvoltage of mains voltage 1	
ID010	GridOVPInstant2	Transient overvoltage of mains voltage 2	
ID011	VGridLineFault	Fault in the mains voltage	
ID012	InvOVP	Inverter overvoltage	
ID017	HwADFaultIGrid	Mains current measurement error	
ID018	HwADFaultDCI	DC current measurement error	
ID019	HwADFaultVGrid(DC)	Sampling error of the mains voltage (DC)	
ID020	HwADFaultVGrid(AC)	Mains voltage sampling error (AC)	

ID021	GFCIDeviceFault(DC)	Leakage current sampling error (DC)	
ID022	GFCIDeviceFault(AC)	Leakage current sampling error (AC)	
ID023	HwADFaultDCV	DC load voltage sampling error	
ID024	HwADFaultIdc	DC input current sampling error	
ID025	HwADErrDCI(DC)	\	
ID026	HwADErrIdcBranch	\	
ID029	ConsistentFault_GFCI	The GFCI sample between the master DSP and the slave DSP is not consistent	
ID030	ConsistentFault_Vgrid	The line voltage sample between the master DSP and the slave DSP is not consistent.	
ID033	SpiCommFault(DC)	SPI communication error (DC)	
ID034	SpiCommFault(AC)	SPI communication error (AC)	
ID035	SChip_Fault	Chip error (DC)	
ID036	MChip_Fault	Master chip error (AC)	
ID037	HwAuxPowerFault	Auxiliary voltage error	
ID041	RelayFail	Relay detection failure	
ID042	IsoFault	Insulation resistance is too low	Check the insulation resistance between the PV

			generator and earth (ground), rectify the fault if there is a short circuit.
ID043	PEConnect Fault	Earth fault	Check the PE conductor for function
ID044	PV Config Error	Incorrect input mode configuration	Check the MPPT input mode setting (parallel mode/independent mode) of the inverter and correct if necessary.
ID045	CTD isconnect	CT error	Check that the wiring of the current transformer is correct.
ID049	TempFault _Bat	Battery temperature error	Make sure that the battery does not get too hot. Check that the temperature sensor has been correctly connected to the battery.
ID050	TempFault _HeatSink1	Temperature error heat sink 1	Make sure that the inverter has been installed in a cool and well-ventilated place without direct sunlight. Make sure the inverter is installed vertically and the ambient temperature is below the inverter's temperature limit.
ID051	TempFault _HeatSink2	Temperature error heat sink 2	
ID052	TempFault _HeatSin3	Heat sink temperature error 3	
ID053	TempFault _HeatSink4	Temperature error heat sink 4	
ID054	TempFault _HeatSin5	Temperature error heat sink 5	
ID055	TempFault _HeatSin6	Temperature error heat sink 6	

ID057	TempFault _Env1	Temperature error ambient temperature 1	
ID058	TempFault _Env2	Temperature error ambient temperature 2	
ID059	TempFault _Inv1	Temperature error module 1	
ID060	TempFault _Inv2	Temperature error module 2	
ID061	TempFault _Inv3	Temperature error module 3	
ID062	TempDiffErrInv		
ID065	VbusRmsUnbalance	Asymmetrical bus voltage RMS	Internal error of the inverter. Switch off the inverter, wait 5 minutes and then switch the unit on again. If the error persists, contact Technical Support.
ID066	VbusInstantUnbalance	The transient value of the bus voltage is unbalanced	
ID067	BusUVP	The DC bus voltage is too low during mains connection	
ID068	BusZVP	The DC bus voltage is too low	
ID069	PVOVP	The PV input voltage is too high	Check whether the PV series voltage (Voc) is higher than the maximum input voltage of the inverter. If this is the case, adjust the number of PV modules in series. After the correction, the inverter automatically returns to its normal state.

ID070	BatOVP	Battery overvoltage	Check whether the voltage of the battery is higher than the maximum input voltage of the inverter. If this is the case, adjust the number of battery modules in series.
ID071	LLCBusOVP	LLC Bus overvoltage protection	Internal error of the inverter. Switch off the inverter, wait 5 minutes and then switch the unit on again. If the error persists, contact Technical Support.
ID072	SwBusRmsOVP	Inverter bus voltage RMS Software overvoltage	
ID073	SwBusInstantOVP	Inverter bus voltage instantaneous Software overvoltage	
ID081	SwBatOCP	Software overcurrent protection of the battery	
ID082	DciOCP	Dci overcurrent protection	
ID083	SwOCPInstant	Instantaneous output current protection	
ID084	SwBuckBoostOCP	BuckBoost software sequence	
ID085	SwAcRmsOCP	Output RMS current protection	
ID086	SwPvOCPInstant	PV overcurrent software protection	
ID087	IpvUnbalance	PV flows in uneven parallelism	
ID088	IacUnbalance	Unbalanced output current	
ID091	SwAcCBCFault		
ID097	HwLLCBusOVP	LLC bus hardware overvoltage	

ID098	HwBusOVP	Inverter bus hardware overvoltage	
ID099	HwBuckBoostOCP	BuckBoost hardware overflows	
ID100	HwBatOCP	Battery hardware overflow	
ID102	HwPVOCP	PV hardware overflows	
ID103	HwACOCP	Mains current is too high and has triggered hardware protection	
ID105	MeterCommFault	Communication fault with meter unit	Check communication to meter.
ID110	Overload1	Overload protection 1	Please check whether the inverter is operating under overload.
ID111	Overload2	Overload protection 2	
ID112	Overload3	Overload protection 3	
ID113	OverTempDerating	The inverter has throttled due to too high a temperature	Make sure that the inverter has been installed in a cool and well-ventilated place without direct sunlight. Make sure the inverter is installed vertically and the ambient temperature is below the temperature limit of the inverter.
ID114	FreqDerating	Mains frequency is too high	Make sure that the mains frequency and voltage are within the permissible range.
ID115	FreqLoading	Mains frequency is too low	
ID116	VoltDerating	AC voltage is too high	
ID117	VoltLoading	AC voltage is too low	

ID124	BatLowVoltageAlarm	Protection against battery undervoltage	Please check if the battery voltage of the inverter is too low.
ID125	BatLowVoltageShut	Low battery voltage shutdown	
ID129	unrecoverHwAcOCP	Mains current is too high and has caused an unrecoverable hardware fault	Internal error of the inverter. Switch off the inverter, wait 5 minutes and then switch the unit on again. If the error persists, contact Technical Support.
ID130	unrecoverBusOVP	Bus voltage is too high and has caused a non-recoverable fault	
ID131	unrecoverHwBusOVP	Permanent bus hardware failure due to overvoltage	
ID132	unrecoverIpvUnbalance	Input current is unbalanced and has caused an unrecoverable fault	
ID133	unrecoverEPSBatOCP	Permanent battery overcurrent error in EPS mode	
ID134	unrecoverAcOCPInstant	Permanent error due to transient overcurrent	
ID135	unrecoverIacUnbalance	Permanent unbalanced output current error	
ID137	unrecoverPvConfigError	Permanent input mode configuration error	Check the MPPT input mode setting (parallel mode/independent mode) of the inverter and correct it if necessary.
ID138	unrecoverPVOCPInstant	Permanent input overcurrent error	
ID139	unrecoverHwPVOCP	Permanent input hardware overcurrent error	Internal error of the inverter. Switch off the inverter, wait 5 minutes and then switch the unit back
ID140	unrecoverRelayFail	Permanent error of the mains relay	

ID141	unrecoverVbusUnbalance	The bus voltage is unbalanced and has caused an unrecoverable error	on. If the error persists, contact Technical Support.
ID142	PermSpdFail(DC)		
ID143	PermSpdFail(AC)		
ID145	USBFault	USB error	Check the USB connection of the inverter.
ID146	WifiFault	Wifi error	Check the inverter's WiFi connection.
ID147	BluetoothFault	Bluetooth error	Check the Bluetooth connection of the inverter.
ID148	RTCFault	RTC clock failure	Internal error of the inverter. Switch off the inverter, wait 5 minutes and then switch the unit back on. If the error persists, contact technical support.
ID149	CommEEPROMFault	EEPROM error of the communication card	
ID150	FlashFault	Communication card FLASH error	
ID152	SafetyVerFrault		
ID153	SciCommLose(DC)	SCI communication error (DC)	
ID154	SciCommLose(AC)	SCI communication error (AC)	
ID155	SciCommLose(Fuse)	SCI communication error (fuse)	
ID156	SoftVerError	Inconsistent software versions	Download the latest firmware from the website and launch the software update. If the error persists, contact technical support.

ID157	BMSCommunicatonFault	Lithium battery communication error	Make sure your battery is compatible with the inverter. CAN communication is recommended. Check the communication line or the connection of the battery and the inverter for errors.
ID161	ForceShutdown	Forced shutdown	The inverter has been forcibly disconnected.
ID162	RemoteShutdown	Remote shutdown	The inverter is shut down remotely.
ID163	Drms0Shutdown	DRM 0 shutdown	The inverter is running with a Drms0 shutdown.
ID165	RemoteDerating	The inverter has reduced its power due to remote control	This message is for information and is not an error
ID166	LogicInterfaceDerating	The inverter has reduced its power due to the digital inputs	
ID167	AlarmAntiRefluxing	Power reduction due to current sensor or SmartMeter configuration	
ID169	FanFault1	Fan 1 fault	Check if the corresponding fan of the inverter is running normally.
ID170	FanFault2	Fan 2 fault	
ID171	FanFault3	Fan 3 fault	
ID172	FanFault4	Fan 4 fault	
ID173	FanFault5	Fan 5 fault	
ID174	FanFault6	Fan 6 fault	
ID175	FanFault7	Fan 7 fault	
ID176	MeterCommLose	Communication fault with meter unit	Check communication to meter

ID177	BMS OVP	BMS overvoltage alarm	Internal error in the connected lithium battery. Switch off the inverter and the lithium battery, wait 5 minutes and then switch the components on again. If the error persists, contact Technical Support.
ID178	BMS UVP	BMS Undervoltage alarm	
ID179	BMS OTP	BMS High temperature warning	
ID180	BMS UTP	BMS low temperature warning	
ID181	BMS OCP	BMS overload warning during charging and discharging	
ID182	BMS Short	BMS Short circuit alarm	

8.2 Maintenance

Inverters do not generally require daily or routine maintenance. Before carrying out cleaning, ensure that the DC switch and AC circuit breaker between the inverter and power grid have been switched off. Wait at least 5 minutes before carrying out cleaning.

8.2.1 Cleaning the inverter

Clean the inverter using an air blower and a dry, soft cloth or a soft bristle brush. Do NOT clean the inverter with water, corrosive chemicals, cleaning agents etc.

8.2.2 Cleaning the heat sink

In order to help guarantee correct long-term operation of the inverter, make sure that there is sufficient space for ventilation around the heat sink. Check the heat sink for blockages (dust, snow etc.) and remove them if present. Please clean the heat sink using an air blower and a dry, soft cloth or a soft bristle brush. Do NOT clean the heat sink with water, corrosive chemicals, cleaning agents etc.

9 Technical data

Data Sheet	HYD 3000-EP	HYD 3680-EP	HYD 4000-EP	HYD 4600-EP	HYD * 5000-EP	HYD 5500-EP	HYD 6000-EP
Battery Parameters							
Battery type	Lithium-ion, Lead-acid						
Nominal battery voltage (V)	48						
Battery voltage range (V)	42–58						
Battery capacity (Ah)	50–2000						
Max. charging / discharging power (W)	3750	4000	4250	5000			
Max. charging current (A)	75	80	85	100			
Max. discharging current (A)	75	80	85	100			
Charging curve (Lithium-ion)	BMS						
Charging curve (Lead-acid)	3-adaptive, with maintenance charging						
Depth of discharge	Lithium-ion: 0-90% DOD adjustable, Lead-acid: 0-50% DOD adjustable						
Input DC (PV side)							
Recommended max. PV input power (Wp)	4500	5400	6000	6900	7500		9000
Max DC power for single MPPT (W)	3500						

Max. input voltage (V)	600					
Start-up voltage (V)	100					
Rated input voltage (V)	360					
MPPT operating voltage range (V)	90–580					
Full power MPPT voltage range (V)	160–520	180–520	200–520	230–520	250–520	300–520
Number of MPP trackers	2					
Max. input current per MPPT (A)	13/13					
Max. input short circuit current per MPPT (A)	18/18					
Output/Input AC (Grid side)						
Nominal AC power (W)	3000	3680	4000	4600	5000	6000
Max. AC power output to utility grid (VA)	3300	3680	4400	4600	5000 / 5500	6000
Max. AC power from utility grid (VA)	6000	7360	8000	9200	10000	12000
Max. AC current output to utility grid (A)	15	16	20	20,9	21,7 / 25	27,3
Max. AC current from utility grid (A)	27,3	32	36,4	41,8	43,4	54,6
Nominal grid voltage	L/N/PE, 220 V, 230 V, 240 V					
Grid voltage range	180Vac-276Vac (According to local standard)					

Nominal grid frequency	50 Hz / 60 Hz				
Output THDi (@nominal power)	<3%				
Power factor	1 default (+/-0.8 adjustable)				
Output AC (Emergency Power Supply)					
Max. apparent power (VA)	3000	3680	4000	4600	5000
Peak output power, duration (VA)	3600, 60s	4400, 60s	4800, 60s	5520, 60s	6000, 60s
Max. output current (A)	13,6	16	18,2	20,9	22,7
Nominal voltage, Frequency	220 V/230 V, 50/60Hz				
THDi (@Nominal power)	<3%				
Switch time	<10 ms				
Efficiency					
MPPT efficiency	99.9%				
Max efficiency of solar inverter	97.6%		97.8%		98.0%
European efficiency of solar inverter	97.2%		97.3%		97.5%
Max. charging efficiency of battery	94.6%				
Max. charging efficiency of battery	94.6%				

Max. discharging efficiency of battery	94.6%
Protection	
PV reverse polarity protection	Yes
PV insulation detection	Yes
Ground fault monitoring	Yes
Overcurrent protection (A)	Yes
Overvoltage protection	Yes
DC switch	Yes
Firm frequency response function	optional
SPD protection	MOV: Type III standard
General Data	
Standby self-consumption	<10 W
Topology	High frequency isolation (for battery)
Degree of protection	IP65
Ambient temperature range	-30℃...+60℃ (above 45℃ derating)
Allowable relative humidity range	0...100%
Communication	RS485 / WiFi / Bluetooth / CAN2.0 / Ethernet, optional: GPRS
Parallel operation	Yes (up to 10 units)
Protective class	Class I
Max. operating altitude	4000 m

Current sensor connection (A)	External
Noise	<25 dB
Weight (kg)	21.5
Cooling	Natural
Dimensions	482*503*183mm
Display	LCD, App via Bluetooth
Warranty	5 years, optional: up to 20 years
Standards	
EMC	EN 61000-6-2, EN 61000-6-3, EN 61000-3-2, EN 61000-3-3, EN 61000-3-11, EN 61000-3-12
Safety standards	IEC 62109-1/2, IEC 62040-1, IEC 62116, IEC 61727, IEC 61683, IEC 60068(1,2,14,30)
Grid standards	AS/NZS 4777, VDE V 0124-100, V 0126-1-1, VDE-AR-N 4105, CEI 0-21, EN 50549, G83/G59/G98/G99, UTE C15-712-1, UNE 206 007-1
The models marked with " * " are available only for some designated countries.	

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