



SAATVIK

UDAY *PLUS* SERIES

SINGLE PHASE HYBRID INVERTER



User Manual

Version: 1.0

Hybrid Models

SS-HYB-LV-3K-1PH-A1
SS-HYB-LV-3K6-1PH-A1
SS-HYB-LV-4K-1PH-A1
SS-HYB-LV-5K-1PH-A1
SS-HYB-LV-6K-1PH-A1
SS-HYB-LV-6K6-1PH-A1
SS-HYB-LV-7K-1PH-A1
SS-HYB-LV-7K5-1PH-A1
SS-HYB-LV-8K-1PH-A1

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Notice

This manual contains important safety instructions, installation, electrical connections, commissioning, maintenance, and troubleshooting of the equipment.

Save the manual!

This manual must be stored carefully and be available at all times.

Copyright Declaration

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1. About this manual

1.1 Applicability

Please read the product manual carefully before installation, operation or maintenance of the inverter. This manual contains important safety instructions and installation instructions that must be followed during installation and maintenance of the equipment.

1.2 Target group

This manual is intended for technical professionals for installation, commissioning and maintenance of the hybrid inverter. The technical personnel has to be familiar with the product, local standards, and electric systems.

1.3 Symbols used

The following types of safety instructions and general information appear in this document as described below:

 DANGER	'Danger' indicates a hazard with a high level of risk that, if not avoided, will result in death or serious injury.
 WARNING	'Warning' indicates a hazard with a medium level of risk that, if not avoided, will result in death or serious injury.
 CAUTION	'Caution' indicates a hazard with a low level of risk that, if not avoided, could result in minor or moderate injury.
 NOTICE	'Notice' indicates a situation that, if not avoided, could result in equipment or property damage or provides tips that are valuable for the optimal operation of your product.

1.4 Acronyms and abbreviations

AFCI	Arc fault circuit interrupter
BAT	Battery
BMS	Battery Master System
DRM	Demand response modes
DRED	Demand response enabling device
EMI	Electromagnetic interference
EPS	Emergency power supply
LED	Light emitting diode
MPP	Maximum power point
MPPT	Maximum power point tracking
PV	Photovoltaic
RCD	Residual Current Operated Protective Device
RSD	Rapid shutdown
THDi	Total Harmonic Distortion of Current
THDv	Total Harmonic Distortion of Voltage

2. Safety

2.1 General Safety

The hybrid inverter has been designed and tested strictly in accordance with international safety regulations. Read all safety instructions carefully prior to any work and observe them at all times when working on or with the hybrid inverter.

Incorrect operation or work may cause:

- ◆ Injury or death to the operator or a third party;
- ◆ Damage to the inverter or other properties.

2.2 Important safety instructions



- PV strings will produce electrical power when exposed to sunlight and can cause lethal voltage and electric shock.
- Only qualified personnel should work on PV panels.
- Do not open lid when the inverter is operating. Unauthorized opening will void warranty and warranty claims and in most cases terminate the operating license.
- When the enclosure lid is removed, live components could be touched which can result in death or serious injury due to electric shock.
- Operating damaged inverter can lead to hazardous situations that can result in death or serious injuries due to electric shock.
- Batteries store large amount of electrical power, short circuiting or incorrect installation may lead to burns or serious injuries.
- Lethal voltages are present at battery terminals and cables connecting to the inverter. Serious injuries or death may occur if the cables and terminals are touched.
- PV negative (PV-) and battery negative (BAT-) on inverter side are not grounded intentionally. Connecting PV- or BAT- to EARTH is strictly forbidden.



Do not disconnect PV, AC and/or battery plugs and cables while the inverter is operating. Before working on the system power down on all supplies and wait for 5 minutes to discharge. Verify that there is no voltage or current before disconnecting any or cables.

Use personal protective equipment, including rubber gloves and protective boots during installation or maintenance



Do not touch any hot parts (such as the heat sink) during operation, temperature of inverter surface may exceed 60° operation.

NOTICE

Electrical installation and maintenance must only be carried out by trained and qualified electrician, following all local regulations. Do not open inverter lid or change components without Saatvik Green Energy authorization. Unauthorized work will invalidate warranty. Operate inverter as explained in this manual, failure will damage equipment and invalidate warranty.

Installation and maintenance must be carried out by competent electricians following all local regulations.

With an integrated universal currentsensitive residual current monitoring unit included the inverter will disconnect immediately from the mains power once a fault current with a value exceeding the limit is detected. However, if an external residual current device (RCD) is mandatory, the switch must be triggered at a residual current of 300 mA (recommended), or it can be set to other values according to local regulations. For example, in Australia, the inverter can use an additional 100 mA (Type A) RCD in installations.

When installing, operating, and maintaining the product, comply with local laws and regulations. The safety instructions in this manual are only supplements and cannot cover all the precautions.

Saatvik will not be held liable for any damage caused by violating general safety operation requirements, general safety standards, or any safety instruction in this manual.

Anti-Islanding Effect

Islanding is a condition when grid connected PV/ batteries back feed power into the Grid when Grid is turned off for maintenance work, putting maintenance personal at serious risk. Saatvik Hybrid Uday Plus inverters prevent islanding through Active Frequency Drift (AFD).

2.3 Explanation of symbols

Symbols on the type label:

Symbol	Explanation
	CE mark. The inverter complies with requirements of applicable CE-guidelines.
	Beware of hot surface. The inverter can be hot during operation. Avoid touching during operation.
	Danger of high voltage. Danger to life due to high voltage in the inverter!
	Danger. Risk of electric shock!
	WEEE designation Do not dispose of the system together with the household waste, but in accordance with the disposal regulations for electronic waste applicable at the installation site.

Symbol	Explanation
	Don't work on this inverter until it is isolated from the battery, mains supply, and on-site PV modules.
	Danger to life due to high voltage. The inverter holds stored power, wait for 5 minutes to discharge before opening the lid.
	Please read this manual before installation.
	RCM (Regulatory Compliance Mark) The product meets the requirements of the applicable Australian standards.

3. Introduction

3.1 Block diagram

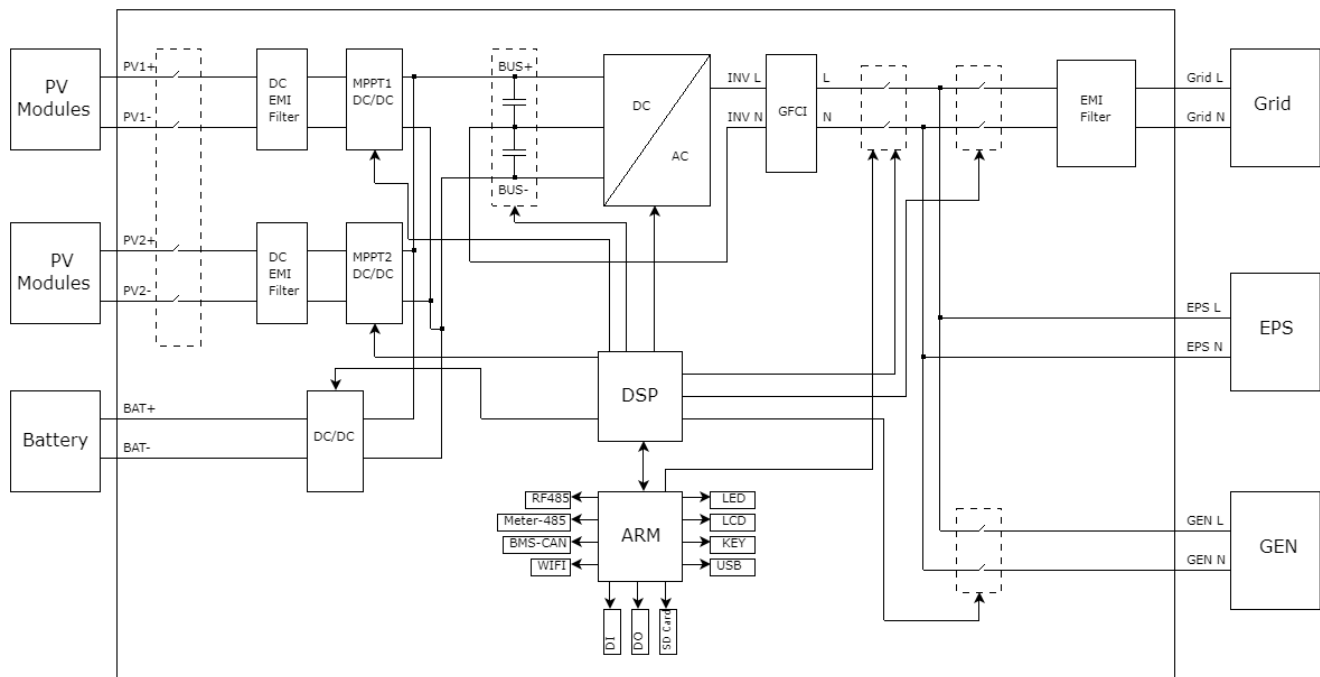
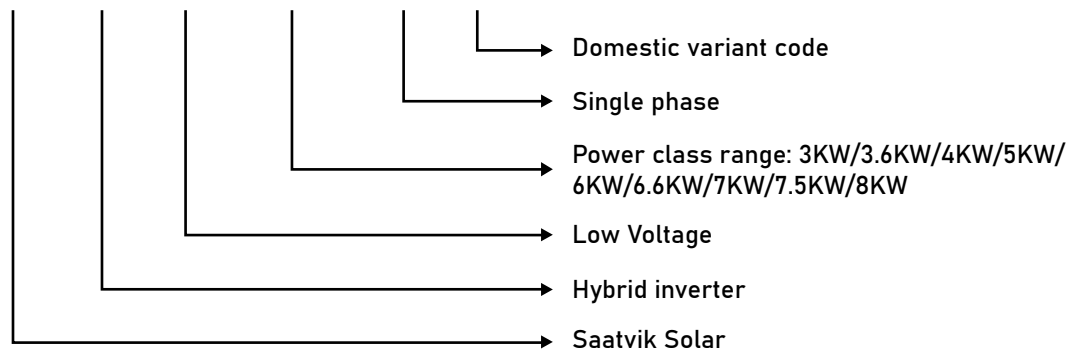


Figure3-1 Block diagram

3.2 Product overview

The SS-HYB-LV-3K-1PH-A1 to SS-HYB-LV-8K-1PH-A1 hybrid inverters are designed to work with PV modules, battery, grid power and electrical loads. Hybrid inverter helps to optimize on site consumption, charge battery with surplus PV power and supply power from battery to meet load. When PV and battery power are insufficient, grid power will be used to support loads.

Model name: **SS-HYB-LV-(3K_8K)-1PH-A1**



3.3 Dimensions

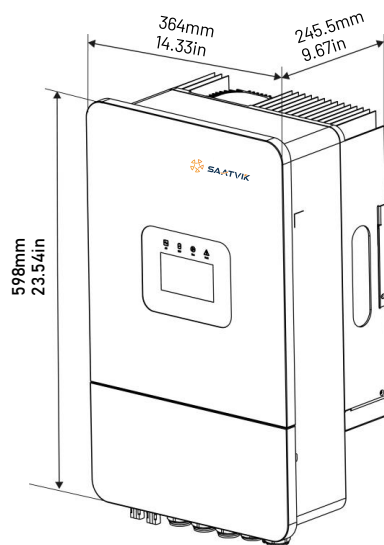
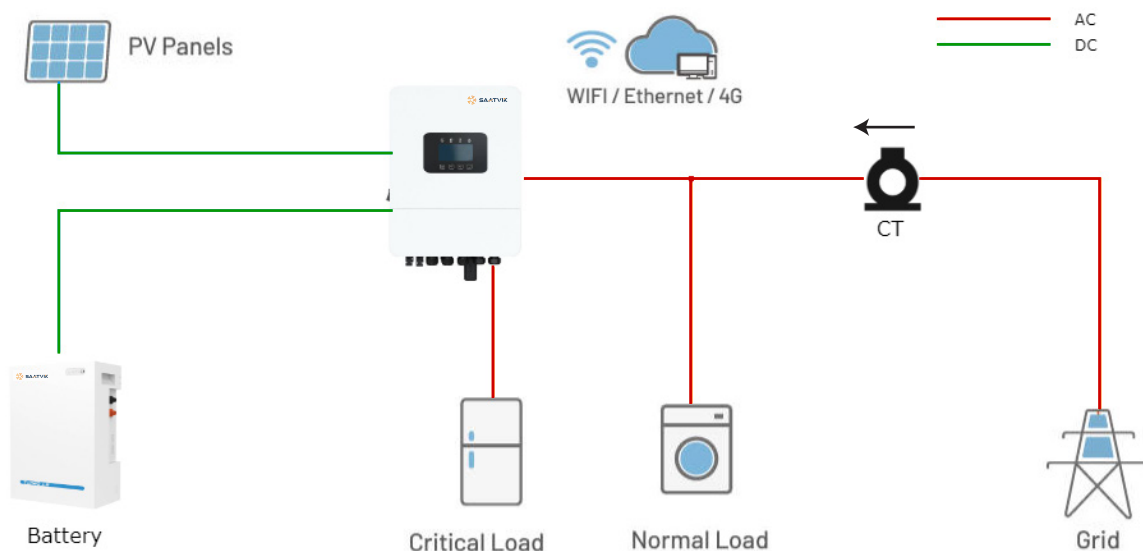


Figure 3-2

3.4 Application Scenarios



Normal Output: Powers your entire home or heavy, non-essential appliances while the grid is active. When the grid goes down, this output automatically shuts off to protect the grid and save your battery.

Critical Output: Powers your essential appliances (e.g., fridge, Wi-Fi, lights, medical equipment) via a dedicated backup panel. During a blackout, the inverter automatically isolates this output and runs these appliances using stored battery and solar power.

3.5 Technical data

Model	SS-HYB -LV-3K- 1PH-A1	SS-HYB -LV-3K6- 1PH-A1	SS-HYB -LV-4K- 1PH-A1	SS-HYB -LV-5K- 1PH-A1	SS-HYB -LV-6K- 1PH-A1	SS-HYB -LV-6K6- 1PH-A1	SS-HYB -LV-7K- 1PH-A1	SS-HYB -LV-7K5- 1PH-A1	SS-HYB -LV-8K- 1PH-A1
PV Input									
Max. PV Access Power[Wp]	6000	7200	8000	10000	12000	13200	14000	15000	16000
Max. PV Input Power[W]	4800	5760	6400	8000	9600	10560	11200	12000	12800
Max. PV Input Voltage[V]	500								
MPPT Voltage Range[V]	90 ~ 450								
Rated PV Input Voltage[V]	300								
Start-up Voltage [V]	120								
No. of MPP Trackers	2								
No. of Input Strings per Tracker	1 / 1						2 / 2		
Max. PV Input Current [A]	20 / 20						40 / 40		
Max. Short-circuit Current [A]	25 / 25						50 / 50		
Max. inverter backfeed current to the array[A]	0								
OVC category	II								
AC Output/Input									
Max. AC Output/Input Apparent Power [VA]	3300	3960	4400	5500	6600	7260	7700	8250	8800
Rated AC Output/Input Power [W]	3000	3600	4000	5000	6000	6600	7000	7500	8000
Max. AC Output/Input Current [A]	15/14.3	18/17.2	20 / 19.1	25 / 24	30 / 28.7	33/31.6	35/33.5	37.5/35.9	40 / 38.3
Rated AC Output/Input Current [A]	13.6/13	16.4/15.7	18.2 / 17.4	22.8 / 21.8	27.3 / 26.1	30/28.7	31.8/30.4	34.1/32.6	36.4 / 34.8
Rated AC Voltage	L / N / PE, 220 / 230								

Model	SS-HYB -LV-3K- 1PH-A1	SS-HYB -LV-3K6- 1PH-A1	SS-HYB -LV-4K- 1PH-A1	SS-HYB -LV-5K- 1PH-A1	SS-HYB -LV-6K- 1PH-A1	SS-HYB -LV-6K6- 1PH-A1	SS-HYB -LV-7K- 1PH-A1	SS-HYB -LV-7K5- 1PH-A1	SS-HYB -LV-8K- 1PH-A1
[V]									
Grid Frequency [Hz]	50 / 60								
Adjustable Power Factor [cosφ]	0.8 leading ~ 0.8 lagging								
Output/Input THDi (@Rated Output)	< 3%								
InrushCurrent [A]	34								
Max. Output Fault Current[A]	118								
Max. Output Overcurrent Protection[A]	90								
OVC Category	III								
ProtectiveClass	I								
AC Input									
Max. AC Input Apparent Power [VA]	6000	7200	8000	10000	12000	13200	14000	15000	16000
Max. AC Input Current [W]	27.2/26. 1	32.7/31.3	36.4/34. 8	45.5/43. 5	54.5/52.2	60/57.4	63.6/60.9	68.2/65.2	72.7/69. 6
Rated AC Voltage [V]	L / N / PE,220 / 230								
Grid Frequency [Hz]	50 / 60								
Battery									
Battery Type	Lead-acid / Li-ion								
Battery Voltage Range[V]	40 ~ 60								
Max. Charging / Discharging Current [A]	70	90	100	100	120	145	175	190	190
Communication Interface[A]	CAN								
Backup Output (With Battery)									
Rated Output Power [W]	3000	3600	4000	5000	6000	6600	7000	7500	8000
Rated Output Voltage [V]	L / N / PE, 220 / 230								
Rated Frequency [Hz]	50 / 60								

Model	SS-HYB -LV-3K- 1PH-A1	SS-HYB -LV-3K6- 1PH-A1	SS-HYB -LV-4K- 1PH-A1	SS-HYB -LV-5K- 1PH-A1	SS-HYB -LV-6K- 1PH-A1	SS-HYB -LV-6K6- 1PH-A1	SS-HYB -LV-7K- 1PH-A1	SS-HYB -LV-7K5- 1PH-A1	SS-HYB -LV-8K- 1PH-A1
Rated Output Current [A]	13.6/13	16.4/15.7	18.2 / 17.4	22.8 / 21.8	27.3 / 26.1	30/28.7	31.8/30.4	34.1/32.6	36.4 / 34.8
Output THDi (@Linear load)	< 3%								
Automatic Switch Time [ms]	< 10								
Peak Apparent Power, Duration [VA, s]	1.5 times of rated power, 10s								
Efficiency									
Max. Efficiency	97.6%								
EuroEfficiency	97.0%								
MPPT Efficiency	> 99%								
Protection									
DC Insulation Monitoring	Integrated								
Input Reverse Polarity Protection	Integrated								
Anti-island Protection	Integrated								
Residual Current Monitoring	Integrated								
Over-heat Protection	Integrated								
AC Overcurrent Protection	Integrated								
AC Overvoltage Protection	Integrated								
DC Surge Protection	Integrated (Type II)								
AC Surge Protection	Integrated (Type II)								
DC Switch	Integrated								
AFCI Protection	Optional								
General Data									
Num. of Parallel [units]	1 ~ 6								
Dimensions (W * H * D) [mm]	598 * 364 * 246.5								
Weight [kg]	28								
Display	LED + LCD								

Model	SS-HYB -LV-3K- 1PH-A1	SS-HYB -LV-3K6- 1PH-A1	SS-HYB -LV-4K- 1PH-A1	SS-HYB -LV-5K- 1PH-A1	SS-HYB -LV-6K- 1PH-A1	SS-HYB -LV-6K6- 1PH-A1	SS-HYB -LV-7K- 1PH-A1	SS-HYB -LV-7K5- 1PH-A1	SS-HYB -LV-8K- 1PH-A1
Communication	RS485, CAN, Dry contact, Optional: WiFi or 4G or Ethernet								
Ambient Temperature Range [°C]	-30 ~ +60 (Derating above 45°)								
Relative Humidity	0 ~ 100%								
Operating Altitude [m]	4000 (>2000 Derating)								
Standby Self- consumption [W]	< 15								
Topology	Non-isolated								
Cooling	Natural				Fan				
Noise[dB]	< 30				< 50				
Ingress Protection	IP65								
Pollution Degree	III								
Certifications & Standards									
Grid Regulation	IEC 61727, IEC 62116, PEA.MEA								
Safety Regulation	IEC 62109-1, IEC 62109-2								
EMC	EN IEC 61000-6-1, EN IEC 61000-6-3,EN 62920								

[1] It can be reached only if PV and battery power are sufficient. For inductive loads such as refrigerators, air conditioners, washing machines, etc., ensure that their start power does not exceed the Peak Power, for example, the Max. start power of the air conditioner is 3-6 times the rated power.

3.6 Components Introduction

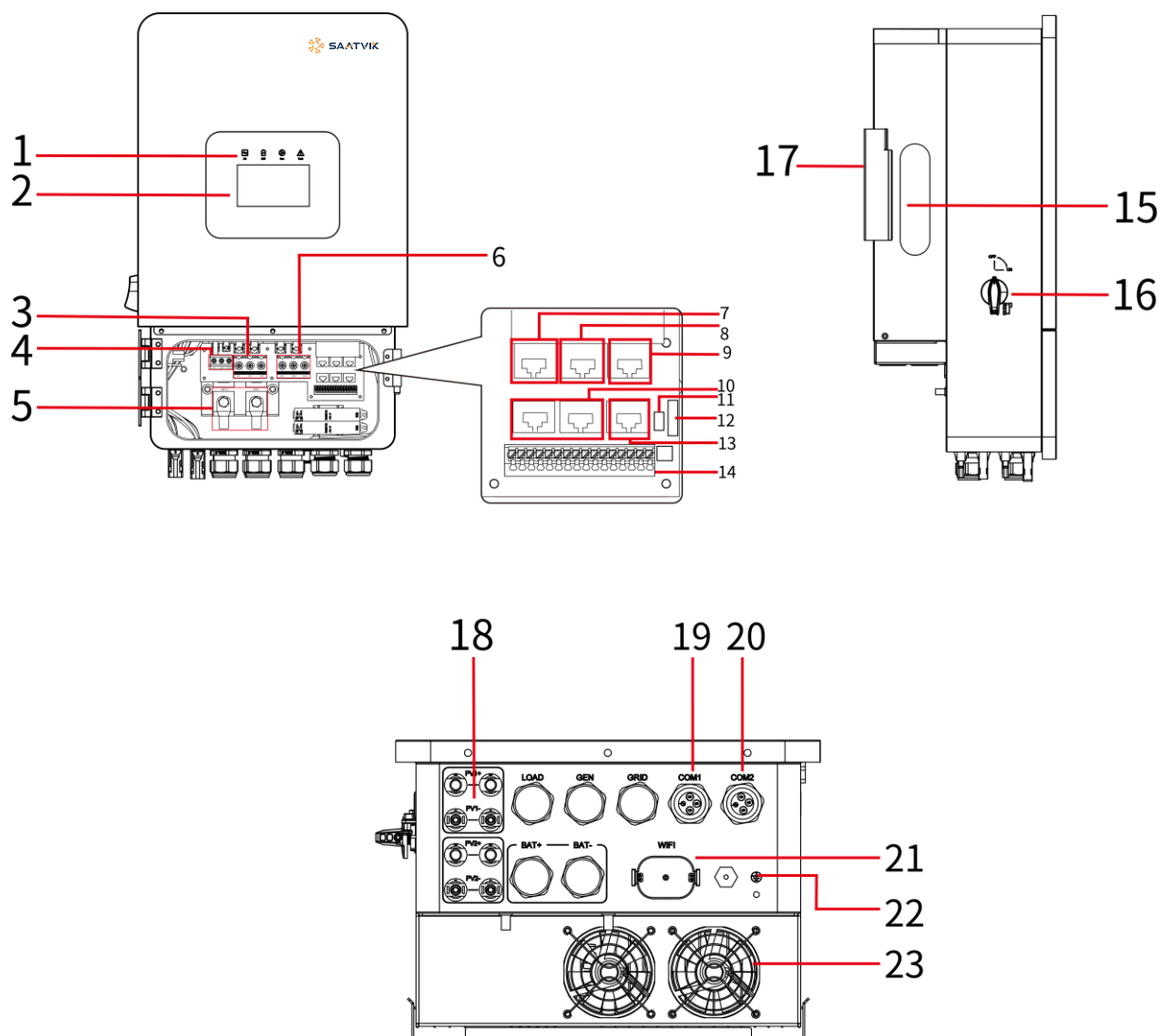


Figure 3-4 Components of the Saatvik Hybrid Uday Plus Inverters

NOTE :

1. The 8K model is of different hardware from the 3-6K models.
2. The maximum number of input strings is 4 for 7-8KW and 2 for 3-6K.

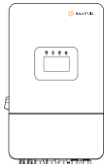
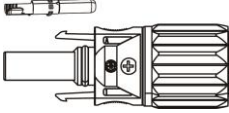
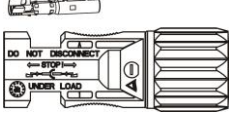
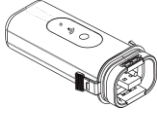
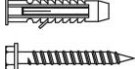
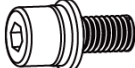
No.	Name	No.	Name
1	LED Indicators	2	LCD screen
3	Generator input	4	Load terminals
5	Battery terminals	6	Grid terminals
7	DRM port	8	BMS-CAN port
9	Meter port	10	Parallel communication port
11	DIP Switch for CAN Bus in Parallel Systems	12	BMS12V (for battery wake-up)
13	RS485 port	14	Function port
15	Handle	16	DC Switch
17	Mounting bracket	18	PV input terminals

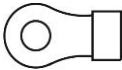
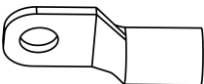
No.	Name	No.	Name
19	Communication port1	20	Communication port 2
21	Smart dongle port	22	Grounding terminal
23	Cooling fan		

4. Installation

4.1 Unpacking

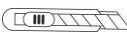
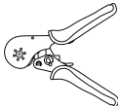
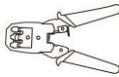
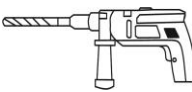
Before opening the package, please check whether the packing box is complete and whether there is any damage or if it is soaked in water; if the package is incomplete or obviously damaged, please contact the supplier. If the package is complete, please open the box to check whether the contents are complete against the material list or as shown in the figure below; if there is any omission or damage, please contact the supplier.

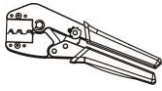
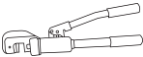
No.	Shape	Model	Quantity
1		SS-HYB-LV-3K-1PH-A1 inverter to SS-HYB-LV-8K-1PH-A1 inverter	1
2		Mounting bracket	1
3		PV cable terminal(+) with a corrugated pipe	4
4		PV cable terminal(-) with a corrugated pipe	4
5		WIFI dongle(Standard) or 4G/Ethernet dongle (Optional)	1
6		CT	1
7		RJ45 plug	6
8		Expansion tube M6 & screw M6*55	4 & 4
9		Fastening screw	2

No.	Shape	Model	Quantity
10		Ground screw	1
11		Ground OT terminal	1
12		Battery terminal	2
13		Tube terminal (Large-diameter)	6
14		Tube terminal (Small-diameter)	3
15		Quality certificate	1
16		User manual	1
17		Quick installation	1

4.2 Preparation for installation

4.2.1 Installation tools

No.	Tool	Model	No.	Tool	Model
1		Spirit level	8		Knife
2		Wire stripper	9		Marker
3		Tube Terminal Crimping Pliers	10		Rubber hammer
4		Heat gun	11		RJ45 crimping tool
5		Hammer drill	12		Torque screwdriver

No.	Tool	Model	No.	Tool	Model
6		PV terminals crimping tool	13		Multimeter
7		Hydraulic Crimping Tool			

4.2.2 Protective tools

No.	Tool	Model	No.	Tool	Model
1		Dust mask	4		Insulated shoes
2		Goggles	5		Safety helmet
3		Insulated gloves			

4.2.3 Required cables

No.	Cable	Model	Cross-section
1		PV cable	12 AWG
2		Grounding cable	8 AWG
3		Grid/GEN /GND cable	6 AWG
4		Load cable	8 AWG
5		Standard network cable	/

4.3 Installation precaution



Loading capacity and hardness of the supporting surface, load rating of the mounting bracket should be at least four times the weight of the devices according to IEC621091. And supporting characteristics will be impaired by wear, corrosion, and material fatigue or ageing, which should be calculated by inspection of the design data of supporting material and consulting a construction engineer.

The Saatvik Uday Plus Hybrid inverter is designed for outdoor installation (IP65)

- Do not install the inverter in direct sunlight.
- Do not mount the inverter on flammable material.

- Do not install an inverter in areas where flammable materials are stored.
- Do not install an inverter in potentially explosive areas.
- Do not install the inverter during rain or high humidity (>95%).
- Provide adequate ventilation when using batteries, and also read the warning label on the bottom of the inverter.
- Install the inverter where the air temperature would be below 40°C. Children should not have access to an inverter.
- The inverter emits a slight noise when operating. This is normal and will not affect performance.
- Mounting should not tilt more than 5 degrees.
- The inverter is heavy ensure the mounting is strong enough to hold the weight of the inverter.
- If installed in a cabinet, closet or other small enclosed areas, sufficient air circulation must be ensured in order to dissipate heat generated by the unit.
- Please select a concrete wall with load-bearing capacity and a non-flammable surface for installation.

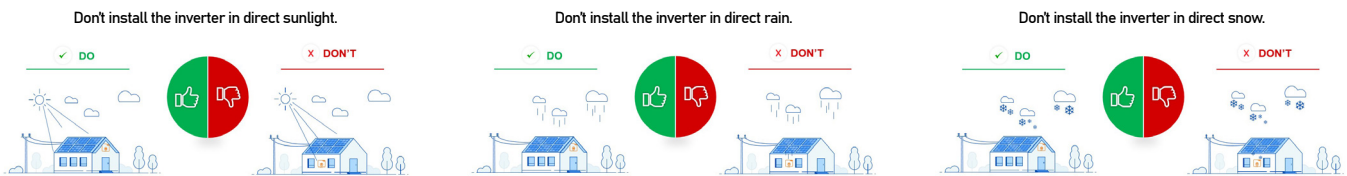


Figure 4-1 Installation environment

4.4 Space requirement

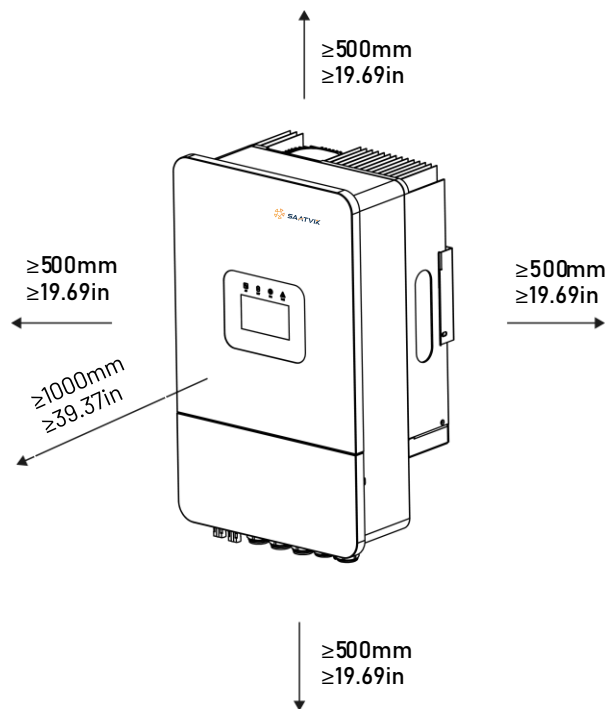


Figure 4-2 Installation space

4.5 Installation steps



- Due to the heavy weight of the inverter, at least 2-3 people should work during manual handling and installation to avoid falling accidents or injuries.
- Do not walk or stand beneath or in the proximity of the load.

1. Use the mounting bracket as a template to mark the position of the 4 holes, and use a level to make sure it is parallel to the ground.

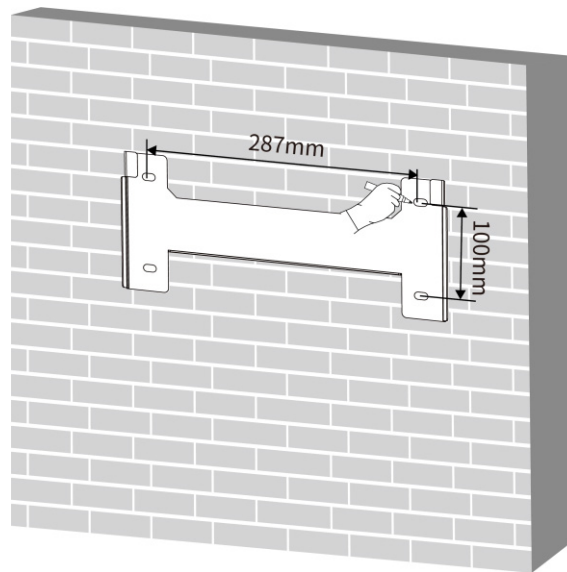


Figure 4-3

2. Drill 4 holes $\geq 55\text{mm}$ deep in the wall with a $\Phi 10\text{mm}$ drill. The mounting bracket is then secured to the wall with expansion screws.

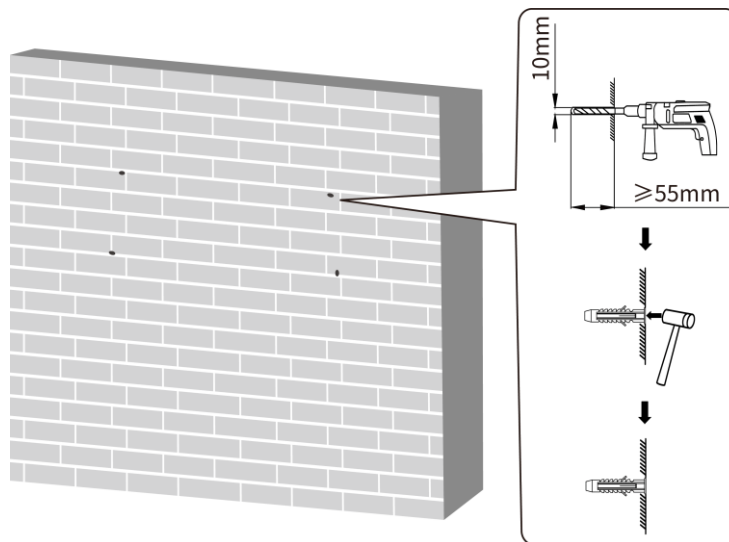


Figure 4-4

3. The mounting bracket is then secured to the wall with expansion screws.

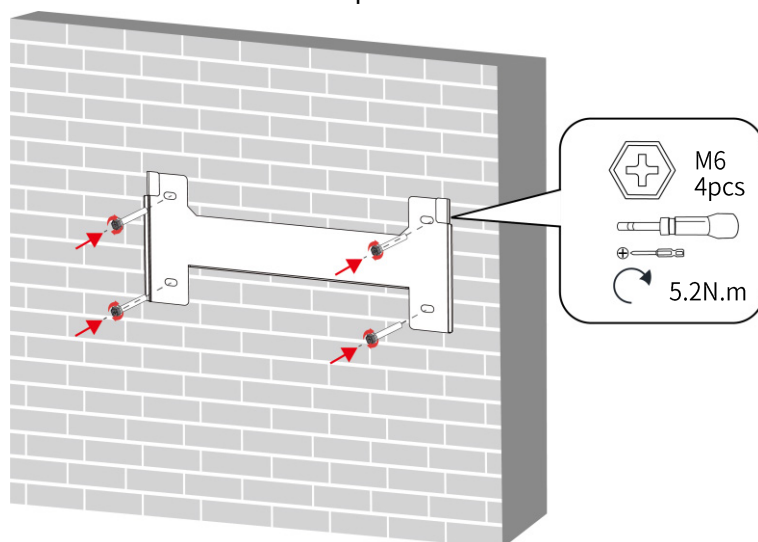


Figure4-5

4. Hang the inverter on the mounting bracket and make sure the unit hangs on the hanging bracket.

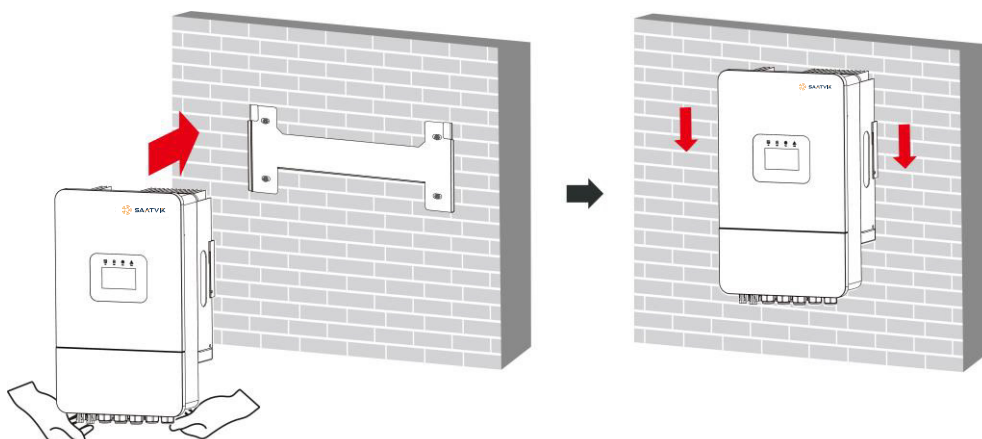


Figure4-6

5. Secure the mounting bracket to the inverter with fastening screw.

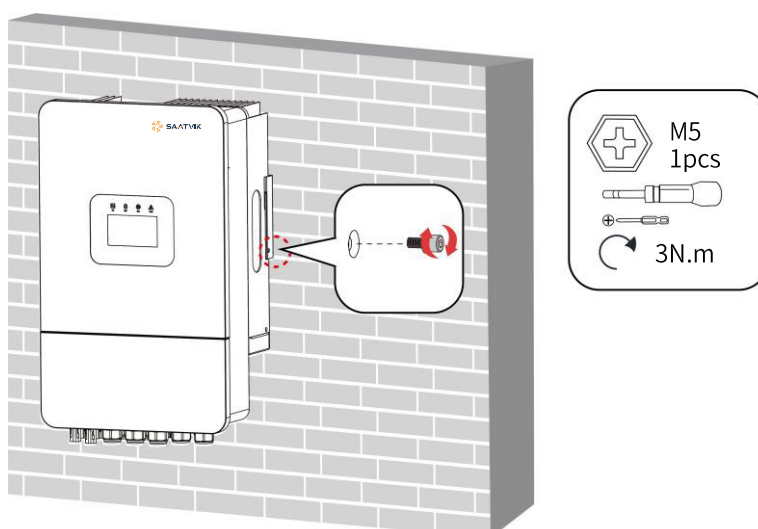


Figure4-7

5. Electrical wiring connection

5.1 Grounding connection

1. Connect the grounding cable before connecting other cables. Users need to prepare their own grounding cable with a recommended cross-sectional area of 6-10mm². Slide the heat shrink tubing over the connector and shrink it with a heat gun.

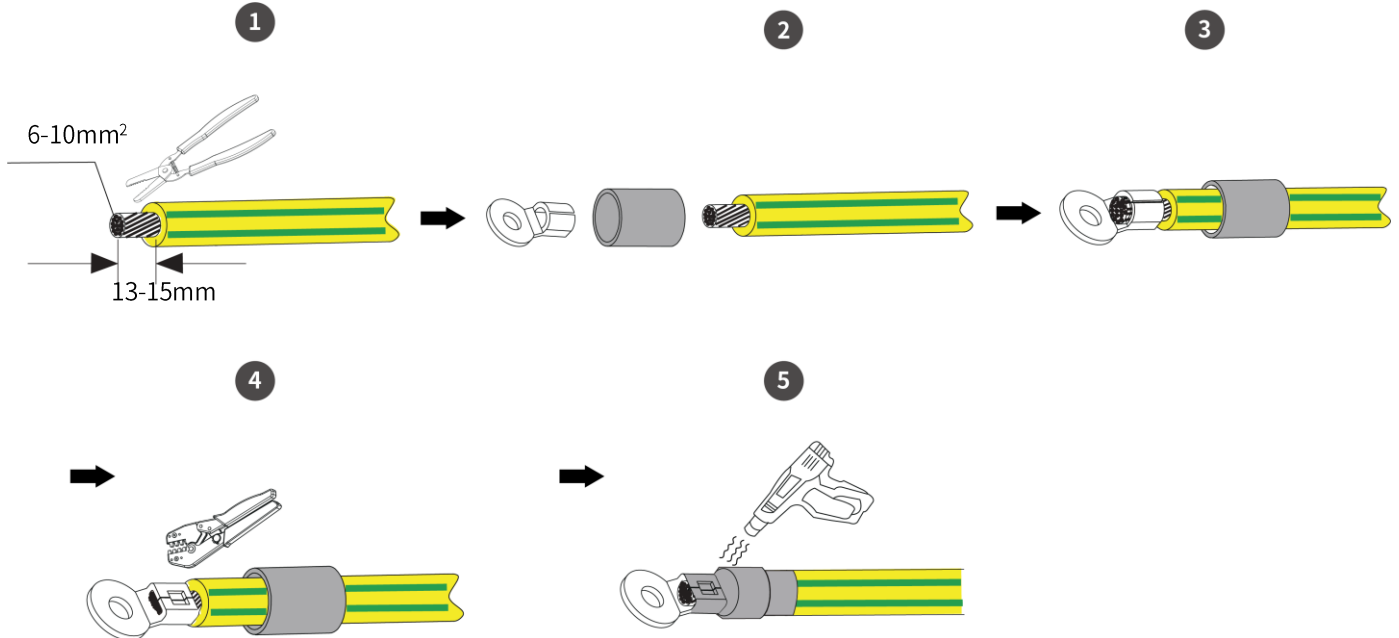


Figure 5-1

2. Connect the grounding cable at the inverter end.

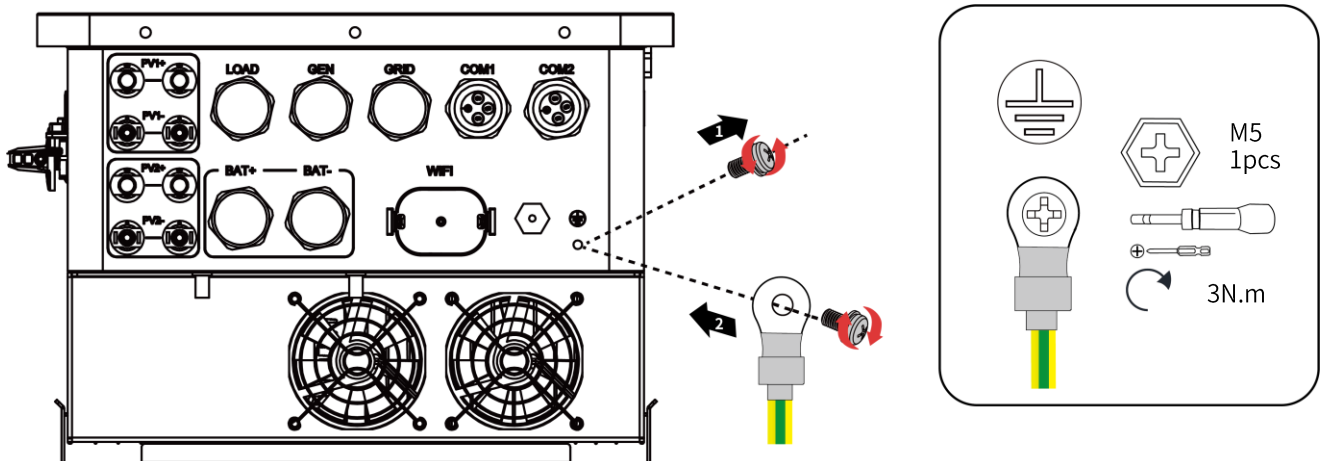


Figure 5-2

5.2 PVconnection



Before connecting PV strings to Saatvik Uday Plus Hybrid inverter (3KW-8KW) ensure the following:

- The total short-circuit current of PV string must not exceed inverter's maximum DC current.
- Make sure that open circuit voltage of PV string is less than 500 V.
- PV strings are not connected to earth/grounding conductor.
- Use the right PV plugs from accessory box, Battery plugs look similar to PV plugs, do confirm before using.
- Ensure that the DC switch is in the off state

⚠ WARNING

- The inverter must only be operated with PV strings with class II protection in accordance with IEC 61730, application class Alt is not allowed for the positive pole or the negative pole of the PV strings to be grounded.
- Verify that the Positive and Negative PV connectors are connected correctly. Otherwise, it may lead to system failure or even personal injury or death.

1. Strip about 7mm of the cable insulation with a wire stripper



Figure 5-3

2. Unscrew the swivel nut and thread the PV cable through the swivel nut

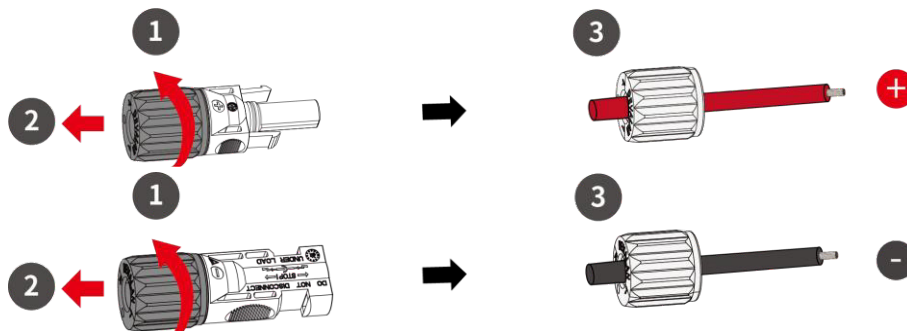
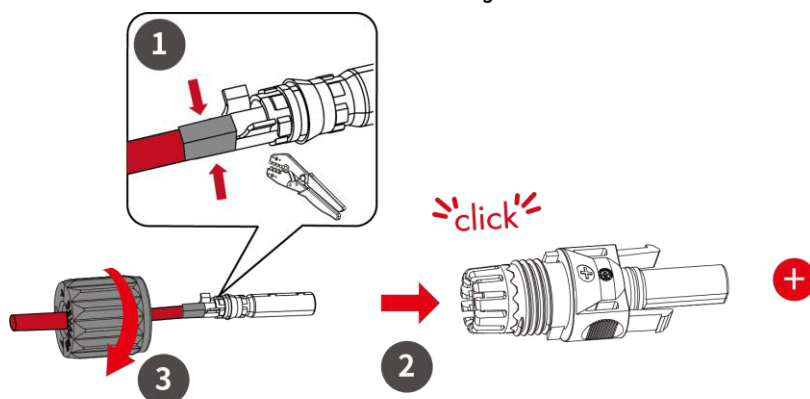


Figure 5-4

3. Insert the cable into the PV cable terminal until a "Click" is heard. Tighten the swivel nut clockwise.



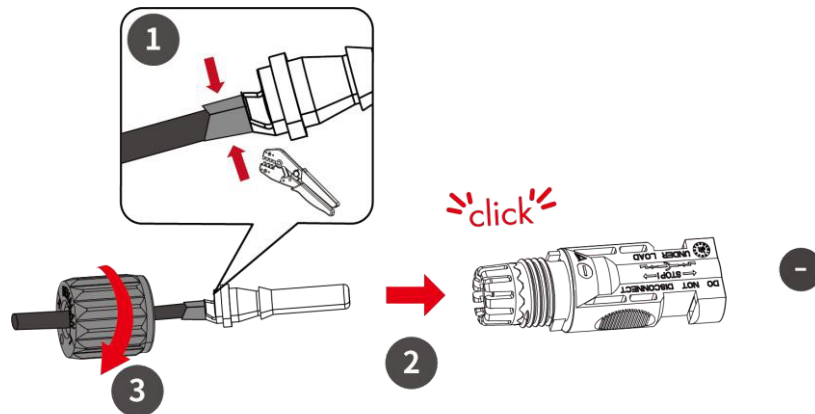


Figure 5-5

4. Use a multimeter to measure the positive and negative voltages at the PV cable terminal. Ensure that the open circuit voltage does not exceed the 500V input limit.

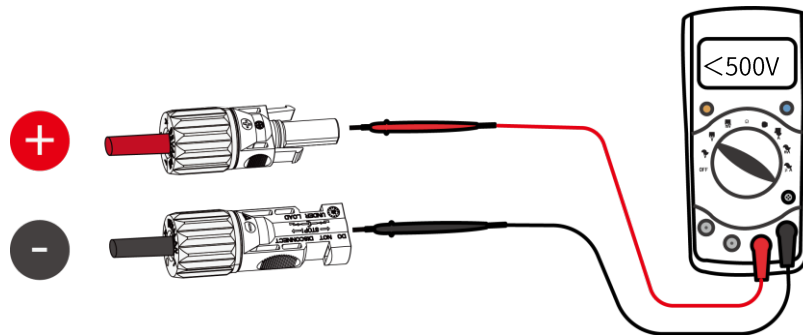


Figure 5-6

5. Remove the PV terminal caps of the hybrid inverter and connect the PV cable terminal to corresponding terminals until there is a "Click".

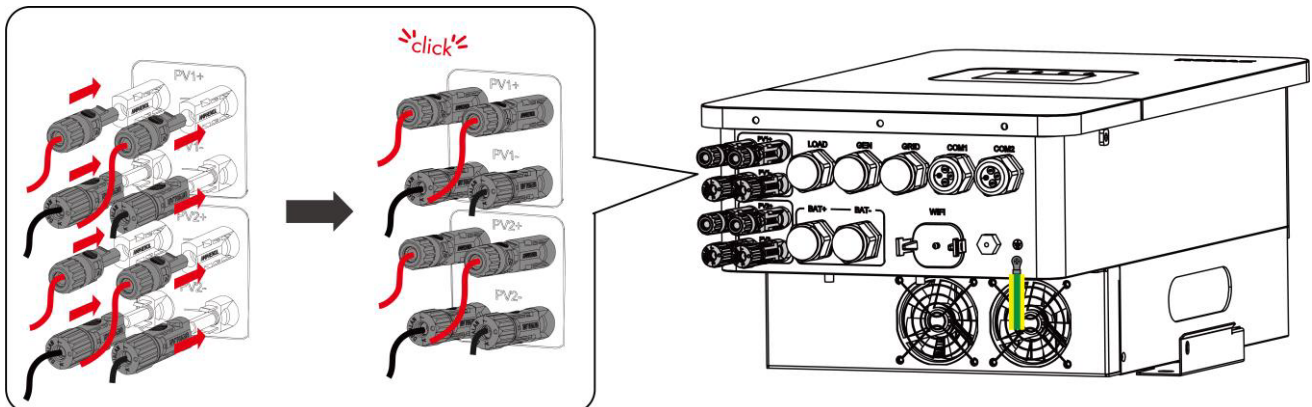


Figure 5-7

5.3 Battery connection

Make and connect the positive and negative cables of the battery as shown in the following picture.

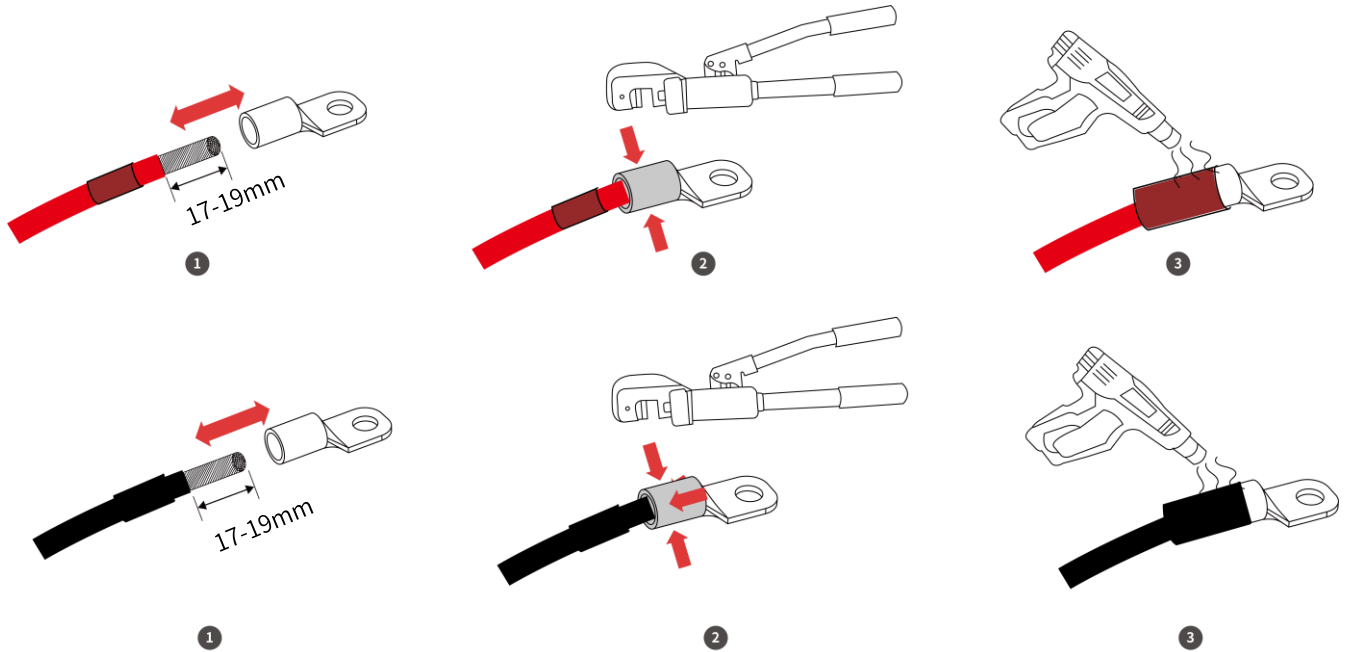


Figure 5-8

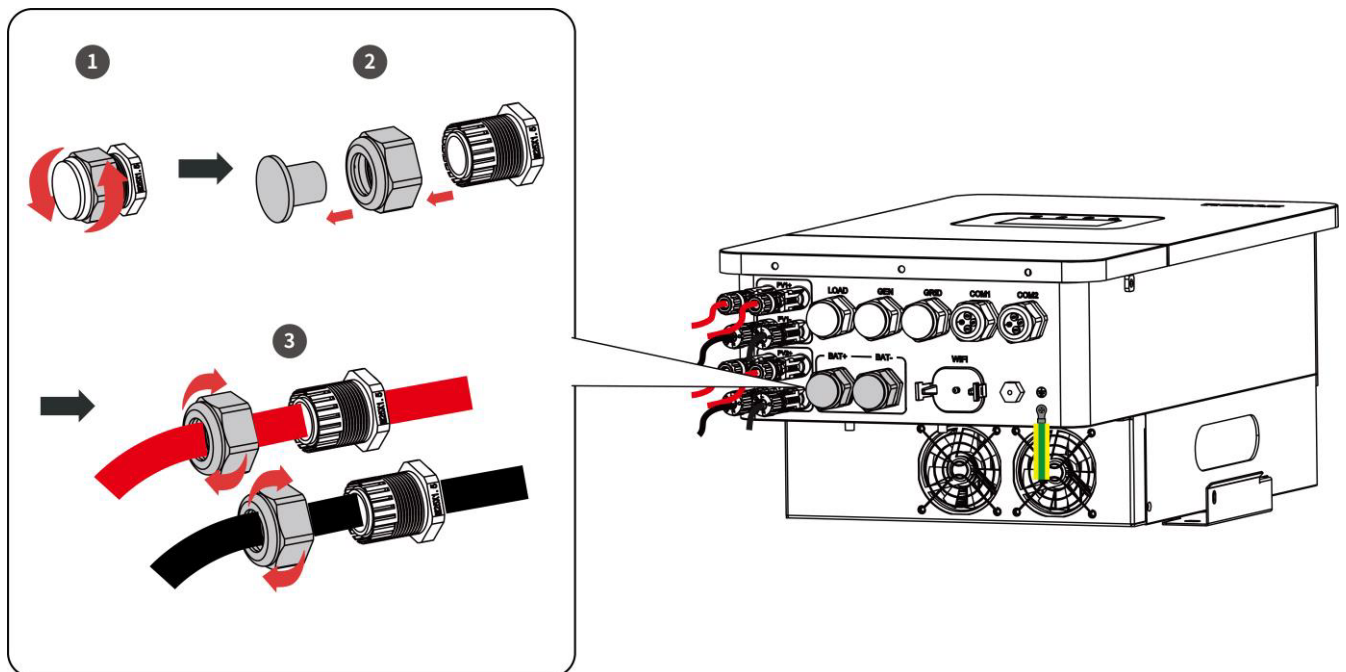
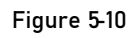
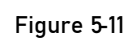


Figure 5-9



Connect the live, neutral and ground wires according to the cables' position and order shown in the diagram below.



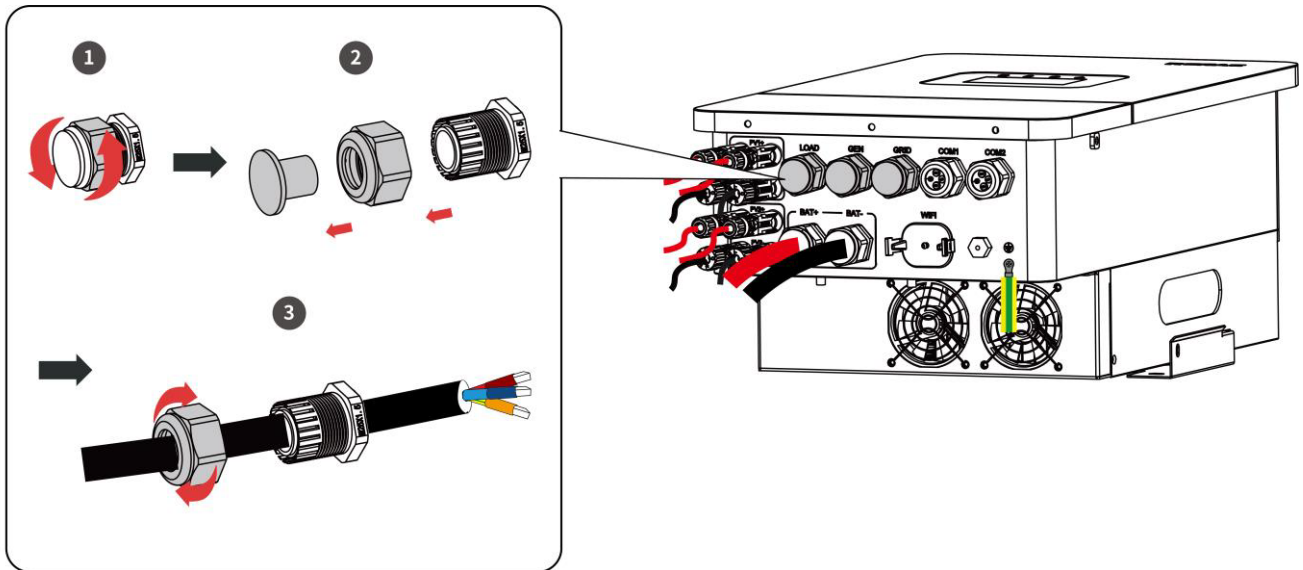


Figure 5-12

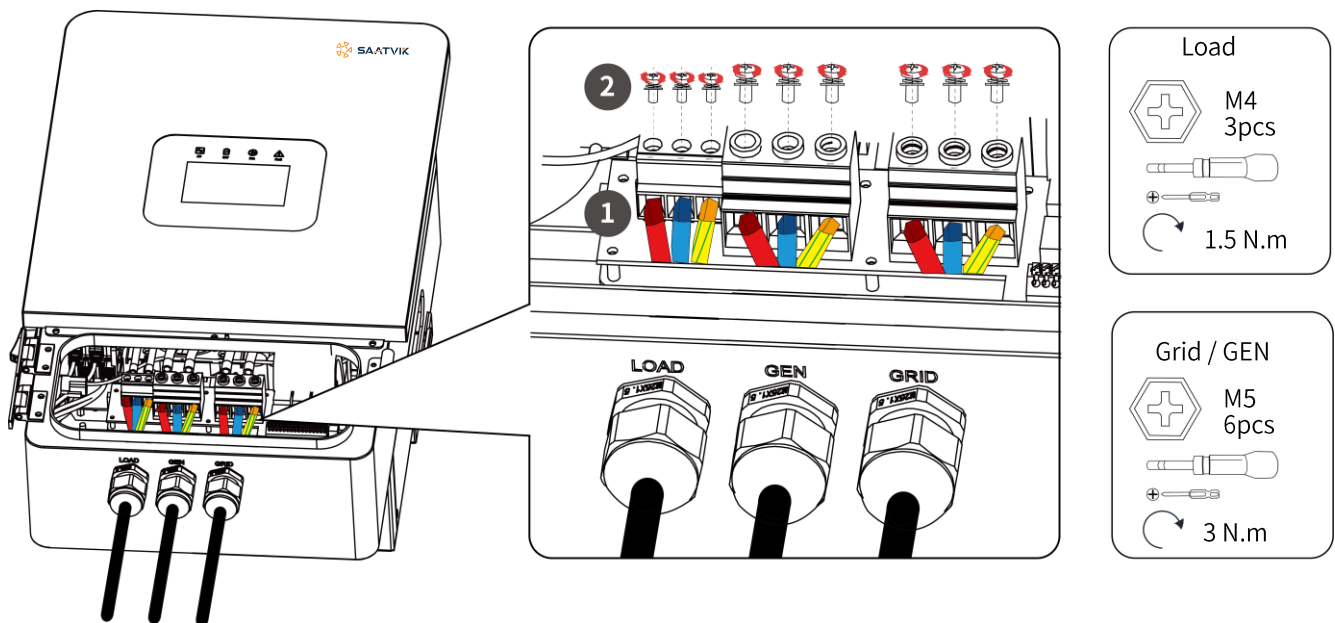


Figure 5-13

- Before connecting AC inputs and outputs, the circuit breaker must be opened to avoid the risk of electric shock and must not be operated with electricity.
- Please check that the cable used is sufficient for the requirements, too thin, poor quality cables are a serious safety hazard.

5.5 Communication connection

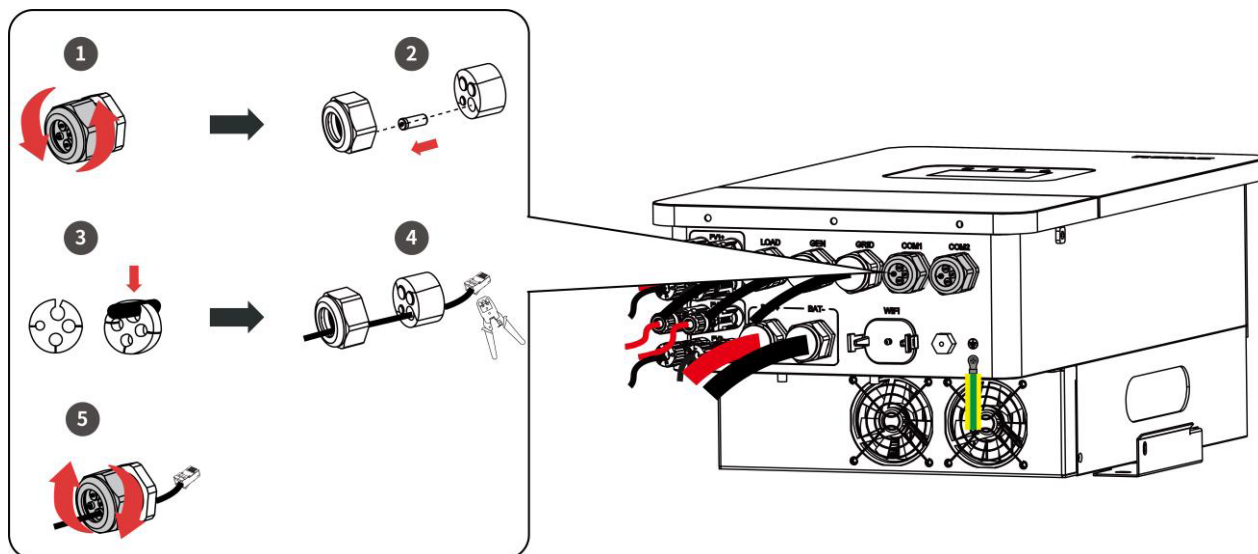


Figure 5-14 Communication port without waterproof cover

NOTE:

The 4-hole fastening rings inside the cable gland for COM1 and COM2 are with openings on the side.
Please separate the gap with hand and squeeze the cables into the holes from the side openings

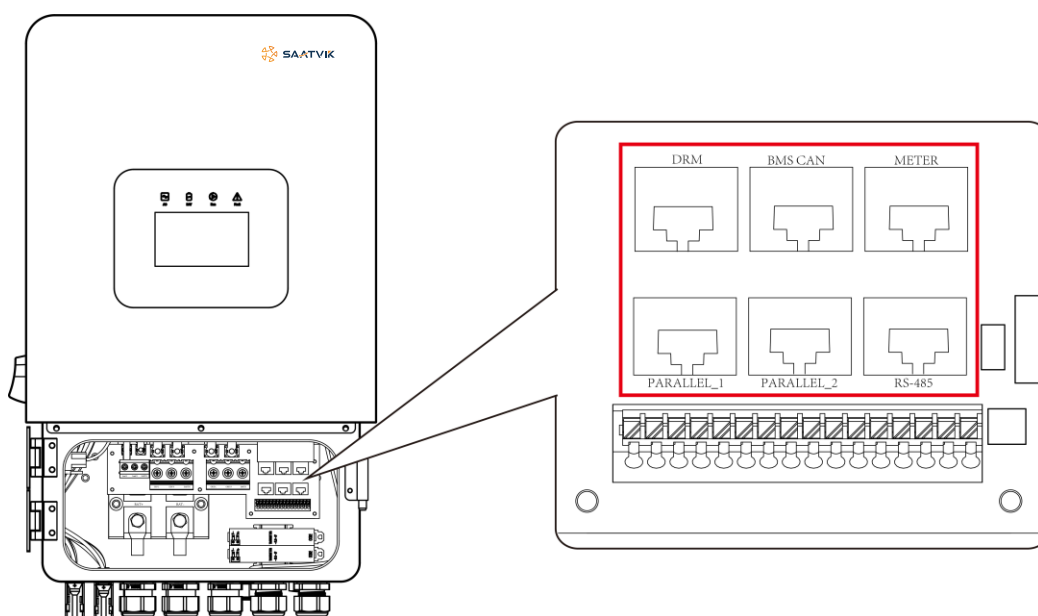
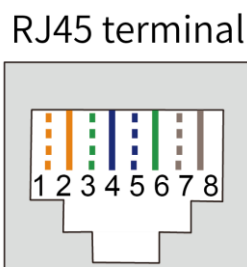
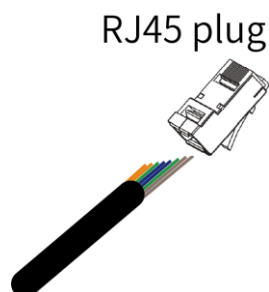


Figure 5-15

No.	Port definition	Description
1	DRM port(Reserve)	For external digital input signals.
2	BMS-CAN	For communication between the inverter and the battery.
3	Meterport	For communication between the inverter and the meter

No.	Port definition	Description
4	Parallel_1port (Reserve)	For the parallel connection of inverters
5	Parallel_2port (Reserve)	For the parallel connection of inverters
6	RS485 (Reserve)	For communication with a 3 rd -party external device or controller.



No.	Color	No.	Color
1	White- Orange	5	White- Blue
2	Orange	6	Green
3	White-Green	7	White-Brown
4	Blue	8	Brown

Figure 5-16

(1)DRM port (Reserve)

Pins definition:

Pin	1	2	3	4	5	6	7	8
Function	DRM1/5	DRM2/6	DRM3/7	DRM4/8	+3.3V	COM/DRM0	GND	GND

In the Australian grid code, requirements for connection call for compatibility with Demand Response Enabling Devices (DRED). The DRED is controlled by a local network operator and allows putting the inverter in one of the Demand Response Modes (DRMs) defined by the standard:

- DRM 0 Operate the disconnection device.
- DRM 1 Do not consume power.
- DRM 2 Do not consume more than 50% of the rated power.
- DRM 3 Do not consume more than 75% of the rated power and source reactive power if capable.
- DRM 4 Increase power consumption (subject to constraints from other active DRMs).
- DRM 5 Do not generate power.
- DRM 6 Do not generate at more than 50% of rated power.
- DRM 7 Do not generate at more than 75% of rated power and sink reactive power if capable.
- DRM 8 Increase power generation (subject to constraints from other active DRMs).

Note: Only DRM0 is currently supported.

(2) BMS-CAN port

Pins definition:

Pin	1	2	3	4	5	6	7	8
Function	NC	NC	NC	CANH	CANL	NC	NC	NC

Note: Only 4 and 5 PIN pins are used.

(3) Meter port

Pins definition:

Pin	1	2	3	4	5	6	7	8
Function	METER-485A	METER-485B	NC	NC	NC	NC	NC	NC

Note: Only 1 and 2 PIN pins are used.

(5) Parallel_1 port & Parallel_2 port(Reserve)

Pins definition:

Pin	1	2	3	4	5	6	7	8
Function	PARALLEL CANH	PARALLEL CANL	/	CAN1 H	CAN1 L	/	/	GND

(6) RS485 port(Reserve)

Pins definition:

Pin	1	2	3	4	5	6	7	8
Function	RS485_A	RS485_B	NC	NC	NC	NC	NC	NC

(7) Terminal Block

Pins definition:

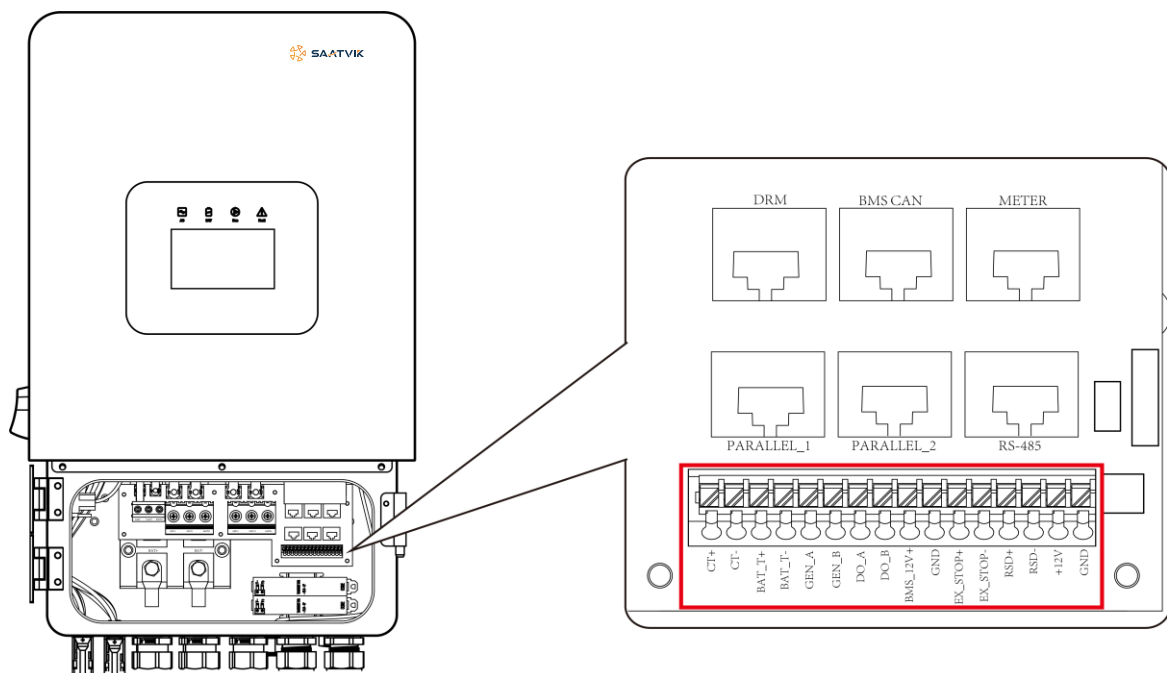


Figure 5-17

Pin	1	2	3	4	5	6	7	8
Function	CT+	CT-	BAT_T+	BAT_T-	GEN_A	GEN_B	DO_A	DO_B
Pin	9	10	11	12	13	14	15	16
Function	BMS_12V+	GND	EX_STOP+	EX_STOP-	RSD+	RSD-	+12V	GND

Pin1 & Pin2 : External CT input for clientside

Pin3 & Pin4 : Lead-Acid battery temperature sensing

Pin5 & Pin6 : Diesel generator emote start interface (Reserve)

Pin7 & Pin8 : Reserved dry contact

Pin9 & Pin10 : BMS wake-up

Pin11 & Pin12 : Emergency stop

Pin13 & Pin14 : RSD power supply

Pin15 & Pin16 : 12V power supply

6. LED indicator status

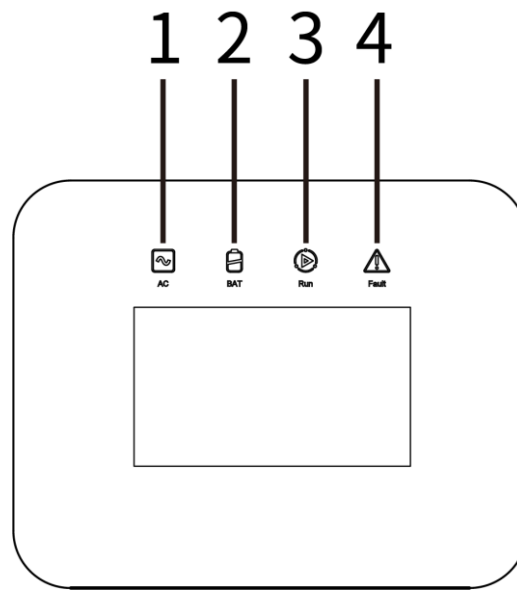


Figure 6-1

No.	Name	Description	
1	AC indicator	On	The inverter is in on-grid state.
		Off	The inverter is not in on-grid state.
2	BAT indicator	On	The battery is selected and operating normally.
		Flashing	The battery is selected but not operating normally.
		Off	The battery is not selected.
3	RUN indicator	On	The inverter is operating normally.
		Flashing	The inverter is shut down
4	Fault indicator	On	The inverter is operating abnormally.
		Flashing	The inverter is in alarm.

7. HMI screen setting

7.1 Main Interface

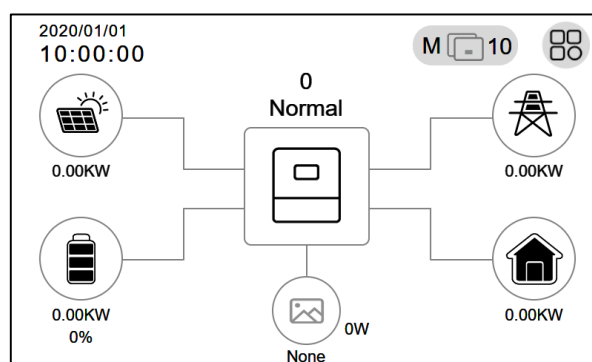


Figure 7-1

Icon	Description	Icon	Description
	PV array		Load
	Battery		Grid
	Inverter status		Smart load
	AC couple		Generator
	Paralleling status		Setting menu

7.2 Time/Language setting

Basic Setting

✓

↺

Year

Month

Day

Hour

Minute

2020

01

01

00

00

Language Select

English

Beep Enable

☐

Screen Sleep

1min

Figure 7-2

7.3 Safety setting

Safety Setting

✓

↺

Safety Code

General

Figure 7-3

Settings	Description
Safetycode	PEA
	MEA
	PEA-W
	MEA-W
	IEC61727-IN
	IEC61727-IN-W
	IEC61727-VN
	IEC61727-VN-W

7.4 Battery setting

7.4.1 Connect to a Lithium Battery

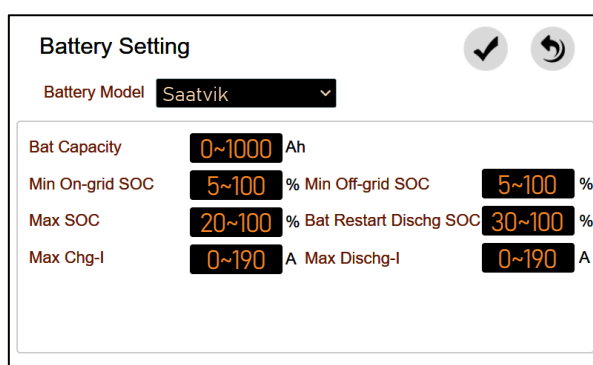


Figure 7-4

Settings	Description
Bat capacity	The value depends on the actual battery capacity.
Min on-grid SOC	When the inverter is in ongrid, the battery will stop discharging once the SOC value reaches this setting.
Max SOC	Charging will stop when the SOC value reaches this setting
Max chg-I	Setting the amount of current when charging the battery.
Min off-grid SOC	When the inverter is in offgrid, the battery will stop discharging once the SOC value reaches this setting.
Bat restart dischg SOC	When the battery SOC is too low to discharge, the battery SOCneeds to reach this setting to discharge again.
Max dischg-I	Set the max battery discharger current.

7.4.2 Connect to a Lead - Acid Battery

Battery Setting

Battery Model Lead-acid

Bat Capacity	0~1000	Ah		
Min On-grid-V	45~50	V	Min Off-grid-V	45~50 V
Equalization-V	50~57	V	Float-V	50~57 V
Bat Low Voltage Alarm	40~60	V	Bat High Voltage Alarm	40~60 V
Bat Restart Dischg-V	48~58	V	Max Chg-I	0~190 A
Max Dischg-I	0~190	A		

Figure 7-5

Settings	Description
Bat capacity	The value depends on the actual battery capacity.
Min on-grid-V	When the inverter is in ongrid, the battery will stop discharging once the voltage value reaches this setting
Equalization-V	The charging voltage used for a limited time to balance the voltage and state of charge of battery cells
Bat low voltage alarm	Battery under-voltage alarm point, when the battery voltage is lower than the judgment point, the under- voltage alarm will be reported.
Bat restart dischg-V	When the battery voltageis too low to discharge, the battery voltageneeds to reach this setting to discharge again.
Max dischg-I	Set the max battery discharger current.
Min off-grid-V	When the inverter is in off-grid, the battery will stop discharging once the voltage value reaches this setting.
Float-V	The maintenance charging voltage used to keep the battery fully charged and compensate for self discharge.
Bat high voltage alarm	Battery over-voltage alarm point, when the battery voltage is higher than the judgment point, the over-voltage alarm will be reported.
Max Chag-I	Setting the amount of current when charging the battery.

7.4.3 No battery

Battery Setting
✓ ↺

Battery Model No Battery

Bat Capacity	0~1000 Ah		
Min On-grid-V	45~50 V	Min Off-grid-V	45~50 V
Equalization-V	50~57 V	Float-V	50~57 V
Bat Low Voltage Alarm	40~60 V	Bat High Voltage Alarm	40~60 V
Bat Restart Dischg-V	48~58 V	Max Chg-I	0~190 A
Max Dischg-I	0~190 A		

Figure 7-6

7.5 PV connect mode

PV Connect Mode
✓ ↺

PV Connect Independent

Figure 7-7

Settings	Description
Independent	Each PV string is connected to the inverter MPPT input on a one to one basis.
Parallel	When external PV strings are connected to the inverter PV input terminals, a single PV string is connected to multiple PV input terminals.

7.6 Meter/CTsetting

Meter/CT
✓ ↺

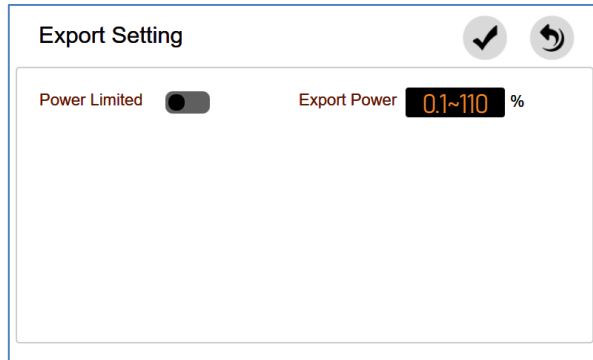
Device Type CT

AC Power Offset -300~0 W

Figure 7-8

Settings	Description
AC power offset	Set inverter power output reductionvalue (this value can be used to reduce export power when grid feed-in occurs).

7.7 Export setting

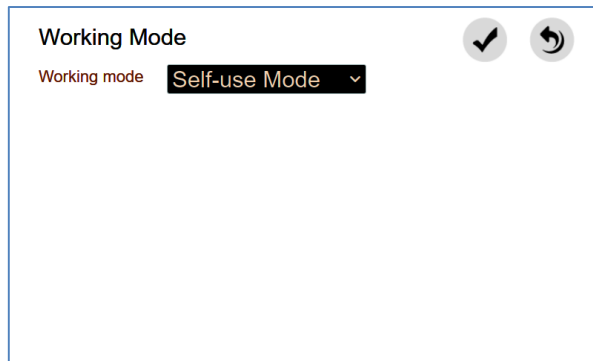


The 'Export Setting' screen features a title bar with a checkmark and a refresh icon. Below the title, there are two main controls: a 'Power Limited' toggle switch which is currently turned off, and an 'Export Power' digital display showing '0.1~110 %'.

Figure 7-9

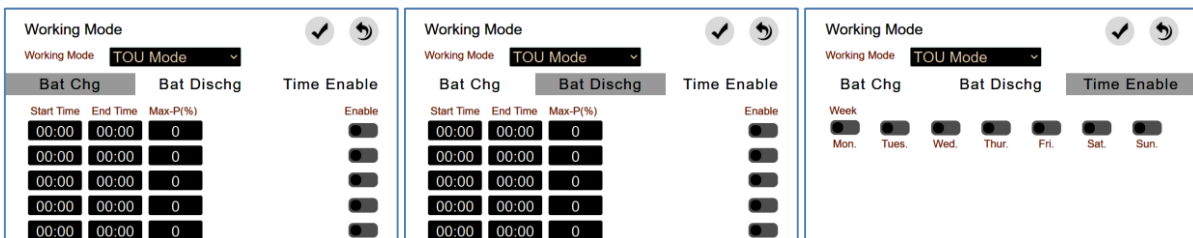
Settings	Description
Power limited	Output power enable
Export power	Setting output power value

7.8 Working mode



The 'Working Mode' screen has a title bar with a checkmark and a refresh icon. The 'Working mode' is set to 'Self-use Mode' via a dropdown menu.

Figure 7-10 Self-use Mode



The 'TOU Mode' screen is divided into three main sections: 'Bat Chg', 'Bat Dischg', and 'Time Enable'. Each section contains a table with 'Start Time', 'End Time', and 'Max-P(%)' settings, along with an 'Enable' toggle. The 'Time Enable' section also includes a 'Week' selection with checkboxes for Mon., Tues., Wed., Thur., Fri., Sat., and Sun.

Figure 7-11 TOU Mode

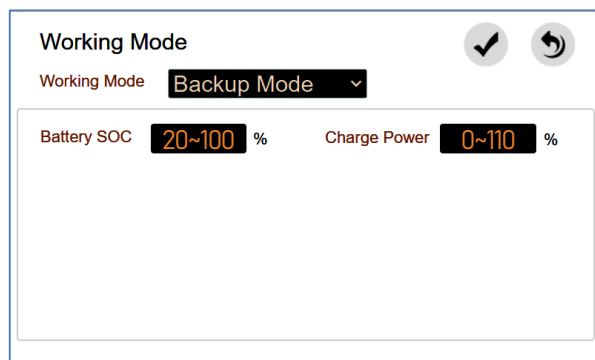


Figure 7-12 Backup Mode

Settings		Description
	Self-use mode	PV power consumption priority: load > battery > grid. In this mode the PV power supplies to the load preferentially, and the excess power is charged to the battery.
TOU mode	Bat chg	Battery charging settings.
	Start time	Start charging or discharging time setting
	End time	End charging or discharging time setting
	Max P(%)	Maximum charge/discharge power setting (rated power %)
	Enable	Charge/discharge time period enabled
	Bat dischg	Battery discharging settings.
	Time enable	Enable date setting
Backup mode	Battery SOC	When the battery SOC falls below this value, the battery will charge until the SOC reaches this value.
	Charge power	Charge power value

8. Troubleshooting and maintenance

8.1 Troubleshooting

This section contains information and procedures for solving possible problems with the Saatvik Hybrid 3KW-8KW inverter and provides you with trouble shooting tips to identify and solve most problems that could occur with the Saatvik Hybrid 3KW-8KW inverter. This section will help you narrow down the source of any problems you may encounter. Please read the following troubleshooting steps.

- Check the warning or fault messages on the System Control Panel or the Fault codes on the inverter information panel. If a message is displayed, record it before doing anything further.
- Attempt the solution indicated in the table below

Fault	Solutions
Parallel Slave Comm Lost	1. Check if the parallel wiring is correct. 2. Check the inverter setting, ensure that only one inverter was set to "Master".
LCD Comm Lost	1. Disconnect the AC output switch, DC input switch & battery switch, then connect them 5 minutes later. 2. Contact the dealer or the after-sales service if the problem persists.

Fault	Solutions
DSP Comm Lost	1. Disconnect the AC output switch, DC input switch & battery switch, then connect them 5 minutes later. 2. Contact the dealer or the aftersales service if the problem persists.
Meter Comm Lost	1. Check if the communication cable between smart meter and Inverter is connected correctly. 2. Check if the smart meter is powered on.
ARM EEPROM Fault	1. Disconnect the AC output switch, DC input switch & battery switch, then connect them 5 minutes later. 2. Contact the dealer or the aftersales service if the problem persists.
RTC Fault	1. Disconnect the AC output switch, DC input switch & battery switch, then connect them 5 minutes later. 2. Contact the dealer or the aftersales service if the problem persists.
BMS Fault	1. Disconnect the AC output switch, DC input switch & battery switch, then connect them 5 minutes later. 2. Contact the dealer or the aftersales service if the problem persists.
BMS Comm Lost	Check if the communication cable between BMS and inverter is connected correctly.
CT Fault	Check if the cable between CT and inverter is connected correctly.
AFCI Comm Lost	1. Disconnect the AC output switch, DC input switch & battery switch, then connect them 5 minutes later. 2. Contact the dealer or the aftersales service if the problem persists.
LCD Comm Lost	1. Disconnect the AC output switch, DC input switch & battery switch, then connect them 5 minutes later. 2. Contact the dealer or the aftersales service if the problem persists.
AFCI Permanent Fault	1. Disconnect the AC output switch, DC input switch & battery switch, then connect them 5 minutes later. 2. Contact the dealer or the aftersales service if the problem persists.
FAN1 Fault	Check whether the external fan is securely connected to the PCB
FAN2 Fault	Check whether the battery side fan and PCB are securely connected
FAN3 Fault	Check whether the relay side fan is reliably connected to the PCB
AFCI Fault	1. Disconnect the AC output switch, DC input switch & battery switch, then connect them 5 minutes later. 2. Contact the dealer or the aftersales service if the problem persists.
PV Over Current Protect	1. Check whether the inverter PV connection is normal, and whether PV+, PV- is reversed. 2. If the PV connection is normal and the inverter still fails, restart the inverter. 3. Contact the dealer or the after-sales service if the problem persists.
Bat Over Voltage Protect	Check if the battery input voltage is within the normal range, then restart the system and confirm whether the fault persists.
Bat Over Current Protect	1. Check whether the power cable connection from the battery to the inverter is normal. 2. If the power cable connection is normal and the inverter still fails, restart the inverter. 3. Contact the dealer or the after sales service if the problem persists.
Bat Chg Over Voltage Protect	1. Disconnect the AC output switch, DC input switch & battery switch, then connect them 5 minutes later. 2. Contact the dealer or the aftersales service if the problem persists.
Bat Over Load Protect	1. Check the EPS load to ensure it does not exceed the inverter EPS Rated Power. 2. Disconnect the AC output switch and DC input switch & battery switch, then connect them 5 minutes later.
Bat Soft Bus Time Out	1. Disconnect the AC output switch, DC input switch & battery switch, then connect them 5 minutes later. 2. Contact the dealer or the aftersales service if the problem persists.
Out Over Load	1. Check the EPS load to ensure it does not exceed the inverter EPS Rated Power. 2. Disconnect the AC output switch and DC input switch & battery switch, then connect them 5 minutes later.
Bat Open Fault	Check if the cable between BAT and inverter is connected correctly.
Bat Dischg	Check whether the battery voltage is below the allowed discharge voltage threshold

Fault	Solutions
Voltage Low	
Bus Over Voltage Protect	1. Disconnect the AC output switch, DC input switch & battery switch, then connect them 5 minutes later. 2. Contact the dealer or the after-sales service if the problem persists.
Bus Under Voltage Protect	1. Disconnect the AC output switch, DC input switch & battery switch, then connect them 5 minutes later. 2. Contact the dealer or the after-sales service if the problem persists.
PV Over Voltage Protect	Check the serial connection of the PV array. Make sure that the open circuit voltage of the PV string is not higher than the maximum operating voltage of the inverter.
AFCI Check Fault	1. Disconnect the AC output switch, DC input switch & battery switch, then connect them 5 minutes later. 2. Contact the dealer or the after-sales service if the problem persists.
PV Input Mode Fault	1. Disconnect the AC output switch, DC input switch & battery switch, then connect them 5 minutes later. 2. Contact the dealer or the after-sales service if the problem persists.
Bus Hardware Over Voltage Protect	1. Disconnect the AC output switch, DC input switch & battery switch, then connect them 5 minutes later. 2. Contact the dealer or the after-sales service if the problem persists.
PV Hardware Over Current Protect	Check the serial connection of the PV array. Make sure that the open circuit voltage of the PV string is not higher than the maximum operating voltage of the inverter.
Self Test Fault	1. Disconnect the AC output switch, DC input switch & battery switch, then connect them 5 minutes later. 2. Contact the dealer or the after-sales service if the problem persists.
Inv Hardware Over Current Protect	1. Check whether the inverter grid is normal. 2. If the power grid is normal and the inverter still fails, restart the inverter. 3. Contact the dealer or the after-sales service if the problem persists.
Sampling Bias Fault	1. Check if the inverter is connected correctly. 2. If the problem persists, please contact the dealer or after-sales service.
NE Voltage Fault	Check whether the neutral and live wires are reversed and whether the earth wire is properly grounded.
DRM0 Fault	1. Disconnect the AC output switch, DC input switch & battery switch, then connect them 5 minutes later. 2. Contact the dealer or the after-sales service if the problem persists.
Out Short Protect	1. Disconnect the AC output switch, DC input switch & battery switch, Check for any short circuits on the load side and the network side, then connect them 5 minutes later. 2. Contact the dealer or the after-sales service if the problem persists.
Grid High Freq Protect	If the problem occurs occasionally, the utility grid may be abnormal temporarily. The inverter will recover automatically after detecting that the utility grid is normal.
Grid Under Freq Protect	2. If the problem occurs frequently, check whether the grid frequency is within the permissible range.
DCV Fault	1. Disconnect the AC output switch, DC input switch & battery switch, then connect them 5 minutes later. 2. Contact the dealer or the after-sales service if the problem persists.
Grid Failure	Check if the power grid is correctly connected
Heart Beat Fault	1. Disconnect the AC output switch, DC input switch & battery switch, then connect them 5 minutes later. 2. Contact the dealer or the after-sales service if the problem persists.
RCD Fault	1. Disconnect the AC output switch, DC input switch & battery switch, then connect them 5 minutes later. 2. Contact the dealer or the after-sales service if the problem persists.
DCI Fault	1. Disconnect the AC output switch, DC input switch & battery switch, then connect them 5 minutes later. 2. Contact the dealer or the after-sales service if the problem persists.

Fault	Solutions
ISO Check Fault	1. Check whether the resistance of the PV string to PE exceeds 50k. If no, check the short circuit point. 2. Check whether the PE cable is connected correctly.
Relay Fault	1. Disconnect the AC output switch, DC input switch & battery switch, then connect them 5 minutes later 2. Contact the dealer or the after sales service if the problem persists.
DSP EEPROM Fault	1. Disconnect the AC output switch, DC input switch & battery switch, then connect them 5 minutes later 2. Contact the dealer or the aftersales service if the problem persists.
Over Temp Protect	Check the ventilation and the ambient temperature at the installation point. If the ventilation is poor or the ambient temperature is too high, improve the ventilation and heat dissipation.
Low Temp Protect	1. Disconnect the AC output switch, DC input switch & battery switch, then connect them 5 minutes later 2. Contact the dealer or the aftersales service if the problem persists.
DSP/ARM Comm Interrupted	1. Disconnect the AC output switch, DC input switch & battery switch, then connect them 5 minutes later 2. Contact the dealer or the after sales service if the problem persists.
RCD Fault	1. Disconnect the AC output switch, DC input switch & battery switch, then connect them 5 minutes later 2. Contact the dealer or the after sales service if the problem persists.
RCD Fault	1. Disconnect the AC output switch, DC input switch & battery switch, then connect them 5 minutes later 2. Contact the dealer or the aftersales service if the problem persists.
DCI Check Fault	1. Disconnect the AC output switch, DC input switch & battery switch, then connect them 5 minutes later 2. Contact the dealer or the after sales service if the problem persists.
Grid Over Voltage Protect	1. If the problem occurs occasionally, the utility grid may be abnormal temporarily. The inverter will recover automatically after detecting that the utility grid is normal. 2. If the problem occurs frequently, check whether the grid voltage is within the permissible range.
Grid Under Voltage Protect	1. If the problem occurs occasionally, the utility grid may be abnormal temporarily. The inverter will recover automatically after detecting that the utility grid is normal. 2. If the problem occurs frequently, check whether the grid voltage is within the permissible range.
Grid 10-min Over Voltage Protect	1. If the problem occurs occasionally, the utility grid may be abnormal temporarily. The inverter will recover automatically after detecting that the utility grid is normal. 2. If the problem occurs frequently, check whether the grid voltage is within the allowed range. • Contact the local power company if the grid voltage exceeds the permissible range. • Modify the grid overvoltage rapid protection threshold after obtaining the consent of the local power company if the grid voltage is within the permissible range.
Off-grid Under Voltage Protect	1. Disconnect the AC output switch, DC input switch & battery switch, then connect them 5 minutes later 2. Contact the dealer or the after-sales service if the problem persists.

8.2 Maintenance

Item	LCD display	Period
System clean	Check the temperature and dust of the inverter. Clean the inverter enclosure if necessary. Check if the air inlet and outlet are normal, Clean the air inlet and outlet if necessary	Six months to a year-(depend on the dust contents in air.)
Cable entry	Check whether the cable entry is insufficiently sealed or the gap is excessively large, and reseal the entry when necessary!	Once a year

Item	LCD display	Period
Electrical Connection	Check whether all cable are firmly in place. Check whether a cable is damaged, especially the part contacting the metal enclosure.	Six months to a year
Fans	Check whether there is an abnormal noise when the fan rotates. Clean or replace the fan if necessary (see the following sections) Note: Only inverters with a rated power of 6 kW or greater are equipped with a fan.	Once a year

Maintenance Instruction

Cleaning Air Inlet and Outlet

A huge amount of heat is generated in the process of running the hybrid inverter. The inverter adapts a controlled forced air cooling method. In order to maintain good ventilation, please check to make sure the air inlet and outlet are not blocked. Clean the air inlet and outlet with soft brush or vacuum cleaner if necessary.

The fans inside the hybrid inverter are used to cool the hybrid inverter during operation. If the fans do not operate properly, the hybrid inverter may not be able to cool, and the efficiency of the hybrid inverter may be reduced. Therefore, it is necessary to clean the dirty fans in time and replace the bad fans

Remove the fan board:

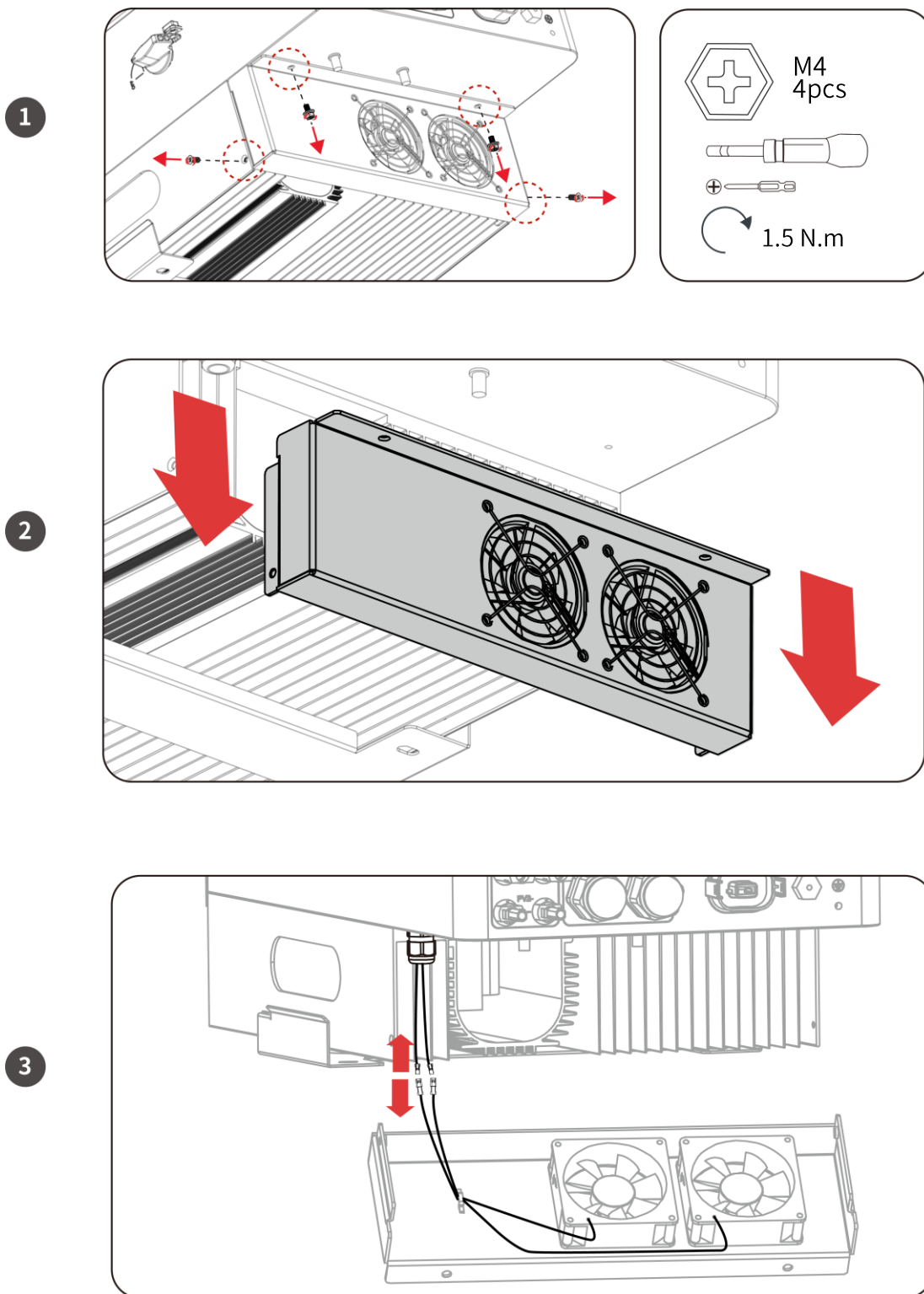


Figure 8-1

Remark

If you find the inverter has serious problems, including but not limited to the above content, please call Saatvik dealer or the after sales service. Please provide the following information to www.saatvikgroup.com for better service.

- (1) Customer Name
- (2) Contact Info
- (3) Site Address and Location
- (4) Project Scale
- (5) Quantity of Faulty Inverters
- (6) Problem Description
- (7) Inverter Model
- (8) Inverter SN
- (9) Date of invoice and installation

Dear Customer,

We congratulate you on your excellent choice of our Saatvik Uday Plus Hybrid Inverter. Please do spare some time in reading this warranty manual. As this is a sophisticated product that requires trained personnel for installation, please make sure to download the detailed user manual as mentioned in the note below. Pay special attention to the detailed user manual. The sections list our conditions and/or practices that can not only result in damage to your Hybrid solar inverter or to other equipment's but also may result in personal injury or loss of life. For any help, please feel free to contact our dealer or e-mail us at customer support. Any query/suggestion of yours will help us to improve our quality and provide you with better services.

NOTE: For the detailed user manual, kindly scan the QR Code below or attached with the product or visit our official website: www.saatvikgroup.com

WARRANTY INFORMATION

- Warranty is available for 5 Years from the date of purchase, subject to the terms of your purchase.
 - Warranty is valid only for manufacturing defects and material defects.
 - All warranty repairs must confirm the terms of the warranty otherwise warranty will be void.
 - Saatvik would be responsible for transit damage if and only if the shipment is paid for by Saatvik. Customer would be responsible if the shipment is paid by the customer (It is advisable to purchase transit insurance).
 - Warranty would be valid if and only if all Saatvik equipment's are installed exactly as per their accompanying instructions and manuals including all standard system protections at the site like over current protections, short circuit protections, lightening protection and equipment earth etc.
 - For the warranty to remain valid, the indoor system should be installed in a clean dust-free, well ventilated environment and protected from ingress of water, heat and moisture.
 - Warranty will be void if the system is serviced by unqualified technicians and/or warranty seal is found broken.
 - In the event of a product malfunction, Saatvik will not bear any responsibility for consequential losses, expenses, or damage to other components.
 - The warranty applies to the original Saatvik Product purchaser and is transferable only if the product remains installed in the original use location.
 - The warranty does not apply to any product or product's part that has been modified or damaged by the following:
 - Installation or Removal
 - Alteration or Disassembly
 - Normal Wear and Tear
 - Accident or Abuse
 - Corrosion
 - Fire, Floods or Force Majeure
 - Incidental or Consequential Damage caused by other components of the power system
 - Any Product whose serial number has been altered, defaced or removed
 - Any Other Event not attributable to Saatvik.
 - AC and DC Surge Protection Devices (SPDs) are expressly excluded from the scope of this warranty.
 - If the inverter is installed without approved ACDB & DCDB, ACDB & DCDB should have proper surge, and other protection is working condition.
 - If proper Earthing is not undertaken/ Lightning Arrestor not installed and Earth value not as per IS.
- Saatvik's liability for any defective product or any product's part shall be limited to the repair or replacement of the product at Saatvik's discretion. Saatvik does not warrant or guarantee workmanship performed by any person or firm installing its products. This warranty does not cover the costs of installation, removal, shipping (except as described below), or reinstallation of products.

To request warranty service or after sales service, the customer must contact 'Saatvik' solar toll-free number 18005471151 and E mail sales@saatvikgroup.com

- Fault during warranty period would be initially attended telephonically, followed by a visit of a service engineer if required.
- Faulty component(s) which cannot be repaired on site will be returned to Saatvik.
- Saatvik will ship the repaired or replacement component(s) prepaid to addresses in India, where applicable during the terms of the warranty.

DISCLAIMER

THIS WARRANTY IS THE EXCLUSIVE WARRANTY APPLICABLE TO SAATVIK PRODUCTS. SAATVIK EXPRESSLY DISCLAIMS ANY OTHER EXPRESS OR IMPLIED WARRANTIES OF ITS PRODUCTS, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SAATVIK ALSO EXPRESSLY LIMITS ITS LIABILITY IN THE EVENT OF A PRODUCT DEFECT TO REPAIR OR REPLACEMENT IN ACCORDANCE WITH THE TERMS OF THIS LIMITED WARRANTY AND EXCLUDES ALL LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION ANY LIABILITY FOR PRODUCTS NOT BEING AVAILABLE FOR USE OR LOST REVENUES OR PROFITS, EVEN IF IT IS MADE AWARE OF SUCH POTENTIAL DAMAGES.

NOTE: A Warranty Certificate will only be issued if this Registration Card is received by Saatvik within 30 days of the date of the first retail sale of the eligible Product. Please submit a copy (not the original) of the product's purchase invoice, which confirms the date and location of purchase, the price paid, and the Product Model and Serial Number.

Please register your Product on Saatvik website (www.saatvikgroup.com) within 30 days of purchase.

5 YEAR WARRANTY REGISTRATION

System Owner Name:

Address:

Product Name:

Model Number:

Sold By:

Serial Number:

Purchase Date:

SYSTEM INFORMATION

System Install/Commission Date:

Number of Saatvik Products in System:

Array Size:

Number of Panels:

System Array Nominal Voltage:

DC Input Wiring Size and Length:

Type of PV Modules:

Battery details (Lead Acid/ Li-ion/ VRLA):

DCDB installation Details:

ACDB installation Details:

Earthing & installation Details:

Installer:

Installer Address:

Installer E-mail:

Saatvik Green Energy Limited

Tower A, IFFCO Complex

Plot No. 3, Institutional Area

Sector 32, Gurugram

Haryana – 122001, India

Website: www.saatvikgroup.com

Toll-Free Number: 1800-547-1151



Scan QR for Complaint Login/
Warranty Registration



SAATVIK

EMPOWERING EVERY HOME WITH SMART ENERGY

SAATVIK GREEN ENERGY LTD.

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✉ sales@saatvikgroup.com

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