

Grid-Hybrid Inverter SPH 10000TL-HU-US



Version: 1.0
044.SK0011300

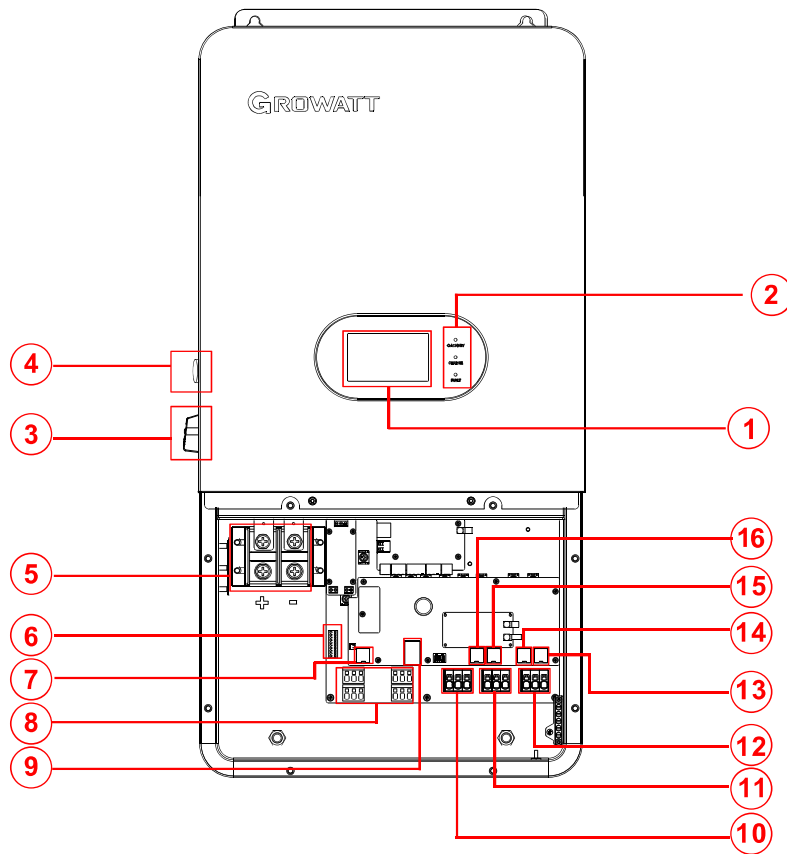
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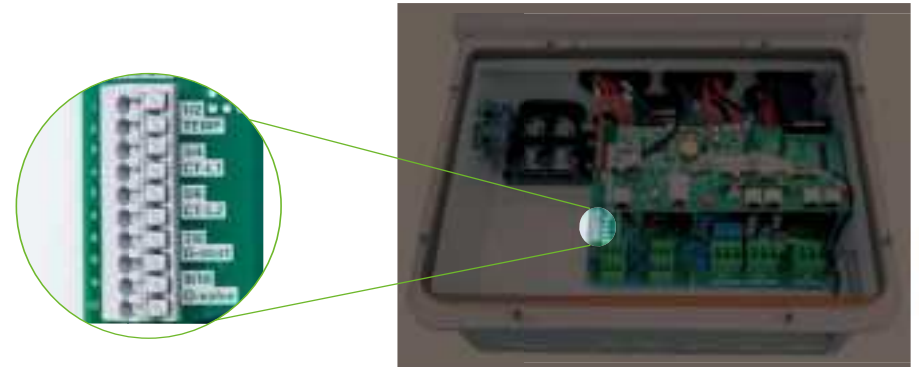
1 Production Introduction

1.1 Product Overview



- | | |
|------------------------|-------------------------|
| 1: LCD Display | 9: Upgrading Port(USB) |
| 2: Inverter Indicators | 10: Grid Port |
| 3: PV Switch | 11: Generator Input |
| 4: Power ON/OFF button | 12: Load Port |
| 5: Battery Input | 13: Parallel-A Port |
| 6: Function Port | 14: Parallel-B Port |
| 7: DRMS Port | 15: Upper Computer Port |
| 8: PV Input | 16: BMS Port |

1.2 Function Port Definition



TEMP (1,2): Battery temperature sensor for lead acid battery.

CT-L1 (3,4): Current transformer (CT1) for "Zero Export Limit" mode clamps on L1 when in split phase system.

CT-L2 (5,6): Current transformer (CT2) for "Zero Export Limit" mode clamps on L2 when in split phase system.

G-start (7,8): Generator start signal should be connected to the CON board CN9 terminal 7/8 position, G-start nominal open circuit. If the user wants to start the generator, G-start nominally closes the port.

G-valve (9,10): Reserved.

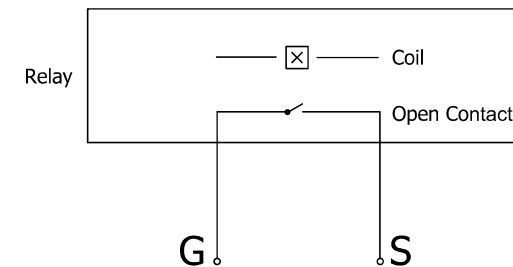
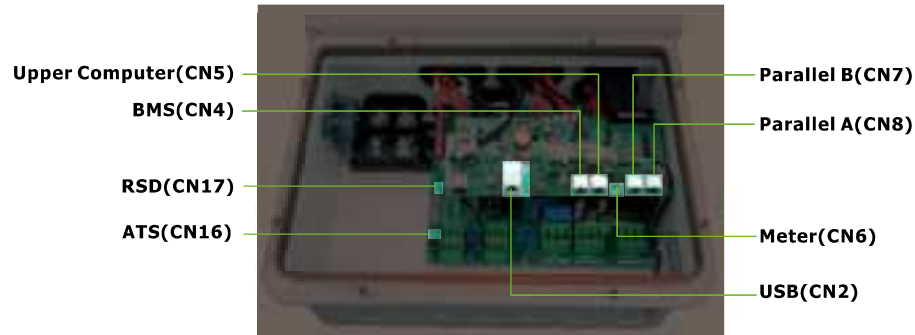


Fig 1.1 GS (diesel generator startup signal)



RSD (CN17): Provide 12Vdc output when inverter is on.

ATS (CN16): 240V output port when inverter is on.

BMS (CN4): RS 485 (1B,2A),CAN (4H,5L) port for battery communication.

Parallel A (CN8): Parallel communication port 1 (CAN interface).

Parallel B (CN7): Parallel communication port 2 (CAN interface).

Meter (CN6): For energy meter communication.

USB (CN2):USB port.

Upper Computer (CN5):Upper Computer port.

1.3 Product Size

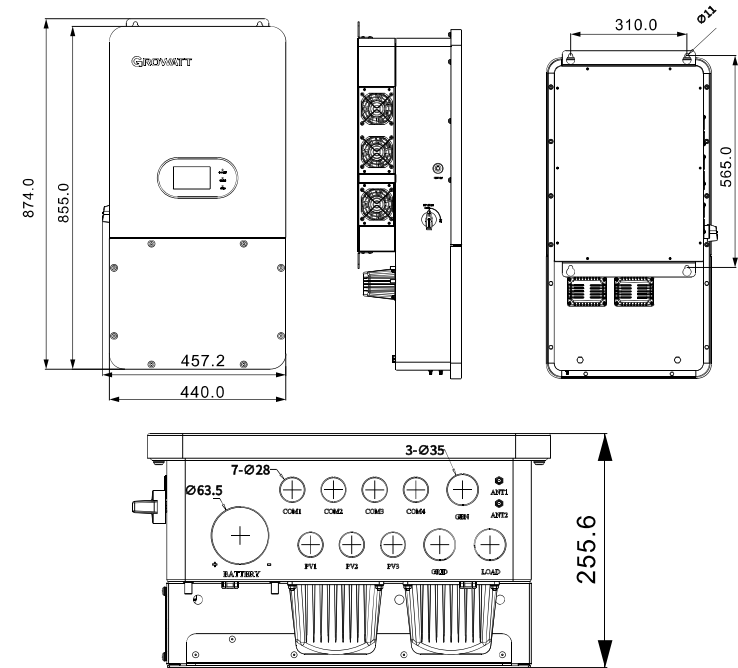


Fig 1.2 Inverter Size

1.4 Product Features

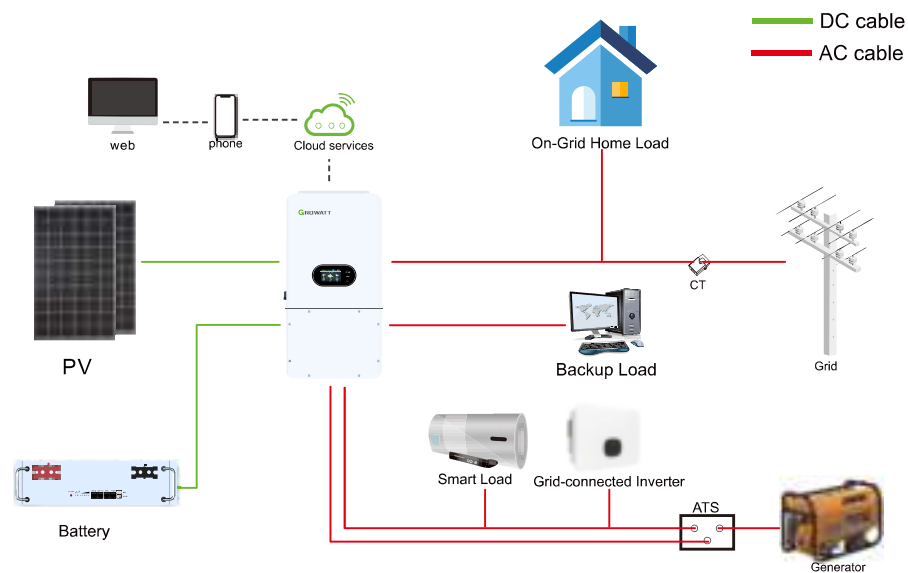
- Supports Split phase 120/240Vac.
- Self-consumption and export to the grid.
- Configurable battery charging current/voltage based by touch screen setting.
- Configurable AC/Solar/Generator Charger priority by touch screen setting.
- Compatible with grid voltage or generator power.
- AC power loss restart.
- Time of use function.
- Smart battery charger design for optimized battery performance.
- Supporting WiFi/4G/Bluetooth monitoring and build-in 3 strings of MPPT.
- Smart settable three stages MPPT charging for optimized battery performance.
- Overload/Over temperature/Short circuit protection.
- Programmable supply priority for battery or grid.
- Programmable multiple operation modes:On Grid Mode,Self-consumption Mode,Zero Export Limit.

1.5 Basic System Architecture

The following illustration shows basic application of this inverter.
It also includes following devices to have a complete running system.

- Generator or Utility
- PV modules
- Battery

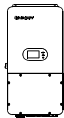











Consult with your system integrator for other possible system architectures depending on your requirements.
This inverter can power all kinds of appliances in home or office environment, including motor type appliances such as refrigerator and air conditioner.



2 Installation

2.1 Part List

Check the equipment before installation. Please make sure nothing is damaged in the package.
You should have received the items in the following package:

Part List						
Item	Descriptions	Number	A	B	C	D
A	Hybrid inverter	1				
B	User manual	1				
C	Warranty Card	1				
D	L-type Hexagon wrench	1				
E	Stainless steel anti-collision bolt M8×80	4				
F	Battery temperature sensor	1				
G	Tubular terminal:6AWG,10AWG	9+12				
H	Rod antenna	2				
I	Fuse	1				
J	Parallel line	2				
K	Mounting template	1				
L	Sensor Clamp	2				

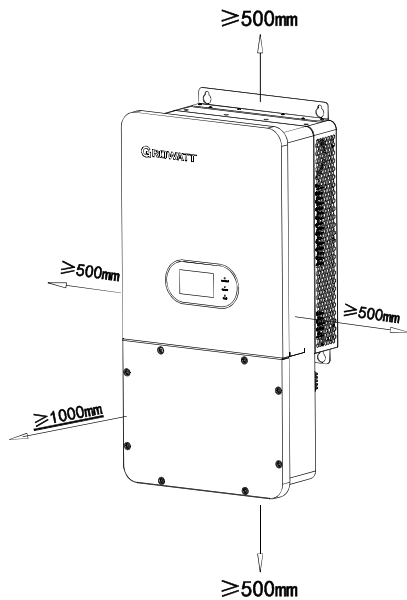
2.2 Mounting Instructions

Installation Precaution

This Hybrid inverter is designed for outdoor use(IP65), Please make sure the installation site meets below conditions:

- Not in direct sunlight.
- Not in areas where highly flammable materials are stored.
- Not in potential explosive areas.
- Not in the cool air directly.
- Not near the television Antenna or antenna cable.

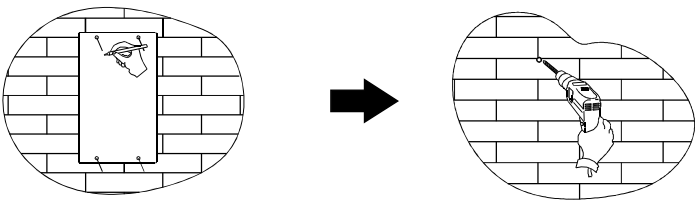
- Not higher than altitude of about 2000 meters above sea level.
 - Not in environment of precipitation or humidity(>95%).
- Considering the following points before selecting where to install:**
- Please select a vertical wall with load-bearing capacity for installation, suitable for installation on concrete or other non-flammable surfaces, installation is shown below.
 - Install this inverter at eye level in order to allow touch screen display to be read at all times.
 - The ambient temperature should be between -25~60°C to ensure optimal operation.
 - Be sure to keep other objects and surfaces as shown in the diagram to guarantee sufficient heat dissipation and have enough space for removing wires.



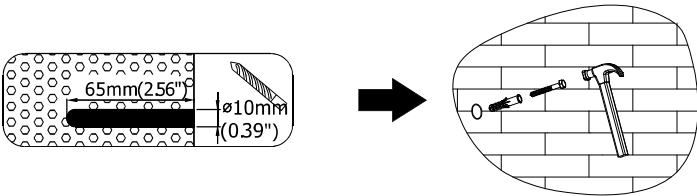
-For proper air circulation to dissipate heat, allow a clearance of approx.50cm to the side and approx.50cm above and below the unit. And 100cm to the front.

Mounting the inverter

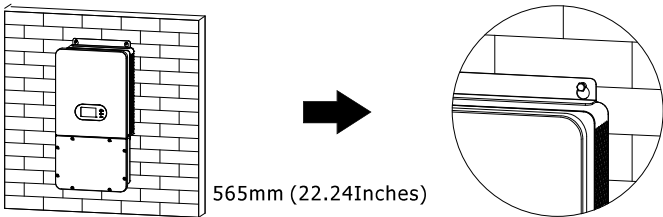
- Remember that this inverter is heavy! Please be careful when lifting out from the package.
- 1.Please Make sure that the thickness of the wall for inverter installation is more than 70mm.
 - 2.Please Place the bitmap horizontally on the wall and confirm the level by level.



- 3.Please mark the holes in the 4 mounting holes of hole pattern.
- 4.Drill a hole with a depth of 65mm at the mark with a drill of 10mm.



- 5.Please knock the expansion screw rubber sleeve into the hole on the wall, and then screw on the Expansion screw.
- 6.Please hang the inverter on the expansion screws, and then tighten the expansion screws.



2.3 Battery Connection

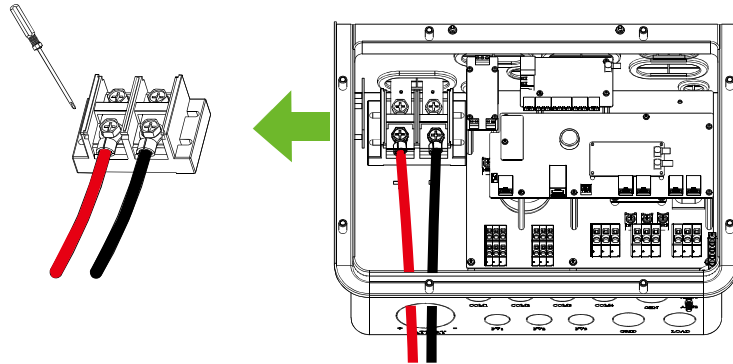
For safe operation and compliance, a separate DC over-current protector or disconnect device is required between the battery and the inverter. In some applications, switching devices may not be required but over-current protectors are still required.

Model	Wire Size
SPH 10000TL-HU-US	2/0AWG or 4/0AWG

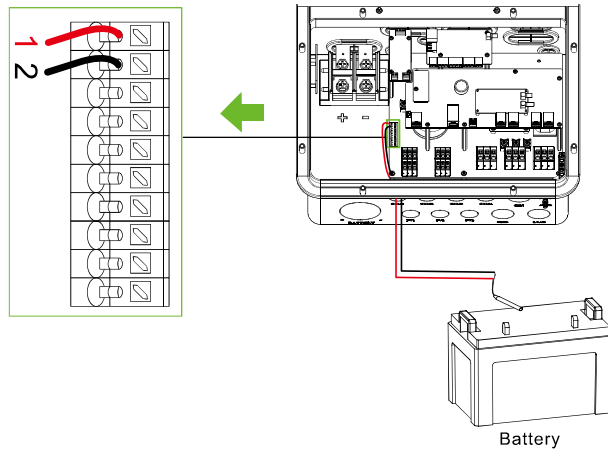
Attention	All wiring must be performed by a professional person. Connecting the battery with a suitable cable is important for safe and efficient operation of the system. To reduce the risk of injury, refer to chart for recommended cables.
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Please follow below steps to implement battery connection:

1. Please choose a suitable battery cable with correct connector which can well fit into the battery terminals.
2. Use a suitable screwdriver to unscrew the bolts and fit the battery connectors in, then fasten the bolt by the screwdriver, make sure the bolts are tightened in clockwise direction.
3. Make sure polarity at both the battery and inverter is correctly connected.



Temperature sensor connection for lead-acid battery



2.4 Grid Connection and Backup Load Connection

Before connecting to grid, please install a separate AC breaker between inverter and grid. Also, it is recommended that installs an AC breaker between backup load and inverter. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current. The recommended of AC breaker is 80A for 10kw. There are three terminal blocks with "Grid" "Load" and "GEN" markings. Please do not disconnect input and output connectors.

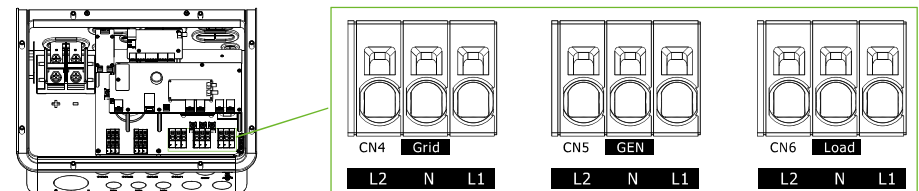
Attention	<i>All wiring must be performed by a qualified personnel. It is very important for system safety and efficient operation to use appropriate cable for AC input connection. To reduce risk of injury, please use the proper recommended cable as below.</i>
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Model	Wire Size
SPH 10000TL-HU-US	6 AWG

Please follow below steps to implement AC input/output connection:

1. Before making Grid, load and Gen port connection, be sure to turn off AC breaker first.
2. Remove insulation sleeve 10 mm for positive and negative conductors.
3. Use crimping pliers to press the 6AWG cable onto the attached tubular terminal to form a quadrilateral.
4. Install the AC conduit to the AC grid output opening (Grid, Gen, Load). Use appropriate conduit fittings and bond where necessary.
5. Terminate the AC conductors to the appropriate terminal.

L2	N	L1	L2	N	L1	L2	N	L1
Grid			GEN			Load		
CN4			CN5			CN6		



Attention	<i>Be sure that AC power source is disconnected before attempting to wire it to the unit.</i>
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Appliances such as air conditioner are required at least 2-3 minutes to restart because it is required to have enough time to balance refrigerant gas inside of circuit. If a power shortage occurs and recovers in short time, it will cause damage to your connected appliances. To prevent this kind of damage, please check manufacturer of air conditioner if it is equipped with time-delay function before installation. Otherwise, this inverter will trigger overload fault and cut off output to protect your appliance but sometimes it still causes internal damage to the air conditioner.

2.5 PV Connection

Before connecting to PV modules, please install a separately DC circuit breaker between inverter and PV modules. It is very important for system safety and efficient operation to use appropriate cable for PV module connection. To reduce risk of injury, please use the proper recommended cable size as below.

Model	Wire Size
SPH 10000TL-HU-US	10AWG

Attention	To avoid any malfunction, do not connect any PV modules with possible current leakage to the inverter. For example, grounded PV modules will cause current leakage to the inverter. When using PV modules, please be sure NO grounding. It is requested to use PV junction box with surge protection. Otherwise, it will cause damage on inverter when lightning occurs on PV modules.
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2.5.1 PV Module Selection

When selecting proper PV modules, please be sure to consider below parameters:

1. Open circuit Voltage (Voc) of PV modules not exceeds max PV array open circuit voltage of inverter.
2. Open circuit Voltage (Voc) of PV modules should be higher than min start voltage.

Inverter Model	SPH 10000TL-HU-US
PV Input Voltage	370V(130V-525V)
PV Array MPPT Voltage Range	150V-450V
No. of MPPT Trackers	3
No. of Strings per MPP Tracker	2+2+2

2.5.2 PV Module Wire Connection

Please follow below steps to implement PV module connection:

1. Remove insulation sleeve 10 mm for positive and negative conductors.
2. Use crimping pliers to press the 10AWG cable onto the attached tubular terminal to form a Quadrilateral.
3. Check correct polarity of wire connection from PV modules and PV input connectors. Then, connect positive pole (+) of connection wire to positive pole (+) of PV input connector. Connect negative pole (-) of connection wire to negative pole (-) of PV input connector. Close the switch and make sure the wires are tightly fixed.

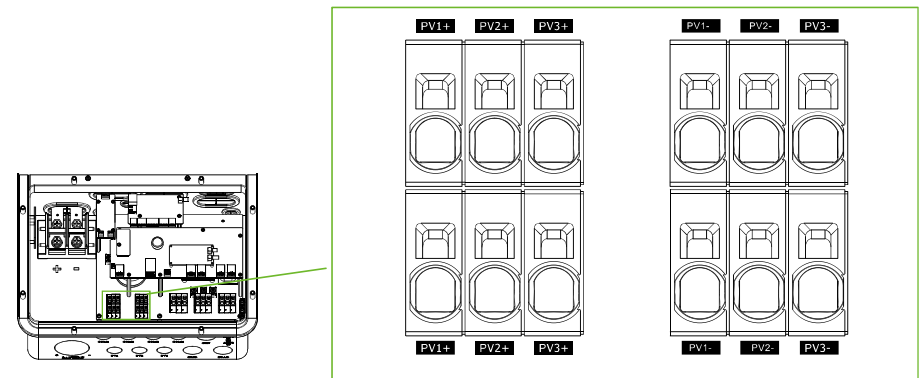
4. Parallel strings per MPPT must be the same Voltage.

- a. PV1 A/B must be the same voltage if using both strings.
- b. Panels of the same MPPT can be installed in the same orientation, while panels of different MPPTs can be installed in different orientations.

5. Terminate the PV strings to the appropriate terminal.

Attention	Make sure the wire is compacted.
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1	2	3	4	5	6
PV1+	PV2+	PV3+	PV1-	PV2-	PV3-
PV1+	PV2+	PV3+	PV1-	PV2-	PV3-

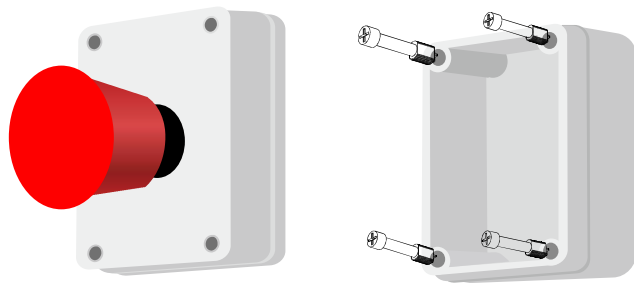


2.5.3 Rapid Shutdown

The inverter includes a rapid shutdown system that complies with 2017 and 2020 NEC 690.12 requirements. In case of emergency, press the rapid shutdown button that cut off the RSD power supply, thus stopping the inverter AC output, and the PV conductors voltage will be reduced to less than 30V within 30 seconds.

1. Mounting the RSD initiation switch

- a. Using a Philips head screwdriver, unscrew the 4 plastic screws of the assembled RSD initiation switch to open the enclosure.
- b. Use the base of the enclosure to mark 4 holes on the wall and drill the holes out. Insert the wall anchors into the holes.
- c. Align the holes of the RSD initiation switch base with the holes in the wall. Using a Philips screwdriver, screw the self tapping screws through the enclosure base into the wall anchors.



2.Wiring the RSD initiation switch

- Install RSD switch wire to the COM input , use appropriate conduit fittings and bond where necessary. Run the signal wire.
- Connect the wire to the RSD switch as shown.
- Reinstall the RSD initiation switch cover and tighten the plastic screws to secure.
- Remove the 3-pin connector from terminal CN17 and remove the jumper across the pins.
- Insert the wire in the 3-pin conductor's positions 1 and 3, as shown.
- Replace the connector in the terminal CN17 and replace the inverter wire box cover.

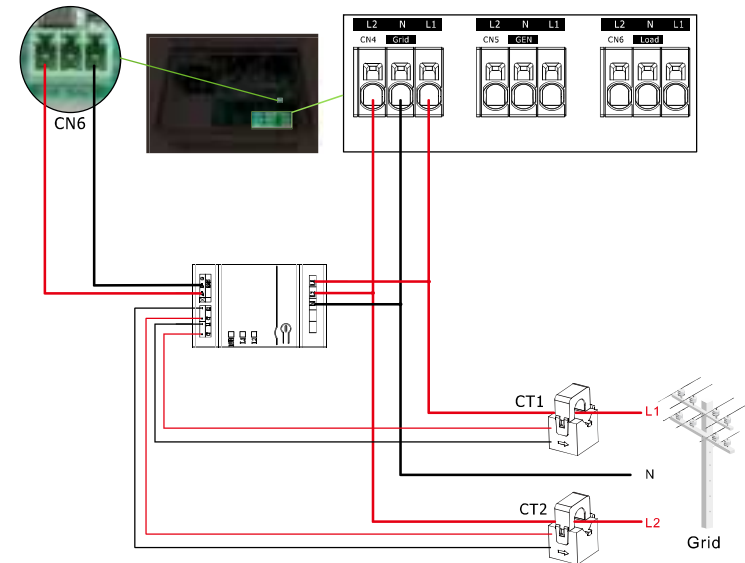


2.6 Meter or CT Connection

Meter Connection

Cable	Meter	Inverter	Type	Conductor cross-sectional area range
AC wire-L1	ΦL1	n/a	solid or stranded	6AWG
AC wire-L2	ΦL2		wire but not fine	
AC wire-N	N		stranded wire	

Ground	PE symbol			
CT-ΦL1	L1 CT +/-	n/a	n/a	n/a
CT-ΦL2	L2 CT +/-			
Communications cable	RS485 A+ RS485 B-		Min. 3-wire shielded twisted pai	0.2-1 mm²/ 24-18 AWG



CT Connection

