

YSmart Technology Co., Ltd.



User Manual

GTI Series Inverters for Grid-connected PV system

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Thanks for using YSmart grid tie micro inverters. Read the following instruction carefully before installation and operating, install and operate as specified by this user manual strictly. There are waterproof products and ordinary moistureproof products, customers can chose different price of products depending on own needs. This user manual is for basical model of ordinary moistureproof products only.

Important Safety Information

Read this First

This manual contains important instructions for use during installation and maintenance of the YSmart Smart Micro inverter. To reduce the risk of electrical shock, and to ensure the safe installation and operation of the YSmart Smart Micro inverter, the following safety symbols appear throughout this document to indicate dangerous conditions and important safety instructions..



DANGER! This indicates a hazardous situation, which if not avoided, will result in death or serious injury.



WARNING! This indicates a situation where failure to follow instructions may be a safety hazard or cause equipment malfunction. Use extreme caution and follow instructions carefully.

Warranty

Warranty Conditions

Warranty Period: 15-year limited warranty period.

Warranty Time Start: From the date of bill of lading.

Warranty Evidence: The bill of lading date, product(s) serial number(s), and product(s) model number(s), and a completed warranty card.

YSmart grants an implied warranty of 1 year to the inverter from date of purchase for repair or replace the Defective Product free of charge includes freight cost. Furthermore, YSmart provides an additional limited warranty for 14 years for repair or replace the Defective Product free of charge but non-free of freight charge. For warranty questions, please contact your retailer or installer. If your device has a defect or malfunction during the warranty period, please also contact your retailer or installer.

Warranty claims are excluded for:

- Alterations or repairs to the unit without prior authorization
- Improper use of device
- Improper and non-standard installation
- Improper operation
- operating the equipment with defective safety devices
- Impact of foreign objects and force majeure (lightning, surge, storm, fire)
- Inadequate or nonexistent ventilation of the device
- disregarding of safety regulations
- shipping damage
- The Product has been improperly stored or was damaged while in possession of the Dealer or end user;

- a. Green LED flash: adjusting for power output, MPPT operating for tracking.
- b. Green LED long light: indicates inverter locking-in Max. output power operation status.

3. Please note that above operations only run at grid-connected status.

Troubleshooting a non-operating Smart micro inverter



WARNING!

Only qualified electrical professionals can do the trouble shooting of the Smart microinverter system.



WARNING!

Do Not disconnect the microinverter from its PV module when the inverter is still operating. Disconnect the inverter from the PV module during running may damage the microinverter and bring electrical hazard to the person nearby.



WARNING!

Disconnect the AC grid first before disconnecting the inverter from the PV module.

To troubleshoot a non-operating Smart Microinverter, follow the steps below in order:

1. Verify the utility voltage and frequency are within ranges shown in the in section Technical Data of this manual.
2. Check the connection to the utility grid. Verify utility power is present at the inverter in question by removing AC, then DC power. **Never disconnect the DC wires while the microinverter is producing power.** Re-connect the DC module connectors and watch for three short LED flashes.

Safety Instruction

- Do not use Smart microinverter in a manner not specified by the manufacturer. Doing so may cause death or injury to persons, or damage to equipment.
- Perform all electrical installations in accordance with all applicable local electrical codes.
- Be aware that only qualified personnel should disassemble and repair the Smart Microinverters and non-qualified personnel should not install and/or repair.
- Do not attempt to repair the Smart Micro inverter; it contains no user-serviceable parts. If it fails, contact YSmart customer service to claim a return merchandise authorization and start the replacement process. Tampering with or opening the Smart Microinverter will void the warranty.
- If the AC cable connector on the microinverter is damaged or broken, do not install the unit.
- Before installing or using the Smart Microinverter, read all instructions and cautionary markings in the technical description and on the Smart Microinverter System and the PV equipment.
- Connect the Smart Microinverter to the utility grid only after you have completed all installation procedures and after receiving prior approval from the local electrical utility company.
- Be aware that the body of the Smart Microinverter is the heat sink. Under normal operating conditions, the temperature is 15°C above ambient, but under extreme conditions the microinverter can reach a temperature of 75°C. To reduce risk of burns, use caution when working with microinverters.
- Do NOT disconnect the PV module from the Smart Microinverter without first removing AC power.
- Keep away from children, no touching, no playing so as not to electric shock when using.
- Please installed in place of low humidity and well-ventilated so as to avoid inverter overheating, as well as clear around the inflammable and explosive materials.

System Function

- **Connect to DC Power Resource directly and Direct-output Power Grid**

DC power resource refers to devices included solar panels, batteries and wind power generators with AC/DC controller, etc. All DC power supply output voltage fit with inverter input voltage setting range which is 10.8-28VDC.

Power grid refers to single phase civil electricity utility grid. Such as 110V (90-140V) and 220V (190-260V) single phase civil electricity utility grid.

YSmartgrid tie microinverters can connect to power grid directly and uploading electric power directly because of inverter output current wave form is pure sine wave which is same as civil electricity grid.

There must be electricity on power grid and connectivity is first necessity of inverter operating. When there is power outage or fault of power grid, inverters will be not operating. And it is the biggest difference between grid tie inverter and off-grid inverter.

- **AC 0 Angle Phase High Precision Auto-detection**

MCU process for high-precision detection and analysis after AC 0 angle phase pass through isolation amplifier and input into MCU, phase shift rate is less than 1%, and finally achieving high-precision of cophasal modulation AC combined Output.

- **Synchronous High-frequency Modulation**

In process for grid connectivity, usually approach with cophasal angle for grid(ie, when total current of inverter and grid is 0, combined current by switch). But our inverter approach for grid with same frequency and same phase is DC to AC first, then rectified AC current into pulse electric which is half-frequency 100Hz, finally combined pulse electric modulation with current of grid and then fed into power grid.

- **Pure Sine Wave Output**

Adopting Sinusoida PWM process for pure sine wave output which is same wave form of grid. No interference for grid.

- **Superstrong Shadow Resistance**

Adopting high frequency conversion operating, less transmission loss will be. In cloudy days or inadequate sunshine days, if only there is 3W-5W output from power supply and input into inverter, inverter can be operate AC conversion. But of cause, output is proportional input. The more input power the more output power and vice versa. Inverter can operate in such low input power supply, it's indicate inverter power conversion operating times can be up more

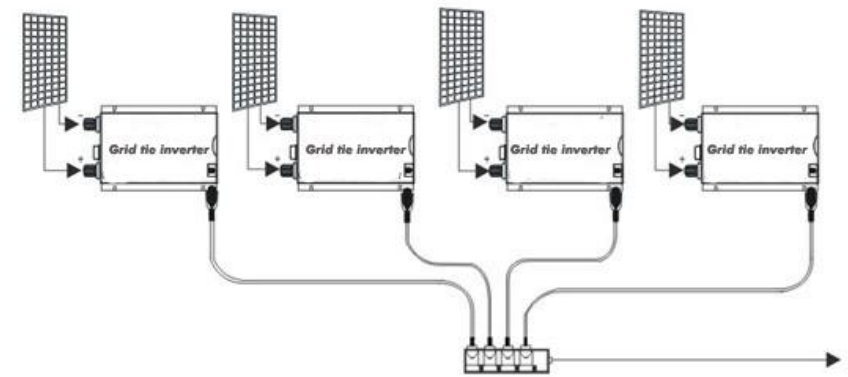


Figure 3

LED Indicator

1. Red LED indicator lights up under any conditions as listed below:

- Low-voltage protection(DC input voltage lower than Min. input voltage of inverters)
- Over-voltage protection(DC input voltage higher than Max. input voltage of inverters)
- Over-temperature protection (inverters will be shut down for power output when the temperature of body of inverters higher than 65-75°C.)

And inverter will be automatically restart up when the temperature of body of the inverter down to 40-50°C.

- Power grid fault protection (when 110VAC or 220VAC grid power outage and/or tripped.
- Islanding protection: inverter will be automatically shut down for power output when disconnect with power grid.

2. Green LED Indicator Operation:

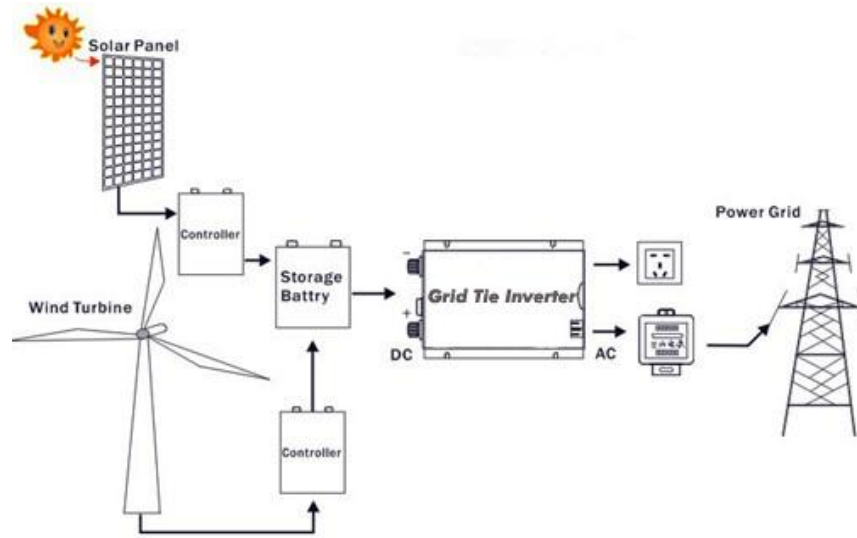


Figure2

3、Stackable connection (The purpose of small power inverter become high-power inverter)

In order to achieve higher power use requirements, the use of this product can be stacked, such as: 5 grid inverter 300W of stack used is equal to 1500W, and the number of open stacks (No Quantitative Restrictions) . Used as shown in Figure 4:

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than 8 hours every day, and this is an advantage which is large power inverter cannot be compared with.

- **Maximum Power Point Tracking (MPPT)**

Output of solar array had characteristics of nonlinear. Output affected by sunrays, ambient temperature and loadings, and output power of solar array can be maximized at a certain output voltage only. Solar array output power operating at peak voltage output which we called MPP-maximum power point. For more effectively operate for solar array, it's important for track down max output power of solar array. YSmartgrid tie microinverter MPPT operating principle: in a specified period, MPU actively adjustable for PWM's duty ratio regularly, changing output current of solar panels and leading to output voltage changing, checking output voltage and output current of solar panels, computing output power of solar array, then track down max power point managing by maximum power point tracking strategy.

- **APL (Power Automatically Locked)**

When MPPT track down the max power point, inverter will be operating of locking in max power point automatically, so as to keep operating max power output of DC power supply device within a corresponding period and achieve more stable output power.

- **Automatically Adapt To Different Power Loading**

Adapt to different power loading because of Synchronism in same frequency between inverter output and power grid. Such as inductive load, resistive load, soluble load.

- **Constant Current, Constant Power, Current Limiting Protection**

Synchronism in same frequency between inverter output and power grid, follow up power grid and take power grid as strong backup to achieve constant current, constant output power, without any overload and any over-current.

- **Automatically Turn Off and Stop Output When Fault of Grid(Islanding Protection)**

When there is fault or outage of electricity power grid, inverters will be turn off automatically and stop operating within 0.5 second.

- **High-Frequency High Conversion Rate**

Adopting magnetic core which import from Japan for inner transformer. High conversion and less loss make higher efficiency of output.

Parameter Table

Power	200W	300W	400W	500W	600W	800W	1000W
Solar panels	≥200W	≥300W	≥400W	≥500W	≥600W	≥800W	≥1000W
DC MAX input	240W	360W	480W	600W	720W	960W	1200W
DC input range	10.8-28V						
MPPT Voltage	15.5-20VDC						
DC MAX current	15A	20A	25A	30A	35A	45A	60A
AC MAX output	230W	330W	430W	550W	630W	830W	1100W
AC output range	120VAC(90-140VAC) or 230VAC(190-260VAC)						
Frequency range	50Hz/60Hz(Auto control)						
Power Factor	>97.5%						
THD	<5%						
Phase Shift	<2%						
Efficiency	120VAC(90-140VAC)						
Peak Efficiency	90%	90%	88%	87%	85%	83%	81%
Stable Efficiency	88%	87%	86%	84%	84%	81%	79%
Efficiency	230VAC(190-260VAC)						
Peak Efficiency	91%	90%	88%	87%	85%	85%	82%
Stable Efficiency	89%	88%	87%	85%	85%	83%	80%
Protection	Islanding; Short-circuit; converse connection; Low Voltage; Over Voltage; Over temperature Protection						
Work Temperature	-25℃-65℃						
Work Humidity	0%~90%RH non-condensing						
Grade of Waterproof	Indoor design						
Show	1 Red and 1 Green						
Cooling	Fan						
Stand-by Power	2-3W						
EMC	EN61000-6-3:2007 EN61000-6-1:2007						
Grid Disturbance	EN 50178+EN 62109-1+VDE0126-1-12						
Grid Detection	DIN VDE 1026 UL1741						
Certificate	CE						

Package

		200-600W	800-1000W
1	Net Weight	1.3KG	2.0KG
2	Gross Weight	2.0KG	2.7KG
3	Inner Box (L x W x H)	30*20.3*11.3cm	39*20.3*11.3cm
4	Carton(L x W x H)	42*31.5*35.5cm(6pcs/ctn)	42*40.5*24.2cm(4pcs/ctn)

Installation and Connection

1.Installation

1. Red terminal: Connect DC positive, black terminal: Connect DC negative. Shown in Figure 1.
2. AC socket: Connection to the mains. The AC cord to the inverter 3 foot outlet, then the AC cord to home 3PIN AC outlet. Are shown in Figure 2.
3. Switch: properly connected; turn on the switch, the inverter to work.

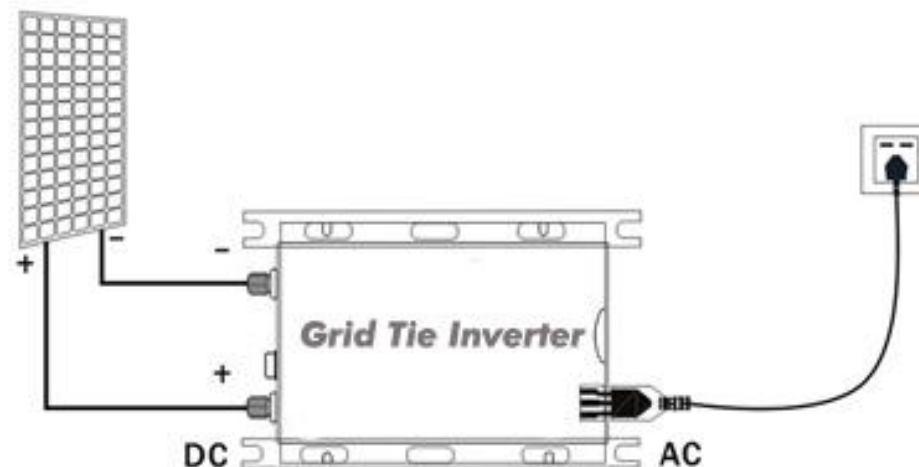


Figure 1

2. Application of Street lights:

Use this product, do not need to add a fan controller, solar panel controller, battery.◦

Connection Method 1 (Figure 4 below):

This connection method, wind energy, solar energy can supply to the grid at the same time, the highest efficiency.