

# Installation / User Manual

SMT-I1KW-240-cETLus

Photovoltaic Grid-connected Microinverter

Version 1.0

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(For USA / Canada)

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## Important Safety Instructions

This manual contains important instructions to follow during installation and maintenance of the SMT systems Photovoltaic Grid-connected Inverter (Microinverter). To reduce the risk of electrical shock and ensure the safe installation and operation of the SMT systems Microinverter, the following symbols appear throughout this document to indicate dangerous conditions and important safety instructions.

Specifications subject to change without notice - please ensure you are using the most recent update found at [www.smartenergy-tech.com](http://www.smartenergy-tech.com)

	Warning: if the operation is not correct, there will be an electric shock hazard. Special attention should be paid to these operations.
	This indicates a situation where failure to follow instructions may cause a serious hardware failure or personnel danger if not applied appropriately. Use extreme caution when performing this task.
	This indicates information that is important for optimized microinverter operation. Follow these instructions closely.
	CAUTION – Hot surfaces – To reduce the risk of burns – Do not touch.
	The inverter must not be disposed of together with household waste.
	Observe all documentation that accompanies the inverter.

## Safety Instructions

### Caution!

1. The external protective earthing conductor is connected to the inverter protective earthing terminal through AC connector.  
When connecting, connect the AC connector first to ensure the inverter earthing then do the DC connections.  
When disconnecting, disconnect the DC inputs first and then disconnect the AC connector.  
In any circumstance, do not connect DC input when AC connector is unplugged.
2. Need permission from the local utility prior to connecting the inverter to the utility grid and hire qualified personnel.
3. Observe all documentation that accompanies the inverter
4. Installations maintenance and installed should be carried out by competent persons, who have sufficient skills and training to apply safe methods of work to install
5. **Do NOT** attempt to repair the SMT systems Microinverter. If it fails, contact SMT systems Customer Support to obtain an RMA number and start the replacement process. Damaging or opening the SMT systems Microinverter will void the warranty.
6. All electrical installations must be done in accordance with the National Wiring Rules of Standard and local code
7. Software version information can be read from the host computer
8. Be aware that the body of the SMT systems Microinverter is the heat sink and can reach a temperature of 80°C. To reduce risk of burns, do not touch the body of the Microinverter.
9. Before installing the SMT inverter, the SMT inverter must first be connected to the ground.

## SMT systems Microinverter System Introduction

The SMT systems Microinverter is used in utility-interactive grid-tied applications, comprised of two key elements:

- SMT systems Microinverter
- SMT systems Centralized controller

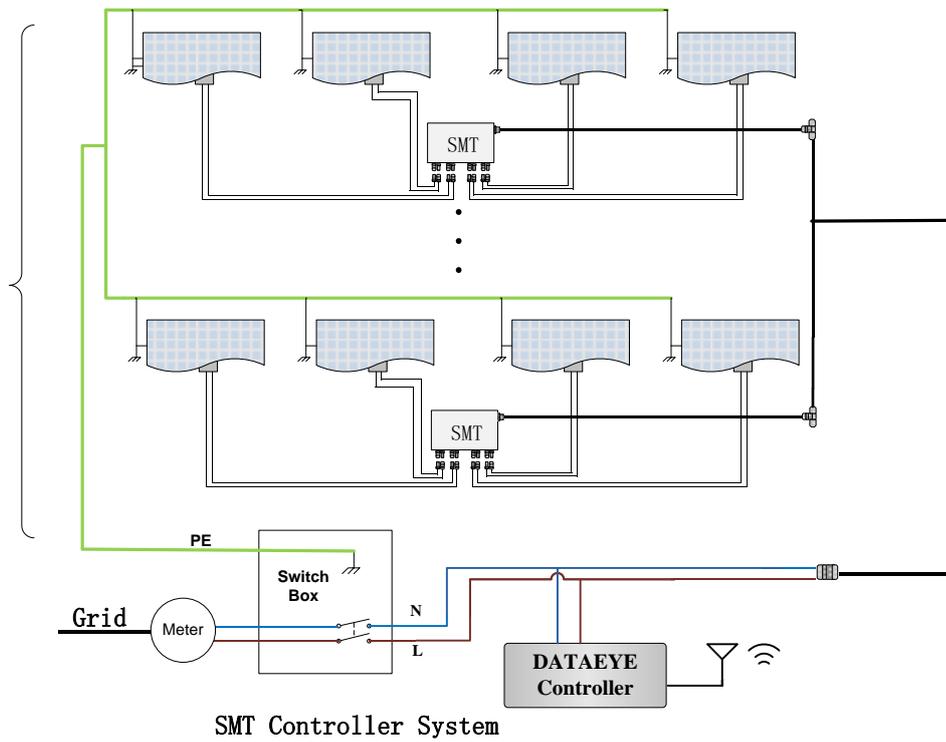


Figure 1

This integrated system improves safety; maximizes solar energy harvest; increases system reliability, and simplifies solar system design, installation, maintenance, and management.

### **SMT systems Microinverters maximize PV energy production**

Each PV module has individual Maximum Peak Power Tracking (MPPT) controls, which ensures that the maximum power is exported to the utility grid regardless of the performance of the other PV modules in the array. When PV modules in the array are affected by shade, dust, orientation, or any situation in which one module underperforms compared with the other units, the SMT systems Microinverter ensures top performance from the array by maximizing the performance of each module within the array.

### **More reliable than centralized or string inverters**

The distributed SMT systems Microinverter system ensures that no single point of system failure exists across the PV system. SMT systems Microinverters are designed to operate at full power at ambient outdoor temperatures of up to 149°F (65°C). The inverter housing is designed for outdoor installation and complies with the IP65 environmental enclosure rating.

### **Simple to install**

You can install individual PV modules in any combination of module quantity, orientation, type, and power rate. **The Ground wire (PE) of the AC cable is connected to the chassis inside of the Microinverter, eliminating the installation of grounding wire.**

### **Smart system performance monitoring and analysis.**

The SMT systems Centralized controller is installed by simply plugging it into any wall outlet and providing an Ethernet or Wi-Fi connection to a broadband router or modem. After installing the Centralized controller, the full network of SMT systems Microinverters automatically reports to the SMT systems Energy Monitor and analysis web server. The SMT DataEye Monitoring software displays performance trends, informs you of abnormal events, and controls system shutdown when it is needed.

## SMT Microinverter Introduction

The SMTsystems M1P series Microinverters connect with the single-phase grid, and operate with most 60 and 72 cell PV modules. For more information, please see the Technical Data page (p.14) of this manual.

Model Number	AC Grid	PV Module
SMT-11KW-240-cETLus	240V/60Hz	60, 72 cell

### SMT Microinverter feature

- high efficiency
- High power factor
- Soft switch
- Low current THD
- Low DC component
- Over voltage / under voltage protection
- Over frequency / under frequency protection
- Over current protection
- Input polarity reverse connection protection
- Short circuit protection
- Island detection and protection

## SMT systems Microinverter System Installation

A PV system using SMT systems Microinverters is simple to install. Each Microinverter easily mounts on the PV racking, directly beneath the PV module(s). Low voltage DC wires connect from the PV module directly to the Microinverter, eliminating the risk of high DC voltage. Installation MUST comply with local regulations and technical rules.

**WARNING:** Perform all electrical installations in accordance with local electrical codes.

**WARNING:** Be aware that only qualified professionals should install and/or replace SMT systems Microinverters.

**WARNING:** Before installing or using an SMT systems Microinverter, please read all instructions and warnings in the technical documents and on the SMT systems Microinverter system itself as well as on the PV array.

**WARNING:** Be aware that installation of this equipment includes the risk of electric shock.

**WARNING:** Do not touch any live parts in the system, including the PV array, when the system has been connected to the electrical grid.

**WARNING:** Affix warning labels to micro system components where and as appropriate for your state/territory.

**NOTE:** Strongly recommend to install Surge protection Devices in the dedicated meter box.



### Required Parts and Tools from you

In addition to your PV array and its associated hardware, you will need the following items:

- An AC isolator
- Mounting hardware suitable for module racking
- Continuous grounding conductor and grounding washers
- A Phillips screwdriver
- A torque wrench

## Installation Procedures

SMT systems Microinverters are designed to only operate when they can sense power coming from the grid. Even if they are plugged into the solar array, they will not turn themselves on until they can read power from the grid.

**WARNING:** Do NOT connect SMT systems Microinverters to the utility grid or energize the AC circuit until you have completed all of the installation procedures as described in the following sections.



**Step 1 - Lay the AC bus according to the arrangement of APsystems Microinverter.**

**Step 2 - Attaching the APsystems Microinverters to the Racking.**

- a. Mark the location of the Microinverter on the rack, with respect to the PV module junction box or any other obstructions.
- b. Mount one Microinverter at each of these locations using hardware recommended by your module racking vendor.

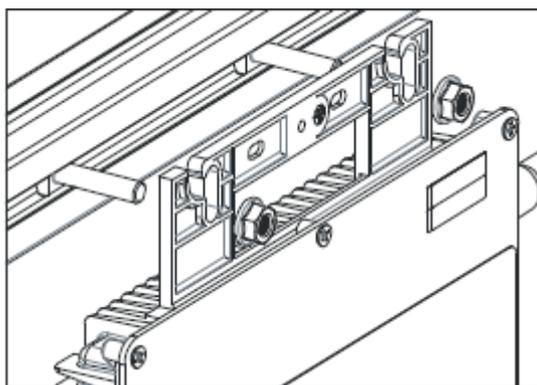


Figure 2

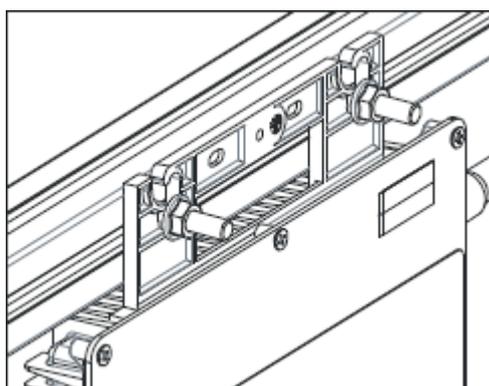


Figure 3

**WARNING:** Prior to installing any of the microinverters, verify that the utility voltage at the point of common connection matches the voltage rating on microinverter label.



**WARNING:** Do not mount the Microinverter in a location that allows exposure to direct sunlight. Allow a minimum of 3/4”(1.5cm.) between the roof and the bottom of the Microinverter to allow proper air flow.



**Step 3 - Connecting the APsystems Microinverter AC Cables to the AC bus cable.**

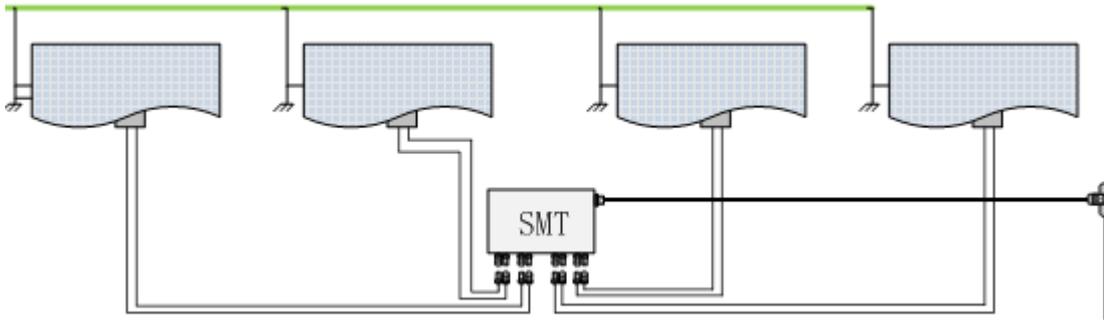


Figure 4

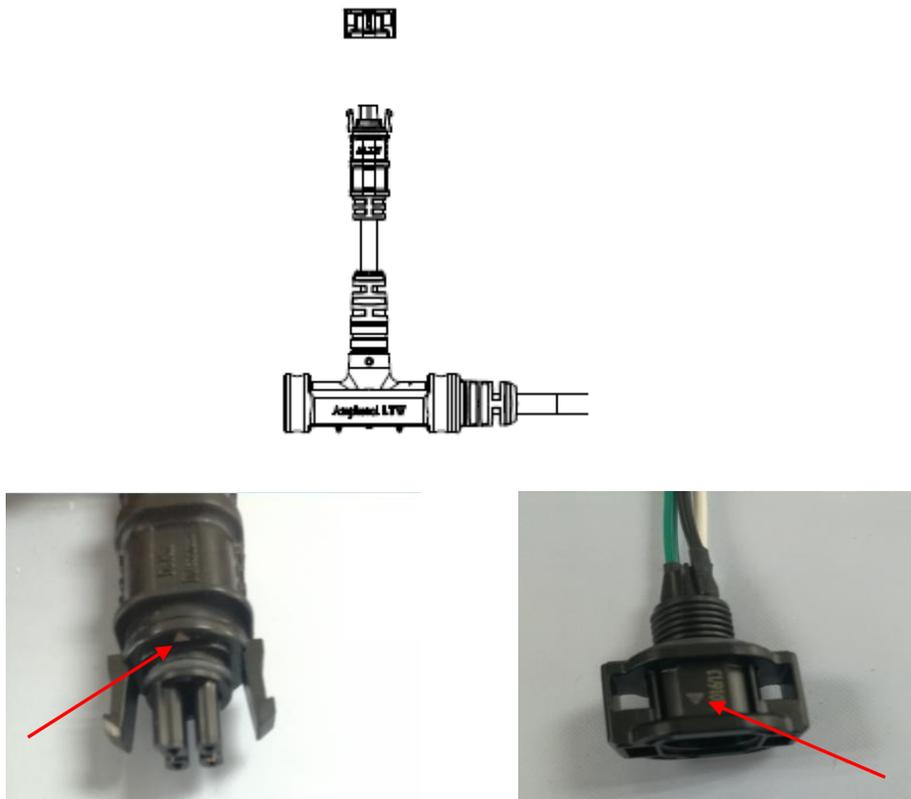


Figure 5

**WARNING:** Pay attention to the mark on the male and female terminal when connect the AC cable.



Cover all unused T connectors with sealing caps to protect the T connectors

#### Step 4 - Connecting SMTsystems Microinverters to the PV Module

Place the PV modules into position on the racking and connect the DC input cables to the microinverters based on optimum layout configuration (up to four PV modules per microinverter).

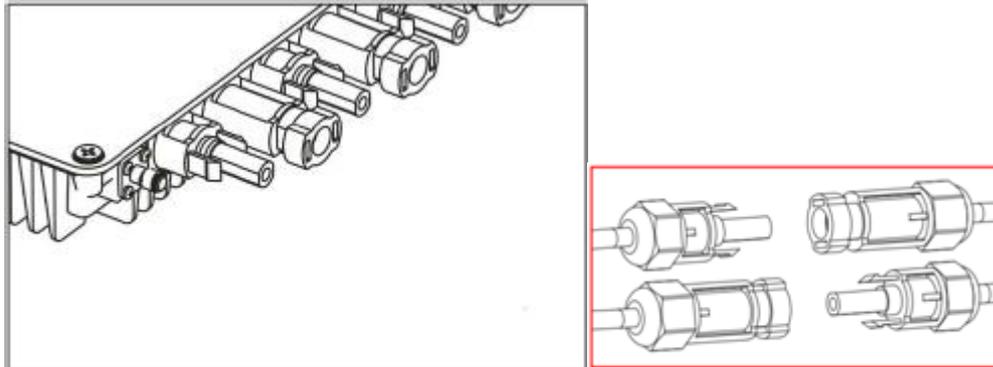


Figure 6

**WARNING:** Double check to make sure all of the AC and DC wiring has been correctly installed. Ensure that none of the AC and/or DC wires are pinched or damaged. Make sure that all of the junction boxes are properly closed.



## SMT microinverter system operating instructions

### To operate the SMT systems microinverter PV system:

1. Turn ON the AC circuit breaker on each microinverter AC branch circuit.
2. Turn ON the main utility-grid AC circuit breaker. Your system will start producing power after a 75s waiting time.
3. The units should start blinking green every 2 seconds five minutes after turning on the AC circuit breaker. This means they are producing power normally.
4. Plug in the Centralized controller and follow the instructions according to the manual for the Centralized controller.
5. The SMT systems Microinverters will start to send performance data over power line to the Centralized controller. The time required for all the Microinverters in the system to report to the Centralized controller will vary with the number of Microinverters in the system. You can verify proper operation of the SMT systems Microinverters via the Centralized controller.

## Troubleshooting

Qualified personnel can use the following troubleshooting steps if the PV system does not operate correctly:

### Status Indications and Error Reporting

#### Start up LED

When the SMT Microinverter lights a red LED that is ready to start up

#### Operation LED

When the SMT Microinverter start blinking green every 2 seconds that has been started.

#### Other Faults

All other faults are reported to the Centralized controller. Refer to the Centralized controller Installation and Operation Manual for a list of additional faults and troubleshooting procedures.

**WARNING:** Only qualified personnel should directly handle the SMT systems microinverter.



**WARNING:** Never disconnect the DC wire connectors under load. Ensure that no current is flowing in the DC wires prior to disconnecting. An opaque covering may be used to cover the module prior to disconnecting the module.



**WARNING:** Always disconnect AC power before disconnecting the PV module wires from the SMT systems microinverter.



**To troubleshoot a non-operating SMTsystems Microinverter, Follow the steps below in order:**

1. Verify the utility voltage and frequency are within ranges shown in the Technical Data section 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 red LED light.
3. Check the AC branch circuit interconnection between all the microinverters. Verify each inverter is energized by the utility grid as described in the previous step.
4. Make sure that any AC breaker are functioning properly and are closed.
5. Check the DC connections between the microinverter and the PV module.
6. Verify the PV module DC voltage is within the allowable range shown
7. If the problem persists, please call SMT systems Energy customer support.

**WARNING:** Do not attempt to repair the SMT systems microinverter. If troubleshooting methods fail, please return the microinverter to your distributor for replacement.



**Replace a microinverter**

**Follow the procedure to replace a failed SMT systems Microinverter**

- A. Disconnect the SMTsystems Microinverter from the PV Module, in the order shown below:
  1. Disconnect the AC by turning off the branch circuit breaker.
  2. Disconnect the first AC connector in the branch circuit.
  3. Disconnect the PV module DC wire connectors from the microinverter.
  4. Remove the Microinverter from the PV array racking.
  5. Cover the module with an opaque cover.
- B. Install a replacement Microinverter to the rack. Remember to observe the flashing LED light as soon as the new Microinverter is plugged into the DC cables.
- C. Connect the AC cable of the replacement Microinverter and the neighboring Microinverter to complete the branch circuit connections.

## Technical Data

**WARNING:** Be sure to verify the voltage and current specifications of your PV module match with those of the Microinverter. Refer to the SMT systems website [www.smartenergy-tech.com](http://www.smartenergy-tech.com) for a list of approved PV Modules.



**WARNING:** You must match the DC operating voltage range of the PV module with the allowable input voltage range of the SMT systems Microinverter.



**WARNING:** The maximum open circuit voltage of the PV module must not exceed the specified maximum input voltage of the SMT systems Microinverter.



**SMARTENERGY SMT-11KW-240-cETLus Microinverter Datasheet****Input Data (DC)**

Nominal Input Power	1200W (300×4)
Maximum Input Power	1280W (320×4)
MPPT Voltage Range	28V~43V
Operation Voltage Range	23V~50V
Maximum Input Voltage	50V
Startup Voltage	22V
Maximum Input Current	12.5A×4

**Output Data (AC)**

Maximum Output Power	1050W
Nominal Output Power	1000W
Nominal AC Voltage	240V
Maximum Continuous Output Current	4.2A
Default AC Voltage Range	212V~263V
Nominal Output Frequency	60Hz
Default Output Frequency Range	59.5Hz~60.5Hz
Power Factor	>0.99
Total Harmonic Distortion	<5%
Maximum Units per 20A Branch Circuit	4(signal phase)

**Efficiency**

Max. Inverter Efficiency	95%
Night Power Consumption	<200mW

**Mechanical Data**

Operating Ambient Temperature Range	-30 °C to +65 °C
Storage Temperature Range	-30 °C to +65 °C
Dimensions (W x H x D)	386mm x 258mm x 52mm
Weight(kg)	5
Enclosure Rating	Type 3
Cooling	Natural Convection

**Features & Compliance**

Communication	Power Line/WiFi
Design Lifetime	5/10/15/20 (optional)
Safety Class Compliance	UL1741, CSA C22.2 No.107.1-01
Grid Connection Compliance	IEEE 1547

# Wiring Diagram

## Sample Wiring Diagram

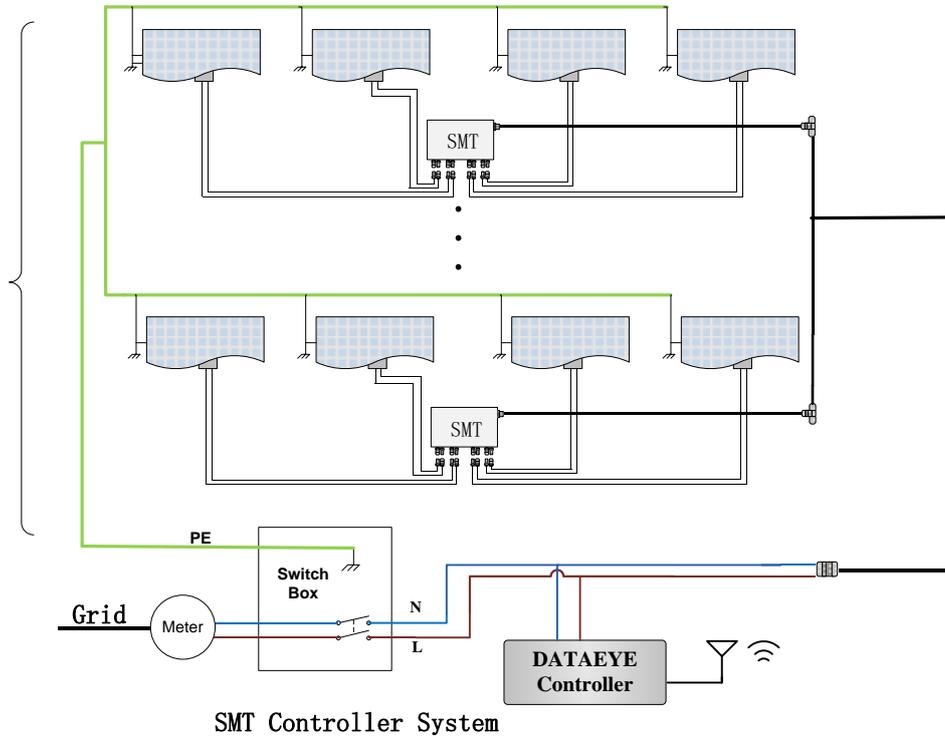


Figure 7