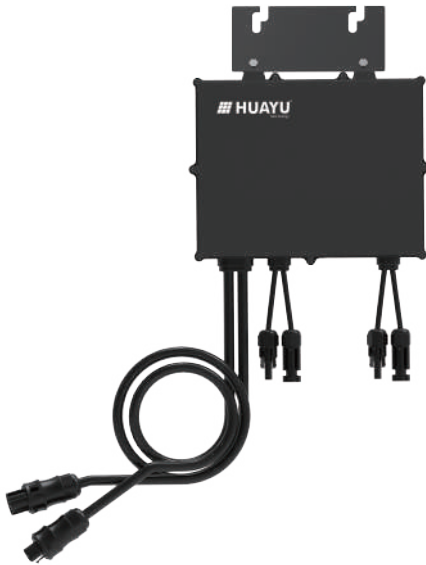


Installation and Operation Manual

HY-1000-Plus & HY-800-Plus



For our home energy independence.

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Company Profile

Huayu New Energy is dedicated to be a world's leading "Safe & Smart Solar Energy" supplier for homeowners.

"For our home energy independence" is a vision deserved for all people who truly trust clean energy is the future for our children, whatever you're from rich families or low-income families.

Since the establishment of Huayu New Energy, we specialize in R&D of Safe Module-Level Solar Solution and Smart Energy Storage Solution which are controlled by Huayu Portal Management Platform with over 10 languages, these innovative technologies are developed to configure a Smart Distributed Solar System with bidirectional flow of energy which no doubt is the basic infrastructure of our future Energy Internet.

Featured with "Renewable, Distributed, Interconnected, Open & Intelligent", Energy Internet is a must for human beings in 21st century to realize a de-monopolistic & de-centralized sustainable power supply system across the globe. Huayu New Energy was born to be the leader of "Safe & Smart" distributed energy solution and play an irreplaceable role for the most exciting renewable energy revolution in human history.

Till today, we have delivered thousands of Huayu microinverters(300-2000W)and Huayu storage inverters(3-12kW)for global families and small businesses in Europe, North America, LATAM, South East Asia, Middle East and Africa.

Together with us, to be a part of game changer for "Safe & Smart Energy" via "Honesty, Trust, Teamwork & Sharing".

1. Introduction

1.1 Prefix

Thank you for choosing the HY-1000/800-Plus microinverter from Huayu. We hope our products will meet your need for renewable energy. Meantime, we appreciate your feedback regarding our products.

1.2 Grid-tied PV System

Grid-tied PV system consists of PV panels, grid-tied inverter and junction boxes. The DC output from the PV panels is converted into AC energy and feedback to the grid through the HY-1000/800-Plus. HY-1000/800-Plus PV microinverter contain isolation transformer with basic insulation between PV input and AC grid output.

1.3 How to Use This Manual







This manual provides detailed product information and installation instructions for the HY-1000/800-Plus microinverter. Please read through this manual before installation and operation.

⚠ 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.

1.4 Label

Label is located on the side of the inverter. The information on the label includes technical data as well as type and serial number of the device. Safety instructions are listed and explained below:

	Danger! The term "danger" describes an issue which, if ignored can cause personal injury.
	Attention! With the term "attention" a circumstance is listed which may cause property damage if disregarded.
	Instructions for use! Under "Instructions for Use", it is pointed out that installation and operating instructions are to be read and understood before installation or repair.
	Caution, hot surface! Under "Caution, hot surface", it should be noted that surfaces of equipment may be hot and create a burn hazard.
	Special disposal instructions! With "Note Separate Disposal", it is pointed out that this product may not be disposed of with normal garbage. An improperly conducted disposal can lead to damage to the environment.
	CE mark The product complies with essential requirements of relevant directives of EU

2. Safety Instruction

WARNING

PLEASE READ THIS MANUAL BEFORE INSTALLATION. ANY DAMAGE TO THE PRODUCT DUE TO NOT FOLLOWING THIS MANUAL IS NOT COVERED BY THE WARRANTEE.

ALL THE INSTALLATION SHOULD BE DONE BY CERTIFIED ELECTRICIAN.
BESIDES THE CABLE CONNECTORS, NOTHING INSIDE THE INVERTER SHOULD BE MODIFIED.

ALL INSTALLATION SHOULD FOLLOW THE LOCAL ELECTRIC CODES. FURTHER PROTECTION ON THE AC WIRING FROM THE INVERTERS SHOULD BE PROVIDED AND MAY BE REQUIRED BY LOCAL AND NATIONAL WIRING REGULATIONS. THIS PROTECTION IS LIKELY TO INCLUDE RESIDUAL CURRENT DEVICES, EARTH FAULT MONITORS AND CIRCUIT BREAKERS. THIS PRODUCT MAY CAUSE AC CURRENT WITH A DC COMPONENT. IF A RESIDUAL CURRENT-OPERATED PROTECTIVE DEVICE (RCD) OR A MONITORING DEVICE (RCM) IS USED FOR PROTECTION IN CASE OF DIRECT OR INDIRECT CONTACT, ONLY AN RCD OR RCM OF TYPE B IS ALLOWED ON THE AC SIDE OF THIS PRODUCT.

NEVER DISCONNECT PV MODULE FROM THE MICROINVERTER WITHOUT FIRST ISOLATING THE AC MAINS. ALL PV CONNECTORS AND AC CONNECTORS ARE FORBIDDEN TO BE DISCONNECTED UNDER LOAD BEFORE SWITCHING OFF THE CIRCUIT BREAKER ON THE AC BRANCH.

PLEASE CONTACT AUTHORIZED SERVICE AGENTS FOR ANY SERVICE WORK.

HY-1000/800-PLUS IS A GRID-TIED SOLAR INVERTER. IT MAY REQUIRE APPROVAL FROM LOCAL UTILITY COMPANY TO CONNECT IT TO THE POWER GRID.

HY-1000/800-PLUS DOES NOT INCLUDE COMPONENTS THAT CAN BE SERVED BY CUSTOMERS.

WARNING

WHEN THE PHOTO VOLTAIC ARRAY IS EXPOSED TO LIGHT, IT SUPPLIES A DC VOLTAGE TO THE MICROINVERTER.

3. FCC Compliance

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications not expressly approved by the party responsible for compliance may void the user's authority to operate the equipment.

4. Installation

A PV system by microinverter is simple to install. Each microinverter easily mounts on the PV racking system, directly beneath the PV module. 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.

Special Statement! An AC GFCI device should not be used to protect the dedicated circuit to the microinverter even though it is an outside circuit. None of the small GFCI devices(5~30mA) are designed for back feeding and will be damaged if so. In a similar manner, AC AFCIs have not been evaluated for back feeding and may be damaged if back feed with the output of a PV inverter.

WARNING

Perform all electrical installations in accordance with local electrical codes.
Be aware that only qualified professionals should install and/or replace microinverter.
Before installing or using a microinverter, please read all instructions and warnings in the technical documents and on the microinverter itself as well as on the PV array.
Be aware that installation of this equipment includes the risk of electric shock.
Do not touch any live parts in the system, including the PV array, when the system has been connected to the electrical grid.
Strongly recommend to install surge protection devices in the dedicated combiner box.

Additional Installation Components

- ① AC Male and Female Interconnection Connectors(offered separately)
- ② Sealing end caps(offered separately)

Required Parts and Tools

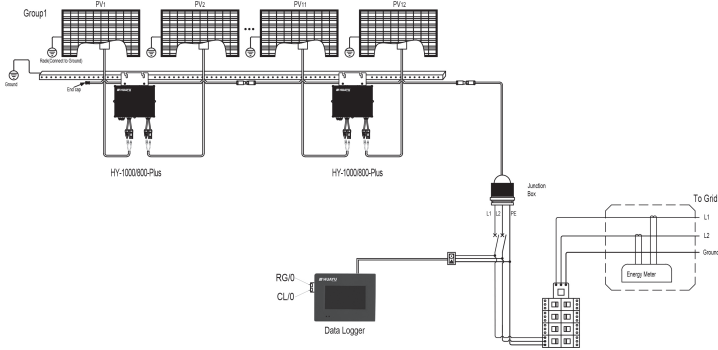
In addition to your PV array and its associated hardware, the following items are needed for installation:

- ① An AC connection junction box
- ② Mounting hardware suitable for module racking system
- ③ Sockets and wrenches for mounting hardware
- ④ Continuous grounding conductor and grounding washers
- ⑤ A Phillips screwdriver
- ⑥ A torque wrench

Simple to Install

You can install individual PV modules in any combination of Module quantity and orientation, different type and power rate. The Ground wire (PE) of the AC cable is connected to the chassis inside of the microinverter, potentially eliminating the installation of grounding wire(check local regulation).

Huayu monitoring data logger connects the microinverter to the Huayu Portal server via the cloud, allowing for collection of production and other data useful in system monitoring and trouble shooting. Users can monitor and manage the microinverter through corresponding website or APP.

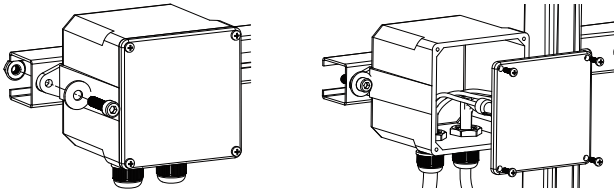


Note:

If the PLC signal is weak, it may be significantly improved by moving the data logger to closer to the microinverter arrays, and/or farther away from other interferers, and/or install a signal filter (LCF) to reduce the interference to PLC communication.

Installation Procedure

Step 1- Install AC Branch Circuit Junction Box



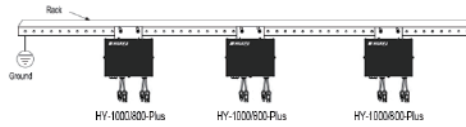
- 1 Install an appropriate junction box at a suitable location on the PV racking system (typically at the end of a branch of modules).
- 2 Connect the open wire end of the AC cable into the junction box using an appropriate gland or strain relief fitting.
- 3 Wire the conductors of the AC (127/220/230): L - red; N - black; PE - yellow green Wire the conductors of the AC (208/240): L1 - red; L2 - black; PE - yellow green.
- 4 Connect the AC branch circuit junction box to the point of utility Interconnection.

WARNING

Wiring colour code can be different according to local regulation, check all the wires of the installation before connecting them to the AC cable. Wrong cabling can damage irreparably microinverter, such an issue is not covered by the warranty.

Step 2- Attach Microinverter to Racking System or the PV Module Frame

- ① Mark the location of the microinverter on the rack, with respect to the PV module junction box or any other obstructions.
- ② Mount one microinverter at each of these locations by recommended hardware.

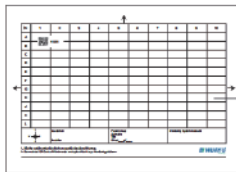


⚠ WARNING

Prior to installing any of microinverter, verify that the utility voltage at the point of common connection matches the voltage rating on microinverter label.
Do not place the microinverter (including DC and AC connectors) where exposed to the sun, rain or snow, even gap between modules. Allow a minimum of 3/4 inch(2cm) between roof and bottom of the microinverter to allow proper air flow.

Step 3- Create an Installation Map

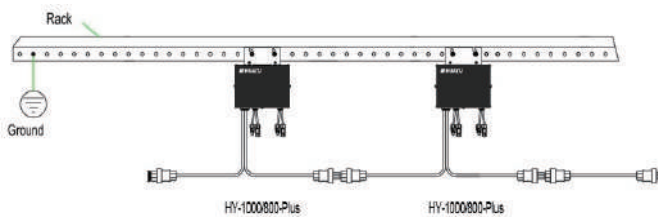
Create a paper installation map to record microinverter serial numbers and position in the array.



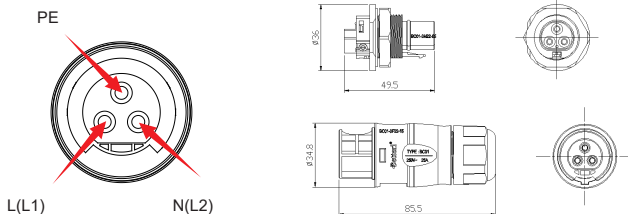
Affix serial number labels

- ① Peel the removable serial number label from each microinverter and affix it to the respective location on the paper installation map.
- ② Fill in the monitoring system account information to the installation map
- ③ Always keep a copy of the installation map for your records.

Step 4- Connect the Microinverter in Parallel



- ① Check Microinverter technical data for the maximum allowable number of Microinverters on each AC branch circuit.
- ② Plug the male AC connector of Microinverter into the female connector to get it connected. AC connector interface is as follows.



⚠ WARNING

DO NOT exceed maximum number of microinverter in an AC branch circuit. For 12awg trunk cable, each HY-1000/800-Plus AC branch circuit must be sourced from a dedicated branch circuit protected by a 20a maximum breaker.

Step 5- Install an AC Cable Protective End Cap at the End of AC Cable

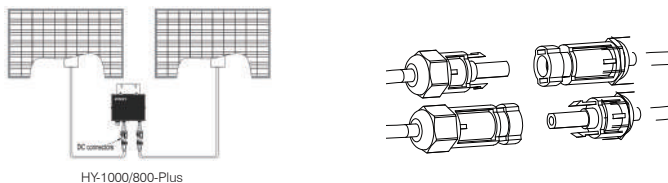
⚠ WARNING

Make sure protective end caps have been installed on all unused ac connectors. Unused AC HY-1000/800-Plus wire harness connectors are live when the system is energized by the utility system.



Step 6- Connect Microinverter to PV Modules

Completely install all HY-1000/800-Plus and all system inter-wiring connections prior to installing the PV modules.



- ① Mount the PV modules above their corresponding HY-1000/800-Plus. Each HY-1000/800-Plus comes with two oppositely sexed DC connectors.
- ② First connect the positive DC wire from the PV module to the negatively marked DC connector (male pin) of the HY-1000/800-Plus. Then connect the negative DC wire from the PV module to the positively marked DC connector (female socket) of the HY-1000/800-Plus. Repeat for all remaining PV modules using one HY-1000/800-Plus for each module. All PV modules shall be ungrounded.

5. Commissioning

WARNING

CONNECT HY-1000/800-PLUS TO THE ELECTRICAL UTILITY GRID ONLY AFTER RECEIVING PRIOR APPROVAL FROM THE UTILITY COMPANY.

WARNING

BE AWARE THAT ONLY QUALIFIED PERSONNEL CAN CONNECT HY-1000/800-PLUS TO THE ELECTRICAL UTILITY GRID.

WARNING

ENSURE THAT ALL AC AND DC WIRING IS CORRECT. ENSURE THAT NONE OF THE AC AND DC WIRES IS PINCHED OR DAMAGED. ENSURE THAT ALL JUNCTION BOXES ARE PROPERLY CLOSED

Following these steps to commission the HY-1000/800-Plus PV system:

- 1 Turn on the AC disconnects or circuit breakers on each HY-1000/800-Plus AC branch circuit.
- 2 Turn on the main utility-grid AC circuit breaker. Your system will start producing power after a few minutes.
- 3 The HY-1000/800-Plus will start to send performance data over the power lines using power line communication (PLC) to the HY-MDL. The time required for each HY-1000/800-Plus in the system to communicate to the HY-MDL will vary with the number of HY-1000/800-Plus in the system.

6. Operating Instructions

The HY-1000/800-Plus is powered on when sufficient DC voltage from the module is applied. The status LED will start flashing after sufficient DC power is applied as an indication that the HY-1000/800-Plus is live.

Status: Standby

The LED light is on by 2 second, and off by 2 seconds
Red: in error.

Orange: no error, but not communicating to HY-MDL

Green: no error, and communicating to HY-MDL

Status: Producing Power

The LED light is on by 1 second, and off by 1 second.

Orange: not communicating to HY-MDL

Green: communicating to HY-MDL

Status: Grounding Fault

The LED light is in solid red color.

In case of fault, HY-1000/800-Plus has multiple protective functions and stops output power.

The fault message may be sent to a connected HY-MDL monitoring data logger through power line communication.

The error message is displayed on the screen of HY-MDL monitoring data logger by a 16-bit error code.

Error Code	Error
Bit-0	DC Over Voltage
Bit-1	DC Under Voltage
Bit-2	Hardware Error
Bit-3	Inverter Over Voltage
Bit-4	Frequency Over
Bit-5	Frequency Under
Bit-6	AC Voltage RMS Over
Bit-7	AC Voltage RMS Under
Bit-8	Peak AC Voltage Over
Bit-9	AC Current RMS Over
Bit-10	Peak AC Current Over
Bit-11	Temperature Over
Bit-12	ADC Error
Bit-13	GFDI Fault Indicator
Bit-14	Relay Error (for some model)
Bit-15	PLC Communication Error

7. Troubleshooting and Maintenance

WARNING

DO NOT ATTEMPT TO REPAIR THE HY-1000/800-PLUS; IT CONTAINS NO USER-SERVICEABLE PARTS. IF TROUBLESHOOTING METHODS FAIL, PLEASE RETURN THE HY-1000/800-PLUS TO YOUR DISTRIBUTOR FOR MAINTENANCE.

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

WARNING

HY-1000/800-PLUS IS POWERED BY DC POWER FROM PV MODULES. MAKE SURE YOU DISCONNECT THE DC CONNECTIONS AND RECONNECT DC POWER TO WATCH FOR THE TWO SECONDS LED ON AND TWO SECONDS LED OFF AFTER DC IS APPLIED.

⚠ WARNING

ALWAYS DISCONNECT AC POWER BEFORE DISCONNECTING PV MODULE WIRES FROM HY-1000/800-PLUS. THE AC CONNECTOR OF THE FIRST HY-1000/800-PLUS IN A BRANCH CIRCUIT IS SUITABLE AS A DISCONNECTING MEANS ONCE THE AC BRANCH CIRCUIT BREAKER IN THE LOADCENTER HAS BEEN OPENED.

LED Indication of Error

- **error mode (except for grounding error)**
The LED light flashes in red color
- **NOT communicating with HY-MDL-3, and with no error**
The LED light flashes in orange color.
- **grounding fault**
The LED light is in solid red color.

Troubleshooting an Inoperable HY-1000/800-Plus

To troubleshoot an inoperable HY-1000/800-Plus, follow the steps in the order shown:

- ① Check the connection to the utility grid. Verify that the utility voltage and frequency are within allowable ranges shown in the label of HY-1000/800-Plus.
- ② Verify utility power is present at the inverter in question by removing AC, then DC power. Never disconnect the DC wires while the HY-1000/800-Plus is producing power. Re-connect the DC module connectors, and then watch for the LED blinks.
- ③ Check the AC branch circuit interconnection harness between all the HY-1000/800-Plus. Verify that each inverter is energized by the utility grid as described in the previous step.
- ④ Make sure that any AC disconnects are functioning properly and are closed.
- ⑤ Verify the PV module DC voltage is within the allowable range shown in the label of HY-1000/800-Plus.
- ⑥ Check the DC connections between the HY-1000/800-Plus and the PV module.
- ⑦ PLC signal quality may be checked through the interface on the HY-MDL monitoring data logger.
If the PLC signal is weak, it might be due to the distance between the microinverter and the monitoring data logger. It may also be caused by the interference from other electronic devices. In most cases, signal quality may be significantly improved by moving the HY-MDL to closer to the microinverter arrays, and/or farther away from other interferers. In some cases, a signal filter (LCF) may be installed to reduce the interference to PLC communication. If there are two or more separate microinverter systems close by, it is highly recommended to install LCF for each microinverter system to block interference from adjacent other systems.
- ⑧ If the problem persists, please contact Huayu.

Disconnecting a HY-1000/800-Plus from the PV Module

To ensure the HY-1000/800-Plus is not disconnected from the PV modules under load, adhere to the following disconnection steps in the order shown:

- ❶ Disconnect the AC by opening the branch circuit breaker.
- ❷ Disconnect the first AC connector in the branch circuit.
- ❸ Cover the module with an opaque cover.
- ❹ Using a DC current probe, verify there is no current flowing in the DC wires between the PV module and the HY-1000/800-Plus.
- ❺ Care should be taken when measuring DC currents, most clamp-on meters must be zeroed first and tend to drift with time.
- ❻ Disconnect the PV module DC wire connectors from the HY-1000/800-Plus.
- ❼ Remove the HY-1000/800-Plus from the PV array racking.

Installing a replacement HY-1000/800-Plus

- ❶ Attach the replacement HY-1000/800-Plus to the PV module racking using hardware recommended by your module racking vendor.
- ❷ Connect the AC cable of the replacement HY-1000/800-Plus and the neighboring HY-1000/800-Plus to complete the branch circuit connections.
- ❸ Complete the installation map and connect the PV Modules.
 - Complete the installation map
 - Each HY-1000/800-Plus has a removable serial number located on the mounting plate. Enter this serial number into a HY-MDL, and correspond it to a number in the installation map.
 - Connect the PV Modules
 - Completely install all HY-1000/800-Plus and all system inter-wiring connections prior to installing the PV modules.
- ❹ Replace the old PLC_ID in the HY-MDL monitoring data logger with the new PLC_ID of the replacement microinverter.

8. Specification

Data Sheet

Input Data(DC)

HY-1000-Plus

Commonly Used Module Pairings	2×500Wp~750Wp		
Maximum Input DC Voltage	60V		
Power Point Tracking Voltage Range	30~55V		
Operating Range	16~60V		
Startup Voltage	20V		
Overvoltage Class DC Port	II		
DC Port Backfeed Current	0 A		
PV Array Configuration	1 x 1 ungrounded array; No additional DC side protection required; AC side protection requires max. 25A per branch circuit		
Maximum Input Current	2×17A		

Output Data(AC)

Peak Output Power	1100W		
Maximum Continuous Output Power	1000W		
Nominal (L-L) Voltage/Range	240/211~264V	208/183~229V	230/Configurable
Maximum Continuous Output Current	8.33A	9.62A	8.7A
Nominal Frequency/Range	60Hz/59.3~60.5Hz		50Hz/Configurable
Extended Frequency/Range	45~55Hz / 55~65Hz		
AC Short Circuit Fault Current Over 3 Cycles	15Arms		
Maximum Units Per 20 A (L-L) Branch Circuit	4	4	4
Overvoltage Class AC Port	III		
Power Factor(Adjustable)	>0.99 Default, 0.8 Leading...0.8 Lagging...		
Level of Harmonics Distortion	<3%		

Efficiency

CEC Weighted Efficiency	95%
Peak Efficiency	96.5%
Static MPPT Efficiency	99%
Night Time Power Consumption	<50mW

Mechanical Data

Ambient Temperature Range	-40°C~+65°C
Relative Humidity Range	4% to 100% (Condensing)
Connector Type: DC	MC4
Dimensions(W*H*D)	268×250×42 mm (Without mounting bracket and cable)
Weight	2.9kg
Cooling	Natural Convection-No Fans
Approved for Wet Locations	Yes
Pollution Degree	PD3
Enclosure Environmental Rating	IP67
AC Cable Length(Integrated with AC Connectors)	3m+

Features

Communication	PLC(Extra Data Logger) / Wi-Fi(Data Logger Built-in)
Monitoring	Support remote web page monitoring and local MDL monitoring
Disconnecting Means	The AC and DC connectors have been evaluated and approved by UL for use as the load-break disconnect required by NEC 690.
Compliance	UL1741, INMETRO.VDE4105, VDE0126, IEC62109, EN50549, CE & INMETRO etc.
Warranty	25 years

8. Specification

Data Sheet

Input Data(DC)

HY-800-Plus

Commonly Used Module Pairings	2×400Wp~650Wp		
Maximum Input DC Voltage	60V		
Power Point Tracking Voltage Range	22~55V		
Operating Range	16~60V		
Startup Voltage	20V		
Overvoltage Class DC Port	II		
DC Port Backfeed Current	0 A		
PV Array Configuration	1 x 1 ungrounded array; No additional DC side protection required; AC side protection requires max. 25A per branch circuit		
Maximum Input Current	2×17A		

Output Data(AC)

Peak Output Power	880W		
Maximum Continuous Output Power	800W		
Nominal (L-L) Voltage/Range	240/211~264V	208/183~229V	230/Configurable
Maximum Continuous Output Current	3.2A	3.36A	3.26A
Nominal Frequency/Range	60Hz/59.3~60.5Hz		50Hz/Configurable
Extended Frequency/Range	45~55Hz / 55~65Hz		
AC Short Circuit Fault Current Over 3 Cycles	15Arms		
Maximum Units Per 20 A (L-L) Branch Circuit	5	5	5
Overvoltage Class AC Port	III		
Power Factor(Adjustable)	>0.99 Default, 0.8 Leading...0.8 Lagging...		
Level of Harmonics Distortion	<3%		

Efficiency

CEC Weighted Efficiency	95%
Peak Efficiency	96.5%
Static MPPT Efficiency	99%
Night Time Power Consumption	<50mW

Mechanical Data

Ambient Temperature Range	-40°C~+65°C
Relative Humidity Range	4% to 100% (Condensing)
Connector Type: DC	MC4
Dimensions(W*H*D)	268×250×42 mm (Without mounting bracket and cable)
Weight	2.9kg
Cooling	Natural Convection-No Fans
Approved for Wet Locations	Yes
Pollution Degree	PD3
Enclosure Environmental Rating	IP67
AC Cable Length(Integrated with AC Connectors)	3m+

Features

Communication	PLC(Extra Data Logger) / Wi-Fi(Data Logger Built-in)
Monitoring	Support remote web page monitoring and local MDL monitoring
Disconnecting Means	The AC and DC connectors have been evaluated and approved by UL for use as the load-break disconnect required by NEC 690.
Compliance	UL1741, INMETRO.VDE4105, VDE0126, IEC62109, EN50549, CE & INMETRO etc.
Warranty	25 years

Huayu Portal - Mobile App



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