

APS M1P-MX
Photovoltaic Grid-connected
Microinverter
Installation and User Manual

(For Mexico)



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1. Important Safety Instructions

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

SAVE THESE INSTRUCTIONS– This manual contains important instructions for Models YC250A/YC250I, YC500A/YC500I that must be followed during installation and maintenance of the Photovoltaic Grid-connected Inverter.



WARNING: 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.



NOTE: This indicates information that is important for optimized Microinverter operation. Follow these instructions closely.

Safety Instructions

- Only qualified professionals should install and/or replace APS Microinverters.
- Perform all electrical installations in accordance with local electrical codes.
- Before installing or using the APS Microinverter, please read all instructions and cautionary markings in the technical documents and on the APS Microinverter system and the solar-array.
- Be aware that the body of the APS 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.
- **Do NOT** disconnect the PV module from the APS Microinverter without first disconnecting the AC power.
- **Do NOT** attempt to repair the APS Microinverter. If it fails, contact APS Customer Support to obtain an RMA number and start the replacement process. Damaging or opening the APS Microinverter will void the warranty.

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Radio interference statement

FCC Compliance: The equipment can comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules, which are designed to protect against harmful interference in a residential installation. The equipment could radiate radio frequency energy and this might cause harmful interference to radio communications if not following the instructions when installing and using the equipment. But there is no guarantee that interference will not occur in a particular installation. If this equipment causes harmful interference to radio or television reception, the following measures might resolve the issues:

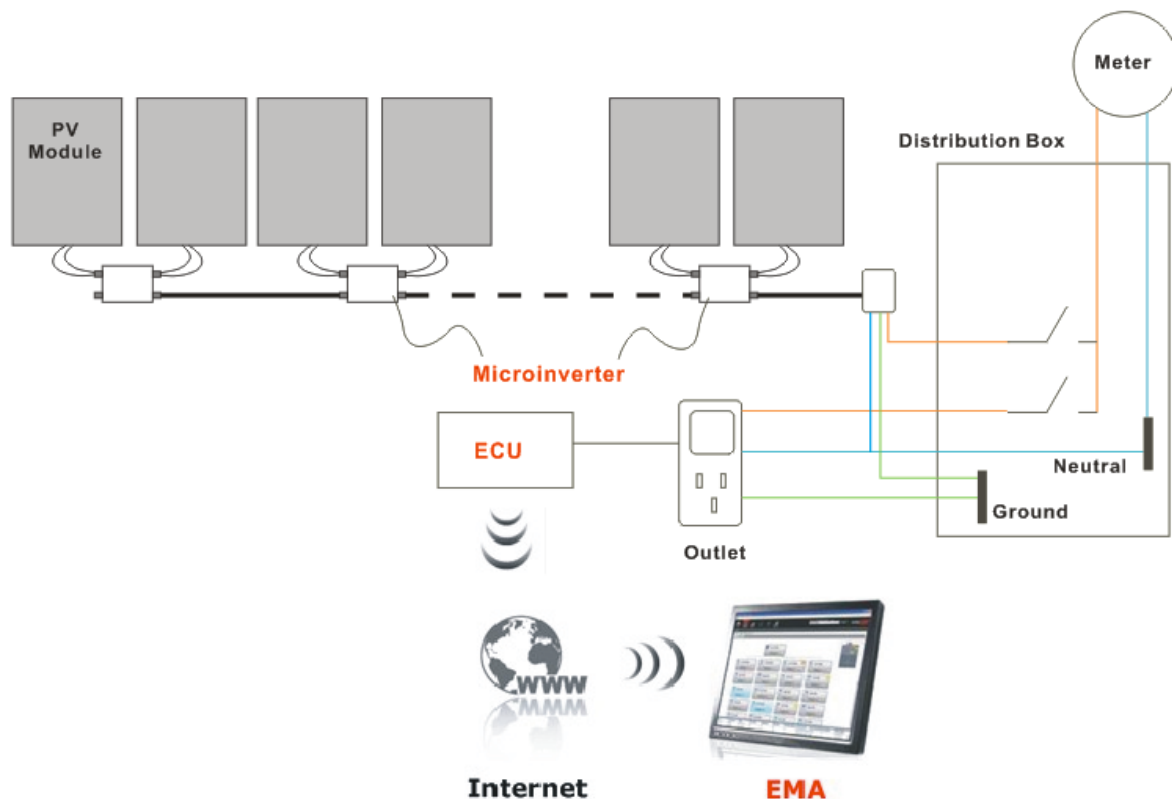
- A) Relocate the receiving antenna and keep it well away from the equipment
- B) Consult the dealer or an experienced radio/TV technical for help.

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

2. APS Microinverter System Introduction

The APS Microinverter is an inverter system for use in utility-interactive applications, comprised of three key elements:

- Altenergy Power Systems Microinverter
- Altenergy Power Systems Energy Communication Unit (ECU)
- Altenergy Power Systems Energy Monitor and Analysis (EMA) web-based monitoring and analysis system



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

The APS Microinverters maximize energy production from photovoltaic (PV) arrays. 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 shading, soiling, orientation, or mismatch, the APS Microinverter ensures top performance from the array by maximizing the performance of each module within the array.

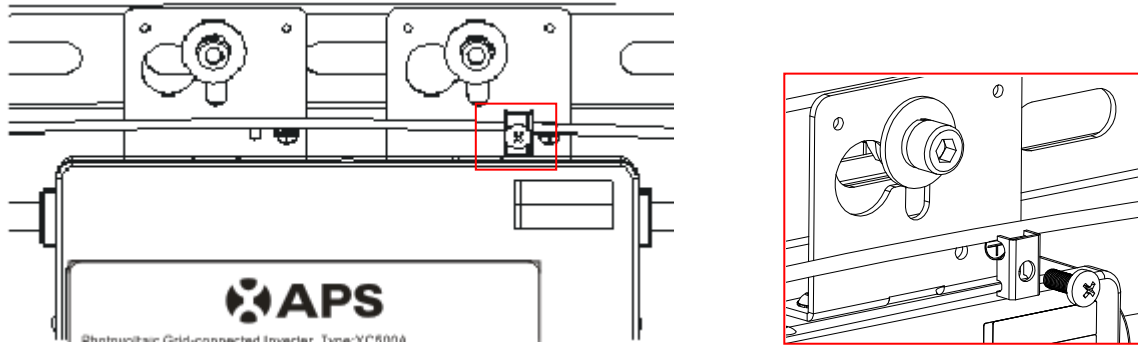
The APS Microinverter system is more reliable than centralized or string inverters. The distributed Microinverter system ensures that no single point of system failure exists across the PV system. APS Microinverters are designed to operate at full power at ambient temperatures of up to 65°C. The inverter housing is designed for outdoor installation and complies with the NEMA 3R environmental enclosure rating.

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PV systems using APS Microinverters are very simple to install. You can install individual PV modules in any combination of module quantity, orientation, type, and power rate.

For 127V situation, the Ground wire (PE) of the AC cable is connected to the chassis inside of the Microinverter, eliminating the installation of grounding wire.

For 240V situation, the Ground wire is installed outside of the Microinverter. As the following figures:



NOTE: If you already use grounding washers to ground the microinverter chassis to the PV module racking as described in step 4, skip this step.

The APS Microinverter system provides smart system performance monitoring and analysis.

The APS Energy Communication Unit (ECU) 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 ECU, the full network of APS Microinverters automatically reports to the APS Energy Monitor and Analysis (EMA) web server. The EMA software displays performance trends, informs you of abnormal events, and controls system shutdown when it is needed.

3. APS Microinverter M1P series Introduction

The APS M1P series Microinverters connect with the Split-phase grid, and operate with most 60 and 72 cell solar modules. For more information, please see the section 8 Technical Data of this manual. or sign in APS website to obtain a solar panel list which can match with APS Microinverters: www.APSmicroinverter.com

Model Number	AC grid	PV Module	Module Connector
YC250A	60Hz/127V	60,72 Cell	MC-4 Type or Customize
YC250I	60Hz/127V	60,72 Cell	MC-4 Type or Customize
YC500A	60Hz/127V	60,72 Cell	MC-4 Type or Customize
YC500I	60Hz/127V	60,72 Cell	MC-4 Type or Customize
YC250A	60Hz/240V	60,72 Cell	MC-4 Type or Customize
YC250I	60Hz/240V	60,72 Cell	MC-4 Type or Customize
YC500A	60Hz/240V	60,72 Cell	MC-4 Type or Customize
YC500I	60Hz/240V	60,72 Cell	MC-4 Type or Customize

Max. units per branch of YC250A/YC250I for 127V situation:

Maximum parallel combination of modules 10 per branch for 25A breaker.

Maximum parallel combination of modules 8 per branch for 20A breaker.

Max. units per branch of YC500A/YC500I for 127V situation:

Maximum parallel combination of modules 5 per branch for 25A breaker.

Maximum parallel combination of modules 4 per branch for 20A breaker.

Max. units per branch of YC250A/YC250I for 240V situation:

Maximum parallel combination of modules 21 per branch for 25 A breaker.

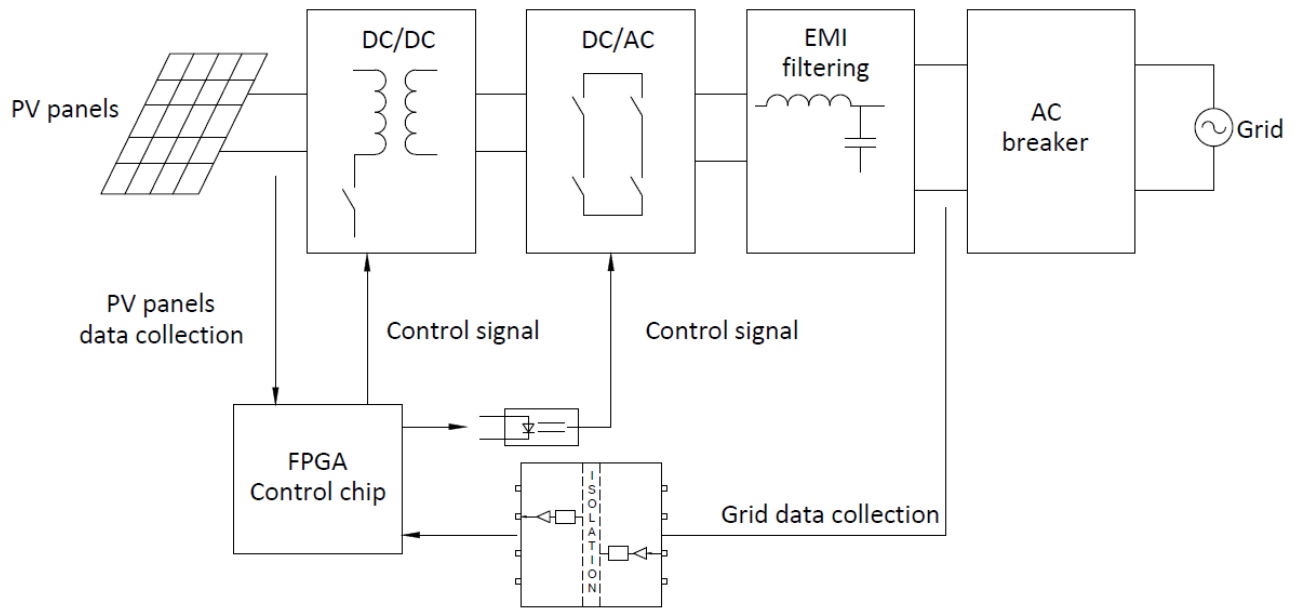
Maximum parallel combination of modules 17 per branch for 20 A breaker.

Max. units per branch of YC500A/YC500I for 240V situation:

Maximum parallel combination of modules 9 per branch for 25 A breaker.

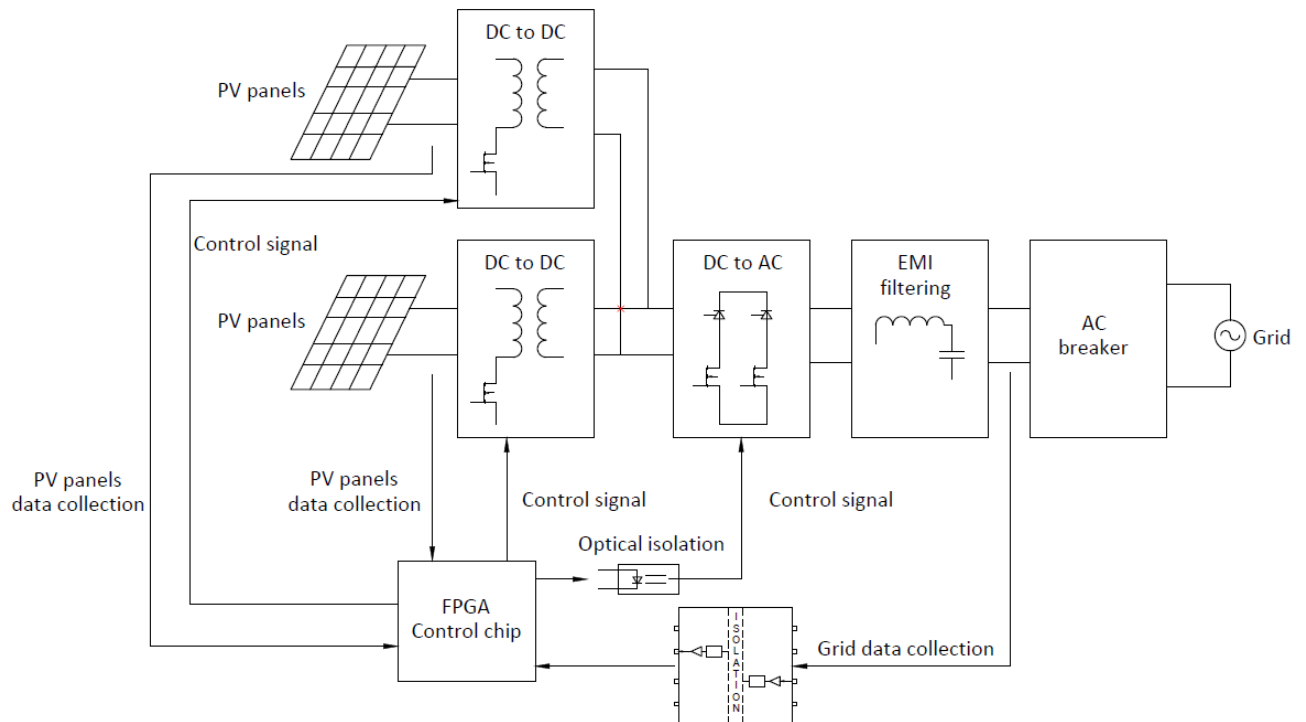
Maximum parallel combination of modules 7 per branch for 20 A breaker.

The following figure shows the APS YC250A/YC250I microinverter schematic:



APS YC500A/YC500I has two independent DC inputs(A input and B input), with independent MPPT control and data monitoring.

The following figure shows the APS YC500A/YC500I microinverter schematic:



4. APS Microinverter System Installation

A PV system using APS Microinverters is simple to install. Each Microinverter easily mounts on the PV racking, directly beneath each PV module. Low voltage DC wires connect from the PV module directly to the Microinverter, eliminating the risk of high DC voltage.

Installation shall comply with local regulations and technical rules.

Special Statement : An AC GFCI device ***should not*** be used to protect the dedicated circuit to the APS microinverter even though it is an outside circuit. None of the small GFCI devices (5mA-30 mA) are designed for back feeding and will be damaged if back feed. 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.



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



WARNING: Before installing or using an APS Microinverter, please read all instructions and warnings in the technical documents and on the APS 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.

Additional Installation components from APS

- AC branch end cable (1 per branch, sold separately)
- Protective end cap (1 per branch, sold separately)

Required Parts and Tools from you

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

- An AC connection junction box
- Mounting hardware suitable for module racking
- Sockets and wrenches for mounting hardware
- A Phillips screwdriver
- A torque wrench

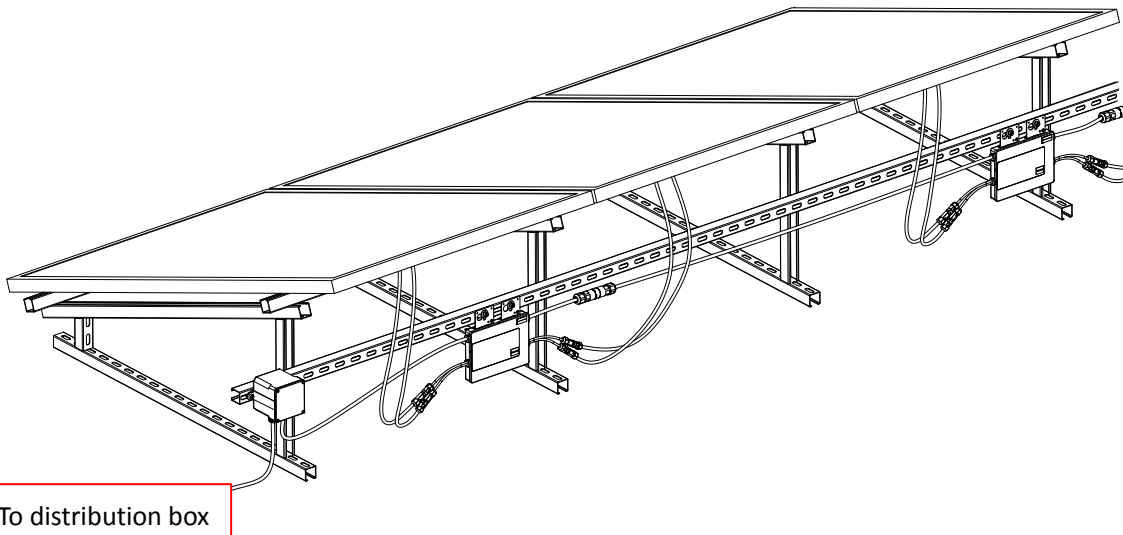
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Installation Procedures

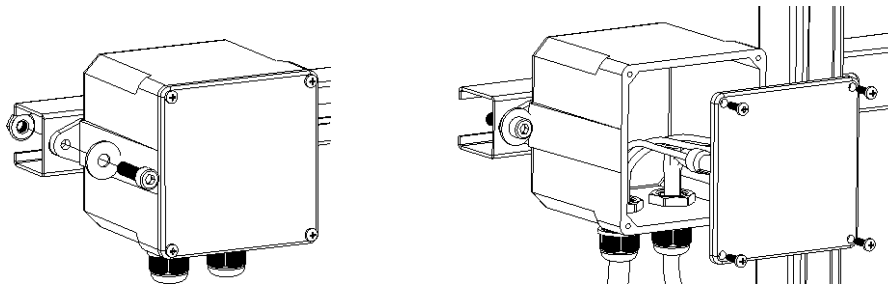


WARNING: Do NOT connect APS Microinverters to the utility grid or energize the AC circuit until you have completed all of the installation procedures as described in the following sections.

For bracket installation, after the completion of system installation rendering as follows:

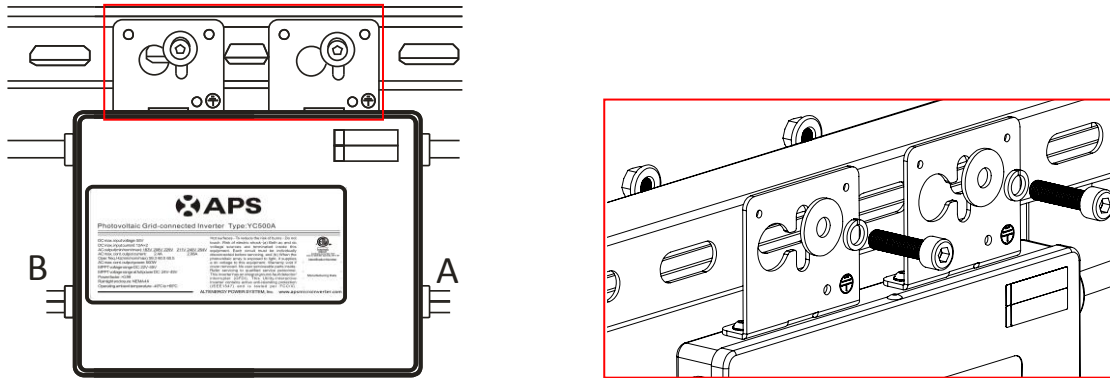


Step 1 - Installing the AC Branch Circuit Junction Box



- Install an appropriate junction box at a suitable location on the PV racking system (typically at the end of a branch of modules).
- Connect the open wire end of the AC branch end cable into the junction box using an appropriate gland or strain relief fitting.
- Wire the conductors according to the marks on cable core.
- Connect the AC branch circuit junction box to the point of utility interconnection.

Step 2 - Attaching the APS Microinverters to the Racking or the PV Module Frame



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

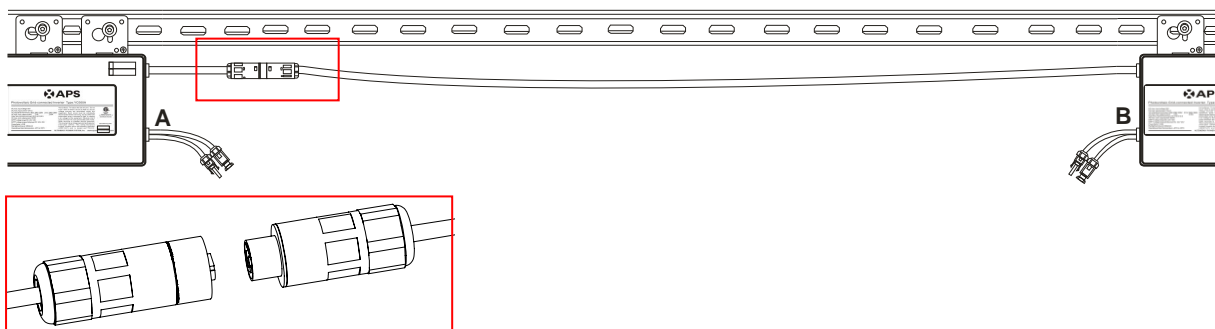


WARNING: Prior to installing any of the microinverters, verify that the utility voltage at the point of common connection matches the voltage rating on microinverter label.



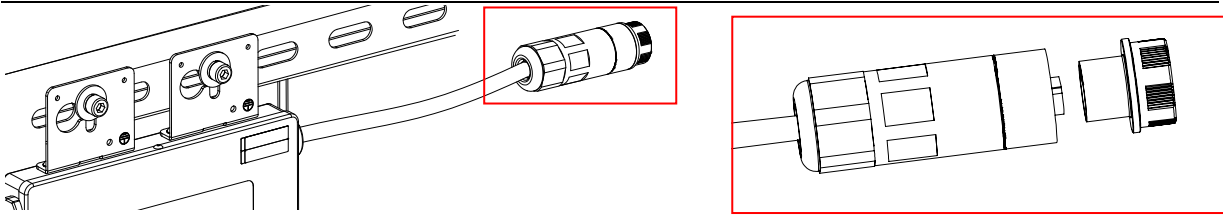
WARNING: Do not mount the Microinverter in a location that allows exposure to direct sunlight. Allow a minimum of 1.5 centimeters between the top of the roof and the bottom of the Microinverter.

Step 3 - Connecting the APS Microinverter AC Cables



- Check the Microinverter quick installation guide for the maximum allowable number of Microinverters on each AC branch circuit.
- Plug the AC female connector of the first Microinverter into the male connector of the next Microinverter, and so on, to form a continuous AC branch circuit.
- Install a protective end cap on the open AC connector of the last Microinverter in the AC branch circuit.

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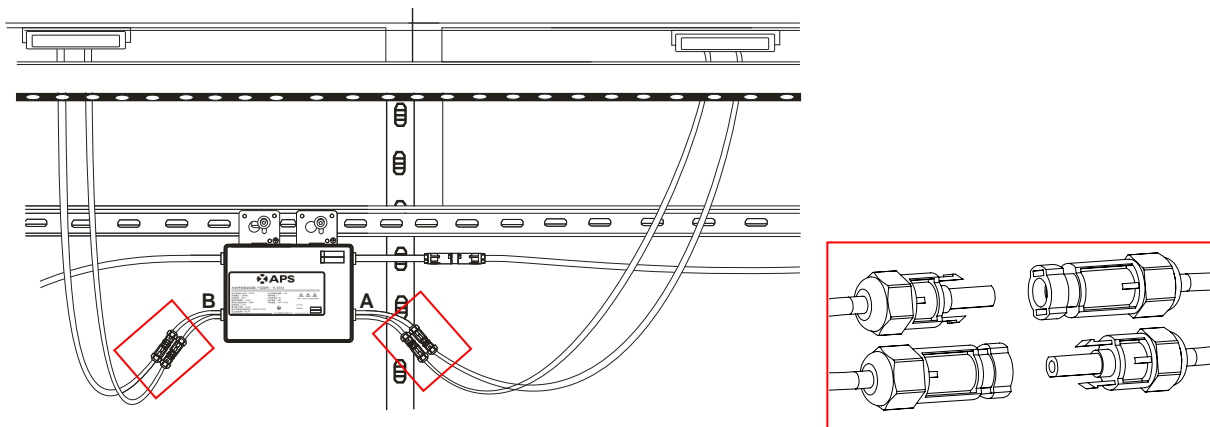
WARNING: Do NOT exceed the maximum number of Microinverters in an AC branch circuit, as displayed on the quick installation guide.



NOTE: Please contact with ALTENERGY POWER SYSTEM Inc for the purchase of AC extended cables when microinverters which are installed space far and AC cable is not long enough.

Step 4 - Connecting APS Microinverters to the PV Module

Connect panels and microinverters according to the demand.



WARNING: Ensure that all AC and DC wiring is correct. Ensure that none of the AC and DC wires are pinched or damaged. Ensure that all junction boxes are properly closed.



NOTE: About A and B Sides corresponding the location of modules, EMA registration show acquiesce in this installation. if there are different connection methods, please email the detail installation drawings to us to register, or the A, B Sides corresponding component location will not correspond to the EMA position.

Step 5 - Completing the APS Installation Map

You need to fill-in APS Warranty Cards, which provide system information and installation map. Feel free to provide your own layout if a larger or more intricate installation map is required.

a. Each APS Microinverter has removable serial number labels. Once the inverters are installed, please peel the labels off and affix them on the warranty card, fill in A, B in each of the labels below (as Figure2) according to the layout on the roof (as Figure1). The warranty cards can be obtained from the appendix of this manual or APS website:

www.APSmicroinverter.com

b. Fill the warranty cards and email to APS at emasupport@altenergy-power.com

c. APS will setup the EMA account and email you information, and then you can use the EMA website to view detailed performance of your PV system. You can learn more information on energy monitoring and analysis system from APS website: www.APSmicroinverter.com

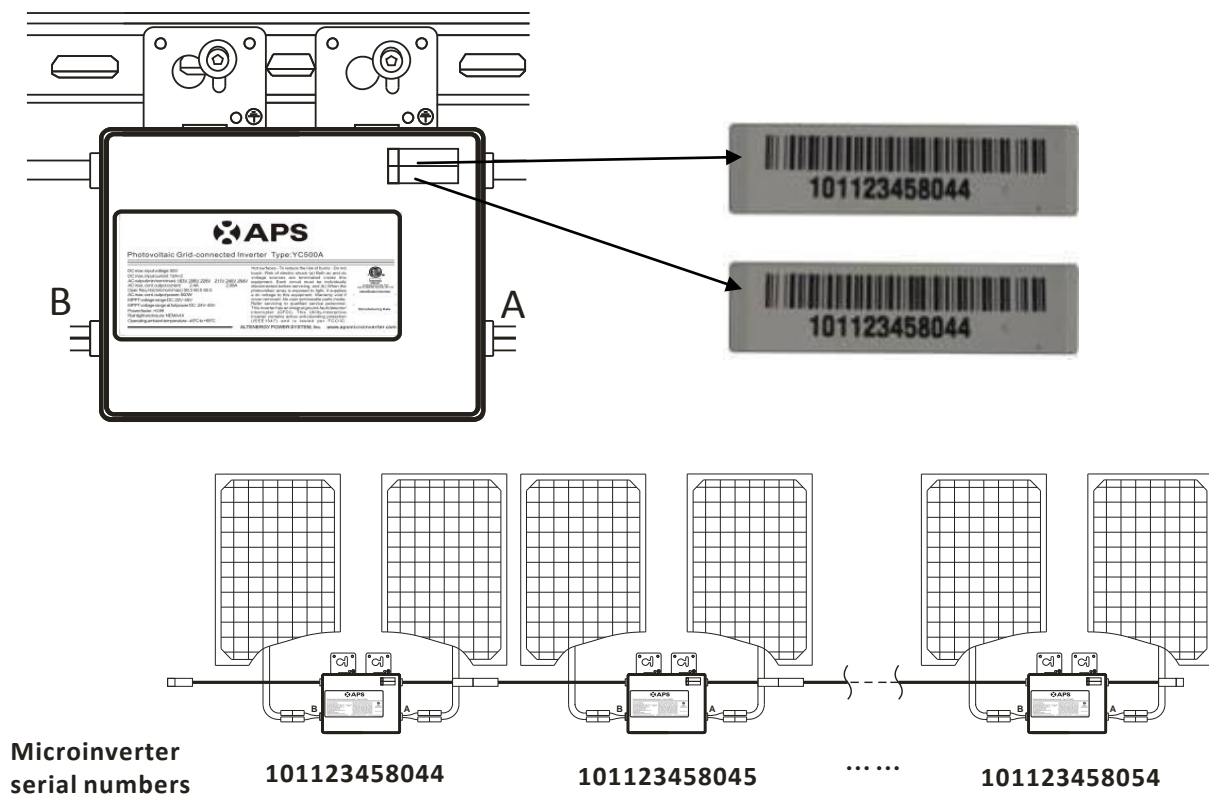


Figure1 APS Microinverter installation schematic arrangement

APS MicroInverter & Energy Communication Unit Warranty Card

The APS Installation Map is a diagram of the physical location of each microinverter in your PV installation. Each APS microinverter has a removable serial number label located on the mounting plate. Peel the label and affix it to the respective location on the APS installation map.

Installation Map Template

[illegible]

To register your APS microinverter, please mail this warranty registration card to: emasupport@altenergy-power.com

Figure2 Schematic diagram of The warranty cards



- NOTE:** 1. The layout of the inverters' serial numbers on the warranty card is only suitable for general arrangement.
2. Step 1 ~ 5 can change sequence for convenience of installation.
3. Warranty card is located in Appendix last page of this manual.

5. APS microinverter system operating instructions

To operate the APS 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 five-minute waiting time.



NOTE: once DC power is applied, the Status LED of each microinverter will blink green three times to indicate normal start-up operation.



NOTE: Once AC power is applied, about 0.1A current and 25VA(W) power for each microinverter may be measured with a meter. This Current and Power are Reactive. The inverters ARE NOT operating. After an over 300s waiting time, the inverters will start operation.

3. The APS microinverters will start to send performance data over the power line to the ECU. The time required for all the microinverters in the system to report to the ECU will vary with the number of microinverters in the system. You can verify proper operation of the APS microinverters via the ECU. See the *ECU Installation and Operation Manual* for more information.

6. Troubleshooting

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

Status Indications and Error Reporting

Startup LED

When DC power is first applied to the microinverter:

- Three short green blinks when DC power is first applied to the microinverter indicate a successful microinverter startup

Operation LED

Flashing Slow Green (10s gap) - Producing power and communicating with ECU

Flashing Fast Green (2s gap) – Producing power and not communicating with ECU

Flashing Red – Not producing power

Other Faults

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



WARNING: Be aware that only qualified personnel should troubleshoot the APS 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 APS microinverter. The AC connector of the first microinverter in a branch circuit is suitable as a disconnecting means once the AC branch circuit breaker in the load center has been opened.



WARNING: The APS microinverter is powered by PV module DC power. Make sure you disconnect and reconnect the DC connections to watch for the three short LED flashes.

Troubleshooting a non-operating APS microinverter

To troubleshoot a non-operating APS microinverter, follow the steps below in order:

1. Verify the utility voltage and frequency are within ranges shown in the in section 8 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.
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 in the Section 8 Technical Data of this manual.
7. If the problem persists, please call APS Energy customer support.



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

7. Replace a microinverter

Follow the procedure to replace a failed APS microinverter.

1. Disconnecting the APS microinverter from the PV Module, in the order shown below:
 - 1) Disconnect the AC by opening the branch circuit breaker.
 - 2) Cover the module with an opaque cover.
 - 3) Disconnect the first AC connector in the branch circuit.
 - 4) Disconnect the PV module DC wire connectors from the microinverter.
 - 5) Remove the microinverter from the PV array racking.
2. Install a replacement microinverter to the rack.
3. Connect the AC cable of the replacement microinverter and the neighboring microinverters to complete the branch circuit connections.
4. Close the branch circuit breaker, and verify operation of the replacement microinverter.

8. Technical Data



WARNING: Be sure to verify the voltage and current specifications of your PV module match with those of the microinverter.



WARNING: You must match the DC operating voltage range of the PV module with the allowable input voltage range of the APS microinverter.



WARNING: The maximum open circuit voltage of the PV module must not exceed the specified maximum input voltage of the APS microinverter.

YC250-MX Technical Specifications

Type	YC250-MX-127V	YC250-MX-240V
Input Data (DC)		
Recommended PV Module Power Range (STC)	180-310W	
MPPT Voltage Range	22-45V	
Operation Voltage Range	16-55V	
Maximum Input Voltage	55V	
Startup Voltage	22V	
Maximum Input Current	10.5A	
Output Data (AC)		
Maximum Output Power	250W	250W
Maximum Output Current	1.97A	1.04A
Nominal Output Voltage/Range	127V / 95V-155V ¹	240V / 211-264V ¹
Extended Output Voltage Range	82V-155V	
Nominal Output Frequency/Range	60Hz / 57Hz-62Hz ¹	60Hz / 57Hz-62Hz ¹
Extended Output Frequency Range	55.1Hz-64.9Hz	
Power Factor	>0.99	
Total Harmonic Distortion	<3%	
Maximum Units per Branch	8 per 20A/10 per 25A Breaker	17 per 20A/21 per 25A Breaker
Efficiency		
Peak Efficiency	95.5% (HF Transformer Isolation)	
Night-time Power Consumption	120mW	100mW
Mechanical Data		
Operating Ambient Temperature Range	-40 ° F to +149 ° F (-40°C to +65°C)	
Operating Internal Temperature Range	-40 ° F to +185 ° F (-40°C to +85°C)	
Storage Temperature Range	-40 ° F to +185 ° F (-40°C to +85°C)	
Dimensions (W x H x D)	160mmX 150mmX 29mm	
Weight	3.3lbs/1.5kg	
AC Cable	12AWG	
Enclosure Rating	NEMA 3R	
Cooling	Natural Convection	
Features & Compliance		
Communication	Power Line	
Design lifetime	25yrs	
Compliance	NOM	FCC Part15; ANSI C63.4;ICES-003; UL1741, CSA C22.2 No.107.1-01; IEEE1547
¹ Programmable through ECU to meet customer need.		

The specifications are subject to change without notice.

YC500-MX Technical Specifications

Type	YC500-MX-127V	YC500-MX-240V
Input Data (DC) (2 independent MPPT)		
Recommended PV Module Power Range (STC)	180-310W	
MPPT Voltage Range	22-45V	
Operation Voltage Range	16-55V	
Maximum Input Voltage	55V	
Startup Voltage	22V	
Maximum Input Current	10.5A×2	12 Ax 2
Output Data (AC)		
Maximum Output Power	450W	500W
Maximum Output Current	3.54A	2.08A
Nominal Output Voltage/Range	127V / 95V-155V ¹	240V / 211V-264V ¹
Extended Output Voltage Range	82V-155V	
Nominal Output Frequency/Range	60Hz / 57Hz-62Hz ¹	60Hz / 57Hz-62Hz ¹
Extended Output Frequency Range	55.1Hz-64.9Hz	
Power Factor	>0.99	
Total Harmonic Distortion	<3%	
Maximum Units per Branch	4 per 20A/5 per 25A Breaker	7 per 20A/9 per 25A Breaker
Efficiency		
Peak Efficiency	95.5% (HF Transformer Isolation)	
Night-time Power Consumption	100mW	120mW
Mechanical Data		
Operating Ambient Temperature Range	-40 °F to +149 °F (-40°C to +65°C)	
Operating Internal Temperature Range	-40 °F to +185 °F (-40°C to +85°C)	
Storage Temperature Range	-40 °F to +185 °F (-40°C to +85°C)	
Dimensions (W x H x D)	221mm X 167mm X 29mm	
Weight	2.5kg	
AC Cable	12AWG	
Enclosure Rating	NEMA 3R	
Cooling	Natural Convection	
Features & Compliance		
Communication	Power Line	
Design lifetime	25yrs	
Compliance	NOM	FCC Part15; ANSI C63.4;ICES-003; UL1741, CSA C22.2 No.107.1-01; IEEE1547

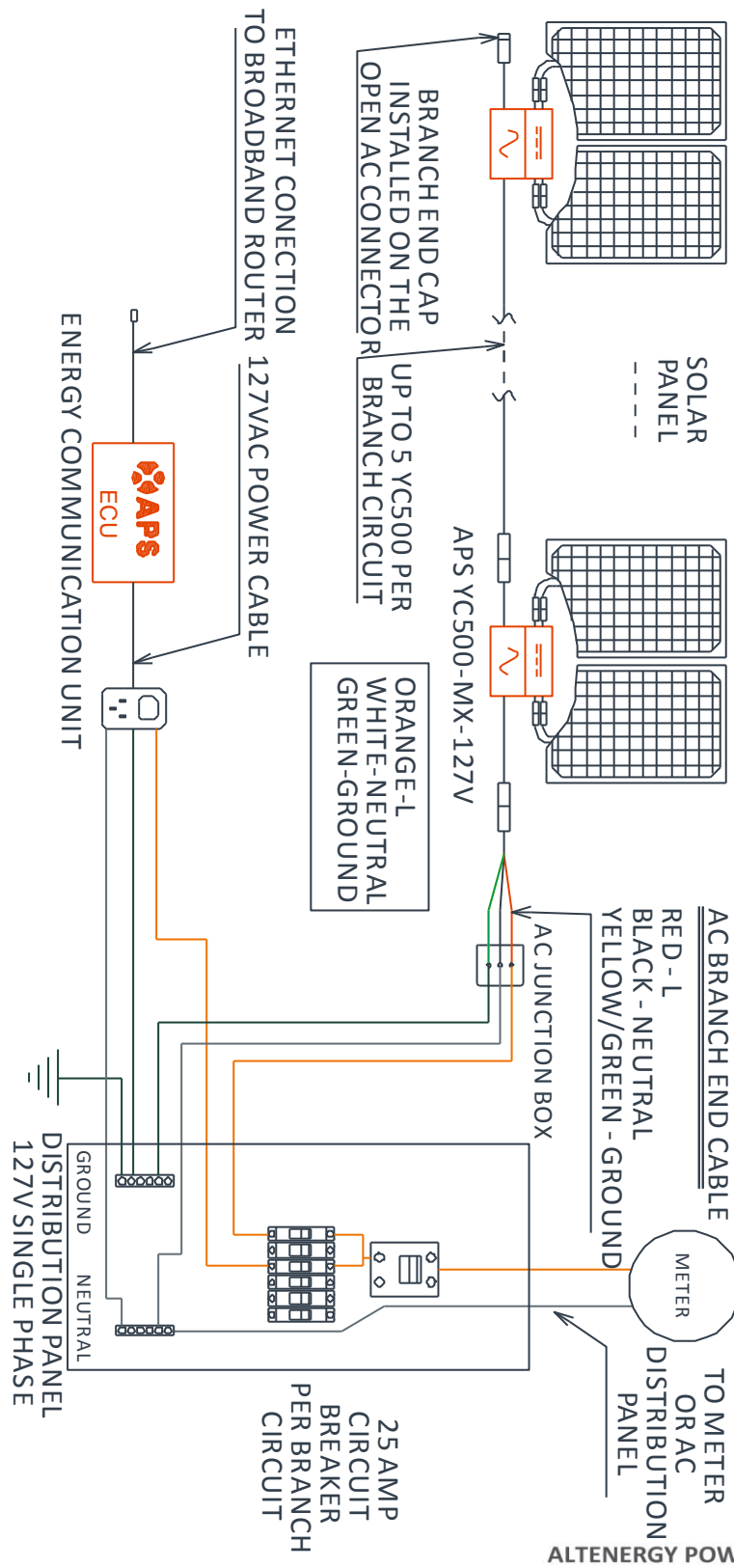
¹ Programmable through ECU to meet customer need.

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The specifications are subject to change without notice.

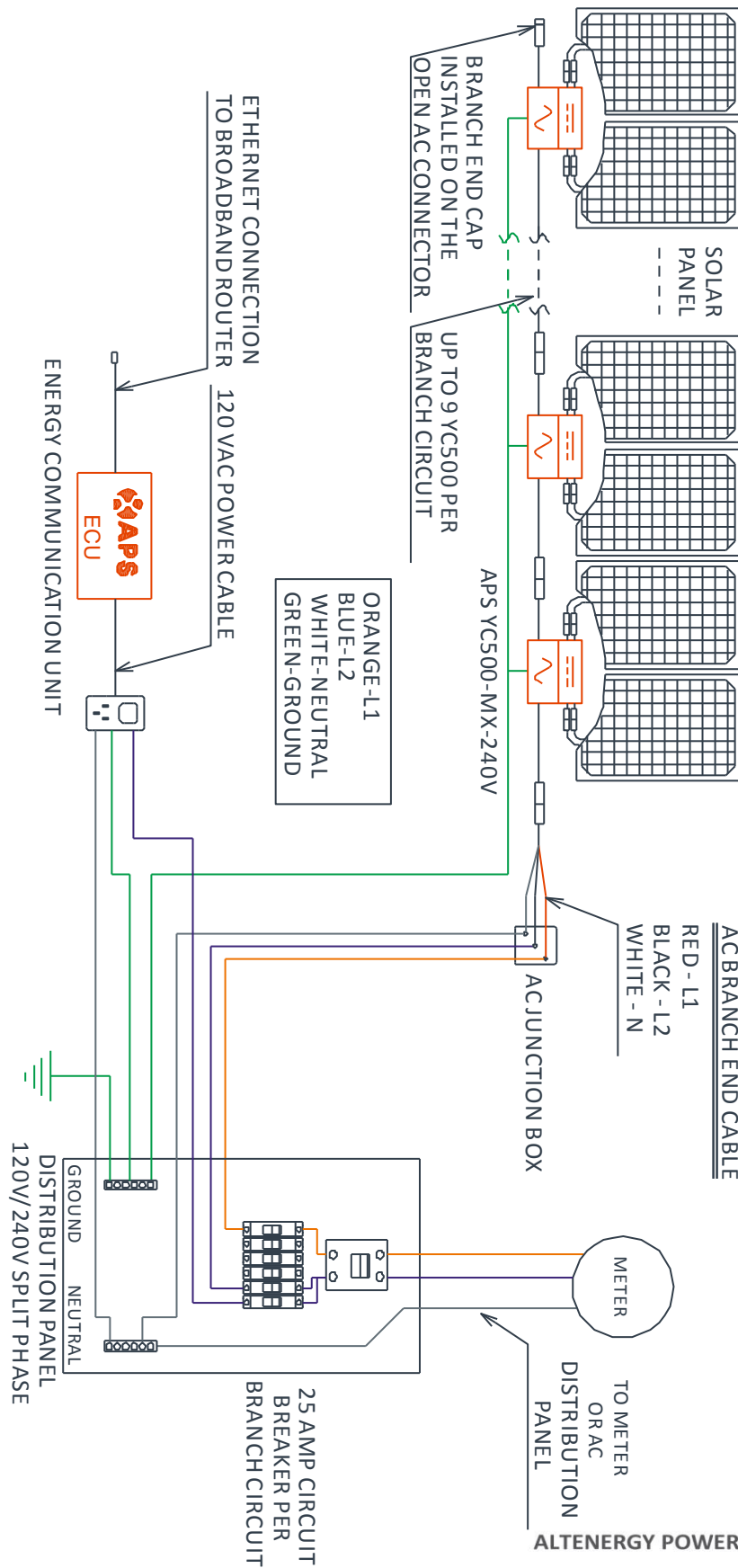
9. Wiring Diagram

9.1 Sample Wiring Diagram -127V Single Phase



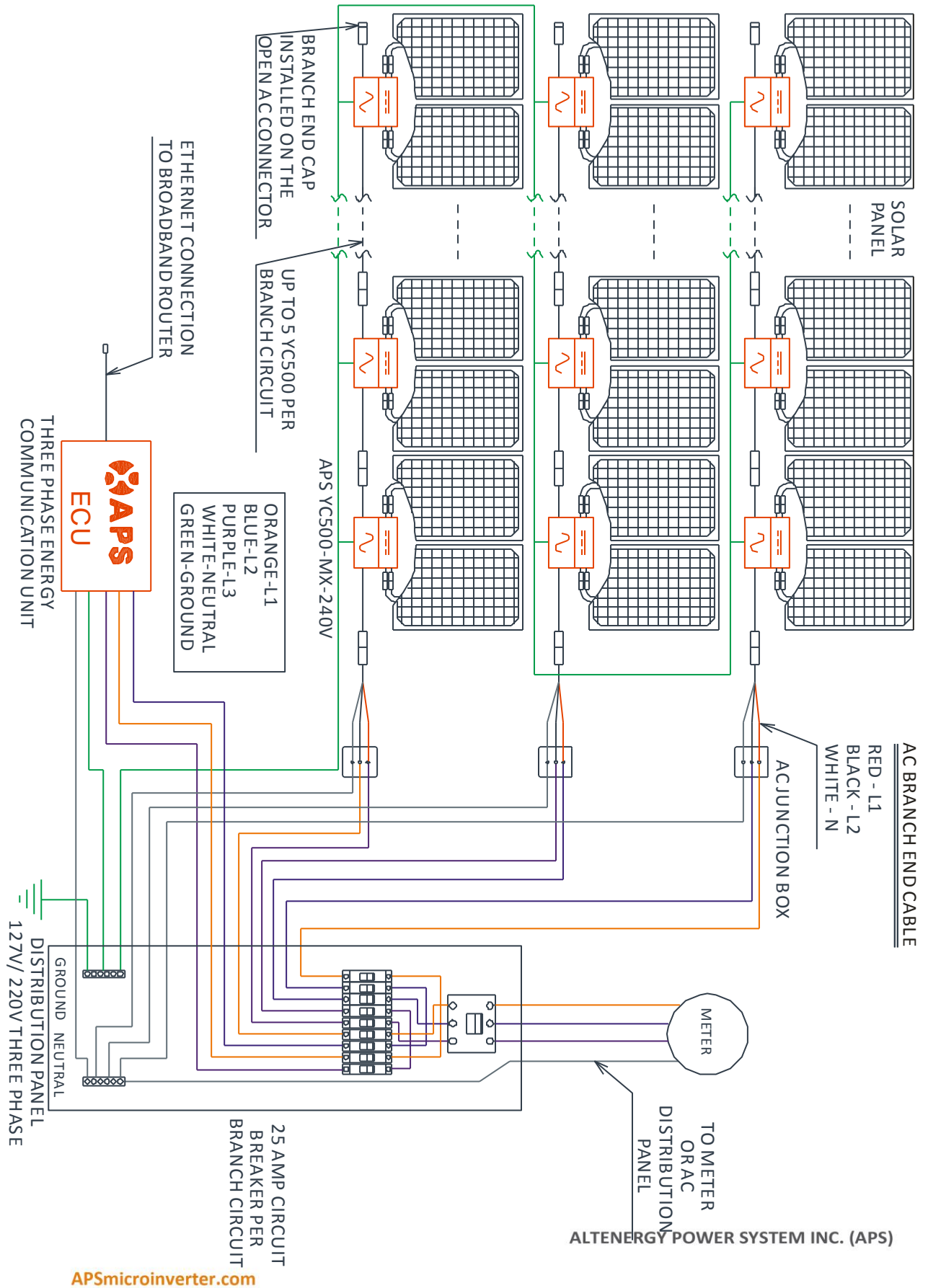
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9.2 Sample Wiring Diagram –120V/240V Split Phase



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9.3 Sample Wiring Diagram -127V/220V Three Phase





APS Microinverter & Energy Communication Unit Warranty Card

The APS Installation Map is a diagram of the physical location of each microinverter in your PV installation. Each APS microinverter has a removable serial number label located on the mounting plate. Peel the label and affix it to the respective location on the APS installation map.

Installation Map Template

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22

To register your APS microinverter, please mail this warranty registration card to: emasupport@altenergy-power.com