

SYSTEM DESCRIPTION	
System type	Installation of Grid-Tied PV System
STC rated DC Power output	
Nominal AC Power Output	
PV module model	
PV module Qty	
Inverter Model	
Inverter Qty	
Rapid Shutdown System	Built into micro-inverters
Monitoring System	S-Miles Cloud
Solar Breaker Box	Electrical Combiner
Service rating	
All electrical equipment installed are UL listed.	

Item	Manufacturer	Model	Listing / Compliance
PV modules			
Inverters	Hoymiles		
All overcurrent protection	Hoymiles	DC & AC	UL

Rapid Shutdown of PV System by NEC 2017 Section 690.12: - <u>Hoymiles</u> Micro-inverter Systems fully meet the rapid shutdown requirement without the need of an additional rapid shutdown inverter. The AC Solar Breaker or Disconnect function as Rapid shutdown switch.	SYSTEM AUTOMATIC OPERATION 1. Grid power is present, photovoltaic system feeds the load at day time, any excess energy will be fed back into the electrical grid. 2. Grid power is lost, photovoltaic system automatically disconnects from the grid as per UL1741 standards. 3. Photovoltaic system will automatically resume feeding power to the grid when the proper voltage and frequency is restored (IEEE Standards) and there is enough sunlight.
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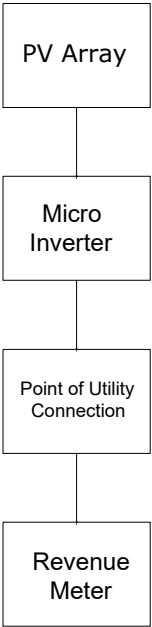
Wiring Schedule

Wiring schedule	Cond. Size (inch)	Cond. Typ	Alternative cond. size & type	Wires

Electrical Notes

1. Please, refer to existing plans of the building for information about existing electrical system. Existing loads of the building are not shown in this Riser for clarity.
2. All conductor material will be **copper (CU)** and all conductor insulation material will be **THWN-2** unless specified otherwise.
3. System voltage will be 1P-3W **120/240V** unless specified otherwise.
4. All elements in Riser Diagram **will be NEW** unless specified as "**EXISTING**".
5. All enclosure **located outdoors** will be rated **NEMA 3R** and all enclosure **located indoors** will be rated **NEMA 1** unless specified otherwise.
6. All conduits running on the roof surface will have a distance greater than 7/8 inch from roof to bottom of conduit.
7. All **NEW** Solar AC Disconnect and Battery Disconnect must be **LOCKABLE** as per 690.15(D).
8. AC Circuits from micro-inverters to each circuit O.C.P.D. can run inside the attic. Use FMC in this situation.
9. All Splices or Taps inside switch and overcurrent device enclosures must comply with **312.8(A)**
10. Flexible metal conduit (FMC) must be grounded.
11. Bonding Jumper must be added to the Main Service Disconnect Enclosure as per **250.28**
12. FMC must comply with NEC 690.3, 690.4 & 690.31
13. When performing a Load Side Connection, solar backfeed breaker must be located at the opposite end of the busbar to comply with 705.12.
14. When Enphase IQ Load Controller (Enpower) is used, for wires smaller than #1 AWG connected to the Main Input or output, pre-installed lugs must be removed and use an approved UL ring terminal.
15. When Enphase IQ Load Controller (Enpower) is used, PV and ESS inputs to Enpower must be wired through lug terminals prior to connecting to breakers.
16. Battery bank installed in a location where subject to vehicle damage needs to be protected by safety bollards or other approved barrier.
17. All NEW electrical equipment and components shall be elevated to the existing F.F.E. of the existing habitable space of the house, minimum.

System automatic operation diagram



Electrical Calculations

Wire sizing	
Design temp.	
Adder (310.15(B)(3)(C)) NOTE: Distance above roof to bottom of conduit > 7/8 in	
Total temp.	
Multiplier at total temp. (310.15(B)(2)(a))	
Branch Circuits	
Inverter nominal current (In)	
Maximum number of inverters in a single circuit	
Max. continuous current	
Wire type selected	
Wire rating @90°C	
Wire rating complying with NEC 110.14 (C) for terminal temp. of 75°C	
Multiple conductors in single conduit adjustment factor. (Table 310.15(B)(3)(a))	
Maximum wire capacity	
Main circuit	
Total number of inverters	
Max. continuous current	
Wire type	
Wire rating @75°C	

Conduit Sizing	
# wire in branch conduit.	
Area (mm²)	
Total area of wires	
Conduit trade size (inch)	
Conduit area	
Over 2 wires reduction factor	
Effective area	
% of conduit used	
No. wire in main conduit.	
Area (mm²)	
Total area	
Conduit trade size (inch)	
Conduit area	
Over 2 wires reduction factor	
Effective area	
% of conduit used	

Point of interconnection	
Type of connection	
Solar OCPD rating	
Rating of service conductores (Table 310.15 (B)(16))	
Rating of service conductors > Solar OCPD rating	
Labels in accordance with NEC 690	

Note Table, Ground Fault Protection and Maximum Circuit Voltage on Cold Temperature
Ground Fault Protection
In an Hoymiles system, ground fault protection is provided in at the microinverter level. In includes integrated grounding, the ground fault protection is provided by a ground fault sensing circuit. The microinverter itself has a Class II double-insulated rating, which includes ground fault protection (GFP). It can be reset using the Gateway
Maximum circuit voltage on cold temperature

REVISIONS:		

Project:	Address:	ELECTRICAL DIAGRAM & CALCULATIONS
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PHONE: 786-292-3304
305.260.7000

SEAL:

ENGINEER OF RECORD:

EDUARDO RODRIGUEZ VELAZQUEZ P.E.
LICENSE #91287

13470 NW 8th St.
Miami, FL 33182.
TEL (786) 556-5574

DATE:

SCALE: NTS

DRAWN BY:
ASIC ENG

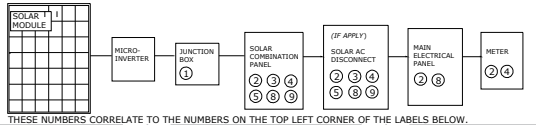
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System Riser Diagram

Labels



THESE NUMBERS CORRELATE TO THE NUMBERS ON THE TOP LEFT CORNER OF THE LABELS BELOW.

NEC 690.31(G)(3) APPLY TO AC JUNCTION BOXES

1 CAUTION
PV OUTPUT CIRCUIT

NEC 690.54 APPLY PERMANENT LABEL TO MAIN ELECTRICAL PANEL, METER & SOLAR DISCONNECT.

2 WARNING
DUAL POWER SUPPLY
SOURCES: UTILITY GRID AND PV
SOLAR ELECTRIC SYSTEM
AC output current
AC operating voltage 240v

NEC 690.05 APPLY TO MAIN ELECTRICAL PANEL

3 WARNING
WARNING: ELECTRIC SHOCK HAZARD.
IF A GROUND FAULT IS INDICATED,
NORMALLY GROUNDED CONDUCTORS
MAY BE UNGROUNDED AND ENERGIZED.

NFPA 1 (11.12.2.1.1.5)

4 Servicing Contractor:
American Solar Installation Company
305.260.7000

NEC 690.31 APPLY TO CONDUIT & RACEWAY

1 PHOTOVOLTAIC POWER SOURCE

NEC 690.17(E) APPLY TO AC COMBINER SOLAR LOAD CENTER & MAIN ELECTRICAL PANEL

2 WARNING
ELECTRIC SHOCK HAZARD
DO NOT TOUCH TERMINALS.
TERMINALS ON BOTH THE LINE AND
LOAD SIDES MAY BE ENERGIZED IN
THE OPEN POSITION

NEC 690 APPLY TO ELECTRICAL PANELS, AT THE LOCATION OF THE SOLAR BREAKERS.

3 PHOTOVOLTAIC SOLAR BREAKER

APPLY TO ELECTRICAL PANELS, AT THE LOCATION OF THE SOLAR BREAKERS.

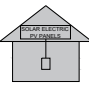
4 DO NOT RELOCATE THIS OVERCURRENT DEVICE

NEC 690.56(C)(1)(A) & NFPA 1 11.12.2.1.1.1.1 AC DISCONNECT, DC DISCONNECT, POINT OF INTERCONNECTION

5 EMERGENCY RESPONDER:
THIS SOLAR PV SYSTEM IS
EQUIPPED WITH RAPID SHUTDOWN

TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUTDOWN ENTIRE PV SYSTEM.

6



DO NOT ENTER
DANGER

1. Labels must comply with NEC 110.21: Adequate marking, permanently affixed and sufficient durability.

2. Labels and markings shall be applied to the appropriate components and in the appropriate way in accordance with the NEC.

3. CSM 1915-145 and ANSI Z39.1 Specifications are recommended but not required.

3.1. Labels shall have rounded corners.

3.2. Labels shall be visible at a minimum of 6 ft.

3.3. "Warning" labels background shall be in orange.

3.4. "Caution" label shall be in blue.

4. The rapid shutdown switch shall have a label located on or no more than 3 ft from the switch as per 11.12.2.1.1.6, that includes the following words:

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

For micro-inverter systems, the rapid shutdown switch is the Solar Output.

5. The Rapid shutdown label shall be located on or no more than 3 ft from the service disconnecting means to which the PV Systems are connected, and the label shall indicate the location of the rapid shutdown switch if it is not at the same location, as per NFPA 1 (11.12.2.1.4)

Sections of the PV System that are shut down when the rapid shutdown switch is operated.

Sections of the PV System that are not shut down when the rapid shutdown switch is operated.

This label shall be reflective, with all letters capitalized and having a minimum height of 3/8 in. (9.5 mm), in white on a red background.