

Electrical Calculations

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:

- **Hoymiles** Micro-inverter Systems fully meet the rapid shutdown requirement without the need of an additional external disconnect device. 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 UL 1703.
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.

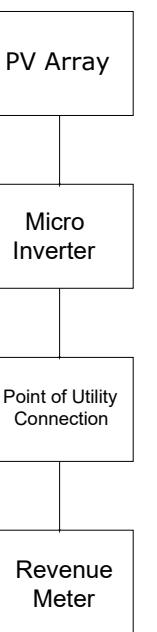
Wiring Schedule

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



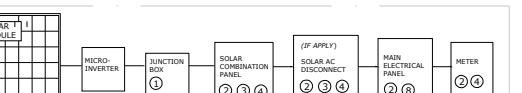
Wire sizing	
Design temp.	
Adder (310.15(B)(3)(C)) NOTE: Distance above roof to bottom of conduit > 7/8 in	
Total temp.	
Multiplier at total temp. (310.15(B)(2)(a))	
Branch Circuits	
Inverter nominal current (In)	
Maximum number of inverters in a single circuit	
Max. continuous current	
Wire type selected	
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. It 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	

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.

DO NOT TOUCH TERMINALS.

TERMINALS ARE HOT. TURN OFF THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION.

NEC 690.31 APPLY TO CONDUIT & RACEWAY

④ PHOTOVOLTAIC POWER SOURCE

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

⑤ WARNING

ELECTRIC SHOCK HAZARD.

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