

# PHOTOVOLTAIC ROOF MOUNT SYSTEM

28 MODULES-ROOF MOUNTED - 10.360 KW DC, 8.806 KW AC

1549 N W MOORE RD, LAKE CITY, FL 32055



SUNERGY SOLAR LLC

7625 LITTLE RD. SUITE 200A,  
NEW PORT RICHEY, FL 34654

## PROJECT DATA

PROJECT ADDRESS 1549 N W MOORE RD,  
LAKE CITY, FL 32055

OWNER: SHAWN HAWKINS

DESIGNER: ESR

SCOPE: 10.360 KW DC ROOF MOUNT  
SOLAR PV SYSTEM WITH  
28 VSUN SOLAR VSUN370-120M-BB  
370W PV MODULES WITH  
28 ENPHASE IQ8PLUS-72-2-US  
MICROINVERTERS

AUTHORITIES HAVING JURISDICTION:  
BUILDING: COLUMBIA COUNTY  
ZONING: COLUMBIA COUNTY  
UTILITY: FPL

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## SIGNATURE

## GENERAL NOTES

1. ALL COMPONENTS ARE UL LISTED AND NEC CERTIFIED, WHERE WARRANTED.
2. THE SOLAR PV SYSTEM WILL BE INSTALLED IN ACCORDANCE WITH ARTICLE 690 OF THE NEC 2020.
3. THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION.
4. ALL CONDUCTORS OF A CIRCUIT, INCLUDING THE EGC, MUST BE INSTALLED IN THE SAME RACEWAY, OR CABLE, OR OTHERWISE RUN WITH THE PV ARRAY CIRCUIT CONDUCTORS WHEN THEY LEAVE THE VICINITY OF THE PV ARRAY.
5. WHERE METALLIC CONDUIT CONTAINING DC CONDUCTORS IS USED INSIDE THE BUILDING, IT SHALL BE IDENTIFIED AS "CAUTION: SOLAR CIRCUIT" EVERY 10FT.
6. HEIGHT OF THE AC DISCONNECT SHALL NOT EXCEED 6'-7" PER NEC CODE 240.24.
7. A GROUNDING ELECTRODE SYSTEM IN ACCORDANCE WITH NEC 2020 690.47 AND 250.50 THROUGH 60 AND 250-166 SHALL BE PROVIDED. PER NEC GROUNDING ELECTRODE SYSTEM OF EXISTING BUILDING MAY BE USED AND BONDED TO THE SERVICE ENTRANCE. IF EXISTING SYSTEM IS INACCESSIBLE OR INADEQUATE A SUPPLEMENTAL GROUNDING ELECTRODE WILL BE USED AT THE INVERTER LOCATION CONSISTING OF A UL LISTED 8 FT. GROUND ROD WITH ACORN CLAMP. GROUNDING ELECTRODE CONDUCTORS SHALL BE NO LESS THAN #8 AWG AND NO LARGER THAN #6 AWG COPPER AND BONDED TO THE EXISTING GROUNDING ELECTRODE TO PROVIDE FOR A COMPLETE SYSTEM.
8. PHOTOVOLTAIC MODULES ARE TO BE CONSIDERED NON-COMBUSTIBLE.
9. PHOTOVOLTAIC INSTALLATION WILL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.
10. ALL WIRING MUST BE PROPERLY SUPPORTED BY DEVICES OR MECHANICAL MEANS DESIGNED AND LISTED FOR SUCH USE. WIRING MUST BE PERMANENTLY AND COMPLETELY HELD OFF THE ROOF SURFACE.
11. ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH THE LOCAL BUILDING CODE. IF EXPOSED TO SUNLIGHT, IT SHALL BE UV RESISTANT. ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS REQUIRED BY THE NEC AND AHJ.
12. INVERTER(S) USED IN UNGROUNDED SYSTEM SHALL BE UL 1741 LISTED.
13. THE INSTALLATION OF EQUIPMENT AND ALL ASSOCIATED WIRING AND INTERCONNECTION SHALL BE PERFORMED ONLY BY QUALIFIED PERSONS [NEC 690.4(C)]
14. ALL OUTDOOR EQUIPMENT SHALL BE NEMA 3R RATED (OR BETTER), INCLUDING ALL ROOF MOUNTED TRANSITION BOXES AND SWITCHES.
15. ALL EQUIPMENT SHALL BE PROPERLY GROUNDED AND BONDED IN ACCORDANCE WITH NEC ARTICLE 250.
16. SYSTEM GROUNDING SHALL BE IN ACCORDANCE WITH NEC 690.41.
17. PV SYSTEM CIRCUITS INSTALLED ON OR IN BUILDINGS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION IN ACCORDANCE WITH NEC 690.12
18. DISCONNECTING MEANS SHALL BE LOCATED IN A VISIBLE, READILY ACCESSIBLE LOCATION WITHIN THE PV SYSTEM EQUIPMENT OR A MAXIMUM OF 10 FEET AWAY FROM THE SYSTEM [NEC 690.13(A)]
19. ALL WIRING METHODS SHALL BE IN ACCORDANCE WITH NEC 690.31
20. WORK CLEARANCES AROUND ELECTRICAL EQUIPMENT WILL BE MAINTAINED PER NEC 110.26(A)(1), 110.26(A)(2) AND 110.26(A)(3).
21. ROOFTOP MOUNTED PHOTOVOLTAIC PANELS AND MODULES SHALL BE TESTED, LISTED & IDENTIFIED IN ACCORDANCE WITH UL1703
22. ELECTRICAL CONTRACTOR TO PROVIDE CONDUIT EXPANSION JOINTS AND ANCHOR CONDUIT RUNS AS REQUIRED PER NEC.
23. IN ACCORDANCE WITH 2021 IFC 1205.5, 2018 IFC 1204.4, AND 2015 IFC 605.11.2 A CLEAR, BRUSH-FREE AREA OF 10 FEET(3048 MM) SHALL BE REQUIRED FOR GROUND-MOUNTED PHOTOVOLTAIC ARRAYS.
24. PANEL LAYOUT ORIENTATION IS SUBJECT TO CHANGE ON DESIGNED MOUNTING PLANES.
25. ALL PERMANENTLY INSTALLED LUMINARIES, EXCLUDING THOSE IN KITCHEN APPLIANCES, SHALL HAVE AN EFFICIENCY OF AT LEAST 45 LUMENS-PER-WATT OR SHALL UTILIZE LAMPS WITH AN EFFICIENCY OF NOT LESS THAN 65 LUMENS-PER-WATT.
26. MOUNTING SYSTEMS SHALL BE LISTED AND LABELLED IN ACCORDANCE WITH UL 2703 TO BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND THEIR LISTINGS.

## VICINITY MAP



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## HOUSE PHOTO



## CODE REFERENCES

PROJECT TO COMPLY WITH THE FOLLOWING:

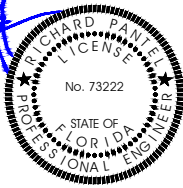
FLORIDA RESIDENTIAL CODE, 8TH EDITION 2023 (FRC)  
FLORIDA PLUMBING CODE, 8TH EDITION 2023 (FPC)  
FLORIDA BUILDING CODE, 8TH EDITION 2023 EDITION (FBC)  
FLORIDA MECHANICAL CODE, 8TH EDITION 2023 (FMC)  
2020 NATIONAL ELECTRICAL CODE  
FLORIDA FIRE PREVENTION CODE, 8TH EDITION 2023 (FFPC)

### REVISIONS

DESCRIPTION	DATE	REV
INITIAL DESIGN	03/01/2024	

Richard Pantel

Digitally signed by  
Richard Pantel DN: c=US, st=Virginia, l=Round Hill, o=TectonCorp, P.C., cn=Richard Pantel email=rpantel@princeton-engineering.com Date: 2024.05.10 04:56:18 +00:00



Reviewed and approved  
Richard Pantel, P.E.  
FL Lic. No. 73222  
5/10/2024

### PROJECT NAME & ADDRESS

HAWKINS  
RESIDENCE

1549 N W MOORE RD,  
LAKE CITY, FL 32055

### DRAWN BY

ESR

### SHEET NAME

COVER SHEET

### SHEET SIZE

ANSI B  
11" X 17"

### SHEET NUMBER

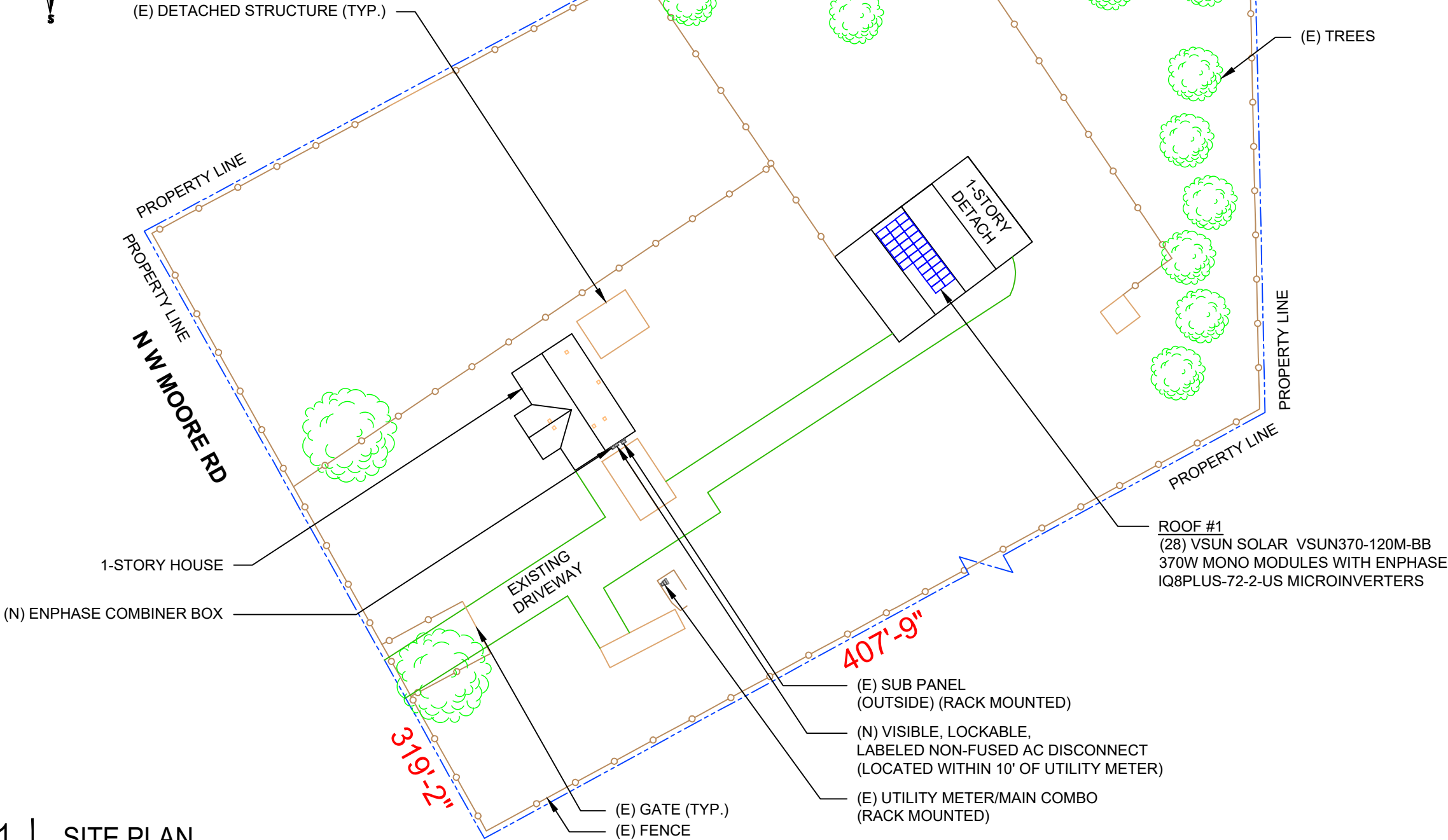
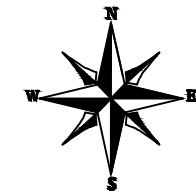
G001

PROJECT DESCRIPTION:

28 X VSUN SOLAR VSUN370-120M-BB 370W MONO MODULES  
ROOF MOUNTED SOLAR PHOTOVOLTAIC MODULES  
DC SYSTEM SIZE: 28 x 370 = 10.360KW DC  
AC SYSTEM SIZE: 0.85 x DC SYSTEM SIZE = 8.806KW AC  
EQUIPMENT SUMMARY  
28 VSUN SOLAR VSUN370-120M-BB 370W MONO MODULES  
28 ENPHASE IQ8PLUS-72-2-US MICROINVERTERS

ROOF ARRAY AREA #1:- 556.36 SQ FT.

NOTE: VISIBLE, LOCKABLE, LABELED AC DISCONNECT  
LOCATED WITHIN 10' OF UTILITY METER

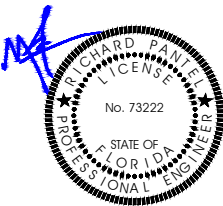


SUNERGY SOLAR LLC

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DRAWN BY  
ESR

SHEET NAME  
SITE PLAN

SHEET SIZE  
ANSI B  
11" X 17"

SHEET NUMBER  
E001

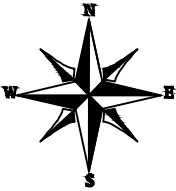
MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 28 MODULES  
MODULE TYPE = VSUN SOLAR VSUN370-120M-BB 370W MONO MODULES  
MODULE WEIGHT = 42.76 LBS / 19.4KG.  
MODULE DIMENSIONS = 69.37" x 41.25" = 19.87 SF

ROOF DESCRIPTION						
ROOF TYPE				METAL ROOF		
ROOF	# OF MODULES	ROOF PITCH	AZIMUTH	RAFTER SIZE	RAFTER SPACING	SEAM SPACING
#1	28	19°	233°	2"X6"	24"	12"

ARRAY AREA & ROOF AREA CALC'S (DETACH)		
TOTAL PV ARRAY AREA (SQ. FT.)	TOTAL ROOF AREA (Sq. Ft.)	ROOF AREA COVERED BY ARRAY (%)
556.36	3744.37	15

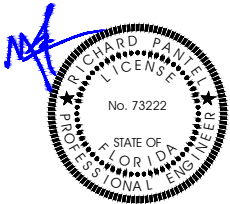
ACTUAL MAXIMUM CANTILEVER ALLOWED = L/3,  
WHERE L IS THE ATTACHMENT SPACING  
ATTACHMENT SPACING, L = 48"  
ACTUAL MAXIMUM CANTILEVER ALLOWED = 48/3  
ACTUAL MAXIMUM CANTILEVER ALLOWED = 16",i.e, 1'-4"



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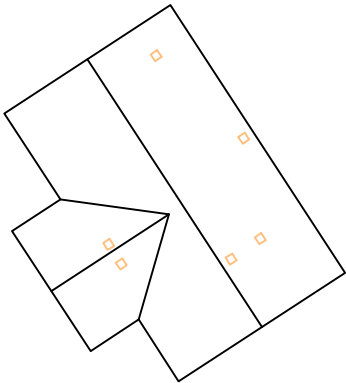
ROOF PLAN AND  
MODULES

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

S001

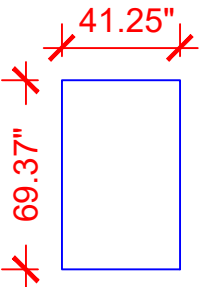


(N) IRONRIDGE XR100 RAIL  
(57) S-51 PROTEABRACKET ATTACHMENTS

CANTILEVER LENGTH 10"

ROOF #1  
PITCH - 19°  
AZIM - 233°

ROOF #1  
(28) VSUN SOLAR VSUN370-120M-BB  
370W MONO MODULES WITH ENPHASE  
IQ8PLUS-72-2-US MICROINVERTERS



VSUN SOLAR  
VSUN370-120M-BB  
370W MODULES

(E) UTILITY METER/MAIN COMBO  
(RACK MOUNTED)

LEGEND

- UM

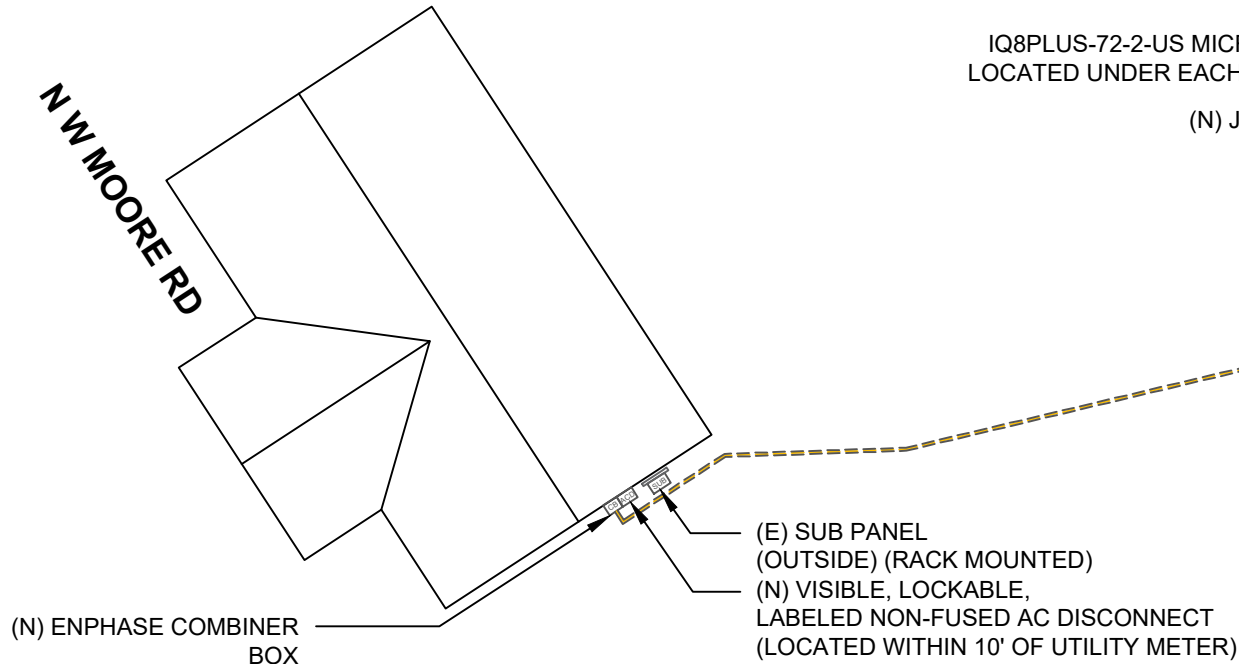
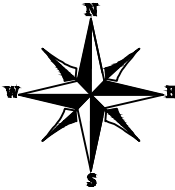
- UTILITY METER
- MSP

- MAIN SERVICE PANEL
- VENT, ATTIC FAN  
(ROOF OBSTRUCTION)
- ROOF ATTACHMENT
- RAFTER



CIRCUIT LEGENDS	
<span style="color: red;">---</span>	CIRCUIT #1
<span style="color: green;">---</span>	CIRCUIT #2
<span style="color: orange;">---</span>	CIRCUIT #3

NOTE : CONDUIT INSTALLED AT  
MINIMUM DISTANCE OF 7/8 INCHES  
ABOVE ROOF



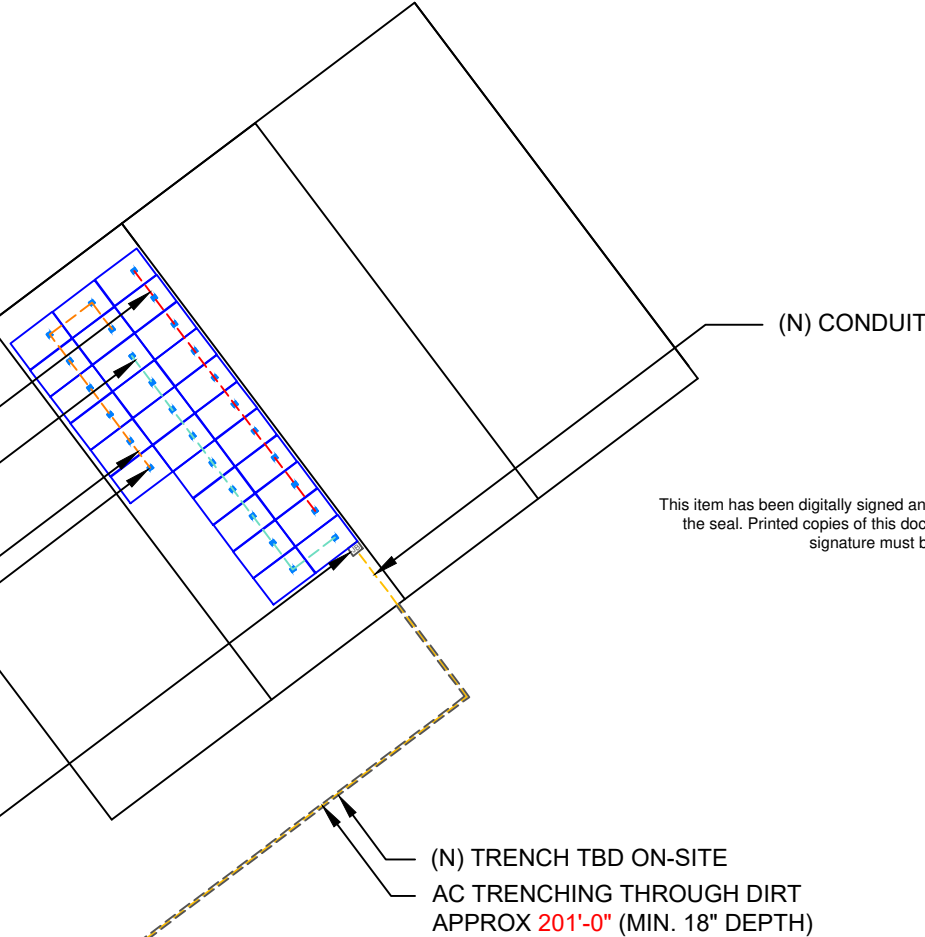
CIRCUIT #1  
(10 MODULES)

CIRCUIT #2  
(10 MODULES)

CIRCUIT #3  
(8 MODULES)

(28) ENPHASE  
IQ8PLUS-72-2-US MICROINVERTERS  
LOCATED UNDER EACH PANEL (240V)

(N) JUNCTION BOX



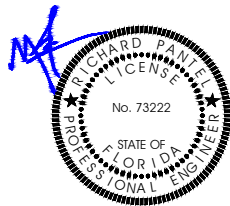
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BILL OF MATERIALS		
EQUIPMENT	QTY	DESCRIPTION
SOLAR PV MODULES	28	VSUN SOLAR VSUN370-120M-BB 370W MODULE
MICRO INVERTERS	28	ENPHASE IQ8PLUS-72-2-US MICROINVERTERS
JUNCTION BOX	1	JUNCTION BOX
RAIL	14	IRONRIDGE XR100 RAIL
SPLICES	10	SPLICES
MID MODULE CLAMPS	50	MID MODULE CLAMPS
END CLAMPS	12	END CLAMPS / STOPPER SLEEVE
ATTACHMENTS	57	S-5! PROTEABRACKET ATTACHMENTS

LEGEND

<span style="border: 1px solid black; padding: 2px;">CB</span>	- COMBINER BOX	<span style="border: 1px solid black; padding: 2px;">JB</span>	- JUNCTION BOX
<span style="border: 1px solid black; padding: 2px;">ACD</span>	- AC DISCONNECT	<span style="border: 1px solid black; padding: 2px;">○</span>	- VENT, ATTIC FAN (ROOF OBSTRUCTION)
<span style="border: 1px solid black; padding: 2px;">UM</span>	- UTILITY METER	<span style="color: red;">●</span>	- ROOF ATTACHMENT
<span style="border: 1px solid black; padding: 2px;">MSP</span>	- MAIN SERVICE PANEL	<span style="color: gray;">---</span>	- RAFTER
<span style="border: 1px solid black; padding: 2px;">SUB</span>	- SUB PANEL	<span style="color: orange;">---</span>	- CONDUIT

(E) UTILITY METER/MAIN COMBO (RACK MOUNTED)

1 ELECTRICAL PLAN

E002

SCALE: 1"=20'-0"

DRAWN BY

ESR

SHEET NAME

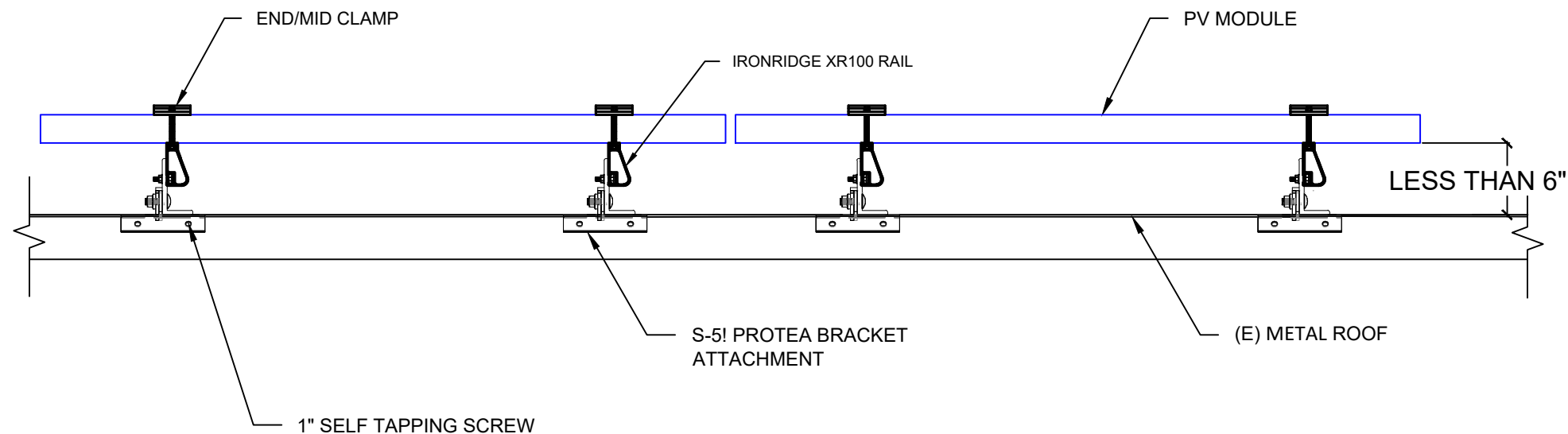
ELECTRICAL PLAN

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

E002

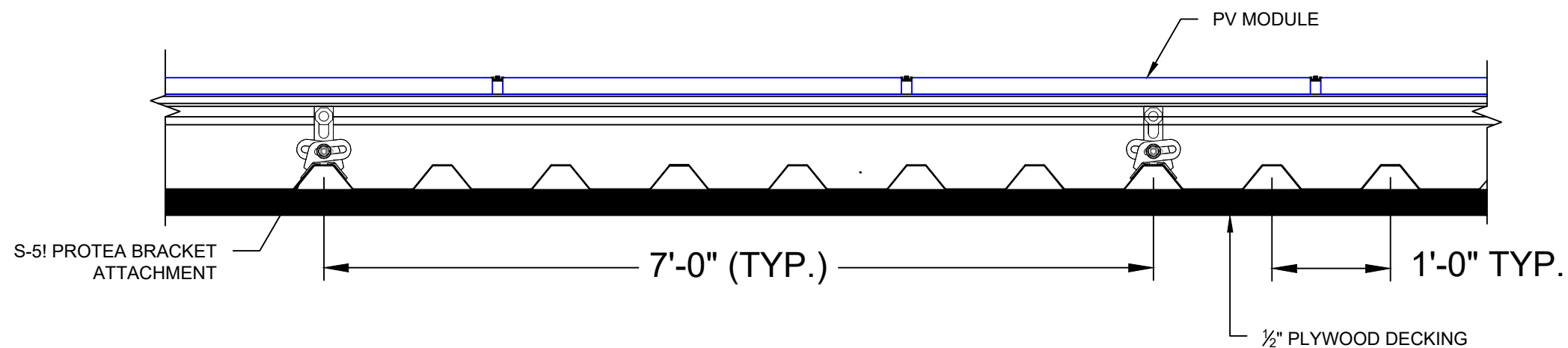


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## 1 ATTACHMENT DETAIL (SIDE VIEW)

S002

SCALE: N.T.S.



## 2 ATTACHMENT DETAIL (FRONT VIEW)

S002

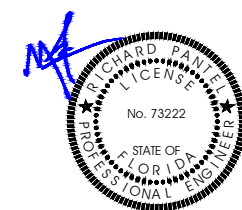
SCALE: N.T.S.



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REVISIONS		
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5/10/2024

### PROJECT NAME & ADDRESS

HAWKINS  
RESIDENCE  
1549 N W MOORE RD,  
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### DRAWN BY

ESR

### SHEET NAME

STRUCTURAL DETAIL

### SHEET SIZE

ANSI B  
11" X 17"

### SHEET NUMBER

S002

(2) BRANCH CIRCUITS OF 10 MODULES AND  
(1) BRANCH CIRCUIT OF 08 MODULES ARE CONNECTED IN PARALLEL

OCPD CONDUCTOR SIZE	
BREAKER/FUSE SIZE	WIRE GAUGE SIZE (75°C COPPER)
20A	10 AWG
25A	10 AWG
30A	10 AWG
35A	8 AWG
40A	8 AWG
45A	8 AWG
50A	8 AWG
60A	6 AWG
70A	4 AWG
80A	4 AWG
90A	3 AWG
100A	3 AWG
110A	2 AWG
125A	1 AWG
150A	1/0 AWG
175A	2/0 AWG
200A	3/0 AWG

1. INTERCONNECTION SIZING, LIMITATIONS AND COMPLIANCE DETERMINED IN ACCORDANCE WITH [NEC 705.12], AND [NEC 690.59].
2. GROUND FAULT PROTECTION IN ACCORDANCE WITH [NEC 215.9], [NEC 230.95].
3. ALL EQUIPMENT TO BE RATED FOR BACKFEEDING.
4. PV BREAKER TO BE POSITIONED AT THE OPPOSITE END OF THE BUSBAR RELATIVE TO THE MAIN BREAKER.

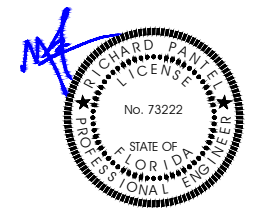
1. DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING LIVE ARE CONNECTED TO THE TERMINALS MARKED "LINE SIDE" (TYPICALLY THE UPPER TERMINALS)
2. AC DISCONNECT MUST BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH
3. DISCONNECT MEANS AND THEIR LOCATION SHALL BE IN ACCORDANCE WITH [NEC 225.31] AND [NEC 225.32].

1. BOND EVERY OTHER RAIL WITH #6 BARE COPPER

1. **GROUNDING ELECTRODES AND GROUNDING ELECTRODE CONDUCTORS.** ADDITIONAL GROUNDING ELECTRODES SHALL BE PERMITTED TO BE INSTALLED IN ACCORDANCE WITH 250.52 AND 250.54. GROUNDING ELECTRODES SHALL BE PERMITTED TO BE CONNECTED DIRECTLY TO THE PV MODULE FRAME(S) OR SUPPORT STRUCTURE PER [NEC 690.47(B)]
2. PV INVERTER IS UNGROUNDED, TRANSFORMER-LESS TYPE.
3. DC GEC AND AC EGC TO REMAIN UNSPLICED, OR SPLICED TO EXISTING ELECTRODE
4. ANY EXISTING WIRING INVOLVED WITH PV SYSTEM CONNECTION THAT IS FOUND TO BE INADEQUATE PER CODE SHALL BE CORRECTED PRIOR TO FINAL INSPECTION.
5. JUNCTION BOX QUANTITIES, AND PLACEMENT SUBJECT TO CHANGE IN THE FIELD - JUNCTION BOX DEPICTED ON ELECTRICAL DIAGRAM REPRESENT WIRE TYPE TRANSITIONS.
6. AC DISCONNECT NOTED IN EQUIPMENT SCHEDULE OPTIONAL IF OTHER AC DISCONNECTING MEANS IS LOCATED WITHIN 10' OF SERVICE DISCONNECT.
7. RACEWAYS AND CABLES EXPOSED TO SUNLIGHT ON ROOFTOPS SHOULD BE INSTALLED MORE THAN 7/8" ABOVE THE ROOF USING CONDUIT SUPPORTS.
8. ALL NEW SERVICE INSTALLATIONS AND REPLACEMENTS REQUIRE A SURGE-PROTECTIVE DEVICE (SPD) IN ACCORDANCE WITH [NEC 230.67]. THE SPD SHALL BE TYPE 1 OR TYPE 2 AND IS REQUIRED TO BE INSTALLED ON THE SERVICE EQUIPMENT OR LOCATED IMMEDIATELY ADJACENT TO THE SERVICE EQUIPMENT.

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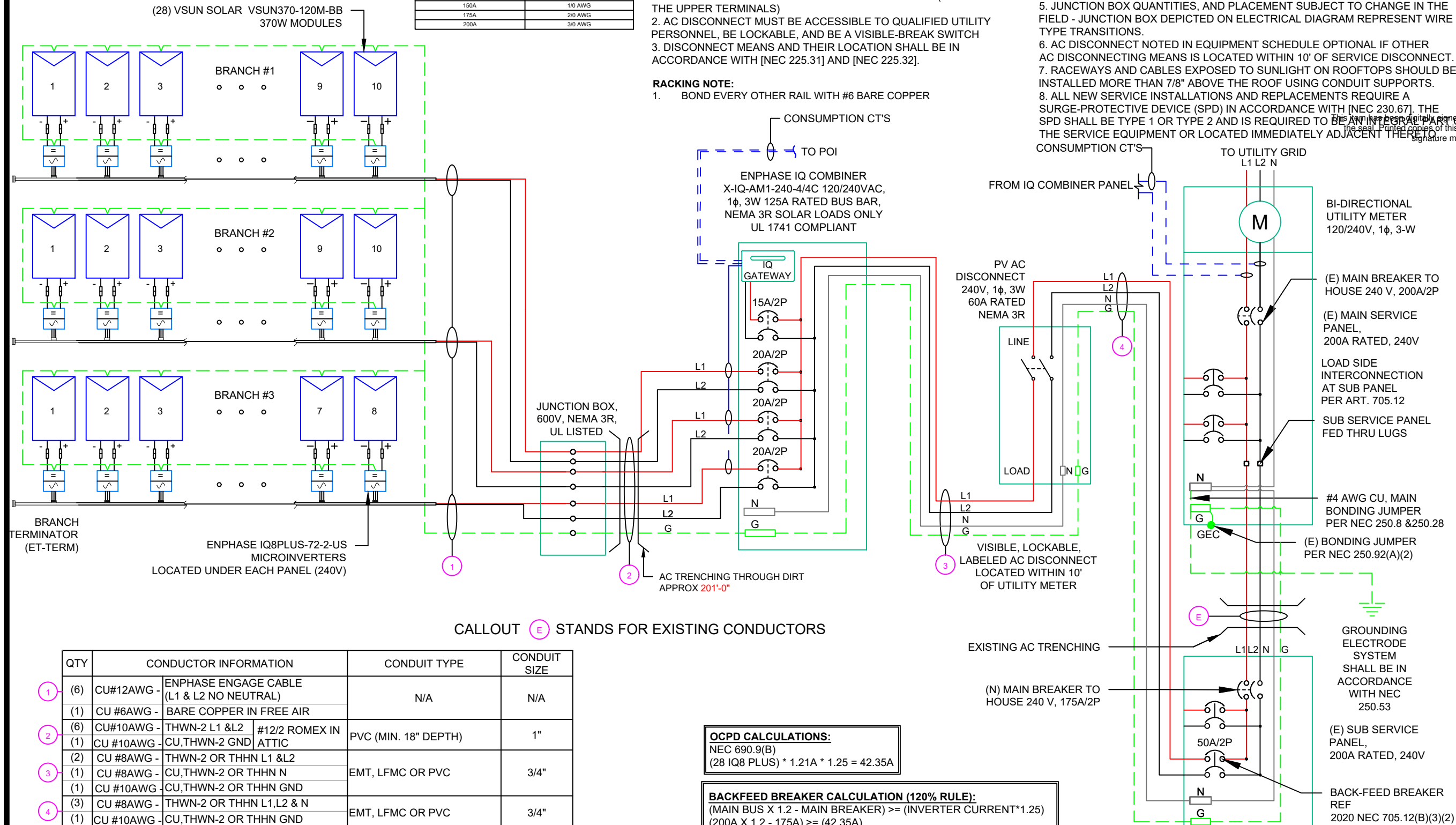
HAWKINS  
RESIDENCE  
1549 N W MOORE RD,  
LAKE CITY, FL 32055

ESR

## ELECTRICAL LINE DIAGRAM

ANSI B  
11" X 17"

E003



1

## ELECTRICAL LINE DIAGRAM

SCALE: NTS

E003

INVERTER SPECIFICATIONS	
MANUFACTURER / MODEL #	ENPHASE IQ8PLUS-72-2-US MICROINVERTERS
MIN/MAX DC VOLT RATING	30V MIN/ 58V MAX
MAX INPUT POWER	235W-440W
NOMINAL AC VOLTAGE RATING	240V/ 211-264V
MAX AC CURRENT	1.21A
MAX MODULES PER CIRCUIT	13 (SINGLE PHASE)
MAX OUTPUT POWER	290 VA

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL #	VSUN SOLAR VSUN370-120M-BB 370W MODULE
VMP	34.4V
IMP	10.76A
VOC	40.9V
ISC	11.52A
TEMP. COEFF. VOC	-0.27%/°C
MODULE DIMENSION	69.37"L x 41.25"W x 1.18"D (In Inch)

AMBIENT TEMPERATURE SPECS	
RECORD LOW TEMP	-5°
AMBIENT TEMP (HIGH TEMP 2%)	37°
MODULE TEMPERATURE COEFFICIENT OF Voc	-0.27%/°C

PERCENT OF VALUES	NUMBER OF CURRENT CARRYING CONDUCTORS IN EMT
.80	4-6
.70	7-9
.50	10-20

AC CALCULATIONS																						
CIRCUIT ORIGIN	CIRCUIT DESTINATION	VOLTAGE (V)	FULL LOAD AMPS "FLA" (A)	FLA*1.25 (A)	OCPD SIZE (A)	NEUTRAL SIZE	GROUND SIZE	CONDUCTOR SIZE	75°C	AMPACITY	AMBIENT TEMP. (°C)	TOTAL CC CONDUCTORS IN RACEWAY	90°C	DERATION FACTOR FOR AMBIENT TEMPERATURE NEC 310.15(B)(2)(a)	DERATION FACTOR FOR CONDUCTORS PER RACEWAY NEC 310.15(B)(3)(a)	90°C	AMPACITY	FEEDER LENGTH (FEET)	CONDUCTOR RESISTANCE (OHM/KFT)	VOLTAGE	CONDUIT	CONDUIT
									AMPACITY (A)	CHECK #1			AMPACITY (A)		DERATED (A)	CHECK #2	DROP (%)			TYPE	SIZE	
CIRCUIT 1	JUNCTION BOX	240	12.10	15.13	20	N/A	BARE COPPER #5 AWG	CU #12 AWG	25	PASS	37	2	30	0.91	1	27.3	PASS			0.46	N/A	#N/A
CIRCUIT 2	JUNCTION BOX	240	12.10	15.13	20	N/A	BARE COPPER #5 AWG	CU #12 AWG	25	PASS	37	2	30	0.91	1	27.3	PASS			0.46	N/A	#N/A
CIRCUIT 3	JUNCTION BOX	240	5.68	12.10	20	N/A	BARE COPPER #5 AWG	CU #12 AWG	25	PASS	37	2	30	0.91	1	27.3	PASS			0.30	N/A	#N/A
JUNCTION BOX	COMBINER BOX	240	12.10	15.13	20	N/A	CU #10 AWG	CU #10 AWG	35	PASS	37	6	40	0.91	0.8	29.12	PASS	201	1.24	2.513	1" PVC	17.7524
COMBINER BOX	AC DISCONNECT	240	33.88	42.35	50	CU #8 AWG	CU #10 AWG	CU #8 AWG	30	PASS	37	2	35	0.91	1	50.03	PASS	5	0.778	0.110	3/4" EMT	24.3591
AC DISCONNECT	POI	240	33.88	42.35	50	CU #8 AWG	CU #10 AWG	CU #8 AWG	30	PASS	37	2	35	0.91	1	50.03	PASS	5	0.778	0.110	3/4" EMT	24.3591
Circuit 1 Voltage Drop																				3.19		
Circuit 2 Voltage Drop																				3.19		
Circuit 3 Voltage Drop																				3.03		

ELECTRICAL NOTES

1. ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL, AND LABELED FOR ITS APPLICATION.
2. ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600 V AND 90 DEGREE C WET ENVIRONMENT.
3. WIRING, CONDUIT, AND RACEWAYS MOUNTED ON ROOFTOPS SHALL BE ROUTED DIRECTLY TO, AND LOCATED AS CLOSE AS POSSIBLE TO THE NEAREST RIDGE, HIP, OR VALLEY.
4. WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.
5. DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS. CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS AND ACCESSORIES TO FULFILL APPLICABLE CODES AND STANDARDS.
6. WHERE SIZES OF JUNCTION BOX, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
7. ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
8. MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURER'S INSTRUCTION.
9. MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER G.E.C. VIA WEEB LUG OR ILSCO GBL-4DBT LAY-IN LUG.
10. TEMPERATURE RATINGS OF ALL CONDUCTORS, TERMINATIONS, BREAKERS, OR OTHER DEVICES ASSOCIATED WITH THE SOLAR PV SYSTEM SHALL BE RATED FOR AT LEAST 75 DEGREE C.
11. CONDUIT INSTALLED AT MINIMUM DISTANCE OF 7/8 INCHES ABOVE ROOF .....NEC 310.15(B)(3)(C)

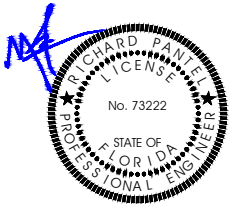


SUNERGY SOLAR LLC

7625 LITTLE RD. SUITE 200A,  
NEW PORT RICHEY, FL 34654

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	03/01/2024	

This item has been sealed by Richard Pantel, P.E. on the date adjacent to the seal. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.



Reviewed and approved  
Richard Pantel, P.E.  
FL Lic. No. 73222  
5/10/2024

PROJECT NAME & ADDRESS

HAWKINS  
RESIDENCE  
  
1549 N W MOORE RD,  
LAKE CITY, FL 32055

DRAWN BY ESR
SHEET NAME WIRING CALCULATIONS
SHEET SIZE ANSI B 11" X 17"
SHEET NUMBER E004



**CAUTION:**  
**AUTHORIZED SOLAR**  
**PERSONNEL ONLY!**

LABEL- 1:  
LABEL LOCATION:  
AC DISCONNECT

**WARNING**  
**ELECTRICAL SHOCK HAZARD**  
**TERMINALS ON THE LINE AND LOAD SIDES MAY**  
**BE ENERGIZED IN THE OPEN POSITION**

LABEL- 2:  
LABEL LOCATION:  
AC DISCONNECT  
COMBINER  
MAIN SERVICE PANEL  
SUBPANEL  
MAIN SERVICE DISCONNECT  
CODE REF: NEC 690.13(B)

**WARNING DUAL POWER SOURCE**  
**SECOND SOURCE IS PHOTOVOLTAIC SYSTEM**  
LABEL- 3:  
LABEL LOCATION:  
UTILITY METER  
MAIN SERVICE PANEL  
SUBPANEL  
CODE REF: NEC 705.12(C) & NEC 690.59

**WARNING**  
**TURN OFF PHOTOVOLTAIC AC**  
**DISCONNECT PRIOR TO**  
**WORKING INSIDE PANEL**

LABEL- 4:  
LABEL LOCATION:  
MAIN SERVICE PANEL  
SUBPANEL  
MAIN SERVICE DISCONNECT  
COMBINER  
CODE REF: NEC 110.27(C) & OSHA 1910.145 (f) (7)

**CAUTION**  
**PHOTOVOLTAIC SYSTEM CIRCUIT IS**  
**BACKFEED**

LABEL- 5:  
LABEL LOCATION:  
MAIN SERVICE PANEL (ONLY IF SOLAR IS BACK-FED)  
SUBPANEL (ONLY IF SOLAR IS BACK-FED)  
CODE REF: NEC 705.12(B)(3-4) & NEC 690.59

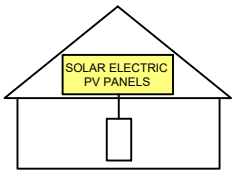
**WARNING**  
**POWER SOURCE OUTPUT**  
**CONNECTION. DO NOT**  
**RELOCATE THIS**  
**OVERCURRENT DEVICE**

LABEL- 6:  
LABEL LOCATION:  
MAIN SERVICE PANEL (ONLY IF SOLAR IS BACK-FED)  
SUBPANEL (ONLY IF SOLAR IS BACK-FED)  
CODE REF: NEC 705.12(B)(3)(2)

**WARNING**  
**THIS EQUIPMENT FED BY**  
**MULTIPLE SOURCES. TOTAL**  
**RATING OF ALL OVERCURRENT**  
**DEVICES EXCLUDING MAIN**  
**SUPPLY OVERCURRENT DEVICE**  
**SHALL NOT EXCEED AMPACITY**  
**OF BUSBAR.**

LABEL- 7:  
LABEL LOCATION:  
MAIN SERVICE PANEL (ONLY IF SOLAR IS BACK-FED)  
SUBPANEL (ONLY IF SOLAR IS BACK-FED)  
CODE REF: NEC 705.12(B)(3)(2)

**SOLAR PV SYSTEM EQUIPPED**  
**WITH RAPID SHUTDOWN**  
TURN RAPID SHUTDOWN  
SWITCH TO THE  
"OFF" POSITION TO  
SHUT DOWN PV SYSTEM  
AND REDUCE  
SHOCK HAZARD  
IN THE ARRAY



LABEL- 8:  
LABEL LOCATION:  
AC DISCONNECT  
CODE REF: FFPC 11.12.1.1.1.1 & NEC 690.56(C)

**RAPID SHUTDOWN SWITCH**  
**FOR SOLAR PV SYSTEM**

LABEL- 9:  
LABEL LOCATION:  
AC DISCONNECT  
CODE REF: NEC 690.56(C)(2)

**PHOTOVOLTAIC**  
**AC DISCONNECT**

LABEL- 10:  
LABEL LOCATION:  
AC DISCONNECT  
CODE REF: NEC 690.13(B)

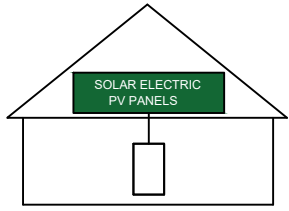
**PHOTOVOLTAIC**  
**AC DISCONNECT**  
**NOMINAL OPERATING AC VOLATGE** **240 V**  
**RATED AC OUTPUT CURRENT** **33.88 A**

LABEL- 11:  
LABEL LOCATION:  
MAIN SERVICE PANEL  
SUBPANEL  
AC DISCONNECT  
CODE REF: NEC 690.54

**MAIN PHOTOVOLTAIC**  
**SYSTEM DISCONNECT**

LABEL- 12:  
LABEL LOCATION:  
MAIN SERVICE DISCONNECT (ONLY IF MAIN SERVICE DISCONNECT IS PRESENT)  
CODE REF: NEC 690.13(B)

**EMERGENCY RESPONDER:**  
**THIS SOLAR PV SYSTEM EQUIPPED**  
**WITH RAPID SHUTDOWN**  
TURN RAPID SHUTDOWN  
SWITCH TO THE 'OFF'  
POSITION TO SHUTDOWN  
ENTIRE PV SYSTEM



**THE 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.**

LABEL- 13:  
LABEL LOCATION:  
AC DISCONNECT  
CODE REF: NFPA 1 (11.12.2.1.1.1.1)  
1. THE RAPID SHUTDOWN LABEL SHALL BE LOCATED ON OR NO MORE  
THAN 3 FT (1 M) FROM THE SERVICE DISCONNECTING MEANS  
2. (HEIGHT OF LABEL IS 3/8 IN. (9.5 MM), IN WHITE ON A RED BACKGROUND)

**SUNERGY SOLAR LLC**  
**EMERGENCY CONTACT**  
**(727) 375-9375**

LABEL- 14  
LABEL LOCATION:  
MAIN SERVICE DISCONNECT  
CODE REF: NFPA 1 (11.12.2.1.5)

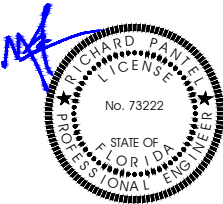


**SUNERGY SOLAR LLC**

7625 LITTLE RD. SUITE 200A,  
NEW PORT RICHEY, FL 34654

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	03/01/2024	

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Reviewed and approved  
Richard Pantel, P.E.  
FL Lic. No. 73222  
5/10/2024

PROJECT NAME & ADDRESS  
**HAWKINS**  
**RESIDENCE**  
**1549 N W MOORE RD,**  
**LAKE CITY, FL 32055**

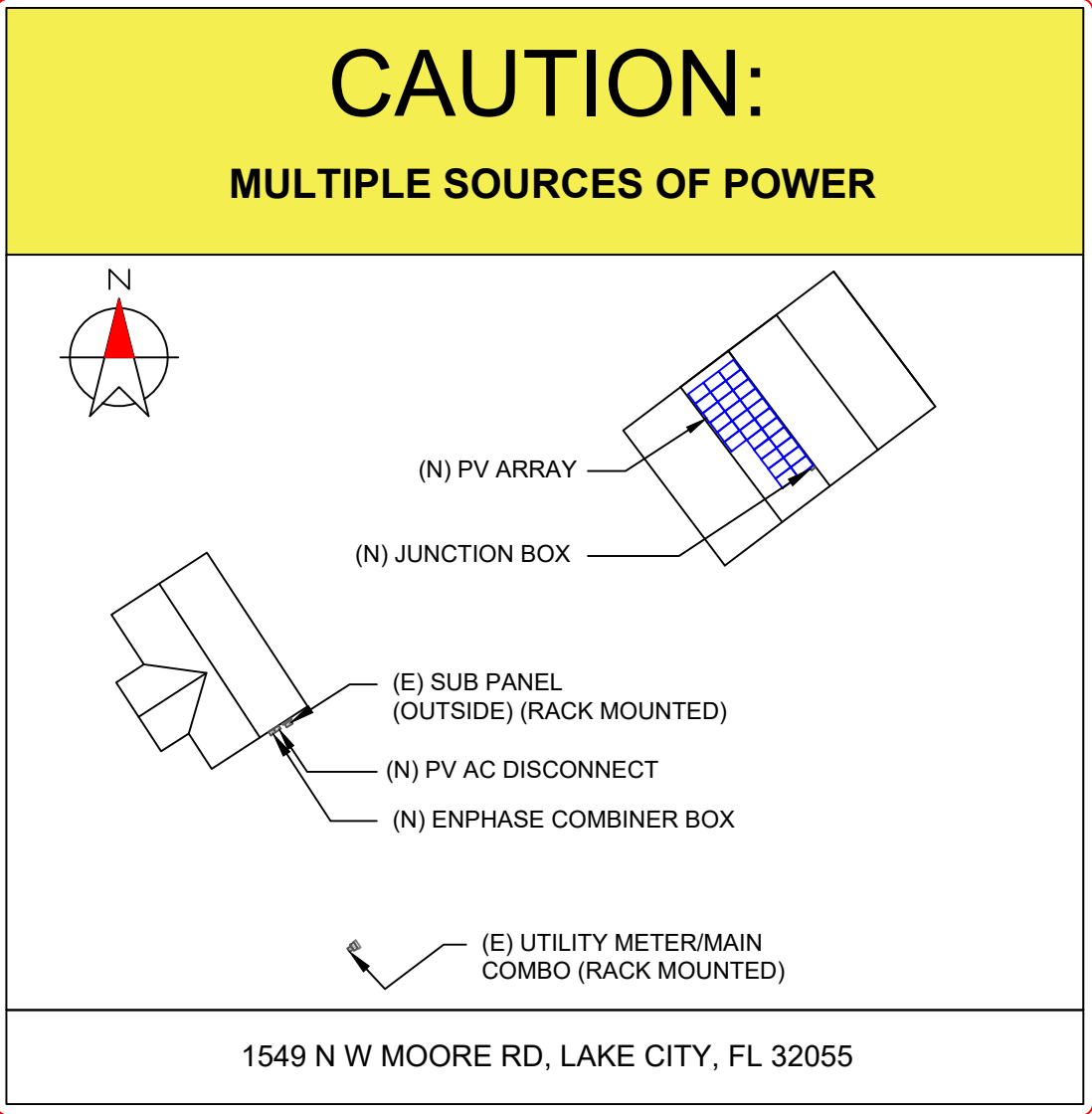
DRAWN BY  
**ESR**

SHEET NAME  
**LABELS**

SHEET SIZE  
**ANSI B**  
**11" X 17"**

SHEET NUMBER  
**E005**





DIRECTORY  
PERMANENT PLAQUE OR DIRECTORY PROVIDING THE LOCATION OF THE SERVICE DISCONNECTING MEANS AND THE PHOTOVOLTAIC SYSTEM.

(ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS OUTLINED WITHIN:  
NEC 690.56(B)&(C), [NEC 705.10])  
PER FFPC 11.12.2.1.4

LABELING NOTES:

1. LABELS CALLED OUT ACCORDING TO ALL COMMON CONFIGURATIONS. ELECTRICIAN TO DETERMINE EXACT REQUIREMENTS IN THE FIELD PER CURRENT NEC AND LOCAL CODES AND MAKE APPROPRIATE ADJUSTMENTS.
2. LABELING REQUIREMENTS BASED ON THE 2020 NATIONAL ELECTRIC CODE, OSHA STANDARD 19010.145, ANSI Z535.
3. MATERIAL BASED ON THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
4. LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED [NEC 110.21]
5. LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8", WHITE ON RED BACKGROUND; REFLECTIVE, AND PERMANENTLY AFFIXED FFPC 11.12.2.1.1.2

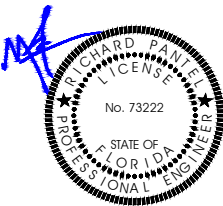


SUNERGY SOLAR LLC

7625 LITTLE RD. SUITE 200A,  
NEW PORT RICHEY, FL 34654

REVISIONS		
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Reviewed and approved  
Richard Pantel, P.E.  
FL Lic. No. 73222  
5/10/2024

PROJECT NAME & ADDRESS	
HAWKINS RESIDENCE	1549 N W MOORE RD, LAKE CITY, FL 32055

DRAWN BY
ESR

SHEET NAME
PLACARD

SHEET SIZE
ANSI B 11" X 17"

SHEET NUMBER
E006

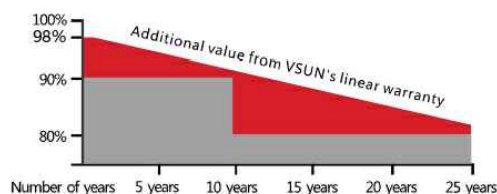
# VSUN370-120M-BB

**370W**  
Highest power output

**20.04%**  
Module efficiency

**12years**  
Material & Workmanship warranty

**25years**  
Linear power output warranty



■ VSUN

■ Standard Warranty

**Munich RE**

**PERC** PERC Cell Technology

**Higher output power**

**Lower risk of micro-crack**

**Positive tolerance offer**

**Lower risk of hot spot**

**Better shading tolerance**

**Certified for salt/ammonia corrosion resistance**

**Load certificates: wind to 2400Pa and snow to 5400Pa**

**Beautiful appearance with black frame and black backsheet**

VSUN, a BNEF Tier-1 PV module manufacturer invested by Fuji Solar, has been committed to providing greener, cleaner and more intelligent renewable energy solutions. VSUN is dedicated to bringing reliable, customized and high-efficient products into various markets and customers worldwide

## Electrical Characteristics at Standard Test Conditions(STC)

Module Type	VSUN370-120M-BB	VSUN365-120M-BB	VSUN360-120M-BB	VSUN355-120M-BB	VSUN350-120M-BB
Maximum Power - Pmax (W)	370	365	360	355	350
Open Circuit Voltage - Voc (V)	40.9	40.7	40.5	40.3	40.1
Short Circuit Current - Isc (A)	11.52	11.43	11.35	11.26	11.19
Maximum Power Voltage - Vmpp (V)	34.4	34.2	34	33.8	33.6
Maximum Power Current - Imp (A)	10.76	10.68	10.59	10.51	10.42
Module Efficiency	20.04%	19.77%	19.50%	19.22%	18.95%

Standard Test Conditions (STC): irradiance 1,000 W/m<sup>2</sup>; AM 1.5; Cell temperature 25°C. Pmax Sorting : 0~5W. Measuring Tolerance: ±3%.

Remark: Electrical data do not refer to a single module and they are not part of the offer. They only serve for comparison among different module types.

## Electrical Characteristics at Normal Operating Cell Temperature(NOCT)

Module Type	VSUN370-120M-BB	VSUN365-120M-BB	VSUN360-120M-BB	VSUN355-120M-BB	VSUN350-120M-BB
Maximum Power - Pmax (W)	275.4	271.7	268	264.4	260.6
Open Circuit Voltage - Voc (V)	38.1	37.9	37.7	37.5	37.3
Short Circuit Current - Isc (A)	9.3	9.23	9.17	9.09	9.02
Maximum Power Voltage - Vmpp (V)	31.6	31.4	31.2	31	30.8
Maximum Power Current - Imp (A)	8.73	8.66	8.59	8.53	8.46

Normal Operating Cell Temperature( NOCT) : irradiance 800W/m<sup>2</sup>; wind speed 1 m/s; ambient temperature 20°C. Measuring Tolerance: ±3%.

## Temperature Characteristics

NOCT	45°C (±2°C)
Voltage Temperature Coefficient	-0.27%/°C
Current Temperature Coefficient	+0.048%/°C
Power Temperature Coefficient	-0.35%/°C

## Maximum Ratings

Maximum System Voltage [V]	1000
Series Fuse Rating [A]	20

## Material Characteristics

Dimensions	1762×1048×30mm (L×W×H)
Weight	19.4kg
Frame	Black anodized aluminum profile
Front Glass	White toughened safety glass, 3.2 mm
Cell Encapsulation	EVA (Ethylene-Vinyl-Acetate)
Back Sheet	Composite film
Cells	12×10 pieces monocrystalline solar cells series strings
Junction Box	IP68, 3 diodes
Cable&Connector	Potrait: 500 mm (cable length can be customized) , 1×4 mm <sup>2</sup> , compatible with MC4

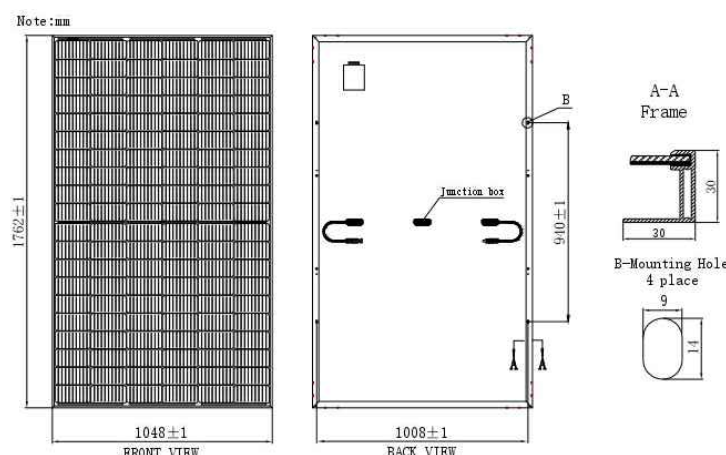
## Packaging

Dimensions(L×W×H)	1800×1125×1181mm
Container 20'	216
Container 40'	468
Container 40'HC	988

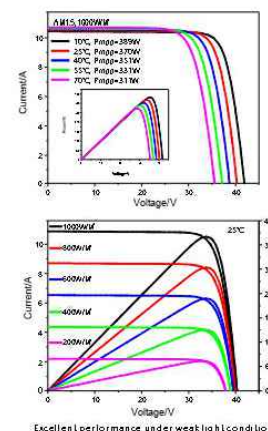
## System Design

Temperature Range	-40 °C to + 85 °C
Withstanding Hail	Maximum diameter of 25 mm with impact speed of 23 m/s
Maximum Surface Load	5,400 Pa
Application class	class A

## Dimensions



## IV-Curves



## SUNERGY SOLAR LLC

7625 LITTLE RD, SUITE 200A,  
NEW PORT RICHEY, FL 34654

## REVISIONS

DESCRIPTION	DATE	REV
INITIAL DESIGN	03/01/2024	

## PROJECT NAME & ADDRESS

**HAWKINS  
RESIDENCE**  
1549 N W MOORE RD,  
LAKE CITY, FL 32055

## DRAWN BY

**ESR**

SHEET NAME  
**MODULE  
DATASHEET**

SHEET SIZE  
**ANSI B  
11" X 17"**

SHEET NUMBER  
**PD001**





DATA SHEET



## IQ8 and IQ8+ Microinverters

Our newest IQ8 Microinverters are the industry's first microgrid-forming, software-defined microinverters with split-phase power conversion capability to convert DC power to AC power efficiently. The brain of the semiconductor-based microinverter is our proprietary application-specific integrated circuit (ASIC) which enables the microinverter to operate in grid-tied or off-grid modes. This chip is built in advanced 55nm technology with high speed digital logic and has super-fast response times to changing loads and grid events, alleviating constraints on battery sizing for home energy systems.



Part of the Enphase Energy System, IQ8 Series Microinverters integrate with the Enphase IQ Battery, Enphase IQ Gateway, and the Enphase App monitoring and analysis software.



IQ8 Series Microinverters redefine reliability standards with more than one million cumulative hours of power-on testing, enabling an industry-leading limited warranty of up to 25 years.



Connect PV modules quickly and easily to IQ8 Series Microinverters using the included Q-DCC-2 adapter cable with plug-n-play MC4 connectors.



IQ8 Series Microinverters are UL Listed as PV Rapid Shut Down Equipment and conform with various regulations, when installed according to manufacturer's instructions.

### Easy to install

- Lightweight and compact with plug-n-play connectors
- Power Line Communication (PLC) between components
- Faster installation with simple two-wire cabling

### High productivity and reliability

- Produce power even when the grid is down\*
- More than one million cumulative hours of testing
- Class II double-insulated enclosure
- Optimized for the latest high-powered PV modules

### Microgrid-forming

- Complies with the latest advanced grid support\*\*
- Remote automatic updates for the latest grid requirements
- Configurable to support a wide range of grid profiles
- Meets CA Rule 21 (UL 1741-SA) requirements

\* Only when installed with IQ System Controller 2, meets UL 1741.

\*\* IQ8 and IQ8Plus supports split phase, 240V installations only.

## IQ8 and IQ8+ Microinverters

INPUT DATA (DC)		IQ8-60-2-US	IQ8PLUS-72-2-US
Commonly used module pairings <sup>1</sup>	W	235 – 350	235 – 440
Module compatibility		60-cell/120 half-cell	60-cell/120 half-cell, 66-cell/132 half-cell and 72-cell/144 half-cell
MPPT voltage range	V	27 – 37	29 – 45
Operating range	V	25 – 48	25 – 58
Min/max start voltage	V	30 / 48	30 / 58
Max input DC voltage	V	50	60
Max DC current <sup>2</sup> [module Isc]	A	15	
Overvoltage class DC port		II	
DC port backfeed current	mA	0	
PV array configuration		1x1 Ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit	
OUTPUT DATA (AC)		IQ8-60-2-US	IQ8PLUS-72-2-US
Peak output power	VA	245	300
Max continuous output power	VA	240	290
Nominal (L-L) voltage/range <sup>3</sup>	V	240 / 211 – 264	
Max continuous output current	A	1.0	1.21
Nominal frequency	Hz	60	
Extended frequency range	Hz	50 – 68	
AC short circuit fault current over 3 cycles	Arms	2	
Max units per 20 A (L-L) branch circuit <sup>4</sup>		16	13
Total harmonic distortion		<5%	
Overvoltage class AC port		III	
AC port backfeed current	mA	30	
Power factor setting		1.0	
Grid-tied power factor (adjustable)		0.85 leading – 0.85 lagging	
Peak efficiency	%	97.5	97.6
CEC weighted efficiency	%	97	97
Night-time power consumption	mW	60	
MECHANICAL DATA			
Ambient temperature range		-40°C to +60°C (-40°F to +140°F)	
Relative humidity range		4% to 100% (condensing)	
DC Connector type		MC4	
Dimensions (HxWxD)		212 mm (8.3") x 175 mm (6.9") x 30.2 mm (1.2")	
Weight		1.08 kg (2.38 lbs)	
Cooling		Natural convection – no fans	
Approved for wet locations		Yes	
Pollution degree		PD3	
Enclosure		Class II double-insulated, corrosion resistant polymeric enclosure	
Environ. category / UV exposure rating		NEMA Type 6 / outdoor	
COMPLIANCE			
Certifications		CA Rule 21 (UL 1741-SA), UL 62109-1, UL1741/IEEE1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 1071-01  This product is UL Listed as PV Rapid Shut Down Equipment and conforms with NEC 2014, NEC 2017, and NEC 2020 section 690.12 and C22.1-2018 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according to manufacturer's instructions.	

(1) No enforced DC/AC ratio. See the compatibility calculator at <https://link.enphase.com/module-compatibility>

(2) Maximum continuous input DC current is 10.6A (3) Nominal voltage range can be extended beyond nominal if required by the utility. (4) Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

IQ8SP-DS-0002-01-EN-US-2022-03-17



### SUNERGY SOLAR LLC

7625 LITTLE RD, SUITE 200A,  
NEW PORT RICHEY, FL 34654

### REVISIONS

DESCRIPTION	DATE	REV
INITIAL DESIGN	03/01/2024	

### PROJECT NAME & ADDRESS

HAWKINS  
RESIDENCE

1549 N W MOORE RD,  
LAKE CITY, FL 32055

### DRAWN BY

ESR

### SHEET NAME

MICROINVERTER  
DATASHEET

### SHEET SIZE

ANSI B  
11" X 17"

### SHEET NUMBER

PD002



Enphase  
IQ Combiner 4/4C  
X-IQ-AM1-240-4  
X-IQ-AM1-240-4C



  
To learn more about Enphase offerings, visit [enphase.com](https://enphase.com)

The **Enphase IQ Combiner 4/4C** with Enphase IQ Gateway and integrated LTE-M1 cell modem (included only with IQ Combiner 4C) consolidates interconnection equipment into a single enclosure and streamlines IQ microinverters and storage installations by providing a consistent, pre-wired solution for residential applications. It offers up to four 2-pole input circuits and Eaton BR series busbar assembly.

Smart

- Includes IQ Gateway for communication and control
- Includes Enphase Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05), included only with IQ Combiner 4C
- Includes solar shield to match Enphase IQ Battery aesthetics and deflect heat
- Flexible networking supports Wi-Fi, Ethernet, or cellular
- Optional AC receptacle available for PLC bridge
- Provides production metering and consumption monitoring

Simple

- Centered mounting brackets support single stud mounting
- Supports bottom, back and side conduit entry
- Up to four 2-pole branch circuits for 240 VAC plug-in breakers (not included)
- 80A total PV or storage branch circuits

Reliable

- Durable NRTL-certified NEMA type 3R enclosure
- Five-year limited warranty
- Two years labor reimbursement program coverage included for both the IQ Combiner SKU's
- UL listed



Enphase IQ Combiner 4/4C

MODEL NUMBER	
IQ Combiner 4 (X-IQ-AM1-240-4)	IQ Combiner 4 with Enphase IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Includes a silver solar shield to match the IQ Battery system and IQ System Controller 2 and to deflect heat.
IQ Combiner 4C (X-IQ-AM1-240-4C)	IQ Combiner 4C with Enphase IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Includes Enphase Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05), a plug-and-play industrial-grade cell modem for systems up to 60 microinverters. (Available in the US, Canada, Mexico, Puerto Rico, and the US Virgin Islands, where there is adequate cellular service in the installation area.) Includes a silver solar shield to match the IQ Battery and IQ System Controller and to deflect heat.
ACCESSORIES AND REPLACEMENT PARTS (not included, order separately)	
Ensemble Communications Kit COMMS-CELLMODEM-M1-06 CELLMODEM-M1-06-SP-05 CELLMODEM-M1-06-AT-05	- Includes COMMS-KIT-01 and CELLMODEM-M1-06-SP-05 with 5-year Sprint data plan for Ensemble sites - 4G based LTE-M1 cellular modem with 5-year Sprint data plan - 4G based LTE-M1 cellular modem with 5-year AT&T data plan
Circuit Breakers BRK-10A-2-240V BRK-15A-2-240V BRK-20A-2P-240V BRK-15A-2P-240V-B BRK-20A-2P-240V-B	Supports Eaton BR210, BR215, BR220, BR230, BR240, BR250, and BR260 circuit breakers. Circuit breaker, 2 pole, 10A, Eaton BR210 Circuit breaker, 2 pole, 15A, Eaton BR215 Circuit breaker, 2 pole, 20A, Eaton BR220 Circuit breaker, 2 pole, 15A, Eaton BR215B with hold down kit support Circuit breaker, 2 pole, 20A, Eaton BR220B with hold down kit support
EPLC-01	Power line carrier (communication bridge pair), quantity - one pair
XA-SOLARSHIELD-ES	Replacement solar shield for IQ Combiner 4/4C
XA-PLUG-120-3	Accessory receptacle for Power Line Carrier in IQ Combiner 4/4C (required for EPLC-01)
XA-ENV-PCBA-3	Replacement IQ Gateway printed circuit board (PCB) for Combiner 4/4C
X-IQ-NA-HD-125A	Hold down kit for Eaton circuit breaker with screws.
ELECTRICAL SPECIFICATIONS	
Rating	Continuous duty
System voltage	120/240 VAC, 60 Hz
Eaton BR series busbar rating	125 A
Max. continuous current rating	65 A
Max. continuous current rating (input from PV/storage)	64 A
Max. fuse/circuit rating (output)	90 A
Branch circuits (solar and/or storage)	Up to four 2-pole Eaton BR series Distributed Generation (DG) breakers only (not included)
Max. total branch circuit breaker rating (input)	80A of distributed generation / 95A with IQ Gateway breaker included
Production metering CT	200 A solid core pre-installed and wired to IQ Gateway
Consumption monitoring CT (CT-200-SPLIT)	A pair of 200 A split core current transformers
MECHANICAL DATA	
Dimensions (WxHxD)	37.5 x 49.5 x 16.8 cm (14.75" x 19.5" x 6.63"). Height is 21.06" (53.5 cm) with mounting brackets.
Weight	7.5 kg (16.5 lbs)
Ambient temperature range	-40° C to +46° C (-40° to 115° F)
Cooling	Natural convection, plus heat shield
Enclosure environmental rating	Outdoor, NRTL-certified, NEMA type 3R, polycarbonate construction
Wire sizes	• 20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors • 60 A breaker branch input: 4 to 1/0 AWG copper conductors • Main lug combined output: 10 to 2/0 AWG copper conductors • Neutral and ground: 14 to 1/0 copper conductors Always follow local code requirements for conductor sizing.
Altitude	To 2000 meters (6,560 feet)
INTERNET CONNECTION OPTIONS	
Integrated Wi-Fi	802.11b/g/n
Cellular	CELLMODEM-M1-06-SP-05, CELLMODEM-M1-06-AT-05 (4G based LTE-M1 cellular modem). Note that an Enphase Mobile Connect cellular modem is required for all Ensemble installations.
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included)
COMPLIANCE	
Compliance, IQ Combiner	UL 1741, CAN/CSA C22.2 No. 107.1, 47 CFR, Part 15, Class B, ICES 003 Production metering: ANSI C12.20 accuracy class 0.5 (PV production) Consumption metering: accuracy class 2.5
Compliance, IQ Gateway	UL 60601-1/CANCSA 22.2 No. 61010-1

To learn more about Enphase offerings, visit [enphase.com](https://enphase.com)  
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SUNERGY SOLAR LLC

7625 LITTLE RD, SUITE 200A,  
NEW PORT RICHEY, FL 34654

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	03/01/2024	



PROJECT NAME & ADDRESS	
HAWKINS RESIDENCE	1549 N W MOORE RD, LAKE CITY, FL 32055

DRAWN BY ESR
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SHEET NAME COMBINER BOX DATASHEET
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SHEET SIZE ANSI B 11" X 17"
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SHEET NUMBER PD003
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The right way to attach solar PV to trapezoidal roof profiles!

# S-5!<sup>®</sup>

## The Right Way!<sup>™</sup>

NEW

NOW AVAILABLE  
IN ALUMINUM

### ProteaBracket<sup>™</sup>

A versatile bracket for  
mounting solar PV to  
trapezoidal roof profiles

ProteaBracket<sup>™</sup> is now made in aluminum. Still the most versatile trapezoidal metal roof attachment solution on the market, the S-5! ProteaBracket just got better!

The bracket features an adjustable attachment base and module attachment options to accommodate different roof profile dimensions and mounting options.

Our pre-applied EPDM gasket with peel and stick adhesive makes installation a snap, ensuring accurate and secure placement the first time.

With no messy sealants, faster installation, and a weather-proof fit, ProteaBracket offers you the most versatile solar attachment solution available.

ProteaBracket\* can be used for  
rail mounting or "direct-attach"  
with S-5! PVKIT<sup>™</sup>

### Features and Benefits

- 34% lighter - saves on shipping
- Stronger L-Foot<sup>™</sup>
- Load-tested for engineered application
- Corrosion-resistant materials
- Adjustable - Fits rib profiles up to 3"
- Peel-and-Stick prevents accidental shifting during installation
- Fully pre-assembled
- 25-year warranty\*

\*When ProteaBracket is used in conjunction with the S-5! PVKIT, an additional nut is required during installation.

\*See [www.S-5.com](http://www.S-5.com) for details.



888-825-3432 | [www.S-5.com](http://www.S-5.com)

# S-5!<sup>®</sup>

The Right Way!<sup>™</sup>

ProteaBracket<sup>™</sup> is the perfect solar attachment solution for most trapezoidal rib, exposed-fastened metal roof profiles!

ProteaBracket<sup>™</sup> is compatible with common metal roofing materials and comes with a pre-applied EPDM gasket on the base.

**Note:** All four pre-punched holes must be used to achieve tested strength. Fasteners are provided.

For design assistance, ask your distributor, or visit [www.S-5.com](http://www.S-5.com) for the independent lab test data that can be used for load-critical designs and applications. Also, please visit our website for more information including metallurgical compatibilities and specifications.

S-5!<sup>®</sup> holding strength is unmatched in the industry.

### Multiple Attachment Options:



Side  
Mount Rail



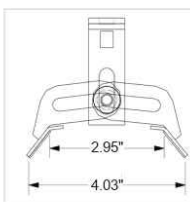
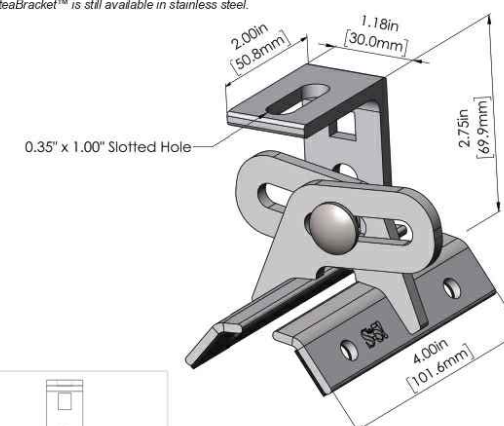
Bottom  
Mount Rail



w/ S-5!  
PVKIT<sup>™</sup>  
(rail-less)

### ProteaBracket<sup>™</sup>

ProteaBracket<sup>™</sup> is still available in stainless steel.



ProteaBracket fits profiles  
up to 3 inches

INSTALLATION:

**No surface preparation needed.** (1) Wipe away excess oil and debris. (2) Peel off adhesive release paper. (3) Align and mount bracket directly onto crown of panel. (4) Secure ProteaBracket through pre-punched holes, using piercing-point S-5! screws.



ProteaBracket<sup>™</sup> and the S-5! PVKIT<sup>™</sup> 2.0  
mounted on a trapezoidal roof profile

**S-5!<sup>®</sup> Warning! Please use this product responsibly!**

Products are protected by multiple U.S. and foreign patents. For published data regarding holding strength, bolt torque, patents, and trademarks, visit the S-5! website at [www.S-5.com](http://www.S-5.com).

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SUNERGY SOLAR LLC

7625 LITTLE RD, SUITE 200A,  
NEW PORT RICHEY, FL 34654

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	03/01/2024	

PROJECT NAME & ADDRESS

HAWKINS  
RESIDENCE

1549 N W MOORE RD,  
LAKE CITY, FL 32055

DRAWN BY

ESR

SHEET NAME  
ATTACHMENT  
DATASHEET

SHEET SIZE

ANSI B  
11" X 17"

SHEET NUMBER

PD004





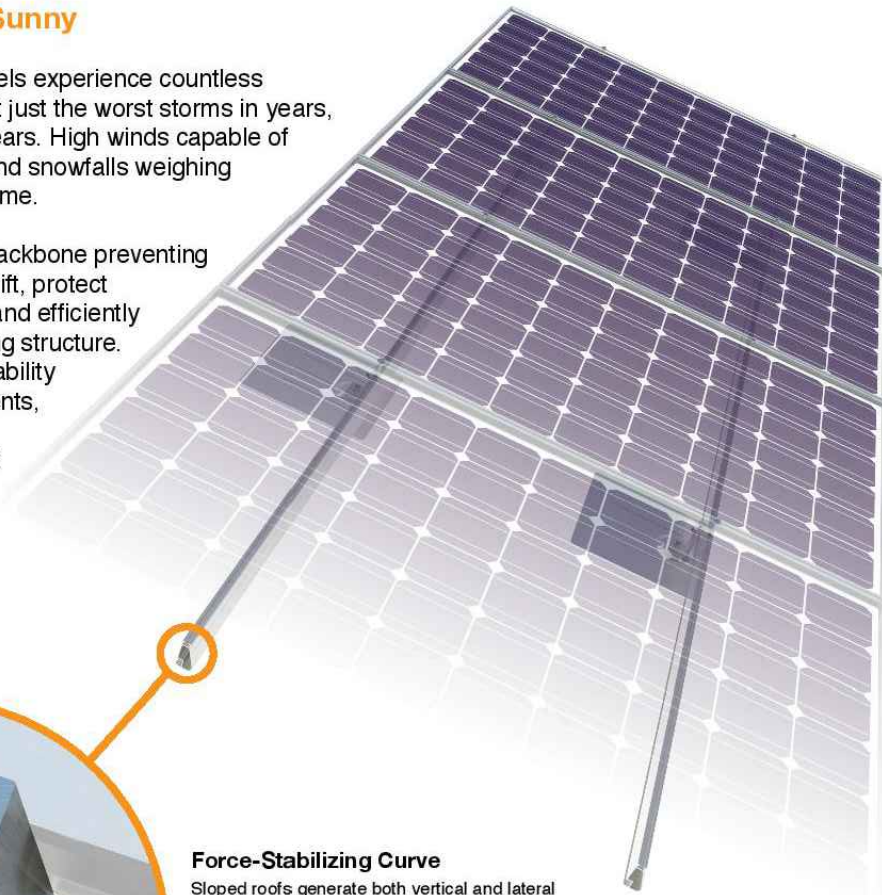
Tech Brief

## XR Rail Family

### Solar Is Not Always Sunny

Over their lifetime, solar panels experience countless extreme weather events. Not just the worst storms in years, but the worst storms in 40 years. High winds capable of ripping panels from a roof, and snowfalls weighing enough to buckle a panel frame.

XR Rails are the structural backbone preventing these results. They resist uplift, protect against buckling and safely and efficiently transfer loads into the building structure. Their superior spanning capability requires fewer roof attachments, reducing the number of roof penetrations and the amount of installation time.



#### Force-Stabilizing Curve

Sloped roofs generate both vertical and lateral forces on mounting rails which can cause them to bend and twist. The curved shape of XR Rails is specially designed to increase strength in both directions while resisting the twisting. This unique feature ensures greater security during extreme weather and a longer system lifetime.

#### Compatible with Flat & Pitched Roofs



XR Rails are compatible with FlashFoot and other pitched roof attachments.



IronRidge offers a range of tilt leg options for flat roof mounting applications.

#### Corrosion-Resistant Materials

All XR Rails are made of 6000-series aluminum alloy, then protected with an anodized finish. Anodizing prevents surface and structural corrosion, while also providing a more attractive appearance.



## XR Rail Family

The XR Rail Family offers the strength of a curved rail in three targeted sizes. Each size supports specific design loads, while minimizing material costs. Depending on your location, there is an XR Rail to match.



#### XR10

XR10 is a sleek, low-profile mounting rail, designed for regions with light or no snow. It achieves spans up to 6 feet, while remaining light and economical.

- 6' spanning capability
- Moderate load capability
- Clear & black anodized finish
- Internal splices available



#### XR100

XR100 is the ultimate residential mounting rail. It supports a range of wind and snow conditions, while also maximizing spans up to 10 feet.

- 10' spanning capability
- Heavy load capability
- Clear & black anodized finish
- Internal splices available



#### XR1000

XR1000 is a heavyweight among solar mounting rails. It's built to handle extreme climates and spans up to 12 feet for commercial applications.

- 12' spanning capability
- Extreme load capability
- Clear anodized finish
- Internal splices available

## Rail Selection

The table below was prepared in compliance with applicable engineering codes and standards.\* Values are based on the following criteria: ASCE 7-16, Gable Roof Flush Mount, Roof Zones 1 & 2e, Exposure B, Roof Slope of 8 to 20 degrees and Mean Building Height of 30 ft. Visit [IronRidge.com](http://IronRidge.com) for detailed certification letters.

Load		Rail Span					
Snow (PSF)	Wind (MPH)	4'	5' 4"	6'	8'	10'	12'
None	90	XR10		XR100		XR1000	
	120						
	140						
	160						
20	90						
	120						
	140						
	160						
30	90						
	160						
40	90						
	160						
80	160						
120	160						

\*Table is meant to be a simplified span chart for conveying general rail capabilities. Use approved certification letters for actual design guidance.



#### SUNERGY SOLAR LLC

7625 LITTLE RD, SUITE 200A,  
NEW PORT RICHEY, FL 34654

#### REVISIONS

DESCRIPTION	DATE	REV
INITIAL DESIGN	03/01/2024	

#### PROJECT NAME & ADDRESS

HAWKINS  
RESIDENCE  
1549 N W MOORE RD,  
LAKE CITY, FL 32055

#### DRAWN BY

ESR

#### SHEET NAME

RACKING  
DATASHEET

#### SHEET SIZE

ANSI B  
11" X 17"

#### SHEET NUMBER

PD005





UFO Family of Components

Tech Brief

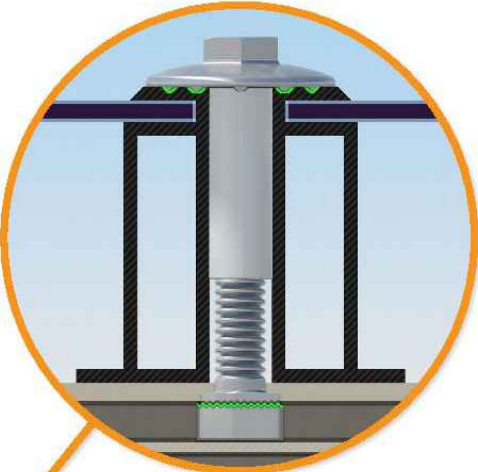
Simplified Grounding for Every Application

The UFO family of components eliminates the need for separate grounding hardware by bonding solar modules directly to IronRidge XR Rails. All system types that feature the UFO family—Flush Mount, Tilt Mount and Ground Mount—are fully listed to the UL 2703 standard.

UFO hardware forms secure electrical bonds with both the module and the rail, resulting in many parallel grounding paths throughout the system. This leads to safer and more reliable installations.



**Stopper Sleeve**  
The Stopper Sleeve snaps onto the UFO, converting it into a bonded end clamp.



**Universal Fastening Object (UFO)**  
The UFO securely bonds solar modules to XR Rails. It comes assembled and lubricated, and can fit a wide range of module heights.



**Bonded Splice**  
Each Bonded Splice uses self-drilling screws to form a secure connection. No bonding strap needed.

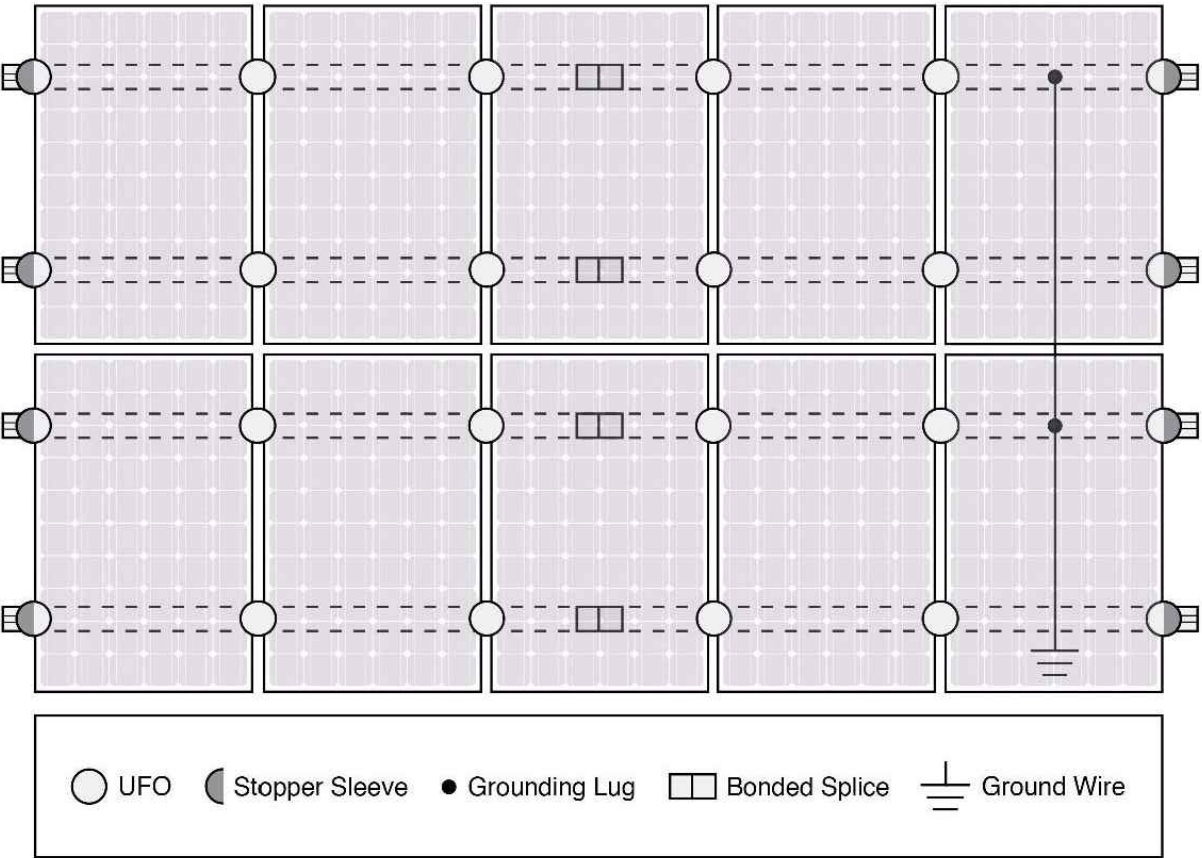


**Grounding Lug**  
A single Grounding Lug connects an entire row of PV modules to the grounding conductor.



**Bonded Attachments**  
The bonding bolt attaches and bonds the L-foot to the rail. It is installed with the same socket as the rest of the system.

System Diagram



Approved Enphase microinverters can provide equipment grounding of IronRidge systems, eliminating the need for grounding lugs and field installed equipment ground conductors (EGC). A minimum of two microinverters mounted to the same rail and connected to the same Engage cable is required. Refer to installation manuals for additional details.

UL Certification

The IronRidge Flush Mount, Tilt Mount, and Ground Mount Systems have been listed to UL 2703 by Intertek Group plc.

UL 2703 is the standard for evaluating solar mounting systems. It ensures these devices will maintain strong electrical and mechanical connections over an extended period of time in extreme outdoor environments.

Go to [IronRidge.com/UFO](https://www.ironridge.com/UFO)

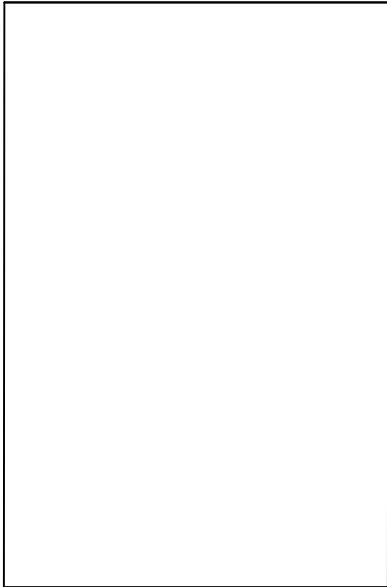
Cross-System Compatibility			
Feature	Flush Mount	Tilt Mount	Ground Mount
XR Rails	✓	✓	XR1000 Only
UFO/Stopper	✓	✓	✓
Bonded Splice	✓	✓	N/A
Grounding Lugs	1 per Row	1 per Row	1 per Array
Microinverters & Power Optimizers	Enphase - M250-72, M250-60, M215-60, C250-72 Darfon - MIG240, MIG300, G320, G640 SolarEdge - P300, P320, P400, P405, P600, P700, P730		
Fire Rating	Class A	Class A	N/A
Modules	Tested or Evaluated with over 400 Framed Modules Refer to installation manuals for a detailed list.		



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PROJECT NAME & ADDRESS

HAWKINS  
RESIDENCE  
1549 N W MOORE RD,  
LAKE CITY, FL 32055

DRAWN BY
ESR

SHEET NAME
GROUNDING AND BONDING DATASHEET

SHEET SIZE
ANSI B 11" X 17"

SHEET NUMBER
PD006