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PHOTOVOLTAIC ROOF MOUNT SYSTEM

12 MODULES-ROOF MOUNTED - 4.620 KW DC, 3.927 KW AC

340 SW CALLAWAY DR, LAKE CITY, FL 32024

PROJECT DATA

PROJECT ADDRESS: 340 SW CALLAWAY DR, LAKE CITY, FL 32024

OWNER: WILLIAM KUNZLER

DESIGNER: ESR

SCOPE: 4.620 KW DC ROOF MOUNT SOLAR PV SYSTEM WITH 12 MISSION SOLAR MSE385SX5R 385W PV MODULES WITH 12 ENPHASE IQ8PLUS-72-2-US MICROINVERTERS

EXISTING: 6.000 KW DC ROOF MOUNT SOLAR PV SYSTEM WITH 15 Q-CELLS Q.PEAK DUO BLK ML-G10+ 400W PV MODULES WITH 15 ENPHASE IQ8PLUS-72-2-US MICROINVERTERS

AUTHORITIES HAVING JURISDICTION:
BUILDING: COLUMBIA COUNTY
ZONING: COLUMBIA COUNTY
UTILITY: CLAY ELECTRIC COOPERATIVE

SHEET INDEX

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E001	SITE PLAN
S001	ROOF PLAN AND MODULES
E002	ELECTRICAL PLAN
S002	STRUCTURAL DETAIL
E003	ELECTRICAL LINE DIAGRAM
E004	WIRING CALCULATIONS
E005	LABELS
E006	PLACARD
PD001+	EQUIPMENT SPECIFICATIONS

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

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)

sunergy

SUNERGY SOLAR LLC

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

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	11/10/2023	
REVISION	01/04/2023	A

Richard Pantel

Digitally signed by Richard Pantel
DN: c=US, st=Virginia, l=Round Hill, o=TectoniCorp, P.C., cn=Richard Pantel email=rpantel@princeton-engineering.com Date: 2024.01.04 16:49:53 +00'00'

RICHARD PANTEL LICENSE No. 73222 STATE OF FLORIDA PROFESSIONAL ENGINEER

Reviewed and approved
Richard Pantel, P.E.
FL Lic. No. 73222
1/4/2024

PROJECT NAME & ADDRESS

KUNZLER RESIDENCE
340 SW CALLAWAY DR,
LAKE CITY, FL 32024

DRAWN BY: ESR

SHEET NAME: COVER SHEET

SHEET SIZE: ANSI B 11" X 17"

SHEET NUMBER: G001

PROJECT DESCRIPTION:

12 X MISSION SOLAR MSE385SX5R 385W MONO MODULES
ROOF MOUNTED SOLAR PHOTOVOLTAIC MODULES
DC SYSTEM SIZE: 12 x 385 = 4.620KW DC
AC SYSTEM SIZE: DC SYSTEM SIZE x 0.85 = 3.927KW AC

EQUIPMENT SUMMARY
12 MISSION SOLAR MSE385SX5R 385W MONO MODULES
12 ENPHASE IQ8PLUS-72-2-US MICROINVERTERS

ROOF ARRAY AREA #1:- 171.36 SQ FT.
ROOF ARRAY AREA #2:- 85.68 SQ FT.

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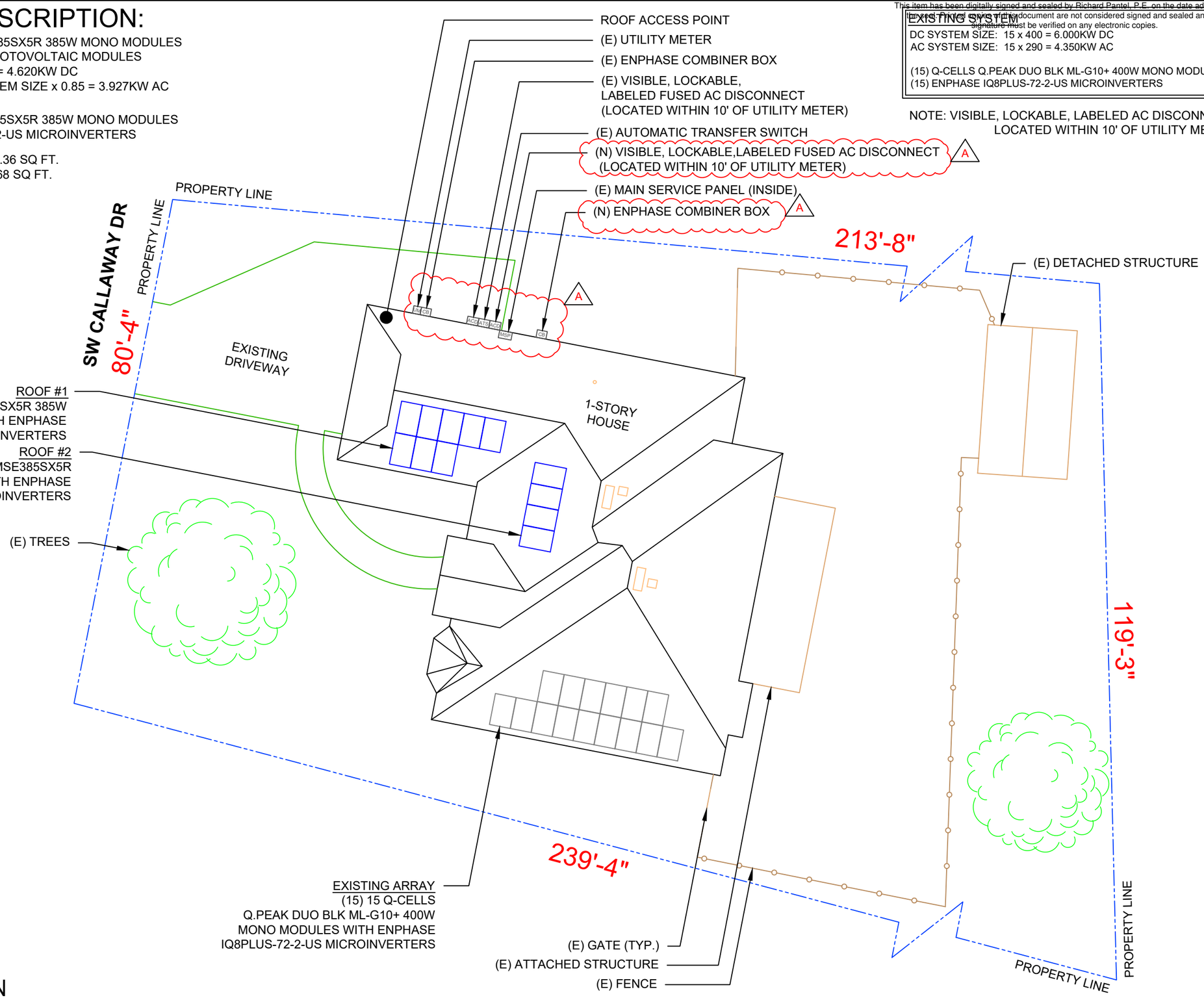
EXISTING SYSTEM
DC SYSTEM SIZE: 15 x 400 = 6.000KW DC
AC SYSTEM SIZE: 15 x 290 = 4.350KW AC

(15) Q-CELLS Q.PEAK DUO BLK ML-G10+ 400W MONO MODULES
(15) ENPHASE IQ8PLUS-72-2-US MICROINVERTERS

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



1 SITE PLAN
E001 SCALE: 1/16" = 1'-0"

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

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PROJECT NAME & ADDRESS
KUNZLER RESIDENCE
340 SW CALLAWAY DR,
LAKE CITY, FL 32024

DRAWN BY
ESR

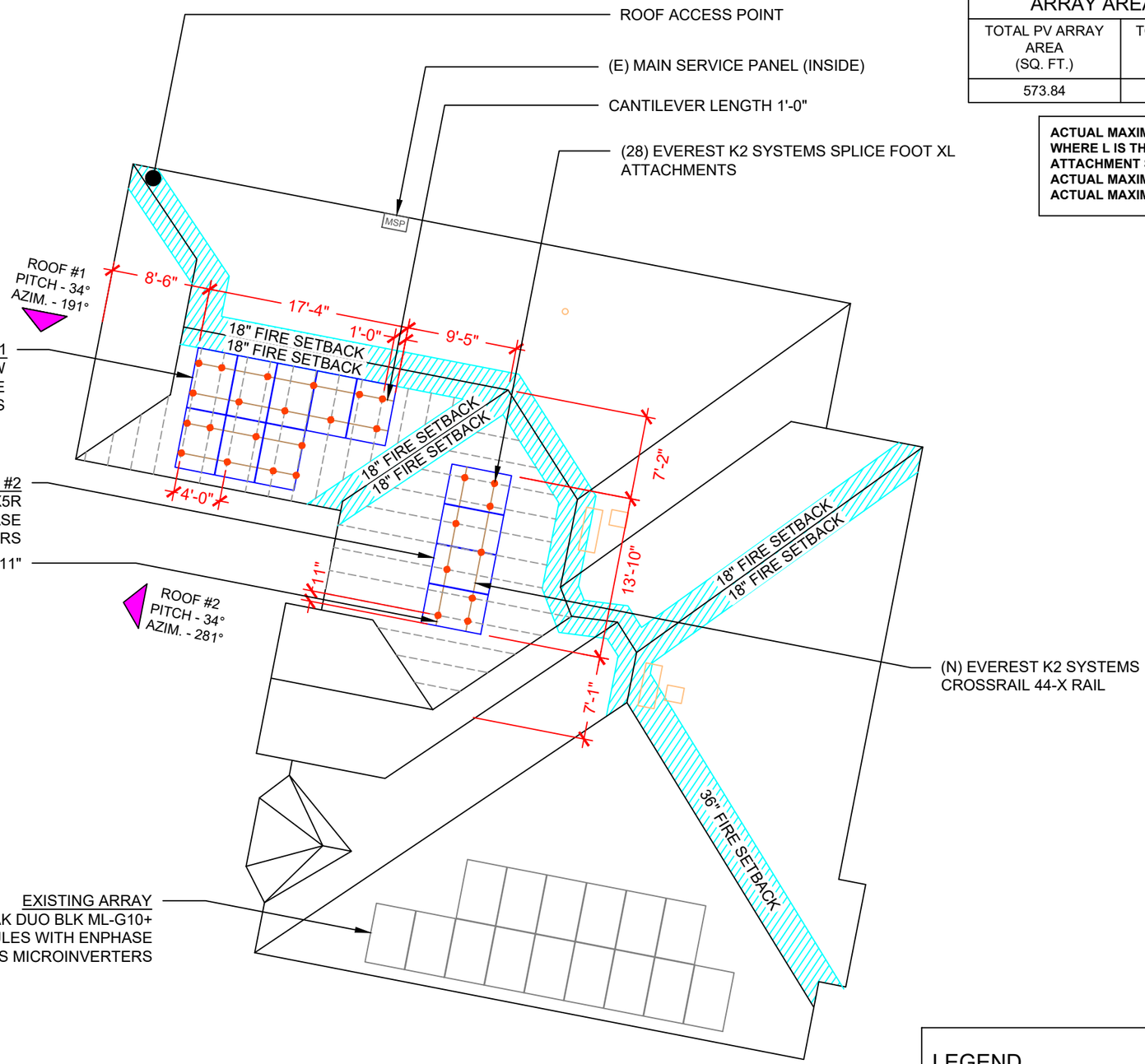
SHEET NAME
SITE PLAN

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
E001

MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 12 MODULES
MODULE TYPE = MISSION SOLAR MSE385SX5R 385W MONO MODULES
MODULE WEIGHT = 49.0 LBS / 22.2KG.
MODULE DIMENSIONS = 75.07" x 41.10" = 21.42 SF

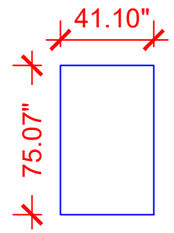


ROOF #1
(8) MISSION SOLAR MSE385SX5R 385W MONO MODULES WITH ENPHASE IQ8PLUS-72-2-US MICROINVERTERS

ROOF #2
(4) MISSION SOLAR MSE385SX5R 385W MONO MODULES WITH ENPHASE IQ8PLUS-72-2-US MICROINVERTERS

CANTILEVER LENGTH 11"

EXISTING ARRAY
(15) Q-CELLS Q.PEAK DUO BLK ML-G10+ 400W MONO MODULES WITH ENPHASE IQ8PLUS-72-2-US MICROINVERTERS



MISSION SOLAR MSE385SX5R 385W MODULES

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ROOF DESCRIPTION

ROOF TYPE				ASPHALT SHINGLE	
ROOF	# OF MODULES	ROOF PITCH	AZIMUTH	TRUSS SIZE	TRUSS SPACING
#1	8	34°	191°	2"X4"	24"
#2	4	34°	281°	2"X4"	24"

ARRAY AREA & ROOF AREA CALC'S

TOTAL PV ARRAY AREA (SQ. FT.)	TOTAL ROOF AREA (Sq. Ft.)	ROOF AREA COVERED BY ARRAY (%)
573.84	3653.89	16

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"

LEGEND

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

1 ROOF PLAN AND MODULES
S001
SCALE: 3/32" = 1'-0"

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7625 LITTLE RD. SUITE 200A,
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PROJECT NAME & ADDRESS
KUNZLER RESIDENCE
340 SW CALLAWAY DR,
LAKE CITY, FL 32024

DRAWN BY
ESR

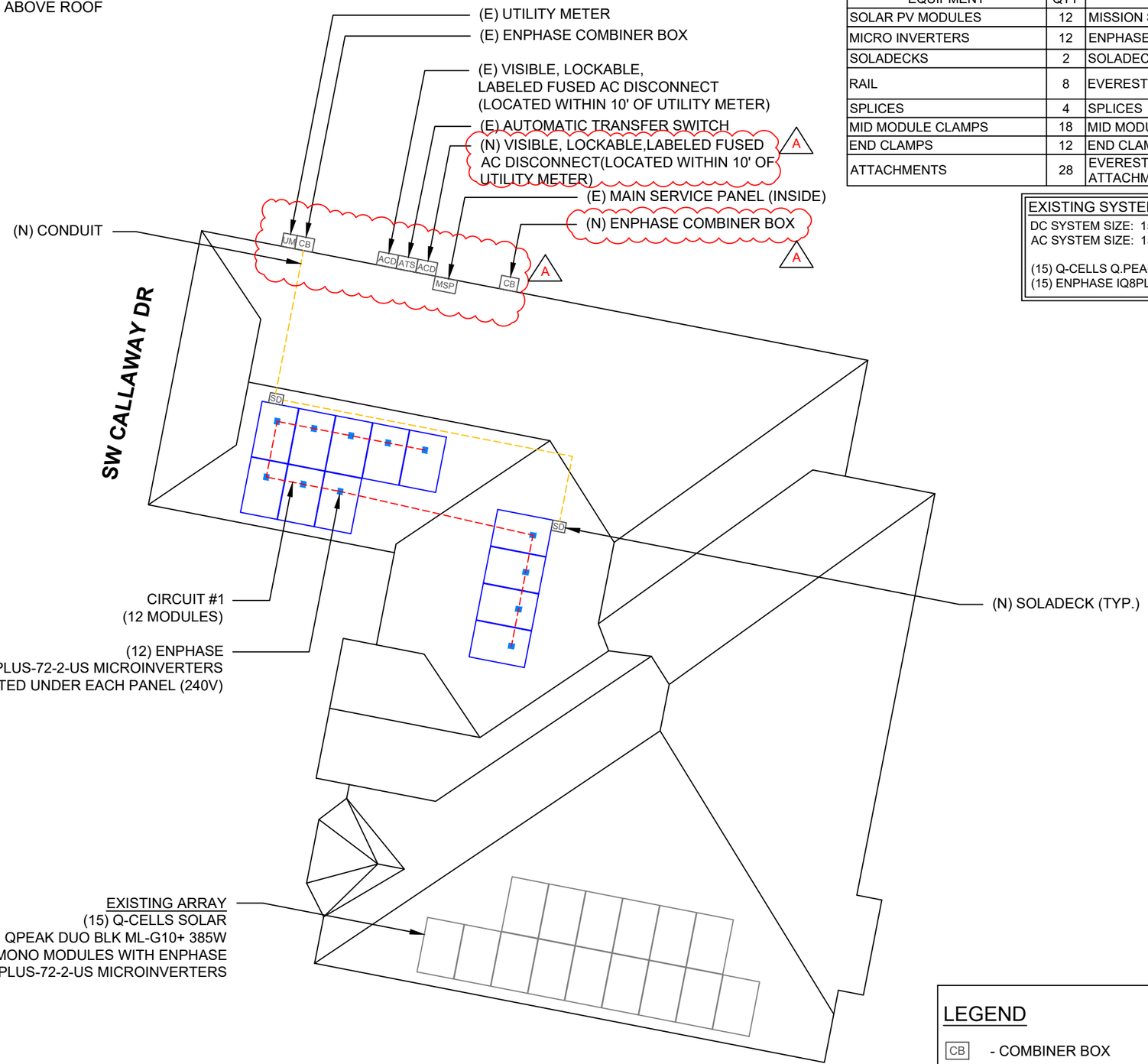
SHEET NAME
ROOF PLAN AND MODULES

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
S001

CIRCUIT LEGENDS
---------- CIRCUIT #1

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



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BILL OF MATERIALS

EQUIPMENT	QTY	DESCRIPTION
SOLAR PV MODULES	12	MISSION SOLAR MSE385SX5R 385W MODULE
MICRO INVERTERS	12	ENPHASE IQ8PLUS-72-2-US MICROINVERTERS
SOLADECKS	2	SOLADECKS
RAIL	8	EVEREST K2 SYSTEMS CROSSRAIL 44-X RAIL
SPLICES	4	SPLICES
MID MODULE CLAMPS	18	MID MODULE CLAMPS
END CLAMPS	12	END CLAMPS / STOPPER SLEEVE
ATTACHMENTS	28	EVEREST K2 SYSTEMS SPLICE FOOT XL ATTACHMENTS

EXISTING SYSTEM

DC SYSTEM SIZE: 15 x 400 = 6.000KW DC
AC SYSTEM SIZE: 15 x 290 = 4.350KW AC

(15) Q-CELLS Q.PEAK DUO BLK ML-G10+ 400W MONO MODULES
(15) ENPHASE IQ8PLUS-72-2-US MICROINVERTERS

LEGEND

CB	- COMBINER BOX	ATS	- AUTOMATIC TRANSFER SWITCH
ACD	- AC DISCONNECT	SD	- SOLADECK
UM	- UTILITY METER		- VENT, ATTIC FAN (ROOF OBSTRUCTION)
MSP	- MAIN SERVICE PANEL		- ROOF ATTACHMENT
			- TRUSS
			- CONDUIT

1 ELECTRICAL PLAN
E002 SCALE: 3/32" = 1'-0"

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

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FL Lic. No. 73222
1/4/2024

PROJECT NAME & ADDRESS
KUNZLER RESIDENCE
340 SW CALLAWAY DR, LAKE CITY, FL 32024

DRAWN BY
ESR

SHEET NAME
ELECTRICAL PLAN

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
E002

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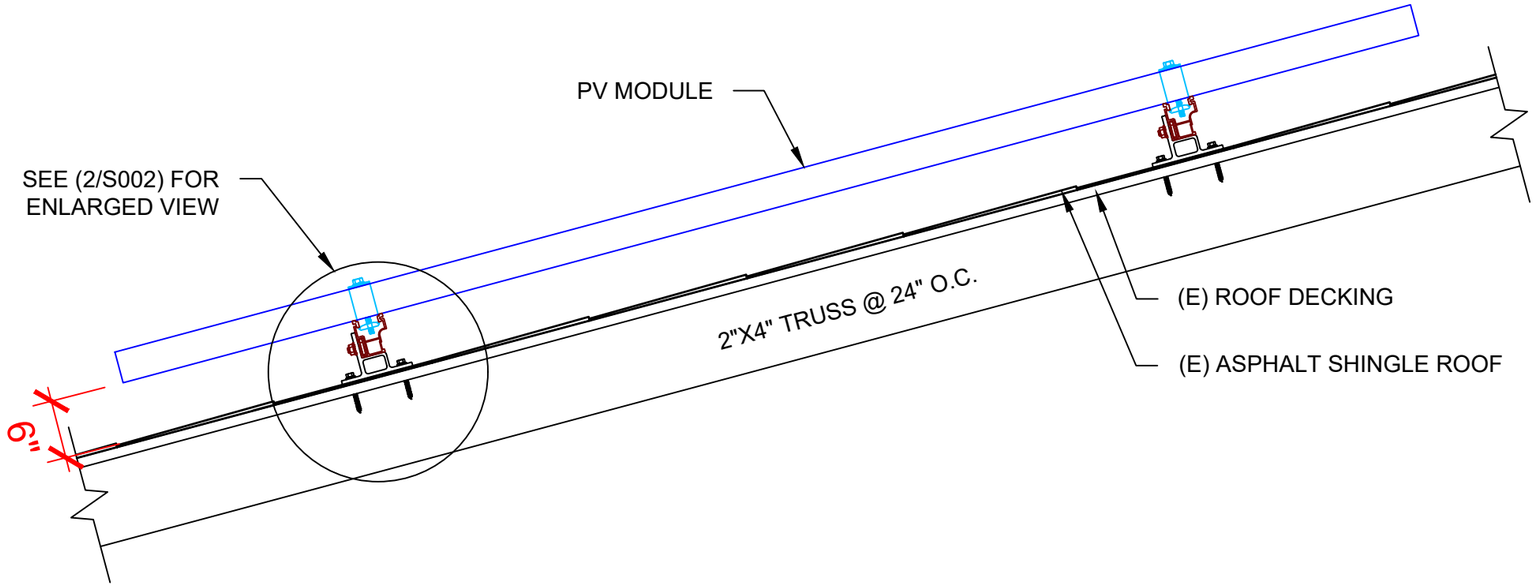
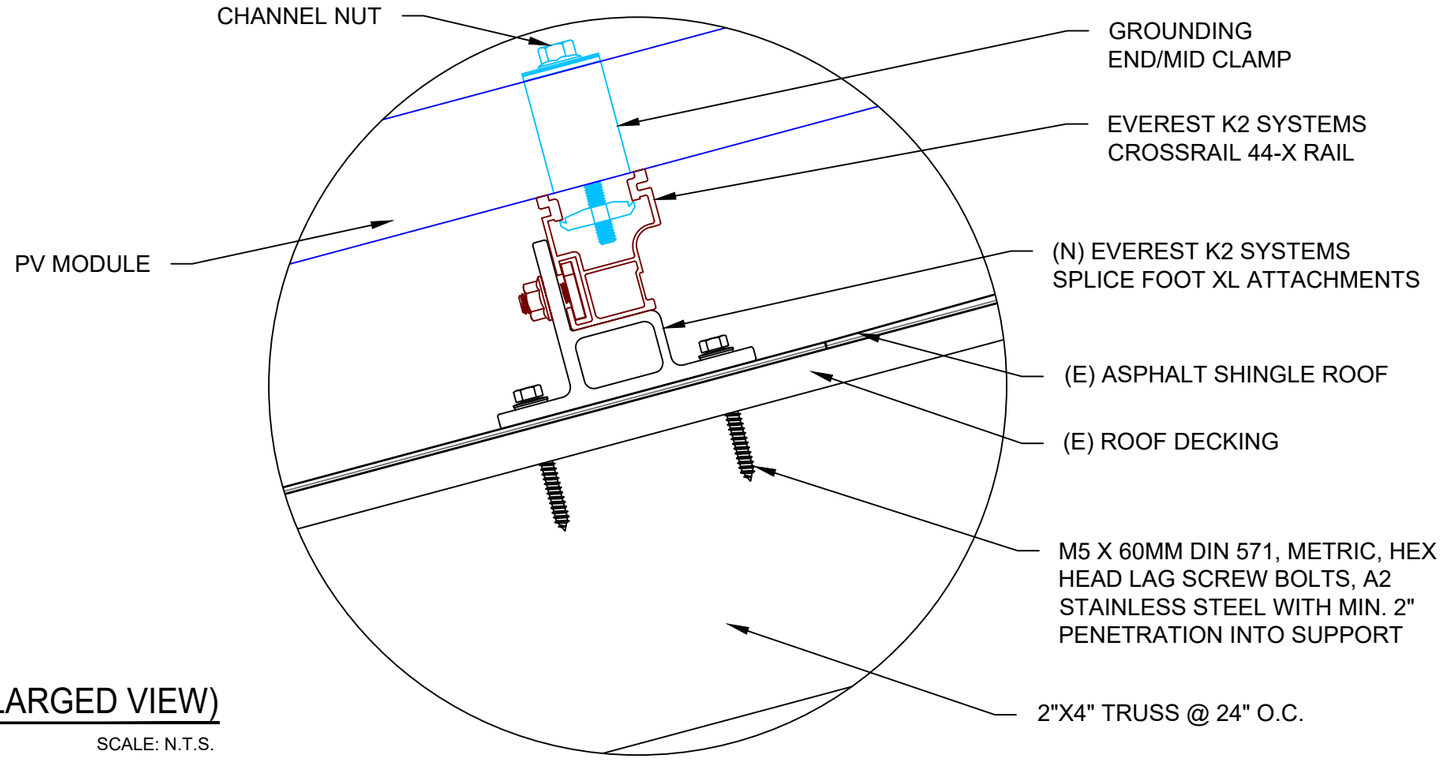


1 ATTACHMENT DETAIL (SIDE VIEW)

S002

SCALE: N.T.S.



2 ATTACHMENT DETAIL (ENLARGED VIEW)

S002

SCALE: N.T.S.

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PROJECT NAME & ADDRESS

KUNZLER RESIDENCE
340 SW CALLAWAY DR,
LAKE CITY, FL 32024

DRAWN BY
ESR

SHEET NAME
STRUCTURAL DETAIL

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
S002

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

INTERCONNECTION NOTES:

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.

DISCONNECT NOTES:

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].

RACKING NOTE:

1. BOND EVERY OTHER RAIL WITH #6 BARE COPPER

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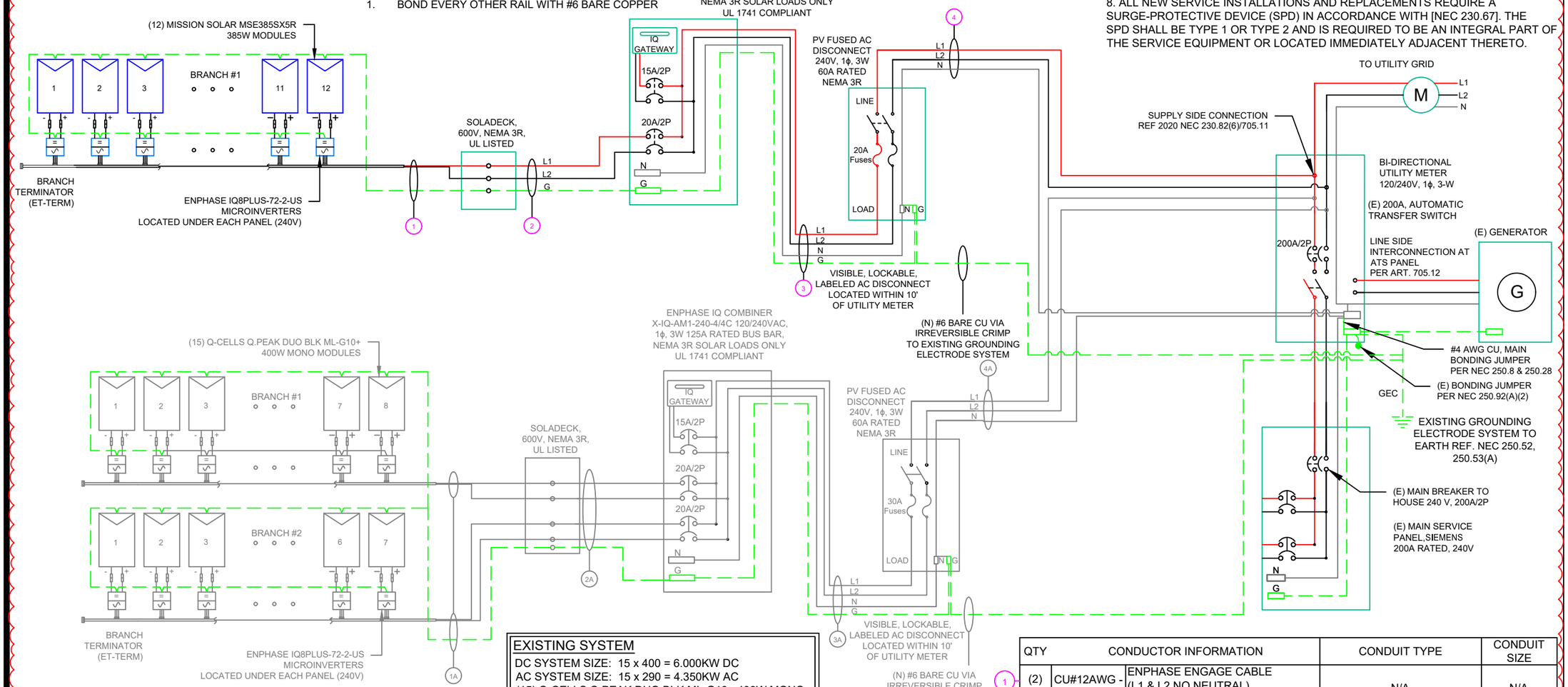
GROUNDING & GENERAL NOTES:

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. SOLADECKS QUANTITIES, AND PLACEMENT SUBJECT TO CHANGE IN THE FIELD - SOLADECKS 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 AN INTEGRAL PART OF THE SERVICE EQUIPMENT OR LOCATED IMMEDIATELY ADJACENT THERETO.



EXISTING SYSTEM

DC SYSTEM SIZE: 15 x 400 = 6.000KW DC
AC SYSTEM SIZE: 15 x 290 = 4.350KW AC
(15) Q-CELLS Q.PEAK DUO BLK ML-G10+ 400W MONO MODULES
(15) ENPHASE IQ8PLUS-72-2-US MICROINVERTERS

DC SYSTEM SIZE: 12 x 385 = 4.620KW DC
AC SYSTEM SIZE: DC SYSTEM SIZE X 0.85 = 3.927KW AC

(12) MISSION SOLAR MSE385SX5R 385W MONO MODULES WITH (12) ENPHASE IQ8PLUS-72-2-US MICROINVERTERS LOCATED UNDER EACH PANEL (240V)

(1) BRANCH CIRCUIT OF 12 MODULES ARE CONNECTED IN PARALLEL

QTY		CONDUCTOR INFORMATION		CONDUIT TYPE	CONDUIT SIZE
1	(2)	CU#12AWG -	ENPHASE ENGAGE CABLE (L1 & L2 NO NEUTRAL)	N/A	N/A
	(1)	CU #6AWG -	BARE COPPER IN FREE AIR		
2	(2)	CU#10AWG -	THWN-2 L1 &L2	ENT OR LFMC IN ATTIC	3/4"
	(1)	CU #10AWG -	CU,THWN-2 GND #12/2 ROMEX IN ATTIC		
3	(2)	CU #10AWG -	THWN-2 OR THHN L1 &L2	EMT, LFMC OR PVC	3/4"
	(1)	CU #10AWG -	CU,THWN-2 OR THHN N		
	(1)	CU #10AWG -	CU,THWN-2 OR THHN GND		
4	(2)	CU #6AWG -	THWN-2 OR THHN L1 &L2	EMT, LFMC OR PVC	3/4"
	(1)	CU #6AWG -	CU,THWN-2 OR THHN N		

NOTE : "CONDUIT SIZE IS MINIMUM REQUIRED PER NEC300.17. CONTRACTOR MAY UPSIZE AS NEEDED".

1 ELECTRICAL LINE DIAGRAM
E003 SCALE: NTS

sunergy
SUNERGY SOLAR LLC
7625 LITTLE RD. SUITE 200A,
NEW PORT RICHEY, FL 34654

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Reviewed and approved
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1/4/2024

PROJECT NAME & ADDRESS
KUNZLER RESIDENCE
340 SW CALLAWAY DR, LAKE CITY, FL 32024

DRAWN BY
ESR

SHEET NAME
ELECTRICAL LINE DIAGRAM

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
E003

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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 #	MISSION SOLAR MSE385SX5R 385W MODULE
VMP	36.93V
IMP	10.42A
VOC	45.03V
ISC	10.97A
TEMP. COEFF. VOC	-0.26%/°C
MODULE DIMENSION	75.07"L x 41.10"W x 1.57"D (In Inch)

AMBIENT TEMPERATURE SPECS	
RECORD LOW TEMP	-5°
AMBIENT TEMP (HIGH TEMP 2%)	37°
MODULE TEMPERATURE COEFFICIENT OF Voc	-0.26%/°C

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

NEW SYSTEM

A

AC CALCULATIONS

CIRCUIT ORIGIN	CIRCIUT DESTINATION	VOLTAGE (V)	FULL LOAD AMPS "FLA" (A)	FLA*1.25 (A)	OCPD SIZE (A)	NEUTRAL SIZE	GROUND SIZE	CONDUCTOR SIZE	75°C AMPACITY (A)	AMPACITY CHECK #1	AMBIENT TEMP. (°C)	TOTAL CC CONDUCTORS IN RACEWAY	90°C AMPACITY (A)	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 DERATED (A)	AMPACITY CHECK #2	FEEDER LENGTH (FEET)	CONDUCTOR RESISTANCE (OHM/KFT)	VOLTAGE DROP AT FLA (%)	CONDUIT SIZE	CONDUIT FILL (%)
CIRCUIT 1	SOLADECK	240	14.52	18.15	20	N/A	BARE COPPER #6 AWG	CU #12 AWG	25	PASS	37	2	30	0.91	1	27.3	PASS			0.65	N/A	#N/A
SOLADECK	COMBINER BOX	240	14.52	18.15	20	N/A	CU #10 AWG	CU #10 AWG	35	PASS	37	2	40	0.91	1	36.4	PASS	20	1.24	0.300	3/4" ENT	11.87617
COMBINER BOX	AC DISCONNECT	240	14.52	18.15	20	CU #10 AWG	CU #10 AWG	CU #10 AWG	35	PASS	37	2	40	0.91	1	36.4	PASS	5	1.24	0.075	3/4" EMT	15.8349
AC DISCONNECT	POI	240	14.52	18.15	20	CU #6 AWG	N/A	CU #6 AWG	65	PASS	37	2	75	0.91	1	68.25	PASS	5	0.491	0.030	3/4" EMT	28.53659

Circuit 1 Voltage Drop	1.055

EXISITING SYSTEM

AC CALCULATIONS

CIRCUIT ORIGIN	CIRCIUT DESTINATION	VOLTAGE (V)	FULL LOAD AMPS "FLA" (A)	FLA*1.25 (A)	OCPD SIZE (A)	NEUTRAL SIZE	GROUND SIZE	CONDUCTOR SIZE	75°C AMPACITY (A)	AMPACITY CHECK #1	AMBIENT TEMP. (°C)	TOTAL CC CONDUCTORS IN RACEWAY	90°C AMPACITY (A)	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 DERATED (A)	AMPACITY CHECK #2	FEEDER LENGTH (FEET)	CONDUCTOR RESISTANCE (OHM/KFT)	VOLTAGE DROP AT FLA (%)	CONDUIT SIZE	CONDUIT FILL (%)
CIRCUIT 1	SOLADECK	240	9.68	12.10	20	N/A	BARE COPPER #6 AWG	CU #12 AWG	25	PASS	37	2	30	0.91	1	27.3	PASS			0.30	N/A	#N/A
CIRCUIT 2	SOLADECK	240	8.47	10.59	20	N/A	BARE COPPER #6 AWG	CU #12 AWG	25	PASS	37	2	30	0.91	1	27.3	PASS			0.23	N/A	#N/A
SOLADECK	COMBINER BOX	240	9.68	12.10	20	N/A	CU #10 AWG	CU #10 AWG	35	PASS	37	4	40	0.91	0.8	29.12	PASS	20	1.24	0.200	3/4" ENT	19.79362
COMBINER BOX	AC DISCONNECT	240	18.15	22.69	30	CU #10 AWG	CU #10 AWG	CU #10 AWG	35	PASS	37	2	40	0.91	1	36.4	PASS	5	1.24	0.094	3/4" EMT	15.8349
AC DISCONNECT	POI	240	18.15	22.69	30	CU #5 AWG	N/A	CU #6 AWG	65	PASS	37	2	75	0.91	1	68.25	PASS	5	0.491	0.037	3/4" EMT	28.53659

Circuit 1 Voltage Drop	0.631
Circuit 1 Voltage Drop	0.561

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 SOLADECKS, 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

SUNERGY SOLAR LLC

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

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	11/10/2023	
REVISION	01/04/2023	A

RICHARD PANTEL LICENSE No. 73222 STATE OF FLORIDA PROFESSIONAL ENGINEER

Reviewed and approved
Richard Pantel, P.E.
FL Lic. No. 73222
1/4/2024

PROJECT NAME & ADDRESS

KUNZLER RESIDENCE
340 SW CALLAWAY DR,
LAKE CITY, FL 32024

DRAWN BY
ESR

SHEET NAME
WIRING CALCULATIONS

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
E004

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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)

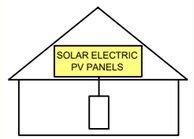
⚠ WARNING

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	14.52 A

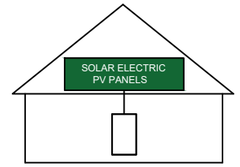
LABEL- 11:
LABEL LOCATION:
MAIN SERVICE PANEL
SUBPANEL
AC DISCONNECT
CODE REF: NEC 690.54

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)

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SUNERGY SOLAR LLC

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

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REVISION	01/04/2023	A

Reviewed and approved
Richard Pantel, P.E.
FL Lic. No. 73222
1/4/2024

PROJECT NAME & ADDRESS

KUNZLER RESIDENCE
340 SW CALLAWAY DR,
LAKE CITY, FL 32024

DRAWN BY
ESR

SHEET NAME
LABELS

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
E005

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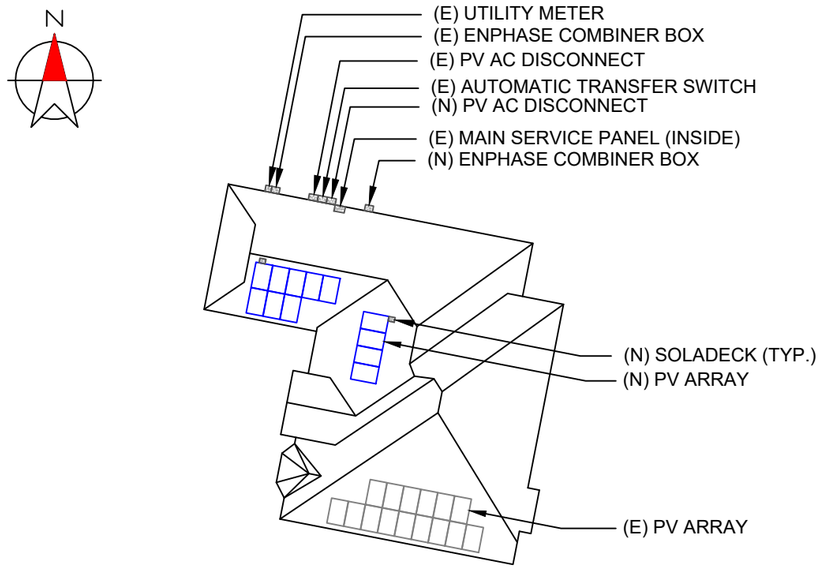
A

CAUTION:

MULTIPLE SOURCES OF POWER



340 SW CALLAWAY DR, LAKE CITY, FL 32024

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

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SUNERGY SOLAR LLC

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

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Reviewed and approved
Richard Pantel, P.E.
FL Lic. No. 73222
1/4/2024

PROJECT NAME & ADDRESS

KUNZLER RESIDENCE
340 SW CALLAWAY DR, LAKE CITY, FL 32024

DRAWN BY
ESR

SHEET NAME
PLACARD

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
E006

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MSE PERC 66

MISSION SOLAR ENERGY

385W Positive Power Tolerance

Class leading power output -0 to +3%

FRAME-TO-FRAME WARRANTY

Degradation guaranteed not to exceed 2% in year one and 0.58% annually from years two to 30 with 84.08% capacity guaranteed in year 25.
For more information, visit www.missionsolar.com/warranty

CERTIFICATIONS

CEC | TÜV SUD | c UL us LISTED

UL 61730 / IEC 61215 / IEC 61730 / IEC 61701

If you have questions or concerns about certification of our products in your area, please contact Mission Solar Energy.

True American Quality
True American Brand

Mission Solar Energy is headquartered in San Antonio, Texas where we manufacture our modules. We produce American, high-quality solar modules ensuring the highest-in-class power output and best-in-class reliability. Our product line is tailored for residential, commercial and utility applications. Every Mission Solar Energy solar module is certified and surpasses industry standard regulations, proving excellent performance over the long term.

Demand the best. Demand Mission Solar Energy.

Certified Reliability
- Tested to UL 61730 & IEC Standards
- PID resistant
- Resistance to salt mist corrosion

Advanced Technology
- 6 Busbar
- Passivated Emitter Rear Contact
- Ideal for all applications

Extreme Weather Resilience
- Up to 5,400 Pa front load & 3,600 Pa back load
- Tested load to UL 61730
- 40 mm frame

BAA Compliant for Government Projects
- Buy American Act
- American Recovery & Reinvestment Act

MODULES ASSEMBLED DESIGNED & ENGINEERED IN THE USA

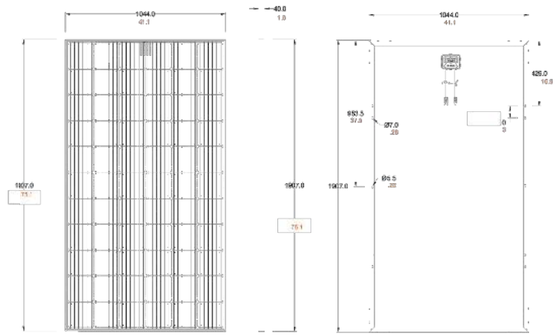
25 YEAR FRAME-TO-FRAME WARRANTY

Class Leading
375-385W

MSE PERC 66

BASIC DIMENSIONS

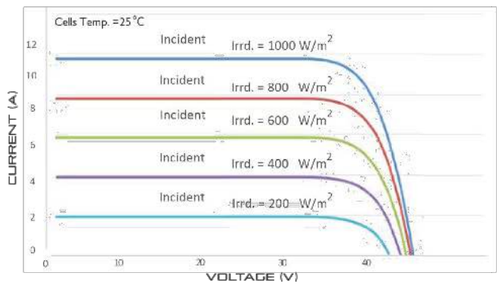
[UNITS: MM/IN]



CURRENT-VOLTAGE CURVE

MSE385SX5R: 385WP, 66 CELL SOLAR MODULE

Current-voltage characteristics with dependence on irradiance and module temperature



CERTIFICATIONS AND TESTS

IEC	61215, 61730, 61701
UL	61730

TÜV SUD | CEC | c UL us LISTED

ELECTRICAL SPECIFICATION

PRODUCT TYPE			MSExxxSX5R (xxx = P_{max})		
Power Output	P_{max}	W_p	375	380	385
Module Efficiency		%	18.8	19.1	19.3
Tolerance		%	0/+3	0/+3	0/+3
Short Circuit Current	I_{sc}	V	10.85	10.91	10.97
Open Circuit Voltage	V_{oc}	A	44.64	44.84	45.03
Rated Current	I_{mp}	V	10.26	10.34	10.42
Rated Voltage	V_{mp}	V	36.56	36.75	36.93
Fuse Rating		A	20	20	20
System Voltage		V	1,000	1,000	1,000

TEMPERATURE COEFFICIENTS

Normal Operating Cell Temperature (NOCT)	44.43°C (±3.7%)
Temperature Coefficient of Pmax	-0.361%/°C
Temperature Coefficient of Voc	-0.262%/°C
Temperature Coefficient of Isc	0.039%/°C

OPERATING CONDITIONS

Maximum System Voltage	1,000Vdc
Operating Temperature Range	-40°C (-40°F) to +85°C (185°F)
Maximum Series Fuse Rating	20A
Fire Safety Classification	Type 1
Front & Back Load (UL Standard)	Up to 5,400 Pa front and 3,600 Pa back load, Tested to UL 61730
Hail Safety Impact Velocity	25mm at 23 m/s

MECHANICAL DATA

Solar Cells	P-type mono-crystalline silicon
Cell Orientation	66 cells (6x11)
Module Dimension	1,907mm x 1,044mm x 40mm
Weight	22 kg (49 lbs.)
Front Glass	3.2mm, tempered, low-iron, anti-reflective
Frame	Anodized
Encapsulant	Ethylene vinyl acetate (EVA)
Junction Box	Protection class IP67 with 3 bypass-diodes
Cable	1.0m, Wire 4mm2 (12AWG)
Connector	Staubli PV-KBT4/6II-UR and PV-KST4/6II-UR, MC4, Renhe 05-8

SHIPPING INFORMATION

Container Feet	Ship To	Pallet	Panels	380 W Bin
53'	Most States	30	780	296.40 kW
Double Stack	CA	26	676	256.88 kW

PALLET [26 PANELS]

Weight	Height	Width	Length
1,274 lbs. (572 kg)	47.56 in (120.80 cm)	46 in (116.84 cm)	77 in (195.58 cm)

Mission Solar Energy
8303 S. New Braunfels Ave., San Antonio, Texas 78235
www.missionsolar.com | info@missionsolar.com

Mission Solar Energy reserves the right to make specification changes without notice.
C-SA2-MKTG-0027 REV 2 05/05/2021

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

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RICHARD PANTEL LICENSE No. 73222 STATE OF FLORIDA PROFESSIONAL ENGINEER

Reviewed and approved
Richard Pantel, P.E.
FL Lic. No. 73222
1/4/2024

PROJECT NAME & ADDRESS

KUNZLER RESIDENCE
340 SW CALLAWAY DR,
LAKE CITY, FL 32024

DRAWN BY
ESR

SHEET NAME
MODULE DATASHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PD001

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ENPHASE

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.

Enphase 25 year limited warranty

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.

UL CERTIFIED SAFETY

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

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

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[1]	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[2] [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[3]	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[4]		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. 107.1-01 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

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Reviewed and approved
Richard Pantel, P.E.
FL Lic. No. 73222
1/4/2024

PROJECT NAME & ADDRESS

KUNZLER RESIDENCE
340 SW CALLAWAY DR,
LAKE CITY, FL 32024

DRAWN BY
ESR

SHEET NAME
MICROINVERTER DATASHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PD002

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Data Sheet
Enphase Networking

Enphase IQ Combiner 4/4C

X-IQ-AM1-240-4
X-IQ-AM1-240-4C

X-IQ-AM1-240-4C

X-IQ-AM1-240-4

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

LISTED

To learn more about Enphase offerings, visit **enphase.com**

ENPHASE

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**

ENPHASE

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sunergy

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

REVISIONS		
DESCRIPTION	DATE	REV
INITIAL DESIGN	11/10/2023	
REVISION	01/04/2023	A

RICHARD PANTEL LICENSE No. 73222 STATE OF FLORIDA PROFESSIONAL ENGINEER

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1/4/2024

PROJECT NAME & ADDRESS

KUNZLER RESIDENCE
340 SW CALLAWAY DR,
LAKE CITY, FL 32024

DRAWN BY
ESR

SHEET NAME
COMBINER BOX DATASHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PD003

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We support PV systems
Formerly Everest Solar Systems

Splice Foot XL

Patent Pending

TECHNICAL SHEET

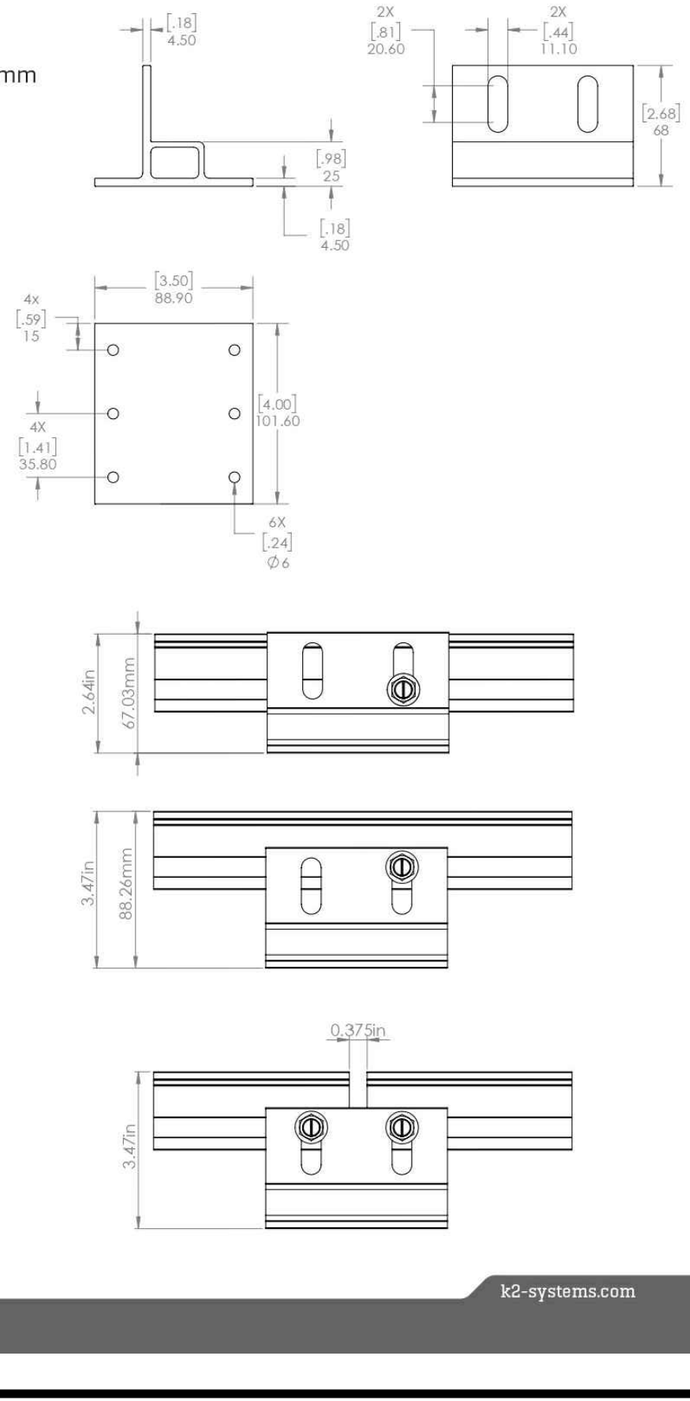
Item Number	Description	Part Number
1	Splice Foot XL	4000162 | Splice Foot XL Kit, Mill
2	K2 EverSeal	
3	M5 x 60 lag screws	
4	T-Bolt & Hex Nut Set	

Technical Data

	Splice Foot XL
Roof Type	Composition shingle
Material	Aluminum with stainless steel hardware
Finish	Mill
Roof Connection	M5 x 60 lag screws
Code Compliance	UL 2703
Compatibility	CrossRail 44-X, 48-X, 48-XL, 80

We support PV systems
Formerly Everest Solar Systems

Units: [in] mm



k2-systems.com

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

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1/4/2024

PROJECT NAME & ADDRESS
KUNZLER RESIDENCE
340 SW CALLAWAY DR,
LAKE CITY, FL 32024

DRAWN BY
ESR

SHEET NAME
ATTACHMENT DATASHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PD004

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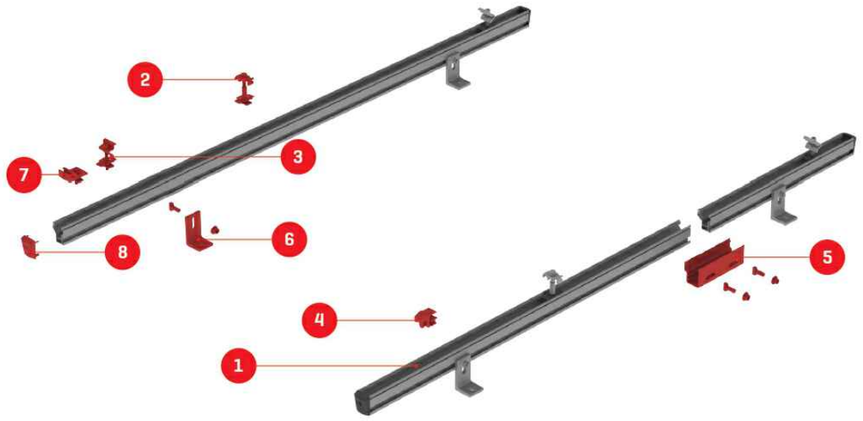
Formerly Everest Solar Systems



CrossRail System

TECHNICAL SHEET

Item Number	Description	Part Number
1	CrossRail 44-X (shown) all CR profiles applicable	4000019 (166" mill), 4000020 (166" dark) , 4000021 (180" mill), 4000022 (180" dark)
2	CrossRail Mid Clamp	4000601-H (mill), 4000602-H (dark)
3	CrossRail (Standard) End Clamp	4000429 (mill), 4000430 (dark)
4	Yeti Hidden End Clamp for CR	4000050-H
5	CrossRail 44-X Rail Connector (shown) CR 48-X, 48-XL Rail Connector available	4000051 (mill), 4000052 (dark)
6	L-Foot Slotted Set	4000630 (mill), 4000631 (dark)
7	Everest Ground Lug	4000006-H
8	CrossRail 44-X End Cap (shown) CrossRail 48-X, 48-XL and 80 available	4000067

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CROSSRAIL 44-X

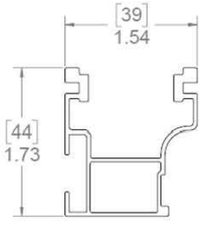
Mechanical Properties

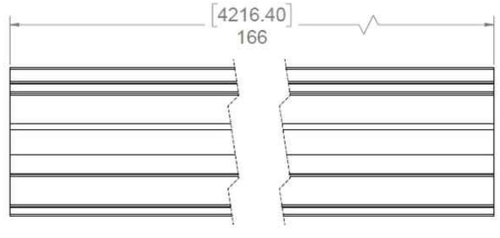
	CrossRail 44-X
Material	6000 Series Aluminum
Ultimate Tensile Strength	37.7 ksi (260 MPa)
Yield Strength	34.8 ksi (240 MPa)
Weight	0.47 lbs/ft (0.699 kg/m)
Finish	Mill or Dark Anodized

Sectional Properties

	CrossRail 44-X
Sx	0.1490 in3 (0.3785 cm3)
Sy	0.1450 in3 (0.3683 cm3)
A (X-Section)	0.4050 in2 (1.0287 cm2

Units: [mm] in





Notes:

- Structural values and span charts determined in accordance with Aluminum Design Manual and ASCE 7-16
- UL2703 Listed System for Fire and Bonding

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sunergy

SUNERGY SOLAR LLC

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

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PROJECT NAME & ADDRESS

KUNZLER RESIDENCE
340 SW CALLAWAY DR,
LAKE CITY, FL 32024

DRAWN BY
ESR

SHEET NAME
RACKING DATASHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PD005

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SolaDeck

FLASHED PV ROOF-MOUNT COMBINER/ENCLOSURE

Basic Features

- Stamped Seamless Construction
- 18 Gauge Galvanized Steel
- Powder Coated Surfaces
- Flashes into the roof deck
- 3 Roof deck knockouts .5", .75", 1"
- 5 Centering dimples for entry/exit fittings or conduit
- 2 Position Ground lug installed
- Mounting Hardware Included

SolaDeck Model SD 0783

SolaDeck UL50 Type 3R Enclosures

Available Models:
Model SD 0783 - (3" fixed Din Rail)
Model SD 0786 - (6" slotted Din Rail)

SolaDeck UL 1741 Combiner/Enclosures

Models SD 0783-41 and SD 0786-41 are labeled and ETL listed UL STD 1741 according to the UL STD 1741 for photovoltaic combiner enclosures.

Max Rated - 600VDC, 120AMPS

Model SD 0783-41 3" Fixed Din Rail fastened using Norlock System

****Typical System Configuration**

4- Din Rail Mounted Fuse Holders 600VDC 30 AMP
1- Power Distribution Block 600VDC 175AMP
1- Bus Bar with UL lug

Model SD 0786-41 6" Slotted Din Rail fastened using steel studs

****Typical System Configuration**

4- Din Rail Mounted Fuse Holders 600VDC 30 AMP
4- Din Rail Mounted Terminal Blocks
Bus Bars with UL lug

**Fuse holders and terminal blocks added in the field must be UL listed or recognized and meet 600 VDC 30 AMP 110C for fuse holders, 600V 50 AMP 90C for rail mounted terminal blocks and 600 V 175 AMP 90C for Power Distribution Blocks. Use Copper Wire Conductors.

Cover is trimmed to allow conduit or fittings, base is center dimpled for fitting locations.

Model SD 0783-41, wired with Din Rail mounted fuse holders, bus bar and power distribution block.

Model SD 0786-41, wired with Din Rail mounted fuse holders, terminal blocks and bus bars.

RSTC Enterprises, Inc • 2219 Heimstead Road • Eau Cliare, WI 54703
For product information call 1(866) 367-7782

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

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PROJECT NAME & ADDRESS

KUNZLER RESIDENCE
340 SW CALLAWAY DR,
LAKE CITY, FL 32024

DRAWN BY
ESR

SHEET NAME
SOLADECK DATASHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PD006