HERSCHLEB RESIDENCE

ADDON 4.800 KW DC STC - 4.188 KW AC PV SYSTEM

423 SW RED CEDAR CT,
FORT WHITE, FL 32038

PROJECT DESCRIPTION:

(N) 12x400 REC : REC400AA BLACK (400W) MODULES
ROOF MOUNTED SOLAR PHOTOVOLTAIC MODULES

(E) 36x320 REC : REC320NP(320W) MODULES
ROOF MOUNTED SOLAR PHOTOVOLTAIC MODULES

(N) SYSTEM SIZE:4.800 kW DC STC
(N) ARRAY AREA #1:239.00 SQ. FT.

(E SYSTEM SIZE: 11.52 kW DC STC
(E) ARRAY AREA #1:647.27 SQ. FT.

(E) EQUIPMENT SUMMARY
36 REC : REC320NP(320W) MODULES
36 ENPHASE: IQ7-60-2-US MICROINVERTERS

(N) EQUIPMENT SUMMARY
12 REC : REC400AA BLACK (400W) MODULES
12 ENPHASE: IQ7A-72-2-US MICROINVERTERS

RACKING: SNAPNRACK ULTRA RAIL UR-40
ATTACHMENT: S-5-PROTEA

DESIGN CRITERIA :

WIND SPEED (ULT):	130 MPH
WIND SPEED (ASD):	101 MPH
RISK CATEGORY:	II
EXPOSURE:	B

CODES AND STANDARDS

GOVERNING CODES:
FLORIDA RESIDENTIAL CODE, 7TH EDITION 2020 (FRC)
FLORIDA PLUMBING CODE, 7TH EDITION 2020 (FPC)
FLORIDA BUILDING CODE, 7TH EDITION 2020 (FBC)
FLORIDA MECHANICAL CODE, 7TH EDITION 2020 (FMC)
NATIONAL ELECTRICAL CODE 2017 (NEC)
ASCE 7-16

OWNER

HERSCHLEB, WILLIAM

INSTALLER

POWER PRODUCTION MANAGEMENT
625 NW 8th Ave,
Gainesville, FL 32601
(352) 263-0766

ENGINEER

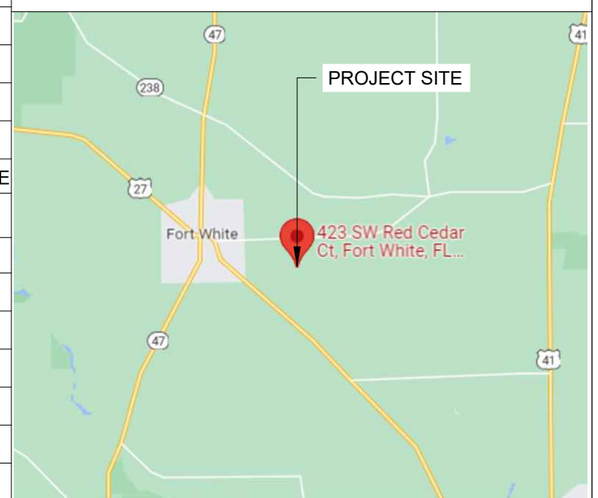
Castillo Engineering Services LLC
620 N. Wymore Road, Suite 250, Maitland, FL 32751
TEL: (407) 289-2575
Ermocrates E. Castillo
License#: FL PE 52590

SHEET INDEX

SHEET #	SHEET DESCRIPTION
G-01	COVER SHEET
A-00	NOTES AND DESCRIPTION
A-01	ROOF PLAN
S-01	MODULE LAYOUT
S-01.1	PARTIAL PRESSURE AND MODULES EXPOSURE
S-02	ATTACHMENT DETAIL
S-02.1	STRUCTURE CALCULATION
E-01	ELECTRICAL LINE DIAGRAM
E-02	WIRING CALCULATIONS
E-03	SYSTEM LABELING
E-03.1	RISER DIAGRAM
DS-01-07	DATA SHEETS

HOUSE PHOTO

VICINITY MAP



STRUCTURAL CERTIFICATION:

I ERMOCRATES CASTILLO PE# 52590 AN ENGINEER LICENSED PURSUANT TO CHAPTER 471, CERTIFY THAT THE INSTALLATION OF THE MODULES IS IN COMPLIANCE WITH FBC: RESIDENTIAL 2020 7th ED., CHAPTER 3. BUILDING STRUCTURE WILL SAFELY ACCOMMODATE WIND LATERAL AND UPLIFT FORCES, AND EQUIPMENT DEAD LOADS.

ELECTRICAL CERTIFICATION:

I ERMOCRATES CASTILLO PE# 52590 AN ENGINEER LICENSED PURSUANT TO CHAPTER 471, CERTIFY THAT THE PV ELECTRICAL SYSTEM AND ELECTRICAL COMPONENTS ARE DESIGNED AND APPROVED USING THE STANDARDS CONTAINED IN THE MOST RECENT VERSION OF THE FLORIDA BUILDING CODE. FBC 107, THE NEC 2017, AND THOSE SET FORTH BY THE FLORIDA SOLAR ENERGY CENTER CERTIFICATION.

Castillo Engineering
SOLAR DONE RIGHT®

CASTILLO ENGINEERING SERVICES, LLC
COA # 28345
620 N. WYMORE ROAD,
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MAITLAND, FL 32751
TEL: (407) 289-2575
ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

POWER PRODUCTION MANAGEMENT, INC.

Signature with Digital

Digitally signed by: Ermocrates E Castillo
Date: 2022.08.09 15:13:48

PROJECT NAME

HERSCHLEB RESIDENCE

423 SW RED CEDAR CT,
FORT WHITE, FL 32038

SHEET NAME

COVER SHEET

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

G-01

Symbols:

Section..... X / X-XX — Sheet where section is located

Elevation ..... X / X-XX — Detail ID Letter; Sheet where section is located

Detail ..... X / X-XX — Detail ID Letter; Sheet where section is located

Detail ..... (Enlarged Plan) X / X-XX — Detail ID Letter; Area to be enlarged; Sheet where section is located

Keyed Notes ..... 1 — Keyed note designation on applicable sheet

Ground Terminal .....

Grounding Point/rod....

Solar Panel ..... or 00 — Module with Source Circuit number

Combiner Box ..... CB

AC Disconnect ..... ACD

Main Distribution Panel ..... MDP

Fuse .....

Overcurrent Breaker ..

Inverter .....

Transformer .....

Automatic ..... Transfer Switch ATS

Vent, Attic fan (Roof obstruction)

PV Roof Attachment

Trusses

Conduit

Fire Access

Abbreviations:

AC	Alternating Current
ACD	AC Disconnect
APPROX	Approximate
AWG	American Wire Gauge
BAT	Battery
CB	Combiner Box
DC	Direct Current
DISC	Disconnect
(E)	Existing
EL	Elevation
EQ	Equal
GP	Generation Panel
JB	Junction Box
MCB	Main Combiner Box
MFR	Manufacturer
MID	Microgrid Interconnect Device
MIN	Minimum
MISC	Miscellaneous
MDP	Main Distribution Panel
(N)	New
NAVD	North American Vertical datum
OCPD	OverCurrent Protection Device
POCC	Point Of Common Coupling
PV	Photovoltaic
SF	Squarefoot/feet
STC	Standard Test Conditions
SD	Soladeck
TBD	To Be Determined
TYP	Typical
UNO	Unless Noted Otherwise
UM	Utility meter
VIF	Verify In Field
WP	Weather Proof

System Description

This system is a grid-tied, PV system, with PV generation consisting of 12x400 REC : REC400AA BLACK (400W) Modules with a combined STC rated dc output power of 4,800W. The modules are connected into 12 Enphase: IQ7A-72-2-US Microinverters 4,188W AC. The inverter has electronic maximum power point tracking to maximize energy captured by the PV modules. The inverter also has an internal ground fault detection and interruption device that is set to disconnect the array in the event that a ground fault that exceeds one ampere should occur. The inverter has DC and AC disconnect integrated system and labels are provided as required by the *National Electrical Code*.

When the sun is shining, power from the PV array is fed into the inverter, where it is converted from DC to AC. The inverter output is then used to contribute to the power requirements of the occupancy. If PV power meets the requirements of the loads of the occupancy, any remaining PV power is sold back to the utility. When utility power is available, but PV power is not available, building loads are supplied by the utility.

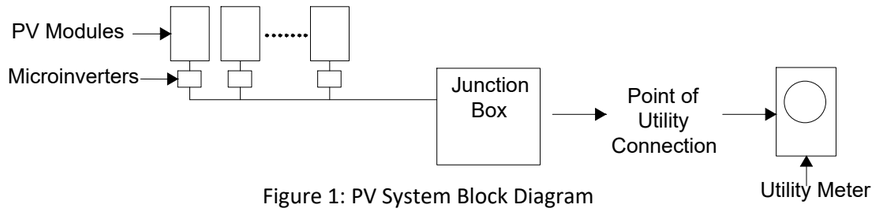


Figure 1: PV System Block Diagram

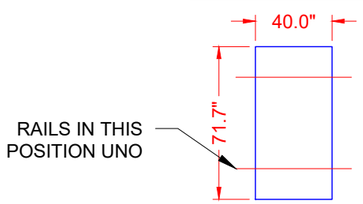
The inverter meets the requirements of IEEE 1547 and UL 1741.

FALL PROTECTION:
ANCHORAGES USED FOR ATTACHMENT OF PERSONAL FALL ARREST EQUIPMENT MUST BE INDEPENDENT OF ANY ANCHORAGE BEING USED TO SUPPORT OR SUSPEND PLATFORMS, AND CAPABLE OF SUPPORTING AT LEAST 5,000 POUNDS PER EMPLOYEE ATTACHED, OR MUST BE DESIGNED AND USED AS FOLLOWS:

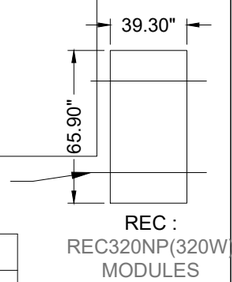
- AS PART OF A COMPLETE PERSONAL FALL ARREST SYSTEM WHICH MAINTAINS A SAFETY FACTOR OF AT LEAST TWO.
- UNDER THE SUPERVISION OF A QUALIFIED PERSON

ADDITIONAL INFORMATION

- 29 CFR 1926 SUBPART M, FALL PROTECTION. OSHA STANDARD.
- 1926.502, FALL PROTECTION SYSTEMS CRITERIA AND PRACTICES
  - 1926.502(D)(15)



ALLOWABLE/DESIGN PRESSURE	PSF
DOWN PRESSURE	75
UPLIFT PRESSURE, 2 RAILS	75



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ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

POWER PRODUCTION MANAGEMENT, INC.

Signature with Seal — Digitally signed by: Ermocrates E Castillo Date: 2022.08.09 15:13:49

PROJECT NAME

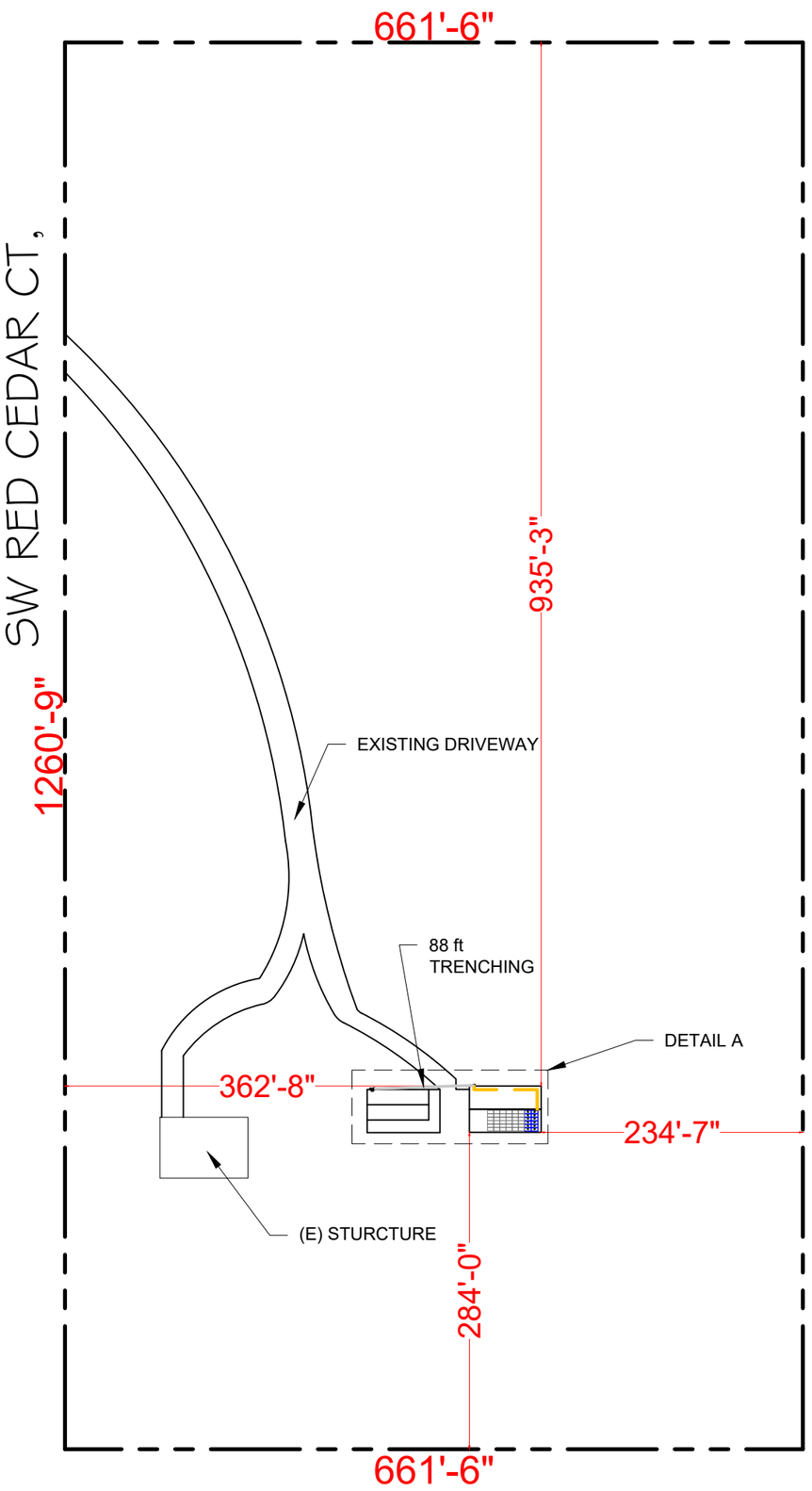
HERSCHLEB RESIDENCE

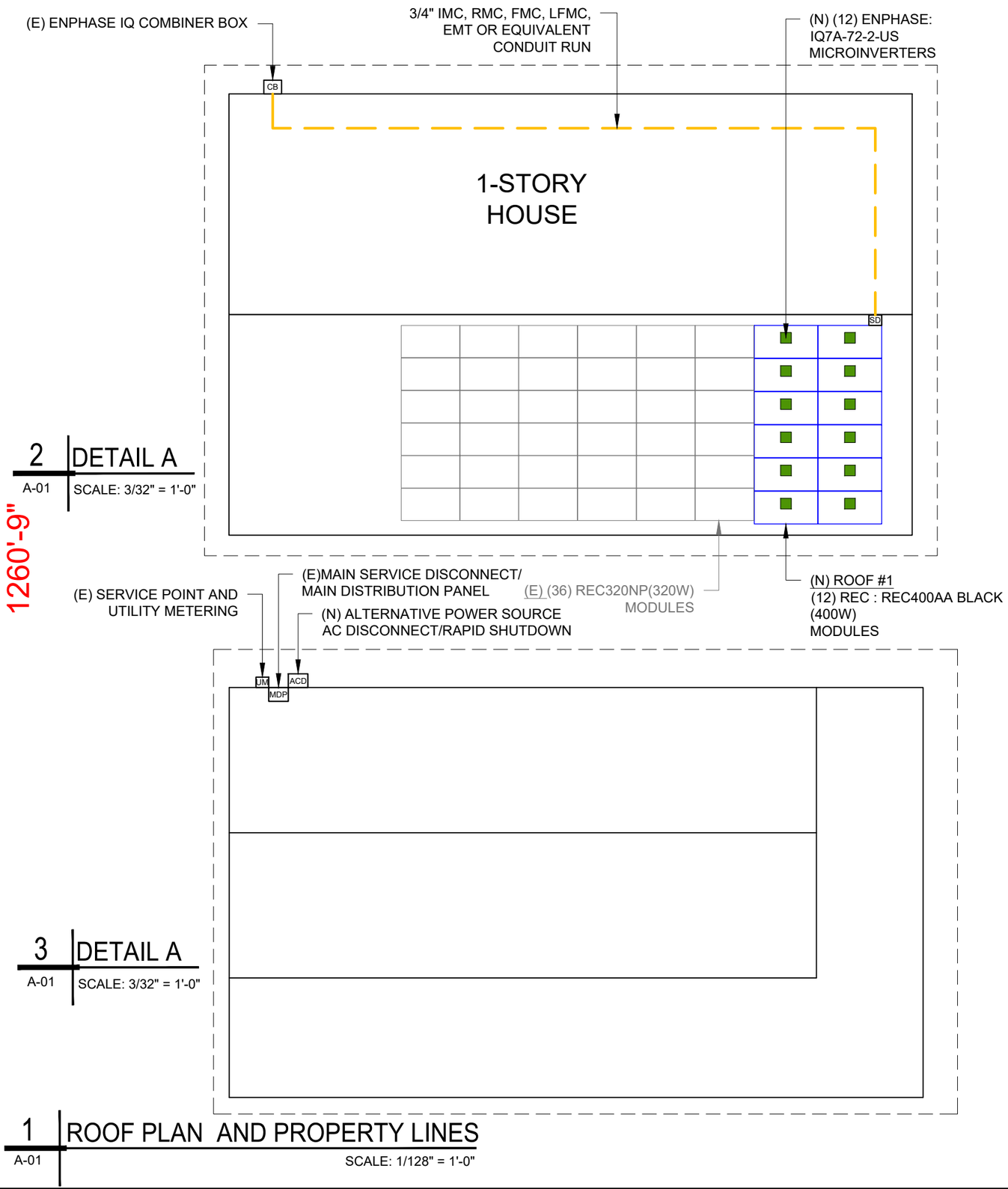
423 SW RED CEDAR CT,
FORT WHITE, FL 32038

SHEET NAME
NOTES AND DESCRIPTION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
A-00





2 DETAIL A
A-01 SCALE: 3/32" = 1'-0"

3 DETAIL A
A-01 SCALE: 3/32" = 1'-0"

1 ROOF PLAN AND PROPERTY LINES
A-01 SCALE: 1/128" = 1'-0"

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423 SW RED CEDAR CT,
FORT WHITE, FL 32038

SHEET NAME

ROOF PLAN

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

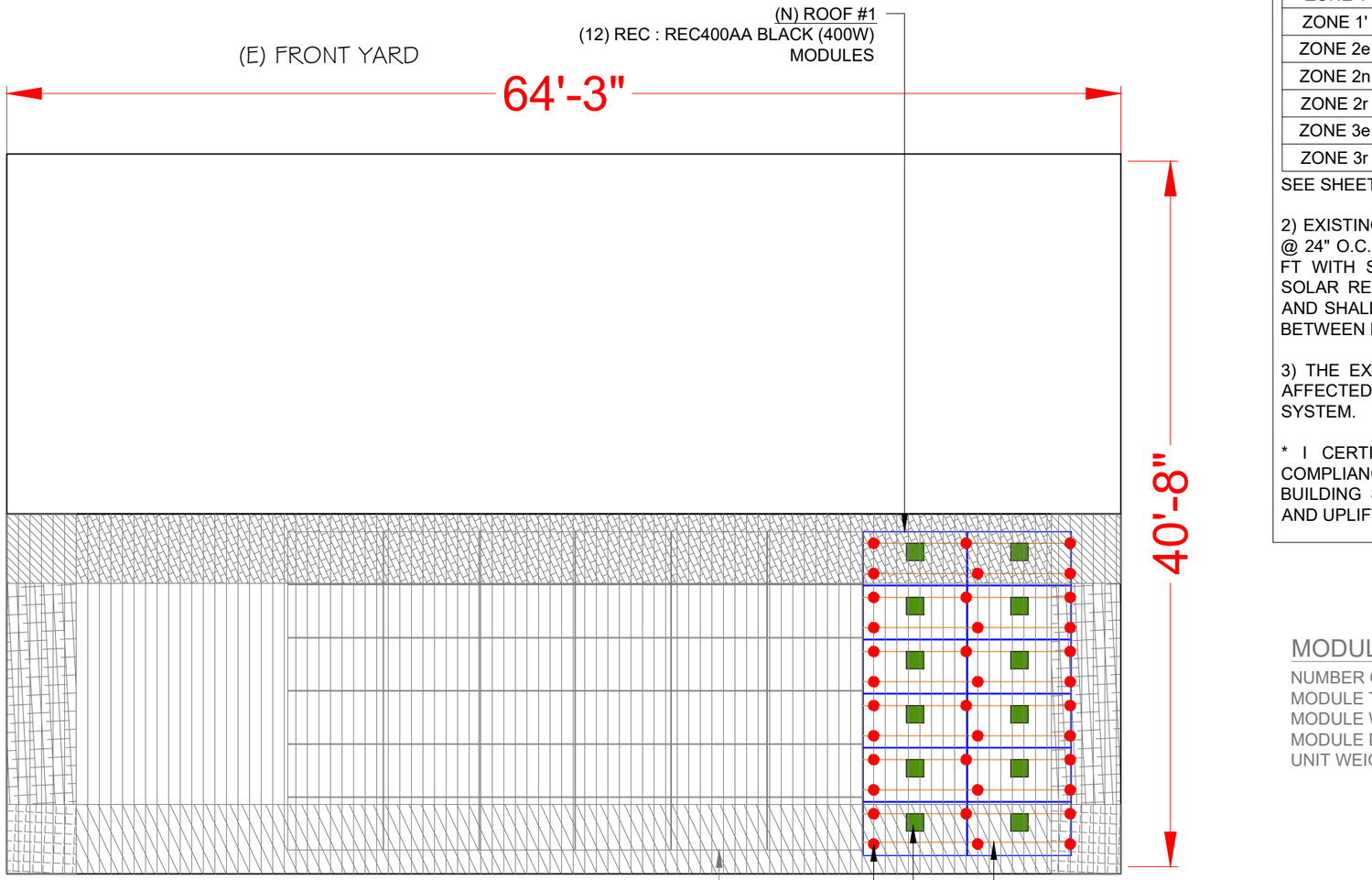
A-01

MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 12 MODULES
MODULE TYPE = REC : REC400AA BLACK (400W) MODULES
MODULE WEIGHT = 45.19 LBS / 20.5 KG.
MODULE DIMENSIONS = 71.7" x 40.0" = 19.92 SF
UNIT WEIGHT OF ARRAY = 2.27 PSF

ARRAY AREA & ROOF AREA CALC'S

	ROOF	ROOF TYPE	ARRAY AREA (sq.Ft.)	ROOF AREA (Sq. Ft.)	ROOF AREA COVERED BY ARRAY (%)	TILT	AZIMUTH	TRUSS SIZE	SEAM SPACING
(#N)	#1	METAL	2354.90	1333.54	176.59	22.6°	180°	2"X4"	8" O.C.
(#E)	#1	METAL	647.28	1333.54	48.54	22.6°	180°	2"X4"	8" O.C.
	TOTAL PLAN VIEW		3002.18	2667.08	112.56				



1 MODULE LAYOUT
S-01 SCALE: 1/8" = 1'-0"

GENERAL INSTALLATION PLAN NOTES:

1) ROOF ATTACHMENTS TO SYP SEAM SHALL BE INSTALLED AS SHOWN IN SHEET S-02 AND AS FOLLOWS FOR EACH WIND ZONE:

WIND ZONES	NON-EXPOSED MODULES		EDGE / EXPOSED MODULES	
	SPAN	CANTILEVER	SPAN	CANTILEVER
ZONE 1	6' - 0"	1' - 4"	6' - 0"	1' - 4"
ZONE 1'	X	X	X	X
ZONE 2e	6' - 0"	1' - 4"	6' - 0"	1' - 4"
ZONE 2n	6' - 0"	1' - 4"	4' - 0"	1' - 4"
ZONE 2r	6' - 0"	1' - 4"	4' - 0"	1' - 4"
ZONE 3e	6' - 0"	1' - 4"	4' - 0"	1' - 4"
ZONE 3r	6' - 0"	1' - 4"	4' - 0"	1' - 4"

SEE SHEET S-02.1 FOR SUPPORTING CALCULATIONS.

2) EXISTING RESIDENTIAL BUILDING HAS 2"X4" SYP TRUSSES SPACED @ 24" O.C. AND METAL ROOF DECKS WITH MEAN ROOF HEIGHT OF 15 FT WITH SEAMS SPACED 8" O.C. EXISTING ROOF SLOPE FOR THE SOLAR RETROFIT IS 22.6 DEGREES. CONTRACTOR TO FIELD VERIFY AND SHALL REPORT TO THE ENGINEER IF ANY DISCREPANCIES EXIST BETWEEN PLANS AND IN FIELD CONDITIONS.

3) THE EXISTING ROOF AND STRUCTURE WILL NOT BE ADVERSELY AFFECTED DUE TO THE ADDITIONAL LOADS IMPOSED BY THE SOLAR SYSTEM.

* I CERTIFY THAT THE INSTALLATION OF THE MODULES IS IN COMPLIANCE WITH FBC: RESIDENTIAL 2020 7TH ED., CHAPTER 3. BUILDING STRUCTURE WILL SAFELY ACCOMMODATE WIND LATERAL AND UPLIFT FORCES AND EQUIPMENT DEAD LOADS. *

MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 36 MODULES
MODULE TYPE = REC : REC320NP(320W) (320W) MODULES
MODULE WEIGHT = 45.19 LBS / 20.5 KG.
MODULE DIMENSIONS = 65.90" x 39.30" = 17.98 SF
UNIT WEIGHT OF ARRAY = 2.27 PSF

LEGEND

- WIND ZONE 1 (TYP)
- WIND ZONE 2e (TYP)
- WIND ZONE 2n (TYP)
- WIND ZONE 2r (TYP)
- WIND ZONE 3r (TYP)
- WIND ZONE 3e (TYP)

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ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

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POWER PRODUCTION MANAGEMENT, INC.

Signature with Seal
Digitally signed by: Ermocrates E Castillo
Date: 2022.08.09 15:13:50

PROJECT NAME

HERSCHLEB RESIDENCE
423 SW RED CEDAR CT, FORT WHITE, FL 32038

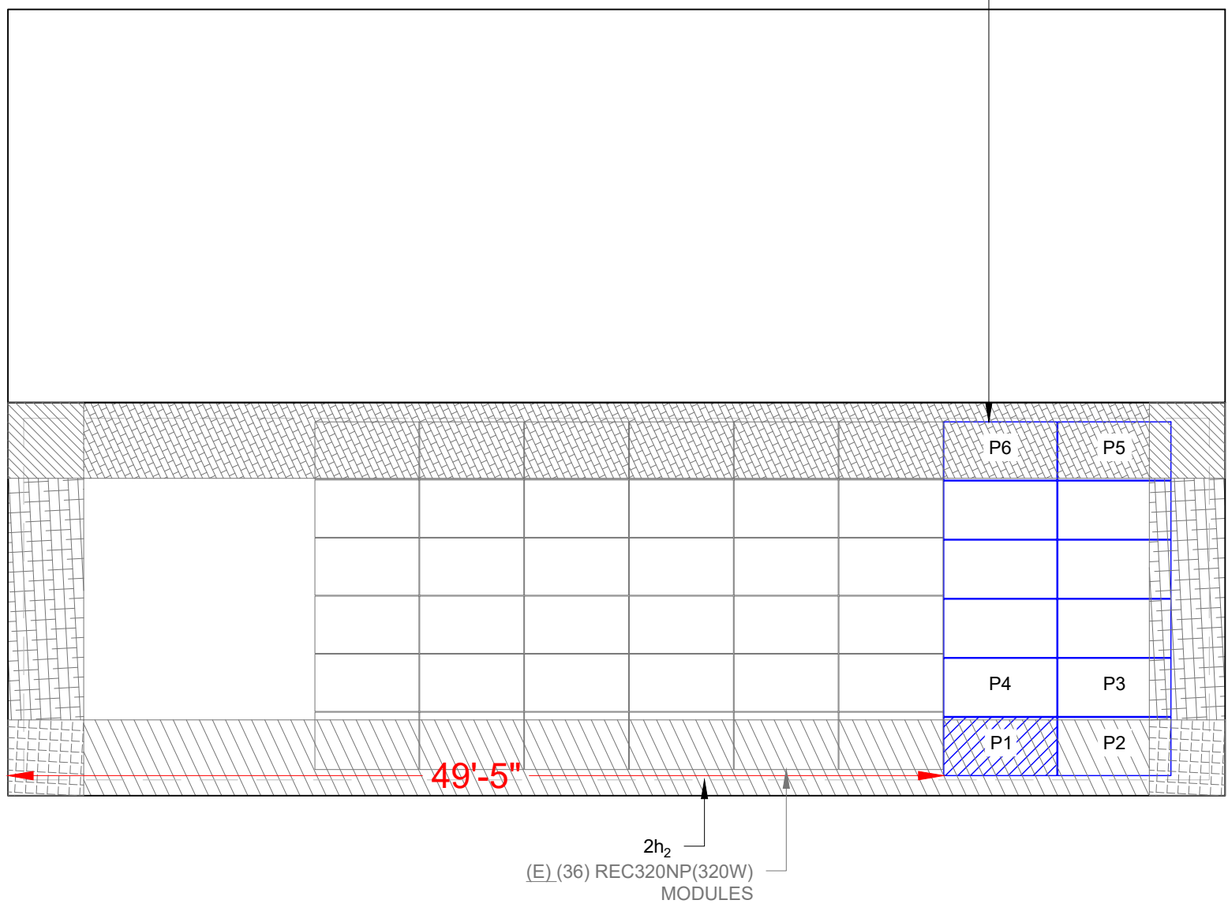
SHEET NAME
MODULE LAYOUT

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
S-01

(N) ROOF #1
(12) REC : REC400AA BLACK (400W)
MODULES

(E) FRONT YARD



(E) BACK YARD

FOR EXPOSED MODULES

1	1'	2e	2n	2r	3e	3r
21.7	0	21.7	30.3	30.3	30.3	34

Module Size	19.92	Sq. ft.

	Exposed modules							Partial
	1	1'	2e	2n	2r	3e	3r	Pressure
P1	0.86	0	19.06	0	0	0	0	21.70

FOR NON-EXPOSED MODULES

1	1	2e	2n	2r	3e	3r
16	0	16	20.2	20.2	20.2	22.7

Module Size	19.92	Sq. ft.

	Non-Exposed modules							Partial
	1	1	2e	2n	2r	3e	3r	Pressure
P2	0.70	0	15.43	0.16	0	3.52	0	15.80
P3	16.13	0	0	3.79	0	0	0	15.80
P4	19.47	0	0	0	0	0	0	15.00
P5	0.53	0	0	0.12	15.61	0	3.66	20.55
P6	0.65	0	0	0	19.27	0	0	20.06

ALLOWABLE MODULE UPLIFT PRESSURE 2 RAILS: 75 PSF

$2h_2$ DISTANCE : 0' - 10"
0.5h DISTANCE : 7' - 6"

NOTE: PARTIAL PRESSURES OF THE WIND ZONES ON ALL MODULES HAVE BEEN VERIFIED AND ARE WITHIN THE ALLOWABLE PER THE MANUFACTURER SPECIFICATION, INSTALLER SHOULD FOLLOW THE LAYOUT TO AVOID HIGHER ZONAL PARTIAL PRESSURES. ANY CHANGES IN LAYOUT SHOULD BE REPORTED BACK TO THE ENGINEER OF RECORD.

LEGEND

- EXPOSED MODULE
- EDGE MODULE
- NON- EXPOSED MODULE
- MISSING MODULE
- MIN. MODULE EDGE DISTANCE LINE
- MODULE EXPOSURE LINE
- WIND ZONE 1 (TYP)
- WIND ZONE 2 & 2e (TYP)
- WIND ZONE 2n (TYP)
- WIND ZONE 2r (TYP)
- WIND ZONE 3r (TYP)
- WIND ZONE 3 & 3e (TYP)

1 PARTIAL PRESSURE AND MODULES EXPOSURE
S-01.1 SCALE: 1/8" = 1'-0"

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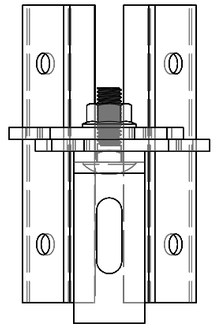
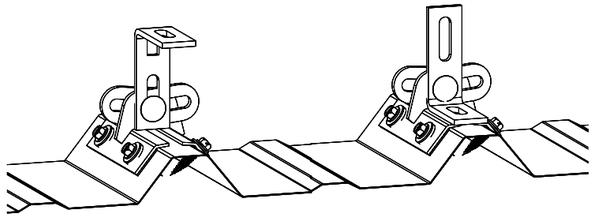
PROJECT NAME
HERSCHLEB RESIDENCE
423 SW RED CEDAR CT,
FORT WHITE, FL 32038

SHEET NAME
PARTIAL PRESSURE AND MODULES EXPOSURE

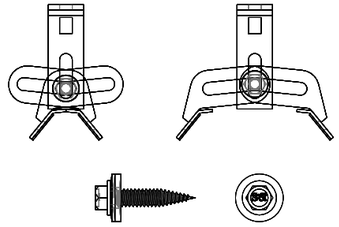
SHEET SIZE
ANSI B
11" X 17"

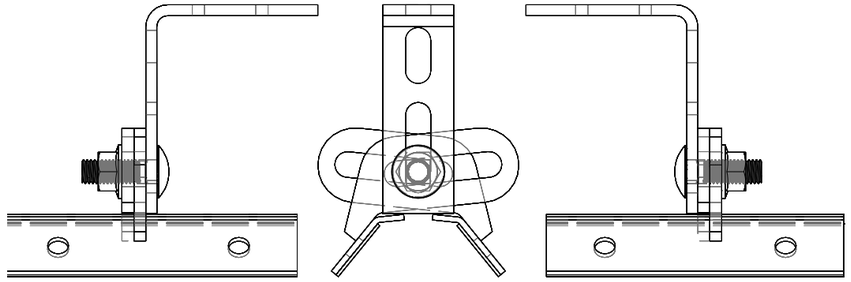
SHEET NUMBER
S-01.1





ProteaBracket



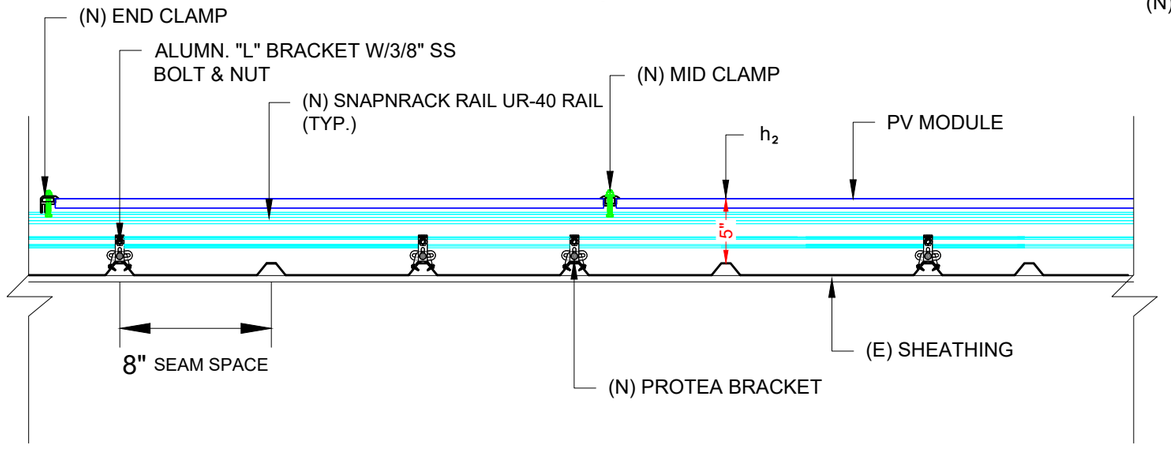


FOR STANDING SEAM SPECIFIC MECHANICAL LOAD TEST INFORMATION AND CLAMP INSTALLATION INFORMATION PLEASE VISIT: WWW.S-5.COM

1 ATTACHMENT DETAIL

S-02

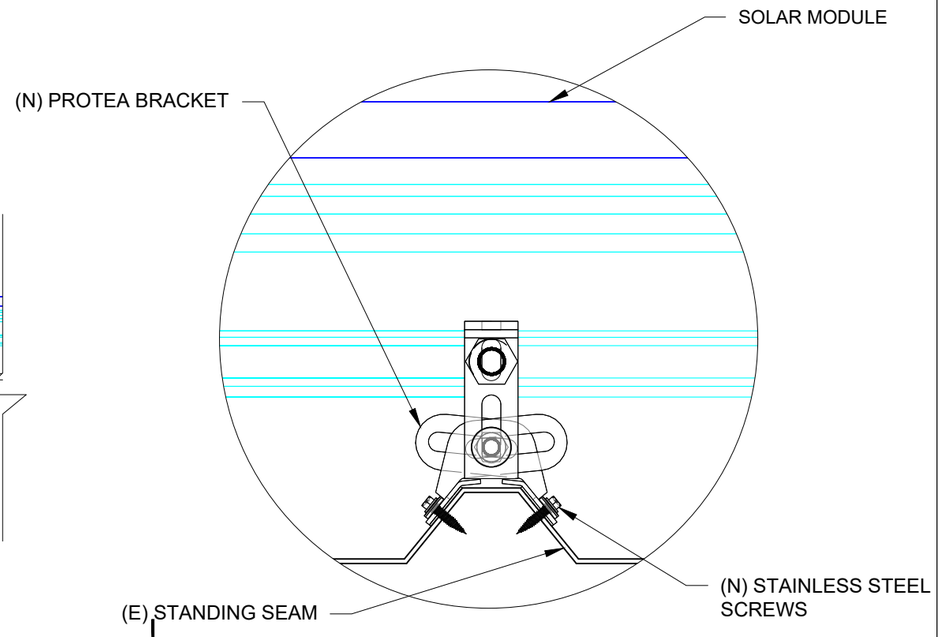
SCALE: NTS



2 ATTACHMENT DETAIL & ENLARGED VIEW

S-02

SCALE: 1' = 1'-0"



ATTACHMENT DETAIL (ENLARGED VIEW)

SCALE: 6" = 1'-0"

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SUITE 250,
MAITLAND, FL 32751
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REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

POWER PRODUCTION MANAGEMENT, INC.

Signature with Digital ID

Digitally signed by: Ermocrates E Castillo
Date: 2022.08.09 15:13:51

PROJECT NAME

HERSCHLEB RESIDENCE

423 SW RED CEDAR CT,
FORT WHITE, FL 32038

SHEET NAME

ATTACHMENT DETAIL

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

S-02

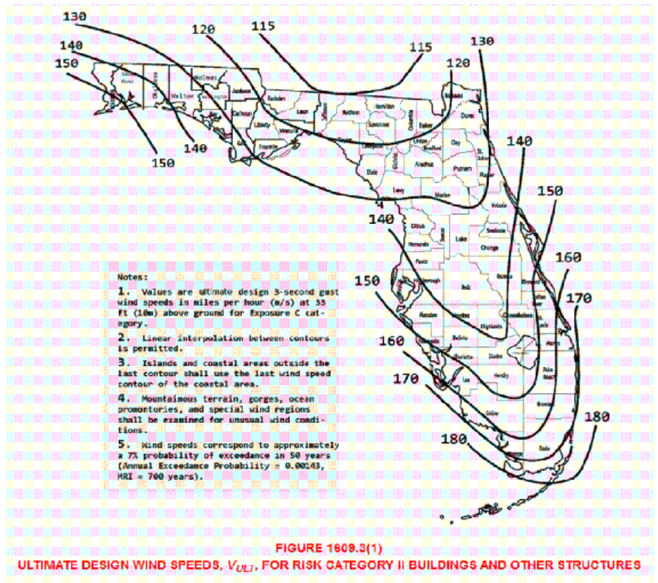

FIGURE 1609.3(1)
ULTIMATE DESIGN WIND SPEEDS, V_{ULT}, FOR RISK CATEGORY II BUILDINGS AND OTHER STRUCTURES

WIND LOAD CALCULATIONS FOR MODULES INSTALLED ON ROOFS WITH A HEIGHT LESS THAN 60'

SITE INFORMATION				
IBC VERSION	2018	RISK CATEGORY	II	
MEAN ROOF HEIGHT (ft)	15.0	EXPOSURE CATEGORY	B	
ROOF LENGTH (ft)	64.3	ROOF SLOPE	5 /12	
ROOF WIDTH (ft)	40.8	ROOF SLOPE (°)	22.6	
PARAPET HEIGHT (ft)	0.0	ROOF TYPE	GABLE	
MODULE LENGTH (in)	71.7	ULTIMATE WIND SPEED	130	mph
MODULE WIDTH (in)	40.00	NOMINAL WIND SPEED	101	mph
MODULE ORIENTATION	PORTRAIT	EXPOSURE FACTOR (C_e)	1.000	
MODULE AREA (sq. ft.)	19.92	TEMPERATURE FACTOR (C_t)	1.000	
GROUND SNOW LOAD (psf)	0.0	IMPORTANCE FACTOR (I_s)	1.000	
DEAD LOAD (psf)	3.0	SLOPE FACTOR (C_s)	0.910	
SLOPED ROOF SNOW LOAD (psf)	0.0	K_D	0.850	
EFFECTIVE WIND AREA (ft^2)	19.9	K_{ZT}	1.000	
GROUND ELEVATION (ft)	86.0	K_e	0.997	
HVHZ	NO	K_z	0.575	

DESIGN CALCULATIONS

VELOCITY PRESSURE (q) = $.00256*K_eK_zK_{ZT}K_DV^2$

VELOCITY PRESSURE(ASD) 12.6 psf

WIDTH OF PRESSURE COEFFICIENT	40.8' * 10%	=	4.08'	ZONE WIDTH A	4 FT	
	15' * 40%	=	6'	ZONE 2 WIDTH	N/A	(FOR (°) < 7°)
				ZONE 3 WIDTH	N/A	(FOR (°) < 7°)

EXTERNAL PRESSURE COEFFICIENT			
	ZONE 1	0.465	-1.501
	ZONE 1'	X	X
	ZONE 2e	0.465	-1.501
	ZONE 2n	0.465	-2.169
	ZONE 2r	0.465	-2.169
	ZONE 3e	0.465	-2.169
	ZONE 3r	0.465	-2.456

INTERNAL PRESSURE COEFFICIENT (+/-) 0.18

DESIGN PRESSURES

ROOF ZONE	DOWN	UP				
1	16.0	-21.3	psf			
1'	X	X	psf			
2e	16.0	-21.3	psf	Module allowable up ift pressure	75	psf
2n	16.0	-29.7	psf	Module allowable down pressure	75	psf
2r	16.0	-29.7	psf			
3e	16.0	-29.7	psf			
3r	16.0	-33.3	psf			

ARRAY FACTORS

ARRAY EDGE FACTOR (EXPOSED)	1.5	SOLAR PANEL PRESSURE EQUALIZATION FACTOR	0.68331
ARRAY EDGE FACTOR (NON-EXPOSED)	1		

ADJUSTED DESIGN PRESSURES

ROOF ZONE	DOWN	UP (Exposed)	UP (N. Exposed)	
1	16.0	-21.7	-16.0	psf
1'	X	X	X	psf
2e	16.0	-21.7	-16.0	psf
2n	16.0	-30.3	-20.2	psf
2r	16.0	-30.3	-20.2	psf
3e	16.0	30.3	20.2	psf
3r	16.0	-34.0	-22.7	psf

ATTACHMENTS USED

ATTACHMENT VODEL	S-5 protea	
ATTACHMENT STRENGTH	422	lbs

MAX DESIGN LOADS ALLOWABLE

LIMIT MAX SPAN TO		N/A	in			
RAFTER/SEAM SPACING		8	in	NO. OF RAILS	Exposed: 2	Non. Exp: 2
ROOF ZONE	DOWN	UP (Exposed)	UP (N. Exposed)		SPANS (E)	SPANS (N.E)
1	286.8	368.7	286.8	lbs	72 in	72 in
1'	X	X	X	lbs	X in	X in
2e	286.8	368.7	286.8	lbs	72 in	72 in
2n	286.8	362.2	362.2	lbs	48 in	72 in
2r	286.8	362.2	362.2	lbs	48 in	72 in
3e	286.8	362.2	362.2	lbs	48 in	72 in
3r	286.8	406.4	406.4	lbs	48 in	72 in

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TEL: (407) 289-2575
ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

POWER PRODUCTION MANAGEMENT, INC.

Signature with Seal

Digitally signed by: Ermocrates E Castillo
Date: 2022.08.09 15:13:51

PROJECT NAME

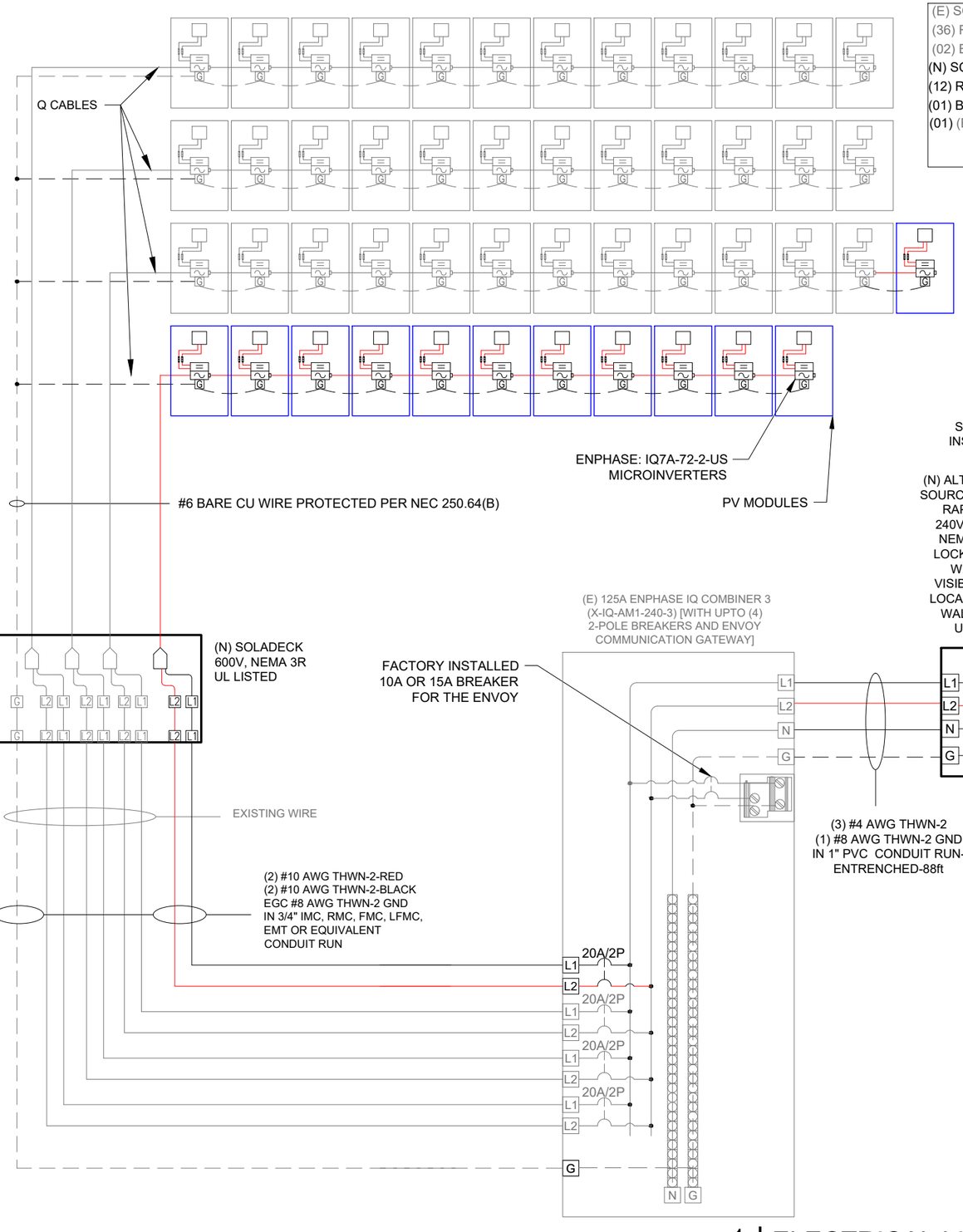
HERSCHLEB RESIDENCE

423 SW RED CEDAR CT,
FORT WHITE, FL 32038

SHEET NAME
STRUCTURAL CALCULATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
S-02.1



(E) SOLAR ARRAY (11.52 kW-DC STC)
(36) REC320NP(320W) MODULES
(02) BRANCH OF 12 MODULES
(N) SOLAR ARRAY (4.800 kW-DC STC)
(12) REC : REC400AA BLACK (400W) MODULES
(01) BRANCH OF 11 MODULES
(01) (E) BRANCH OF 12 MODULES + 1 (N) MODULE

1. SUBJECT PV SYSTEMS HAS BEEN DESIGNED TO MEET THE REQUIREMENTS OF THE NEC 2017, AND THOSE SET FORTH BY THE FLORIDA SOLAR ENERGY CENTER CERTIFICATION, INCLUDING MAXIMUM NUMBER OF MODULE STRINGS, MAXIMUM NUMBER OF MODULES PER STRING, MAXIMUM OUTPUT, MODULE MANUFACTURER AND MODEL NUMBER, INVERTER MANUFACTURER AND MODEL NUMBER, AS APPLICABLE.
2. PROVIDE TAP BOX IN COMPLIANCE WITH NEC 312.8 IF PANEL GUTTER SPACE IS INADEQUATE.
3. IF THE FUSED AC DISCONNECT WIRE RUN EXCEEDS 10 FT FROM THE POINT OF INTERCONNECTION, CABLE LIMITERS OR CURRENT-LIMITED CIRCUIT BREAKERS MUST BE INSTALLED FOR EACH UNGROUNDED CONDUCTOR PER NEC 705.31.

Voltage	240	V
Current	58.08	A
Wire Size	#4	AWG
Wire Run Length	88	ft
Calculated Voltage Drop	3.1	V
Percentage Voltage Drop	1.312%	2%
Original Wire needed	#6	AWG
Voltage Drop Corrected wire	#6	AWG
Original GND wire needed	#8	AWG
GND Wire required	#8	AWG

1 ELECTRICAL LINE DIAGRAM

E-01 SCALE: NTS

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PROJECT NAME

HERSCHLEB RESIDENCE

423 SW RED CEDAR CT,
FORT WHITE, FL 32038

SHEET NAME
ELECTRICAL LINE DIAGRAM

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
E-01

ELECTRICAL CALCULATION

Module Manufacturer	Rec Solar
Module Model	REC400-AA
Inverter Manufacturer	Enphase
Inverter Model	Enphase IQ 7 A
Modules/Branch Circuit 1	11
Modules/Branch Circuit 3	12 Existing Modules + 1 New Module
Modules/Branch Circuit 4	12 Existing Modules
Modules/Branch Circuit 5	12 Existing Modules
Total Array Power (kW)	4.400
System ac Voltage	240V 1-Phase

Module Properties			
Voc	48.8	Isc	10.1
Vmpp	42.1	Imp	9.51
TC Voc	-0.24%/ °C	TC Vmp	-0.26%/ °C
Pmp	400.0	NOCT	45 °C

Design Temperature	
Min. Ambient Temp. °F	32
Max. Ambient Temp. °F	117
Calculated Max. Voc	53
Calculated Min Vmp	33
Conduit Fill	
Number of conduits	2

Inverter Properties	
Output Voltage	240 L-L 1-PH
Max Input dc Voltag	58 Vdc
Operating Range	18 - 58 Vdc
MPPT Voltage Range	30 - 58 Vdc
Start Voltage	30 Vdc
Max Input Power	460 Wdc
Continuous AC Powe	349 VA

Ampacity Calcultions

Circuit	Max Amps	1.25 x Max Amps	AWG	90 °C Ampacity	Ambient Temp °F	Temp Derate	Conduit Fill	Fill Derate	Derated Ampacity	Maximum Circuit Breaker
Circuit 1	16.0	20.0	#10	40	130	0.76	8	0.7	21.28	20 A
Circuit 3 (12 Existing + 1	13.5	16.9	#10	40	130	0.76	8	0.7	21.28	20 A
Circuit 4 (Existing	12.0	15.0	#10	40	130	0.76	8	0.7	21.28	20 A
Circuit 5 (Existing	12.0	15.0	#10	40	130	0.76	8	0.7	21.28	20 A
AC Combiner Panel Output	53.5	66.9	#4	95	95	0.96	3	1	91.2	70 A

Maximum Circuit Voltage Drop	2%

Voltage Drop Calculations

Circuit	AWG	Circular Mills	I	V	Max Length
Circuit 1	#10	10380	16.0	240	121 Feet
Circuit 3 (12 Existing + 1 new)	#10	10380	13.5	240	143 Feet
Circuit 4 (Existing)	#10	10380	12.0	240	161 Feet
Circuit 5 (Existing)	#10	10380	12.0	240	161 Feet
Combiner Panel Output	#4	41740	53.5	240	145 Feet

Notes

	Temp derate based on NEC Table 310.15(B)(2)(a)
	Conduit fill derate based on NEC Table 310.15(B)(3)(a)
	Maximum Voc calculated using module manufacture temperature coefficients per NEC 690.7(A)
	Unless otherwise specified, all wiring must be THHN or THWN-2 Copper
	All wire sizes listed are the minimum allowable
	In any cell indicates that the system is safe and complies with NEC requirements
	In any cell indicates a potentially unsafe condition
	Information input by system designer
	Informaton obtained from manufacturer datasheets

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. THE TERMINALS ARE RATED FOR 75 DEGREE C.
3. THE WIRES ARE SIZED ACCORDING TO NEC 110.14.
4. 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.
5. WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.
6. DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS. CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS AND ACCESSORIES TO FULFILL APPLICABLE CODES AND STANDARDS.
7. WHERE SIZES OF JUNCTION BOXES, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
8. ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
9. MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURER'S INSTRUCTION.
10. MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER G.E.C. VIA WEEB LUG OR ILSCO GBL-4DBT LAY-IN LUG.
11. THE POLARITY OF THE GROUNDED CONDUCTORS IS NEGATIVE .
12. UTILITY HAS 24-HR UNRESTRICTED ACCESS TO ALL PHOTOVOLTAIC SYSTEM COMPONENTS LOCATED AT THE SERVICE ENTRANCE.
13. MODULES CONFORM TO AND ARE LISTED UNDER UL 1703.
14. RACKING CONFORMS TO AND IS LISTED UNDER UL 2703.
15. CONDUCTORS EXPOSED TO SUNLIGHT SHALL BE LISTED AS SUNLIGHT RESISTANT PER NEC ARTICLE 300.6 (C) (1) AND ARTICLE 310.10 (D).
16. CONDUCTORS EXPOSED TO WET LOCATIONS SHALL BE SUITABLE FOR USE IN WET LOCATIONS PER NEC ARTICLE 310.10 (C).
17. THIS SYSTEM IS EQUIPPED WITH RAPID SHUTDOWN OF PV CONDUCTORS IN COMPLIANCE WITH NEC 690.12.
18. LABELING IN COMPLIANCE WITH NEC 690.12 AND 690.56(C) IS SHOWN ON SHEET E-03.
19. ALL CONDUITS TO BE INSTALLED A MIN OF 7/8" ABOVE THE ROOF SURFACE.

I ERMOCRATES CASTILLO PE# 52590 AN ENGINEER LICENSED PURSUANT TO CHAPTER 471, CERTIFY THAT THE PV ELECTRICAL SYSTEM AND ELECTRICAL COMPONENTS ARE DESIGNED AND APPROVED USING THE STANDARDS CONTAINED IN THE MOST RECENT VERSION OF THE FLORIDA BUILDING CODE. FBC 107, THE NEC 2017, AND THOSE SET FORTH BY THE FLORIDA SOLAR ENERGY CENTER CERTIFICATION.

Castillo Engineering
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CASTILLO ENGINEERING SERVICES, LLC
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620 N. WYMORE ROAD,
SUITE 250,
MAITLAND, FL 32751
TEL: (407) 289-2575
ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

POWER PRODUCTION MANAGEMENT, INC.

Signature with Seal
Digitally signed by: Ermocrates E Castillo
Date: 2022.08.09 15:13:52

PROJECT NAME

HERSCHLEB RESIDENCE
423 SW RED CEDAR CT,
FORT WHITE, FL 32038

SHEET NAME

WIRING CALCULATIONS

SHEET SIZE

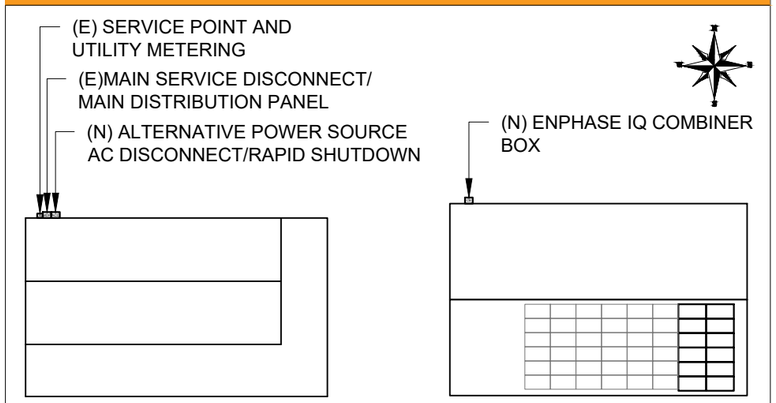
ANSI B
11" X 17"

SHEET NUMBER

E-02

CAUTION!

POWER TO THIS BUILDING
SUPPLIED FROM MULTIPLE SOURCES

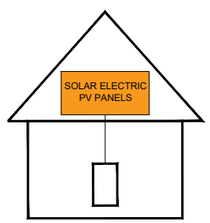


423 SW RED CEDAR CT, FORT WHITE, FL 32038

LABEL LOCATION:
MAIN SERVICE DISCONNECT / MAIN DISTRIBUTION PANEL, PV DISCONNECT
LOCATED NO MORE THAN 3FT (1M) FROM THE SERVICE DISCONNECT
(TEXT HEIGHT SHOULD BE A MINIMUM OF 3/8")
PER CODE NEC 705.10

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 LOCATION:
AC DISCONNECT, POINT OF INTERCONNECTION
(PER CODE: NEC 690.56(C)(1)(a), IFC 1204.5.1

⚠ WARNING

ELECTRIC SHOCK HAZARD
TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

LABEL LOCATION:
AC DISCONNECT, POINT OF INTERCONNECTION
(PER CODE: NEC 690.13(B))

⚠ WARNING DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

LABEL LOCATION:
POINT OF INTERCONNECTION
(PER CODE: NEC 705.12(B)(2)(3)(b))

PHOTOVOLTAIC SYSTEM AC DISCONNECT

RATED AC OPERATING CURRENT 53.5 AMPS
AC NOMINAL OPERATING VOLTAGE 240 VOLTS

LABEL LOCATION:
AC DISCONNECT, POINT OF INTERCONNECTION
(PER CODE: NEC 690.54)

WARNING:

POWER SOURCE OUTPUT CONNECTION DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL LOCATION:
POINT OF INTERCONNECTION
(PER CODE: NEC 705.12(B)(2)(3)(b))

DATA PER PANEL

NOMINAL OPERATING AC VOLTAGE -	240	**V**
NOMINAL OPERATING AC FREQUENCY-	60	**Hz**
MAXIMUM AC POWER-	349	**VA**
MAXIMUM AC CURRENT-	1.45	**A**
MAXIMUM OVERCURRENT DEVICE RATING FOR AC MODULE PROTECTION PER CIRCUIT-	20	**A**

LABEL LOCATION:
COMBINER BOX
(PER CODE: NEC 690.52)

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

LABEL LOCATION:
AC DISCONNECT
(PER CODE: NEC 690.56(C)(3))

ADHESIVE FASTENED SIGNS:
- THE LABEL SHALL BE VISIBLE, REFLECTIVE AND SUITABLE FOR THE ENVIRONMENT WHERE IT IS INSTALLED [NFPA 1, 11.12.2.1]
- WHERE REQUIRED ELSEWHERE IN THIS CODE, ALL FIELD APPLIED LABELS, WARNINGS, AND MARKINGS SHOULD COMPLY WITH ANSI Z535.4 [NEC 110.21(B) FIELD MARKING].
- ADHESIVE FASTENED SIGNS MAY BE ACCEPTABLE IF PROPERLY ADHERED. VINYL SIGNS SHALL BE WEATHER RESISTANT [IFC 605.11.1.3]

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620 N. WYMORE ROAD,
SUITE 250,
MAITLAND, FL 32751
TEL: (407) 289-2575
ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

POWER PRODUCTION MANAGEMENT, INC.

Signature with Logo
Digitally signed by: Ermocrates E Castillo
Date: 2022.08.09 15:13:52

PROJECT NAME

HERSCHLEB RESIDENCE
423 SW RED CEDAR CT,
FORT WHITE, FL 32038

SHEET NAME

SYSTEM LABELING

SHEET SIZE

ANSI B
11" X 17"

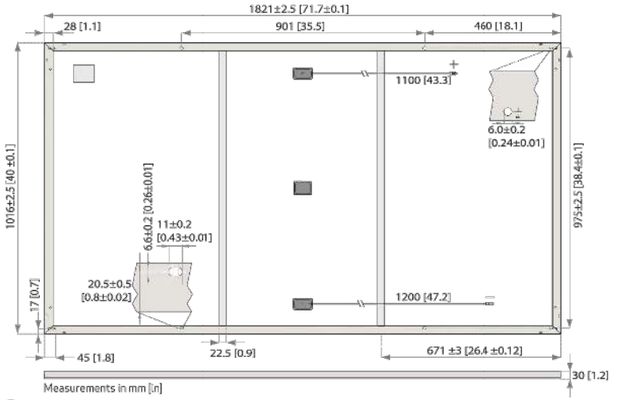
SHEET NUMBER

E-03

REC
SOLAR'S MOST TRUSTED

PRODUCT SPECIFICATIONS

REC ALPHA PURE BLACK SERIES > PRODUCT SPECIFICATIONS



GENERAL DATA

Cell type:	132 half-cut REC heterojunction cells with lead-free, gapless technology 6 strings of 22 cells in series	Connectors:	Staubli MC4 PV-KBT4/KST4, 12 AWG (4 mm²) in accordance with IEC 62852 IP68 only when connected
Glass:	0.13 in (3.2 mm) solar glass with anti-reflection surface treatment	Cable:	12 AWG (4 mm²) PV wire, 43+47 in (1.1+1.2 m) accordance with EN 50618
Backsheet:	Highly resistant polymer (black)	Dimensions:	71.7 x 40 x 1.2 in (1821 x 1016 x 30 mm)
Frame:	Anodized aluminum (black)	Weight:	45 lbs (20.5 kg)
Junction box:	3-part, 3 bypass diodes, IP67 rated in accordance with IEC 62790	Origin:	Made in Singapore

ELECTRICAL DATA

Product Code*: RECxxxAA Pure Black

STC	Power Output - P_{MAX} (Wp)	385	390	395	400	405
	Watt Class Sorting - (W)	0/+5	0/+5	0/+5	0/+5	0/+5
	Nominal Power Voltage - V_{MPP} (V)	41.2	41.5	41.8	42.1	42.4
	Nominal Power Current - I_{MPP} (A)	9.35	9.40	9.45	9.51	9.56
	Open Circuit Voltage - V_{OC} (V)	48.5	48.6	48.7	48.8	48.9
	Short Circuit Current - I_{SC} (A)	9.99	10.03	10.07	10.10	10.14
	Power Density (W/sq ft)	19.3	19.6	19.8	20.1	20.3
	Panel Efficiency (%)	20.8	21.1	21.3	21.6	21.9
NMOT	Power Output - P_{MAX} (Wp)	293	297	301	305	309
	Nominal Power Voltage - V_{MPP} (V)	38.8	39.1	39.4	39.7	40.0
	Nominal Power Current - I_{MPP} (A)	7.55	7.59	7.63	7.68	7.72
	Open Circuit Voltage - V_{OC} (V)	45.7	45.8	45.9	46.0	46.1
	Short Circuit Current - I_{SC} (A)	8.07	8.10	8.13	8.16	8.19

Values at standard test conditions (STC: air mass AM 1.5, irradiance 10.75 W/sq ft (1000 W/m²), temperature 77°F (25°C), based on a production spread with a tolerance of P_{MAX}, V_{OC} & I_{SC} ±3% within one watt class. Nominal module operating temperature (NMOT: air mass AM 1.5, irradiance 800 W/m², temperature 68°F (20°C), windspeed 3.3 ft/s (1 m/s). * Where xxx indicates the nominal power class (P_{MPP}) at STC above.

CERTIFICATIONS

IEC 61215:2016, IEC 61730:2016, UL 61730 (Pending)

ISO 14001:2004, ISO 9001:2015, OHSAS 18001:2007, IEC 62941

Intertek

WARRANTY

	Standard	REC ProTrust	
Installed by an REC Certified Solar Professional	No	Yes	Yes
System Size	All	≤25 kW	25-500 kW
Product Warranty (yrs)	20	25	25
Power Warranty (yrs)	25	25	25
Labor Warranty (yrs)	0	25	10
Power in Year 1	98%	98%	98%
Annual Degradation	0.25%	0.25%	0.25%
Power in Year 25	92%	92%	92%

See warranty documents for details. Conditions apply

MAXIMUM RATINGS

Operational temperature:	-40 ... +185°F (-40 ... +85°C)
Maximum system voltage:	1000 V
Maximum test load (front):	+7000 Pa (146 lbs/sq ft)*
Maximum test load (rear):	-4000 Pa (83.5 lbs/sq ft)*
Max series fuse rating:	25 A
Max reverse current:	25 A

* See installation manual for mounting instructions. Design load = Test load / 1.5 (safety factor)

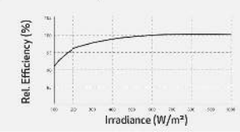
TEMPERATURE RATINGS*

Nominal Module Operating Temperature:	44°C (±2°C)
Temperature coefficient of P_{MAX}:	-0.26 %/°C
Temperature coefficient of V_{OC}:	-0.24 %/°C
Temperature coefficient of I_{SC}:	0.04 %/°C

*The temperature coefficients stated are linear values

LOW LIGHT BEHAVIOUR

Typical low irradiance performance of module at STC:



Specifications subject to change without notice.

Ref: PM-DS-12-01-Rev-A 03.21

Founded in 1996, REC Group is an international pioneering solar energy company dedicated to empowering consumers with clean, affordable solar power. As Solar's Most Trusted, REC is committed to high quality, innovation, and a low carbon footprint in the solar materials and solar panels it manufactures. Headquartered in Norway with operational headquarters in Singapore, REC also has regional hubs in North America, Europe, and Asia-Pacific.

REC
www.recgroup.com

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POWER PRODUCTION MANAGEMENT, INC.

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Date: 2022.08.09 15:13:53

PROJECT NAME

HERSCHLEB RESIDENCE

423 SW RED CEDAR CT,
FORT WHITE, FL 32038

SHEET NAME

DATA SHEET

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

DS-01

REC Americas LLC
1420 Gateway Dr, Suite 170
San Mateo, CA 94404
Dir 805 704 3226
Fax 805 457 6104
www.recgroup.com

Castillo Engineering Services, LLC
2925 W. State Road 434, Suite 111,
Longwood, Fl 32779

RE: REC Modules Max Wind Load

San Luis Obispo, 18 February 2021

To Whom it May Concern;

REC Americas LLC confirms that the REC Twin Peak 3M series (RECXXXTP3M) and REC Alpha Series (RECXXXAA) modules have passed UL2703 Mechanical Load testing at a test load of +/-113 PSF utilizing four-point attachments on the long side of the module.

Please be in touch with the REC Technical Department if you have any questions.

Sincerely,

George McClellan
REC Americas LLC
Senior Technical Sales Manager

Castillo Engineering
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SHEET NAME

DATA SHEET

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

DS-02

Data Sheet
Enphase Microinverters
Region: AMERICAS

Enphase IQ 7A Microinverter

The high-powered smart grid-ready **Enphase IQ 7A Micro™** dramatically simplifies the installation process while achieving the highest system efficiency for systems with 60-cell and 72-cell modules.

Part of the Enphase IQ System, the IQ 7A Micro integrates with the Enphase IQ Envoy™, Enphase IQ Battery™, and the Enphase Enlighten™ monitoring and analysis software.

The IQ Series Microinverters extend the reliability standards set forth by previous generations and undergo over a million hours of power-on testing, enabling Enphase to provide an industry-leading warranty of up to 25 years.

High Power
- Peak output power 366 VA @ 240 VAC and 295 VA @ 208 VAC

Easy to Install
- Lightweight and simple
- Faster installation with improved, lighter two-wire cabling
- Built-in rapid shutdown compliant (NEC 2014, 2017 & 2020)

Efficient and Reliable
- Optimized for high powered 60-cell and 72-cell modules
- Highest CEC efficiency of 97%
- More than a million hours of testing
- Class II double-insulated enclosure
- UL listed

Smart Grid Ready
- Complies with advanced grid support, voltage and frequency ride-through requirements
- Envoy and Internet connection required
- Configurable for varying grid profiles
- Meets CA Rule 21 (UL 1741-SA)

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

ENPHASE.

Enphase IQ 7A Microinverter

INPUT (DC)	IQ7A-72-2-US	
Commonly used module pairings[1]	295 W–460 W +	
Module compatibility	60-cell, 66-cell and 72-cell PV modules	
Maximum input DC voltage	58 V	
Power point tracking voltage range[2]	18 V–58 V	
Min/Max start voltage	33 V / 58 V	
Max DC short circuit current (module Isc)[3]	15 A	
Overvoltage class DC port	II	
DC port backfeed current	0 A	
PV array configuration	1 x 1 ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit	
OUTPUT (AC)	**@ 240 VAC**	**@ 208 VAC**
Peak output power	366 VA	295 VA
Maximum continuous output power	349 VA	290 VA
Nominal (L-L) voltage/range[4]	240 V / 211–264 V	208 V / 183–229 V
Maximum continuous output current	1.45 A (240 VAC)	1.39 A (208 VAC)
Nominal frequency	60 Hz	
Extended frequency range	47–68 Hz	
AC short circuit fault current over 3 cycles	5.8 Arms	
Maximum units per 20 A (L-L) branch circuit[5]	11 (240 VAC)	11 (208 VAC)
Overvoltage class AC port	III	
AC port backfeed current	18 mA	
Power factor setting	1.0	
Power factor (adjustable)	0.85 leading ... 0.85 lagging	
EFFICIENCY	**@240 VAC**	**@208 VAC**
CEC weighted efficiency	97.0 %	96.5%
MECHANICAL		
Ambient temperature range	-40°C to +60°C	
Relative humidity range	4% to 100% (condensing)	
Connector type: DC (IQ7A-72-2-US)	MC4	
Dimensions (HxWxD)	212 mm x 175 mm x 30.2 mm (without bracket)	
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	
Environmental category / UV exposure rating	NEMA Type 6 / outdoor	
FEATURES		
Communication	Power Line Communication (PLC)	
Monitoring	Enlighten Manager and MyEnlighten monitoring options Compatible with Enphase IQ Envoy	
Disconnecting means	The AC and DC connectors have been evaluated and approved by UL for use as the load-break disconnect required by NEC 690.	
Compliance	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 C22.1-2015 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according manufacturer's instructions.	

1. No enforced DC/AC ratio. See the compatibility calculator at https://enphase.com/en-us/support/module-compatibility.
2. CEC peak power tracking voltage range is 38 V to 43 V.
3. Maximum continuous input DC current is 10.2A.
4. Voltage range can be extended beyond nominal if required by the utility.
5. Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

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

11-04-2021

ENPHASE.

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ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

POWER PRODUCTION MANAGEMENT, INC.

Signature with Seal
Digitally signed by: Ermocrates E Castillo
Date: 2022.08.09 15:13:54

PROJECT NAME

HERSCHLEB RESIDENCE

423 SW RED CEDAR CT,
FORT WHITE, FL 32038

SHEET NAME
DATA SHEET

SHEET SIZE
ANSI B
11" X 17"

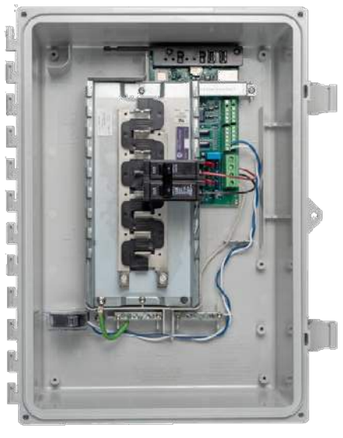
SHEET NUMBER
DS-03

Data Sheet
Enphase Networking

Enphase IQ Combiner 3

(X-IQ-AM1-240-3)

The **Enphase IQ Combiner 3™** with Enphase IQ Envoy™ consolidates interconnection equipment into a single enclosure and streamlines PV 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 Envoy for communication and control
- Flexible networking supports Wi-Fi, Ethernet, or cellular
- Optional AC receptacle available for PLC bridge
- Provides production metering and optional consumption monitoring
- Supports Ensemble Communications Kit for communication with Enphase Encharge™ storage and Enphase Enpower™ smart switch

Simple

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

Reliable

- Durable NRTL-certified NEMA type 3R enclosure
- Five-year limited warranty
- UL listed

LISTED

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

ENPHASE

Enphase IQ Combiner 3

MODEL NUMBER	
IQ Combiner 3 X-IQ-AM1-240-3	IQ Combiner 3 with Enphase IQ Envoy™ printed circuit board for integrated revenue grade PV **production** metering (ANSI C12.20 +/- 0.5%) and optional* **consumption** monitoring (+/- 2.5%).
ACCESSORIES and REPLACEMENT PARTS (not included, order separately)	
Enphase Mobile Connect™ CELLMODEM-03 (4G/12-year data plan) CELLMODEM-01 (3G/5-year data plan) CELLMODEM-M1 (4G based LTE-M/5-year data plan)	Plug and play industrial grade cellular modem with data plan 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.)
Consumption Monitoring* CT CT-200-SPLIT * Consumption monitoring is required for Enphase Storage Systems	Split core current transformers enable whole home **consumption** metering (+/- 2.5%).
Ensemble Communications Kit COMMS-KIT-01	Installed at the IQ Envoy. For communications with Enphase Encharge™ storage and Enphase Enpower™ smart switch. Includes USB cable for connection to IQ Envoy or Enphase IQ Combiner™ and allows wireless communication with Encharge and Enpower.
Circuit Breakers BRK-10A-2-240 BRK-15A-2-240 BRK-20A-2P-240	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
EPLC-01	Power line carrier (communication bridge pair), quantity - one pair
XA-SOLARSHIELD-ES	Replace the default solar shield with this Ensemble Combiner Solar Shield to match the look and feel of the Enphase Enpower™ smart switch and the Enphase Encharge™ storage system
XA-PLUG-120-3	Accessory receptacle for Power Line Carrier in IQ Combiner 3 (required for EPLC-01)
XA-ENV-PCBA-3	Replacement IQ Envoy printed circuit board (PCB) for Combiner 3
ELECTRICAL SPECIFICATIONS	
Rating	Continuous duty
System voltage	120/240 VAC, 60 Hz
Eaton BR series busbar rating	125 A
Max. continuous current rating (output to grid)	65 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. continuous current rating (input from PV)	64 A
Max. total branch circuit breaker rating (input)	80 A of distributed generation / 95 A with IQ Envoy breaker included
Envoy breaker	10A or 15A rating GE Q-line/Siemens Type QP /Eaton BR series included
Production Metering CT	200 A solid core pre-installed and wired to IQ Envoy
MECHANICAL DATA	
Dimensions (WxHxD)	49.5 x 37.5 x 16.8 cm (19.5" x 14.75" 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
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included)
Cellular	CELLMODEM-M1 4G based LTE-M cellular modem (not included). Note that an Enphase Mobile Connect cellular modem is required for all Ensemble installations.
COMPLIANCE	
Compliance, 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)
Compliance, IQ Envoy	UL 60601-1/CANCSA 22.2 No. 61010-1

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423 SW RED CEDAR CT,
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SHEET NAME

DATA SHEET

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

DS-04

SnapNrack
Solar Mounting Solutions

Ultra Rail

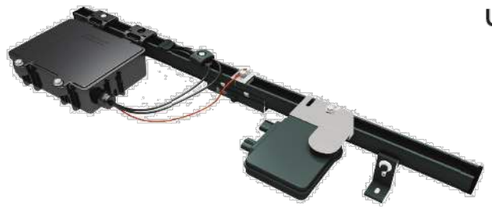
UR-40
UR-60

SnapNrack Ultra Rail System

A sleek, straightforward rail solution for mounting solar modules on all roof types. Ultra Rail features two rail profiles; UR-40 is a lightweight rail profile that is suitable for most geographic regions and maintains all the great features of SnapNrack rail, while UR-60 is a heavier duty rail profile that provides a larger rail channel and increased span capabilities. Both are compatible with all existing mounts, module clamps, and accessories for ease of install.

The Entire System is a Snap to Install

- New Ultra Rail Mounts include snap-in brackets for attaching rail
- Compatible with all the SnapNrack Mid Clamps and End Clamps customers love
- Universal End Clamps and snap-in End Caps provide a clean look to the array edge



Unparalleled Wire Management

- Open rail channel provides room for running wires resulting in a long-lasting quality install
- Industry best wire management offering includes Junction Boxes, Universal Wire Clamps, MLPE Attachment Kits, and Conduit Clamps
- System is fully bonded and listed to UL 2703 Standard

The Ultimate Value in Rooftop Solar

- Industry leading Wire Management Solutions
- Mounts available for all roof types
- Single Tool Installation
- All SnapNrack Module Clamps & Accessories are compatible with both rail profiles

Heavy Duty UR-60 Rail

- UR-60 rail profile provides increased span capabilities for high wind speeds and snow loads
- Taller, stronger rail profile includes profile-specific rail splice and end cap
- All existing mounts, module clamps, and accessories are retained for the same great install experience

Start Installing Ultra Rail Today

RESOURCES snapnrack.com/resources
DESIGN snapnrack.com/configurator
WHERE TO BUY snapnrack.com/where-to-buy

Quality. Innovative. Superior.

SnapNrack Solar Mounting Solutions are engineered to optimize material use and labor resources and improve overall installation quality and safety.

877-732-2860 **www.snapnrack.com** **contact@snapnrack.com**

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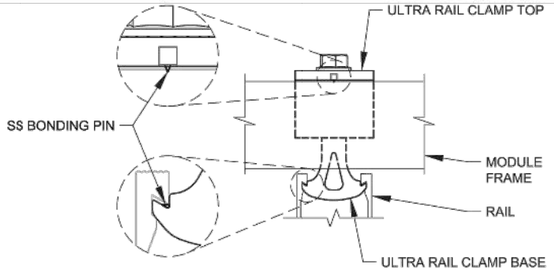
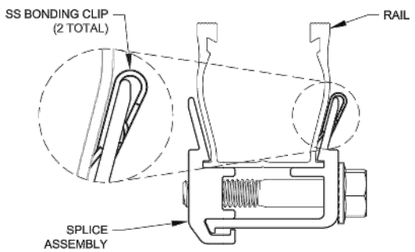
Grounding Specifications

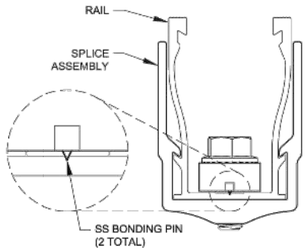
snapnrack.com

System Bonding Methods

1. SnapNrack Ultra Rail Mid Clamp
2. SnapNrack Ultra Rail End Clamp
3. SnapNrack Mid Clamp
4. SnapNrack Adjustable End Clamp
5. SnapNrack UR-40 Rail Splice
6. SnapNrack UR-60 Rail Splice



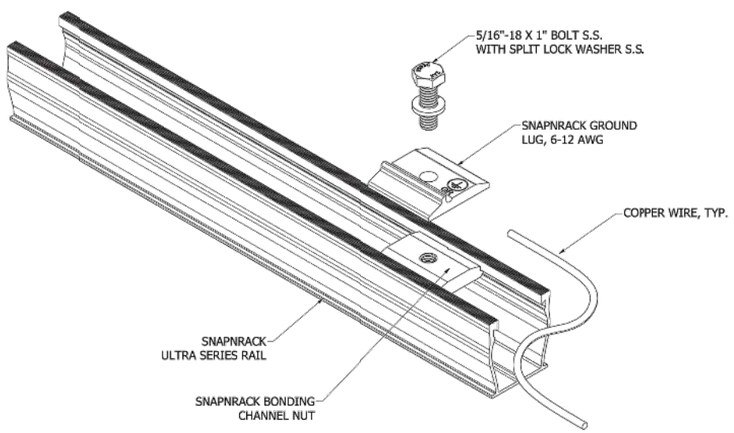




Note:
SnapNrack module clamps contain a SnapNrack Channel Nut with integral bonding clips or pins in assembly to properly bond the system (except Universal End Clamps).

Note:
SnapNrack Ultra Rail Splices contain integral bonding clips in assembly to properly bond the system.

SnapNrack Ground Lug Assembly



An Intro to SnapNrack Ultra Rail

snapnrack.com

SnapNrack Ultra Rail Solar Mounting System offers a low profile, visually appealing, photovoltaic (PV) module installation system. This innovative system simplifies the process of installing solar PV modules, shortens installation times, and lowers installation costs..

SnapNrack systems, when installed in accordance with this manual, will be structurally adequate for the specific installation site and will meet the local and International Building Code. Systems will also be bonded to ground, under SnapNrack's UL 2703 Listing.

The SnapNrack installation system is a set of engineered components that can be assembled into a wide variety of solar mounting structures. It is designed to be installed by qualified solar installation technicians. With SnapNrack you will be able to solve virtually any PV module mounting challenge.

Benefits of Installing the SnapNrack Ultra Rail System

Install With Existing Roof Attachments
Compatible with existing SnapNrack roof attachments

Install With Very Few Tools
All Ultra Rail hardware is attached using a standard 1/2" socket

Built in Wire Management and Aesthetics
Extensive wire management solutions have been designed specifically for the system that adapts to multiple possible mounting positions.

The system is designed to be aesthetically pleasing on its own, so it does not require an aesthetic skirt. SnapNrack does offer an optional skirt for those looking for a high end look to the system.

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PROJECT NAME

HERSCHLEB RESIDENCE
423 SW RED CEDAR CT,
FORT WHITE, FL 32038

SHEET NAME
DATA SHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
DS-06

S-5!®

The Right Way!™

NEW

NOW AVAILABLE IN ALUMINUM

ProteaBracket™

ProteaBracket™

A versatile bracket for mounting solar PV to trapezoidal roof profiles

ProteaBracket™ 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™

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

Features and Benefits

- 34% lighter - saves on shipping
- Stronger L-Foot™
- 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*

*See www.S-5.com for details.

The right way to attach solar PV to trapezoidal roof profiles!

888-825-3432 | www.S-5.com |

MADE IN USA

S-5!®

The Right Way!™

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

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

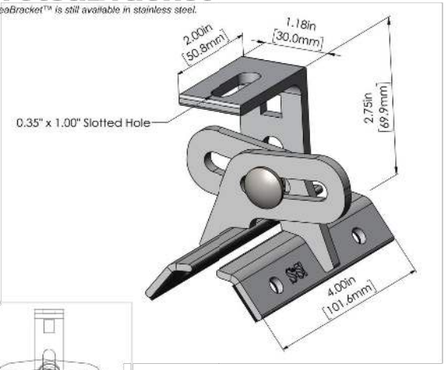
Note: All four pre-punched holes must be used to achieve tested strength. Fasteners are provided.

For design assistance, ask your distributor, or visit **www.S-5.com** 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!® holding strength is unmatched in the industry.

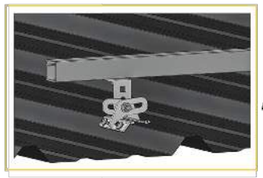
ProteaBracket™

ProteaBracket™ is still available in stainless steel.



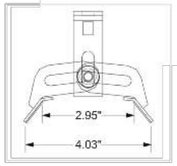
Multiple Attachment Options:

Side Mount Rail



Bottom Mount Rail

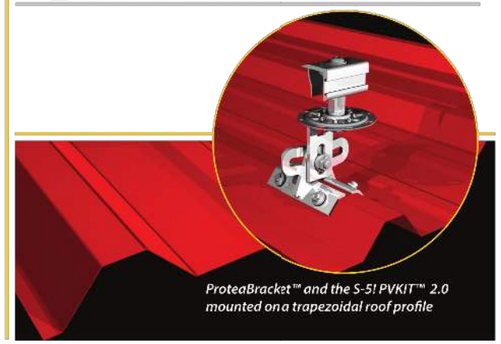
w/ S-5! PVKIT™ (rail-less)



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™ and the S-5! PVKIT™ 2.0 mounted on a trapezoidal roof profile

S-5!® 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.

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