HUDSON RESIDENCE

11.63 kW PV SYSTEM

444 SE HORIZON GLEN,
LAKE CITY, FL 32025

PROJECT DESCRIPTION:

31x375 LG NEON2: LG375N1C-A6 (375) MODULES
ROOF MOUNTED SOLAR PHOTOVOLTAIC MODULES
SYSTEM SIZE: 11.625 kW DC STC
ARRAY AREA #1: 39.03 SQ FT.
ARRAY AREA #2: 253.67 SQ FT.
ARRAY AREA #3: 312.21 SQ FT.

EQUIPMENT SUMMARY

31	LG NEON2: LG375N1C-A6 (375) MODULES
31	ENPHASE: IQ7PLUS-72-2-US MICROINVERTERS
01	ENPHASE ENCHARGE 10 BATTERY
01	ENPHASE ENPOWER SWITCH

RACKING: UNIRAC LIGHT RAIL
ATTACHMENT: UNIRAC FLASHLOC

DESIGN CRITERIA:

WIND SPEED (ULT):	120 MPH
WIND SPEED (ASD):	93 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

HUDSON, RYAN

INSTALLER

SUNPRO SOLAR
4492 Eagle Falls Place,
Tampa, FL 33619
PH: (866) 450-1012

ENGINEER

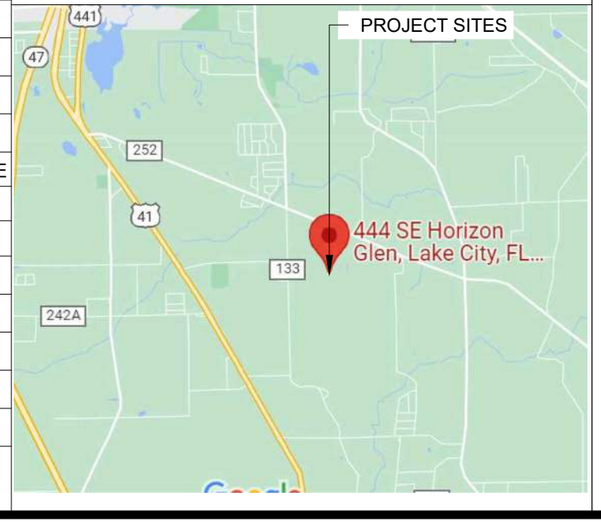
Castillo Engineering Services LLC
620 N. Wymore Road, Suite 250, Maitland, FL 32751
TEL: (407) 289-2575
Ermocrates E. Castillo
License#: FL PE 52590

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
DS-01-09	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
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MAITLAND, FL 32751
TEL: (407) 289-2575
ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

SUNPRO

E. CASTILLO LICENSE No. 52590 STATE OF FLORIDA PROFESSIONAL ENGINEER

Digitally Signed by: Ermocrates E Castillo
Date: 2021.09.15 16:33:52
Signature with Seal

PROJECT NAME

HUDSON RESIDENCE
444 SE HORIZON GLEN,
LAKE CITY, FL 32025

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 31x375 LG NEON2: LG375N1C-A6 (375W) Modules with a combined STC rated dc output power of 11,625W. The modules are connected into 31 Enphase: IQ7PLUS-72-2-US microinverters. 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.

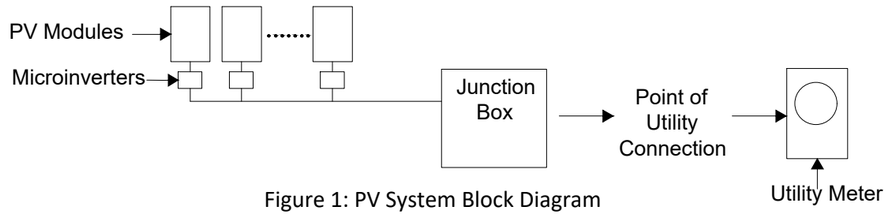


Figure 1: PV System Block Diagram

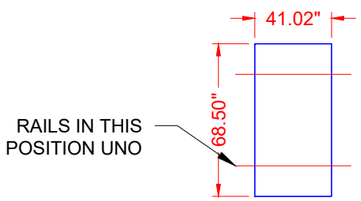
The inverter meets the requirements of IEEE 1547 and UL 1741.

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)



LG NEON2:
LG375N1C-A6 (375W)
MODULES

ALLOWABLE/DESIGN PRESSURE	PSF
DOWN PRESSURE	125
UPLIFT PRESSURE, 2 RAILS	88

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REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

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Date: 2021.09.15 16:33:52
Signature with Seal

PROJECT NAME

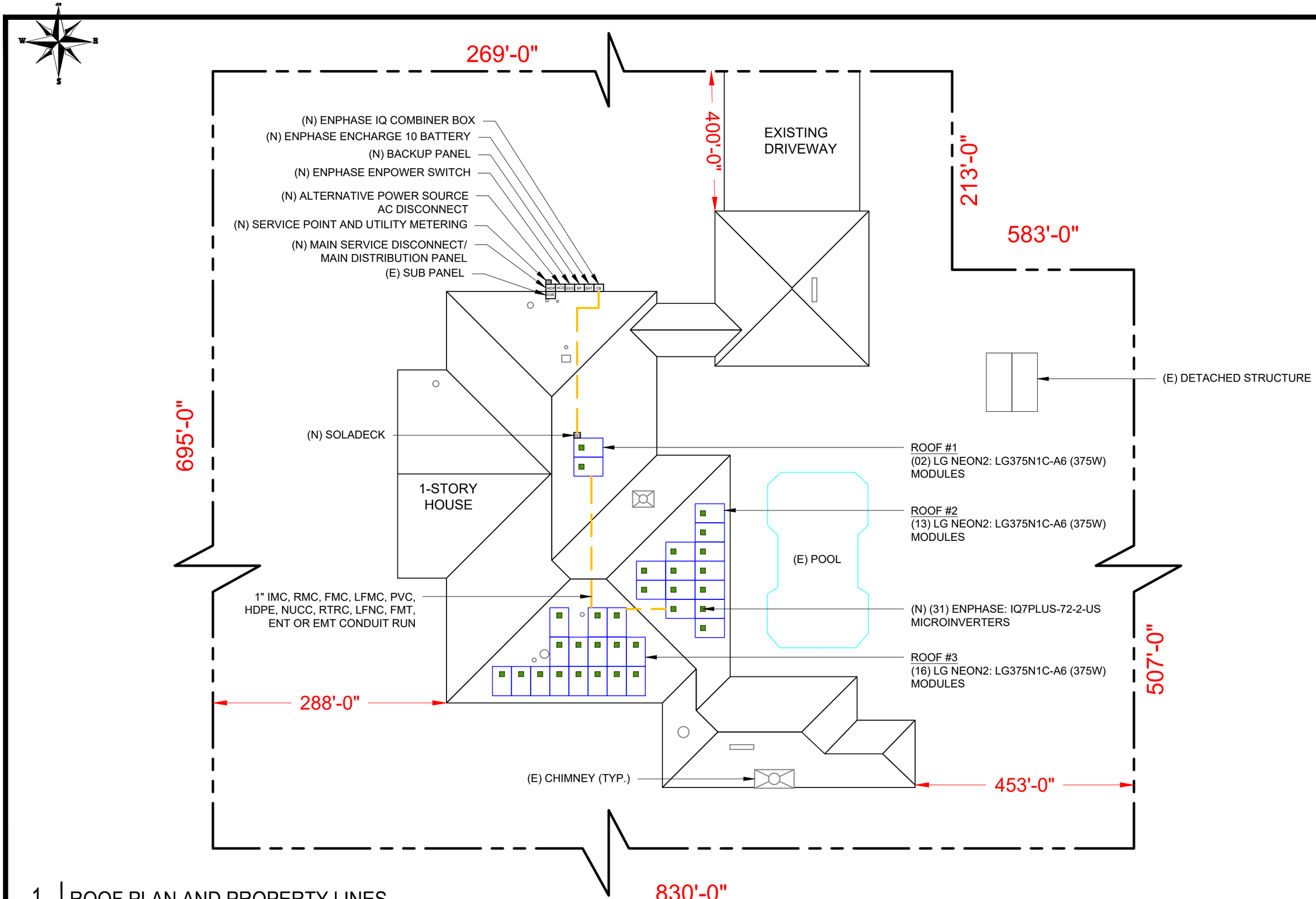
HUDSON RESIDENCE

444 SE HORIZON GLEN,
LAKE CITY, FL 32025

SHEET NAME
NOTES AND DESCRIPTION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
A-00



1 ROOF PLAN AND PROPERTY LINES

A-01

SCALE: 1/16" = 1'-0"

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PROJECT NAME

HUDSON RESIDENCE

444 SE HORIZON GLEN, LAKE CITY, FL 32025

SHEET NAME

ROOF PLAN

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

A-01

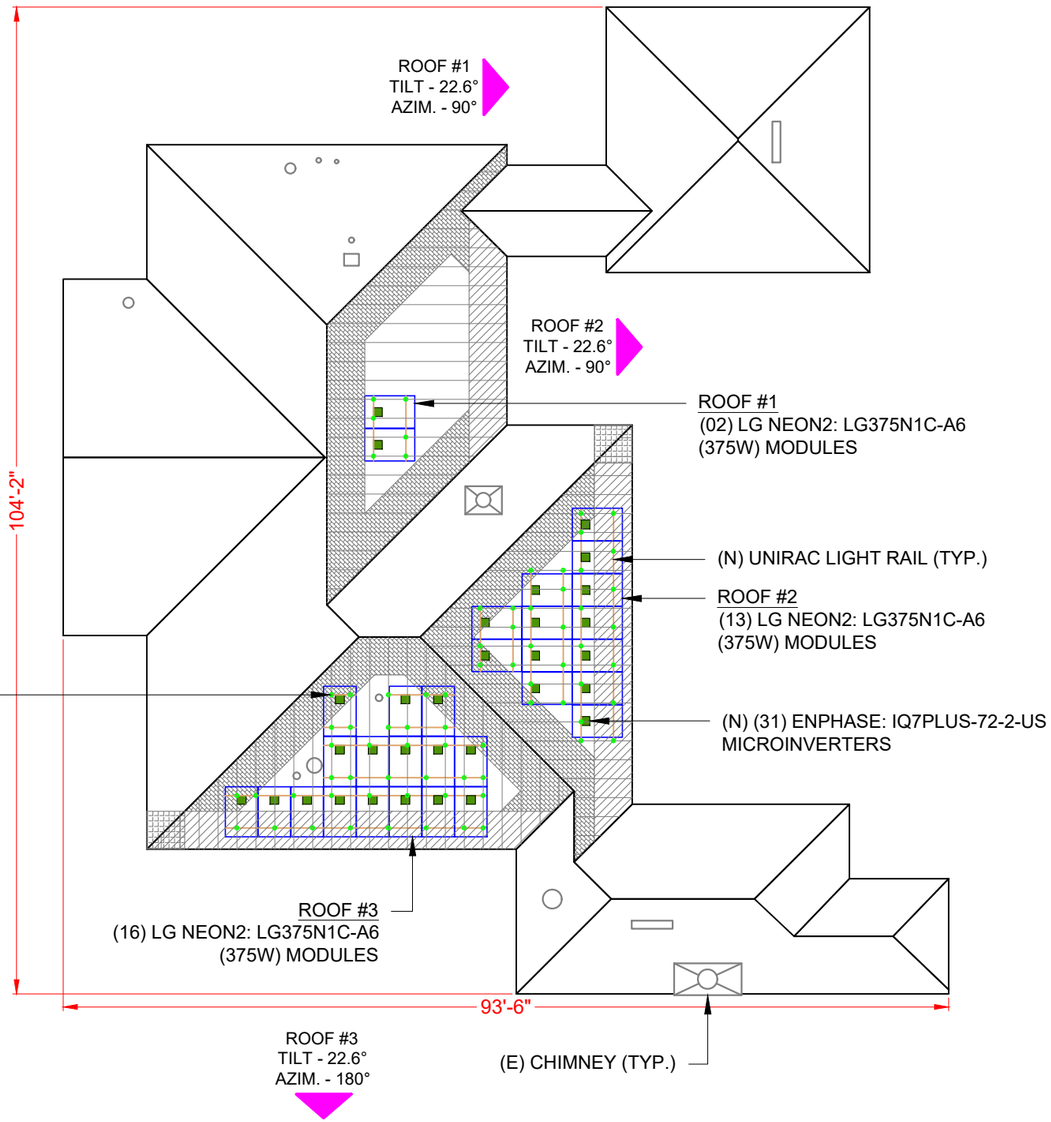
MODULE TYPE, DIMENSIONS & WEIGHT

NUMBER OF MODULES = 31 MODULES
MODULE TYPE = LG NEON2: LG375N1C-A6 (375W) MODULES
MODULE WEIGHT = 41.01 LBS / 18.6 KG.
MODULE DIMENSIONS = 68.50"x 41.02" = 19.51 SF
UNIT WEIGHT OF ARRAY = 2.10 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	TRUSS SPACING
#1	ASPHALT SHINGLE	39.03	539.13	7.24	22.6°	90°	2"X4"	24" O.C.
#2	ASPHALT SHINGLE	253.67	509.66	49.77	22.6°	90°	2"X4"	24" O.C.
#3	ASPHALT SHINGLE	312.21	608.57	51.30	22.6°	180°	2"X4"	24" O.C.

(E) FRONT YARD



(E) BACK YARD

1 MODULE LAYOUT
S-01 SCALE: 1/16" = 1'-0"

GENERAL INSTALLATION PLAN NOTES:

1) ROOF ATTACHMENTS TO SYP TRUSSES 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	4' - 0"	1' - 4"	4' - 0"	1' - 4"
ZONE 1'	X	X	X	X
ZONE 2e	4' - 0"	1' - 4"	4' - 0"	1' - 4"
ZONE 2n	X	X	X	X
ZONE 2r	4' - 0"	1' - 4"	4' - 0"	1' - 4"
ZONE 3e	4' - 0"	1' - 4"	4' - 0"	1' - 4"
ZONE 3r	X	X	X	X

SEE SHEET S-02.1 FOR SUPPORTING CALCULATIONS.

2) EXISTING RESIDENTIAL BUILDING IS AN ASPHALT SHINGLE ROOF WITH MEAN ROOF HEIGHT IS 15 FT AND SYP 2"X4" ROOF TRUSSES SPACED 24" O.C. EXISTING ROOF SLOPE FOR SOLAR SYSTEM 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.

* 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. *

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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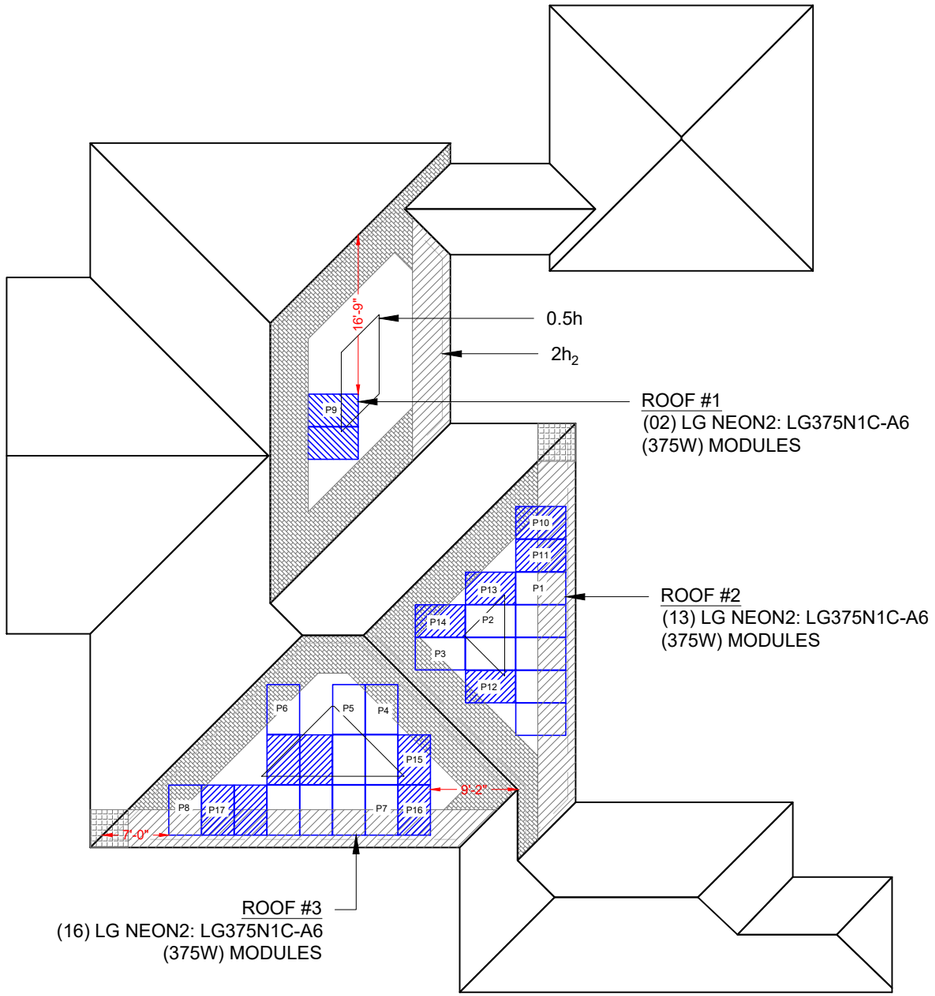
LAKE CITY, FL 32025

SHEET NAME
MODULE LAYOUT

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
S-01

(E) FRONT YARD



ROOF #1
(02) LG NEON2: LG375N1C-A6
(375W) MODULES

ROOF #2
(13) LG NEON2: LG375N1C-A6
(375W) MODULES

ROOF #3
(16) LG NEON2: LG375N1C-A6
(375W) MODULES

(E) BACK YARD

FOR NON- EXPOSED MODULES

1	1'	2e	2n	2r	3e	3r
16	0	16	0	16	16	0

Module Size	19.51	Sq. ft.

Non-Exposed modules								Partial
	1	1'	2e	2n	2r	3e	3r	Pressure
P1	8.58	0	10.93	0	0	0	0	16.00
P2	19.51	0	0	0	0	0	0	16.00
P3	11.53	0	0	0	7.98	0	0	16.00
P4	10.75	0	0	0	8.76	0	0	16.00
P5	19.30	0	0	0	0.21	0	0	16.00
P6	10.34	0	0	0	9.17	0	0	16.00
P7	9.54	0	9.97	0	0	0	0	16.00
P8	2.29	0	9.97	0	7.25	0	0	16.00

FOR EXPOSED MODULES

1	1'	2e	2n	2r	3e	3r
16	0	21.6	0	21.6	21.6	0

Module Size	19.51	Sq. ft.

Exposed modules								Partial
	1	1'	2e	2n	2r	3e	3r	Pressure
P9	19.51	0	0	0	0	0	0	16.00
P10	3.50	0	10.94	0	5.07	0	0	20.60
P11	8.57	0	10.94	0	0	0	0	19.14
P12	17.32	0	0	0	2.19	0	0	16.63
P13	18.17	0	0	0	1.34	0	0	16.39
P14	13.09	0	0	0	6.42	0	0	17.84
P15	16.84	0	0	0	2.67	0	0	16.77
P16	9.54	0	0	0	9.97	0	0	18.86
P17	9.41	0	9.97	0	0.13	0	0	18.90

ALLOWABLE MODULE UPLIFT PRESSURE 2 RAILS : 88 PSF

LEGEND

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

$2h_2$ 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.

1 PARTIAL PRESSURE AND MODULES EXPOSURE
S-01.1 SCALE: 1/16" = 1'-0"

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ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

SUNPR

ERMOCRATES E. CASTILLO LICENSE No. 52590 STATE OF FLORIDA PROFESSIONAL ENGINEER

Digitally Signed by: Ermocrates E Castillo
Date: 2021.09.15 16:33:54
Signature with Seal

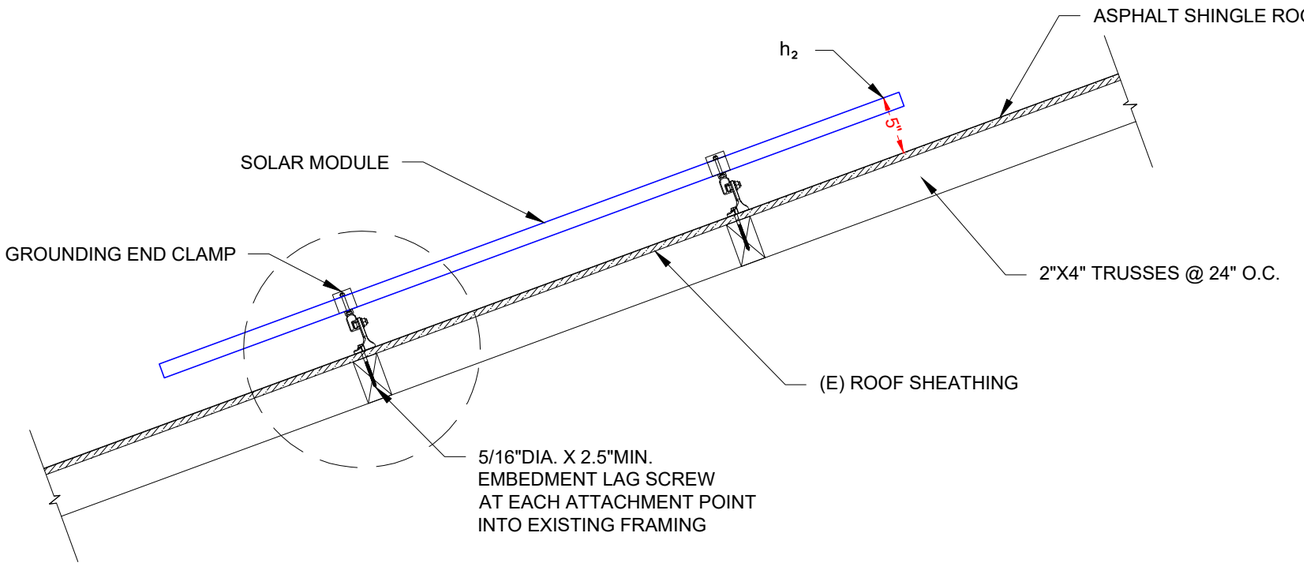
PROJECT NAME

HUDSON RESIDENCE
444 SE HORIZON GLEN,
LAKE CITY, FL 32025

SHEET NAME
PARTIAL PRESSURE AND MODULES EXPOSURE

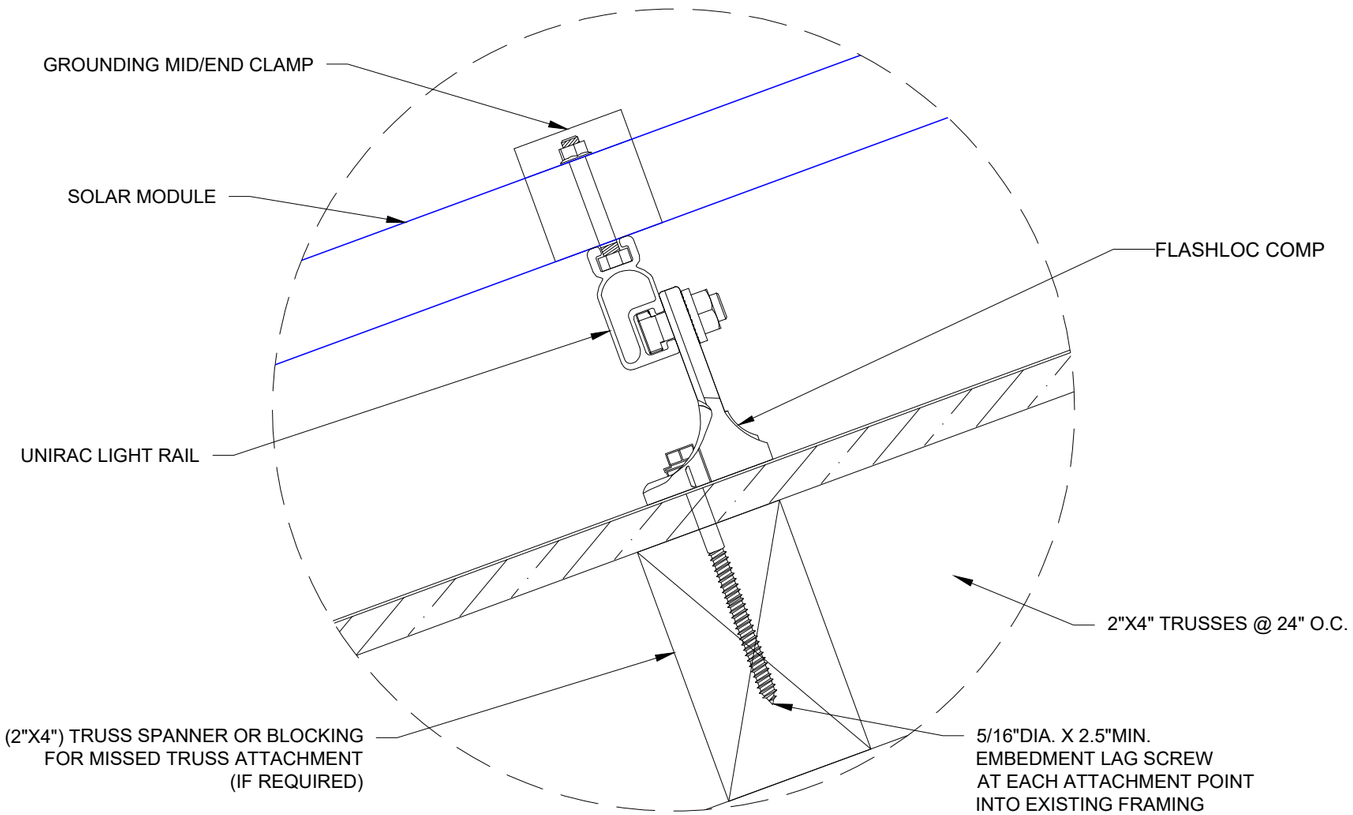
SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
S-01.1



1 ATTACHMENT DETAIL

S-02 SCALE: 1" = 1'-0""



2 ATTACHMENT DETAIL (ENLARGED VIEW)

S-02 SCALE: 1"=2"

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REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

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Date: 2021.09.15 16:33:55

PROJECT NAME

HUDSON RESIDENCE

444 SE HORIZON GLEN,
LAKE CITY, FL 32025

SHEET NAME

ATTACHMENT DETAIL

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

S-02

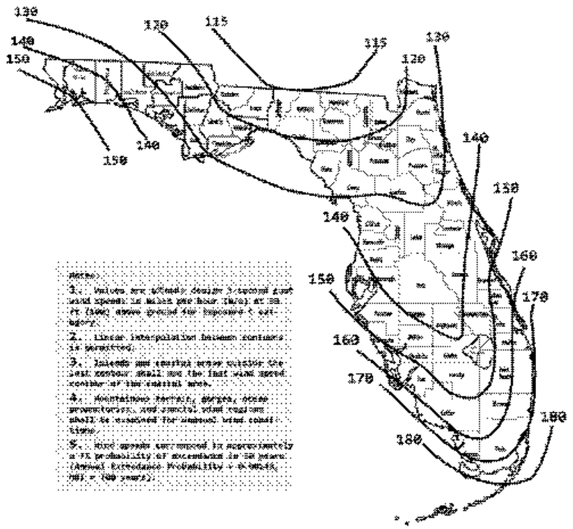

FIGURE 1609.3(1)
ULTIMATE DESIGN WIND SPEEDS, V_{ULT}, FOR RISK CATEGORY II BUILDINGS AND OTHER STRUCTURES

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

SITE INFORMATION

FBC VERSION	2020	RISK CATEGORY	II
MEAN ROOF HEIGHT (ft)	15.0	EXPOSURE CATEGORY	B
ROOF LENGTH (ft)	104.0	ROOF SLOPE	5 /12
ROOF WIDTH (ft)	94.0	ROOF SLOPE (°)	22.6
PARAPET HEIGHT (ft)	0.0	ROOF TYPE	HIP
MODULE LENGTH (in)	68.5	ULTIMATE WIND SPEED	120 mph
MODULE WIDTH (in)	41.02	NOMINAL WIND SPEED	93 mph
MODULE ORIENTATION	PORTRAIT	EXPOSURE FACTOR (C_e)	1.000
MODULE AREA (sq. ft.)	19.51	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)	19.5	K_{ZT}	1.000
GROUND ELEVATION (ft)	121.0	K_e	0.996
HVHZ	NO	K_z	0.575

DESIGN CALCULATIONS

VELOCITY PRESSURE (q) = $.00256*K_e*K_z*K_{ZT}*K_D*V^2$
VELOCITY PRESSURE(ASD) 10.8 psf

WIDTH OF PRESSURE COEFFICIENT	94' * 10%	=	9.4'	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	0.584	-1.226
	ZONE 1'	0.584	X
	ZONE 2e	0.584	-1.777
	ZONE 2n	0.584	X
	ZONE 2r	0.584	-1.777
	ZONE 3e	0.584	-1.777
	ZONE 3r	0.584	X
INTERNAL PRESSURE COEFFICIENT (+/-)		0.18	

DESIGN PRESSURES

ROOF ZONE	DOWN	UP				
1	16.0	-15.1	psf			
1'	16.0	X	psf			
2e	16.0	-21.1	psf	Module allowable uplift pressure	88	psf
2n	16.0	X	psf	Module allowable down pressure	125	psf
2r	16.0	-21.1	psf			
3e	16.0	-21.1	psf			
3r	16.0	X	psf			

ARRAY FACTORS

ARRAY EDGE FACTOR (EXPOSED)	1.5	SOLAR PANEL PRESSURE EQUALIZATION FACTOR	0.68387
ARRAY EDGE FACTOR (NON-EXPOSED)	1		

ADJUSTED DESIGN PRESSURES

ROOF ZONE	DOWN	UP (Exposed)	UP (N. Exposed)	
1	16.0	-16.0	-16.0	psf
1'	16.0	X	X	psf
2e	16.0	-21.6	-16.0	psf
2n	16.0	X	X	psf
2r	16.0	-21.6	-16.0	psf
3e	16.0	-21.6	-16.0	psf
3r	16.0	X	X	psf

ATTACHMENTS USED

ATTACHMENT MODEL	Lag Bolts- Shingle
ATTACHMENT STRENGTH	476 lbs

MAX DESIGN LOADS ALLOWABLE

LIMIT MAX SPAN TO		**48**	**in**					
RAFTER/SEAM SPACING		**24**	**in**	**NO. OF RAILS**	**Exposed:**	**2**	**Non. Exp:**	**2**
ROOF ZONE	DOWN	UP (Exposed)	UP (N. Exposed)		SPANS (E)		SPANS (N.E)	
1	182.7	182.7	182.7	lbs	48	in	48	in
1'	0.0	X	X	lbs	X	in	X	in
2e	182.7	246.5	182.7	lbs	48	in	48	in
2n	0.0	X	X	lbs	X	in	X	in
2r	182.7	246.5	182.7	lbs	48	in	48	in
3e	182.7	246.5	182.7	lbs	48	in	48	in
3r	0.0	X	X	lbs	X	in	X	in

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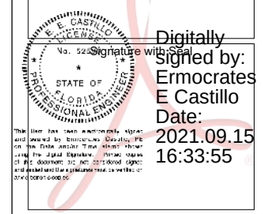
MAITLAND, FL 32751
TEL: (407) 289-2575
ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

SUNPRO



Digitally Signature with Seal
Signed by: Ermocrates E Castillo
Date: 2021.09.15 16:33:55

PROJECT NAME

HUDSON RESIDENCE
444 SE HORIZON GLEN,
LAKE CITY, FL 32025

SHEET NAME
STRUCTURE CALCULATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
S-02.1

Q CABLE

ENPHASE: IQ7PLUS-72-2-US MICROINVERTERS

PV MODULES

#6 BARE CU WIRE PROTECTED PER NEC 250.64(B)

(N) SOLADECK 600 V, NEMA 3R UL LISTED

INTERCONNECTION
120% RULE - NEC 705.12(B)(2)(3)(b)

UTILITY FEED + SOLAR BACKFEED
200A + 70A = 270A
BUSS RATING x 120%
225A x 120% = 270A

(3) 10/2 ROMEX RUN IN ATTIC
OR
(3) #10 AWG THWN-2-RED
(3) #10 AWG THWN-2-BLACK
EGC #6 AWG THWN-2 GND
IN 1" PVC, IMC, RMC, FMC, LFMC, HDPE, NUCC, RTRC, LFNC, EMT, FMT OR ENT CONDUIT RUN

(N) JUNCTION BOX 600 V, NEMA 3R UL LISTED

(3) #10 AWG THWN-2 - RED
(3) #10 AWG THWN-2 - BLACK
EGC #6 AWG THWN-2
IN 1" PVC, IMC, RMC, FMC, LFMC, HDPE, NUCC, RTRC, LFNC, EMT, FMT, OR ENT CONDUIT RUN

(N) 125A ENPHASE IQ COMBINER 3 (X-IQ-AM1-240-3) [WITH UPTO (4) 2-POLE BREAKERS AND ENVOY COMMUNICATION GATEWAY]

15A

20A/2P

20A/2P

20A/2P

SQUARE-D, 20A RATED, WITH 24 VAC COIL CLASS1 DIV, 2 DEFINITE PURPOSE CONTACTOR P/N 89100PT2V14 IN 10x10x4 PVC JUNCTION BOX (OPTIONAL)

1A FUSE

24VAC XFRMR EP4031F

LOAD SHEDDING ENCLOSURE (OPTIONAL)

(3) #6 AWG THWN-2
(1) #6 AWG THWN-2 GND
IN 1" PVC, IMC, RMC, FMC, LFMC, HDPE, NUCC, RTRC, LFNC, EMT, FMT, ENT CONDUIT RUN

MANUFACTURER RECOMMENDED WIRE RAN IN CONDUIT

MANUFACTURER RECOMMENDED WIRE RAN IN CONDUIT

(N) ENPHASE ENPOWER SMART SWITCH, MICROGRID INTERCONNECT DEVICE, 200A RATED, 240V

CONTROL PCBA

AC COMBINER BREAKER 50A

AUTO TRANSFORMER

ENCHARGE BREAKER 20A

GENERATOR BREAKER

MAINS RELAY

NUETRAL

GROUNDING

I/O-1 I/O-2 I/O-1 I/O-2

GEN I/O

AC COM. ENC. GEN.

(N) (01) ENPHASE ENCHARGE 10 BATTERY

(2) #12 AWG THWN-2
(1) #6 AWG THWN-2 GND
IN 1" IMC, RMC, FMC, LFMC, HDPE, NUCC, RTRC, PVC, FMT, ENT, OR EMT CONDUIT RUN

BACKUP LOADS PANEL'S NOTES:
THE COMBINED ENCHARGE POWER CAPACITY IS 3.84KVA WITH 24A STARTING CURRENT CAPACITY. VERIFY THAT THE SINGLE LARGEST LOAD ON BACKUP LOADS PANEL IS BELOW THIS CAPACITY, INCLUDING STARTING CURRENT.

(N) BACKUP PANEL, 125A RATED, 240V

20A/1P

(N) MAIN BREAKER 60A/2P, 240V

TO UTILITY GRID

(N) BI-DIRECTIONAL SERVICE POINT AND UTILITY METERING 1-PHASE, 240V,200A

(3) #2/0 AWG THWN-2 CU IN 2" PVC OR EMT CONDUIT RUN SER PER NEC 310.15(B)(7)

(N) MAIN SERVICE DISCONNECT / MAIN DISTRIBUTION PANEL , 225A RATED, 240V.

(N) MAIN BREAKER 200A/2P, 240V

70A/2P

(E) SUB PANEL, 200A RATED, 240V

(E) MAIN BREAKER 200A/2P, 240V

EXISTING WIRE AND CONDUIT, MINIMUM
(3) 2/0 AWG THWN-2 CU
(1) #6 AWG THWN-2 GND IN 2" PVC OR EMT FEEDER PER NEC 310.15(B)(7)

MIN. 6'

NEW OR REROUTED EXISTING GROUNDING ELECTRODE SYSTEM
#4 AWG THWN-2 GND BONDED TO (2) 1/2" X 8' GND RODS MIN 6' APART PER NEC 250.53

(3) #4 AWG THWN-2
(1) #6 AWG THWN-2 GND
IN 1-1/2" PVC, IMC, RMC, FMC, LFMC, HDPE, NUCC, RTRC, LFNC, EMT, FMT, ENT CONDUIT RUN

(N) ALTERNATIVE POWER SOURCE /AC DISCONNECT: 240V, 100AMP NEMA 3R, UL LISTED LOCKABLE AND NON-FUSIBLE

(3) #4 AWG THWN-2
(1) #6 AWG THWN-2 GND
IN 1-1/2" PVC, IMC, RMC, FMC, LFMC, HDPE, NUCC, RTRC, LFNC, EMT, FMT, ENT CONDUIT RUN

(3) #6 AWG THWN-2
(1) #6 AWG THWN-2 GND
IN 1" PVC, IMC, RMC, FMC, LFMC, HDPE, NUCC, RTRC, LFNC, EMT,
FMT, OR ENT CONDUIT RUN

SOLAR ARRAY (11.625 kW-DC STC)

(31) LG NEON2: LG375N1C-A6 (375W) MODULES
(01) BRANCH OF 12 MODULES
(01) BRANCH OF 10 MODULES
(01) BRANCH OF 09 MODULES

NOTE:
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. MID INTERCONNECTION PER 705.12(A) & 705.170, AND COMPLIANT WITH NEC 690.10, 690.71, AS WELL AS 705.12(B)(2)(3)(e).
3.SERVICE ENTRANCE CONDUCTORS AND FEEDERS SIZED PER NEC 310.15(B)(7). CONDUCTOR SIZES TO BE VERIFIED AND CONFIRMED BY INSTALLER.
4.ALL PANELS DOWNSTREAM OF LOAD SIDE INTERCONNECTION TO BE PROTECTED BY PREEXISTING OR ADDITIONAL OCPD PER NEC 408.36.
5.REFER TO SHEET DS-10 FOR LOAD CALCULATIONS.

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ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

SUNPRO

E. CASTILLO LICENSE No. 52590 STATE OF FLORIDA PROFESSIONAL ENGINEER

Digitally Signed by: Ermocrates E Castillo
Date: 2021.09.15 16:33:56

Signature with Seal

PROJECT NAME

HUDSON RESIDENCE

444 SE HORIZON GLEN,
LAKE CITY, FL 32025

SHEET NAME

ELECTRICAL LINE DIAGRAM

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

E-01

ELECTRICAL CALCULATION

Module Manufacturer	LG
Module Model	LG375N1C-A6
Inverter Manufacturer	Enphase
Inverter Model	Enphase IQ 7 Plus
Modules/Branch Circuit 1	12
Modules/Branch Circuit 2	10
Modules/Branch Circuit 3	9
Total Array Power (kW)	11.63
System AC Voltage	240V 1-Phase

Module Properties			
Voc	41.8	Isc	11.35
Vmpp	35.3	Imp	10.63
TC Voc	-0.26%/ °C	TC Vmp	-0.34%/ °C
Pmp	375.0	NOCT	45 °C

Design Temperature	
Min. Ambient Temp. °F	32
Max. Ambient Temp. °F	117
Calculated Max. Voc	45
Calculated Min Vmp	38
Conduit Fill	
Number of conduits	1

Inverter Properties	
Output Voltage	240 L-L 1-PH
Max Input DC Voltage	60 Vdc
Operating Range	16 - 60 Vdc
MPPT Voltage Range	27 - 45 Vdc
Start Voltage	22 Vdc
Max Input Power	440 Wdc
Continuous AC Power	290 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	14.5	18.1	#10	40	130	0.76	6	0.8	24.32	20 A
Circuit 2	12.1	15.1	#10	40	130	0.76	6	0.8	24.32	20 A
Circuit 3	10.9	13.6	#10	40	130	0.76	6	0.8	24.32	20 A
Enphase Combiner Output	37.5	46.8	#6	75	95	0.96	3	1	72	50 A
Enpower to Backup Panel	48.0	60.0	#6	75	95	0.96	3	1	72	60 A
Enpower to Encharge	16.0	20.0	#12	30	95	0.96	3	1	28.8	20 A
Enpower to Main Panel	53.5	66.8	#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	14.5	240	133 Feet
Circuit 2	#10	10380	12.1	240	160 Feet
Circuit 3	#10	10380	10.9	240	178 Feet
Enphase Combiner Output	#6	26240	37.5	240	130 Feet
Enpower to Backup Panel	#6	26240	48.0	240	102 Feet
Enpower to Encharge	#12	6530	16.0	240	76 Feet
Enpower to Main Panel	#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.

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ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

PROJECT INSTALLER

SUNPRO

E. CASTILLO No. 52590 STATE OF FLORIDA PROFESSIONAL ENGINEER

Digitally Signed by: Ermocrates E Castillo
Date: 2021.09.15 16:33:56
Signature with Seal

PROJECT NAME

HUDSON RESIDENCE

444 SE HORIZON GLEN,
LAKE CITY, FL 32025

SHEET NAME

WIRING CALCULATIONS

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

E-02

⚠ 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))

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

LABEL LOCATION:
AC DISCONNECT
(PER CODE: NEC690.56(C)(3))

ADHESIVE FASTENED SIGNS:
- THE LABEL SHALL BE SUITABLE FOR THE ENVIRONMENT WHERE IT IS INSTALLED.
- 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]

11.63 kW SOLAR DISCONNECT LOCATED

LABEL LOCATION:
AC DISCONNECT, POINT OF INTERCONNECTION
(PER CODE: NEC690.54)

AC COMBINER BOX

LABEL LOCATION:
COMBINER BOX
(PER CODE: NEC690.52)

PHOTOVOLTAIC SYSTEM MICROINVERTERS LOCATED UNDER EACH PV MODULE IN ROOF TOP ARRAY

LABEL LOCATION:
INVERTER
(PER CODE: NEC690.52)

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: NEC690.54)

WARNING
INVERTER OUTPUT CONNECTION DO NOT RELOCATE THIS OVERCURRENT DEVICE

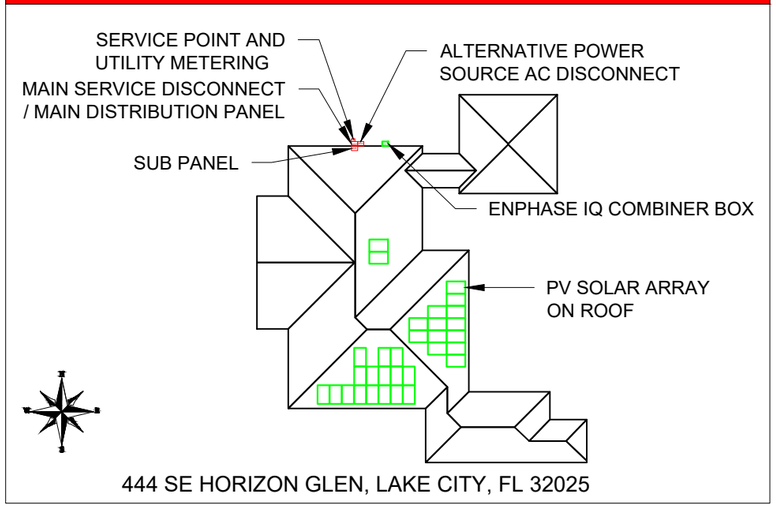
LABEL LOCATION:
POINT OF INTERCONNECTION
(PER CODE: NEC 705.12(B)(2)(3)(b))

DATA PER PANEL

NOMINAL OPERATING AC VOLTAGE -	240	V
NOMINAL OPERATING AC FREQUENCY-	60	Hz
MAXIMUM AC POWER-	290	VA
MAXIMUM AC CURRENT-	1.21	A
MAXIMUM OVERCURRENT DEVICE RATING FOR AC MODULE PROTECTION PER CIRCUIT-	20	A

LABEL LOCATION:
COMBINER BOX
(PER CODE: NEC690.52)

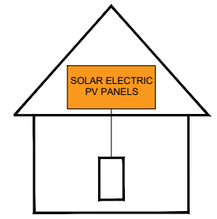
CAUTION:
POWER TO THIS BUILDING IS ALSO SUPPLIED FROM THE FOLLOWING SOURCES WITH DISCONNECTS LOCATED AS SHOWN



LABEL LOCATION:
MAIN SERVICE DISCONNECT / MAIN DISTRIBUTION PANEL, PV DISCONNECT
(TEXT HEIGHT SHOULD BE A MINIMUM OF 3/8")
(PER CODE: NEC 690.56(B) AND 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



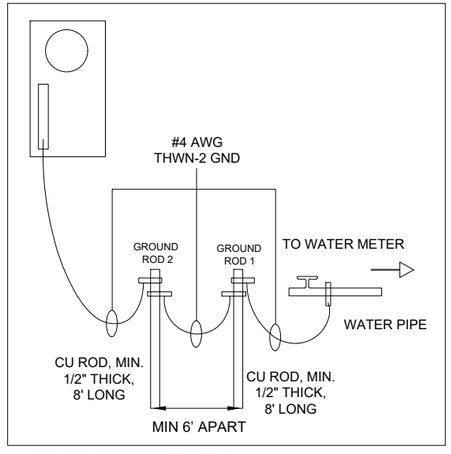
LABEL LOCATION:
AC DISCONNECT, POINT OF INTERCONNECTION
(PER CODE: NEC 690.56(C)(1)(a), IFC 605.11.3.1(1)

AC DISCONNECT

LABEL LOCATION:
AC DISCONNECT, POINT OF INTERCONNECTION
(PER CODE: NEC690.54)

SOLAR BREAKER

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



NEW GROUNDING RISER DETAIL

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TEL: (407) 289-2575
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SUNPRO

PROJECT NAME

HUDSON RESIDENCE
444 SE HORIZON GLEN, LAKE CITY, FL 32025

SHEET NAME
SYSTEM LABELING

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
E-03

LG NeON®2

LG375N1C-A6

60

375W

The LG NeON® 2 is LG's best selling solar module and one of the most powerful and versatile modules on the market today. The cells are designed to appear all-black at a distance, and the performance warranty guarantees 90.6% of labeled power output at 25 years.

25 YEAR PRODUCT · PERFORMANCE · LABOR WARRANTY

c UL us

Made in USA

Features

Enhanced Performance Warranty

LG NeON® 2 has an enhanced performance warranty. After 25 years, LG NeON® 2 is guaranteed at least 90.6% of initial performance.

25-Year Limited Product Warranty

The NeON® 2 is covered by a 25-year limited product warranty. In addition, up to $450 of labor costs will be covered in the rare case that a module needs to be repaired or replaced.

Solid Performance on Hot Days

LG NeON® 2 performs well on hot days due to its low temperature coefficient.

Roof Aesthetics

LG NeON® 2 has been designed with aesthetics in mind using thinner wires that appear all black at a distance.

When you go solar, ask for the brand you can trust: LG Solar

About LG Electronics USA, Inc.

LG Electronics is a global leader in electronic products in the clean energy markets by offering solar PV panels and energy storage systems. The company first embarked on a solar energy source research program in 1985, supported by LG Group's vast experience in the semi-conductor, LCD, chemistry and materials industries. In 2010, LG Solar successfully released its first MonoX® series to the market, which is now available in 32 countries. The NeON® (previous MonoX® NeON), NeON®2, NeON®2 BiFacial won the "Intersolar AWARD" in 2013, 2015 and 2016, which demonstrates LG's leadership and innovation in the solar industry.

LG Life's Good

LG NeON®2

Made in USA

LG375N1C-A6

General Data

Cell Properties (Material/Type)	Monocrystalline/N-type
Cell Maker	LG
Cell Configuration	60 Cells (6 x 10)
Module Dimensions (L x W x H)	1,740mm x 1,042mm x 40mm
Weight	18.6 kg
Glass (Material)	Tempered Glass with AR Coating
Backsheet (Color)	White
Frame (Material)	Anodized Aluminium
Junction Box (Protection Degree)	IP 68 with 3 Bypass Diodes
Cables (Length)	1,100mm x 2EA
Connector (Type/Maker)	MC 4/MC

Certifications and Warranty

Certifications*	IEC 61215-1/-1-1/-2 : 2016, IEC 61730-1/2 : 2016, UL 61730-1 : 2017, UL 61730-2 : 2017
	ISO 9001, ISO 14001, ISO 50001
	OHSAS 18001
Salt Mist Corrosion Test	IEC 61701:2012 Severity 6
Ammonia Corrosion Test	IEC 62716 : 2013
Module Fire Performance	Type 1 (UL 61730)
Fire Rating	Class C (UL 790, ULC/ORD C 1703)
Solar Module Product Warranty	25 Year Limited
Solar Module Output Warranty	Linear Warranty*

*Improved: 1st year 98.5%, from 2-24th year: 0.33%/year down, 90.6% at year 25

Temperature Characteristics

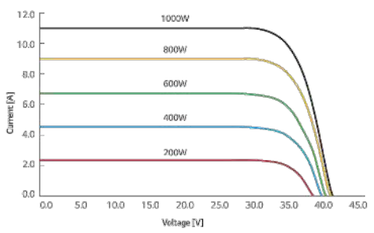
NMOT*	[°C]	42 ± 3
Pmax	[%/°C]	-0.34
Voc	[%/°C]	-0.26
Isc	[%/°C]	0.03

*NMOT (Nominal Module Operating Temperature): Irradiance 800 W/m², Ambient temperature 20°C, Wind speed 1 m/s, Spectrum AM 1.5

Electrical Properties (NMOT)

Model		LG375N1C-A6
Maximum Power (Pmax)	[W]	281
MPP Voltage (Vmpp)	[V]	33.2
MPP Current (Impp)	[A]	8.46
Open Circuit Voltage (Voc)	[V]	39.4
Short Circuit Current (Isc)	[A]	9.13

I-V Curves



Electrical Properties (STC*)

Model		LG375N1C-A6
Maximum Power (Pmax)	[W]	375
MPP Voltage (Vmpp)	[V]	35.3
MPP Current (Impp)	[A]	10.63
Open Circuit Voltage (Voc, ± 5%)	[V]	41.8
Short Circuit Current (Isc, ± 5%)	[A]	11.35
Module Efficiency	[%]	20.7
Bifaciality Coefficient of Power	[%]	10
Power Tolerance	[%]	0 ~ +3

*STC (Standard Test Condition): Irradiance 1000 W/m², cell temperature 25°C, AM 1.5

Operating Conditions

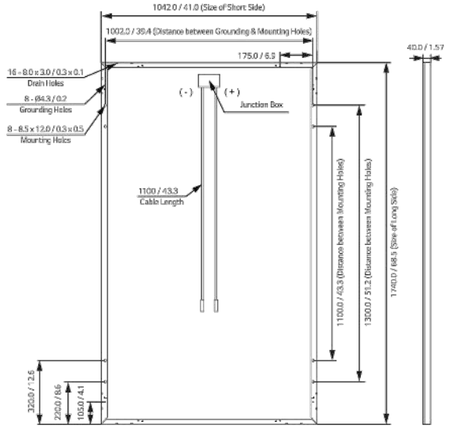
Operating Temperature	[°C]	-40 ~ +85
Maximum System Voltage	[V]	1,000
Maximum Series Fuse Rating	[A]	20
Mechanical Test Load* (Front)	[Pa/psf]	5,400
Mechanical Test Load* (Rear)	[Pa/psf]	4,000

*Based on IEC 61215-2 : 2016 (Test Load = Design Load x Safety Factor (1.5))
Mechanical Test Loads 6,000Pa / 5,400Pa based on IEC 61215 : 2005

Packaging Configuration

Number of Modules per Pallet	[EA]	25
Number of Modules per 40' Container	[EA]	650
Number of Modules per 53' Container	[EA]	850
Packaging Box Dimensions (L x W x H)	[mm]	1,790 x 1,120 x 1,213
Packaging Box Dimensions (L x W x H)	[in]	70.5 x 44.1 x 47.8
Packaging Box Gross Weight	[kg]	500
Packaging Box Gross Weight	[lb]	1,102

Dimensions (mm/inch)



LG Life's Good

LG Electronics USA, Inc.
Solar Business Division
2000 Millbrook Drive
Lincolnshire, IL 60069
www.lg-solar.com

Product specifications are subject to change without notice.
LG375N1C-A6_AUS.pdf
012221

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SOLAR DONE RIGHT®

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PROJECT INSTALLER

SUNPRO

E. CASTILLO LICENSE No. 52590 STATE OF FLORIDA PROFESSIONAL ENGINEER

Digitally Signature with Seal
Signed by: Ermocrates E Castillo
Date: 2021.09.15 16:33:57

PROJECT NAME

HUDSON RESIDENCE

444 SE HORIZON GLEN,
LAKE CITY, FL 32025

SHEET NAME

DATA SHEET

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

DS-01

LG Electronics U.S.A., Inc.
111 Sylvan Avenue
Englewood Cliffs, NJ 07632
201.816.2000

Friday, February 5, 2021

RE: Mechanical Load Testing to Determine Structural Performance under Uniform Static Pressure

To: Castillo Engineering,

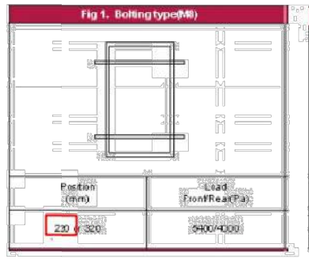
Upon your request we have conducted in house tests to determine the structural performance of the LG Module frames listed below. Our test results meet the requirements you presented in our conference call on January 29th. We will present the test criteria, results, and product limitations that may result from these test conditions in this letter.

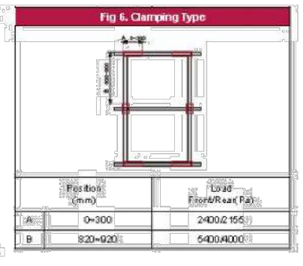
The specifications and conditions presented in this letter apply retroactively to the following LG module(s);

	2 Rails	3 Rails
Front	9,000Pa	9,000Pa
Rear	6,350Pa	9,000Pa
Model	LGxxxN1C(K)-N5(L5), LGxxxN1C(K)-A6(B6) LGxxxQ1C(K)-V5, LGxxxQ1C(K)-A6	

***The result is based on test load.**

Our R&D department has tested these modules to determine the structural performance of under uniform static loading to represent the effects of a wind load on the module. This test was designed only to determine structural performance; the revised specifications apply only to the mechanical performance of the module. *A safety factor of 1.5 should be applied to these test loads for obtaining design loads. It is not recommend designing any system to the full test load.*





The scope of this test does not include electrical functionality or performance testing. Subjecting the module to these pressures may result in power degradation or total power loss. The electrical function and power generation warranties and specifications of these products are not altered by this document.

If you have any additional questions or concerns about this letter or the test protocol, contact your LG Solar Sales Representative.

Castillo Engineering
SOLAR DONE RIGHT®
CASTILLO ENGINEERING SERVICES, LLC
COA # 28345
620 N. WYMORE ROAD,
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ERMOCRATES E. CASTILLO - FL PE 52590

REVISIONS

DESCRIPTION	DATE	REV

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PROJECT NAME

HUDSON RESIDENCE

444 SE HORIZON GLEN,
LAKE CITY, FL 32025

SHEET NAME

DATA SHEET

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

DS-02

Data Sheet
Enphase Microinverters
Region: US

Enphase IQ 7 and IQ 7+ Microinverters

The high-powered smart grid-ready **Enphase IQ 7 Micro™** and **Enphase IQ 7+ Micro™** dramatically simplify the installation process while achieving the highest system efficiency.

Part of the Enphase IQ System, the IQ 7 and IQ 7+ Microinverters integrate seamlessly with the Enphase IQ Envoy™, Enphase Q Aggregator™, Enphase IQ Battery™, and the Enphase Enlighten™ monitoring and analysis software.

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

Easy to Install

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

Productive and Reliable

- Optimized for high powered 60-cell and 72-cell* modules
- 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
- Remotely updates to respond to changing grid requirements
- Configurable for varying grid profiles
- Meets CA Rule 21 (UL 1741-SA)

* The IQ 7+ Micro is required to support 72-cell modules.

UL CERTIFIED SAFETY US CA E341165

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

ENPHASE.

Enphase IQ 7 and IQ 7+ Microinverters

INPUT DATA (DC)	IQ7-60-2-US		IQ7PLUS-72-2-US	
Commonly used module pairings[1]	235 W - 350 W +		235 W - 440 W +	
Module compatibility	60-cell PV modules only		60-cell and 72-cell PV modules	
Maximum input DC voltage	48 V		60 V	
Peak power tracking voltage	27 V - 37 V		27 V - 45 V	
Operating range	16 V - 48 V		16 V - 60 V	
Min/Max start voltage	22 V / 48 V		22 V / 60 V	
Max DC short circuit current (module Isc)	15 A		15 A	
Overvoltage class DC port	II		II	
DC port backfeed current	0 A		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 DATA (AC)	**IQ 7 Microinverter**		**IQ 7+ Microinverter**	
Peak output power	250 VA		295 VA	
Maximum continuous output power	240 VA		290 VA	
Nominal (L-L) voltage/range[2]	240 V / 211-264 V	208 V / 183-229 V	240 V / 211-264 V	208 V / 183-229 V
Maximum continuous output current	1.0 A	1.15 A	1.21 A	1.39 A
Nominal frequency	60 Hz		60 Hz	
Extended frequency range	47 - 68 Hz		47 - 68 Hz	
AC short circuit fault current over 3 cycles	5.8 Arms		5.8 Arms	
Maximum units per 20 A (L-L) branch circuit[3]	16 (240 VAC) 13 (208 VAC)		13 (240 VAC) 11 (208 VAC)	
Overvoltage class AC port	III		III	
AC port backfeed current	0 A		0 A	
Power factor setting	1.0		1.0	
Power factor (adjustable)	0.7 leading ... 0.7 lagging		0.7 leading ... 0.7 lagging	
EFFICIENCY	**@240 V**	**@208 V**	**@240 V**	**@208 V**
Peak CEC efficiency	97.6 %	97.6 %	97.5 %	97.3 %
CEC weighted efficiency	97.0 %	97.0 %	97.0 %	97.0 %
MECHANICAL DATA	**IQ 7 Microinverter**			
Ambient temperature range	-40°C to +65°C			
Relative humidity range	4% to 100% (condensing)			
Connector type	MC4 (or Amphenol H4 UTX with additional Q-DCC-5 adapter)			
Dimensions (WxHxD)	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. Both options require installation of an 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 and NEC-2017 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. Nominal voltage range can be extended beyond nominal if required by the utility.
3. 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**

ENPHASE.

2018-02-08

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LAKE CITY, FL 32025

SHEET NAME

DATA SHEET

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

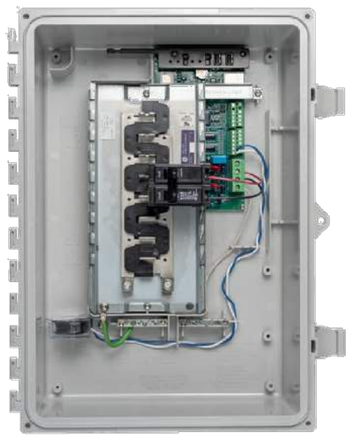
DS-03

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

UL 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

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

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ERMOCRATES E. CASTILLO - FL PE 52590

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PROJECT NAME

HUDSON RESIDENCE

444 SE HORIZON GLEN,
LAKE CITY, FL 32025

SHEET NAME

DATA SHEET

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

DS-04

Data Sheet
Enphase Ensemble energy management system

Enphase Enpower

The **Enphase Enpower**™ smart switch connects the home to grid power, the Encharge storage system, and solar PV. It provides microgrid interconnection device (MID) functionality by automatically detecting and seamlessly transitioning the home energy system from grid power to backup power in the event of a grid failure. It consolidates interconnection equipment into a single enclosure and streamlines grid independent capabilities of PV and storage installations by providing a consistent, pre-wired solution for residential applications.

Reliable

- Durable NEMA type 3R enclosure
- Ten-year limited warranty

Smart

- Controls safe connectivity to the grid
- Automatically detects grid outages
- Provides seamless transition to backup

Simple

- Connects to the load or service equipment[1] side of the main load panel
- Centered mounting brackets support single stud mounting
- Supports conduit entry from the bottom, bottom left side, and bottom right side
- Supports whole home and partial home backup and subpanel backup
- Up to 200A main breaker support
- Includes neutral-forming transformer for split phase 120/240V backup operation

1. Enpower is not suitable for use as service equipment in Canada.

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

ENPHASE.

Enphase Enpower

MODEL NUMBER	
EP200G101-M240US00	Enphase Enpower smart switch with neutral-forming transformer (NFT), Microgrid Interconnect Device (MID), breakers, and screws. Streamlines grid-independent capabilities of PV and storage installations.
ACCESSORIES and REPLACEMENT PARTS	
XA-E3-PCBA-ENS	Replacement Enpower controller printed circuit board
Circuit breakers (as needed)[2,3]	Not included, must order separately:
BRK-100A-2P-240V	• Main breaker, 2 pole, 100A, 25kAIC, CSR2100N or CSR2100
BRK-125A-2P-240V	• Main breaker, 2 pole, 125A, 25kAIC, CSR2125N
BRK-150A-2P-240V	• Main breaker, 2 pole, 150A, 25kAIC, CSR2150N
BRK-175A-2P-240V	• Main breaker, 2 pole, 175A, 25kAIC, CSR2175N
BRK-200A-2P-240V	• Main breaker, 2 pole, 200A, 25kAIC, CSR2200N
BRK-20A-2P-240V-B	• Circuit breaker, 2 pole, 20A, 10kAIC, BR220B
BRK-30A-2P-240V	• Circuit breaker, 2 pole, 30A, 10kAIC, BR230B
BRK-40A-2P-240V	• Circuit breaker, 2 pole, 40A, 10kAIC, BR240B
BRK-60A-2P-240V	• Circuit breaker, 2 pole, 60A, 10kAIC, BR260
BRK-80A-2P-240V	• Circuit breaker, 2 pole, 80A, 10kAIC, BR280
EP200G-HNDL-R1	Enpower installation handle kit (order separately)
ELECTRICAL SPECIFICATIONS	
Assembly rating	Continuous operation at 100% of its rating
Nominal voltage / range (L-L)	240 VAC / 100 - 310 VAC
Voltage measurement accuracy	±1% V nominal (±1.2V L-N and ±2.4V L-L)
Nominal frequency / range	60 Hz / 56 - 63 Hz
Frequency measurement accuracy	±0.1 Hz
Maximum continuous current rating	160A
Maximum output overcurrent protection device	200A
Maximum input overcurrent protection device	200A
Maximum overcurrent protection device rating for storage branch circuit[4]	80A
Maximum overcurrent protection device rating for PV combiner branch circuit[4]	80A
Neutral Forming Transformer (NFT)	• Breaker rating (pre-installed): 40A between L1 and Neutral; 40A between L2 and Neutral • Continuous rated power: 3600VA • Maximum continuous unbalance current: 30A @ 120V • Peak rated power: 8800VA for 30 seconds • Peak unbalanced current: 80A @ 120V for 30 seconds
MECHANICAL DATA	
Dimensions (WxHxD)	50cm x 91.6cm x 24.6cm (19.7 in x 36 in x 9.7 in)
Weight	38.5 kg (85 lbs)
Ambient temperature range	-40° C to +50° C (-40° F to 122° F)
Cooling	Natural convection, plus heat shield
Enclosure environmental rating	Outdoor, NEMA type 3R, polycarbonate construction
Altitude	To 2500 meters (8200 feet)
WIRE SIZES	
Connections	• Main lugs, backup load lugs, and CSR breakers: Cu/AL: 2 AWG - 300 KCMIL • BR breakers (wire provided): 6 AWG • AC combiner lugs, Encharge lugs, and generator (reserved for future use) lugs: 14 AWG – 2 AWG • Neutral (large lugs): Cu/AL: 6 AWG - 300 KCMIL
Neutral and ground bars	Large holes (5/16-24 UNF): 14 AWG – 1/0 AWG Small holes (10-32 UNF): 14 AWG – 6 AWG
COMPLIANCE	
Compliance	UL 1741, UL 1741 SA, UL1998, UL869A[5], UL67[5], UL508[5], UL50E[5] CSA 22.2 No. 107.1, 47 CFR, Part 15, Class B, ICES 003, AC156.

2. Compatible with BRHDK125 Hold-Down Kit to comply with 2017 NEC 710.15E for back-fed circuit breakers.
3. The kAIC of Enpower is the same as the kAIC of the main breaker being installed as listed.
4. Not included. Installer must provide properly rated breaker per circuit breaker list above.
5. Sections from these standards were used during the safety evaluation and included in the UL 1741 listing.

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

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444 SE HORIZON GLEN,
LAKE CITY, FL 32025

SHEET NAME
DATA SHEET

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
DS-05

Data Sheet
Enphase Storage System

Enphase Encharge 10

The **Enphase Encharge 10™** all-in-one AC-coupled storage system is **reliable, smart, simple,** and **safe**. It is comprised of three base Encharge 3™ storage units, has a total usable energy capacity of 10.08 kWh and twelve embedded grid-forming microinverters with 3.84 kW power rating. It provides backup capability and installers can quickly design the right system size to meet the needs of both new and retrofit solar customers.

Reliable

- Proven high reliability IQ Series Microinverters
- Ten-year limited warranty
- Three independent Encharge storage base units
- Twelve embedded IQ 8X-BAT Microinverters
- Passive cooling (no moving parts/fans)

Smart

- Grid-forming capability for backup operation
- Remote software and firmware upgrade
- Mobile app-based monitoring and control
- Support for self consumption
- Utility time of use (TOU) optimization

Simple

- Fully integrated AC battery system
- Quick and easy plug-and-play installation
- Interconnects with standard household AC wiring

Safe

- Cells safety tested
- Lithium iron phosphate (LFP) chemistry for maximum safety and longevity

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

ENPHASE.

Enphase Encharge 10

MODEL NUMBER	
ENCHARGE-10-1P-NA	Encharge 10 battery storage system with integrated Enphase Microinverters and battery management unit (BMU). Includes: - Three Encharge 3.36 kWh base units (B03-A01-US00-1-3) - One Encharge 10 cover kit with cover, wall mounting bracket, watertight conduit hubs, and interconnect kit for wiring between batteries (B10-C-1050-0)
ACCESSORIES	
ENCHARGE-HNDL-R1	One set of Encharge base unit installation handles
OUTPUT (AC)	**@ 240 VAC[1]**
Rated (continuous) output power	3.84 kVA
Peak output power	5.7 kVA (10 seconds)
Nominal voltage / range	240 / 211 – 264 VAC
Nominal frequency / range	60 / 57 – 61 Hz
Rated output current	16 A
Peak output current	24.6A (10 seconds)
Power factor (adjustable)	0.85 leading ... 0.85 lagging
Maximum units per 20 A branch circuit	1 unit (single phase)
Interconnection	Single-phase
Maximum AC short circuit fault current over 3 cycles	69.6 Arms
Round trip efficiency[2]	89%
BATTERY	
Total capacity	10.5 kWh
Usable capacity	10.08 kWh
Round trip efficiency	96%
Nominal DC voltage	67.2 V
Maximum DC voltage	73.5 V
Ambient operating temperature range	-15° C to 55° C (5° F to 131° F) non-condensing
Optimum operating temperature range	0° C to 30° C (32° F to 86° F)
Chemistry	Lithium iron phosphate (LFP)
MECHANICAL DATA	
Dimensions (WxHxD)	1070 mm x 664 mm x 319 mm (42.13 in x 26.14 in x 12.56 in)
Weight	Three individual 44.2 kg (97.4 lbs) base units plus 21.1 kg (48.7 lbs) cover and mounting bracket; total 154.7 kg (341 lbs)
Enclosure	Outdoor – NEMA type 3R
IQ 8X-BAT microinverter enclosure	NEMA type 6
Cooling	Natural convection – No fans
Altitude	Up to 2500 meters (8200 feet)
Mounting	Wall mount
FEATURES AND COMPLIANCE	
Compatibility	Compatible with grid-tied PV systems. Compatible with Enphase M215/M250 and IQ Series Micros, Enphase Enpower, and Enphase IQ Envoy for backup operation.
Communication	Wireless 2.4 GHz
Services	Backup, self-consumption, TOU, Demand Charge, NEM Integrity
Monitoring	Enlighten Manager and MyEnlighten monitoring options; API integration
Compliance	UL 9540, UN 38.3, UL 9540A, UL 1998, UL 991, NEMA Type 3R, AC156 EMI: 47 CFR, Part 15, Class B, ICES 003 Cell Module: UL 1973, UN 38.3 Inverters: UL 62109-1, IEC 62109-2, UL 1741SA, CAN/CSA C22.2 No. 107.1-16, and IEEE 1547
LIMITED WARRANTY	
Limited Warranty[3]	>70% capacity, up to 10 years or 4000 cycles

1. Supported in backup/off grid operations
2. AC to Battery to AC at 50% power rating.
3. Whichever occurs first. Restrictions apply.

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

ENPHASE.

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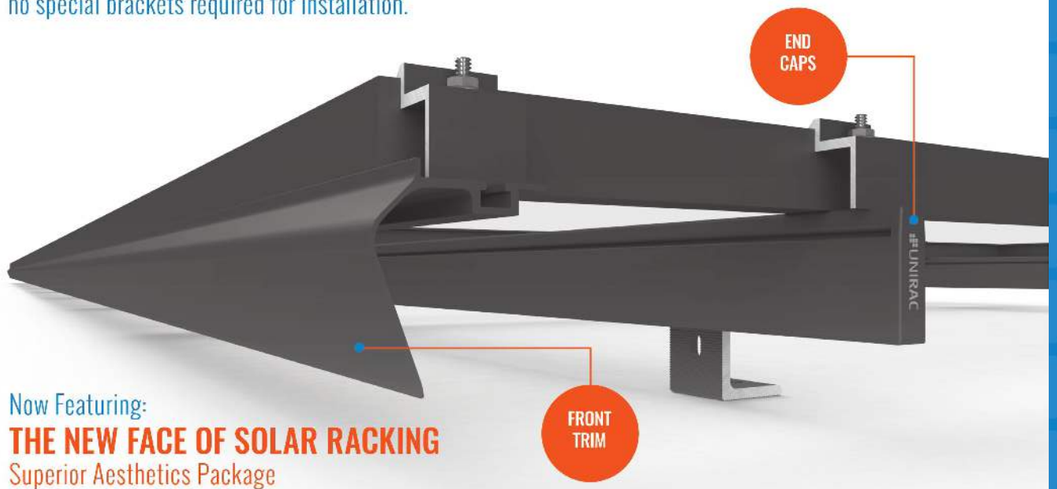
SHEET NUMBER

DS-06

SOLARMOUNT

UNIRAC

SOLARMOUNT defined the standard in solar racking. Features are designed to get installers off the roof faster. Our grounding & bonding process eliminates copper wire and grounding straps to reduce costs. Systems can be configured with standard or light rail to meet your design requirements at the lowest cost possible. The superior aesthetics package provides a streamlined clean edge for enhanced curb appeal, with no special brackets required for installation.



Now Featuring:

THE NEW FACE OF SOLAR RACKING

Superior Aesthetics Package

LOSE ALL OF THE COPPER & LUGS
System grounding through Enphase microinverters and trunk cables

SMALL IS THE NEXT NEW BIG THING
Light Rail is Fully Compatible with all SM Components

ENHANCED DESIGN & LAYOUT TOOLS
Featuring Google Map Capabilities within U-Builder

FAST INSTALLATION. SUPERIOR AESTHETICS

OPTIMIZED COMPONENTS • VERSATILITY • DESIGN TOOLS • QUALITY PROVIDER

SOLARMOUNT

UNIRAC

OPTIMIZED COMPONENTS

INTEGRATED BONDING & PRE-ASSEMBLED PARTS

Components are pre-assembled and optimized to reduce installation steps and save labor time. Our new grounding & bonding process eliminates copper wire and grounding straps or bonding jumpers to reduce costs. Utilize the microinverter mount with a wire management clip for an easier installation.

VERSATILITY

ONE PRODUCT - MANY APPLICATIONS

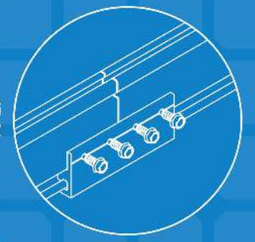
Quickly set modules flush to the roof or at a desired tilt angle. Change module orientation to portrait or landscape while securing a large variety of framed modules on flat, low slope or steep pitched roofs. Available in mill, clear and dark anodized finishes to outperform your projects financial and aesthetic aspirations.

AUTOMATED DESIGN TOOL

DESIGN PLATFORM AT YOUR SERVICE

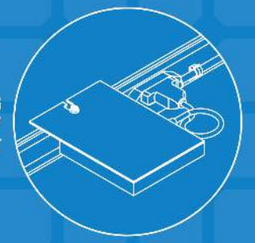
Creating a bill of materials is just a few clicks away with U-Builder, a powerful online tool that streamlines the process of designing a code compliant solar mounting system. Save time by creating a user profile, and recall preferences and projects automatically when you log in. You will enjoy the ability to share projects with customers: there's no need to print results and send to a distributor, just click and share.

INTEGRATED BONDING MIDCLAMP



INTEGRATED BONDING SPLICE BAR

INTEGRATED BONDING L-FOOT w/ T-BOLT



INTEGRATED BONDING MICROINVERTER MOUNT w/ WIRE MANAGEMENT

LISTED **UL2703** BONDING & GROUNDING
MECHANICAL LOADING
SYSTEM FIRE CLASSIFICATION

UNIRAC CUSTOMER SERVICE MEANS THE HIGHEST LEVEL OF PRODUCT SUPPORT

UNMATCHED EXPERIENCE | CERTIFIED QUALITY | ENGINEERING EXCELLENCE | BANKABLE WARRANTY | DESIGN TOOLS | PERMIT DOCUMENTATION

TECHNICAL SUPPORT

Unirac's technical support team is dedicated to answering questions & addressing issues in real time. An online library of documents including engineering reports, stamped letters and technical data sheets greatly simplifies your permitting and project planning process.

CERTIFIED QUALITY PROVIDER

Unirac is the only PV mounting vendor with ISO certifications for 9001:2015, 14001:2015 and OHSAS 18001:2007, which means we deliver the highest standards for fit, form, and function. These certifications demonstrate our excellence and commitment to first class business practices.

BANKABLE WARRANTY

Don't leave your project to chance, Unirac has the financial strength to back our products and reduce your risk. Have peace of mind knowing you are receiving products of exceptional quality. SOLARMOUNT is covered by a twenty five (25) year limited product warranty and a five (5) year limited finish warranty.

PROTECT YOUR REPUTATION WITH QUALITY RACKING SOLUTIONS BACKED BY ENGINEERING EXCELLENCE AND A SUPERIOR SUPPLY CHAIN

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Castillo Engineering
SOLAR DONE RIGHT®

CASTILLO ENGINEERING SERVICES, LLC
COA # 28345
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

SUNPRO

E. CASTILLO LICENSE No. 52590 STATE OF FLORIDA PROFESSIONAL ENGINEER

Digitally Signature with Seal
Signed by: Ermocrates E Castillo
Date: 2021.09.15 16:34:01

PROJECT NAME

HUDSON RESIDENCE

444 SE HORIZON GLEN,
LAKE CITY, FL 32025

SHEET NAME

DATA SHEET

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

DS-07

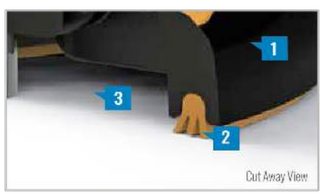
FLASH LOC

UNIRAC
BETTER SOLAR STARTS HERE

FLASHLOC is the ultimate attachment for composition shingle and rolled comp roofs. The all-in-one mount installs fast — no kneeling on hot roofs to install flashing, no prying or cutting shingles, no pulling nails. Simply drive the lag bolt and inject sealant into the base. **FLASH**LOC's patented TRIPLE SEAL technology preserves the roof and protects the penetration with a permanent pressure seal. Kitted with lag bolts, sealant, and hardware for maximum convenience. Don't just divert water, **LOC it out!**

PROTECT THE ROOF

Install a high-strength waterproof attachment without lifting, prying or damaging shingles.



LOC OUT WATER

With an outer shield 1 contour-conforming gasket 2 and pressurized sealant chamber 3 the Triple Seal technology delivers a 100% waterproof connection.

HIGH-SPEED INSTALL

Simply drive lag bolt and inject sealant into the port 4 to create a permanent pressure seal.

FASTER INSTALLATION. 25-YEAR WARRANTY.

FOR QUESTIONS OR CUSTOMER SERVICE VISIT UNIRAC.COM OR CALL (505) 248-2702

FLASH LOC

INSTALLATION GUIDE

UNIRAC
BETTER SOLAR STARTS HERE

PRE-INSTALL

Snap chalk lines for attachment rows. On shingle roofs, snap lines 1-3/4" below upslope edge of shingle course. Locate rafters and mark attachment locations.

At each location, drill a 7/32" pilot hole. Clean roof surface of dirt, debris, snow, and ice. Next, BACKFILL ALL PILOT HOLES WITH SEALANT.

NOTE: Space mounts per racking system install specifications.

STEP 1: SECURE

Place **FLASH**LOC over pilot hole with lag on down-slope side. Align indicator marks on sides of mount with chalk line. Pass included lag bolt and sealing washer through **FLASH**LOC into pilot hole. Drive lag bolt until mount is held firmly in place.

NOTE: The EPDM in the sealing washer will expand beyond the edge of the metal washer when proper torque is applied.

STEP 2: SEAL

Insert tip of UNIRAC provided sealant into port. Inject until sealant exits both vents.

Continue array installation, attaching rails to mounts with provided T-bolts.

NOTE: When **FLASH**LOC is installed over gap between shingle tabs or vertical joints, fill gap/joint with sealant between mount and upslope edge of shingle course.

NOTE: When installing included rail attachment hardware, torque nut to 30 ft/lbs.

USE ONLY UNIRAC APPROVED SEALANTS: Chemlink Duralink 50 (included in kit) or Chemlink M-1

FASTER INSTALLATION. 25-YEAR WARRANTY.

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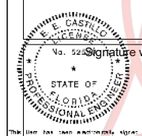

Digitally Signature with Seal
Signed by: Ermocrates E Castillo
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PROJECT NAME

HUDSON RESIDENCE

444 SE HORIZON GLEN,
LAKE CITY, FL 32025

SHEET NAME

DATA SHEET

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

DS-08

Residential Optional Calculation

by: John Sokolik

9/25/1997

Version 2011 L

Job Name

Marc Jones Construction, LLC Sunpro Solar

0

0

0

9/15/2021 10:25

STEP 1 Article 220.82 (B) (1),(2)

sq. ft	2500	General Lighting load	7,500 VA
	4	Small Appliance	6,000 VA
	1	Laundry circuit	1,500 VA
		Gen.Lgt, Sm App.& Laun. Load	15,000 VA

STEP 2 Article 220.82 (C) ☑

A/C Condenser & Fixed Electric Space Heating

					QTY
5 ton	7,130 VA	AHU 1	9.6kW	10,800 VA	1
A/C #2	VA	AHU 2	Select	VA	Qty
A/C #3	VA	AHU 3	Select	VA	Qty
A/C #4	VA	AHU 4	Select	VA	Qty
A/C #5	VA	AHU 5	Select	VA	Qty

General lighting, Sm. Appl. & Laundry	**15,000 VA**
Total	**1**
Heating Load	7,440 VA
CU Load	8,330 VA
Electric Space Heat @ 65% <4, 40% >3, vs. A/C @ 100%	**8,330 VA**

STEP 3 Article 220.82 (B) (3)

	4,500 VA	1	Water Heater	4,500 VA
	1,400 VA	2	Refrigerator	2,800 VA
	600 VA		Freezer	VA
	1,030 VA	1	Dishwasher	1,030 VA
	690 VA		Disposal	VA
	400 VA	1	R / Hood	400 VA
	1,630 VA		Microwave	VA
☐	4,000 VA		Microwave	VA
	170 VA		Mini Refrig	VA
☐	400 VA	1	Wine Clr	400 VA
☐	5,000 VA		Insta Hot	VA
	1,500 VA		Ironing Center	VA
☐	select		Jacuzzi Tub	VA
☐	select		Sprinkler Pump	VA
☐	1 hp		Well Pump	1,840 VA
	select		Fountain Pump	VA
	select		Elevator	VA
			Pool Equip. Panel	1,840 VA Apply Demand
☐			GATES	VA No Demand
☐			Other load	VA No Demand

Appliance Demand Load	**12,810 VA**
Dryer Demand Load	**5,000 VA**
Range Demand Load	**10,000 VA**
Service Demand	**31,454 VA**
Demand Load	**131 A**
Neutral Demand	**81 A**
Min.Service Req.	**150 A**
Min. Feeder size	**1**
Min. Neutral size	**4**
Eq. Grding Cond.	**6**
☐	**Copper**
Total Appliance Load	**12,810 VA**

STEP 4 Article 220.82 (B) (3)

Electric Clothes Dryers **5,000 VA**

STEP 5 Article 220.82 (B) (3)

Electric Ranges **10,000 W** Col C demand **8000**

or Number of appliances

☐ Check Box for Gas Range

Cooktop	Col B demand
Cooktop	Col B demand
Oven(s)	Col B demand
Oven(s)	Col B demand

Number of appliances **0** Dem. Factor

Cooktop & Oven Demand Load

jmp1jds@comcast.net

\>>><<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<

Pool Panel Feeder Calculation			(See Note)	A	B	N
Continuous Motors		0	. . . . . .	0	0	0
Non-continuous		1,840	. . . . . .	920	920	0
Spa heater 11 kVA			. . . . . .	0	0	
Pool heater 3.5 ton			. . . . . .	0	0	
Pool heater 5 ton			. . . . . .	0	0	
Pool Light	select	0	. . . . . .	0	0	0
Blower	select	0	☐ 240v	0	0	0
other load		0	☐ 240v	0	0	0
other load		0	☐ 240v	0	0	0
☐ Min.Copper Pool Feeder			**AWG**	**8 A**	**8 A**	**A**
Minimum Panel Rating			**30A**	Phase Amperes		Neut. load

Continuous Motors		Non-continuous Motors	
select	☐ 240v	1 hp	☐ 240v
select	☐ 240v	select	☐ 240v
select	☐ 240v	select	☐ 240v
select	☐ 240v	select	☐ 240v
select	☐ 240v	select	☐ 240v

0.0 Motor Neutral Load

Max.Unbalanced Neutral Load

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PROJECT INSTALLER

SUNPRO

No. 52590

Signature with Seal

This item has been electronically signed and sealed by Ermocrates Castillo, PE on the Date and/or Time stamp shown using the Digital Signature. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Digitally signed by: Ermocrates E Castillo
Date: 2021.09.15 16:34:02

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