WYSSLING CONSULTING
CORPORATE EXPERIENCE WITH SMALL BUSINESS VALUE

Scott E. Wyssling, PE
Coleman D. Larsen, SE, PE
Gregory T. Elvestad, PE

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November 23, 2022

Lighting Electric, LLC
230 Blacksnake Road
Stanley, NC 28164

Scott Wyssling, PE

Digitally signed by Scott Wyssling, PE
DN: C=US, S=Utah, L=Alpine, O=Wyssling Consulting, OU=Engineering, CN="Scott Wyssling, PE", E=swyssling@wysslingconsulting.com
Reason: I am the author of this document
Location: your signing location here
Date: 2022.11.23 14:20:40-07'00'
Foxit PDF Editor Version: 11.1.0

Re: Engineering Services
Blackwell Residence
131 Rad Street, Lillington NC
7.600 kW System

To Whom It May Concern:

We have received information regarding solar panel installation on the roof of the above referenced structure. Our evaluation of the structure is to verify the existing capacity of the roof system and its ability to support the additional loads imposed by the proposed solar system.

A. Site Assessment Information

1. Site visit documentation identifying attic information including size and spacing of framing for the existing roof structure.
2. Design drawings of the proposed system including a site plan, roof plan and connection details for the solar panels. This information will be utilized for approval and construction of the proposed system.

B. Description of Structure:

Roof Framing: 2x6 dimensional lumber at 24" on center.
Roof Material: Composite Asphalt Shingles
Roof Slope: 30 degrees
Attic Access: Accessible
Foundation: Permanent

C. Loading Criteria Used

- **Dead Load**
  - Existing Roofing and framing = 7 psf
  - New Solar Panels and Racking = 3 psf
  - TOTAL = 10 PSF
- **Live Load** = 20 psf (reducible) – 0 psf at locations of solar panels
- **Ground Snow Load** = 15 psf
- **Wind Load** based on ASCE 7-10
  - Ultimate Wind Speed = 117 mph (based on Risk Category II)
  - Exposure Category C

Analysis performed of the existing roof structure utilizing the above loading criteria is in accordance with the 2018 NCRC (2015 IRC). including provisions allowing existing structures to not require strengthening if the new loads do not exceed existing design loads by 105% for gravity elements and 110% for seismic elements. This analysis indicates that the existing framing will support the additional panel loading without damage, if installed correctly.

D. Solar Panel Anchorage

1. The solar panels shall be mounted in accordance with the most recent Unirac manual. If during solar panel installation, the roof framing members appear unstable or deflect non-uniformly, our office should be notified before proceeding with the installation.
2. The maximum allowable withdrawal force for a $^{5}/_{16}$" lag screw is 235 lbs per inch of penetration as identified in the National Design Standards (NDS) of timber construction specifications. Based on a minimum penetration depth of 2½", the allowable capacity per connection is greater than the design withdrawal force (demand). Considering the variable factors for the existing roof framing and installation tolerances, the connection using one $^{5}/_{16}$" diameter lag screw with a minimum of 2½" embedment will be adequate and will include a sufficient factor of safety.
3. Considering the wind speed, roof slopes, size and spacing of framing members, and condition of the roof, the panel supports shall be placed no greater than 48" on center.
4. Panel supports connections shall be staggered to distribute load to adjacent framing members.

Based on the above evaluation, this office certifies that with the racking and mounting specified, the existing roof system will adequately support the additional loading imposed by the solar system. This evaluation is in conformance with the 2018 NCRC (2015 IRC), current industry standards, and is based on information supplied to us at the time of this report.

Should you have any questions regarding the above or if you require further information do not hesitate to contact me.

Very truly yours,

Scott E. Wyssling, PE
North Carolina License No. 46546

THIS PLAN HAS BEEN ELECTRONICALLY SIGNED AND SEALED BY SCOTT WYSSLING, PE USING A DIGITAL SIGNATURE AND DATE. PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES

NORTH CAROLINA PROFESSIONAL SEAL 046546 ENGINEER SCOTT E. WYSSLING

Wyssling Consulting, PLLC
76 N Meadowbrook Drive Alpine UT 84004
North Carolina COA # P-2308

Signed *11/23/2022*

SCOPE OF WORK:
TO INSTALL A ROOF MOUNTED SOLAR PHOTOVOLTAIC SYSTEM AT THE OWNER RESIDENCE LOCATED AT 131 RAD ST, LILLINGTON, NC 27546.
THE POWER GENERATED BY THE PV SYSTEM WILL BE INTERCONNECTED WITH THE UTILITY GRID THROUGH THE EXISTING ELECTRICAL SERVICE EQUIPMENT.
THE PV SYSTEM DOES INCLUDE STORAGE BATTERIES

EQUIPMENT SUMMARY
19 HANWHA Q CELLS Q.PEAK DUO BLK ML-G10+ 400 MODULES
19 ENPHASE IQ8-60-2-US(240V) MICROINVERTERS
01 ENPHASE ENCHARGE 3
01 ENPHASE SYSTEM CONTROLLER 2

NOTICE TO CONTRACTOR
All construction must comply with current NC Building Codes and is subject to field inspection and verification.
APPROVED
Limited building only review
Permit holder responsible for full compliance with the code
01/03/2023
Harnett COUNTY NORTH CAROLINA

GOVERNING CODES
2018 NORTH CAROLINA BUILDING CODE
2018 NORTH CAROLINA RESIDENTIAL CODE
2018 NORTH CAROLINA EXISTING BUILDING CODE
2018 NORTH CAROLINA FIRE PREVENTION CODE
2018 NORTH CAROLINA PLUMBING CODE
2018 NORTH CAROLINA MECHANICAL CODE
2018 NORTH CAROLINA FUEL GAS CODE
2018 NORTH CAROLINA ENERGY CONSERVATION CODE
2020 NORTH CAROLINA ELECTRICAL CODE

GENERAL NOTES:
- THESE CONSTRUCTION DOCUMENTS HAVE BEEN BASED ON FIELD INSPECTIONS AND OTHER INFORMATION AVAILABLE AT THE TIME. ACTUAL FIELD CONDITIONS MAY REQUIRE MODIFICATIONS IN CONSTRUCTION DETAILS.
- ARCHITECT HAS NOT BEEN RETAINED TO SUPERVISE ANY CONSTRUCTION OR INSTALLATION OF ANY EQUIPMENT AT SITE.
- CONTRACTOR SHALL FURNISH ALL LABOR, MATERIAL, EQUIPMENT, TOOLS, OBTAINS ALL PERMITS, LICENSES AND PAY ALL REQUIRED FEES AND COMPLETE INSTALLATION.
- CONTRACTOR HAS THE FULL RESPONSIBILITY TO CHECK AND VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS. ANY DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK. ANY WORK STARTED BEFORE CONSULTATION AND ACCEPTANCE BY THE ENGINEER SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE SUBJECT TO CORRECTION BY THEM WITHOUT ADDITIONAL COMPENSATION.
- DAMAGE CAUSED TO THE EXISTING STRUCTURE, PIPES, DUCTS, WINDOWS, WALL, FLOORS, ETC. SHALL BE REPAIRED TO THE ORIGINAL CONDITION OR REPLACED BY THE CONTRACTOR AT NO ADDITIONAL COST.
- THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR THE PROPER INSTALLATION AND COMPLETION OF THE WORK WITH APPROVED MATERIALS.
- NO CHANGES ARE TO BE MADE WITHOUT THE CONSULTATION AND APPROVAL OF THE ARCHITECT.
- CONTRACTOR SHALL OBTAIN BULDING PERMIT. NO WORK TO START UNLESS BUILDING PERMIT IS PROPERLY DISPLAYED.
- ALL WORKMANSHIP AND MATERIALS SHALL BE OF FIRST QUALITY AND IN COMPLIANCE WITH THE REQUIREMENTS OF THE NC BUILDING CODE, THE DEPARTMENT OF ENVIRONMENTAL PROTECTION AND ALL PERTINENT AGENCIES.
- IT IS ESSENTIAL THAT ALL WORK PROCEED WITH THE MAXIMUM COOPERATION OF ALL PARTIES AND WITH MINIMUM INTERFERENCE TO THE OCCUPANTS WITHIN THE BUILDING. THE OWNER'S DIRECTIONS IN THIS REGARD SHALL BE FULLY COMPLIED WITH.
- ALL EXPOSED PLUMBING, HVAC, ELECTRICAL DUCTWORK, PIPING AND CONDUITS ARE TO BE PAINTED BY GENERAL CONTRACTOR.
- THE CONTRACTOR SHALL PERFORM THE WORK IN STRICT CONFORMANCE WITH THE LOCAL LAWS, REGULATIONS AND THE NATIONAL ELECTRIC CODE.
- THE CONTRACTOR SHALL OBTAIN ALL PERMITS, APPROVALS, AFFIDAVITS, CERTIFICATIONS, ETC. AND PAY ALL FEES AS REQUIRED BY THE LOCAL AUTHORITIES.
- CONTRACTORS SHALL OBTAIN FIRE CERTIF. UPON COMPLETION OF WORK.

WIRING AND CONDUIT NOTES:
- ALL CONDUIT SIZES AND TYPES, SHALL BE LISTED FOR ITS PURPOSE AND APPROVED FOR THE SITE APPLICATIONS
- ALL PV CABLES AND HOMERUN WIRES BE #10AWG *USE-2, PV WIRE, OR PROPRIETARY SOLAR CABLING SPECIFIED BY MFR, OR EQUIVALENT; ROUTED TO SOURCE CIRCUIT COMBINER BOXES AS REQUIRED
- ALL CONDUCTORS AND OCPD SIZES AND TYPES SPECIFIED ACCORDING TO [NEC 690.8 (A)(1) & (B)(1)], [NEC 240] [NEC 690.7] FOR MULTIPLE CONDUCTORS
- ALL PV DC CONDUCTORS IN CONDUIT EXPOSED TO SUNLIGHT SHALL BE DERATED ACCORDING TO [NEC TABLE 310.15 (B)(2)(C)] BLACK ONLY**
- EXPOSED ROOF PV DC CONDUCTORS SHALL BE USE-2, 90°C RATED, WET AND UV RESISTANT, AND UL LISTED RATED FOR 600V, UV RATED SPIRAL WRAP SHALL BE USED TO PROTECT WIRE FROM SHARP EDGES
- PHASE AND NEUTRAL CONDUCTORS SHALL BE DUAL RATED THHN/THWN-2 INSULATED, 90°C RATED, WET AND UV RESISTANT, RATED FOR 600V PER NEC 2008 OR 1000V PER NEC 2017
- 4-WIRE DELTA CONNECTED SYSTEMS HAVE THE PHASE WITH THE HIGHER VOLTAGE TO GROUND MARKED ORANGE OR IDENTIFIED BY OTHER EFFECTIVE MEANS
- ALL SOURCE CIRCUITS SHALL HAVE INDIVIDUAL SOURCE CIRCUIT PROTECTION
- VOLTAGE DROP LIMITED TO 2%
- AC CONDUCTORS >4AWG COLOR CODED OR MARKED: PHASE A OR L1- BLACK, PHASE B OR L2- RED, PHASE C OR L3- BLUE, NEUTRAL- WHITE/GRAY

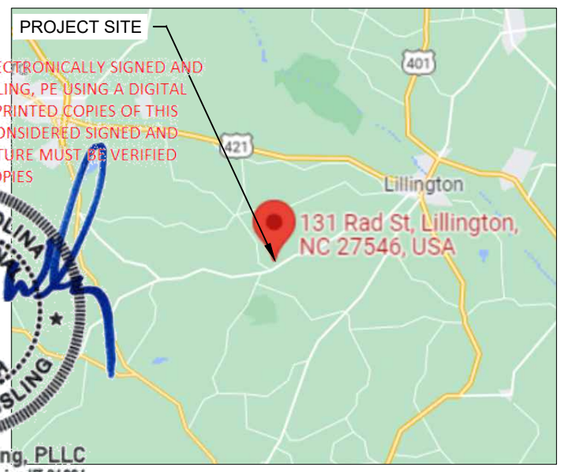
ELECTRICAL NOTES:
- THE EQUIPMENT AND ALL ASSOCIATED WIRING AND INTERCONNECTION SHALL BE INSTALLED ONLY BY QUALIFIED PEOPLE. A QUALIFIED PERSON IS ONE WHO HAS SKILLS AND KNOWLEDGE RELATED TO THE CONSTRUCTION AND OPERATION OF THE ELECTRICAL EQUIPMENT AND INSTALLATIONS AND HAS RECIEVED SAFETY TRAINING TO RECOGNIZE AND AVOID THE HAZARDS INVOLVED. (NEC 690.4(E) AND 705.6)
- LOCAL UTILITY PROVIDER SHALL BE NOTIFIED PRIOR TO USE AND ACTIVATION OF ANY SOLAR PHOTOVOLTAIC INSTALLATION. FOR A LINE SIDE TAP CONNECTION, UTILITY NEEDS TO BE NOTIFIED WELL IN ADVANCE TO COORDINATE BUILDING ELECTRICAL SHUT OFF.
- NEW CONDUIT ROUTING SHOWN IS ESSENTIALLY SCHEMATIC. SUBCONTRACTOR SHALL LAY OUT RUNS TO SUIT FIELD CONDITIONS AND THE COORDINATION REQUIREMENTS OF OTHER TRADES.
- ARRAY WIRING SHOULD NOT BE READILY ACCESSIBLE EXCEPT TO QUALIFIED PERSONNEL.
- ALL EXTERIOR CONDUIT, FITTINGS, AND BOXES SHALL BE WATERTIGHT AND APPROVED FOR USE IN WET LOCATIONS. (NEC 314.15A).
- WIRING METHODS FOR PV SYSTEM CONDUCTORS AREN'T PERMITTED WITHIN 10 IN. OF THE ROOF DECKING OR SHEATHING EXCEPT WHERE LOCATED DIRECTLY BELOW THE ROOF SURFACE THAT'S COVERED BY PV MODULES AND ASSOCIATED EQUIPMENT WIRING
- BACK-FED BREAKER MUST BE AT THE OPPOSITE END OF BUS BAR FROM THE MAIN BREAKER OR MAIN LUG SUPPLYING CURRENT FROM THE UTILITIES.
- ALL CONDUCTORS AND WIRE TIES EXPOSED TO SUNLIGHT ARE LISTED AS UV RESISTANT.
- CONTRACTOR SHALL FOLLOW ALL ELECTRICAL EQUIPMENT LABELING REQUIREMENTS IN NEC 690 AND IFC 2018
- PV SOURCE, OUTPUT AND INVERTER CIRCUITS SHALL BE IDENTIFIED AT ALL POINTS OF TERMINATION, CONNECTION, AND SPLICES. THE MEANS OF ID CAN BE SEPARATE COLOR CODING, MARKING TAPE, TAGGING ETC. (NEC 690.4).
- MEASURE THE LINE-TO-LINE AND LINE-TO-NEUTRAL VOLTAGE OF ALL SERVICE ENTRANCE CONDUCTORS PROIR TO INSTALLING ANY SOLAR EQUIPMENT. THE VOLTAGES FOR THE 240VAC RATED.

SYSTEM RATING
7.60 KWDC
4.66 KWAC

SHEET INDEX

PV-0	COVER PAGE
PV-1	SITE PLAN
PV-2	ROOF PLAN & MODULES
PV-2A	STRING LAYOUT & BOM
PV-3	ATTACHMENT DETAIL
PV-3A	ATTACHMENT DETAIL
PV-4	ELECTRICAL LINE DIAGRAM & CALCS.
PV-4A	SPECIFICATIONS & CALCULATION
PV-5	SIGNAGE
PV-6+	EQUIPMENT SPECIFICATIONS

1 PV-0 HOUSE PHOTO SCALE: NTS



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NORTH CAROLINA PROFESSIONAL SEAL 046546 ENGINEER SCOTT E. WYSSLING

Wyssling Consulting, PLLC
76 N Meadowbrook Drive Alpine UT 84004
North Carolina COA # P-2308

Signed 11/23/2022

PV-0 VICINITY MAP SCALE: NTS

LIGHTING ELECTRIC
LIGHTING ELECTRIC
230 BLACKSNAKE RD,
STANLEY, NC 28164
(704) 361-8011
LICENSE NUMBER :- 29517

SYSTEM INFO.
(19)HANWHA Q CELLS Q.PEAK DUO BLK ML-G10+ 400
(19) ENPHASE IQ8-60-2-US(240V)
DC SYSTEM SIZE: 7.60 KWDC
AC SYSTEM SIZE: 4.66 KWAC

REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

PROJECT NAME & ADDRESS
HAROLD BLACKWELL RESIDENCE
131 RAD ST
LILLINGTON, NC 27546
PH.# : (901)-225-2262
Email: haroldblackwell@gmail.com

DATE: 11/23/2022

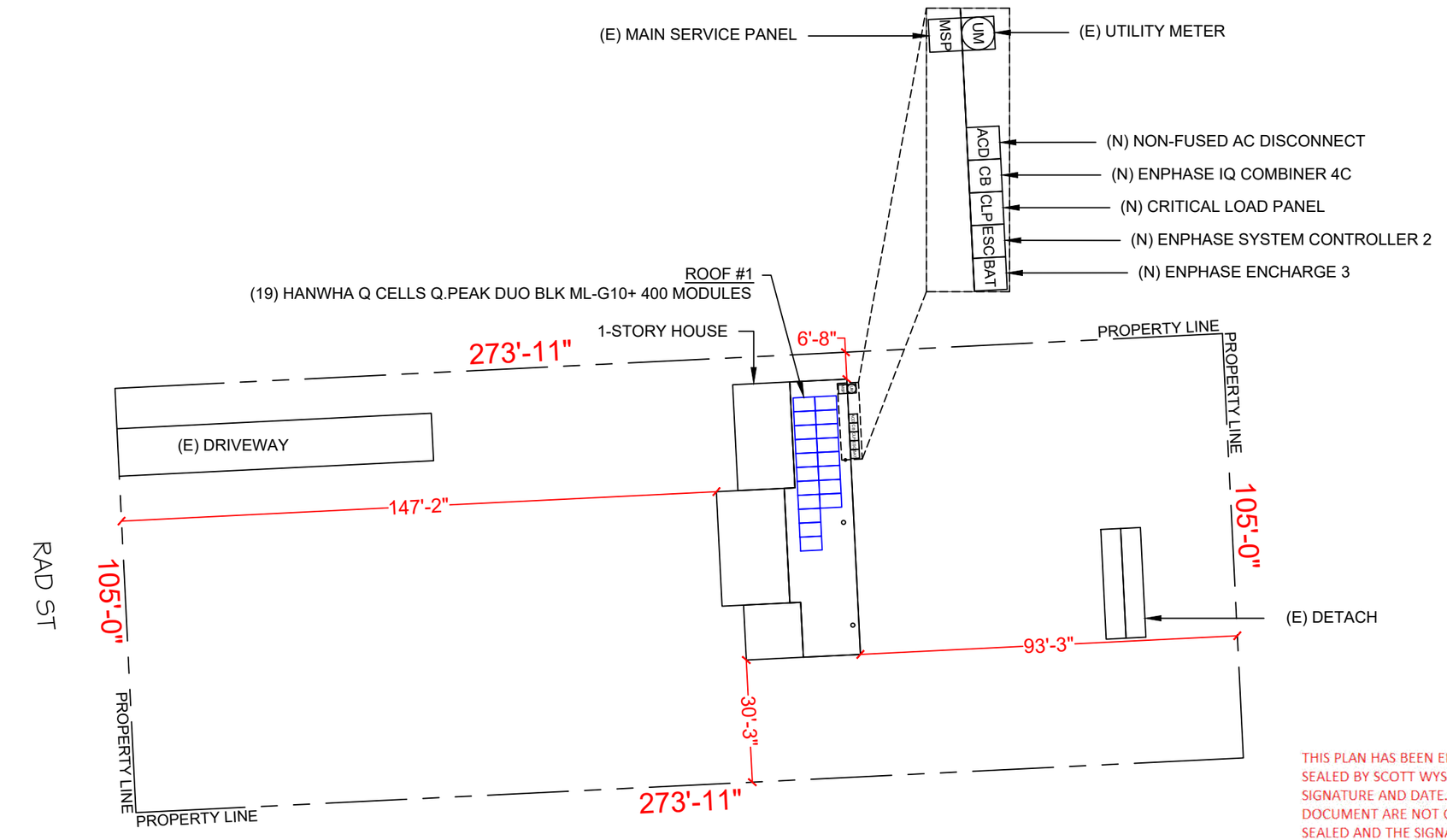
SHEET NAME
COVER PAGE

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-0

SITE NOTES

- A LADDER SHALL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS.
- THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE AND THIS SYSTEM IS AN UTILITY INTERACTIVE SYSTEM WITH STORAGE BATTERIES.
- THE SOLAR PV INSTALLATION SHALL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.
- PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL BE PROVIDED AS PER SECTION [NEC 110.26]



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76 N Meadowbrook Drive Alpine UT 84004
North Carolina COA # P-2308
Signed 11/23/2022

1 PLOT PLAN WITH ROOF PLAN
PV-1
SCALE: 1/32" = 1'-0"

LIGHTING ELECTRIC
LIGHTING ELECTRIC
LIGHTING ELECTRIC
230 BLACKSNAKE RD,
STANLEY, NC 28164
(704) 361-8011
LICENSE NUMBER :- 29517

SYSTEM INFO.

(19)HANWHA Q CELLS Q.PEAK DUO BLK ML-G10+ 400

(19) ENPHASE IQ8-60-2-US(240V)

DC SYSTEM SIZE: 7.60 KWDC

AC SYSTEM SIZE: 4.66 KWAC

REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

PROJECT NAME & ADDRESS

HAROLD BLACKWELL
RESIDENCE
131 RAD ST
LILLINGTON, NC 27546
PH.# : (901)-225-2262
Email: haroldblackwell@gmail.com

DATE: 11/23/2022

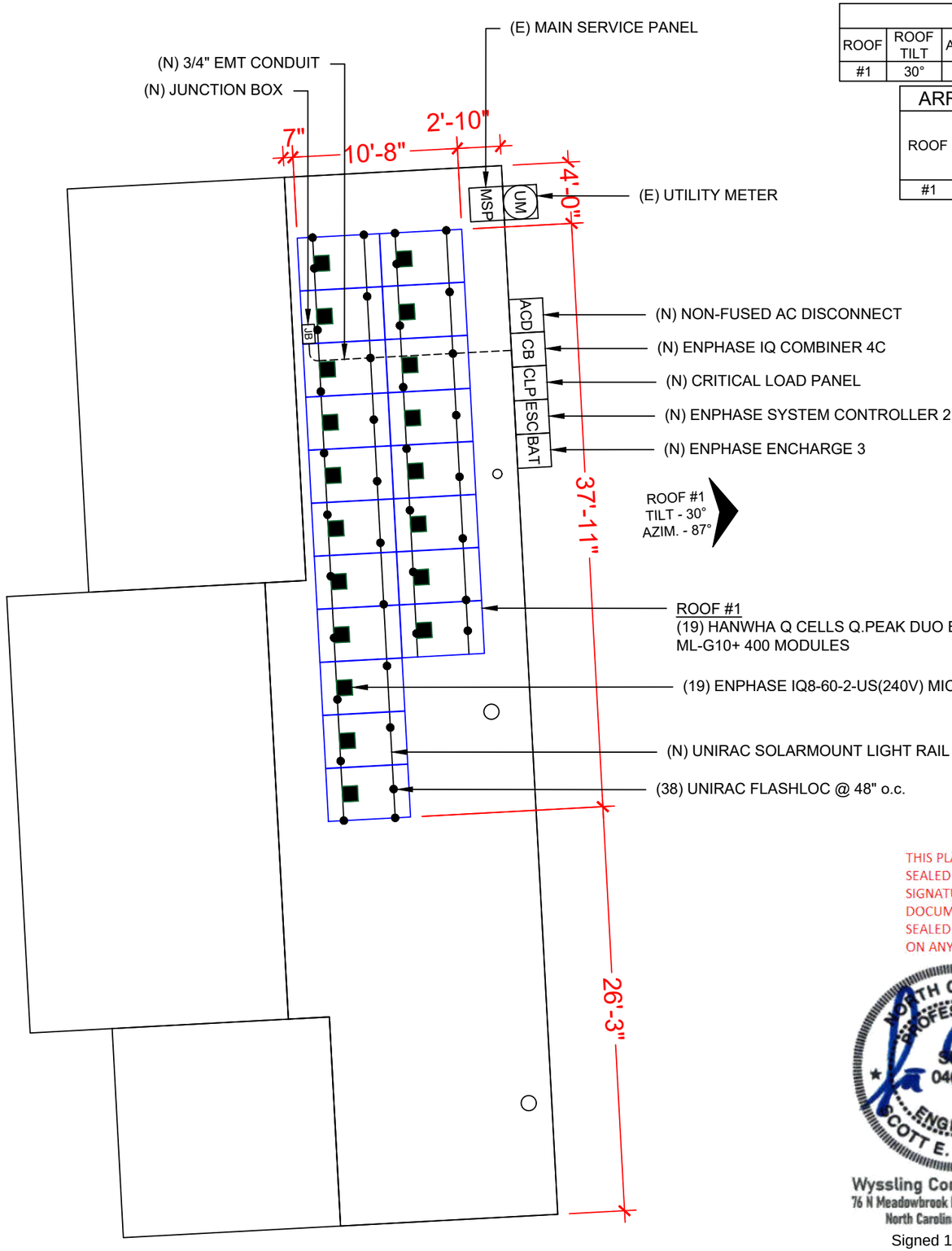
SHEET NAME
SITE PLAN

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-1

DESIGN SPECIFICATION	
RISK CATEGORY:	II
CONSTRUCTION:	SFD
ZONING:	RESIDENTIAL
SNOW LOAD (ASCE 7-10):	15 PSF
EXPOSURE CATEGORY:	C
WIND SPEED (ASCE 7-10):	117 MPH

MODULE TYPE, DIMENSIONS & WEIGHT	
NUMBER OF MODULES:	19 MODULES
MODULE TYPE:	HANWHA Q CELLS Q.PEAK DUO BLK ML-G10+ 400
MODULE WEIGHT:	48.5 LBS
MODULE DIMENSIONS:	74.0" x 41.1" = 21.12SF
UNIT WEIGHT OF AREA:	2.30 PSF



ROOF DESCRIPTION					
ROOF	ROOF TILT	AZIMUTH	RAFTER SIZE	RAFTER SPACING	ROOF MATERIAL
#1	30°	87°	2"X6"	24" o.c.	COMP. SHINGLE

ARRAY AREA & ROOF AREA CALC'S				
ROOF	# OF MODULES	ARRAY AREA (Sq. Ft.)	ROOF AREA (Sq. Ft.)	ROOF AREA COVERED BY ARRAY (%)
#1	19	349.53	1036.69	34

LEGEND

- JB - JUNCTION BOX
- MSP - MAIN SERVICE PANEL
- UM - UTILITY METER
- BAT - ENPHASE ENCHARGE 3
- ESC - ENPHASE SYSTEM CONTROLLER 2
- CB - IQ COMBINER BOX 4C
- ACD - NON-FUSED AC DISCONNECT
- CLP - CRITCAL LOAD PANEL
- VENT, ATTIC FAN (ROOF OBSTRUCTION)
- ROOF ATTACHMENT
- CONDUIT

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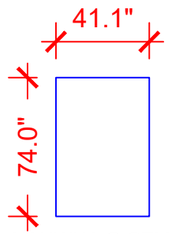


HANWHA Q CELLS Q.PEAK DUO BLK ML-G10+ 400 MODULES

1 ROOF PLAN & MODULES
PV-2
SCALE: 1/8" = 1'-0"

LIGHTING ELECTRIC
LIGHTING ELECTRIC
230 BLACKSNAKE RD,
STANLEY, NC 28164
(704) 361-8011
LICENSE NUMBER :- 29517

SYSTEM INFO.
(19)HANWHA Q CELLS Q.PEAK DUO BLK ML-G10+ 400
(19) ENPHASE IQ8-60-2-US(240V)
DC SYSTEM SIZE: 7.60 KWDC
AC SYSTEM SIZE: 4.66 KWAC

REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

PROJECT NAME & ADDRESS
HAROLD BLACKWELL RESIDENCE
131 RAD ST
LILLINGTON, NC 27546
PH.# : (901)-225-2262
Email: haroldblackwell@gmail.com

DATE: 11/23/2022

SHEET NAME
ROOF PLAN & MODULES

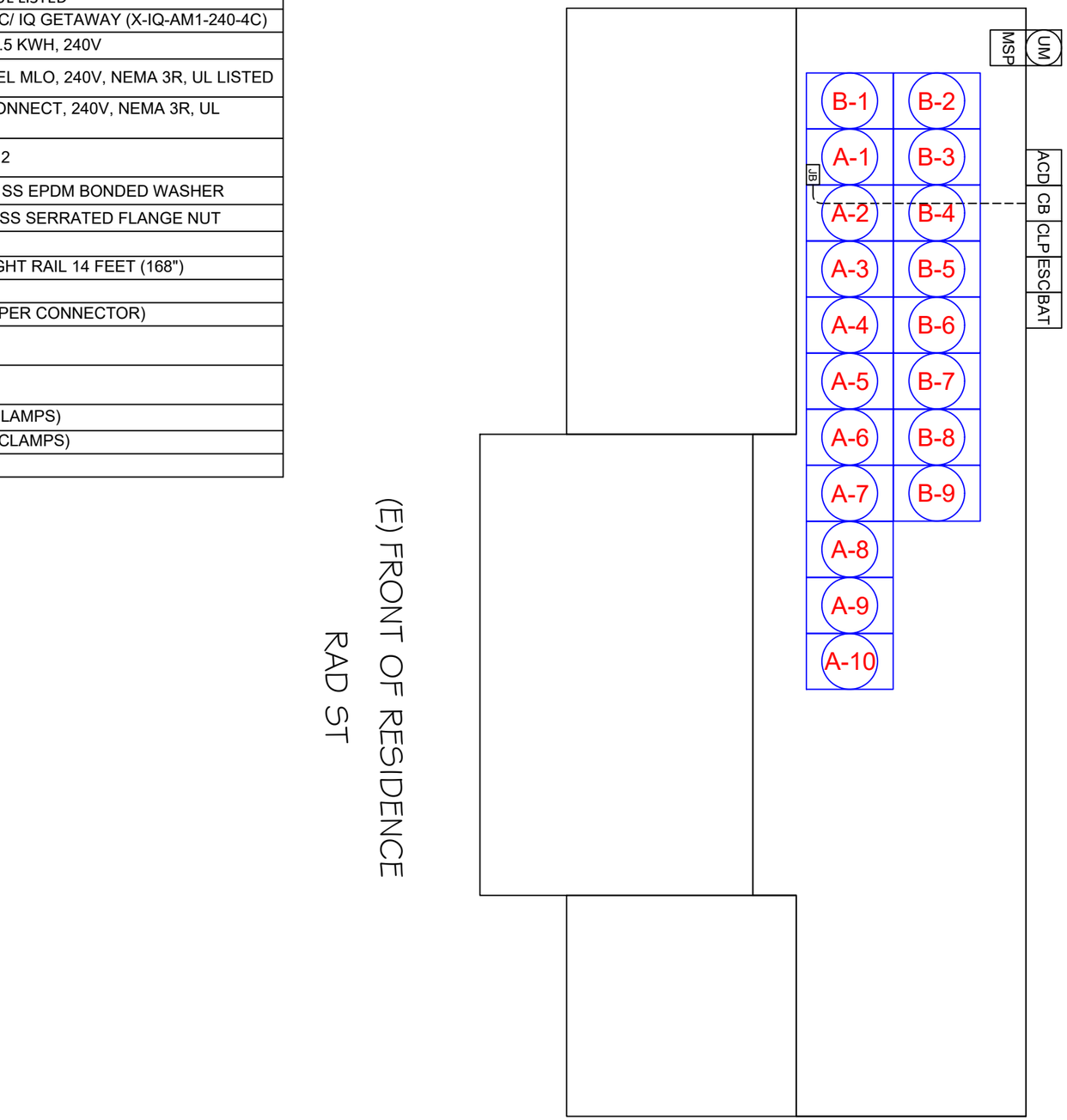
SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-2

BILL OF MATERIALS

EQUIPMENT	QTY	DESCRIPTION
SOLAR PV MODULE	19	HANWHA Q CELLS Q.PEAK DUO BLK ML-G10+ 400 MODULES
MICROINVERTER	19	ENPHASE IQ8-60-2-US(240V) MICROINVERTERS
JUNCTION BOX	1	JUNCTION BOX, NEMA 3R, UL LISTED
COMBINER BOX	1	ENPHASE IQ COMBINER 4C/ IQ GETAWAY (X-IQ-AM1-240-4C)
ENERGY STORAGE	1	ENPHASE ENCHARGE 3, 3.5 KWH, 240V
CRITICAL LOAD PANEL	1	125A CRITICAL LOAD PANEL MLO, 240V, NEMA 3R, UL LISTED
AC DISCONNECT	1	30A NON-FUSED AC DISCONNECT, 240V, NEMA 3R, UL LISTED
INTERCONNECT DEVICE	1	IQ SYSTEM CONTROLLER 2
ATTACHMENT	38	5/16" x 4" SS LAG BOLT W/ SS EPDM BONDED WASHER
ATTACHMENT	38	SS SERRATED T-BOLT W/ SS SERRATED FLANGE NUT
ATTACHMENT	38	FLASHLOC BASE
RAILS	10	UNIRAC SOLARMOUNT LIGHT RAIL 14 FEET (168")
BONDED SPLICE	6	SPLICE KIT
ENPHASE Q CABLE	20	ENPHASE Q CABLE 240V (PER CONNECTOR)
BRANCH TERMINATOR	2	BRANCH TERMINATOR
IQ WATER TIGHT CAP	1	IQ WATER TIGHT CAPS
MID CLAMP	34	MODULES CLAMPS (MID CLAMPS)
END CLAMP	8	MODULES CLAMPS (END CLAMPS)
GROUNDING LUG	2	GROUNDING LUG

A B - MODULE STRINGING



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North Carolina COA # P-2308

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1 ROOF PLAN WITH STRING LAYOUT & BOM
PV-2A
SCALE: 3/16"=1'-0"

LIGHTING ELECTRIC
LIGHTING ELECTRIC
230 BLACKSNAKE RD,
STANLEY, NC 28164
(704) 361-8011
LICENSE NUMBER :- 29517

SYSTEM INFO.

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(19) ENPHASE IQ8-60-2-US(240V)

DC SYSTEM SIZE: 7.60 KWDC

AC SYSTEM SIZE: 4.66 KWAC

REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

PROJECT NAME & ADDRESS

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SHEET NAME
STRING LAYOUT & BOM

SHEET SIZE
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11" X 17"

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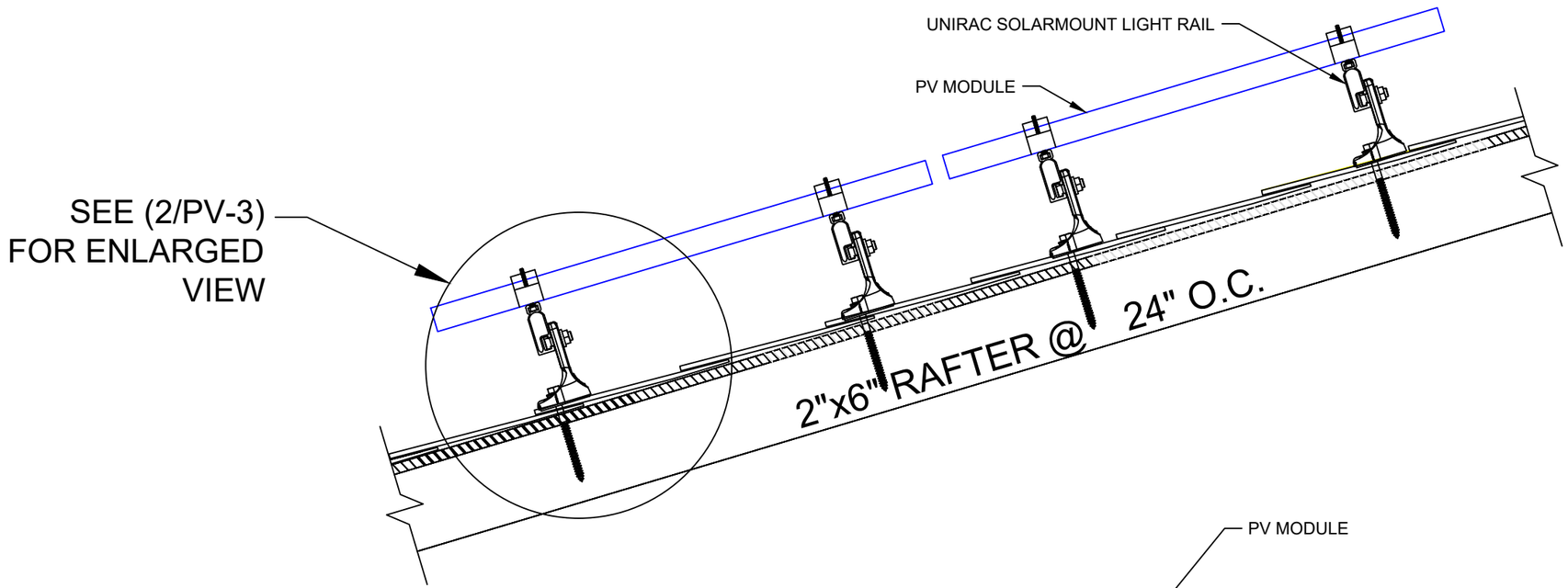
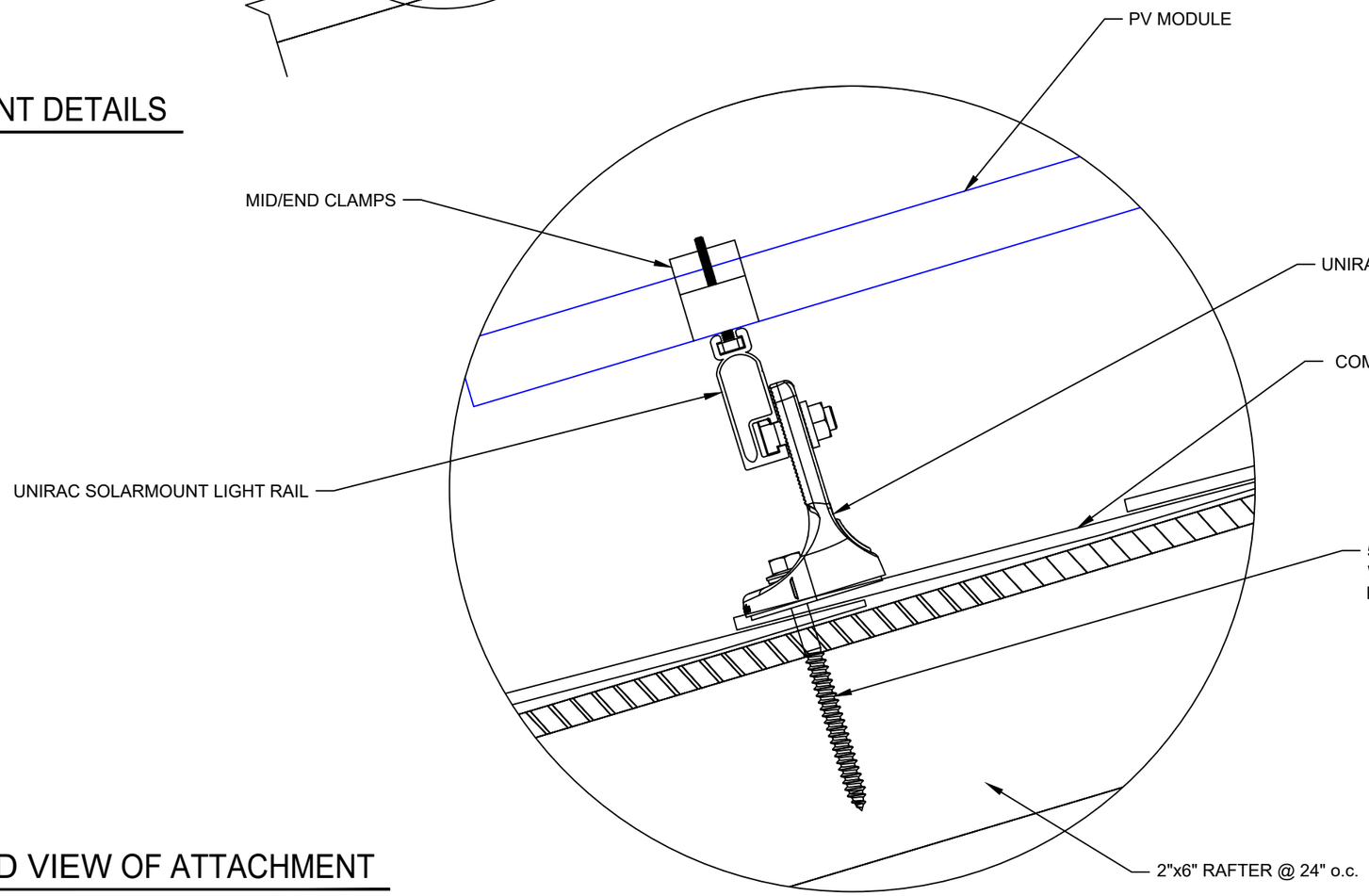
PV-2A



1 ATTACHMENT DETAILS

PV-3



2 ENLARGED VIEW OF ATTACHMENT

SCALE: NTS

PV-3

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REVISIONS

DESCRIPTION	DATE	REV

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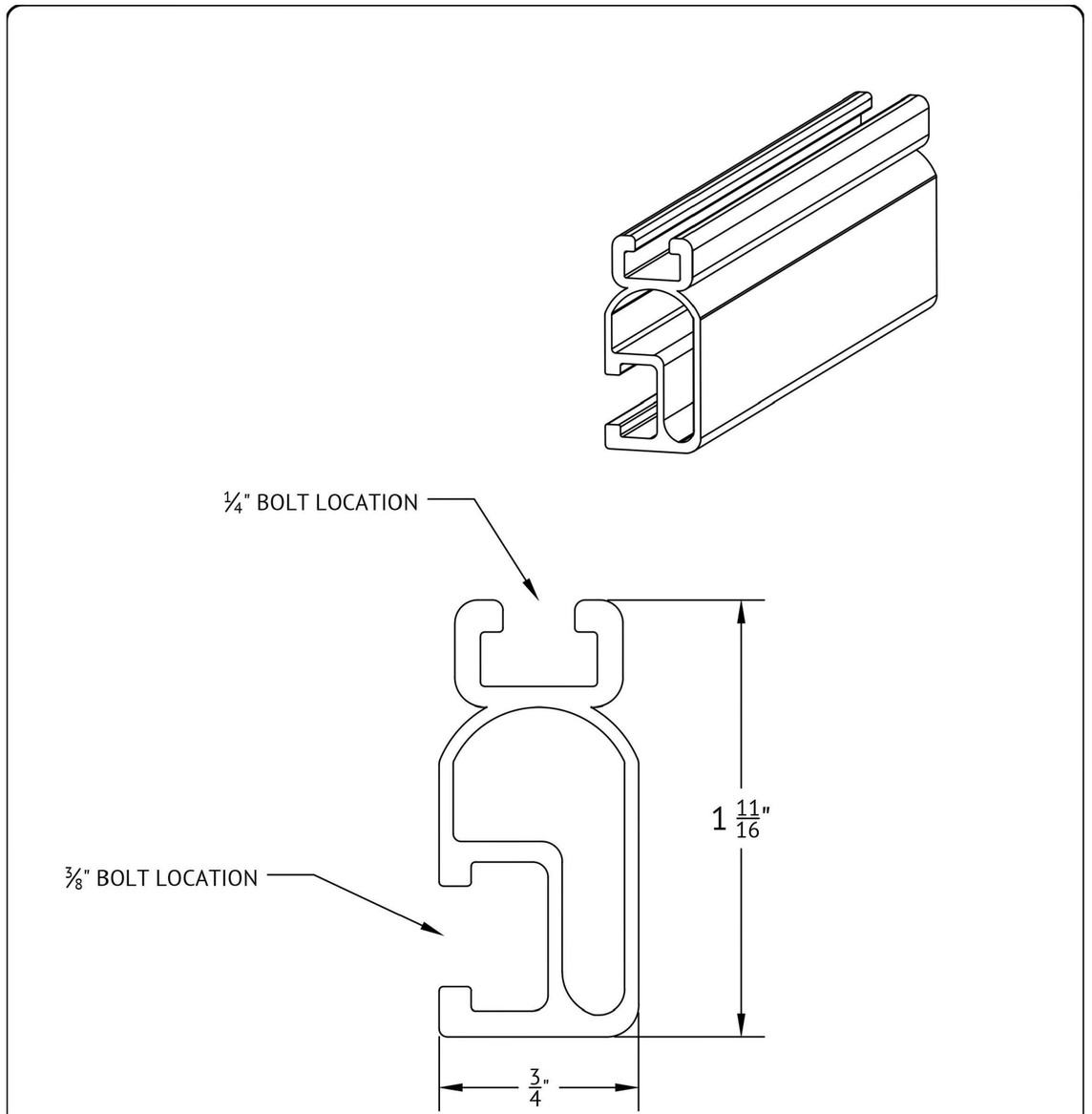
Email: haroldblackwell@gmail.com

DATE: 11/23/2022

SHEET NAME
ATTACHMENT DETAIL

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-3



PRODUCT LINE:	SOLARMOUNT
DRAWING TYPE:	PART DETAIL
DESCRIPTION:	LIGHT RAIL
REVISION DATE:	APRIL 2016

UNIRAC

1411 BROADWAY BLVD NE
ALBUQUERQUE, NM 87102 USA

WWW.UNIRAC.COM

DRAWING NOT TO SCALE
ALL DIMENSIONS ARE NOMINAL

PRODUCT PROTECTED BY ONE OR MORE US PATENTS

LEGAL NOTICE

SM-P02

SHEET

THIS PLAN HAS BEEN ELECTRONICALLY SIGNED AND SEALED BY SCOTT WYSSLING, PE USING A DIGITAL SIGNATURE AND DATE. PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES

NORTH CAROLINA PROFESSIONAL SEAL 046546 ENGINEER SCOTT E. WYSSLING

Wyssling Consulting, PLLC
76 N Meadowbrook Drive Alpine UT 84004
North Carolina COA # P-2308

Signed 11/23/2022

LIGHTING ELECTRIC

LIGHTING ELECTRIC
LIGHTING ELECTRIC
230 BLACKSNAKE RD,
STANLEY, NC 28164
(704) 361-8011
LICENSE NUMBER :- 29517

SYSTEM INFO.

(19)HANWHA Q CELLS Q.PEAK DUO BLK ML-G10+ 400

(19) ENPHASE IQ8-60-2-US(240V)

DC SYSTEM SIZE: 7.60 KWDC

AC SYSTEM SIZE: 4.66 KWAC

REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

PROJECT NAME & ADDRESS

HAROLD BLACKWELL
RESIDENCE
131 RAD ST
LILLINGTON, NC 27546
PH.# : (901)-225-2262
Email: haroldblackwell@gmail.com

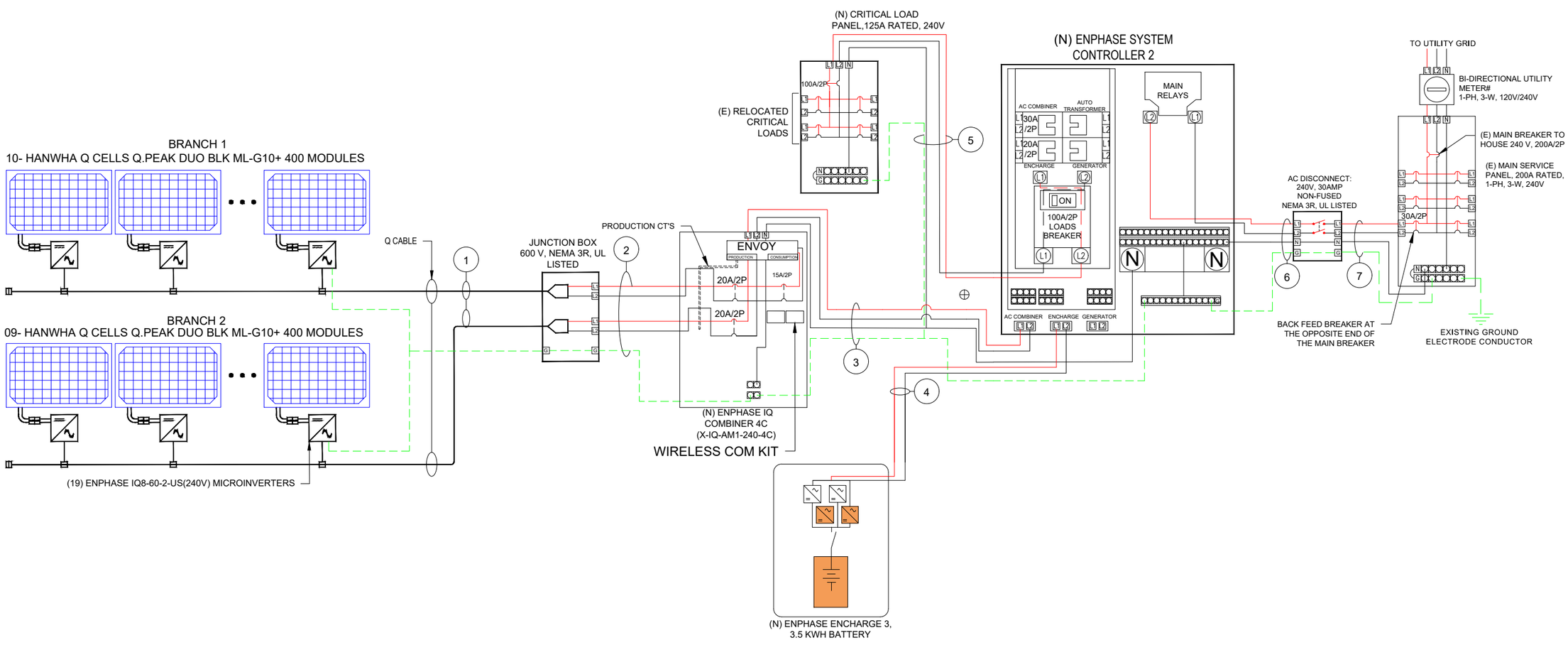
DATE: 11/23/2022

SHEET NAME
ATTACHMENT DETAIL

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-3A

ID	TYPICAL	INITIAL CONDUCTOR LOCATION	FINAL CONDUCTOR LOCATION	CONDUCTOR			CONDUIT	# OF PARALLEL CIRCUITS	CURRENT-CARRYING CONDUCTORS IN CONDUIT	CONDUIT FILL PERCENT	OCPD	EGC		TEMP. CORR. FACTOR		CONDUIT FILL FACTOR	CONT. CURRENT	MAX. CURRENT	BASE AMP.	DERATED AMP.	TERM. TEMP. RATING	LENGTH	VOLTAGE DROP
1	2	ARRAY	JUNCTION BOX	12 AWG	Q CABLE		-	1	2	N/A	N/A	6 AWG	BARE COPPER	0.71	(58°C)	N/A	10.0A	12.5A	N/A	N/A	75°C	35FT	0.38%
2	1	JUNCTION BOX	IQ COMBINER BOX 4C	10 AWG	THWN-2	COPPER	MIN 0.75" Dia EMT	2	4	19.09%	20A	8 AWG	THWN-2, COPPER	0.91	(36°C)	0.8	10.0A	12.5A	40A	29.1A	75°C	24FT	0.26%
3	1	IQ COMBINER BOX 4C	ENPHASE SYSTEM CONTROLLER 2	10 AWG	THWN-2	COPPER	MIN 0.75" Dia EMT	1	3	15.27%	30A	8 AWG	THWN-2, COPPER	0.91	(36°C)	1	19.0A	23.8A	40A	36.4A	75°C	5FT	0.10%
4	1	ENPHASE ENCHARGE 3	ENPHASE SYSTEM CONTROLLER 2	10 AWG	THWN-2	COPPER	MIN 0.75" Dia EMT	1	2	11.45%	20A	N/A	N/A	0.91	(36°C)	1	5.3A	6.6A	40A	36.4A	75°C	5FT	0.03%
5	1	CRITICAL LOAD PANEL	ENPHASE SYSTEM CONTROLLER 2	3 AWG	THWN-2	COPPER	MIN 1.25" Dia EMT	1	3	25.15%	100A	8AWG	THWN-2, COPPER	0.91	(36°C)	1	80.0A	100.0A	115A	104.6A	75°C	5FT	0.08%
6	1	ENPHASE SYSTEM CONTROLLER 2	NON-FUSED AC DISCONECT	10 AWG	THWN-2	COPPER	MIN 0.75" Dia EMT	1	3	15.27%	N/A	8 AWG	THWN-2, COPPER	0.91	(36°C)	1	19.0A	23.8A	40A	36.4A	75°C	5FT	0.10%
7	1	NON-FUSED AC DISCONECT	MSP	10 AWG	THWN-2	COPPER	MIN 0.75" Dia EMT	1	3	15.27%	30A	8 AWG	THWN-2, COPPER	0.91	(36°C)	1	19.0A	23.8A	40A	36.4A	75°C	5FT	0.10%



1 ELECTRICAL LINE DIAGRAM

PV-4 SCALE: NTS

SERVICE INFO.	
AHJ:	HARNETT COUNTY
MAIN SERVICE VOLTAGE:	240V
MAIN PANEL BRAND:	CUTLER HAMMER
MAIN SERVICE PANEL:	200A
MAIN BREAKER RATING:	200A
MAIN SERVICE LOCATION:	EAST

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SYSTEM INFO.

(19)HANWHA Q CELLS Q.PEAK DUO BLK ML-G10+ 400

(19) ENPHASE IQ8-60-2-US(240V)

DC SYSTEM SIZE: 7.60 KWDC

AC SYSTEM SIZE: 4.66 KWAC

REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

PROJECT NAME & ADDRESS

HAROLD BLACKWELL RESIDENCE
131 RAD ST
LILLINGTON, NC 27546
PH.# : (901)-225-2262
Email: haroldblackwell@gmail.com

DATE: 11/23/2022

SHEET NAME
ELECTRICAL LINE & CALCS.

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-4

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL	HANWHA Q CELLS Q.PEAK DUO BLK ML-G10+ 400
VMP	37.13 V
IMP	10.77 A
VOC	45.30 V
ISC	11.14 A
TEMP. COEFF. VOC	-0.27 %/K
MODULE DIMENSION	74.0" (L) x 41.1" (W)
PANEL WATTAGE	400W

INVERTER SPECIFICATIONS	
MANUFACTURER / MODEL	ENPHASE IQ8-60-2-US(240V)
MAX DC SHORT CIRCUIT CURRENT	15 A
CONTINUOUS OUTPUT CURRENT	1.0A (240V)

AMBIENT TEMPERATURE SPECS	
RECORD LOW TEMP	-10°C
AMBIENT TEMP (HIGH TEMP 2%)	36°C
CONDUIT HEIGHT	0.5"
ROOF TOP TEMP	90°C
CONDUCTOR TEMPERATURE RATE	58°C
MODULE TEMPERATURE COEFFICIENT OF VOC	-0.27 %/K

PERCENT OF VALUES	NUMBER OF CURRENT CARRYING CONDUCTORS IN EMT
0.80	4-6
0.70	7-9
0.50	10-20

ENPHASE ENPOWER SPECIFICATION	
MAX. DISCONNECT CURRENT	200A
MAX. OVERCURRENT PROTECTION BREAKER	200A

BATTERY SPECIFICATION	
MODEL	ENCHARGE-3-1P-NA
AMBIENT TEMPERATURE RANGE	-15°C TO 55°C
RATED OUTPUT CURRENT	5.3 A
NOMINAL VOLTAGE	240 V
USABLE CAPACITY	3.36 KWH
INTERCONNECTION	SINGLE-PHASE

Voltage rise in Q Cable from the Microinverters to the Junction Box

For branch circuit #1 of 10 IQ 8 Micros, the voltage rise on the 240 VAC Q Cable is 0.38%
For branch circuit #2 of 09 IQ 8 Micros, the voltage rise on the 240 VAC Q Cable is 0.31%

Voltage rise from the Junction Box to the IQ Combiner box

VRise = (amps/inverter × number of inverters) × (resistance in Ω/ft) × (2-way wire length in ft)
= (1.0 amp ×10) × (0.00129 Ω/ft) × (24 ft × 2)
= 10.0 amps × 0.00129 Ω/ft × 48 ft
= 0.62 volts
%VRise = 0.62 volts ÷ 240 volts = 0.26%
The voltage rise from the Junction Box to the IQ Combiner Box is 0.26%

Voltage rise from the IQ Combiner Box to Enphase Enpower

VRise = (amps/inverter × number of inverters) × (resistance in Ω/ft.) × (2-way wire length in ft.)
= (1.0 amp × 19) × (0.00129 Ω/ft) × (5 ft. × 2)
= 19.0 amps × 0.00129 Ω/ft × 10 ft.
= 0.25 volts
%VRise = 0.25 volts ÷ 240 volts = 0.10%
The voltage rise from the IQ Combiner Box to the Enphase Enpower is 0.10%

Total system voltage rise for all three wire sections

0.38% + 0.26% + 0.10% = 0.74%

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(19) ENPHASE IQ8-60-2-US(240V)

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AC SYSTEM SIZE: 4.66 KWAC

REVISIONS

DESCRIPTION	DATE	REV

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PH.# : (901)-225-2262
Email: haroldblackwell@gmail.com

DATE: 11/23/2022

SHEET NAME
SPECIFICATIONS & CALC.

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-4A

1

⚠ WARNING

ELECTRIC SHOCK HAZARD
DO NOT TOUCH TERMINALS
TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

LABEL LOCATION:
POINT OF INTERCONNECTION,
(PER CODE: NEC 690.17(E))

2

WARNING - Electric Shock Hazard
No user serviceable parts inside
Contact authorized service provider for assistance

LABEL LOCATION:
INVERTER, JUNCTION BOXES (ROOF),
(PER CODE: NEC690.13.G.3 & NEC 690.13.G.4)

3

⚠ WARNING: DUAL POWER SOURCE
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

LABEL LOCATION:
POINT OF INTERCONNECTION
(PER CODE: NEC 705.12(D)(4))

4

WARNING: PHOTOVOLTAIC POWER SOURCE

LABEL LOCATION:
CONDUIT, COMBINER BOX
(PER CODE: NEC690.31(G)(3)(4) & NEC 690.13(G)(4)

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]

5

PHOTOVOLTAIC SYSTEM AC DISCONNECT
RATED AC OUTPUT CURRENT 19.0 AMPS
NOMINAL OPERATING AC VOLTAGE 240 VOLTS

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

6

WARNING
INVERTER OUTPUT CONNECTION DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL LOCATION:
POINT OF INTERCONNECTION
(PER CODE: NEC 705.12(D)(7))
[Not required if panelboard is rated not less than sum of ampere ratings of all overcurrent devices supplying it]

7

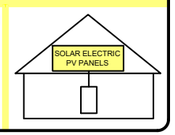
CAUTION: SOLAR ELECTRIC SYSTEM CONNECTED

LABEL LOCATION:
POINT OF INTERCONNECTION
(PER CODE: NEC690.15, 690.13(B))
INVERTER

8

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



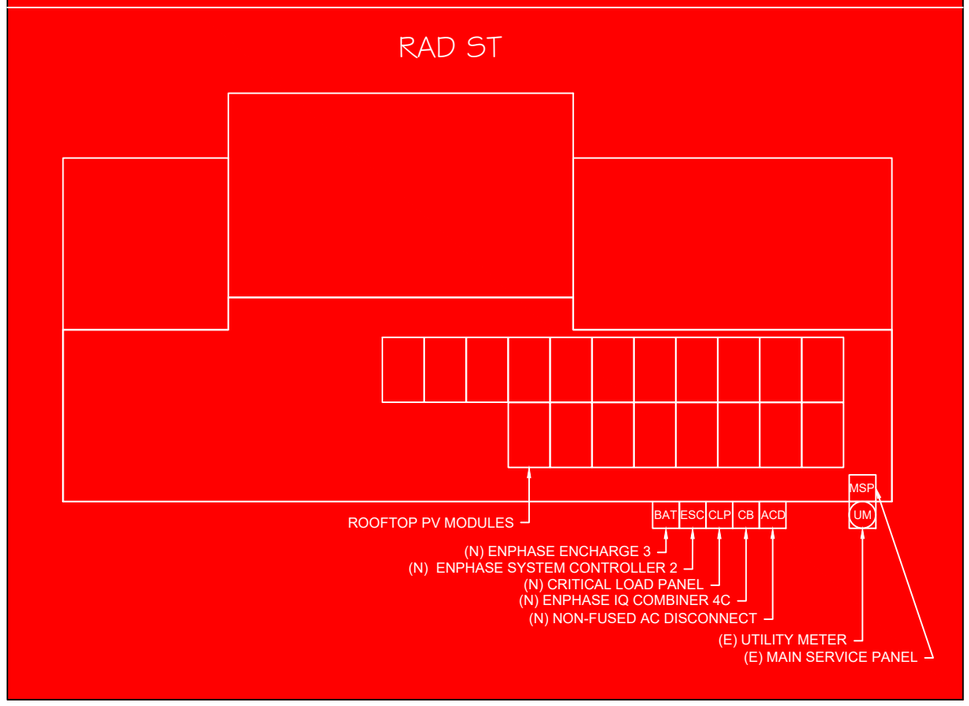
LABEL PER NEC 690.56(C)- PROVIDE AT AC DISCONNECT FOR RAPID SHUTDOWN COMPLIANT SYSTEM

9

CAUTION: SOLAR CIRCUIT

LABEL LOCATION:
MARKINGS PLACED ON ALL INTERIOR AND EXTERIOR DC CONDUIT, RACEWAYS, ENCLOSURES, AND CABLE ASSEMBLIES AT LEAST EVERY 1O FT, AT TURNS AND ABOVE/BELOW PENETRATIONS AND ALL COMBINER/JUCTION BOXES. (PER CODE: IFC 605.11.1.4)

PV ELECTRICAL EQUIPMENT LAYOUT



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REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

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131 RAD ST
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PH.# : (901)-225-2262
Email: haroldblackwell@gmail.com

DATE: 11/23/2022

SHEET NAME
SIGNAGE

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-5

powered by Q.ANTUM DUO Z

Q.PEAK DUO BLK ML-G10+

385-405

ENDURING HIGH PERFORMANCE

Quality Controlled PV

TÜVRheinland CERTIFIED

www.tuv.com ID 1111232615

ASSEMBLED IN THE USA

25 YR Warranty Product & Performance

EUPD RESEARCH TOP BRAND PV MODULES EUROPE 2021

Q CELLS Yield Security

BREAKING THE 20% EFFICIENCY BARRIER

Q.ANTUM DUO Z Technology with zero gap cell layout boosts module efficiency up to 20.9%.

THE MOST THOROUGH TESTING PROGRAMME IN THE INDUSTRY

Q CELLS is the first solar module manufacturer to pass the most comprehensive quality programme in the industry: The new "Quality Controlled PV" of the independent certification institute TÜV Rheinland.

INNOVATIVE ALL-WEATHER TECHNOLOGY

Optimal yields, whatever the weather with excellent low-light and temperature behavior.

ENDURING HIGH PERFORMANCE

Long-term yield security with Anti LID Technology, Anti PID Technology[1], Hot-Spot Protect and Traceable Quality Tra.Q™.

EXTREME WEATHER RATING

High-tech aluminum alloy frame, certified for high snow (5400 Pa) and wind loads (4000 Pa).

A RELIABLE INVESTMENT

Inclusive 25-year product warranty and 25-year linear performance warranty[2].

[1] APT test conditions according to IEC / TS 62804-1:2015, method A (−1500 V, 96 h)

[2] See data sheet on rear for further information.

6 BUSBAR CELL TECHNOLOGY

12 BUSBAR CELL TECHNOLOGY

THE IDEAL SOLUTION FOR:

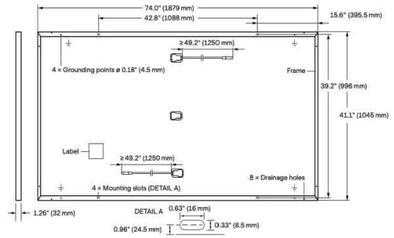
Rooftop arrays on residential buildings

Engineered in Germany

Q CELLS

MECHANICAL SPECIFICATION

Format	74.0 in × 41.1 in × 1.26 in (including frame) (1879 mm × 1045 mm × 32 mm)
Weight	48.5 lbs (22.0 kg)
Front Cover	0.13 in (3.2 mm) thermally pre-stressed glass with anti-reflection technology
Back Cover	Composite film
Frame	Black anodized aluminum
Cell	6 × 22 monocrystalline Q.ANTUM solar half cells
Junction Box	2.09-3.98 in × 1.26-2.36 in × 0.59-0.71 in (53-101 mm × 32-60 mm × 15-18 mm), IP67, with bypass diodes
Cable	4 mm² Solar cable; (+) ≥ 49.2 in (1250 mm), (−) ≥ 49.2 in (1250 mm)
Connector	Stäubli MC4; IP68

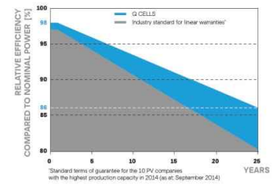


ELECTRICAL CHARACTERISTICS

POWER CLASS			385	390	395	400	405
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC[1] (POWER TOLERANCE +5 W / −0 W)							
Minimum	Power at MPP[1]	P_{MPP} [W]	385	390	395	400	405
	Short Circuit Current[1]	I_{SC} [A]	11.04	11.07	11.10	11.14	11.17
	Open Circuit Voltage[1]	V_{OC} [V]	45.19	45.23	45.27	45.30	45.34
	Current at MPP	I_{MPP} [A]	10.59	10.65	10.71	10.77	10.83
	Voltage at MPP	V_{MPP} [V]	36.36	36.62	36.88	37.13	37.39
	Efficiency[1]	η [%]	≥19.6	≥19.9	≥20.1	≥20.4	≥20.6
MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT[2]							
Minimum	Power at MPP	P_{MPP} [W]	288.8	292.6	296.3	300.1	303.8
	Short Circuit Current	I_{SC} [A]	8.90	8.92	8.95	8.97	9.00
	Open Circuit Voltage	V_{OC} [V]	42.62	42.65	42.69	42.72	42.76
	Current at MPP	I_{MPP} [A]	8.35	8.41	8.46	8.51	8.57
	Voltage at MPP	V_{MPP} [V]	34.59	34.81	35.03	35.25	35.46

[1] Measurement tolerances P_{MPP} ±3%; I_{SC}; V_{OC} ±5% at STC: 1000 W/m², 25±2 °C, AM 1.5 according to IEC 60904-3 • [2] 800 W/m², NMOT, spectrum AM 1.5

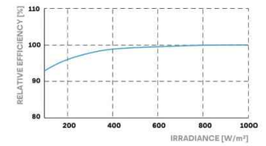
Q CELLS PERFORMANCE WARRANTY



At least 98% of nominal power during first year. Thereafter max. 0.5% degradation per year. At least 93.5% of nominal power up to 10 years. At least 86% of nominal power up to 25 years.

All data within measurement tolerances. Full warranties in accordance with the warranty terms of the Q CELLS sales organisation of your respective country.

PERFORMANCE AT LOW IRRADIANCE



Typical module performance under low irradiance conditions in comparison to STC conditions (25 °C, 1000 W/m²)

TEMPERATURE COEFFICIENTS						
Temperature Coefficient of I_{SC}	α	[%/K]	+0.04	Temperature Coefficient of V_{OC}	β	[%/K]	−0.27
Temperature Coefficient of P_{MPP}	γ	[%/K]	−0.34	Nominal Module Operating Temperature	NMOT	[°F]	109±5.4 (43±3 °C)

PROPERTIES FOR SYSTEM DESIGN

Maximum System Voltage V_{SYS}	[V]	1000 (IEC) / 1000 (UL)	PV module classification	Class II
Maximum Series Fuse Rating	[A DC]	20	Fire Rating based on ANSI / UL 61730	TYPE 2
Max. Design Load, Push / Pull[3]	[lbs/ft²]	75 (3600 Pa) / 55 (2660 Pa)	Permitted Module Temperature on Continuous Duty	−40 °F up to +185 °F (−40 °C up to +85 °C)
Max. Test Load, Push / Pull[3]	[lbs/ft²]	113 (5400 Pa) / 84 (4000 Pa)		

[3] See Installation Manual

QUALIFICATIONS AND CERTIFICATES

UL 61730, CE-compliant, Quality Controlled PV - TÜV Rheinland, IEC 61215:2016, IEC 61730:2016, U.S. Patent No. 9,893,215 (solar cells),

c SP us Certified UL 61730

CE

TÜVRheinland CERTIFIED www.tuv.com ID 1111220277

PACKAGING INFORMATION

Horizontal packaging	76.4 in 1940 mm	43.3 in 1100 mm	48.0 in 1220 mm	1656 lbs 751 kg	24 pallets	24 pallets	32 modules

Note: Installation instructions must be followed. See the installation and operating manual or contact our technical service department for further information on approved installation and use of this product.

Hanwha Q CELLS America Inc.
400 Spectrum Center Drive, Suite 1400, Irvine, CA 92618, USA | TEL +1 949 748 59 96 | EMAIL inquiry@us.q-cells.com | WEB www.q-cells.us

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DATE: 11/23/2022

SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-6

ENPHASE

DATA SHEET

IQ8 and IQ8+ Microinverters

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

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

Enphase 25 year limited warranty

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

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

UL CERTIFIED SAFETY

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

Easy to install

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

High productivity and reliability

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

Microgrid-forming

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

IQ8 and IQ8+ Microinverters

INPUT DATA (DC)		IQ8-60-2-US	IQ8PLUS-72-2-US
Commonly used module pairings[1]	W	235 – 350	235 – 440
Module compatibility		60-cell/120 half-cell	60-cell/120 half-cell and 72-cell/144 half-cell
MPPT voltage range	V	27 – 37	29 – 45
Operating range	V	25 – 48	25 – 58
Min/max start voltage	V	30 / 48	30 / 58
Max input DC voltage	V	50	60
Max DC current[2] [module Isc]	A	15	
Overvoltage class DC port		II	
DC port backfeed current	mA	0	
PV array configuration		1x1 Ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit	
OUTPUT DATA (AC)		**IQ8-60-2-US**	**IQ8PLUS-72-2-US**
Peak output power	VA	245	300
Max continuous output power	VA	240	290
Nominal (L-L) voltage/range[3]	V	240 / 211 – 264	
Max continuous output current	A	1.0	1.21
Nominal frequency	Hz	60	
Extended frequency range	Hz	50 – 68	
Max units per 20 A (L-L) branch circuit[4]		16	13
Total harmonic distortion		<5%	
Overvoltage class AC port		III	
AC port backfeed current	mA	30	
Power factor setting		1.0	
Grid-tied power factor (adjustable)		0.85 leading – 0.85 lagging	
Peak efficiency	%	97.5	97.6
CEC weighted efficiency	%	97	97
Night-time power consumption	mW	60	
MECHANICAL DATA			
Ambient temperature range		-40°C to +60°C (-40°F to +140°F)	
Relative humidity range		4% to 100% (condensing)	
DC Connector type		MC4	
Dimensions (HxWxD)		212 mm (8.3") x 175 mm (6.9") x 30.2 mm (1.2")	
Weight		1.08 kg (2.38 lbs)	
Cooling		Natural convection – no fans	
Approved for wet locations		Yes	
Acoustic noise at 1 m		<60 dBA	
Pollution degree		PD3	
Enclosure		Class II double-insulated, corrosion resistant polymeric enclosure	
Environ. category / UV exposure rating		NEMA Type 6 / outdoor	
COMPLIANCE			
Certifications		CA Rule 21 (UL 1741-SA), UL 62109-1, UL1741/IEEE1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01 This product is UL Listed as PV Rapid Shut Down Equipment and conforms with NEC 2014, NEC 2017, and NEC 2020 section 690.12 and C22.1-2018 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according to manufacturer's instructions.	

(1) No enforced DC/AC ratio. See the compatibility calculator at https://link.enphase.com/module-compatibility (2) Maximum continuous input DC current is 10.6A (3) Nominal voltage range can be extended beyond nominal if required by the utility. (4) Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

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STANLEY, NC 28164
(704) 361-8011
LICENSE NUMBER :- 29517

SYSTEM INFO.

(19)HANWHA Q CELLS Q.PEAK DUO BLK ML-G10+ 400

(19) ENPHASE IQ8-60-2-US(240V)

DC SYSTEM SIZE: 7.60 KWDC

AC SYSTEM SIZE: 4.66 KWAC

REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

PROJECT NAME & ADDRESS

HAROLD BLACKWELL RESIDENCE
131 RAD ST
LILLINGTON, NC 27546
PH.# : (901)-225-2262
Email: haroldblackwell@gmail.com

DATE: 11/23/2022

SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-7

Data Sheet
Enphase Networking

Enphase IQ Combiner 4/4C

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

X-IQ-AM1-240-4C

X-IQ-AM1-240-4

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

Smart

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

Simple

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

Reliable

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

LISTED

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

ENPHASE

Enphase IQ Combiner 4/4C

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

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

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(704) 361-8011
LICENSE NUMBER :- 29517

SYSTEM INFO.

(19)HANWHA Q CELLS Q.PEAK DUO BLK ML-G10+ 400
(19) ENPHASE IQ8-60-2-US(240V)
DC SYSTEM SIZE: 7.60 KWDC
AC SYSTEM SIZE: 4.66 KWAC

REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

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Email: haroldblackwell@gmail.com

DATE: 11/23/2022

SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-8

Data Sheet
Enphase Storage System

Enphase Encharge 3

The **Enphase Encharge 3**™ all-in-one AC-coupled storage system is **reliable, smart, simple,** and **safe**. It has a total usable energy capacity of 3.36 kWh and includes four embedded grid-forming microinverters with 1.28 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
- Four 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

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

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

ENPHASE.

Enphase Encharge 3

MODEL NUMBER	
ENCHARGE-3-1P-NA	Encharge 3 battery storage system with integrated Enphase Microinverters and battery management unit (BMU). Includes: - One Encharge 3.36 kWh base unit (B03-A01-US00-1-3) - One Encharge 3 cover kit with cover and wall mounting bracket (B03-C-0350-O)
ACCESSORIES	
ENCHARGE-HNDL-R1	One set of Encharge base unit installation handles
OUTPUT (AC)	**@240 VAC[1]**
Rated (continuous) output power	1.28 kVA
Peak output power	1.92 kVA (10 seconds)
Nominal voltage / range	240/211–264 VAC
Nominal frequency / range	60/57–63 Hz
Rated output current	5.3 A
Peak output current	8.2A (10 seconds)
Power factor (adjustable)	0.85 leading ... 0.85 lagging
Maximum units per 20 A branch circuit	Three units (single phase)
Interconnection	Single phase
Maximum AC short circuit fault current over 3 cycles	23.2 Arms
Round trip efficiency[2]	89%
BATTERY	
Total capacity	3.5 kWh
Usable capacity	3.36 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)	367 mm x 664 mm x 319mm (14.45 in x 26.14 in x 12.56 in)
Weight	One individual 44.2 kg (97.4 lbs) base unit plus 7.8 kg (17.2 lbs) cover and mounting bracket; total 52 kg (114.6 lbs)
Enclosure	Outdoor – NEMA 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 operation.
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**

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LICENSE NUMBER :- 29517

SYSTEM INFO.

(19)HANWHA Q CELLS Q.PEAK DUO BLK ML-G10+ 400

(19) ENPHASE IQ8-60-2-US(240V)

DC SYSTEM SIZE: 7.60 KWDC

AC SYSTEM SIZE: 4.66 KWAC

REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

PROJECT NAME & ADDRESS

HAROLD BLACKWELL
RESIDENCE
131 RAD ST
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PH.# : (901)-225-2262
Email: haroldblackwell@gmail.com

DATE: 11/23/2022

SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-9

Data Sheet
Enphase Energy System

Enphase IQ System Controller 2

The **Enphase IQ System Controller 2** connects the home to grid power, the IQ Battery 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
- IQ System Controller supports backward compatibility with older generation of PV microinverters (M215, M250 and S series), making it simple for home owners to upgrade their systems
- Easy integration with generator from major manufacturers

1. IQ System Controller 2 is not suitable for use as service equipment in Canada.

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

ENPHASE.

Enphase IQ System Controller 2

MODEL NUMBER	
EP200G101-M240US01	Enphase IQ System Controller 2 with neutral-forming transformer (NFT), Microgrid Interconnect Device (MID), breakers, and screws. Streamlines grid-independent capabilities of PV and battery installations.
ACCESSORIES and REPLACEMENT PARTS	
EP200G-NA-XA-E3	Replacement IQ System Controller 2 printed circuit board
EP200G-NA-HD-200A	Eaton type BR circuit breaker hold-down screw kit, BRHDK125
CT-200-SPLIT	200 A split core current transformers for Generator metering (+/- 2.5%)
Circuit breakers (as needed)[2,3] • BRK-100A-2P-240V : Main breaker, 2 pole, 100A, 25kAIC, 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	Not included, must order separately: • 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	IQ System Controller 2 installation handle kit (order separately)
EP200G-LITKIT	IQ System Controller 2 literature kit, including labels, feed-through headers, screws, filler plates, and QIG
BRK-20A40A-2P-240V	2 pole, 20A/40A, 10kAIC, BQC220240
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)
Auxiliary contact for load control, excess PV control, and generator two-wire control	24V, 1A
Nominal frequency / range	60 Hz / 56 - 63 Hz
Frequency measurement accuracy	±0.1 Hz
Maximum continuous current rating	160A
Maximum input overcurrent protection device	200A
Maximum output overcurrent protection device	200A
Maximum overcurrent protection device rating for Generator circuit[4]	80A
Maximum overcurrent protection device rating for storage branch circuit[4] (the storage branch circuit can be replaced with PV)	80A
Maximum overcurrent protection device rating for IQ8 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	39.4 kg (87 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 (All lugs are rated to 90C)	• Main lugs and backup load lugs • CSR breaker bottom wiring lugs • BR breakers (wire provided) • AC combiner lugs, Encharge lugs, and generator lugs • Neutral (large lugs)	Cu/Al: 1 AWG – 300 KCMIL Cu/Al: 2 AWG – 300 KCMIL 6 AWG 14 AWG – 2 AWG Cu/Al: 6 AWG - 300 KCMIL
Neutral and ground bars	Large holes (5/16-24 UNF) Small holes (10-32 UNF)	14 AWG – 1/0 AWG 14 AWG – 6 AWG
COMPLIANCE		
Compliance	UL 1741, UL 1741 SA, UL 1741 PCS, UL1998, UL869A[5], UL67[5], UL508[5], UL50E[5] CSA 22.2 No. 107.1, 47 CFR, Part 15, Class B, ICES 003, AC156. IQ System Controller 2 is approved for Use as Service Equipment in the United States[5].	

2. Compatible with BRHDK125 Hold-Down Kit to comply with 2017 NEC 710.15E for back-fed circuit breakers.
3. The IQ System Controller 2 is rated 22 kAIC
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**

ENPHASE.

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(19) ENPHASE IQ8-60-2-US(240V)

DC SYSTEM SIZE: 7.60 KWDC

AC SYSTEM SIZE: 4.66 KWAC

REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

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DATE: 11/23/2022

SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-10

FLASH LOC

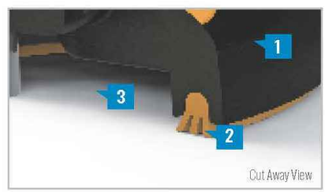
UNIRAC
BETTER SOLAR STARTS HERE

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!**

TESTED TO TAS-100
WIND DRIVEN RAIN TEST
AND UL441 RAIN TEST

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% waperproof 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
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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.

USE ONLY UNIRAC APPROVED SEALANTS: Chemlink Duralink 50, Chemlink M-1, Geocel 4500, or Geocel S-4

FASTER INSTALLATION. 25-YEAR WARRANTY.

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(19) ENPHASE IQ8-60-2-US(240V)
DC SYSTEM SIZE: 7.60 KWDC
AC SYSTEM SIZE: 4.66 KWAC

REVISIONS		
DESCRIPTION	DATE	REV

Signature with Seal

PROJECT NAME & ADDRESS

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Email: haroldblackwell@gmail.com

DATE: 11/23/2022

SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-11

SOLARMOUNT

UNIRAC

SOLARMOUNT is the professionals' choice for residential PV mounting applications. Every aspect of the system is designed for an easier, faster installation experience. **SOLAR**MOUNT is a complete solution with revolutionary universal clamps, **FLASHKIT** PRO, full system UL 2703 certification and 25-year warranty. Not only is **SOLAR**MOUNT easy to install, but best-in-class aesthetics make it the most attractive on any block!

New & Improved:

THE PROFESSIONALS' CHOICE

With Superior Aesthetics

NOW FEATURING FLASHKIT PRO
The Complete Roof Attachment Solution
FEATURING SHED & SEAL TECHNOLOGY

NOW WITH UNIVERSAL MIDCLAMPS
Accommodates 30mm-51mm module frames
One tool, one-person installs are here!

REVOLUTIONARY NEW ENDCLAMPS
Concealed design and included End Caps

THE PROFESSIONALS' CHOICE FOR RESIDENTIAL RACKING

BEST INSTALLATION EXPERIENCE • CURB APPEAL • COMPLETE SOLUTION • UNIRAC SUPPORT

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

SOLARMOUNT

UNIRAC

BETTER DESIGNS

TRUST THE INDUSTRY'S BEST DESIGN TOOL

Start the design process for every project in our U-Builder on-line design tool. It's a great way to save time and money.

BETTER SYSTEMS

ONE SYSTEM - MANY APPLICATIONS

Quickly set modules flush to the roof on steep pitched roofs. Orient a large variety of modules in Portrait or Landscape. Tilt the system up on flat or low slow roofs. Components available in mill, clear, and dark finishes to optimize your design financials and aesthetics.

BETTER RESULTS

MAXIMIZE PROFITABILITY ON EVERY JOB

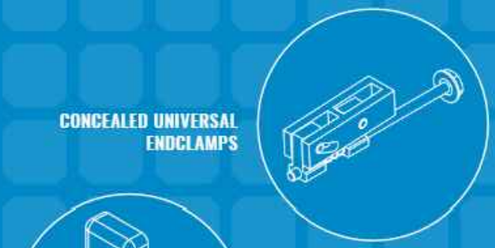
Trust Unirac to help you minimize both system and labor costs from the time the job is quoted to the time your teams get off the roof. Faster installs. Less Waste. More Profits.

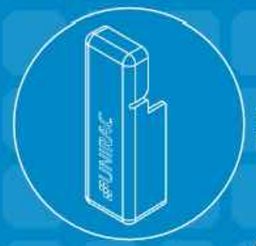
BETTER SUPPORT

WORK WITH THE INDUSTRIES MOST EXPERIENCED TEAM

Professional support for professional installers and designers. You have access to our technical support and training groups. Whatever your support needs, we've got you covered. Visit Unirac.com/solarmount for more information.

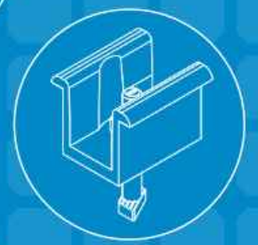
CONCEALED UNIVERSAL ENDCLAMPS





END CAPS INCLUDED WITH EVERY ENDCLAMP

UNIVERSAL SELF STANDING MIDCLAMPS



U-BUILDER ONLINE DESIGN TOOL SAVES TIME & MONEY
Visit design.unirac.com

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 9001:2008, 14001:2004 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 providing products of exceptional quality. SOLARMOUNT is covered by a 25 year limited product warranty and a 5 year limited finish warranty.

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

FUS2018AUSER - PRINTED UPDATE

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

LIGHTING ELECTRIC
LIGHTING ELECTRIC
230 BLACKSNAKE RD,
STANLEY, NC 28164
(704) 361-8011
LICENSE NUMBER :- 29517

SYSTEM INFO.
(19)HANWHA Q CELLS Q.PEAK DUO BLK ML-G10+ 400
(19) ENPHASE IQ8-60-2-US(240V)
DC SYSTEM SIZE: 7.60 KWDC
AC SYSTEM SIZE: 4.66 KWAC

REVISIONS

DESCRIPTION	DATE	REV

Signature with Seal

PROJECT NAME & ADDRESS

HAROLD BLACKWELL RESIDENCE
131 RAD ST
LILLINGTON, NC 27546
PH.# : (901)-225-2262
Email: haroldblackwell@gmail.com

DATE: 11/23/2022

SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-12

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

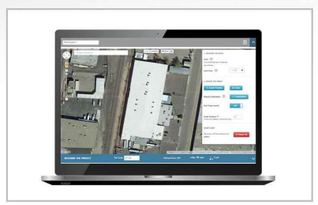
Superior Aesthetics Package

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

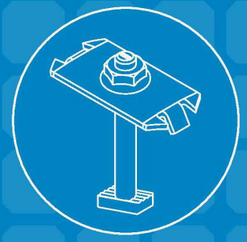
ONE PRODUCT - MANY APPLICATIONS

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.

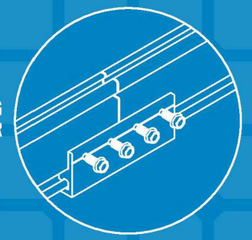
AUTOMATED DESIGN TOOL

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.

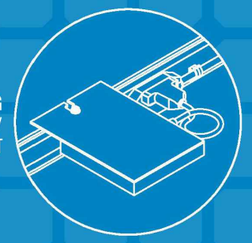


INTEGRATED BONDING MIDCLAMP



INTEGRATED BONDING SPLICE BAR

INTEGRATED BONDING L-FOOT w/ T-BOLT



INTEGRATED BONDING MICROINVERTER MOUNT w/ WIRE MANAGEMENT

LISTED **UL2703**

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PUB2017FEB28 - PRINTED

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