LUCENT ENGINEERING
Solar Professional Engineering Consulting 2022.12.14

**Lucent Engineering, P.C.**
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Lehi, UT 84043
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January 12, 2023

Encōr Solar, LLC
3049 Executive Pkwy, Ste 300
Lehi, UT 84043

RE: Engineering Services
Purvis Residence
181 Remington Hill Dr, Bunnlevel, NC
10 kW System
Solo Job #3100976

Nicholas J Bowens
Digitally signed by Nicholas J Bowens
DN: CN=Nicholas J Bowens, dnQualifier=A01410C000001845347 08F50004D286, O=LUCENT ENGINEERING P.C., C=US
Date: 2023.01.12 11:13:57-07'00'

To Whom It May Concern,

We have reviewed the following information regarding the solar panel installation for this project. Alterations to these documents or plans shall not be made without direct written consent of the Engineer of Record.

**A. Assumptions from Field Observation provided by Encōr Solar, LLC**

The following structural design regarding the proposed alterations have been prepared from these assumptions. The verification of the field observations is the responsibility of the contractor. **Prior to commencement of work, the contractor shall verify the framing sizes, spacings, and spans noted in the sealed plans, calculations, and/or certification letter and notify the Engineer of Record of any discrepancies.**

| | Roof |
|---|---|
| Roof Finish : | Asphalt Shingle |
| Roof Underlayment : | OSB |
| Roof Profile : | Hip Gable |
| Roof Structural System : | Rafter w/ Various Support |
| Truss Top Chord/Setup : | 2 x 6 / Rafter |
| Chord/Rafter Wood Grade : | Southern Pine #2 or better |
| Truss/Rafter Spacing : | 24" o.c. |
| Roof Slope : | 34 deg |
| Max Top Chord/Rafter Span : | 13.24 ft |
| Bearing Wall Type : | Convl Lt-Frame Constr |
| Foundation : | Permanent Concrete |
| Stories : | Two |

**B. Building Design Criteria**

| | | | |
|---|---|---|---|
| Code : | 2018 NCRC (ASCE 7-10) | Risk Category : | II |
| Roof Live Load : | 20 psf (0 psf at panels) | Occupancy Class : | R-3 |
| Ground Snow Load : | 10 psf | Roof Dead Load : | 6.8 psf |
| Ult Wind Speed : | 120 mph | PV Dead Load : | 3 psf |
| Exposure Category : | C | Total Dead Load : | 9.8 psf |

**C. Summary of Existing Structure Results**

Roof
After review of the field observations and based on our calculations and in accordance with the applicable building codes and current industry standards, the existing roof structure supporting the proposed alterations consisting of the solar array has been determined to be:

- Adaquate to support the additional imposed loads. **No structural upgrades are required.**

***D. Solar Panel Support Bracket Anchorage***

1. Solar panels shall be designed, mounted, and installed in accordance with the most recent "SnapNrack Manual", which can be found on the SnapNrack website (http://snapnrack.com/).
2. Manufacturer's Panel Bracket Connection to Roof Chord/Rafter Member:

| | |
|---|---|
| Fastener : | (1) 5/16" Lag Screw per Bracket |
| NDS Withdrawl Value : | 307 lbs/inch |
| Min. Thread Length and Pentration Depth : | 2.5" |

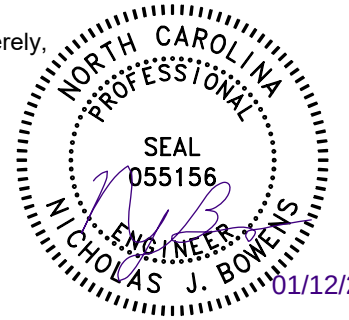
3. Considering the existing roof's slope, size, spacing, condition, and calculated loads, the panel bracket supports shall be placed no greater than 72 in. o/c.
4. Panel supports connections shall be staggered to distribute load to adjacent trusses.

**E. Overall Summary**

Based on the information supplied to us at the time of this report, on the evaluation of the existing structure, and solar array panel bracket connection, it is our opinion that the roof system will adequately support the additional loads imposed by the solar array. This evaluation conforms to 2018 NCRC and current industry standards.

Should you have any questions regarding this letter or if you require further information, do not hesitate to contact me.

Sincerely,




Nicholas J. Bowens, PE
License No. 55156

**Limits of Scope of Work and Liablity**

The existing structure is assumed to have been designed and constructed following appropriate codes at the time of erection and assumed to have appropriated permits. The calculations performed are only for the roof framing supporting the solar array installation referenced in the stamped plans and were completed according to generally recognized structural analysis standards and procedures, professional engineering, and design experience opinions and judgements. Existing deficiencies which are unknown or were not observed during the time the site observation are not included in this scope of work. All solar panel modules, racking, and mounting equipment shall be designed and installed per the manufacturer's approved installation specifications. The Engineer of Record and the engineering consulting firm assume no responsibility for misuse or improper installation. This analysis is not stamped for water leakage. Framing was determined on information in provided plans and/or photos, along with engineering judgement. Prior to commencement of work, the contractor shall verify the framing sizes, spacings, and spans noted in the stamped plans, calculations, and/or certification letter and notify the Engineer of Record of any discrepancies prior to starting construction. 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. The contactor shall also verify that there are no damage/deficiencies (i.e., dry rot, water damage, termite damage, framing member/connection damage, etc.) to framing that was not addressed in the stamped plans, calculations, and/or certification letter and notify the Engineer of Record of any concerns prior to starting construction.

# NEC Standard Load Calculation for Single Family Dwellings

## For Service Ratings of 120/240V, 225A Max

**Michael Purvis**
**181 Remington Hill Dr, Bunnlevel, NC 28323**

**General Lighting/Power Load**

| Description of Load | QTY | Volt-Amps (Wattage) Per Load | Total Volt-Amps (Wattage) Used |
|---|---|---|---|
| Kitchen Apliance Branch Circuits | 2 | 1500 | 3000 |
| Laundry Circuits | 1 | 1500 | 1500 |
| **Appliances & Equipment Excluding Air Conditioner(s)** | | | |
| Microwave | 1 | 1500 | 1500 |
| Trash Compactor | 0 | 0 | 0 |
| Dish Washer | 0 | 0 | 0 |
| Disposal | 1 | 700 | 700 |
| Oven | 1 | 5760 | 5760 |
| Electric Range | 0 | 0 | 0 |
| Induction Range | 0 | 0 | 0 |
| Clothes Dryer | 0 | 0 | 0 |
| Clothes Washer | 1 | 500 | 500 |
| Tankless Water Heater | 0 | 0 | 0 |
| Electric Water Heater | 0 | 0 | 0 |
| Pool or Spa | 0 | 0 | 0 |
| Evaporator Cooler | 0 | 0 | 0 |
| Electric Vehicle Supply Equipment (EVSE) | 0 | 0 | 0 |
| Sub-Panel | 1 | 19200 | 19200 |
| Other | 1 | 3840 | 3840 |
| Other | 1 | 11520 | 11520 |

**Calculations of All Appliances and Lighting Excluding Air Conditioner(s)**

Total Square Footage of Building: 2242 ft² X 3 = 6726
Total Volt Amps (Wattage) of All Loads: 47520 W + 6726 = 54246 W
54246 W - 10000 = 44246 W
44246 W X .40 = 17698.4 W
17698.4 W + 10000 = 27698.4 W

**Heating and Air Conditioning**

| Description of Load | Total Volt-Amps (Wattage) Used |
|---|---|
| AC & Cooling | 4800 |
| Heating | 7680 |
| Heat Pump | 0 |
| Space Heat, 4 Separate Units | 0 |
| Space Heat, > 4 Units | 0 |
| Thermal Storage & Other | 0 |

**Total Home Calculations**

Largest HVAC Load: 7680 W
Grand Total of All Loads: 27698.4 W + 7680 W = 35378.4 W
35378.4 W / 240 V = 147.41 A

| | |
|---|---|
| **RATING OF EXISTING/PROPOSED ELECTRICAL SERVICE MAIN BREAKER (AMPS) =** | **175 A** |
| **TOTAL MINIMUM SIZE (AMPS) REQUIRED FOR MAIN SERVICE DISCONNECT =** | **147.41 A** |

**PASS**

## SHEET INDEX



## SYSTEM SIZE

AC SYSTEM SIZE: 10 KW AC
DC SYSTEM SIZE: 9.6 KW DC

## SITE SPECIFICATIONS

OCCUPANCY: R-3
ZONING: RESIDENTIAL

## APPLICABLE GOVERNING CODES

2020 NATIONAL ELECTRICAL CODE

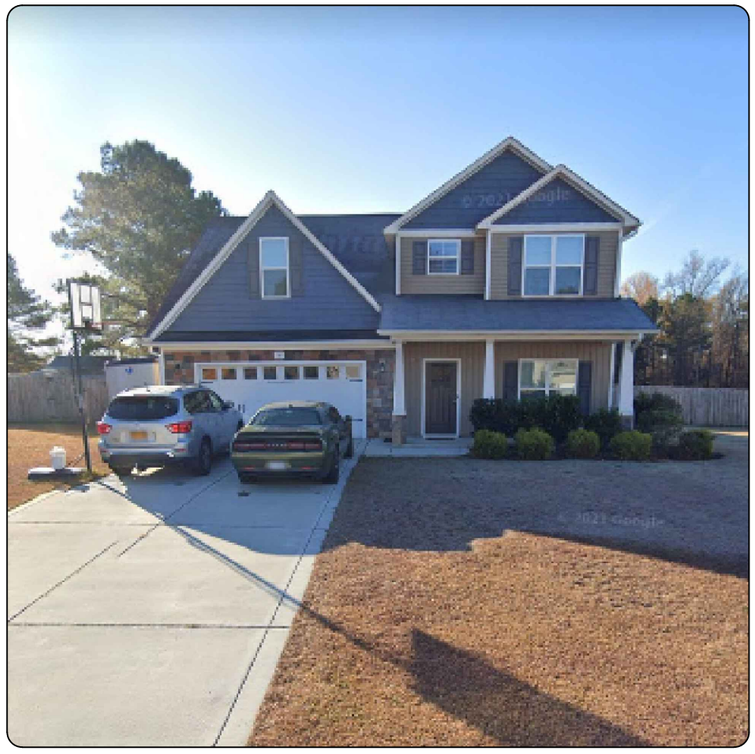
2018 NORTH CAROLINA STATE BUILDING CODE: RESIDENTIAL

2018 NORTH CAROLINA STATE BUILDING CODE: BUILDING

2018 NORTH CAROLINA STATE BUILDING CODE: FIRE

## AERIAL VIEW

## STREET VIEW



## ELECTRICAL EQUIPMENT

(24) HANWHA Q.PEAK DUO BLK ML-G10 400 PV MODULES
(1) SOLAREDGE SE10000H-US (240V) INVERTER(S)
(24) SOLAREDGE S440 OPTIMIZERS

## RACKING

ATTACHMENT: SPEEDSEAL FOOT


## GENERAL NOTES

1. INSTALLATION OF SOLAR PHOTOVOLTAIC SYSTEM SHALL BE IN ACCORDANCE WITH NEC ARTICLE 690, AND ALL OTHER APPLICABLE NEC CODES WHERE NOTED OR EXISTING
2. PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL COMPLY WITH NEC ARTICLE 110
3. ALL WIRES, INCLUDING THE GROUNDING ELECTRODE CONDUCTOR SHALL BE PROTECTED FROM PHYSICAL DAMAGE IN ACCORDANCE WITH NEC ARTICLE 250
4. THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE; THIS SYSTEM IS UTILITY INTERACTIVE PER UL 1741 AND DOES NOT INCLUDE STORAGE BATTERIES OR OTHER ALTERNATIVE STORAGE SOURCES
5. ALL DC WIRES SHALL BE SIZED ACCORDING TO [NEC 690.8]
6. DC CONDUCTORS SHALL BE WITHIN PROTECTED RACEWAYS IN ACCORDANCE WITH [NEC 690.31]
7. ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH LOCAL JURISDICTIONAL BUILDING CODE

ENCŌR


CONTRACTOR INFORMATION:
ENCŌR SOLAR, LLC
3049 Executive Parkway
Suite 300
Lehi, UT 84043
License # U.35743


## SITE INFORMATION

**MICHAEL PURVIS**

181 REMINGTON HILL DR

BUNNLEVEL, NC 28323

AC SYSTEM SIZE: 10 KW AC

DC SYSTEM SIZE: 9.6 KW DC

LAT, 35.289151

LONG, -78.9247906

(24) HANWHA Q.PEAK DUO BLK ML-G10 400 PV MODULES

(1) SOLAREDGE SE10000H-US (240V) INVERTER(S)

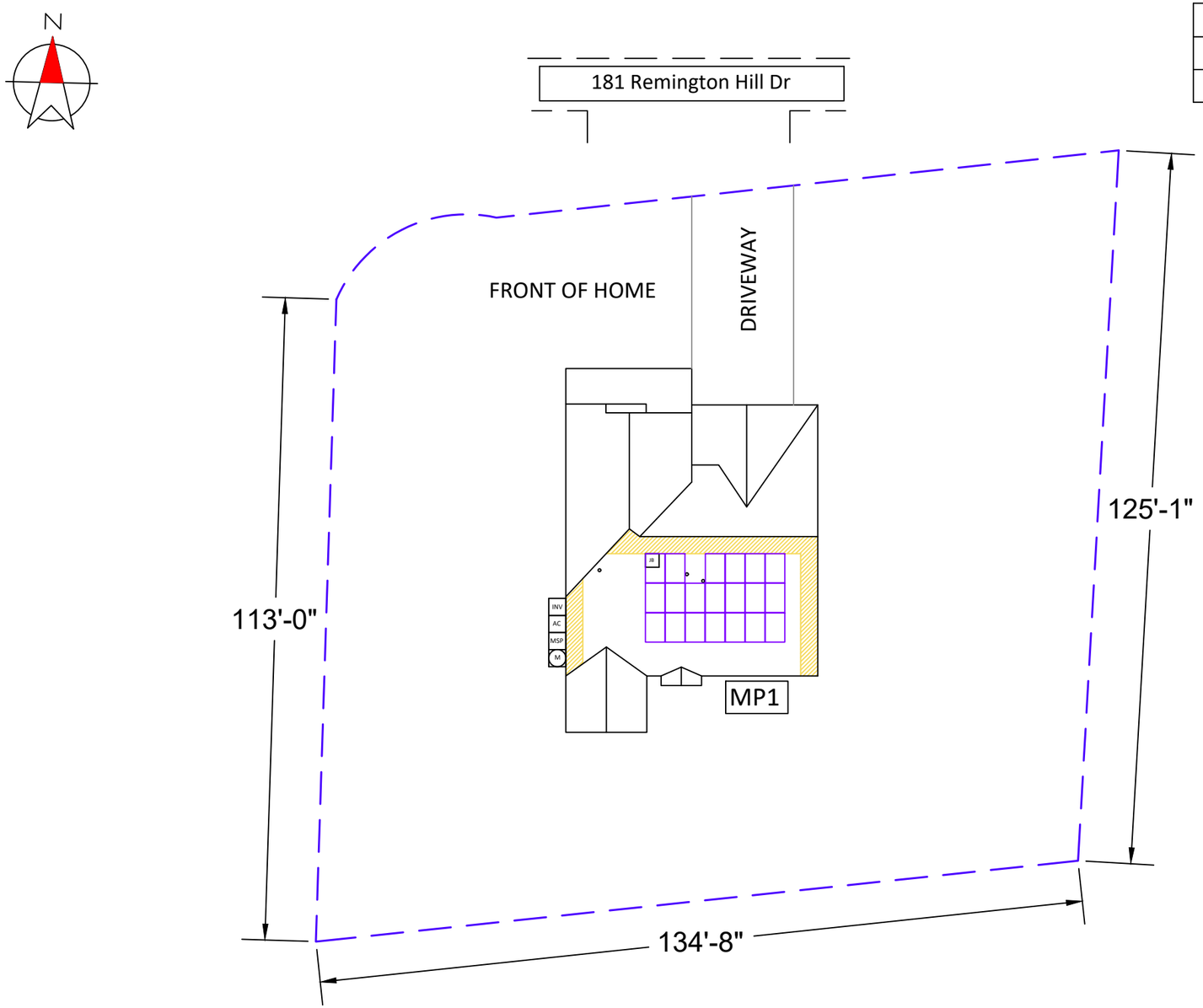
(24) SOLAREDGE S440 OPTIMIZERS

SOUTH RIVER EMC


DRAWN BY: SoloCAD

1/11/2023

COVER - PV01




| ARRAY DETAILS: | | |
|---|---|---|
| MOUNTING PLANE: | AZIMUTH: | TILT: |
| MP1 | 179° | 34° |

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SOUTH RIVER EMC


EQUIPMENT LEGEND:

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| M | UTILITY METER | AC | VISIBLE, LOCKABLE, LABELED AC DISCONNECT | INV | INVERTER | SUB | SUB PANEL | SD | SERVICE DISCONNECT |
| MSP | MAIN SERVICE PANEL | PV | METER SOCKET (FOR UTILITY PV METER) | C | COMBINER BOX | LC | LOAD CENTER | BATT | BATTERY(IES) |

PV MODULES | FIRE ACCESS PATHWAY (3' TYP) | JB JUNCTION BOX | PROPERTY LINE

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

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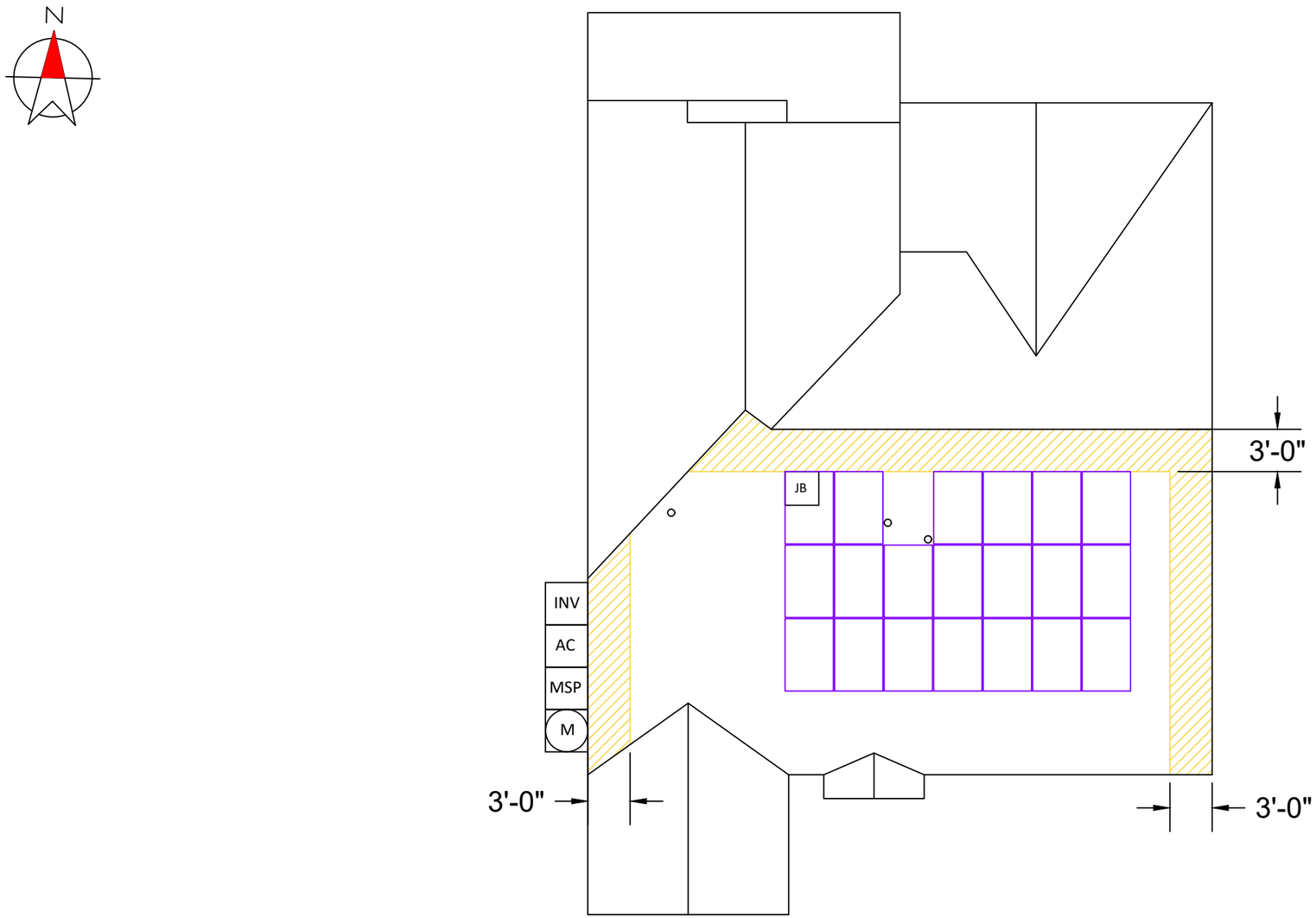
1/11/2023

SITE PLAN - PV02




| EQUIPMENT INFORMATION: | | ROOF INFO: | | PHOTOVOLTAIC ARRAY STRUCTURAL CRITERIA: | |
|---|---|---|---|---|---|
| RAIL MANUFACTURER: | SNAPNRACK | ROOF TYPE: | ASPHALT SHINGLE | PV MODULE COUNT: | 24 |
| RAIL PART NUMBER: | ULTRA RAIL UR-40 | ROOF FRAMING: | MANUFACTURED TRUSS | ARRAY AREA: | MODULE COUNT * 21.14 FT² = 507.36 |
| ATTACHMENTS | SPEEDSEAL FOOT | RAFTER/TOP CHORD SIZE: | 2x6 | ROOF AREA: | 2404 FT² |
| ATTACHMENT QTY: | 34 | RAFTER/TOP CHORD SPACING: | 24" | PERCENT OF ROOF COVERED: | 21% |
| SPLICE QTY: | 4 | ATTACHMENT SPACING: | 72" | ARRAY WEIGHT: | MODULE COUNT * 49 LBS = 1176 LBS |
| MIDCLAMP QTY: | 32 | | | POINT LOAD: | ARRAY LBS/ATTACHMENTS = 34.59 |
| ENDCLAMP QTY: | 16 | | | DISTRIBUTED LOAD: (lbs/ft²) | ARRAY WEIGHT/AREA = 2.32 LBS/FT² |

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SOUTH RIVER EMC

NORTH CAROLINA PROFESSIONAL SEAL 055156 ENGINEER NICHOLAS J. BOWENS

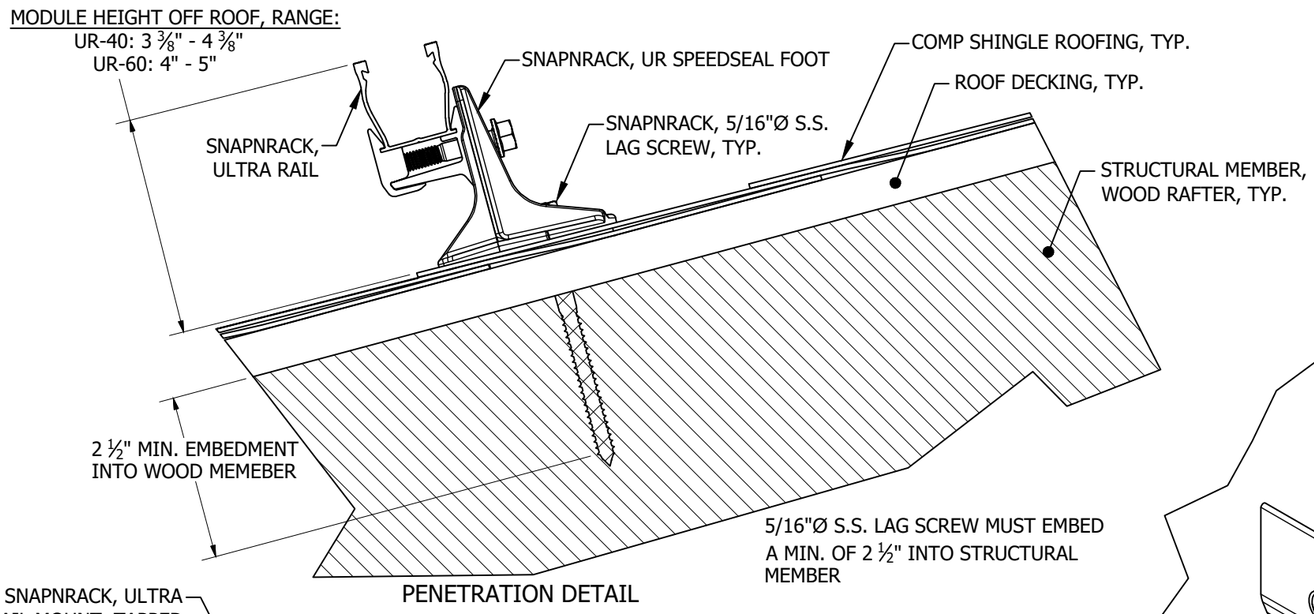
01/12/23

DRAWN BY: SoloCAD

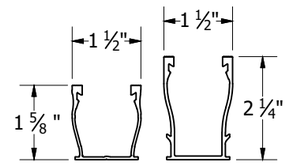
1/11/2023

ROOF PLAN - PV03

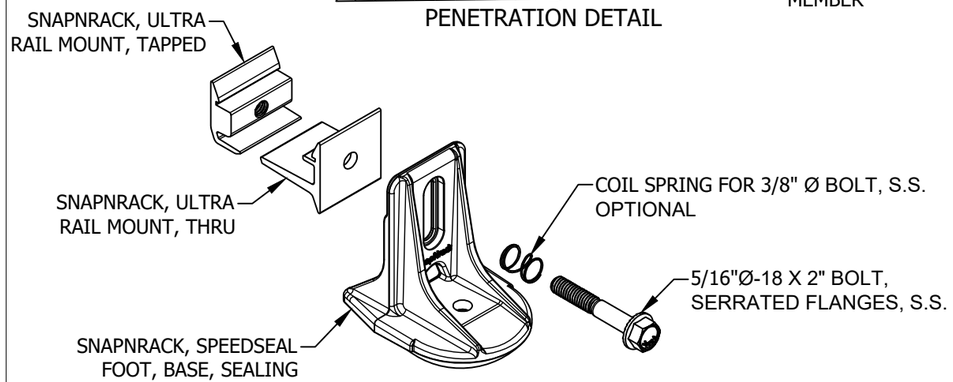
# SNAPNRACK UR SPEEDSEAL FOOT FOR COMPOSITION ROOF MOUNTING



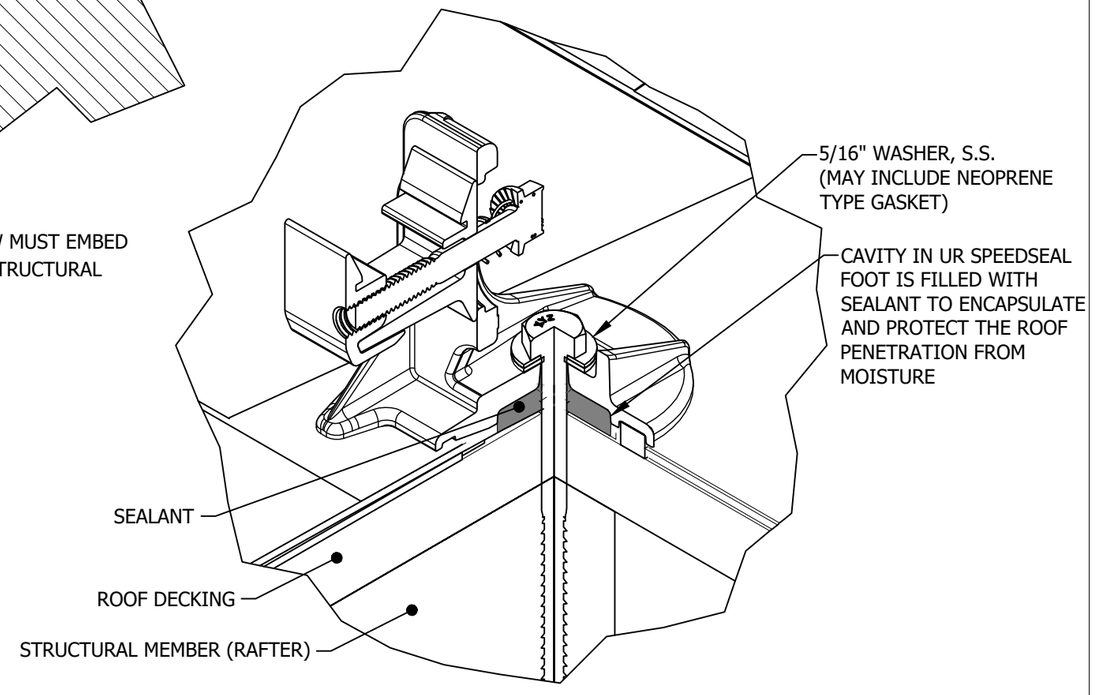

PENETRATION DETAIL




UR-40 RAIL | UR-60 RAIL
FOR USE WITH SNAPNRACK ULTRA SERIES RAILS




EXPLODED




| EQUIPMENT INFORMATION: | | ROOF INFO: | | PHOTOVOLTAIC ARRAY STRUCTURAL CRITERIA: | |
|---|---|---|---|---|---|
| RAIL MANUFACTURER: | SNAPNRACK | ROOF TYPE: | ASPHALT SHINGLE | PV MODULE COUNT: | 24 |
| RAIL PART NUMBER: | ULTRA RAIL UR-40 | ROOF FRAMING: | MANUFACTURED TRUSS | ARRAY AREA: | MODULE COUNT * 21.14 FT² = 507.36 |
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SOUTH RIVER EMC

NORTH CAROLINA PROFESSIONAL SEAL 055156 ENGINEER NICHOLAS J. BOWENS

01/12/23

DRAWN BY: SoloCAD

1/11/2023

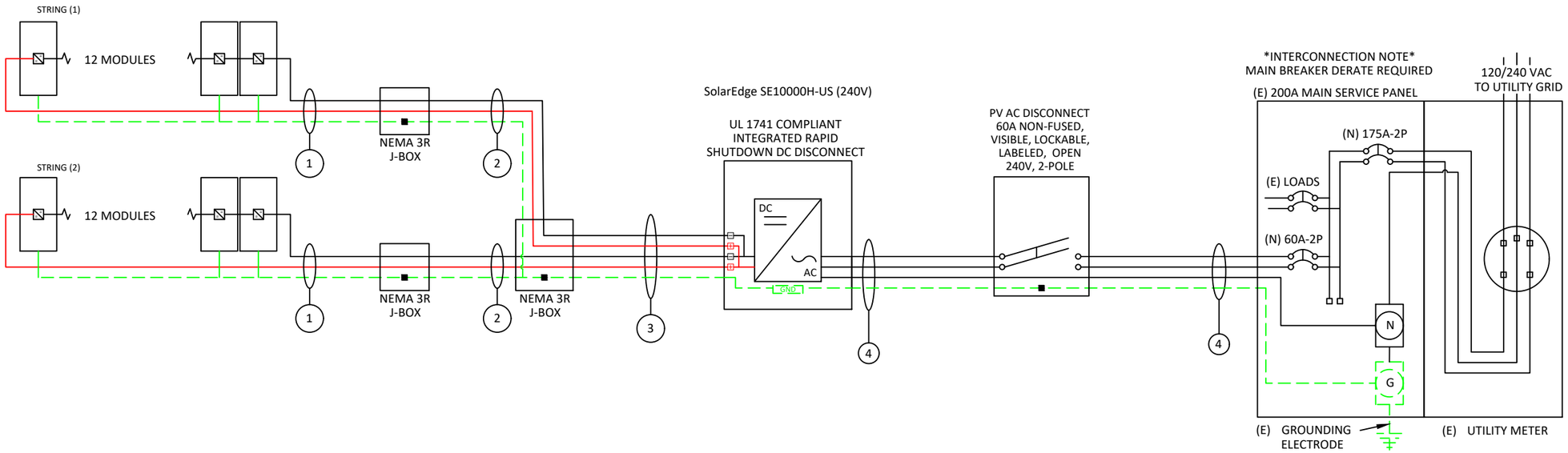
MOUNTING DETAIL - PV04

| HANWHA Q.PEAK DUO BLK ML-G10 400 SPECS | |
|---|---|
| POWER MAX (PMAX): | 400 W |
| OPEN CIRCUIT VOLTAGE (VOC): | 45.3 V |
| MAX POWER-POINT CURRENT (IMP): | 10.77 A |
| MAX POWER-POINT VOLTAGE (VMP): | 37.13 V |
| SHORT CIRCUIT CURRENT (ISC): | 11.14 A |
| SERIES FUSE RATING: | 20 A |

| SOLAREDGE SE10000H-US (240V) SPECS | |
|---|---|
| MAX INPUT VOLTAGE: | 480 V |
| MAX INPUT CURRENT: | 27 A |
| NOMINAL DC INPUT VOLTAGE: | 400 V |
| MAXIMUM OUTPUT POWER: | 10000 W |
| NOM. OUTPUT VOLTAGE: | 240 V |
| MAX OUTPUT CURRENT: | 42 A |
| 1-PHASE, 60 HZ, UL 1741 LISTED | |

| EQUIPMENT SCHEDULE | | | |
|---|---|---|---|
| TYPE | QTY | DESCRIPTION | RATING |
| MODULES: | (24) | HANWHA Q.PEAK DUO BLK ML-G10 400 | 400 W |
| INVERTERS: | (1) | SOLAREDGE SE10000H-US (240V) | 10000 W |
| AC DISCONNECT(S): | (1) | PV AC DISCONNECT, 240V, 2-POLE | 60 A |
| DC OPTIMIZERS: | (24) | SOLAREDGE S440 | 15 Adc |
| | | | |
| | | | |
| | | | |

| CONDUIT & CONDUCTOR SCHEDULE | | | | |
|---|---|---|---|---|
| TAG | QTY | WIRE GAUGE | DESCRIPTION | CONDUIT SIZE |
| 1 | (2) | 10 AWG | PV-WIRE, USE-2 COPPER - (L1, L2) | N/A - FREE AIR |
| | (1) | 6 AWG | BARE COPPER - (GROUND) | |
| 2 | (2) | 10 AWG | THHN/THWN-2 COPPER - (L1, L2) | 3/4" EMT |
| | (1) | 10 AWG | THWN-2 COPPER - (GROUND) | |
| 3 | (4) | 10 AWG | THHN/THWN-2 (L1, L2) | 3/4" EMT |
| | (1) | 10 AWG | THWN-2 COPPER -(GROUND) | |
| 4 | (3) | 4 AWG | THWN-2 COPPER - (L1, L2, NEUTRAL) | 1" EMT |
| | (1) | 10 AWG | THWN-2 COPPER - (GROUND) | |





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

DRAWN BY: SoloCAD

1/11/2023

LINE DIAGRAM - PV05

| STRING CALCULATIONS | | |
|---|---|---|
| SolarEdge SE10000H-US (240V) | STRING #1 | STRING #2 |
| OPTIMIZER MAX OUTPUT CURRENT: | 15A | 15A |
| OPTIMIZERS IN SERIES: | 12 | 12 |
| NOMINAL STRING VOLTAGE: | 400V | 400V |
| ARRAY OPERATING CURRENT: | 12A | 12A |
| ARRAY DC POWER: | 9600W | |
| TOTAL MAX AC CURRENT: | 42A | |

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

| SYSTEM OCPD CALCULATIONS | |
|---|---|
| INVERTER MODEL(S): | SOLAREDGE SE10000H-US (240V) |
| # OF INVERTERS: | 1 |
| MAX OUTPUT CURRENT: | 42A |
| (# OF INVERTERS) X (MAX OUTPUT CURRENT) X 125% <= OCPD RATING | |
| (1 X 42A X 1.25) = 52.5A <= 60A, OK | |

| BUSBAR CALCULATIONS - 120% RULE | |
|---|---|
| MAIN BUSBAR RATING: | 200A |
| MAIN DISCONNECT RATING: | 175A |
| PV OCPD RATING: | 60A |
| (MAIN BUS RATING X 120%) - MAIN DISCONNECT RATING >= OCPD RATING | |
| (200A X 1.2) - 175A = 65A, >= 60A, OK | |

## CONDUIT & CONDUCTOR SCHEDULE

| TAG | QTY | WIRE GAUGE | DESCRIPTION | CONDUIT SIZE | CONDUCTOR RATING | CONDUCTOR TEMP. RATE | AMBIENT TEMP | TEMP. DERATE | # OF CONDUCTORS DERATE | CONDUCTOR RATING W/DERATES | CONDUIT FILL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | (2) | 10 AWG | PV-WIRE, USE-2 COPPER - (L1, L2) | N/A - FREE AIR | 40A | 90°C | 36°C | 0.91 | N/A - FREE AIR | 36.4A | N/A - FREE AIR |
| | (1) | 6 AWG | BARE COPPER - (GROUND) | | | | | | | | |
| 2 | (2) | 10 AWG | THHN/THWN-2 COPPER - (L1, L2) | 3/4" EMT | 40A | 90°C | 36°C | 0.91 | 1 | 36.4A | 11.9% |
| | (1) | 10 AWG | THWN-2 COPPER - (GROUND) | | | | | | | | |
| 3 | (4) | 10 AWG | THHN/THWN-2 (L1, L2) | 3/4" EMT | 40A | 90°C | 36°C | 0.91 | 0.8 | 29.12A | 19.8% |
| | (1) | 10 AWG | THWN-2 COPPER -(GROUND) | | | | | | | | |
| 4 | (3) | 4 AWG | THWN-2 COPPER - (L1, L2, NEUTRAL) | 1" EMT | 85A | 75°C | 36°C | 0.88 | 1 | 74.8A | 31.1% |
| | (1) | 10 AWG | THWN-2 COPPER - (GROUND) | | | | | | | | |

**GROUNDING & GENERAL NOTES:**

1. PV INVERTER IS UNGROUNDED, TRANSFORMER-LESS TYPE.
2. DC GEC AND AC EGC TO BE SPLICED TO EXISTING ELECTRODE
3. ANY EXISTING WIRING INVOLVED WITH PV SYSTEM CONNECTION THAT IS FOUND TO BE INADEQUATE PER CODE SHALL BE CORRECTED PRIOR TO FINAL INSPECTION.
4. JUNCTION BOX QUANTITIES, AND PLACEMENT SUBJECT TO CHANGE IN THE FIELD - JUNCTION BOXES DEPICTED ON ELECTRICAL DIAGRAM REPRESENT WIRE TYPE TRANSITIONS.
5. AC DISCONNECT NOTED IN EQUIPMENT SCHEDULE OPTIONAL IF OTHER AC DISCONNECTING MEANS IS LOCATED WITHIN 10' OF SERVICE DISCONNECT.

**INTERCONNECTION NOTES:**

1. INTERCONNECTION SIZING, LIMITATIONS AND COMPLIANCE DETERMINED IN ACCORDANCE WITH [NEC 705.12].
2. GROUND FAULT PROTECTION IN ACCORDANCE WITH [NEC 215.9], [NEC 230.95] AND [NEC 690.41]
3. ALL EQUIPMENT TO BE RATED FOR BACKFEEDING.
4. PV BREAKER TO BE POSITIONED AT THE OPPOSITE END OF THE BUSBAR RELATIVE TO THE MAIN BREAKER.

**DISCONNECT NOTES:**

1. DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAINING LIVE ARE CONNECTED TO THE TERMINALS MARKED “LINE SIDE” (TYPICALLY THE UPPER TERMINALS)
2. AC DISCONNECT MUST BE ACCESSIBLE TO QUALIFIED UTILITY PERSONNEL, BE LOCKABLE, AND BE A VISIBLE-BREAK SWITCH


CONTRACTOR INFORMATION:
ENCŌR SOLAR, LLC
3049 Executive Parkway
Suite 300
Lehi, UT 84043
License # U.35743


## SITE INFORMATION

**MICHAEL PURVIS**

181 REMINGTON HILL DR

BUNNLEVEL, NC 28323

AC SYSTEM SIZE: 10 KW AC

DC SYSTEM SIZE: 9.6 KW DC

LAT, 35.289151

LONG, -78.9247906

(24) HANWHA Q.PEAK DUO BLK ML-G10 400 PV MODULES

(1) SOLAREDGE SE10000H-US (240V) INVERTER(S)

(24) SOLAREDGE S440 OPTIMIZERS

SOUTH RIVER EMC

DRAWN BY: SoloCAD

1/11/2023

ELECTRICAL CALCS - PV06

**MAIN PHOTOVOLTAIC SYSTEM DISCONNECT**

LABEL 1
PLACED ON THE MAIN DISCONNECTING MEANS FOR THE PV SYSTEM.
[NEC 690.13(B)]

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

LABEL 2
FOR PV DISCONNECTING MEANS WHERE THE LINE AND LOAD TERMINALS MAY BE ENERGIZED IN THE OPEN POSITION.
[NEC 690.13(B)]

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

LABEL 3
PLACED ADJACENT TO THE BACK-FED BREAKER FROM THE INVERTER IF TIE IN CONSISTS OF LOAD SIDE CONNECTION TO BUSBAR.
[NEC 705.12(B)(3)(2)]

**CAUTION**
**MULTIPLE SOURCES OF POWER**

LABEL 4
PLACED ON EQUIPMENT CONTAINING OVERCURRENT DEVICES IN CIRCUITS SUPPLYING POWER TO A BUSBAR OR CONDUCTOR SUPPLIED FROM MULTIPLE SOURCES
[NEC 705.10]

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

LABEL 5
EQUIPMENT CONTAINING OVERCURRENT DEVICES IN CIRCUITS SUPPLYING POWER TO A BUSBAR OR CONDUCTOR SUPPLIED FROM MULTIPLE SOURCES SHALL BE MARKED TO INDICATE THE PRESENCE OF ALL SOURCES.[NEC 705.12(B)(3)(3)]

**PHOTOVOLTAIC AC DISCONNECT**
**RATED AC OUTPUT CURRENT:** 42
**NOMINAL OPERATING AC VOLTAGE:** 240

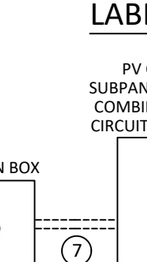
LABEL 6
MARKED AT AC DISCONNECTING MEANS.
[NEC 690.54]

**PHOTOVOLTAIC POWER SOURCE**

LABEL 7
AT DIRECT-CURRENT EXPOSED RACEWAYS, CABLE TRAYS, COVERS AND ENCLOSURES OF JUNCTION BOXES, AND OTHER WIRING METHODS; SPACED AT MAXIMUM 10FT SECTION OR WHERE SEPARATED BY ENCLOSURES, WALLS, PARTITIONS, CEILINGS, OR FLOORS.
[NEC 690.31(D)(2)]

**SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN**

TURN RAPID SHUTDOWN SWICH TO THE "OFF" POSITION TO SHUT DOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN ARRAY




LABEL 8
FOR PV SYSTEMS THAT SHUT DOWN THE ARRAY AND CONDUCTORS LEAVING THE ARRAY:
SIGN TO BE LOCATED ON OR NO MORE THAN 3 FT AWAY FROM SERVICE DISCONNECTING MEANS TO WHICH THE PV SYSTEMS ARE CONNECTED AND SHALL INDICATE THE LOCATION OF ALL IDENTIFIED RAPID SHUTDOWN SWITCHES IF NOT AT THE SAME LOCATION.
[NEC 690.56(C)(1)]

**RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM**

LABEL 9
SIGN LOCATED ON OR NO MORE THAN 3FT FROM INITIATION DEVICE
[NEC 690.56(C)(2)].

**DO NOT UPSIZE MAIN BREAKER**
BREAKER HAS BEEN DOWNSIZED FOR PV SOLAR SYSTEM CONNECTION

LABEL 10
SIGN LOCATED AT POINT OF INTERCONNECTION IF IT CONSISTS OF A MAIN BREAKER DERATE

LABELING NOTES:
1. LABELS CALLED OUT ACCORDING TO ALL COMMON CONFIGURATIONS. ELECTRICIAN TO DETERMINE EXACT REQUIREMENTS IN THE FIELD PER CURRENT NEC AND LOCAL CODES AND MAKE APPROPRIATE ADJUSTMENTS.
2. LABELING REQUIREMENTS BASED ON THE 2020 NATIONAL ELECTRIC CODE, OSHA STANDARD 19010.145, ANSI Z535.
3. MATERIAL BASED ON THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
4. LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED [NEC 110.21]
5. LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8", WHITE ON RED BACKGROUND; REFLECTIVE, AND PERMANENTLY AFFIXED [NEC 690.31(D)(2)]

## LABELING DIAGRAM:




** ELECTRICAL DIAGRAM SHOWN ABOVE IS FOR LABELING PURPOSES ONLY. NOT AN ACTUAL REPRESENATION OF EQUIPMENT AND CONNECTIONS TO BE INSTALLED. LABEL LOCATIONS PRESENTED MAY VERY DEPENDING ON TYPE OF INTERCONNECTION METHOD AND LOCATION PRESENTED ELECTRICAL DIAGRAM PAGE. **

ENCŌR

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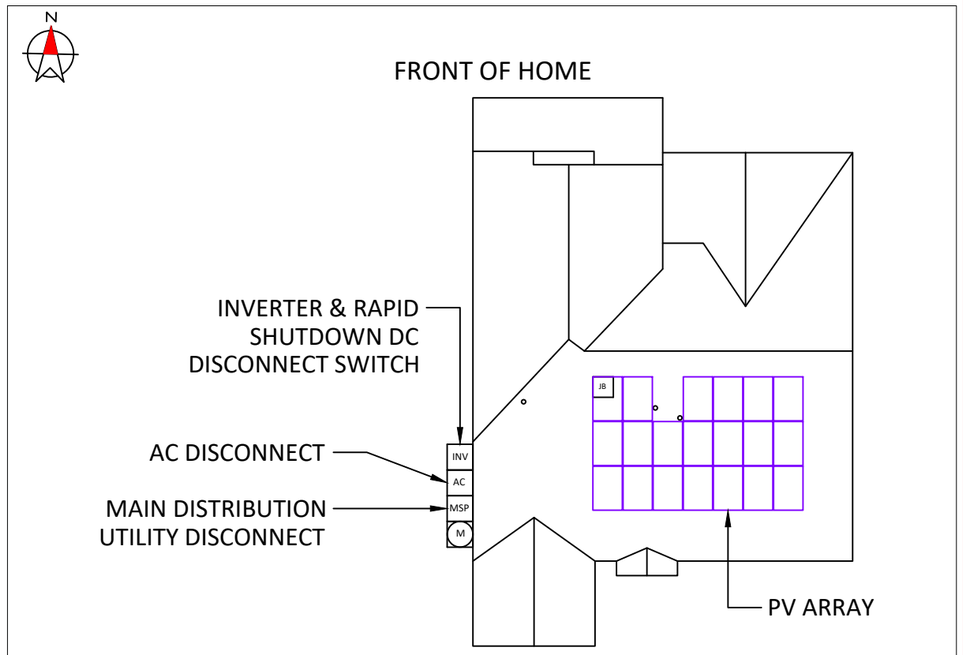
(1) SOLAREDGE SE10000H-US (240V) INVERTER(S)
(24) SOLAREDGE S440 OPTIMIZERS

SOUTH RIVER EMC

DRAWN BY: SoloCAD
1/11/2023
LABELS - PV07

# CAUTION

POWER TO THIS BUILDING IS ALSO SUPPLIED FROM ROOF MOUNTED SOLAR ARRAYS WITH SAFETY DISCONNECTS AS SHOWN:




181 Remington Hill Dr, Bunnlevel NC 28323

DIRECTORY

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

(ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS OUTLINED WITHIN: NEC 690.56(B)&(C), [NEC 705.10])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**SITE INFORMATION**

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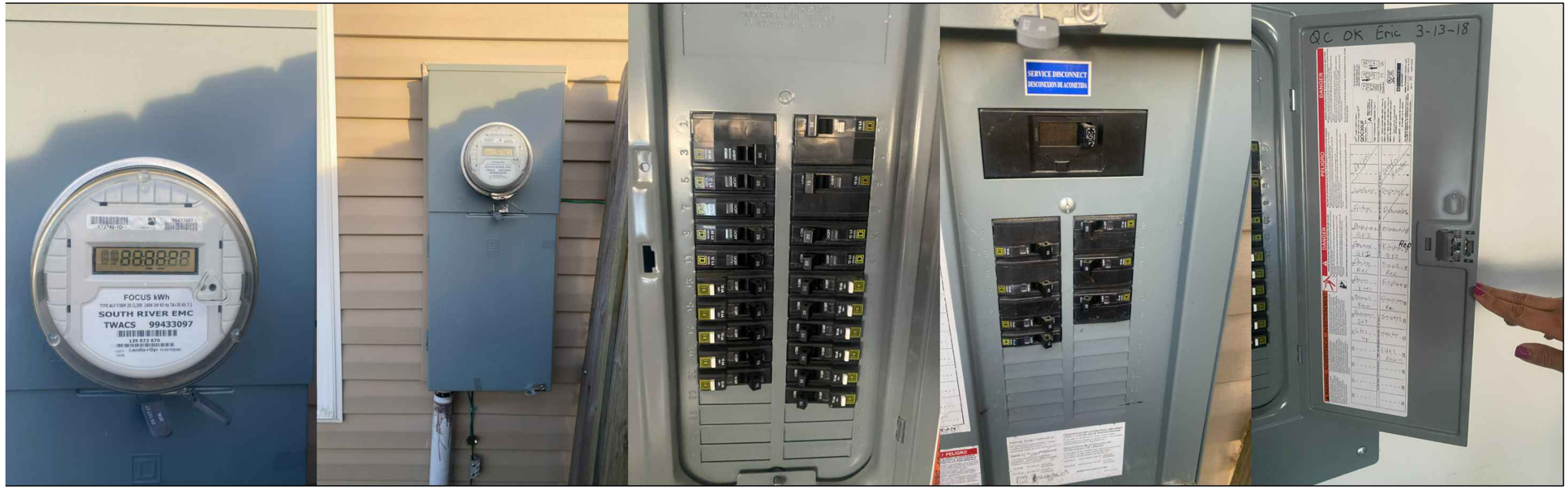
SOUTH RIVER EMC

DRAWN BY: SoloCAD

1/11/2023

PLACARD - PV08

# SITE PHOTOS:





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SOUTH RIVER EMC

DRAWN BY: SoloCAD

1/11/2023

SITE PHOTOS - PV09

PRELIMINARY

# Q.PEAK DUO BLK ML-G10
## 385-405

ENDURING HIGH PERFORMANCE

EUPD RESEARCH TOP BRAND PV MODULES EUROPE 2020

ntv GERMANY'S MOST POPULAR PROVIDER Life & Living Award 2020 1st Place Solar Technology

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%.

### INNOVATIVE ALL-WEATHER TECHNOLOGY
Optimal yields, whatever the weather with excellent low-light and temperature behaviour.

### 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 aluminium alloy frame, certified for high snow (5400 Pa) and wind loads (4000 Pa).

### A RELIABLE INVESTMENT
Inclusive 12-year product warranty and 25-year linear performance warranty[2].

### STATE OF THE ART MODULE TECHNOLOGY
Q.ANTUM DUO combines cutting edge cell separation and innovative wiring with Q.ANTUM Technology.

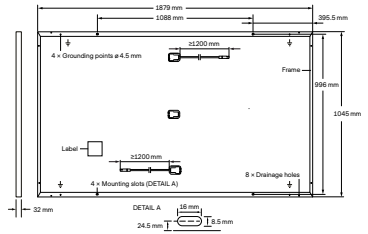
[1] APT test conditions according to IEC/TS 62804-1:2015, method B (−1500 V, 168 h)
[2] See data sheet on rear for further information.

### THE IDEAL SOLUTION FOR:
Rooftop arrays on residential buildings

Engineered in Germany

## MECHANICAL SPECIFICATION

| | |
|---|---|
| Format | 1879 mm × 1045 mm × 32 mm (including frame) |
| Weight | 22.0 kg |
| Front Cover | 3.2 mm thermally pre-stressed glass with anti-reflection technology |
| Back Cover | Composite film |
| Frame | Black anodised aluminium |
| Cell | 6 × 22 monocrystalline Q.ANTUM solar half cells |
| Junction box | 53-101 mm × 32-60 mm × 15-18 mm Protection class IP67, with bypass diodes |
| Cable | 4 mm² Solar cable; (+) ≥1200 mm, (−) ≥1200 mm |
| Connector | Stäubli MC4, Hanwha Q CELLS HQC4; IP68 |

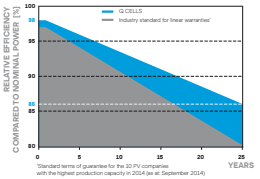



## ELECTRICAL CHARACTERISTICS

| 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

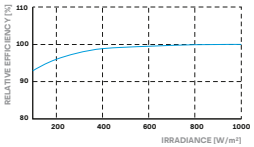
### Q CELLS PERFORMANCE WARRANTY




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 | [°C] | 43±3 |

## PROPERTIES FOR SYSTEM DESIGN

| | | | | | |
|---|---|---|---|---|---|
| Maximum System Voltage | $V_{SYS}$ | [V] | 1000 | PV module classification | Class II |
| Maximum Reverse Current | $I_R$ | [A] | 20 | Fire Rating based on ANSI / UL 61730 | C / TYPE 2 |
| Max. Design Load, Push / Pull | | [Pa] | 3600 / 2660 | Permitted Module Temperature on Continuous Duty | −40 °C - +85 °C |
| Max. Test Load, Push / Pull | | [Pa] | 5400 / 4000 | | |

## QUALIFICATIONS AND CERTIFICATES

IEC 61215:2016;
IEC 61730:2016.
This data sheet complies with DIN EN 50380.

TÜVRheinland CERTIFIED www.tuv.com ID 1111220277

CE

**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 GmbH**
Sonnenallee 17-21, 06766 Bitterfeld-Wolfen, Germany | **TEL** +49 (0)3494 66 99-23444 | **FAX** +49 (0)3494 66 99-23000 | **EMAIL** sales@q-cells.com | **WEB** www.q-cells.com



Engineered in Germany

# Single Phase Inverter with HD-Wave Technology

## for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US /
SE7600H-US / SE10000H-US / SE11400H-US

INVERTERS

12-25 YEAR WARRANTY


## Optimized installation with HD-Wave technology

- Specifically designed to work with power optimizers
- Record-breaking 99% weighted efficiency
- Quick and easy inverter commissioning directly from a smartphone using the SolarEdge SetApp
- Fixed voltage inverter for longer strings
- Integrated arc fault protection and rapid shutdown for NEC 2014, NEC 2017 and NEC 2020 per article 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Small, lightweight, and easy to install both outdoors or indoors
- Built-in module-level monitoring
- Optional: Faster installations with built-in consumption metering (1% accuracy) and production revenue grade metering (0.5% accuracy, ANSI C12.20)

solaredge.com

solaredge


# Single Phase Inverter with HD-Wave Technology

## for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US/
SE7600H-US / SE10000H-US / SE11400H-US


| MODEL NUMBER | SE3000H-US | SE3800H-US | SE5000H-US | SE6000H-US | SE7600H-US | SE10000H-US | SE11400H-US | |
|---|---|---|---|---|---|---|---|---|
| APPLICABLE TO INVERTERS WITH PART NUMBER | SEXXXXH-XXXXXBXX4 | | | | | | | |
| **OUTPUT** | | | | | | | | |
| Rated AC Power Output | 3000 | 3800 @ 240V<br>3300 @ 208V | 5000 | 6000 @ 240V<br>5000 @ 208V | 7600 | 10000 | 11400 @ 240V<br>10000 @ 208V | VA |
| Maximum AC Power Output | 3000 | 3800 @ 240V<br>3300 @ 208V | 5000 | 6000 @ 240V<br>5000 @ 208V | 7600 | 10000 | 11400 @ 240V<br>10000 @ 208V | VA |
| AC Output Voltage Min.-Nom.-Max. (211 - 240 - 264) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Vac |
| AC Output Voltage Min.-Nom.-Max. (183 - 208 - 229) | - | ✓ | - | ✓ | - | - | ✓ | Vac |
| AC Frequency (Nominal) | 59.3 - 60 - 60.5[1] | | | | | | | Hz |
| Maximum Continuous Output Current @240V | 12.5 | 16 | 21 | 25 | 32 | 42 | 47.5 | A |
| Maximum Continuous Output Current @208V | - | 16 | - | 24 | - | - | 48.5 | A |
| Power Factor | 1, Adjustable - 0.85 to 0.85 | | | | | | | |
| GFDI Threshold | 1 | | | | | | | A |
| Utility Monitoring, Islanding Protection, Country Configurable Thresholds | Yes | | | | | | | |
| **INPUT** | | | | | | | | |
| Maximum DC Power @240V | 4650 | 5900 | 7750 | 9300 | 11800 | 15500 | 17650 | W |
| Maximum DC Power @208V | - | 5100 | - | 7750 | - | - | 15500 | W |
| Transformer-less, Ungrounded | Yes | | | | | | | |
| Maximum Input Voltage | 480 | | | | | | | Vdc |
| Nominal DC Input Voltage | 380 | | | | 400 | | | Vdc |
| Maximum Input Current @240V[2] | 8.5 | 10.5 | 13.5 | 16.5 | 20 | 27 | 30.5 | Adc |
| Maximum Input Current @208V[2] | - | 9 | - | 13.5 | - | - | 27 | Adc |
| Max. Input Short Circuit Current | 45 | | | | | | | Adc |
| Reverse-Polarity Protection | Yes | | | | | | | |
| Ground-Fault Isolation Detection | 600kΩ Sensitivity | | | | | | | |
| Maximum Inverter Efficiency | 99 | 99.2 | | | | | | % |
| CEC Weighted Efficiency | 99 | | | | | | 99 @ 240V<br>98.5 @ 208V | % |
| Nighttime Power Consumption | < 2.5 | | | | | | | W |

(1) For other regional settings please contact SolarEdge support
(2) A higher current source may be used; the inverter will limit its input current to the values stated

# Single Phase Inverter with HD-Wave Technology

## for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US/
SE7600H-US / SE10000H-US / SE11400H-US

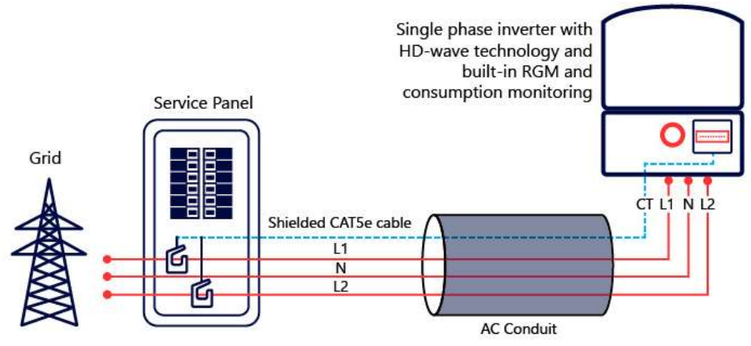
| MODEL NUMBER | SE3000H-US | SE3800H-US | SE5000H-US | SE6000H-US | SE7600H-US | SE10000H-US | SE11400H-US | |
|---|---|---|---|---|---|---|---|---|
| **ADDITIONAL FEATURES** | | | | | | | | |
| Supported Communication Interfaces | RS485, Ethernet, ZigBee (optional), Cellular (optional) | | | | | | | |
| Revenue Grade Metering, ANSI C12.20 | Optional[3] | | | | | | | |
| Consumption metering | | | | | | | | |
| Inverter Commissioning | With the SetApp mobile application using Built-in Wi-Fi Access Point for Local Connection | | | | | | | |
| Rapid Shutdown - NEC 2014, NEC 2017 and NEC 2020, 690.12 | Automatic Rapid Shutdown upon AC Grid Disconnect | | | | | | | |
| **STANDARD COMPLIANCE** | | | | | | | | |
| Safety | UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07 | | | | | | | |
| Grid Connection Standards | IEEE1547, Rule 21, Rule 14 (HI) | | | | | | | |
| Emissions | FCC Part 15 Class B | | | | | | | |
| **INSTALLATION SPECIFICATIONS** | | | | | | | | |
| AC Output Conduit Size / AWG Range | 1" Maximum / 14-6 AWG | | | | | 1" Maximum /14-4 AWG | | |
| DC Input Conduit Size / # of Strings / AWG Range | 1" Maximum / 1-2 strings / 14-6 AWG | | | | | 1" Maximum / 1-3 strings / 14-6 AWG | | |
| Dimensions with Safety Switch (HxWxD) | 17.7 x 14.6 x 6.8 / 450 x 370 x 174 | | | | | 21.3 x 14.6 x 7.3 / 540 x 370 x 185 | | in / mm |
| Weight with Safety Switch | 22 / 10 | | 25.1 / 11.4 | 26.2 / 11.9 | | 38.8 / 17.6 | | lb / kg |
| Noise | < 25 | | | | | <50 | | dBA |
| Cooling | Natural Convection | | | | | | | |
| Operating Temperature Range | -40 to +140 / -40 to +60[4] | | | | | | | °F / °C |
| Protection Rating | NEMA 4X (Inverter with Safety Switch) | | | | | | | |

(3) Inverter with Revenue Grade Meter P/N: SExxxxH-US000BNC4; Inverter with Revenue Grade Production and Consumption Meter P/N: SExxxxH-US000BNI4 . For consumption metering, current transformers should be ordered separately: SEACT0750-200NA-20 or SEACT0750-400NA-20. 20 units per box

(4) Full power up to at least 50°C / 122°F, for power de-rating information refer to: https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf

## How to Enable Consumption Monitoring

By simply wiring current transformers through the inverter's existing AC conduits and connecting them to the service panel, homeowners will gain full insight into their household energy usage helping them to avoid high electricity bills






RoHS

# Power Optimizer

## For North America

S440, S500


POWER OPTIMIZER

## PV power optimization at the module level

- Specifically designed to work with SolarEdge residential inverters
- Detects abnormal PV connector behavior, preventing potential safety issues*
- Module-level voltage shutdown for installer and firefighter safety
- Superior efficiency (99.5%)
- Mitigates all types of module mismatch loss, from manufacturing tolerance to partial shading
- Faster installations with simplified cable management and easy assembly using a single bolt
- Flexible system design for maximum space utilization
- Compatible with bifacial PV modules
- Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PVRSS)

* Expected availability in 2022

solaredge.com

solaredge

# / Power Optimizer

## For North America

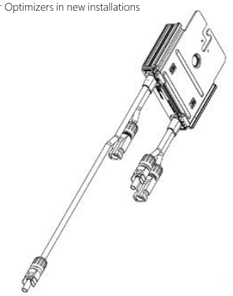
S440, S500

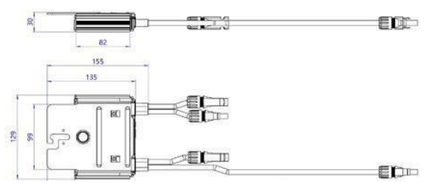
| | S440 | S500 | Unit |
|---|---|---|---|
| **INPUT** | | | |
| Rated Input DC Power(1) | 440 | 500 | W |
| Absolute Maximum Input Voltage (Voc) | 60 | | Vdc |
| MPPT Operating Range | 8 - 60 | | Vdc |
| Maximum Short Circuit Current (Isc) of Connected PV Module | 14.5 | 15 | Adc |
| Maximum Efficiency | 99.5 | | % |
| Weighted Efficiency | 98.6 | | % |
| Overvoltage Category | II | | |
| **OUTPUT DURING OPERATION** | | | |
| Maximum Output Current | 15 | | Adc |
| Maximum Output Voltage | 60 | | Vdc |
| **OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM INVERTER OR INVERTER OFF)** | | | |
| Safety Output Voltage per Power Optimizer | 1+/-0.1 | | Vdc |
| **STANDARD COMPLIANCE** | | | |
| Photovoltaic Rapid Shutdown System | NEC 2014, 2017 & 2020 | | |
| EMC | FCC Part 15 Class B, IEC61000-6-2, IEC61000-6-3 | | |
| Safety | IEC62109-1 (class II safety), UL1741 | | |
| Material | UL94 V-0, UV Resistant | | |
| RoHS | Yes | | |
| Fire Safety | VDE-AR-E 2100-712:2013-05 | | |
| **INSTALLATION SPECIFICATIONS** | | | |
| Maximum Allowed System Voltage | 1000 | | Vdc |
| Dimensions (W x L x H) | 129 x 153 x 30 / 5.07 x 6.02 x 1.18 | | mm / in |
| Weight (including cables) | 655 / 1.5 | | gr / lb |
| Input Connector | MC4(2) | | |
| Input Wire Length | 0.1 / 0.32 | | m / ft |
| Output Connector | MC4 | | |
| Output Wire Length | (+) 2.3, (-) 0.10 / (+) 7.54, (-) 0.32 | | m / ft |
| Operating Temperature Range(3) | -40 to +85 | | °C |
| Protection Rating | IP68 / Type6B | | |
| Relative Humidity | 0 - 100 | | % |

(1) Rated power of the module at STC will not exceed the power optimizer Rated Input DC Power. Modules with up to +5% power tolerance are allowed
(2) For other connector types please contact SolarEdge
(3) For ambient temperature above +70°C / +158°F power de-rating is applied. Refer to Power Optimizers Temperature De-Rating Technical Note for more details

| PV System Design Using a SolarEdge Inverter | | Single Phase HD-Wave | Three Phase for 208V grid | Three Phase for 277/480V grid | |
|---|---|---|---|---|---|
| Minimum String Length (Power Optimizers) | S440, S500 | 8 | 14 | 18 | |
| Maximum String Length (Power Optimizers) | | 25 | | 50(4) | |
| Maximum Nominal Power per String | | 5700 (6000 with SE7600-US-SE11400-U) | 6000 | 12750 | W |
| Maximum Allowed Connected Power per String (5) (Permitted only when the difference in connected power between strings is 1,000W or less) | | Refer to Footnote 5 | One String 7200W | 15,000W | |
| | | | Two strings or more 7800W | | |
| Parallel Strings of Different Lengths or Orientations | | Y | | | |

(4) A string with more than 30 optimizers does not meet NEC rapid shutdown requirements; safety voltage will be above the 30V requirement
(5) If the inverters rated AC power ≤ maximum nominal power per string, then the maximum power per string will be able to reach up to the inverters maximum input DC power. Refer to: https://www.solaredge.com/sites/default/files/se-power-optimizer-single-string-design-application-note.pdf
(6) It is not allowed to mix S-series and P-series Power Optimizers in new installations








Intertek

RoHS

SnapNrack™
Solar Mounting Solutions

UR-40
UR-60

# Ultra Rail

## The Ultimate Value in Rooftop Solar

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

## Start Installing Ultra Rail Today

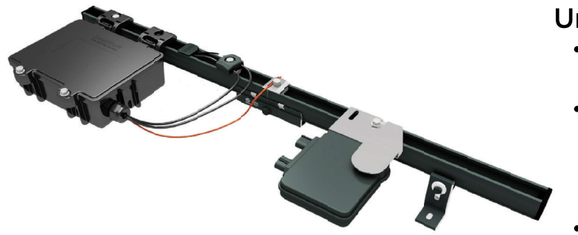
| | |
|---|---|
| **RESOURCES** | snapnrack.com/resources |
| **DESIGN** | snapnrack.com/configurator |
| **WHERE TO BUY** | snapnrack.com/where-to-buy |

## SnapNrack Ultra Rail System

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

### The Entire System is a Snap to Install

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



### Unparalleled Wire Management

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

### Heavy Duty UR-60 Rail

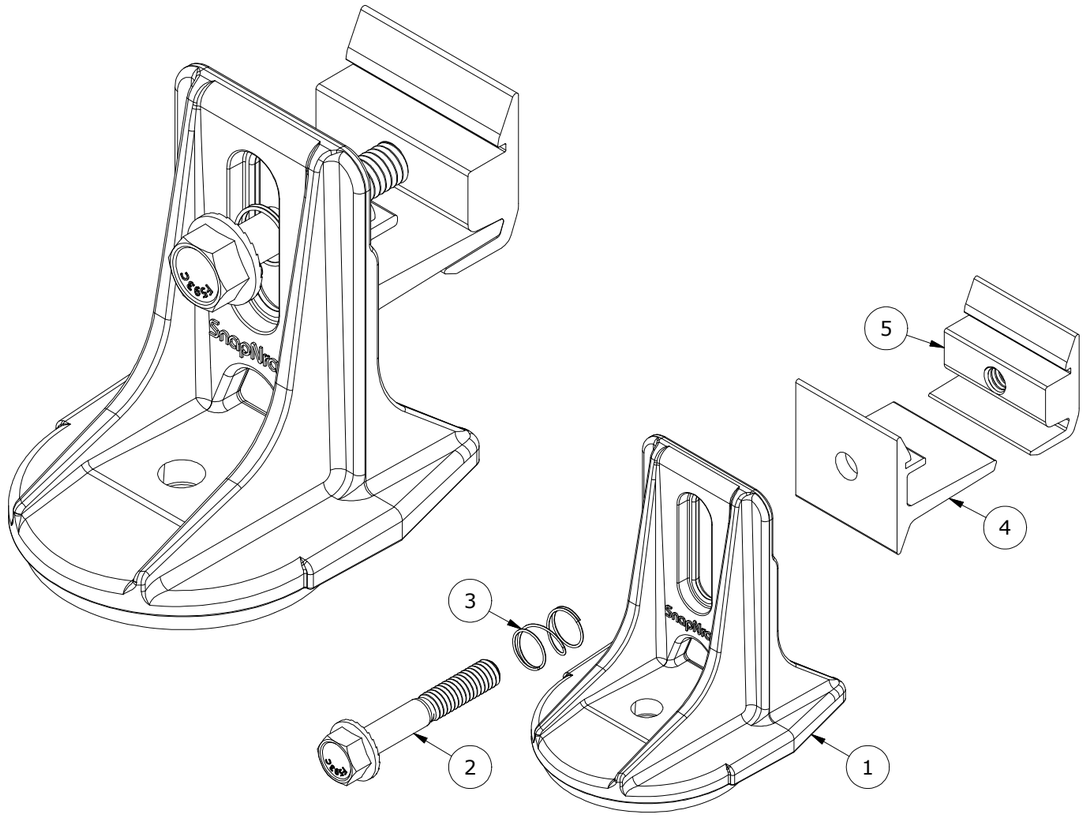
- UR-60 rail profile provides increased span capabilities for high wind speeds and snow loads
- Taller, stronger rail profile includes profile-specific rail splice and end cap
- All existing mounts, module clamps, and accessories are retained for the same great install experience

## Quality. Innovative. Superior.

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

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

| DESCRIPTION: | DRAWN BY: | SnapNrack™ Solar Mounting Solutions |
|---|---|---|
| SNAPNRACK, ULTRA RAIL SPEEDSEAL™ FOOT | mwatkins | |
| PART NUMBER(S): | REVISION: | 595 MARKET STREET, 29TH FLOOR • SAN FRANCISCO, CA 94105 USA<br>PHONE (415) 580-6900 • FAX (415) 580-6902 |
| 242-02163, 242-02167 | A | THE INFORMATION IN THIS DRAWING IS CONFIDENTIAL AND PROPRIETARY. ANY REPRODUCTION, DISCLOSURE, OR USE THEREOF IS PROHIBITED WITHOUT THE WRITTEN CONSENT OF SUNRUN SOUTH LLC. |




| PARTS LIST | | |
|---|---|---|
| ITEM | QTY | DESCRIPTION |
| 1 | 1 | SNAPNRACK, SPEEDSEAL FOOT, BASE, SEALING, SILVER / BLACK |
| 2 | 1 | BOLT, FLANGE, SERRATED, 5/16IN-18 X 2IN, SS |
| 3 | 1 | SNAPNRACK, RL UNIVERSAL, MOUNT SPRING, SS |
| 4 | 1 | SNAPNRACK, ULTRA RAIL MOUNT THRU PRC, CLEAR / BLACK |
| 5 | 1 | SNAPNRACK, ULTRA RAIL MOUNT TAPPED PRC, CLEAR / BLACK |

| | | |
|---|---|---|
| MATERIALS: | DIE CAST A380 ALUMINUM, 6000 SERIES ALUMINUM, STAINLESS STEEL | |
| DESIGN LOAD (LBS): | 802 UP, 1333 DOWN, 357 SIDE | OPTIONS: |
| ULTIMATE LOAD (LBS): | 2118 UP, 4006 DOWN, 1331 SIDE | CLEAR / BLACK |
| TORQUE SPECIFICATION: | 12 LB-FT | |
| CERTIFICATION: | UL 2703, FILE E359313; WIND-DRIVEN RAIN TEST FROM SUBJECT UL 2582 | |
| WEIGHT (LBS): | 0.45 | |


| DESCRIPTION: | DRAWN BY: | SnapNrack™ Solar Mounting Solutions |
|---|---|---|
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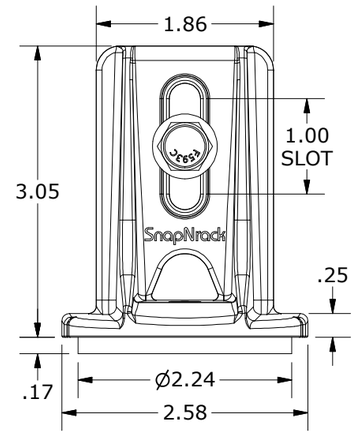
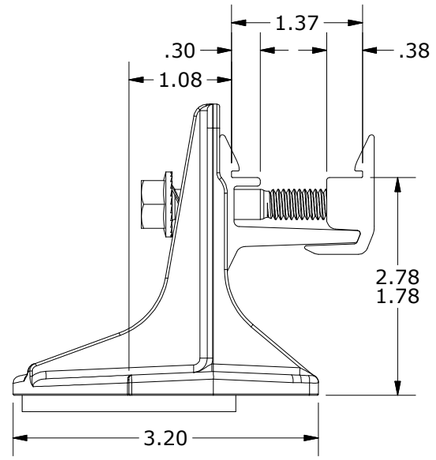
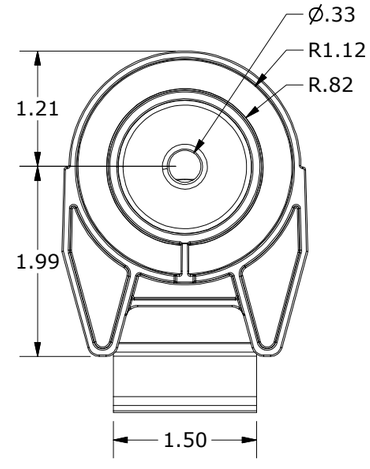



ALL DIMENSIONS IN INCHES

# SnapNrack SpeedSeal™ Foot

*Patent Pending Lag Driven Sealant Solution for Ultra Rail*

### A New Generation of Roof Attachments

- Innovative design incorporates flashing reliability into a single roof attachment
- 100% waterproof solution
- Sealing cavity with compressible barrier secures sealant in place & fills voids

### Maintain the Integrity of the Roof by Eliminating Disruption

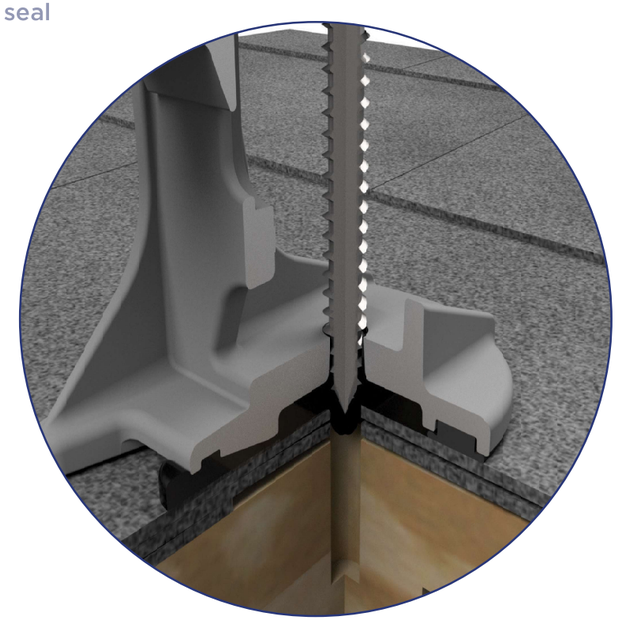
- Zero prying of shingles
- Zero removal of nails leaving holes in the roof
- Roof remains installed the way manufacturer meant it to be

### Lag Driven Sealant Waterproofing

- Time Tested Roof Sealant provides lasting seal
- Sealant is compressed into cavity and lag hole as attachment is secured to rafter
- Active sealant solidifies bond if ever touched by liquid
- Technology passes UL 2582 Wind Driven Rain Test and ASTM E2140 Water Column Testing standards. Patent Pending.

### Single Tool Installation

- SnapNrack was the first in the industry to develop a complete system that only requires a single tool. That tradition is continued as a ½" socket is still the only tool necessary to secure the mount as well as all other parts of the system.



*Note: Sealant shown in white for illustration purposes only.*

snapnrack.com

# SnapNrack SpeedSeal™ Foot

*Fastest Roof Attachment in Solar*

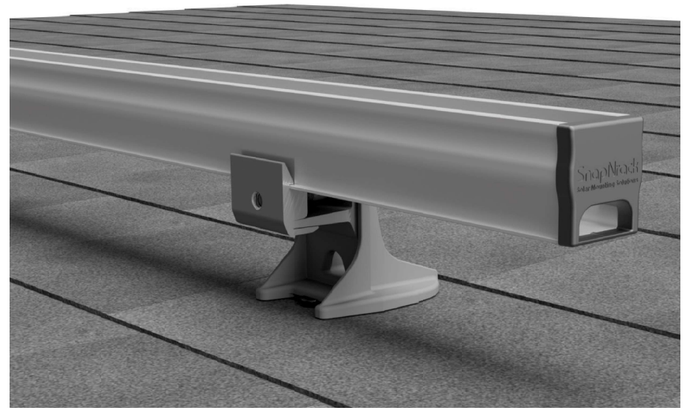
- Lag straight to a structural member, no in-between components such as flashings or bases.
- Simply locate rafter, fill sealant cavity & secure to roof. *It's that simple!*

*Integrated Flashings. No Questions.*

- Sealant fills around lag screw keeping roof and structure sealed and intact
- No added holes from ripping up nails, staples and screws holding shingles on roof

*Less Time. Less Parts. Less Tools.*

- No more need for a pry bar to rip up shingles
- No more proprietary lag screws
- Single Tool installation with ½" socket



***Total System Solution***

*One Tool. One Warranty.*

- SnapNrack Ultra Rail is a straightforward intuitive install experience on the roof without compromising quality, aesthetics & safety, all supported by a 25 year warranty.
- Built-in Wire Management & Aesthetically pleasing features designed for Ultra Rail result in a long-lasting quality install that installers and homeowners love.

*Certifications*

SnapNrack Ultra Rail System has been evaluated by Underwriters Laboratories (UL) and Listed to UL/ANSI Standard 2703 for Mechanical Loading and Fire. Additionally it is listed to UL 2582 for wind-driven rain and ASTM 2140.

SnapNrack
Solar Mounting Solutions

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