

GENERAL NOTES

CODE AND STANDARDS

1. ALL WORK SHALL COMPLY WITH 2017 NATIONAL ELECTRIC CODE (NEC), 2018 NORTH CAROLINA BUILDING CODE (NCBC), 2018 NORTH CAROLINA RESIDENTIAL CODE (NCRC), PLUMBING CODE (NPC), AND ALL STATE AND LOCAL BUILDING, ELECTRICAL, AND PLUMBING CODES.
2. DRAWINGS HAVE BEEN DETAILED ACCORDING TO UL LISTING REQUIREMENTS.

SITE NOTES / OSHA REGULATION

1. A LADDER SHALL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS.
2. THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE AND THIS SYSTEM IS A UTILITY INTERACTIVE SYSTEM.
3. THE SOLAR PV INSTALLATION SHALL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.
4. ROOF COVERINGS SHALL BE DESIGNED, INSTALLED, AND MAINTAINED IN ACCORDANCE WITH THIS CODE AND THE APPROVED MANUFACTURER'S INSTRUCTIONS SUCH THAT THE ROOF COVERING SHALL SERVE TO PROTECT THE BUILDING OR STRUCTURE.

SOLAR CONTRACTOR

1. MODULE CERTIFICATIONS WILL INCLUDE UL1703, IEC61646, IEC61730.
2. IF APPLICABLE, MODULE GROUNDING LUGS MUST BE INSTALLED AT THE MARKED GROUNDING LUG HOLES PER THE MANUFACTURER'S INSTALLATION REQUIREMENTS.
3. AS INDICATED BY DESIGN, OTHER NRTL LISTED MODULE GROUNDING DEVICES MAY BE USED IN PLACE OF STANDARD GROUNDING LUGS AS SHOWN IN MANUFACTURER DOCUMENTATION AND APPROVED BY THE AHJ.
4. CONDUIT AND WIRE SPECIFICATIONS ARE BASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING AS REQUIRED BY FIELD CONDITIONS.
5. CONDUIT POINT OF PENETRATION FROM EXTERIOR TO INTERIOR TO BE INSTALLED AND SEALED WITH A SUITABLE SEALING COMPOUND.
6. DC WIRING LIMITED TO MODULE FOOTPRINT W/ ENPHASE AC SYSTEM.
7. ENPHASE WIRING SYSTEMS SHALL BE LOCATED AND SECURED UNDER THE ARRAY W/ SUITABLE WIRING CLIPS.
8. MAX DC VOLTAGE CALCULATED USING MANUFACTURER PROVIDED TEMP COEFFICIENT FOR VOC UNLESS NOT AVAILABLE.
9. ALL INVERTERS, MOTOR GENERATORS, PHOTOVOLTAIC MODULES, PHOTOVOLTAIC PANELS, AC PHOTOVOLTAIC MODULES, DC COMBINERS, DC-TO-DC CONVERTERS, SOURCE CIRCUIT COMBINERS, AND CHARGE CONTROLLERS INTENDED FOR USE IN A PHOTOVOLTAIC POWER SYSTEM WILL BE IDENTIFIED AND LISTED FOR THE APPLICATION PER NEC 690.4(B).
10. ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE.
11. TERMINALS AND LUGS WILL BE TIGHTENED TO MANUFACTURER TORQUE SPECIFICATIONS (WHEN PROVIDED) IN ACCORDANCE WITH NEC CODE 110.14(D) ON ALL ELECTRICAL CONNECTIONS.

EQUIPMENT LOCATIONS

1. PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL BE PROVIDED AS PER SECTION NEC 110.26.
2. EQUIPMENT INSTALLED IN DIRECT SUNLIGHT MUST BE RATED FOR EXPECTED OPERATING TEMPERATURE AS SPECIFIED BY NEC 690.31(A) AND NEC TABLE 310.15(B).
3. ALL EQUIPMENT SHALL BE INSTALLED ACCESSIBLE TO QUALIFIED PERSONNEL ACCORDING TO NEC APPLICABLE CODES.
4. ALL COMPONENTS ARE LISTED FOR THEIR PURPOSE AND RATED FOR OUTDOOR USAGE WHEN APPROPRIATE.

PROJECT INFORMATION:

NUMBER OF STORIES: 1
CONDUIT RUN: Interior
ECOBEE QTY: 0
LIGHT BULB QTY: 0
PV METER: Not Required

ROOF TYPE (1) INFORMATION:

ROOF TYPE: Comp Shingle
FRAMING TYPE: Manufactured Truss
SHEATHING TYPE: OSB
ATTACHMENT: SFM Infinity Flashkit
RACKING: Unirac SFM Infinity @ 48" OC Portrait / 72" OC Landscape
NUMBER OF ATTACHMENTS: 29

ROOF TYPE (2) INFORMATION (IF APPLICABLE):

**SEE PV4.2*

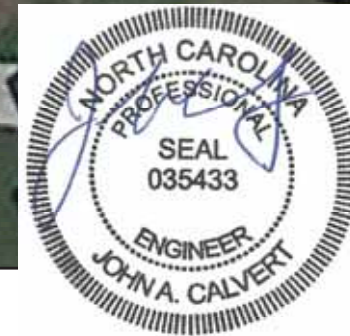
SYSTEM TO BE INSTALLED INFORMATION:

DC SYSTEM SIZE: 6.3 kW DC
AC SYSTEM SIZE: 4.725 kW AC
MODULE TYPE: (15) REC Solar REC420AA PURE-R
INVERTER TYPE: Enphase IQ7X-96-2-US
MONITORING: Enphase IQ Combiner 4 X-IQ-AM1-240-4

AERIAL VIEW



Sealed For Existing Roof & Attachment Only



DESIGN CRITERIA

WIND SPEED: 115 mph
GROUND SNOW LOAD: 15 lb/ft²
WIND EXPOSURE FACTOR: C
SEISMIC DESIGN CATEGORY: B

SITE SPECIFICATIONS

CONSTRUCTION - V-B
 ZONING: RESIDENTIAL

SCOPE OF WORK

INSTALLATION OF UTILITY INTERACTIVE PHOTOVOLTAIC SOLAR SYSTEM AND ANY NECESSARY ADDITIONAL WORK NEEDED FOR INSTALLATION.

SHEET INDEX

PV1 - COVER SHEET
 PV2 - SITE PLAN
 PV3 - ROOF PLAN
 PV4 - STRUCTURAL
 PV5 - ELECTRICAL 3-LINE DIAGRAM
 PV6 - ELECTRICAL CALCULATIONS
 PV7 - WARNING LABELS AND LOCATIONS
 (ALL OTHER SHEETS AS REQUIRED)
 SS - PRODUCT SPEC. SHEETS

Firm No. : D-0449
 10/18/2023

UTILITY COMPANY:

South River Electric Coop

PERMIT ISSUER:

Harnett County

Digitally signed by John A. Calvert
 Date: 2023.10.18 10:15:33 -06'00'



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PV INSTALLATION PROFESSIONAL

Scott Gurney
 #PV-011719-015866

CONTRACTOR:
 BRS FIELD OPS
 800-377-4480

CUSTOMER INFORMATION:

Ronald Alexander
 96 Southern Pl
 Lillington North Carolina 27546
AC SYSTEM SIZE: 4.725 kW AC
DC SYSTEM SIZE: 6.3 kW DC

DRAWING BY:

Brendan Fillmore

PLOT DATE:

October 18, 2023

PROJECT NUMBER:

881211

SHEET NAME:

COVER SHEET

REVISION:

0

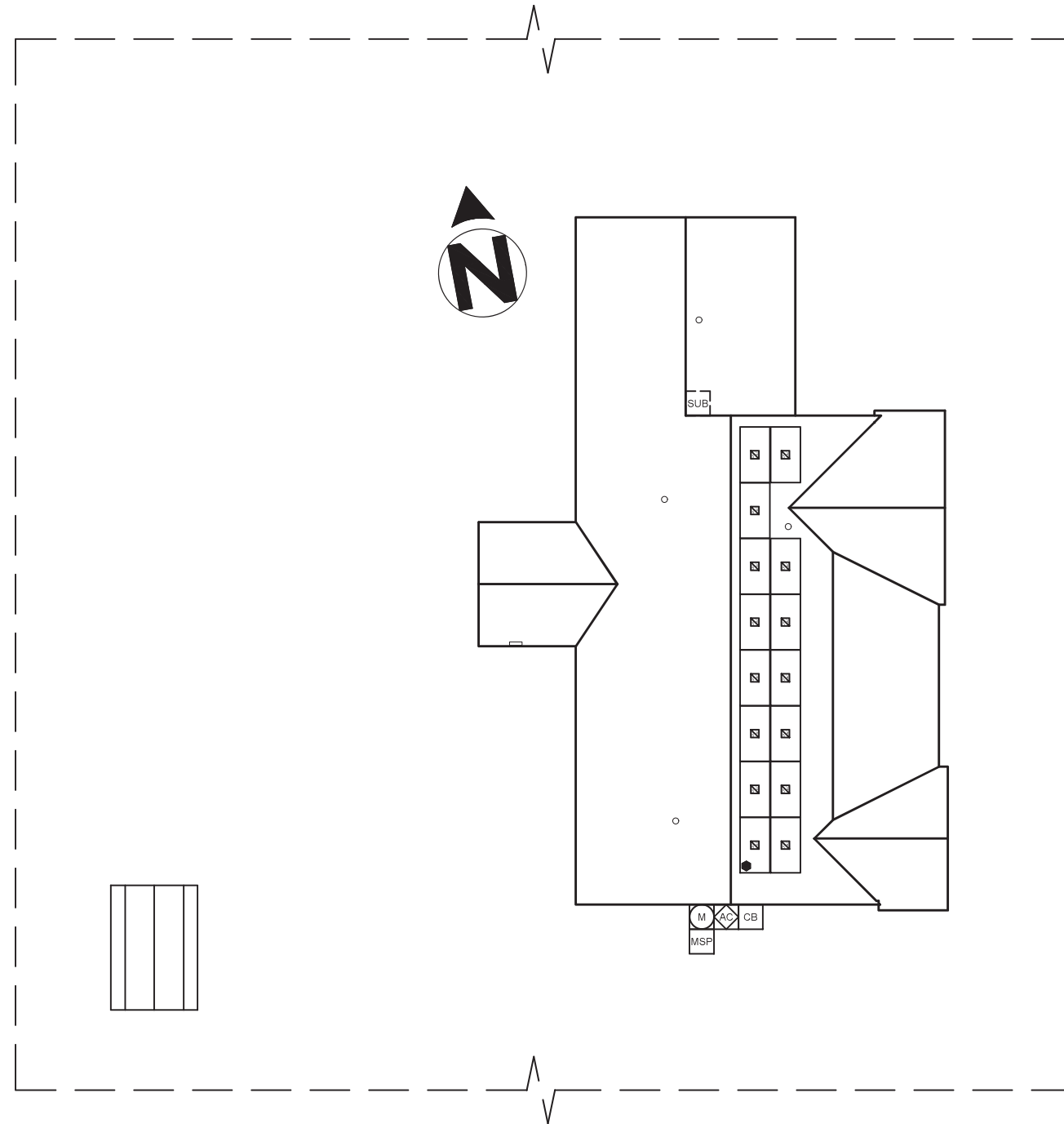
PAGE NUMBER:

PV1

PV SYSTEM SPECIFICATIONS

TOTAL NUMBER OF MODULES: 15
MODULE MAKE AND MODEL: REC Solar REC420AA PURE-R
MODULE WATTAGE: 420W DC
















INVERTER MAKE AND MODEL: Enphase IQ7X-96-2-US
INVERTER TYPE: Microinverter (1 Inverter per PV Module)
INVERTER CURRENT OUTPUT: 1.31A AC
INVERTER NOMINAL VOLTAGE: 240V
INVERTER WATTAGE: 315W AC



FRONT OF HOME
 96 SOUTHERN PL

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LEGEND

-  JUNCTION BOX
-  UTILITY METER
-  MAIN SERVICE PANEL
-  AC DISCONNECT
-  COMBINER BOX
-  LOAD CENTER
-  SUBPANEL
-  PV METER
-  TRANSFER SWITCH
-  SUNPOWER ESS
-  SUNPOWER HUB+
-  REMOTE POWER OFF
-  FIRE SETBACK
-  TRENCHING
-  PROPERTY LINE

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



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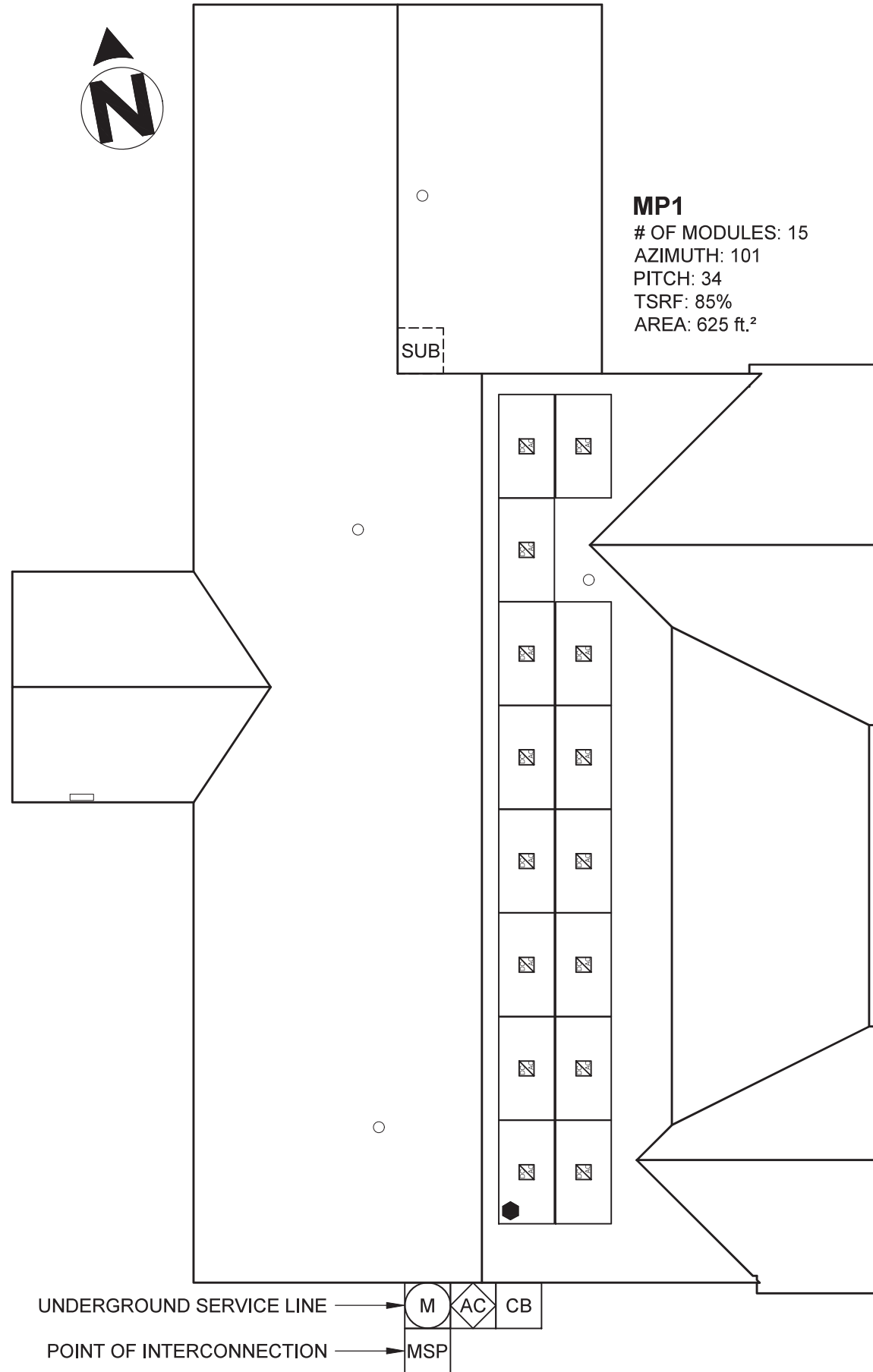
SHEET NAME:
 SITE PLAN

| | |
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| REVISION: 0 | PAGE NUMBER: PV2 |
|----------------|---------------------|

PV SYSTEM SPECIFICATIONS

TOTAL NUMBER OF MODULES: 15
MODULE MAKE AND MODEL: REC Solar REC420AA PURE-R
MODULE WATTAGE: 420W DC

INVERTER MAKE AND MODEL: Enphase IQ7X-96-2-US
INVERTER TYPE: Microinverter (1 Inverter per PV Module)
INVERTER CURRENT OUTPUT: 1.31A AC
INVERTER NOMINAL VOLTAGE: 240V
INVERTER WATTAGE: 315W AC



MP1
OF MODULES: 15
AZIMUTH: 101
PITCH: 34
TSRF: 85%
AREA: 625 ft.²

LEGEND

- JUNCTION BOX
- UTILITY METER
- MAIN SERVICE PANEL
- AC DISCONNECT
- COMBINER BOX
- LOAD CENTER
- SUBPANEL
- PV METER
- TRANSFER SWITCH
- SUNPOWER ESS
- SUNPOWER HUB+
- REMOTE POWER OFF
- FIRE SETBACK
- TRENCHING
- PROPERTY LINE

SCALE: 1/8" = 1'-0"

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CUSTOMER INFORMATION:
 Ronald Alexander
 96 Southern Pl
 Lillington North Carolina 27546

AC SYSTEM SIZE: 4.725 kW AC
DC SYSTEM SIZE: 6.3 kW DC

DRAWING BY:
 Brendan Fillmore

PLOT DATE:
 October 18, 2023

PROJECT NUMBER:
 881211

SHEET NAME:
 ROOF PLAN

REVISION: 0 PAGE NUMBER: PV3

STRUCTURAL INFORMATION:

ROOF TYPE (1):
ROOF TYPE: Comp Shingle
SHEATHING TYPE: OSB
FRAMING TYPE: Manufactured Truss
FRAMING SIZE: 2x4 @ 24" OC
CEILING JOIST SIZE: 2x4 @ 24" OC

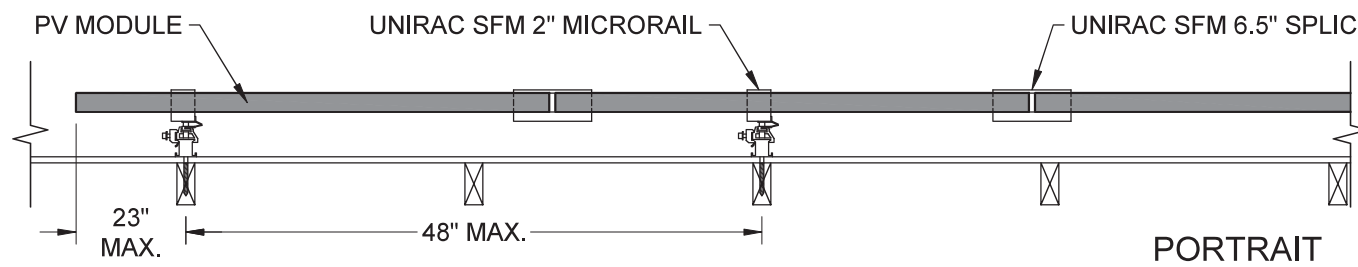
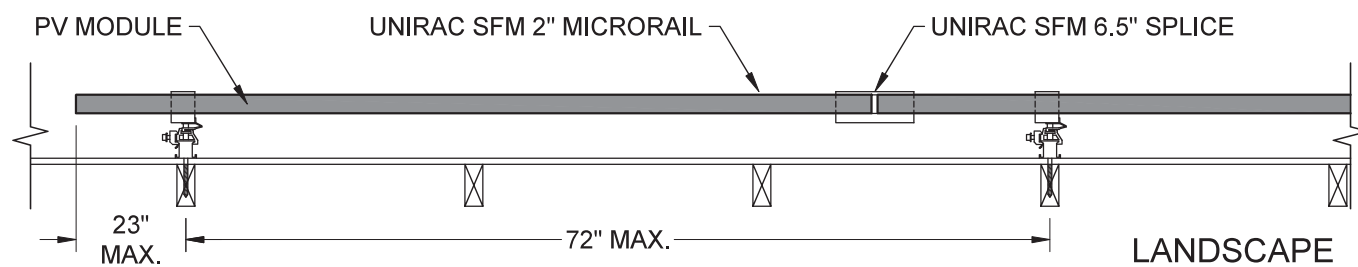
ATTACHMENT: SFM Infinity Flashkit
RACKING: Unirac SFM Infinity
 @ 48" OC Portrait / 72" OC Landscape
NUMBER OF ATTACHMENTS: 29

PV MODULE COUNT: 15 Modules
TOTAL ARRAY AREA: 306.0 ft² (20.4ft²/panel)
TOTAL ROOF AREA: 2909 ft²
ARRAY/ROOF AREA: 10.5%
ARRAY WEIGHT: 750 lbs (50 lbs/panel)
DISTRIBUTED LOAD: 2.45 lbs/ft²
POINT LOAD: 25.86 lbs/attachment

STRUCTURAL NOTES:

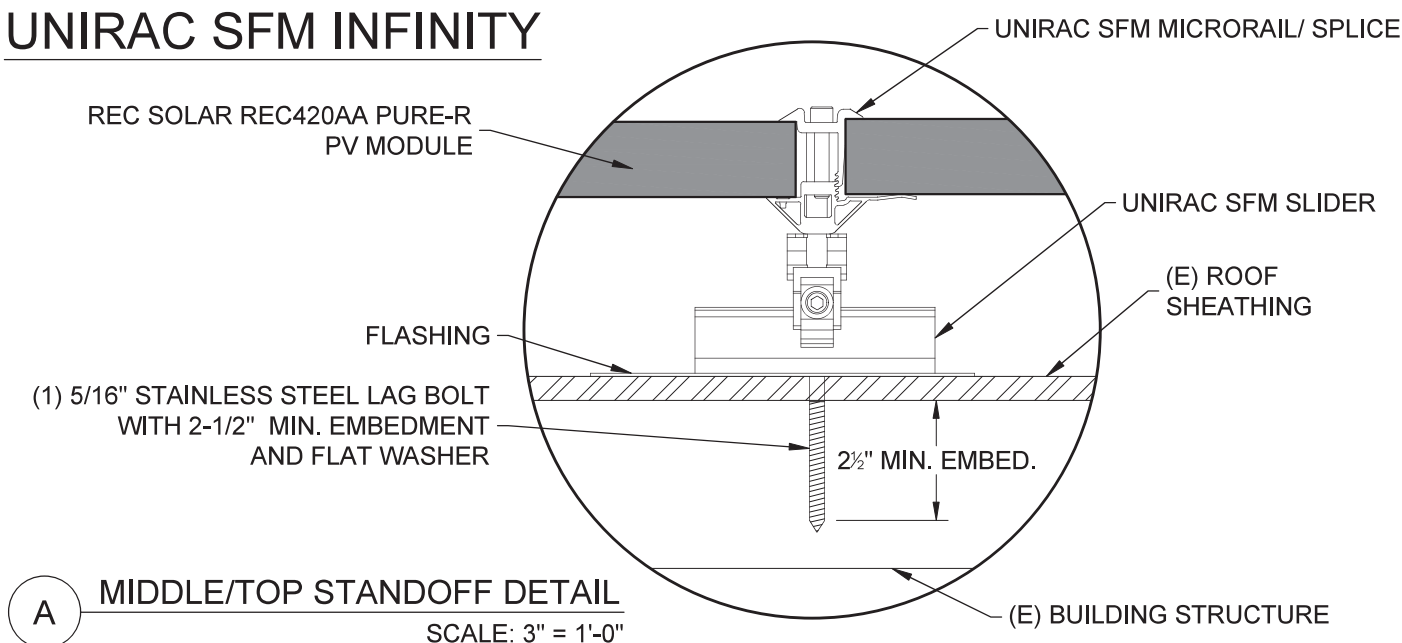
None

*NOTE: LISTED NUMBER OF ATTACHMENT POINTS ARE AN ESTIMATE ONLY AND MAY VARY BASED ON FIELD CONDITIONS. MAXIMUM ATTACHMENT SPACING TO BE FOLLOWED PER ENGINEER OF RECORD SPECIFICATIONS.

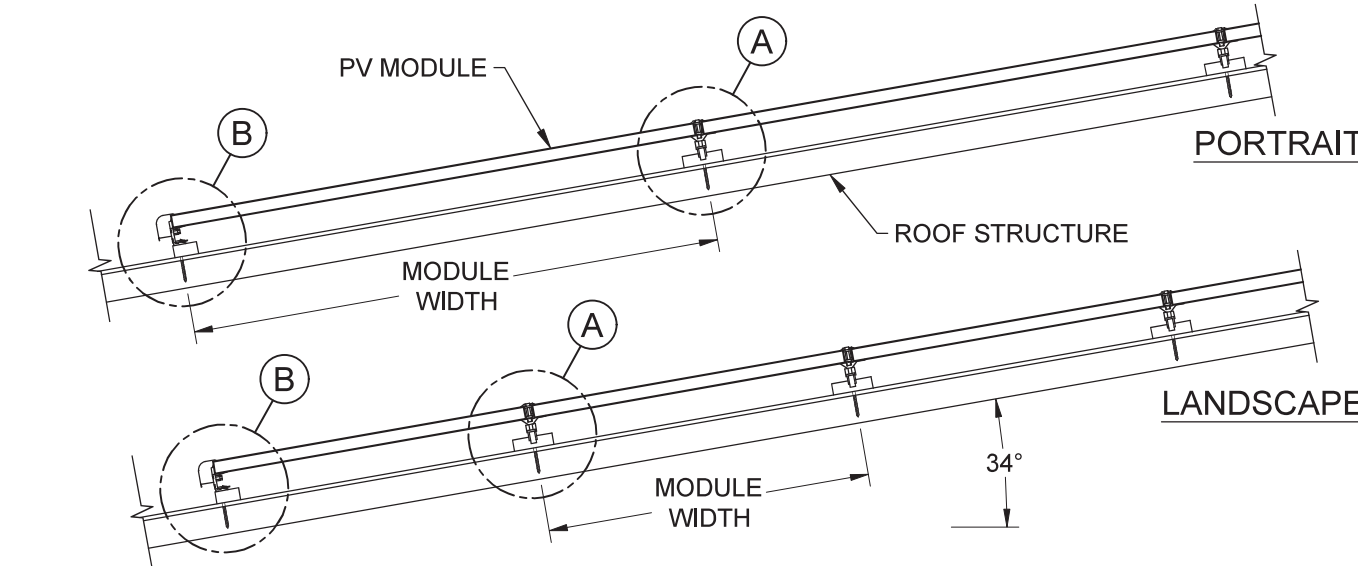


C ATTACHMENT SPACING- FRONT VIEW -RACKING ATTACHMENTS TO BE STAGGERED
 SCALE: 3/4" = 1'-0"

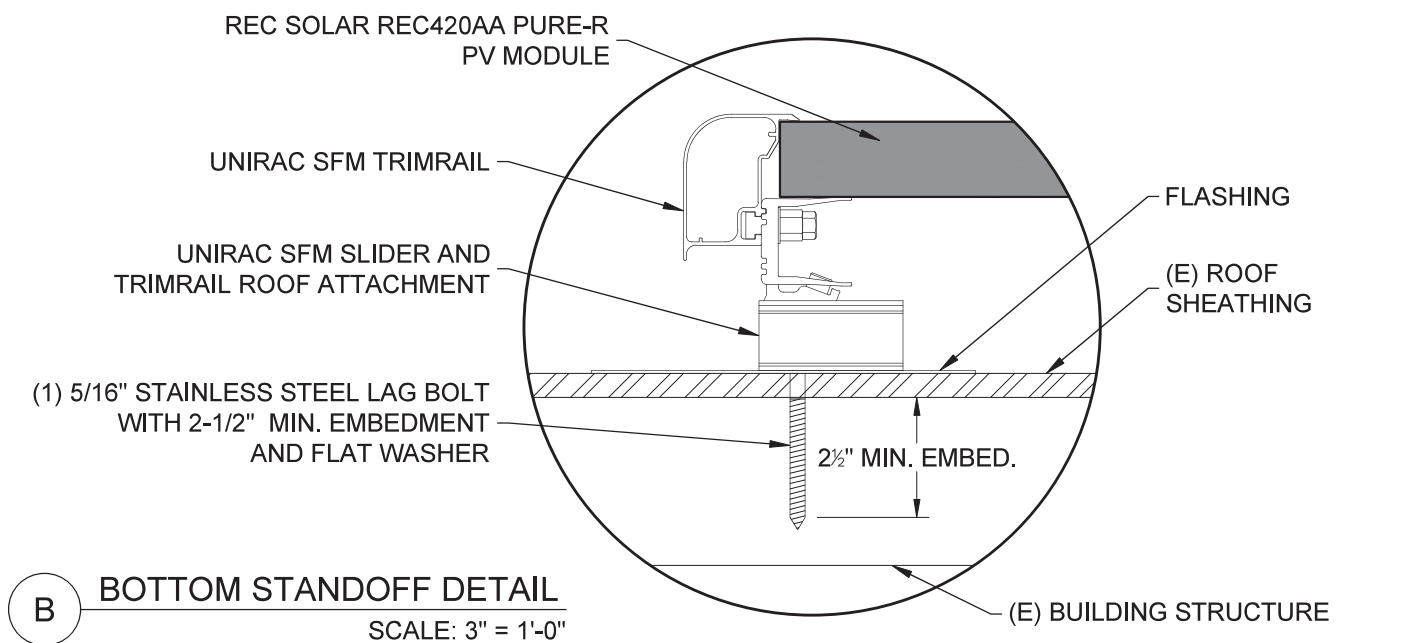
UNIRAC SFM INFINITY



A MIDDLE/TOP STANDOFF DETAIL
 SCALE: 3" = 1'-0"



D ATTACHMENT SPACING- SIDE VIEW
 SCALE: 1/2" = 1'-0"



B BOTTOM STANDOFF DETAIL
 SCALE: 3" = 1'-0"

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AC SYSTEM SIZE: 4.725 kW AC
DC SYSTEM SIZE: 6.3 kW DC

DRAWING BY:
 Brendan Fillmore

PLOT DATE:
 October 18, 2023

PROJECT NUMBER:
 881211

SHEET NAME:
 STRUCTURAL

REVISION: 0 PAGE NUMBER: PV4

| | | | | | | | | | | | |
|----|--|-----------|---|--|---------------|---|--|---------------|---|----------------------------------|---------------|
| 15 | (1) 10 AWG THHN/THWN-2, CU., BLACK (L1) | 19.7 A AC | 3 | (2) 10 AWG THHN/THWN-2, CU., BLACK (L1) | MAX 10.5 A AC | 2 | (1) 10 AWG THHN/THWN-2, CU., BLACK (L1) | MAX 10.5 A AC | 1 | (1) 12-2 TC-ER, THHN/THWN-2, CU. | MAX 10.5 A AC |
| | (1) 10 AWG THHN/THWN-2, CU., RED (L2) | 240 V AC | | (2) 10 AWG THHN/THWN-2, CU., RED (L2) | 240 V AC | | (1) 10 AWG THHN/THWN-2, CU., RED (L2) | 240 V AC | | (1) 6 AWG BARE, CU (EGC) | 240 V AC |
| | (1) 10 AWG THHN/THWN-2, CU., WHITE (N) | | | (1) 10 AWG THHN/THWN-2, CU., GREEN (EGC) | | | (1) 10 AWG THHN/THWN-2, CU., GREEN (EGC) | | | | |
| | (1) 10 AWG THHN/THWN-2, CU., GREEN (EGC) | | | | | | OR 10-2 UF-B W/G (OR NM-B), THHN/THWN-2, SOLID CU. | | | | |
| | (1) 3/4 INCH EMT | EXTERIOR | | (1) 3/4 INCH EMT | EXTERIOR | | (1) 3/4 INCH EMT (Not Required for UF-B or NM-B Cable) | INTERIOR | | | EXTERIOR |



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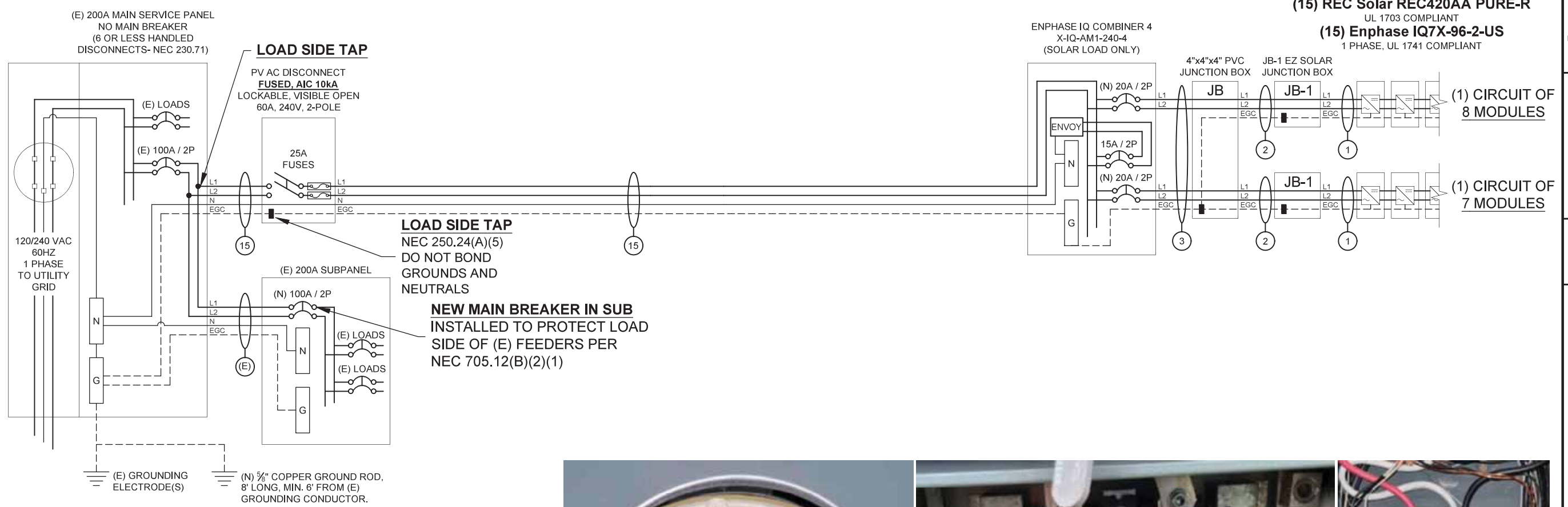
CONTRACTOR:
BRS FIELD OPS
800-377-4480

CUSTOMER INFORMATION:
Ronald Alexander
96 Southern Pl
Lillington North Carolina 27546
AC SYSTEM SIZE: 4.725 kW AC
DC SYSTEM SIZE: 6.3 kW DC

DESIGNER NOTES:

LOAD SIDE TAP IN MSP, EXTERIOR POI. USE THE 100A MAIN BREAKER IN THE SUB PANEL.

ELECTRICAL NOTES:



IF REQUIRED, VERIFICATION WILL BE DONE TO ENSURE THE GROUNDING ELECTRODE SYSTEM IS CONGRUENT WITH CURRENT REQUIREMENTS. (NEC 250 PART III) IF NOT, A NEW GROUND ROD WILL BE INSTALLED.

GEC INSTALLED PER NEC 250.64: 6 OR 4 AWG SOLID COPPER GEC.

LOAD SIDE TAP
NEC 250.24(A)(5)
DO NOT BOND GROUNDS AND NEUTRALS

NEW MAIN BREAKER IN SUB
INSTALLED TO PROTECT LOAD SIDE OF (E) FEEDERS PER NEC 705.12(B)(2)(1)

INTERCONNECTION NOTES

705.12(B)(3) THE FOLLOWING METHOD(S) SHALL BE USED TO DETERMINE THE RATINGS OF BUSBARS: (2) WHERE TWO SOURCES, ONE A PRIMARY POWER SOURCE AND THE OTHER ANOTHER POWER SOURCE, ARE LOCATED AT OPPOSITE ENDS OF A BUSBAR THAT CONTAINS LOADS, THE SUM OF 125 PERCENT OF THE POWER-SOURCE(S) OUTPUT CIRCUIT CURRENT AND THE RATING OF THE OVERCURRENT DEVICE PROTECTING THE BUS BAR SHALL NOT EXCEED 120 PERCENT OF THE AMPACITY OF THE BUSBAR.



UTILITY COMPANY: South River Electric Coop PERMIT ISSUER: Harnett County

DRAWING BY:
Brendan Fillmore

PLOT DATE:
October 18, 2023

PROJECT NUMBER:
881211

SHEET NAME:
ELECTRICAL

REVISION: 0 PAGE NUMBER: PV5

| MODULE SPECIFICATIONS | REC Solar REC420AA PURE-R |
|--|---------------------------|
| RATED POWER (STC) | 420 W |
| MODULE VOC | 59.4 V DC |
| MODULE VMP | 50 V DC |
| MODULE IMP | 8.4 A DC |
| MODULE ISC | 8.88 A DC |
| VOC CORRECTION | -0.24 %/°C |
| VMP CORRECTION | -0.24 %/°C |
| SERIES FUSE RATING | 25 A DC |
| ADJ. MODULE VOC @ ASHRAE LOW TEMP | 64.4 V DC |
| ADJ. MODULE VMP @ ASHRAE 2% AVG. HIGH TEMP | 45.0 V DC |

| MICROINVERTER SPECIFICATIONS | Enphase IQ7X Microinverters |
|-------------------------------------|-----------------------------|
| POWER POINT TRACKING (MPPT) MIN/MAX | 53 - 64 V DC |
| MAXIMUM INPUT VOLTAGE | 79.5 V DC |
| MAXIMUM DC SHORT CIRCUIT CURRENT | 10 A DC |
| MAXIMUM USABLE DC INPUT POWER | 460 W |
| MAXIMUM OUTPUT CURRENT | 1.31 A AC |
| AC OVERCURRENT PROTECTION | 20 A |
| MAXIMUM OUTPUT POWER | 315 W |
| CEC WEIGHTED EFFICIENCY | 97.5 % |

| AC PHOTOVOLTAIC MODULE MARKING (NEC 690.52) | |
|---|---------------|
| NOMINAL OPERATING AC VOLTAGE | 240 V AC |
| NOMINAL OPERATING AC FREQUENCY | 47 - 68 HZ AC |
| MAXIMUM AC POWER | 240 VA AC |
| MAXIMUM AC CURRENT | 1.0 A AC |
| MAXIMUM OCPD RATING FOR AC MODULE | 20 A AC |

| DESIGN LOCATION AND TEMPERATURES | |
|----------------------------------|--------------------------|
| TEMPERATURE DATA SOURCE | ASHRAE 2% AVG. HIGH TEMP |
| STATE | North Carolina |
| CITY | Lillington |
| WEATHER STATION | SEYMOUR-JOHNSON AFB |
| ASHRAE EXTREME LOW TEMP (°C) | -10 |
| ASHRAE 2% AVG. HIGH TEMP (°C) | 35 |

| SYSTEM ELECTRICAL SPECIFICATIONS | CIR 1 | CIR 2 | CIR 3 | CIR 4 | CIR 5 | CIR 6 |
|------------------------------------|----------|---------|-------|-------|-------|-------|
| NUMBER OF MODULES PER MPPT | 8 | 7 | | | | |
| DC POWER RATING PER CIRCUIT (STC) | 3360 | 2940 | | | | |
| TOTAL MODULE NUMBER | 15 | | | | | |
| STC RATING OF ARRAY | 6300 | | | | | |
| AC CURRENT @ MAX POWER POINT (IMP) | 10.5 | 9.2 | | | | |
| MAX. CURRENT (IMP X 1.25) | 13.1 | 11.4625 | | | | |
| OCPD CURRENT RATING PER CIRCUIT | 20 | 20 | | | | |
| MAX. COMB. ARRAY AC CURRENT (IMP) | 19.7 | | | | | |
| MAX. ARRAY AC POWER | 4725W AC | | | | | |

| AC VOLTAGE RISE CALCULATIONS | DIST (FT) | COND. | √RISE(V) | VEND(V) | %VRISE |
|-------------------------------------|-----------|--------|----------|---------|--------|
| VRISE SEC. 1 (MICRO TO JBOX) | 28.8 | 12 Cu. | 0.93 | 240.93 | 0.39% |
| VRISE SEC. 2 (JBOX TO COMBINER BOX) | 15 | 10 Cu. | 0.40 | 240.40 | 0.17% |
| VRISE SEC. 3 (COMBINER BOX TO POI) | 5 | 10 Cu. | 0.25 | 240.25 | 0.10% |
| TOTAL VRISE | | | 1.58 | 241.58 | 0.66% |

| PHOTOVOLTAIC AC DISCONNECT OUTPUT LABEL (NEC 690.54) | |
|--|-----------|
| AC OUTPUT CURRENT | 19.7 A AC |
| NOMINAL AC VOLTAGE | 240 V AC |

| CONDUCTOR SIZE CALCULATIONS | |
|-----------------------------------|---|
| MICROINVERTER TO JUNCTION BOX (1) | MAX. SHORT CIRCUIT CURRENT (ISC) = 10.5 A AC MAX. CURRENT (ISC X1.25) = 13.1 A AC CONDUCTOR (TC-ER, COPPER (90°C)) = 12 AWG CONDUCTOR RATING = 30 A AMB. TEMP. AMP. CORRECTION = 0.96 ADJUSTED AMP. = 28.8 > 13.1 |
| JUNCTION BOX TO JUNCTION BOX (2) | MAX. SHORT CIRCUIT CURRENT (ISC) = 10.5 A AC MAX. CURRENT (ISC X1.25) = 13.1 A AC CONDUCTOR (UF-B, COPPER (60°C)) = 10 AWG CONDUCTOR RATING = 30 A CONDUIT FILL DERATE = 1 AMB. TEMP. AMP. CORRECTION = 0.96 ADJUSTED AMP. = 28.8 > 13.1 |
| JUNCTION BOX TO COMBINER BOX (3) | MAX. SHORT CIRCUIT CURRENT (ISC) = 10.5 A AC MAX. CURRENT (ISC X1.25) = 13.1 A AC CONDUCTOR (UF-B, COPPER (60°C)) = 10 AWG CONDUCTOR RATING = 30 A CONDUIT FILL DERATE = 0.8 AMB. TEMP. AMP. CORRECTION = 0.96 ADJUSTED AMP. = 23.04 > 13.1 |
| COMBINER BOX TO MAIN PV OCPD (15) | INVERTER RATED AMPS = 19.7 A AC MAX. CURRENT (RATED AMPS X1.25) = 24.56 A AC CONDUCTOR (THWN-2, COPPER (75°C TERM.)) = 10 AWG CONDUCTOR RATING = 35 A CONDUIT FILL DERATE = 1 AMB. TEMP. AMP. CORRECTION = 0.96 ADJUSTED AMP. = 33.6 > 24.6 |



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PV INSTALLATION PROFESSIONAL
Scott Gurney
#PV-011719-015866

CONTRACTOR:
BRS FIELD OPS
800-377-4480

GROUNDING NOTES

1. A GROUNDING ELECTRODE SYSTEM IN ACCORDANCE WITH [NEC 690.47] AND [NEC 250.50-60] SHALL BE PROVIDED. PER [NEC 690.47], THE GROUNDING ELECTRODE SYSTEM OF AN EXISTING BUILDING MAY BE USED AND BE BONDED AT THE SERVICE ENTRANCE. IF EXISTING SYSTEM IS INACCESSIBLE, OR INADEQUATE, OR IS ONLY METALLIC WATER PIPING, A SUPPLEMENTAL GROUNDING ELECTRODE WILL BE USED AT THE INVERTER LOCATION CONSISTING OF A UL LISTED 8 FT GROUND ROD WITH ACORN CLAMP.
2. THE GROUNDING ELECTRODE CONDUCTOR SHALL BE PROTECTED FROM PHYSICAL DAMAGE BETWEEN THE GROUNDING ELECTRODE AND THE PANEL (OR INVERTER) IF SMALLER THAN #6 AWG COPPER WIRE PER [NEC 250.64(B)]. THE GROUNDING ELECTRODE CONDUCTOR WILL BE CONTINUOUS, EXCEPT FOR SPLICES OR JOINTS AT BUSBARS WITHIN LISTED EQUIPMENT PER [NEC 250.64(C)].
3. GROUNDING ELECTRODE CONDUCTORS SHALL BE NO LESS THAN 8 AWG AND NO GREATER THAN 6 AWG COPPER AND BONDED TO THE EXISTING GROUNDING ELECTRODE TO PROVIDE FOR A COMPLETE SYSTEM.
4. PV SYSTEM SHALL BE GROUNDED IN ACCORDANCE TO [NEC 250.21], [NEC TABLE 250.122], AND ALL METAL PARTS OR MODULE FRAMES ACCORDING TO [NEC 690.46].
5. MODULE SOURCE CIRCUITS SHALL BE GROUNDED IN ACCORDANCE TO [NEC 690.42].
6. THE GROUNDING CONNECTION TO A MODULE SHALL BE ARRANGED SUCH THAT THE REMOVAL OF A MODULE DOES NOT INTERRUPT A GROUNDED CONDUCTOR TO ANOTHER MODULE.
7. EACH MODULE WILL BE GROUNDED USING THE SUPPLIED CONNECTION POINTS IDENTIFIED IN THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.
8. ENCLOSURES SHALL BE PROPERLY PREPARED WITH REMOVAL OF PAINT/FINISH AS APPROPRIATE WHEN GROUNDING EQUIPMENT WITH TERMINATION GROUNDING LUGS.
9. GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, AND GROUNDING DEVICES EXPOSED TO THE ELEMENTS SHALL BE RATED FOR DIRECT BURIAL.
10. GROUNDING AND BONDING CONDUCTORS SHALL BE COPPER, SOLID OR STRANDED, AND BARE WHEN EXPOSED.
11. EQUIPMENT GROUNDING CONDUCTORS SHALL BE SIZED ACCORDING TO [NEC 690.45] AND BE A MINIMUM OF 10 AWG WHEN NOT EXPOSED TO DAMAGE (6 AWG SHALL BE USED WHEN EXPOSED TO DAMAGE).
12. GROUNDING AND BONDING CONDUCTORS, IF INSULATED, SHALL BE COLOR CODED GREEN (OR MARKED GREEN IF 4 AWG OR LARGER).
13. ALL CONDUIT BETWEEN THE UTILITY AC DISCONNECT AND THE POINT OF CONNECTION SHALL HAVE GROUNDED BUSHINGS AT BOTH ENDS.
14. SYSTEM GEC SIZED ACCORDING TO [NEC 690.47], [NEC TABLE 250.66], DC SYSTEM GEC SIZED ACCORDING TO [NEC 250.166], MINIMUM 8 AWG WHEN INSULATED, 6 AWG WHEN EXPOSED TO DAMAGE.
15. EXPOSED NON-CURRENT CARRYING METAL PARTS OF MODULE FRAMES, EQUIPMENTS, AND CONDUCTOR ENCLOSURES SHALL BE GROUNDED IN ACCORDANCE WITH [NEC 250.134] OR [NEC 250.136(A)] REGARDLESS OF VOLTAGE.

WIRING & CONDUIT NOTES

1. ALL CONDUIT SIZES AND TYPES, SHALL BE LISTED FOR ITS PURPOSE AND APPROVED FOR THE SITE APPLICATIONS.
2. BOLTED CONNECTION REQUIRED IN DC DISCONNECTS ON THE WHITE GROUNDED CONDUCTOR (USE POLARIS BLOCK OR NEUTRAL BAR).
3. ANY CONNECTION ABOVE LIVE PARTS MUST BE WATERTIGHT. REDUCING WASHERS DISALLOWED ABOVE LIVE PARTS, MEYERS HUBS RECOMMENDED
4. UV RESISTANT CABLE TIES (NOT ZIP TIES) USED FOR PERMANENT WIRE MANAGEMENT OFF THE ROOF SURFACE IN ACCORDANCE WITH [NEC 110.2.110.3(A-B)].
5. SOLADECK JUNCTION BOXES MOUNTED FLUSH WITH ROOF SURFACE TO BE USED FOR WIRE MANAGEMENT AND AS FLASHED ROOF PENETRATIONS FOR INTERIOR CONDUIT RUNS.
6. ALL PV CABLES AND HOMERUN WRES BE TYPE USE-2, AND SINGLE-CONDUCTOR CABLE LISTED AND IDENTIFIED AS PV WIRE, TYPE TC-ER, OR EQUIVALENT; ROUTED TO SOURCE CIRCUIT COMBINER BOXES AS REQUIRED.
7. ALL CONDUCTORS AND OCPD SIZES AND TYPES SPECIFIED ACCORDING TO [NEC 690.8] FOR MULTIPLE CONDUCTORS.
8. ALL PV DC CONDUCTORS IN CONDUIT EXPOSED TO SUNLIGHT SHALL BE INSTALLED AT LEAST 7/8" ABOVE THE ROOF SURFACE AND DERATED ACCORDING TO [NEC TABLE 310.15 (B)(2)(A)], [NEC TABLE 310.15(B)(3)(A)], & [NEC 310.15(B)(3)(C)].
9. 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.
10. PHASE AND NEUTRAL CONDUCTORS SHALL BE DUAL RATED THHN/THWN-2 INSULATED, 90°C RATED, WET AND UV RESISTANT, RATED FOR 600V
11. 4-WIRE DELTA CONNECTED SYSTEMS HAVE THE PHASE WITH THE HIGHER VOLTAGE TO GROUND MARKED ORANGE OR IDENTIFIED BY OTHER EFFECTIVE MEANS.
12. ALL SOURCE CIRCUITS SHALL HAVE INDIVIDUAL SOURCE CIRCUIT PROTECTION
13. VOLTAGE DROP LIMITED TO 2% FOR DC CIRCUITS AND 3% FOR AC CIRCUITS
14. NEGATIVE GROUNDED SYSTEMS DC CONDUCTORS SHALL BE COLOR CODED AS FOLLOWS: DC POSITIVE- RED (OR MARKED RED), DC NEGATIVE- GREY (OR MARKED GREY)
15. POSITIVE GROUNDED SYSTEMS DC CONDUCTORS COLOR CODED: DC POSITIVE- GREY (OR MARKED GREY), DC NEGATIVE- BLACK (OR MARKED BLACK)
16. 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
* USE-2 IS NOT INDOOR RATED BUT PV CABLE IS RATED THWN/THWN-2 AND MAY BE USED INSIDE
** USE-2 IS AVAILABLE AS UV WHITE
17. RIGID CONDUIT, IF INSTALLED, (AND/OR NIPPLES) MUST HAVE A PULL BUSHING TO PROTECT WIRES.
18. IF CONDUIT DETERMINED TO BE RAN THROUGH ATTIC IN FIELD THEN CONDUIT WILL BE EITHER EMT, FMC, OR MC CABLE IF DC CURRENT COMPLYING WITH [NEC 690.31], [NEC 250.118(10)]. DISCONNECTING MEANS SHALL COMPLY WITH [NEC 690.13] AND [NEC 690.15].
19. CONDUIT RAN THROUGH ATTIC WILL BE AT LEAST 18" BELOW ROOF SURFACE COMPLYING WITH [NEC 230.6(4)] AND SECURED NO GREATER THAN 6' APART PER [NEC 330.30(B)].

CUSTOMER INFORMATION:
Ronald Alexander
96 Southern PI
Lillington North Carolina 27546
AC SYSTEM SIZE: 4.725 kW AC
DC SYSTEM SIZE: 6.3 kW DC

DRAWING BY:
Brendan Fillmore

PLOT DATE:
October 18, 2023

PROJECT NUMBER:
881211

SHEET NAME:
ELEC CALCS

REVISION: 0 PAGE NUMBER: PV6

STANDARD LABELS

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

LABEL 1
FOR PV SYSTEM DISCONNECTING MEANS WHERE THE LINE AND LOAD TERMINALS MAY BE ENERGIZED IN THE OPEN POSITION.
[2017 NEC 690.13(B)]
[2020 NEC 690.13(B)]

PHOTOVOLTAIC SYSTEM AC DISCONNECT
RATED AC OUTPUT CURRENT 19.65 A
NOMINAL OPERATING AC VOLTAGE 240 V

LABEL 2
SHALL BE MARKED AT AN ACCESSIBLE LOCATION AT THE DISCONNECTING MEANS AS A POWER SOURCE AND WITH THE RATED AC OUTPUT CURRENT AND THE NOMINAL OPERATING AC VOLTAGE.
[2017 NEC 690.54]
[2020 NEC 690.54]

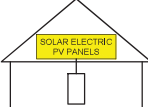
WARNING
DUAL POWER SUPPLY
SOURCES: UTILITY GRID AND PV SOLAR ELECTRIC SYSTEM

LABEL 3
IF INTERCONNECTING LOAD SIDE, INSTALL THIS LABEL ANYWHERE THAT IS POWERED BY BOTH THE UTILITY AND THE SOLAR PV SYSTEM, IE. MAIN SERVICE PANEL AND SUBPANELS.
[2017 NEC 705.12(B)(3)]
[2020 NEC 705.12(B)(3)]

WARNING
POWER SOURCE OUTPUT CONNECTION
DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL 4
APPLY TO THE DISTRIBUTION EQUIPMENT ADJACENT TO THE BACK-FED BREAKER FROM THE POWER SOURCE.
[2017 NEC 705.12(B)(2)(3)(b)]
[2020 NEC 705.12(B)(3)(2)]

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN
TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUT DOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN THE ARRAY



LABEL 6
BUILDINGS WITH PV SYSTEMS SHALL HAVE A PERMANENT LABEL LOCATED AT EACH SERVICE EQUIPMENT LOCATION TO WHICH THE PV SYSTEMS ARE CONNECTED OR AT AN APPROVED READILY VISIBLE LOCATION AND SHALL INDICATE THE LOCATION OF RAPID SHUTDOWN INITIATION DEVICES.
[2017 NEC 690.56(C)(1)(a)]
[2020 NEC 690.56(C)]

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

LABEL 7
SIGN LOCATED AT RAPID SHUT DOWN DISCONNECT SWITCH
[2017 NEC 690.56(C)(3)]
[2020 NEC 690.56(C)(2)]

WARNING
MAIN DISTRIBUTION UTILITY DISCONNECT(S)
POWER TO THIS BUILDING IS ALSO SUPPLIED FROM A ROOF MOUNTED SOLAR ARRAY WITH A RAPID SHUTDOWN DISCONNECTING MEANS GROUPED AND LABELED WITHIN LINE OF SITE AND 10 FT OF THIS LOCATION

LABEL 8
PERMANENT PLAQUE OR DIRECTORY DENOTING THE LOCATION OF ALL ELECTRIC POWER SOURCE DISCONNECTING MEANS ON OR IN THE PREMISES SHALL BE INSTALLED AT EACH SERVICE EQUIPMENT LOCATION AND AT THE LOCATION(S) OF THE SYSTEM DISCONNECT(S) FOR ALL ELECTRIC POWER PRODUCTION SOURCES CAPABLE OF BEING INTERCONNECTED.
[2017 NEC 705.10]
[2020 NEC 705.10]

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 2017 & 2020 NEC CODE, OSHA STANDARD 19010.145, ANSIZ535.
- 3) MATERIAL BASED ON THE REQUIREMENTS OF THE AHJ.
- 4) LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED AND SHALL NOT BE HANDWRITTEN [NEC 110.21]

WARNING
POWER TO THIS BUILDING IS ALSO SUPPLIED FROM MAIN DISTRIBUTION UTILITY DISCONNECT LOCATED

LABEL 9
PERMANENT PLAQUE OR DIRECTORY DENOTING THE LOCATION OF ALL ELECTRIC POWER SOURCE DISCONNECTING MEANS ON OR IN THE PREMISES SHALL BE INSTALLED AT EACH SERVICE EQUIPMENT LOCATION AND AT THE LOCATION(S) OF THE SYSTEM DISCONNECT(S) FOR ALL ELECTRIC POWER PRODUCTION SOURCES CAPABLE OF BEING INTERCONNECTED.
[2017 NEC 705.10]
[2020 NEC 705.10]

WARNING
POWER TO THIS BUILDING IS ALSO SUPPLIED FROM A ROOF MOUNTED SOLAR ARRAY. SOLAR ARRAY RAPID SHUTDOWN DISCONNECT IS LOCATED OUTSIDE NEXT TO THE UTILITY METER.

LABEL 10
PERMANENT PLAQUE OR DIRECTORY TO BE LOCATED AT MAIN SERVICE EQUIPMENT DENOTING THE LOCATION OF THE RAPID SHUTDOWN SYSTEM DISCONNECTING MEANS IF SOLAR ARRAY RAPID SHUTDOWN DISCONNECTING SWITCH IS NOT GROUPED AND WITHIN LINE OF SITE OF MAIN SERVICE DISCONNECTING MEANS.
[2017 NEC 705.10 AND 690.56(C)(1)(a)]
[2020 NEC 705.10 AND 690.56(C)]

WARNING
PHOTOVOLTAIC SYSTEM COMBINER PANEL
DO NOT ADD LOADS

LABEL 11
PERMANENT PLAQUE OR DIRECTORY TO BE LOCATED AT AC COMBINER PANEL.
[2017 NEC 110.21(B)]
[2020 NEC 110.21(B)]

ADDITIONAL LABELS

WARNING
DUAL POWER SUPPLY
SOURCES: UTILITY GRID AND PV SOLAR ELECTRIC SYSTEM

LABEL 3
IF INTERCONNECTING LOAD SIDE, INSTALL THIS LABEL ANYWHERE THAT IS POWERED BY BOTH THE UTILITY AND THE SOLAR PV SYSTEM, IE. MAIN SERVICE PANEL AND SUBPANELS. [NEC 705.12(B)(3)]



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PV INSTALLATION PROFESSIONAL
Scott Gurney
#PV-011719-015866

CONTRACTOR:
BRS FIELD OPS
800-377-4480

CUSTOMER INFORMATION:

Ronald Alexander
96 Southern Pl
Lillington North Carolina 27546
AC SYSTEM SIZE: 4.725 kW AC
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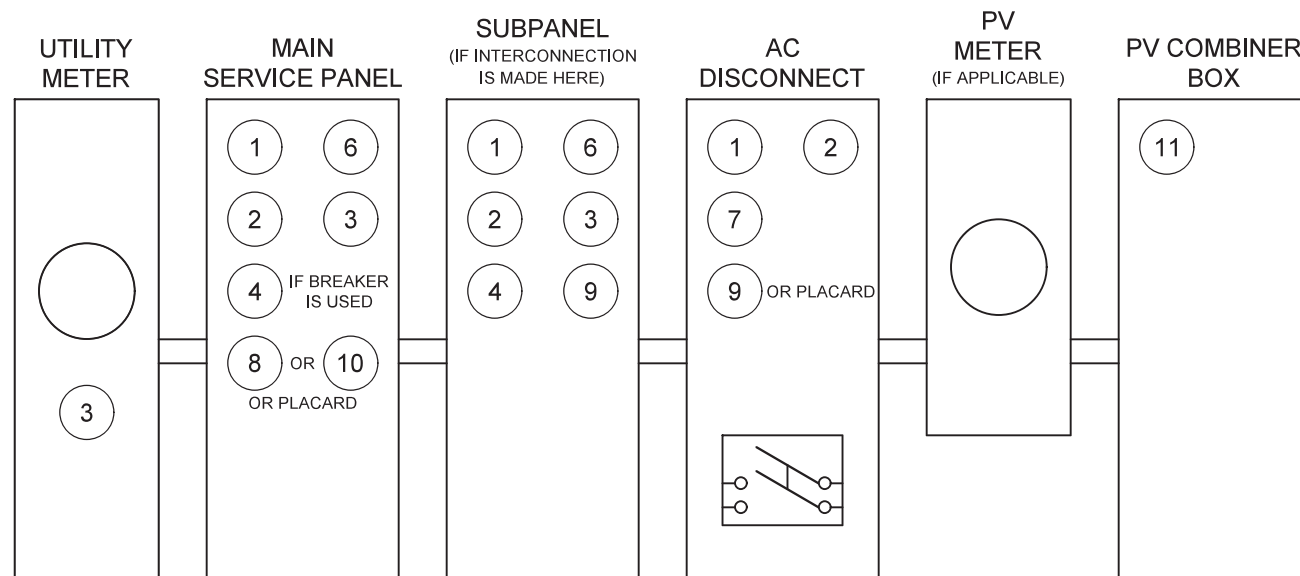
LABELS

REVISION:

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PAGE NUMBER:

PV7



*ELECTRICAL DIAGRAM SHOWN ABOVE IS FOR LABELING PURPOSES ONLY. NOT AN ACTUAL REPRESENTATION OF EQUIPMENT AND CONNECTIONS TO BE INSTALLED. LABEL LOCATIONS PRESENTED MAY VARY DEPENDING ON TYPE OF INTERCONNECTION METHOD AND LOCATION PRESENTED ON 3 LINE DIAGRAM. 3 LINE DIAGRAM ON PV5 TO REFLECT ACTUAL REPRESENTATION OF PROPOSED SCOPE OF WORK.



SOLAR'S MOST TRUSTED 

REC ALPHA PURE-R SERIES

PRODUCT SPECIFICATIONS

COMPACT PANEL SIZE

9 A MODULE CURRENT COMPATIBLE WITH MLPE

430 WP
20.7 W/FT²
22.3% EFFICIENCY



LEAD-FREE
 ROHS COMPLIANT

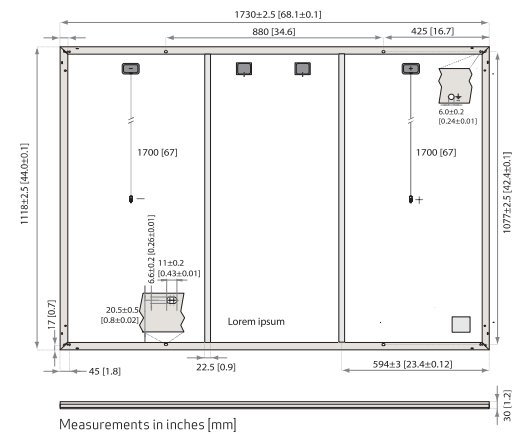
EXPERIENCE
α
 PERFORMANCE

REC ALPHA PURE-R SERIES

PRODUCT SPECIFICATIONS

 SOLAR'S MOST TRUSTED

| GENERAL DATA | |
|---------------|--|
| Cell type: | 80 half-cut REC bifacial, heterojunction cells with lead-free, gapless technology |
| Glass: | 0.13in(3.2mm) solar glass with anti-reflective surface treatment in accordance with EN 12150 |
| Backsheet: | Highly resistant polymer (black) |
| Frame: | Anodized aluminum (black) |
| Junction box: | 4-part, 4 bypass diodes, lead-free IP68 rated, in accordance with IEC 62790 |
| Connectors: | Stäubli MC4 PV-KBT4/KST4 (12 AWG) in accordance with IEC 62852, IP68 only when connected |
| Cable: | 12 AWG (4 mm ²) PV wire, 67 + 67 in (1.7 + 1.7 m) in accordance with EN 50618 |
| Dimensions: | 68.1 x 44.0 x 1.2in (20.77 ft ²) / 1730 x 1118 x 30mm (1.93m ²) |
| Weight: | 47.4 lbs (21.5 kg) |
| Origin: | Made in Singapore |



| | | Product Code*: RECxxxAA PURE-R | | | | |
|--|--|--|-------|-------|-------|------|
| STC | Power Output - P _{MAX} (Wp) | 400 | 410 | 420 | 430 | |
| | Watt Class Sorting - (W) | 0/+10 | 0/+10 | 0/+10 | 0/+10 | |
| | Nominal Power Voltage - V _{MPP} (V) | 48.8 | 49.4 | 50.0 | 50.5 | |
| | Nominal Power Current - I _{MPP} (A) | 8.20 | 8.30 | 8.40 | 8.52 | |
| | Open Circuit Voltage - V _{OC} (V) | 58.9 | 59.2 | 59.4 | 59.7 | |
| | Short Circuit Current - I _{SC} (A) | 8.80 | 8.84 | 8.88 | 8.91 | |
| | Power Density (W/ft ²) | 19.26 | 19.74 | 20.22 | 20.70 | |
| | Panel Efficiency (%) | 20.7 | 21.2 | 21.8 | 22.3 | |
| | NMOT | Power Output - P _{MAX} (Wp) | 305 | 312 | 320 | 327 |
| | | Nominal Power Voltage - V _{MPP} (V) | 46.0 | 46.6 | 47.1 | 47.6 |
| Nominal Power Current - I _{MPP} (A) | | 6.64 | 6.70 | 6.80 | 6.88 | |
| Open Circuit Voltage - V _{OC} (V) | | 55.5 | 55.8 | 56.0 | 56.3 | |
| | Short Circuit Current - I _{SC} (A) | 7.11 | 7.16 | 7.20 | 7.24 | |

Values at standard test conditions (STC: air mass AM1.5, irradiance 1075 W/sq ft (1000 W/m²), temperature 77°F (25°C), based on a production spread with a tolerance of P_{MAX}, V_{OC} & I_{SC} ±3% within one watt class. Nominal module operating temperature (NMOT): air mass AM1.5, irradiance 800 W/m², temperature 68°F (20°C), windspeed 3.3 ft/s (1 m/s). * Where xxx indicates the nominal power class (P_{MAX}) at STC above.

| MAXIMUM RATINGS | |
|--------------------------|--------------------------------------|
| Operational temperature: | -40...+85°C |
| System voltage: | 1000 V |
| Test load (front): | +7000 Pa (146 lbs/ft ²) |
| Test load (rear): | -4000 Pa (83.5 lbs/ft ²) |
| Series fuse rating: | 25 A |
| Reverse current: | 25 A |

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

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

See warranty documents for details. Conditions apply

Available from:

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

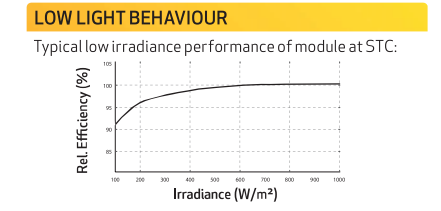
| CERTIFICATIONS | |
|---|------------------------------------|
| IEC 61215:2016, IEC 61730:2016, UL 61730 | |
| IEC 62804 | PID |
| IEC 61701 | Salt Mist |
| IEC 62716 | Ammonia Resistance |
| UL 61730 | Fire Type 2 |
| IEC 62782 | Dynamic Mechanical Load |
| IEC 61215-2:2016 | Hailstone (35mm) |
| IEC 62321 | Lead-free acc. to RoHS EU 863/2015 |
| ISO 14001, ISO 9001, IEC 45001, IEC 62941 | |



| TEMPERATURE RATINGS* | |
|---|-------------|
| Nominal Module Operating Temperature: | 44°C (±2°C) |
| Temperature coefficient of P _{MAX} : | -0.24 %/°C |
| Temperature coefficient of V _{OC} : | -0.24 %/°C |
| Temperature coefficient of I _{SC} : | 0.04 %/°C |

* The temperature coefficients stated are linear values

| DELIVERY INFORMATION | |
|--|------------------|
| Panels per pallet: | 33 |
| Panels per 40 ft GP/high cube container: | 858 (26 pallets) |
| Panels per 53 ft truck: | 858 (26 pallets) |



REC Solar PTE. LTD.
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 Singapore 637312
 post@recgroup.com
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PV INSTALLATION PROFESSIONAL
 Scott Gurney
 #PV-011719-015866

CONTRACTOR:
 BRS FIELD OPS
 385-498-6700

DRAWING BY:

PLOT DATE:

PROJECT NUMBER:

SHEET NAME:

SPEC SHEET

REVISION: PAGE NUMBER:

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Ref: PD-05-A-APR Rev 3.1 03.23 Specifications subject to change without notice.

IQ7X Microinverter

The high-powered, smart grid-ready **IQ7X Microinverter** dramatically simplifies the installation process while achieving the highest system efficiency for systems with 96-cell modules.

Part of the Enphase Energy System, the IQ7X Microinverter integrates with the IQ Gateway, IQ Battery, and the Enphase Installer App monitoring and analysis software.

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

Easy to Install

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

Efficient and Reliable

- Optimized for high powered 96-cell* modules
- Highest CEC efficiency of 97.5%
- More than a million hours of testing
- Class II double-insulated enclosure
- UL listed

Smart Grid-Ready

- Complies with advanced grid support, voltage and frequency ride-through requirements
- Remotely updates to respond to changing grid requirements
- Configurable for varying grid profiles
- Meets CA Rule 21 (UL 1741-SA) and IEEE 1547:2018 (UL 1741-SB, 3rd Ed.)

* The IQ7X is required to support 96-cell modules.

IQ7X Microinverter

| INPUT DATA (DC) | IQ7X-96-2-US | |
|---|---|----------------|
| Commonly used module pairings ¹ | 320W - 460W | |
| Module compatibility | 96-cell PV modules | |
| Maximum input DC voltage | 79.5V | |
| Peak power tracking voltage | 53V - 64V | |
| Operating range | 25V - 79.5V | |
| Min/Max start voltage | 33V/79.5V | |
| Max DC short circuit current (module I _{sc}) | 10A | |
| Overvoltage class DC port | II | |
| DC port backfeed current | 0A | |
| PV array configuration | 1 x 1 ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit | |
| OUTPUT DATA (AC) | @ 240VAC | @ 208VAC |
| Peak output power | 320VA | |
| Maximum continuous output power | 315VA | |
| Nominal (L-L) voltage/range ² | 240V/211-264V | 208V/183-229V |
| Maximum continuous output current | 1.31A (240VAC) | 1.51A (208VAC) |
| Nominal frequency | 60 Hz | |
| Extended frequency range | 49 - 68 Hz | |
| AC short circuit fault current over 3 cycles | 5.8 Arms | |
| Maximum units per 20A (L-L) branch circuit ³ | 12 (240VAC) | 10 (208VAC) |
| Overvoltage class AC port | III | |
| AC port backfeed current | 18 mA | |
| Power factor setting | 1.0 | |
| Power factor (adjustable) | 0.85 leading ... 0.85 lagging | |
| EFFICIENCY | @240VAC | @208VAC |
| CEC weighted efficiency | 97.5 % | 97.0 % |
| MECHANICAL DATA | | |
| Ambient temperature range | -40°C to +60°C | |
| Relative humidity range | 4% to 100% (condensing) | |
| Connector type (IQ7X-96-2-US) | MC4 (or Amphenol H4 UTX with optional Q-DCC-5 adapter) | |
| Dimensions (WxHxD) | 212 mm x 175 mm x 30.2 mm (without bracket) | |
| Weight | 1.08 kg (2.38 lbs) | |
| Cooling | Natural convection - No fans | |
| Approved for wet locations | Yes | |
| Pollution degree | PD3 | |
| Enclosure | Class II double-insulated, corrosion resistant polymeric enclosure | |
| Environmental category/UV exposure rating | NEMA Type 6/outdoor | |
| FEATURES | | |
| Communication | Power Line Communication (PLC) | |
| Monitoring | Enphase Installer App and monitoring options Compatible with IQ Gateway | |
| Disconnecting means | The AC and DC connectors have been evaluated and approved by UL for use as the load-break disconnect required by NEC 690. | |
| Compliance | CA Rule 21 (UL 1741-SA), IEEE 1547:2018 (UL 1741-SB, 3 rd Ed.) HEI Rule 14H SRD 2.0 UL 62109-1, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01 This product is UL Listed as PV Rapid Shut Down Equipment and conforms with NEC 2014, NEC 2017, and NEC 2020, section 690.12 and C22.1-2015 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according manufacturer's instructions. | |

1. Pairing PV modules with wattage above the limit may result in additional clipping losses. See the compatibility calculator at <https://link.enphase.com/module-compatibility>.
2. Nominal voltage range can be extended beyond nominal if required by the utility.
3. Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

To learn more about Enphase offerings, visit enphase.com

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IQ7X-DS-0099-EN-US-12-27-2022



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To learn more about Enphase offerings, visit enphase.com
 IQ7X-DS-0099-EN-US-12-27-2022

Enphase Q Cable Accessories

The **Enphase Q Cable™** and accessories are part of the latest generation Enphase IQ System™. These accessories provide simplicity, reliability, and faster installation times.



Enphase Q Cable

- Two-wire, double-insulated Enphase Q Cable is 50% lighter than the previous generation Enphase cable
- New cable numbering and plug and play connectors speed up installation and simplify wire management
- Link connectors eliminate cable waste

Field-Wireable Connectors

- Easily connect Q cables on the roof without complex wiring
- Make connections from any open connector and center feed any section of cable within branch limits
- Available in male and female connector types

Enphase Q Cable Accessories

CONDUCTOR SPECIFICATIONS

| | |
|---------------------|--|
| Certification | UL3003 (raw cable), UL 9703 (cable assemblies), DG cable |
| Flame test rating | FT4 |
| Compliance | RoHS, OIL RES I, CE, UV Resistant, combined UL for Canada and United States |
| Conductor type | THHN/THWN-2 dry/wet |
| Disconnecting means | The AC and DC bulkhead connectors have been evaluated and approved by UL for use as the load-break disconnect required by NEC 690. |





Q CABLE TYPES / ORDERING OPTIONS

| Connectorized Models | Size / Max Nominal Voltage | Connector Spacing | PV Module Orientation | Connector Count per Box |
|----------------------|----------------------------|-------------------|-----------------------|-------------------------|
| Q-12-10-240 | 12 AWG / 277 VAC | 1.3 m (4.2 ft) | Portrait | 240 |
| Q-12-17-240 | 12 AWG / 277 VAC | 2.0 m (6.5 ft) | Landscape (60-cell) | 240 |
| Q-12-20-200 | 12 AWG / 277 VAC | 2.3 m (7.5 ft) | Landscape (72-cell) | 200 |

ENPHASE Q CABLE ACCESSORIES

| Name | Model Number | Description |
|---|---------------|---|
| Raw Q Cable | Q-12-RAW-300 | 300 meters of 12 AWG cable with no connectors |
| Field-wireable connector (male) | Q-CONN-10M | Make connections from any open connector |
| Field-wireable connector (female) | Q-CONN-10F | Make connections from any Q Cable open connector |
| Cable Clip | Q-CLIP-100 | Used to fasten cabling to the racking or to secure looped cabling |
| Disconnect tool | Q-DISC-10 | Disconnect tool for Q Cable connectors, DC connectors, and AC module mount |
| Q Cable sealing caps (female) | Q-SEAL-10 | One needed to cover each unused connector on the cabling |
| Terminator | Q-TERM-10 | Terminator cap for unused cable ends |
| Enphase EN4 to MC4 adaptor ¹ | ECA-EN4-S22 | Connect PV module using MC4 connectors to IQ micros with EN4 (TE PV4-S SOLARLOK). 150mm/5.9" to MC4. |
| Enphase EN4 non-terminated adaptor ¹ | ECA-EN4-FW | For field wiring of UL certified DC connectors. EN4 (TE PV4-S SOLARLOK) to non-terminated cable. 150mm/5.9" |
| Enphase EN4 to MC4 adaptor (long) ¹ | ECA-EN4-S22-L | Longer adapter cable for EN4 (TE PV4-S SOLARLOK) to MC4. Use with split cell modules or PV modules with short DC cable. 600mm/23.6" |
| Replacement DC Adaptor (MC4) | Q-DCC-2 | DC adaptor to MC4 (max voltage 100 VDC) |
| Replacement DC Adaptor (UTX) | Q-DCC-5 | DC adaptor to UTX (max voltage 100 VDC) |

1. Qualified per UL subject 9703.

| | | | |
|---|---|---|---|
|  | TERMINATOR Terminator cap for unused cable ends, sold in packs of ten (Q-TERM-10) |  | SEALING CAPS Sealing caps for unused aggregator and cable connections (Q-BA-CAP-10 and Q-SEAL-10) |
|  | DISCONNECT TOOL Plan to use at least one per installation, sold in packs of ten (Q-DISC-10) |  | CABLE CLIP Used to fasten cabling to the racking or to secure looped cabling, sold in packs of one hundred (Q-CLIP-100) |

To learn more about Enphase offerings, visit enphase.com

IQ Combiner 4/4C



The **IQ Combiner 4/4C** with IQ Gateway and integrated LTE-M1 cell modem (included only with IQ Combiner 4C) consolidates interconnection equipment into a single enclosure. It 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 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
- Supports Wi-Fi, Ethernet, or cellular connectivity
- Optional AC receptacle available for PLC bridge
- Provides production metering and consumption monitoring

Simple

- Mounts on single stud with centered brackets
- Supports bottom, back and side conduit entry
- Allows up to four 2-pole branch circuits for 240VAC 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
- X2-IQ-AM1-240-4 and X2-IQ-AM1-240-4C comply with IEEE 1547:2018 (UL 1741-SB, 3rd Ed.)

IQ Combiner 4/4C

MODEL NUMBER

| | |
|--|--|
| IQ Combiner 4 X-IQ-AM1-240-4 X2-IQ-AM1-240-4 (IEEE 1547:2018) | IQ Combiner 4 with 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 and IQ System Controller 2 and to deflect heat. |
| IQ Combiner 4C X-IQ-AM1-240-4C X2-IQ-AM1-240-4C (IEEE 1547:2018) | IQ Combiner 4C with IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 ± 0.5%) and consumption monitoring (± 2.5%). Includes 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)

| | |
|---|---|
| Supported microinverters: | IQ6, IQ7, and IQ8. (Do not mix IQ6/7 Microinverters with IQ8) |
| 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 - 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 |
| 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) |
| X-IQ-NA-HD-125A | Hold-down kit for Eaton circuit breaker with screws |
| Consumption monitoring CT (CT-200-SPLIT/CT-200-CLAMP) | A pair of 200A split core current transformers |

ELECTRICAL SPECIFICATIONS

| | |
|--|--|
| Rating | Continuous duty |
| System voltage | 120/240VAC, 60 Hz |
| Eaton BR series busbar rating | 125A |
| Max. continuous current rating | 65A |
| Max. continuous current rating (input from PV/storage) | 64A |
| Max. fuse/circuit rating (output) | 90A |
| 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 |
| IQ Gateway breaker | 10A or 15A rating GE/Siemens/Eaton included |
| Production metering CT | 200A solid core pre-installed and wired to IQ Gateway |

MECHANICAL DATA

| | |
|--------------------------------|---|
| Dimensions (WxHxD) | 37.5 cm x 49.5 cm x 16.8 cm (14.75 in x 19.5 in x 6.63 in). Height is 53.5 cm (21.06 in) with mounting brackets. |
| Weight | 7.5 kg (16.5 lbs) |
| Ambient temperature range | -40°C to +46°C (-40°F to 115°F) |
| Cooling | Natural convection, plus heat shield |
| Enclosure environmental rating | Outdoor, NRTL-certified, NEMA type 3R, polycarbonate construction |
| Wire sizes | • 20A to 50A breaker inputs: 14 to 4 AWG copper conductors • 60A 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 | Up to 3,000 meters (9,842 feet) |

INTERNET CONNECTION OPTIONS

| | |
|------------------|--|
| Integrated Wi-Fi | IEEE 802.11b/g/n |
| Cellular | CELLMODEM-M1-06-SP-05, CELLMODEM-M1-06-AT-05 (4G based LTE-M1 cellular modem). Note that an Mobile Connect cellular modem is required for all Enphase Energy System installations. |
| Ethernet | Optional, IEEE 802.3, Cat5E (or Cat6) UTP Ethernet cable (not included) |

COMPLIANCE

| | |
|-------------------------|--|
| Compliance, IQ Combiner | CA Rule 21 (UL 1741-SA) IEEE 1547:2018 - UL 1741-SB, 3 rd Ed. (X2-IQ-AM1-240-4 and X2-IQ-AM1-240-4C) CAN/CSA C22.2 No. 107.1, Title 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 |

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IQ-C-4-4C-DS-0103-EN-US-12-29-2022



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PV INSTALLATION
PROFESSIONAL

Scott Gurney
#PV-011719-015866

CONTRACTOR:
BRS FIELD OPS
385-498-6700



To learn more about Enphase offerings, visit enphase.com
IQ-C-4-4C-DS-0103-EN-US-12-29-2022



SHEET NAME:

SPEC SHEETS

REVISION:

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PAGE NUMBER:

SS

A. System Specifications and Ratings

- Maximum Voltage: 1,000 Volts
- Maximum Current: 80 Amps
- Allowable Wire: 14 AWG – 6 AWG
- Spacing: Please maintain a spacing of at least ½” between uninsulated live parts and fittings for conduit, armored cable, and uninsulated live parts of opposite polarity.
- Enclosure Rating: Type 3R
- Roof Slope Range: 2.5 – 12:12
- Max Side Wall Fitting Size: 1”
- Max Floor Pass-Through Fitting Size: 1”
- Ambient Operating Conditions: (-35°C) - (+75°C)
- Compliance:
 - JB-1.2: UL1741
 - Approved wire connectors: must conform to UL1741
- System Marking: **Interek Symbol and File #5019942**
- Periodic Re-inspections: If re-inspections yield loose components, loose fasteners, or any corrosion between components, components that are found to be affected are to be replaced immediately.

| ITEM NO. | PART NUMBER | DESCRIPTION | QTY |
|----------|--------------------------------------|----------------------------------|-----|
| 1 | JB-1.2 BODY | POLYCARBONATE WITH UV INHIBITORS | 1 |
| 2 | JB-1.2 LID | POLYCARBONATE WITH UV INHIBITORS | 1 |
| 3 | #10 X 1-1/4" PHILLIPS PAN HEAD SCREW | | 6 |
| 4 | #8 X 3/4" PHILLIPS PAN HEAD SCREW | | 6 |

| SIZE | DWG. NO. | REV |
|------------|------------------|--------------|
| B | JB-1.2 | |
| SCALE: 1:2 | WEIGHT: 1.45 LBS | SHEET 1 OF 3 |

| | |
|-----------------------|----------------------------------|
| TORQUE SPECIFICATION: | 15-20 LBS |
| CERTIFICATION: | UL STANDARD 1741, NEMA 3R |
| WEIGHT: | 1.45 LBS |



PV INSTALLATION PROFESSIONAL
Scott Gurney
#PV-011719-015866

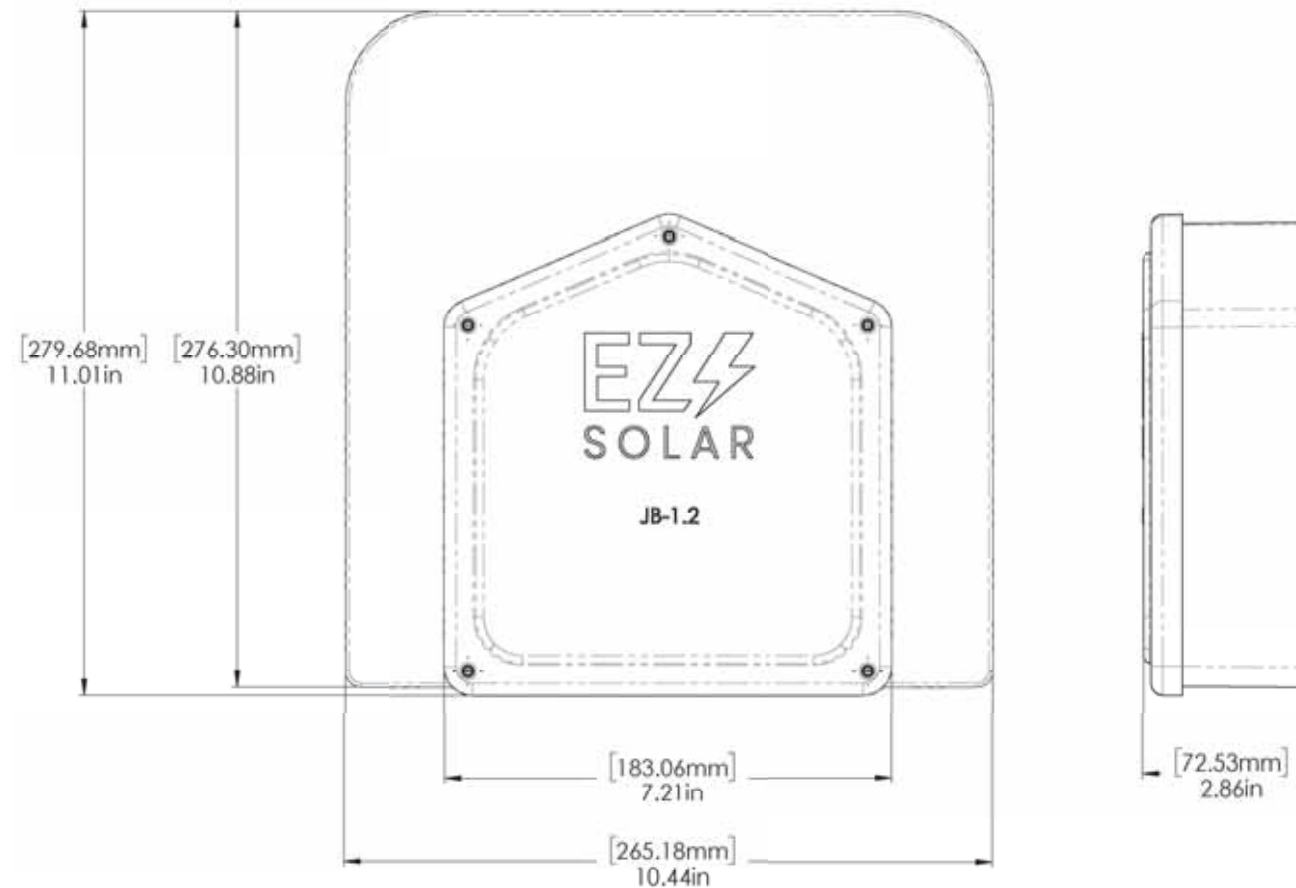
CONTRACTOR:
BRS FIELD OPS
385-498-6700

Table 1: Typical Wire Size, Torque Loads and Ratings

| | 1 Conductor | 2 Conductor | Torque | | | | |
|---|-------------|-------------|---------|-------------|-------------|---------|---------|
| | | | Type | NM | Inch Lbs | Voltage | Current |
| ABB Z56 terminal block | 10-24 awg | 16-24 awg | Sol/Str | 0.5-0.7 | 6.2-8.85 | 600V | 30 amp |
| ABB Z510 terminal block | 6-24 awg | 12-20 awg | Sol/Str | 1.0-1.6 | 8.85-14.16 | 600V | 40 amp |
| ABB Z516 terminal block | 4-24 awg | 10-20 awg | Sol/Str | 1.6-2.4 | 14.6-21.24 | 600V | 60 amp |
| ABB M6/8 terminal block | 8-22 awg | | Sol/Str | .08-1 | 8.85 | 600V | 50 amp |
| Ideal 452 Red WING-NUT Wire Connector | 8-18 awg | | Sol/Str | Self Torque | Self Torque | 600V | |
| Ideal 451 Yellow WING-NUT Wire Connector | 10-18 awg | | Sol/Str | Self Torque | Self Torque | 600V | |
| Ideal, In-Sure Push-In Connector Part #39 | 10-14 awg | | Sol/Str | Self Torque | Self Torque | 600V | |
| WAGO, 2204-1201 | 10-20 awg | 16-24 awg | Sol/Str | Self Torque | Self Torque | 600V | 30 amp |
| WAGO, 221-612 | 10-20 awg | 10-24 awg | Sol/Str | Self Torque | Self Torque | 600V | 30 amp |
| Dottie DRC75 | 6-12 awg | | Sol/Str | Snap-In | Snap-In | | |
| ESP NG-53 | 4-6 awg | | Sol/Str | | 45 | 2000V | |
| | 10-14 awg | | Sol/Str | | 35 | | |
| ESP NG-717 | 4-6 awg | | Sol/Str | | 45 | 2000V | |
| | 10-14 awg | | Sol/Str | | 35 | | |
| Brumall 4-5,3 | 4-6 awg | | Sol/Str | | 45 | 2000V | |
| | 10-14 awg | | Sol/Str | | 35 | | |

Table 2: Minimum wire-bending space for conductors through a wall opposite terminals in mm (inches)

| Wire size, AWG or kcmil (mm2) | Wires per terminal (pole) | | | |
|-------------------------------|---------------------------|-------------|-------------|---------------------|
| | 1 mm (inch) | 2 mm (inch) | 3 mm (inch) | 4 or More mm (inch) |
| 14-10 (2.1-5.3) | Not specified | - | - | - |
| 8 (8.4) | 38.1 (1-1/2) | - | - | - |
| 6 (13.3) | 50.8 (2) | - | - | - |



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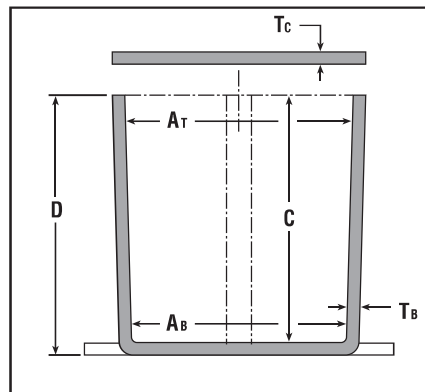
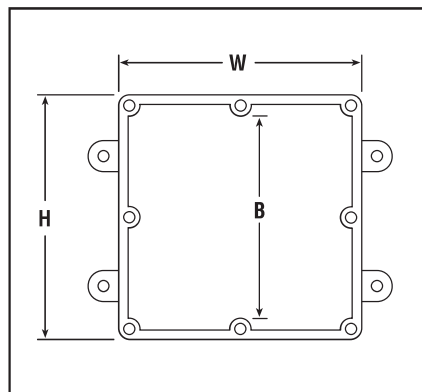
SS

Rigid Nonmetallic Conduit – Junction Boxes

Molded Nonmetallic Junction Boxes 6P Rated

It's another first from Carlon® - the first nonmetallic junction boxes UL Listed with a NEMA 6P rating per Section 314.29, Exception of the National Electrical Code. Manufactured from PVC or PPO thermoplastic molding compound and featuring foam-in-place gasketed lids attached with stainless steel screws, these rugged enclosures offer all the corrosion resistance and physical properties you need for direct burial applications.

Type 6P enclosures are intended for indoor or outdoor use, primarily to provide a degree of protection against contact with enclosed equipment, falling dirt, hose-directed water, entry of water during prolonged submersion at a limited depth, and external ice formation.



- All Carlon Junction Boxes are UL Listed and maintain a minimum of a NEMA Type 4/4x Rating.
- Parts numbers with an asterisk (*) are UL Listed and maintain a NEMA Type 6P Rating and Type 4/4X Rating.

| Part No. | Size in Inches H x W x D | Std. Ctn. Qty. | Min. At | Min. Ab | Min. B | Min. C | Ta | Tc Typical | Material | | Std. Ctn. Wt. (Lbs.) |
|---------------|-----------------------------|----------------|---------|---------|---------|--------|------|---------------|----------|----------------|----------------------|
| | | | | | | | | | PVC | Thermo-plastic | |
| E989NNJ-CAR* | 4 x 4 x 2 | 5 | 3 11/16 | 3 5/8 | N/A | 2 | .160 | .155 | X | | 3 |
| E987N-CAR* | 4 x 4 x 4 | 5 | 3 11/16 | 3 1/2 | N/A | 4 | .160 | .155 | X | | 4 |
| †E989NNR-CAR* | 4 x 4 x 6 | 4 | 3 11/16 | 3 3/8 | N/A | 6 | .160 | .200 | X | | 5 |
| E989PPJ-CAR* | 5 x 5 x 2 | 4 | 4 11/16 | 4 1/2 | N/A | 2 | .110 | .150 | | X | 3 |
| E987R-CAR* | 6 x 6 x 4 | 2 | 6 | 5 5/8 | N/A | 4 | .190 | .190 | | X | 3 |
| E989RRR-UPC* | 6 x 6 x 6 | 8 | 5 5/8 | 5 3/8 | N/A | 6 | .160 | .150 | | X | 14 |
| E989N-CAR | 8 x 8 x 4 | 1 | 8 | 8 | N/A | 4 | .185 | .190 | | X | 2 |
| E989SX-UPC | 8 x 8 x 7 | 2 | 7 21/32 | 7 5/16 | N/A | 7 | .160 | .150 | | X | 6 |
| E989UUN | 12 x 12 x 4 | 3 | 11 5/8 | 11 1/2 | 11 1/8 | 4 | .160 | .150 | | X | 12 |
| E989R-UPC | 12 x 12 x 6 | 2 | 11 5/16 | 11 7/8 | 11 7/16 | 6 | .265 | .185 | | X | 10 |

VIEW SHOWN LESS COVER FOR CLARITY

SECTION A-A
SCALE 0.500

| SIZE | A | B | C |
|--|-----------------|-----------------|-----------------|
| E989NNJ E989NNJB E989NNJ-CAR E989NNJCL E989NNJL (4X4X2) | 2.00 (50.8) | 4.63 (117.6) | 5.13 (130.2) |
| E989NNR E989NNR-CAR (4X4X6) | 8.00 (152.4) | 5.00 (127.0) | 5.50 (139.7) |

NOTES:
1. MATERIAL: PVC
2. NEMA TYPES: 4/4X, 6P

GENERAL NOTES

1. ALL DIMENSIONS ARE FOR REFERENCE ONLY.
2. DIMENSIONS IN BRACKETS [] ARE IN METRIC UNITS.

REVISIONS

F SEE ERN 2016195 FOR APPROVAL SIGNATURES & RELEASE DATE.
PROJECT NO: 5AM000006

Thomas & Betts
www.tnb.com

DESCRIPTION: **MOLDED NON-METALLIC ENCLOSURE**

| | | | |
|--------------------------------|-----------|----------|-------------|
| ORIGINAL PROJECT NO / (ERN NO) | SHEET NO: | REV. NO: | DRAWING NO: |
| / () | 2 OF 2 | F | WSD-AC01977 |

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NABCEP
CERTIFIED
PV INSTALLATION
PROFESSIONAL
Scott Gurney
#PV-011719-015866

CONTRACTOR:
BRS FIELD OPS
385-498-6700

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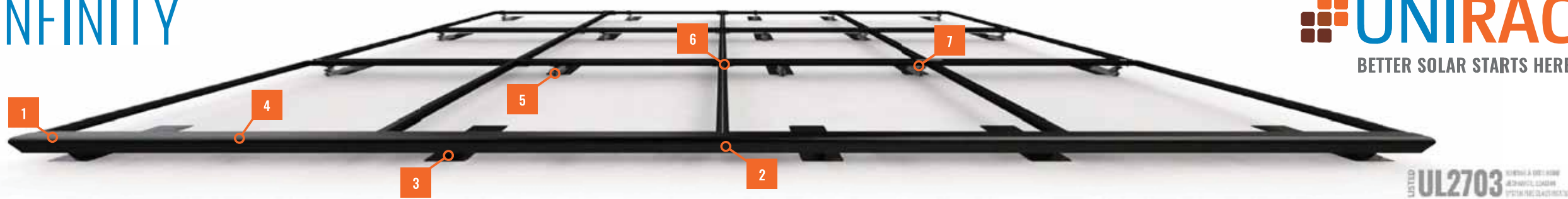
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SFM INFINITY



LISTED **UL2703** WITH A DESIGN APPROVAL, LISTED SYSTEM CLASSIFICATION



2 INSTALLS PER DAY

Make two installs per day your new standard. **SFM INFINITY** has fewer roof attachments, one tool installation, and pre-assembled components to get you off the roof 40% faster.

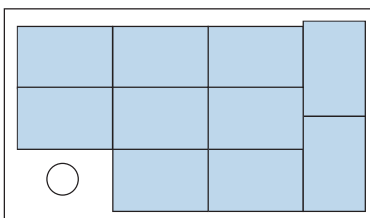
87% OF HOMEOWNERS PREFER

BETTER AESTHETICS








Install the system with the aesthetics preferred by homeowners, with integrated front trim, trim end caps, dark components, and recessed hardware.

MAXIMUM POWER DENSITY




Easily mix module orientations to achieve optimal power density without incurring the increased bill of materials, labor, and attachments required by rail.



SYSTEM OVERVIEW

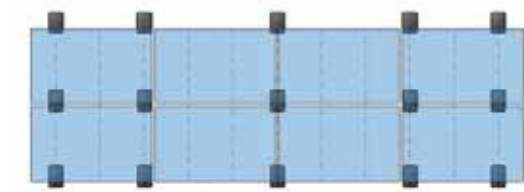
| | PART NAME | DESCRIPTION |
|---|---|---|
| 1 |  TRIMRAIL | Structural front trim provides aesthetic and aligns modules. |
| 2 |  TRIMRAIL SPLICE | Connects and electrically bonds sections of TRIMRAIL . |
| 3 |  TRIMRAIL FLASHKIT | Attaches TRIMRAIL to roof. Available for comp shingle or tile. |
| 4 |  MODULE CLIPS | Secure modules to TRIMRAIL . |
| 5 |  MICRORAIL | Connects modules to SLIDERS. Provides post-install array leveling. |
| 6 |  SPLICE | Connects and supports modules. Provides east-west bonding. ATTACHED SPLICE also available. |
| 7 |  SLIDER FLASHKIT | Roof attachment and flashing. Available for comp shingle and tile. |

BONDING AND ACCESSORIES

| | PART NAME | DESCRIPTION |
|--|--|---|
| |  TRIMRAIL ENDCAPS | Covers ends of TRIMRAIL for refined aesthetic. |
| |  TRIMRAIL BONDING CLAMP | Electrically bonds TRIMRAIL and modules |
| |  N/S BONDING CLAMP | Electrically bonds rows of modules |

20% FEWER ATTACHMENTS

Save time and money on every project: **SFM INFINITY** requires fewer attachments than rail systems.



SFM INFINITY 15 Attachments



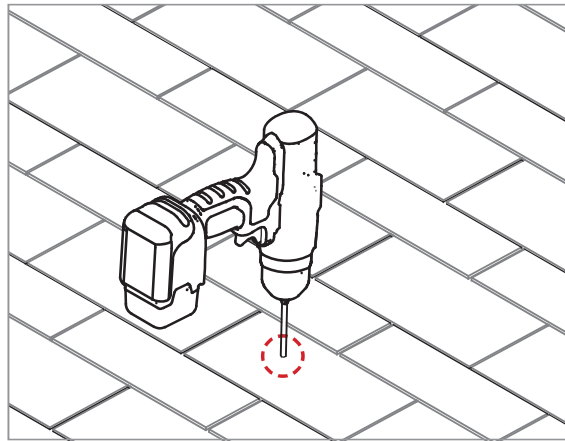
RAIL 20 Attachments

30% LOGISTICS SAVINGS

With fewer SKUs and compact components, **SFM INFINITY** is easier to stock, easier to transport, and easier to lift to the roof. Plus, make more efficient use of your vehicle fleet.

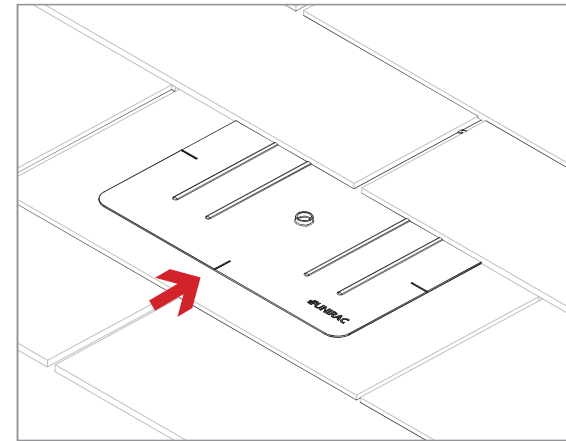


SFM INFINITY REVOLUTIONIZES ROOFTOP SOLAR WITH BENEFITS ACROSS YOUR BUSINESS, FROM DESIGN AND LOGISTICS, THROUGH ARRAY INSTALLATION AND SERVICE.



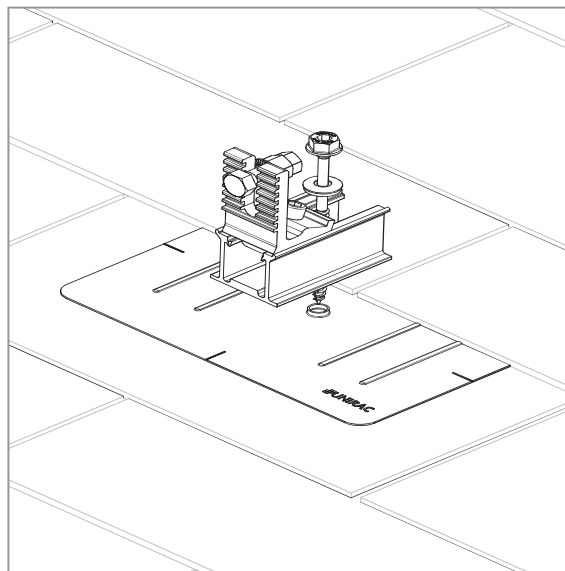
PILOT HOLES:

Drill pilot holes for lag screws or structural screws (as necessary) at marked attachment points



FLASHINGS:

Place flashings

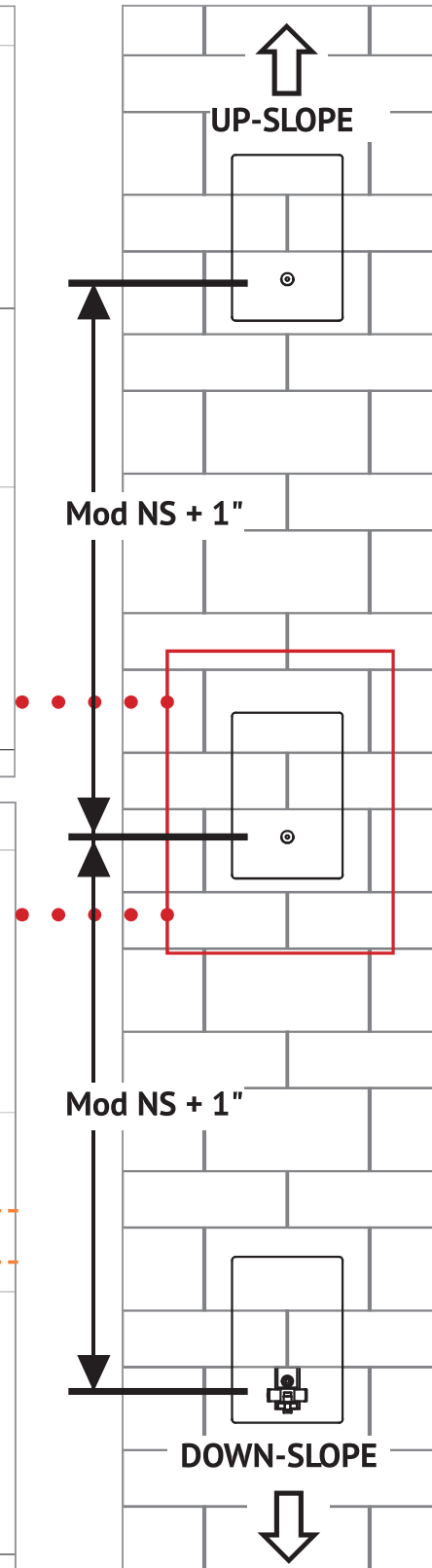
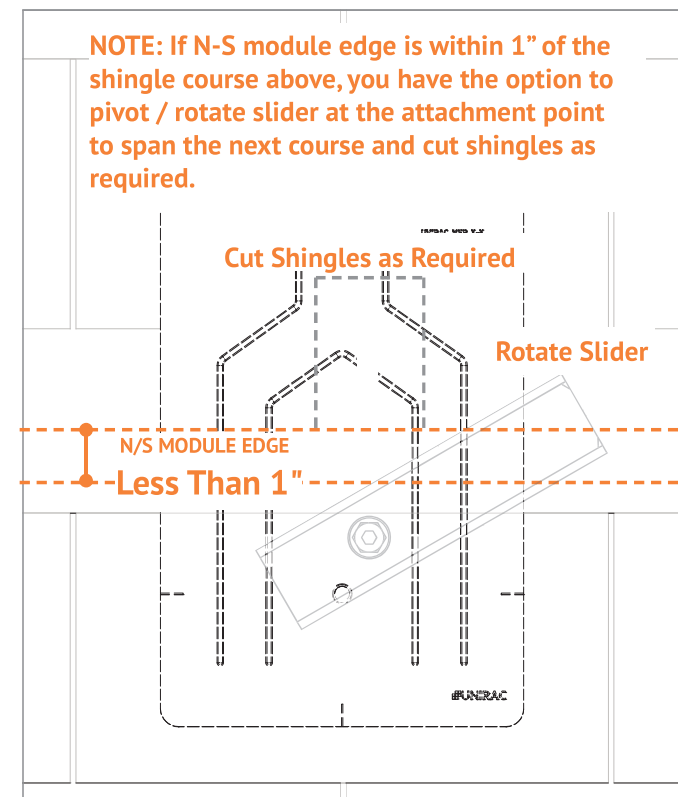
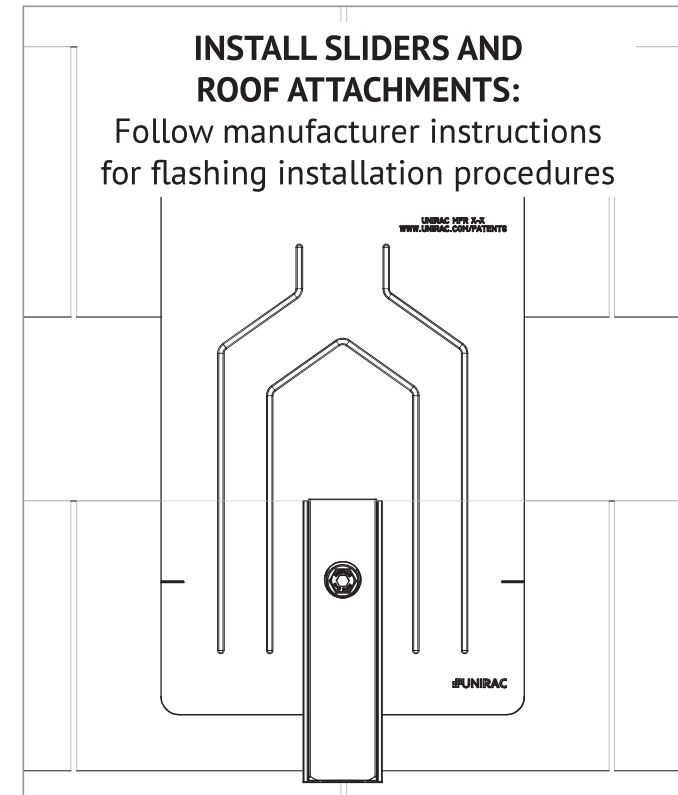
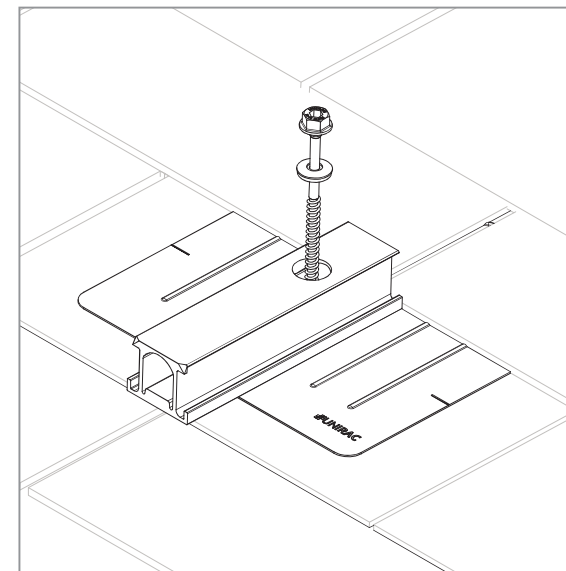


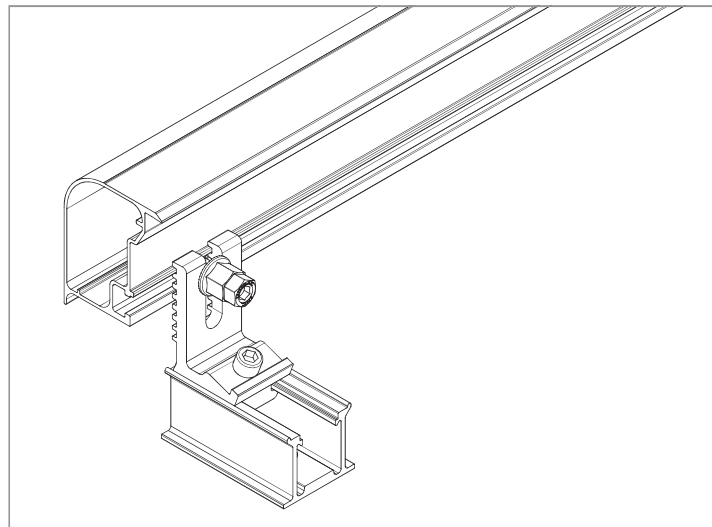
INSTALL SLIDERS AND TRIMRAIL ROOF ATTACHMENTS:

- Insert flashings per manufacturer instructions

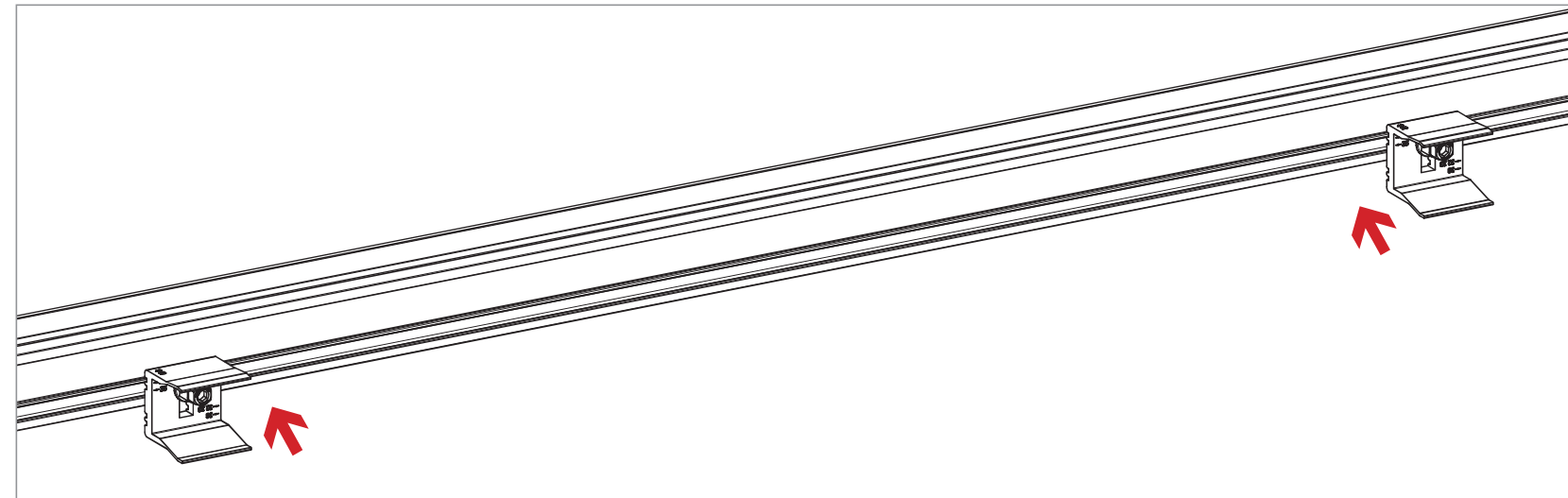
NOTE: Use Lag screw or structural fastener with a maximum diameter of 5/16"

- Attach sliders to rafters
- Verify proper row to row spacing for module size (Mod NS + 1")
- Ensure that Trimrail™ roof attachments in each row have sufficient engagement with slider dovetails for proper attachment.



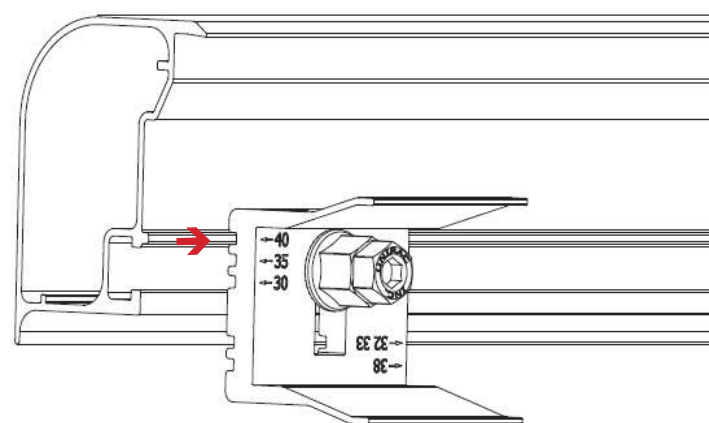


ATTACH TRIMRAIL TO ROOF ATTACHMENT:
Attach rail using 3/8" hex bolt & Tri-drive or serrated flange nuts. Make sure Trimrail™ is level across all Trimrail™ roof attachments. After rail is level, tighten channel clamp bolts to secure Trimrail™ roof attachments to channels.

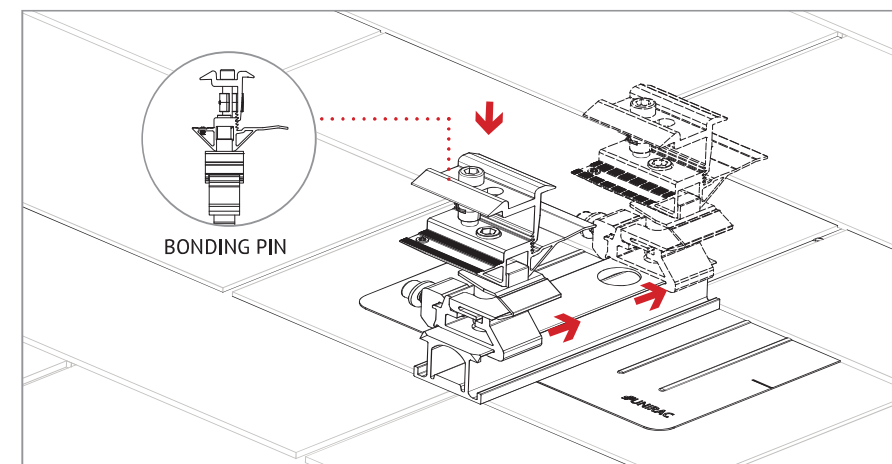
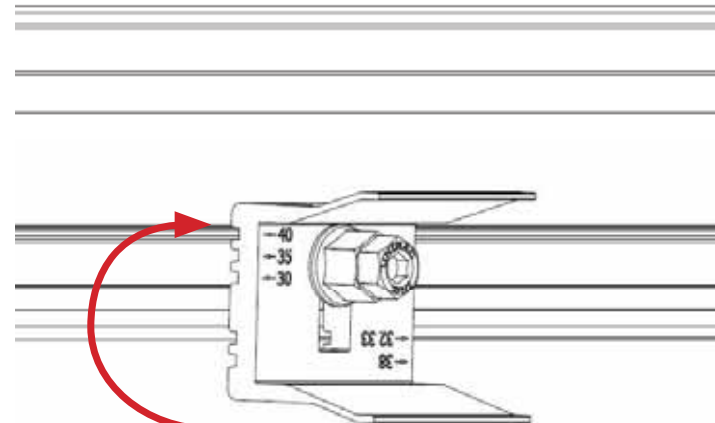


INSTALL MODULE CLIPS ON TRIMRAIL:
Attach module clips to Trimrail using 3/8" T-bolts and Tri-drive or serrated flange nuts. A minimum of two clips are required per module. Refer to SFM D&E guide and U-builder for required position and quantity of module clips.

NOTE: module clips may be pre-installed on trimrail prior to attaching trimrail to roof attachments

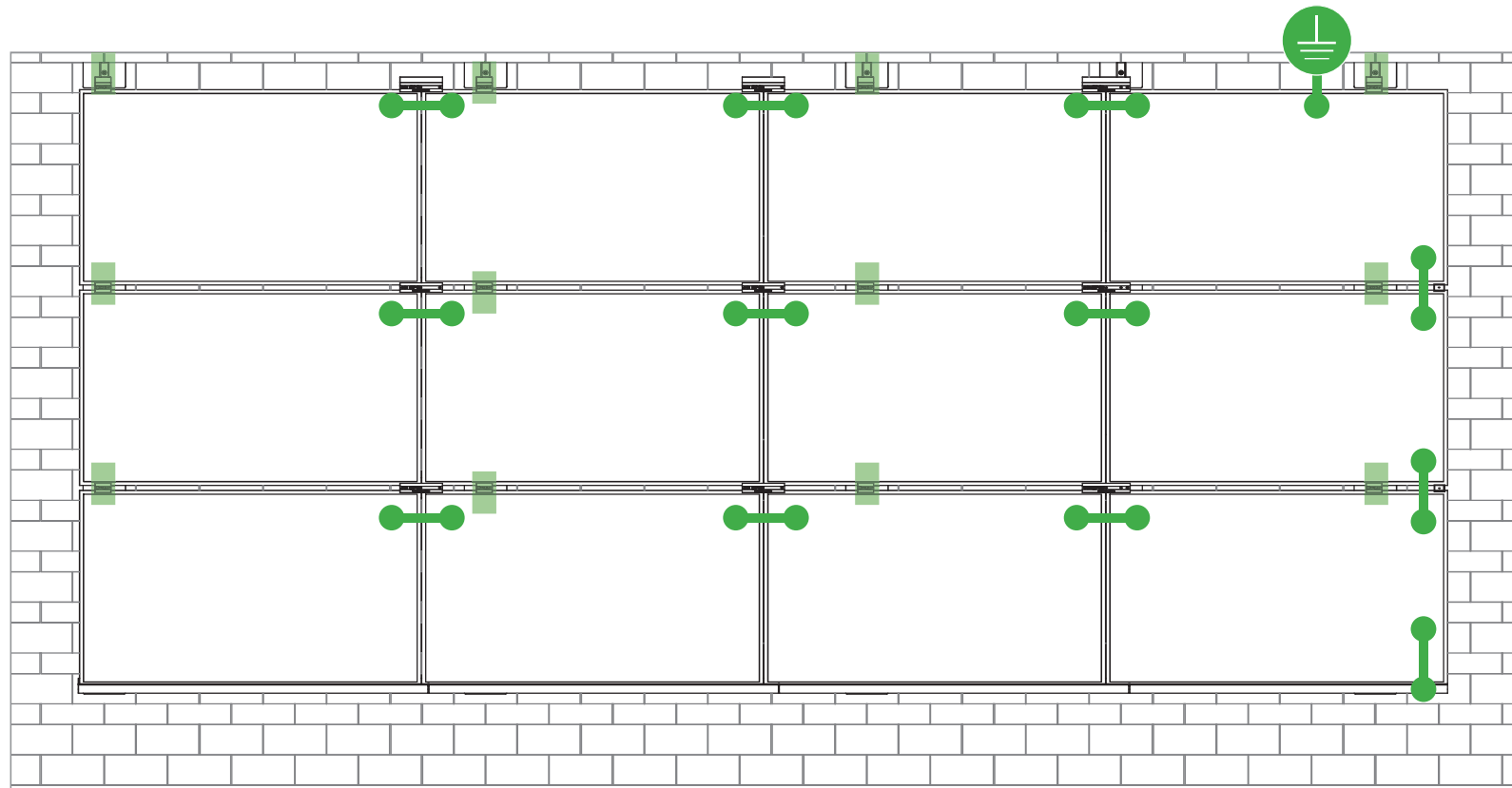


POSITION MODULE CLIPS ACCORDING TO MODULE THICKNESS:
Align notch in module clip with trimrail rib according to module thickness (identified in mm on faces of module clips). Rotate clip to position at required location.



NOTE: Bonding pin on Microrails should be positioned downslope.

INSTALL MICRORAILS:
Install Microrail™ at marked attachment points. Click Microrail™ into sliders and push Microrail™ to top of slider. Ensure that cap remains in upper most (40mm) position.



Star Washer is Single Use Only



TERMINAL TORQUE,
Install Conductor and torque to the following:
4-6 AWG: 35in-lbs
8 AWG: 25 in-lbs
10-14 AWG: 20 in-lbs

LUG DETAIL & TORQUE INFO
IlSCO Lay-In Lug (GBL-4DBT)

- 10-32 mounting hardware
- Torque = 5 ft-lb
- AWG 4-14 - Solid or Stranded

TERMINAL TORQUE,
Install Conductor and torque to the following:
4-14 AWG: 35in-lbs



LUG DETAIL & TORQUE INFO
IlSCO Flange Lug (SGB-4)

- 1/4" mounting hardware
- Torque = 75 in-lb
- AWG 4-14 - Solid or Stranded

WEEBLUG Single Use Only



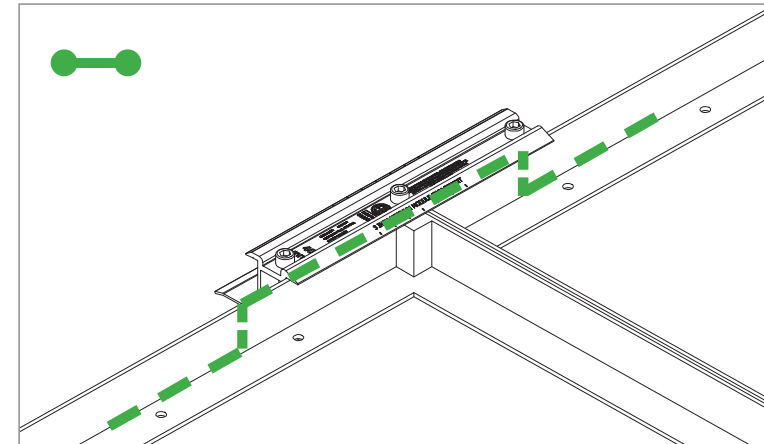
TERMINAL TORQUE,
Install Conductor and torque to the following:
6-14 AWG: 7ft-lbs

LUG DETAIL & TORQUE INFO
Wiley WEEBLug (6.7)

- 1/4" mounting hardware
- Torque = 10 ft-lb
- AWG 6-14 - Solid or Stranded

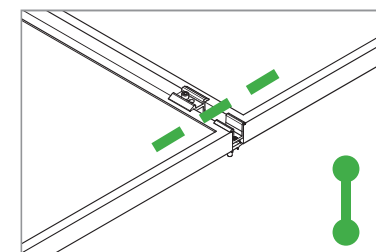
NOTE: ISOLATE COPPER FROM ALUMINUM CONTACT TO PREVENT CORROSION

System bonding is accomplished through modules. System grounding accomplished by attaching a ground lug to any module at a location on the module specified by the module manufacturer.



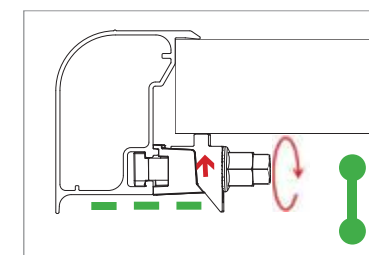
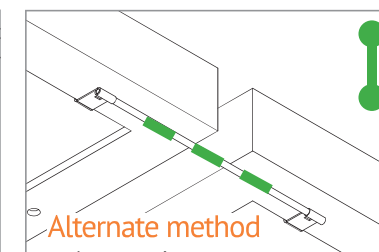
E-W BONDING PATH:

E-W module to module bonding is accomplished with 2 pre-installed bonding pins which engage on the secure side of the Microrail™ and splice.



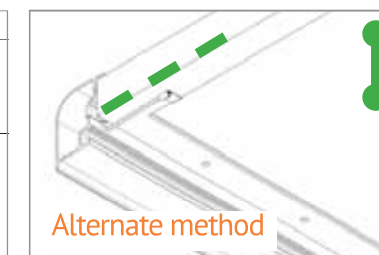
N-S BONDING PATH:

N-S module to module bonding is accomplished with bonding clamp with 2 integral bonding pins. (refer also to alternate method)



TRIMRAIL BONDING PATH:

Trimrail to module bonding is accomplished with bonding clamp with integral bonding pin and bonding T-bolt. (refer also to alternate method)



SYSTEM LEVEL FIRE CLASSIFICATION

The system fire class rating requires installation in the manner specified in the SUNFRAME MICRORAIL (SFM) Installation Guide. SFM has been classified to the system level fire portion of UL 1703. This UL 1703 classification has been incorporated into the UL 2703 product certification. SFM has achieved Class A, B & C system level performance for low slope & steep sloped roofs when used in conjunction with type 1 and type 2 modules. Class A, B & C system level fire

performance is inherent in the SFM design, and no additional mitigation measures are required. The fire classification rating is valid for any roof pitch. There is no required minimum or maximum height limitation above the roof deck to maintain the Class A, B & C fire rating for SFM. SUNFRAME MICRORAIL™ components shall be mounted over a fire resistant roof covering rated for the application.

| Module Type | Roof Slope | System Level Fire Rating | Microrail Direction | Module Orientation | Mitigation Required |
|-------------------|-------------------------|--------------------------|---------------------|-----------------------|---------------------|
| Type 1 and Type 2 | Steep Slope & Low Slope | Class A, B & C | East-West | Landscape OR Portrait | None Required |

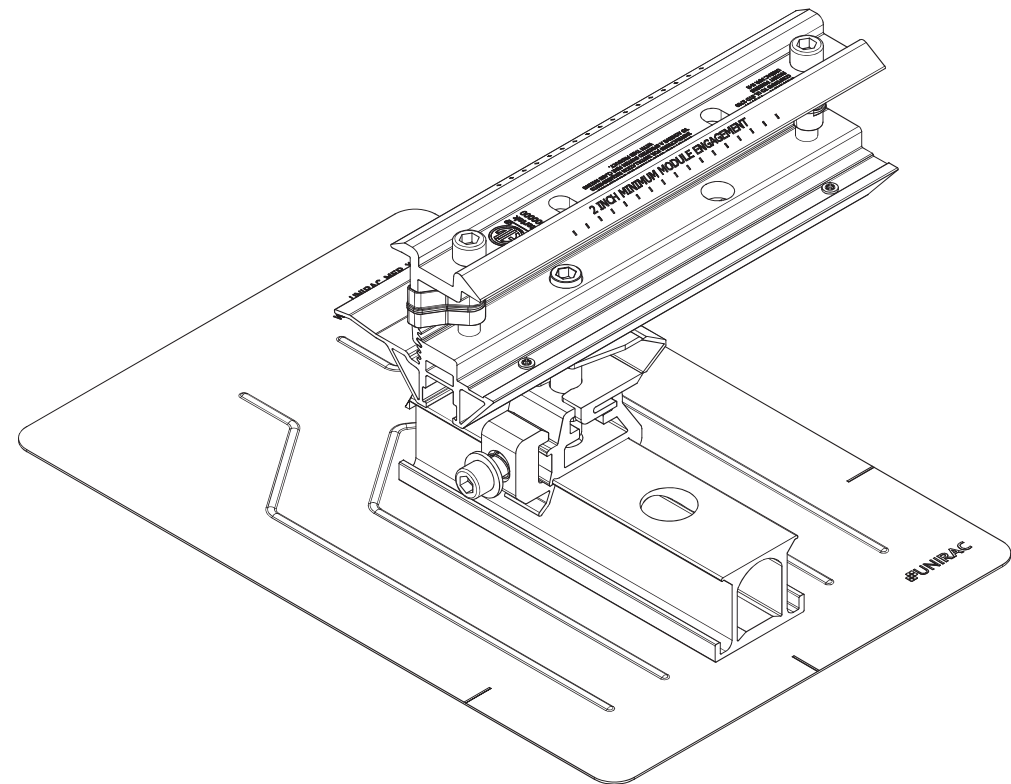
UL2703 TEST MODULES

See pages 22 and 23 for a list of modules that were electrically and mechanically tested or qualified with the SUNFRAME MICRORAIL (SFM) components outlined within this Installation Guide.

- Maximum Area of Module = 27.76 sqft
- UL2703 Design Load Ratings:
 - a) Downward Pressure – 113 PSF / 5400 Pa
 - b) Upward Pressure – 50 PSF / 2400 Pa
 - c) Down-Slope Load – 21.6 PSF / 1034 Pa
- Tested Loads:
 - a) Downward Pressure – 170 PSF / 8000 Pa
 - b) Upward Pressure – 75 PSF / 3500 Pa
 - c) Down-Slope Load – 32.4 PSF / 1550 Pa
- Maximum Span = 6ft
- Use with a maximum over current protection device OCPD of 30A
- System conforms to UL Std 2703, certified to LTR AE-001-2012
- Rated for a design load of 2400 Pa / 5400 Pa with 24 inch span
- PV modules may have a reduced load rating, independent of the SFM load rating. Please consult the PV module manufacturer's installation guide for more information
- Down-Slope design load rating of 30 PSF/ 1400 Pa for module areas of 22.3 sq ft or less

LABEL MARKINGS

- System fire class rating: See installation instructions for installation requirements to achieve a specified system fire class rating with Unirac.
- Unirac SUNFRAME MICRORAIL™ is listed to UL 2703.
- All splices within a system are shipped with marking indicating date and location of manufacture.



| Manufacture | Module Model / Series |
|---------------------|---|
| Aleo | P-Series |
| Aptos | DNA-120-(BF/MF)26 DNA-144-(BF/MF)26 |
| Astronergy | CHSM6612P, CHSM6612P/HV, CHSM6612M, CHSM6612M/HV, CHSM6610M (BL)(BF)/(HF), CHSM72M-HC |
| Auxin | AXN6M610T, AXN6P610T, AXN6M612T & AXN6P612T |
| Axitec | AXIblackpremium 60 (35mm), AXIpower 60 (35mm), AXIpower 72 (40mm), AXIpremium 60 (35mm), AXIpremium 72 (40mm). |
| Boviet | BVM6610, BVM6612 |
| BYD | P6K & MHK-36 Series |
| Canadian Solar | CS1(H/K/U/Y)-MS CS3(K/L/U), CS3K-MB-AG, CS3K-(MS/P) CS3N-MS, CS3U-MB-AG, CS3U-(MS/P), CS3W CS5A-M, CS6(K/U), CS6K-(M/P), CS6K-MS CS6P-(M/P), CS6U-(M/P), CS6V-M, CS6X-P |
| Centrosolar America | C-Series & E-Series |
| CertainTeed | CT2xxMxx-01, CT2xxPxx-01, CTxxxMxx-02, CTxxxM-03, CTxxxMxx-04, CTxxxHC11-04 |
| Dehui | DH-60M |

| Manufacture | Module Model / Series |
|-----------------|---|
| Eco Solargy | Orion 1000 & Apollo 1000 |
| ET Solar | ET-M672BHxxTW |
| Freedom Forever | FF-MP-BBB-370 |
| FreeVolt | Mono PERC |
| GCL | GCL-P6 & GCL-M6 Series |
| Hansol | TD-AN3, TD-AN4, UB-AN1, UD-AN1 |
| Heliene | 36M, 60M, 60P, 72M & 72P Series, 144HC M6 Monofacial/ Bifacial Series, 144HC M10 SL Bifacial |
| HT Solar | HT60-156(M) (NDV) (-F), HT 72-156(M/P) |
| Hyundai | KG, MG, TG, RI, RG, TI, MI, HI & KI Series HiA-SxxxHG |
| ITEK | iT, iT-HE & iT-SE Series |
| Japan Solar | JPS-60 & JPS-72 Series |
| JA Solar | JAP6 60-xxx, JAM6-60-xxx/SI, JAM6(K)-60/ xxx, JAP6(k)-72-xxx/4BB, JAP72SYY-xxx/ZZ, JAP6(k)-60-xxx/4BB, JAP60SYY-xxx/ZZ, JAM6(k)-72-xxx/ZZ, JAM72SYY-xxx/ZZ, JAM6(k)-60-xxx/ZZ, JAM60SYY-xxx/ZZ. i. YY: 01, 02, 03, 09, 10 ii. ZZ: SC, PR, BP, HiT, IB, MW, MR |
| Jinko | JKM & JKMS Series Eagle JKMxxxM JKMxxxM-72HL-V |
| Kyocera | KU Series |

| Manufacture | Module Model / Series | |
|----------------|--|------------------|
| LG Electronics | LGxxxN2T-A4 LGxxx(A1C/E1C/E1K/N1C/N1K/N2T/N2W/ Q1C/Q1K/S1C/S2W)-A5 LGxxxN2T-B5 LGxxxN1K-B6 LGxxx(A1C/M1C/M1K/N1C/N1K/Q1C/Q1K/ QAC/QAK)-A6 LGxxx(N1C/N1K/N2T/N2W)-E6 LGxxx(N1C/N1K/N2W/S1C/S2W)-G4 LGxxxN2T-J5 LGxxx(N1K/N1W/N2T/N2W)-L5 LGxxx(N1C/Q1C/Q1K)-N5 LGxxx (N1C/N1K/N2W/Q1C/Q1K)-V5 | |
| | LR4-60(HIB/HiH/HPB/HPH)-xxxM LR4-72(HiH/HPH)-xxxM LR6-60(BP/HBD/HIBD)-xxxM (30mm) LR6-60(BK)(PE)(HPB)(HPH)-xxxM (35mm) LR6-60(BK)(PE)(PB)(PH)-xxxM (40mm) LR6-72(BP)(HBD)(HIBD)-xxxM (30mm) LR6-72(HV)(BK)(PE)(PH)(PB)(HPH)-xxxM (35mm) LR6-72(BK)(HV)(PE)(PB)(PH)-xxxM (40mm) | |
| | Mission Solar Energy | MSE Series |
| | Mitsubishi | MJE & MLE Series |
| | Neo Solar Power Co. | D6M & D6P Series |

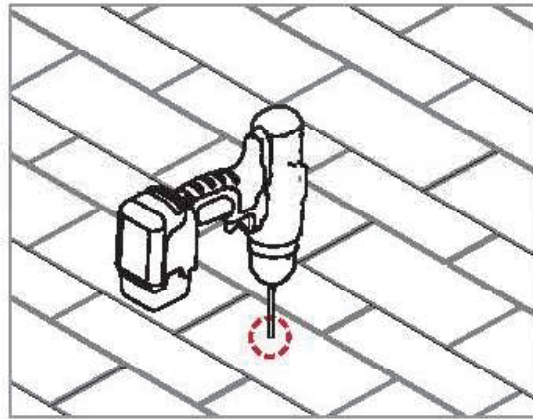
- Unless otherwise noted, all modules listed above include all wattages and specific models within that series. Variable wattages are represented as "xxx"
- Items in parenthesis are those that may or may not be present in a compatible module's model ID
- Slashes "/" between one or more items indicates that either of those items may be the one that is present in a module's model ID
- Please see the SFM UL2703 Construction Data Report at Unirac.com to ensure the exact solar module selected is approved for use with SFM
- SFM Infinity is not compatible with module frame height of less than 30mm and more than 40mm. See Module Mounting section, page 12 for further information

| Manufacture | Module Model / Series |
|-------------|---|
| Panasonic | EVPVxxx (H/K/PK), VBHNxxxSA15 & SA16, VBHNxxxSA17 & SA18, VBHNxxxSA17(E/G) & SA18E, VBHNxxxKA01 & KA03 & KA04, VBHNxxxZA01, VBHNxxxZA02, VBHNxxxZA03, VBHNxxxZA04 |
| Peimar | SGxxxM (FB/BF) |
| Phono Solar | PS-60, PS-72 |
| Prism Solar | P72 Series |
| Q.Cells | Plus, Pro, Peak, G3, G4, G5, G6(+), G7, G8(+) Pro, Peak L-G2, L-G4, L-G5, L-G6, L-G7 Q.PEAK DUO BLK-G6+ Q.PEAK DUO BLK-G6+/TS Q.PEAK DUO (BLK)-G8(+) Q.PEAK DUO L-G8.3/BFF Q.PEAK DUO (BLK) ML-G9(+) Q.PEAK DUO XL-G9/G9.2/G9.3 Q.PEAK DUO (BLK) ML-G10(+) Q.PEAK DUO XL-G(10/10.2/10.3/10.c/10.d) Q.PEAK DUO BLK ML-G10+ / t |
| REC Solar | Alpha (72) (Black) (Pure) RECxxxAA PURE-R RECxxxNP3 Black N-Peak (Black) N-Peak 2 (Black) PEAK Energy Series PEAK Energy BLK2 Series PEAK Energy 72 Series |

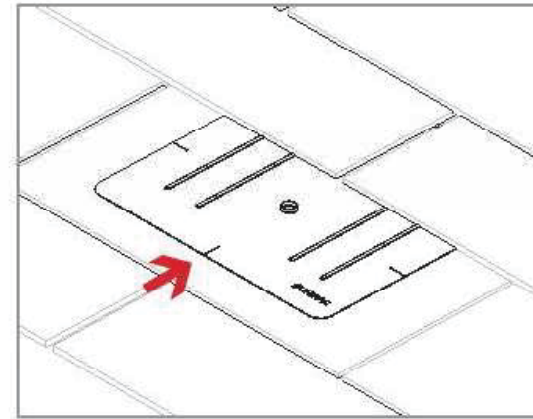
| Manufacture | Module Model / Series |
|-------------------|---|
| REC Solar (cont.) | TwinPeak Series TwinPeak 2 Series TwinPeak 2 BLK2 Series TwinPeak 2S(M)72(XV) TwinPeak 3 Series (38mm) TP4 (Black) |
| Renesola | Vitrus2 Series & 156 Series |
| Risen | RSM72-6 (MDG) (M), RSM60-6 |
| SEG Solar | SEG-xxx-BMD-HV SEG-xxx-BMD-TB |
| S-Energy | SN72 & SN60 Series (40mm) |
| Seraphim | SEG-6 & SRP-6 Series |
| Sharp | NU-SA & NU-SC Series |
| Silfab | SLA, SLG, BC Series & SILxxx(BL/NL/NT/HL/ML/BK/NX/NU/HC) |
| Solarever USA | SE-166*83-xxxM-120N |
| Solaria | PowerXT-xxxR-(AC/PD/BD) PowerXT-xxxC-PD PowerXT-xxxR-PM (AC) |
| SolarWorld | Sunmodule Protect, Sunmodule Plus |
| Sonali | SS-M-360 to 390 Series, SS-M-390 to 400 Series, SS-M-440 to 460 Series, SS-M-430 to 460 BiFacial Series, SS 230 - 265 |
| SunEdison | F-Series, R-Series & FLEX FXS Series |

| Manufacture | Module Model / Series |
|-------------------------------|---|
| Suniva | MV Series & Optimus Series |
| SunPower | A-Series A400-BLK, SPR-MAX3-XXX-R, X-Series, E-Series & P-Series |
| Suntech | STP, STPXXXS - B60/Wnhb |
| Talesun | TP572, TP596, TP654, TP660, TP672, Hipor M, Smart |
| Tesla | SC, SC B, SC B1, SC B2 TxxxH, TxxxS |
| Trina | PA05, PD05, DD05, DE06, DD06, PE06, PD14, PE14, DD14, DE09.05, DE14, DE15, PE15H |
| Upsolar | UP-MxxxP(-B), UP-MxxxM(-B) |
| United Renewable Energy (URE) | D7MxxxH7A, D7(M/K)xxxH8A FAKxxx(C8G/E8G), FAMxxxE7G-BB FAMxxxE8G(-BB) FBMxxxMFG-BB |
| Vikram | Eldora, Solivo, Somera |
| Waaree | AC & Adiya Series |
| Winaico | WST & WSP Series |
| Yingli | YGE & YLM Series |
| ZN Shine | ZXM6-72, ZXM6-NH144-166_2094 |

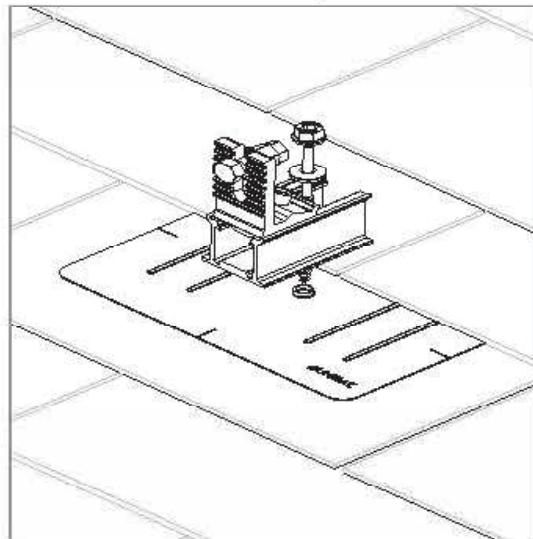
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- SFM Infinity is not compatible with module frame height of less than 30mm and more than 40mm. See Module Mounting section, page 12 for further information



PILOT HOLES:
Drill pilot holes for lag screws or structural screws (as necessary) at marked attachment points



FLASHINGS:
Place flashings



INSTALL SLIDERS AND TRIMRAIL ROOF ATTACHMENTS:

- Insert flashings per manufacturer instructions
- **NOTE: Use Lag screw or structural fastener with a maximum diameter of 5/16"**
- Attach sliders to rafters
- Verify proper row to row spacing for module size (Mod NS + 1")
- Ensure that Trimrail™ roof attachments in each row have sufficient engagement with slider dovetails for proper attachment.

