

GENERAL NOTES

CODES AND STANDARDS

- 1. ALL WORK SHALL COMPLY WITH 2017 OREGON ELECTRIC SPECIALTY CODE (OESC), 2019 OREGON STRUCTURAL SPECIALTY CODE, 2017 OREGON RESIDENTIAL SPECIALTY CODE, AND ALL STATE AND LOCAL BUILDING AND ELECTRICAL 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 WITH NO STORAGE BATTERIES.
- 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.
- 5. NO. OF SHINGLE LAYERS :1

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 MANUFACTURERS' 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 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. ADDITIONAL AC DISCONNECTS SHALL BE PROVIDED WHERE THE INVERTER IS NOT ADJACENT TO THE UTILITY AC DISCONNECT, OR NOT WITHIN SIGHT OF THE UTILITY AC DISCONNECT.
- 4. ALL EQUIPMENT SHALL BE INSTALLED ACCESSIBLE TO QUALIFIED PERSONNEL ACCORDING TO NEC APPLICABLE CODES.
- 5. ALL COMPONENTS ARE LISTED FOR THEIR PURPOSE AND RATED FOR OUTDOOR USAGE WHEN APPROPRIATE.

AERIAL VIEW



DESIGN CRITERIA  
WIND SPEED: 96 MPH  
GROUND SNOW LOAD: 25 PSF  
WIND EXPOSURE FACTOR: C  
SEISMIC DESIGN CATEGORY: D

SITE SPECIFICATIONS  
CONSTRUCTION - V-B  
ZONING: RESIDENTIAL

SHEET INDEX  
PV1 - COVER SHEET  
PV2 - PROPERTY PLAN  
PV3 - SITE PLAN  
PV4 - EQUIPMENT & ATTACHMENT DETAIL  
PV5 - ELECTRICAL SINGLE LINE DIAGRAM  
PV6 - ELECTRICAL CALCULATIONS & ELECTRICAL NOTES  
PV7 - MAIN BREAKER DERATE CALCS. (IF NEEDED)  
PV8 - LABELS & LOCATIONS  
PV9 - CUSTOM DIRECTORY PLACARD (IF NEEDED - NEC 690.56(B))

UTILITY COMPANY: Pacific Power  
PERMIT ISSUER: City of Albany

SCOPE OF WORK  
  
INSTALLATION OF UTILITY INTERACTIVE PHOTOVOLTAIC SOLAR SYSTEM  
  
5.625 kW DC PHOTOVOLTAIC SOLAR ARRAY  
ROOF TYPE: Comp Shingle  
MODULES: (15) JinKO Solar Eagle JKM375M-6RL3-B  
INVERTER(S): Enphase IQ7PLUS-72-x-US,----  
RACKING: Unirac SFM Infinity

Sealed For  
Existing Roof &  
Attachment Only



6/9/2021  
Exp: 12/31/21



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OREM, UT 84097  
  
800-377-4480  
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CONTRACTOR:  
BRS FIELD OPS  
385.498.6700

SITE INFORMATION:  
  
Brandon Low  
4384 furlong ave SE  
Albany, Oregon 97322  
  
DC SYSTEM SIZE: 5.625 kW DC

DRAWING BY  
ENPHASE ENERGY

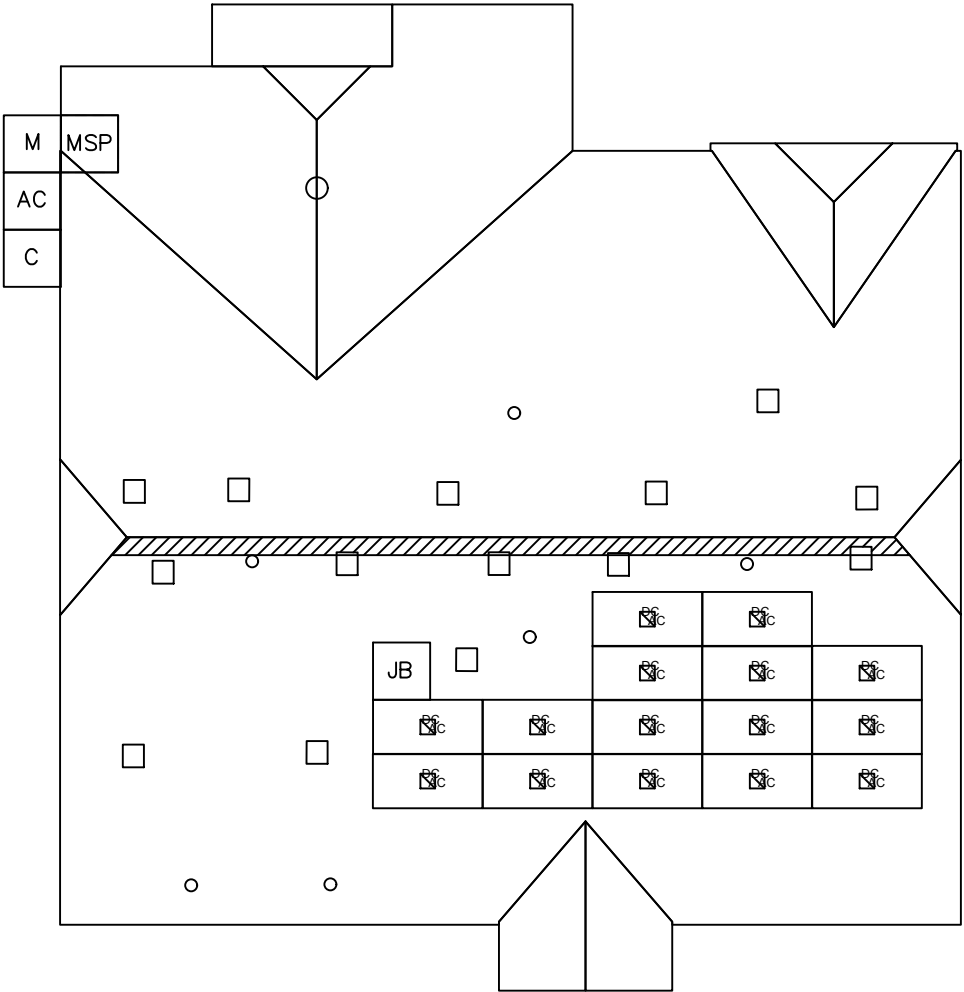
DATE  
June 9, 2021

PROJECT NUMBER  
364918

SHEET NAME  
COVER SHEET

PAGE NUMBER  
PV1  
  
REVISION  
0

4384 furlong ave SE  
FRONT OF HOME



ROOF ATTACHMENTS SHALL BE SPACED  
NO GREATER THAN 24" ON CENTER IN  
ANY DIRECTION WHERE LOCATED WITHIN  
3' OF A ROOF EDGE, HIP, EAVE, OR RIDGE  
OSSC 3111.5.3 ITEM 3.2  
AC disconnect to be located within 10' of Utility  
Meter.

LEGEND

INV

INVERTER & DC DISCONNECT

SUB

(E) SUBPANEL

LC

(N) LOAD CENTER

AC

AC DISCONNECT

M

UTILITY METER

MSP

MAIN SERVICE PANEL

JB

JUNCTION BOX

TS

TRANSFER SWITCH

C

COMBINER BOX/AGGREGATOR

PV

PV REVENUE METER

FIRE SETBACK

EMT CONDUIT RUN  
(TO BE DETERMINED IN FIELD)

PV WIRE STRING

PROPERTY LINE

SCALE: 3/32" = 1'-0"

0'

4'

8'

16'

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PV INSTALLATION  
PROFESSIONAL  
Scott Gurney  
# PV-011719-015866

CONTRACTOR:  
BRS FIELD OPS  
385.498.6700

SITE INFORMATION:

Brandon Low  
4384 furlong ave SE  
Albany, Oregon 97322  
DC SYSTEM SIZE: 5.625 kW DC

DRAWING BY

ENPHASE ENERGY

DATE

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SHEET NAME

PROPERTY PLAN

PAGE NUMBER

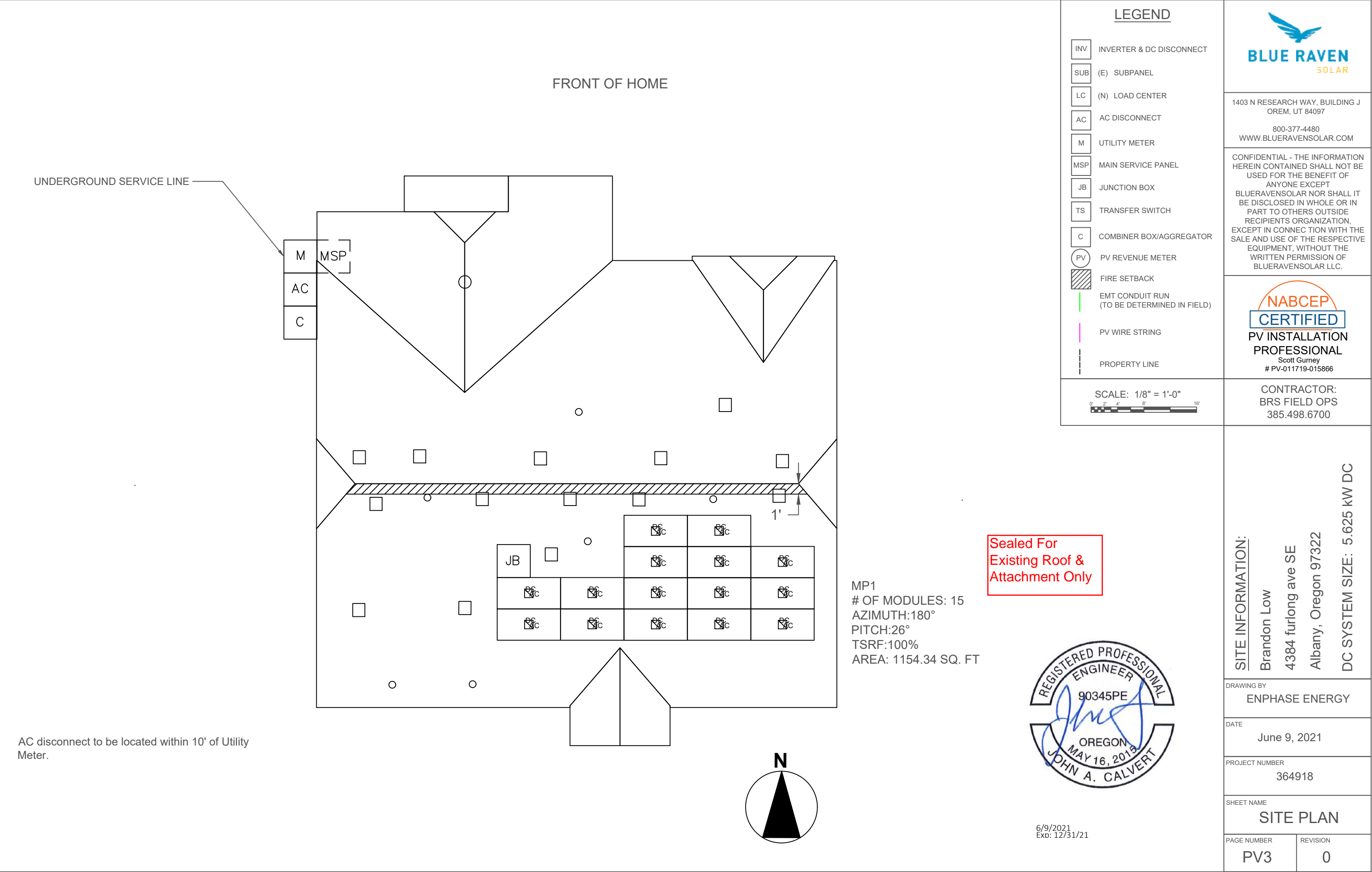
PV2

REVISION

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LEGEND

INV

INVERTER & DC DISCONNECT

SUB

(E) SUBPANEL

LC

(N) LOAD CENTER

AC

AC DISCONNECT

M

UTILITY METER

MSP

MAIN SERVICE PANEL

JB

JUNCTION BOX

TS

TRANSFER SWITCH

C

COMBINER BOX/AGGREGATOR

PV

PV REVENUE METER

FIRE SETBACK

EMT CONDUIT RUN  
(TO BE DETERMINED IN FIELD)

PV WIRE STRING

PROPERTY LINE

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


0'

2'

4'

8'


16'



BLUE RAVEN  
SOLAR

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NABCEP  
CERTIFIED

PV INSTALLATION  
PROFESSIONAL  
Scott Gurney  
# PV-011719-015866

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385.498.6700

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Brandon Low  
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SHEET NAME

SITE PLAN

PAGE NUMBER

PV3

REVISION

0

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AC disconnect to be located within 10' of Utility  
Meter.

MP1  
# OF MODULES: 15  
AZIMUTH:180°  
PITCH:26°  
TSRF:100%  
AREA: 1154.34 SQ. FT

PV ARRAY INFORMATION

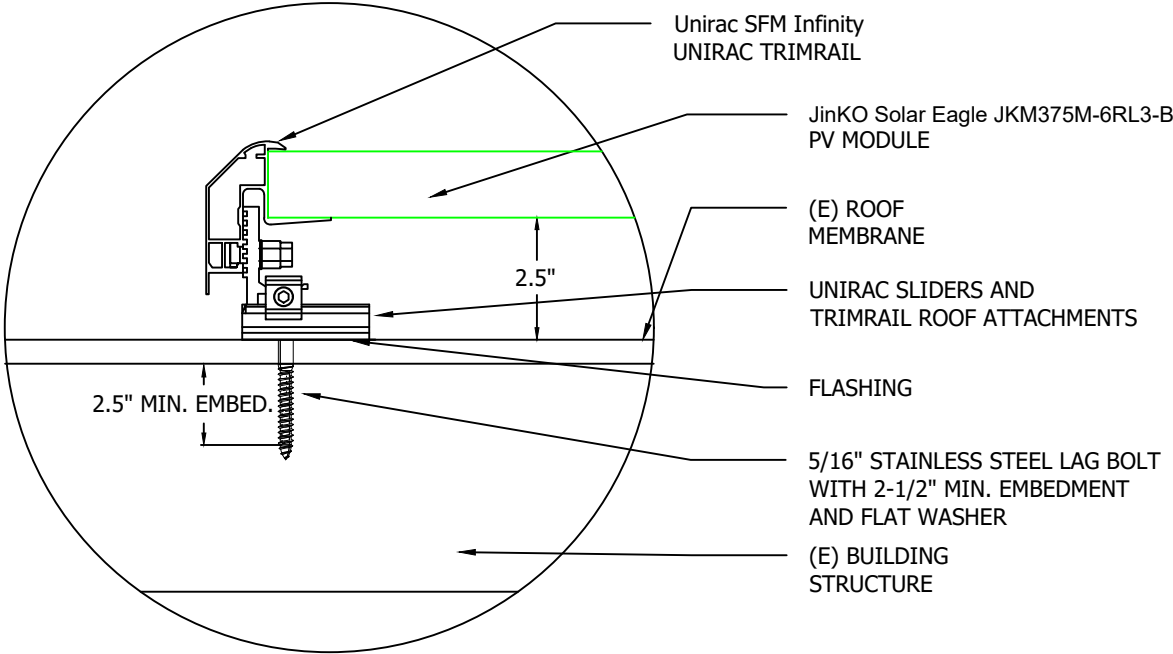
PV MODULE COUNT: 15 MODULES  
# OF ATTACHMENT POINTS<sup>1</sup>: 37  
ARRAY AREA: Module Count x 17.51ft² = 262.7ft²  
ROOF AREA: 2679.4ft²  
% OF ARRAY/ROOF: 9.8%  
ARRAY WEIGHT: Module Count x 50lbs = 750.0lbs  
DISTRIBUTED LOAD: Array Weight ÷ Array Area = 2.86 lbs/ft²  
POINT LOAD: Array Weight ÷ Attachments = 20.3lbs/attachment

ROOF ATTACHMENTS SHALL BE SPACED NO GREATER THAN 24" ON CENTER IN ANY DIRECTION WHERE LOCATED WITHIN 3' OF A ROOF EDGE, HIP, EAVE, OR RIDGE OSSC 3111.5.3 ITEM 3.2

1 - Number of attachment points estimated and may vary based on on-site conditions as long as maximum attachment spacing followed per engineered plans.

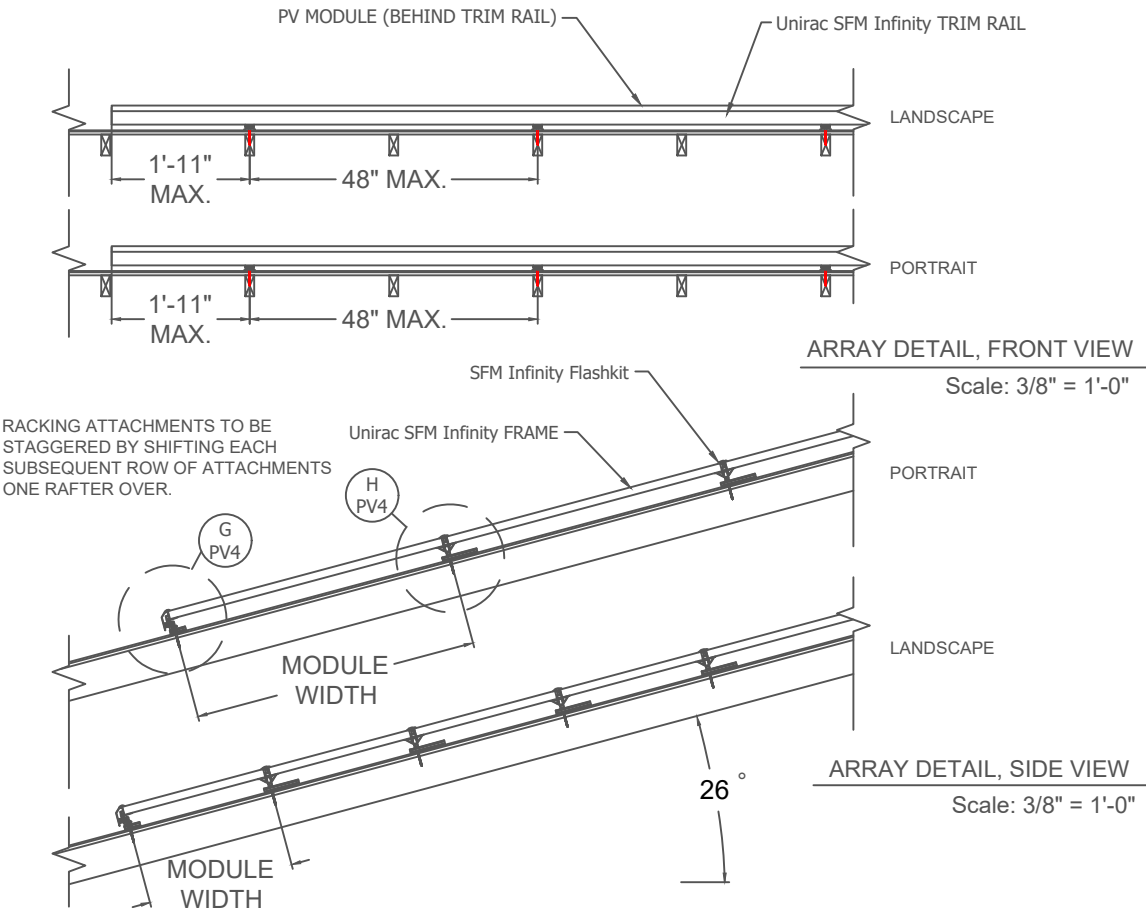
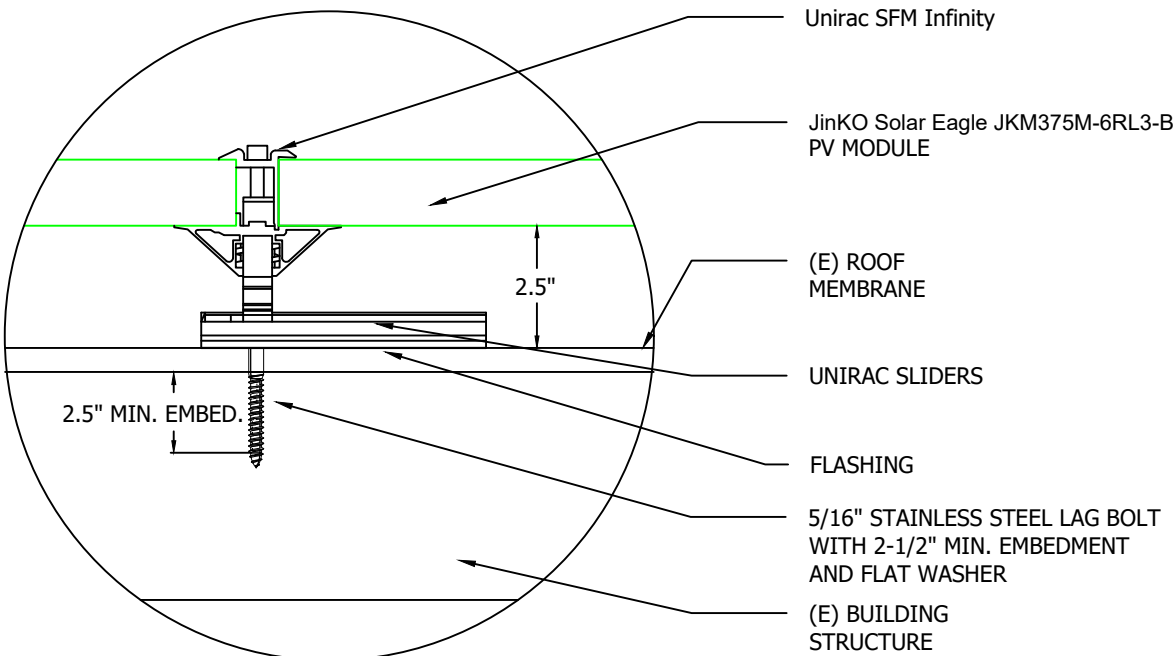
DETAIL, BOTTOM STANDOFF  
Scale: 3" = 1'-0"

G



DETAIL, MIDDLE/TOP STANDOFF  
Scale: 3" = 1'-0"

H



ROOF TYPE: Comp Shingle  
ROOF FRAMING TYPE: Manufactured Truss  
RAFTER OR TOP CHORD(TRUSS) 2x4 @ 24"O.C.  
CEILING JOIST OR BOTTOM CHORD(TRUSS) 2x4 @ 24"O.C.

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CONTRACTOR:  
BRS FIELD OPS  
385.498.6700

SITE INFORMATION:  
Brandon Low  
4384 furlong ave SE  
Albany, Oregon 97322  
DC SYSTEM SIZE: 5.625 kW DC

DRAWING BY  
ENPHASE ENERGY

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SHEET NAME  
EQUIP. DETAIL

PAGE NUMBER  
PV4  
REVISION  
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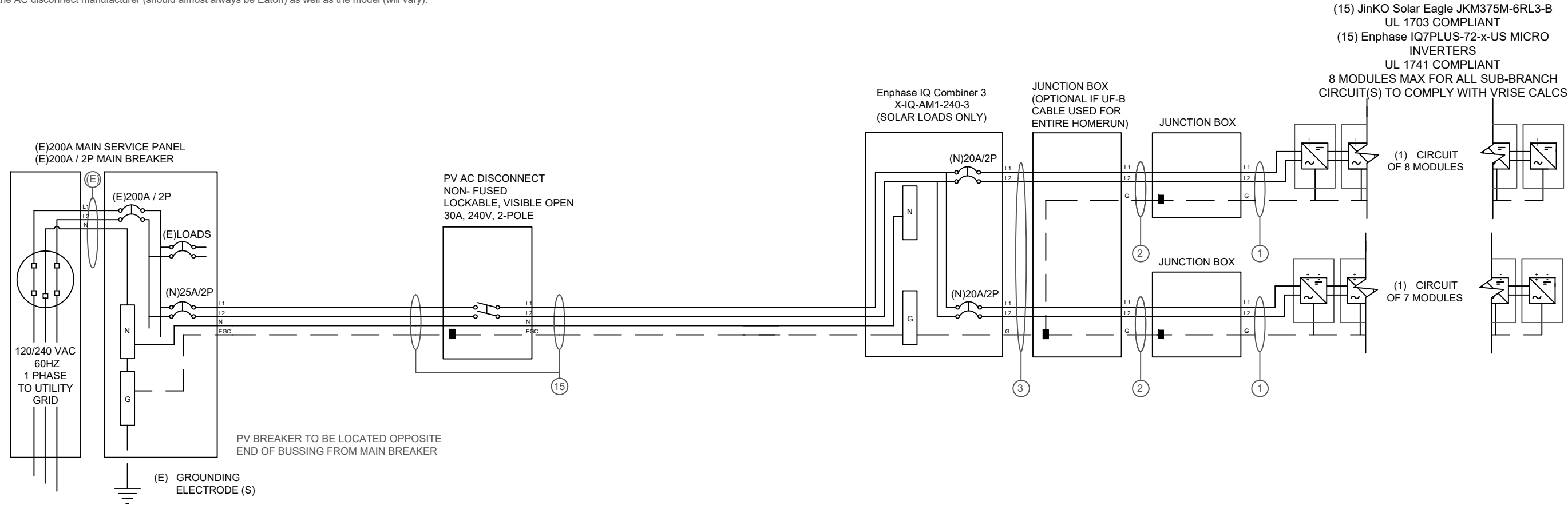


15	(1) 10 AWG THHN/THWN-2, CU., BLACK (L1)	18.2 A AC	3	(2) 12 - 2 UF-B W/G, THHN/THWN-2, SOLID CU.	MAX 9.7 A AC	2	(1) 12 - 2 UF-B (or NM) W/G, THHN/THWN-2, SO	MAX 9.7 A AC	1	(1) 12-2 TC-ER, THHN/THWN-2, CU.	MAX 9.7 A AC
	(1) 10 AWG THHN/THWN-2, CU., RED (L2)	240 V AC			240 V AC			240 V AC		(1) 6 AWG 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) 3/4 INCH EMT		EXTERIOR	(1) 1 1/2 INCH EMT		EXTERIOR			INTERIOR			EXTERIOR

ALL CONDUIT TO BE RAN AT LEAST 7/8 IN. ABOVE ROOF SURFACE WHERE EXPOSED TO SUNLIGHT.

AC disconnect to be located within 10' of Utility Meter.

the AC disconnect manufacturer (should almost always be Eaton) as well as the model (will vary).

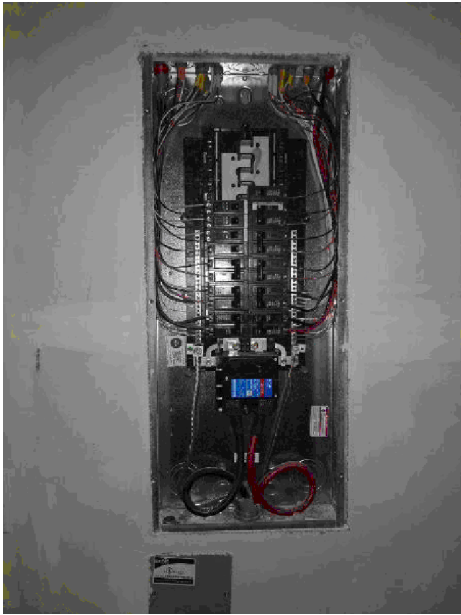
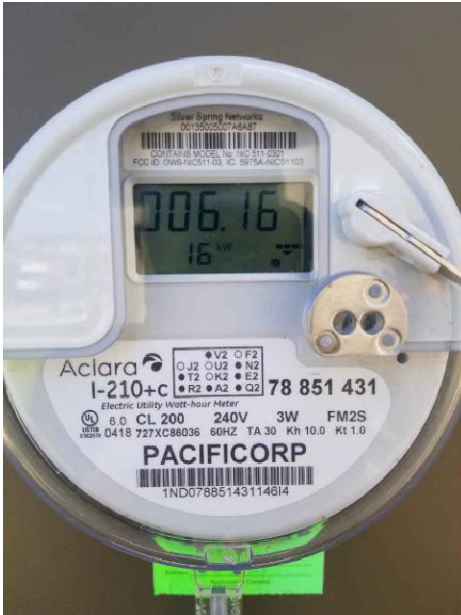


INTERCONNECTION NOTES

1. ONE OF THE METHODS THAT FOLLOWS SHALL BE USED TO DETERMINE THE RATINGS OF BUSBARS AND PANELBOARDS. (a) THE SUM OF 125 PERCENT OF THE INVERTER(S) OUTPUT CIRCUIT CURRENT AND THE RATING OF THE OVERCURRENT DEVICE PROTECTING THE BUSBAR SHALL NOT EXCEED THE AMPACITY OF THE BUS BAR. (b) WHERE TWO SOURCES, ONE THE UTILITY AND THE OTHER AN INVERTER ARE LOCATED AT OPPOSITE ENDS OF A BUSBAR THAT CONTAINS LOADS, THE SUM OF 125 PERCENT OF THE INVERTER(S) OUTPUT CIRCUIT CURRENT AND THE RATING OF THE OVERCURRENT DEVICE PROTECTING THE BUSBAR SHALL NOT EXCEED 120 PERCENT OF THE AMPACITY OF THE BUSBAR [NEC 705.12].

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



Utility Company: Pacific Power Permit Issuer: City of Albany



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PV INSTALLATION  
PROFESSIONAL  
Scott Gurney  
# PV-011719-015866

CONTRACTOR:  
BRS FIELD OPS  
385.498.6700

SITE INFORMATION:

Brandon Low  
4384 furlong ave SE  
Albany, Oregon 97322

DC SYSTEM SIZE: 5.625 kW DC

DRAWING BY  
ENPHASE ENERGY

DATE  
June 9, 2021

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SHEET NAME  
ELEC. 3 LINE DIAG.

PAGE NUMBER  
PV5

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MODULE SPECIFICATIONS	JinKO Solar Eagle JKM375M-6RL3-B
RATED POWER (STC)	375 W
MODULE VOC	44.12 V DC
MODULE VMP	36.8 V DC
MODULE IMP	10.19 A DC
MODULE ISC	11.01 A DC
VOC CORRECTION	-0.28 %/°C
VMP CORRECTION	-0.35 %/°C
SERIES FUSE RATING	20 A DC
ADJ. MODULE VOC @ ASHRAE LOW TEMP	48.2 V DC
ADJ. MODULE VMP @ ASHRAE 2% AVG. HIGH TEMP	31.6 V DC

MICROINVERTER SPECIFICATIONS	Enphase IQ7+ Microinverters
POWER POINT TRACKING (MPPT) MIN/MAX	22 - 60 V DC
MAXIMUM INPUT VOLTAGE	60 V DC
MAXIMUM DC SHORT CIRCUIT CURRENT	15 A DC
MAXIMUM USABLE DC INPUT POWER	440 W
MAXIMUM OUTPUT CURRENT	1.21 A AC
AC OVERCURRENT PROTECTION	20 A
MAXIMUM OUTPUT POWER	290 W
CEC WEIGHTED EFFICIENCY	97 %

AC PHOTOVOLATIC 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	Oregon
CITY	Albany
WEATHER STATION	CORVALLIS MUNI
ASHRAE EXTREME LOW TEMP (°C)	-8
ASHRAE 2% AVG. HIGH TEMP (°C)	33

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)	3000	2625				
TOTAL MODULE NUMBER	15 MODULES					
STC RATING OF ARRAY	5625W DC					
AC CURRENT @ MAX POWER POINT (IMP)	9.7	8.5				
MAX. CURRENT (IMP X 1.25)	12.1	10.5875				
OCPD CURRENT RATING PER CIRCUIT	20	20				
MAX. COMB. ARRAY AC CURRENT (IMP)	18.2					
MAX. ARRAY AC POWER	3600W 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)	45	12 Cu.	1.76	241.76	0.73%
VRISE SEC. 3 (COMBINER BOX TO POI)	10	10 Cu.	0.46	240.46	0.19%
TOTAL VRISE			3.15	243.15	

PHOTOVOLTAIC AC DISCONNECT OUTPUT LABEL (NEC 690.54)	
AC OUTPUT CURRENT	18.2 A AC
NOMINAL AC VOLTAGE	240 V AC

CONDUCTOR SIZE CALCULATIONS	
MICROINVERTER TO JUNCTION BOX (1)	MAX. SHORT CIRCUIT CURRRENT (ISC) = 9.7 A AC MAX. CURRENT (ISC X1.25) = 12.1 A AC CONDUCTOR (TC-ER, COPPER (90°C)) = 12 AWG CONDUCTOR RATING = 30 A AMB. TEMP. AMP. CORRECTION = 0.96 ADJUSTED AMP. = 28.8 > 12.1
JUNCTION BOX TO JUNCTION BOX (2)	MAX. SHORT CIRCUIT CURRENT (ISC) = 9.7 A AC MAX. CURRENT (ISC X1.25) = 12.1 A AC CONDUCTOR (UF-B, COPPER (60°C)) = 12 AWG CONDUCTOR RATING = 20 A CONDUIT FILL DERATE = 1 AMB. TEMP. AMP. CORRECTION = 0.96 ADJUSTED AMP. = 19.2 > 12.1
JUNCTION BOX TO COMBINER BOX (3)	MAX. SHORT CIRCUIT CURRENT (ISC) = 9.7 A AC MAX. CURRENT (ISC X1.25) = 12.1 A AC CONDUCTOR (UF-B, COPPER (60°C)) = 12 AWG CONDUCTOR RATING = 20 A CONDUIT FILL DERATE = 0.8 AMB. TEMP. AMP. CORRECTION = 0.96 ADJUSTED AMP. = 15.36 > 12.1
COMBINER BOX TO MAIN PV OCPD (15)	INVERTER RATED AMPS = 18.2 A AC MAX. CURRENT (RATED AMPS X1.25) = 22.69 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 > 22.7

GROUNDING NOTES

1. A GROUNDING ELECTRODE SYSTEM IN ACCORDANCE WITH [NEC 690-47] AND [NEC 250-50] THROUGH [NEC 250-60] SHALL BE PROVIDED. PER NEC, GROUNDING ELECTRODE SYSTEM OF EXISTING BUILDING MAY BE USED AND BONDED TO 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 250-64B. THE GROUNDING ELECTRODE CONDUCTOR WILL BE CONTINUOUS, EXCEPT FOR SPLICES OR JOINTS AT BUSBARS WITHIN LISTED EQUIPMENT PER [NEC 250.64C].
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 CONNECTIONS 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 SIZE ACCORDING TO [NEC 690.45] AND BE A MINIMUM OF #10AWG WHEN NOT EXPOSED TO DAMAGE (#6AWG 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 #8AWG WHEN INSULATED, #6AWG WHEN EXPOSED TO DAMAGE.
15. EXPOSED NON-CURRENT CARRYING METAL PARTS OF MODULE FRAMES, EQUIPMENTS, AND CONDUCTOR ENCLOSURES SHALL BE GROUNDED IN ACCORDANCE WITH 250.134 OR 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). 300.4
5. SOLADECK JUNCTION BOXES MOUNTED FLUSH W/ROOF SURFACE TO BE USED FOR WIRE MANAGEMENT AND AS FLASHED ROOF PENETRATIONS FOR INTERIOR CONDUIT RUNS.
6. ALL PV CABLES AND HOMERUN WIRES 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 690.13 AND 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).



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PV INSTALLATION  
PROFESSIONAL

Scott Gurney  
# PV-011719-015866

CONTRACTOR:  
BRS FIELD OPS  
385.498.6700

SITE INFORMATION:

Brandon Low  
4384 furlong ave SE  
Albany, Oregon 97322

DC SYSTEM SIZE: 5.625 kW DC

DRAWING BY  
ENPHASE ENERGY

DATE  
June 9, 2021

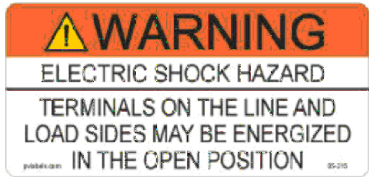
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364918

SHEET NAME  
ELEC. CALCS.

PAGE NUMBER  
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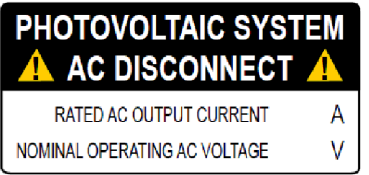




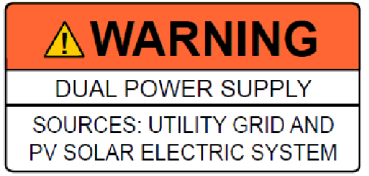
LABEL 1  
FOR PV DISCONNECTING MEANS WHERE ALL  
TERMINALS OF THE DISCONNECTING MEANS MAY BE  
ENERGIZED IN THE OPEN POSITION.  
[NEC 690.13(B), NEC 705.22]



LABEL 2  
AT EACH DC DISCONNECTING MEANS, INCLUDING THE  
DC DISCONNECT AT THE INVERTER.  
[NEC 690.53, NEC 690.13(B)]



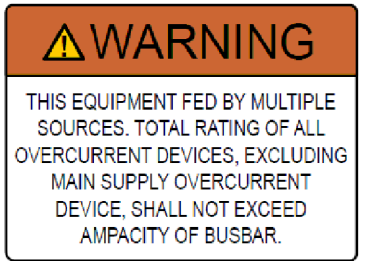
LABEL 3  
AT POINT OF INTERCONNECTION, MARKED AT AC  
DISCONNECTING MEANS.  
[NEC 690.54, NEC 690.13 (B)]



LABEL 4  
IF INTERCONNECTING ON THE LOAD SIDE, INSTALL THIS  
LABEL ANYWHERE THAT IS POWERED BY BOTH THE  
UTILITY AND THE SOLAR PV SYSTEM: THE MAIN SERVICE  
PANEL AND SUB-PANELS.  
[NEC 705.12(B)(3)]



LABEL 5  
PLACED ADJACENT TO THE BACK-FED BREAKER  
FROM THE INVERTER IF TIE IN CONSISTS OF LOAD  
SIDE CONNECTION TO BUSBAR.  
[NEC 705.12(B)(2)(3)(b)]



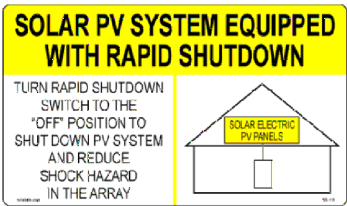
LABEL 6  
(ONLY IF 3 OR MORE SUPPLY SOURCES TO  
A BUSBAR)  
SIGN LOCATED AT LOAD CENTER IF IT  
CONTAINS 3 OR MORE POWER SOURCES.  
[NEC 705.12(B)(2)(3)(C)]



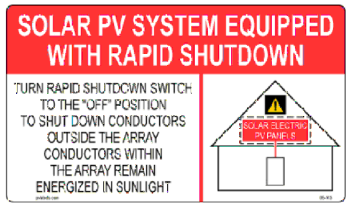
LABEL 7  
AT DIRECT-CURRENT EXPOSED RACEWAYS, CABLE TRAYS, COVERS  
AND ENCLOSURES OF JUNCTION BOXES, AND OTHER WIRING METHODS;  
SPACED AT MAXIMUM 10FT SECTION OR WHERE SEPARATED BY  
ENCLOSURES, WALLS, PARTITIONS, CEILINGS, OR FLOORS.  
[NEC 690.31(G)(3&4)]

LABELING NOTES:

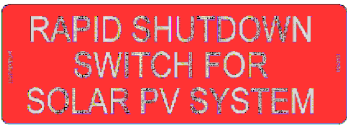
1. LABELS CALLED OUT ACCORDING TO ALL COMMON CONFIGURATIONS. ELECTRICIAN TO DETERMINE EXACT REQUIREMENTS IN THE FIELD PER CURRENT NEC AND LOCAL CODES AND MAKE APPROPRIATE ADJUSTMENTS.
2. LABELING REQUIREMENTS BASED ON THE 2017 NATIONAL ELECTRIC CODE, OSHA STANDARD 19010.145, ANSI Z535.
3. MATERIAL BASED ON THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
4. LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED AND SHALL NOT BE HANDWRITTEN [NEC 110.21]
5. LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8", WHITE ON RED BACKGROUND; REFLECTIVE, AND PERMANENTLY AFFIXED [IFC 605.11.1.1]



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)(A)]



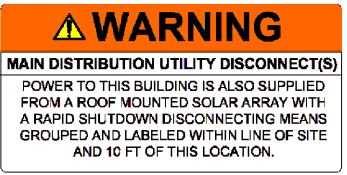
LABEL 9  
FOR PV SYSTEMS THAT ONLY SHUT DOWN  
CONDUCTORS LEAVING THE ARRAY:  
SIGN TO BE LOCATED ON OR NO MORE THAN 3  
FT AWAY FROM SERVICE DISCONNECTING  
MEANS TO WHICH THE PV SYSTEMS ARE  
CONNECTED AND SHALL INDICATE THE  
LOCATION OF ALL IDENTIFIED RAPID SHUTDOWN  
SWITCHES IF NOT AT THE SAME LOCATION.  
[NEC 690.56(C)(1)(B)]



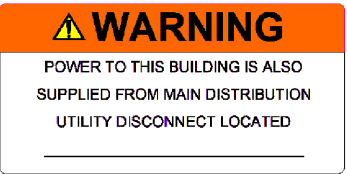
LABEL 10  
SIGN LOCATED AT RAPID SHUT DOWN  
DISCONNECT SWITCH [NEC 690.56(C)(3)].



LABEL 14  
SIGN LOCATED AT METER BASE PER  
PACIFIC POWER.



LABEL 11  
PERMANENT DIRECTORY TO BE LOCATED AT  
MAIN SERVICE EQUIPMENT LOCATION IF ALL  
ELECTRICAL POWER SOURCE DISCONNECTING  
MEANS (SOLAR ARRAY RAPID SHUTDOWN  
SWITCH) ARE GROUPED AND IN LINE OF SITE OF  
MAIN SERVICE DISCONNECTING MEANS.  
[NEC 690.56(C) & NEC 705.10].



LABEL 12  
PERMANENT DIRECTORY TO BE LOCATED AT  
SOLAR ARRAY RAPID SHUTDOWN SWITCH  
DENOTING THE LOCATION OF THE SERVICE  
EQUIPMENT LOCATION IF SOLAR ARRAY RAPID  
SHUT DOWN DISCONNECT SWITCH IS NOT  
GROUPED AND WITHIN LINE OF SITE OF MAIN  
SERVICE DISCONNECTING MEANS.  
[NEC 705.10]

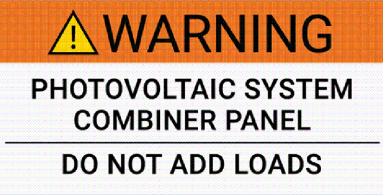


LABEL 13  
PERMANENT DIRECTORY TO BE LOCATED AT MAIN  
SERVICE EQUIPMENT DENOTING THE LOCATION  
OF THE PV RAPID SHUTDOWN SYSTEM  
DISCONNECTING MEANS IF SOLAR ARRAY RAPID  
SHUT DOWN DISCONNECT SWITCH IS NOT  
GROUPED AND WITHIN LINE OF SITE OF MAIN  
SERVICE DISCONNECTING MEANS. [NEC 705.10,  
NEC 690.56(C)(1)]

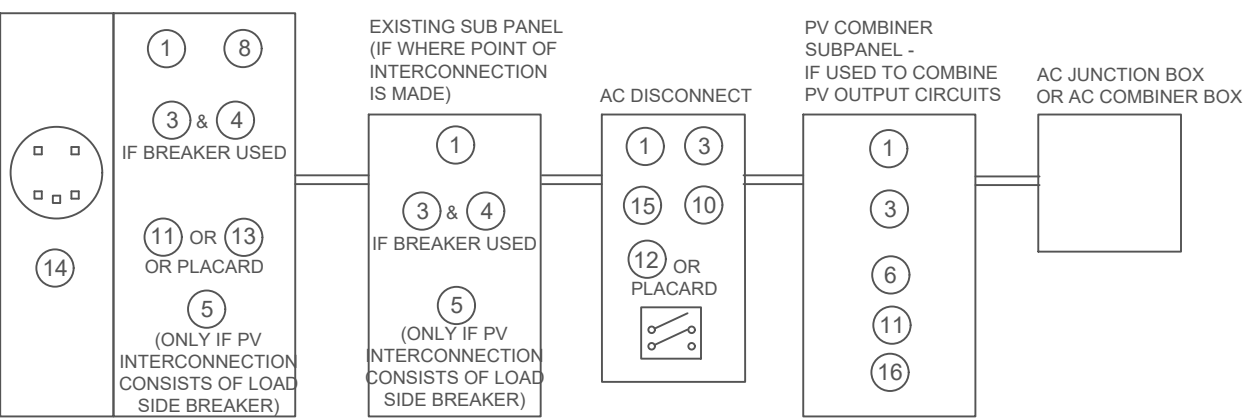


LABEL 15  
SIGN LOCATED AT AC DISCONNECT PER  
PACIFIC POWER.

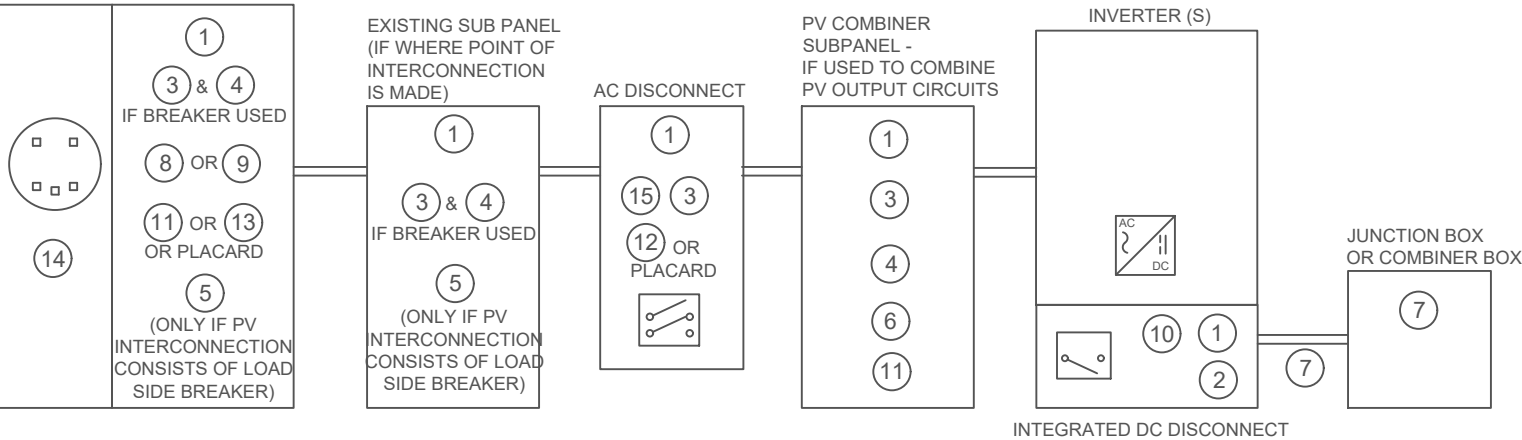
LABEL 16  
PERMANENT DIRECTORY TO BE LOCATED  
AC COMBINER PANEL [NEC 110.21(B)]



LABELING DIAGRAM FOR MICRO INV.:



LABELING DIAGRAM FOR STRING INV. / DC OPTIMIZER INV.:



\*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 PV5 OF 3 LINE DIAGRAM. PV5 LINE DIAGRAM TO REFLECT ACTUAL REPRESENTATION OF PROPOSED SCOPE OF WORK.



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CONTRACTOR:  
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SITE INFORMATION:  
Brandon Low  
4384 furlong ave SE  
Albany, Oregon 97322  
DC SYSTEM SIZE: 5.625 kW DC

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DATE  
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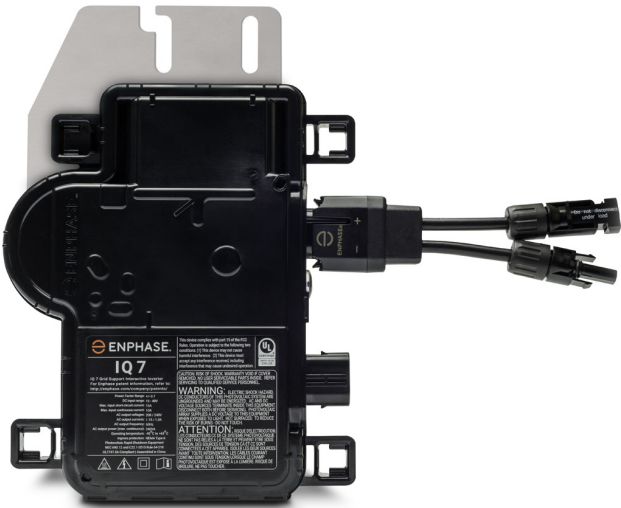
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# Enphase IQ 7 and IQ 7+ Microinverters

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

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

IQ Series Microinverters extend the reliability standards set forth by previous generations and undergo 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)

### Productive and Reliable

- Optimized for high powered 60-cell/120 half-cell and 72-cell/144 half-cell\* modules
- More than a million hours of testing
- Class II double-insulated enclosure
- UL listed

### Smart Grid Ready

- Complies with advanced grid support, voltage and frequency ride-through requirements
- Remotely updates to respond to changing grid requirements
- Configurable for varying grid profiles
- Meets CA Rule 21 (UL 1741-SA)

\* The IQ 7+ Micro is required to support 72-cell/144 half-cell modules.

## Enphase IQ 7 and IQ 7+ Microinverters

INPUT DATA (DC)		IQ7-60-2-US		IQ7PLUS-72-2-US	
Commonly used module pairings <sup>1</sup>		235 W - 350 W +		235 W - 440 W +	
Module compatibility		60-cell/120 half-cell PV modules only		60-cell/120 half-cell and 72-cell/144 half-cell PV modules	
Maximum input DC voltage		48 V		60 V	
Peak power tracking voltage		27 V - 37 V		27 V - 45 V	
Operating range		16 V - 48 V		16 V - 60 V	
Min/Max start voltage		22 V / 48 V		22 V / 60 V	
Max DC short circuit current (module Isc)		15 A		15 A	
Overvoltage class DC port		II		II	
DC port backfeed current		0 A		0 A	
PV array configuration		1 x 1 ungrounded array; No additional AC side protection required; AC side protection requires max 20 A per branch circuit		Additional DC side protection required; AC side protection requires max 20 A per branch circuit	
OUTPUT DATA (AC)		IQ 7 Microinverter		IQ 7+ Microinverter	
Peak output power		250 VA		295 VA	
Maximum continuous output power		240 VA		290 VA	
Nominal (L-L) voltage/range <sup>2</sup>		240 V / 211-264 V	208 V / 183-229 V	240 V / 211-264 V	208 V / 183-229 V
Maximum continuous output current		1.0 A (240 V)	1.15 A (208 V)	1.21 A (240 V)	1.39 A (208 V)
Nominal frequency		60 Hz		60 Hz	
Extended frequency range		47 - 68 Hz		47 - 68 Hz	
AC short circuit fault current over 3 cycles		5.8 Arms		5.8 Arms	
Maximum units per 20 A (L-L) branch circuit <sup>3</sup>		16 (240 VAC)	13 (208 VAC)	13 (240 VAC)	11 (208 VAC)
Overvoltage class AC port		III		III	
AC port backfeed current		18 mA		18 mA	
Power factor setting		1.0		1.0	
Power factor (adjustable)		0.85 leading ... 0.85 lagging		0.85 leading ... 0.85 lagging	
EFFICIENCY		@240 V	@208 V	@240 V	@208 V
Peak efficiency		97.6 %	97.6 %	97.5 %	97.3 %
CEC weighted efficiency		97.0 %	97.0 %	97.0 %	97.0 %
MECHANICAL DATA					
Ambient temperature range		-40°C to +65°C			
Relative humidity range		4% to 100% (condensing)			
Connector type		MC4 (or Amphenol H4 UTX with additional Q-DCC-5 adapter)			
Dimensions (HxWxD)		212 mm x 175 mm x 30.2 mm (without bracket)			
Weight		1.08 kg (2.38 lbs)			
Cooling		Natural convection - No fans			
Approved for wet locations		Yes			
Pollution degree		PD3			
Enclosure		Class II double-insulated, corrosion resistant polymeric enclosure			
Environmental category / UV exposure rating		NEMA Type 6 / outdoor			
FEATURES					
Communication		Power Line Communication (PLC)			
Monitoring		Enlighten Manager and MyEnlighten monitoring options. Both options require installation of an Enphase IQ Envoy.			
Disconnecting means		The AC and DC connectors have been evaluated and approved by UL for use as the load-break disconnect required by NEC 690.			
Compliance		CA Rule 21 (UL 1741-SA) UL 62109-1, UL1741/IEEE1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01 This product is UL Listed as PV Rapid Shut Down Equipment and conforms with NEC 2014, NEC 2017, and NEC 2020 section 690.12 and C22.1-2015 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according manufacturer's instructions.			

1. No enforced DC/AC ratio. See the compatibility calculator at <https://enphase.com/en-us/support/module-compatibility>.  
2. 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.



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SPEC SHEET

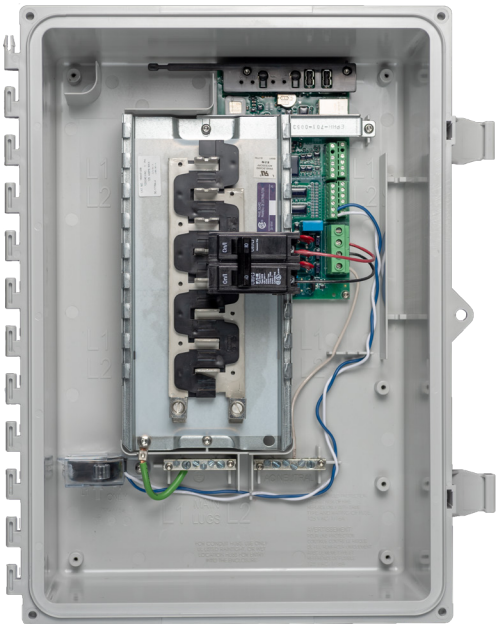
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# Enphase IQ Combiner 3 (X-IQ-AM1-240-3)

The **Enphase IQ Combiner 3™** with Enphase IQ Envoy™ consolidates interconnection equipment into a single enclosure and streamlines PV and storage installations by providing a consistent, pre-wired solution for residential applications. It offers up to four 2-pole input circuits and Eaton BR series busbar assembly.



### Smart

- Includes IQ Envoy for communication and control
- Flexible networking supports Wi-Fi, Ethernet, or cellular
- Optional AC receptacle available for PLC bridge
- Provides production metering and optional consumption monitoring

### Simple

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

### Reliable

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



To learn more about Enphase offerings, visit [enphase.com](https://enphase.com)

## Enphase IQ Combiner 3

MODEL NUMBER	
IQ Combiner 3 X-IQ-AM1-240-3	IQ Combiner 3 with Enphase IQ Envoy™ printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and optional* consumption monitoring (+/- 2.5%).
ACCESSORIES and REPLACEMENT PARTS (not included, order separately)	
Enphase Mobile Connect™ CELLMODEM-03 (4G/12-year data plan) CELLMODEM-01 (3G/5-year data plan) CELLMODEM-M1 (4G based LTE-M/5-year data plan) Consumption Monitoring* CT CT-200-SPLIT * Consumption monitoring is required for Enphase Storage Systems	Plug and play industrial grade cellular modem with data plan for systems up to 60 microinverters. (Available in the US, Canada, Mexico, Puerto Rico, and the US Virgin Islands, where there is adequate cellular service in the installation area.) Split core current transformers enable whole home <b>consumption</b> metering (+/- 2.5%).
Wireless USB adapter COMMS-KIT-01	Installed at the IQ Envoy. For communications with Enphase Encharge™ storage and Enphase Enpower™ smart switch. Includes USB cable for connection to IQ Envoy or Enphase IQ Combiner™ and allows redundant wireless communication with Encharge and Enpower.
Circuit Breakers BRK-10A-2-240 BRK-15A-2-240 BRK-20A-2P-240	Supports Eaton BR210, BR215, BR220, BR230, BR240, BR250, and BR260 circuit breakers. Circuit breaker, 2 pole, 10A, Eaton BR210 Circuit breaker, 2 pole, 15A, Eaton BR215 Circuit breaker, 2 pole, 20A, Eaton BR220
EPLC-01	Power line carrier (communication bridge pair), quantity - one pair
XA-PLUG-120-3	Accessory receptacle for Power Line Carrier in IQ Combiner 3 (required for EPLC-01)
XA-ENV-PCBA-3	Replacement IQ Envoy printed circuit board (PCB) for Combiner 3
ELECTRICAL SPECIFICATIONS	
Rating	Continuous duty
System voltage	120/240 VAC, 60 Hz
Eaton BR series busbar rating	125 A
Max. continuous current rating (output to grid)	65 A
Max. fuse/circuit rating (output)	90 A
Branch circuits (solar and/or storage)	Up to four 2-pole Eaton BR series Distributed Generation (DG) breakers only (not included)
Max. continuous current rating (input from PV)	64 A
Max. total branch circuit breaker rating (input)	80A of distributed generation / 90A with IQ Envoy breaker included
Production Metering CT	200 A solid core pre-installed and wired to IQ Envoy
MECHANICAL DATA	
Dimensions (WxHxD)	49.5 x 37.5 x 16.8 cm (19.5" x 14.75" x 6.63"). Height is 21.06" (53.5 cm with mounting brackets).
Weight	7.5 kg (16.5 lbs)
Ambient temperature range	-40° C to +46° C (-40° to 115° F)
Cooling	Natural convection, plus heat shield
Enclosure environmental rating	Outdoor, NRTL-certified, NEMA type 3R, polycarbonate construction
Wire sizes	• 20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors • 60 A breaker branch input: 4 to 1/0 AWG copper conductors • Main lug combined output: 10 to 2/0 AWG copper conductors • Neutral and ground: 14 to 1/0 copper conductors Always follow local code requirements for conductor sizing.
Altitude	To 2000 meters (6,560 feet)
INTERNET CONNECTION OPTIONS	
Integrated Wi-Fi	802.11b/g/n
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included)
Cellular	Optional, CELLMODEM-01 (3G) or CELLMODEM-03 (4G) or CELLMODEM-M1 (4G based LTE-M) (not included)
COMPLIANCE	
Compliance, Combiner	UL 1741, CAN/CSA C22.2 No. 107.1, 47 CFR, Part 15, Class B, ICES 003 Production metering: ANSI C12.20 accuracy class 0.5 (PV production)
Compliance, IQ Envoy	UL 60601-1/CANCSA 22.2 No. 61010-1

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2019-11-04



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OREM, UT 84097  
  
800-377-4480  
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THE MOST  
DEPENDABLE  
SOLAR BRAND

## EAGLE 66TR G4

370-390 WATT  
TILING RIBBON MONO MODULE

Positive power tolerance of 0~+3%

- NYSE-listed since 2010, Bloomberg Tier 1 manufacturer
- Best-selling panel globally for last 4 years
- Top performance in the strictest 3rd party labs
- 99.9% on-time delivery to the installer
- Premium solar panel factories in USA and Malaysia

### KEY FEATURES



#### TR Technology

Tiling Ribbon eliminates cell gaps  
to increase module efficiency and power.



#### 9BB Half Cell Technology

Uniquely designed 9 busbar mono half cut solar cells  
deliver ultra-high power in a small footprint.



#### Shade Tolerant

Twin array design allows continued performance  
even with shading by trees or debris.



#### Designed for Long Life

Uses the same DuPont protective film as the Space  
Station, Mars Lander, and jetliners.



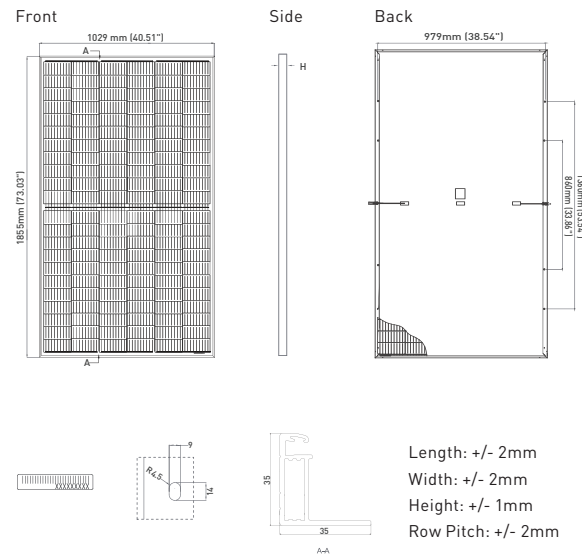
#### Leading Warranty

12-year product and 25-year linear power warranty;  
98% guaranteed first year, max 0.55% annual loss.

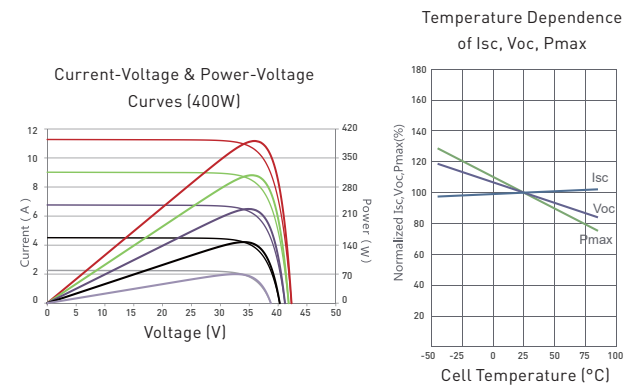
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### ENGINEERING DRAWINGS



### ELECTRICAL PERFORMANCE & TEMPERATURE DEPENDENCE



### ELECTRICAL CHARACTERISTICS

Module Type	JKM370M-6RL3-B		JKM375M-6RL3-B		JKM380M-6RL3-B		JKM385M-6RL3-B		JKM390M-6RL3-B	
	SCT	NOCT	SCT	NOCT	SCT	NOCT	SCT	NOCT	SCT	NOCT
Maximum Power (Pmax)	370Wp	275Wp	375Wp	279Wp	380Wp	283Wp	385Wp	286Wp	390Wp	290Wp
Maximum Power Voltage (Vmp)	36.71V	33.49V	36.80V	33.57V	36.90V	33.70V	37.02V	33.90V	37.15V	34.02V
Maximum Power Current (Imp)	10.08A	8.22A	10.19A	8.31A	10.30A	8.39A	10.40A	8.45A	10.50A	8.53A
Open-circuit Voltage (Voc)	44.02V	41.55V	44.12V	41.64V	44.22V	41.74V	44.34V	41.85V	44.47V	41.97V
Short-circuit Current (Isc)	10.90A	8.80A	11.01A	8.89A	11.12A	8.98A	11.22A	9.06A	11.32A	9.14A
Module Efficiency STC (%)	19.38%		19.65%		19.91%		20.17%		20.43%	

\*STC: ☀ Irradiance 1000W/m<sup>2</sup>

NOCT: ☀ Irradiance 800W/m<sup>2</sup>

🌡 Cell Temperature 25°C

🌡 Ambient Temperature 20°C

☁ AM = 1.5

☁ AM = 1.5

🌀 Wind Speed 1m/s

\*Power measurement tolerance: +/- 3%

The company reserves the final right for explanation on any of the information presented hereby. JKM370-390M-6RL3-B-D2-US

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385.498.6700



### MECHANICAL CHARACTERISTICS

Cells	Monocrystalline
No. of Cells	132 (6x22)
Dimensions	1855x1029x35mm (73.03x40.51x1.37 in)
Weight	21.3 kg (46.96 lbs)
Front Glass	3.2mm, Anti-Reflection Coating High Transmission, Low Iron, Tempered Glass
Frame	Anodized Aluminum Alloy
Junction Box	IP67 Rated
Output Cables	12 AWG, 1825mm (71.85in) or Customized Length
Connector	MC4
Fire Type	Type 1
Pressure Rating	5400Pa (Snow) & 2400Pa (Wind)

### TEMPERATURE CHARACTERISTICS

Temperature Coefficients of Pmax	-0.35%/°C
Temperature Coefficients of Voc	-0.28%/°C
Temperature Coefficients of Isc	0.048%/°C
Nominal Operating Cell Temperature (NOCT)	45 ± 2°C

### MAXIMUM RATINGS

Operating Temperature (°C)	-40°C~+85°C
Maximum System Voltage	1000VDC
Maximum Series Fuse Rating	20A

### PACKAGING CONFIGURATION

2 pallets = 1 stack; 31pcs/pallets, 62pcs/stack, 744pcs/ 40'HQ Container

- ISO9001:2008 Quality Standards
- ISO14001:2004 Environmental Standards
- IEC61215, IEC61730 certified products
- UL1703/61730 certified products (pending)
- ISO45001:2018 Occupational Health & Safety Standards

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Powering Business Worldwide

pe.eaton.com

Eaton general duty non-fusible safety switch

DG221UGB

UPC:782113120102

Dimensions:

- Height: 10.69 IN
- Length: 6.88 IN
- Width: 6.38 IN

Weight:6 LB

Notes:WARNING! Switch is not approved for service entrance unless a neutral kit is installed.

Warranties:

- Eaton Selling Policy 25-000, one (1) year from the date of installation of the Product or eighteen (18) months from the date of shipment of the Product, whichever occurs first.

Specifications:

- Type: Non-fusible, single-throw
- Amperage Rating: 30A
- Enclosure: NEMA 1, Indoor
- Enclosure Material: Painted steel
- Fuse Configuration: Non-fusible
- Number Of Poles: Two-pole
- Number Of Wires: Two-wire
- Product Category: General duty safety switch
- Voltage Rating: 240V

Supporting documents:

- [Eatons Volume 2-Commercial Distribution](#)
- [Eaton Specification Sheet - DG221UGB](#)

Certifications:

- UL Listed

Product compliance: No Data



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Basic Features

- Stamped Seamless Construction
- 18 Gauge Galvanized Steel
- Powder Coated Surfaces
- Flashes into the roof deck
- 3 Roof deck knockouts .5", .75", 1"
- 5 Centering dimples for entry/exit fittings or conduit
- 2 Position Ground lug installed
- Mounting Hardware Included



SolaDeck Model SD 0783



SolaDeck UL50 Type 3R Enclosures

Available Models:  
Model SD 0783 - (3" fixed Din Rail)  
Model SD 0786 - (6" slotted Din Rail)



SolaDeck UL 1741 Combiner/Enclosures

Models SD 0783-41 and SD 0786-41 are labeled and ETL listed UL STD 1741 according to the UL STD 1741 for photovoltaic combiner enclosures.  
Max Rated - 600VDC, 120AMPS

Model SD 0783-41 3" Fixed Din Rail fastened using Norlock System

\*\*Typical System Configuration

- 4- Din Rail Mounted Fuse Holders 600VDC 30 AMP
- 1- Power Distribution Block 600VDC 175AMP
- 1- Bus Bar with UL lug

Model SD 0786-41 6" Slotted Din Rail fastened using steel studs

\*\*Typical System Configuration

- 4- Din Rail Mounted Fuse Holders 600VDC 30 AMP
- 4- Din Rail Mounted Terminal Blocks
- Bus Bars with UL lug

\*\*Fuse holders and terminal blocks added in the field must be UL listed or recognized and meet 600 VDC 30 AMP 110C for fuse holders, 600V 50 AMP 90C for rail mounted terminal blocks and 600 V 175 AMP 90C for Power Distribution Blocks. Use Copper Wire Conductors.



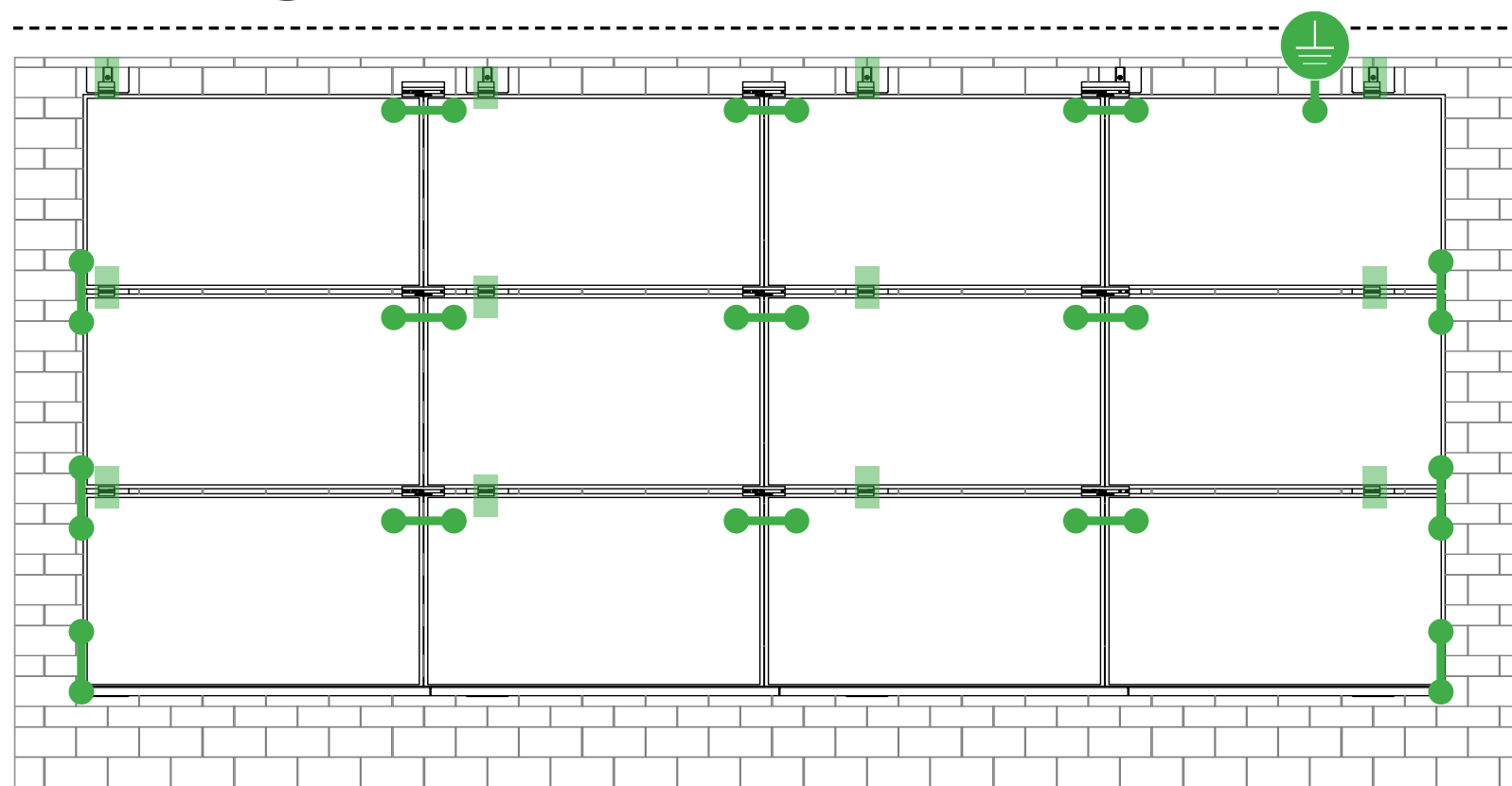
Cover is trimmed to allow conduit or fittings, base is center dimpled for fitting locations.



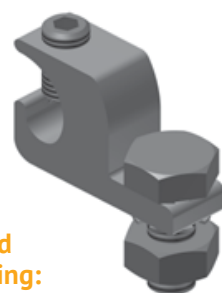
Model SD 0783-41, wired with Din Rail mounted fuse holders, bus bar and power distribution block.



Model SD 0786-41, wired with Din Rail mounted fuse holders, terminal blocks and bus bars.

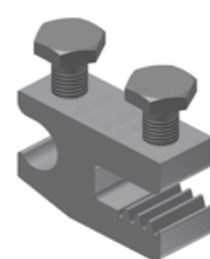


Star Washer is  
Single Use Only

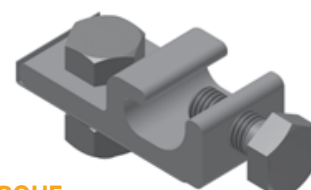


**TERMINAL TORQUE,**  
Install Conductor and  
torque to the following:  
4-6 AWG: 35in-lbs  
8 AWG: 25 in-lbs  
10-14 AWG: 20 in-lbs

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



WEEBLUG  
Single Use Only



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

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

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

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

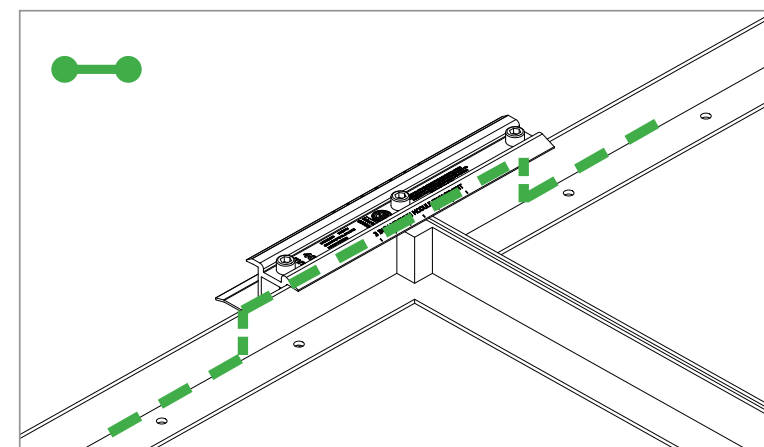
- 1/4" mounting hardware
- Torque = 75 in-lb
- AWG 4-14- Solid or Stranded

**LUG DETAIL & TORQUE INFO**  
**Wiley WEEBLug (6.7)**

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

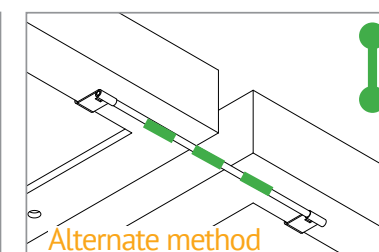
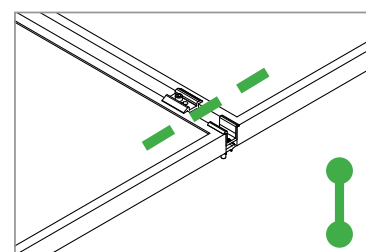
**NOTE: ISOLATE COPPER FROM ALUMINUM CONTACT TO PREVENT CORROSION**

**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.**



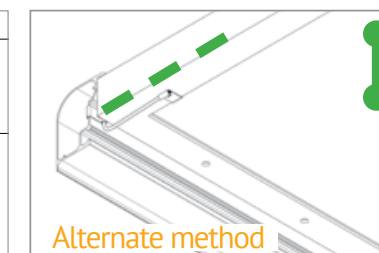
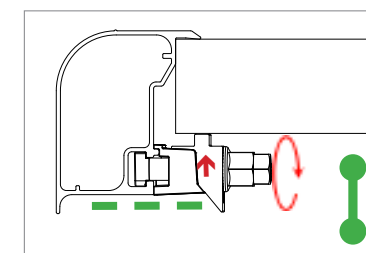
## E-W BONDING PATH:

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 )



# UL CODE COMPLIANCE NOTES

## INSTALLATION GUIDE

### R PAGE

### 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

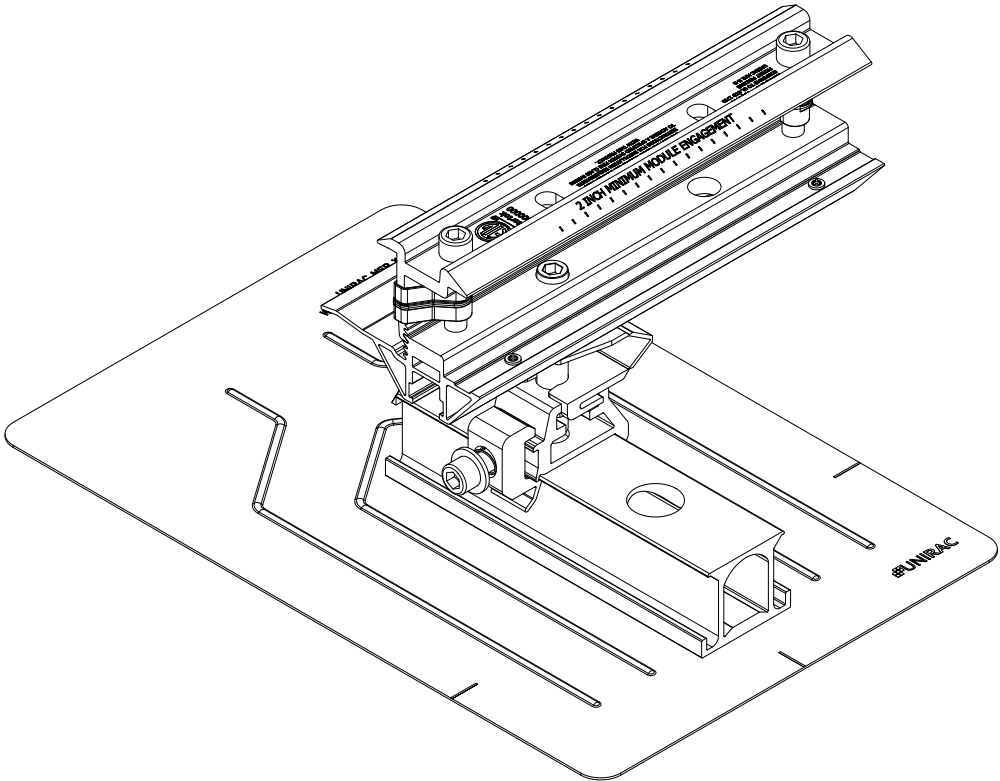
### UL2703 TEST MODULES

See page "S" 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 = 22.3 sqft
- UL2703 Design Load Ratings:
  - a) Downward Pressure – 113 PSF / 5400 Pa
  - b) Upward Pressure – 50 PSF / 2400 Pa
  - c) Down-Slope Load – 30 PSF / 1400 Pa
- Tested Loads:
  - a) Downward Pressure – 170 PSF / 8000 Pa
  - b) Upward Pressure – 75 PSF / 3500 Pa
  - c) Down-Slope Load – 45 PSF / 2100 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

### 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.



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TESTED / CERTIFIED MODULE LIST

INSTALLATION GUIDE : PAGE

Manufacture	Module Model / Series
Aleo	P-Series
Astronergy	CHSM6612P, CHSM6612P/HV, CHSM6612M, CHSM6612M/HV, CHSM6610M (BL)(BF)/(HF), CHSM72M-HC
Auxin	AXN6M610T, AXN6P610T, AXN6M612T & AXN6P612T
Axitec	AXI Power, AXI Premium, AXI Black Premium
Boviet	BVM6610, BVM6612
BYD	P6K & MHK-36 Series
Canadian Solar	CS6V-M, CS6P-P, CS6K-M, CS5A-M, CS6K-MS, CS6U-P, CS6U-M, CS6X-P, CS6K-MS, CS6K-M, CS6K-P, CS6P-P, CS6P-M, CS3U-P, CS3U-MS, CS3K-P, CS3K-MS, CS1K-MS, CS3K, CS3U, CS3U-MB-AG, CS3K-MB-AG, CS6K, CS6U, CS3L, CS3W, CS1H-MS, CS1U-MS
Centrosolar America	C-Series & E-Series
CertainTeed	CT2xxMxx-01, CT2xxPxx-01, CTxxxMxx-02, CTxxxM-03, CTxxxMxx-04, CTxxxHC11-04
Dehui	DH-60M
Eco Solargy	Orion 1000 & Apollo 1000
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
HT Solar	HT60-156(M) (NDV) (-F), HT 72-156(M/P)
Hyundai	KG, MG, TG, RI, RG, TI, MI, HI & KI Series
ITEK	iT, iT-HE & iT-SE Series
Japan Solar	JPS-60 & JPS-72 Series

Manufacture	Module Model / 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
Jinko	JKM & JKMS Series
Kyocera	KU Series
LG Electronics	LG xxx S1C-A5, LG xxx N1C-A5, LGxxxQ1C(Q1K)-A5, LGxxxN1C(N1K)-A5, LGxxxS1CA5, LGxxxA1C-A5, LGxxxN2T-A4, LGxxxN2T-A5, LGxxxN2W-A5 LGxxxS2W-A5, LGxxxE1C-A5, LGxxxS2W-G4 LGxxxN1C(N1K)-G4, LGxxxN2W-G4, LGxxxS1C-G4, LGxxxE1K-A5, LGxxxN2T-J5, LGxxxN1K(N1C)-V5, LGxxxQ1C(N2W)-V5,
LONGi	LR6-60 & LR6-72 Series, LR4-60 & LR4-72 Series
Mission Solar Energy	MSE Series
Mitsubishi	MJE & MLE Series
Neo Solar Power Co.	D6M & D6P Series
Panasonic	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
Q.Cells	Plus, Pro, Peak, G3, G4, G5, G6(+), G7, G8(+) Pro, Peak L-G2, L-G4, L-G5, L-G6, L-G7

Manufacture	Module Model / Series
REC	PEAK Energy Series, PEAK Energy BLK2 Series, PEAK Energy 72 Series, TwinPeak 2 Series, TwinPeak 2 BLK2 Series, TwinPeak Series
Renesola	Vitrus2 Series & 156 Series
Risen	RSM Series
S-Energy	SN72 & SN60 Series (40mm)
Seraphim	SEG-6 & SRP-6 Series
Sharp	NU-SA & NU-SC Series
Silfab	SLA, SLG & BC Series
Solaria	PowerXT
SolarWorld	Sunmodule Protect, Sunmodule Plus
Sonali	SS 230 - 265
Suntech	STP
Suniva	MV Series & Optimus Series
Sun Edison/Flextronics	F-Series, R-Series & FLEX FXS Series
SunPower	X-Series, E-Series & P-Series
Talesun	TP572, TP596, TP654, TP660, TP672, Hipor M, Smart
Tesla	SC, SC B, SC B1, SC B2
Trina	PA05, PD05, DD05, DE06, DD06, PE06, PD14, PE14, DD14, DE14, DE15, PE15H
Upsolar	UP-MxxxP(-B), UP-MxxxM(-B)
URE	D7MxxxH8A, D7KxxxH8A, D7MxxxH7A
Vikram	Eldora, Solivo, Somera
Waaree	AC & Adiya Series
Winaico	WST & WSP Series
Yingli	YGE & YLM Series

Please see the SFM UL2703Construction 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 32mm and more than 40mm. See page J for further information.



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**Applicant:** Unirac, Inc

**Manufacturer:**

**Address:** 1411 Broadway Blvd NE  
Albuquerque, NM 87102

**Address:**

**Country:** USA  
**Contact:** Klaus Nicolaedis  
Todd Ganshaw

**Country:**  
**Contact:**

**Phone:** 505-462-2190  
505-843-1418  
**FAX:** NA  
**Email:** klaus.nicolaedis@unirac.com  
toddg@unirac.com

**Phone:**  
**FAX:**  
**Email:**

**Party Authorized To Apply Mark:** Same as Manufacturer  
**Report Issuing Office:** Lake Forest, CA

**Control Number:** 5003705

**Authorized by:**

*Claudia Ladynski*  
for L. Matthew Snyder, Certification Manager



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545 East Algonquin Road, Arlington Heights, IL 60005  
Telephone 800-345-3851 or 847-439-5667 Fax 312-283-1672

<b>Standard(s):</b>	Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels [UL 2703: 2015 Ed.1]
	Photovoltaic Module Racking Systems [CSA LTR AE-001:2012 Ed.2012/10/23]
<b>Product:</b>	Photovoltaic Mounting System, Sun Frame Microrail Installation Guide, PUB2020MAY04
<b>Brand Name:</b>	Unirac
<b>Models:</b>	Unirac SFM

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**Contact:** Klaus Nicolaedis  
Todd Ganshaw  
**Phone:** 505-462-2190  
505-843-1418  
**FAX:** NA  
**Email:** klaus.nicolaedis@unirac.com  
toddg@unirac.com

**Country:**  
**Contact:**  
**Phone:**  
**FAX:**  
**Email:**

**Party Authorized To Apply Mark:** Same as Manufacturer  
**Report Issuing Office:** Lake Forest, CA

**Control Number:** 5003705

**Authorized by:**

*Claudia Ladynski*  
for L. Matthew Snyder, Certification Manager



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Telephone 800-345-3851 or 847-439-5667 Fax 312-283-1672

<b>Standard(s):</b>	Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels [UL 2703: 2015 Ed.1]
	Photovoltaic Module Racking Systems [CSA LTR AE-001:2012 Ed.2012/10/23]
<b>Product:</b>	Photovoltaic Mounting System, Sun Frame Microrail Installation Guide, PUB2020MAY04
<b>Brand Name:</b>	Unirac
<b>Models:</b>	Unirac SFM



1403 N RESEARCH WAY, BUILDING J  
OREM, UT 84097

800-377-4480  
WWW.BLUERAVENSOLAR.COM

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CONTRACTOR:  
BRS FIELD OPS  
385.498.6700

SHEET NAME

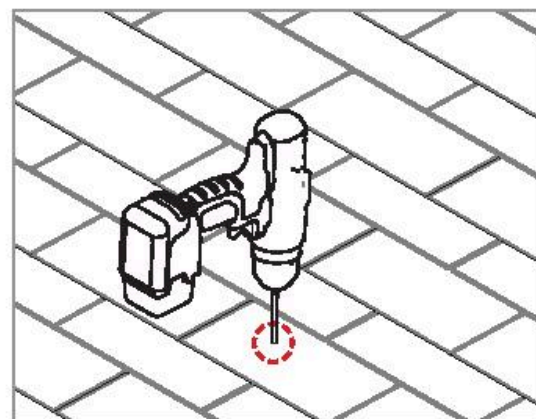
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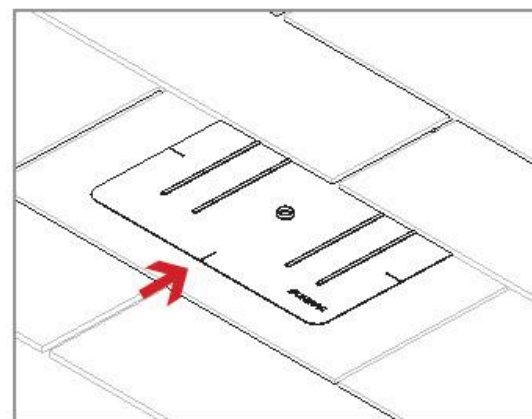
REVISION

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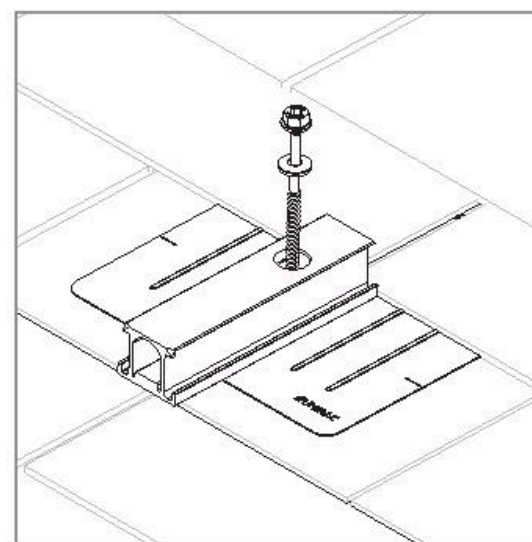
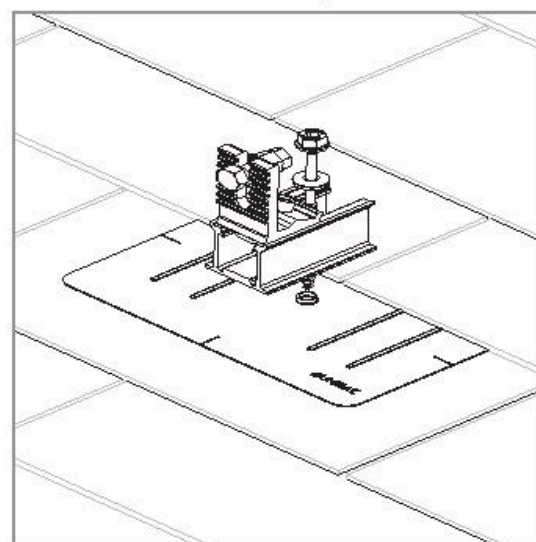
### PILOT HOLES:

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.

