Scott E. Wyssling, PE, PP, CME

*Wyssling Consulting*
*76 North Meadowbrook Drive*
*Alpine, UT 84004*
*office (201) 874-3483*
*swyssling@wysslingconsulting.com*

July 14, 2021

Scott Wyssling PE

Digitally signed by Scott Wyssling PE
DN: C=US, S=Utah, L=Alpine, O=Scott Wyssling PE, CN=Scott Wyssling PE, E=swyssling@wysslingconsulting.com
Reason: I am the author of this document
Location: your signing location here
Date: 2021.07.14 08:02:47-04'00'
Foxit PhantomPDF Version: 10.1.3

Jacob Humpherys, COO
Meraki Solutions
30700 Wekiva River Road
Sorrento, FL 32776

Re: Engineering Services
Polk Residence
364 SW Worry Free Glen, Fort White, FL
10.890 kW System

Dear Mr. Humphreys:

Pursuant to your request, we have reviewed the following information regarding solar panel installation on the roof of the above referenced home:

1. Site Visit/Verification Form prepared by a Meraki Solutions representative identifying specific site information including size and spacing of rafters for the existing roof structure.
2. Design drawings of the proposed system including a site plan, roof plan and connection details for the solar panels. This information was prepared by Meraki Solutions and will be utilized for approval and construction of the proposed system.
3. Photographs of the interior and exterior of the roof system identifying existing structural members and their conditions.

Based on the above information we have evaluated the structural capacity of the existing roof system to support the additional loads imposed by the solar panels and have the following comments related to our review and evaluation:

***Description of Residence:***

The existing residence is a wood framing construction with the roof system consisting of 2 x 4 dimensional lumber at 24" on center with perpendicular 2 x 6 lumber at 24" on center providing additional support. The attic space is unfinished and photos indicate that there was free access to visually inspect the size and condition of the roof rafters. All wood material utilized for the roof system is assumed to be Spruce Pine Fir #2 or better with standard construction components. The existing roofing material consists of metal roofing.

***A. Loading Criteria Used***

- 160 MPH wind loading based on ASCE 7-16 Exposure Category "C" at a slope of 9 degrees
- 7 PSF = Dead Load roofing/framing Live Load = 20 PSF/ 0 PSF(where panels are installed)
- 3 PSF = Dead Load solar panels/mounting hardware

*Total Dead Load =10 PSF*

*The above values are within acceptable limits of recognized industry standards for similar structures in accordance with the (FBC 2020, 7th Edition). Analysis performed of the existing roof structure utilizing the above loading criteria indicates that the existing rafters will support the additional panel loading without damage, if installed correctly.*

***B. Solar Panel Anchorage***

1. The solar panels shall be mounted in accordance with the most recent "*EZ Grip Metal Deck Mount Installation Manual*", which can be found on the Sunmodo website (*http://sunmodo.com/*). If during solar panel installation, the roof framing members appear unstable or deflect non-uniformly, our office should be notified before proceeding with the installation.
2. System will be attached to the metal roofing material utilizing the patented EZ Grip connection. Installation of the connections shall be in accordance with the manufacturer's recommendations.
3. Considering the roof slopes, the size, spacing, condition of roof, the panel supports shall be placed no greater than 48" o/c.

Based on the above evaluation, it is the opinion of this office that with appropriate panel anchors being utilized the roof system will adequately support the additional loading imposed by the solar panels. This evaluation is in conformance with the FBC 2020, 7th Edition, current industry and standards, and based on information supplied to us at the time of this report.

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

Very truly yours,

Scott E. Wyssling, PE
Florida License No. 81558


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## AERIAL VIEW:

## MAP VIEW:


MERAKI
ZERO DOWN SOLAR

CONTRACTOR INFORMATION:
Meraki Installers
484-663-3792
21 N New Warrington Rd
Pensacola, FL 32507
License # CVC57044

## SITE INFORMATION

**Larry R Polk**
364 SW Worry Free Glen
Fort White, FL 32038
AC SYSTEM SIZE: 10 kW AC
DC SYSTEM SIZE: 10.89 kW DC
Lat, 29.85192541
Long, -82.68799818
(33) TSM-DD06M.05(II) 330 PV MODULES

(1) SolarEdge SE10000H-US (240V) INVERTER(S)
Clay Electric Cooperative

## GENERAL NOTES

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

## PHOTOVOLTAIC (PV) SYSTEM SPECIFICATIONS

EQUIPMENT:
AC SYSTEM SIZE: 10 kW AC
DC SYSTEM SIZE: 10.89 kW DC
(33) TSM-DD06M.05(II) 330 PV MODULES
(1) SolarEdge SE10000H-US (240V) INVERTER(S)
RACKING: IronRidge - 48" O.C.

SCOTT E. WYSSLING LICENSE NO. PE81858 STATE OF FLORIDA PROFESSIONAL ENGINEER

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## APPLICABLE GOVERNING CODES

2017 NEC
2018 IRC
2018 IBC
2018 IEBC
2020 FBC 7th Edition

## SITE SPECIFICATIONS

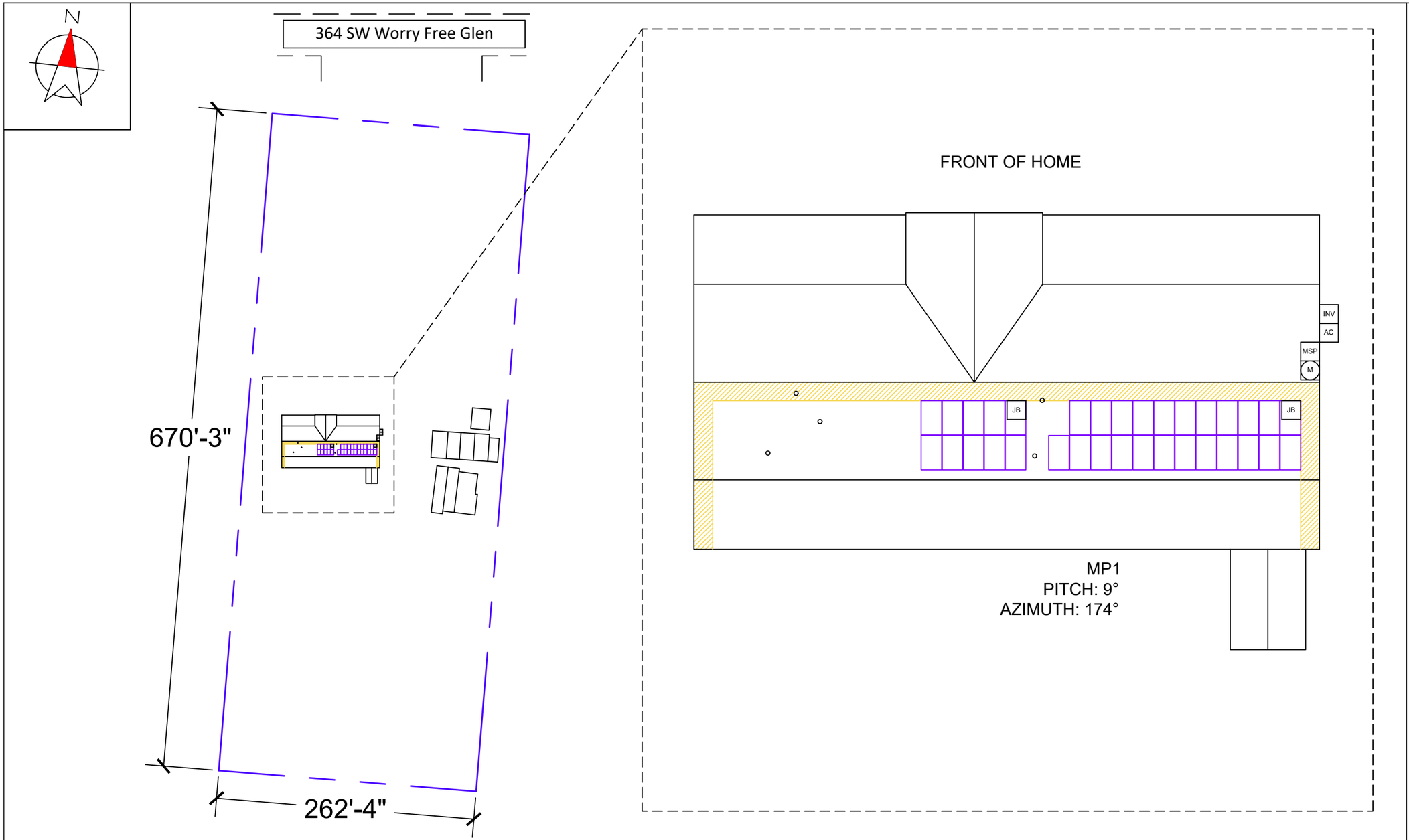
OCCUPANCY: R-3
ZONING: RESIDENTIAL

## SHEET INDEX:



DRAWN BY: SoloCAD

DATE:
July 13, 2021

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Clay Electric Cooperative

## ENGINEER STAMP

(IF APPLICABLE)

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## EQUIPMENT LEGEND:

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

FIRE ACCESS PATHWAY (3' TYP)
PROPERTY LINE
BATT BATTERY(IES)

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

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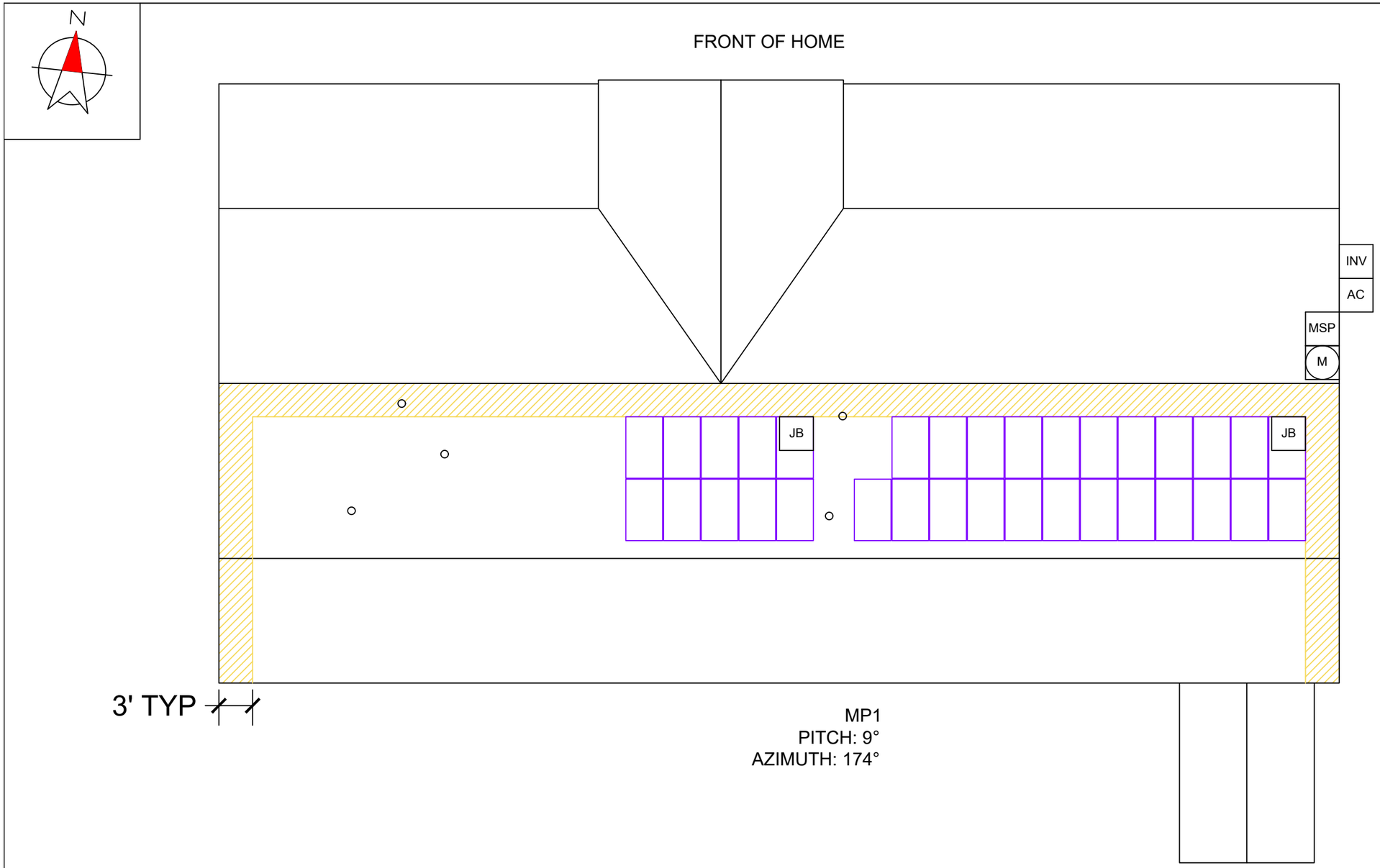
DATE: July 13, 2021

SITE PLAN - PV02




MERAKI
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## EQUIPMENT LEGEND:

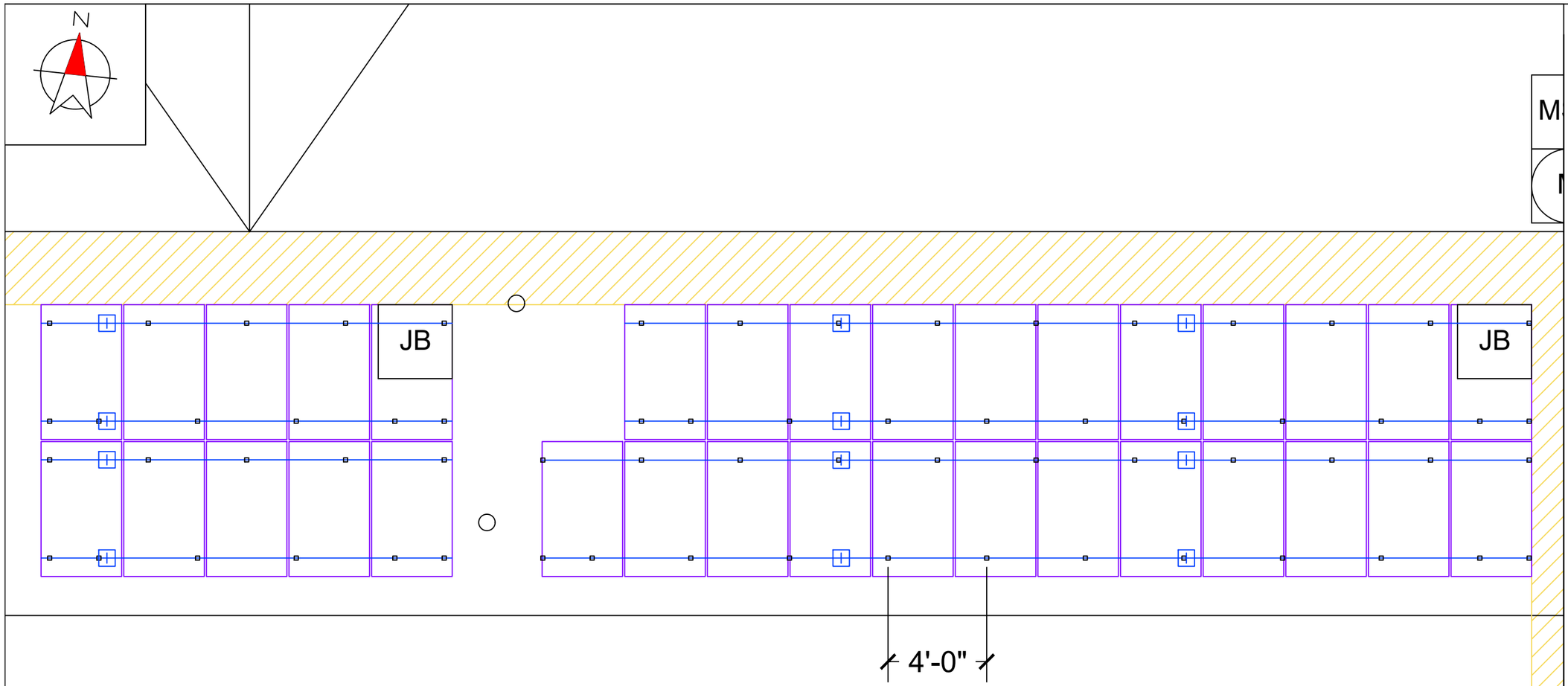
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| M | UTILITY METER | AC | VISIBLE, LOCKABLE, LABELED AC DISCONNECT | INV | INVERTER | SUB | SUB PANEL | | FIRE ACCESS PATHWAY (3' TYP) |
| MSP | MAIN SERVICE PANEL | PV | METER SOCKET (FOR UTILITY PV METER) | C | COMBINER BOX | LC | LOAD CENTER | BATT | BATTERY(IES) |

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

DRAWN BY: SoloCAD

DATE: July 13, 2021

ROOF PLAN - PV03




| EQUIPMENT INFORMATION: | |
|---|---|
| RAIL MANUFACTURER | IronRidge |
| RAIL PART NUMBER | XR-100 |
| ATTACHMENTS | EZ Grip Metal Deck Mount |
| ATTACHMENT QTY | 66 |
| SPLICE QTY | 12 |
| MIDCLAMP QTY | 58 |
| ENDCLAMP QTY | 16 |

| ROOF INFO: | |
|---|---|
| ROOF TYPE | trap_metal |
| ROOF FRAMING | traditional_framing |
| RAFTER/TOP CHORD SIZE | 2x4 |
| RAFTER/TOP CHORD SPACING | 24" |
| ATTACHMENT SPACING | 48 |

| PHOTOVOLTAIC ARRAY STRUCTURAL CRITERIA: | |
|---|---|
| PV MODULE COUNT: | 33 |
| ARRAY AREA: | MODULE COUNT * 18.06ft² = 595.98 |
| ROOF AREA: | 5503 ft² |
| PERCENT OF ROOF COVERED: | 11% |
| ARRAY WEIGHT: | MODULE COUNT * 50lbs = 1650 |
| DISTRIBUTED LOAD: | ARRAY LBS/ATTACHMENTS = 25 |
| POINT LOAD: (lbs/ft²) | (ARRAY) WEIGHT/AREA = 2.77 lbs/ft² |

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ZERO DOWN SOLAR

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(1) SolarEdge SE10000H-US (240V)
INVERTER(S)
Clay Electric Cooperative

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DATE:
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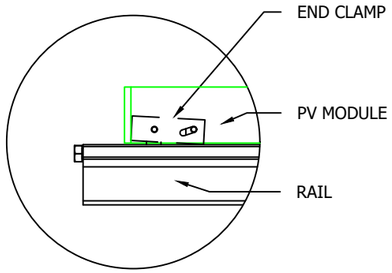
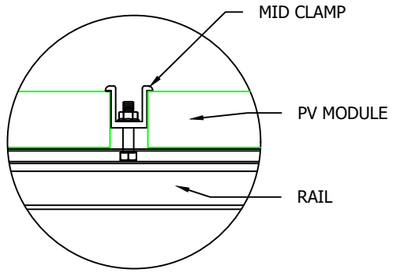
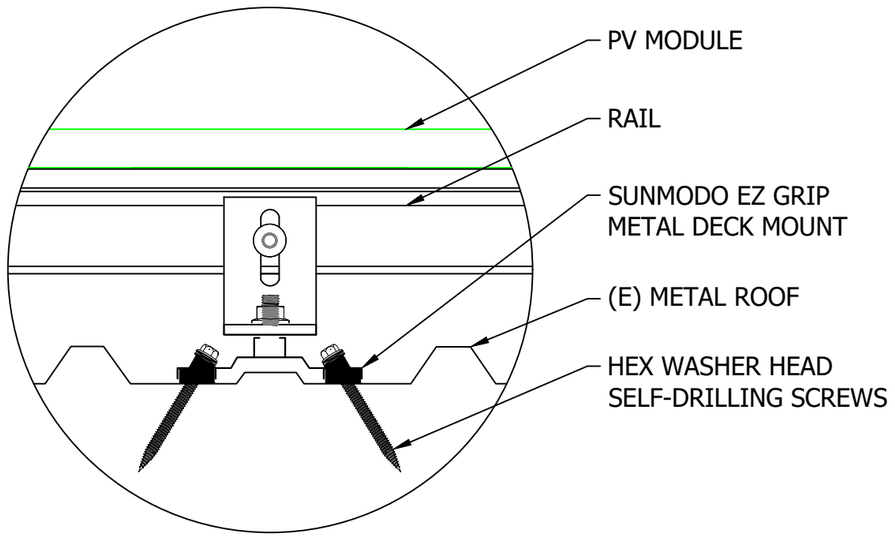
ROOF ATTACHMENTS - PV04



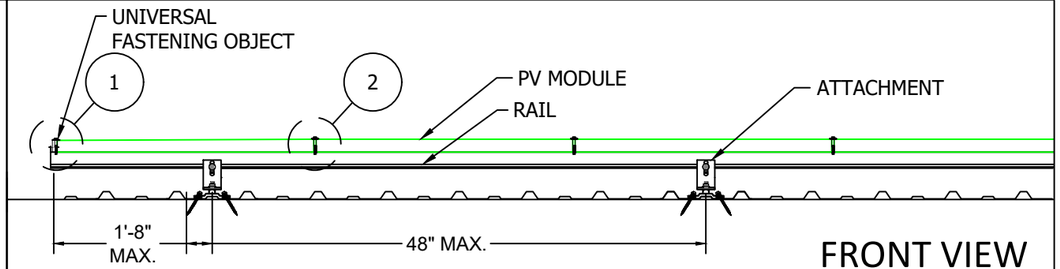

1 END CLAMP DETAILS



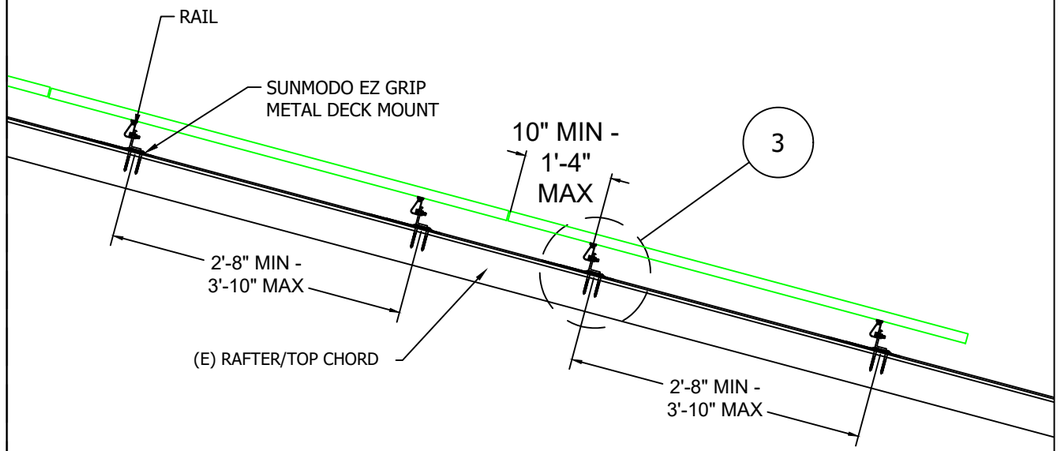

2 MID CLAMP DETAILS




3 FRONT DETAIL




FRONT VIEW




SIDE VIEW

| EQUIPMENT INFORMATION: | |
|---|---|
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| RAIL PART NUMBER | XR-100 |
| ATTACHMENTS | EZ Grip Metal Deck Mount |
| ATTACHMENT QTY | 66 |
| SPLICE QTY | 12 |
| MIDCLAMP QTY | 58 |
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| ATTACHMENT SPACING | 48 |

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| ROOF AREA: | 5503 ft² |
| PERCENT OF ROOF COVERED: | 11% |
| ARRAY WEIGHT: | MODULE COUNT * 50lbs = 1650 |
| DISTRIBUTED LOAD: | ARRAY LBS/ATTACHMENTS = 25 |
| POINT LOAD: (lbs/ft²) | (ARRAY) WEIGHT/AREA = 2.77 lbs/ft² |

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ZERO DOWN SOLAR

CONTRACTOR INFORMATION:
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(1) SolarEdge SE10000H-US (240V) INVERTER(S)
Clay Electric Cooperative

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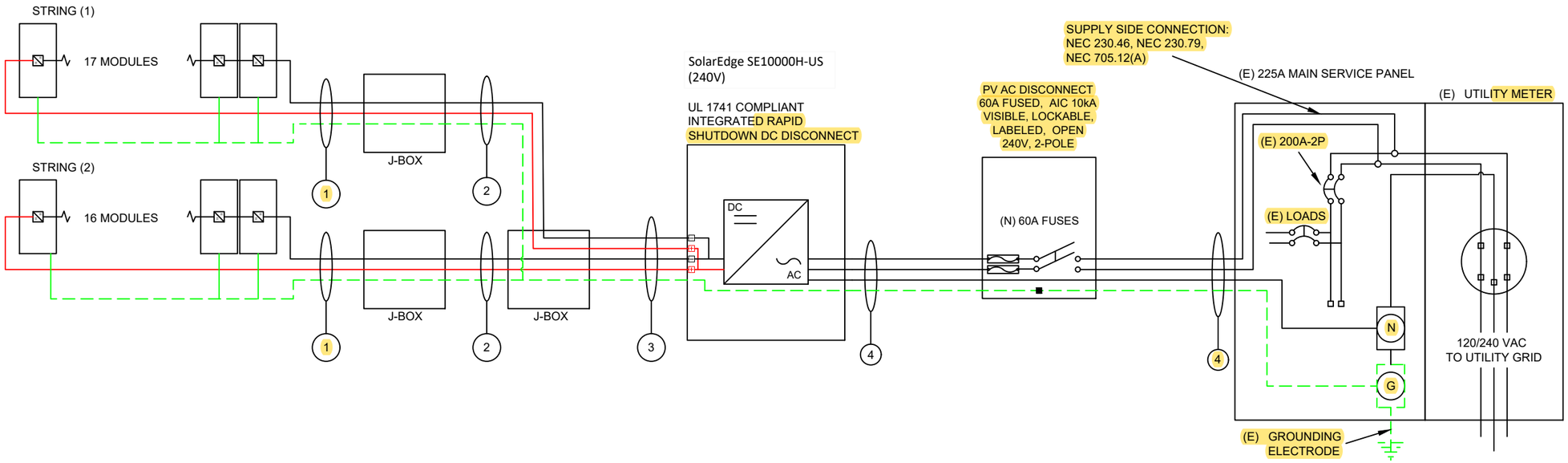
DATE:
July 13, 2021

MOUNTING DETAIL - PV05

| Conduit & Conductor Schedule | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| TAG | WIRE GAUGE | DESCRIPTION | QTY | CONDUIT SIZE | CONDUCTOR RATING | # OF CONDUCTORS DERATE | TEMP. DERATE | CONDUCTOR RATING W/DERATES | CONDUIT FILL |
| 1 | 10 AWG | PV-WIRE , USE-2, COPPER (L1, L2) | (2) | N/A - FREE AIR | 35A | N/A - FREE AIR | 0.96 | 33.6A | N/A - FREE AIR |
| | 6 AWG | BARE, COPPER (GROUND) | (1) | | | | | | |
| 2 | 10 AWG | THWN-2, or THHN, or 10/2 NM-B COPPER - (L1, L2) | (2) | 3/4" EMT | 35A | 1 | 0.96 | 33.6A | 11.9% |
| | 10 AWG | THWN-2, or THHN, or 10/2 NM-B COPPER - (GROUND) | (1) | | | | | | |
| 3 | 10 AWG | THHN/THWN-2, COPPER - (L1, L2) | (4) | 3/4" EMT | 35A | 0.8 | 0.96 | 26.88A | 19.8% |
| | 10 AWG | THHN/THWN-2 - (GROUND) | (1) | | | | | | |
| 4 | 6 AWG | THWN-2 COPPER - (L1, L2, NEUTRAL) | (3) | 3/4" EMT | 65A | 1 | 0.96 | 62.4A | 32.6% |
| | 10 AWG | THWN-2 COPPER - (GROUND) | (1) | | | | | | |

| EQUIPMENT SCHEDULE: | | | |
|---|---|---|---|
| TYPE: | QTY: | DESCRIPTION: | RATING: |
| MODULES: | (33) | TSM-DD06M.05(II) 330 | 330 W |
| INVERTERS: | (1) | SolarEdge SE10000H-US (240V) | 10000 W |
| AC DISCONNECT(S): | (1) | PV AC DISCONNECT, 240V, 2-POLE | 60A |
| DC OPTIMIZERS: | (33) | SolarEdge P340 | 15 Adc |
| | | | |
| | | | |

SUBJECT PV SYSTEMS HAS BEEN DESIGNED TO MEET THE REQUIREMENTS OF THE NEC 2017, AND THOSE SET FORTH BY THE FLORIDA SOLAR ENERGY CENTER CERTIFICATION, INCLUDING- MAXIMUM NUMBER OF MODULE STRINGS. MAXIMUM NUMBER OF MODULES PER STRING, MAXIMUM OUTPUT, MODULE MANUFACTURER AND MODEL NUMBER, INVERTER MANUFACTURER AND MODEL NUMBER.




**GROUNDING & GENERAL NOTES:**

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

**INTERCONNECTION NOTES**

1. GROUND FAULT PROTECTION IN ACCORDANCE WITH [NEC 215.9] & [NEC 230.95]
2. SUPPLY SIDE INTERCONNECTION ACCORDING TO [NEC705.12(A)] WITH SERVICE ENTRANCE CONDUCTORS IN ACCORDANCE WITH [NEC 240.21(B)]

**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.
3. FUSED AC DISCONNECT TO BE USED.

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

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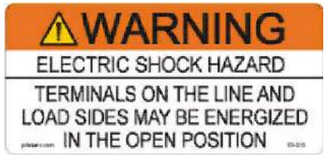
LINE DIAGRAM - PV06




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


LABEL 2
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)]

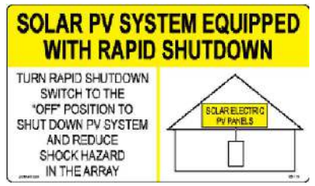

LABEL 3
PLACED ADJACENT TO THE BACK-FED BREAKER FROM THE INVERTER IF TIE IN CONSISTS OF LOAD SIDE CONNECTION TO BUSBAR.
[NEC 705.12(B)(2)(3)(c)]


LABEL 4
EQUIPMENT CONTAINING OVERCURRENT DEVICES IN CIRCUITS SUPPLYING POWER TO A BUSBAR OR CONDUCTOR SUPPLIED FROM MULTIPLE SOURCES SHALL BE MARKED TO INDICATE THE PRESENCE OF ALL SOURCES.[NEC 705.12(B)(3)]

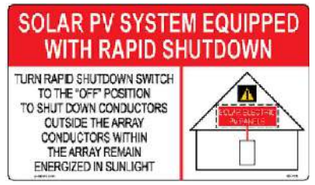

LABEL 5
AT POINT OF INTERCONNECTION, MARKED AT AC DISCONNECTING MEANS.
[NEC 690.54, NEC 690.13 (B)]

IMPORTANT


LABEL 6
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)]




LABEL 7
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)]

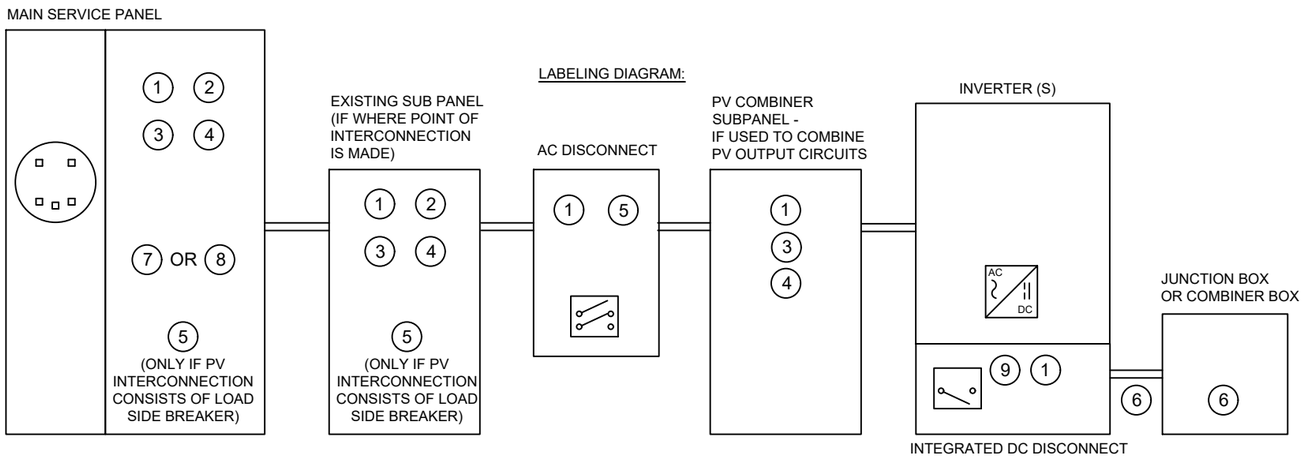



LABEL 8
FOR PV SYSTEMS THAT ONLY SHUT DOWN CONDUCTORS LEAVING THE ARRAY:
SIGN TO BE LOCATED ON OR NO MORE THAN 3 FT AWAY FROM SERVICE DISCONNECTING MEANS TO WHICH THE PV SYSTEMS ARE CONNECTED AND SHALL INDICATE THE LOCATION OF ALL IDENTIFIED RAPID SHUTDOWN SWITCHES IF NOT AT THE SAME LOCATION.
[NEC 690.56(C)(1)(b)]

IMPORTANT


LABEL 9
SIGN LOCATED AT RAPID SHUT DOWN DISCONNECT SWITCH [NEC 690.56(C)(3)].

LABELING DIAGRAM:




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

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 [NEC 110.21(B)(3)]
5. LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8", WHITE ON RED BACKGROUND; REFLECTIVE, AND PERMANENTLY AFFIXED [IFC 605.11.1.1]

MERAKI
ZERO DOWN SOLAR

CONTRACTOR INFORMATION:
Meraki Installers
484-663-3792
21 N New Warrington Rd
Pensacola, FL 32507
License # CVC57044

**SITE INFORMATION**
**Larry R Polk**
364 SW Worry Free Glen
Fort White, FL 32038
AC SYSTEM SIZE: 10 kW AC
DC SYSTEM SIZE: 10.89 kW DC
Lat, 29.85192541
Long, -82.68799818
(33) TSM-DD06M.05(II) 330 PV MODULES

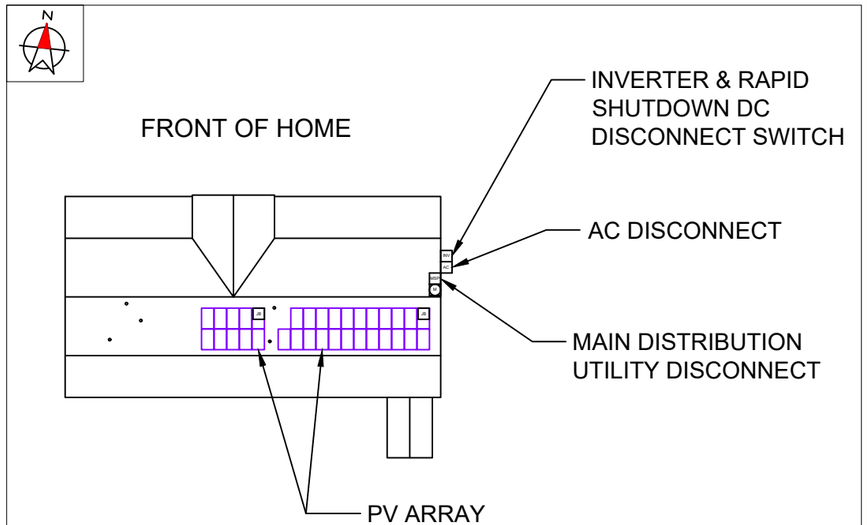
(1) SolarEdge SE10000H-US (240V) INVERTER(S)
Clay Electric Cooperative

**ENGINEER STAMP**
(IF APPLICABLE)

DRAWN BY: SoloCAD
DATE:
July 13, 2021
LABELS - PV07

# CAUTION

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




364 SW Worry Free Glen, Fort White FL 32038

DIRECTORY

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

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

MERAKI
ZERO DOWN SOLAR


CONTRACTOR INFORMATION:

Meraki Installers
484-663-3792
21 N New Warrington Rd
Pensacola, FL 32507
License # CVC57044


**SITE INFORMATION**

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(1) SolarEdge SE10000H-US (240V) INVERTER(S)
Clay Electric Cooperative

**ENGINEER STAMP**
(IF APPLICABLE)

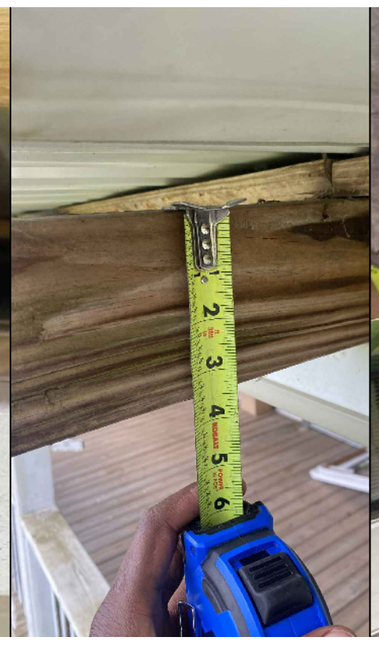
DRAWN BY: SoloCAD

DATE:
July 13, 2021

PLACARD - PV08

# SITE PHOTOS:





MERAKI
ZERO DOWN SOLAR

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484-663-3792
21 N New Warrington Rd
Pensacola, FL 32507
License # CVC57044

**SITE INFORMATION**

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Long, -82.68799818
(33) TSM-DD06M.05(II) 330 PV MODULES

(1) SolarEdge SE10000H-US (240V) INVERTER(S)
Clay Electric Cooperative

**ENGINEER STAMP**
(IF APPLICABLE)

DRAWN BY: SoloCAD

DATE:
July 13, 2021

SITE PHOTOS - PV09

Mono Multi Solutions

THE

# Residential Module

## MULTI-BUSBAR 120 HALF-CELL BOB MODULE

**120-Cell**
MONOCRYSTALLINE MODULE

**330 W**
POWER OUTPUT RANGE

**19.6%**
MAXIMUM EFFICIENCY

**-5W+3%**
POSITIVE POWER TOLERANCE

| PRODUCTS | BACKSHEET COLOR | POWER RANGE |
|---|---|---|
| TSM-DD06M.05(II) | Black | 330W |

FRAME COLOR: Black

### High power output

- Reduce BOS cost with high power bin and 1000V system voltage
- New cell string layout and split J-box location reduces the energy loss caused by inter-row shading
- Lower resistance of half-cut cells and increased MBB (Multi Busbar) reflectance ensure higher power

### High energy generation, low LCOE

- Excellent 3rd party validated IAM and low light performance with cell process and module material optimization
- Low Pmax temp coefficient (-0.36%) increases energy production
- Better anti-shading performance and lower operating temperature

### Outstanding visual appearance, easy to install

- Designed for superior rooftop aesthetics
- Thinner wires give an eye catching all black look
- Safe and easy to transport, handle, and install

### Certified to perform in highly challenging environments

- High PID resistance through cell process and module material control
- Resistant to salt, acid, sand, and ammonia
- Over 30 in-house tests (UV, TC, HF etc)
- Certified to 5400 Pa positive load and 2400 Pa negative load

PERFORMANCE WARRANTY

10 Year Product Warranty · 25 Year Power Warranty


Founded in 1997, Trina Solar is the world's leading comprehensive solutions provider for solar energy. we believe close cooperation with our partners is critical to success. Trina Solar now distributes its PV products to over 60 countries all over the world. Trina is able to provide exceptional service to each customer in each market and supplement our innovative, reliable products with the backing of Trina as a strong, bankable partner. We are committed to building strategic, mutually beneficial collaboration with installers, developers, distributors and other partners.

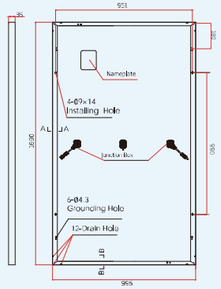
### Comprehensive Products And System Certificates

UL 61730
IEC61215/IEC61730/UL1703/IEC61701/IEC62716
ISO 9001: Quality Management System
ISO 14001: Environmental Management System
ISO14064: Greenhouse gases Emissions Verification
OHSAS 18001: Occupation Health and Safety Management System

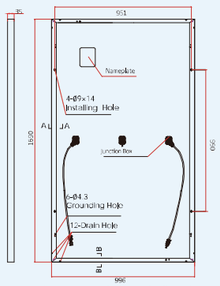
# Residential Module

## MULTI-BUSBAR 120 HALF-CELL BOB MODULE

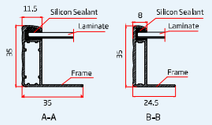
DIMENSIONS OF PV MODULE(mm)



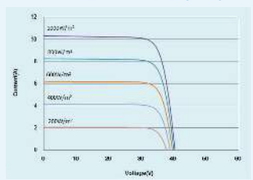

String Inverter Configuration



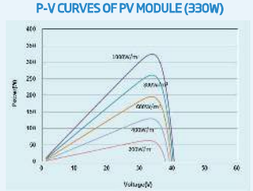

Microinverter or Optimizer Configuration




I-V CURVES OF PV MODULE (330W)



P-V CURVES OF PV MODULE (330W)



### ELECTRICAL DATA (STC)

| | | | |
|---|---|---|---|
| Peak Power Watts-$P_{MAX}$ (Wp)* | | 330 | |
| Power Output Tolerance-$P_{MAX}$ (W) | | -5 + 3% | |
| Maximum Power Voltage-$V_{MPP}$ (V) | | 33.8 | |
| Maximum Power Current-$I_{MPP}$ (A) | | 9.76 | |
| Open Circuit Voltage-$V_{OC}$ (V) | | 40.6 | |
| Short Circuit Current-$I_{SC}$ (A) | | 10.40 | |
| Module Efficiency $\eta_m$ (%) | | 19.6 | |

STC: Irradiance 1000W/m², Cell Temperature 25°C, Air Mass AM1.5.
*Measuring tolerance: ±3%.

### ELECTRICAL DATA (NMOT)

| | | | |
|---|---|---|---|
| Maximum Power-$P_{MAX}$ (Wp) | | 250 | |
| Maximum Power Voltage-$V_{MPP}$ (V) | | 31.7 | |
| Maximum Power Current-$I_{MPP}$ (A) | | 7.86 | |
| Open Circuit Voltage-$V_{OC}$ (V) | | 38.3 | |
| Short Circuit Current-$I_{SC}$ (A) | | 8.38 | |

NMOT: Irradiance at 800W/m², Ambient Temperature 20°C, Wind Speed 1m/s.

### MECHANICAL DATA

| | |
|---|---|
| Solar Cells | Monocrystalline |
| Cell Orientation | 120 cells (6 × 20) |
| Module Dimensions | 1690 × 996 × 35 mm (66.54 × 39.21 × 1.38 inches) |
| Weight | 18.0 kg (39.7 lb) |
| Glass | 3.2 mm (0.13 inches), High Transmission, AR Coated Heat Strengthened |
| Encapsulant Material | Glass EVA |
| Backsheet | Black [DD06M.05(II)] |
| Frame | 35 mm (1.38 inches) Anodized Aluminium Alloy |
| J-Box | IP 68 rated |
| Cables | Photovoltaic Technology Cable 4.0mm² (0.006 inches²)<br>Portrait: N 140mm/P 285mm (5.51/11.22 inches)<br>Landscape: N 1200 mm /P 1200 mm (47.24/47.24 inches) |
| Connector | MC4 |

### TEMPERATURE RATINGS

| | |
|---|---|
| NMOT (Nominal Module Operating Temperature) | 41°C (±3°C) |
| Temperature Coefficient of $P_{MAX}$ | - 0.36%/°C |
| Temperature Coefficient of Voc | - 0.26%/°C |
| Temperature Coefficient of Isc | 0.04%/°C |

### MAXIMUM RATINGS

| | |
|---|---|
| Operational Temperature | -40~+85°C |
| Maximum System Voltage | 1000V DC (IEC) |
| | 1000V DC (UL) |
| Max Series Fuse Rating | 20A |

(DO NOT connect Fuse in Combiner Box with two or more strings in parallel connection)

### WARRANTY

12 year Product Workmanship Warranty
25 year Power Warranty
(Please refer to product warranty for details)

### PACKAGING CONFIGURATION

Modules per box: 30 pieces
Modules per 40' container: 780 pieces

CAUTION: READ SAFETY AND INSTALLATION INSTRUCTIONS BEFORE USING THE PRODUCT.

# Single Phase Inverter with HD-Wave Technology

## for North America

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

12-25 YEAR WARRANTY

INVERTERS

## Optimized installation with HD-Wave technology

- Specifically designed to work with power optimizers
- Record-breaking efficiency
- Fixed voltage inverter for longer strings
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Extremely small
- Built-in module-level monitoring
- Outdoor and indoor installation
- Optional: Revenue grade data, ANSI C12.20 Class 0.5 (0.5% accuracy)

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# Single Phase Inverter with HD-Wave Technology for North America

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

| | SE3000H-US | SE3800H-US | SE5000H-US | SE6000H-US | SE7600H-US | SE10000H-US | SE11400H-US | |
|---|---|---|---|---|---|---|---|---|
| **OUTPUT** | | | | | | | | |
| Rated AC Power Output | 3000 | 3800 @ 240V<br>3300 @ 208V | 5000 | 6000 @ 240V<br>5000 @ 208V | 7600 | 10000 | 11400 @ 240V<br>10000 @ 208V | VA |
| Maximum AC Power Output | 3000 | 3800 @ 240V<br>3300 @ 208V | 5000 | 6000 @ 240V<br>5000 @ 208V | 7600 | 10000 | 11400 @ 240V<br>10000 @ 208V | VA |
| AC Output Voltage Min.-Nom.-Max. (211 - 240 - 264) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Vac |
| AC Output Voltage Min.-Nom.-Max. (183 - 208 - 229) | - | ✓ | - | ✓ | - | - | ✓ | Vac |
| AC Frequency (Nominal) | 59.3 - 60 - 60.5[1] | | | | | | | Hz |
| Maximum Continuous Output Current @240V | 12.5 | 16 | 21 | 25 | 32 | 42 | 47.5 | A |
| Maximum Continuous Output Current @208V | - | 16 | - | 24 | - | - | 48.5 | A |
| GFDI Threshold | 1 | | | | | | | A |
| Utility Monitoring, Islanding Protection, Country Configurable Thresholds | Yes | | | | | | | |
| **INPUT** | | | | | | | | |
| Maximum DC Power @240V | 4650 | 5900 | 7750 | 9300 | 11800 | 15500 | 17650 | W |
| Maximum DC Power @208V | - | 5100 | - | 7750 | - | - | 15500 | W |
| Transformer-less, Ungrounded | Yes | | | | | | | |
| Maximum Input Voltage | 480 | | | | | | | Vdc |
| Nominal DC Input Voltage | 380 | | | | 400 | | | Vdc |
| Maximum Input Current @240V[2] | 8.5 | 10.5 | 13.5 | 16.5 | 20 | 27 | 30.5 | Adc |
| Maximum Input Current @208V[2] | - | 9 | - | 13.5 | - | - | 27 | Adc |
| Max. Input Short Circuit Current | 45 | | | | | | | Adc |
| Reverse-Polarity Protection | Yes | | | | | | | |
| Ground-Fault Isolation Detection | 600kΩ Sensitivity | | | | | | | |
| Maximum Inverter Efficiency | 99 | 99.2 | | | | | | % |
| CEC Weighted Efficiency | 99 | | | | | | 99 @ 240V<br>98.5 @ 208V | % |
| Nighttime Power Consumption | < 2.5 | | | | | | | W |
| **ADDITIONAL FEATURES** | | | | | | | | |
| Supported Communication Interfaces | RS485, Ethernet, ZigBee (optional), Cellular (optional) | | | | | | | |
| Revenue Grade Data, ANSI C12.20 | Optional[3] | | | | | | | |
| Rapid Shutdown - NEC 2014 and 2017 690.12 | Automatic Rapid Shutdown upon AC Grid Disconnect | | | | | | | |
| **STANDARD COMPLIANCE** | | | | | | | | |
| Safety | UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07 | | | | | | | |
| Grid Connection Standards | IEEE1547, Rule 21, Rule 14 (HI) | | | | | | | |
| Emissions | FCC Part 15 Class B | | | | | | | |
| **INSTALLATION SPECIFICATIONS** | | | | | | | | |
| AC Output Conduit Size / AWG Range | 1" Maximum / 14-6 AWG | | | | | 1" Maximum /14-4 AWG | | |
| DC Input Conduit Size / # of Strings / AWG Range | 1" Maximum / 1-2 strings / 14-6 AWG | | | | | 1" Maximum / 1-3 strings / 14-6 AWG | | |
| Dimensions with Safety Switch (HxWxD) | 17.7 x 14.6 x 6.8 / 450 x 370 x 174 | | | | | 21.3 x 14.6 x 7.3 / 540 x 370 x 185 | | in / mm |
| Weight with Safety Switch | 22 / 10 | 25.1 / 11.4 | 26.2 / 11.9 | | | 38.8 / 17.6 | | lb / kg |
| Noise | < 25 | | | | <50 | | | dBA |
| Cooling | Natural Convection | | | | | | | |
| Operating Temperature Range | -13 to +140 / -25 to +60[4] (-40°F / -40°C option)[5] | | | | | | | °F / °C |
| Protection Rating | NEMA 4X (Inverter with Safety Switch) | | | | | | | |

[1] For other regional settings please contact SolarEdge support
[2] A higher current source may be used; the inverter will limit its input current to the values stated
[3] Revenue grade inverter P/N: SExxxxH-US000NNC2
[4] For power de-rating information refer to: https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf
[5] -40 version P/N: SExxxxH-US000NNU4



RoHS

# Power Optimizer

## For North America

P320 / P340 / P370 / P400 / P405 / P505


POWER OPTIMIZER

## PV power optimization at the module-level

- Specifically designed to work with SolarEdge inverters
- Up to 25% more energy
- Superior efficiency (99.5%)
- Mitigates all types of module mismatch losses, from manufacturing tolerance to partial shading
- Flexible system design for maximum space utilization
- Fast installation with a single bolt
- Next generation maintenance with module-level monitoring
- Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PVRSS)
- Module-level voltage shutdown for installer and firefighter safety

solaredge.com

solaredge

# Power Optimizer

## For North America

P320 / P340 / P370 / P400 / P405 / P505

| Optimizer model (typical module compatibility) | P320 (for 60-cell modules) | P340 (for high-power 60-cell modules) | P370 (for higher-power 60 and 72-cell modules) | P400 (for 72 & 96-cell modules) | P405 (for thin film modules) | P505 (for higher current modules) | |
|---|---|---|---|---|---|---|---|
| **INPUT** | | | | | | | |
| Rated Input DC Power[1] | 320 | 340 | 370 | 400 | 405 | 505 | W |
| Absolute Maximum Input Voltage (Voc at lowest temperature) | 48 | | 60 | 80 | 125[2] | 87[2] | Vdc |
| MPPT Operating Range | 8 - 48 | | 8 - 60 | 8 - 80 | 12.5 - 105 | 12.5 - 87 | Vdc |
| Maximum Short Circuit Current (Isc) | 11 | | | 10.1 | | 14 | Adc |
| Maximum DC Input Current | 13.75 | | | 12.5 | | 17.5 | Adc |
| Maximum Efficiency | 99.5 | | | | | | % |
| Weighted Efficiency | 98.8 | | | | | 98.6 | % |
| Overvoltage Category | II | | | | | | |
| **OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREDGE INVERTER)** | | | | | | | |
| Maximum Output Current | 15 | | | | | | Adc |
| Maximum Output Voltage | 60 | | | | 85 | | Vdc |
| **OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREDGE INVERTER OR SOLAREDGE INVERTER OFF)** | | | | | | | |
| Safety Output Voltage per Power Optimizer | 1 ± 0.1 | | | | | | Vdc |
| **STANDARD COMPLIANCE** | | | | | | | |
| EMC | FCC Part15 Class B, IEC61000-6-2, IEC61000-6-3 | | | | | | |
| Safety | IEC62109-1 (class II safety), UL1741 | | | | | | |
| Material | UL94 V-0 , UV Resistant | | | | | | |
| RoHS | Yes | | | | | | |
| **INSTALLATION SPECIFICATIONS** | | | | | | | |
| Maximum Allowed System Voltage | 1000 | | | | | | Vdc |
| Compatible inverters | All SolarEdge Single Phase and Three Phase inverters | | | | | | |
| Dimensions (W x L x H) | 129 x 153 x 27.5 / 5.1 x 6 x 1.1 | | | 129 x 153 x 33.5 / 5.1 x 6 x 1.3 | 129 x 159 x 49.5 / 5.1 x 6.3 x 1.9 | 129 x 162 x 59 / 5.1 x 6.4 x 2.3 | mm / in |
| Weight (including cables) | 630 / 1.4 | | | 750 / 1.7 | 845 / 1.9 | 1064 / 2.3 | gr / lb |
| Input Connector | Single or dual MC4[3] | | | | | | |
| Input Wire Length | 0.16 / 0.52 | | | | | | m / ft |
| Output Wire Type / Connector | Double Insulated / MC4 | | | | | | |
| Output Wire Length | 0.9 / 2.95 | | 1.2 / 3.9 | | | | m / ft |
| Operating Temperature Range | -40 - +85 / -40 - +185 | | | | | | °C / °F |
| Protection Rating | IP68 / NEMA6P | | | | | | |
| Relative Humidity | 0 - 100 | | | | | | % |

[1] Rated power of the module at STC will not exceed the optimizer "Rated Input DC Power". Modules with up to +5% power tolerance are allowed
[2] NEC 2017 requires max input voltage be not more than 80V
[3] For other connector types please contact SolarEdge

| PV System Design Using a SolarEdge Inverter[4][5] | | Single Phase HD-Wave | Single phase | Three Phase 208V | Three Phase 480V | |
|---|---|---|---|---|---|---|
| Minimum String Length (Power Optimizers) | P320, P340, P370, P400 | 8 | | 10 | 18 | |
| | P405 / P505 | 6 | | 13 (12 with SE3K) | 14 | |
| Maximum String Length (Power Optimizers) | | 25 | | 25 | 50[6] | |
| Maximum Power per String | | 5700 (6000 with SE7600-US - SE11400-US) | 5250 | 6000[7] | 12750[8] | W |
| Parallel Strings of Different Lengths or Orientations | | Yes | | | | |

[4] For detailed string sizing information refer to: http://www.solaredge.com/sites/default/files/string_sizing_na.pdf
[5] It is not allowed to mix P405/P505 with P320/P340/P370/P400 in one string
[6] A string with more than 30 optimizers does not meet NEC rapid shutdown requirements; safety voltage will be above the 30V requirement
[7] For SE14.4KUS/SE43.2KUS: It is allowed to install up to 6,500W per string when 3 strings are connected to the inverter (3 strings per unit for SE43.2KUS) and when the maximum power difference between the strings is up to 1,000W
[8] For SE30KUS/SE33.3KUS/SE66.6KUS/SE100KUS: It is allowed to install up to 15,000W per string when 3 strings are connected to the inverter (3 strings per unit for SE66.6KUS/SE100KUS) and when the maximum power difference between the strings is up to 2,000W



CE RoHS

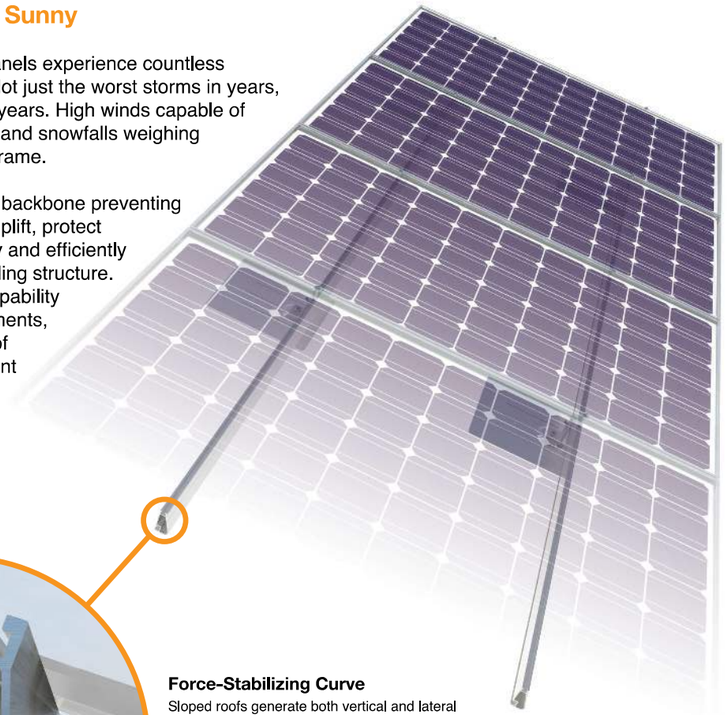
Tech Brief

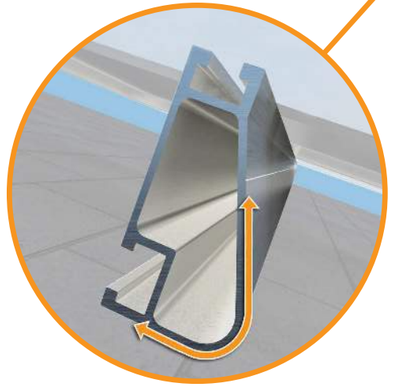
# XR Rail Family

## Solar Is Not Always Sunny

Over their lifetime, solar panels experience countless extreme weather events. Not just the worst storms in years, but the worst storms in 40 years. High winds capable of ripping panels from a roof, and snowfalls weighing enough to buckle a panel frame.

XR Rails are the structural backbone preventing these results. They resist uplift, protect against buckling and safely and efficiently transfer loads into the building structure. Their superior spanning capability requires fewer roof attachments, reducing the number of roof penetrations and the amount of installation time.





### Force-Stabilizing Curve

Sloped roofs generate both vertical and lateral forces on mounting rails which can cause them to bend and twist. The curved shape of XR Rails is specially designed to increase strength in both directions while resisting the twisting. This unique feature ensures greater security during extreme weather and a longer system lifetime.

### Compatible with Flat & Pitched Roofs

XR Rails are compatible with FlashFoot and other pitched roof attachments.

IronRidge offers a range of tilt leg options for flat roof mounting applications.

### Corrosion-Resistant Materials

All XR Rails are made of 6000-series aluminum alloy, then protected with an anodized finish. Anodizing prevents surface and structural corrosion, while also providing a more attractive appearance.

Tech Brief

## XR Rail Family

The XR Rail Family offers the strength of a curved rail in three targeted sizes. Each size supports specific design loads, while minimizing material costs. Depending on your location, there is an XR Rail to match.

**XR10**

XR10 is a sleek, low-profile mounting rail, designed for regions with light or no snow. It achieves spans up to 6 feet, while remaining light and economical.

- 6’ spanning capability
- Moderate load capability
- Clear & black anodized finish
- Internal splices available

**XR100**

XR100 is the ultimate residential mounting rail. It supports a range of wind and snow conditions, while also maximizing spans up to 10 feet.

- 10’ spanning capability
- Heavy load capability
- Clear & black anodized finish
- Internal splices available

**XR1000**

XR1000 is a heavyweight among solar mounting rails. It’s built to handle extreme climates and spans up to 12 feet for commercial applications.

- 12’ spanning capability
- Extreme load capability
- Clear anodized finish
- Internal splices available

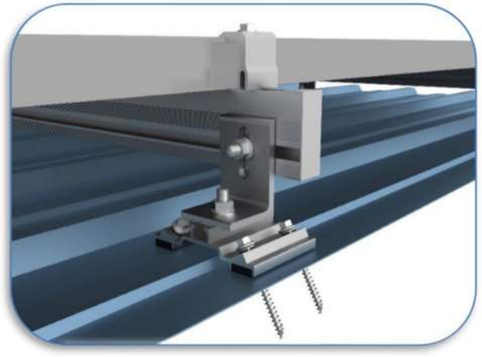
## Rail Selection

The table below was prepared in compliance with applicable engineering codes and standards.* Values are based on the following criteria: ASCE 7-16, Gable Roof Flush Mount, Roof Zones 1 & 2e, Exposure B, Roof Slope of 8 to 20 degrees and Mean Building Height of 30 ft. Visit IronRidge.com for detailed certification letters.

| Load | | Rail Span | | | | | |
|---|---|---|---|---|---|---|---|
| Snow (PSF) | Wind (MPH) | 4’ | 5’ 4” | 6’ | 8’ | 10’ | 12’ |
| None | 90 | XR10 | | XR100 | | XR1000 | |
| | 120 | | | | | | |
| | 140 | | | | | | |
| | 160 | | | | | | |
| 20 | 90 | | | | | | |
| | 120 | | | | | | |
| | 140 | | | | | | |
| | 160 | | | | | | |
| 30 | 90 | | | | | | |
| | 160 | | | | | | |
| 40 | 90 | | | | | | |
| | 160 | | | | | | |
| 80 | 160 | | | | | | |
| 120 | 160 | | | | | | |

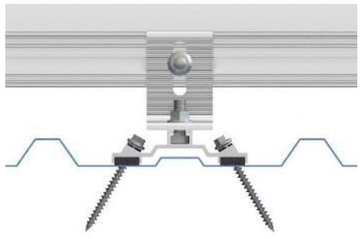
*Table is meant to be a simplified span chart for conveying general rail capabilities. Use approved certification letters for actual design guidance.

# *EZ Grip Metal Deck Mount*



**Make your next metal roof attachment without the daunting task of locating the truss.** SunModo's EZ Grip Metal Deck Mount installs into 26 gauge sheet metal, 1/2 plywood or 7/16 OSB roof decking material.

**SunModo's EZ Grip Metal Deck Mount** installs in just minutes into sheet metal, plywood or OSB roof decking. The four included 1/4 x 3" Hex Washer Head Self-tapping Screws have the length to penetrate though 1-1/2 inches of insulation while still piercing completely through the roof decking. And since the four screws are guided by the aluminum extruded base to penetrate at a 30-degree angle, the Metal Roof Deck Mount Kit offers superior attachment performance. 1/4-20 Self-drilling screws can be used for attachments into 26 gauge minimum thickness metal roofs.



**The EZ Grip Metal Deck Mount** is designed to fit on the most popular R-Panel and U-Panel trapezoidal types of metal roofs. The aluminum extruded base easily clears roof profiles 7/16" tall by 1-1/2" wide. The EPDM gaskets on the washers and on the aluminum extruded base combine to provide a water tight seal at the roof penetration site.

**Features and Benefits**

- Attaches into 1/2 plywood or 7/16 OSB roof decking material using four 1/4 x 3" Hex Washer Head Self-tapping Screws
- Attaches into 26 gauge minimum thickness sheet metal using four 1/4 x 2" Hex Washer Head Self-drilling Screws
- Angled penetrations provide superior attachment performance
- A wide variety of L-feet and attachment options are available
- Passed the High-Velocity Hurricane Zone (HVHZ) –TAS 100(a) Wind-Driven Rain Test