

# BARUN CORP

August 22, 2023

Dear Whom It May Concern,

Project Name : JOHN HICKEY, 327 NW CARR CT, LAKE CITY, FL 32055

Installation of a 12.16 kW (DC) Rooftop PV Solar System

Per Florida Statute 377-705 (revised 7/01/2017), I, Mike Rieth, P.E., a licensed engineer pursuant to Chapter 471, certify that the PV electrical system and electrical components are designed and approved using the code requirements and standards contained in the Florida Building Code.

If you have any questions regarding this project, please feel free to contact me.

Sincerely,

Mike Rieth, P.E.  
[miker@baruncorp.com](mailto:miker@baruncorp.com)



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Freedom Forever  
Planset Revision Letter

8/21/2023  
REV #2

Attn. Columbia County (FL):

The changes outlined in Revision Details have been applied to the plans corresponding to the following customer:

JOHN HICKEY  
327 NW CARR CT, LAKE CITY, FL 32055

**Revision Details:**

Layout changed with 32 x Jinko 380W modules and 10K inverter

All corresponding changes are notated on the plans by revision clouds.

Thank you for your time in reviewing these plans. Please reach out if you have any additional questions or concerns.

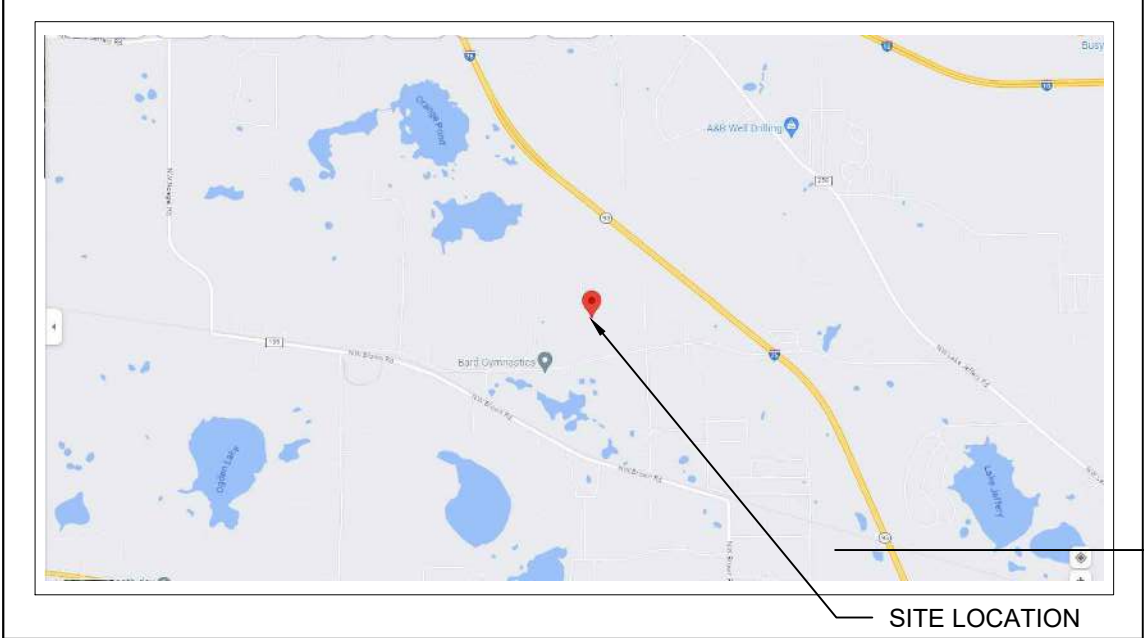
Construction Engineering  
Freedom Forever  
[engineering@freedomforever.com](mailto:engineering@freedomforever.com)

# ROOF MOUNT PHOTOVOLTAIC SYSTEM

|               |
|---------------|
| <b>CODES:</b> |
|---------------|

THIS PROJECT COMPLIES WITH THE FOLLOWING:  
2020 7TH EDITION FLORIDA BUILDING CODE: BUILDING  
2020 7TH EDITION FLORIDA BUILDING CODE: RESIDENTIAL  
2020 7TH EDITION FLORIDA BUILDING CODE: MECHANICAL  
2020 7TH EDITION FLORIDA BUILDING CODE: PLUMBING  
2020 7TH EDITION FLORIDA BUILDING CODE: FUEL GAS  
2020 7TH EDITION FLORIDA BUILDING CODE: ENERGY CONSERVATION  
2020 7TH EDITION FLORIDA BUILDING CODE: EXISTING BUILDING  
2020 7TH EDITION FLORIDA BUILDING CODE: ACCESSIBILITY  
2020 7TH EDITION FLORIDA FIRE PREVENTION CODE (NFPA)  
2017 NATIONAL ELECTRIC CODE (NEC)  
AS ADOPTED BY COLUMBIA COUNTY (FL)

#### VICINITY MAP:



|                           |
|---------------------------|
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|---------------------------|

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|          |                                   |
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|          |                                   |

#### CONSTRUCTION NOTES:

CONDUIT AND CONDUCTOR SPECIFICATIONS ARE BASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING AS REQUIRED BY FIELD CONDITIONS.

ALL SOLAR ENERGY SYSTEM EQUIPMENT SHALL BE SCREENED TO THE MAXIMUM EXTENT POSSIBLE AND SHALL BE PAINTED A COLOR SIMILAR TO THE SURFACE UPON WHICH THEY ARE MOUNTED.

MODULES SHALL BE TESTED , LISTED AND IDENTIFIED WITH FIRE CLASSIFICATION IN ACCORDANCE WITH UL 2703. SMOKE AND CARBON MONOXIDE ALARMS ARE REQUIRED PER SECTION R314 AND 315 TO BE VERIFIED AND INSPECTED BY INSPECTOR IN THE FIELD.

DIG ALERT (811) TO BE CONTACTED AND COMPLIANCE WITH EXCAVATION SAFETY PRIOR TO ANY EXCAVATION TAKING PLACE

PHOTOVOLTAIC SYSTEM GROUND WILL BE TIED INTO EXISTING GROUND AT MAIN SERVICE FROM DC DISCONNECT/INVERTER AS PER 2017 NEC SEC 250.166(A).

SOLAR PHOTOVOLTAIC SYSTEM EQUIPMENT WILL BE INSTALLED IN ACCORDANCE WITH REQUIREMENTS OF ART. 690 OF THE 2017 NEC

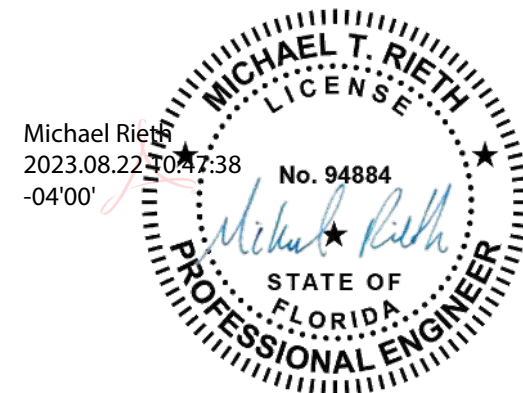
THE MAIN SERVICE PANEL WILL BE EQUIPPED WITH A GROUND ROD OR UFER

UTILITY COMPANY WILL BE NOTIFIED PRIOR TO ACTIVATION OF THE SOLAR PV SYSTEM

SOLAREEDGE OPTIMIZERS ARE LISTED TO IEC 62109-1 (CLASS II SAFETY) AND UL 1741 STANDARDS

INSTALL CREW TO VERIFY ROOF STRUCTURE PRIOR TO COMMENCING WORK. EMT CONDUIT ATTACHED TO THE ROOF USING CONDUIT MOUNT.

THIS SYSTEM DESIGNED WITH:  
WIND SPEED: 120  
WIND EXPOSURE: C



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2

**CLIENT:**  
JOHN HICKEY  
327 NW CARR CT, LAKE CITY, FL 32055  
AHJ: COLUMBIA COUNTY (FL)  
UTILITY: FPL - FLORIDA POWER & LIGHT  
METER: ACD8732  
PHONE: (386) 867-0620  
EMAIL: BIGDOGMOM1@GMAIL.COM  
FINANCE: OTHER

**SYSTEM:**  
SYSTEM SIZE (DC): 32 X 380 = 12.160 kW  
SYSTEM SIZE (AC): 10.000 kW @ 240V  
MODULES: 32 X JINKO SOLAR:  
JKM380M-6RL3-B  
OPTIMIZERS: 32 X SOLAREDGE S440  
INVERTER: SOLAREDGE SE10000H-USRGM  
[S1]

|     | REVISIONS  |          |
|-----|------------|----------|
| NO. | REVISED BY | DATE     |
| 1   | J.M.       | 6/27/202 |
| 2   | A.M.       | 8/21/202 |
| -   | -          | -        |



FREEDOM FOREVER LLC  
2619 CONSULATE DR SUITE 800, ORLANDO,  
FL 32819  
Tel: (800) 385-1075  
GREG ALBRIGHT

Gay Allen

**CONTRACTOR LICENSE:**  
CERTIFIED ELECTRICAL CONTRACTOR  
EC13008056

|               |  |  |  |
|---------------|--|--|--|
| SITE LOCATION |  |  |  |
|               |  |  |  |

|         |           |              |        |
|---------|-----------|--------------|--------|
| JOB NO: | DATE:     | DESIGNED BY: | SHEET: |
| 331623  | 8/21/2023 | A.M.         | PV-1   |

LEGEND:

OBSTRUCTION

PIPE VENT

UM

MSP

INV

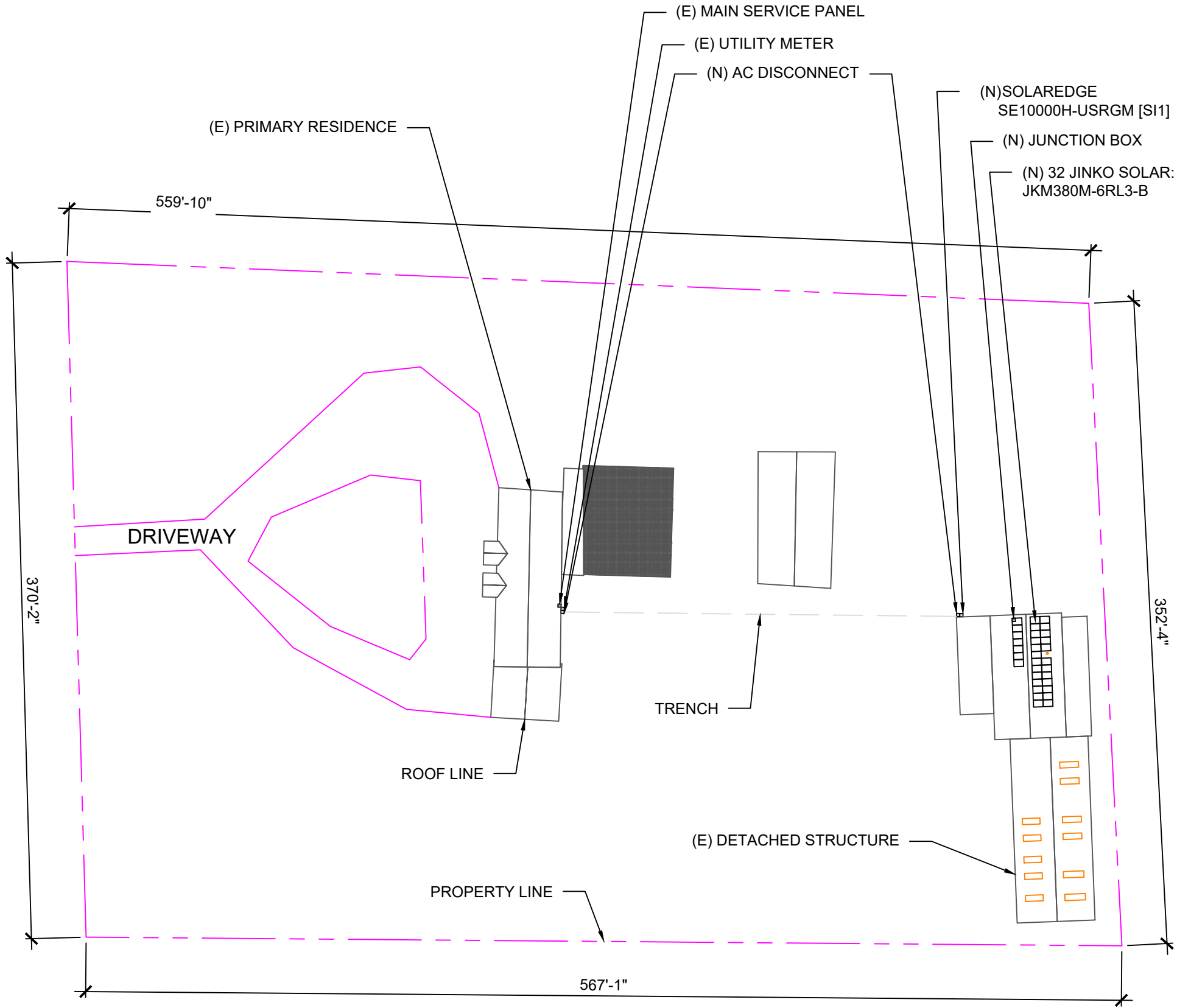
JB

PV SYSTEM

12.160 kW-DC

10.000 kW-AC

NW CARR CT

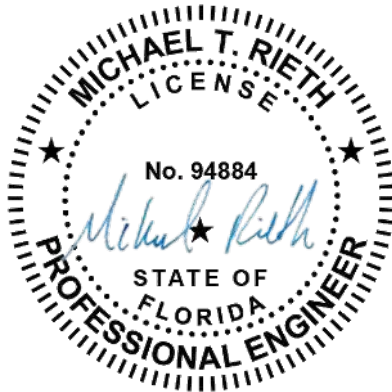


SITE PLAN

SCALE: 1/64" = 1'-0"

1

2



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ROOF AREA: 9609.04 SQ FT

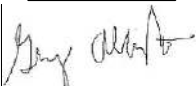
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INVERTER: SOLAREEDGE SE10000H-USRGM [SI1]

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GREG ALBRIGHT



CONTRACTOR LICENSE:  
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EC13008056

| SITE PLAN |           |              |        |
|-----------|-----------|--------------|--------|
| JOB NO:   | DATE:     | DESIGNED BY: | SHEET: |
| 331623    | 8/21/2023 | A.M.         | PV-2   |

LEGEND:

- OBSTRUCTION
- PIPE VENT
- 32 JINKO SOLAR:  
JKM380M-6RL3-B
- CONDUIT
- SETBACK
- UM

UTILITY METER
- MSP

MSP
- INV

INVERTER
- VISIBLE  
LOCKABLE  
LABELED AC  
DISCONNECT
- JB

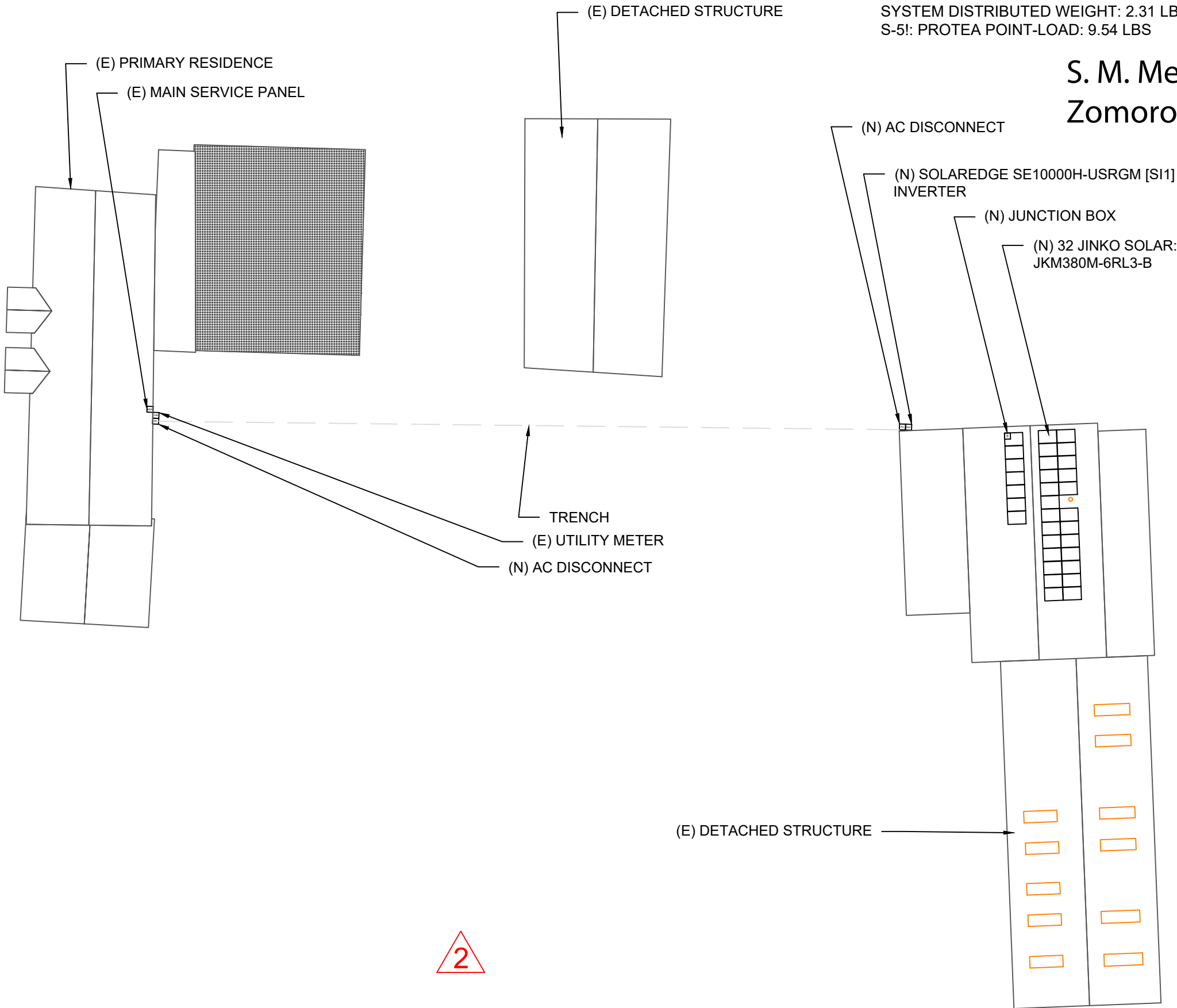
JUNCTION  
BOX

PV SYSTEM  
12.160 kW-DC  
10.000 kW-AC



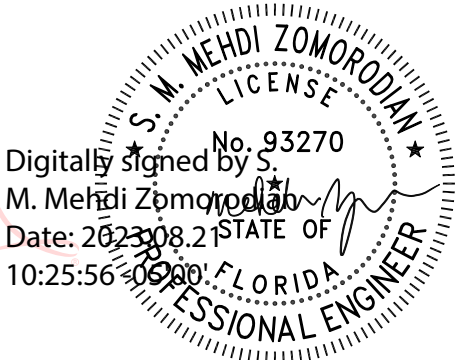
ROOF PLAN  
SCALE: 1/32" = 1'-0"

1



TOTAL ROOF AREA: 9609.04 SQ FT  
TOTAL ARRAY AREA: 657.48 SQ FT  
ARRAY COVERAGE: 6.84%  
SYSTEM DISTRIBUTED WEIGHT: 2.31 LBS  
S-5!: PROTEA POINT-LOAD: 9.54 LBS

S. M. Mehdi  
Zomorodian



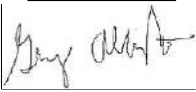
Digitally signed by S.  
M. Mehdi Zomorodian  
Date: 2023.08.21  
10:25:56 -0600  
This item has been electronically signed and sealed by  
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ROOF AREA: 9609.04 SQ FT

CLIENT:  
JOHN HICKEY  
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AHJ: COLUMBIA COUNTY (FL)  
UTILITY: FPL - FLORIDA POWER & LIGHT  
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[S1]

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CONTRACTOR LICENSE:  
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EC13008056

ROOF PLAN WITH MODULES LAYOUT

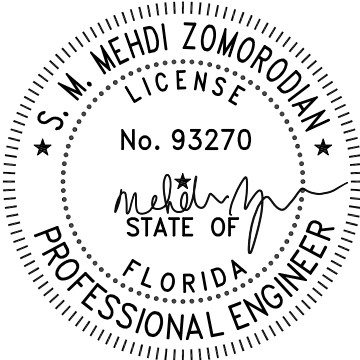
| JOB NO: | DATE:     | DESIGNED BY: | SHEET: |
|---------|-----------|--------------|--------|
| 331623  | 8/21/2023 | A.M.         | PV-2A  |

NOTES:

- EMT CONDUIT ATTACHED TO THE ROOF USING CONDUIT MOUNTS
- ATTACHED CLAMPS AT 25% FROM THE EDGE AND 50% FROM THE CENTER OF THE MODULES
- JUNCTION BOX IS MOUNTED TO THE RAIL.

ROOF DETAILS:

TOTAL ROOF AREA: 9609.04 SQ FT  
TOTAL ARRAY AREA: 657.48 SQFT  
ARRAY COVERAGE: 6.84%  
SYSTEM DISTRIBUTED WEIGHT: 2.31 LBS  
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| ROOF AREA STATEMENT |                 |            |             |         |               |              |
|---------------------|-----------------|------------|-------------|---------|---------------|--------------|
| ROOF                | MODULE QUANTITY | ROOF PITCH | ARRAY PITCH | AZIMUTH | ROOF AREA     | ARRAY AREA   |
| ROOF 1              | 7               | 20         | 20          | 267     | 1421.97 SQ FT | 143.82 SQ FT |
| ROOF 2              | 25              | 20         | 20          | 87      | 1426.18 SQ FT | 513.66 SQ FT |
| ----                | ----            | ----       | ----        | ----    | SQ FT         | SQ FT        |
| ----                | ----            | ----       | ----        | ----    | SQ FT         | SQ FT        |
| ----                | ----            | ----       | ----        | ----    | SQ FT         | SQ FT        |
| ----                | ----            | ----       | ----        | ----    | SQ FT         | SQ FT        |
| ----                | ----            | ----       | ----        | ----    | SQ FT         | SQ FT        |
| ----                | ----            | ----       | ----        | ----    | SQ FT         | SQ FT        |
| ----                | ----            | ----       | ----        | ----    | SQ FT         | SQ FT        |
| ----                | ----            | ----       | ----        | ----    | SQ FT         | SQ FT        |

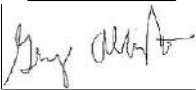
CLIENT:  
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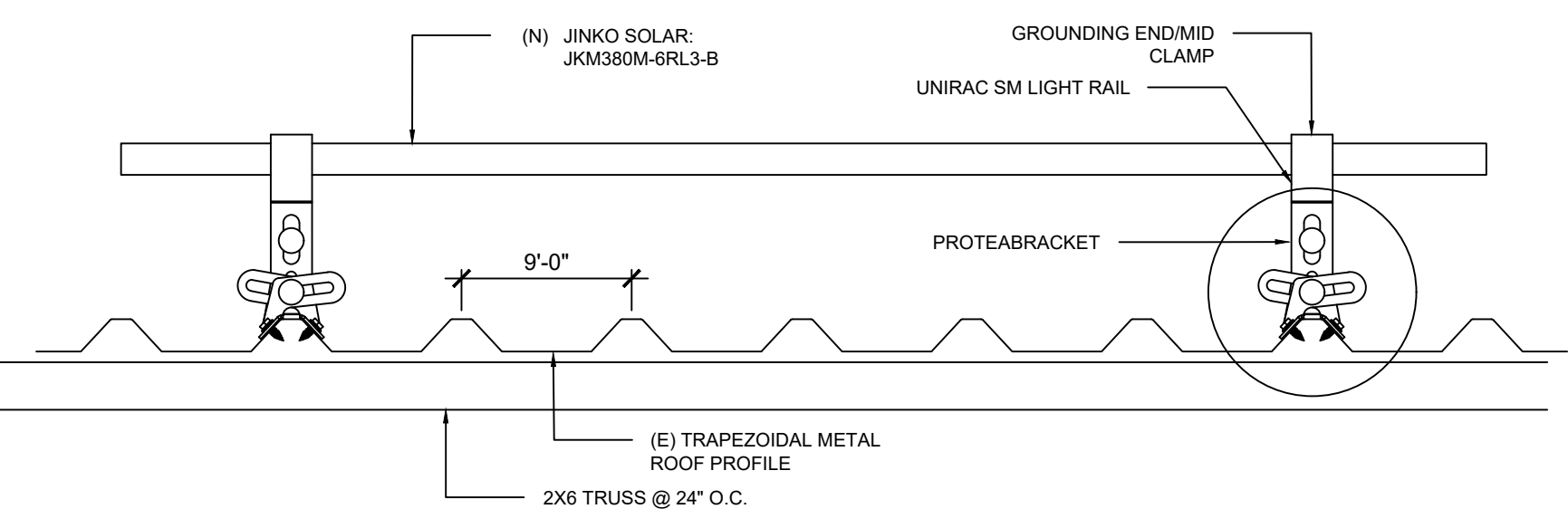


CONTRACTOR LICENSE:  
CERTIFIED ELECTRICAL CONTRACTOR  
EC13008056

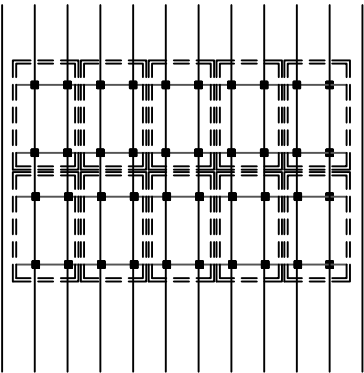
| ROOF DETAILS      |                    |                      |                 |
|-------------------|--------------------|----------------------|-----------------|
| JOB NO:<br>331623 | DATE:<br>8/21/2023 | DESIGNED BY:<br>A.M. | SHEET:<br>PV-2B |

| TABLE 1 - ARRAY INSTALLATION                                                                                                                                                         |            |              |                   |                    |                           |                        |                      |                               |                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|--------------|-------------------|--------------------|---------------------------|------------------------|----------------------|-------------------------------|--------------------------|
|                                                                                                                                                                                      | ROOF PITCH | ROOFING TYPE | ATTACHMENT TYPE   | FRAMING TYPE1      | MAX UNBRACED LENGTH(FT.)1 | RAFTER/TRUSS SISTERING | PENETRATION PATTERN2 | MAX ATTACHMENT SPACING (IN.)2 | MAX RAIL OVERHANG(I N.)3 |
| ROOF 1                                                                                                                                                                               | 20         | METAL        | S-5 PROTEABRACKET | 2X6 TRUSS @ 24" OC | 4.00'                     | NOT REQ'D              | STAGGERED            | 36                            | 12                       |
| ROOF 2                                                                                                                                                                               | 20         | METAL        | S-5 PROTEABRACKET | 2X6 TRUSS @ 24" OC | 4.00'                     | NOT REQ'D              | STAGGERED            | 36                            | 12                       |
|                                                                                                                                                                                      |            |              |                   |                    |                           |                        | 0                    | 0                             |                          |
|                                                                                                                                                                                      |            |              |                   |                    |                           |                        | 0                    | 0                             |                          |
|                                                                                                                                                                                      |            |              |                   |                    |                           |                        | 0                    | 0                             |                          |
|                                                                                                                                                                                      |            |              |                   |                    |                           |                        | 0                    | 0                             |                          |
|                                                                                                                                                                                      |            |              |                   |                    |                           |                        | 0                    | 0                             |                          |
|                                                                                                                                                                                      |            |              |                   |                    |                           |                        | 0                    | 0                             |                          |
|                                                                                                                                                                                      |            |              |                   |                    |                           |                        | 0                    | 0                             |                          |
|                                                                                                                                                                                      |            |              |                   |                    |                           |                        | 0                    | 0                             |                          |
| 1. CONTRACTOR TO VERIFY FRAMING TYPE AND MAX UNBRACED LENGTH PRIOR TO INSTALLATION. IF THE ABOVE INFORMATION DOES NOT MATCH FIELD CONDITIONS, NOTIFY ENGINEER OF RECORD IMMEDIATELY. |            |              |                   |                    |                           |                        |                      |                               |                          |
| 2. WHERE COLLAR TIES OR RAFTER SUPPORTS EXIST, CONTRACTOR SHALL USE RAFTERS WITH COLLAR TIES AS ATTACHMENT POINTS.                                                                   |            |              |                   |                    |                           |                        |                      |                               |                          |
| 3. WHERE APPLICABLE FOR RAILED ATTACHMENT INSTALLATIONS.                                                                                                                             |            |              |                   |                    |                           |                        |                      |                               |                          |

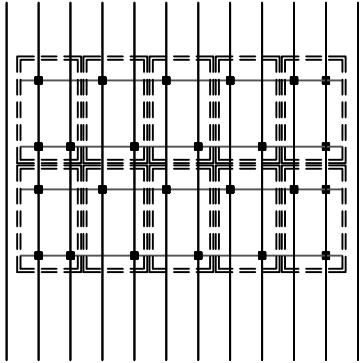
MAX ATTACHMENT SPAN - 3' STAGGERED  
9" BETWEEN SEAMS/DOMES



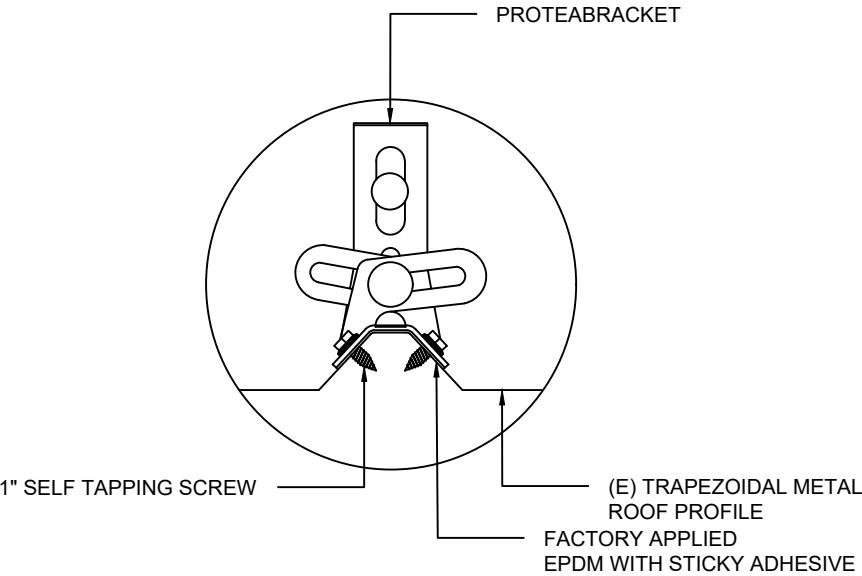
SOLAR PV ARRAY SECTION VIEW  
Scale: NTS



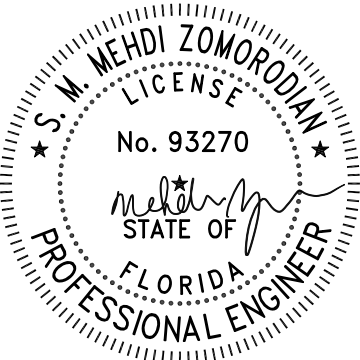
STACKED DETAIL  
For Illustration purposes only



STAGGERED DETAIL  
For Illustration purposes only



ATTACHMENT DETAIL  
Scale: NTS

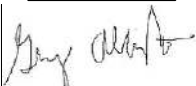


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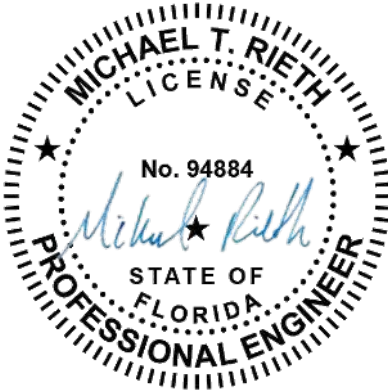
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FREEDOM FOREVER LLC  
2619 CONSULATE DR SUITE 800, ORLANDO, FL 32819  
Tel: (800) 385-1075  
GREG ALBRIGHT  
  
CONTRACTOR LICENSE:  
CERTIFIED ELECTRICAL CONTRACTOR  
EC13008056

| MOUNTING DETAILS  |                    |                      |                |
|-------------------|--------------------|----------------------|----------------|
| JOB NO:<br>331623 | DATE:<br>8/21/2023 | DESIGNED BY:<br>A.M. | SHEET:<br>PV-3 |

|                                      |   |      |   |        |                |  |
|--------------------------------------|---|------|---|--------|----------------|--|
| BACKFEED FUSE SIZING                 |   |      |   |        |                |  |
| MAX. CONTINUOUS OUTPUT 42.00A @ 240V |   |      |   |        |                |  |
| 42.00                                | X | 1.25 | = | 53AMPS | 60A FUSES - OK |  |

PV SYSTEM  
12.160 kW-DC  
10.000 kW-AC



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SYSTEM WILL ATTACH TO  
METER #ACD8732

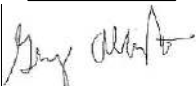
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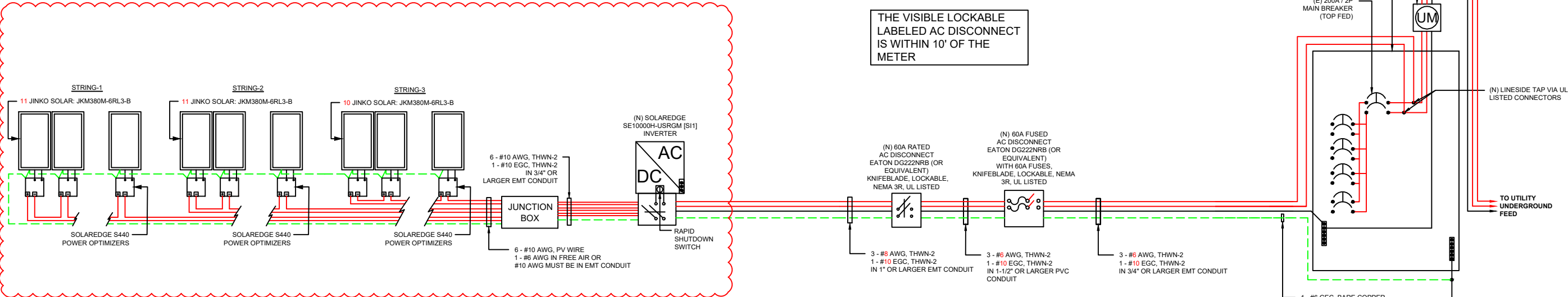
FREEDOM FOREVER LLC  
2619 CONSULATE DR SUITE 800, ORLANDO, FL 32819  
Tel: (800) 385-1075  
GREG ALBRIGHT



CONTRACTOR LICENSE:  
CERTIFIED ELECTRICAL CONTRACTOR  
EC13008056

| THREE LINE DIAGRAM |                    |                      |                |
|--------------------|--------------------|----------------------|----------------|
| JOB NO:<br>331623  | DATE:<br>8/21/2023 | DESIGNED BY:<br>A.M. | SHEET:<br>PV-4 |

2



NOTE:  
CONDUIT AND CONDUCTORS SPECIFICATIONS ARE BASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING AS REQUIRED BY FIELD CONDITIONS

## PTC RATING: 351.3 W

MAX DC CURRENT:  $I_{max} = 1.25 \times (\text{OPTIMIZER OUTPUT CURRENT}) = 1.25 \times 15 = 18.75\text{A}$   
 MAX AC CURRENT:  $I_{max} = 1.25 \times (\text{SUM OF MAX CONTINUOUS OUTPUT CURRENT FROM INVERTERS})$   
 $= 1.25 \times (42.00) = 52.50\text{A}$



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[illegible]

## CONDUCTOR AMPACITY CALCULATIONS IN ACCORDANCE WITH NEC 690.8.

CLIENT:  
JOHN HICKEY  
327 NW CARR CT, LAKE CITY, FL 32055  
AHJ: COLUMBIA COUNTY (FL)  
UTILITY: FPL - FLORIDA POWER & LIGHT  
METER: ACD8732  
PHONE: (386) 867-0620  
EMAIL: BIGDOGMOM1@GMAIL.COM  
FINANCE: OTHER

**SYSTEM:**  
SYSTEM SIZE (DC): 32 X 380 = 12.160 kW  
SYSTEM SIZE (AC): 10.000 kW @ 240V  
MODULES: 32 X JINKO SOLAR:  
JKM380M-6RL3-B  
OPTIMIZERS: 32 X SOLAREDGE S440  
INVERTER: SOLAREDGE SE10000H-USRGM  
[S11]

|     | REVISIONS  |           |
|-----|------------|-----------|
| NO. | REVISED BY | DATE      |
| 1   | J.M.       | 6/27/2023 |
| 2   | A.M.       | 8/21/2023 |
| -   | -          | -         |



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GREG ALBRIGHT

Gay Allen

**CONTRACTOR LICENSE:**  
**CERTIFIED ELECTRICAL CONTRACTOR**  
**EC13008056**

| CONDUCTOR CALCULATIONS |                    |                      |                |
|------------------------|--------------------|----------------------|----------------|
| JOB NO:<br>331623      | DATE:<br>8/21/2023 | DESIGNED BY:<br>A.M. | SHEET:<br>PV-5 |

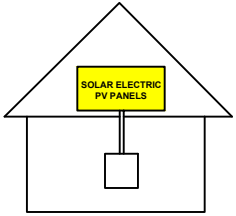


**WARNING:**  
POWER SOURCE OUTPUT  
CONNECTION  
DO NOT RELOCATE THIS  
OVERCURRENT DEVICE.

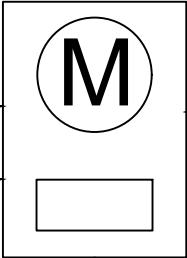
705.12(B)(2)(3)(b)

**SOLAR PV SYSTEM EQUIPPED  
WITH RAPID SHUTDOWN**

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



690.56(C)(1)(A)

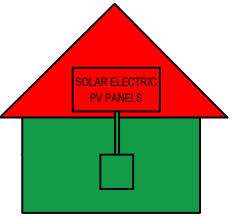


**"WARNING"**  
DUAL POWER SOURCES  
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM  
RATED AC OUTPUT CURRENT - 42.00 AMPS  
AC NORMAL OPERATING VOLTAGE - 240 VOLTS

690.54

**EMERGENCY RESPONDER  
THIS SOLAR PV SYSTEM EQUIPPED  
WITH RAPID SHUTDOWN**

TURN RAPID SHUTDOWN  
SWITCH TO THE "OFF"  
POSITION.  
ONLY CONDUCTORS INSIDE  
BUILDING OR OFF THE  
ROOF WILL SHUT DOWN



NFPA 11.12.2.1.1.1.2

**PV SYSTEM AC DISCONNECT  
RATED AC OUTPUT CURRENT - 42.00 AMPS  
AC NORMAL OPERATING VOLTAGE - 240 VOLTS**

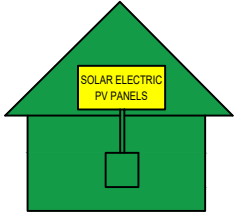
690.15, 690.54

**RAPID SHUTDOWN SWITCH FOR  
SOLAR PV SYSTEM**

690.56(C)(3)

**EMERGENCY RESPONDER  
THIS SOLAR PV SYSTEM EQUIPPED  
WITH RAPID SHUTDOWN**

TURN RAPID SHUTDOWN  
SWITCH TO THE "OFF"  
POSITION TO SHUT DOWN  
ENTIRE PV SYSTEM



NFPA 11.12.2.1.1.1.1

If you have any questions about your system, please call  
our Customer Support Team at

**888.557.6431**

or visit [freedomforever.com/customer-service](http://freedomforever.com/customer-service)

This solar PV system was installed by



\*Freedom Forever is a licensed contractor in all states it operates in. For more information visit [freedomforever.com/licenses](http://freedomforever.com/licenses)

**NOTES:**

1. NEC ARTICLES 690 AND 705 AND IRC SECTION R324 MARKINGS SHOWN HEREON.
2. ALL MARKING SHALL CONSIST OF THE FOLLOWING:
  - A. UV RESISTANT SIGN MATERIAL WITH ENGRAVED OR MACHINE PRINTED LETTERS OR ELECTRO-PLATING.
  - B. RED BACKGROUND COLOR WHITE TEXT AND LINE WORK.
  - C. ARIAL FONT.
3. ALL SIGNS SHALL BE SIZED APPROPRIATELY AND PLACED IN THE LOCATIONS SPECIFIED. SIGNAGE CANNOT BE HAND-WRITTEN.
4. SIGNS SHALL BE ATTACHED TO THE SERVICE EQUIPMENT WITH POP-RIVETS OR SCREWS



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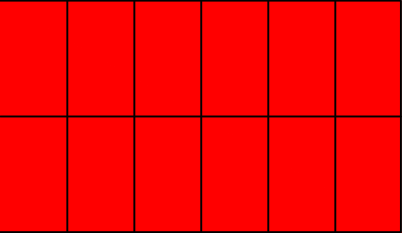
**"WARNING"**  
ELECTRICAL SHOCK HAZARD.  
TERMINALS ON BOTH LINE AND LOAD SIDES  
MAY BE ENERGIZED IN THE OPEN POSITION.

690.13 (B)

**PV SYSTEM DC DISCONNECT  
MAXIMUM VOLTAGE: 480V  
MAXIMUM CIRCUIT CURRENT: 27A  
MAX RATED OUTPUT CURRENT OF  
THE CONTROLLER OR DC-TO-DC  
CONVERTER: 15A**

690.53

**ARRAY**



NEC 690.31(G)(3) & (4)

**"WARNING"**  
PHOTOVOLTAIC POWER SOURCE

EVERY 10' ON CONDUIT AND ENCLOSURES

CLIENT:  
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PHONE: (386) 867-0620  
EMAIL: BIGDOGMOM1@GMAIL.COM  
FINANCE: OTHER

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SYSTEM SIZE (DC): 32 X 380 = 12.160 kW  
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OPTIMIZERS: 32 X SOLAREEDGE S440  
INVERTER: SOLAREEDGE SE10000H-USRGM [S11]

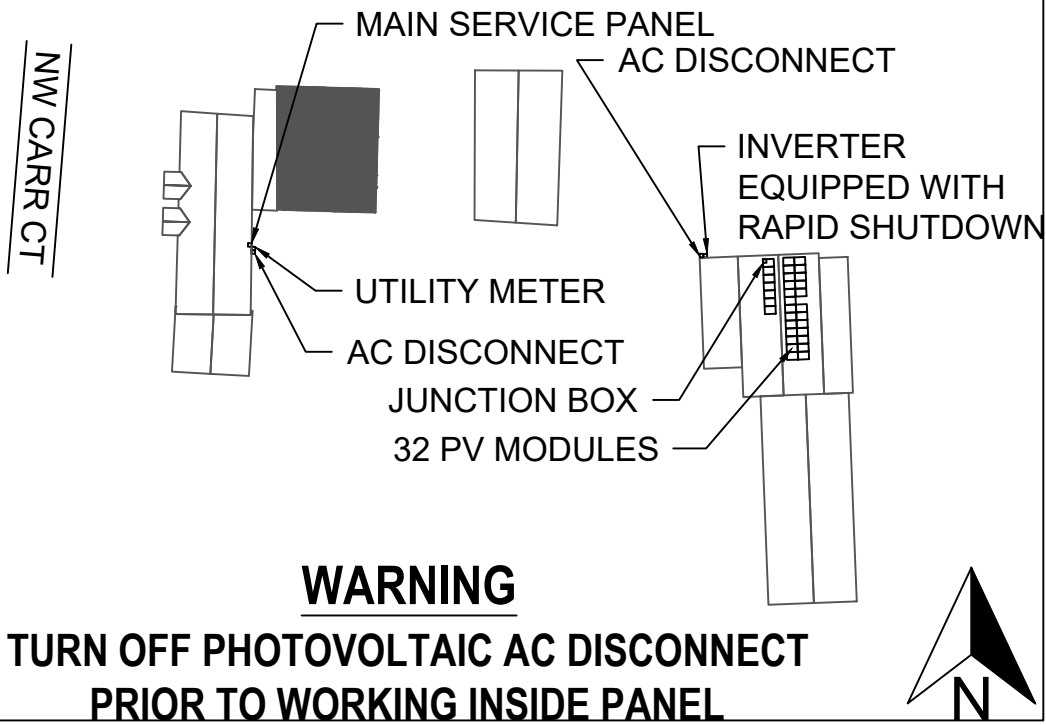
| REVISIONS |            |           |
|-----------|------------|-----------|
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| 2         | A.M.       | 8/21/2023 |
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EC13008056

| LABELS            |                    |                      |                |
|-------------------|--------------------|----------------------|----------------|
| JOB NO:<br>331623 | DATE:<br>8/21/2023 | DESIGNED BY:<br>A.M. | SHEET:<br>PV-7 |

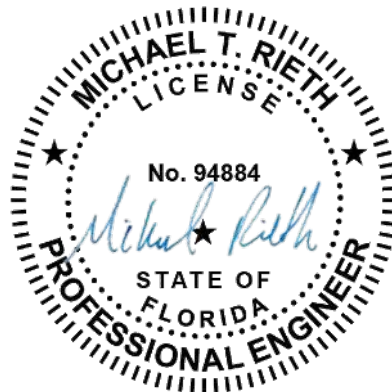
# CAUTION:

POWER TO THIS BUILDING IS  
ALSO SUPPLIED FROM THE  
FOLLOWING SOURCES WITH  
DISCONNECTS AS SHOWN



## WARNING

TURN OFF PHOTOVOLTAIC AC DISCONNECT  
PRIOR TO WORKING INSIDE PANEL

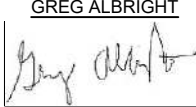


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EC13008056

| SITE PLACARD      |                    |                      |                 |
|-------------------|--------------------|----------------------|-----------------|
| JOB NO:<br>331623 | DATE:<br>8/21/2023 | DESIGNED BY:<br>A.M. | SHEET:<br>PV-7A |

## NOTES:

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4. SIGNS SHALL BE ATTACHED TO THE SERVICE EQUIPMENT WITH POP-RIVETS OR SCREWS.

SOLAREEDGE OPTIMIZER CHART

1-10 11-20 21-30 31-40 41-50 51-60

1

2

3

4

5

6

7

8

9

10

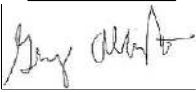


JB

CLIENT:  
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| OPTIMIZER CHART   |                    |                      |                |
|-------------------|--------------------|----------------------|----------------|
| JOB NO:<br>331623 | DATE:<br>8/21/2023 | DESIGNED BY:<br>A.M. | SHEET:<br>PV-8 |

# SAFETY PLAN

---

**INSTRUCTIONS:**

- USE SYMBOLS IN KEY TO MARK UP THIS SHEET.
- SAFETY PLAN MUST BE MARKED BEFORE JOB STARTS AS PART OF THE PRE-PLAN
- DOCUMENT ALL ADDITIONAL HAZARDS ON THIS PAGE & MAKE NOTES ON THE JHA SHEET

**INCIDENT REPORTING:**

INJURIES - CALL INJURY HOTLINE  
**(855) 400-7233**  
*\*If injury is life threatening, call 911 first THEN the Injury Hotline*

NON-INJURIES - USE MOBILE INCIDENT REPORTING  
 (Auto, Property Damage, Near Miss)



**NEAREST OCCUPATIONAL/INDUSTRIAL CLINIC:**

NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

**NEAREST HOSPITAL:**

NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

**SAFETY COACH CONTACT INFORMATION:**

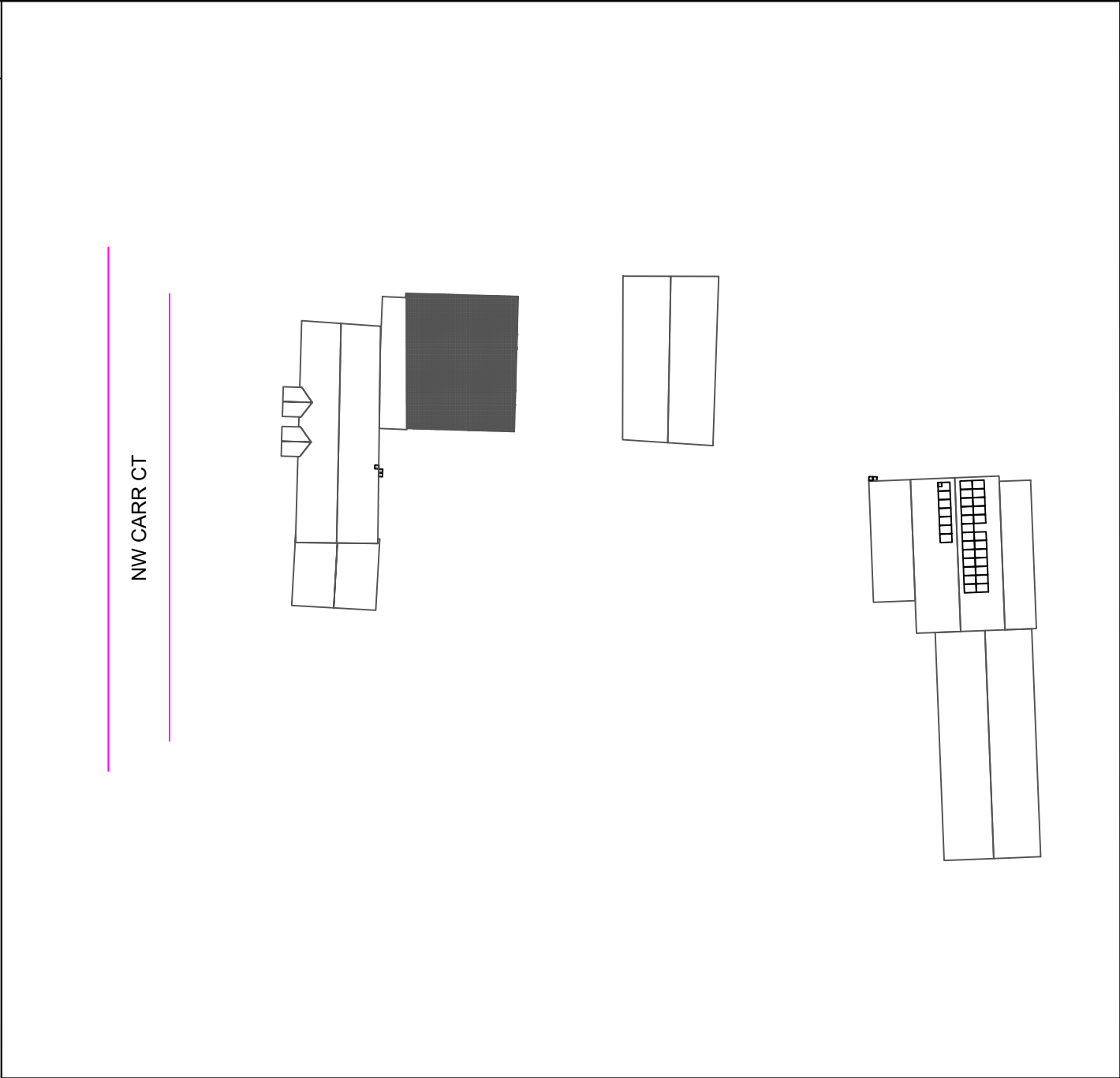
NAME: \_\_\_\_\_

PHONE NUMBER: \_\_\_\_\_

ALL EMPLOYEES ON SITE SHALL BE MADE AWARE OF THE SAFETY PLAN AND SIGN INDICATING THAT THEY ARE AWARE OF THE HAZARDS ON-SITE AND THE PLAN FOR WORKING SAFELY.

| <u>NAME</u> | <u>SIGNATURE</u> |
|-------------|------------------|
| _____       | _____            |
| _____       | _____            |
| _____       | _____            |
| _____       | _____            |
| _____       | _____            |
| _____       | _____            |
| _____       | _____            |

DATE: \_\_\_\_\_ TIME: \_\_\_\_\_



| MARK UP KEY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |            |           |         |                                                                                                                                                                                                                                                                                      |         |           |         |  |     |            |      |   |      |           |   |      |           |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                              |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----------|---------|--|-----|------------|------|---|------|-----------|---|------|-----------|---|---|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <div><div>P</div>PERMANENT ANCHOR</div> <div><div>T</div>TEMPORARY ANCHOR</div> <div><div>IL</div>INSTALLER LADDER</div> <div><div>B</div>JUNCTION / COMBINER BOX</div> <div><div>S</div>STUB-OUT</div> <div><div>X</div>SKYLIGHT</div> <div><div></div>NO LADDER ACCESS (STEEP GRADE OR GROUND LEVEL OBSTRUCTIONS)</div> <div><div></div>RESTRICTED ACCESS</div> <div><div></div>CONDUIT</div> <div><div>GAS</div>GAS SHUT OFF</div> <div><div>H<sub>2</sub>O</div>WATER SHUT OFF</div> <div><div>7</div>SERVICE DROP</div> <div><div>Z</div>POWER LINES</div> |            |           |         | <div>CLIENT:<br/>JOHN HICKEY<br/>327 NW CARR CT, LAKE CITY, FL 32055<br/>AHJ: COLUMBIA COUNTY (FL)<br/>UTILITY: FPL - FLORIDA POWER &amp; LIGHT<br/>METER: ACD8732<br/>PHONE: (386) 867-0620<br/>EMAIL: BIGDOGMOM1@GMAIL.COM<br/>FINANCE: OTHER</div>                                |         |           |         |  |     |            |      |   |      |           |   |      |           |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                              |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |           |         | <div>SYSTEM:<br/>SYSTEM SIZE (DC): 32 X 380 = 12.160 kW<br/>SYSTEM SIZE (AC): 10.000 kW @ 240V<br/>MODULES: 32 X JINKO SOLAR:<br/>JKM380M-6RL3-B<br/>OPTIMIZERS: 32 X SOLAREEDGE S440<br/>INVERTER: SOLAREEDGE SE10000H-USRGM [SI1]</div>                                            |         |           |         |  |     |            |      |   |      |           |   |      |           |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                              |  |
| RE RESPONSIBLE FOR ENSURING THIS IS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |            |           |         | <table><thead><tr><th colspan="3">REVISIONS</th></tr><tr><th>NO.</th><th>REVISED BY</th><th>DATE</th></tr></thead><tbody><tr><td>1</td><td>J.M.</td><td>6/27/2023</td></tr><tr><td>2</td><td>A.M.</td><td>8/21/2023</td></tr><tr><td>-</td><td>-</td><td>-</td></tr></tbody></table> |         | REVISIONS |         |  | NO. | REVISED BY | DATE | 1 | J.M. | 6/27/2023 | 2 | A.M. | 8/21/2023 | - | - | - |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                              |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |           |         | REVISIONS                                                                                                                                                                                                                                                                            |         |           |         |  |     |            |      |   |      |           |   |      |           |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                              |  |
| NO.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | REVISED BY | DATE      |         |                                                                                                                                                                                                                                                                                      |         |           |         |  |     |            |      |   |      |           |   |      |           |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                              |  |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | J.M.       | 6/27/2023 |         |                                                                                                                                                                                                                                                                                      |         |           |         |  |     |            |      |   |      |           |   |      |           |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                              |  |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | A.M.       | 8/21/2023 |         |                                                                                                                                                                                                                                                                                      |         |           |         |  |     |            |      |   |      |           |   |      |           |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                              |  |
| -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -          | -         |         |                                                                                                                                                                                                                                                                                      |         |           |         |  |     |            |      |   |      |           |   |      |           |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                              |  |
| <table><thead><tr><th>1300HRS</th><th>1400HRS</th><th>1500HRS</th><th>1600HRS</th></tr></thead><tbody><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr></tbody></table>                                                                                                               |            |           |         | 1300HRS                                                                                                                                                                                                                                                                              | 1400HRS | 1500HRS   | 1600HRS |  |     |            |      |   |      |           |   |      |           |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | <div><div></div><div>FREEDOM FOREVER LLC<br/>2619 CONSULATE DR SUITE 800, ORLANDO,<br/>FL 32819<br/>Tel: (800) 385-1075<br/><u>GREG ALBRIGHT</u><br/><br/>CONTRACTOR LICENSE:<br/>CERTIFIED ELECTRICAL CONTRACTOR<br/>EC13008056</div></div> |  |
| 1300HRS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1400HRS    | 1500HRS   | 1600HRS |                                                                                                                                                                                                                                                                                      |         |           |         |  |     |            |      |   |      |           |   |      |           |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                              |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |           |         |                                                                                                                                                                                                                                                                                      |         |           |         |  |     |            |      |   |      |           |   |      |           |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                              |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |           |         |                                                                                                                                                                                                                                                                                      |         |           |         |  |     |            |      |   |      |           |   |      |           |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                              |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |           |         |                                                                                                                                                                                                                                                                                      |         |           |         |  |     |            |      |   |      |           |   |      |           |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                              |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |           |         |                                                                                                                                                                                                                                                                                      |         |           |         |  |     |            |      |   |      |           |   |      |           |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                              |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |           |         |                                                                                                                                                                                                                                                                                      |         |           |         |  |     |            |      |   |      |           |   |      |           |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                              |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |           |         |                                                                                                                                                                                                                                                                                      |         |           |         |  |     |            |      |   |      |           |   |      |           |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                              |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |           |         |                                                                                                                                                                                                                                                                                      |         |           |         |  |     |            |      |   |      |           |   |      |           |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                              |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |           |         | SAFETY PLAN                                                                                                                                                                                                                                                                          |         |           |         |  |     |            |      |   |      |           |   |      |           |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                              |  |
| JOB NO:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            | DATE:     |         | DESIGNED BY:                                                                                                                                                                                                                                                                         |         |           |         |  |     |            |      |   |      |           |   |      |           |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                              |  |
| 331623                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            | 8/21/2023 |         | A.M.                                                                                                                                                                                                                                                                                 |         |           |         |  |     |            |      |   |      |           |   |      |           |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                              |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |           |         | SHEET:<br>PV-9                                                                                                                                                                                                                                                                       |         |           |         |  |     |            |      |   |      |           |   |      |           |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                              |  |

|     | REVISIONS  |           |
|-----|------------|-----------|
| NO. | REVISED BY | DATE      |
| 1   | J.M.       | 6/27/2023 |
| 2   | A.M.       | 8/21/2023 |
| -   | -          | -         |



# freedom

FOREVER

**FREEDOM FOREVER LLC**

2619 CONSULATE DR SUITE 800, ORLANDO,  
FL 32819  
Tel: (800) 385-1075

**GREG ALBRIGHT**



**CONTRACTOR LICENSE:**  
**CERTIFIED ELECTRICAL CONTRACTOR**  
 EC13008056

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| SAFETY PLAN       |                    |                      |                |
|-------------------|--------------------|----------------------|----------------|
| JOB NO:<br>331623 | DATE:<br>8/21/2023 | DESIGNED BY:<br>A.M. | SHEET:<br>PV-9 |

JOB HAZARD ANALYSIS

Crew leader to fill out all sections below, hold a pre-job safety meeting with all personnel, and upload this completed document and the Safety Plan to Site Capture

Ladder Access

- Ladders must be inspected before each use.
  - Extension ladders must be set up on a firm and level surface at a 4-to-1 rise to run angle (or 75 degrees) and the top must be secured to the structure. Extension style ladders placed on uneven, loose or slippery surfaces must additionally have the base firmly anchored or lashed so the base will not slip out.
  - Extension ladders must be used with walk-through devices or the ladder must extend 36" above the stepping off point.
  - A-frame ladders must only be climbed with the ladder spreader bars locked in the open position; A-frame ladders shall not be climbed while in the closed position (ex, closed and used while leaned against a structure).
- Additional notes:

Mobile Equipment

- Only Qualified operators will operate equipment; operators must maintain a certification on their person for the equipment being operated.
- Type(s) of mobile equipment (Type/Make/Model):
- Qualified operator(s):

Material Handling and Storage

- Materials will be staged/stored in a way that does not present a hazard to client, personnel or public. Materials stored on the roof will be physically protect from failing or sliding off.

Fall Protection

- A site-specific plan for fall prevention and protection is required prior to starting work and must remain onsite at all times until work is complete; a fall rescue plan must be outlined and discussed among the crew prior to work start.
- First-person-Up (FPU) must install their anchor and connect before any other task, including installing other anchors. The Last-Person-Down (LPD) must be the only person on a roof uninstalling fall protection.

- FPCP (name and title):
- FPU and LPD (name and title):

Electrical Safety

- The Electrical Qualified Person (EQP) is required onsite to perform electrical work.
  - All electrical work will be performed with equipment in an electrically safe condition (de-energized) unless approval has been granted prior to work.
  - Service drops and overhead electrical hazards will be indentified and protected from contact, as neccessary.
- EQP (name and tile):

Public Protection

- The safety of the Client and Public must be maintained at all times.
- The Client and the Public shall be prevented from entering the work zone through the use of barriers and/or signage, as required.
- Company, Client and Public property shall be protected from falling objects.
- Pets (including dogs) shall be secured by their owners prior to work start.
- The Client should not leave pets, family members, or others in charge or care of Employees, Contractors, or Temporary Workers.

- Crew leader responsible for communication with the client:
- Client and public is excluded from work area by barricades (N/A, Yes, No):

Training and Pre-Job Safety Briefing

- All employees onsite shall be made aware of the specific hazards of this project and review this HJA during a pre-job briefing, and their signature indicates awareness of site conditions and the plan to eliminate any hazards identified prior to and during the project.

- Crew leader (name/title):
- Crew member (name/title):
- Crew member (name/title):
- Crew member (name/title):
- Crew member (name/title):
- Crew member (name/title):

Airborne Contaminants:

- Asbestos-containing (Transite) piping (ACP) - Do not disturb (move, drill, cut fracture, etc.)
- Asbestos-containing thermal insulation (ACI) and Asbestos-containing duct wrapping (ACW) - do not disturb, no attic or crawlspace access is allowed if work to be performed could cause exposure to personnel, client or public.

- If yes, list specific tasks and protection in place:

Weather and Environment

- The site supervisor shall forecast the weather conditions at the job site, prior to crew arrival, in order to mitigate any hazards associated with inclement weather (heat, cold, wind, rain, etc.)
  - The site supervisor will utilized a portable wind meter (anemometer) to verify actual onsite wind conditions, by checking at the ground and on any elevated work surface (ex, rooftop) prior to work start, at midday and prior to solar panel staging on a roof.
  - Elevated work involving the moving or maneuvering of solar panels shall cease at 25mph (sustained wind) until wind subsides.
- Forecasted weather maximum temp (degrees f):

Heat Related Illness Prevention

- Employees shall have access to potable drinking water that is fresh, pure, and suitably cool. The water shall be located as close as practicable to the areas where employees are working. Water shall be supplied in sufficient quantity at the beginning of the work shift to provide at least one quart per employee per hour for drinking for the entire shift. Employees may begin the shift with smaller quantities of water if they identify the location and have effective means for replenishment during the shift to allow employees to drink on quart or more per hour. The frequent drinking of water shall be encouraged.
- Shade shall be present when temperature exceeds 80 degrees Fahrenheit. When the outdoor temperature in the work exceeds 80 degrees Fahrenheit, employees shall have and maintain one or more areas with shade at all times.
- New employees must be acclimatized. New employees will be monitored by their Crew Leader (site supervisor) for the first two (2) weeks of employment or longer when necessary.
- Employees will be allowed and encouraged to implement scheduled breaks during each shift. Employees must take cool-down breaks in the shade any time they feel the need to do so to protect them from overheating. Supervisors are REQUIRED to allow employees any break period they need during high heat conditions.
- Cool Vests are encouraged for all employees at all times during periods of high heat.
- Identify the location of the closet Occupational/Industrial Clinic or Hospital in case a crew member becomes ill.

What is the specific plan to provide and replenish sufficient water for all employees on site?

- If offsite replenish is necessary, where will you go to replenish water (location/address):
- Who will replenish the drinking water (name):

Restroom facilities

- Employees shall have access to restroom facilities with hand-washing stations. Use of onsite restroom is at the client's discretion (location is annotated below). If client does not give permission, location of suitable restroom facilities with hand-washing stations offsite will be provided. The onsite supervisor will identify location and make arrangements to ensure all employees have access at any point.
- Restroom facilities will be (circle one): Onsite - Offsite
  - If Offsite, add location name and address:

Incident Reporting Procedure

- Contact your Site Supervisor
- Name:

Phone:
- Contact your Manager
- Name:

Phone:
- Contact your Site Supervisor
- Name:

Phone:

With: Your full name, phone number, office location, brief description of what happen and when.

NOTE ADDITIONAL HAZARDS NOT ADDRESSED ABOVE  
(add as many as necessary by using additional sheets)

|                    |                                   |
|--------------------|-----------------------------------|
| Define the Hazard: | Method/steps to prevent incident: |
|                    |                                   |
| Define the Hazard: | Method/steps to prevent incident: |
|                    |                                   |
| Define the Hazard: | Method/steps to prevent incident: |
|                    |                                   |
| Define the Hazard: | Method/steps to prevent incident: |
|                    |                                   |

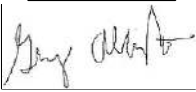
CLIENT:  
JOHN HICKEY  
327 NW CARR CT, LAKE CITY, FL 32055  
AHJ: COLUMBIA COUNTY (FL)  
UTILITY: FPL - FLORIDA POWER & LIGHT  
METER: ACD8732  
PHONE: (386) 867-0620  
EMAIL: BIGDOGMOM1@GMAIL.COM  
FINANCE: OTHER

SYSTEM:  
SYSTEM SIZE (DC): 32 X 380 = 12.160 kW  
SYSTEM SIZE (AC): 10.000 kW @ 240V  
MODULES: 32 X JINKO SOLAR:  
JKM380M-6RL3-B  
OPTIMIZERS: 32 X SOLAREEDGE S440  
INVERTER: SOLAREEDGE SE10000H-USRGM [S11]

|     |            |           |
|-----|------------|-----------|
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EC13008056

| SAFETY PLAN       |                    |                      |                 |
|-------------------|--------------------|----------------------|-----------------|
| JOB NO:<br>331623 | DATE:<br>8/21/2023 | DESIGNED BY:<br>A.M. | SHEET:<br>PV-10 |



EAGLE  
MODULES

# THE MOST DEPENDABLE SOLAR PRODUCT

## EAGLE 66TR G4

### 380-400 WATT TILING RIBBON MODULE

Positive power tolerance of 0~+3%

- NYSE-listed since 2010, Bloomberg Tier 1 manufacturer
- Top performance in the strictest 3<sup>rd</sup> party labs
- Premium solar factories in USA, Vietnam, 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 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.



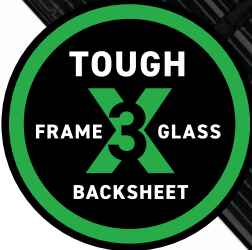
#### Thick and Tough

Fire Type 1 rated module engineered with a thick frame, 3.2mm front side glass, and thick backsheet for added durability.

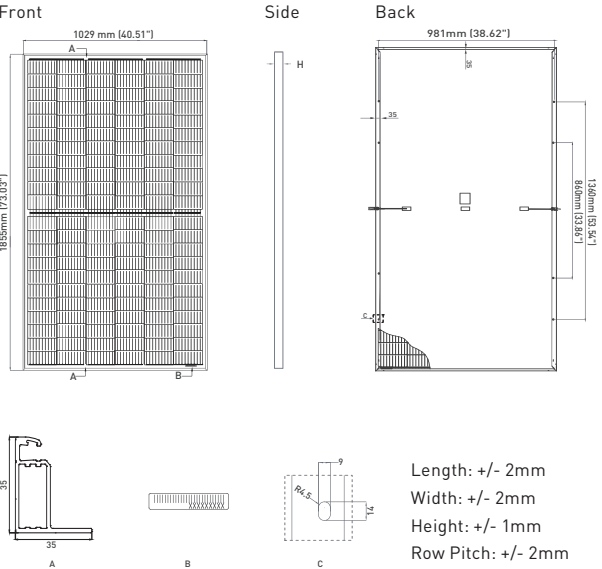


#### Leading Warranty

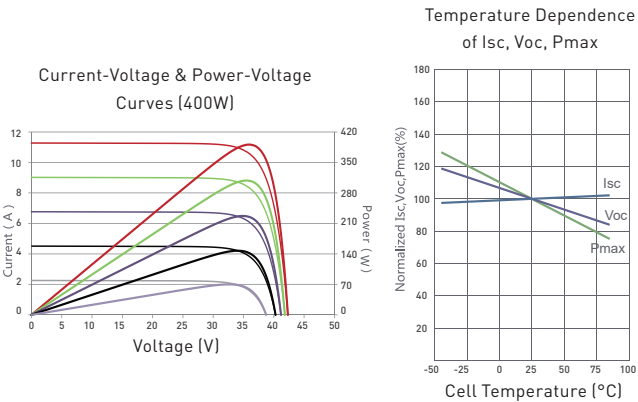
25-year product and 25-year linear power warranty; 98% guaranteed first year, max 0.55% annual loss.



### ENGINEERING DRAWINGS



### ELECTRICAL PERFORMANCE & TEMPERATURE DEPENDENCE



### ELECTRICAL CHARACTERISTICS

| Module Type                 | JKM380M-6RL3-B |        | JKM385M-6RL3-B |        | JKM390M-6RL3-B |        | JKM395M-6RL3-B |        | JKM400M-6RL3-B |        |
|-----------------------------|----------------|--------|----------------|--------|----------------|--------|----------------|--------|----------------|--------|
|                             | STC            | NOCT   | STC            | NOCT   | STC            | NOCT   | STC            | NOCT   | STC            | NOCT   |
| Maximum Power (Pmax)        | 380Wp          | 283Wp  | 385Wp          | 286Wp  | 390Wp          | 290Wp  | 395Wp          | 294Wp  | 400Wp          | 298Wp  |
| Maximum Power Voltage (Vmp) | 36.90V         | 33.70V | 37.02V         | 33.90V | 37.15V         | 34.02V | 37.27V         | 34.13V | 37.39V         | 34.25V |
| Maximum Power Current (Imp) | 10.30A         | 8.39A  | 10.40A         | 8.45A  | 10.50A         | 8.53A  | 10.60A         | 8.61A  | 10.70A         | 8.69A  |
| Open-circuit Voltage (Voc)  | 44.22V         | 41.74V | 44.34V         | 41.85V | 44.47V         | 41.97V | 44.59V         | 42.09V | 44.71V         | 42.20V |
| Short-circuit Current (Isc) | 11.12A         | 8.98A  | 11.22A         | 9.06A  | 11.32A         | 9.14A  | 11.42A         | 9.22A  | 11.52A         | 9.30A  |
| Module Efficiency STC (%)   | 19.91%         |        | 20.17%         |        | 20.43%         |        | 20.69%         |        | 20.96%         |        |

\*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%

### MECHANICAL CHARACTERISTICS

|                 |                                                                               |
|-----------------|-------------------------------------------------------------------------------|
| No. of Cells    | 132 [2x66]                                                                    |
| Dimensions      | 1855x1029x35mm [73.03x40.51x1.37 in]                                          |
| Weight          | 21.5 kg [47.40 lbs]                                                           |
| Front Glass     | 3.2mm, Anti-Reflection Coating<br>High Transmission, Low Iron, Tempered Glass |
| Frame           | Anodized Aluminum Alloy                                                       |
| Junction Box    | IP67 Rated                                                                    |
| Output Cables   | 12 AWG, 2053mm [80.83in] or Customized Length                                 |
| Connector       | Staubli 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; 30pcs/pallets, 60pcs/stack, 720pcs/ 40'HQ Container

- ISO9001:2008 Quality Standards
- ISO14001:2004 Environmental Standards
- IEC61215, IEC61730 certified products
- UL61730 Certification
- ISO45001:2018 Occupational Health & Safety Standards



BUILDING YOUR TRUST IN SOLAR. [WWW.JINKOSOLAR.US](http://WWW.JINKOSOLAR.US)

The company reserves the final right for explanation on any of the information presented hereby. JKM380-400M-6RL3-B-A2-US

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# Power Optimizer

## For North America

S440, S500



POWER OPTIMIZER

### PV power optimization at the module level

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

\* Expected availability in 2022

[solaredge.com](https://www.solaredge.com)



## Power Optimizer

### For North America

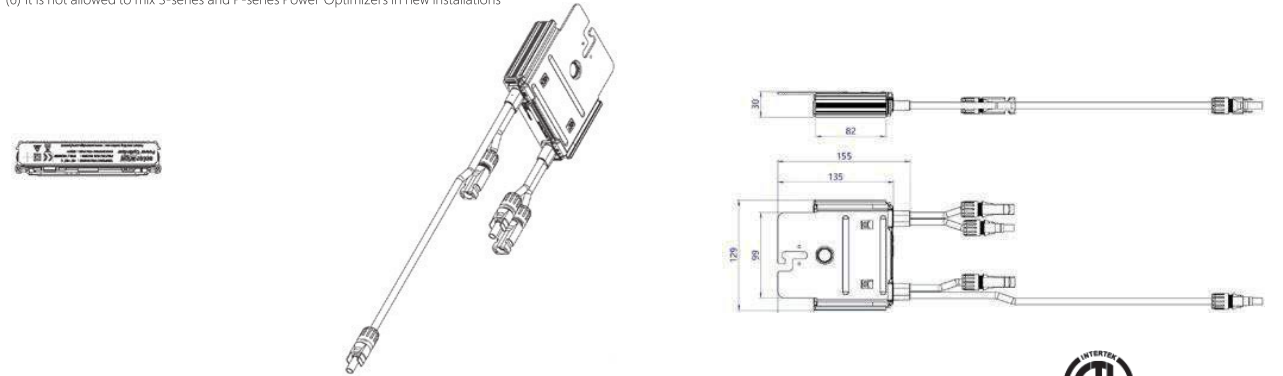
S440, S500

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

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

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

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



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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



INVERTERS

## Optimized installation with HD-Wave technology

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

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

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

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

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

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

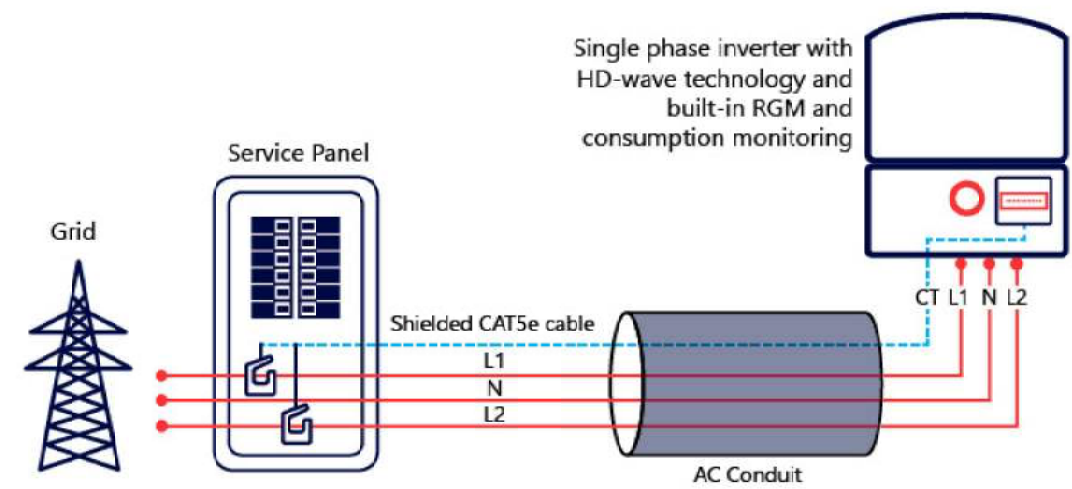
SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US/  
SE7600H-US / SE10000H-US / SE11400H-US

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

(3) Inverter with Revenue Grade Meter P/N: SExxxxH-US000BNC4; Inverter with Revenue Grade Production and Consumption Meter P/N: SExxxxH-US000BNI4 . For consumption metering, current transformers should be ordered separately: SEACT0750-200NA-20 or SEACT0750-400NA-20. 20 units per box  
(4) Full power up to at least 50°C / 122°F; for power de-rating information refer to: <https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf>

## How to Enable Consumption Monitoring

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



Product specifications

Eaton DG222NRB

Catalog Number: DG222NRB

Eaton General duty cartridge fuse safety switch, 60 A, NEMA 3R, Painted galvanized steel, Class H fuses, Fusible with neutral, Two-pole, Three-wire, Category: general duty safety switch, 240 V

General specifications

|                                                                                                                                                                                  |                                                                                                                                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Product Name                                                                                                                                                                     | Catalog Number                                                                                                                   |
| Eaton general duty cartridge fuse safety switch                                                                                                                                  | DG222NRB                                                                                                                         |
|                                                                                                                                                                                  | UPC                                                                                                                              |
|                                                                                                                                                                                  | 782113144221                                                                                                                     |
| Product Length/Depth                                                                                                                                                             | Product Height                                                                                                                   |
| 7.35 in                                                                                                                                                                          | 14.37 in                                                                                                                         |
| Product Width                                                                                                                                                                    | Product Weight                                                                                                                   |
| 8.4 in                                                                                                                                                                           | 10 lb                                                                                                                            |
| Warranty                                                                                                                                                                         | Certifications                                                                                                                   |
| 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. | UL Listed                                                                                                                        |
|                                                                                                                                                                                  | Catalog Notes                                                                                                                    |
|                                                                                                                                                                                  | Maximum hp ratings apply only when dual element fuses are used. 3-Phase hp rating shown is a grounded B phase rating, UL listed. |



Physical Attributes

|                               |
|-------------------------------|
| Enclosure                     |
| NEMA 3R                       |
| Enclosure material            |
| Painted galvanized steel      |
| Fuse configuration            |
| Fusible with neutral          |
| Number Of Poles               |
| Two-pole                      |
| Number of wires               |
| 3                             |
| Type                          |
| General duty, cartridge fused |

Performance Ratings

|                      |
|----------------------|
| Amperage Rating      |
| 60A                  |
| Fuse class provision |
| Class H fuses        |
| Voltage rating       |
| 240V                 |

Miscellaneous

|                            |
|----------------------------|
| Product Category           |
| General duty safety switch |

Resources

|                                          |
|------------------------------------------|
| Catalogs                                 |
| Eaton's Volume 2—Commercial Distribution |
| Multimedia                               |
| Double Up on Safety                      |
| Switching Devices Flex Center            |
| Specifications and datasheets            |
| Eaton Specification Sheet - DG222NRB     |



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INSULATION-PIERCING TAP CONNECTORS  
CONECTORES DE DERIVACIÓN QUE PERFORAN EL AISLAMIENTO

Installation Instructions:



**Warning**

Improperly installed electrical wiring can be dangerous and cause electrical fires. The connector chosen must be sized to the wires being used. Consult local building code before doing any electrical work. For assistance, refer to an instructional book or consult a qualified electrician.



**Warning**

Contact with electricity can cause serious injury or death. Use on insulated cable only. [RHH, RHW(-2), THHN, THHW, THW, THWN, USE, XHHW(-2)]. Consult factory for other insulation types). If the installation is to be made on an energized run, the tap conductor must be under no load and must not be grounded. Use electrically insulated gloves. De-energize the run cable if there are any questions of these conditions being met.

- Determine the direction for the tap conductor to exit and discard one end cap. **See figure 1.**
- Position the main (or feeder) side of the connector around the run cable and tighten the bolt finger tight. **See figure 2.** If required, loosen the bolt slightly to allow the connector to open completely. **DISASSEMBLY NOT RECOMMENDED.** The plastic “Turbo” spacer holds the connector open which eases installation and ensures proper connections.
- Cut the end of the tap cable squarely. **DO NOT STRIP CABLE INSULATION.**
- Insert the tap cable into the tap side of the connector until it is seated in the remaining end cap. **See figure 3.**
- Continue tightening the torque regulating bolt with a standard box or socket wrench until the torque regulating piece breaks away. If the connector has two (2) assembly bolts, alternately tighten until the hexagonal torque devices break away. **See figures 4a & 4b.** Note that the plastic “turbo” spacer on the side will also break. To make the installation even easier and to relieve torque from the cables, a second wrench can be used on the hexagonal piece on the bottom of the connector.

**DO NOT use gripping type pliers, pipe, open ended or adjustable wrenches** as these may damage the hexagonal torque regulating device. A torque wrench is not required.

**MAKE SURE ONLY THE TOP HEXAGONAL TORQUE DEVICE OF THE BOLT HEAD IS USED FOR ASSEMBLY. THE SECOND HEX PIECE [CLOSER TO THE BODY OF THE CONNECTOR] IS USED FOR DISASSEMBLY.**

Note: The torque regulating bolt ensures the correct torque is applied to the conductors without using a torque wrench. Important information such as run and tap ranges, voltage ratings and material/temperature ratings is marked on the connector.

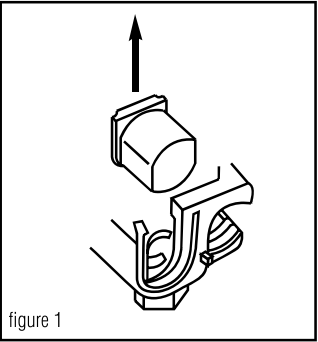


figure 1

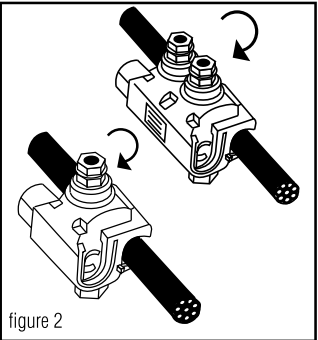


figure 2

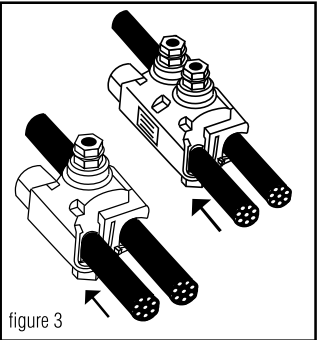


figure 3

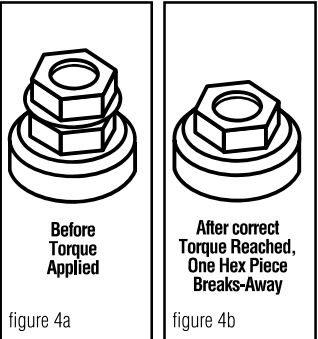


figure 4a

figure 4b

Instalación Instrucciones:



**Advertencia**

Los cables eléctricos mal instalados pueden ser peligrosos y provocar incendios. El conector escogido debe ser de un tamaño adecuado para los cables que se utilicen. Consulte los códigos de construcción locales antes de efectuar trabajos eléctricos. Si necesita ayuda, consulte un libro de instrucciones o consulte con un electricista capacitado.



**Advertencia**

Use sólo en cable aislado. [RHH, RHW(-2), THHN, THHW, THW, THWN, USE, XHHW(-2)]. Consulte con la fábrica para obtener información sobre otros tipos de aislamiento). Si se va a hacer la instalación sobre un cable con corriente el conductor derivado debe estar libre de carga y no debe estar aterado. Use guantes con aislamiento eléctrico. Quite le la corriente al cable del cual se hace la derivación si no se pueden cumplir estas condiciones. El contacto con electricidad puede producir lesiones graves o mortales.

- Determine la dirección en la que el conductor derivado saldrá y deseche la tapa terminal sobrante. **Vea la ilustración 1.**
- Coloque el lado principal (o de alimentación) del conector alrededor del cual se hace la derivación y apriete firmemente el dedo del perno. **Vea la ilustración 2.** Si hace falta, afloje el perno ligeramente para permitir que el conector se abra completamente. **NO ES RECOMENDABLE DESARMAR EL CONECTOR.** El espaciador “Turbo” de plástico mantiene al conector abierto, lo cual facilita la instalación y asegura que las conexiones se hagan correctamente.
- Corte el extremo del cable de derivación perpendicularmente a su eje. **NO PELE EL AISLAMIENTO DEL CABLE.**
- Inserte el cable de derivación en el lado de derivación del conector hasta que tope contra la tapa terminal que queda. **Vea la ilustración 3.**
- Continué apretando este perno que regula la torsión con una llave estándar o de cubo hasta que la pieza que regula la torsión se parta y se separe. Si el conector tiene dos (2) pernos de ensamblaje, apriéte los alternativamente hasta que el dispositivo de regulación de torció se parta. **Vea la ilustración 4a y 4b.** Observe que el espaciador “turbo” de plástico en el costado también se fracturará. Para hacer esta instalación aún más fácil y para aliviar la torsión de los cables, se puede usar una segunda llave sobre la pieza hexagonal al fondo del conector.

**NO USE alicates de presión, llaves de turbo, llaves comunes o ajustables** ya que éstas pueden dañar el dispositivo hexagonal que regula la torsión. No se requiere una llave de torsión.

**ASEGÚRESE QUE SE USE, PARA EL ENSAMBLADO, SÓLO EL DISPOSITIVO SUPERIOR DE REGULACIÓN DE TORSIÓN DE LA CABEZA DEL PERNO. LA SEGUNDA PIEZA HEXAGONAL (LA MÁS CERCANA AL CUERPO DEL CONECTOR) SE USA SÓLO PARA DESARMAR EL CONECTOR.**

Nota: El perno regulador de torsión garantiza la aplicación de la torsión correcta a los conductores sin usar una llave de torsión. La información importante de longitud de cable pelado y de toma, las clasificaciones de materiales y temperatura está marcada en el conector.

| B-TAP® INSULATION PIERCING TAP CONNECTORS TORQUE AND CURRENT RATINGS                                                                                |         |           |                |                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----------|----------------|-------------------------------|
| (Solid and/or Stranded)                                                                                                                             |         |           |                |                               |
| CATALOG#                                                                                                                                            | MAIN    | TAP       | NOMINAL TORQUE | TAP CURRENT RATING (IN AMPS)* |
| BTC2/0-14                                                                                                                                           | 2/0-4   | 10-14+    | 80 IN. LBS.    | 40                            |
| BTC1/0-10                                                                                                                                           | 1/0-8   | 2-10++    | 80 IN. LBS.    | 130                           |
| BTC4/0-10                                                                                                                                           | 4/0-3   | 2-10+++   | 125 IN. LBS.   | 130                           |
| BTC4/0-6                                                                                                                                            | 4/0-2   | 1/0-6     | 160 IN. LBS.   | 170                           |
| BTC4/0-2                                                                                                                                            | 4/0-2   | 4/0-2     | 160 IN. LBS.   | 260                           |
| BTC250-6                                                                                                                                            | 250-4   | 4/0-6     | 160 IN. LBS.   | 260                           |
| BTC250-4                                                                                                                                            | 250-1   | 3/0-4     | 160 IN. LBS.   | 225                           |
| BTC250-2                                                                                                                                            | 250-1/0 | 4/0-2     | 160 IN. LBS.   | 260                           |
| BTC350-1/0                                                                                                                                          | 350-1/0 | 350-1/0   | 330 IN. LBS.   | 350                           |
| BTC500-4                                                                                                                                            | 500-2/0 | 4/0-4     | 330 IN. LBS.   | 260                           |
| BTC500-1/0                                                                                                                                          | 500-4/0 | 350-1/0   | 330 IN. LBS.   | 350                           |
| BTC500-14                                                                                                                                           | 750-3/0 | 10-14 +++ | 80 IN. LBS.    | 40                            |
| BTC750-250                                                                                                                                          | 750-250 | 500-250   | 330 IN. LBS.   | 430                           |
| +10-14 Cu SOLID/STRANDED; 10-12 Al SOLID/STRANDED                                                                                                   |         |           |                |                               |
| ++2-10 Cu SOLID/STRANDED; 2-10 Al STRANDED                                                                                                          |         |           |                |                               |
| +++2-10 Cu SOLID/STRANDED; 2-8 Al STRANDED                                                                                                          |         |           |                |                               |
| ++++10-14 Cu SOLID/STRANDED; 10-12 Al STRANDED                                                                                                      |         |           |                |                               |
| Full line is 600V dual-rated, 194°F(90°C)                                                                                                           |         |           |                |                               |
| * Based on NEC Table 310-16 1996 (Not more than 3 insulated conductors in a raceway at ambient temperature of 30° C) for the largest tap wire size. |         |           |                |                               |



**WARNING:** Cancer and Reproductive Harm - [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).



**ADVERTENCIA:** Cáncer y Daño Reproductivo - [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

One year limited warranty. See [idealind.com](http://idealind.com) for more information.

Garantía limitada de un año. Visite [www.idealind.com](http://www.idealind.com) para obtener detalles de la garantía.



**IDEAL INDUSTRIES, INC.**

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ALL IDEAL Customers

2/9/23

Subject: **The Buchanan B-TAP® splice/tap connectors meet the 2020 NEC article 230.46 requirement for “line side applications”**

The Buchanan B-TAP® brand of insulation piercing connectors which correspond to part numbers beginning with “BTC” meet the requirements of article 230.46 of the 2020 NEC. These products have already been tested to the newer requirements. The installation instructions are in the process of being updated to show the required notation: “suitable for use on the line side of the service equipment”. This change will take a few weeks to get into our production.

In addition, the marking “SR” will be added to the product. That addition is in process and will take a few months to complete.

This notice will provide confirmation to the inspectors that B-TAP® products meet the requirements of the 2020 and 2023 NEC article 230.46 “Spliced and Tapped Conductors”.

Sushil Keswani

A handwritten signature in black ink, appearing to read "Sushil Keswani", written over a light blue horizontal line.

Director of Engineering  
IDEAL Industries, Inc.,

# ZMVV.E5238 - Wire Connectors and Soldering Lugs

Note: We are enhancing our systems and you may notice duplicate entries/missing/outdated data. During this interim period, please contact our Customer Service at <https://www.ul.com/about/locations>.

## Wire Connectors and Soldering Lugs

### IDEAL INDUSTRIES INC

1375 Park Ave  
SYCAMORE, IL 60178 United States

E5238

[View model for additional information](#)

**Insulated butt splice crimp type connectors,** Model(s): [BVS1](#), [BVS2](#), [BVS5](#)

**Insulated flange spade type crimp cconnectors,** Model(s): [SV5-3.7](#), [SVL5-4](#), [SVL5-6](#)

**Insulated flange spade type crimp connectors,** Model(s): [FSNYD1-3.7](#), [FSNYD1-4](#), [FSNYD1-5](#), [FSNYD2-3.7](#), [FSNYD2-4](#), [FSNYD2-5](#), [FSNYD5-3.7](#), [FSNYD5-4](#), [FSNYD5-5](#)

**Insulated hook type crimp connectors,** Model(s): [HNYD1-3.7](#), [HNYD1-4](#), [HNYD1-5](#), [HNYD2-3.7](#), [HNYD2-4](#), [HNYD2-5](#), [HNYD5-3.7](#), [HNYD5-4](#), [HNYD5-5](#), [HVV1-3.7](#), [HVV1-4](#), [HVV1-5](#), [HVV2-4](#), [HVV2-5](#), [HVV5-3.7](#), [HVV5-4](#), [HVV5-5](#)

**Insulated locking spade crimp connectors,** Model(s): [LSNYD1-3.7](#), [LSNYD2-3.7](#), [LSNYD5-3.7](#), [LSNYD5-4](#), [LSNYD5-5](#), [LSNYDL1-4](#), [LSNYDL1-5](#), [LSNYDL2-4](#), [LSNYDL2-5](#)

**Insulated multiple stud ring type crimp connectors,** Model(s): [MSRNYD1-3753](#), [MSRNYD2-3753](#), [MSRNYD5-3753](#)

**Insulated parallel connectors,** Model(s): [PVT1](#), [PVT14](#), [PVT2](#), [PVT22](#), [PVT5](#), [PVT8](#)

**Insulated pin type connectors,** Model(s): [PTNYD1-12](#), [PTNYD2-12](#), [PTNYD5-13](#)

**Insulated ring type crimp connectors,** Model(s): [RNYB14-11](#), [RNYB22-11](#), [RNYD1-10](#), [RNYD1-3.2](#), [RNYD1-5](#), [RNYD1-6](#), [RNYD1-8](#), [RNYD2-10](#), [RNYD2-2](#), [RNYD2-3.2](#), [RNYD2-6](#), [RNYD2-8](#), [RNYD5-10](#), [RNYD5-12](#), [RNYD5-3.2](#), [RNYD5-3.7](#), [RNYD5-5](#), [RNYD5-6](#), [RNYD5-8](#), [RNYDL1-3.7](#), [RNYDL1-4](#), [RNYDL2-3.7](#), [RNYDL2-4](#), [RNYDL5-3.7](#), [RNYDL5-4](#), [RNYDM2-3.7](#), [RNYDS1-3.7](#), [RNYDS1-4](#), [RNYDS2-4](#), [RNYDS2-5](#), [RNYDS5-4](#), [RV1-3.2](#), [RV1-5](#), [RV1-6](#), [RV2-3.2](#), [RV5-10](#), [RV5-3.7](#), [RV5-5](#), [RV5-6](#), [RV5-8](#), [RVL1-4](#), [RVL2-4](#), [RVL5-4](#), [RVM1-3.7](#), [RVM2-3.7](#), [RVY1-3.2](#)

**Insulated spade type crimp connectors,** Model(s): [SNYD1-3.2](#), [SNYD5-3.7](#), [SNYD5-5](#), [SNYDL1-3.7](#), [SNYDL1-4](#), [SNYDL2-3.7](#), [SNYDL2-4](#), [SNYDL2-5](#), [SNYDL5-4](#), [SNYDLL1-3.7](#), [SNYDLL2-3.7](#), [SNYDM1-4](#), [SNYDM2-4](#), [SNYDS1-5](#), [SNYDS2-5](#), [SVL1-3.7](#), [SVL1-5](#), [SVL2-3.7](#), [SVL2-5](#), [SVM1-4](#), [SVM2-4](#), [SVY1-3.2](#), [SVY2-3.2](#), [SVY5-3.7](#), [SVY5-5](#), [SVYL1-3.7](#), [SVYL1-4](#), [SVYL2-3.7](#), [SVYL2-4](#), [SVYL2-5](#), [SVYL5-4](#), [SVYLL1-3.7](#), [SVYLL2-3.7](#), [SVYM1-4](#), [SVYM2-4](#), [SVYS1-5](#), [SVYS2-5](#), [SVYS5-4](#)

**Insulated splice connectors,** Model(s): [PB1-](#), [PB2-](#), [PB5-](#)

**Insulating caps or covers, for use on manufacturer`s splice caps, for 2006-S, 2008-S connectors,** Model(s): [2007](#)

**Insulating caps or covers, for use on manufacturer`s splice caps, for 2011-S connector,** Model(s): [2014](#)

**Listed pressure cable connectors,** Model(s): [BHT1](#), [BHT2](#), [BHT5](#), [BN1](#), [BN2](#), [BN5](#), [BNT1-16](#), [BNT14](#), [BNT2-16](#), [BNT22](#), [BNT5-20](#), [BNT8](#), [BNYDF1](#), [BNYDF2](#), [BNYDF5](#), [BNYT1](#), [BNYT2](#), [BNYT5](#), [BV1](#), [BV2](#), [BV5](#), [BVT14](#), [BVT22](#), [BVT8](#)

**Listed pressure ring terminal connectors,** Model(s): [RNYB14-8](#), [RNYB8-11](#), [RNYBL22-5](#), [RNYBL22-6](#)

**Listed splicing wire connectors,** Model(s): [L12](#), [L13](#), [L15](#)

**Non-insulated flange spade crimp connectors,** Model(s): [FSN1-3.7](#), [FSN1-4](#), [FSN1-5](#), [FSN2-3.7](#), [FSN2-4](#), [FSN2-5](#), [FSN5-3.7](#), [FSN5-4](#), [FSN5-5](#), [FSNB1-3.7](#), [FSNB1-4](#), [FSNB1-5](#), [FSNB2-3.7](#), [FSNB2-4](#), [FSNB2-5](#), [FSNB5-3.7](#), [FSNB5-4](#), [FSNB5-5](#), [FSNL1-3.7](#), [FSNL2-5](#)

**Non-insulated hook crimp connectors,** Model(s): [HN1-4](#), [HN1-5](#), [HN2-3.7](#), [HN2-4](#), [HN2-5](#), [HN5-3.7](#), [HN5-4](#), [HN5-5](#)

**Non-insulated locking type crimp connectors,** Model(s): [LSN1-3.7](#), [LSN2-3.7](#), [LSN5-3.7](#), [LSN5-4](#), [LSN5-5](#), [LSN5-6](#), [LSNL1-4](#), [LSNL1-5](#), [LSNL2-5](#)

**Non-insulated multiple stud ring type crimp connectors,** Model(s): [MSRNB1-3753](#)

**Non-insulated parallel crimp connectors,** Model(s): [PNT 1](#), [PNT 14](#), [PNT 2](#), [PNT 22](#), [PNT 5](#), [PNT 8](#), [PNT1](#), [PNT2](#), [PNT5](#)

**Non-insulated pin type crimp connectors,** Model(s): [PTN1-12](#), [PTN2-12](#), [PTN5-13](#)

**Non-insulated ring type crimp connector,** Model(s): [RNB1-10](#), [RNB1-3.2](#), [RNB14-11](#), [RNB14-12](#), [RNB14-16](#), [RNB1-6](#), [RNB1-8](#), [RNB2-10](#), [RNB2-2](#), [RNB2-6](#), [RNB5-12](#), [RNB8-12](#), [RNB1-4](#)

**Non-insulated ring type crimp connectors,** Model(s): [RNB1-3.2](#), [RNB14-10](#), [RNB14-5](#), [RNB14-8](#), [RNB1-5](#), [RNB2-10](#), [RNB22-10](#), [RNB22-12](#), [RNB22-8](#), [RNB2-3.2](#), [RNB2-8](#), [RNB5-10](#), [RNB5-3.2](#), [RNB5-3.7](#), [RNB5-3.7](#), [RNB5-5](#), [RNB5-6](#), [RNB5-8](#), [RNB8-10](#), [RNB8-11](#), [RNB8-16](#), [RNB8-8](#), [RNBL1-3.7](#), [RNBL22-5](#), [RNBL22-6](#), [RNBL2-3.7](#), [RNBL2-5](#), [RNBL38-10](#), [RNBL5-3.7](#), [RNBL5-4](#), [RNB1-3.7](#), [RNB1-4](#), [RNB1-5](#), [RNB1-6](#), [RNB1-8](#), [RNB2-10](#), [RNB2-2](#), [RNB2-6](#), [RNB5-12](#), [RNB8-12](#), [RNB1-4](#)

**Non-insulated spade type crimp connectors,** Model(s): [SN1-3.2](#), [SN2-3.2](#), [SN5-3.7](#), [SN5-5](#), [SNB1-3.2](#), [SNB5-3.7](#), [SNB5-5](#), [SNBL1-3.7](#), [SNBL1-4](#), [SNBL2-4](#), [SNBL2-5](#), [SNBL5-4](#), [SNBL5-6](#), [SNB1-3.7](#), [SNB1-4](#), [SNB1-5](#), [SNB1-6](#), [SNB1-8](#), [SNB2-10](#), [SNB2-2](#), [SNB2-6](#), [SNB5-12](#), [SNB8-12](#), [SNBL1-4](#)

**Pressure cable connectors,** Model(s): [KB - 1000](#), [KB - 2/0](#), [KB - 350](#), [KB - 4/0](#), [KB - 500](#), [KB - 800](#), [KS - 1000](#), [KS - 2/0](#), [KS - 350](#), [KS - 4/0](#), [KS - 500](#), [KS - 800](#)

**Pressure terminal connectors,** Model(s): [FSVY1-3.7](#), [FSVY1-4](#), [FSVY1-5](#), [FSVY2-3.7](#), [FSVY2-4](#), [FSVY2-5](#), [FSVY5-3.7](#), [FSVY5-4](#), [FSVY5-5](#), [K-5655](#), [K-5656](#), [LSV1-3.7](#), [LSV2-3.7](#), [LSV5-4](#), [LSV5-5](#), [LSV5-6](#), [LSVL2-4](#), [LSVS1-4](#), [LSVS1-5](#), [LSVS2-5](#), [LSVY1-3.7](#), [LSVY2-3.7](#), [LSVY5-3.7](#), [LSVY5-4](#), [LSVY5-5](#), [LSVY5-6](#), [LSVYL1-4](#), [LSVYL1-5](#), [LSVYL2-4](#), [LSVYL2-5](#), [MSRNB2-3753](#), [MSRVY1-3753](#), [MSRVY2-3753](#), [MSRVY5-3753](#), [PTVY1-12](#), [PTVY2-12](#), [PTVY5-13](#), [RVY1-10](#), [RVY1-5](#), [RVY1-6](#), [RVY1-8](#), [RVY2-10](#), [RVY2-2](#), [RVY2-3.2](#), [RVY2-6](#), [RVY2-8](#), [RVY5-10](#), [RVY5-12](#), [RVY5-3.2](#), [RVY5-3.7](#), [RVY5-5](#), [RVY5-6](#), [RVY5-8](#), [RVYL1-3.7](#), [RVYL1-4](#), [RVYL2-3.7](#), [RVYL2-4](#), [RVYL2-5](#), [RVYL5-3.7](#), [RVYL5-4](#), [RVYM2-3.7](#), [RVYS1-3.7](#), [RVYS1-4](#), [RVYS2-3.7](#), [RVYS2-4](#), [RVYS2-5](#), [RVYS5-4](#), [SNBM2-4](#), [SNYD2-3.2](#), [TLK16-6](#), [TLK25-10](#)

**Pressure Terminal Connectors,** Model(s): [RNYB14-10](#), [RNYB14-12](#), [RNYB14-5](#), [RNYB22-12](#), [RNYB22-8](#), [RNYB8-10](#), [RNYB8-12](#), [RNYB8-8](#), [RNYBM8-5](#), [RNYBS14-6](#)

**Slicing wire connectors,** Model(s): [OK-2 \(Pkg. cat No. 84\)](#), [OK-3 \(Pkg. cat No. 85\)](#), [OK-4 \(Pkg. cat No. 86\)](#), [OK-5 \(Pkg. cat No. 87\)](#), [OK-6W \(Pkg. cat No. 88\)](#), [OK-8 \(Pkg. cat No. 90\)](#), [OK-8W \(NA\)](#)

**Splicing wire connectors,** Model(s): [12](#), [13](#), [14](#), [14-6](#), [15](#), [199](#), [199S](#), [200](#), [2002](#), [2006-S](#), [2008-S](#), [2011-S](#), [22-10](#), [22-12](#), [29](#), [299](#), [299S](#), [30](#), [300](#), [32](#), [33](#), [34](#), [340](#), [36](#), [37](#), [38](#), [39](#), [399](#), [400](#), [400AL](#), [42](#), [50](#), [615069](#), [66](#), [70](#), [800](#), [AS-1/0](#), [AS-2](#), [AS-2/0](#), [AS-350](#), [AS-4](#), [AS-4/0](#), [AS-500](#), [AS-6](#), [B1](#), [B2](#), [B4](#), [BT-2](#), [BTC 1/0-10](#), [BTC 1/0-14](#), [BTC 2/0-14](#), [BTC 250-4](#), [BTC 350-1/0](#), [BTC 4/0-10](#), [BTC 4/0-2](#), [BTC 4/0-6](#), [BTC 500-1/0](#), [BTC 500-14](#), [BTC 500-4](#), [BTC1/0-10](#), [BTC2/0-14](#), [BTC250-4](#), [BTC350-1/0](#), [BTC4/0-10](#), [BTC4/0-2](#), [BTC4/0-6](#), [BTC500-1/0](#), [BTC500-14](#), [BTC500-4](#), [BV1](#), [BV1](#), [BV2](#), [BV2](#), [BV5](#), [BV5](#), [C-3](#), [C-4](#), [C-5](#), [K1/0](#), [K1000](#), [K2](#), [K2/0](#), [K250](#), [K3](#), [K3/0](#), [K350](#), [K4](#), [K500](#), [K6](#), [K750](#), [K8](#), [KS10](#), [R1](#), [S1/O](#), [S2](#), [S2/0](#), [S250](#), [S3](#), [S3/0](#), [S350](#), [S4](#), [S500](#), [S6](#), [TRQ1](#), [TRQ2](#), [W1](#), [W2](#), [W4](#), [WT1](#), [WT2](#), [WT3](#), [WT4](#), [WT6](#), [WTW51](#), [WTW52](#), [WTW53](#), [WTW54](#)

**Splicing Wire Connectors,** Model(s): [BNT1](#), [BNT2](#)

**Splicing Wire Connectors,;** Model(s): [46-404](#), [46-405](#)

**Splicinig wire connectors**, Model(s): [H-1566](#), [H-1567](#), [H-1570](#), [H-1571](#), [H-1572](#), [H-1591](#), [H-1592](#), [H-1594](#)

**Terminal connectors**, Model(s): [10](#), [11](#), [22](#), [250](#), [300](#), [341](#), [342](#), [410 with insulating cap No. 415](#), [411 with insulating cap No. 417](#), [412 with insulating cap No. 417](#), [451](#), [452](#), [454](#), [48](#), [49](#), [49 Black](#), [53-B](#), [59B](#), [600](#), [71B#](#), [72B#](#), [73B#](#), [73B+](#), [74B](#), [76B](#), [76B+](#), [78B+](#), [82](#), [K-5504](#), [LSNL2-4](#), [M-3](#), [PV3-750](#), [PV3-750](#), [PV3-750](#), [PV4-750](#), [PV4-750](#), [PV4-750](#), [RNBL2-4](#), [RNBS14-6](#), [RNBS38-6](#), [RNBS38-8](#), [RNYB22-10](#), [RNYBS8-6](#), [RV2-6](#), [RVL2-5](#), [SV5-5](#), [WT1](#), [WT2](#), [WT3](#), [WT4](#), [WT41](#), [WT51](#), [WT52](#), [WT53](#), [WT54](#), [WT6](#)

**Terminal Connectors**, Model(s): [RNB22-11](#)

**Wire Connectors**, Model(s): [65](#), [653](#)

**Wire Connectors and Soldering Lugs**, Model(s): [L22](#), [L23](#), [L25](#), [PS10](#), [PS12](#), [PS2](#), [PS3](#), [PS4](#), [PS4S](#), [PS5](#), [PS6](#), [PS8](#)

# - The equipment (71B, 72B and 73B) were also evaluated to the requirements of UL 2043 and are suitable for use in air handling spaces.  
\* - May be followed by suffix B, J, T or X.  
NOTE - All models may be provided with or without prefix "V" or suffix "MP" or "V" and prefix "BP". All models may be followed by suffixes BT, UB or UF with or without a two or four digit number, with or without suffixes B, LP, NP, PF, PH, SP and/or T. Die Series terminals may be followed by Suffixes UI, UT, UF, US, or UB, with or without a two to four digit number, with or without Suffix T or B, followed by Suffixes SP, LP, NP, PF, or and/or NM, by PH or BE, with or without Suffixes NT, BS, and /or G.

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The right way to attach solar PV to trapezoidal roof profiles!

# S-5!®

## The Right Way!™



NOW AVAILABLE  
IN ALUMINUM

ProteaBracket™

### ProteaBracket™

A versatile bracket for mounting solar PV to trapezoidal roof profiles

ProteaBracket™ is now made in aluminum. Still the most versatile trapezoidal metal roof attachment solution on the market, the S-5! ProteaBracket just got better!

The bracket features an adjustable attachment base and module attachment options to accommodate different roof profile dimensions and mounting options.

Our pre-applied EPDM gasket with peel and stick adhesive makes installation a snap, ensuring accurate and secure placement the first time.

With no messy sealants, faster installation, and a weather-proof fit, ProteaBracket offers you the most versatile solar attachment solution available.

ProteaBracket\* can be used for rail mounting or "direct-attach" with S-5! PVKIT™



### Features and Benefits

- 34% lighter - saves on shipping
- Stronger L-Foot™
- Load-tested for engineered application
- Corrosion-resistant materials
- Adjustable - Fits rib profiles up to 3"
- Peel-and-Stick prevents accidental shifting during installation
- Fully pre-assembled
- 25-year warranty\*

\*When ProteaBracket is used in conjunction with the S-5! PVKIT, an additional nut is required during installation.

\*See [www.S-5.com](http://www.S-5.com) for details.



888-825-3432 | [www.S-5.com](http://www.S-5.com)

# S-5!®

The Right Way!™

ProteaBracket™ is the perfect solar attachment solution for most trapezoidal rib, exposed-fastened metal roof profiles!

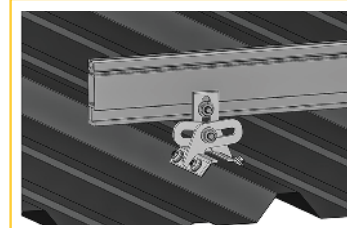
ProteaBracket™ is compatible with common metal roofing materials and comes with a pre-applied EPDM gasket on the base.

**Note:** All four pre-punched holes must be used to achieve tested strength. Fasteners are provided.

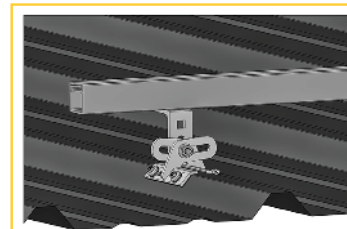
For design assistance, ask your distributor, or visit [www.S-5.com](http://www.S-5.com) for the independent lab test data that can be used for load-critical designs and applications. Also, please visit our website for more information including metallurgical compatibilities and specifications.

S-5!® holding strength is unmatched in the industry.

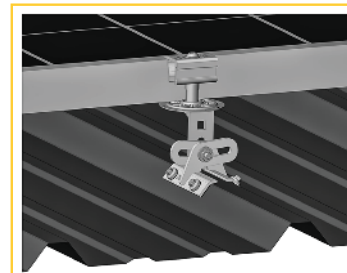
### Multiple Attachment Options:



Side  
Mount Rail



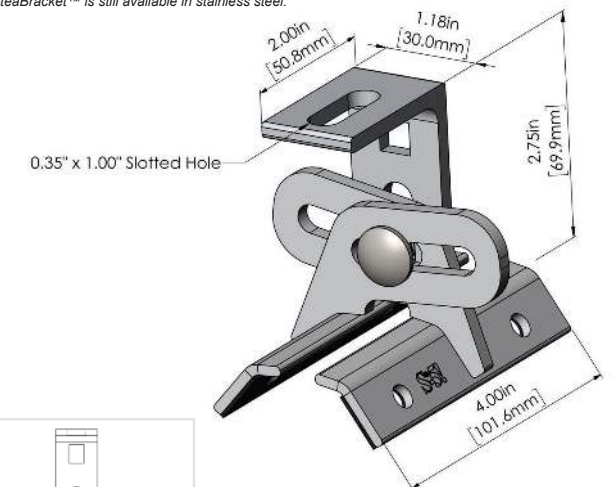
Bottom  
Mount Rail



w/ S-5!  
PVKIT™  
(rail-less)

### ProteaBracket™

ProteaBracket™ is still available in stainless steel.



ProteaBracket fits profiles  
up to 3 inches

INSTALLATION:

No surface preparation needed. (1) Wipe away excess oil and debris. (2) Peel off adhesive release paper. (3) Align and mount bracket directly onto crown of panel. (4) Secure ProteaBracket through pre-punched holes, using piercing-point S-5! screws.



ProteaBracket™ and the S-5! PVKIT™ 2.0 mounted on a trapezoidal roof profile

S-5!® Warning! Please use this product responsibly!

Products are protected by multiple U.S. and foreign patents. For published data regarding holding strength, bolt torque, patents, and trademarks, visit the S-5! website at [www.S-5.com](http://www.S-5.com).

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With Superior Aesthetics



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

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### MAXIMIZE PROFITABILITY ON EVERY JOB

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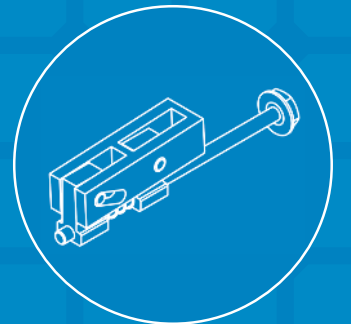
Professional support for professional installers and designers. You have access to our technical support and training groups. Whatever your support needs, we've got you covered. Visit [Unirac.com/solarmount](http://Unirac.com/solarmount) for more information.



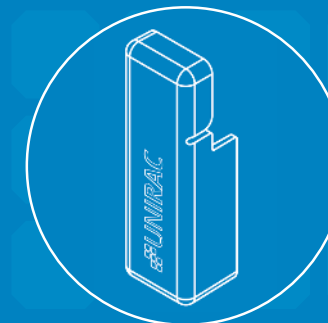
**UL2703**

BONDING & GROUNDING  
MECHANICAL LOADING  
SYSTEM FIRE CLASSIFICATION

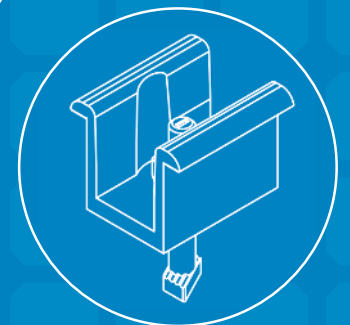
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DOCUMENTATION

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### CERTIFIED QUALITY PROVIDER

Unirac is the only PV mounting vendor with ISO certifications for 9001:2008, 14001:2004 and OHSAS 18001:2007, which means we deliver the highest standards for fit, form, and function. These certifications demonstrate our excellence and commitment to first class business practices.

### BANKABLE WARRANTY

Don't leave your project to chance. Unirac has the financial strength to back our products and reduce your risk. Have peace of mind knowing you are providing products of exceptional quality. SOLARMOUNT is covered by a 25 year limited product warranty and a 5 year limited finish warranty.

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

PUB2018AUG31 - PRINTED UPDATE

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# Certificate of Compliance

**Certificate:** 70131735

**Master Contract:** 266909

**Project:** 80082031

**Date Issued:** 2021-06-02

**Issued To:** Unirac  
1411 Broadway NE  
Albuquerque, New Mexico, 87102  
United States

**Attention:** Klaus Nicolaedis

*The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only.*

**Issued by:** Michael Hoffnagle  
Michael Hoffnagle



## PRODUCTS

CLASS - C531302 - POWER SUPPLIES - PHOTOVOLTAICS-PV Racking and clamping systems  
CLASS - C531382 - POWER SUPPLIES - PHOTOVOLTAICS-PV Racking and clamping systems -  
Certified to US Standards

|         |     |   |                                                                                                                                                       |
|---------|-----|---|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Models: | SM  | - | SOLARMOUNT Flush-to-Roof is an extruded aluminum rail PV racking system that is installed parallel to the roof in landscape or portrait orientations. |
|         | ULA | - | Unirac Large Array is a ground mount system using the SolarMount (SM) platform for the bonding and grounding of PV modules.                           |

**Solarmount**



**Certificate:** 70131735  
**Project:** 80082031

**Master Contract:** 266909  
**Date Issued:** 2021-06-02

The system listed is designed to provide bonding/grounding, and mechanical stability for photovoltaic modules. The system is secured to the roof with the L-Foot components through the roofing material to building structure. Modules are secured to the racking system with stainless steel or aluminum mid clamps and Aluminum end clamps. The modules are bonded to the racking system with the stainless-steel bonding mid clamps with piercing points. The system is grounded with 10 AWG copper wire to bonding/grounding lugs. Fire ratings of Class A with Type 1, 2, 3, 10, 19, 22 or 25 for steep slope. Tested at 5" interstitial gap which allows installation at any stand-off height.

The grounding of the system is intended to comply with the latest edition of the National Electrical Code, to include NEC 250 & 690. Local codes compliance is required, in addition to national codes. All grounding/bonding connections are to be torqued in accordance with the Installation Manual and the settings used during the certification testing for the current edition of the project report.

The system may employ optimizers/micro-inverters and used for grounding when installed per installation instructions.

UL 2703 Mechanical Load ratings:

|                                            |       |
|--------------------------------------------|-------|
| Downward Design Load (lb/ft <sup>2</sup> ) | 113.5 |
| Upward Design Load (lb/ft <sup>2</sup> )   | 50.7  |
| Down-Slope Load (lb/ft <sup>2</sup> )      | 16.13 |

Test Loads:

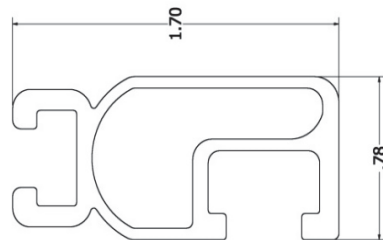
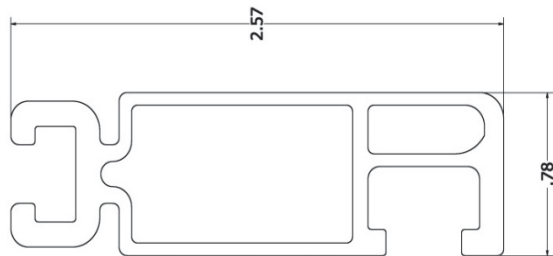
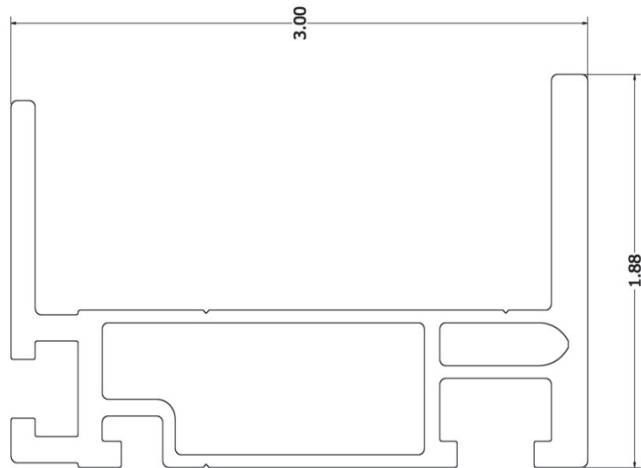
|                                       |        |
|---------------------------------------|--------|
| Downward Load (lb/ft <sup>2</sup> )   | 170.20 |
| Upward Load (lb/ft <sup>2</sup> )     | 76.07  |
| Down-Slope Load (lb/ft <sup>2</sup> ) | 24.2   |

## Unirac Large Array

ULA is a ground mount system using the SolarMount (SM) platform for the bonding and grounding of PV modules. ULA aluminum components merge with SM rails and installer-supplied steel pipe. The SM rail system is secured to the horizontal Pipe using the Rail Bracket components. The Rear and Front cap secures the horizontal Pipe to the vertical Pipe. The Front cap is also used to secure the Cross brace. A Slider is attached to the vertical Pipe to secure the Cross brace. The SM rails, caps, slider, rail brackets, and cross braces materials are 6105-T5 aluminum extrusion. Fasteners materials are 304 stainless steel. Horizontal and vertical pipe materials meet the minimum requirements of ASTM A53 for galvanized steel pipe in 2" and 3" diameter.

The mechanical load ratings from the SM test data will be applied to the ULA model.

Fire Testing is not applicable due to being a ground mount system.



| Properties                  | SOLARMOUNT Light | SOLARMOUNT Rail Profile 2 | SOLARMOUNT HD | Units           |
|-----------------------------|------------------|---------------------------|---------------|-----------------|
| BEAM HEIGHT                 | 1.70             | 2.57                      | 3.00          | in              |
| APPROX WEIGHT               | 0.491            | 0.728                     | 1.271         | plf             |
| CROSS SECTION AREA          | 0.409            | 0.625                     | 1.059         | in <sup>2</sup> |
| SECTION MODULUS (X-AXIS)    | 0.15             | 0.363                     | 0.898         | in <sup>3</sup> |
| SECTION MODULUS (Y-AXIS)    | 0.067            | 0.113                     | 0.221         | in <sup>3</sup> |
| MOMENT OF INERTIA (X-AXIS)  | 0.13             | 0.467                     | 1.45          | in <sup>4</sup> |
| MOMENT OF INERTIA (Y-AXIS)  | 0.026            | 0.045                     | 0.267         | in <sup>4</sup> |
| RADIUS OF GYRATION (X-AXIS) | 0.564            | 0.865                     | 1.17          | in              |
| RADIUS OF GYRATION (Y-AXIS) | 0.254            | 0.269                     | 0.502         | in              |

Certificate



Certificate no. US 82160015 01

**License Holder:**  
Unirac Inc.  
1411 Broadway NE  
Albuquerque NM 87102  
USA

**Manufacturing Plant:**  
Unirac Inc.  
1411 Broadway NE  
Albuquerque NM 87102  
USA

Test report no.: USA- 31440029 005      Client Reference: Tom Young  
Tested to:      UL 2703:2015

Certified Product: Module Rack Mounting System      License Fee - Units  
Model Designation: SolarMount (SM)      7

Max System Voltage of PV Module: 1000 VDC  
Max Size of PV Module: 20.8 sq.ft. surface area  
Max Overcurrent Protection Rating of PV Module:  
30 A when using the qualified grounding lugs;  
20 A when using the Enphase micro inverter EGC.

Fire Rating: Class A when installed with  
Type 1, Type 2, Type3, or Type 10 fire rated modules.

(continued)

Appendix: 1,1-5

|                                                                                                              |                                            |
|--------------------------------------------------------------------------------------------------------------|--------------------------------------------|
| Licensed Test mark:<br> | Date of Issue<br>(day/mo/yr)<br>27/07/2016 |
|--------------------------------------------------------------------------------------------------------------|--------------------------------------------|



12-May-2023

Unirac  
1411 Broadway Blvd. NE  
Albuquerque, NM 87101  
Tel: 505 242 6411

Attn.: Engineering Department

Subject: Engineering Certification for the Unirac SOLARMOUNT Flush Rail System to Support Photovoltaic Panels.

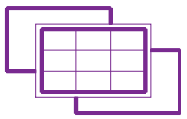
The Unirac SOLARMOUNT Flush-to-Roof is an extruded aluminum rail system that is engineered to hold most framed solar modules to a roof structure and installed parallel to the roof.

We have reviewed the SOLARMOUNT system, a proprietary mounting system constructed from modular parts which are intended for rooftop installation of solar photovoltaic (PV) panels; and have reviewed the U-Builder 2.0 Online tool. This U-Builder 2.0 software includes analysis for the SOLARMOUNT rails (SM LIGHT rail, SM STANDARD rail, and SM HEAVY DUTY rail) with Standard, Universal AF, and Pro Series hardware. All information, data, and analysis are in compliance with the following codes, city ordinances, and typical specifications:

- Codes:**
1. 2014-2020 Florida Building Code.
  2. ASCE/SEI 7-10, 7-16 Minimum Design Loads for Buildings and Other Structures.
  3. International Building Code, 2012- 2018 Edition w/ Provisions from SEAOC PV-2 2017.
  4. International Residential Code, 2012- 2018 Edition w/ Provisions from SEAOC PV-2 2017.
  5. AC428, Acceptance Criteria for Modular Framing Systems Used to Support Photovoltaic (PV) Panels, November 1, 2012 by ICC-ES.
  6. Aluminum Design Manual, 2015 & 2020 Edition.

Following are typical specifications to meet the above code requirements:

- Design Criteria:**
- Ground Snow Load = 0 - 100 (psf)  
Basic Wind Speed = 85 - 190 (mph)  
Roof Mean Height = 0 - 60 (ft)  
Roof Pitch = 0 - 45 (degrees)  
Exposure Category = B, C & D
- Attachment:**
- Shingle Roof:**  
L-Foot, Flashkit Pro, Flashloc Comp, Flashloc Duo, Flashkit Pro SB
- Metal Roof:**  
Standing Seam attachments, PM-9000S, PM Adjust Slotted
- Tile Roofs:**  
Solar Hooks, Tile Replacement
- Attachment Spacing:** Per U-Builder 2.0 Engineering report.
- Cantilever:** The maximum cantilever length is L/3, where “L” is the span noted in the U-Builder 2.0 online tool.
- Clearance:** 2” to 10” clear from top of roof to top of PV panel
- Tolerance(s):** 1.0” tolerance for any specified dimension in this report is allowed for installation



**Installation Orientation:** See SOLARMOUNT Rail Flush Installation Guide.  
Landscape - PV Panel long dimension is parallel to ridge/eave line of the roof and the PV panel is mounted on the long side.  
Portrait - PV Panel short dimension is parallel to ridge/eave line of the roof and the PV panel is mounted on the short side.

**Components and Cladding Roof Zones:**  
The Components and Cladding Roof Zones shall be determined based on ASCE 7-10 & 7-16 Component and Cladding design.

- Notes:**
1. U-Builder 2.0 Online tool analysis is only for Unirac SM SOLARMOUNT Rail Flush systems and do not include roof capacity check.
  2. Risk Category II per ASCE 7-16.
  3. Topographic factor, kzt is 1.0.
  4. Array Edge Factor  $Y_E = 1.5$
  5. Average parapet height is 0.0 ft.
  6. Wind speeds are LRFD values.
  7. Attachment spacing(s) apply to a seismic design category E or less.

**Design Responsibility:**  
The U-Builder 2.0 design software is intended to be used under the responsible charge of a registered design professional where required by the authority having jurisdiction. In all cases, this U-Builder 2.0 software should be used under the direction of a design professional with sufficient structural engineering knowledge and experience to be able to:

- Evaluate whether the U-Builder 2.0 Software is applicable to the project, and
- Understand and determine the appropriate values for all input parameters of the U-Builder 2.0 software.

This letter certifies that the Unirac SM SOLARMOUNT Rails Flush, when installed according to the U-Builder 2.0 engineering report and the manufacturer specifications are in compliance with the above codes and loading criteria.

This certification excludes evaluation of the following components:  
1) The structure to support the loads imposed on the building by the array; including, but not limited to: strength and deflection of structural framing members, fastening and/or strength of roofing materials, and/or the effects of snow accumulation on the structure.  
2) The attachment of the SM SOLARMOUNT Rails to the existing structure.  
3) The capacity of the solar module frame to resist the loads.

This requires additional knowledge of the building and is outside the scope of the certification of this racking system.

Please feel free to call for any questions or clarifications.

Prepared By:  
Engineering Alliance, Inc  
Sugar Land, TX

Saddam  
Ahmad

Digitally signed by  
Saddam Ahmad  
Date: 2023.05.12  
08:33:34 -05'00'



This item has been electronically signed and sealed by Saddam Ahmad PE using a Digital Signature and date. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies

# BARUN CORP

August 21, 2023

RE:

CERTIFICATION LETTER

Project Address:

JOHN HICKEY  
327 NW CARR CT  
LAKE CITY, FL 32055

## Design Criteria:

- Applicable Codes = 2020 FLBC/FLEBC 7th Edition, 2020 FLRC 7th Edition, 2018 IEBC/IBC, ASCE 7-16 and 2018 NDS
- Risk Category = II
- Wind Speed = 120 mph, Exposure Category C, Partially/Fully Enclosed Method
- Ground Snow Load = 0 psf
- Roof 1&2: 2 x 6 @ 24" OC, Roof DL = 6 psf, Roof LL/SL = 20 psf (Non-PV), Roof LL/SL = 0 psf (PV)

To Whom It May Concern,

A structural evaluation of loading was conducted for the above address based on the design criteria listed above.

Existing roof structural framing has been reviewed for additional loading due to installation of Solar PV System on the roof. The structural review applies to the sections of roof that is directly supporting the Solar PV System.

Based on this evaluation, I certify that the alteration to the existing structure by installation of the Solar PV System meets the prescriptive compliance requirements of the applicable existing building and/or new building provisions adopted/referenced above.

Additionally, the Solar PV System assembly (including attachment hardware) has been reviewed to be in accordance with the manufacturer's specifications and to meet and/or exceed the requirements set forth by the referenced codes.

Sincerely,

S. M. Mehdi  
Zomorodian

Digitally signed by S. M. Mehdi Zomorodian  
Date: 2023.08.21 10:26:13 -0400  
No. 93270  
STATE OF FLORIDA  
PROFESSIONAL ENGINEER

This item has been electronically signed and sealed by Mehdi Zomorodian, SE, PE, on the date and/or time stamp shown using a digital signature. Printed copies of this document are not considered signed and sealed and the signature must be verified by a 3rd Party Certificate Authority on any electronic copy.

This document is the property of Barun Corp and cannot be reproduced without prior consent. It is site specific and shall not be transferred to any other property, property owner, person(s), or entity. This document may include an expression of professional opinion by the engineer of record, which is based on his or her best knowledge, information provided by others, and belief. Other professionals may have different opinions. Barun Corp reserves the right to amend and/or supplement this document in the event additional information be uncovered or made available.

| MOUNTING PLANE STRUCTURAL EVALUATION |            |        |                    |
|--------------------------------------|------------|--------|--------------------|
| MOUNTING PLANE                       | ROOF PITCH | RESULT | GOVERNING ANALYSIS |
| Roof 1&2                             | 20°        | OK     | IEBC IMPACT CHECK  |
|                                      |            |        |                    |
|                                      |            |        |                    |
|                                      |            |        |                    |
|                                      |            |        |                    |
|                                      |            |        |                    |

| STANDOFF HARDWARE EVALUATION FOR WIND UPLIFT |                 |
|----------------------------------------------|-----------------|
| MOUNTING PLANE                               | WIND UPLIFT DCR |
| Roof 1&2                                     | 81.1%           |
|                                              |                 |
|                                              |                 |
|                                              |                 |
|                                              |                 |
|                                              |                 |

### Limits of Scope of Work and Liability:

The existing structure has been reviewed based on the assumption that it has been originally designed and constructed per appropriate codes. The structural analysis of the subject property is based on the provided site survey data. The calculations produced for this structure's assessment are only for the roof framing supporting the proposed PV installation referenced in the stamped planset and were made according to generally recognized structural analysis standards and procedures. All PV modules, racking and attachment components shall be designed and installed per manufacturer's approved guidelines and specifications. These plans are not stamped for water leakage or existing damage to the structural component that was not accessed during the site survey. Prior to commencement of work, the PV system installer should verify that the existing roof and connections are in suitable condition and inspect framing noted on the certification letter and inform the Engineer of Record of any discrepancies prior to installation. The installer should also check for any damages such as water damage, cracked framing, etc. and inform the Engineer of Record of existing deficiencies which are unknown and/or were not observable during the time of survey and have not been included in this scope of work. Any change in the scope of the work shall not be accepted unless such change, addition, or deletion is approved in advance and in writing by the Engineer of Record.

|                                                  |                  |
|--------------------------------------------------|------------------|
| BARUN CORP                                       | LOAD CALCULATION |
|                                                  | Roof 1&2         |
| JOHN HICKEY, 327 NW CARR CT, LAKE CITY, FL 32055 |                  |

| PV PANELS DEAD LOAD (PV-DL) |                         |
|-----------------------------|-------------------------|
| PV Panels Weight            | = 2.50 psf              |
| Hardware Assembly Weight    | = 0.50 psf              |
| <b>Total PV Panels</b>      | <b>PV-DL = 3.00 psf</b> |

| ROOF DEAD LOAD (R-DL)            |                       |            |                        |
|----------------------------------|-----------------------|------------|------------------------|
| Existing Roofing Material Weight | Corrugated Metal Roof | 1 Layer(s) | = 1.50 psf             |
| Underlayment Weight              |                       |            | = 0.50 psf             |
| Plywood/OSB Sheathing Weight     |                       |            | = 1.50 psf             |
| Framing Weight                   | 2 x 6 @ 24 in. O.C.   |            | = 1.15 psf             |
| No Vaulted Ceiling               |                       |            | = 0.00 psf             |
| Miscellaneous                    |                       |            | = 1.50 psf             |
| <b>Total Roof Dead Load</b>      |                       |            | <b>R-DL = 6.10 psf</b> |

| REDUCED ROOF LIVE LOAD (Lr)                      |                          |
|--------------------------------------------------|--------------------------|
| Roof Live Load                                   | Lo = 20.00 psf           |
| Member Tributary Area                            | At < 200 ft <sup>2</sup> |
| Roof 1&2 Pitch                                   | 20° or 5/12              |
| Tributary Area Reduction Factor                  | R1 = 1.00                |
| Roof Slope Reduction Factor                      | R2 = 0.98                |
| <b>Reduced Roof Live Load, Lr = Lo (R1) (R2)</b> | <b>Lr = 19.50 psf</b>    |

| SNOW LOAD                   |                      |
|-----------------------------|----------------------|
| Ground Snow Load            | pg = 0.00 psf        |
| Effective Roof Slope        | 20°                  |
| Snow Importance Factor      | Is = 1.00            |
| Snow Exposure Factor        | Ce = 1.00            |
| Snow Thermal Factor         | Ct = 1.10            |
| Minimum Flat Roof Snow Load | pf-min = 0.00 psf    |
| <b>Flat Roof Snow Load</b>  | <b>pf = 0.00 psf</b> |

| SLOPED ROOF SNOW LOAD ON ROOF (Non-Slippery Surfaces) |                           |
|-------------------------------------------------------|---------------------------|
| Roof Slope Factor                                     | Cs-roof = 0.83            |
| <b>Sloped Roof Snow Load on Roof</b>                  | <b>ps-roof = 0.00 psf</b> |

| SLOPED ROOF SNOW LOAD ON PV PANELS (Unobstructed Slippery Surfaces) |                         |
|---------------------------------------------------------------------|-------------------------|
| Roof Slope Factor                                                   | Cs-PV = 0.83            |
| <b>Sloped Roof Snow Load on PV Panels</b>                           | <b>ps-PV = 0.00 psf</b> |

|                                                  |                   |  |
|--------------------------------------------------|-------------------|--|
| BARUN CORP                                       | IEBC IMPACT CHECK |  |
|                                                  | Roof 1&2          |  |
| JOHN HICKEY, 327 NW CARR CT, LAKE CITY, FL 32055 |                   |  |

|                        | EXISTING | WITH PV PANELS |     |
|------------------------|----------|----------------|-----|
| Roof Dead Load (DL) =  | 6.10     | 9.10           | psf |
| Roof Live Load (Lr) =  | 19.50    | 0.00           | psf |
| Roof Snow Load (SL) =  | 0.00     | 0.00           | psf |
|                        | EXISTING | WITH PV PANELS |     |
| (DL + Lr)/Cd =         | 20.48    | 10.11          | psf |
| (DL + SL)/Cd =         | 5.30     | 7.91           | psf |
| Maximum Gravity Load = | 20.48    | 10.11          | psf |
| Load Increase (%) =    | -50.63%  | OK             |     |

The requirements of section 806.2 of 2018 IEBC are met and the structure is permitted to remain unaltered.

|                                                  |                         |
|--------------------------------------------------|-------------------------|
| BARUN CORP                                       | WIND UPLIFT CALCULATION |
|                                                  | Roof 1&2                |
| JOHN HICKEY, 327 NW CARR CT, LAKE CITY, FL 32055 |                         |

| SITE INFORMATION        |            |                                              |       |
|-------------------------|------------|----------------------------------------------|-------|
| Ultimate Wind Speed =   | 120.00 mph | Roof Pitch =                                 | 20°   |
| Risk Category =         | II         | Roof Type =                                  | Gable |
| Exposure Category =     | C          | Velocity Pressure Exposure Coefficient, Kz = | 0.85  |
| Mean Roof Height =      | 15.00 ft   | Topographic Factor, Kzt =                    | 1.00  |
| Solar Array Dead Load = | 3.00 psf   | Wind Directionality Factor, Kd =             | 0.85  |
| a =                     | 3.00 ft    | Ground Elevation Factor, Ke =                | 1.00  |

| DESIGN CALCULATIONS                            |                |                                 |                              |
|------------------------------------------------|----------------|---------------------------------|------------------------------|
| Wind Velocity Pressure, qh =                   |                | 26.60 psf                       | (0.00256*Kz*Kzt*Kd*Ke*(V^2)) |
| Solar Array Pressure Equalization Factor, ya = |                | 0.60                            |                              |
| Hardware Type =                                | 0              |                                 |                              |
| Allowable Load =                               | 300.00 lbs     | Metal Roof Attachment           |                              |
|                                                |                |                                 |                              |
| Array Edge Factor, γE =                        | 1.00           | Non-Exposed Condition           |                              |
| Max. X - Spacing (Zone 1 & 2e) =               | 3.00 ft        | Effective Wind Area<br>9.00 ft² |                              |
| Max. Y - Spacing (Zone 1 & 2e) =               | 3.00 ft        |                                 |                              |
| Max. X - Spacing (Zone 2n - 3e) =              | 3.00 ft        | Effective Wind Area<br>9.00 ft² |                              |
| Max. Y - Spacing (Zone 2n - 3e) =              | 3.00 ft        |                                 |                              |
| Max. X - Spacing (Zone 3r) =                   | 2.00 ft        | Effective Wind Area<br>6.00 ft² |                              |
| Max. Y - Spacing (Zone 3r) =                   | 3.00 ft        |                                 |                              |
| ROOF ZONE                                      | GCp (-) UPLIFT | UPLIFT PRESSURE                 | PULLOUT FORCE                |
| 1 & 2e                                         | -2.00          | -17.46 psf                      | 157.14 lbs                   |
| 2n - 3e                                        | -3.00          | -27.04 psf                      | 243.33 lbs                   |
| 3r                                             | -3.60          | -32.78 psf                      | 196.69 lbs                   |

**NOTE:**

- Wind calculation is based on ASCE 7-16, 29.4 - C&C, LC #7: 0.6DL + 0.6WL is used.