



Freedom Forever
Planset Revision Letter

8/21/2023
REV #1

Attn. Columbia County (FL):

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

PEG HICKEY ADD-ON
327 NW CARR CT , LAKE CITY, FL 32055

Revision Details:

1. Modules swapped to Jinko 380W

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

ROOF MOUNT PHOTOVOLTAIC SYSTEM

CODES:

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
2017 NATIONAL ELECTRIC CODE
AS ADOPTED BY COLUMBIA COUNTY (FL)

VICINITY MAP:

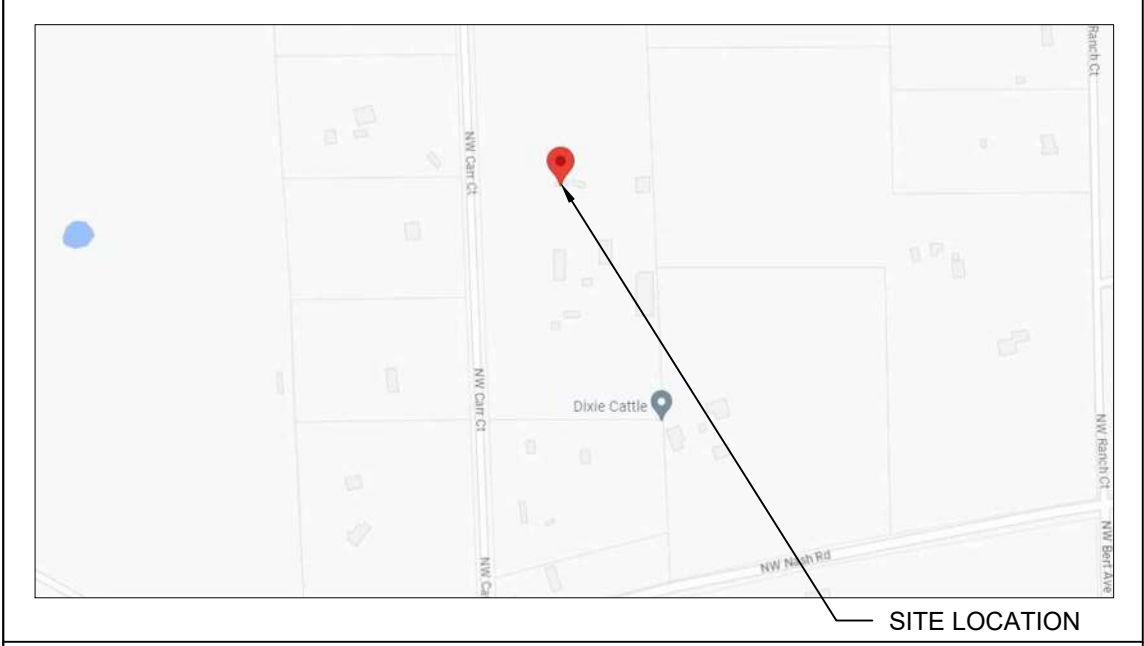
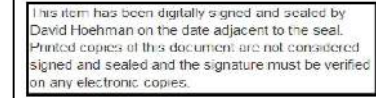


TABLE OF CONTENTS:

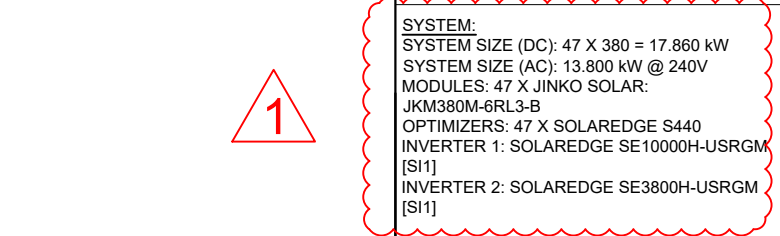
PV-1	SITE LOCATION
PV-2	SITE PLAN
PV-2A	ROOF PLAN WITH MODULES LAYOUT
PV-2B	ROOF AND STRUCTURAL TABLES
PV-3	MOUNTING DETAILS
PV-4	THREE LINE DIAGRAM
PV-5	CONDUCTOR CALCULATIONS
PV-6	EQUIPMENT & SERVICE LIST
PV-7	LABELS
PV-7A	SITE PLACARD
PV-8	OPTIMIZER CHART
PV-9	SAFETY PLAN
PV-10	SAFETY PLAN
APPENDIX	MANUFACTURER SPECIFICATION SHEETS

CONSTRUCTION NOTES:

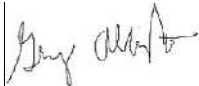
CONDUIT AND CONDUCTOR SPECIFICATIONS ARE BASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING AS REQUIRED BY FIELD CONDITIONS.
ALL SOLAR ENERGY SYSTEM EQUIPMENT SHALL BE SCREENED TO THE MAXIMUM EXTENT POSSIBLE AND SHALL BE PAINTED A COLOR SIMILAR TO THE SURFACE UPON WHICH THEY ARE 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
SOLAREDGE 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: B



CLIENT:
PEG HICKEY ADD-ON
327 NW CARR CT, LAKE CITY, FL 32055
AHJ: COLUMBIA COUNTY (FL)
UTILITY: FPL - FLORIDA POWER & LIGHT
METER: ACD8733
PHONE: (386) 867-0620
EMAIL: BIGDOGMOM1@GMAIL.COM
FINANCE: OTHER



	REVISIONS		
NO.	REVISED BY	DATE	
1	A.M.	8/21/2023	
-	-	-	
-	-	-	


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

CONTRACTOR LICENSE:
CERTIFIED ELECTRICAL CONTRACTOR
EC13008056

	SITE LOCATION			
	JOB NO: 350453	DATE: 8/21/2023	DESIGNED BY: A.M.	SHEET: PV-1

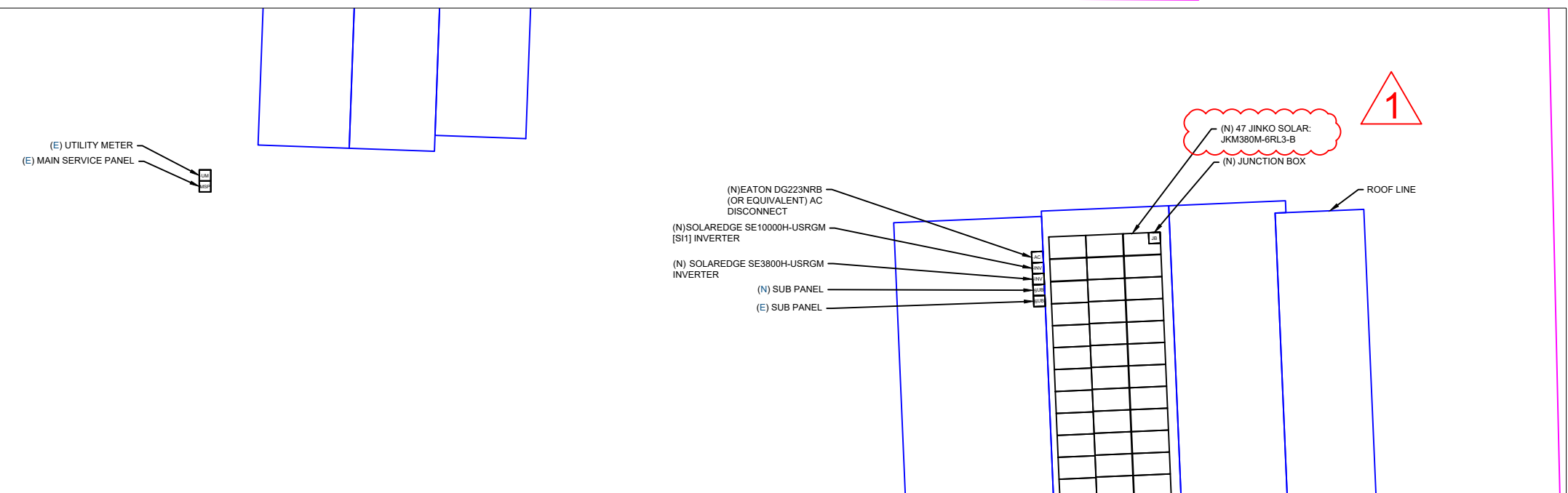
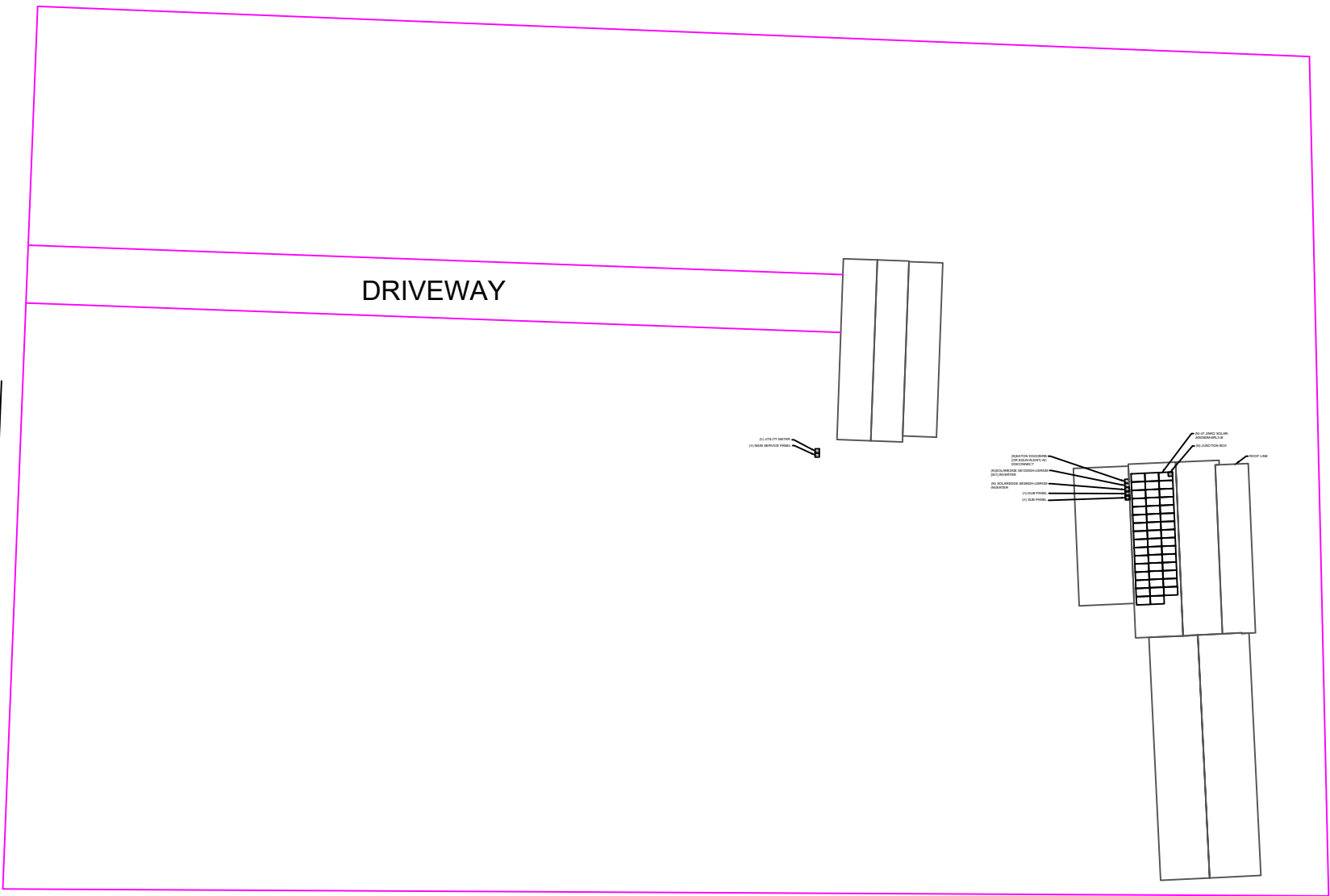
	SITE LOCATION			
	JOB NO: 350453	DATE: 8/21/2023	DESIGNED BY: A.M.	SHEET: PV-1

LEGEND:

-  CHIMNEY
-  PIPE VENT
-  MODULES
-  CONDUIT
-  SETBACK
-  AC DISCONNECT
-  JUNCTION BOX
-  SUBPANEL
-  ISOLATED LOAD PANEL
-  MAIN SERVICE PANEL

NW CARR CT

DRIVEWAY



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

1



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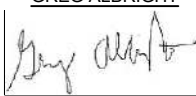
Digitally signed
by David
Hoehman
Date:
2023.08.21
10:24:58 -04'00'

ROOF AREA: 9445.04 SQ FT

CLIENT:
PEG HICKEY ADD-ON
327 NW CARR CT, LAKE CITY, FL 32055
AHJ: COLUMBIA COUNTY (FL)
UTILITY: FPL - FLORIDA POWER & LIGHT
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FINANCE: OTHER

SYSTEM:
SYSTEM SIZE (DC): 47 X 380 = 17.860 kW
SYSTEM SIZE (AC): 13.800 kW @ 240V
MODULES: 47 X JINKO SOLAR:
JKM380M-6RL3-B
OPTIMIZERS: 47 X SOLAREEDGE S440
INVERTER 1: SOLAREEDGE SE10000H-USRGM [SI1]
INVERTER 2: SOLAREEDGE SE3800H-USRGM [SI1]

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SITE PLAN			
JOB NO:	DATE:	DESIGNED BY:	SHEET:
350453	8/21/2023	A.M.	PV-2

LEGEND:

 CHIMNEY

 PIPE VENT

 MODULES

 CONDUIT

 SETBACK

AC

AC DISCONNECT

JB

JUNCTION BOX

SUB

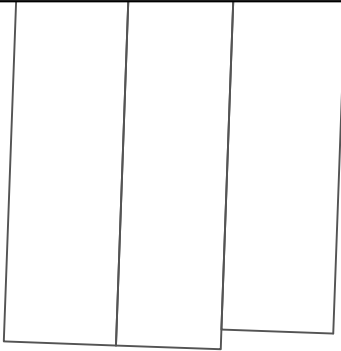
SUBPANEL

ISO

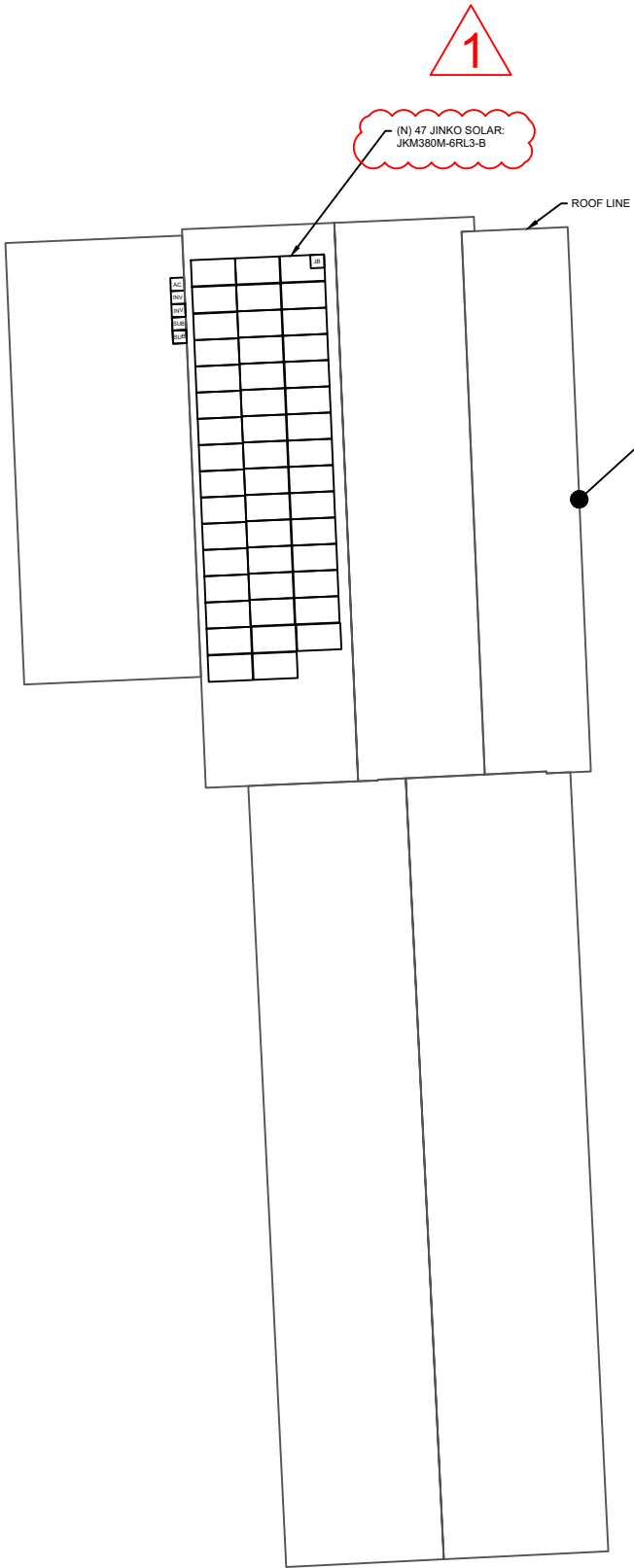
ISOLATED LOAD PANEL

MSP

MAIN SERVICE PANEL



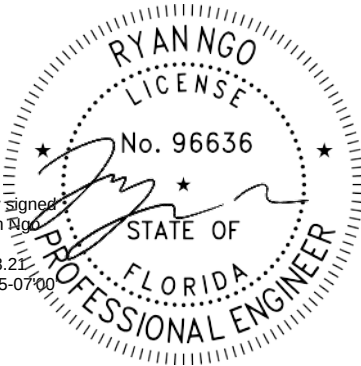
1



TOTAL ROOF AREA: 9445.04 SQ FT
TOTAL ARRAY AREA: 965.67 SQ FT
ARRAY COVERAGE: 10.22%
SYSTEM DISTRIBUTED WEIGHT: 2.31 LBS
S-5!: PROTEA POINT-LOAD: 10.93 LBS

Ryan Ngo

Digitally signed by Ryan Ngo
Date: 2023.08.21 21:41:35-07'00



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ROOF AREA: 9445.04 SQ FT

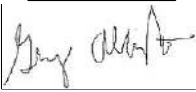
CLIENT:
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FREEDOM FOREVER LLC
2619 CONSULATE DR SUITE 800, ORLANDO, FL 32819
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GREG ALBRIGHT



CONTRACTOR LICENSE:
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ROOF PLAN WITH MODULES LAYOUT

JOB NO: 350453	DATE: 8/21/2023	DESIGNED BY: A.M.	SHEET: PV-2A
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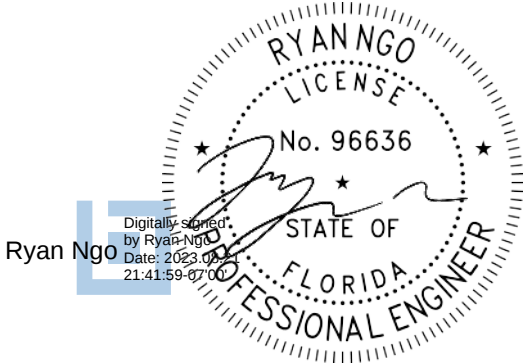
ROOF PLAN
SCALE: 1/24" = 1'-0"

1

- 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: 9445.04 SQ FT
TOTAL ARRAY AREA: 965.67 SQFT
ARRAY COVERAGE: 10.22%
SYSTEM DISTRIBUTED WEIGHT: 2.31 LBS
S-5I: PROTEA POINT-LOAD: 10.93 LBS



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ROOF AREA STATEMENT						
ROOF	MODULE QUANTITY	ROOF PITCH	ARRAY PITCH	AZIMUTH	ROOF AREA	ARRAY AREA
ROOF 1	47	21	21	268	1508.93 SQ FT	965.67 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
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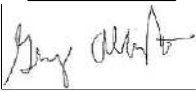
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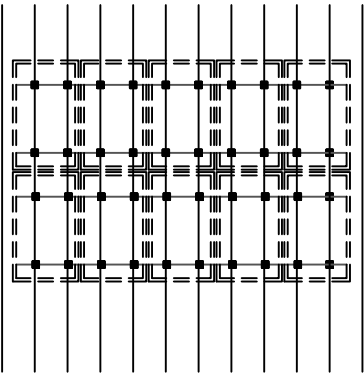
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FL 32819
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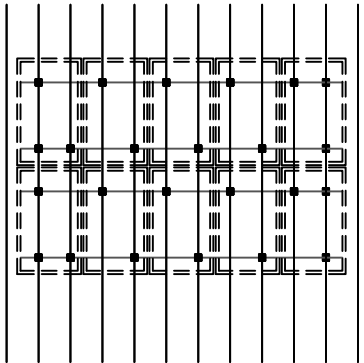
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ROOF DETAILS			
JOB NO: 350453	DATE: 8/21/2023	DESIGNED BY: A.M.	SHEET: PV-2B

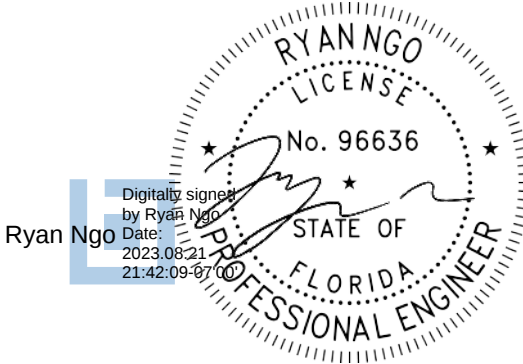
TABLE 1 - ARRAY INSTALLATION									
	ROOF PITCH	ROOFING TYPE	ATTACHMENT TYPE	FRAMING TYPE1	MAX UNBRACED LENGTH(FT.)1	RAFTER/TRUSS SISTERING	PENETRATION PATTERN2	MAX ATTACHMENT SPACING (IN.)2	MAX RAIL OVERHANG(I N.)3
ROOF 1	21	METAL	S-5 PROTEABRACKET	2X6 TRUSS @ 24" OC	4.00'	NOT REQ'D	STAGGERED	48" OC	16"
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.									



STACKED DETAIL
For Illustration purposes only



STAGGERED DETAIL
For Illustration purposes only



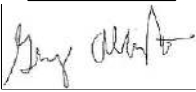
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FINANCE: OTHER

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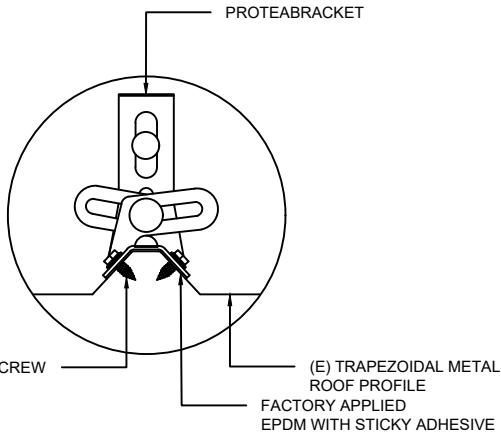
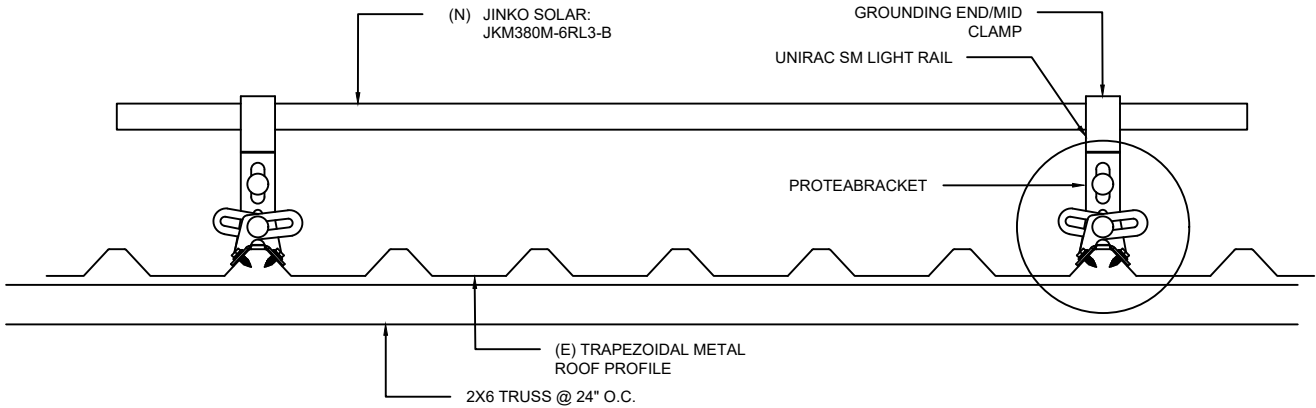
REVISIONS		
NO.	REVISED BY	DATE
1	A.M.	8/21/2023
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FREEDOM FOREVER LLC
2619 CONSULATE DR SUITE 800, ORLANDO, FL 32819
Tel: (800) 385-1075
GREG ALBRIGHT

CONTRACTOR LICENSE:
CERTIFIED ELECTRICAL CONTRACTOR
EC13008056

MOUNTING DETAILS			
JOB NO:	DATE:	DESIGNED BY:	SHEET:
350453	8/21/2023	A.M.	PV-3

SOLAR PV ARRAY SECTION VIEW
Scale: NTS



ATTACHMENT DETAIL
Scale: NTS

BACKFEED FUSE SIZING						
MAX. CONTINUOUS OUTPUT 58.00A @ 240V						
58.00	X	1.25	=	72.50AMPS	80A FUSES - OK	
SEE 705.12 OF 2017 NEC						
200	X	1.20	=	240		
240	-	200	=	40A ALLOWABLE BACKFEED		



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Digitally
signed by
David
Hoehman

Date:

2023.08.21

10:25:19

-04'00'

CLIENT:
PEG HICKEY ADD-ON
327 NW CARR CT, LAKE CITY, FL 32055
AHJ: COLUMBIA COUNTY (FL)
UTILITY: FPL - FLORIDA POWER & LIGHT
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FL 32819

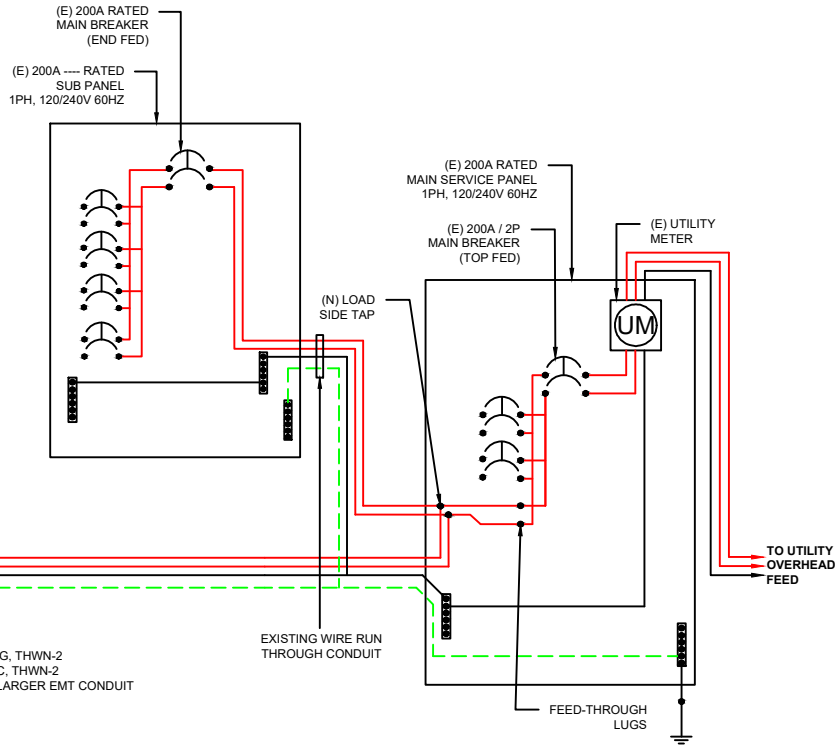
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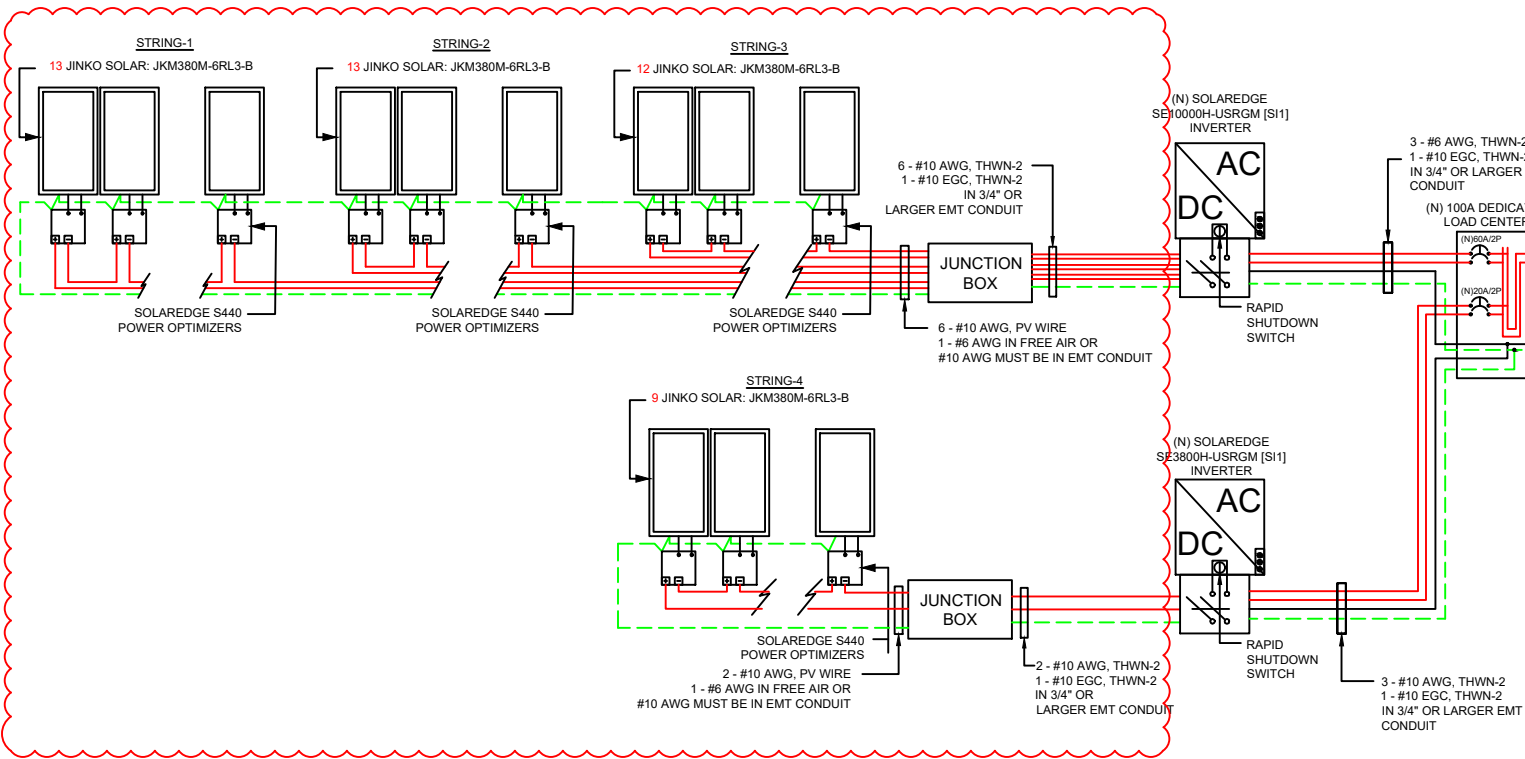
THREE LINE DIAGRAM

JOB NO:	DATE:	DESIGNED BY:	SHEET:
350453	8/21/2023	A.M.	PV-4



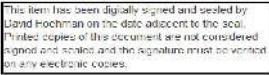
NOTE:
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TO LIMIT UP-SIZING AS REQUIRED BY FIELD CONDITIONS

1



PTC RATING: 351.3 W

MAX DC CURRENT: I_{max} = 1.25 X (OPTIMIZER OUTPUT CURRENT) = 1.25 X 15 = 18.75A
 MAX AC CURRENT: I_{max} = 1.25 X (SUM OF MAX CONTINUOUS OUTPUT CURRENT FROM INVERTERS)
 = 1.25 X (58.00) = 72.50A



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signed by
David
Hoehman
Date:
2023.08.21
10:25:36
-04'00'

CONDUCTOR AMPACITY CALCULATIONS IN ACCORDANCE WITH NEC 690.8.

CLIENT:
PEG HICKEY ADD-ON
327 NW CARR CT, LAKE CITY, FL 32055
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 [S11]
INVERTER 2: SOLAREDGE SE3800H-USRGM
 [S11]

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-	-	-
-	-	-



CONDUCTOR CALCULATIONS			
JOB NO:	DATE:	DESIGNED BY:	SHEET:
350453	8/21/2023	A.M.	PV-5

OCPD SIZES:

[illegible]

SERVICE LIST:

[illegible]

MATERIAL LIST:

[illegible]

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David
Hoehman
Date:
2023.08.21
10:26:24
-04'00'

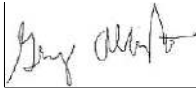
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EQUIPMENT & SERVICE LIST

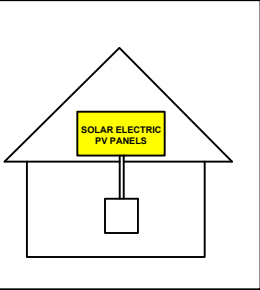
JOB NO:	DATE:	DESIGNED BY:	SHEET:
350453	8/21/2023	A.M.	PV-6

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

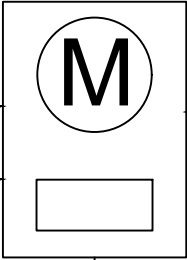
705.12(B)(2)(3)(b)

**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)

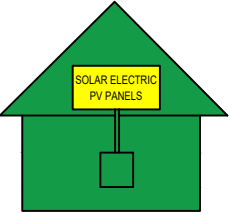


"WARNING"
DUAL POWER SOURCES
SECOND SOURCE IS PHOTOVOLTAIC SYSTEM
RATED AC OUTPUT CURRENT - 58.00 AMPS
AC NORMAL OPERATING VOLTAGE - 240 VOLTS

690.54

EMERGENCY RESPONDER
THIS SOLAR PV SYSTEM EQUIPPED
WITH RAPID SHUTDOWN

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



NFPA 11.12.2.1.1.1.1

PV SYSTEM AC DISCONNECT
RATED AC OUTPUT CURRENT - 58.00 AMPS
AC NORMAL OPERATING VOLTAGE - 240 VOLTS

690.15, 690.54

RAPID SHUTDOWN SWITCH FOR
SOLAR PV SYSTEM

690.56(C)(3)

AC

INVERTER

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

888.557.6431

or visit 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

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



This form has been digitally signed and sealed by David Hoehman on the date adjacent to the seal. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Digitally
signed by
David
Hoehman
Date:
2023.08.21
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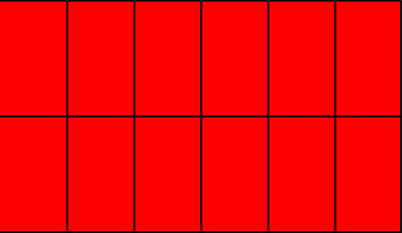
"WARNING"
ELECTRICAL SHOCK HAZARD.
TERMINALS ON BOTH LINE AND LOAD SIDES
MAY BE ENERGIZED IN THE OPEN POSITION.

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:
PEG HICKEY ADD-ON
327 NW CARR CT, LAKE CITY, FL 32055
AHJ: COLUMBIA COUNTY (FL)
UTILITY: FPL - FLORIDA POWER & LIGHT
METER: ACD8733
PHONE: (386) 867-0620
EMAIL: BIGDOGMOM1@GMAIL.COM
FINANCE: OTHER

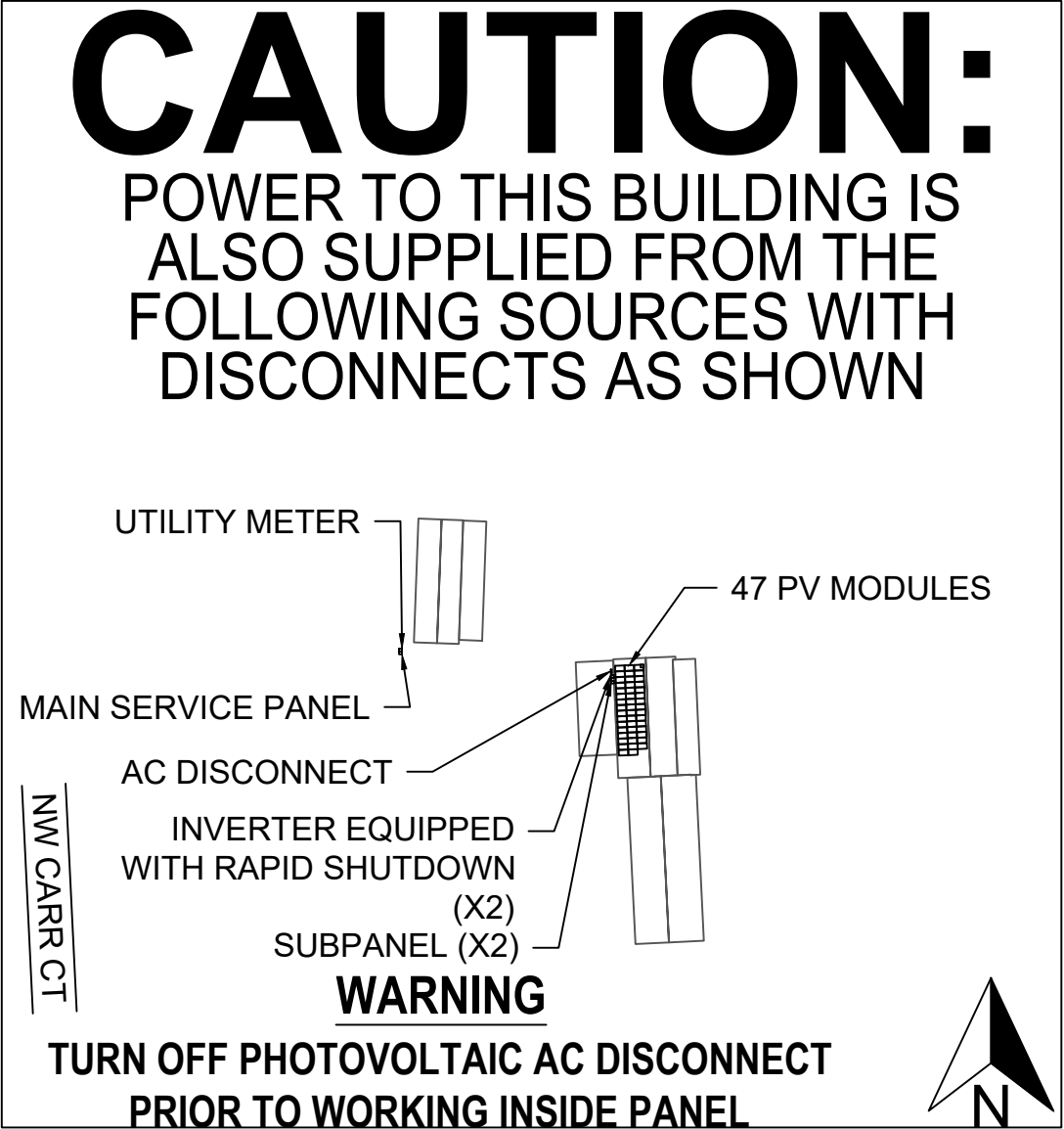
SYSTEM:
SYSTEM SIZE (DC): 47 X 380 = 17.860 kW
SYSTEM SIZE (AC): 13.800 kW @ 240V
MODULES: 47 X JINKO SOLAR:
JKM380M-6RL3-B
OPTIMIZERS: 47 X SOLAREEDGE S440
INVERTER 1: SOLAREEDGE SE10000H-USRGM [S1]
INVERTER 2: SOLAREEDGE SE3800H-USRGM [S1]

REVISIONS		
NO.	REVISED BY	DATE
1	A.M.	8/21/2023
-	-	-
-	-	-

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

CONTRACTOR LICENSE:
CERTIFIED ELECTRICAL CONTRACTOR
EC13008056

LABELS			
JOB NO:	DATE:	DESIGNED BY:	SHEET:
350453	8/21/2023	A.M.	PV-7



NOTES:

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Digitally
signed by
David
Hoehman

Date:
2023.08.21
10:27:07
-04'00'

CLIENT:
PEG HICKEY ADD-ON
327 NW CARR CT, LAKE CITY, FL 32055
AHJ: COLUMBIA COUNTY (FL)
UTILITY: FPL - FLORIDA POWER & LIGHT
METER: ACD8733
PHONE: (386) 867-0620
EMAIL: BIGDOGMOM1@GMAIL.COM
FINANCE: OTHER

SYSTEM:
SYSTEM SIZE (DC): 47 X 380 = 17.860 kW
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FL 32819
Tel: (800) 385-1075
GREG ALBRIGHT

CONTRACTOR LICENSE:
CERTIFIED ELECTRICAL CONTRACTOR
EC13008056

SITE PLACARD			
JOB NO: 350453	DATE: 8/21/2023	DESIGNED BY: A.M.	SHEET: PV-7A

1-15 16-30 31-45 46-60

SYSTEM:
SYSTEM SIZE (DC): 47 X 380 = 17.860 kW
SYSTEM SIZE (AC): 13.800 kW @ 240V
MODULES: 47 X JINKO SOLAR:
 JKM380M-6RL3-B
OPTIMIZERS: 47 X SOLAREDGE S440
INVERTER 1: SOLAREDGE SE10000H-USRGM
 [SI1]
INVERTER 2: SOLAREDGE SE3800H-USRGM
 [SI1]

 **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

JOB NO: 350453	DATE: 8/21/2023	DESIGNED BY: A.M.	SHEET: PV-8
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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: _____

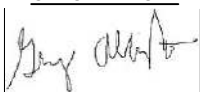
PHONE NUMBER: _____

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: _____

[illegible]

- | CLIENT:
PEG HICKEY ADD-ON
327 NW CARR CT, LAKE CITY, FL 32055
AHJ: COLUMBIA COUNTY (FL)
UTILITY: FPL - FLORIDA POWER & LIGHT
METER: ACD8733
PHONE: (386) 867-0620
EMAIL: BIGDOGMOM1@GMAIL.COM
FINANCE: OTHER | | | | | | | | | | | | | | | | | | |
|--|------------|--------------|--------|-----------|-------|--------------|--------|------------|-----------|------|------|-----------|---|---|---|---|---|---|
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INVERTER 2: SOLAREEDGE SE3800H-USRGM [S11] | | | | | | | | | | | | | | | | | | |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">REVISIONS</th> <th></th> </tr> <tr> <th style="width: 10%;">NO.</th> <th style="width: 70%;">REVISED BY</th> <th style="width: 20%;">DATE</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">A.M.</td> <td style="text-align: center;">8/21/2023</td> </tr> <tr> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> </tr> <tr> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> </tr> </tbody> </table> | | | | REVISIONS | | | NO. | REVISED BY | DATE | 1 | A.M. | 8/21/2023 | - | - | - | - | - | - |
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| - | - | - | | | | | | | | | | | | | | | | |
| - | - | - | | | | | | | | | | | | | | | | |
|  <div style="display: inline-block; vertical-align: middle;"> <div style="font-size: 2em; font-weight: bold; color: green;">freedom</div> <div style="font-size: 0.8em; font-weight: bold; color: red; margin-top: 5px;">FOREVER</div> </div> | | | | | | | | | | | | | | | | | | |
| <u>FREEDOM FOREVER LLC</u>
2619 CONSULATE DR SUITE 800, ORLANDO, FL 32819
Tel: (800) 385-1075
<u>GREG ALBRIGHT</u> | | | | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | | | | |
| <u>CONTRACTOR LICENSE:</u>
CERTIFIED ELECTRICAL CONTRACTOR
EC13008056 | | | | | | | | | | | | | | | | | | |
| SAFETY PLAN | | | | | | | | | | | | | | | | | | |
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| 350453 | 8/21/2023 | A.M. | PV-9 | | | | | | | | | | | | | | | |

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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:
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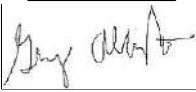
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CONTRACTOR LICENSE:
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SAFETY PLAN			
JOB NO: 350453	DATE: 8/21/2023	DESIGNED BY: A.M.	SHEET: PV-10

FOR INSTALLATION REFERENCE ONLY

SCAN QR CODE TO ACCESS REFERENCE LINK

FREEDOM REFERENCES



INSTALL HOTLINE

PV INSTALLATION REFERENCES



ENPHASE IQ8



SOLAREEDGE HD WAVE



TESLA INVERTER

BATTERY INSTALLATION REFERENCES



TESLA POWERWALL 2



SHIFT/SELF CONSUMPTION



SOLAREEDGE ENERGY BANK



SOLAREEDGE LG RESU (BACKUP)



TESLA POWERWALL+ (BACKUP)



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 3rd 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.



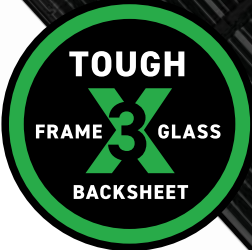
Thick and Tough

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

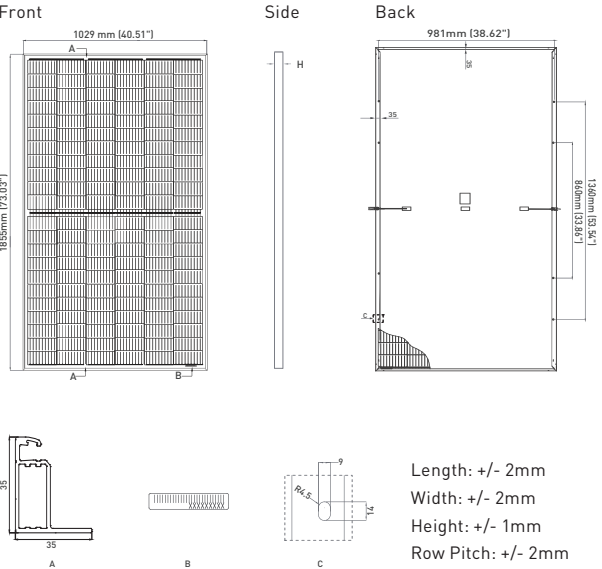


Leading Warranty

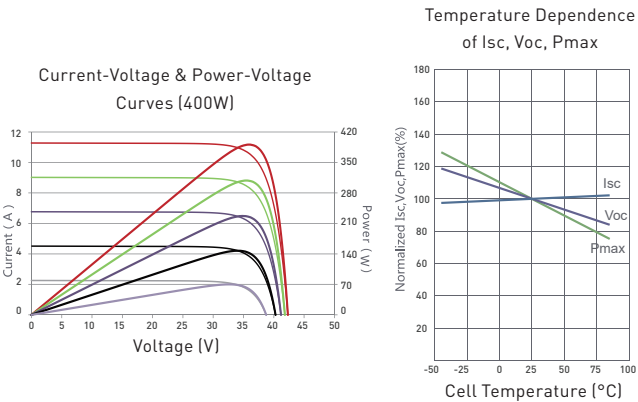
25-year product and 25-year linear power warranty; 98% guaranteed first year, max 0.55% annual loss.



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/m²
NOCT: ☀ Irradiance 800W/m²

🌡 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 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



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

BUILDING YOUR TRUST IN SOLAR. WWW.JINKOSOLAR.US



BUILDING YOUR TRUST IN SOLAR. WWW.JINKOSOLAR.US



Power Optimizer

For North America

S440, S500



POWER OPTIMIZER

PV power optimization at the module level

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

* Expected availability in 2022

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



Power Optimizer

For North America

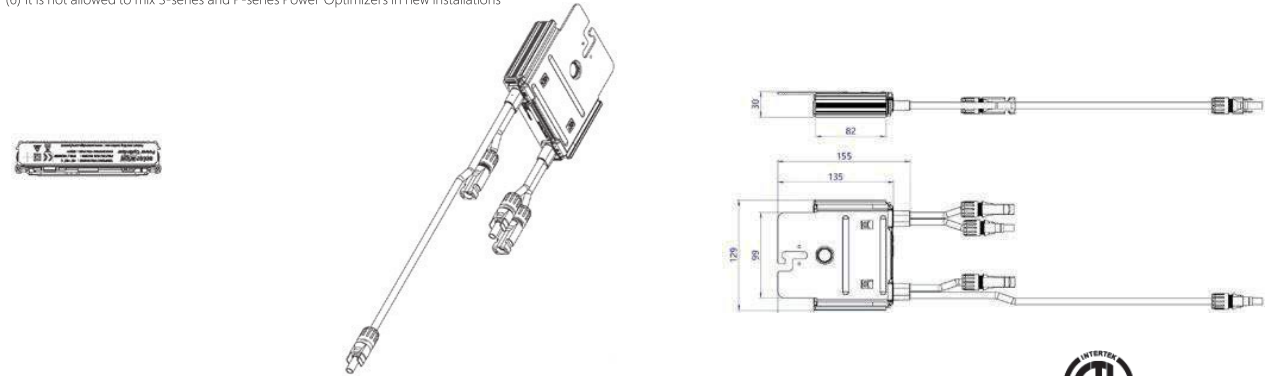
S440, S500

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

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

PV System Design Using a SolarEdge Inverter		Single Phase HD-Wave	Three Phase for 208V grid	Three Phase for 277/480V grid	
Minimum String Length (Power Optimizers)	S440, S500	8	14	18	
Maximum String Length (Power Optimizers)		25		50 ⁽⁴⁾	
Maximum Nominal Power per String		5700 (6000 with SE7600-US-SE11400-U)	6000	12750	W
Maximum Allowed Connected Power per String ⁽⁵⁾ (Permitted only when the difference in connected power between strings is 1,000W or less)		Refer to Footnote 5	One String 7200W 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 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA
Maximum AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA
AC Output Voltage Min.-Nom.-Max. (211 - 240 - 264)	✓	✓	✓	✓	✓	✓	✓	Vac
AC Output Voltage Min.-Nom.-Max. (183 - 208 - 229)	-	✓	-	✓	-	-	✓	Vac
AC Frequency (Nominal)	59.3 - 60 - 60.5 ⁽¹⁾							Hz
Maximum Continuous Output Current @240V	12.5	16	21	25	32	42	47.5	A
Maximum Continuous Output Current @208V	-	16	-	24	-	-	48.5	A
Power Factor	1, Adjustable - 0.85 to 0.85							
GFDI Threshold	1							A
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes							
INPUT								
Maximum DC Power @240V	4650	5900	7750	9300	11800	15500	17650	W
Maximum DC Power @208V	-	5100	-	7750	-	-	15500	W
Transformer-less, Ungrounded	Yes							
Maximum Input Voltage	480							Vdc
Nominal DC Input Voltage	380				400			Vdc
Maximum Input Current @240V ⁽²⁾	8.5	10.5	13.5	16.5	20	27	30.5	Adc
Maximum Input Current @208V ⁽²⁾	-	9	-	13.5	-	-	27	Adc
Max. Input Short Circuit Current	45							Adc
Reverse-Polarity Protection	Yes							
Ground-Fault Isolation Detection	600k Ω Sensitivity							
Maximum Inverter Efficiency	99	99.2						%
CEC Weighted Efficiency	99						99 @ 240V 98.5 @ 208V	%
Nighttime Power Consumption	< 2.5							W

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

Single Phase Inverter with HD-Wave Technology
for North America

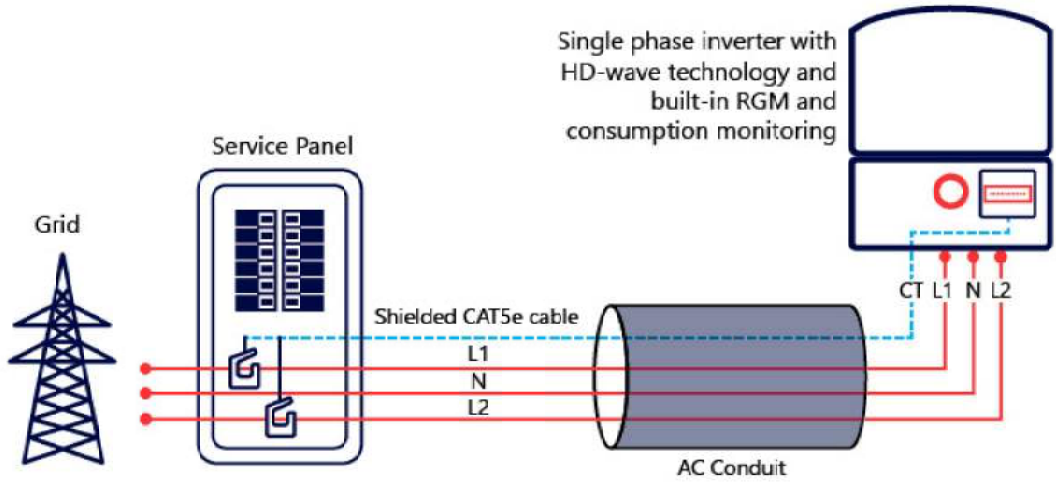
SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US/
SE7600H-US / SE10000H-US / SE11400H-US

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

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

How to Enable Consumption Monitoring

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



Product specifications

Eaton DG223NRB

Catalog Number: DG223NRB

Eaton General duty cartridge fuse safety switch, 100 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	DG223NRB
	UPC
	782113144252
Product Length/Depth	Product Height
7.38 in	19.25 in
Product Width	Product Weight
9.13 in	14 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
100A
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 - DG223NRB



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Eaton.com/socialmedia

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.

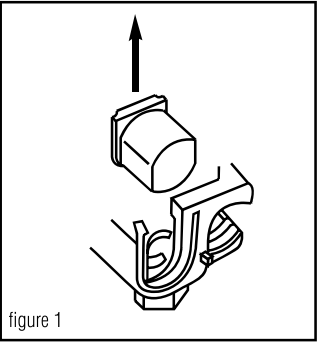


figure 1

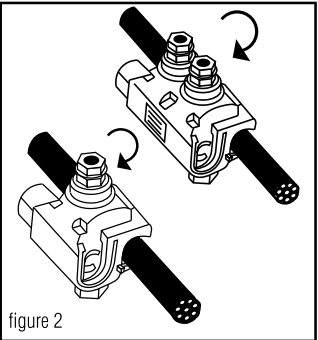


figure 2

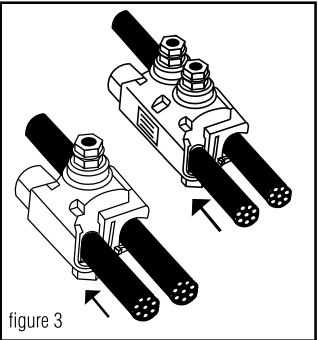


figure 3

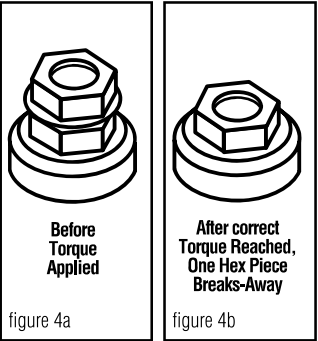


figure 4a

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.



ADVERTENCIA: Cáncer y Daño Reproductivo - www.P65Warnings.ca.gov.

One year limited warranty. See idealind.com for more information.

Garantía limitada de un año. Visite www.idealind.com para obtener detalles de la garantía.



IDEAL INDUSTRIES, INC.

1375 Park Avenue • Sycamore, Illinois 60178 • 815.895.5181 • www.idealind.com

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](#), [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](#), [SNBLL1-3.7](#), [SNBLL2-3.7](#), [SNBM1-4](#), [SNBS1-5](#), [SNBS5-4](#), [SNL1-3.7](#), [SNL1-4](#), [SNL2-3.7](#), [SNL2-4](#), [SNL2-5](#), [SNLL1-3.7](#), [SNLL2-3.7](#), [SNM1-4](#), [SNM2-4](#), [SNS1-5](#), [SNS2-5](#), [SNS5-4](#)

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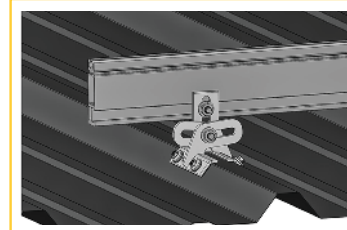
ProteaBracket™ is compatible with common metal roofing materials and comes with a pre-applied EPDM gasket on the base.

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

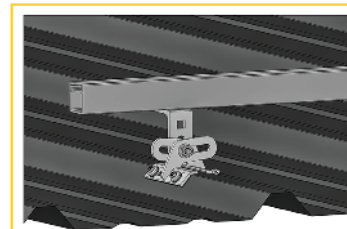
For design assistance, ask your distributor, or visit www.S-5.com for the independent lab test data that can be used for load-critical designs and applications. Also, please visit our website for more information including metallurgical compatibilities and specifications.

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

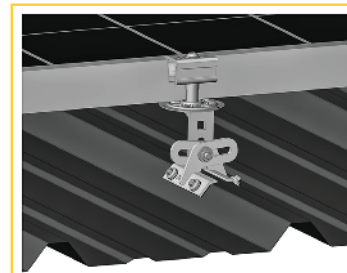
Multiple Attachment Options:



Side
Mount Rail



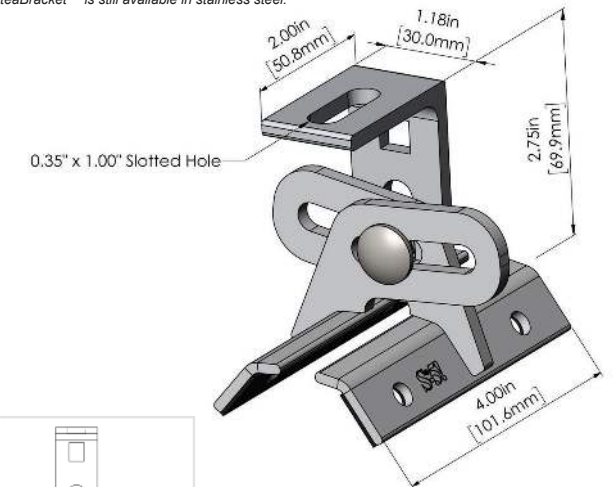
Bottom
Mount Rail



w/ S-5!
PVKIT™
(rail-less)

ProteaBracket™

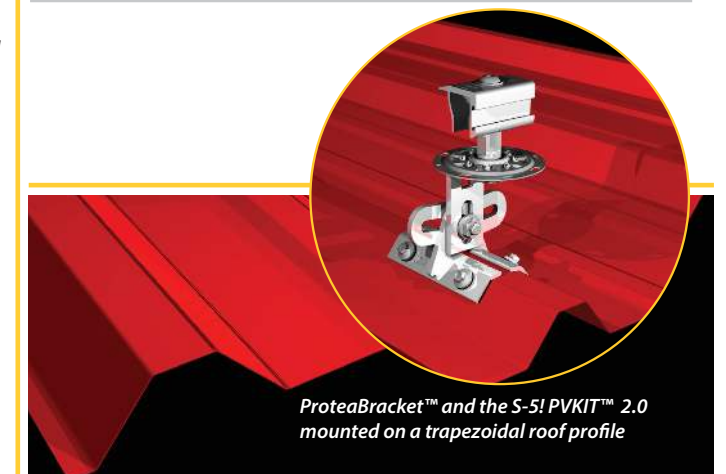
ProteaBracket™ is still available in stainless steel.



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!

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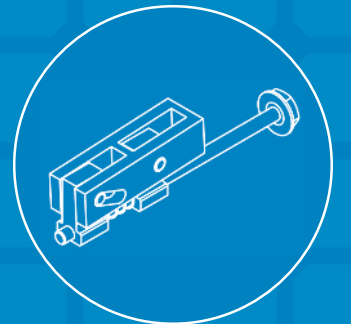
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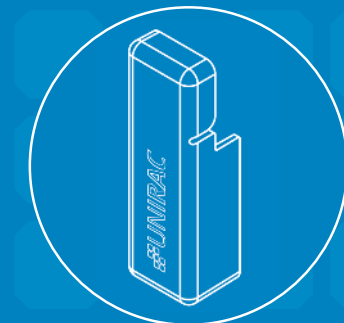
LISTED UL2703

BONDING & GROUNDING
MECHANICAL LOADING
SYSTEM FIRE CLASSIFICATION

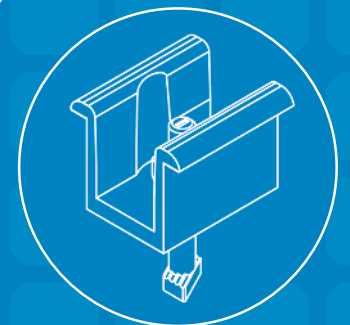
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Certificate of Compliance

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 ²)	113.5
Upward Design Load (lb/ft ²)	50.7
Down-Slope Load (lb/ft ²)	16.13

Test Loads:

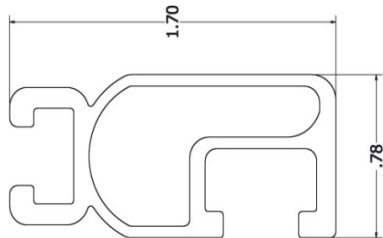
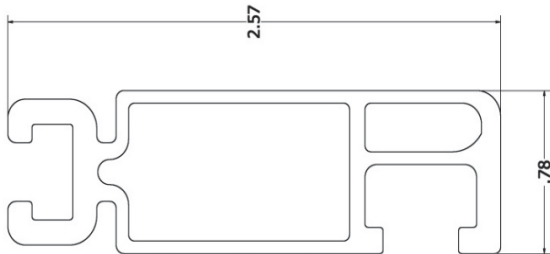
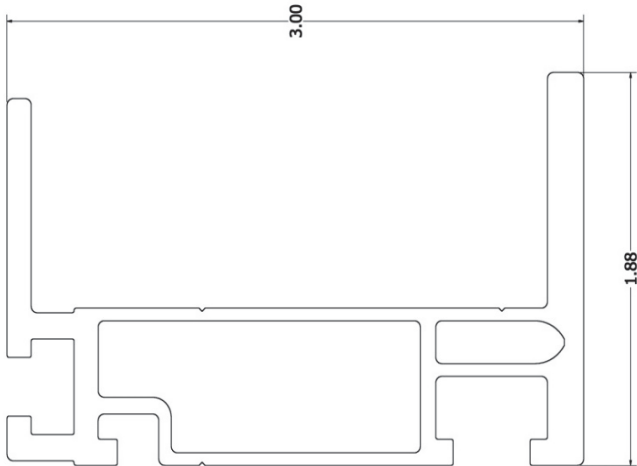
Downward Load (lb/ft ²)	170.20
Upward Load (lb/ft ²)	76.07
Down-Slope Load (lb/ft ²)	24.2

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 ²
SECTION MODULUS (X-AXIS)	0.15	0.363	0.898	in ³
SECTION MODULUS (Y-AXIS)	0.067	0.113	0.221	in ³
MOMENT OF INERTIA (X-AXIS)	0.13	0.467	1.45	in ⁴
MOMENT OF INERTIA (Y-AXIS)	0.026	0.045	0.267	in ⁴
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
Tested to: UL 2703:2015

Client Reference: Tom Young

Certified Product: Module Rack Mounting System
Model Designation: SolarMount (SM)

License Fee - Units
7

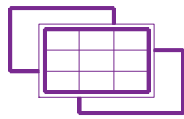
Max System Voltage of PV Module: 1000 VDC
Max Size of PV Module: 20.8 sq.ft. surface area
Max Overcurrent Protection Rating of PV Module:
30 A when using the qualified grounding lugs;
20 A when using the Enphase micro inverter EGC.

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:	Date of Issue (day/mo/yr) 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:

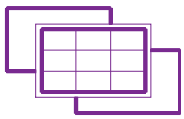
Solar Hooks, Tile Replacement
- Attachment Spacing:**

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