Freedom Forever
Planset Revision Letter

9/15/2023
REV #4

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:
1. WIRE SIZE REVISED FOR VOLTAGE DROP DERATE

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

VICINITY MAP:

TABLE OF CONTENTS:

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 INDENTIFIED 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: C

Michael Rieth
2023.09.18 10:15:33-04'00'

MICHAEL T. RIETH LICENSE No. 94884 STATE OF FLORIDA PROFESSIONAL ENGINEER

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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 [SI1]

REVISIONS		
NO.	REVISED BY	DATE
2	A.M.	8/21/2023
3	J.M.	9/13/2023
4	J.M.	9/15/2023

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

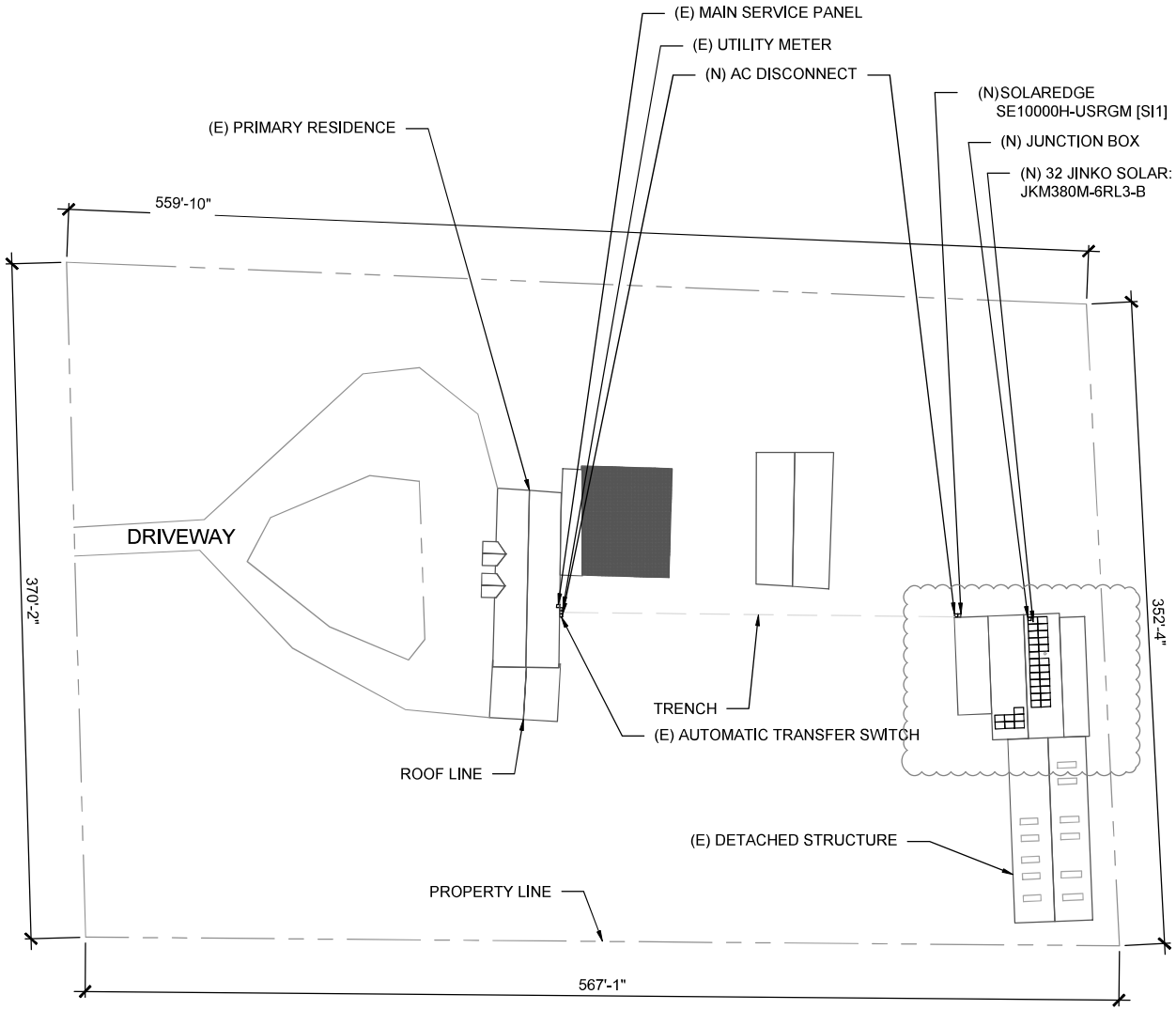
SITE LOCATION

JOB NO:	DATE:	DESIGNED BY:	SHEET:
331623	9/15/2023	J.M.	PV-1

LEGEND:

- OBSTRUCTION
- PIPE VENT
- 32 JINKO SOLAR: JKM380M-6RL3-B
- CONDUIT
- SETBACK
- UM — UTILITY METER
- MSP — MSP
- INV — INVERTER
- AC — VISIBLE LOCKABLE LABELED AC DISCONNECT
- JB — JUNCTION BOX

PV SYSTEM
12.160 kW-DC
10.000 kW-AC



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

1

2

3

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ROOF AREA: 9609.04 SQ FT

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SITE PLAN

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PV SYSTEM
12.160 kW-DC
10.000 kW-AC

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: 2023.09.16 11:23:58 -05'00'

M. MEHDI ZOMORODIAN LICENSE No. 93270 STATE OF FLORIDA PROFESSIONAL ENGINEER

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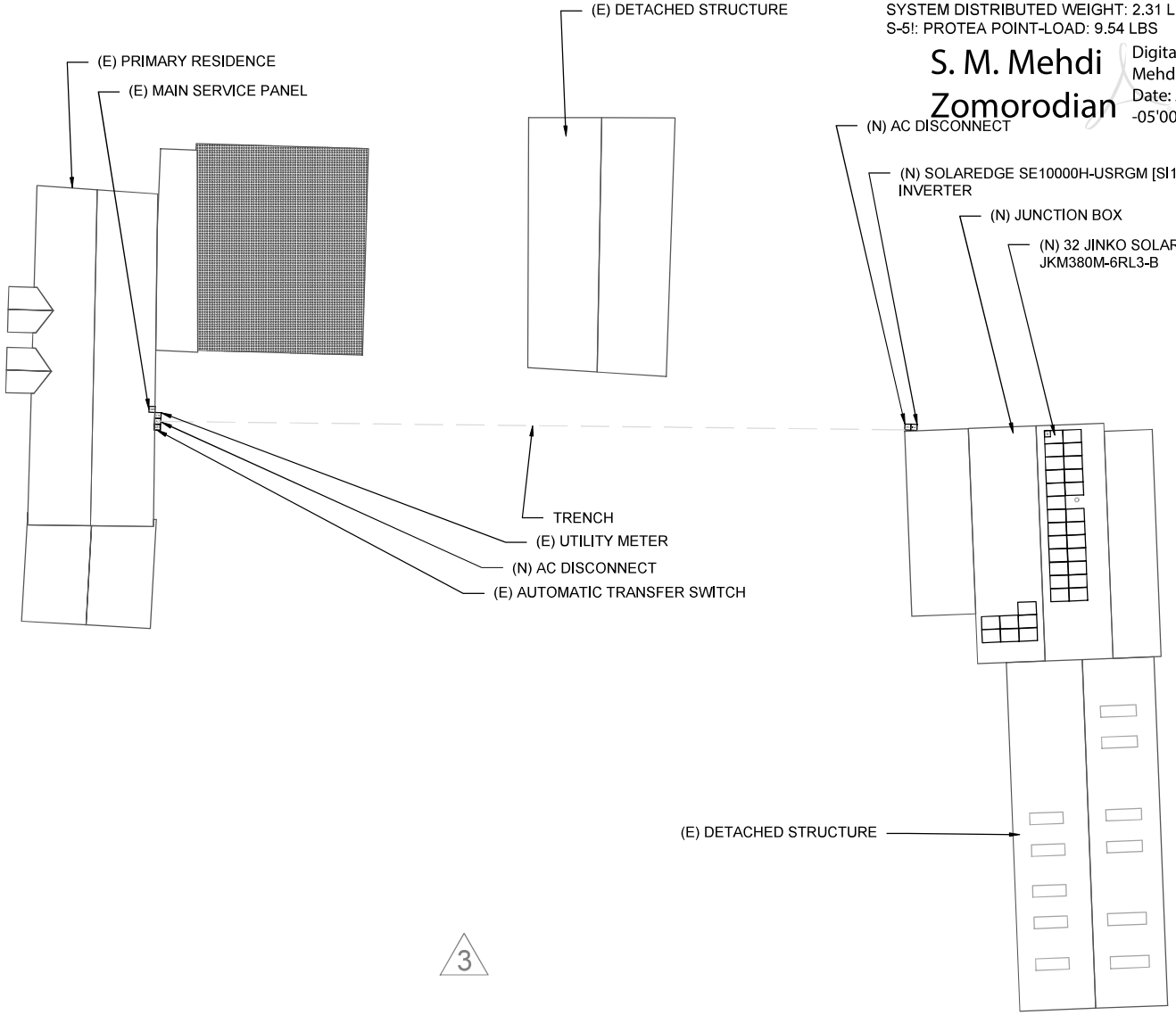

3

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

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

ROOF AREA: 9609.04 SQ FT

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ROOF PLAN WITH MODULES LAYOUT

JOB NO:	DATE:	DESIGNED BY:	SHEET:
331623	9/15/2023	J.M.	PV-2A

ROOF DETAILS:

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

2

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
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----	----	----	----	----	SQ FT	SQ FT
----	----	----	----	----	SQ FT	SQ FT
----	----	----	----	----	SQ FT	SQ FT

S. M. MEHDI ZOMORODIAN
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No. 93270
STATE OF FLORIDA
PROFESSIONAL ENGINEER

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ROOF DETAILS

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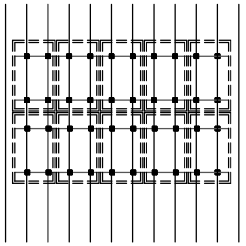
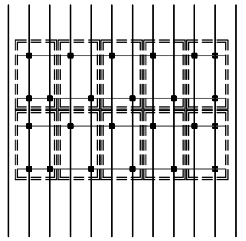
TABLE 1 - ARRAY INSTALLATION

	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(IN.)3
ROOF 1	20	METAL	S-5 PROTEABRACKET	2X6 TRUSS @ 24" OC	4.00'	NOT REQ'D	STAGGERED	27	
ROOF 2	20	METAL	S-5 PROTEABRACKET	2X6 TRUSS @ 24" OC	4.00'	NOT REQ'D	STAGGERED	27	
							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.

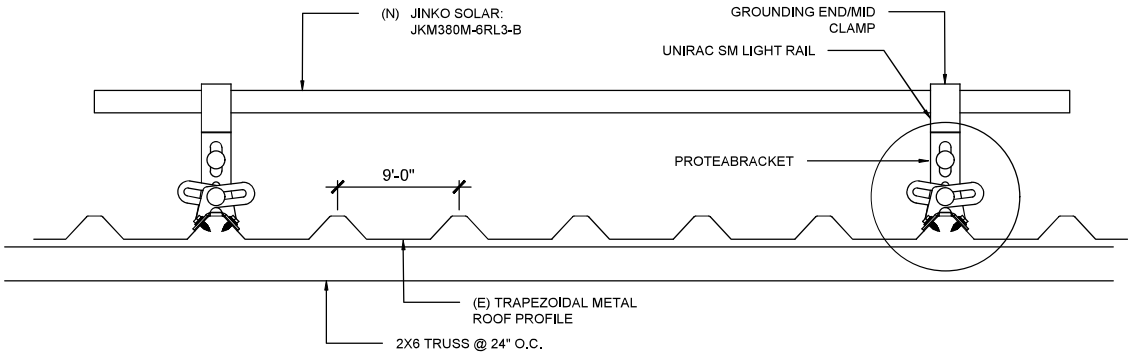


STACKED DETAIL
For Illustration purposes only

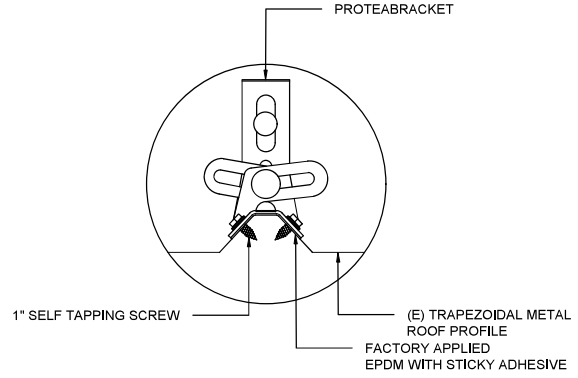


STAGGERED DETAIL
For Illustration purposes only

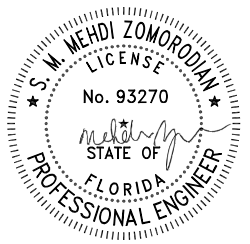
MAX ATTACHMENT SPAN - 2.25' STAGGERED
9" BETWEEN SEAMS/DOMES



SOLAR PV ARRAY SECTION VIEW
Scale: NTS



ATTACHMENT DETAIL
Scale: NTS



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[SI1]

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EC13008056

MOUNTING DETAILS

JOB NO:	DATE:	DESIGNED BY:	SHEET:
331623	9/15/2023	J.M.	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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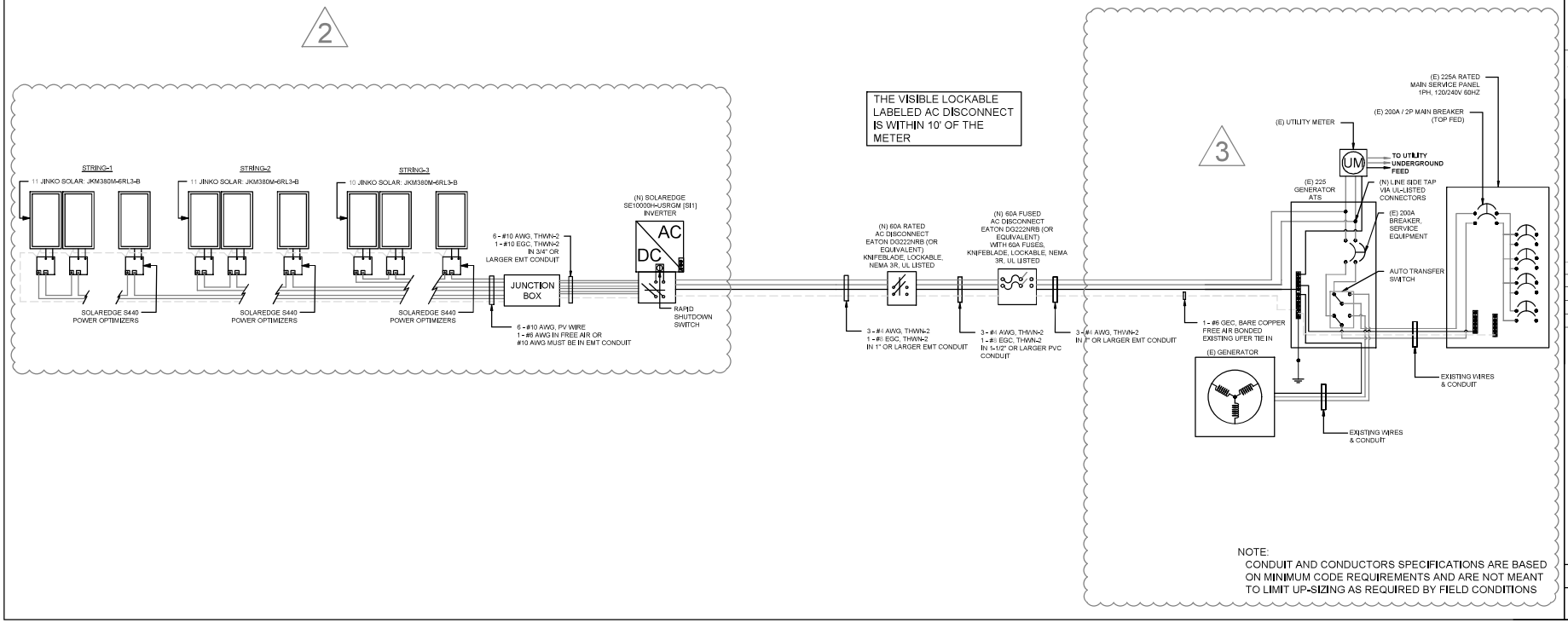
SYSTEM WILL ATTACH TO
METER #ACD8732



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THREE LINE DIAGRAM

JOB NO:	DATE:	DESIGNED BY:	SHEET:
331623	9/15/2023	J.M.	PV-4

MODULE INFO

MAKE/MODEL: JINKO SOLAR: JKM380M-6RL3-B
Voc: 44.22 V
Vmp: 36.9 V
Isc: 11.12 A
Imp: 10.3 A
STC RATING: 380 W
PTC RATING: 351.3 W

MAX DC CURRENT: Imax = 1.25 X (OPTIMIZER OUTPUT CURRENT) = 1.25 X 15 = 18.75A
MAX AC CURRENT: Imax = 1.25 X (SUM OF MAX CONTINUOUS OUTPUT CURRENT FROM INVERTERS)
= 1.25 X (42.00) = 52.50A

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WIRE SCHEDULE

RACEWAY #	EQUIPMENT					CONDUCTOR QTY.	AWG WIRE SIZE	STARTING ALLOWABLE AMPACITY @ 90°C 310.15(B)(16)	STARTING CURRENT APPLIED TO CONDUCTORS IN RACEWAY	TEMPERATURE CORRECTION FACTOR 310.15(B)(2)(a)	ADJUSTMENT FACTOR FOR MORE THAN 3 CONDUCTORS 310.15(B)(3)(a)	ADJUSTED CONDUCTOR AMPACITY @ 90°C	MAXIMUM CURRENT APPLIED TO CONDUCTORS IN RACEWAY
1	DC	MODULE	TO	OPTIMIZER	2	10	40	13.90	0.96	1	38.40	17.38
2	DC	OPTIMIZER	TO	JUNCTION BOX	2	10	40	15.00	0.96	1	38.40	18.75
3	DC	JUNCTION BOX	TO	INVERTER	6	10	40	15.00	0.96	0.8	30.72	18.75
4	AC	INVERTER	TO	AC DISCONNECT	3	4	95	42.00	0.96	1	91.20	52.50
5	AC	AC DISCONNECT	TO	POI	3	4	95	42.00	0.96	1	91.20	52.50

CONDUCTOR AMPACITY CALCULATIONS IN ACCORDANCE WITH NEC 690.8.

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CONDUCTOR CALCULATIONS

JOB NO:	DATE:	DESIGNED BY:	SHEET:
331623	9/15/2023	J.M.	PV-5

OCPD SIZES:

SERVICE LIST:

NONE

MATERIAL LIST:

QTY.	PART	PART #	DESCRIPTION
32	MODULES	PV-118-380	JINKO SOLAR: JKM380M-6RL3-B
32	OPTIMIZERS	OPT-130-440-2	SOLAREDGE S440 POWER OPTIMIZER - FRAME MOUNTED MODULE ADD-ON
1	FITTINGS/ANCHORS	RAC-261-527	600VDC NEMA 3R UL LISTED JUNCTION BOX
2	ELECTRICAL ACCESSORIES	EA-350-326	STAUBLI / MULTI-CONTACT MC4 CONNECTORS (FEMALE)
2	EQUIPMENT ACCESSORIES	EA-350-327	STAUBLI / MULTI-CONTACT MC4 CONNECTORS (MALE)
1	INVERTERS	INV-120-108	SE10000H-US [SI1] RGM 240V INVERTER UL1741 SA CERTIFIED INTEGRATED ARC FAULT PROTECTION AND RAPID SHUTDOWN
1	DISCONNECTS	EE-321-061	60A RATED 240VAC NEMA 3R UL LISTED
2	FUSES	BR-330-060	60A FUSE 1 PH 240VAC
3	ELECTRICAL ACCESSORIES	EA-350-113	IDEAL B-TAP 4/0-10 AWG
159	FITTINGS/ANCHORS	RAC-240-401	S-5!: PROTEA
16	RAILS	RAC-211-100	UNIRAC SM LIGHT RAIL 168 INCH (TOTAL 217 FEET NEEDED)
32	FITTINGS/ANCHORS	RAC-261-517	BND T-BOLT AND NUT SS
34	ENDS/MIDS	RAC-221-101	SM MIDCLAMP PRO DRK
34	ENDS/MIDS	RAC-221-209	SM ENDCLAMP PRO W/ END CLAMP
11	FITTINGS/ANCHORS	RAC-261-600	BND SPLICE BAR PRO SERIES MILL
34	FITTINGS/ANCHORS	RAC-261-510	MICRO MNT BND TBOLT SS
9	RAILS	RAC-211-209-NS	E-BOSS CONDUIT MOUNT COMP KIT
18	RAILS	RAC-211-200	E-BOSS RAIL TRAY
6	RAILS	RAC-211-206	E-BOSS BRIDGE TRAY
10	RAILS	RAC-211-207	E-BOSS BRIDGE CLIPS
32	FITTINGS/ANCHORS	RAC-260-300	BURNDY GROUND WEEB-LUG
55	FOOTINGS	RAC-241-100	UNIRAC L-FOOT SERRATED W/T-BOLT CLEAR (KIT)

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2	A.M.	8/21/2023
3	J.M.	9/13/2023
4	J.M.	9/15/2023

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

CONTRACTOR LICENSE:
CERTIFIED ELECTRICAL CONTRACTOR
EC13008056

EQUIPMENT & SERVICE LIST

JOB NO:	DATE:	DESIGNED BY:	SHEET:
331623	9/15/2023	J.M.	PV-6

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

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

M

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

690.54

NOTES:

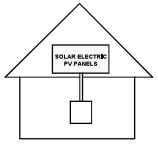
1. NEC ARTICLES 690 AND 705 AND IRC SECTION R324 MARKINGS SHOWN HEREON.
2. ALL MARKING SHALL CONSIST OF THE FOLLOWING:
   - A. UV RESISTANT SIGN MATERIAL WITH ENGRAVED OR MACHINE PRINTED LETTERS OR ELECTRO-PLATING.
   - B. RED BACKGROUND COLOR WHITE TEXT AND LINE WORK.
   - C. ARIAL FONT.
3. ALL SIGNS 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

MICHAEL T. RIETH LICENSE No. 94884 STATE OF FLORIDA PROFESSIONAL ENGINEER

This item has been digitally signed and sealed by Michael Rieth 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.

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

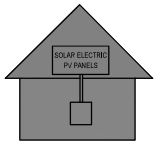
TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUT DOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN THE ARRAY



690.56(C)(1)(A)

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

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

690.13 (B)

AC

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

690.15, 690.54

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

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

690.56(C)(3)

INVERTER

DC

J/B

ARRAY

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

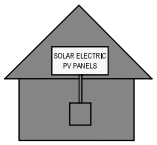
If you have any questions about your system, please call our Customer Support Team at
888.557.6431
or visit freedomforever.com/customer-service
This solar PV system was installed by
freedom FOREVER

"WARNING"
PHOTOVOLTAIC POWER SOURCE

EVERY 10' ON CONDUIT AND ENCLOSURES

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

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 [SI1]

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4	J.M.	9/15/2023

freedom FOREVER
FREEDOM FOREVER LLC
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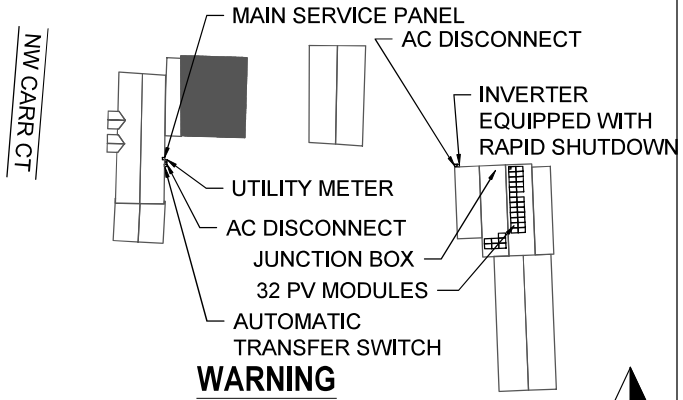
LABELS

JOB NO:	DATE:	DESIGNED BY:	SHEET:
331623	9/15/2023	J.M.	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

3

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

MICHAEL T. RIETH
LICENSE
No. 94884
STATE OF FLORIDA
PROFESSIONAL ENGINEER

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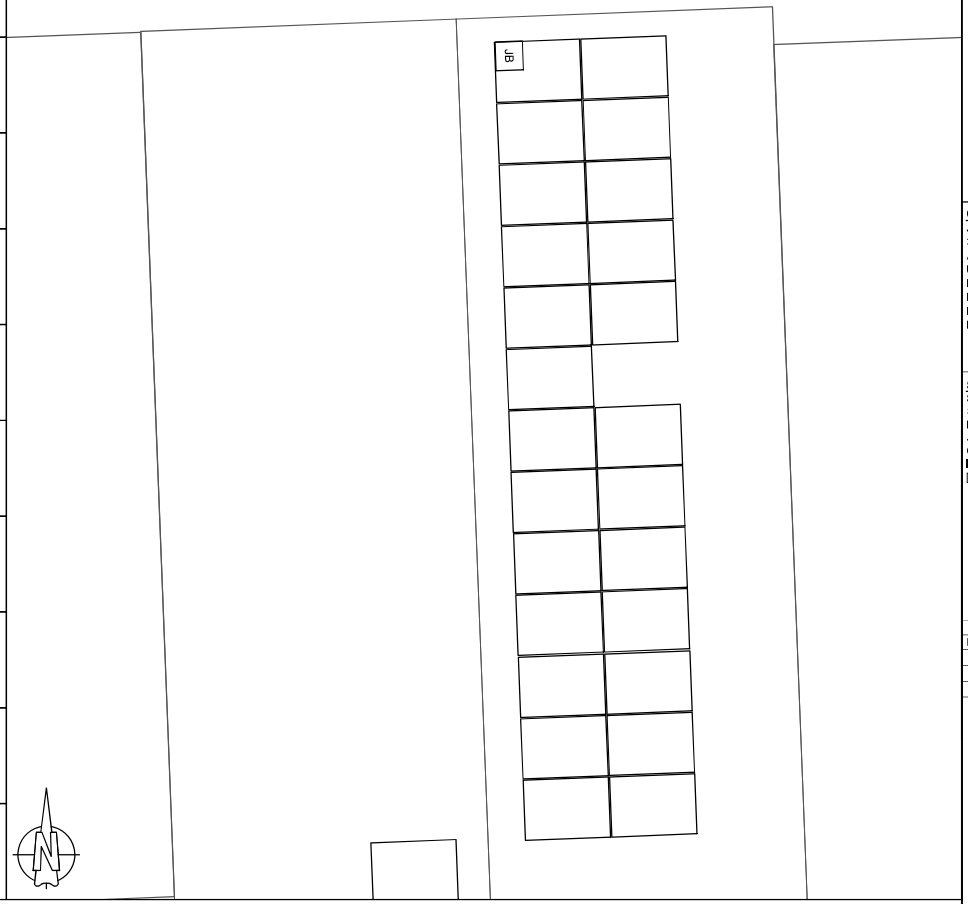
EC13008056

SITE PLACARD

JOB NO:	DATE:	DESIGNED BY:	SHEET:
331623	9/15/2023	J.M.	PV-7A

SOLAREDGE OPTIMIZER CHART

	1-10	11-20	21-30	31-40	41-50	51-60
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						



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OPTIMIZER CHART

JOB NO:	DATE:	DESIGNED BY:	SHEET:
331623	9/15/2023	J.M.	PV-8

SAFETY PLAN

INSTRUCTIONS:

1. USE SYMBOLS IN KEY TO MARK UP THIS SHEET.
2. SAFETY PLAN MUST BE MARKED BEFORE JOB STARTS AS PART OF THE PRE-PLAN
3. 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:

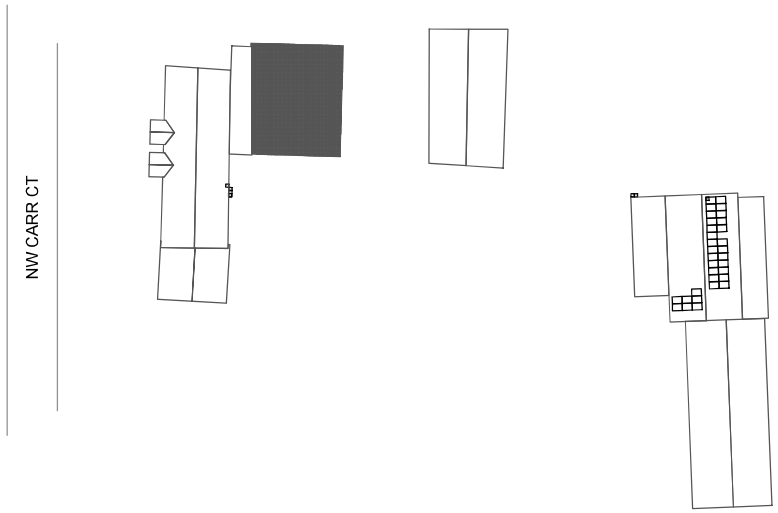
NAME: _____

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.

NAME	SIGNATURE

DATE: _____ TIME: _____



MARK UP KEY

- (P) PERMANENT ANCHOR
- (T) TEMPORARY ANCHOR
- [IL] INSTALLER LADDER
- [B] JUNCTION / COMBINER BOX
- [S] STUB-OUT
- [X] SKYLIGHT
- NO LADDER ACCESS (STEEP GRADE OR GROUND LEVEL OBSTRUCTIONS)
- [ ] RESTRICTED ACCESS
- CONDUIT
- (GAS) GAS SHUT OFF
- (H_2O) WATER SHUT OFF
- (7) SERVICE DROP
- (Z) POWER LINES

BREAK AND WATER LOG

THIS LOG IS TO BE FILLED OUT ANY TIME THE TEMP EXCEEDS **90** DEGREES. THE CREW LEAD AND ROOF LEAD ARE RESPONSIBLE FOR ENSURING THIS IS COMPLETED AND UPLOADED AT THE END OF EVERYDAY WHEN TEMPS EXCEED **90** DEGREES

NAME	0800HRS	0900HRS	1000HRS	1100HRS	1200HRS	1300HRS	1400HRS	1500HRS	1600HRS

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SAFETY PLAN

JOB NO:	DATE:	DESIGNED BY:	SHEET:
331623	9/15/2023	J.M.	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:
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AHJ: COLUMBIA COUNTY (FL)
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SAFETY PLAN

JOB NO:	DATE:	DESIGNED BY:	SHEET:
331623	9/15/2023	J.M.	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 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.

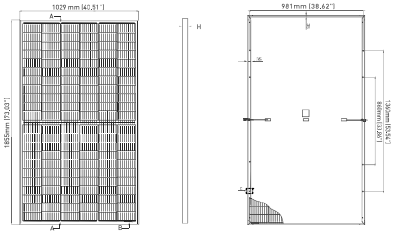
Shade Tolerant
Twin array design allows continued performance even with shading by trees or debris.

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

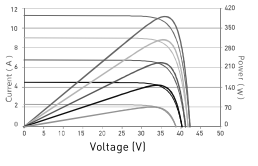
Front Side Back



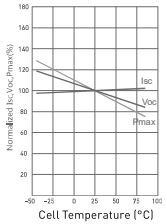
Length: +/- 2mm
Width: +/- 2mm
Height: +/- 1mm
Row Pitch: +/- 2mm

ELECTRICAL PERFORMANCE & TEMPERATURE DEPENDENCE

Current-Voltage & Power-Voltage Curves (400W)



Temperature Dependence of Isc, Voc, Pmax



MECHANICAL CHARACTERISTICS

No. of Cells	132 (2x66)
Dimensions	1855x1029x35mm (73.03×40.51×1.37 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

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 Cell Temperature 25°C AM = 1.5
NOCT: Irradiance 800W/m² Ambient Temperature 20°C AM = 1.5 Wind Speed 1m/s

*Power measurement tolerance: +/- 3%

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

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/ Power Optimizer

For North America

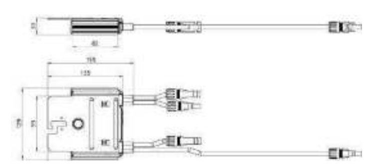
S440, S500

	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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Intertek

RoHS

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

12-25 YEAR WARRANTY

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)

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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

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	600kΩ 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

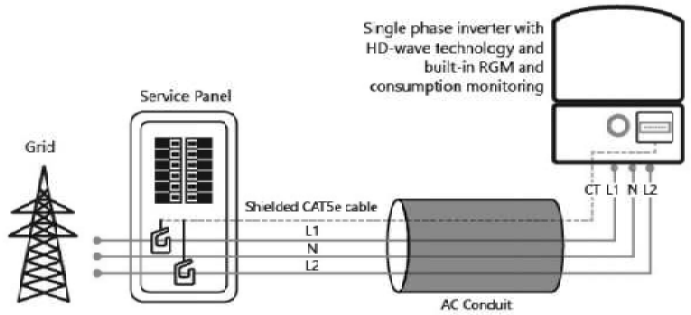
MODEL NUMBER	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US	
ADDITIONAL FEATURES								
Supported Communication Interfaces	RS485, Ethernet, ZigBee (optional), Cellular (optional)							
Revenue Grade Metering, ANSI C12.20	Optional[3]							
Consumption metering								
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



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RoHS

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
Eaton general duty cartridge fuse safety switch

Catalog Number
DG222NRB

UPC
782113144221

Product Length/Depth
7.35 in

Product Height
14.37 in

Product Width
8.4 in

Product Weight
10 lb

Warranty
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.

Certifications
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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Eaton.com

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BUCHANAN

B-TAP®

Listed 486B
Pressure Cable Connectors
File No. E-5238
Suitable for use on the line side of the service equipment.

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.

1. Determine the direction for the tap conductor to exit and discard one end cap. **See figure 1.**
2. 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.
3. Cut the end of the tap cable squarely. **DO NOT STRIP CABLE INSULATION.**
4. Insert the tap cable into the tap side of the connector until it is seated in the remaining end cap. **See figure 3.**
5. 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.

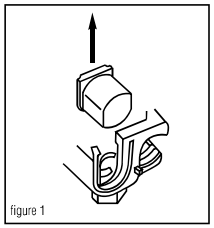
figure 1

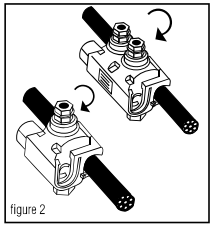
figure 2

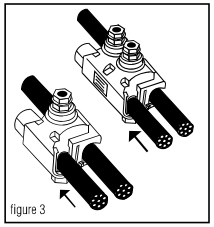
figure 3

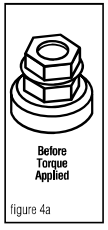

figure 4a

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.

1. Determine la dirección en la que el conductor derivado saldrá y deseche la tapa terminal sobrante. **Vea la ilustración 1.**
2. 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.
3. Corte el extremo del cable de derivación perpendicularmente a su eje. **NO PELE EL AISLAMIENTO DEL CABLE.**
4. 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.**
5. 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, apriételos 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 RATIING (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.

CONSTRUCTION PRODUCTS BUCHANAN
1800 S. Prairie Drive
Sycamore, IL, U.S.A.
800-435-0705 • www.idealind.com

ND 9053-2
1839420

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

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 E5238
1375 Park Ave
SYCAMORE, IL 60178 United States

View model for additional information

Insulated butt splice crimp type connectors, Model(s): BVS1, BVS2, BVS5

Insulated flange spade type crimp ccomnectors, 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, FSNYDS-3.7, FSNYDS-4, FSNYDS-5

Insulated hook type crimp connectors, Model(s): HNYD1-3.7, HNYD1-4, HNYD1-5, HNYD2-3.7, HNYD2-4, HNYD2-5, HNYDS-3.7, HNYDS-4, HNYDS-5, HVY1-3.7, HVY1-4, HVY1-5, HVY2-4, HVY2-5, HVYS-3.7, HVYS-4, HVYS-5

Insulated locking spade crimp connectors, Model(s): LSNYD1-3.7, LSNYD2-3.7, LSNYDS-3.7, LSNYDS-4, LSNYDS-5, LSNYDL1-4, LSNYDL1-5, LSNYDL2-4, LSNYDL2-5

Insulated multiple stud ring type crimp connectors, Model(s): MSRNYD1-3753, MSRNYD2-3753, MSRNYDS-3753

Insulated parallel connectors, Model(s): PVT1, PVT14, PVT2, PVT22, PVT5, PVT8

Insulated pin type connectors, Model(s): PTNYD1-12, PTNYD2-12, PTNYDS-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, RNYDS-10, RNYDS-12, RNYDS-3.2, RNYDS-3.7, RNYDS-5, RNYDS-6, RNYDS-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, SNYDS-3.7, SNYDS-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

Feedback

Listed pressure cable connectors, Model(s): BHT-1, BHT-2, BHT-5, BN-1, BN-2, BN-5, 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, RNBL1-4

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, RNB5-5, 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, RNBM1-3.7, RNBM1-3.7, RNBM2-3.7, RNBM2-3.7, RNBM8-5, RNBS1-4, RNBS14-5, RNBS2-4, RNBS2-5, RNBS5-4, RNBS8-6

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): PSVY1-3.7, PSVY1-4, PSVY1-5, PSVY2-3.7, PSVY2-4, PSVY2-5, PSVY5-3.7, PSVY5-4, PSVY5-5, 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, TUK16-6, TUK25-10

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, 1995, 200, 2002, 2006-S, 2008-S, 2011-S, 22-10, 22-12, 29, 299, 2995, 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, S1/0, S2, S2/0, S250, S3, S3/0, S350, S4, S500, S6, TRO1, TRO2, W1, W2, W4, WT1, WT2, WT3, WT4, WT6, WTW51, WTW52, WTW53, WTW54

Feedback

Splicing Wire Connectors, Model(s): BNT1, BNT2

Splicing Wire Connectors:, Model(s): 46-404, 46-405

Splicing 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, 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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Feedback

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The Right Way!™

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™

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

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

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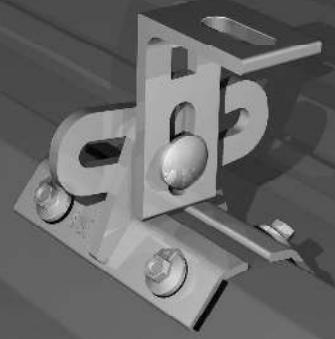

ProteaBracket™

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*

*See www.S-5.com for details.

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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.

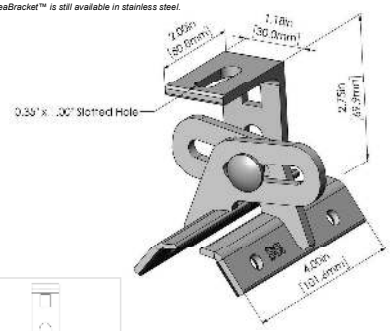
Note: All four pre-punched holes must be used to achieve tested strength. Fasteners are provided.

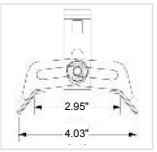
For design assistance, ask your distributor, or visit **www.S-5.com** for the independent lab test data that can be used for load-critical designs and applications. Also, please visit our website for more information including metallurgical compatibilities and specifications.

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

ProteaBracket™

ProteaBracket™ is still available in stainless steel.

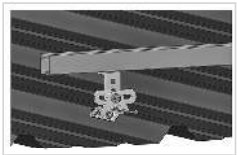




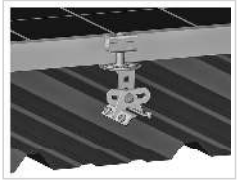
ProteaBracket fits profiles up to 3 inches

Multiple Attachment Options:

Side Mount Rail



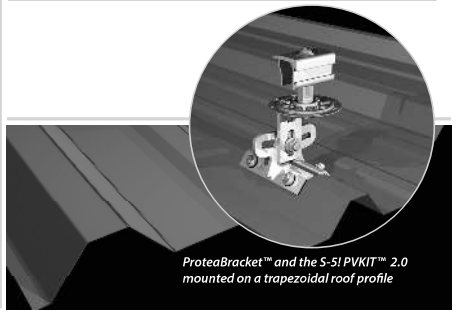
Bottom Mount Rail



w/ S-5! PVKIT™ **(rail-less)**

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.

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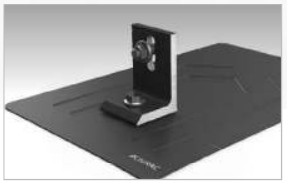

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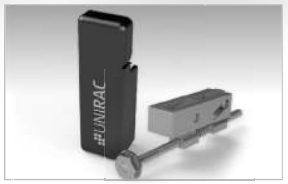

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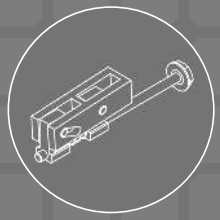

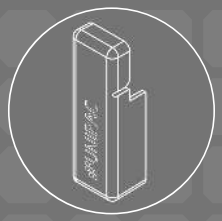

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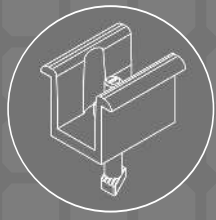

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Certificate: 70131735 **Master Contract:** 266909

Project: 80082031 **Date Issued:** 2021-06-02

Issued To: **Unirac**
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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

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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/ft²)	113.5
Upward Design Load (lb/ft²)	50.7
Down-Slope Load (lb/ft²)	16.13

Test Loads:

Downward Load (lb/ft²)	170.20
Upward Load (lb/ft²)	76.07
Down-Slope Load (lb/ft²)	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.

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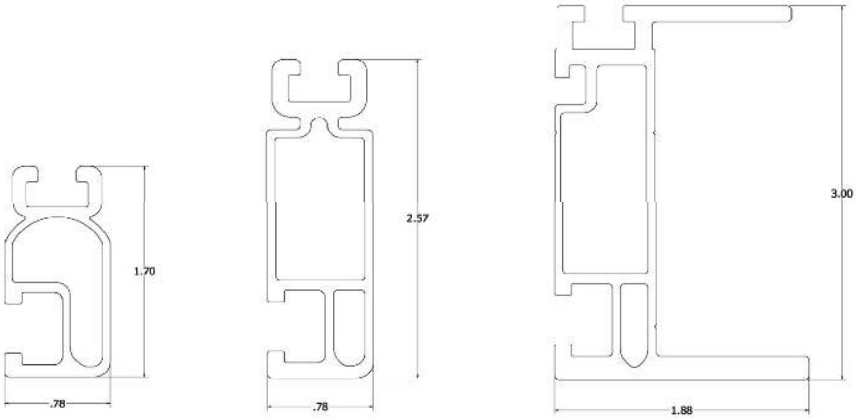

Properties	SOLARMOUNT Light	SOLARMOUNT Rail Profile 2	SOLARMOUNT HD	Units
BEAM HEIGHT	1.70	2.57	3.00	in
APPROX WEIGHT	0.491	0.728	1.271	plf
CROSS SECTION AREA	0.409	0.625	1.059	in^2
SECTION MODULUS (X-AXIS)	0.15	0.363	0.898	in^3
SECTION MODULUS (Y-AXIS)	0.067	0.113	0.221	in^3
MOMENT OF INERTIA (X-AXIS)	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

TÜV Rheinland PTL

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 7

Licensed Test mark: **Date of Issue (day/mo/yr)** 27/07/2016

TÜVRheinland US

TÜV Rheinland PTL, LLC. 1107 W. Fairmont Drive, Building A. Tempe, Arizona 85282. Tel (480) 966-1700. Fax (775) 314-6458

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-S000S, 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

Engineering Alliance, Inc
https://www.eng-alliance.com

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 LICENSE No.75316 STATE OF FLORIDA PROFESSIONAL ENGINEER

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

4603 April Meadow Way, Sugar Land, TX 77479. Ph: 832 865 4757

BARUN CORP

September 14, 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

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BARUN CORP

September 14, 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: 2023.09.14 09:26:24 -05'00'

S. MEHDI ZOMORODIAN
LICENSE
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.

BARUN CORP	RESULTS SUMMARY
JOHN HICKEY, 327 NW CARR CT, LAKE CITY, FL 32055	

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	93.2%

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
Total PV Panels	**PV-DL = 3.00 psf**

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
Total Roof Dead Load			**R-DL = 6.10 psf**

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

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
Flat Roof Snow Load	**pf = 0.00 psf**

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

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

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, γa =		0.60	
Hardware Type =	S-5 PROTEABRACKET		
Allowable Load =	300.00 lbs	Metal Roof Attachment	
Array Edge Factor, γE =	1.50	Exposed Condition	
Max. X - Spacing (Zone 1 & 2e) =	2.25 ft	Effective Wind Area	
Max. Y - Spacing (Zone 1 & 2e) =	3.00 ft	6.75 ft²	
Max. X - Spacing (Zone 2n - 3e) =	2.25 ft	Effective Wind Area	
Max. Y - Spacing (Zone 2n - 3e) =	3.00 ft	6.75 ft²	
Max. X - Spacing (Zone 3r) =	1.50 ft	Effective Wind Area	
Max. Y - Spacing (Zone 3r) =	3.00 ft	4.50 ft²	

ROOF ZONE	GCp (-) UPLIFT	UPLIFT PRESSURE	PULLOUT FORCE
1 & 2e	-2.00	-27.04 psf	182.50 lbs
2n - 3e	-3.00	-41.40 psf	279.45 lbs
3r	-3.60	-50.02 psf	225.09 lbs

NOTE:

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