GENERAL NOTES

1. ALL ELECTRICAL MATERIALS SHALL BE NEW AND LISTED BY RECOGNIZED ELECTRICAL TESTING LABORATORY

CUSTOM MADE EQUIPMENT SHALL HAVE COMPLETE TEST DATA SUBMITTED BY THE MANUFACTURER ATTESTING TO ITS SAFETY

2. OUTDOOR EQUIPMENT SHALL BE NEMA 3R RATED OR BETTER

3. ALL METALLIC EQUIPMENT SHALL BE GROUNDED

4. CONTRACTOR SHALL OBTAIN ELECTRICAL PERMITS PRIOR TO INSTALLATION AND SHALL COORDINATE ALL INSPECTIONS, TESTING COMMISSIONING AND ACCEPTANCE WITH THE CLIENT, UTILITY CO. AND CITY INSPECTORS AS NEEDED.

5. THE ELECTRICAL CONTRACTOR SHALL VERIFY THE EXACT LOCATIONS OF SERVICE POINTS AND SERVICE SIZES WITH THE SERVING UTILITY COMPANY AND COMPLY WITH ALL UTILITY COMPANIES REQUIREMENTS.

6. DRAWINGS ARE DIAGRAMMATIC ONLY, ROUTING OF RACEWAYS SHALL BE OPTION OF THE CONTRACTOR UNLESS OTHERWISE NOTED AND SHALL BE COORDINATED WITH OTHER TRADES.

7. IF THE ROOF MATERIAL OR ROOF STRUCTURE NOT ADEQUATE FOR PV INSTALLATION, CALL ENGINEER PRIOR TO INSTALL. THE CONTRACTOR IS RESPONSIBLE TO VERIFY THAT THE ROOF IS CAPABLE OF WITHSTANDING THE EXTRA WEIGHT.

8. IF THE DISTANCES FOR CABLE RUNS ARE DIFFERENT THAN SHOWN, THE CONTRACTOR SHALL NOTIFY THE ELECTRICAL ENGINEER TO VALIDATE THE WIRE SIZE. FINAL DRAWINGS WILL BE RED-LINED AND UPDATED AS APPROPRIATE.

9. WHENEVER A DISCREPANCY IN QUALITY OF EQUIPMENT ARISES ON THE DRAWING OR SPECIFICATIONS, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ALL MATERIAL AND SERVICES REQUIRED BY THE STRICTEST CONDITIONS NOTED ON THE DRAWINGS OR IN THE SPECIFICATIONS TO ENSURE COMPLETE COMPLIANCE AND LONGEVITY OF THE OPERABLE SYSTEM REQUIRED BY THE ARCHITECT/ENGINEERS.

10. ALL BROCHURES, OPERATION MANUALS, CATALOGS, SHOP DRAWINGS, ETC. SHALL BE HANDED OVER TO OWNER'S REPRESENTATIVE AT THE COMPLETION OF WORK

PHOTOVOLTAIC NOTES:

1. ROOFTOP MOUNTED PHOTOVOLTAIC PANELS AND MODULES SHALL BE TESTED, LISTED AND IDENTIFIED BY RECOGNIZED ELECTRICAL TESTING LABORATORY

2. SOLAR SYSTEM SHALL NOT COVER ANY PLUMBING OR MECHANICAL VENTS

3. MODULES AND SUPPORT STRUCTURES SHALL BE GROUNDED.

4. SOLAR INVERTER SHALL BE LISTED TO UL1741.

5. REMOVAL OF AN INTERACTIVE INVERTER OR OTHER EQUIPMENT SHALL NOT DISCONNECT THE BONDING CONNECTION BETWEEN THE GROUNDING ELECTRODE CONDUCTOR AND THE PHOTOVOLTAIC SOURCE AND/OR OUTPUT CIRCUIT GROUNDED CONDUCTORS.

6. ALL PV MODULES AND ASSOCIATED EQUIPMENT AND WIRING SHALL BE PROTECTED FROM PHYSICAL DAMAGE.

7. LIVE PARTS OF PV SOURCE CIRCUITS AND PV OUTPUT CIRCUITS OVER 150V TO GROUND SHALL NOT BE ACCESSIBLE TO OTHER THAN QUALIFIED PERSONS WHILE ENERGIZED.

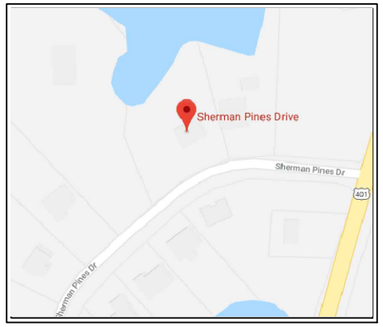
8. INVERTER IS EQUIPED WITH INTEGRATED GFDI, THUS PROVIDING GROUND FAULT PROTECTION

9. ALL CONDUCTORS SHALL BE COPPER AND 90 DEG RATED

10. ALL ELECTRICAL EQUIPMENT SHALL BE LISTED BY A RECOGNIZED ELECTRICAL TESTING LABORATORY.

11. A SINGLE CONDUCTOR SHALL BE PERMITTED TO BE USED TO PERFORM THE MULTIPLE FUNCTIONS OF DC GROUNDING, AC GROUNDING AND BONDING BETWEEN AC AND DC SYSTEMS.

12. NON-CURRENT CARRYING METAL PARTS OF EQUIPMENT SHALL BE EFFECTIVELY BONDED TOGETHER. BOND BOTH ENDS OF RACEWAYS.



VICINITY MAP
SCALE: NTS

SATELLITE VIEW
SCALE: NTS

INDEX

MAIN

THE INSTALLATION OF SOLAR ARRAYS AND PHOTOVOLTAIC POWER SYSTEMS SHALL COMPLY WITH THE FOLLOWING CODES:

NATIONAL ELECTRICAL CODE 2017
INTERNATIONAL RESIDENTIAL CODE 2018
INTERNATIONAL BUILDING CODE 2018
INTERNATIONAL ENERGY CONSERVATION CODE 2018

AS ADOPED BY THE STATE OF NORTH CAROLINA

ALL OTHER ORDINANCE ADOPTED BY THE LOCAL GOVERNING AGENCIES

PV SOLAR SYSTEM DETAILS

SYSTEM SIZE: DC STC: 4.72 KW
SYSTEM SIZE: AC CEC: 4.25 KW
SOLAR MODULES: (16) Solar World 295 Watt
INVERTERS: (1) SolarEdge 3.8 KW

ELECTRICAL INFORMATION:
EXISTING
MAIN SERVICE PANEL BUS SIZE: 200A
MAIN SERVICE BREAKER SIZE: 200A
MOUNTING SYSTEM: Everest Crossrail 48-X

BUILDING INFORMATION:
CONSTRUCTION TYPE: V-B
OCCUPANCY: R
ROOF: COMP. SHINGLE
RAFTER: 2 X 10 @ 16" O.C.

Project Name:
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Property address:
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Fuquay Varina, NC 27526

CONTRACTOR

EMERALDENERGY
North Carolina Renewable Energy Specialists

DESIGNER: DAVID DURGAR
DATE: 1/9/2019
david.pv.design@gmail.com

INDEX	
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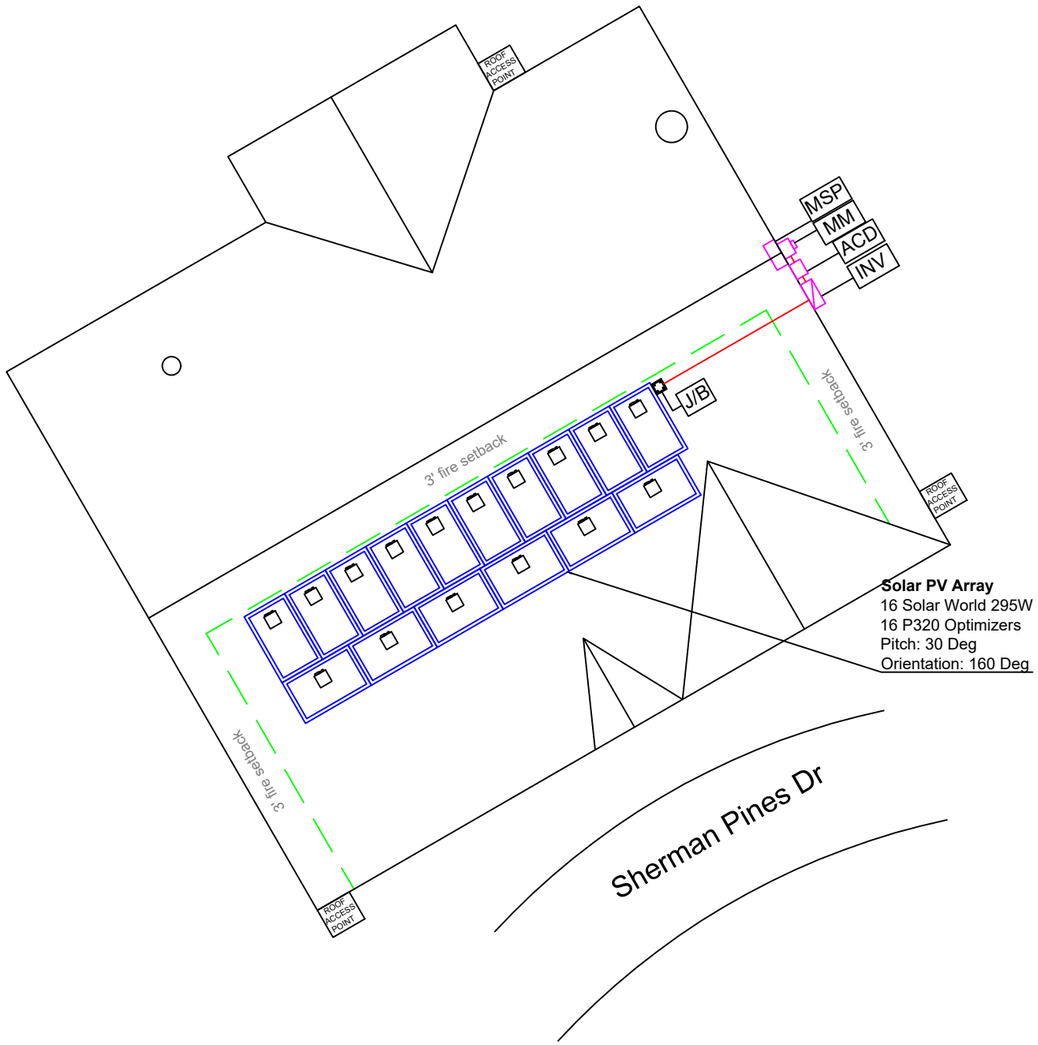
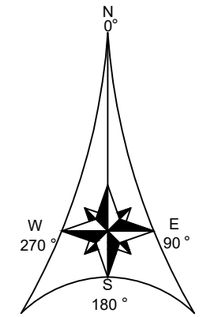
	Solar Module
	Conduit
	Setback





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

1	ROOF PLAN

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NOTE: Conduit will run trough attic
Main Panel is in garage on rear wall of garage perpendicular to the far left side of the house/meter base on outside wall.

#	ITEM	DESCRIPTION	QTY
1	PV MODULE	SOLAR WORLD SW 295 MONO Voc = 39.8V, Vmp = 32.3V Isc = 9.78A, Imp = 9.25A	16
2	INVERTER	SOLAREDGE SE3800H-US (240) 99% CEC EFFICIENCY 3800Wac CONTINIOUS MAX OUTPUT CURRENT 16Aac MAX INPUT CURRENT 10.5Adc	1
3	PVC JUNCTION BOX	SOLADECK JUNCTION BOX WITH (1)15A and (1)30A FUSSES	1
4	AC DISCONNECT	30A 2P BLADE TYPE 240V NON-FUSABLE	1
5	MAIN SERVICE PANEL	(E) MAIN SERVICE PANEL & METER 200A BUSBAR & 200A MAIN BREAKER	1
6	POWER OPTIMIZER	SOLAREDGE, P320 OPTIMIZER INPUT POWER: 320 WATTS MAX INPUT VOLTAGE: 40Vdc MPPT RANGGE: 8 TO 48Vdc MAX INPUT CURRENT: 11Adc MAX OUTPUT CURRENT: 15Adc STRING LIMITATIOS: 8 TO 25, 5700 WATTS STC PER STRING MAX	16
7	MAIN METER	UTILITY METER, 240V. 1Ø. 3W	1

WIRE CHART

#	MAX AMPS X NEC MULT = DESIGN AMPS	BREAKER SIZE (A)	WIRE TYPE	EGC	WIRE RATING X TEMP DERATE X CONDUCTOR DERATE = DERATED WIRE	CONDUIT SIZE
1	15 X 1.25 = 18.8 A	20	(2) #10 PV-WIRE	(1) #6 BARE SOLID COPPER GEC	40 X .71 X 1 = 28.4 >= 18.8	IN FREE AIR
2	15 X 1.25 = 18.8 A	20	(4) #10 AWG, CU-THWN-2	(1) #8 AWG, CU-THWN-2 EGC	40 X .71 X .8 = 22.72 >= 18.8	3/4" EMT
3	16 X 1.25 = 20 A	20	(3) #10 AWG, CU-THWN-2	(1) #8 AWG, CU-THWN-2 EGC	40 X .91 X 1 = 36.4 >= 20	3/4" EMT
4	16 X 1.25 = 20 A	20	(3) #10 AWG, CU-THWN-2	(1) #8 AWG, CU-THWN-2 EGC	40 X .91 X 1 = 36.4 >= 20	3/4" EMT

KEY NOTES:

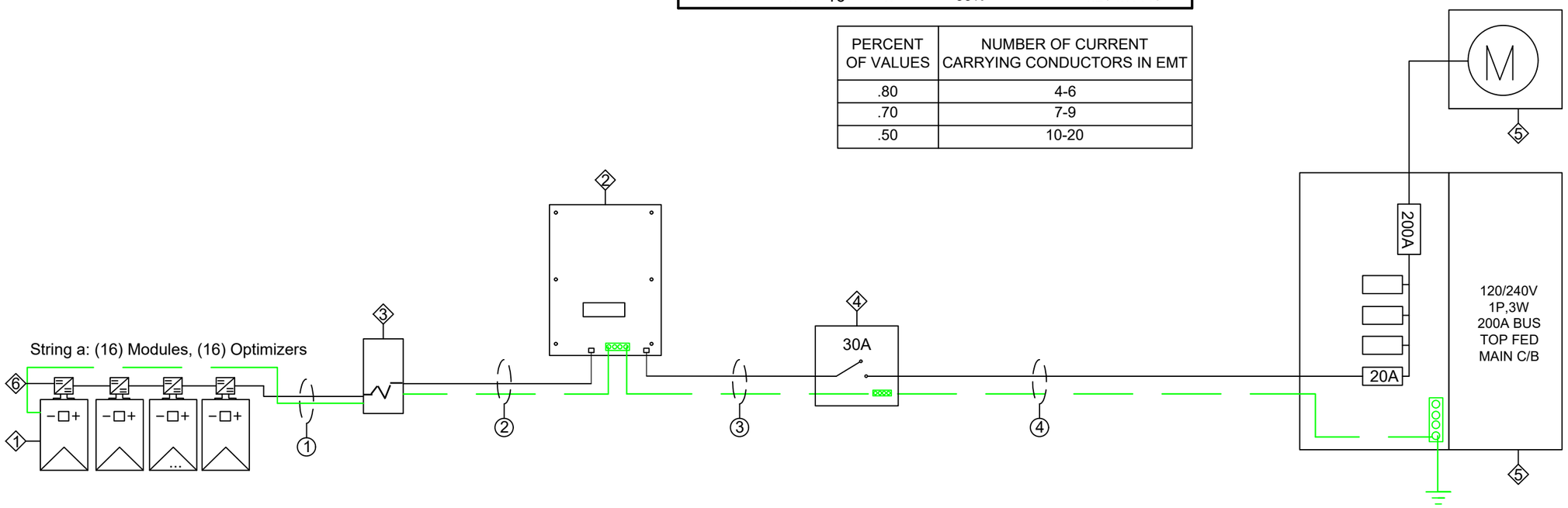
- **SOLID BARE G.E.C (FREE-AIR) MOUNTED UNDER ARRAY**
- **PER NEC ARTICLE 690.35 INVERTER GROUND FAULT PROTECTION PROVIDED**
- **ALL GROUNDS AND NEUTRALS BONDED TO EXISTING GROUNDING CONDUCTOR W/IRREVERSIBLE CRIP CONNECTOR,**
- **BACKFED BREAKERS MUST BE LOCATED @ OPPOSITE END OF BUS BAR FROM MAIN BREAKER OR MAIN LUG ON GRID SIDE. WHEN A BACKFED BREAKER IS THE METHOD OF UTILITY INTERCONNECTION, BREAKER SHALL NOT READ ' LINE OR LOAD'.**
- **PER CEC 250.65(C): CONDUCTOR SPLICES ONLY ALLOWED WITH COMPRESSION CONNECTORS OR EXOTHERMIC WELDING**
- **ALL GROUNDS AND NEUTRALS BONDED TO EXISTING GROUNDING CONDUCTOR W/IRREVERSIBLE CRIP CONNECTOR,**
- **VERIFY (E) UFER GROUND NEAR MSP. IF (E) UFER IS NOT ACCESSIBLE OR VERIFIABLE, INSTALL A NEW 5/8" Ø X 8' LONG GROUNDING ROD AND BOND SOLAR SYSTEM EQUIPMENT GROUNDING ACCORDINGLY.**

- **LOAD/LINE SIDE INTERCONNECTION AT MAIN PANEL PER ART. 705.12**

120% RULE CALCULATION PER NEC 705.12(D)(2)(3)		
MAIN BUSBAR RATING:	200	AMPS
MAIN SERVICE BREAKER RATING:	200	AMPS
PV BACKFEDING CURRENT:	20	AMPS
BUSBAR X 120%	- MAIN BREAKER	= MAX PV BREAKER
240	- 200	= 40

AC SYSTEM SIZE CALCULATION						
Module PTC Rating (W)	x	NO. of Modules	x	Average Inverter CEC Efficiency	=	AC System Size
268.7	x	16	x	99%	=	4.25 kW AC

PERCENT OF VALUES	NUMBER OF CURRENT CARRYING CONDUCTORS IN EMT
.80	4-6
.70	7-9
.50	10-20



2 SINGLE LINE DIAGRAM

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1. **CAUTION**
AUTHORIZED SOLAR PERSONNAL ONLY!

2. **CAUTION**
SOLAR DC CURRENT PRESENT DURING DAYLIGHT HOURS

(STICKER TO BE LOCATED ON CONDUIT WITH DC CURRENT EVERY 4' HORIZONTALLY OR 10' VERTICALLY AND 1' FROM EACH SIDE OF A BEND)

3. **WARNING!**
ELECTRIC SHOCK HAZARD.
IF GROUND FAULT IS INDICATED, NORMALLY GROUNDED CONDUCTORS MAY BE UNGROUNDED AND ENERGIZED.

4. **DC DISCONNECT**
DC PHOTOVOLTAIC POWER SOURCE
RATED MAX POWER POINT CURRENT- 10.5 AMPS
RATED MAX POWER POINT VOLTAGE- 380 VOLTS
MAXIMUM SYSTEM VOLTAGE- 500 VOLTS
SHORT CIRCUIT CURRENT- 15 AMPS

5. **WARNING!**
ELECTRIC SHOCK HAZARD.
DO NOT TOUCH THE TERMINALS.
TERMINALS ON BOTH THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION.

6. **PV SUB-PANEL ONLY**

(TO BE LOCATED ON SUB-PANEL ONLY WHEN SUB-PANEL IS DEDICATED FOR PV ONLY)

7. **AC DISCONNECT**
AC PHOTOVOLTAIC POWER SOURCE
RATED AC OUTPUT CURRENT: 47.5 A MAX
NOMINAL AC OPERATING VOLTAGE: 240 Vac

8. **THIS PANEL FED BY MULTIPLE SOURCES (UTILITY & SOLAR)**

9. **SOLAR**

(STICKER LOCATED INSIDE PANEL NEXT TO SOLAR BREAKER)

10. **WARNING!**
INVERTER OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE

(STICKER LOCATED INSIDE PANEL BELOW PV BREAKER)

11. **PV LOAD CENTER SIZED FOR PV BREAKERS ONLY OR RENDERED UNABLE TO ACCEPT ANY ADDITIONAL LOADS.**

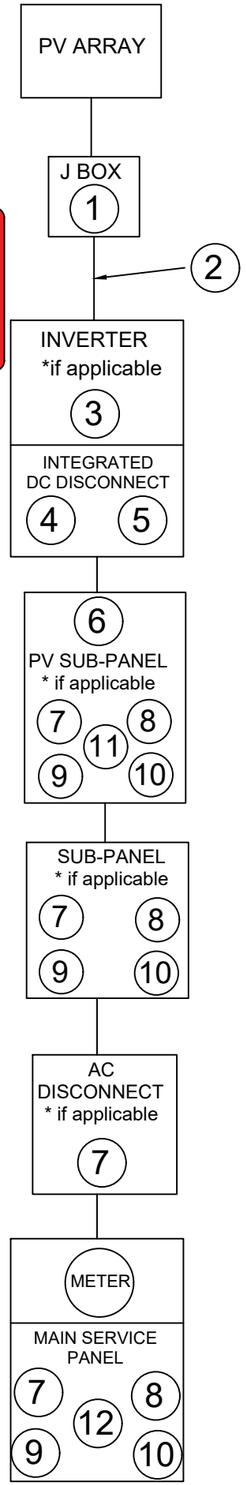
(STICKER LOCATED ON THE PV SUB PANEL)

12. **PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUT DOWN**

(STICKER LOCATED ON THE MAIN SERVICE PANEL)

Permanent directory or plaque providing location of service disconnecting means and photovoltaic system disconnecting means, if not located at the same location. (Plaques shall be metal or plastic, with engraved or machine printed letters, or electro-photo plating, in a contrasting color to the plaque. Plaques shall be permanently attached to the equipmenq or in the required location using an approved method that is suitable to withstand the environment to which it is exposed. Plaques and signage shall meet legibility, defacemet, exposure and adhesion requirements of Underwriters Laboratories marking and labeling system 969(UL969).

Plaques will have red background & white lettering.



MARKINGS, LABELS AND WIRING SIGNS

A. Purpose: Provide emergency responders with appropriate warning and guidance with respect to isolating solar electric system.
This can facilitate identifying energized electrical lines that connect solar panels to the inverter, as these should not be cut when venting for smoke removal
B. Main Service Disconnect.
1. Residential buildings - The marking main be placed within the main service disconnect. The marking shall be placed
outside cover if the main service disconnect is operable with the service panel closed.
2. Commercial buildings - Tha marking shall be placed adjacent to the main service disconnect clearly visible from the location where the level is operated
3. Markings: Verbiage, Format and Type of Material.
a. Verbiage: CAUTION: SOLAR ELECTRIC SYSTEM CONNECTED
b. Format: White lettering on a red background. Minimum 3/8 inches letter height. All letters shall be capitalized. Arial or similar font, non bold.
c. Material: Reflective, weather resistant material suitable for the environment (use UL - 969 as standard for weather rating). Durable adhesive materials meet this requirement.
C.Marking Requirements on DC conduit, raceways, enclosures, cable assemblies, DC combiners and junction boxes:
1. Markings: Verbiage, Format and Type of Material.
a. Placement : Markings shall be placed every 10 feet on all interior and exterior DC conduits, raceways, enclosures, and cable assemblies,
at turns, above and for below penetrations, all DC combiners and junction boxes
b. Verbiage: CAUTION: SOLAR CIRCUIT Note: The format and type of material shall adhere to "V. V-3b, c" of this requirement.
c. Inverters are not required to have caution markings
1.Marking is required on all interior and exterior DC conduit raceways,enclosures,cable assemblies,and junction boxes,combiner boxes and disconnects.
2.The materials used for marking shall be reflective,weather resistant material suitable for the environment.
Minimum 3/8 "letter height; all upper case letters Arial or similar font; Red background with white lettering.
3.Marcking shall contain the words: **WARNING : PHOTOVOLTAIC POWER SOURCE**.
4.Marking shall be placed adjacent to the main service disconnect in a location clearly visible from the location where the disconnect is operated

3 **SIGNAGE**

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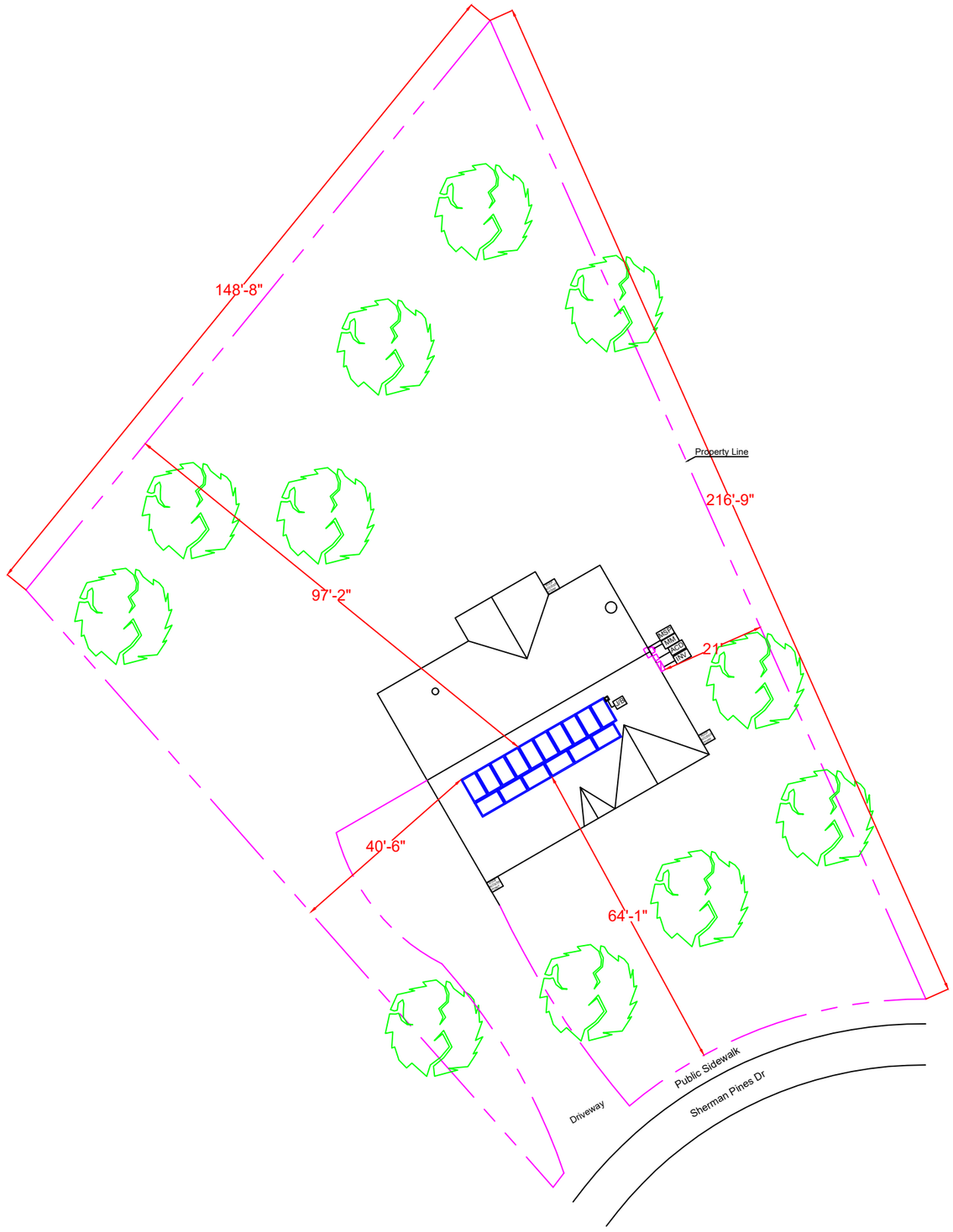

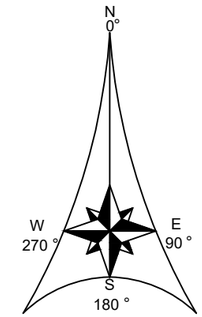

SCALE: 1/16" = 1'-0"

4 SITE PLAN

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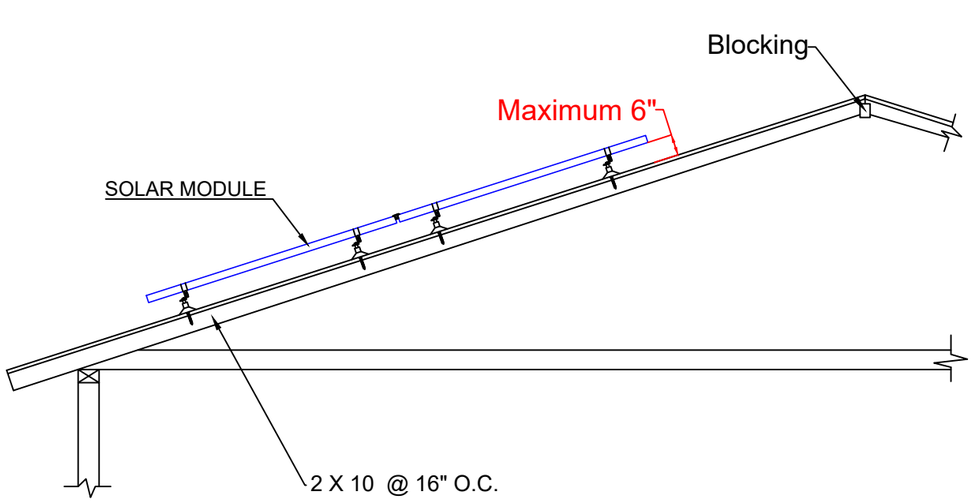
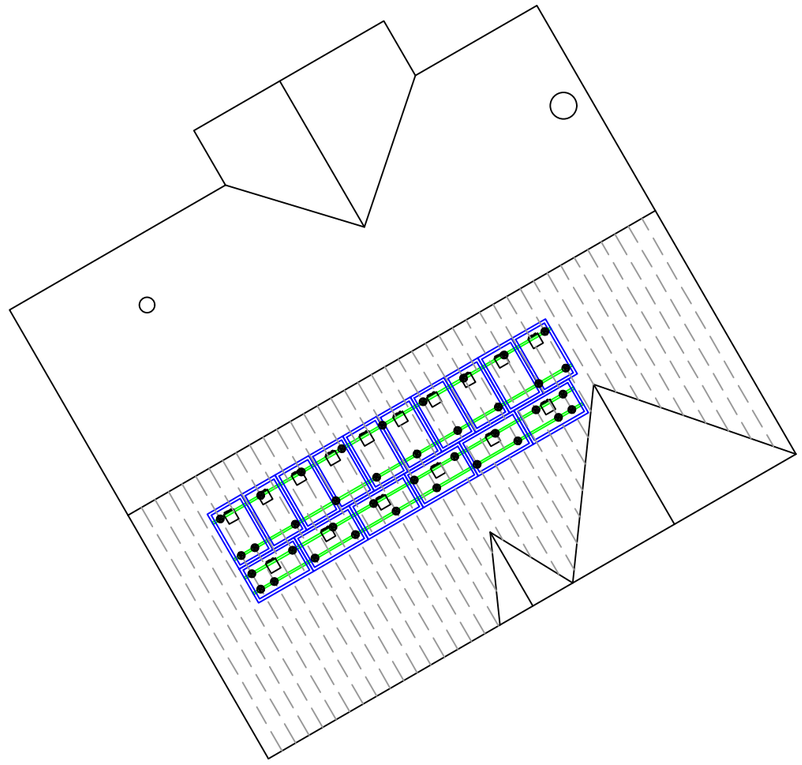
MODULE WEIGHT (lbs)	39.7
# OF MODULES	16
TOTAL MODULE WEIGHT (lbs)	635
RACK WEIGHT (lbs)	127
OPTIMIZERS WEIGHT (lbs)	27
TOTAL SYSTEM WEIGHT (lbs)	789
# OF STANDOFFS	38
MAX SPAN BETWEEN STANDOFFS (in)	48
LOADING PER STANDOFF (lbs)	20.7
TOTAL AREA (sq.ft.)	288
LOADING (PSF)	2.7

1. Everest CrossRail 48-x Racking System
2. **SRH QUICKBOLT (5.25" bolts +4" Microflashing)** Attachment
3. Roof attachment hardware to be mounted to existing structure
   (2 X 10 @ 16" O.CRAFTER) with 48" O.C. rail spans or less.
4. Lag bolts are 5/16" X 3.5" stainless steel with 2.5" minimum embedment into the center of the roof
5. Roof sheathed with 1/2" plywood and upper surface is faced with felt paper.
   Finished roof surface is **One layer of** COMP. SHINGLE.





ATTACHMENT

RAIL

RAFTER

5 ATTACHMENT LAYOUT

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solaredge

SolarEdge Single Phase Inverters

For North America

SE3000A-US / SE3800A-US / SE5000A-US / SE6000A-US /
SE7600A-US / SE10000A-US / SE11400A-US

INVERTERS

The best choice for SolarEdge enabled systems

- Specifically designed to work with power optimizers
- Superior efficiency (98%)
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Small, lightweight and easy to install outdoors or indoors on provided bracket
- Built-in module-level monitoring
- Internet connection through Ethernet or Wireless
- Fixed voltage inverter for longer strings
- Optional – revenue grade data, ANSI C12.1

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solaredge

Single Phase Inverters for North America

SE3000A-US / SE3800A-US / SE5000A-US / SE6000A-US /
SE7600A-US / SE10000A-US / SE11400A-US

	SE3000A-US	SE3800A-US	SE5000A-US	SE6000A-US	SE7600A-US	SE10000A- US	SE11400A-US	
OUTPUT								
Nominal AC Power Output	3000	3800	5000	6000	7600	9980 @ 208V 10000 @240V	11400	VA
Max. AC Power Output	3300	4150	5400 @ 208V 5450 @240V	6000	8350	10800 @ 208V 10950 @240V	12000	VA
AC Output Voltage Min.-Nom.-Max.[1] 183 - 208 - 229 Vac	-	-	✓	-	-	✓	-	
AC Output Voltage Min.-Nom.-Max.[1] 211 - 240 - 264 Vac	✓	✓	✓	✓	✓	✓	✓	
AC Frequency Min.-Nom.-Max.[1]	59.3 - 60 - 60.5							Hz
Max. Continuous Output Current	12.5	16	24 @ 208V 21 @ 240V	25	32	48 @ 208V 42 @ 240V	47.5	A
GFDI Threshold	1							A
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes							Yes
INPUT								
Maximum DC Power (STC)	4050	5100	6750	8100	10250	13500	15350	W
Transformer-less, Ungrounded	Yes							
Max. Input Voltage	500							Vdc
Nom. DC Input Voltage	325 @ 208V / 350 @ 240V							Vdc
Max. Input Current[2]	9.5	13	16.5 @ 208V 15.5 @ 240V	18	23	33 @ 208V 30.5 @ 240V	34.5	Adc
Max. Input Short Circuit Current	45							Adc
Reverse-Polarity Protection	Yes							
Ground-Fault Isolation Detection	600kΩ Sensitivity							
Maximum Inverter Efficiency	97.7	98.2	98.3	98.3	98	98	98	%
CEC Weighted Efficiency	97.5	98	97 @ 208V 98 @ 240V	97.5	97.5	97 @ 208V 97.5 @ 240V	97.5	%
Nighttime Power Consumption	< 2.5					< 4		W
ADDITIONAL FEATURES								
Supported Communication Interfaces	RS485, RS232, Ethernet, ZigBee (optional)							
Revenue Grade Data, ANSI C12.1	Optional[3]							
Rapid Shutdown - NEC 2014 and 2017 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect[5]							
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 part15 class B							
INSTALLATION SPECIFICATIONS								
AC output conduit size / AWG range	3/4" minimum / 16-6 AWG					3/4" minimum / 8-3 AWG		
DC input conduit size / # of strings / AWG range	3/4" minimum / 1-2 strings / 16-6 AWG					3/4" minimum / 1-3 strings / 14-6 AWG		
Dimensions with Safety Switch (HxWxD)	30.5 x 12.5 x 7.2 / 775 x 315 x 184					30.5 x 12.5 x 10.5 / 775 x 315 x 260		in / mm
Weight with Safety Switch	51.2 / 23.2		54.7 / 24.7			88.4 / 40.1		lb / kg
Cooling	Natural Convection			Natural convection and internal fan (user replaceable)		Fans (user replaceable)		
Noise	< 25					< 50		dBA
Min.-Max. Operating Temperature Range	-13 to +140 / -25 to +60 (-40 to +60 version available[4])							°F / °C
Protection Rating	NEMA 3R							

(1) For other regional settings please contact SolarEdge support.
(2) A higher current source may be used; the inverter will limit its input current to the values stated.
(3) Revenue grade inverter P/N: SExxxxA-US000NNR2 (for 7600W inverter:SE7600A-US002NNR2).
(4) -40 version P/N: SExxxxA-US000NNU4 (for 7600W inverter:SE7600A-US002NNU4).
(5) P/Ns SExxxxA-US0xxxxxx have Manual Rapid Shutdown for NEC 2014 compliance (NEC 2017 compliance with outdoor installation)

RoHS

6 **INVERTER DATA SHEET**

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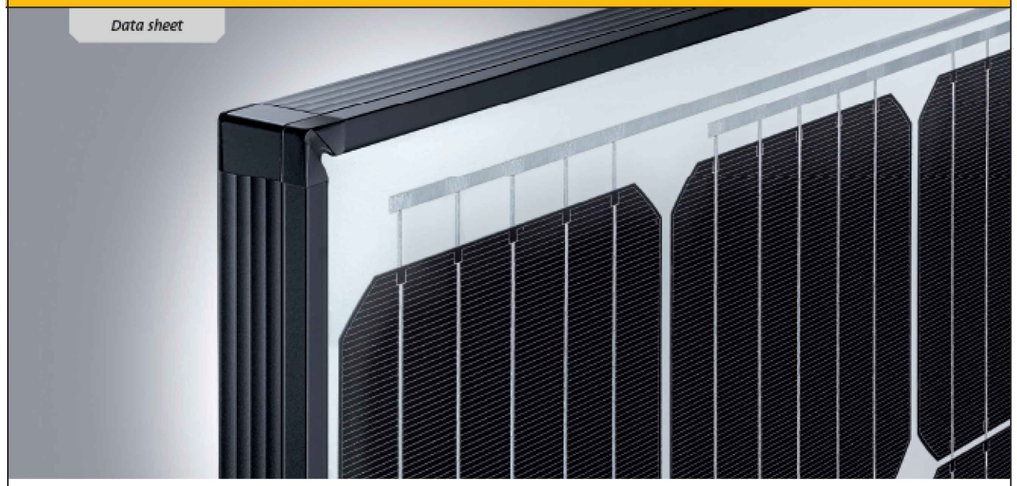
Sunmodule Plus
SW 290 - 300 MONO

SOLARWORLD REAL VALUE

Data sheet



QUALITY BY SOLARWORLD

SolarWorld's foundation is built on more than 40 years of ongoing innovation, continuous optimization and technology expertise. All production steps from silicon to module are established at our production sites ensuring the highest possible quality for our customers. Our modules come in a variety of different sizes and power, making them suitable for all global applications – from residential solar systems to large-scale power plants.

- Extremely tough and stable, despite its light weight – able to handle loads up to 178 psf (8.5 kN/m²)
- Tested in extreme weather conditions – hail-impact tested and resistant to salt spray, frost, ammonia, dust and sand
- Proven guarantee against hotspots and PID-free to IEC 62804-1
- SolarWorld Efficell™ PERC cell technology for the highest possible energy yields
- Patented corner design with integrated drainage for optimized self-cleaning
- High-transmissive glass with anti-reflective coating
- Long-term safety and guaranteed top performance – 25-year linear performance warranty; 20-year product warranty

MADE IN USA OF US & IMPORTED PARTS

VDE Quality Tested ID: 40048046

www.solarworld.com

Sunmodule Plus
SW 290 - 300 MONO

SOLARWORLD REAL VALUE

PERFORMANCE UNDER STANDARD TEST CONDITIONS (STC)*

		SW 290	SW 295	SW 300
Maximum power	P_{max}	290 Wp	295 Wp	300 Wp
Open circuit voltage	V_{oc}	39.6 V	39.8 V	40.0 V
Maximum power point voltage	V_{mpp}	31.9 V	32.3 V	32.6 V
Short circuit current	I_{sc}	9.75 A	9.78 A	9.83 A
Maximum power point current	I_{mpp}	9.20 A	9.25 A	9.31 A
Module efficiency	η_m	17.3 %	17.59 %	17.89 %

Measuring tolerance (P_{max}) traceable to TUV Rheinland: +/- 2% (TUV Power controlled, ID 0000039351) *STC: 1000W/m², 25°C, AM 1.5

PERFORMANCE AT 800 W/m², NOCT, AM 1.5

		SW 290	SW 295	SW 300
Maximum power	P_{max}	219.6 Wp	223.6 Wp	226.7 Wp
Open circuit voltage	V_{oc}	36.7 V	36.9 V	37.0 V
Maximum power point voltage	V_{mpp}	29.5 V	29.9 V	30.2 V
Short circuit current	I_{sc}	7.99 A	8.01 A	8.06 A
Maximum power point current	I_{mpp}	7.43 A	7.47 A	7.52 A

Minor reduction in efficiency under partial load conditions at 25 °C: at 200 W/m², 97% (+/-3%) of the STC efficiency (1000 W/m²) is achieved.

PARAMETERS FOR OPTIMAL SYSTEM INTEGRATION

Power sorting	-0 Wp / +5 Wp
Maximum system voltage SC II / NEC	1000 V
Maximum reverse current	25 A
Number of bypass diodes	3
Operating temperature	-40 to +85 °C
*Maximum design loads (Two rail system)**	113 psf downward, 64 psf upward
*Maximum design loads (Three rail system)**	178 psf downward, 64 psf upward

*Please refer to the Sunmodule installation instructions for the details associated with these load cases.

COMPONENT MATERIALS

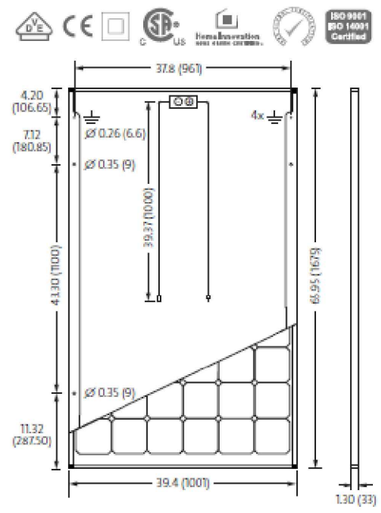
Cells per module	60
Cell type	Monocrystalline PERC
Cell dimensions	6 in x 6 in (156 mm x 156 mm)
Front	Tempered safety glass with ARC (EN 12150)
Back	Multi-layer polymer backsheet, white
Frame	Black anodized aluminum
J-Box	IP65
Connector	PV wire (UL4703) with Amphenol UTX connectors
Module fire performance	(UL 1703) Type 1

DIMENSIONS / WEIGHT

Length	65.95 in (1675 mm)
Width	39.40 in (1001 mm)
Height	1.30 in (33 mm)
Weight	39.7 lb (18.0 kg)

THERMAL CHARACTERISTICS

NOCT	46 °C
TC I_{sc}	0.07 % /C
TC V_{oc}	-0.29 % /C
TC P_{mpp}	-0.39 % /C



All units provided are imperial. SI units provided in parentheses.

ORDERING INFORMATION

Order number	*Description*
82000482	Sunmodule Plus SW 290 mono (black frame)
82000430	Sunmodule Plus SW 295 mono (black frame)
82000432	Sunmodule Plus SW 300 mono (black frame)

CERTIFICATES AND WARRANTIES

Certificates	IEC 61730	IEC 61215	UL 1703
	IEC 62716	IEC 60068-2-68	IEC 61701
*Warranties**	Product Warranty		20 years
	Linear Performance Guarantee		25 years

**Supplemental warranty coverage available through SolarWorld Assurance™ Warranty Protection Program – www.solarworld.com/assurance*

SolarWorld AG reserves the right to make specification changes without notice. This data sheet complies with the requirements of EN 50380.

SW-01-7506US 20170622

7 **MODULE DATA SHEET**

Project Name:
Anita Bolz
Property address:
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Fuquay Varina, NC 27526

CONTRACTOR

EMERALDENERGY
North Carolina Renewable Energy Specialists

DESIGNER: DAVID DURGAR
DATE: 1/9/2019
david.pv.design@gmail.com

solaredge

Power Optimizer

P320 / P370 / P400 / P405 / P505

POWER OPTIMIZER

PV power optimization at the module-level

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

www.solaredge.us

solaredge

Power Optimizer

P320 / P370 / P400 / P405 / P505

OPTIMIZER MODEL (typical module compatibility)	P320 (for high-power 60-cell modules)	P370 (for higher-power 60 and 72-cell modules)	P400 (for 72 & 96-cell modules)	P405 (for thin film modules)	P505 (for higher current modules)	
INPUT						
Rated Input DC Power[1]	320	370	400	405	505	W
Absolute Maximum Input Voltage (Voc at lowest temperature)	48	60	80	125	83	Vdc
MPPT Operating Range	8 - 48	8 - 60	8 - 80	12.5 - 105	12.5 - 83	Vdc
Maximum Short Circuit Current (Isc)	11		10.1		14	Adc
Maximum DC Input Current	13.75		12.63		17.5	Adc
Maximum Efficiency	99.5					%
Weighted Efficiency	98.8				98.6	%
Overvoltage Category	II					
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREDGE INVERTER)						
Maximum Output Current	15					Adc
Maximum Output Voltage	60			85		Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREDGE INVERTER OR SOLAREDGE INVERTER OFF)						
Safety Output Voltage per Power Optimizer	1 ± 0.1					Vdc
STANDARD COMPLIANCE						
EMC	FCC Part15 Class B, IEC61000-6-2, IEC61000-6-3					
Safety	IEC62109-1 (class II safety), UL1741					
RoHS	Yes					
INSTALLATION SPECIFICATIONS						
Maximum Allowed System Voltage	1000					Vdc
Compatible inverters	All SolarEdge Single Phase and Three Phase inverters					
Dimensions (W x L x H)	128 x 152 x 28 / 5 x 5.97 x 1.1		128 x 152 x 36 / 5 x 5.97 x 1.42	128 x 152 x 50 / 5 x 5.97 x 1.96	128 x 152 x 59 / 5 x 5.97 x 2.32	mm / in
Weight (including cables)	630 / 1.4		750 / 1.7	845 / 1.9	1064 / 2.3	gr / lb
Input Connector	MC4[2]					
Output Wire Type / Connector	Double Insulated; MC4					
Output Wire Length	0.95 / 3.0	1.2 / 3.9				m / ft
Operating Temperature Range	-40 - +85 / -40 - +185					˚C / ˚F
Protection Rating	IP68 / NEMA6P					
Relative Humidity	0 - 100					%

(1) Rated STC power of the module. Module of up to +5% power tolerance allowed.
(2) For other connector types please contact SolarEdge

PV SYSTEM DESIGN USING A SOLAREDGE INVERTER[3][4]		SINGLE PHASE HD-WAVE	SINGLE PHASE	THREE PHASE 208V	THREE PHASE 480V	
Minimum String Length (Power Optimizers)	P320, P370, P400	8		10	18	
	P405 / P505	6		8	14	
Maximum String Length (Power Optimizers)		25		25	50[5]	
Maximum Power per String		5700 (6000 with SE7600-US - SE11400-US)	5250	6000	12750	W
Parallel Strings of Different Lengths or Orientations		Yes				

(3) For detailed string sizing information refer to: http://www.solaredge.com/sites/default/files/string_sizing_na.pdf.
(4) It is not allowed to mix P405/P505 with P320/P370/P400/P600/P700/P800 in one string.
(5) A string with more than 30 optimizers does not meet NEC rapid shutdown requirements; safety voltage will be above the 30V requirement

8 **OPTIMIZER DATA SHEET**

Project Name:
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CONTRACTOR

EMERALDENERGY
North Carolina Renewable Energy Specialists

DESIGNER: DAVID DURGAR
DATE: 1/9/2019
david.pv.design@gmail.com

Mounting systems for solar technology

CrossRail 48-X / 48-XL Rail Connector:

- Structural properties
- One splice connects CrossRail 48-X and CrossRail 48-XL
- Uses 2 T-bolts

EVEREST SOLAR SYSTEMS

CROSSRAIL 48-X / 48-XL RAIL CONNECTOR

CrossRail 48-X / 48-XL
Material: Aluminum

CrossRail 48-X / 48-XL Rail Connector
Material: Aluminum
Hardware: Stainless Steel

Contractor is solely responsible for work safety and prevention regulations and corresponding standards and regulations of the applicable occupational safety and health agency are followed. Please see full safety guidelines on the Everest Solar website at **http://www.everest-solarsystems.com/us/downloads/technical-information.html.**

INSTALLATION OF CROSSRAIL 48-X AND 48-XL RAIL CONNECTOR: STEP BY STEP

1 of 3

INSERT RAIL CONNECTOR
Slide the rail connector onto CrossRail 48-X or 48-XL

The rail connector contains mating features and must be inserted prior to aligning the rails together.

2 of 3

ALIGN RAILS
Align the two rail ends next to each other and center the rail connector between the two rails.

Note: CrossRail 48-XL pictured.

3 of 3

CONNECT THE RAILS
Attach the rail connector using two M10 T-Bolts (use bonding T-Bolts with dark rail) and two hex nuts.

Ensure that the slot on the bottom of the T-Bolt is vertical, indicating that the T-Bolt head is properly engaged in the rail channel.

Torque M10 serrated hex nuts to 25.8 ft-lbs (35 Nm)

Note: Please refer to the system and state-specific engineering letters for allowable spans, limitations and installation notes regarding the capabilities of CrossRail 48-X or 48-XL and the CrossRail 48-X / 48-XL Rail Connector.

Note: CrossRail 48-XL pictured.

Ready!

THANK YOU FOR CHOOSING AN EVEREST SOLAR SYSTEMS MOUNTING SYSTEM.

The CrossRail Rail Connector is simple and fast to install. Please contact us for further assistance:

SERVICE-HOTLINE +1.760.301.5300

Everest Solar Systems, LLC
3809 Ocean Ranch Blvd.
Suite 111
Oceanside, CA 92056
Tel. +1.760.301.5300
info@everest-solarsystems.com
www.everest-solarsystems.com

CrossRail 48-X / 48-XL Rail Connector Quick Guide
US1-0518

9 **RACKING DATA SHEET**

Project Name:
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North Carolina Renewable Energy Specialists

DESIGNER: DAVID DURGAR
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ASPHALT SHINGLE ROOF MOUNTS

SolarRoofHook has the most innovative line of Asphalt Shingle Roof Mounts in the industry.

Our QuickBOLT with Microflashing™ is the future of Asphalt Shingle Roof solar mounting. Use the QuickBOLT to save time and money by installing faster, eliminating the need for bulky aluminum flashing, and completing more residential jobs. The installers' liability is also reduced, as Microflashing™ can be installed directly over the shingles and does not require the removal of any nails. Try the QuickBOLT with Microflashing™ today.

We also carry a line of Flashed L-Foot and U-Foot products.

AVAILABLE ONLINE:

UL Certification | Specs & Test Results | AZ Test Results | Racking Compatibility | Installation Instructions | Videos

LOW PROFILE **QUICKBOLT**
With 3" Microflashing™ | Fixed Height

Asphalt Shingle | Side Mount | 3" Microflashing™ | Low Profile

PN#	BOX QTY
17664	5.25" Bolts (10)
17666	Bolts + 3" Microflashing™ (10ea.)
17667SS	Bolts + 3" Microflashing™ + SS L-Foot + Nuts (10ea.)

First & only Microflashing™ in the industry
Stainless Steel L-Foot
Fastest installation in the industry
UL Certified

LOW PROFILE **QUICKBOLT**
With 4" Microflashing™ | Fixed Height

Asphalt Shingle | Side Mount | 4" Microflashing™ | Low Profile

PN#	BOX QTY
17664	5.25" Bolts (10)
17720	Bolts + 4" Microflashing™ (10ea.)
17721SS	Bolts + 4" Microflashing™ + SS L-Foot + Nuts (10ea.)

First & only Microflashing™ in the industry
Stainless Steel L-Foot
4" Microflashing™ provides more coverage
Fastest installation in the industry
UL Certified

7" **QUICKBOLT**
With 3" Microflashing™ | Adjustable

Asphalt Shingle | Side Mount | 3" Microflashing™ | Adjustable

PN#	BOX QTY
17670	7" Bolts (10)
17671	Bolts + 3" Microflashing™ (10ea.)
17672SS	Bolts (10) + 3" Microflashing™ (10) + SS L-Foot (10) + Nuts (20)

First & only Microflashing™ in the industry
Stainless Steel L-Foot
UL Certified

7" **QUICKBOLT**
With 4" Microflashing™ | Adjustable

Asphalt Shingle | Side Mount | 4" Microflashing™ | Adjustable

PN#	BOX QTY
17670	7" Bolts (10)
17723	Bolts + 4" Microflashing™ (10ea.)
17724SS	Bolts (10) + 4" Microflashing™ (10) + SS L-Foot (10) + Nuts (20)

First & only Microflashing™ in the industry
Stainless Steel L-Foot
4" Microflashing™ provides more coverage
UL Certified

10 **ATTACHMENT DATA SHEET**

Project Name:
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