



Scott E. Wyssling, PE
Coleman D. Larsen, SE, PE
Gregory T. Elvestad, PE

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

February 28, 2024

BYLD Better
1213 W Moorehead Street Suite 500
Charlotte, NC 28208

Re: Engineering Services
Wilson Residence
18 Brewster Court, Cameron NC
7.600 kW System

To Whom It May Concern:

We have received information regarding solar panel installation on the roof of the above referenced structure. Our evaluation of the structure is to verify the existing capacity of the roof system and its ability to support the additional loads imposed by the proposed solar system.

A. Site Assessment Information

1. Site visit documentation identifying attic information including size and spacing of framing for the existing roof structure.
2. Design drawings of the proposed system including a site plan, roof plan and connection details for the solar panels. This information will be utilized for approval and construction of the proposed system.

B. Description of Structure:

Roof Framing: Assumed 2x6 dimensional lumber at 24" on center with interior bearing wall support.
Roof Material: Composite Asphalt Shingles
Roof Slope: 18 degrees
Attic Access: Inaccessible
Foundation: Permanent

C. Loading Criteria Used

- **Dead Load**
 - Existing Roofing and framing = 7 psf
 - New Solar Panels and Racking = 3 psf
 - TOTAL = 10 PSF
- **Live Load** = 20 psf (reducible) – 0 psf at locations of solar panels
- **Ground Snow Load** = 10 psf
- **Wind Load** based on ASCE 7-10
 - Ultimate Wind Speed = 116 mph (based on Risk Category II)
 - Exposure Category C

Analysis performed of the existing roof structure utilizing the above loading criteria is in accordance with the 2018 North Carolina Residential Code, including provisions allowing existing structures to not require strengthening if the new loads do not exceed existing design loads by 105% for gravity elements and 110% for seismic elements. This analysis indicates that the existing framing will support the additional panel loading without damage, if installed correctly.

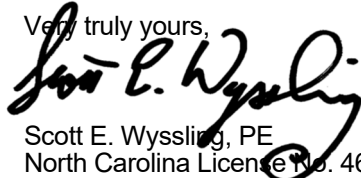
D. Solar Panel Anchorage

1. The solar panels shall be mounted in accordance with the most recent Ironridge installation manual. If during solar panel installation, the roof framing members appear unstable or deflect non-uniformly, our office should be notified before proceeding with the installation.
2. The maximum allowable withdrawal force for two (2) #14 lag bolt is 229 lbs per inch of penetration as identified in the National Design Standards (NDS) of timber construction specifications. Based on a minimum penetration depth of 2", the allowable capacity per connection is greater than the design withdrawal force (demand). Considering the variable factors for the existing roof framing and installation tolerances, the connection using two (2) #14 diameter lag bolt with a minimum of 2" embedment will be adequate and will include a sufficient factor of safety.
3. Considering the wind speed, roof slopes, size and spacing of framing members, and condition of the roof, the panel supports shall be placed no greater than 48" on center.

Based on the above evaluation, this office certifies that with the racking and mounting specified, the existing roof system will adequately support the additional loading imposed by the solar system. This evaluation is in conformance with the 2018 North Carolina Residential Code, current industry standards, and is based on information supplied to us at the time of this report.

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

Very truly yours,



Scott E. Wyssling, PE
North Carolina License No. 46546
North Carolina COA P-2308

THIS PLAN HAS BEEN ELECTRONICALLY SIGNED AND SEALED BY SCOTT WYSSLING, 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



Signed 2/28/2024

NEW PV ROOFTOP SYSTEM DESIGN

14 MODULES - 5.530 KW DC & 7.600 KW AC SYSTEM SIZE

JOEL WILSON RESIDENCE - 18 BREWSTER COURT, CAMERON, NORTH CAROLINA 28326

DESIGN ENGINEER



**76 N. MEADOWBROOK DRIVE
ALPINE, UTAH 84004**
swysling@wysslingconsulting.com
(201) 874-3483

NORTH CAROLINA COA NO. P-2308

SOLAR COMPANY/CLIENT



BYLD BETTER
1213 W MOOREHEAD STREET SUITE 500
CHARLOTTE, NC 28208

WILSON, JOEL
18 BREWSTER COURT
CAMERON, NC 28326
5.530 KW DC 7.600 KW AC

REVISIONS

NO	DATE:	COMMENTS
1		
2		

COVER SHEET

THIS PLAN HAS BEEN ELECTRONICALLY SIGNED AND SEALED BY SCOTT WYSSLING, 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



Signed 2/28/2024

SCOTT E. WYSSLING, P.E.
NORTH CAROLINA LICENSE NO.
46546

DATE: 2/28/2024

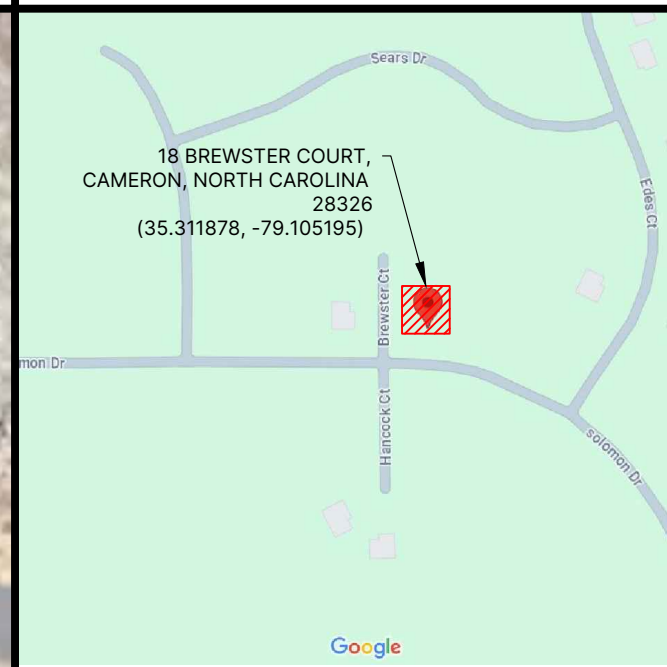
DRAWN BY: TSD

REVIEWED BY: CCR

AERIAL MAP



VICINITY MAP



SHEET INDEX

PV-1	COVER SHEET
PV-2	SITE PLAN
PV-3	MOUNTING PLAN
S-1	STRUCTURAL DETAILS
E-1	ELECTRICAL DIAGRAM
E-1.1	ONE LINE ELECTRICAL DIAGRAM
E-2	EQUIPMENT INFORMATION
E-3	PV LABELS
PV-4	SITE PHOTOS
SPECS 1-6	MANUFACTURER'S SPECS

SCOPE OF WORK

INSTALL 5.530 KW DC ROOF MOUNTED PV SYSTEM UTILIZING
(14) MISSION SOLAR PERC 66 MSE395SX9R
(1) TESLA INVERTER 7.6KW
(5) TESLA MCI
(1) 60A UTILITY AC DISCONNECT
IRONRIDGE AIRE RACKING WITH
IRONRIDGE - HUG MOUNTS
EXISTING 200 A BUSBAR WITH 200 A MAIN BREAKER
INTERCONNECTION METHOD: LOAD SIDE BREAKER
ROOF TYPE: COMP SHINGLE
NUMBER OF STORIES: 2

CONTRACTOR

BYLD BETTER
1213 W MOOREHEAD STREET SUITE 500
CHARLOTTE, NC 28208

CODE REFERENCE

AHJ: CAMERON

2020 NORTH CAROLINA ELECTRIC CODE
2018 NORTH CAROLINA BUILDING CODE
2018 NORTH CAROLINA RESIDENTIAL CODE

DESIGN CRITERIA

ASCE 7-10 WIND SPEED: 116 MPH
EXPOSURE CATEGORY C
GROUND SNOW LOAD: 10 PSF

GENERAL NOTES

- CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND REVIEW ALL MANUFACTURER INSTALLATION DOCUMENTS PRIOR TO INITIATING CONSTRUCTION.
- ALL COMPONENTS SHALL BE NEW AND LISTED BY A RECOGNIZED ELECTRICAL TESTING LABORATORY AND LISTED FOR THEIR SPECIFIC APPLICATION.
- OUTDOOR EQUIPMENT SHALL BE NEMA 3R RATED OR BETTER.
- ACCESS TO ELECTRICAL COMPONENTS OVER 150 VOLTS TO GROUND SHALL BE RESTRICTED TO QUALIFIED PERSONNEL.
- 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.
- EACH MODULE TO BE GROUNDED USING THE SUPPLIED CONNECTION POINT PER THE MANUFACTURER'S REQUIREMENTS. ALL PV MODULES, EQUIPMENT, AND METALLIC COMPONENTS ARE TO BE BONDED. IF THE EXISTING GROUNDING ELECTRODE SYSTEM CANNOT BE VERIFIED OR IS ONLY METALLIC WATER PIPING, IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSTALL A SUPPLEMENTAL GROUNDING ELECTRODE.
- DC CONDUCTORS SHALL BE RUN IN EMT AND/OR MC (METAL CLAD CABLE) AND SHALL BE LABELED. ALL DC CONDUCTORS RUN INSIDE OF THE STRUCTURE SHALL BE INSTALLED A MINIMUM OF 18" BELOW THE ROOF DECK.
- EXPOSED NON-CURRENT CARRYING METAL PARTS OF ELECTRICAL EQUIPMENT SHALL BE GROUNDED IN ACCORDANCE WITH APPLICABLE NEC.
- CONFIRM LINE SIDE VOLTAGE AT THE ELECTRIC UTILITY SERVICE PRIOR TO CONNECTING INVERTER. VERIFY SERVICE VOLTAGE IS WITHIN INVERTER VOLTAGE OPERATIONAL RANGE.
- ELECTRICAL CONTRACTOR TO PROVIDE CONDUIT EXPANSION JOINTS AND ANCHOR CONDUIT RUNS AS REQUIRED PER CODE.
- ALL WIRING MUST BE PROPERLY SUPPORTED BY DEVICES OR MECHANICAL MEANS DESIGNED AND LISTED FOR SUCH USE, AND FOR ROOF-MOUNTED SYSTEMS, WIRING MUST BE PERMANENTLY AND COMPLETELY HELD OFF OF THE ROOF SURFACE.
- ALL ROOF PENETRATIONS MUST BE SEALED OR FLASHED.
- EQUIPMENT MAY BE SUBSTITUTED FOR SIMILAR EQUIPMENT BASED ON AVAILABILITY. SUBSTITUTED EQUIPMENT SHALL COMPLY WITH DESIGN CRITERIA.
- 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.
- WHENEVER A DISCREPANCY IN THE 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 ENGINEERS.

ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA

PV-1

SITE PLAN LEGEND

UTILITY METER	
MAIN SERVICE PANEL	
GAS METER	
AC DISCONNECT	
DC DISCONNECT	
AC COMBINER PANEL	
INVERTER	
IQ SYSTEM CONTROLLER	
BACKUP INTERFACE	
BATTERY	
PRODUCTION METER	
SUBPANEL	
JUNCTION BOX	
FIRE PATHWAY	
SATELLITE DISH	
PROPERTY LINE	
ATTIC RUN CONDUIT	
EXTERNAL CONDUIT	
CHIMNEY	
ROOF OBSTRUCTION (TYP.)	
ROOF VENT (TYP.)	

UTILITY: CENTRAL EMC

MODULE SPEC AND ROOF INFO:

PV MODULE TYPE - MISSION SOLAR PERC 66 MSE395SX9R (395W)
 WEIGHT OF INDIVIDUAL PANEL - 48.50 LBS
 INDIVIDUAL SOLAR PANEL AREA - 21.64 SQ FT
 ROOF AREA - 2433.51 SQ FT

ROOF COVERAGE - 12.4%

EQUIPMENT LIST:

(N) (14) MISSION SOLAR PERC 66 MSE395SX9R
 (N) (1) TESLA INVERTER 7.6KW
 (N) (5) TESLA MCI
 (N) (1) 60A UTILITY AC DISCONNECT
 IRONRIDGE AIRE RACKING WITH IRONRIDGE - HUG MOUNTS

SITE PLAN NOTES:

1. VERIFY ALL OBSTRUCTIONS AND DIMENSIONS IN THE FIELD.
2. PROVIDE RAIL SPLICES AS REQUIRED BY MANUFACTURER'S GUIDELINES.
3. NO SIGNIFICANT SHADING WILL RESULT FROM EXISTING ROOF OBSTRUCTIONS.
4. PV MODULES CANNOT BE INSTALLED OVER OR BLOCK ATTIC, PLUMBING, FURNACE OR WATER HEATER VENTS
5. AC DISCONNECT SHALL BE VISIBLE-OPEN TYPE, LOCKABLE AND READILY ACCESSIBLE. TO BE WITHIN 10' OF THE UTILITY METER
6. 3/4" OR GREATER CONDUIT RUN (7/8" ABOVE ROOF SURFACE)
7. ROOF ACCESS POINTS SHALL BE LOCATED IN AREAS THAT DO NOT REQUIRE THE PLACEMENT OF GROUND LADDERS OVER OPENINGS SUCH AS WINDOWS OR DOORS, AND LOCATED AT STRONG POINTS OF BUILDING CONSTRUCTION IN LOCATIONS WHERE THE ACCESS POINT DOES NOT CONFLICT WITH OVERHEAD OBSTRUCTIONS SUCH AS TREE LIMBS, WIRES OR SIGNS.

INVERTER	
MANUFACTURER/ MODEL	TESLA INVERTER 7.6KW
MAX AC OUTPUT	32 A
AC OUTPUT VOLTAGE	240 V
MAX DC INPUT VOLTAGE	600 V
MAX INPUT CURRENT	11 A
WEIGHTED CEC EFFICIENCY	97.50%
INVERTER WATTAGE	7600 W

DESIGN ENGINEER

**76 N. MEADOWBROOK DRIVE
 ALPINE, UTAH 84004**
 swysling@wysslingconsulting.com
 (201) 874-3483
 NORTH CAROLINA COA NO. P-2308

SOLAR COMPANY/CLIENT

 BYLD BETTER
 1213 W MOOREHEAD STREET SUITE 500
 CHARLOTTE, NC 28208

WILSON, JOEL
 18 BREWSTER COURT
 CAMERON, NC 28326
 5.530 KW DC 7.600 KW AC

REVISIONS

NO	DATE:	COMMENTS
1		
2		

SITE PLAN

THIS PLAN HAS BEEN ELECTRONICALLY SIGNED AND SEALED BY SCOTT WYSSLING, 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

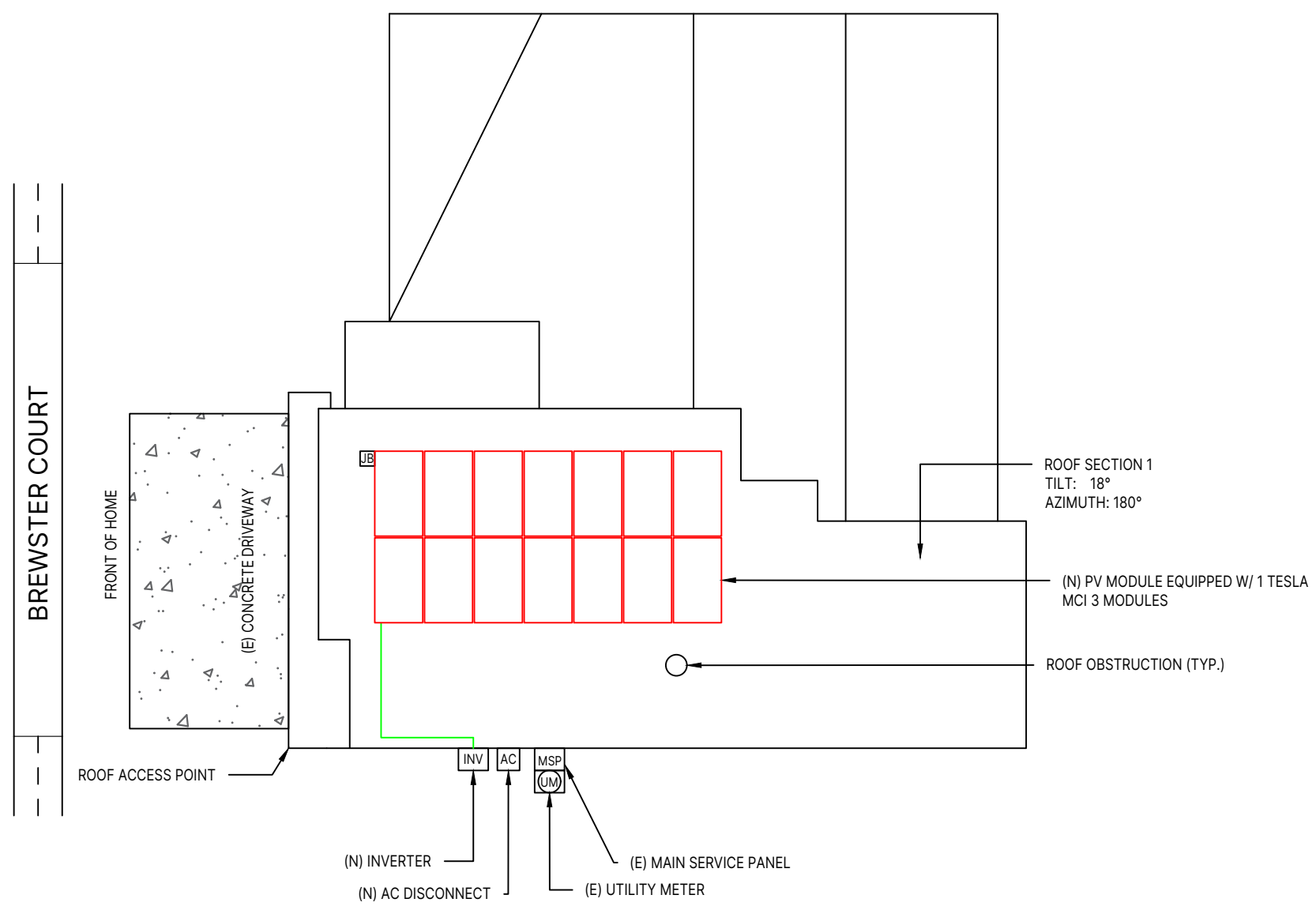


Signed 2/28/2024

SCOTT E. WYSSLING, P.E.
 NORTH CAROLINA LICENSE NO. 46546

DATE:	2/28/2024
DRAWN BY:	TSD
REVIEWED BY:	CCR

PV-2



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

**MOUNTING PLAN
LEGEND**

UTILITY METER	
MAIN SERVICE PANEL	
GAS METER	
AC DISCONNECT	
DC DISCONNECT	
AC COMBINER PANEL	
INVERTER	
IQ SYSTEM CONTROLLER	
BACKUP INTERFACE	
BATTERY	
PRODUCTION METER	
SUBPANEL	
JUNCTION BOX	
SATELLITE DISH	
PROPERTY LINE	---
ATTIC RUN CONDUIT	---
EXTERNAL CONDUIT	---
RAIL	---
MOUNT	□
ROOF FRAMING	---
CHIMNEY	
ROOF OBSTRUCTION (TYP.)	○
ROOF VENT (TYP.)	□

CANTILEVER NOTES:

1. CANTILEVER (OVERHANG) LENGTHS CAN BE UP TO 33% OF THE SPAN LENGTH.
2. THE CANTILEVER IS DEFINED AS THE DISTANCE FROM THE CENTER OF THE MOUNT TO THE EDGE OF THE RAIL.

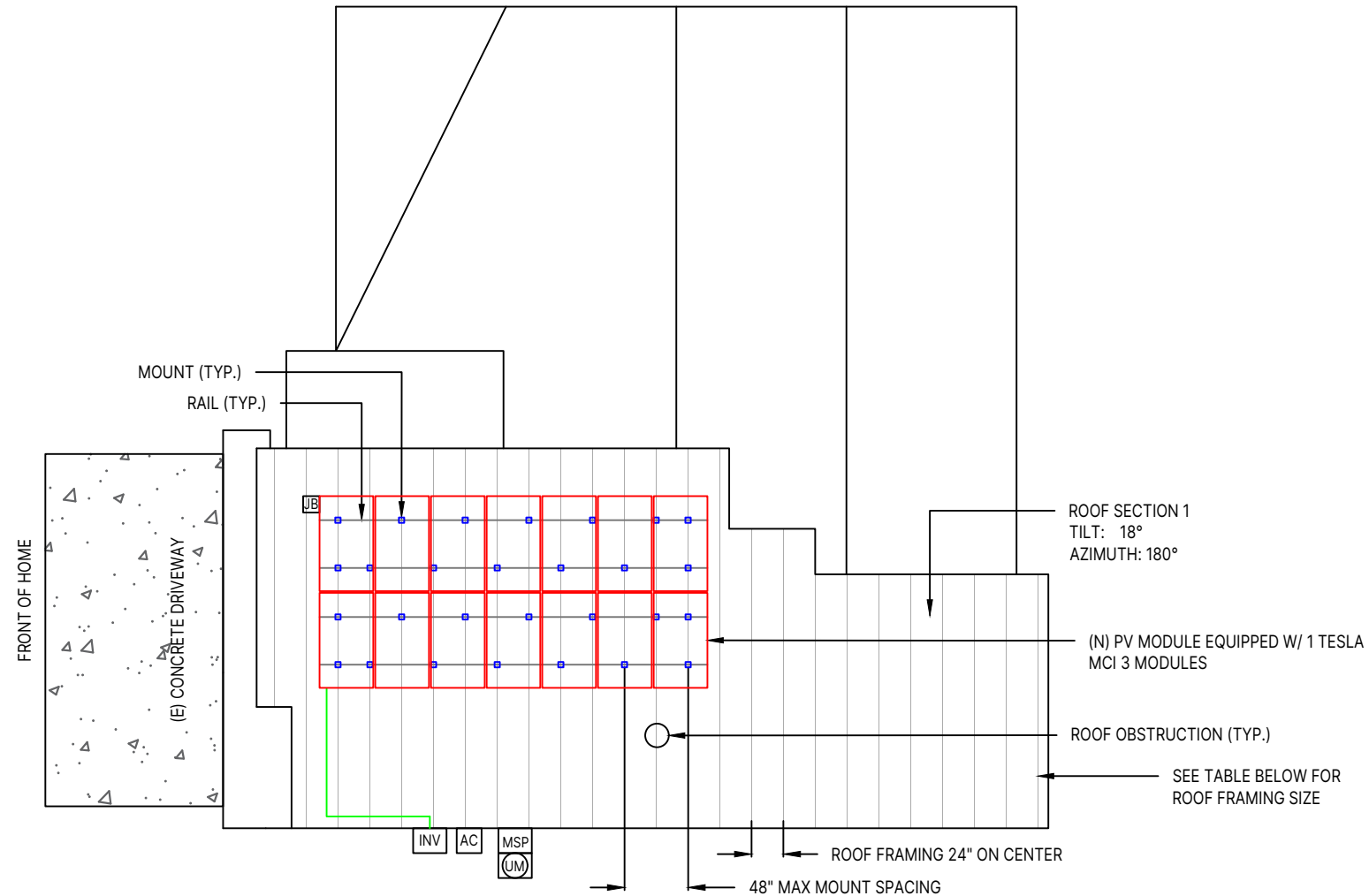
MOUNTING PLAN NOTES:

1. VERIFY ALL OBSTRUCTIONS AND DIMENSIONS IN THE FIELD.
2. PROVIDE RAIL SPLICES AS REQUIRED BY MANUFACTURER'S GUIDELINES.
3. NO SIGNIFICANT SHADING WILL RESULT FROM EXISTING ROOF OBSTRUCTIONS.
4. PV MODULES CANNOT BE INSTALLED OVER OR BLOCK ATTIC, PLUMBING, FURNACE OR WATER HEATER VENTS
5. ACTUAL ROOF CONDITIONS AND ROOF FRAMING (OR SEAM) LOCATIONS MAY VARY. INSTALL PER MANUFACTURER(S) INSTALLATION GUIDELINES AND ENGINEERED SPANS FOR ATTACHMENTS

MOUNT QUANTITY:

1. (28) IRONRIDGE - HUG ATTACHMENTS
- DISTRIBUTED LOAD - (ARRAY) WEIGHT/AREA = 2.24 lbs/ ft²
 TOTAL WEIGHT OF SYSTEM - 679 lbs

BREWSTER COURT



	TILT	AZIMUTH	# OF MODULES	ROOF FRAMING	FRAMING SPACING	ROOF TYPE	MAX MOUNT SPACING	MOUNT TYPE
ROOF SECTION 1	18°	180°	14	2X6 - RAFTERS	24"	COMP SHINGLE	48"	IRONRIDGE - HUG

ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA



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

DESIGN ENGINEER



**76 N. MEADOWBROOK DRIVE
ALPINE, UTAH 84004**
 swysling@wysslingconsulting.com
 (201) 874-3483

NORTH CAROLINA COA NO. P-2308

SOLAR COMPANY/CLIENT



BYLD BETTER
 1213 W MOOREHEAD STREET SUITE
 500
 CHARLOTTE, NC 28208

WILSON, JOEL
 18 BREWSTER COURT
 CAMERON, NC 28326
 5.530 KW DC 7.600 KW AC

REVISIONS

NO	DATE:	COMMENTS
1		
2		

MOUNTING PLAN

THIS PLAN HAS BEEN ELECTRONICALLY SIGNED AND SEALED BY SCOTT WYSSLING, 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

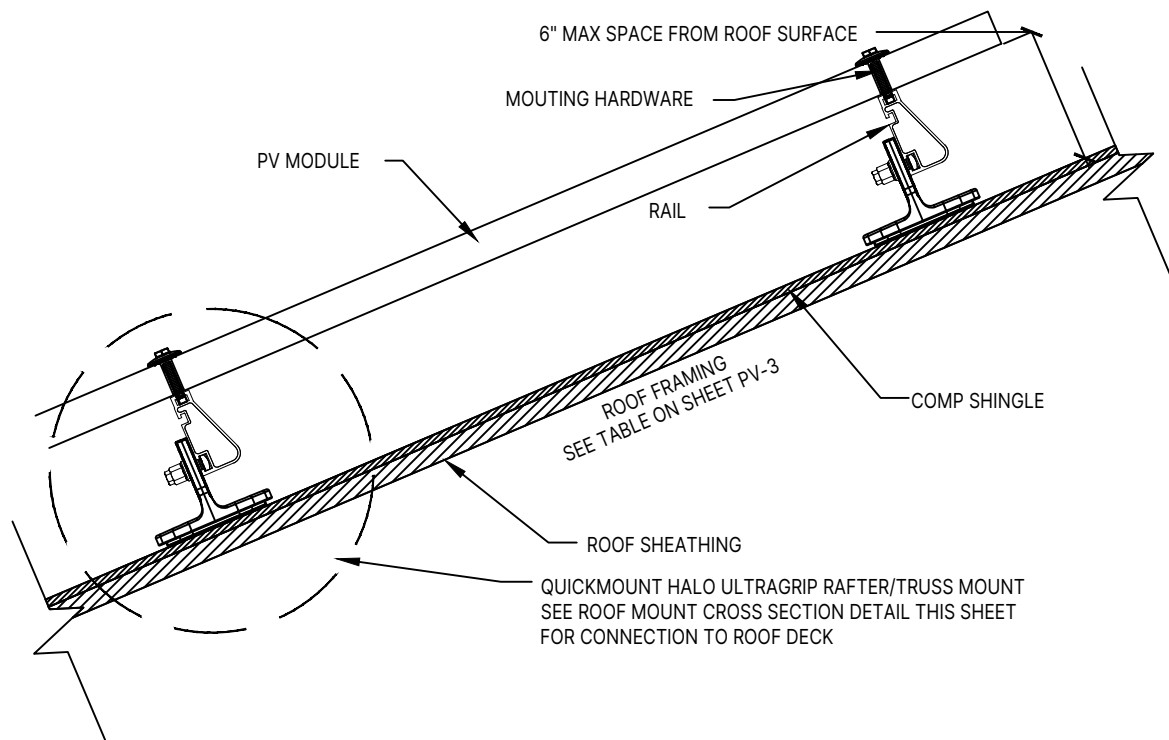


Signed 2/28/2024

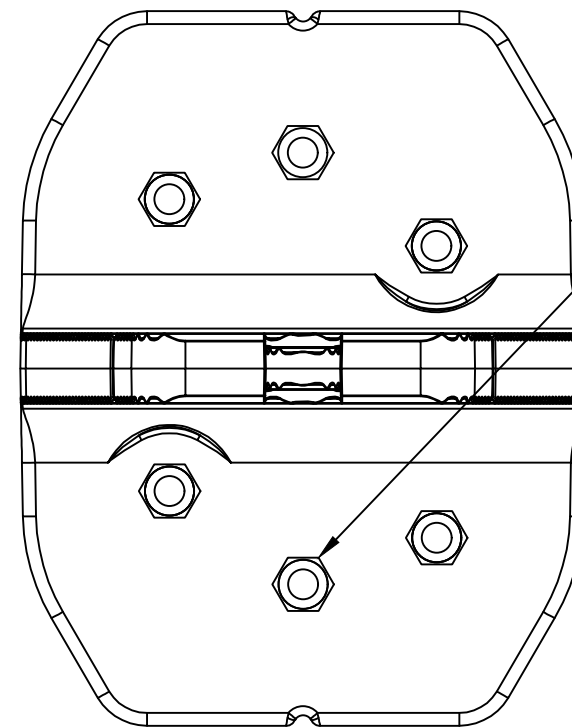
SCOTT E. WYSSLING, P.E.
 NORTH CAROLINA LICENSE NO.
 46546

DATE:	2/28/2024
DRAWN BY:	TSD
REVIEWED BY:	CCR

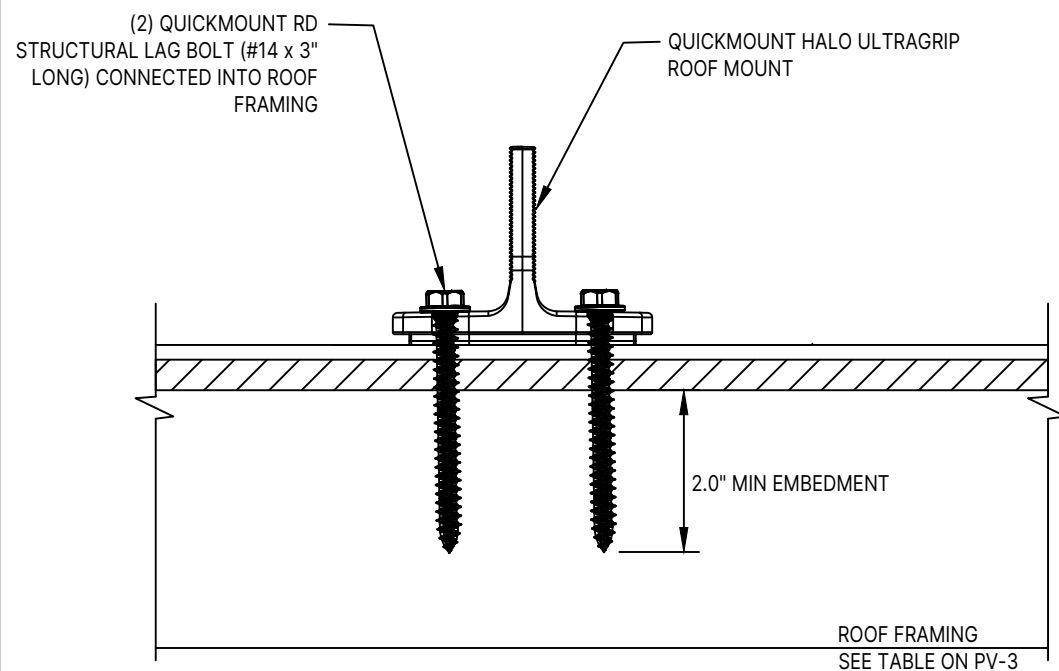
PV-3



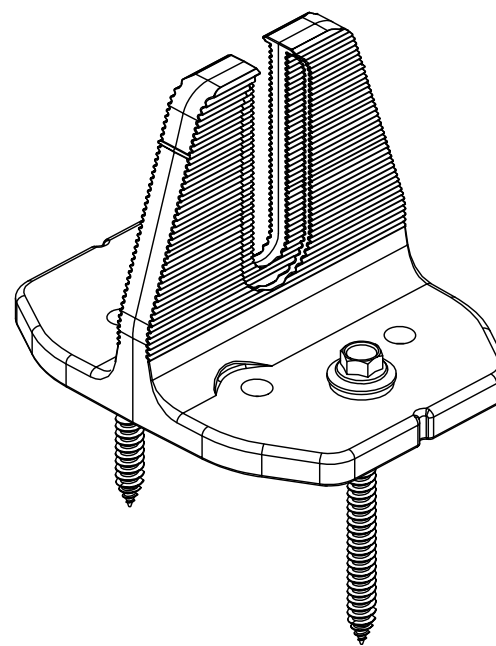
GENERAL ROOF MOUNT DETAIL
NTS



ROOF MOUNT PLAN VIEW DETAIL
NTS



ROOF MOUNT CROSS SECTION DETAIL
NTS



ROOF MOUNT
NTS

MOUNT INSTALLATION NOTES

1. CONTRACTOR IS TO FOLLOW THE PLAN FOR INSTALLING ROOF MOUNTS.
2. IF THE CONTRACTOR IDENTIFIES THE ROOF FRAMING IS DIFFERENT FROM WHAT IS IDENTIFIED ON THIS PLAN, CONTRACTOR SHALL NOTIFY THE ENGINEER BEFORE PROCEEDING WITH INSTALLATION.
3. CONTRACTOR IS TO LOCATE THE ROOF FRAMING BY UTILIZING A HAMMER.
4. WHEN THE ROOF FRAMING IS LOCATED, CONTRACTOR IS TO DRILL A PILOT HOLE TO CONFIRM CENTER OF ROOF FRAMING. IF THE ROOF FRAMING IS MISSED, AND A NEW PILOT HOLE IS TO BE DRILLED, CONTRACTOR TO UTILIZE SILICON/CAULK TO SEAL THE ORIGINAL PILOT HOLE.
5. DIRECT TO DECK MOUNTS ARE ONLY TO BE USED WITH APPROVED DESIGN BY THE ENGINEER. DIRECT TO DECK MOUNT INSTALLATION IS NOT A SUBSTITUTION FOR LAG SCREWS INTO ROOF FRAMING.
6. CONTRACTOR TO FOLLOW MANUFACTURERS SPECIFICATIONS FOR INSTALLATION AND REQUIRED SCREWS.

ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA

DESIGN ENGINEER



**76 N. MEADOWBROOK DRIVE
ALPINE, UTAH 84004**
swysling@wysslingconsulting.com
(201) 874-3483

NORTH CAROLINA COA NO. P-2308

SOLAR COMPANY/CLIENT



BYLD BETTER
1213 W MOOREHEAD STREET SUITE
500
CHARLOTTE, NC 28208

WILSON, JOEL
18 BREWSTER COURT
CAMERON, NC 28326
5.530 KW DC 7.600 KW AC

REVISIONS

NO	DATE:	COMMENTS
1		
2		

**STRUCTURAL
DETAILS**

THIS PLAN HAS BEEN ELECTRONICALLY SIGNED AND SEALED BY SCOTT WYSSLING, 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



Signed 2/28/2024

SCOTT E. WYSSLING, P.E.
NORTH CAROLINA LICENSE NO.
46546

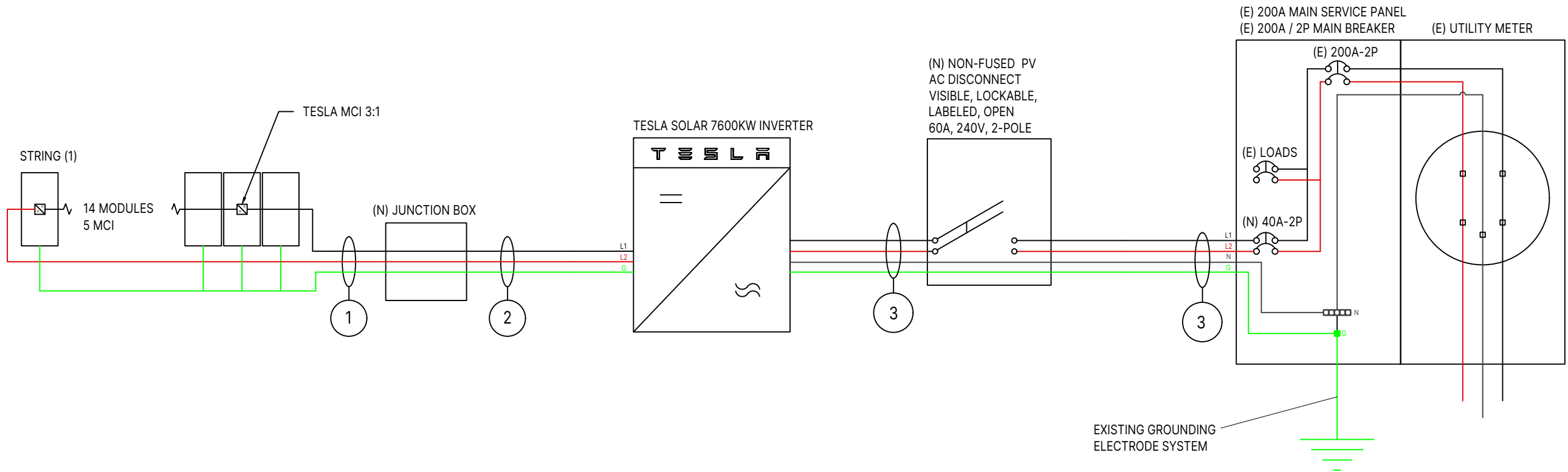
DATE:	2/28/2024
DRAWN BY:	TSD
REVIEWED BY:	CCR

CONDUCTOR SCHEDULE

TAG ID	CONDUCTORS				GROUND		CONDUIT
	WIRES IN CONDUIT	WIRE AWG	TYPE, MATERIAL	AMPACITY	SIZE	TYPE, MATERIAL	
1	3	#10 AWG	PV CABLE	30	#6 AWG	BARE, CU	
2	3	#10 AWG	THWN-2, CU	30	#10 AWG	THHW, CU	3/4" CONDUIT
3	4	#8 AWG	THWN-2, CU	50	#10 AWG	THHW, CU	3/4" CONDUIT

EQUIPMENT LIST:

- (N) (14) MISSION SOLAR PERC 66 MSE395SX9R
- (N) (1) TESLA INVERTER 7.6KW
- (N) (5) TESLA MCI
- (N) (1) 60A UTILITY AC DISCONNECT
- IRONRIDGE AIRE RACKING WITH IRONRIDGE - HUG MOUNTS
- MODULE WATTAGE: 395 W



GENERAL NOTES

1. AC DISCONNECT SHALL BE VISIBLE-OPEN TYPE, LOCKABLE AND READILY ACCESSIBLE. TO BE WITHIN 10' OF THE UTILITY METER
2. 3/4" OR GREATER CONDUIT RUN (7/8" ABOVE ROOF SURFACE
3. GAS METER LOCATED IN PROXIMITY OF THE PV INSTALLATION, LOAD CENTER, AND/OR DISCONNECTS. DISCONNECTS SHALL BE LOCATED IN COMPLIANCE WITH UTILITY AND THE AHJ (AUTHORITY HAVING JURISDICTION).
4. PER NEC REQUIREMENTS GROUNDING CONDUCTORS SMALLER THAN #6 AWG SHALL BE PROTECTED IN A CONDUIT, RACEWAY, OR ARMORED PROTECTIVE SHEATHING (NEC 250.64).
5. THE WORKING CLEARANCES AROUND THE EXISTING ELECTRICAL EQUIPMENT AS WELL AS THE NEW ELECTRICAL EQUIPMENT WILL BE MAINTAINED IN ACCORDANCE WITH NEC 110.26.
6. ANY CONDUCTORS EXPOSED TO SUNLIGHT SHALL BE LISTED AS SUNLIGHT RESISTANT. (NEC 300.6 C1, 310.8 D).
7. ROOM FOR EQUIPMENT WITHIN 5 FEET FROM MSP.

ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA

DESIGN ENGINEER



**76 N. MEADOWBROOK DRIVE
ALPINE, UTAH 84004**

swyssling@wysslingconsulting.com
(201) 874-3483

NORTH CAROLINA COA NO. P-2308

SOLAR COMPANY/CLIENT



BYLD BETTER
1213 W MOOREHEAD STREET SUITE
500
CHARLOTTE, NC 28208

WILSON, JOEL
18 BREWSTER COURT
CAMERON, NC 28326
5.530 KW DC 7.600 KW AC

REVISIONS

NO	DATE:	COMMENTS
1		
2		

**ELECTRICAL
DIAGRAM**

DATE: 2/28/2024

DRAWN BY: TSD

REVIEWED BY: CCR

E-1

INTERCONNECTION CALCULATIONS

ITEM	UNIT	PANEL
BUS RATING	AMPS	200A
MAIN OCPD	AMPS	200A
ALLOWED PV PER NEC	AMPS	40A

CONDUCTOR CALCULATIONS

TAG 1 (SEE E-1)	TAG 2 (SEE E-1)	TAG 3 (SEE E-1)
UNDER MODULES, NOT IN CONDUIT	#10 AWG MAX CURRENT = 30A	#8 AWG MAX CURRENT = 50A
#10 AWG MAX CURRENT = 30A		
		TESLA INVERTER 7.6KW MAX OUTPUT = 32 A
TESLA INVERTER 7.6KW MAX CIRCUIT CURRENT	TESLA INVERTER 7.6KW MAX CIRCUIT CURRENT	32*1.25 A=40
15 A FOR CIRCUIT 1	15 A FOR CIRCUIT 1	RECOMMENDED OCPD = 40A

EQUIPMENT INFORMATION

MODULE	
MANUFACTURER/ MODEL	MISSION SOLAR PERC 66 MSE395SX9R
P _{MAX}	395 W
V _{OC}	45.18 V
V _{MPP}	36.99 V
I _{MPP}	10.68 A
I _{SC}	11.24 A
TEMPERATURE COEFFICIENT OF P _{MAX}	-0.367 %/°C
TEMPERATURE COEFFICIENT OF V _{OC}	-0.259 %/°C

INVERTER	
MANUFACTURER/ MODEL	TESLA INVERTER 7.6KW
MAX AC OUTPUT	32 A
AC OUTPUT VOLTAGE	240 V
MAX DC INPUT VOLTAGE	600 V
MAX INPUT CURRENT	11 A
WEIGHTED CEC EFFICIENCY	97.50%
INVERTER WATTAGE	7600 W

DESIGN ENGINEER



**76 N. MEADOWBROOK DRIVE
ALPINE, UTAH 84004**
swysling@wysslingconsulting.com
(201) 874-3483

NORTH CAROLINA COA NO. P-2308

SOLAR COMPANY/CLIENT



BYLD BETTER
1213 W MOOREHEAD STREET SUITE
500
CHARLOTTE, NC 28208

WILSON, JOEL
18 BREWSTER COURT
CAMERON, NC 28326
5.530 KW DC 7.600 KW AC

REVISIONS

NO	DATE:	COMMENTS
1		
2		

EQUIPMENT INFORMATION

DATE: 2/28/2024
DRAWN BY: TSD
REVIEWED BY: CCR

ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA

E-2

PHOTOVOLTAIC AC DISCONNECT
 MAXIMUM AC OPERATING CURRENT: 32
 NOMINAL OPERATING AC VOLTAGE: 240

AT POINT OF INTERCONNECTION,
 MARKED AT DISCONNECTING MEANS
 [NEC 690.54]

**WARNING DUAL POWER SOURCE
 SECOND SOURCE IS PHOTOVOLTAIC SYSTEM**

AT POINT OF INTERCONNECTION.
 [NEC 705.12(C), 690.59]

**MAIN PHOTOVOLTAIC
 SYSTEM DISCONNECT**

EACH PV SYSTEM DISCONNECTING MEANS
 SHALL PLAINLY INDICATE WHETHER IN THE
 OPEN (OFF) OR CLOSED (ON) POSITION AND
 BE PERMANENTLY MARKED [NEC. 690.13(B)]

**PHOTOVOLTAIC
 DC DISCONNECT**

AT EACH DC DISCONNECTING MEANS
 [NEC 690.13(B)]

**PHOTOVOLTAIC
 AC DISCONNECT**

AT EACH AC DISCONNECTING
 MEANS [NEC 690.13(B)]

**WARNING: PHOTOVOLTAIC
 POWER SOURCE**

AT EXPOSED RACEWAYS, CABLE TRAYS,
 AND OTHER WIRING METHODS; SPACED
 AT MAXIMUM 10FT SECTION OR WHERE
 SEPARATED BY ENCLOSURES, WALLS,
 PARTITIONS, CEILINGS, OR FLOORS
 [NEC 690.31(D)(2)]

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

AT BUILDING OR STRUCTURE MAIN
 DISCONNECTING MEANS. [NEC 690.12(E),
 NEC 690.13(B)]

WARNING
 THE EQUIPMENT FED BY MULTIPLE SOURCES.
 TOTAL RATING OF ALL OVERCURRENT DEVICES,
 EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE,
 SHALL NOT EXCEED AMPACITY OF BUSBAR

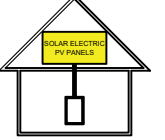
PERMANENT WARNING LABELS SHALL BE
 APPLIED TO DISTRIBUTION EQUIPMENT

WARNING
 INVERTER OUTPUT CONNECTION. DO NOT
 RELOCATE THIS OVERCURRENT DEVICE

A PERMANENT WARNING LABEL SHALL BE
 APPLIED TO THE DISTRIBUTION
 EQUIPMENT ADJACENT TO THE
 BACK-FED BREAKER FROM THE
 INVERTER.
 [NEC 705.12(B)(3)(2)]

**SOLAR PV SYSTEM EQUIPPED
 WITH RAPID SHUTDOWN**

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

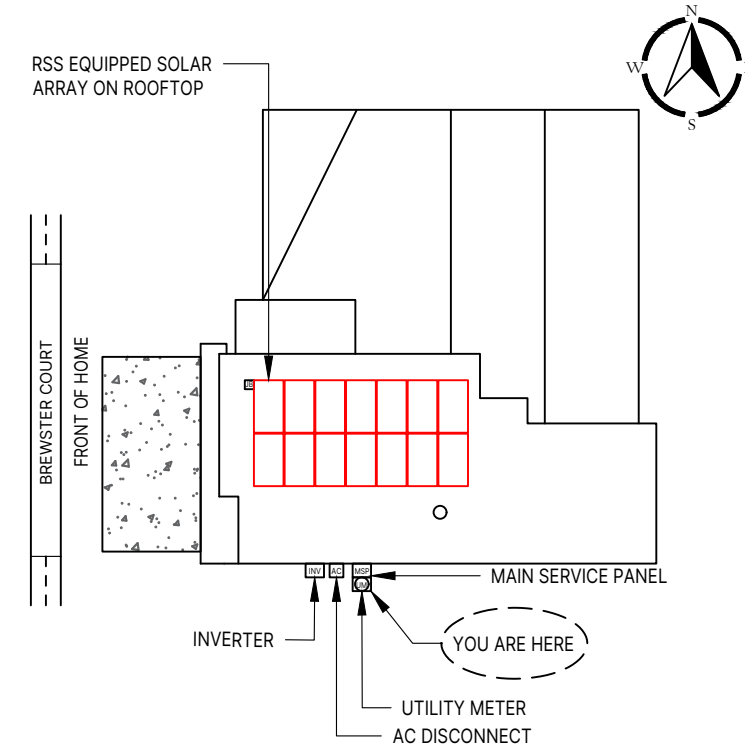


FOR PV SYSTEMS THAT SHUT DOWN THE
 ARRAY AND CONDUCTORS LEAVING THE
 ARRAY: THE TITLE "SOLAR PV SYSTEM IS
 EQUIPPED WITH RAPID SHUTDOWN"
 SHALL UTILIZE CAPITALIZED
 CHARACTERS WITH A MINIMUM HEIGHT
 OF 3/8 IN. IN BLACK ON YELLOW
 BACKGROUND, AND THE REMAINING
 CHARACTERS SHALL BE CAPITALIZED
 WITH A MINIMUM HEIGHT OF 3/16 IN. IN
 BLACK ON WHITE BACKGROUND. [NEC
 690.56(C)(1)(A)]

**RAPID SHUTDOWN
 SWITCH FOR SOLAR PV**

A RAPID SHUTDOWN SWITCH SHALL
 HAVE A LABEL LOCATED ON OR NO MORE
 THAN 3 FT FROM THE SWITCH THAT
 INCLUDES THIS WORDING. THE LABEL
 SHALL BE REFLECTIVE, WITH ALL
 LETTERS CAPITALIZED AND HAVING A
 MINIMUM HEIGHT OF 3/8 IN., IN WHITE ON
 RED BACKGROUND. [NEC 690.56(C)(2)]

CAUTION
 MULTIPLE SOURCES OF POWER



18 BREWSTER COURT, CAMERON, NORTH CAROLINA 28326

LABEL LOCATION: MSP CODE REF: NEC 2020 - 705.10

DESIGN ENGINEER



**76 N. MEADOWBROOK DRIVE
 ALPINE, UTAH 84004**
 swysling@wysslingconsulting.com
 (201) 874-3483

NORTH CAROLINA COA NO. P-2308

SOLAR COMPANY/CLIENT



BYLD BETTER
 1213 W MOOREHEAD STREET SUITE
 500
 CHARLOTTE, NC 28208

WILSON, JOEL
 18 BREWSTER COURT
 CAMERON, NC 28326
 5.530 KW DC 7.600 KW AC

REVISIONS

NO	DATE:	COMMENTS
1		
2		

**PV
 LABELS**

DATE: 2/28/2024

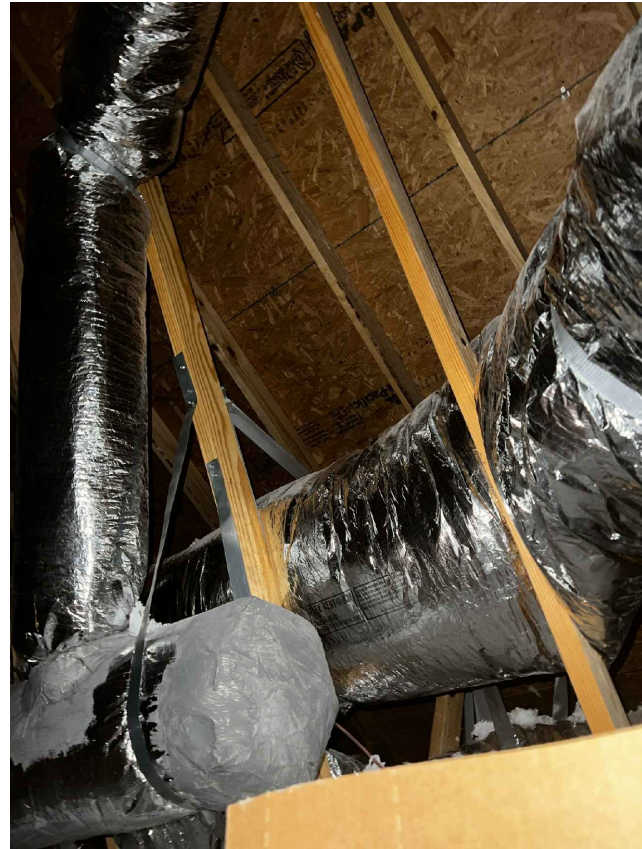
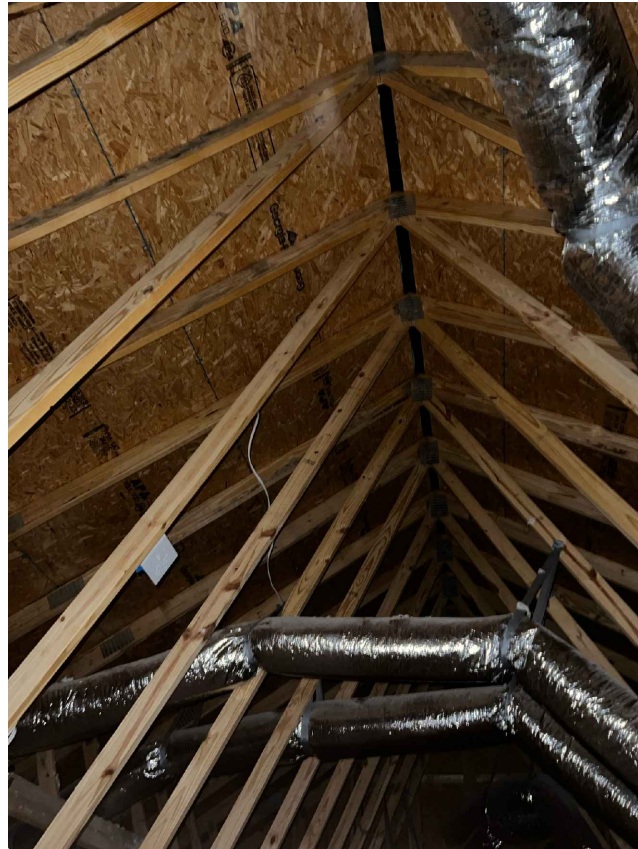
DRAWN BY: TSD

REVIEWED BY: CCR

E-3

LABELING NOTES:

1. LABELING REQUIREMENTS BASED ON THE 2020 NATIONAL ELECTRIC CODE, OSHA STANDARD 19010.145, ANSI Z535.
2. MATERIAL BASED ON THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
3. LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED [NEC 110.21]
4. LABELS TO BE A MINIMUM LETTER HEIGHT OF 3/8", WHITE ON RED BACKGROUND; REFLECTIVE, AND PERMANENTLY AFFIXED [IFC 605.11.1.1]



DESIGN ENGINEER
WYSSLING CONSULTING
 76 N. MEADOWBROOK DRIVE
 ALPINE, UTAH 84004
 swysslings@wysslingconsulting.com
 (201) 874-3483
 NORTH CAROLINA COA NO. P-2308

SOLAR COMPANY/CLIENT
BYLD BETTER
 BYLD BETTER
 1213 W MOOREHEAD STREET SUITE 500
 CHARLOTTE, NC 28208

WILSON, JOEL
 18 BREWSTER COURT
 CAMERON, NC 28326
 5.530 KW DC 7.600 KW AC

REVISIONS

NO	DATE:	COMMENTS
1		
2		

SITE PHOTOS



DATE: 2/28/2024
 DRAWN BY: TSD
 REVIEWED BY: CCR

PV-4

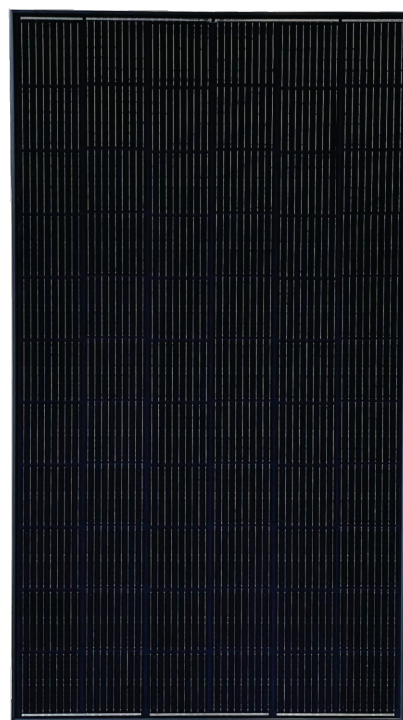
MSE PERC 66

MISSION SOLAR ENERGY

395W

Class leading power output -0 to +3%

Positive Power Tolerance



True American Quality True American Brand

Mission Solar Energy is headquartered in San Antonio, Texas where we manufacture our modules. We produce American, high-quality solar modules ensuring the highest-in-class power output and best-in-class reliability. Our product line is tailored for residential, commercial and utility applications. Every Mission Solar Energy solar module is certified and surpasses industry standard regulations, proving excellent performance over the long term.

Demand the best. Demand Mission Solar Energy.



Certified Reliability

- Tested to UL 61730 & IEC Standards
- PID resistant
- Resistance to salt mist corrosion



Advanced Technology

- 9 Busbar
- Passivated Emitter Rear Contact
- Ideal for all applications



Extreme Weather Resilience

- Up to 5,400 Pa front load & 3,600 Pa back load
- Tested load to UL 61730
- 40 mm frame



BAA Compliant for Government Projects

- Buy American Act
- American Recovery & Reinvestment Act

CERTIFICATIONS



UL 61730 / IEC 61215 / IEC 61730 / IEC 61701

If you have questions or concerns about certification of our products in your area, please contact Mission Solar Energy.

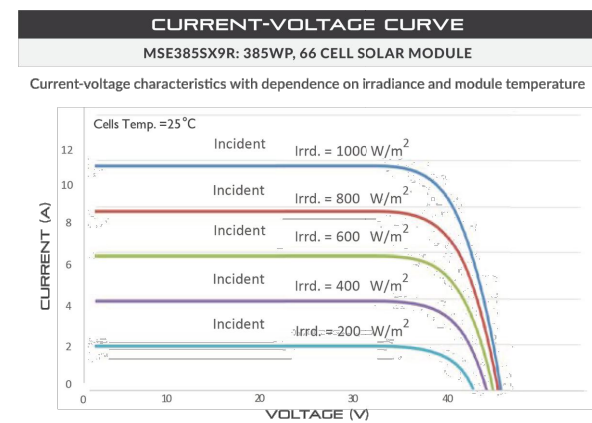
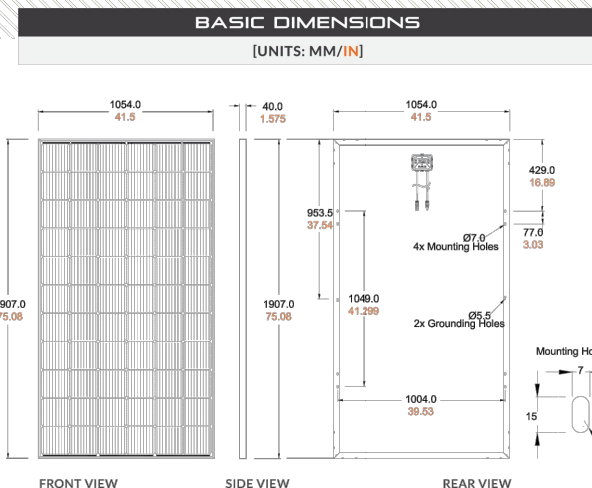


C-SA2-MKTG-0027 REV 4 03/18/2022

www.missionsolar.com | info@missionsolar.com

Class Leading
390-400W

MSE PERC 66



CERTIFICATIONS AND TESTS

IEC	61215 61730, 61701
UL	61730



Mission Solar Energy

8303 S. New Braunfels Ave., San Antonio, Texas 78235
www.missionsolar.com | info@missionsolar.com

Mission Solar Energy reserves the right to make specification changes without notice.
C-SA2-MKTG-0027 REV 4 03/18/2022

ELECTRICAL SPECIFICATION

PRODUCT TYPE	MSExxxSX9R (xxx = P _{max})			
Power Output	P _{max} W _p	390	395	400
Module Efficiency	%	19.4	19.7	19.9
Tolerance	%	0/+3	0/+3	0/+3
Short Circuit Current	I _{sc} A	11.19	11.24	11.31
Open Circuit Voltage	V _{oc} V	45.04	45.18	45.33
Rated Current	I _{mp} A	10.63	10.68	10.79
Rated Voltage	V _{mpp} V	36.68	36.99	37.07
Fuse Rating	A	20	20	20
System Voltage	V	1,000	1,000	1,000

TEMPERATURE COEFFICIENTS

Normal Operating Cell Temperature (NOCT)	43.75°C (±3.7%)
Temperature Coefficient of P _{max}	-0.367%/°C
Temperature Coefficient of V _{oc}	-0.259%/°C
Temperature Coefficient of I _{sc}	0.033%/°C

OPERATING CONDITIONS

Maximum System Voltage	1,000Vdc
Operating Temperature Range	-40°F to 185°F (-40°C to +85°C)
Maximum Series Fuse Rating	20A
Fire Safety Classification	Type 1*
Front & Back Load (UL Standard)	Up to 5,400 Pa front and 3,600 Pa back load, Tested to UL 61730
Hail Safety Impact Velocity	25mm at 23 m/s

*Mission Solar Energy uses quality sourced materials that result in a Type 1 fire rating. Please note, the 'Fire Class' Rating is designated for the fully-installed PV system, which includes, but is not limited to, the module, the type of mounting used, pitch and roof composition.

MECHANICAL DATA

Solar Cells	P-type mono-crystalline silicon
Cell Orientation	66 cells (6x11)
Module Dimension	1,907mm x 1,054mm x 40mm
Weight	48.5 lbs. (22 kg)
Front Glass	3.2mm tempered, low-iron, anti-reflective
Frame	40mm Anodized
Encapsulant	Ethylene vinyl acetate (EVA)
Junction Box	Protection class IP67 with 3 bypass-diodes
Cable	1.2m, Wire 4mm ² (12AWG)
Connector	Staubli PV-KBT4/6II-UR and PV-KST4/6II-UR, MC4, Renhe 05-8

SHIPPING INFORMATION

Container Feet	Ship To	Pallet	Panels	390W Bin
53'	Most States	30	780	304.20 kW
Double Stack	CA	26	676	263.64 kW

PALLET (26 PANELS)

Weight	Height	Width	Length
1,300 lbs. (572 kg)	47.56 in (120.80 cm)	46 in (116.84 cm)	77 in (195.58 cm)

www.missionsolar.com | info@missionsolar.com

DESIGN ENGINEER



76 N. MEADOWBROOK DRIVE
ALPINE, UTAH 84004

swyssl@wysslingconsulting.com
(201) 874-3483

NORTH CAROLINA COA NO. P-2308

SOLAR COMPANY/CLIENT

BYLD BETTER

BYLD BETTER
1213 W MOOREHEAD STREET SUITE 500
CHARLOTTE, NC 28208

WILSON, JOEL
18 BREWSTER COURT
CAMERON, NC 28326
5.530 KW DC 7.600 KW AC

REVISIONS

NO	DATE:	COMMENTS
1		
2		

MODULE SPEC SHEET

DATE: 2/28/2024

DRAWN BY: TSD

REVIEWED BY: CCR

SPECS-1

ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA





TESLA

SOLAR INVERTER

3.8 kW | 7.6 kW

Tesla Solar Inverter completes the Tesla home solar system, converting DC power from solar to AC power for home consumption. Tesla's renowned expertise in power electronics has been combined with robust safety features and a simple installation process to produce an outstanding solar inverter that is compatible with both Solar Roof and traditional solar panels. Once installed, homeowners use the Tesla mobile app to manage their solar system and monitor energy consumption, resulting in a truly unique ecosystem experience.

KEY FEATURES

- Built on Powerwall 2 technology for exceptional efficiency and reliability
- Designed to integrate with Tesla Powerwall and Tesla App
- Wi-Fi, Ethernet, and cellular connectivity with easy over-the-air updates
- 3.8 kW and 7.6 kW models available

SOLAR INVERTER

Tesla Solar Inverter provides DC to AC conversion and integrates with the Tesla ecosystem, including Solar Panels, Solar Roof, Powerwall, and vehicle charging, to provide a seamless sustainable energy experience.

KEY FEATURES

- Integrated rapid shutdown, arc fault, and ground fault protection
- 2x the standard number of MPPTs for high production on complex roofs
- No neutral wire simplifies installation



ELECTRICAL SPECIFICATIONS

OUTPUT (AC)	3.8 kW	7.6 kW
Nominal Power	3,800 W	7,600 W
Maximum Apparent Power	3,328 VA at 208 V 3,840 VA at 240 V	6,656 VA at 208 V 7,680 VA at 240 V
Maximum Continuous Current	16 A	32 A
Breaker (Overcurrent Protection)	20 A	40 A
Nominal Power Factor	1 - 0.85 (leading / lagging)	
THD (at Nominal Power)	<5%	
INPUT (DC)		
MPPT	2	4
Input Connectors per MPPT	1-2	1-2-1-2
Maximum Input Voltage	600 VDC	
DC Input Voltage Range	60 - 550 VDC	
DC MPPT Voltage Range ¹	60 - 480 VDC	
Maximum Current per MPPT (I _{mp})	11 A	
Maximum Short Circuit Current per MPPT (I _{sc})	15 A	

PERFORMANCE SPECIFICATIONS

Peak Efficiency ^a	97.5%	98.0%
CEC Efficiency ²	97.5%	
Allowable DC/AC Ratio	1.4	
Customer Interface	Tesla Mobile App	
Internet Connectivity	Wi-Fi (2.4 GHz, 802.11 b/g/n), Ethernet, Cellular (LTE/4G) ³	
AC Remote Metering Support	Wi-Fi (2.4 GHz, 802.11 b/g/n), RS-485	
Protections	Integrated arc fault circuit interrupter (AFCI), Rapid Shutdown	
Supported Grid Types	60 Hz, 240 V Split Phase 60 Hz, 208 V Wye	
Required Number of Tesla Solar Shutdown Devices per Solar Module	See <i>Solar Shutdown Device Requirements per Module</i> on page 3	
Warranty	12.5 years	

¹Maximum current.

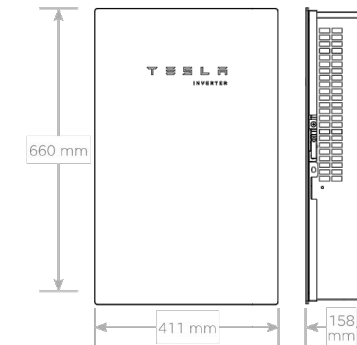
²Expected efficiency pending final CEC listing.

³Cellular connectivity subject to network operator service coverage and signal strength.

MECHANICAL SPECIFICATIONS

Dimensions	660 mm x 411 mm x 158 mm (26 in x 16 in x 6 in)
Weight	52 lb ⁴
Mounting options	Wall mount (bracket)

⁴Door and bracket can be removed for a mounting weight of 37 lb.



ENVIRONMENTAL SPECIFICATIONS

Operating Temperature ⁵	-30°C to 45°C (-22°F to 113°F)
Operating Humidity (RH)	Up to 100%, condensing
Storage Temperature	-30°C to 70°C (-22°F to 158°F)
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Rating	Type 3R
Ingress Rating	IP55 (Wiring compartment)
Pollution Rating	PD2 for power electronics and terminal wiring compartment, PD3 for all other components
Operating Noise @ 1 m	< 40 db(A) nominal, < 50 db(A) maximum

⁵For the 7.6 kW Solar Inverter, performance may be de-rated to 6.2 kW at 240 V or 5.37 kW at 208 V when operating at temperatures greater than 45°C.

COMPLIANCE INFORMATION

Grid Certifications	UL 1741, UL 1741 SA, IEEE 1547, IEEE 1547.1
Safety Certifications	UL 1699B, UL 1741, UL 1998 (US)
Emissions	EN 61000-6-3 (Residential), FCC 47CFR15.109 (a)

TESLA

NA 2021-1-14

TESLA.COM/ENERGY

DESIGN ENGINEER



76 N. MEADOWBROOK DRIVE
ALPINE, UTAH 84004

swysling@wysslingconsulting.com
(201) 874-3483

NORTH CAROLINA COA NO. P-2308

SOLAR COMPANY/CLIENT

BYLD BETTER

BYLD BETTER
1213 W MOOREHEAD STREET SUITE
500
CHARLOTTE, NC 28208

WILSON, JOEL
18 BREWSTER COURT
CAMERON, NC 28326
5.530 KW DC 7.600 KW AC

REVISIONS

NO	DATE:	COMMENTS
1		
2		

INVERTER SPEC SHEET

DATE: 2/28/2024

DRAWN BY: TSD

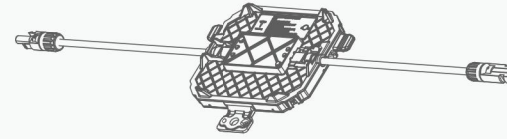
REVIEWED BY: CCR

SPECS-2

ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA

SOLAR SHUTDOWN DEVICE

The Tesla Solar Shutdown Device is part of the PV system rapid shutdown (RSD) function in accordance with Article 690 of the applicable NEC. When paired with the Tesla Solar Inverter, the PVRSS is initiated by any loss of AC power.



ELECTRICAL SPECIFICATIONS

Nominal Input DC Current Rating (I_{MP})	12 A
Maximum Input Short Circuit Current (I_{SC})	15 A
Maximum System Voltage	600 V DC

RSD MODULE PERFORMANCE

Maximum Number of Devices per String	5
Control	Power Line Excitation
Passive State	Normally open
Maximum Power Consumption	7 W
Warranty	25 years

COMPLIANCE INFORMATION

Certifications	UL 1741 PVRSS PVRSA (Photovoltaic Rapid Shutdown Array)
----------------	--

PVRSS

RSD Initiation Method	Loss of AC power
Compatible Equipment	Tesla Solar Inverter

ENVIRONMENTAL SPECIFICATIONS

Ambient Temperature	-40°C to 50°C (-40°F to 122°F)
Storage Temperature	-30°C to 70°C (-22°F to 158°F)
Enclosure Rating	NEMA 4 / IP65

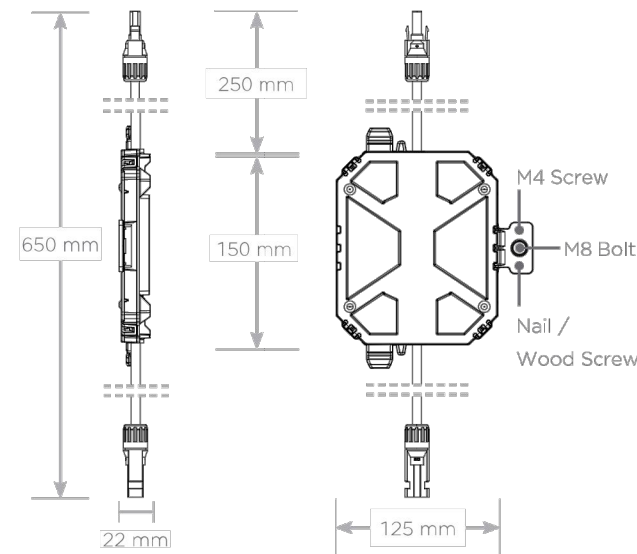
SOLAR SHUTDOWN DEVICE REQUIREMENTS PER MODULE

The following modules have been certified as part of a PV Rapid Shutdown Array (PVRSA) when installed together with the Tesla Solar Inverter and Tesla Solar Shutdown Devices. See the Tesla Solar Inverter Installation Manual for guidance on installing Tesla Solar Inverter and Solar Shutdown Devices with other modules.

Brand	Model	Required Solar Shutdown Devices
Tesla	Solar Roof V3	1 Solar Shutdown Device per 10 modules
Hanwha	Q.PEAK DUO BLK-G5	1 Solar Shutdown Device per 3 modules
Hanwha	Q.PEAK DUO BLK-G6+	1 Solar Shutdown Device per 3 modules

MECHANICAL SPECIFICATIONS

Electrical Connections	MC4 Connector
Housing	Plastic
Dimensions	125 mm x 150 mm x 22 mm (5 in x 6 in x 1 in)
Weight	350 g (0.77 lb)
Mounting Options	ZEP Home Run Clip M4 Screw (#10) M8 Bolt (5/16") Nail / Wood screw



DESIGN ENGINEER



76 N. MEADOWBROOK DRIVE
ALPINE, UTAH 84004
wyssling@wysslingconsulting.com
(201) 874-3483

NORTH CAROLINA COA NO. P-2308

SOLAR COMPANY/CLIENT

BYLD BETTER

BYLD BETTER
1213 W MOOREHEAD STREET SUITE
500
CHARLOTTE, NC 28208

WILSON, JOEL
18 BREWSTER COURT
CAMERON, NC 28326
5.530 KW DC 7.600 KW AC

REVISIONS

NO	DATE:	COMMENTS
1		
2		

RSD SPEC SHEET

DATE: 2/28/2024

DRAWN BY: TSD

REVIEWED BY: CCR

SPECS-3



Aire® Flush Mount System

Datasheet



Breathe easy with accelerated installations.

The Aire® racking system has been carefully engineered to streamline every part of the installation process. We've eliminated tiresome hassles, so that you get off the roof and on to your next project faster than ever.

Aire® retains the strength and reliability that IronRidge installers depend on. It also takes wire management to the next level with the first (and only) NEC-compliant rail, formally approved and listed as a cable tray.



Strength Tested

All components have been evaluated for superior structural performance.



PE Certified

Pre-stamped engineering letters are available online for most states.



Class A Fire Rating

Certified to maintain the fire resistance rating of the existing roof structure.



Approved Cable Tray

Open channel listed to NEMA VE 1, certified to hold PV and DG cables.



UL 2703 Listed System

Entire system and components meet the latest effective UL 2703 standards.



25-Year Warranty

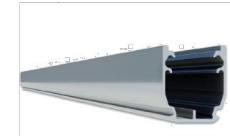
Products are guaranteed to arrive without any impairing defects.

One-Tool System - 1/2" Hex-Head Components

Datasheet

Rails

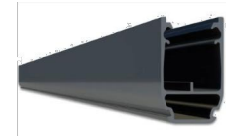
Aire® A1 Rail



The lighter, open Aire® rail for standard conditions.

- 6' spanning capability
- Wire management tray
- Mill or anodized black

Aire® A2 Rail



The tougher, open Aire® rail for higher load capacity.

- 8' spanning capability
- Wire management tray
- Mill or anodized black

Aire® Rail Ties



Structurally connect and bond Aire™ Rails together.

- Reinstallable, up to 5x
- Internal splice design
- No more splice rules

Aire® Dock



Connects Aire® Rails to attachments with ease.

- Clicks on, slides easily
- Drops into open slots
- Anodized assembly

Clamps & Grounding

Aire® Lock Mids



Securely bond between modules to Aire® Rails.

- Fits 30-40mm modules
- Utilizes UFO® design
- Minimal 1/2" gap

Aire® Lock Ends



Securely bond modules to Aire® Rails along ends.

- Fits 30-40mm modules
- Easy rail engagement
- Clean aesthetics

Aire® Lock Stealth®



Securely bonds modules to rail ends, entirely hidden.

- Angled for easy install
- Robust tether leash
- Fits most modules

Aire® Lug



Bonds Aire® Rails to grounding conductors.

- Simplified with single bolt
- Low-profile form factor
- Works with 10-6 AWG

Accessories

Aire® Caps



Block entry and provide a finished look to Aire® Rails.

- Stay secure on rail ends
- Symmetrical, with drain
- Cover rough-cut ends

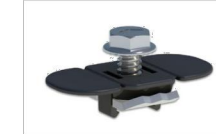
Aire® Clip



Keeps wiring contained in open Aire® Rail channels.

- No module interference
- Simple press-in design
- Slot for easy removal

Aire® MLPE Mount



Securely bonds MLPE and accessories to Aire® Rails.

- Glove-friendly installation
- Lays flush in rail channel
- Low profile form factor

Aire® All Tile Hook



Attaches rails to tile roofs, with Aire® Dock included.

- Works on flat, S, & W tiles
- Single-socket installation
- Optional deck flashing

Resources



Design Assistant

Quickly go from rough layout to fully engineered system.

Go to IronRidge.com/design



Approved for FL Hurricane Zones

Aire® has Florida Product Approval. Additional details can be found on the Florida Building Code website.

Learn More at bit.ly/florida-aire

© 2023 IronRidge, Inc. All rights reserved. U.S. Patents Pending. Version 1.03

DESIGN ENGINEER



76 N. MEADOWBROOK DRIVE
ALPINE, UTAH 84004

swyssl@wysslingconsulting.com
(201) 874-3483

NORTH CAROLINA COA NO. P-2308

SOLAR COMPANY/CLIENT

BYLD BETTER

BYLD BETTER
1213 W MOOREHEAD STREET SUITE
500
CHARLOTTE, NC 28208

WILSON, JOEL
18 BREWSTER COURT
CAMERON, NC 28326
5.530 KW DC 7.600 KW AC

REVISIONS

NO	DATE:	COMMENTS
1		
2		

RAIL SPEC SHEET

DATE: 2/28/2024

DRAWN BY: TSD

REVIEWED BY: CCR

SPECS-4

ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA



Tech Brief



The Respect Your Roof Deserves

When integrating with a home, solar attachments must be dependable for the lifetime of the rooftop. Due to recent innovations, many asphalt shingles have bonded courses. A mount that protects without the need to pry shingles can really speed things up.

Halo UltraGrip® (HUG®) is here to respect the roof. Its Halo is a cast-aluminum barrier that encases the UltraGrip, our industrial-grade, foam-and-mastic seal. This allows HUG to accelerate the installation process and provide the utmost in waterproofing protection. Give your roof a HUG.®



Multi-Tiered Waterproofing
HUG® utilizes a multi-tiered stack of components to provide revolutionary waterproofing protection. The Halo cast-aluminum, raised-perimeter foundation surrounds the UltraGrip base—a foam-backed mastic seal combination that prevents water intrusion by adhering and sealing with the shingle surface.

Halo UltraGrip™ is part of the QuickMount® product line.



UltraGrip® Seal Technology
HUG UltraGrip utilizes a state-of-the-art seal design that uses a unique, foam-and-mastic combination. The foam-backed adhesive provides an entirely new flashing system that conforms and adheres to every nook and cranny of composition shingles, filling gaps and shingle step-downs (up to 1/8" in height).

Rafter Mount

Deck Mount

Rafter & Deck Mounting Options

Mount HUG® to the roof rafters, the roof deck, or both with our custom-engineered RD (rafter-or-deck) Structural Screw. The RD Structural Screw anchors HUG to the roof with an EPDM sealing washer, completing the stack of waterproofing barriers. See backside for more installation information.

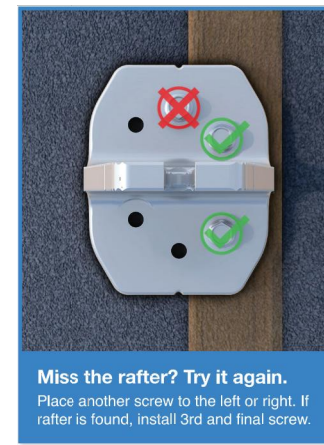
Triple Rated & Certified to Respect the Roof™
UL 2703, 441 (27)
TAS 100(A)-95
Intertek

Adaptive, Rafter-Friendly Installation

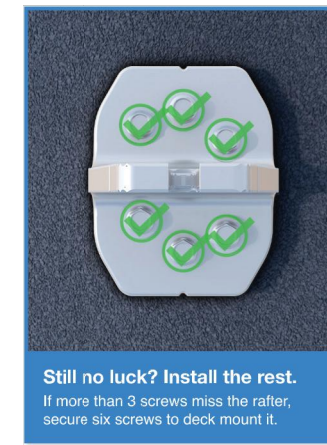
Tech Brief



Hit the rafter? Good to go!
When you find a rafter, you can move on. Only 2 RD Structural Screws are needed.



Miss the rafter? Try it again.
Place another screw to the left or right. If rafter is found, install 3rd and final screw.



Still no luck? Install the rest.
If more than 3 screws miss the rafter, secure six screws to deck mount it.

Trusted Strength & Less Hassle



25-Year Warranty
Product guaranteed free of impairing defects.

Structural capacities of HUG® were reviewed in many load directions, with racking rail running cross-slope or up-slope in relation to roof pitch.

For further details, see the HUG certification letters for attaching to rafters and decking.

IronRidge designed the HUG, in combination with the RD Structural Screw to streamline installs, which means the following:

- No prying shingles
- No roof nail interference
- No pilot holes necessary
- No sealant (in most cases)
- No butyl shims needed

Attachment Loading

The rafter-mounted HUG has been tested and rated to support 1004 (lbs) of uplift and 368 (lbs) of lateral load.

Structural Design

Parts are designed and certified for compliance with the International Building Code & ASCE/SEI-7.

Water Seal Ratings

HUG passed both the UL 441 Section 27 "Rain Test" and TAS 100(A)-95 "Wind Driven Rain Test" by Intertek.

UL 2703 System

Systems conform to UL 2703 mechanical and bonding requirements. See Flush Mount Manual for more info.

© 2023 IronRidge, Inc. All rights reserved. Visit www.ir-patents.com for patent information. Version 1.03

DESIGN ENGINEER



**76 N. MEADOWBROOK DRIVE
ALPINE, UTAH 84004**
swyssl@wysslingconsulting.com
(201) 874-3483

NORTH CAROLINA COA NO. P-2308

SOLAR COMPANY/CLIENT

BYLD BETTER

BYLD BETTER
1213 W MOOREHEAD STREET SUITE
500
CHARLOTTE, NC 28208

WILSON, JOEL
18 BREWSTER COURT
CAMERON, NC 28326
5.530 KW DC 7.600 KW AC

REVISIONS

NO	DATE:	COMMENTS
1		
2		

MOUNTING SPEC SHEET

DATE: 2/28/2024
DRAWN BY: TSD
REVIEWED BY: CCR

SPECS-5

ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA



Class 3130 / Refer to Catalog 3100CT1602

Light Duty Safety Switches

Light Duty—Visible Blades 10 kA Short Circuit Current Rating
The Square D light duty enclosed switch is ideal for home applications in disconnecting power to workshops, hobby rooms, furnaces, and garages. The light duty safety switch has visible blades and a ground lug as standard features.



L221N

Table 3.1: Fusible

System	Amperes	Fuse	NEMA Type 1 Indoor Cat. No.	Horsepower Ratings			
				120 Vac		240 Vac	
				Std.	Max.	Std.	Max.
2 Wire (1 Blade and Fuseholders, 1 Neutral)—120 Vac							
	30	Plug	L111N	—	—	—	—
				1Ø	1Ø	1Ø	1Ø
3 Wire (2 Blades and Fuseholders, 1 Neutral)—120/240 Vac							
	30	Plug Cart	L211N L221N	1/2	2	1-1/2	3
				1/2	1/2	1-1/2	3

General Duty—Up To 100 kA Short Circuit Current Rating

General duty safety switches are designed for residential and commercial applications where durability and economy are prime considerations. Typical loads are lighting, air conditioning, and appliances. They are suitable for use as service equipment when equipped with a factory or field-installed neutral assembly or a field-installed service grounding kit, (see page 3-5) as applicable.

General duty safety switches are UL Listed, File E2875, and meet or exceed the NEMA Standard KS1.

240 Volt—Single Throw Fusible Switches

Table 3.2: Fusible

System	Amperes	Fuse	NEMA Type 1 Indoor Cat. No.	NEMA Type 3R [1] Rainproof Cat. No.	Class R Fuse Kits [2] Cat. No.	Horsepower Ratings			
						Std. (Fast Acting One-Time Fuses)		Max. (Dual Element Time-Delay Fuses)	
						1Ø	3Ø	1Ø	3Ø
2 Wire (1 Blade and Fuseholder, 1 Neutral)—120 Vac									
	30	Plug	Use Light Duty Device for this Application (see above)			—	—	—	—
			Cart.	Use three-wire devices for this application			—	—	—
3 Wire (2 Blades and Fuseholders, 1 Neutral)—120/240 Vac (Plug), 240 Vac (Cart.) Maximum									
	30	Plug	D211N	D211NRB	—	1-1/2	—	3	—
	30	Cart.	D221N	D221NRB	DRK30	1-1/2	3[3]	3	7-1/2 [3]
	60	Cart.	D222N	D222NRB	RFK03H	3	7-1/2[3]	10	15[3]
	100	Cart.	D223N	D223NRB	RFK10	7-1/2	15[3]	15	30[3]
	200	Cart.	D224N [4]	D224NRB [4]	HRK1020	15	25[3]	—	60[3]
	400	Cart.	D225N	D225NR	DRK40	—	—	—	—
600 [5]	Cart.	D226N	D226NR	DRK600	—	—	—	—	
4 Wire (3 Blades and Fuseholders, 1 Neutral)—240 Vac Maximum									
	30	Cart.	D321N	D321NRB	DRK30	1-1/2	3	3	7-1/2
	60	Cart.	D322N	D322NRB	RFK03H	3	7-1/2[6]	10	15[6]
	100	Cart.	D323N	D323NRB	RFK10	7-1/2	15[6]	15	30[6]
	200	Cart.	D324N [4]	D324NRB [4]	HRK1020	15	25[6]	—	60[6]
	400	Cart.	D325N	D325NR	DRK40	—	50	—	125
	400 [7]	Class T	D325NT	D325NTR	—	—	50	—	—
	600 [5]	Cart.	D326N	D326NR	DRK600	—	75	—	150
	600 [7]	Class T	D326NT	D326NTR	—	—	75	—	—
800 [7]	Class T	T327N	T327NR	—	—	100	—	—	

3 SAFETY SWITCHES

[1] Bolt-on hubs—Refer to Rainproof Bolt-On Hubs, Table 1.27, page 3-14.
 [2] When properly installed, the Class R Fuse Kit rejects all but Class R fuses.
 [3] For corner grounded delta systems only. Use switching poles for ungrounded conductors. See data bulletin 2700DB0202 for additional information.
 [4] For 200% neutral, order (1) additional neutral kit SN20A and (1) neutral jumper kit SN20NI.
 [5] Order Class J Fuse Kit GDJK600 if using Class J fuses.
 [6] If corner grounded delta, use outer switching poles for ungrounded conductors.
 [7] D325NT, D325NTR, D326NT, D326NTR, T327N and T327NR accept only 300Vac Class T fuses.

General Duty Safety Switches

General Duty—Up to 100 kA Short Circuit Current Rating
Class 3130 / Refer to Catalog 3100CT1602



240 Volt—Single Throw Non-Fusible Switches

Table 3.3: Non-Fusible

System	Amperes	NEMA Type 1 Indoor		NEMA Type 3R Rainproof [9]		Horsepower Ratings (Max.)	
		Cat. No.	Cat. No.	Cat. No.	Cat. No.	1Ø	3Ø
2 Wire (2 Blades)—240 Vac Maximum							
	30	—	—	DU221RB	—	3	—
	60	—	—	DU222RB	—	10	—
	60	QO260NATS [9] [10]	—	QO200TR [9] [10] [11]	—	10	—
	100	QO200ONS [9] [10]	—	QO200NRB [9] [11]	—	20	—
	200	Use 3P Switch	—	Use 3P Switch	—	—	—
	400	Use 3P Switch	—	Use 3P Switch	—	—	—
600	Use 3P Switch	—	Use 3P Switch	—	—	—	
3 Wire (3 Blades)—240 Vac Maximum							
	30	DU321	—	DU321RB	—	3	7-1/2
	60	DU322	—	DU322RB	—	10	15
	100	DU323 [12]	—	DU323RB [12]	—	15	40
	200	DU324 [13]	—	DU324RB [13]	—	15	60
	400	DU325	—	—	—	—	125
	600	DU326 [14]	—	—	—	—	150

UL Listed Maximum Short Circuit Current Ratings — AC Only

Table 3.4: Fusible Safety Switch Short Circuit Current Rating

Fuse Class	UL Listed Short Circuit Rating
Plug	10 kA
H, K	10 kA
J [15], R	100 kA
T [16]	100 kA

Non-Fusible Safety Switches

Systems equal or less than 10 kAIR SCCR—Any brand of circuit breaker or fuse not exceeding the ampere rating of the switch may be used in conjunction with a non-fusible safety switch.

Systems above 10 kAIR SCCR—The UL Listed short circuit current rating for Square D non-fusible switches is based upon the switch being used in conjunction with fuses or Square D circuit breakers or Mag-Gard motor circuit protectors.

Table 3.5: Non-Fusible Safety Switch Short Circuit Current Rating

Fuse Class or Circuit Breaker Type [17]	UL Listed Short Circuit Rating
Any Brand Circuit Breaker	10 kA
H or J PowerPact Circuit Breaker	Up to 65 kA [18]
H, K	10 kA
J, R	100 kA [19]
T	100 kA [20]

[8] Bolt-on hubs—Refer to Hubs, page 3-14.
 [9] Enclosed molded case switch—Refer to Section 1.
 [10] Includes factory-installed grounding kit.
 [11] Not service entrance rated—Refer to Table 3.34 for more information.
 [12] If a neutral assembly is required, order and field install SN0610.
 [13] If a neutral assembly is required, order and field install a SN20A Neutral Assembly Kit. For a 200% neutral application, order and field install (2) SN20A Neutral Assembly Kits and (1) SN20NI Neutral Jumper Kit.
 [14] If a neutral assembly is required, order and field install D600SN.
 [15] Only applicable to 200 A - 600 A except D325NT, D325NTR, D326NT and D326NTR.
 [16] Only applicable to D325NT, D325NTR, D326NT, D326NTR, T327N and T327NR.
 [17] Ampere rating of fuse or circuit breaker not to exceed switch ampere rating.
 [18] Only applicable to DU324 and DU324RB. HD, JD = 25 kA maximum.
 [19] SCCR = 50 kA, applicable to DU222RB, DU322 and DU322RB.
 [20] Only applicable to DU323, DU323RB, DU325 and DU326.

DESIGN ENGINEER



76 N. MEADOWBROOK DRIVE
ALPINE, UTAH 84004

swysling@wysslingconsulting.com
(201) 874-3483

NORTH CAROLINA COA NO. P-2308

SOLAR COMPANY/CLIENT



BYLD BETTER
1213 W MOOREHEAD STREET SUITE
500
CHARLOTTE, NC 28208

WILSON, JOEL
18 BREWSTER COURT
CAMERON, NC 28326
5.530 KW DC 7.600 KW AC

REVISIONS

NO	DATE:	COMMENTS
1		
2		

DISCONNECT SPEC SHEET

DATE: 2/28/2024

DRAWN BY: TSD

REVIEWED BY: CCR

ENGINEERED PLANS COMPLETED BY ENGINEERS IN THE USA

SPECS-6