

PROJECT DESCRIPTION

THIS GROUND-MOUNTED PHOTOVOLTAIC (PV) SYSTEM IS TO BE INSTALLED AT THE SINGLE FAMILY RESIDENTIAL IN . THE ENERGY PRODUCED BY THE PV SYSTEM SHALL BE INTERCONNECTED WITH THE UTILITY GRID THROUGH THE EXISTING ON-SITE ELECTRICAL EQUIPMENT VIA A BACK-FED BREAKER IN THE MAIN SERVICE PANEL.

GENERAL NOTES

1. LOCAL UTILITY PROVIDER SHALL BE NOTIFIED PRIOR TO USE AND ACTIVATION OF ANY SOLAR PHOTOVOLTAIC INSTALLATION.
2. BACK-FED BREAKER MUST BE AT THE OPPOSITE END OF BUS BAR FROM THE MAIN BREAKER OR MAIN LUG SUPPLYING CURRENT FROM THE UTILITIES.
3. ALL CONDUCTORS EXPOSED TO SUNLIGHT ARE LISTED AS SUNLIGHT RESISTANT.
4. NO SHEET METAL OR TECH SCREWS SHALL BE USED TO GROUND DISCONNECT ENCLOSURE WITH TIN-PLATED ALUMINUM LUGS; PROPER GROUNDING/GROUND BAR KITS SHOULD BE USED.
5. ALL EXTERIOR CONDUIT, FITTINGS, AND BOXES SHALL BE WITH RAIN TIGHT AND APPROVED FOR USE IN WET LOCATIONS.
6. DRAWINGS ARE DIAGRAMMATIC ONLY. THE LOCATION AND ROUTING OF RACEWAYS SHALL BE DETERMINED BY THE CONTRACTOR UNLESS OTHERWISE NOTED OR STANDARDIZED.
7. ALL EQUATIONS ACCOUNT FOR WORST CASE CONDITIONS.
8. INSTALLER TO FOLLOW ALL LOCAL JURISDICTION GUIDELINES.
9. GROUNDING BUSHINGS ARE REQUIRED AROUND PRE-PUNCHED CONCENTRIC KNOCKOUTS ON THE DC SIDE OF THE SYSTEM.
10. THE ELECTRICAL CONTRACTOR SHALL COMPLY WITH ANY AND ALL REQUIREMENTS GIVEN BY UTILITY COMPANIES.
11. ALL OUTDOOR EQUIPMENT SHALL BE MIN. NEMA 3R RATED.
12. IF A DISCREPANCY IN QUANTITY OR SIZE OF CONDUIT, WIRE, EQUIPMENT DEVICES, OVER CURRENT PROTECTION, GROUNDING SYSTEMS, ETC. (ALL EQUIPMENT AND MATERIALS) THE CONTRACTOR AND OR HOME OWNER SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ALL MATERIALS AND SERVICES REQUIRED BY THE STRICTEST CONDITIONS IN THE SPECIFICATIONS OR NOTED ON THE PLANS TO ENSURE COMPLETE COMPLIANCE WITH ALL CODES AND TO ENSURE THE LONGEVITY AND SAFETY OF THE OPERABLE SYSTEM.
13. ALL LABELS AND MARKINGS SHALL BE ATTACHED ACCORDING TO REQUIREMENTS BY NEC AND THE LOCAL AHJ. THE AHJ MAY HAVE SPECIAL LABEL REQUIREMENTS BEYOND THE SCOPE OF THIS DOCUMENT.
14. FOR ADDITIONAL EQUIPMENT SPECIFICATIONS, SEE PROVIDED CUT SHEETS.
15. ALL ELECTRICAL MATERIAL SHALL BE LISTED BY "UL" FOR THE TYPE OF APPLICATION AND "UL" LABEL SHALL APPEAR ON ALL ELECTRICAL EQUIPMENT.



AERIAL VIEW



GOVERNING CODES

ALL MODULES AND RAIL ARE LISTED BY UNDERWRITERS LABORATORIES FOR ELECTRICAL AND FIRE SAFETY (CLASS A FIRE RATING)

- NOTE:
- 1) NO DISCHARGE OF ANY POLLUTANTS TO ANY STORM DRAIN SYSTEM.
 - 2) UL 1703 FOR MODULES & UL 1741 FOR INVERTERS PER CITY SOLAR REQUIREMENTS.

THIS PROJECT SHALL COMPLY WITH THE :
 2018 STATE BUILDING CODE
 2018 INTERNATIONAL PLUMBING CODE
 2018 INTERNATIONAL RESIDENTIAL CODE
 2018 INTERNATIONAL ENERGY CODE
 2018 INTERNATIONAL MECHANICAL CODE
 2018 INTERNATIONAL FIRE CODE
 2017 NATIONAL ELECTRICAL CODE AND ORDINANCES OF CITY AND OR COUNTY OF ST JOSEPH

SCOPE OF WORK

SYSTEM SIZE:
 22.401 KW-AC
 24.600 KW-DC

GROUND MOUNT ARRAY
 ARRAY PITCH: 20°
 AZIMUTH: 180°

MODULES :
 (60)TRINA SOLAR,
 TSM-410DE15M (II) 410W

INVERTER :
 (2)FRONIUS PRIMO,12.5-1 [240V]

RAPID SHUTDOWN :
 (2)FRONIUS,
 RAPID SHUTDOWN BOX-QUATTRO

MAIN PANEL/BUS-BAR: (E)400A
 MAIN BREAKER : (E)2-200A

PV RAIL:
 IRONRIDGE XR1000
 PV MOUNT:
 IRONRIDGE GROUND MOUNT SYSTEM

INDEX SHEET

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HOME OWNER BUILDER

J
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 PHONE:

OWNER / ADDRESS

JEREMY
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 PHONE:

OCCUPANCY R3 /
 TYPE 5 STRU.
 APN#:

SYSTEM SIZE

22.401 KW-AC
 24.600 KW-DC

MODULES :
**(60) TRINA SOLAR,
 TSM-410DE15M (II) 410W**

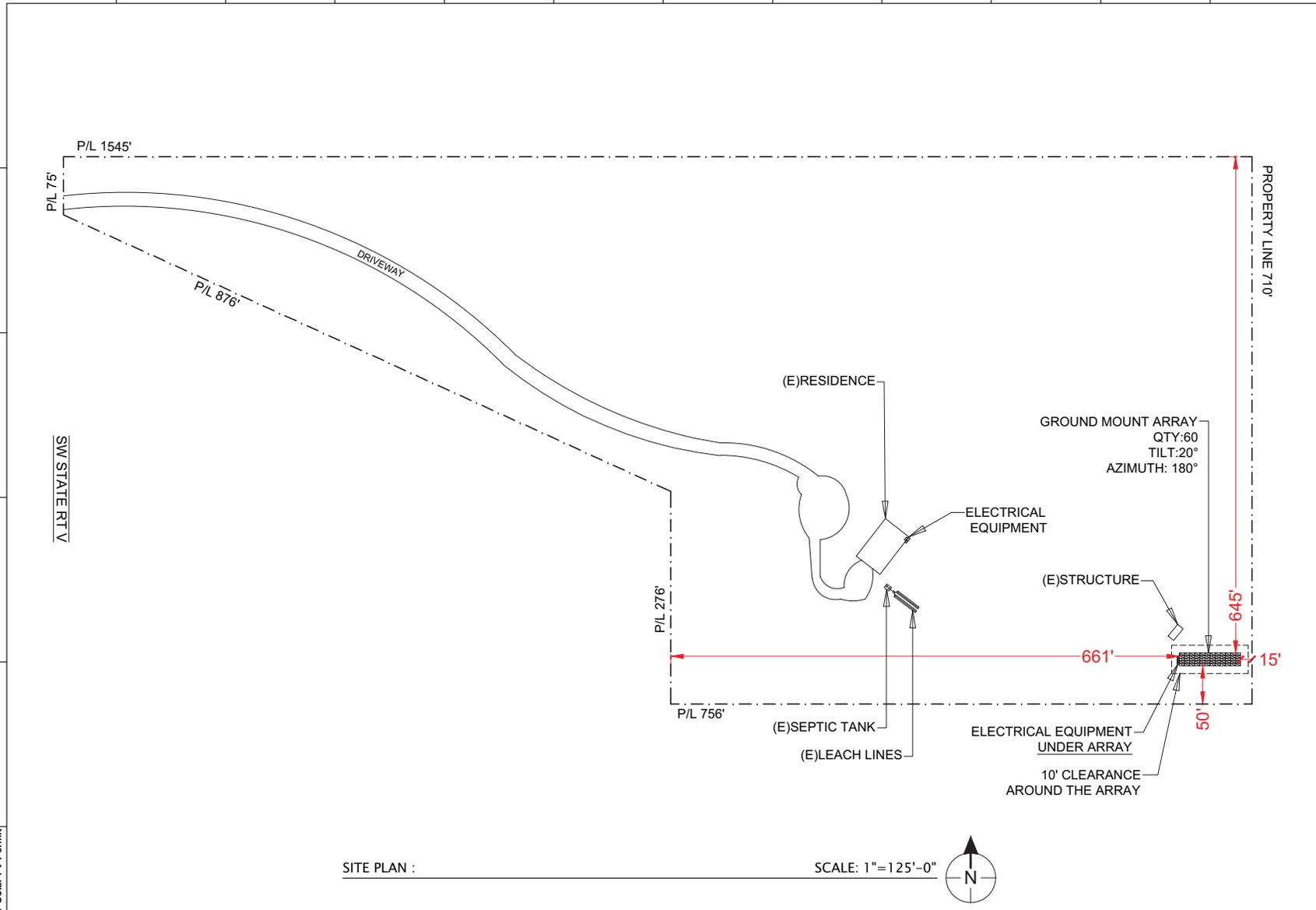
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(2) FRONIUS PRIMO, 12.5-1 [240V]

DATE: 03/30/21

REVISION :

PAGE INFORMATION

TITLE:
 COVER PAGE



SITE PLAN :

SCALE: 1"=125'-0"



HOME OWNER BUILDER

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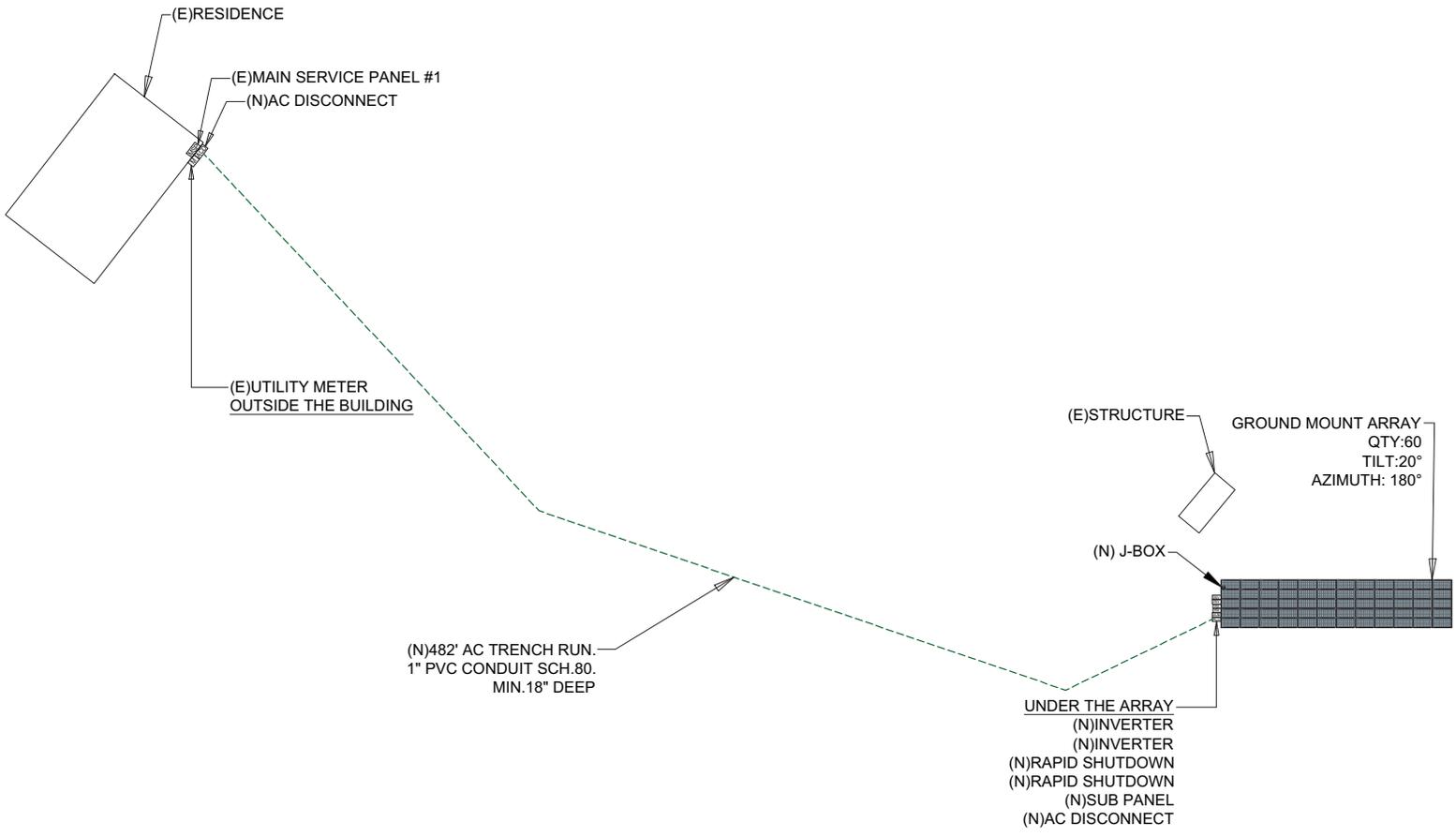
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PLOT PLAN / ROOF PLAN

PV-02

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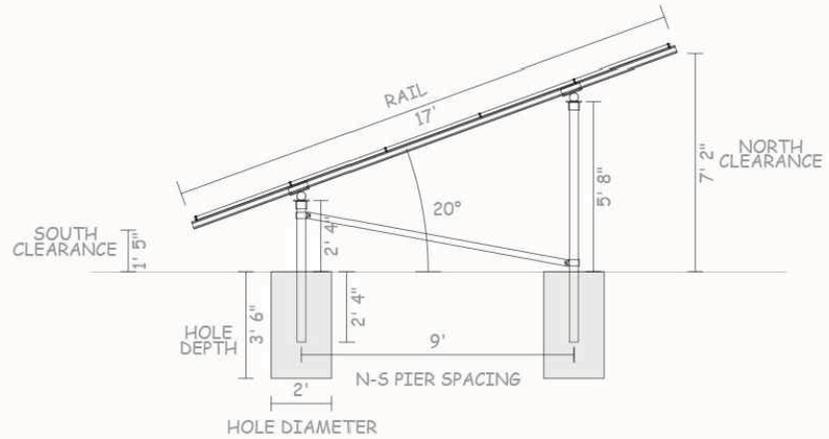
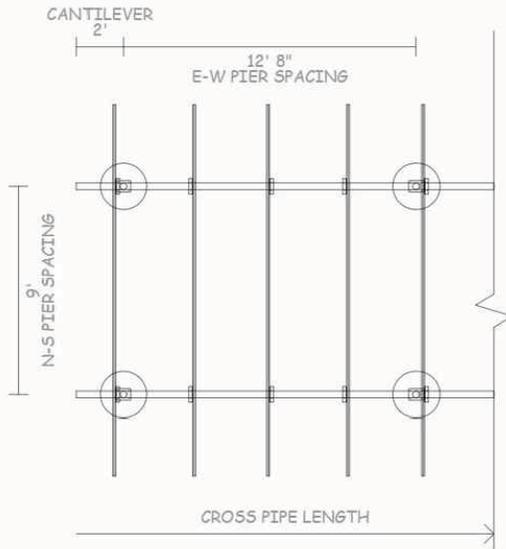
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PLOT PLAN / ROOF PLAN

PV-03

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| Rail type | Diagonal bracing | E/W spacing | Rail cantilever | Size | Edge clearances | Shear ⁱ | Moment ⁱ | Uplift ⁱ |
|-----------|------------------|-------------|-----------------|------------------------|----------------------|--------------------|---------------------|---------------------|
| XR1000 | yes | 12' 8" | 3' 9" | 80' (EW) × 16' 9" (NS) | 1' 5" (S); 7' 2" (N) | 821 lbs | 0 ft-lbs | -1,514 lbs |
| Rows | Columns | Repeats | Piers/repeat | Total South piers | Total North piers | Total cross pipes | Pipe cantilever | Total pipe length |
| 5 | 12 | 1 | 14 | 7 (4' 8") | 7 (8') | 2 (80') | 2' | 248' 7" |

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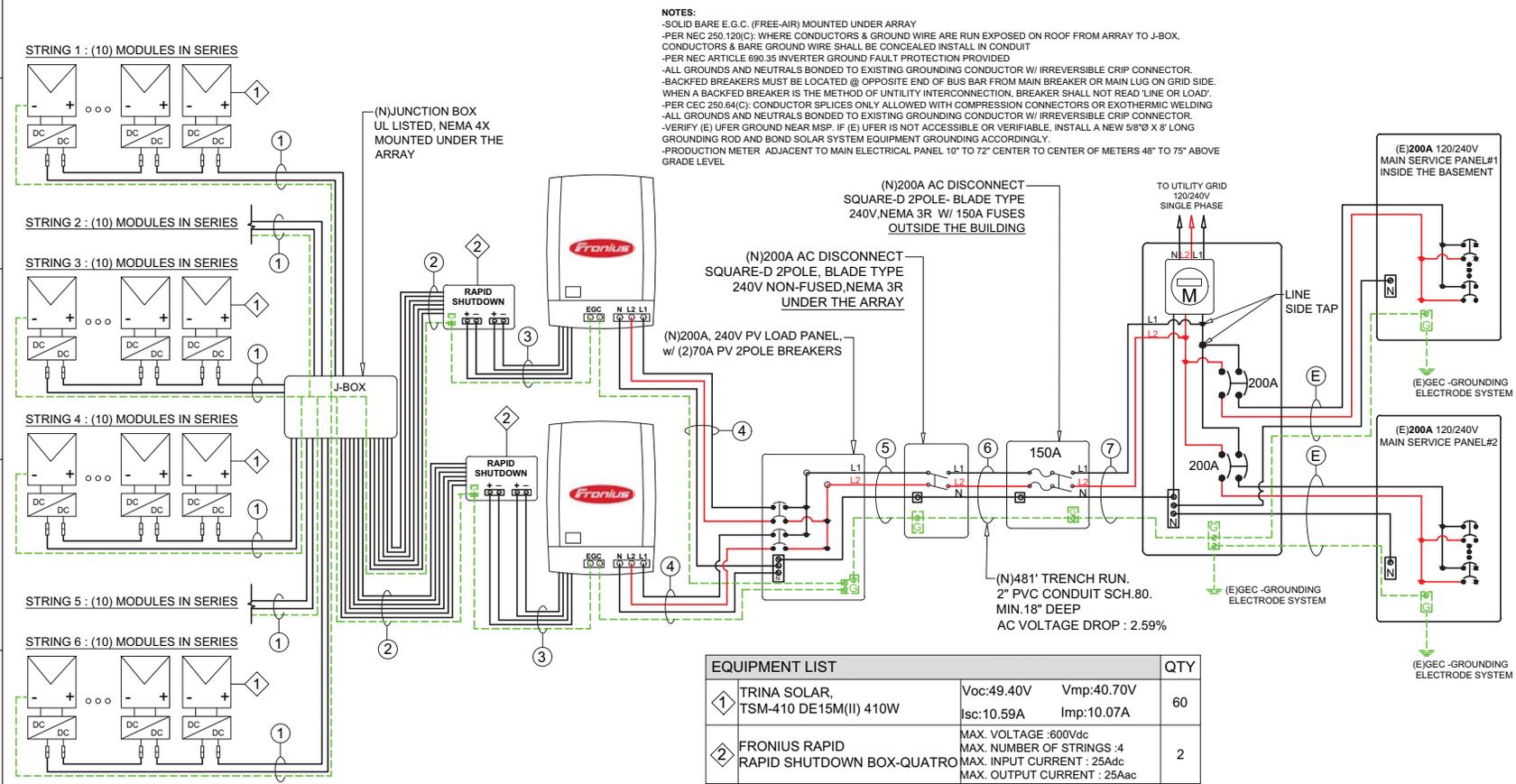
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SPECS

PV-05

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| WIRE TAG# | MAX AMPS X MULT= | NEC DESIGN AMPS | BREAKER SIZE AMPS | WIRE TYPE | EGC / GRND.SIZE | WIRE RATING IN 90° X DERATE X CONDUCTOR DERATE = | TEMP DERATE = | TERMINAL 60°C RATING | CONDUIT SIZE | CONDUIT FILL |
|-----------|------------------|-----------------|-------------------|-----------------|------------------------------|--|---------------|----------------------|-------------------------|--------------|
| ① | 10.59 x | 1.56 =16.55A | 20A | (2) #10 PV WIRE | (1)#6 THWN-2 BARE COPPER EGC | 40 x 0.65 x 1.0 =26.0 | >=16.5 | 30> =16.5 | OPEN AIR | |
| ② | 10.59 x | 1.56 =16.55A | 20A | (6) #10 THWN-2 | (1)#8 THWN-2 EGC | 40 x 0.65 x 0.8 =20.8 | >=16.5 | 30> =16.5 | 3/4" EMT FILL: 0.1632 | , 31% |
| ③ | 25.00 x | 1.25 =31.25A | 40A | (3) #8 THWN-2 | (1)#8 THWN-2 EGC | 55 x 0.91 x 0.8 =40.0 | >=31.3 | 40> =31.3 | 1" EMT FILL: 0.1464 | , 33% |
| ④ | 52.10 x | 1.25 =65.13A | 70A | (3) #4 THWN-2 | (1)#8 THWN-2 EGC | 95 x 0.91 x 1.0 =86.5 | >=65.1 | 70> =65.1 | 1" EMT FILL: 0.2838 | , 33% |
| ⑤ | 104.20 x | 1.25 =130.25A | 150A | (3) #2/O THWN-2 | (1)#4 THWN-2 EGC | 195 x 0.91 x 1.0 =177.5 | >=130.3 | 145> =130.3 | 1 1/2" EMT FILL: 0.7493 | , 37% |
| ⑥ | 104.20 x | 1.25 =130.25A | 150A | (3) #4/O THWN-2 | (1)#4 THWN-2 EGC | 260 x 0.91 x 1.0 =236.6 | >=130.3 | 195> =130.3 | 2" PVC FILL: 1.0535 | , 37% |
| ⑦ | 104.20 x | 1.25 =130.25A | 150A | (3) #2/O THWN-2 | (1)#4 THWN-2 EGC | 195 x 0.91 x 1.0 =177.5 | >=130.3 | 145> =130.3 | 1 1/2" EMT FILL: 0.7493 | , 37% |



| | EQUIPMENT LIST | QTY |
|---|---|-----|
| ① | TRINA SOLAR, TSM-410 DE15M(II) 410W Voc:49.40V Vmp:40.70V Isc:10.59A Imp:10.07A | 60 |
| ② | FRONIUS RAPID RAPID SHUTDOWN BOX-QUATRO MAX. VOLTAGE :600Vdc MAX. NUMBER OF STRINGS :4 MAX. INPUT CURRENT : 25Adc MAX. OUTPUT CURRENT : 25Aac | 2 |

HOME OWNER BUILDER

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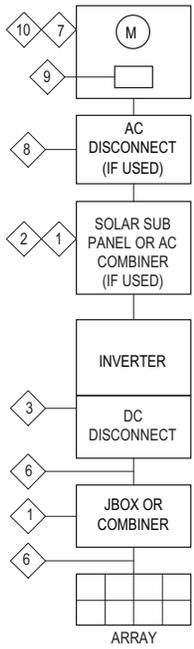
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ELECTRICAL DIAGRAM

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MAXIMUM VOLTAGE 600V
MAXIMUM CIRCUIT CURRENT 25A
MAX RATED OUTPUT CURRENT OF THE CHARGE CONTROLLER OR DC-TO-DC CONVERTER (IF INSTALLED) 25A
 690.53 INVERTER #1

WARNING: PHOTOVOLTAIC POWER SOURCE
 REFLECTIVE STICKER, 690.31(G)(3)(4)

WARNING DUAL POWER SOURCE SECOND SOURCE IS PHOTOVOLTAIC SYSTEM
 ORANGE WARNING AREA, 705.12(B)(3)

INVERTER#1 & #2 PHOTOVOLTAIC AC DISCONNECT
RATED AC OUTPUT CURRENT 52.1A
NOMINAL OPERATING AC VOLTAGE 240V
 690.13(B), 690.54 INVERTER #1

WARNING POWER SOURCE OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE.
 ORANGE WARNING AREA, 705.12(B)(2)(3)(b)

WARNING ELECTRICAL SHOCK HAZARD
 TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION
 ORANGE WARNING AREA, 690.13(B)

WARNING TURN OFF PHOTOVOLTAIC AC DISCONNECT PRIOR TO WORKING INSIDE PANEL
 ORANGE WARNING AREA, 110.27(C)

WARNING ELECTRICAL SHOCK HAZARD
 TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION
 DC VOLTAGE IS ALWAYS PRESENT WHEN SOLAR MODULES ARE EXPOSED TO SUNLIGHT
 ORANGE WARNING AREA, 690.13(B)

PHOTOVOLTAIC DC DISCONNECT
 690.13(B)

RAPID SHUTDOWN SWITCH FOR SOLAR SYSTEM
 REFLECTIVE STICKER, 690.56(C)(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 THE ARRAY

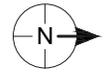
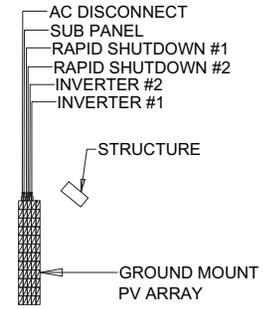
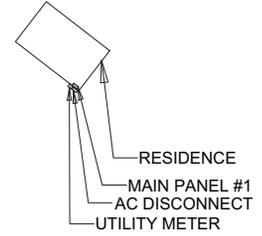
The title "SOLAR PV SYSTEM IS EQUIPPED WITH RAPID SHUTDOWN" shall utilize capitalized characters with a minimum height of 9.5 mm (3/8 in.) in black on yellow background and the remaining characters shall be capitalized with a minimum height of 4.8 mm (3/16 in.) in black on white background. 690.56(C)(1)(a)

MIN.6"X8" PLACARD SHALL BE IN RED COLOR WITH PRINTED IN WHITE TO GO ON MAIN SERVICE PANEL CEC 705.10

CAUTION

POWER TO THIS BUILDING IS ALSO SUPPLIED FROM THE FOLLOWING SOURCES WITH DISCONNECT(S) LOCATED AS SHOWN. DANGEROUS VOLTAGE MAY BE PRESENT AT ALL TIMES.

SW STATE RTE V



"WARNING" PHOTOVOLTAIC ARRAY DISCONNECTION OF NEUTRAL OR GROUNDED CONDUCTORS MAY RESULT IN OVERVOLTAGE ON ARRAY OR INVERTER

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

- ARTICLES 690 AND 705 MARKINGS SHOWN HEREON
- ALL MARKINGS SHALL CONSIST OF THE FOLLOWING:
 - UV RESISTANT SIGN MATERIAL WITH ENGRAVED OR MACHINE PRINTED LETTERS OR ELECTRO-PLATING
 - RED BACKGROUND COLOR WITH WHITE TEXT AND LINE WORK UNO
 - ARIAL FONT
- ALL SIGNS SHALL BE SIZED APPROPRIATELY AND PLACED IN THE LOCATIONS SPECIFIED.
- SIGNS SHALL BE ATTACHED TO THE SERVICE EQUIPMENT USING PERMANENT ADHESIVE, POP-RIVETS, OR SCREWS

HOME OWNER BUILDER

J
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OWNER / ADDRESS

J
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PHONE:

OCCUPANCY R3 /
TYPE 5 STRU.
APN#:

SYSTEM SIZE

22.401 KW-AC
24.600 KW-DC

MODULES :
(60) TRINA SOLAR,
TSM-410DE15M (II) 410W

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WARNING LABELS

PV-07

Mono Multi Solutions

TALLMAX^M

TSM-DE15M(II)



144 HALF-CUT MONOCRYSTALLINE CELLS

390-415W POWER OUTPUT RANGE

20.4% MAXIMUM EFFICIENCY

0/+5W POSITIVE POWER TOLERANCE

Founded in 1992, Trina Solar is the world's leading comprehensive solutions provider for solar energy. We believe close cooperation with our partners is critical to success. Trina Solar now distributes its PV products to over 60 countries all over the world. Trina Solar is able to provide exceptional service to each customer in each market and supplement our innovative, reliable products with the backing of Trina Solar as a strong, bankable partner. We are committed to building strategic, mutually beneficial collaboration with installers, developers, distributors and other partners.

Comprehensive Product And System Certificates

IEC61215/IEC61730/UL1709
IEC61703 Salt Mist Corrosion
IEC62716 Ammonia Corrosion
IEC60068 Blowing Sand
ISO9001:2015/ISO14001:2015/ISO45001



High power output

- Multi busbar technology combined with mono PERC cells
- Reduced BOS costs with higher power bins and 1.500V system voltage
- Consistently high bankability ratings by BNEF, banks and investors



Half-cut cell design brings higher efficiency

- Optimized power output under inter-row shading conditions
- Low thermal coefficients for higher energy yield at elevated operating temperatures
- Reduced interconnection losses



Highly reliable due to stringent quality control

- Over 30 in-house tests (UV, TC, HF, and many more)
- In-house testing goes well beyond certification requirements
- PID resistant
- 2x100% inline EL inspection



Certified to withstand challenging environmental conditions

- Salt Mist Corrosion
- Ammonia Corrosion
- Blowing Sand

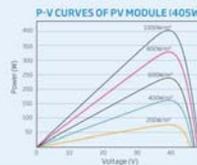
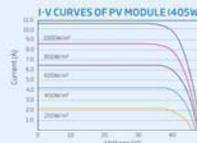
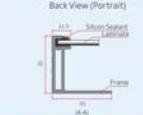
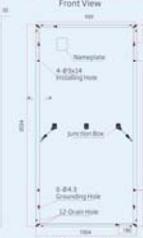
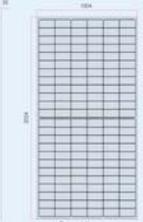


TALLMAX^M

TSM-DE15M(II)

DIMENSIONS OF PV MODULE

TSM-DE15M(II) (unit: mm)



| ELECTRICAL DATA @ STC | TSM-390 DE15M(II) | TSM-395 DE15M(II) | TSM-400 DE15M(II) | TSM-405 DE15M(II) | TSM-410 DE15M(II) | TSM-415 DE15M(II) |
|---------------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Peak Power Watts- P_{max} (W)* | 390 | 395 | 400 | 405 | 410 | 415 |
| Power Output Tolerance- P_{max} (W) | 0/+5 | 0/+5 | 0/+5 | 0/+5 | 0/+5 | 0/+5 |
| Maximum Power Voltage- U_{mp} (V) | 40.0 | 40.1 | 40.3 | 40.5 | 40.7 | 40.9 |
| Maximum Power Current- I_{mp} (A) | 9.75 | 9.86 | 9.92 | 10.0 | 10.07 | 10.15 |
| Open Circuit Voltage- U_{oc} (V) | 48.5 | 48.7 | 49.0 | 49.2 | 49.4 | 49.6 |
| Short Circuit Current- I_{sc} (A) | 10.30 | 10.37 | 10.45 | 10.52 | 10.59 | 10.66 |
| Module Efficiency η (%) | 19.2 | 19.4 | 19.7 | 19.9 | 20.2 | 20.4 |

STC: Irradiance 1000 W/m², Cell Temperature 25 °C, Air Mass AM1.5
*Measuring tolerance: ±3%

| ELECTRICAL DATA @ NMOT | TSM-390 DE15M(II) | TSM-395 DE15M(II) | TSM-400 DE15M(II) | TSM-405 DE15M(II) | TSM-410 DE15M(II) | TSM-415 DE15M(II) |
|-------------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Maximum Power- P_{max} (W) | 294 | 298 | 301 | 305 | 309 | 313 |
| Maximum Power Voltage- U_{mp} (V) | 37.6 | 37.7 | 37.9 | 38.1 | 38.3 | 38.4 |
| Maximum Power Current- I_{mp} (A) | 7.83 | 7.90 | 7.96 | 8.02 | 8.08 | 8.13 |
| Open Circuit Voltage- U_{oc} (V) | 45.6 | 45.8 | 46.1 | 46.3 | 46.5 | 46.7 |
| Short Circuit Current- I_{sc} (A) | 8.30 | 8.36 | 8.43 | 8.48 | 8.54 | 8.60 |

NMOT: Irradiance 800 W/m², Ambient Temperature 20 °C, Wind Speed 1 m/s.

MECHANICAL DATA

| | |
|----------------------|--|
| Solar Cells | Monocrystalline |
| Cell Orientation | 144 cells (6 x 24) |
| Module Dimensions | 2024 x 1004 x 35 mm |
| Weight | 22.8 kg |
| Glass | 3.2 mm, High Transmission, AR Coated Heat Strengthened Glass |
| Encapsulant Material | EVA |
| Backsheet | White |
| Frame | 35 mm Anodized Aluminium Alloy |
| J-Box | IP 68 rated |
| Cables | Photovoltaic Cable 4.0mm ² , Portrait: N 140mm/P 285mm, Landscape: N 1400 mm/P 1400 mm |
| Connector | TS4 |

TEMPERATURE RATINGS

| | |
|---|------------|
| NMOT (Nominal Module Operating Temperature) | 41°C (±3K) |
| Temperature Coefficient of P_{max} | -0.37%/K |
| Temperature Coefficient of U_{oc} | -0.29%/K |
| Temperature Coefficient of I_{sc} | 0.05%/K |

MAXIMUM RATINGS

| | |
|-------------------------|--------------------|
| Operational Temperature | -40 to +85°C |
| Maximum System Voltage | 1500VDC (IEC) |
| Max Series Fuse Rating | 20A |
| Snow Load | 5400 Pa (3600 Pa*) |
| Wind Load | 2400 Pa (1500 Pa*) |

*Design load with safety factor 1.5 (DO NOT connect 1 Fuse in Combiner Box with two or more strings in parallel connection)

PACKAGING CONFIGURATION

| | |
|----------------------------|------------|
| Modules per box: | 30 pieces |
| Modules per 40' container: | 660 pieces |

WARRANTY

| |
|--------------------------------------|
| 10 year Product Workmanship Warranty |
| 25 year Linear Performance Warranty |

(Please refer to product warranty for details)

CAUTION: READ SAFETY AND INSTALLATION INSTRUCTIONS BEFORE USING THE PRODUCT.

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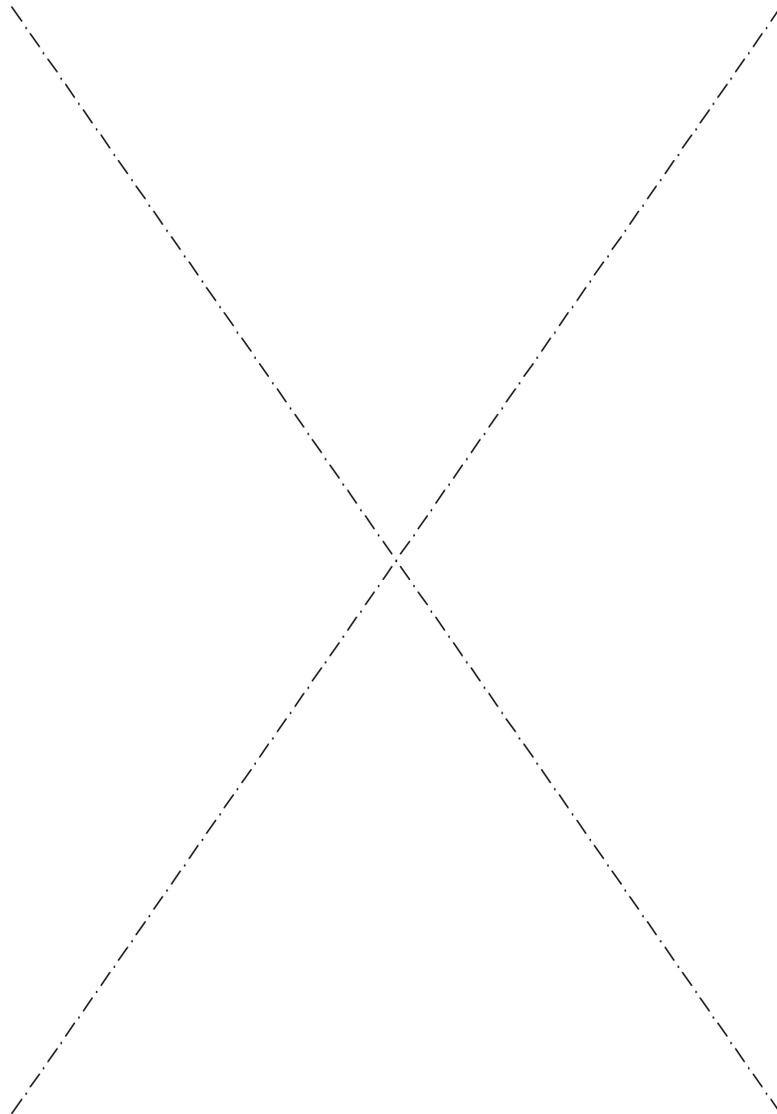
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SPECS

PV-08



CERTIFICATE OF COMPLIANCE

Certificate Number 20140510-E306515
Report Reference E306515-20130329
Issue Date 2014-May-10

Issued to: TRINA SCLAR LTD
2 TIAN HE RD,
ELECTRNICNS PARK NEW DISTRICT,
CHANGZHOU,
JIANGSU 213031 CHINA.

This is to certify that representative samples of PHOTOVOLTAIC MODULES AND PANELS WITH SYSTEM VOLTAGE RATINGS OVER 600 VOLTS
See Addendum page.

Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: Standard for Safety for Flat-Plate Photovoltaic Modules and Panels - UL 1703. Flat-Plate Photovoltaic Modules and Panels - UL/ORD-C1703-01. Guidelines for California's Solar Electric Incentive Programs', CEC-300-2013-008-ED5-CMF. Crystalline Silicon Terrestrial Photovoltaic (PV) Modules - Design Qualification and Type Approval', IEC 61215

Additional Information: See the UL Online Certifications Directory at www.ul.com/database for additional information

Only those products bearing the UL Listing Mark for the US and Canada should be considered as being covered by UL's Listing and Follow-Up Service meeting the appropriate requirements for US and Canada.

The UL Listing Mark for the US and Canada generally includes: the UL in a circle symbol with "C" and

"US" identifiers:  the word "LISTED"; a control number (may be alphanumeric) assigned by UL; and the product category name (product identifier) as indicated in the appropriate UL Directory.

Look for the UL Listing Mark on the product.


William R. Carney, Director, North American Certification Programs
UL LLC

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL. For questions, please contact a local UL Customer Service Representative at www.ul.com/contact



HOME OWNER BUILDER

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OWNER / ADDRESS

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PHONE:

OCCUPANCY R3 /
TYPE 5 STRU.

APN#:

SYSTEM SIZE

22.401 KW-AC
24.600 KW-DC

MODULES :
(60) TRINA SOLAR,
TSM-410DE15M (II) 410W

INVERTER(S) :
(2) FRONIUS PRIMO, 12.5-1 [240V]

DATE: 03/30/21

REVISION :

PAGE INFORMATION

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PV-09

/ Perfect Welding / Solar Energy / Perfect Charging

FRONIUS PRIMO



The transformerless Fronius Primo is the ideal compact single-phase inverter for residential and small-scale commercial applications with power categories from 3.8 to 8.2 kW. In accordance with ESA rules for residential applications, the Fronius Primo can operate efficiently at a maximum input voltage of 600 V. And for increased efficiency and additional cost savings for commercial applications, the Fronius Primo can operate at the maximum input voltage of 1,000 V. Industry-leading features now come standard with the Fronius Primo, including: dual maximum power point tracking, arc fault protection, integrated wireless monitoring and SunSpec Modbus interfaces for seamless monitoring and datalogging via Fronius' online and mobile platform, Fronius Solarweb.

TECHNICAL DATA FRONIUS PRIMO

| GENERAL DATA | FRONIUS PRIMO 3.8 - 8.2 | FRONIUS PRIMO 10.0-15.0 |
|--|---|---|
| Dimensions (width x height x depth) | 16.9 x 24.7 x 8.1 in. / 42.9 x 62.7 x 20.6 cm | 20.1 x 28.5 x 8.9 in. / 51.1 x 72.4 x 20.6 cm |
| Weight | 47.4 lb. / 21.5 kg | 82.5 lb. / 37.4 kg |
| Degree of protection | | NEMA 4X |
| Night time consumption | | < 1 W |
| Inverter topology | | Transformerless |
| Cooling | | Controlled forced ventilation, variable speed fan |
| Installation | | Indoor and outdoor installation |
| Ambient operating temperature range | -40 to 131 F / -40 to 55 C | -40 to 140 F / -40 to 60 C |
| Permitted humidity | | 0 - 100 % |
| DC connection terminals | 2x DC-1, 2x DC-2 and 4x DC screw terminals for solid copper and aluminum (stranded / fine stranded); copper and aluminum | 4x DC-1, 2x DC-2 and 6x DC screw terminals for copper (solid / stranded) or aluminum (solid / stranded) |
| AC connection terminals | | Screw terminals 12 - 6 AWG |
| Reverse Grade Metering | | Optional (ANSI C12.1 accuracy) |
| Certificates and compliance with standards | UL 1741-2015, UL1998 (for functions: AFCI, RCMU and isolation monitoring), IEEE 1547-2003, IEEE 1547.1-2003, ANS/IEEE C62.41, IEC Part 15 A & B, NEC 2014 Article 690, C22.2 No. 107.1-01 (September 2001), UL1699B Issue 2 - 2013, CSA T11.07 Issue 1 - 2013 | UL 1741-2015, UL1998 (for functions: AFCI, RCMU and isolation monitoring), IEEE 1547-2003, IEEE 1547.1-2003, ANS/IEEE C62.41, IEC Part 15 A & B, NEC Article 690-2014, C22.2 No. 107.1-01 (September 2001), UL1699B Issue 2 - 2013, CSA T11.07 Issue 1 - 2013 |
| PROTECTIVE DEVICES | STANDARD WITH ALL PRIMO MODELS | |
| AFCI | | Yes |
| Ground Fault Protection with Isolation Monitor Interrupter | | Yes |
| DC disconnect | | Yes |
| DC reverse polarity protection | | Yes |
| INTERFACES | AVAILABILITY | AVAILABLE WITH ALL FRONIUS PRIMO MODELS |
| USB (A socket) | Standard | Datalogging and inverter update via USB |
| 2x RS422 (B/B5 socket) | Standard | Fronius Solar Net, interface protocol |
| Wi-Fi* Ethernet/Serial/Datalogger and webserver | Optional | Wireless standard 802.11 b/g/n / Fronius Solarweb, SunSpec Modbus TCP, JSON / SunSpec Modbus RTU |
| 3x inputs for digital inputs/outputs | Optional | External relay control |

*The term Wi-Fi® is a registered trademark of the WiFi Alliance.

TECHNICAL DATA FRONIUS PRIMO 3.8-1 TO 8.2-1

| INPUT DATA | PRIMO 3.8-1 | PRIMO 5.0-1 | PRIMO 6.0-1 | PRIMO 7.6-1 | PRIMO 8.2-1 |
|---|----------------------------------|---------------------|---------------------|---------------------|---------------------|
| Max. permitted PV power (kWp) | 5.7 kW | 7.5 kW | 9.0 kW | 11.4 kW | 12.3 kW |
| Max. usable input current (MPPT 1/MPPT 2) | 18 A / 18 A | 18 A / 18 A | 18 A / 18 A | 18 A / 18 A | 18 A / 18 A |
| Total max. DC current | 36 A | | | | |
| Max. admissible input current (MPPT 1/MPPT 2) | 27 A | | | | |
| Operating voltage range | 80 V - 1,000 V | | | | |
| Max. input voltage | 1,000 V | | | | |
| Nominal input voltage | 410 V | 420 V | 420 V | | 420 V |
| Admissible conductor size DC | AWG 14 - AWG 6 | | | | |
| MPPT voltage range | 200 - 800 V | 240 - 800 V | 240 - 800 V | 250 - 800 V | 270 - 800 V |
| Number of MPPT | 2 | | | | |
| OUTPUT DATA | PRIMO 3.8-1 | PRIMO 5.0-1 | PRIMO 6.0-1 | PRIMO 7.6-1 | PRIMO 8.2-1 |
| Max. output power | 240 V: 3,600 W 208 V: 3,000 W | 5,000 W | 6,000 W | 7,600 W | 8,200 W |
| Max. output fault current / Duration | 240 V: 584 A Peak / 154 ms | 584 A Peak / 154 ms | 584 A Peak / 154 ms | 584 A Peak / 154 ms | 584 A Peak / 154 ms |
| Max. continuous output current | 240 V: 15.8 A 208 V: 18.3 A | 20 A | 25.0 A | 31.7 A | 34.2 A |
| Recommended OCPD/AC breaker size | 240 V: 20 A 208 V: 25 A | 30 A | 35 A | 40 A | 45 A |
| Max. efficiency (Line version) | 97.9 % | | | | |
| CEC efficiency (Line version) | 240 V: 95.5 % | 96.5 % | 96.5 % | 97.0 % | 97.0 % |
| Admissible conductor size AC | 200 / 240 V | | | | |
| Grid connection | 200 / 240 V | | | | |
| Frequency | 60 Hz | | | | |
| Total harmonic distortion | + 5.0 % | | | | |
| Power factor (cos φ _{ac}) | 0.95 - 1 ind./cap | | | | |

TECHNICAL DATA FRONIUS PRIMO 10.0-1 TO 15.0-1

| INPUT DATA | PRIMO 10.0-1 | PRIMO 11.4-1 | PRIMO 12.5-1 | PRIMO 15.0-1 |
|---|--|----------------------|----------------------|----------------------|
| Max. permitted PV power (kWp) | 15.00 kW | 17.10 kW | 18.75 kW | 22.50 kW |
| Max. usable input current (MPPT 1/MPPT 2) | | | 33.0 A / 18.0 A | 51 A |
| Total max. DC current | | | 49.5 A / 27.0 A | 80 A |
| Max. admissible input current (MPPT 1/MPPT 2) | | | 80 V - 1,000 V | 1,000 V |
| Operating voltage range | | | 1,000 V | 1,000 V |
| Max. input voltage | | | 655 V | 660 V |
| Nominal input voltage | | | 655 V | 660 V |
| Admissible conductor size DC | AWG 14 - AWG 6 copper direct, AWG 6 aluminum direct, AWG 4 - AWG 2 copper or aluminum with optional input combiner | | | |
| MPPT Voltage Range | 220 - 800 V | 240 - 800 V | 260 - 800 V | 320 - 800 V |
| Number of MPPT | 2 | | | |
| OUTPUT DATA | PRIMO 10.0-1 | PRIMO 11.4-1 | PRIMO 12.5-1 | PRIMO 15.0-1 |
| Max. output power | 240 V: 9,975 W 208 V: 9,995 W | 11,400 W | 12,500 W | 15,000 W |
| Max. output fault current / Duration | 240 V: 916 A Peak / 6.46 ms | 916 A Peak / 6.46 ms | 916 A Peak / 6.46 ms | 916 A Peak / 6.46 ms |
| Max. continuous output current | 240 V: 41.6 A 208 V: 48.1 A | 47.5 A | 52.1 A | 62.5 A |
| Recommended OCPD/AC breaker size | 240 V: 60 A 208 V: 60 A | 60 A | 70 A | 80 A |
| Max. efficiency (Line version) | 97.9 % | | | |
| CEC efficiency (Line version) | 240 V: 96.5 % | 96.5 % | 96.5 % | 97.3 % |
| Admissible conductor size AC | AWG 10 - AWG 2 copper (solid / stranded / fine stranded) ; AWG 6 - AWG 2 copper (solid / stranded) | | | |
| Grid connection | 208 / 240 V | | | |
| Frequency | 60 Hz | | | |
| Total harmonic distortion | + 2.5 % | | | |
| Power factor (cos φ _{ac}) | 0.1 ind./cap. | | | |

Fronius Canada Ltd. / 2875 Argenta Road, Units 3 - 6 / Mississauga, ON L5N 8G6 / www.fronius.ca / 905-288-2100

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OCCUPANCY R3 /
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DATE: 03/30/21

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PV-10

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/ Perfect Welding / Solar Energy / Perfect Charging



RAPID SHUTDOWN BOX

/ The convenient rapid shutdown solution for Fronius inverters.



EASY AND COST-EFFECTIVE NEC 2014 COMPLIANCE

/ The Fronius Rapid Shutdown Box (RSB) provides a convenient solution for NEC 2014 (690.12) compliance, while enhancing overall rooftop and firefighter safety. Low-profile design, a small foot print, installer-friendly mounting and wiring, make the Fronius Rapid Shutdown Box the ultimate solution for all Fronius SnapInverters* in systems up to 600 V. Directly connected to the inverter through the same conduit as the DC homeruns and powered by the array, the Fronius solution minimizes the number of components and eliminates the need for an external power supply and control button.

/ The low profile design allows for installation underneath the modules, ensuring a clean system look. Thanks to the NEMA 4X rating, the box is built for severe outdoor conditions. MC4 connectors, spring loaded terminals and generous wiring space make wiring easy. Rapid Shutdown is triggered when AC is not present at the inverter, rapidly discharging the DC lines to the inverter. An optional method is to install an emergency stop button to open the signal loop.

SLEEK DESIGN

- / Low-profile design that fits underneath a module for clean system look
- / Mounting brackets with multiple mounting options for maximum flexibility
- / NEMA 4X rated for severe outdoor conditions



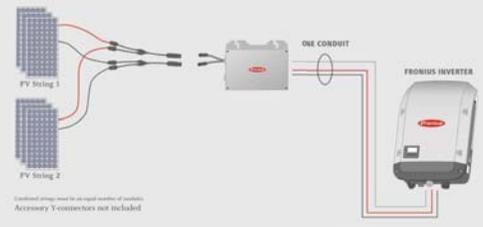
EASY WIRING

- / MC4 connectors, spring loaded terminals and external equipment ground lug make wiring easy
- / 25A rated inputs for up to two strings per input channel (via MC4 "Y" connectors, not included)

SMALL NUMBER OF COMPONENTS

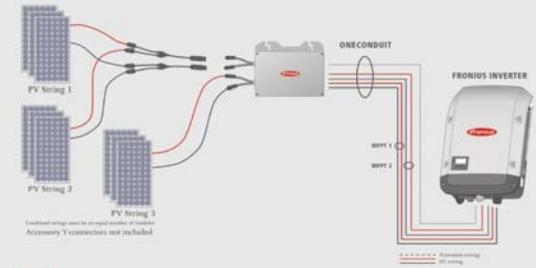
- / Rapid Shutdown Box replaces your junction box
- / PV-powered: no extra power supply needed
- / No additional control button needed

SAMPLE CONFIGURATION DUO



* Excluding the Fronius Symo 15.0-3 20S

SAMPLE CONFIGURATION QUATTRO



TECHNICAL DATA

| GENERAL DATA | RAPID SHUTDOWN BOX-DUO | RAPID SHUTDOWN BOX-QUATTRO |
|---|--|---|
| Maximum voltage | 600 VDC | |
| Start voltage | 80 VDC | |
| Maximum input current | 25A | 25A/ 25A |
| Power Supply | DC (from the PV array) | |
| Typ. self consumption during operation | 2 W | |
| Input Circuits MC-4 | 1 (2 if used with MC-4 Y connector) | 2 (4 if used with MC-4 Y connectors) |
| Max. number of strings | 2 | 4 |
| Max. output current | 25A | 25A/ 25A |
| Output circuits Spring clips | 1 | 2 |
| Max. DC homerun wire size | AWG 8 | |
| Max. communication wire size | AWG 14 | |
| Number of conduit ports | 2 | |
| Conduit size | 3/4in. and 1in. | |
| For use with Amphenol H4/other connectors | Remove MC-4 connectors and replace with UL listed connectors | |
| External hardware required | Appropriate "Y" connectors if combining two strings | |
| Permissible operating temperature range | -40F to +149F (-40C to +65C) | |
| Rel. humidity | 0 - 100% (non condensing) | |
| Maximum installation elevation | 13123 ft (4000m) | |
| Enclosure Type | Type 4X | |
| Unit dimensions | 11.3 x 9.7 x 2.8 inch (286 x 246.5 x 71.5 mm) | 13.8 x 11.5 x 2.8 inch (351 x 293 x 71.5 mm) |
| Unit weight | 4 lbs. (1.8 kg) | 6 lbs. (2.7 kg) |
| Compliance | UL1741; LTR AE 004-2015; FCC 15 Class B | |
| Compatible inverters | Fronius Galvo, Fronius Primo*, Fronius Symo (excluding the Fronius Symo 15.0-3 20S) up to 600V | |

** Note: If Fronius Rapid Shutdown Box is added to an existing system with a Fronius Primo 10.0 to 15.0, make sure that inverter software is up to date. Updates are available through software update file version fw27330.apd and can be easily downloaded at www.fronius-usa.com/PrimoUpdate and installed via USB stick or remote update via Fronius Solarweb. Updates are available through software update file version fw27330.apd and can be easily downloaded at www.fronius-usa.com/PrimoUpdate and installed via USB stick or remote update via Fronius Solarweb.



/ Perfect Welding / Solar Energy / Perfect Charging

THREE BUSINESS UNITS, ONE GOAL: TO SET THE STANDARD THROUGH TECHNOLOGICAL ADVANCEMENT.
What began in 1945 as a one-man operation now sets technological standards in the fields of welding technology, photovoltaics and battery charging. Today, the company has around 3,800 employees worldwide and 1,242 patents for product development show the innovative spirit within the company. Sustainable development means for us to implement environmentally relevant and social aspects equally with economic factors. Our goal has remained constant throughout: to be the innovation leader.

Further information about all Fronius products and our global sales partners and representatives can be found at www.fronius.com

Fronius USA LLC
6797 Fronius Drive
Portage, IN 46368
USA
pv-support-usa@fronius.com
www.fronius.us/pv

MAGAZIN US Version 1/2017



Certificate of Compliance

Certificate: 70043748 Master Contract: 203213
 Project: 70143515 Date Issued: 2017-08-03
 Issued to: Fronius International GmbH
 Guenter Fronius Strasse 1
 Wels-Thalheim, 4600
 AUSTRIA
 Attention: Josef Feichtinger

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: *Sadia Mahboob*
 Sadia Mahboob, P.Eng.

PRODUCTS

CLASS – 5311 09 - POWER SUPPLIES-Distributed Generation Power Systems Equipment
 CLASS – 5311 89 - POWER SUPPLIES - Distributed Generation-Power Systems Equipment - Certified to U.S. Standards

Rapid Shutdown Box, models Single, Duo, Multi, Quattro, rack mounted, permanently connected for use with Fronius Galvo, Primo and Symo series inverters.

For details related to rating, size, configuration, etc. reference should be made to the CSA Certification Record, Annex A, or the descriptive report.

APPLICABLE REQUIREMENTS

CSA-C22.2 No. 107.1-01 - General Use Power Supplies
 UL Std No. 1741 - Second Edition - Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources (Rev. Mar 23, 2016)

Referenced UL CRD for PV Rapid Shutdown Systems and CSA LTR No. AE-004-2015 (revised March 23, 2016) for PV Rapid Shutdown Systems



Supplement to Certificate of Compliance

Certificate: 70043748 Master Contract: 203213

The products listed, including the latest revision described below, are eligible to be marked in accordance with the referenced Certificate.

Product Certification History

| Project | Date | Description |
|----------|------------|--|
| 70143515 | 2017-08-03 | Update report 70043748 to increase thermal rating up to 65C on Model RSB Duo, and RSB Quattro. |
| 70121897 | 2017-05-10 | Update report 70043748 to add two new models Rapid Shut Down Box Duo, and Quattro. |
| 70099516 | 2016-10-04 | Update report 70043748 to include alternate label material and alternate mounting bracket. |
| 70065402 | 2016-05-18 | Update report 70043748 to include Rapid Shutdown Box Multi and accept test data under the CSA SMTC program in conjunction with CSA remote video testing. |
| 70043748 | 2015-11-27 | Evaluation of Fronius Rapid Shutdown Box (PVRSE). Costs shared (15 days of witness testing in Wels Austria, Sept 14 to Oct 2, 2015) with 5 other projects. |

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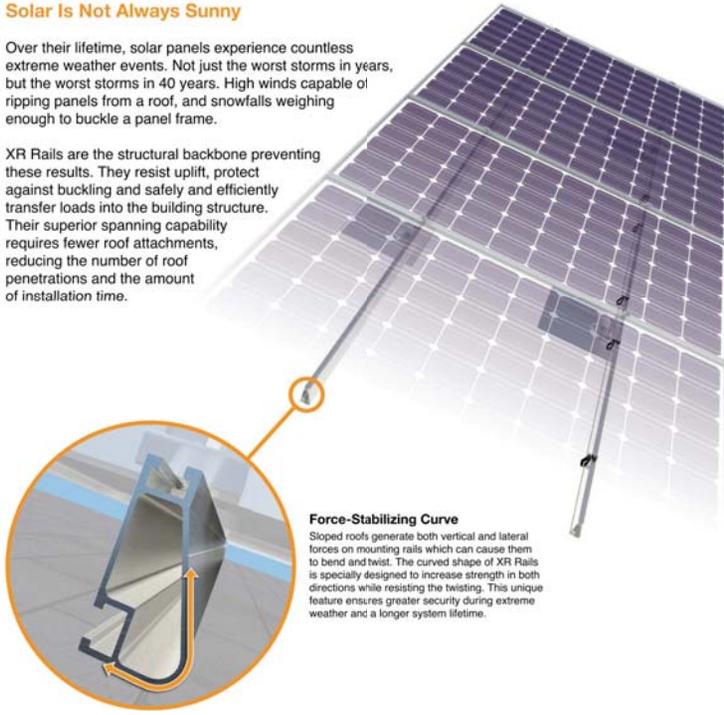
Tech Brief

XR Rail Family

Solar Is Not Always Sunny

Over their lifetime, solar panels experience countless extreme weather events. Not just the worst storms in years, but the worst storms in 40 years. High winds capable of ripping panels from a roof, and snowfalls weighing enough to buckle a panel frame.

XR Rails are the structural backbone preventing these results. They resist uplift, protect against buckling and safely and efficiently transfer loads into the building structure. Their superior spanning capability requires fewer roof attachments, reducing the number of roof penetrations and the amount of installation time.



Force-Stabilizing Curve

Sloped roofs generate both vertical and lateral forces on mounting rails which can cause them to bend and twist. The curved shape of XR Rails is specially designed to increase strength in both directions while resisting the twisting. This unique feature ensures greater security during extreme weather and a longer system lifetime.

Compatible with Flat & Pitched Roofs



XR Rails are compatible with FlashFoot and other pitched roof attachments.



IronRidge offers a range of tilt leg options for flat roof mounting applications.

Corrosion-Resistant Materials

All XR Rails are made of marine-grade aluminum alloy, then protected with an anodized finish. Anodizing prevents surface and structural corrosion, while also providing a more attractive appearance.



XR Rail Family

The XR Rail Family offers the strength of a curved rail in three targeted sizes. Each size supports specific design loads, while minimizing material costs. Depending on your location, there is an XR Rail to match.



XR10

XR10 is a sleek, low-profile mounting rail, designed for regions with light or no snow. It achieves 6 foot spans, while remaining light and economical.

- 6' spanning capability
- Moderate load capability
- Clear anodized finish
- Internal splices available



XR100

XR100 is the ultimate residential mounting rail. It supports a range of wind and snow conditions, while also maximizing spans up to 8 feet.

- 8' spanning capability
- Heavy load capability
- Clear & black anodized finish
- Internal splices available



XR1000

XR1000 is a heavyweight among solar mounting rails. It's built to handle extreme climates and spans 12 feet or more for commercial applications.

- 12' spanning capability
- Extreme load capability
- Clear anodized finish
- Internal splices available

Rail Selection

The following table was prepared in compliance with applicable engineering codes and standards. Values are based on the following criteria: ASCE 7-10, Roof Zone I, Exposure B, Roof Slope of 7 to 27 degrees and Mean Building Height of 30 ft. Visit IronRidge.com for detailed span tables and certifications.

| Load | | Rail Span | | | | | |
|------------|------------|-----------|-------|-------|----|--------|-----|
| Snow (PSF) | Wind (MPH) | 4' | 5' 4" | 6' | 8' | 10' | 12' |
| None | 100 | | | | | | |
| | 120 | | | | | | |
| | 140 | XR10 | | XR100 | | XR1000 | |
| | 160 | | | | | | |
| 10-20 | 100 | | | | | | |
| | 120 | | | | | | |
| | 140 | | | | | | |
| 30 | 100 | | | | | | |
| | 160 | | | | | | |
| 40 | 100 | | | | | | |
| | 160 | | | | | | |
| 50-70 | 160 | | | | | | |
| 80-90 | 160 | | | | | | |

Tech Brief

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Tech Brief

Class A Fire Rating

Background

All roofing products are tested and classified for their ability to resist fire.

Recently, these fire resistance standards were expanded to include solar equipment as part of the roof system. Specifically, this requires the modules, mounting hardware and roof covering to be tested together as a system to ensure they achieve the same fire rating as the original roof covering.

These new requirements are being adopted throughout the country in 2016.

IronRidge Certification

IronRidge was the first company to receive a Class A Fire Rating—the highest possible rating—from Intertek Group plc., a Nationally Recognized Testing Laboratory.

IronRidge Flush Mount and Tilt Mount Systems were tested on sloped and flat roofs in accordance with the new UL 1703 & UL 2703 test standards. The testing evaluated the system's ability to resist flame spread, burning material and structural damage to the roof.

Refer to the table below to determine the requirements for achieving a Class A Fire Rating on your next project.

Fire Testing Process

Test Setup

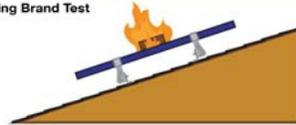
Solar Modules
Solar modules are given a Type classification based on their materials and construction.

Mounting System
Mounting is tested as part of a system that includes type-tested modules and fire-rated roof covering.

Roof Covering
Roof covering products are given a Fire Class Rating of A, B or C based on their tested fire resistance.

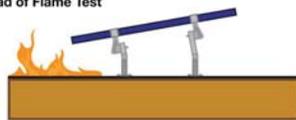


Burning Brand Test



A burning wooden block is placed on module as a fan blows at 12 mph. Flame cannot be seen on underside of roof within 90 minutes.

Spread of Flame Test



Flame at southern edge of roof is aimed up the roof as a fan blows at 12 mph. The flame cannot spread 6 feet or more in 10 minutes.

| System | Roof Slope | Module | Fire Rating* |
|--|-------------|----------------|--------------|
| Flush Mount  | Any Slope | Type 1, 2, & 3 | Class A |
| Tilt Mount  | ≤ 6 Degrees | Type 1, 2, & 3 | Class A |

*Class A rated PV systems can be installed on Class A, B, and C roofs.

Frequently Asked Questions

What is a "module type"?

The new UL1703 standard introduces the concept of a PV module type, based on 4 construction parameters and 2 fire performance parameters. The purpose of this classification is to certify mounting systems without needing to test it with every module.

What roofing materials are covered?

All fire rated roofing materials are covered within this certification including composition shingle, clay and cement tile, metal, and membrane roofs.

What if I have a Class C roof, but the jurisdiction now requires Class A or B?

Generally, older roofs will typically be "grandfathered in", and will not require re-roofing. However, if 50% or more of the roofing material is replaced for the solar installation the code requirement will be enforced.

Where is the new fire rating requirement code listed?

2012 IBC: 1509.7.2 Fire classification. Rooftop mounted photovoltaic systems shall have the same fire classification as the roof assembly required by Section 1505.

Where is a Class A Fire Rating required?

The general requirement for roofing systems in the IBC refers to a Class C fire rating. Class A or B is required for areas such as Wildland Urban Interface areas (WUI) and for very high fire severity areas. Many of these areas are found throughout the western United States. California has the most Class A and B roof fire rating requirements, due to wild fire concerns.

Are standard mid clamps covered?

Mid clamps and end clamps are considered part of the PV "system", and are covered in the certification.

More Resources



Installation Manuals

Visit our website for manuals that include UL 2703 Listing and Fire Rating Classification.
Go to IronRidge.com



Engineering Certification Letters

We offer complete engineering resources and pre-stamped certification letters.
Go to IronRidge.com

Tech Brief

What attachments and flashings are deemed compatible with Class A?

Attachments and their respective flashings are not constituents of the rating at this time. All code-compliant flashing methods are acceptable from a fire rating standpoint.

What mounting height is acceptable?

UL fire testing was performed with a gap of 5", which is considered worst case in the standard. Therefore, the rating is applicable to any module to roof gap.

Am I required to install skirting to meet the fire code?

No, IronRidge achieved a Class A fire rating without any additional racking components.

What determines Fire Classification?

Fire Classification refers to a fire-resistance rating system for roof covering materials based on their ability to withstand fire exposure.

Class A - effective against severe fire exposure
Class B - effective against moderate fire exposure
Class C - effective against light fire exposure

What if the roof covering is not Class A rated?

The IronRidge Class A rating will not diminish the fire rating of the roof, whether Class A, B, or C.

What tilts is the tilt mount system fire rated for?

The tilt mount system is rated for 1 degree and up and any roof to module gap, or mounting height.

HOME OWNER BUILDER

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PHONE:

OWNER / ADDRESS

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PHONE:

OCCUPANCY R3 /
TYPE 5 STRU.
APN#:

SYSTEM SIZE

22.401 KW-AC
24.600 KW-DC

MODULES :
(60) TRINA SOLAR,
TSM-410DE15M (II) 410W

INVERTER(S) :
(2) FRONIUS PRIMO, 12.5-1 [240V]

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Ground Mount System

Datasheet

Datasheet



360° Product Tour
Visit ironridge.com

Substructure

Top Caps



Connect vertical and cross pipes.

Bonded Rail Connectors



Attach and bond Rail Assembly to cross pipes.

Diagonal Braces



Optional Brace provides additional support.

Cross Pipe & Piers



Steel pipes or mechanical tubing for substructure.

Rail Assembly

XR1000 Rails



Curved rails increase spanning capabilities.

UFOs



Universal Fastening Objects bond modules to rails.

Stopper Sleeves



Snap onto the UFO to turn into a bonded end clamp.

CAMO



Bond modules to rails while staying completely hidden.

Resources



Design Assistant

Go from rough layout to fully engineered system. For free. Go to ironridge.com/design



NABCEP Certified Training

Earn free continuing education credits, while learning more about our systems. Go to ironridge.com/training

Mount on all terrains, in no time.

The IronRidge Ground Mount System combines our XF1000 rails with locally-sourced steel pipes or mechanical tubing, to create a cost-effective structure capable of handling any site or terrain challenge.

Installation is simple with only a few structural components and no drilling, welding, or heavy machinery required. In addition, the system works with a variety of foundation options, including concrete piers and driven piles.



Rugged Construction

Engineered steel and aluminum components ensure durability.



PE Certified

Pre-stamped engineering letters available in most states.



UL 2703 Listed System

Meets newest effective UL 2703 standard.



Design Software

Online tool generates engineering values and bill of materials.



Flexible Architecture

Multiple foundation and array configuration options.



25-Year Warranty

Products guaranteed to be free of impairing defects.

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UFO Family of Components

Tech Brief

Simplified Grounding for Every Application

The UFO family of components eliminates the need for separate grounding hardware by bonding solar modules directly to IronRidge XR Rails. All system types that feature the UFO family—Flush Mount, Tilt Mount and Ground Mount—are fully listed to the UL 2703 standard.

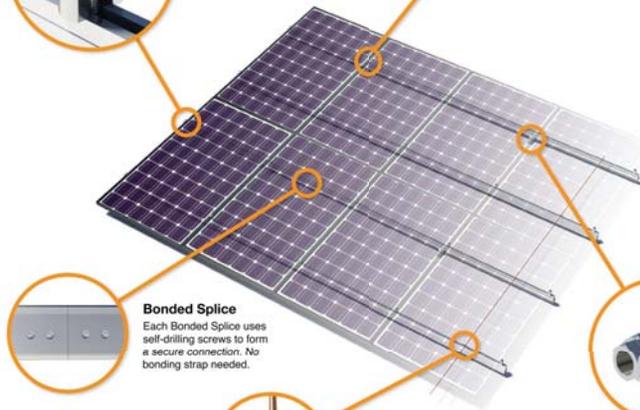
UFO hardware forms secure electrical bonds with both the module and the rail, resulting in many parallel grounding paths throughout the system. This leads to safer and more reliable installations.



Universal Fastening Object (UFO)
The UFO securely bonds solar modules to XR Rails. It comes assembled and lubricated, and can fit a wide range of module heights.



Stopper Sleeve
The Stopper Sleeve snaps onto the UFO, converting it into a bonded end clamp.



Bonded Splice
Each Bonded Splice uses self-drilling screws to form a secure connection. No bonding strap needed.

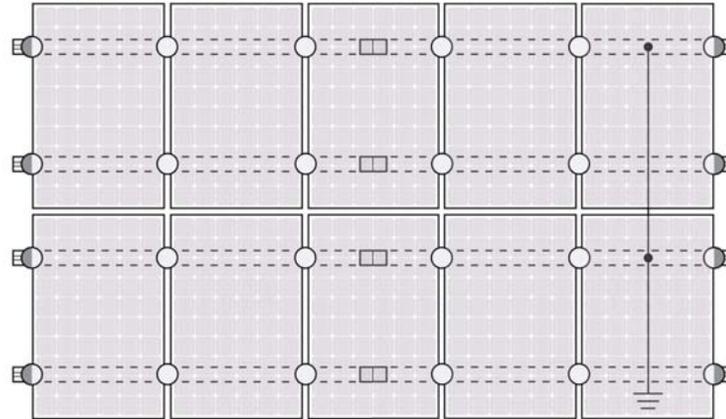


Grounding Lug
A single Grounding Lug connects an entire row of PV modules to the grounding conductor.



Bonded Attachments
The bonding bot attaches and bonds the L-foot to the rail. It is installed with the same socket as the rest of the system.

System Diagram



○ UFO ◐ Stopper Sleeve ● Grounding Lug □ Bonded Splice ⊥ Ground Wire

Approved Enphase microinverters can provide equipment grounding of IronRidge systems, eliminating the need for grounding lugs and field installed equipment ground conductors (EGC). A minimum of two microinverters mounted to the same rail and connected to the same Engage cable is required. Refer to installation manuals for additional details.

UL Certification

The IronRidge Flush Mount, Tilt Mount, and Ground Mount Systems have been listed to UL 2703 by Intertek Group plc.

| Feature | Cross-System Compatibility | | |
|---------------|----------------------------|------------|--------------|
| | Flush Mount | Tilt Mount | Ground Mount |
| XR Rails | ✓ | ✓ | XR1000 Only |
| UFO/Stopper | ✓ | ✓ | ✓ |
| Bonded Splice | ✓ | ✓ | N/A |

Tech Brief

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