

STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

IN RE:	:	
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A PETITION OF SOLARCITY CORPORATION TO APPROVE BY DECLARATORY RULING THE CONSTRUCTION AND OPERATION OF A SOLAR PHOTOVOLTAIC ELECTRIC GENERATING FACILITY AT 7 GRACE WAY, NORTH CANAAN, CONNECTICUT	:	PETITION NO. 1234
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	:	
	:	
	:	JULY 11, 2016

**RESPONSES OF SOLARCITY CORPORATION
TO CONNECTICUT SITING COUNCIL INTERROGATORIES, SET ONE**

On June 28, 2016, the Connecticut Siting Council (“Council”) issued Interrogatories to SolarCity Corporation (“SolarCity”), relating to the above-captioned docket. Below are SolarCity’s responses.

Question No. 1

SolarCity Corporation’s (SolarCity) proposed photovoltaic facility includes a 2.28 megawatt (MW) ground-mounted array and a 0.52 MW roof-mounted array, for a total 2.8 MW. Are these power outputs based on direct current (DC) or alternating current (AC)? If these power outputs are based on DC, provide the MW for each array based on AC.

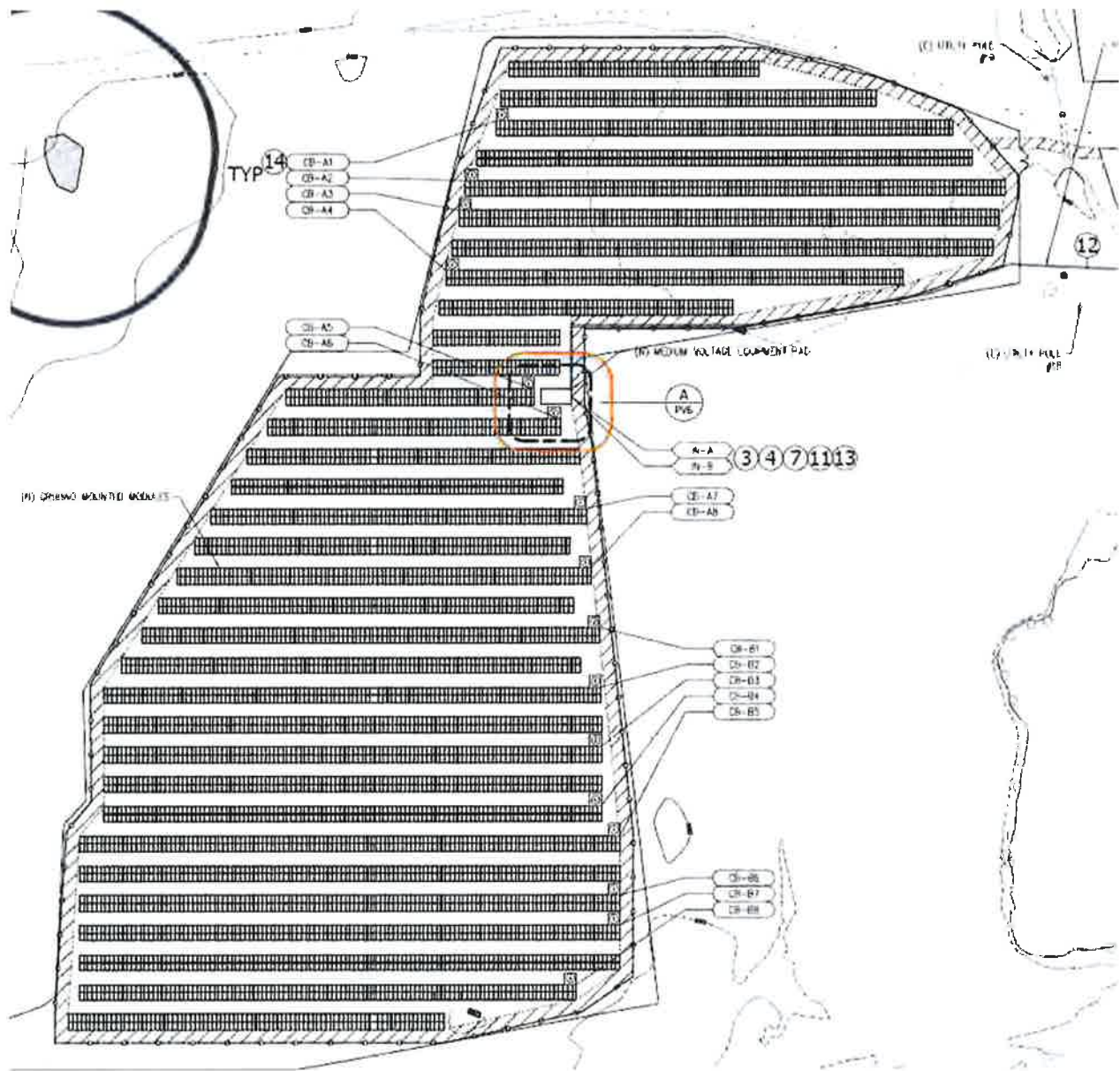
Response

Above mentioned system sizes are DC size. The 2.28 MW ground-mounted array has a 1716 kw AC in size, and the roof-mounted array is at (updated) 468.72 kw DC and 336 kw AC.

Question No. 2

Where would the inverters and transformers, as applicable, be located? What are the

Figure 2



Question No. 3

Provide the specifications sheets for a) proposed inverters and b) solar photovoltaic panels, if available.

Response

See Equipment specification sheets included in Attachment 1.

Question No. 4

In general, in the case of fixed solar panels, does orienting your solar panels to the south provide a sort of balance (in terms of sun exposure) between the sun rising in the east and setting in the west and ultimately result in optimizing (or attempting to maximize) your total annual energy production (in kilowatt-hours) and your capacity factor?

Response

Orienting the solar panels to the south allows Solar City to optimize the total annual energy production from the facility.

Question No. 5

Is it correct to say that the objective of the project, as proposed, is to maximize annual energy production in kilowatt-hours for economic and environmental benefits (e.g. reducing carbon emissions by causing traditional generation including fossil-fueled plants to “ramp down” as renewable power is added to the grid) as opposed to a solar plant designed for peak load shaving?

Response

Yes.

Question No. 6

Would the solar panels provide power directly to serve the Becton, Dickinson & Company? Would the project utilize net metering, or would the solar facility operate in parallel with the grid on the “grid side” of the meter? Explain.

Response

The solar electric system will be tied directly into the main electric infrastructure of the Becton Dickinson (“BD”) facility resulting in a net metering application. Once the solar facility

is operational, the BD facility will first consume the electricity produced by the solar PV system. If the BD facility needs additional electricity, it will draw power from the existing utility service. If the BD facility doesn't use all of the electricity produced by the solar PV system the surplus power will be fed back into the distribution system.

Question No. 7

If applicable, has SolarCity confirmed that Eversource's distribution system can accept any surplus power output? Is a System Impact Study required for the interconnection process? Does the Petitioner have an Interconnection Agreement and with whom?

Response

Utility interconnection application is in process. SolarCity is awaiting the results of the interconnection study from Eversource.

Question No. 8

What is the capacity factor expected of the proposed project to achieve?

Response

Total proposed system size is 2749.08 kW DC, and 2052 kW AC. Capacity factor is therefore 1.3397.

Question No. 9

Would the solar plant have a protection system to shut the plant down in the event of a fault in the feeder(s) that connect(s) the solar plant to the building's electrical system?

Response

The system is equipped with automated relays that will shut down the system in the event of faults in the solar PV system and/or feeders from the arrays to the points of interconnection.

Question No. 10

Approximately how many years is the projected operational life of the facility?

Response

The expected life of the solar electric system is 35 years. The Power Purchase Agreement (“PPA”) between BD and SolarCity has a 20 year term. If BD does not renew the PPA or purchase the solar PV system at the end of the 20 year term the solar electric system will be removed at that time.

Question No. 11

Is a battery storage or other type of energy storage system proposed? Describe the function of lithium-ion battery or other type of storage system. (What prediction methods and reports has SolarCity used to assess total capacity and annual energy production in kilowatt-hours for this project, and how are the proposed batteries or other type of energy storage incorporated into those predictions? Are the batteries or other type of energy storage used to “even out” the energy production, charging during the day and discharging at night, or are they charged during off-peak hours to grant more output during peak hours? Are they simply used to function as a power supply backup?)

Response

No battery storage system is proposed on site.

Question No. 12

For the ground-mounted solar array, approximately how many feet above grade would the top and bottom edges of the solar panels be?

Response

The bottoms of the solar panels are at least 24 inches above grade. The tops of the solar

panels are approximately 8 feet above grade.

Question No. 13

For the rooftop-mounted solar array, approximately how many feet above the rooftop would the top and bottom edges of the solar panels be? Would the rooftop-mounted panels have the same 25 degree tilt as the proposed ground-mounted solar panels or would they be installed at a different angle? Explain.

Response

The bottoms of the roof-mounted solar panels are approximately 2 inches above the roof of the BD building. The top of the solar panels will be approximately 10 inches above the roof. Roof-mounted panels are set at an eight (8) degrees tilt.

Question No. 14

Has a response from the State Historic Preservation Office (SHPO) regarding the May 2016 Cultural Resources Assessment and Reconnaissance Survey been received? If yes, provide a copy of such correspondence.

Response

No response had been received to date.

Question No. 15

Has the State of Connecticut Department of Agriculture purchased any development rights for the proposed site as part of the State Program for the Preservation of Agricultural Land?

Response

No.

Question No. 16

Has the Petitioner received a response from the Connecticut Department of Energy and Environmental Protection (DEEP) regarding State-listed species? If yes, provide a copy of such letter and indicate whether SolarCity would comply with any wildlife impact mitigation measures suggested by DEEP.

Response

To date, the DEEP has not provided a response.

Question No. 17

Is the proposed project located near any Important Bird Areas designated by the Connecticut Audubon Society?

Response

No. The nearest Important Bird Area (the White Memorial Foundation) is located approximately 19.5 miles to the southeast in Litchfield, Connecticut.

Question No. 18

Would grass be planted in the solar field area? If so, what types? Describe the maintenance of the grass/vegetative surface in the fenced solar field area (e.g. proposed mowing schedule).

Response

Yes. All cleared areas would be loamed, seeded and mulched to establish a permanent ground cover of low-growth native grasses. The facility would be mowed four (4) times per year.

Question No. 19

How would vegetative growth be controlled to keep the solar panels clear?

Response

The mowing schedule indicated in the response to Q. 18 above would include the interior perimeter of the fence-enclosed solar PV facility to control the growth of any tall vegetation.

Question No. 20

Would the proposed solar panels utilize a “drip edge” to collect and direct stormwater flows?

Response

No “drip edge” is proposed as part of the solar panel installation. Storm water will fall from solar panels and sheet flow over the ground into the proposed infiltration basins.

Question No. 21

Would the solar panels “heat” rainwater and potentially thermally pollute wetlands?

Response

The solar PV panels will not cause an increase in the temperature of the rainwater runoff and will not thermally pollute the wetlands. The time that the rainwater will come in contact with the solar panels is extremely short due to a 25-degree fixed pitch, and the smooth surface of the panel (minimal friction) as well as the openings between each panel which will reduce the length of the potential flow path. Once the rain water runs off the panels, it will infiltrate into the soil and/or mix with other surface water flowing from the grassed areas around the PV panels. It is important to keep in mind that during rain events the sky will be cloudy, thus significantly reducing the surface temperature of the panels themselves. Finally, the facility has been designed to follow and enhance existing drainage patterns on the BD property and reduce pre-development peak discharge rates by incorporating infiltration basins to collect storm water prior to its discharge. The proposed infiltration basins have been designed to treat more than three (3) times the required water volume at the site and allow the majority of runoff to infiltrate into the ground.

Question No. 22

Would the tree clearing be performed in stages (e.g. five acres at a time), or would the clearing all be performed together as one stage of construction? (Note: Connecticut Department of Energy and Environmental Protection “DEEP” General Permit for the Discharge of Stormwater and Dewatering Wastewaters Associated with Construction Activities states that, “Whenever possible, the site shall be phased to avoid the disturbance of over five acres at a time...”).

Response

All tree clearing will be performed at one time.

Question No. 23

Estimate the amounts of cut and fill in cubic yards for the proposed project.

Response

The installation of the infiltration basins requires the removal of approximately 1000 cubic yards of material. The excavated material will be spread over the area to be cleared for the installation of the solar PV system resulting in less than one inch of fill over the disturbed site area. No excess material will be trucked off site.

Question No. 24

How would the mounting posts (that support the racking system) be driven into the ground? What type of posts are proposed, e.g. wide-flange beams?

Response

Mounting posts will be ASTM A615 Grade 60 billet steel with a minimum 2500 PSI concrete footings. Concrete footings will be installed at a depth of five feet below grade.

Question No. 25

How would the Petitioner handle potential snow accumulation on the panels and its effects of blocking the sunlight?

Response

Snow accumulation will not be cleared from the solar arrays as it will not cause physical harm to the solar PV system. Performance reduction due to snow accumulation has been taken into account in annual kWh production calculation.

Question No. 26

Has any analysis been conducted to determine structural limits of snow accumulation on the solar panels and steel support structures, assuming heavy, wet snow and or ice? What accumulation of snow could the structures handle? Would the Petitioner clear snow from the panels when it approached the limit? Would the responses be the same for both the ground-mounted and roof-mounted solar panels?

Response

Structural analyses on the solar panels and the support structures have been conducted. The solar arrays can be buried in snow without any negative structural consequences. For the ground mounted system, snow removal is not part of standard maintenance protocol. Snow removal is performed on roof mounted systems only when the snow load approaches the maximum allowable weight bearing capacity of the building's roof structure. As the roof mounted systems add only 2.5 pounds per square foot to the structure's collateral load they do not significantly impact roof loading.

Question No. 27

Would the installed solar panels require regular cleaning or other, similar, maintenance?

How would this be accomplished?

Response

As it rains intermittently every month of the year at this location solar panel washing is typically not necessary. In the event that solar panel washing is needed, we would do so with clean water only. Water would be brought to the site by truck using the perimeter access road.

ATTACHMENT 1

THE Trina mount MODULE



PD14.10

PD14.18

72 CELL
MULTICRYSTALLINE MODULE
WITH TRINAMOUNT FRAME

300-315W
POWER OUTPUT RANGE

16.2%
MAXIMUM EFFICIENCY

0~+5W
POWER OUTPUT GUARANTEE

As a leading global manufacturer of next generation photovoltaic products, we believe close cooperation with our partners is critical to success. With local presence around the globe, Trina is able to provide exceptional service to each customer in each market and supplement our innovative, reliable products with the backing of Trina as a strong, bankable partner. We are committed to building strategic, mutually beneficial collaboration with installers, developers, distributors and other partners as the backbone of our shared success in driving Smart Energy Together.

Trina Solar Limited
www.trinasolar.com



Fast and simple to install through drop in mounting solution



Good aesthetics for residential applications



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



Certified to withstand challenging environmental conditions

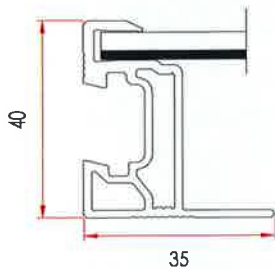
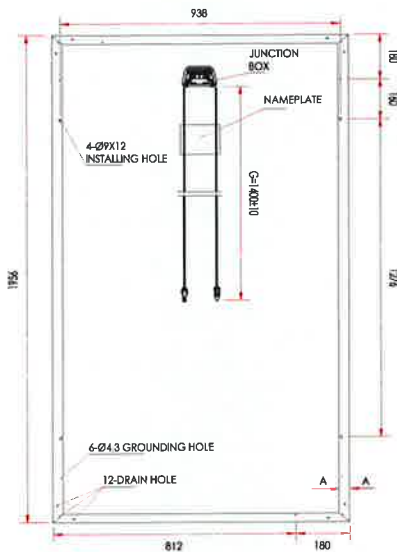
- 2400 Pa wind load
- 2400 Pa snow load

LINEAR PERFORMANCE WARRANTY

10 Year Product Warranty • 25 Year Linear Power Warranty

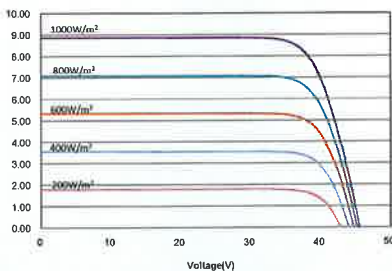


DIMENSIONS OF PV MODULE
unit:mm



Back View

I-V CURVES OF PV MODULE (310W)



CERTIFICATION



ELECTRICAL DATA @ STC

Peak Power Watts-P _{MAX} (Wp)	300	305	310	315
Power Output Tolerance-P _{MAX} (W)	0 ~ +5			
Maximum Power Voltage-V _{MP} (V)	36.2	36.6	37.0	37.1
Maximum Power Current-I _{MPP} (A)	8.28	8.33	8.38	8.51
Open Circuit Voltage-V _{OC} (V)	45.4	45.5	45.5	45.6
Short Circuit Current-I _{SC} (A)	8.77	8.81	8.85	9.00
Module Efficiency η _m (%)	15.5	15.7	16.0	16.2

STC: Irradiance 1000 W/m², Cell Temperature 25°C, Air Mass AM1.5 according to EN 60904-3. Typical efficiency reduction of 4.5% at 200 W/m² according to EN 60904-1.

ELECTRICAL DATA @ NOCT

Maximum Power-P _{MAX} (Wp)	223	227	230	234
Maximum Power Voltage-V _{MP} (V)	33.6	34.0	34.3	34.3
Maximum Power Current-I _{MPP} (A)	6.62	6.68	6.72	6.83
Open Circuit Voltage (V)-V _{OC} (V)	42.1	42.2	42.2	42.3
Short Circuit Current (A)-I _{SC} (A)	7.08	7.11	7.15	7.27

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

MECHANICAL DATA

Solar cells	Multicrystalline 156 × 156 mm (6 inches), 4BB
Cell orientation	72 cells (6 × 12)
Module dimensions	1956 × 992 × 40 mm (77 x 39.05 x 1.57 inches)
Weight	26.5 kg (58.42lbs)
Glass	4.0 mm (0.16 inches), High Transmission, AR Coated Tempered Glass
Backsheet	White
Frame	Silver(PD14.10), Black(PD14.18) Anodized Aluminium Alloy
J-Box	IP 65 or IP 67 rated
Cables	Photovoltaic Technology cable 4.0mm ² (0.006 inches ²) 1400mm (55.12 inches)
Connector	H4 Amphenol
Fire type	UL 1703 Type 2 for Solar City

TEMPERATURE RATINGS

Nominal Operating Cell Temperature (NOCT)	44°C (±2°C)
Temperature Coefficient of P _{MAX}	- 0.41%/°C
Temperature Coefficient of V _{OC}	- 0.32%/°C
Temperature Coefficient of I _{SC}	0.05%/°C

MAXIMUM RATINGS

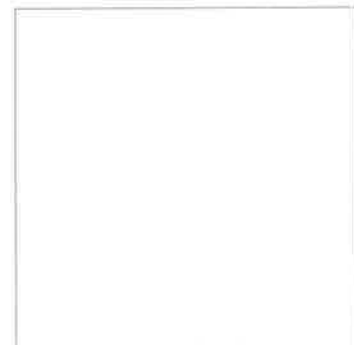
Operational Temperature	-40~+85°C
Maximum System Voltage	1000V DC(IEC) 1000V DC (UL)
Max Series Fuse Rating	15A

WARRANTY

10 year Product Workmanship Warranty
25 year Linear Power Warranty
(Please refer to product warranty for details)

PACKAGING CONFIGURATION

Modules per box: 26 pieces
Modules per 40' container: 572 pieces



TSM_EN_2015_C



SGI 500XTM SGI 750XTM

FEATURES

- Compliant with NEC 2014 690.11 & 690.12 arc fault and rapid shutdown requirements when coupled with ARCCOM combiner
- 98% CEC efficiency
- 1000 VDC
- Parallel power stages
- Fuse and breaker subcombiner options
- Modbus communications
- User-interactive LCD

OPTIONS

- Stainless steel enclosure
- Web-based monitoring
- Built-in cellular connectivity
- AC breaker with shunt trip
- Revenue grade metering
- Air filters
- Uptime guarantee

OPTIONS FOR UTILITIES

- Real power curtailment
- Reactive power control
- Voltage ride through
- Frequency ride through
- Controlled ramp rates
- DMS tie-in
- Plant master controller
- Rule 21 compatible



1000VDC UTILITY-SCALE INVERTERS

The only 1000VDC inverter available that is compliant with NEC 2014 690.11 & 690.12 arc fault and rapid shutdown requirements. Solectria Renewables' next generation of SMARTGRID series inverters are optimized for high efficiency, reliability, and economy. Available in two power classes, 500 kW and 750 kW, these inverters are designed for direct connection to an external transformer for large commercial or utility-scale applications. They are robust, outdoor rated inverters that can be configured as 1 or 1.5 MW Solar Stations. Available utility-scale options include a plant master controller and advanced grid management features such as voltage and frequency ride through, reactive power control, real power curtailment and power factor control. Listed to 1000 VDC, with 98% CEC weighted efficiency, the SGI 500/750XTM inverters set a new standard for large scale power conversion.



Built for the real world

SPECIFICATIONS	SGL 500XTM	SGL 750XTM
DC Input		
Absolute Maximum Input Voltage		1000 VDC
Max Power Input Voltage Range (MPPT)*		545-820 VDC
Operating Voltage Range		545-1000 VDC
Maximum Operating Input Current	965 A	1445 A
Strike Voltage		700 V
AC Output		
Native Output Voltage		380 VAC, 3-Ph
AC Voltage Range		-12/+10%
Continuous Output Power	500 kW	750 kW
Continuous Output Current	760 A	1140 A
Maximum Backfeed Current		0 A
Nominal Output Frequency		60 Hz
Output Frequency Range		57-60.5 Hz
Power Factor		Adjustable - 0.8 to +0.8, factory set at 1
Total Harmonic Distortion (THD) @ Rated Load		< 3%
Efficiency		
Peak Efficiency		98.3%
CEC Efficiency		98.0%
Tare Loss	89 W	123 W
Subcombiner Options		
Fuses		4 to 16 positions, 100-400 A
Breakers		4 to 15 positions, 125-350 A
Temperature		
Ambient Temperature Range (full power)		-40°F to +122°F (-40°C to +50°C)
Storage Temperature Range		-40°F to +122°F (-40°C to +50°C)
Relative Humidity (non-condensing)		5-95%
Data Monitoring		
Optional SolrenView Web-based Monitoring		Integrated
Optional Revenue Grade Monitoring	800 A	1600 A
Optional SolZone™ Sub-Array Monitoring (DC Current)		1 zone per protected input (up to 16 zones)
Optional Cellular Communication		SolrenView AIR
External Communication Interface		RS-485 SunSpec Modbus RTU
Testing & Certifications		
Safety Listings & Certifications		UL 1741/IEEE 1547, CSA C22.2#107.1
Testing Agency		ETL
Warranty		
Standard		5 year
Optional		10, 15, 20 year; extended service agreement; uptime guarantee
Dedicated External Transformer		
Dedicated External Transformer		Required, provided by customer to Solectria's specification
Transformer Type		Self cooled, step up, pad mount
Output Voltage		Typical: 2.4-36.0 kV, 3-Ph
Enclosure		
DC Disconnect (integrated)		Standard
AC Disconnect/Breaker (integrated)		Optional disconnect, breaker or breaker with shunt trip
Dimensions (H x W x D)		82 in. x 109 in. x 41 in. (2080 mm x 2769 mm x 1041 mm)
Shading Set Back		137" (3480 mm) at 30° solar elevation
Shipping Weight	3080 lbs (1397 kg)	3570 lbs (1619 kg)
Enclosure Rating		Type 3R
Enclosure Finish		Polyester powder coated steel; optional 316 stainless steel

*At nominal AC voltage

TECHNICAL DATA FRONIUS SYMO

INPUT DATA	10.0-3 208/240	12.0-3 208/240	10.0-3 480	12.5-3 480	15.0-3 480	17.5-3 480	20.0-3 480	22.7-3 480	24.0-3 480
Recommended PV power (kWp)	8.0 - 13.0	9.5 - 15.5	8.0 - 13.0	10.0 - 16.0	12.0 - 19.5	14.0 - 23.0	16.0 - 26.0	18.0 - 29.5	19.0 - 31.0
Max. usable input current (MPPT1/MPPT 2)	25.0 A / 16.5 A		33.0 A / 25.0 A						
Max. usable input current total (MPPT 1 + MPPT 2)	41.5 A		51 A						
Max. array short circuit current (1.5 * Imax) MPPT 1/MPPT 2)	37.5 A / 24.8 A		49.5 A / 37.5 A						
Integrated DC string fuse holders	6- and 6+								
MPP voltage range	300 - 500 V	300 - 500 V	300 - 800 V	350 - 800 V	350 - 800 V	400 - 800 V	450 - 800 V	500 - 800 V	500 - 800 V
Operating voltage range	200 - 600 V	200 - 600 V	200 - 1000 V	200 - 1000 V	200 - 1000 V	200 - 1000 V	200 - 1000 V	200 - 1000 V	200 - 1000 V
Max. input voltage	600 V	600 V	1000 V	1000 V	1000 V	1000 V	1000 V	1000 V	1000 V
208 V	350 V	350 V	NA	NA	NA	NA	NA	NA	NA
240 V	370 V	370 V	NA	NA	NA	NA	NA	NA	NA
480 V	NA	NA	675 V	685 V	685 V	695 V	710 V	720 V	720 V
Admissible conductor size DC	AWG 14 - AWG 6 copper direct, AWG 6 aluminum direct, AWG 4 - AWG 2 copper or aluminum with input combiner								
Number of MPPT	2								
OUTPUT DATA	10.0-3 208/240	12.0-3 208/240	10.0-3 480	12.5-3 480	15.0-3 480	17.5-3 480	20.0-3 480	22.7-3 480	24.0-3 480
Max. output power	208 V 240 V 480 V	9995 VA 9995 VA NA	NA NA 9995 VA	NA NA 12495 VA	NA NA 14995 VA	NA NA 17495 VA	NA NA 19995 VA	NA NA 22727 VA	NA NA 23995 VA
Max. continuous output current	208 V 240 V	27.7 A 24.0 A	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA
AC breaker size	208 V 240 V 480 V	35 A 30 A NA	NA NA 15 A	NA NA 20 A	NA NA 25 A	NA NA 30 A	NA NA 30 A	NA NA 35 A	NA NA 40 A
Max. Efficiency	98.0 %								
CEC Efficiency	98.1 %								
Admissible conductor size AC	98.1 %								
Grid connection	208 / 240 V	208 / 240 V	480 V Delta + N**	480 V Delta + N**	480 V Delta + N**	480 V Delta + N**	480 V Delta + N**	480 V Delta + N**	480 V Delta + N**
Frequency	60 Hz								
Total harmonic distortion	< 1.75 %								
Power factor	0 - 1 ind./cap.								
INTERFACES	AVAILABLE WITH ALL FRONIUS SYMO MODELS								
USB (A socket)	Datalogging and inverter update possible via USB								
2x RS422 (RJ45 socket)	Fronius Solar Net, interface protocol								
Wi-Fi/Internet/Serial/ Datalogger and webserver	Wireless standard 802.11 b/g/n / Fronius Solarweb, SunSpec, Modbus TCP, JSON / SunSpec Modbus RTU								
6 inputs and 4 digital I/Os	Load management; signaling, multipurpose I/O								
**+N for sensing purposes - no current carrying conductor.									

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/ Perfect Welding / Solar Energy / Perfect Charging

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/ Whether welding technology, photovoltaics or battery charging technology - our goal is clearly defined: to be the innovation leader. With around 3,000 employees worldwide, we shift the limits of what's possible - our record of over 1,000 granted patents is testimony to this. While others progress step by step, we innovate in leaps and bounds. Just as we've always done. The responsible use of our resources forms the basis of our corporate policy.

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