

Exhibit A

Equipment Specification Sheets

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- 9. Power Electronics**
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- 12. TMEIC**
- 13. Prolec**
- 14. Powin Energy**

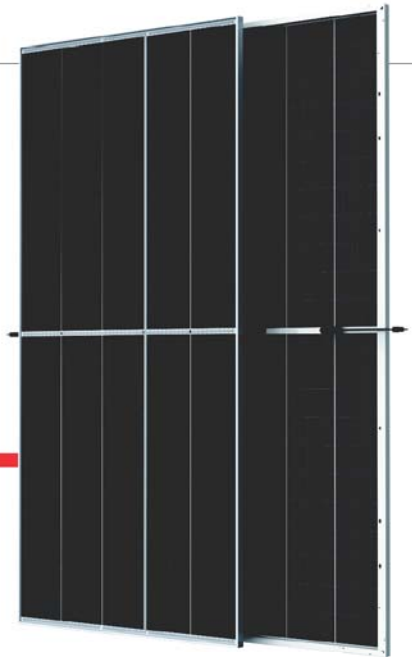
Exhibit A

Equipment Specification Sheets

1. Trina Solar

THE Vertex

BIFACIAL DUAL GLASS MONOCRYSTALLINE MODULE



550W

MAXIMUM POWER OUTPUT

21.0%

MAXIMUM EFFICIENCY

0~+5W

POSITIVE POWER TOLERANCE

Founded in 1997, Trina Solar is the world's leading total solution provider for solar energy. With local presence around the globe, Trina Solar is able to provide exceptional service to each customer in each market and deliver our innovative, reliable products with the backing of Trina as a strong, bankable brand. Trina Solar now distributes its PV products to over 100 countries all over the world. We are committed to building strategic, mutually beneficial collaborations with installers, developers, distributors and other partners in driving smart energy together.

Comprehensive Products and System Certificates

IEC61215/IEC61730/IEC61701/IEC62716
ISO 9001: Quality Management System
ISO 14001: Environmental Management System
ISO14064: Greenhouse Gases Emissions Verification
ISO45001: Occupational Health and Safety Management System



Trina solar

PRODUCTS

TSM-DEG19C.20

POWER RANGE

530-550W



High customer value

- Lower LCOE (Levelized Cost Of Energy), reduced BOS (Balance of System) cost, shorter payback time
- Lowest guaranteed first year and annual degradation; extended 30-year warranty
- Designed for compatibility with existing mainstream system components
- Higher return on Investment



High power up to 550W

- Up to 21.0% module efficiency with high density interconnect technology
- Multi-busbar technology for better light trapping effect, lower series resistance and improved current collection



High reliability

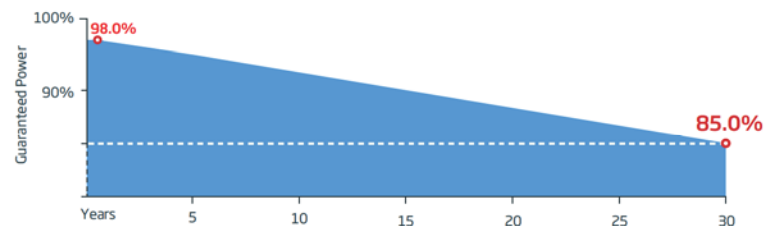
- Minimized micro-cracks with innovative non-destructive cutting technology
- Ensured PID resistance through cell process and module material control
- Resistant to harsh environments such as salt, ammonia, sand, high temperature and high humidity areas
- Mechanical performance up to 5400 Pa positive load and 2400 Pa negative load
- Certificated to fire class A

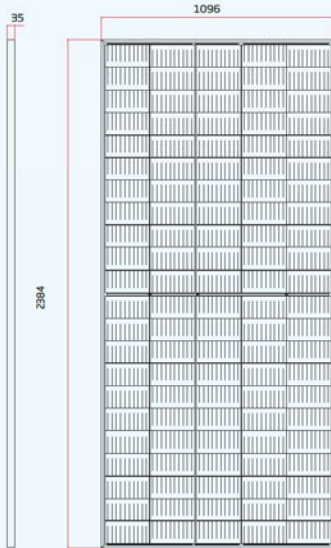
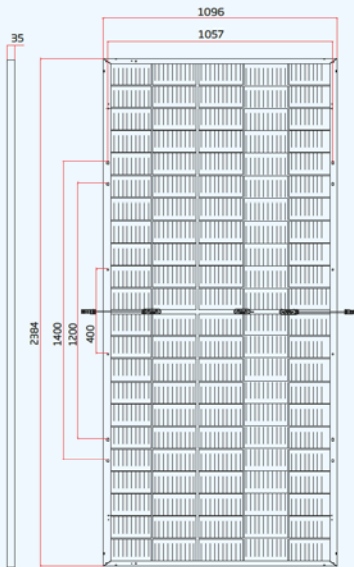
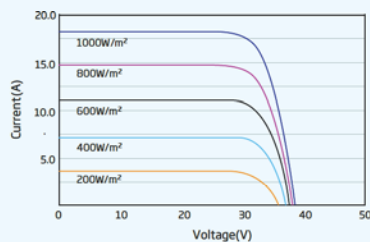
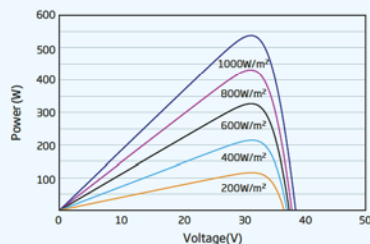


High energy yield

- Excellent IAM (Incident Angle Modifier) and low irradiation performance, validated by 3rd party certifications
- The unique design provides optimized energy production under inter-row shading conditions
- Lower temperature coefficient (-0.34%) and operating temperature
- Up to 25% additional power gain from back side depending on albedo

Trina Solar's Vertex Bifacial Dual Glass Performance Warranty



DIMENSIONS OF PV MODULE(mm)

Front View

Back View
I-V CURVES OF PV MODULE(540 W)

P-V CURVES OF PV MODULE(540W)

ELECTRICAL DATA (STC)

Peak Power Watts- P_{MAX} (Wp)*	530	535	540	545	550
Power Tolerance- P_{MAX} (W)	0 ~ +5				
Maximum Power Voltage- V_{MPP} (V)	31.0	31.2	31.4	31.6	31.8
Maximum Power Current- I_{MPP} (A)	17.11	17.16	17.21	17.24	17.29
Open Circuit Voltage- V_{OC} (V)	37.3	37.5	37.7	37.9	38.1
Short Circuit Current- I_{SC} (A)	18.19	18.24	18.30	18.35	18.39
Module Efficiency η_m (%)	20.3	20.5	20.7	20.9	21.0

STC: Irradiance 1000W/m², Cell Temperature 25°C, Air Mass AM1.5.

*Measuring tolerance: $\pm 3\%$.

Electrical characteristics with different power bin (reference to 10% Irradiance ratio)

Total Equivalent power - P_{MAX} (Wp)	567	573	578	583	589
Maximum Power Voltage- V_{MPP} (V)	31.0	31.2	31.4	31.6	31.8
Maximum Power Current- I_{MPP} (A)	18.31	18.36	18.41	18.45	18.50
Open Circuit Voltage- V_{OC} (V)	37.3	37.5	37.7	37.9	38.1
Short Circuit Current- I_{SC} (A)	19.46	19.52	19.58	19.63	19.68
Irradiance ratio (rear/front)	10%				

Power Bifaciality: 70 \pm 5%.

ELECTRICAL DATA (NOCT)

Maximum Power- P_{MAX} (Wp)	401	405	409	413	416
Maximum Power Voltage- V_{MPP} (V)	28.8	29.0	29.2	29.4	29.5
Maximum Power Current- I_{MPP} (A)	13.93	13.97	14.02	14.08	14.10
Open Circuit Voltage- V_{OC} (V)	35.1	35.3	35.5	35.7	35.9
Short Circuit Current- I_{SC} (A)	14.66	14.70	14.75	14.79	14.82

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

MECHANICAL DATA

Solar Cells	Monocrystalline
No. of cells	110 cells
Module Dimensions	2384 \times 1096 \times 35 mm (93.86 \times 43.15 \times 1.38 inches)
Weight	32.6 kg (71.9 lb)
Front Glass	2.0 mm (0.08 inches), High Transmission, AR Coated Heat Strengthened Glass
Encapsulant material	POE/EVA
Back Glass	2.0 mm (0.08 inches), Heat Strengthened Glass (White Grid Glass)
Frame	35mm(1.38 inches) Anodized Aluminium Alloy
J-Box	IP 68 rated
Cables	Photovoltaic Technology Cable 4.0mm ² (0.006 inches ²), Portrait: 280/280 mm(11.02/11.02 inches) Landscape: 2050/2050 mm(80.71/80.71 inches)
Connector	MC4 EV02 / TS4*

*Please refer to regional datasheet for specified connector.

TEMPERATURE RATINGS

NOCT(Nominal Operating Cell Temperature)	43°C ($\pm 2^\circ\text{C}$)
Temperature Coefficient of P_{MAX}	-0.34%/°C
Temperature Coefficient of V_{OC}	-0.25%/°C
Temperature Coefficient of I_{SC}	0.04%/°C

(Do not connect Fuse in Combiner Box with two or more strings in parallel connection)

WARRANTY

12 year Product Workmanship Warranty
30 year Power Warranty
2% first year degradation
0.45% Annual Power Attenuation

(Please refer to product warranty for details)

MAXIMUM RATINGS

Operational Temperature	-40~+85°C
Maximum System Voltage	1500V DC (IEC)
Max Series Fuse Rating	35A

PACKAGING CONFIGURATION

Modules per box: 31 pieces
Modules per 40' container: 558 pieces

Exhibit A

Equipment Specification Sheets

2. First Solar



INDUSTRY BENCHMARK SOLAR MODULES

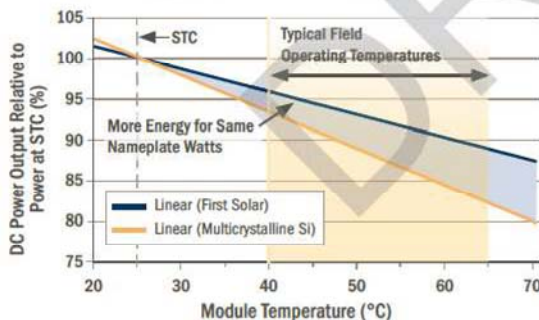
As a global leader in PV energy, First Solar's advanced thin film solar modules have set the industry benchmark with over 17 gigawatts (GW) installed worldwide and a proven performance advantage over conventional crystalline silicon solar modules. Generating more energy than competing modules with the same power rating, First Solar's Series 6™ and Series 6A™ PV Modules deliver superior performance and reliability to our customers. First Solar's Series 6™ and Series 6A™ PV Modules provide faster installation times and lower installed costs with a form factor similar to crystalline silicon modules.



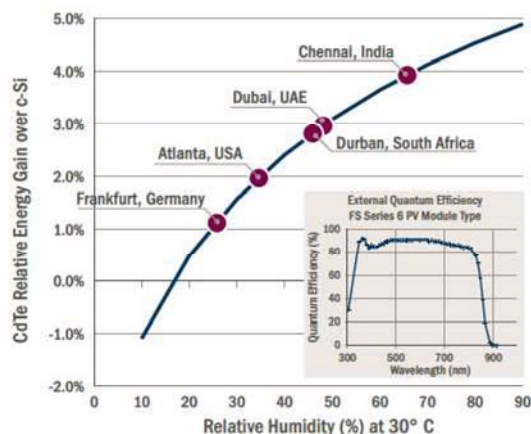
PROVEN ENERGY YIELD ADVANTAGE

- More energy than conventional c-Si with the same power in hot, humid climates
- Anti-reflective coated glass (Series 6A™) enhances energy production
- Visit PlantPredict.com - The only Energy Prediction Software designed for Utility Scale PV

Superior Temperature Coefficient



Superior Spectral Response



REDUCED INSTALLATION COSTS

- Easily adapts to 3rd party structures
- Single frame type for Fixed Tilt and Tracker
- More watts per connection than 72-cell multicrystalline modules

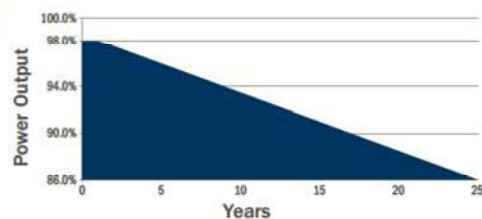


ADVANCED PERFORMANCE & RELIABILITY

- Independently certified for reliable performance in high temperature, high humidity, extreme desert and coastal environments based on accelerated life and stress tests
- Recycling services available through First Solar's industry-leading recycling program or customer-selected third party



MODULE WARRANTY¹

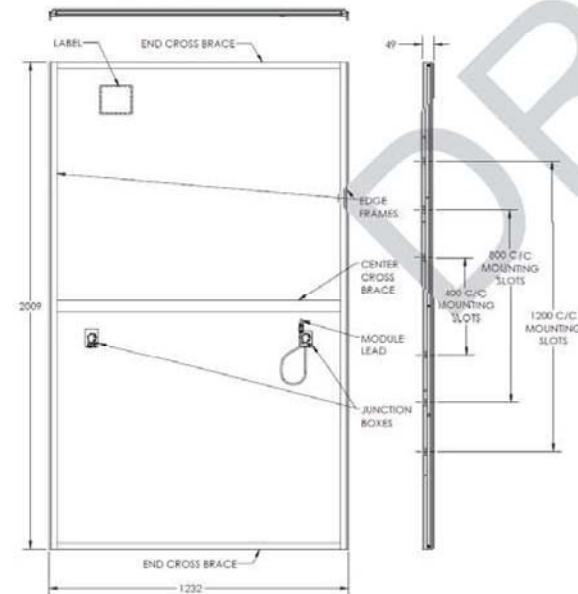


- 25-Year Linear Performance Warranty²
- 10-Year Limited Product Warranty

FIRST SOLAR SERIES 6™

MECHANICAL DESCRIPTION		MODEL TYPES AND RATINGS AT STANDARD TEST CONDITIONS (1000W/m², AM 1.5, 25°C) ¹							
Length	2009 mm	NOMINAL VALUES		FS-6420 FS-6420A	FS-6425 FS-6425A	FS-6430 FS-6430A	FS-6435 FS-6435A	FS-6440 FS-6440A	FS-6445 FS-6445A
Width	1232 mm								
Laminate Thickness	5.4 mm	Nominal Power ⁴ (-0/+5%)	P _{MPP} (W)	420.0	425.0	430.0	435.0	440.0	445.0
Area	2.47 m²	Efficiency (%)	%	17.0	17.2	17.4	17.6	17.8	18.0
Module Weight	35 kg	Voltage at P _{MAX}	V _{MPP} (V)	178.5	179.4	180.3	181.2	182.0	182.8
Leadwire ⁵	2.5 mm², 51.5 cm (+) & Bulkhead (-)	Current at P _{MAX}	I _{MPP} (A)	2.35	2.37	2.38	2.40	2.42	2.43
Connectors	TBD	Open Circuit Voltage	V _{OC} (V)	214.6	215.0	215.3	215.7	216.1	216.5
Bypass Diode	None	Short Circuit Current	I _{SC} (A)	2.62	2.63	2.63	2.64	2.65	2.65
Cell Type	Thin-film CdTe semiconductor, up to 260 cells	Maximum System Voltage	V _{SYs} (V)	1500 ⁶					
Frame Material	Anodized Aluminum	Limiting Reverse Current	I _R (A)	6.0					
Front Glass	2.8 mm heat strengthened	Maximum Series Fuse	I _{CF} (A)	6.0					
Back Glass	2.2 mm heat strengthened	RATINGS AT NOMINAL OPERATING CELL TEMPERATURE OF 45°C (800W/m², 20°C air temperature, AM 1.5, 1m/s wind speed) ³							
Encapsulation	Laminate material with edge seal	Nominal Power	P _{MPP} (W)	317.1	320.9	324.7	328.4	332.3	336.1
Frame to Glass Adhesive	Silicone	Voltage at P _{MAX}	V _{MPP} (V)	166.9	168.0	169.1	169.3	170.4	171.5
Wind Load ⁷	2400 Pa	Current at P _{MAX}	I _{MPP} (A)	1.90	1.91	1.92	1.94	1.95	1.96
Snow Load ⁷	5400 Pa	Open Circuit Voltage	V _{OC} (V)	202.6	203.0	203.3	203.7	204.0	204.4
		Short Circuit Current	I _{SC} (A)	2.12	2.12	2.12	2.13	2.13	2.14
		TEMPERATURE CHARACTERISTICS							
		Module Operating Temperature Range	(°C)	-40 to +85					
		Temperature Coefficient of P _{MPP}	T _K (P _{MPP})	-0.28%/K [Temperature Range: 298.15 K to 348.15 K]					
		Temperature Coefficient of V _{OC}	T _K (V _{OC})	-0.28%/K					
		Temperature Coefficient of I _{SC}	T _K (I _{SC})	+0.04%/K					

MECHANICAL DRAWING



Install in portrait only

- Limited power output and product warranties subject to warrant terms and conditions.
- Ensures 98% rated power in first year, -0.5%/year through year 25.
- All ratings $\pm 10\%$, unless specified otherwise. Specifications are subject to change.
- Measurement uncertainty applies.
- Minimum leadwire length from junction box exit to connector mating surface.
- IEC 61730-1: 2016 Class II | UL 1703 1000V listed
- See User Guide
- Testing Certifications/Listings pending.

Disclaimer

The information included in this Module Datasheet is subject to change without notice and is provided for informational purposes only. No contractual rights are established or should be inferred because of user's reliance on the information contained in this Module Datasheet. Please refer to the appropriate Module User Guide and Module Product Specification document for more detailed technical information regarding module performance, installation and use.

The First Solar logo, First Solar™, and all products denoted with * are registered trademarks, and those denoted with a ™ are trademarks of First Solar, Inc.

PACKAGING INFORMATION

Modules Per Pallet	26
Pallet Weight	1025 kg
Pallet Dimensions (L x W x H)	2200 x 1300 x 1150 mm (86 x 51 x 45 in)
Pallets per 40' Container	18

CERTIFICATIONS AND TESTS⁸

IEC	61215 & 61730 1500V, CE
IEC	61701 Salt Mist Corrosion
	60068-2-68 Dust and Sand Resistance
UL	UL 1703 1500V Listed ⁶
	UL Construction and Fire Performance PV Module Type [TBD]
Regional Certifications	CSI Eligible FSEC MCS CEC Australia
	JET SII InMetro
Extended Durability Tests	PID Resistant Thresher Test
	Long-Term Sequential ATLAS 25+
Quality	ISO 9001:2008 & 14001:2004

Exhibit A

Equipment Specification Sheets

3. JA Solar

Harvest the Sunshine

DEEP BLUE 3.0

Mono

550W MBB Bifacial Mono PERC
Half-cell Double Glass Module
JAM72D30 525-550/MB Series

Introduction

Assembled with 11BB bifacial PERCUM cells and half-cell configuration, these double glass modules have the capability of converting the incident light from the rear side together with the front side into electricity, providing higher output power, lower temperature coefficient, less shading loss, as well as enhanced tolerance for mechanical loading.



Higher output power



More reliable, more stable
power generation



Less shading effect

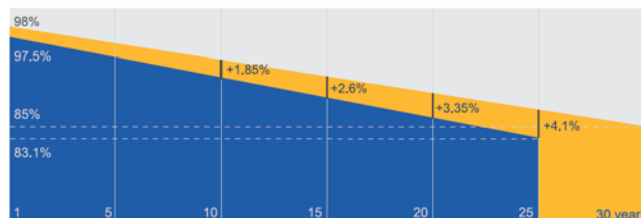


Lower temperature coefficient

Superior Warranty

- 12-year product warranty
- 30-year linear power output warranty

0.45% Annual Degradation
Over 30 years



■ Bifacial double glass module linear power warranty

■ Standard module linear power warranty

Comprehensive Certificates

- IEC 61215, IEC 61730, UL 61215, UL 61730
- ISO 9001: 2015 Quality management systems
- ISO 14001: 2015 Environmental management systems
- ISO 45001: 2018 Occupational health and safety management systems
- IEC TS 62941: 2016 Terrestrial photovoltaic (PV) modules – Guidelines for increased confidence in PV module design qualification and type approval



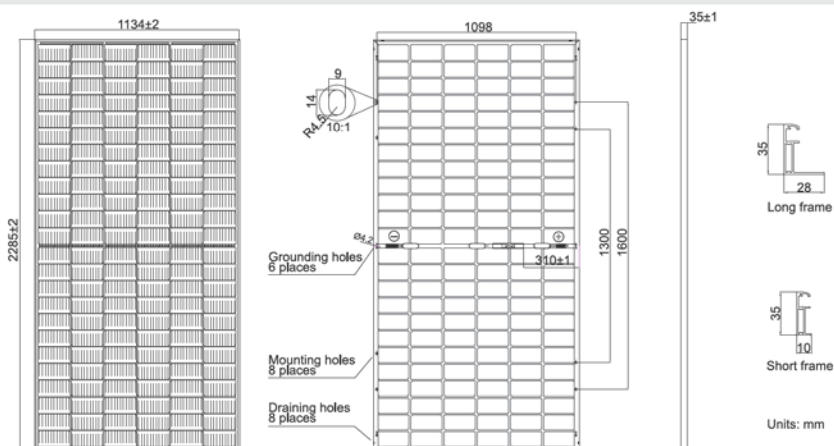
JA SOLAR

www.jasolar.com

Specifications subject to technical changes and tests.
JA Solar reserves the right of final interpretation.



MECHANICAL DIAGRAMS



Remark: customized frame color and cable length available upon request

SPECIFICATIONS

Cell	Mono
Weight	31.6kg±3%
Dimensions	2285±2mm×1134±2mm×35±1mm
Cable Cross Section Size	4mm ² (IEC), 12 AWG(UL)
No. of cells	144(6×24)
Junction Box	IP68, 3 diodes
Connector	QC 4.10-35
Cable Length (Including Connector)	Portrait:300mm(+)/400mm(-); Landscape:1200mm(+)/1200mm(-)
Front Glass/Back Glass	2.0mm/2.0mm
Packaging Configuration	31pcs/Pallet, 620pcs/40ft Container

ELECTRICAL PARAMETERS AT STC

TYPE	JAM72D30 -525/MB	JAM72D30 -530/MB	JAM72D30 -535/MB	JAM72D30 -540/MB	JAM72D30 -545/MB	JAM72D30 -550/MB
Rated Maximum Power(P _{max}) [W]	525	530	535	540	545	550
Open Circuit Voltage(V _{oc}) [V]	49.15	49.30	49.45	49.60	49.75	49.90
Maximum Power Voltage(V _{mp}) [V]	41.15	41.31	41.47	41.64	41.80	41.96
Short Circuit Current(I _{sc}) [A]	13.65	13.72	13.79	13.86	13.93	14.00
Maximum Power Current(I _{mp}) [A]	12.76	12.83	12.90	12.97	13.04	13.11
Module Efficiency [%]	20.3	20.5	20.6	20.8	21.0	21.2
Power Tolerance	0~+5W					
Temperature Coefficient of I _{sc} (α _{Isc})	+0.045%/°C					
Temperature Coefficient of V _{oc} (β _{Voc})	-0.275%/°C					
Temperature Coefficient of P _{max} (γ _{Pmp})	-0.350%/°C					
STC	Irradiance 1000W/m ² , cell temperature 25°C, AM1.5G					

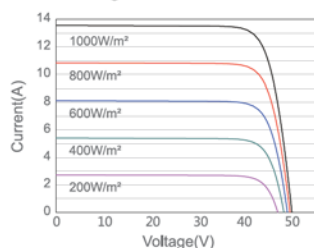
Remark: Electrical data in this catalog do not refer to a single module and they are not part of the offer. They only serve for comparison among different module types.

ELECTRICAL CHARACTERISTICS WITH DIFFERENT POWER RANGES
(REFERENCE TO 10% SOLAR ILLUMINANCE RATIO)

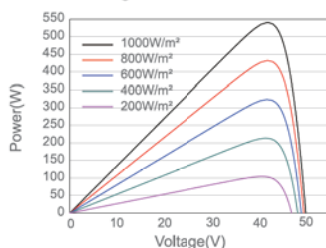
TYPE	JAM72D30 -525/MB	JAM72D30 -530/MB	JAM72D30 -535/MB	JAM72D30 -540/MB	JAM72D30 -545/MB	JAM72D30 -550/MB	OPERATING CONDITIONS	
Rated Max Power(P _{max}) [W]	562	567	572	578	583	589	Maximum System Voltage	1500V DC
Open Circuit Voltage(V _{oc}) [V]	49.54	49.67	49.80	49.93	50.03	50.21	Operating Temperature	-40°C~+85°C
Max Power Voltage(V _{mp}) [V]	41.53	41.77	41.99	42.24	42.43	42.67	Maximum Series Fuse Rating	30A
Short Circuit Current(I _{sc}) [A]	14.34	14.39	14.45	14.50	14.56	14.63	Maximum Static Load, Front* Maximum Static Load, Back*	5400Pa(112 lb/ft ²) 2400Pa(50 lb/ft ²)
Max Power Current(I _{mp}) [A]	13.52	13.58	13.63	13.69	13.74	13.79	NOCT	45±2°C
Bifaciality=P _{max, rear} /Rated P _{max, front}							Bifaciality	70%±10%
							Fire Performance	UL Type 29

CHARACTERISTICS

Current-Voltage Curve JAM72D30-540/MB



Power-Voltage Curve JAM72D30-540/MB



Current-Voltage Curve JAM72D30-540/MB

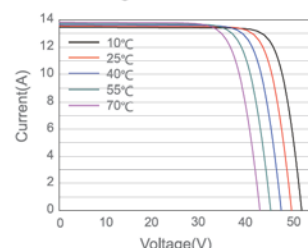


Exhibit A

Equipment Specification Sheets

4. Jinko Solar

Bifacial HC 72M 520-540 Watt

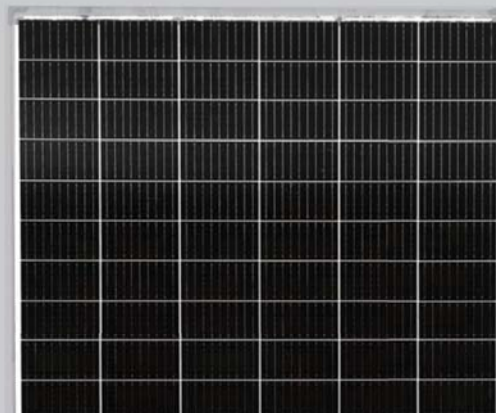
MONOCRYSTALLINE MODULE

Positive power tolerance of 0~+3%

ISO9001:2015, ISO14001:2015, ISO45001:2018
certified factory.

IEC61215, IEC61730, certified products.

TIGER Pro



KEY FEATURES



Multi Busbar Solar Cell

MBB solar cell adopts new technology to improve the efficiency of modules, offers a better aesthetic appearance, making it perfect for rooftop installation.



PID Resistance

Excellent Anti-PID performance guarantee limited power degradation for mass production.



Higher Lifetime Power Yield:

0.45% annual power degradation
30 year linear power warranty



Light-weight design:

Light-weight design using transparent backsheet for easy installation and low BOS cost.



Higher power output:

Module power increases 5-25% generally (per different reflective condition)
lower LCOE and higher IRR

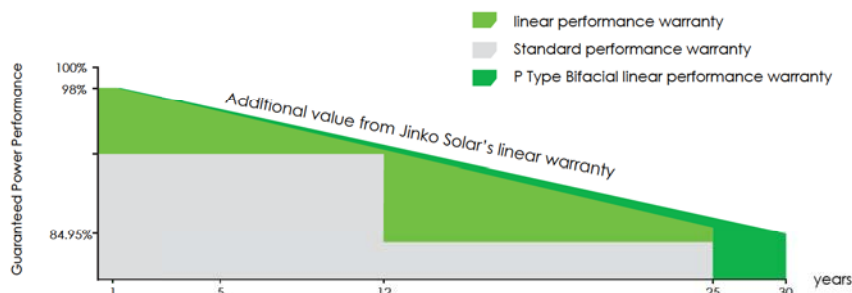


Better low-light performance:

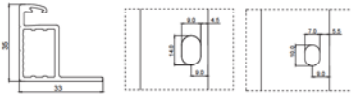
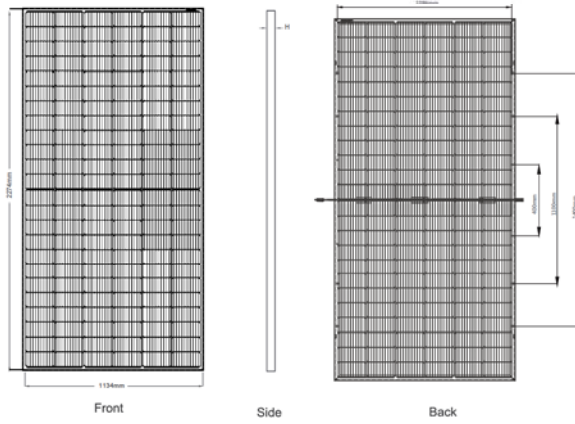
Excellent performance in low-light environments
(e.g. early morning, dusk, and cloud, etc.)

LINEAR PERFORMANCE WARRANTY

12 Year Product Warranty • 30 Year Linear Power Warranty
0.45% Annual Degradation Over 30 years



Engineering Drawings



Length: $\pm 2\text{mm}$
Width: $\pm 2\text{mm}$
Height: $\pm 1\text{mm}$
Row Pitch: $\pm 2\text{mm}$

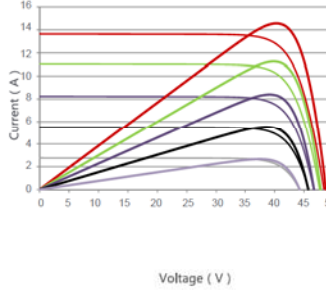
Packaging Configuration

(Two pallets = One stack)

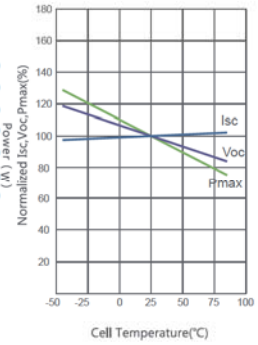
31pcs/pallets, 62pcs/stack, 620pcs/ 40'HQ Container

Electrical Performance & Temperature Dependence

Current-Voltage & Power-Voltage Curves (520W)



Temperature Dependence of Isc, Voc, Pmax



Mechanical Characteristics

Cell Type	P type Mono-crystalline
No. of cells	144 (6×24)
Dimensions	2274×1134×35mm (89.53×44.65×1.38 inch)
Weight	29.4 kg (64.6 lbs)
Front Glass	3.2mm, Anti-Reflection Coating, High Transmission, Low Iron, Tempered Glass
Frame	Anodized Aluminium Alloy
Junction Box	IP68 Rated
Output Cables	TUV 1×4.0mm ² (+): 290mm, (-): 145 mm or Customized Length

SPECIFICATIONS

Module Type	JKM520M-72HL4-TV		JKM525M-72HL4-TV		JKM530M-72HL4-TV		JKM535M-72HL4-TV		JKM540M-72HL4-TV	
	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Maximum Power (Pmax)	520Wp	387Wp	525Wp	391Wp	530Wp	394Wp	535Wp	398Wp	540Wp	402Wp
Maximum Power Voltage (Vmp)	40.22V	37.42V	40.36V	37.56V	40.49V	37.70V	40.63V	37.84V	40.76V	37.97V
Maximum Power Current (Imp)	12.93A	10.34A	13.01A	10.40A	13.09A	10.46A	13.17A	10.52A	13.25A	10.58A
Open-circuit Voltage (Voc)	48.72V	45.99V	48.86V	46.12V	48.99V	46.24V	49.13V	46.37V	49.26V	46.50V
Short-circuit Current (Isc)	13.61A	10.99A	13.69A	11.06A	13.77A	11.12A	13.85A	11.19A	13.93A	11.25A
Module Efficiency STC (%)	20.17%		20.36%		20.55%		20.75%		20.94%	
Operating Temperature(°C)						-40°C~+85°C				
Maximum system voltage						1500VDC (IEC)				
Maximum series fuse rating						25A				
Power tolerance						0~+3%				
Temperature coefficients of Pmax						-0.35%/°C				
Temperature coefficients of Voc						-0.28%/°C				
Temperature coefficients of Isc						0.048%/°C				
Nominal operating cell temperature (NOCT)						45±2°C				
Refer. Bifacial Factor						70±5%				

BIFACIAL OUTPUT-REAR SIDE POWER GAIN

		546Wp	551Wp	557Wp	562Wp	567Wp
5%	Maximum Power (Pmax)	546Wp	551Wp	557Wp	562Wp	567Wp
	Module Efficiency STC (%)	21.17%	21.38%	21.58%	21.78%	21.99%
15%	Maximum Power (Pmax)	598Wp	604Wp	610Wp	615Wp	621Wp
	Module Efficiency STC (%)	23.19%	23.41%	23.64%	23.86%	24.08%
25%	Maximum Power (Pmax)	650Wp	656Wp	663Wp	669Wp	675Wp
	Module Efficiency STC (%)	25.21%	25.45%	25.69%	25.93%	26.18%

* STC: Irradiance 1000W/m² Cell Temperature 25°C

AM=1.5

NOCT: Irradiance 800W/m² Ambient Temperature 20°C

AM=1.5

Wind Speed 1m/s

* Power measurement tolerance: $\pm 3\%$

Exhibit A

Equipment Specification Sheets

5. Longi

Hi-MO 5

LR5-72HBD 540~565M

- Based on M10-182mm wafer, best choice for ultra-large power plants
- Advanced module technology delivers superior module efficiency
 - M10 Gallium-doped Wafer • Smart Soldering • 9-busbar Half-cut Cell
- Globally validated bifacial energy yield
- High module quality ensures long-term reliability

12

12-year Warranty for
Materials and Processing

30

30-year Warranty for Extra
Linear Power Output

Complete System and Product Certifications

IEC 61215, IEC 61730, UL 61730

ISO 9001:2008: ISO Quality Management System

ISO 14001: 2004: ISO Environment Management System

TS62941: Guideline for module design qualification and type approval

OHSAS 18001: 2007 Occupational Health and Safety

LONGI



22.1%
MAX MODULE
EFFICIENCY

0~+5W
POWER
TOLERANCE

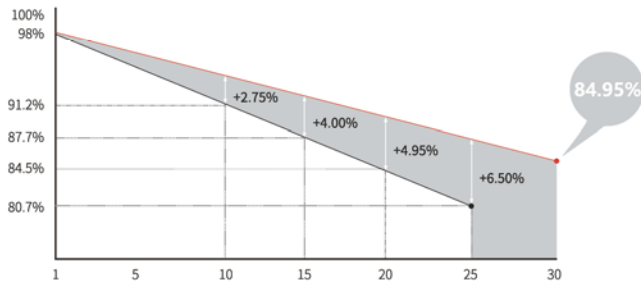
<2%
FIRST YEAR
POWER DEGRADATION

0.45%
YEAR 2-30
POWER DEGRADATION

HALF-CELL
Lower operating temperature

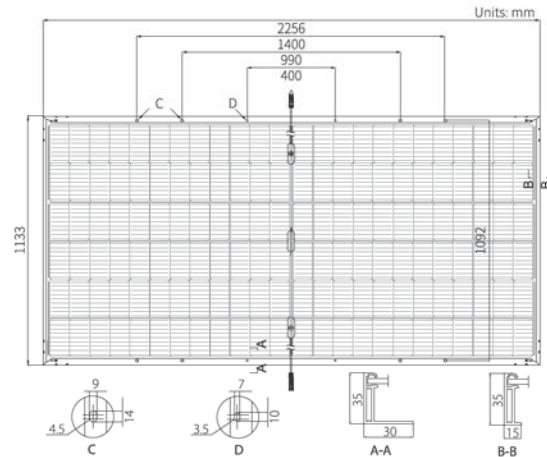
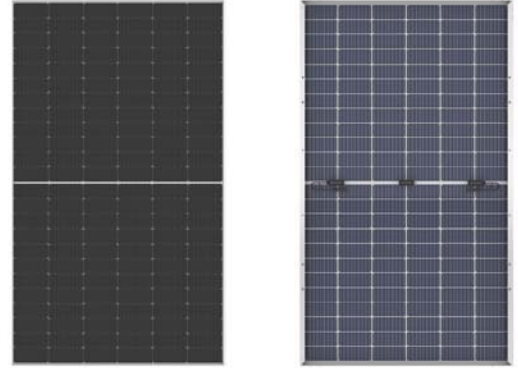
Additional Value

30-Year Power Warranty



Mechanical Parameters

Cell Orientation	144 (6×24)
Junction Box	IP68, three diodes
Output Cable	4mm ² , positive 400 / negative 200mm length can be customized
Glass	Dual glass, 2.0mm coated tempered glass
Frame	Anodized aluminum alloy frame
Weight	32.3kg
Dimension	2256×1133×35mm
Packaging	31pcs per pallet / 155pcs per 20' GP / 558pcs per 40' HC



Electrical Characteristics

STC: AM1.5 1000W/m² 25°C

Test uncertainty for Pmax: ±3%

	540	545	550	555	560	565
Power Class	540	545	550	555	560	565
Maximum Power (Pmax/W)	540	545	550	555	560	565
Open Circuit Voltage (Voc/V)	49.50	49.65	49.80	49.95	50.10	50.25
Short Circuit Current (Isc/A)	13.85	13.92	13.98	14.04	14.10	14.16
Voltage at Maximum Power (Vmp/V)	41.65	41.80	41.95	42.10	42.25	42.40
Current at Maximum Power (Imp/A)	12.97	13.04	13.12	13.19	13.26	13.33
Module Efficiency(%)	21.1	21.3	21.5	21.7	21.9	22.1

Operating Parameters

Operational Temperature	-40°C ~ +85°C
Power Output Tolerance	0 ~ +5 W
Voc and Isc Tolerance	±3%
Maximum System Voltage	DC1500V (IEC/UL)
Maximum Series Fuse Rating	30A
Nominal Operating Cell Temperature	45±2°C
Protection Class	Class II
Fire Rating	UL type 29
Bifaciality	70±5%

Mechanical Loading

Front Side Maximum Static Loading	5400Pa
Rear Side Maximum Static Loading	2400Pa
Hailstone Test	25mm Hailstone at the speed of 23m/s

Temperature Ratings (STC)

Temperature Coefficient of Isc	+0.050%/°C
Temperature Coefficient of Voc	-0.284%/°C
Temperature Coefficient of Pmax	-0.350%/°C

Exhibit A

Equipment Specification Sheets

6. NEXTracker



NX Gemini

Introducing the NEXTracker Two-in-Portrait Smart Solar Tracker

The NX Gemini™ two-in-portrait (2P) solar tracker optimizes lifetime value and performance, helping project developers and asset owners get the most from their power plant. Ideally suited for sites with challenging soils, high winds, and irregular boundaries, the ruggedized 2P tracker features a patent-pending distributed drive system for maximum stability in extreme weather, eliminating the need for dampers and producing virtually zero energy losses associated with stowing.

Capitalize with Highest Power Density Solar Tracker

NX Gemini's flexible 2P module configuration allows for the maximum number of modules per foundation, requiring only 60 meters and seven foundation posts to provide support for up to 120 modules on four 1500-volt strings. With the lowest number of foundations per megawatts on the solar tracker market today, NX Gemini helps reduce tracker installation costs on difficult sites.

Pair with TrueCapture and Bifacial for Maximum Performance

The 2P tracker can be equipped with either monofacial or bifacial PV modules and integrated with the entire NEXTracker software ecosystem, including the TrueCapture™ advanced smart control and energy yield enhancement platform. Incorporated into the NX Gemini design is the field-proven innovations found in NX Horizon™, such as independent-row architecture, intelligent control systems and wireless communications.

FEATURES AND BENEFITS

- Industry-leading 2P design with 7 foundations points per 120 module row
- Ideal for challenging soils
- Bifacial-optimized for maximum performance
- Patent-pending distributed drive system for maximum stability in high winds
- TrueCapture ready, gain up to 6% more energy
- Special rotation feature for high velocity module installation

“ The NEXTracker team has always collaborated with us during their product development process, resulting in trackers that are faster to build, compatible for more sites and easier to maintain. NX Gemini is a strong tracker option for sites with challenging topography and geotechnical conditions. ”

George Hershman, President of Swinerton Renewable Energy

GENERAL AND MECHANICAL

Tracking type	Horizontal single-axis, independent row	Tracking range of motion	±50°
String voltage	1,500 V _{DC}	Operating temperature range	Array powered: -20°C to 55°C (-4°F to 131°F) AC powered: -40°C to 55°C (-40°F to 131°F)
Typical row size	112 - 120 modules, depending on module string length	Module configuration	2 in portrait, 4 x 1,500 strings per standard tracker. Partial length trackers available.
Drive type	NX patent-pending self-locking, distributed drive	Module attachment	Self-grounding, electric tool-actuated fasteners standard. Clamping system optional.
Motor type	48 V brushless DC motor	Materials	Galvanized steel
Array height	Rotation axis elevation 1.9 to 2.5 m/ 6'2" to 8'2"	Allowable wind speed	Configurable up to 235 kph (145 mph) 3-second gust
Ground coverage ratio (GCR)	Typical range 28-50%	Wind protection	Intelligent wind stowing with self-locking, distributed drive system for maximum array stability in all wind conditions
Modules supported	Mounting options available for most utility-scale crystalline modules	Foundations	Standard W8 section foundation posts. Typically ~160 piers/MW
Bifacial features	Available with optimized central torque tube gap		

ELECTRONICS AND CONTROLS

Solar tracking method	Astronomical algorithm with backtracking. TrueCapture™ upgrades available for terrain adaptive backtracking and diffuse tracking mode
Control electronics	NX tracker controller with inbuilt inclinometer and backup battery
Communications	Zigbee wireless communications to all tracker rows and weather stations via network control units (NCUs)
Nighttime stow	Yes
Power supply	Array powered: NX Integrated DC pre-combiner & power supply AC powered: Customer-provided AC circuit

INSTALLATION, OPERATIONS AND SERVICE

PE stamped structural calculations and drawings	Included
Onsite training and system commissioning	Included
Installation requirements	Simple assembly using swaged fasteners and bolted connections. No field cutting, drilling or welding
Monitoring	NX Data Hub™ centralized data aggregation and monitoring
Module cleaning compatibility	Compatible with virtually all standard cleaning systems
DC string monitoring	Available with array-powered option
Warranty	10-year structural, 5-year drive and control components
Codes and standards	UL 3703, UL 2703, IEC 62817

Installer-friendly array height with construction rotation feature for faster, easier installation



NEXTrackerSPT

INTRODUCING A WHOLE NEW WAY TO TRACK THE SUN

The NEXTracker™ Self-Powered Tracker (SPT) brings self-contained motor power to each row, saving time and money. No more external power wiring. No more UPS backup systems. Safer, more reliable with higher performance.

Independent, Mechanically-Balanced Rows

The NEXTrackerSPT leverages NEXTracker's mechanically-balanced row design, which aligns the PV panels with the tracker's axis of rotation. This alignment greatly reduces torsional load, requiring less energy from the motor to track throughout the day and freeing each row to track independently.

Plug and Play with No Power Wiring

NEXTrackerSPT's independent rows eliminate external AC power source systems, wiring, and associated trenching. Self-contained units on each row include a dedicated 30W PV panel to provide power to the Self-Powered Controller (SPC), which powers the motor and hosts intelligent control electronics to position each tracker. NEXTrackerSPT's wireless power and communication from the SPC enable each row to be truly plug and play.

Higher Performance & Safety

Independently powered rows eliminate parasitic utility draw for a higher net energy yield. Those intelligent, autonomous rows optimize operation and maintenance activities. The tracking system rapidly moves into safe stow positions; an entire site can be stowed in one to two minutes, versus up to 45 minutes for other horizontal trackers. That same quick positioning makes it five times faster to clean.

More Site Flexibility, Less Site Preparation

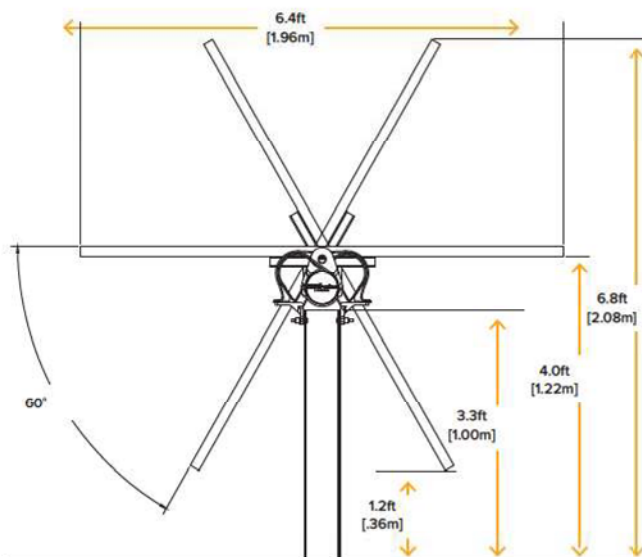
NEXTrackerSPT's autonomous rows enable maximum flexibility in system design, freeing layouts from the rectilinear constraints of typical linked-row trackers. No East/West grading, reduced access roads, and better utilization of corner areas increase power capacity 10-20% per site while reducing construction timelines. The self-powered rows allow the system to be commissioned without grid power.

Quicker to track, quicker to commission, quicker to profits.

NEXTrackerSPT Specifications

Tracking Technology	Horizontal single-axis balanced-mass tracker with independently-driven rows
Tracking Range	Up to 120° ($\pm 60^\circ$)
Control System	1 Self-Powered Controller (SPC) per tracker; 1 Network Control Unit per 100 SPCs
Communications	Wireless ZigBee® mesh network/SCADA; no communication wiring required
Drive System	One slew gear, 24VDC motor and self-powered controller w/ dedicated solar panel per row
DC Capacity	23-35kWp per tracker row, depending on module type
System Voltage	Flexible, based on system design
Power Consumption	No grid power required
Ground Coverage Ratio	Any - fully configurable by customer; typical range 33%-50%
Installation Method	Rapid field assembly, no welding required
Foundation Types	Compatible with all major foundation types (driven pier, concrete foundation, ground screw)
Standard Wind Design	100mph/161kph, 3 second gust per ASCE7-10; configurable for higher wind speeds
Safety Stowing	Automated wind and snow stowing with self-contained backup power - no external power required
Torsional Limiter	Included at each foundation/bearing for additional wind & snow load protection
Principal Materials	Galvanized and stainless steel
Grounding Method	Self grounding structure. Separate materials and labor not required
Compliance	Grounding/bonding: UL2703; Structural Design: ASCE7-10
Other Available Options	Snow and flood sensors
Warranty	10 years on structural components, 5 years on drive and control systems
Typical Dimensions	Height 2.1m/6.8ft (@ 60 degrees), Width 2.0m/6.4ft, Length 85m/283ft

Typical 72-cell c-Si configuration: 85m row with 80 modules mounted in portrait:



NEXTracker

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Fremont, CA 94555 USA
+1 510 270 2500
nexttracker.com

Exhibit A

Equipment Specification Sheets

7. Soltec



SF UTILITY SOLAR TRACKER

> **COST EFFECTIVENESS**

A cost-effective installation is assured beginning with the lowest piles-per-MW spec on the market combined with the widest range of installation and assembly tolerances that reduce all aspects of civil works, installation labor, and machine costs.

> **HIGHER YIELD**

Higher yield is enabled by less array-gap on the tracker and less site-gaps on the ground, along with the widest tracking range of 120°+ and TeamTrack asymmetric backtracking control.

> **GREATER LAND-USE OPTIONS**

SF Utility provides greater land-use options that enable greater site-fill even on irregular land, and reduced civil works that minimize costs and environmental impact issues including earth grading and emissions of carbon dioxide. Moreover, SF Utility standard steep-slope tolerance of 17% NS and short-track configuration makes for simple installation where others simply cannot install without special cost.

> **FACTORY SERVICED**

SF Utility is Factory Serviced with dedicated customer project support in plant design and factory response, and onsite services including tutelage, supervision, logistics, training, commissioning, and regionally available installation and O&M contracting.



SF UTILITY SOLAR TRACKER

Technical Datasheet

www.soltec.com

MAIN FEATURES

Tracking System	Horizontal Single-Axis with independent rows
Tracking Range	120° +
Drive System	Enclosed Slewing Drive, DC Motor
Power Supply	AC/DC Universal Input Self-Powered with Battery Backup
Tracking Algorithm	Astronomical with Adaptive Backtracking
Communication	
Wire	RS485 Cable between Trackers and Gateway
Wireless	Wireless Mesh Network
Wind Resistance	Per Local Codes
Land Use Features	
Independent Rows	YES
Slope North-South	17%
Slope East-West	Unlimited
Ground Coverage Ratio	Configurable. Typical range: 28-50%
Foundation	Driven Pile Ground Screw Concrete
Temperature Range	
Standard	- 4°F to +131°F -20°C to +55°C
Extended	-40°F to +131°F -40°C to +55°C
Availability	>99%
Tracker Installation Service	YES
Modules	Standard: 72 cells Optional: 60 Cells; Crystalline, Thin Film (Solar Frontier, First Solar and others); Bifacial

TYPICAL MODULE CONFIGURATIONS

1000V

	Length	Height	Width
2x38	127' 7" (38.9 m)	12' 10" (3.9 m)	12' 10" (3.9 m)
2x40	123' 4" (37.6 m)		

1500V

	Length	Height	Width
2x42	141' (43 m)	12' 10" (3.9 m)	12' 10" (3.9 m)
2x43.5	146' 2" (44.8 m)		
2x45	150' 7" (45.9 m)		

MAINTENANCE

Self-lubricating Bearings	YES
Face to Face Cleaning Mode	YES
Maintenance Service	YES

WARRANTY

Structure	10 years (extendable)
Motor	5 years (extendable)
Electronics	5 years (extendable)



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DNV GL Technology
Review available
Bankability report
WIND TUNNEL TESTED



Exhibit A

Equipment Specification Sheets

8. Array Technologies



A (r)evolutionary design that builds on the DuraTrack heritage while adding innovative features engineered to deliver the best LCOE in the industry.

THE (R)EVOLUTION IN TRACKER DESIGN IS HERE.

DuraTrack HZ v3 is not just an evolution of our innovative single-axis horizontal solar tracker, it incorporates revolutionary features found nowhere else in the industry.

HIGHEST POWER DENSITY

In fact, 6% more than our closest competitor. Increase capacity on a reduced footprint, or add to production by cutting down on backtracking.

GREATEST RELIABILITY

Reducing the number of sensitive components has resulted in the highest operational uptime in the industry. An improved driveline design allows for fewer motors—less than two per megawatt. No stow required—a failure-free wind relief management feature takes care of that.

ULTRA-EFFICIENT INSTALLATION

One single-fastener clamp per module streamlines the most labor-intensive step. Per megawatt, this equals 15,000 fewer fasteners than competitive systems, adding up to big savings.

ZERO MAINTENANCE

Gearboxes are sealed and lubricated for life resulting in zero scheduled maintenance. All tracker rows self-calibrate twice daily ensuring that each row is always at the optimal tracking angle.

Array Technologies Inc.

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- F** +1 505.881.7572
- E** sales@arraytechinc.com
- W** arraytechinc.com

DuraTrack HZ v3



THE V3 DELIVERS LOWEST LCOE

Add it up. Working together, all the features of the DuraTrack HZ v3 are designed to result in the best LCOE. When you calculate what you'll save on installation due to the streamlined design, what you won't be spending on O&M due to zero scheduled maintenance, and what you'll add in production due to 99.996% uptime, 6% more density and optimized 52° ROM, you'll discover the value added by going with the industry leader in solar tracking.

With more gigawatts installed, and nearly 30 years dedicated to tracker design and manufacturing, Array's reliability and reputation make it the low-risk choice that you and your financial institution can rely on.

THE ARRAY ADVANTAGE

Array Technologies is the worldwide leader in tracking solutions for utility and commercial solar electric generation systems, with multiple gigawatts across the globe. After more than 28 years in the industry, Array's innovations in solar tracking continue to provide the best leveled cost of electricity through reliable, easy to install and maintain systems. Array Technologies' solutions are engineered in the USA and shipped worldwide.

STRUCTURAL & MECHANICAL FEATURES/SPECIFICATIONS

Tracking Type	Horizontal single axis
Tilt Angle	0°
kW per Drive Motor	~ 650–800 kW DC
String Voltage	Up to 1,500V DC
Maximum Linked Rows	28
Maximum Row Size	80 modules (crystalline, 1,000V DC) & 90 modules (crystalline, 1,500V DC)
Drive Type	Rotating gear drive
Motor Type	2 HP, 3 PH, 480V AC
Motors per 1 MW AC	Less than 2
East-West / North-South Dimensions	Site / module specific
Array Height	54" standard, adjustable (46" min height above grade)
Ground Coverage Ratio (GCR)	Flexible, 28–45% typical
Modules Supported	Most commercially available, including frameless crystalline and thin film
Tracking Range of Motion	± 52°
Operating Temperature Range	-30°F to 140°F (-34°C to 60°C)
Module Configuration	Single-in-portrait standard. Dual-in-landscape (crystalline), four-in-landscape (thin film) also available.
Module Attachment	Single fastener, high-speed mounting clamps with integrated grounding. Traditional rails for crystalline in landscape, custom racking for thin film and frameless crystalline per manufacturer specs.
Materials	HDG steel and aluminum structural members
Allowable Wind Load (IBC 2012)	135 mph, 3-second gust exposure C
Wind Protection	Passive mechanical system relieves wind and obstruction damage — no power required

ELECTRONIC CONTROLLER FEATURES/SPECIFICATIONS

Solar Tracking Method	Algorithm with GPS input
Control Electronics	MCU plus Central Controller
Data Feed	MODBUS over Ethernet to SCADA system
Night-time Stow	Yes
Tracking Accuracy	± 2° standard, field adjustable
Backtracking	Yes

INSTALLATION, OPERATION & MAINTENANCE

PE Stamped Structural Calculations & Drawings	Yes
On-site Training & System Commissioning	Yes
Connection Type	Fully bolted connections, no welding
In-field Fabrication Required	No
Dry Slide Bearings & Articulating Driveline Connections	No lubrication required
Scheduled Maintenance	None required

GENERAL

Annual Power Consumption (kWh per 1 MW)	400 kWh per MW per year, estimated
Land Area Required per 1 MW	Approx. 5 to 5.75 acres per MW @ 33% GCR (site and design specific)
Energy Gain vs. Fixed-Tilt	Up to 25%, site specific
Warranty	10 year structural, 5 year drive & control components
Patent Numbers	US patent 8,459,249 US patent 9,281,778 US patent 9,581,678 B2 and patents pending
Codes and Standards	UL Certified (3703 & 2703)

Exhibit A

Equipment Specification Sheets

9. Power Electronics

TECHNICAL CHARACTERISTICS

HEM GEN 3 (preliminary)

REFERENCE		FS4200M
OUTPUT	AC Output Power(kVA/kW) @50°C ^[1]	3900
	AC Output Power(kVA/kW) @40°C ^[1]	4200
	Operating Grid Voltage (VAC)	34.5kV ±10%
	Operating Grid Frequency (Hz)	60Hz
	Current Harmonic Distortion (THDi)	< 3% per IEEE519
	Power Factor (cosine phi) ^[3]	0.5 leading ... 0.5 lagging adjustable / Reactive power injection at night
INPUT	MPPT (VDC)	934V-1500V
	Maximum DC voltage	1500V
	Number of PV inputs ^[2]	Up to 36
	Max. DC continuous current (A) ^[4]	4590
	Max. DC short circuit current (A) ^[4]	6400
EFFICIENCY & AUXILIARY SUPPLY	Efficiency (Max) (η)	97.80% including MV transformer
	CEC (η)	97.51% including MV transformer
	Max. Power Consumption (KVA)	20
CABINET	Dimensions [WxDxH] (ft)	21.7 x 7 x 7
	Dimensions [WxDxH] (m)	6.6 x 2.2 x 2.2
	Weight (lb)	30865
	Weight (kg)	14000
	Type of ventilation	Forced air cooling
ENVIRONMENT	Degree of protection	NEMA 3R
	Permissible Ambient Temperature	-35°C to +60°C / >50°C Active Power derating
	Relative Humidity	4% to 100% non condensing
	Max. Altitude (above sea level) ^[5]	2000m
	Noise level ^[6]	< 79 dBA
CONTROL INTERFACE	Communication protocol	Modbus TCP
	Plant Controller Communication	Optional
	Keyed ON/OFF switch	Standard
PROTECTIONS	Ground Fault Protection	GFDI and Isolation monitoring device
	General AC Protection	MV Switchgear (configurable)
	General DC Protection	Fuses
	Overvoltage Protection	AC, DC Inverter and auxiliary supply type 2
CERTIFICATIONS	Safety	UL 1741, CSA 22.2 No.107.1-16
	Compliance	NEC 2017
	Utility interconnect	IEEE 1547.1-2005 / UL 1741 SA-Feb. 2018

[1] Values at 1.00·Vac nom and cos Φ= 1. Consult Power Electronics for derating curves.

[2] Consult Power Electronics for other configurations.

[3] Consult P-Q charts available: $Q(kVar) = \sqrt{(S(kVA))^2 - P(kW)^2}$.

[4] Consult Power Electronics for Freemaq DC/DC connection configurations.

[5] Consult Power Electronics for altitudes above 1000m.

[6] Readings taken 1 meter from the back of the unit.

Exhibit A

Equipment Specification Sheets

10. GE



LV5⁺ Solar Power Station Data Sheet



The LV5⁺ Solar Power Station combines GE's LV5⁺ 1500V solar inverter, with medium voltage power transformer, optional MV switchgear, and various options for a reliable, plug & play, factory integrated power conversion solution for utility-scale solar installations.

The LV5⁺ Solar Inverter is one of the industry's leading 1500V developments and is GE's latest evolution in renewable power electronics. Building on expertise in the renewables industry, GE now offers its latest power conversion technology for efficient, cost effective and dispatchable solar power.

LV5⁺ Solar Power Station Features:

- UL or IEC compliant configurations
- 3.0 - 3.9 MVA output power
- High efficiency
- Air-cooled system
- Plug & play
- Night time disconnect option
- Direct outdoor installation
- Standard 20ft ISO high cube container for optimized logistics and reduced on site installation and commissioning
- Fibre-optic SCADA interface
- Digital ready

1. LV5⁺ 1500V Solar Power Station Data

Specifications	Units	LV5 ⁺ 1560 Solar Power Station	LV5 ⁺ 1563 Solar Power Station	LV5 ⁺ 1566 Solar Power Station	LV5 ⁺ 1569 Solar Power Station
Input Data					
MPPT Range ¹	Vdc	853 - 1300	895 - 1300	938 - 1300	980 - 1300
Max Permissible DC Voltage	Vdc	1500			
Max Continuous DC Current (at 35°C / 50°C)	Adc	4000 / 3200			
Max DC Short Circuit Interrupt Rating	Adc	12000 ²			
Number of MPPT		1			
Number of DC Inputs		up to 24			
Output Data - Medium Voltage					
Transformer HV / LV Connection		Δ (Delta) / Y (Wye)			
Efficiency at 100% Load (Standard / High)	%	98.8 (Standard) / 99.1 (Option)			
Active AC Output Power (PF=0.92) ³ (at 40°C / 50°C)	MW	3.08 / 2.73	3.23 / 2.87	3.40 / 3.00	3.54 / 3.14
AC Output Voltage (+10% / -10%) ⁴	kVac	22 / 33 / 34.5			
Max AC Current (at 50°C)	Aac	78 / 52 / 50	82 / 55 / 52	86 / 57 / 55	90 / 60 / 57
Max AC Current (at 40°C)	Aac	88 / 59 / 56	93 / 62 / 59	97 / 65 / 62	101 / 68 / 65
Grid Frequency ±5%	Hz	50 / 60			
Power Factor (PF) Range		0-1 leading & lagging ⁴			
Current Harmonic Distortion (TDD)	%	<3			
Medium Voltage Cable		Designed for 630 mm² / 1250 MCM max			
Efficiency & Auxiliary Power					
System Efficiency (Max / EU / CEC) ⁵	%	97.8 / 97.6 / 97.7			
Inverter Efficiency (Max / EU / CEC) ⁶	%	98.9 / 98.6 / 98.7			
System Nighttime Aux Power ⁷	W	≤700			
Interfaces					
Plant Control Interface / PLC		Modbus TCP, OPCUA, EGD			
Programming / Diagnostic Interface		Modbus TCP, OPCUA			
Extra Analog and Digital I/O		Option			
Features and Options					
Cooling		Air Cooled			
Emergency Shut Down		Included			
Mounting Options		Piers / Pad / Gravel			

Specifications	Units	LV5+ 1560 Solar Power Station	LV5+ 1563 Solar Power Station	LV5+ 1566 Solar Power Station	LV5+ 1569 Solar Power Station
Array Configurations Supported		Negative Pole Grounded or Floating			
Ground Fault Monitoring		Standard for Grounded Arrays, Option for Floating Arrays			
Nighttime Transformer Disconnect		Option			
Nighttime VAR Function		Option			
Insulation Monitoring		Option			
Power Disconnect AC Side		Motorized AC Circuit Breaker			
Switch-Disconnect DC Side		Motorized DC Switch			
Overvoltage Protection, DC and AC		Included – IEC 61643-1 Class II / UL 1449			
Main Power Transformer Oil Type		Mineral - ONAN (Standard), ONAF (ambient ≥ 40°C) / Biodegradable - KNAN/AF (Option)			
Oil Containment		Option			
Aux Power for Tracker / Customer Loads		Option (up to 55 kVA)			
Door Interlocking System		Option			
Weather Station		Option			
Noise (at 1m / 10m)*	dBA	≤85 / ≤75			
Weight	kg / lbs	approx. 17000 / 37480			
Dimensions (L x W x H)	m / ft	6.1 x 2.4 x 2.9 / 20.0 x 8.0 x 9.5			
Protection Rating and Ambient Conditions					
Operating Temperature Range	°C	Standard -10 to +55, Option -25 to +55			
Storage Temperature Range	°C	-40 to +65			
Cold Weather Option ⁹	°C	Down to -35			
Humidity	%	5-100 (rated for outdoor installation)			
Maximum Altitude without Derating ¹⁰	m / ft	1000 / 3281			
Seismic		Zone 2B ASCE 7 / IBC			
Maximum Wind Speed ¹¹	kph / mph	250 / 155			
Snow Load		ASCE 7			
NEMA Rating / IP Class		NEMA3 / IP54 (Inverter & RMU) NEMA3R / IP23 (Transformer)			
Standards					
Electromagnetic Compatibility (EMC)		EN 61000-6-2, 62920 / CISPR 11			
Certifications		IEC, CE, UL 1741 SA			

¹ At nominal grid voltage and PF=1, derating above 1300 Vdc according to PQ curves

² Up to 5 times per lifetime

³ Active power is valid for the PF range 0.92 with grid voltage \geq nominal voltage

⁴ Derating will apply according to PQ curves

⁵ Preliminary, includes auxiliary power losses

⁶ Preliminary, excludes auxiliary power losses

⁷ No heating, no cooling, without environmental controls enabled, DC link de-energized and without main transformer no load losses, no customer loads, for inverter only auxiliary needs

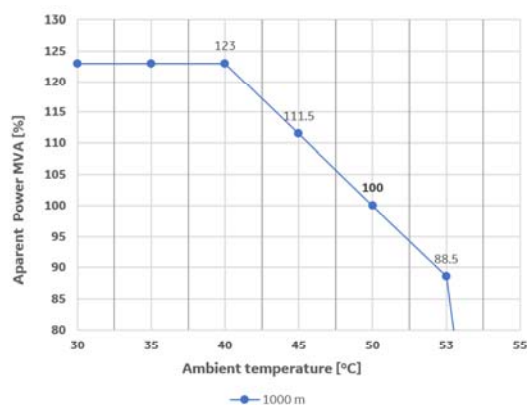
⁸ At 1m / 10m in front of enclosure and 1m up from the ground

⁹ Cold weather option on request

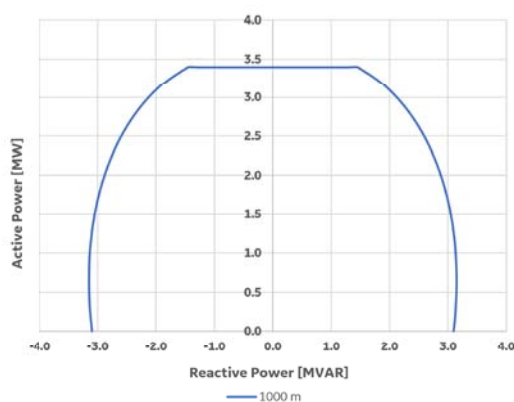
¹⁰ Higher altitudes (with derating) on request

¹¹ Maximum wind speed without derating 81 kph / 50 mph

2. Power/ Temperature Derating Curve¹² & Sample PQ Diagram¹³



¹² Applicable for grid voltage \geq nominal voltage, altitudes $>1000\text{m}$ on request



¹³ PQ diagram for LV5* 1566 at nominal grid voltage, 1150 Vdc and 35°C ambient

www.ge.com/renewableenergy/hybrid

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GEA33501 08/20 - LV5* Solar Power Station Data Sheet

Exhibit A

Equipment Specification Sheets

11. SMA



SC 4000 UP / SC 4200 UP / SC 4400 UP / SC 4600 UP

preliminary

Efficient

- Up to 4 inverters can be transported in one standard shipping container
- Overdimensioning up to 150% is possible
- Full power at ambient temperatures of up to 25°C

Robust

- Intelligent air cooling system OptiCool for efficient cooling
- Suitable for outdoor use in all climatic ambient conditions worldwide

Flexible

- Conforms to all known grid requirements worldwide
- Q on demand
- Available as a single device or turnkey solution, including medium-voltage block

Easy to Use

- Improved DC connection area
- Connection area for customer equipment
- Integrated voltage support for internal and external loads

SUNNY CENTRAL UP

The new Sunny Central: more power per cubic meter

With an output of up to 4600 kVA and system voltages of 1500 V DC, the SMA central inverter allows for more efficient system design and a reduction in specific costs for PV power plants. A separate voltage supply and additional space are available for the installation of customer equipment. True 1500 V technology and the intelligent cooling system OptiCool ensure smooth operation even in extreme ambient temperature as well as a long service life of 25 years.

Technical Data	SC 4000 UP	SC 4200 UP
Input (DC)		
MPP voltage range V_{DC} (at 25 °C / at 50 °C)	880 to 1325 V / 1100 V	921 to 1325 V / 1100 V
Min. input voltage $V_{DC, min}$ / Start voltage $V_{DC, Start}$	849 V / 1030 V	891 V / 1071 V
Max. input voltage $V_{DC, max}$	1500 V	1500 V
Max. input current $I_{DC, max}$	4750 A	4750 A
Max. short-circuit current $I_{DC, SC}$	6400 A	6400 A
Number of DC inputs	24 double pole fused (32 single pole fused)	
Max. number of DC cables per DC input (for each polarity)	2 x 800 kcmil, 2 x 400 mm ²	
Integrated zone monitoring	○	
Available DC fuse sizes (per input)	200 A, 250 A, 315 A, 350 A, 400 A, 450 A, 500 A	
Output (AC)		
Nominal AC power at cos φ =1 (at 25 °C / at 50 °C)	4000 kVA / 3400 kVA	4200 kVA / 3570 kVA
Nominal AC power at cos φ =0.8 (at 25 °C / at 50 °C)	3200 kW / 2720 kW	3360 kW / 2856 kW
Nominal AC current $I_{AC, nom}$ (at 25 °C / at 50 °C)	3850 A / 3273 A	3850 A / 3273 A
Max. total harmonic distortion	< 3% at nominal power	< 3% at nominal power
Nominal AC voltage / nominal AC voltage range ^{1) 8)}	600 V / 480 V to 720 V	630 V / 504 V to 756 V
AC power frequency / range	50 Hz / 47 Hz to 53 Hz 60 Hz / 57 Hz to 63 Hz > 2	
Min. short-circuit ratio at the AC terminals ⁹⁾	> 2	
Power factor at rated power / displacement power factor adjustable ^{8) 10)}	1 / 0.8 overexcited to 0.8 underexcited	
Efficiency		
Max. efficiency ²⁾ / European efficiency ²⁾ / CEC efficiency ³⁾	98.7%* / 98.6%* / 98.5%*	98.7%* / 98.6%* / 98.5%*
Protective Devices		
Input-side disconnection point	DC load break switch	
Output-side disconnection point	AC circuit breaker	
DC overvoltage protection	Surge arrester, type I	
AC overvoltage protection (optional)	Surge arrester, class I	
Lightning protection (according to IEC 62305-1)	Lightning Protection Level III	
Ground-fault monitoring / remote ground-fault monitoring	○ / ○	
Insulation monitoring	○	
Degree of protection: electronics / air duct / connection area (as per IEC 60529)	IP54 / IP34 / IP34	
General Data		
Dimensions (W / H / D)	2780 / 2318 / 1588 mm (109.4 / 91.3 / 62.5 inch)	
Weight	< 4000 kg / < 8818.5 lb	
Self-consumption (max. ⁴⁾ / partial load ⁵⁾ / average ⁶⁾	< 8100 W / < 1800 W / < 2000 W	
Self-consumption (standby)	< 370 W	
Internal auxiliary power supply	○ Integrated 8.4 kVA transformer	
Operating temperature range ⁶⁾	-25 °C to 60 °C / -13 °F to 140 °F	
Noise emission ⁷⁾	67.0 dB(A)*	
Temperature range (standby)	-40 °C to 60 °C / -40 °F to 140 °F	
Temperature range (storage)	-40 °C to 70 °C / -40 °F to 158 °F	
Max. permissible value for relative humidity (condensing / non-condensing)	95% to 100% (2 month/year) / 0% to 95%	
Maximum operating altitude above MSL ⁸⁾ 1000 m / 2000 m / 3000 m	● / ○ / ○ (earlier temperature-dependent derating)	
Fresh air consumption	6500 m ³ /h	
Features		
DC connection	Terminal lug on each input (without fuse)	
AC connection	With busbar system (three busbars, one per line conductor)	
Communication	Ethernet, Modbus Master, Modbus Slave	
Communication with SMA string monitor (transmission medium)	Modbus TCP / Ethernet (FO MM, Cat-5)	
Enclosure / roof color	RAL 9016 / RAL 7004	
Supply transformer for external loads	○ (2.5 kVA)	
Standards and directives complied with	CE, IEC / EN 62109-1, IEC / EN 62109-2, AR-N 4110, IEEE1547, UL 840 Cat. IV, Arrêté du 23/04/08	
EMC standards	IEC 55011, FCC Part 15 Class A	
Quality standards and directives complied with	VDI/VDE 2862 page 2, DIN EN ISO 9001	
● Standard features ○ Optional * preliminary		
Type designation	SC 4000 UP	SC 4200 UP

- 1) At nominal AC voltage, nominal AC power decreases in the same proportion
2) Efficiency measured without internal power supply
3) Efficiency measured with internal power supply
4) Self-consumption at rated operation
5) Self-consumption at < 75% P_n at 25 °C
6) Self-consumption averaged out from 5% to 100% P_n at 25 °C

- 7) Sound pressure level at a distance of 10 m
8) Values apply only to inverters. Permissible values for SMA MV solutions from SMA can be found in the corresponding data sheets.
9) A short-circuit ratio of < 2 requires a special approval from SMA
10) Depending on the DC voltage

Technical Data	SC 4400 UP	SC 4600 UP
Input (DC)		
MPP voltage range V_{DC} (at 25 °C / at 50 °C)	962 to 1325 V / 1100 V	1003 to 1325 V / 1100 V
Min. input voltage $V_{DC, min}$ / Start voltage $V_{DC, Start}$	934 V / 1112 V	976 V / 1153 V
Max. input voltage $V_{DC, max}$	1500 V	1500 V
Max. input current $I_{DC, max}$	4750 A	4750 A
Max. short-circuit current $I_{DC, SC}$	6400 A	6400 A
Number of DC inputs	24 double pole fused (32 single pole fused)	
Max. number of DC cables per DC input (for each polarity)	2 x 800 kcmil, 2 x 400 mm²	
Integrated zone monitoring	○	
Available DC fuse sizes (per input)	200 A, 250 A, 315 A, 350 A, 400 A, 450 A, 500 A	
Output (AC)		
Nominal AC power at $\cos \varphi = 1$ (at 25 °C / at 50 °C)	4400 kVA / 3740 kVA	4600 kVA / 3910 kVA
Nominal AC power at $\cos \varphi = 0.8$ (at 25 °C / at 50 °C)	3520 kW / 2992 kW	3680 kW / 3128 kW
Nominal AC current $I_{AC, nom}$ (at 25 °C / at 50 °C)	3850 A / 3273 A	3850 A / 3273 A
Max. total harmonic distortion	< 3% at nominal power	< 3% at nominal power
Nominal AC voltage / nominal AC voltage range ^{1) 8)}	660 V / 528 V to 759 V	690 V / 552 V to 759 V
AC power frequency / range	50 Hz / 47 Hz to 53 Hz 60 Hz / 57 Hz to 63 Hz > 2	
Min. short-circuit ratio at the AC terminals ⁹⁾	> 2	
Power factor at rated power / displacement power factor adjustable ^{8) 10)}	● 1 / 0.8 overexcited to 0.8 underexcited	
Efficiency		
Max. efficiency ²⁾ / European efficiency ²⁾ / CEC efficiency ³⁾	98.7%* / 98.6%* / 98.5%*	98.7%* / 98.6%* / 98.5%*
Protective Devices		
Input-side disconnection point	DC load break switch	
Output-side disconnection point	AC circuit breaker	
DC overvoltage protection	Surge arrester, type I	
AC overvoltage protection (optional)	Surge arrester, class I	
Lightning protection (according to IEC 62305-1)	Lightning Protection Level III	
Ground-fault monitoring / remote ground-fault monitoring	○ / ○	
Insulation monitoring	○	
Degree of protection: electronics / air duct / connection area (as per IEC 60529)	IP54 / IP34 / IP34	
General Data		
Dimensions (W / H / D)	2780 / 2318 / 1588 mm (109.4 / 91.3 / 62.5 inch)	
Weight	< 4000 kg / < 8818.5 lb	
Self-consumption (max. ⁴⁾ / partial load ⁵⁾ / average ⁶⁾	< 8100 W / < 1800 W / < 2000 W	
Self-consumption (standby)	< 370 W	
Internal auxiliary power supply	○ Integrated 8.4 kVA transformer	
Operating temperature range ⁸⁾	-25 °C to 60 °C / -13 °F to 140 °F	
Noise emission ⁷⁾	67.0 dB(A)*	
Temperature range (standby)	-40 °C to 60 °C / -40 °F to 140 °F	
Temperature range (storage)	-40 °C to 70 °C / -40 °F to 158 °F	
Max. permissible value for relative humidity (condensing / non-condensing)	95% to 100% (2 month/year) / 0% to 95%	
Maximum operating altitude above MSL ⁸⁾ 1000 m / 2000 m / 3000 m	● / ○ / ○ (earlier temperature-dependent derating)	
Fresh air consumption	6500 m³/h	
Features		
DC connection	Terminal lug on each input (without fuse)	
AC connection	With busbar system (three busbars, one per line conductor)	
Communication	Ethernet, Modbus Master, Modbus Slave	
Communication with SMA string monitor (transmission medium)	Modbus TCP / Ethernet (FO MM, Cat-5)	
Enclosure / roof color	RAL 9016 / RAL 7004	
Supply transformer for external loads	○ (2.5 kVA)	
Standards and directives complied with	CE, IEC / EN 62109-1, IEC / EN 62109-2, AR-N 4110, IEEE1547, UL 840 Cat. IV, Arrêté du 23/04/08	
EMC standards	IEC 55011, FCC Part 15 Class A	
Quality standards and directives complied with	VDI/VDE 2862 page 2, DIN EN ISO 9001	
● Standard features ○ Optional * preliminary		
Type designation	SC 4400 UP	SC 4600 UP

1) At nominal AC voltage, nominal AC power decreases in the same proportion

2) Efficiency measured without internal power supply

3) Efficiency measured with internal power supply

4) Self-consumption at rated operation

5) Self-consumption at < 75% P_n at 25 °C

6) Self-consumption averaged out from 5% to 100% P_n at 25 °C

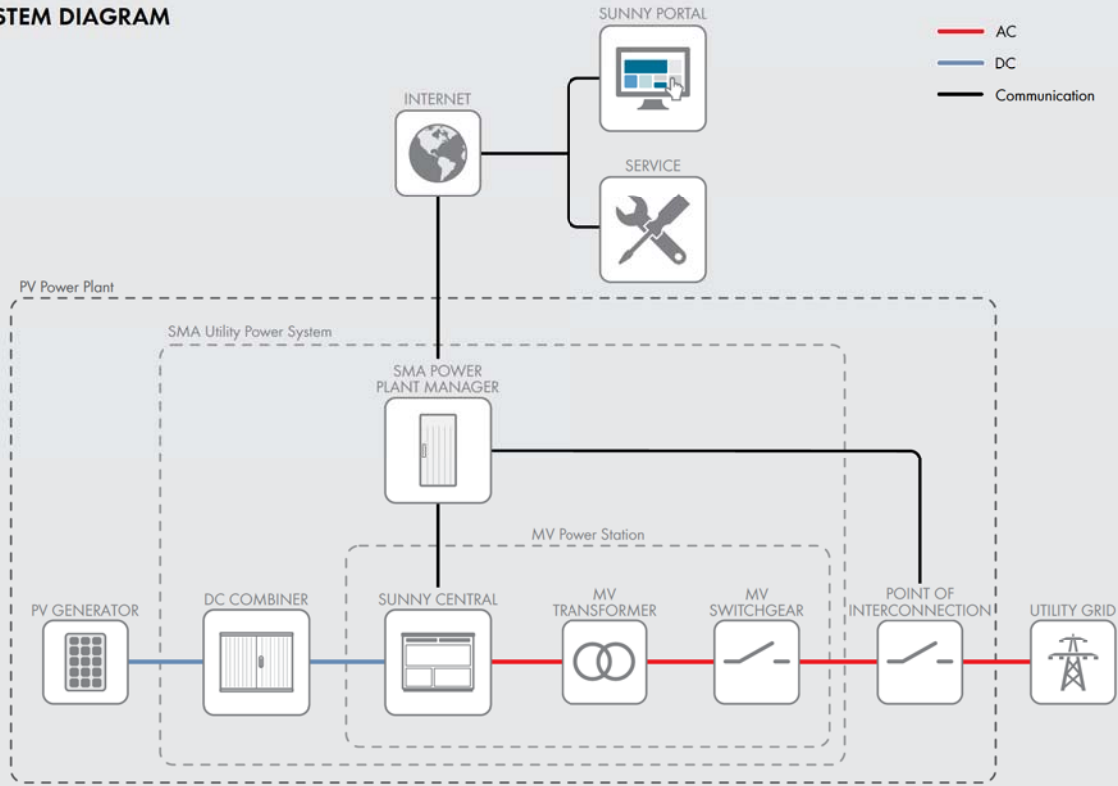
7) Sound pressure level at a distance of 10 m

8) Values apply only to inverters. Permissible values for SMA MV solutions from SMA can be found in the corresponding data sheets.

9) A short-circuit ratio of < 2 requires a special approval from SMA

10) Depending on the DC voltage

SYSTEM DIAGRAM



TEMPERATURE BEHAVIOR (at 1000 m)

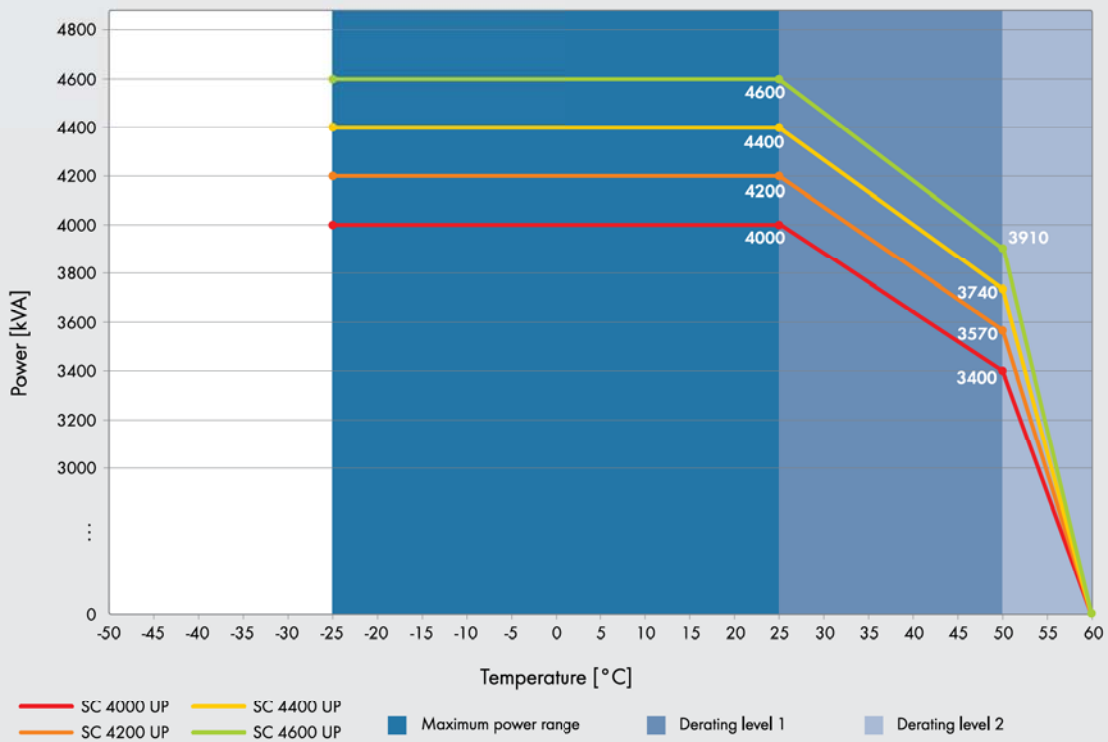


Exhibit A

Equipment Specification Sheets

12. TMEIC

Solar Ware Ninja™

TMEiC
We drive industry

Multiple Configurations for Maximum Flexibility

TMEiC's Solar Ware Ninja is the latest evolution of the highly successful Solar Ware family of inverters, joining over 20GW of TMEiC's globally installed photovoltaic inverters. Continuing the legacy of high efficiency, cutting-edge features, and unmatched reliability, the new Ninja modular inverter system is the culmination of input from utilities, developers, and technicians.

The Ninja is a global product, performing the duties of both generation and energy storage. The modular system introduces multiple layers of flexibility to allow designers an almost unlimited number of options for every project. The advanced controls system is packed with features to meet not only today's smart inverter requirements, but also new requirements as they are introduced. Like the award-winning Samurai series of inverters, the Ninja utilizes the same highly reliable IGBT based power conversion system.



Customizable Block

Up to 6 Ninja units on the same skid. Able to combine PV and ESS inverters in the same lineup. A skid controller will manage output of the Ninja power station.

- Fully Modular design means:
 - Completely independent inverters for increased availability
 - Individual MPPT for greater energy yield
 - Latest generation of Smart Inverter controls platform
 - Multiple output options with various MPPT ranges
- DC Zone monitoring is standard
- UL or IEC certified global design
- PV or Energy Storage (bi-directional)
- Outdoor rated enclosure

TMEiC is Bankable

- Stable, with multi billion \$USD revenue
- Diversified, with decades of power electronics experience in a variety of heavy industries, including metals, oil & gas, mining, and container cranes industries
- Manufacturing in the US and several other locations

TMEiC is Reliable

- Over 20GW of PV and ESS inverters globally
- Own exclusive use of Mitsubishi Electric's 3 level NPS technology
- Industry leading fleet availability

TMEiC is Support

- Award winning service
- 24/7 US based hot line
- Over 30 years PV inverter manufacturing and R&D experience
- Comprehensive customer training programs
- Authorized Service Provider program available

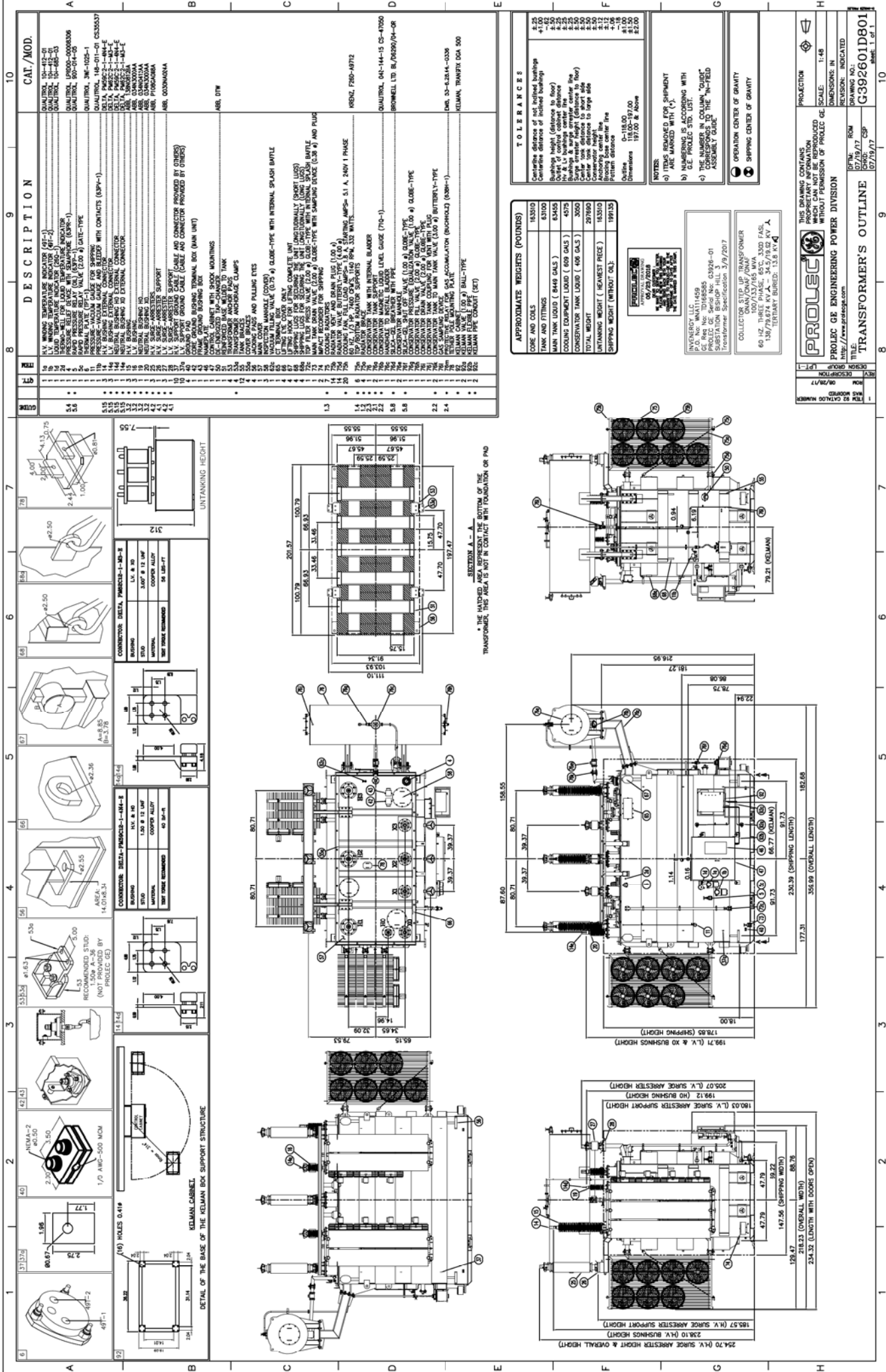
Type	PV-PCS			ESS-PCS		
	PVU-L0800GR	PVU-L0840GR	PVU-L0880GR	BSU-L0640GR	BSU-L0800GR	BSU-L0840GR
Output side (AC)	Rated Power@25°C	800kW	840kW	880kW	640kW	840kW
	Rated Power@50°C	730kW	765kW	800kW	550kW	730kW
	Rated Voltage	600V +10%, -12%	630V +10%, -12%	660V +10%, -12%	480VAC	630VAC
	Rated Frequency	50Hz / 60Hz (+0.5Hz, -0.7Hz)				
Environ. Conditions	Rated Power Factor	>0.99				
	Reactive Capability	±421 kVAR	±442 kVAR	±464 kVAR	±448 kVAR	±560 kVAR
	Rated Current	702 Arms @50 °C				
	Maxium Current	770 Arms @25 °C				
Input side (DC)	Maximum Efficiency	98.72%*	98.72%	98.72%*	98.72%*	98.72%*
	CEC Efficiency	98%*	98%	98%*	98%*	98%*
	Maximum Voltage	1500 Vdc				
	MPPT Operation Range	875-1300VDC	915-1300VDC	960-1300VDC	710-1100VDC	875-1300VDC
Protective Functions	Ingress Protection Ratings	IP54 / NEMA3R				
	Installation	Outdoor				
	Ambient Temperature Range	-25° to 50°C				
	Maximum Altitude	>2000 m power derating (Max. 4000m)				
Harmonic Distortion of AC Current	Input (DC) Side	DC Protection: Input Fuses, Ground Fault Detection, DC Reverse Current, Over Voltage, Over Current				
	Grid (AC) Side	AC Protection: Disconnect Switch and Fuse, Anti-islanding, Over/Under Voltage, Over/Under Frequency, Over Current				
	Grid Assistance	Reactive/Active Power Control, Power Factor Control, Fault Ride Through (optional)				
	Harmonic Distortion of AC Current	≤ 3% THD (at rated power)				
Communication	Modbus/TCP					
Fault Analysis	Fault Event Log, Waveform Acquisition via memory card					
Compliance	UL1741, UL1745A / IEEE1547 / NEC2017 / IEC62109-1,2 / IEC61000-6-2,4 / IEC61727, IEC62116 / IEC61400, BDEW / IEC61683 / IEC60068					
Cooling Method	Heat Pipes and Forced Air Cooling					
Number of Inputs	Standard 6 inputs for PV (maximum 8 per inverter)					1 per Inverter
Standard Control Power Supply	Control Power Supply from Inverter output and Capacitor backup circuit (3 sec. compensation)					
Short Circuit Withstand Current	AC side – 65kA; DC side – 30kA					AC side – 65kA; DC side – 100kA
Weight	<1000kgs					
Dimensions (H x W x D)	1100 X 1100 X 1900 mm (L x W x H)					
Floor Space	1875.5 sq. in. (1.21 m²)					
Color	Cabinet: Munsell N7.0, Roof: Munsell N4.5					

Note: Standard configuration not limited configuration. Contact TMEIC for detailed information.
*Preliminary specification

Exhibit A

Equipment Specification Sheets

13. Prolec



REV	DESCRIPTION	LPT-1
DESIGN GROUP	 PROLEC OE ENGINEERING POWER DIVISION	
TITLE	http://www.prolec.com	
NAME/PLATE	THIS DRAWING CONTAINS INFORMATION THAT CANNOT BE REPRODUCED WITHOUT PERMISSION OF PROLEC OE	
DATE	DATE	ROW
07/19/2017	07/19/2017	05
07/19/2017	07/19/2017	06
07/19/2017	07/19/2017	07
07/19/2017	07/19/2017	08
07/19/2017	07/19/2017	09
07/19/2017	07/19/2017	10
07/19/2017	07/19/2017	11
07/19/2017	07/19/2017	12
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07/19/2017	07/19/2017	81
07/19/2017	07/19/2017	82
07/19/2017	07/19/2017	83
07/19/2017	07/19/2017	84
07/19/2017	07/19/2017	85
07/19/2017	07/19/2017	86

TECHNICAL PROPOSAL INFORMATION

Customer: INVENERGY Date: 10/11/19
Proposal No: _____ Spec No: EXHIBIT A: DESIGN O Item No: 22837416/A

RATING						
Type	Transformer	Class	H Winding	X Winding	Y Winding	
Phase	3		345 Wye kV	34.5 Wye kV	13.8 Delta kV	
Hertz	60	ONAN	80,000 KVA	80,000 KVA	- KVA	
Temp Rise	65 °C	ONAF	107,000 KVA	107,000 KVA	- KVA	
Insul Liquid	Oil Type II(inhibited)	ONAF	134,000 KVA	134,000 KVA	- KVA	
		-	- KVA	- KVA	- KVA	

ADDITIONAL TAP VOLTAGES						
H Winding (Kv)	± 16 of 0.625 %	LTC - FCBN				
X Winding (Kv)	-	-				
Y Winding (Kv)	Buried					
CONNECTIONS FOR OPERATION						
Transformers in Bank	To Transformer From	Phase	Connected	To Transformer To	Phase	Connected
-	-	-	-	-	-	-

PERFORMANCE BASED ON A LOADING OF				DIELECTRIC TESTS		INSULATION LEVELS		
						ITEMS	Basic Lightning Impulse (kV)	
							Winding	Bushing
H Winding	345.0 kV	80.0 MVA		Applied Voltage	H Winding 70 kV	H Line	1050	1050
X Winding	34.5 kV	80.0 MVA		(To other wind- ing and ground)	X Winding 70 kV	H neutral	200	200
Y Winding	13.8 kV	- MVA			Y Winding - kV	X line	200	200
-	-	-	-	Induced	One Hour 315 kV	X neutral	200	200
-	-	-	-	Voltage	Enh 7200cy 360 kV	Y line	-	-

PERFORMANCE DATA, Based on 85 °C Reference Temperature, 80 MVA Altitude: 1000 Mts.						
Exciting Current		Losses (KW)			Regulation	
Excitation	% Ex	No Load Losses (20°C)	Load Losses	Total Losses	Power Factor	% Regulation
100%	.58	63	209	272	0.80	5.853
110%	2.173	92 *	209	301 *	1.0	0.664
-	-	* Not Guaranteed			-	-

AUXILIARY (COOLING) LOSSES			
Transformer KVA	Class	KWatts Loss	
80,000	ONAN	0	
107,000	ONAF	7	
134,000	ONAF	14	
-	-	-	
-	-	-	
Average Sound Level		81/83/85 dB	ONAN/ONAF/ONAF

PERCENT IMPEDANCE VOLTS					
% IZ	Between Windings	At kVA	% IZ Zero	Between Windings	At kVA
9	H-X	80,000	7.7*	H-X	80,000
-	H-Y	-	-	H-Y	-
-	X-Y	-	-	X-Y	-

* APPROXIMATE ONLY, NOT GUARANTEED

EFFICIENCIES (p.f=1) AT 80 MVA				
Load	Full Load	3/4 Load	1/2 Load	1/4 Load
%	99.664	99.703	99.716	99.626

Not for Construction Purposes

Outline Dwg No: DW 228374A16

Dimensions (Approximate)		Ft. (Mts.)
Height	(A)	26.4 (8.05)
Width	(B)	37.5 (11.43)
Depth	(C)	24.1 (7.33)
Height over Cover	(D)	15.7 (4.80)
Untanking (Plus slings)	(E)	26.2 (7.98)
Shipping Dimensions:Ft	WxDxH	25.1 x 11.6 x 15.8
Masses (Approximate)		pounds (Kg)
Core and Coils		151,070 (68,520)
Tank and Fittings		108,790 (49,350)
Liquid 15,500 Gal		116,450 (52,820)
Total Mass		376,310 (170,690)
Shipping without OIL		210,060 (95,280)
Shipping with OIL H=17.9'		306,290 (138,930)

Prepared by: Miguel Angel Gomez Garcia / Proposal Engineering

MECHANICAL DATA

TECHNICAL PROPOSAL INFORMATION

Customer: INVENERGY Date: 10/09/19
 Proposal No: _____ Spec No: EXHIBIT A: DESIGN Q REV 4A Item No: 22837419/A

RATING						
Type	Transformer	Class	H Winding	X Winding	Y Winding	
Phase	3		345 Wye kV	34.5 Wye kV	13.8 Delta kV	
Hertz	60	ONAN	113,000 KVA	113,000 KVA	- KVA	
Temp Rise	65 °C	ONAF	151,000 KVA	151,000 KVA	- KVA	
Insul Liquid	Oil Type II(inhibited)	ONAF	189,000 KVA	189,000 KVA	- KVA	
		-	- KVA	- KVA	- KVA	

ADDITIONAL TAP VOLTAGES						
H Winding (Kv)	± 16 of 0.625 %	LTC - FCBN				
X Winding (Kv)	-	-				
Y Winding (Kv)	Buried					
CONNECTIONS FOR OPERATION						
Transformers in Bank	To Transformer From	Phase	Connected	To Transformer To	Phase	Connected
-	-	-	-	-	-	-

PERFORMANCE BASED ON A LOADING OF				DIELECTRIC TESTS			INSULATION LEVELS		
							ITEMS	Basic Lightning Impulse (kV)	
								Winding	Bushing
H Winding	345.0 kV	113.0 MVA		Applied Voltage	H Winding	70 kV	H Line	1050	1050
X Winding	34.5 kV	113.0 MVA		(To other winding and ground)	X Winding	70 kV	H neutral	200	200
Y Winding	13.8 kV	- MVA			Y Winding	- kV	X line	200	200
-	-	-	-	Induced	One Hour	315 kV	X neutral	200	200
-	-	-	-	Voltage	Enh 7200cy	360 kV	Y line	-	-

PERFORMANCE DATA, Based on 85 °C Reference Temperature, 113 MVA Altitude: 1600 Mts.						
Exciting Current		Losses (KW)			Regulation	
Excitation	% Ex	No Load Losses (20°C)	Load Losses	Total Losses	Power Factor	% Regulation
100%	.486	78	277	355	0.80	6.170
110%	1.557	112.5 *	277	389.5 *	1.0	0.693
-	-	* Not Guaranteed			-	-

AUXILIARY (COOLING) LOSSES			
Transformer KVA	Class	KWatts Loss	
113,000	ONAN	0	
151,000	ONAF	7	
189,000	ONAF	14	
-	-	-	
-	-	-	
Average Sound Level		83/85/86 dB	ONAN/ONAF/ONAF

PERCENT IMPEDANCE VOLTS					
% IZ	Between Windings	At kVA	% IZ Zero	Between Windings	At kVA
9.5	H-X	113,000	8.1 *	H-X	113,000
-	H-Y	-	-	H-Y	-
-	X-Y	-	-	X-Y	-

* APPROXIMATE ONLY, NOT GUARANTEED

EFFICIENCIES (p.f = 1) AT 113 MVA				
Load	Full Load	3/4 Load	1/2 Load	1/4 Load
%	99.69	99.728	99.743	99.668

Not for Construction Purposes

Outline Dwg No: DW 228374A19

Dimensions (Approximate)		Ft. (Mts.)
Height	(A)	25.7 (7.82)
Width	(B)	37.3 (11.37)
Depth	(C)	25.8 (7.86)
Height over Cover	(D)	16.9 (5.15)
Untanking (Plus slings)	(E)	27.7 (8.44)
Shipping Dimensions:Ft	WxDxH	26.6 x 12.8 x 16
Masses (Approximate)		pounds (Kg)
Core and Coils		195,880 (88,850)
Tank and Fittings		126,430 (57,350)
Liquid	20,590 Gal	154,710 (70,180)
Total Mass		477,020 (216,380)
Shipping without OIL		263,430 (119,490)
Shipping with OIL H=19'		393,110 (178,310)

Prepared by: Miguel Angel Gomez Garcia / Proposal Engineering

MECHANICAL DATA

Exhibit A

Equipment Specification Sheets

14. Powin Energy

PRODUCT LINE

Powin Stacks

Powin Stacks are modular, flexible, purpose-built battery arrays that are easily and cost-effectively scalable from kilowatts to megawatts. Powin's patented StackOS™ — the only seamlessly integrated EMS and BMS platform in the energy storage industry — comes installed in every Stack module. This cutting-edge

battery system utilizes LFP cell technology, minimizing system footprint while maintaining a high level of safety. Powin Stacks can perform a full spectrum of advanced applications to fulfill today's energy storage requirements, and are flexible enough to support future use cases as markets change.

STACK230 & STACK360

- Specially designed for stationary storage applications
- Can be flexibly scaled to accommodate any energy need
- Optional Energy Management System for intelligent battery dispatch
- Controls interface can connect directly to any SCADA system
- Range of inverter and converter options available depending on application and best possible price
- Available in indoor & outdoor configurations



Stack230

STACKOS™ SOFTWARE PLATFORM

StackOS™ Controls

- A dynamic energy management system that can serve myriad revenue streams simultaneously.
- Provides behind and in-front-of-the-meter applications that can optimize cell-level and balancing awareness, all observable through Powin and/or customer NOCs.
- Can be configured with 3rd party EMS allowing customers to still enjoy Powin's industry leading cell fidelity, global monitoring, deep analytics and advanced balancing function.
- Advanced applications include primary response to react to grid conditions, firming to forecast, peak shaving, PV smoothing, demand response and microgrid support.
- MESA 802 / SunSpec 103 & 123 compliant.

StackOS™ Battery Management & Safety

- Unprecedented depth of real-time battery system monitoring down to the cell level
- Patented battery management system aggregates battery data collected from Stacks for reporting to other systems, such as the EMS.
- 3-levels of control executing balancing configurations for health & safety among battery strings, packs and cells.
- Uses a distributed intelligence approach to build its battery system control hierarchy.
- Ensures that DC components of the system operate within safe margins and core battery reporting is performed correctly.
- Includes a standardized API Modbus TCP and MESA 802/SunSpec for compliance.

		STACK230P		STACK230E		STACK360P		STACK360E	
Electrical	DC Voltage	760 - 937 V				1193 - 1470 V			
	Duration	1.5+ hrs		3+ hrs		1.5+ hrs		3+ hrs	
	Maximum DC Energy Capacity	230 kWh		235 kWh		360 kWh		365 kWh	
	Rated DC Power	150 kW		57.5 kW		236 kW		90 kW	
	DC Energy Capacity @ Rated Power ^{1,2}	225 kWh		230kWh		355 kWh		360 kWh	
	Duration @ Rated Power	1.5 hrs		4 hrs		1.5 hrs		4 hrs	
	Aux Load per Stack (Standby/Peak) ³	84 W / 1,221 W				168 W / 2,045 W			
	Daily Aux Energy per Stack ^{4, 5}	7.0 kWh		8.8 kWh		10.2 kWh		13 kWh	
	Daily Aux Energy per Stack, Net of Balancing ⁵	5 - 6 kWh				6 - 7 kWh			
Performance & Safety	Cycle Life ⁶	3,650 cycles	6,570 cycles	5,475 cycles	7,300 cycles	3,650 cycles		5,475 cycles	7,300 cycles
	Calendar Life ⁷	15 years	20 years	15 years	20 years	15 years		15 years	20 years
	Cell Model	EVE LF280L	CATL CB2W0	EVE LF280L	CATL CB310	EVE LF280L		EVE LF280L	CATL CB310
	DC Round Trip Efficiency @ Rated Power	92%		94%		92%		94%	
	Cell Chemistry	Lithium Iron Phosphate (LFP)							
	Cell Operating Temperature Range ⁸	20 - 35° C							
	Depth of Discharge	100%							
	Codes & Compliance ⁹	UL9540A, UL1973, UN3480, UN38.3							
Mechanical	Weight (Approximate)	5,000 lbs (2,273 kg)				7,500 lbs (3,409 kg)			
	Enclosure Dimensions	4'4" W x 3'2" D x 6'5" H (1,321 mm x 965 mm x 1,956 mm)				6'2" W x 3'2" D x 6'5" H (1,880 mm x 965 mm x 1,956 mm)			
	Enclosure Type / Rating	NEMA 1 / IP20							
	Ambient Operating Temperature Range	10 - 45° C							
Software	BMS + EMS + Solar + Environmental Controls	StackOS™							
	Remote Monitoring + Optimization + Data	StackOS+™							
	First Responder HMI	Powin for First Responders™							
	Communications Interface	Modbus TCP (MESA/Sunspec) & REST API							

1 Energy capacity is recorded at the DC bus and varies by use case; contact Powin for an accurate estimate

2 Power / Energy for 3-hr applications: Stack230E = 76 kW / 228 kWh & Stack360E = 119 kW / 357 kWh

3 Peak values are atypical and assume maximum active cell balancing current within a Stack

4 Includes recoverable active balancing energy during charge / discharge

5 Assumes 1 full cycle per day; includes Stack-level fans but not HVAC

6 Assumes 1 full cycle per day; cycle EOL SoH: EVE LF280L = 70%, CATL CB2W0 = 61%, CATL CB310 = 66.5%

7 Calendar EOL SoH: EVE LF280L = 70%, CATL CB2W0 = 60%, CATL CB310 = 68%

8 HVAC designed to maintain all cells near 25° C; full operating range 5 - 45° C; power derated at low temperatures

9 Current and expected



BATTERY ENERGY STORAGE SYSTEM



PowinEnergy



POWIN BATTERY ENCLOSURE

POWIN SMART ENCLOSURES

Powin Energy's cost effective smart enclosures are a scalable purpose-built battery solution that includes all of the balance of system (BOS) equipment that can be modified to meet local AHJ requirements. The thermal management of this enclosure has been meticulously designed through air ducting and HVAC, providing an optimal temperature controlled environment for the battery enabling deployment in many different geographical climate types. Powin Smart Enclosures come in 20^{FT}, 40^{FT} and 53^{FT} sizes.

FULLY INTEGRATED

- + Up to 20 Stack225s or Stack230s per enclosure in parallel
- + Powin's patented StackOS integrated Battery Management and Energy Management Platform
- + HVAC & forced air with ducting that directly targets the stacks

- + AC breaker panel for coms and aux loads
- + Fire suppression system that also provides detection and monitoring
- + DC Collection, cable and tray
- + IP 54 rated
- + Insulation options for hot and cold climates
- + Isolation, and over current and fault protection
- + Minimal on site installation requirements

COMMUNICATION CABINET

- + Full state of awareness monitoring for fire suppression/ HVAC/inverter and transformer status/E stop/UPS aux
- + Switch
- + Router
- + UPS – Control
- + Linux computer
- + HMI
- + Controls interface can connect to any SCADA system



POWIN ENERGY ENCLOSURES TECHNICAL SPECIFICATIONS



MODEL	20 ^{FT} ENCLOSURE			40 ^{FT} ENCLOSURE			53 ^{FT} ENCLOSURE	
Stack Product	Stack225	Stack230	Stack230P	Stack225	Stack230	Stack225	Stack230	
Battery Chemistry	Lithium Iron Phosphate [LFP]							
Integrated BMS + EMS	StackOS™							
Rated DC Power (kW)	660	345	2100	1540	805	2200	1150	
Maximum DC Energy*	1350	1380	3220	3150	3290	4500	4600	
Duration @ Rated Power [hrs]	2	4	1.5	2	4	2	4	
DC Voltage Range	760-963 VDC							
Max Current (A)	1080	540	2870	2520	1260	1800 X 2	900 X 2	
Depth of Discharge	100%							
DC Round Trip Efficiency @ Rated Power (%)	93%		91%	93%				
Performance Guarantee	80% SoH after 3,650 cycles Or 70% SoH after 15 yrs	66.5% SoH after 7300 cycles Or 70% SoH after 20 years	80% SoH after 5,840 cycles or 80% SoH after 16 yrs	80% SoH after 3,650 cycles Or 70% SoH after 15 years	66.5% SoH after 7,300 cycles Or 70% SoH after 20 years	80% SoH after 3,650 cycles Or 70% SoH after 15 yrs	66.5% SoH after 7,300 cycles Or 70% SoH after 20 years	
Weight [lbs / kg]	42,125 / 19,108		90,500 / 41,050				126,455 / 57,360	
Dimensions	19'10.2" L x 8' W x 9'6" H		40' L x 8' W x 9'6" H					
Enclosure Type / Rating	ISO HC / NEMA3 / IP54							
Ambient Temperature Range	-10 to +50 °C							
Number of Stacks	6		14		20			
Energy Density [kWh / ft^2]	7.73	8.08	9.15	8.95	9.36	9.65	10.09	
Fire Suppression	Included with Fire Suppression Agent, Fire Detection Panels with Sensors, Pull Handle, and Lights, and FDC dry standpipe connection							
Cooling	Dual Redundant Forced Air HVAC with Thermostat, Humidity Control, & Economizer							
DC Collection, Cable Tray, AC Load Panel	Included							
Code and Standards Compliance	UL1973, UL9540A, IEC62619, NFPA855, ISO1496-1							
*Usable energy for fully populated container; Actual usable energy varies by use case and DC topology; Contact Powin for an accurate estimate								

ABOUT POWIN ENERGY

Powin Energy is creating the next wave of safe and scalable battery energy storage that is purpose-built for the demands of utility-scale, commercial and industrial, and microgrid applications. With an unrivaled team of experts from across the energy industry, almost three decades of supply chain management expertise, extensive battery management software proficiency, a modular architecture, and a streamlined installation processes, Powin is making energy storage highly cost-effective and relatively pain free.

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Case No(s). 20-1679-EL-BGN

Summary: Application - 3 of 25 (Exhibit A - Equipment Specifications Sheets) electronically filed by Christine M.T. Pirik on behalf of Pleasant Prairie Solar Energy LLC