











# GSC CONSTRUCTION

801 MILUK DR.  
ROOF MOUNT SOLAR PV & BESS  
BATTERY BACK-UP  
Coos Bay, OR 97420  
THREE LINE DIAGRAM

## FOR CONSTRUCTION

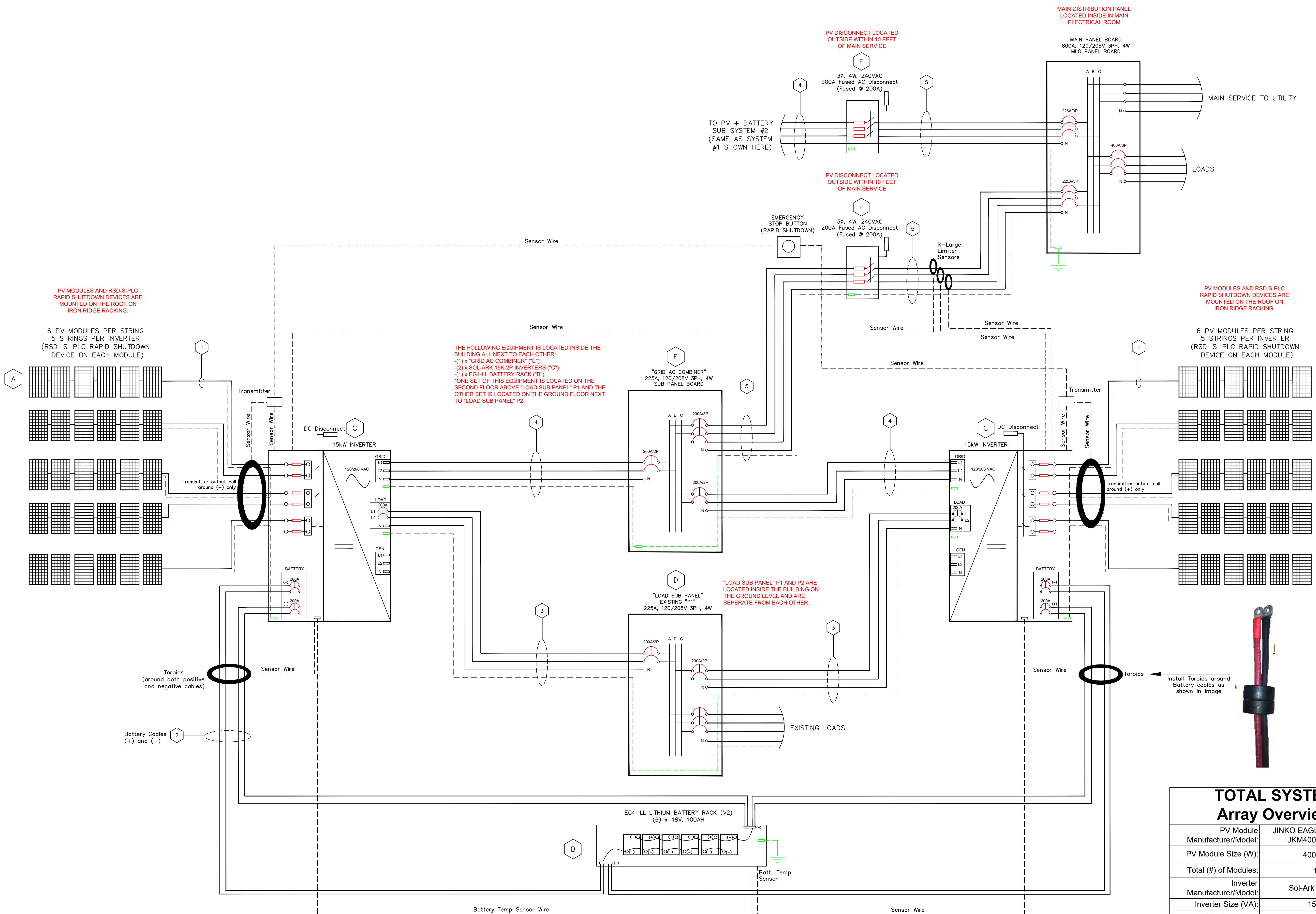
ENGINEER:  
David Brueck, P.E.  
GA LICENSE # 038102  
Certified NABCEP  
PV Installer# 042013-17

DRAFTER:  
David Brueck

PROJECT #:  
BC-2023-06

SHEET:  
004

SCALE:  
N/A



TOTAL SYSTEM Array Overview	
PV Module Manufacturer/Model:	JINKO EAGLE HC 72M G2 JKM400M-72HL-V
PV Module Size (W):	400 watts
Total (#) of Modules:	120
Inverter Manufacturer/Model:	Sol-Ark 15K-2P-N
Inverter Size (VA):	15,000
Total (#) of Inverters:	4
Batteries Model:	EG4-LL (V2) Lithium Battery Bank (includes 6 Batteries)
Battery Bank Size:	(6) x 100Ah = 600Ah, 48V
Total (#) Battery Banks:	2
PV System Size (DC):	48,000 W
System Size (AC):	60,000 W

NO	DATE	BY	REVISION DESCRIPTION
0	3/16/2023	D.BRUECK	FOR CONSTRUCTION
		D.BRUECK	APR/VD



CONDUIT FILL CALCULATION (DC CIRCUITS ONLY)

PER NEC ART. 352.22 FOR PVC AND 358.22 FOR EMT  
AREA OF 1000 VOLT #10PV WIRE = 0.0543 SQ. IN.  
AREA OF 1000 VOLT #6PV WIRE = 0.0956 SQ. IN.

EXAMPLE:  
(12) x 0.0543 (#10 PV WIRES) = 0.66 SQ. IN.  
(1) x 0.0956 (#6 PV WIRES) = 0.0956 SQ. IN.  
TOTAL = 0.76 SQ. IN.

-FROM NEC CHAPTER 9, TABLE 4 FOR RMC CONDUIT @ 40%  
FILL: 1-1/2" CONDUIT = 0.829 SQ. IN. AVAILABLE.  
-0.76 SQ. IN. IS LESS THAN 0.829 SQ. IN., SO 1-1/2" CONDUIT  
WORKS FOR DC CONDUIT WITH UP TO (12) #10 CU PV WIRES.  
\*USE TABLE 4 IN NEC CHAPTER 9 FOR RMC CONDUIT. USE  
COLUMN FOR "OVER 2 WIRES 40%" TO DETERMINE MAX  
CROSS-SECTIONAL AREA AVAILABLE FOR WIRES AND MAKE SURE  
TOTAL WIRE CROSS-SECTIONAL AREA IS LESS THAN CONDUIT  
SIZE CROSS-SECTIONAL AREA AVAILABLE AT 40%

Table with 2 columns: Parameter, Value. SUB SYSTEM #1 Overview. PV Module: JINKO EAGLE HC 72M G2 JKM400M-72HL-V. PV Module Size (W): 400 watts. Total (#) of Modules: 60. Inverter: Sol-Ark "Limitless 15kV-LV". Inverter Size (VA): 15,000. Total (#) of Inverters: 2. Batteries Model: EG4-LL Lithium Battery Rack (V2). Battery Bank Size: (6) x 100Ah = 600Ah, 48V. Total (#) Battery Banks: 1. PV System Size (DC): 24,000 W. System Size (AC): 30,000 W.

Table with 2 columns: Parameter, Value. SUB SYSTEM #2 Overview. PV Module: JINKO EAGLE HC 72M G2 JKM400M-72HL-V. PV Module Size (W): 400 watts. Total (#) of Modules: 60. Inverter: Sol-Ark "Limitless 15kV-LV". Inverter Size (VA): 15,000. Total (#) of Inverters: 2. Batteries Model: EG4-LL Lithium Battery Rack (V2). Battery Bank Size: (6) x 100Ah = 600Ah, 48V. Total (#) Battery Banks: 1. PV System Size (DC): 24,000 W. System Size (AC): 30,000 W.

Table with 2 columns: Parameter, Value. TOTAL SYSTEM Overview. PV Module: JINKO EAGLE HC 72M G2 JKM400M-72HL-V. PV Module Size (W): 400 watts. Total (#) of Modules: 120. Inverter: Sol-Ark "Limitless 15kV-LV". Inverter Size (VA): 15,000. Total (#) of Inverters: 4. Batteries Model: EG4-LL Lithium Battery Rack (V2). Battery Bank Size: (6) x 100Ah = 600Ah, 48V. Total (#) Battery Banks: 2. PV System Size (DC): 48,000 W. System Size (AC): 60,000 W.

GSC CONSTRUCTION

801 MILUK DR.  
ROOF MOUNT SOLAR PV & BESS  
BATTERY BACK-UP  
Coos Bay, OR 97420  
SCHEDULES

FOR CONSTRUCTION

ENGINEER:  
David Brueck, P.E.  
GA LICENSE # 038102  
Certified NABCEP  
PV Installer# 042013-17

DRAFTER:  
David Brueck

PROJECT #:  
BC-2023-06

SHEET:  
005

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N/A

EQUIPMENT SCHEDULE

Table with 5 columns: EQUIPMENT DESIGNATION, MANUFACTURER, MODEL #, QTY, DESCRIPTION. Rows A-F detailing solar modules, shutdown devices, battery banks, inverters, and panels.

CONDUCTOR SCHEDULE - DC SIDE (PV STRINGS)

Table with 4 main sections: GENERAL, OCPD, VOLTAGE DROP CALCULATIONS, CONDUCTOR & CONDUIT SCHEDULE. Includes circuit descriptions, distances, current ratings, and voltage drop percentages.

CONDUCTOR SCHEDULE - DC SIDE (BATTERY BANK)

Table with 4 main sections: GENERAL, OCPD, VOLTAGE DROP CALCULATIONS, CONDUCTOR & CONDUIT SCHEDULE. Includes circuit descriptions, distances, current ratings, and voltage drop percentages.

CONDUCTOR SCHEDULE - AC SIDE

Table with 4 main sections: GENERAL, OCPD, VOLTAGE DROP CALCULATIONS, CONDUCTOR & CONDUIT SCHEDULE. Includes circuit descriptions, distances, current ratings, and voltage drop percentages.

PV MODULE SPECIFICATIONS

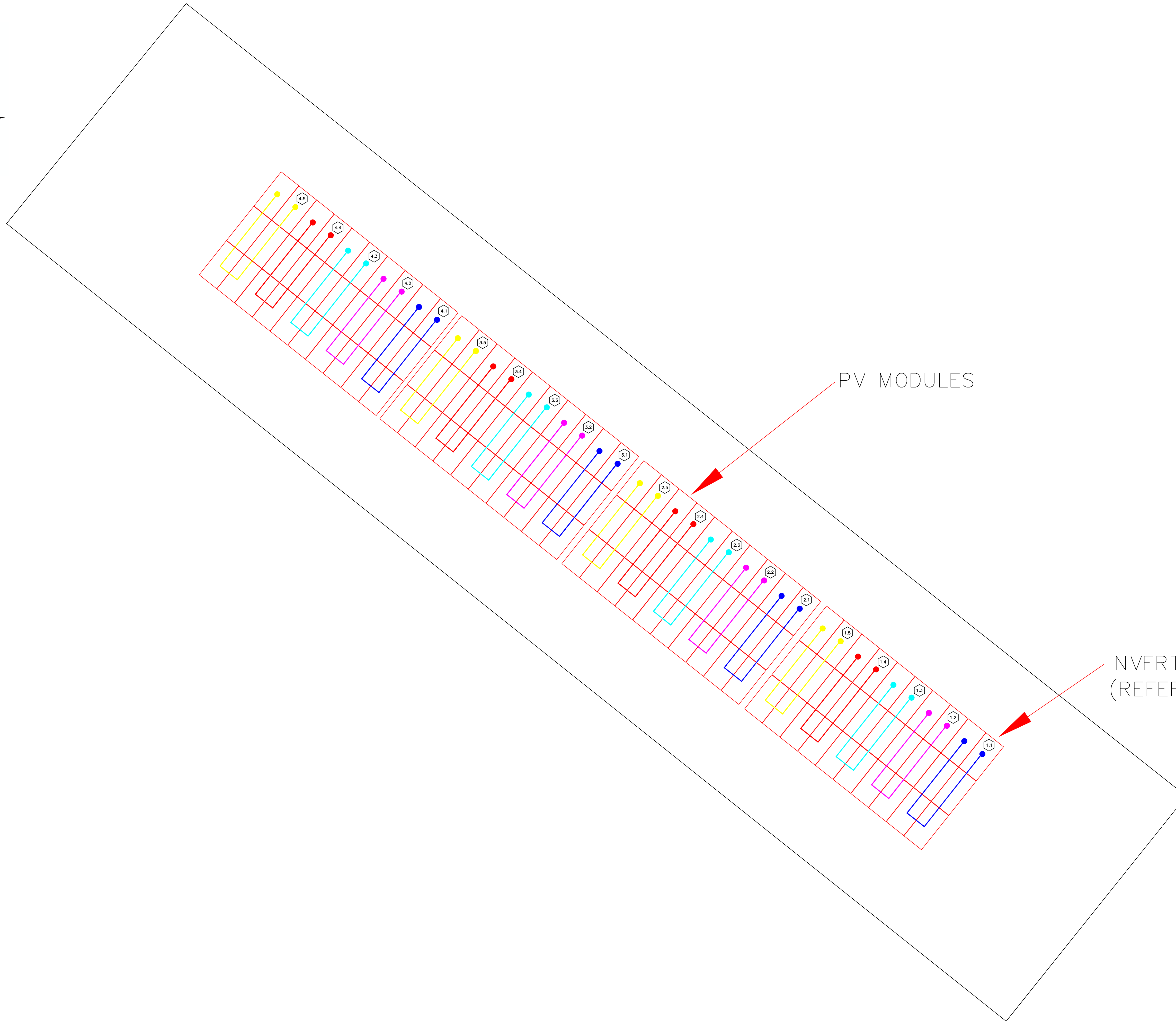
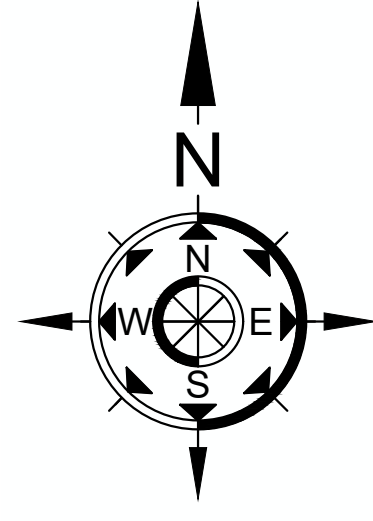
Table with 2 columns: Parameter, Value. Module Name: JINKO EAGLE HC 72M G2 JKM400M-72HL-V. STC Power Rating (W): 400. Voc (V): 49.8. Vmp (V): 41.7. Isc (A): 10.36. Imp (A): 9.60. Module Efficiency: 19.88%.

INVERTER ELECTRICAL SPECIFICATIONS

Table with 2 columns: Parameter, Value. Inverter Name: Sol-Ark 15k-2P-N. DC Input (Solar PV): Max DC Voltage (Voc): 500V, MPPT Voltage Range (V): 125 - 425V, Starting Voltage (V): 125V, Number of MPPT: 3, Max Solar Strings per MPPT: 2, Max DC Current per MPPT (A): 26A. Output (AC): Rated Power (VA): 15,000, Nominal AC Voltage (V): 120/240/208V Split Phase, AC Frequency (Hz): 60, Max Output Current w/ PV (A): 72.2 L-L (208V), Max Output Current w/ Battery (A): 58A L-L (208V), Max Output Current w/ Grid (A): 200A L-L (208V). PV DC Disconnect Switch: Integrated. Ground Fault Detection: Integrated. PV Rapid Shutdown: Integrated. PV Arc Fault Detection: Integrated. PV Input Lightning Protection: Integrated. PV String Input Reverse Polarity Protection: Integrated. AC Output Breakers: Integrated. 200A x 2 Battery Breaker / Disconnect: Integrated. Surge Protection: DC Type II / AC Type II.

NO DATE BY D.BRUECK FOR CONSTRUCTION D.BRUECK APR/VD REVISION DESCRIPTION





GSC  
CONSTRUCTION

801 MILUK DR.  
ROOF MOUNT SOLAR PV & BESS  
BATTERY BACK-UP  
Coos Bay, OR 97420  
STRING LAYOUT

FOR  
CONSTRUCTION

ENGINEER:  
David Brueck, P.E.  
GA LICENSE # 038102  
Certified NABCEP  
PV Installer# 042013-17

DRAFTER:  
David Brueck

PROJECT #:  
BC-2023-06

SHEET:  
006

SCALE:  
N/A

NO	DATE	BY	REVISION DESCRIPTION	APR/VD
0	3/16/2023	D BRUECK	FOR CONSTRUCTION	D BRUECK







**JinkoSolar**

**Eagle HC 72M G2**  
380-400 Watt  
MONO PERC HALF CELL MODULE

Positive power tolerance of 0-3%



**KEY FEATURES**

- Diamond Cell Technology**  
Uniquely designed high performance 3 busbar mono PERC half cell
- High Voltage**  
UL and IEC 100V certified lower BCL costs and yields better LCOE
- Higher Module Power**  
Decrease in current loss yields higher module efficiency
- Shade Tolerance**  
More shade tolerance due to half anti-reflection
- PID FREE**  
Anti-reflection coat prevents potential induced degradation
- Strength and Durability**  
Certified for high snow (3400Pa) and wind (2400 Pa) loads

**LINEAR PERFORMANCE WARRANTY**  
10 Year Product Warranty • 25 Year Linear Power Warranty



**IRONRIDGE**

**XR Rail® Family**

**Solar Is Not Always Sunny**

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

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

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

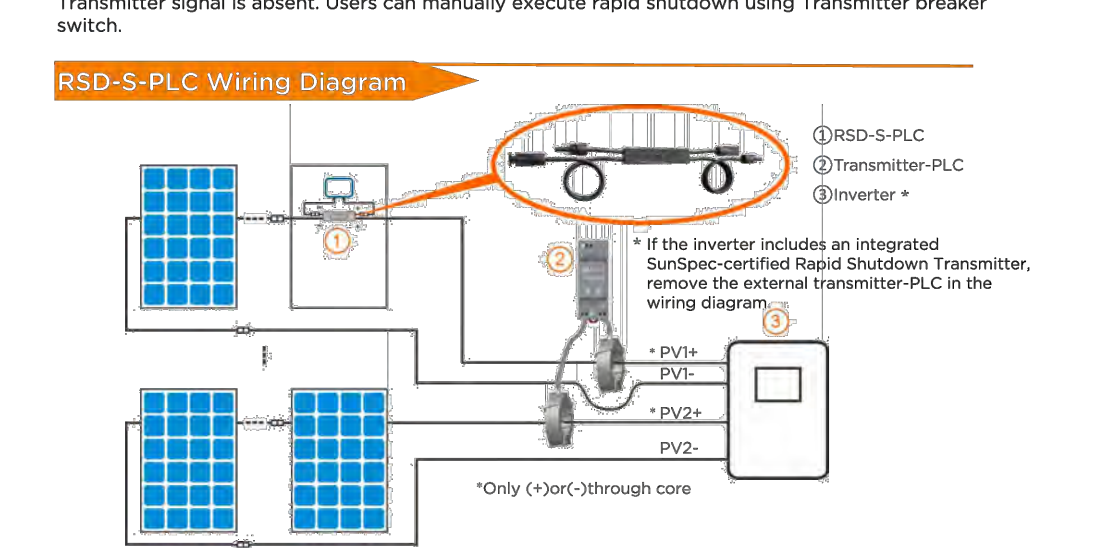
**Compatible with Flat & Pitched Roofs**  
XR Rails® are compatible with FlatRoof® and other pitched roof attachments.

**Corrosion-Resistant Materials**  
All XR Rails® are made of 6000-series aluminum alloy, then protected with an anodized finish. Anodizing prevents surface and structural corrosion, while also providing a more attractive appearance.

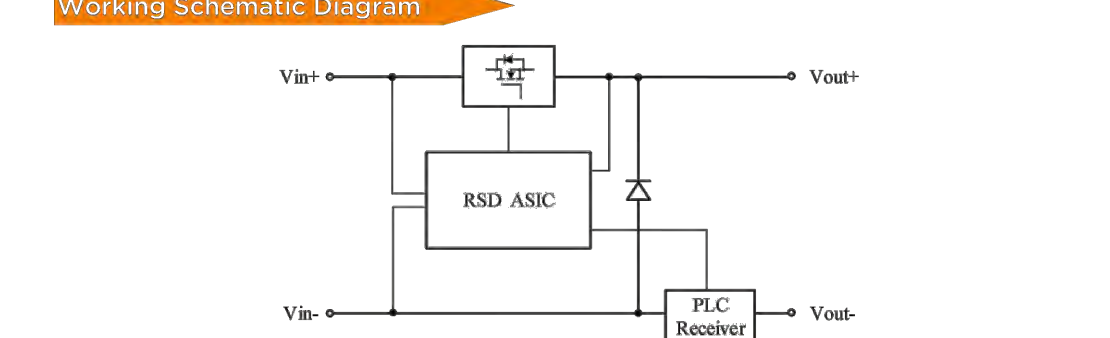
**APsmart**

The RSD-S-PLC meets SunSpec requirements, maintaining normal function by continually receiving a heartbeat signal from the APsmart Transmitter. The RSD executes rapid system shutdown when the Transmitter signal is absent. Users can manually execute rapid shutdown using Transmitter breaker switch.

**RSD-S-PLC Wiring Diagram**



**Working Schematic Diagram**



**ORDERING INFORMATION**

415002	1500V UL/1000V TUV, 12m cable, MC4
415001	1000V UL/TUV, 12m cable, Customized connector

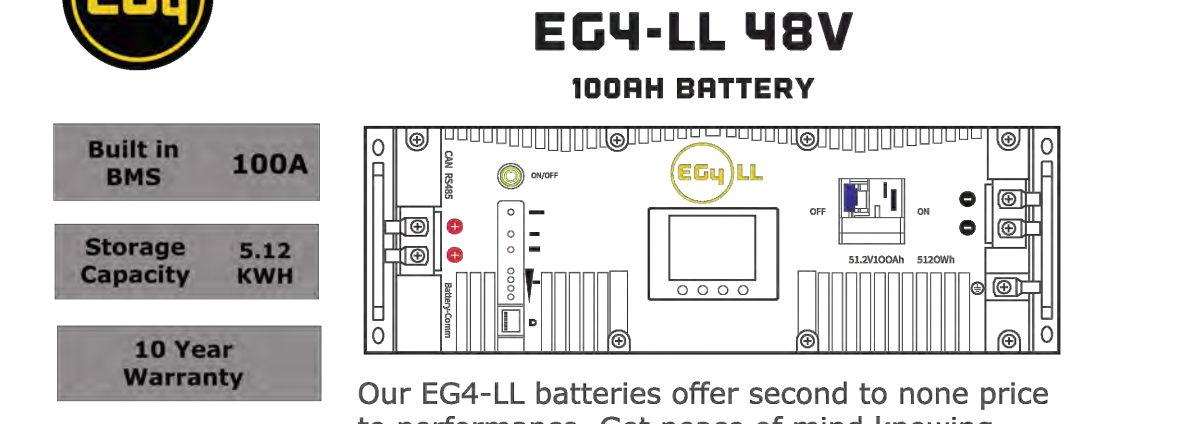
**APsmart**  
600 Erickson Ave NE, Suite 200 Seattle, WA 98101 | +1-727-218-8488 | +1-866-374-8538 | support@APsmartGlobal.com | APsmartGlobal.com

REV 2.2 2021-3-27

**EG4 Electronics | Specification Sheet**

**EG4-LL 48V 100AH BATTERY**

**Built in BMS 100A**  
**Storage Capacity 5.12 KWH**  
**10 Year Warranty**  
**UL 1973 Listed UL 9540A Compliant**



Our EG4-LL batteries offer second to none price to performance. Get peace of mind knowing these batteries are designed to last for more than 7000 deep charge and discharge cycles; beyond 15 years with an 80% depth of discharge daily!

**On-board LCD Touch Screen**  
Easy to see BMS monitoring, and selectable closed-loop communications with EG4, Schneider, Solarik, Victron, Growatt, Megarevo, Luxpower, and Deye inverters.

**Dual On-board Fire Arrestors**  
Offer fail-safe operation in high risk environments and protect against rare hardware failure on high voltage solar charge controllers.

**Welded Prismatic Cell Connections**  
Never worry about losing power due to a loose internal connection.

**PC Monitoring Software**  
See real-time statistics of your battery.


**Paralleled up to 16 Batteries**  
Get the most power possible! Up to 81.9 kWh while maintaining BMS communications.

**Rack Mount Design**  
4U server rack mounting makes it convenient to store.

support@eg4electronics.com  
January 2023 | Rev 1.0.0 | Specifications subject to change without notice.

**Sol-Ark®**

**15K-2P-N**  
UL Model: "Limitless 15K-LV"



**Battery (optional) Output Power 12,000W**

Type	Lead-Acid or Li-Ion
Nominal DC Input	48V
Capacity	50 - 9000Ah
Voltage Range	43.0 - 63.0V
Continuous Battery Charging Output	275A
Charging Curve	3-Stage w/ Equalization
Grid to Batt Charging Efficiency	96.0%
External Temperature Sensor	Included
Current Shunt for Accurate % SOC or NSOC	Included
External Gen Start Based on Voltage or NSOC	Included
Communication to Lithium Battery	CanBus & RS485

**Solar Input Power 19,500W**

Max Allowed PV Power	19,500W
Max PV Power Delivered to Battery & AC Outputs	15,000W
Max DC Voltage (Voc)	500V @ 26A
MPPT Voltage Range	125-425V
Starting Voltage	125V
Number of MPPT	3
Max Solar Strings per MPPT	2
Max DC Current per MPPT (Self Limiting)	26A
Max AC Coupled Input (Micro/String Inverters)	19,200W

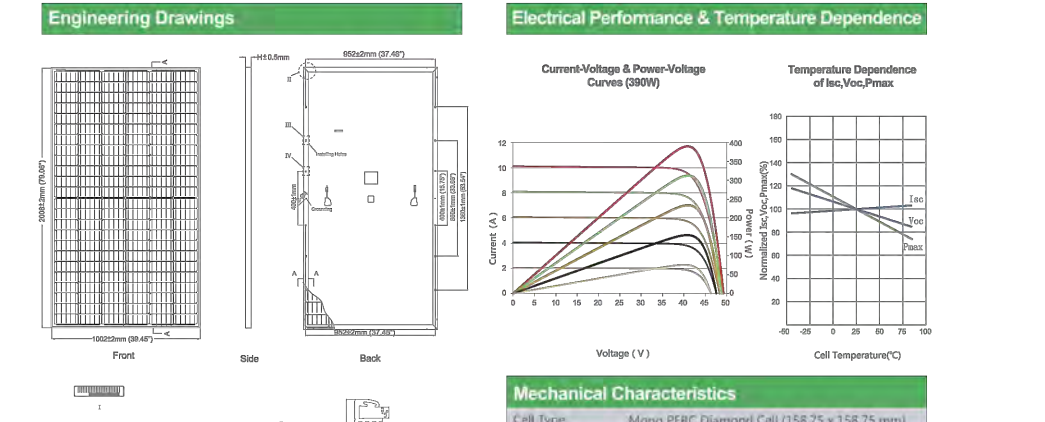
**AC Output Power 15kW On-Grid & Off-Grid**

Connections	120/240/208V Split Phase
Continuous AC Power with PV	15,000W 62.5A-L (240V)
Continuous AC Power from Batteries	12,000W 50A-L (240V)
Total Harmonic Distortion (THD)	≤ 3%
Surge AC Power 10sec	24,000VA L-L (240V)
Surge AC Power 100ms	30,000VA L-L (240V)
Fault Current 5sec	94A w/ PV 175A w/o PV
Fault Current 100ms	120A
Parallel Stacking	Yes - Up to 12
Frequency	60/50Hz
Continuous AC Power with Grid or Generator	48,000W 200A L-L (240V)
Generator	24,000W 200A L-L (120V)
CEC Efficiency	96.5% (Peak 97.5%)
Idle Consumption Typical - No Load	90W
Self Back Power Modes	Limited to Household/Fullly Grid Tied
Design (DC to AC)	Transformerless DC
Response Time (Grid Tied to Off Grid)	5ms
Power Factor	+/- 0.9 - 1.0

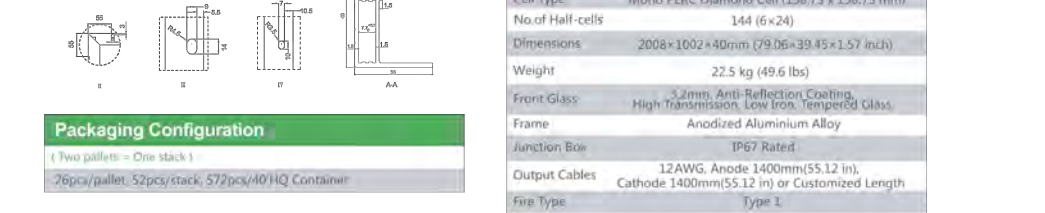
**Protections & Certifications**

Electronics Certified Safety by SGS Labs to NEC & UL Specs - NEC 690.48 & NEC 725.47c	Yes
Grid Self Back - UL 1741, IEEE 1547, IEEE 1547A, IEEE 1547B, IEEE 1547C, IEEE 1547D, IEEE 1547E, IEEE 1547F, IEEE 1547G, IEEE 1547H, IEEE 1547I, IEEE 1547J, IEEE 1547K, IEEE 1547L, IEEE 1547M, IEEE 1547N, IEEE 1547O, IEEE 1547P, IEEE 1547Q, IEEE 1547R, IEEE 1547S, IEEE 1547T, IEEE 1547U, IEEE 1547V, IEEE 1547W, IEEE 1547X, IEEE 1547Y, IEEE 1547Z, IEEE 1547AA, IEEE 1547AB, IEEE 1547AC, IEEE 1547AD, IEEE 1547AE, IEEE 1547AF, IEEE 1547AG, IEEE 1547AH, IEEE 1547AI, IEEE 1547AJ, IEEE 1547AK, IEEE 1547AL, IEEE 1547AM, IEEE 1547AN, IEEE 1547AO, IEEE 1547AP, IEEE 1547AQ, IEEE 1547AR, IEEE 1547AS, IEEE 1547AT, IEEE 1547AU, IEEE 1547AV, IEEE 1547AW, IEEE 1547AX, IEEE 1547AY, IEEE 1547AZ, IEEE 1547BA, IEEE 1547BB, IEEE 1547BC, IEEE 1547BD, IEEE 1547BE, IEEE 1547BF, IEEE 1547BG, IEEE 1547BH, IEEE 1547BI, IEEE 1547BJ, IEEE 1547BK, IEEE 1547BL, IEEE 1547BM, IEEE 1547BN, IEEE 1547BO, IEEE 1547BP, IEEE 1547BQ, IEEE 1547BR, IEEE 1547BS, IEEE 1547BT, IEEE 1547BU, IEEE 1547BV, IEEE 1547BW, IEEE 1547BX, 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IEEE 1547ZW, IEEE 1547ZX, IEEE 1547ZY, IEEE 1547ZZ	

**Engineering Drawings**



**Electrical Performance & Temperature Dependence**



**Mechanical Characteristics**

Cell Type	Monocrystalline PERC
Cell Size	182mm x 182mm
Weight	22.5 kg (49.6 lbs)
Front Glass	3.2mm Anti-Reflection Coated, Tempered Glass
Backsheet	0.5mm White PET
Output Cables	12AWG, Anode 1000mm (31.5 in), Cathode 1000mm (31.5 in) Customized Length
Frame Type	Aluminum

**PACKAGING CONFIGURATION**

1 Tray (400W) - One Stack (1)  
20 Trays (8000W) - One Stack (2)  
40 Trays (16000W) - One Stack (4)

**SPECIFICATIONS**

Module Type	J030304-72H-LV	J030304-72H-LV	J030304-72H-LV	J030304-72H-LV	J030304-72H-LV	J030304-72H-LV
STC	160W	160W	160W	160W	160W	160W
Maximum Power (Pmax)	300W	300W	300W	300W	300W	300W
Maximum Power Voltage (Vmp)	30.5V	30.5V	30.5V	30.5V	30.5V	30.5V
Maximum Power Current (Imp)	9.8A	9.8A	9.8A	9.8A	9.8A	9.8A
Open-circuit Voltage (Voc)	40.5V	40.5V	40.5V	40.5V	40.5V	40.5V
Short-circuit Current (Isc)	9.75A	9.75A	9.75A	9.75A	9.75A	9.75A
Maximum Efficiency (STC)	21.5%	21.5%	21.5%	21.5%	21.5%	21.5%
Operating Temperature (°C)	-40°C~85°C	-40°C~85°C	-40°C~85°C	-40°C~85°C	-40°C~85°C	-40°C~85°C
Minimum System Voltage	18V~500V (1500V/DC)	18V~500V (1500V/DC)	18V~500V (1500V/DC)	18V~500V (1500V/DC)	18V~500V (1500V/DC)	18V~500V (1500V/DC)
Maximum Series Fuse Rating	20A	20A	20A	20A	20A	20A
Peak System Voltage	1500V	1500V	1500V	1500V	1500V	1500V
Temperature Coefficient of Pmax	-0.36%/°C	-0.36%/°C	-0.36%/°C	-0.36%/°C	-0.36%/°C	-0.36%/°C
Temperature Coefficient of Voc	-0.35%/°C	-0.35%/°C	-0.35%/°C	-0.35%/°C	-0.35%/°C	-0.35%/°C
Temperature Coefficient of Isc	0.05%/°C	0.05%/°C	0.05%/°C	0.05%/°C	0.05%/°C	0.05%/°C
Nominal Operating Cell Temperature (NOCT)	45°C	45°C	45°C	45°C	45°C	45°C

STC: Irradiance 1000W/m<sup>2</sup> Cell Temperature 25°C AM=1.5  
NOCT: Irradiance 800W/m<sup>2</sup> Ambient Temperature 20°C AM=1.5 Wind Speed 1m/s  
\* Power measurement tolerance: ± 3%

CAUTION: READ SAFETY AND INSTALLATION INSTRUCTIONS BEFORE USING THE PRODUCT.  
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J030304-0004-72H-LV-V1-05

**XR Rail® Family**

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

**XR10**  
XR10 is a sleek, low-profile mounting rail, designed for regions with light or no snow. It achieves spans up to 8 feet, while remaining light and economical.

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

**XR100**  
XR100 is the ultimate residential mounting rail. It supports a range of wind and snow conditions, while also maximizing spans up to 10 feet.

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

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

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

**Rail Selection**

The table below was prepared in compliance with applicable engineering codes and standards. \* Values are based on the following criteria: ASCE 7-16, Gable Roof Flush Mount, Roof Zones 1 & 2e, Exposure B, Roof Slope of 8 to 20 degrees and Mean Building Height of 30 ft. Visit IronRidge.com for detailed certification letters.

Snow (PSF)	Rail Span						
	4'	6'	8'	10'	12'	14'	16'
None	XR10	XR10	XR100	XR100	XR1000	XR1000	XR1000
20	XR10	XR10	XR100	XR100	XR1000	XR1000	XR1000
30	XR10	XR10	XR100	XR100	XR1000	XR1000	XR1000
40	XR10	XR10	XR100	XR100	XR1000	XR1000	XR1000
80	XR10	XR10	XR100	XR100	XR1000	XR1000	XR1000
120	XR10	XR10	XR100	XR100	XR1000	XR1000	XR1000

\*Note: This is meant to be a simplified span chart for conveying general rail capabilities. Use approved certification letters for actual design guidance.

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