#### **GENERAL NOTES**

#### **CODE AND STANDARDS**

1. ALL WORK SHALL COMPLY WITH 2017 NATIONAL ELECTRIC CODE (NEC), 2018 INTERNATIONAL BUILDING CODE (IBC), 2018 INTERNATIONAL RESIDENTIAL CODE (IRC), 2018 UNIFORM PLUMBING CODE (UPC), AND ALL STATE AND LOCAL BUILDING, ELECTRICAL, AND PLUMBING CODES.

2. DRAWINGS HAVE BEEN DETAILED ACCORDING TO UL LISTING REQUIREMENTS.

#### SITE NOTES / OSHA REGULATION

1. A LADDER SHALL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS

2. THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE AND THIS SYSTEM IS A UTILITY INTERACTIVE SYSTEM. 3. THE SOLAR PV INSTALLATION SHALL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS. 4. ROOF COVERINGS SHALL BE DESIGNED, INSTALLED, AND MAINTAINED IN ACCORDANCE WITH THIS CODE AND THE APPROVED MANUFACTURER'S INSTRUCTIONS SUCH THAT THE ROOF COVERING SHALL SERVE TO PROTECT THE BUILDING OR STRUCTURE. 5.NO. OF SHINGLE LAYERS : 1

#### SOLAR CONTRACTOR

1. MODULE CERTIFICATIONS WILL INCLUDE UL1703, IEC61646, IEC61730.

2. IF APPLICABLE, MODULE GROUNDING LUGS MUST BE INSTALLED AT THE MARKED GROUNDING LUG HOLES PER THE MANUFACTURER'S INSTALLATION REQUIREMENTS.

3. AS INDICATED BY DESIGN, OTHER NRTL LISTED MODULE GROUNDING DEVICES MAY BE USED IN PLACE OF STANDARD GROUNDING LUGS AS SHOWN IN MANUFACTURER DOCUMENTATION AND APPROVED BY THE AHJ.

4. CONDUIT AND WIRE SPECIFICATIONS ARE BASED ON MINIMUM CODE REQUIREMENTS AND ARE NOT MEANT TO LIMIT UP-SIZING AS REQUIRED BY FIELD CONDITIONS 5. CONDUIT POINT OF PENETRATION FROM EXTERIOR TO INTERIOR TO BE INSTALLED AND SEALED WITH A

SUITABLE SEALING COMPOUND.

6. DC WIRING LIMITED TO MODULE FOOTPRINT W/ ENPHASE AC SYSTEM.

7. ENPHASE WIRING SYSTEMS SHALL BE LOCATED AND SECURED UNDER THE ARRAY W/ SUITABLE WIRING CLIPS. 8. MAX DC VOLTAGE CALCULATED USING MANUFACTURER PROVIDED TEMP COEFFICIENT FOR VOC UNLESS NOT AVAII ABI F

9. ALL INVERTERS, MOTOR GENERATORS, PHOTOVOLTAIC MODULES, PHOTOVOLTAIC PANELS, AC

PHOTOVOLTAIC MODULES, DC COMBINERS, DC-TO-DC CONVERTERS, SOURCE CIRCUIT COMBINERS, AND CHARGE CONTROLLERS INTENDED FOR USE IN A PHOTOVOLTAIC POWER SYSTEM WILL BE IDENTIFIED AND LISTED FOR THE APPLICATION PER NEC 690.4(B).

10. ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE.

11. TERMINALS AND LUGS WILL BE TIGHTENED TO MANUFACTURER TORQUE SPECIFICATIONS (WHEN PROVIDED) IN ACCORDANCE WITH NEC CODE 110.14(D) ON ALL ELECTRICAL CONNECTIONS.

#### **EQUIPMENT LOCATIONS**

1. PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL BE PROVIDED AS PER SECTION NEC 110.26.

2. EQUIPMENT INSTALLED IN DIRECT SUNLIGHT MUST BE RATED FOR EXPECTED OPERATING TEMPERATURE AS SPECIFIED BY NEC 690.31(A) AND NEC TABLE 310.15(B)

3. ALL EQUIPMENT SHALL BE INSTALLED ACCESSIBLE TO QUALIFIED PERSONNEL ACCORDING TO NEC APPLICABLE CODES.

4. ALL COMPONENTS ARE LISTED FOR THEIR PURPOSE AND RATED FOR OUTDOOR USAGE WHEN APPROPRIATE.

#### **PROJECT INFORMATION:**

NUMBER OF STORIES: 2 **CONDUIT RUN:** Interior ECOBEE QTY: 1 LIGHT BULB QTY: 18 **PV METER:** Not Required

#### **ROOF TYPE (1) INFORMATION:**

**ROOF TYPE:** Comp Shingle FRAMING TYPE: Rafter SHEATHING TYPE: OSB ATTACHMENT: UNIRAC STRONGHOLD ATT RACKING: NXT Horizon @ 48" OC Portrait / 64" OC Landscape NUMBER OF ATTACHMENTS: 58

#### ROOF TYPE (2) INFORMATION (IF APPLICABLE):

\*SEE PV4.2

#### SYSTEM TO BE INSTALLED INFORMATION:

DC SYSTEM SIZE: 7.6 kW DC AC SYSTEM SIZE: 5.51 kW DC MODULE TYPE: (19) URE FBM400MFG-BB **INVERTER TYPE: Enphase IQ8PLUS-72-2-US** MONITORING: Enphase IQ Combiner 4 X-IQ-AM1-240-4



#### **PV SYSTEM SPECIFICATIONS**

TOTAL NUMBER OF MODULES: 19 MODULE MAKE AND MODEL: URE FBM400MFG-BB MODULE WATTAGE: 400W DC

INVERTER MAKE AND MODEL: Enphase IQ8PLUS-72-2-US INVERTER TYPE: Microinverter (1 Inverter per PV Module) INVERTER CURRENT OUTPUT: 1.21A AC INVERTER NOMINAL VOLTAGE: 240V INVERTER WATTAGE: 290W AC



FRONT OF HOME 1824 SW Blackstone Pl



#### **PV SYSTEM SPECIFICATIONS**

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FRONT OF HOME







SUPPLY SIDE TAP INTERIOR POI



#### INTERCONNECTION NOTES 705.11 AN ELECTRIC POWER PRODUCTION SOURCE, WHERE

CONNECTED TO THE SUPPLY SIDE OF THE SERVICE DISCONNECTING MEANS AS PERMITTED IN 230.82(6), SHALL COMPLY WITH 705.11 (A) THROUGH (E).



MODULE SPECIFICATIONS	URE FBM400MFG-BB	DESIGN LOCATION AND TEMPERATURES							CONDUCTOR SIZE CAL	CULATIONS
RATED POWER (STC)	400 W	TEMPERATURE DATA SOURCE			А	SHRAE 2%	AVG. HIG	<b>SH TEMP</b>	MICROINVERTER TO	MAX. SHORT CIRC
MODULE VOC	37.2 V DC	STATE						Missouri	JUNCTION BOX (1)	MAX.
MODULE VMP	31.2 V DC	CITY					Lee's	s Summit		CONDUCTOR (T
MODULE IMP	12.8 A DC	WEATHER STATION				KANS	AS CITY IN	ITL ARPT		
MODULE ISC	13.7 A DC	ASHRAE EXTREME LOW TEMP (°C)						-21		AMB. TEMI
VOC CORRECTION	-0.27 %/°C	ASHRAE 2% AVG. HIGH TEMP (°C)						35		
VMP CORRECTION	-0.32 %/°C								JUNCTION BOX TO	MAX. SHORT CIR
SERIES FUSE RATING	30 A DC	SYSTEM ELECTRICAL SPECIFICATIONS	CIR 1	CIR 2	CIR 3	CIR 4	CIR 5	CIR 6	JUNCTION BOX (2)	MAX.
ADJ. MODULE VOC @ ASHRAE LOW TEMP	41.8 V DC	NUMBER OF MODULES PER MPPT	10	9						CONDUCTOR (
ADJ. MODULE VMP @ ASHRAE 2% AVG. HIGH TEN	VIP 27.0 V DC	DC POWER RATING PER CIRCUIT (STC)	4000	3600						
		TOTAL MODULE NUMBER			19 MOD	ULES				С
MICROINVERTER SPECIFICATIONS Enph	ase IQ8+ Microinverters	STC RATING OF ARRAY			7600W	/ DC				AMB. TEMI
POWER POINT TRACKING (MPPT) MIN/MAX	30 - 58 VDC	AC CURRENT @ MAX POWER POINT (IMP)	12.1	10.9						
MAXIMUM INPUT VOLTAGE	60 V DC	MAX. CURRENT (IMP X 1.25)	15.125	13.6125					JUNCTION BOX TO	MAX. SHORT CIR
MAXIMUM DC SHORT CIRCUIT CURRENT	15 A DC	OCPD CURRENT RATING PER CIRCUIT	20	20					COMBINER BOX (3)	MAX.
MAXIMUM USABLE DC INPUT POWER	440 W	MAX. COMB. ARRAY AC CURRENT (IMP)			23.0	)				CONDUCTOR (
MAXIMUM OUTPUT CURRENT	1.21 A AC	MAX. ARRAY AC POWER			5510W	/ AC				
AC OVERCURRENT PROTECTION	20 A									С
MAXIMUM OUTPUT POWER	290 W	AC VOLTAGE RISE CALCULATIONS	DIST (FT)	COND.	VRISE(V)	VEND(V)	%VRISE			AMB. TEMI
CEC WEIGHTED EFFICIENCY	97 %	VRISE SEC. 1 (MICRO TO JBOX)	36	12 Cu.	1.45	241.45	0.61%			
		VRISE SEC. 2 (JBOX TO COMBINER BOX)	70	10 Cu.	2.15	242.15	0.90%		COMBINER BOX TO	IN
AC PHOTOVOLATIC MODULE MARKING (NEC 690	.52)	VRISE SEC. 3 (COMBINER BOX TO POI)	50	10 Cu.	2.92	242.92	1.22%		MAIN PV OCPD (15)	MAX. CURRENT
NOMINAL OPERATING AC VOLTAGE	240 V AC	TOTAL VRISE			6.53	246.53			CONI	DUCTOR (THWN-2, C
NOMINAL OPERATING AC FREQUENCY	47 - 68 HZ AC									
MAXIMUM AC POWER	240 VA AC	PHOTOVOLTAIC AC DISCONNECT OUTPUT L	ABEL (NEC	690.54)						C
MAXIMUM AC CURRENT	1.0 A AC	AC OUTPUT CURRENT					23.0	A AC		AMB. TEMI
MAXIMUM OCPD RATING FOR AC MODULE	20 A AC	NOMINAL AC VOLTAGE					240	V AC		

#### **GROUNDING NOTES**

#### WIRING & CONDUIT NOTES

<ol> <li>A GROUNDING ELECTRODE SYSTEM IN ACCORDANCE WITH [NEC 690.47] AND [NEC 250.50-60] SHALL BE USED AND BE BONDED AT THE SERVICE ENTRANCE. IF EXISTING SYSTEM IS INACCESSIBLE, OR INADEQUATE, OR IS ONLY METALLIC WATER PIPING, A SUPPLEMENTAL GROUNDING ELECTRODE WILL BE USED AT THE INVERTER LOCATION CONSISTING OF A UL LISTED 8 FT GROUND ROD WITH ACORN CLAMP.</li> <li>THE GROUNDING ELECTRODE CONDUCTOR SHALL BE PROTECTED FROM PHYSICAL DAMAGE BETWEEN THE GROUNDING ELECTRODE AND THE PANEL (OR INVERTER) IF SMALLER THAN #6 AWG COPPER WIRE PER [NEC 250.64(B)]. THE GROUNDING ELECTRODE CONDUCTOR WILL BE CONTINUOUS, EXCEPT FOR PPLICES 020, 50(H)]. THE GROUNDING ELECTRODE CONDUCTOR WILL BE CONTINUOUS, EXCEPT FOR PPLICES 020, 54(B)]. THE GROUNDING GROUNDING ELECTRODE TO PROVIDE FOR ACOMPLETE SYSTEM.</li> <li>A GROUNDING ELECTRODE AND THE EXISTING GROUNDING ELECTRODE TO PROVIDE FOR A COMPLETE SYSTEM.</li> <li>A GROUNDING ELECTRODE CONDUCTORS SHALL BE NO LESS THAN 8 AWG AND NO GREATER THAN 6 AWG COPPER AND BONDED TO THE EXISTING GROUNDING ELECTRODE TO PROVIDE FOR A COMPLETE SYSTEM.</li> <li>A MODULE DES NOT INTERRUPT A GROUNDED IN ACCORDANCE TO [NEC 250.21], INEC 1ABLE 250.122], AND ALL METAL PARTS OR MODULE FRAMES ACCORDING TO [NEC 690.46].</li> <li>MODULE DOES NOT INTERRUPT A GROUNDED CONDUCTOR TO ANOTHER MODULE.</li> <li>THE GROUNDING CONNECTION TO A MODULE SHALL BE ARRANGED SUCH THAT THE REMOVAL OF A MODULE DOES NOT INTERRUPT A GROUNDED CONDUCTOR TO ANOTHER MODULE.</li> <li>ENCLOSURES SHALL BE ROUNDED USING THE SUPPLIED CONNECTION POINTS IDENTIFIED IN THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.</li> <li>ENCOLOURES SHALL BE ROPERLY PREPARED WITH REMOVAL OF PAINT/FINISH AS APPROPRIATE WHEN GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, AND GROUNDING DEVISES EXPOSED TO THE ELEMENTS SHALL BE RATED FOR DIRECT BURAL.</li> <li>GROUNDING SYSTEM COMPONING CONDUCTORS SHALL BE COLOR CODED GREEN (OR MARKED GROUNDING SYSTEM COMPONING CONDUCTORS SHALL BE COLOR CODED GREEN (0R M</li></ol>	<ol> <li>ALL CONDUIT SIZES AND TYPES, SHALL BE LISTED FOR ITS PURPOSE AND APPROVED FOR THE SITE APPLICATIONS.</li> <li>BOLTED CONNECTION REQUIRED IN DC DISCONNECTS ON THE WHITE GROUNDED CONDUCTOR (USE POLARIS BLOCK OR NEUTRAL BAR).</li> <li>ANY CONNECTION ABOVE LIVE PARTS MUST BE WATERTIGHT. REDUCING WASHERS DISALLOWED ABOVE LIVE PARTS, MEYERS HUBS RECOMMENDED</li> <li>UV RESISTANT CABLE TIES (NOT ZIP TIES) USED FOR PERMANENT WIRE MANAGEMENT OFF THE ROOF SURFACE IN ACCORDANCE WITH [NEC 110.2,110.3(A-B)].</li> <li>SOLADECK JUNCTION BOXES MOUNTED FLUSH WITH ROOF SURFACE TO BE USED FOR WIRE MANAGEMENT AND AS FLASHED ROOF PENETRATIONS FOR INTERIOR CONDUIT CONSULT CABLE LISTED AND IDENTIFIED AS PV WIRE, TYPE TC-ER, OR EQUIVALENT; ROUTED TO SOURCE CIRCUIT COMBINER BOXES AS REQUIRED.</li> <li>ALL PV CABLES AND HOMERUN WIRES BE TYPE USE-2, AND SINGLE-CONDUCTOR CABLE LISTED AND IDENTIFIED AS PV WIRE, TYPE TC-ER, OR EQUIVALENT; ROUTED TO SOURCE CIRCUIT COMBINER BOXES AS REQUIRED.</li> <li>ALL PV DC CONDUCTORS IN CONDUIT EXPOSED TO SUNLIGHT SHALL BE INSTALLED AT LEAST 7/8' ABOVE THE ROOF SURFACE AND DERATED ACCORDING TO [NEC TABLE 310.15 (B)(2)(A)], [NEC TABLE 310.15(B)(3)(A)],&amp; [NEC 310.15(B)(3)(C)].</li> <li>EXPOSED ROOF PV DC CONDUCTORS SHALL BE USE-2, 90°C RATED, WET AND UV RESISTANT, AND UL LISTED RATED FOR 600V, UV RATED SPIRAL WRAP SHALL BE USED TO PROTECT WIRE FROM SHARP EDGES.</li> <li>PHASE AND NEUTRAL CONDUCTORS SHALL BE DUAL RATED THHN/THWN-2 INSULATED, 90°C RATED, WET AND UV RESISTANT, RATED FOR 600V</li> <li>AWIRE DELTA CONNECTED SYSTEMS HAVE THE PHASE WITH THE HIGHER VOLTAGE TO GROUND MARKED ORANGE OR IDENTIFIED BY OTHER EFFECTIVE MEANS.</li> <li>ALL DVURE SUSTANT, RATED FOR 600V</li> <li>AUGREG CIRCUITS SHALL HAVE INDIVIDUAL SOURCE CIRCUIT PROTECTION</li> <li>VOEASORG OR IDENTIFIED BY OTHER FFFECTIVE MEANS.</li> <li>ALL CONDUCTORS SHALD BE CONDUCTORS SHALL BE CLOOR CODED IS</li>     DORDONED SYSTEMS DC CONDUCTORS SHALL BE CLOOR CODED IS     DORDO</ol>	
--	--	--

CUIT CURRRENT (ISC) =	12.1	A AC		
CURRENT (ISC X1.25) =	15.1	A AC		BILLE RAVEN
C-ER, COPPER (90°C)) =	12	AWG		SOLAR
	0.96	А		1403 N Research Way
ADJUSTED AMP =	28.8	>	15.1	Orem. UT 84097
UIT CURRRENT (ISC) =	12.1	A AC	10.1	800.377.4480
CURRENT (ISC X1.25) =	15.1	A AC		WWW.BLUERAVENSOLAR.COM
JF-B, COPPER (60°C)) =	10	AWG		CONFIDENTIAL- THE INFORMATION HEREIN CONTAINED SHALL NOT BE
ONDUCTOR RATING =	30	А		USED FOR THE BENEFIT OF ANYONE EXCEPT BLUE RAVEN SOLAR NOR
ONDUIT FILL DERATE =	1			SHALL IT BE DISCLOSED IN WHOLE OR
. AMP. CORRECTION =	0.96			RECIPIENTS ORGANIZATION, EXCEPT
ADJUSTED AMP. =	28.8	>	15.1	USE OF THE RESPECTIVE EQUIPMENT,
UIT CURRRENT (ISC) =	12.1	A AC		WITHOUT THE WRITTEN PERMISSION OF BLUE RAVEN SOLAR LLC.
CURRENT (ISC X1.25) =	15.1	A AC		
JF-B, COPPER (60°C)) =	10	AWG		
	30	A		TRADULI
	0.0			CERTIFIED
ADJUSTED AMP. =	23.04	>	15.1	PV INSTALLATION
/ERTER RATED AMPS =	23.0	AAC	13.1	PROFESSIONAL
(RATED AMPS X1.25) =	28.74	A AC		Scott Gurney #PV-011719-015866
OPPER (75°C TERM.)) =	10	AWG		
CONDUCTOR RATING =	35	Α		CONTRACTOR:
ONDUIT FILL DERATE =	1			800-377-4480
AMP. CORRECTION =	0.96			000-377-4400
ADJUSTED AMP. =	33.6	>	28.7	
				<b>CUSTOMER INFORMATION:</b> James Darville 1824 SW Blackstone Pl Lee's Summit, Missouri 64082 AC SYSTEM SIZE: 5.51 kW A0 DC SYSTEM SIZE: 7.6 kW DC
				September 23, 2022
				UII4UO
			۵	RELEASE FOR CONSTRUCTION S NOTED ON PLANS REVIEW
			A.	REDEVENDIMENT SERVICES MBER: LEE'S SUMMIT, MISSOURIA
				-

## STANDARD LABELS

## **ADDITIONAL LABELS**

ELECTRIC SHOCK HAZARD

TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

#### PHOTOVOLTAIC SYSTEM AC DISCONNECT

RATED AC OUTPUT CURRENT 19 A NOMINAL OPERATING AC VOLTAGE  $240 \mathrm{V}$ 

## 

DUAL POWER SUPPLY

SOURCES: UTILITY GRID AND PV SOLAR ELECTRIC SYSTEM

## 

POWER SOURCE OUTPUT CONNECTION

DO NOT RELOCATE THIS OVERCURRENT DEVICE

## 

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

#### SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

TURN RAPID SHUTDOW SWITCH TO THE "OFF" POSITION TO SHUT DOWN PV SYSTEM AND REDUCE

#### LABEL 6 BUILDINGS WITH PV SYSTEMS SHALL HAVE A

PERMANENT LABEL LOCATED AT EACH SERVICE EQUIPMENT LOCATION TO WHICH THE PV SYSTEMS ARE CONNECTED OR AT AN APPROVED READILY VISIBLE LOCATION AND SHALL INDICATE THE LOCATION OF RAPID SHUTDOWN INITIATION DEVICES. [2017 NEC 690.56(C)(1)(a)] [2020 NEC 690.56(C)]



LABEL 7 SIGN LOCATED AT RAPID SHUT DOWN DISCONNECT SWITCH [2017 NEC 690.56(C)(3)]

[2020 NEC 690.56(C)(2)]

## 

MAIN DISTRIBUTION UTILITY DISCONNECT(S) POWER TO THIS BUILDING IS ALSO SUPPLIED

FROM A ROOF MOUNTED SOLAR ARRAY WITH A RAPID SHUTDOWN DISCONNECTING MEANS GROUPED AND LABELED WITHIN LINE OF SITE AND 10 FT OF THIS LOCATION



POWER TO THIS BUILDING IS ALSO SUPPLIED FROM MAIN DISTRIBUTION UTILITY DISCONNECT LOCATED

## 

POWER TO THIS BUILDING IS ALSO SUPPLIED FROM A ROOF MOUNTED SOLAR ARRAY, SOLAR ARRAY RAPID SHUTDOWN DISCONNECT IS LOCATED OUTSIDE NEXT TO THE UTILITY METER.



LABEL 8

PERMANENT PLAQUE OR DIRECTORY DENOTING THE LOCATION OF ALL ELECTRIC POWER SOURCE DISCONNECTING MEANS ON OR IN THE PREMISES SHALL BE INSTALLED AT EACH SERVICE EQUIPMENT LOCATION AND AT THE LOCATION(S) OF THE SYSTEM DISCONNECT(S) FOR ALL ELECTRIC POWER PRODUCTION SOURCES CAPABLE OF BEING INTERCONNECTED [2017 NEC 705.10] [2020 NEC 705.10]

#### LABEL 9

PERMANENT PLAQUE OR DIRECTORY DENOTING THE LOCATION OF ALL ELECTRIC POWER SOURCE DISCONNECTING MEANS ON OR IN THE PREMISES SHALL BE INSTALLED AT EACH SERVICE EQUIPMENT LOCATION AND AT THE LOCATION(S) OF THE SYSTEM DISCONNECT(S) FOR ALL ELECTRIC POWER PRODUCTION SOURCES CAPABLE OF BEING INTERCONNECTED. [2017 NEC 705.10] [2020 NEC 705.10]

#### LABEL 10

PERMANENT PLAQUE OR DIRECTORY TO BE LOCATED AT MAIN SERVICE FOUIPMENT DENOTING THE LOCATION OF THE RAPID SHUTDOWN SYSTEM DISCONNECTING MEANS IF SOLAR ARRAY RAPID SHUTDOWN DISCONNECTING SWITCH IS NOT GROUPED AND WITHIN LINE OF SITE OF MAIN SERVICE DISCONNECTING MEANS. [2017 NEC 705.10 AND 690.56(C)(1)(a)] [2020 NEC 705.10 AND 690.56(C)]

#### LABEL 11

PERMANENT PLAQUE OR DIRECTORY TO BE LOCATED AT AC COMBINER PANEL. [2017 NEC 110.21(B)] [2020 NEC 110.21(B)]



\*ELECTRICAL DIAGRAM SHOWN ABOVE IS FOR LABELING PURPOSES ONLY. NOT AN ACTUAL REPRESENTATION OF EQUIPMENT AND CONNECTIONS TO BE INSTALLED. LABEL LOCATIONS PRESENTED MAY VARY DEPENDING ON TYPE OF INTERCONNECTION METHOD AND LOCATION PRESENTED ON 3 LINE DIAGRAM. 3 LINE DIAGRAM ON PV5 TO REFLECT ACTUAL REPRESENTATION OF PROPOSED SCOPE OF WORK

#### LABELING NOTES

1) LABELS CALLED OUT ACCORDING TO ALL COMMON CONFIGURATIONS. ELECTRICIAN TO DETERMINE EXACT REQUIREMENTS IN THE FIELD PER CURRENT NEC AND LOCAL CODES AND MAKE APPROPRIATE ADJUSTMENTS. 2) LABELING REQUIREMENTS BASED ON THE 2017 & 2020 NEC CODE, OSHA STANDARD 19010.145, ANSIZ535. 3) MATERIAL BASED ON THE REQUIREMENTS OF THE AHJ

4) LABELS TO BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED AND SHALL NOT BE HANDWRITTEN [NEC 110.21]

LABEL 3 IF INTERCONNECTING LOAD SIDE, INSTALL THIS LABEL ANYWHERE THAT IS POWERED BY BOTH THE UTILITY AND THE SOLAR PV SYSTEM, IE. MAIN SERVICE PANEL

NOMINAL OPERATING AC VOLTAGE

FOR PV SYSTEM DISCONNECTING MEANS WHERE THE

LINE AND LOAD TERMINALS MAY BE ENERGIZED IN THE

SHALL BE MARKED AT AN ACCESSIBLE LOCATION AT

THE DISCONNECTING MEANS AS A POWER SOURCE

AND WITH THE RATED AC OUTPUT CURRENT AND THE

#### LABEL 4

LABEL 5

APPLY TO THE PV COMBINER BOX [2017 NEC 705.12(B)(2)(3)(c)]

[2020 NEC 705.12(B)(3)(3)]

LABEL 1

LABEL 2

[2017 NEC 690.54]

[2020 NEC 690.54]

AND SUBPANELS.

[2017 NEC 705.12(B)(3)]

[2020 NEC 705.12(B)(3)]

OPEN POSITION

[2017 NEC 690.13(B)]

[2020 NEC 690.13(B)]

APPLY TO THE DISTRIBUTION EQUIPMENT ADJACENT TO THE BACK-FED BREAKER FROM THE POWER SOURCE [2017 NEC 705.12(B)(2)(3)(b) [2020 NEC 705.12(B)(3)(2)]





### **DIRECTORY PLACARD NOTES**

[NEC 705.10] A PERMANENT PLAQUE OR DIRECTORY DENOTING THE LOCATION OF ALL ELECTRIC POWER SOURCE DISCONNECTING MEANS ON OR IN THE PREMISES SHALL BE INSTALLED AT EACH SERVICE EQUIPMENT LOCATION AND AT THE LOCATION(S) OF THE SYSTEM DISCONNECT(S) FOR ALL ELECTRIC POWER PRODUCTION SOURCES CAPABLE OF BEING INTERCONNECTED. THE MARKING SHALL COMPLY WITH [110.21(B)].



### 



## IQ8 and IQ8+ Microinverters

Our newest IQ8 Microinverters are the industry's first microgrid-forming, softwaredefined microinverters with split-phase power conversion capability to convert DC power to AC power efficiently. The brain of the semiconductor-based microinverter is our proprietary application-specific integrated circuit (ASIC) which enables the microinverter to operate in grid-tied or off-grid modes. This chip is built in advanced 55nm technology with high speed digital logic and has super-fast response times to changing loads and grid events, alleviating constraints on battery sizing for home energy systems.



Part of the Enphase Energy System, IQ8 Series Microinverters integrate with the Enphase IQ Battery, Enphase IQ Gateway, and the Enphase App monitoring and analysis software.



Connect PV modules quickly and easily to IQ8 Series Microinverters using the included Q-DCC-2 adapter cable with plug-n-play MC4 connectors.

#### Enphase 25 year limited warranty

IQ8 Series Microinverters redefine reliability standards with more than one million cumulative hours of power-on testing, enabling an industryleading limited warranty of up to 25 years.



IQ8 Series Microinverters are UL Listed as PV Rapid Shut Down Equipment and conform with various regulations, when installed according to manufacturer's instructions.

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IQ8SP-DS-0002-01-EN-US-2022-03-17

#### Easy to install

• Lightweight and compact with plug-n-play connectors

DATA SHEET

- Power Line Communication (PLC) between components
- Faster installation with simple
   two-wire cabling

#### High productivity and reliability

- Produce power even when the grid is down\*
- More than one million cumulative hours of testing
- Class II double-insulated
   enclosure
- Optimized for the latest highpowered PV modules

#### **Microgrid-forming**

- Complies with the latest
   advanced grid support\*\*
- Remote automatic updates for the latest grid requirements
- Configurable to support a wide range of grid profiles
- Meets CA Rule 21 (UL 1741-SA)
   requirements

 \* Only when installed with IQ System Controller 2, meets UL 1741.
 \*\* IQ8 and IQ8Plus supports split phase, 240V installations only.

#### IQ8 and IQ8+ Microinverters

		108-50-2-05	
Commonly used module pairings	w	235 - 350	60
Module compatibility		60-cell/120 half-cell	60-cell/
MPPT voltage range	۷	27 - 37	
Operating range	۷	25 - 48	
Min/max start voltage	٧	30 / 48	
Max input DC voltage	۷	50	
Max DC current <sup>2</sup> [module lsc]	Α	1	5
Overvoltage class DC port		I	I
DC port backfeed current	mA	(	)
PV array configuration		1x1 Ungrounded array; No additional DC side protection requ	ired; AC side
OUTPUT DATA (AC)		IQ8-60-2-US	
Peak output power	VA	245	
Max continuous output power	VA	240	
Nominal (L-L) voltage/range <sup>3</sup>	٧	240/2	11 – 264
Max continuous output current	А	1.0	
Nominal frequency	Hz	6	0
Extended frequency range	Hz	50 -	- 68
AC short circuit fault current over 3 cycles	Arms	2	2
Max units per 20 A (L-L) branch circuit <sup>4</sup>		16	
Total harmonic distortion		<5	%
Overvoltage class AC port		1	I
AC port backfeed current	mA	3	0
Power factor setting		1.	0
Grid-tied power factor (adjustable)		0.85 leading -	- 0.85 laggir
Peak efficiency	%	97.5	
CEC weighted efficiency	%	97	
Night-time power consumption	mW	6	0
MECHANICAL DATA			
Ambient temperature range		-40°C to +60°C	-40°F to +1
Relative humidity range		4% to 100% (	condensing
DC Connector type		M	24
Dimensions (HxWxD)		212 mm (8.3") x 175 mm	(6.9") x 30.
Weight		1.08 kg (	2.38 lbs)
Cooling		Natural conve	ction – no fa
Approved for wet locations		Ye	€S
Pollution degree		PE	03
Enclosure		Class II double-insulated, corrosi	on resistant
Environ. category / UV exposure rating		NEMA Туре	6 / outdoor
COMPLIANCE			
		CA Rule 21 (UL 1741-SA), UL 62109-1, UL1741/IEEE1547, FCC Part	15 Class B, I
Certifications		This product is UL Listed as PV Rapid Shut Down Equipment and 690.12 and C22.1-2018 Rule 64-218 Rapid Shutdown of PV Syste manufacturer's instructions.	conforms w ms, for AC a

(1) No enforced DC/AC ratio. See the compatibility calculator at https://link.enphase.com/module-compatibility (2) Maximum continuous input DC current is 10.6A (3) Nominal voltage range can be extended beyond nominal if required by the utility. (4) Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.



Data Sheet Enphase Networking

## Enphase IQ Combiner 4/4C X-IQ-AM1-240-4 X-IQ-AM1-240-4C



**LISTED** To learn more about Enphase offerings, visit <u>enphase.com</u>

The **Enphase IQ Combiner 4/4C** with Enphase IQ Gateway and integrated LTE-M1 cell modem (included only with IQ Combiner 4C) consolidates interconnection equipment into a single enclosure and streamlines IQ microinverters and storage installations by providing a consistent, pre-wired solution for residential applications. It offers up to four 2-pole input circuits and Eaton BR series busbar assembly.

#### Smart

- Includes IQ Gateway for communication and control
- Includes Enphase Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05), included only with IQ Combiner 4C
- Includes solar shield to match Enphase IQ Battery aesthetics and deflect heat
- Flexible networking supports Wi-Fi, Ethernet, or cellular
- + Optional AC receptacle available for PLC bridge
- Provides production metering and consumption
  monitoring

#### Simple

- Centered mounting brackets support single stud mounting
- $\boldsymbol{\cdot}\,$  Supports bottom, back and side conduit entry
- Up to four 2-pole branch circuits for 240 VAC plug-in breakers (not included)
- 80A total PV or storage branch circuits

#### Reliable

- Durable NRTL-certified NEMA type 3R enclosure
- Five-year limited warranty
- Two years labor reimbursement program coverage included for both the IQ Combiner SKU's
- UL listed



#### Enphase IQ Combiner 4/4C

MODEL NUMBER	
IQ Combiner 4 (X-IQ-AM1-240-4)	IQ Combiner 4 with Enphase IQ Gateway printed circuit board for i C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Includes IO System Controller 2 and to deflect heat.
IQ Combiner 4C (X-IQ-AM1-240-4C)	IQ Combiner 4C with Enphase IQ Gateway printed circuit board for (ANSI C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Ir (CELLMODEM-M1-06-SP-05), a plug-and-play industrial-grade or (Available in the US, Canada, Mexico, Puerto Rico, and the US Virg the installation area.) Includes a silver solar shield to match the I0
ACCESSORIES AND REPLACEMENT PARTS	(not included, order separately)
Ensemble Communications Kit COMMS-CELLMODEM-M1-06 CELLMODEM-M1-06-SP-05 CELLMODEM-M1-06-AT-05	<ul> <li>Includes COMMS-KIT-01 and CELLMODEM-M1-06-SP-05 with Ensemble sites</li> <li>4G based LTE-M1 cellular modem with 5-year Sprint data pla</li> <li>4G based LTE-M1 cellular modem with 5-year AT&amp;T data plar</li> </ul>
Circuit Breakers BRK-10A-2-240V BRK-15A-2-240V BRK-20A-2P-240V BRK-15A-2P-240V-B BRK-20A-2P-240V-B	Supports Eaton BR210, BR215, BR220, BR230, BR240, BR250, Circuit breaker, 2 pole, 10A, Eaton BR210 Circuit breaker, 2 pole, 15A, Eaton BR215 Circuit breaker, 2 pole, 20A, Eaton BR220 Circuit breaker, 2 pole, 15A, Eaton BR215B with hold down kit Circuit breaker, 2 pole, 20A, Eaton BR220B with hold down kit
EPLC-01	Power line carrier (communication bridge pair), quantity - one
XA-SOLARSHIELD-ES	Replacement solar shield for IQ Combiner 4/4C
XA-PLUG-120-3	Accessory receptacle for Power Line Carrier in IQ Combiner 4/4
XA-ENV-PCBA-3	Replacement IQ Gateway printed circuit board (PCB) for Comb
X-IQ-NA-HD-125A	Hold down kit for Eaton circuit breaker with screws.
ELECTRICAL SPECIFICATIONS	
Rating	Continuous duty
System voltage	120/240 VAC, 60 Hz
Eaton BR series busbar rating	125 A
Max. continuous current rating	65 A
Max. continuous current rating (input from PV/storage)	64 A
Max. fuse/circuit rating (output)	90 A
Branch circuits (solar and/or storage)	Up to four 2-pole Eaton BR series Distributed Generation (DG)
Max. total branch circuit breaker rating (input) Production metering CT	80A of distributed generation / 95A with IQ Gateway breaker in 200 A solid core pre-installed and wired to IQ Gateway
Consumption monitoring CT (CT-200-SPLIT)	A pair of 200 A split core current transformers
MECHANICAL DATA	
Dimensions (WxHxD)	37.5 x 49.5 x 16.8 cm (14.75" x 19.5" x 6.63"). Height is 21.06" (
Weight	7.5 kg (16.5 lbs)
Ambient temperature range	-40° C to +46° C (-40° to 115° F)
Cooling	Natural convection, plus heat shield
Enclosure environmental rating	Outdoor, NRTL-certified, NEMA type 3R, polycarbonate constr
Wire sizes	<ul> <li>20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors</li> <li>60 A breaker branch input: 4 to 1/0 AWG copper conductors</li> <li>Main lug combined output: 10 to 2/0 AWG copper conductor</li> <li>Neutral and ground: 14 to 1/0 copper conductors</li> <li>Always follow local code requirements for conductor sizing.</li> </ul>
Altitude	To 2000 meters (6,560 feet)
INTERNET CONNECTION OPTIONS	
Integrated Wi-Fi	802.11b/g/n
Cellular	CELLMODEM-M1-06-SP-05, CELLMODEM-M1-06-AT-05 (46 ba Mobile Connect cellular modem is required for all Ensemble instal
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not inclu
COMPLIANCE	
Compliance, IQ Combiner	UL 1741, CAN/CSA C22.2 No. 107.1, 47 CFR, Part 15, Class B, I Production metering: ANSI C12.20 accuracy class 0.5 (PV pro- Consumption metering: accuracy class 2.5
Compliance, IQ Gateway	UL 60601-1/CANCSA 22.2 No. 61010-1

#### To learn more about Enphase offerings, visit enphase.com

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Positive power tolerance

Withstand heavy loading

Front load 5400 Pa & rear load 2400 Pa

+0 ~ +5 watt



FBM\_MFG-BB / 108 cells 390W - 405 W Mono-Crystalline PV Module

URE Peach module uses URE state-of -the art cell cutting technology, and advanced module manufacturing experiences.



UL 61730, CE-compliant Quality Controlled PV-TÜV SUD IEC 61215:2016, IEC 61730:2016



100% EL inline inspection Better module reliability

Design for 1000 VDC Reduce the system BOS effectively



Excellent low light performance 3.5% relative eff. Reduction at low  $(200W/m^{2})$ 



Fire resistance Class of reaction to Type 1/ Class C



For more information, please visit us at www.urecorp.com



 $723 \pm 1$ 

United Renewable Energy Co., Ltd.

#### **Electrical Data**

EN

Model - STC		FBM390MFG-BB	FBM395MFG-BB	FBM400MFG-BB	FBM405MFG-BB
Maximum Rating Power (Pmax)	[W]	390	395	400	405
Module Efficiency	[%]	19.98	20.23	20.49	20.75
Open Circuit Voltage (Voc)	[V]	36.84	37.03	37.20	37.36
Maximum Power Voltage	[V]	30.82	31.00	31.17	31.36
Short Circuit Current (Isc)	[A]	13.50	13.59	13.68	13.78
Maximum Power Current	[A]	12.66	12.75	12.84	12.92

dard Test Condition (STC): Cell Temperature 25 °C, Irradia \*Values without tolerance are typical numbers. Measurement tolerance: ± 3%

Item	Specification	Item	Specification	
Dimensions	1723 mm (L) <sup>1</sup> x 1133 mm (W) <sup>1</sup> x 35 mm (D) <sup>2</sup> /	Mechanical Load	5400 Pa	
	67.83" (L) <sup>1</sup> x 44.61" (W) <sup>1</sup> x 1.38" (D) <sup>2</sup>	Maximum System Voltage	1000V	
Weight	21.7 kg / 47.84 lbs	Series Fuse Rating	30 A	
Solar Cell	12x9 pieces monocrystalline solar cells series strings	Operating Temperature	-40 to 85 °C	
Front Glass	White toughened safety glass, 3.2mm thickness	Temperature Characteristics		
Cell Encapsulation	EVA (Ethylene-Viny-Acetate)	Temperature enaracteristics	100 N.M. 10	
Frame	Black anodized aluminum profile	Item	Specification	
Junction Box	IP≥ 68, 3 diodes	Nominal Module Operating Temperature	45°C ± 2°C	
Cable	1200 mm (cable length can be customized), 4mm <sup>2</sup>	Temperature Coefficient of Isc	0.048 % / °C	
Connector Type	MC4 / MC4 Compatible	Temperature Coefficient of Voc	-0.27 % / °C	
Package Configuration 31 pcs Per Pallet, 806 pcs per 40' HQ container		Temperature Coefficient of Pmax	-0.32 % / °C	

<sup>2</sup>: With assembly tolerance of ± 0.8 mm [ ± 0.03 "]

#### **Engineering Drawing (mm)**

#### **Dependence on Irradiance**



Tel : +886-2-2656-2000 Fax:+886-2-2656-0593 e-mail : sales@urecorp.com



irradiance 800W/m<sup>2</sup>, temperature 20°C, windspeed 1 m/s. \*Reduction in efficiency from 1000W/m<sup>2</sup> to 200W/m<sup>2</sup> at 25°C: 3.5 ± 2%.



- For more information, please visit us at www.urecorp.com

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URECO\_US\_Peach\_FBM\_MFG-BB\_V1\_3.2\_35mm\_BS\_EN\_220602



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> **PV INSTALLATION** PROFESSIONAL Scott Gurney #PV-011719-015866

CONTRACTOR: **BRS FIELD OPS** 385-498-6700

HEET NAME: OTED ON PLANS REVIEV BAGE NUMBER: Development EE'S SUMMIT, MISSOURI

#### Product data sheet Characteristics

### D222NRB

Safety switch, general duty, fusible, 60A, 2 poles, 15 hp, 120 VAC, NEMA 3R, bolt-on provision, neutral factory installed

Product availability : Stock - Normally stocked in distribution facility

#### SQUARE 1



Price\* : 326.00 USD



Main		
Product	Single Throw Safety Switch	
Current Rating	60 A	
Certifications	UL listed file E2875	
Enclosure Rating	NEMA 3R	
Disconnect Type	Fusible disconnect switch	
Factory Installed Neutral	Neutral (factory installed)	
Short Circuit Current Rating	100 kA maximum depending on fuse H, K or R	
Mounting Type	Surface	
Number of Poles	2	
Electrical Connection	Lugs	
Duty Rating	General duty	
Voltage Rating	240 V AC	
Wire Size	AWG 12AWG 3 aluminium AWG 14AWG 3 copper	

#### Complementary

Maximum Horse Bower Pating	1.5 bp 120 V/ AC 60 Hz 1 pbase NEC 240.6				
Maximum norse Fower Rating	1.5 hp 120 v AC 00 h2 hp lase NEC 240.0				
	3 hp 120 V AC 60 Hz 3 phase NEC 430.52				
	3 hp 240 V AC 60 Hz 1 phase NEC 240.6				
	7.5 hp 240 V AC 60 Hz 3 phase NEC 240.6				
	10 hp 240 V AC 60 Hz 1 phase NEC 430.52				
	15 hp 240 V AC 60 Hz 3 phase NEC 430.52				
Tightening torque	35 lbf.in (3.95 N.m) 0.000.01 in <sup>2</sup> (2.085.26 mm <sup>2</sup> ) AWG 14AWG 10)				
	35 lbf.in (3.95 N.m) AWG 14AWG 10)				
	45 lbf.in (5.08 N.m) 0.01 in <sup>2</sup> (8.37 mm <sup>2</sup> ) AWG 8)				
	45 lbf.in (5.08 N.m) 0.020.03 in <sup>2</sup> (12.321.12 mm <sup>2</sup> ) AWG 6AWG 4)				
	50 lbf.in (5.65 N.m) 0.04 in <sup>2</sup> (26.67 mm <sup>2</sup> ) AWG 3)				
* Price is "List Price" and may be subject to a tra	de discount - check with your local distributor or retailer for actual price				
	de discourt – check with your local distributor of retailer for actual price.				
Apr 21, 2021					

Life Is On Schneider

 Height
 14.88 in (377.95 mm)

 Width
 7.45 in (189.23 mm)

 Depth
 4.87 in (123.70 mm)

#### Ordering and shipping details

Category	00106 - D & DU SW,NEMA3R, 30-200A
Discount Schedule	DE1A
GTIN	00785901460640
Nbr. of units in pkg.	1
Package weight(Lbs)	8.25 lb(US) (3.74 kg)
Returnability	Yes
Country of origin	US

#### Packing Units

Unit Type of Package 1	PCE	
Package 1 Height	5.20 in (13.208 cm)	
Package 1 width	7.70 in (19.558 cm)	
Package 1 Length	16.20 in (41.148 cm)	
Unit Type of Package 2	PAL	
Number of Units in Package 2	120	
Package 2 Weight	1022.00 lb(US) (463.571 kg)	
Package 2 Height	45.00 in (114.3 cm)	
Package 2 width	40.00 in (101.6 cm)	
Package 2 Length	48.00 in (121.92 cm)	

#### Offer Sustainability

Sustainable offer status	Green Premium product
California proposition 65	WARNING: This product can expose you to chemicals incl is known to the State of California to cause cancer and birt more information go to www.P65Warnings.ca.gov
REACh Regulation	REACh Declaration
REACh free of SVHC	Yes
EU RoHS Directive	Compliant EU RoHS Declaration
Mercury free	Yes
RoHS exemption information	Yes
China RoHS Regulation	China RoHS declaration Product out of China RoHS scope. Substance declaration
Environmental Disclosure	Product Environmental Profile
PVC free	Yes

#### Contractual warranty

Warranty

18 months

2



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PV INSTALLATION PROFESSIONAL Scott Gurney #PV-011719-015866

CONTRACTOR: BRS FIELD OPS 385-498-6700

cluding: Lead and lead compounds, which rth defects or other reproductive harm. For

for your information.



**Specification Sheet** 

PV Junction Box for Composition/Asphalt Shingle Roofs

### A. System Specifications and Ratings

- o Maximum Voltage: 600 Volts
- o Maximum Current: 60 Amps
- Allowable Wire: 14 AWG 6 AWG
- Spacing: Please maintain a spacing of at least ½" between uninsulated live parts and fittings for conduit, armored cable, and uninsulated lie parts of opposite polarity. 0
- Enclosure Rating: Type 3R 0
- Roof Slope Range: 2.5 12:12
- Max Side Wall Fitting Size: 1"
- Max Floor Pass-Through Fitting Size: 1"
- Ambient Operating Conditions: -35°C +75°C 0
- Compliance: 0
  - JB-1: UL1741
  - Approved wire connectors: must conform to UL1741
- System Marking: Intertek Symbol and File # 5015705 0
- Periodic Re-inspections: If re-inspections yield loose components, loose fasteners, or any corrosion between components, components that are found to be affected are to be replaced immediately.

#### Table 1: Typical Wire Size, Torque Loads and Ratings

				Torque			
	1 Conductor	2 Conductor	Туре	NM Inch Lbs		Voltage	Current
ABB ZS6 terminal block	10-24 awg	16-24 awg	Sol/Str	0.5-0.7	6.2-8.85	600V	30 amp
ABB ZS10 terminal block	6-24 awg	12-20 awg	Sol/Str	1.0-1.6	8.85-14.16	600V	40 amp
ABB ZS16 terminal bock	4-24 awg	10-20 awg	Sol/Str	1.6-2.4	14.6-21.24	600V	60 amp
ABB M6/8 terminal block	8-22 awg		Sol/Str	.08-1	8.85	600V	50 amp
Ideal 452 Red WING-NUT Wire	8-18 awg		Sol/Str			600V	
Connector	0-10 awg		501/50			0001	
Ideal 451 Yellow WING-NUT	10-18 awg	.0-18 awg Sol/St	Sol/Str	Sol/Str		600V	
Wire Connector	10 10 400		501/50				
Ideal, In-Sure Push-In	10-14 awg		Sol/Str	600V	600V		
Connector Part #39	10-14 awg		301/30			0000	
International Hydraulics 252/0	10-14 awg		Sol/Str	4	35		
International Hydraulics 232/0	8 awg		Sol/Str	4.5	40		
Brumall 4-5-3	4-6 awg		Sol/Str		45	200	01/
bruman 4-5,5	10-14 awg		Sol/Str		35	200	00
Blackburn LL414	4-14 awg		Sol/Str				

#### Table 2: Minimum wire-bending space for conductors through a wall opposite terminals in mm (inches)

Wire size	e, AWG or	Wires per terminal (pole)							
		1		2 3		3	4 or	More	
kcmil	(mm2)	mm	(inch)	mm	(inch)	mm	(inch)	mm	(inch)
14-10	(2.1-5.3)	Not specified			-		-		-
8	(8.4)	38.1	(1-1/2)		-		-		-
6	(13.3)	50.8	(2)		-		-		-

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QTY.	l	L	5	4
DESCRIPTION	POLYCARBONATE WITH UV INHIBITORS	POLYCARBONATE WITH UV INHIBITORS		
PART NUMBER	JB-1 Body w/ E-Z LOK TECHNOLOGY	JB-1 Lid w/ Gasket	10-32 × 1-1/4" Phillips pan head bolt	#8 × 1-1/4" Phillips
ITEM NO.	-	2	e	4

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4







## Carlon



† Not CSA Certified

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Thomas Betts A-269



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**NXT** HORIZON®

# **BETTER SOLAR STARTS HERE**

NXT HORIZON COMBO CLAMP

#### DISCOVER YOUR NXT HORIZON<sup>®</sup> DARK: CCLAMPD1 MILL: CCLAMPM1 The culmination of over two decades of experience. Thoughtful design, Clicks into rail anywhere (even where there are cables!) Self-standing clamp with spring rigorous engineering, world-class support, and a reliable supply chain are the combines as both mid and end clar Clamps 30-40 mm modules foundation of what makes us confident that NXT HORIZON<sup>®</sup> is the NXT Level of DESIGN, SIMPLICITY, and VALUE. STRONGHOLD<sup>™</sup> RAIL CLAMP DARK: SHCLMPD1 1/2 inch module spacing for efficiency MILL: SHCLMPM1 Unirac-quality bonding that works both as Adaptable rail connection to attachments mid and end clamps. allows click-in feature compatibility with almost all of Unirac's attachments. WIRE MANAGEMENT OPTONS NXT HORIZON RAIL FlashLoc technology combined with new features: click-in rail & open slot L-Foot for DARK: 168RLD1 the hest flash-less install experience MILL: 168RLM1 Strong, lightweight open channel rail with invisible, easy, unfailing STRONGHOLD" ATTACHMENT KIT and integrated wire manage system DARK: SHCPKTD MILL: SHCPKTM1 Rail clicks into the clamps attached to the NXT HORIZON' RAIL SPLICE Stronghold<sup>™</sup> base. Open slot in L-foot allows NXT HORIZON MLPE & LUG CLAMP NXT HORIZON WIRE MANAGEMENT CLIP drop-in rail clamp **RISPICM1** LUGMLPE1 WRMCLPD1 Structural internal splice that does Alternative attachment options not interfere with roof connection Works as either MLPE Mount or Grounding Aesthetic, yet functional accessory that works to nor module connection. Lug connection to the rail. Why source two help installers keep wires inside the rail. Pre-assembled thread cutting bolt No zip-ties required. Optional zip tie loop for extra FLASHLOC" DU parts when one can do the job? wire management capabilities!

ALL NXT HORIZON® SYSTEMS INCLUDE A FREE PERMITTING PLANSET DESIGN - FOR QUESTIONS OR CUSTOMER SERVICE VISIT UNIRAC.COM OR EMAIL NXTPERMITS@UNIRAC.COM



# APPENDIX HORIZON<sup>®</sup> APPENDIX 1 BONDING CONNECTION GROUND PATHS PAGE





#### BONDING COMBO MID-END CLAMP ASSEMBLY

- **1** Aluminum combo mid-end clamp cap with stainless steel bonding pins that pierce module frame anodization to bond module to module through clamp
- 2 Stainless steel bolt bonds aluminum clamp to stainless steel Hex bolt
- Aluminum combo mid-end clamp rail nut with stainless steel bonding pins that pierce rail anodization to bond module to module through clamp





#### **BONDING MICROINVERTER MOUNT**

- Stainless steel Tooth lock washer beneath the MLPE flange remove anodization on the mlpe and bonds.
- Tabs on the stainless-steel washer remove anodization on the rail and bonds. NOTE: See page K for installation details



### **BONDING RAIL SPLICE**

- Bonding Hardware creates bond between Splice bar and each rail section
- Aluminum splice bar spans across rail gap to create rail to rail bond. Rail on at least one side of splice will be grounded.

**NOTE:** See page I for installation details Splice certified for single-use only



#### **RACK SYSTEM GROUND**

- Tabs on the stainless-steel washer pierce anodization on the rail to bond rail to ground wire.
- Solid copper wire connected to lug is routed to provide final system ground connection.

NOTE: See page J for installation details and alternate racking system grounding methods.

## **BONDING BETWEEN THERMAL BREAKS**

- Lug is connected at the end of each thermal break to the rail
- Solid copper wire is connected across the gap to bond the two ends

NOTE: See page D for installation details

## ALTERNATE ROW-TO-ROW BONDING PATHS

- Row-to-row module bonding is accomplished with bonding 1 clamp with 2 integral bonding pins.
- 2 Alternate method by connecting clips on either module to complete the bonding path.

**NOTE:** See page J for installation details Row-to-row module bonding certified for single-use only







# **EXAMPLE APPENDIX** HORIZON<sup>®</sup> APPENDIX 2 BONDING CONNECTION GROUND PATHS PAGE





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**PV INSTALLATION** PROFESSIONAL Scott Gurney #PV-011719-015866

CONTRACTOR: **BRS FIELD OPS** 385-498-6700

DRAWING BY:

PLOT DATE:

PROJECT NUMBER:



# **HORIZON**®



The NXT Horizon system has been certified and listed to the UL 2703 standard (Rack Mounting Systems and Clamping Devices for Flat-Plate Photovoltaic Modules and Panels). This standard included electrical grounding, electrical bonding, mechanical load and fire resistance testing.

### SYSTEM LEVEL FIRE CLASSIFICATION

The system fire class rating requires installation in the manner specified in the NXT HORIZON Installation Guide. NXT HORIZON has been classified to the system level fire portion of UL 2703. NXT HORIZON has achieved system level performance for steep sloped roofs. System level fire performance is inherent in the NXT HORIZON design, and no additional mitigation measures are required. The fire classification rating is only valid on roof pitches greater than 2:12 (slopes  $\geq$  2 inches per foot, or 9.5 degrees). The system is to be mounted over fire resistant roof covering rated for the application. There is no required minimum or maximum height limitation above the roof deck to maintain the system fire rating for NXT HORIZON. Approved Module Types & System Level Fire Ratings are listed below:

Module Type	System Level Fire Rating	Rail Direction	Module Orientation
Type 1, 2, 3, 10, 19, 22, and 25	Class A, Class B & Class C	Parallel OR Perpendicular to Ridge	Landscape OR Portrai

### MECHANICAL LOAD TEST MODULES

The modules selected for UL 2703 mechanical load testing were selected to represent the broadest range possible for modules on the market. The tests performed covers module frame thicknesses greater than or equal to 1.0 mm, single and double wall frame profiles (some complex frame profiles could require further analysis to determine applicability), and clear and dark anodized aluminum frames.

Tested Module	UL2703 Certification Load Ratings	Tested Loads	Tested Module Area
SunPower SPR-A440 -COM	Down: 113 psf, Up: 50 psf , Slope: 15 psf	Down: 170 psf, Up: 75 psf , Slope: 23 psf	21.86 sq ft

### **UL2703 CERTIFICATION MARKING LABEL:**

Unirac NXT HORIZON is listed to UL 2703. Certification marking is embossed on all Combo Clamps as shown. Labels with additional certification information are provided with clamps and must be applied to the NXT Horizon Rail at the edge of the array.

Note: This racking system may be used to ground and/or mount a PV module complying with UL1703/UL61730 only when the specific module has been evaluated for grounding and/or mounting in compliance with the included instructions.



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ι		



# **HORIZON**

#### **Electrical Bonding and Grounding Test Modules**

The list below is not exhaustive of compliant modules but shows those that have been evaluated and found to be electrically compatible with the NXT Horizon system.

Manufacture	Module Model / Series	Manufacture	Module Model / Series	Manufacture	Module Model / Seri
Aleo	P-Series & S-Series	Centrosolar America	C-Series & E-Series	Jinko	JKM & JKMS Series
Aptos Solar	DNA-120-(MF/BF)23 DNA-144-(MF/BF)23 DNA-120-MF26	CertainTeed	CT2xxMxx-01, CT2xxPxx-01, CTxxxMxx-01, CTxxxPxx-01, CTxxxMxx-02, CTxxxMxx-03 CTxxxMxx-04, CTxxxHC11-04	Kyocera	KD-F & KU Series
	DNA-144-MF26	Eco Solargy	Orion 1000 & Apollo 1000		LGxxx(A1C/M1C/M1
	CHSM6612 M, M/HV	ET Solar	ET AC Module, ET Module		QAC/QAK)-A6 LGxxxN2W-B3 LGxxx(N2T/N2W)-E6 LGxxx(N1C/N1K/N2V LGxxxN2T-J5
Astronergy	CHSM6612P Series	Flextronics	FXS-xxxBB	LC Electronics	
324015	CHSM72M-HC.	GCL	GCL-P6 & GCL-M6 Series	LG Electronics	
	AXN6M610T.	Hanwha SolarOne	HSL 60		
Auxin	AXN6P610T, AXN6M612T	Hansol	TD-AN3, TD-AN4, UB-AN1, UD-AN1		LGXXX(N1K/N2T/N2V LGXXX(M1C/N1C)-N5 LGXXX(N1C/N1K/N2V
	AXN6P6121	Heliene	36M, 36P 60M, 60P, 72M & 72P Series		LR4-60(HPB/HPH)
Axitec	AC-xxx(M/P)/60S, AC-xxx(M/P)/72S AC-xxxP/156-60S AC-xxxMH/120(S/V/SB/VB) AC-xxxMH/144(S/V/SB/VB)	HT Solar	HT72-156(M/P), HT72-156P-C, HT72-156P(V)-C HT72-156M(PDV)-BF, HT72-156M(PD)-BF	LONGI	LR4-72(HPH) LR6-60 LR6-60(BK/HPB/HPF
Boviet	BVM6610, BVM6612		HT60-156M-C, HT60-156M00-C		LR6-72 LR6-72(BK/HV/PB/PI RealBlack LR4-60HP RealBlack LR6-60HP
BYD	P6K & MHK-36 Series		KG MG RW TG RI RG TI KI HI Series		
	CS1(H/K/U)-MS	Hyundai	HiD-SxxxRG(BK), HiS-S400PI		
	CS3K-(MB/MB-AG/MS/P/P HE/PB-AG)	ITEK	iT-SE Series	Mission Solar Energy	MSE Mono, MSE Pero
	CS3L-(MS/P)	Japan Solar	JPS-60 & JPS-72 Series	Mitsubishi	MJE & MLE Series
	CS3W-(MS/P/P-PB-AG)		14P6 60-XXX	Neo Solar Power Co.	D6M Series
Canadian Solar CS5A-M CS6K-(M/MS/MS AllBlack/P/P HE) CS6P-(M/P) CS6U-(M/P/P HE) CS6X-P CSX-P	JA Solar	JAM6(K)-60/xxx, JAP6(k)-72-xxx/4BB, JAP72SYY-xxx/ZZ, JAP6(k)-60-xxx/4BB, JAP60SYY-xxx/ZZ, JAM6(k)-72-xxx/ZZ, JAM72SYY-xxx/ZZ, JAM6(k)-60-xxx/ZZ, JAM60SYY-xxx/ZZ. i. YY: 01, 02, 03, 09, 10	Panasonic	VBHNxxxSA06/SA06 VBHNxxxSA15/SA15 VBHNxxxKA, VBHNxx VBHNxxxSA17/SA17 VBHNxxxZA01/ZA02 EVPV	
	ELPS CS6(A/P)-MM		ii. ZZ: SC, PR, BP, HiT, IB, MW	Peimar	SGxxxM (FB/BF)

• The frame profile must not have any feature that might interfere with the bonding devices that are integrated into the racking system

• Use with a maximum over current protection device OCPD of 30A

• Please see the SM UL2703Construction Data Report at Unirac.com to ensure the exact solar module selected is approved for use with NXT Horizon • Listed models can be used to achieve a Class A fire system rating, for steep slope applications, only when modules fire typed 1, 2, 3, or 10. See Appendix page 3



ies

/N1K/N2T/N2W/S1C/

K/N1C/N1K/01C/01K/

W/S1C/S2W)-G4

W)-L5

W/Q1C/Q1K)-V5

H/HV/PB/PE/PH)

E/PH) PR

SB/SA11/SA11B 5B/SA16/SA16B, xxKA03/04. G/SA17E/SA18/SA18E, 2/ZA03/VBHNxxxZA04



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**PV INSTALLATION** PROFESSIONAL Scott Gurney #PV-011719-015866

CONTRACTOR: **BRS FIELD OPS** 385-498-6700

DRAWING BY

PLOT DATE:

PROJECT NUMBER:



# **HORIZON**

### **Electrical Bonding and Grounding Test Modules**

The list below is not exhaustive of compliant modules but shows those that have been evaluated and found to be electrically compatible with the NXT Horizon system.

		1	1		
Manufacture	Module Model / Series	Manufacture	Module Model / Series	Manufacture	Module Model / Series
	PSxxxM1-20/U	S-Energy	SN72 & SN60 Series	Tesla	SC, SC B, SC B1, SC B2
	PSxxxM1H-20/U PSxxxM1-20UH		SEG-(6PA/6PB/6MA/6MA-HV/6MB/E01/E11) SRP-(6QA/6QB)	Trina	PA05, PD05, DD05, DD06, DE06 PD14, PE14, DD14, DE14, DE15
	PSxxxM1H-20UH PSxxxM1-20/UH	Seraphim	SRP-xxx-6MB-HV, SRP-320-375-BMB-HV, SRP-xxx-BMC-HV, SRP-390-450-BMA-HV, SRP-xxx-BM7-HV, SRP-390-405-BMD-HV	тѕмс	TS-150C2 CIGSw
Phono Solar	PSxxxM1H-20/UH			Upsolar	UP-MxxxP, UP-MxxxM(-B)
	PSxxxM-24/T PSxxxMH-24/T	Sharp	NU-SA & NU-SC Series	URE	D7MxxxH8A, D7KxxxH8A, D7MxxxH7A, D7KxxxH7A
	PSxxxM-24/TH PSxxxMH-24/TH	Silfab	SLA-M, SLA-P, SLG-M, SLG-P & BC Series SILxxx(BL/NL/NT/HL/ML/BK/NX/NU/HC)	Vikram	Eldora, Somera, Ultima
	Plus, Pro, Peak, G3, G4, Peak G5(SC) , G6(+)(SC)(AC), G7, G8(+).	Coloria	PowerXT-xxxR-(AC/PD/BD)	VSUN	VSUNxxx-60M-BB, VSUNxxx-72MH VSUN4xx-144BMH
Q.Cells	Plus, Pro, Peak L-G2, L-G4, L-G5	Solana	PowerXT-xxxR-PM (AC)		VNS-72M1-5-xxxW-1.5,
		Solartech	STU HJT, STU PERC & Quantum PERC	Vina	VNS-144M1-5-xxxW-1.5,
	RECXXXPE72, RECXXXPE	SolarWorld	Sunmodule Protect, Sunmodule Plus/Pro		VNS-144M3-5-xxxW-1.5,
DEC	RECxxxTP25(M)72, RECxxxTP2 BLK2,	Suntech	STP		VNS-120M3-5-xxxW-1.0
REC	RECxxxTP2(M)	Suniva	MV Series & Optimus Series (35mm)	Winaico	WST & WSP Series
	RECXXXNP (N-PEAK) RECXXXAA(BLK)	Sun Edison	F-Series, R-Series	Yingli	YGE & YLM Series
Renesola	All 60-cell modules	SunPower	AC, X-Series, E-Series & P-Series		
Risen	RSM Series	Talesun	TP572, TP596, TP654, TP660, TP672, Hipor M, Smart		

• The frame profile must not have any feature that might interfere with the bonding devices that are integrated into the racking system

• Use with a maximum over current protection device OCPD of 30A

• Please see the SM UL2703Construction Data Report at Unirac.com to ensure the exact solar module selected is approved for use with NXT Horizon

• Listed models can be used to achieve a Class A fire system rating, for steep slope applications, only when modules fire typed 1, 2, 3, or 10. See Appendix page 3

## **APPENDIX** : 5 SYSTEM CERTIFICATION PAGE





PROJECT NUMBER:

