SCOPE OF WORK

TO INSTALL A ROOF MOUNTED SOLAR PHOTOVOLTAIC SYSTEM AT THE OWNER RESIDENCE LOCATED AT 3312 DELANA WAY, ALVA, FL 33920, USA.
THE POWER GENERATED BY THE PV SYSTEM WILL BE INTERCONNECTED WITH THE UTILITY GRID THROUGH THE EXISTING ELECTRICAL SERVICE EQUIPMENT.
THE PV SYSTEM DOES NOT INCLUDE STORAGE BATTERIES.

EQUIPMENT SUMMARY
14 URECO FBM445M7G-BB MODULES
29 EXISTING URECO FBM400MFG-BB MODULES
14 ENPHASE IQ8PLUS -72-2-US (240V) MICROINVERTERS
29 EXISTING ENPHASE IQ8PLUS -72-2-US (240V) MICROINVERTERS

GENERAL NOTES

- THESE CONSTRUCTION DOCUMENTS HAVE BEEN BASED ON FIELD INSPECTIONS AND OTHER INFORMATION AVAILABLE AT THE TIME. ACTUAL FIELD CONDITIONS MAY REQUIRE MODIFICATIONS
- CONTRACTOR SHALL FURNISH ALL LABOR, MATERIAL, EQUIPMENT, TOOLS, OBTAIN ALL PERMITS, LICENSES AND PAY ALL REQUIRED FEES AND COMPLETE INSTALLATION.
- CONTRACTOR SHALL OBTAIN BULDING PERMIT. NO WORK TO START UNLESS BUILDING PERMIT IS PROPERLY DISPLAYED.
- ALL WORKMANSHIP AND MATERIALS SHALL BE OF FIRST QUALITY AND IN COMPLIANCE WITH THE REQUIREMENTS OF THE FLORIDA BUILDING CODE, THE DEPARTMENT OF ENVIRONMENTAL PROTECTION AND ALL PERTINENT AGENCIES.
- IT IS ESSENTIAL THAT ALL WORK PROCEED WITH THE MAXIMUM COOPERATION OF ALL PARTIES AND WITH MINIMUM INTERFERENCE TO THE OCCUPANTS WITHIN THE BUILDING. THE OWNER'S DIRECTIONS IN THIS REGARD SHALL BE FULLY COMPLIED WITH.
- THE CONTRACTOR SHALL PERFORM THE WORK IN STRICT CONFORMANCE WITH THE LOCAL LAWS, REGULATIONS AND THE NATIONAL ELECTRIC CODE.
- THE CONTRACTOR SHALL OBTAIN ALL PERMITS, APPROVALS, AFFIDAVITS, CERTIFICATIONS, ETC. AND PAY ALL FEES AS REQUIRED BY THE LOCAL AUTHORITIES.
- CONTRACTORS SHALL OBTAIN FIRE CERTIF. UPON COMPLETION OF WORK.

ELECTRICAL NOTES

- ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL, AND LABELED FOR ITS APPLICATION.
- ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600 V AND 90 DEGREE C WET ENVIRONMENT.
- WIRING, CONDUIT, AND RACEWAYS MOUNTED ON ROOFTOPS SHALL BE ROUTED DIRECTLY TO, AND LOCATED AS CLOSE AS POSSIBLE TO THE NEAREST RIDGE, HIP, OR VALLEY.
- WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.
- WHERE SIZES OF JUNCTION BOXES, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
- ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
- MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURERS INSTRUCTION.
- MODULE SUPPORT RAIL SHALL BE BONDED TO THE MODULE

GOVERNING CODES
2021 NFPA 1 (FIRE CODE) 2020 NATIONAL ELECTRICAL CODE 2023 FLORIDA BUILDING CODE (8TH EDITION) 2023 FLORIDA FIRE PREVENTION CODE (8TH EDITION) FLORIDA ADMINISTRATIVE CODE(FAC)
AHJ NAME : LEE COUNTY

WIRING AND CONDUIT NOTES

- ALL CONDUIT SIZES AND TYPES SHALL BE LISTED FOR ITS PURPOSE AND APPROVAL FOR THE SITE APPLICATIONS
- ALL PV CABLES AND HOMERUN WIRES BE #10AWG *USE-2, PV WIRE, OR PROPRIETARY SOLAR CABLING SPECIFIED BY MFR, OR EQUIVALENT; ROUTED TO SOURCE CIRCUIT COMBINER BOXES AS REQUIRED
- ALL PV DC CONDUCTORS IN CONDUIT EXPOSED TO SUNLIGHT SHALL BE DERATED ACCORDING TO AS PER LATEST NEC CODE.
- 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
- PHASE AND NEUTRAL CONDUCTORS SHALL BE DUAL RATED THHN/THWN-2 INSULATED, 90°C RATED, WET AND UV RESISTANT, RATED FOR 1000V AS PER APPLICABLE NEC
- 4-WIRE DELTA CONNECTED SYSTEMS HAVE THE PHASE WITH THE HIGHER VOLTAGE TO GROUND MARKED ORANGE OR IDENTIFIED BY OTHER EFFECTIVE MEANS
- ALL SOURCE CIRCUITS SHALL HAVE INDIVIDUAL SOURCE CIRCUIT PROTECTION
- VOLTAGE DROP LIMITED TO 2%
- AC CONDUCTORS >4AWG COLOR CODED OR MARKED: PHASE A OR L1- BLACK, PHASE B OR L2- RED, PHASE C OR L3- BLUE, NEUTRAL- WHITE/GRAY

PROJECT SITE

VICINITY MAP

SCALE: NTS

SYSTEM RATING
6.230 kWDC
4.060 kWAC

PHOTOVOLTAIC SYSTEM FIRE CLASSIFICATION LISTING IN ACCORDANCE WITH UL 1703 STANDARD.

SHEET INDEX	
PV1	COVER PAGE
PV2	SITE PLAN
PV3	ROOF PLAN
PV4	STRING LAYOUT & BOM
PV5-PV6	ATTACHMENT DETAILS
PV7	ELECTRICAL LINE & CALCS.
PV8	SPECIFICATIONS & NOTES
PV9-PV10	SIGNAGE
PV11-PV17	EQUIPMENT SPECIFICATIONS

PROJECT SITE

HOUSE PHOTO

SCALE: NTS

INFENERGY
5448 PROVINE PL,
ALEXANDRIA, LA 71303, USA
PH# : (850) 693-0167
72494

SYSTEM INFO
(14) URECO FBM445M7G-BB
(14) ENPHASE IQ8PLUS -72-2-US (240V)
DC SYSTEM SIZE: 6.230 kWDC
AC SYSTEM SIZE: 4.060 kWAC

REVISIONS		
DESCRIPTION	DATE	REV

PROJECT NAME & ADDRESS

AVA MORALES
RESIDENCE
3312 DELANA WAY, ALVA, FL 33920, USA
EMAIL ID: AVA.MORALESCARDENEZ@VA.GOV
PHONE NO. (615) 717-8056

DATE: 8/20/2024

SHEET NAME
COVER PAGE

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-1

SITE NOTES

- A LADDER SHALL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS.
- THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE AND THIS SYSTEM IS AN UTILITY INTERACTIVE SYSTEM WITH NO STORAGE BATTERIES.
- THE SOLAR PV INSTALLATION SHALL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.
- PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL BE PROVIDED AS PER SECTION [NEC 110.26]

LEGEND

- JB — (N) JUNCTION BOX
- UM — (E) UTILITY METER
- MSP — (E) MAIN SERVICE PANEL
- IQ — (E) ENPHASE IQ COMBINER
- AC — (N) NON FUSED AC DISCONNECT
- VENT, ATTIC FAN (ROOF OBSTRUCTION)
- ROOF ATTACHMENT
- CONDUIT
- ENPHASE IQ8PLUS -72-2-US (240V) MICROINVERTER
- URECO FBM445M7G-BB MODULES
- K2 CROSSRAIL 44-X
- TRENCH

SCALE: 1/16"= 1'-0"

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INFENERGY
5448 PROVINE PL,
ALEXANDRIA, LA 71303, USA
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SYSTEM INFO
(14) URECO FBM445M7G-BB
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DC SYSTEM SIZE: 6.230 kWDC
AC SYSTEM SIZE: 4.060 kWAC

REVISIONS

DESCRIPTION	DATE	REV

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PHONE NO. (615) 717-8056

DATE: 8/20/2024

SHEET NAME
SITE PLAN

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-2

DESIGN SPECIFICATION	
RISK CATEGORY:	II
CONSTRUCTION:	SFD
ZONING:	RESIDENTIAL
SNOW LOAD (ASCE7-22):	0 PSF
EXPOSURE CATEGORY:	B
WIND SPEED (ASCE7-22):	150 MPH

MODULE TYPE, DIMENSIONS & WEIGHT	
NUMBER OF MODULES:	14 MODULES
MODULE TYPE:	URECO FBM445M7G-BB
MODULE WEIGHT:	53.35 LBS
MODULE DIMENSIONS:	75.12" X 44.65" = 23.29 SF
UNIT WEIGHT OF AREA:	2.3 PSF

ROOF DESCRIPTION				
ROOF	ROOF TILT	RAFTER SIZE	RAFTER SPACING	ROOF MATERIAL
#1	24°	2" x 4"	24" o.c.	COMP SHINGLE

ARRAY AREA & ROOF AREA CALC'S		
ROOF	# OF MODULES	ARRAY AREA (Sq. Ft.)
#1	14	326.1
(TOTAL ARRAY AREA/TOTAL ROOF AREA) X 100%		
= (620.28/4755) X 100% = 13.05%		

LEGEND

- JB — (N) JUNCTION BOX
- UM — (E) UTILITY METER
- MSP — (E) MAIN SERVICE PANEL
- IQ — (E) ENPHASE IQ COMBINER
- AC — (N) NON FUSED AC DISCONNECT
- VENT, ATTIC FAN (ROOF OBSTRUCTION)
- ROOF ATTACHMENT
- CONDUIT
- ENPHASE IQ8PLUS -72-2-US (240V) MICROINVERTER
- URECO FBM445M7G-BB MODULES
- K2 CROSSRAIL 44-X
- TRENCH

NOTE:-ATTACHMENT SPACING @48" O.C. STAGGERED.

(29) EXISTING URECO FBM400MFG-BB (400W) MODULES WITH (29) EXISTING ENPHASE IQ8PLUS -72-2-US (240V) MICROINVERTERS

SCALE: 3/32"= 1'-0"

INFENERGY
INFENERGY
5448 PROVINE PL,
ALEXANDRIA, LA 71303, USA
PH# : (850) 693-0167
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SYSTEM INFO
(14) URECO FBM445M7G-BB
(14) ENPHASE IQ8PLUS -72-2-US (240V)
DC SYSTEM SIZE: 6.230 kWDC
AC SYSTEM SIZE: 4.060 kWAC

REVISIONS		
DESCRIPTION	DATE	REV

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DATE: 8/20/2024

SHEET NAME
ROOF PLAN

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-3

BILL OF MATERIALS		
EQUIPMENT	QTY	DESCRIPTION
SOLAR PV MODULE	14	URECO FBM445M7G-BB
INVERTER	14	ENPHASE IQ8PLUS -72-2-US (240V)
JUNCTION BOX	1	JUNCTION BOX, NEMA 3R, UL LISTED
NON FUSED AC DISCONNECT	1	100A NON FUSED AC DISCONNECT, 240V, NEMA 3R, UL LISTED
ATTACHMENT	30	K2 SPLICEFOOT XL
ATTACHMENT	30	K2 EVERSEAL
ATTACHMENT	60	#14 X 3IN X 5/16IN HEX HEAD SCREW
ATTACHMENT	30	T-BOLT & HEX NUT SET
ENPHASE Q CABLE	15	ENPHASE Q CABLE 240V (PER CONNECTOR)
BRANCH TERMINATOR	2	BRANCH TERMINATOR
IQ WATER TIGHT CAP	1	IQ WATER TIGHT CAPS
RAILS	8	K2 CROSSRAIL 44-X
BONDED SPLICE	4	SPLICE KIT
MID CLAMP	24	MODULES MID CLAMPS
END CLAMP	8	MODULES END CLAMPS
GROUNDING LUG	2	GROUNDING LUG

SCALE: 3/32"= 1'-0"

A B C D - MODULE STRINGING

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DC SYSTEM SIZE: 6.230 kWDC
AC SYSTEM SIZE: 4.060 kWAC

REVISIONS		
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DATE: 8/20/2024

SHEET NAME
STRING LAYOUT & BOM

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-4

1 ATTACHMENT DETAILS

SCALE: NTS

2 ENLARGED VIEW OF ATTACHMENT

SCALE: NTS

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SYSTEM INFO
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(14) ENPHASE IQ8PLUS -72-2-US (240V)
DC SYSTEM SIZE: 6.230 kWDC
AC SYSTEM SIZE: 4.060 kWAC

REVISIONS		
DESCRIPTION	DATE	REV

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PHONE NO. (615) 717-8056

DATE: 8/20/2024

SHEET NAME
ATTACHMENT DETAILS

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-5

NOTE:
PROPRIETARY GEOMETRIES HAVE BEEN REMOVED. GENERAL LENGTH, WIDTH, AND HIEGHT GEOMETRIES WERE NOT ALTERED.

RAIL CONNECTOR ASSEMBLIES

44-X

48-X

48-XL

80

REVISION HISTORY		
Revision	Date	Description
01		
02		
03		
04		
05		

PROPRIETARY AND CONFIDENTIAL
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THIRD ANGLE

Everest Solar Systems, LLC.
a division of K2 Systems International
2835 La Mirada Dr Suite A
Vista, CA 92081
phone 760.301.5300

	Name	Date
Drawn	I. VIZCAINO	07/23/2020
Checked	R. HAGEN	08/07/2020
Approved	I. VIZCAINO	08/20/2020
Last Revision		

Title: CROSSRAIL RAIL CONNECTOR ASSEMBLIES

Size: B

All Dimensions are mm

Scale: 1:25 | Revision: 00 | Sheet 2 of 2

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INFENERGY
5448 PROVINE PL,
ALEXANDRIA, LA 71303, USA
PH# : (850) 693-0167
72494

SYSTEM INFO
(14) URECO FBM445M7G-BB
(14) ENPHASE IQ8PLUS -72-2-US (240V)
DC SYSTEM SIZE: 6.230 kWDC
AC SYSTEM SIZE: 4.060 kWAC

REVISIONS		
DESCRIPTION	DATE	REV

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PHONE NO. (615) 717-8056

DATE: 8/20/2024

SHEET NAME
ATTACHMENT DETAILS

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-6

ID	TYPICAL	INITIAL CONDUCTOR LOCATION	FINAL CONDUCTOR LOCATION	CONDUCTOR			CONDUIT	# OF PARALLEL CIRCUITS	CURRENT-CARRYING CONDUCTORS IN CIRCUIT	CONDUIT FILL PERCENT	OCPD	EGC		TEMP. CORR. FACTOR		CONDUIT FILL FACTOR	CONT. CURRENT	MAX. CURRENT	BASE AMP.	DERATED AMP.	LENGTH	VOTAGE DROP
1	3	ARRAY	(E) JUNCTION BOX	12 AWG	Q CABLE	-	-	1	2	N/A	N/A	6 AWG	BARE COPPER	0.71	(56°C)	N/A	15.73A	19.66A	N/A	N/A	59FT	0.76%
2	1	ARRAY	(N) JUNCTION BOX	12 AWG	Q CABLE	-	-	1	2	N/A	N/A	6 AWG	BARE COPPER	0.71	(56°C)	N/A	15.73A	19.66A	N/A	N/A	47FT	0.76%
3	1	(E) JUNCTION BOX	IQ COMBINER BOX 4C	10 AWG	THWN 2	COPPER	MIN 0.75" DIA EMT	3	6	31.71%	20A	10 AWG	THWN-2 COPPER	0.96	(34°C)	0.8	15.73A	19.66A	35A	26.88A	40FT	0.68%
4	1	(N) JUNCTION BOX	IQ COMBINER BOX 4C	10 AWG	THWN 2	COPPER	MIN 0.75" DIA EMT	1	2	21.76%	20A	10 AWG	THWN-2 COPPER	0.96	(34°C)	1	15.73A	19.66A	35A	26.88A	53FT	0.89%
5	1	IQ COMBINER BOX 4C	NON FUSED AC DISCONNECT	4 AWG	THWN 2	COPPER	MIN 1" DIA EMT	1	3	31.94%	N/A	6 AWG	THWN-2 COPPER	0.96	(34°C)	1	52.03A	65.04A	85A	81.60A	5FT	0.06%
6	1	NON FUSED AC DISCONNECT	MSP	4 AWG	THWN 2	COPPER	MIN 1" DIA EMT	1	3	31.94%	70A	6 AWG	THWN-2 COPPER	0.96	(34°C)	1	52.03A	65.04A	85A	81.60A	5FT	0.06%

SCALE: NTS

INTERCONNECTION
120% RULE - NEC 705.12(B)(3)(2)
UTILITY FEED + SOLAR BACKFEED 150A + 70A = 220A
BUSS RATING X 120% 200A x 120% = 240A

SYSTEM RATING
6.230 kWDC
4.060 kWAC

SERVICE INFO	
UTILITY PROVIDER:	FLORIDA POWER & LIGHT
AHJ NAME:	LEE COUNTY
MAIN SERVICE VOLTAGE:	240V
MAIN PANEL BRAND:	SQUARE D
MAIN SERVICE PANEL:	200 A
MAIN BREAKER RATING:	150 A
SERVICE FEED SOURCE:	UNDERGROUND

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SYSTEM INFO
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(14) ENPHASE IQ8PLUS -72-2-US (240V)
DC SYSTEM SIZE: 6.230 kWDC
AC SYSTEM SIZE: 4.060 kWAC

REVISIONS		
DESCRIPTION	DATE	REV

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DATE: 8/20/2024

SHEET NAME
ELECTRICAL LINE & CALCS.

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-7

SOLAR MODULE SPECIFICATIONS	
MANUFACTURER / MODEL	URECO FBM445M7G-BB
VMP	34.8 V
IMP	12.79 A
VOC	41.9 V
ISC	13.48 A
TEMP. COEFF. VOC	-0.27%/K
PTC RATING	415 W
MODULE DIMENSION	75.12"(L) x 44.65"(W)
PANEL WATTAGE	445 W

INVERTER SPECIFICATIONS	
MANUFACTURER / MODEL	ENPHASE IQ8PLUS -72-2-US (240V)
MAX DC SHORT CIRCUIT CURRENT	15 A
CONTINUOUS OUTPUT CURRENT	1.21 A

AMBIENT TEMPERATURE SPECS	
RECORD LOW TEMP	2°C
AMBIENT TEMP (HIGH TEMP 2%)	34°C
CONDUIT HEIGHT	7/8"
ROOF TOP TEMP	56°C
CONDUCTOR TEMPERATURE RATE	90°C
MODULE TEMPERATURE COEFFICIENT OF VOC	-0.27%/K

PERCENT OF VALUES	NUMBER OF CURRENT CARRYING CONDUCTORS IN EMT
0.80	4-6
0.70	7-9
0.50	10-20

VOLTAGE RISE IN Q CABLE FROM THE MICROINVERTERS TO THE JUNCTION BOX

FOR (E)BRANCH CIRCUIT #1 OF 13 IQ8PLUS MICROS, THE VOLTAGE RISE ON THE 240 VAC Q CABLE IS 0.76%
FOR (E)BRANCH CIRCUIT #2 OF 13 IQ8PLUS MICROS, THE VOLTAGE RISE ON THE 240 VAC Q CABLE IS 0.76%
FOR (E)BRANCH CIRCUIT #3 OF 4 IQ8PLUS MICROS, THE VOLTAGE RISE ON THE 240 VAC Q CABLE IS 0.08%

FOR (N)BRANCH CIRCUIT #4 OF 13 IQ8PLUS MICROS, THE VOLTAGE RISE ON THE 240 VAC Q CABLE IS 0.76%

VOLTAGE RISE FROM THE (N)JUNCTION BOX TO THE IQ COMBINER BOX 4C

VRISE = (AMPS/INVERTER X NUMBER OF INVERTERS) X (RESISTANCE IN OHMS/FT.) X (2-WAY WIRE LENGTH IN FT.)
= (1.21 AMP X 13) X (0.00129 OHMS/FT) X (53 FT X 2)
= 15.73 AMPS X 0.00129 OHMS/FT) X 106 FT
= 2.15 VOLTS
%VRISE = 2.15 VOLTS ÷ 240 VOLTS = 0.89%
THE VOLTAGE RISE FROM THE (N)JUNCTION BOX TO THE IQ COMBINER BOX 4C IS 0.89%

VOLTAGE RISE FROM THE IQ COMBINER BOX 4C TO THE NON FUSED AC DISCONNECT

VRISE = (AMPS/INVERTER X NUMBER OF INVERTERS) X (RESISTANCE IN OHMS/FT.) X (2-WAY WIRE LENGTH IN FT.)
= [(1.21 AMP X 14)+(1.21 AMP X 29)] X (0.000321 OHMS/FT) X (5 FT X 2)
= 52.03 AMPS X 0.000321 OHMS/FT) X 10 FT
= 0.16 VOLTS
%VRISE = 0.16 VOLTS ÷ 240 VOLTS = 0.06%
THE VOLTAGE RISE FROM THE IQ COMBINER BOX 4C TO THE NON FUSED AC DISCONNECT IS 0.06%

VOLTAGE RISE FROM THE NON FUSED AC DISCONNECT TO THE MSP

VRISE = (AMPS/INVERTER X NUMBER OF INVERTERS) X (RESISTANCE IN OHMS/FT.) X (2-WAY WIRE LENGTH IN FT.)
= [(1.21 AMP X 14)+(1.21 AMP X 29)] X (0.000321 OHMS/FT) X (5 FT X 2)
= 0.16 AMPS X 0.000321 OHMS/FT) X 10 FT
= 0.16 VOLTS
%VRISE = 0.16 VOLTS ÷ 240 VOLTS = 0.06%
THE VOLTAGE RISE FROM THE NON FUSED AC DISCONNECT TO THE MSP IS 0.06%

TOTAL SYSTEM VOLTAGE RISE FOR ALL WIRE SECTIONS

0.76% + 0.89% + 0.06% + 0.06% = 1.77%

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(14) ENPHASE IQ8PLUS -72-2-US (240V)
DC SYSTEM SIZE: 6.230 kWDC
AC SYSTEM SIZE: 4.060 kWAC

REVISIONS		
DESCRIPTION	DATE	REV

PROJECT NAME & ADDRESS

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PHONE NO. (615) 717-8056

DATE: 8/20/2024

SHEET NAME
SPECIFICATIONS & NOTES

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-8

1

PHOTOVOLTAIC SYSTEM AC DISCONNECT

RATED AC OUTPUT CURRENT 16.94 AMPS

NOMINAL OPERATING AC VOLTAGE 240 VOLTS

LABEL LOCATION:

AC DISCONNECT

PER CODE: NFPA 70, NEC 690.54

2

WARNING

INVERTER OUTPUT CONNECTION DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL LOCATION:

PLACE THIS LABEL AT P.O.C. TO SERVICE DISTRIBUTION EQUIPMENT (I.E. MAIN PANEL (AND SUBPANEL IF APPLICABLE))

PER CODE: NEC 705.12(B)(3)(2)

3

WARNING

POWER SOURCE OUTPUT CONNECTION DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL LOCATION:

PLACE THIS LABEL AT P.O.C. TO SERVICE DISTRIBUTION EQUIPMENT (I.E. MAIN PANEL (AND SUBPANEL IF APPLICABLE))

PER CODE: NEC705.12(B)(2)(c)

4

PHOTOVOLTAIC

AC DISCONNECT

LABEL LOCATION:

AC DISCONNECT/BREAKER/POINTS OF CONNECTION

PER CODE: NEC, 690.13(B)

5

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

LABEL LOCATION:

AC DISCONNECT

PER CODE: NEC 690.56(C)(3)

6

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

TURN RAPID SHUTDOWN SWITCH TO THE 'OFF' POSITION TO SHUT DOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN THE ARRAY

LABEL LOCATION:

MAIN SERVICE DISCONNECT IF MSD IS OUTSIDE PLACE IT THERE / IF MSD IS INSIDE PLACE ON THE AC DISCONNECT

PER CODE: 2020 NEC 690.56(C)

ADHESIVE FASTENED SIGNS

- THE LABEL SHALL BE SUITABLE FOR THE ENVIRONMENT WHERE IT IS INSTALLED.
- WHERE REQUIRED ELSEWHERE IN THIS CODE, ALL FIELD APPLIED LABELS, WARNING AND MARKINGS SHOULD COMPLY WITH ANSI 2535.4 [NEC 110.21(B) FIELD MARKING].
- ADHESIVE FASTENED SIGNS MAY BE ACCEPTABLE IF PROPERLY ADHERED. VINYL SIGNS SHALL BE WEATHER RESISTANT [IFC 605.11.1.3]

INFENERGY

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DC SYSTEM SIZE: 6.230 kWDC
AC SYSTEM SIZE: 4.060 kWAC

REVISIONS

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RESIDENCE
3312 DELANA WAY, ALVA, FL 33920, USA
EMAIL ID: AVA.MORALESCARDENEZ@VA.GOV
PHONE NO. (615) 717-8056

DATE: 8/20/2024

SHEET NAME

SIGNAGE

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-9

CAUTION!

POWER TO THIS SERVICE IS ALSO SUPPLIED FROM THE FOLLOWING SOURCE WITH DISCONNECTS LOCATED AS SHOWN

LABEL LOCATION:
EACH SERVICE EQUIPMENT LOCATION AND AT THE LOCATION(S) OF THE SYSTEM DISCONNECT(S) FOR ALL ELECTRIC POWER PRODUCTION SOURCES CAPABLE OF BEING INTERCONNECTED (PER CODE: NEC 705.10)

INFENERGY
5448 PROVINE PL,
ALEXANDRIA, LA 71303, USA
PH# : (850) 693-0167
72494

SYSTEM INFO
(14) URECO FBM445M7G-BB
(14) ENPHASE IQ8PLUS -72-2-US (240V)
DC SYSTEM SIZE: 6.230 kWDC
AC SYSTEM SIZE: 4.060 kWAC

REVISIONS		
DESCRIPTION	DATE	REV

PROJECT NAME & ADDRESS

AVA MORALES
RESIDENCE
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SHEET NAME
SIGNAGE

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-10

URE
UNITED RENEWABLE ENERGY

FBM445M7G-BB / 120 cells
445 Watt Mono-Crystalline PV Module

URE modules use state-of-the-art cell cutting technology, and advanced module manufacturing experience to provide leading power density and long term reliability.

UL 61730, CE-compliant
Quality Controlled PV-TÜV
SUD IEC 61215:2016,
IEC 61730:2016
Type 1/Class C Fire Rating

Key Features

- At 445 Watts and 20.57% Efficiency URE Solar Panels are Industry Leaders in Output and Efficiency
- 25 Year Output Warranty and 25 Year Product Guarantee
- Super All Black Design with more Uniform Appearance for High Profile Residential Installations
- High Quality Solar Cell Technology allows URE to be a major international exporter to Solar Module manufacturers in the United States and Europe
- Excellent Performance in Low Light and Poor Weather Conditions to Maximize Energy Harvest
- Winner of Taiwan Excellence Award 7 Consecutive Years for Highest Efficiency Module

THE IDEAL SOLUTION FOR:

- Rooftop arrays on residential buildings
- Residential ground mount arrays

UNITED RENEWABLE ENERGY
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URE
UNITED RENEWABLE ENERGY

Electrical Data

Model - STC		FBM440M7G-BB	FBM445M7G-BB	FBM450M7G-BB	FBM455M7G-BB
Maximum Rating Power (Pmax)	[W]	440	445	450	455
Module Efficiency	[%]	20.34	20.57	20.80	21.03
Open Circuit Voltage (Voc)	[V]	41.70	41.90	42.10	42.30
Maximum Power Voltage	[V]	34.60	34.80	35.00	35.20
Short Circuit Current (Isc)	[A]	13.41	13.48	13.56	13.63
Maximum Power Current	[A]	12.72	12.79	12.86	12.93

*Standard Test Condition (STC): Cell Temperature 25 °C, Irradiance 1000 W/m², AM 1.5
*Values without tolerance are typical numbers.Measurement tolerance: ± 3%

Mechanical Data

Item	Specification
Dimensions	1908 mm (L)¹ x 1134 mm (W)¹ x 35 mm (D)² / 75.12˝ (L)¹ x 44.65˝ (W)¹ x 1.38˝ (D)²
Weight	24.2 kg / 53.35 lbs
Solar Cell	12x10 pieces monocrystalline solar cells series strings
Front Glass	White toughened safety glass, 3.2mm thickness
Cell Encapsulation	EVA (Ethylene-Viny-Acetate)
Back Cover	Black composite film
Frame	Black anodized aluminum profile
Junction Box	IP 68, 3 diodes
Connectors Type	Staubli MC4
Cable	1200mm (cable length can be customized), 4mm²
Package Configuration	31 pcs Per Pallet, 744 pcs per 40' HQ container

¹ : With assembly tolerance of ± 2 mm [± 0.08 ˝]
² : With assembly tolerance of ± 0.8 mm [± 0.03 ˝]

Operating Conditions

Item	Specification
Mechanical Load	5400 Pa
Maximum System Voltage	1000V
Series Fuse Rating	30 A
Operating Temperature	-40 to 85 °C

Temperature Characteristics

Item	Specification
Nominal Module Operating Temperature	45°C ± 2°C
Temperature Coefficient of Isc	0.048 % / °C
Temperature Coefficient of Voc	-0.27 % / °C
Temperature Coefficient of Pmax	-0.33 % / °C

*Nominal module operating temperature (NMOT): Air mass AM 1.5, irradiance 800W/m², temperature 20°C, windspeed 1 m/s.
*Reduction in efficiency from 1000W/m² to 200W/m² at 25°C: 3.5 ± 2%.

Engineering Drawing (mm)

Dependence on Irradiance

Reliability with Warranty

UNITED RENEWABLE ENERGY
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INFENERGY

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(14) ENPHASE IQ8PLUS -72-2-US (240V)
DC SYSTEM SIZE: 6.230 kWDC
AC SYSTEM SIZE: 4.060 kWAC

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SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-11

ENPHASE

DATA SHEET

IQ8 and IQ8+ Microinverters

Our newest IQ8 Microinverters are the industry's first microgrid-forming, software defined 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 superfast 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 IQ Battery, IQ Gateway, and the Enphase App monitoring and analysis software.

Enphase 25 year limited warranty

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

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

UL CERTIFIED SAFETY

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

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

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Easy to install

- Lightweight and compact with plug-n-play connectors
- 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 high-powered 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) and IEEE 1547:2018 (UL 1741-SB 3rd Ed.)

Note:

IQ8 Microinverters cannot be mixed together with previous generations of Enphase microinverters (IQ7 Series, IQ6 Series, etc) in the same system.

IQ8SP-12A-DS-0067-03-EN-US-2022-12-27

IQ8 and IQ8+ Microinverters

INPUT DATA (DC)		IQ8-60-2-US	IQ8PLUS-72-2-US
Commonly used module pairings[1]	W	235 – 350	235 – 440
Module compatibility		60-cell / 120 half-cell	54-cell / 108 half-cell, 60-cell / 120 half-cell, 66-cell / 132 half-cell and 72-cell / 144 half-cell
MPPT voltage range	V	27 – 37	27 – 45
Operating range	V	16 – 48	16 – 58
Min. / Max. start voltage	V	22 / 48	22 / 58
Max. input DC voltage	V	50	60
Max. continuous input DC current	A	10	12
Max. input DC short-circuit current	A	25	
Max. module I_{sc}	A	20	
Overvoltage class DC port		II	
DC port backfeed current	mA	0	
PV array configuration		1 x 1 Ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit	
OUTPUT DATA (AC)		**IQ8-60-2-US**	**IQ8PLUS-72-2-US**
Peak output power	VA	245	300
Max. continuous output power	VA	240	290
Nominal (L-L) voltage / range[2]	V	240 / 211 – 264	
Max. continuous output current	A	1.0	1.21
Nominal frequency	Hz	60	
Extended frequency range	Hz	47 – 68	
AC short circuit fault current over 3 cycles	Arms	2	
Max. units per 20 A (L-L) branch circuit[3]		16	13
Total harmonic distortion		<5%	
Overvoltage class AC port		III	
AC port backfeed current	mA	30	
Power factor setting		1.0	
Grid-tied power factor (adjustable)		0.85 leading – 0.85 lagging	
Peak efficiency	%	97.7	
CEC weighted efficiency	%	97	
Night-time power consumption	mW	60	
MECHANICAL DATA			
Ambient temperature range		-40°C to +60°C (-40°F to +140°F)	
Relative humidity range		4% to 100% (condensing)	
DC Connector type		MC4	
Dimensions (H x W x D)		212 mm (8.3") x 175 mm (6.9") x 30.2 mm (1.2")	
Weight		1.08 kg (2.38 lbs)	
Cooling		Natural convection – no fans	
Approved for wet locations		Yes	
Pollution degree		PD3	
Enclosure		Class II double-insulated, corrosion resistant polymeric enclosure	
Environ. category / UV exposure rating		NEMA Type 6 / outdoor	
COMPLIANCE			
Certifications		CA Rule 21 (UL 1741-SA), UL 62109-1, IEEE 1547:2018 (UL 1741-SB 3rd Ed.), FCC Part 15 Class B, ICES-0003 Class B, CAN / CSA-C22.2 NO. 107.1-01 This product is UL Listed as PV Rapid Shutdown Equipment and conforms with NEC 2014, NEC 2017, and NEC 2020 section 690.12 and C22.1-2018 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according to manufacturer's instructions.	

(1) Pairing PV modules with wattage above the limit may result in additional clipping losses. See the compatibility calculator at https://link.enphase.com/module-compatibility.
(2) Nominal voltage range can be extended beyond nominal if required by the utility. (3) Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

IQ8SP-12A-DS-0067-03-EN-US-2022-12-27

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SHEET NAME
EQUIPMENT SPECIFICATIONS

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-12

Data Sheet
Enphase Networking

Enphase IQ Combiner 4/4C

X-IQ-AM1-240-4
X-IQ-AM1-240-4C

X-IQ-AM1-240-4C

X-IQ-AM1-240-4

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
- 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

LISTED

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

ENPHASE.

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 integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Includes a silver solar shield to match the IQ Battery system and IQ 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 integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Includes Enphase Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05), a plug-and-play industrial-grade cell modem for systems up to 60 microinverters. (Available in the US, Canada, Mexico, Puerto Rico, and the US Virgin Islands, where there is adequate cellular service in the installation area.) Includes a silver solar shield to match the IQ Battery and IQ System Controller and to deflect heat.
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	- Includes COMMS-KIT-01 and CELLMODEM-M1-06-SP-05 with 5-year Sprint data plan for Ensemble sites - 4G based LTE-M1 cellular modem with 5-year Sprint data plan - 4G based LTE-M1 cellular modem with 5-year AT&T data plan
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, and BR260 circuit breakers. 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 support Circuit breaker, 2 pole, 20A, Eaton BR220B with hold down kit support
EPLC-01	Power line carrier (communication bridge pair), quantity - one pair
XA-SOLARSHIELD-ES	Replacement solar shield for IQ Combiner 4/4C
XA-PLUG-120-3	Accessory receptacle for Power Line Carrier in IQ Combiner 4/4C (required for EPLC-01)
XA-ENV-PCBA-3	Replacement IQ Gateway printed circuit board (PCB) for Combiner 4/4C
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) breakers only (not included)
Max. total branch circuit breaker rating (input)	80A of distributed generation / 95A with IQ Gateway breaker included
Envoy breaker	10A or 15A rating GE/Siemens/Eaton included
Production metering CT	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" (53.5 cm) with mounting brackets.
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 construction
Wire sizes	• 20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors • 60 A breaker branch input: 4 to 1/0 AWG copper conductors • Main lug combined output: 10 to 2/0 AWG copper conductors • Neutral and ground: 14 to 1/0 copper conductors Always follow local code requirements for conductor sizing.
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 (4G based LTE-M1 cellular modem). Note that an Enphase Mobile Connect cellular modem is required for all Ensemble installations.
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included)
COMPLIANCE	
Compliance, IQ Combiner	UL 1741, CAN/CSA C22.2 No. 107.1, 47 CFR, Part 15, Class B, ICES 003 Production metering: ANSI C12.20 accuracy class 0.5 (PV production) 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**

ENPHASE.

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INFENERGY

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SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-13

Splice Foot XL #14 Kit

DATA SHEET

PRODUCT FEATURES

/ All-in-one mount and splice foot

/ K2 EverSeal technology

/ Available in mill and dark

/ 30+ years of proven water sealing technology on asphalt

/ Optimized for CrossRail systems and components

/ No L-Foot needed

/ T-Bolt hardware included

TECHNICAL DATA

Splice Foot XL

Item Number	Description	Part Number
1	Splice Foot XL	4000165 | Splice Foot XL #14 Kit, Dark 4000300 | Splice Foot XL #14 Kit, Mill
2	K2 EverSeal	
3	#14 × 3in x 5/16in Hex Head Screw	
4	T-Bolt & Hex Nut Set	

	Splice Foot XL
Roof Type	Composition shingle, EPDM, TPO, Bitumen, Asphalt
Material	Aluminum with stainless steel hardware
Finish	Mill
Roof Connection	#14 × 3in x 5/16in Hex Head Screw
Code Compliance	UL 2703
Compatibility	CrossRail 44-X, 48-X, 48-XL, 80

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SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-14

TECHNICAL DATA

Units: [in] mm

CrossRail System & Splice Foot

K2 EverSeal
- Pre-installed butyl flexible flashing
- 30+ years of proven water sealing technology
- TAS 100(A) and Wind Driven Rain tested and approved

Self-Tapping Screws
- Self-sealing; no sealant required
- Self-tapping; no pilot holes required
- 2 screws included per mount
- #14 × 3in x 5/16in Hex Head Screw

Rail Shelf
- Allows for easier rail support
- Aligns CrossRail T-Bolt channel

Rafter Attached
- Best as primary attachment method
- 2 screws required (included) in center holes
- Self-tapping and self-sealing

Deck Attached
- Best as secondary attachment method
- 4 screws required in corner holes
- Alternative to rafter connection
- Requires additional lag screws

As a Standard Roof Attachment
- Only requires one T-Bolt set (included)
- No L-Foot required
- Torque to 25.8 ft-lbs (35 Nm)

As a Splice
- Requires 2 T-Bolt sets
- Additional T-Bolt set not included
- Torque to 25.8 ft-lbs (35 Nm)

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SHEET SIZE
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11" X 17"

SHEET NUMBER
PV-15

CrossRail 44-X

DATA SHEET

Part Number	Description
4000019	CrossRail 44-X 166'', Mill
4000020	CrossRail 44-X 166'', Dark
4000021	CrossRail 44-X 180'', Mill
4000022	CrossRail 44-X 180'', Dark
4000719	CrossRail 44-X 172'', Mill
4000720	CrossRail 44-X 172'', Dark
4000721	CrossRail 44-X 185'', Mill
4000722	CrossRail 44-X 185'', Dark
4000143	SPO CrossRail 44-X 86'', Mill

TECHNICAL DATA

Mechanical Properties

	CrossRail 44-X
Material	6000 Series Aluminum
Ultimate Tensile Strength	37.7 ksi (260 MPa)
Yield Strength	34.8 ksi (240 MPa)
Weight	.47 lbs/ft (0.699 kg/m)

Sectional Properties

	CrossRail 44-X
Sx	0.149 in3 (0.3785 cm3)
Sy	0.145 in3 (0.3683 cm3)
A (X-Section)	0.405 in2 (1.0287 cm2)

LOAD		RAIL SPAN								
SNOW (psf)	WIND (mph)	32''	4'	64''	6'	80''	8'	112''	10'	12'
0	120									
0	140									
0	160									
10	120									
10	140									
10	160									
20	140									
20	160									
30	160									
40	160									
80	160									
100	160									

44X/MAX 48X 48XL CR80

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SHEET NAME
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SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-16

Units: [mm] in

Notes:

- Structural values and span charts determined in accordance with Aluminum Design Manual and ASCE 7-16
- UL2703 Listed System for Fire and Bonding

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