



RESIDENTIAL ROOFTOP SOLAR PERMIT PACKAGE

Mathew Chau  
220 SAINT CLAIR DR  
Fuquay Varina, North Carolina 27526  
3365968187



SCOPE OF WORK  
INSTALLATION OF ROOFTOP MOUNTED PHOTOVOLTAIC SOLAR SYSTEM



SHEET INDEX

- PV1 COVER SHEET
- PV2 SITE PLAN
- PV3 ROOF PLAN
- PV4 STRUCTURAL
- PV5 ELECTRICAL 3-LINE
- PV6 ELECTRICAL CALCULATIONS
- PV7 LABELS
- PV8 PLACARD
- SS SPEC SHEETS

NOTICE TO CONTRACTOR  
All construction must comply with current NC Building Codes and is subject to field inspection and verification.

APPROVED  
Limited building only review  
Permit holder responsible for full compliance with the code  
04/11/2025

Harnett County  
NORTH CAROLINA

CEC-AC SYSTEM SIZE: 3.388 kW AC

TYPICAL STRUCTURAL INFORMATION

ROOF MATERIAL: Comp Shingle  
SHEATHING: OSB  
FRAMING: Manufactured Truss  
RACKING: PEGASUS RAIL  
ROOF ATTACHMENT: PEGASUS INSTAFLASH 2  
TOTAL ATTACHMENTS: 31

NEW PV SYSTEM INFORMATION

DC SYSTEM SIZE: 6.44 kW DC  
AC SYSTEM SIZE: 5.32 kW AC  
MODULE TYPE: (14) REC Solar REC460AA Pure-RX  
INVERTER TYPE: (14) Enphase IQ8X-80-M-US



3/17/2025  
Firm No. : D-0449

TOTAL PV DC SYSTEM SIZE  
6.440 kW DC

TOTAL PV AC SYSTEM SIZE  
5.320 kW AC

DESIGN CRITERIA

WIND SPEED: 115  
WIND EXPOSURE FACTOR: C  
RISK CATEGORY: II  
GROUND SNOW LOAD: 15  
ROOF SNOW LOAD: 10.5  
SEISMIC DESIGN CATEGORY: B

WEATHER STATION DATA

WEATHER STATION: SEYMOUR-JOHNSON AFB  
HIGH TEMP 2% AVG: 35°C  
EXTREME MINIMUM TEMP: -10°C

APPLICABLE CODES

\*2017 NATIONAL ELECTRIC CODE (NEC)  
\*2018 NORTH CAROLINA BUILDING CODE (NCBC)  
\*2018 NORTH CAROLINA RESIDENTIAL CODE (NCRC), PLUMBING CODE (NCPC), AND ALL STATE AND LOCAL BUILDING, ELECTRICAL, AND PLUMBING CODES

GENERAL NOTES

AHJ  
Harnett County NC  
Digitally signed by John A. Calvert  
Date: 2025.03.17 12:09:10 -06'00'

UTILITY COMPANY  
Duke Energy Progress

CUSTOMER NAME: Mathew Chau  
220 SAINT CLAIR DR  
Fuquay Varina, North Carolina 27526

AHJ: Harnett County NC

UTILITY COMPANY: Duke Energy Progress

PROJECT ID: 1305604

PV DC SYSTEM SIZE: 6.440 kW DC

PV AC SYSTEM SIZE: 5.320 kW AC

REVISIONS:

A	
B	
C	
D	

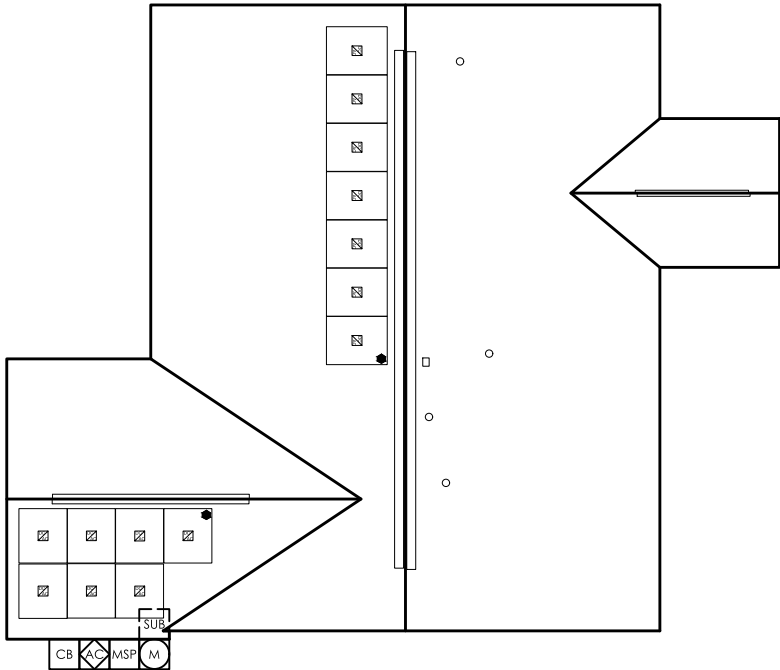
DRAWN BY: Jordan Davis

PLOT DATE: March 17, 2025

DRAWING TITLE: Cover Sheet

DRAWING NUMBER: PV1




















FRONT OF HOME  
220 SAINT CLAIR DR



3/17/2025  
Firm No. : D-0449

**SITE PLAN**  
SCALE: 1/16" = 1'-0"

LEGEND

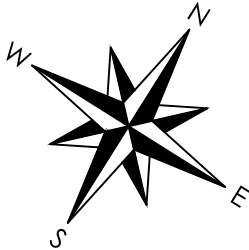
 UTILITY METER	 BREAKER ENCLOSURE	 ESS - BATTERY	 FIRE SETBACK HATCH	 TRENCH OR OVERHEAD
 MAIN SERVICE PANEL	 AC DISCONNECT	 ESS - CONTROLLER	 MICROINVERTER	 PROPERTY LINE
 SUBPANEL	 PV PRODUCTION METER	 REMOTE POWER OFF SWITCH	 ROOF TOP JUNCTION BOX	 ICONS WITH DOTTED OUTLINE INDICATE INTERIOR LOCATION
 UTILITY METER CT CABINET	 COMBINER BOX	 GENERATOR ATS PANEL	 INVERTER	

PV SYSTEM SPECIFICATIONS

NEW PV SYSTEM INFORMATION

**PV MODULE:** (14) REC Solar REC460AA Pure-RX, **POWER RATING:** 460 W  
**INVERTER:** (14) Enphase IQ8X-80-M-US, **POWER RATING:** 380 W

COMPASS



DRAWN BY:  
Jordan Davis

PLOT DATE:  
March 17, 2025

DRAWING TITLE:  
Site Plan

DRAWING NUMBER:  
PV2



1403 N 630 E  
Orem, Utah 84097  
(800) 377-4480  
BlueRavenSolar.com

**Mathew Chau**

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Harnett County NC

Duke Energy Progress

DC SYSTEM SIZE: 6.44 KW DCMODULE: REC 460INVERTER(S): Enphase IQ8X Microinverters



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PROJECT ID:

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6.440 kW DC

PV AC SYSTEM SIZE:

5.320 kW AC

REVISIONS:

A	
B	
C	
D	

DRAWN BY:

Jordan Davis

PLOT DATE:

March 17, 2025

DRAWING TITLE:

Roof Plan

DRAWING NUMBER:

PV3

Sealed For  
Existing Roof &  
Attachment Only



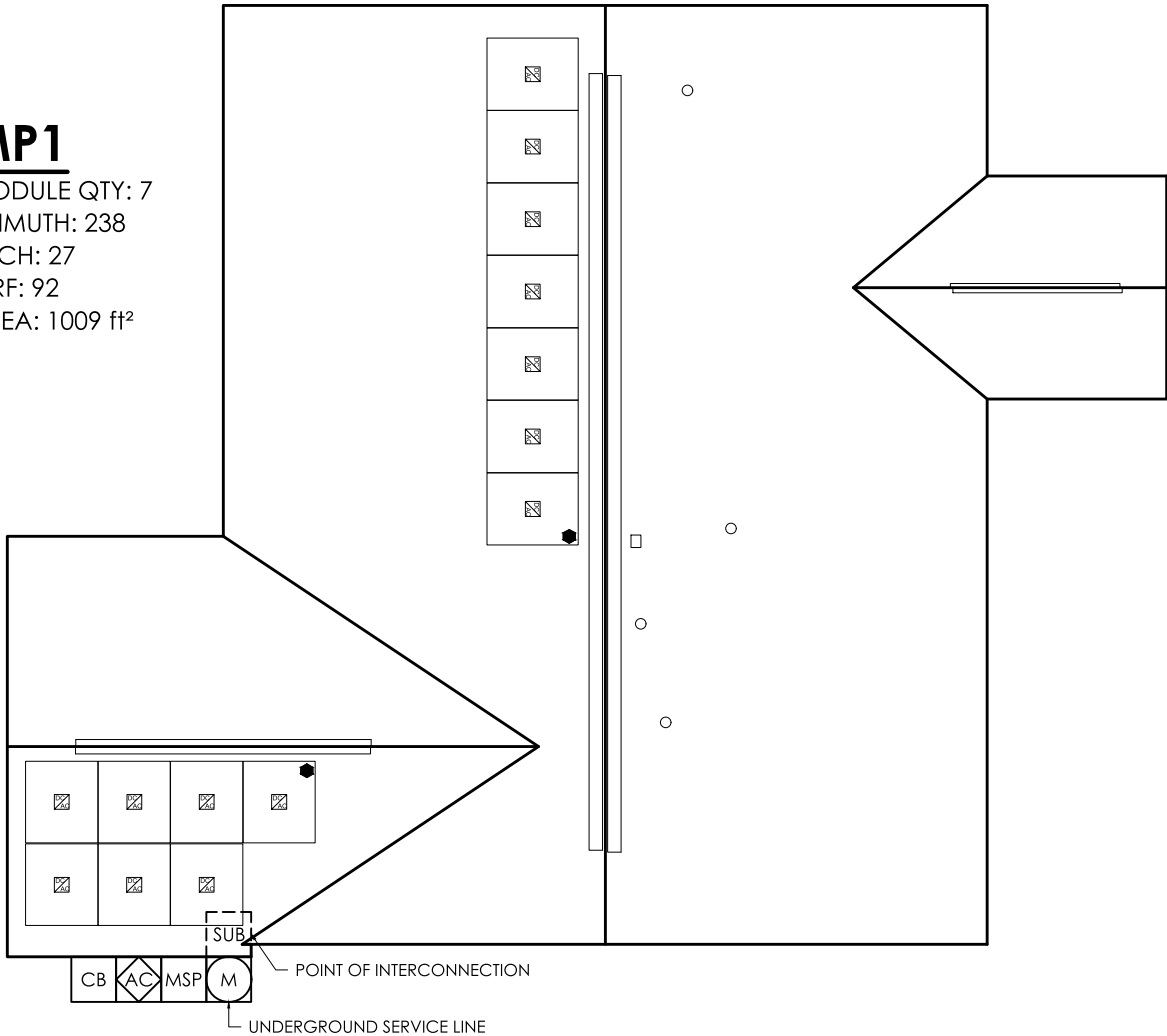
3/17/2025  
Firm No. : D-0449

### MP1

MODULE QTY: 7  
AZIMUTH: 238  
PITCH: 27  
TSRF: 92  
AREA: 1009 ft²

### MP2

MODULE QTY: 7  
AZIMUTH: 148  
PITCH: 37  
TSRF: 96  
AREA: 304 ft²



### ROOF PLAN

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

#### LEGEND

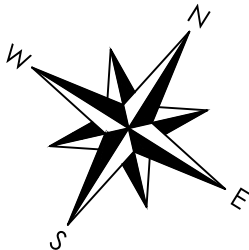
UTILITY METER	BREAKER ENCLOSURE	ESS - BATTERY	FIRE SETBACK HATCH	TRENCH OR OVERHEAD
MAIN SERVICE PANEL	AC DISCONNECT	ESS - CONTROLLER	MICROINVERTER	PROPERTY LINE
SUBPANEL	PV PRODUCTION METER	REMOTE POWER OFF SWITCH	ROOF TOP JUNCTION BOX	INVERTER
UTILITY METER CT CABINET	COMBINER BOX	GENERATOR ATS PANEL	ICONS WITH DOTTED OUTLINE INDICATE INTERIOR LOCATION	


#### PV SYSTEM SPECIFICATIONS

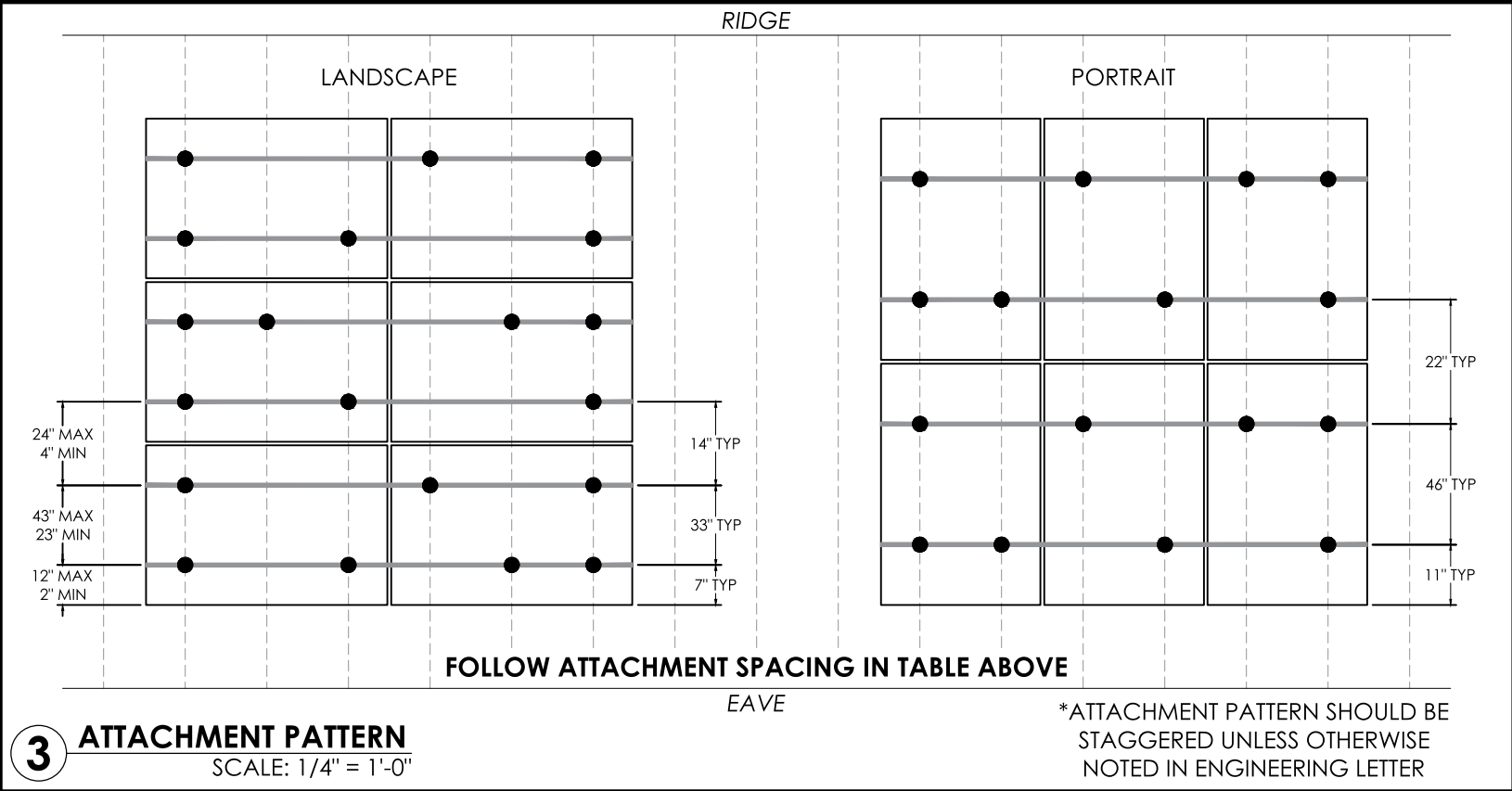
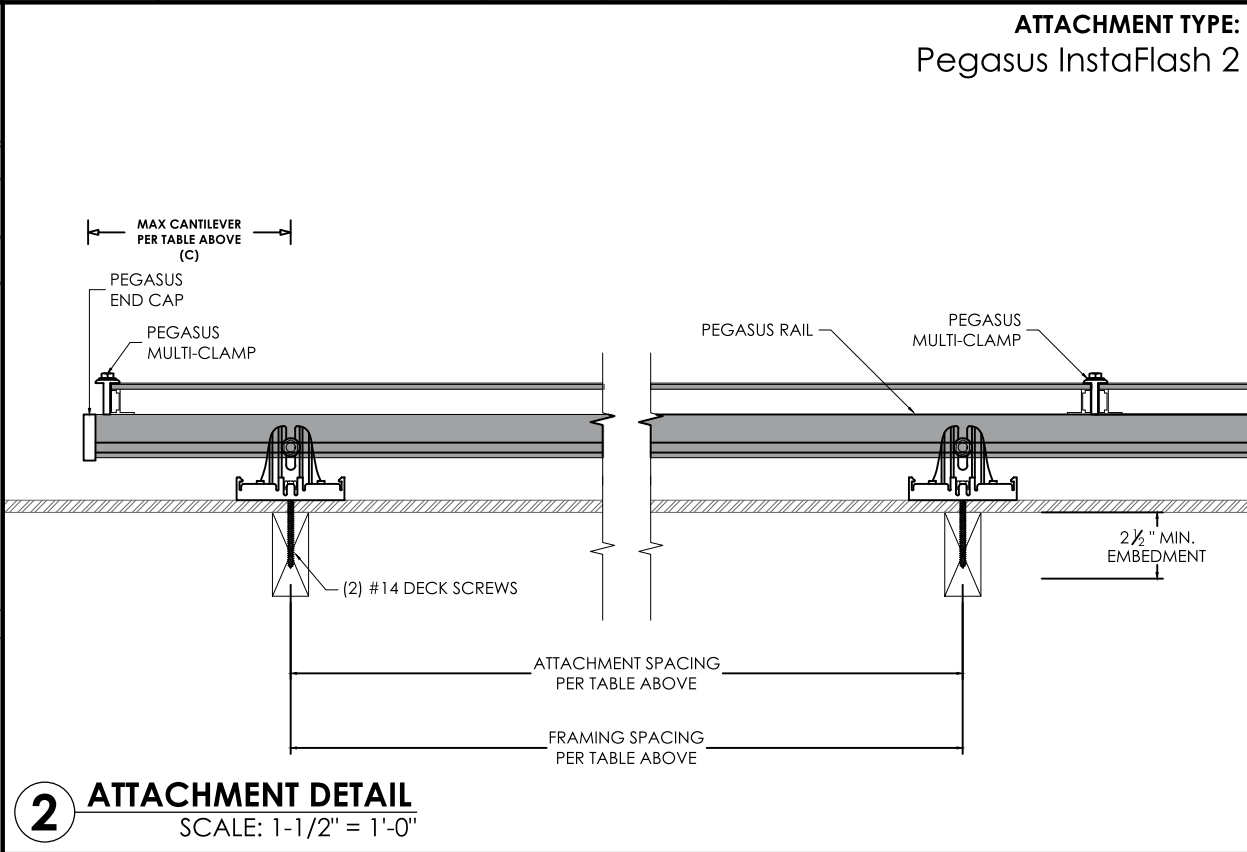
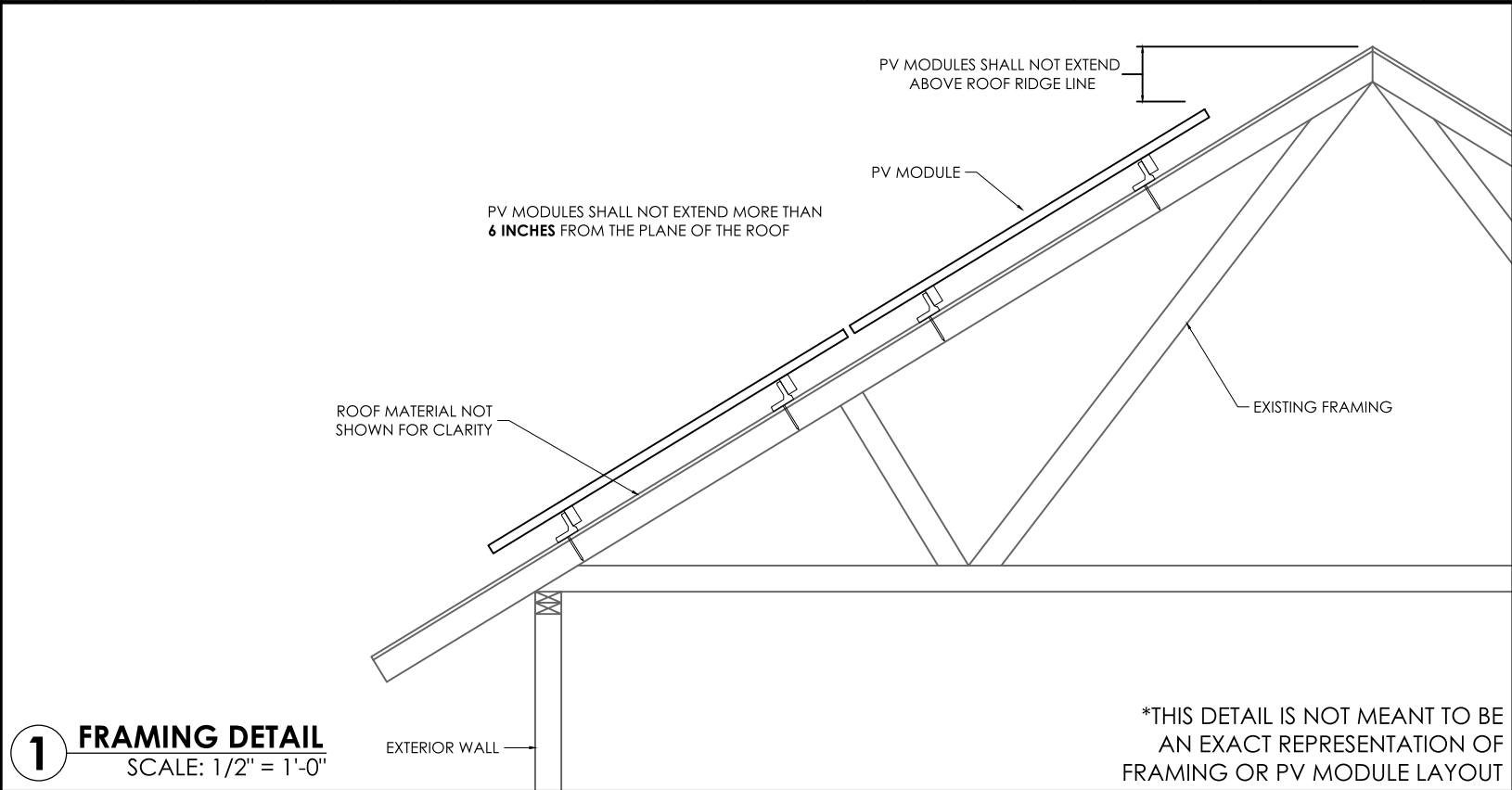
##### NEW PV SYSTEM INFORMATION

**PV MODULE:** (14) REC Solar REC460AA Pure-RX, **POWER RATING:** 460 W  
**INVERTER:** (14) Enphase IQ8X-80-M-US, **POWER RATING:** 380 W

#### COMPASS



	PANEL COUNT	AZIMUTH (DEG)	PITCH (DEG)	TSRF (%)	AREA (ft²)	ROOF MATERIAL	SHEATHING TYPE	FRAMING TYPE	FRAMING SIZE AND SPACING	CEILING JOIST/ PURLINS SIZE AND SPACING	RACKING TYPE	ATTACHMENT TYPE	MAXIMUM ATTACHMENT SPACING (S)	MAXIMUM CANTILEVER (C)	PRIMARY PV ARRAY AREA (ft²)		313.83	<div> <b>BLUE RAVEN</b> SOLAR</div>	
															PRIMARY ROOF AREA (ft²)		3000.41		
															PRIMARY ROOF COVERAGE (%)		10.46		
															SECONDARY PV ARRAY AREA (ft²)				
															SECONDARY ROOF AREA (ft²)				
															SECONDARY ROOF COVERAGE (%)				
MP1	7	238	27	92	1009	Comp Shingle	OSB	Manufactured Truss	2x4 @ 24 in OC	2x4 @ 24 in OC	PEGASUS RAIL	PEGASUS INSTAFLASH 2	72"L / 48"P	24"L / 16"P	* IF APPLICABLE	TOTAL PV ARRAY WEIGHT (lbs)		700	1403 N 630 E Orem, Utah 84097 (800) 377-4480 BlueRavenSolar.com
MP2	7	148	37	96	304	Comp Shingle	OSB	Manufactured Truss	2x4 @ 24 in OC	2x4 @ 24 in OC	PEGASUS RAIL	PEGASUS INSTAFLASH 2	72"L / 48"P	24"L / 16"P		TOTAL PV ATTACHMENTS		31	
MP3	0															POINT LOAD (lbs/att.)		22.6	
MP4	0															DISTRIBUTED LOAD (psf)		2.23	
MP5	0																		
MP6	0																		
MP7	0																		
MP8	0																		
MP9	0																		
MP10	0																		



**NOTES**

Sealed For Existing Roof & Attachment Only

3/17/2025  
Firm No. : D-0449

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Fuquay Varina, North Carolina 27526

AHJ:  
UTILITY COMPANY:

**Customer Name:**  
Mathew Chau

**Project ID:**  
1305604

**PV DC SYSTEM SIZE:**  
6.440 kW DC

**PV AC SYSTEM SIZE:**  
5.320 kW AC

**Revisions:**

A	
B	
C	
D	

**Drawn By:**  
Jordan Davis

**Plot Date:**  
March 17, 2025

**Drawing Title:**  
Structural

**Drawing Number:**  
PV4



4

L1 (1) 10 AWG THHN/THWN-2 CU BLACK  
L2 (1) 10 AWG THHN/THWN-2 CU RED  
N (1) 10 AWG THHN/THWN-2 CU WHITE  
G (1) 10 AWG THHN/THWN-2 CU GREEN  
3/4 INCH EMT

Exterior

3

L1 (2) 10 AWG THHN/THWN-2 CU BLACK  
L2 (2) 10 AWG THHN/THWN-2 CU RED  
G (1) 10 AWG THHN/THWN-2 CU GREEN  
\*TYPE UF CABLE MAY BE SUBSTITUTED FOR USE IN CONDUIT WHERE ELECTRICAL CODE PERMITS

3/4 INCH EMT\*

2

L1 (1) 10 AWG THHN/THWN-2 CU BLACK  
L2 (1) 10 AWG THHN/THWN-2 CU RED  
G (1) 10 AWG THHN/THWN-2 CU GREEN  
\*TYPE NM (ROMEX) OR UF CABLE IS PERMITTED FOR INTERIOR OR ATTIC RUNS AND SHALL BE USED WHEN ELECTRICAL CODE PERMITS

3/4 INCH \*

1

L1 (1) 12 AWG THHN/THWN-2 CU BLACK  
L2 (1) 12 AWG THHN/THWN-2 CU RED  
G (1) 6 AWG BARE, CU  
ENPHASE Q-CABLE, 2-WIRE, FREE AIR

Exterior



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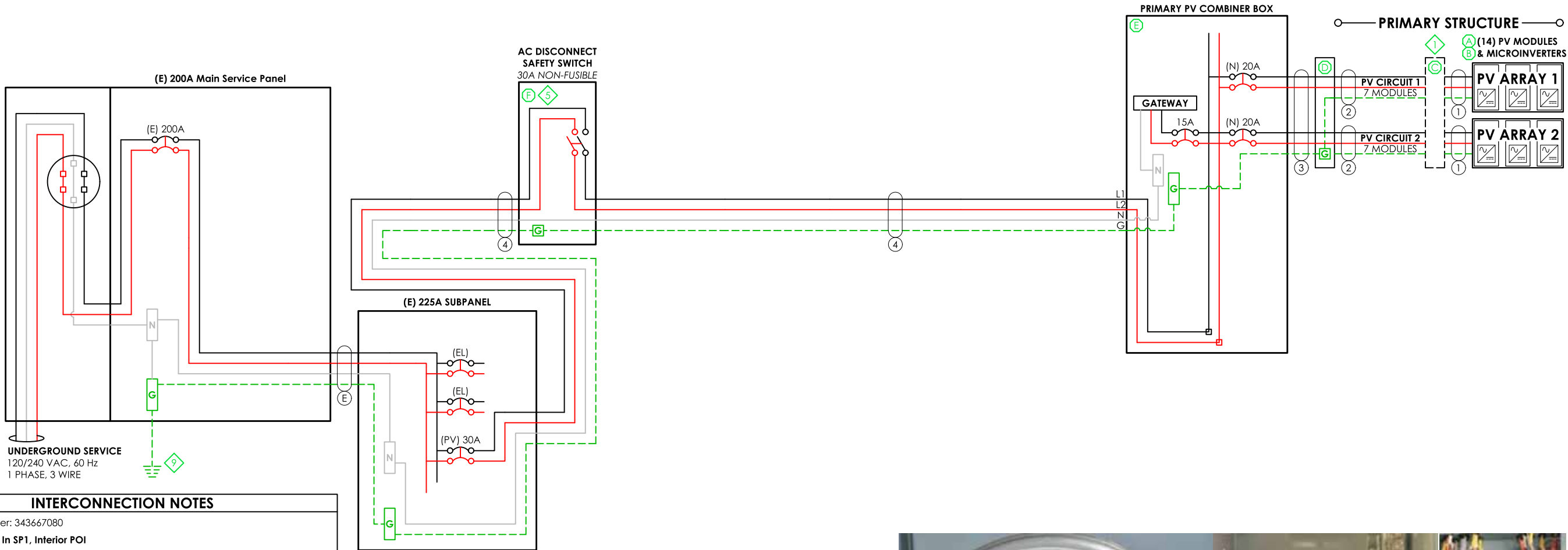
March 17, 2025

DRAWING TITLE:

Electrical  
3-Line

DRAWING NUMBER:

PV5



INTERCONNECTION NOTES

Utility Meter Number: 343667080  
Load Side Breaker In SP1, Interior POI

LEGEND

(E) EXISTING	(PV) PV BREAKER
(N) NEW	(FIB) FACTORY INSTALLED BREAKER
(EL) EXISTING LOADS	SPD SURGE PROTECTIVE DEVICE
(RL) RELOCATED LOADS	MI MECHANICAL INTERLOCK

EQUIPMENT NOTES

1 FINAL CONFIGURATION OF PV CIRCUITS TO BE DECIDED BY INSTALLER. MUST COMPLY WITH MAX MICROINVERTERS PER CIRCUIT AS LISTED ON ATTACHED SPEC SHEET.

EQUIPMENT DESCRIPTIONS

- A PV MODULE: REC Solar REC460AA Pure-RX, 460 W DC, UL 1703 / UL 61730 COMPLIANT  
B MICROINVERTER: ENPHASE IQ8X-80-M-US, 380 W AC (0.380 kW), 1 PHASE, UL 1741 COMPLIANT  
C ROOFTOP JUNCTION BOX: EZ SOLAR JB-1.2 JUNCTION BOX  
D JUNCTION BOX: PVC 4 X 4 JUNCTION BOX  
E PV COMBINER BOX: ENPHASE COMBINER 5 (X-IQ-AM1-240-5)  
F SQUARE-D SAFETY SWITCH 30A, 2P, 240VAC, NON-FUSIBLE (DU221RB)

9 GROUNDING ELECTRODE SYSTEM SHALL BE IN ACCORDANCE WITH NEC 250.53.

OTHER NOTES

14 MICROINVERTERS X 380 W AC = 5.32 KW AC;PANEL WATTAGE = 460 W DC

ELECTRICAL INFORMATION	
UTILITY ELECTRICAL SYSTEM	
1-Phase, 3-Wire, 60Hz, 120/240V	
NEW PV SYSTEM	
1-Phase, 3-Wire, 60Hz, 120/240V	
AC SYSTEM SIZE	5.32kW AC
DC SYSTEM SIZE	6.44kW DC
PV MODULES	
QUANTITY	14
TYPE	REC Solar REC460AA Pure-RX
WATTAGE	460W DC
INVERTERS	
TYPE	Enphase IQ8X-80-M-US
OUTPUT CURRENT	1.58A AC
NOMINAL VOLTAGE	240V AC
OUTPUT POWER	380W AC

PV BREAKER BACKFEED CALCULATIONS			
"120% RULE"			
(BUSBAR RATING * 120%) - OCPD RATING = AVAILABLE BACKFEED			
	MAIN SERVICE PANEL	SUBPANEL 1	SUBPANEL 2
BUSBAR RATING	200A	225A	----A
PANEL OCPD RATING	200A	NoneA	----A
AVAILABLE BACKFEED (120% RULE)	40A	##A	##A
PV BREAKER RATING	30A	30A	30A
*THESE CALCULATIONS ARE ONLY APPLICABLE IF PV INTERCONNECTION IS A LOAD SIDE BREAKER. *PV BREAKER MUST BE RATED LESS THAN OR EQUAL TO AVAILABLE BACKFEED FOR CODE COMPLIANCE*			

DESIGN LOCATION AND TEMPERATURES	
DATA SOURCE	ASHRAE Weather Station Data
STATE	North Carolina
CITY	Fuquay Varina
WEATHER STATION	SEYMOUR-JOHNSON AFB
HIGH TEMP 2% AVG	35°C
EXTREME MINIMUM TEMP	-10°C

WIRE SIZE SPECIFICATIONS										
	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
MINIMUM CONDUCTOR AMPACITY	13.83A AC	13.83A AC	13.83A AC	27.65A AC	----A AC	----A AC	----A AC	----A AC	----A AC	----A AC
CONDUCTOR MATERIAL	CU	CU	CU	CU	----	----	----	----	----	----
CONDUCTOR TYPE	THHN/THWN-2	THHN/THWN-2	THHN/THWN-2	THHN/THWN-2	----	----	----	----	----	----
CONDUCTOR SIZE	12 AWG	10 AWG	10 AWG	10 AWG	----					
CONDUCTOR AMPACITY	30A	40A	40A	40A	----A	----A	----A	----A	----A	----A
AMBIENT TEMPERATURE ADJUSTMENT FACTOR	0.96	0.96	0.96	0.96	----	----	----	----	----	----
CONDUIT FILL ADJUSTMENT FACTOR	1	1	0.8	1	----	----	----	----	----	----
ADJUSTED CONDUCTOR AMPACITY	28.8A	38.4A	30.72A	38.4A	----A	----A	----A	----A	----A	----A
WIRE RUN DISTANCE (FT)	46	50	10	10	----	----	----	----	----	----
CALCULATED VOLTAGE DROP	0.48%	0.57%	0.11%	0.23%	0%	0%	0%	0%	0%	0%

PV CIRCUIT SPECIFICATIONS													
	PRIMARY STRUCTURE								DETACHED STRUCTURE				
	CIRCUIT 1	CIRCUIT 2	CIRCUIT 3	CIRCUIT 4	CIRCUIT 5	CIRCUIT 6	CIRCUIT 7	CIRCUIT 8	CIRCUIT 1	CIRCUIT 2	CIRCUIT 3	CIRCUIT 4	CIRCUIT 5
NUMBER OF MODULES PER CIRCUIT	7	7	0	0	0	0	0	0	0	0	0	0	0
RATED AC OUTPUT CURRENT (I <sub>out</sub> )	11.1A	11.1A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A
MINIMUM AMPACITY (I <sub>out</sub> x 125%)	13.8A	13.8A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A
OVERCURRENT PROTECTION RATING	20A	20A	20A	20A	20A	20A	20A	20A	20A	20A	20A	20A	20A
COMBINED AC OUTPUT CURRENT (C <sub>out</sub> )	22.1A								0.0A				
MINIMUM AMPACITY (C <sub>out</sub> x 125%)	27.7A								0.0A				
COMBINED PV BREAKER RATING	30AA								0AA				

TOTAL PV VOLTAGE DROP	
	VOLTAGE DROP
WIRE TAG #1	0.48%
WIRE TAG #2	0.57%
WIRE TAG #3	0.11%
WIRE TAG #4	0.23%
WIRE TAG #5	0%
WIRE TAG #6	0%
TOTAL	1.390000%



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AHJ:

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6.440 kW DC

PV AC SYSTEM SIZE:

5.320 kW AC

REVISIONS:

A	
B	
C	
D	

DRAWN BY:

Jordan Davis

PLOT DATE:

March 17, 2025

DRAWING TITLE:

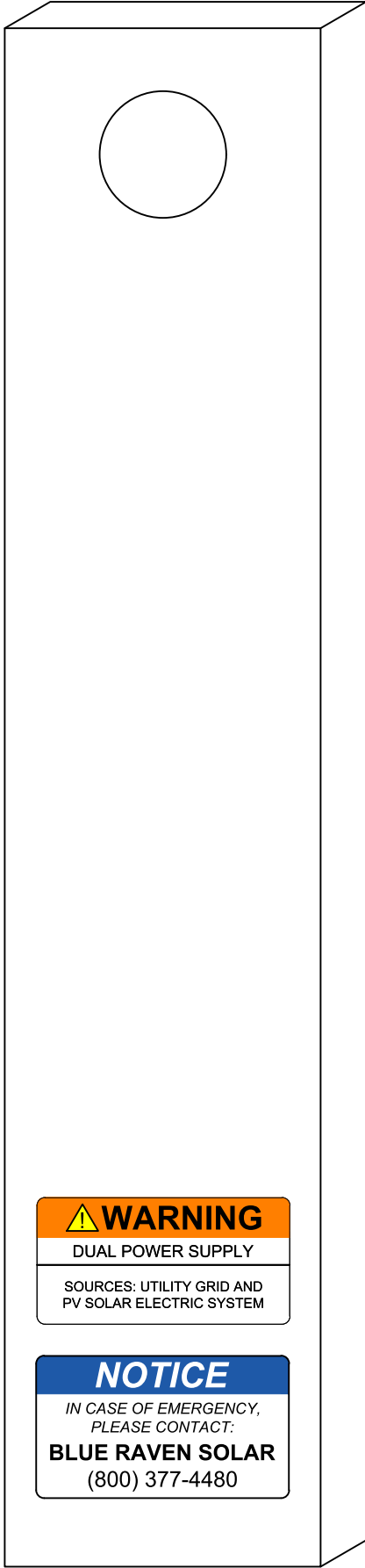
Electrical  
Calculations

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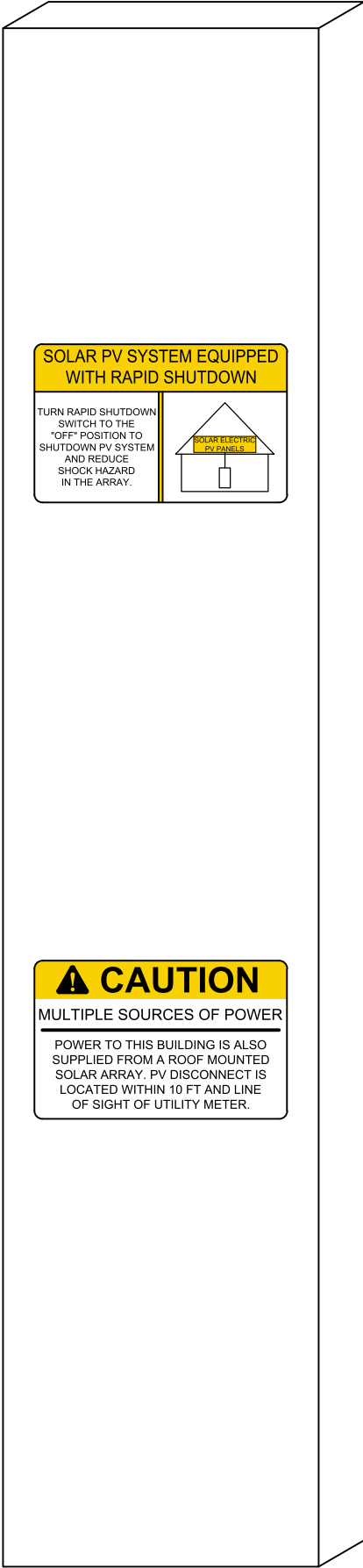
PV6

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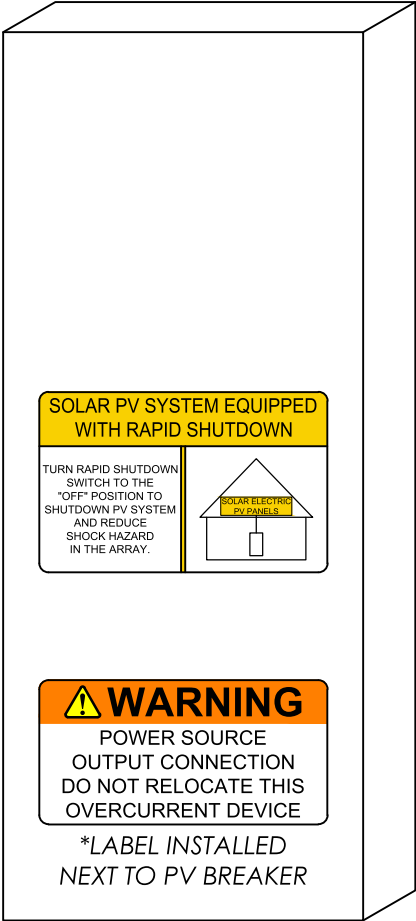
UTILITY METER



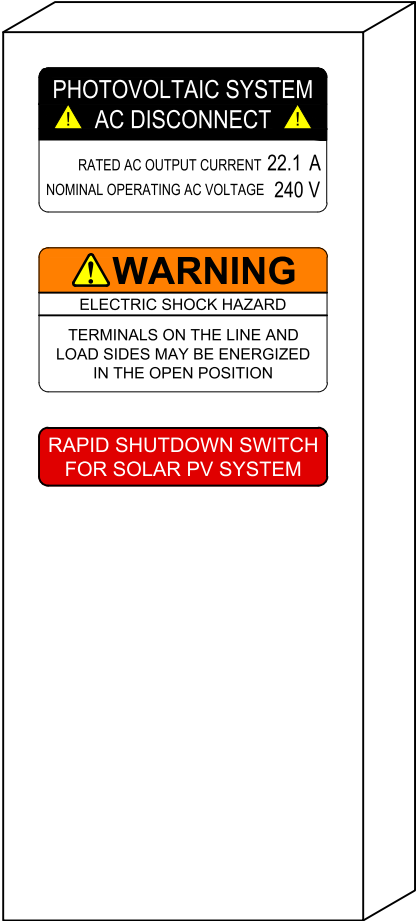
MAIN SERVICE PANEL



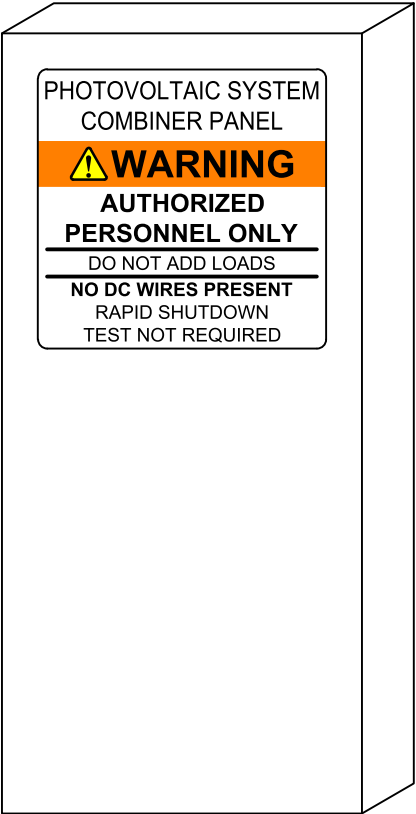
SUBPANEL



PV AC DISCONNECT



PV COMBINER BOX



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DRAWN BY:

Jordan Davis

PLOT DATE:

March 17, 2025

DRAWING TITLE:

Warning  
Labels

DRAWING NUMBER:

PV7



# REC ALPHA<sup>®</sup> PURE-RX SERIES

## DATASHEET

470 W<sub>P</sub>  
22.6% EFFICIENCY  
226 W/M<sup>2</sup>

SOLAR'S MOST TRUSTED



9 A MODULE CURRENT  
COMPATIBLE WITH MLPE



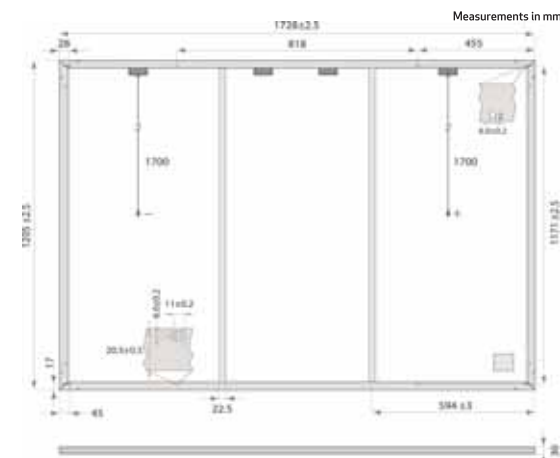
EXPERIENCE  
**α**  
PERFORMANCE

## REC ALPHA<sup>®</sup> PURE-RX SERIES DATASHEET



### GENERAL DATA

Cell Type	88 half-cut bifacial REC heterojunction cells, with gapless technology
Glass	3.2 mm solar glass with anti-reflective surface treatment in accordance with EN12150
Backsheet	Highly resistant polymer (Black)
Frame	Anodized aluminum (Black)
Junction Box	4-part, 4 bypass diodes, IP68 rated, in accordance with IEC 62790
Connectors	Stäubli MC4 PV-KBT4/KST4 (4 mm <sup>2</sup> ) in accordance with IEC 62852, IP68 only when connected
Cable	4 mm <sup>2</sup> solar cable, 1.7 m + 1.7 m in accordance with EN50618
Dimensions	1728 x 1205 x 30 mm (2.08 m <sup>2</sup> )
Weight	22.7 kg
Origin	Made in Singapore



### ELECTRICAL DATA

PRODUCT CODE\*: RECxxxAA Pure-RX

STC	Power Output - P <sub>MAX</sub> (W <sub>p</sub> )	450	460	470
	Watt Class Sorting - (W)	0/+10	0/- .0	0/+10
	Nominal Power Voltage - V <sub>MPP</sub> (V)	54.3	54.9	55.4
	Nominal Power Current - I <sub>MPP</sub> (A)	8.29	8.38	8.49
	Open Circuit Voltage - V <sub>OC</sub> (V)	65.1	65.3	65.6
	Short Circuit Current - I <sub>SC</sub> (A)	8.81	8.88	8.95
	Power Density (W/m <sup>2</sup> )	216	221	226
NMOT	Panel Efficiency (%)	21.6	22.1	22.6
	Power Output - P <sub>MAX</sub> (W <sub>p</sub> )	343	350	358
	Nominal Power Voltage - V <sub>MPP</sub> (V)	51.2	51.7	52.2
	Nominal Power Current - I <sub>MPP</sub> (A)	6.70	6.77	6.86
	Open Circuit Voltage - V <sub>OC</sub> (V)	61.3	61.6	61.8
	Short Circuit Current - I <sub>SC</sub> (A)	7.11	7.17	7.23

Values at standard test conditions (STC: air mass AM 1.5, irradiance 1000 W/m<sup>2</sup>, temperature 25°C), based on a production spread with a tolerance of P<sub>max</sub>, V<sub>oc</sub> & I<sub>sc</sub> ±2% within one watt class. Nominal module operating temperature (NMOT: air mass AM 1.5, irradiance 800 W/m<sup>2</sup>, temperature 20°C, windspeed 1 m/s). \* Where xxx indicates the nominal power class (P<sub>nom</sub>) at STC above.

### MAXIMUM RATINGS\*

Operational Temperature	-40 °C - 85 °C
System Voltage	1000 V
Maximum Test Load (front)	+7000 Pa (713 kg/m <sup>2</sup> )
Maximum Test Load (rear)	-4000 Pa (407 kg/m <sup>2</sup> )
Max Series Fuse Rating	25 A
Max Reverse Current	25 A

\* See installation manual for mounting instructions.  
Design load = Test load / 15 (safety factor)

### TEMPERATURE RATINGS\*

Nominal Module Operating Temperature	44 °C ± 2°C
Temperature coefficient of P <sub>MAX</sub>	-0.24% / °C
Temperature coefficient of V <sub>OC</sub>	-0.24% / °C
Temperature coefficient of I <sub>SC</sub>	0.04% / °C

\*The temperature coefficients stated are linear values

### DELIVERY INFORMATION

Panels per Pallet	33
Panels per 40 ft GP/high cube container	594 (18 Pallets)
Panels per 13.6 m truck	660 (20 Pallets)

Available from:

Founded in 1996, REC Group is an international pioneering solar energy company dedicated to empowering consumers with clean, affordable solar power. As Solar's Most Trusted, REC is committed to high quality, innovation, and a low carbon footprint in the solar materials and solar panels it manufactures. Headquartered in Norway with operational headquarters in Singapore, REC also has regional hubs in North America, Europe, and Asia-Pacific.

### CERTIFICATIONS

IEC 61215:2015; IEC61730:2016; UL61730  
ISO 11925-2 Ignitability (EN 13501-1 Class E)  
IEC 62716 Ammonia Resistance  
IEC 61701 Salt Mist (SM6)  
IEC 61215:2016 Hailstone (35 mm)  
UL 61730 Fire Type 2  
ISO 14001; ISO9001; IEC45001; IEC62941



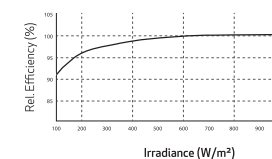
### WARRANTY

	Standard		REC ProTrust	
	No	Yes	Yes	Yes
Installed by an REC Certified Professional				
System Size	All	<25 kW	25-500 kW	
Product Warranty (yrs)	20	25	25	
Power Warranty (yrs)	25	25	25	
Labor Warranty (yrs)	0	25	10	
Power in Year 1	98%	98%	98%	
Annual Degradation	0.25%	0.25%	0.25%	
Power in Year 25	92%	92%	92%	

The REC ProTrust Warranty is only available on panels purchased through an REC Certified Solar Professional installer. Warranty conditions apply. See [www.recgroup.com](http://www.recgroup.com) for more details

### LOW LIGHT BEHAVIOUR

Typical low irradiance performance of module at STC:



REC Solar PTE. LTD.  
20 Tuas South Ave. 14  
Singapore 637312  
post@recgroup.com  
[www.recgroup.com](http://www.recgroup.com)



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PRELIMINARY DATASHEET



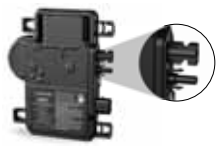
# IQ8X Microinverter

Our newest IQ8 Series 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 mode. This chip is built using advanced 55-nm technology with high-speed digital logic and superfast response times to changing loads and grid events, alleviating constraints on battery sizing for home energy systems.

IQ8X Microinverter is the latest addition to this family, designed to support PV modules with high input DC voltage and cell counts, such as 80-half-cut cells, 88-half-cut cells and 96-cells.



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



Connect PV modules quickly and easily to the IQ8 Series Microinverters with integrated MC4 connectors.



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.



IQ8 Series Microinverters are UL Listed as PV rapid shutdown equipment and conform with regulations when installed according to the manufacturer’s instructions.

\*Meets UL 1741 only when installed with IQ System Controller 2 and 3.

**Easy to install**

- Lightweight and compact with plug-and-play connectors
- Power line communication (PLC) between components
- Faster installation with simple two-wire cabling

**High productivity and reliability**

- Produces 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

**NOTE:**

- IQ8 Series Microinverters cannot be mixed with previous generations of Enphase microinverters (IQ7 Series, IQ6 Series, and so on) in the same system.
- IQ Gateway is required to change the default grid profile at the time of installation to meet local Authority Having Jurisdiction (AHJ) requirements.

## IQ8X Microinverter

INPUT DATA (DC)		UNIT	IQ8X-80-M-US
Commonly used module pairings <sup>1</sup>		W	320–540
Module compatibility		—	To meet compatibility, PV modules must be within the following maximum input DC voltage and maximum module I <sub>sc</sub> . Module compatibility can be checked at <a href="https://enphase.com/installers/microinverters/calculator">https://enphase.com/installers/microinverters/calculator</a>
MPPT voltage range		V	43–60
Operating range		V	25–79.5
Minimum and maximum start voltage		V	30–79.5
Maximum input DC voltage		V	79.5
Maximum continuous operating DC current		A	10
Maximum input DC short-circuit current		A	16
Maximum module I <sub>sc</sub>		A	13
Overvoltage class DC port		—	II
DC port backfeed current		mA	0
PV array configuration		—	Ungrounded array; no additional DC side protection required; AC side protection requires maximum 20 A per branch circuit

OUTPUT DATA (AC)		UNIT	IQ8X-80-M-US @240 VAC	IQ8X-80-M-US @208 VAC
Peak output power		VA	384	366
Maximum continuous output power		VA	380	360
Nominal grid voltage (L-L)		V	240, split-phase (L-L), 180°	208, single-phase (L-L), 120° <sup>4</sup>
Minimum and maximum grid voltage <sup>2</sup>		V	211–264	183–229
Max. continuous output current		A	1.58	1.73
Nominal frequency		Hz		60
Extended frequency range		Hz		47–68
AC short circuit fault current over three cycles		A <sub>rms</sub>		2.70
Maximum units per 20 A (L-L) branch circuit <sup>3</sup>		—	10	9
Total harmonic distortion		%		<5
Overvoltage class AC port		—		III
AC port backfeed current		mA		18
Power factor setting		—		1.0
Grid-tied power factor (adjustable)		—		0.85 leading ... 0.85 lagging
Peak efficiency		%	97.3	97.0
CEC weighted efficiency		%	96.5	96.5
Nighttime power consumption		mW	26	12

MECHANICAL DATA	
Ambient temperature range	–40°C to 65°C (–40°F to 149°F)
Relative humidity range	4% to 100% (condensing)
DC connector type	Stäubli MC4
Dimensions (H × W × D); Weight	212 mm (8.3") × 175 mm (6.9") × 30.2 mm (1.2"); 1.1 kg (2.43 lbs)
Cooling	Natural convection – no fans
Approved for wet locations; Pollution degree	Yes; PD3
Enclosure	Class II double-insulated, corrosion-resistant polymeric enclosure
Environmental 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), 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, NEC 2020, and NEC 2023 section 690.12 and C22.1-2018 Rule 64-218 rapid shutdown of PV systems for AC and DC conductors when installed according to the manufacturer’s instructions.

(1) No enforced DC/AC ratio.  
(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.  
(4) IQ8X is not certified for use with Enphase Three Phase Network Protection Relay (NPR-3P-208-NA) and therefore designed for single-phase operation only. Check with the local utility requirements if you wish to install single phase inverter across three phases.



DRAWING NUMBER:

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# Enphase Q Cable Accessories

The **Enphase Q Cable™** and accessories are part of the latest generation Enphase IQ System™. These accessories provide simplicity, reliability, and faster installation times.



### Enphase Q Cable

- Two-wire, double-insulated Enphase Q Cable is 50% lighter than the previous generation Enphase cable
- New cable numbering and plug and play connectors speed up installation and simplify wire management
- Link connectors eliminate cable waste

### Field-Wireable Connectors

- Easily connect Q cables on the roof without complex wiring
- Make connections from any open connector and center feed any section of cable within branch limits
- Available in male and female connector types





## Enphase Q Cable Accessories

CONDUCTOR SPECIFICATIONS	
Certification	UL3003 (raw cable), UL 9703 (cable assemblies), DG cable
Flame test rating	FT4
Compliance	RoHS, OIL RES I, CE, UV Resistant, combined UL for Canada and United States
Conductor type	THHN/THWN-2 dry/wet
Disconnecting means	The AC and DC bulkhead connectors have been evaluated and approved by UL for use as the load-break disconnect required by NEC 690.

Q CABLE TYPES / ORDERING OPTIONS				
Connectorized Models	Size / Max Nominal Voltage	Connector Spacing	PV Module Orientation	Connector Count per Box
Q-12-10-240	12 AWG / 277 VAC	1.3 m (4.2 ft)	Portrait	240
Q-12-17-240	12 AWG / 277 VAC	2.0 m (6.5 ft)	Landscape (60-cell)	240
Q-12-20-200	12 AWG / 277 VAC	2.3 m (7.5 ft)	Landscape (72-cell)	200

ENPHASE Q CABLE ACCESSORIES		
Name	Model Number	Description
Raw Q Cable	Q-12-RAW-300	300 meters of 12 AWG cable with no connectors
Field-wireable connector (male)	Q-CONN-10M	Make connections from any open connector
Field-wireable connector (female)	Q-CONN-10F	Make connections from any Q Cable open connector
Cable Clip	Q-CLIP-100	Used to fasten cabling to the racking or to secure looped cabling
Disconnect tool	Q-DISC-10	Disconnect tool for Q Cable connectors, DC connectors, and AC module mount
Q Cable sealing caps (female)	Q-SEAL-10	One needed to cover each unused connector on the cabling
Terminator	Q-TERM-10	Terminator cap for unused cable ends
Enphase EN4 to MC4 adaptor <sup>1</sup>	ECA-EN4-S22	Connect PV module using MC4 connectors to IQ micros with EN4 (TE PV4-S SOLARLOK). 150mm/5.9" to MC4.
Enphase EN4 non-terminated adaptor <sup>1</sup>	ECA-EN4-FW	For field wiring of UL certified DC connectors. EN4 (TE PV4-S SOLARLOK) to non-terminated cable. 150mm/5.9"
Enphase EN4 to MC4 adaptor (long) <sup>1</sup>	ECA-EN4-S22-L	Longer adapter cable for EN4 (TE PV4-S SOLARLOK) to MC4. Use with split cell modules or PV modules with short DC cable. 600mm/23.6"
Replacement DC Adaptor (MC4)	Q-DCC-2	DC adaptor to MC4 (max voltage 100 VDC)
Replacement DC Adaptor (UTX)	Q-DCC-5	DC adaptor to UTX (max voltage 100 VDC)

1. Qualified per UL subject 9703.

	<b>TERMINATOR</b> Terminator cap for unused cable ends, sold in packs of ten (Q-TERM-10)		<b>SEALING CAPS</b> Sealing caps for unused aggregator and cable connections (Q-BA-CAP-10 and Q-SEAL-10)
	<b>DISCONNECT TOOL</b> Plan to use at least one per installation, sold in packs of ten (Q-DISC-10)		<b>CABLE CLIP</b> Used to fasten cabling to the racking or to secure looped cabling, sold in packs of one hundred (Q-CLIP-100)

To learn more about Enphase offerings, visit [enphase.com](https://enphase.com)



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2020-06-26



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X-IQ-AM1-240-5  
X-IQ-AM1-240-5C

# IQ Combiner 5/5C

The IQ Combiner 5/5C consolidates interconnection equipment into a single enclosure and streamlines IQ Series Microinverters and IQ Gateway installation by providing a consistent, pre-wired solution for residential applications. IQ Combiner 5/5C uses wired control communication and is compatible with IQ System Controller 3/3G and IQ Battery 5P.

The IQ Combiner 5/5C, IQ Series Microinverters, IQ System Controller 3/3G, and IQ Battery 5P provide a complete grid-agnostic Enphase Energy System.



**IQ Series Microinverters**  
The high-powered smart grid-ready IQ Series Microinverters (IQ6, IQ7, and IQ8 Series) simplify the installation process.



**IQ System Controller 3/3G**  
Provides microgrid interconnection device (MID) functionality by automatically detecting grid failures and seamlessly transitioning the home energy system from grid power to backup power.



**IQ Battery 5P**  
Fully integrated AC battery system. Includes six field-replaceable IQ8D-BAT Microinverters.



**IQ Load Controller**  
Helps prioritize essential appliances during a grid outage to optimize energy consumption and prolong battery life.



5-year limited warranty



\*For country-specific warranty information, see the <https://enphase.com/installers/resources/warranty> page.

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IQC-5-5C-DSH-00007-3.0-EN-US-2024-03-01

## IQ Combiner 5/5C

MODEL NUMBER	
IQ Combiner 5 (X-IQ-AM1-240-5)	IQ Combiner 5 with IQ Gateway printed circuit board for integrated revenue-grade PV production metering (ANSIC12.20 ±0.5%), consumption monitoring (± 2.5%), and IQ Battery monitoring (±2.5%). Includes a silver solar shield to deflect heat.
IQ Combiner 5C (X-IQ-AM1-240-5C)	IQ Combiner 5C with IQ Gateway printed circuit board for integrated revenue-grade PV production metering (ANSI C12.20 ±0.5%), consumption monitoring (±2.5%) and IQ Battery monitoring (±2.5%). Includes Enphase Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05) <sup>1</sup> . Includes a silver solar shield to deflect heat.
WHAT'S IN THE BOX	
IQ Gateway printed circuit board	IQ Gateway is the platform for total energy management for comprehensive, remote maintenance, and management of the Enphase Energy System
Busbar	80 A busbar with support for 1 × IQ Gateway breaker and 4 × 20 A breaker for installing IQ Series Microinverters and IQ Battery 5P
IQ Gateway breaker	Circuit breaker, 2-pole, 10 A/15 A
Production CT	Pre-wired revenue-grade solid-core CT, accurate up to ±0.5%
Consumption CT	Two consumption metering clamp CTs, shipped with the box, accurate up to ±2.5%
IQ Battery CT	One battery metering clamp CT, shipped with the box, accurate up to ±2.5%
CTRL board	Control board for wired communication with IQ System Controller 3/3G and the IQ Battery 5P
Enphase Mobile Connect (only with IQ Combiner 5C)	4G-based LTE-M1 cellular modem (CELLMODEM-M1-06-SP-05) with a 5-year T-Mobile data plan
Accessories kit	Spare control headers for the COMMS-KIT-02 board
ACCESSORIES AND REPLACEMENT PARTS (NOT INCLUDED, ORDER SEPARATELY)	
CELLMODEM-M1-06-SP-05	4G-based LTE-M1 cellular modem with a 5-year T-Mobile data plan
CELLMODEM-M1-06-AT-05	4G-based LTE-M1 cellular modem with a 5-year AT&T data plan
Circuit breakers (off-the-shelf)	Supports Eaton BR2XX, Siemens Q2XX and GE/ABB THQL21XX Series circuit breakers (XX represents 10, 15, 20, 30, 40, 50, or 60). Also supports Eaton BR220B, BR230B, and BR240B circuit breakers compatible with the hold-down kit.
Circuit breakers (provided by Enphase)	BRK-10A-2-240V, BRK-15A-2-240V, BRK-20A-2P-240V, BRK-15A-2P-240V-B, and BRK-20A-2P-240V-B (more details in the "Accessories" section)
XA-SOLARSHIELD-ES	Replacement solar shield for IQ Combiner 5/5C
XA-ENV2-PCBA-5	IQ Gateway replacement printed circuit board (PCB) for IQ Combiner 5/5C
X-IQ-NA-HD-125A	Hold-down kit compatible with Eaton BR-B Series circuit breakers (with screws)
XA-COMMS2-PCBA-5	Replacement COMMS-KIT-02 printed circuit board (PCB) for IQ Combiner 5/5C
ELECTRICAL SPECIFICATIONS	
Rating	80 A
System voltage and frequency	120/240 VAC, 60 Hz
Busbar rating	125 A
Fault current rating	10 kAIC
Maximum continuous current rating (input from PV/storage)	64 A
Branch circuits (solar and/or storage)	Up to four 2-pole Eaton BR, Siemens Q, or GE/ABB THQL Series distributed generation (DG) breakers only (not included)
Maximum total branch circuit breaker rating (input)	80 A of distributed generation/95 A with IQ Gateway breaker included
IQ Gateway breaker	10 A or 15 A rating GE/Siemens/Eaton included
Production metering CT	200 A solid core pre-installed and wired to IQ Gateway
Consumption monitoring CT (CT-200-CLAMP)	A pair of 200 A clamp-style current transformers is included with the box
IQ Battery metering CT	200 A clamp-style current transformer for IQ Battery metering, included with the box

1. A plug-and-play industrial-grade cell modem for systems of up to 60 microinverters. Available in the United States, Canada, Mexico, Puerto Rico, and the US Virgin Islands, where there is adequate cellular service in the installation area.

IQC-5-5C-DSH-00007-3.0-EN-US-2024-03-01

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MECHANICAL DATA	
Dimensions (W × H × D)	37.5 cm × 49.5 cm × 16.8 cm (14.75" × 19.5" × 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°F to 115°F)
Cooling	Natural convection, plus heat shield
Enclosure environmental rating	Outdoor, NRTL-certified, NEMA type 3R, polycarbonate construction
Wire sizes	<ul style="list-style-type: none"><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 conductors</li><li>• Neutral and ground: 14 to 1/0 copper conductors</li><li>• Always follow local code requirements for conductor sizing</li></ul>
Communication (in-premise connectivity)	Built-in CTRL board for wired communication with IQ Battery 5P and IQ System Controller 3/3G. Integrated power line communication for IQ Series Microinverters
Altitude	Up to 2,600 meters (8,530 feet)

COMMUNICATION INTERFACES	
Integrated Wi-Fi	802.11b/g/n (dual band 2.4 GHz/5 GHz), for connecting the Enphase Cloud through the internet
Wi-Fi range (recommended)	10 m (32.8 feet)
Bluetooth	BLE4.2, 10 m range to configure Wi-Fi SSID
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included), for connecting to the Enphase Cloud through the internet
Cellular/Mobile Connect	CELLMODEM-M1-06-SP-05 or CELLMODEM-M1-06-AT-05 (included with IQ Combiner 5C)
Digital I/O	Digital input/output for grid operator control
USB 2.0	Mobile Connect, COMMS-KIT-01 for IQ Battery 3/3T/10/10T, COMMS-KIT-02 for IQ Battery 5P
Access point (AP) mode	For connection between the IQ Gateway and a mobile device running the Enphase Installer App
Metering ports	Up to two Consumption CTs, one IQ Battery CT, and one Production CT
Power line communication	90–110 kHz
Web API	See <a href="https://developer-v4.enphase.com">https://developer-v4.enphase.com</a>
Local API	See <a href="#">guide for local API</a>

COMPLIANCE	
IQ Combiner with IQ Gateway	
UL 1741, CAN/CSA C22.2 No. 107.1, Title 47 CFR, Part 15, Class B, ICES 003, NOM-208-SCFI-2016, UL 60601-1/CANCSA 22.2 No. 61010-1, IEEE 1547: 2018 (UL 1741-SB, 3rd Ed.), IEEE 2030.5/CSIP Compliant, Production metering: ANSI C12.20 accuracy class 0.5 (PV production)	

COMPATIBILITY		
PV	Microinverters	IQ6, IQ7, and IQ8 Series Microinverters
	IQ System Controller	EP200G101-M240US00
COMMS-KIT-01 <sup>2</sup>	IQ System Controller 2	EP200G101-M240US01
	IQ Battery	ENCHARGE-3-1P-NA, ENCHARGE-10-1P-NA, ENCHARGE-3T-1P-NA, ENCHARGE-10T-1P-NA
COMMS-KIT-02 <sup>3</sup>	IQ System Controller 3	SC200D111C240US01, SC200G111C240US01
	IQ Battery	IQBATTERY-5P-1P-NA

## Accessories



### Mobile Connect

4G-based LTE-M1 cellular modem with a 5-year data plan  
(CELLMODEM-M1-06-SP-05 for Sprint and CELLMODEM-M1-06-AT-05 for AT&T)



### Circuit breakers

BRK-10A-2-240V Circuit breaker, 2-pole, 10 A, Eaton BR210  
BRK-15A-2-240V Circuit breaker, 2-pole, 15 A, Eaton BR215  
BRK-20A-2P-240V Circuit breaker, 2-pole, 20 A, Eaton BR220  
BRK-15A-2P-240V-B Circuit breaker, 2-pole, 15 A, Eaton BR215B with hold-down kit support  
BRK-20A-2P-240V-B Circuit breaker, 2-pole, 20 A, Eaton BR220B with hold-down kit support



### CT-200-SOLID

200 A revenue-grade solid core Production CT with <0.5% error rate (replacement SKU)

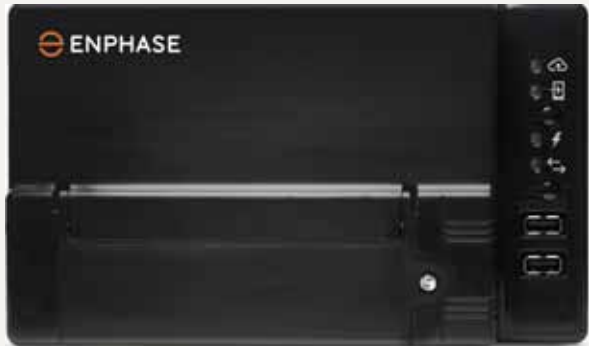


### CT-200-CLAMP

200 A clamp-style consumption and battery metering CT with <2.5% error rate (replacement SKU)

2. For information about IQ Combiner 5/5C compatibility with the 2<sup>nd</sup>-generation batteries, refer to the [compatibility matrix](#).

3. IQ Combiner 5/5C comes pre-equipped with COMMS-KIT-02.



# IQ Gateway

The IQ Gateway delivers solar production and energy consumption data to Enphase Installer Portal monitoring and analysis software for comprehensive, remote maintenance, and management of Enphase systems.

With integrated production metering and optional consumption monitoring, the IQ Gateway is the platform for total energy management. It integrates with the IQ System Controller and IQ Battery.



**IQ Series Microinverters**  
The high-powered smart grid-ready IQ Series Microinverters (IQ6, IQ7, and IQ8 Series) dramatically simplify the installation process.



**IQ System Controller**  
Provides microgrid interconnect device (MID) functionality by automatically detecting grid failures and seamlessly transitioning the home energy system from grid power to backup power.



**IQ Battery**  
All-in-one AC coupled storage system that is reliable, smart, simple, and safe. It provides backup capability and installers can quickly design the right system size to meet the needs of both new and retrofit solar customers.



**IQ Load Controller**  
Helps prioritize essential appliances during a grid outage to optimize energy consumption and prolong battery life.

Smart

- Enables web-based monitoring and control
- Provides bidirectional communications for remote upgrades
- Supports power export limiting and zero-export applications

Simple

- Easy system configuration using Enphase Installer App
- Flexible networking with Wi-Fi, Ethernet, or cellular

Reliable

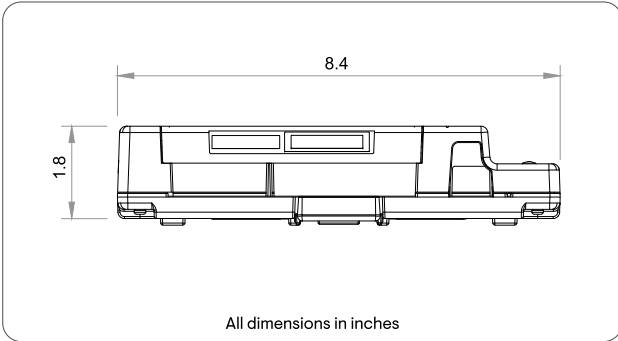
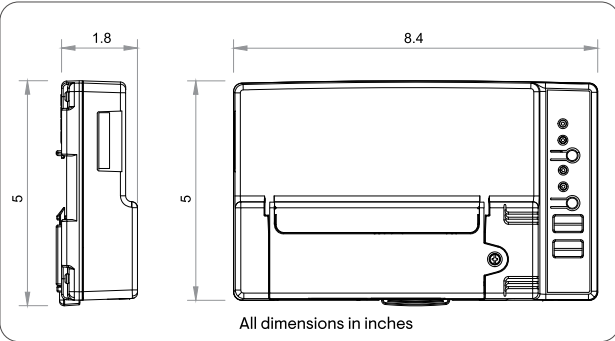
- Designed for installation indoors or outdoors in a NEMA 3R rated enclosure
- 5-year limited warranty
- ENV2-IQ-AM1-240 complies with IEEE® 1547:2018 (UL 1741-SB, 3<sup>rd</sup> Ed.)

## IQ Gateway





MODEL NUMBER		ENV-IQ-AM1-240, ENV2-IQ-AM1-240
IQ Gateway ENV-IQ-AM1-240 ENV2-IQ-AM1-240 (IEEE® 1547:2018)		IQ Gateway integrates revenue grade PV production metering (ANSI C12.20 ±0.5%), consumption metering (±2.5%), and battery metering (±2.5%) with IQ Battery 5P. Includes one 200 A continuous rated Production Current Transformer (CT).
ACCESSORIES - ORDER SEPARATELY		
Mobile Connect 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 - 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
Consumption monitoring CT and IQ Battery 5P metering CT CT-200-SPLIT CT-200-CLAMP		Split-core and clamp style CTs with 2.5% accuracy enable whole home and IQ Battery 5P metering
Communications Kit COMMS-KIT-01 COMMS-KIT-02		Installed at the IQ Gateway. For communications with IQ Battery and IQ System Controller. Includes USB cable for connection to IQ Gateway or IQ Combiner and allows wireless communication with IQ Battery and IQ System Controller.
POWER REQUIREMENTS		
AC power requirements	120/240 V, 120/208Y V, or 127/220Y V. Three-wire. 60 Hz.	
IQ Gateway breaker	2-pole and maximum 20 A overcurrent protection required	
Typical power consumption	5 W	
CAPACITY		
Number of microinverters polled	Up to 300	
MECHANICAL AND ELECTRICAL DATA		
Dimensions (W × H × D)	21.3 cm × 12.6 cm × 4.5 cm (8.4 in × 5 in × 1.8 in)	
Weight	1.09 lb	
Ambient temperature range	-40°C to 65°C (-40°F to 149°F) [ENV-IQ-AM1-240] -40°C to 50°C (-40°F to 122°F) [ENV2-IQ-AM1-240] -40°C to 46°C (-40°F to 115°F) if installed in an enclosure	
Environmental rating	IP30. For installation indoors or in an NRTL-certified, NEMA type 3R or better-rated enclosure, if installing outdoors.	
Altitude	Up to 2,600 meters (8,530 feet)	
COMMUNICATION INTERFACES		
Integrated Wi-Fi	802.11b/g/n (2.4 GHz, 5 GHz), for connecting the Enphase Cloud via the internet.	
Wi-Fi range (recommended)	10 m	
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included), for connecting to the Enphase Cloud via the internet.	
Mobile Connect	CELLMODEM-M1-06-SP-05, CELLMODEM-M1-06-AT-05 (to be purchased separately, mandatory for sites with IQ Battery)	
Digital I/O	Digital input/output for grid operator control	
USB 2.0	For Mobile Connect and Communications Kit	
Access point (AP) mode	For a connection between the IQ Gateway and a mobile device running the Enphase Installer App	
Metering ports	Up to two Consumption CTs, one Production CT, and one battery CT (for IQ Battery 5P)	
Power line communication (PLC)	90 kHz–110 kHz (Class B), to microinverters.	
Web API	Refer to <a href="https://developer-v4.enphase.com">https://developer-v4.enphase.com</a>	
Local API	Refer to <a href="#">guide for local API</a>	
LED indicators	From top to bottom: Cloud connectivity, Wi-Fi access point mode, PV production state, PLC communications state	
Configured via	Enphase Installer App and Enphase Installer Platform	



POWER PRODUCTION/EXPORT LIMITING VIA THE IQ GATEWAY'S DIGITAL IO	
Maximum relays read	4
Capabilities supported	Power production limiting (Production CT/s required), power export limiting (Production CT/s required and Consumption CT/s – <b>Load with Solar</b> configuration)
Minimum IQ Gateway version	v7.3.120
Cable configurations	18 AWG, UL-Std. 62, 600 V, 105°C, and minimum 0.03 inches average thickness
Signal voltage range	2.5 V–5 V (digital high), 0 V–1.9 V (digital low)
Terminal blocks	Five terminals, up to 0.002 in <sup>2</sup>
Configuration via	Enphase Installer App, Enphase Installer Platform (site settings)
SCOPE OF DELIVERY	
Package dimensions (H × W × D)	6.3 in × 10.8 in × 3.9 in
Package weight	2.2 lb
Aluminium DIN rail	4.9 in
Current transformers (CTs)	One CT-200-SOLID included
COMPLIANCE	
Compliance	CA Rule 21 (UL 1741-SA), IEEE® 1547:2018 – UL 1741-SB, 3rd Ed.(ENV2-IQ-AM1-240), UL 61010-1 CAN/CSA C22.2 No. 61010-1 Title 47 CFR, Part 15, Class B, ICES 003 IEC/EN 61010-1:2010, EN50065-1, EN61000-4-5, EN61000-6-1, EN61000-6-2 Metering: ANSI C12.20 accuracy class 0.5 (PV production only)
COMPATABILITY	
IQ System Controller	SC200D111C240US01, SC200G111C240US01, EP200G101-M240US01, EP200G101-M240US00
IQ Battery	IQBATTERY-5P-1P-NA, ENCHARGE-3T-1P-NA, ENCHARGE-10T-1P-NA
Microinverter	IQ6, IQ7, and IQ8 Series Microinverters



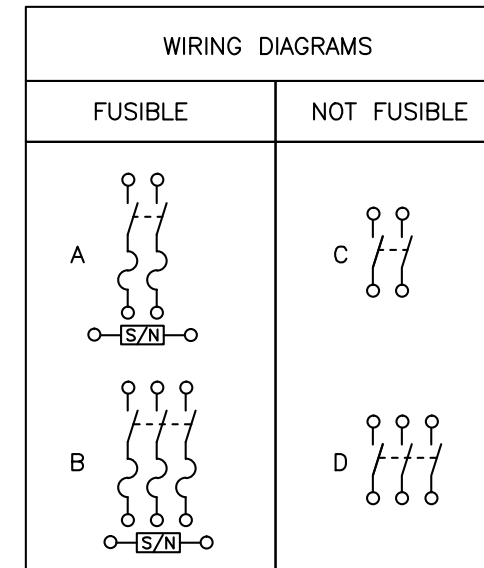
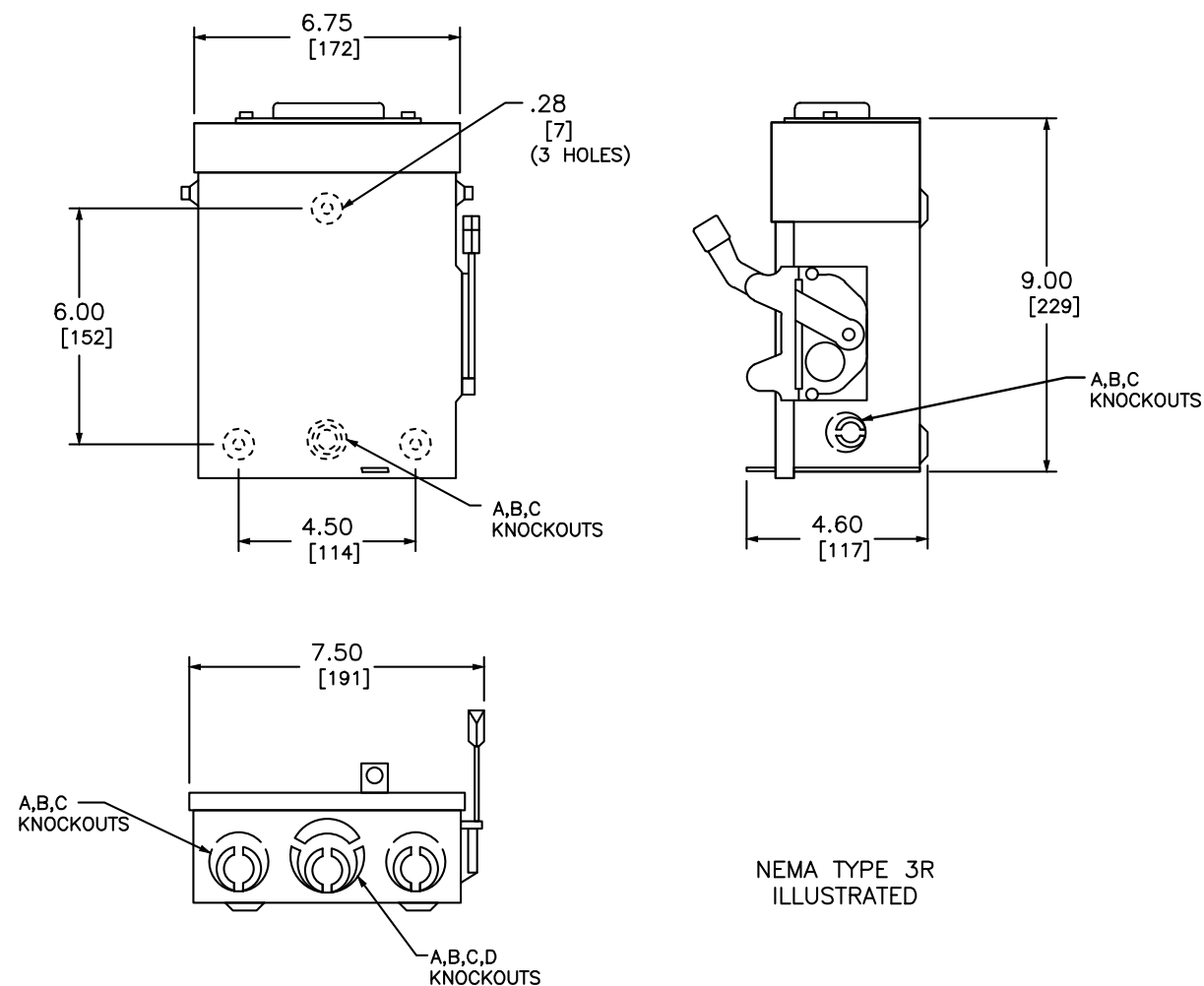
## Accessories

	<b>Enphase Mobile Connect</b> 4G-based LTE-M1 cellular modem with a 5-year data plan (CELLMODEM-M1-06-SP-05 for Sprint and CELLMODEM-M1-06-AT-05 for AT&T)		<b>Circuit breakers</b> BRK-10A-2-240V Circuit breaker, 2-pole, 10 A, Eaton BR210 BRK-15A-2-240V Circuit breaker, 2-pole, 15 A, Eaton BR215 BRK-20A-2P-240V Circuit breaker, 2-pole, 20 A, Eaton BR220 BRK-15A-2P-240V-B Circuit breaker, 2-pole, 15 A, Eaton BR215B with hold-down kit support BRK-20A-2P-240V-B Circuit breaker, 2-pole, 20 A, Eaton BR220B with hold-down kit support
	<b>CT-200-SOLID</b> 200 A revenue grade solid core Production CT with <0.5% error rate (replacement SKU)		<b>CT-200-CLAMP</b> 200 A clamp-style consumption and battery metering CT with <2.5% error rate (replacement SKU)

## Revision history

REVISION	DATE	DESCRIPTION
DSH-00111-3.0	December 2023	Updated power requirement and added IG Gateway breaker values.
DSH-00111-2.0	August 2023	Updated temperature specification for ENV2-IQ-AM1-240.
DSH-00111-1.0	June 2023	Updated altitude and recommended maximum microinverters on a site.





TERMINAL LUGS ‡			
AMPERES	MAX. WIRE	MIN. WIRE	TYPE
30	# 6 AWG	# 12 AWG	AL
	# 6 AWG	# 14 AWG	CU

KNOCKOUTS				
SYMBOL	A	B	C	D
CONDUIT SIZE	.50	.75	1	1.25

DUAL DIMENSIONS: INCHES  
MILLIMETERS

CATALOG NUMBER	VOTAGE RATINGS	WIRING DIAG.	HORSEPOWER RATINGS					
			120VAC		240VAC			
			STD.	MAX.	STD.		MAX.	
			1 Ø	1 Ø	1 Ø	3 Ø	1 Ø	3 Ø
D211NRB●■	240VAC	A	1/2	2	1 1/2	—	3	—
D221NRB	240VAC	A	—	—	1 1/2	3*	3	7 1/2*
D321NRB	240VAC	B	—	—	1 1/2	3	3	7 1/2
DU221RB	240VAC	C	—	—	—	—	3	—
DU321RB	240VAC	D	—	—	—	—	3	7 1/2

NOTES:  
FINISH — GRAY BAKED ENAMEL ELECTRODEPOSITED OVER CLEANED PHOSPHATIZED STEEL.  
UL LISTED — FILE E-2875  
ALL NEUTRALS — INSULATED GROUNDABLE  
SUITABLE FOR USE AS SERVICE EQUIPMENT  
TOP OF NEMA TYPE 3R SWITCHES HAVE PROVISIONS FOR MAXIMUM 2 1/2" BOLT-ON HUB.  
SHORT CIRCUIT CURRENT RATINGS:  
● 10,000 AMPERES.  
■ 10,000 AMPERES WHEN USED WITH OR PROTECTED BY CLASS H OR K FUSES.  
■ 100,000 AMPERES WITH CLASS R FUSES.  
\* FOR CORNER GROUNDING DELTA SYSTEMS.  
■ PLUG FUSES  
‡ LUGS SUITABLE FOR 60°C OR 75° CONDUCTORS.

GENERAL DUTY SAFETY SWITCHES  
VISIBLE BLADE TYPE  
30 AMPERE  
ENCLOSURE — NEMA TYPE 3R RAINPROOF

SQUARE D  
by Schneider Electric

DWG# 1852  
NO.

**A. System Specifications and Ratings**

- Maximum Voltage: 1,000 Volts
- Maximum Current: **JB-1.2:** 80 Amps; **JB-1.XL:** 120 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 live parts of opposite polarity.
- Enclosure Rating: Type 3R
- 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)
- Compliance:
  - **JB-1.2:** UL1741, CSA C22.2 No. 290; **JB-1.XL:** UL1741, CSA C22.2 No. 290
  - Approved wire connectors: must conform to UL1741, CSA C22.2 No. 290
- System Marking: **Interek Symbol and File #5019942**
- 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**

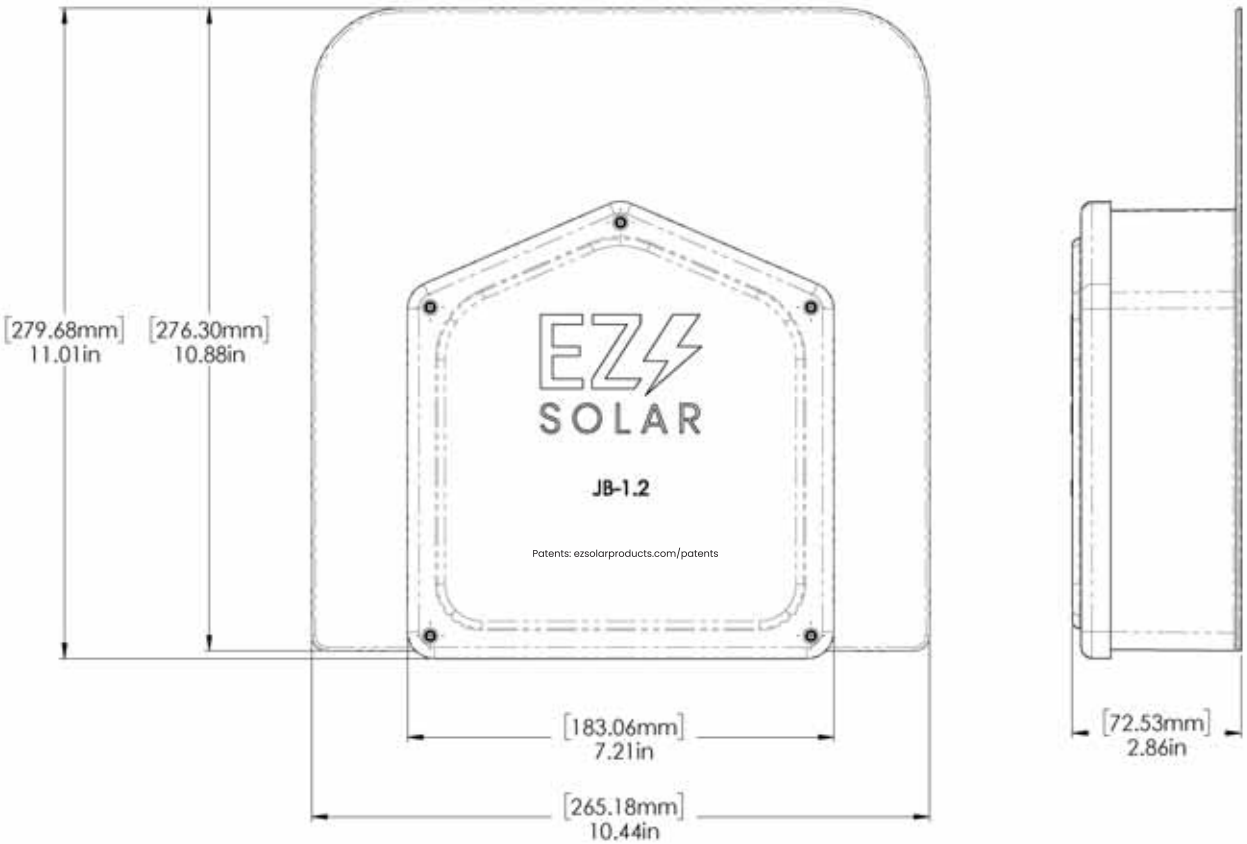
	1 Conductor	2 Conductor	Torque				
			Type	NM	Inch Lbs	Voltage	Current
ABB ZS6 terminal block	10-24 awg	16-24 awg	Sol/Str	0.5-0.7	6.2-8.85	600V	30 amp
ABB ZS10 terminal block	6-24 awg	12-20 awg	Sol/Str	1.0-1.6	8.85-14.16	600V	40 amp
ABB ZS16 terminal block	4-24 awg	10-20 awg	Sol/Str	1.6-2.4	14.6-21.24	600V	60 amp
ABB M6/8 terminal block	8-22 awg		Sol/Str	.08-1	8.85	600V	50 amp
Ideal 452 Red <small>WING-NUT Wire Connector</small>	8-18 awg		Sol/Str	Self-Torque	Self-Torque	600V	
Ideal 451 Yellow <small>WING-NUT Wire Connector</small>	10-18 awg		Sol/Str	Self-Torque	Self-Torque	600V	
Ideal, In-Sure <small>Push-In Connector Part #39</small>	10-14 awg		Sol/Str	Self-Torque	Self-Torque	600V	
WAGO, 2204-1201	10-20 awg	16-24 awg	Sol/Str	Self-Torque	Self-Torque	600V	30 amp
WAGO, 221-612	10-20 awg	10-24 awg	Sol/Str	Self-Torque	Self-Torque	600V	30 amp
Dottie DRC75	6-12 awg		Sol/Str	Snap-In	Snap-In		
ESP NG-53	4-6 awg		Sol/Str		45	2000V	
	10-14 awg		Sol/Str		35		
ESP NG-717	4-6 awg		Sol/Str		45	2000V	
	10-14 awg		Sol/Str		35		
Brumall 4-5,3	4-6 awg		Sol/Str		45	2000V	
	10-14 awg		Sol/Str		35		

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

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

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	JB-1.2 BODY	POLYCARBONATE WITH UV INHIBITORS	1
2	JB-1.2 LID	POLYCARBONATE WITH UV INHIBITORS	1
3	#10 X 1-1/4" PHILLIPS PAN HEAD SCREW		6
4	#8 X 3/4" PHILLIPS PAN HEAD SCREW		6

SIZE <b>B</b>	DWG. NO. <b>JB-1.2</b>	REV
SCALE: 1:2	WEIGHT: 1.45 LBS	SHEET 1 OF 3
TORQUE SPECIFICATION:		15-20 LBS
CERTIFICATION:		UL 1741, NEMA 3R CSA C22.2 NO. 290
WEIGHT:		1.45 LBS



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RIGID PVC CONDUIT FITTINGS

JB444 JUNCTION BOXES

ISSUE DATE:  
DATE D'EMISSION: 2009 04 30

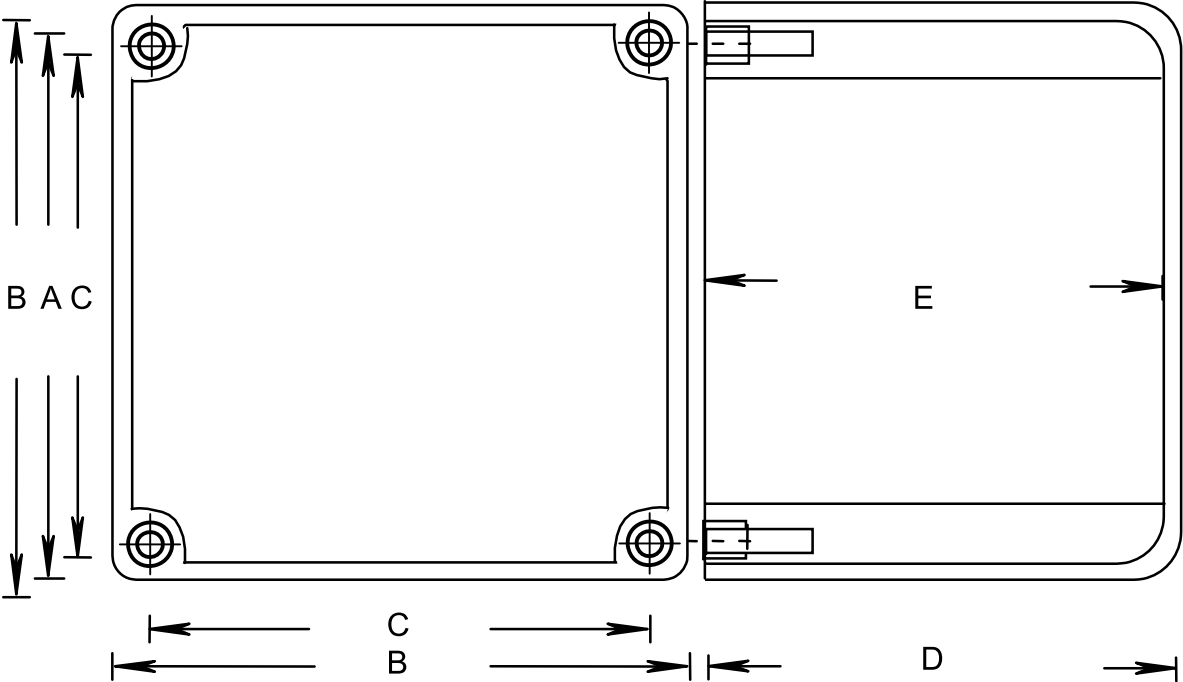
SUPERCEDES:  
REPLACE: 2004 07 15

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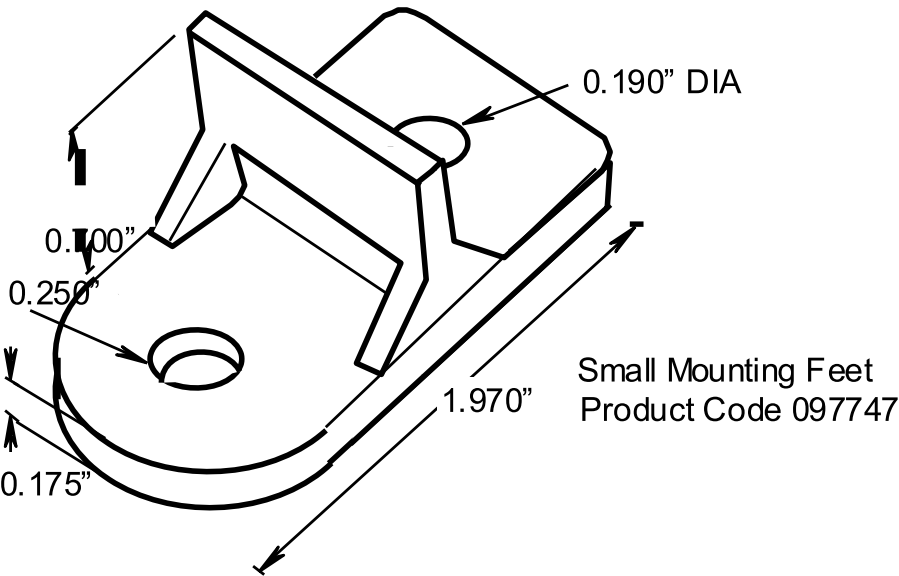
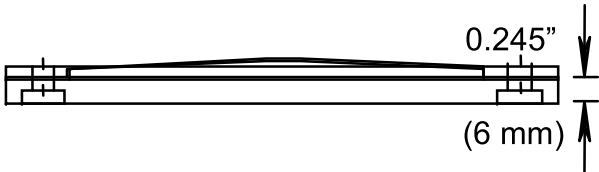
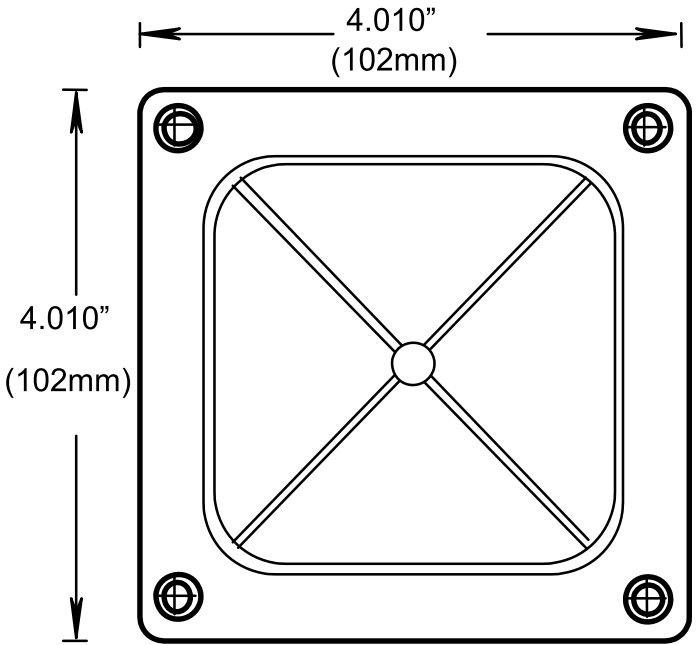
PRODUCT CODE	PART NUMBER	NOMINAL SIZE		A		B		C	
		(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)
076668	J444 STAHLIN	4	103	3.675	93	4.000	102	3.450	88
076259	AMJB444 ALLIED	4	103	3.675	93	4.000	102	3.450	88
077643*	2037-424T CANLET	4	103	3.675	93	4.000	102	3.450	88
077696	JB 444	4	103	4.000	101	4.395	112	3.950	101

PRODUCT CODE	PART NUMBER	NOMINAL SIZE		D		E		VOLUME	
		(in)	(mm)	(in)	(mm)	(in)	(mm)	(cu. In)	(cu. Cm)
076668	J444 STAHLIN	4	103	4.180	106.	3.850	98	51.5	844.6
076259	AMJB444 ALLIED	4	103	4.180	106	3.850	98	51.5	844.6
077643*	2037-424T CANLET	4	103	4.180	106	3.850	98	51.5	844.6
077696	JB 444	4	103	4.170	106	3.930	100	51.5	844.6

PRODUCT CODE	PART NUMBER	NOMINAL SIZE		GASKET CODE	INSERT CODE	SCREW CODE	M.FEET CODE
		(in)	(mm)				
076668	J444 STAHLIN	4	103		072538 (4)		
076259	AMJB444 ALLIED	4	103		072538 (4)		
077643*	2037-424T CANLET	4	103		072538 (4)		
077696	JB 444	4	103	097731	072538 (4) 072539 (2)	072522 (4) 072513 (2)	097747

\* BOX WITH MOLDED MOUNTING FEET, INSERT ONLY; NO COVER, OR GASKET, UL LISTED 576J

COVER DIMENSIONS





## Heyco®-Tite Liquid Tight Cordgrips for Enphase Q Cables

Straight-Thru, NPT Hubs with Integral Sealing Ring

*The Ultimate in Liquid Tight Strain Relief Protection*

ALL NEW  
PRODUCT!

- Two new cordgrips now accommodate the Enphase Q Cable – M3231GCZ (1/2" NPT) and M3234GDA-SM (3/4" NPT).

- The 1/2" version provides liquid tight entry for one Enphase Q Cable – .24 x .38" (6,1 x 9,7 mm).

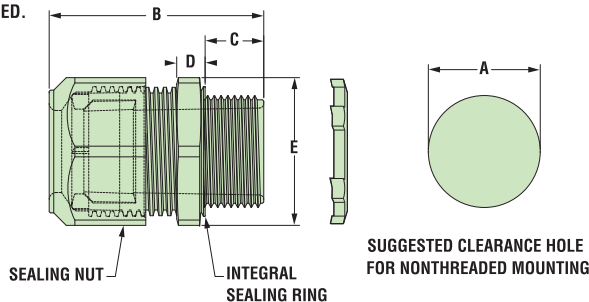
- The 3/4" version provides liquid tight entry for up to two Enphase Q Cables – .24 x .38" (6,1 x 9,7 mm) and an additional .130" (3,3 mm) dia. hole for a #8 solid grounding cable.



- The 3/4" version utilizes our skinned-over technology so any unused holes will retain a liquid tight seal.

- Rated for use with DG Cable.

GLAND CONFIGURATION			PART NO.	DESCRIPTION	UL/CSA or cULus	PART DIMENSIONS							
Type	Size	No.				A Clearance Hole Dia.	B Max. O.A. Length	C Thread Length	D Wrenching Nut Thickness	E Flat Size			
	mm.		Black			in.	mm.	in.	mm.	in.	mm.	in.	mm.
<b>Oval Gland</b>													
Q Cable	6,1 x 9,7	1	M3231GCZ	LTCG 1/2 6.1x9.7MM	UL/CSA	.875	22,2	1.70	43,2	.61	15,5	.21	5,3
<b>Break-Thru Skinned Over Gland</b>													
Q Cables plus Ground	6,1 x 9,7 3,3	2 1	M3234GDA-SM	SMCG 3/4 2-6.1x9.7MM 1-3.3MM	UL/CSA	1.040	26,4	2.00	50,8	.62	15,7	.25	6,4

Metal Locknuts INCLUDED.

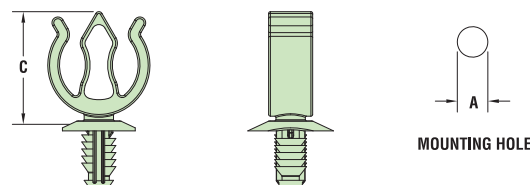


Material	Nylon 6/6 with TPE Sealing Gland		
Certifications		Listed under Underwriters' Laboratories File E504900	
		CSA Certified by the Canadian Standards Association File 93876	
Flammability Rating	94V-2		
Temperature Range	Static -40°F (-40°C) to 239°F (115°C)		
	Dynamic -4°F (-20°C) to 212°F (100°C)		
IP Rating	IP 68		

## Heyco® Helios® UVX Clip – Blind Mount

ALL NEW  
PRODUCT!

PANEL THICKNESS RANGE				WIRE DIAMETER RANGE 1-2 Wires		PART NO.	DESCRIPTION	MOUNTING HOLE DIA. A		OVERALL HEIGHT C	
Minimum in.   mm.		Maximum in.   mm.						in.   mm.		in.   mm.	
1-2 Wires											
.028	0,7	.250	6,4	.23 (5,8 mm) - .32 (8,0 mm) each cable		S6520 S6560	Helios UVX Clip 100 Pack Helios UVX Clip Bulk	.260	6,6	.96	24,4



Material	Nylon 6/6 with extended UV Capabilities		
Flammability Rating	94V-2		
Temperature Range	Dynamic -4°F (-20°C) to 185°F (85°C)		



# RAIL SYSTEM

## Instant Bonding

The N-S Bonding Jumper bonds row to row with no tools.

## One Clamp Anywhere

The Multi-Clamp works as mid- or end-clamp, and fits standard 30-40mm frames.

## Lifetime Wire Management

Open rail channel holds and protects wires. Clamps won't pinch wires after tightening.

## Bonding Structural Splice

Connect rails instantly, without tools, interference or limitations.

## Next-Level Solar Mounting

A complete system for hassle-free rooftop installation, from watertight mounts to lifetime wire management.



### Simplicity

1/2" socket for everything.  
One clamp for mid or end.  
No tool splicing and bonding.  
Easy wire management.



### Code Compliant

UL 2703 listed  
LTR-AE-001-2012 listed  
Class A fire rating for any slope  
ASCE 7-16 PE Certified  
FL Cert of Approval FL41396



### Premium Aesthetics

The narrowest panel gap available. Optional Hidden End Clamps and End Caps provide a flush look on the edge of the array.



### Watertight for Life

Secured on industry-leading Pegasus Mounts, for composite shingle and tile roofs. Backed by a 25-year warranty.

Pegasus Solar Inc | 506 West Ohio Avenue, Richmond, CA 94804 | [www.pegasussolar.com](http://www.pegasussolar.com)



# RAIL SYSTEM



### Pegasus Rail

Available in 14' and 7' lengths for easy layout and shipping.  
Open-channel design holds MC4 connectors, PV wire and trunk cables.  
Black and Mill finish



### Pegasus Max Rail

Maximum-strength design.  
Meets specifications for high snow-load and hurricane zones.  
Black and Mill finish



### Splice and Max Splice

Installs by hand.  
Works over mounts.  
Structurally connects and bonds rails automatically; UL2703 listed as reusable.



### Dovetail T-bolt

Dovetail shape for extra strength.  
Uses 1/2" socket.



### Multi-Clamp

Fits 30-40mm PV frames, as mid- or end-clamp.  
Twist-locks into position; doesn't pinch wires in rail.  
Bonds modules to rail; UL2703 listed as reusable



### Hidden End Clamp

Offers premium edge appearance.  
Preinstalled pull-tab grips rail edge, allowing easy, one-hand installation.  
Tucks away for reuse.



### Ground Lug

Holds 6 or 8 AWG wire.  
Mounts on top or side of rail.  
Assembled on MLPE Mount.  
UL2703 listed as reusable.



### N-S Bonding Jumper

Installs by hand, eliminates row-to-row copper wire.  
UL2703 listed as reusable only with Pegasus Rail.



### MLPE Mount

Secures and bonds most micro-inverters and optimizers to rail.  
Connectors and wires easily route underneath after installation.  
UL2703 listed as reusable.



### Cable Grip

Secures four PV wires or two trunk cables.  
Stainless-steel backing provides durable grip.  
Eliminates sagging wires.



### Wire Clip

Hand operable.  
Holds wires in channel.  
Won't slip.



### End Cap and Max End Cap

Fits flush to PV module and hides raw or angled cuts.  
Hidden drain quickly clears water from rail.

### Certifications:

- UL 2703, Edition 1
- LTR-AE-001-2012
- ASCE 7-16 PE certified
- Class A fire rating for any slope roof
- FL Cert of Approval FL41396



### FREE PEGASUS SOLAR Design Tool

Quickly calculate the most efficient layout, spans and materials needed to suit your job. Visit the Pegasus Customer Portal. [pegasussolar.com/portal](http://pegasussolar.com/portal)

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LOAD		SPAN				
SNOW (psf)	WIND (MPH)	32"	48"	72"	96"	120"
0	100					
	130					
10	140					
30	190					
50						
100						
120						

PEGASUS RAIL

PEGASUS MAX RAIL

For reference only. Spans above are calculated using 7-16 for a Gable Roof, Exposure Category B, 0-20deg roof angle, 30ft mean roof height with non-exposed modules. For PE certified span tables, visit [www.pegasussolar.com/spans](http://www.pegasussolar.com/spans).

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DRAWING NUMBER:

SS

Pegasus Rail System may be used to ground a PV module complying with UL 2703 only when the specific module has been evaluated for grounding and/or mounting in compliance with this installation manual. Unless otherwise specified, “xxx” refers to the power rating of the PV module. Both black & silver frames are included in the UL2703 listing.



Rev 31  
23

Pegasus Rail System may be used to ground a PV module complying with UL 2703 only when the specific module has been evaluated for grounding and/or mounting in compliance with this installation manual. Unless otherwise specified, "xxx" refers to the power rating of the PV module. Both black & silver frames are included in the UL2703 listing.



[www.pegasussolar.com](http://www.pegasussolar.com)





# INSTAFLASH<sup>®</sup> 2

## Rafter or Deck Attach!

- No pilot holes
- Pre-installed sealant
- No caulking, no ripping shingles



### Pre-installed sealant

**Before:** Sealant contained by protective cage. No contact with hands or tools.



### Instant, watertight seal

**After:** Non-hardening sealant automatically fills all gaps, overlays and butt joints.

### Install in any season

Install in 0 to 170° F weather, including rain and sleet. Watertight for life.

## The Ultimate Comp Roof Attachment

Simple to use. Works for rafter or deck attach. No caulking, no ripped shingles, no mess. Pre-installed sealant acts as a chemical flashing and fills all gaps, voids, and butt joints for an instant, watertight seal.



### 25-Year Warranty

Manufactured with advanced materials and coatings to outlast the roof itself



### Code Compliant

Fully IBC/CBC Code Compliant  
Exceeds ASCE 7-22 Standards  
UL2703 Certified



### Self-Healing

Proprietary non-hardening sealant will flex and reseal over years of thermal expansion and contraction



### Larger Spans

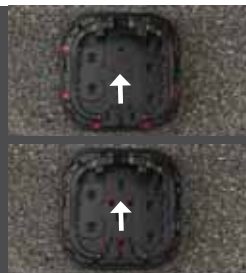
Extra-large L-foot and proprietary screws result in larger spans between mounts

Pegasus | 506 West Ohio Avenue, Richmond, CA 94804 | [www.pegasussolar.com](http://www.pegasussolar.com)



## INSTAFLASH<sup>®</sup> 2

**1**  
Release Safety.



**2**  
Install screw through center hole, and drive into roof until InstaFlash2 pushes through cage and seats onto the roof.



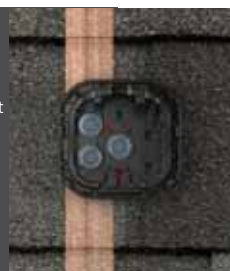
**3**  
If screw hits rafter, drive second screw in hole above. Ensure screws are embedded at least 2.5" into rafter. Installation complete.



**4**  
If first screw misses rafter, install second screw into the left or right screw holes over rafter.

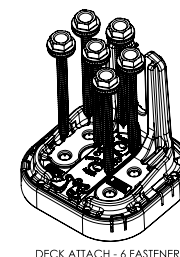
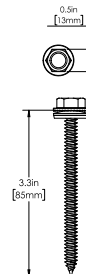
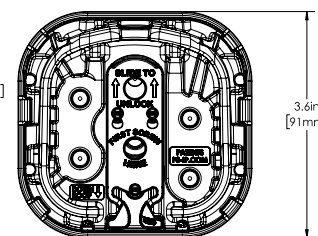
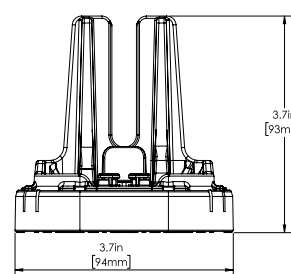


**5**  
Continue until 2 screws are embedded at least 2.5" into rafter.

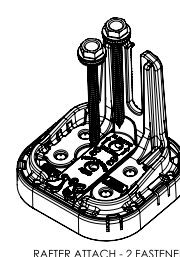


**6**  
For deck attach, use 6 screws.

*Note: Deck attach may reduce max span.*



DECK ATTACH - 6 FASTENERS



RAFTER ATTACH - 2 FASTENERS

SPECIFICATIONS	INSTAFLASH KITS			
	PIF2-B0	PIF2-BDT	PIF2-M0	PIF2-MDT
Finish	Black		Mill	
Kit Contents	Black InstaFlash2	Black InstaFlash2, Dovetail T-bolt	Mill InstaFlash2	Mill InstaFlash2, Dovetail T-bolt
Attachment Type	Rafter & Deck Attach			
Roof Fasteners	1/2" Socket Driven; PF-DRW85 (sold separately in boxes of 24)			
Roof Type	Sloped Roof: Composition Shingle, Rolled Asphalt   Flat Roof: Modified Bitumen Roof, Built-Up Roof			
Flashing Type	Factory Installed Non-Drying, Non-Skinning Butyl Based Chemical Flashing			
Installation Temperature	0° F to 170° F			
Cure Time	Instantly Waterproof; Non-Hardening			
Service Temperature	-40° F to 195° F			
Certifications	IBC, ASCE/SEI 7-16 & 7-22, UL2703			
Install Application	Most Railed Systems			
Kit Quantity	24			
Boxes Per Pallet	36			

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SCAN FOR  
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