



RESIDENTIAL ROOFTOP SOLAR PERMIT PACKAGE

Eloise Stinson
17 Longleaf Pine Way
Sanford, North Carolina 27332
(757) 693-0229



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

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
Unsealed Building only - review
Permit holder responsible for
full compliance with the code

06/03/2025

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: 60

NEW PV SYSTEM INFORMATION
DC SYSTEM SIZE: 10.12 kW DC
AC SYSTEM SIZE: 8.36 kW AC
MODULE TYPE: (22) REC Solar REC460AA Pure-RX
INVERTER TYPE: (22) Enphase IQ8X-80-M-US

TOTAL PV DC SYSTEM SIZE
10.120 kW DC

TOTAL PV AC SYSTEM SIZE
8.360 kW AC

DESIGN CRITERIA
WIND SPEED: 115 mph
WIND EXPOSURE FACTOR: C
SEISMIC DESIGN CATEGORY: B
RISK CATEGORY: II
GROUND SNOW LOAD: 15 psf

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 (NCPCL), AND ALL STATE AND LOCAL BUILDING, ELECTRICAL, AND PLUMBING CODES

GENERAL NOTES

Sealed For Existing Roof & Attachment Only

Digitally signed by John Calvert
Date: 2025.05.09 16:55:33 -06'00'

5/9/25
Firm No. : D-0449

AHJ
Harnett County NC

UTILITY COMPANY
Duke Energy

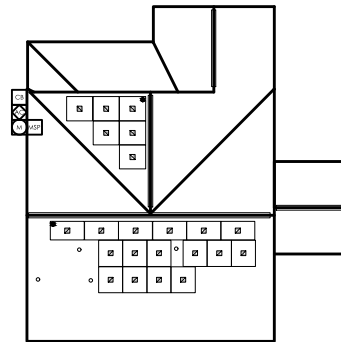
CUSTOMER NAME: Eloise Stinson
17 Longleaf Pine Way
Sanford, North Carolina 27332
AHJ: Harnett County NC
UTILITY COMPANY: Duke Energy

PROJECT ID: 1326974
PV DC SYSTEM SIZE: 10.120 kW DC
PV AC SYSTEM SIZE: 8.360 kW AC
REVISIONS:

A	
B	
C	
D	

DRAWN BY: Jacob Massey
PLOT DATE: May 10, 2025
DRAWING TITLE: Cover Sheet
DRAWING NUMBER: PV1

17 Longleaf Pine Way



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Attachment Only



5/9/25
Firm No. : D-0449

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



UTILITY METER
MAIN SERVICE
PANEL
SUBPANEL
UTILITY METER
CT CABINET



BREAKER
ENCLOSURE

AC DISCONNECT

PV PRODUCTION
METER

COMBINER BOX



ESS - BATTERY

ESS - CONTROLLER

REMOTE POWER
OFF SWITCH

GENERATOR
ATS PANEL



FIRE SETBACK
HATCH

MICROINVERTER

ROOF TOP
JUNCTION BOX

INVERTER



TRENCH OR
OVERHEAD

PROPERTY LINE

**WITH DOTTED OUTLINE
INTERIOR LOCATION**

NEW PV SYSTEM INFORMATION

PV MODULE: (22) REC Solar REC460AA Pure-RX, **POWER RATING:** 460 W
INVERTER: (22) Enphase IQ8X-80-M-US, **POWER RATING:** 380 W

DRAWN BY:
Jacob Massey

PLOT DATE: May 10, 2025

DRAWING TITLE:

Site Plan

DRAWING NUMBER:
PV2



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Eloise Stinson

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Harnett County NC

Duke Energy

CUSTOMER NAME:

AHJ:

UTILITY COMPANY:

PROJECT ID:

1326974

PV DC SYSTEM SIZE:
10.120 kW DC

PV AC SYSTEM SIZE:
8.360 kW AC

REVISIONS:

A	
B	
C	
D	

DRAWN BY:

Jacob Massey

PLOT DATE:

May 10, 2025

DRAWING TITLE:

Site Plan

DRAWING NUMBER:

PV2

DC SYSTEM SIZE: 10.12 KW DCMODULE: REC 460INVERTER(S): Enphase IQ8X Microinverters



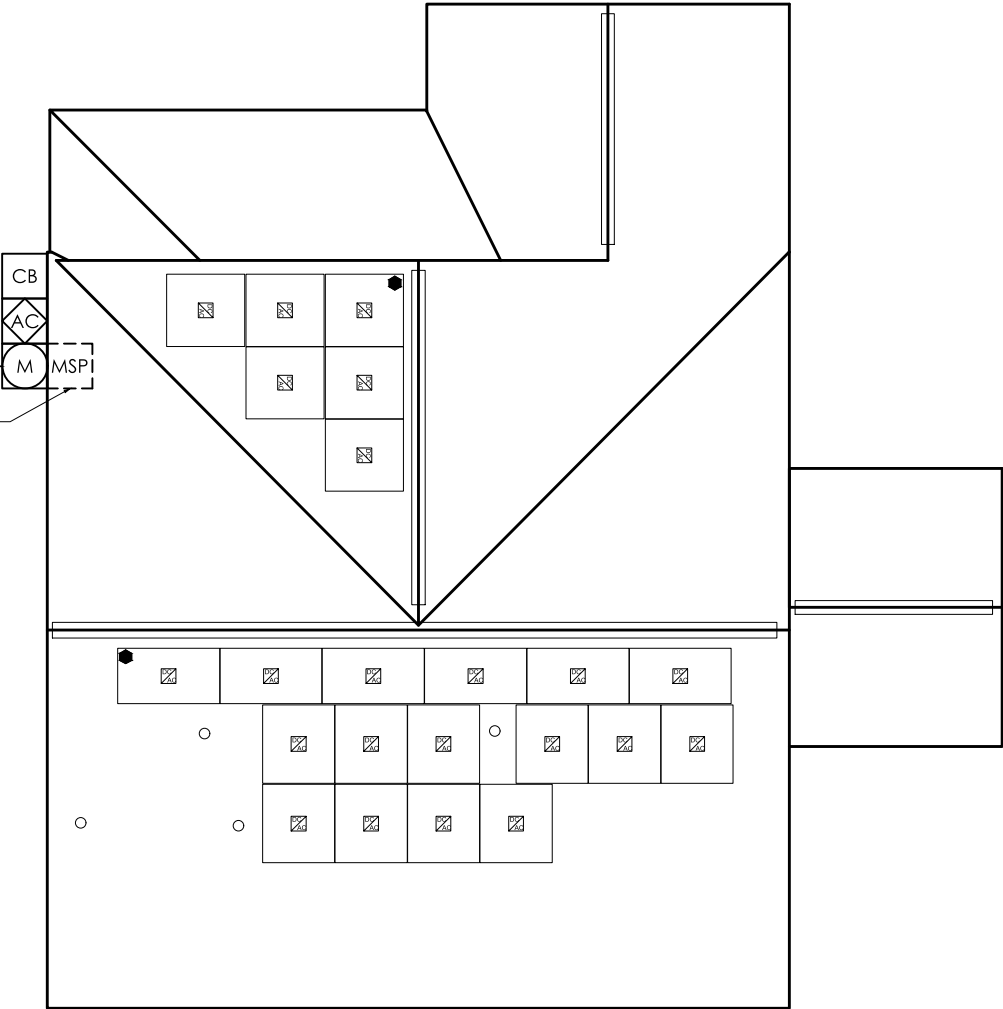
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FRONT OF HOME

MP2
MODULE QTY: 6
AZIMUTH: 232
PITCH: 40
TSRF: 87
AREA: 266 ft²

UNDERGROUND SERVICE LINE

POINT OF INTERCONNECTION



MP1
MODULE QTY: 16
AZIMUTH: 142
PITCH: 40
TSRF: 78
AREA: 1127 ft²

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5/9/25
Firm No. : D-0449

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

LEGEND

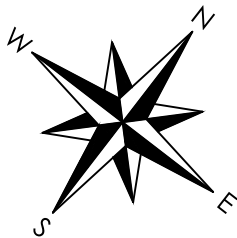
 UTILITY METER	 BREAKER ENCLOSURE	 ESS - BATTERY	 FIRE SETBACK HATCH	 TRENCH OR OVERHEAD
 MAIN SERVICE PANEL	 AC DISCONNECT	 ESS - CONTROLLER	 MICROINVERTER	 PROPERTY LINE
 SUBPANEL	 PV PRODUCTION METER	 REMOTE POWER OFF SWITCH	 ROOF TOP JUNCTION BOX	 ICONS WITH DOTTED OUTLINE INDICATE INTERIOR LOCATION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

PV SYSTEM SPECIFICATIONS

NEW PV SYSTEM INFORMATION

PV MODULE: (22) REC Solar REC460AA Pure-RX, **POWER RATING:** 460 W
INVERTER: (22) Enphase IQ8X-80-M-US, **POWER RATING:** 380 W

COMPASS



DRAWN BY:
Jacob Massey

PLOT DATE:
May 10, 2025

DRAWING TITLE:
Roof Plan

DRAWING NUMBER:
PV3

CUSTOMER NAME:

Eloise Stinson
17 Longleaf Pine Way
Sanford, North Carolina 27332

AHJ:

Harnett County NC

UTILITY COMPANY:

Duke Energy

PROJECT ID:

1326974

PV DC SYSTEM SIZE:
10.120 kW DC

PV AC SYSTEM SIZE:
8.360 kW AC

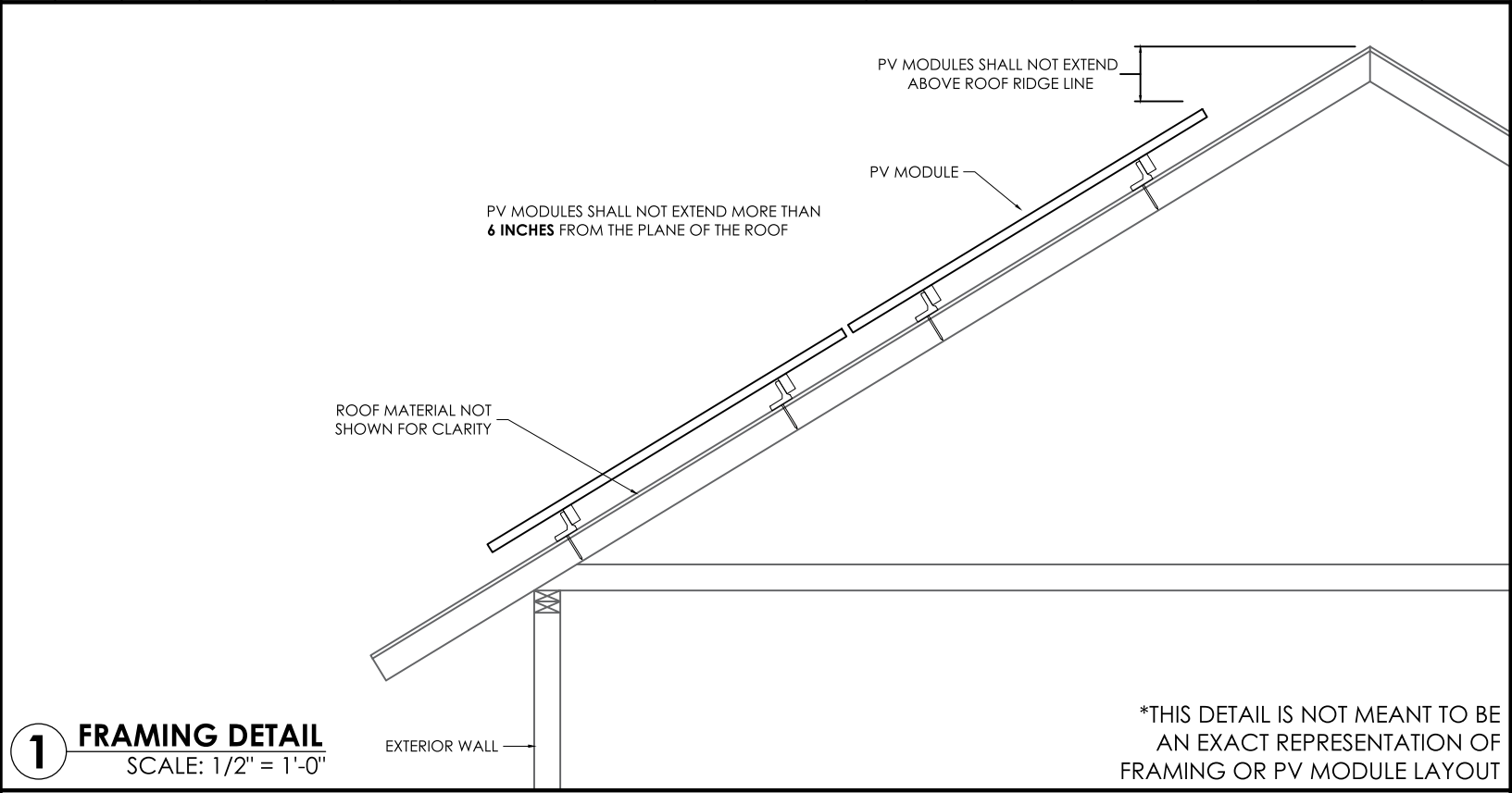
REVISIONS:

A	
B	
C	
D	

	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)		493.16	 BLUE RAVEN SOLAR	
															PRIMARY ROOF AREA (ft²)		2995.06		
															PRIMARY ROOF COVERAGE (%)		16.47		
															SECONDARY PV ARRAY AREA (ft²)				
MP1	16	142	40	78	1127	Comp Shingle	OSB	Rafter	2x8 @ 16 in OC	2x4 @ 28 in OC	PEGASUS RAIL	PEGASUS INSTAFLASH 2	64"L / 48"P	21"L / 16"P	* IF APPLICABLE	SECONDARY ROOF AREA (ft²)		<td rowspan="4">1403 N 630 E Orem, Utah 84097 (800) 377-4480 BlueRavenSolar.com</td>	1403 N 630 E Orem, Utah 84097 (800) 377-4480 BlueRavenSolar.com
MP2	6	232	40	87	266	Comp Shingle	OSB	Rafter	2x8 @ 16 in OC	2x8 @ 32 in OC	PEGASUS RAIL	PEGASUS INSTAFLASH 2	64"L / 48"P	21"L / 16"P		SECONDARY ROOF COVERAGE (%)			
MP3	0																		
MP4	0																		
MP5	0															TOTAL PV ARRAY WEIGHT (lbs)		1100	
MP6	0															TOTAL PV ATTACHMENTS		60	
MP7	0															POINT LOAD (lbs/att.)		18.3	
MP8	0															DISTRIBUTED LOAD (psf)		2.23	
MP9	0																		
MP10	0																		

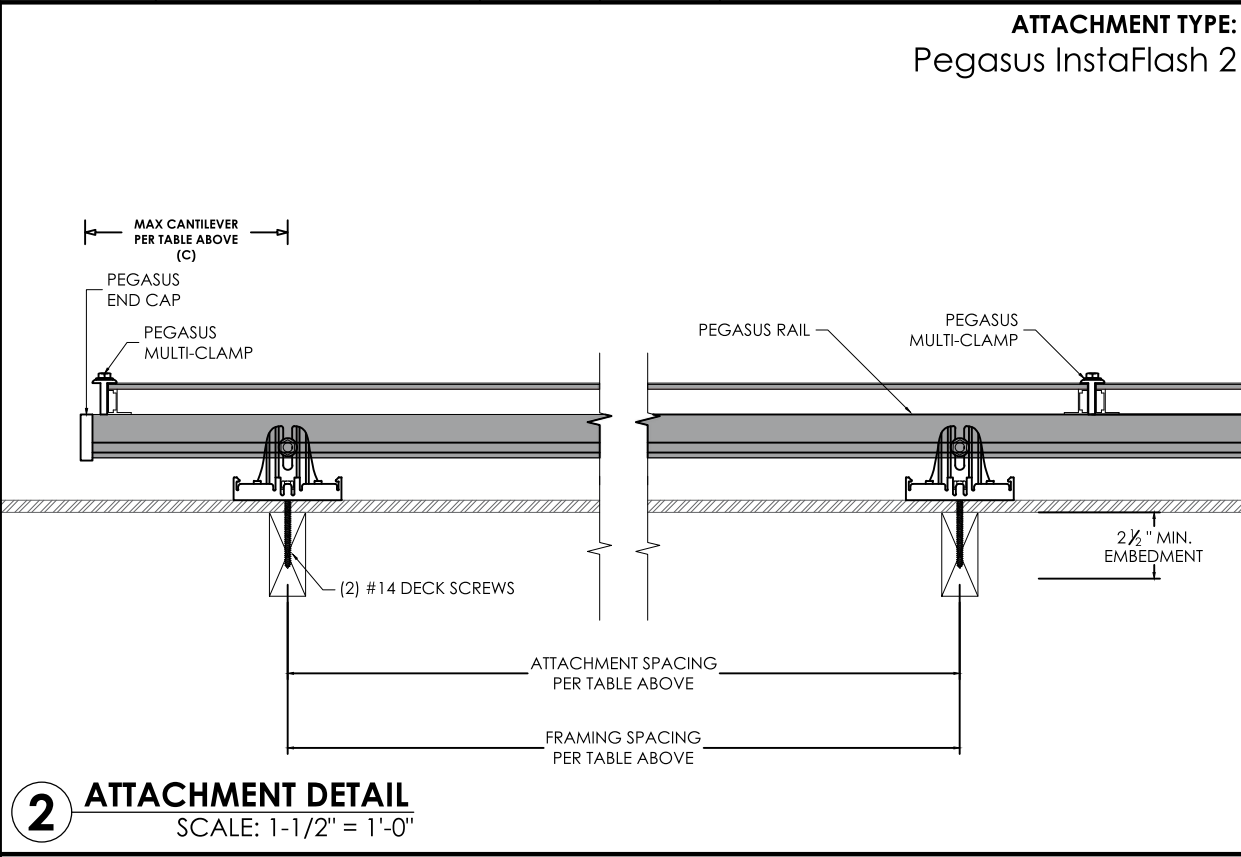


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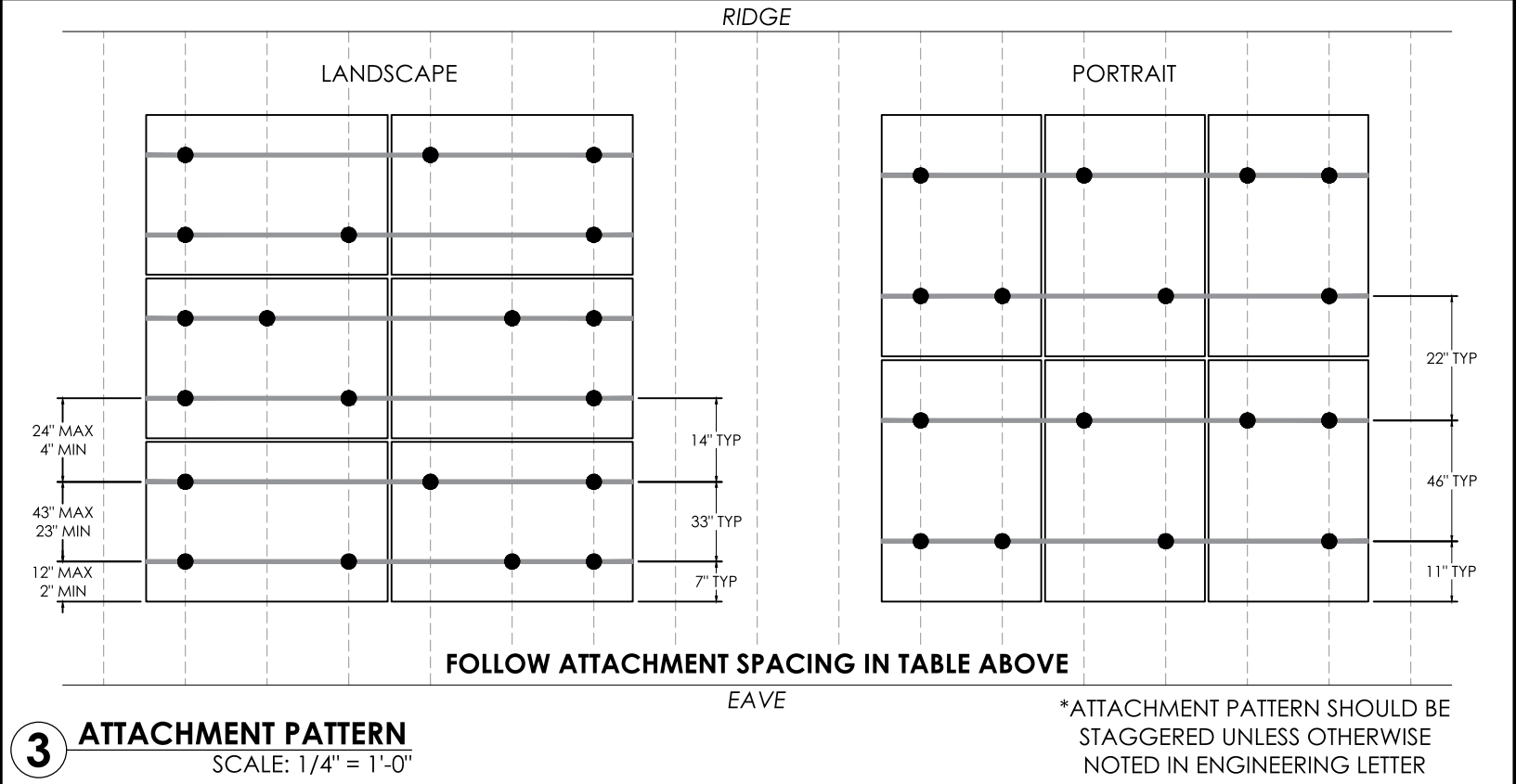


1 FRAMING DETAIL
SCALE: 1/2" = 1'-0"

*THIS DETAIL IS NOT MEANT TO BE AN EXACT REPRESENTATION OF FRAMING OR PV MODULE LAYOUT



2 ATTACHMENT DETAIL
SCALE: 1-1/2" = 1'-0"



3 ATTACHMENT PATTERN
SCALE: 1/4" = 1'-0"

*ATTACHMENT PATTERN SHOULD BE STAGGERED UNLESS OTHERWISE NOTED IN ENGINEERING LETTER

NOTES

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5/9/25
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REVISIONS:
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DRAWN BY:
Jacob Massey

PLOT DATE:
May 10, 2025

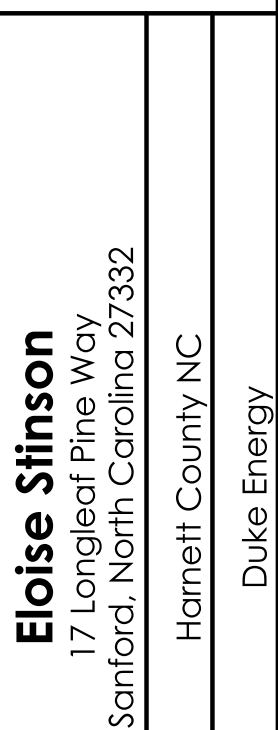
DRAWING TITLE:
Structural

DRAWING NUMBER:
PV4



BLUE RAVEN
SOLAR

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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 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 60A, 2P, 240VAC, FUSIBLE (D222NRB)
G	
H	
I	
J	
K	
L	
M	
N	
O	
P	
Q	
R	
S	
T	



CUSTOMER NAME:		AHJ:		UTILITY COMPANY:	
PROJECT ID:					
1326974					
PV DC SYSTEM SIZE:					
10.120 kW DC					
PV AC SYSTEM SIZE:					
8.360 kW AC					
REVISIONS:					
					
					
					
					
DRAWN BY:					
Jacob Massey					
PLOT DATE:					
May 10, 2025					
DRAWING TITLE:					
Electrical 3-Line					
DRAWING NUMBER:					
PV5					

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	8.36kW AC
DC SYSTEM SIZE	10.12kW DC
PV MODULES	
QUANTITY	22
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	----A	----A
PANEL OCPD RATING	200A	----A	----A
AVAILABLE BACKFEED (120% RULE)	40A	##A	##A
PV BREAKER RATING	45A	45A	45A
*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	Sanford
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	15.8A AC	15.8A AC	15.8A AC	43.45A AC	43.45A AC	----A AC	----A AC	----A AC	----A AC	----A AC
CONDUCTOR MATERIAL	CU	CU	CU	CU	CU	----	----	----	----	----
CONDUCTOR TYPE	THHN/THWN-2	THHN/THWN-2	THHN/THWN-2	THHN/THWN-2	THHN/THWN-2	----	----	----	----	----
CONDUCTOR SIZE	12 AWG	10 AWG	10 AWG	8 AWG	6 AWG					
CONDUCTOR AMPACITY	30A	40A	40A	55A	75A	----A	----A	----A	----A	----A
AMBIENT TEMPERATURE ADJUSTMENT FACTOR	0.96	0.96	0.96	0.96	0.96	----	----	----	----	----
CONDUIT FILL ADJUSTMENT FACTOR	1	1	0.7	1	1	----	----	----	----	----
ADJUSTED CONDUCTOR AMPACITY	28.8A	38.4A	26.88A	52.8A	72A	----A	----A	----A	----A	----A
WIRE RUN DISTANCE (FT)	52	35	10	5	10	----	----	----	----	----
CALCULATED VOLTAGE DROP	0.62%	0.46%	0.13%	0.11%	0.14%	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	8	7	7	0	0	0	0	0	0	0	0	0	0
RATED AC OUTPUT CURRENT (I _{out})	12.6A	11.1A	11.1A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A
MINIMUM AMPACITY (I _{out} x 125%)	15.8A	13.8A	13.8A	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 _{out})	34.8A								0.0A				
MINIMUM AMPACITY (C _{out} x 125%)	43.5A								0.0A				
COMBINED PV BREAKER RATING	45AA								0AA				

TOTAL PV VOLTAGE DROP	
	VOLTAGE DROP
WIRE TAG #1	0.62%
WIRE TAG #2	0.46%
WIRE TAG #3	0.13%
WIRE TAG #4	0.11%
WIRE TAG #5	0.14%
WIRE TAG #6	0%
TOTAL	1.460000%



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Duke Energy

CUSTOMER NAME:

AHJ:

UTILITY COMPANY:

PROJECT ID:

1326974

PV DC SYSTEM SIZE:

10.120 kW DC

PV AC SYSTEM SIZE:

8.360 kW AC

REVISIONS:

A	
B	
C	
D	

DRAWN BY:

Jacob Massey

PLOT DATE:

May 10, 2025

DRAWING TITLE:

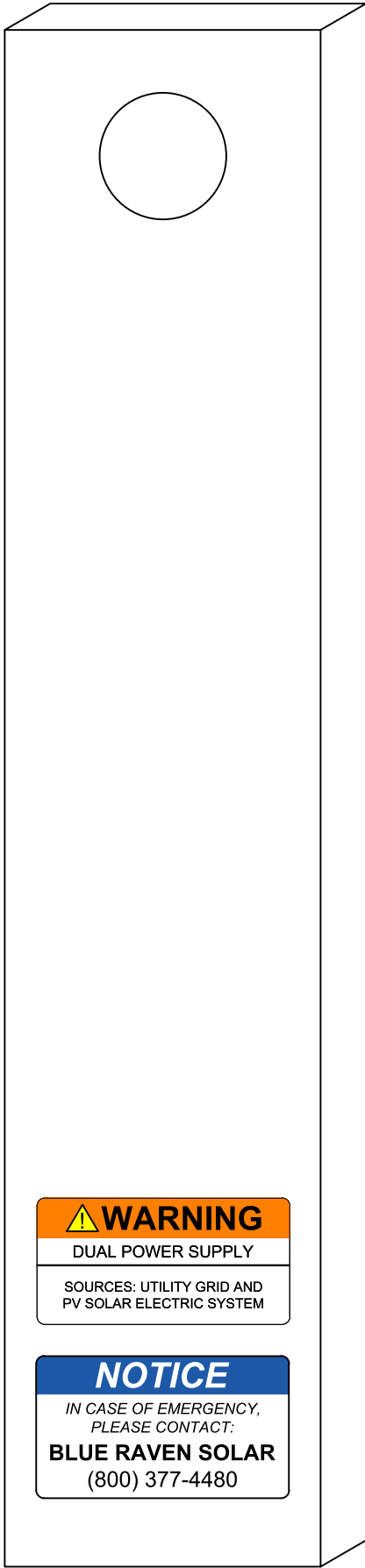
Electrical
Calculations

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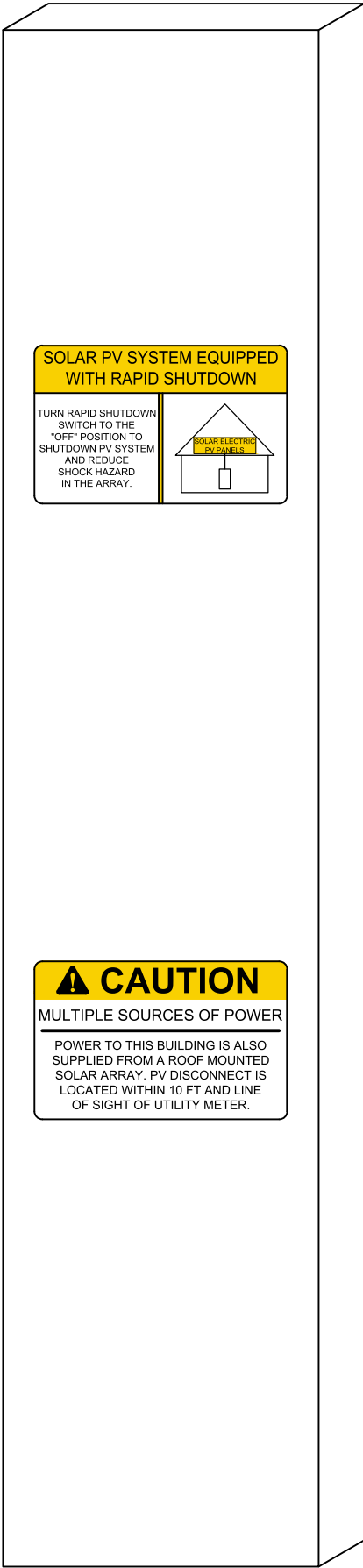
PV6

WARNING LABELS

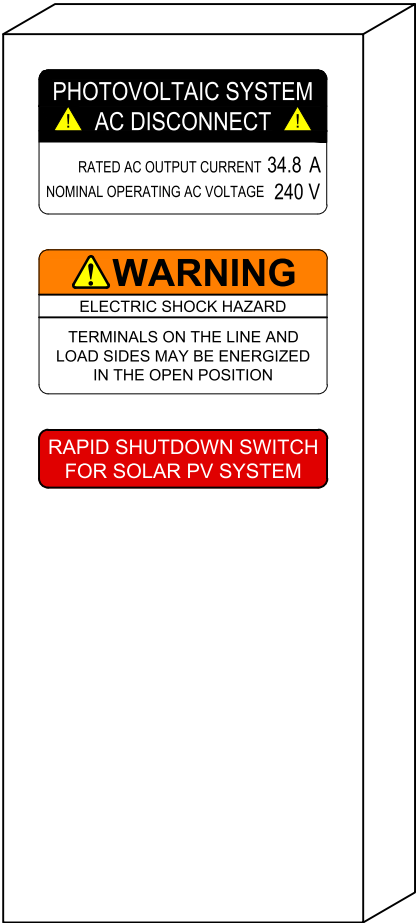
UTILITY METER



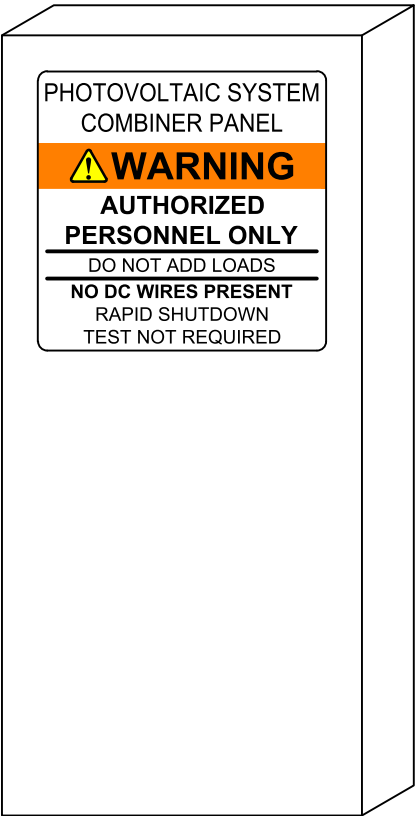
MAIN SERVICE PANEL



PV AC DISCONNECT



PV COMBINER BOX



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Jacob Massey

PLOT DATE:

May 10, 2025

DRAWING TITLE:

Warning
Labels

DRAWING NUMBER:

PV7

REC ALPHA[®] PURE-RX SERIES

DATASHEET

470 W_P
22.6% EFFICIENCY
226 W/M²

SOLAR'S MOST TRUSTED



9 A MODULE CURRENT
COMPATIBLE WITH MLPE



EXPERIENCE



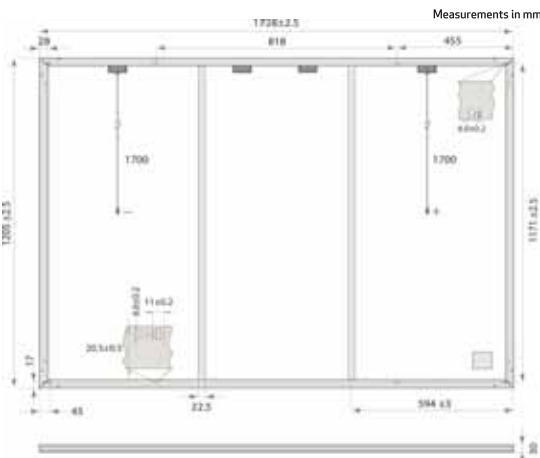
PERFORMANCE

REC ALPHA[®] 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 ²) in accordance with IEC 62852, IP68 only when connected
Cable	4 mm ² solar cable, 1.7 m + 1.7 m in accordance with EN50618
Dimensions	1728 x 1205 x 30 mm (2.08 m ²)
Weight	22.7 kg
Origin	Made in Singapore



ELECTRICAL DATA

PRODUCT CODE*: RECxxxAA Pure-RX

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

Values at standard test conditions (STC: air mass AM 1.5, irradiance 1000 W/m², temperature 25°C), based on a production spread with a tolerance of P_{max}, V_{oc} & I_{sc} ±2% within one watt class. Nominal module operating temperature (NMOT: air mass AM 1.5, irradiance 800 W/m², temperature 20°C, windspeed 1 m/s). * Where xxx indicates the nominal power class (P_{nom}) at STC above.

MAXIMUM RATINGS*

Operational Temperature	-40 °C - 85 °C
System Voltage	1000 V
Maximum Test Load (front)	+7000 Pa (713 kg/m ²)
Maximum Test Load (rear)	-4000 Pa (407 kg/m ²)
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 _{MAX}	-0.24% / °C
Temperature coefficient of V _{OC}	-0.24% / °C
Temperature coefficient of I _{SC}	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 61215:2012; IEC 61730:2016; UL 61730
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; ISO 9001; IEC 45001; IEC 62941



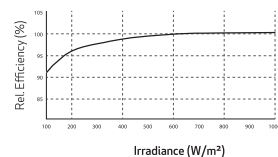
WARRANTY

	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 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



Specifications subject to change without notice.

Ref: PM-DS-12-06-Rev-4.4.5.2024



DRAWING NUMBER:

SS



PRELIMINARY DATASHEET

IQ8X Microinverter



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.

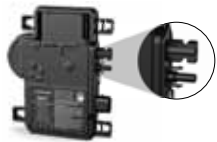
IQ8X Microinverter is the latest addition to this family, designed to support PV modules with high input DC voltage and cell counts, such as 80-half-cut cells, 88-half-cut cells and 96-cells.



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



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 the IQ8 Series Microinverters with integrated MC4 connectors.



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
 - Meets CA Rule 21 (UL 1741-SA) and IEEE 1547:2018 (UL 1741-SB)

- 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.

INPUT DATA (DC)	UNIT	IQ8X-80-M-US
Commonly used module pairings ¹	W	320–540
Module compatibility	—	To meet compatibility, PV modules must be within the following maximum input DC voltage and maximum module I _{sc} . Module compatibility can be checked at https://enphase.com/installers/microinverters/calculator
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 _{sc}	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° ⁴
Minimum and maximum grid voltage ²	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 _{rms}	2.70	
Maximum units per 20 A (L-L) branch circuit ³	—	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.

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 ¹	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 ¹	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) ¹	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.

	TERMINATOR Terminator cap for unused cable ends, sold in packs of ten (Q-TERM-10)		SEALING CAPS Sealing caps for unused aggregator and cable connections (Q-BA-CAP-10 and Q-SEAL-10)
	DISCONNECT TOOL Plan to use at least one per installation, sold in packs of ten (Q-DISC-10)		CABLE CLIP 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



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2020-06-26



DRAWING NUMBER:

SS



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) ¹ . 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

DRAWING NUMBER:

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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	• 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
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 https://developer-v4.enphase.com
Local API	See guide for local API

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 ²	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 ³	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)

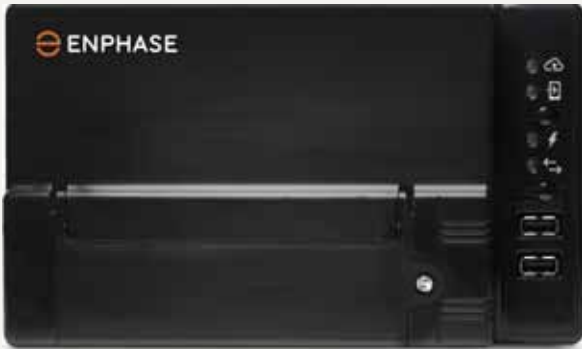


CT-200-CLAMP

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 2nd-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.



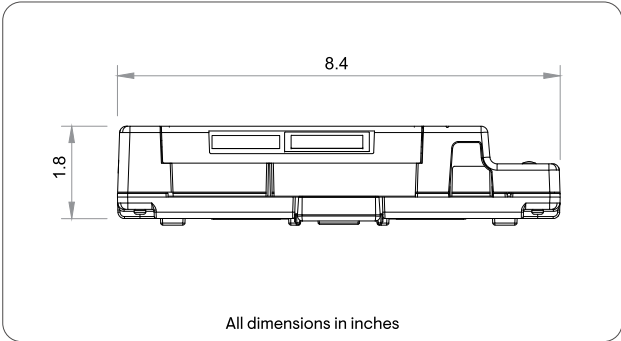
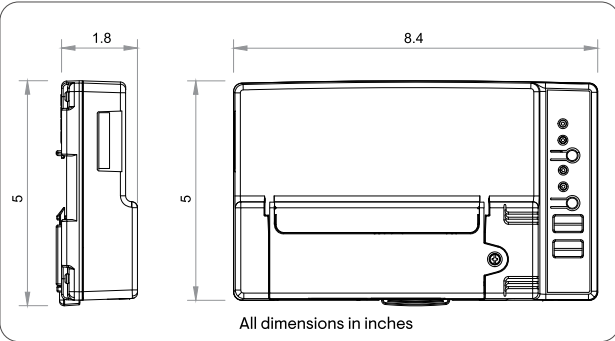
IQ Load Controller
Helps prioritize essential appliances during a grid outage to optimize energy consumption and prolong battery life.



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 https://developer-v4.enphase.com
Local API		Refer to guide for local API
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 – Load with Solar 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 ²
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



Enphase 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)

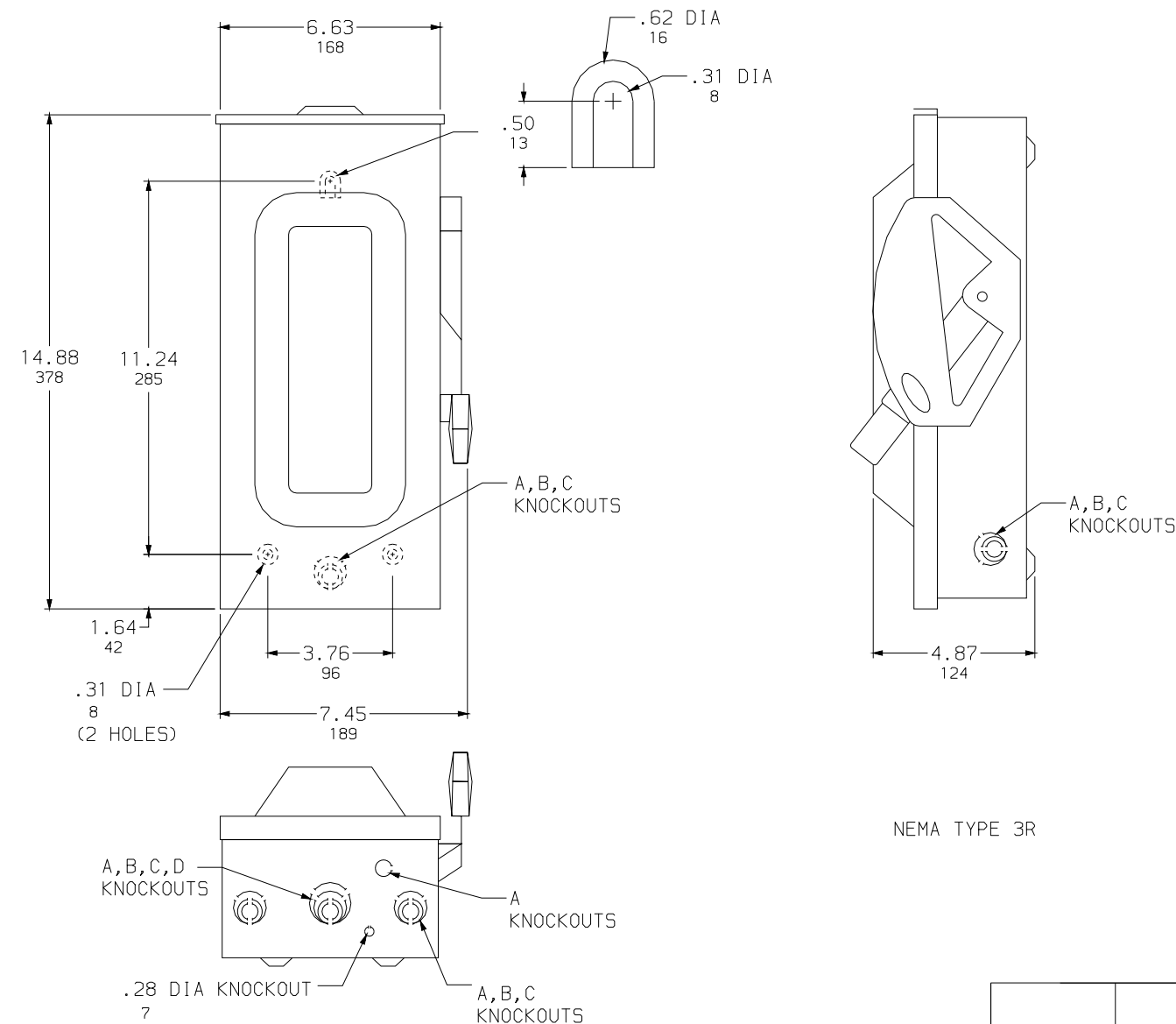


CT-200-CLAMP

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

Revision history

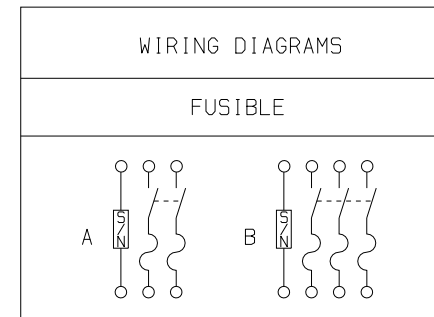
REVISION	DATE	DESCRIPTION
DSH-00111-3.0	December 2023	Updated power requirement and added IG Gateway breaker values.
DSH-00111-2.0	August 2023	Updated temperature specification for ENV2-IQ-AM1-240.
DSH-00111-1.0	June 2023	Updated altitude and recommended maximum microinverters on a site.



NEMA TYPE 3R

DUAL DIMENSIONS: INCHES
MILLIMETERS

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
SHORT CIRCUIT RATINGS:
10,000 AMPERES WHEN USED WITH OR PROTECTED BY CLASS H OR K FUSES
100,000 AMPERES WHEN USED WITH OR PROTECTED BY CLASS R FUSES
TOP ON NEMA 3R ENCLOSURES HAVE PROVISIONS FOR MAXIMUM 2.50 BOLT-ON HUBS.
WHEN MOUNTING THESE SWITCHES, ALLOW 3.00 IN / 76 MM MIN. CLEARANCE
BETWEEN ENCLOSURES FOR OPENING OF SIDE HINGED DOOR.
✱USE OUTER SWITCHING POLES
●FOR CORNER GROUNDED DELTA SYSTEMS ONLY.
‡LUGS SUITABLE FOR 60°C OR 75°C CONDUCTORS.



TERMINAL LUGS ‡			
AMPERES	MAX. WIRE	MIN. WIRE	TYPE
60	# 3 AWG	#14 AWG	CU OR AL

KNOCKOUTS				
SYMBOL	CONDUIT SIZE		DIAMETER	
	IN	MM	IN	MM
A	.50	13	.88	22
B	.75	19	1.13	29
C	1.00	25	1.38	35
D	1.25	32	1.75	45

CATALOG NUMBER	VOLTAGE RATINGS	WIRING DIAG.	AMPERE RATING	HORSEPOWER RATINGS			
				240VAC			
				STD.		MAX.	
				1 Ø	3 Ø	1 Ø	3 Ø
D222NRB	240VAC	A	60	3	7.50 ●	10	15 ●
D322NRB	240VAC	B	60	3 ✱	7.50	10	15

GENERAL DUTY SAFETY SWITCHES
VISIBLE BLADE TYPE
60 AMPERE
ENCLOSURE - NEMA TYPE 3R RAINPROOF

SQUARE D COMPANY

DWG. NO. 1863

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

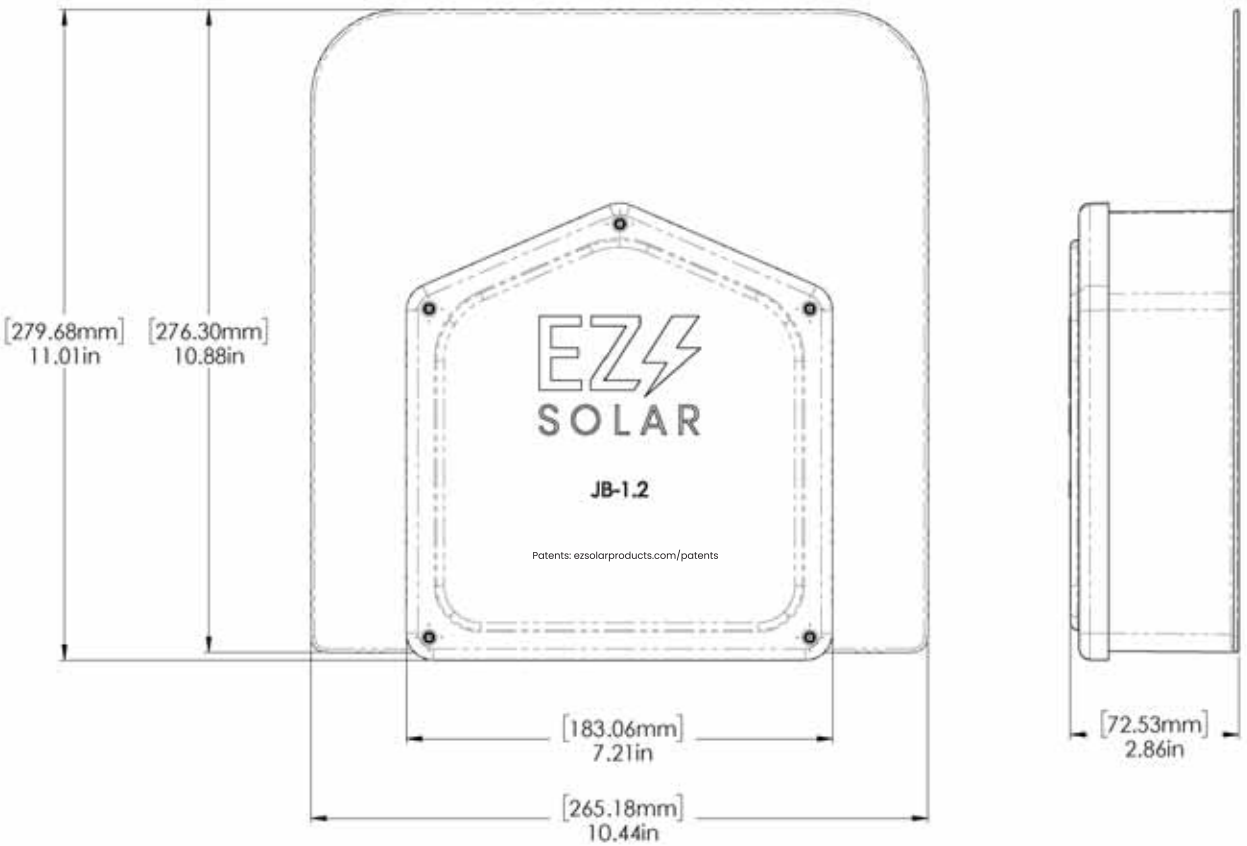
	1 Conductor	2 Conductor	Torque				
			Type	NM	Inch Lbs	Voltage	Current
ABB ZS6 terminal block	10-24 awg	16-24 awg	Sol/Str	0.5-0.7	6.2-8.85	600V	30 amp
ABB ZS10 terminal block	6-24 awg	12-20 awg	Sol/Str	1.0-1.6	8.85-14.16	600V	40 amp
ABB ZS16 terminal block	4-24 awg	10-20 awg	Sol/Str	1.6-2.4	14.6-21.24	600V	60 amp
ABB M6/8 terminal block	8-22 awg		Sol/Str	.08-1	8.85	600V	50 amp
Ideal 452 Red WING-NUT Wire Connector	8-18 awg		Sol/Str	Self-Torque	Self-Torque	600V	
Ideal 451 Yellow WING-NUT Wire Connector	10-18 awg		Sol/Str	Self-Torque	Self-Torque	600V	
Ideal, In-Sure Push-In Connector Part #39	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	DWG. NO. JB-1.2	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



PROPRIETARY AND CONFIDENTIAL: THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF EZ SOLAR. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF EZ SOLAR IS PROHIBITED.



RIGID PVC CONDUIT FITTINGS

JB444 JUNCTION BOXES

ISSUE DATE:
DATE D'EMISSION: 2009 04 30

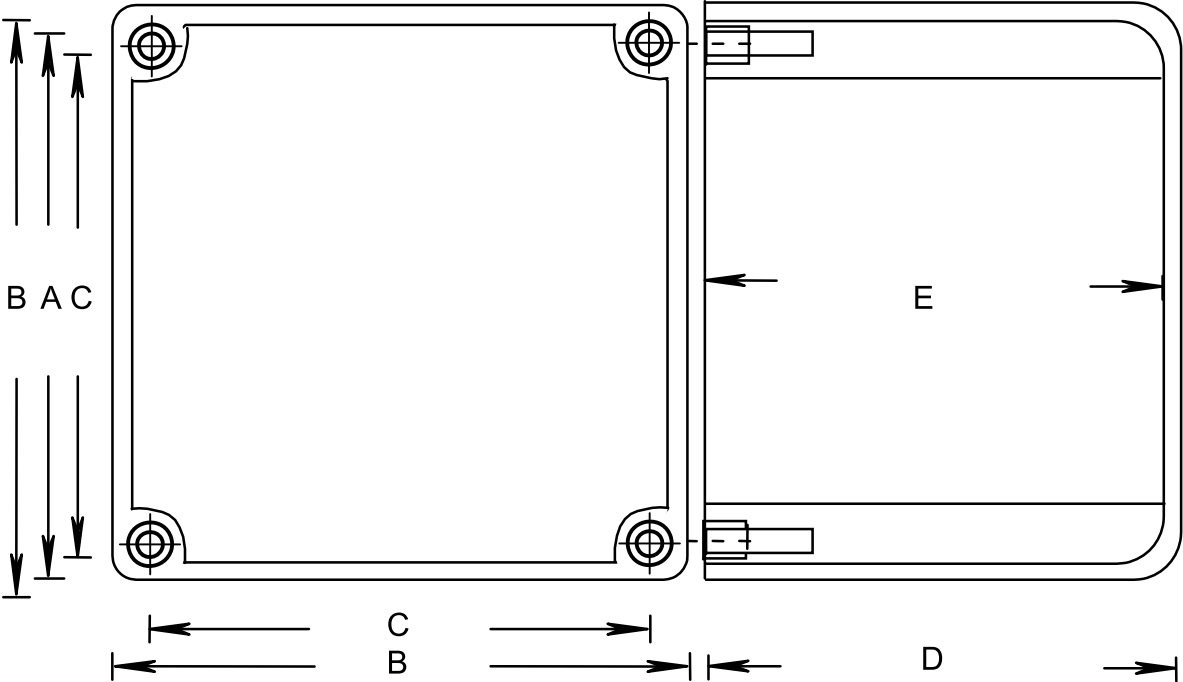
SUPERCEDES:
REPLACE: 2004 07 15

RIGID PVC CONDUIT FITTINGS

JB444 JUNCTION BOXES

ISSUE DATE:
DATE D'EMISSION: 2009 04 30

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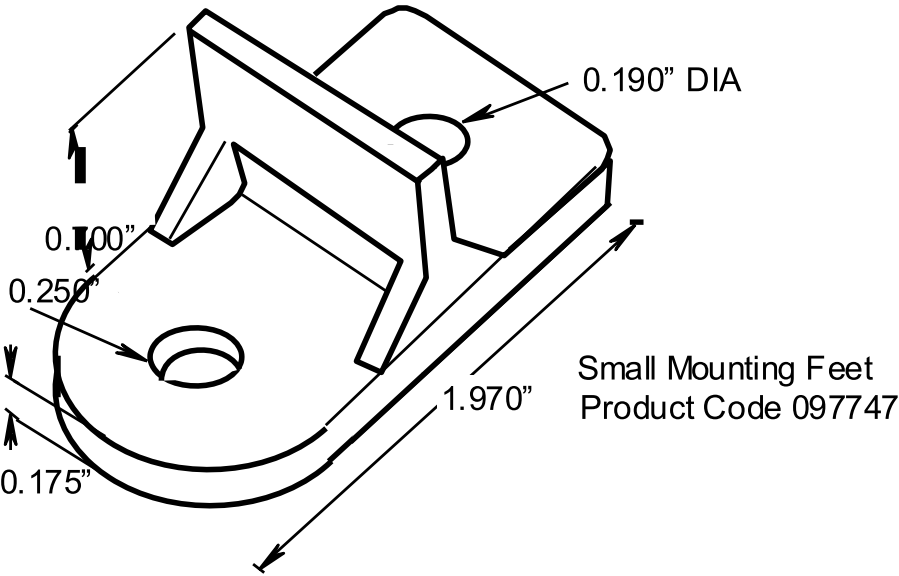
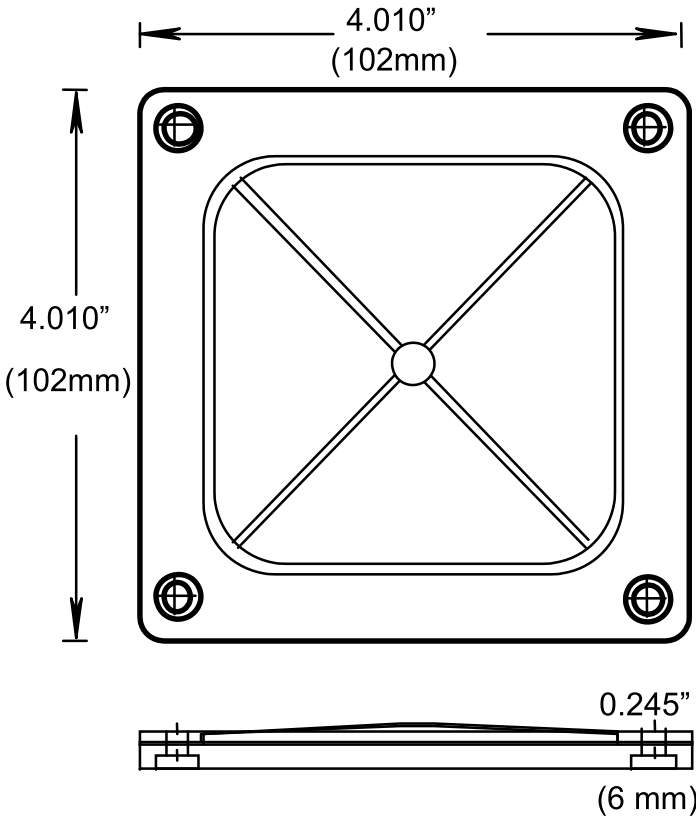
PRODUCT CODE	PART NUMBER	NOMINAL SIZE		A		B		C	
		(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)
076668	J444 STAHLIN	4	103	3.675	93	4.000	102	3.450	88
076259	AMJB444 ALLIED	4	103	3.675	93	4.000	102	3.450	88
077643*	2037-424T CANLET	4	103	3.675	93	4.000	102	3.450	88
077696	JB 444	4	103	4.000	101	4.395	112	3.950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



Small Mounting Feet
Product Code 097747

“Stay Connected” with **HEYCO®** Solar Power Components
a PennEngineering® Company

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).

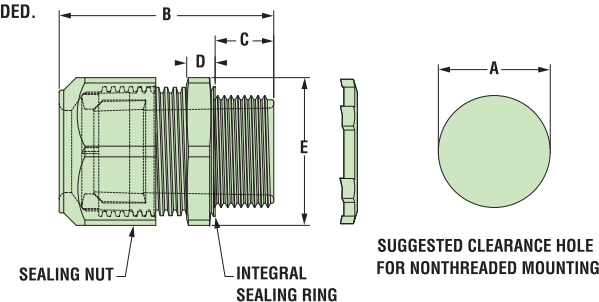
- The 3/4" version provides liquid tight entry for up to two Enphase Q Cables – .24 x .38" (6,1 x 9,7 mm) and an additional .130" (3,3 mm) dia. hole for a #8 solid grounding cable.

- 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.
Oval Gland													
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
Break-Thru Skinned Over Gland													
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.

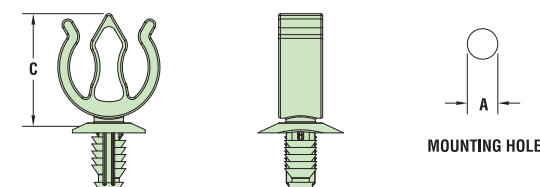


Material	Nylon 6/6 with TPE Sealing Gland
Certifications	UL Listed under Underwriters' Laboratories File E504900 CSA Certified by the Canadian Standards Association File 93876
Flammability Rating	94V-2
Temperature Range	Static -40°F (-40°C) to 239°F (115°C) Dynamic -4°F (-20°C) to 212°F (100°C)
IP Rating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

- The jersey pine tree mounting style installs easily with superior holding power.
- UVX nylon protects from corrosion due to outdoor exposure.
- Installs into .260" (6,6 mm) mounting hole.
- Holds up to 2 cables between .230 - .315" (5,8 - 8,0 mm) each.
- Cables install with fingertip pressure.
- Molded from our robust UVX nylon 6/6 with extended UV capabilities for our Solar 20 Year Warranty.



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



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

Patents pending. All rights reserved. ©2023 Pegasus Solar Inc.

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.

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DRAWING NUMBER:

SS

Appendix A - Compatible PV Mod-

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.



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Appendix A - Compatible PV Modules (cont.)

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.

[illegible]



INSTAFLASH[®] 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.

Install in any season

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

Instant, watertight seal

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

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

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INSTAFLASH[®] 2

1
Release Safety.

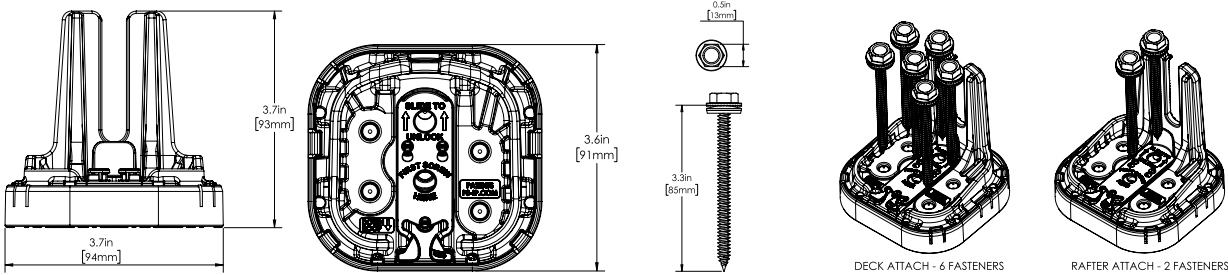
2
Install screw through center hole, and drive into roof until InstaFlash2 pushes through cage and seats onto the roof.

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.



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
INSTALLATION
VIDEO



SCAN FOR
FREE TRIAL

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SICAME-POMPADOUR-FRANCE

REFERENCE

TTD 1510 F

TTD 1510 XF

TTD 1510 FT

TTD 1510 XFT

TITLE

TTD 1510 .F.

N°E1210840

Revision : D

Date/By : 26/09/16 PJM

Verified :

70mm [2".76]

93mm [3".66]

44mm [1".73]

Hex 1/2"

Hex 17mm [0".67]

SECTION A-A

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12

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13

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Batch number (YY + XXXXX)

Reference	Screw		Nut		Washer	
	Galvanised steel	Stainless steel	Galvanised steel	Stainless steel	Galvanised steel	Stainless steel
TTD 1510 F/FT	Y	N	Y	N	Y	N
TTD 1510 XF/XFT	N	Y	N	Y	N	Y

TTD 1510 F

1/2125 in.1b

AL9CU-600V str-sol

Main 4/0-#3

Tap #2-#10



Prt	Qty	Description	Material
13		Lubricant	Silicone based
12	1	Marking	Colour - White
11	2	Cap seal	Thermoplastic rubber - Red
10	2	End cap	Polyamide GF - Black
9	1	Turbo (T option, see reference)	Polyamide GF - Red
8	1	Shearhead	Polyarylamide GF - Black
7	1	Screw (see table)	Galvanised steel or Stainless steel
6	1	Washer (see table)	Galvanised steel or Stainless steel
5	1	Nut (see table)	Galvanised steel or Stainless steel
4	2	Seal	Thermoplastic rubber - Black
3	4	Electrical contact blade	Tinned brass
2	1	1/2 body; nut side	Polyamide GF - Black
1	1	1/2 body; screw side	Polyamide GF - Black

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SICAME® Group Products

UL Product iQ®

Wire Connectors for Electric Utilities

COMPANY

SICAME
1 Av Basile Lachaud
Pompadour, 19230 France



E155510

Splicing wire connectors, Model(s): TTD0510 Catalog number may be followed by Suffix T, J, B, F, A or X. with the exception that "X", "A" and "T" option (stainless steel screws, different size for shear head HEX and loosening HEX and 'turbo' option) may only appears on the reference on the packaging.

Splicing wire connectors, Model(s): TTD0810 Catalog number may be followed by Suffix T, J, B, F, A or X. with the exception that "X", "A" and "T" option (stainless steel screws, different size for shear head HEX and loosening HEX and 'turbo' option) may only appears on the reference on the packaging.

Splicing wire connectors, Model(s): TTD1010 Catalog number may be followed by Suffix T, J, B, F, A or X. with the exception that "X", "A" and "T" option (stainless steel screws, different size for shear head HEX and loosening HEX and 'turbo' option) may only appears on the reference on the packaging.

Splicing wire connectors, Model(s): TTD1510 Catalog number may be followed by Suffix T, J, B, F, A or X. with the exception that "X", "A" and "T" option (stainless steel screws, different size for shear head HEX and loosening HEX and 'turbo' option) may only appears on the reference on the packaging.

Splicing wire connectors, Model(s): TTD1810 Catalog number may be followed by Suffix T, J, B, F, A or X. with the exception that "X", "A" and "T" option (stainless steel screws, different size for shear head HEX and loosening HEX and 'turbo' option) may only appears on the reference on the packaging.

Splicing wire connectors, Model(s): TTD2110 Catalog number may be followed by Suffix T, J, B, F, A or X. with the exception that "X", "A" and "T" option (stainless steel screws, different size for shear head HEX and loosening HEX and 'turbo' option) may only appears on the reference on the packaging.

Splicing wire connectors, Model(s): TTD2610 Catalog number may be followed by Suffix T, J, B, F, A or X. with the exception that "X", "A" and "T" option (stainless steel screws, different size for shear head HEX and loosening HEX and 'turbo' option) may only appears on the reference on the packaging.

Splicing wire connectors, Model(s): TTD2710 Catalog number may be followed by Suffix T, J, B, F, UNI, A or X. with the exception that "X", "A" and "T" option (stainless steel screws, different size for shear head HEX and loosening HEX and 'turbo' option) may only appears on the reference on the packaging.

* - May be followed by suffix B, J, T or X.

Last Updated on 2024-09-03

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