RESIDENTIAL ROOFTOP SOLAR PERMIT PACKAGE

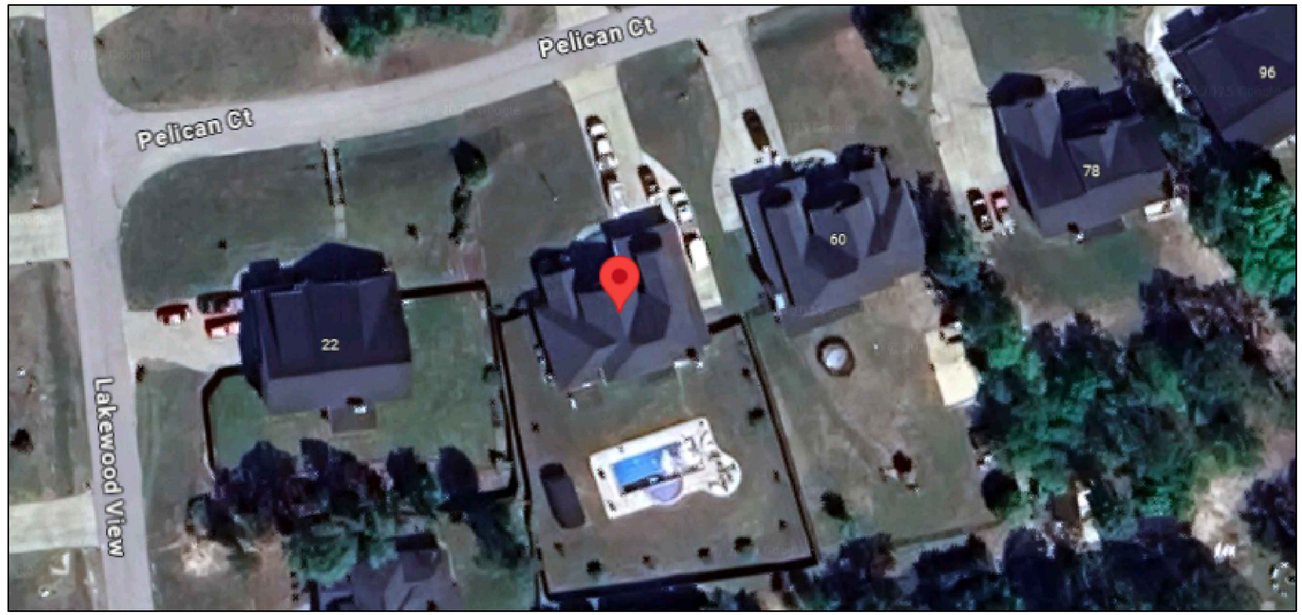
NABCEP CERTIFIED
PV Installation Professional
Cecil Lopeman
#042013-75

David Nutt
42 Pelican Ct
Sanford, North Carolina 27332
9795713056

Enphase Platinum Installer

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

SCOPE OF WORK
INSTALLATION OF ROOFTOP MOUNTED PHOTOVOLTAIC SOLAR SYSTEM



SHEET INDEX

CEC-AC SYSTEM SIZE: 10.529 kW AC

TYPICAL STRUCTURAL INFORMATION
ROOF MATERIAL: Comp Shingle
SHEATHING: OSB
FRAMING: Rafter
RACKING: PEGASUS RAIL
ROOF ATTACHMENT: PEGASUS INSTAFLASH 2
TOTAL ATTACHMENTS: 57

NEW PV SYSTEM INFORMATION
DC SYSTEM SIZE: 11.44 kW DC
AC SYSTEM SIZE: 8.32 kW AC
MODULE TYPE: (26) JA Solar JAM54D41-440/MB
INVERTER TYPE: (26) Enphase IQ8MC-72-M-US

TOTAL PV DC SYSTEM SIZE
11.440 kW DC

TOTAL PV AC SYSTEM SIZE
8.320 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

GENERAL NOTES
Sealed For Existing Roof & Attachment Only

Digitally signed by John A. Calvert
Date: 2025.09.22 13:32:28 -06'00'

NORTH CAROLINA PROFESSIONAL SEAL 035433 ENGINEER JOHN A. CALVERT

9/22/2025
Firm No. : D-0449

AHJ
Harnett County NC

UTILITY COMPANY
Central EMC

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

CUSTOMER NAME: David Nutt
42 Pelican Ct
Sanford, North Carolina 27332

AHJ: Harnett County NC

UTILITY COMPANY: Central EMC

PROJECT ID: 1441466

PV DC SYSTEM SIZE: 11.440 kW DC

PV AC SYSTEM SIZE: 8.320 kW AC

REVISIONS:
A
B
C
D

DRAWN BY: McKay Ashton

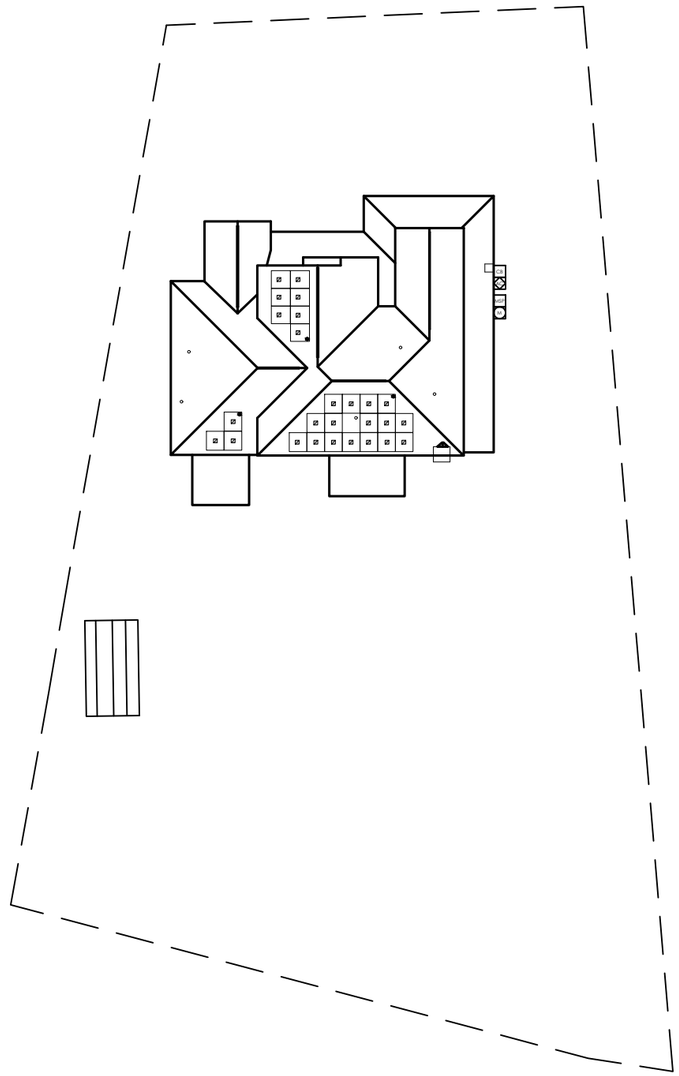
PLOT DATE: September 20, 2025

DRAWING TITLE: Cover Sheet

DRAWING NUMBER: PV1

FRONT OF HOME

42 Pelican Ct



SITE PLAN

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

Sealed For
Existing Roof &
Attachment Only

9/22/2025
Firm No. : D-0449

LEGEND

M	UTILITY METER	BE	BREAKER ENCLOSURE	BAT	ESS - BATTERY		FIRE SETBACK HATCH
MSP	MAIN SERVICE PANEL	AC	AC DISCONNECT	ESC	ESS - CONTROLLER	DC/AC	MICROINVERTER
SUB	SUBPANEL	PV	PV PRODUCTION METER	RPO	REMOTE POWER OFF SWITCH		ROOF TOP JUNCTION BOX
CT	UTILITY METER CT CABINET	CB	COMBINER BOX	ATS	GENERATOR ATS PANEL	INV	INVERTER

TRENCH OR OVERHEAD

PROPERTY LINE

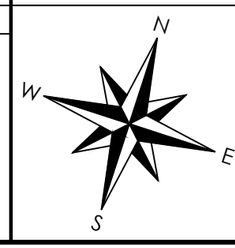
ICONS WITH DOTTED OUTLINE INDICATE INTERIOR LOCATION

PV SYSTEM SPECIFICATIONS

NEW PV SYSTEM INFORMATION

PV MODULE: (26) JA Solar JAM54D41-440/MB, **POWER RATING:** 440 W
INVERTER: (26) Enphase IQ8MC-72-M-US, **POWER RATING:** 320 W

COMPASS



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CUSTOMER NAME: David Nutt
42 Pelican Ct
Sanford, North Carolina 27332

AHJ: Harnett County NC

UTILITY COMPANY: Central EMC

PROJECT ID: 1441466

PV DC SYSTEM SIZE: 11.440 kW DC

PV AC SYSTEM SIZE: 8.320 kW AC

REVISIONS:
A
B
C
D

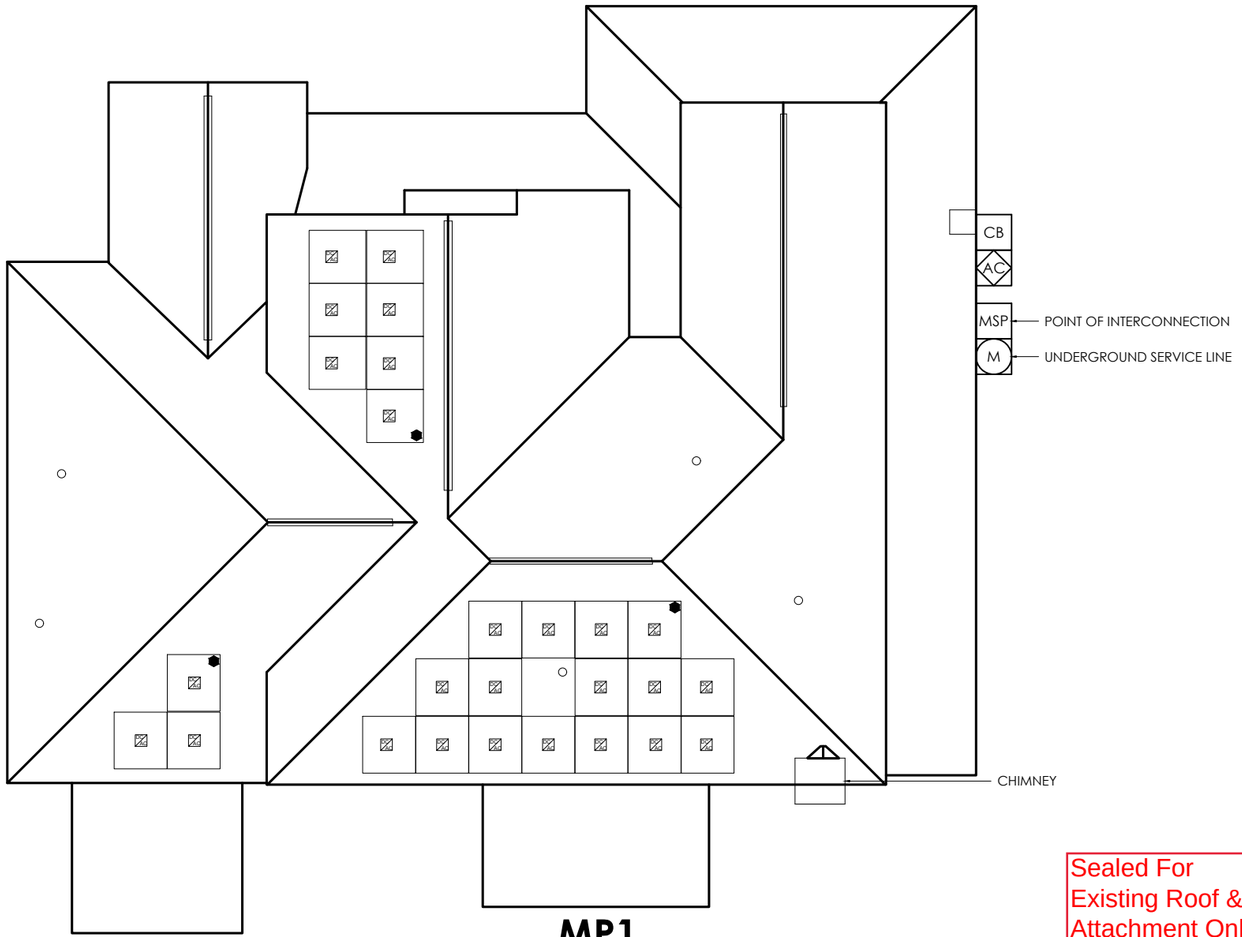
DRAWN BY: McKay Ashton

PLOT DATE: September 20, 2025

DRAWING TITLE: Site Plan

DRAWING NUMBER: PV2

FRONT OF HOME



MP2
MODULE QTY: 7
AZIMUTH: 252
PITCH: 45
TSRF: 80
AREA: 466 ft²

MP3
MODULE QTY: 3
AZIMUTH: 162
PITCH: 45
TSRF: 88
AREA: 314 ft²

MP1
MODULE QTY: 16
AZIMUTH: 162
PITCH: 45
TSRF: 93
AREA: 616 ft²

Sealed For Existing Roof & Attachment Only

NORTH CAROLINA PROFESSIONAL SEAL 035433 ENGINEER JOHN A. CALVERT

9/22/2025
Firm No. : D-0449

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

LEGEND

M	UTILITY METER	BE	BREAKER ENCLOSURE	BAT	ESS - BATTERY		FIRE SETBACK HATCH
MSP	MAIN SERVICE PANEL	AC	AC DISCONNECT	ESC	ESS - CONTROLLER	DC/AC	MICROINVERTER
SUB	SUBPANEL	PV	PV PRODUCTION METER	RPO	REMOTE POWER OFF SWITCH		ROOF TOP JUNCTION BOX
CT	UTILITY METER CT CABINET	CB	COMBINER BOX	ATS	GENERATOR ATS PANEL	INV	INVERTER

TRENCH OR OVERHEAD

PROPERTY LINE

ICONS WITH DOTTED OUTLINE INDICATE INTERIOR LOCATION

PV SYSTEM SPECIFICATIONS

NEW PV SYSTEM INFORMATION

PV MODULE: (26) JA Solar JAM54D41-440/MB, **POWER RATING:** 440 W
INVERTER: (26) Enphase IQ8MC-72-M-US, **POWER RATING:** 320 W

COMPASS

N W E S

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CUSTOMER NAME: **David Nutt**
42 Pelican Ct
Sanford, North Carolina 27332

AHJ: Harnett County NC

UTILITY COMPANY: Central EMC

PROJECT ID: 1441466

PV DC SYSTEM SIZE: 11.440 kW DC

PV AC SYSTEM SIZE: 8.320 kW AC

REVISIONS:
A
B
C
D

DRAWN BY: McKay Ashton

PLOT DATE: September 20, 2025

DRAWING TITLE: Roof Plan

DRAWING NUMBER: PV3

	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)
MP1	16	162	45	93	616	Comp Shingle	OSB	Rafter	2x8 @ 16 in OC	2x10 @ 16 in OC	PEGASUS RAIL	PEGASUS INSTAFLASH 2	64"L / 48"P	21"L / 16"P
MP2	7	252	45	80	466	Comp Shingle	OSB	Rafter	2x8 @ 16 in OC	2x10 @ 16 in OC	PEGASUS RAIL	PEGASUS INSTAFLASH 2	64"L / 48"P	21"L / 16"P
MP3	3	162	45	88	314	Comp Shingle	OSB	Rafter	2x8 @ 16 in OC	2x10 @ 16 in OC	PEGASUS RAIL	PEGASUS INSTAFLASH 2	64"L / 48"P	21"L / 16"P
MP4	0													
MP5	0													
MP6	0													
MP7	0													
MP8	0													
MP9	0													
MP10	0													

PRIMARY PV ARRAY AREA (ft²)	546.59
PRIMARY ROOF AREA (ft²)	4779.89
PRIMARY ROOF COVERAGE (%)	11.44
* IF APPLICABLE SECONDARY PV ARRAY AREA (ft²)	
SECONDARY ROOF AREA (ft²)	
SECONDARY ROOF COVERAGE (%)	
TOTAL PV ARRAY WEIGHT (lbs)	1232.4
TOTAL PV ATTACHMENTS	57
POINT LOAD (lbs/att.)	21.6
DISTRIBUTED LOAD (psf)	2.25

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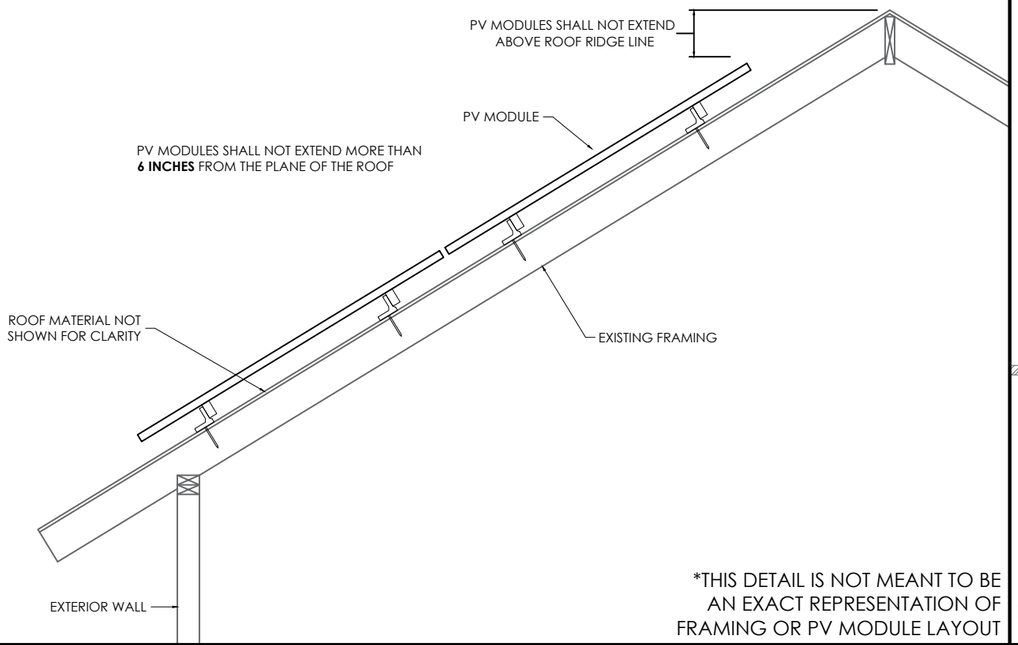
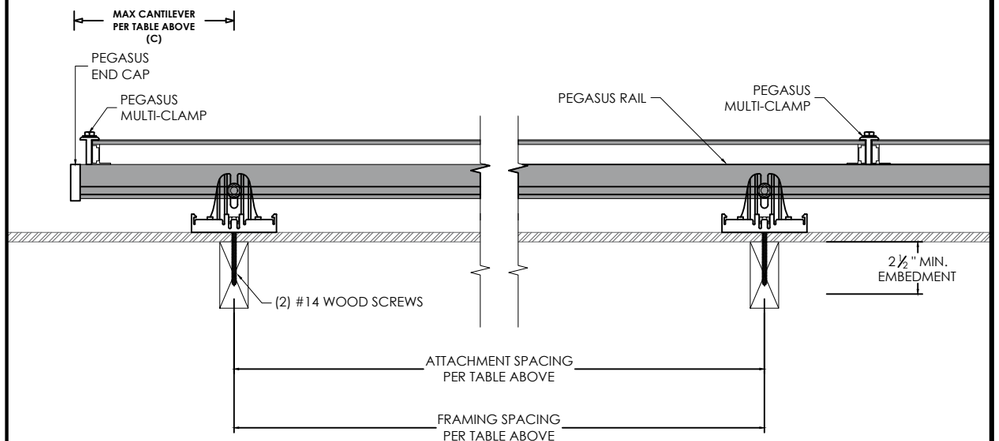


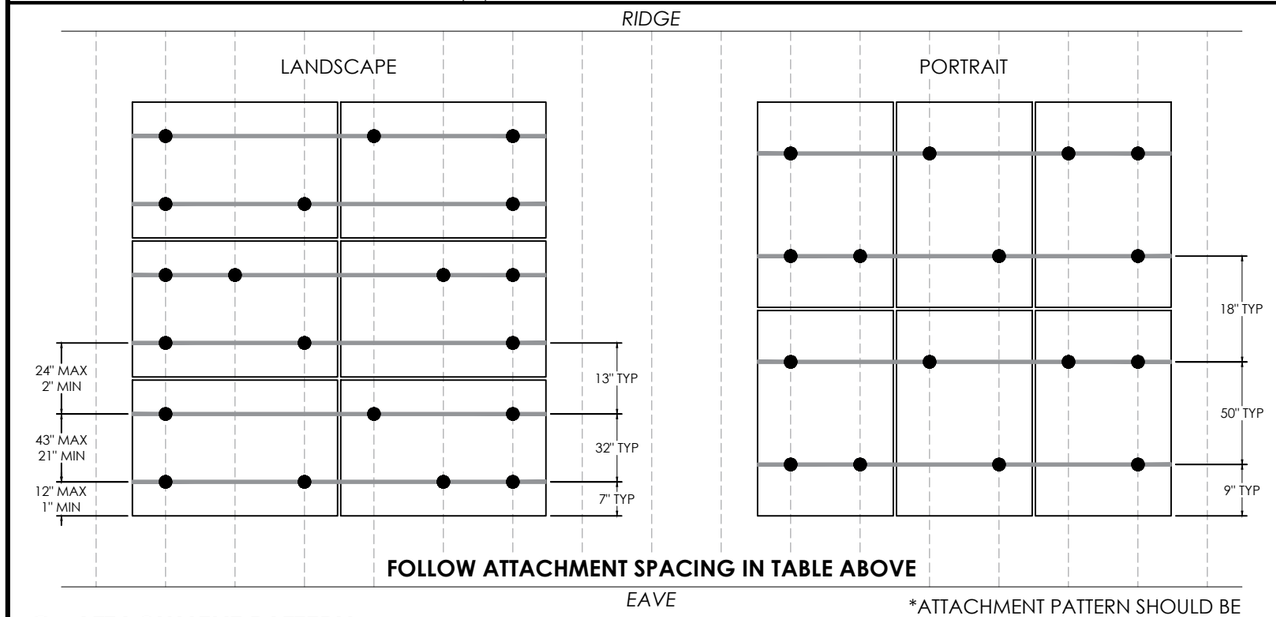
1 FRAMING DETAIL
SCALE: 1/2" = 1'-0"

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

ATTACHMENT TYPE:
Pegasus InstaFlash 2



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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NORTH CAROLINA PROFESSIONAL SEAL 035433 ENGINEER JOHN A. CALVERT

9/22/2025
Firm No. : D-0449

CUSTOMER NAME: David Nutt
42 Pelican Ct
Sanford, North Carolina 27332

AHJ: Harnett County NC

UTILITY COMPANY: Central EMC

PROJECT ID: 1441466

PV DC SYSTEM SIZE: 11.440 kW DC

PV AC SYSTEM SIZE: 8.320 kW AC

REVISIONS:
A
B
C
D

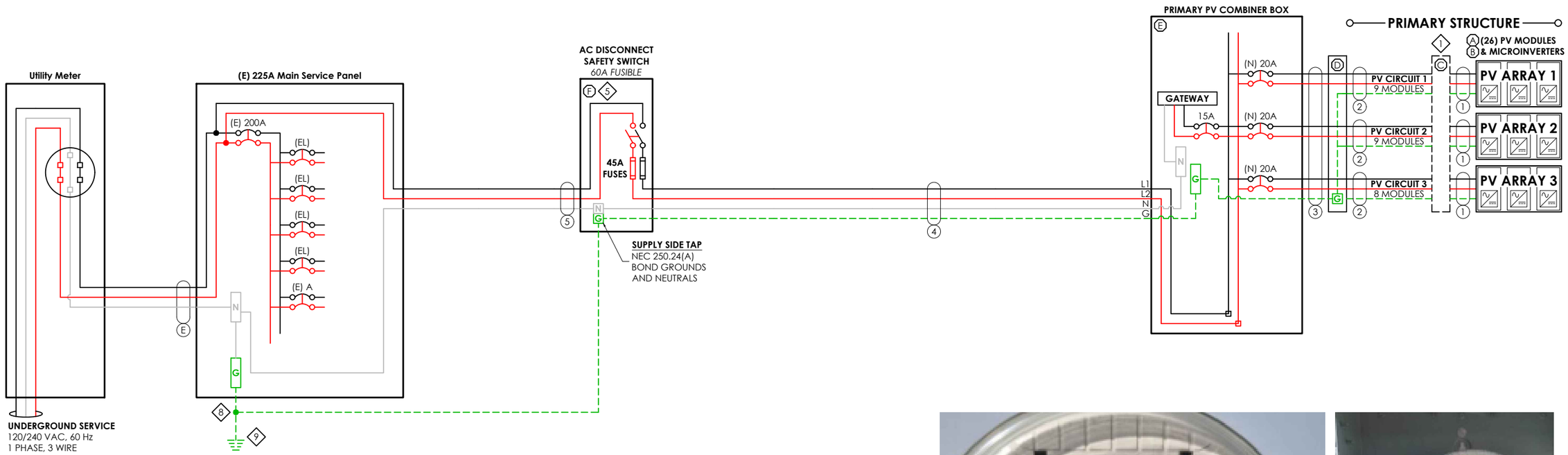
DRAWN BY: McKay Ashton

PLOT DATE: September 20, 2025

DRAWING TITLE: Structural

DRAWING NUMBER: PV4

5	L1 (1) 6 AWG THHN/THWN-2 CU BLACK L2 (1) 6 AWG THHN/THWN-2 CU RED N (1) 6 AWG THHN/THWN-2 CU WHITE	3/4 INCH EMT	Exterior
4	L1 (1) 8 AWG THHN/THWN-2 CU BLACK L2 (1) 8 AWG THHN/THWN-2 CU RED N (1) 8 AWG THHN/THWN-2 CU WHITE G (1) 10 AWG THHN/THWN-2 CU GREEN	3/4 INCH EMT	Exterior
3	L1 (3) 10 AWG THHN/THWN-2 CU BLACK L2 (3) 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



INTERCONNECTION NOTES

Utility Meter Number: 159384615

Supply side Tap in MSP,Exterior POI.

LEGEND

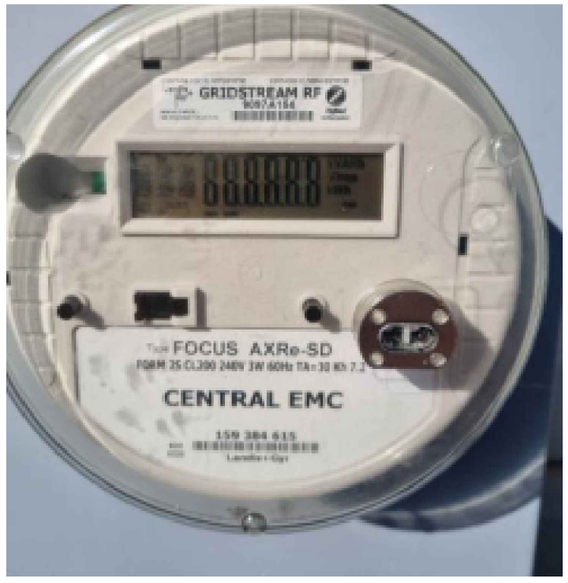
(E)	EXISTING	(PV)	PV BREAKER
(N)	NEW	(FIB)	FACTORY INSTALLED BREAKER
(EL)	EXISTING LOADS	SPD	SURGE PROTECTIVE DEVICE
(RL)	RELOCATED LOADS	MI	MECHANICAL INTERLOCK

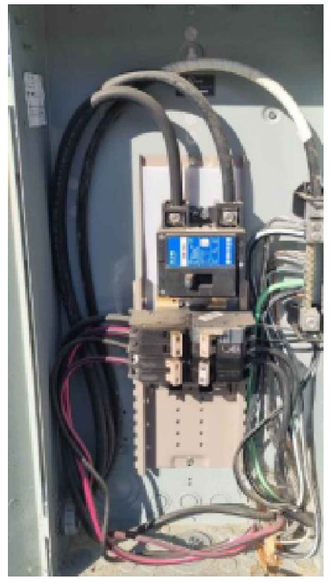
EQUIPMENT NOTES

1. FINAL CONFIGURATION OF PV CIRCUITS TO BE DECIDED BY INSTALLER. MUST COMPLY WITH MAX MICROINVERTERS PER CIRCUIT AS LISTED ON ATTACHED SPEC SHEET.
2.
3.
4.
5.
6.
7.
8. 6 AWG SOLID COPPER GEC TO BE IRREVERSIBLY SPLICED TO (E) GEC TO COMPLY WITH NEC 250.64(D)(1).
9. GROUNDING ELECTRODE SYSTEM SHALL BE IN ACCORDANCE WITH NEC 250.53.
10.
11.
12.

EQUIPMENT DESCRIPTIONS

- (A) **PV MODULE:** JA Solar JAM54D41-440/MB, 440 W DC, UL 1703 / UL 61730 COMPLIANT
- (B) **MICROINVERTER:** ENPHASE IQ8MC-72-M-US, 320 W AC (0.320 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 SAFTEY SWITCH 60A, 2P, 240VAC, FUSIBLE (D222NRB)
- (G)
- (H)
- (I)
- (J)
- (K)
- (L)
- (M)
- (N)
- (O)
- (P)
- (Q)
- (R)
- (S)
- (T)





OTHER NOTES

BLUE RAVEN SOLAR

1403 N 630 E
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(800) 377-4480
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CUSTOMER NAME: David Nutt
42 Pelican Ct
Sanford, North Carolina 27332

AHJ: Harnett County NC

UTILITY COMPANY: Central EMC

PROJECT ID: 1441466

PV DC SYSTEM SIZE: 11.440 kW DC

PV AC SYSTEM SIZE: 8.320 kW AC

REVISIONS:

A	
B	
C	
D	

DRAWN BY: McKay Ashton

PLOT DATE: September 20, 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	8.32kW AC
DC SYSTEM SIZE	11.44kW DC
PV MODULES	
QUANTITY	26
TYPE	JA Solar JAM54D41-440/MB
WATTAGE	440W DC
INVERTERS	
TYPE	Enphase IQ8MC-72-M-US
OUTPUT CURRENT	1.33A AC
NOMINAL VOLTAGE	240V AC
OUTPUT POWER	320W AC

PV BREAKER BACKFEED CALCULATIONS

"120% RULE"

(BUSBAR RATING * 120%) - OCPD RATING = AVAILABLE BACKFEED

	MAIN SERVICE PANEL	SUBPANEL 1	SUBPANEL 2
BUSBAR RATING	225A	----A	----A
PANEL OCPD RATING	200A	----A	----A
AVAILABLE BACKFEED (120% RULE)	70A	##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	14.96A AC	14.96A AC	14.96A AC	43.23A AC	43.23A 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)	59	85	20	10	10	----	----	----	----	----
CALCULATED VOLTAGE DROP	0.64%	1.05%	0.25%	0.22%	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	9	9	8	0	0	0	0	0	0	0	0	0	0
RATED AC OUTPUT CURRENT (I_{OUT})	12.0A	12.0A	10.6A	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%)	15.0A	15.0A	13.3A	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})	34.6A								0.0A				
MINIMUM AMPACITY (C_{OUT} x 125%)	43.2A								0.0A				
COMBINED PV BREAKER RATING	45AA								0AA				

TOTAL PV VOLTAGE DROP

	VOLTAGE DROP
WIRE TAG #1	0.64%
WIRE TAG #2	1.05%
WIRE TAG #3	0.25%
WIRE TAG #4	0.22%
WIRE TAG #5	0.14%
WIRE TAG #6	0%
TOTAL	***2.300000%***

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AHJ: Harnett County NC

UTILITY COMPANY: Central EMC

PROJECT ID: 1441466

PV DC SYSTEM SIZE: 11.440 kW DC

PV AC SYSTEM SIZE: 8.320 kW AC

REVISIONS:

A	
B	
C	
D	

DRAWN BY: McKay Ashton

PLOT DATE: September 20, 2025

DRAWING TITLE: Electrical Calculations

DRAWING NUMBER: PV6

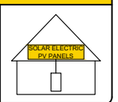
WARNING LABELS

UTILITY METER

WARNING
DUAL POWER SUPPLY
SOURCES: UTILITY GRID AND PV SOLAR ELECTRIC SYSTEM

NOTICE
IN CASE OF EMERGENCY, PLEASE CONTACT:
BLUE RAVEN SOLAR
(800) 377-4480

MAIN SERVICE PANEL

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN
TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUTDOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN THE ARRAY.


CAUTION
MULTIPLE SOURCES OF POWER
POWER TO THIS BUILDING IS ALSO SUPPLIED FROM A ROOF MOUNTED SOLAR ARRAY. PV DISCONNECT IS LOCATED WITHIN 10 FT AND LINE OF SIGHT OF UTILITY METER.

PV AC DISCONNECT

PHOTOVOLTAIC SYSTEM
AC DISCONNECT
RATED AC OUTPUT CURRENT 34.6 A
NOMINAL OPERATING AC VOLTAGE 240 V

WARNING
ELECTRIC SHOCK HAZARD
TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

PV COMBINER BOX

PHOTOVOLTAIC SYSTEM
COMBINER PANEL
WARNING
AUTHORIZED PERSONNEL ONLY
DO NOT ADD LOADS
NO DC WIRES PRESENT
RAPID SHUTDOWN
TEST NOT REQUIRED

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PV AC SYSTEM SIZE: 8.320 kW AC

REVISIONS:
A
B
C
D

DRAWN BY: McKay Ashton

PLOT DATE: September 20, 2025

DRAWING TITLE: Warning Labels

DRAWING NUMBER: PV7

Harvest the Sunshine

440W

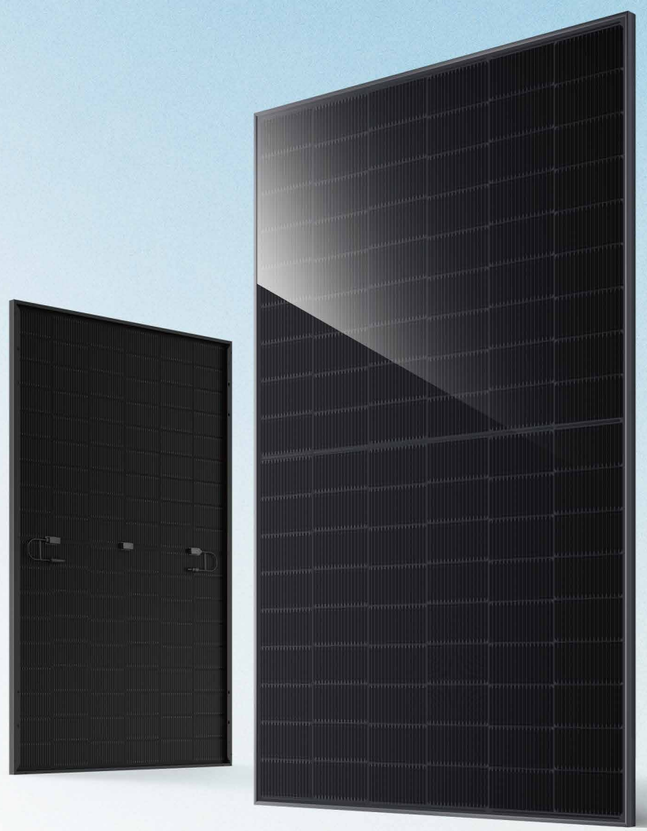
JA SOLAR

JAM54D41 MB Black Module n-type Double Glass Bifacial Modules

Premium Cells

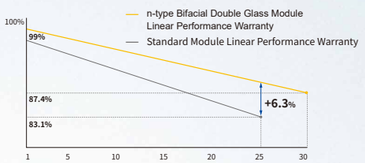
n-Bycium+ 16BB
MBB Half-Cell Technology

26% Up To
Cell Conversion Efficiency



Premium Modules

- Higher power generation better LCOE
- LID n-type with very Lower LID
- Better Temperature Coefficient
- Better low irradiance response



1% 1st-year Degradation 0.4% Annual Degradation Over 30 years

25 25-year product warranty

30 30-year linear power output warranty

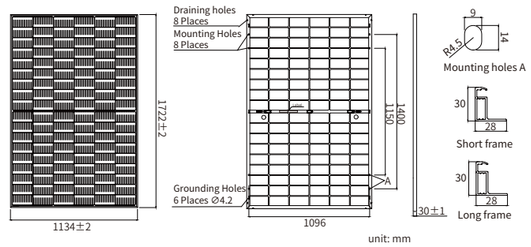
Comprehensive Certificates

- IEC 61215, IEC 61730, UL 61215, UL 61730
- ISO 9001: 2015 Quality management systems
- ISO 14001: 2015 Environmental management systems
- ISO 45001: 2018 Occupational health and safety management systems
- IEC 62941: 2019 Terrestrial photovoltaic (PV) modules - Quality system for PV module manufacturing

DEEP BLUE 4.0 Pro

JAM54D41 MB n-type Double Glass Bifacial Modules

DEEP BLUE 4.0 Pro



MECHANICAL PARAMETERS

Cell	Mono
Weight	21.5kg
Dimensions	1722±2mm×1134±2mm×30±1mm
Cable Cross Section Size	4mm²(IEC), 12 AWG(UL)
No. of cells	108(6×18)
Junction Box	IP68, 3diodes
Connector	QC 4.10-351/ MC4-EVO2
Cable Length (Including Connector)	Portrait: 300mm(+) /400mm(-) Landscape: 1100mm(+)/1100mm(-)
Front Glass/Back Glass	1.6mm/1.6mm
Packaging Configuration	36pcs/Pallet, 864pcs/40HQ Container

Remark: customized frame color and cable length available upon request

ELECTRICAL PARAMETERS AT STC

TYPE	JAM54D41 415/MB	JAM54D41 420/MB	JAM54D41 425/MB	JAM54D41 435/MB	JAM54D41 435/MB	JAM54D41 440/MB
Rated Maximum Power(Pmax) [W]	415	420	425	435	435	440
Open Circuit Voltage (Voc) [V]	38.00	38.28	38.56	39.11	39.11	39.38
Maximum Power Voltage(Vmp) [V]	32.13	32.38	32.64	33.13	33.13	33.37
Short Circuit Current(Isc) [A]	13.60	13.65	13.70	13.80	13.80	13.85
Maximum Power Current(Imp) [A]	12.92	12.97	13.02	13.13	13.13	13.18
Module Efficiency [%]	21.3	21.5	21.8	22.3	22.3	22.5
Power Tolerance	±2%					
Temperature Coefficient of Isc(α_Isc)	+0.045%/°C					
Temperature Coefficient of Voc (β_Voc)	-0.250%/°C					
Temperature Coefficient of Pmax(γ_Pmp)	-0.290%/°C					
STC	Irradiance 1000W/m², cell temperature 25°C, AM1.5G					

Remark: Electrical data in this catalog do not refer to a single module and they are not part of the offer. They only serve for comparison among different module types.

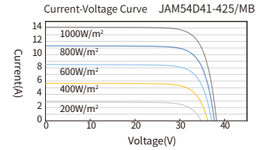
ELECTRICAL CHARACTERISTICS WITH 10% SOLAR IRRADIATION RATIO

TYPE	JAM54D41 415/MB	JAM54D41 420/MB	JAM54D41 425/MB	JAM54D41 435/MB	JAM54D41 435/MB	JAM54D41 440/MB
Rated Max Power(Pmax) [W]	448	454	459	470	470	475
Open Circuit Voltage(Voc) [V]	38.00	38.28	38.56	39.11	39.11	39.38
Max Power Voltage(Vmp) [V]	32.13	32.38	32.64	33.13	33.13	33.37
Short Circuit Current(Isc) [A]	14.69	14.74	14.80	14.90	14.90	14.96
Max Power Current(Imp) [A]	13.95	14.01	14.06	14.18	14.18	14.24
Irradiation Ratio (rear/front)			10%			

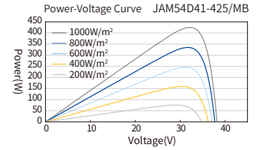
* Bifaciality=Pmax, rear/Rated Pmax, front

CHARACTERISTICS

Current-Voltage Curve JAM54D41-425/MB



Power-Voltage Curve JAM54D41-425/MB



OPERATING CONDITIONS

Maximum System Voltage	1500V DC
Operating Temperature	-40°C~+85°C
Maximum Series Fuse Rating	30A
Maximum Static Load, Front	5400Pa(112 lb/ft²)
Maximum Static Load, Back	2400Pa(50 lb/ft²)
NOCT	45±2°C
Bifaciality*	80%±10%
Safety Class	Class II
Fire Performance	UL Type 38/Class C

JA SOLAR

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Version No. : Global-EN-20241018A

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ENPHASE.

DATA SHEET

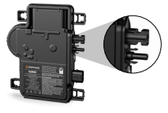
IQ8MC Microinverter

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 modes. This chip is built in advanced 55-nm technology with high-speed digital logic and has superfast response times to changing loads and grid events, alleviating constraints on battery sizing for home energy systems.

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

Enphase 25 year limited warranty

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



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

UL CERTIFIED SAFETY

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

*Meets UL 1741 only when installed with IQ System Controller 2 or 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 Microinverters cannot be mixed together with previous generations of Enphase microinverters (IQ7 Series, IQ6 Series, and so on) in the same system.
- IQ Microinverters ship with default settings that meet North America's IEEE 1547 interconnection standard requirements. Region-specific adjustments may be requested by an Authority Having Jurisdiction (AHJ) or utility representative. An IQ Gateway is required to make these changes during installation.

IQ8MC Microinverter

INPUT DATA (DC)	UNITS	IQ8MC-72-M-US
Commonly used module pairings [1]	W	260–460
Module compatibility	–	To meet compatibility, PV modules must be within the following max. input DC voltage and max. module I_{sc}. Module compatibility can be checked at https://enphase.com/installers/microinverters/calculator.
MPPT voltage range	V	25–45
Operating range	V	18–58
Min./Max. start voltage	V	22/58
Max. input DC voltage	V	60
Max. continuous operating DC current	A	14
Max. input DC short-circuit current	A	25
Max. module I_{sc}	A	20
Overvoltage class DC port	–	II
DC port backfeed current	mA	0
PV array configuration	–	Ungrounded array; no additional DC side protection required; AC side protection requires max 20 A per branch circuit

OUTPUT DATA (AC)	UNITS	IQ8MC-72-M-US @240 VAC	IQ8MC-72-M-US @208 VAC
Peak output power	VA	330	315
Max. continuous output power	VA	320	310
Nominal grid voltage (L-L)	V	240, split-phase (L-L), 180°	208, single-phase (L-L), 120°
Min./Max. grid voltage [2]	V	211–264	183–229
Max. continuous output current	A	1.33	1.49
Nominal frequency	Hz	60	
Extended frequency range	Hz	47–68	
AC short circuit fault current over three cycles	Arms	2.70	
Max. units per 20 A (L-L) branch circuit [3]	–	12	10
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	%	97.4	97.2
CEC weighted efficiency	%	97.0	96.5
Nighttime power consumption	mW	33	25

MECHANICAL DATA	UNITS
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
Environ. category; UV exposure rating	NEMA Type 6; outdoor

COMPLIANCE	
Certifications	CA Rule 21 (UL 1741-SA), UL 62109-1, IEEE 1547:2018 (UL 1741-SB), 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.

IQ8MC-MC4-DSH-00049-4.0-EN-US-2024-02-09

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Data Sheet
Enphase Q Cable Accessories
REGION: Americas

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.

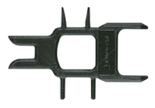
Q CABLE TYPES / ORDERING OPTIONS				
Connectorized Models	**Size / Max Nominal Voltage**	**Connector Spacing**	**PV Module Orientation**	**Connector Count per Box**
Q-12-10-240	12 AWG / 277 VAC	1.3 m (4.2 ft)	Portrait	240
Q-12-17-240	12 AWG / 277 VAC	2.0 m (6.5 ft)	Landscape (60-cell)	240
Q-12-20-200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

2020-06-26

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DATA SHEET

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.

Enphase 5 year limited warranty

5-year limited warranty

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

Smart

- Includes IQ Gateway for communication and control
- Includes Enphase Mobile Connect (CELLMODEM-M1-06-SP-05), only with IQ Combiner 5C
- Supports flexible networking: Wi-Fi, Ethernet, or cellular
- Provides production metering (revenue grade) and consumption monitoring

Easy to install

- Mounts to one stud with centered brackets
- Supports bottom, back, and side conduit entries
- Supports up to four 2-pole branch circuits for 240 VAC plug-in breakers (not included)
- 80 A total PV branch circuits
- Bluetooth-based Wi-Fi provisioning for easy Wi-Fi setup

Reliable

- Durable NRTL-certified NEMA type 3R enclosure
- 5-year limited warranty
- 2-year labor reimbursement program coverage included for both the IQ Combiner SKUs*
- UL1741 Listed

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

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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
COMMS-KIT-01 [2]	IQ System Controller	EP200G101-M240US00
	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

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.

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)

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

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DATA SHEET

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, 3rd Ed.)

Enphase 5 year limited warranty

UL LISTED

IQ Gateway

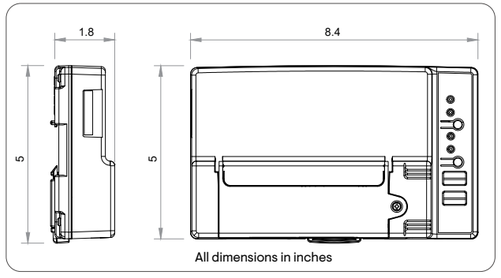
MODEL NUMBER	ENV-IQ-AM1-240, ENV2-IQ-AM1-240
IQ Gateway ENV-IQ-AM1-240 ENV2-IQ-AM1-240 (IEEE® 1547:2018)	IQ Gateway integrates revenue grade PV production metering (ANSI C12.20 ±0.5%), consumption metering (±2.5%), and battery metering (±2.5%) with IQ Battery 5P. Includes one 200 A continuous rated Production 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

IQ-G-DSH-00111-3.0-EN-US-2023-12-20

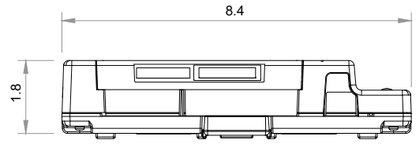
BLUE RAVEN SOLAR

DRAWING NUMBER:
SS

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



All dimensions in inches



All dimensions in inches

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)

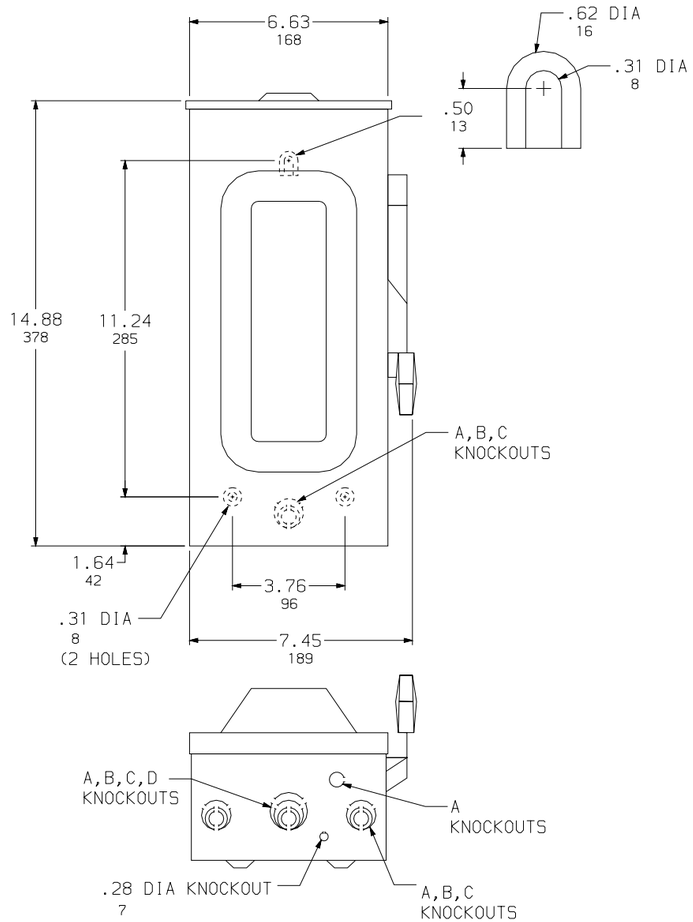
Revision history

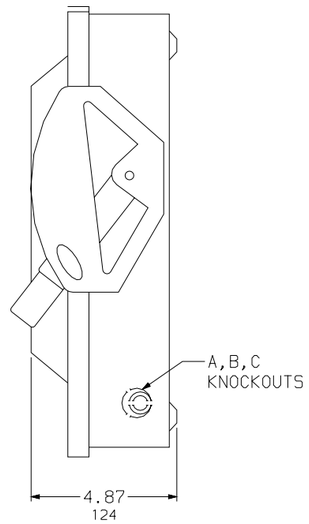
REVISION	DATE	DESCRIPTION
DSH-00111-3.0	December 2023	Updated power requirement and added IG Gateway breaker values.
DSH-00111-2.0	August 2023	Updated temperature specification for ENV2-IQ-AM1-240.
DSH-00111-1.0	June 2023	Updated altitude and recommended maximum microinverters on a site.

IQ-G-DSH-00111-3.0-EN-US-2023-12-20

BLUE RAVEN SOLAR

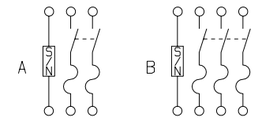
DRAWING NUMBER:
SS





NEMA TYPE 3R

WIRING DIAGRAMS
FUSIBLE



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

DUAL DIMENSIONS: INCHES / MILLIMETERS

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

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 MAXIMIM 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.

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

SQUARE D COMPANY

DWG. NO. 1863

JUNE 2000

REF DWG #1863

BLUE RAVEN SOLAR

DRAWING NUMBER:
SS

EZ SOLAR
making solar simple.

JB-1.2, JB-1.XL
Specification Sheet
PV Junction Box for Composition/Asphalt Shingle Roofs

EZ SOLAR
making solar simple.

PHONE: 385-202-4150
WWW.EZSOLARPRODUCTS.COM

BLUE RAVEN SOLAR

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.

c ETL us
Intertek
5019942

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		

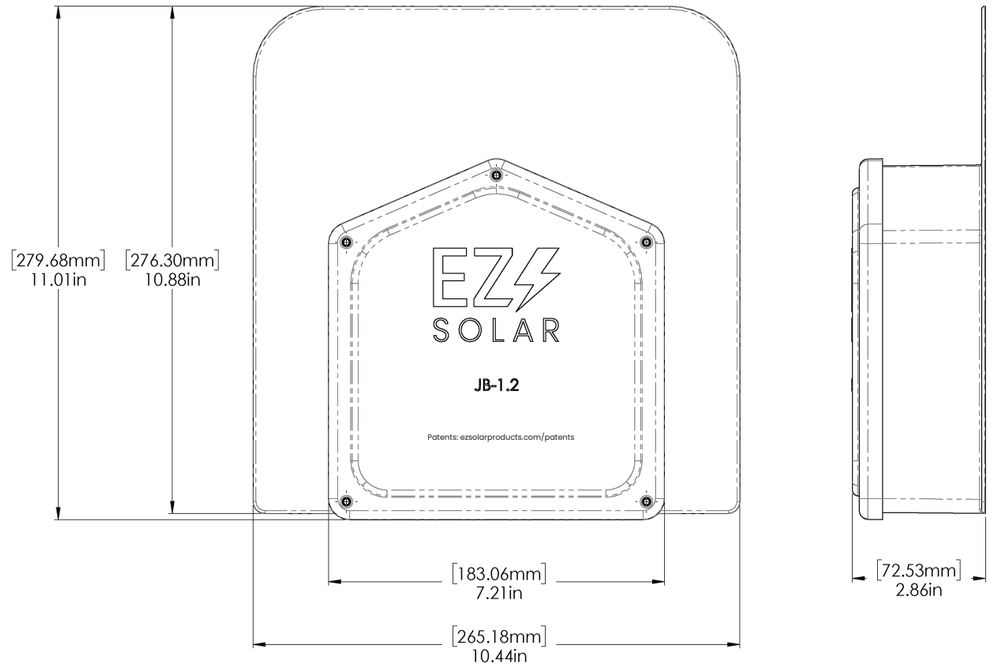
Table 2: Minimum wire-bending space for conductors through a wall opposite terminals in mm (inches)

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

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	DWG. NO.	REV
B	JB-1.2	
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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DRAWING NUMBER:
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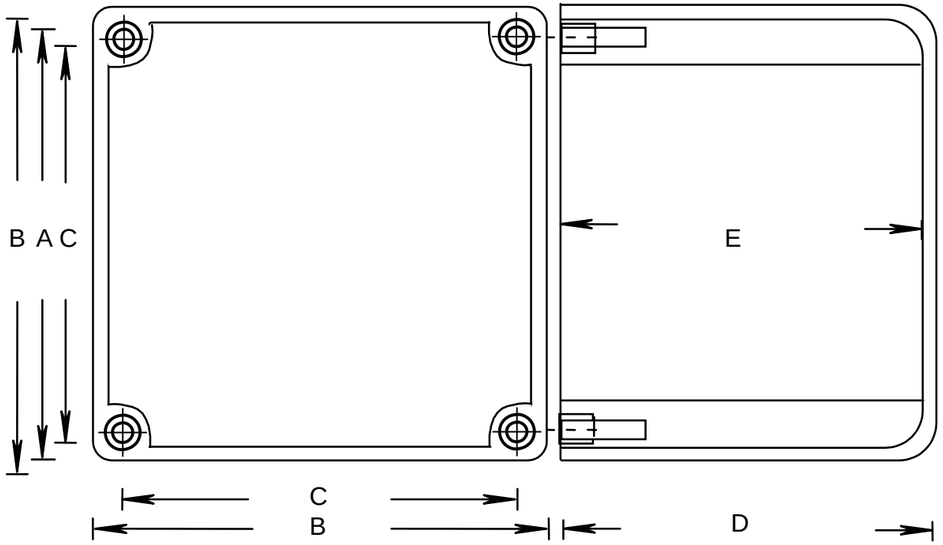


PRODUCT CODE	PART NUMBER	NOMINAL SIZE (in)	NOMINAL SIZE (mm)	A (in)	A (mm)	B (in)	B (mm)	C (in)	C (mm)
076668	J444 STAHLIN	4	103	3.675	93	4.000	102	3.450	88
076259	AMJB444 ALLIED	4	103	3.675	93	4.000	102	3.450	88
077643*	2037-424T CANLET	4	103	3.675	93	4.000	102	3.450	88
077696	JB 444	4	103	4.000	101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

PRODUCT CODE	PART NUMBER	NOMINAL SIZE (in)	NOMINAL SIZE (mm)	D (in)	D (mm)	E (in)	E (mm)	VOLUME (cu. In)	VOLUME (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 (in)	NOMINAL SIZE (mm)	GASKET CODE	INSERT CODE	SCREW CODE	M.FEET CODE
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

RIGID PVC CONDUIT FITTINGS

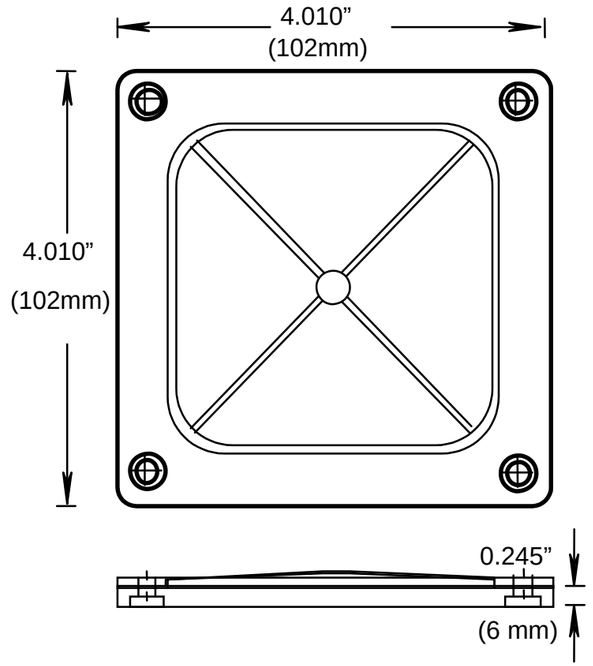
JB444 JUNCTION BOXES

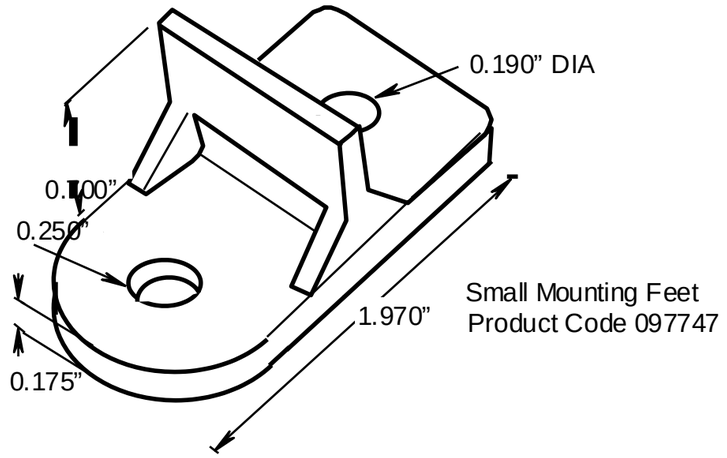
ISSUE DATE:
DATE D'EMISSION: 2009 04 30

SUPERCEDES:
REMPLACE: 2004 07 15

5

COVER DIMENSIONS





Small Mounting Feet
Product Code 097747

BLUE RAVEN SOLAR

DRAWING NUMBER:
SS

"Stay Connected" with HEYCO® Solar Power Components

a PennEngineering® Company

Heyco®-Tite Liquid Tight Cordgrips for Enphase Q Cables

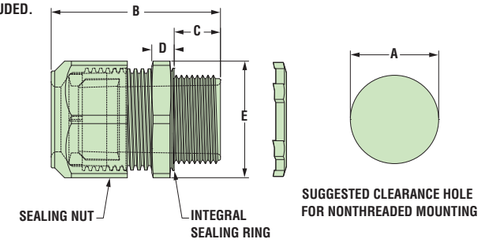
Straight-Thru, NPT Hubs with Integral Sealing Ring

The Ultimate in Liquid Tight Strain Relief Protection

ALL NEW PRODUCT!

GLAND CONFIGURATION Conductors Type *	Size mm.	No.	PART NO. Black	DESCRIPTION	UL/CSA or cULus	PART DIMENSIONS A Clearance Hole Dia. in.	mm.	B Max. O.A. Length in.	mm.	C Thread Length in.	mm.	D Wrenching Thickness in.	mm.	E Nut Flat Size 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	.98	24,9
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	1.30	33,0

Metal Locknuts INCLUDED.



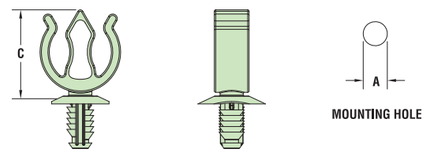
Material	Nylon 6/6 with TPE Sealing Gland
Certifications	UL Listed under Underwriters' Laboratories File E504900
	CSA Certified by the Canadian Standards Association File 93876
Flammability Rating	94V-2
Temperature Range	Static -40°F (-40°C) to 239°F (115°C) Dynamic -4°F (-20°C) to 212°F (100°C)
IP Rating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

- 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.

Heyco® Helios® UVX Clip – Blind Mount

ALL NEW PRODUCT!

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



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.

1-800-526-4182 • 732-286-1800 (NJ) • FAX: 732-244-8843 • www.heyco.com

BLUE RAVEN SOLAR

DRAWING NUMBER: SS

PEGASUS

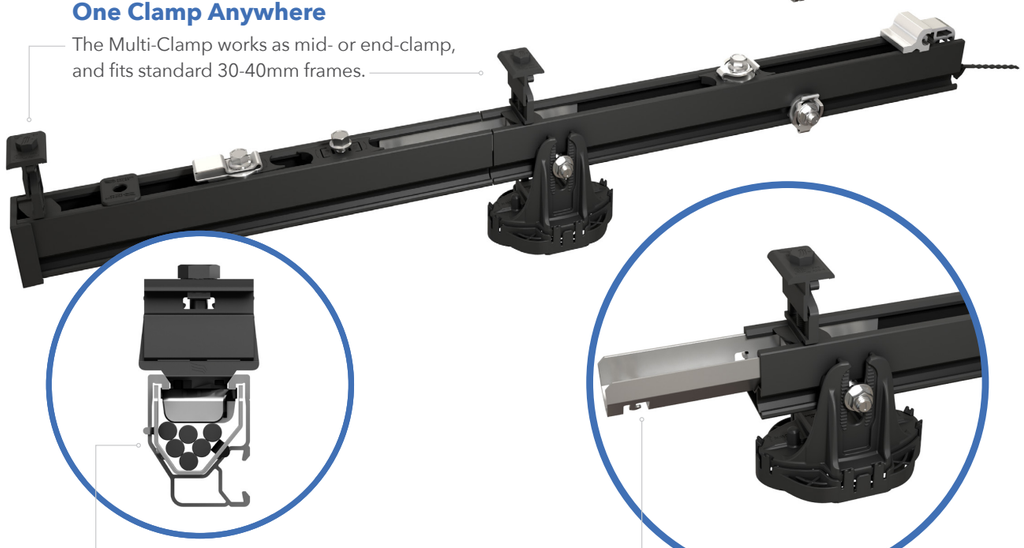
RAIL SYSTEM

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

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 ½" 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

C SP® US

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**

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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BLUE RAVEN SOLAR

DRAWING NUMBER:

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Appendix A - Compatible PV Modules

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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Manufacturer	Model
Auxin	AXN6M612Txxx
Aptos	DNA-144-BF26-xxxW; DNA-144-MF26-xxxW; DNA-120-BF26-xxxW; DNA-120-MF26-xxxW; DNA-120-MF10-xxxW; DNA-120-BF10-xxxW; DNA-108-BF10-xxxW; DNA-108-MF10-xxxW; DNA-120MF23-xxxW
Axitec	AC-xxxM/156-60S; AC-xxxM/60S; AC-xxxMH/120S; AC-xxxMH/144S; AC-xxxMBT/108V; AC-xxxTGBL/108WB
Boviet	BVM6610M-xxx; BVM6610P-xxx
Canadian Solar	CS1 H-xxxMS; CS1 K-xxxMS; CS1Y-xxxMS; CS3K-xxxMS; CS3U-xxxMS; CS6K-xxxM; CS6K-xxxMS; CS6K-xxxP; CS6U-xxxM; CS6U-xxxP; CS6X-xxxM; CS6X-xxxP;BiHiKu CS3W-xxxMB-AG; CS3L-xxxMS; CS6R-xxxMS; CS3W-xxxPB-AG; CS3W-xxxP; CS3W-xxxMS; CS3L-xxxP; CS3L-xxxMS; CS3N-xxxMS; CS6W-xxxMB-AG; CS7NxxxMB-AG; CS6.1-54TM-xxxH; CS6.1-60TM-xxxH; CS6.2-48TM-xxxH
CertainTeed	CTxxxHC11-04; CTxxxM10-02; CTxxxM11-02; CTxxxM11-03; CTxxxHC00-04; CTxxxHC12-06; CTxxxHC11-06; CTM10440HC11-09
Chint Solar	CHSM6612M-xxx
Freedom Forever	FF-MP-BBB-xxx
Gstar	GSD7S54T-xxxBT
Hansol	HSxxx TD-AN3
Heliene	Heliene20M xxx; Heliene36M xxx; Heliene36P xxx; Heliene60M xxx; Heliene60P xxx; Heliene72M Bifacial xxx; Heliene72P xxx; Heliene96M xxx Bifacial; Heliene96M xxx; Heliene 96P xxx; HSPE-144M M6 HC Bifacial xxx; HSPE 120M M6 HC Monofacial xxx; 144HC-M10-Bifacial; 460-144M-HC-M6; 156HC M10 NTYP SL Bifacial
Hyperion	HY-DH108P8B-xxx
Hyundai	HiD-SxxxRG(BK); HiS-MxxxRG; HIS-SxxxKI; HiS-SxxxRG; HiS-SxxxRG(BK); HiS-SxxxRI; HiS-SxxxTI; HIA-SxxxHI; HiS-SxxxXG(BK); HiN-SxxxXG(BK); HiS-SxxxY-H(BK);HiS-SxxxYH(BK); HiN-TxxxNF(BK)
Imperial Star	ISM7-SHDD108-xxx/M; ISM7-SHSB108-xxx/M
JA Solar	JAM72S01-xxx/PR; JAP72S01-xxx/SC; JAM72D20-xxx/MB; JAM54S30-xxx/LR; JAM72D30-xxx-MB-DS; JAM54S31 xxx-MR
Jinko	JKMxxxM-60; JKMxxxM-60B; JKMxxxM-60B L; JKMxxxM-60HBL; JKMxxxM-60HL; JKMxxxM-60L; JKMxxxM-60-V; JKMxxxM-72; JKMxxxM-72HL-V; JK-MxxxM-72H-V;JKMxxxM-72-V; JKMxxxP-60; JKMxxxPP-60; JKMxxxN-6RL3; JKMxxxM-6RL3-B; JKMxxxM-7RL3-TV; JKMxxxM-72HBL-V; JKMxxxN-54HL4-B
LG	LG N 1 K-G4; LGS 1 C-AS; LGxxxA 1 C-AS; LGxxxE1 C-AS; LGxxxE1 K-AS; LGxxxN 1 C-A3; LGxxxN 1 C-AS; LGxxxN 1 C-B3; LGxxxN 1 C-G3; LGxxxN 1 C-G4; LGxxxN1 C-VS; LGxxxN1C-Z4; LGxxxN1 K-AS; LGxxxN1 K-G4; LGxxxN1 K-VS; LGxxxN1 K-Z4; LGxxxN2T-AS; LGxxxN2W-AS; LGxxxN2W-G4; LGxxxN2W-VS; LGxxxN2W-LS; LGxxxO1CAS; LGxxxO1C-VS; LGxxxO1 K-AS; LGxxxO1 K-VS; LGxxxS1C-A5; LGxxxS1C-G4; LGxxxS2W-AS; LGxxxN1 K-LS; LGxxxNIC-NS; LGxxxM1 K-A6; LGxxxN1 K-B6; LGxxxO1C-A6; LGxxxxOAC-A6; LGxxxOAK-A6; LGxxxM1C-A6; LGxxxN2W-E6; LGxxxN2T-E6; LGxxxN1 K-E6; LGxxxN3K-V6; LGxxxN1C-A6
Longi	LR6-60BP-xxx; LR6-60HPB-xxx; LR6-60HPH-xxx; LR6-60PB-xxx; LR6-60PE-xxx; LR6-60-xxx; LR4-60HPH-xxxM; LR4-HPB-xxxM; LR4-72HPH-xxxM; LR4-72HBD-xxxM; LR5-54HPH-xxxM; LR5-72HBD-xxxM; LR5-54HABB-xxxM; LR5-54HPB-xxxM; LR7-72HGD-xxxM; LR8-54HGBB-xxxM
Maxeon	SPR-MAX3-xxx-COM; SPR-MAX3-xxx-BLK; SPR-MAXS-xxx-COM; SPR-MAX6-xxx-COM; SPR-X21/22-xxx-COM; SPR-MAX3-XXX-BLK-R; SPR-MAX6-XXX-BLK
Meyer Burger	MB_B120AyB_xxx; MB_TG120ByB_xxx; MB_W120AyB_xxx
Mission Solar	MSE60Axxx; MSExxxSB 1 A; MSExxxSO6J; MSExxxSOSK; MSExxxSOST; MSExxxSO8K; MSExxxSO8T; MSExxxSO9S; MSExxxSX6S; MSExxxSX6W; MSExxxSXST; MSExxxSXSK; MSExxxSXSR; MSExxxSX6Z; MSExxxSX9R; MSExxxSX9Z; MSExxxSR9S; MSExxxSR8K; MSExxxSR8T; MSExxxHTOB; MSI10-xxx-HT4G; MSI10-xxxHT4T; MSI10-xxxHN4G; MSExxxHN0B
Mitrex	Mxxx-L3H; Mxxx-I3H; Mxxx-H1 H; Mxxx-B1 F; Mxxx-A1 F
mSolar	TXI10-xxx108BB
Panasonic	VBHNxxxKA01; VBHNxxxKA03; VBHNxxxSA16; VBHNxxxSA16B; VBHNxxxSA17; VBHNxxxSA17E; EVPVxxx; EVPVxxxK; EVPVxxxPK; EVPVxxxH; EVPVxxx-HK;EVPVxxxPK
Philadelphia Solar	PS-M60(BF)-xxx; PS-M72(BF)-xxx; PS-MNB144(HCBF)-xxxW; PS-MNB108(HCBF)-xxxW
Phono Solar	PSxxxM6-18/VHB; PSxxxM6H-18/VHB; PSxxxM8GFH-18/VNHB; PSxxxM8GFH-18/VNH; PSxxxL8GFH-16/QNH

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.

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Manufacturer	Model
QCells	O.Peak 265; O.PEAK BLK-G3.1 xxx; O.PEAK BLK-G4.1 xxx; O.PEAK DUO BLK-GS xxx; O.PEAK DUO BLK-GS/SC xxx; O.PEAK DUO BLK-G6+ xxx; 0 PEAK DUO G6+ xxx AC ENP 107+; 0 PEAi< DUO BLK G9+ xxx; O.PEAI< DUO L-GS.2 xxx; O.PEAK DUO L-GS.3 xxx; O.Peak Duo-GS xxx; O.PEAK DUO-GS/SC xxx; O.PEAK DUO-G7 xxx; O.PEAK G4.1 xxx; O.PEAK G4.1/ Max xxx; O.PEAK G4.1/SC xxx; O.PEAK G4.1/TAA xxx; O.PEAK L-G4.2 xxx; O.PLUS BFR G4.1 xxx; O.PLUS BFR-G4.1/TAA xxx; O.PLUS L-G4.1 xxx; O.PLUS L-G4.2 xxx; O.PLUS L-G4.2/TAA xxx; O.PRO BFR-G4.1 xxx; O.PEAK DUO L-G8.2 xxx; O.PEAK DUO BLK-G8 xxx; O.PEAK DUO BLK-G8+ xxx; O.PEAK DUO BLK ML G9 xxx; O.PEAK DUO BLK ML G9+ xxx; O.PEAK DUO BLK-G10 xxx; O.PEAK DUO BLK-G10+ xxx; O.Peak DUO ML-G10+; O.Peak DUO BLK ML-G10.a+; O.Peak Duo XL G10 xxxBFG; O.PEAK DUO-G10 xxx; O.PEAK DUO-G10+ xxx; O.PEAK DUO-G10.a xxx; O.PEAK DUO-G10.a+ xxx; O.PEAK DUO BLK -G10.a xxx; O.PEAK DUO BLK-G10.a+ xxx; O.PEAK DUO ML-G10 xxx; O.PEAI< DUO ML-G10.a xxx; O.PEAI< DUO ML-G10.a+ xxx; O.PEAK DUO BLK ML-G10 xxx; O.PEAK DUO BLK ML-G10+ xxx; O.PEAK DUO BLK ML-G10.a xxx; O.Peak Duo ML-G10+/t xxx; O.TRON BLK M-G2+ xxx; O.TRON M-G2+ xxx; O.TRON XL-G2.3/ BFG; a.PEAK DUO XL-G11 S.3/BFG; O.PEAK DUO XL-G11.3/BFG; O.PEAK DUO XL-G11.3; a.PEAK DUO ML-G12S.3 / BFG; a.PEAK DUO ML-G12S.d / BFG; O.TRON BLK M-G2+/AC; a.PEAK DUO BLK ML-G10.a+; a.PEAK DUO BLK ML-G10+; O.PEAK DUO BLK ML-G10.B+; Q.PEAK DUO BLK ML-G10.C+; Q.TRON BLK M-G2.H+; Q.TRON BLK M-G2.H1+/AC
REC	RECxxxNP: RECxxxNP Black: RECxxxPE: RECxxxPE 72: RECxxxPE(BLK): RECxxxTP: RECxxxTP BLK: RECxxxTP2: RECxxxTP2 BLK: RECxxxTP2 BLK 02; RECxxxTP2 BLK2; RECxxxTP2M; RECxxxTP2S 72; RECxxxAA; RECxxxAA Pure; RECxxxAA Black; RECxxxAA 72; RECxxxAA PURE-R; RECxxxNP3 Black; RECxxxNP2 Black; RECxxxNP2; RECxxxAA Pure-RX; RECxxxAA Pure 2; RECxxxAA PRO L; RECxxxAA Pro M
S-Energy	SNxxxM-1 0; SNxxxM-10(B): SNxxxM-1 OT; SC20-60M B E-xxxM
SEG	SEG-xxx-BMA-HV; SEG-xxx-BMA-TB; SEG-xxx-BMA-BG; SEG-xxx-BMB-HV; SEG-xxx-BMA-BG; SEG-xxx-BMD-HV_; SEG-xxx-BMD-TB; SEG-xxx-BMB-BG; SEG-xxx-BMC-HV; SEG-xxx-BMC-TB: SEG-xxx-BMC-BG; SEG-xxx-BTD-BG; SEG-xxx-BTB-BG
Silfab	SILxxxBL: SILxxxNL; SLAxxxM; SLAxxxM: SLGxxxM; SSAxxxM; SIL-xxxNX; SIL-xxxHL; SIL-xxxNX; SIL-xxxBK: SIL-xxxHC; SIL-xxxHC+; SIL-xxxBG; SIL-xxxHN: SIL-xxxHM; SIL-520OM;; SIL-xxx-OD; SIL-xxx XM
Sirius	ELNSM54M-HC-xxxW
Sonali	SS-XXXW-M60 M10
Solar4America	S4Axxx-72MH5BB, S4Axxx-60MH5B B; S4Axxx-108MH10BB; S4Axxx-144MH10STT; S4Axxx-108TH10BB; S4Axxx-144TH10STT; S4Axxx-108TH16BB; S4Axxx-144TH16XXX
SolarEver	SE-182*91-xxxM-108N; SE-166*83-xxxM-144; SE-182*91-XXXM-108; SE-182*91-XXXM-144; SE-182*105-xxxM-96-BD
Solaria	PowerXT-xxxR-AC; PowerXT-xxxR-8D; PowerXT-xxxR-BX; PowerXT-xxxR-PD; PowerXT-xxxR-PX; PowerXT-xxxR-PM; PowerXT-xxxR-PL; PowerX-xxxR; PowerX-xxxR-4T
SunPower	SPR-Axxx-G-AC; SPR-E19-xxx; SPR-E19-xxx-D-AC; SPR-E20-xxx; SPR-E20-xxx-C-AC; SPR-E20-xxx-COM; SPR-E20-xxx-D-AC; SPR-E20-xxx-E-AC; SPR-X20-xxx-D-AC; SPR-X20-xxx-E-AC; SPR-X21-xxx; SPR-X21-xxx-BLK; SPR-X21-xxx-BLK-C-AC; SPR-X21-xxx-BLK-D-AC; SPR-X21-xxx-BLK-E-AC; SPR-X21-xxx-C-AC; SPR-X21-xxx-D-AC; SPR-X22-xxx; SPR-X22-xxx-C-AC; SPR-X22-xxx-COM; SPR-X22-xxx-D-AC; SPR-X22-xxx-D-AC; SPR-X22-xxx-E-AC; SPR-xxxE-WHT-D; SPR-xxxNE-WHT-D; SPR-Mxxx-HAC; SPR-Mxxx-BLK-H-AC
Talesun	TP6L60M; TP6L60M(H); TP7F60M; TP7F60M(H): TP7F54M; TP7F54M;TM7G54M-xxx; TM7G54M(BK)-xxx; TP7G54M-xxx; TM3G48M-xxx
Tesla	SC31582; SCxxx; SCxxxB1; SCxxxB2; T xxxS; T xxxH; SxxxH
Trina	TSM-xxxDD05A; TSM-xxxDD05A(II); TSM-xxxDD05A.05(II); TSM-xxxDD05A.08(II); TSM-xxxDD05A.18(I1); TSM-xxxDD05H.05(II); TSM-xxxDD05H.08(II); TSM-xxxPA05.18; TSM-xxxPD05.05; TSM-xxxPD05.18; TSM-xxxPD14; TSM-xxxDD06M.05(I); TSM-DD06H.08(II): TSM-DD06H.05(II); TSM-DE09C.05; TSM-DE09.05; TSM-DE09.07; TSMDE09C. 07; TSM-DE06X05(II): TSM-DD06M 05(11)T; SM-DE15V(II); TSM-DE15M(II); TSM-DE15H(II); TSM-14H(II); TSM-DE09 08; TSM-NE09RC.05; TSM-NE09RH.05; TSM-NED19RC.20; TSM-NEG19RC.20; TSM-NE19RC
United Ren. Energy	D6MxxxH3A
URE Co.	FAMxxxES-BB; FAMxxxESG-BB, FBMxxxMFG-BB; FAKxxxCSG; FAKxxxESG; FAMxxxE7G-BB; FBMxxxMFG; FBMxxxM7G-BB
Vikram	VSMDH.66.xxx.05; VSMDH.72.xxx.05; VSMDH.78.xxx.05; VSMDH.72.xxx.05
VSun	VSUN-xxx-108B MH; VSUNxxx-120B MH; VSUNxxx-108M-BB; VSUNxxx-144BMH-DG; VSUNxxxN-108BMH; VSUNxxxN-108MH
Waaree	WSMDi-xxx
Winaico	WSP-xxxM6
Yingli	YLxxxD-306; YLxxxP-296
ZNShine	ZXM6-NHLDD144; ZXM8-SP150; ZXM8-SP120; ZXM8-SPLDD120;ZXM6-NH144; ZXM6-NH132;ZXM6-NH120; ZXM7-SPLD144; ZXM6-NHLD120; ZXM6-NHLD132; ZXM7-SH108

BLUE RAVEN SOLAR

DRAWING NUMBER:
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PEGASUS

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

Pegasus | 506 West Ohio Avenue, Richmond, CA 94804 | **www.pegasussolar.com**

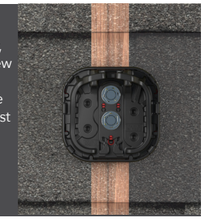
PEGASUS

INSTAFLASH® 2

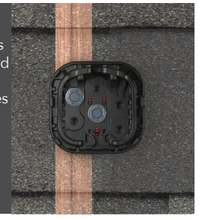
1 Release Safety.

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

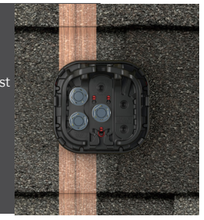
3 If screw hits rafter, drive second screw in hole above. Ensure screws are embedded at least 2.5" into rafter. Installation complete.



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

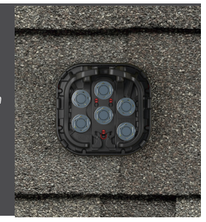


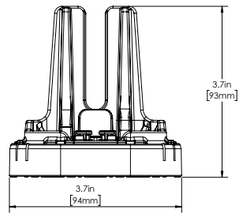
5 Continue until 2 screws are embedded at least 2.5" into rafter.

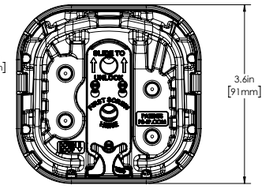


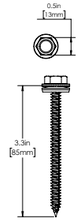
6 For deck attach, use 6 screws.

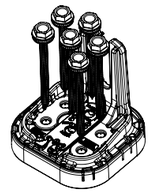
Note: Deck attach may reduce max span.



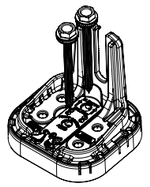








DECK ATTACH - 6 FASTENERS



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 INSTALLATION VIDEO

SCAN FOR FREE TRIAL

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BLUE RAVEN SOLAR

DRAWING NUMBER:
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SICAME-POMPADOUR-FRANCE

REFERENCE

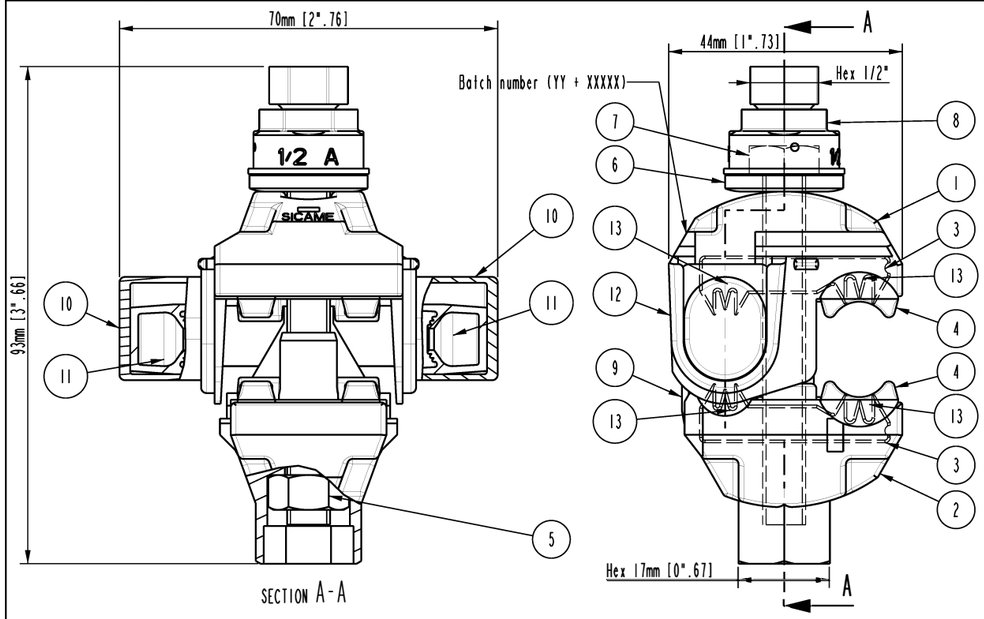
TTD 1510 F
TTD 1510 XF
TTD 1510 FT
TTD 1510 XFT

TITLE

TTD 1510 .F.

N°E1210840

Revision : D
Date/By : 26/09/16 PJM
Verified :



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
(1/2) 125 in.lb
AL9CU-600V str-sol
Main 4/0-#3
◁-Tap #2-#10 Tap-▷
LISTED E M 74

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

 - -

SICAME® Group Products

SICAME CORP 626 N Highland - AURORA - Illinois 60506 - USA - info@sicameusa.com

UL Product iQ®

UL Solutions

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.

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BLUE RAVEN SOLAR

DRAWING NUMBER:
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