SHEET CATALOG

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SS	SPEC SHEET(S)

SCOPE OF WORK

GENERAL SYSTEM INFORMATION:
SYSTEM SIZE:
14000W DC, 11375W AC
MODULES:
(35)REC ALPHA REC400AA PURE
INVERTER:
(35)ENPHASE IQ8M-72-2-US (240V),
BRANCH DETAILS:
3X9,1X8 ENPHASE BRANCHES

APPLICABLE CODES

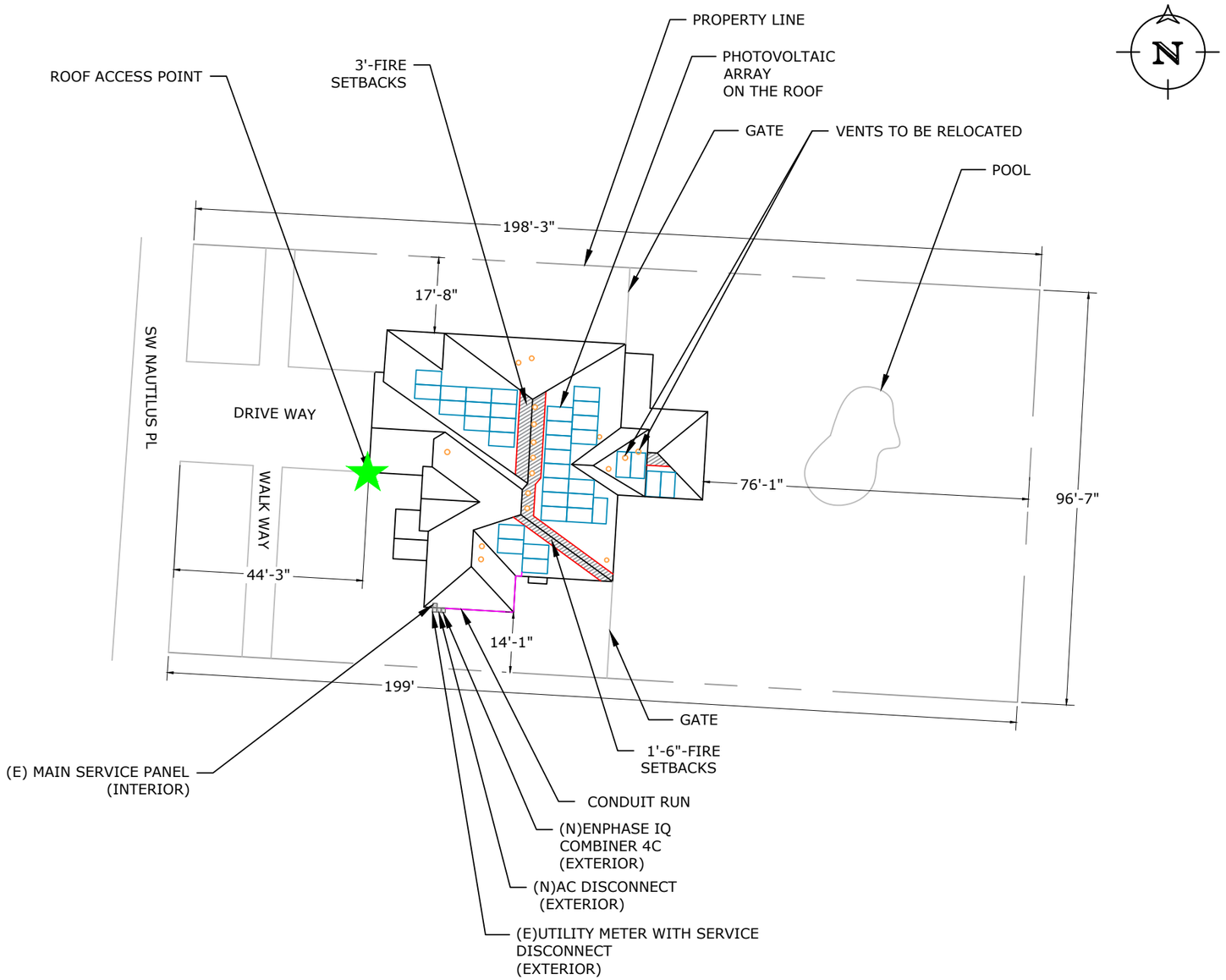
- ELECTRIC CODE:NEC 2017
- FIRE CODE:IFC 2018
- BUILDING CODE:IBC 2018
- RESIDENTIAL CODE:IRC 2018

GENERAL NOTES

1.MODULES ARE LISTED UNDER UL 1703 AND CONFORM TO THE STANDARDS.
2.INVERTERS ARE LISTED UNDER UL 1741 AND CONFORM TO THE STANDARDS.
3.DRAWINGS ARE DIAGRAMMATIC, INDICATING GENERAL ARRANGEMENT OF THE PV SYSTEM AND THE ACTUAL SITE CONDITION MIGHT VARY.
4.WORKING CLEARANCES AROUND THE NEW PV ELECTRICAL EQUIPMENT WILL BE MAINTAINED IN ACCORDANCE WITH NEC 110.26.
5.ALL GROUND WIRING CONNECTED TO THE MAIN SERVICE GROUNDING IN MAIN SERVICE PANEL/ SERVICE EQUIPMENT.
6.ALL CONDUCTORS SHALL BE 600V, 75°C STANDARD COPPER UNLESS OTHERWISE NOTED.
7.WHEN REQUIRED, A LADDER SHALL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS.
8.THE SYSTEM WILL NOT BE INTERCONNECTED BY THE CONTRACTOR UNTIL APPROVAL FROM THE LOCAL JURISDICTION AND/OR THE UTILITY.
9.ROOF ACCESS POINT SHALL BE LOCATED IN AREAS THAT DO NOT REQUIRE THE PLACEMENT OF GROUND LADDERS OVER OPENINGS SUCH AS WINDOWS OR DOORS, AND LOCATED AT STRONG POINTS OF BUILDING CONSTRUCTION WHERE THE ACCESS POINT DOES NOT CONFLICT WITH OVERHEAD OBSTRUCTIONS SUCH AS TREES, WIRES OR SIGNS.
10.PV ARRAY COMBINER/JUNCTION BOX PROVIDES TRANSITION FROM ARRAY WIRING TO CONDUIT WIRING

CHRISTI DUKE - 14.000kW DC, 11.375kW AC

SITE PLAN LAYOUT

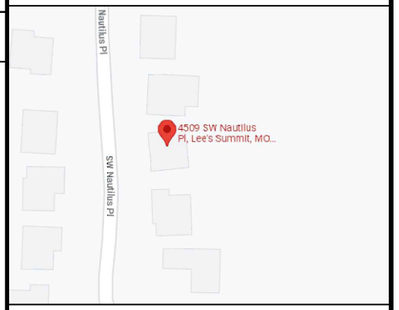


SCALE:1"=30'-0"

ENGINEERING SCOPE OF WORK

1. ILLUMINE INDUSTRIES INC. HAS ONLY PROVIDED DRAFTING SERVICES FOR THE PERMIT DRAWINGS. NO ACTUAL ENGINEERING WORK, ENGINEERING REVIEW OR ENGINEERING APPROVAL HAS BEEN CONDUCTED BY ILLUMINE INDUSTRIES INC UNLESS NOTED OTHERWISE.
2. WHEN A PROFESSIONAL ENGINEER APPROVES AND SEALS THE DESIGN FOR COMPONENTS OF THEIR RESPECTIVE DISCIPLINE (STRUCTURAL/ELECTRICAL) SHOWN ON THESE PERMIT DRAWINGS, HE/SHE:
   a. TAKES FULL DIRECT CONTROL OF THE ENGINEERED DESIGN
   b. IS GIVEN ACCESS TO PERSONALLY SUPERVISE AND RECTIFY ANY ASPECT OF THE ENGINEERED DESIGN
   c. HAS FULLY ACCEPTED RESPONSIBILITY FOR THE ENGINEERED DESIGN

VICINITY MAP



Astrawatt Solar

CUSTOMER INFORMATION

NAME:CHRISTI DUKE

ADDRESS:4509 SW NAUTILUS PL, LEES SUMMIT, MO 64082, USA

38.837260, -94.379607
APN:030-305-000-000-002-017

AHJ:MO-CITY OF LEE'S SUMMIT

UTILITY:KCPL-M

PRN NUMBER:RGS-59369

ILLUMINE i

COVER PAGE

DRAFTED BY: S.VISVESH QC'ED BY: S.KISHORE	PAPER SIZE:17"X11"
SCALE:AS NOTED	REV:B
DATE:8/16/2022	T-01

INSTALLATION NOTES

1.STRUCTURAL ROOF MEMBER LOCATIONS ARE ESTIMATED AND SHOULD BE LOCATED AND VERIFIED BY THE CONTRACTOR WHEN LAG BOLT PENETRATION OR MECHANICAL ATTACHMENT TO THE STRUCTURE IS REQUIRED.
2.ROOFTOP PENETRATIONS FOR SOLAR RACKING WILL BE COMPLETED AND SEALED WITH APPROVED SEALANT PER CODE BY A LICENSED CONTRACTOR.
3.LAGS MUST HAVE A MINIMUM 2.5" THREAD EMBEDMENT INTO THE STRUCTURAL MEMBER.
4.ALL PV RACKING ATTACHMENTS SHALL BE STAGGERED BY ROW BETWEEN THE ROOF FRAMING MEMBERS AS NECESSARY.
5.ROOF MOUNTED STANDARD RAIL REQUIRES ONE THERMAL EXPANSION GAP FOR EVERY RUN OF RAIL GREATER THAN 40'.
6.ALL CONDUCTORS AND CONDUITS ON THE ROOF SHALL BE MINIMUM 7/8" ABOVE THE ROOF SURFACE (INCLUDING CABLES UNDERNEATH MODULES AND RACKING).
7.THE PV INSTALLATION SHALL NOT OBSTRUCT ANY PLUMBING, MECHANICAL OR BUILDING ROOF VENTS.

ROOF ACCESS PATHWAYS AND SETBACKS:

1204.2.1 SOLAR PHOTOVOLTAIC SYSTEMS FOR GROUP R-3BUILDINGS.SOLAR PHOTOVOLTAIC SYSTEMS FOR GROUP R-3 BUILDINGS SHALL COMPLY WITH SECTIONS 1204.2.1.1 THROUGH 1204.2.1.3.

EXCEPTIONS:

1.THESE REQUIREMENTS SHALL NOT APPLY TO STRUCTURES DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE INTERNATIONAL RESIDENTIAL CODE.
2.THESE REQUIREMENTS SHALL NOT APPLY TO ROOFS WITH SLOPES OF 2 UNITS VERTICAL IN 12 UNITS HORIZONTAL OR LESS.

1204.2.1.1 PATHWAYS TO RIDGE. NOT FEWER THAN TWO 36-INCH-WIDE (914 MM) PATHWAYS ON SEPARATE ROOF PLANES,FROM LOWEST ROOF EDGE TO RIDGE, SHALL BE PROVIDED ON ALL BUILDINGS. NOT FEWER THAN ONE PATHWAY SHALL BE PROVIDED ON THE STREET OR DRIVEWAY SIDE OF THE ROOF. FOR EACH ROOF PLANE WITH A PHOTOVOLTAIC ARRAY, NOT FEWER THAN ONE 36-INCH-WIDE (914 MM) PATHWAY FROM LOWEST ROOF EDGE TO RIDGE SHALL BE PROVIDED ON THE SAME ROOF PLANE AS THE PHOTOVOLTAIC ARRAY, ON AN ADJACENT ROOF PLANE OR STRADDLING THE SAME AND ADJACENT ROOF PLANES

1204.2.1.2 SETBACKS AT RIDGE.FOR PHOTOVOLTAIC ARRAYS OCCUPYING 33 PERCENT OR LESS OF THE PLAN VIEW TOTAL ROOF AREA,
A SETBACK OF NOT LESS THAN 18 INCHES (457 MM)WIDE IS REQUIRED ON BOTH SIDES OF A HORIZONTAL RIDGE. FOR PHOTOVOLTAIC ARRAYS OCCUPYING MORE THAN 33 PERCENT OF THE PLAN VIEW TOTAL ROOF AREA, A SETBACK OF NOT LESS THAN 36 INCHES (457 MM) WIDE IS REQUIRED ON BOTH SIDES OF A HORIZONTAL RIDGE.

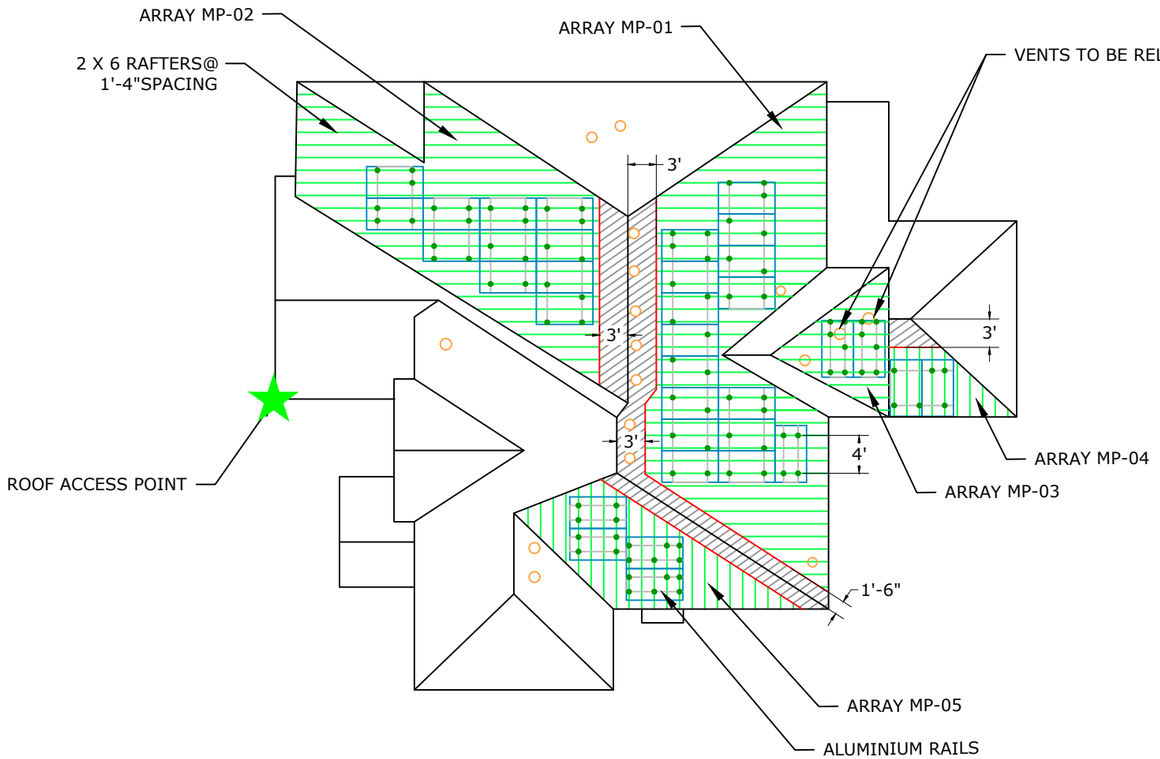
1204.2.2 EMERGENCY ESCAPE AND RESCUE OPENINGS. PANELS AND MODULES INSTALLED ON GROUP R-3 BUILDINGS SHALL NOT BE PLACED ON THE PORTION OF A ROOF THAT IS BELOW AN EMERGENCY ESCAPE AND RESCUE OPENING. A PATHWAY OF NOT LESS THAN 36 INCHES (914 MM) WIDE SHALL BE PROVIDED TO THE EMERGENCY ESCAPE AND RESCUE OPENING

1204.2.1.3 ALTERNATIVE SETBACKS AT RIDGE. WHERE AN AUTOMATIC SPRINKLER SYSTEM IS INSTALLED WITHIN THE DWELLING IN ACCORDANCE WITH SECTION 903.3.1.3, SETBACKS AT THE RIDGE SHALL CONFORM TO ONE OF THE FOLLOWING:
1.FOR PHOTOVOLTAIC ARRAYS OCCUPYING 66 PERCENT OR LESS OF THE PLAN VIEW TOTAL ROOF AREA, A SETBACK OF NOT LESS THAN 18 INCHES (457 MM) WIDE IS REQUIRED ON BOTH SIDES OF A HORIZONTAL RIDGE.
2.FOR PHOTOVOLTAIC ARRAYS OCCUPYING MORE THAN 66 PERCENT OF THE PLAN VIEW TOTAL ROOF AREA, A SETBACK OF NOT LESS THAN 36 INCHES (914 MM) WIDE IS REQUIRED ON BOTH SIDES OF A HORIZONTAL RIDGE

SITE INFORMATION - WIND SPEED: 115 MPH AND SNOW LOAD: 25 PSF

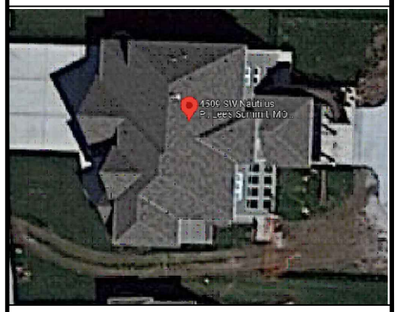
SR. NO	AZIMUTH	PITCH	NO. OF MODULES	ARRAY AREA (SQ. FT.)	ROOF TYPE	ATTACHMENT	ROOF EXPOSURE	FRAME TYPE	FRAME SIZE	FRAME SPACING	MAX RAIL SPAN	OVER HANG
MP-01	93°	34°	16	318.7	COMPOSITION SHINGLE	FLASH FOOT 2	ATTIC	RAFTERS	2 X 6	1'-4"	4'-0"	1'-6"
MP-02	273°	34°	11	219.1	COMPOSITION SHINGLE	FLASH FOOT 2	ATTIC	RAFTERS	2 X 6	1'-4"	4'-0"	1'-6"
MP-03	93°	34°	2	39.8	COMPOSITION SHINGLE	FLASH FOOT 2	ATTIC	RAFTERS	2 X 6	1'-4"	4'-0"	1'-6"
MP-04	183°	30°	2	39.8	COMPOSITION SHINGLE	FLASH FOOT 2	ATTIC	RAFTERS	2 X 6	1'-4"	4'-0"	1'-6"
MP-05	183°	45°	4	79.7	COMPOSITION SHINGLE	FLASH FOOT 2	ATTIC	RAFTERS	2 X 6	1'-4"	4'-0"	1'-6"

NOTE:PENETRATIONS ARE STAGGERED



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

AERIAL VIEW



Astrawatt Solar

CUSTOMER INFORMATION

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38.837260, -94.379607
APN:030-305-000-000-002-017

AHJ:MO-CITY OF LEE'S SUMMIT

UTILITY:KCPL-M

PRN NUMBER:RGS-59369

ILLUMINE i

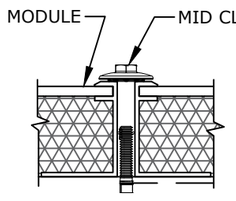
MOUNTING DETAIL

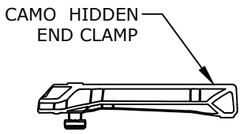
DRAFTED BY: S.VISVESH QC'ED BY: S.KISHORE	PAPER SIZE:17"X11"
SCALE:AS NOTED	REV:B
DATE:8/16/2022	S-01

DEAD LOAD CALCULATIONS

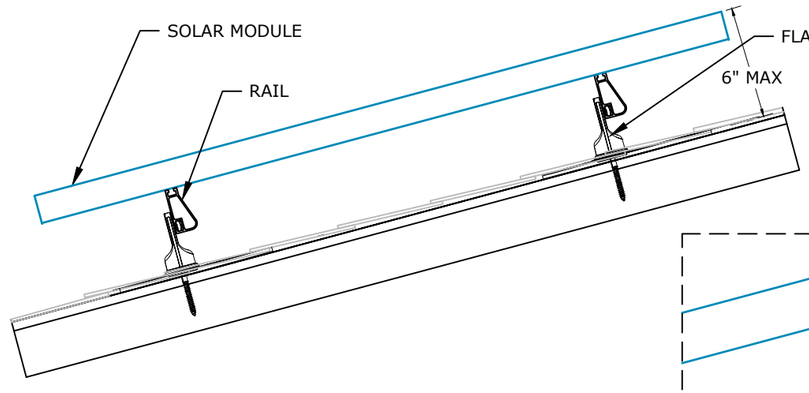
BOM	QUANTITY	LBS/UNIT	TOTAL WEIGHT (LBS)
MODULES	35	45	1575.00
MID-CLAMP	40	0.050	2.00
END-CLAMP	60	0.050	3.00
RAIL LENGTH	258	0.680	175.44
SPLICE BAR	6	0.360	2.16
FLASH FOOT 2	102	1.88	191.76
MICRO-INVERTER	35	2.38	83.30
TOTAL WEIGHT OF THE SYSTEM (LBS)			2032.66
TOTAL ARRAY AREA ON THE ROOF (SQ. FT.)			697.08
WEIGHT PER SQ. FT.(LBS)			2.92
WEIGHT PER PENETRATION (LBS)			19.93

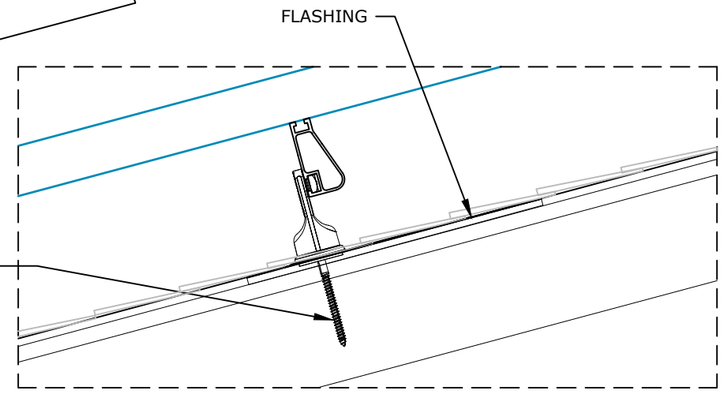
MID-CLAMP AND END-CLAMP ANATOMY





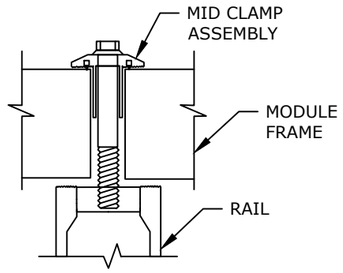
ATTACHMENT DETAIL-FLASH FOOT 2





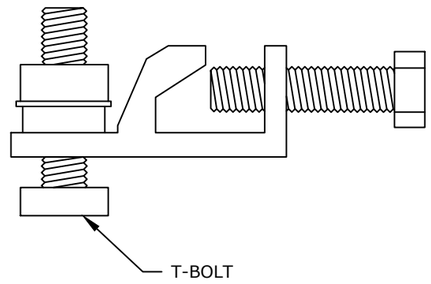
GROUNDING DETAILS

MODULE TO MODULE & MODULE TO RAIL

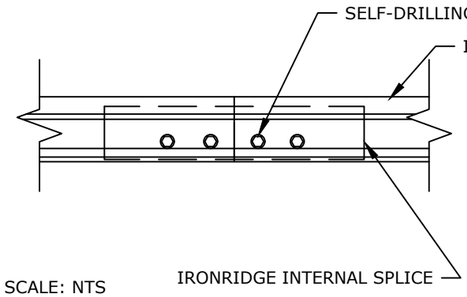


GROUNDING MID-CLAMP
SCALE: NTS

GROUNDING LUG



RAIL TO RAIL



SCALE: NTS

MODULES DATA

REC ALPHA REC400AA PURE

MODULE DIMS	71.7"x40"x1.2"
LAG SCREWS	5/16"x3.5":2.5"MIN EMBEDMENT

Astrawatt Solar

CUSTOMER INFORMATION

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UTILITY:KCPL-M

PRN NUMBER:RGS-59369

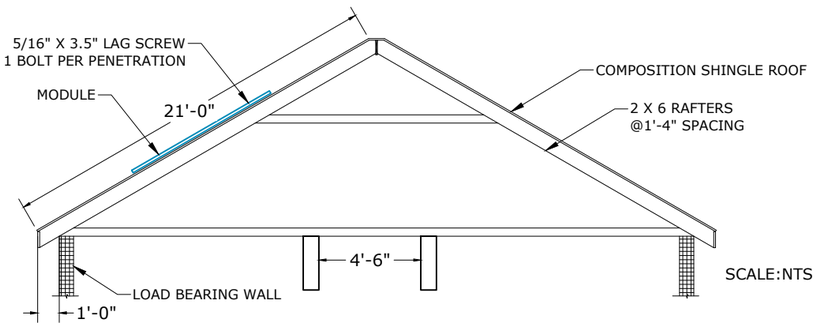
ILLUMINE i

STRUCTURAL DETAIL

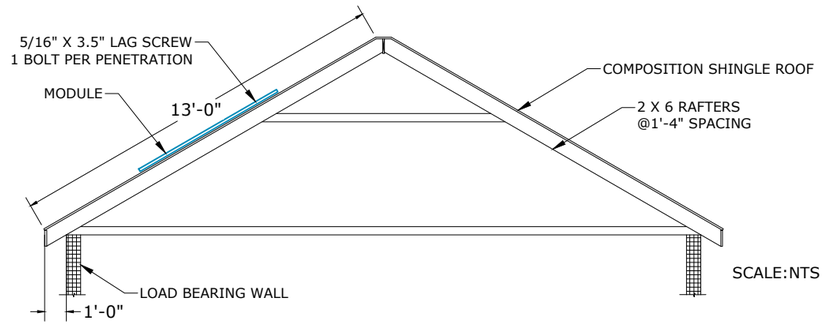
DRAFTED BY: S.VISVESH QC'ED BY: S.KISHORE	PAPER SIZE:17"X11"
SCALE:AS NOTED	REV:B
DATE:8/16/2022	S-02

ROOF FRAMING DETAILS

MP-01,MP-02:



MP-03:



MP-04:

MP-05:

Astrawatt Solar

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UTILITY:KCPL-M

PRN NUMBER:RGS-59369

ILLUMINE i

ROOF FRAMING DETAILS

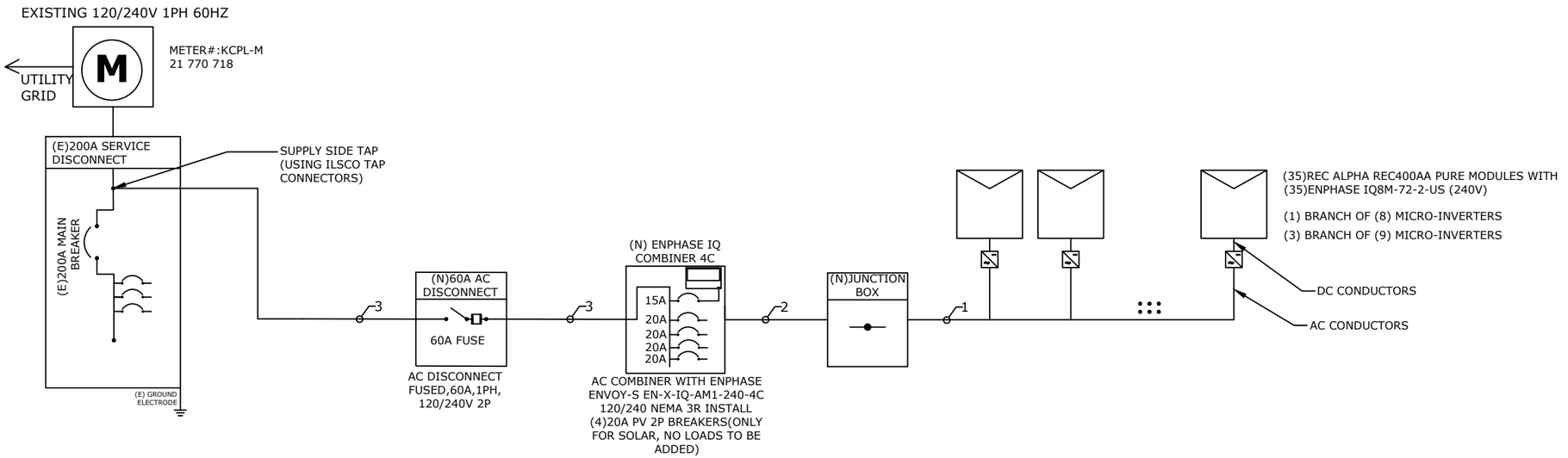
DRAFTED BY: S.VISVESH QC'ED BY: S.KISHORE	PAPER SIZE:17"X11"
SCALE:AS NOTED	REV:B
DATE:8/16/2022	S-03

SINGLE LINE DIAGRAM: DC SYSTEM SIZE - 14000W, AC SYSTEM SIZE - 11375W

MICRO INVERTER SPECIFICATIONS	
MODEL	ENPHASE IQ8M-72-2-US (240V)
MAX CONTINUOUS OUTPUT POWER	325VA
MAX OUTPUT CURRENT	1.35A
CEC WEIGHTED EFFICIENCY	97%
MAX NO OF MICRO INVERTERS/BRANCH	11
MAX DC VOLTAGE	60V

MODULE SPECIFICATION	
MODEL	REC ALPHA REC400AA PURE
MODULE POWER @ STC	400W
OPEN CIRCUIT VOLTAGE:**Voc**	48.8V
MAX POWER VOLTAGE:**Vmp**	42.1V
SHORT CIRCUIT CURRENT:**Isc**	10.28A
MAX POWER CURRENT:**Imp**	9.51A

NOTE:
EACH MICRO INVERTER IS RAPID SHUTDOWN COMPLIANT



CONDUIT SCHEDULE				
TAG ID	CONDUIT SIZE	CONDUCTOR	NEUTRAL	GROUND
1	NONE	(2) 12AWG ENPHASE Q CABLE PER BRANCH CIRCUIT	NONE	(1) 6AWG BARE COPPER
2	1"EMT OR EQUIV	(8) 10AWG THWN-2	NONE	(1) 10AWG THWN-2
3	1"EMT OR EQUIV	(2) 4 AWG THWN-2	(1) 4 AWG THWN-2	(1) 10AWG THWN-2

NOTE:
SERVICE DISCONNECT RATING:200A, MAIN BREAKER RATING:200A
LINE SIDE TAP: 100% ALLOWABLE BACKFEED IS =200A

OCPD CALCULATIONS:
INVERTER OVERCURRENT PROTECTION= INVERTER O/P I X CONTINUOUS LOAD(1.25)
=1.35x1.25x35=59.06A=>PV BREAKER = 60A
TOTAL REQUIRED PV BREAKER SIZE / FUSE SIZE=>60A PV BREAKER

ELECTRICAL CALCULATIONS

AC WIRE SIZING CALCULATIONS BASED OF FOLLOWING EQUATIONS >>

- REQUIRED CONDUCTOR AMPACITY: INVERTER OUTPUT CURRENT X #OF INVERTERS = MAX CURRENT PER 690.8(A)(3) X 125% = MAX CURRENT PER 690.8(B)(1)
- CORRECTED AMPACITY CALCULATIONS: AMPACITY X TEMPERATURE DERATE FACTOR X CONDUIT FILL DERATE = DERATED CONDUCTOR AMPACITY PER 690.8(B)(2)
- DERATED CONDUCTOR AMPACITY CHECK: MAX CURRENT PER 690.8(A)(3) < DERATED CONDUCTOR AMPACITY

AC WIRE CALCULATIONS:- MATERIAL:COPPER & TEMPERATURE RATING:90°C

TAG ID	REQUIRED CONDUCTOR AMPACITY									CORRECTED AMPACITY CALCULATION							DERATED CONDUCTOR AMPACITY CHECK		
1	1.35	X	9	=	12.15	X	1.25	=	15.19A	30	X	0.87	X	1	=	26.10A	15.19A	<	26.10A
2	1.35	X	9	=	12.15	X	1.25	=	15.19A	40	X	0.87	X	0.7	=	24.36A	15.19A	<	24.36A
3	1.35	X	35	=	47.25	X	1.25	=	59.06A	95	X	0.87	X	1	=	82.65A	59.06A	<	82.65A

ELECTRICAL NOTES

1.CONDUCTORS EXPOSED TO SUNLIGHT SHALL BE LISTED AS SUNLIGHT RESISTANT PER NEC 310.10(D).
2.CONDUCTORS EXPOSED TO WET LOCATIONS SHALL BE SUITABLE FOR USE IN WET LOCATIONS PER NEC 310.10(C).
3.MAXIMUM DC/AC VOLTAGE DROP SHALL BE NO MORE THAN 2%.
4.ALL CONDUCTORS SHALL BE IN CONDUIT UNLESS OTHERWISE NOTED.
5.BREAKER/FUSE SIZES PER NEC 240.
6.AC EQUIPMENT GROUNDING CONDUCTOR SIZED PER NEC 250.122.
7.AMBIENT TEMPERATURE CORRECTION FACTOR IS BASED ON NEC 690.31(A).
8.AMBIENT TEMPERATURE ADJUSTMENT FACTOR IS BASED ON NEC 310.15(B)(2).
9.MAX. SYSTEM VOLTAGE CORRECTION IS PER NEC 690.7.
10.CONDUCTORS ARE SIZED PER NEC TABLE 310.15(B)(16).

Astrawatt Solar

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ILLUMINE i

SINGLE LINE DIAGRAM

DRAFTED BY: S.VISVESH QC'ED BY: S.KISHORE	PAPER SIZE:17"X11"
SCALE:AS NOTED	REV:B
DATE:8/16/2022	E-01

WARNING PLACARD

⚠ WARNING

ELECTRIC SHOCK HAZARD

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

DC VOLTAGE IS ALWAYS PRESENT WHEN SOLAR MODULES ARE EXPOSED TO SUNLIGHT

LABEL LOCATION
AC DISCONNECT,POINT OF INTERCONNECTION
PER CODE: NEC 690.13

WARNING:PHOTOVOLTAIC POWER SOURCE

LABEL LOCATION
CONDUIT, COMBINER BOX
PER CODE: NEC690.31(G)(3)

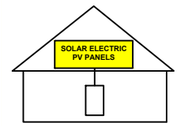
PHOTOVOLTAIC

AC DISCONNECT

LABEL LOCATION
DISCONNECT, POINT OF INTERCONNECTION
PER CODE: NEC690.13(B)

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

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



LABEL LOCATION
AC DISCONNECT
POINT OF INTERCONNECTION
(PER CODE: NEC690.56(C))

PHOTOVOLTAIC SYSTEM AC DISCONNECT SWITCH

RATED AC OPERATING CURRENT 47.25 AMPS AC
AC NOMINAL OPERATING VOLTAGE 240 VAC

LABEL LOCATION
AC DISCONNECT , POINT OF INTERCONNECTION
PER CODE: NEC 690.54

⚠ WARNING

DUAL POWER SOURCE SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

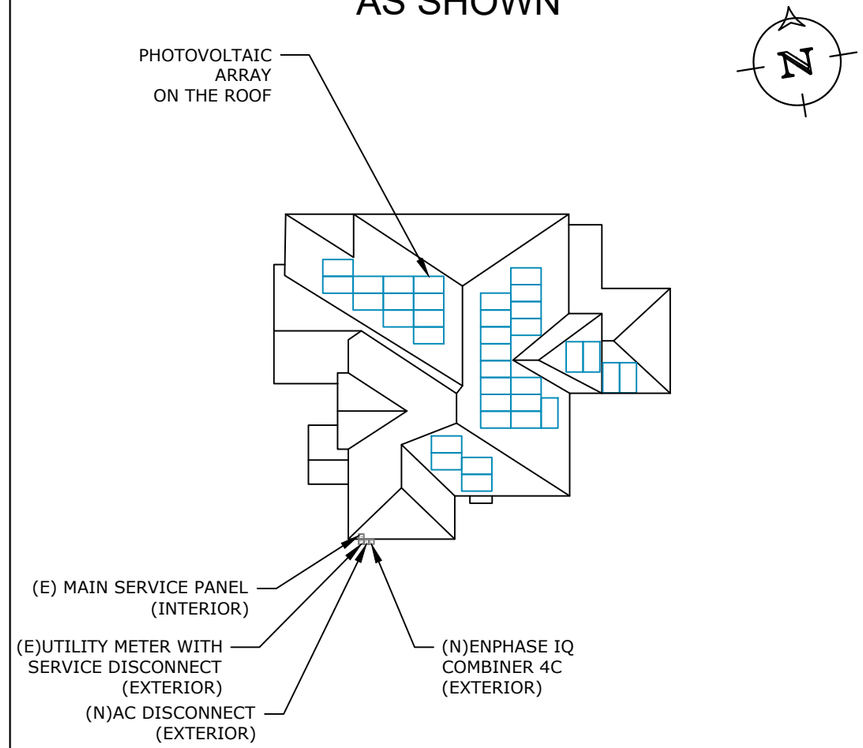
LABEL LOCATION
POINT OF INTERCONNECTION
PER CODE: NEC705.12(B)(3)

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

LABEL LOCATION
INVERTER
[PER CODE: NEC 690.56(C)(3)]

WARNING: ⚠

POWER TO THIS BUILDING IS ALSO SUPPLIED FROM THE FOLLOWING SOURCES WITH DISCONNECTS LOCATED AS SHOWN



4509 SW NAUTILUS PL, LEES SUMMIT, MO 64082, USA

SYSTEM UTILIZES MICRO-INVERTERS LOCATED UNDER EACH SOLAR MODULE

LABEL LOCATION
SERVICE PANEL
PER CODE: NEC 705.10

NOTES:
ALL PLACARDS SHALL BE OF WEATHER PROOF CONSTRUCTION, BACKGROUND ON ALL PLACARDS SHALL BE RED WITH WHITE LETTERING U.O.N.
PLACARD SHALL BE MOUNTED DIRECTLY ON THE EXISTING UTILITY ELECTRICAL SERVICE.
FASTENERS APPROVED BY THE LOCAL JURISDICTION

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ILLUMINE i

WARNING PLACARDS

DRAFTED BY: S.VISVESH QC'ED BY: S.KISHORE	PAPER SIZE:17"X11"
SCALE:AS NOTED	REV:B
DATE:8/16/2022	PL-01

SPEC SHEET

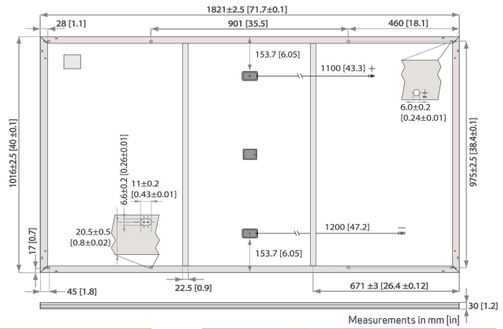
REC ALPHA PURE SERIES

PRODUCT SPECIFICATIONS

SOLAR'S MOST TRUSTED

GENERAL DATA

Cell type:	132 half-cut REC heterojunction bifacial cells with lead-free, gapless technology, 6 strings of 22 cells in series
Glass:	0.13 in (3.2 mm) solar glass with anti-reflective surface treatment in accordance with EN 12150
Backsheet:	Highly resistant polymer (black)
Frame:	Anodized aluminum (black)
Junction box:	3-part, 3 bypass diodes, lead-free IP68 rated, in accordance with IEC 62790
Connectors:	Stäubli MC4 PV-KBT4/KST4 (4 mm²) in accordance with IEC 62852, IP68 only when connected
Cable:	12 AWG (4 mm²) PV wire, 43+ 47 in (1.1 + 1.2 m) in accordance with EN 50618
Dimensions:	71.7 x 40 x 1.2 in (19.91 ft²) / 1821 x 1016 x 30 mm (1.85 m²)
Weight:	45 lbs (20.5 kg)
Origin:	Made in Singapore



Measurements in mm [in]

ELECTRICAL DATA — Product Code*: RECxxxAA Pure

Power Output - P_{MAX} (Wp)	380	385	390	395	400	405	410
Watt Class Sorting - (W)	0/+5	0/+5	0/+5	0/+5	0/+5	0/+5	0/+5
Nominal Power Voltage - V_{MPP} (V)	40.9	41.2	41.5	41.8	42.1	42.4	42.7
Nominal Power Current - I_{MPP} (A)	9.30	9.35	9.40	9.45	9.51	9.56	9.61
Open Circuit Voltage - V_{OC} (V)	48.4	48.5	48.6	48.7	48.8	48.9	49.0
Short Circuit Current - I_{SC} (A)	10.17	10.18	10.22	10.25	10.28	10.30	10.35
Power Density (W/ft²)	19.1	19.3	19.6	19.8	20.1	20.3	20.6
Panel Efficiency (%)	20.5	20.8	21.1	21.4	21.6	21.9	22.2

STC

Power Output - P_{MAX} (Wp)	290	293	297	301	305	309	312
Nominal Power Voltage - V_{MPP} (V)	38.5	38.8	39.1	39.4	39.7	40.0	40.2
Nominal Power Current - I_{MPP} (A)	7.51	7.55	7.59	7.63	7.68	7.72	7.76
Open Circuit Voltage - V_{OC} (V)	45.6	45.7	45.8	45.9	46.0	46.1	46.2
Short Circuit Current - I_{SC} (A)	8.12	8.16	8.20	8.24	8.28	8.32	8.36

NMOT

Values at standard test conditions (STC: air mass AM 1.5, irradiance 10.75 W/sq ft (1000 W/m²), temperature 77°F (25°C), based on a production spread with a tolerance of P_{MAX}, V_{OC} & I_{SC} ±3% within one watt class. Nominal module operating temperature (NMOT: air mass AM 1.5, irradiance 800 W/m², temperature 68°F (20°C), windspeed 3.3 ft/s (1 m/s). *Where xxx indicates the nominal power class (P_{MAX}) at STC above.

MAXIMUM RATINGS

Operational temperature:	-40 ... +85°C
Maximum system voltage:	1000 V
Maximum test load (front):	+7000 Pa (146 lbs/ft²)*
Maximum test load (rear):	-4000 Pa (83.5 lbs/ft²)*
Max series fuse rating:	25 A
Max reverse current:	25 A

*See installation manual for mounting instructions. Design load = Test load / 1.5 (safety factor)

WARRANTY

	Standard	REC ProTrust	
Installed by an REC Certified Solar Professional	No	Yes	Yes
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%

See warranty documents for details. Conditions apply

CERTIFICATIONS

IEC 61215:2016, IEC 61730:2016, UL 61730	
IEC 62804	PID
IEC 61701	Salt Mist
IEC 62716	Ammonia Resistance
UL 61730	Fire Type Class 2
IEC 62782	Dynamic Mechanical Load
IEC 61215-2:2016	Hailstone (35mm)
IEC 62321	Lead-free acc. to RoHS EU 863/2015
ISO 14001, ISO 9001, IEC 45001, IEC 62941	

Lead-Free

TEMPERATURE RATINGS*

Nominal Module Operating Temperature:	44°C (±2°C)
Temperature coefficient of P_{MAX}:	-0.26 %/°C
Temperature coefficient of V_{OC}:	-0.24 %/°C
Temperature coefficient of I_{SC}:	0.04 %/°C

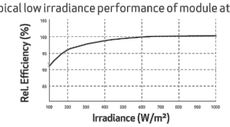
*The temperature coefficients stated are linear values

DELIVERY INFORMATION

Panels per pallet:	33
Panels per 40 ft GP/high cube container:	792 (24 pallets)
Panels per 53 ft truck:	891 (27 pallets)

LOW LIGHT BEHAVIOUR

Typical low irradiance performance of module at STC:



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.

www.recgroup.com

Specifications subject to change without notice.

Ref: PM-DS-12-06-Rev- G 04.22

Astrawatt Solar

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AHJ:MO-CITY OF LEE'S SUMMIT

UTILITY:KCPL-M

PRN NUMBER:RGS-59369

ILLUMINE i

MODULE SPEC SHEET

DRAFTED BY: S.VISVESH QC'ED BY: S.KISHORE	PAPER SIZE:17"X11"
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DATE:8/16/2022	SS-01

ENPHASE.

DATA SHEET

IQ8 Series Microinverters

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

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

Enphase 25 year limited warranty

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

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

UL CERTIFIED SAFETY

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

Easy to install

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

High productivity and reliability

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

Microgrid-forming

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

IQ8 Series Microinverters

INPUT DATA (DC)		IQ8-60-2-US	IQ8PLUS-72-2-US	IQ8M-72-2-US	IQ8A-72-2-US	IQ8H-240-72-2-US	IQ8H-208-72-2-US[1]
Commonly used module pairings[2]	W	235 – 350	235 – 440	260 – 460	295 – 500	320 – 540+	295 – 500+
Module compatibility		60-cell/120 half-cell	60-cell/120 half-cell and 72-cell/144 half-cell				
MPPT voltage range	V	27 – 37	29 – 45	33 – 45	36 – 45	38 – 45	38 – 45
Operating range	V	25 – 48	25 – 58				
Min/max start voltage	V	30 / 48	30 / 58				
Max input DC voltage	V	50	60				
Max DC current[3] [module Isc]	A	15					
Overvoltage class DC port		II					
DC port backfeed current	mA	0					
PV array configuration		1x1 Ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit					
OUTPUT DATA (AC)		**IQ8-60-2-US**	**IQ8PLUS-72-2-US**	**IQ8M-72-2-US**	**IQ8A-72-2-US**	**IQ8H-240-72-2-US**	**IQ8H-208-72-2-US**
Peak output power	VA	245	300	330	366	384	366
Max continuous output power	VA	240	290	325	349	380	360
Nominal (L-L) voltage/range[4]	V	240 / 211 – 264					208 / 183 – 250
Max continuous output current	A	1.0	1.21	1.35	1.45	1.58	1.73
Nominal frequency	Hz	60					
Extended frequency range	Hz	50 – 68					
Max units per 20 A (L-L) branch circuit[5]		16	13	11	11	10	9
Total harmonic distortion		<5%					
Overvoltage class AC port		III					
AC port backfeed current	mA	30					
Power factor setting		1.0					
Grid-tied power factor (adjustable)		0.85 leading – 0.85 lagging					
Peak efficiency	%	97.5	97.6	97.6	97.6	97.6	97.4
CEC weighted efficiency	%	97	97	97	97.5	97	97
Night-time power consumption	mW	60					
MECHANICAL DATA							
Ambient temperature range		-40°C to +60°C (-40°F to +140°F)					
Relative humidity range		4% to 100% (condensing)					
DC Connector type		MC4					
Dimensions (HxWxD)		212 mm (8.3") x 175 mm (6.9") x 30.2 mm (1.2")					
Weight		1.08 kg (2.38 lbs)					
Cooling		Natural convection – no fans					
Approved for wet locations		Yes					
Acoustic noise at 1 m		<60 dBA					
Pollution degree		PD3					
Enclosure		Class II double-insulated, corrosion resistant polymeric enclosure					
Environ. category / UV exposure rating		NEMA Type 6 / outdoor					
COMPLIANCE							
Certifications		CA Rule 21 (UL 1741-SA), UL 62109-1, UL1741/IEEE1547, 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 Shut Down Equipment and conforms with NEC 2014, NEC 2017, and NEC 2020 section 690.12 and C22.1-2018 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according to manufacturer's instructions.					

(1) The IQ8H-208 variant will be operating in grid-tied mode only at 208V AC. (2) No enforced DC/AC ratio. See the compatibility calculator at https://link.enphase.com/module-compatibility (3) Maximum continuous input DC current is 10.6A (4) Nominal voltage range can be extended beyond nominal if required by the utility. (5) Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

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ILLUMINE i

INVERTER SPEC SHEET

DRAFTED BY: S.VISVESH QC'ED BY: S.KISHORE	PAPER SIZE:17"X11"
SCALE:AS NOTED	REV:B
DATE:8/16/2022	SS-02

SPEC SHEET

Data Sheet
Enphase Networking

Enphase IQ Combiner 4/4C

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

X-IQ-AM1-240-4C

X-IQ-AM1-240-4

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

Smart

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

Simple

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

Reliable

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

LISTED

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

ENPHASE.

Enphase IQ Combiner 4/4C

MODEL NUMBER	
IQ Combiner 4 (X-IQ-AM1-240-4)	IQ Combiner 4 with Enphase IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Includes a silver solar shield to match the IQ Battery system and IQ System Controller 2 and to deflect heat.
IQ Combiner 4C (X-IQ-AM1-240-4C)	IQ Combiner 4C with Enphase IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Includes Enphase Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05), a plug-and-play industrial-grade cell modem for systems up to 60 microinverters. (Available in the US, Canada, Mexico, Puerto Rico, and the US Virgin Islands, where there is adequate cellular service in the installation area.) Includes a silver solar shield to match the IQ Battery and IQ System Controller and to deflect heat.
ACCESSORIES AND REPLACEMENT PARTS	(not included, order separately)
Ensemble Communications Kit COMMS-CELLMODEM-M1-06 CELLMODEM-M1-06-SP-05 CELLMODEM-M1-06-AT-05	- Includes COMMS-KIT-01 and CELLMODEM-M1-06-SP-05 with 5-year Sprint data plan for Ensemble sites - 4G based LTE-M1 cellular modem with 5-year Sprint data plan - 4G based LTE-M1 cellular modem with 5-year AT&T data plan
Circuit Breakers BRK-10A-2-240V BRK-15A-2-240V BRK-20A-2P-240V BRK-15A-2P-240V-B BRK-20A-2P-240V-B	Supports Eaton BR210, BR215, BR220, BR230, BR240, BR250, and BR260 circuit breakers. Circuit breaker, 2 pole, 10A, Eaton BR210 Circuit breaker, 2 pole, 15A, Eaton BR215 Circuit breaker, 2 pole, 20A, Eaton BR220 Circuit breaker, 2 pole, 15A, Eaton BR215B with hold down kit support Circuit breaker, 2 pole, 20A, Eaton BR220B with hold down kit support
EPLC-01	Power line carrier (communication bridge pair), quantity - one pair
XA-SOLARSHIELD-ES	Replacement solar shield for IQ Combiner 4/4C
XA-PLUG-120-3	Accessory receptacle for Power Line Carrier in IQ Combiner 4/4C (required for EPLC-01)
XA-ENV-PCBA-3	Replacement IQ Gateway printed circuit board (PCB) for Combiner 4/4C
X-IQ-NA-HD-125A	Hold down kit for Eaton circuit breaker with screws.
ELECTRICAL SPECIFICATIONS	
Rating	Continuous duty
System voltage	120/240 VAC, 60 Hz
Eaton BR series busbar rating	125 A
Max. continuous current rating	65 A
Max. continuous current rating (input from PV/storage)	64 A
Max. fuse/circuit rating (output)	90 A
Branch circuits (solar and/or storage)	Up to four 2-pole Eaton BR series Distributed Generation (DG) breakers only (not included)
Max. total branch circuit breaker rating (input)	80A of distributed generation / 95A with IQ Gateway breaker included
Production metering CT	200 A solid core pre-installed and wired to IQ Gateway
Consumption monitoring CT (CT-200-SPLIT)	A pair of 200 A split core current transformers
MECHANICAL DATA	
Dimensions (WxHxD)	37.5 x 49.5 x 16.8 cm (14.75" x 19.5" x 6.63"). Height is 21.06" (53.5 cm) with mounting brackets.
Weight	7.5 kg (16.5 lbs)
Ambient temperature range	-40° C to +46° C (-40° to 115° F)
Cooling	Natural convection, plus heat shield
Enclosure environmental rating	Outdoor, NRTL-certified, NEMA type 3R, polycarbonate construction
Wire sizes	• 20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors • 60 A breaker branch input: 4 to 1/0 AWG copper conductors • Main lug combined output: 10 to 2/0 AWG copper conductors • Neutral and ground: 14 to 1/0 copper conductors Always follow local code requirements for conductor sizing.
Altitude	To 2000 meters (6,560 feet)
INTERNET CONNECTION OPTIONS	
Integrated Wi-Fi	802.11b/g/n
Cellular	CELLMODEM-M1-06-SP-05, CELLMODEM-M1-06-AT-05 (4G based LTE-M1 cellular modem). Note that an Enphase Mobile Connect cellular modem is required for all Ensemble installations.
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included)
COMPLIANCE	
Compliance, IQ Combiner	UL 1741, CAN/CSA C22.2 No. 107.1, 47 CFR, Part 15, Class B, ICES 003 Production metering: ANSI C12.20 accuracy class 0.5 (PV production) Consumption metering: accuracy class 2.5
Compliance, IQ Gateway	UL 60601-1/CANCSA 22.2 No. 61010-1

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

ENPHASE.

Astrawatt Solar

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PRN NUMBER:RGS-59369

ILLUMINE i

COMBINER SPEC SHEET

DRAFTED BY: S.VISVESH QC'ED BY: S.KISHORE	PAPER SIZE:17"X11"
SCALE:AS NOTED	REV:B
DATE:8/16/2022	SS-03

SPEC SHEET

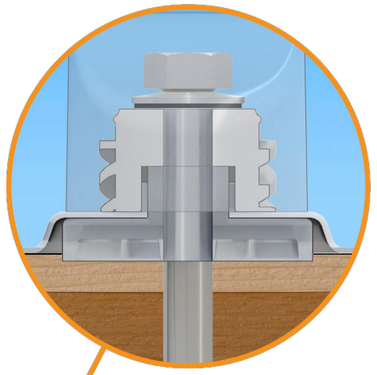
Tech Brief

IRONRIDGE

FlashFoot2

The Strongest Attachment in Solar

IronRidge FlashFoot2 raises the bar in solar roof protection. The unique water seal design is both elevated and encapsulated, delivering redundant layers of protection against water intrusion. In addition, the twist-on Cap perfectly aligns the rail attachment with the lag bolt to maximize mechanical strength.

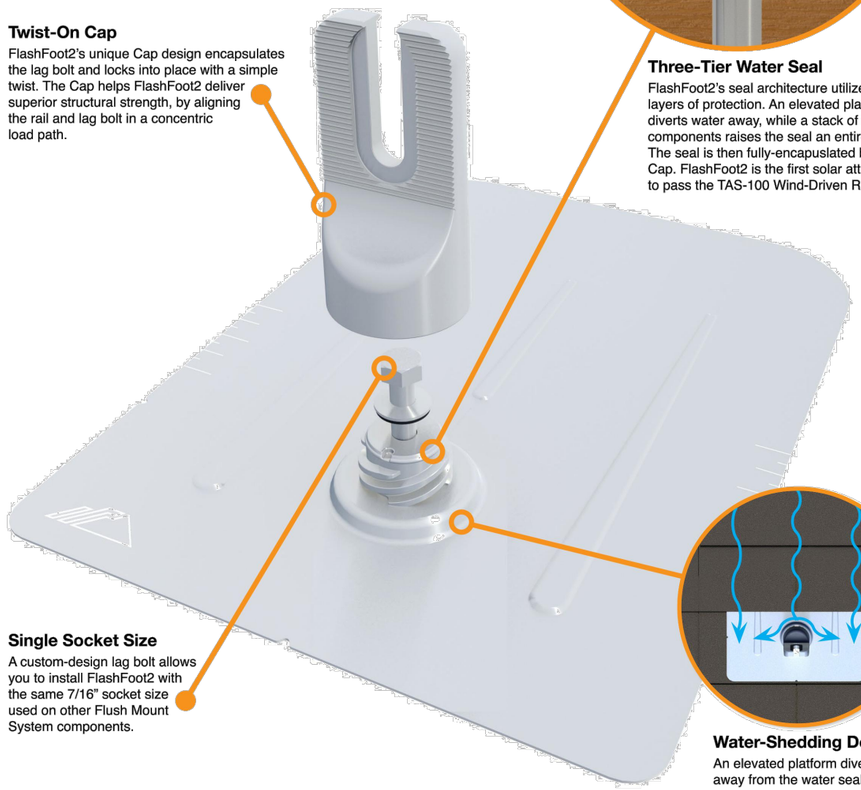


Three-Tier Water Seal

FlashFoot2's seal architecture utilizes three layers of protection. An elevated platform diverts water away, while a stack of rugged components raises the seal an entire inch. The seal is then fully-encapuslated by the Cap. FlashFoot2 is the first solar attachment to pass the TAS-100 Wind-Driven Rain Test.

Twist-On Cap

FlashFoot2's unique Cap design encapsulates the lag bolt and locks into place with a simple twist. The Cap helps FlashFoot2 deliver superior structural strength, by aligning the rail and lag bolt in a concentric load path.



Single Socket Size

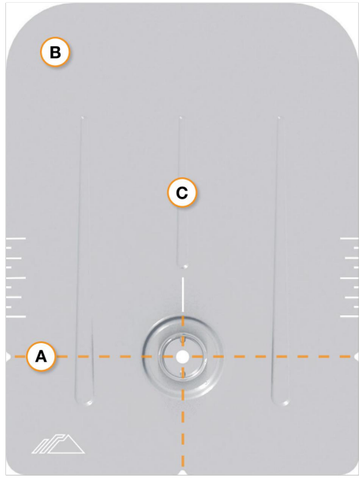
A custom-design lag bolt allows you to install FlashFoot2 with the same 7/16" socket size used on other Flush Mount System components.

Water-Shedding Design

An elevated platform diverts water away from the water seal.

Tech Brief

Installation Features



A Alignment Markers

Quickly align the flashing with chalk lines to find pilot holes.

B Rounded Corners

Makes it easier to handle and insert under the roof shingles.

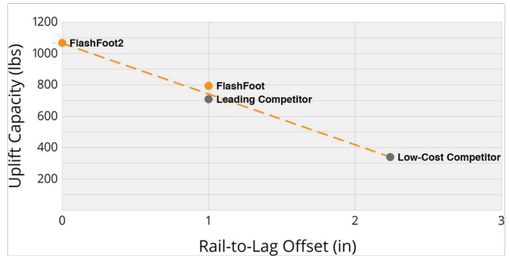
C Reinforcement Ribs

Help to stiffen the flashing and prevent any bending or crinkling during installation.

Benefits of Concentric Loading

Traditional solar attachments have a horizontal offset between the rail and lag bolt, which introduces leverage on the lag bolt and decreases uplift capacity.

FlashFoot2 is the only product to align the rail and lag bolt. This concentric loading design results in a stronger attachment for the system.



Testing & Certification

Structural Certification

Designed and Certified for Compliance with the International Building Code & ASCE/SEI-7.

Water Seal Ratings

Water Sealing Tested to UL 441 Section 27 "Rain Test" and TAS 100-95 "Wind Driven Rain Test" by Intertek. Ratings applicable for composition shingle roofs having slopes between 2:12 and 12:12.

UL 2703

Conforms to UL 2703 Mechanical and Bonding Requirements. See Flush Mount Install Manual for full ratings.

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MOUNT SPEC SHEET

DRAFTED BY: S.VISVESH QC'ED BY: S.KISHORE	PAPER SIZE:17"X11"
SCALE:AS NOTED	REV:B
DATE:8/16/2022	SS-04

SPEC SHEET

Tech Brief

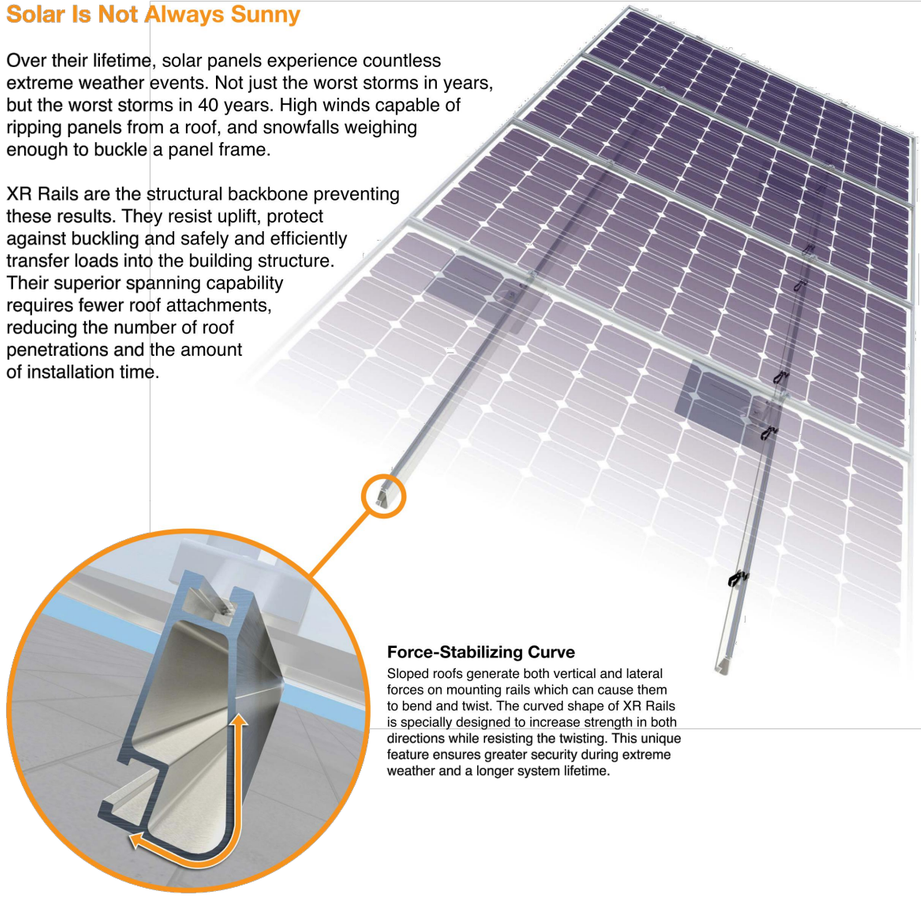
IRONRIDGE

XR Rail Family

Solar Is Not Always Sunny

Over their lifetime, solar panels experience countless extreme weather events. Not just the worst storms in years, but the worst storms in 40 years. High winds capable of ripping panels from a roof, and snowfalls weighing enough to buckle a panel frame.

XR Rails are the structural backbone preventing these results. They resist uplift, protect against buckling and safely and efficiently transfer loads into the building structure. Their superior spanning capability requires fewer roof attachments, reducing the number of roof penetrations and the amount of installation time.



Force-Stabilizing Curve

Sloped roofs generate both vertical and lateral forces on mounting rails which can cause them to bend and twist. The curved shape of XR Rails is specially designed to increase strength in both directions while resisting the twisting. This unique feature ensures greater security during extreme weather and a longer system lifetime.

Compatible with Flat & Pitched Roofs

XR Rails are compatible with FlashFoot and other pitched roof attachments.

IronRidge offers a range of tilt leg options for flat roof mounting applications.

Corrosion-Resistant Materials

All XR Rails are made of marine-grade aluminum alloy, then protected with an anodized finish. Anodizing prevents surface and structural corrosion, while also providing a more attractive appearance.

Tech Brief

XR Rail Family

The XR Rail Family offers the strength of a curved rail in three targeted sizes. Each size supports specific design loads, while minimizing material costs. Depending on your location, there is an XR Rail to match.

XR10

XR10 is a sleek, low-profile mounting rail, designed for regions with light or no snow. It achieves 6 foot spans, while remaining light and economical.

- 6' spanning capability
- Moderate load capability
- Clear anodized finish
- Internal splices available

XR100

XR100 is the ultimate residential mounting rail. It supports a range of wind and snow conditions, while also maximizing spans up to 8 feet.

- 8' spanning capability
- Heavy load capability
- Clear & black anodized finish
- Internal splices available

XR1000

XR1000 is a heavyweight among solar mounting rails. It's built to handle extreme climates and spans 12 feet or more for commercial applications.

- 12' spanning capability
- Extreme load capability
- Clear anodized finish
- Internal splices available

Rail Selection

The following table was prepared in compliance with applicable engineering codes and standards. Values are based on the following criteria: ASCE 7-10, Roof Zone 1, Exposure B, Roof Slope of 7 to 27 degrees and Mean Building Height of 30 ft. Visit IronRidge.com for detailed span tables and certifications.

Load		Rail Span					
Snow (PSF)	Wind (MPH)	4'	5' 4"	6'	8'	10'	12'
None	100	XR10		XR100		XR1000	
	120						
	140						
	160						
10-20	100						
	120						
	140						
	160						
30	100						
	160						
40	100						
	160						
50-70	160						
80-90	160						

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RAIL SPEC SHEET

DRAFTED BY: S.VISVESH QC'ED BY: S.KISHORE	PAPER SIZE:17"X11"
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SPEC SHEET

INFORMATION SHEET

KUP-L-Tap, Insul-Eater Single Use Insulation Piercing Connectors

1) Specifications:
   Conductors - Class B or C Aluminum and or Copper wires
   Temperature rating - 90°C

Item ID	Run	Tap	Torque (in-lbs)	Tools (Socket & Box wrenches)	Voltage
IPC-1/0-2	1/0 - 8 AWG	#2 - #8 AWG	192	1/2"	300 (480 grounded Y system)
IPC-4/0-6	4/0 - #4 AWG	#6 - #14 AWG	156	1/2"	600
IPC-4/0-2/0 * +	4/0 - #2 AWG	2/0 - #6 AWG	300	1/2"	600
IPC-250-4/0 * #	250 kcmil-#1 AWG	4/0 - #6 AWG	360	5/8"	600
IPC-350-4/0	350 kcmil-4/0	4/0 - #10 AWG	300	5/8"	300 (480 grounded Y system)
IPC-350-350	350 kcmil-4/0	350 kcmil-4/0	300	5/8"	300 (480 grounded Y system)
IPC-500-12	500-250 kcmil	#10-#12 AWG	300	5/8"	300 (480 grounded Y system)
IPC-500-250	500-250 kcmil	250 - #4 AWG	720	5/8" & 11/16"	600
IPC-500-500 *	500-300 kcmil	500-250 kcmil	900	7/8"	600
IPC-750-500 *	750-500kcmil	500-350kcmil	900	7/8"	600

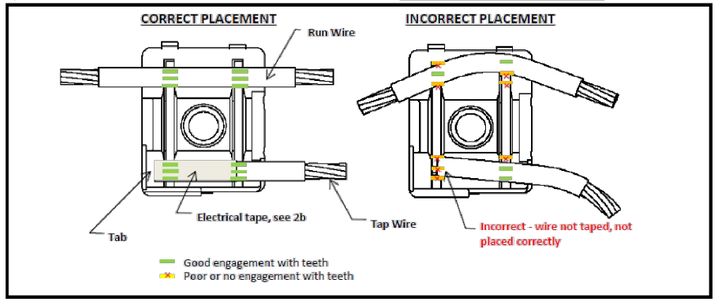
* Can be used on bare wire or bare & insulated wire combinations
  * - When used on bare conductor, break out the tabs and extend wire 1.5 - 2" beyond the connector body.
+ Tap side is limited to .528" OD including the insulation.
# Max OD on the main is .730" inculding insulation

-IPC-250-4/0 & IPC-4/0-2/0- To insure the top and bottom are aligned -There are lines on the side of the connector to help.

2) Installation Instructions For Use as a Run and Tap:
   a) Remove the tab blocking the **Main** conductor groove with screwdriver or **pliers.**
      - Tap must be broken cleanly to the bottom of the channel.
   b) Cut insulated cable end **squarely** and apply a crisscrossed layer of UL listed electrical **tape over the exposed end of the wire.**
      Tape the exposed wire end with Two pieces of **tape** measuring approximately three inches long.
   c) **Separate** the connector halves by loosening the bolt.
   d) Slide the connector over the run conductor.
   e) Insert the **tap** conductor until it **butts** up against the **tab.**
      BE SURE THE TAP CONDUCTOR IS ALL THE WAY THROUGH THE CONNECTOR.
   f) Center both conductors over the piercing teeth, and finger tighten the bolt.
      - (Refer to the diagram below for correct placement of conductors)
   g) Holding the connector firmly in your hand, tighten the bolt to the **torque** in the above table.

Click For YouTube Video

3) Additional Information
   a) Connector can be used on **BUILDING CODE (Stranded CLASS B or C)** wire either copper and/or aluminum conductors
   b) The Insul-Eater is **fully** insulated without an external cover or tape
   c) The Insul-Eater connector should not be installed when **tap conductor is under load**



Form 73
Revised 6-15-2016

Astrawatt Solar

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APN:030-305-000-000-002-017

AHJ:MO-CITY OF LEE'S SUMMIT

UTILITY:KCPL-M

PRN NUMBER:RGS-59369

ILLUMINE i

TAP CONNECTOR SPEC SHEET

DRAFTED BY: S.VISVESH QC'ED BY: S.KISHORE	PAPER SIZE:17"X11"
SCALE:AS NOTED	REV:B
DATE:8/16/2022	SS-06

SPEC SHEET

Tech Brief

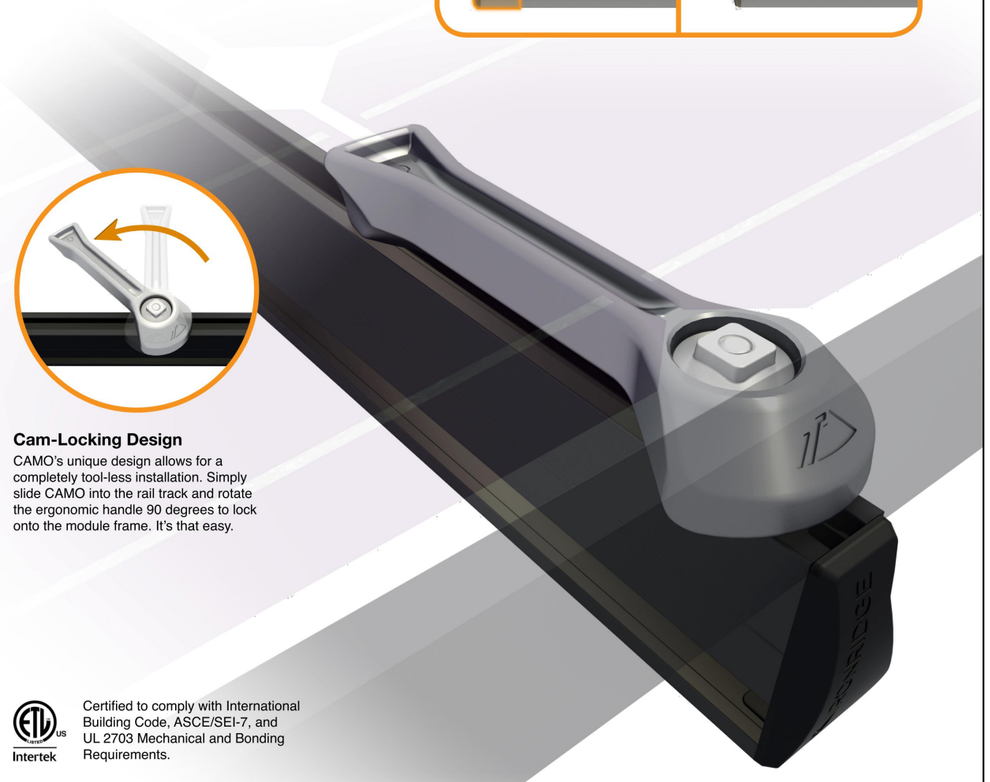
IRONRIDGE

Hidden End Cam

Solar, Sleeker Than Ever

Most solar installations use mounting rails and fasteners to secure modules to the building structure, but these critical components often protrude from the sides of the modules, giving arrays a coarse look.

CAMO is an invisible fastener that secures solar modules flush to rail ends, creating a clean, sleek appearance. CAMO works with nearly all solar modules and installs without tools or torque specifications. It simply rotates into place to structurally secure and electrically bond with the module.



Cam-Locking Design

CAMO's unique design allows for a completely tool-less installation. Simply slide CAMO into the rail track and rotate the ergonomic handle 90 degrees to lock onto the module frame. It's that easy.

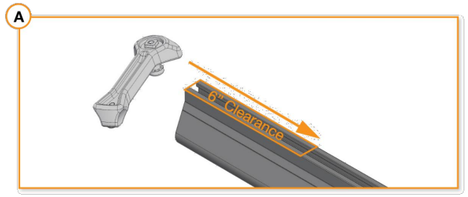
Certified to comply with International Building Code, ASCE/SEI-7, and UL 2703 Mechanical and Bonding Requirements.

Tech Brief

Easy, Tool-Less Installation

A. PLACE CAMO

Slide CAMO into rail track far enough to clear the module frame. CAMO requires 6" of clearance from end of rail.

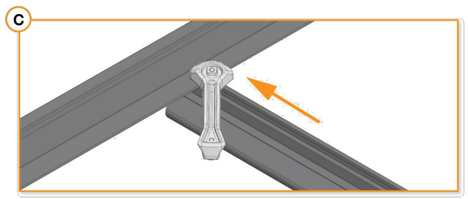


B. PLACE MODULE

Place module on rails and align flush with rail ends (module cells not shown in image to provide clarity). The module can overhang the rail no more than 1/4".

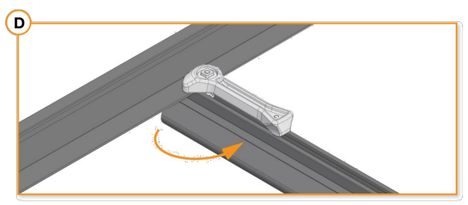
C. SLIDE CAMO

Pull CAMO towards rail end, at a 45 degree angle, so linear bonding pin contacts the module flange edge.

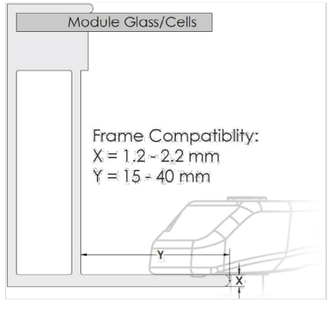


D. SECURE CAMO

Rotate handle with an upwards motion until CAMO snaps into rail track. Ensure CAMO bonding pins are fully seated on top of module frame.



Tested & Certified



UL 2703

CAMO conforms to STD UL 2703 (2015) requirements and fits modules with bottom flanges that meet specifications shown in the frame compatibility diagram on the left.

See IronRidge Installation Manuals for full ratings and a list of certified compatible modules.

Intertek

Astrawatt Solar

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ILLUMINE i

CAMO SPEC SHEET

DRAFTED BY: S.VISVESH QC'ED BY: S.KISHORE	PAPER SIZE:17"X11"
SCALE:AS NOTED	REV:B
DATE:8/16/2022	SS-07

SPEC SHEET

Tech Brief

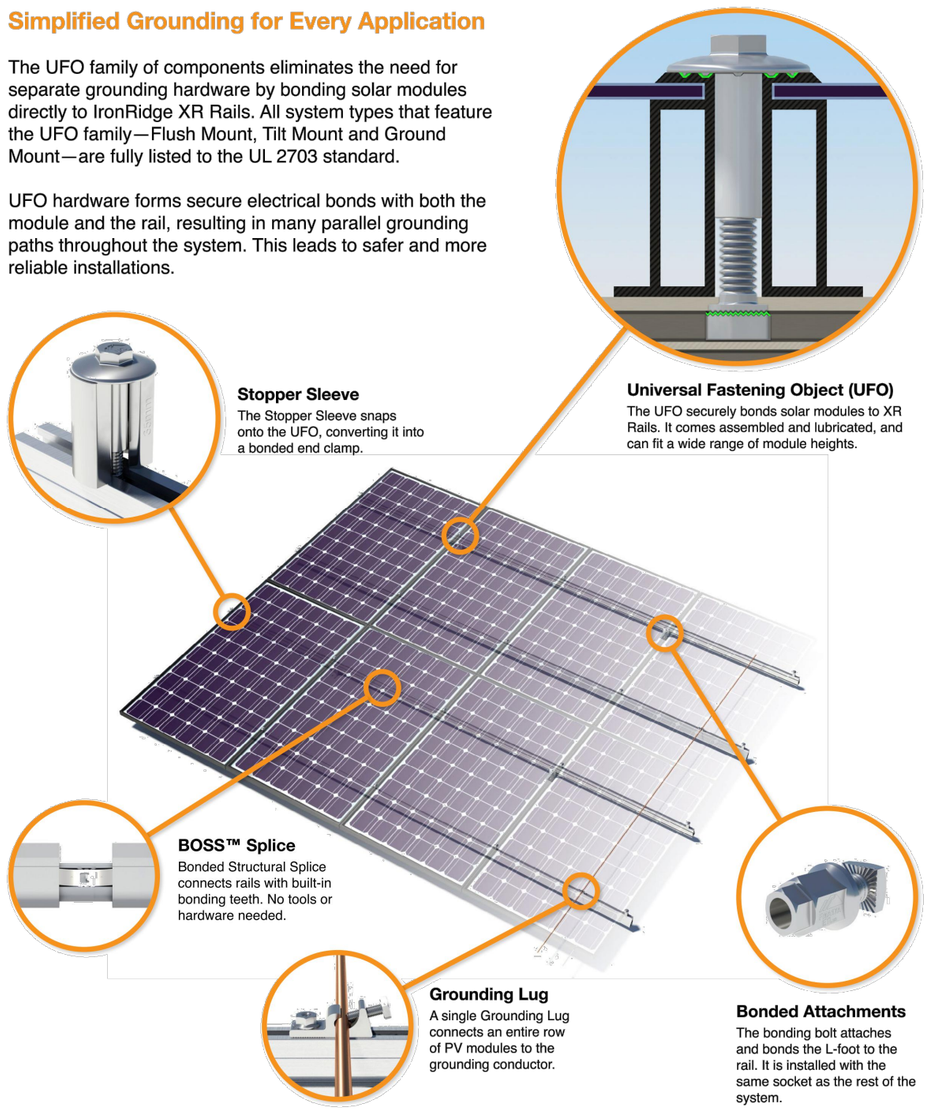
IRONRIDGE

UFO Family of Components

Simplified Grounding for Every Application

The UFO family of components eliminates the need for separate grounding hardware by bonding solar modules directly to IronRidge XR Rails. All system types that feature the UFO family—Flush Mount, Tilt Mount and Ground Mount—are fully listed to the UL 2703 standard.

UFO hardware forms secure electrical bonds with both the module and the rail, resulting in many parallel grounding paths throughout the system. This leads to safer and more reliable installations.



Stopper Sleeve
The Stopper Sleeve snaps onto the UFO, converting it into a bonded end clamp.

Universal Fastening Object (UFO)
The UFO securely bonds solar modules to XR Rails. It comes assembled and lubricated, and can fit a wide range of module heights.

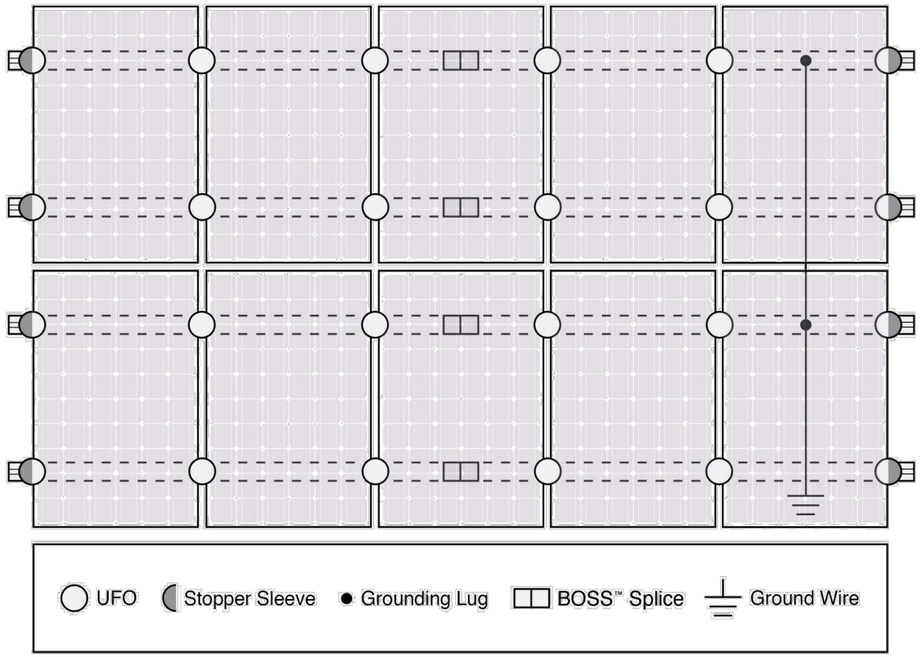
BOSS™ Splice
Bonded Structural Splice connects rails with built-in bonding teeth. No tools or hardware needed.

Grounding Lug
A single Grounding Lug connects an entire row of PV modules to the grounding conductor.

Bonded Attachments
The bonding bolt attaches and bonds the L-foot to the rail. It is installed with the same socket as the rest of the system.

Tech Brief

System Diagram



Approved Enphase microinverters can provide equipment grounding of IronRidge systems, eliminating the need for grounding lugs and field installed equipment ground conductors (EGC). A minimum of two microinverters mounted to the same rail and connected to the same Engage cable is required. Refer to installation manuals for additional details.

UL Certification

The IronRidge Flush Mount, Tilt Mount, and Ground Mount Systems have been listed to UL 2703 by Intertek Group plc.

UL 2703 is the standard for evaluating solar mounting systems. It ensures these devices will maintain strong electrical and mechanical connections over an extended period of time in extreme outdoor environments.

Go to IronRidge.com/UFO

Cross-System Compatibility

Feature	Flush Mount	Tilt Mount	Ground Mount
XR Rails	✔	✔	XR100 & XR1000
UFO/Stopper	✔	✔	✔
BOSS™ Splice	✔	✔	N/A
Grounding Lugs	1 per Row	1 per Row	1 per Array
Microinverters & Power Optimizers	Compatible with most MLPE manufacturers. Refer to system installation manual.		
Fire Rating	Class A	Class A	N/A
Modules	Tested or Evaluated with over 400 Framed Modules Refer to installation manuals for a detailed list.		

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