

PHOTOVOLTAIC GROUND MOUNT SYSTEM

64 MODULES - SYSTEM SIZE STC (26.880 kW DC / 24.576 kW AC)
1822 LAKE ROAD, WEBSTER, NY 14580, USA (43.274096, -77.3814947)

SYSTEM SUMMARY STC (26.880 kW DC / 24.576 kW AC)

- STC DC: (64) 420W = 26.880 kW
STC AC: (64) 384W = 24.576 kW
- (64) SILFAB SOLAR INC. SIL-420 BG MODULES
 - (64) ENPHASE ENERGY INC. IQ8H-240-72-2-US [240V] MICROINVERTERS
 - 8x BRANCH OF 8 CONNECTED IN PARALLEL

GOVERNING CODES

- 2020 NEW YORK STATE FIRE CODE
- 2020 BUILDING CODE OF NEW YORK STATE
- 2020 NEW YORK STATE RESIDENTIAL CODE
- 2017 NFPA 70 - NATIONAL ELECTRICAL CODE

GENERAL NOTES

- ALL PANELS, SWITCHES, ETC. SHALL HAVE SUFFICIENT GUTTER SPACE AND LUGS IN COMPLIANCE WITH UL REQUIREMENTS TO ACCOMMODATE CONDUCTORS SHOWN.
- THIS SYSTEM WILL NOT BE INTERCONNECTED UNTIL APPROVAL FROM THE LOCAL JURISDICTION AND UTILITY IS OBTAINED.
- ALL EXTERIOR ELECTRICAL DEVICES AND EQUIPMENT INCLUDING THOSE THAT ARE EXPOSED TO OUTSIDE ENVIRONMENT SHALL BE WEATHERPGROUND AND SHALL BE LISTED BY 'UL' FOR THE TYPE OF APPLICATION AND 'UL' LABEL SHALL APPEAR ON ALL ELECTRICAL EQUIPMENT.
- WIRING METHOD SHALL BE EMT ABOVE GROUND MOUNTED IN CONCEALED SPACES (UNLESS APPROVED OTHERWISE) AND SCHEDULE-40 PVC FOR BELOW GROUND INSTALLATIONS UNLESS NOTED OTHERWISE.
- AN OSHA APPROVED LADDER PROVIDING ACCESS TO ALL PORTIONS OF THE ARRAY SHALL BE SECURED IN PRIOR TO REQUESTING INSPECTION.
- IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSTALL A SUPPLEMENTAL GROUNDING ELECTRODE CONDUCTOR IF NECESSARY.

LEGEND

NEW PV MODULE

FRONT OF HOUSE

DIMENSIONS

PROPERTY LINE

JB1 AC JUNCTION BOX (NEW)

JB2 AC JUNCTION BOX (NEW)

CBA AC COMBINER PANEL (NEW)

DA AC DISCONNECT FUSED (NEW)

MSP MAIN SERVICE PANEL (EXISTING, 200A)

PM REVENUE GRADE METER (NEW)

UM UTILITY METER (EXISTING)

GT IQ GATEWAY (NEW)

FENCE

GATE

DRIVEWAY

OBSTRUCTION

SITE PLAN
SCALE: 1/100"=1'-0"

LAKE ROAD

SHEET INDEX

PV-1	COVER PAGE
PV-2	GROUND MOUNT PLAN WITH MODULES
PV-3	RACKING DETAIL
PV-3.1	ATTACHMENT DETAIL
PV-4	SINGLE LINE DIAGRAM
PV-5	WIRING CALCULATION
PV-6	PLACARDS
PV-7+	EQUIPMENT SPECIFICATION

AHJ: WEBSTER (TOWNSHIP OF), NEW YORK
UTILITY: ROCHESTER GAS & ELECTRIC CORP

HOUSE PHOTO
SCALE: NTS

VICINITY MAP
SCALE: NTS

CONTRACTOR: ACES
ADDRESS: 7288 RUSH LIMA RD,
HONEOYE FALLS, NY 14472,USA
PHONE: 15859357186
EMAIL: Steve@aces-energy.com
LICENSE #: N/A in New York State

REVISIONS

DESCRIPTION	DATE	REV

SIGNATURE & SEAL

HOMEOWNER INFO

DAVID STERN
1822 LAKE ROAD, WEBSTER, NY
14580, USA
APN: 037.03-1-33.1 PHONE: +15857037612
EMAIL: dstern@elliottstern.com

SHEET NAME

COVER PAGE

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-1

MODULE AREA & WEIGHT CALCULATIONS

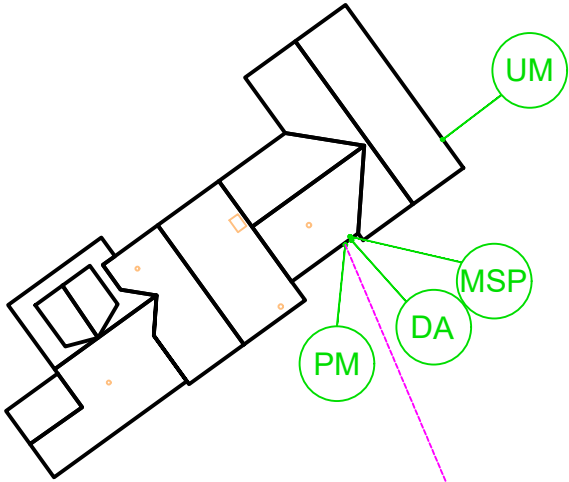
- PV PANELS (COUNT, AREA, WEIGHT):
- (64x) SILFAB SOLAR INC. SIL-420 BG (73.4" x 40.5", 45.8 LB)
- MICRO-INVERTERS (COUNT, WEIGHT):
- (64x) ENPHASE ENERGY INC. IQ8H-240-72-2-US [240V] (2.43 LB)

BILL OF MATERIALS		
EQUIPMENT	QTY	DESCRIPTION
SOLAR PV MODULES	64	SILFAB SOLAR INC. SIL-420 BG
MICRO INVERTERS	64	ENPHASE ENERGY INC. IQ8H-240-72-2-US [240V]
JUNCTION BOX (AC)	2	JUNCTION BOX 600V, NEMA 3R UL LISTED
LOAD CENTER (AC)	1	AC COMBINER PANEL
IQ GATEWAY	1	ENPHASE IQ GATEWAY
PRODUCTION METER	1	REVENUE GRADE METER
AC DISCONNECT	1	PV VISIBLE LOCKABLE LABELED DISCONNECT (200A FUSED 1PH 240VAC)
ATTACHMENTS	-	KRINNER G76X2100-4XM16 - REFER TO PAGE NO.(PV-11 TO PV-16.1)

GROUND MOUNT DESCRIPTION		
ARRAY	ARRAY TILT	AZIMUTH
#1	30°	165°

DESIGN CRITERIA

- EXPOSURE CATEGORY = C
- WIND SPEED = 110 MPH
- SNOW LOAD = 40 PSF



LEGEND

NEW PV MODULE

FIRE SETBACK

OPTIMIZER

MICRO-INVERTER

GROUND ATTACHMENT

FRONT OF HOUSE

RAFTER/TRUSS

RAIL

CONDUIT

OBSTRUCTION

JB1
AC JUNCTION BOX
(NEW)

JB2
AC JUNCTION BOX
(NEW)

CBA
AC COMBINER PANEL
(NEW)

DA
AC DISCONNECT FUSED
(NEW)

MSP
MAIN SERVICE PANEL
(EXISTING, 200A)

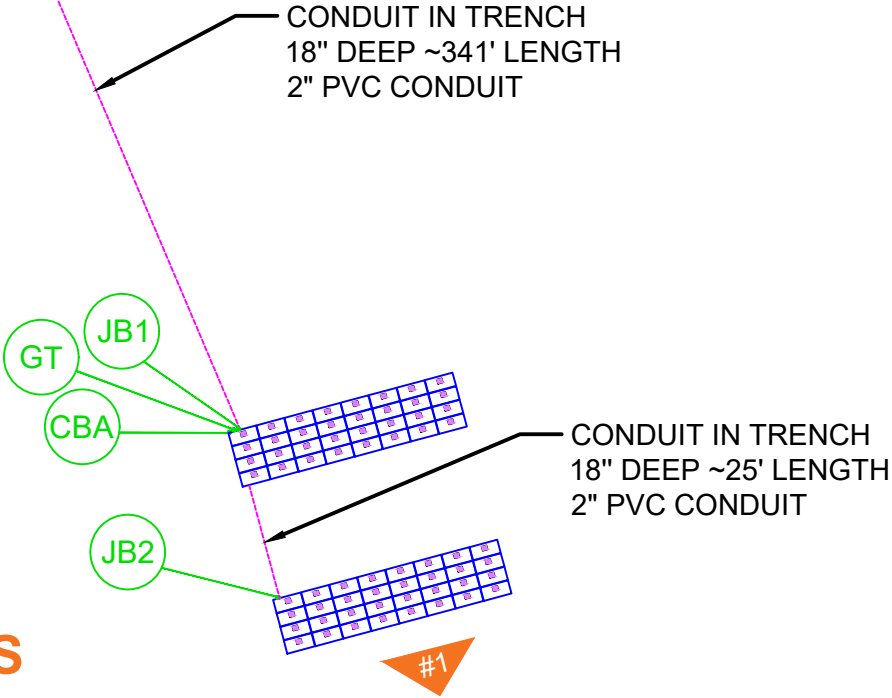
PM
REVENUE GRADE METER
(NEW)

UM
UTILITY METER
(EXISTING)

GT
IQ GATEWAY
(NEW)

GROUND MOUNT PLAN WITH MODULES

SCALE: 3/128" = 1'-0"



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SHEET NAME

GROUND
MOUNT PLAN
WITH MODULES

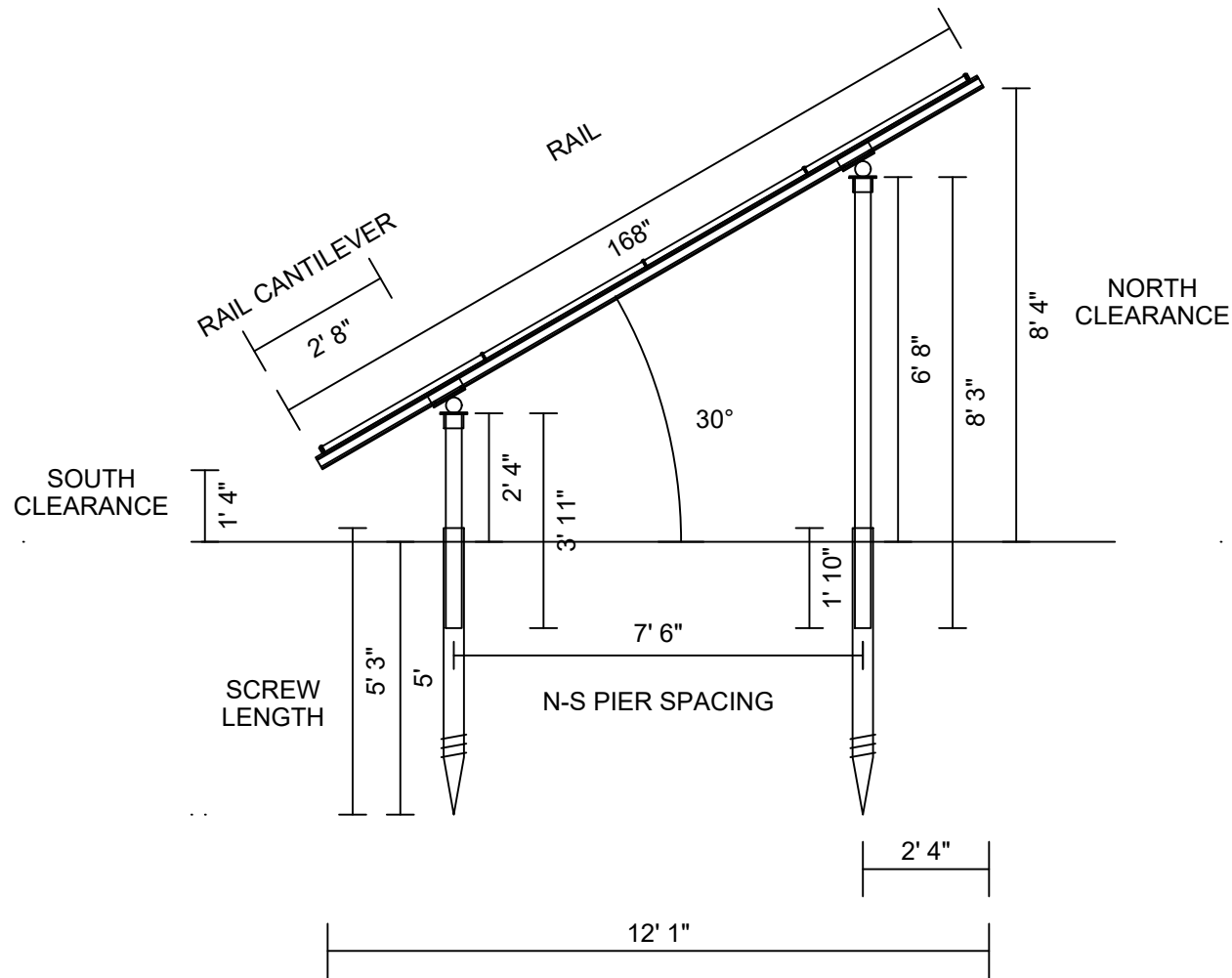
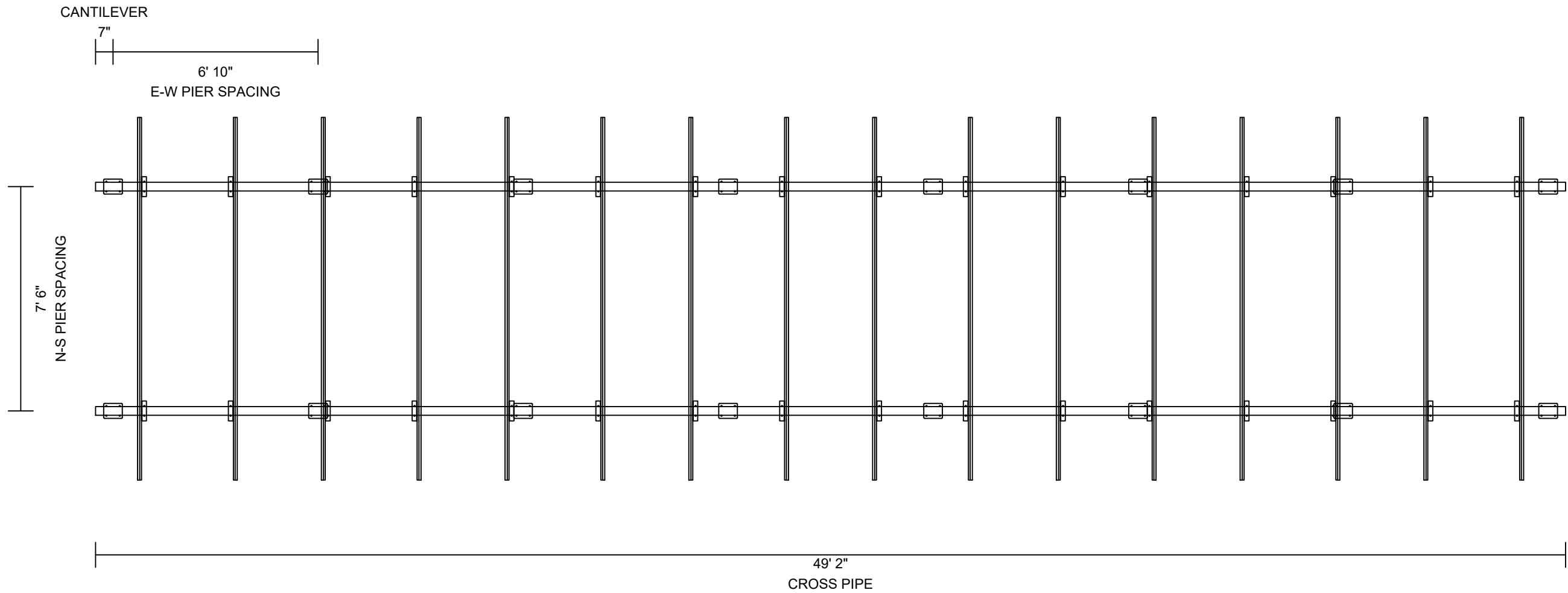
SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-2





RACKING DETAIL
SCALE: NTS



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SHEET NAME

RACKING
DETAIL

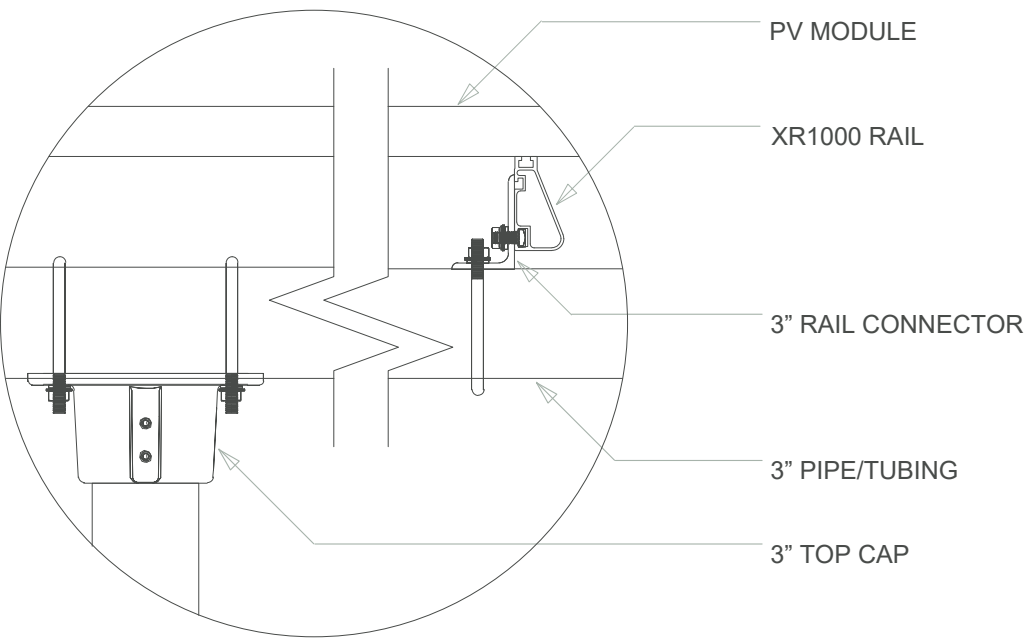
SHEET SIZE

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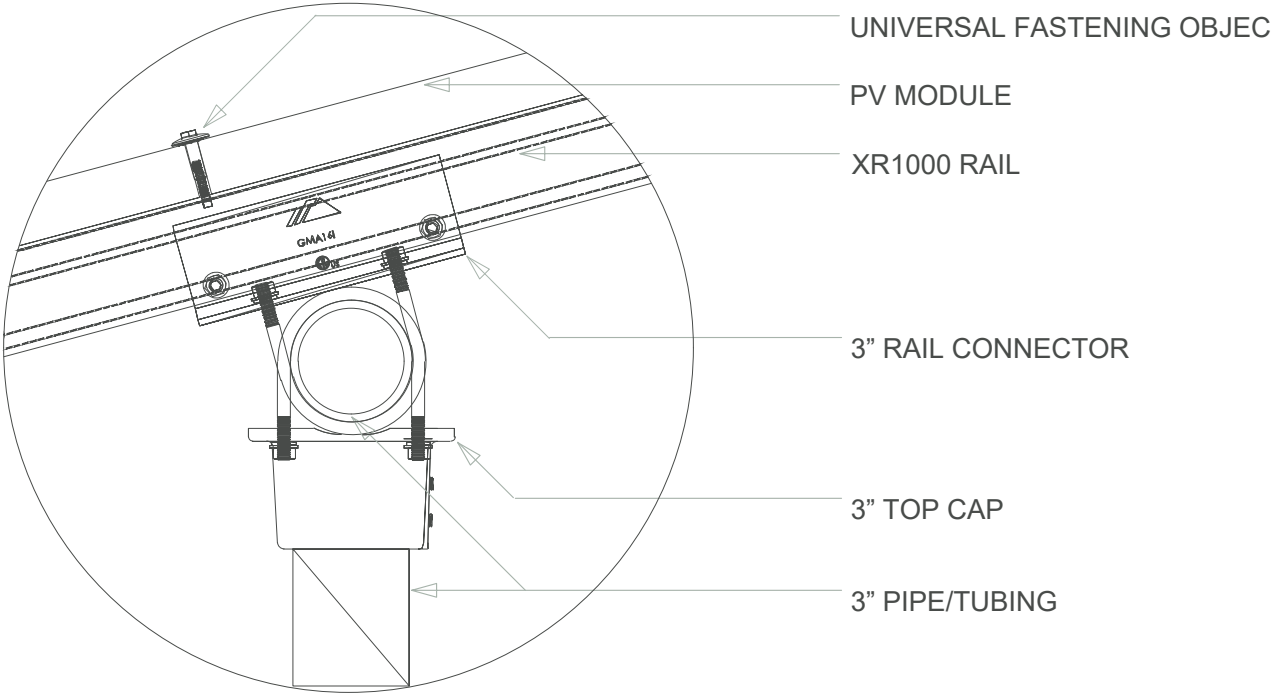
SHEET NUMBER

PV-3A

XR1000 Rail

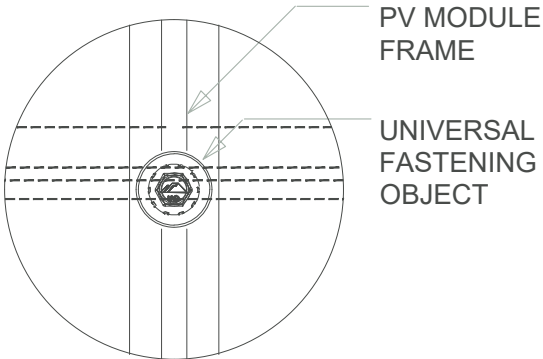


Front View

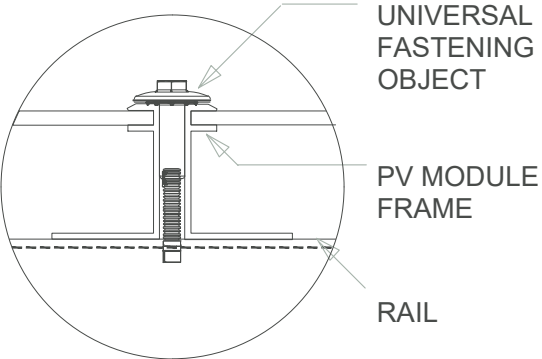


Side View

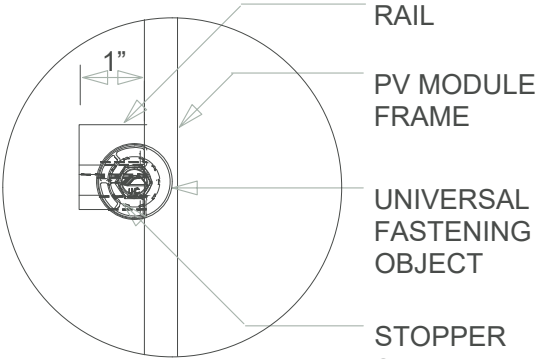
Clamp Detail



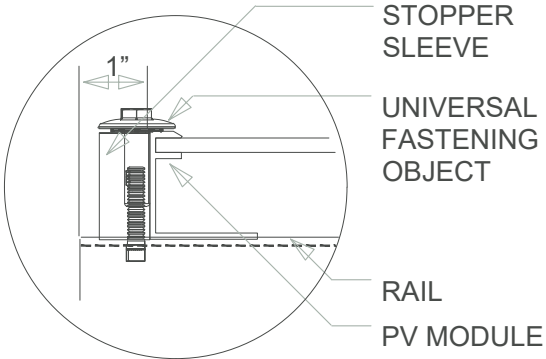
Mid Clamp, Plan



Mid Clamp, Front



End Clamp, Plan



End Clamp, Front

ATTACHMENT DETAIL

SCALE: NTS



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SHEET NAME
ATTACHMENT
DETAIL

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-3.1

MOD: SILFAB SOLAR INC. SIL-420 BG
INV: ENPHASE ENERGY INC.
IQ8H-240-72-2-US [240V]
(1 BRANCH X 8 MICRO-INV)



12 AWG Q-CABLE
06 AWG Cu BARE G (BOND RACKING)

MOD: SILFAB SOLAR INC. SIL-420 BG
INV: ENPHASE ENERGY INC.
IQ8H-240-72-2-US [240V]
(1 BRANCH X 8 MICRO-INV)



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(1 BRANCH X 8 MICRO-INV)



12 AWG Q-CABLE
06 AWG Cu BARE G (BOND RACKING)

INTERCONNECTION 120% RULE
(MAIN PANEL)

INTERCONNECTION
120% RULE
NOT REQUIRED

LINE-SIDE PANEL CONNECTION
DOES NOT AFFECT MAIN BUS

EXTREME CASE MODULE OUTPUT
(SILFAB SOLAR INC. SIL-420 BG)

$I_{sc}(25^{\circ}\text{C}) = 11.40\text{A}$, $T_{isc} = 0.046\%/^{\circ}\text{C}$
 $I_{sc}(T) = I_{sc}(25^{\circ}\text{C}) \times [1 + T_{isc} \times (T - 25^{\circ}\text{C})]$
 $I_{sc}(-16^{\circ}\text{C}) = 11.18\text{A}$, $I_{sc}(29^{\circ}\text{C}) = 11.42\text{A}$

$V_{oc}(25^{\circ}\text{C}) = 46.36\text{V}$, $T_{voc} = -0.279\%/^{\circ}\text{C}$
 $V_{oc}(T) = V_{oc}(25^{\circ}\text{C}) \times [1 + T_{voc} \times (T - 25^{\circ}\text{C})]$
 $V_{oc}(-16^{\circ}\text{C}) = 51.66\text{V}$, $V_{oc}(29^{\circ}\text{C}) = 45.84\text{V}$

SYSTEM SUMMARY STC (26.880 kW DC / 24.576 kW AC)

STC DC: (64) 420W = 26.880 kW

STC AC: (64) 384W = 24.576 kW

- (64) SILFAB SOLAR INC. SIL-420 BG MODULES
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SHEET NAME

SINGLE LINE
DIAGRAM

SHEET SIZE

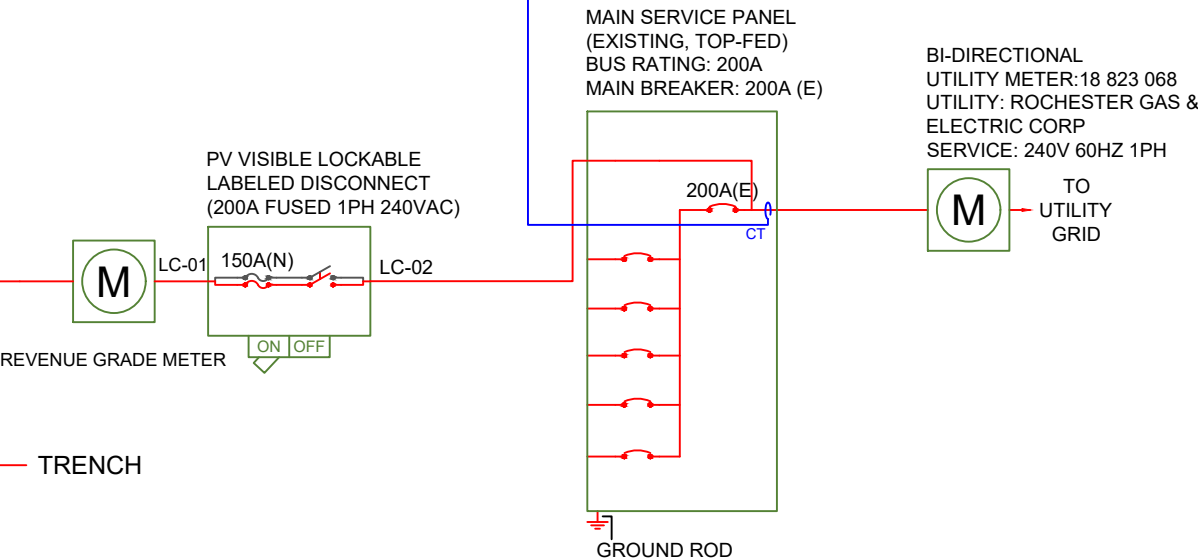
ANSI B
11" X 17"

SHEET NUMBER

PV-4

ELECTRICAL SINGLE LINE DIAGRAM

SCALE: NTS



ELECTRICAL NOTES

- ALL GROUNDING TO COMPLY WITH NEC 690.47.
- GROUND TOP CONDUIT SHALL BE LOCATED MIN. 7/8" ABOVE GROUND SURFACE.
- ALL TERMINALS SHALL BE MIN. 75°C RATED.

AC wire details							
Wire	Min Ampacity	Live	Neutral	Ground	Min EMT	Min PVC	Min RMC
MS-01	14.50A	12 AWG (Q-Cable)	-	06 AWG BARE (NOT IN CONDUIT)	-	-	-
MS-02	14.50A	12 AWG (Q-Cable)	-	06 AWG BARE (NOT IN CONDUIT)	-	-	-
MCB-01	14.50A	(2) 10 AWG THWN-2	-	10 AWG THWN-2	-	1 in	-
MCB-02	14.50A	(2) 10 AWG THWN-2	-	10 AWG THWN-2	1/2 in	1/2 in	1/2 in
LC-01	126.40A	(2) 2/0 AWG THWN-2	2/0 AWG THWN-2	06 AWG THWN-2	-	2 in	-
LC-02	126.40A	(2) 1/0 AWG THWN-2	1/0 AWG THWN-2	06 AWG THWN-2	2 in	2 in	2 in

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STC AC: (64) 384W = 24.576 kW
- (64) SILFAB SOLAR INC. SIL-420 BG MODULES
 - (64) ENPHASE ENERGY INC. IQ8H-240-72-2-US [240V] MICROINVERTERS
- 8x BRANCH OF 8 CONNECTED IN PARALLEL

AC wire details																	
WireID	#Modules	Nominal Voltage	Backfeed *1.25 /cond. set	Min OCPD	Total Power	Conductor sets	ccConductors /conduit	Expected max temp	Adjusted ampacity (ampacity x temp derate x conduit fill derate)	Conductor & neutral size	EGC size (Cu)	Conductor metal	Max length	V drop	Min EMT size	Min PVC size	Min RMC size
MS-01	8	240 V	14.50A	20 A	3.8 kW	1	2	29	25 x 1.00 x - = 25.00 A	12 AWG (Q-Cable)	06 AWG BARE (NOT IN CONDUIT)	Cu	50 ft	1.12 %	-	-	-
MS-02	8	240 V	14.50A	20 A	3.4 kW	1	2	29	25 x 1.00 x - = 25.00 A	12 AWG (Q-Cable)	06 AWG BARE (NOT IN CONDUIT)	Cu	50 ft	1.01 %	-	-	-
MCB-01	8	240 V	14.50A	20 A	3.8 kW	1	2	29	35 x 1.00 x 1.00 = 35.00 A	10 AWG THWN-2	10 AWG THWN-2	Cu	25 ft	0.15 %	-	1 in	-
MCB-02	8	240 V	14.50A	20 A	3.4 kW	1	2	29	35 x 1.00 x 1.00 = 35.00 A	10 AWG THWN-2	10 AWG THWN-2	Cu	50 ft	0.61 %	1/2 in	1/2 in	1/2 in
LC-01	64	240 V	126.40 A	150 A	24.3 kW	1	2	29	175 x 1.00 x 1.00 = 175.00 A	2/0 AWG THWN-2	06 AWG THWN-2	Cu	341 ft	2.79 %	-	2 in	-
LC-02	64	240 V	126.40 A	150 A	24.3 kW	1	2	29	150 x 1.00 x 1.00 = 150.00 A	1/0 AWG THWN-2	06 AWG THWN-2	Cu	10 ft	0.09 %	2 in	2 in	2 in

INTERCONNECTION 120% RULE
(MAIN PANEL)

INTERCONNECTION
120% RULE
NOT REQUIRED

LINE-SIDE PANEL CONNECTION
DOES NOT AFFECT MAIN BUS

EXTREME CASE MODULE OUTPUT
(SILFAB SOLAR INC. SIL-420 BG)

Isc(25°C) = 11.40A, Tisc = 0.046%/°C
Isc(T) = Isc(25°C) x [1 + Tisc x (T-25°C)]
Isc(-16°C) = 11.18A, Isc(29°C) = 11.42A

Voc(25°C) = 46.36V, Tvoc = -0.279%/°C
Voc(T) = Voc(25°C) x [1 + Tvoc x (T-25°C)]
Voc(-16°C) = 51.66V, Voc(29°C) = 45.84V

ELECTRICAL NOTES

- ALL EQUIPMENT TO BE LISTED BY UL OR OTHER NRTL, AND LABELED FOR ITS APPLICATION.
- ALL CONDUCTORS SHALL BE COPPER, RATED FOR 600V AND 90°C WET ENVIRONMENT.
- WIRING, CONDUIT, AND RACEWAYS MOUNTED ON GROUNDTOPS SHALL BE ROUTED DIRECTLY TO, AND LOCATED AS CLOSE AS POSSIBLE TO THE NEAREST RIDGE, HIP, OR VALLEY.
- WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC 110.26.
- DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS. CONTRACTOR SHALL FURNISH ALL NECESSARY OUTLETS, SUPPORTS, FITTINGS AND ACCESSORIES TO FULFILL APPLICABLE CODES AND STANDARDS.
- WHERE SIZES OF JUNCTION BOXES, RACEWAYS, AND CONDUITS ARE NOT SPECIFIED, THE CONTRACTOR SHALL SIZE THEM ACCORDINGLY.
- ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
- MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER THE GROUNDING CLIP MANUFACTURER'S INSTRUCTION.
- MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER G.E.C.VIA WEEB LUG OR ILSCO GBL-4DBT LAY-IN LUG.
- PV EQUIPMENT SHALL BE DESIGNED AND INSTALLED IN ACCORDANCE WITH NEC 690.
- EXACT LOCATION OF AUXILIARY GROUNDING TO BE DETERMINED AT TIME OF INSTALL.
- EXISTING WIRES MUST BE REPLACED IF SMALLER THAN LISTED MINIMUM SIZES PER NEC 310.15(B)(16).

WIRING CALCULATIONS

SCALE: NTS



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SHEET NAME

WIRING
CALCULATIONS

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-5

⚠️

WARNING

ELECTRICAL SHOCK HAZARD

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

LABEL LOCATION: INVERTERS, DC & AC DISCONNECTS, DC & AC COMBINER PANELS (IF APPLICABLE)
CODE REF: NEC 2017 - 690.13(B)

RAPID SHUTDOWN SWITCH
FOR SOLAR PV SYSTEM

LABEL LOCATION: UTILITY INTERCONNECTION DISCONNECT (MSP OR AC DISCONNECT), AND WHEREVER REQUIRED BY AHJ (DC DISCONNECTS, INVERTERS)
CODE REF: NEC 2017 - 690.56(C)(3)

PV SYSTEM DISCONNECT

MAXIMUM AC OPERATING CURRENT: 101.12AMPS
NOMINAL OPERATING AC VOLTAGE: 240 VAC

LABEL LOCATION: AC DISCONNECTS, PV POINT OF INTERCONNECTION
CODE REF: NEC 2017 - 690.54

PHOTOVOLTAIC

AC DISCONNECT

LABEL LOCATION: AC DISCONNECT, PV BACKFEED BREAKER/POINT OF INTERCONNECTION
CODE REF: NEC 2017 - 690.13(B)

MAIN PHOTOVOLTAIC
SYSTEM DISCONNECT

LABEL LOCATION: INTERCONNECTION DISCONNECT FOR UTILITY ACCESS
CODE REF: NEC 2017 - 690.13(B) OR UTILITY

PHOTOVOLTAIC
SYSTEM METER

LABEL LOCATION: PV PRODUCTION METER
CODE REF: N/A

⚠️

WARNING

PHOTOVOLTAIC SYSTEM
COMBINER PANEL

DO NOT ADD LOADS

LABEL LOCATION: AC COMBINER PANEL (WHEN APPLICABLE FOR PV LOAD CENTER)
CODE REF: N/A

⚠️

WARNING

INVERTER OUTPUT CONNECTION
DO NOT RELOCATE THIS
OVERCURRENT DEVICE

LABEL LOCATION: ADJACENT TO BACKFEED BREAKER IN SUBPANEL/MSP (IF APPLICABLE)
CODE REF: NEC 2017 - 705.12(B)(2)(3)(b)

⚠️

CAUTION

DUAL POWER SOURCE SECOND
SOURCE IS PHOTOVOLTIC

LABEL LOCATION: MAIN PANEL
CODE REF: UTILITY

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: INTERCONNECTION POINT (MSP OR AC DISCONNECT IF LINE SIDE TAP)
CODE REF: NEC 2017 - 690.12, NEC 2017 - 690.56(C)

CAUTION:
POWER TO THIS SERVICE IS ALSO SUPPLIED FROM THE FOLLOWING SOURCES WITH DISCONNECTS AS SHOWN

LABEL LOCATION: MSP
CODE REF: NEC 2017 - 705.10

NOTES AND SPECIFICATIONS

- 1) SIGNS AND LABELS SHALL MEET THE REQUIREMENTS OF NEC 110.21(B), UNLESS SPECIFIC INSTRUCTIONS ARE REQUIRED BY SECTION 690, OR IF REQUESTED BY THE LOCAL AHJ.
- 2) SIGNS AND LABELS SHALL ADEQUATELY WARN OF HAZARDS USING EFFECTIVE WORDS, COLORS AND SYMBOLS.
- 3) LABELS SHALL BE PERMANENTLY AFFIXED TO THE EQUIPMENT OR WIRING METHOD AND SHALL NOT BE HAND WRITTEN.
- 4) LABEL SHALL BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED.
- 5) SIGNS AND LABELS SHALL COMPLY WITH ANSI Z535.4 - 2017, PRODUCT SAFETY SIGNS AND LABELS, UNLESS OTHERWISE SPECIFIED.
- 6) DO NOT COVER EXISTING MANUFACTURER LABELS.



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SHEET NAME

PLACARDS

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-6

SILFAB ELITE

SIL - 420 BG



NOT JUST ANOTHER SOLAR PANEL.

Silfab Elite

Back-contact technology with an innovative conductive backsheet and integrated cell design delivers the highest performance, durability and beautiful aesthetics.

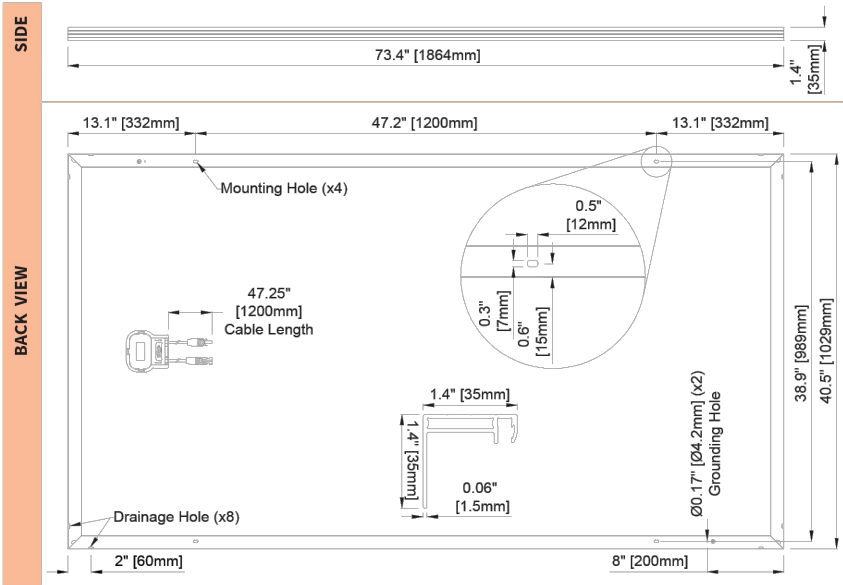
Manufactured exclusively in the United States.

SILFABSOLAR.COM



ELECTRICAL SPECIFICATIONS		420	
Test Conditions		STC	NOCT
Module Power (Pmax)	Wp	420	313
Maximum power voltage (Vpmax)	V	38.51	35.89
Maximum power current (Ipmax)	A	10.91	8.73
Open circuit voltage (Voc)	V	46.36	43.45
Short circuit current (Isc)	A	11.4	9.18
Module efficiency	%	21.9%	20.4%
Maximum system voltage (VDC)	V	1000	
Series fuse rating	A	20	
Power Tolerance	Wp	0 to +10	
Measurement conditions: STC 1000 W/m² • AM 1.5 • Temperature 25 °C • NOCT 800 W/m² • AM 1.5 • Measurement uncertainty ≤ 3% Sun simulator calibration reference modules from Fraunhofer Institute. Electrical characteristics may vary by ±5% and power by 0 to +10W.			
MECHANICAL PROPERTIES / COMPONENTS		METRIC	IMPERIAL
Module weight		20.8±0.2	45.8±0.4 lbs
Dimensions (H x L x D)		1864 mm x 1029 mm x 35 mm	73.4 in x 40.5 in x 1.4 in
Maximum surface load (wind/snow)*		5400 Pa rear load / 5400 Pa front load	112.8 lb/ft² rear load / 112.8 lb/ft² front load
Hail impact resistance		ø 25 mm at 83 km/h	ø 1 in at 51.6 mph
Cells		66 high-efficiency mono-PERC MWT c-Si cells 166 x 166 mm	66 high-efficiency mono-PERC MWT c-Si cells 6.53 x 6.53 in
Glass		3.2 mm high transmittance, tempered, anti-reflective coating	0.126 in high transmittance, tempered, anti-reflective coating
Cables and connectors (refer to installation manual)		1200 mm ø 5.7 mm, MC4 from Staubli	47.2 in, ø 0.22 (12AWG), MC4 from Staubli
Backsheet		Multilayer, integrated insulation film and electrically conductive backsheet, superior hydrolysis and UV resistance, fluorine-free PV backsheet	
Frame		Anodized Aluminum (Black)	
Bypass diodes		3 diodes-30SQ045T (45V max DC blocking voltage, 30A max forward rectified current)	
Junction Box		UL 3730 Certified, IEC 62790 Certified, IP67 rated	
TEMPERATURE RATINGS		WARRANTIES	
Temperature Coefficient Isc	+0.046 %/°C	Module product workmanship warranty	25 years**
Temperature Coefficient Voc	-0.279 %/°C	Linear power performance guarantee	30 years
Temperature Coefficient Pmax	-0.377 %/°C		≥ 98% end 1st yr ≥ 94.7% end 12th yr ≥ 90.8% end 25th yr ≥ 89.3% end 30th yr
NOCT (± 2°C)	43.5 °C		
Operating temperature	-40/+85 °C		
CERTIFICATIONS		SHIPPING SPECS	
Product	UL 61215-1:2017 Ed.1, UL 61215-2:2017 Ed.1, UL 61730-1:2017 Ed.1, UL 61730-2:2017 Ed.1, CSA C22.2#61730-1:2019 Ed.2, CSA C22.2#61730-2:2019 Ed.2, IEC 61215-1:2016 Ed.1, IEC 61215-2:2016 Ed.1, IEC 61730-1:2016 Ed.2, IEC 61730-2:2016 Ed.2, IEC 61701:2020 (Salt Mist Corrosion), IEC 62716:2013 (Ammonia Corrosion), CEC Listing, UL Fire Rating: Type 1	Modules Per Pallet:	27 or 27 (California)
		Pallets Per Truck	31 or 30 (California)
Factory	ISO9001:2015	Modules Per Truck	837 or 810 (California)

* ▲ Warning. Read the Safety and Installation Manual for mounting specifications and before handling, installing and operating modules.
** 12 year extendable to 25 years subject to registration and conditions outlined under "Warranty" at silfabsolar.com.
PAN files generated from 3rd party performance data are available for download at: silfabsolar.com/downloads.



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Silfab - SIL-420-BG-20231221
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SHEET NAME
EQUIPMENT SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-7



DATA SHEET



IQ8H 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.



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



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



IQ8 Series Microinverters are UL Listed as PV Rapid 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

IQ8H Microinverters

INPUT DATA (DC)		I08H-240-72-2-US	I08H-208-72-2-US¹
Commonly used module pairings²	W	320 – 540+	295 – 500+
Module compatibility		60-cell/120 half-cell and 72-cell/144 half-cell	
MPPT voltage range	V	38 – 45	38 – 45
Operating range	V	25 – 58	
Min/max start voltage	V	30 / 58	
Max input DC voltage	V	60	
Max DC current³ [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)		I08H-240-72-2-US	I08H-208-72-2-US
Peak output power	VA	384	366
Max continuous output power	VA	380	360
Nominal (L-L) voltage/range⁴	V	240 / 211 – 264	208 / 183 – 250
Max continuous output current	A	1.58	1.73
Nominal frequency	Hz	60	
Extended frequency range	Hz	50 – 68	
Max units per 20 A (L-L) branch circuit⁵		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	%	97.6	97.4
CEC weighted efficiency	%	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.

IQ8H-DS-0004-01-EN-US-2021-10-19



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SHEET NAME

EQUIPMENT
SPECIFICATION

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-8



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.



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

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



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EQUIPMENT
SPECIFICATION

SHEET SIZE

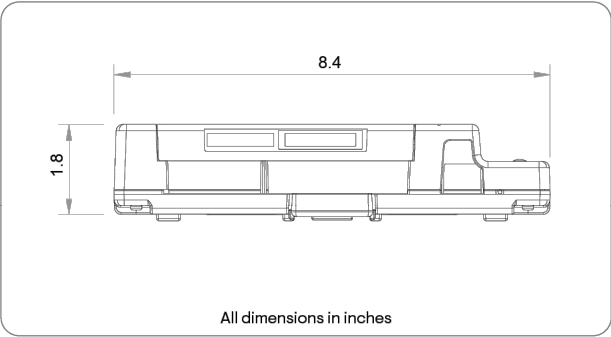
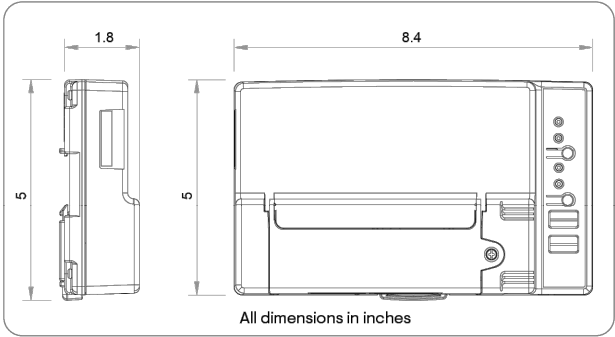
ANSI B
11" X 17"

SHEET NUMBER





PV-9

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

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



Accessories

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



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SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-10



Ground Mount System

Datasheet



Mount on all terrains, in no time.

The IronRidge Ground Mount System combines our XR1000 rails with locally-sourced steel pipes, or mechanical tubing, to create a cost-effective structure capable of handling any site or terrain challenge. Installation is simple with only a few structural components and no drilling, welding, or heavy machinery required. In addition, the system works with a variety of foundation options, including concrete piers and driven piles.



Rugged Construction
Engineered steel and aluminum components ensure durability.



PE Certified
Pre-stamped engineering letters available in most states.



Simple Assembly
Just a few simple components and no heavy equipment.



Design Software
Online tool generates engineering values and bill of materials.



Flexible Architecture
Multiple foundation and array configuration options.



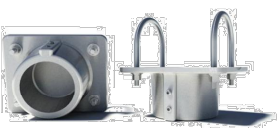
20 Year Warranty
Twice the protection offered by competitors.



 **360° Product Tour**
Visit ironridge.com

Substructure

Top Caps



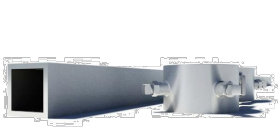
Connect vertical and cross pipes.

Rail Connectors



Attach Rail Assembly to horizontal pipes.

Diagonal Braces



Optional Brace provides additional support.

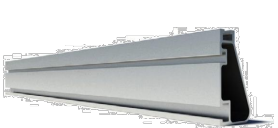
Cross Pipe & Piers



Steel pipes or mechanical tubing for substructure.

Rail Assembly

XR1000 Rails



Curved rails increase spanning capabilities.

Top-Down Clamps



Secure modules to rails and substructure.

Under Clamps



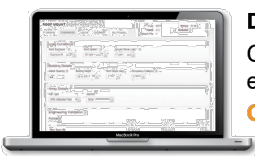
Alternative clamps for pre-attaching modules to rails.

Accessories



Wire Clips and End Caps provide a finished look.

Resources



Design Assistant
Go from rough layout to fully engineered system. For free.
[Go to ironridge.com/gm](http://ironridge.com/gm)



NABCEP Certified Training
Earn free continuing education credits, while learning more about our systems.
[Go to ironridge.com/training](http://ironridge.com/training)



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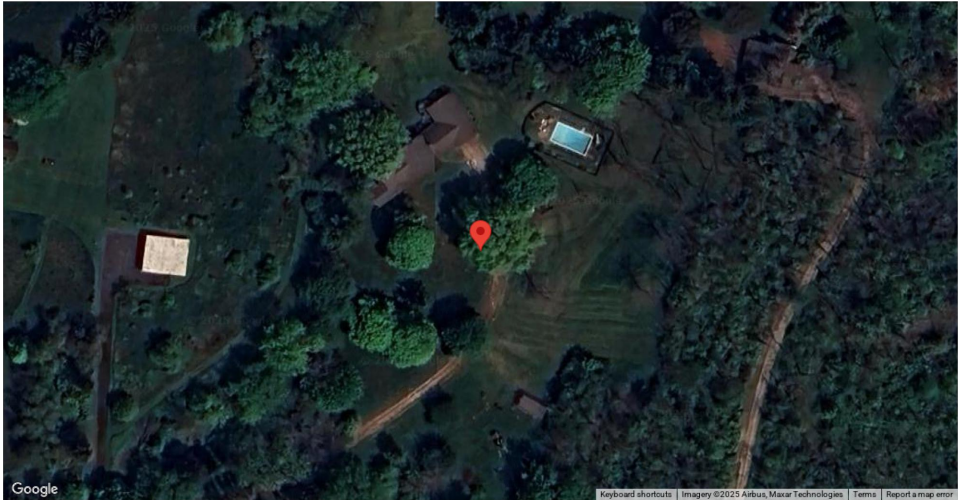
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**ANSI B
11" X 17"**

SHEET NUMBER

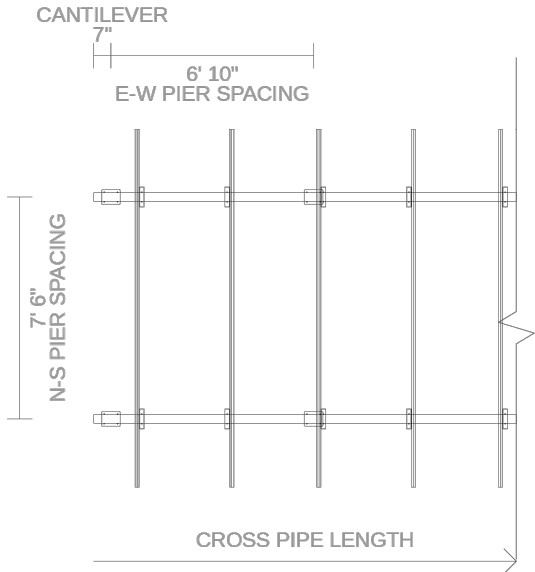
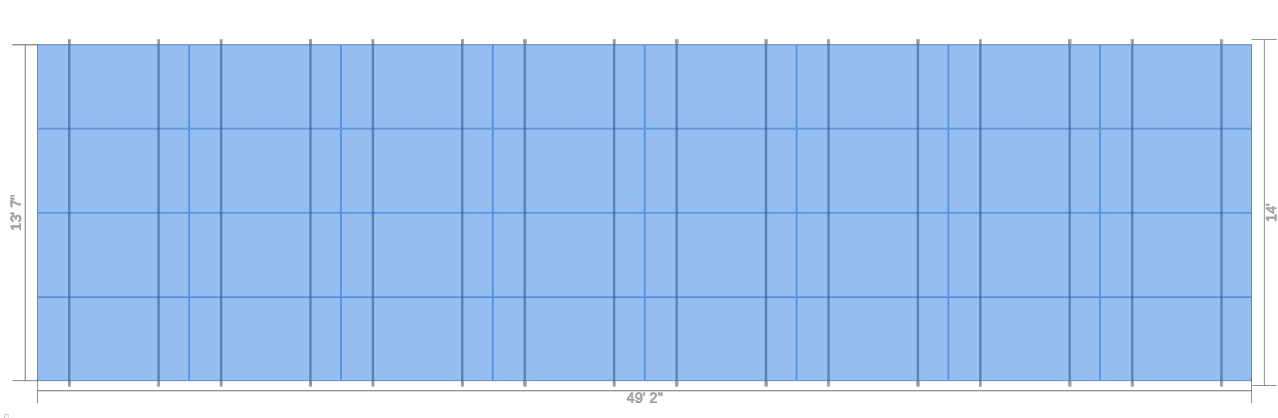
PV-11

Project Details			
Name	1822 Lake Road	Date	02/05/2025
Location	1822 Lake Road, Webster, NY 14580	ASCE code	7.16
Total modules	64	Wind speed	110 mph
Module	Silfab: SIL-420-BG	Snow load	40 psf
Dimensions	Dimensions: 73.39" x 40.51" x 1.38" (1864.0mm x 1029.0mm x 35.0mm)	Wind exposure	C
Total watts	26,880	Piers	32
Inter sub-array spacing	321.0" Calculated using solar azimuth of -43.02° and solar elevation of 10.56° at 9AM (America/New_York) on the winter solstice.		



Substructure & Foundation			
Tilt	30°	South facing grade	0°
Pipe/tubing diameter	3"	Soil class	2 - 5
Foundation type	Ground screws	Screw length	63" (1600mm)
Freeze thaw depth	None entered	Hex head set screws / Screw	4

Sub array #1					
Rows	4	Columns	8	# Arrays	1
Area	49' 2" (EW) × 13' 9" (NS)	Rail type	XR1000	Diagonal bracing	no
E/W spacing	6' 10"	Rail cantilever	2' 8"	Pipe cantilever	7"
Piers/array	16	Total south piers	8 (3' 11")	Total north piers	8 (8' 3")
Total cross pipes	2 (49' 2")	Total pipe length	195' 11"		
Shear	1,138 lbs	Moment	2,845 ft-lbs	Uplift	-1,047 lbs



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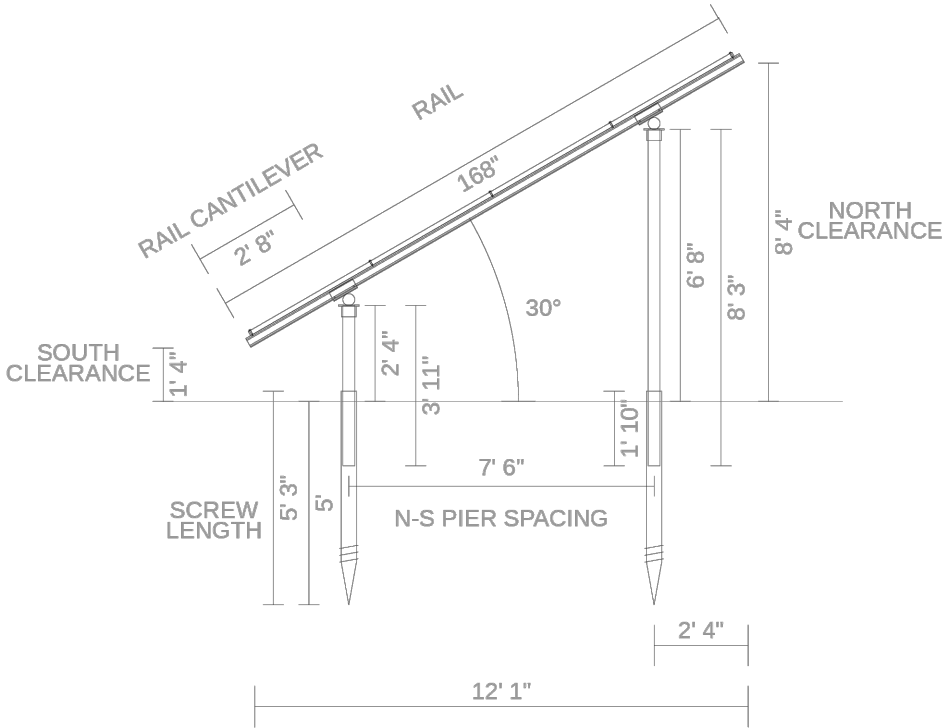
EQUIPMENT
SPECIFICATION

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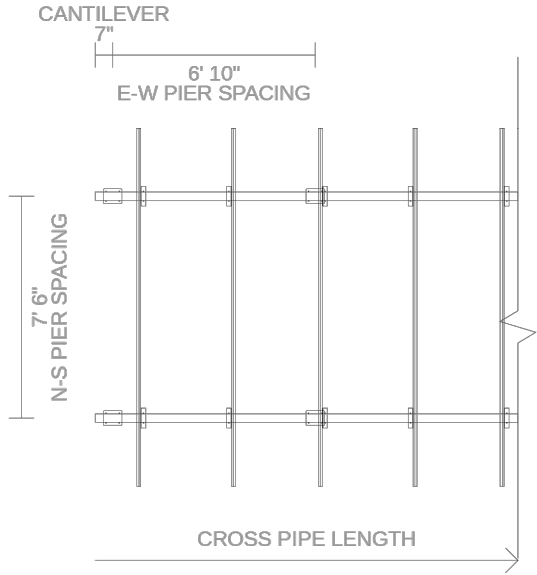
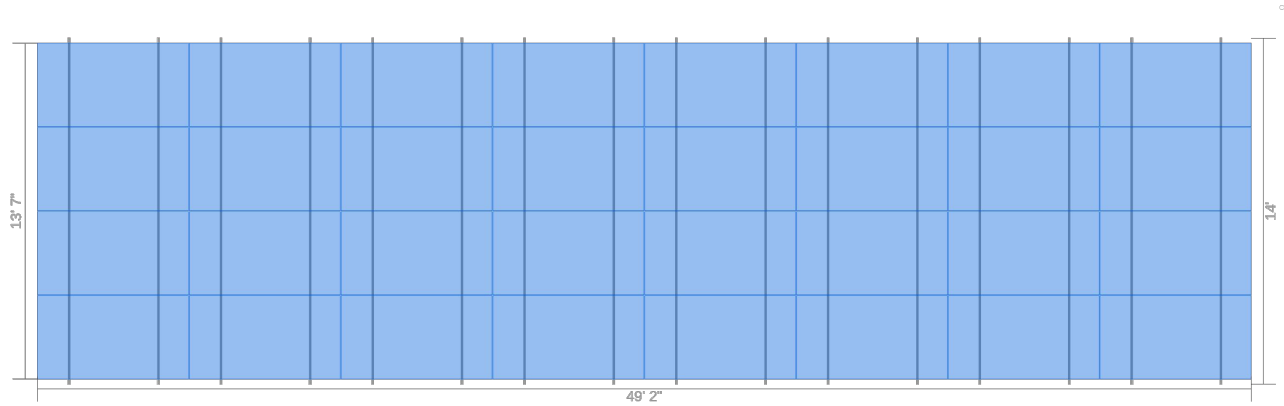
ANSI B
11" X 17"

SHEET NUMBER

PV-12



Sub array #2					
Rows	4	Columns	8	# Arrays	1
Area	49' 2" (EW) × 13' 9" (NS)	Rail type	XR1000	Diagonal bracing	no
E/W spacing	6' 10"	Rail cantilever	2' 8"	Pipe cantilever	7"
Piers/array	16	Total south piers	8 (3' 11")	Total north piers	8 (8' 3")
Total cross pipes	2 (49' 2")	Total pipe length	195' 11"		
Shear	1,138 lbs	Moment	2,845 ft-lbs	Uplift	-1,047 lbs



CONTRACTOR: ACES
ADDRESS: 7288 RUSH LIMA RD,
HONEOYE FALLS, NY 14472,USA
PHONE: 15859357186
EMAIL: Steve@aces-energy.com
LICENSE #: N/A in New York State

REVISIONS

DESCRIPTION	DATE	REV

SIGNATURE & SEAL

HOMEOWNER INFO

DAVID STERN
1822 LAKE ROAD, WEBSTER, NY
14580, USA
APN: 037.03-1-33.1 PHONE: +15857037612
EMAIL: dstern@elliottstern.com

SHEET NAME

EQUIPMENT
SPECIFICATION

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-13

CONTRACTOR: ACES
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EMAIL: dstern@elliottstern.com

SHEET NAME

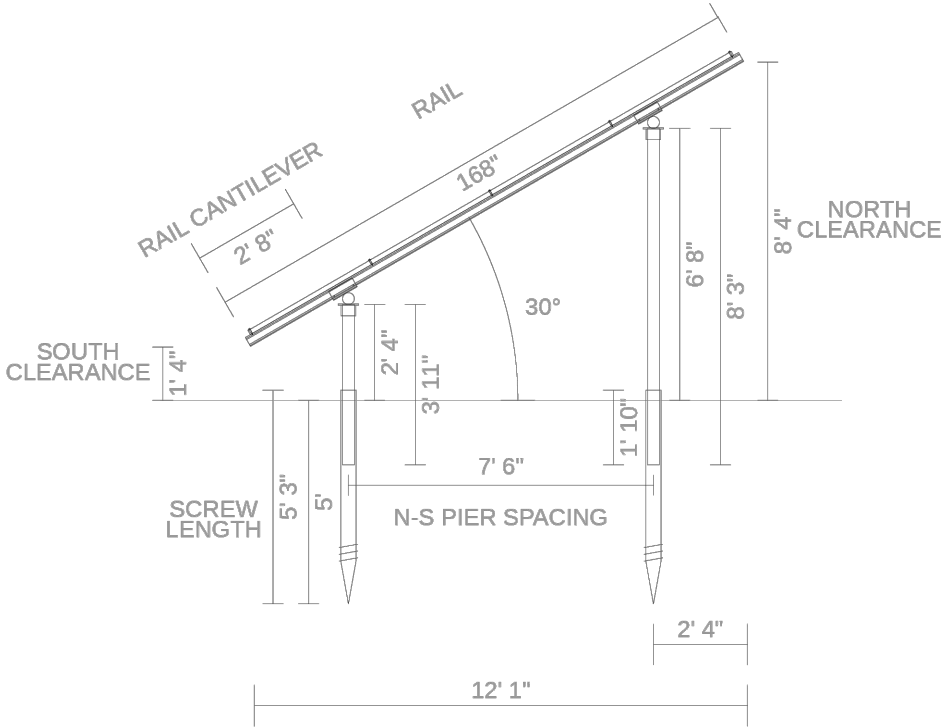
**EQUIPMENT
SPECIFICATION**

SHEET SIZE

**ANSI B
11" X 17"**

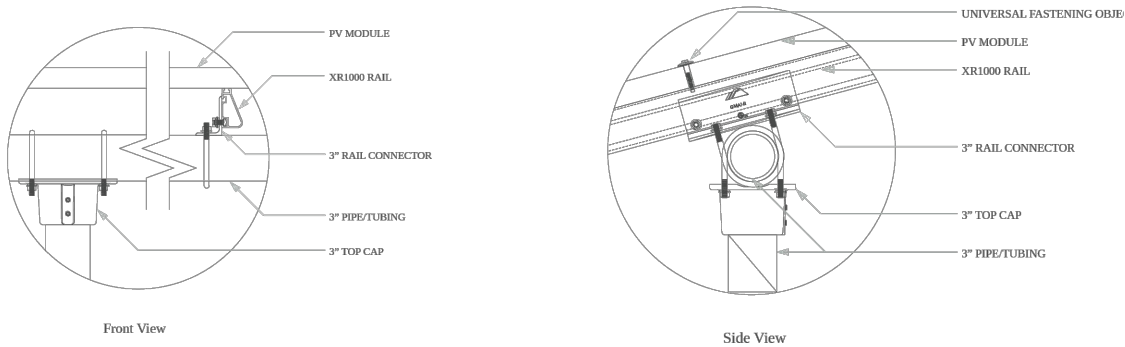
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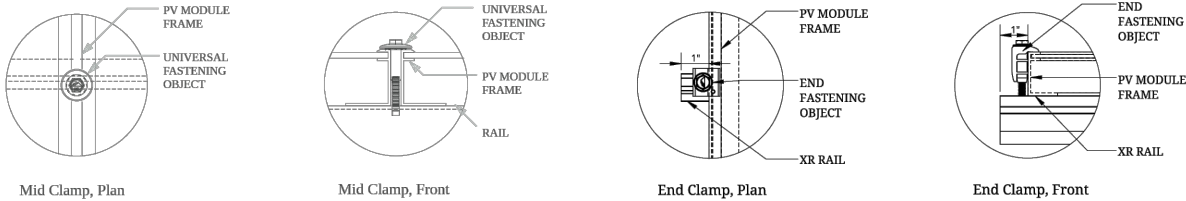


Pipe Fitting Detail

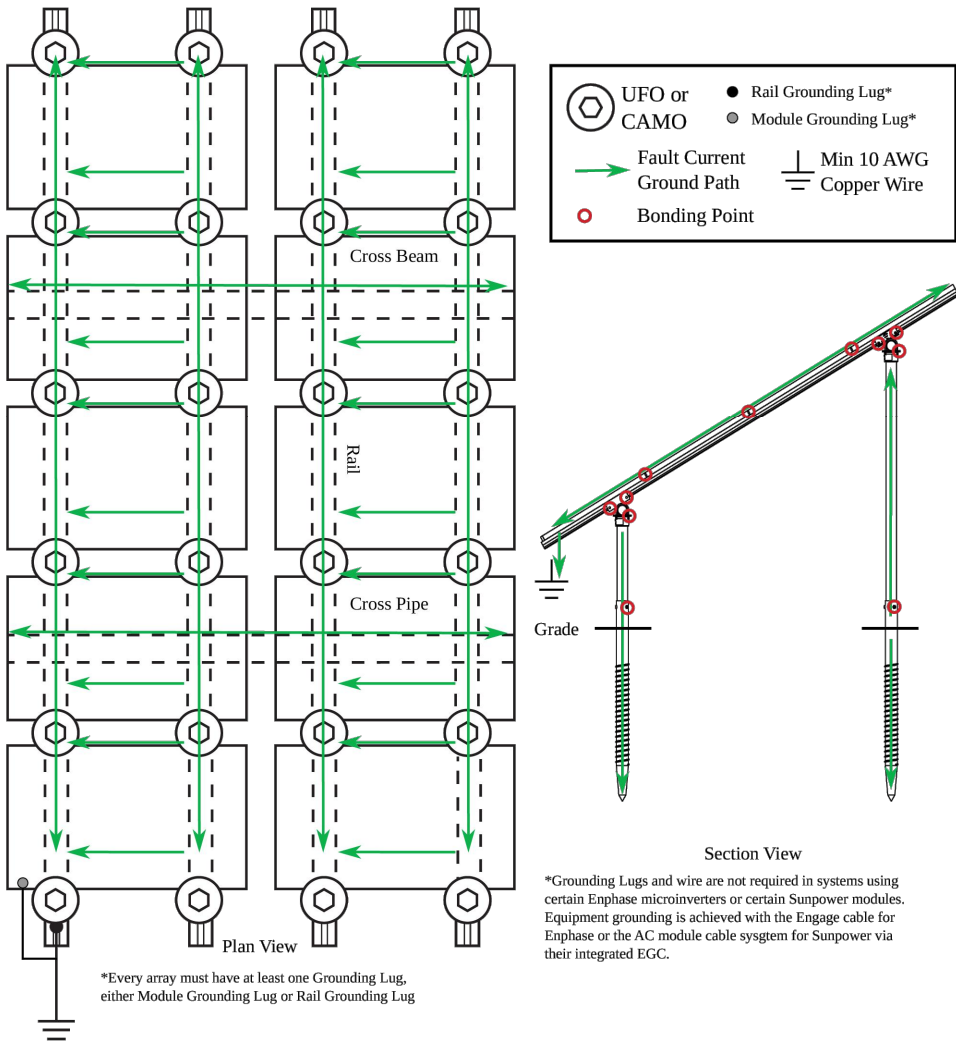
XR1000 Rail



Clamp Detail



Grounding Diagram



KRINNER

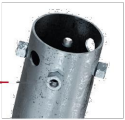


KRINNER G-SERIES

The pioneer in sustainable foundation construction

KRINNER

G76x2100-4xM16



Basic Information

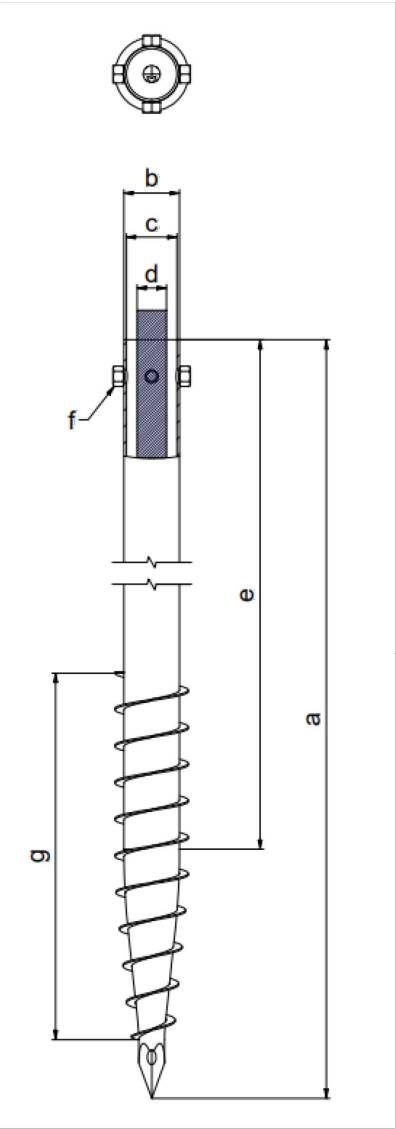
KSF G 76x2100-4xM16	
Nominal length (mm)	2100
Tube diameter (mm)	76.10
Weight (kg)	13.9
Item number	29003

Construction

- Nut: DIN EN ISO 4032 - 8
- Continuous welded helix
- Coating: Hot-dip galvanized according to ASTM A123/A123M 09

Technical Data

KSF G 76x2100- 4xM16	
a	Length (mm) (+-35 mm) 2060
b	Shaft outer diameter (mm) 76.10
c	Inner diameter (mm) 68.90
d	Diameter setting (mm) 60
e	Depth setting (mm) (+-25 mm) 1790
f	Nut 4xM16
g	Length of helix (mm) 1150



Subject to technical change.
Krinner Foundation Systems | 3127 E South St. Suite C1 | Long Beach, CA 90805 US
Phone: +1 877 465 7466 | E-Mail: info@krinnerfoundations.com | https://www.krinner.io

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SHEET NAME
EQUIPMENT
SPECIFICATION

SHEET SIZE
ANSI B
11" X 17"

SHEET NUMBER
PV-15

Bill of Materials		
Part	Spares	Qty
Rails		
XR-1000-168A XR-1000, 168" (14') Clear	0	32
Clamps & Grounding		
UFO-CL-01-A1 Universal Module Clamp, Clear	0	96
UFO-END-01-A1 End Fastening Object (End Clamp, 30-40mm), Mill	0	64
XR-LUG-03-A1 Grounding Lug, Low Profile	0	2
Substructure		
70-0300-SGA SGA Top Cap at 3"	0	32
GM-BRC3-01-M1 Ground Mount Bonded Rail Connector - 3"	0	64
GM-HSHW-01-M1 Hex Head Set Screw	0	128

CHECKLIST

PRE-INSTALLATION

- ☐ Verify module compatibility. See [Page 14](#) for info.
- ☐ Purchase 2" or 3" Pipe or Mechanical Tubing

Pipe: 2" or 3" (NPS) ASTM A53 Grade B SCH 40 Pipe, galvanized to a min of ASTM A653 G90 or ASTM A123 G35.

Mechanical Tubing: 2.375" x 12 ga (O.D) or 3.500" x 8 ga (O.D.) Mechanical Tubing with one of the following Galvinizations (ASTM A1057).

- Allied Gatorshield
- Allied Flo-Coat Coating
- Wheatland ThunderCoat

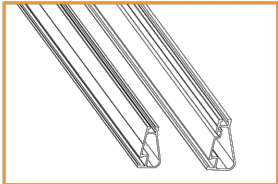
TOOLS REQUIRED

- ☐ Post Hole Digger or Powered Auger
- ☐ Socket Drive (7/16", 9/16", 15/16" and 1/2" Sockets)
- ☐ Torque Wrenches (0-240 in-lbs and 10-40 ft-lbs)
- ☐ Transit, String Line, or Laser Level
- ☐ 3/16" Allen Head

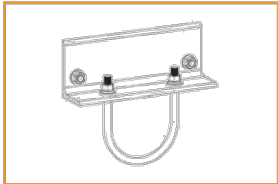
TORQUE VALUES

- Top Cap Set Screws (3/16" Allen Head)
- ☐ 2" or 3" NPS Schedule 40 Grade B Pipe: 20 ft-lbs
 - ☐ 2.375" x 12 ga OD Mechanical Tubing: 11 ft-lbs
 - ☐ 3.500" x 8 ga OD Mechanical Tubing: 16 ft-lbs
- ☐ For Ground Screw to Pipe Connection Hardware see [Page 5](#).
- ☐ Top Cap U-Bolt Nuts (9/16" Socket): 15 ft-lbs
 - ☐ Rail Connector Bracket Nuts (9/16" Socket): 21 ft-lbs
 - ☐ Rail Connector U-Bolt Nuts (9/16" Socket): 60 in-lbs
 - ☐ Rail Grounding Lug Nut (7/16" Socket): 80 in-lbs
 - ☐ Rail Grounding Lug Terminal Screws (7/16" Socket): 20 in-lbs
 - ☐ Module Grounding Lug Nut (3/8" Socket): 60 in-lbs
 - ☐ Module Grounding Lug Terminal Screws (1/2" Socket): 20 in-lbs
 - ☐ Universal Fastening Objects (7/16" Socket): 80 in-lbs
 - ☐ Diagonal Brace Set Screws (1/2" Socket): 15 ft-lbs
 - ☐ Diagonal Brace Bolts (1/2" Socket): 40 ft-lbs
 - ☐ Microinverter Kit Nuts (7/16" Socket): 80 in-lbs
 - ☐ Frameless Module Kit Nuts (7/16" Socket): 80 in-lbs
- If using previous version of: Integrated Grounding Mid Clamps, Grounding Lug and End Clamps please refer to **Alternate Components Addendum (Version 1.90)**.
- If installing on a low slope roof please refer to **Ground Mount for Flat Roof Applications Addendum (Version 3.30)**.
- Unless otherwise noted, all components have been evaluated for multiple use. They can be uninstalled and reinstalled in the same or new location.

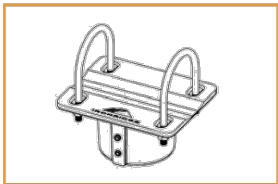
IRONRIDGE COMPONENTS



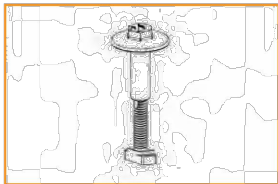
XR100 & XR1000 Rail



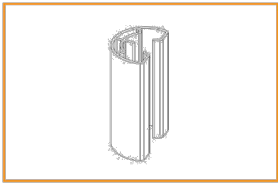
Rail Connector



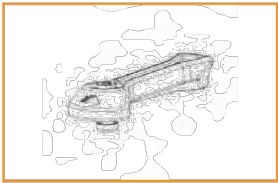
Top Cap



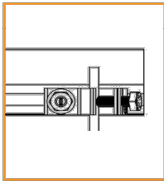
UFO (30-46mm)



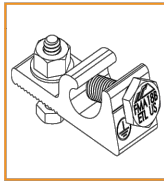
Stopper Sleeve



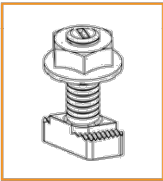
CAMO



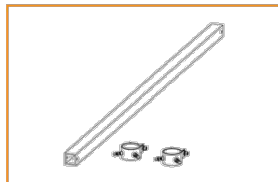
Rail Grounding Lug



Module Grounding Lug



Microinverter Kit



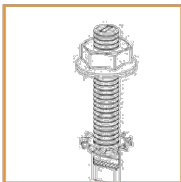
Diagonal Brace



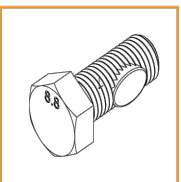
End Cap



Wire Clip



Frameless Module Kit



Hex Head Set Screw



Frameless End/Mid Clamp

REVISIONS

DESCRIPTION	DATE	REV

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SHEET NAME

**EQUIPMENT
SPECIFICATION**

SHEET SIZE

**ANSI B
11" X 17"**

SHEET NUMBER

PV-16

Table 2B - MAXIMUM PIER SPACING (in) (APPLICABLE TO PANELS UP TO 80in)											
3" Unbraced Pipe Frame Wind Speed & Exposure Category	Snow	Slope (deg)									
	psf	0	5	10	15	20	25	30	35	40	45
90 mph Exposure C	0	224	224	203	197	187	174	128	108	92	78
	10	197	197	187	184	181	174	128	108	92	78
	20	169	169	162	161	161	162	128	108	92	78
	30	158	158	153	152	153	155	128	108	92	78
	40	144	144	140	140	142	145	128	108	92	78
	50	131	131	131	130	133	137	128	108	92	78
	60	121	121	121	123	126	130	128	108	92	78
95 mph Exposure C	0	221	221	194	189	179	156	114	97	82	70
	10	196	196	181	179	175	156	114	97	82	70
	20	167	168	159	157	157	156	114	97	82	70
	30	157	157	150	149	150	151	114	97	82	70
	40	143	144	138	138	139	142	114	97	82	70
	50	131	131	129	128	131	134	114	97	82	70
	60	121	121	121	121	124	128	114	97	82	70
100 mph Exposure C	0	212	212	186	181	171	141	103	87	74	63
	10	191	191	176	174	170	141	103	87	74	63
	20	165	165	155	154	153	141	103	87	74	63
	30	155	155	147	146	146	141	103	87	74	63
	40	142	142	136	135	137	139	103	87	74	63
	50	131	131	127	127	129	131	103	87	74	63
	60	121	121	120	119	122	125	103	87	74	63
105 mph Exposure C	0	204	204	178	173	164	128	94	79	67	57
	10	186	187	171	169	164	128	94	79	67	57
	20	162	162	152	150	149	128	94	79	67	57
	30	152	152	144	143	143	128	94	79	67	57
	40	140	140	134	133	134	128	94	79	67	57
	50	130	130	125	125	126	128	94	79	67	57
	60	121	121	118	118	120	123	94	79	67	57
110 mph Exposure C	0	196	196	171	166	157	116	85	72	61	52
	10	182	182	167	164	157	116	85	72	61	52
	20	159	159	149	147	145	116	85	72	61	52
	30	150	150	141	140	139	116	85	72	61	52
	40	138	138	131	130	131	116	85	72	61	52
	50	128	129	123	123	124	116	85	72	61	52
	60	118	118	111	110	111	103	72	61	52	44
120 mph Exposure C	0	183	183	159	154	141	98	72	61	52	44
	10	174	174	158	154	141	98	72	61	52	44
	20	153	153	142	140	138	98	72	61	52	44
	30	145	145	136	134	133	98	72	61	52	44
	40	134	134	127	126	126	98	72	61	52	44
	50	125	126	119	119	120	98	72	61	52	44
	60	117	117	108	105	105	83	61	52	44	38
130 mph Exposure C	0	166	166	148	143	120	83	61	52	44	38
	10	147	148	136	134	120	83	61	52	44	38
	20	140	140	130	129	120	83	61	52	44	38
	30	130	130	122	121	120	83	61	52	44	38
	40	122	122	116	115	115	83	61	52	44	38
	50	116	116	108	105	105	72	53	45	38	30
	60	108	108	100	97	97	61	52	44	38	26
140 mph Exposure C	0	158	158	138	134	104	72	53	45	38	30
	10	142	142	130	128	104	72	53	45	38	30
	20	135	136	125	123	104	72	53	45	38	30
	30	127	127	118	117	104	72	53	45	38	30
	40	119	119	112	111	104	72	53	45	38	30
	50	110	110	102	99	99	61	52	44	38	26
	60	102	102	94	91	91	53	45	38	30	22
150 mph Exposure C	0	150	151	130	126	90	63	46	39		
	10	150	151	130	126	90	63	46	39		
	20	137	137	125	123	90	63	46	39		
	30	131	131	120	118	90	63	46	39		
	40	123	123	114	113	90	63	46	39		
	50	114	114	106	103	83	55	40			
	60	106	106	98	95	75	47	39			
160 mph Exposure C	0	142	142	122	118	79	55	40			
	10	142	142	122	118	79	55	40			
	20	132	132	120	117	79	55	40			
	30	127	127	116	114	79	55	40			
	40	119	119	110	108	79	55	40			
	50	110	110	102	99	79	55	40			
	60	102	102	94	91	75	47	39			
170 mph Exposure C	0	134	135	116	112	70	49				
	10	134	135	116	112	70	49				
	20	127	127	115	112	70	49				
	30	122	123	111	109	70	49				
	40	116	116	106	105	70	49				
	50	108	108	98	95	75	47	39			
	60	100	100	90	87	75	47	39			

Notes: see page 26-27



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SHEET NAME

EQUIPMENT
SPECIFICATION

SHEET SIZE

ANSI B
11" X 17"

SHEET NUMBER

PV-16.1

CERTIFICATE OF COMPLIANCE

Certificate Number 20220917-E341165
Report Reference E341165-20210317
Date 2022-09-17

Issued to: Enphase Energy Inc.
1420 N. McDowell Blvd. Petaluma, CA 94954-6515

This is to certify that representative samples of Photovoltaic Grid Support Utility Interactive Inverter with Rapid Shutdown Functionality
Models: IQ8-60, IQ8PLUS-72, IQ8M-72, IQ8A-72, IQ8H-208-72, IQ8H-240-72, may be f/b -2, -5, -E or -M, may be f/b -ACM, f/b -US, may be f/b -NM, may be f/b -RMA, may be f/b -&, where "&" designates additional characters.

Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: See Page 2

Additional Information: See the UL Online Certifications Directory at www.ul.com/database for additional information

This Certificate of Compliance does not provide authorization to apply the UL Mark. Only the UL Follow-Up Services Procedure provides authorization to apply the UL Mark.

Only those products bearing the UL Mark should be considered as being UL Certified and covered under UL's Follow-Up Services.

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Bruce Mahrenholz, Director North American Certification Program

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CERTIFICATE OF COMPLIANCE

Certificate Number 20220917-E341165
Report Reference E341165-20210317
Date 2022-09-17

This is to certify that representative samples of the product as specified on this certificate were tested according to the current UL requirements.
Standards for Safety:

UL 1741, Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources, Edition 3, Issue Date 09/28/2021. Including the requirements in UL 1741 Supplements SA and SB.

IEEE 1547, Interconnection and Interoperability of Distributed Energy Resources (DERs) with Associated Electric Power Systems (EPSs) Interfaces, Issue Date 02/15/2018

IEEE 1547.1, IEEE Standard Conformance Test Procedures for Interconnecting Distributed Energy Resources (DERs) with Electric Power Systems (EPSs) Associated Interfaces, Issue Date 03/05/2020.

UL 62109-1, Safety of Converters for Use in Photovoltaic Power Systems - Part 1: General Requirements; IEC 62109-2, Safety of Power Converters for use in Photovoltaic Power Systems - Part 2: Particular Requirements for Inverters.

CAN/CSA C22.2 No. 62109-1, Safety of Power Converters for use in photovoltaic power systems - Part 1: General Requirements, 2016/07

CAN/CSA C22.2 No. 62109-2, Safety of Power Converters for use in photovoltaic power systems - Part 2: Particular requirements for inverters, 2016/07

☒ R21: The evaluation to the Standards above provides evidence of compliance to the intent of the existing California Rule 21 Interconnection (references to the past publication of IEEE 1547 standards) and UL1741 Table SA1.1 option to use the IEEE 1547.1-2020 and UL1741SB test methods in conjunction with using IEEE 1547-2018 as the SRD under which SA11.2 Normal Ramp Rate is not addressed. Additional testing was conducted to confirmed compliance to Normal Ramp Rate SA11.2 . See also Appendix A.

☐ 14H (SA): The evaluation to the Standards above provides evidence of compliance to HECO Rule 14H, SRD V1.0, Interconnection Application.

☒ 14H (SB): The evaluation to the Standards above provides evidence of compliance to HECO Rule 14H, SRD V2.0, Interconnection Application.

B. Mahrenholz

Bruce Mahrenholz, Director North American Certification Program

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ANSI B
11" X 17"

SHEET NUMBER

PV-17

CERTIFICATE OF COMPLIANCE

Certificate Number 20220917-E341165
Report Reference E341165-20210317
Date 2022-09-17

Inverter Firmware Version:			
Model	UL 1998 (grid support)	Date	Version/Revision
IQ8-60, IQ8PLUS-72, IQ8M-72, IQ8A-72, IQ8H-208-72, IQ8H-240-72	Yes	2022-08-02	2.45.04
	Yes	2022-09-09	2.48.01


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APPENDIX A

As permitted by UL1741, 3rd Edition, Table SA1.1, shown below, allows for the evaluation of products using either the UL 1741 SA tests or alternative testing methods using the requirements of IEEE 1547.1-2020 in accordance with IEEE 1547-2018 and IEEE 1547.1-2020.

UL1741 SA test name	SA test section	Comparable IEEE 1547.1-2020 test section	Subject Inverter complies with UL1741SA
Anti-Islanding Protection	SA8	5.10.2	✓
Low and High Voltage Ride-Through	SA9	5.4.4, 5.4.7	✓
Low and High Frequency Ride-Through	SA10	5.5.3, 5.5.4	✓
Normal Ramp Rates	SA11.2	NA ^a	✓
Soft-Start Ramp Rates	SA11.4	5.6	✓
Specified Power Factor	SA12	5.14.3	✓
Volt/Var Mode	SA13	5.14.4	✓ ^b
Frequency-Watt	SA14	5.15.2	✓
Volt-Watt	SA15	5.14.9	✓
Disable Permit Service	SA17	5.6	✓
Limit Active Power	SA18	5.13	✓
^a IEEE 1547-2018 and IEEE 1547.1-2020 do not have a requirement for, or test equivalent to, the UL 1741 SA Normal Ramp Rate which is presently a local requirement per California Rule 21 and/or Hawaii 14H. This inverter has been additionally tested and is compliance with the Normal Ramp Rate test of SA11.2.			
^b - Functional in the following priority modes: [X] active power [X] reactive power			


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SHEET NAME

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ANSI B
11" X 17"

SHEET NUMBER

PV-18