GENERAL NOTES

1. *All electrical materials shall be new and listed by recognized electrical testing laboratory*
   Custom made equipment shall have complete test data submitted by the manufacturer attesting to its safety
2. *Outdoor equipment shall be NEMA 3R rated or equivalent*
3. *All metallic equipment shall be grounded*
4. *Contractor shall obtain electrical permits prior to installation and shall coordinate all inspections, testing commissioning and acceptance with the client,*
   utility co. and city inspectors as needed.
5. *The electrical contractor shall verify the exact locations of service points and service sizes with the serving utility company and comply with all utility companies requirements.*
6. *Drawings are diagrammatic only, routing of raceways shall be option of the contractor unless otherwise noted and shall be coordinated with other trades.*
7. *If the roof material or the roof structure not adequate for PV installation, call the engineer of record print to installation. The contractor is responsible to verify that the roof is capable of withstanding the extra weight.*
8. *If the distances for cable runs are different than shown, the contractor shall notify the electrical engineer to validate the wire size. Final drawings will be red-lined and updated as appropriate.*
9. *Whenever a discrepancy in quality of equipment arises on the drawing or specifications, the contractor shall be responsible for providing and installing all materials and services required by the strictest conditions noted on the drawings or in the specifications to ensure complete compliance and longevity of the operable system required by the engineer of record.*

PHOTOVOLTAIC NOTES:

1. *Ground mounted photovoltaic panels and modules shall be tested, listed and identified by recognized testing laboratory*
2. *Solar system shall not cover any plumbing or mechanical vents*
3. *Modules and support structures shall be grounded unless racking has integrated ground.*
4. *Removal of an interactive inverter or other equipment shall not disconnect the bonding connection between the grounding electrode conductor and the photovoltaic source and/or output circuit grounded conductors.*
5. *All PV modules and associated equipment and wiring shall be protected from physical damage.*
6. *Live parts of PV source circuits and PV output circuits over 150v to ground shall not be accessible to other than qualified persons while energized.*
7. *Inverter is equipped with integrated DC disconnect, thus providing ground fault protection*
8. *All conductors shall be copper and 75 deg rated*
9. *A single conductor shall be permitted to be used to perform the multiple functions of dc grounding, AC grounding and bonding between AC and DC systems.*
10. *Non-current carrying metal parts of equipment shall be effectively bonded together. Bond both ends of raceways.*

SHEET INDEX

GOVERNING CODES

THE INSTALLATION OF SOLAR ARRAYS AND PHOTOVOLTAIC POWER SYSTEMS SHALL COMPLY WITH THE FOLLOWING CODES:

- *2020 National Electrical Code*
- *2018 International Building Code*
- *2018 International Residential Code*
- *2020 Minnesota Residential Code*
- *2020 Minnesota Building Code*
- *2020 Minnesota Energy Code*
- *2020 Minnesota Accessibility Code*
- *2020 Minnesota State Fire Code*
- *2018 International Fire Code*
- *2018 International Energy Conservation Code*
- *2018 Mechanical Code*

AS ADOPTED BY THE STATE OF MINNESOTA
ALL OTHER ORDINANCE ADOPTED BY THE LOCAL GOVERNING AGENCIES

SYSTEM RATING

DC 12.96 KW STC
AC 10.44 KW STC

EQUIPMENT SUMMARY

36 HANWHA 360 WATT MODULES
WITH IQ7+ MICROINVERTERS

ELECTRICAL INFORMATION

EXISTING
MAIN SERVICE PANEL BUS SIZE:**200A**
MAIN SERVICE BREAKER SIZE:**200A**
MOUNTING SYSTEM: SUNMODO GROUND MOUNT

BUILDING INFORMATION

CONSTRUCTION TYPE: V-B
OCCUPANCY: R3

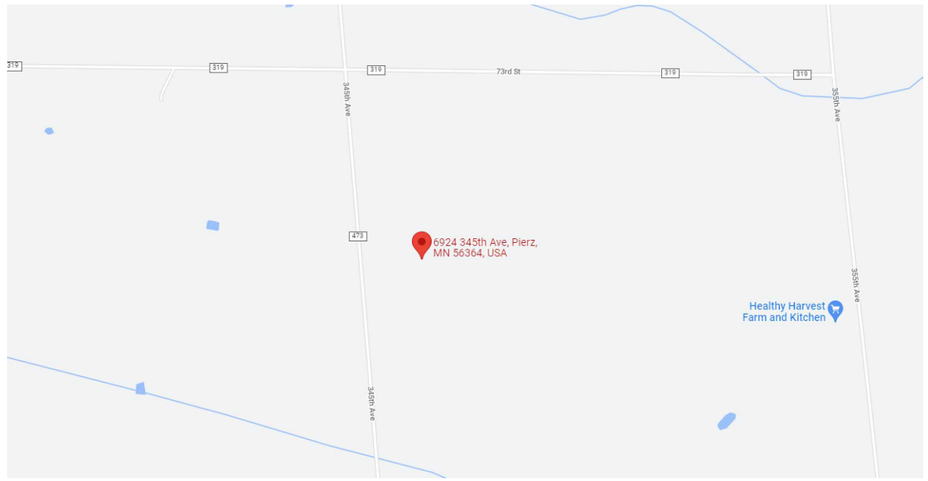
CONTRACTOR

Address:101 Isanti Parkway
NE, Isanti, MN 55040
Phone number: (763) 229-6662
E-mail: contact@wolfriverelectric.com

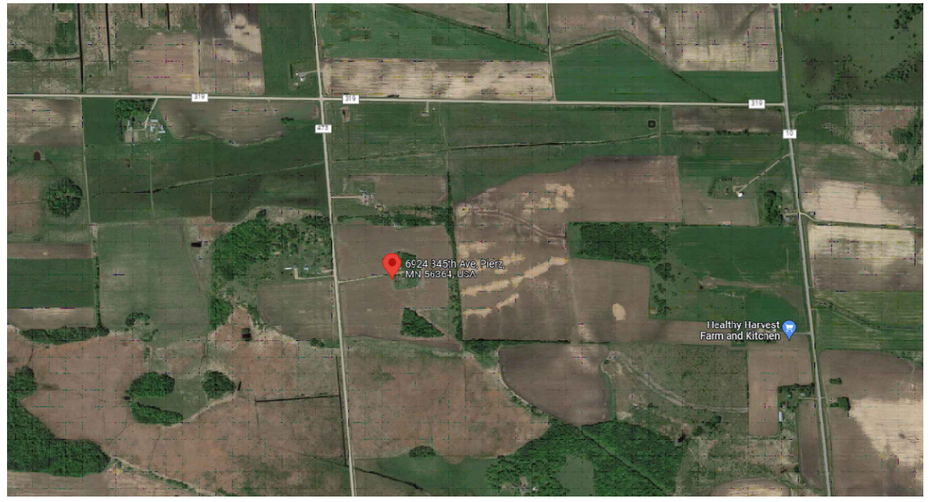
WOLF RIVER ELECTRIC

Owner: Nicolas Frank
Property Address: 6924 345th Ave Pierz, MN 56364
Property Type: Single Family Residence
Drawn by: New@engineerinc.io
Date: *04/06/2022*

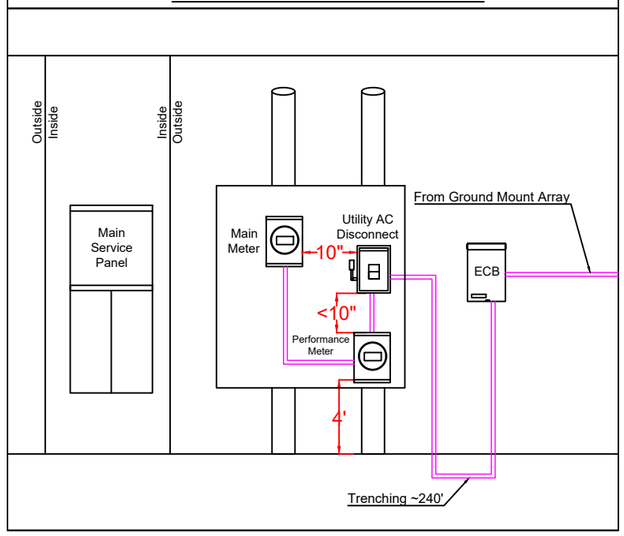
VICINITY MAP (SCALE: NTS)



SATELLITE VIEW (SCALE: NTS)

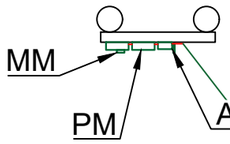


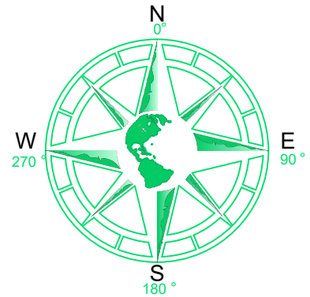
EQUIPMENT ELEVATION



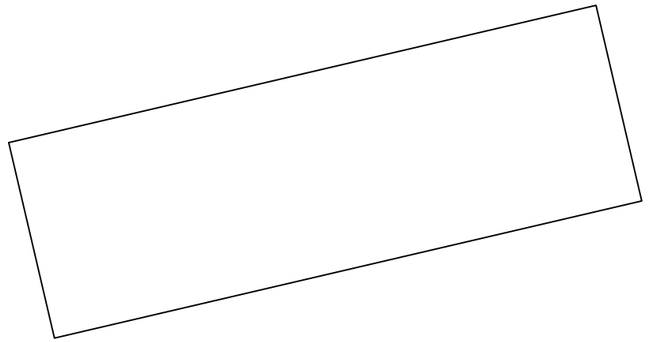
NOTE: No clearance issue
Distance between all equipments is maximum 10"
East Central Energy
Note: 24/ 7 Unescorted keyless access is to be provided for ALL UTILITY EQUIPMENT

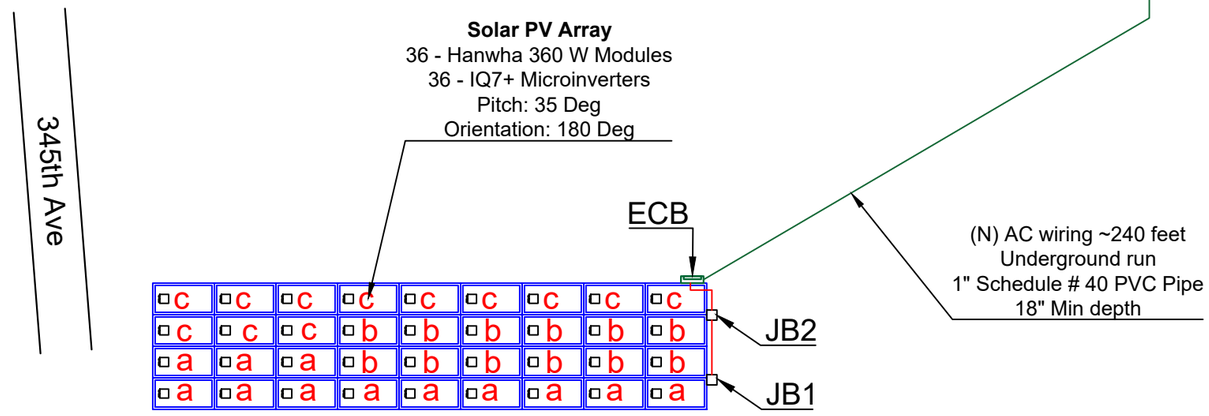
SECONDARY INTERCONNECTION





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





INDEX

MSP (E) **200A** Main Service Panel
MM .....(E) Main Meter
ECB....(N) Enphase Combiner Box
AC ..... (N) 60A Utility AC
PM.....(N) Performance Meter
JB .....(N) Junction Box
.....(N) Microinverter
..... Solar Module
.....EMT type Conduit
..... Fire Setback Line
.....FMT type Conduit
.....PVC type Conduit

SOLAR MODULES

36 Hanwha 360 Watt
Model #Q.PEAK DUO BLK-G10+

INVERTER

INVERTER TYPE: Micro:
36 Enphase IQ7PLUS
Model # IQ7PLUS-72-2-US(240V)

CONTRACTOR

Wolf RIver Electirc
Address:101 Isanti Parkway
NE, Isanti, MN 55040
Phone number: (763) 229-6662
E-mail: contact@wolfriverelectric.com

SITE MAP & PV LAYOUT

ENGINEERINC
Drawn by:New@engineerinc.io
DATE: 04/06/2022

Project Name:
Nicolas Frank
Property Adress:
6924 345th Ave
Pierz, MN 56364

Project:
PV SYSTEM
Scale:
AS INDICATED

PV 1.0

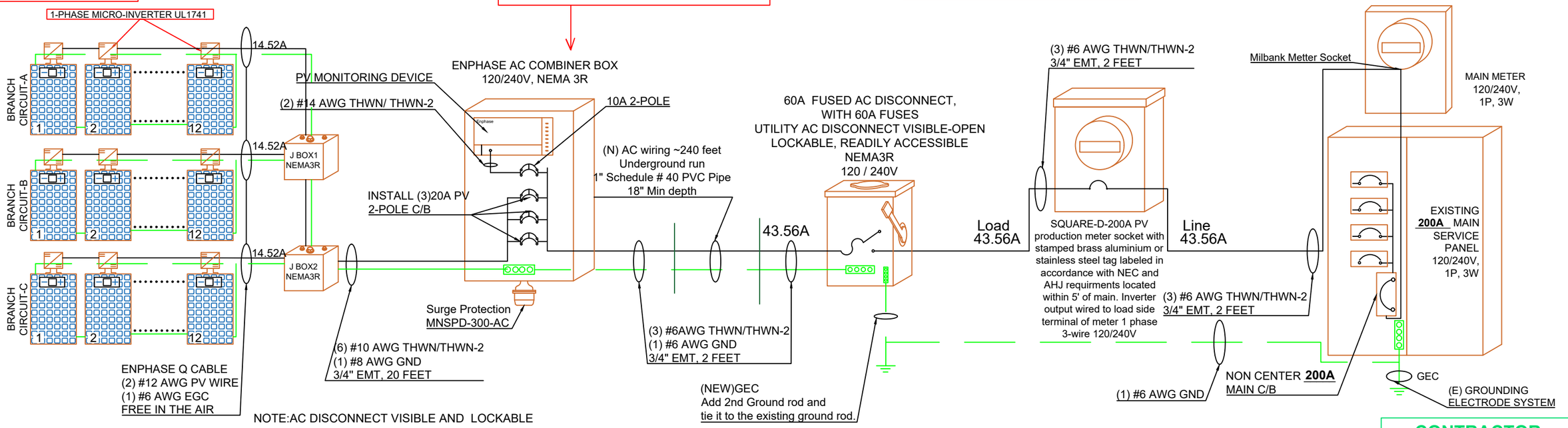
ATT:PLEASE REFER TO WH NET METEERING GUIDE:APPENDIX G

1-PHASE MICRO-INVERTER UL1741

REFERENCE POINT OF APPLICABILITY

SECONDARY INTERCONNECTION

NOTE: *Service Panel does not contain center fed Main Breaker:*



NOTE:AC DISCONNECT VISIBLE AND LOCKABLE

In locations where there is no local Public Authority, the customer is exempt from inspection, and/or the service has been shut off or disconnected for more than 365 days (1 year), the licensed electrician or wireman shall submit a signed and dated East Central Energy Electrical Inspection Certificate to the Company's Builders Call Line attesting that the electrical installation has been completed and installed according to the current National Electrical Code®, the East Central Energy Standard for Electric Installation and Use, and any other applicable codes that apply before electric service is energized.

The lockable visible disconnect must be located within 5 feet from the General Service Meter and must be located on the exterior of the building

Meter Socket must be **200A** rated and must have lever Bypass

PV Production meter socket must have lever bypass/bypass

No loads or energy storage systems shall be connected on the DER side of the production meter

36 HANWHA 360 WATT MODULES
36 ENPHASE IQ7PLUS MICROINVERTERS
ENPHASE IQ7PLUS MICROINVERTERS
1 PHASE 290VA
MAXIMUM OUTPUT CURRENT 1.21A
AC PORT BACKFEED CURRENT 0A
DC SHORT CIRCUIT CURRENT 15A

SYSTEM RATING AND DER POWER OUTPUT
DC 12.96 KW STC
AC 10.44 KW STC
INVERTER:ENPHASE IQ7PLUS-72-2-US
INVERTER MAXIMUM CONTINUOUS OUTPUT:290VA
SYSTEM POWER OUTPUT: 36 x 290 =10.44

For smaller DERs, using the PoC as the Reference Point of Applicability allows the DER equipment type testing certification to be utilized as the main method by which compliance with the Standard is verified. The PoC might be the terminals of an inverter, for example, and utilizing a UL 1741 certified and listed inverter would be sufficient to demonstrate Standard compliance.

East Central Energy

Note: 24/ 7 Unescorted keyless access is to be provided for ALL UTILITY EQUIPMENT

Design meet National Electric Code(NEC codes)

DC 12.96 KW STC
AC 10.44 KW STC

For smaller DERs, using the PoC as the Reference Point of Applicability allows the DER equipment type testing certification to be utilized as the main method by which compliance with the Standard is verified. The PoC might be the terminals of an inverter, for example, and utilizing a UL 1741 certified and listed inverter would be sufficient to demonstrate Standard compliance.

Production meter is required based on the der size and program under which the application is submitted

PV ARRAY RATING								*WIRE SIZE CALCULATION*	
BRANCH CIRCUIT-A								*BRANCH CIRCUIT -A*	
Number Modules	*12*	*Type*	*Q.PEAK DUO BLK-G10+*		*Hanwha 360 Watt*			*Number OF Microinverters in Circuit*	*12*
Number MicroInverters	*12*	*Type*	*Enphase IQ7+ Microinverters*		*IQ7PLUS-72-2-US(240V)*			*Microinverter Maximum Output Current (A)*	*1.21*
Total DC Wattage (Watts)	*Watts STC, (Watts/Module) 12*360=4320*							*Branch Circuit Total Current (A)*	*12 * 1.21 * 1.25 = 18.15*
Array Currents	*I-SC*	*11.04*	*A*	*I-MP*	*10.49*	*A*		*Breaker Size Per Branch Circuit (A)*	*20*
Module Voltage	*V-OC*	*41.18*	*V*	*V-MP*	*34.31*	*V*			
BRANCH CIRCUIT - B								*BRANCH CIRCUIT - B*	
Number Modules	*12*	*Type*	*Q.PEAK DUO BLK-G10+*		*Hanwha 360 Watt*			*Number OF Microinverters in Circuit*	*12*
Number MicroInverters	*12*	*Type*	*Enphase IQ7+ Microinverters*		*IQ7PLUS-72-2-US(240V)*			*Microinverter Maximum Output Current (A)*	*1.21*
Total DC Wattage (Watts)	*Watts STC, (Watts/Module) 12*360=4320*							*Branch Circuit Total Current (A)*	*12 * 1.21 * 1.25 = 18.15*
Array Currents	*I-SC*	*11.04*	*A*	*I-MP*	*10.49*	*A*		*Breaker Size Per Branch Circuit (A)*	*20*
Module Voltage	*V-OC*	*41.18*	*V*	*V-MP*	*34.31*	*V*			
BRANCH CIRCUIT - C								*BRANCH CIRCUIT - C*	
Number Modules	*12*	*Type*	*Q.PEAK DUO BLK-G10+*		*Hanwha 360 Watt*			*Number OF Microinverters in Circuit*	*12*
Number MicroInverters	*12*	*Type*	*Enphase IQ7+ Microinverters*		*IQ7PLUS-72-2-US(240V)*			*Microinverter Maximum Output Current (A)*	*1.21*
Total DC Wattage (Watts)	*Watts STC, (Watts/Module) 12*360=4320*							*Branch Circuit Total Current (A)*	*12 * 1.21 * 1.25 = 18.15*
Array Currents	*I-SC*	*11.04*	*A*	*I-MP*	*10.49*	*A*		*Breaker Size Per Branch Circuit (A)*	*20*
Module Voltage	*V-OC*	*41.18*	*V*	*V-MP*	*34.31*	*V*			
FROM JBOX TO ENPHASE COMBINER BOX									
Maximum Continius Current (A)	*18.15*	*More Than 3 CCC Adjist. Factor*			*0.8*			*Adjusted Conductor Ampacity(A)*	*18.15 / 0.8 = 22.69*
Raceway Height From Roof (Temp 39+22=61C)	*3 1/2"*	*# of wire(# BC *2)*			*6*			*Ambiend Tem Factor Per NEC Table 310.15(b)(2)(a)*	*0.71*
Temp. Derate Factor (max. continous current divided ambient tem. Factor (A)					*22.69 * 0.71 = 31.95*			*Wire Size from NEC Table 310.15(b)16*	*10 AWG*
FROM ENPHASE COMBINER BOX TO MAIN PANEL									
Total Number Of Microinverters	*36*	*Total Amps From All Microinverters (A)*			*36 * 1.21 = 43.56*			*Consider Continuous (A)*	*43.56 * 1.25 = 54.45*
Temp. Derate Factor(0.91 at wall of the Building) (A)					*54.45 / 0.91 = 59.84*			*Wire Size from NEC Table 310.15(b)16*	*6 AWG*
Ambiend Tem Factor Per NEC Table 310.15(b)(2)(a)					*0.91*				

CONTRACTOR

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E-mail: contact@wolfriverelectric.com

ELECTRICAL 1-LINE DIAGRAM

ENGINEERINC

Drawn by:New@engineerinc.io
DATE: 04/06/2022

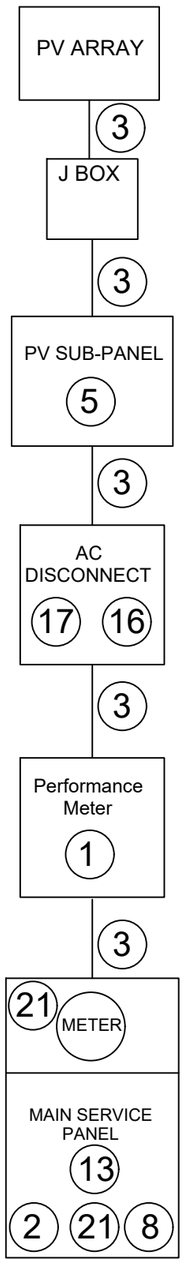
Project Name:
Nicolas Frank

Property Adress:
6924 345th Ave
Pierz, MN 56364

Project:
PV SYSTEM

Scale:
AS INDICATED

PV 2.0



LABEL 1

Production Meter

LABEL 2

Photovoltaic Power Source

LABEL 3

CAUTION: SOLAR CIRCUIT

LABEL 4

WARNING

ELECTRIC SHOCK HAZARD

THE DC CONDUCTORS OF THIS PHOTOVOLTAIC SYSTEM ARE UNDERGROUND AND MAY BE ENERGIZED

LABEL 5

WARNING

ELECTRIC SHOCK HAZARD

IF GROUND FAULT IS INDICATED NORMALLY GROUNDED CONDUCTORS MAY BE UNDERGROUND AND ENERGIZED

LABEL 6

WARNING

ELECTRIC SHOCK HAZARD

DO NOT TOUCH TERMINALS TERMINALS ON BOTH LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

LABEL 7

WARNING

ELECTRIC SHOCK HAZARD

DO NOT TOUCH TERMINALS 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 8

WARNING

TURN OF PHOTOVOLTAIC AC DISCONNECT PRIOR TO WORKING INSIDE PANEL

LABEL 9

DO NOT DISCONNECT UNDER LOAD

LABEL 10

MAIN PV SYSTEM DISCONNECT

LABEL 11

MAIN PV SYSTEM AC DISCONNECT

LABEL 12

SOLAR DISCONNECT

LABEL 13

CAUTION

SOLAR ELECTRIC SYSTEM CONNECTED

LABEL 14

WARNING-DUAL POWER SOURCE SECOND SOURCE IS PV SYSTEM

LABEL 15

CAUTION

PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED

LABEL 16

PHOTOVOLTAIC AC DISCONNECT

MAXIMUM AC OPERATING CURRENT 43.56A

MAXIMUM AC OPERATING CURRENT 240V

LABEL 17

PHOTOVOLTAIC

UTILITY AC DISCONNECT

LABEL 18

PHOTOVOLTAIC

DC DISCONNECT

LABEL 19

NOMINAL OPERATING AC VOLTAGE

NOMINAL OPERATING AC FREQUANCY

MAXIMUM AC POWER

MAXIMUM AC CURRENT

MAX OCERCURRENT DEVICE RATING FOR AC MODULE PROTECTION

LABEL 20

PV SYSTEM DC DISCONNECT

OPERATING CURRENT

OPERATING VOLTAGE

MAXIMUM SYSTEM VOLTAGE

SHORT CIRCUIT CURRENT

LABEL 21

RATED MAX POWER-FONT CURRENT

RATED MAX POWER-FONT VOLTAGE

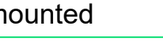
MAXIMUM SYSTEM VOLTAGE

SHORT CIRCUIT CURRENT

MAX RATED OUTPUT CURRENT OF THE CHARGE CONTROLLER IF INSTALLED

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



Note: LABELS SHALL COMPLY WITH NEC 690

"Labels shall be weatherproof, durable and permanently mounted"

*** ALL LABELS = RED THERMOPLASTIC/REFLECTIVE , Permanently mounted

CONTRACTOR

WOLF RIVER ELECTRIC

Wolf RIver Electirc
Address:101 Isanti Parkway
NE, Isanti, MN 55040
Phone number: (763) 229-6662
E-mail: contact@wolfriverelectric.com

SYSTEM LABELING DETAIL

ENGINEERINC

Drawn by:New@engineerinc.io
DATE: 04/06/2022

Project Name:
Nicolas Frank

Property Adress:
6924 345th Ave
Pierz, MN 56364

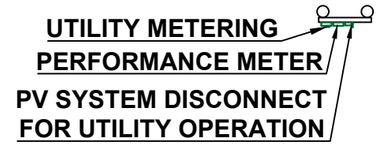
Project:
PV SYSTEM

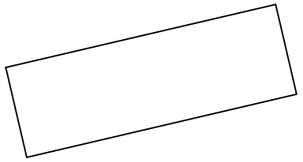
Scale:
AS INDICATED

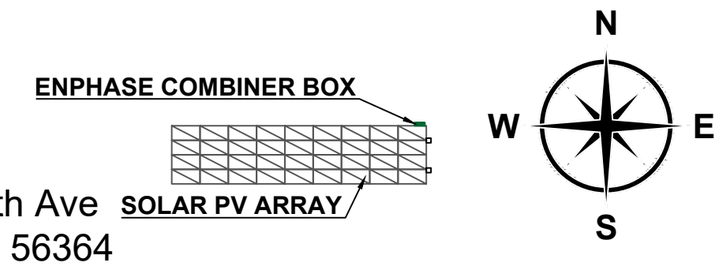
PV 3.1

CAUTION

POWER TO THIS BUILDING IS ALSO SUPPLIED
FROM THE FOLLOWING SOURCES WITH
DISCONNECTS LOCATED AS SHOWN:
SERVICE 1 OF 2



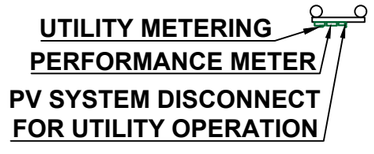


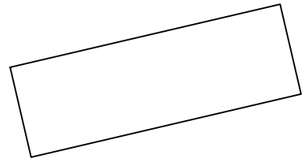


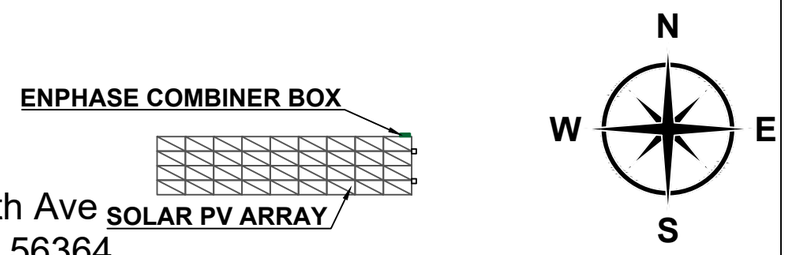
6924 345th Ave
Pierz, MN 56364

CAUTION

POWER TO THIS BUILDING IS ALSO SUPPLIED
FROM THE FOLLOWING SOURCES WITH
DISCONNECTS LOCATED AS SHOWN:
SERVICE 2 OF 2







6924 345th Ave
Pierz, MN 56364

CONTRACTOR

Wolf RIver Electirc
Address:101 Isanti Parkway
NE, Isanti, MN 55040
Phone number: (763) 229-6662
E-mail: contact@wolfriverelectric.com

PLACARD

ENGINEERINC

Drawn by:New@engineerinc.io
DATE: 04/06/2022

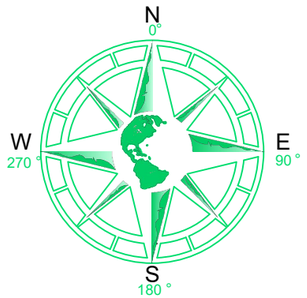
Project Name:
Nicolas Frank

Property Adress:
6924 345th Ave
Pierz, MN 56364

Project:
PV SYSTEM

Scale:
AS INDICATED

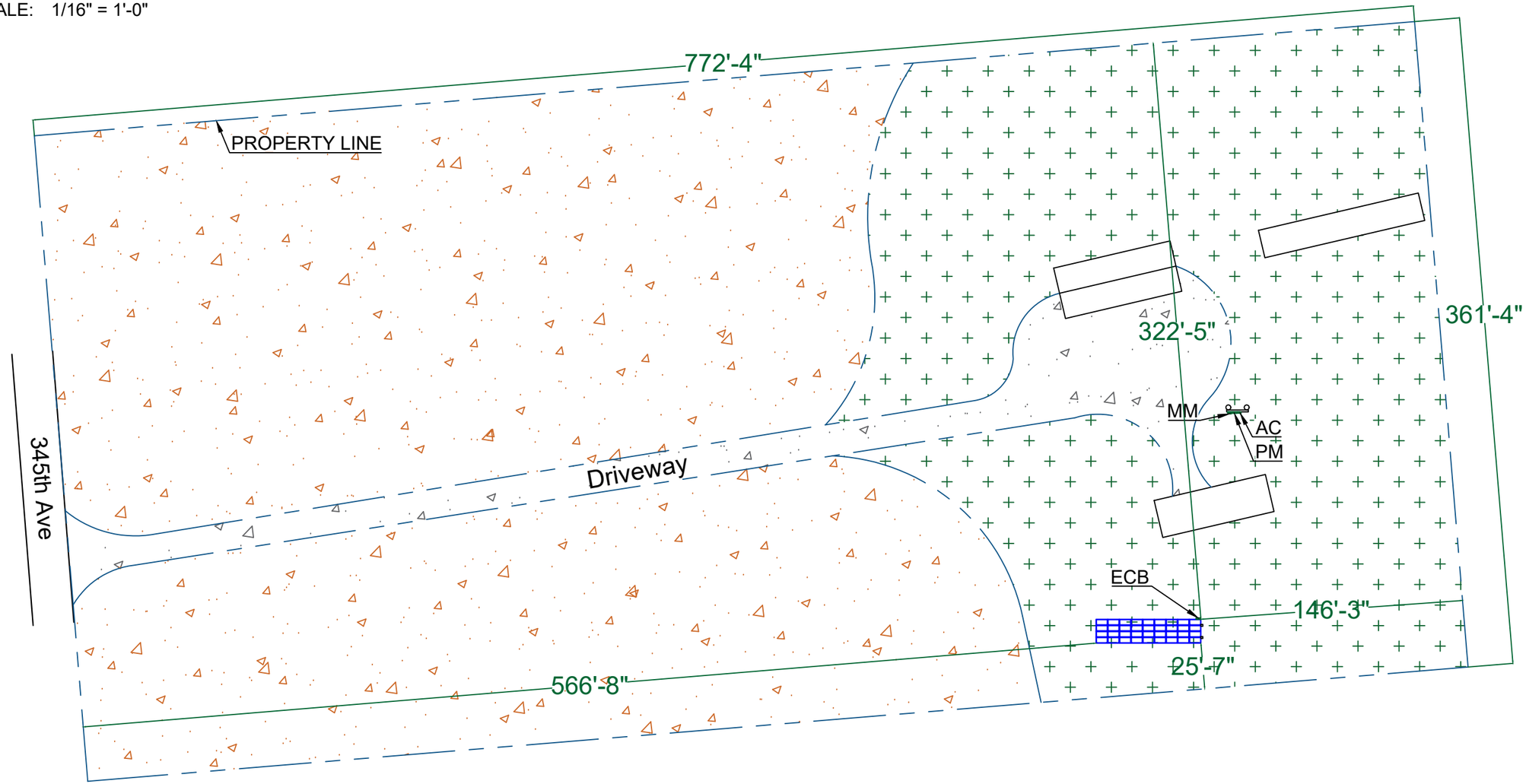
PV 3.2



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

LEGEND

MSP..... Main Service Panel
MM ..... Main Meter
AC ..... AC Disconnect
ECB..... Enphase Combiner Box
PM..... Performance Meter



East Central Energy
Note: 24/ 7 Unescorted keyless access is to be provided for ALL UTILITY EQUIPMENT

CONTRACTOR

Wolf RIver Electirc
Address:101 Isanti Parkway
NE, Isanti, MN 55040
Phone number: (763) 229-6662
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PROPERTY PLAN

ENGINEERINC

Drawn by:New@engineerinc.io
DATE: 04/06/2022

Project Name:
Nicolas Frank

Property Adress:
6924 345th Ave
Pierz, MN 56364

Project:
PV SYSTEM

Scale:
AS INDICATED

PV 4.0

ATTACHMENT

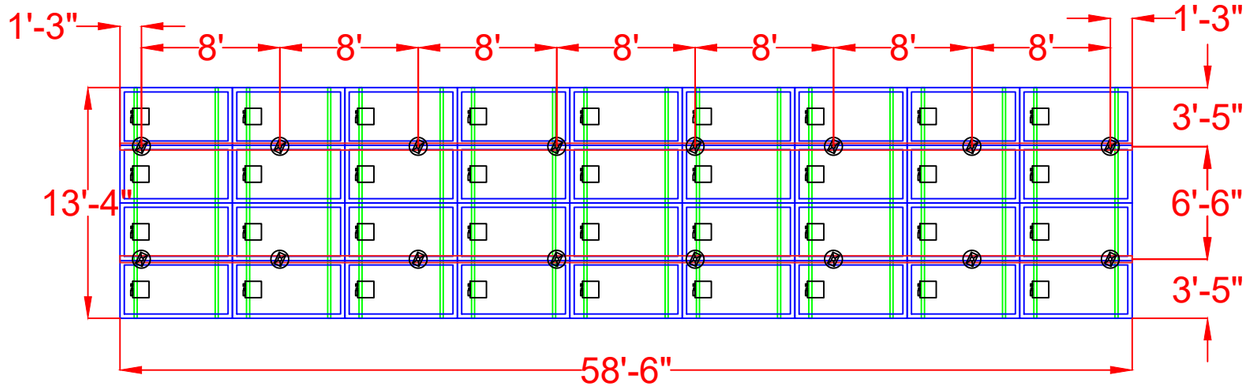
RAIL

2" HORIZONTAL PIPE

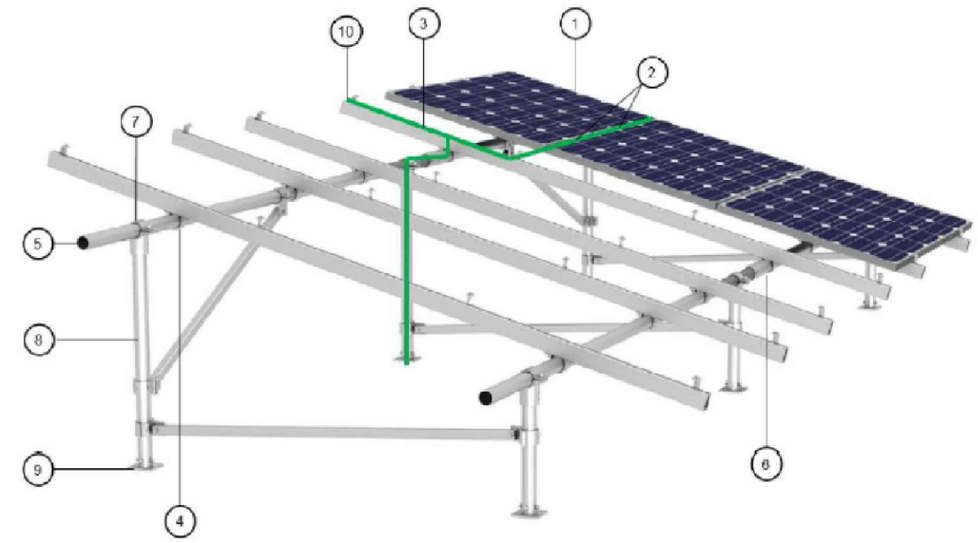
East Central Energy

Note: 24/ 7 Unescorted keyless access is to be provided for ALL UTILITY EQUIPMENT

POINT LOAD CALCULATION PER ARRAY	
Module Weight (lbs)	43.87
# Of Modules	36
Total Module Weight (lbs)	1579.32
Rack Weight (lbs)	315.86
MicroInverters Weight (lbs)	85.68
Total System Weight (lbs)	1980.86
# Of Standoffs	16
Max Span Between Standoffs (in)	96
Loading Per Standoff (lbs)	123.80
Total Area (sq.ft.)	648
Loading (PSF)	3.05



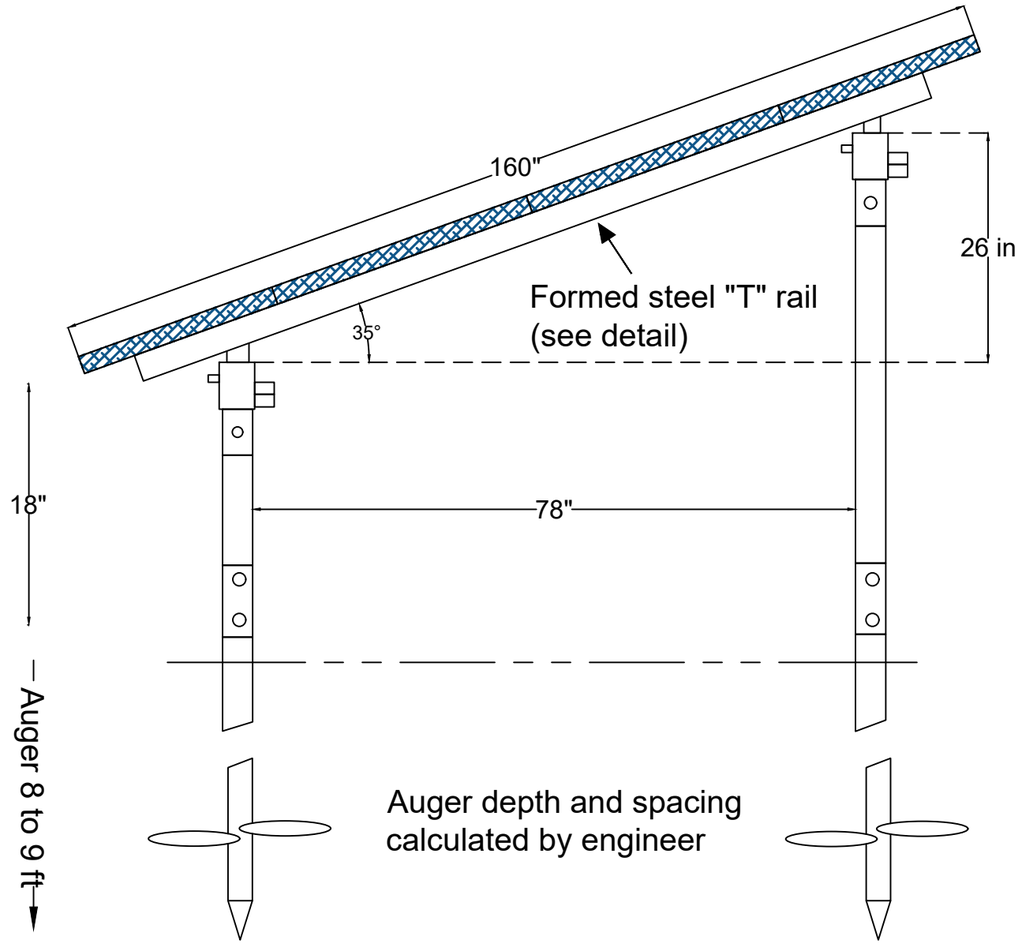
Fault Current Path Diagram



Items are listed in the fault current path in order from the PV Panel to the Post Base

1. PV Panel
2. Grounding Mid Clamp Kit
3. Helio Rail
4. 2" Aluminium Pipe Clamp Kit with PVC insulator
5. Horizontal Steel Post
6. 2" Pipr Splice Kit (configuration dependent)
7. 2" T Pipe Cap Kit
8. Vertical Post
9. 2" Post Base Kit
10. Grounding Lug

Fault Current Path



Auger depth and spacing calculated by engineer

CONTRACTOR

WOLF RIVER ELECTRIC

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NE, Isanti, MN 55040
Phone number: (763) 229-6662
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ATTACHMENT LAYOUT

ENGINEERINC

Drawn by:New@engineerinc.io
DATE: 04/06/2022

Project Name:
Nicolas Frank

Property Adress:
6924 345th Ave
Pierz, MN 56364

Project: PV SYSTEM

Scale: AS INDICATED

PV 5.0

Data Sheet
Enphase Microinverters
Region: AMERICAS

Enphase IQ 7 and IQ 7+ Microinverters

The high-powered smart grid-ready **Enphase IQ 7 Micro**™ and **Enphase IQ 7+ Micro**™ dramatically simplify the installation process while achieving the highest system efficiency.

Part of the Enphase IQ System, the IQ 7 and IQ 7+ Microinverters integrate with the Enphase IQ Envoy™, Enphase IQ Battery™, and the Enphase Enlighten™ monitoring and analysis software.

IQ Series Microinverters extend the reliability standards set forth by previous generations and undergo over a million hours of power-on testing, enabling Enphase to provide an industry-leading warranty of up to 25 years.

Easy to Install

- Lightweight and simple
- Faster installation with improved, lighter two-wire cabling
- Built-in rapid shutdown compliant (NEC 2014 & 2017)

Productive and Reliable

- Optimized for high powered 60-cell and 72-cell* modules
- More than a million hours of testing
- Class II double-insulated enclosure
- UL listed

Smart Grid Ready

- Complies with advanced grid support, voltage and frequency ride-through requirements
- Remotely updates to respond to changing grid requirements
- Configurable for varying grid profiles
- Meets CA Rule 21 (UL 1741-SA)

* The IQ 7+ Micro is required to support 72-cell modules.

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

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Enphase IQ 7 and IQ 7+ Microinverters

INPUT DATA (DC)	IQ7-60-2-US / IQ7-60-B-US		IQ7PLUS-72-2-US / IQ7PLUS-72-B-US	
Commonly used module pairings[1]	235 W - 350 W +		235 W - 440 W +	
Module compatibility	60-cell PV modules only		60-cell and 72-cell PV modules	
Maximum input DC voltage	48 V		60 V	
Peak power tracking voltage	27 V - 37 V		27 V - 45 V	
Operating range	16 V - 48 V		16 V - 60 V	
Min/Max start voltage	22 V / 48 V		22 V / 60 V	
Max DC short circuit current (module Isc)	15 A		15 A	
Overvoltage class DC port	II		II	
DC port backfeed current	0 A		0 A	
PV array configuration	1 x 1 ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit			
OUTPUT DATA (AC)	**IQ 7 Microinverter**		**IQ 7+ Microinverter**	
Peak output power	250 VA		295 VA	
Maximum continuous output power	240 VA		290 VA	
Nominal (L-L) voltage/range[2]	240 V / 211-264 V	208 V / 183-229 V	240 V / 211-264 V	208 V / 183-229 V
Maximum continuous output current	1.0 A (240 V)	1.15 A (208 V)	1.21 A (240 V)	1.39 A (208 V)
Nominal frequency	60 Hz		60 Hz	
Extended frequency range	47 - 68 Hz		47 - 68 Hz	
AC short circuit fault current over 3 cycles	5.8 Arms		5.8 Arms	
Maximum units per 20 A (L-L) branch circuit[3]	16 (240 VAC)	13 (208 VAC)	13 (240 VAC)	11 (208 VAC)
Overvoltage class AC port	III		III	
AC port backfeed current	0 A		0 A	
Power factor setting	1.0		1.0	
Power factor (adjustable)	0.7 leading ... 0.7 lagging		0.7 leading ... 0.7 lagging	
EFFICIENCY	**@240 V**	**@208 V**	**@240 V**	**@208 V**
Peak CEC efficiency	97.6 %	97.6 %	97.5 %	97.3 %
CEC weighted efficiency	97.0 %	97.0 %	97.0 %	97.0 %
MECHANICAL DATA				
Ambient temperature range	-40ºC to +65ºC			
Relative humidity range	4% to 100% (condensing)			
Connector type (IQ7-60-2-US & IQ7PLUS-72-2-US)	MC4 (or Amphenol H4 UTX with additional Q-DCC-5 adapter)			
Connector type (IQ7-60-B-US & IQ7PLUS-72-B-US)	Friends PV2 (MC4 intermateable). Adaptors for modules with MC4 or UTX connectors: - PV2 to MC4: order ECA-S20-S22 - PV2 to UTX: order ECA-S20-S25			
Dimensions (WxHxD)	212 mm x 175 mm x 30.2 mm (without bracket)			
Weight	1.08 kg (2.38 lbs)			
Cooling	Natural convection - No fans			
Approved for wet locations	Yes			
Pollution degree	PD3			
Enclosure	Class II double-insulated, corrosion resistant polymeric enclosure			
Environmental category / UV exposure rating	NEMA Type 6 / outdoor			
FEATURES				
Communication	Power Line Communication (PLC)			
Monitoring	Enlighten Manager and MyEnlighten monitoring options. Both options require installation of an Enphase IQ Envoy.			
Disconnecting means	The AC and DC connectors have been evaluated and approved by UL for use as the load-break disconnect required by NEC 690.			
Compliance	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 and NEC-2017 section 690.12 and C22.1-2015 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according manufacturer's instructions.			

1. No enforced DC/AC ratio. See the compatibility calculator at https://enphase.com/en-us/support/module-compatibility.
2. Nominal voltage range can be extended beyond nominal if required by the utility.
3. Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

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

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2018-05-24

CONTRACTOR

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INVERTER DATA SHEET

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Enphase® Energy // Rapid Shutdown

Rapid shutdown is built-in

The 2014 edition of the National Electrical Code (NEC 2014) added new rapid shutdown requirements for PV systems installed on buildings. Enphase Microinverters fully meet rapid shutdown requirements in the new code without the need to install any additional electrical equipment.

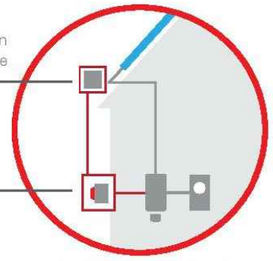
What's new in NEC 2014?
NEC 2014, Section 690.12 applies to PV conductors over 10 feet from the PV array and requires that the conductors power down to 30 volts and 240 volt-amperes within 10 seconds of rapid shutdown initiation.

String inverters require work arounds for rapid shutdown

Work around.
Specialized Rapid Shutdown electrical box installed on the roof within 10 feet of array.

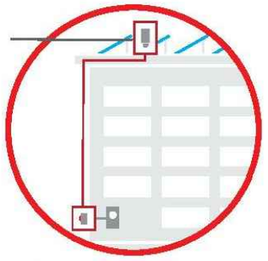
Work around.
Shutoff switch that is easily accessible to first responders on the ground.

Work around.
Extra conduit in installation.



Residential String Inverter

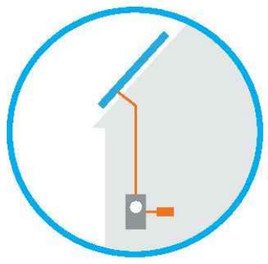
Work around.
String inverter installed on roof, a hostile environment that string inverters are not built to live in.



Commercial String Inverter

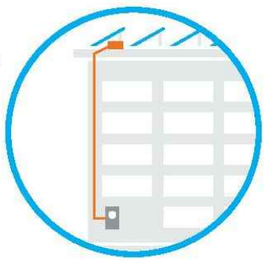
Enphase comes standard with rapid shutdown capability

All Enphase microinverters, even those that were previously installed, inherently meet rapid shutdown requirements, no additional equipment or workarounds needed



Residential Microinverter

Enphase microinverters can safely shut down automatically, leaving only low-voltage DC electricity isolated to the PV module



Commercial Microinverter

To learn more, visit enphase.com

[e] enphase ENERGY

Planning for Microinverter Installation

The Enphase IQ 7 Micro is compatible with 60-cell PV modules, and the IQ 7+ Micro and IQ 7A Micro support PV modules with 60 or 72 Cells. The IQ 7X requires a 96-cell PV module. All of them install quickly and easily. The microinverter housing is designed for outdoor installation and complies with the NEMA 250, type 6 environmental enclosure rating standard:

NEMA 6 rating definition: Indoor or outdoor use primarily to provide a degree of protection against hose-directed water, the entry of water during occasional temporary submersion at a limited depth, and damage from external ice formation

The Enphase Q Cable is available with connector spacing options to accommodate installation of PV modules in portrait or landscape orientation. For Enphase Q Cable ordering information, see “Enphase Q Cable Planning and Ordering” on page 27.

Compatibility

The Enphase IQ Series Micros are **electrically compatible** with PV modules as listed in the following table. For specifications, see “Technical Data” on page 29 of this manual. You can refer to the Enphase Compatibility Calculator at: enphase.com/en-us/support/module-compatibility to verify PV module electrical compatibility. To ensure **mechanical compatibility**, be sure to order the correct connector type for both microinverter and PV module from your distributor.

WARNING: Risk of fire. The PV module DC conductors must be labeled "PV Wire" or "PV Cable" to comply with NEC for Ungrounded PV Power Systems.

Microinverter model	Connector type	PV module cell count
IQ7-60-2-US	MC-4 locking type	Pair only with 60-cell modules
IQ7PLUS-72-2-US	MC-4 locking type	Pair with 60 or 72-cell modules
IQ7X-96-2-US	MC-4 locking type	Pair only with 96-cell modules
IQ7A-72-2-US	MC-4 locking type	Pair with 60 or 72-cell modules

Grounding Considerations

The Enphase Microinverter models listed in this guide do not require grounding electrode conductors (GEC), equipment grounding conductors (EGC), or grounded conductor (neutral). Your Authority Having Jurisdiction (AHJ) may require you to bond the mounting bracket to the racking. If so, use UL2703 hardware or star washers. The microinverter itself has a Class II double-insulated rating, which includes ground fault protection (GFP). To support GFP, use only PV modules equipped with DC cables labeled PV Wire or PV Cable.

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ENPHASE RAPID SHUTDOWN, COMPATIBILITY WITH PV

ENGINEERINC

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Scale:
AS INDICATED

D 7.0

powered by Q.ANTUM DUO Z

PRELIMINARY

Q.PEAK DUO BLK-G10+
350-370

ENDURING HIGH PERFORMANCE

Quality Controlled PV
TÜVRheinland CERTIFIED
www.tuv.com ID 1111232915

25 YR Warranty Product & Performance

EUPD RESEARCH TOP BRAND PV MODULES EUROPE 2021

Q CELLS Yield Security

BREAKING THE 20% EFFICIENCY BARRIER
Q.ANTUM DUO Z Technology with zero gap cell layout boosts module efficiency up to 20.9%.

THE MOST THOROUGH TESTING PROGRAMME IN THE INDUSTRY
Q CELLS is the first solar module manufacturer to pass the most comprehensive quality programme in the industry: The new "Quality Controlled PV" of the independent certification institute TÜV Rheinland.

INNOVATIVE ALL-WEATHER TECHNOLOGY
Optimal yields, whatever the weather with excellent low-light and temperature behaviour.

ENDURING HIGH PERFORMANCE
Long-term yield security with Anti LID Technology, Anti PID Technology[1], Hot-Spot Protect and Traceable Quality Tra.Q™.

EXTREME WEATHER RATING
High-tech aluminium alloy frame, certified for high snow (5400 Pa) and wind loads (4000 Pa).

A RELIABLE INVESTMENT
Inclusive 25-year product warranty and 25-year linear performance warranty[2].

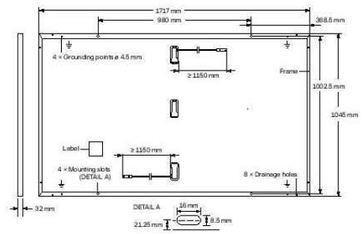
[1] APT test conditions according to IEC / TS 62804-1:2015, method A (–1500 V, 96h)
[2] See data sheet on rear for further information.

THE IDEAL SOLUTION FOR:
Rooftop arrays on residential buildings

Engineered in Germany

MECHANICAL SPECIFICATION

Format	1717 mm × 1045 mm × 32 mm (including frame)
Weight	19.9 kg
Front Cover	3.2 mm thermally pre-stressed glass with anti-reflection technology
Back Cover	Composite film
Frame	Black anodised aluminium
Cell	6 × 20 monocrystalline Q.ANTUM solar half cells
Junction box	53-101 mm × 32-60 mm × 15-18 mm Protection class IP67, with bypass diodes
Cable	4 mm² Solar cable; (+) ≥ 1150 mm, (–) ≥ 1150 mm
Connector	Stäubli MC4; IP68

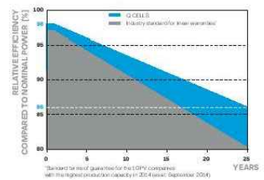


ELECTRICAL CHARACTERISTICS

POWER CLASS			350	355	360	365	370
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC[1] (POWER TOLERANCE +5 W / –0 W)							
Minimum	Power at MPP[1]	P_{MPP} [W]	350	355	360	365	370
	Short Circuit Current[1]	I_{SC} [A]	10.97	11.00	11.04	11.07	11.10
	Open Circuit Voltage[1]	V_{OC} [V]	41.11	41.14	41.18	41.21	41.24
	Current at MPP	I_{MPP} [A]	10.37	10.43	10.49	10.56	10.62
	Voltage at MPP	V_{MPP} [V]	33.76	34.03	34.31	34.58	34.84
	Efficiency[1]	η [%]	≥19.5	≥19.8	≥20.1	≥20.3	≥20.6
MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT[2]							
Minimum	Power at MPP	P_{MPP} [W]	262.6	266.3	270.1	273.8	277.6
	Short Circuit Current	I_{SC} [A]	8.84	8.87	8.89	8.92	8.95
	Open Circuit Voltage	V_{OC} [V]	38.77	38.80	38.83	38.86	38.90
	Current at MPP	I_{MPP} [A]	8.14	8.20	8.26	8.31	8.37
	Voltage at MPP	V_{MPP} [V]	32.24	32.48	32.71	32.94	33.17

[1] Measurement tolerances P_{MPP} ±3%; I_{SC}; V_{OC} ±5% at STC: 1000 W/m², 25 ± 2 °C, AM 1.5 according to IEC 60904-3 • [2] 800 W/m², NMOT, spectrum AM 1.5

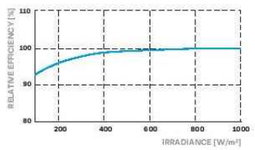
Q CELLS PERFORMANCE WARRANTY



At least 98% of nominal power during first year. Thereafter max. 0.5% degradation per year. At least 93.5% of nominal power up to 10 years. At least 86% of nominal power up to 25 years.

All data within measurement tolerances. Full warranties in accordance with the warranty terms of the Q CELLS sales organisation of your respective country.

PERFORMANCE AT LOW IRRADIANCE



Typical module performance under low irradiance conditions in comparison to STC conditions (25 °C, 1000 W/m²).

TEMPERATURE COEFFICIENTS							
Temperature Coefficient of I_{SC}	α	[%/K]	+0.04	Temperature Coefficient of V_{OC}	β	[%/K]	–0.27
Temperature Coefficient of P_{MPP}	γ	[%/K]	–0.34	Nominal Module Operating Temperature	NMOT	[°C]	43 ± 3

PROPERTIES FOR SYSTEM DESIGN

Maximum System Voltage	V_{SYS}	[V]	1000	PV module classification	Class II
Maximum Reverse Current	I_R	[A]	20	Fire Rating based on ANSI / UL 61730	C / TYPE 2
Max. Design Load, Push / Pull		[Pa]	3600 / 2660	Permitted Module Temperature on Continuous Duty	–40 °C - +85 °C
Max. Test Load, Push / Pull		[Pa]	5400 / 4000		

QUALIFICATIONS AND CERTIFICATES

Quality Controlled PV - TÜV Rheinland; IEC 61215:2016; IEC 61730:2016. This data sheet complies with DIN EN 50380. QCPV Certification ongoing.

TÜVRheinland www.tuv.com ID 1111232877

CE

Note: Installation instructions must be followed. See the installation and operating manual or contact our technical service department for further information on approved installation and use of this product.

Hanwha Q CELLS GmbH
Sonnenallee 17-21, 06766 Bitterfeld-Wolfen, Germany | **TEL** +49 (0)3494 66 99-23444 | **FAX** +49 (0)3494 66 99-23000 | **EMAIL** sales@q-cells.com | **WEB** www.q-cells.com

Engineered in Germany

CONTRACTOR

WOLF RIVER ELECTRIC

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MODULE DATA SHEET

ENGINEERINC

Drawn by:New@engineerinc.io
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Project Name:
Nicolas Frank

Property Adress:
6924 345th Ave
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Project:	Scale:
PV SYSTEM	AS INDICATED

D 8.0

SUNMODO

GO BIG ON TURF

SunTurf™ Ground Mount System

SunModo offers the next generation Ground Mount System with SunTurf™. The streamlined design combines the strength of Helio Rails with steel pipes to create the perfect ground mount solution.

SurTurf™ is ideal for solar installers looking for a durable and cost-effective system that can accommodate a wide variety of soil conditions.

The SunTurf™ Ground Mount Advantage

- ✔ Easily scalable from kilowatts to multimegawatts PV Arrays.
- ✔ Foundation design solution for every soil condition.
- ✔ Online configuration tool available to streamline design process.
- ✔ Components optimized for strength, durability and fast installation.
- ✔ UL 2703 Listed by Intertek.

Key Features of SunTurf™ Ground Mount System

SUNMODO
We've Got Your Rack!

SunTurf™ Ground Mount System easily integrate Helio Rails with Schedule 40 steel pipes. No drilling is required to attach the aluminum rails to the horizontal pipe. Optional bracing can provide additional structural rigidity for sites with high snow or wind load conditions. Anchor any ground mount installation using one of our fountain types including helical piles, precast ballasts and concrete piers.

Augers and Ground Screws

Our augers are suitable for use in weak to moderate strength soils and areas with a high-water table. Our ground screws are ideal for use in hard packed earth or soils with large amounts of cobble and gravel.

Ground Screw

Earth Auger

Technical Data

Application	Ground Mount
Material	High grade aluminum, galvanized steel and 304 stainless steel hardware
Module Orientation	Portrait and Landscape
Tilt Angle	Range between 10 to 50 degrees
Foundation Types	Post in concrete, helical earth auger, ground screw anchor and ballast
Structural Integrity	Stamped engineering letters available
Certificate	UL2703 listed by ETL
Warranty	25 years

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RACKING DATA SHEET

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AS INDICATED

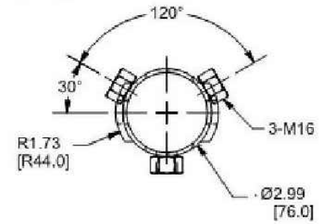
D 9.0

SUNMODO

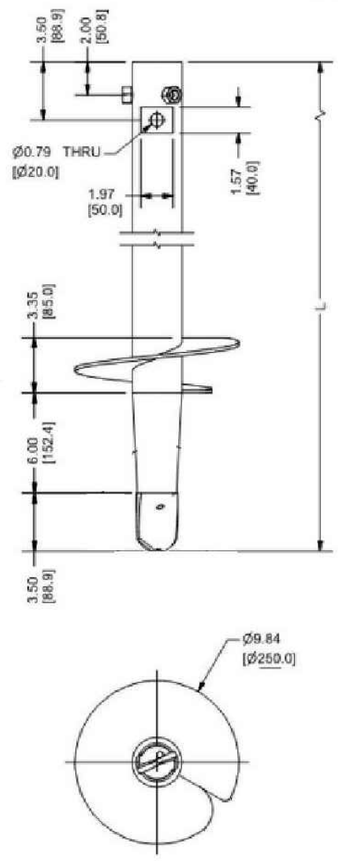
BASIC INFORMATION	
Part Number	A21146-XXX
Description	10” Helix Blade Auger
Lengths (-063 | -080)	63 inches | 80 inches
Auger Outside Diameter	76mm
Attachment Hardware	3X M16 Set Screws
Material	#45 Structural Carbon Steel
Finish	Hot Dip Galvanized
Approximate Weight	8,2 kg | 10,5 kg

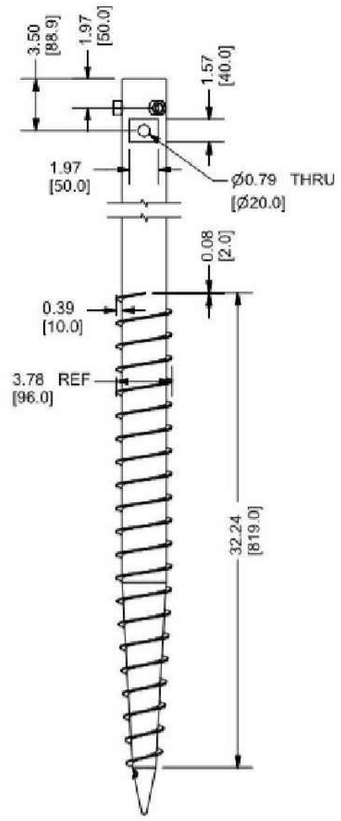
BASIC INFORMATION	
Part Number	A21147-XXX
Description	Screw Anchor
Lengths (-063 | -080)	63 inches | 80 inches
Auger Outside Diameter	76mm
Attachment Hardware	3X M16 Set Screws
Material	#45 Structural Carbon Steel
Finish	Hot Dip Galvanized
Approximate Weight	8,2 kg | 10,5 kg

SUNMODO



TYPICAL DETAIL





A21146-XXX

A21147-XXX

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Data Sheet
Enphase Networking

Enphase AC Combiner Box

The **Enphase AC Combiner Box**™ with Enphase Envoy-S™ consolidates interconnection equipment into a single enclosure and streamlines PV installations by providing a consistent, pre-wired solution for residential applications.

Smart

- Includes Envoy-S for communication and control
- Flexible networking supports Wi-Fi, Ethernet, or cellular

Simple

- Three pre-installed 20 A / 240 VAC circuit breakers
- Pre-configured revenue-grade metering available

Reliable

- Durable NRTL-certified NEMA type 3R enclosure
- Five-year warranty

LISTED

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

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Enphase AC Combiner Box

MODEL NUMBERS	
XAM1-120-B (880-00834) or XAM1-120 (880-00211)	AC Combiner with Enphase Envoy-S Metered™ for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and optional consumption monitoring (+/- 2.5%).
ACCESSORIES (order separately)	
Enphase Mobile Connect™ CELLMODEM-01 (3G) or CELLMODEM-03 (4G)	Plug and play industrial grade cellular modem with five-year data plan 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.)
Consumption Monitoring CT CT-200-SPLIT	Split core current transformers enable whole home consumption metering (+/- 2.5%).
ELECTRICAL SPECIFICATIONS	
Rating	Continuous duty
Solar branch circuit breakers	Three 2-pole 20 A / 240 VAC DIN rail-mounted breakers
Maximum system voltage	240 VAC
Rated output current	48 A
Rated input current, each input	16 A
Maximum fuse/circuit breaker rating (output)	60 A
Production Metering CT	200 A solid core pre-installed on solar busbar and wired to Envoy-S
MECHANICAL DATA	
Dimensions (WxHxD)	38.0 x 38.7 x 20.3 cm (15.0" x 15.3" x 8.0")
Weight	5.1 kg (11.2 lbs)
Ambient temperature range	-40° C to +46° C (-40° to 115° F)
Cooling	Vented, natural convection, plus heat shield
Enclosure environmental rating	Outdoor, NRTL-certified, NEMA type 3R, polycarbonate construction
Altitude	To 2000 meters (6,560 feet)
Wire size:	Follow local code requirements for conductor sizing.
Model XAM1-120-B	• 14 to 6 AWG copper conductors for branch inputs. • 14 to 4 AWG copper conductors for combined output.
Model XAM1-120	• 12 to 6 AWG copper conductors for branch inputs. • 12 to 4 AWG copper conductors for combined output.
INTERNET CONNECTION OPTIONS	
Integrated Wi-Fi	802.11b/g/n
Ethernet	802.3, Cat5E (or Cat 6) UTP Ethernet cable - (not included)
Cellular	Optional, CELLMODEM-01 (3G) or CELLMODEM-03 (4G) - (not included)
COMPLIANCE	
Compliance, Combiner Box	UL 1741
Compliance, Envoy-S	UL 916 CAN/CSA C22.2 No. 61010-1 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

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

2017-04-14

ENPHASE.

CONTRACTOR

WOLF RIVER ELECTRIC

Wolf RIver Electirc
Address:101 Isanti Parkway
NE, Isanti, MN 55040
Phone number: (763) 229-6662
E-mail: contact@wolfriverelectric.com

ENPHASE AC COMBINER BOX DATASHEET

ENGINEERINC

Drawn by:New@engineerinc.io
DATE: 04/06/2022

Project Name:
Nicolas Frank

Property Adress:
6924 345th Ave
Pierz, MN 56364

Project: PV SYSTEM

Scale: AS INDICATED

D 11.0

CERTIFICATE OF COMPLIANCE

Certificate Number	20180530-E341165
Report Reference	E341165-20171030
Issue Date	2018-MAY-30

Issued to: ENPHASE ENERGY INC
1420 N McDowell Blvd
Petaluma CA 94954-6515

This is to certify that representative samples of STATIC INVERTERS, CONVERTERS AND ACCESSORIES FOR USE IN INDEPENDENT POWER SYSTEMS; PHOTOVOLTAIC RAPID SHUTDOWN SYSTEM EQUIPMENT
See Addendum

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

Standard(s) for Safety: See Addendum

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

Only those products bearing the UL Certification Mark should be considered as being covered by UL's Certification and Follow-Up Service.

Look for the UL Certification Mark on the product.

Bruce Mahrenholz, Director North American Certification Program
UL LLC

CERTIFICATE OF COMPLIANCE

Certificate Number	20180530-E341165
Report Reference	E341165-20171030
Issue Date	2018-MAY-30

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

Permanently-connected, Grid Support utility Interactive, 208V single-phase, 240V single phase evaluated for use on a split phase system, distributed resource power system.

Models IQ7-60, IQ7PLUS-72, and IQ7X-96, followed by -2, -5, -B, or -ACM, followed by -US+. Models IQ7PD-72-2-US and IQ7PD-84-2-US.

USL/CNL – Photovoltaic Rapid Shutdown Equipment.

Models IQ7-60, IQ7PLUS-72, and IQ7X-96, followed by -2, -5, -B, or -ACM, followed by -US+. Models IQ7PD-72-2-US and IQ7PD-84-2-US.

+ may be followed by additional characters not affecting safety

Standard(s) for Safety:

UL 62109-1, SAFETY OF POWER CONVERTERS FOR USE IN PHOTOVOLTAIC POWER SYSTEMS - PART 1: GENERAL REQUIREMENTS

CSA C22.2 NO. 107.1-01, GENERAL USE POWER SUPPLIES

IEEE 1547 INTERCONNECTING DISTRIBUTED RESOURCES WITH ELECTRIC POWER SYSTEMS

IEEE 1547.1 IEEE STANDARD CONFORMANCE TEST PROCEDURES FOR EQUIPMENT INTERCONNECTING DISTRIBUTED RESOURCES WITH ELECTRIC POWER SYSTEMS

UL 1741, INVERTERS, CONVERTERS, CONTROLLERS AND INTERCONNECTION SYSTEM EQUIPMENT FOR USE WITH DISTRIBUTED ENERGY RESOURCES

CEC-300-2011-005,-CMF GUIDELINES FOR CALIFORNIA'S SOLAR ELECTRIC INCENTIVE PROGRAMS PURSUANT TO SENATE BILL 1

Bruce Mahrenholz, Director North American Certification Program
UL LLC

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL. For questions, please contact a local UL Customer Service Representative at http://ul.com/aboutul/locations/

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INVERTER CERTIFICATION

ENGINEERINC

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MIDNITE SOLAR INC.

Surge Protection

Surge Protection You Can Count On!

MidNite Solar Surge Protection Devices are type 1 devices, designed for indoor and outdoor applications. Engineered for both AC and PV DC electrical systems, they provide protection to service panels, load centers or electronic devices that are directly connected to a MidNite Surge Protection Device (SPD).

MidNite's SPDs are offered in four models to protect a variety of different voltage ranges. They achieve this protection by clamping surge voltage to a level that your system can sustain without damaging the components of the system.

Compare our SPDs against other surge protection devices. You will see there is no comparison in both our price and features. All our SPDs are made in the USA and have a 5 year warranty.

With lightning you only get one chance, so get the best!

www.midnitesolar.com/spd
17722 67th Ave. NE., Arlington, WA. 360-403-7207 FAX: 360-691-6862

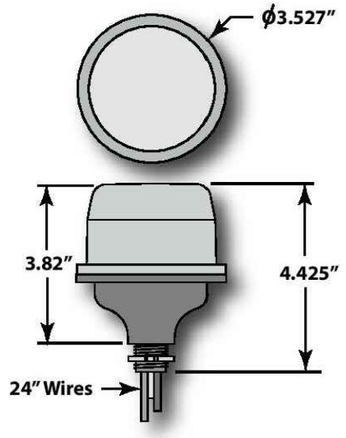
MNSPD300ACFM (Cut-in box)
(MNSPD-300-AC included)

Four Models:

MNSPD-115
MNSPD-300-AC
MNSPD-300-DC
MNSPD-600

MidNite Surge Protection Devices

PART NUMBER	MNSPD-115	MNSPD-300-AC	MNSPD-300-DC	MNSPD-600
Nominal Voltage	0 to 90 VAC 0 to 115 VDC	0 to 250 VAC	0 to 300 VDC	0 to 480 VAC 0 to 600 VDC
MCOV	180V	470V	470V	780V
VPR Line to Ground	600V	1200V	1200V	1800V
Suggested Placement	Up to 90VAC circuits, 12V, 24V, 48VDC battery circuits	120/240 VAC circuits	Off-grid PV combiners Charge controller inputs up to 300VDC	316V/480 VAC circuits Grid-tie PV combiners Grid-tie inverter input Non-Isolated Inverters
Type	UL1449 4th Ed. Type 1	UL1449 4th Ed. Type 1	UL1449 4th Ed. Type 1	UL1449 4th Ed. Type 1
Diagnostic Blue LED	MNSPD-300-AC LED indicates when voltage is present between L1 + ground and L2 + ground MNSPD-115, MNSPD-300-DC and MNSPD-600: LED indicates when voltage is present between L1 + L2 (PV+ PV-)			
Thermal Disconnector	Internal Fuse			
Response Time	<1 micro sec.			



Performance	
Surge Current Rating per Phase	80kA
Short Circuit Current Rating	10kA
Fusing	Individually fused MOVs
Thermal Fusing	Yes
Over current Fusing	Yes
Operating Frequency	0 to 500 Hz
Mechanical Description	
Enclosure	Polycarbonate UL94V-0
Environmental Rating	Type 4X
Connection Method	#12 AWG
Weight	1 lb.
Mounting Method	1/2″ Conduit Knockout
Operating Altitude	Sea Level – 12,000′ (3,658 Meters)
Storage Temp	-40° F to +185° F (-40° C to +85° C)
Operating Temp	-40° F to +185° F (-40° C to +85° C)
Diagnostics	
Blue status LED, one per leg	
Listings and Performance	
UL Standard for Safety, UL 1449 Surge Protective Devices-Fourth Edition	
CSA C22.2 No. 8-M1986 Electromangetic Interference (EMI) Filters, Fourth Edition	

Model No.	Max Operating Voltage	Surge Current per Phase	Configuration	MCOV	SCCR	VPR 600V/3kA L_G
MNSPD-115	100 VAC/150VDC	80kA	1ϕ, 3-wire (2 Legs)	180V L-N	10kA	600V
MNSPD-300-AC	300VAC	80kA	1ϕ, 3-wire (2 Legs)	470V L-N	10kA	1200V
MNSPD-300-DC	385VDC	80kA	1ϕ, 3-wire (2 Legs)	470V L-N	10kA	1200V
MNSPD-600	480VAC/600VDC	80kA	1ϕ, 3-wire (2 Legs)	780V L-N	10kA	1800V

www.midnitesolar.com/spd
17722 - 67th Ave NE, Arlington, WA 98223 PH. 360-403-7207 FAX 360-691-6862

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SURGE PROTECTION

ENGINEERINC

Drawn by:New@engineerinc.io
DATE: 04/06/2022

Project Name:
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Project:
PV SYSTEM

Scale:
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DEPARTMENT OF LABOR AND INDUSTRY

Solar PV Inspection Checklist

Solar PV Inspection Checklist for REI #ELE- _____ Installer Wolf RIver Electric
Job Address 6924 345th Ave _____ City/Township Pierz, MN 56364

Required Documentation
- Manufacturer's specifications for the inverter
- Manufacturer's specifications for the module
- Manufacturer's specifications for the optimizer (if used)
- Verification that the racking system grounding and bonding is listed

PV Inverter

- [ ] Is the PV system utility-interactive, stand alone or multimode? 690.2
- [ ] Is all the equipment listed for PV application? 690.4
- [ ] Is the system grounded, ungrounded or (functionally grounded)? 690.2 and 690.41
- [ ] Has DC Ground-Fault Protection been provided and properly labeled? 690.41(B)?
- [ ] What is the maximum PV system voltage? 690.7
- [ ] Is all listed equipment rated for the maximum voltage? 690.7
- [ ] Determine the maximum circuit current for the PV Source and Output Circuit; Inverter Output Circuit; Inverter Input Circuit; and DC to DC Converter Output (refer to inverter documentation). 690.8

System Grounding

- [ ] Are all exposed non-current carrying metal parts of the PV system grounded? 690.43 and 690.47
- [ ] Are the mounting structures or systems used for equipment grounding? 690.43
- [ ] Are the interconnecting devices used for equipment grounding listed and identified? 690.43
- [ ] Are the EGC properly sized and protected if exposed and not smaller than #6? 690.45, 690.46, 690.50, 250.122, 250.120(C)
- [ ] Has the grounding electrode system been installed? 690.47
- [ ] If both are present, has the DC grounding electrode system been bonded to the AC GES? 690.47(A)

Wiring Methods and Disconnecting Means

- [ ] Are the conductor and cable ampacities determined at 125% before adjustment factors? 690.8 (B)
- [ ] How are the PV Source and Output Circuit protected from overcurrent? 690.9
- [ ] Do AC or DC OCPD's have the appropriate voltage, current and interrupt ratings? 690.9
- [ ] Has arc-fault circuit protection been provided for DC source and/or output circuits? 690.11
- [ ] Is a rapid shutdown required and if so, how is it accomplished and identified? 690.12 & 690.56(C)
- [ ] Is the PV disconnect permanently marked and installed in a readily accessible location? 690.13
- [ ] Are the Isolating devices or equipment disconnecting means installed in circuits connected to equipment at a location within the equipment, or within sight and 10 feet of the equipment? (Where the maximum circuit current is greater than 30 amperes an equipment disconnecting means shall be provided for isolation.) 690.15
- [ ] Has the fuse disconnecting means, if required, been installed? 690.15 and 240.40
- [ ] Are PV source or output circuits > 30 volts in a raceway or guarded if readily accessible? 690.31
- [ ] Is single conductor cable used outdoors Type USE-2 or listed & labeled PV wire? 690.31
- [ ] Are PV source or output circuits on or inside a building in a metal raceway and marked? 690.31

Interconnection

- [ ] Has a plaque or directory been installed at each disconnecting means (capable of interconnection) denoting all electric power sources & power production sources? 705.10
- [ ] Has the point of connection to other sources been installed per 705.12?
- [ ] Is the supply side disconnect readily accessible and within 10' of the connection point? 705.11
- [ ] Are the utility interactive inverters connected to the system through a dedicated circuit breaker or fusible disconnecting means? 705.12
- [ ] Does the bus or conductor ampacity comply with 705.12?
- [ ] Have all the required labels been applied? (See separate label list.)

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PV INSPECTION CHECKLIST

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