



HISTORIC PRESERVATION COMMISSION

Marc Elrich
County Executive

Sandra I. Heiler
Chairman

Date: January 28, 2021

MEMORANDUM

TO: Mitra Pedoeem
Department of Permitting Services

FROM: Dan Bruechert
Historic Preservation Section
Maryland-National Capital Park & Planning Commission

SUBJECT: Historic Area Work Permit # 937640 - Solar Installation

The Montgomery County Historic Preservation Commission (HPC) has reviewed the attached application for a Historic Area Work Permit (HAWP). This application was **approved** at the January 27, 2021 HPC meeting.

The HPC staff has reviewed and stamped the attached construction drawings.

THE BUILDING PERMIT FOR THIS PROJECT SHALL BE ISSUED CONDITIONAL UPON ADHERENCE TO THE ABOVE APPROVED HAWP CONDITIONS AND MAY REQUIRE APPROVAL BY DPS OR ANOTHER LOCAL OFFICE BEFORE WORK CAN BEGIN.

Applicant: Scott Wallston
Address: 1 Montgomery Ave., Takoma Park

This HAWP approval is subject to the general condition that the applicant will obtain all other applicable Montgomery County or local government agency permits. After the issuance of these permits, the applicant must contact this Historic Preservation Office if any changes to the approved plan are made. Once work is complete the applicant will contact Dan Bruechert at 301.563.3400 or dan.bruechert@montgomeryplanning.org to schedule a follow-up site visit.



SOLAR PV SYSTEM: 6.12 kW

WALLSTEN RESIDENCE 1 MONTGOMERY AVENUE TAKOMA PARK, MD UNITED STATES 20912

APPROVED
Montgomery County
Historic Preservation Commission

Sandra J. Heiler

REVIEWED

By Dan.Bruechert at 2:39 pm, Jan 28, 2021

PROJECT INFORMATION

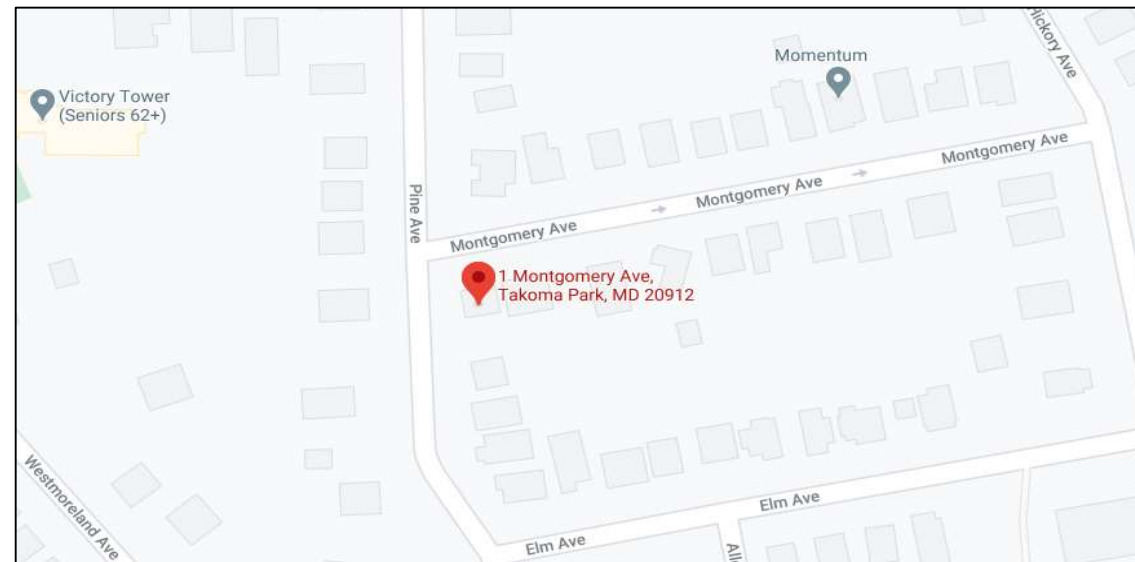
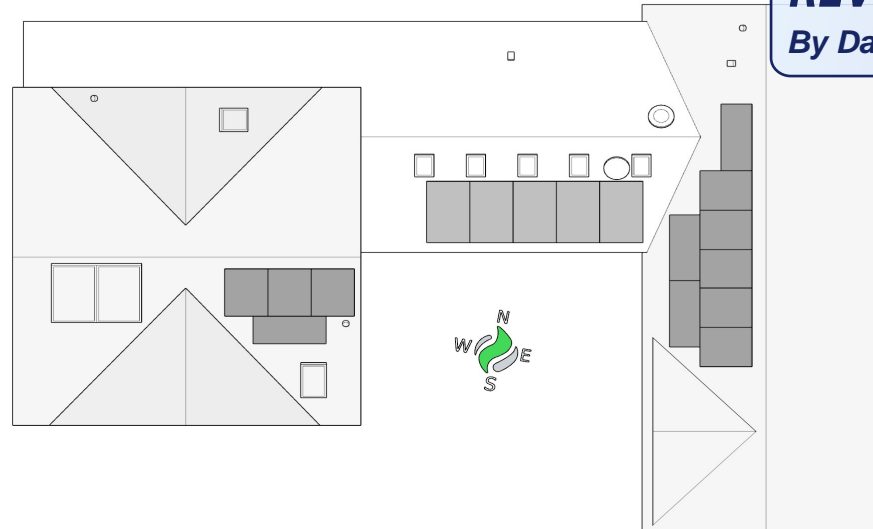
OWNER: SCOTT WALLSTEN
ADDRESS: 1 MONTGOMERY AVENUE
TAKOMA PARK, MD UNITED STATES 20912

AHJ: MONTGOMERY
ADDRESS: 255 ROCKVILLE PIKE, 2ND FLOOR ROCKVILLE, MD 20850

ZONING: RESIDENTIAL
BUILDING CODE: IBC 2018
ELECTRICAL CODE: NEC 2017
ASCE VERSION: ASCE 7-16

SNOW LOAD: 30 PSF
WIND SPEED: 110 MPH
WIND EXPOSURE: B

DC RATING: 6.12 kW
AC RATING: 4.93 kW
RACKING: UNIRAC SM LIGHT RAIL
MODULE: (17) REC360AA
INVERTER: (17) IQ7PLUS-72-2-US



FOR PERMITTING USE ONLY

PROJECT SCOPE

THIS PROJECT INVOLVES THE INSTALLATION OF (17) REC 360 SOLAR MODULES. THE SOLAR MODULES WILL BE RACKED USING A PRE-ENGINEERED RACKING SYSTEM. THE RACKED MODULES WILL BE ELECTRICALLY CONNECTED TO (17) ENPHASE DC TO AC POWER INVERTERS, AND INTERCONNECTED TO THE LOCAL UTILITY USING MEANS AND METHODS CONSISTENT WITH THE RULES ENFORCED BY THE LOCAL UTILITY AND PERMITTING JURISDICTION.

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| APPENDIX | MODULE DATASHEET |
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| | ANCHOR DATASHEET |

PROJECT ADDRESS:

SCOTT WALLSTEN
1 MONTGOMERY AVENUE
TAKOMA PARK, MD
UNITED STATES 20912

CONTRACTOR INFO:



3600 COMMERCE DR
SUITE 601
BALTIMORE, MD 21227
(443) 955-0779

LICENSE NUMBER:

MHIC-30991

| REV | DATE |
|-----|------------|
| IFC | 12/29/2020 |

COVER

Z001

GENERAL NOTES

1) THIS PHOTOVOLTAIC (PV) SYSTEM SHALL COMPLY WITH THE NATIONAL ELECTRIC CODE (NEC) ARTICLE 690, ALL MANUFACTURERS'S LISTING AND INSTALLATION INSTRUCTIONS, AND THE RELEVANT CODES AS SPECIFIED BY THE AUTHORITY HAVING JURISDICTION (AHJ).

2) ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE AND AS REQUIRED BY THE NEC AND AHJ.

3) PV SYSTEM CIRCUITS INSTALLED ON OR IN BUILDINGS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION TO REDUCE SHOCK HAZARD FOR EMERGENCY RESPONDERS

4) THIS SYSTEM IS A UTILITY INTERACTIVE SYSTEM, AND THE PV MODULES ARE CONSIDERED NON-COMBUSTIBLE.



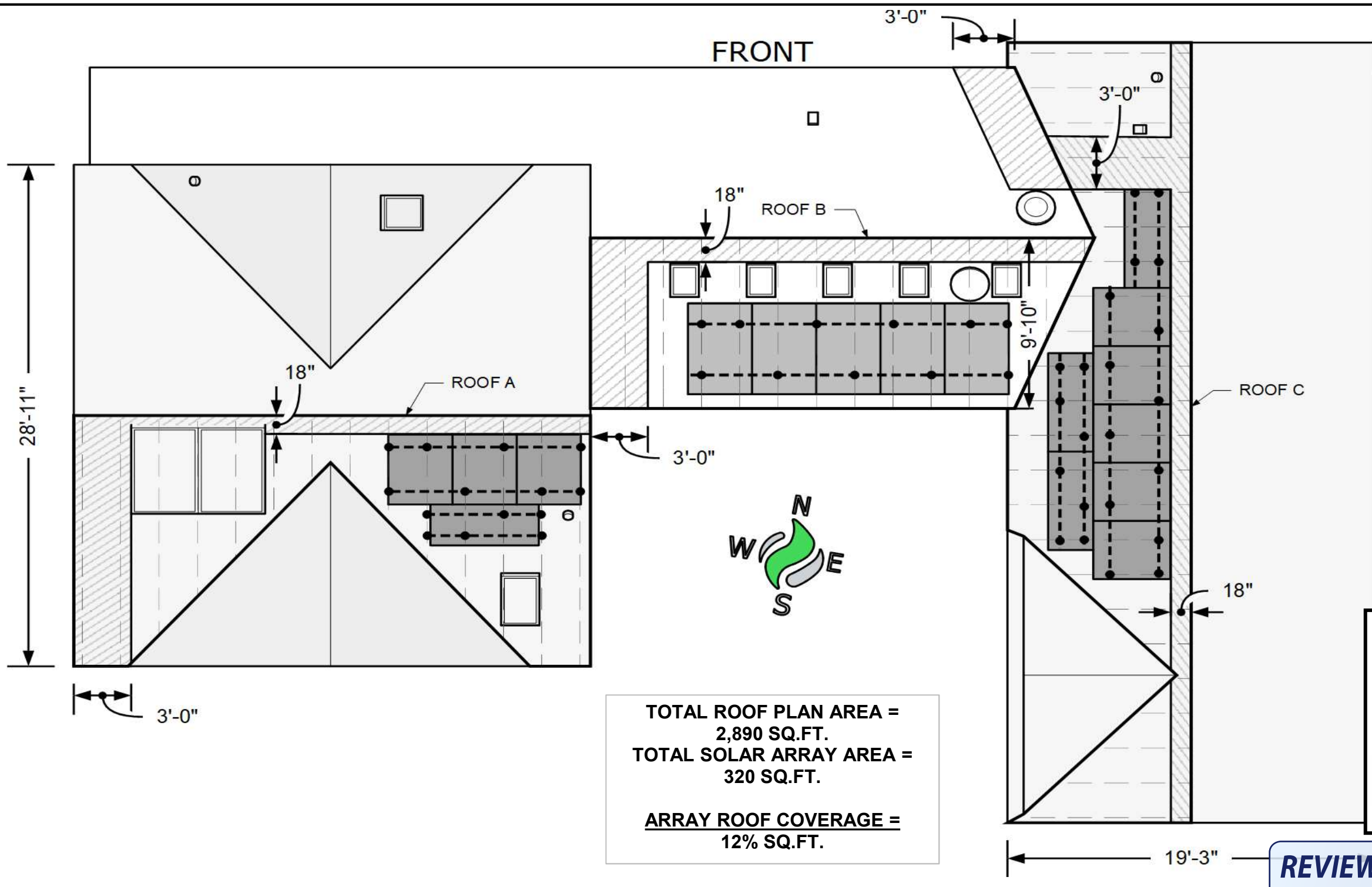
STAMPED AND SIGNED FOR STRUCTURAL ONLY

Professional Certification: I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland.
License No. 49910 Expires: 9/15/22

DocuSigned by:
Andrew Oesterreicher

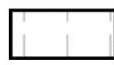
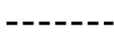



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FOR ENGINEERING USE ONLY



TOTAL ROOF PLAN AREA = 2,890 SQ.FT.
TOTAL SOLAR ARRAY AREA = 320 SQ.FT.
ARRAY ROOF COVERAGE = 12% SQ.FT.

FOR PERMITTING USE ONLY

-  ROOF SUPPORT
-  MOUNTING RAIL
-  ROOF ATTACHMENT
-  PV ARRAY
-  FIRECODE SETBACK

APPROVED
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 Historic Preservation Commission

Sandra L. Heiler

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 By Dan.Bruechert at 2:39 pm, Jan 28, 2021



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INSTALLATION NOTES

- 1) ALL SOLAR MODULES SUPPORTED BY ROOF ATTACHMENTS STAGGERED AT 48" O.C. (OR AS INDICATED)
- 2) SOLAR PHOTOVOLTAIC SYSTEM INSTALLED PARALLEL TO ROOF SURFACE
- 3) SOLAR PHOTOVOLTAIC SYSTEM INSTALLED AT A MAXIMUM HEIGHT OF 6" ABOVE ROOF SURFACE (OR AS INDICATED)
- 4) ANY ROOFING PENETRATIONS SHALL HAVE PROPER FLASHING SEALANT USED TO PROVIDE WATERTIGHT ASSEMBLY

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ATTACHMENT & SITE PLAN

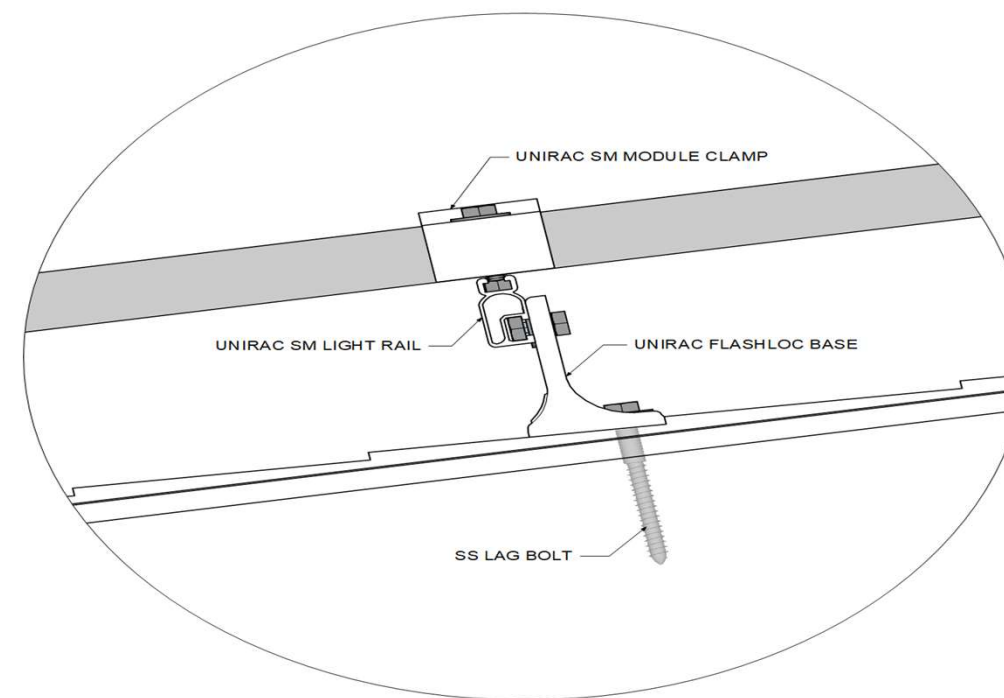
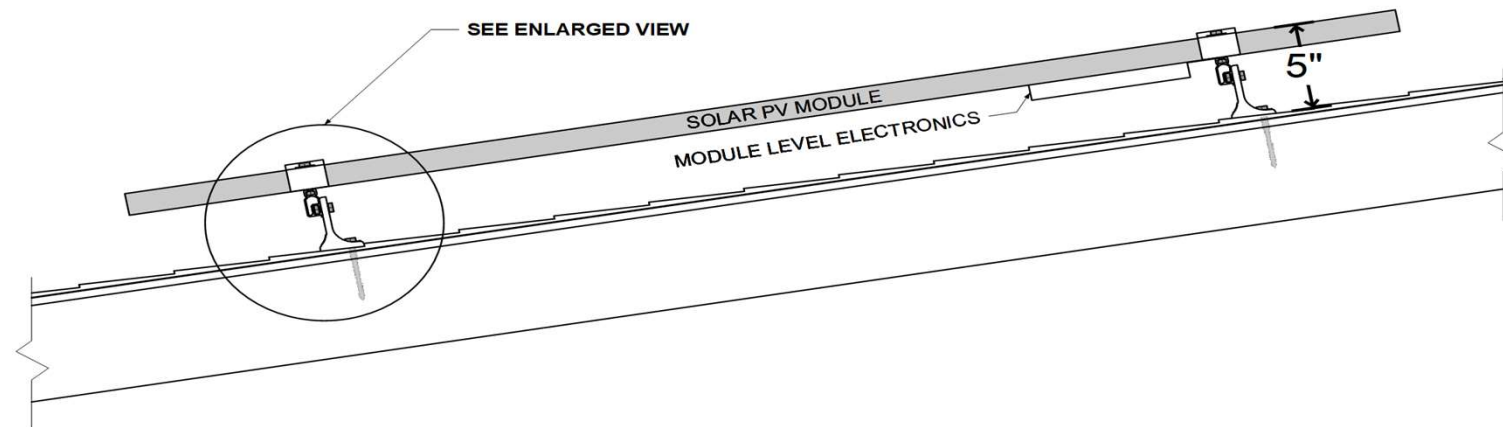
A001

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| MOUNTING SYSTEM PROPERTIES | |
|----------------------------|----------------------|
| RACKING | UNIRAC SM LIGHT RAIL |
| STANDOFF | UNIRAC FLASHLOC |
| MAX. RAIL SPAN | 48 IN |
| MIN. FASTENER DEPTH | 2.50 IN |
| MAX. RAIL CANTILEVER | 16 IN |
| MAX. ARRAY HEIGHT | 6" |

| DEAD LOAD CALCULATION | | | |
|---------------------------|------------------|-----------------|------------|
| LOAD | QTY. OR LIN. FT. | WEIGHT PER (LB) | TOTAL LBS. |
| MODULES | 17 | 43 | 731.00 |
| M.L.E.'S | 17 | 2.38 | 40.46 |
| RACKING | 135.1 | 0.81 | 109.40 |
| STANDOFF | 49 | 0.5 | 24.50 |
| TOTAL ARRAY WEIGHT (LBS) | | | 905.4 |
| TOTAL ARRAY AREA (SQ.FT.) | | | 319.9 |
| DISTRIBUTED LOAD (PSF) | | | 2.83 |

| POINT LOAD CALCULATION | |
|----------------------------------|--------|
| TOTAL ARRAY WEIGHT (LBS) | 905.36 |
| TOTAL NUMBER OF STANDOFFS (TYP.) | 49 |
| POINT LOAD (LBS/STANDOFF) | 18.48 |



| ROOF PROPERTIES | ROOF LABEL: | A | B | C |
|-----------------|-----------------------------|----------------------|-----------------------|----------------------|
| | MATERIAL: | 3-Tab Comp. Shingle | 3-Tab Comp. Shingle | 3-Tab Comp. Shingle |
| | PITCH: | 45° | 23° | 45° |
| | AZIMUTH: | 170° | 170° | 260° |
| | PRIMARY SUPPORT: | 2x10 RAFTERS | 2x4 TOP CHORD TRUSSES | 2x10 RAFTERS |
| | PRIMARY SUPPORT SPACING: | 24" | 24" | 24" |
| | LEAST HORIZONTAL DIMENSION: | 14' | 9' | 9' |
| | MEAN HEIGHT: | 25' | 15' | 15' |
| | RACKING: | UNIRAC SM LIGHT RAIL | UNIRAC SM LIGHT RAIL | UNIRAC SM LIGHT RAIL |
| | STANDOFF: | UNIRAC FLASHLOC | UNIRAC FLASHLOC | UNIRAC FLASHLOC |

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ASSEMBLY & LOAD CALCS

S001

APPROVED
Montgomery County
Historic Preservation Commission

Sandra J. Heiler

REVIEWED
By Dan.Bruechert at 2:40 pm, Jan 28, 2021

INSTALLATION NOTES

- 1) ALL RACKING SHALL BE INSTALLED PER MANUFACTURER SPECIFICATIONS
- 2) M.L.E.'S = MODULE LEVEL ELECTRONICS (IE, POWER OPTIMIZERS, MICRO-INVERTERS, CABELS, ETC)
- 3) USE 5/16" X 4"HEX HEAD STAINLESS STEEL LAG SCREWS



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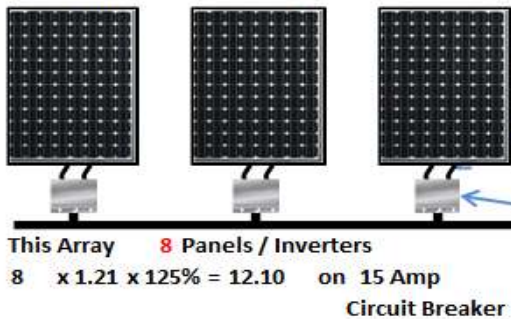
Designed by Melissa Damm

When the AC utility source is removed from the inverter output circuits via any means, such as an AC breaker, AC disconnect or removal of the solar or main utility service meter, this equipment performs the rapid shutdown function per 690.12.

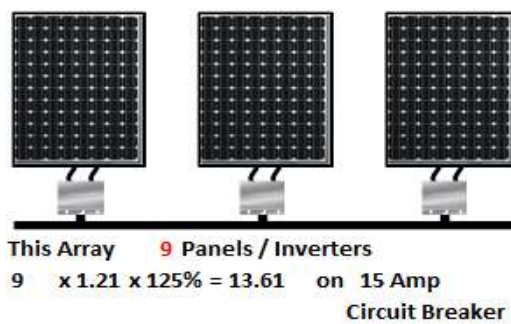
Scott Wallsten
1 Montgomery Avenue
Takoma Park, MD 20912

All conduit sizing will be in accordance to the NEC, Chapter #9
 Two Ungrounded conductors per circuit of inverters (Typ)

Array bonded with # 6 Bare Cu



This Array 8 Panels / Inverters
 8 x 1.21 x 125% = 12.10 on 15 Amp
 Circuit Breaker



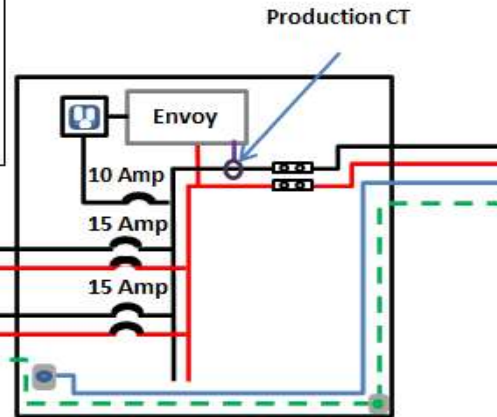
This Array 9 Panels / Inverters
 9 x 1.21 x 125% = 13.61 on 15 Amp
 Circuit Breaker

Solar Module Total
17 Modules and Inverters
 DC wiring from the solar module (typ)

Enphase Micro Inverter
 Ground Fault Protection is integrated within
 Inverter Model: IQ7PLUS - 72 - 2 - US
 Max DC Volt Rating: 60 VDC
 Max Power @ 40 degrees C: 295W
 Nominal AC Voltage: 240V
 Max AC Current: 1.21 Amps

Installation of the 3/4" Steel EMT conduit (70') will have two circuits, will consist of:
 (4) #10 THHN-THWN-2, phase conductors,
 plus (1) # 8 Ground

Enphase Trunk Cable (5')
 (2) #12 - THHN-THWN-2 Copper Conductors
 (1) #12 - THHN-THWN-2 Copper Ground



Enphase IQ Combiner with circuit breakers listed below:
 (2) 15 Amp, 2 pole circuit breakers as shown
 (1) 10 Amp, 1-pole circuit breaker for Envoy

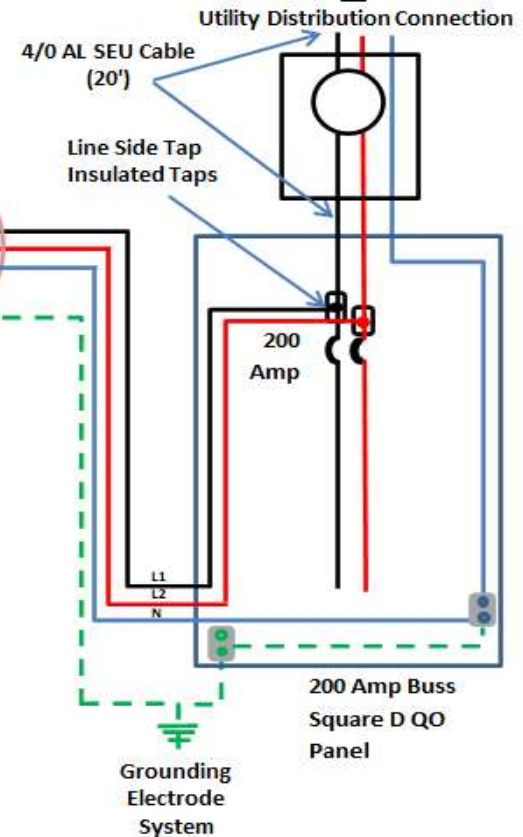
AC Disconnect within 6' of the Utility Meter

240 Volt, 1 Phase Non-Fused Disconnect Switch mounted adjacent to the utility meter
30 Amp

240 Volt, 1 Phase, 100 Amp Circuit Breaker Enclosure adjacent to the main circuit breaker panel
30 Amp

(3) #10 - THHN-THWN-2 Copper
 (1) #8 - THHN-THWN-2 Copper Ground
 3/4" Steel EMT (15')

(3) #6 - THHN-THWN-2 Copper
 1" Steel EMT (5')



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ELECTRICAL - LINE DIAGRAM

E001

APPROVED

Montgomery County
 Historic Preservation Commission

Sandra L. Skiles

REVIEWED

By Dan.Bruechert at 2:40 pm, Jan 28, 2021

ELECTRICAL NOTES

- 1) ALL EQUIPMENT TO BE LISTED AND LABELED FOR ITS APPLICATION
- 2) WORKING CLEARANCES AROUND ALL NEW AND EXISTING ELECTRICAL EQUIPMENT SHALL COMPLY WITH NEC
- 3) IF USED, PV POWER SOURCE BREAKER TO BE LOCATED AT BOTTOM OF BUS
- 4) LISTING AGENCY NAME AND NUMBER TO BE INDICATED ON INVERTERS AND MODULES
- 5) AC COMBINER PANELS SHALL BE LABELED AS "INVERTER AC COMBINER PANEL"
- 5) PV POWER SOURCE TO BE SUITABLE FOR BACKFEED

Combiner To Array
 Wire Length 70'
 Wire Size #10 AWG
WIRE SIZING CALCULATION
 2017 NEC Article 310
 Full Load Amperage : 10.89
 Source Voltage : 240
 Length of Run (Feet) : 70
 Load Duty : Noncontinuous
 Conductor Type : THWN-2
 Conductor Material..... : Copper
 Conductor Location : Dry or Wet
 Conductor Insulation Temperature : 90 °C
 Rooftop Installation: NEC 310.15(B)(3)(c)
 Distance Above Roof : Less than 23mm (7/8 inch) above rooftop
 Average Outside Temp : 90 Deg. F 32.2 Deg. C
 Temperature Adder : 0 Deg. F 0 Deg. C

Adjusted Ambient Temperature ... : 90.0 Deg. F 32.2 Deg. C
 Terminal Temperature Rating : 60 °C
 Circuit Type : Single Phase 2 Wire (2 phase conductors, or phase & neutral)
 Qty. of Circuit Current-Carrying Conductors : 2
 Additional Current-Carrying Conductors : 2

Total Qty. Current-Carrying Conductors : 4
 Conductor Requirement:
 Full Load Amps : 10.89
 Load Duty Multiplier : 1.0
 Ambient Temp. Multiplier . : 1.04
 Qty. Conductors Multiplier : 1.25

Required Conductor Ampacity: 14.16
 Terminal Requirement:
 Full Load Amps : 10.89
 Load Duty Multiplier : 1.0

Required Terminal Ampacity : 10.89
 Selected Conductor:
 Conductor Ampacity : 40.0
 Ambient Temp. Derate : 0.96
 Qty. Conductors Derate ... : 0.8

Adjusted Ampacity : 30.72
SELECTED CONDUCTOR SIZE : 10 Awg
 $2 \times \text{Ohms/MilFt} \times \text{Length} \times \text{Amps} \times 1.24 \times 70 \times 14.16$
 $\text{VD} = \text{-----} = 1.89$
 1000 x Qty Wires per Phase 1000 x 1
 Volts At Load Terminals..... : 238.11
 Actual Percent Voltage Drop . : 0.79

Interconnection
 Line Side Tap
 Wire Size #10 AWG
WIRE SIZING CALCULATION
 2017 NEC Article 310
 Full Load Amperage : 20.57
 Source Voltage : 240
 Length of Run (Feet) : 30
 Load Duty : Continuous
 Conductor Type : THWN-2
 Conductor Material..... : Copper
 Conductor Location : Dry or Wet
 Conductor Insulation Temperature : 90 °C
 Ambient Temperature : 26-30 °C = 78-86 °F
 Terminal Temperature Rating : 60 °C
 Circuit Type : Single Phase 3 Wire (2 phase conductors & neutral)
 Qty. of Circuit Current-Carrying Conductors : 2
 Conductor Requirement:
 Full Load Amps : 20.57
 Load Duty Multiplier : 1.25
 Ambient Temp. Multiplier . : 1.15
 Qty. Conductors Multiplier : 1.0

Required Conductor Ampacity: 29.57
 Terminal Requirement:
 Full Load Amps : 20.57
 Load Duty Multiplier : 1.25

Required Terminal Ampacity : 25.71
 Selected Conductor:
 Conductor Ampacity : 40.0
 Ambient Temp. Derate : 0.87
 Qty. Conductors Derate ... : 1.0

Adjusted Ampacity : 34.8
SELECTED CONDUCTOR SIZE : 10 Awg
 $2 \times \text{Ohms/MilFt} \times \text{Length} \times \text{Amps} \times 1.24 \times 30 \times 29.57$
 $\text{VD} = \text{-----} = 1.53$
 1000 x Qty Wires per Phase 1000 x 1
 Volts At Load Terminals..... : 238.47
 Actual Percent Voltage Drop . : 0.64

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 Montgomery County
 Historic Preservation Commission


REVIEWED
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| CALCULATION FOR PV BREAKER | | | | | |
|--|-------|---|---------------|---|-----------|
| CALCULATION FOR MAIN PV BREAKER & CIRCUITS | | | | | |
| SYSTEM CURRENT: | 1.21 | x | 17 | = | 20.57 A |
| DESIGN AMPERAGE: | 20.57 | x | 125% | = | 25.7125 A |
| MAIN BUSS RATING: | 200 | x | 120% | = | 240 A |
| EXISTING MAIN BREAKER: | | | | = | 200 A |
| MAX SOLAR BREAKER: | 240 | - | 200 | = | 40 A |
| CIRCUIT #1 = | 8 | x | 1.21 x 125% = | | 12.1 A |
| CIRCUIT #2 = | 9 | x | 1.21 x 125% = | | 13.61 A |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

- ELECTRICAL NOTES**
- 1) ALL CONDUCTORS SHALL BE COPPER, RATED FOR 90°C AND WET ENVIRONMENT, UNLESS OTHERWISE NOTED.
 - 2) ALL WIRE TERMINATIONS SHALL BE APPROPRIATELY LABELED AND READILY VISIBLE.
 - 3) MODULE GROUNDING CLIPS TO BE INSTALLED BETWEEN MODULE FRAME AND MODULE SUPPORT RAIL, PER MANUFACTURER'S INSTRUCTION.

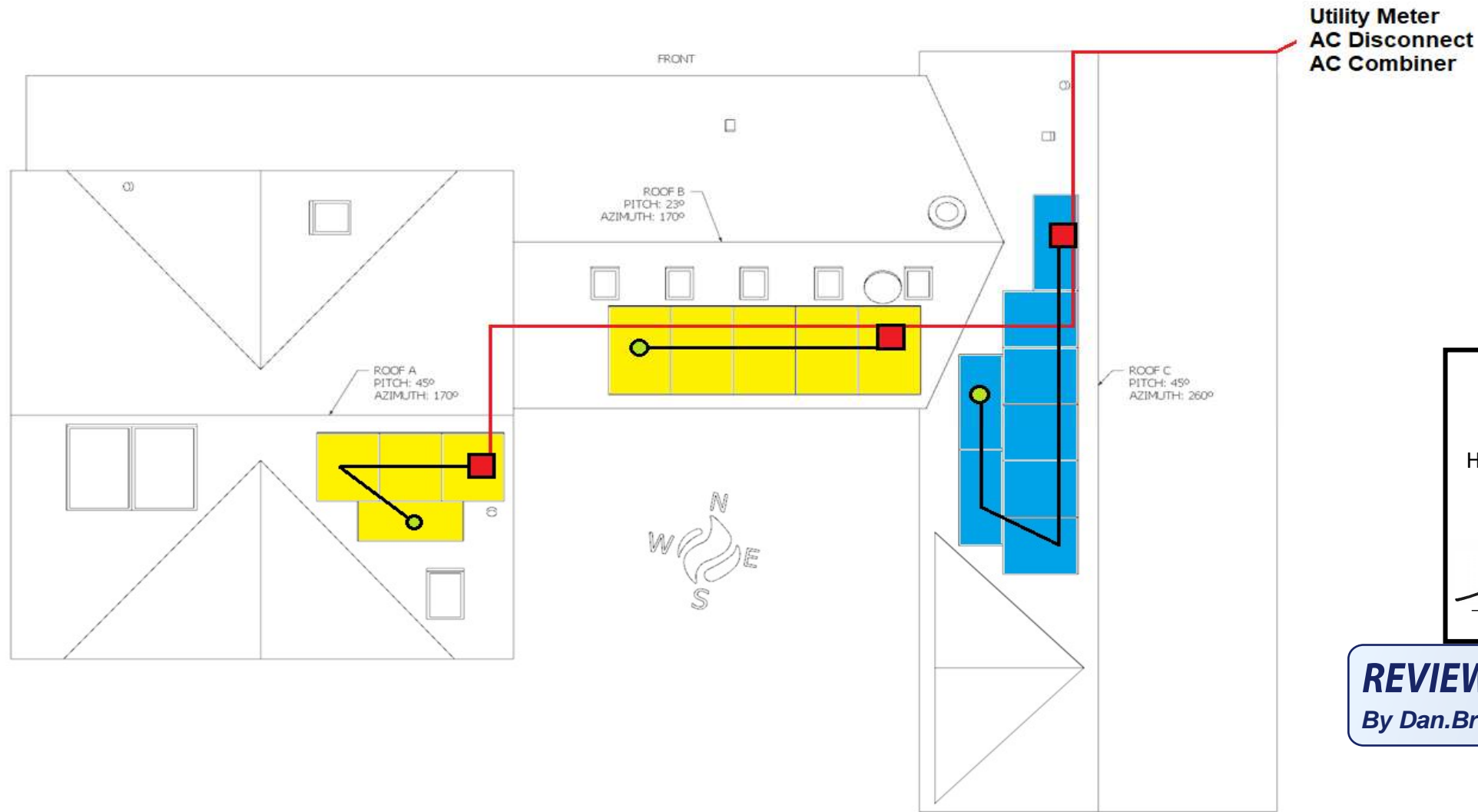
4) MODULE SUPPORT RAIL TO BE BONDED TO CONTINUOUS COPPER GEC VIA WEEB LUG

| REV | DATE |
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ELECTRICAL - WIRE CALCS

E002

- Circuit 1 (8)
- Circuit 2 (9)
- Junction Box
- Soladeck
- End Cap
- Trunk Cable
- Exterior Conduit
- Interior Conduit



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ELECTRICAL NOTES

| | |
|--|--|
| | |
|--|--|

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STRING & CONDUIT LAYOUT

E003

| SOLAR MODULE RATINGS | | |
|------------------------|-------|----------------------|
| REC 360 Specifications | | |
| Length: | 67.75 | in |
| Width: | 40 | in |
| Thickness: | 1.18 | in |
| Weight: | 43 | lbs |
| I _{mp} : | 9.55 | A |
| V _{mp} : | 37.7 | V |
| V _{oc} : | 44.3 | V |
| I _{sc} : | 10.16 | A |
| OCPD: | 25 | A |
| P _{max} : | 360 | W |
| V _{max} : | 1000 | V |
| Temp. Coefficient: | -0.24 | %V _{oc} /°C |

| INVERTER 1 RATINGS | | |
|--------------------------------|------|-----|
| IQ7PLUS-72-2-US Specifications | | |
| Max # Per String: | 13 | |
| I _{max} (ac): | 1.21 | A |
| V _{max} (dc): | 60 | V |
| P _{max} : | 290 | W |
| Nom. AC Voltage: | 240 | V |
| OCPD: | 20 | A |
| Weight (Optimizer): | 2.38 | lbs |
| I _{max} (Input): | 15 | A |
| P _{max} (dc) Input: | N/A | V |

WARNING: PHOTOVOLTAIC POWER SOURCE

LABEL TO BE INSTALLED AT EXPOSED RACEWAYS, CABLE TRAYS, AND OTHER WIRING METHODS; SPACED AT MAXIMUM 10FT SECTION OR WHERE SEPARATED BY ENCLOSURES, WALLS, PARTITIONS, CEILINGS, OR FLOORS.

LETTERS AT LEAST 3/8 INCH; WHITE ON RED BACKGROUND; REFLECTIVE

PHOTOVOLTAIC DC DISCONNECT

LABEL TO BE INSTALLED AT EACH DC DISCONNECTING MEANS

PHOTOVOLTAIC AC DISCONNECT

LABEL TO BE INSTALLED AT EACH AC DISCONNECTING MEANS

PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN

LABEL TO BE INSTALLED AT RAPID SHUTDOWN SWITCH

LETTERS AT LEAST 3/8 INCH; WHITE ON RED BACKGROUND; REFLECTIVE

SOLAR PV SYSTEM DISCONNECT

RATED AC OUTPUT CURRENT: 20.57 A

NOMINAL OPERATING AC VOLTAGE: 240 V

LABEL TO BE INSTALLED AT AN ACCESSIBLE LOCATION AT THE DISCONNECTING MEANS AS A POWER SOURCE

WARNING

ELECTRICAL SHOCK HAZARD

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

LABEL TO BE INSTALLED AT EACH DISCONNECTING MEANS FOR PHOTOVOLTAIC EQUIPMENT

WARNING

ELECTRICAL SHOCK HAZARD

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

LABEL TO BE INSTALLED AT EACH DISCONNECTING MEANS FOR PHOTOVOLTAIC EQUIPMENT

WARNING

DUAL POWER SOURCE SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

LABEL TO BE INSTALLED ON EXTERIOR OF MAIN ELECTRICAL PANEL

WARNING

INVERTER OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL TO BE APPLIED TO THE DISTRIBUTION EQUIPMENT

INTERACTIVE PHOTOVOLTAIC SYSTEM CONNECTED

LABEL TO BE INSTALLED AT UTILITY METER

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EQUIP. RATINGS & SIGNAGE

E004

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 By Dan.Bruechert at 2:40 pm, Jan 28, 2021

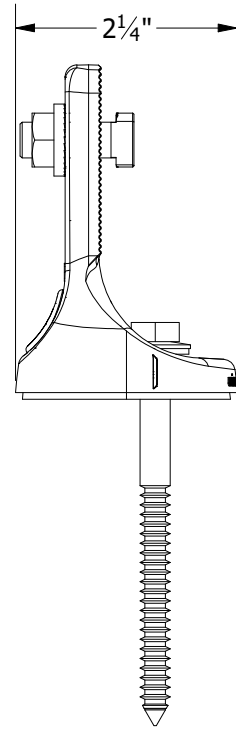
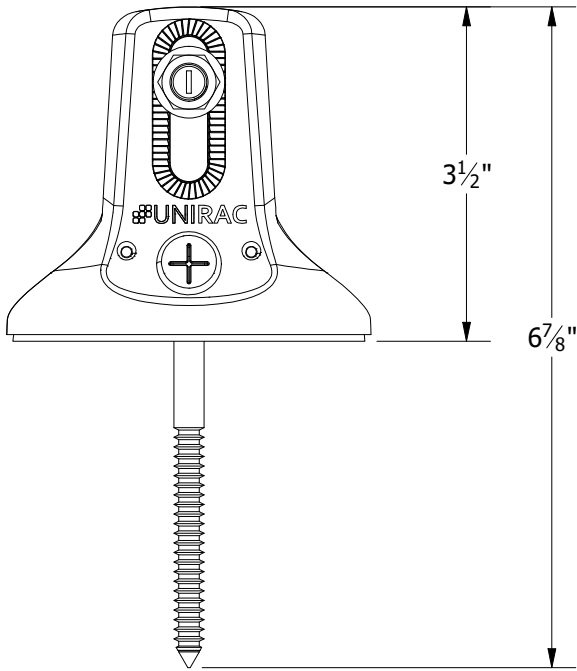
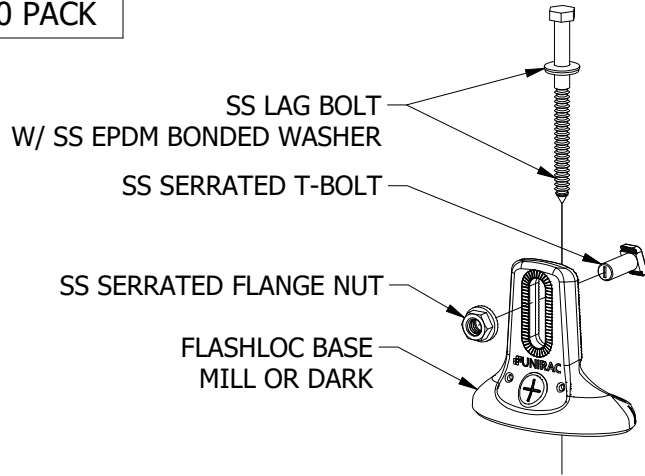
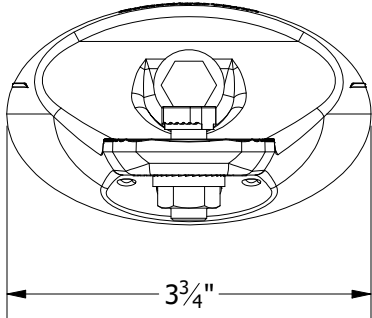
SIGNAGE NOTES

- 1) ALL PLAQUES AND LABELS SHALL HAVE A RED BACKGROUND (OR AS SHOWN HERE)
- 2) ALL LETTERING SHALL BE WHITE AND HAVE A MINIMUM HEIGHT OF 3/8" (OR AS SHOWN HERE)
- 3) FONT SHALL BE ARIAL (OR SIMILAR) AND ALL LETTERING SHALL BE CAPITALIZED
- 4) ALL PLAQUES AND LABELS SHALL BE OF A MATERIAL SUITABLE FOR THE ENVIRONMENT INSTALLED

Sandra L. Heiler

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| PART TABLE | |
|------------|---------------------------------|
| P/N | DESCRIPTION |
| 004085M | FLASHLOC COMP KIT MILL, 20 PACK |
| 004085D | FLASHLOC COMP KIT DARK, 20 PACK |



1411 BROADWAY BLVD. NE
 ALBUQUERQUE, NM 87102 USA
 PHONE: 505.242.6411
 WWW.UNIRAC.COM

| | |
|----------------|-------------------|
| PRODUCT LINE: | SOLARMOUNT |
| DRAWING TYPE: | PART DRAWING |
| DESCRIPTION: | FLASHLOC COMP KIT |
| REVISION DATE: | 10/3/2019 |

DRAWING NOT TO SCALE
 ALL DIMENSIONS ARE
 NOMINAL

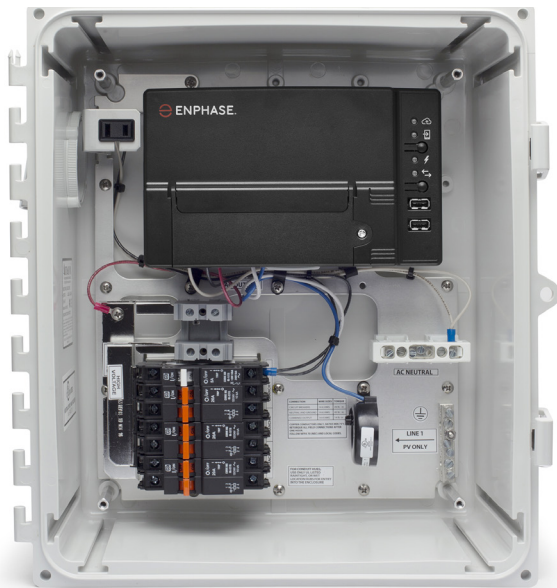
PRODUCT PROTECTED BY
 ONE OR MORE US PATENTS

LEGAL NOTICE

FL-A01
 SHEET

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



To learn more about Enphase

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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 | <ul style="list-style-type: none"> • 14 to 6 AWG copper conductors for branch inputs. • 14 to 4 AWG copper conductors for combined output. |
| Model XAM1-120 | <ul style="list-style-type: none"> • 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 |

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To learn more about Enphase offerings, visit enphase.com

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2017-04-14

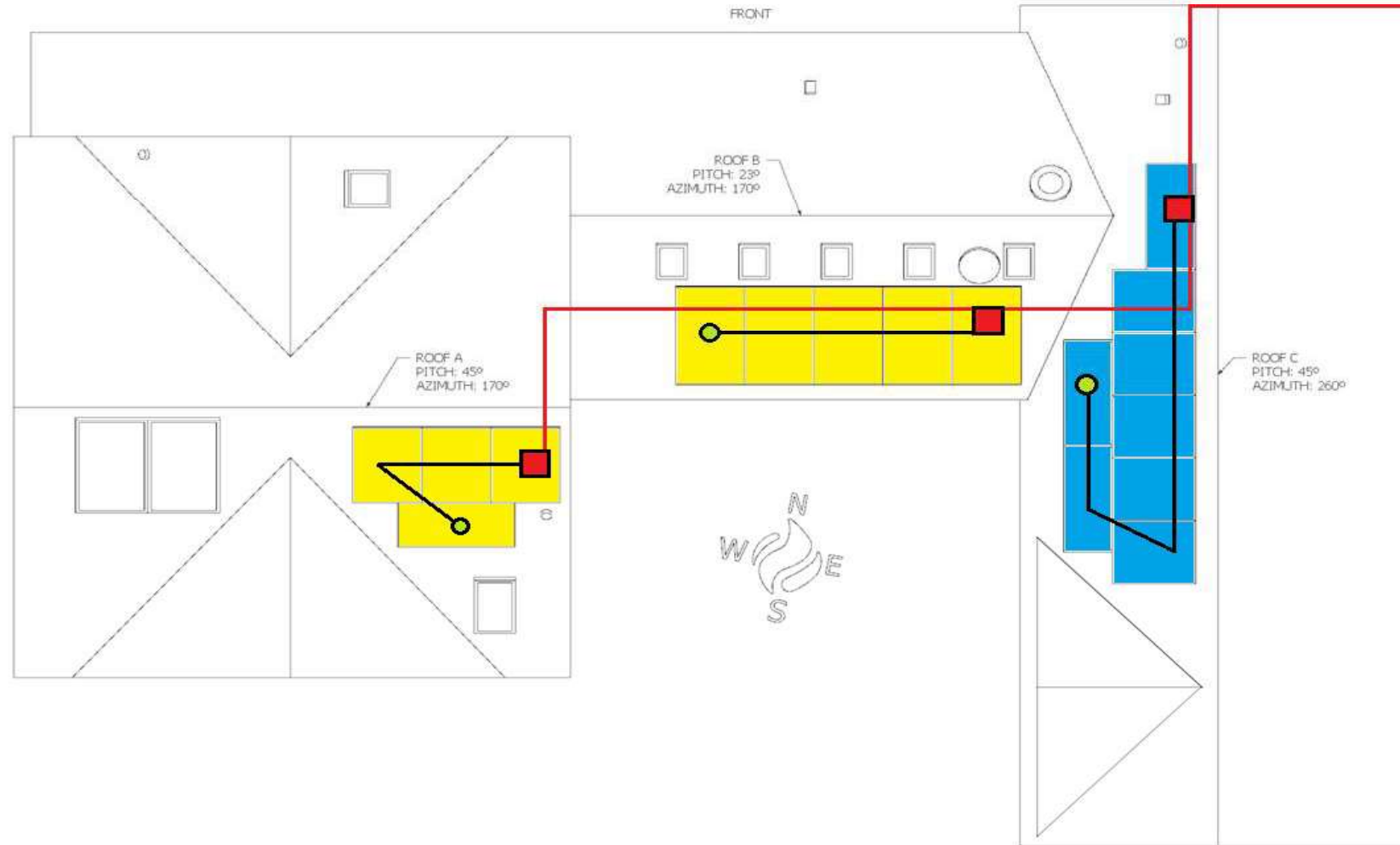
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By Dan.Bruechert at 2:41 pm, Jan 28, 2021

Trademarks or brands in this document are registered by their respective owner.



- Circuit 1 (8)
- Circuit 2 (9)
- Junction Box
- Soladeck
- End Cap
- Trunk Cable
- Exterior Conduit
- Interior Conduit



Utility Meter
AC Disconnect
AC Combiner

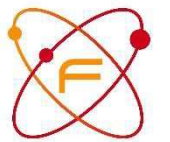
✗ Solar disconnect and combiner will be mounted here, next to the meter

FOR PERMITTING USE ONLY

PROJECT ADDRESS:

SCOTT WALLSTEN
1 MONTGOMERY AVENUE
TAKOMA PARK, MD
UNITED STATES 20912

CONTRACTOR INFO:



FUSION SOLAR SERVICES

3600 COMMERCE DR
SUITE 601
BALTIMORE, MD 21227
(443) 955-0779

LICENSE NUMBER:

MHIC-30991

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ELECTRICAL NOTES

REV DATE

IFC 12/29/2020

STRING & CONDUIT LAYOUT

E003

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Enphase IQ 7 and IQ 7+ Microinverters

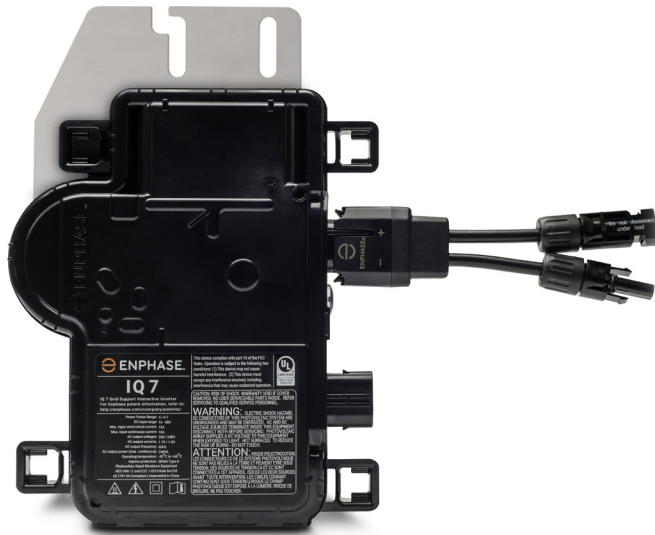
REVIEWED

By Dan.Bruechert at 2:42 pm, Jan 28, 2021

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.



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 I _{sc}) | 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) | 0.85 leading ... 0.85 lagging | | 0.85 leading ... 0.85 lagging | |
| EFFICIENCY | @240 V | @208 V | @240 V | @208 V |
| Peak 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 | -40°C to +65°C |
| 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

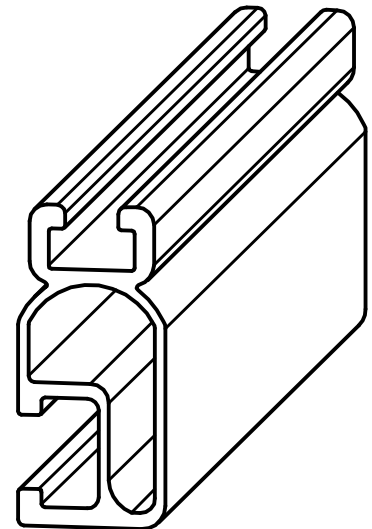
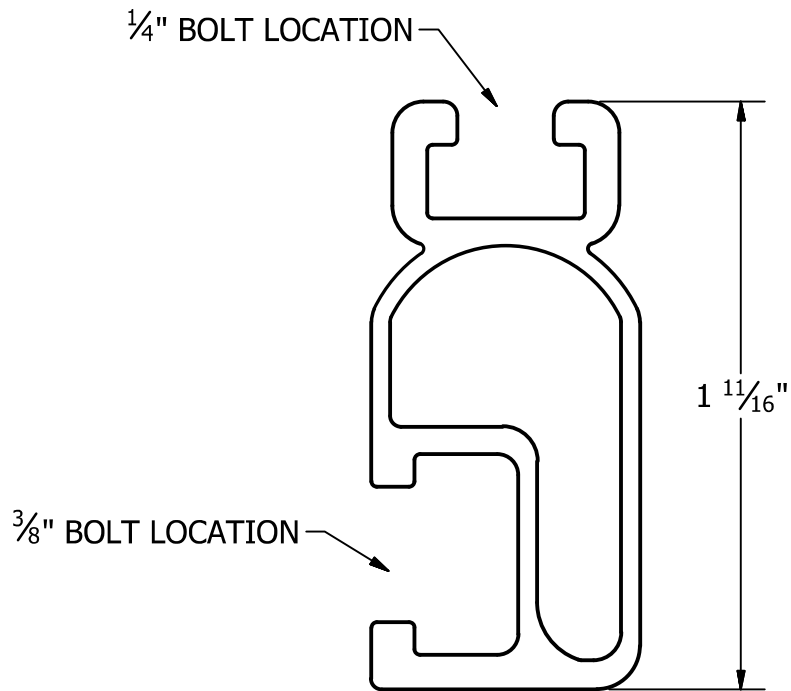
| | |
|---------------|---|
| Communication | Power Line Communication (PLC) |
| Monitoring | Enlighten Manager and MyEnlighten monitoring options. Monitoring options require installation of an Enphase IQ Envoy. |
| Disconnect | AC and DC connectors have been evaluated and approved by UL for use as the load-break disconnect required by NEC 690. |
| Code | UL Rule 21 (UL 1741-SA) UL 2109-1, UL1741/IEEE1547, FCC Part 15 Class B, ICES-0003 Class B, FCC Part 15 Class B, ICES-0003 Class B, UL/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. |

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1. N/A
2. N/A
3. L/A

REVIEWED Enphase offerings, visit enphase.com
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 By Dan.Bruechert at 2:42 pm, Jan 28, 2021

| PART # TABLE | | |
|--------------|-------------------------|--------|
| P/N | DESCRIPTION | LENGTH |
| 315168M | SM LIGHT RAIL 168" MILL | 168" |
| 315168D | SM LIGHT RAIL 168" DRK | 168" |
| 315240M | SM LIGHT RAIL 240" MILL | 240" |
| 315240D | SM LIGHT RAIL 240" DRK | 240" |

UNIRAC[®]

1411 BROADWAY BLVD, NE
 ALBUQUERQUE, NM 87102 USA
 PHONE: 505.242.6411
 WWW.UNIRAC.COM

| | |
|----------------|-------------|
| PRODUCT LINE: | SOLARMOUNT |
| DRAWING TYPE: | PART DETAIL |
| DESCRIPTION: | LIGHT RAIL |
| REVISION DATE: | 9/11/2017 |

DRAWING NOT TO SCALE
 ALL DIMENSIONS ARE
 NOMINAL

PRODUCT PROTECTED BY
 ONE OR MORE US PATENTS

LEGAL NOTICE

SM-P02

SHEET

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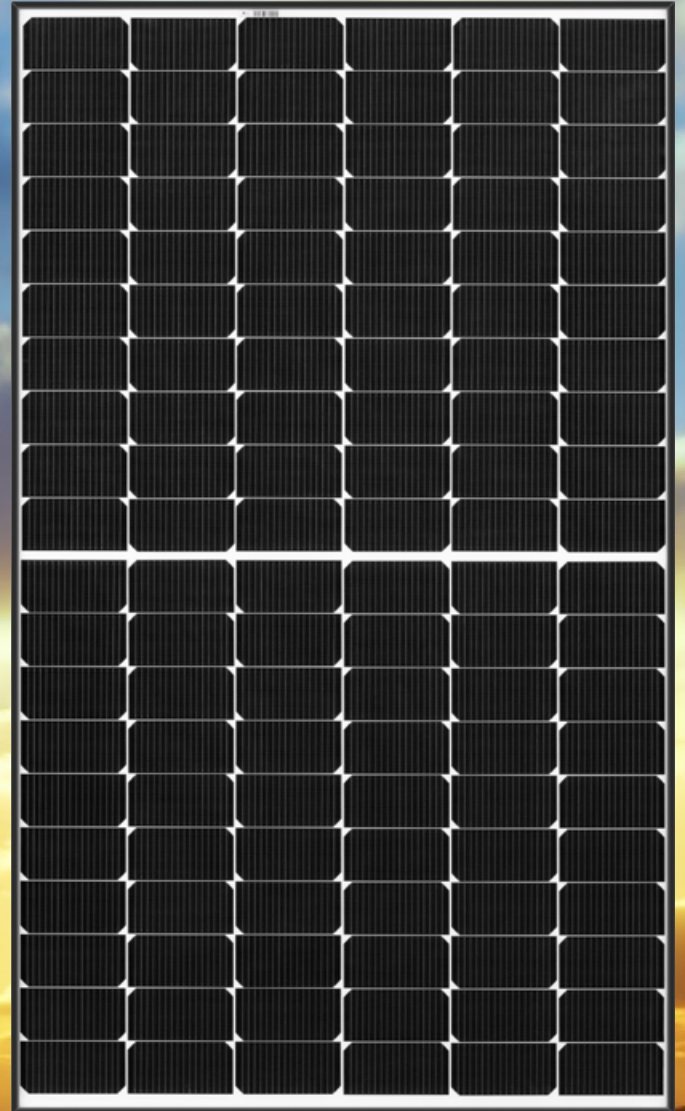
Sandra L. Heiler

SOLAR'S MOST TRUSTED



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REC ALPHA SERIES

380 W_P POWER

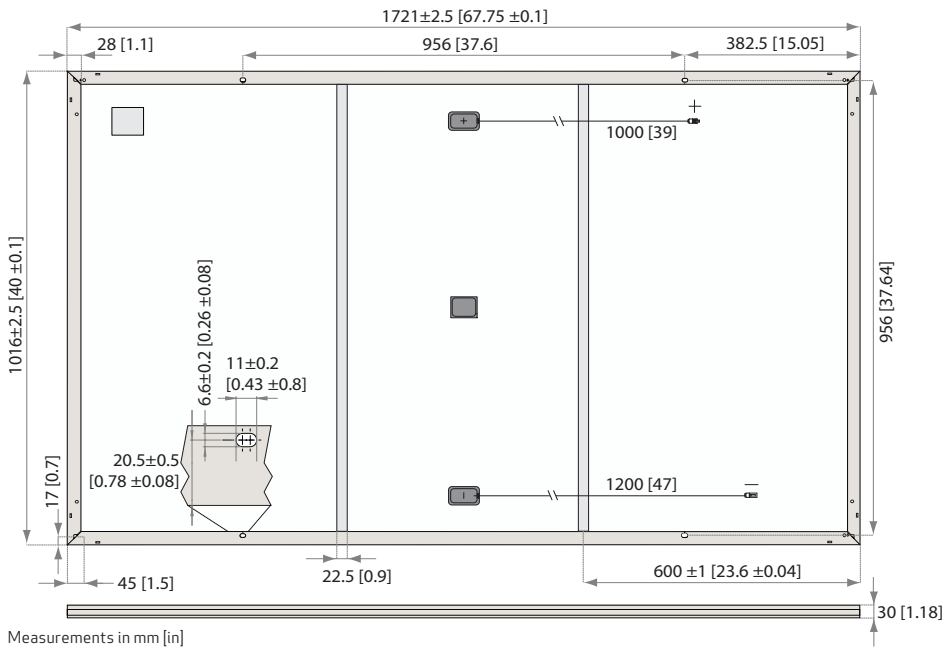
20 YEAR PRODUCT WARRANTY

25 YEAR POWER OUTPUT WARRANTY



recgroup.com/alpha

REC ALPHA SERIES



ELECTRICAL DATA @ STC

Product Code*: RECxxxAA

| | 360 | 365 | 370 | 375 | 380 |
|---------------------------------------|-------|-------|-------|-------|-------|
| Nominal Power - P_{MPP} (Wp) | 360 | 365 | 370 | 375 | 380 |
| Watt Class Sorting - (W) | -0/+5 | -0/+5 | -0/+5 | -0/+5 | -0/+5 |
| Nominal Power Voltage - V_{MPP} (V) | 37.7 | 38.0 | 38.3 | 38.7 | 39.0 |
| Nominal Power Current - I_{MPP} (A) | 9.55 | 9.60 | 9.66 | 9.71 | 9.76 |
| Open Circuit Voltage - V_{OC} (V) | 44.3 | 44.6 | 44.9 | 45.2 | 45.5 |
| Short Circuit Current - I_{SC} (A) | 10.16 | 10.19 | 10.21 | 10.23 | 10.26 |
| Panel Efficiency (%) | 20.6 | 20.9 | 21.2 | 21.4 | 21.7 |

Values at standard test conditions (STC: air mass AM1.5, irradiance 10.75 W/sq ft (1000 W/m²), temperature 77°F (25°C), based on a production spread with a tolerance of V_{OC} & I_{SC} ±3% within one watt class. * Where xxx indicates the nominal power class (P_{MPP}) at STC above.

ELECTRICAL DATA @ NMOT

Product Code*: RECxxxAA

| | 272 | 276 | 279 | 284 | 287 |
|---------------------------------------|------|------|------|------|------|
| Nominal Power - P_{MPP} (Wp) | 272 | 276 | 279 | 284 | 287 |
| Nominal Power Voltage - V_{MPP} (V) | 35.3 | 35.5 | 35.8 | 36.2 | 36.5 |
| Nominal Power Current - I_{MPP} (A) | 7.71 | 7.75 | 7.80 | 7.84 | 7.88 |
| Open Circuit Voltage - V_{OC} (V) | 41.4 | 41.7 | 42.0 | 42.3 | 42.5 |
| Short Circuit Current - I_{SC} (A) | 8.21 | 8.23 | 8.25 | 8.26 | 8.29 |

Nominal module operating temperature (NMOT: air mass AM1.5, irradiance 800 W/m², temperature 68°F (20°C), windspeed 3.3 ft/s (1 m/s).

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WARRANTY

- 20 year product warranty
 - 25 year linear power output warranty
 - Maximum annual power degradation of 0.25% p.a.
 - Guarantees 92% of power after 25 years
- See warranty conditions for further details.

REVIEWED REC is a leading vertically integrated solar energy company. Through integrated manufacturing from silicon to wafers, cells, and modules, REC provides the world with a reliable source of clean energy. REC's renowned product quality is supported by the lowest warranty claims rate in the industry. REC is a BlueStar Elk River company with headquarters in Norway and operational headquarters in the United States. REC manufactures solar panels annually.

By Dan.Bruechert at 2:42 pm, Jan 28, 2021

GENERAL DATA

| | |
|---------------|--|
| Cell type: | 120 half-cut n-type mono cells with REC heterojunction cell technology 6 strings of 20 cells in series |
| Glass: | 0.13 in (3.2 mm) solar glass with anti-reflection surface treatment |
| Backsheet: | Highly resistant polymeric construction |
| Frame: | Anodized aluminum (black) |
| Junction box: | 3-part, 3 bypass diodes, IP67 rated in accordance with IEC 62790 |
| Cable: | 12 AWG (4 mm ²) PV wire, 39 + 47 in (1 + 1.2 m) in accordance with EN 50618 |
| Connectors: | Stäubli MC4PV-KBT4/KST4, 12 AWG (4 mm ²) in accordance with IEC 62852 IP68 only when connected |
| Origin: | Made in Singapore |

MECHANICAL DATA

| | |
|-------------|--|
| Dimensions: | 67.8 x 40 x 1.2 in (1721 x 1016 x 30 mm) |
| Area: | 18.8 sq ft (1.75 m ²) |
| Weight: | 43 lbs (19.5 kg) |

MAXIMUM RATINGS

| | |
|--------------------------|---------------------------|
| Operational temperature: | -40 ... +85°C |
| Maximum system voltage: | 1000 V |
| Design load (+): snow | 4666 Pa (97.5 lbs/sq ft)* |
| Maximum test load (+): | 7000 Pa (146 lbs/sq ft)* |
| Design load (-): wind | 2666 Pa (55.6 lbs/sq ft)* |
| Maximum test load (-): | 4000 Pa (83.5 lbs/sq ft)* |
| Max series fuse rating: | 25 A |
| Max reverse current: | 25 A |

* Calculated using a safety factor of 1.5
* See installation manual for mounting instructions

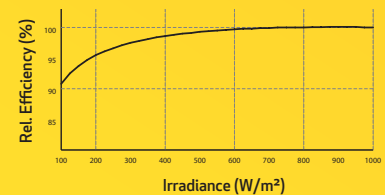
TEMPERATURE RATINGS*

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

* The temperature coefficients stated are linear values

LOW LIGHT BEHAVIOUR

Typical low irradiance performance of module at STC:



www.recgroup.com

24