
## PV MATERIAL SUMMARY: DISTRIBUTOR

| | |
|---|---|
| FBM400MFG-BB | 32 |
| IQ7A-72-2-US | 32 |
| X-IQ-AM1-240-4 | 1 |
| Q-12-17-240 | 35 |
| Q-SEAL-10 | 3 |
| Q-TERM-10 | 5 |
| XR-10-168B | 19 |
| XR-10-204B | 3 |
| XR10-BOSS-01-M1 | 12 |
| UFO-CL-01-B1 | 80 |
| UFO-STP-35MM-B1 | 32 |
| XR-LUG-03-A1 | 9 |
| QB DECK MOUNT 16317 | 149 |
| MI-BHW | 32 |
| GC66803 Geocel Sealant | 10 |
| SOLADECK 0799-5B | 4 |

NOTICE TO CONTRACTOR:
All construction must comply with current NC Building Codes and is subject to field inspection and verification.

APPROVED
Limited building only review
Permit holder responsible for full compliance with the code

12/22/2022

Harnett COUNTY NORTH CAROLINA

NC SOLAR NOW

NORTH CAROLINA PROFESSIONAL SEAL 035699 ENGINEER ANDREW W. KING
12/14/22

## CLIENT INFO

KENNETH COGDELL JR
3304 ASHE AVE
DUNN,NC 28334

## PROJECT INFO

| | |
|---|---|
| DC INPUT: | 12.800 kW |
| AC EXPORT: | 11.168 kW |
| DOI INSPT. METHOD: | OPTION 2 |

## CODE REFERENCES

NATION ELECTRICAL CODE v. 2017
NC FIRE PROTECTION CODE v. 2018
NC BUILDING CODE v. 2018
NC RESIDENTIAL CODE v. 2018
ACSE v. 7-10

## SITE CONDITIONS

| | |
|---|---|
| WIND SPEED: | 119 MPH |
| RISK CATEGORY: | II |
| EXPOSURE: | B |
| SNOW: | 10 PSF |

## SHEET INDEX

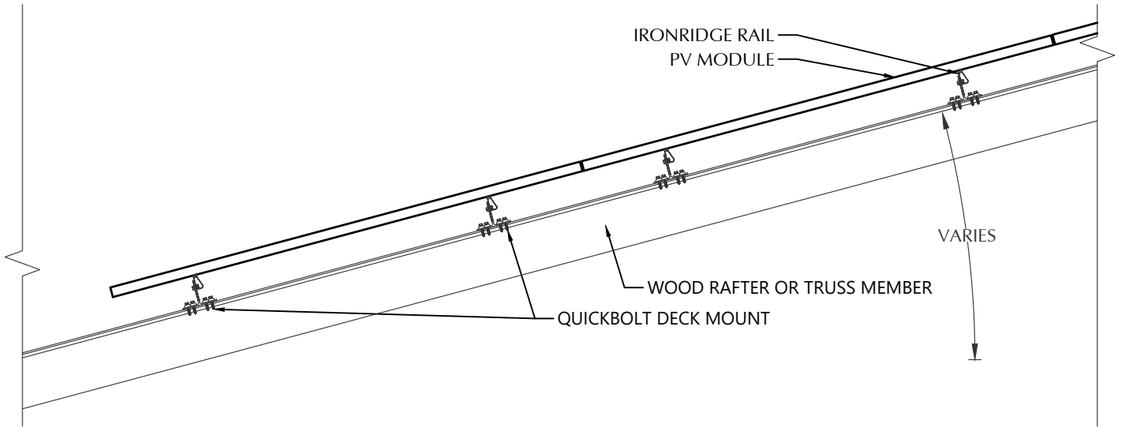


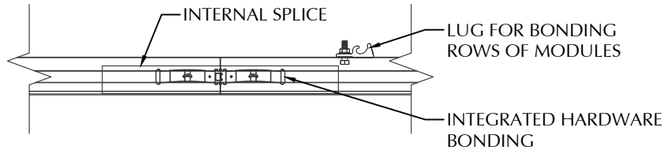
## DESIGNER INFO

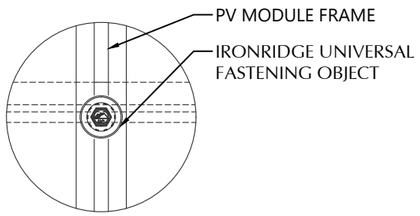
| | |
|---|---|
| DESIGNER | MCP |
| ENGINEER | AWK |
| DATE | 12/14/2022 |
| VERSION | P1 |

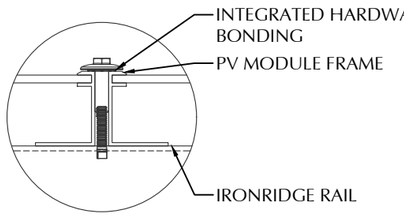
PV SYSTEM COVER PAGE

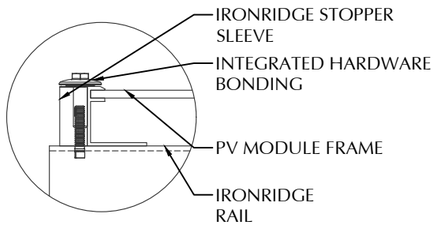
# PV-1.1

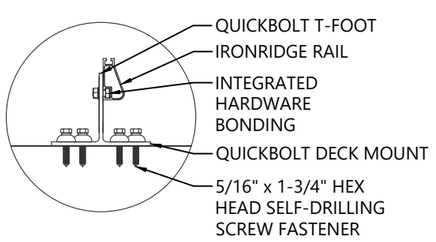


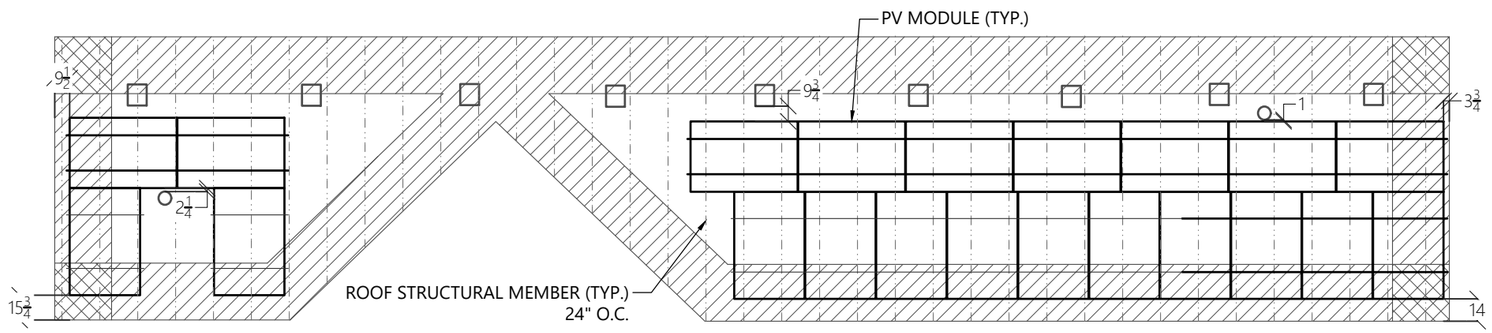




1 ROOF FASTENER DETAIL
NOT TO SCALE




2 ROOF A ARRAY LAYOUT
1/8" = 1'-0"

## STATEMENT OF STRUCTURAL COMPLIANCE

THE EXISTING ROOF STRUCTURE HAS BEEN DESIGNED TO SUPPORT THE ADDITIONAL LOADS OF THE PROPOSED PV SYSTEM. IN ADDITION, THE RACKING AND FASTENING SYSTEM SHALL BE CAPABLE OF SECURING THE SYSTEM TO THE STRUCTURE UNDER DESIGN CONDITIONS WHEN INSTALLED PROPERLY AND IN ACCORDANCE WITH THE RACKING AND FASTENING ARRANGEMENT DETAILED WITHIN THESE DRAWINGS.

NAME: ANDREW W. KING, PE

SIGNED:

## PV MODULES

| | |
|---|---|
| MAKE | URECO |
| MODEL | FBM400MFG-BB |
| WIDTH | 44.61 IN |
| LENGTH | 67.83 IN |
| THICKNESS | 35 MM |
| WEIGHT | 47.84 LBS. |
| ARRAY AREA | 441 SQFT. |
| ARRAY WEIGHT | 1103 LBS. |

## ROOF SUMMARY

| | |
|---|---|
| STRUCTURE: | |
| TYPE | TRUSSES |
| MATERIAL | SOUTHERN PINE #2 |
| SIZE | 2 X 4 |
| SPACING | 24 IN O.C. |
| ALLOWABLE SPAN | 88 IN |
| PITCH | 3/12 |
| DENSITY | 30 LBS./CU.FT. |
| DECKING: | |
| TYPE | OSB |
| MATERIAL | COMPOSITE |
| THICKNESS | 7/16 IN |
| WEIGHT | 1.60 LBS/SQFT |
| ROOFING: | |
| TYPE | ASPHALT SHINGLE |
| MATERIAL | ASPHALT |
| WEIGHT | 2.30 LBS./SQFT. |

## ROOF MOUNT SUMMARY

| MAXIMUM (IN) | MOUNT SPACING | RAIL OVERHANG |
|---|---|---|
| WIND ZONE 1 | PORT 43 LAND 65 | 9 IN |
| WIND ZONE 2 | PORT 23 LAND 36 | 9 IN |
| WIND ZONE 3 | PORT 13 LAND 21 | 5 IN |

## ROOF LOADING

| | |
|---|---|
| GROUND SNOW LOAD: | 15 LBS./SQFT. |
| LIVE LOAD | 20 LBS./SQFT. |
| DEAD LOAD | |
| ROOFING | 3.9 LBS/SQFT. |
| PV ARRAY | 2.5 LBS./SQFT. |
| TOTAL | 6.4 LBS./SQFT. |
| WIND LOAD: | |
| UPLIFT ZONE 1 | -23.0 LBS./SQFT. |
| UPLIFT ZONE 2 | -38.0 LBS./SQFT. |
| UPLIFT ZONE 3 | -57.1 LBS./SQFT. |
| DOWNWARD | 13.6 LBS./SQFT. |
| FASTENER LOAD: | |
| UPLIFT ZONE 1 | -234 LBS. |
| UPLIFT ZONE 2 | -211 LBS. |
| UPLIFT ZONE 3 | -186 LBS. |
| DOWNWARD | 138 LBS. |

## ROOF MOUNT & FASTENER

| | |
|---|---|
| ROOF MOUNT: | |
| MAKE | QUICKBOLT |
| MODEL | QB DECK MOUNT 16317 |
| MATERIAL | STAINLESS / EPDM |
| FASTENER: | |
| MAKE | QUICK SCREWS |
| MODEL | HEX LAG PN# 16318 |
| MATERIAL | 304 SS |
| SIZE | 5/16" X 1-3/4" |
| GENERAL: | |
| WEIGHT | 0.88 LBS. |
| FASTENERS PER MOUNT | 4 |
| MAX. PULL-OUT FORCE | 705.0 LBS. |
| SAFETY FACTOR | 3 |
| DESIGN PULL-OUT FORCE | 235.0 LBS. |

## MOUNTING RAILS

| | |
|---|---|
| MAKE | IRONRIDGE |
| MODEL | XR10 |
| MATERIAL | ALUMINUM |
| WEIGHT | 0.425 LBS/IN |
| SPACING | 34 IN |

NC SOLAR NOW

NORTH CAROLINA PROFESSIONAL SEAL 035699 ENGINEER ANDREW W. KING 12/14/22

## CLIENT INFO

KENNETH COGDELL JR
3304 ASHE AVE
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NC RESIDENTIAL CODE v. 2018
ACSE v. 7-10

## SITE CONDITIONS

| | |
|---|---|
| WIND SPEED: | 119 MPH |
| RISK CATEGORY: | II |
| EXPOSURE: | B |
| SNOW: | 10 PSF |

## SHEET INDEX

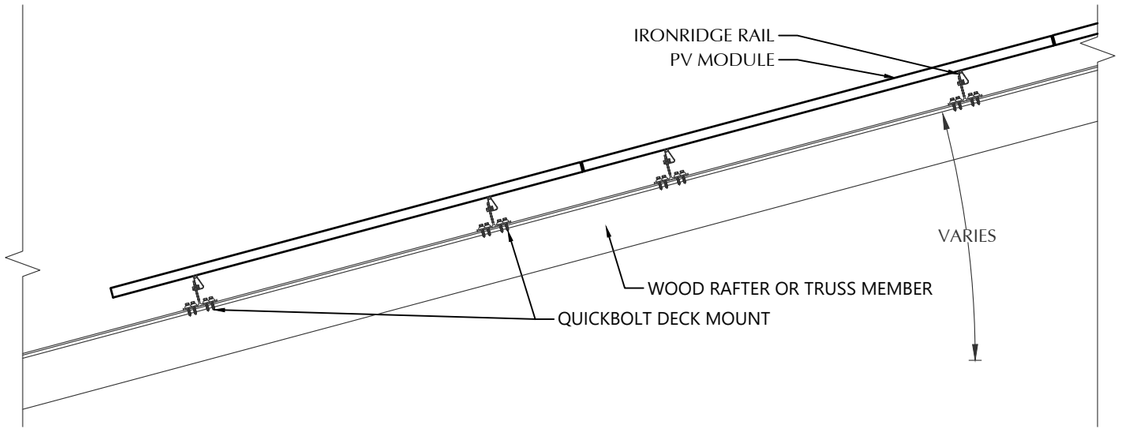


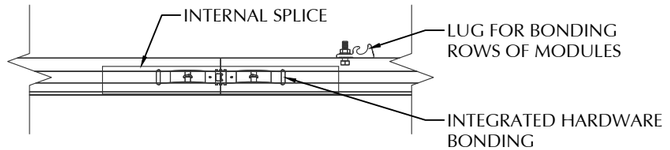
## DESIGNER INFO

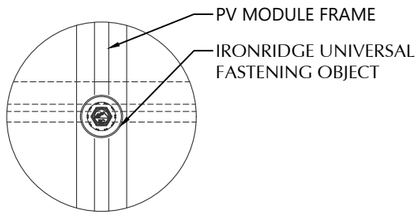
| | |
|---|---|
| DESIGNER | MCP |
| ENGINEER | AWK |
| DATE | 12/14/2022 |
| VERSION | P1 |

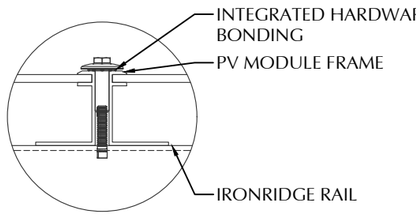
PV SYSTEM STRUCTURAL

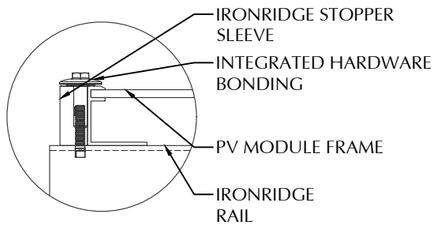
# PV-2.1

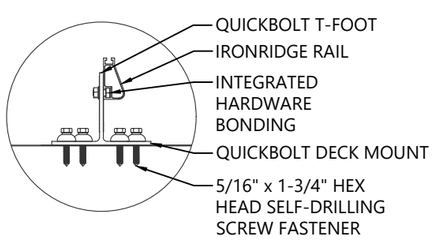


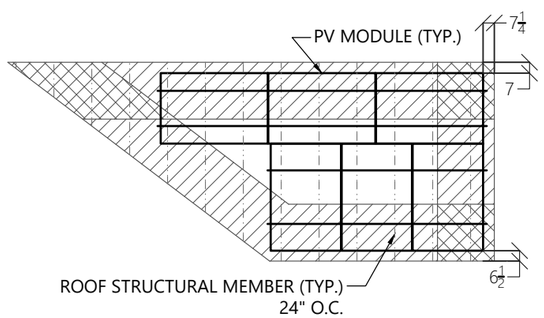




1 ROOF FASTENER DETAIL
NOT TO SCALE




2 ROOF B ARRAY LAYOUT
1/8" = 1'-0"

## STATEMENT OF STRUCTURAL COMPLIANCE

THE EXISTING ROOF STRUCTURE HAS BEEN DESIGNED TO SUPPORT THE ADDITIONAL LOADS OF THE PROPOSED PV SYSTEM. IN ADDITION, THE RACKING AND FASTENING SYSTEM SHALL BE CAPABLE OF SECURING THE SYSTEM TO THE STRUCTURE UNDER DESIGN CONDITIONS WHEN INSTALLED PROPERLY AND IN ACCORDANCE WITH THE RACKING AND FASTENING ARRANGEMENT DETAILED WITHIN THESE DRAWINGS.

NAME: ANDREW W. KING, PE

SIGNED:

## PV MODULES

| | |
|---|---|
| MAKE | URECO |
| MODEL | FBM400MFG-BB |
| WIDTH | 44.61 IN |
| LENGTH | 67.83 IN |
| THICKNESS | 35 MM |
| WEIGHT | 47.84 LBS. |
| ARRAY AREA | 126 SQFT. |
| ARRAY WEIGHT | 315 LBS. |

## ROOF SUMMARY

| | |
|---|---|
| STRUCTURE: | |
| TYPE | TRUSSES |
| MATERIAL | SOUTHERN PINE #2 |
| SIZE | 2 X 4 |
| SPACING | 24 IN O.C. |
| ALLOWABLE SPAN | 88 IN |
| PITCH | 4/12 |
| DENSITY | 30 LBS./CU.FT. |
| DECKING: | |
| TYPE | OSB |
| MATERIAL | COMPOSITE |
| THICKNESS | 7/16 IN |
| WEIGHT | 1.60 LBS/SQFT |
| ROOFING: | |
| TYPE | ASPHALT SHINGLE |
| MATERIAL | ASPHALT |
| WEIGHT | 2.30 LBS./SQFT. |

## ROOF MOUNT SUMMARY

| MAXIMUM (IN) | MOUNT SPACING | RAIL OVERHANG |
|---|---|---|
| WIND ZONE 1 | PORT 43 LAND 65 | 9 IN |
| WIND ZONE 2 | PORT 23 LAND 36 | 9 IN |
| WIND ZONE 3 | PORT 13 LAND 21 | 5 IN |

## ROOF LOADING

| | |
|---|---|
| GROUND SNOW LOAD: | 15 LBS./SQFT. |
| LIVE LOAD | 20 LBS./SQFT. |
| DEAD LOAD | |
| ROOFING | 3.9 LBS/SQFT. |
| PV ARRAY | 2.5 LBS./SQFT. |
| TOTAL | 6.4 LBS./SQFT. |
| WIND LOAD: | |
| UPLIFT ZONE 1 | -23.0 LBS./SQFT. |
| UPLIFT ZONE 2 | -38.0 LBS./SQFT. |
| UPLIFT ZONE 3 | -57.1 LBS./SQFT. |
| DOWNWARD | 13.6 LBS./SQFT. |
| FASTENER LOAD: | |
| UPLIFT ZONE 1 | -231 LBS. |
| UPLIFT ZONE 2 | -212 LBS |
| UPLIFT ZONE 3 | -191 LBS |
| DOWNWARD | 137 LBS |

## ROOF MOUNT & FASTENER

| | |
|---|---|
| ROOF MOUNT: | |
| MAKE | QUICKBOLT |
| MODEL | QB DECK MOUNT 16317 |
| MATERIAL | STAINLESS / EPDM |
| FASTENER: | |
| MAKE | QUICK SCREWS |
| MODEL | HEX LAG PN# 16318 |
| MATERIAL | 304 SS |
| SIZE | 5/16" X 1-3/4" |
| GENERAL: | |
| WEIGHT | 0.88 LBS. |
| FASTENERS PER MOUNT | 4 |
| MAX. PULL-OUT FORCE | 705.0 LBS. |
| SAFETY FACTOR | 3 |
| DESIGN PULL-OUT FORCE | 235.0 LBS. |

## MOUNTING RAILS

| | |
|---|---|
| MAKE | IRONRIDGE |
| MODEL | XR10 |
| MATERIAL | ALUMINUM |
| WEIGHT | 0.425 LBS/IN |
| SPACING | 34 IN |

NC SOLAR NOW

NORTH CAROLINA PROFESSIONAL SEAL 035699 ENGINEER ANDREW W. KING
12/14/22

## CLIENT INFO

KENNETH COGDELL JR
3304 ASHE AVE
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## PROJECT INFO

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| DC INPUT: | 12.800 kW |
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| DOI INSPT. METHOD: | OPTION 2 |

## CODE REFERENCES

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NC BUILDING CODE v. 2018
NC RESIDENTIAL CODE v. 2018
ACSE v. 7-10

## SITE CONDITIONS

| | |
|---|---|
| WIND SPEED: | 119 MPH |
| RISK CATEGORY: | II |
| EXPOSURE: | B |
| SNOW: | 10 PSF |

## SHEET INDEX

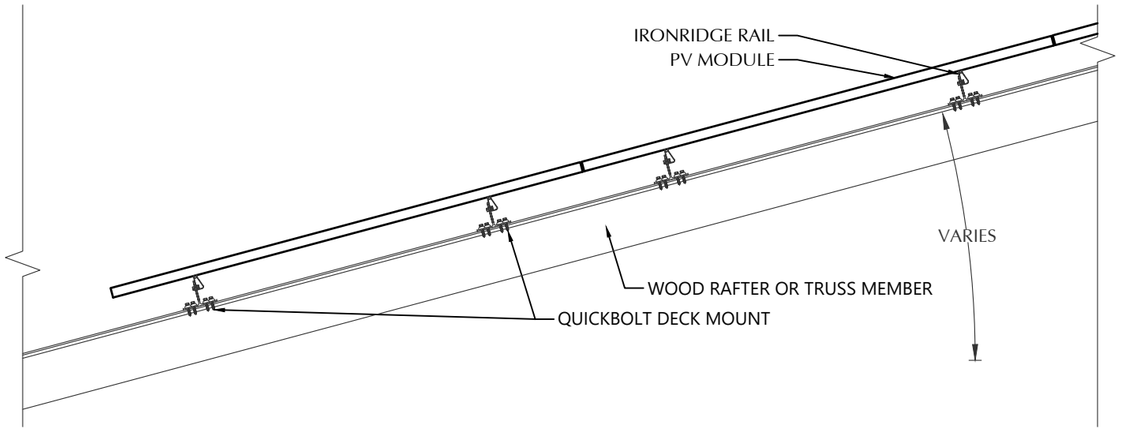


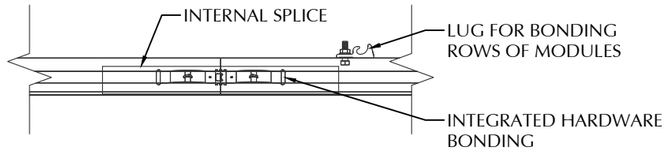
## DESIGNER INFO

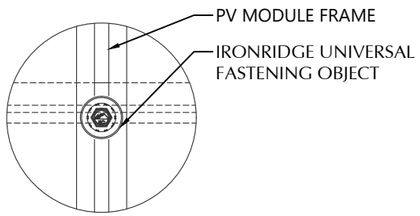
| | |
|---|---|
| DESIGNER | MCP |
| ENGINEER | AWK |
| DATE | 12/14/2022 |
| VERSION | P1 |

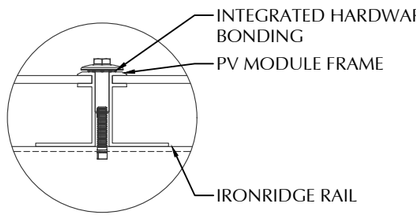
PV SYSTEM STRUCTURAL

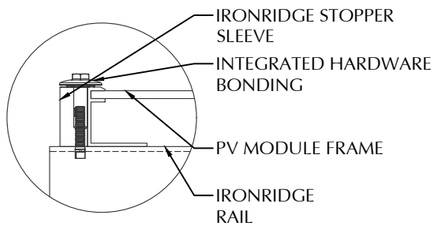
# PV-2.2

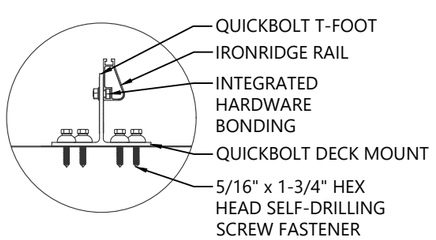


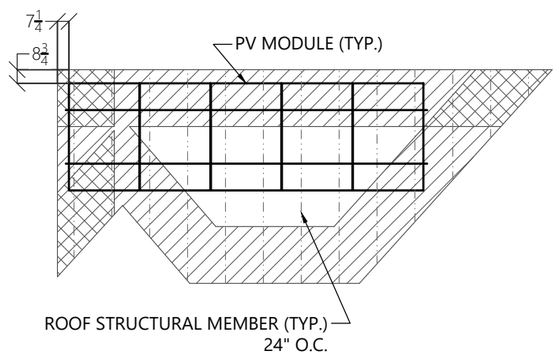




1 ROOF FASTENER DETAIL
NOT TO SCALE




2 ROOF C ARRAY LAYOUT
1/8" = 1'-0"

## STATEMENT OF STRUCTURAL COMPLIANCE

THE EXISTING ROOF STRUCTURE HAS BEEN DESIGNED TO SUPPORT THE ADDITIONAL LOADS OF THE PROPOSED PV SYSTEM. IN ADDITION, THE RACKING AND FASTENING SYSTEM SHALL BE CAPABLE OF SECURING THE SYSTEM TO THE STRUCTURE UNDER DESIGN CONDITIONS WHEN INSTALLED PROPERLY AND IN ACCORDANCE WITH THE RACKING AND FASTENING ARRANGEMENT DETAILED WITHIN THESE DRAWINGS.

NAME: ANDREW W. KING, PE

SIGNED:

## PV MODULES

| | |
|---|---|
| MAKE | URECO |
| MODEL | FBM400MFG-BB |
| WIDTH | 44.61 IN |
| LENGTH | 67.83 IN |
| THICKNESS | 35 MM |
| WEIGHT | 47.84 LBS. |
| ARRAY AREA | 105 SQFT. |
| ARRAY WEIGHT | 263 LBS. |

## ROOF SUMMARY

| | |
|---|---|
| STRUCTURE: | |
| TYPE | TRUSSES |
| MATERIAL | SOUTHERN PINE #2 |
| SIZE | 2 X 4 |
| SPACING | 24 IN O.C. |
| ALLOWABLE SPAN | 88 IN |
| PITCH | 3/12 |
| DENSITY | 30 LBS./CU.FT. |
| DECKING: | |
| TYPE | OSB |
| MATERIAL | COMPOSITE |
| THICKNESS | 7/16 IN |
| WEIGHT | 1.60 LBS/SQFT |
| ROOFING: | |
| TYPE | ASPHALT SHINGLE |
| MATERIAL | ASPHALT |
| WEIGHT | 2.30 LBS./SQFT. |

## ROOF MOUNT SUMMARY

| MAXIMUM (IN) | MOUNT SPACING | RAIL OVERHANG |
|---|---|---|
| WIND ZONE 1 | 43 IN | 10 IN |
| WIND ZONE 2 | 24 IN | 10 IN |
| WIND ZONE 3 | 14 IN | 6 IN |

## ROOF LOADING

| | |
|---|---|
| GROUND SNOW LOAD: | 15 LBS./SQFT. |
| LIVE LOAD | 20 LBS./SQFT. |
| DEAD LOAD | |
| ROOFING | 3.9 LBS/SQFT. |
| PV ARRAY | 2.5 LBS./SQFT. |
| TOTAL | 6.4 LBS./SQFT. |
| WIND LOAD: | |
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## ROOF MOUNT & FASTENER

| | |
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| ROOF MOUNT: | |
| MAKE | QUICKBOLT |
| MODEL | QB DECK MOUNT 16317 |
| MATERIAL | STAINLESS / EPDM |
| FASTENER: | |
| MAKE | QUICK SCREWS |
| MODEL | HEX LAG PN# 16318 |
| MATERIAL | 304 SS |
| SIZE | 5/16" X 1-3/4" |
| GENERAL: | |
| WEIGHT | 0.88 LBS. |
| FASTENERS PER MOUNT | 4 |
| MAX. PULL-OUT FORCE | 705.0 LBS. |
| SAFETY FACTOR | 3 |
| DESIGN PULL-OUT FORCE | 235.0 LBS. |

## MOUNTING RAILS

| | |
|---|---|
| MAKE | IRONRIDGE |
| MODEL | XR10 |
| MATERIAL | ALUMINUM |
| WEIGHT | 0.425 LBS/IN |
| SPACING | 34 IN |

NC SOLAR NOW

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## PROJECT INFO

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| AC EXPORT: | 11.168 kW |
| DOI INSPT. METHOD: | OPTION 2 |

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NC RESIDENTIAL CODE v. 2018
ACSE v. 7-10

## SITE CONDITIONS

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|---|---|
| WIND SPEED: | 119 MPH |
| RISK CATEGORY: | II |
| EXPOSURE: | B |
| SNOW: | 10 PSF |

## SHEET INDEX



## DESIGNER INFO

| | |
|---|---|
| DESIGNER | MCP |
| ENGINEER | AWK |
| DATE | 12/14/2022 |
| VERSION | P1 |

PV SYSTEM STRUCTURAL

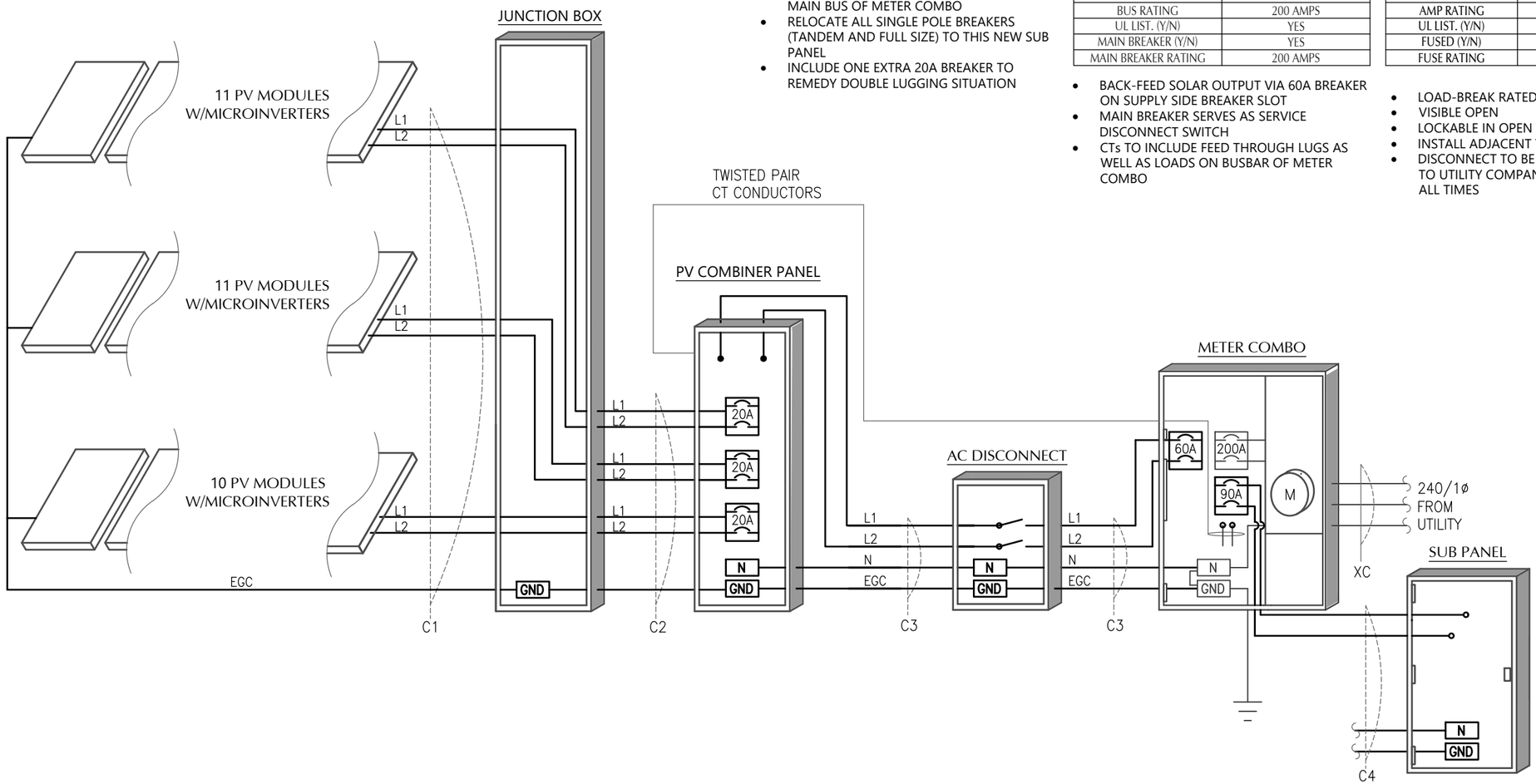
# PV-2.3

## CONDUCTOR SCHEDULE

| TAG | CURRENT CARRYING CONDUCTORS | | | GROUNDING CONDUCTORS | | | CONDUIT/RACEWAY | | | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|
| | QTY. | SIZE | INSULATION | QTY. | SIZE | INSULATION | QTY. | SIZE | LOCATION | |
| C1 | 6 | 12 AWG | DG CABLE | 1 | 6 AWG | BARE | - | - | FREE AIR | 1 |
| C2 | 6 | 10 AWG | THWN-2 | 1 | 10 AWG | THWN-2 | 1 | 3/4" | EXT/INT | 2,4 |
| C3 | 3 | 6 AWG | THWN-2 | 1 | 10 AWG | THWN-2 | 1 | 3/4" | EXTERIOR | 2,4 |
| C4 | 3 | 3 AWG | THWN-2 | 1 | 8 AWG | THWN-2 | 1 | 1" | EXTERIOR | 2,4 |
| XC | - | - | - | - | - | - | - | - | - | 3 |

NOTES:

1. MANUFACTURER PROVIDED, UL LISTED WIRING HARNESS FOR USE ON EXPOSED ROOFS
2. CONDUIT SIZE SHOWN IS CODE MINIMUM. LARGER SIZES ARE ALLOWED.
3. EXISTING CONDUCTORS, FIELD VERIFY
4. EQUIPMENT TERMINAL RATING SHALL BE A MINIMUM OF 75°C AT BOTH END OF CONDUCTOR




1 ELECTRICAL SCHEMATIC
NTS

## PV MODULE

| | |
|---|---|
| MAKE | URECO |
| MODEL | FBM400MFG-BB |
| NOM. POWER (PNOM) | 400 WATTS |
| NOM. VOLT. (VMPP) | 31.2 VOLTS |
| O.C. VOLT (VOC) | 37.2 VOLTS |
| MAX. SYS. VOLT. | 1000 VOLTS |
| NOM. CURR. (IMPP) | 12.8 AMPS |
| S.C. CURR. (ISC) | 13.7 AMPS |
| TEMP. COEF. (PMPP) | -0.32 %/C |
| TEMP. COEF. (Voc) | -0.27 %/C |
| MAX SERIES FUSE | 30 AMPS |
| UL COMPLIANT (Y/N) | YES |

## SUB PANEL (NEW)

| | |
|---|---|
| MAKE | GENERIC |
| MODEL | N/A |
| ENCL. RATING | NEMA TYPE 1 |
| VOLT. RATING | 240 |
| BUS RATING | 125 AMPS |
| UL LIST. (Y/N) | YES |
| MAIN BREAKER (Y/N) | NO |
| MAIN BREAKER RATING | N/A |

- FEED NEW SUB PANEL VIA 90A BREAKER ON MAIN BUS OF METER COMBO
- RELOCATE ALL SINGLE POLE BREAKERS (TANDEM AND FULL SIZE) TO THIS NEW SUB PANEL
- INCLUDE ONE EXTRA 20A BREAKER TO REMEDY DOUBLE LUGGING SITUATION

## PV COMBINER PANEL

| | |
|---|---|
| MAKE | ENPHASE |
| MODEL | X-IQ-AM1-240-4 |
| INPUT: | |
| MAX BRANCH CIRCUITS | 4 TOTAL |
| BRANCH CIRCUIT OCPD | 50 AMPS |
| OUTPUT: | |
| MAX POWER | 15600 WATTS |
| NOM. VOLTAGE | 240 VOLTS |
| BUS RATING | 125 AMPS |
| MAIN BREAKER Y/N | NO |
| ENCL. RATING | NEMA TYPE 3R |
| UL LIST. (Y/N) | YES |

## JUNCTION BOX

| | |
|---|---|
| MAKE | SOLADECK |
| PROTECT. RATING | NEMA TYPE 3R |
| UL LIST. (Y/N) | YES |

## METER COMBO (EXISTING)

| | |
|---|---|
| MAKE | GENERIC |
| MODEL | N/A |
| ENCL. RATING | NEMA 3R |
| VOLT. RATING | 240 |
| BUS RATING | 200 AMPS |
| UL LIST. (Y/N) | YES |
| MAIN BREAKER (Y/N) | YES |
| MAIN BREAKER RATING | 200 AMPS |

- BACK-FEED SOLAR OUTPUT VIA 60A BREAKER ON SUPPLY SIDE BREAKER SLOT
- MAIN BREAKER SERVES AS SERVICE DISCONNECT SWITCH
- CTs TO INCLUDE FEED THROUGH LUGS AS WELL AS LOADS ON BUSBAR OF METER COMBO

## DC / AC INVERTER

| | |
|---|---|
| MAKE | ENPHASE |
| MODEL | IQ7A-72-2-US |
| DC INPUT: | |
| POWER RANGE (WATTS) | 295-460 |
| MIN/MAX START VOLT. | 33 / 58 |
| OPERATING VOLT. RANGE | 18-58 |
| MAX. CURRENT | 15 AMPS |
| MODULE COMPATIBILITY | 60, 66, & 72 CELL |
| AC OUTPUT: | |
| MAX. POWER | 366 WATTS |
| NOM. POWER | 349 WATTS |
| NOM. VOLT. | 211-240-264 |
| MAX. CURR. | 1.45 AMPS |
| DC DISC. (Y/N) | NO |
| RAPID SHUTDOWN (Y/N) | YES |
| PROTECT. RATING | NEMA TYPE 6 |
| UL LIST. (Y/N) | YES |
| MAX BRANCH CIRCUIT | 11 |

## AC DISCONNECT

| | |
|---|---|
| MAKE | GENERIC |
| MODEL | NA |
| ENCL. RATING | NEMA 3R |
| VOLT. RATING | 240 VOLTS |
| AMP RATING | 60 AMPS |
| UL LIST. (Y/N) | YES |
| FUSED (Y/N) | NO |
| FUSE RATING | N/A |

- LOAD-BREAK RATED
- VISIBLE OPEN
- LOCKABLE IN OPEN POSITION
- INSTALL ADJACENT TO METER
- DISCONNECT TO BE READILY ACCESSIBLE TO UTILITY COMPANY PERSONNEL AT ALL TIMES

NC SOLAR NOW

NORTH CAROLINA PROFESSIONAL SEAL 035699 ENGINEER ANDREW W. KING
12/14/22

### CLIENT INFO

KENNETH COGDELL JR
3304 ASHE AVE
DUNN,NC 28334

### PROJECT INFO

| | |
|---|---|
| DC INPUT: | 12.800 kW |
| AC EXPORT: | 11.168 kW |
| DOI INSPT. METHOD: | OPTION 2 |

### CODE REFERENCES

NATION ELECTRICAL CODE v. 2017
NC FIRE PROTECTION CODE v. 2018
NC BUILDING CODE v. 2018
NC RESIDENTIAL CODE v. 2018
ACSE v. 7-10

### SITE CONDITIONS

| | |
|---|---|
| WIND SPEED: | 119 MPH |
| RISK CATEGORY: | II |
| EXPOSURE: | B |
| SNOW: | 10 PSF |

### SHEET INDEX



### DESIGNER INFO

| | |
|---|---|
| DESIGNER | MCP |
| ENGINEER | AWK |
| DATE | 12/14/2022 |
| VERSION | P1 |

PV SYSTEM ELECTRICAL

# PV-3.1

**⚠WARNING**
PHOTOVOLTAIC SYSTEM COMBINER PANEL
DO NOT ADD LOADS

NEC 705.12 (C)(3)
PLACE ON PV COMBINER PANEL

**⚠WARNING**
POWER SOURCE OUTPUT CONNECTION DO NOT RELOCATE THIS OVERCURRENT DEVICE

NEC 705.12 (B)(2)(3)(b)
PLACE ADJACENT TO BACK-FED BREAKER

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

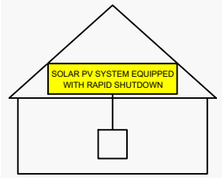
NEC 705.12 (B)(3)
PLACE ON ALL EQUIPMENT THAT IS SUPPLIED BY BOTH POWER SOURCES

**⚠WARNING**
THIS EQUIPMENT FED BY MULTIPLE SOURCES. TOTAL RATING OF ALL OVERCURRENT DEVICES EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE SHALL NOT EXCEED AMPACITY OF BUSBAR.

NEC 705.12 (B)(2)(3)(c)
PLACE ON PV COMBINER PANEL.

**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




NEC 690.56 (C)(1)(a)
PLACE WITHIN 3FT OF SERVICE DISCONNECTING MEANS TO WHICH THE PV SYSTEMS ARE CONNECTED AND SHALL INDICATE THE LOCATIONS OF RAPID SHUTDOWN SWITCHES

**RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM**

NEC 690.56 (C)(3)
PLACE ON RAPID SHUTDOWN SWITCH OR EQUIPMENT WITH INTEGRATED RAPID SHUTDOWN *REFLECTIVE*

**PV SYSTEM DISCONNECT**

NEC 690.13 (B)
PLACE ON PV SYSTEM DISCONNECTING MEANS.

**PHOTOVOLTAIC SYSTEM AC DISCONNECT**

| | | |
|---|---|---|
| OPERATING VOLTAGE | 240 | VOLTS |
| OPERATING CURRENT | 46.4 | AMPS |

NEC 690.54
PLACE ON INTERCONNECTION DISCONNECTING MEANS

**⚠WARNING**
THIS EQUIPMENT FED BY MULTIPLE SOURCES. TOTAL RATING OF ALL OVERCURRENT DEVICES EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE SHALL NOT EXCEED AMPACITY OF BUSBAR.

NEC 705.12 (B)(2)(3)(c)
PLACE ON PV COMBINER PANEL.

SERVICE DISCONNECT LOCATED:
SOUTH SIDE OF HOUSE

PV DISCONNECT LOCATED:
SOUTH SIDE OF HOUSE

NEC 705.10
PLACE AT SERVICE EQUIPMENT AND PV SYSTEM DISCONNECTING MEANS. FIELD VERIFY EQUIPMENT LOCATIONS AND LABEL ACCORDINGLY.

## LABEL NOTES

1. LABELS SHOWN ARE HALF THEIR ACTUAL REQUIRED SIZE.
2. LABEL MATERIAL SHALL BE SUITABLE FOR THE EQUIPMENT ENVIRONMENT.
3. DC CONDUIT SHALL BE MARKED WITH REQUIRED LABEL EVERY 10 FEET.
4. LABELS WILL BE APPLIED IN ACCORDANCE WITH THE NEC. SOME LABELS MAY NOT BE NECESSARY.

## DC WIRING NOTES

1. CONDUCTORS SHALL BE COPPER, RATED AT NOT LESS THAN 600 VOLTS FOR RESIDENTIAL CONSTRUCTION AND NOT LESS THAN 1000 VOLTS FOR COMMERCIAL CONSTRUCTION.
2. MINIMUM SIZE SHALL BE #10 AWG UNLESS OTHERWISE NOTED ON THE DRAWINGS.
3. EXPOSED WIRING CONDUCTOR INSULATION SHALL BE TYPE PV WIRE, USE-2, OR RHW-2 WHERE THE OUTER LAYER OF THE INSULATION IS UV, SUNLIGHT, AND MOISTURE RESISTANT.
6. EXTERIOR WIRING CONDUCTOR INSULATION SHALL BE TYPE THWN-2 AND INSTALLED IN ELECTRICAL METALLIC TUBING(EMT) OR RIGID POLYVINYL CHLORIDE CONDUIT(PVC). ALTERNATIVELY, METAL CLAD CABLE(MC) CAN BE USED AS WELL WHEN RATED FOR USE IN WET LOCATIONS.
7. INTERIOR WIRING CONDUCTOR INSULATION SHALL BE TYPE THHN-2 AND INSTALLED IN ELECTRICAL METALLIC TUBING(EMT), FLEXIBLE METAL CONDUIT(FMC), OR METAL CLAD CABLE(MC).
6. USE SCHEDULE 40 PVC OUTDOORS WHERE NOT SUBJECT TO PHYSICAL DAMAGE OR BELOW FLOOR SLAB. USE SCHEDULE 80 PVC OUTDOORS WHERE SUBJECT TO PHYSICAL DAMMAGE
7. MINIMUM CONDUIT SIZE TO BE 1/2".
8. WIRING METHODS TO CONFORM TO ARTICLES 330, 334, 348, 350, 352, 356, AND 358 OF THE 2017 NEC.

## AC WIRING NOTES

1. CONDUCTORS SHALL BE COPPER RATED AT NOT LESS THAN 600 VOLTS.
2. MINIMUM SIZE SHALL BE #14 AWG UNLESS OTHERWISE NOTED ON THE DRAWINGS.
3. EXTERIOR WIRING CONDUCTOR INSULATION SHALL BE TYPE THWN AND INSTALLED IN ELECTRICAL METALLIC TUBING(EMT), RIGID POLYVINYL CHLORIDE CONDUIT(PVC), LIQUID-TIGHT FLEXIBLE METAL CONDUIT(LFMC), OR LIQUID-TIGHT FLEXIBLE NON-METALLIC CONDUIT(LFNC) . ALTERNATIVELY, METAL CLAD CABLE(MC) CAN BE USED AS WELL WHEN RATED FOR USE IN WET LOCATIONS.
4. INTERIOR WIRING CONDUCTOR INSULATION SHALL BE TYPE THHN AND INSTALLED IN ELECTRICAL METALLIC TUBING(EMT), FLEXIBLE METAL CONDUIT(FMC), METAL CLAD CABLE(MC), OR ROMEX.
5. USE SCHEDULE 40 PVC OUTDOORS WHERE NOT SUBJECT TO PHYSICAL DAMAGE OR BELOW FLOOR SLAB. USE SCHEDULE 80 PVC OUTDOORS WHERE SUBJECT TO PHYSICAL DAMMAGE
6. MINIMUM CONDUIT SIZE TO BE 1/2".
7. WIRING METHODS TO CONFORM TO ARTICLES 330, 334, 348, 350, 352, 356, AND 358 OF THE 2017 NEC.

## CONSTRUCTION NOTES

1. ALL WORK IS TO BE PERFORMED IN ACCORDANCE WITH THE NEC, STATE, AND LOCAL APPLICABLE CODES.
2. FOLLOW MANUFACTURER'S INSTALLATION INSTRUCTIONS, BEST PRACTICES, AND SPECIFICATIONS.
3. ENSURE REQUIRED MAINTENANCE ACCESS AND CLEARANCES ARE MAINTAINED.
4. WIRES SHALL BE RATED AND LABELED "SUNLIGHT RESISTANT" WHERE EXPOSED TO AMBIENT CONDITIONS.
5. FUSES 0 - 600 AMPS SHALL BE UL CLASS "RK-1" LOW PEAK DUAL ELEMENT TIME DELAY WITH 200,000 AMPERE INTERRUPTING RATING AS MANUFACTURED BY BUSSMANN, UNLESS NOTED OTHERWISE.
6. ALL TERMINALS/LUGS SHALL BE 75° RATED. ALL TERMINALS, SPLICING CONNECTORS, LUGS, ETC SHALL BE IDENTIFIED FOR USE WITH THE MATERIAL (CU/AL) OF THE CONDUCTOR AND SHALL BE PROPERLY INSTALLED.
7. PROVIDE A PULLWIRE IN ALL EMPTY CONDUITS.
8. ALL PENETRATIONS THROUGH EXTERIOR ROOFS SHALL BE FLASHED IN A WATERPROOF MANNER.
9. ALL PENETRATIONS THROUGH ATTIC FIRE BARRIERS SHALL BE SEALED WITH FIRE-BARRIER SEALANT CAULK.
10. SUPPORT ALL CONDUIT AND EQUIPMENT IN ACCORDANCE W/ NEC. ANY SUSPENDED MATERIALS SHALL BE DIRECTLY SUPPORTED BY THE BUILDING STRUCTURE.
11. METAL CONDUIT COUPLINGS CAN BE COMPRESSION TYPE, THREADED, OR BE SET-SCREW TYPE. PLASTIC CONDUIT COUPLINGS TO BE SOCKET GLUED TYPE.
12. A COMPLETE GROUNDING SYSTEM SHALL BE PRESENT OR PROVIDED AND INSTALLED IN ACCORDANCE WITH ARTICLE 250 OF THE NEC, AND AS SHOWN ON THE DRAWINGS.
13. EACH ELECTRICAL APPLIANCE SHALL BE PROVIDED WITH A NAMEPLATE GIVING THE IDENTIFYING NAME AND THE RATING IN VOLTS AND AMPERES, OR VOLTS AND WATTS. IF THE APPLIANCE IS TO BE USED ON A SPECIFIC FREQUENCY OR FREQUENCIES, IT SHALL BE SO MARKED. WHERE MOTOR OVERLOAD PROTECTION EXTERNAL TO THE APPLIANCES IS REQUIRED, THE APPLIANCE SHALL BE SO MARKED.
14. WHERE APPLICABLE, GROUNDING ELECTRODE CONDUCTOR TO BE CONTINUOUS. GROUNDING CRIMPS TO BE IRREVERSIBLE.
15. PHOTOVOLTAIC SYSTEMS SHALL BE PERMANENTLY MARKED AT VARIOUS EQUIPMENT LOCATIONS TO IDENTIFY THAT A PHOTOVOLTAIC SYSTEM IS INSTALLED AND THAT VARIOUS DANGERS ARE PRESENT.
16. EACH PHOTOVOLTAIC SYSTEM DISCONNECTING MEANS SHALL BE PERMANENTLY MARKED TO IDENTIFY IT AS A PHOTOVOLTAIC SYSTEM DISCONNECT.
17. WHERE ALL TERMINALS OF A DISCONNECTING MEANS MAY BE ENERGIZED IN THE OPEN POSITION, A WARNING SIGN SHALL BE MOUNTED ON OR ADJACENT TO THE DISCONNECT.
18. A PERMANENT LABEL FOR THE DIRECT-CURRENT PHOTOVOLTAIC POWER SOURCE SHALL BE PROVIDED AT THE DC DISCONNECT MEANS.
19. A PERMANENT PLAQUE OR DIRECTORY, DENOTING ALL ELECTRIC POWER SOURCES SERVING THE PREMISES, SHALL BE INSTALLED AT EACH SERVICE EQUIPMENT LOCATION AND AT LOCATIONS OF ALL POWER PRODUCTION SOURCES.
20. ALL MODULE GROUND CONNECTIONS SHALL BE MADE IN ACCORDANCE WITH NEC SECTION 690.4 (C)
21. A NORTH CAROLINA REGISTERED DESIGN PROFESSIONAL WILL BE REQUIRED TO SEAL THE STRUCTURAL DESIGN AT THE TIME OF PERMIT APPLICATION IF ANY OF THE FOLLOWING EXIST AND ARE ATTESTED TO BY THE APPLICANT:
    I. THE WEIGHT OF THE PV SYSTEM EXCEEDS THREE (3) POUNDS PER SQUARE FOOT(PSF)
    II. THE ROOF POSSESSES MORE THAN ONE (1) LAYER OF ASPHALT SHINGLES
    III. THE ROOFING MATERIAL CONSISTS OF A TYPE OTHER THAN ASPHALT SHINGLES OR METAL
    IV. THE ROOF IS LOCATED IN A 140 MPH OR GREATER WIND ZONE

NC SOLAR NOW

NORTH CAROLINA PROFESSIONAL SEAL 035699 ENGINEER ANDREW W. KING
12/14/22

## CLIENT INFO

KENNETH COGDELL JR
3304 ASHE AVE
DUNN,NC 28334

## PROJECT INFO

| | |
|---|---|
| DC INPUT: | 12.800 kW |
| AC EXPORT: | 11.168 kW |
| DOI INSPT. METHOD: | OPTION 2 |

## CODE REFERENCES

NATION ELECTRICAL CODE v. 2017
NC FIRE PROTECTION CODE v. 2018
NC BUILDING CODE v. 2018
NC RESIDENTIAL CODE v. 2018
ACSE v. 7-10

## SITE CONDITIONS

| | |
|---|---|
| WIND SPEED: | 119 MPH |
| RISK CATEGORY: | II |
| EXPOSURE: | B |
| SNOW: | 10 PSF |

## SHEET INDEX

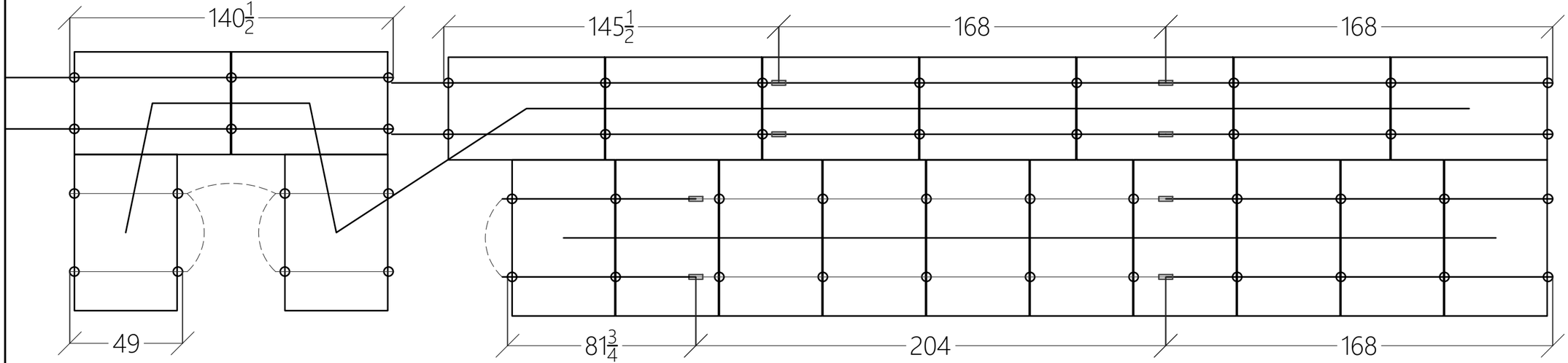


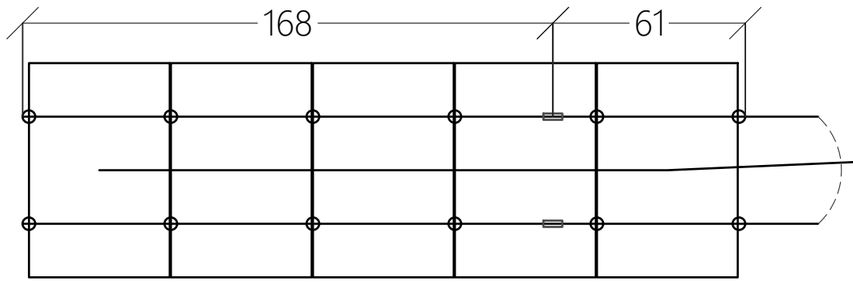
## DESIGNER INFO

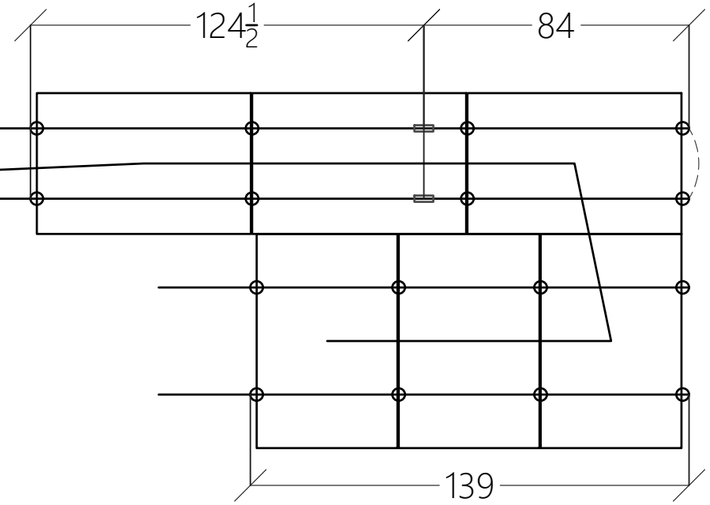
| | |
|---|---|
| DESIGNER | MCP |
| ENGINEER | AWK |
| DATE | 12/14/2022 |
| VERSION | P1 |

PV SYSTEM EQUIPMENT LABELS

# PV-4.1




1 ARRAY LAYOUT DETAIL
NOT TO SCALE

NC SOLAR NOW

NORTH CAROLINA PROFESSIONAL SEAL 035699 ENGINEER ANDREW W. KING
12/14/22

## CLIENT INFO

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## PROJECT INFO

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NC RESIDENTIAL CODE v. 2018
ACSE v. 7-10

## SITE CONDITIONS

| | |
|---|---|
| WIND SPEED: | 119 MPH |
| RISK CATEGORY: | II |
| EXPOSURE: | B |
| SNOW: | 10 PSF |

## SHEET INDEX



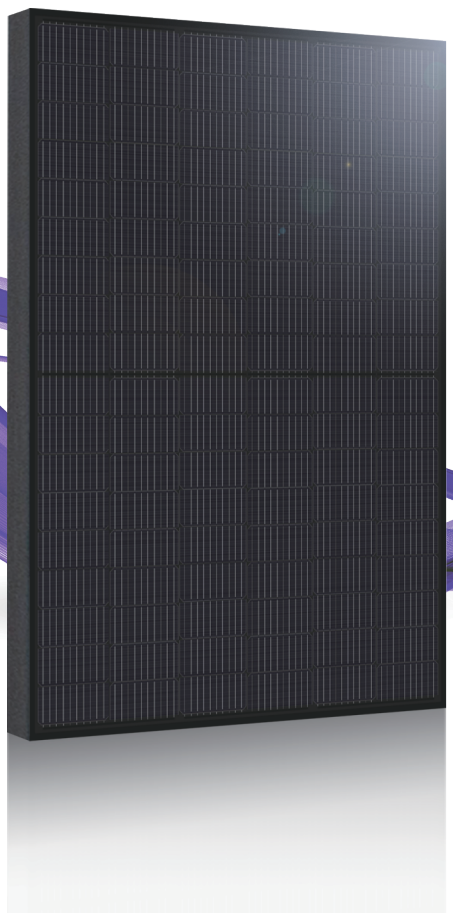
## DESIGNER INFO

| | |
|---|---|
| DESIGNER | MCP |
| ENGINEER | AWK |
| DATE | 12/14/2022 |
| VERSION | P1 |

PV SYSTEM INSTALL GUIDE

# PV-5.1

# UNITED RENEWABLE ENERGY



FBM_MFG-BB / 108 cells
390W - 405 W
Mono-Crystalline PV Module

URE modules use URE's state-of -the art cell cutting technology, and advanced module manufacturing experience.

## Key Features

+ Publicly Traded Taiwanese Company. Formed as the merger of four Cell and Module Manufacturers in 2018. All four founding companies (Neo Solar Power, Gintech, Solartech, NDF) were in existence since 2008 or earlier.

+ Over 400MW Of Projects Installed in the United States.

+ 25 Year Output Warranty and 25 Year Product Guarantee

+ Winner of Taiwan Excellence Award 7 Consecutive Years for Highest Efficiency Module.

+ Super All Black Design for High Profile Residential and Commercial Installations.

+ High Quality Solar Cell Technology allows URE to be major international exporter to Solar Module manufacturers in the United States and Europe.

# UNITED RENEWABLE ENERGY

## Electrical Data

| Model - STC | | FBM390MFG-BB | FBM395MFG-BB | FBM400MFG-BB | FBM405MFG-BB |
|---|---|---|---|---|---|
| Maximum Rating Power (Pmax) | [W] | 390 | 395 | 400 | 405 |
| Module Efficiency | [%] | 19.98 | 20.23 | 20.49 | 20.75 |
| Open Circuit Voltage (Voc) | [V] | 36.84 | 37.03 | 37.20 | 37.36 |
| Maximum Power Voltage | [V] | 30.82 | 31.00 | 31.17 | 31.36 |
| Short Circuit Current (Isc) | [A] | 13.50 | 13.59 | 13.68 | 13.78 |
| Maximum Power Current | [A] | 12.66 | 12.75 | 12.84 | 12.92 |

*Standard Test Condi on (STC): Cell Temperature 25 °C, Irradiance 1000 W/m², AM 1.5
*Values without tolerance are typical numbers.Measurement tolerance: ± 3%

## Mechanical Data

| Item | Specificatio |
|---|---|
| Dimensions | 1723 mm (L)[1] x 1133 mm (W)[1] x 35 mm (D)[2] / 67.83" (L)[1] x 44.61" (W)[1] x 1.38" (D)[2] |
| Weight | 21.7 kg / 47.84 lbs |
| Solar Cell | 12x9 pieces monocrystalline solar cells series strings |
| Front Glass | White toughened safety glass, 3.2mm thickness |
| Cell Encapsulatio | EVA (Ethylene-Viny-Acetate) |
| Frame | Black anodized aluminum profile |
| Junction ox | IP≥ 68, 3 diodes |
| Cable & Connector | Potrait : 500 mm (cable length can be customized), 1 x 4 mm² compatible with MC4 |
| Package Configuratio | 31 pcs Per Pallet, 806 pcs per 40' HQ container |

[1] : With assembly tolerance of ± 2 mm [ ± 0.08" ]
[2] : With assembly tolerance of ± 0.8 mm [ ± 0.03" ]

## Operating Conditions

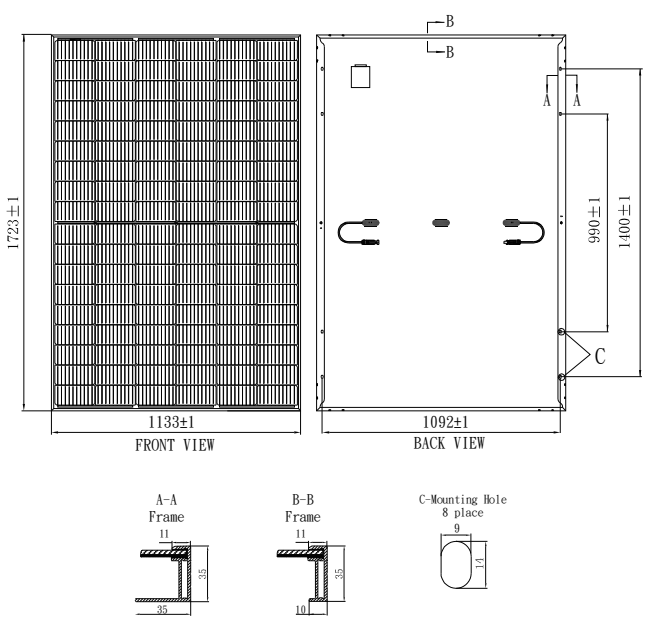
| Item | Specificatio |
|---|---|
| Mechanical Load | 5400 Pa |
| Maximum System Voltage | 1000V |
| Series Fuse Ratin | 30 A |
| Operating Temperature | -40 to 85 °C |

## Temperature Characteristics

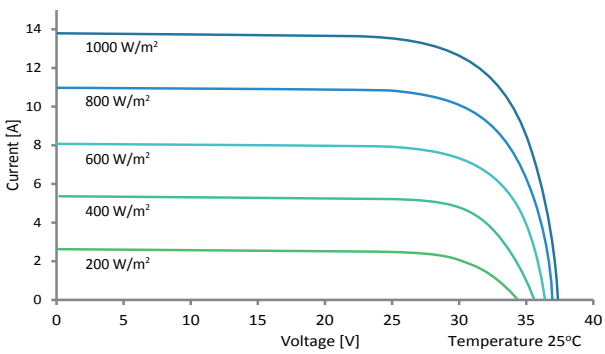
| Item | Specificatio |
|---|---|
| Nominal Module Operating Temperature | 45°C ± 2°C |
| Temperature Coefficient of Isc | 0.048 % / °C |
| Temperature Coefficient of Voc | -0.27 % / °C |
| Temperature Coefficient of Pmax | -0.32 % / °C |

*Nominal module operating emperature (NMOT): Air mass AM 1.5, irradiance 800W/m², temperature 20°C, windspeed 1 m/s.
*Reduc on in efficiency from 1000W/m² to 200W/m² at 25°C: 3.5 ± 2%.

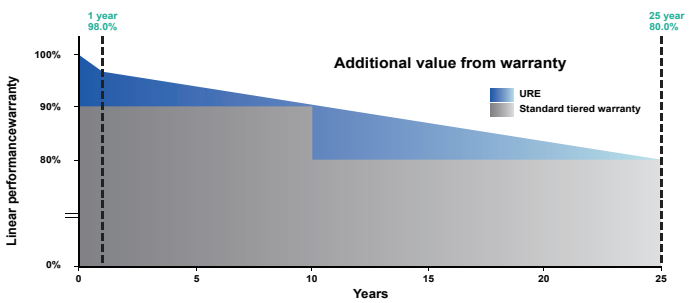
## Engineering Drawing (mm)




## Dependence on Irradiance




## Reliability with Warranty




For more information, please visit us at www.urecorp.com



UNITED RENEWABLE ENERGY

For more information, please visit us at ***www.urecorp.com***

# Enphase IQ 7A Microinverter

The high-powered smart grid-ready **Enphase IQ 7A Micro**™ dramatically simplifies the installation process while achieving the highest system efficiency for systems with 60-cell and 72-cell modules.

Part of the Enphase IQ System, the IQ 7A Micro integrates with the Enphase IQ Envoy™, Enphase IQ Battery™, and the Enphase Enlighten™ monitoring and analysis software.

The 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.


### High Power
- Peak output power 366 VA @ 240 VAC and 295 VA @ 208 VAC

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

### Efficient and Reliable
- Optimized for high powered 60-cell and 72-cell modules
- Highest CEC efficiency of 97%
- 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
- Envoy and Internet connection required
- Configurable for varying grid profiles
- Meets CA Rule 21 (UL 1741-SA)

UL CERTIFIED SAFETY

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

ENPHASE

# Enphase IQ 7A Microinverter

| INPUT (DC) | IQ7A-72-2-US | |
|---|---|---|
| Commonly used module pairings[1] | 295 W–460 W + | |
| Module compatibility | 60-cell, 66-cell, and 72-cell PV modules | |
| Maximum input DC voltage | 58 V | |
| Power point tracking voltage range[2] | 18 V–58 V | |
| Min/Max start voltage | 33 V / 58 V | |
| Max DC short circuit current (module Isc)[3] | 15 A | |
| Overvoltage class DC port | II | |
| DC port backfeed current | 0 A | |
| PV array configuration | 1 x 1 ungrounded array; No additional DC side protection required;<br>AC side protection requires max 20A per branch circuit | |
| **OUTPUT (AC)** | **@ 240 VAC** | **@ 208 VAC** |
| Peak output power | 366 VA | 295 VA |
| Maximum continuous output power | 349 VA | 290 VA |
| Nominal (L-L) voltage/range[4] | 240 V / 211–264 V | 208 V / 183–229 V |
| Maximum continuous output current | 1.45 A (240 VAC) | 1.39 A (208 VAC) |
| Nominal frequency | 60 Hz | |
| Extended frequency range | 47–68 Hz | |
| AC short circuit fault current over 3 cycles | 5.8 Arms | |
| Maximum units per 20 A (L-L) branch circuit[5] | 11 (240 VAC) | 11 (208 VAC) |
| Overvoltage class AC port | III | |
| AC port backfeed current | 18 mA | |
| Power factor setting | 1.0 | |
| Power factor (adjustable) | 0.85 leading ... 0.85 lagging | |
| **EFFICIENCY** | **@240 VAC** | **@208 VAC** |
| CEC weighted efficiency | 97.0 % | 96.5% |
| **MECHANICAL** | | |
| Ambient temperature range | -40°C to +60°C | |
| Relative humidity range | 4% to 100% (condensing) | |
| Connector type: DC (IQ7A-72-2-US) | MC4 | |
| Dimensions (HxWxD) | 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<br>Compatible with 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)<br>UL 62109-1, UL1741/IEEE1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01<br>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. CEC peak power tracking voltage range is 38 V to 43 V.
3. Maximum continuous input DC current is 10.2A.
4. 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.

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


2020-06-16

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QUICK **INSTALL** GUIDE (Model X-IQ-AM1-240-3)

ENPHASE.

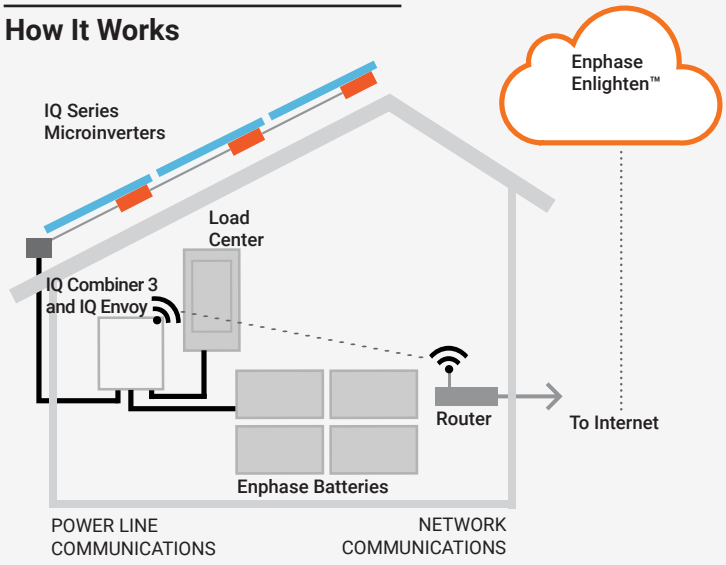
# Installing the **Enphase IQ Combiner 3**

The Enphase IQ Combiner 3™ combines up to four AC branch circuits of Enphase IQ Series Microinverters and/or Enphase IQ Batteries. To install the IQ Combiner 3, read and follow all warnings and instructions in this guide. Safety warnings are listed on the back of this guide. If you do not fully understand any of the concepts, terminology, or hazards outlined in these instructions, refer installation to a qualified electrician or installer. These instructions are not meant to be a complete explanation of a renewable energy system. All installations must comply with national and local electrical codes. Professional installation is recommended.

The IQ Combiner 3 is an outdoor-rated, NRTL-certified NEMA type 3R enclosure containing an Enphase IQ Envoy™, circuit breakers, and wiring for IQ Envoy connections. Use the IQ Combiner 3 for single-phase applications and to support the AC connections needed for an Enphase residential solar installation.

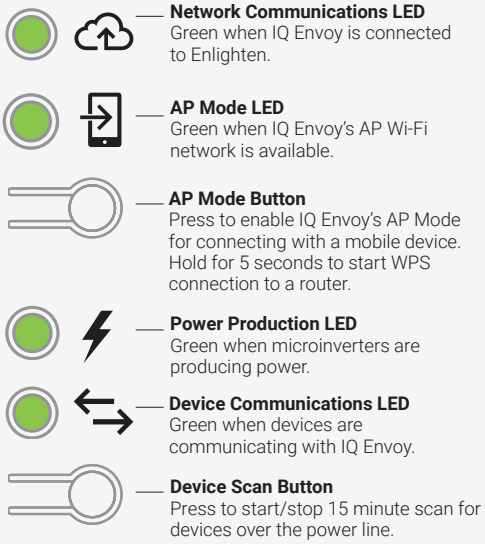
**IMPORTANT: Enphase IQ Series Microinverters require the Q Cable and are not compatible with previous Enphase cabling. The IQ Envoy inside the Combiner is required to monitor performance of the IQ Microinverters. The Q Accessories work only with Enphase IQ Series Microinverters.**

## How It Works




## IQ Envoy Display and Controls

Track system installation progress with the **Enphase Installer Toolkit** mobile app. The LEDs on the IQ Envoy PCB (printed circuit board) are solid green when a function is enabled or performing as expected, flashing when an operation is in progress, or solid amber when troubleshooting with Installer Toolkit is required. For a legend of all LED states, see *Troubleshooting* a.



**Network Communications LED**
Green when IQ Envoy is connected to Enlighten.

**AP Mode LED**
Green when IQ Envoy's AP Wi-Fi network is available.

**AP Mode Button**
Press to enable IQ Envoy's AP Mode for connecting with a mobile device. Hold for 5 seconds to start WPS connection to a router.

**Power Production LED**
Green when microinverters are producing power.

**Device Communications LED**
Green when devices are communicating with IQ Envoy.

**Device Scan Button**
Press to start/stop 15 minute scan for devices over the power line.


**Enphase Installer Toolkit mobile app**

## PREPARATION

A ) Download the Enphase Installer Toolkit mobile app and open it to log in to your Enlighten account. With this app, you can connect to the IQ Envoy to track system installation progress. To download, go to enphase.com/toolkit or scan the QR code at right.

B) Check the box for the following items:
- Enphase IQ Combiner 3 with IQ Envoy printed circuit board
- *Enphase IQ Combiner 3 Quick Install Guide* (this document)

C ) Make sure you have the following **required** items:
- Tools: screwdriver, pliers, and torque wrench.
- Up to four Eaton BR-style breakers (one for each DG branch circuit). You can install 10A, 15A, or 20A breaker(s) in the IQ Combiner 3 (order BRK-10A-2-240V, BRK-15A-2-240V, and/or BRK-20A-2P-240V).
- Overcurrent protection in the load center in accordance with NFPA 70, §705.12.
- Suitable mounting hardware: use #8 (or larger) screws that are long enough to secure the unit to the vertical mounting surface
- Copper conductors rated for wet locations and sized to meet local code requirements and voltage drop/rise considerations. Wire sizes and torque values are listed on the door of the unit.
- UL Listed rain-tight hubs for wire entry into the enclosure.

D ) If you plan to do consumption metering:
- Make sure you have two split-core consumption metering CTs (order CT-200-SPLIT).
- Check that there is enough space in the load center to install CTs. Do not install the CTs in a panel where they exceed 75% of the wiring space of any cross-sectional area within the load center.

E ) Decide how to connect the IQ Envoy to the Internet: Use Wi-Fi, an Enphase Mobile Connect modem, or Ethernet. Then, make sure you have the following optional items, if needed:
- Enphase Mobile Connect modem
- Ethernet over power line communication (PLC) bridge with Ethernet cables (order EPLC-01). If you choose this option, you will need to install an Enphase accessory receptacle (order XA-PLUG-120-3) inside the Combiner.
- Ethernet cable: 802.3, Cat5E or Cat6, unshielded twisted pair (UTP). Do not use shielded twisted pair (STP) cable. You must install a ferrite bead (we recommend Fair-Rite 0431167281) as close as possible to the IQ Envoy on the Ethernet cable.

F ) Create a paper installation map to record device serial numbers and positions in the array. You will scan this map later using Installer Toolkit and your mobile device.
- Write the IQ Envoy serial number on the paper installation map. Later, you will need to enter this number in Installer Toolkit. You can type it in manually or scan the label on the inside of the Combiner door.
- Always keep a copy of the installation map for your records.

H ) **Note that installation of the Combiner has two parts. To ensure successful device detection, complete Part 2 after installing any Enphase IQ Microinverters and/or Enphase AC Battery(ies).**

**Note:** If needed, you can find an installation map at the back of any Enphase Microinverter Quick Install Guide.

## INSTALLATION — Part 1

**It is a best practice to complete Installation Part 1 before installing Enphase Microinverters and/or Batteries.**

### 1 Choose a location for the IQ Combiner 3

A ) Install the IQ Combiner 3 in a readily accessible location, at least three feet (91 cm) off the ground if outdoors. Install it at least 12 inches (30.5 cm) off the ground if installed indoors.

B ) Consider the dimensions of the IQ Combiner 3, easy access, box height, and length of cable when selecting the location. The IQ Combiner 3 is rainproof but not watertight.

C ) Mount the IQ Combiner 3 on a vertical surface.

**NOTE**: You must mount the Combiner within 15 degrees of vertical.

### 2 Install Circuit Breaker(s)

The combiner includes one two-pole 10A circuit breaker that feeds the IQ Envoy and the AC outlet (if present). You can install additional breakers, if needed. You must follow all NEC and local electrical codes.

A ) Open the enclosure door. Pinch the top of the hinge rod using a pair of needle-nosed pliers. Slide the door up and away to remove it. Set the door aside for later reattachment.

**NOTE**: Risk of equipment damage. Do not remove the pre-installed heat shield attached to the enclosure door.

B ) Remove the plastic deadfront. It is not necessary to completely remove the screws.

**Warning! Risk of electric shock. To maintain the warranty, do not modify the dead-front other than to remove or replace filler plates, as needed.**

C ) Remove a filler plate on the deadfront for each breaker position you will use. To remove the filler plate, press the single latch inward while gently pushing the filler plate out.

D ) Snap the breaker onto the busbar, using only the breaker positions indicated in the diagram on the door of the unit.

### 3 Drill Holes to Accept Conduit

**Warning! Risk of equipment damage. Do not drill conduit holes on the top of the box or at any location that allows moisture ingress.**

A ) The bottom and sides of the Combiner 3 are the best locations to drill holes for conduit fittings. Rear conduit entry below the busbar assembly is also supported.

**Note:** When drilling, consider the internal parts of the combiner. Make sure that the holes do not interfere with the internal workings, mechanics, or the deadfront legs in the corners of the Combiner.

**Best Practice:** Use a stepped drill bit for making the conduit holes. Using a hole saw may crack the plastic housing. As an alternative, use a sharp chassis punch with caution.

B ) Use a snap punch or other type of center punch to prevent the drill from wandering. Drill a pilot hole with a smaller drill before using a step drill bit.

C ) Use only UL-listed rain-tight hubs for wire entry into the enclosure.

**Warning! Risk of equipment damage. Observe bend radius requirements when routing wires.**

### 4 Wire the Output Connections

Refer to the diagram on the door of the IQ Combiner 3 and do the following:

A ) Use conductors sized per local code requirements taking into consideration the voltage drop/rise and upstream breaker or fuse.

B ) The two terminals below the circuit breaker(s) are the output connections. Install L1 into the left terminal and L2 into the right terminal.

C ) Connect the neutral (white) to the neutral busbar.

**Note:** Enphase IQ Series Microinverters use a two-wire system and do not use a Neutral. However, the IQ Envoy in the combiner still requires a Neutral from the load center.

D ) Connect the ground (green or green/yellow) to the Ground busbar.

E ) Torque all connections as indicated by the table below.

### 5 Wire Inputs from the AC Branch Circuits

You can install AC branch circuit breakers up to 80 A total (sum of handle ratings, excluding the 10 A breaker). With individual branch circuits, you will typically use up to four 20 A breakers. Refer to the diagram on the door of the IQ Combiner 3 and do the following:

A ) Use copper conductors sized to meet local code requirements and voltage drop/rise considerations.

B ) Bring in the wires from each AC branch circuit.

C ) Connect the ground (green or green/yellow) to the ground busbar.

D ) Pass the L1 conductors from each PV branch circuit through the production CT in the same direction as the arrow on the side of the CT.

E ) If you use the fourth (Battery/PV) breaker position for PV, you must route the L1 conductor through the production CT.

**Note:** Do not pass conductors from AC Battery branch circuits through the production CT. This will distort production readings.

F ) Connect L1 and L2 (usually one black and one red) from each AC branch circuit (PV and/or battery) to the circuit breaker(s). Observe the L1 and L2 polarity marking at each breaker position.

G ) Torque all connections as indicated by the following table.

| CONNECTION | WIRE SIZES | TORQUE |
|---|---|---|
| Eaton BR series DG breaker(s) | 14-10 AWG<br>8 AWG<br>6-4 AWG | 2.2 Nm (20 in-lb)<br>2.8 Nm (25 in-lb)<br>3.0 Nm (27 in-lb) |
| 60 A circuit breaker only | 4-1/0 AWG | 5.0 Nm (45 in-lb) |
| Neutral and ground<br>Large screw<br>Small screw | <br>14-1/0 AWG<br>14 - 6 AWG | <br>5.0 Nm (45 in-lb)<br>2.2 Nm (20 in-lb) |
| Main lug | 10-4 AWG<br>3-2/0 AWG | 5.0 Nm (45 in-lb)<br>5.6 Nm (50 in-lb) |
| Copper conductors only, rated minimum 75°C. Follow NFPA 70 (NEC) or CSA C22.1 part 1 and all local codes. | | |
| For DG breakers larger than 20 A, use wire insulated for 90°C based on 75°C ampacities. | | |

## 6 Install CTs for Consumption Metering (optional)

The IQ Envoy printed circuit board inside the IQ Combiner 3 is pre-wired at the terminal blocks for power and production metering connections. One solid-core current transformer (CT) is provided for revenue grade production metering. You can install two optional split-core CTs to provide consumption metering. To do this, you must create a protected route using conduit for the CT wires from the main load center to the IQ Envoy. If you need to extend the wires, refer to the *Enphase IQ Envoy Installation and Operation Manual* at: enphase.com/support.

**Note:** Because of variance in load center design and main power feed, there may not always be enough space to install consumption metering CTs.

A ) Make sure that the main load center wires are de-energized until you have secured the CT wires in the terminal blocks.

B ) Before running the CT wires through the conduit, use colored tape to mark one of the CTs and the free end of its wires.

C ) For the marked CT wires, connect the white and blue wires to the white and blue "C1" terminals.

D ) For the unmarked CT wires, connect the white and blue wires to the white and blue "C2" terminals.

E ) Tighten all connections to 5 in-lbs.

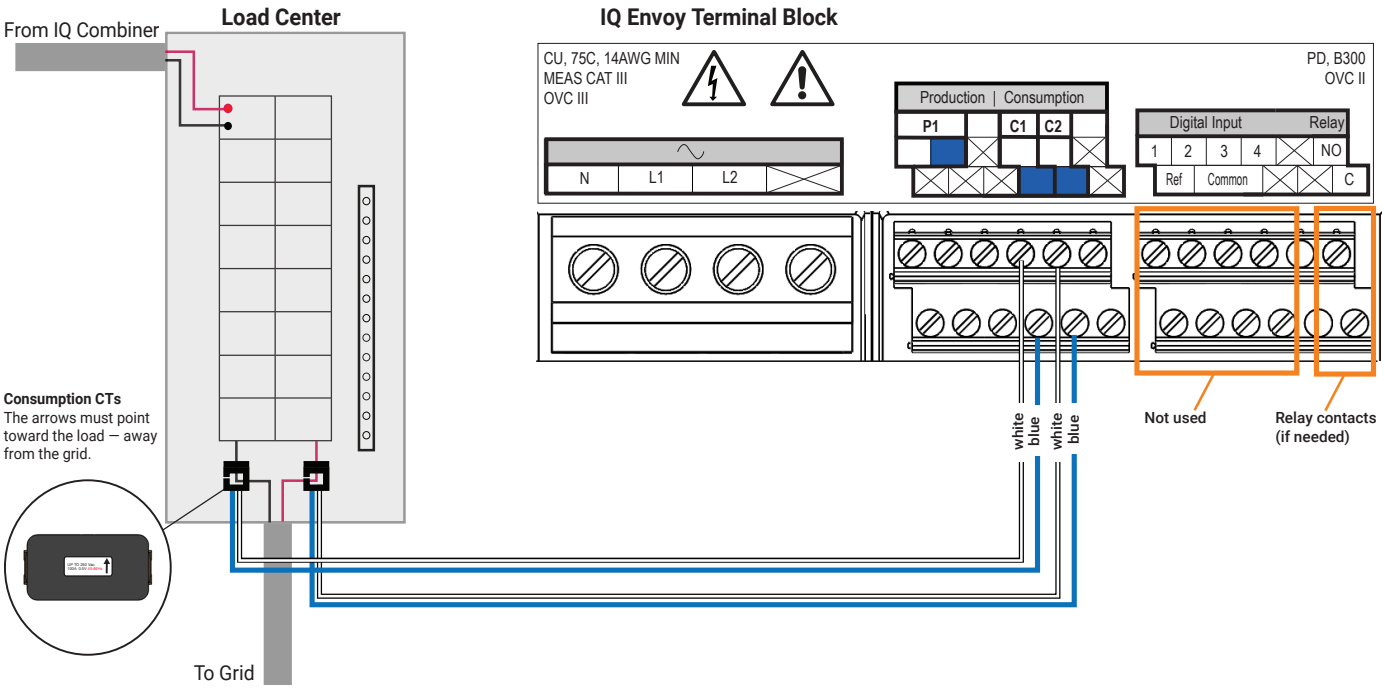
F ) Clamp the marked CT on the load center feed wire Line 1 (matching the Envoy's "L1" voltage terminal) **with the CT arrow pointing toward the load (away from the grid)**.

G ) Clamp the unmarked CT on the load center feed wire Line 2 (matching the Envoy's "L2" voltage terminal) **with the CT arrow pointing toward the load (away from the grid).**

**DANGER!** Risk of electric shock. Always de-energize the load center before beginning wiring.

**DANGER!** Risk of electrocution! Do not install CTs when current is flowing in the sensed circuit. Always install CT wires in the terminal blocks before energizing the sensed circuit.

**Notes:** It is important to match CT and sense voltage phases. To properly measure power and energy, CT inputs must align with the respective voltage inputs. Be sure to consistently identify and match the two AC lines at two points: the main load center feed and the Envoy. Wire colors (typically black and red) may not always consistently identify Lines 1 and 2. If in doubt, use a multimeter to check.




## 7 Energize and Update the IQ Envoy

A ) Re-install the plastic deadfront. Start all of the screws, but do not completely tighten them.

B ) Once all screws are partially tightened, go back and tighten each one completely.

C ) Turn off the DG breaker(s).

D ) Reinstall the IQ Combiner 3 door.

E ) Turn on the circuit feeding the combiner.

F ) On the IQ Envoy (inside the Combiner), if the AP Mode LED is not lit, press the AP Mode button.

G ) On your mobile device, go to Settings and join the Wi-Fi network "Envoy_nnnnnn" (where "nnnnnn" equals the final six digits of the Envoy serial number).

H ) The app informs you if the software on the Envoy is not the latest version by displaying the Envoy Software Update message. If the app displays this message, follow the on-screen instructions to update the Envoy.

I ) For a short period (5-10 minutes), you must keep your mobile device near the Combiner. Follow the on-screen instructions while the update takes place.

The update may take up to 20 minutes. The Envoy reboots several times during the update and the LEDs light up in varied sequences until the update is complete.

Once the update is finished and the PV system is installed, the Envoy is ready for Installation Part 2.

All four LEDs flash amber during boot up (approximately 3 minutes). When boot up is complete, the Device Communications LED ⇆ lights solid amber, indicating that devices are not yet detected.

# INSTALLATION — Part 2

**You must complete Installation Part 2 after installing any Enphase IQ Microinverters and/or Enphase Battery(ies).**

## 8 Detect Devices

A ) Turn on the DG breaker(s).

B ) Use one of the following methods to detect devices (Enphase IQ Microinverters and/or Enphase Batteries):

**Method A // Provision devices with Installer Toolkit**

Use the Installer Toolkit mobile app to configure the IQ Envoy with the serial numbers of the installed devices.

A ) Launch the Installer Toolkit app and tap **View Systems.**

B ) Select the system you are working with, or tap **[+]** to add a system.

C ) Connect to the IQ Envoy with your mobile device (smart phone or tablet). The AP Mode LED lights solid green when the network is available.
- On the Envoy, if the AP Mode LED is not lit, press the **AP Mode** button.
- On your mobile device, go to Settings and join the Wi-Fi network "Envoy_nnnnnn" (where "nnnnnn" equals the final six digits of the IQ Envoy serial number).

D ) If the serial number for the Envoy you are installing is not displayed on the System Overview screen, tap the **[+]** next to the word "Envoys". When the app displays the serial number of the Envoy, tap it to add it to the system.

E ) Following the on-screen instructions to create the arrays and scan the serial numbers from the installation map.

F ) Tap the **Connect** button. This provisions the scanned devices on the Envoy.

G ) When prompted, confirm the number of devices that you installed.

H ) If your system is in Hawaii or in a region that does not use the **Factory-Installed Grid Profile**, select and apply a grid profile to the devices.

The Device Communications LED lights solid green if all provisioned devices are communicating or solid amber if any devices are not communicating.

**Method B // Discover devices with Installer Toolkit**

Use the Installer Toolkit mobile app to set the number of devices the IQ Envoy should search for on the power line.

A ) Connect to the IQ Envoy with your mobile device (smart phone or tablet). The AP Mode LED lights solid green when the network is available.
- On the Envoy, if the AP Mode LED is not lit, press the AP Mode button.
- On your mobile device, go to Settings and join the Wi-Fi network "Envoy_nnnnnn" (where "nnnnnn" equals the final six digits of the IQ Envoy serial number).

B ) Launch Installer Toolkit and tap **Connect to an Envoy.**

C ) When prompted, enter the number of devices that you installed.

D ) If your system is in Hawaii or in region that does not use the **Factory-Installed Grid Profile**, select and apply a grid profile to the devices.

E ) When prompted to start a device scan, tap **OK**.

The Device Communications LED flashes green while scanning, solid green when all the devices you installed are communicating, or solid amber if any devices are not communicating.

**With both methods**

If the Device Communications LED remains solid amber, see *Troubleshooting* b.

## 9 Verify System Configuration

While still connected to the IQ Envoy with Installer Toolkit, check the Overview screen for the following:

A ) Confirm that the expected number of devices are detected and communicating.

B ) Check that the new profile is set on all the devices. Setting the profile may take up to 5 minutes for a typical system.

C ) Tap the **Meters** button.

D ) Tap **Production Meter** and follow the on-screen instructions to enable the Production Meter.

E ) If you installed consumption metering CT(s), tap **Consumption Meter** and follow the on-screen instructions to enable the Consumption Meter.

F ) Return to the **Overview** screen and verify the meter reading(s).

If you used Installer Toolkit to detect devices, the Power Production LED lights solid green when all ***expected*** microinverters are producing power. If you did not use Installer Toolkit, it lights solid green if all ***communicating*** microinverters are producing power. It flashes green when devices are upgrading. Check Installer Toolkit for production status details. If the Power Production LED remains solid amber, see *Troubleshooting* c.

## 10 Connect to Enlighten

This step describes using the IQ Envoy integrated Wi-Fi or the Mobile Connect modem to connect to the Internet. For information about using Ethernet and/or PLC bridges, refer to the *Enphase IQ Envoy Installation and Operation Manual* at: enphase.com/support.

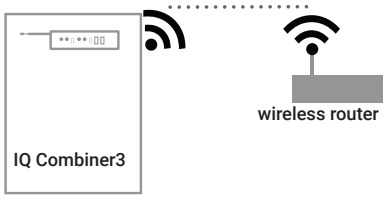
**Method A // Integrated Wi-Fi**

Requires a wireless router with an Internet connection.

A ) On the Envoy, verify that no Ethernet cable is plugged into the RJ45 port.

B ) If the router supports WPS, press and hold the WPS button on the wireless router for a few seconds. On most routers, a WPS indicator begins flashing.

C ) If you are using the Installer Toolkit mobile app, tap the **Network** button, tap **Wi-Fi,** and then tap your network from the list of available networks. If the wireless router does not support WPS, you may be prompted to enter a password.




The Network Communications LED begins ***flashing*** green. Within three minutes the same LED lights ***solid*** green, indicating a successful connection to Enlighten. If the Network Communications LED remains off or lights solid amber, see Troubleshooting d.

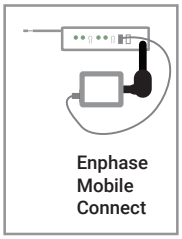
**Method B // Enphase Mobile Connect Modem**
(Order CELLMODEM-01 or CELLMODEM-03 separately)

A ) Connect the antenna(s) to the modem, and mount the modem as described in the *Enphase Mobile Connect Installation Guide*.

B ) First, connect the USB cable to the IQ Envoy and then connect the mini-USB connector to the modem.

If receiving power from the IQ Envoy, the modem power LED lights.

Within three minutes the Network Communications LED lights solid green, indicating a successful connection to Enlighten. If the Network Communications LED remains off or lights solid amber, see Troubleshooting in the *Enphase Mobile Connect Installation Guide*.




IQ Combiner 3

## 11 Send System Summary Report

When you have completed your system setup, you can generate and email a summary report.

A ) From Installer Toolkit, tap **Done** in the upper-right corner of the screen to disconnect from the Envoy. Installer Toolkit will ask if you want to view a summary report.

B ) Tap **View Report.** The report displays IQ Envoy and system information with a list of device serial numbers, their last power reports, and information about the grid profile applied to the microinverters.

C ) Tap to email the report to your office as a record of successful system installation or to the utility for evidence of grid profile settings.

## 12 Activate Monitoring

Register the IQ Envoy in Enlighten (enlighten.enphaseenergy.com).

**Method A // If the IQ Envoy is associated with a system in Installer Toolkit**

A ) On your mobile device, go to Settings and disconnect from the Envoy's AP Wi-Fi network.

B ) Return to the Installer Toolkit app and tap the **Sync** button on the System Overview screen.

C ) When you have access to a computer, log in to Enlighten and select the system name from the Activation List on the dashboard.

D ) From the activation form, open Array Builder.

If you used Installer Toolkit to build arrays and scan device serial numbers, the array(s) are built. Make any necessary adjustments in Array Builder.

If you did NOT use Installer Toolkit to build arrays and scan device serial numbers, create the virtual array in Array Builder using the installation map as your reference.

**Method B // If the IQ Envoy is NOT associated with a system in Installer Toolkit**

A ) Log into Enlighten and click **Add a New System** from the dashboard.

B ) Enter the System, Installer, Owner, and Location information.

C ) Enter the IQ Envoy serial number.

D ) Click **Save** to submit the form.

E ) After the devices have reported to Enlighten, open Array Builder from the activation form, and create the virtual array, using the installation map as your reference.

# TROUBLESHOOTING

Contact Enphase Customer Support (enphase.com/en-us/support/contact) if you have any questions about troubleshooting your system.

## a LED overview

| LED | State | Description |
|---|---|---|
| All | Flashing amber in unison | The IQ Envoy is booting up |
| | Flashing green sequentially | Software upgrade in progress |
| Network communications | Solid green | Communicating with Enlighten |
| | Flashing green | WPS connection in progress, or<br>IQ Envoy is attempting to connect to Enlighten |
| | Solid amber | Local network connection only |
| | Off | No network connection |
| AP mode | Solid green | AP mode enabled:<br>IQ Envoy Wi-Fi network available |
| | Off | AP mode disabled:<br>IQ Envoy Wi-Fi network unavailable |
| Power production | Solid green | All communicating microinverters are producing |
| | Flashing green | Microinverter upgrade in progress |
| | Solid Amber | At least one microinverter is not producing |
| | Off | Microinverters are not communicating<br>(low light or night time) |
| Device communications | Solid Green | All devices are communicating |
| | Flashing Green | Device scan in progress |
| | Solid Amber | At least one device is not communicating |
| | Off | Devices are not communicating<br>(low light or night time) |

## b Device detection issues

If the Device Communications LED ⇆ lights solid amber, it may be a result of low light levels. If there isn't enough sunlight to power up the microinverters, they can't communicate with the Envoy.

If there is sufficient daylight for the microinverters to power up, the issue may be that the Envoy is having difficulty communicating over the power lines. To troubleshoot this issue:

- Check the Installer Toolkit mobile app to see which devices are not communicating.
- Check that the circuit breaker(s) in the IQ Combiner 3 for the PV array are in the "ON" position.
- Verify that the PV modules are connected to the microinverters.
- Verify the PV module DC voltage is within the allowable range for the microinverter.

## c Power production issues

If the Power Production LED ⚡ lights solid amber, check the Installer Toolkit mobile app to see which microinverters are not producing:

- If none of the microinverters are producing power, there may be a grid or wiring issue. First, verify that there is proper input voltage and frequency from the utility. Next, check the breaker and wiring, starting at the load center.
- If all of the non-productive microinverters are on the same branch, check the breaker and wiring starting at the junction box for the affected branch.
- If only one or scattered microinverters are not producing power, first check to see that the AC connectors are fully seated. Next, check that each module is providing the required startup voltage for the microinverter (22V). A PV module that is failing or that is undersized may not generate enough power for AC conversion.

## d Internet connection issues

If you are using Wi-Fi and the Network Communications LED ☁ remains off or solid amber:

- The WPS connection window may have timed out. Retry the connection steps.
- Make sure that the broadband router is connected and operational by checking that other devices at the site can access the network.
- Be aware that metal enclosures or obstructions impede wireless communication.
- If you don't see your router/access point in the list on the Envoy, or cannot maintain a connection, you may need to add a wireless repeater to extend the network range.

You can troubleshoot network issues with the Installer Toolkit mobile app by tapping the **Network** button, then **Diagnostic Tools**.

If you are using the Enphase Mobile Connect modem and the Network Communications LED remains off or lights solid amber, see Troubleshooting in the *Enphase Mobile Connect Installation Guide*.

If you replace your router, configure the IQ Envoy Wi-Fi settings for the new Wireless Network Name (SSID) and password, or use the WPS function described in Installation Step 10.

## e Loss of AC to a single branch of microinverters

If a single branch of microinverters is not producing, it may indicate loss of AC to the branch.

- Use a multi-meter set to AC to test the breaker lugs. The result should be around 240 VAC.
- If not, switch the breaker off and on to reset.

## f Inoperable IQ Envoy (all LEDs off)

If the IQ Envoy is not receiving power, all LEDs will be off.

- Use a multimeter set to AC to test line 1 on the Envoy breaker to the AC neutral busbar. The result should be around 120 VAC.

## g Inoperable IQ Envoy and no AC to branch

If a branch of microinverters is not producing and the IQ Envoy LEDs are off:

- Test at the main lugs for L-L and L-N voltages. The results should be around 240 VAC and 120 VAC respectively. If not, there may be a problem with the wiring from the panel.

# SAFETY

**IMPORTANT SAFETY INSTRUCTIONS**
**SAVE THESE INSTRUCTIONS**

Follow these important instructions during installation and maintenance of the IQ Combiner 3.

## Safety and Advisory Symbols

| | |
|---|---|
| ⚠ | **DANGER**: This indicates a hazardous situation, which if not avoided, will result in death or serious injury. |
| ⚠ | **WARNING**: This indicates a situation where failure to follow instructions may be a safety hazard or cause equipment malfunction. Use extreme caution and follow instructions carefully. |
| ✓ | **NOTE**: This indicates information particularly important for optimal system operation. Follow instructions carefully. |

**FCC Statement**: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications not expressly approved by the party responsible for compliance may void the user's authority to operate the equipment.

This Class B digital apparatus complies with Industry Canada ICES-003.

## Safety Instructions

| | |
|---|---|
| ⚠ | **DANGER**: Risk of electric shock. Risk of fire. Do not attempt to repair the IQ Envoy; it contains no user-serviceable parts. Tampering with the IQ Envoy will void the warranty. If the IQ Envoy fails, contact Enphase Customer Support for assistance (enphase.com/en-us/support/contact). |
| ⚠ | **DANGER:** Risk of electrocution! Do not install CTs when current flowing in the sensed circuit. Always install CT wires in the terminal blocks before energizing the sensed circuit. |
| ⚠ | **DANGER**: Risk of electric shock. Do not use Enphase equipment in a manner not specified by the manufacturer. Doing so may cause death or injury to persons, or damage to equipment. |
| ⚠ | **DANGER**: Risk of electric shock. Be aware that installation of this equipment includes risk of electric shock. Do not install the IQ Combiner 3 without first removing AC power from the Enphase System. Ensure the power coming from the microinverters is de-energized before servicing or installing. |
| ⚠ | **DANGER**: Risk of electric shock. Risk of fire. Only qualified personnel should troubleshoot, install, or replace the IQ Combiner 3. |
| ⚠ | **DANGER**: Risk of electric shock. Improper servicing of the IQ Combiner 3 or its components may result in a risk of shock, fire or explosion. To reduce these risks, disconnect all wiring before attempting any maintenance or cleaning. |
| ⚠ | **DANGER**: Risk of electric shock. Always de-energize the AC branch circuit before servicing. While connectors are rated for disconnect under load, it is a best practice to de-energize before disconnecting. |
| ⚠ | **DANGER**: Risk of electric shock. Risk of fire. Only use electrical system components approved for wet locations. |
| ⚠ | **DANGER**: Risk of electric shock. Risk of fire. Ensure that all wiring is correct and that none of the wires are pinched or damaged. |
| ⚠ | **DANGER**: Risk of electric shock. Risk of fire. Do not work alone. Someone should be in the range of your voice or close enough to come to your aid when you work with or near electrical equipment. Remove rings, bracelets, necklaces, watches etc. when working with batteries, photovoltaic modules or other electrical equipment. |
| ⚠ | **DANGER**: Risk of electric shock. Risk of fire. Before making any connections verify that the circuit breaker(s) are in the off position. Double check all wiring before applying power. |
| ⚠ | **DANGER**: Risk of electric shock. Risk of fire. Do not wire unused terminals or terminal blocks on the IQ Envoy. |
| ⚠ | **WARNING:** Risk of electric shock. To maintain the warranty, do not modify the dead-front other than to remove filler plates, as needed. |
| ⚠ | **WARNING**: Before installing or using the IQ Combiner 3, read all instructions and cautionary markings in the technical description and on the equipment. |
| ⚠ | **WARNING**: Use the circuit breakers in the Enphase IQ Combiner 3 only for serving Enphase equipment. No other loads are allowed. |
| ⚠ | **WARNING**: This unit is not provided with a GFDI device. This inverter or charge controller must be used with an external GFDI device as required by the Article 690 of the National Electrical Code for the installation location. |
| ⚠ | **WARNING**: The IQ Combiner 3 has a pre-installed heat shield attached to the enclosure door. Do not remove the heat shield. |
| ⚠ | **WARNING**: This product is intended for operation in an environment having a maximum ambient temperature of 46ºC (115ºF). |
| ⚠ | **WARNING**: BONDING BETWEEN CONDUIT CONNECTIONS IS NOT AUTOMATIC AND MUST BE PROVIDED AS PART OF THE INSTALLATION. |
| ✓ | **NOTE**: Perform all wiring in accordance with all applicable local electrical codes, with the Canadian Electrical Code, Part I, and with the National Electrical Code (NEC), ANSI/NFPA 70. |
| ✓ | **NOTE**: Protection against lightning and resulting voltage surge must be in accordance with local standards. |
| ✓ | **NOTE**: Using unapproved attachments or accessories could result in damage or injury. |
| ✓ | **NOTE**: Install the IQ Combiner 3 in the field with 75°C or higher copper conductors sized per local code requirements and voltage drop/rise considerations. |
| ✓ | **NOTE**: Use Class 1 wiring methods for field wiring connections to terminals of a Class 2 circuit. Use 14 to 6 AWG wire for branch circuits and 14 to 3 AWG for output circuits. Select the wire gauge used based on the protection provided by the circuit breaker(s)/fuses. Overcurrent protection must be installed as part of the system installation. |
| ✓ | **NOTE**: To ensure optimal reliability and to meet warranty requirements, the Enphase IQ Combiner 3 must be installed according to the instructions in this manual. |

**RSTC Enterprises Inc**
**2214 Heimstead Road**
**Eau Claire, WI 54703**
**715-830-9997**

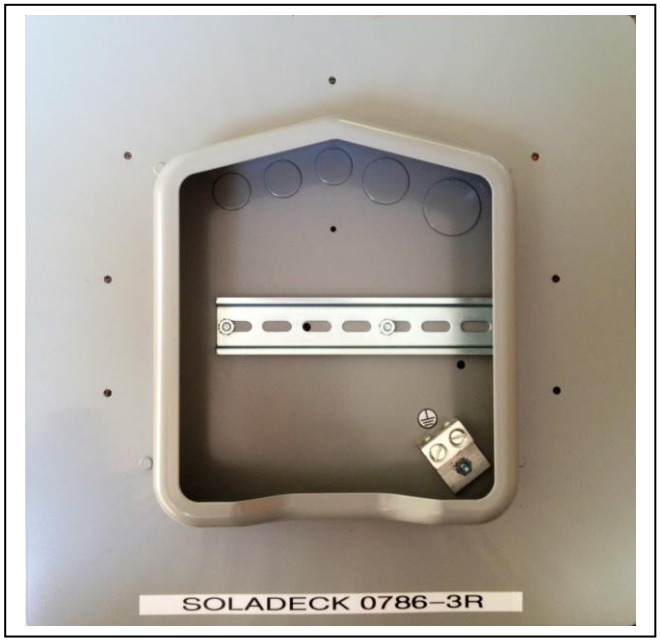
# Outdoor Pass Thru enclosure:

**Model - 0786-3R**

**Asphalt/Cedar roof systems**

**ETL Listed and labeled**
**Report # 3125796 CRT-001b Revised March 2012**

- **UL50 Type 3R, 11 Edition Electrical**
- **equipment enclosures**
- **CSA C22.2 # 94-M91 special purpose**
- **enclosures (2006)**




## Basic specifications

**Material - 18 Gauge Galvanized 90 Steel Base/Cover**
**Process - Seamless draw (stamped)**
**Flashing - 15" x 15"**
**Height - 2.625"**
**Cavity - 8" x 9" x 2.5" (162 Cubic inches)**
**Finish - Powder coat (1100 hours salt spray)**

**Assembly:**

- **Cavity Base and cover hole punched for matched assembly**
- **Base flashing pre-punched for roof deck mounting**
- **Cavity Base - 5 predetermined dimples for fittings or conduit**

**Base Plate Attachment:**

- **16 gauge galvanized steel**
- **Fastened to base flashing with toggle fastening system**
- **Finish – Powder coat (1100 hours salt spray)**
- **5 roof deck knockouts**
- **Knockout sizes – (3) .5", (1) .75" , and (1) 1"**
- **Rail 7" slotted 35mm**

**Ground – Installed with steel stud and star nut**
**Dual position Wire size - 2/0-14**
**Located with ground sticker**

**Strain Relief Clip – Aluminum riveted installation**

**Hardware Installation Pack:**
**7 - 1" Truss head screws**
**4 - .5" 8-32 thread cutting screws**
**4 - Bonded seal washers #10**
**2 – 10-32 ½" Steel studs**
**2 – 10-32 3/8" steel star nuts**
**1 – Foam gasket seal**
**1 – Installation instructions**


**With 2 string DC pass thru kit**
**Kit Part # 01602**
***** Kit sold separately**

# Installation Manual

# For SolaDeck Models 0783-41 and 0786-41

Table of Contents:



First Edition - February 2009

RSTC Enterprises Inc
2219 Heimstead Road
Eau Claire, Wi 54703
866-367-7782

Warranty Information:

Thank you for your purchase. As with all manufactured devices repairs may be needed due to damage, unauthorized use, or defect.

- Warranty repairs must conform to warranty terms.
- Equipment must be installed according to the instructions and manuals provided.
- Products returned, must be Packaged, properly addressed and shipped prepaid.
- There is no additional allowance or reimbursement for installer or user labor or travel time required to disconnect, service or reinstall the damaged component(s).
- RSTC will ship a replacement product prepaid to addresses in the continental United States.
- In the event of a product malfunction, RSTC will not bear any responsibility for resulting losses, expenses, or damage to other components.

*DO NOT PROCEED WITH INSTALLATION UNTIL YOU HAVE READ ENTIRE INSTRUCTIONS INCLUDING WARNINGS*

# WARNING! *STOP*

**DO NOT WORK ON ROOF IF SURFACE IS WET, FROSTED, ICE OR SNOW COVERED.**
**USE LADDERS SAFELY**
**USE HAND & EYE PROTECTION WHEN WORKING WITH POWER TOOLS**
**USE EXTREME CAUTION TO AVOID CONTACT WITH POWER LINES. CONTACT WITH POWER LINES, ELECTRIC LIGHTS OR POWER CIRCUITS MAY BE FATAL**

Installation of this product should be attempted only by individuals skilled in the use of the tools and equipment necessary for installation. Protect you and all persons and property during installation. If you have any doubt concerning your competence or expertise, consult a qualified expert to perform the installation. R.S.T.C. Enterprises Incorporated assumes no responsibility for the failure of an architect, contractor, installer, or building owner to comply with all applicable laws, building codes and requirements, and adequate safety precautions.

## One Year Limited Warranty

**Important:** Evidence of original purchase is required for warranty service.
**WARRANTOR:** RSTC Enterprises Incorporated
**ELEMENTS OF WARRANTY:** RSTC warrants for one year to the original retail owner, this SolaDeck is free from defects in materials and craftsmanship with only the limitations or exclusions set out below.
**WHAT IS NOT COVERED:** This warranty covers only defects in materials and workmanship provided by RSTC Enterprises, and does not cover equipment damage or malfunction from misuse, abuse, accident, and act of God. Installation must be in accordance with our written instructions. RSTC Enterprises will not be liable for any installation charges associated with replacement , incidental or consequential damages resulting from your use of or inability to use the SolaDeck.
**REMEDY:** Your only remedy under this warranty is the exchange or replacement in the event that the product does not conform to this warranty. This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state.
**CLAIMS PROCESS:** To make a claim under this warranty, the product should be shipped postage paid, with original purchase receipt to:

**RSTC ENTERPRISES**
**2219 HEIMSTEAD ROAD**
**EAU CLAIRE, WI 54703**
1-866-367-7782 or www.commdeck.com

**m**
**pa**

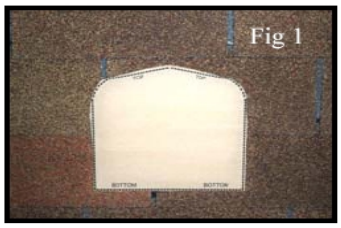
## Tools and Hardware List

**Utility Knife - #2 Phillips Head Driver Bit- Pry Bar – Roof sealant – Cordless Drill**

**A – (7) # 10 – 1" Phillips head wood screws**
**B – (4) 8-32 – ½" Phillips head threading machine screws**
**C – (4) #10 Bonded seal washers**
**D – (2) 10-32 – ½" Steel studs**
**E – (2) # 10 Star washers**
**F – (2) 10-32 – 3/8" steel nuts**

# SolaDeck Installation Instructions

1. Determine the location for the SolaDeck on the roof surface.
2. Use the template from the SolaDeck Carton and position it ¾" below the shingle line. Trace the outline on the roof (Fig. 1).




3. Use a pry bar to loosen the shingles and remove any nails that will interfere with the flashing sliding beneath the shingles (Fig. 2).
4. Cut the roofing material to the template shape.


5. Inside of the base there are three knockout sizes. Remove the one (s) needed for the conduit fitting (s).
6. Slide the SolaDeck with flashing beneath the shingles into place and trace the knockout hole (s) (Fig. 3).
7. Drill out the traced knockout hole (s) 1/3 larger than the knockout.


8. Slide the SolaDeck base back into place and fasten it to the roof deck with the 1" truss head screws provided. (Fig 4).
9. Use a quality roof sealant to seal the shingles to the SolaDeck flashing.


10. With the base installed, you have several options to wire the SolaDeck enclosure. Use either the sump built into the base or the predetermined centering dimples to knock out a hole for the fitting or conduit size you choose.
    - Dimples at the corners of the base allow for ½"or ¾"fittings.
    - Dimples below the sump allow for ½" fittings.
    - These dimple positions accept conduit, liquid tight or strain relief fittings.


11. Peel off the tape on the foam Gasket and position it on the inside of the cover where it will contact the base sump.
12. When connections are complete, finish by fastening the cover to the base using the 8-32 screws with bonded seal washers provided.

*NOTE: Extra steel studs are provided for installing an isolated negative terminal or power distribution block

# IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS- This manual contains important instructions for models 0783-41 and 0786-41that shall be followed during installation of the combiner.

SolaDeck models are listed by ETL as PV Combiners under the standard:

UL 1741, First Edition

SolaDeck models meet UL 50 Type 3R rainproof requirements.

This enclosure is rated for up to 600 VDC fuses.

**Grounding Instructions**- Each system should be connected to a grounded, permanent wiring system. All system wiring and system grounding must comply with NEC Code, ANSI/NFPA 70-1996, or other appropriate codes, is the responsibility of the installer.

The equipment ground on SolaDeck is marked with the symbol: 

**Note: Solar panels produce electrical current when lighting is present, even during overcast weather. Do not wire from the array to the SolaDeck combiner. Complete all connections inside the SolaDeck combiner first and then connect the array.**

**General Wiring Installation Instructions**

- Remove any necessary knockouts before securing the SolaDeck to the roof or other surface.
- Follow the mounting instructions page 3
- Slide the fuse holders onto the Din rail and lock in place.
- Secure the Bus Bar to the fuse holders.
- Install the negative power distribution block using the steel studs in the location designated for the Negative PV Model (0783).
- Install negative terminal blocks on DIN rail where designated PV Negative and lock in place. Model (0786).
- Connect all wires to fuse holders, bus bar lug and negative terminals, securing them according to the listed torque values from table on page 5.
- Conduit and Strain relief fittings and hubs must comply with UL 514B

## Requirements

- Use minimum 75 C copper
- Use only code approved, appropriately listed fuse holders and Fuses

| | |
|---|---|
| Maximum Fuse Rating | 30 AMP , 600 Volt |
| Total Maximum Current Rating | 0783-41 / 0786-41 120 AMPS DC |
| Maximum Fuse Short Circuit Current | 10ka |
| Fuse Holder Torque | 13.6 in lb Flat or Phillips Head Driver |
| Din Rail Mounted Terminal Block Torque | 9 - 14 in lb Flat Head Driver |

Torque Data* for Box Lug

| Wire Size | | Torque | |
|---|---|---|---|
| AWG | mm2 | in lbs | Nm |
| 14-10 | 2.1-5.3 | 35 | 4 |
| 8 | 8.4 | 40 | 4.5 |
| 6-4 | 13.3-21.2 | 45 | 5.1 |
| 2 | 13.3-21.2 | 50 | 5.7 |

Torque Data* for Negative Power Distribution Block

| Wire Size | | Torque | | |
|---|---|---|---|---|
| | | Screw Driver | External Drive Wrench | |
| AWG | mm2 | in lbs | | Nm |
| 14-10 | 2.1-5.3 | 35 | 75 | 4 |
| 8 | 8.4 | 40 | 75 | 4.5 |
| 6-4 | 13.3-21.2 | 45 | 110 | 5.1 |
| Main 2/0-14 | 13.3-21.2 | 0 | 120 | 5.7 |

Torque Data* for Ground Lug

| Wire Size | | Torque | |
|---|---|---|---|
| AWG | mm2 | in lbs | Nm |
| 14-10 | 2.1-5.3 | 35 | 4 |
| 8 | 8.4 | 40 | 4.5 |
| 6-4 | 13.3-21.2 | 45 | 5.1 |
| 2-2/0 | 13.3-21.2 | 50 | 5.7 |

## SolaDeck Combiner Features

- **Stamped Seamless Galvanized Steel**
- **Powder Coated Surfaces**
- **Mounting Hardware Included**
- **Flashes into the roof deck**
- **6” DIN rail installed Model (0786)**
- **3” DIN rail installed Model (0783)**
- **2 Position Ground lug installed**
- **3 Roof deck knockouts .5”, .75”, 1”**
- **5 Centering dimples for enter/exit strain or conduit fittings**
- **Accommodates fuse holders with combiner bus**

**SolaDeck cover on base** **Fig 1**
**Four 8-32 3/8” phillips head self thread screws and boded seal washers secure the SolaDeck cover**


**Figure 1**

**SolaDeck Base showing dimples Fig 2**
**Corner dimples support .5” or .75” fittings or conduit**
**Center dimples support .5” fittings or conduit**

**Figure 2**

**Base plate configuration Fig 3**
**Three knockouts for roof deck penetration .5”, .75”, 1”**

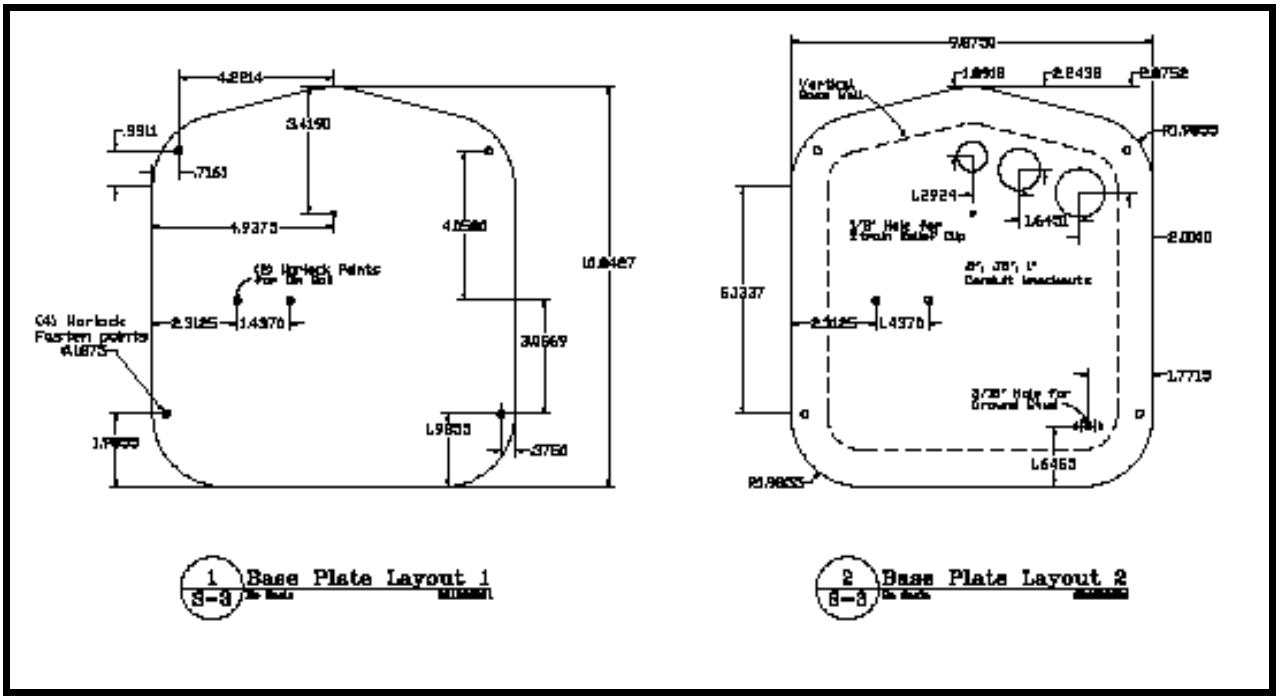



**Figure 3**

## Fuse holders with bus Bar Fig 4

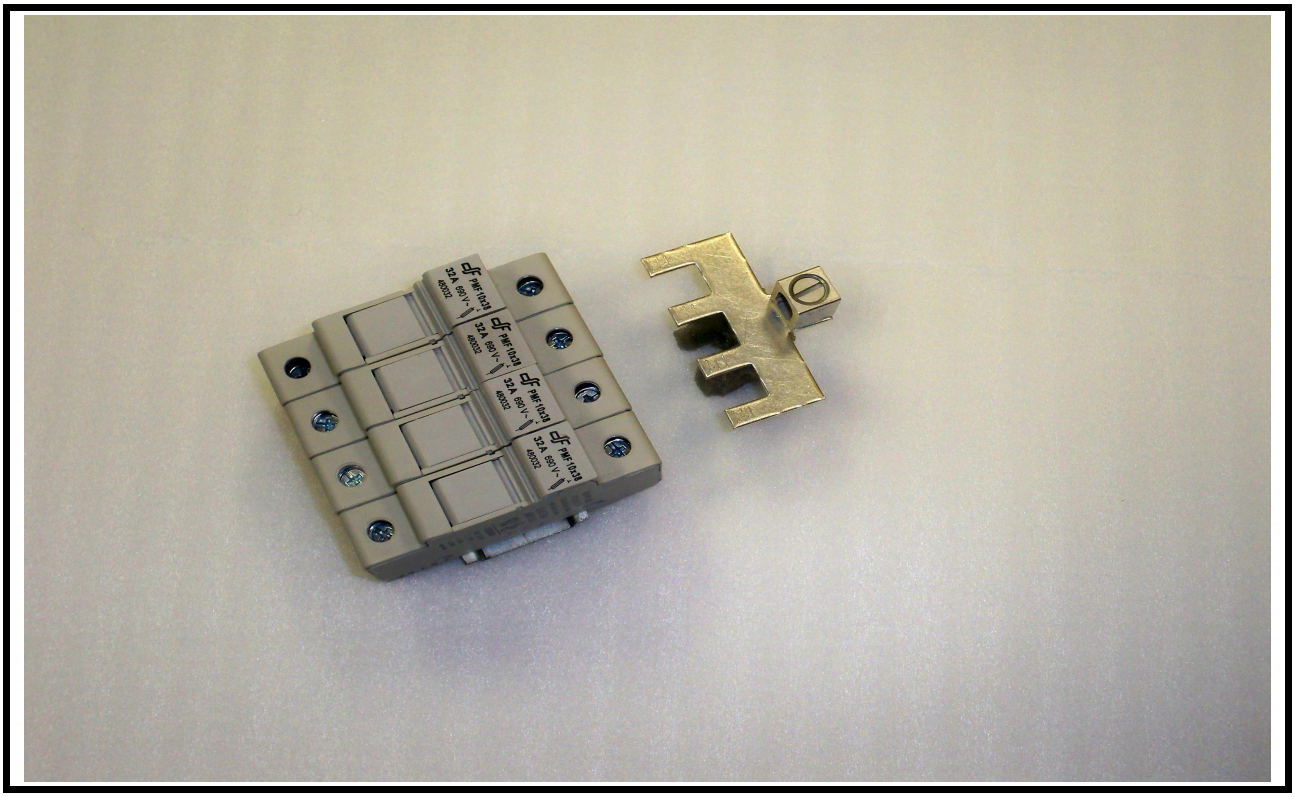
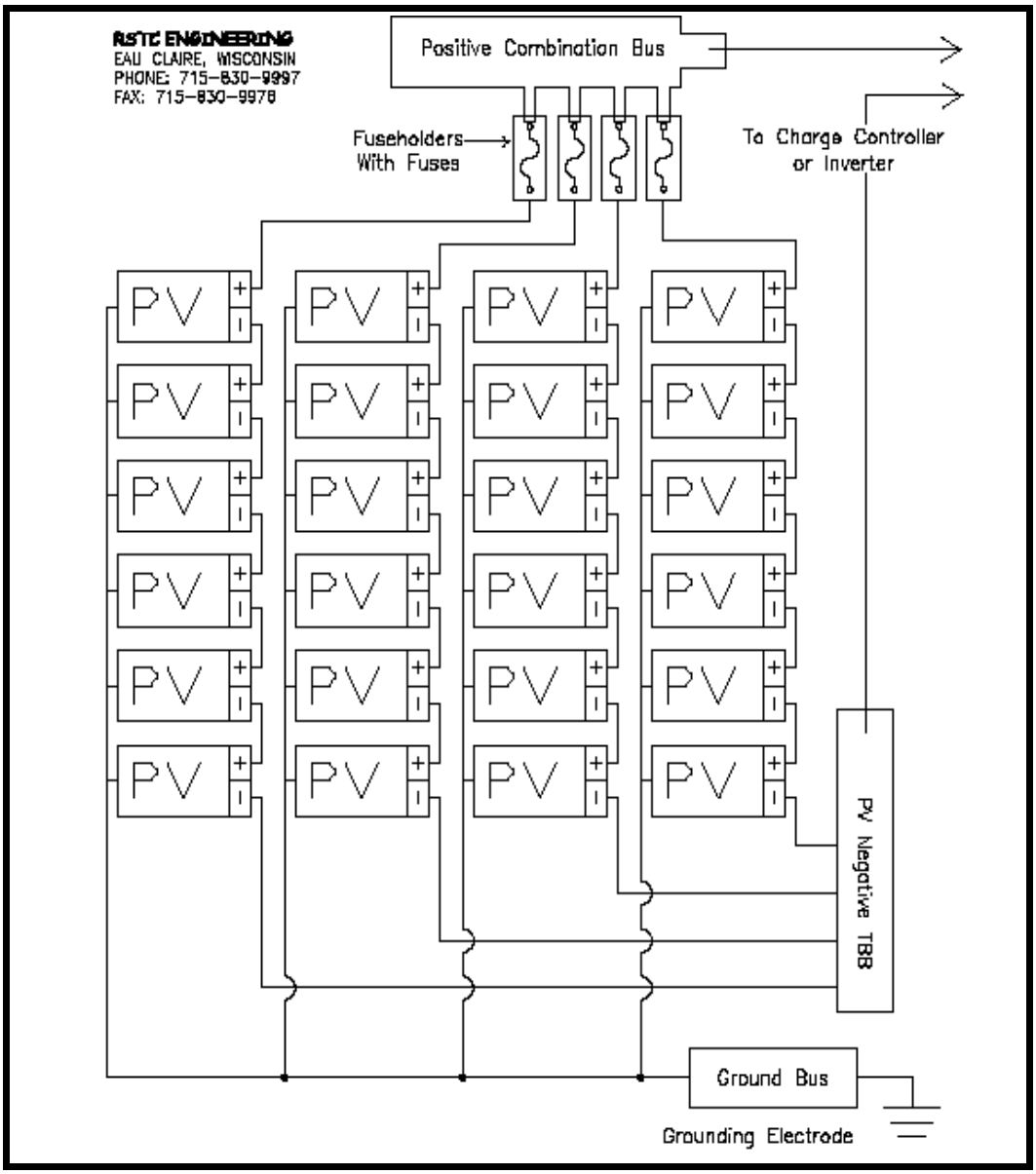


**Figure 4**

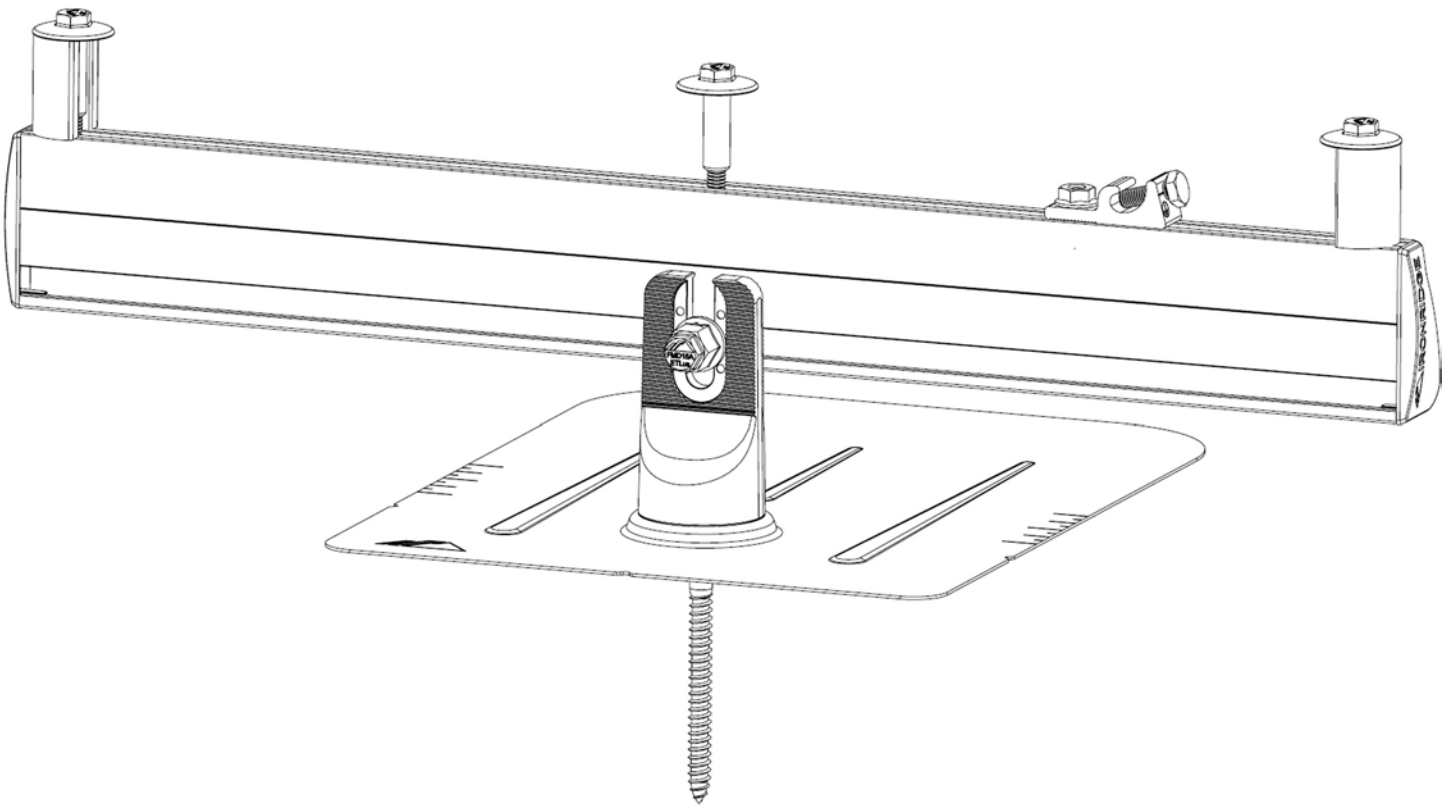
**SolaDeck Models with cover off**

**Model 0786-41**

## PV Panel Example



# FLUSH MOUNT



INSTALLATION MANUAL

IRONRIDGE

# CONTENTS



# DISCLAIMER

This manual describes proper installation procedures and provides necessary standards required for product reliability. Warranty details are available on website. All installers must thoroughly read this manual and have a clear understanding of the installation procedures prior to installation. Failure to follow these guidelines may result in property damage, bodily injury or even death.

**IT IS THE INSTALLER'S RESPONSIBILITY TO:**

- Ensure safe installation of all electrical aspects of the array. All electrical installation and procedures should be conducted by a licensed and bonded electrician or solar contractor. Routine maintenance of a module or panel shall not involve breaking or disturbing the bonding path of the system. All work must comply with national, state and local installation procedures, product and safety standards.
- Comply with all applicable local or national building and fire codes, including any that may supersede this manual.
- Ensure all products are appropriate for the installation, environment, and array under the site's loading conditions.
- Use only IronRidge parts or parts recommended by IronRidge; substituting parts may void any applicable warranty.
- Review the Design Assistant and Certification Letters to confirm design specifications.
- Ensure provided information is accurate. Issues resulting from inaccurate information are the installer's responsibility.
- Ensure bare copper grounding wire does not contact aluminum and zinc-plated steel components, to prevent risk of galvanic corrosion.
- If loose components or loose fasteners are found during periodic inspection, re-tighten immediately. Any components showing signs of corrosion or damage that compromise safety shall be replaced immediately.
- Provide an appropriate method of direct-to-earth grounding according to the latest edition of the National Electrical Code, including NEC 250: Grounding and Bonding, and NEC 690: Solar Photovoltaic Systems.
- Disconnect AC power before servicing or removing modules, AC modules, microinverters and power optimizers.
- Review module and any 3rd party manufacturer's documentation for compatibility and compliance with warranty terms and conditions.

# RATINGS

### UL 2703 LISTED

#5003807

**Conforms to STD UL 2703 Standard for Safety First Edition: Mounting Systems, Mounting Devices, Clamping/ Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels**

- Max Overcurrent Protective Device (OCPD) Rating: 40A
- Max Module Size: 30.5 ft²
- Module Orientation: Portrait or Landscape
- System Design Load Rating: 10 PSF downward, 5 PSF upward, 5 PSF lateral
- Actual system structural capacity including spans and cantilevers are defined by PE stamped certification letters.
- CAMO Specific Design Load rating: 50 PSF downward, 50 PSF upward, 15 PSF lateral

**Certified to CSA TIL No. A-40 Photovoltaic Module Racking Systems**

- Load Rating: 2400 PA [50 PSF]

### CLASS A SYSTEM FIRE RATING PER UL 2703

- Any Roof Slope with Module Types 1, 2, 3, 13, 19, 25 & 29: Allowed with any roof slope. Any module-to-roof gap is permitted, with no perimeter guarding required.
- Module Types 4 and 5: Allowed with Steep Slope Roofs (≥ 9.5°). Any module-to-roof gap is permitted, low edge guarding (Trim) required
- Class A rated PV systems can be installed on Class A, B, and C roofs without affecting the roof fire rating

### CLASS B SYSTEM FIRE RATING PER UL 2703

- Module Types 4 and 5: Allowed with Steep Slope Roofs (≥ 9.5°). Any module-to-roof gap is permitted, with no perimeter guarding required

### WATER SEAL RATINGS:

- UL 441 (Flashfoot2, All Tile Hook, Knockout Tile, Flashvue, L-Mount)
- TAS 100(A)-95 (Flashfoot2, All Tile Hook, Knockout Tile, Flashvue, L-Mount, Qbase)
- Tested and evaluated without sealant.
- Any roofing manufacturer approved sealant is allowed. Ratings applicable for roof slopes between 2:12 and 12:12

### STRUCTURAL CERTIFICATION

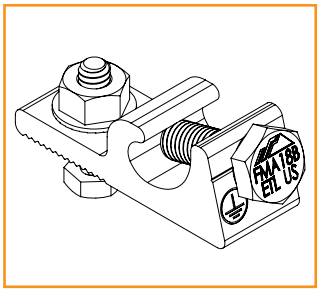
- Designed and Certified for Compliance with the International Building Code & ASCE/SEI-7

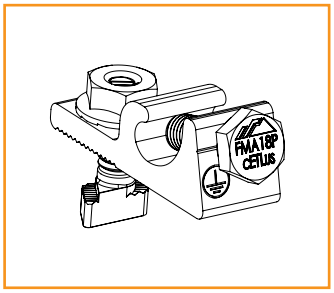
### FLORIDA PRODUCT APPROVAL #FL29843

- Conforms to TAS202, TAS100(A)
- Approved for installation both inside and outside High Velocity Hurricane Zones (HVHZ)
- Allowable design pressure up to +100/-100 PSF
- Additional details and full list of approved components can be found Here.

# MARKINGS

Product markings are located on the Grounding Lug bolt head.





# ATTACHMENTS

## PRE-INSTALLATION

☐ Verify module compatibility. See Page 21 for info.

## TOOLS REQUIRED

- ☐ Cordless Drill (non-impact)
- ☐ Impact Driver (for lag bolts)
- ☐ Torque Wrench (0-250 in-lbs)
- ☐ 7/16” Socket
- ☐ 1/2" Socket
- ☐ 9/16" Socket
- ☐ 7/32" Drill Bit
- ☐ 1/8" Drill Bit
- ☐ 1/4" Drill Bit
- ☐ T30 Bit
- ☐ Channel Lock Pliers
- ☐ #3 Phillips Bit
- ☐ 3/16" Hex Bit

## BONDING HARDWARE TORQUE VALUES

**Please refer to each attachment's individual section for full details on all torque values and instructions.**

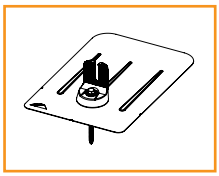
- ☐ 3/8" Bonding Hardware Nuts (7/16" Socket): 250 in-lbs
- ☐ All Tile Hook Carriage Bolts (7/16" Socket): 132 in-lbs
- ☐ Flat Roof Attachment Nuts (9/16” Socket): 250 in-lbs
- ☐ Lynx Set Screw (3/16" Hex Drive): 150 in-lbs
- ☐ Lynx Flange Nut (1/2" Socket): 150 in-lbs

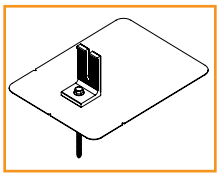
➢ **If using previous version of Integrated Grounding Mid Clamps, End Clamps, Expansion Joints and for a list of approved 3rd party components please refer to Alternate Components Addendum (Version 1.9)**

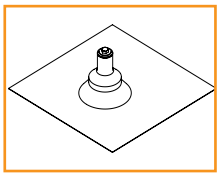
## ATTACHMENTS

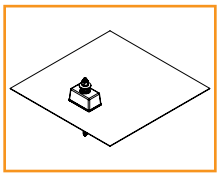
### COMPOSITION SHINGLE

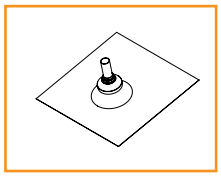

FlashFoot2


FlashVue

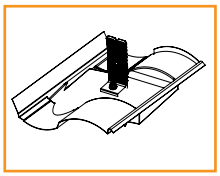

QM L-Mount

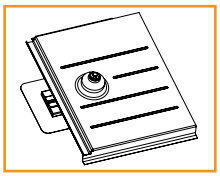

QM QBase

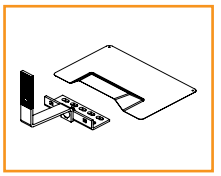

QM Classic Comp Mount

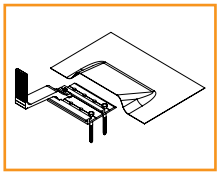

QM Composition Conduit Penetration

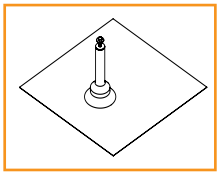
### TILE

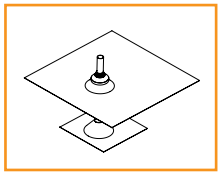

Knockout Tile


QM Tile Replacement

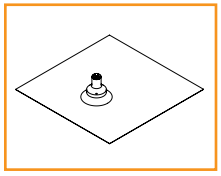

All Tile Hook and Flashing (optional)

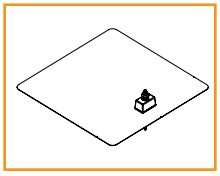

QM Quick Hook and Flashing (optional)

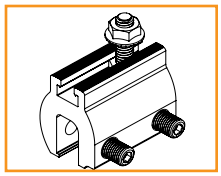

QM QBase Tile


QM Tile Conduit Penetration

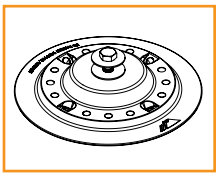
### ADDITIONAL ROOF TYPES

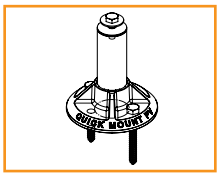

QM Qbase Shake - Slate - Metal Shingle


QM Classic Mount Shake


QM Lynx Metal Roof Attachment

### LOW SLOPE ROOF


Flat Roof Attachment



QM QBase Mount

# COMPONENTS

## PRE-INSTALLATION

☐ Verify module compatibility. See Page 21 for info.

## TOOLS REQUIRED

- ☐ Cordless Drill (non-impact)
- ☐ Impact Driver (for lag bolts)
- ☐ Torque Wrench (0-250 in-lbs)
- ☐ 7/16" Socket
- ☐ 1/2" Socket
- ☐ 9/16" Socket
- ☐ 7/32" Drill bit
- ☐ 1/8" Drill bit
- ☐ 1/4" Drill bit
- ☐ T30 Torx Bit
- ☐ Channel Lock Pliers
- ☐ #3 Phillips Bit
- ☐ Paddle Bit

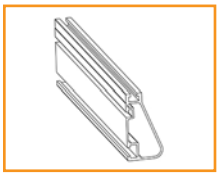
## BONDING HARDWARE TORQUE VALUES

**Please refer to each attachment's individual section for full details on all torque values and instructions.**

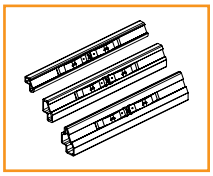
- ☐ Universal Fastening Object (7/16" Socket): 80 in-lbs
- ☐ Rail Grounding Lug Nut (7/16" Socket): 80 in-lbs
- ☐ Module Grounding Lug Nut (7/16" Socket): 60 in-lbs
  - ☐ Grounding Lug Terminal Screws (7/16" Socket): 20 in-lbs
- ☐ Expansion Joint Nuts (7/16" Socket): 80 in-lbs
- ☐ Microinverter Kit Nuts (7/16" Socket): 80 in-lbs
- ☐ Frameless Module Kit Nuts (7/16" Socket): 80 in-lbs
- ☐ 3/8" Bonding Hardware Nuts (7/16" Socket): 250 in-lbs
- ☐ Contour Clamp (T-30 Torx Bit): 80 in-lbs

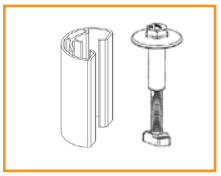
➢ **Unless otherwise noted, all components have been evaluated for multiple use. They can be uninstalled and reinstalled in the same or new location.**

## COMPONENTS

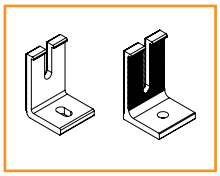

XR Rail


Wire Clip

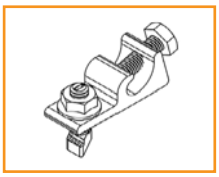

BOSS

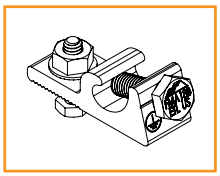

UFO and Stopper Sleeve (30-46MM)

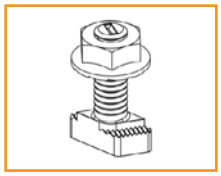

CAMO

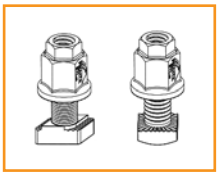

Ironridge L-Foot and QM L-Foot

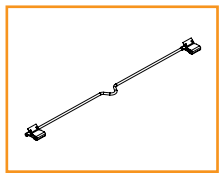
End Cap

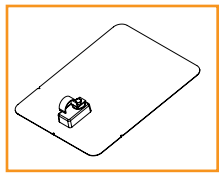

Rail Grounding Lug

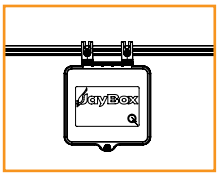

Module Grounding Lug


Microinverter Kit

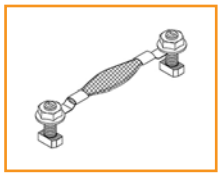

3/8" Bonding Hardware

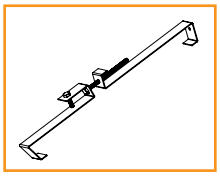

8" Bonding Jumper Single Use Only


QM Classic Conduit Comp Mount

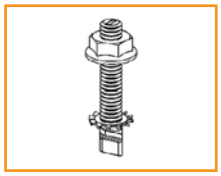


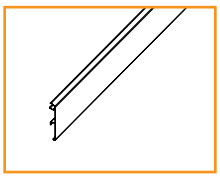
JAYBOX

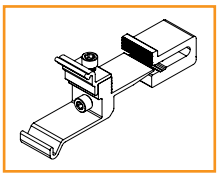

Expansion Joint


QM Tile Conduit Mount


Frameless End/Mid Clamp

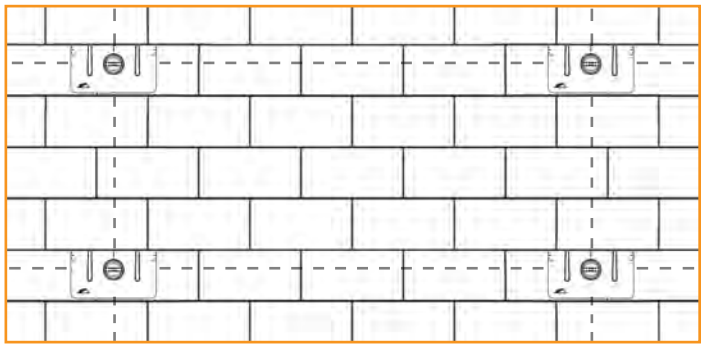

Frameless Module Kit


Contour Trim


Contour Clamp

# 1. PLACE ATTACHMENTS

The general installation method for attachments is to locate a rafter, drill a pilot hole and install the attachment. For composition roof attachments installation instructions refer to page 10. For tile roof attachments refer to page 12. For low slope roof attachments refer to page 14. When using approved third party attachments, refer to manufacturer's install instructions.



**Tested or evaluated third-party roof attachments:**

- **S-5! Standing Seam Metal Roof Clamps - Certification of metal roof clamps includes bonding to both painted and galvalume metal roofs. Tighten S-5! and S-5! Mini set screws to 130-150 in-lbs (≥ 24 gauge) or 160-180 in-lbs (22 gauge) roofs. Tighten S-5! M10 bolt to 240 in-lbs or S-5! Mini M8 bolt to 160 in-lbs. Use the following fastening guidelines for other S-5! roof clamps: ProteaBracket™ - firmly seat roof screws and tighten hinge bolt to 225 in-lbs; RibBracket™ - firmly seat roof screws and tighten M8 bolt (M8-1.25 x 22mm sold separately) to 160 in-lbs; and SolarFoot™ - firmly seat roof screws and tighten M8 flange nut to 160 in-lbs.**
- **EcoFasten Green Fasten GF-1 Anchors**

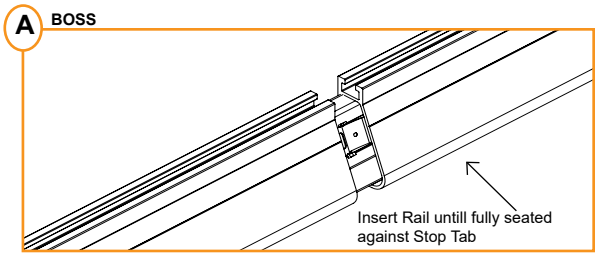
# 2. PLACE RAILS

## A. CONNECT SPLICES

Use BOSS(Bonded Structural Splice), as needed, to join multiple sections of Rail.

**BOSS - Bonded Structual Splice**
Insert BOSS into first Rail up until the Stop Tab. Slide second Rail fully into place.

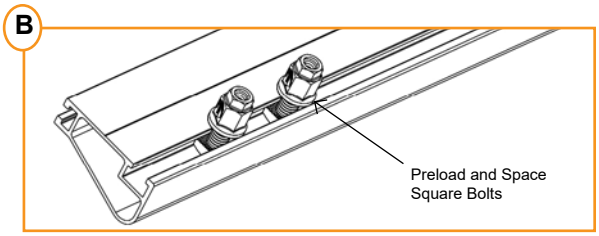
- **Rows using BOSS and exceeding 100 feet of Rail must use Expansion Joints.**
- **Boss Splices may be installed in any location within a span.**
- **UFO and Bonding Hardware must be installed 1" away from the point where two Rails join together.**




## B. PREPARE HARDWARE

Slide square-headed bolts into side-facing rail slot. Space out bolts to match attachment spacing.

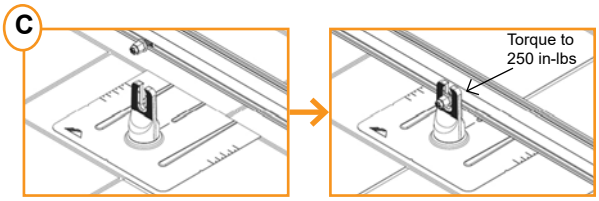
- **Tape ends of rail, to keep bolts from sliding out while moving.**
- **If using T-bolts, carry hardware onto roof and proceed.**




## C. ATTACH RAILS

Drop rail with hardware into roof attachment. Level rail at desired height, then torque to **250 in-lbs**.

- **Rail can face either upslope or downslope on roof.**
- **When using attachments with longer slots, do not install Rail lower than the top of the L-Foot to avoid damage to modules.**



# 3. SECURE LUGS

## Grounding Lugs

Only one Grounding Lug (Rail or Module) required per continuous subarray, regardless of subarray size (Unless frameless modules are used, see Page 20).

- **Grounding Lugs are intended to for use with one solid or stranded copper wire, conductor size 10-4 AWG.**

**Rail Grounding Lug**

Insert T-bolt in Top Rail slot and torque Hex Nut to **80 in-lbs**. Install a minimum 10 AWG solid copper or stranded grounding wire. Torque terminal screw to **20 in-lbs**.

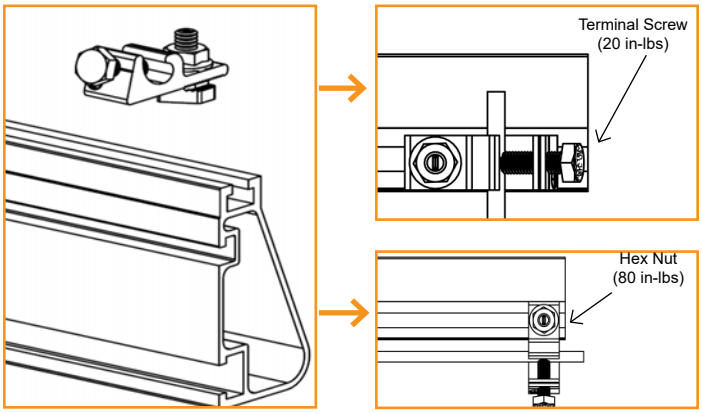
- **Module Grounding Lugs can be installed anywhere along the Rail and in either orientation shown.**

**Module Grounding Lug**

Insert Bolt through Manufacturer approved grounding location and torque Hex nut to **60 in-lbs.** One Module Grounding Lug may be installed to one module per row. Install a minimum 10 AWG solid copper or stranded grounding wire. Torque terminal screw to **20 in-lbs**.

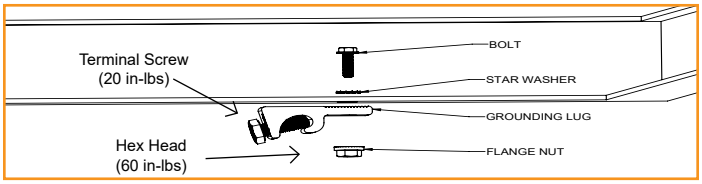
- **If using Enphase microinverters or Sunpower AC modules, Grounding Lugs may not be needed. See Page 19 for more info.**
- **Refer to module manufactuer for mounting location and instructions.**

**Rail Grounding Lug**




Use with one solid or stranded copper wire, conductor size 10-4AWG.

**Module Grounding Lug**




# 4. SECURE MODULES

## A. SECURE FIRST END

Place first module in position on rails, a minimum of 1" from rail ends. Snap Stopper Sleeves onto UFO. Fasten module to rail using the UFO, ensuring that the UFO is hooked over the top of the module. Torque to **80 in-lbs**.

- **Ensure rails are square before placing modules.**
- **Hold Stopper Sleeves on end while torquing to prevent rotation.**
- **If using CAMO instead of UFO + Stopper Sleeve, refer to Page 19 for CAMO installation procedure.**
- **UFO can be installed on modules 30 to 46mm.**

## B. SECURE NEXT MODULES

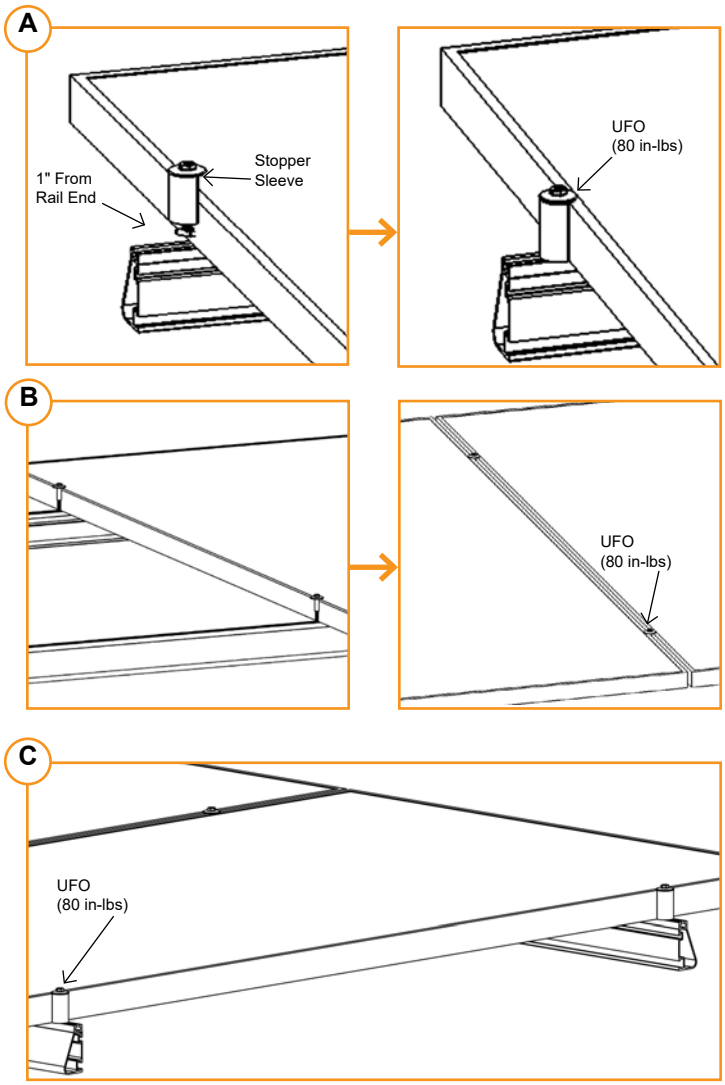
Place UFO into each rail, placing them flush against first module. Slide second module against UFO. Torque to **80 in-lbs**. Repeat for each following module.

- **When reinstalling UFO, move modules a minimum of 1/16" so UFOs are in contact with a new section of module frame.**
- **When UFOs are loosened and re-tightened, ensure UFO T-bolt bottoms out in rail channel before re-torquing UFO to achieve full engagement between T-bolt and rail.**
- **If using Wire Clips, refer to Page 18.**

## C. SECURE LAST END

Place last module in position on rails, a minimum of 1" from rail ends. Snap Stopper Sleeves onto UFO. Secure UFO Clamps on rails, ensuring they are hooked over top of module. Torque to **80 in-lbs**.

- **Hold Stopper Sleeves on end while torquing to prevent rotation.**
- **Repeat all steps for each following row of modules, leaving a minimum 3/8" gap between rows**
- **If using CAMO instead of UFO + Stopper Sleeve, refer to Page 6**



# CAMO

### A. SLIDE INTO RAIL

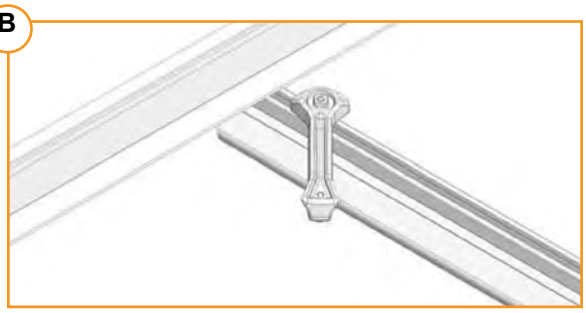
Slide CAMO into rail channel far enough to clear the module frame. CAMO requires 6" of clearance from end of rail.

A


### B. PLACE MODULE

Place module on rails (module cells not shown for clarity). When installing CAMO the module can overhang the rail no more than 1/4".

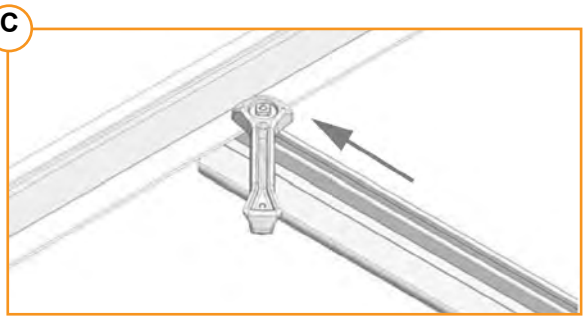
B



### C. PULL TOWARDS END

Pull CAMO towards rail ends, at 45 degree angle, so the bonding bolt contacts the module flange edge.

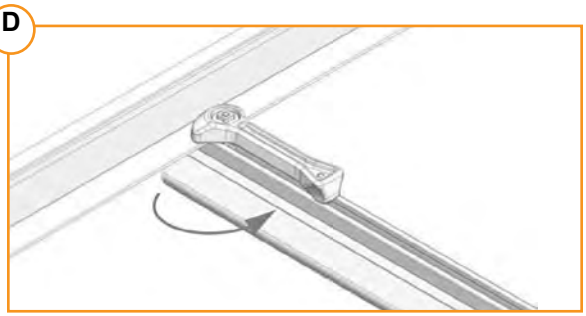
C



### D. SECURE TO FRAME

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

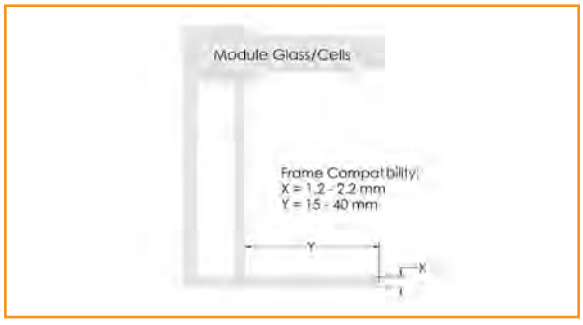
D



### FRAME COMPATIBILITY

CAMO has been tested or evaluated with all modules listed in the Module Compatibility section having frames within the referenced dimensions. Be sure the specific module being used meets the dimension requirements.

- **For installations with Hanwha Q CELLS modules with 32 mm frame heights, the maximum ground snow is 45 PSF (33 PSF module pressure).**
- **CAMO is only compatible with Canadian Solar modules CS1YxxxMS and CS3N-xxxMS. "xxx" refers to the module power rating**




# 8" BONDING JUMPER

8" Bonding Jumper is an electrical bonding jumper that can be used on the Flush Mount System for row to row bonding; making the module frames the medium for the equipment ground path.

- **Bonding jumper is pushed onto the bottom flange of the module.**
- **New jumpers should be used if re-installation of jumper is required.**
- **Supports bottom flange thicknesses from 1.2mm to 3.1mm.**

# EXPANSION JOINTS

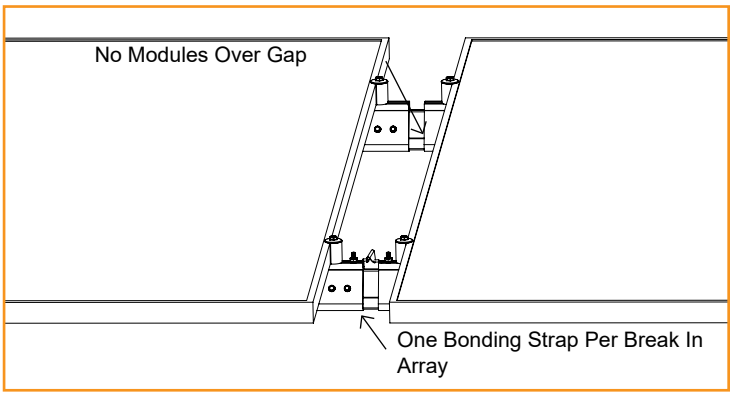
Expansion Joints are required every 100' of continuous rail to allow for thermal expansion and contraction of the system.

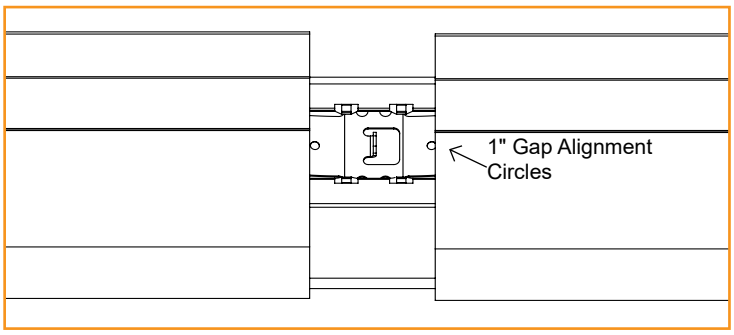
- **Do not install modules over expansion joint.**

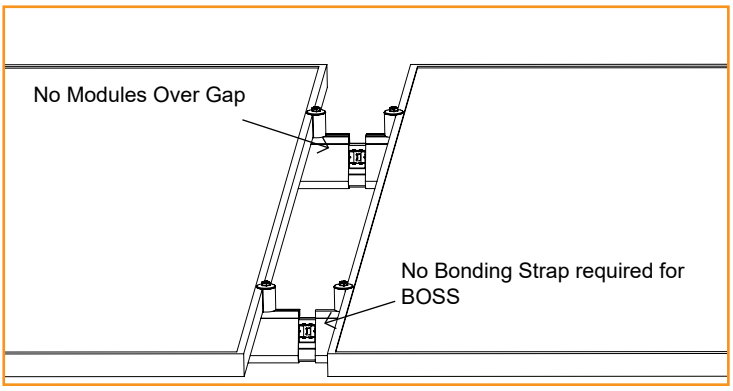
## BOSS

Insert BOSS into first Rail up to the Alignment Circle, Slide second Rail over BOSS to the second Alignment Circle, leaving a 1" gap between the Rails.

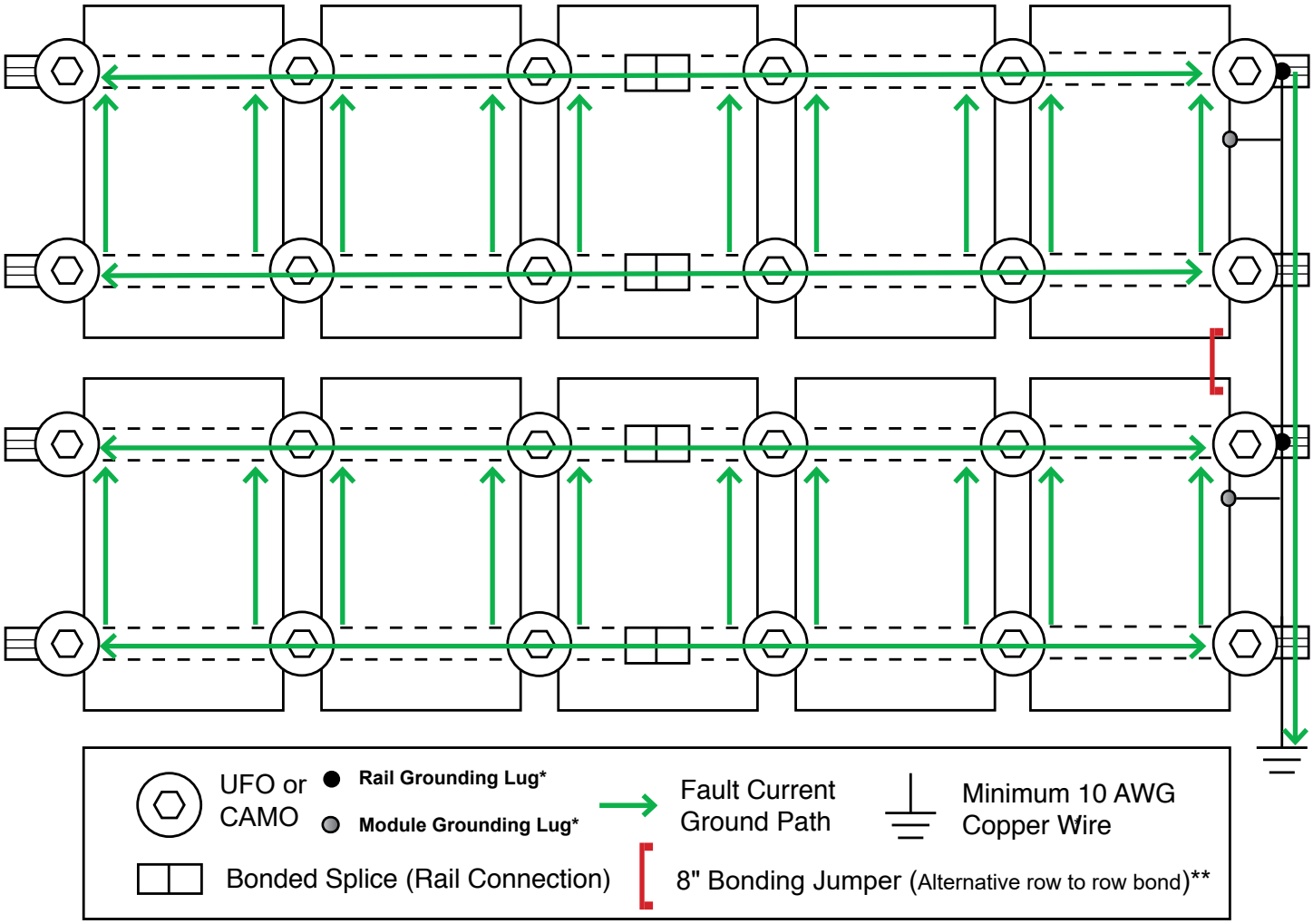
There must be a 1" of space between the edge of the Rail and the edge of the panel to allow proper installation of the UFO and Stopper Sleeve.



# ELECTRICAL DIAGRAM



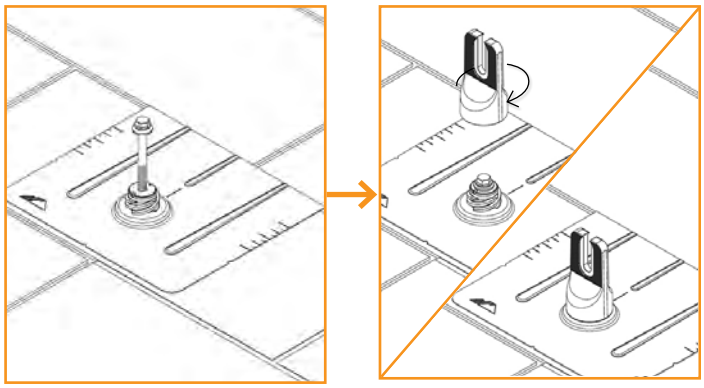

*One Module Grounding Lug or Rail Grounding lug is required per row of a system.

** The use of the 8" Bonding Jumper eliminates the need for row to row bonding. A minimum of one grounding lug per continuous array is required for earth ground.

Grounding Lugs and wire are not required in systems using certain Enphase microinverters or certain Sunpower modules. Equipment grounding is achieved with the Engage cable for Enphase or the AC module cable system for Sunpower via their integrated EGC.

## FLASHFOOT2

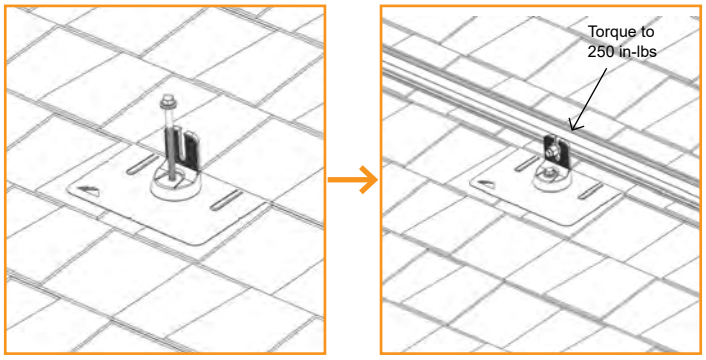
Locate roof rafters and mark locations on roof. Drill 1/4" pilot holes perpendicular to the roof and back fill with roofing manufacturers' approved sealant. Slide flashing between 1st and 2nd course of shingles, ensuring both that the flashing reaches under the 3rd shingle course and doesn't overhang the downhill shingle course. Line up with pilot hole and insert supplied lag bolt with washer through flashing. With a 7/16" Socket fully seat lag bolt. Place Cap onto flashing in desired orientation for E/W or N/S rails and rotate 180 degrees until it locks into place.



- **Rail can be installed on either side of FlashFoot2 Cap.**
- **For additional details refer to the full FlashFoot2 Installation Manual.**

## FLASHVUE

Locate rafters and snap vertical and horizontal lines to mark locations of flashings. Drill 1/4" pilot holes, then backfill with an approved sealant. Slide flashing between 1st and 2nd course of shingles, ensuring both that the flashing reaches under the 3rd shingle course and doesn't overhang the downhill shingle course. Line up pilot hole with View Port. Press Grip Cap onto flashing in desired orientation for E/W or N/S rails. Insert Lag Bolt with mechanically bonded washer through flashing. With a 7/16" Socket drive Lag Bolt until fully seated. FlashVue is now installed and ready for IronRidge XR Rails.
Attach rails to either side of the open slot using bonding hardware. Level rail at desired height, then torque to **250 in-lbs (21 ft-lbs).**
When installing Gripcap+ on roofs with undulations greater than 1 inch, install GripCap+ in low points across the array as required.

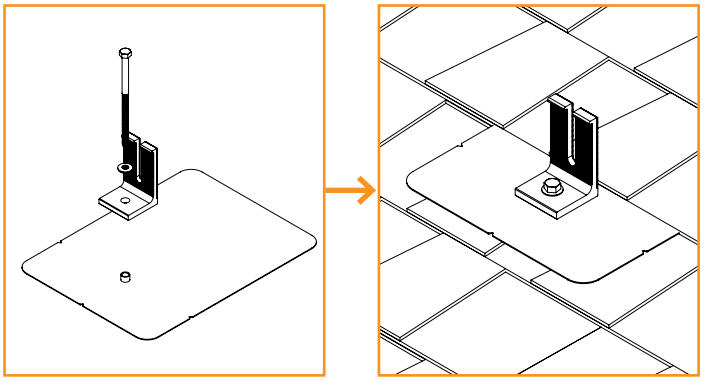



- **For additional details refer to the full FlashVue Installation Manual.**
- **For additional details on the GripCap+ refer to the full GripCap+ Installation Manual.**

# COMPOSITION SHINGLE

## QM L-MOUNT

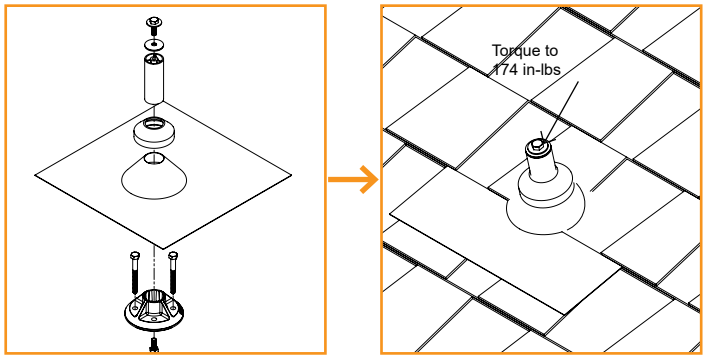
Locate roof rafters and mark locations on roof. Drill 7/32”(Lag) or 1/8"(ST) pilot holes perpendicular to the roof and back fill with roofing manufacturers' approved sealant. Slide flashing between 1st and 2nd course of shingles, ensuring both that the flashing reaches under the 3rd shingle course and doesn't overhang the downhill shingle course. Place L-foot on flute and rotate into desired position. Prepare lag bolt or structural screw with sealing washer. Use 1/2" socket to drive prepared lag bolt through L-foot until fully seated and L-foot can no longer rotate easily. Torque Nut to **156 in-lbs (13 ft-lbs)** for ST. Attach rail to L-Foot with Bonding Hardware and torque to **250 in-lbs (21 ft-lbs).**



- **Structural screw can be driven with T-30 hex head bit.**
- **For additional details refer to the full QM Installation Manual.**

## QM QBASE COMPOSITION MOUNT

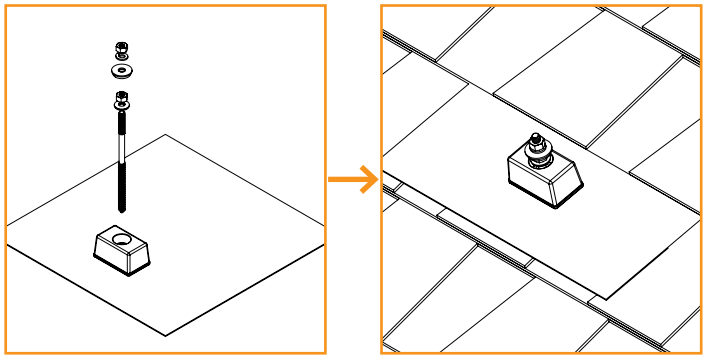
Locate roof rafters and mark locations on roof. Align QBase vertical holes over center rafter and mark. Drill two pilot holes with 7/32" drill bit, perpendicular to roof and back fill with roofing manufacturers' approved sealant. Set grade 8 cap screw through bottom of QBase, place QBase over drilled holes and secure lags. Screw Post to QBase. Proceed with roofing up until the flashing should be installed. Install flashing over mount. Allow roofing to proceed to the next course. Apply sealant where post and flashing meet, install EPDM counter flashing collar. Attach L-Foot on Standoff with hardware. Torque to **174 in-lbs (14.5 ft-lbs)**. Attach rail to L-Foot with Bonding Hardware and torque to **250 in-lbs (21 ft-lbs).**




- **For additional details refer to the full QM Installation Manual.**

## CLASSIC COMP MOUNT

Locate roof rafters and mark locations on roof. Drill 7/32" pilot holes perpendicular to the roof and back fill with roofing manufacturers' approved sealant. Slide flashing between 1st and 2nd course of shingles, ensuring both that the flashing reaches under the 3rd shingle course and doesn't overhang the downhill shingle course. Prepare Hanger Bolt with Hex Nut and Sealing Washer, insert into hole and using 1/2" socket drive hanger bolt until fully seated and QBlock stops rotating easily. Insert EPDM rubber washer over hanger bolt into block, using Rack Kit hardware secure L-Foot to the mount. Torque to **156 in-lbs (13 ft-lbs)**. Attach rail to L-Foot with Bonding Hardware and torque to **250 in-lbs (21 ft-lbs).**

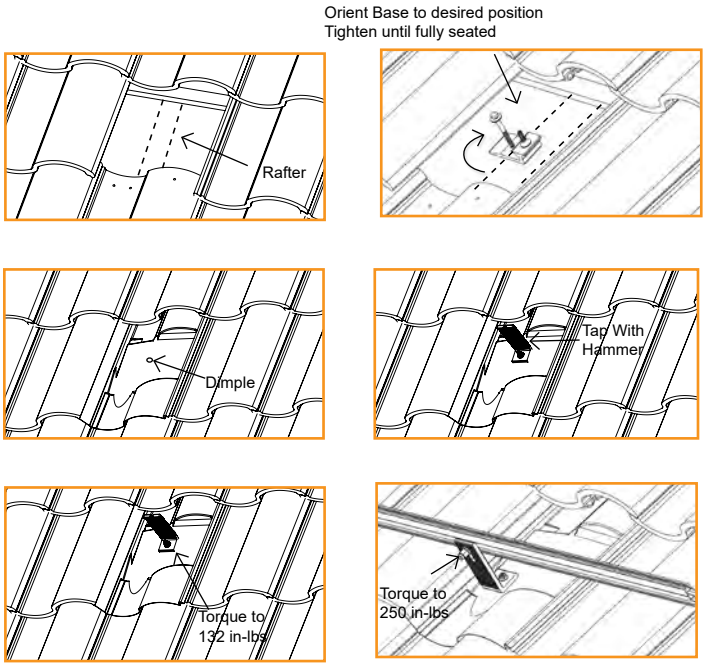


- **For additional details refer to the full QM Installation Manual.**

## KNOCKOUT TILE

Remove tile and mark rafter. Use base as guide to drill 1/4” pilot hole and fill with roofing manufacturer’s approved sealant. Install optional Roof Flashing and seal appropriately. Insert lag bolt with bonded washer through base (and flashing if used) and drive until fully seated. Insert Tile Replacement Flashing, lower onto base and apply pressure over the threaded post until it dimples the flashing. Place L-Foot over dimple and tap with hammer to punch threaded post through the flashing. Ensure punched pieces of flashing are cleared away. Form flashing as needed to sit flush with surrounding tiles, position L-Foot in desired orientation and torque hardware to **132 in-lbs (11 ft-lbs)**. Attach rail to L-Foot with Aire Dock and torque to **250 in-lbs (21 ft-lbs)**.

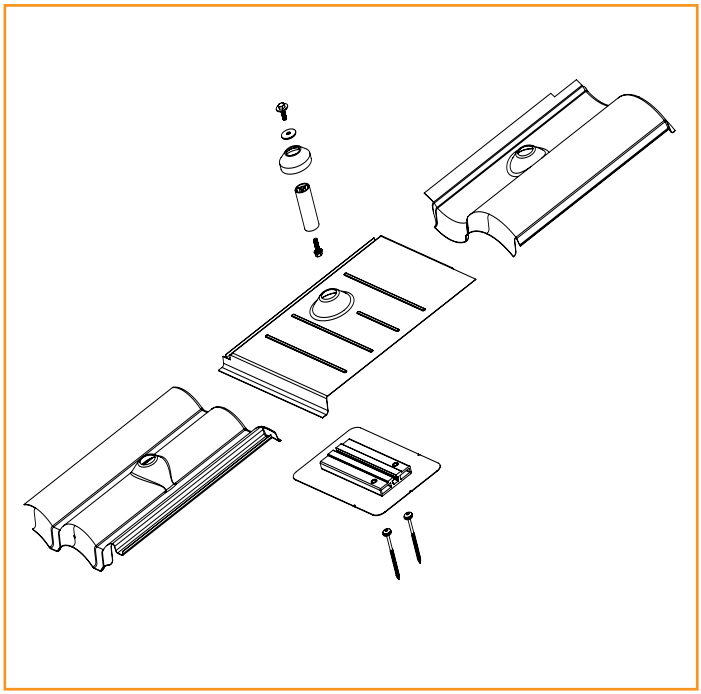
- **Base can be installed in any orientation relative to rafter.**
- **Ensure L-Foot does not extend above rail.**
- **Optional deck level flashing is available. Standalone installation manual available on website**
- **Standalone Knockout Tile manual available on website.**




## QM TILE REPLACEMENT

Remove tile and mark rafter. Measure up 8 3/4" from the adjacent tiles and mark horizontal across rafter. Align baseplate over rafter so that the lag holes align with the post groove. The orientation of the plate can be adjusted cross roof, mark location of lag holes on the roof. Drill two 1/8" Pilot holes and back fill with roofing manufacturers' approved sealant. Waterproof at underlayment level according to roofing manufacturers' instructions and the Tile Roofing Industry Alliance guidelines. Use T-30 Torx bit to lag base into position. Insert Grade 8 Serrated Flange Bolt into bottom of the Post, slide Post into Base channel. Line up post with the hole in the Tile Replacement Flashing. Leave loose for adjustments. Place Tile Replacement Flashing over the Post and Mount, allowing the flashing to properly interlock with surrounding tiles. Secure Post by tightening with channel lock pliers. Replace all tiles. Apply a bead of sealant where the post meets the flashing, slip EPDM collar over post and down to flashing. Attach L-Foot on Standoff with hardware. Torque to **174 in-lbs (14.5 ft-lbs).** Attach rail to L-Foot with Bonding Hardware and torque to **250 in-lbs (21 ft-lbs)**.

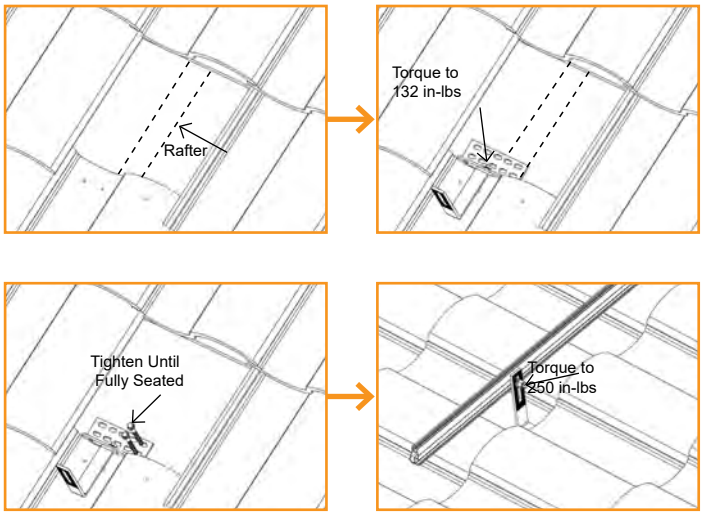
- **If deck level flashing is required, approved flashing methods include user supplied adhesive backed flexible flashing.**
- **For additional details refer to the full QM Installation Manual.**



## ALL TILE HOOK

Remove tile and mark rafter. Position base over rafter, adjust arm if necessary and torque hardware to **132 in-lbs (11 ft-lbs)**. Use base as guide to drill 1/4" pilot holes, back fill with roofing manufacturer's approved sealant, then insert lag bolts and tighten until fully seated. Replace tiles and notch as necessary to ensure proper fit. Attach rails to either side of slot using Bonding Hardware and torque to **250 in-lbs (21-ft-lbs)**.

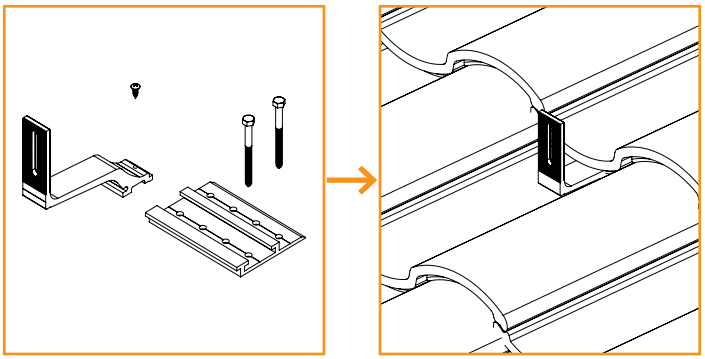
- **Position arm near the center of valley for curved tiles.**
- **Position arm away from seam of joining flat tiles.**
- **Ensure top of hook does not extend above rail.**
- **Standalone All Tile Hook manual available on website.**

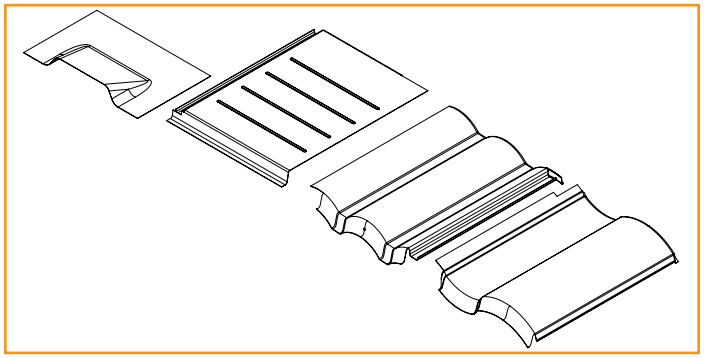



## QM QUICK HOOK

Remove tile and mark rafter, use Base Plate to mark two holes on rafter. Drill two 7/32" pilot holes and back fill with roofing manufacturers' approved sealant. Use 1/2" socket to drive lag into place. Slide hook into place and adjust to desired position. Drive self-tapping screw using a #3 Phillips bit to lock hook in place. Clean underlayment and apply a bead of sealant compatible with roofing manufacturer, install flashing over mount. Fasten sub-flashing to deck with one roofing nail in each corner. Waterproof at underlayment level according to roofing manufacturers' instructions and the Tile Roofing Industry Alliance guidelines. Cut clearance notch in the weather guard of tile as needed or utilize QM Tile Replacement Flashings. Attach rails to either side of slot using Bonding Hardware and torque to **250 in-lbs (21-ft-lbs)**.

- **Position arm near the center of valley for curved tiles.**
- **Position arm away from seam of joining flat tiles.**
- **Ensure top of hook does not extend above rail.**
- **For additional details refer to the full QM Installation Manual.**

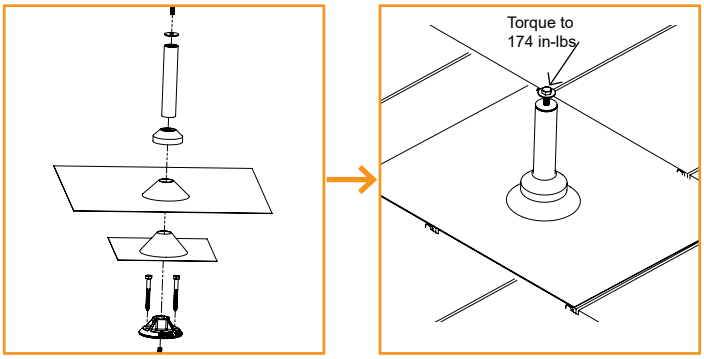




# TILE

## QM QBASE UNIVERSAL TILE MOUNT

Remove tile and mark rafter. Measure up 6 5/8" from bottom of tiles and mark horizontally. Align QBase over rafter center and drill two 7/32" pilot holes, back fill with roofing manufacturers' approved sealant. Place grade-8 Cap Screw under QBase, lag QBase into rafter location. Install Sub-flashing, waterproof at underlayment level according to roofing manufacturers' instructions and the Tile Roofing Industry Alliance guidelines. Cut tile with diamond blade to allow post to pass through. Place tile in position and then install Post. Install 18"x18" flashing, pre-bent to follow the contour of the tile as required. Apply sealant where Post and Flashing meet and install EPDM counter flashing. Attach L-Foot on Standoff with hardware. Torque to **174 in-lbs (14.5 ft-lbs).** Attach rails to L-Foot using Bonding Hardware and torque to **250 in-lbs (21-ft-lbs)**.

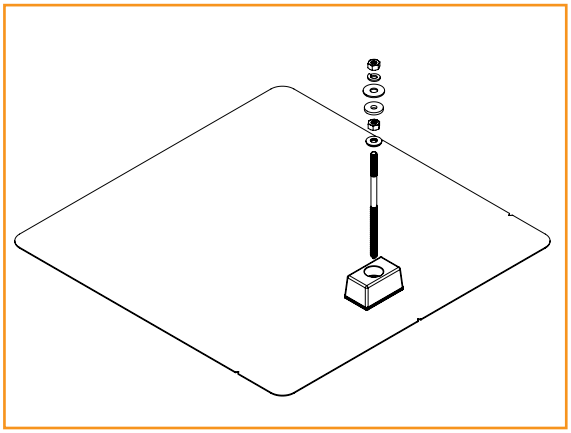



- **For additional details refer to the full QM Installation Manual.**

# ADDITIONAL ROOF TYPES

## QM CLASSIC SHAKE MOUNT

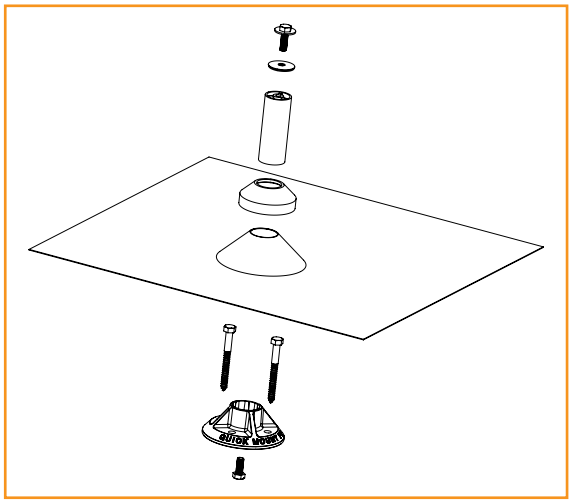
Locate roof rafters and mark locations on roof, remove shakes directly above mount if needed to expose felt paper. Level out installation area and location installation point, mark. Drill 7/32" pilot hole, back fill with roofing manufacturers' approved sealant. Prepare Hanger Bolt with Hex Nut and Sealing washer, insert into QBlock hole and drive into rafter until fully seated and the QBlock no longer swivels easily. Insert EPDM washer over hanger bolt and then install L-Foot in desired orientation and torque hardware to **132 in-lbs (11 ft-lbs)**. Attach rail to L-Foot with Bonding Hardware and torque to **250 in-lbs (21 ft-lbs)**.



- **For additional details refer to the full QM Installation Manual.**

## QM QBASE METAL, SHAKE AND SLATE

The QM QBase can be used to install on multiple roofing types with different installation methods.

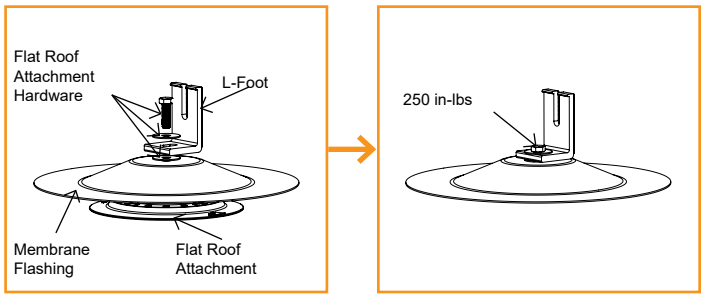


- **For instructions on installing the QBase on Slate refer to the full QM Installation Manual.**
- **For instructions on installing the QBase on Shake refer to the full QM Installation Manual.**
- **For instructions on installing the QBase on Metal Shingle refer to the full QM Installation Manual.**

# LOW SLOPE ROOFS

## FLAT ROOF ATTACHMENT

Flat Roof Attachment can be used with an L-foot for flush mounting modules on low sloped roofs. Mark locations for Flat Roof Attachment. Screws should be installed symmetrically to each other. If using a membrane flashing, remove the silicone washer's protective liner prior to attaching the membrane. Attach L-foot with washers and 3/8” hardware torqued to **250 in-lbs (21 ft-lbs)**. Seal attachment and/or membrane per roofing manufacturer’s requirements.

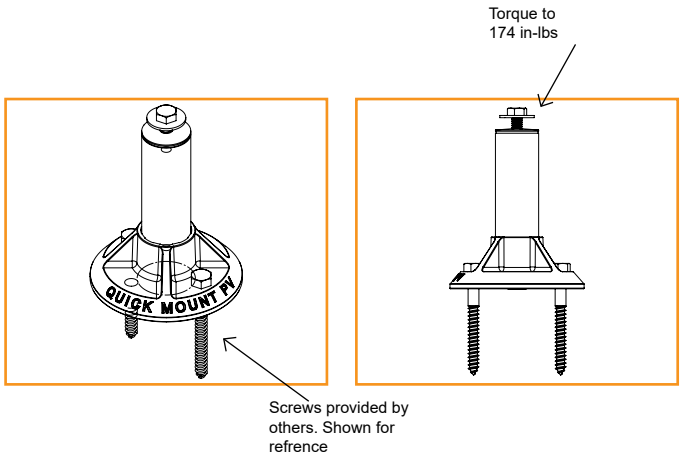



- **Type, size, and quantity of roof screws to be specified by Structural Engineer. Fastener size not to exceed #15.**
- **Membrane flashing available for TPO, PVC, and KEE roofs. Ensure membrane flashing is compatible with existing roofing material.**
- **If membrane flashing is not used, only washer on top of L-Foot is required.**
- **Standalone Flat Roof Attachment Manual available on website.**

## QM QBASE MOUNT

Locate the desired mount placement over a rafter. Using the base as a template, mark the two penetration points. Drill two 7/32" pilot holes, back fill with roofing manufacturers' approved sealant. Place the grade-8 hex bolt in the bottom of the base and screw the Post. Attach L-Foot on Standoff with hardware. Torque to 1**74 in-lbs (14.5 ft-lbs).** Attach rail to L-Foot with Bonding Hardware and torque to **250 in-lbs (21 ft-lbs).**

The mount can be flashed with available 9", 12" or 18" aluminum flashings, pitch pocket or curb, or with a membrane cone flashing. If using a membrane flashing utilize the services of a qualified roofer

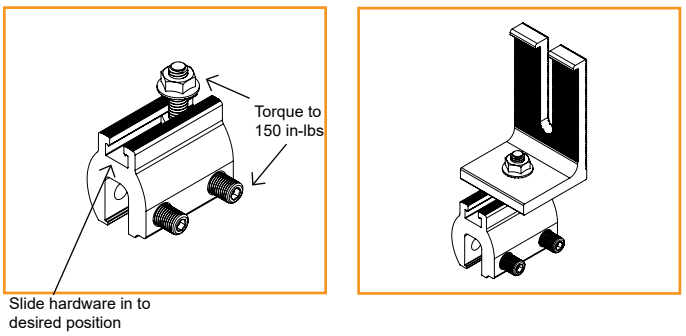



- **For additional details refer to the full QM Installation Manual.**

# METAL ROOF

## QM LYNX

Locate the desired mount placement over a roofing seam, make sure block is fully seated on metal seam. Torque Set Screws to **150 in-lbs(12.5 ft-lbs)** using 3/16" Hex Drive, alternate driving each bolt till required torque is met. Slide Hex Bolt into slot and to desired position. Place rail attachment bracket over Hex Bolt and secure with Flange Nut, torque Flange Nut to **150 in-lbs(12.5 ft-lbs)** using 1/2" socket.

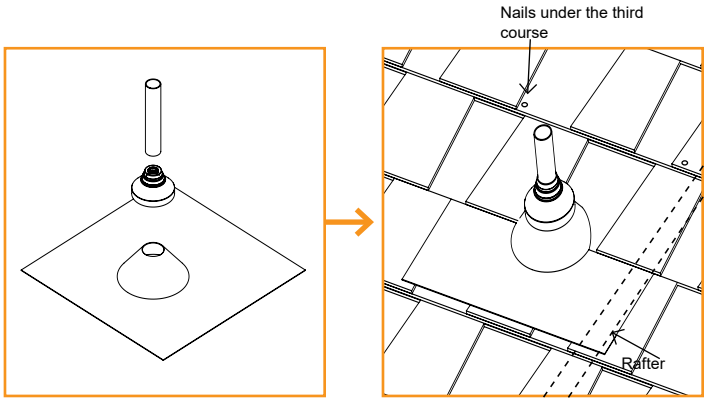



- **For additional details refer to the full QM Installation Manual.**
- **Certification of Lynx calmp includes bonding to both painted and galvalume metal roofs.**

# CONDUIT PENETRATION FLASHINGS

## QM CONDUIT PENETRATION FLASHING - COMP SHINGLE

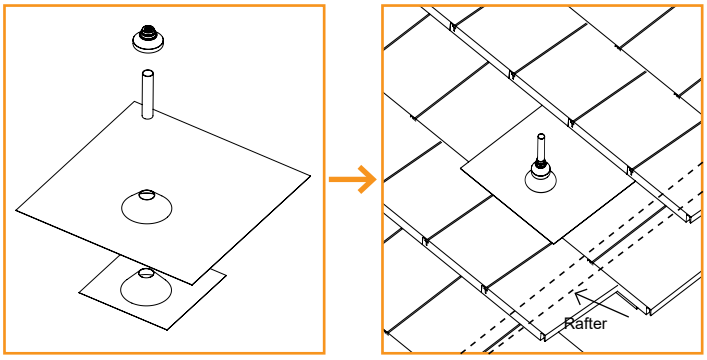
Mark a drill point so that the flashing reaches up to the 3rd shingle course. Drill your conduit hole next to the rafter so you can secure the conduit below the roof surface. Cut shingle and remove nails as needed to center the drilled hole and flashing hole. Apply roofing manufacturer's approved sealant on the underside of the flashing in a Upside down U and to top of flashing. Under the 3rd course and through the second course secure flashing with 2 roofing nails, apply sealant over the nail heads. Cut EPDM collar to appropriate size. Apply a bead of sealant compatible with the roofing manufacturer and EPDM rubber to anywhere the EPDM collar contacts.




- **Be sure to secure conduit to rafters below the roof surface per local building codes and NEC code requirements.**
- **Cut EPDM collar to appropriate size using the sizing chart in the installation manual, approved for 1/2" to 1" EMT.**
- **For additional details refer to the full QM Installation Manual.**

## QM CONDUIT PENETRATION FLASHING - TILE

Drill your conduit hole next to the rafter so that you can secure the conduit below the roof surface. Apply roofing manufacturer approve sealant to the underside of the sub-flashing in the shape of an upside down U. Clear away any dust and debris to install sub-flashing. Waterproof at under laminate level according to roofing manufacturer instructions and Tile Roofing Institute Guidelines. Under the top layer of felt, secure the sub-flashing with two roofing nails. Cut EPDM collar to appropriate size. Apply a bead of sealant compatible with the roofing manufacturer and EPDM rubber to anywhere the EPDM collar contacts. With a diamond blade cut tile to allow conduit to pass through, replace all tiles. Bend the flashing to follow the contour of the tiles. Place flashing over the conduit and tuck up under the next course of tiles. Apply a bead of sealant compatible with the roofing manufacturer and EPDM rubber to anywhere the EPDM collar contacts. Slide collar onto conduit all the way down to the flashing.



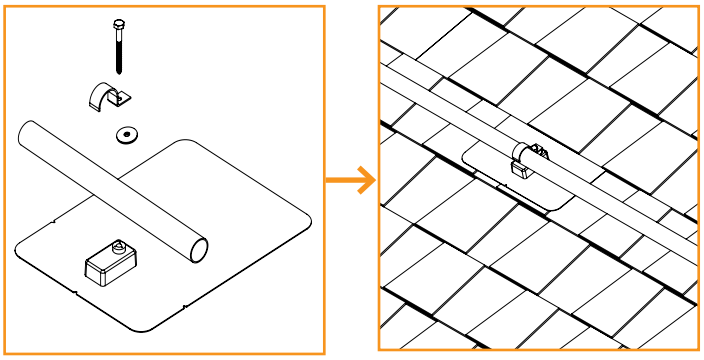

- **Be sure to secure conduit to rafters below the roof surface per local building codes and NEC code requirements.**
- **Cut EPDM collar to appropriate size using the sizing chart in the installation manual, approved for 1/2" to 1" EMT.**
- **For additional details refer to the full QM Installation Manual.**

# CONDUIT MOUNT

## QM CONDUIT MOUNT - COMPOSITION SHINGLE

Place conduit mounts along path of conduit. Lift shingle above mount location and insert flashing into position. Mark center for drilling, remove flashing and drill pilot hole with 1/8" bit. Clean area, fill hole with roofing manufacturer's approved sealant. Lift shingle and slide Conduit Mount into place. Prepare the lag bolt with sealing washer and pipe clamp (not included). Insert lag through hole in block and drill with 7/16" socket until block is tight.

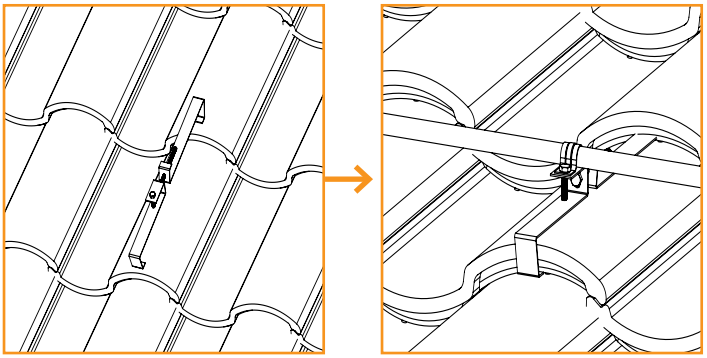
- **Install mounts as required to support conduit across the roof.**
- **For additional details refer to the full QM Installation Manual.**



## QM CONDUIT MOUNT - TILE

Remove the tile that the mount will be installed on, and the tiles in the course above it. Lift the bottom of the tile and slide the bottom clamp over the bottom edge of the tile. Insert the 4" tap bolt through the slot into the threaded hole and use a 7/16" socket to thread the screw. Tighten until the top clamp hook end unbends and forms a 90 degree angle with the tile. Use the Cap Screw (included) to attach your pipe clamp (not included) to bottom clamp. Insert conduit and tighten with 7/16" socket.

- **The clamp is reversible, use the wider hook end on tile greater than 1" thick and the thinner hook end on tiles less than 1" thick.**
- **The installation process is the same on curved tile, make sure that the Conduit Mount is installed on the crown(high point) of the tile.**
- **Install mounts as required to support conduit across the roof.**
- **For additional details refer to the full QM Installation Manual.**

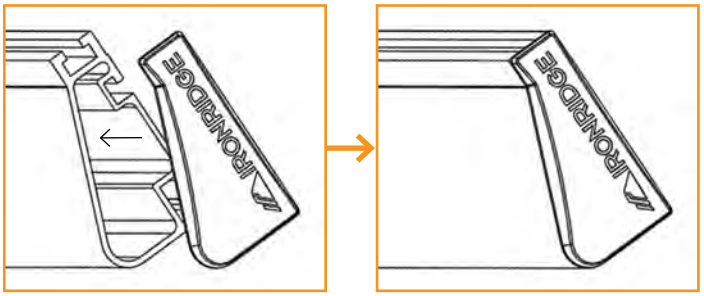


# WIRE CLIPS

End Caps add a completed look and keep debris and pests from collecting inside rail.

Firmly press End Cap onto rail end.

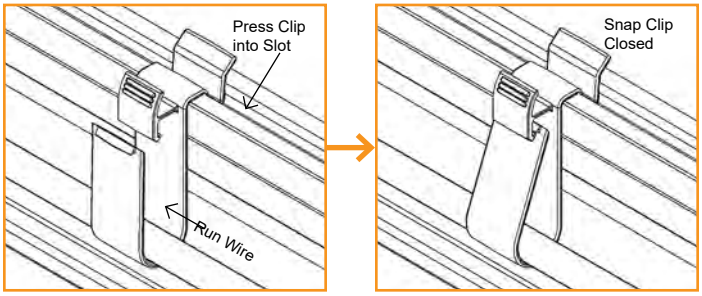
- **End Caps come in sets of left and right. Check that the proper amount of each has been provided.**



## WIRE CLIPS

Wire Clips offer a simple wire management solution.

Firmly press Wire Clip into top rail slot. Run electrical wire through open clip. Snap closed once all wires have been placed.

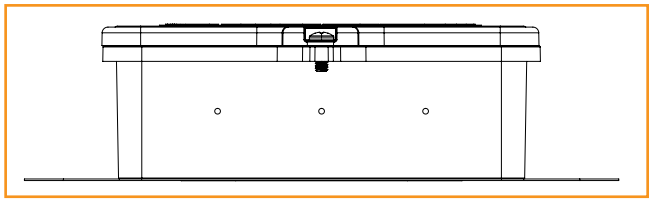



## JAYBOX

**A.**

Prior to installation, use step drill bit to place pass through holes for conduits or water-tight connectors. Drill bit starter locations are provided on the sides and front of enclosure.

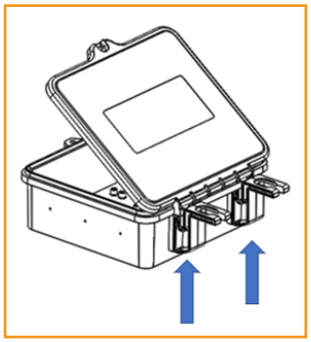
- **Do not install conduit facing up roof.**

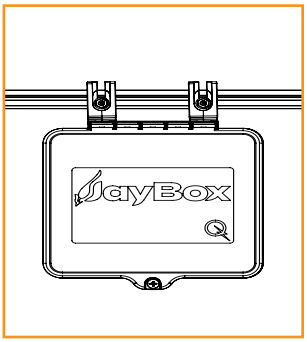


**B (Rail).**

Use rail-specific MLPE mounting hardware to attach Rail Hangers to rail. Ensure junction box is pushed as close to the rail as possible. Torque to 80-in lbs (1/2" or 7/16" socket).

- **Do not overtighten**
- **If installing in areas with ground snow loads greater than 40 psf, install JayBox under module directly next to module frame edge.**

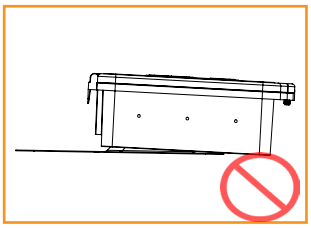


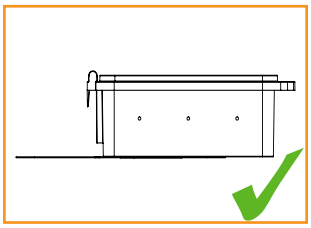


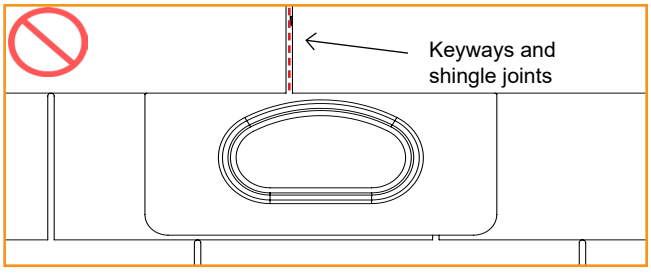

**B (Shingle).**

Align sealing oval of box to align with mating feature on flashing. An EPDM foam gasket is pre-installed to the underside of the junction box to seal the flashing to the box without the need for additional sealant. Secure with supplied #12 x 1-¾" deck screws (2x) until the junction box is pulled tight to the flashing. Do not over-tighten screws to avoid stripping screws in OSB.

- **If installing pass through fittings, ensure that the JayBox and roof deck are both properly prepared. Complete installation process before attaching the Jaybox to the deck.**
- **Do not install JayBox under shingle seam as illustrated below.**



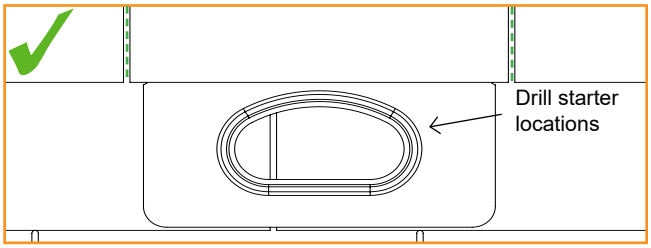





**C.**

Install wiring, conduit and fittings per NEC requirements and following local AHJ guidance. Using Philips Head Driver tighten the bolt.

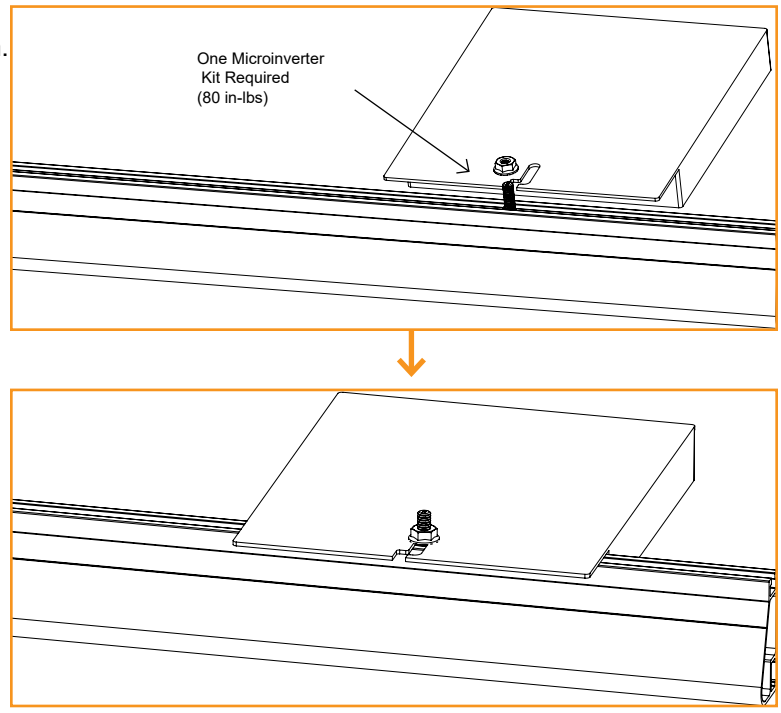
- **For additional details refer to the full QM Installation Manual.**



# MICROINVERTER KITS

Use IronRidge's Microinverter Kit to bond compatible microinverters and power optimizers to the racking system.

Insert Microinverter Kit T-bolt into top rail slot. Place compatible microinverter or power optimizer into position and tighten hex nut to **80 in-lbs**.




- **If installing in areas with ground snow loads greater than 40 psf, install MLPE devices directly next to module frame edge**

## COMPATIBLE PRODUCTS

**Enphase**
**M250-72, 250-60, M215-60, C250-72, S230, S280, IQ 6, IQ 6+, IQ IQ7, IQ 7A, IQ 7+, IQ7 PD, IQ 7X, Q Aggregator; IQ8-60, IQ8PLUS-72, IQ8A-72, IQ8H-208-72, IQ8H-240-72, IQ8M-72, may be followed by -2-US**

**Darfon**
**MIG240, MIG300, G320, G640**

**Solar Edge**
**M1600, P300, P320, P340, P370, P400, P401, P405, P485, P505, P600, P700, P730, P750, P800p, P800s, P801, P850, P860, P950, P960, P1100, P1101, S440, S500, S1200, S1201**

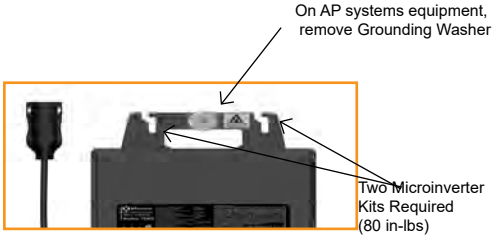
**SMA**
**RoofCommKit-P2-US, TS4-R Module Retrofit Kits (TS4-R-S, TS4-R-O, TS4-R-F)**

**Tigo**
**Tigo Access Point (TAP)**
**TS4-R-X (where X can be F, M, O, or S)**
**TS4-R-X-DUO (where X can be M, O, or S)**
**TS4-A-X (where X can be F, 2F, O, O-DUO, or S)**

**Generac**
**S2502**

**AP Systems**
**DS3, QS1, QT2 and YC600**

**NEP**
**BDM-300, BDM-300X2 and BDM-800**




- **Remove Grounding Washer on AP Systems QS1, QT2, DS3 and YC600 inverters before installing to XR rails.**
- **Remove the Stainless Steel Clip on Tigo-"A" MLPE Devices before attaching to XR rails.**
- **Use the number of IronRidge Microinverter kits allowed by the MLPE mounting flange. Some will require 1 kit and others 2 kits.**

# SYSTEMS USING ENPHASE MICROINVERTERS OR SUNPOWER AC MOD-

IronRidge systems using approved Enphase products or SunPower modules eliminate the need for lay-in lugs and field installed equipment grounding conductors (EGC). This solution meets the requirements of UL 2703 for bonding and grounding and is included in this listing.

## COMPATIBLE PRODUCTS

**Sunpower**
**Modules with model identifier Ab-xxx-YY and InvisiMount (G5) 46mm frame; where "A" is either E, or X; "b" can be 17, 18, 19, 20, 21, or 22; and "YY" can be C-AC, D-AC, BLK-C-AC, or BLK-D-AC.**

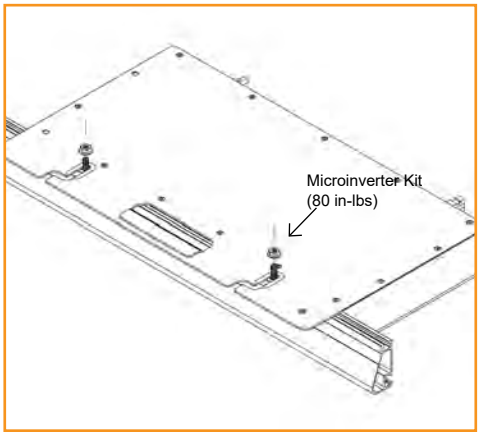
**Enphase**
**Microinverters M250-72, M250-60, M215-60, C250-72, and Engage cables ETXX-240, ETXX-208, ETXX-277.**

- **A minimum of two inverters mounted to the same rail and connected to the same Engage cable are required.**
- **The microinverters or Sunpower AC modules must be used with a maximum 20 A branch rated overcurrent protection device (OCPD).**
- **If an AC module is removed from a circuit for maintenance, you must first disconnect AC power and then install a temporary EGC to bridge the gap by inserting an AC extension cable (or via other NEC-compliant means), in order to maintain effective ground continuity to subsequent modules.**

# SYSTEMS USING MICROSTORAGE PRODUCTS

Use IronRidge's Microinverter Kit to bond compatible microstroage devices to the racking system. Insert Microinverter Kit T-bolt into top rail slot. Place compatible microstorage into position and tighten hex nut to **80 in-lbs**.

PHAZR



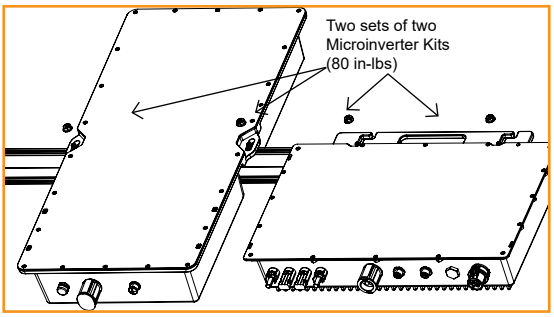

## COMPATIBLE PRODUCTS

**PHAZR**
**PHAZR Devices PHAZR-X, where X is 6-12.**

**Solpad**
**Solpad Inverter model SI-1k**
**Solpad Battery Storage model SB-2K**
**Solpad Junction Box model SJB-4k**

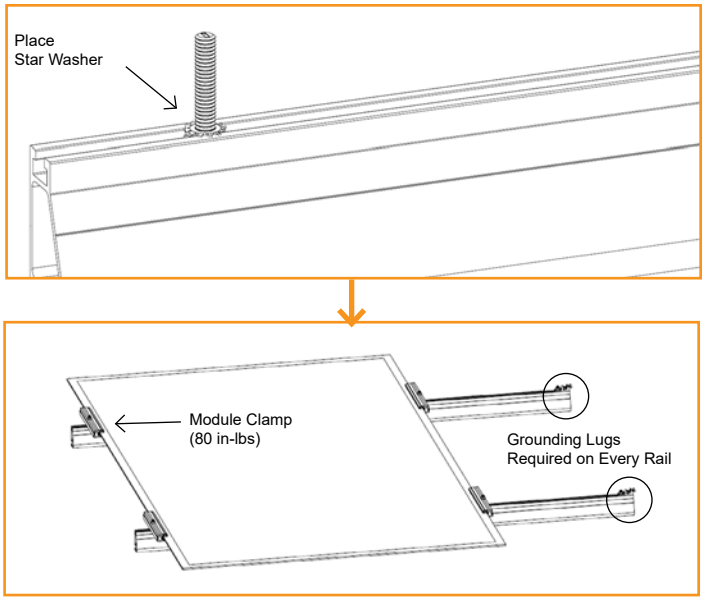
- **Running a separate equipment grounding conductor to the PHAZR or Solpad devices is not required.**
- **If installing in areas with ground snow loads greater than 40 psf and underneath a module, install PHAZR and Solpad devices as close as possible to module frame edge.**
- **Solpad may only be installed on XR-100 and XR-1000**
- **Solpad may only be installed with modules having a frame thickness of 35mm or greater.**
- **Use the number of IronRidge Microinverter kits allowed by the microstorage mounting flange. Some will require 1 kit and others 2 kits.**

Solpad




# FRAMELESS MODULE KITS

Insert Frameless Kit T-bolt in top rail slot. Place star washer over T-bolt, allowing it to rest on top of rail. Secure module clamps with a hex nut and torque to **80 in-lbs**.




## COMPATIBLE PRODUCTS

**Sunforson**
**Sunforson silver or black SFS-UTMC-200(B) mid and SFS-UTEC-200(B) end clamps.**

**Sunpreme**
**Sunpreme silver or black mid and end clamps with part numbers 7500105X where "X" is 1, 5, 6 or 7.**

**Ironridge**
**IronRidge silver or black mid and end clamps with part numbers FMLS-XC-001-Y where "X" is E or M and "Y" is B or blank.**

- **Follow module manufacturer's installation instructions to install the module clamps.**
- **Frameless modules require using a Grounding Lug on every rail.**
- **For Sunpreme Modules Only: If required to use slide prevention hardware, see Module Slide Prevention Addendum (Version 1.10).**

### Install Contour

Install Contour on a completed array.

**A.** Start by placing Contour Clamp on module frame within 12 inches of the down roof corner of the array. Each piece of 84" Contour Trim must be suppported by two Clamps. Clamps must be installed in the 12" clamping zones at edge of trim. Once trim is placed and in position, secure trim by tightening  Clamp set screw to **80 in-lbs**.

**B.** Multiple Contour pieces can be joined using Contour Splice. Install Splice on exsisting Contour edge and install Clamps in appropriate clamping zones for next piece of trim. Place trim on Clamps, slide into splice to join two pieces together.  Secure Contour by tightening Clamp set screw to **80 in-lbs**. Repeat as needed across the array.

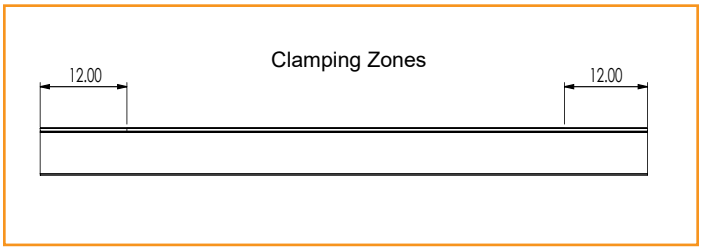
**C.** Cut trim to line up with edge of array.

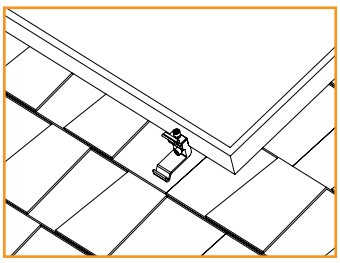
**D.** Install Clamps within clamping zones on side of array. Install second Clamp as needed up array.  Place Corner Cap on trim and slide side trim to align with Cap.  Repeat as needed along roof for both inside and outside corners.

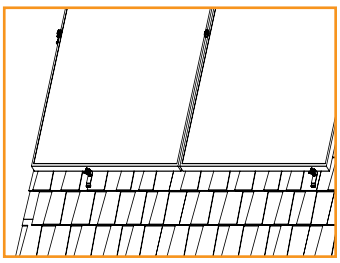
**E.** Use optional End Caps to cover any exposed edges of Contour as desired.

- **Do not install on side of array facing roof peak.**
- **Contour can be installed with 1 clamp if trim section is 12" long (or shorter) and has a splice attached on one end, on which the section of trim the 12" section is spliced to also has 2 clamps.**
- **Contour Trim when installed when installed up roof requires the use of Aire Stealth Clamps.**
- **Wind Speed: no restrictions**
- **Ground Snow: up to 90 PSF**

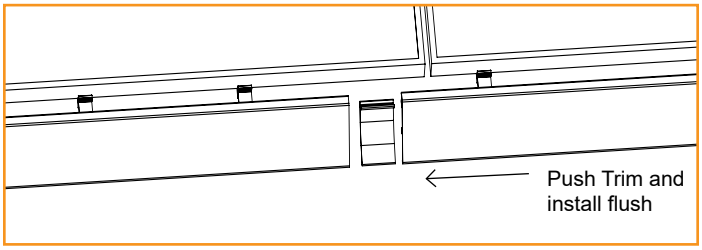
**A.**



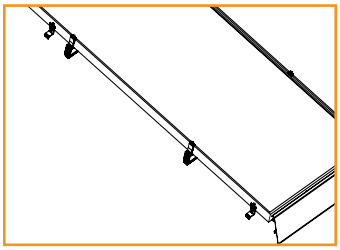





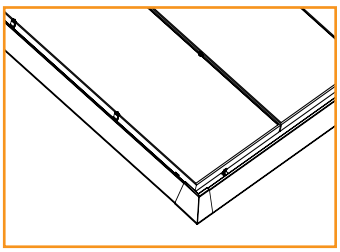
**B.**



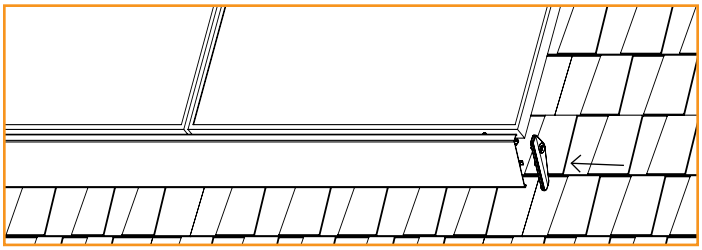

**C.**



**D.**



**E.**



# MODULE COMPATIBILITY

The Flush Mount System may be used to ground and/or mount a PV module complying with UL 2703 only when the specific module has been evaluated for grounding and/or mounting in compliance with the included instructions. Unless otherwise noted, “xxx” refers to the module power rating and both black and silver frames are included in the certification.

## FRAMED MODULE LIST

| MAKE | MODELS |
|---|---|
| Adani | Adani modules with 35 and 40mm frames<br>ASX-Y-ZZ-xxx<br>Where "X" can be B, M or P, "Y" can be 6, 7 or M10 and "ZZ" can be blank, 144, PERC, B-PERC, or AB-PERC |
| AIONRISE | AIONRISE modules with 35 and 40mm frames<br>AIONyyG1-xxx<br>Where "yy" can be 60 or 72 |
| Amerisolar | Amerisolar modules with 35 and 40 mm frames<br>AS-bYxxxZ<br>Where "b" can be 5 or 6; "Y" can be M, P, M27, P27, M30, or P30; and "Z" can be blank, W or WB |
| Aptos Solar | Aptos modules with 35 and 40 mm frames<br>DNA-yy-zzaa-xxx<br>Where "yy" can be 120 or 144; "zz" can be MF or BF; and "aa" can be 23 or 26 |
| Astronergy Solar | Astronergy modules with 30, 35 and 40 mm frames<br>aaSMbbyyC/zz-xxx<br>Where “aa” can be CH or A; "bb" can be 60, 66, or 72; “yy” can be blank, 10 or 12; "C" can M, P, M(BL), M-HC, M(BL)-HC, P-HC, M(DG), or M(DGT); and “zz” can be blank, HV, F-B, or F-BH |
| ASUN | ASUN modules with 35 and 40 mm frames<br>ASUN-xxx-YYZZ-aa<br>Where "YY" can be 60 or 72; "ZZ" can be M,or MH5; and "aa" can be blank or BB |
| Auxin | Auxin modules with 40 mm frames<br>AXN6y6zAxxxB<br>Where "y" can be M or P; "z" can be 08, 09, 10, 11, or 12; and "A" can be F, M or T; and "B" can be blank, A, B or C |
| Axitec | Axitec Modules with 30, 35 and 40 mm frames<br>AC-xxxY/aaZZb<br>Where "Y" can be M, P, MB or MH; "aa" can be blank, 125- or 156-; "ZZ" can be 54, 60, 72, 108, 120, or 144; "b" can be S, X, V, VB, XV, or MX |
| Bluesun Solar | Bluesun modules with 30 and 35mm frames<br>BSMxxxY-AAA<br>Where "Y" can be M or M10; and "AAA" can be 54HPH, 60HPH or 72HBD |
| Boviet | Boviet modules with 35 and 40mm frames<br>BVMZZaaYY-xxxBcc<br>Where "ZZ" can be 66 or 76; "aa" can be 9, 10 or 12; "YY" is M or P; and "B" can be blank, L or S; and "cc" can be blank, H, H-BF, H-BF-DG, H-HC, H-HC-BF, H-HC-BF-DG, HC-BF or HC-BF-DG |
| BYD | BYD modules with 35 mm frames<br>BYDxxxAY-ZZ<br>Where "A" can be M6, P6, MH or PH; "Y" can be C or K; and "ZZ" can be 30 or 36 |
| Canadian Solar | Canadian Solar modules with 30, 32, 35 and 40 mm frames<br>CSbY-xxxZ<br>Where "b" can be 1, 3, 6 or 7 "Y" can be H, K, L, N, P, R, U, V, W, X or Y; and "Z" can be M, P, MS, PX , M-SD, P-AG, P-SD, MB-AG, PB-AG, MS-AG, MS-HL, or MS-SD |
| CertainTeed | CertainTeed modules with 35 and 40 frames<br>CTxxxYZZ-AA<br>Where "Y" can be M, P, or HC; "ZZ" can be 00, 01, 10, or 11; and "AA" can be 01, 02, 03, 04 or 06 |

# MODULE COMPATIBILITY

| | |
|---|---|
| CSUN | Csun modules with 35 and 40 mm frames<br>YYxxx-zzAbb<br>Where "YY" is CSUN or SST; "zz" is blank, 60, or 72; and "A" is blank, P, M or MM; "bb" is blank, BB, 5BB, BW, or ROOF |
| Dehui | Dehui modules with 30, 35 and 40mm frames<br>DH-MYYYZ-xxx<br>Where “YYY” can be 760, 772, 860, 872; and “Z” can be B, F or W |
| Ecosolargy | Ecosolargy modules with 35 and 40 mm frames<br>ECOxxxYzzA-bbD<br>Where “Y” can be A, H, S, or T; “zz” can be 125 or 156; “A” can be M or P; “bb” can be 60 or 72; and “D” can be blank or B |
| ET Solar | ET Solar modules with 30, 35 and 40 mm frames<br>ET-YZZZxxxAA<br>Where "Y" can be P, L, or M; "ZZZ" can be 660, 660BH, 672, 672BH, 754BH, 766BH, 772BH; and "AA" can be GL, TB, TW, WB, WW, BB, WBG, WWG, WBAC, WBCO, WWCO, WWBCO or BBAC |
| Flex | Flex modules with 35 and 40 mm frames<br>FXS-xxxYY-ZZ;<br>Where “YY” can be BB or BC; and “ZZ” can be MAA1B, MAA1W, MAB1W, SAA1B, SAA1W, SAC1B, SAC1W, SAD1W, SBA1B, SBA1W, SBC1B, or SBC1W |
| Freedom Forever | Freedom Forever modules with 35mm frames<br>FF-MP-BBB-xxx |
| GCL | GCL modules with 35 mm and 40 mm frames<br>GCL-ab/YY xxx<br>Where “a” can be M or P; “b” can be 3 or 6; and “YY” can be 60, 72, 72H, or 72DH |
| GigaWatt Solar | Gigawatt modules with 40 mm frames<br>GWxxxYY<br>Where “YY” can be either PB or MB |
| Hansol | Hansol modules with 35 and 40 frames<br>HSxxxYY-zz<br>Where “YY” can be PB, PD, PE, TB, TD, UB, UD, or UE; and “zz” can be AH2, AN1, AN3, AN4, HH2, HV1, or JH2 |
| Hanwa Solar | Hanwha Solar modules with 40 mm frames<br>HSLaaP6-YY-1-xxxZ<br>Where “aa” can be either 60 or 72; “YY” can be PA or PB; and “Z” can be blank or B |
| Hanwha Q CELLS | Hanwha Q CELLS Modules with 32, 35, 40mm frames<br>aaYY-ZZ-xxx<br>where "aa" can be Q. or B.; "YY" can be PLUS, PRO, PEAK, LINE PRO, LINE PLUS, PLUS DUO or PEAK DUO; and "ZZ" can be G3, G3.1, G4, G4.1, L-G2, L-G2.3, L-G3, L-G3.1, L-G3y, L-G4, L-G4.2, L-G4y, LG4.2/TAA, BFR-G3, BLK-G3, BFR-G3.1, BLK-G3.1, BFR-G4, BFR-G4.1, BFR G4.3, BLK-G4.1, G4/SC, G4.1/SC, G4.1/TAA, G4.1/MAX, BFR G4.1/TAA, BFR G4.1/MAX, BLK G4.1/TAA, BLK G4.1/SC, EC-G4.4, G5, G5/SC, G5/TS, BLK-G5, BLK-G5/SC, BLK-G5/TS, L-G5, L-G5.1, L-G5.2, L-G5.2/H, L-G5.3, G6, G6/SC, G6/TS, G6+/TS, G6+, BLK-G6, L-G6, L-G6.1, L-G6.2, L-G6.3, G7, BLK-G6+, BLK-G6+/AC, BLK-G6+/HL, BLK-G6+/SC, BLK-G6/TS, BLK-G6+/TS, BLK-G7, G7.2, G8, BLK-G8, G8+, BLK-G8+ L-G7, L-G7.1, L-G7.2, L-G7.3, L-G8, L-G8.1, L-G8.2, L-G8.3, L-G8.3/BFF, L-G8.3/BFG, L-G8.3/BGT, ML-G9, BLK ML-G9, ML-G9+, BLK ML-G9+, BLK-G10+, BLK G10+/AC, ML-G10, BLK ML-G10, ML-G10+, BLK ML-G10+, ML-G10.a, BLK ML-G10.a, ML-G10.a+, BLK ML-G10.a+, XL-G9, XL-G9.2, XL-G9.3, XL-G9.3/BFG, XL-G10.2, XL-G10.3, XL-G10.c, XL-G10.d, XL-G10.d/BFG, XL-G10.3/BFG, XL-G11.2, XL-G11.3 or XL-G11.3/BFG |
| Heliene | Heliene modules with 35 and 40 mm frames<br>YYZZxxxA<br>Where "YY" can be 36, 60, 72, 96, 120 or 144; "ZZ" can be HC, M, P, or MBLK; and "A" can be blank, HomePV, Bifacial, M10 Bifacial or M10 SL-Bifacial |
| HT-SAAE | HT-SAAE modules with 35 and 40 mm frames<br>HTyy-aaaZ-xxx<br>Where "yy" can be 60, 66, 72 or 78, "aaa" can be 18, 156 or 166, "Z" can be M, P, M-C, P-C, M(S), M(VS), M(V), P(V), M(V)-C, P(V)-C, or X |

# MODULE COMPATIBILITY

| | |
|---|---|
| Hyundai | Hyundai modules with 32, 33, 35 and 40mm frames<br>HiY-SxxxZZ<br>Where "Y" can be A, D or S; "S" can be M or S; and "ZZ" can be GI, HG, HI, KI, MI, MF, MG, PI, RI, RG, RG(BF), RG(BK), SG, TI, TG, YH(BK) or XG(BK) |
| Itek | Itek Modules with 40 mm frames<br>IT-xxx-YY<br>Where “YY” can be blank, HE, or SE, or SE72 |
| JA Solar | JA Solar modules with 30, 35 and 40 mm frames<br>JAyyzz-bbww-xxx/aa<br>Where “yy” can be M, P, M6 or P6; “zz” can be blank, (K), (L), (R), (V), (BK), (FA), (TG), (FA)(R), (L)(BK), (L)(TG), (R)(BK), (R)(TG), (V)(BK), (BK)(TG), or (L)(BK)(TG); “bb” can be 48, 54, 60, 66, 72 or 78; "ww" can be D09, D10, D20, D30, S01, S02, S03, S06, S09, S10, S12, S17, S20, S30 or S31; and “aa” can be BP, MB, MR, SI, SC, PR, 3BB, 4BB, 4BB/RE, 5BB |
| Jinko | Jinko modules with 35 and 40 mm frames<br>JKMYxxxZZ-aa<br>Where "Y" can either be blank or S; "ZZ" can be M, P, or PP; and "aa" can be blank, 60, 60B, 60H, 60L, 60BL, 60HL, 60HB, 60HBL, 6HBL-EP, 60-J4, 60B-J4, 60B-EP, 60(Plus), 60-V, 60-MX, 6RL3, 6RL3-B, 6TL3-B, 7RL3-V, 7RL3-TV, 72, 72B, 72-J4, 72B-J4, 72(Plus), 72-V, 72H-V, 72L-V, 72HL-V, 72HL4-V, 72HL4-TV, 72-MX, 72H-BDVP, 72HL-TV, or 72HL-V-MX3 |
| Kyocera | Kyocera Modules<br>KYxxxZZ-AA<br>Where “Y” can be D or U; “ZZ” can be blank, GX, or SX; and “AA” can be LPU, LFU, UPU, LPS, LPB, LFB, LFBS, LFB2, LPB2, 3AC, 3BC, 3FC, 4AC, 4BC, 4FC, 4UC, 5AC, 5BC, 5FC, 5UC, 6BC, 6FC, 8BC, 6MCA, or 6MPA |
| LG | LG modules with 35 and 40 mm frames<br>LGxxxYaZ-bb<br>Where "Y" can be A, E, M, N, Q, S; "a" can be A, 1, 2 or 3 "Z" can be C, K, T, or W; and "bb" can be A3, A5, A6, B3, B6, E6, E6.AW5, G3, G4, J5, K4, L5, N5, V5, V6 |
| Longi | Longi modules with 30, 35 and 40 mm frames<br>LRa-YYZZ-xxxM<br>Where "a" can be 4, 5 or 6; "YY" can be blank, 60, 66, or 72; and "ZZ" can be blank, BK, BP, HV, PB, PE, PH, HBD, HIB, HIH, HPB, HPH, or HIBD |
| Maxeon | Maxeon modules with 35, 40 and 46mm frames<br>SPR-AAAY-xxx-zzz<br>Where "AAA" can be MAX, P or X; "Y" can be 3, 5, 6, 21 or 22; and "zzz" can be BLK, COM or UPP |
| Meyer Burger | Meyer Burger Modules with 35mm frames<br>Meyer Burger Black or White |
| Mission Solar | Mission Solar modules with 33, 35 and 40 mm frames<br>YYYbb-xxxZZaa<br>Where "YYY" can be MSE or TXS; "bb" can be blank, 6 or 60A; "ZZ" can be blank, MM, SE, SO, SQ , SR, SX, TS, 120 or 144; and "aa" can be blank, BB, BW, 1J, 4J, 4S, 5K, 5R, 5T, 60, 6J, 6S, 6W, 6Z, 8K, 8T, or 9S |
| Mitsubishi | Mitsubishi modules<br>PV-MYYxxxZZ<br>Where “YY” can be LE or JE; and “ZZ” can be either HD, HD2, or FB |
| Moltech | IM and XS series modules with 40 mm frames |
| Next Energy Alliance | Next Energy Alliance modules with 35 and 40mm frames<br>yyNEA-xxxZZ<br>where “yy” can be blank or US; “ZZ” can be M, MB or M-60 |
| Neo Solar Power | Neo Solar Power modules with 35 mm frames<br>D6YxxxZZaa<br>Where “Y” can be M or P; “ZZ” can be B3A, B4A, E3A, E4A, H3A, H4A; and “aa” can be blank, (TF), ME or ME (TF) |

# MODULE COMPATIBILITY

| | |
|---|---|
| Panasonic (HIT) | Panasonic modules with 35 and 40 mm frames<br>VBHNxxxYYzzA<br>Where “YY” can be either KA, RA, SA or ZA; “zz” can be either 01, 02, 03, 04, 06, 06B, 11, 11B, 15, 15B, 16, 16B, 17, or 18; and “A” can be blank, E, G, or N |
| Panasonic (EverVolt) | Panasonic modules with 30 mm frames<br>EVPVxxxA<br>Where "A" can be blank or H, K or PK |
| Peimar | Peimar modules with 40 mm frames<br>SbxxxYzz<br>Where “b” can be G, M or P; “Y” can be M or P; and “zz” can be blank, (BF) or (FB) |
| Philadelphia Solar | Philadelphia modules with 35 and 40 mm frames<br>PS-YzzAA-xxx<br>Where "Y" can be M or P; "zz" can be 60, 72 or 144; and "AA" can be blank, (BF), (HC) or (HCBF) |
| Phono Solar | Phono Solar modules with 30, 35 and 40mm frames<br>PSxxxY-ZZ/A<br>Where "Y" can be M, M1, MH, M1H, M4, M4H, M5GF, M5GFH, M6, M6H, M8GF, M8GFH or P; "ZZ" can be 18, 20 or 24; and "A" can be F, T, TH, U, UH, UHB, VH or VHB |
| Prism Solar | Prism Solar modules with 35mm frames<br>PST-xxxW-M72Y<br>Where "Y" can be H, HB or HBI |
| Recom | Recom modules with 35 and 40 mm frames<br>RCM-xxx-6yy<br>Where “yy” can be MA, MB, ME or MF |
| REC Solar | REC modules with 30 and 38 mm frames<br>RECxxxYYZZ<br>Where “YY” can be AA, M, NP, NP2, PE, PE72, TP, TP2, TP2M, TP2SM, TP2S, TP3M or TP4; and “ZZ” can be blank, Black, BLK, BLK2, SLV, 72, or Pure |
| Renesola | ReneSola modules with 35 and 40 mm frames<br>AAxxxY-ZZ<br>Where "AA" can be SPM(SLP) or JC; "Y" can be blank, F, M or S; and "ZZ" can be blank, Ab, Ab-b, Abh, Abh-b, Abv, Abv-b, Bb, Bb-b, Bbh, Bbh-b, Bbv, Bbv-b, Db, Db-b, or 24/Bb |
| Renogy | Renogy Modules with 40 mm frames<br>RNG-xxxY<br>Where “xxx” is the module power rating; and “Y” can be D or P |
| Risen | Risen Modules with 30, 35 and 40 mm frames<br>RSMyy-a-xxxZZ<br>Where "yy" can be 60, 72, 110, 120, 132 or 144; "a" can be 6, 7 or 8; and "ZZ" can be M, P or BMDG |
| S-Energy | S-Energy modules with 35 and 40mm frames<br>SABB-CCYYY-xxxZ<br>Where “A” can be C, D, L or N; “BB” can be blank, 20, 25, 40 or 45; “CC” can be blank, 60 or 72; “YYY” can be blank, BDE, MAE, MAI, MBE, MBI, MCE or MCI; and “Z” can be V, M-10, P-10 or P-15 |
| SEG Solar | SEG Solar with 30, 35 and 40 mm frames<br>SEG-aYY-xxxZZ<br>Where "a" can be blank, 6 or B; "YY" can be blank, MA, MB, PA, or PB; and "ZZ" can be blank, BB, BG, BW, HV, WB, WW, BMB, BMA-HV, BMA-BG, BMA-TB, BMB-TB, BMB-HV, BMD-HV, BMB-BG |
| Seraphim USA | Seraphim modules with 30, 35 and 40 mm frames<br>SRP-xxx-YYY-ZZ<br>Where "xxx" is the module power rating; and "YYY" can be BMA, BMD, 6MA, 6MB, 6PA, 6PB, 6QA-XX-XX, and 6QB-XX-XX; ZZ is blank, BB, BG or HV |
| Sharp | Sharp modules with 35 and 40 mm frames<br>NUYYxxx<br>Where “YY” can be SA or SC |

# MODULE COMPATIBILITY

| | |
|---|---|
| Shinsung E&G | Shinsung Modules with 35mm frames<br>SSVxxx-144MH |
| Silfab | Silfab Modules with 35 and 38 mm frames<br>SYY-Z-xxxAb<br>Where "YY" can be IL, SA, LA, SG or LG; "Z" can be blank, M, P, or X; "A" can be blank, B, H, M, N; and "b" can be A, C, G, K, L, N, T, U or X |
| Solaria | Solaria modules with 35 and 40 mm frames<br>PowerA-xxxY-ZZ<br>Where "A" can be X or XT, "Y" can be R or C; and "ZZ" can be blank, AC, BD, BX, BY, PD, PL, PM, PM-AC, PX, PZ, WX or WZ |
| Solarcity (Tesla) | Solarcity modules with 40 mm frames<br>SCxxxYY<br>Where “YY” can be blank, B1 or B2 |
| SolarTech | SolarTech modules with 40 mm frames<br>AAA-xxxYY<br>Where "AAA" can be PERCB-B, PERCB-W, HJTB-B, HJTB-W or STU; "YY" can be blank, PERC or HJT |
| SolarWorld AG | SolarWorld Sunmodule Plus, Protect, Bisun, XL, Bisun XL, may be followed by mono, poly, duo, black, bk, or clear; modules with 31 and 33 mm frames<br>SW-xxx |
| SolarWorld Americas | SolarWorld Sunmodule Plus, Protect, Bisun, XL, Bisun XL, may be followed by mono, poly, duo, black, bk, or clear; modules with 33 mm frames<br>SWA-xxx |
| Sonali | Sonali Modules with 35 and 40 mm frames<br>SS-M-xxx<br>Where "M" can be blank or M |
| Stion | Stion Thin film modules with 35 mm frames<br>STO-xxx or STO-xxxA |
| SunEdison | SunEdison Modules with 35 and 40 mm frames<br>SE-YxxxZABCDE<br>Where "Y" can be B, F, H, P, R, or Z; "Z" can be 0 or 4; "A" can be B,C,D,E,H,I,J,K,L,M, or N ; "B" can be B or W; "C" can be A or C; "D" can be 3, 7, 8, or 9; and "E" can be 0, 1 or 2 |
| Suniva | Suniva modules with 35, 38 and 40 mm frames<br>OPTxxx-AA-B-YYY-Z<br>MVXxxx-AA-B-YYY-Z<br>Where "AA" is either 60 or 72; "B" is either 4 or 5; "YYY" is either 100,101,700,1B0, or 1B1; and "Z" is blank or B |
| Sunmac Solar | Sunmac Solar modules with 30 and 35mm frames<br>SMxxxMaaaZZ-BB<br>Where "aaa" can be 660 or 754; and "ZZ" can be NH or SH |
| Sunpower | Sunpower standard (G3 or G4) or InvisiMount (G5) 35 and 40mm frames<br>SPR-Zb-xxx-YY<br>Where "Z" can be A, E, M, P or X; “b” can be blank, 17, 18, 19, 20, 21, or 22; and “YY” can be blank, BLK, COM, C-AC, D-AC, E-AC, BLK-E-AC, G-AC, BLK-G-AC, H-AC, BLK-H-AC, BLK-C-AC, or BLK-D-AC |
| Sunspark | Sunspark modules with 40 mm frames<br>SYY-xxxZ-A<br>Where “YY” can be MX or ST; and “Z” can be M, MB, M3, M3B, P or W; and "A" can be 60 or 72 |
| Suntech | Suntech Modules with 35 and 40mm frames<br>STPxxxy-zz/aa<br>Where "y" is blank or S; and "zz" can be 20, 24, A60, A72U, B60 or B72; and "aa" can be Vd, Vem, Vfw, Vfh, Vnh, Wdb, Wde, Wd, Wfhb or Wnhb |
| Talesun | Talesun modules with 30, 35 and 40mm frames<br>TAByZZaa-xxx-b<br>Where "A" can be D or P; "B" can be 6 or 7; "y" can be blank, F, G, H, I or L; "ZZ" can be 60, 66, 72 or 78; "aa" can be M, M(H), or P; and "b" can be blank, B, T, or (H) |

# MODULE COMPATIBILITY

| | |
|---|---|
| Tesla | Tesla modules with 40 mm frames<br>TxxxY<br>Where "Y" can be H or S |
| Trina | Trina Modules with 30, 35 and 40mm frames<br>TSM-xxxYYZZ<br>Where "YY" can be DD05, DD06, DD14, DE14, DE15, DE15V, DEG15, DEG15VC, DE18M, DEG18MC, DE09, DE19, DEG19C.20, DE06X, PA05, PC05, PD05, PD06, PA14, PC14, PD14, PE14, or PE15 ; and "ZZ" can be blank, .05, .05(II), .08, .08(II), .10, .18, .08D, .18D, 0.82, .002, .00S, 05S, 08S, .20(II), A, A.05, A.08, A.10, A.18, (II), A(II), A.05(II), A.08(II), A.082(II), A.10(II), A.18(II), C.05, C.07, C.05(II), C.07(II), H, H(II), H.05(II), H.08(II), HC.20(II), HC.20(II), M, M(II), M.05(II), MC.20(II) |
| URE | URE modules with 35 mm frames<br>DyZxxxaa<br>Where "D" can be D or F, "y" can be A, B, 6 or 7; "Z" can be K or M; and "aa" can be C8G, H3A, H4A, H8A, E7G-BB, E8G, E8G-BB or MFG-BB |
| Vikram | Vikram solar modules with 35 and 40 mm frames<br>XVSyy.ZZ.AAA.bb<br>Where "X" can be blank, Paradea, Prexos or Somera; "yy" can be M, P, MBB, MDH, MDHT, MH, MS, MHBB, or PBB; "ZZ" can be 60 or 72; "AAA" is the module power rating; and "bb" can be 03, 04 or 05 |
| VSUN | VSUN modules with 30, 35 and 40 mm frames<br>VSUNxxx-YYz-aa<br>Where "YY" can be 60, 72, 108, 120, or 144; "z" can be M, P, MH, PH, or BMH; and "aa" can be blank, BB, BW, or DG |
| Waaree | Waaree modules with 40mm frames<br>AAyy-xxx<br>Where "AA" canbe WS or Bi; and "yy" can be blank, M, MB, 55 or 66 |
| Winaico | Winaico modules with 35 and 40 mm frames<br>Wsy-xxxZa<br>Where "y" can be either P or T; "Z" can be either M, P, or MX; and "a" can be blank or 6 |
| Yingli | Yingli modules with 35 and 40 mm frames<br>YLxxxZ-yy<br>Where "Z" can be D or P; "yy" can be 29b, 30b, 34d, 35b, 36b or 40d |
| ZN Shine | ZN Shine modules with 35mm frames<br>ZXMY-AAA-xxx/M<br>Where "Y" can be 6, 7 or 8; "AAA" can be 72, NH120, NH144, NHDB144, NHLDD144, SH144, SHDB144, SHLDD144 or TP120 |

# MODULE COMPATIBILITY

## FRAMELESS MODULE LIST

| MAKE | MODELS |
|---|---|
| Astronergy Solar | Astronergy frameless modules<br>CHSM6610P(DG)-xxx |
| Canadian Solar | Canadian Solar frameless modules<br>CSbY-xxx-Z<br>Where “b” can be 3 or 6; “Y” is K, P, U, or X; and “Z” can be M-FG, MS-FG, P-FG, MB-FG, or PB-FG |
| Heliene | Heliene frameless modules<br>YYZZxxxA<br>Where "YY" can be72; "ZZ" can be M; and "A" can be GH |
| Jinko | Jinko frameless modules<br>JKMxxxPP-DV |
| Prism Solar | Prism Solar frameless modules<br>BZYY-xxxAAA<br>Where "Z" can be i or N; "YY" can be 48, 60, 60S, 72 or 72S; and "AAA" can be blank or BSTC |
| Risen | Risen frameless modules<br>RSMyy-6-xxxZZ<br>Where “yy” can be 60, 72, 120 or 144; and “ZZ” can be MDG or PDG |
| Stion | Stion frameless modules<br>STL-xxx or STL-xxxA |
| Sunpreme | Sunpreme frameless modules<br>GXB-xxxYY<br>Where “YY” can be blank or SL |
| Trina | Trina frameless modules<br>TSM-xxxYY<br>Where “YY” can be either DEG5(II), DEG5.07(II), DEG5.40(II), DEG5.47(II), DEG14(II), DEG14C(II), DEG14C.07(II), DEG14.40(II), PEG5, PEG5.07, PEG5.40, PEG5.47, PEG14, or PEG14.40 |

GE Consumer & Industrial
Electrical Distribution

# NEMA 3R
# Service Entrance Disconnect
## 150-200 Amp Main Breaker

- Factory installed main breaker
- Galvanized steel construction with electro deposited paint for superior corrosion protection
- 9 1/2" wide for easy wiring
- Factory installed and bonded ground lugs
- Padlock provision for secure installations

- Single phase, three wire, 120/240 VAC, 22kAIC rated
- UL Listed for US and Canada
- 60°C/75°C conductor rating
- Suitable for reverse feed

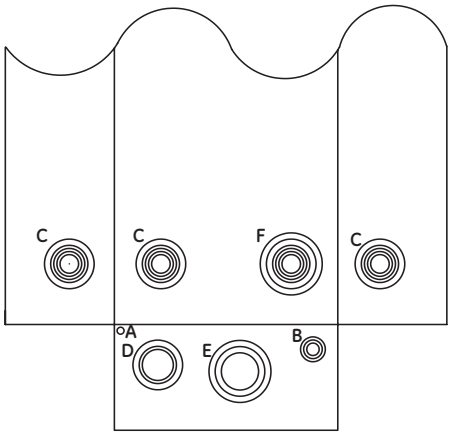
imagination at work

# NEMA 3R Service Entrance Disconnect

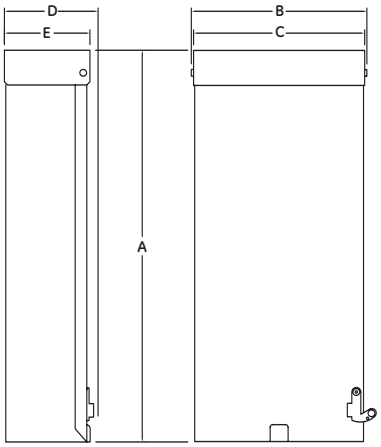
| **Catalog Number** | **THQMV150NRE, THQMV200NRE** |
|---|---|
| Main Breaker Type | THQMV (Factory Installed) |
| Main Amp Rating | 150A, 200A |
| Wire Range | 1-4/0 Cu, 2/0-4/0 Al |
| Enclosure | Outdoor (NEMA 3R) |
| Front Type | Surface |
| Conduit Hub (Top) | 3/4" – 2" |
| Padlock Hasp (Hole Diameters) | 5/32" & 5/16" |
| Bending Space (Line/Load) | 7" / 10 3/4" |
| Factory Installed Lugs | |
| Neutral | 1-4/0 Cu/Al |
| Ground | 6-2/0 Cu/Al |

Suitable ONLY for service entrance equipment (bonded neutral) when installed in accordance with the NEC.

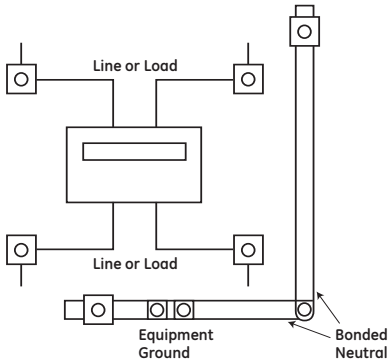
## Knockouts




## Dimensions




## Typical Wiring Diagram




| Conduit Size in Inches | Symbol | | | | | |
|---|---|---|---|---|---|---|
| | A | B | C | D | E | F |
| | 9/32" | - | - | - | - | - |
| | - | 1/2" | 1/2" | - | - | 1/2" |
| | - | 3/4" | 3/4" | - | - | 3/4" |
| | - | 1" | 1" | - | - | 1" |
| | - | - | 1 1/4" | 1 1/4" | - | 1 1/4" |
| | - | - | 1 1/2" | 1 1/2" | 1 1/2" | 1 1/2" |
| | - | - | 2" | 2" | 2" | 2" |
| | - | - | - | - | 2 1/2" | 2 1/2" |

| Cat. No. | A | B | C | D | E |
|---|---|---|---|---|---|
| THQMV150NRE | 21 3/4" | 9 3/4" | 9 1/2" | 5" | 4 3/4" |
| THQMV200NRE | | | | | |

### Conduit Hub Accessory

| Size | 3/4" | 1" | 1 1/4" | 1 1/2" | 2" |
|---|---|---|---|---|---|
| Cat. No. | TC75 | TC100 | TC125 | TC150 | TC200 |

**GE Consumer & Industrial**
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