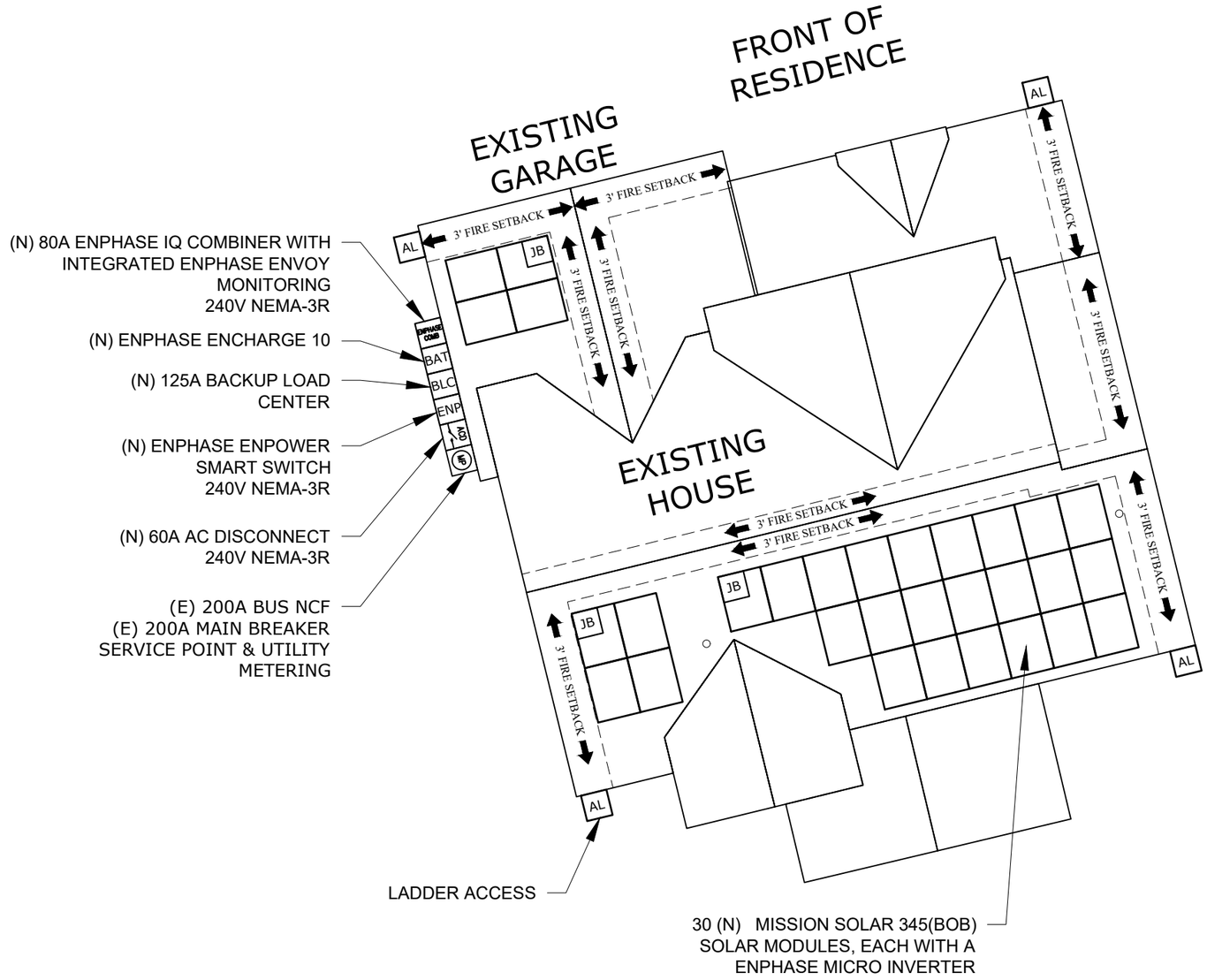
# DANNY RICHARDS

## 8.70 kW (AC),10.35 (DC) kW PHOTOVOLTAIC SYSTEM

## 19 KENTUCKY DERBY LN LILLINGTON, NC 27546




N

SITE PLAN

SCALE: 3/32" = 1'-0"

NOTE: ALL SCALES SET TO 11X17 SHEET SIZE

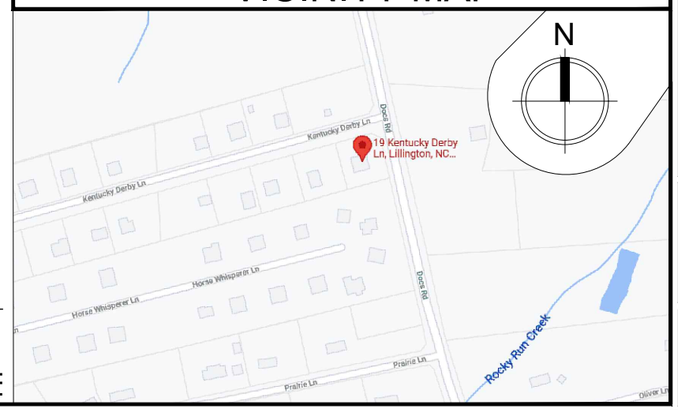
## SCOPE OF WORK:

| | | | |
|---|---|---|---|
| 30 | - | MISSION SOLAR 345(BOB) | (N)SOLAR PANELS |
| | - | | SOLAR PANELS |
| 30 | - | IQ7PLUS-72-2-US | (N)INVERTER |
| | - | | INVERTER |
| 1 | - | ENPHASE ENCHARGE 10 | (N)BATTERY BACKUP |
| | - | | BATTERY BACKUP |
| 1 | - | 200A/200A | (E) MAIN SERVICE PANEL |

## SHEET INDEX:



## VICINITY MAP





VON LOOR & SLOOF ENERGY, LLC
10861 HAMILTON CLUB DR.
#306 RALEIGH, NC 27617


PROJECT:

PROPOSED SOLAR PHOTOVOLTAIC SYSTEM FOR:

DANNY RICHARDS

19 KENTUCKY DERBY LN
LILLINGTON, NC 27546

| | |
|---|---|
| DRAWN BY: | DINESH SAHU |
| DATE: | 11/15/21 |
| (DC) kW: | 10.35 |
| (AC) kW: | 8.70 |
| PROJECT #: | |

SHEET NUMBER:

**E1**

# SOLAR PHOTOVOLTAIC SYSTEM NOTES:

ALL MATERIALS, EQUIPMENT, INSTALLATION AND WORK SHALL COMPLY WITH THE FOLLOWING APPLICABLE CODES:

- 2015 IBC
- 2017 NEC
- 2015 IFC
- 2015 IRC
- 2018 NC BUILDING CODE
- 2018 NC ENERGY CODE
- 2017 NATIONAL ELECTRICAL CODE
- 2018 NC FIRE PREVENTION CODE
- 2018 NC MECHANICAL CODE
- 2018 NC PLUMBING CODE
- 2018 NC RESIDENTIAL CODE
- AUTHORITY HAVING JURISDICTION
- FIRE AUTHORITY HAVING JURISDICTION

1. EXISTING PLUMBING VENTS, SKYLIGHTS, EXHAUST OUTLETS, VENTILATIONS INTAKE AIR OPENINGS SHALL NOT BE COVERED BY THE SOLAR PHOTOVOLTAIC SYSTEM.
2. EQUIPMENT. INVERTERS, MOTOR GENERATORS, PHOTOVOLTAIC MODULES, PHOTOVOLTAIC PANELS, AC PHOTOVOLTAIC MODULES, SOURCE-CIRCUIT COMBINERS, AND CHARGE CONTROLLERS INTENDED FOR USE IN PHOTOVOLTAIC POWER SYSTEMS SHALL BE IDENTIFIED AND LISTED FOR THE APPLICATION. (CEC 690.4(B))
3. ALL OUTDOOR EQUIPMENT SHALL BE NEMA 3R RATED, INCLUDING ALL ROOF MOUNTED TRANSITION BOXES AND NON ROOF SWITCHES. ROOF SWITCHES TO BE NEMA 4 RATED.
4. ALL EQUIPMENT SHALL BE PROPERLY GROUNDED AND BONDED IN ACCORDANCE WITH CEC ARTICLE 250.
5. PROTECTION DEVICES FOR PV SOURCE CIRCUITS AND PV OUTPUT CIRCUITS ALSO CONNECTED TO SOURCES HAVING SIGNIFICANTLY HIGHER CURRENT AVAILABILITY (E.G., PARALLEL STRINGS OF MODULES, UTILITY POWER), SHALL BE PROTECTED AT THE SOURCE FROM OVERCURRENT. [ CEC 690.9(A)]
6. PV SYSTEM CIRCUITS INSTALLED ON OR IN BUILDINGS SHALL INCLUDE A RAPID SHUTDOWN FUNCTION THAT CONTROLS SPECIFIC CONDUCTORS. [ CEC 690.12]
7. THE UTILITY INTERACTIVE INVERTERS SHALL AUTOMATICALLY DE-ENERGIZE ITS OUTPUT TO THE CONNECTED ELECTRICAL PRODUCTION AND DISTRIBUTION NETWORK UPON LOSS OF VOLTAGE IN THE SYSTEM AND SHALL REMAIN IN THAT STATE UNTIL THE ELECTRICAL PRODUCTION AND DISTRIBUTION NETWORK VOLTAGE HAS BEEN RESTORED.
[ CEC 705.41]
8. ALL CONDUCTOR EXPOSED TO WEATHER SHALL BE LISTED AND IDENTIFIED FOR USE IN DIRECT SUNLIGHT. [ CEC 310.10(D)(1)]
10. THE MODULE CONDUCTORS MUST BE TYPE USE-2 OR LISTED FOR PHOTOVOLTAIC (PV) WIRE. ( CEC 690.31(C)
10. ALL CONDUCTORS SHALL BE MARKED ON EACH END FOR UNIQUE IDENTIFICATION.
11. AN INSULATED GROUNDED CONDUCTOR OF 6 AWG OR SMALLER SHALL BE IDENTIFIED AS A CONTINUOUS WHITE FINISH. [ CEC 200.6]
12. THE OUTPUT OF AN INTERCONNECTED ELECTRICAL POWER SOURCE SHALL BE PERMITTED TO BE CONNECTED TO THE LOAD SIDE. INTERCONNECTING PROVISIONS FOR OTHER POWER SOURCES SHALL COMPLY WITH 705.12(B)(1) THROUGH 705.12(B)(5)
13. EACH SOURCE INTERCONNECTION OF ONE OR MORE POWER SOURCES INSTALLED IN ONE SYSTEM SHALL BE MADE AT A DEDICATED CIRCUIT BREAKER OR FUSIBLE DISCONNECTING MEANS [ CEC 705.12(B)(1)]
14. THE SUM OF THE AMPERE RATING OF THE OVERCURRENT DEVICES IN CIRCUITS SUPPLYING POWER TO THE BUSBAR OR CONDUCTOR SHALL NOT EXCEED 120% OF THE RATING OF BUSBAR OR CONDUCTOR. [ CEC 705.12(B)(2)(3)(B)]
15. A CONNECTION AT EITHER END, BUT NOT BOTH ENDS, OF A CENTER-FED PANEL BOARD IN DWELLINGS SHALL BE PERMITTED WHERE THE SUM OF 125 PERCENT OF THE POWER SOURCE(S) OUTPUT CIRCUIT CURRENT AND THE RATING OF THE OVERCURRENT DEVICE PROTECTING THE BUSBAR DOES NOT EXCEED 120 PERCENT OF THE CURRENT RATING OF THE BUSBAR. [CEC 705.12(B)(2)(3)(D)]
16. EQUIPMENT CONTAINING OVERCURRENT DEVICES IN CIRCUITS SUPPLYING POWER TO A BUS BAR OR CONDUCTOR SHALL BE MARKED TO INDICATE THE PRESENCE OF ALL SOURCES. [ CEC 705.12(B)(3)]
17. CIRCUIT BREAKER, IF BACKFED, SHALL BE SUITABLE FOR SUCH OPERATION. [ CEC 705.12(B)(4)]
18. TO MINIMIZE OVERHEATING OF THE BUSBAR IN PANELBOARD, THE PANELBOARD MAIN CIRCUIT BREAKER AND THE PV POWER SOURCE CIRCUIT BREAKER SHALL BE PHYSICALLY LOCATED AT THE OPPOSITE END OF THE BUSBAR.
19. ALL THE CEC REQUIRED WARNING SIGNS, MARKINGS, AND LABELS SHALL BE POSTED ON EQUIPMENT AND DISCONNECTS PRIOR TO ANY INSPECTIONS TO BE PERFORMED BY THE BUILDING DEPARTMENT INSPECTOR.
20. WHERE PV SYSTEM DC CIRCUIT'S RUN INSIDE A BUILDING, THEY SHALL BE CONTAINED IN METAL RACEWAYS TYPE MC METAL CLAD CABLE OR METAL ENCLOSURES FROM POINT OF PENETRATION OF THE SURFACE OF THE BUILDING TO THE FIRST READILY ACCESSIBLE DISCONNECTING MEANS. [ CEC 690.31(G)]
20. FLEXIBLE, FINE-STRANDED CABLES SHALL BE TERMINATED ONLY WITH TERMINALS, LUGS, DEVICES OR CONNECTOR THAT ARE IS IN ACCORDANCE WITH CEC 110.14
21. CONNECTORS SHALL BE OF LATCHING OR LOCKING TYPE. CONNECTORS THAT ARE READILY ACCESSIBLE AND OPERATING AT OVER 30V DC OR 15V AC SHALL REQUIRE TOOL TO OPEN AND MARKED "DO NOT DISCONNECT UNDER LOAD" OR "NOT FOR CURRENT INTERRUPTING". [ CEC 690.33(C) & (E)(2)]
22. EQUIPMENT GROUNDING CONDUCTOR FOR PV MODULES SMALLER THAN 6AWG SHALL BE PROTECTED FROM PHYSICAL DAMAGE BY A RACEWAY OR CABLE ARMOR. [ CEC 690.46 & 250.120(C)]
23. AN EQUIPMENT GROUNDING CONDUCTOR SHALL NOT BE SMALLER THAN 14 AWG. [ CEC 690.45]
24. FINE STRANDED CABLES USED FOR BATTERY TERMINALS, DEVICES, AND CONNECTIONS REQUIRE LUGS AND TERMINALS IS IN ACCORDANCE WITH CEC 110.14
25. GROUNDING ELECTRODE CONDUCTOR(S) SHALL BE INSTALLED IN ONE CONTINUOUS LENGTH WITHOUT A SPLICE OR JOINT. IF NECESSARY, SPLICES OR CONNECTIONS SHALL BE MADE AS PERMITTED. (CEC 250.64 C)
26. ALL SMOKE ALARMS, CARBON MONOXIDE ALARMS AND AUDIBLE NOTIFICATION DEVICES SHALL BE LISTED AND LABELED IN ACCORDANCE WITH UL 217 AND UL 2034. THEY WILL BE INSTALLED IN ACCORDANCE WITH NFPA 72 AND NFPA 720. (IRC 2019 R314 & R315).
27. SMOKE ALARMS AND CARBON MONOXIDE ALARMS WILL BE RETROFITTED INTO THE EXISTING DWELLING. THESE SMOKE ALARMS ARE REQUIRED TO BE IN ALL BEDROOMS, OUTSIDE EACH BEDROOM, AND AT LEAST ONE ON EACH FLOOR OF THE HOUSE. CARBON MONOXIDE ALARMS ARE REQUIRED TO BE RETROFITTED OUTSIDE EACH BEDROOM AND AT LEAST ONE ON EACH FLOOR OF THE HOUSE. THESE ALARMS MAY BE SOLELY BATTERY OPERATED IF THE PHOTOVOLTAIC PROJECT DOES NOT INVOLVE THE REMOVAL OF INTERIOR WALL AND CEILING FINISHES INSIDE THE HOME, OTHERWISE, THE ALARMS MUST BE HARD WIRED AND INTERCONNECTED.

# ABBREVIATIONS

| | |
|---|---|
| A | AMPERE |
| AC | ALTERNATING CURRENT |
| AHJ | AUTHORITY HAVING JURISDICTION |
| BLDG | BUILDING |
| CONC | CONCRETE |
| CB | COMBINER BOX |
| CEC | CALIFORNIA ELECTRICAL CODE |
| CU | COPPER |
| DP | DISTRIBUTION PANEL |
| DC | DIRECT CURRENT |
| EGC | EQUIPMENT GROUNDING CONDUCTOR |
| (E) | (EXISTING) |
| FV | FIELD VERIFIED |
| GALV | GALVANIZED |
| GEC | GROUNDING ELECTRODE CONDUCTOR |
| GND | GROUND |
| HDG | HOT DIPPED GALVANIZED |
| I | CURRENT |
| Imp | CURRENT AT MAX POWER |
| INVT | INVERTER |
| Isc | SHORT CIRCUIT CURRENT |
| kVA | KILOVOLT AMPERE |
| kW | KILOWATT |
| LBW | LOAD BEARING WALL |
| MIN. | MINIMUM |
| MCB | MAIN CIRCUIT BREAKER |
| MSP | MAIN SERVICE PANEL |
| (N) | (NEW) |
| N3R | NEMA 3R, RAINTIGHT OUTSIDE RATED |
| NEC | NATIONAL ELECTRICAL CODE |
| NTS | NOT TO SCALE |
| OC | ON CENTER |
| OCPD | OVERCURRENT PROTECTION DEVICE |
| P | POLES -BREAKER POLES- |
| PL | PROPERTY LINES |
| PV | PHOTOVOLTAIC |
| PVC | POLYVINYL CHLORIDE |
| RR | ROOF RAFTER |
| SBC | SOLID BARE COPPER |
| SP | SOLAR PLANE |
| SPL | SUBPANEL |
| SCH | SCHEDULE |
| SS | STAINLESS STEEL |
| PTC | PRACTICAL TESTING CONDITIONS |
| SWH | SOLAR WATER HEATER |
| TYP | TYPICAL |
| UNO | UNLESS NOTED OTHERWISE |
| V | VOLT |
| Vmp | VOLTAGE AT MAX POWER |
| Voc | VOLTAGE AT OPEN CIRCUIT |
| W | WATT |

* OCCUPANCY TYPE: R-3
* CONSTRUCTION TYPE: TYPE V-B
* UNSPRINKLERED

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PROJECT:

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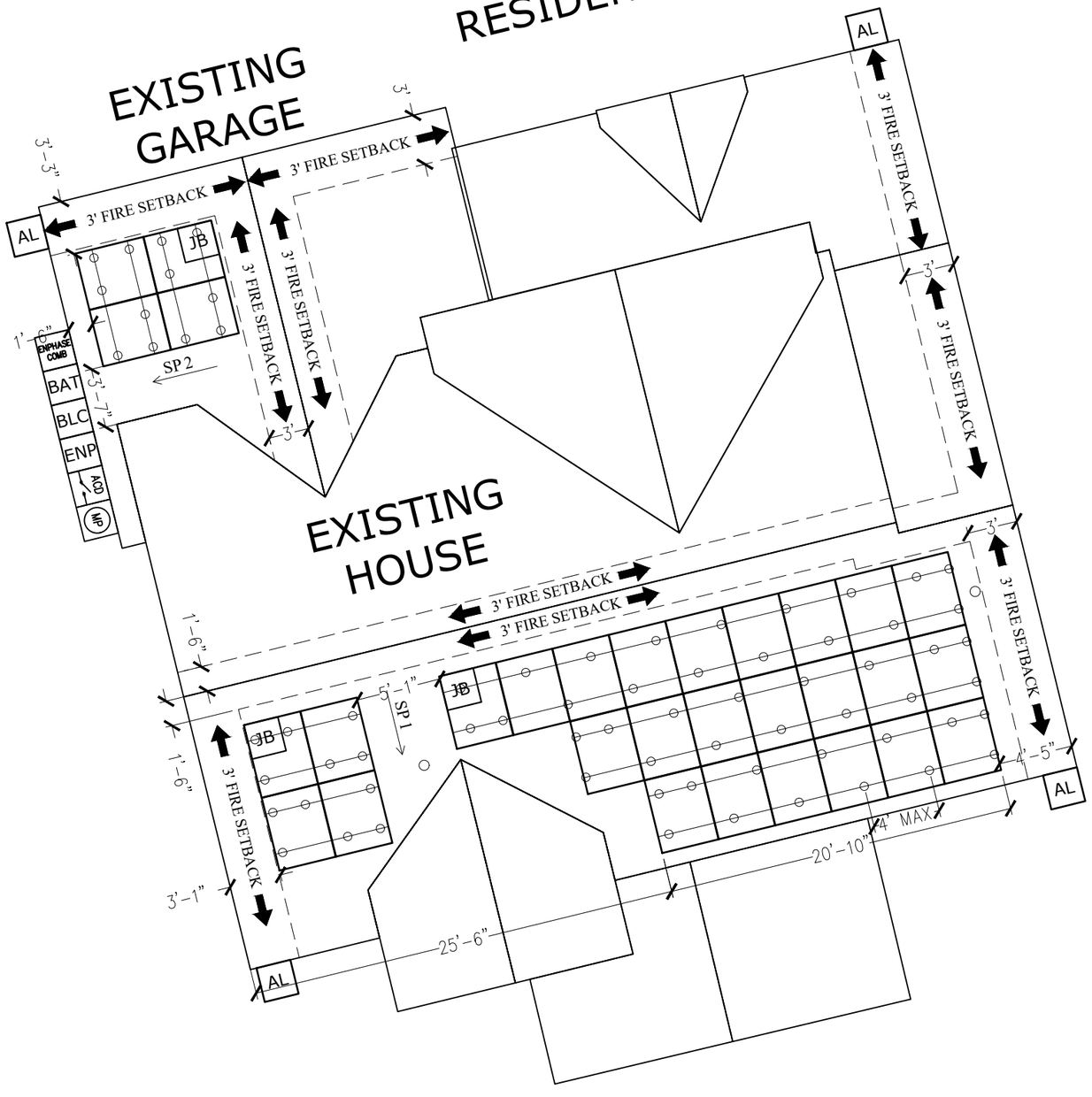
|---|---|
| DRAWN BY: | DINESH SAHU |
| DATE: | 11/15/21 |
| (DC) kW: | 10.35 |
| (AC) kW: | 8.70 |
| PROJECT #: | ---- |

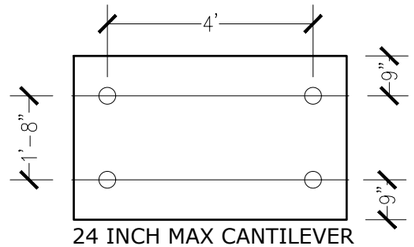
SHEET NUMBER:
**E2**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ROOF# | 1 | PITCH 39° | AZIMUTH 166° | MATERIAL COMP SHINGLES | SP SQ.FT 975.50 | ARRAY SQ.FT 515.61 | RAFTER SPECS 2X4 @ 24" O.C. |
| ROOF# | 1 | PITCH 44° | AZIMUTH 256° | MATERIAL COMP SHINGLES | SP SQ.FT 281.03 | ARRAY SQ.FT 79.33 | RAFTER SPECS 2X4 @ 24" O.C. |

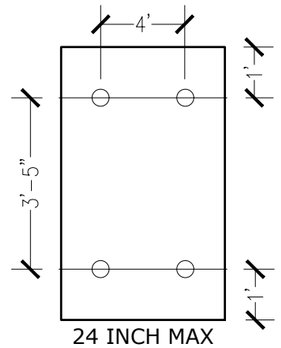
NEW PV CONDUIT TO BE RUN UNDER EVE WHENEVER POSSIBLE. PROPOSED CONDUIT RUN SUBJECT TO CHANGE BY INSTALLER.

70 ATTACHMENTS INSTALLED @ 48" O.C. MAX (TYP)




24 INCH MAX CANTILEVER




24 INCH MAX CANTILEVER

| ARRAY AREA & ROOF AREA CALC'S | | | |
|---|---|---|---|
| # OF MODULES | ARRAY AREA (Sq. Ft.) | ROOF AREA (Sq. Ft.) | ROOF AREA COVERED BY ARRAY (%) |
| 30 | 594.94 | 3296.98 | 18.04 |

N

ROOF PLAN

SCALE:1/8" = 1'-0"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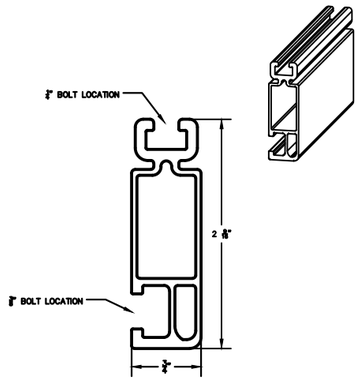
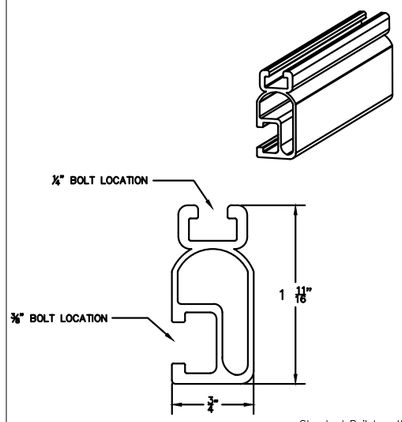
SHEET NUMBER:

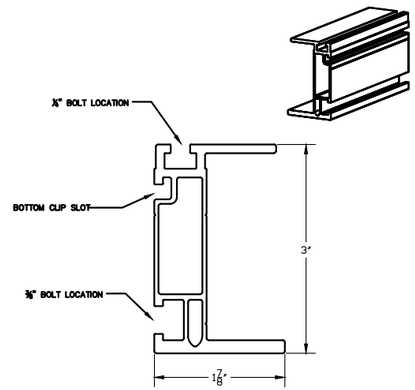
**E5**



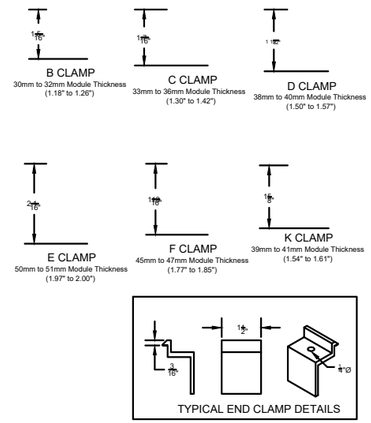

Standard Rail Lengths:
132"
168"
208"
240"

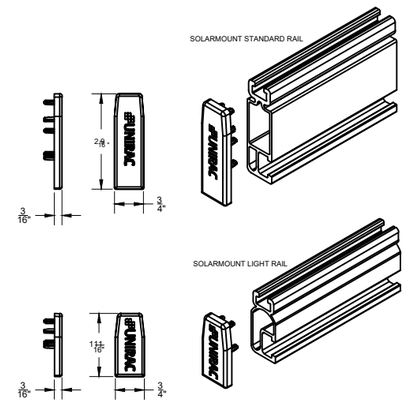


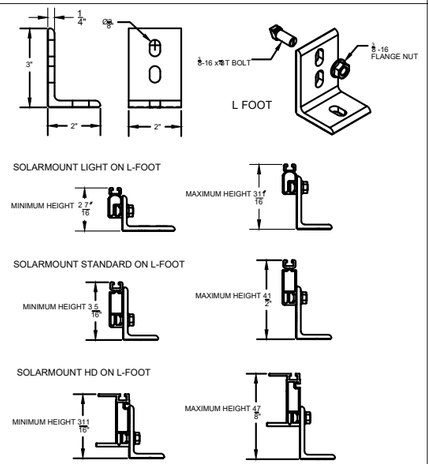

Standard Rail Lengths:
168"
240"



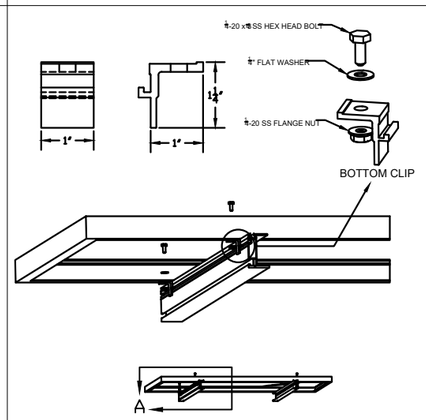

Standard Rail Lengths:
144"
168"
204"
240"

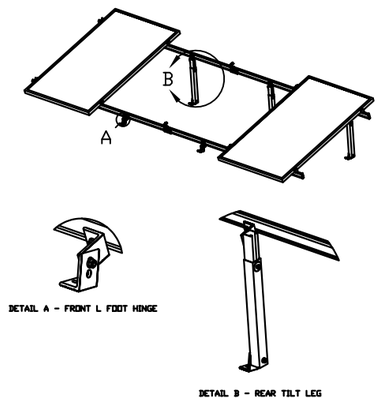


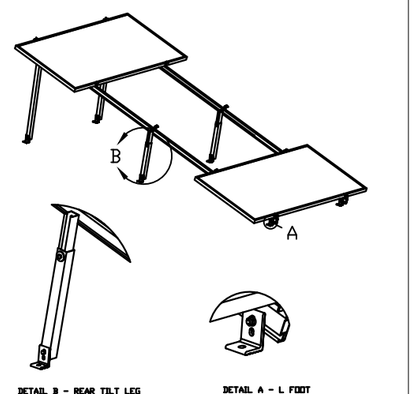



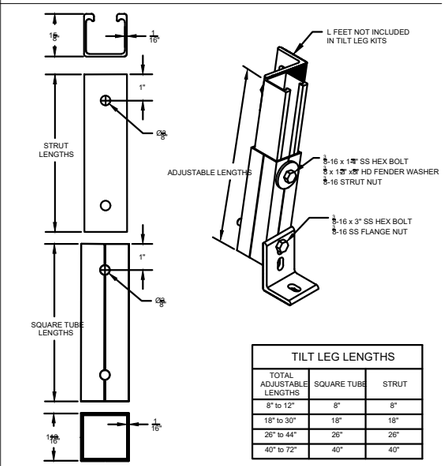




NOTE: L-FOOT CAN BE INSTALLED IN TWO ORIENTATIONS. PLEASE REFER TO INSTRUCTIONS IN THE QUICK START GUIDE.

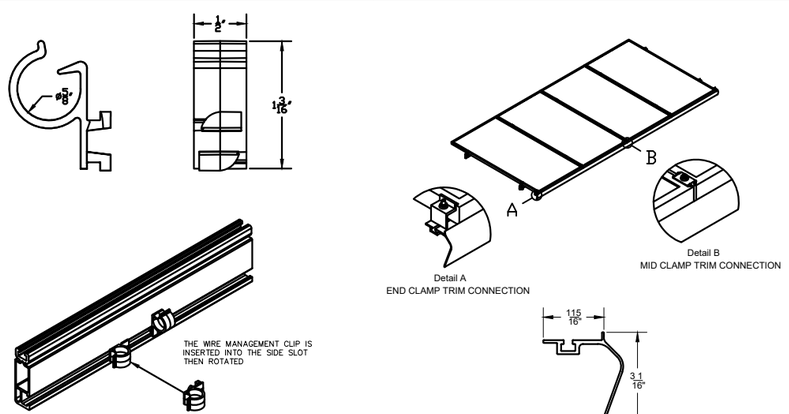


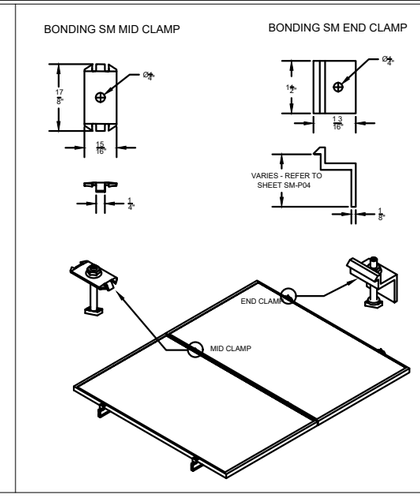



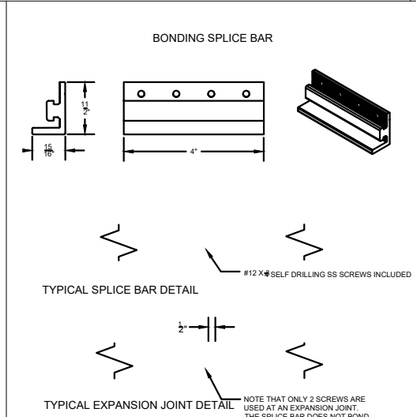



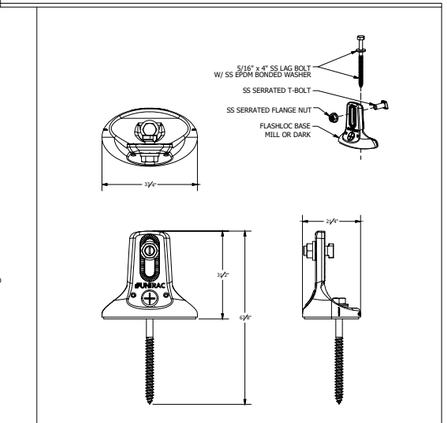




| TILT LEG LENGTHS | | |
|---|---|---|
| TOTAL ADJUSTABLE LENGTHS | SQUARE TUBE | STRUT |
| 8" to 12" | 8" | 8" |
| 18" to 30" | 18" | 18" |
| 26" to 44" | 26" | 26" |
| 40" to 72" | 40" | 40" |




# ATTACHMENT DETAIL

SCALE: 187/256" = 1'-0"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| DRAWN BY: | DINESH SAHU |
| DATE: | 11/15/21 |
| (DC) kW: | 10.35 |
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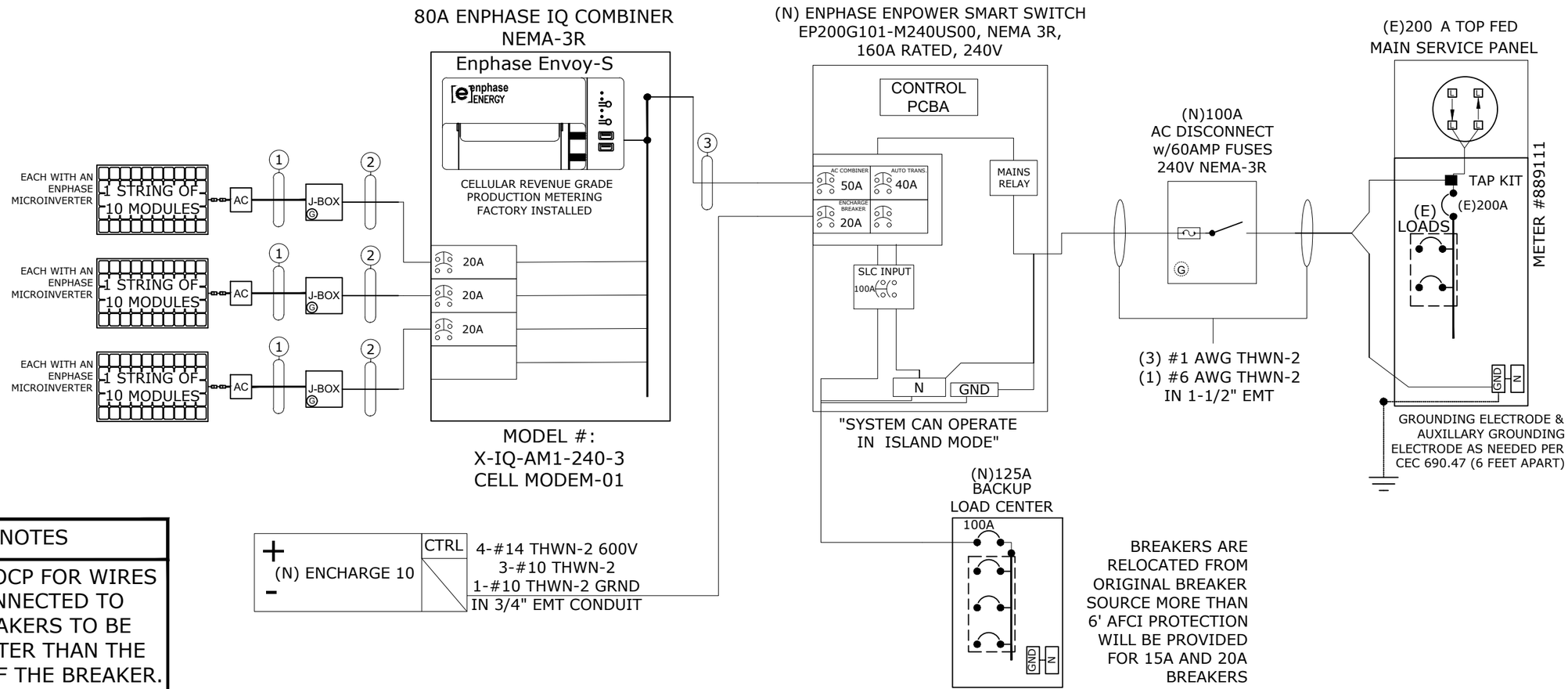
SHEET NUMBER:
**E6**

| SERVICE INFO | | |
|---|---|---|
| UTILITY COMPANY: DUKE ENERGY | | MSP VOLTAGE: 120/240 |
| MSP LOC: RIGHT | SERV. TYPE: UNDERGROUND | MSP GROUND: (N) ROD |

| INVERTER SPECS | | |
|---|---|---|
| INVERTER: IQ7PLUS-72-2-US QTY: 30 | | |
| VOLTAGE: 240V | WATTAGE: 290 | CEC EFF: 97.5% |

| MODULE SPECS | | | |
|---|---|---|---|
| MODULE TYPE: MSE345SX5T | QTY: 30 | WATTAGE: 345 | FRAME COLOR: BLACK |
| Voc: 41.0 | Isc: 10.92 | Imp: 10.34 | Vpmax: 33.37 |

| ASHRAE AMBIENT TEMPERATURE SPECS | | |
|---|---|---|
| High Temp | DISTANCE ABOVE ROOF | EXTREME |
| 2% Avg. | 1" | MIN |
| 36.2° C | NO TEMP ADDER PER 310.15(B)(3)(C) | -9.9° C |




## NOTES

WIRE OCP FOR WIRES CONNECTED TO BREAKERS TO BE GREATER THAN THE SIZE OF THE BREAKER.

EQUIPMENT TERMINALS ARE RATED AT 75°C. STRING AMPERAGE NOT TO EXCEED THE 75°C RATING OF THE WIRE THAT IS ATTACHED TO THE TERMINALS.

**INTERCONNECTION METHOD PER 705.12(B)(2)(3)(c).**
THE SUM OF THE AMPERE RATINGS OF ALL OVERCURRENT DEVICES ON PANELBOARDS, BOTH LOAD AND SUPPLY DEVICES, EXCLUDING THE RATING OF THE OVERCURRENT DEVICE PROTECTING THE BUSBAR, SHALL NOT EXCEED THE AMPACITY OF THE BUSBAR. THE RATING OF THE OVERCURRENT DEVICE PROTECTING THE BUSBAR SHALL NOT EXCEED THE RATING OF THE BUSBAR.

| WIRE TAG # | CONDUIT | WIRE QTY | WIRE GAUGE: | WIRE TYPE (ENPHASE TRUNK CABLE INCLUDES #12 GROUND) | TEMP RATING: | WIRE AMP | TEMP DE-RATE: | CONDUIT FILL: | WIRE OCP: | TERMINAL 75°C RATING: | INVERTER QTY: | NOC: | NEC: | STRING AMPS | GRND SIZE | GRND WIRE TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Open Air | 2 | 12 | Trunk Cable | 90°C | 30 x | 0.91 x | 1 = | 27.3A | 25 | 15 x | 1.21 x | 1.25 = | 22.69 A | #6 | SBC |
| 2 | 3/4" EMT | 2 | 10 | THWN -2 | 90°C | 40 x | 0.91 x | 1 = | 36.4A | 35 | 15 x | 1.21 x | 1.25 = | 22.69 A | #6 | THWN -2 |
| 3 | 1" EMT | 3 | 6 | THWN -2 | 90°C | 75 x | 0.91 x | 1 = | 68.2A | 65 | 30 x | 1.21 x | 1.25 = | 45.38 A | #8 | THWN -2 |

**WARNING:**
THIS EQUIPMENT FED BY MULTIPLE SOURCES. TOTAL RATING OF ALL OVERCURRENT DEVICES, EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE, SHALL NOT EXCEED AMPACITY OF BUSBAR.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SHEET NUMBER:
**E7**

# ELECTRICAL NOTES:

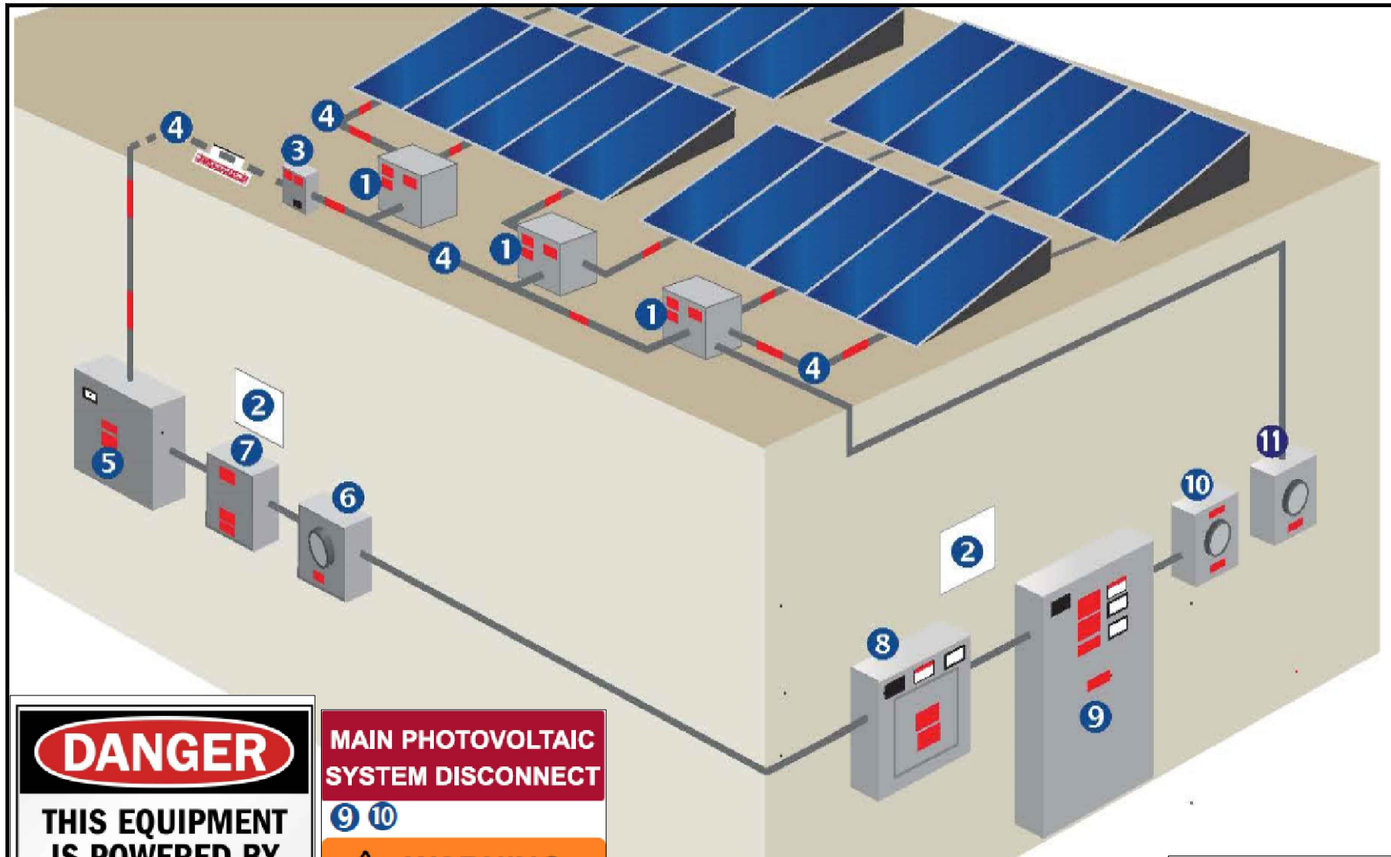
1) ALL MODULES WILL BE GROUNDED IN ACCORDANCE WITH CODE AND THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.
2) ALL PV EQUIPMENT SHALL BE LISTED BY A RECOGNIZED TESTED LAB.
3) NOTIFY SERVING UTILITY BEFORE ACTIVATION OF PV SYSTEM.
4) WHEN A BACKFED BREAKER IS THE METHOD OF UTILITY INTERCONNECTION, BREAKER SHALL NOT READ LINE AND LOAD.
5) WHEN A BACKFED BREAKER IS THE METHOD OF UTILITY INTERCONNECTION, THE BREAKER SHALL BE INSTALLED AT THE OPPOSITE END OF THE BUS BAR OF THE MAIN BREAKER.
6) WORK CLEARANCES AROUND ELECTRICAL EQUIPMENT WILL BE MAINTAINED PER [CEC 110.26(A)(1), 110.26(A)(2) & 110.26(A)(3)]
7) ALL EXTERIOR CONDUITS, FITTINGS AND BOXES SHALL BE RAIN-TIGHT AND APPROVED FOR USE IN WET LOCATIONS PER [CEC 314.15].
8) ALL METALLIC RACEWAYS AND EQUIPMENT SHALL BE BONDED AND ELECTRICALLY CONTINUOUS.
9) ALL PV EQUIPMENT, SYSTEMS AND ALL ASSOCIATED WIRING AND INTERCONNECTIONS SHALL BE INSTALLED BY QUALIFIED PERSONS.
10) THE PHOTOVOLTAIC SYSTEM CONDUCTORS SHALL BE IDENTIFIED AND GROUPED. THE MEANS OF IDENTIFICATION SHALL BE PERMITTED BY SEPARATED COLOR CODING, MARKING TAPE, TAGGING OR OTHER APPROVED MEANS. [CEC 690.31(B)(1)]
11) ADEQUATE SPACING MUST BE MAINTAINED BETWEEN ANY PLUMBING SEWER VENTS EXTENDING THROUGH THE ROOF AND THE UNDERSIDE OF THE PHOTOVOLTAIC PANELS (6" MINIMUM RECOMMENDED).
12) PV EQUIPMENT, SYSTEMS AND ALL ASSOCIATED WIRING AND INTERCONNECTIONS SHALL ONLY BE INSTALLED BY QUALIFIED PERSONS [CEC 690.4 C].
13) THE SUM OF 125 PERCENT OF THE INVERTER(S) OUTPUT CIRCUIT CURRENT AND THE RATING OF THE OVERCURRENT DEVICE PROTECTING THE BUSBAR SHALL NOT EXCEED THE AMPACITY OF THE BUSBAR. [CEC 705.12(B)(2)(3)(A)]
14) A CONNECTION AT EITHER END, BUT NOT BOTH ENDS, OF A CENTER-FED PANEL BOARD IN DWELLINGS SHALL BE PERMITTED WHERE THE SUM OF 125 PERCENT OF THE POWER SOURCE(S) OUTPUT CIRCUIT CURRENT AND THE RATING OF THE OVERCURRENT DEVICE PROTECTING THE BUSBAR DOES NOT EXCEED 120 PERCENT OF THE CURRENT RATING OF THE BUSBAR. [CEC 705.12(B)(2)(3)(D)]

VON LOOR & SLOOF ENERGY, LLC
10861 HAMILTON CLUB DR.
#306 RALEIGH, NC 27617

PROJECT:
PROPOSED SOLAR PHOTOVOLTAIC SYSTEM FOR:
DANNY RICHARDS
---
---
19 KENTUCKY DERBY LN
LILLINGTON, NC 27546

| | |
|---|---|
| DRAWN BY: | DINESH SAHU |
| DATE: | 11/15/21 |
| (DC) kW: | 10.35 |
| (AC) kW: | 8.70 |
| PROJECT #: | ---- |

SHEET NUMBER:
**E8**



**DANGER**

**THIS EQUIPMENT IS POWERED BY MULTIPLE SOURCES**

9

**PHOTOVOLTAIC AC DISCONNECT**

7

**MAIN PHOTOVOLTAIC SYSTEM DISCONNECT**

9 10

**⚠ WARNING**

POWER SOURCE OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE.

8 9

**⚠ CAUTION**

**TRI POWER SOURCE**

SECOND POWER SOURCE IS AC BATTERY

THIRD SOURCE IS PV INVERTER

8 9

**⚠ WARNING**

ELECTRICAL SHOCK HAZARD

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

7 8 9

**DO NOT DISCONNECT UNDER LOAD**

8 9

**⚠ CAUTION**

PHOTOVOLTAIC SYSTEM CIRCUIT IS BACKFED

8 9

**⚠ WARNING** DUAL POWER SOURCE

SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

8 9

**⚠ WARNING**

THE DISCONNECTION OF THE GROUNDED CONDUCTOR(S) MAY RESULT IN OVERVOLTAGE ON THE EQUIPMENT

5

**WARNING: PHOTOVOLTAIC POWER SOURCE**

4

**⚠ WARNING**

ELECTRICAL SHOCK HAZARD

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

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

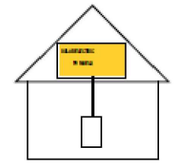
3

**PHOTOVOLTAIC DC DISCONNECT**

3

**SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN**

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



9 11

**RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM**

11

**A = BLACK**
**B = RED**
**C = BLUE**
**NEUTRAL = WHITE**

8 9

**⚠ WARNING**

**SHOCK HAZARD**

TERMINALS ON THE LINE BE ENERGIZED IN THE OPEN POSITION

1

**⚠ WARNING**

TURN OFF PHOTOVOLTAIC AC DISCONNECT PRIOR TO WORKING INSIDE PANEL

1 8 9

**⚠ WARNING**

ELECTRICAL SHOCK HAZARD

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

7 8 9

1. LABEL FOR COMBINER BOX / CIRCUITS / CONDUIT COMBINER BOX / ENCLOSURES / EMT ENCLOSURES
2. LABEL FOR MAIN SERVICE PANEL PLACARD
3. LABEL FOR DC DISCONNECT / BREAKER / RECOMBINER BOX
4. WARNING LABEL SHALL BE PLACED ON INTERIOR AND EXTERIOR DC CONDUIT, RACEWAYS, ENCLOSURES, CABLE ASSEMBLIES, JUNCTION BOXES, AND DISCONNECTS. MARKING SHALL BE PLACED ON INTERIOR AND EXTERIOR DC CONDUIT, RACEWAYS, ENCLOSURES AND CABLE ASSEMBLIES EVERY 10 FEET (3048 MM), 1 FOOT OF TURNS OR BENDS AND WITHIN 1 FOOT ABOVE AND BELOW PENETRATIONS OF ROOF/CEILING ASSEMBLIES, WALLS OR BARRIERS.
5. LABEL FOR WALL MOUNTED INVERTER (IF USED)
6. LABEL FOR PRODUCTION / NET METER
7. LABEL FOR AC DISCONNECT / BREAKER / POINTS OF CONNECTION
8. LABEL FOR BREAKER PANEL / PULL BOXES
9. LABEL FOR MAIN SERVICE DISCONNECT / UTILITY METER
10. LABEL FOR MAIN SERVICE DISCONNECT / UTILITY METER
11. LABEL FOR RAPID SHUTDOWN DEVICE

## MARKING PV CIRCUIT

MARKING IS REQUIRED ON ALL INTERIOR AND EXTERIOR PV CONDUIT, RACEWAYS, ENCLOSURES, CABLE ASSEMBLIES, AND JUNCTION BOXES TO ALERT THE FIRE SERVICE TO AVOID CUTTING THEM. MARKING SHALL BE PLACED EVERY 10 FEET, AT TURNS AND ABOVE AND/OR BELOW PENETRATIONS, AND AT ALL PV COMBINER AND JUNCTION BOXES.

REFLECTIVE WEATHER RESISTANT MATERIAL SUITABLE FOR THE ENVIRONMENT (DURABLE ADHESIVE MATERIALS MUST MEET THIS REQUIREMENT)

MARKING CONTENT AND FORMAT
PER [ CEC 110.21(B)] WITH REFERENCE
TO ANSI Z535.4-2011

-BACKGROUND PER ANSI Z535.4-2011
-LETTERING PER ANSI Z535.4-2011
-MINIMUM 3/8" LETTER HEIGHT
-ALL CAPITAL LETTERS
-ARIAL OR SIMILAR FONT, NON BOLD


VON LOOR & SLOOF ENERGY, LLC
10861 HAMILTON CLUB DR.
#306 RALEIGH, NC 27617


VON LOOR & SLOOF ENERGY

PROJECT:

PROPOSED SOLAR PHOTOVOLTAIC SYSTEM FOR:
DANNY RICHARDS

19 KENTUCKY DERBY LN
LILLINGTON, NC 27546

| | |
|---|---|
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SHEET NUMBER:

**E9**

SOLAR LOAD CENTER
NO ADDITIONAL LOADS ALLOWED

8 LABEL TO BE INSTALLED ON THE INSIDE AND THE OUTSIDE OF THE LOAD CENTER

PHOTOVOLTAIC AC DISCONNECT

RATED AC OUTPUT CURRENT: 36.30 A
NOMINAL OPERATING AC VOLTAGE: 240 V

INVERTER AMPERAGE

5 7 8

PHOTOVOLTAIC POWER SOURCE

OPERATING AC VOLTAGE: 240 V
MAXIMUM OPERATING AC OUTPUT CURRENT: 52.30 AMPS

THIS IS THE COMBINED AMPERAGE OF INVERTER AND BATTERY

LABEL FOR MAIN SERVICE PANEL COVER

ENERGY STORAGE SYSTEM

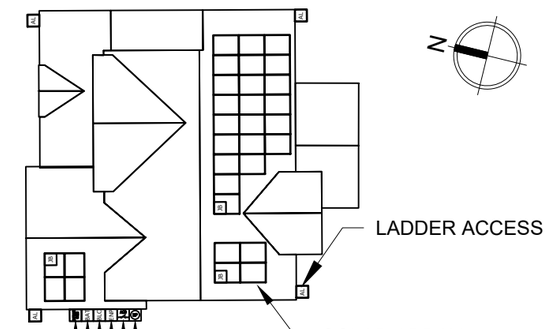
NOMINAL ESS VOLTAGE: 240 VAC
OPERATING CURRENT: 16 AAC

LABEL FOR ESS BATTERY ,
QTY-1

# CAUTION

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

NOT ENERGIZED
FULL RAPID
SHUTDOWN




2 PLACARD RIVITED TO THE MAIN SERVICE PANEL

VON LOOR & SLOOF ENERGY, LLC
10861 HAMILTON CLUB DR.
#306 RALEIGH, NC 27617

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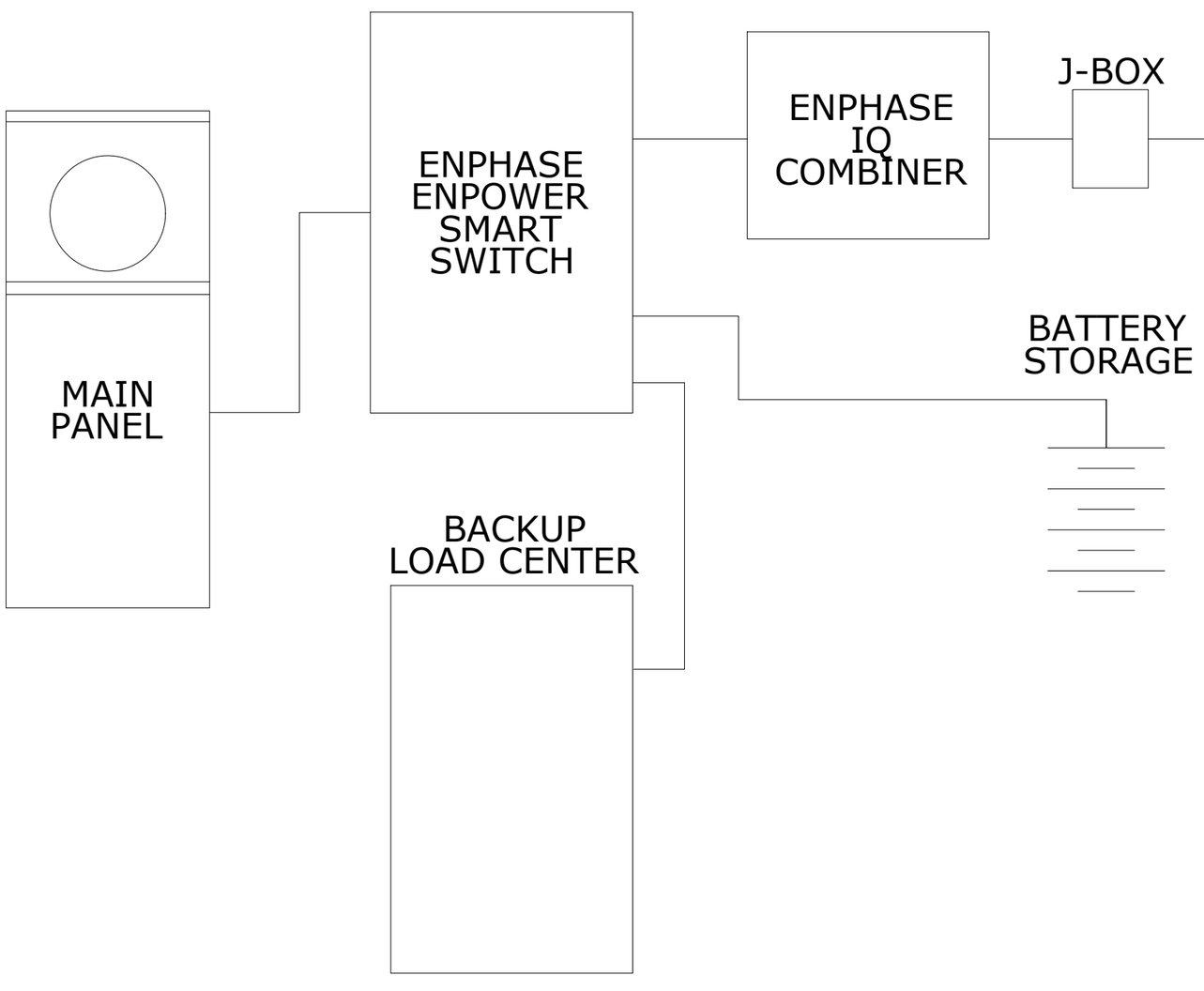
SHEET NUMBER:
E9.1

# SINGLE LINE PLACARD

# CAUTION

## SITE MAP





VON LOOR & SLOOF
ENERGY, LLC
10861 HAMILTON CLUB DR.
#306 RALEIGH, NC 27617


PROJECT:

PROPOSED
SOLAR PHOTOVOLTAIC SYSTEM FOR:
DANNY RICHARDS

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19 KENTUCKY DERBY LN
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| PROJECT #: | ---- |

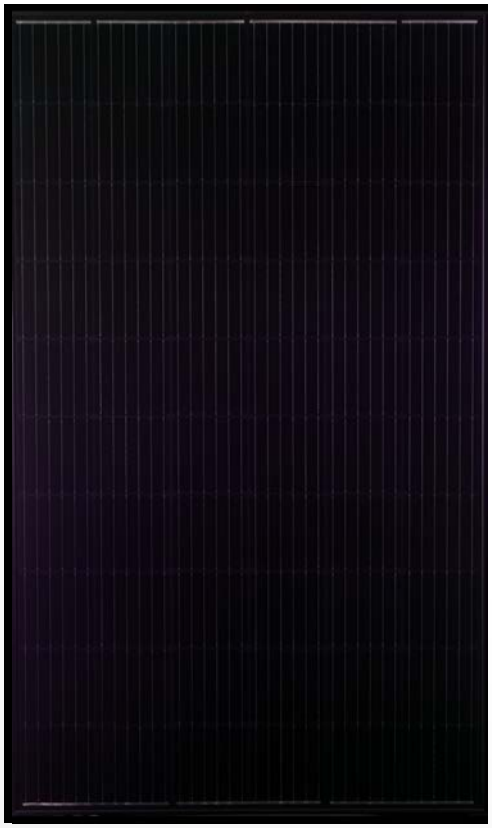
SHEET NUMBER:

**E9.3**

# AMERICA'S MODULE COMPANY ™

MISSION SOLAR ENERGY

## MSE PERC 60



**CLASS LEADING POWER OUTPUT**

**345 W**

**POSITIVE POWER TOLERANCE**

**-0** to **+3 %**

## The True American Brand

Mission Solar Energy is headquartered in San Antonio, Texas, where we manufacture our modules. We produce American, high quality solar modules ensuring the highest in class power output and best in-class reliability. Our product line is tailored for residential, commercial and utility applications. Every Mission Solar Energy solar module is certified and surpasses industry standard regulations, proving excellent performance over the long-term. Demand the best, demand Mission Solar Energy.

**CERTIFIED RELIABILITY**

› Tested to UL 61730 & IEC standards
› PID resistant
› Resistance to salt mist corrosion

**ADVANCED TECHNOLOGY**

› PERC and 6 busbar drive 18.7% module efficiency
› Ideal for all applications

**EXTREME WEATHER RESILIENCE**

› 5600 Pa front and 4800 Pa back load
› Tested load to UL 61730
› 40mm frame

**BAA COMPLIANT FOR GOVERNMENT PROJECTS**

› Buy American Act
› American Recovery & Reinvestment Act

FRAME-TO-FRAME 25 YEAR WARRANTY

MODULES ASSEMBLED DESIGNED & ENGINEERED IN THE USA OF U.S. AND NON-U.S. PARTS

**FRAME-TO-FRAME WARRANTY**

Degradation guaranteed not to exceed 2% in year one and 0.7% annually from years two to 30 with 81.2% guaranteed in year 25.

**CERTIFICATIONS**

UL 61730
IEC 61215 - IEC 61730
IEC 61701

c UL us LISTED

CEC

TÜV SÜD

Please contact Mission Solar Energy if you have questions or concerns about certification of our products in your area.

*Standard 12-year product warranty extendable to 25 years with registration: www.missionsolar.com/warranty/

# PERC 60

## CLASS-LEADING 330-345 W

## ELECTRICAL SPECIFICATION

| Product Type | MSExxxSX5T (xxx=$P_{max}$) | | | | | |
|---|---|---|---|---|---|---|
| Power Output | $P_{max}$ | $W_p$ | 330 | 335 | 340 | 345 |
| Module Efficiency | | % | 17.9 | 18.2 | 18.5 | 18.7 |
| Tolerance | | % | 0/+3 | 0/+3 | 0/+3 | 0/+3 |
| Short Circuit Current | $I_{sc}$ | V | 10.72 | 10.78 | 10.86 | 10.92 |
| Open Circuit Voltage | $V_{oc}$ | A | 40.40 | 40.58 | 40.82 | 41.00 |
| Rated Current | $I_{mp}$ | V | 10.05 | 10.14 | 10.24 | 10.34 |
| Rated Voltage | $V_{mp}$ | V | 32.85 | 33.03 | 33.20 | 33.37 |
| Fuse Rating | | A | 20 | 20 | 20 | 20 |
| System Voltage | | V | 1000 | 1000 | 1000 | 1000 |

## TEMPERATURE COEFFICIENTS

| | |
|---|---|
| Normal Operating Cell Temperature (NOCT) | 44.43°C (±3.7%) |
| Temperature Coefficient of $P_{max}$ | -0.361%/°C |
| Temperature Coefficient of $V_{oc}$ | -0.262%/°C |
| Temperature Coefficient of $I_{sc}$ | 0.039%/°C |

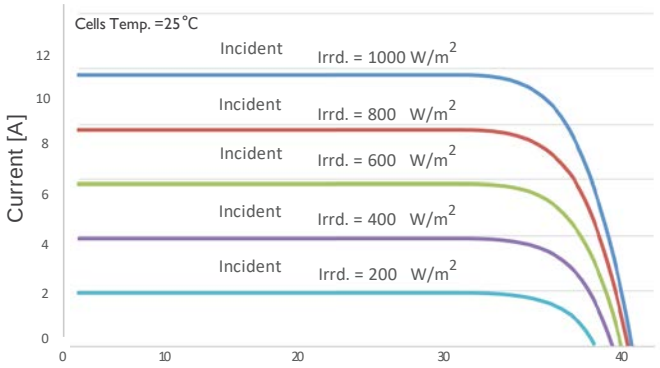
## OPERATING CONDITIONS

| | |
|---|---|
| Maximum System Voltage | 1,000Vdc |
| Operating Temperature Range | -40°C (-40°F) to +85°C (185°F) |
| Maximum Series Fuse Rating | 20A |
| Fire Safety Classification | Type 1 |
| Front & Back Load (UL Standard) | 5600 Pa front and 4800 Pa back load<br>Tested to UL 61730 |
| Hail Safety Impact Velocity | 25mm at 23 m/s |

## MECHANICAL DATA

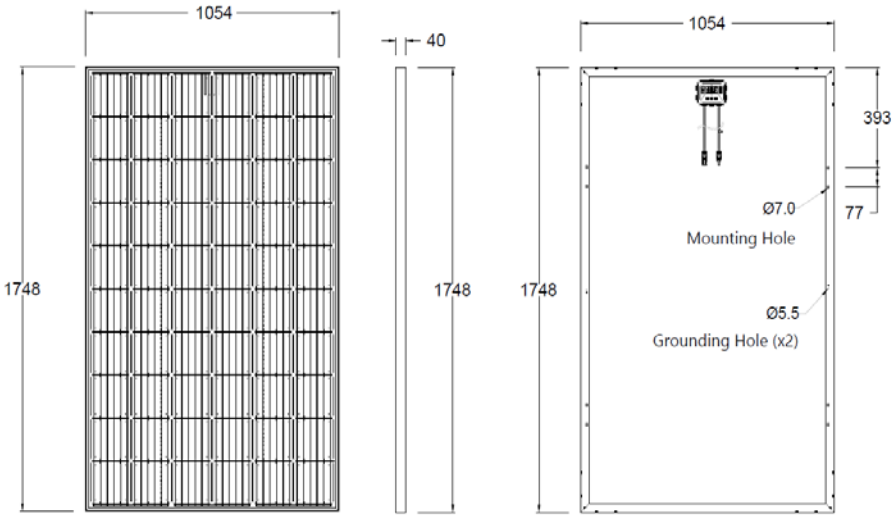
| | |
|---|---|
| Solar Cells | P-type mono-crystalline silicon |
| Cell Orientation | 60 cells (6x10) |
| Module Dimension | 1748mm x 1054mm x 40mm |
| Weight | 20.3 kg (44.8 lbs.) |
| Front Glass | 3.2mm, tempered, low-iron, anti-reflective |
| Frame | Anodized |
| Encapsulant | Ethylene vinyl acetate (EVA) |
| Junction Box | Protection class IP67<br>with 3 bypass-diodes |
| Cable | 1.0m, Wire 4mm² (12AWG) |
| Connector | Staubli PV-KBT4/6II-UR and<br>PV-KST4/6II-UR, MC4, Renhe 05-8 |

## MSE345SX5T: 345WP, 60 CELL SOLAR MODULE CURRENT - VOLTAGE CURVE




Current-voltage characteristics with dependence on irradiance and module temperature

## BASIC DIMENSIONS (UNITS: mm)




## CERTIFICATIONS & TESTS

| | |
|---|---|
| IEC | 61215, 61730, 61701 |
| UL | 61730 |

c UL us LISTED CEC TÜV SÜD

## SHIPPING INFORMATION

| Container FT | Ship To | Pallet | Panels | 345 W Bin |
|---|---|---|---|---|
| 53' | Most states | 34 | 884 | 304.98 kW |
| Double Stack | California | 28 | 728 | 251.16 kW |

| Pallet [26 Panels] | | | |
|---|---|---|---|
| Weight | Height | Width | Length |
| 1263 lbs. (573 kg) | 47.5 in (120.65 cm) | 46 in (116.84 cm) | 70.25 in (178.43 cm) |



**Mission Solar Energy** | 8303 S. New Braunfels Ave., San Antonio, Texas 78235
**www.missionsolar.com** | **info@missionsolar.com**

# Enphase Encharge 10

| | |
|---|---|
| **MODEL NUMBER** | |
| ENCHARGE-10-1P-NA | Encharge 10 battery storage system with integrated Enphase Microinverters and battery management unit (BMU). Includes:<br>- Three Encharge 3.36 kWh base units (B03-A01-US00-1-3)<br>- One Encharge 10 cover kit with cover, wall mounting bracket, watertight conduit hubs, and interconnect kit for wiring between batteries (B10-C-1050-O) |
| **ACCESSORIES** | |
| ENCHARGE-HNDL-R1 | One set of Encharge base unit installation handles |
| **OUTPUT (AC)** | **@ 240 VAC[1]** |
| Rated (continuous) output power | 3.84 kVA |
| Peak output power | 5.7 kVA (10 seconds) |
| Nominal voltage / range | 240 / 211 – 264 VAC |
| Nominal frequency / range | 60 / 57 – 61 Hz |
| Rated output current | 16 A |
| Peak output current | 24.6A (10 seconds) |
| Power factor (adjustable) | 0.85 leading ... 0.85 lagging |
| Maximum units per 20 A branch circuit | 1 unit (single phase) |
| Interconnection | Single-phase |
| Maximum AC short circuit fault current over 3 cycles | 69.6 Arms |
| Round trip efficiency[2] | 89% |
| **BATTERY** | |
| Total capacity | 10.5 kWh |
| Usable capacity | 10.08 kWh |
| Round trip efficiency | 96% |
| Nominal DC voltage | 67.2 V |
| Maximum DC voltage | 73.5 V |
| Ambient operating temperature range | -15° C to 55° C (5° F to 131° F) non-condensing |
| Optimum operating temperature range | 0° C to 30° C (32° F to 86° F) |
| Chemistry | Lithium iron phosphate (LFP) |
| **MECHANICAL DATA** | |
| Dimensions (WxHxD) | 1070 mm x 664 mm x 319 mm (42.13 in x 26.14 in x 12.56 in) |
| Weight | Three individual 44.2 kg (97.4 lbs) base units plus 21.1 kg (48.7 lbs) cover and mounting bracket; total 154.7 kg (341 lbs) |
| Enclosure | Outdoor – NEMA type 3R |
| IQ 8X-BAT microinverter enclosure | NEMA type 6 |
| Cooling | Natural convection – No fans |
| Altitude | Up to 2500 meters (8200 feet) |
| Mounting | Wall mount |
| **FEATURES AND COMPLIANCE** | |
| Compatibility | Compatible with grid-tied PV systems. Compatible with Enphase M215/M250 and IQ Series Micros, Enphase Enpower, and Enphase IQ Envoy for backup operation. |
| Communication | Wireless 2.4 GHz |
| Services | Backup, self-consumption, TOU, Demand Charge, NEM Integrity |
| Monitoring | Enlighten Manager and MyEnlighten monitoring options; API integration |
| Compliance | UL 9540, UN 38.3, UL 9540A, UL 1998, UL 991, NEMA Type 3R, AC156<br>EMI: 47 CFR, Part 15, Class B, ICES 003<br>Cell Module: UL 1973, UN 38.3<br>Inverters: UL 62109-1, IEC 62109-2, UL 1741SA, CAN/CSA C22.2 No. 107.1-16, and IEEE 1547 |
| **LIMITED WARRANTY** | |
| Limited Warranty[3] | >70% capacity, up to 10 years or 4000 cycles |

1. Supported in backup/off grid operations
2. AC to Battery to AC at 50% power rating.
3. Whichever occurs first. Restrictions apply.

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



ENPHASE.



# Enphase Encharge 10

The **Enphase Encharge 10**™ all-in-one AC-coupled storage system is **reliable, smart, simple,** and **safe**. It is comprised of three base Encharge 3™ storage units, has a total usable energy capacity of 10.08 kWh and twelve embedded grid-forming microinverters with 3.84 kW power rating. It provides backup capability and installers can quickly design the right system size to meet the needs of both new and retrofit solar customers.


## Reliable

- Proven high reliability IQ Series Microinverters
- Ten-year limited warranty
- Three independent Encharge storage base units
- Twelve embedded IQ 8X-BAT Microinverters
- Passive cooling (no moving parts/fans)

## Smart

- Grid-forming capability for backup operation
- Remote software and firmware upgrade
- Mobile app-based monitoring and control
- Support for self consumption
- Utility time of use (TOU) optimization

## Simple

- Fully integrated AC battery system
- Quick and easy plug-and-play installation
- Interconnects with standard household AC wiring

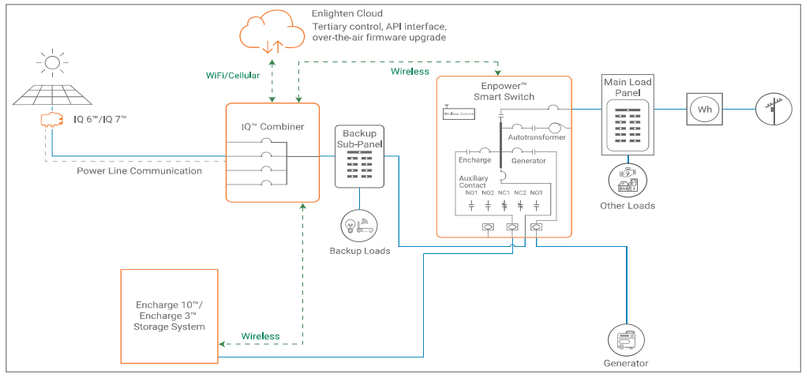
## Safe

- Cells safety tested
- Lithium iron phosphate (LFP) chemistry for maximum safety and longevity

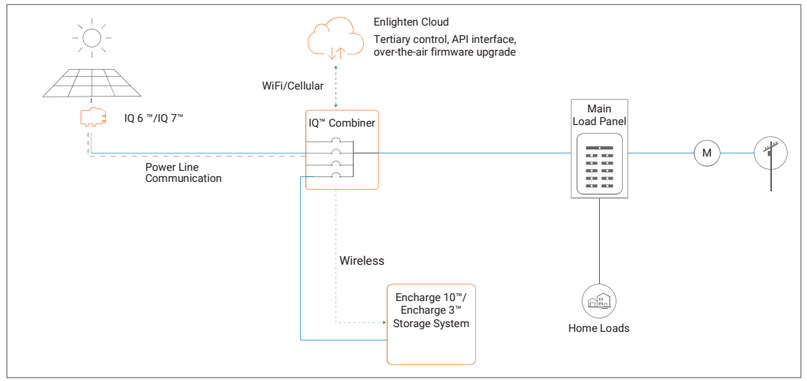
To learn more about Enphase offerings, visit **enphase.com**

ENPHASE.

***Partial home backup with main load panel as service entrance and PV combiner connected to subpanel.*** *This is the preferred connection configuration for partial home backup using a subpanel when the PV circuit breaker size is more than 80A. The space available in Enpower for combiner (solar) connection is left vacant.*




***Self consumption, no Enpower smart switch.*** *The preferred configuration when adding battery storage and PV for self-consumption in a grid-tied application with no option for backup during outages. PV and Encharge will not operate when the grid is unavailable.*




## PREPARATION

A ) Inspect the packaging and the Encharge Battery(ies) for damage, such as cracks, dents, or leaking electrolyte. **Do not install or use the Encharge Battery(ies) if it has been damaged in any way**. If damaged, contact your distributor for replacement.

B ) Ensure that your kit includes the following Encharge components:
- The **Encharge 10** includes three batteries and two inter-unit raceways, an Encharge 10 triple-width cover, and a triple-width mounting bracket.
- The **Encharge 3** includes one battery, and single-width cover with mounting bracket.

  **NOTE**: Check the "Energize By" label on the shipping box to verify that the Encharge Battery(ies) will be installed by the date shown. If the date has passed, contact your distributor for next steps.

  ⚠ **WARNING**: Risk of injury. Take care when lifting. The Encharge Battery unit is heavy (44.2 kg/ 97.4 lbs) and requires two persons to lift.

C ) Ensure you have the following **required Enphase items for backup systems**:
- An Enphase Enpower smart switch with microgrid interconnect device (MID) functionality and an Enphase IQ™ Combiner.
- The Enphase Encharge system requires an Internet connection through the IQ Envoy in the IQ Combiner. Failure to maintain an Internet connection may have an impact on the warranty. See enphase.com/warranty for full terms.
- Wireless communications kit (COMMS-KIT-01) to be installed at the IQ Envoy for communications with Encharge and Enpower. Includes USB cable for connection to IQ Envoy / IQ Combiner and allows wireless communication with Encharge and Enpower.
- Encharge lifting handles, two pieces (ENCHARGE-HNDL-R1).

D ) Make sure you also have the following **required items**:
- Mounting location that is structurally suited to bearing the weight of the Encharge Battery(ies). Total weight for the Encharge 3, including the Encharge base unit, cover and wall mount bracket, is 52 kg (114.6 lbs). Total weight for the Encharge 10, including the three Encharge base units, cover, and wall mount bracket, is 154.7 kg (341 lbs).The wall must contain blocked studs that can bear the battery weight or can be of masonry or other suitable structure.
- Tools: conduit (with fittings and fitting tools), drill, 5/32 inch pilot bit (or metric equivalent), screwdriver, socket wrench, torque wrench, level, wire stripper, and stud finder if installing on studs.
- Fasteners for wall mount bracket. Slots are 6.8mm (0.27"). Check with a structural engineer and local standards for requirements:

  Single-wide bracket: Three 1/4" lag bolts or screws, 7.6 cm (3 inches) long (depending on attachment wall).

  Triple-wide bracket: Nine 1/4" lag bolts or screws, 7.6 cm (3 inches) long (depending on attachment wall).
- Washers for use between fastener heads and wall-mount bracket.
- Copper conductors: No. 14 - 8 AWG (11mm/7/16 inch strip length) copper conductors (rated at 75° C or 90° C) for terminals.
- Conduit fittings: 3/4 inch (left side) and 1/2 inch (right side) hubs are required for all installations, and NEMA Type 3R conduit fittings (hubs) are needed when installing out of doors (one for each used conduit opening). Also needed are conduit plugs to close unused conduit openings and conduit grounding nuts.
- Over current protection: The overcurrent protection in Encharge is not branch circuit overcurrent protection and cannot be relied upon for that purpose. The branch circuit overcurrent protection is located in Enpower or, when combining , in a separate combiner. See the Enphase Enpower Quick Install Guide for more information.
- Personal protective equipment (PPE) for handling lithium batteries as required by local safety standards.

E ) Verify that main service is 120/240 VAC, and not 208/120 VAC. Encharge batteries cannot be installed where L1 to L2 measures 208 VAC.

F ) Install the PV system and the IQ Combiner as directed by the Enphase installation manuals.

QUICK **INSTALL** GUIDE **(Models ENCHARGE-3-1P-NA and ENCHARGE-10-1P-NA)**

ENPHASE.

# Install the Enphase **Encharge Storage System**

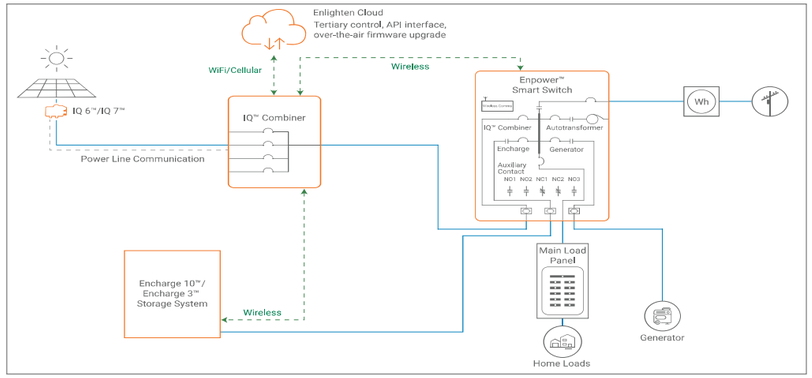
To install the Enphase **Encharge 3**™ storage system or **Encharge 10**™ storage system and the Enphase wall-mount bracket, read and follow all warnings and instructions in this guide. Safety warnings are listed on the back of this guide. These instructions are not meant to be a complete explanation of how to design and install an energy storage system. All installations must comply with national and local electrical codes and standards. **Only qualified electricians shall install, troubleshoot, or replace the Encharge 3 or Encharge 10.**

**The Encharge™ storage system includes the Enphase Encharge Battery(ies) with integrated Enphase IQ™ Microinverters. The Enphase IQ Envoy™ communication gateway measures PV production and home energy consumption. The Encharge storage system senses when it is optimal to charge or discharge the battery so that energy is stored when it is abundant and used when scarce. Encharge storage systems are capable of providing backup power when an Enphase Enpower™ smart switch is installed at the site.**

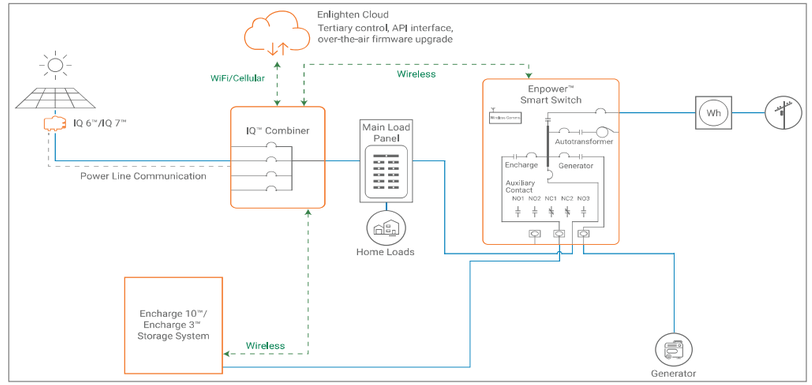
Five unique installation scenarios are shown:

***Whole home backup with Enpower as service entrance and PV combiner connected to Enpower.*** *This is the preferred configuration for back up of the entire main load panel. This configuration supports up to an 80A breaker for the PV circuit and an 80A breaker for battery storage.*

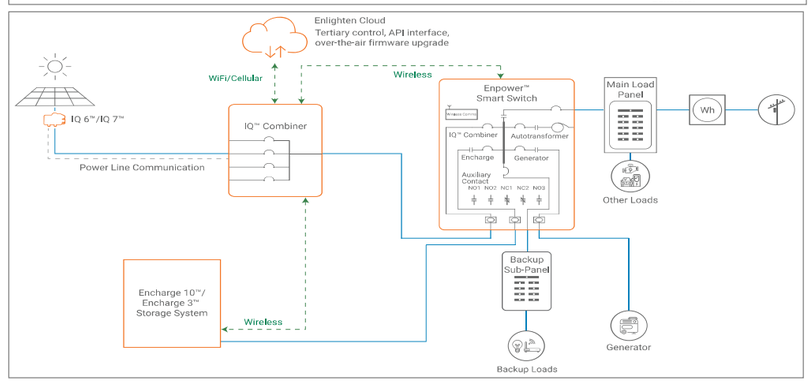
***NOTE:***
*1. For M215/M250 connection to Ensemble, refer tech brief at https://enphase.com/en-us/storage-m-series*
*2. M series microinverters require Envoy-S metered.*




***Whole home backup with Enpower as service entrance and PV combiner connected to main load panel.*** *This is the preferred configuration when you back up the entire main load panel, and the size of the PV combiner circuit is more than 80A. In this configuration, the PV combiner circuit connection space in Enpower is left vacant. When existing PV combiner circuits are connected to the main load panel, and you want to add battery storage to the system, you can keep the PV combiner connected to the main load panel and connect only the battery storage system to Enpower.*




***Partial home backup with main load panel as service entrance and PV combiner connected to Enpower.*** *When PV circuits breaker size is less than 80A, this is the preferred configuration for partial home backup with subpanel.*



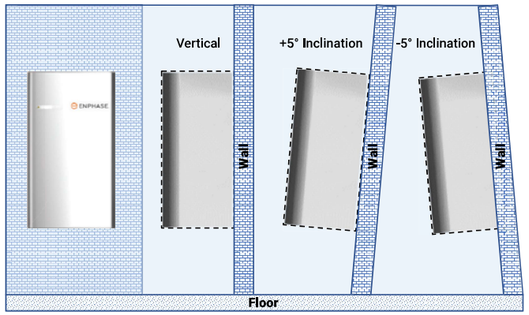

140-00151-10

## 4 Install the Encharge 3 (single width) or Encharge 10 (triple width) wall mount bracket

Follow the instruction below for the bracket style (single-width or triple-width) you are installing.

⚠ **WARNING!** Risk of injury and equipment damage. Attach the wall mount to the wall so that it is no more than five percent from vertical. See the following image for reference:

**Allowable tilt from vertical for Encharge installation**




### Encharge 3 — single-width bracket

A ) Place the wall-mount bracket on the wall so that the mounting holes in the middle of the bracket align with the center of the stud.

B ) Use a level to keep the bottom of the wall-mount bracket level.

C ) Use 1/4" screws (or masonry attachments for masonry) to attach the bracket using one screw and washer for each slot (6.8mm / 0.27").Tighten all the screws to manufacturer's specified torque values.

D ) Verify that the wall-mount bracket is solidly attached to the wall. You must use four screws in each mounting bracket.

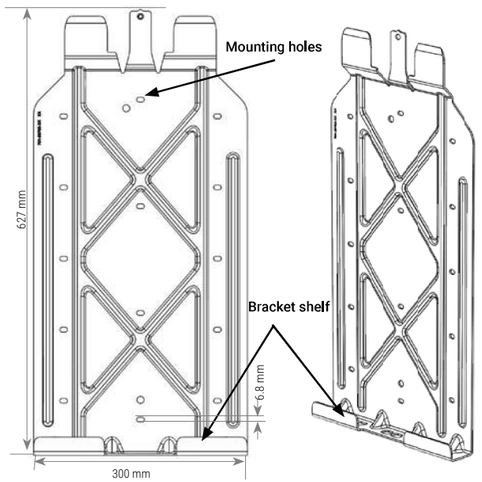
⚠ **WARNING!** Risk of injury and equipment damage. Do not mount an Encharge 3 on a bracket that is not properly mounted.

E ) If installing additional batteries, install adjacent wall-mount brackets, as needed. Be sure to align the mounting holes in the wall-mount bracket to the center of the wall stud. You may install another row of brackets above the one already installed. Maintain at least 15 cm (six inches) vertical clearance between rows of Encharge installations, and ensure that the wall can support the structural load (weight) of the installation.

⚠ **WARNING!** Risk of injury and equipment damage. Do not install more than three Encharge 3 units per 20A branch circuit.

**Encharge 3 wall mount bracket**

**Front view** **Angle view**




### Encharge 10 — triple-width bracket

A ) Place the wall-mount bracket on the wall so that the mounting holes in the middle of the bracket align with the center of the stud, and the mounting holes on the left and right align with the adjacent studs.

B ) Use a level to keep the bottom of the wall-mount bracket level.

C ) Use 1/4" screws (or masonry attachments for masonry) to attach the bracket using one screw and washer for each slot (6.8mm / 0.27"). Use screws in each section of the mounting bracket to support the three Encharge battery units. There is an array of slots so that you can choose those that allow you to mount the bracket on studs. Tighten all the screws to manufacturer's specified torque values.

D ) Verify that the wall-mount bracket is solidly attached to the wall.

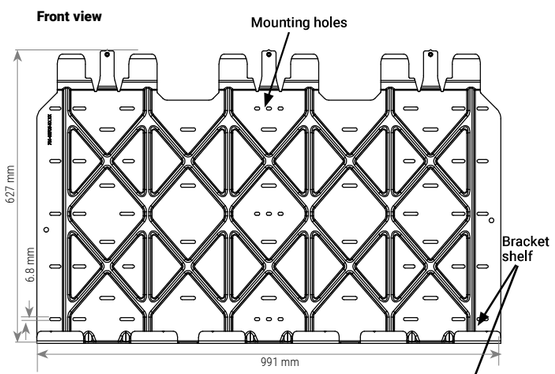
⚠ **WARNING!** Risk of injury and equipment damage. Do not mount Encharge 10 batteries on a bracket that is not properly mounted.

E ) If installing additional batteries, install adjacent wall-mount brackets, as needed. Be sure to align the mounting holes in the wall-mount bracket to the center of the wall stud. You may install another row of brackets above the one already installed. Maintain at least 15 cm (six inches) vertical clearance between rows of Encharge installations, and ensure that the wall can support the structural load (weight) of the installation.

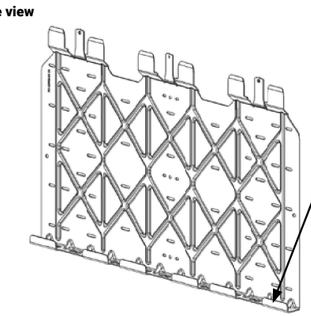
⚠ **WARNING!** Risk of injury and equipment damage. Do not install more than one Encharge 10 unit per 20A branch circuit.

**Encharge 10 wall mount bracket**

**Front view**




**Angle view**



# INSTALLATION

## 1 Plan a location for the Encharge batteries

The Encharge housing is NEMA type 3R and can be installed indoors or outdoors. The terminal blocks accepts copper conductors of No. 14 - 8 AWG.

A ) **Following local standards,** choose a well-ventilated location where the ambient temperature and humidity are within -15° C to 55° C (5° F to 131° F) and 5% to 100% RH, non-condensing, preferably out of direct sunlight. The optimum ambient temperature range for installation location is 0º C to 30º C (32º F to 86º F).

B ) **Ensure that the mounting location can sustain the total weight of the Encharge batteries and mounting bracket.** Total weight for the Encharge 3, including the Encharge base unit, cover and wall mount bracket, is 52 kg (114.6 lbs). Total weight for the Encharge 10, including the three Encharge base units, cover, and wall mount bracket, is 154.7 kg (341 lbs).

⚠ **WARNING:** The installer should install blocking between studs to ensure that no single stud carries the entire weight load of the Encharge batteries.

C ) Plan the mounting location to be at least 15cm (six inches) off the ground and 15cm (six inches) from the ceiling. Keep the Encharge away from falling or moving objects, including motor vehicles.

⚠ **WARNING:** If mounted in the path of a motor vehicle, we recommend a mounting height that is 91 cm (36-inch) minimum above the floor.

D ) Ensure that there are no pipes or electrical wires where you plan to drill.

E ) Plan to maintain at least three feet of clearance in front of each Encharge. Allow at least 15cm (six inches) clearance on top and bottom of the Encharge so that the vents on the top and bottom of the units are not blocked for air circulation.

F ) Consider the dimensions of the Encharge batteries, easy access, height, and length of cable when selecting the location.

G ) Select a location where you can interconnect to the Enphase Enpower smart switch.

H ) Follow all local standards.

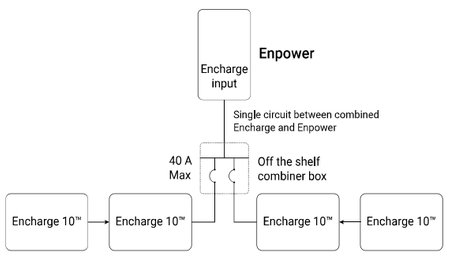
J ) Review your external conduit plan to determine to which side of the field wiring compartment you will connect conduit.

K ) Up to two Encharge 10 (or six Encharge 3) units can be daisy chained on a single branch circuit. For installations with more than this number of units, there must be a separate load center, subpanel, or circuit combiner with over current protection to combine the daisy chained circuits, and you must run only one circuit for all the Encharge units to the Enpower (or to Enphase IQ Combiner for grid-tied-only installations). You must select proper conductors and circuit breakers for these circuits according to local codes, standards, and other applicable requirements. Enpower supports up to a maximum of 80 A breaker for Encharge connection circuit.

The subpanel could be a small, two circuit box with circuit breakers. The circuit breakers in the box would have to be suitable for back-feeding, per NEC 408.36(D).

Select the right size subpanel and breakers based on the number of Encharge units being installed. Up to four Encharge 10s or twelve Encharge 3s can be safely connected to 80A load center.

To do this, you must purchase an off-the-shelf subpanel and install as shown in the following image:




⚠ **WARNING!** Parallel power production sources only. Do not connect load circuits.

## 2 Install the AC disconnect

**Following all local codes and standards:**

A ) Install an AC disconnect that can break the maximum rated current of the branch circuit under load. The AC disconnect must be readily accessible and located within line-of-sight of Encharge, per NEC 2017 706.7(A).

B ) Each Encharge unit is suitable for use with up to No. 8 AWG wires on a maximum 40 A branch circuit. If more than 32 A of Encharge batteries (corresponding to a 40 A branch circuit) are installed, a separate subpanel must be installed between the Encharge units and Enpower to combine the Enpower circuits together. All circuit breakers in the subpanel must be suitable for back-feeding, per NEC 408.36(D).

C ) Verify that AC voltage at the site is within range: single-phase L1 to L2 voltage must measure between 211 and 264 VAC, while L-N should measure between 106 and 132 VAC.

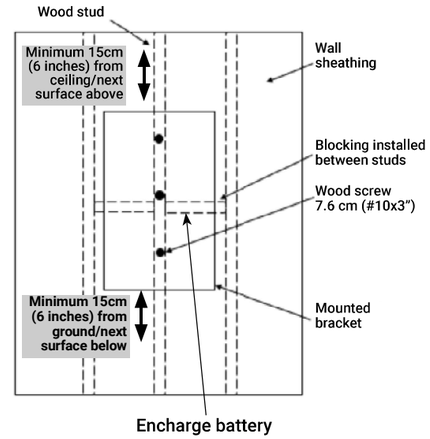
## 3 Prepare to install the wall-mount bracket

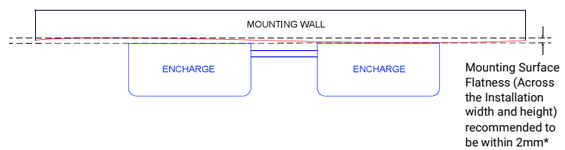
A ) Make sure that the planned position for the wall-mount bracket meets clearance requirements as shown. The image depicts a single bracket, but clearances and requirements are the same for the triple-width bracket.

B) Ensure that the mounting location can sustan the weight of the Encharge batteries and mounting bracket. Total weight for the Encharge 3 including the mounting brackets and cover is 52 kg (114.6 lbs), while the total weight for Encharge 10 including the mounting bracket and cover add up to 154.7 kg (341 lbs).

C ) Starting at installation position closest to the power source, mark a level line on the wall as a guide.

⚠ **WARNING!** Multiple risks. Make sure not to drill or attach into electric wiring or pipes that are in the wall!




**NOTE**: The above specified surface flatness requirment is applicable to all the combinations of Encharge 3 and 10.

* If the difference in flatness is more than 2mm, recommend installing a substructure like unistrut for better alignment of the units.

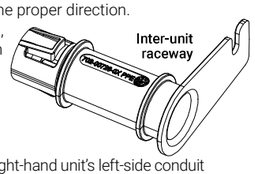
## 6 Install conduit and field wiring, continued

⚠ **DANGER!** Risk of electric shock. Check that the dedicated circuit breaker protecting the branch where the Encharge Battery(ies) will be connected is turned off before wiring.

⚠ **WARNING!** Risk of equipment damage. The DC switch must be OFF before installing, otherwise Encharge will try to form a grid.

D ) **If installing an Encharge 10**, install the inter-unit raceways. The left-side and right-side conduit openings are different diameters, so you must install the raceway in the proper direction.

- Face the fronts of the batteries, and insert the raceway through the right-hand unit's left-side conduit opening from within the field wiring compartment, with the arm of the raceway pointing up.




- Push the raceway through the right-hand unit's left-side conduit opening and into the left-side unit's right-side conduit, opening until the two snap features on the raceway engage the left-side unit's enclosure.
- Once fully inserted, rotate the "arm" toward you until it stops.
- The left-side conduit opening of each battery unit has a flat surface, without additional features. The larger seal (green) on the raceway mates with this opening. The right-side conduit opening has a groove around the hole to fit the O-ring (red) of the raceway. Make sure that the O-ring is captured in the groove between the Encharge enclosure and the raceway flange adjacent to the O-ring.

E ) Using the conductors and suitable conduits, connect the AC disconnect and the first adjacent Encharge Battery. Use the conduit openings provided to connect the conduit and pass the wires through them. Note that if an Enphase Enpower is in line-of-sight, the breaker can service as a disconnect.

⚠ **WARNING!** Risk of equipment damage. Do not modify or rewire the pre-installed wiring or bonding connections in the field wiring compartment.

⚠ **WARNING!** Risk of equipment damage. Always connect to two Lines (active) and one ground.

F ) Connect each wire in the field wiring compartment to its corresponding conductor (Lines and Ground). Each terminal accepts two 14-8 AWG conductors (11mm/7/16 inch strip length). Tighten to 14 lb-in.

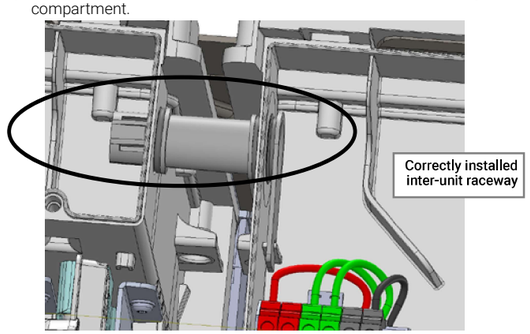
G ) **If installing an Encharge 10**, route the wires from the first Encharge Battery to the adjacent Encharge Battery through the inter-unit raceway. There are two positions for each line and for ground in the terminal block to allow for daisy-chaining.

⚠ **WARNING!** Risk of equipment damage. Do not daisy chain more than six total Encharge 3 or two Encharge 10 on a single branch circuit.

H ) After all wires in the field wiring compartment are connected and secured, check that there are no exposed conductors.

I ) If connecting additional Encharge Batteries, use another conduit and another set of wires to connect between field wiring compartments.

J ) Gently arrange all the wires and connectors inside the field wiring compartment.

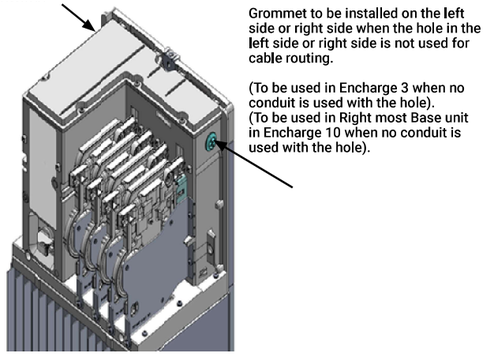



K ) Plug any unused conduit openings before proceeding.

L ) Replace the field wiring compartment cover. Use a cross-head screw driver to tighten the cover screws to 2.3Nn (20.3 lb-in).

⚠ **WARNING!** Risk of equipment damage. Ensure that no wires are pinched before replacing the cover.

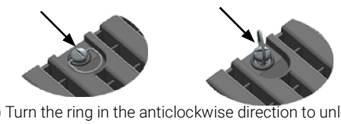
⚠ **DANGER!** Risk of electric shock. The system is not ready to be energized! Do not close the circuit breaker or turn on the DC switch.




## 7 Dismounting of Encharge 3 Cover

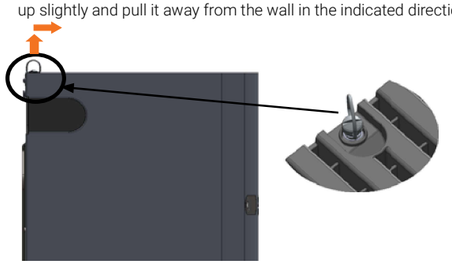
A) Remove the conduit covers from either sides of the Encharge cover


B) Lift up the ring of the quarter turn screw.



C) Turn the ring in the anticlockwise direction to unlock the screw.

D) After unlocking, hold the ring of the screw and lift the top cover up slightly and pull it away from the wall in the indicated direction.



E) While pulling out the cover, make sure that the indicated snaps at the bottom of the unit are being unlocked.

F) Simillarly for dismounting the Encharge 10 Cover, please follow the instructions from A to E.

## 5 Mount the Encharge Battery(ies) on the wall

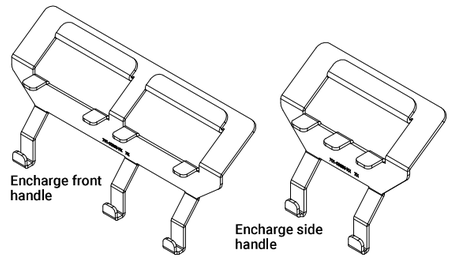
⚠ **WARNING**: Risk of injury. Take care when lifting.
**Each Encharge battery base unit is heavy (44.2 kg/ 97 lbs) and requires two persons to lift.**

⚠ **WARNING!** Risk of injury and equipment damage. Avoid dropping the Encharge Battery(ies). Doing so may create a hazard, cause serious injury, and/or damage the equipment.

⚠ **WARNING!** Risk of injury and equipment damage. Protect the Encharge Battery(ies) from impact damage and improper use.

A ) Two person together must lift a single Encharge battery base unit from the packaging and place it right side up on a flat surface.

B ) Locate the Encharge lifting handles:




C ) If installing multiple battery units, plan to install the Encharge battery unit located closest to the main supply.

D ) The first person lifting must slide the longer front handle under the front edge of the Encharge battery, then tilt the handle up so that handle tabs engage with the slots on the front side of the battery.

E ) The second person lifting must slide the shorter side handle under the left or right side (as needed) of the Encharge battery, and support the upper back of the Encharge battery with their free hand.

F ) Together, lift the Encharge battery and bring it to the already mounted bracket.

G ) Hold the Encharge battery at an angle so the top of the unit sets into the top of the wall-mount bracket.

⚠ **WARNING!** Risk of injury and equipment damage. Do not release the Encharge battery unit until you ensure that the Encharge battery unit is fully seated in the wall-mount bracket shelf.

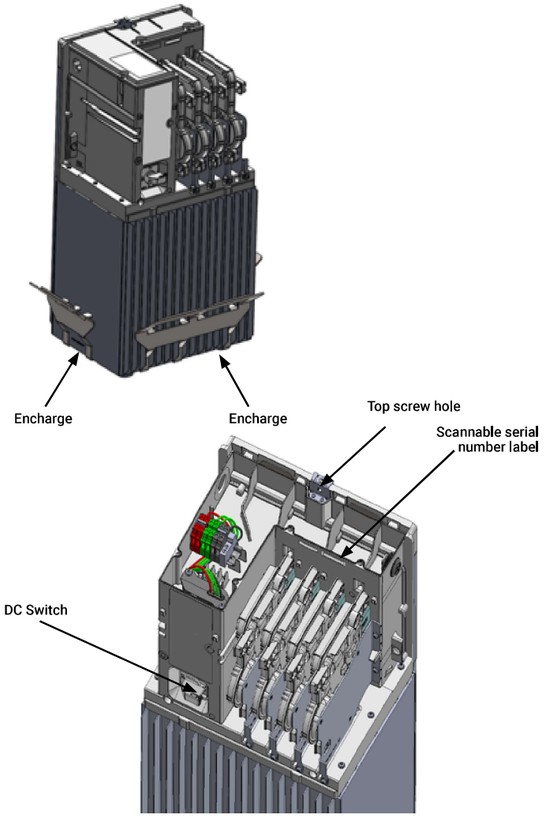
H ) Once the top of the battery is engaged with the top tabs of the wall-mount bracket, keep the battery vertical, make sure the battery is flush against the bracket, and lower the battery down until fully seated with the wall-mount bracket and set into the bracket shelf.

I ) Remove the handles and reserve for the next Encharge battery installation.

J ) Use a Phillips screw driver to loosen the screws securing the field wiring compartment cover and remove the cover. Keep the cover and screws handy as you will need them later.

K ) Attach the battery to the mounting bracket aligning the screw hole at the top of the battery with the screw hole at the top of the bracket.

L ) To record the installation of each Encharge battery base unit, scan the serial number label using Enphase Installer Toolkit™ and your mobile device.




## 6 Install conduit and field wiring

⚠ **DANGER!** Risk of electric shock. The DC switch must be in the Locked position before performing this step.

A ) If not already done, use a Phillips screw driver to loosen the screws securing the field wiring compartment cover and remove the cover. Keep the cover and screws handy as you will need them later.

B ) Remove the sealing plug for entry into the field wiring compartment. If installing only one battery or when installing the last battery in the array, seal up the hole with the supplied sealing plug.

C ) Size the conductors (Lines and Ground) to account for voltage rise and to conform to the tables below. Design for a voltage rise total of less than 2%. Encharge can use any circuit breaker size between 10 A and 40 A. Breaker rating and wire size are installation dependent.

| Number of Encharge E3/E10 units | Current (A) | Minimum wire size (AWG) | Breaker rating (A) |
|---|---|---|---|
| 1*E3 | 5.3 | 14 | 10 |
| 2*E3 | 10.7 | 14 | 15 |
| 3*E3 or 1*E10 | 16.0 | 12 | 20 |
| 4*E3 or (1*E10 + 1*E3) | 21.3 | 10 | 30 |
| 5*E3 or (1*E10 + 2*E3) | 27.7 | 8 | 35 |
| 6*E3 or 2*E10 or (1*E10 + 3*E3) | 32.0 | 8 | 40 |

*E3 refers to Encharge 3
*E10 refers to Encharge 10

In all cases in the table, it is possible to always use larger conductors and a breaker sized for that conductor or smaller. For Example in row 3, with 3*E3 or 1*E10, it is possible to use:

a) 12 AWG wire with 20 A breaker, or
b) 10 AWG wire with 20 A or 30 A breaker, or
c) 8 AWG wire with 30, 35, or 40 A breaker

# SAFETY

IMPORTANT SAFETY INSTRUCTIONS. SAVE THESE INSTRUCTIONS. This guide contains important instructions that you must follow during installation and maintenance of the Enphase Encharge Battery(ies). Failing to follow any of these instructions may void the warranty (enphase.com/warranty).

## In Case of Fire or Other Emergency

**In all cases:**
- If safe to do so, switch off the AC breaker for the Encharge Battery circuit, and if an isolator switch is present, switch off the AC isolator for the Encharge Battery circuit.
- Contact the fire department or other required emergency response team.
- Evacuate the area.

**In case of fire:**
- When safe, use a fire extinguisher. Suitable types are A, B, and C dry chemical fire extinguishers. Additional extinguishing media include carbon dioxide, or alcohol-resistant foams.

**In case of flooding:**
- Stay out of the water if any part of the Encharge Battery(ies) or wiring is submerged.
- If possible, protect the system by finding and stopping the source of the water, and pumping it away.
- If water has contacted the battery, call your installer to arrange a inspection. If you are sure that water has never contacted the battery, let the area dry completely before use.

**In case of unusual noise, smell or smoke:**
- Ensure nothing is in contact with the Encharge Battery(ies) or in the venting area of the Encharge Battery(ies).
- Ventilate the room.
- Contact Enphase Customer Support at enphase.com/en-us/support/contact.

## 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. |

## Safety Instructions

| | |
|---|---|
| ⚠ | **DANGER**: Risk of electric shock. Risk of fire. Only qualified electricians should install, troubleshoot, or replace the Encharge Battery(ies). |
| ⚠ | **DANGER**: Risk of fire or explosion. Only qualified personnel, using personal protective equipment (PPE) should transport or handle the Encharge Battery(ies). |
| ⚠ | **DANGER**: Risk of explosion. Do not dispose of Encharge Battery(ies) in a fire or by burning. The Encharge Battery(ies) can explode. |
| ⚠ | **DANGER**: Risk of fire or explosion. This product is designed for stationary installation only and should be used accordingly. It is not designed for mobile applications such as installation and on vehicles and trailers and should not be used in such applications. |
| ⚠ | **DANGER:** Risk of fire. During use, when stored, or during transport, keep the Encharge Battery(ies) in an area that is well ventilated and protected from the elements, where the ambient temperature and humidity are within -15° C to 55° C (5° F to 131° F) and 5% to 100% RH, non-condensing, preferably out of direct sunlight. Do not install the Encharge Battery(ies) at elevations over 2500 m (8,200 feet) above sea level. |
| ⚠ | **DANGER:** Risk of fire. If the Encharge Battery(ies) generate smoke, remove AC power from the Enphase System and turn the DC connect switch to the off position so that charging/discharging stops. |
| ⚠ | **DANGER:** Risk of electric shock. Risk of fire. Do not attempt to repair the Encharge Battery(ies). DO NOT OPEN THE ENCLOSURE -- NO SERVICEABLE PARTS. Tampering with or opening the Encharge Battery(ies) will void the warranty. If the Encharge Battery(ies) fail, contact Enphase Customer Support for assistance at enphase.com/en-us/support/contact. |
| ⚠ | **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. Do not install the Encharge Battery(ies) without first removing AC power from the photovoltaic system. Disconnect the power coming from the photovoltaics before servicing or installing. |
| ⚠ | **DANGER**: Risk of electric shock. Always de-energize the AC branch circuit during an emergency and/or before servicing the Encharge Battery(ies). Never disconnect the DC switch under load. |
| ⚠ | **DANGER**: Risk of electric shock. Risk of high short-circuit current. Observe the following precautions when working on batteries:<br>• Remove watches, rings, or other metal objects.<br>• Use tools with insulated handles.<br>• Wear insulating gloves and boots.<br>• Do not lay tools or metal parts on top of batteries. |
| ⚠ | **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. |
| ⚠ | **DANGER**: Risk of fire. Do not allow or place flammable, sparking, or explosive items near the Encharge Battery(ies). |

**Enphase Customer Support:** enphase.com/en-us/support/contact

## Safety Instructions, continued

| | |
|---|---|
| ⚠ | **DANGER**: Risk of electric shock. In areas where flooding is possible, install the Encharge Battery(ies) at a height that prevents water ingress. |
| ⚠ | **DANGER**: Risk of electric shock. AC voltage is present at the output when the DC switch is on. |
| ⚠ | **DANGER**: Risk of electric shock. Branch circuit protection must be off before switching DC power on or off. |
| ⚠ | **DANGER**: Risk of electric shock. The DC switch must locked in the OFF position for shipping and service. |
| ⚠ | **WARNING**: Risks of electric shock, energy hazard, and chemical hazard. Do not disassemble. |
| ⚠ | **WARNING**: Risk of equipment damage. During use, storage, transport, or installation, always keep the Encharge Battery(ies) in an upright position. |
| ⚠ | **WARNING**: You must install the Encharge Battery(ies) only on a suitable wall using an Enphase wall-mount bracket. |
| ⚠ | **WARNING**: Before installing or using the Encharge Battery(ies), read all instructions and cautionary markings in this guide and on the equipment. |
| ⚠ | **WARNING**: Do not install or use the Encharge Battery(ies) if it has been damaged in any way. |
| ⚠ | **WARNING**: Do not exceed the maximum number (3) of Encharge Batteries in a 20 A AC branch circuit. |
| ⚠ | **WARNING**: Do not sit on, step on, place objects on, or insert objects into the Encharge Battery(ies). |
| ⚠ | **WARNING**: Do not place beverages or liquid containers on top of the Encharge Battery(ies). Do not expose the Encharge Battery(ies) to liquids or flooding. |
| ⚠ | **WARNING**: When placing the Encharge Battery(ies) in storage, ensure that AC power is not present and that the DC switch is in the Locked position. While in storage, damage to the battery can occur from over-discharge. If the battery state of charge falls to 0%, the Encharge Battery(ies) can be damaged or destroyed. Because of this, the Encharge Battery(ies) must only be stored for a limited amount of time.<br>• The Encharge Battery(ies) must be installed and energized by the "Must Energize By" date on the shipping box label.<br>• The Encharge Battery(ies) must have a charge state of no more than 30% when placed in storage. To do this, the Encharge Battery(ies) must be placed in **Sleep Mode**.<br>• If the Encharge Battery(ies) is already been installed, it must be placed into **Sleep Mode** prior to uninstalling. A battery in **Sleep Mode** can be stored a maximum of two months after being placed into **Sleep Mode**. |
| ✓ | **NOTE**: Perform installation and wiring, including protection against lightning and resulting voltage surge, in accordance with all applicable local electrical codes and standards. |
| ✓ | **NOTE**: Because Encharge Battery(ies) are grid forming, you must install signage in accordance with NEC articles 705, 706, and 710. |
| ✓ | **NOTE**: Using unapproved attachments or accessories could result in damage or injury. |
| ✓ | **NOTE**: Install properly rated over current protection as part of the system installation. |
| ✓ | **NOTE**: To ensure optimal reliability and to meet warranty requirements, the Encharge Battery(ies) must be installed and/or stored according to the instructions in this guide. |
| ✓ | **NOTE**: The Encharge Battery(ies) are compatible only with the **IQ Envoy communications gateway properly fitted with USB hub, USB radios, and production and consumption CTs.** The **IQ Envoy** is required for operation of the Encharge Battery(ies). Earlier versions of the Enphase Envoy communications gateway are incompatible. |
| ✓ | **NOTE**: The Enphase Encharge Battery(ies) are intended to operate with an Internet connection. Failure to maintain an Internet connection may have an impact on the warranty. See Limited Warranty for full terms and services (enphase.com/warranty). |
| ✓ | **NOTE**: When replacing Enphase Encharge Battery(ies), you must replace with an Encharge Battery(ies) of the same type, with the same AC current rating. |
| ✓ | **NOTE**: When disconnected and stored, no automatic charge of the battery is possible. |
| ✓ | **NOTE**: Properly mount the Encharge Battery(ies). Ensure that the mounting location is structurally suited to bearing the weight of the Encharge Battery(ies). |
| ✓ | **NOTE**: During use, storage, and transport, keep the Encharge Battery(ies):<br>• Properly ventilated<br>• Away from water, other liquids, heat, sparks, and direct sunlight<br>• Away from excessive dust, corrosive and explosive gases, and oil smoke<br>• Away from direct exposure to gas exhaust, such as from motor vehicles<br>• Free of vibrations<br>• Away from falling or moving objects, including motor vehicles. If mounted in the path of a motor vehicle, we recommend a 91 cm (36-inch) minimum mounting height<br>• At an elevation of lower than 2,500m (8,200 feet) above sea-level<br>• In a location compliant with fire safety regulations<br>• In a location compliant with local building codes and standards |
| ✓ | **NOTE**: Conditions for the Encharge installation site apply also to storage conditions. |

## Environmental Protection

ELECTRONIC DEVICE: DO NOT THROW AWAY. Waste electrical products should not be disposed of with household waste. Proper disposal of batteries is required. Refer to your local codes for disposal requirements.

## 8 Cover and energize the system

⚠ **WARNING:** Before energizing, make sure that ALL Encharge Batteries in the system are properly installed and conductors terminated.

**NOTE: Check the box for updates on cover installation instructions.**

A ) Check that the field wiring compartment cover(s) for all Encharge Batteries in the system are closed and secured.

⚠ **WARNING:** Complete the Enphase Enpower and Enphase Combiner installations before turning the DC switch(es) ON.

⚠ **DANGER: Risk of electric shock**. Before continuing, check that Encharge units are properly wired, and ground connection does not have a L1 or L2 connection, as this introduces a safety hazard.

- Apply AC power to the Encharge circuits. Do NOT turn on the DC switch on Encharges.
- Using a voltmeter measure the Encharge chassis metal to ground (e.g., grounded conduit) and ensure there is no AC voltage source present. If wiring is incorrect, a ground fault may exist, and the AC voltage may read ~120VAC. If voltage is present, DO NOT touch the chassis, and immediately remove AC power from the Encharge circuits.
- Remove AC power to the Encharge circuits and correct the wiring.

⚠ **WARNING!** Risk of electric shock and equipment damage. If the DC switch is ON, AC voltage might be present at the terminals.

⚠ **DANGER: Risk of electric shock. AC voltage might be present at the output when the DC switch is on.**

⚠ **WARNING:** Branch Circuit protection for Encharge MUST be ON (with AC voltage present) before turning DC switch ON. Wait for 15 seconds after turning branch circuit protection ON and check that LED on Encharge is ON (Any color LED is ON) before turning DC switch ON.

B ) Turn on the AC power first (branch circuit protection) and then turn on the DC switches of the Encharge batteries.

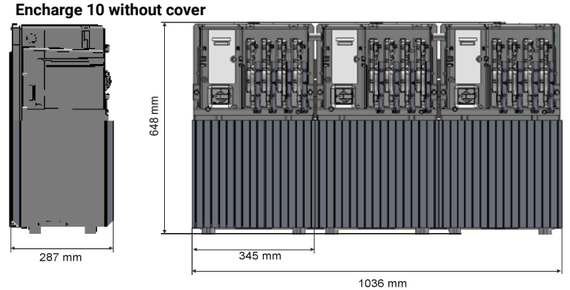
**NOTE:** Do NOT leave the Encharge unit's DC switch in the ON position for any extended period of time (such as overnight or for more than 24 hours) unless Encharge is commissioned (communicating with Envoy), connected to AC, and has passed functional testing and is operational. Leaving the DC switch ON without AC connection and communication with the system will drain the battery and may cause damage to the battery cells such that they no longer be able to charge. Damage resulting from this improper installation and misuse is not covered under the product's limited warranty.

C ) Place enclosure cover(s) over the battery(ies) as follows.

**Encharge 3 (single-width battery cover)**
- Pick up the Encharge 3 Battery cover, stand in front of the battery so that the cover and battery are on a level, and slide the cover over the battery so that the interior guides of the cover slide easily over the guides on the battery unit.
- Check that the screw hole on top of the battery cover aligns with that on the battery.
- Use the included screw to attach the cover to the battery. Tighten the screw as needed.

**Encharge 10 (triple-width battery cover)**
- The Encharge 10 Battery cover in wide and may require two persons to guide smoothly over the battery units.
- Pick up the Encharge 10 Battery cover, stand in front of the battery so that the cover and battery are on a level, and slide the cover over the battery so that the interior guides of the cover slide easily over the guides on the battery units.
- Check that the screw holes on top of the battery cover align with those on the batteries.
- Use the included screws to attach the cover to the batteries. Tighten the screws as needed.

**Encharge 10 without cover**




# CONFIGURE and ACTIVATE

A ) Use the Enphase Installer Toolkit to commission the Encharge Battery(ies). Once connected to the IQ Envoy, refer to the Installer Toolkit help topics for more information.

B ) After the IQ Envoy has detected the Encharge Battery(ies), the Encharge LEDs operate as described in the following section.

# OPERATION

## a LED overview

After being commissioned, the LED flashes yellow while each Encharge Battery boots up. If the LED rapidly flashes green for more than two minutes, the battery is in trickle charge mode and will remain so until it reaches a minimum state of charge (up to 30 minutes). After the Encharge Battery is booted up, the LED becomes blue or green depending on the charge level. If the LED flashes yellow after one hour or changes to a flashing red state, contact Enphase Customer Support at enphase.com/en-us/support/contact.

| State | Description |
|---|---|
| **Uncommissioned** | |
| Flashing blue | After booting up, when Encharge has paired with an IQ Envoy but has not passed the commissioning three-way handshake to confirm that it is an Enphase device. |
| Flashing green | After passing the three-way handshake with the IQ Envoy. |
| **After commissioning (normal operation)*** | |
| Rapidly flashing yellow | Starting up / Establishing communications |
| Red flashes in sequences of 2 | Error. See "Troubleshooting". |
| Solid yellow | Not operating due to high temperature. See "Troubleshooting". |
| Solid blue or green | Idle. Color transitions from blue to green as state of charge increases. You can check Enlighten for charge status. |
| Slowly flashing blue | Discharging |
| Slowly flashing green | Charging |
| Slowly flashing yellow | Sleep mode activated |
| Off | Not operating. See "Troubleshooting". |

* Encharge batteries have a one-hour orphan timer. If the IQ Envoy stops communicating with them, after one hour the Encharge batteries return to an "uncommissioned" state.

## b Troubleshooting

If the Encharge Battery(ies) are not operating correctly, perform the following steps. If the issue persists, contact Enphase Customer Support at enphase.com/en-us/support/contact.

A ) If the Encharge Battery(ies) do not operate, check the temperature in the room and increase cooling and/or ventilation as required. Check that the front, top, and sides of the Encharge batteries have at least 15cm (six inches) of unobstructed clearance.

B ) If the Encharge LED is off, turn off the breaker for the branch circuit, wait for at least one minute, and turn it back on.

**NOTE**: During a brownout or blackout, the Encharge powers down automatically. This is normal. When power is restored, it automatically starts up again.

C ) If you do not see Encharge information in Enlighten, check that the IQ Envoy and the Internet connection are working. If the issue persists, contact Enphase Customer Support at enphase.com/en-us/support/contact.

**Limitation of Use :**
**Your Encharge storage unit is not intended for use as a primary or backup power source for life-support systems, other medical equipment, or any other use where product failure could lead to injury, loss of life, or catastrophic property damage. Enphase disclaims any and all liability arising out of any such use of your Encharge storage unit. Further, Enphase reserves the right to refuse to provide support in connection with any such use and disclaims any and all liability arising out of Enphase's provision of, or refusal to provide, support for your Encharge storage device in such circumstances.**

Data Sheet
**Enphase Microinverters**
Region: AMERICAS

# Enphase IQ 7 and IQ 7+ Microinverters

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

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

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


## Easy to Install

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

## Productive and Reliable

- Optimized for high powered 60-cell/120 half-cell and 72-cell/144 half-cell* modules
- More than a million hours of testing
- Class II double-insulated enclosure
- UL listed

## Smart Grid Ready

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

* The IQ 7+ Micro is required to support 72-cell/144 half-cell modules.

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## Enphase IQ 7 and IQ 7+ Microinverters

| INPUT DATA (DC) | IQ7-60-2-US | | IQ7PLUS-72-2-US | |
|---|---|---|---|---|
| Commonly used module pairings[1] | 235 W - 350 W + | | 235 W - 440 W + | |
| Module compatibility | 60-cell/120 half-cell PV modules only | | 60-cell/120 half-cell and 72-cell/144 half-cell PV modules | |
| Maximum input DC voltage | 48 V | | 60 V | |
| Peak power tracking voltage | 27 V - 37 V | | 27 V - 45 V | |
| Operating range | 16 V - 48 V | | 16 V - 60 V | |
| Min/Max start voltage | 22 V / 48 V | | 22 V / 60 V | |
| Max DC short circuit current (module Isc) | 15 A | | 15 A | |
| Overvoltage class DC port | II | | II | |
| DC port backfeed current | 0 A | | 0 A | |
| PV array configuration | 1 x 1 ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit | | | |
| **OUTPUT DATA (AC)** | **IQ 7 Microinverter** | | **IQ 7+ Microinverter** | |
| Peak output power | 250 VA | | 295 VA | |
| Maximum continuous output power | 240 VA | | 290 VA | |
| Nominal (L-L) voltage/range[2] | 240 V / 211-264 V | 208 V / 183-229 V | 240 V / 211-264 V | 208 V / 183-229 V |
| Maximum continuous output current | 1.0 A (240 V) | 1.15 A (208 V) | 1.21 A (240 V) | 1.39 A (208 V) |
| Nominal frequency | 60 Hz | | 60 Hz | |
| Extended frequency range | 47 - 68 Hz | | 47 - 68 Hz | |
| AC short circuit fault current over 3 cycles | 5.8 Arms | | 5.8 Arms | |
| Maximum units per 20 A (L-L) branch circuit[3] | 16 (240 VAC) | 13 (208 VAC) | 13 (240 VAC) | 11 (208 VAC) |
| Overvoltage class AC port | III | | III | |
| AC port backfeed current | 18 mA | | 18 mA | |
| Power factor setting | 1.0 | | 1.0 | |
| Power factor (adjustable) | 0.85 leading ... 0.85 lagging | | 0.85 leading ... 0.85 lagging | |
| **EFFICIENCY** | **@240 V** | **@208 V** | **@240 V** | **@208 V** |
| Peak efficiency | 97.6 % | 97.6 % | 97.5 % | 97.3 % |
| CEC weighted efficiency | 97.0 % | 97.0 % | 97.0 % | 97.0 % |
| **MECHANICAL DATA** | | | | |
| Ambient temperature range | -40°C to +65°C | | | |
| Relative humidity range | 4% to 100% (condensing) | | | |
| Connector type | MC4 (or Amphenol H4 UTX with additional Q-DCC-5 adapter) | | | |
| 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>Both options require installation of an Enphase IQ Envoy. | | | |
| Disconnecting means | The AC and DC connectors have been evaluated and approved by UL for use as the load-break disconnect required by NEC 690. | | | |
| Compliance | CA Rule 21 (UL 1741-SA)<br>UL 62109-1, UL1741/IEEE1547, FCC Part 15 Class B, ICES-0003 Class B,<br>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, NEC 2017, and NEC 2020 section 690.12 and C22.1-2015 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according manufacturer's instructions. | | | |

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

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# Enphase IQ Combiner 3-ES/3C-ES

## X-IQ-AM1-240-3-ES
## X-IQ-AM1-240-3C-ES


X-IQ-AM1-240-3C-ES

X-IQ-AM1-240-3-ES

The **Enphase IQ Combiner 3-ES/3C-ES™** with Enphase IQ Envoy™ and integrated LTE-M1 cell modem (included only with IQ Combiner 3C-ES) consolidates interconnection equipment into a single enclosure and streamlines PV and storage installations by providing a consistent, pre-wired solution for residential applications. It offers up to four 2-pole input circuits and Eaton BR series busbar assembly.

### Smart

- Includes IQ Envoy for communication and control
- Includes LTE-M1 cell modem (included only with IQ Combiner 3C-ES)
- Includes solar shield to match Ensemble esthetics and deflect heat
- Flexible networking supports Wi-Fi, Ethernet, or cellular
- Optional AC receptacle available for PLC bridge
- Provides production metering and consumption monitoring

### Simple

- Reduced size from IQ Combiner+ (X-IQ-AM1-240-2)
- Centered mounting brackets support single stud mounting
- Supports back and side conduit entry
- Up to four 2-pole branch circuits for 240 VAC plug-in breakers (not included)
- 80 A total PV or storage branch circuits

### Reliable

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

UL LISTED

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## Enphase IQ Combiner 3-ES / 3C-ES

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

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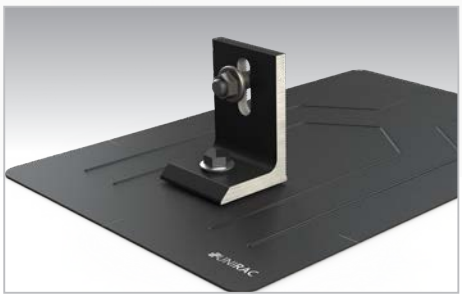

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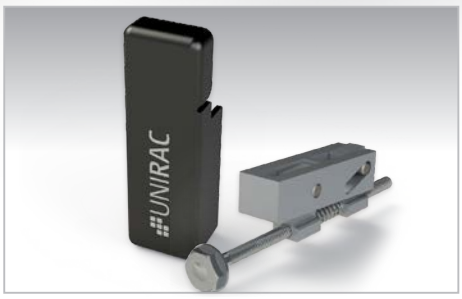


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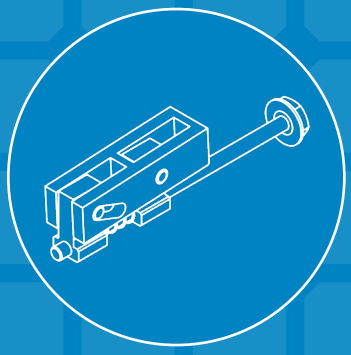
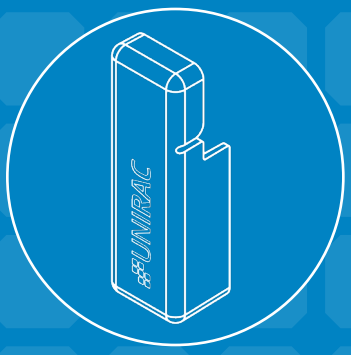


CONCEALED UNIVERSAL ENDCLAMPS

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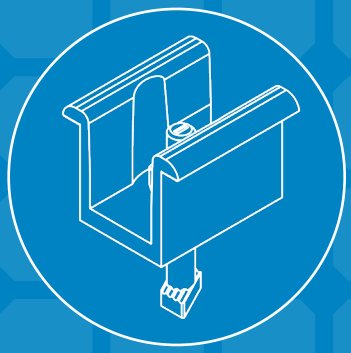

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UNMATCHED EXPERIENCE | CERTIFIED QUALITY | ENGINEERING EXCELLENCE | BANKABLE WARRANTY | DESIGN TOOLS | PERMIT DOCUMENTATION

### TECHNICAL SUPPORT

Unirac's technical support team is dedicated to answering questions & addressing issues in real time. An online library of documents including engineering reports, stamped letters and technical data sheets greatly simplifies your permitting and project planning process.

### CERTIFIED QUALITY PROVIDER

Unirac is the only PV mounting vendor with ISO certifications for 9001:2008, 14001:2004 and OHSAS 18001:2007, which means we deliver the highest standards for fit, form, and function. These certifications demonstrate our excellence and commitment to first class business practices.

### BANKABLE WARRANTY

Don't leave your project to chance, Unirac has the financial strength to back our products and reduce your risk. Have peace of mind knowing you are providing products of exceptional quality. SOLARMOUNT is covered by a 25 year limited product warranty and a 5 year limited finish warranty.

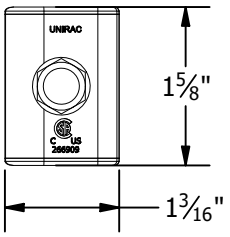
**ENHANCE YOUR REPUTATION WITH QUALITY RACKING SOLUTIONS BACKED BY ENGINEERING EXCELLENCE AND A SUPERIOR SUPPLY CHAIN**

PUB2018AUG31 - PRINTED UPDATE

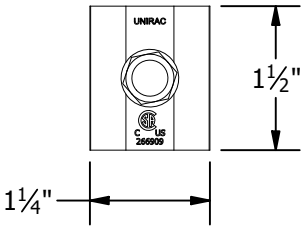
FOR QUESTIONS OR CUSTOMER SERVICE VISIT UNIRAC.COM OR CALL (505) 248-2702

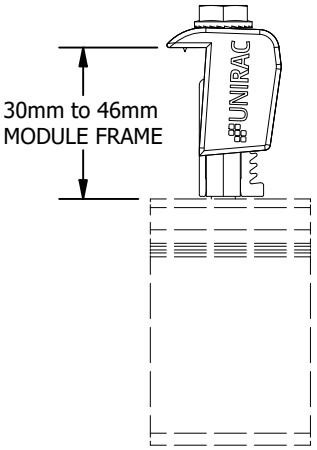
| PART # TABLE | |
|---|---|
| P/N | DESCRIPTION |
| 302045M | UNIVERSAL AF MID CLAMP - MILL |
| 302045D | UNIVERSAL AF MID CLAMP - DRK |
| 302050M | UNIVERSAL AF END CLAMP - MILL |
| 302050D | UNIVERSAL AF END CLAMP - DRK |

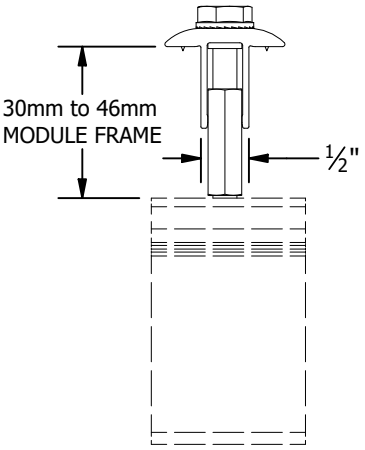
UNIVERSAL AF END CLAMP




UNIVERSAL AF MID CLAMP

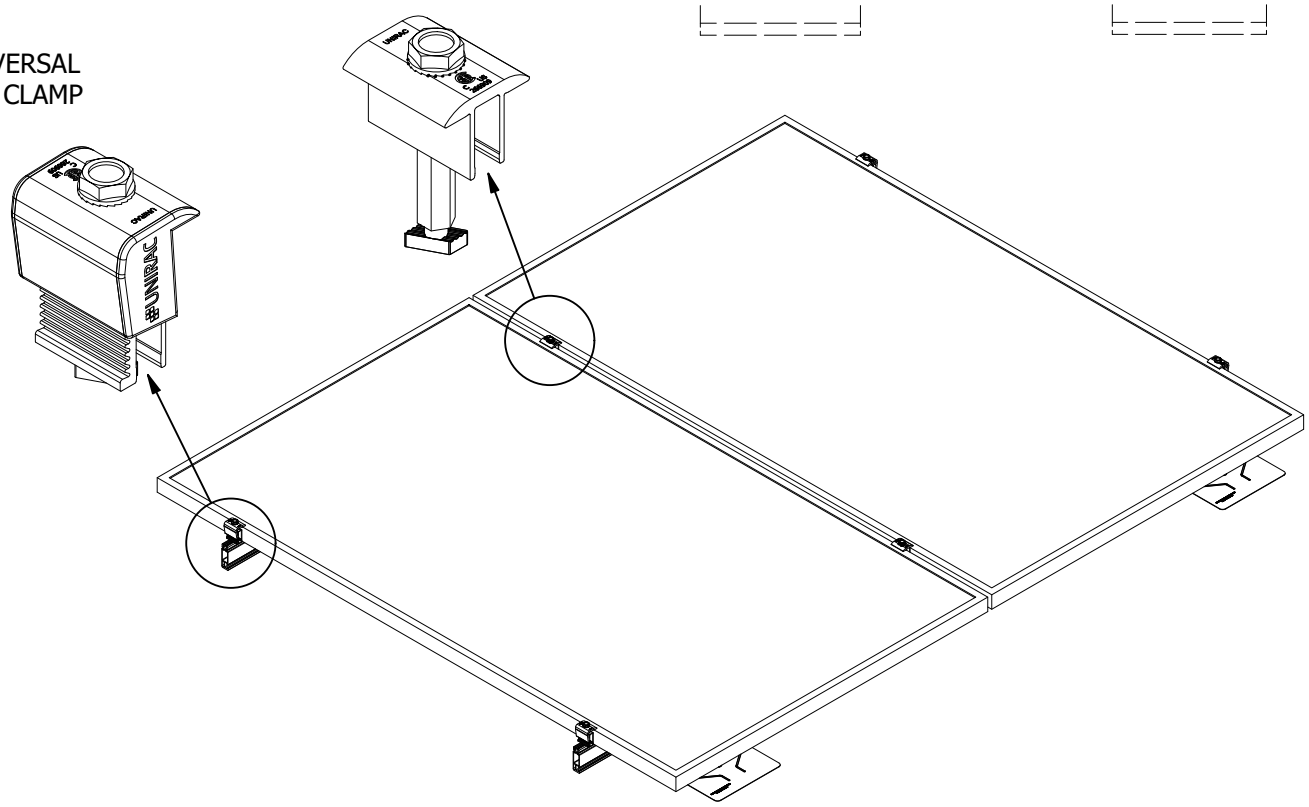



UNIVERSAL MID CLAMP

UNIVERSAL END CLAMP

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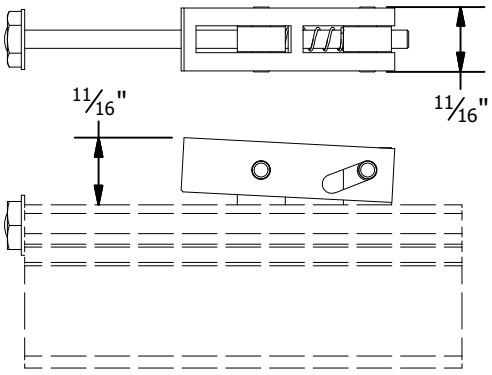
| | |
|---|---|
| PRODUCT LINE: | SOLARMOUNT |
| DRAWING TYPE: | PART & ASSEMBLY |
| DESCRIPTION: | UNIVERSAL AF CLAMPS |
| REVISION DATE: | 9/28/2020 |

DRAWING NOT TO SCALE
ALL DIMENSIONS ARE NOMINAL

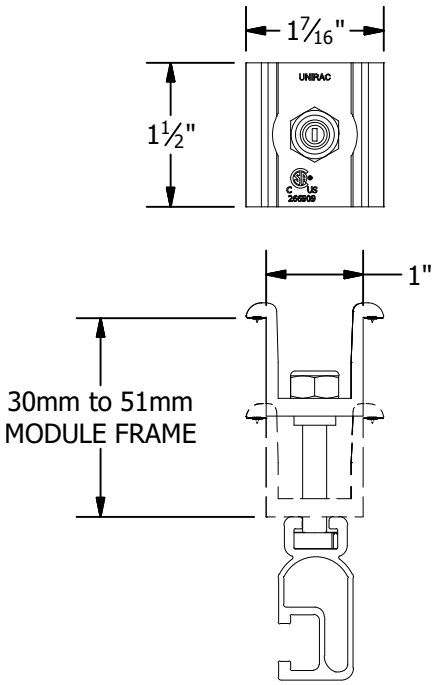


SM-A01B
SHEET

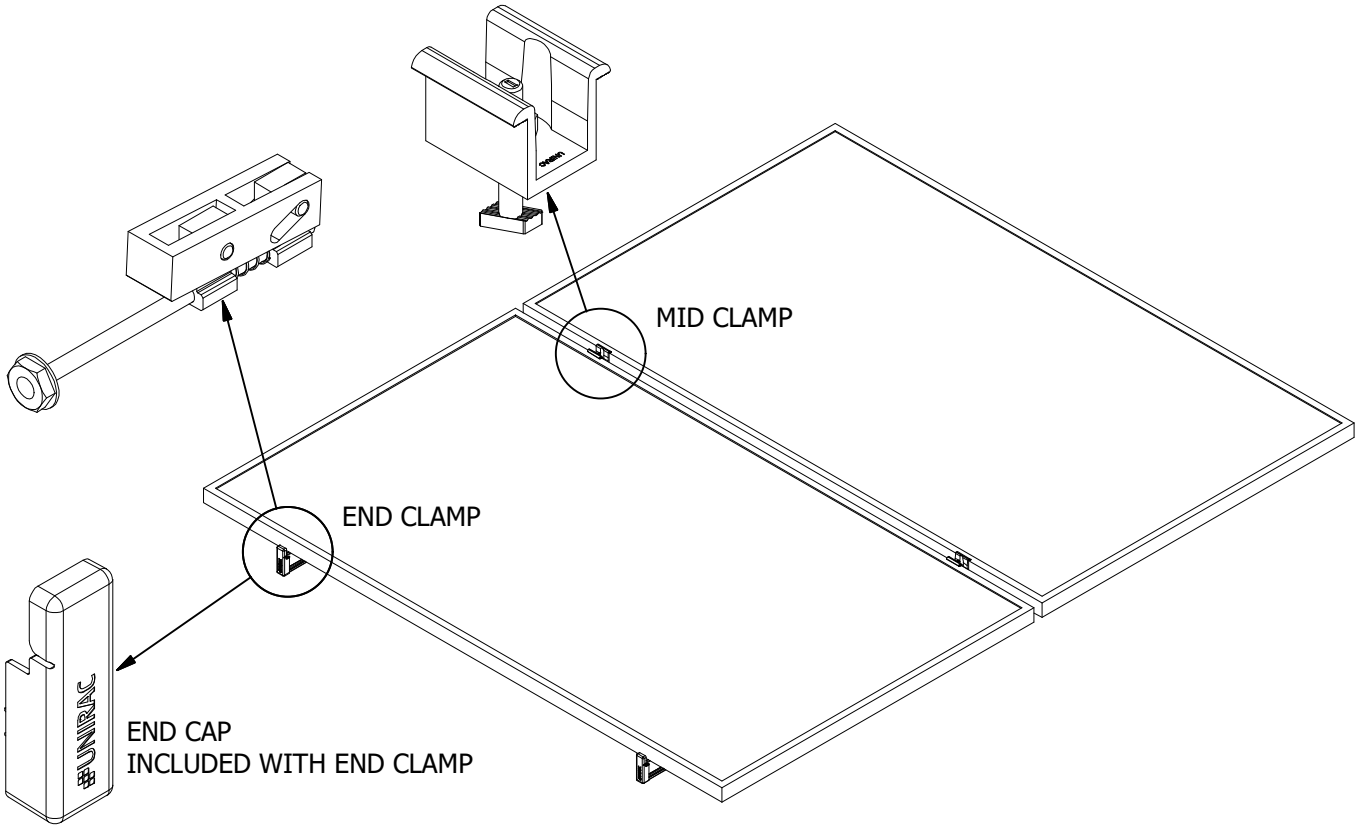
## PRO SERIES END CLAMP




## PRO SERIES MID CLAMP




| PART # TABLE | |
|---|---|
| P/N | DESCRIPTION |
| 302035M | ENDCLAMP PRO |
| 302030M | MIDCLAMP PRO - MILL |
| 302030D | MIDCLAMP PRO - DRK |

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| | |
|---|---|
| PRODUCT LINE: | SOLARMOUNT |
| DRAWING TYPE: | PART & ASSEMBLY |
| DESCRIPTION: | PRO SERIES BONDING CLAMPS |
| REVISION DATE: | 10/26/2017 |

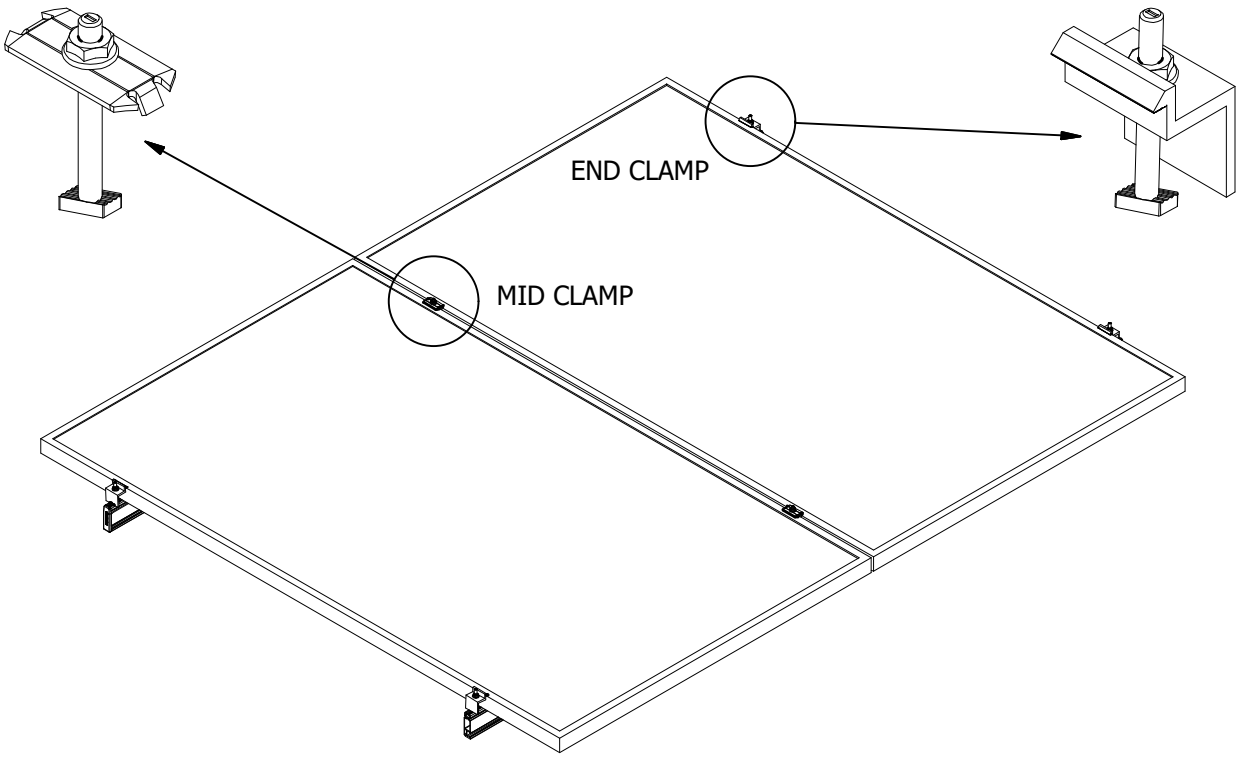
DRAWING NOT TO SCALE
ALL DIMENSIONS ARE NOMINAL

PRODUCT PROTECTED BY ONE OR MORE US PATENTS

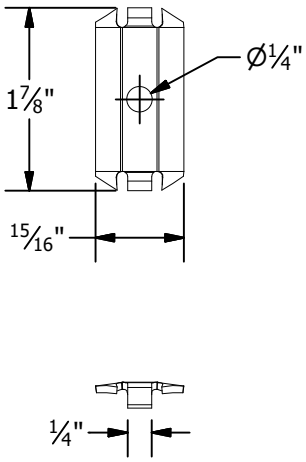
LEGAL NOTICE

SM-A01

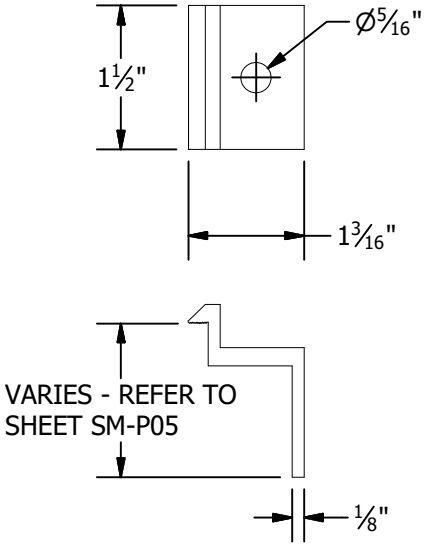
SHEET




| PART # TABLE | |
|---|---|
| P/N | DESCRIPTION |
| 302027C | SM BND MIDCLAMP BC SS |
| 302027D | SM BND MIDCLAMP BC DRK SS |
| 302028C | SM BND MIDCLAMP EF SS |
| 302028D | SM BND MIDCLAMP EF DRK SS |
| 302029C | SM BND MIDCLAMP DK SS |
| 302029D | SM BND MIDCLAMP DK DRK SS |
| | FOR BONDING END CLAMP<br>REFER TO SHEET SM-P05 |




BONDING SM MID CLAMP




BONDING SM END CLAMP

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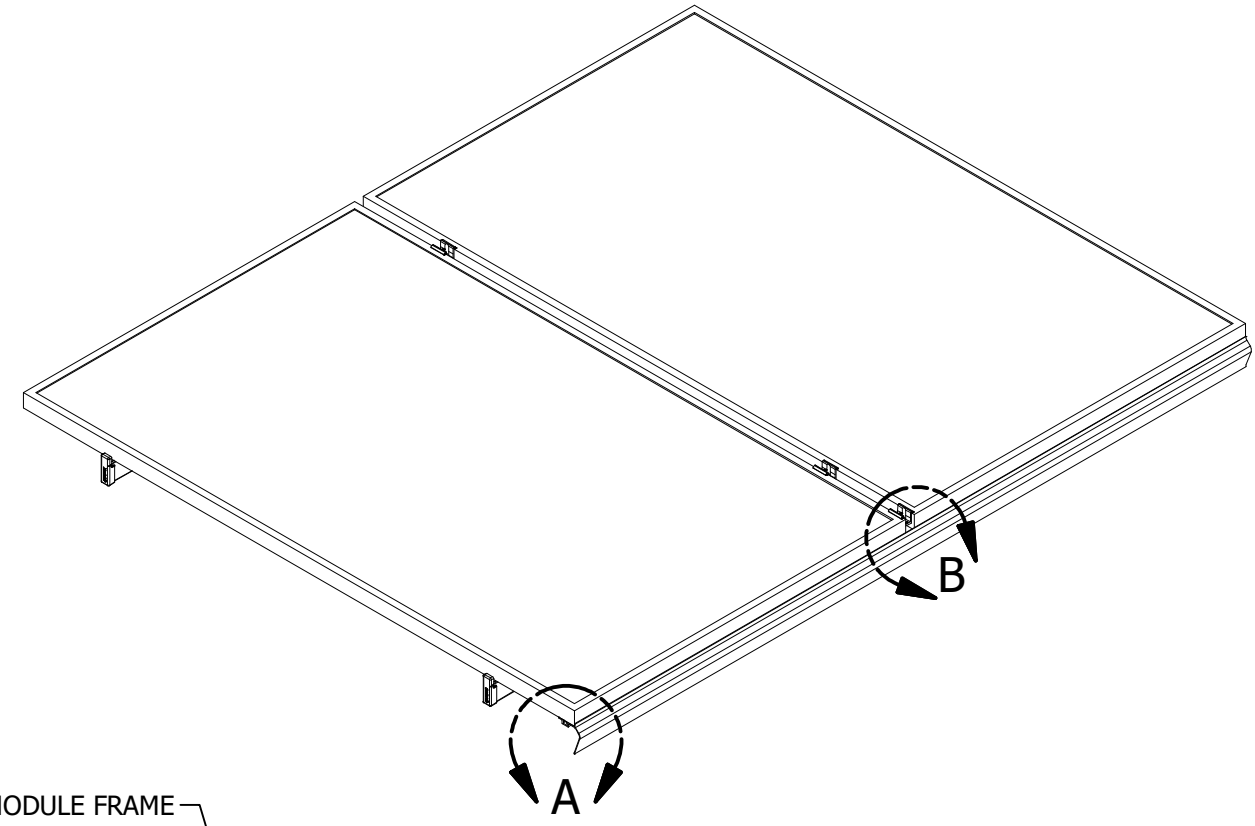
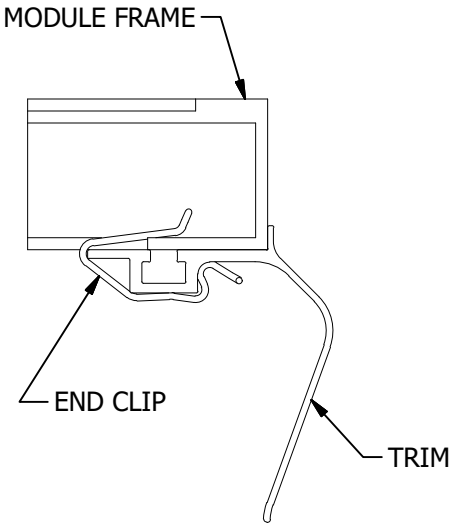
| | |
|---|---|
| PRODUCT LINE: | SOLARMOUNT |
| DRAWING TYPE: | PART & ASSEMBLY |
| DESCRIPTION: | BONDING TOP CLAMPS |
| REVISION DATE: | 10/26/2017 |

DRAWING NOT TO SCALE
ALL DIMENSIONS ARE NOMINAL

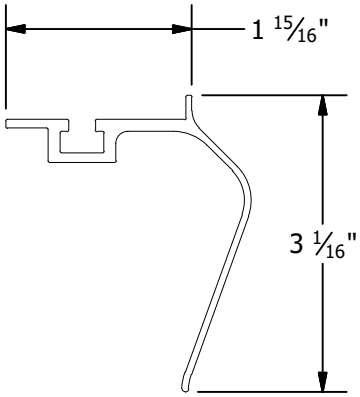


SM-A01A
SHEET

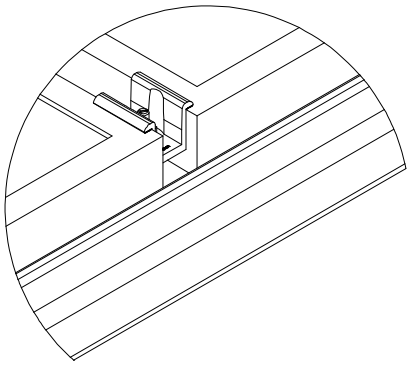



DETAIL A
TRIM END CLIP




TRIM



DETAIL B
MID CLAMP TRIM CONNECTION

| PART # TABLE | | |
|---|---|---|
| P/N | DESCRIPTION | LENGTH |
| 206072D-B | SM TRIM DRK | 168" |
| 008025S | SM TRIM END CLIP | - |

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|---|---|
| PRODUCT LINE: | SOLARMOUNT |
| DRAWING TYPE: | PART & ASSEMBLY |
| DESCRIPTION: | SM TRIM END CLIP |
| REVISION DATE: | 9/27/2017 |

DRAWING NOT TO SCALE
ALL DIMENSIONS ARE NOMINAL

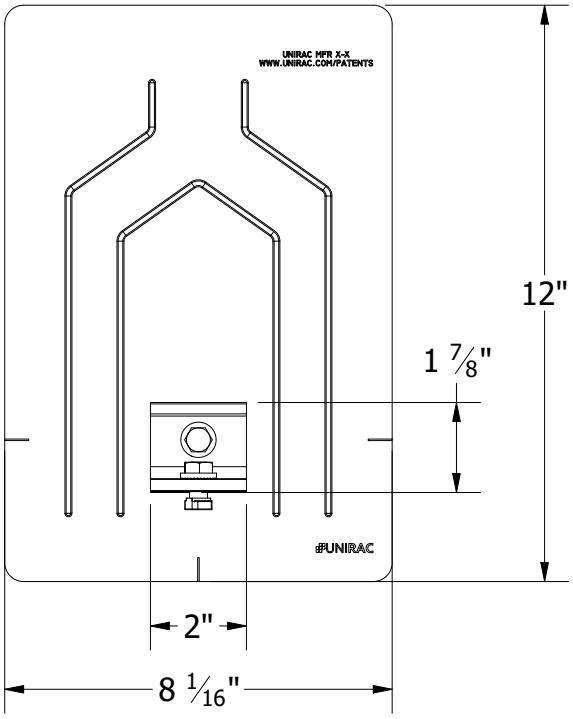
PRODUCT PROTECTED BY ONE OR MORE US PATENTS

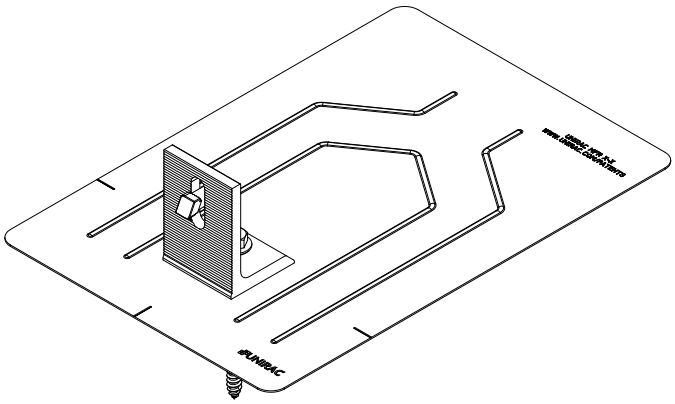
LEGAL NOTICE

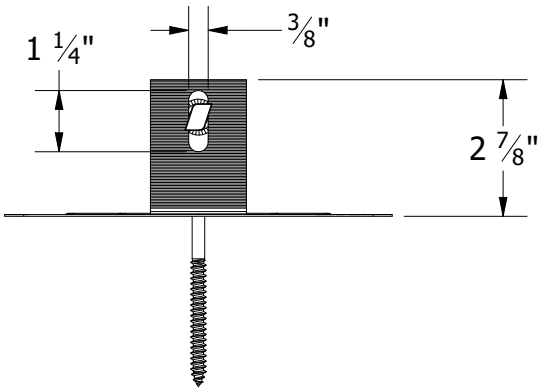
SM-A02

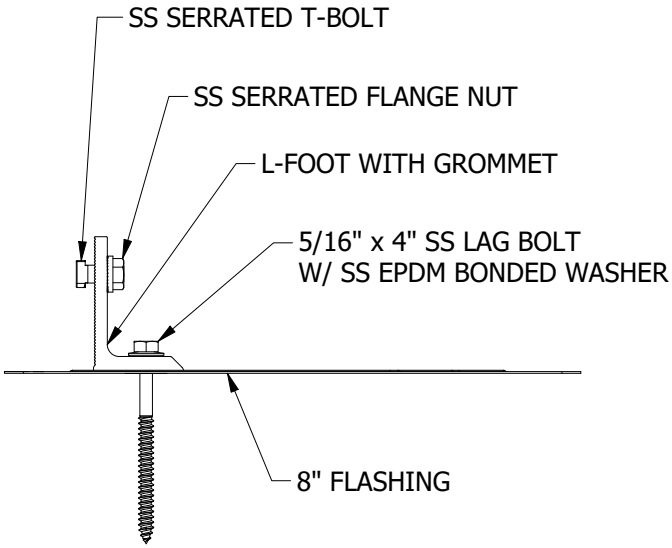
SHEET

NOTES:
1. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S WRITTEN SPECIFICATIONS AND INSTALLATION INSTRUCTIONS.
2. PACKAGING: KITS OF 10






| PART # TABLE | |
|---|---|
| P/N | DESCRIPTION |
| 004055M | FLASHKIT PRO MILL |
| 004055D | FLASHKIT PRO DRK |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| | |
|---|---|
| PRODUCT LINE: | SOLARMOUNT |
| DRAWING TYPE: | KIT DETAIL |
| DESCRIPTION: | FLASHKIT PRO |
| REVISION DATE: | 4/28/2020 |

DRAWING NOT TO SCALE
ALL DIMENSIONS ARE NOMINAL

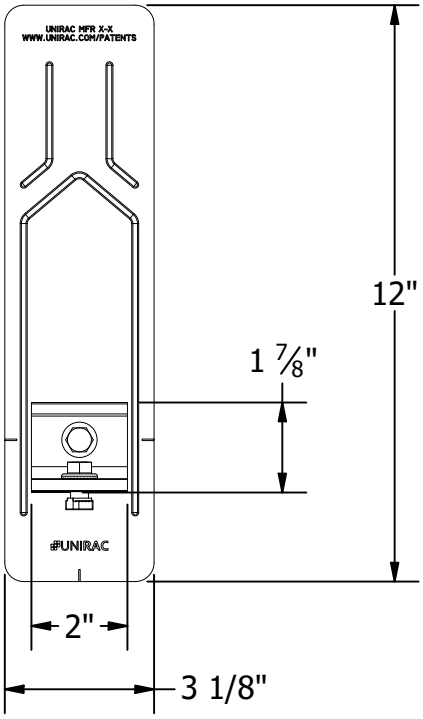
PRODUCT PROTECTED BY ONE OR MORE US PATENTS

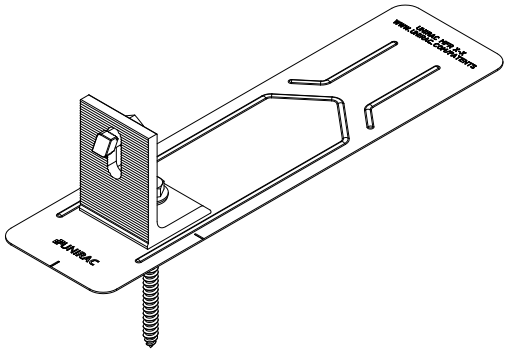
LEGAL NOTICE

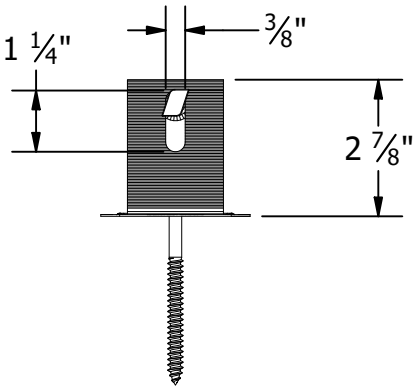
SM-A03

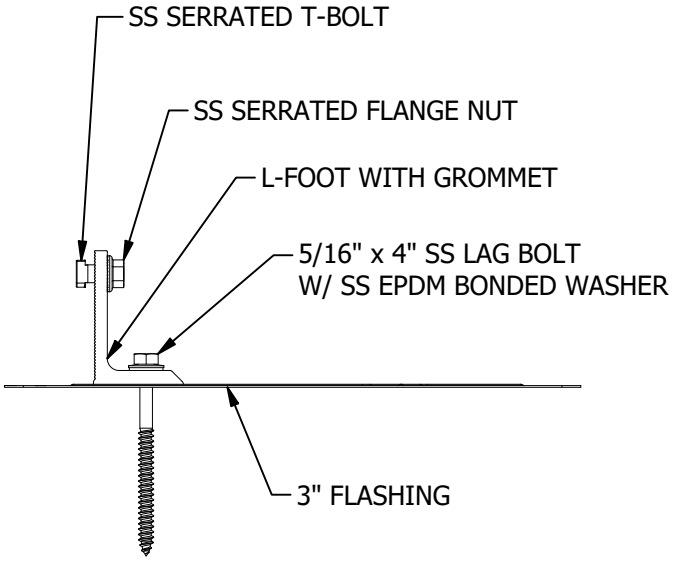
SHEET

NOTES:
1. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S WRITTEN SPECIFICATIONS AND INSTALLATION INSTRUCTIONS.
2. PACKAGING: KITS OF 10




| PART # TABLE | |
|---|---|
| P/N | DESCRIPTION |
| 004015M | FLASHKIT PRO SB, MILL |
| 004015D | FLASHKIT PRO SB, DRK |

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| | |
|---|---|
| PRODUCT LINE: | SOLARMOUNT |
| DRAWING TYPE: | KIT DETAIL |
| DESCRIPTION: | FLASHKIT PRO SB |
| REVISION DATE: | 4/20/2021 |

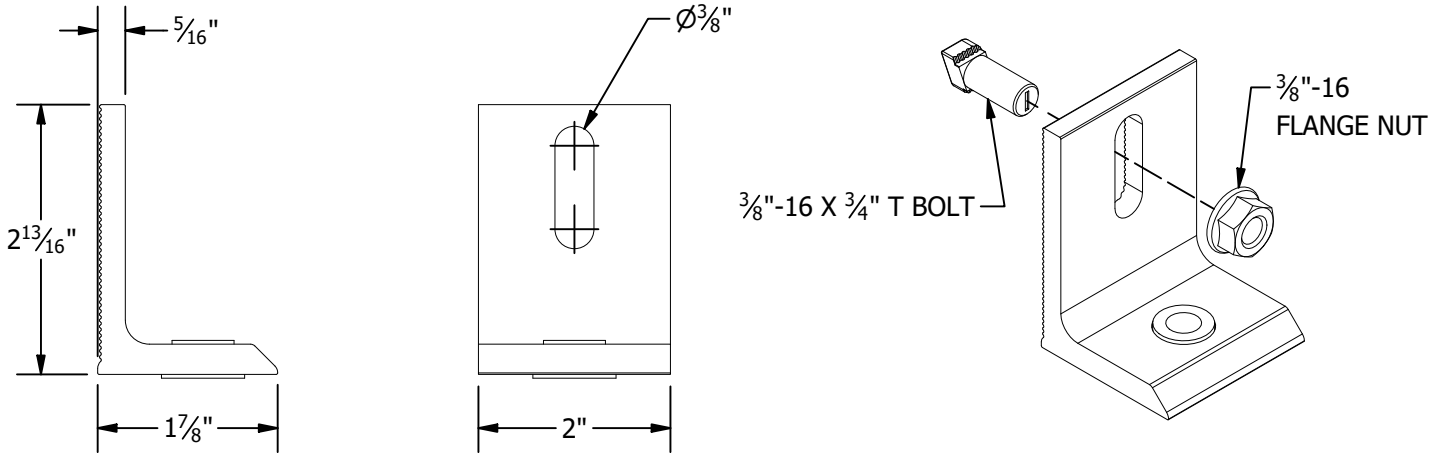
DRAWING NOT TO SCALE
ALL DIMENSIONS ARE NOMINAL

PRODUCT PROTECTED BY ONE OR MORE US PATENTS

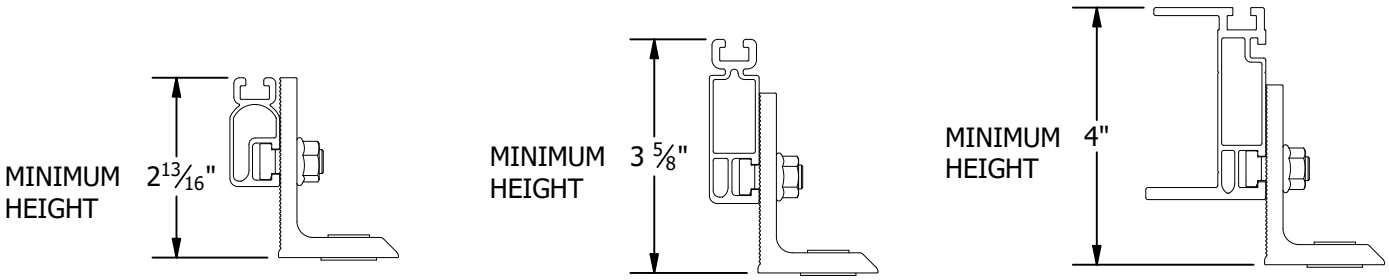
LEGAL NOTICE

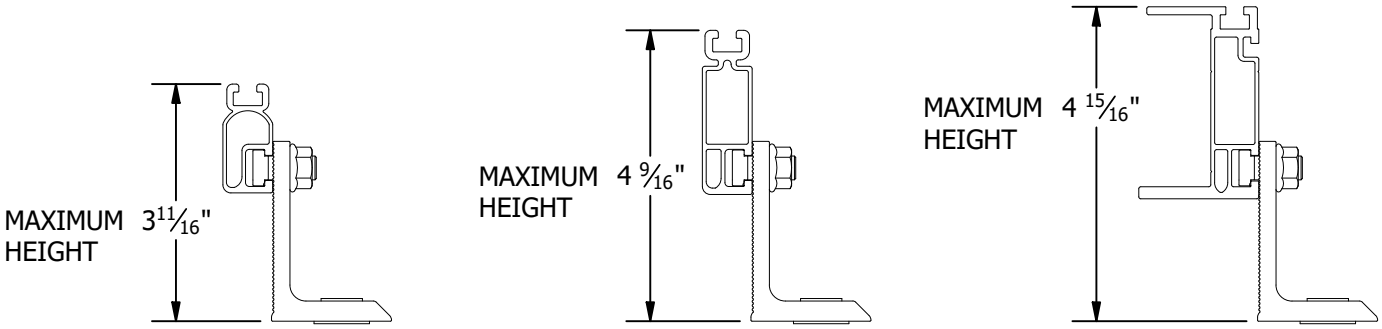
SM-A16

SHEET




L-FOOT




SOLARMOUNT LIGHT ON L-FOOT

SOLARMOUNT STANDARD ON L-FOOT

SOLARMOUNT HD ON L-FOOT

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| | |
|---|---|
| PRODUCT LINE: | SOLARMOUNT |
| DRAWING TYPE: | PART & ASSEMBLY |
| DESCRIPTION: | L-FOOT |
| REVISION DATE: | 11/19/2018 |

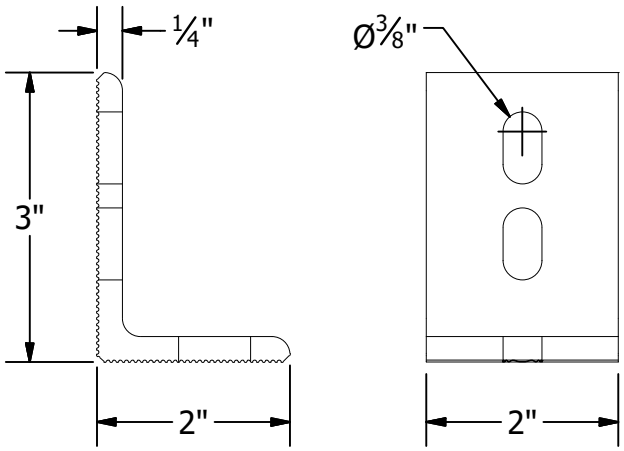
DRAWING NOT TO SCALE
ALL DIMENSIONS ARE NOMINAL

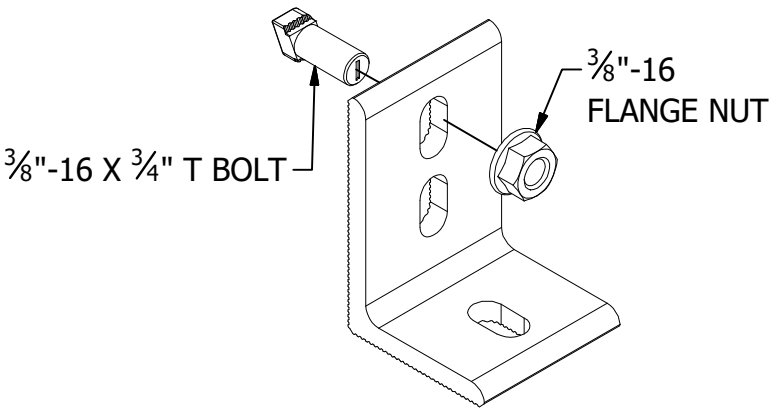
PRODUCT PROTECTED BY ONE OR MORE US PATENTS

LEGAL NOTICE

SM-A11

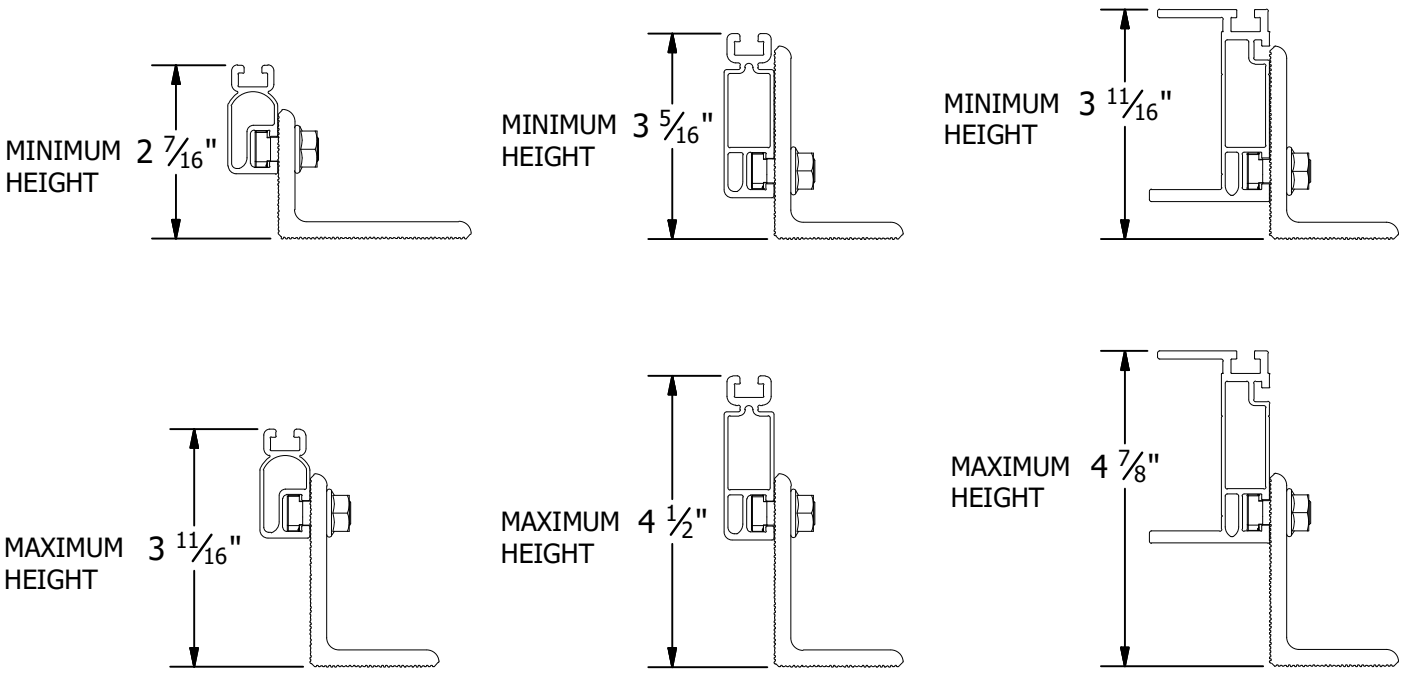
SHEET




L-FOOT

| PART # TABLE | |
|---|---|
| P/N | DESCRIPTION |
| 304001C | L-FOOT SERR W/T-BOLT CLR |
| 304001D | L-FOOT SERR W/T-BOLT DRK |




SOLARMOUNT LIGHT ON L-FOOT

SOLARMOUNT STANDARD ON L-FOOT

SOLARMOUNT HD ON L-FOOT

NOTES:
1. L-FOOT CAN BE INSTALLED IN TWO ORIENTATIONS, PLEASE REFER TO INSTRUCTIONS IN THE QUICK START GUIDE.

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| | |
|---|---|
| PRODUCT LINE: | SOLARMOUNT |
| DRAWING TYPE: | PART & ASSEMBLY |
| DESCRIPTION: | L-FOOT |
| REVISION DATE: | 9/27/2017 |

DRAWING NOT TO SCALE
ALL DIMENSIONS ARE NOMINAL

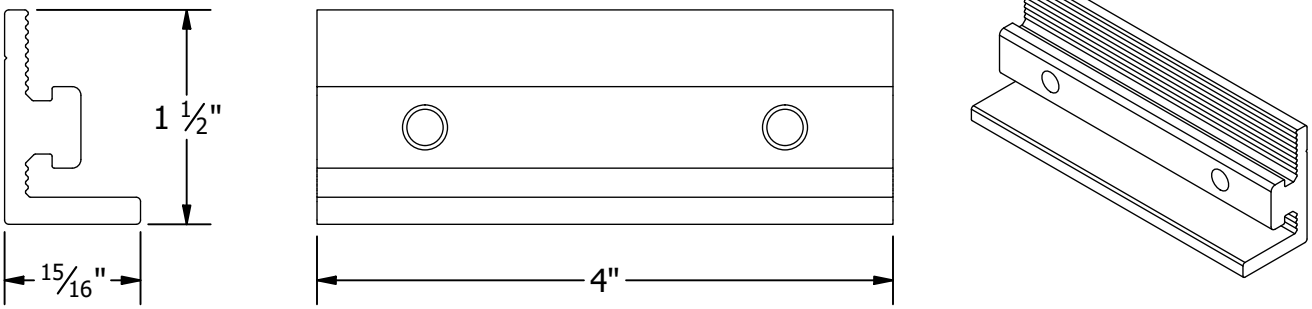
PRODUCT PROTECTED BY ONE OR MORE US PATENTS

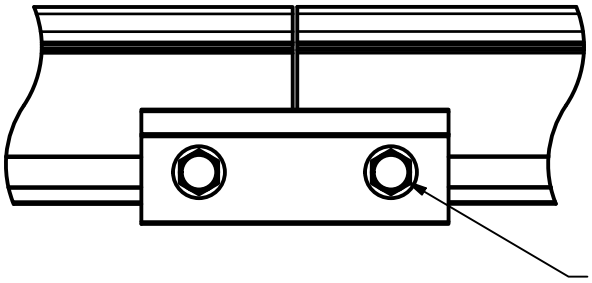
LEGAL NOTICE

SM-A04

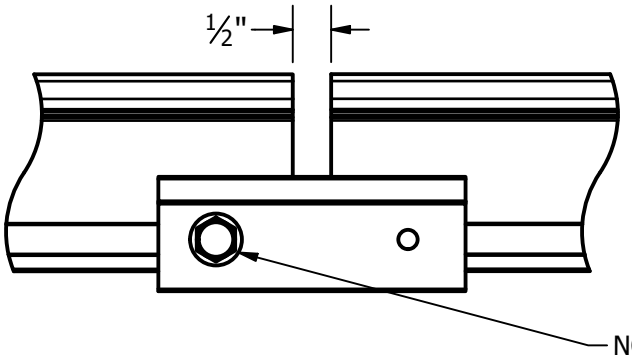
SHEET

# BONDING SPLICE BAR




TYPICAL SPLICE BAR DETAIL




TYPICAL EXPANSION JOINT DETAIL

| PART # TABLE | |
|---|---|
| P/N | DESCRIPTION |
| 303019M | BND SPLICE BAR PRO SERIES MILL |
| 303019D | BND SPLICE BAR PRO SERIES DRK |

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| | |
|---|---|
| PRODUCT LINE: | SOLARMOUNT |
| DRAWING TYPE: | PART & ASSEMBLY |
| DESCRIPTION: | BONDING SPLICE BAR PRO SERIES |
| REVISION DATE: | 9/17/2019 |

DRAWING NOT TO SCALE
ALL DIMENSIONS ARE NOMINAL

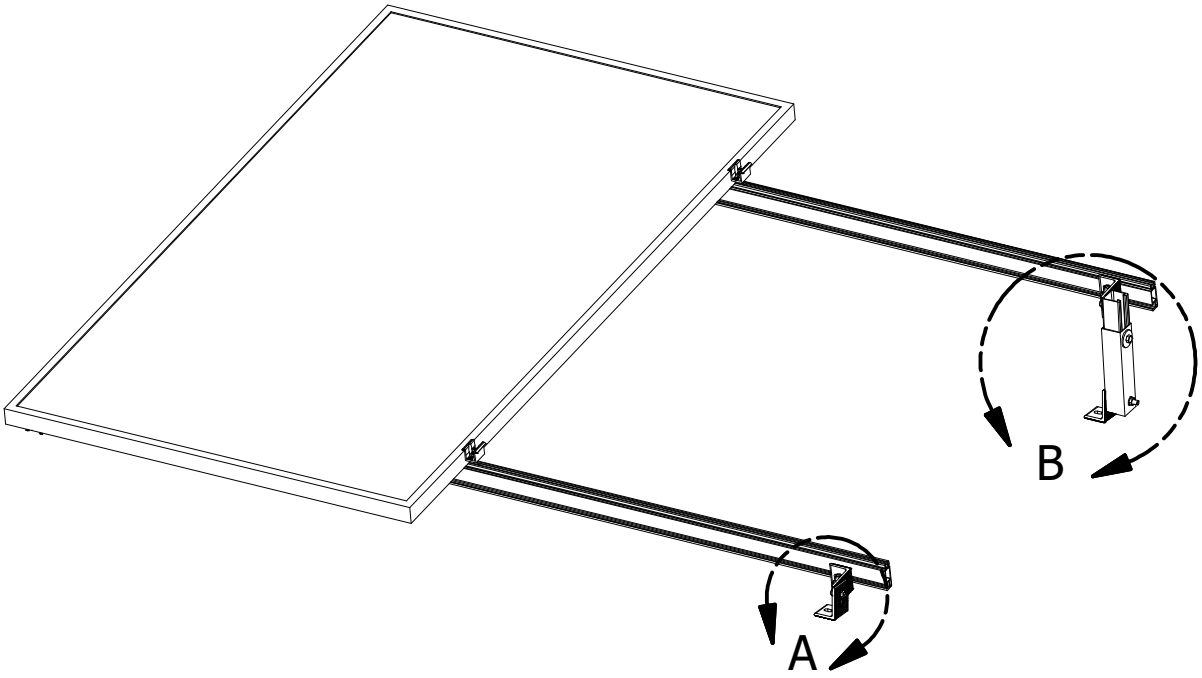
PRODUCT PROTECTED BY ONE OR MORE US PATENTS

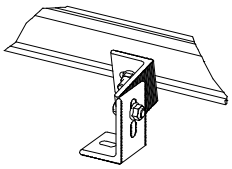
LEGAL NOTICE

SM-A05

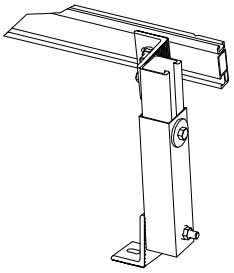
SHEET

NOTES:
1. SEE SM TiH INSTALLATION GUIDE FOR ASSEMBLY INSTRUCTIONS.



DETAIL A
FRONT L-FOOT HINGE



DETAIL B
REAR TILT LEG

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| | |
|---|---|
| PRODUCT LINE: | SOLARMOUNT TILT |
| DRAWING TYPE: | ASSEMBLY |
| DESCRIPTION: | LOW PROFILE TILT |
| REVISION DATE: | 9/27/2017 |

DRAWING NOT TO SCALE
ALL DIMENSIONS ARE NOMINAL

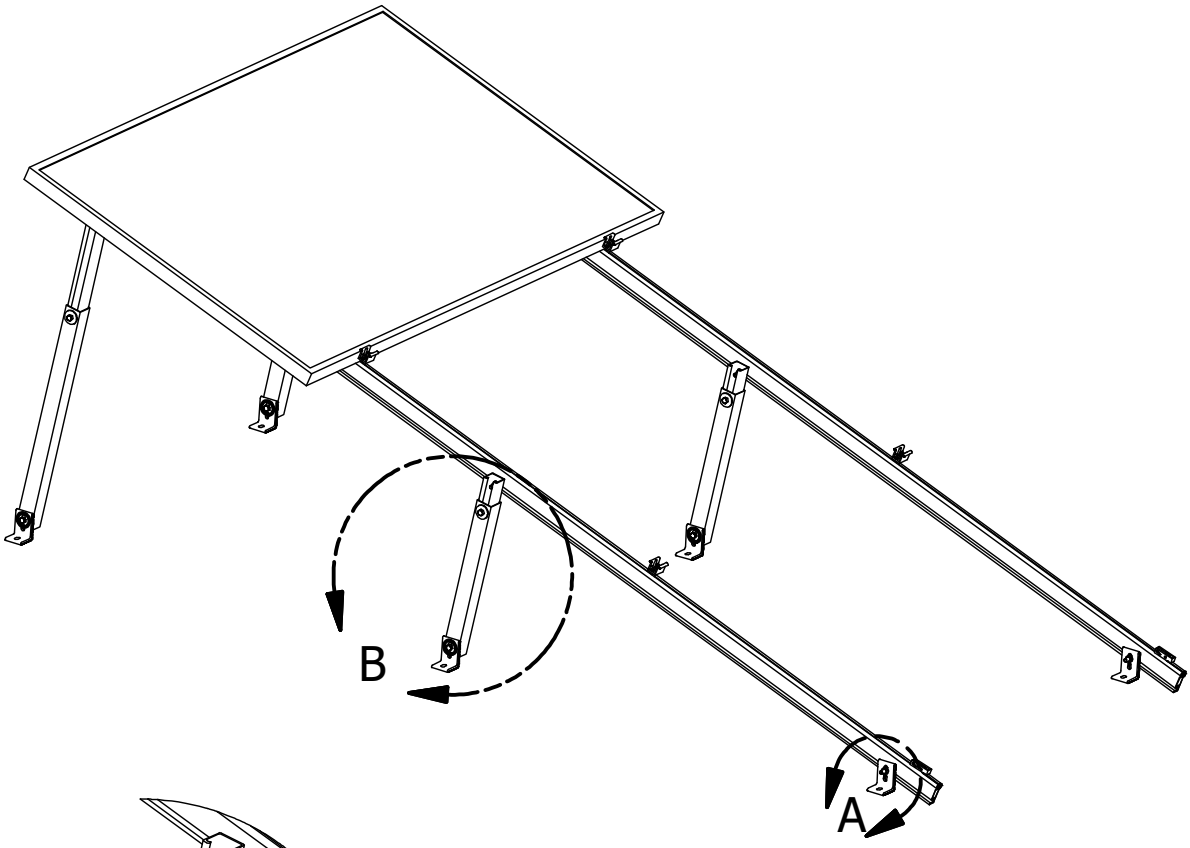
PRODUCT PROTECTED BY ONE OR MORE US PATENTS

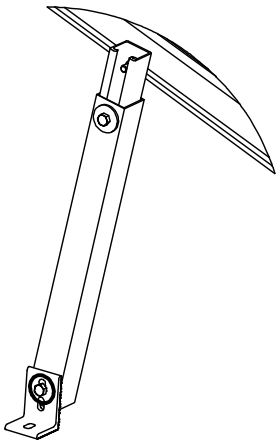
LEGAL NOTICE

SM-A07

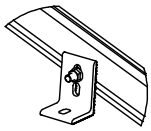
SHEET

NOTES:
1. SEE SM TiH INSTALLATION GUIDE FOR ASSEMBLY INSTRUCTIONS.



DETAIL B
REAR TILT LEG



DETAIL A
L FOOT

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ALBUQUERQUE, NM 87102 USA
PHONE: 505.242.6411
WWW.UNIRAC.COM

| | |
|---|---|
| PRODUCT LINE: | SOLARMOUNT TILT |
| DRAWING TYPE: | ASSEMBLY |
| DESCRIPTION: | HIGH PROFILE TILT |
| REVISION DATE: | 9/27/2017 |

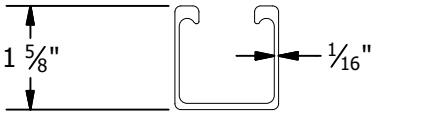
DRAWING NOT TO SCALE
ALL DIMENSIONS ARE NOMINAL

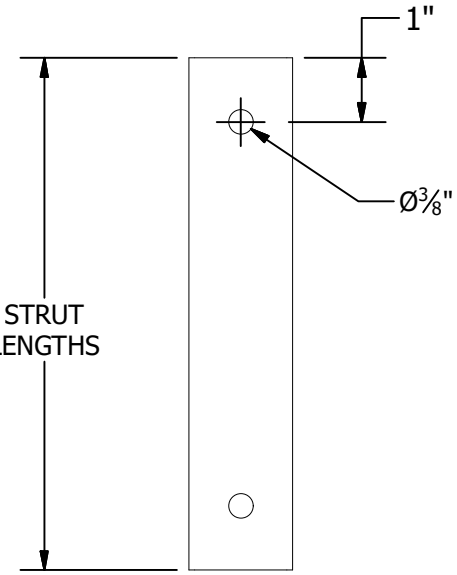
PRODUCT PROTECTED BY ONE OR MORE US PATENTS

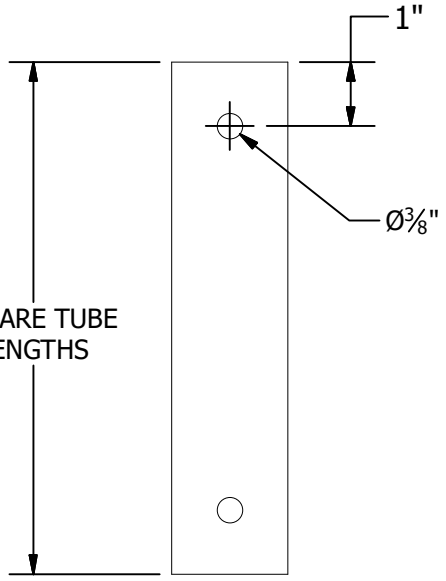
LEGAL NOTICE

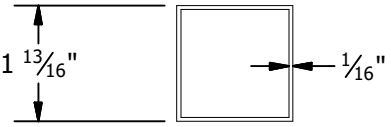
SM-A08

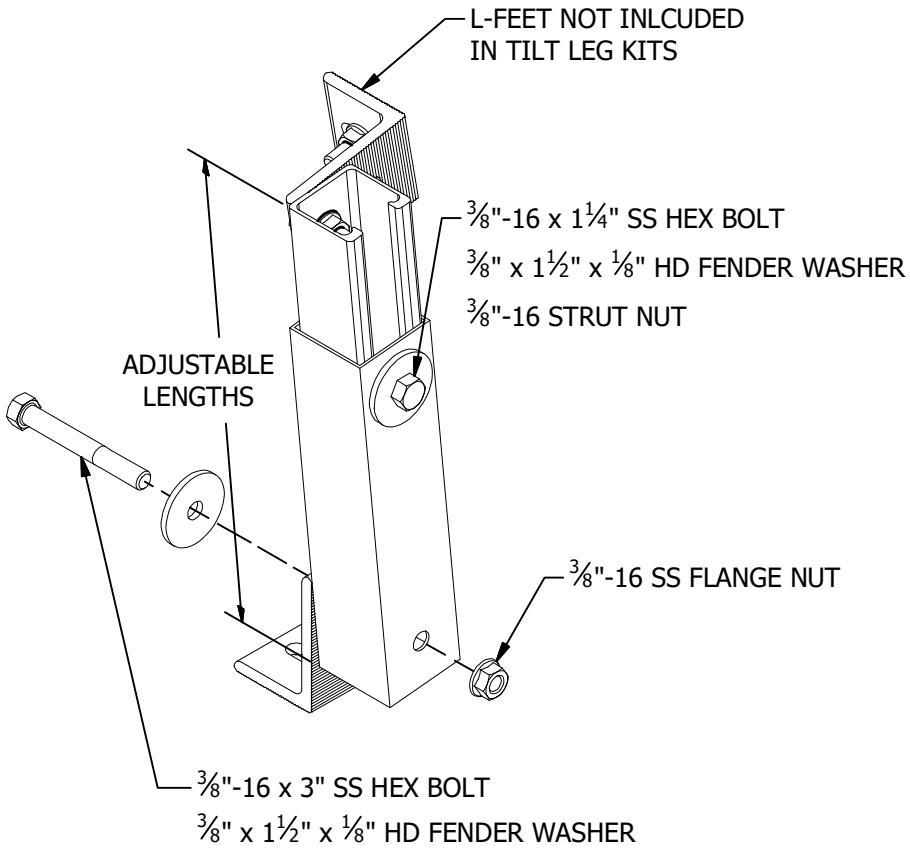
SHEET




| TILT LEG TABLE | | | | |
|---|---|---|---|---|
| P/N | DESCRIPTION | TOTAL ADJUSTABLE LENGTHS | SQUARE TUBE | STRUT |
| 307107M | SM ADJ TILT LEG, 8"-12", W/HDW | 8" to 12" | 8" | 8" |
| 307115M | SM ADJ TILT LEG, 18"-30", W/HDW | 18" to 30" | 18" | 18" |
| 307120M | SM ADJ TILT LEG, 26"-44", W/HDW | 26" to 44" | 26" | 26" |
| 307134M | SM ADJ TILT LEG, 40"-72", W/HDW | 40" to 72" | 40" | 40" |

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| | |
|---|---|
| PRODUCT LINE: | SOLARMOUNT TILT |
| DRAWING TYPE: | ASSEMBLY |
| DESCRIPTION: | ADJUSTABLE TILT LEG |
| REVISION DATE: | 9/27/2017 |

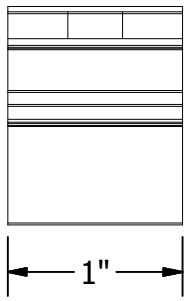
DRAWING NOT TO SCALE
ALL DIMENSIONS ARE NOMINAL

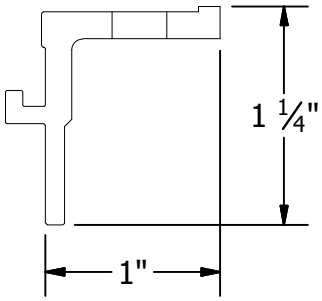
PRODUCT PROTECTED BY ONE OR MORE US PATENTS

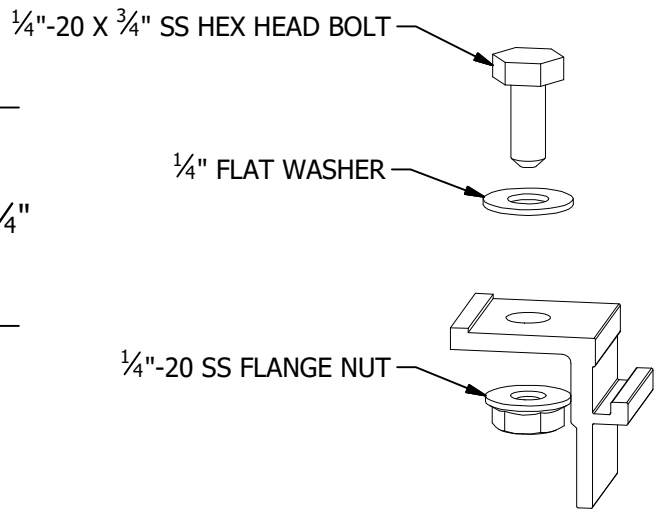
LEGAL NOTICE

SM-A09

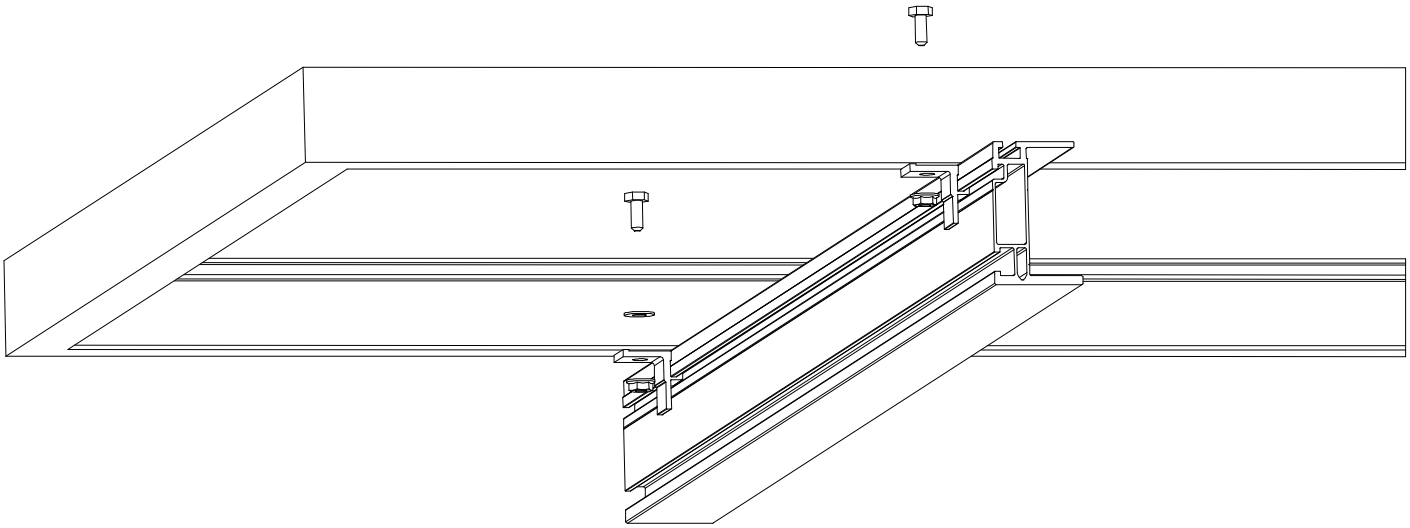
SHEET



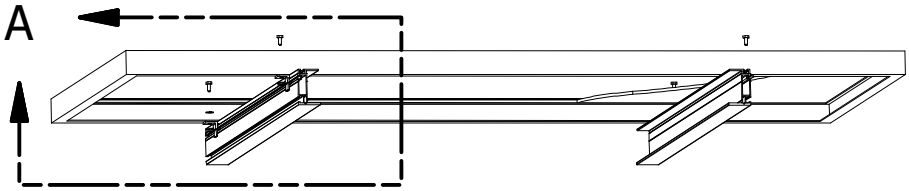




BOTTOM CLIP



DETAIL A




| PART # TABLE | |
|---|---|
| P/N | DESCRIPTION |
| 302000C | SMHD BOTTOM CLIPS W/HDW CLR |

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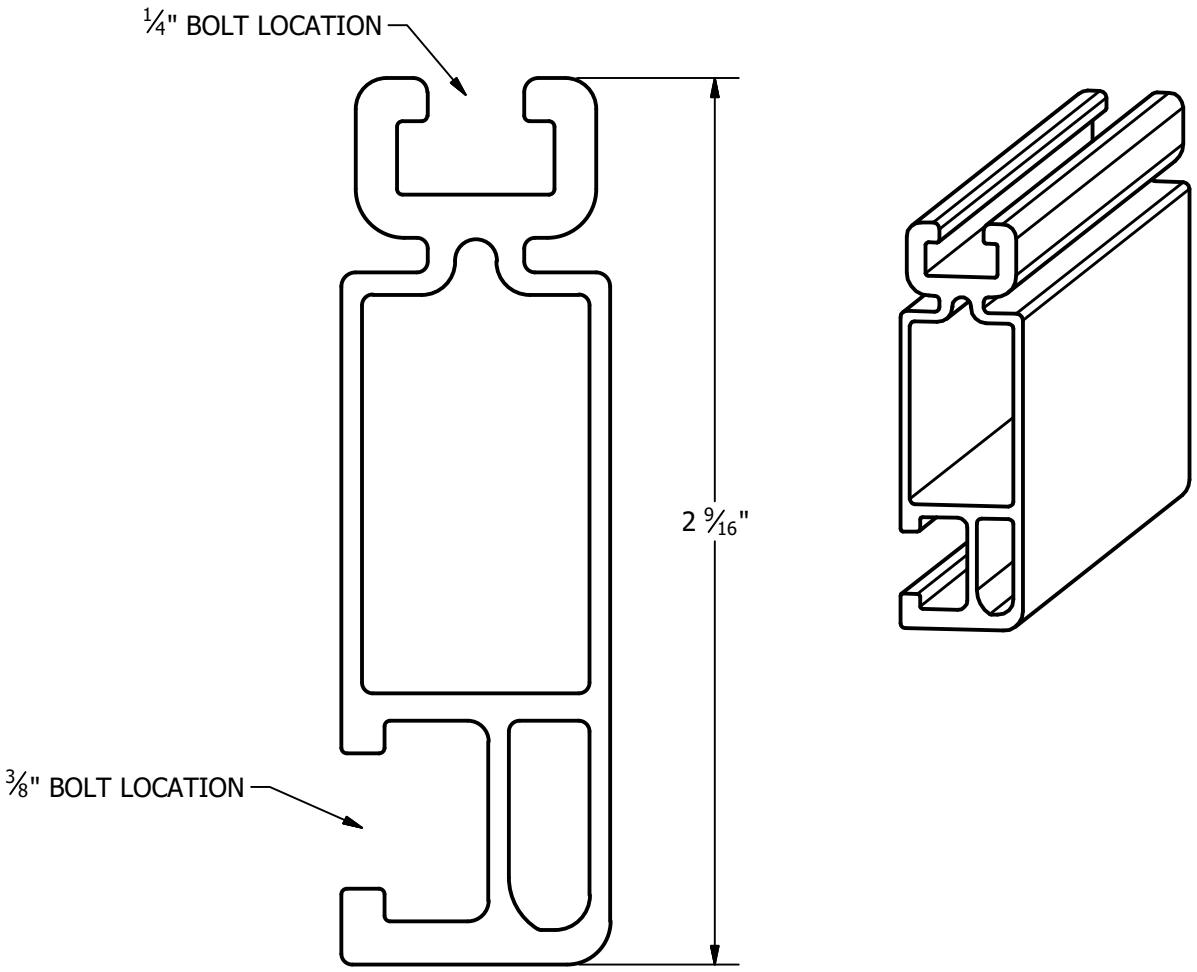
|---|---|
| PRODUCT LINE: | SOLARMOUNT HD |
| DRAWING TYPE: | PART & ASSEMBLY |
| DESCRIPTION: | BOTTOM CLIP |
| REVISION DATE: | 9/27/2017 |

DRAWING NOT TO SCALE
ALL DIMENSIONS ARE NOMINAL



SM-A10
SHEET




| PART # TABLE | | |
|---|---|---|
| P/N | DESCRIPTION | LENGTH |
| 320132M | SM RAIL 132" MILL | 132" |
| 310132C | SM RAIL 132" CLR | 132" |
| 320168M | SM RAIL 168" MILL | 168" |
| 310168C | SM RAIL 168" CLR | 168" |
| 320168D | SM RAIL 168" DRK | 168" |
| 320208M | SM RAIL 208" MILL | 208" |
| 310208C | SM RAIL 208" CLR | 208" |
| 320240M | SM RAIL 240" MILL | 240" |
| 310240C | SM RAIL 240" CLR | 240" |
| 310240D | SM RAIL 240" DRK | 240" |

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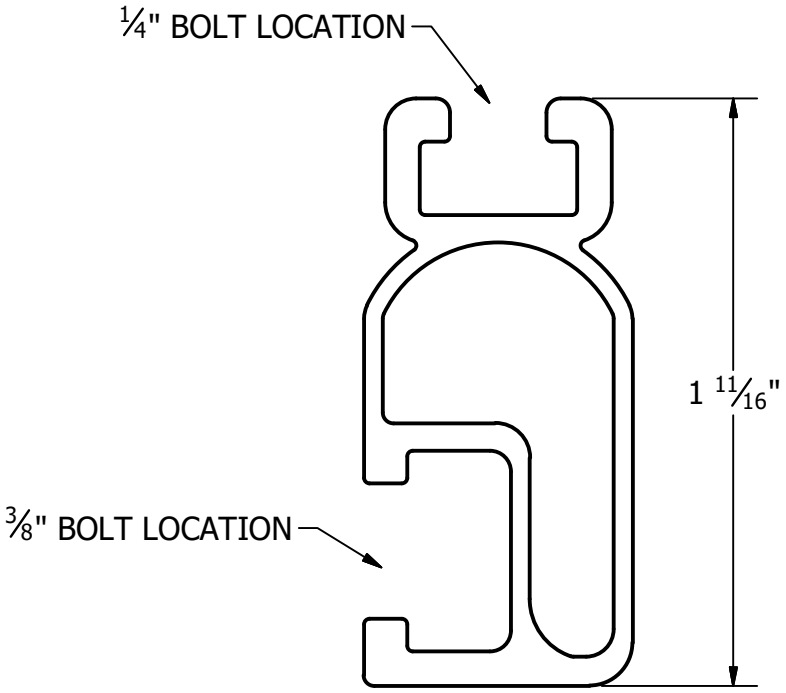
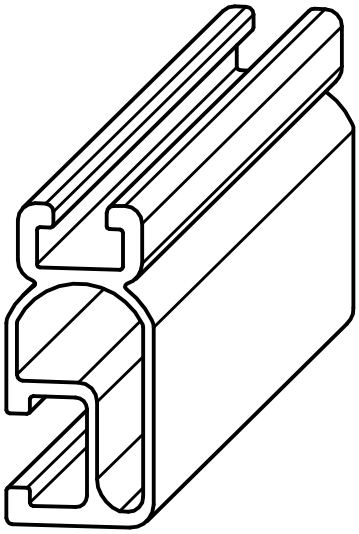
|---|---|
| PRODUCT LINE: | SOLARMOUNT |
| DRAWING TYPE: | PART DETAIL |
| DESCRIPTION: | STANDARD RAIL |
| REVISION DATE: | 9/11/2017 |

DRAWING NOT TO SCALE
ALL DIMENSIONS ARE NOMINAL



SM-P01
SHEET



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

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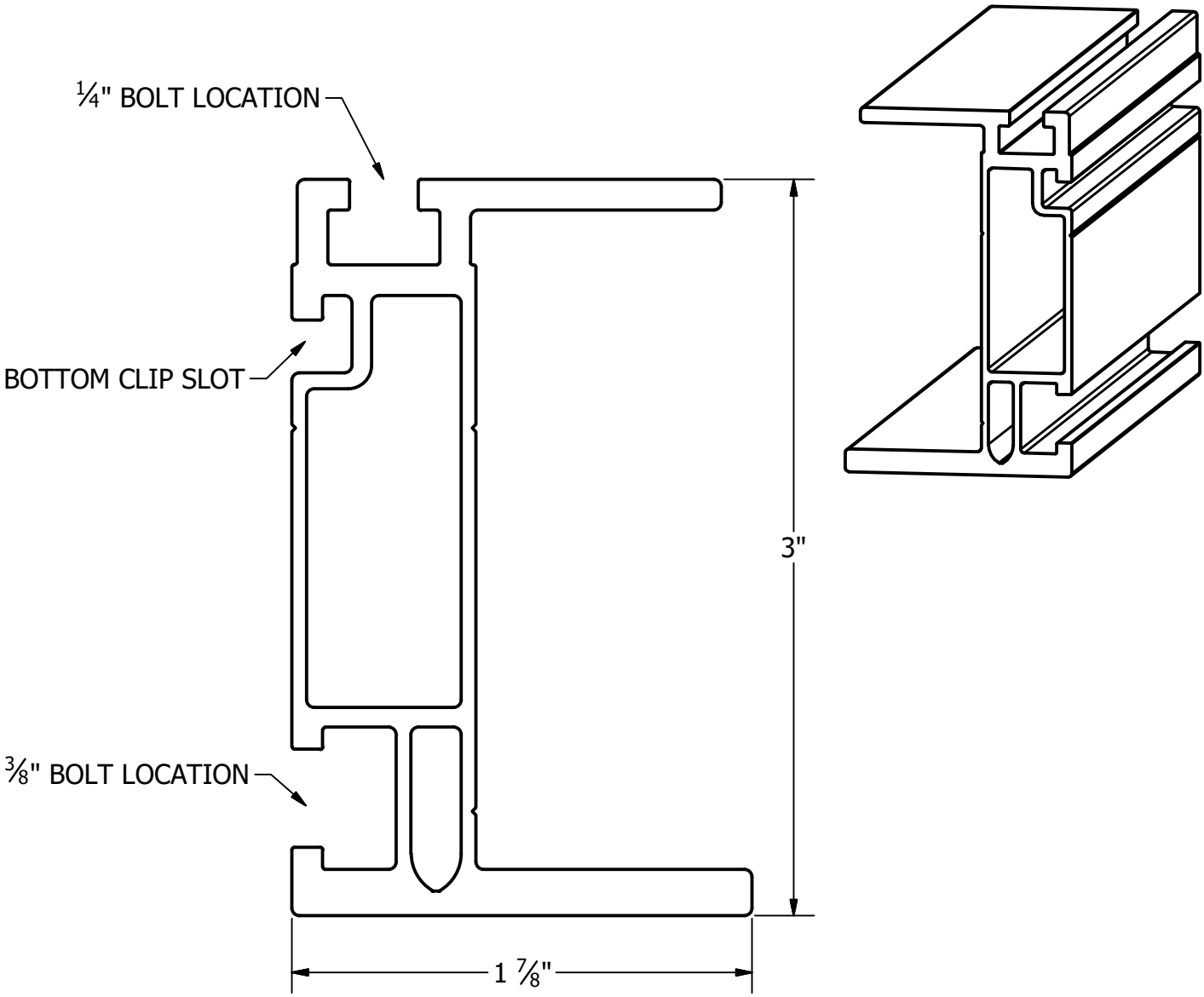
| | |
|---|---|
| PRODUCT LINE: | SOLARMOUNT |
| DRAWING TYPE: | PART DETAIL |
| DESCRIPTION: | LIGHT RAIL |
| REVISION DATE: | 9/11/2017 |

DRAWING NOT TO SCALE
ALL DIMENSIONS ARE NOMINAL



SM-P02
SHEET




| PART # TABLE | | |
|---|---|---|
| P/N | DESCRIPTION | LENGTH |
| 410144M | SMHD, RAIL 144" MILL | 144" |
| 410168M | SMHD, RAIL 168" MILL | 168" |
| 410204M | SMHD, RAIL 204" MILL | 204" |
| 410240M | SMHD, RAIL 240" MILL | 240" |

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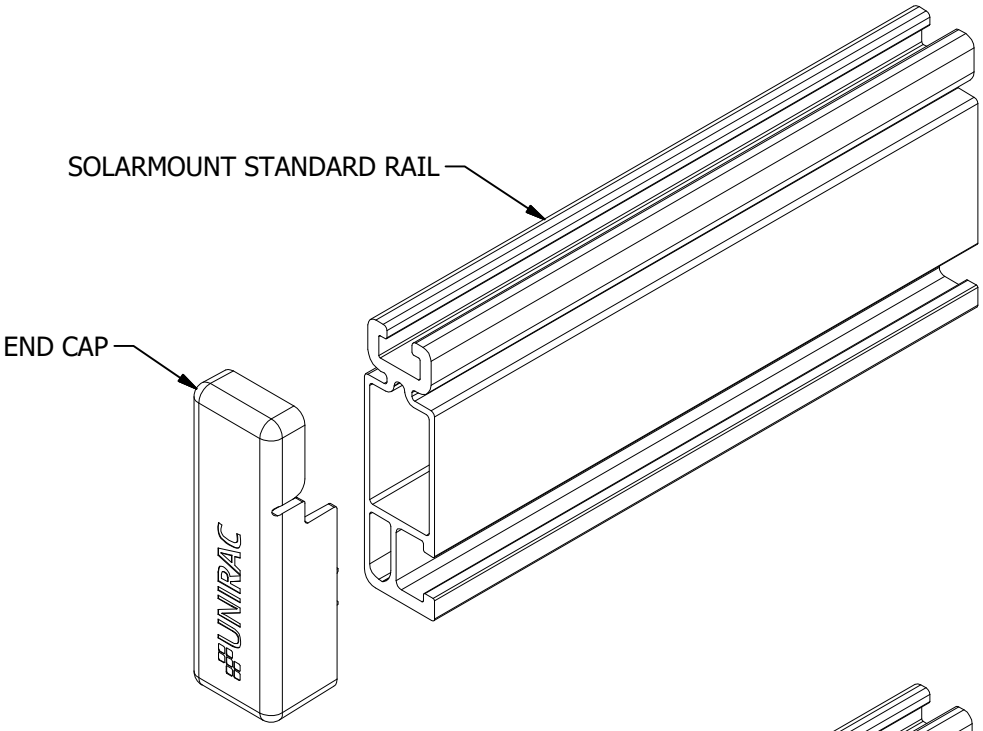
|---|---|
| PRODUCT LINE: | SOLARMOUNT |
| DRAWING TYPE: | PART DETAIL |
| DESCRIPTION: | HD RAIL |
| REVISION DATE: | 9/11/2017 |

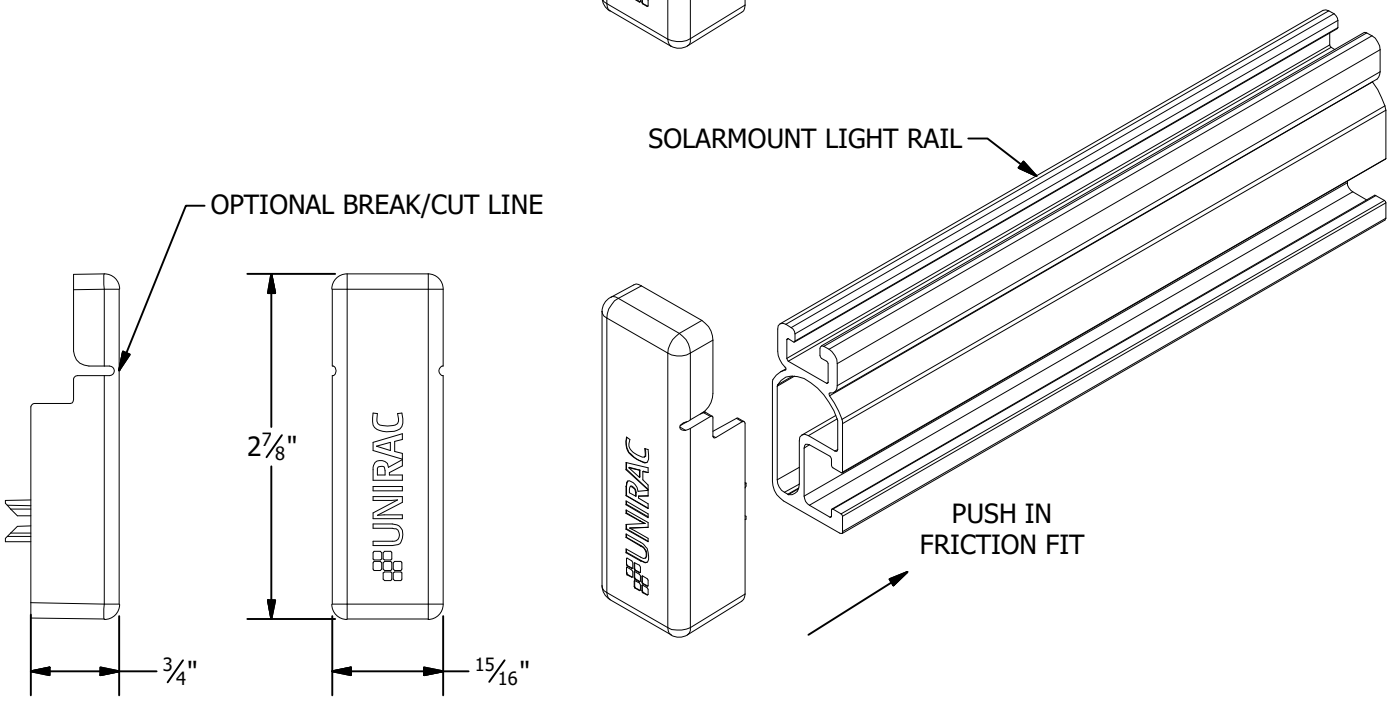
DRAWING NOT TO SCALE
ALL DIMENSIONS ARE NOMINAL



SM-P03
SHEET

NOTES:
1. END CAP INCLUDED WITH EVERY END CLAMP.
2. END CAP FITS SOLARMOUNT LIGHT AND STANDARD RAIL PROFILES.

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| | |
|---|---|
| PRODUCT LINE: | SOLARMOUNT |
| DRAWING TYPE: | PART DETAIL |
| DESCRIPTION: | END CAPS |
| REVISION DATE: | 9/27/2017 |

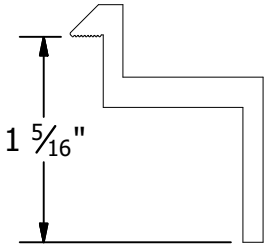
DRAWING NOT TO SCALE
ALL DIMENSIONS ARE NOMINAL

PRODUCT PROTECTED BY ONE OR MORE US PATENTS

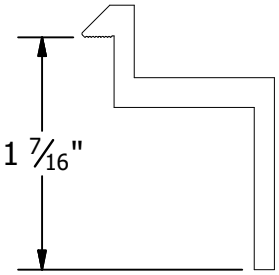
LEGAL NOTICE

**SM-P04**

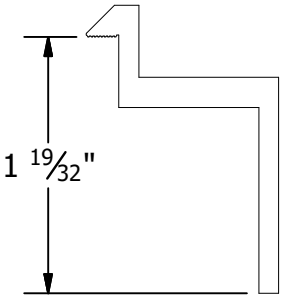
SHEET



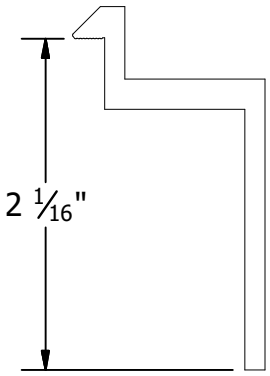

B CLAMP
30mm to 32mm Module Thickness
(1.18" to 1.26")



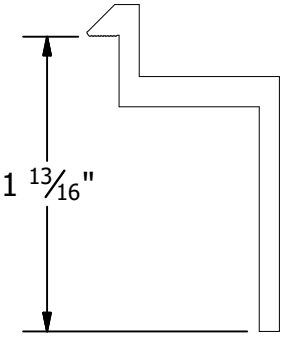

C CLAMP
33mm to 36mm Module Thickness
(1.30" to 1.42")



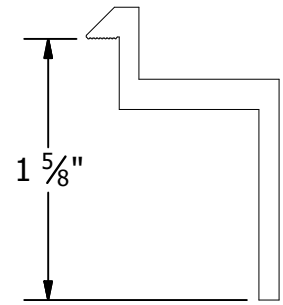

D CLAMP
38mm to 40mm Module Thickness
(1.50" to 1.57")




E CLAMP
50mm to 51mm Module Thickness
(1.97" to 2.00")

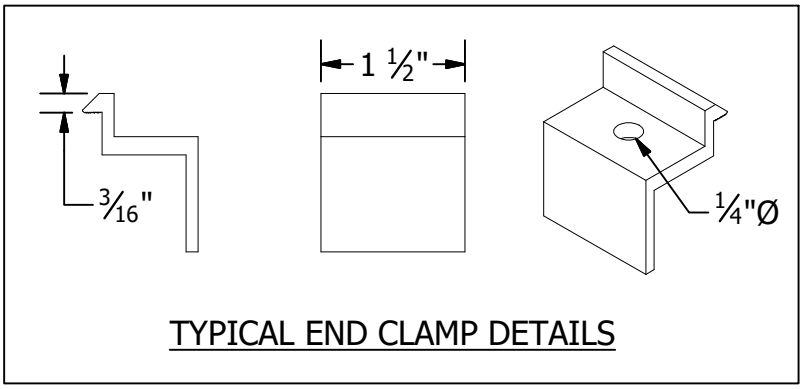



F CLAMP
45mm to 47mm Module Thickness
(1.77" to 1.85")




K CLAMP
39mm to 41mm Module Thickness
(1.54" to 1.61")

| PART # TABLE | |
|---|---|
| P/N | DESCRIPTION |
| 302021C | SM ENDCLAMP B CLR AL |
| 302021D | SM ENDCLAMP B DRK AL |
| 302022C | SM ENDCLAMP C CLR AL |
| 302022D | SM ENDCLAMP C DRK AL |
| 302023C | SM ENDCLAMP D CLR AL |
| 302023D | SM ENDCLAMP D DRK AL |
| 303024C | SM ENDCLAMP E CLR AL |
| 302024D | SM ENDCLAMP E DRK AL |
| 302025C | SM ENDCLAMP F CLR AL |
| 302025D | SM ENDCLAMP F DRK AL |
| 302026C | SM ENDCLAMP K CLR AL |
| 302026D | SM ENDCLAMP K DRK AL |




TYPICAL END CLAMP DETAILS

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| | |
|---|---|
| PRODUCT LINE: | SOLARMOUNT |
| DRAWING TYPE: | PART DETAIL |
| DESCRIPTION: | END CLAMPS - TOP MOUNTING |
| REVISION DATE: | 9/27/2017 |

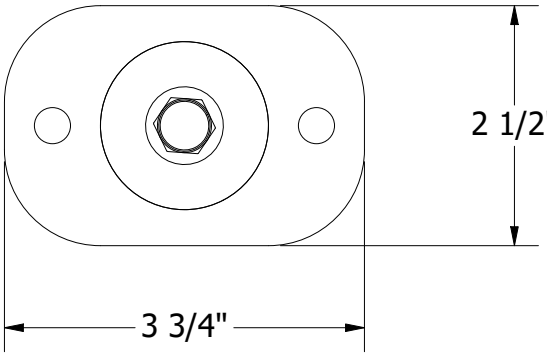
DRAWING NOT TO SCALE
ALL DIMENSIONS ARE NOMINAL

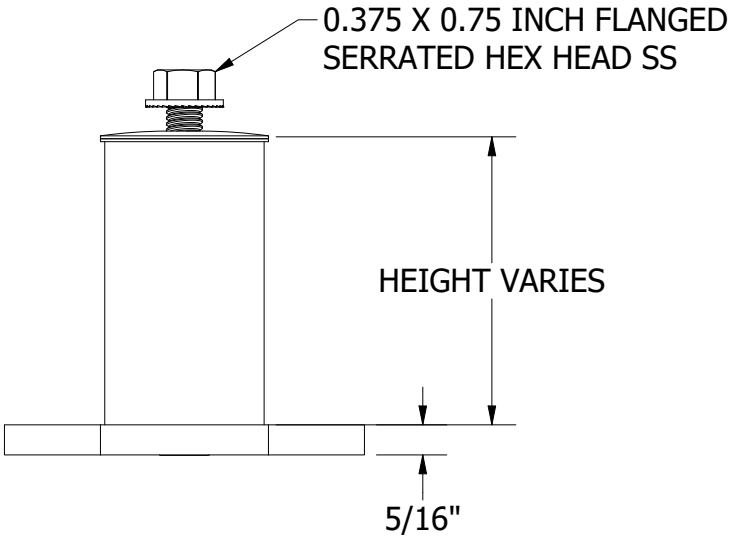
PRODUCT PROTECTED BY ONE OR MORE US PATENTS

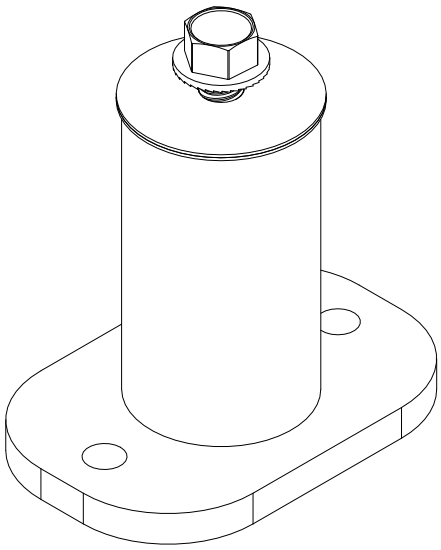
LEGAL NOTICE

SM-P05

SHEET



| PART # TABLE | |
|---|---|
| P/N | DESCRIPTION |
| 004300M | 3" 2 PIECE STANDOFF MILL |
| 004300D | 3" 2 PIECE STANDOFF DARK |
| 004400M | 4" 2 PIECE STANDOFF MILL |
| 004400D | 4" 2 PIECE STANDOFF DARK |
| 004600M | 6" 2 PIECE STANDOFF MILL |
| 004600D | 6" 2 PIECE STANDOFF DARK |
| 004700M | 7" 2 PIECE STANDOFF MILL |
| 004700D | 7" 2 PIECE STANDOFF DARK |

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| | |
|---|---|
| PRODUCT LINE: | SM |
| DRAWING TYPE: | ASSEMBLY DETAIL |
| DESCRIPTION: | STANDOFF |
| REVISION DATE: | 5/19/2020 |

DRAWING NOT TO SCALE
ALL DIMENSIONS ARE NOMINAL

PRODUCT PROTECTED BY ONE OR MORE US PATENTS

LEGAL NOTICE

SM-A12

SHEET