EcoFasten
For Installers. By Installers.

JUNCTION BOX

SIZEABLE ELECTRICAL BOX FOR ALL ROOF TYPES

INSTALLATION GUIDE

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JUNCTION BOX

Our Junction Box plays a simple, but important role: housing and protecting electrical wires on solar arrays. This box is compatible with all rail-less and rail-based systems and is specifically sized to house up to four strings (DC/AC). The hinged lid is designed so it can be removed or remain open during installation. It comes with integrated weep holes and drill guides on three sides (South, East, and West) for a faster, assisted installation.

The Junction Box can be deck-mounted or rail-mounted and can also be used for attic applications. When roof-mounted, there is no need to cut around shingles. Utilizing EcoFasten's patented, watertight technology and a pre-installed seal, the shorter and wider 9" x 12" flashing prevents interference with nails and is compatible with any system.

For rail-based systems, the two rail mounts easily attach to the MLPE mount. The low-profile design sits neatly under the solar PV array and off the surface of the roof.

FEATURES:

- Patented Watertight Technology
- Ample room to house four strings (DC/AC)
- For deck-mounted or rail-mounted applications
- Supports 2 attic pass throughs
- Weep holes rated for NEMA 3R compliance
- Multiple bosses for flexibility with DIN 3 (35mm) rails and grounding lugs & bars
- Integrated captive lid nut to reduce stripping
- Minimal components for a fast & easy installation

IMPORTANT SAFETY INSTRUCTIONS

This product has been designed and tested to national safety requirements to ensure your personal safety. Improper use may result in potential electric shock. To reduce the risk of personal injury, read and follow all instructions and warnings in this installation manual.

A) SAVE THESE INSTRUCTIONS

This manual contains important instructions that shall be followed during installation and maintenance of the system. This manual should be stored near the product's installation and must be available at all times.

B) SAFETY WARNINGS AND CAUTIONS

This product is only to be installed by qualified personnel. These installation and service instructions are for qualified personnel only. To reduce the risk of electric shock, injury or death, all wiring and connection must be performed by qualified personnel. Do not perform any installation or service other than that to which you are qualified to perform. Lethal voltages are present during the installation, operation and service of this equipment. Proper precautions must be taken at all times to ensure the safety of the service personnel.

At all times follow state and federal occupational safety and health administration (OSHA) guidelines and regulations. Ensure the electrical installation is in accordance with the National Electrical Code (NEC), ANSI, NFPA 70, all local electrical codes, and with the authority having jurisdiction. If there are any contradictions between the NEC and this document, follow the NEC requirements.

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WARNINGS

- Ensure all electrical conductors are at zero voltage potential before installing or servicing this unit.
- Never break contact on a circuit without using the appropriate disconnect device.
- Follow established lockout-tagout procedures for all electrical conductors prior to servicing.
- Photovoltaic systems produce potentially lethal electrical energy when exposed to light. Use all appropriate procedures to deenergize the photovoltaic system and the conductors leaving the system prior to service.
- Check all wiring and connections for integrity and proper installation prior to energizing the circuit. Nicked, pinched, or damaged wires can lead to electrocution or cause a fire.
- Use all appropriate electrical safety equipment as defined by OSHA or by the local or national governing safety body for servicing and installing high voltage products.
- Wear safety equipment rated for a minimum of 1500V or as required for the specific site conditions.
- Activating the AC and/or DC disconnect switch within a circuit does not shut off potential electrical energy or voltage from the photovoltaic panels.
- Do not use this equipment in a manner other than that outlined in these instructions. Doing so may cause personal injury or death.
- If any part of this product becomes damaged, remove and discard the entire unit, and replace with a new one. Failure to do so could result in fire, property damage, personal injury, electrocution, or death.
- When disconnecting the inverter, allow 15 minutes for all electrical storage components to discharge before servicing any conductors in that circuit.
- Be aware of and work away from power lines. Contact with power lines could result in electrocution, personal injury, or death.
- Whenever drilling into an attic space, ensure that no electrical wires, conduit or electrical components are on the other side. Failure to note electrical equipment locations could lead to damage which could result in electrocution, personal injury or death.

CAUTIONS

- Do not exceed the maximum wire sizes specified in this manual.
- Do not exceed maximum voltage ratings specified in this manual.
- Do not install attic pass-through holes without use of the flashing and self drilling roofing screws
- Do not install the box in a rail-mounted configuration in a location where snow loads could cause contact of the box and/or MLPE mount with the back of the PV module.
- Use proper safety and personal protective equipment (PPE) such as goggles and safety glasses, gloves, ear protection, hard hats, safety harness and fall protection, etc. Ensure you have proper training on how to use and install this equipment. Follow all national and local regulations and best practices.
- The installation of this product involves working around high-voltage electrical equipment. Follow applicable safety regulation and best practices to avoid creating an electrocution hazard.
- The installation of this product requires working on roofs. Follow applicable safety regulations and best practices to avoid falling from the work area. Take steps to prevent objects from falling off the roof. Cordon off the area on the ground directly under where the roof work will take place or equipment/tools will be stored.
- Never work alone. Someone should always be in range of your voice or close enough to come to your aid in the event of an accident.
- Remove all rings, bracelets, necklaces, watches or other metal equipment that could become energized while working with electrical conductors and equipment.
- The maximum ambient operation condition of this equipment is 75°C. NOTE: this includes temperature rise over ambient due to irradiance from the sun. Qualified system designer and Engineer is responsible for identifying maximum temperature based upon site conditions. Exceeding the temperature rating could cause electrical failure or arcing that could result in property damage, fire, electrocution, personal injury or death.
- If loose components or loose fasteners are found during periodic inspection, re-tighten immediately. Any componentsshowing signs of corrosion or damage that compromise safety shall be replaced immediately.

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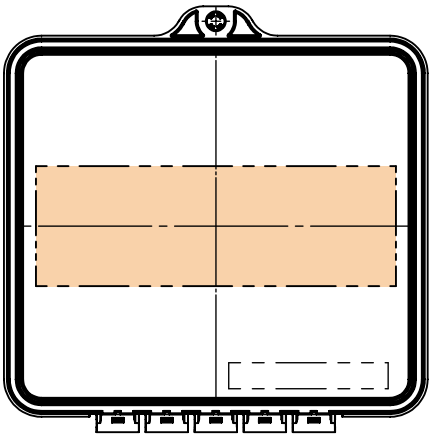
RATINGS

Compliance	Conforms to UL STD 1741 Certified to CSA STD C22.2 No. 107.1
Maximum System Voltage	1500 Volts
Maximum Total Current (Isc)	100 A
Maximum Current Per String (Isc)	30A
Maximum number of Inputs	4 (Combined circuits not to exceed 100 Amps)
Ambient Operating Conditions	-35°C to 75°C (-31°F to 167°F)
Enclosure Rating	Type 3R - Rainproof
Allowable Wire Inputs	12 - 10 AWG
Allowable Wire Outputs	12 - 8 AWG
Equipment Grounding Conductor	10 - 6- AWG
Roof Slope Range	2:12 and above
Attic Conduit Pass-Through Fitting Size Range	1/2" - 1-1/4"
Max Attic Pass-through Conduit Fittings	2
Max Side Wall Conduit Fittings Size	1-1/4"
Approved Water Seal Ratings	UL 441 and TAS100(A)-95

SYSTEM MARKING:



LOCATED ON INSIDE OF LID

PHOTOVOLTAIC JUNCTION BOX

c ETL us LISTED 5021605

Intertek

Conforms to UL STD 1741
Certified to CSA STD C22.2 #107.1

Maximum System Voltage (DC)	1500V
Max Total Current (Isc)	100A
Max Current per String (Isc)	30A
Max number of Inputs	4
Ambient Operating Conditions	-35°C to 75°C
Enclosure Rating	Type 3R - Rainproof
Allowable Wire Inputs	12 – 10 AWG
Allowable Wire Outputs	12 – 8 AWG
Equipment Grounding Conductor	10 – 6 AWG

Warning!

- Risk Of Electric Shock. DC or AC voltage sources are connected inside this equipment. Each circuit must be individually disconnected before servicing. When the photovoltaic array is exposed to light, it supplies a DC or AC voltage to this equipment.

Attention!

- Risque De Choc Electrique. Des sources de tension CC ou CA sont connectées à l'intérieur de cet appareil. Chaque circuit doit être déconnecté individuellement avant l'entretien. Lorsque le générateur photovoltaïque est exposé à la lumière, il fournit une tension CC ou CA à cet équipment.

INTERIOR PRODUCT DIMENSIONS

Component	Dimensions
Box	8" W x 8"D x 3" H
Box Volume	150 in^3
Flashing	12"W x 9"D

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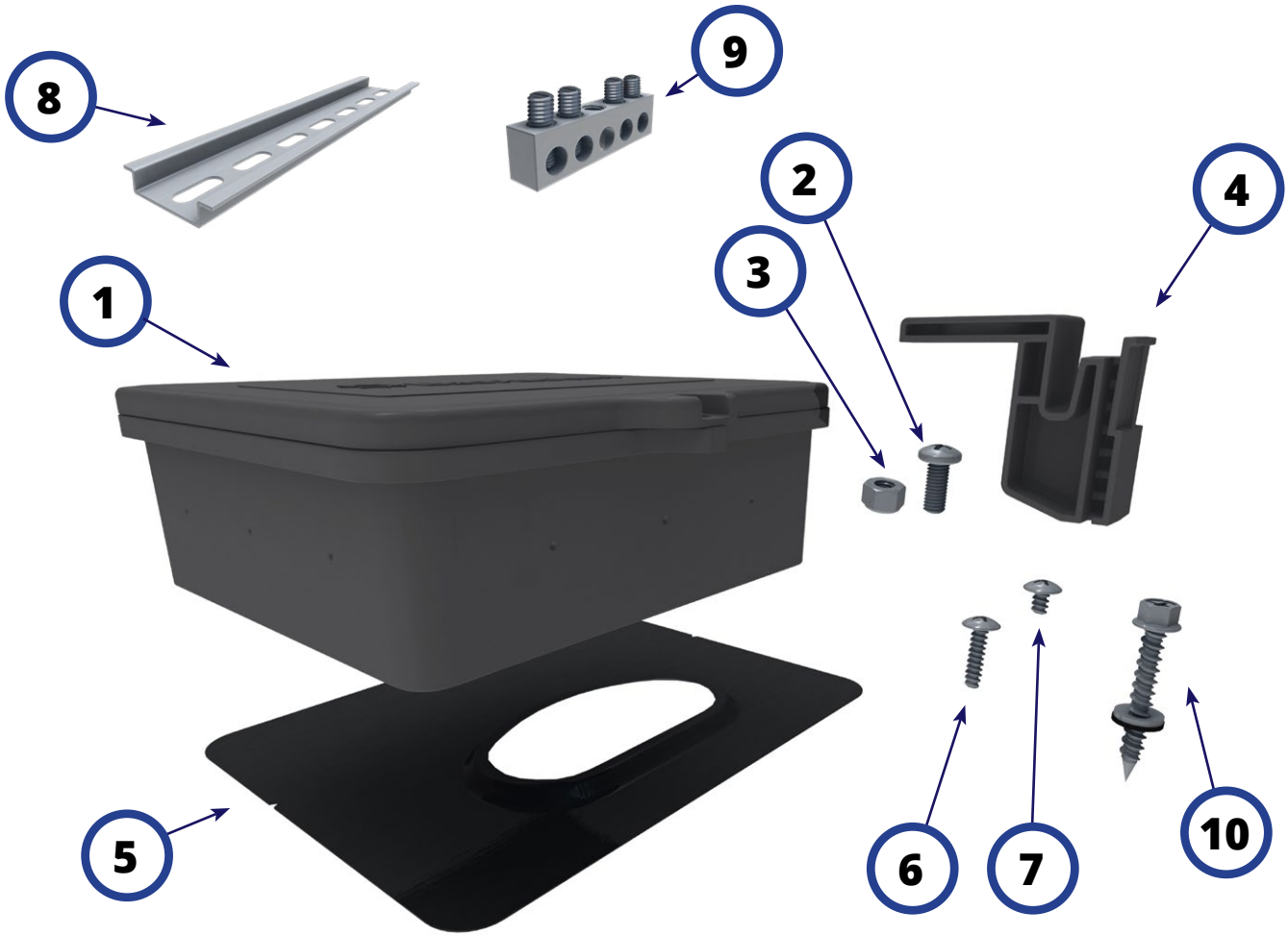
SYSTEM COMPONENTS REQUIRED



DECK-MOUNTED KIT

1. JUNCTION BOX
2. LID SCREW
3. CAPTIVE LID SCREW NUT
5. JUNCTION BOX FLASHING 12" X 9"
6. GROUNDING BAR SCREW #8X3/4" SS (2x)
7. DIN 3 RAIL SCREW #8X3/8" SS (4x)
8. DIN 3 RAIL 6 7/8"
9. 4-TERMINAL BAR W/5TH CENTER MOUNTED HOLE
10. DECK SCREW #12x1-3/4" W/ EPDM SEALING WASHER (2x)

RAIL-MOUNTED KIT

1. JUNCTION BOX
2. LID SCREW
3. CAPTIVE LID SCREW NUT
4. RAIL CONNECTORS (2X)
6. GROUNDING BAR SCREW #8X3/4" SS (2x)
7. DIN 3 RAIL SCREW #8X3/8" SS (4x)
8. DIN 3 RAIL 6 7/8"
9. 4-TERMINAL BAR W/5TH CENTER MOUNTED HOLE

RATING REQUIREMENTS FOR ADDITIONAL USER SUPPLIED COMPONENTS

- IP65, IP66, IP67 or IP68 Rated Cable Glands, Strain Relief Fittings or Cord Grips for PV/DG wires for sidewall pass-through.
- Listed rain tight or wet location conduit connectors or fittings for transition wiring for sidewall pass-through.
- #12-#8 AWG, min 90° C copper wire as required by NEC.
- #10-#6 AWG equipment grounding conductor as required by NEC.
- Listed Wire Connectors for Wire Gauge #12AWG to #6AWG
- Listed Terminal Blocks

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INSTALLATION PREPARATION

A. DRILL THE BOX

Prior to installation, use a step drill bit to place pass through holes for conduits or water-tight connectors. Drill bit starter locations are provided on the sides and front of enclosure. Do not install conduit facing up roof.

B. OPTIONAL DIN 3 RAIL INSTALLATION

Install DIN 3 rail at preferred location using hardware provided. Up to 6 7/8” long DIN 3 rail can be installed in one horizontal orientation and three vertical options within the box using the provided #8x3/8” Phillips head screws.

INSTALLATION PREPARATION

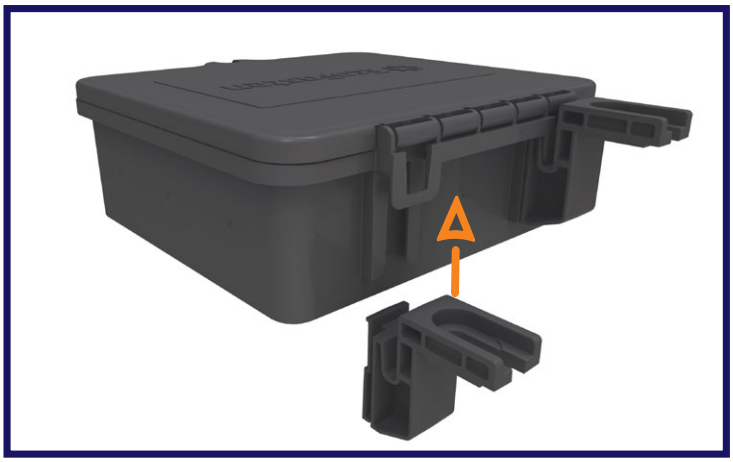
C. OPTIONAL GROUNDING DEVICES

When installing the junction box on the uproof side of the rail, two 1/8" field drilled weep holes must be installed in the downslope corners of the box.

Install grounding buss bar or lug at any screw boss location using hardware provided: #8x3/4” Phillips head screw. Grounding Bar can be installed in any orientation that the mounting holes allow. Torque buss bar screws to 25 in-lbs.

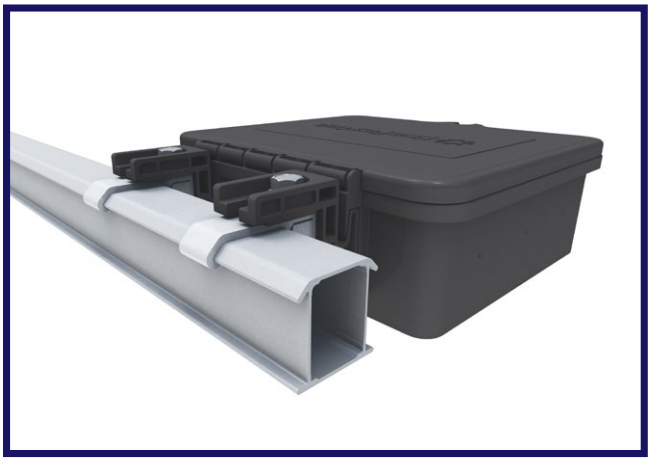
RAIL-MOUNTED INSTALLATION

A. INSTALL RAIL CONNECTORS



Insert Rail Connectors onto rear of enclosure at locations provided. Rail Connectors will click when fully seated

B. MOUNT TO RAIL



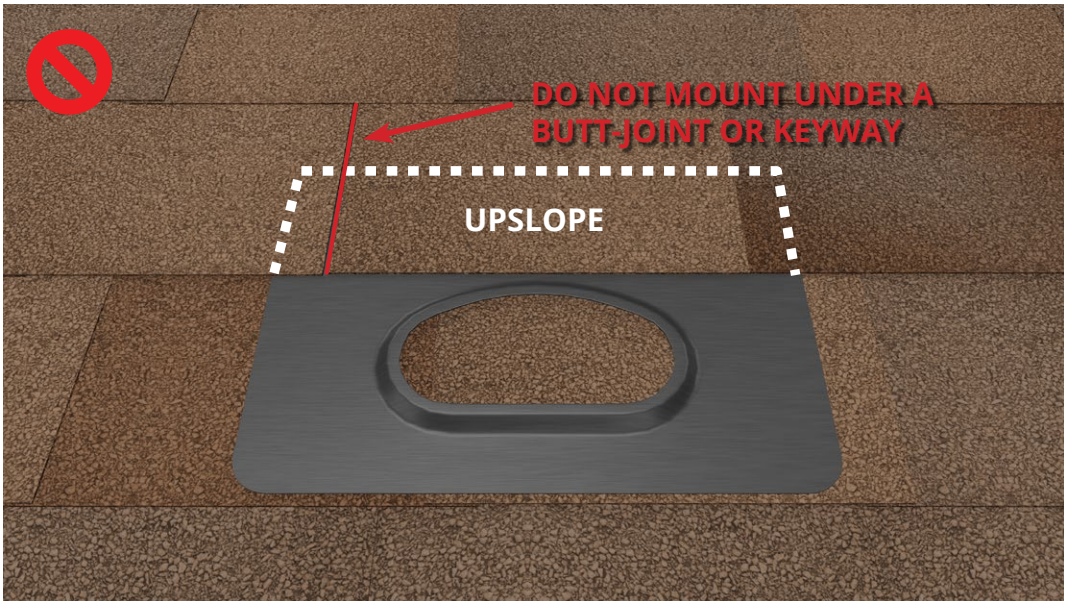
Use ClickFit MLPE Mount to attach Rail Connectors to rail. Ensure junction box is pushed as close to the rail as possible. Torque to 80 in-lbs, do not over-tighten. If installing in areas with ground snow loads greater than 40 psf, install Junction Box directly next to module frame edge.

DECK-MOUNTED INSTALLATION

A. LOCATION

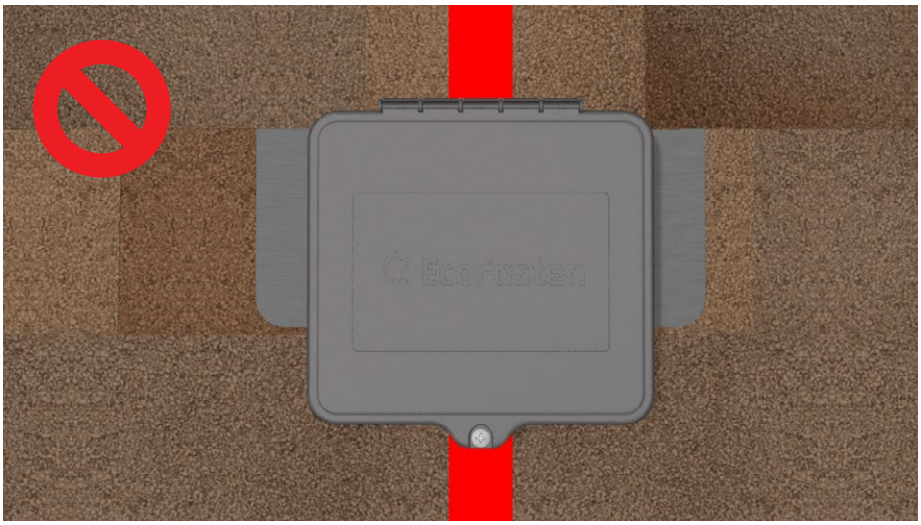
- Locate the Junction Box during the system design process to ensure optimal placement and compliance to permit requirements. It is acceptable to install the Junction Box under a PV module. To service the PV system, it is important to have access to the Junction Box after the installation. When installing the Junction Box under a module, consider placing it under the last module in a string or under a module that is easy to lift out of position for access.
- Place the junction box in a location that will limit contact of the module back sheet under high snow loads, such as near a module frame edge rather than the center of the module.
- Place the Junction Box in a location that avoids keyways, shingle joints or tabs in the shingle course above the Junction Box. The flashing is designed for use with typical 5”- 5-7/8” asphalt shingle coursing.
- If utilizing the attic pass-through, do not install the Box directly over a rafter such that the rafter interferes with the conduit coming down from the Box. If you run your wires through the attic, place the Junction Box in an optimal location for access when working inside the attic space.

INCORRECT INSTALLATION



DECK-MOUNTED INSTALLATION

DO NOT PLACE JUNCTION BOX DIRECTLY OVER A RAFTER



Do not install over a rafter when using the pass-through.

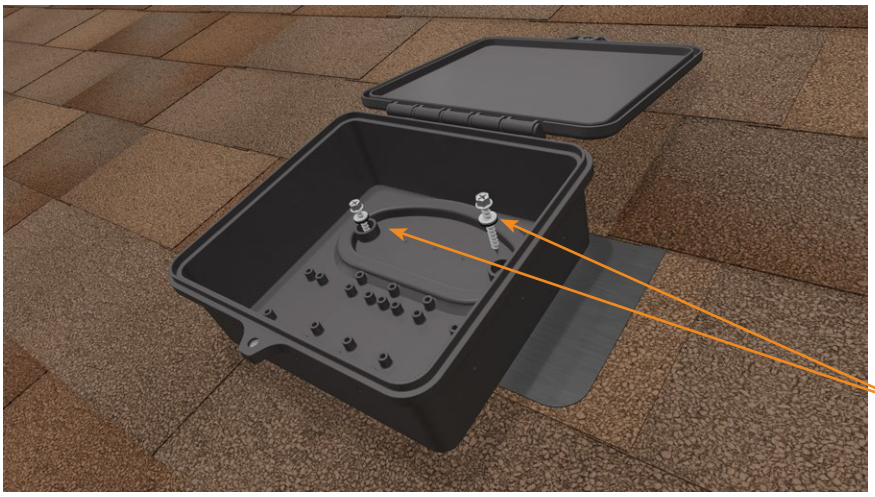
DECK-MOUNTED INSTALLATION

B. INSTALL FLASHING

Carefully loosen the shingle glue line under the second shingle course and insert the flashing under the second course to the V alignment marks on the side of the flashing.. The flashing should not overhang the shingle, and the marking for UPSLOPE on the flashing should be under the second shingle course

C. INSTALL JUNCTION BOX ON FLASHING

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



*If installing pass through fittings, ensure that the Junction Box and roof deck are both properly prepared. Complete installation process before attaching the Junction Box to the deck.

DECK-MOUNTED INSTALLATION

D. INSTALLING PASS THROUGH FITTINGS

Using a pilot drill, begin drilling out the box at the desired conduit pass through location. It is acceptable to use any location inside the watertight oval for a penetration. Drill through both the box and into the roofing, marking the location on the roof of the clearance hole, transferring the proper drill location to the roof surface.

Remove the box from the roof surface and finish creating conduit mating hole within the box with a step drill bit.

DRILL PASS THRU HOLE WITH CLEARANCE HOLE SAW:

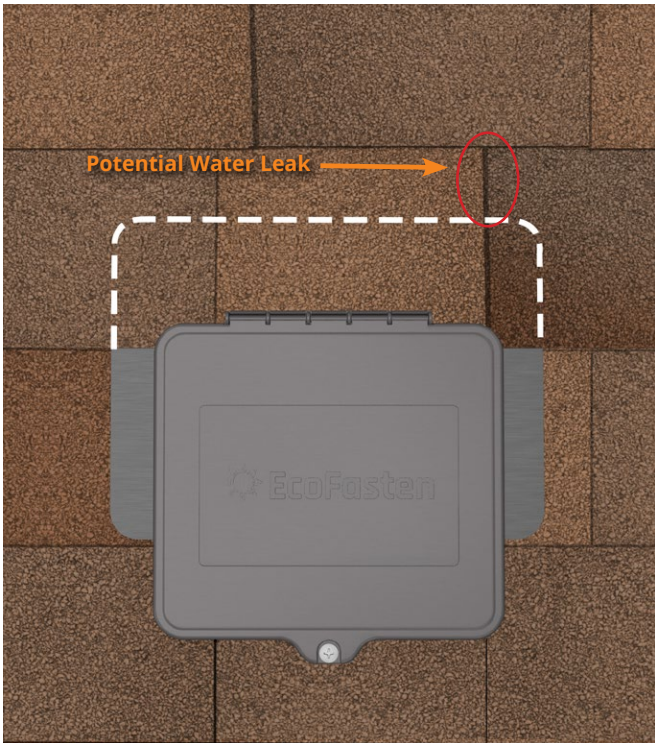
- 2 - 1/4" for 1 - 1/4" conduit fitting
- 1 - 7/8" for 1" conduit fitting
- 1 - 5/8" for ¾" conduit fitting
- 1 - 3/8" for ½" conduit fitting

Install conduit fitting to bottom of box provided per conduit fittings manufacturer instructions. Place Junction Box back over flashing and secure to the roof using self drilling wood screws.

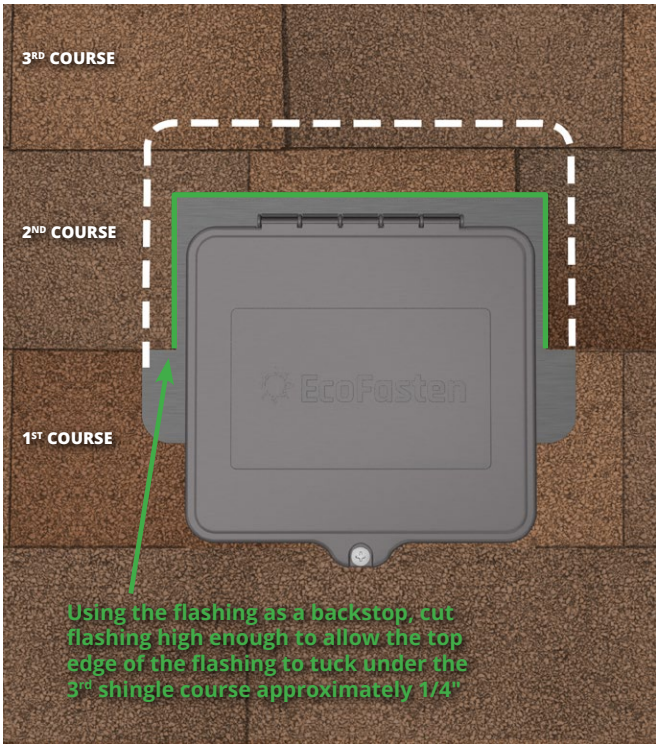
ALTERNATIVE INSTALLATION METHOD

If placing the flashings under a shingle butt-seam or a 3-tab keyway cannot be avoided to prevent roof leaks, you may proceed with this alternative method illustrated below.

UNACCEPTABLE INSTALLATION METHOD



ACCEPTABLE ALTERNATIVE INSTALLATION METHOD



To avoid an exposed and un-flashed shingle butt-seam or keyway, cut away a section of the 2nd shingle course to allow the flashing to tuck up under the 3rd course. this flashes any exposed shingle butt-seam or keyway.

FINALIZE INSTALLATION

A. WIRING

Install wiring, conduit and fittings per NEC requirements and following local AHJ guidance.

B. SECURE LID

Close lid and fasten with Philips Head Screw Driver, tighten screw 50 in-lbs. Do not overtighten lid screw.

SPECIFICATIONS

SYSTEM COMPONENTS

1. Junction Box:

Consists of (1) polyermic junction box with (1) pre-installed polymeric lid with (1) UNC-2AX.625" Lid Screw, (1) Captive Lid Screw Nut and (2) #12 Deck Screw w/EPDM sealing washer.

2. Junction Box Flashing:

(1) black finish 0.32 gauge aluminum, embossed.

3. Rail Connectors:

(2) polymeric slide-on Rail Connectors.

4. Accessories:

Includes (4) #8x3/8" SS DIN Rail Screw and (2) #8 x3/4" SS Grounding Bar Screw.
(1) DIN 3 Rail 6 7/8".
(1) 4-Terminal Bar w/5th Centered Mounted Hole

5. Recommended Sealant:

Water Seal Tested without Sealant, if required by roof manufacturer, sealant shall be roof manufacturer approved.

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SPECIFICATIONS

DELIVERY / STORAGE / HANDLING

Inspect material upon delivery. Notify manufacturer within 24 hours of any missing or defective items. Keep material dry, covered and off the ground until installed.

PATENTS

Visit www.efpatents.com for patent information.

DESIGN REQUIREMENTS

1. Install a minimum of two fasteners when mounting to the deck. Do not over-tighten
2. It is important to design new structures or assess existing structures to make sure they withstand retained loads.

EXAMINATION

1. Substrate: Inspect structure on which brackets are to be installed and verify that it will withstand any additional loading that may be incurred.
2. Notify General Contractor of any deficiencies before installing EcoFasten Solar brackets.
3. Verify that roofing material has been installed correctly prior to installing solar attachment bracket.

INSTALLATION

Comply with architectural drawings and project engineer's recommendation for location of system. Comply with Manufacturer's written installation instructions for installation and layout.