

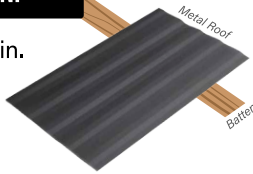
KEY NOTES:

- Compatible with Standing Seam and G-style Metal Roofs. G-style ribs to have a maximum height of 3/16". Valley to be 6.5 inches wide minimum.
- Not to be installed within 2 feet of existing roof penetrations or skylights.
- Installation should occur centered between metal roof ribbing/seams.
- Installer is responsible for verifying underlying roof construction is structurally sound and in good condition.

STEP 1

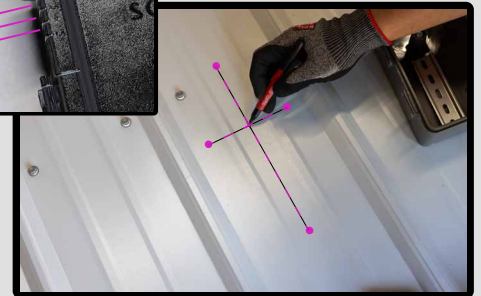
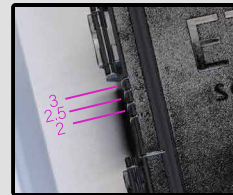
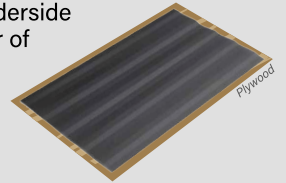
IF BATTEN OR PURLIN CONSTRUCTION:

- 1A.** Locate nearest horizontal Batten or Purlin. **Remove Lid from the box to use as a template.** Lay the lid face down on the roof surface (as shown), and align the bottom of the Batten with the 'Bottom of the Batten' line on the lid.



IF PLYWOOD UNDERLAYMENT:

- 1B.** Center Tombstone in the Valley. Determine desired penetration location, ensure the underside of roof structure is clear of rafters or obstructions.



Mark the roof surface using desired penetration hole size tick marks. Mark the center on the north side of the lid. Connect three lines using a straight edge to determine the center for hole saw pilot bit.

STEP 2

- 2.** Penetrate Roof Surface with hole saw, centered in the valley. A larger hole through the Roof Surface will allow for more fittings to be installed; 2", 2.5", 3".

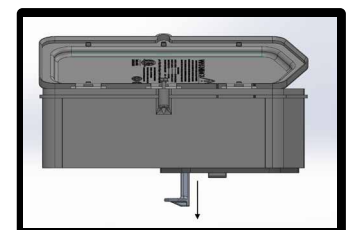


STEP 3

- 3. Release compression leg to prepare for install**

Using a 5/16" hex head bit on a Drill, turn the Compression Leg Bolt counterclockwise until desired Leg height is achieved (releases Compression Leg, ready for Install). Remove protective shell when loosening the compression leg.

Pro Tip: The Leg height under the enclosure should be greater than the thickness of the roof.



STEP 4

4. Apply Sealant

Using recommended metal roofing sealant, apply an 1/4" bead around the outside perimeter of the gasket on the bottom of the box. Follow the sealant application guide.

Pro Tip: After box is installed, wipe excess sealant around the outer edges of box to create a clean bead.

Approved Sealants: M1 Adhesive or Geocell 4500 Roof Bonding Sealant.



STEP 5

5. Drop and Slide Compression Leg to the Underside of the Roof

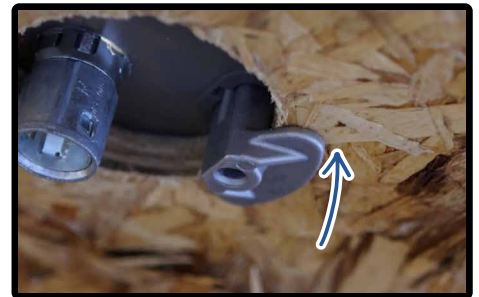
Drop and slide the extended Compression Leg into the roof penetration. Slide until Compression Leg engages with the bottom of the drilled hole.



STEP 6

6. Tighten the Compression Leg

Align the enclosure so that it is parallel to the metal roof ribs. Using a 5/16" hex head bit, tighten the Compression Leg. The Compression Indicator will move towards the installer, and when fully tightened will stop moving. Torque to 15-20 in-lbs.



STEP 7

7. Center Box and Install the four sheet metal screws

Install each screw using a 5/16" hex head bit on a drill, following the tightening sequence as shown. Torque the four supplied self tapping sheet metal screws to 20 in-lbs.



STEP 8

8. Close and Secure Lid

After completing all necessary electrical connections, close the lid. Using a 5/16" hex head bit, tighten the lid screw to 15 in-lbs.



WIRING & PROPER USE

Tombstone is a Junction Box designed for metal roof pass-through electrical tie ins. All wires are to be copper conductors with insulation rated to 75°C or higher. To ensure dependable long-term connection it is required to use outdoor rated, UL 514B, NEMA 3R approved fittings and/or strain reliefs. Tombstone does not come with fittings, wire nuts, or terminal blocks due to site-specific needs. It is the responsibility of the installer to specify the proper accessories for the installation. Follow the installation instructions from the fittings, strain reliefs, din-rails, terminal blocks and grounding block manufacturer and follow the National Electrical Code, ANSI/NFPA 70 wiring methods and guidelines. When using terminal blocks, wiring shall be in conformance to wire bending space as listed in UL 1741 or as shown in Table 2.

Tombstone is nonconductive and therefore does not need to be grounded. However, this also means the box cannot be used to maintain an electrical bond between fittings. Ensure all proper jumpers or other bonding mechanisms are in place per NEC. The PV system grounding shall be installed per the requirements of Sections 690.41 through 690.47 of the National Electrical Code, ANSI/NFPA 70, NEMA 3R and is the responsibility of the installer.

When installing a conduit hub, the hub shall be connected to the conduit before the hub is connected to Tombstone.

To maintain Tombstone's 3R rainproof rating, the lid must close freely without interference from wires and be secured with the provided screws to 15-20 lb-in. Failure to properly close the lid can lead to excessive water ingress leading to an electrical short and possibly a fire.

SYSTEM SPECIFICATIONS & RATINGS

- Maximum Voltage: 1,500 Volts
- Maximum Current: 120 Amps
- Allowable Wire: 14-6 AWG
- Spacing: Please maintain a spacing of at least 1.2" between uninsulated live parts and fittings for conduit, armored cable, and uninsulated live parts of opposite polarity.
- Enclosure Rating: Type 3R
- Max Side Wall and Floor Pass-Through Fitting Size: 1-1/4"
- Roof Slope Range: 2.5 – 12:12
- Ambient Operating Conditions: (-35°C) - (+75°C)
- Compliance: UL1741, CSA C22.2 No. 290
- Approved wire connectors: Must conform to UL1741
- System Marking: Interek Symbol and Control #
- Periodic Re-inspections: If re-inspections yield loose components, loose fasteners, or any corrosion between components, components that are found to be affected are to be replaced immediately.

TABLE 1 Typical Wire Size, Torque Loads and Ratings

	1 Conductor	2 Conductor	Torque				
			Type	NM	Inch Lbs	Voltage	Current
ABB ZS6 terminal block	10-24 awg	16-24 awg	Sol/Str	0.5-0.7	6.2-8.85	600V	30 amp
ABB ZS10 terminal block	6-24 awg	12-20 awg	Sol/Str	1.0-1.6	8.85-14.16	600V	40 amp
ABB ZS16 terminal block	4-24 awg	10-20 awg	Sol/Str	1.6-2.4	14.6-21.24	600V	60 amp
ABB M6/8 terminal block	8-22 awg		Sol/Str	.08-1	8.85	600V	50 amp
Ideal 452 Red <small>WING-NUT Wire Connector</small>	8-18 awg		Sol/Str	Self-Torque	Self-Torque	600V	
Ideal 451 Yellow <small>WING-NUT Wire Connector</small>	10-18 awg		Sol/Str	Self-Torque	Self-Torque	600V	
Ideal, In-Sure <small>Push-In Connector Part #39</small>	10-14 awg		Sol/Str	Self-Torque	Self-Torque	600V	
WAGO, 2204-1201	10-20 awg	16-24 awg	Sol/Str	Self-Torque	Self-Torque	600V	30 amp
WAGO, 221-612	10-20 awg	10-24 awg	Sol/Str	Self-Torque	Self-Torque	600V	30 amp
Dottie DRC75	6-12 awg		Sol/Str	Snap-In	Snap-In		
ESP NG-53	4-6 awg		Sol/Str		45	2000V	
ESP NG-63	10-14 awg		Sol/Str		35		
ESP NG-717	4-6 awg		Sol/Str		45	2000V	
	10-14 awg		Sol/Str		35		
Brumall 4-5,3	4-6 awg		Sol/Str		45	2000V	
	10-14 awg		Sol/Str		35		

TABLE 2 Minimum wire-bending space for conductors through a wall opposite terminals in mm (inches)

Wire size, AWG or kcmil (mm2)	Wires per terminal (pole)			
	1 mm (inch)	2 mm (inch)	3 mm (inch)	4 or More mm (inch)
14-10 (2.1-5.3)	Not Specified	-	-	-
8 (8.4)	38.1 (1-1/2)	-	-	-
6 (13.3)	50.8 (2)	-	-	-

WARNING! STOP IMPORTANT SAFETY INSTRUCTIONS

READ ALL INSTRUCTIONS AND SAFETY WARNINGS PRIOR TO INSTALLATION



NOTE: 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. This product is intended for operation in an environment having a maximum temperature of 75°C.

This product is only to be installed by qualified personnel. These installation instructions are for qualified personnel only and the instructions herein are provided for those individual(s) only. To reduce the risk of electric shock, injury or death, all wiring and connections must be performed by qualified personnel. Do not perform any installation or service other than that to which you are qualified to perform. Protect you and all persons and property during installation and servicing of this equipment.

If you have any doubt concerning your competence or expertise, consult a qualified expert to perform the installation.

Lethal voltages are present during the installation, operation and service of this equipment. Proper precautions must be taken at all items to ensure the safety of the service personnel.

At all times follow state and federal occupational safety and health administration (OSHA) guidelines and regulations.

Utilize proper Personal Protective Equipment (PPE) as required per national and local regulations as well as for installation best practices.

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.

Install, operate, and use this product in a manner consistent with the instructions provided. Failure to follow the procedures indicated may result in roof leaks, property damage, or consequential damage.

- 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 de-energize the photovoltaic system and the conductors leaving the system prior to service.
- Ensure all wires are in good service condition. Nicked, pinched, or damaged wires can lead to electrocution or cause a fire.
- Be aware of and work away from power lines. Contact with power lines could result in electrocution, personal injury, or death.
- When disconnecting source or supply circuits, provide sufficient time as stated in the power electronics manufacturer's instruction manual in order to ensure discharge of all conductors in the circuit.
- Always verify the integrity and proper installation of the electrical components prior to energizing electrical circuits.
- Non-metallic enclosures do not provide grounding means between conduit connections if used. The use of grounding hubs and jumper wires are required.
- Grounding must be sized per NEC requirements and is the responsibility of the installer.
- Wear safety equipment rated for a minimum of 600V or as required for the specific site conditions.
- Disconnect all conductors from the array prior to making or breaking connections within this product or within any other point of the circuit.
- Activating the AC and/or DC disconnect switch within a circuit does not shut off potential electrical energy or voltage from the photovoltaic panels. Ensure the photovoltaic array is disconnected and there is zero voltage potential on the conductors being installed before servicing this product.
- Do not use this equipment in a manner other than that outlined in these instructions. Doing so may cause personal injury or death.
- Check all wiring and connections for integrity and proper installation prior to energizing the circuit.
- Always de-energize the DC and AC circuits prior to installation or service. Neglecting to do so could result in property damage, 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.
- Do not install if the roof is wet, frosted, or covered by ice or snow.
- 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.
- Do not use the product to anchor fall protection equipment.
- When determining ambient operating temperature, system designer must take into account external sources of heat such as irradiance from the sun or the environmental conditions under which the product is installed such as under a PV module. Exceeding the temperature rating could cause electrical failure or arcing that could result in property damage, fire, electrocution, personal injury or death.
- 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.
- 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.
- If modules are required to be removed or lifted during JB-1.XL servicing, ensure the system is designed such that the removal of the module will not disturb or break the system ground path. In addition, ensure the lifted module maintains its ground during servicing. Failure to follow these instructions could produce a shock hazard leading to personal injury or death.
- Use a very sharp cutting tool to drill through the box walls and floor then clean all burrs.

Easy Solar Products, Inc assumes no responsibility for the failure of an architect, contractor, installer, or building owner to comply with all applicable laws, building codes and requirements, and adequate safety precautions

