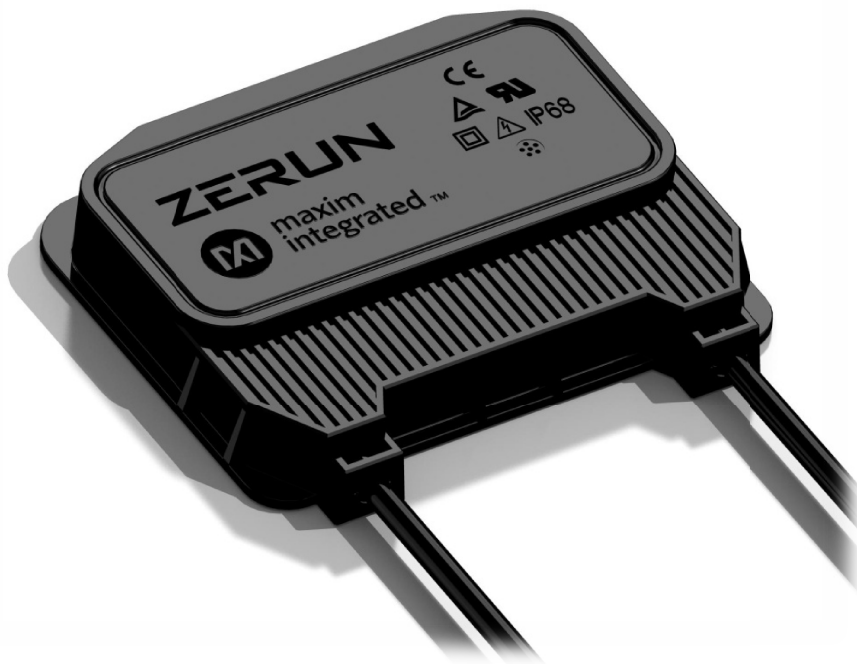




Zerun ZS Series

Cell-String Optimizer Junction Box for Photovoltaic Module



Connection System for Solar Panel

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1. Scope

This specification contains guidelines for the assembly, installation and fitting of the ZS Solar junction boxes, and connection parts to customer solar panels.

2. Product Characteristics

2.1 Product Specifications

Rated System Voltage	1500V DC	1000V DC
Rated Impulse Voltage	16000V	12000V
Output Rated Current	12A	
Reverse Current (max)	25A	
Protection Class	Class II	
Connecting Capacity	1x4.0mm ²	
Protection Degree	IP68 (1m, 1h)	
Operating Temperature	- 40℃ ~ +85℃	
Applicable Size of PV ribbons	3X0.2mm ² ~ 8X0.5mm ²	
PV+ Maximum Input Current	10.5A	
Input Voltage Range between PV- and PV+(max)	18V for each port	

- PCBA detail information refer to Data Sheet ZS_W005

Temperature in back sheet of the module is less than 107℃ under the condition that ambient temperature of 85℃ and the junction box working at it's maximum power.

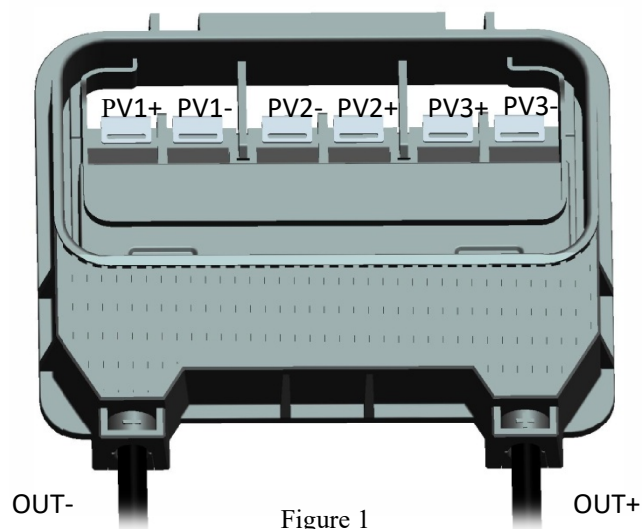


Figure 1

2.2 Features

- Perform MPPT on 20-24 series-connected PV cells.
- Fast MPPT reacts quickly to changing conditions.
- Integrated voltage-limiting clamps output voltage.
- Integrated current-limiting clamps output current.

- Active bypass function eliminates diodes and hot spots.
- Support panel Flash and Electroluminescence(EL) testing.
- Peak 99.3%, CEC 99.0% and Euro 98.6% Efficiency.

2.3 Product Family

Type Designation	ZS-abcd a, b, c, d are variables
ZS	J-Box Series - ZS: optimizer J-box
a: PCB Type	Z: Generation 2, MAX20800T-D00# F: Generation 2, MAX20800T-D01#
b: Ribbon Connection	C: Clamping type S: Soldering type 1 Q: Soldering type 2
c: Output rated current	C: 12A
d: System Voltage	K: 1kv N: 1.5kv

2.4 Related Documents

- Customer Drawing ZS_T001
- Data Sheet ZS_W005

3. User Instruction

3.1 Cleaning

Any type of exposure to contaminants (dust, humidity etc.) can negatively affect the system with regards to its functions, over the duration of use. This applies especially to the functionality of the connector seals and crimped contact connections. Therefore, during assembly, it is necessary to ensure a careful and clean processing environment.

During storage, transportation and installation, it is necessary to protect the non-inserted contacts against contamination from dust or moisture. Connectors should be protected with the appropriate recommended dust caps* prior to being fully connected.

* Suitable protective covers are available for connectors.

Articles which can erode the plastics (connector and Junction Box) must not be used to clean the products. We recommend the use of soft cloths moistened with isopropyl alcohol for cleaning.



Unplugged terminal points must be protected against moisture, dust and any environmental pollution. Only clean and dry plugged terminal points fulfill their respective pollution class.

3.2 Installation Guidelines for the Junction Box Attachment to the PV Modules

The following application technical instructions are made as guidelines. These instructions do not excuse the user or installer of the ZS boxes from independently testing the adhesive tapes or silicone glues to determine the suitability for their proposed assembly process and application.

3.2.1 Content

This section describes the gluing of connecting boxes onto the rear side of the solar modules with the goal to secure the product in accordance with this specification.

3.2.2 Equipment

The recommended adhesive is typically provided in cartridges. Refer to supplier's application instructions for adhesive applicator and application.

- Guns for spraying from the cartridge
- Gloves, soft and clean cloths
- Cleaning product isopropyl alcohol
- Spatula, brush
- Weight, for example a piece of metal with an approximate weight of 1kg

3.2.3 Safety Instructions

Before beginning the junction box attachment process, obtain, review and follow the manufacturer's material safety information.



The use of appropriate gloves and eye protection is required throughout the attachment process. Ensure adequate ventilation at all times during the attachment process. Refrain from eating, drinking or smoking in the vicinity. Do not expose to open flames.

When working with silicone adhesive:

- Avoid contact with eyes. If eye contact occurs, rinse for a period of 15 minutes and seek medical help.
- Avoid prolonged contact with skin.

3.2.4 Final Assembly Process Using Single Component Silicon Adhesive

3.2.4.1 Preparation

Place the photovoltaic panel face down on the work table. The attachment area of the photovoltaic panel must be dry, oil-/fat-free and free of any dust, oil and contaminants. Thoroughly clean the attachment area with a clean, lightly moistened Isopropyl alcohol soft cloth (e.g. moistened using a

dosing unit). Further auxiliary or other cleaning agents are not permitted. Use of any other cleaning agents has to be specified and tested by the customer. The attachment area must be free from condensation and moisture.

To improve adherence, junction boxes may be treated with primer. The attachment area should be thoroughly covered with primer by using a small spatula brush. The specification from the supplier of the primer has to be followed.

Bend the photovoltaic panel PV ribbons so that they extend perpendicular from the plane of the panel.

3.2.4.2 Adhesive Application Procedure

Before applying the adhesive, it is recommended that the junction box lid be opened to ease later attachment to the solar panel. 8mm~12mm wide and 3mm~5mm height band of adhesive applied to the area which as shown in Figure 2 is adequate. During this process, the white spots indicated in Figure 3-1 must be covered. And ensure that the silicon bead is continuous and free of gaps.

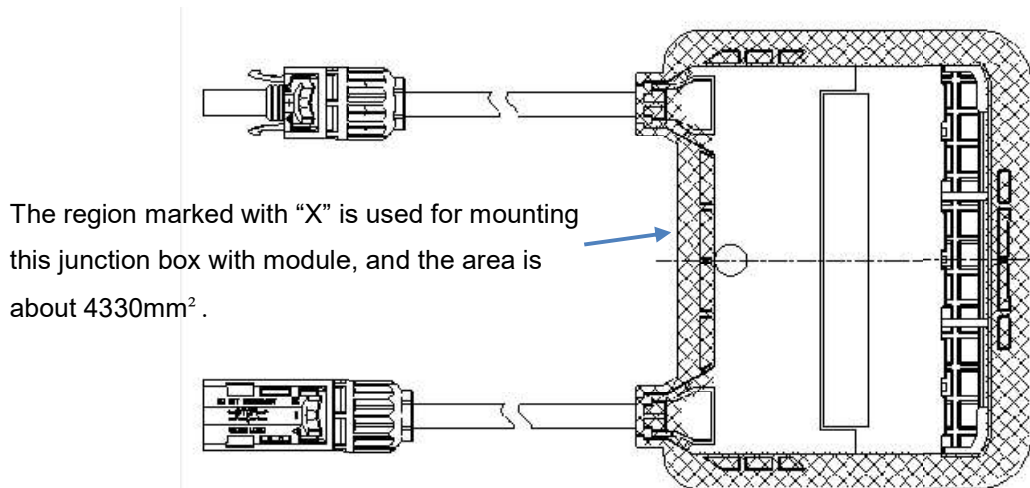


Figure 2

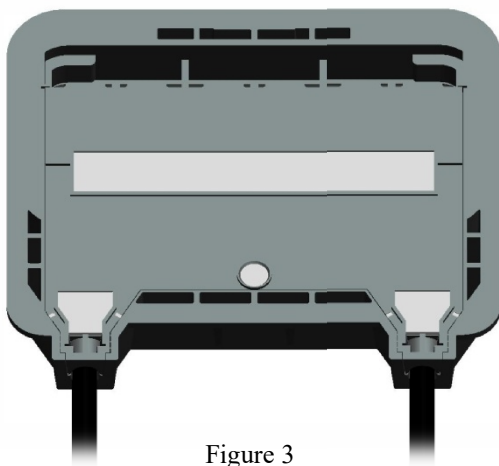


Figure 3

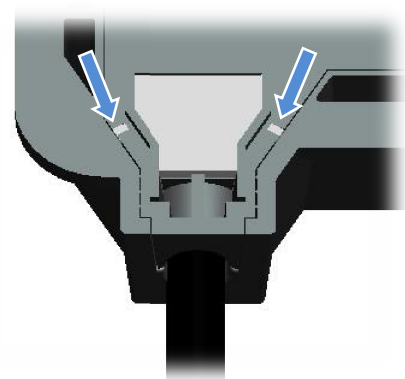


Figure 3-1

To attach the junction box to the photovoltaic panel, thread the PV ribbon through the openings in the bottom of the junction box. Make sure the junction box is properly oriented in a horizontal position

before firmly placing the junction box into its final position on the photovoltaic panel. Then, the 1kg metal weight can be applied to the top of the junction box to ensure adequate adhesive coverage.

If needed, use the spatula to smooth any excess silicon that may have extruded out of the joint. Keep the photovoltaic module assembly in the horizontal until full cure is obtained.

A full cure requires 24 hours at room temperature before the photovoltaic module can be connected and tested.



Touching or handling of the PV ribbons during the pressing of the box is not permitted. Mechanical stressing of PV ribbons can cause their destruction and thereby the malfunction of the panel.

3.3 Wiring the Junction Box

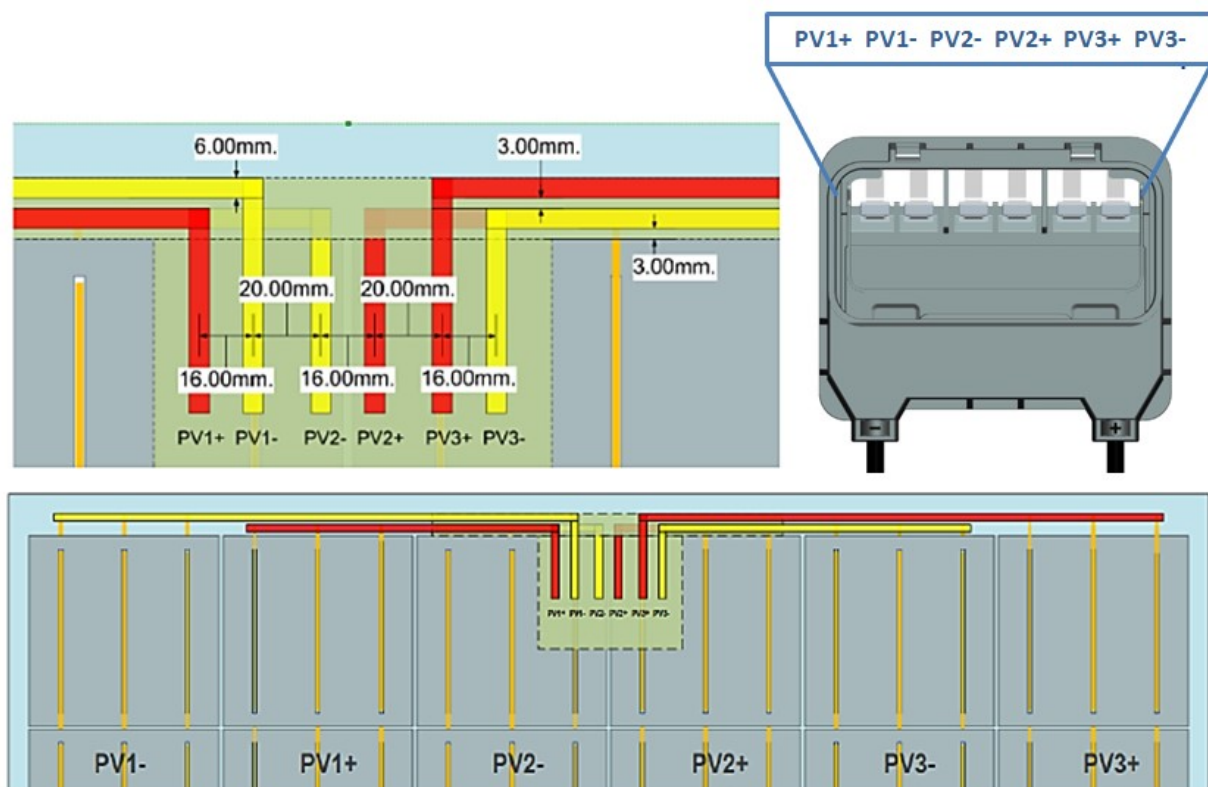


Figure 4

3.3.1 Soldering Type

Make sure the polarities of PV ribbons from solar module keep conformity with that of junction box, see Figure 1 and Figure 4.

- Type 1: Reference length of the PV ribbon is 9mm from the conductive contact as shown in Figure 5. Bend the PV ribbons and insert them through the correlated contact slots, see Figure 6.

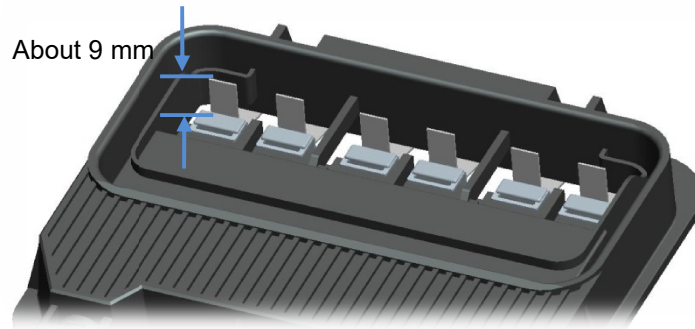


Figure 5

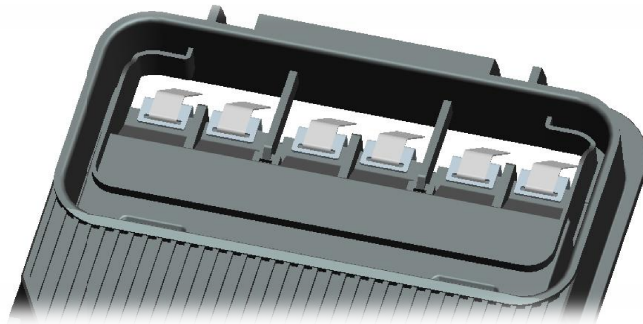


Figure 6

- Type 2: Insert the PV ribbons through correlated contact slots. Reference length of the PV ribbon is 6mm from the conductive contact as shown in Figure 7. Bend the PV ribbons, see Figure 8.

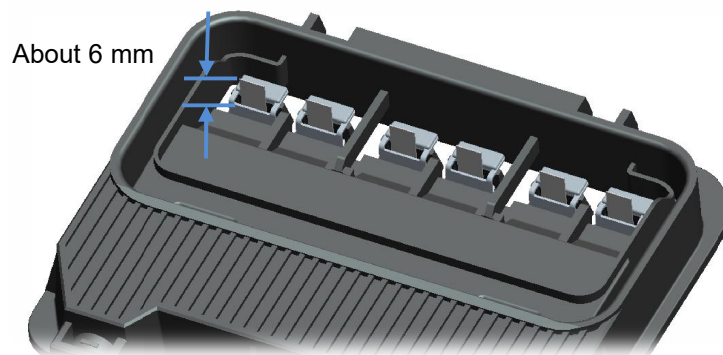


Figure 7

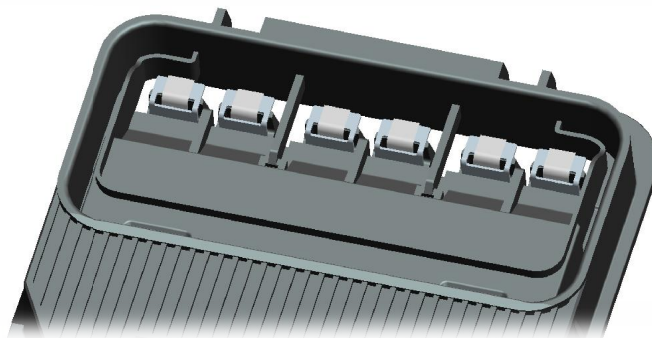


Figure 8

Set the soldering iron head temperature to 360-380 degrees, and the rear end diameter is about 5mm. Iron heating contact rails for about two seconds till the solder is totally melted, then take iron away. For quality control, this process shall only be operated by mechanical equipment. After that, immediately use tweezers or other tools to hold the PV ribbon for about two seconds.

Check and make sure every PV ribbon was fixed well with the contact rail.

Note: If PV ribbons are too high, press them down.



All the wiring steps shall be going with the operators wearing anti-static gloves.

Set the junction box horizontal, then pour the glue evenly and carefully into the junction box which has been attached with module and finished connected with PV ribbons. The potting glue's volume is about 20ml as shown in Figure 9.

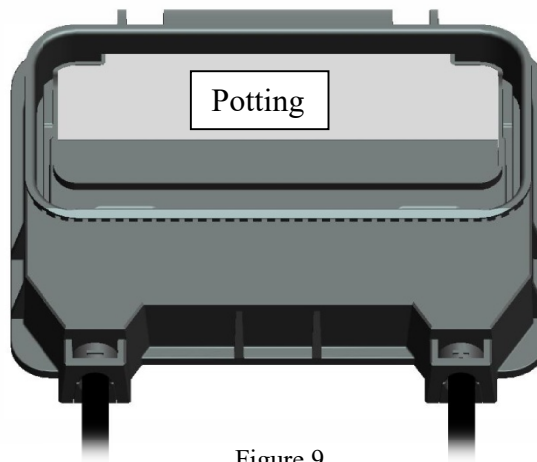


Figure 9

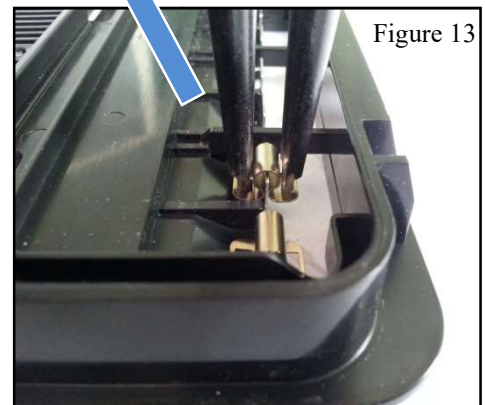
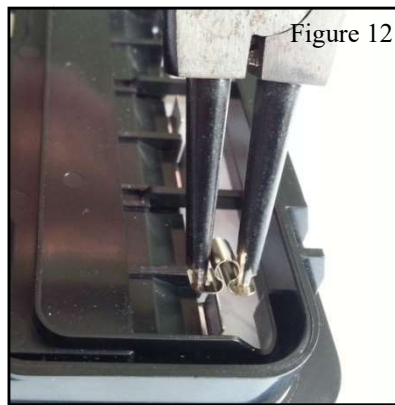
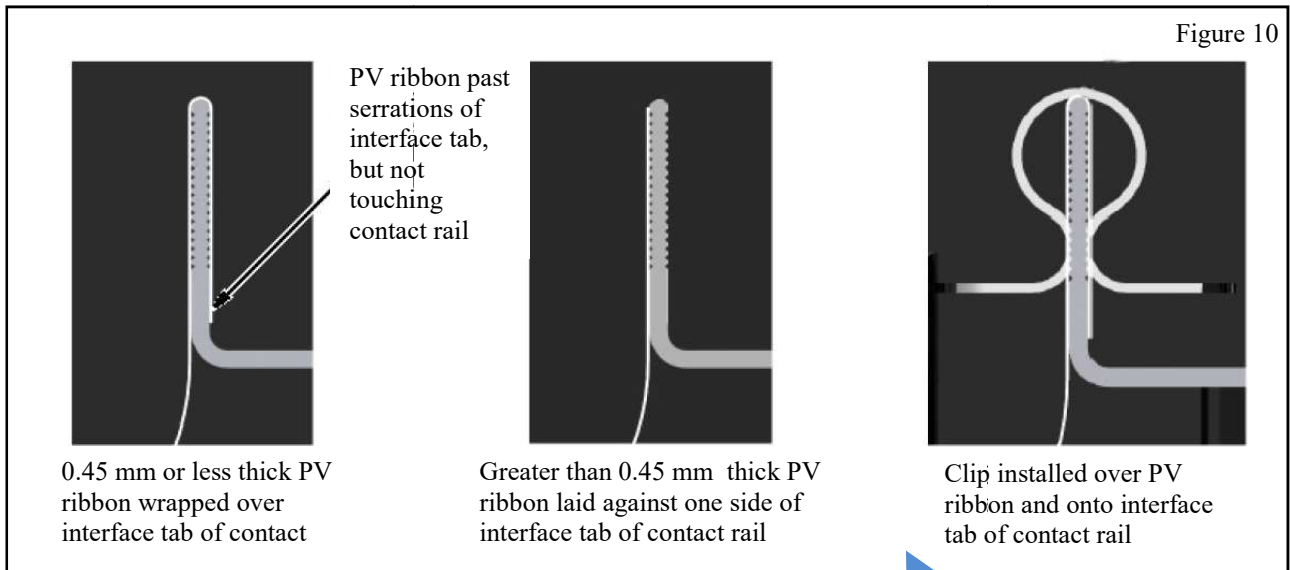
Note: The solder type junction box seal the PV ribbons by potting glue, while the clamp type seal by o-ring and membrane without potting in the front part.

3.3.2 Clamping Type

Make sure the polarities of PV ribbons from solar module keep conformity with that of junction box, see Figure 1 and Figure 4.

Bend the PV ribbons and put them over the interface tabs, see Figure 10.

Then Use the tool supplied by Zerun to install clip. The open end of each clip must be spread apart to a maximum of 1.5mm to enable the clip to slide over the thickness of the PV ribbon of the solar panel and interface tab of its respective contact rail, and then released. One clip must be installed onto each interface tab. Refer to Figure 10, 11, 12, 13.



3.4 Junction Box Lid Assembly

Close the Box: Check the o-ring* on the lid whether there is rolling-over or falls off, Then close the connecting box by pressing the lid into the housing until snaps hold the lid firmly. During this procedure, it is necessary to pay attention that the lid is assembled well.

Attachment tabs of lid in slots of housing

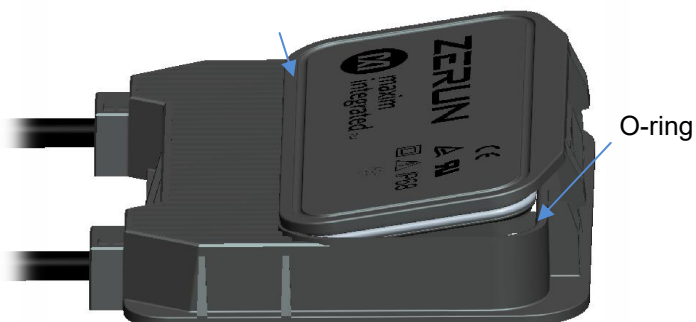


Figure 14

Close the Lid

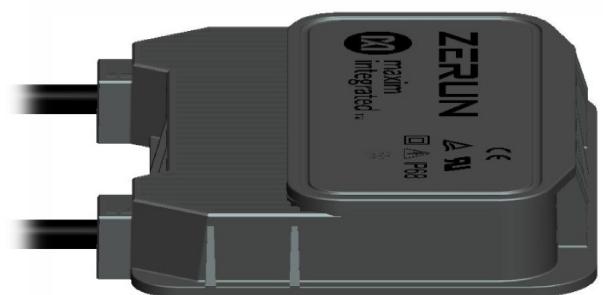


Figure 15

* Only the clamp type junction box has o-ring.



For the clamp type junction box, Must make sure the junction box lid assemble tight and the seal is correctly fitted.

Open the Box: To open the lid of the junction box, the tip of a screwdriver having a 3 to 5 mm flat blade must be inserted into the release pocket of the lid, and then the attachment tab be pried while simultaneously slightly lifting the front of lid, see Figure 17, 18.



Figure 17

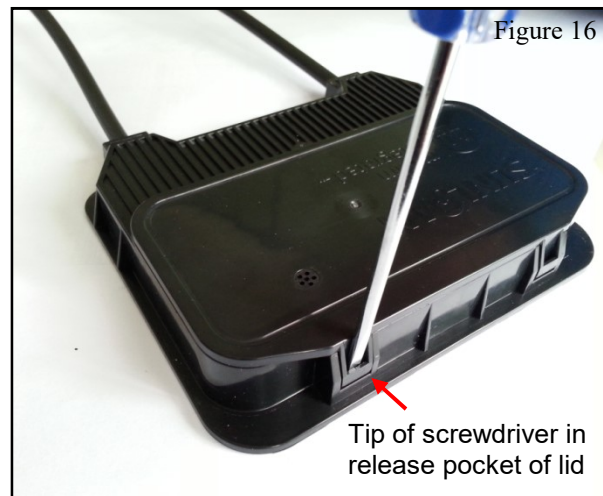


Figure 16

Tip of screwdriver in release pocket of lid



Figure 18



Do not open the junction box while it is under an electrical load. Components within the junction box may be electrically charged and capable of inflicting severe injury or death. Extreme caution should be applied when opening the junction box.

For protection against injury by electrical current, the box and the connector must always be completely separated from other sources of voltage during the prefabricating and cannot be connected or disconnected under voltage. All the openings in the casing must be entirely closed.

Attention: The junction box should only be opened by authorized and trained personnel.

3.5 Cable Routing

The cable must not be bent or crushed on the direct exiting. A minimum bending radius $R \geq 5 \times \text{cable diameter}$ must be maintained. The cable must be routed in a way that tensile stress on the conductor or connections is prevented.



Figure 19