

User Manual

S-BOX

In order to prevent improper operation before use, please carefully read this manual.

1. Introduction

In most photovoltaic systems, the DC isolator is integrated into the DC/AC power inverter. After switching off the DC isolator, the cables between the DC solar modules and DC/AC power inverter running through the building are still subject to up to 1000 Vdc. In the event of a fire, firefighters are exposed to a very serious source of potential danger. The S-BOX provides the solution to this problem. It directly disconnects the DC current in close proximity to the solar modules and creates a safer situation for firefighters.

Basic Features:

- AC power shut down=automatic DC power shut down
- Auto reset when AC power is back=DC power is back
- Easy to install

2. System Advantages

2.1 Easy installation

S-BOX can be installed without disassembling the shell.

2.2 Gain valuable time in case of a fire

S-BOX works according to standard international firefighter routines, resulting in valuable time lost in AC power is shut down, S-BOX will automatically switch off and isolate DC cables running between the PV modules and the inverter. Firefighters only have to follow their regular routine and do not have to waste valuable time eliminating the risk of DC power still present at these cables. In case the AC power is not shut down and the temperature reaches 70°C at the S-BOX unit it will automatically shut down the DC power as extra safety system.

2.3 Completely isolate PV modules

S-BOX is powered by a motorized X-type switch and can therefore be located directly at the PV modules. This minimizes the amount of cabling with dangerous high voltage and leads to a completely powerless situation in the house, maximizing safety when needed.

2.4 Auto reset

A power down situation can occur at any time and for many reasons. S-BOX has an auto reset function. S-BOX automatically switches off if the regular AC power is down for more than 6 sec and automatically switches on when the regular AC power is on again. No manual reset is necessary every time the power has been down! After check of the safety situation and when the AC main power is reconnected automatically the S-BOX will switch on the DC power.

2.5 For use in industrial and residential photovoltaic installations

By using this standard concept unit for either 1 or 2 strings it is possible to combine unlimited number of units to fix every size of installation. As option it is possible to connect all units to the same AC source in order to create a separate DC on-off operation by switching this specific AC source on-off that will operate all units at the same time. Again, reset is done automatically AC on = DC on, AC off = DC off. These units can be easily retrofitted to existing or new installations.

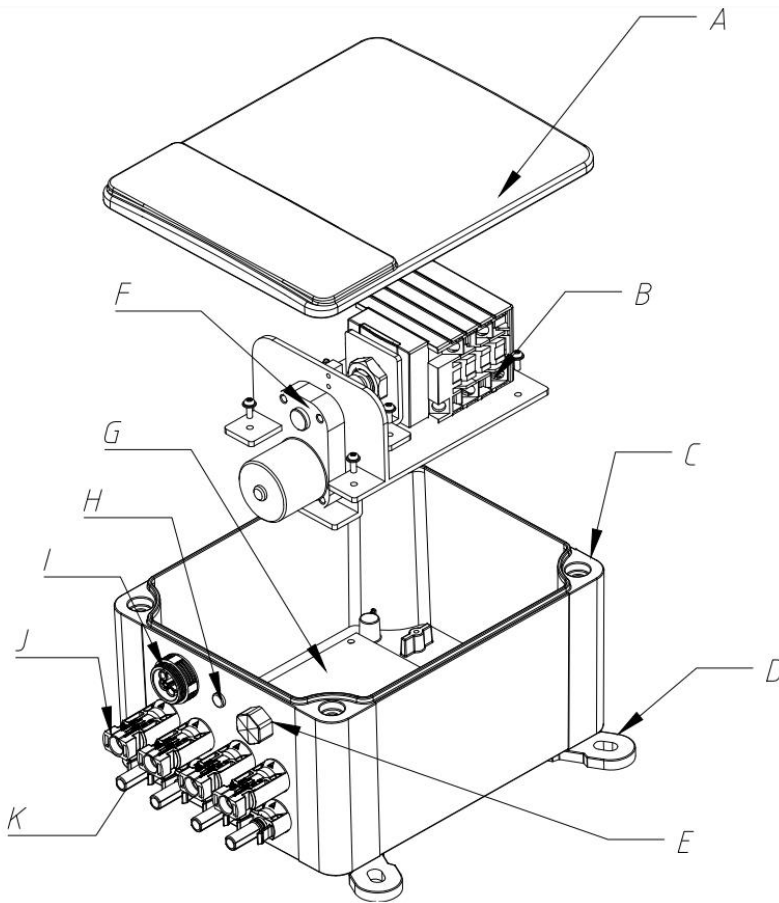
2.6 Indication of DC switch status

S-BOX provides remote and in-place instructions for customers to confirm the status of the switch. Users can determine whether the switch is closed by providing a light on the machine or by connecting the dry contact (FB1, FB2) to the remote indicator light.

Note: The dry contact (FB1, FB2) can be used a circuit 24Vdc - 300mA max.

3. About Product

3.1 Overview



| Item | Description | Item | Description |
|------|------------------------|------|-------------|
| A | Cover | G | PCB |
| B | Motor-driven switch | H | LED light |
| C | Enclosure | I | Terminal |
| D | Fixed block | J | PV+ |
| E | Water proof vent valve | K | PV- |
| F | Motor | | |

A. Cover

IP66 watertight & UV resistant are designed for optimal switch access and easy installation.

B. Motor-driven switch

A motorized X-type switch.

C. Enclosure

S-Box body.

D. Fixed block

Use the simplest way to fix the product.

E. Water proof vent valve

- Prevent condensation and fog, improve the service life.
- Heat dissipation and balance pressure difference, improve product integrity.
- Chemical resistance, high and low temperature resistance, aging resistance. These performances can improve the reliability of products in harsh environment.

F. Motor

Drive the switch rotation to open or close the motor automatically.

G. PCB

PCB includes the power supply unit, AC detection unit, temperature detection unit, motor control unit.

H. LED light

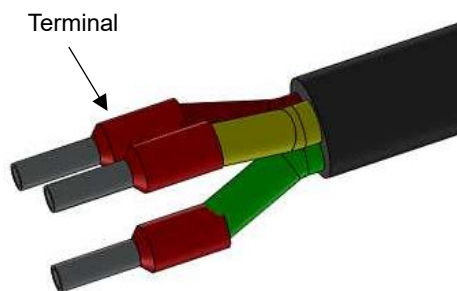
Visual feedback of the switch position: LED will go off when the DC switch goes off; LED will on when the DC switch is on.

I. Terminal

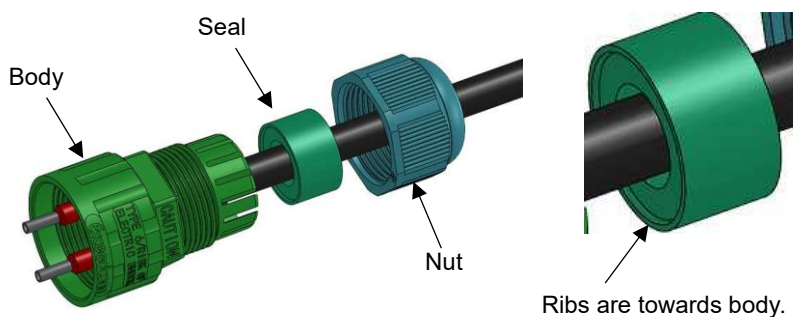
Contains AC input and dry contact (FB1, FB2):

- AC input: Signal input and power supply of the S-BOX.
- Dry contact (FB1, FB2): It can control the remote indicator light. When DC switch goes off, FB1 disconnects to FB2; when DC switch on, FB1 connects to FB2.

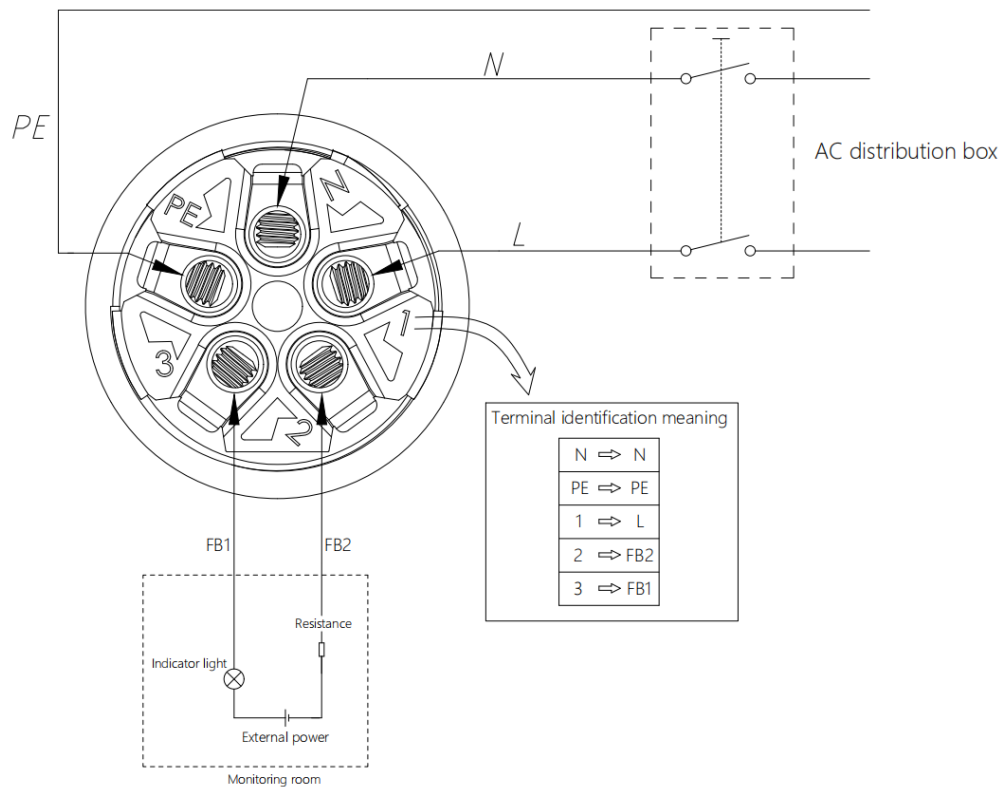
Step 1: Riveting terminal.



Step 2: Tread the parts on the cable.



Step 3: Tighten wires as shown in the figure below. Tightening torque $0.6 \pm 0.1 \text{ N}\cdot\text{m}$, then insert cable respectively to pin hole.



Note:

External power: +5~48V, >150mA

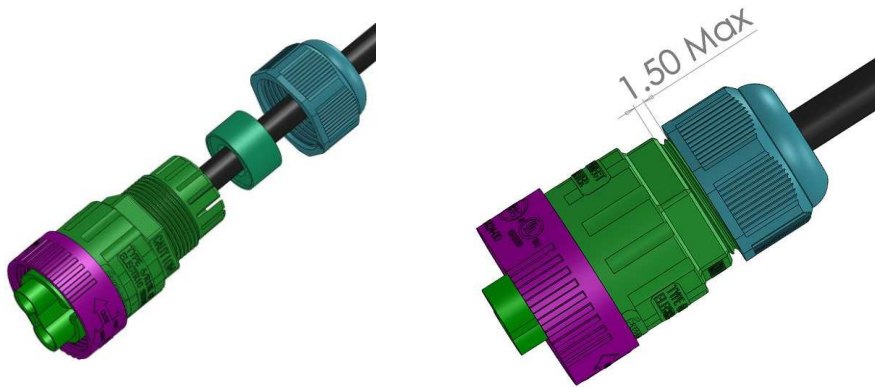
Resistance: metal shell, >10W



Step 4: Screw body to housing, tightening torque $1.2 \pm 0.2 \text{ N}\cdot\text{m}$.

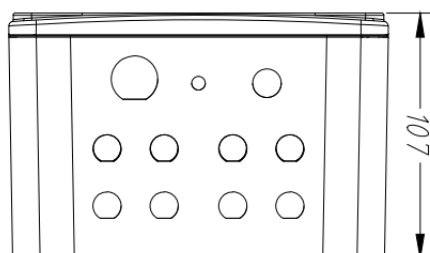
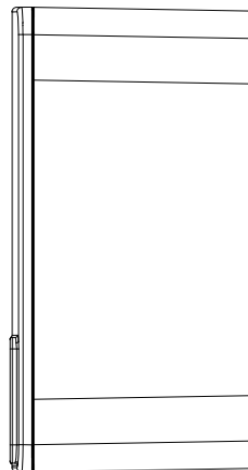
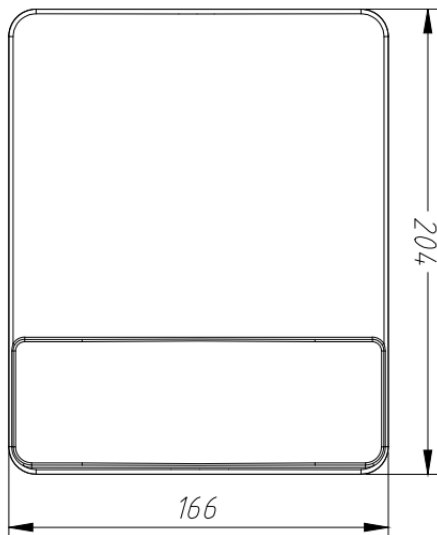


Step 5: Insert seal into body, then tighten the nut, torque $1.5 \pm 0.3 \text{ N}\cdot\text{m}$. The maximum spacing between the nut and the body after tightening is 1.5mm.



J&K PV+&PV-

3.2 Dimensions



4. Technical Parameters

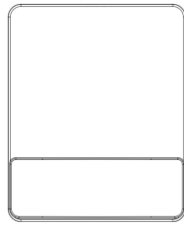
| Type S-BOX | Number of Strings | Number of Poles | Specs. |
|------------|-------------------|-----------------|--|
| S-BOX (G) | 2 | 4 | Unit with cable glands 8 * M12 and 1 * M23 quick connection for AC |
| S-BOX | 2 | 4 | Unit pre-wired with 8 * MC4 connectors and 1 * M23 quick connection for AC |

| Ratings according to IEC: EN 60947-3:2009/A1:2012/C1:2013/A2:2015 Cat PV-1 based on switching both the + and the - pole: | | | | | | |
|--|-----|-----|-----|------|------|------|
| VDC | 300 | 600 | 800 | 1000 | 1200 | 1500 |
| A | 25 | 25 | 25 | 25 | 25 | 16 |

| Technical Parameter | |
|--|-------------------|
| String voltages (Vdc) | 300~1500 |
| String current (A) | 25 |
| Number of strings | 2 |
| Switch wiring | 4 |
| Operating voltage | 100Vac~270Vac |
| Nominal voltage | 230Vac |
| Nominal current | 30mA |
| Start up (loading) current | average 100mA |
| Switch on action current | max 300mA |
| Feedback contact | 24Vdc - 300mA max |
| Operating temperature range | -20°C - +50°C |
| Max. operating temperature before automatic switch off | +70°C |
| Storage temperature range | -40°C - +85°C |
| Protection degree | IP66 |
| Protection level | Class II |
| DC switch disconnect according to | CE |
| Certification | EN 60947-1&3 |
| Number of operations | 10000 |
| Number of operations under load (PV1) | >1500 |

5. Mounting

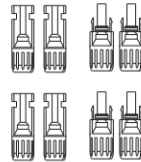
5.1 Packing List



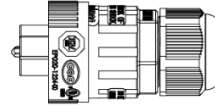
A



B



C



D



E



F

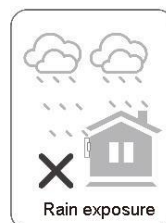
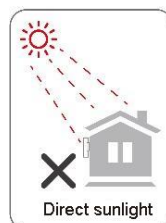


G

| Object | Quantity | Description | Object | Quantity | Description |
|--------|----------|---|--------|----------|------------------|
| A | 1 | S-BOX | E | 8 | Expansion screws |
| B | 4 | Fixed blocks | F | 4 | Expansion tubes |
| C | 8 | PV connectors (4*positive, 4*negative) | G | 1 | User manual |
| D | 1 | Waterproof terminal block | | | |

5.2 Preparation

- Please refer to the Technical Data to make sure the environmental conditions fit the requirements (degree of protection, temperature, etc.).
- Please avoid direct sunlight, rain exposure and snow build-up during installation and operation.
- To avoid overheating, always make sure the air flow around the box is not blocked.
- Do not install in places where gas or flammable substances may be present.
- Avoid electromagnetic interference that can compromise the correct operation of electronic equipment.
- The slope of the wall should be within $\pm 5^\circ$.
- The S-BOX needs to be placed as close to the solar panels as possible.

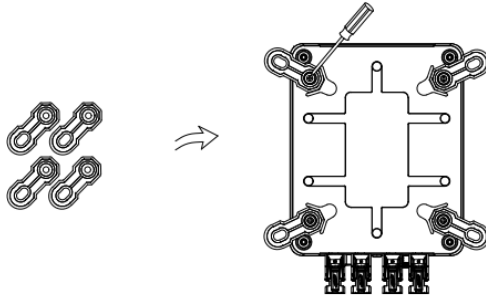


5.3 Tools Required

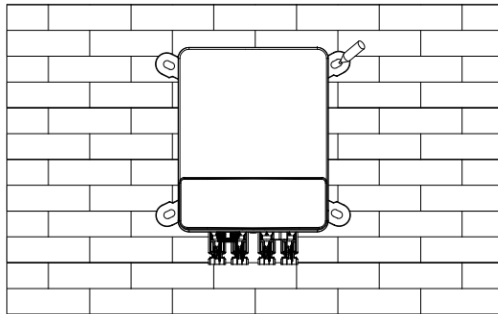
- Manual wrench;
- Electric drill (drill bit set 8mm);
- Crimping pliers;
- Stripping pliers;
- Screwdriver.

5.4 Installation Steps

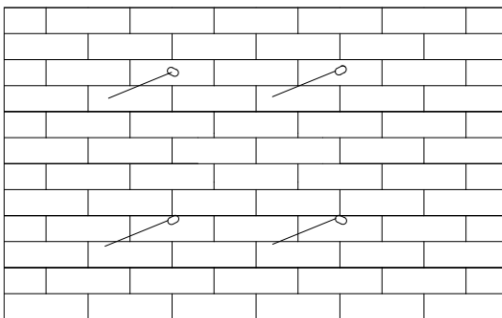
- Prepare 4 fixed blocks. The four fixing blocks are locked on the box body with M5 self-tapping screw.



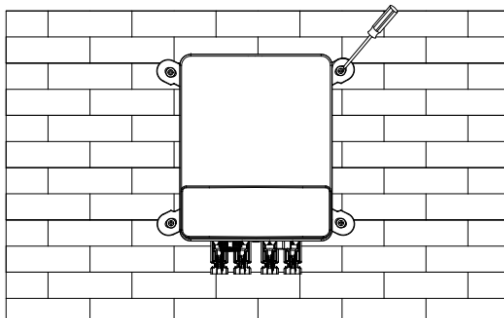
- Choose the place you want to install the S-BOX. Place the S-BOX on the wall and mark the position of the 4 holes from fixing blocks.



- Drill holes with electric drill, make sure the holes are at least 50mm deep, and then tighten the expansion tubes.



- Insert expansion tubes into the holes and tighten them. Install the fixing blocks with expansion screws.



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