



# **Rapid Shutdown**

XRSD-1C/XRSD-2C XRSD-Core Kit

# **User Manual**

Version 0.0



www.solaxpower.com

# STATEMENT

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#### Scope of Validity

This manual is an integral part of the SolaX XRSD-1C/2C and XRSD-Core Kit. It describes the detailed information, installation, and usage of the product. Please read it carefully before operating.

XRSD	XRSD-1C <sup>*1</sup>
(SolaX Rapid Shutdown Device)	XRSD-2C <sup>*1</sup>
Transmitter Kit	XRSD-Core Kit <sup>*2</sup>

#### Note:

\*1 "1C" means one input. "2C" means two inputs.

\*2 XRSD-Core Kit includes an outdoor enclosure, an 85~264V power supply, a transmitter, and one core (two cores are optional).

#### **Target Group**

The installation, maintenance and grid-related setting can only be performed by qualified personnel who

- Are licensed and/or satisfy state and local jurisdiction regulations.
- Have good knowledge of this manual and other related documents.

#### Conventions

The symbols that may be found in this manual are defined as follows.

Symbol	Description	
ANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.	
	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.	
	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.	
NOTICE!	Provides tips for the optimal operation of the product.	

### **Change History**

Version 0.0 (2024/11/20)

Initial release

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### 1.1 General Safety

Safety precautions must be strictly observed and followed to reduce the risk of personal injury and ensure a safe installation.

Before installing the device, carefully read, fully understand, and strictly follow the detailed instructions of the user manual, related sections of your inverter manual, and other regulations. And the safety instructions in this document are only supplements to local laws and regulations.

SolaX shall not be liable for any consequences caused by the violation of the storage, transportation, installation, and operation regulations specified in this document, including, but not limited to:

- Product damage due to force majeure, such as an earthquake, flooding, thunderstorm, lighting, fire hazard, volcanic eruption, etc.
- Product damage due to man-made causes
- Product used or operated against any items in local policy
- Failure to follow the operation instructions and safety precautions on the product and in this document
- Not install and operate within the <u>5 Technical Data (P33)</u> listed in their datasheets.
- Unauthorized modifications to the product or software
- Product damage caused during transportation by the customer
- Installation and commissioning are operated by unauthorized personnel who are not licensed and/or satisfy state and local jurisdiction regulations.

#### 1.2 Safety Instructions

Please read these instructions carefully, and use this product correctly and safely. After reading, please keep these instructions in a safe place

# Anger!

- When exposed to sunlight, high DC voltage will be generated by PV modules. Death or lethal injuries will occur due to electric shock.
- Do not attempt to install in inclement weather.
- The installation, wiring, or maintenance of the XRSD and XRSD-Core Kit can only be performed by qualified and experienced electricians.
- In order to avoid electric shock, do not open the enclosure of the XRSD. And the disassembly or maintenance of this product must be operated by a qualified person.
- Please perform all electrical installations in accordance with local codes.
- Use insulated tools when installing the device. Individual protective tools must be worn during installation, electrical connection, and maintenance.
- Do not touch non-insulated parts or cables.
- Do not install the XRSD in the situation of having been physically damaged or meeting the wiring standards any more.
- Do not use connectors from different manufacturers for risks of burns can be produced due to incompatible connectors.

# DANGER!

- Do not connect or disconnect the XRSD while the inverter is running. And turning off the inverter and/or the XRSD products may not reduce this risk. After disconnecting all power sources, internal capacitors within the inverter can remain charged for several minutes.
- If service is required, verify capacitors have discharged by measuring a voltage across inverter terminals before disconnecting wiring.
- After rapid shutdown activation, wait 30 seconds before disconnecting DC cables or turning off DC disconnect switch.
- Do not disconnect the PV module from the XRSD without first disconnecting the AC power of the XRSD-Core Kit.
- Make sure that the emergency stop button is pressed to cut off the AC power during installation.
- The power supply of the XRSD-Core Kit MUST be on the same AC branch circuit as the inverter in order to meet the rapid shutdown requirement.

### WARNING!

- Do not touch the XRSD when it is running. Surface high temperature may cause burns or personal injury.
- Do not attempt to repair the device if it is not working properly, please contact the SolaX Customer Support team. Any attempt to repair the XRSD will automatically void the warranty.

Keep the products away from children.

#### NOTICE!

All the labels and nameplate on the product shall be maintained clearly visible.

# 2 Product Overview

#### 2.1 System Description









The XRSD is part of the rapid shutdown solution when paired with the XRSD-Core Kit.

The XRSD-Core Kit is installed in line with a solar PV inverter. It continuously sends a 'keep-alive' signal to the XRSD, ensuring a stable connection between the PV modules and the inverters. When XRSD receive an uninterrupted 'keep-alive' signal from the XRSD-Core Kit, they will operate the PV system as expected.

However, when power to the XRSD-Core Kit having been cut, this signal will cease and send every XRSD into shutdown mode to ensure system safety.

In this way, once the AC power supply of the XRSD-Core Kit is lost, the PV array enters rapid shutdown.



As part of the SolaX rapid shutdown solution for PV system, XRSD-1C can be connected to one PV module while XRSD-2C can be connected to two.

Highlights

- Meets NEC2017&NEC2020 690.12 requirements
- One or two inputs, Max. PV input current 20A
- PLC communication, rapid shutdown
- Clip installation design, simple and convenient

- Lower power consumption and wider operating voltage range
- IP68 protection, long life cycle
- High security: overvoltage protection, overcurrent protection, overtemperature protection

### 2.3 XRSD-Core Kit

The XRSD-Core Kit, in tandem with XRSD, forms a crucial segment of the SOLAX rapid shutdown system. It includes an outdoor enclosure, an 85~264V power supply, a transmitter, and one core (two cores are optional).

Highlights



- Meets NEC2017&NEC2020 (690.12)
- Realize rapid shutdown by simply powering off the XRSD-Core Kit or using external initiator on the enclosure
- Equipped with one or two cores (two cores are optional)
- IP65 protection

### 2.4 Symbols on the Device

The information on the device includes technical data and serial number of the device. Safety instructions on the label are listed and explained below :

Table 2-1 Description of symbols

Symbol	Description
4	Danger of high voltages. Danger to life due to high voltages in the inverter!
	Danger. Risk of electric shock!
	Observe enclosed documentation.
	Double insulation symbol The device does not require a safety connection to electrical earth (ground).
CE	CE mark. The device complies with the requirementsof the applicable CE guidelines.
X	The device can not be disposed together with the household waste. Disposal information can be found in the enclosed documentation.

#### 3.1 Safety Precautions

- Do not attempt to install in inclement weather.
- Only qualified personnel can perform the mechanical installation.
- Perform all electrical installations in accordance with local codes.
- Be equipped with individual protective tools and insulated tools when installing the XRSD and XRSD-Core Kit.
- Before installing or using XRSD, please read all instructions and warnings in the user manual, on the inverter system, and on the PV array.
- Follow the installation steps sequence to install. Damage caused by improper installation will not covered by warranty.
- Make sure the voltage, current and power specification of PV modules match the XRSD specifications.
- The maximum open circuit voltage of the PV module must not exceed the specified maximum input voltage of the XRSD.
- Never apply an external voltage source to a module or string that is equipped with XRSD.
- Connect XRSD to its respective modules before connecting its outputs in series.
- Install XRSD before powering on the XRSD-Core Kit.
- If parallel string connections are needed, first connect the XRSD to the PV modules, then connect all outputs of XRSD in series, and finally pass one side (+ or -) of the string through the transmitter to turn the system ON.
- Do not touch any live parts in the system, including the PV array, when the system has been connected to the electrical grid.

• After installing XRSD and XRSD-Core Kit, place the rapid shutdown system label within 1m of the emergency stop button or AC disconnect.



Figure 3-1 Rapid shutdown system label

### 3.2 Scope of Delivery

#### **XRSD**



\* Refer to the actual purchase quantity.

# **XRSD-Core Kit**



Item	Description	Quantity	Remark
А	Outdoor enclosure	1 pcs	
В	Mounting lugs	4 pcs	_
С	Round head screws	4 pcs	For wall-mounting instalation
D	Plastic wall anchor & Self-Tapping screw	4 pairs	_
E	DIN35 rail	1 pcs	
F	M4.8*L10 screw	2 pcs	For securing DIN35 rail
G	Clamps	2 pcs	
Н	AC power Supply	1 pcs	
I	Transmitter	1 pcs	
J	Core	1/2 pcs(optional)	
К	Zip ties	4 pcs	
L	Documents	/	

#### Table 3-1 XRSD-Core Kit Packing list

\* Refer to the actual delivery for the optional accessories.

### 3.3 Tools Requirement

Installation tools include but are not limited to the following recommended ones. If necessary, use other auxiliary tools on site.



# Additionally Required Materials

Table 3-2 Additionally required wires

Required Material		Туре	Quantity
PV cable	Q	According to the inverter type	/
MC4 PV Connector		match with PV cable of inverter	/
3 Waterproof connectors with corrugated pipe	2.3	M12(for power cable port)	1 pcs
		M25/ M32 <sup>*</sup>	2 pcs (single core)
			4 pcs (dual core)
power cable of XRSD- Core Kit	N	2 Core, 0.5 A Conductor diameter:24 AWG Overall diameter:match with waterproof connectors	/
	PV cable MC4 PV Connector Waterproof connectors with corrugated pipe power cable of XRSD-	PV cable Image: Constraint of the second s	PV cable   Q   According to the inverter type     MC4 PV Connector   image: match with PV cable of inverter     Waterproof connectors with corrugated pipe   M12(for power cable port)     M25/ M32*     power cable of XRSD- Core Kit   2 Core, 0.5 A Conductor diameter:24 AWG Overall diameter:match with

\* M25: Max. Number of Strings- 2.5 M32: Max. Number of Strings- 5

#### 3.4 XRSD Installation

#### \Lambda warning!

- Make sure that the PV system is powered off.
- When installing XRSD, connect the input cables to the PV module before connecting the XRSD output cables in series.
- When disconnect XRSD, disconnect XRSD outpout cables from a string before disconnecting the XRSD input cables from the module junction box.
- Connectors from different manufacturers cannot be mated with each other.

#### NOTICE!

- Do not place the XRSD (including DC connectors) where exposed to the sun, rain or snow, even gap between modules.
- Allow a minimum of 1.5 cm of space between the roof and the XRSD enclosure in order to ensure ventilation and heat dissipation.
- Recommended model for PV module connectors: Dian Wei Electronic Technology (Vaconn Interconnection Solution) VP-D4B-CTSF4 VP-D4B-CTSM4 We are not responsible for any problems caused by using other models.

### XRSD-1C



Figure 3-2 XRSD-1C terminal

**Step 1:** Remove the serial number label on the machine package and attach it on the corresponding position on the <u>installation map</u>, which is used to model the physical layout of the roof module.



Figure 3-3 Stick the serial number label on the installation map



**Step 2:** Install XRSD on the frame of the PV module with mounting brackets.

Figure 3-4 Buckle XRSD on the PV module frame

**Step 3:** Connect PV modules to XRSD inputs. Each XRSD must have a PV module connected to its inputs. You can use the DC extension cabel if necessary.



Figure 3-5 Connect PV modules to XRSD inputs

**Step 4:** Use a multimeter to measure the XRSD-1C output voltage. The output voltage should be 0.2~1.5V.



Figure 3-6 Measure the XRSD-1C output positive/negative voltage

Step 5: Connect the output of two adjacent XRSDs together.



Figure 3-7 Connect XRSD outputs in series

# XRSD-2C



Figure 3-8 XRSD-2C terminal

**Step 1:** Remove the serial number label on the machine package and attach it on the corresponding position on the <u>installation map</u>, which is used to model the physical layout of the roof module.



Figure 3-9 Stick the serial number label on the installation map





Figure 3-10 Buckle XRSD on the PV module frame

**Step 3:** Connect modules to XRSD inputs. Each XRSD must have a PV module connected to its inputs.

You can use the DC extension cabel if necessary.



Figure 3-11 Connect PV modules to XRSD inputs

**Step 4:** Use a multimeter to measure the XRSD-2C output voltage. The output voltage should be 0.2~1.5V.



Figure 3-12 Measure the XRSD-2C output positive/negative voltage

#### **Step 5:** Connect the output of two adjacent XRSDs together.



Figure 3-13 Connect XRSD outputs in series

#### 3.5 XRSD-Core Kit Installation

### XRSD-Core Kit box drilling

- **Step 1:** Drill holes on the sides of the enclosure by using the drilling template. For detailed size please refer to <u>3.6 Conduit Drilling Guide (P31)</u> Remove burrs after drilling holes.
- Step 2: Install the waterproof connectors to ensure the safety of the box.



Figure 3-14 Install waterproof connectors

**Step 3:** Fix the mounting lugs with round head screws at the four corners of the box.



Figure 3-15 Fix mounting lugs with round head screws

# Box inside installation



Connection diagram



Step 4: Fix the DIN rail onto the second row from the top.

Figure 3-16 Fix DIN rail

- **Step 5:** Mount AC power supply, transmitter, SolaX Pocket WiFi+LAN, and cores on DIN rail in the following order.
  - 1) Fix a clamp at the left ends of the rail, then use a one-screwdriver to cock the edge of the clamp and snap it into the rail slot.



Figure 3-17 Fix clamp

 Pull down the bottom latch of the power supply. Attach the power supply to the rail and push the latch back.



Figure 3-18 Fix power supply

 Pull down the latch of transmitter. After fixing the transmitter to the rail, push the latch back. Install anothor clamp next to the transmitter.



Figure 3-19 Fix transmitter and clamp

4) Insert the cores into the bottom of the transmitter until you hear a "click". If there is only single core , connect Core 1 to PLC1 first.



Figure 3-20 Insert the cores

Step 5: Connect the emergency stop switch wire to the power supply and fix it to the rail. Then secure the wires with a flat-head screwdriver. red/black wire — Power supply "+"/"-" port plastic terminal — Transmitter "+12V-GND" port (Align the red wire with the "+12V" port and the black wire with the "GND" port.)



Figure 3-21 Connect emergency stop switch wire

### Wall mounting



Figure 3-22 Recommended installation distance

**Step 6:** Lock the XRSD-Core Kit box.

Align the enclosure horizontally on the wall with spirit level: adjust the enclosure until the bubble stays in the middle. Mark the position of the drill holes.





Figure 3-23 Mark the holes of XRSD-Core Kit box

**Step 7:** Set the enclosure aside and drill holes.(Drill bit:Ø10; Depth:60-80mm) Insert the expansion bolt into holes by using a rubber mallet.



Figure 3-24 Drill the holes

**Step 8:** Use a torque wrench to secure the enclosure to the wall with expansion bolts.



Figure 3-25 Secure the expansion bolts

#### Wire connection



#### DANGER!

Press the emergency stop button to cut off the AC power before wire connection.





Figure 3-26 Pull the PV cable through corrugated pipe

Step 10:Connect wires to N,L port of power supply from grid or inverter. Pass the same positive PV cable(+) or the same negative PV cable(-) through cores. Then run the PV cables through the box to the inverter.

#### NOTICE!

For SolaX Energy storage inverter, connect AC wires from **EPS terminal**.



Figure 3-27 ingle Core-cable connect



Figure 3-28 Dual cores-cable connect

#### NOTICE!

If the number of PV strings exceeds 10, do not pass PV cable (-) through the box, connect it to the inverter from outside the box.





Figure 3-29 Stripping the PV cable and insert to PV pin contact

Step 12: Make the MC4 connector for PV cables.



Figure 3-30 Making MC4 connectors

Make sure the the PV cable and PV pin contact are of the same polarity.

**Step 13:**Connect the serially connected outputs of XRSD to the inverter with the assembled connectors until there is an audible "Click".



Figure 3-31 Connect outputs of XRSD to the inverter

#### NOTICE!

- Max cable length from inverter(+) to inverter(-) : 10m~200m
- When multiple inverters are connected to the grid, each inverter needs to be grounded separately.

### Commissioning

**Step 1:** Release the emergency stop button to turn on the AC power.



Figure 3-32 Twist emergency stop button

**Step 2:** Turn the DC switch of the inverter to ON positon.



Figure 3-33 Turning on the DC switch

**Step 3:** After waiting for about 1 minute, please check the voltage of the series circuit displayed on the inverter. The voltage should be module open circuit voltage\* the number of modules.

#### NOTICE!

After installing XRSD and XRSD-Core Kit, fill gaps around pipes both outside and inside with seal putty.



#### 3.6 Conduit Drilling Guide



Single Core



# 4 Rapid Shutdown methods

XRSD can be shutdown automatically or manually.

#### 4.1 Automatic shutdown

Automatic shutdown will occur if any of the following conditions are met:

- Over temperature When the temperature sensor on the XRSD detects ambient temperature is over 85°C.
- Over voltage When a single PV module voltage exceeds **80V**.
- Over current When a single PV module current exceeds **20A**.

#### 4.2 Manual shutdown

# AC Supply Cut-Off

Shut down solar panel by disconnecting the external AC supply.

## Activate an external initiator

Activate an external initiator when there is an emergency, then the PV system will enter modulelevel rapid shutdown within the time specified by the safety regulations.

The Emergency Switch can be conveniently located at ground level for easy access, and multiple switches can be installed in different multi-level building zones.





# 5 Technical Data

#### XRSD

- ARSD		
Model	XRSD-1C	XRSD-2C
Electrical Data		
Input voltage range	8-80V	8-80V / 8-80V
Output voltage range	8-80V	16-160V
Max. PV input current	20A	20A
Max. short circuit current	26A	26A
Recommended fuse rating	30A	30A
Maximum system voltage	1500V	1500V
Mechanical		
Dimensions(W x D x H) (Without cables and connectors)	130 x 21 x 36mm	135 x 20 x 59mm
Weight(Including Cables)	400g	720g
Input cable length	0.2m	0.45m
Output cable length	1.2m	2.4m
Input / Output connectors	MC4 (st	tandard)
Communication type	PI	LC
Environment limit		
Altitude	0-30	000m
Pollution degree	:	3
Protection class	IP	68
Operating temperature range	-40°C t	o +85°C
Humidity	4% -	100%
Over voltage category		II
Compliance		

Safety

IEC/EN62109-1, EN IEC 61000-6-1/2/3/4

\* XRSD does not have an automatic shutdown function for arc detection. When the system is abnormal, the transmitter signal is cut off by powering off the XRSD-Core Kit or using external initiator on the enclosure, which triggers shutdown. While XRSD is designed to reduce the risk of fire suppression, it does not eliminate the risk of an arc fire.



#### • XRSD-Core Kit

Model	XRSD-Core Kit		
Electrical Data			
Power Supply Input Voltage	85-264Vac		
Transmitter Input Voltage	12Vdc (±2%)		
Transmitter Input Current	1A		
Core			
Max. Number of Configure Core	2		
Max. Current per Core	150A		
Max. String Voltage	1500Vdc		
Diameter	~31 (inner) /52mm (outer)		
Max. Number of Strings per Core*	11		
Mechanical			
Dimensions(W x D x H)	200 x 170 x 300mm		
Environment limit			
Altitude	0-3000m		
Pollution degree	3		
Protection class	IP65		
Operating temperature range	-40°C to +75°C		
Humidity	4 - 100%		
Over voltage category	III		
Compliance			

#### Safety

IEC/EN62109-1, EN IEC 61000-6-1/2/3/4

\* This data refers to a cable diameter of Ø6 mm.If cable diameter is more than Ø6 mm, Strings Per Core will be reduced. Extra precaution must be taken to avoid exceeding the permissible current limit.







Power Supply



	ties number:	16				
		15				
		14				
		13				
0	XRSD-Core Kit series number:	12				
Ma	×	11				
S		10				
tic	Customer information :	6				
allá		8				
sti		7				
<b>XRSD</b> Installation Map	J	9				
SSI		5				
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		3				
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		1				
	Make sure N for North	OW	۲	۵	υ	۵

# 6 Appendix

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