



SMART RAPID SHUTDOWN SYSTEM

Installation and Operation Guide

Revision 00

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Table of Contents

1	General Safety Information	2
1.1	Safety and Advisory Symbols	2
1.2	Safety Instructions	3
2	System Introduction	4
2.1	SMART RSS.....	4
2.2	Front view and dimensions.....	5
3	Installation and Removal Guide.....	5
3.1	Install the Smart RSS.....	6
3.2	Removal of the Smart RSS	8
3.3	Grounding	10
3.4	Marking.....	10
4	Operation of the SMART RSS	11
4.1	Activate Rapid Shutdown.....	11
4.2	Self-test Function.....	11
5	Technical Specifications.....	12





IMPORTANT SAFETY INSTRUCTIONS




SAVE THESE INSTRUCTIONS

1 General Safety Information

This manual contains important instructions for the Delta's Smart Rapid Shutdown System that should be followed during installation and maintenance. To prevent the risk of electrical shock, and to ensure long-term operation, read these instructions carefully and follow all safety precautions at all times.

1.1 Safety and Advisory Symbols

	<p>DANGER indicates a hazardous situation, which if not avoided, will result in death or serious injury.</p> <p>DANGER indique une situation dangereuse qui, si elle n'est pas évitée, est susceptible de provoquer un décès ou des blessures graves.</p>
	<p>WARNING indicates a hazardous situation, which if not avoided, could result in death or serious injury.</p> <p>AVERTISSEMENT indique une situation dangereuse qui, si elle n'est pas évitée, est susceptible de provoquer un décès ou des blessures graves.</p>
	<p>CAUTION indicates a hazardous situation, which if not avoided, could result in minor or moderate injury.</p> <p>PRUDENCE indique une situation dangereuse qui, si elle n'est pas évitée, est susceptible de provoquer des blessures légères ou de degré moyen.</p>
	<p>HIGH VOLTAGE WARNING! Indicates hazardous high voltages are present, which, if not avoided, will result in death or serious injury. Thus, only authorized and trained personnel should install and/or maintain this product.</p> <p>AVERTISSEMENT HAUTE TENSION! indique la présence de hautes tensions présentant un danger susceptibles de provoquer un décès ou des blessures graves si elles ne sont pas évitées. Par conséquent, l'installation et/ou l'entretien de ce produit doivent être entreprises uniquement par un personnel autorisé et formé.</p>

	<p>Hot surface Surface chaude</p>		<p>Wait for a prescribed amount of time before engaging in the indicated action. Patientez le délai requis avant d'entreprendre l'action indiquée.</p>
	<p>Equipment grounding conductor (PE) équipement conducteur de terre</p>		

1.2 Safety Instructions

- **CAUTION** - Risk of Electric Shock. When the PV array is exposed to light, it supplies a DC voltage to this equipment.
- **CAUTION** - Risk of Electric Shock. Do not remove cover. No user serviceable parts inside. Refer servicing to qualified service personnel.
- **CAUTION** - Risk of Electric Shock from energy stored in capacitor. Do not remove cover until 1 minutes after disconnecting all sources of supply.
- **WARNING** - For continuous protection against risk of fire, replace only with same type and ratings of fuse.
- **WARNING** - The device surfaces may become hot. To reduce the risk of burns, do not touch them.

- **PRUDENCE** - Quand les panneaux photovoltaïque sont exposés à la lumière, ils fournissent une tension en courant continu à l'équipement.
- **PRUDENCE** - Le boîtier ne doit en aucun cas être ouvert. Aucun composant interne n'est à entretenir. Reportez-vous à un technicien qualifié pour tout entretien.
- **PRUDENCE** - Risque de choc électrique à partir d'énergie stockée dans les condensateurs. Retirer le couvercle
- **AVERTISSEMENT** - Du boîtier au moins 5 minutes après avoir débranché toutes les sources d'alimentation.
- **AVERTISSEMENT** - Le châssis de l'onduleur et les surfaces des dissipateurs de chaleur peuvent devenir chauds.

2 System Introduction

2.1 SMART RSS

The SMART RSS provides an automatic disconnect of residential or small commercial PV systems of 600VDC or less, fully compliant with the Rapid Shutdown requirements of NEC 2014 Article 690.12 when installed per instructions provided in this manual. It is compatible with DELTA SOLIVIA single-phase residential inverters: SOLIVIA 3.0 TL, SOLIVIA 3.8 TL, SOLIVIA 5.2 TL, SOLIVIA 6.6 TL, and SOLIVIA 7.6 TL.

The SMART RSS must be installed within 10 feet of the PV array when mounted outside or within 5 feet after entering a building in order to comply with NEC 690.12. The SMART RSS is capable of being mounted to the top of a standard mounting rail beneath a PV module or indoors. Please refer to Section 3 for details.

The SMART RSS only has one directional un-fused PV string input. It is acceptable to connect 2 strings of PV modules into SMART RSS but a certified combiner box or appropriate UL/CSA listed 2-in-1 T-branch connector, or equivalent is needed. The SMART RSS also has a single output with PV connectors. DC output conductors are routed to the input terminal of inverters. Figure below shows example of 3 strings connected to a SOLIVIA 7.6 TL using both MPPT zones: 1 string on one side and 2 strings on the other

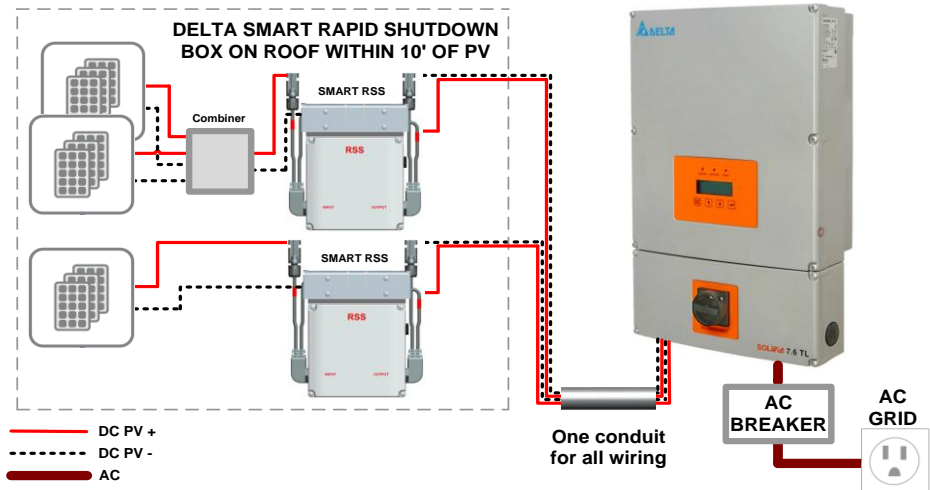


Figure 1: Connection Diagram of SMART RSS

2.2 Front view and dimensions

The front view and dimensions of the Smart RSS as shown below. It consists of input cables, output cables, box and bracket. The polarity of the input and output are also shown in the figure.

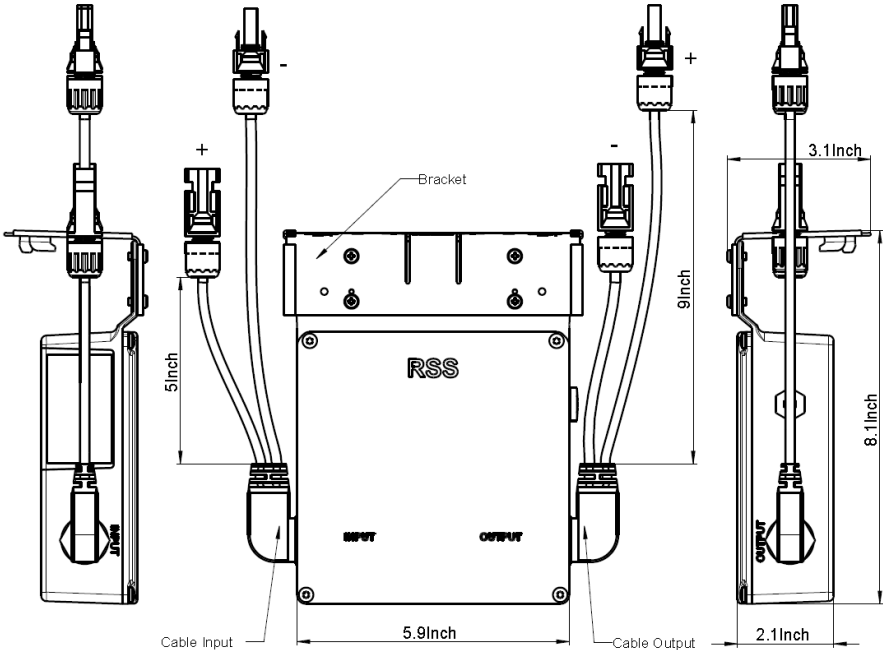


Figure 2: Front View and Dimensions of SMART RSS

3 Installation and Removal Guide

- **WARNING** - Installation and commissioning must be performed by a qualified personnel in accordance with local, state, and National Electrical Code ANSI/NFPA 70 requirements. In Canada, the installation and wiring methods used must comply with the Canadian Electric Code.

- **DANGER** - To ensure maximum protection against hazardous voltages while assembling PV installations, both the positive and the negative leads must be strictly isolated electrically from ground as well as each other.
- **WARNING** - Electric Shock Hazard. The DC conductors of this photovoltaic system are ungrounded and may be energized.
- **WARNING** - Always de-energize the AC branch circuit before servicing. Never disconnect the DC connectors under load.
- **WARNING** - Disconnect DC switch after shut off AC utility power to initiate rapid shutdown.

- **AVERTISSEMENT** - L'installation et la mise en service doivent être effectuées par un électricien autorisé conformément aux exigences locales et nationales ainsi qu'au National Electrical Code ANSI/NFPA 70. Au Canada, les méthodes d'installation et de câblage utilisées doivent être conformes au Canadian Electric Code.
- **DANGER** - Pour assurer le maximum de protection contre des tensions dangereuses tandis que l'assemblage des installations photovoltaïques, les aspects positifs et négatifs conduit doit être strictement isolée électriquement du terrain, ainsi que les autres.
- **AVERTISSEMENT** - Risque de choc électrique.les conducteurs c.c. de ce système photovoltaïque sont sans fondement et peut être sous tension.
- **AVERTISSEMENT** - Toujours de dynamiser l'ac direction circuit avant l'entretien. Jamais couper le dc connecteurs sous charge.
- **AVERTISSEMENT** - Déconnecter dc passer après coupe ac utilité pouvoir de coupure rapide.

3.1 Install the Smart RSS

The Bracket mounts to the SMART RSS and provides both a UL listed bonding path to ground and a mechanical connection to the Zep Compatible PV panel frame.

To install the Smart RSS, first press bracket into the Zep Groove until bracket is flush with module frame. Then press on ground tab to lock into the Groove. Make sure tab is flush with the front face of the bracket. Tap with tool if extra force is needed.

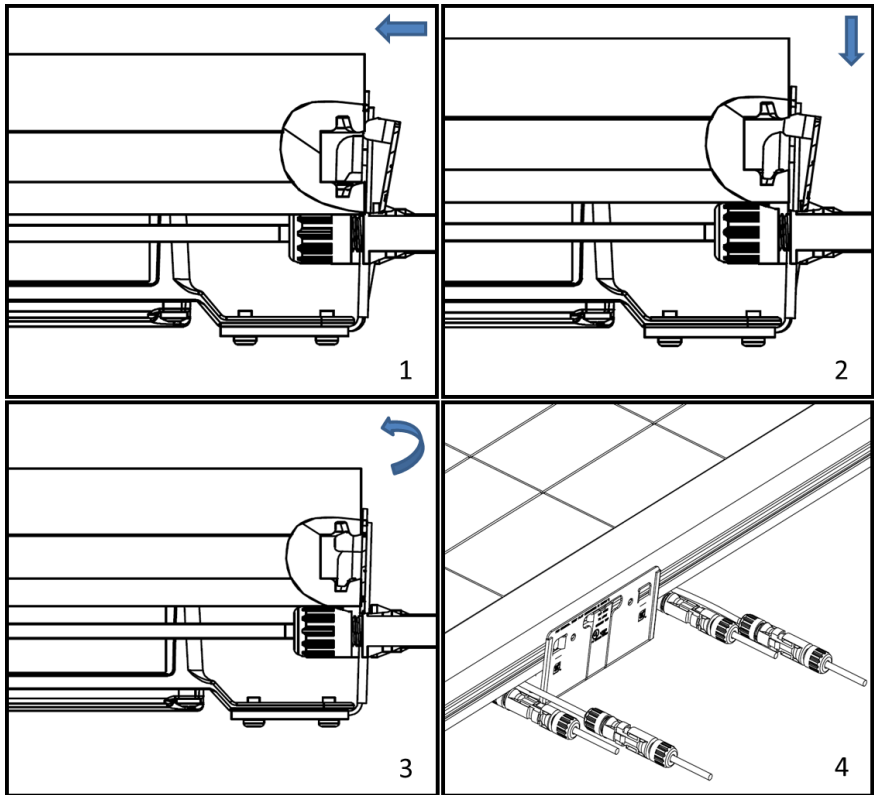


Figure 3: Installation of Bracket and RSS to Panel

Input and Output Connections

Directly connect the PV strings to the input of SMART RSS and route the DC output conductors to the DC input terminals in the inverter.

- **CAUTION** - Risk of damage. Make sure that the polarity and voltage level are correct when making the connections. Connecting it incorrectly will cause damage to the device.
- **CAUTION** - Field wiring conductors shall have an ampacity based on Table 310.16 of NEC 2014. Calculate circuit sizing and current according to NEC 2014 Article 690.8. Cables with minimal 10AWG and maximum length 100ft need to be granted.

Clearance instructions

If the SMART RSS is installed under the module or on racking, there must be more than 2.6 inch (65 mm) from the back of the module laminate to the roof's surface.

As shown in Figure 4. The minimum allowed clearance is 0.6 inch (15 mm) from PV panel to SMART RSS, and 0.6 inch (15 mm) from SMART RSS to roof.

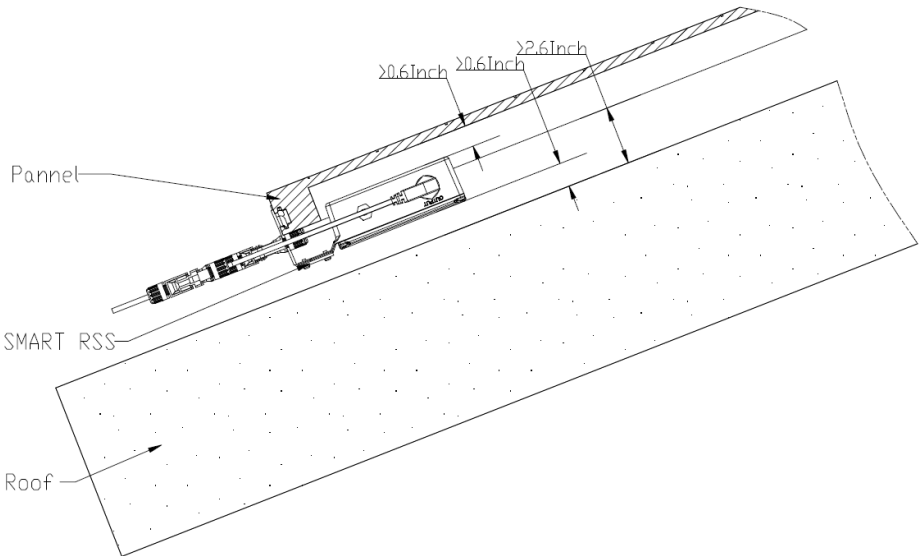


Figure 4: SMART RSS Clearances

3.2 Removal of the Smart RSS

To remove the Smart RSS, first use a screwdriver to unlock the tooth of the bracket. Then lift the RSS and pull it out.

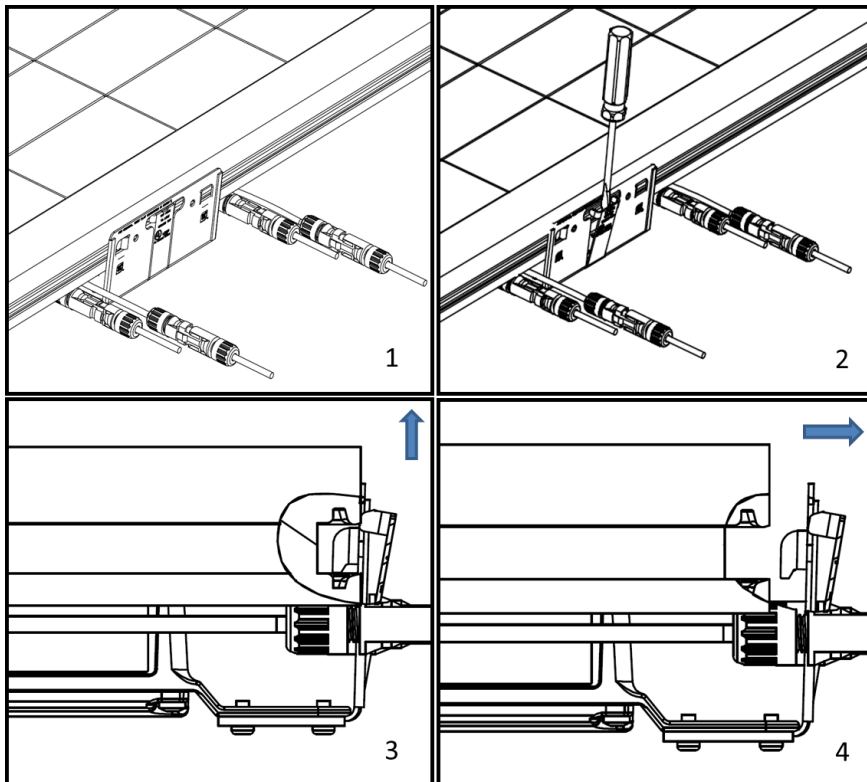


Figure 5: Removal Diagram

- CAUTION** - Failure to follow removal instructions may result in a bent bracket that cannot be reinstalled.

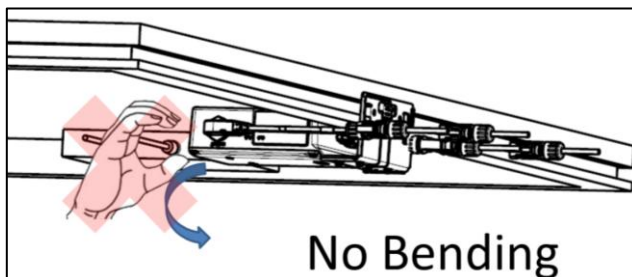


Figure 6: No bending

3.3 Equipment Grounding

Ground fault protection (GFP) is integrated into the Delta string inverter. No additional equipment grounding is needed if the bracket was locked securely on the PV rack.

A threaded hole on the bracket was also provided for equipment grounding if the bracket was not used. Make sure the cross-section of grounding conductor $\geq 3.3\text{mm}^2$ (12AWG) for copper conductor or $\geq 5.3\text{mm}^2$ (10AWG) for aluminum or copper-clad aluminum conductor per UL 1741 clause 18

The wire-binding grounding screw for bonding to the rack solution shall have a green colored head that is hexagonal, slotted, or both. The size is M4. And the UL/CSA listed grounding lug/kit can also be used for bonding to the rack and use the recommended torque according to manufacturer's specification.

3.4 Marking

A system which uses the AC or DC disconnect device to initiate Rapid Shutdown shall be provided with a permanent marking including the following wording or the equivalent:

“PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN”

“OPERATION OF THIS SYSTEM DISCONNECT DEVICE WILL RESULT IN SHUTDOWN OF THE PHOTOVOLTAIC ARRAY IN ADDITION TO INTERRUPTION OF SYSTEM POWER”

The term **“PHOTOVOLTAIC”** may be replaced with **“PV”**.

The plaque or directory shall be reflective, with all letters capitalized and having a minimum height of 9.5 mm (3/8 in.) in white on red background.

Example below: The PV system with rapid shutdown ability shall be properly labeled according NEC 690.56 (B) and (C). The signage shall permanently indicate as below, at the service entrance.



**PHOTOVOLTAIC SYSTEM
EQUIPPED WITH
RAPID SHUTDOWN**

4 Operation of the SMART RSS

4.1 Activate Rapid Shutdown

When the inverter loses utility power, the DC feeders between the SMART RSS device and the inverter become de-energized below 30V in 10 seconds. The utility power can be cut off at any point upstream of the inverter to allow the contactors to open inside the SMART RSS Box, ensuring there is no high voltage DC between the inverter and the SMART RSS Box.

For safety, disconnect DC switch immediately after initiating rapid shutdown.

4.2 Self-test Function

SMART RSS devices have an automatic self-test function. Under normal operating condition, self-test occur each day during start-up. Failure of the self-test will initiate a continuous alarm. The device will continue conducting the self-test until successfully completed. Devices that fail to complete self-test need to be replaced by a qualified service technician. For more detail, please contact Delta technical support in the US.

5 Technical Specifications

Technical Specifications	SMART RSS
RATINGS	
Max. system voltage	600V DC
Rated input current	20A DC
Rated input operating voltage	150~550V DC
Rated input operating current	0~20A DC
Fuse Rating	NA
Max. number of controlled circuits	1
GENERAL DATA	
L x W x D inches	7.87 x 5.91x 2.09
Weight	0.5 lbs.
DC input/output connectors	Amphenol Helios H4 or MC4 PV Connectors
Bracket	Groove Adapter Bracket
Operating temperature	- 40... 158 °F (-40 ... 70 °C)
Storage temperature	- 40... 185 °F (-40 ... 85 °C)
Humidity	0 ... 100%
Max. operating altitude	2000 m above sea level
STANDARD COMPLIANCE	
Enclosure protection rating	NEMA 4X
Safety	UL 1741, UL 1741 CRD PVRSS, CSA-C22.2 No. 107.1-01
Rapid shutdown	NEC 2014 Article 690.12
EMC	FCC Part 15 B

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