

YASKAWA

SOLECTRIA SOLAR

RAPID SHUTDOWN COMBINER

Installation and Operation Guide

Revision B

© 2017, Yaskawa – Solectria Solar





IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

1. General Safety Information

This manual contains important instructions for Solectria’s Rapid Shutdown (RSD) Combiner that should be followed during installation and maintenance of the combiner. To reduce the risk of electrical shock, and to ensure the safe installation and operation of the Solectria RSD Combiner, follow these instructions.

1.1 Safety and Advisory Symbols

DANGER	DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.		
WARNING	WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.		
CAUTION	CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.		
NOTICE	NOTICE indicates a situation that can result in property damage if not avoided.		
	HIGH VOLTAGE WARNING! Indicates hazardous high voltages are present, which, if not avoided, will result in death or serious injury. Only authorized and trained personnel should install and/or maintain this product.		Hot surface
			Equipment grounding conductor
			Wait for a prescribed amount of time before engaging in the indicated action.

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 5 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 RSD Combiner surfaces may become hot. To reduce the risk of burns, do not touch them.

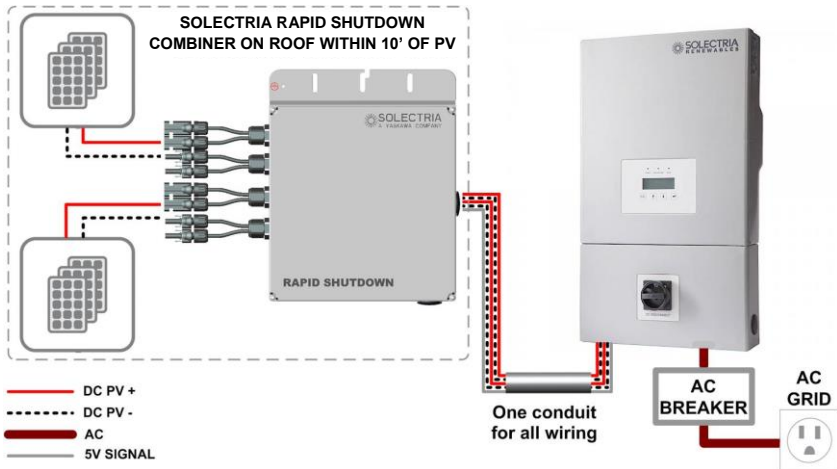
- **PRUDENCE** - Quand les panneaux photovoltaïque sont exposés à la lumière, ils fournissent une tension en courant continu à l'équipement.
- **PRUDENCE** - Le boîtier ne doit en aucun cas être ouvert. Aucun composant interne n'est à entretenir. Reportez-vous à un technicien qualifié pour tout entretien.
- **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. Rapid Shutdown Combiner

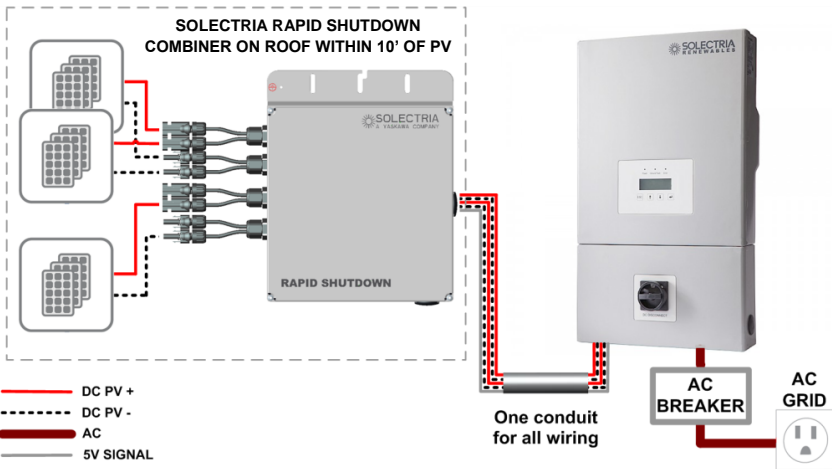
The Solectria RSD Combiner provides an automatic disconnect of 600 VDC residential or small commercial PV array systems, fully compliant with the Rapid Shutdown requirements of NEC 2014 article 690.12 when installed appropriately. It is compatible with Solectria's single-phase residential inverters: PVI 3800TL, PVI 5200TL, PVI 6600TL, and PVI 7600TL.

Solectria's RSD Combiner 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 RSD Combiner is capable of being mounted to the top of a standard mounting rail beneath a PV module or indoors. Please refer to section 4 for details.

The RSD Combiner has two discrete 2 position fused PV string inputs. Each pair of modules combines into a single output where the DC output conductors are routed to the MPPT zone bypass terminals in the PVI single phase inverters. For use with the PVI 3800TL, only one input (2 positives) of the RSD Combiner can be used. For the PVI 5200TL, PVI 6600TL, and PVI 7600TL inverters, all inputs of the RSD combiner should be used. It is acceptable to use only 2 or 3 of the 4 positions based on the PV array design.



Example 1: 2 strings of 260W modules, 12 modules per string and a PVI 5200TL using both MPPT zones (1 string per RSD input).



Examples 2: 3 strings of 260W module, 12 modules per string and a PVI 7600TL using both MPPT zones (1 string on one side and 2 strings on the other).

Fig.1 Connection Diagram of Solectria RSD Combiner

Always check with the local inspector on wire routing.

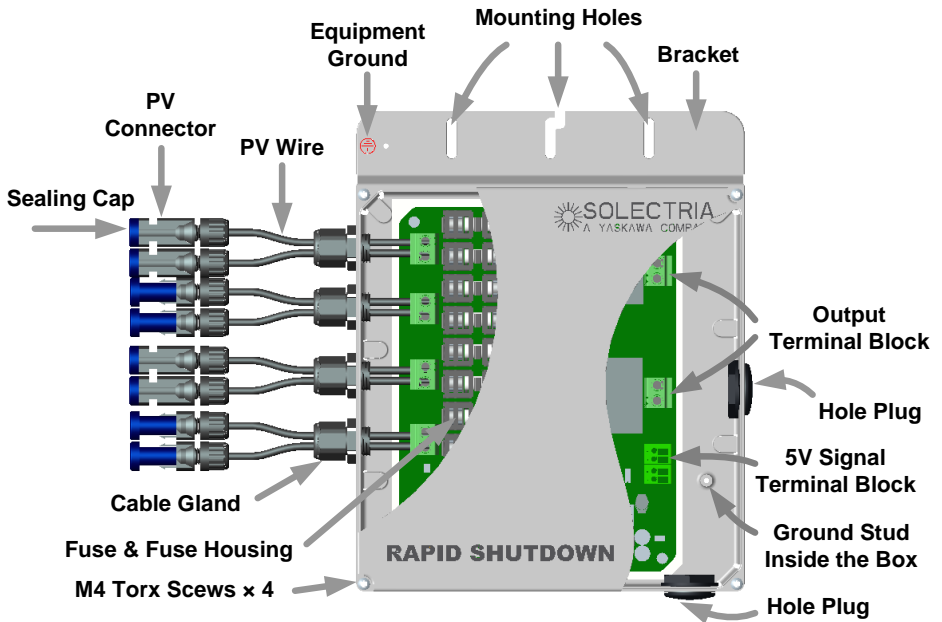


Fig.2 Front View of Solectria RSD Combiner

When the inverter loses utility power, the DC output conductors between the RSD Combiner and the inverter become de-energized below 30V within 10 seconds. The utility power can be cut off at any point upstream of the inverter to allow the contactors to open inside the RSD Combiner, ensuring there is no high voltage DC between the inverter and the RSD Combiner.

The PV system with rapid shutdown ability shall be properly labeled according to NEC 690.56 (C). The sign/label should be right at the service entrance and match the sample below (text and color scheme).



3. Technical Specifications

INPUT RATINGS	
Max. system voltage	600V DC
Max. Number of input circuits	4
Rated input current per string	10A DC
Fuse rating	15A
OUTPUT RATINGS	
Max. Number of output circuits	2
Rated output current per circuit	20A DC
Output Terminal Wire Size	12-6* AWG
Output conduit size	¾" (two conduits)
5V signal wire voltage rating	600V
5V signal wire size range	24-14 AWG**
GENERAL DATA	
Enclosure size L x W x D	12.4 x 10 x 2.2 inches (316 x 255 x 55 mm)
Weight	6.6 lbs. (3.0 kg)
DC input connectors	Amphenol Helios H4 PV connector
DC output connectors	Screw terminal blocks
Operating temperature	- 40... 158 °F (-40 ... 70 °C)
Storage temperature	- 40... 185 °F (-40 ... 85 °C)
Humidity	0 ... 100% (non-condensing)
Max. operating altitude	2000 m above sea level
Warranty	10 years
STANDARD COMPLIANCE	
Enclosure protection rating	Type 4X
Safety	UL 1741, CSA 22.2 107-1
Rapid shutdown	NEC 2014 Article 690.12

* When sizing your wires, make sure you comply with all local codes and regulations

**Suggested 5V signal wire is unshielded multi conductor type cable PVC insulation with PVC jacket or equivalent

4. Dimensions of the RSD Combiner

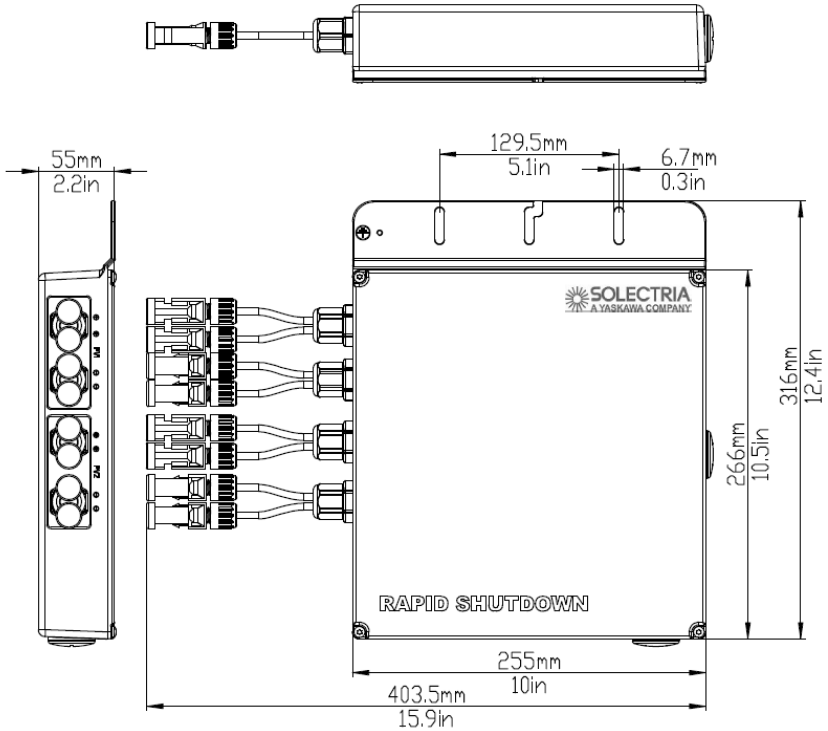


Fig.3 Dimensions of SOLECTRIA RSD Combiner

5. Quick Install Guide

- WARNING** - Do not connect Solectria RSD Combiner to PV string before completing all installation and DC output connection. Once connected to PV string, the RSD Combiner will wake up immediately. Danger! High Voltage. Risk of electric shock.
- WARNING** - Installation and commissioning must be performed by a licensed electrician 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 conductors must be strictly isolated electrically from ground as well as each other.
- **WARNING** - Always de-energize the AC branch circuit before servicing. Never disconnect the DC connectors under load.
- **WARNING** - Install the RSD Combiner within 10 feet of the array per 2014 NEC requirements.
- **CAUTION** - Despite having a Type 4X enclosure with a pollution degree II certification, the RSD Combiner must not be exposed to heavy soiling.
- **CAUTION** - Unused connectors and holes must be covered with sealing connectors and plugs.

5.1 Mounting the RSD combiner

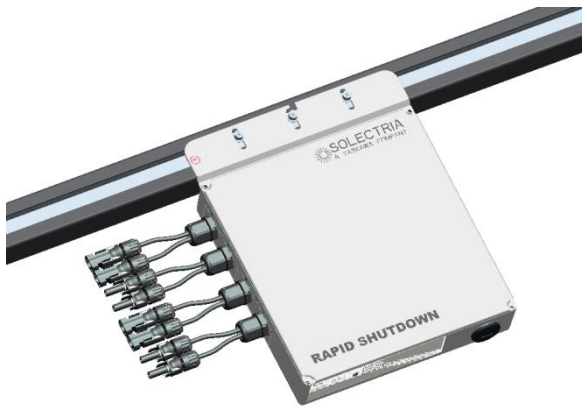


Fig.4 Mounting SOLECTRIA RSD Combiner

- Mount the RSD Combiner under the PV module, away from rain and sun. Do not mount the RSD Combiner in a position that allows long-term exposure to direct sunlight or in a vertical orientation that allows water to collect in the DC connector area.
- Tighten the RSD Combiner fasteners to a torque of 45-50 in-lbs (5 Nm) for 1/4" (6 mm) hardware and 80-85 in-lbs (9 Nm) for 5/16" (8 mm) hardware. Do not over torque. All three mounting locations should be used to support the RSD to the rail. Use suitable hardware for the racking system used.

- **NOTICE** - Using a power screwdriver to tighten the mounting hardware is not recommended due to the risk of thread galling.
- Check that the RSD Combiner is mounted securely on the PV racking.
- **CAUTION** - Do not bend the bracket of RSD Combiner.
- **NOTICE** - Stainless steel hardware should be used since the RSD combiner is installed outdoors.

5.2 Opening the cover of RSD combiner

- Remove the 4 M4 cover screws with a T20 Torx screw driver. To replace the cover screws use a torque of 16 in-lbs (1.8 Nm).
- **WARNING** - Ensure no live voltages are present on PV input and output circuit before RSD Combiner installation.

5.3 Grounding

- The Solectria RSD Combiner has an external threaded grounding point for bonding to the racking system. The required equipment ground for this device shall be connected to the threaded grounding point located inside the enclosure.

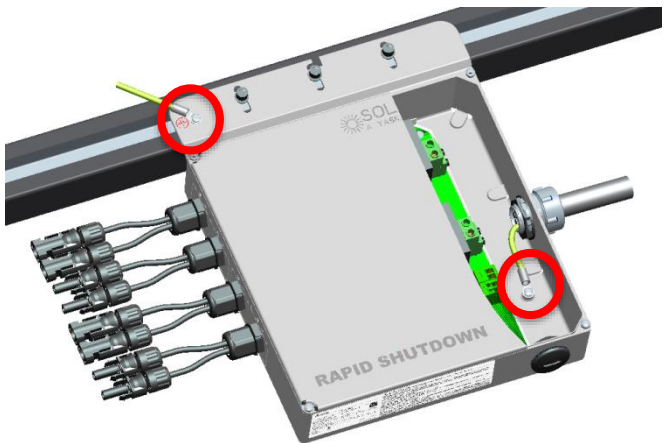


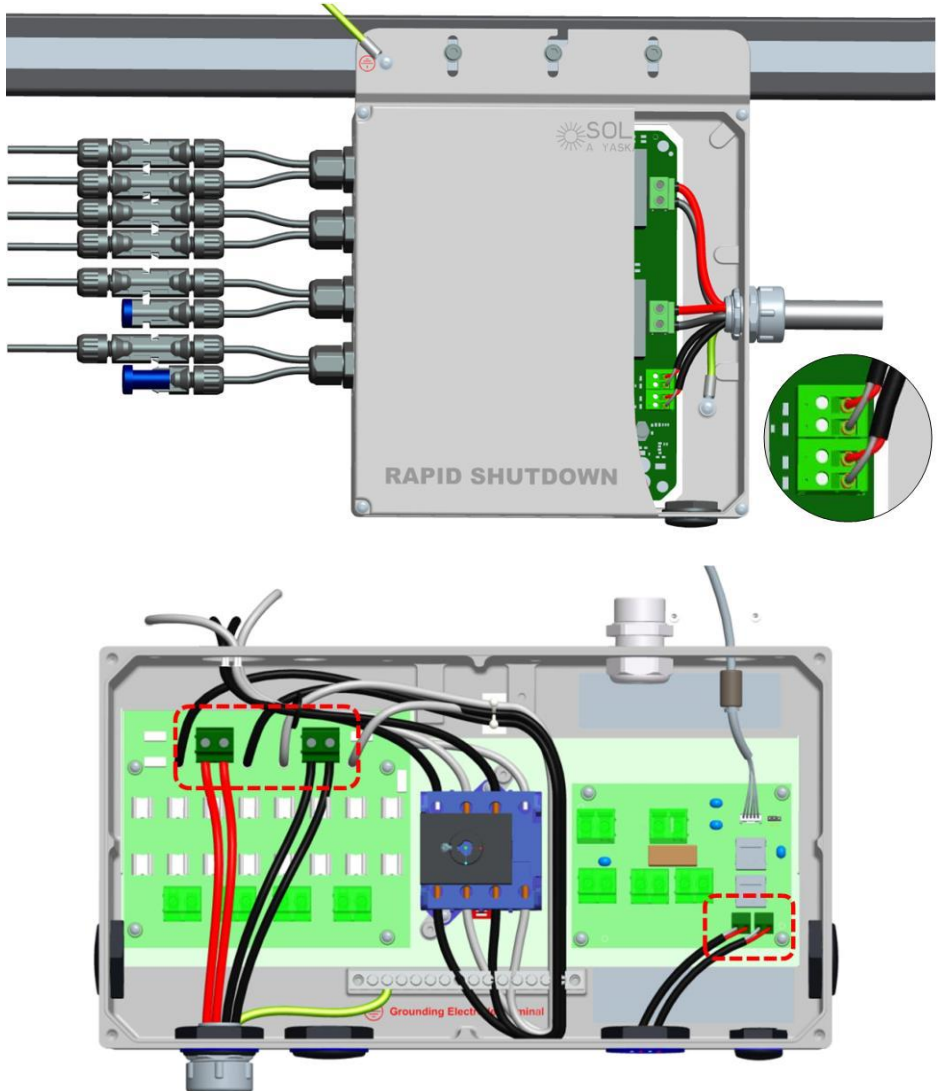
Fig.5 Grounding of Solectria RSD Combiner

5.4 Conduit installation and wiring

- Two conduit plugs are provided for $\frac{3}{4}$ inch conduit fittings.
- Remove the conduit plug(s) by placing a flathead screw driver in the slot on the conduit plug face and turning counter-clockwise while gripping the nut on the inside of the enclosure to ensure it does not slip. Unscrew the nut from the conduit plug and slip the conduit plug out of the conduit opening.
- **CAUTION** - Do not enlarge the conduit openings as the enclosure will be damaged and will violate the terms of the RSD Combiner warranty.
- **NOTICE** - Conduit fittings must be water tight, listed with a Type 4X rating.
- Once conduit and fittings are installed, route wiring thru conduit and fitting and allowing a 6 inch stain relief/service loop within the RSD Combiner.

5.5 RSD Combiner DC output connections

- **NOTICE** - All screw terminals of the DC outputs accept solid or stranded 12-6 AWG copper wire only. Stranded wire is recommended. A 1/8" (3.5 mm) flat head bit is recommended for tightening screw terminals to a torque of 10.5 in-lbs. (1.2 Nm).
- **CAUTION** - The rapid shutdown signal wire may be routed together with the DC output cables in the same conduit, but all the cables shall be listed and rated 600 V and use Class 1 wiring methods. Always check with the local AHJ.
- Although two conductors are enough for the 5V signal wire, AWG 24 4C cable is recommended for the 5V signal wire. The signal wire can be wired with either polarity. Suggested 5V signal wire is unshielded multi conductor type cable PVC insulation with PVC jacket or equivalent. Wire sizes 14-24 AWG acceptable, current draw is 5mA, so there is no concern about voltage drop.
- 14 AWG stranded THWN-2 wire may be used but smaller jacketed 4-conductor 600V rated and listed wire of 22-24AWG recommended for ease of installation.
- It is recommended to run redundant signal wires wire (4C conductor)
- Check with your AHJ on wire choice.



Connect DC wire to the DC wiring board
And connect 5V signal wire to the AC wiring board of Solectria single-phase PV inverter

Note: Redundant wiring is shown for 5V signal wire

Fig.6 Terminal Wiring Diagram of Solectria RSD Combiner

5.6 PV array string input connections

- Finally, directly connect the PV strings to the inputs of the RSD Combiner via standard MC-4 style, Ampenol Helios H4 PV or equivalent connectors.
- **CAUTION** - Risk of damage. Be sure that the polarity and voltage level is correct when you make the connection. Connecting it incorrectly will cause damage to the equipment.

5.7 PV string fuses Replacement

- **NOTICE** - The maximum acceptable string fuse for the RSD Combiner is 20A (KLKD 20). Use of larger fuses will void the warranty.
- Always replace the string fuse with the same rating and UL/CSA listed PV fuse.

6. Product Warranty and RMA Policy

The current warranty and RMA statement for the product is available online at <http://www.solectria.com/support/documentation/warranty-information/grid-tied-inverter-warranty-letter/>. If you do not have access to the internet or to request a copy to be mailed to you, please contact our Technical Service department 978-683-9700 x 2.



Appendix A – Rapid Shutdown Combiner Data Sheet

<https://solectria.com/support/documentation/inverter-datasheets/rapid-shutdown-combiner-option-for-pvi-3800-7600tl/>

Appendix B – String Sizing Tool

<https://solectria.com/support/string-sizing-tool/>

Appendix C – Contact Information

Yaskawa – Solectria Solar
360 Merrimack Street
Building 9, Floor 2
Lawrence, Massachusetts 01843
USA

Tel: 978.683.9700
Fax: 978.683.9702
Sales/General Info: inverters@solectria.com
Technical Support & Service: 978-683-9700 x2
Website: www.solectria.com

Appendix D – Authorized Distributors

<https://solectria.com/pv-inverters/how-to-buy/>

Appendix E – UL1741/IEEE1547 Certification Letter



Certificate of Compliance

Certificate: 70026744

Master Contract: 260655

Project: 70026744

Date Issued: March 13, 2015

Issued to: SOLECTRIA RENEWABLES LLC
Bldg 9 360 Merrimack Street
Lawrence,
MA 01843,
USA
Attention: Chinedu Igbokwe

The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only



Kyle Song

Issued by: Kyle Song

PRODUCTS

CLASS 5311 09 - POWER SUPPLIES - Distributed Generation Power Systems Equipment
CLASS 5311 89 - POWER SUPPLIES - Distributed Generation - Power Systems Equipment
- Certified to U.S. Standards

PV combiner box with rapid shutdown function, Model RSD-PVI-3800-7600-TL, rack mounted.

Notes:

For details related to rating, size, configuration, etc. reference should be made to the CSA Certification Record, Certificate of Compliance Annex A, or the descriptive report.

APPLICABLE REQUIREMENTS

CSA-C22.2 No.107.1-01 - General Use Power Supplies

UL Std No. 1741-Second Edition - Inverters, Converters, Controllers and Interconnection System Equipment For Use With Distributed Energy Sources (January 28, 2010)



Supplement to Certificate of Compliance

Certificate: 70026744

Master Contract: 260655

The products listed, including the latest revision described below, are eligible to be marked in accordance with the referenced Certificate.

Product Certification History

Project	Date	Description		
70026744	March 13, 2015	Multiple Listing		
		Original Report 70019596	Model No. RSS-600	Listee Model No. RSD-PVI-3800-7600-TL