



Power Reduction Control Application Note

This document describes how to control and/or limit the inverter output power.

This application note describes two options for power reduction control in SolarEdge inverters:

- **Hardware Power Reduction:** The inverter can be connected to a RRCR (Radio Ripple Control Receiver) in order to dynamically limit the output power of all the inverters in the installation.
- **Software Configurable Power Limitation:** A fixed power limit as a percentage [%].

Power Reduction Interface Connection

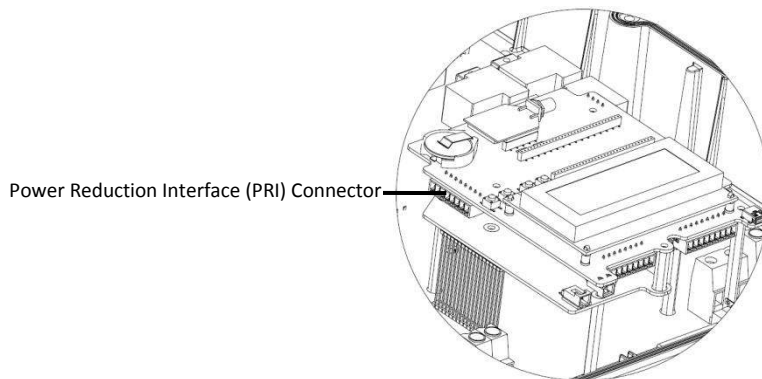


Figure 1 – PRI Interface Input

► To connect a four-relay¹ Radio Ripple Control Receiver (RRCR):

1. Connect the RRCR² directly to the SolarEdge inverter communication board through the Power Reduction Interface (PRI) connector. Figure 1 shows the location of the connector. The connector is an 8-port terminal block.

The following table describes the connector pin assignment and functionality:

PRI Connector Pin #	Pin Name	Description	Connected to (RRCR)
1	V	5VDC Voltage Supply	Relays common node
2	G	GND	Not connected
3	L4	Relay contact 4 input	K4 – Relay 4 output
4	L3	Relay contact 3 input	K3 – Relay 3 output
5	L2	Relay contact 2 input	K2 – Relay 2 output
6	L1	Relay contact 1 input	K1 – Relay 1 output
7	NC	Not connected	Not connected
8	NC	Not connected	Not connected

¹ For three-relay RRCR connection, please refer to appendix A.

² The RRCR must be purchased separately. It is not supplied by SolarEdge.

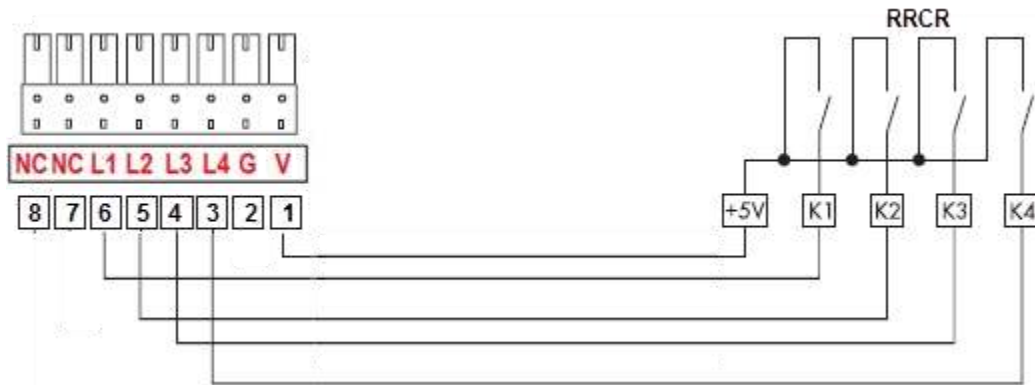


Figure 2 – Inverter – RRCR Connection

**IMPORTANT NOTE:**

Excessive voltage can damage the inverter!

Use an insulated power conductor from pin 1 of the PRI connector as the RRCR relay's common node.

Do not use any external voltage.

2. Use a 6-wire cable (not supplied by SolarEdge) with an external diameter $\leq 200\text{mil} / 5\text{mm}$ in order to ensure proper fit and sealing of the inverter gland.
3. Route the 6-wire cable as illustrated below and tie it to the oval hole using a cable tie.

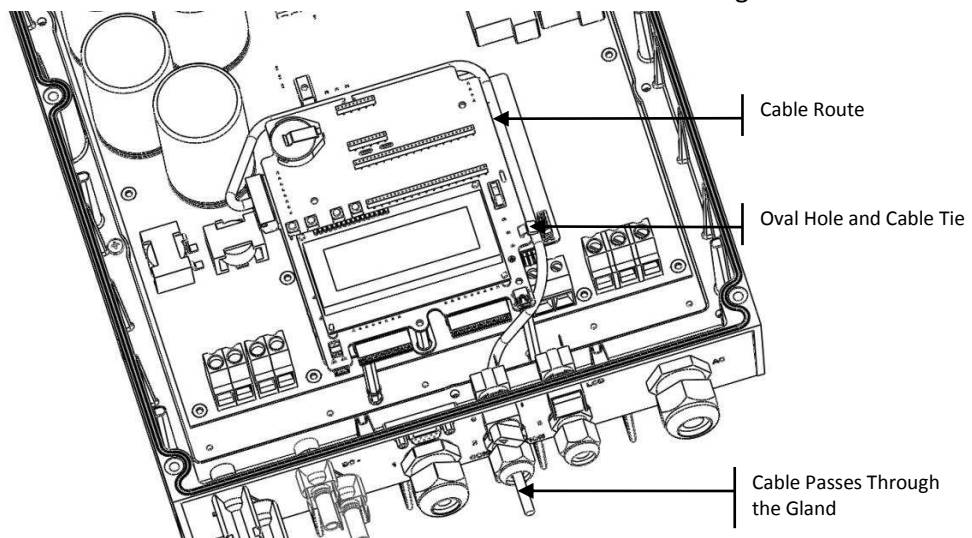


Figure 3 – Power Reduction Control Cable Route

Using the Power Reduction Control

The inverter is preconfigured to the following power levels:

Table 1 – RRCR Preconfigured Power Levels

L1	L2	L3	L4	Active Power	Cos(ϕ)
1	0	0	0	0%	1
0	1	0	0	30%	1
0	0	1	0	60%	1
0	0	0	1	100%	1

Active power control and reactive power control are enabled separately.



NOTE:

The inverter saves the last power reduction state in its memory. If the inverter is disconnected from the RRCR, then it retains its last power reduction state until the AC is powered off or until the next morning; whichever is sooner.

► To enable the Power Reduction:

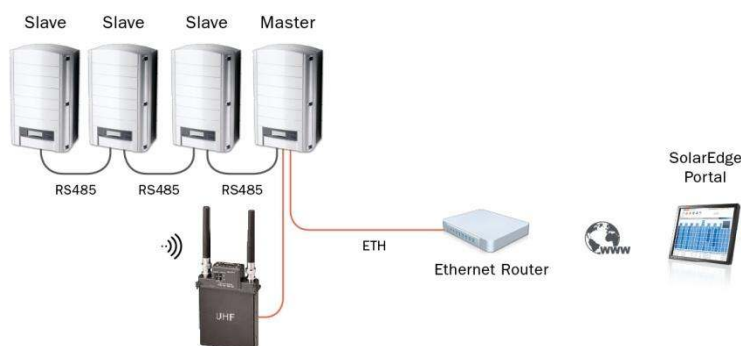


Figure 4 – RRCR Connection in a Multi-Inverter Environment

- The slave inverters are preconfigured. If a configuration of a slave Inverter is required, proceed as follows. In the LCD menu, select:
 - Communication → RS485-1 Conf → Device Type → [select *SolarEdge*]
 - Communication → RS485-1 Conf → Protocol → [select *Slave*]
 - Communication → Server → RS485
- Set a Master Inverter configuration, as follows. In the LCD menu, select:
 - Communication → RS485-1 Conf → Device Type → [select *SolarEdge*]
 - Communication → RS485-1 Conf → Protocol → [select *Master*]
 - Communication → RS485-1 Conf → Slave Detect

The Master should report the correct number of slaves. If it does not, verify the connections and terminations.

- Power Control → RRCR Conf. → RRCR Enable

The inverters will limit their power output according to the RRCR.



NOTE:

The reactive power can be configured separately by selecting the required **Mode** in the **Power Control** menu.

You may refer to the *SolarEdge Inverter Installation Guide* for detailed instructions regarding SolarEdge inverter installation and connectivity.

► **To enable the power factor control using RRCR:**

1. Enable Power Reduction, as described above.
2. Set the configuration of all inverters as follows.

In the LCD menu, select:

Power Control → Reactive Pwr Conf. → Mode → RRCR.

You may refer to *SolarEdge Inverters, Power Control Options* application note for a detailed description of various active and reactive power modes configuration. Please refer to:

http://www.solaredge.com/files/pdfs/application_note_power_control_configuration.pdf

Fixed Power Limitation

The peak power of the inverter can be limited by software configuration.

No additional hardware is required.

► **To configure the Inverter:**

- In the LCD menu select Power Control → Active Pwr Conf. → Power Limit → Set Power Limit (%): [Enter the required value].

Firmware Version

- Both power limitation methods are supported from CPU firmware release V2.293 and up
- Fixed power limitation also requires the following DSP firmware:

Inverter Type	DSP1	DSP2
1ph inverter	1.210.53 and above	-
3ph inverter	1.13.67 and above	2.19.56 and above

The inverter can be upgraded locally in the field using the SolarEdge Inverter Configuration Tool.

You may contact the SolarEdge support team in order to obtain upgrade files and instructions.

SolarEdge Support contact information can be found at the end of this document.

Appendix A – Connect and Configure a three-relay RRCR:

► **To connect a three-relay RRCR:**

2. Connect the RRCR³ directly to the SolarEdge inverter communication board through the Power Reduction Interface (PRI) connector. Figure 1 shows the location of the connector. The connector is an 8-port terminal block.

The following table describes the connector pin assignment and functionality:

PRI Connector Pin #	Pin Name	Description	Connected to RRCR
1	V	5VDC Voltage Supply	Relays common node
2	G	GND	Not connected
3	L4	Relay contact 4 input	Not connected
4	L3	Relay contact 3 input	K3 – Relay 3 output
5	L2	Relay contact 2 input	K2 – Relay 2 output
6	L1	Relay contact 1 input	K1 – Relay 1 output
7	NC	Not connected	Not connected
8	NC	Not connected	Not connected



Figure 5 – Inverter – Three-Relay RRCR Connection



IMPORTANT NOTE:

Excessive voltage can damage the inverter!

Use an insulated power conductor from pin 1 of the PRI connector as the RRCR relay's common node.

Do not use any external voltage.

³ The RRCR must be purchased separately. It is not supplied by SolarEdge.

Using the Power Reduction Control

The inverter is preconfigured to the following power levels:

Table 2 – RRCR Preconfigured Power Levels

L1	L2	L3	L4	Active Power	Cos(ϕ)
1	0	0	0	0%	1
0	1	0	0	30%	1
0	0	1	0	60%	1
0	0	0	1	100%	1

In order to support three-relay RRCR, state “0” (L1 – L4 = 0000) should be enabled in addition to the default setting and its active power should be set to 100%:

Table 3 – Enabling State “0”

L1	L2	L3	L4	Active Power	Cos(ϕ)
0	0	0	0	100%	1

► To enable State “0”:

Select **Power Control** → Select **RRCR Conf.** → Select **Set Values** → select **0000** point and press Enter → select **Enable** → choose **Yes** and press Enter

► To set the values of state “0”:

Select **Power Control** → Select **RRCR Conf.** → Select **Set Values** → select **0000** point and press Enter → select **Pwr Reduce** and press Enter → set the value to 100 % by pressing Down key and press Enter

Active power control and reactive power control are enabled separately.

You may refer to *SolarEdge Inverters, Power Control Options* application note for a detailed description of various active and reactive power modes configuration. Please refer to:

http://www.solaredge.com/files/pdfs/application_note_power_control_configuration.pdf



NOTE:

The inverter saves the last power reduction state in its memory. If the inverter is disconnected from the RRCR, then it retains its last power reduction state until the AC is powered off or until the next morning; whichever is sooner.

SolarEdge Support Contact Information

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