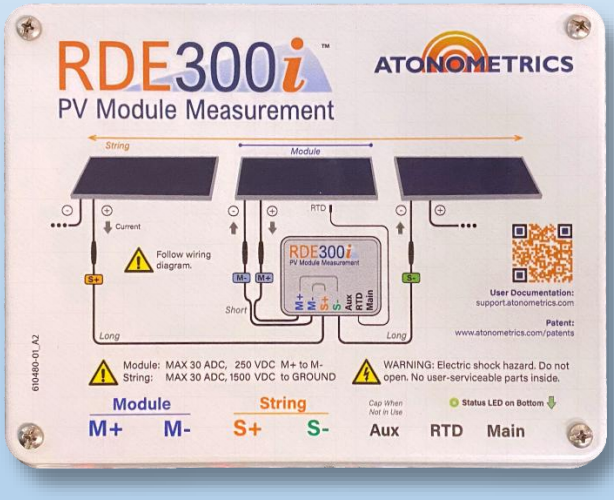
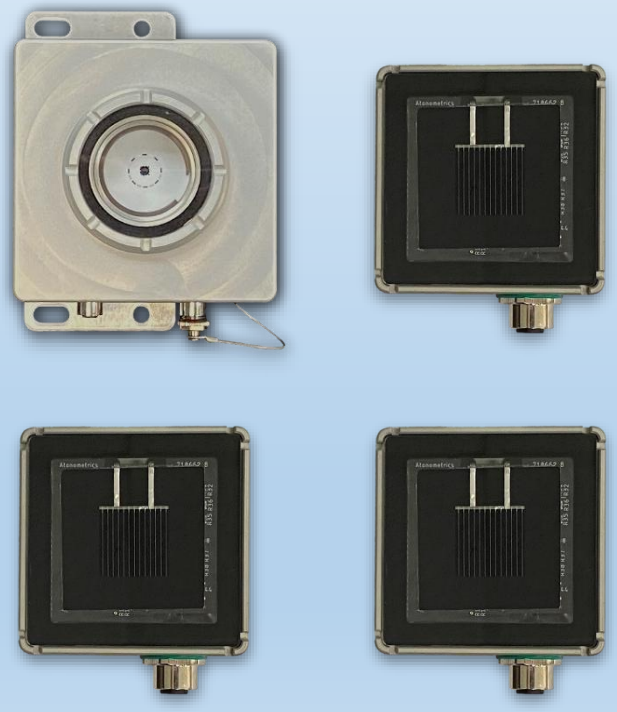
Configuration and Normalization Guide

for Module-Cell and Module-Cell-Optical Applications





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1 Overview

This document will guide you through the configuration and normalization of systems where data is obtained from PV modules via RDE300i™ and compared against reference data obtained from RC22™ Reference Cells. This Module-Cell system may be used for soiling, degradation, or any other applications where PV module data need to be compared against reference cell data. In addition, instructions are presented to integrate a Mars™ Soiling Sensor unit into your RDE300i Aux Network. The purpose of this Module-Cell-Optical system is to avert routine washing of RC22 units.

This guide presents instructions on how to configure both Module-Cell and Module-Cell-Optical systems for both monofacial and bifacial PV modules.

One RDE300i unit will be configured as a Leader. Power and data logger or SCADA communication connections will be made only to the Leader, while RC22 and, optionally, Mars units will connect to the Leader over the Leader's private Aux network.

The user's data logger or SCADA system will read all data from the Leader.

"Aux Devices" will refer to all RC22 and Mars units present on the Aux Network.

Note: For more information on RDE300i configuration options, including Solo, Leader, and Follower configurations, see the RDE300i User Guide (880093).

Note: For more information on RDE300i system configurations and cabling, see the Soiling Products Ordering Guide (880100), available from the Atonometrics website.

Sections 3 (RC22 Configuration), 4 (Mars Configuration), and 5 (RDE300i Configuration) may be completed in an office environment prior to field deployment. Section 4 will only need to be completed if your system configuration includes a Mars unit.

Following the steps in this document, you will normalize the Performance Index (P.I). This is equivalent to the initial calibration of the soiling ratio for soiling applications or normalization for degradation applications.

To successfully normalize the Performance Index, the normalization procedure must be completed on a clear sunny day. Additionally, the plane of array (POA) irradiance must be higher than 500W/m2.

The normalization procedure takes approximately 30 minutes to complete.

For more information on **RDE300i**, consult the RDE300i User Guide (880093).

Note: Please read the entire RDE300i User Guide (880093) before undertaking the instructions in this guide.

2 Equipment and Software Required

Obtain the following equipment and software before performing the steps in this guide:

- One RDE300i unit
- Latest RDE300i firmware
    - Acquire the latest firmware version from RDE300i Software Updates
- PV Modules for RDE300i units
- One RC22 unit for monofacial PV modules
- Three RC22 units for bifacial PV modules
- Latest RC22 firmware
    - Acquire the latest firmware version from RC22 Software Updates
- Latest RC22 Configuration Manager Software (500099)
    - Acquire the latest version from RC22 Configuration Manager Software
- One Mars unit if deploying the system configuration to circumvent routine washing
- Latest Mars firmware
    - Acquire the latest firmware version from Mars Firmware Updates
- Power and Communication Cables (830284 and 830303)
- Necessary equipment specified for your application
    - Reference the Soiling Products Ordering Guide for the necessary equipment
- Configuration Kit (810276), shown in **Figure 2-1**
- Latest RDE300i Configuration Manager Software (500092)
    - Acquire the latest version from RDE300i Software Updates
- RDE300i User Guide (880093)
    - Acquire the latest version from RDE300i User Guide
- Laptop or PC (Windows 7 or Higher)

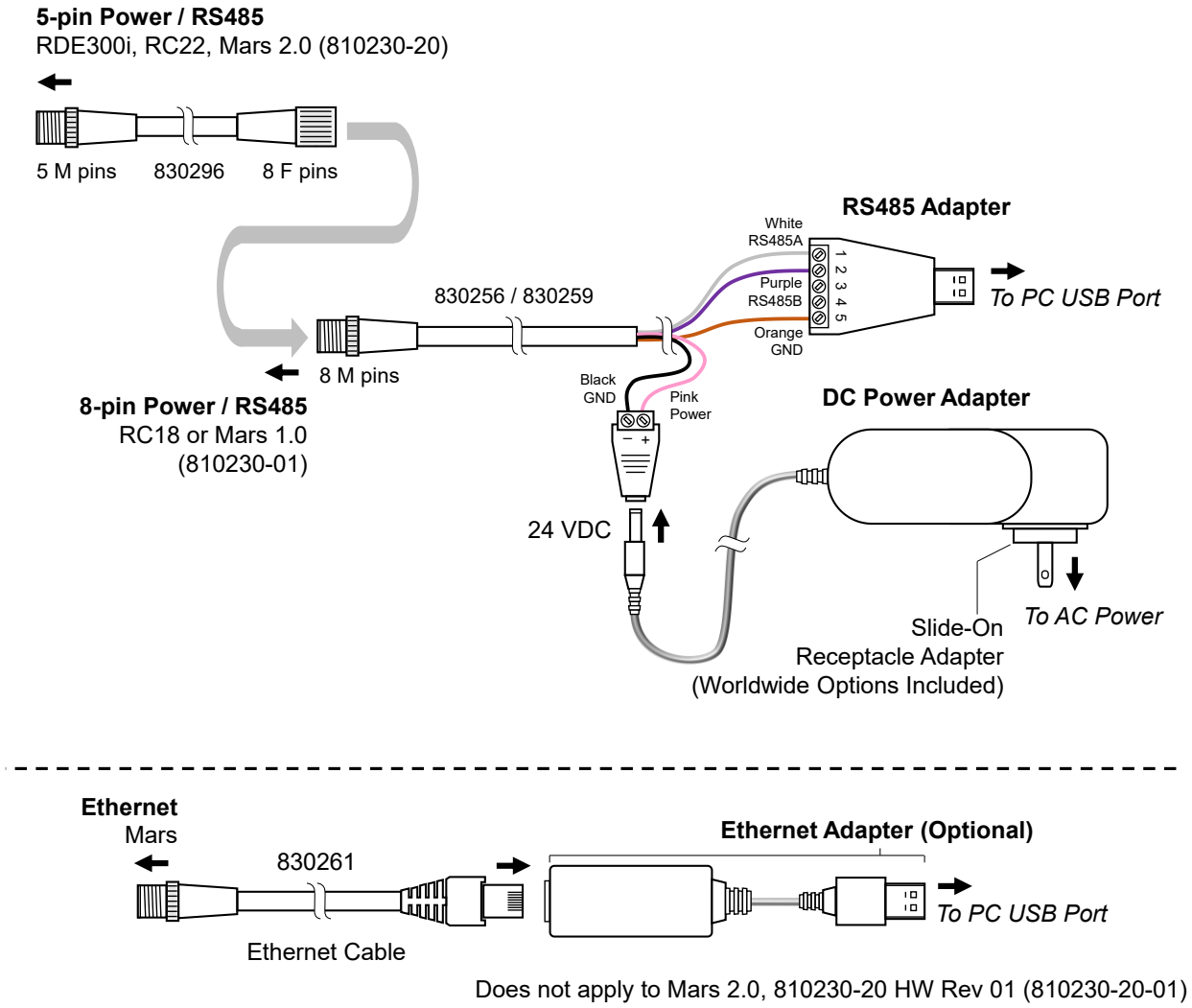


Figure 2-1: Configuration Kit 810276 for connecting your PC to RDE300i, Mars, RC22

Note: For more information on Configuration Kit 810276, or to find software drivers, visit support.atonometrics.com.

3 RC22 Configuration

3.1 Designating RC22 units for the Aux Network

Refer to **Table 3-1** to view the necessary mounting position and Modbus settings for RC22(s) on your Aux Network.

Line	RC22 Mounting Position	Modbus Address	Baud Rate	Data Format
1	Front Facing	22	57600	8-N-1
2	Rear Facing East	23	57600	8-N-1
3	Rear Facing West	24	57600	8-N-1

Table 3-1: RC22 Modbus Communication Settings for Aux Network

For the monofacial application, the mounting position and Modbus settings from only Line 1 will be needed for your RC22 unit. Atonometrics recommends creating a label with the information displayed in Line 1 and attaching it to the RC22 unit.

For the bifacial application, three RC22 units are required. Atonometrics recommends designating each RC22 unit by creating three labels. Write the information from Line 1 on one label, Line 2 on the next label, and Line 3 on the last label. Then attach one label to each RC22 unit.

Note: For the bifacial application, one line in **Table 3-1** must be assigned to each RC22 unit. Do not assign multiple RC22 units to the same settings within the same Aux Network.

3.2 Configuring RC22 units for the Aux Network

To apply the Modbus settings displayed in **Table 3-1**, you will need to use the RC22 Configuration Manager Software and the Configuration Kit as shown in **Figure 2-1**.

Use the Configuration Kit to connect to one RC22 unit at a time. Ensure the Configuration Kit is powered and connected to RC22. Plug the USB-RS485 converter into your PC. Open the RC22 Configuration Manager.

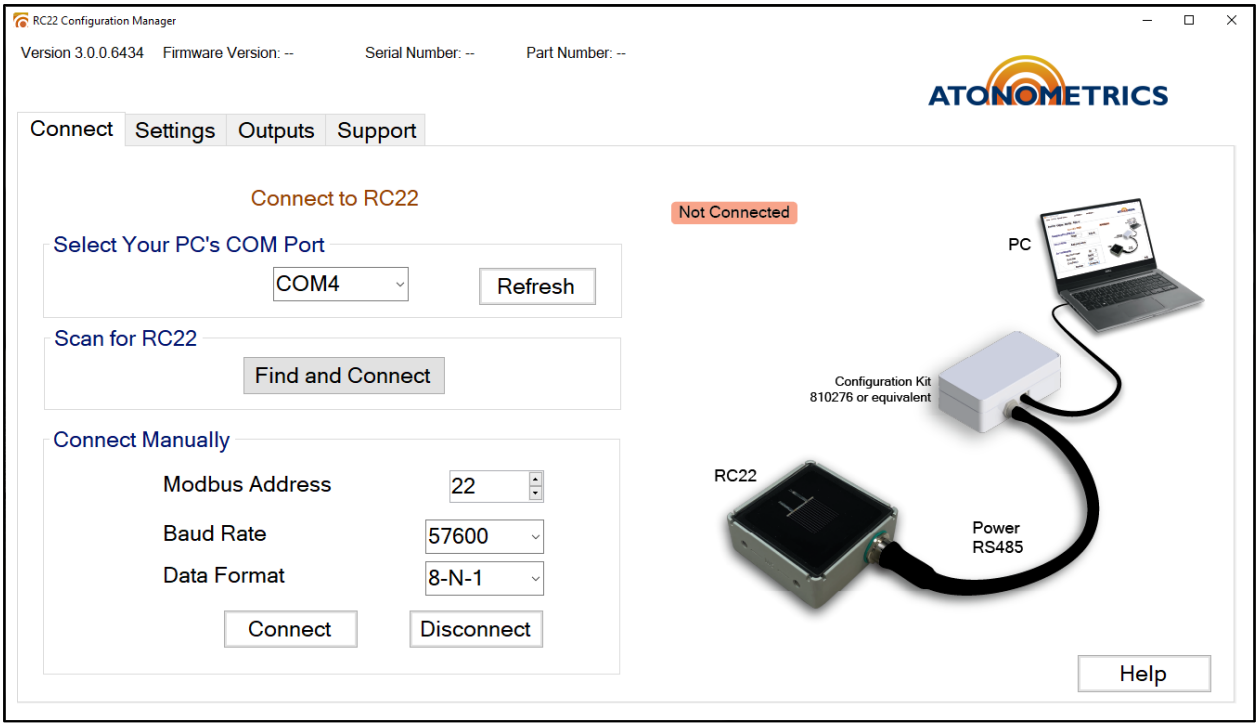


Figure 3-1: RC22 Configuration Manager – Disconnected

Determine the COM port to which the Configuration Kit is connected. If you are not sure which COM to select, then unplug the USB-RS485 converter from your PC and press the “Refresh” button. Note which COM ports are displayed in the “COM Port” dropdown. Then, plug the converter back in and hit the “Refresh” button again. The newly added COM port will map to the Configuration Kit connection.

Select the correct COM port for the Configuration Kit. Then press the “Find” button to establish a connection with RC22.

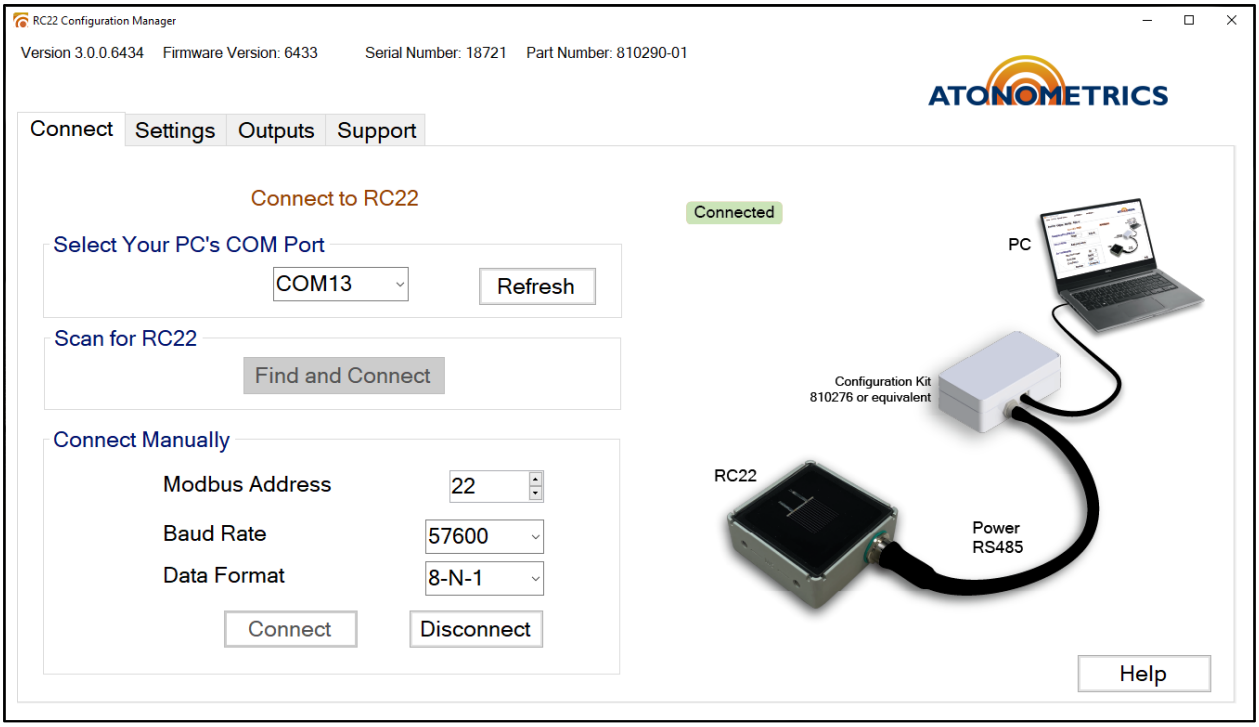


Figure 3-2: RC22 Configuration Manager – Connected

Navigate to the “Settings” Tab of the RC22 Configuration Manager. Refer to **Table 3-1** to apply the Modbus settings that you designated for the RC22 unit. Enter the corresponding Modbus address, baud rate, and data format to the RC22 Configuration Manager and press the “Apply” button.

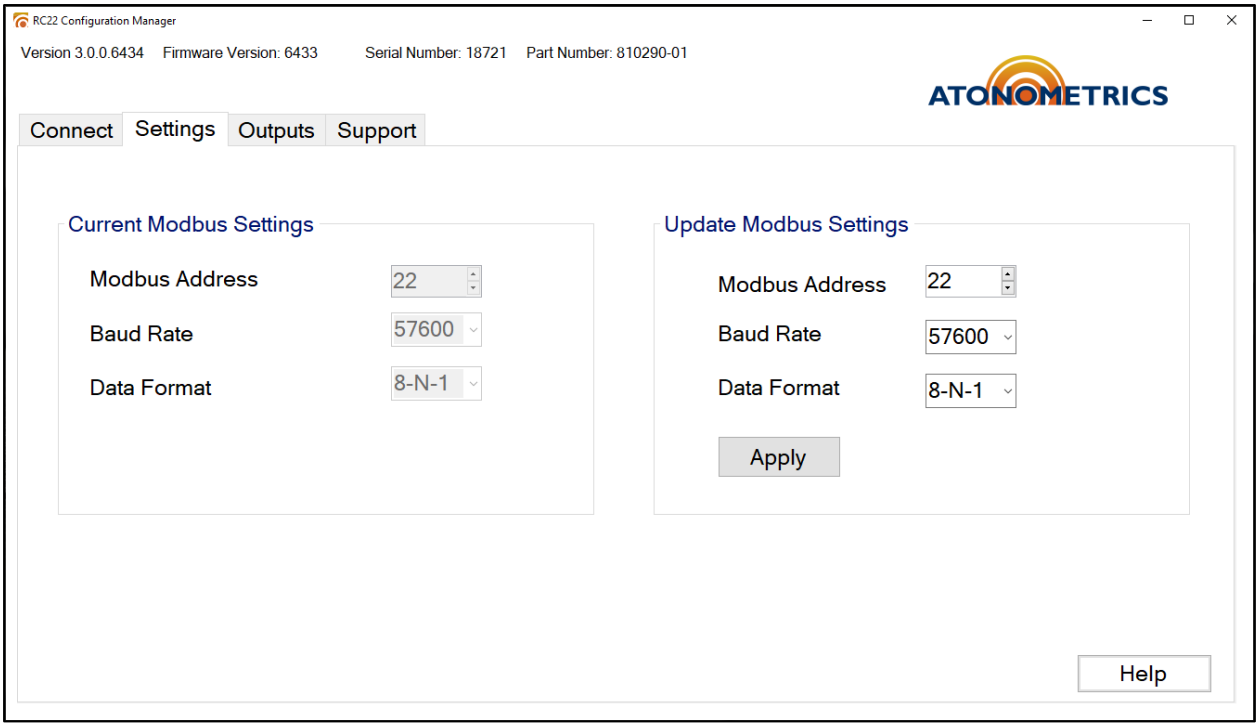


Figure 3-3: Communication Settings Entry (example for Front Facing RC22 unit)

Return to the “Connection” tab of the RC22 Configuration Manager. Press “Disconnect” and then “Find” to confirm that the correct Modbus settings were applied to the unit as shown in **Figure 3-4**.

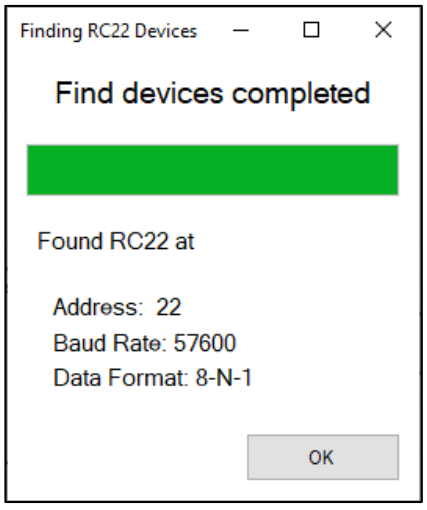


Figure 3-4: Verify settings (example for Front Facing RC22 unit)

If you are using RC22 for the bifacial application, follow these steps for the other RC22 units. Ensure that you refer to the row in **Table 3-1** that you assigned to the RC22 unit.

4 Mars Configuration

Consult this section if you are integrating the Mars Soiling Sensor into your Aux Network. Otherwise, continue to Section 5.

Communication to Mars on the Aux Network will be established via Modbus RTU over RS485. In order to configure the Mars unit with the correct Modbus settings, you must use the Web Interface first.

4.1 Accessing the Web Interface

For Mars model 810230-20:

To configure settings on Mars model 810230-20 HW Rev 01 (810230-20-01), described in the Mars 810230-20 User Guide, use Wi-Fi to connect your smartphone or laptop PC to the device's web-based user interface.

To access the web-based user interface:

- Power on the Mars unit. The unit's soil collection window will light up for a short time and then will go dark.
- Wait 1-2 minutes for the device to start it's Wi-Fi network for configuration.
- On your smartphone or laptop PC, use the network selection interface to select your Mars unit's Wi-Fi network. Your unit's SSID (network name) will be "Mars" followed by the last three digits of its serial number.
- For example, on a Windows PC you may see a dialog like **Figure 4-1** by accessing the network selection icon in the lower right corner of the screen.
- After selecting the Mars unit's network, enter the unit's Wi-Fi password (network security key). By default, the Wi-Fi password will be "marsXXXXX" where XXXXX is the unit's 5-digit serial number. Ignore any security warnings. If asked, select your PC to be non-discoverable.
- Launch a web browser, such as Chrome, Firefox, or Edge.
- Enter the Mars™ default IP address of 10.244.69.66 in the browser's URL field.
- You will then see the Mars™ web interface shown in **Figure 4-2**

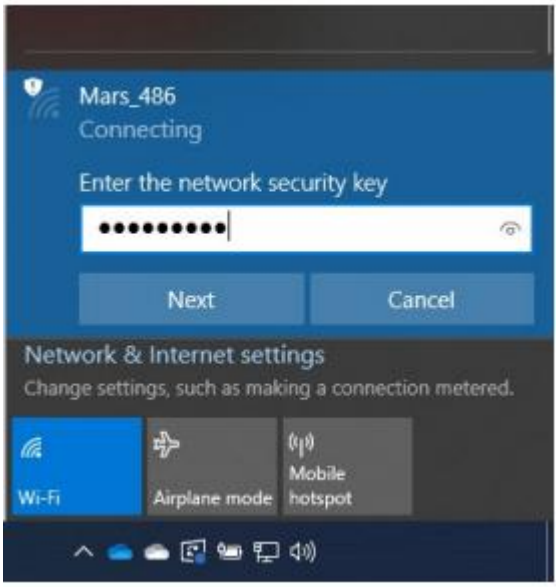


Figure 4-1: Selecting the Mars unit's Wi-Fi network for configuration

For previous version of Mars:

Please visit Documentation for obsolete Mars models to find the Mars User Guide for your corresponding model, and please follow the procedure for accessing the Web Interface within the guide.

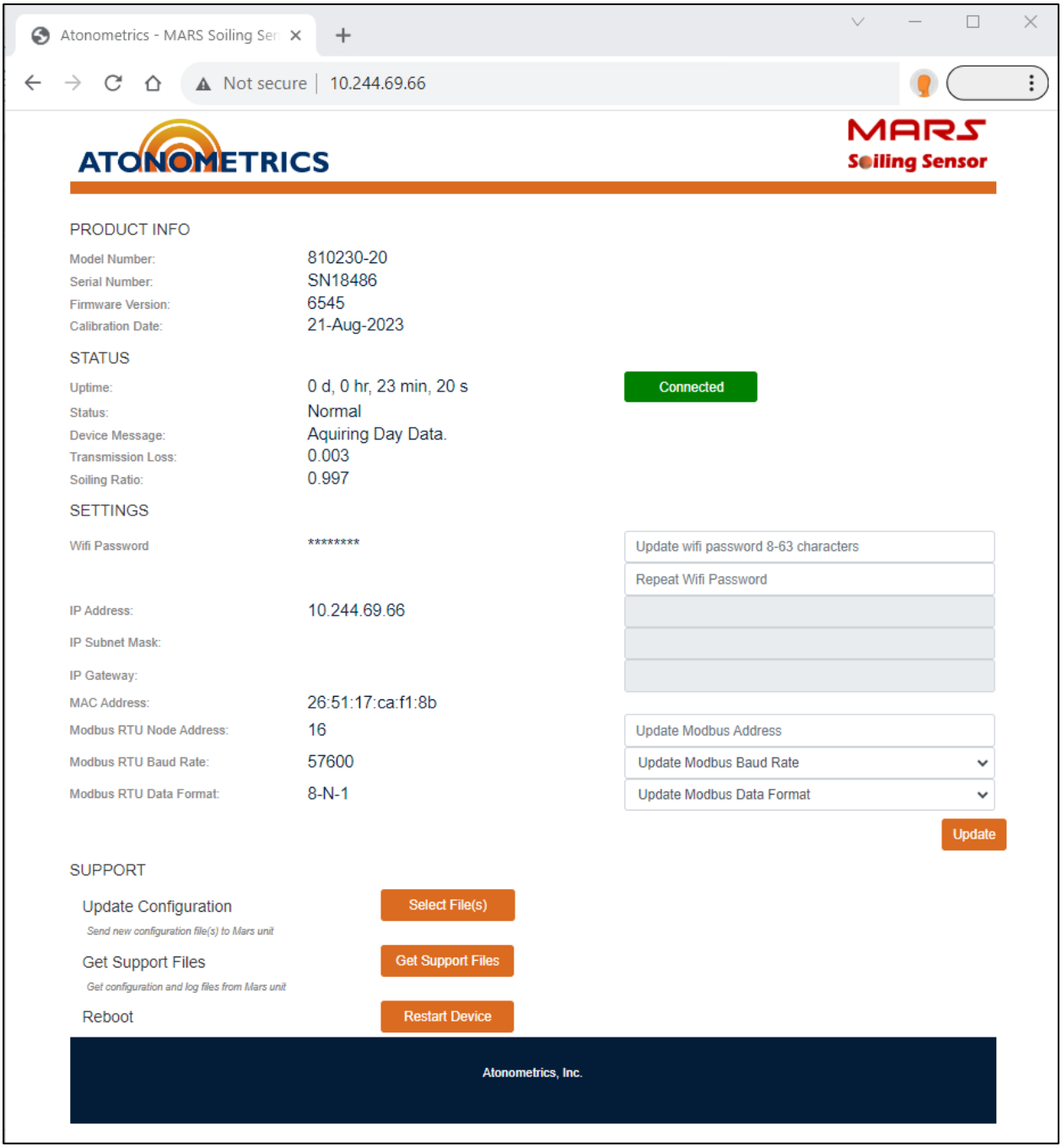


Figure 4-2: Mars web user interface with correct modbus settings

Note: The Mars Wi-Fi network will automatically disable after 60 minutes since power-up. This is a security feature. If needed, cycle power to the unit to regain access to the configuration screen.

Note: The default Wi-Fi password may be changed by the user. If the password has been changed and is unknown, see the Password Reset Instructions or contact Atonometrics.

4.2 Configuring Mars

The Mars Modbus settings must be configured to the Mars default values, matching **Table 4-1**. The correct input settings are displayed in **Figure 4-2**.

Modbus Address	Baud Rate	Data Format
16	57600	8-N-1

Table 4-1: Mars Modbus Settings for Aux Network

If the Modbus settings do not match the Modbus Settings in **Table 4-1,** enter the Modbus address, baud rate, and data format (16, 57600, 8-N-1) into their respective text boxes on the web interface shown in **Figure 4-2**. Then press the “Update” button.

Confirm that the correct settings are displayed under “SETTINGS” once the update has completed, as displayed in **Figure 4-2**.

Mars is now ready to be deployed within the Aux Network!

5 RDE300i Configuration

5.1 Configure as Leader

5.1.1 Connect to the Leader

Disconnect the configuration kit from the Aux Device you most recently configured. Then, connect or daisy chain 830284 power and communication cables from each Aux Device's main port to the Leader's Aux port as shown in example **Figure 5-1**. Note that your configuration may not have all of the components shown in the figure.

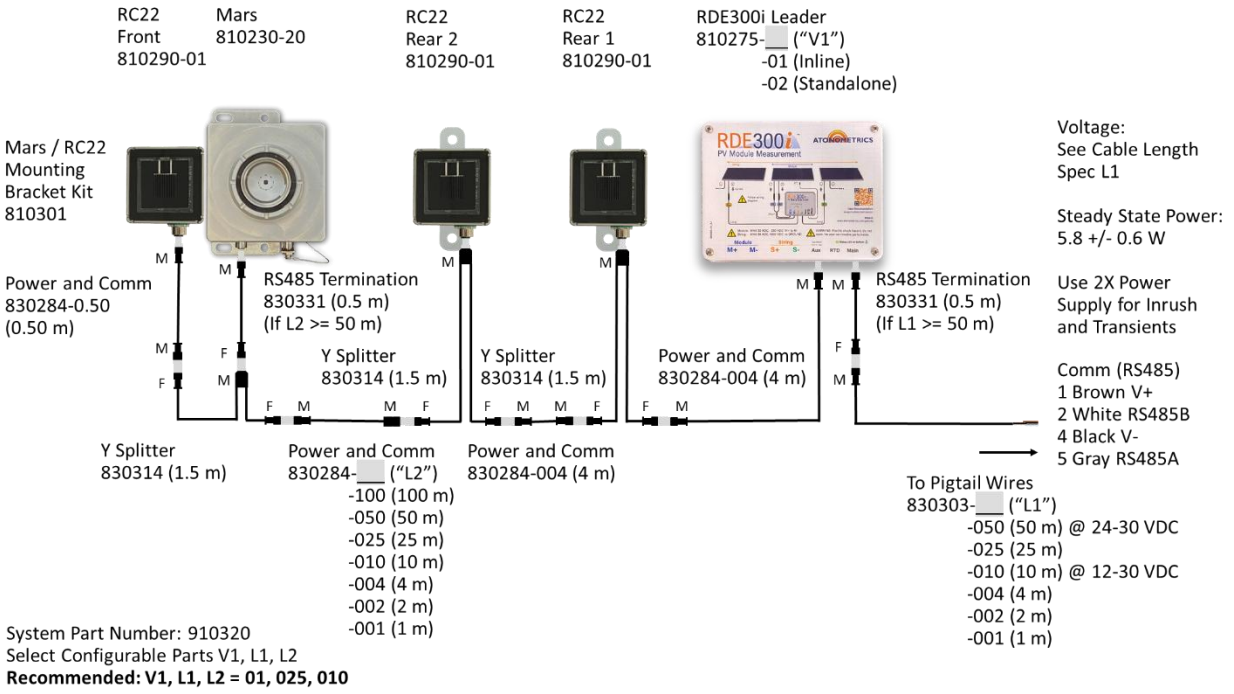


Figure 5-1: Bifacial Module-Cell-Optical system cabling diagram (example)

To daisy chain multiple Aux Devices, use the 830314 Y-splitter cables and 830284 Power and Comm cables as shown in **Figure 5-1**. Use 830331 RS485 termination cables where necessary, per the Soiling Measurement Ordering Guide (880100), available from the Atonometrics website.

Connect the Configuration Kit (or equivalent equipment) to the Leader RDE300i unit and ensure the kit is powered. Launch the RDE300i Configuration Manager Software on your PC. From the RDE300i Configuration Manager, select the Connect tab and connect to the Leader unit. Select your PC's COM port corresponding to the USB/RS485 adapter of the Configuration Kit. If the Modbus communication settings of your RDE300i are unknown, scan for the RDE300i using the Find button. The software will attempt to discover your RDE300i address, baud rate, and data format. If your Modbus communication settings are known, you may enter these in the Connect

Manually box and press the Connect button. Once your RDE300i unit is connected, the software will display the Connected status as shown in **Figure 5-2**.

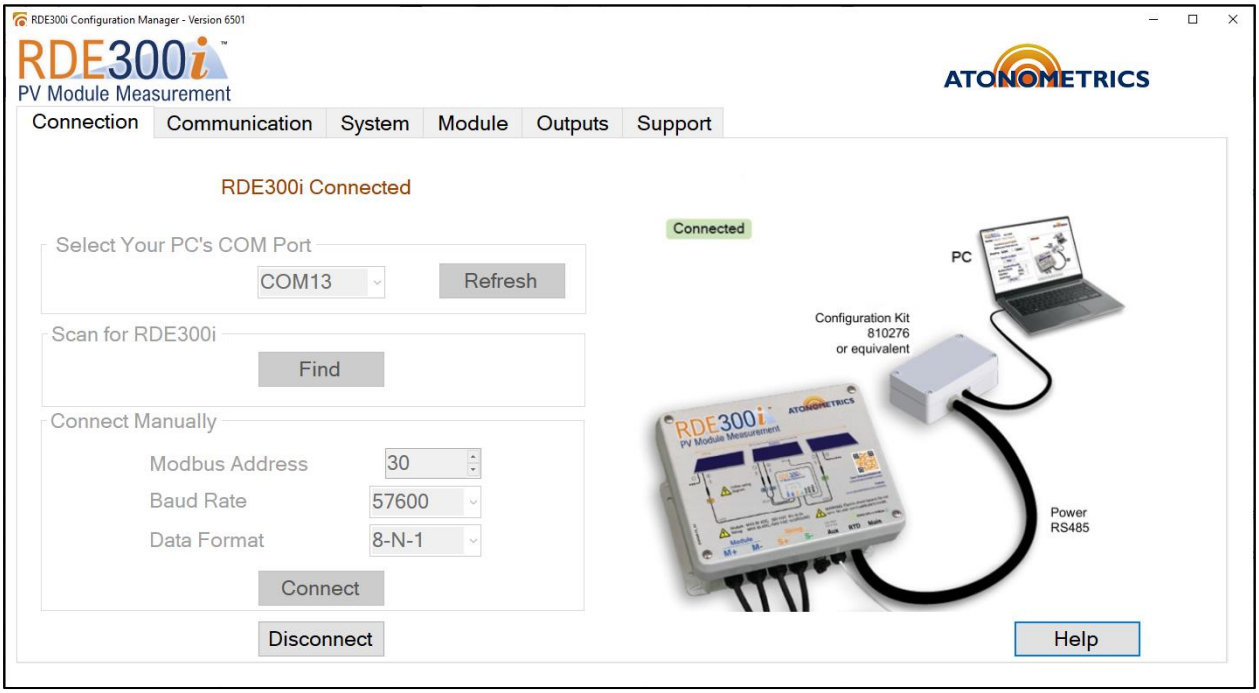


Figure 5-2: RDE300i Connected

5.1.2 Configure as Leader

To set the RDE300i to the Leader configuration, select the System tab, and select Leader from the Choose Device Configuration drop-down menu. If you are using multiple RDE300i Followers, reference 880096-01 Configuration and Normalization Guides for RDE300i Systems, otherwise set the dropdown labelled “RDE300i Followers” to 0. Then, select the number of RC22 and Mars units from their respective drop-down menus, as shown in **Figure 5-3**. Press Apply.

The diagram displayed on the tab illustrates how the Leader connects to the Aux devices.

The System Status box displays the operation status of the connected RDE300i Leader and Aux Devices as well as their part numbers, serial numbers, and installed firmware versions.

Note: When RDE300i is set to the Leader configuration, its Modbus communication parameters may be set by the user, but the Aux Devices must be operating at default parameters as shown in the diagram below.

Note: If using RDE300i units as Followers, see the Configuration and Normalization Guides for RDE300i Systems (880096-01).

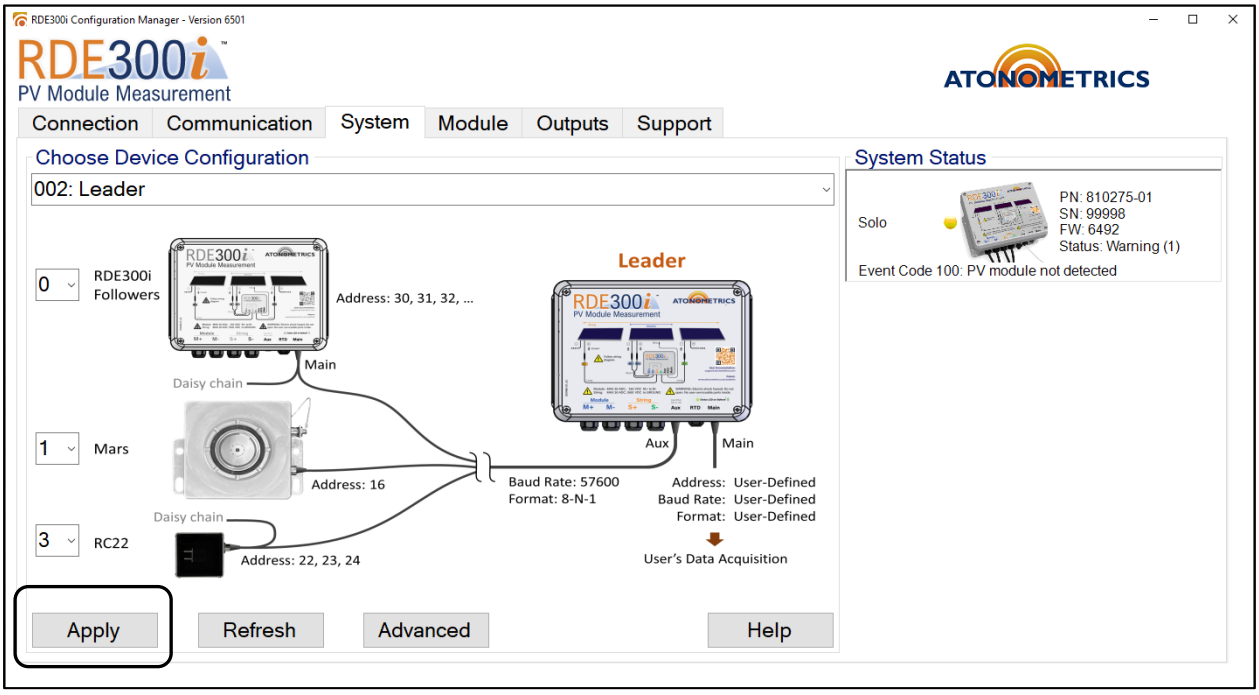


Figure 5-3: Setting Leader configuration

(Example for Module-Cell-Optical Bifacial Application)

5.2 Verify System Communication

Remain connected to the Leader unit.

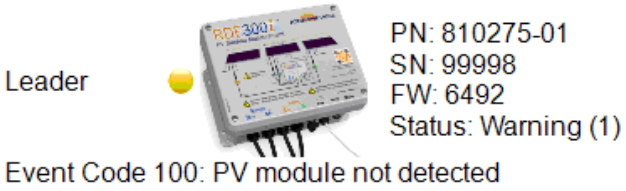
Select the System tab and verify that the Status is OK for the Leader and all Aux Device units as shown in **Figure 5-4**. (Status = Warning is also valid if not connected to a PV module.)

If Mars is included in your Aux Network, you may need to wait 2-5 minutes for communication to establish. A notification will be shown in the System Status panel as displayed in **Figure 5-5.**

The System Status box displays whether communication from the Leader to the Aux Devices is working properly and displays the operation status of the Leader and Aux Devices as well as their part numbers, serial numbers, and installed firmware versions.

Note: If an Aux Device is not properly configured or connected, its status may be displayed with an error in the System Status box. To resolve this condition, ensure that the Leader and Aux Devices are connected, and that the Leader unit is properly configured.

If you are not connected to a PV module, you will see a yellow indicator, “Status: Warning (1)”, and “Event Code 100: PV module not detected” in the system status box. This is okay for all of Section 3 Configuration.



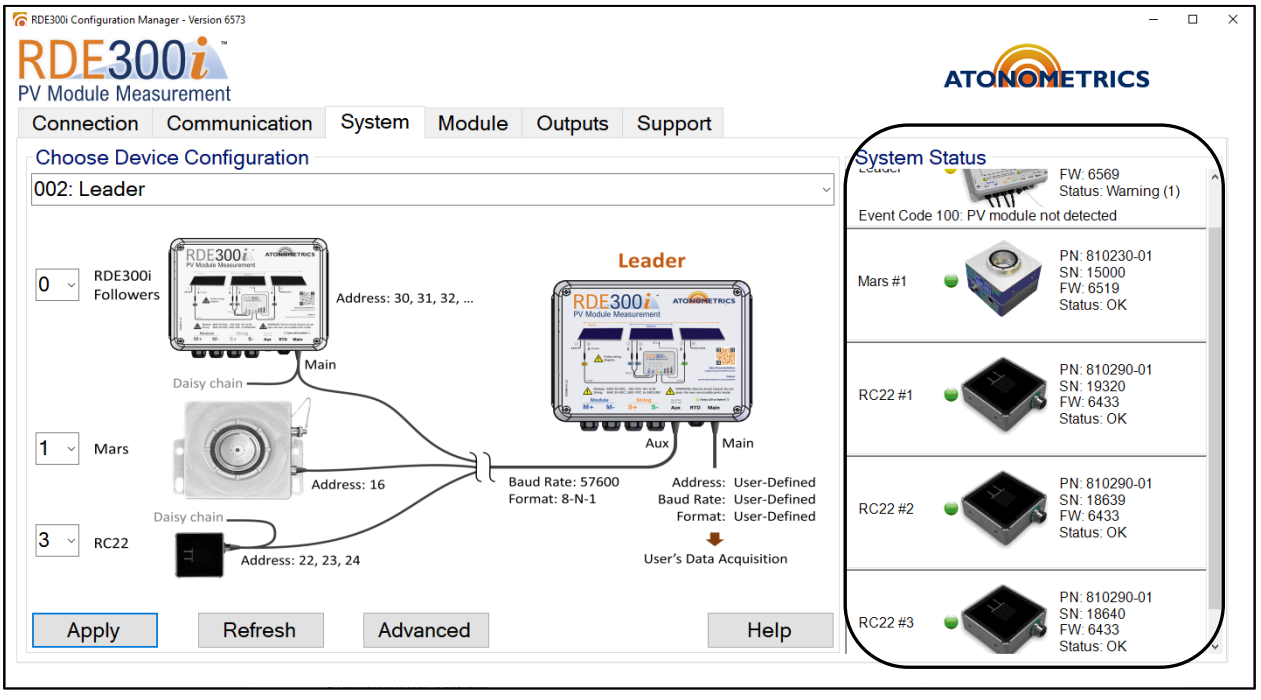


Figure 5-4: Verifying communication between Leader and Aux Devices (Example for Module-Cell-Optical Bifacial Application)

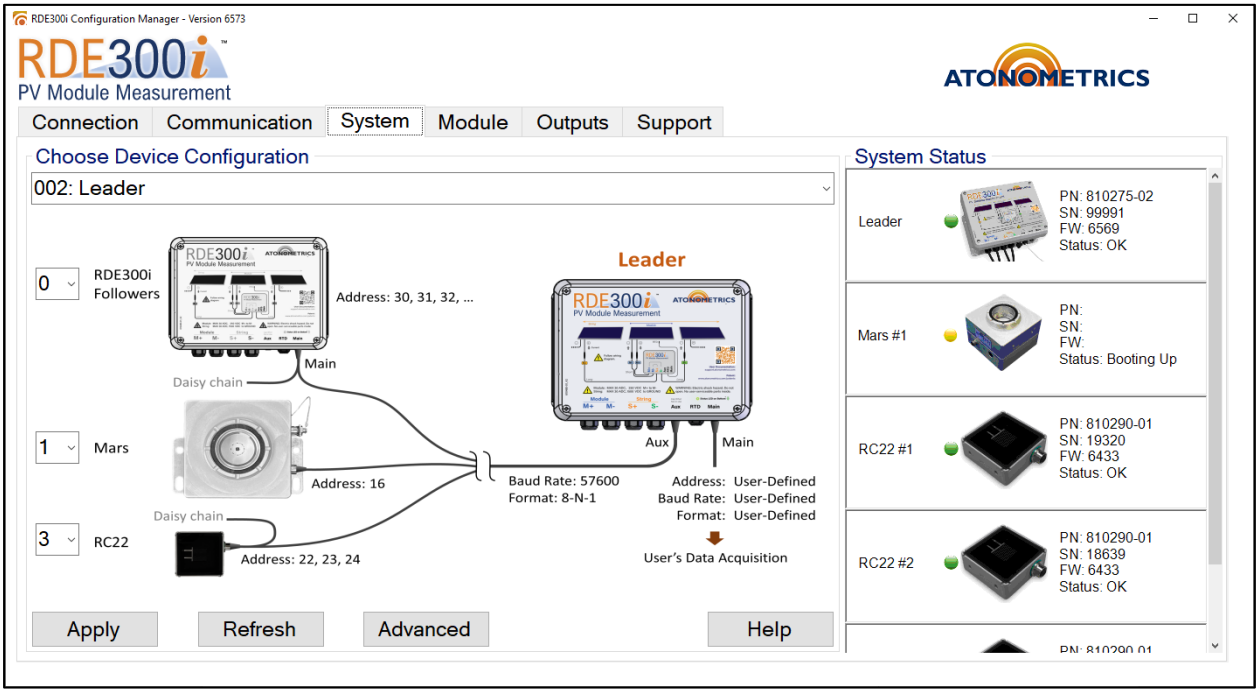


Figure 5-5: Mars bootup notification shown in the System Status panel.

5.2.1 Set Module Parameters

RDE300i needs calibration data on its connected PV module to calculate performance metrics.

Calibration parameters include the modules' short-circuit current (Isc) and maximum power (Pmax) at reference conditions of irradiance and temperature.

Typically reference irradiance and temperature are standard test conditions (STC) of 1000 W/m2 and 25 °C, but other conditions may be used. Isc and Pmax temperature coefficients must also be provided.

You may use datasheet information for the Module parameters or obtain these parameters from a calibration report, if available.

For bifacial modules, it is important to enter the module's bifaciality factor. This may be found on the module datasheet.

Select the Module tab to set these values, as shown in **Figure 5-6**. Enter the module parameters and press Apply.

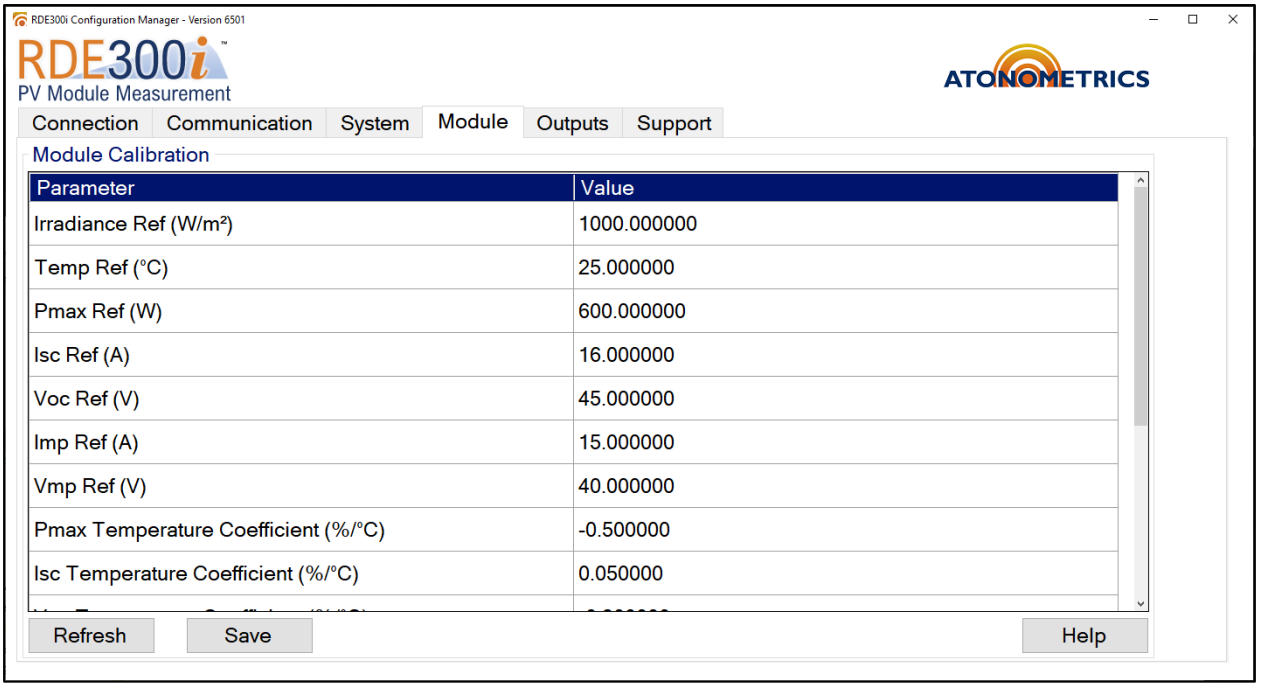


Figure 5-6: Setting Module Parameters

5.2.2 Set Leader Communication Options

Your RDE300i unit's default Modbus serial communication parameters for its Main communication port are Address = 30, Baud Rate = 57600, and Data Format = 8-N-1 (8 data bits, no parity, 1 stop bit).

To update the communication parameters, use the Communication tab of RDE300i Configuration Manager, shown in **Figure 5-7**.

Enter your new parameters in the Update Modbus Settings box and press Apply to transmit these to the unit. These are the communication parameters that you will use with your data logger or SCADA system to communicate with the Leader unit.

Addresses from 1 to 247 are allowed.

Supported baud rates are 9600, 19200, 38400, 57600, and 115200.

Supported data formats are 8-N-1, 8-N-2, 8-E-1, and 8-O-1.

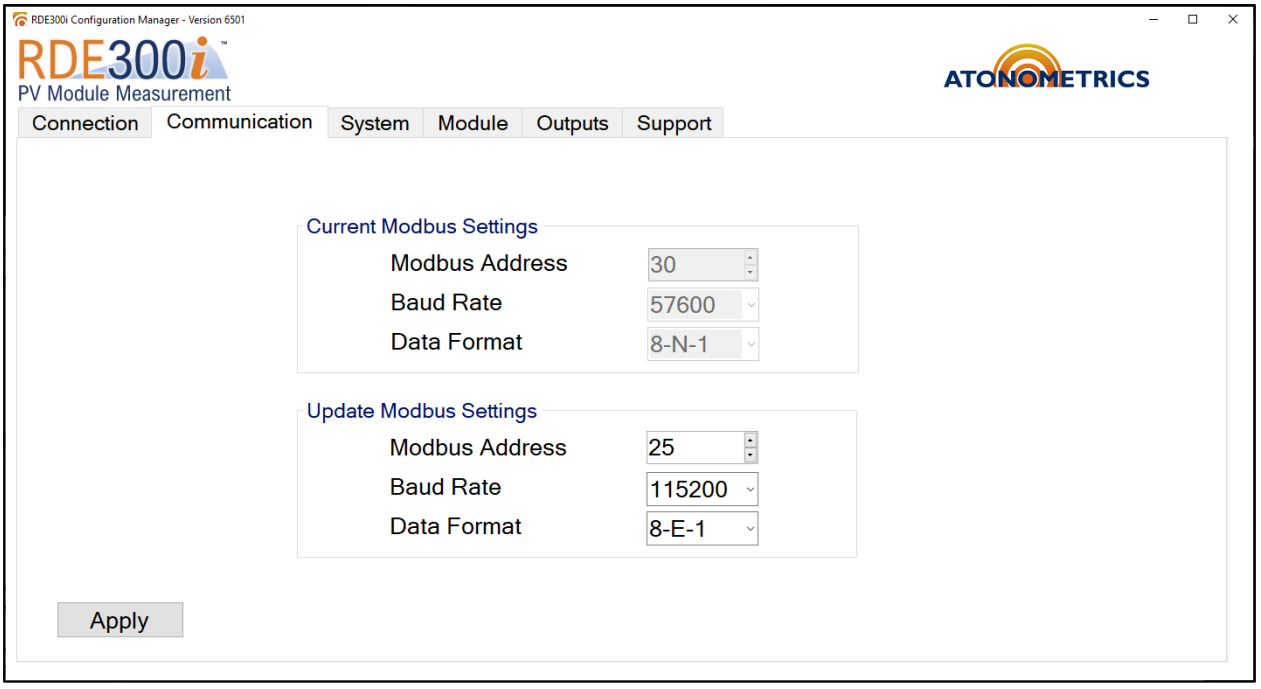


Figure 5-7: Setting Leader communication parameters

Note: If performing configuration in an office environment, this is your last step. Remove the Aux cables and Configuration Kit. The following sections must be completed in the field.

6 Equipment Installation

Refer to the RDE300i User Guide (880093) for the installation procedure and wiring instructions to install your system.

See **Figure 6-1** through **Figure 6-4** below for our recommended field layout for the various system configurations. For more information on system configuration options, see document 880100.

Ensure the RC22 unit(s) and Mars unit, if deployed, are at the same tilt angles as the PV module to which the Leader is connected, preferably within 0.5 degrees. Use a handheld inclinometer to confirm. Check the tilt in both directions across each device. If necessary, remount the device.

WARNING: Follow all installation and wiring instructions per the RDE300i User Guide (880093). Failure to follow instructions properly may result in serious damage to the product or connected equipment and/or hazards to human health and safety.

For **Module-Cell Monofacial** system configurations:

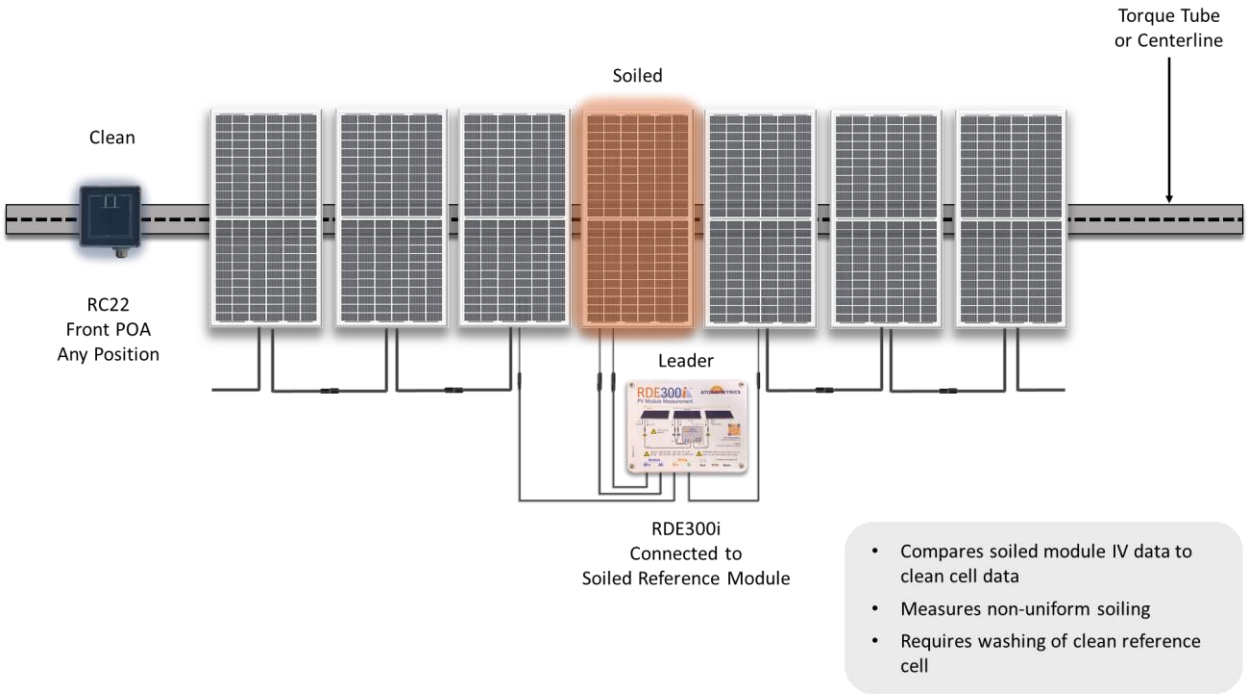


Figure 6-1: Module-Cell Monofacial System

- The RC22 unit should be routinely cleaned.
- The RC22 unit should be mounted so it is front-facing and coplanar with the PV module connected to the Leader.
- The RC22 unit will serve as a clean reference for the Leader.

- The PV module connected to the Leader should be allowed to soil in the same way as other modules in the PV array.

For **Module-Cell Bifacial** system configurations:

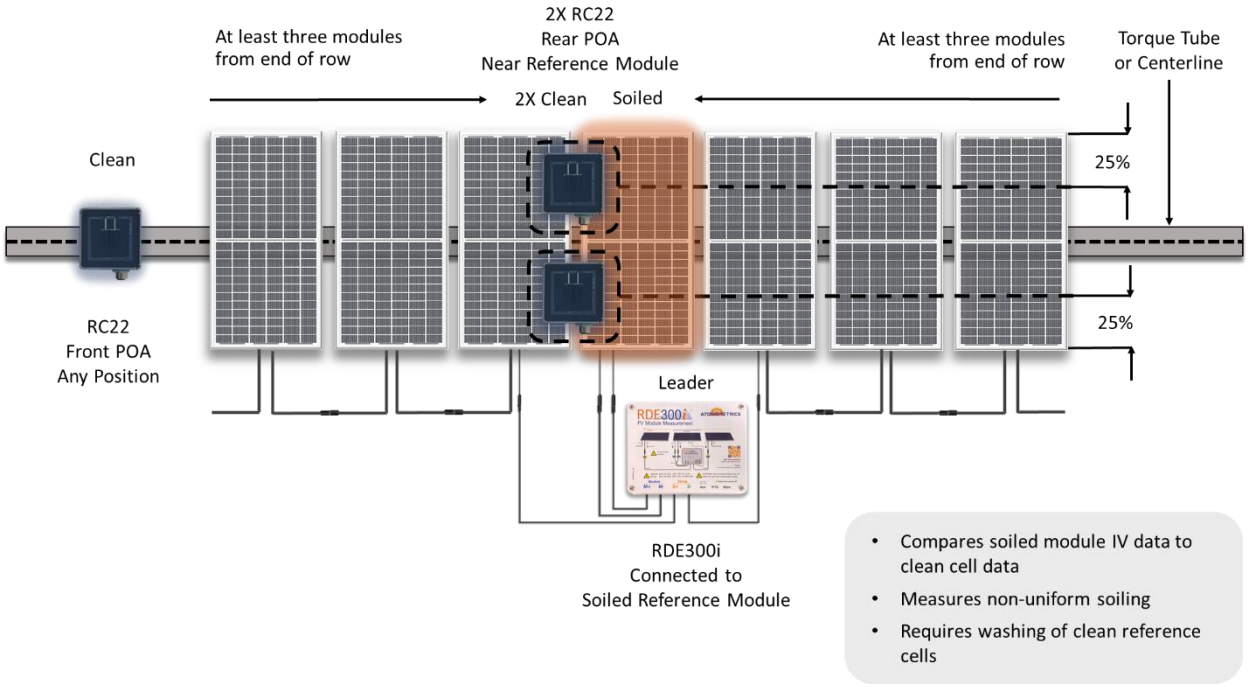


Figure 6-2: Module-Cell Bifacial System

- The RC22 units should be routinely cleaned.
- One RC22 should be mounted so that it is front-facing and coplanar with the PV Module to which the Leader unit is connected.
- Two RC22 units should be mounted so that they are rear-facing and coplanar with the PV Module to which the Leader unit is connected. One RC22 unit should be mounted on the East side and the other on the West side on the rear of the PV Module.
- The data from the RC22 units will be used together to produce a reference for the Leader.
- The PV module connected to the Leader should be allowed to soil in the same way as other modules in the PV array.

For **Module-Cell-Optical Monofacial** system configurations:

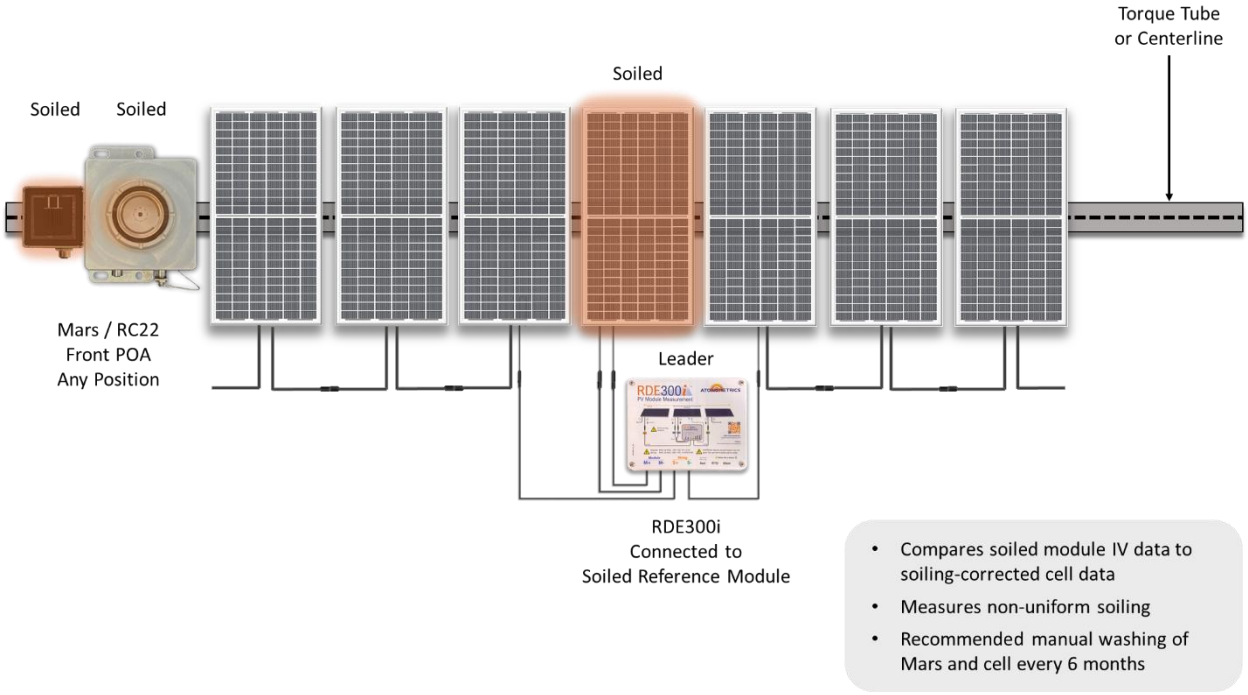


Figure 6-3: Module-Cell-Optical Monofacial System

- No routine washing required.
- The RC22 unit and Mars unit should be mounted so they are front-facing and coplanar with the PV module connected to the Leader.
- The data from the RC22 unit and Mars unit will be used to produce a reference for the Leader.
- The PV module connected to the Leader should be allowed to soil in the same way as other modules in the PV array. Clean Mars and the RC22 unit only when the PV modules are cleaned. A 6-month washing period for RC22 and Mars units is recommended.

For **Module-Cell-Optical Bifacial** system configurations:

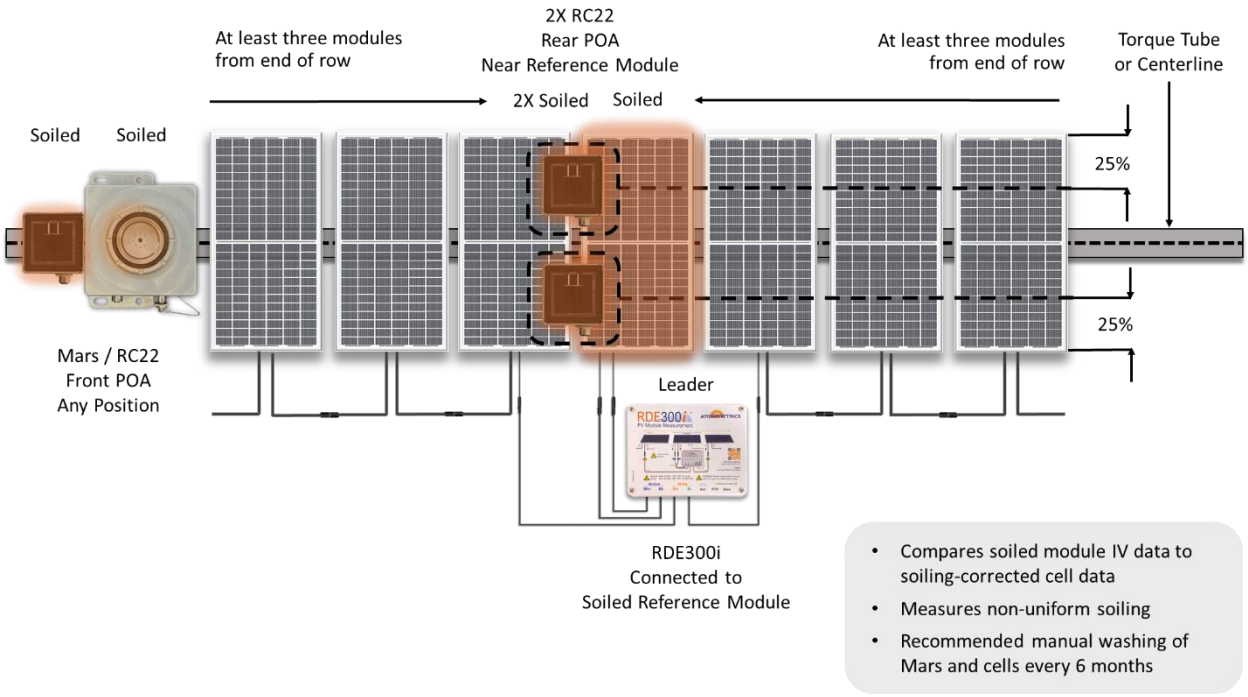


Figure 6-4: Module-Cell-Optical Bifacial System

- No routine washing required
- The data from the RC22 units and Mars unit will be used to produce a reference to the Leader.
- One RC22 should be mounted so that it is front-facing and coplanar with the PV Module to which the Leader unit is connected.
- Two RC22 units should be mounted so that they are rear-facing and coplanar with the PV Module to which the Leader unit is connected. One RC22 unit should be mounted on the East side and the other on the West side of the PV Module.
- The PV module connected to the Leader should be allowed to soil in the same way as other modules in the PV array. Clean Mars and the RC22 units only when the PV modules are cleaned. A 6-month washing period for RC22 and Mars units is recommended.

7 Verify System Operation

If not already connected, repeat the steps in **Section 5.1.1** to connect to the RDE300i Leader unit. Select the System tab and ensure that the Status is OK for the Leader and your Aux Devices, as shown in **Figure 7-1**.

Note: If an Aux Device is not properly configured or connected, its status may be displayed with an error in the System Status box. To resolve this condition, ensure that the Leader and Aux Devices are connected and properly configured.

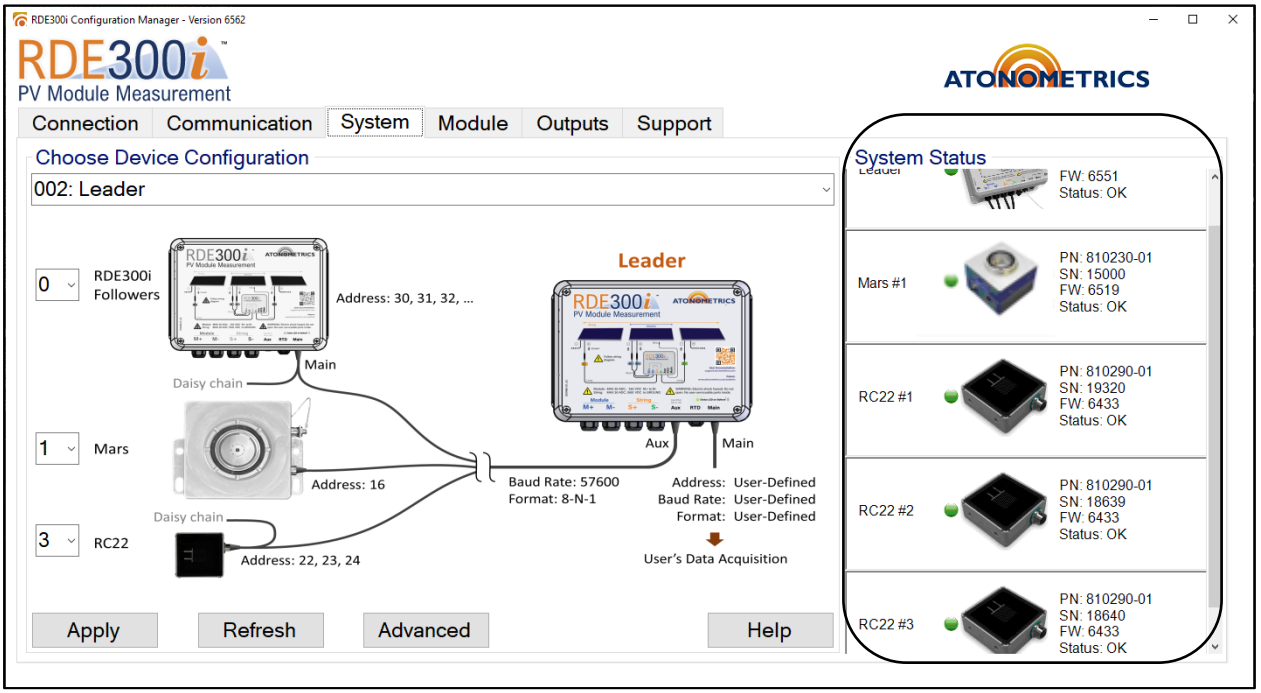


Figure 7-1: Verifying system operation between Leader and Aux Devices

Select the Outputs tab to check the measurement results from your system, as shown in **Figure 7-2** and **Figure 7-3**.

The tab displays the most recently measured IV curve and the most recent readings of all the measured and calculated parameters, including Pmax, Isc, module voltages and currents, string data, irradiance, performance indices, and more. Scroll through the tab to examine all the parameters.

The Leader's data are displayed as Module 1 and the Aux Device's data are displayed below that as Mars 1, RC22 1, etc. Ensure data are updating for each Aux Device.

All the data displayed on the Outputs tab are available for data acquisition via the Modbus interface.

In the Outputs tab, check that the module Isc, Pmax, and Total Effective Irradiance values are periodically updated (every 2-60 seconds, depending on configuration options) for the Leader unit, and that reasonable values are being reported, as shown in **Figure 7-2** and **Figure 7-3**.

Note: If values are not being updated, ensure that all Aux Devices are connected to the Leader, and the Leader is connected to its respective PV module.

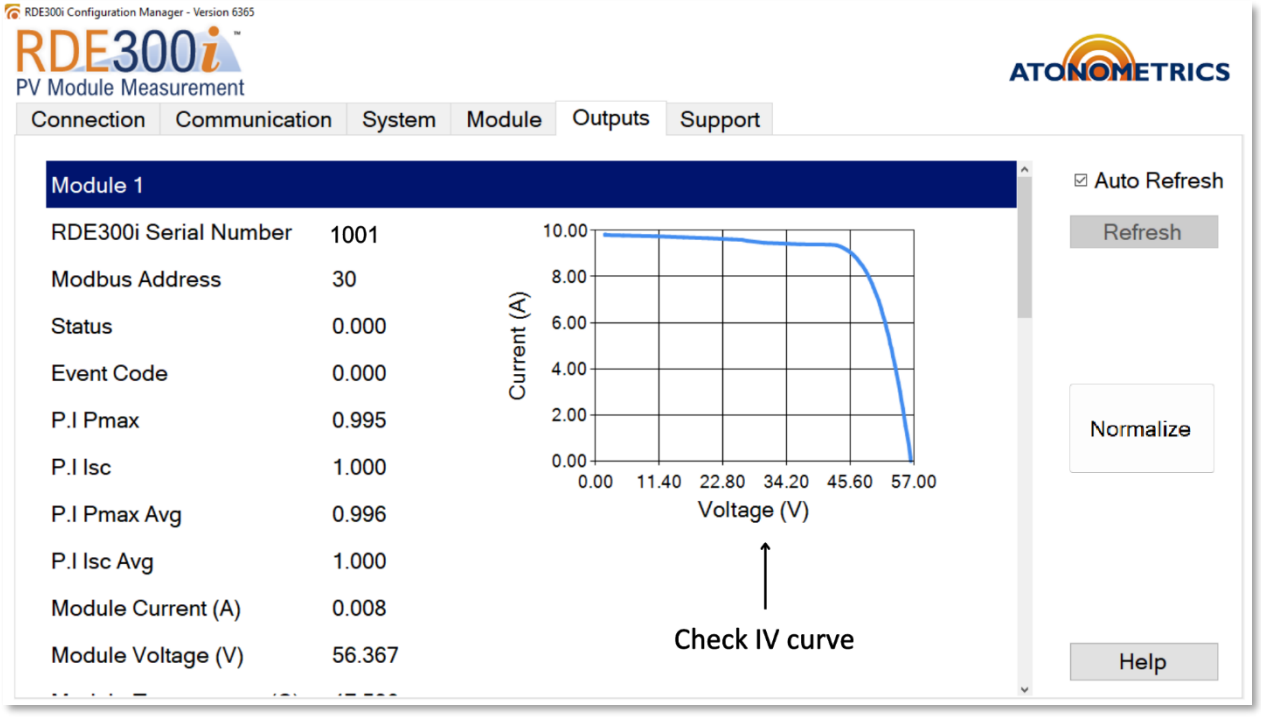


Figure 7-2: Checking output data and IV curves

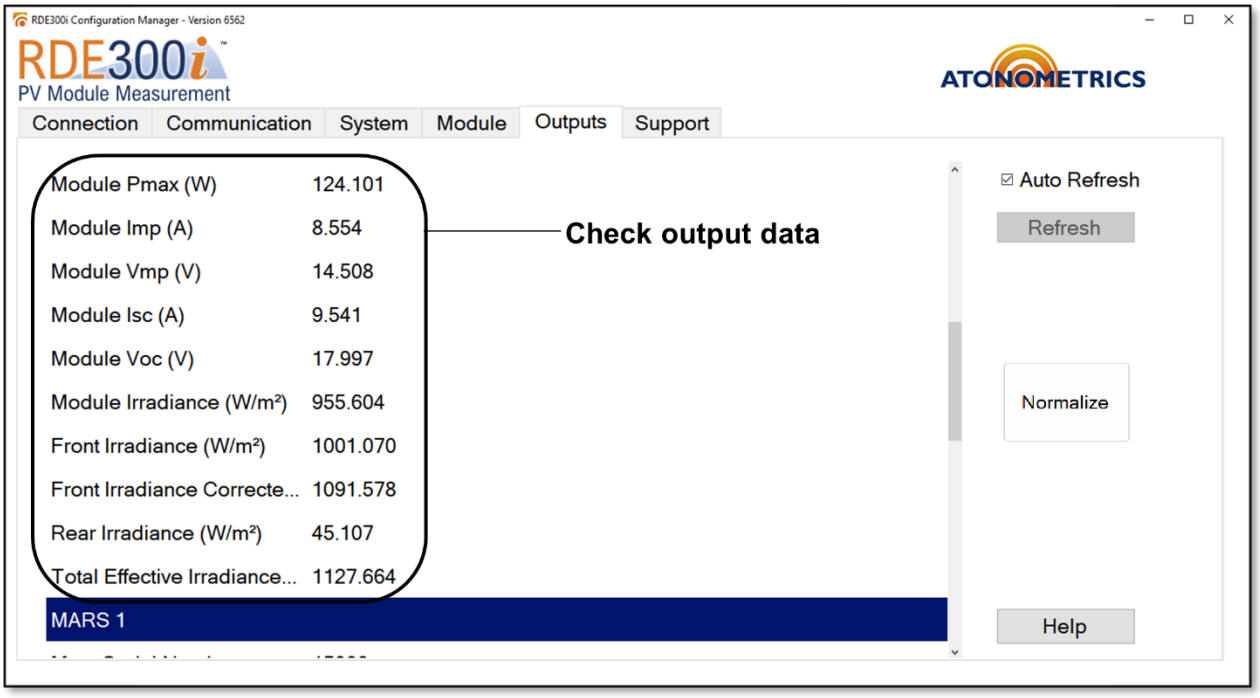


Figure 7-3: Check output data gathered from the module and Aux Devices

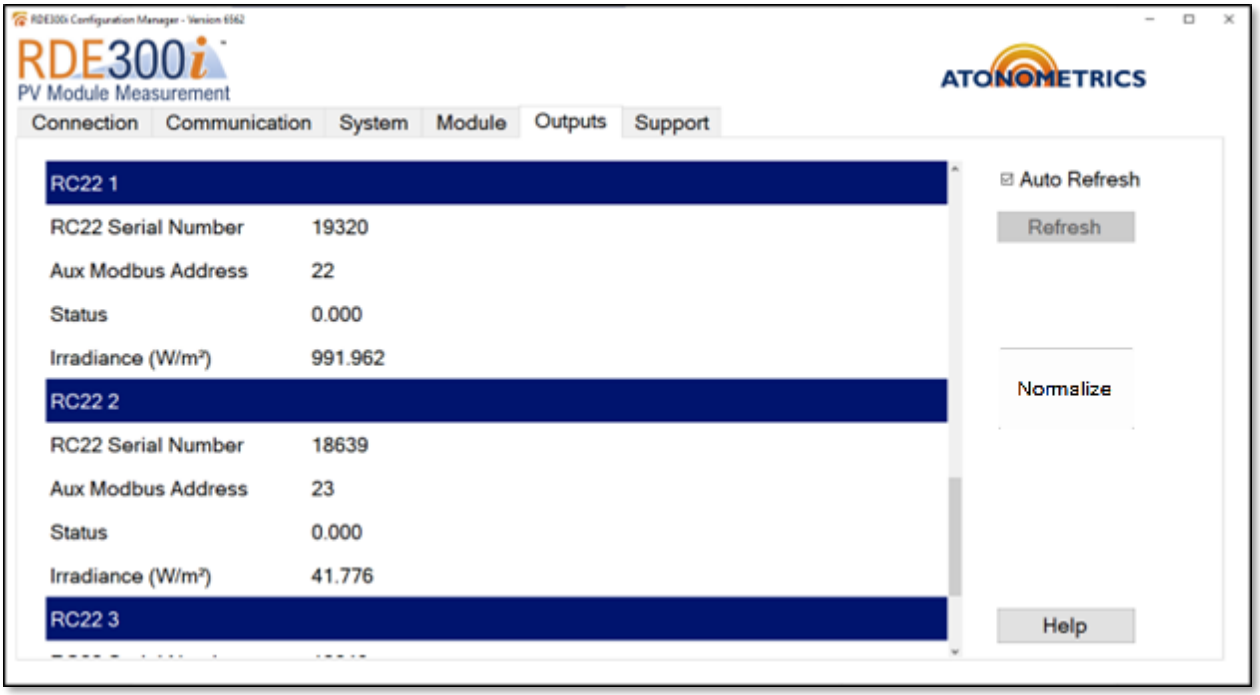


Figure 7-4: Check data gathered from Aux Devices

8 Normalization

8.1 Objective

The purpose of normalization is to support measurement of performance indices by comparing modules with a reference.

Normalization can be done through the configuration manager locally (**Section 8.3**) or remotely (**Section 8.4**).

Note: Performance indices represent the measured output of each module compared to expectations from the rated module parameters normalized for irradiance. For more information on Performance Index calculations, see the RDE300i User Guide.

8.2 Wash Modules

Before normalizing your soiling system, thoroughly clean the module connected to the Leader RDE300i, thoroughly clean the RC22 unit(s), and thoroughly clean the Mars unit (if present). This will directly affect the normalization process. For bifacial gain applications, cover the rear side of the Leader's PV module.

Washing can be done the day you plan to normalize or the day before you plan to normalize, as long as the modules remain clean when you start the normalization process.

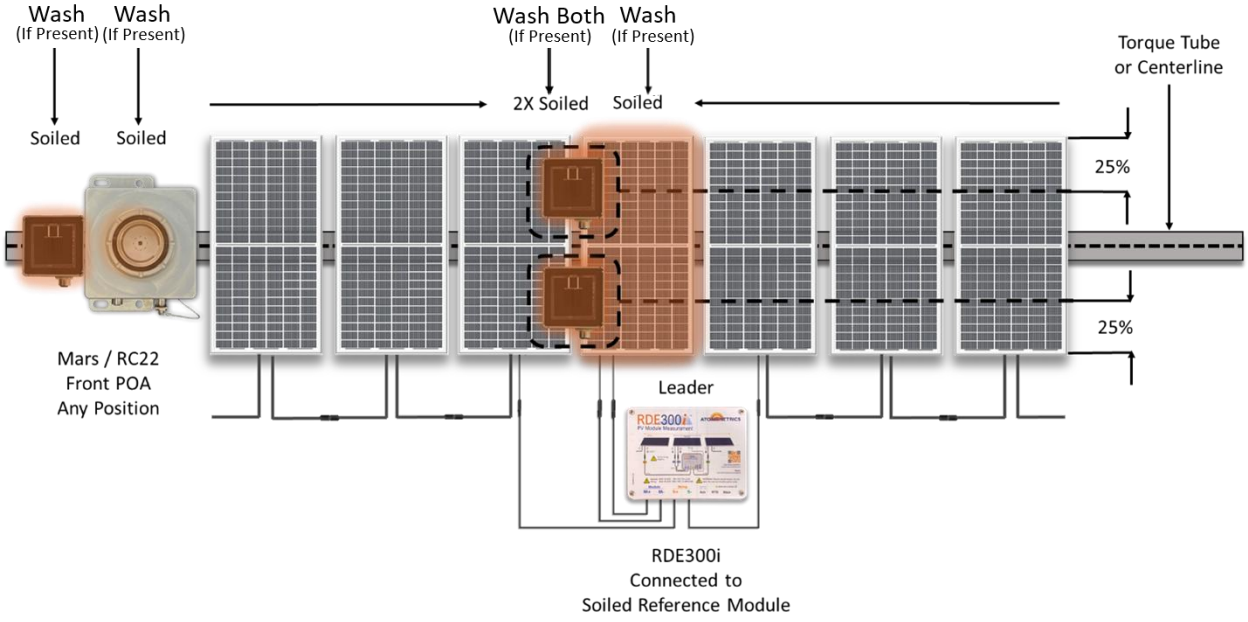


Figure 8-1: Module and auxiliary devices that require washing before Normalization

8.3 Perform Normalization Locally

In this section, we give directions on performing a normalization in the field with RDE300i Configuration Manager.

Before initiating the normalization process, **ensure that it is a clear sunny day, ensure the plane of array (POA) irradiance is higher than 500W/m2, and ensure the modules are clean (refer to Section 8.2).** Additionally, the angle of incidence to the sun should be small, preferably less than 35 degrees.

Connect to the leader RDE300i and verify the firmware on all units is up to date. If not, it is recommended that all units in your soiling system be updated with latest revision of firmware.

The normalization process takes about 20 minutes in total (two 10-minute stages).

In the Outputs tab, click the “Normalize” button, as shown in **Figure 8-2**. This initiates an automated normalization process. A progress bar will appear with a 10 minute timer countdown.

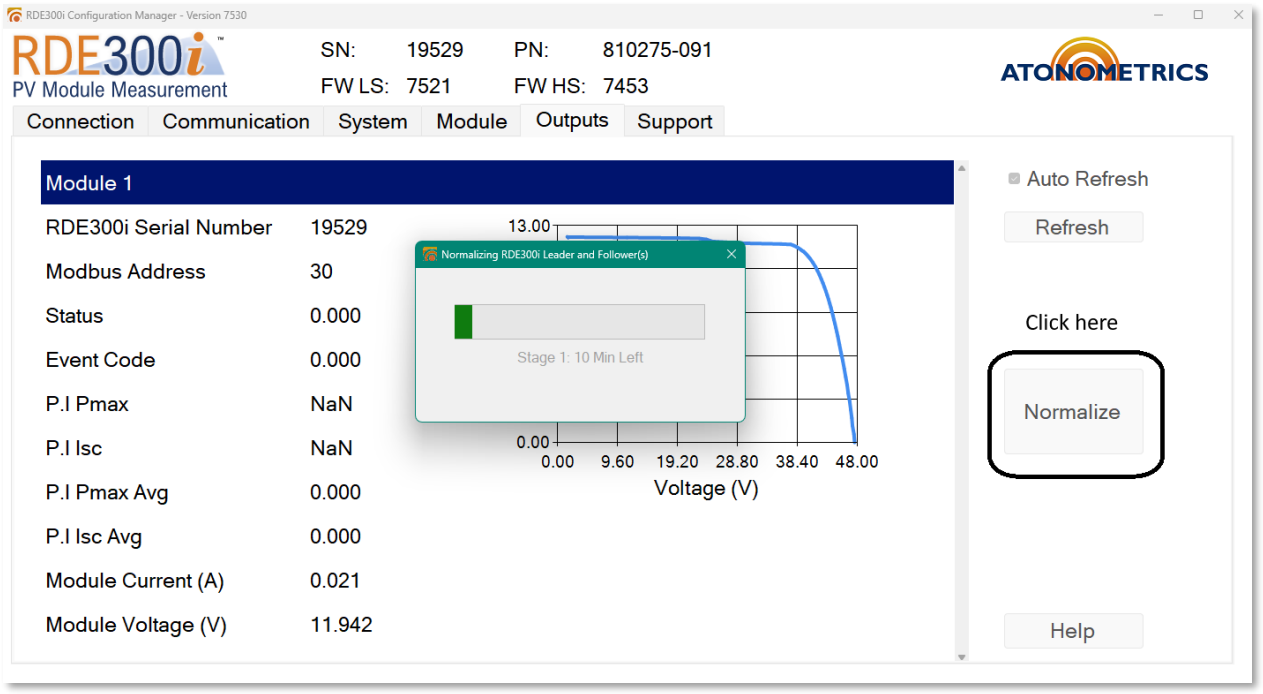


Figure 8-2: Initiate Normalization

Stage one resets normalization data and then collects baseline data. After the ten minutes in stage 1, stage 2 will begin as shown in **Figure 8-3**.

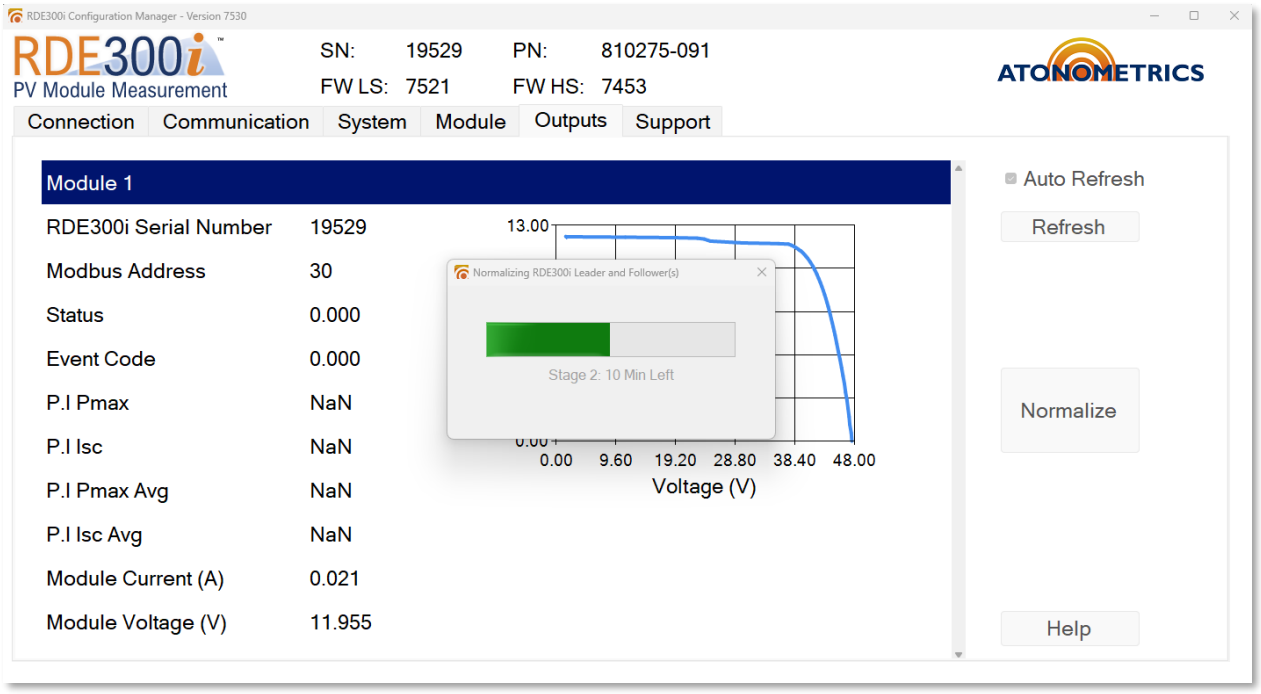


Figure 8-3: Stage 2 Normalization Progress Bar

Stage 2 sets new normalization constants and collects test data to evaluate normalization. At the end of stage two, a success message will show if there were no issues with the normalization process as shown in **Figure 8-4**. An error message will show if the normalization process fails at any point. If normalization factors or performance indices are not within limits, a warning message will show at the end of the 20 minute normalization period.

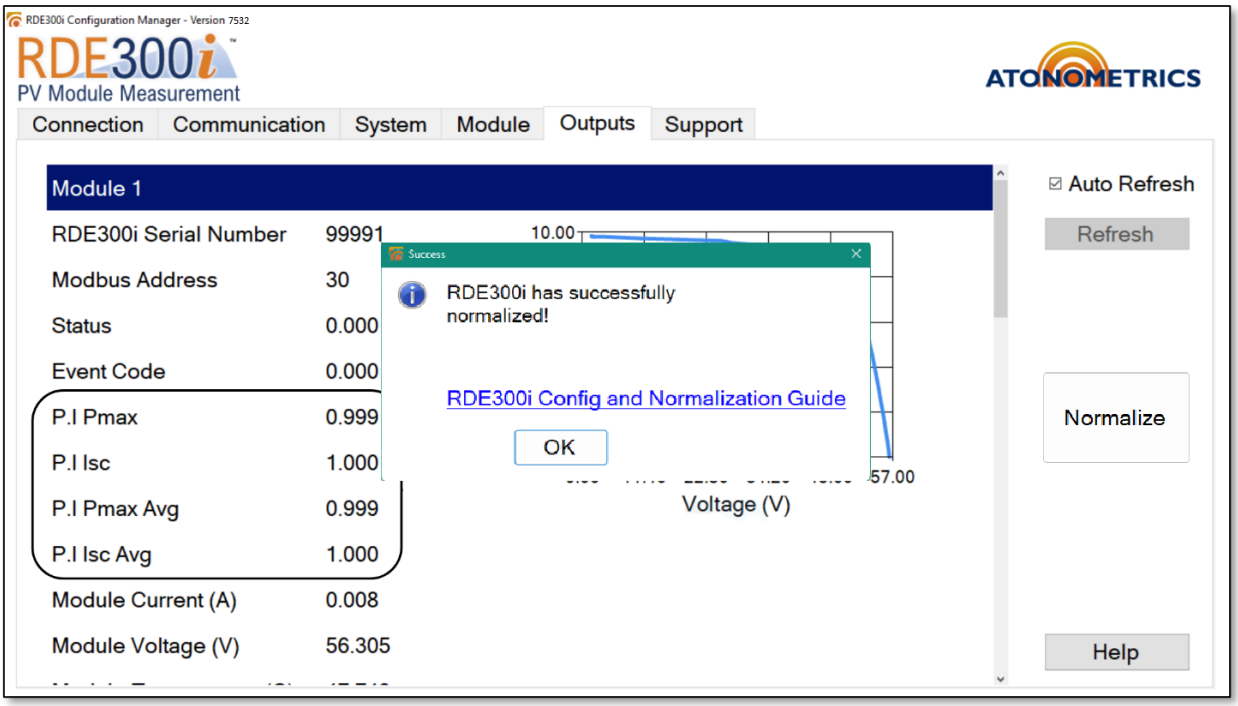


Figure 8-4: Normalization Success

Note: Unstable irradiance conditions negatively affect the normalization process.

Note: The normalization process must be completed on a clear sunny day, plane of array (POA) irradiance should be higher than 500W/m2, and solar angle of incidence to the modules less than 35 degrees.

The configuration and normalization of your RDE300i Module-Cell or Module-Cell-Optical system is complete. The system is ready to go!

8.4 Perform Normalization Remotely

In this section, we explain how to perform a normalization remotely. With this feature, multiple different soiling stations can be normalized in parallel without having technicians present at each station.

Before initiating the normalization process, **ensure that it is a clear sunny day, ensure the plane of array (POA) irradiance is higher than 500W/m2, and ensure the modules are clean (refer to Section 8.2).** Additionally, the angle of incidence to the sun should be small, preferably less than 35 degrees.

Remote normalization is supported using RDE300i firmware **R7521 and higher**. Writing the password, 6.566, to modbus register 103 will initiate an automated normalization process within RDE300i firmware. Refer to **Table 8-1** for additional normalization related registers. The normalization process takes 20 minutes.

The normalization trigger command can be sent directly by a SCADA system (**Figure 8-5**) or through a datalogger (**Figure 8-6**). **Section 8.4.1** demonstrates how to remotely normalize your soiling system using a the CR1000x data logger from Campbell Scientific.

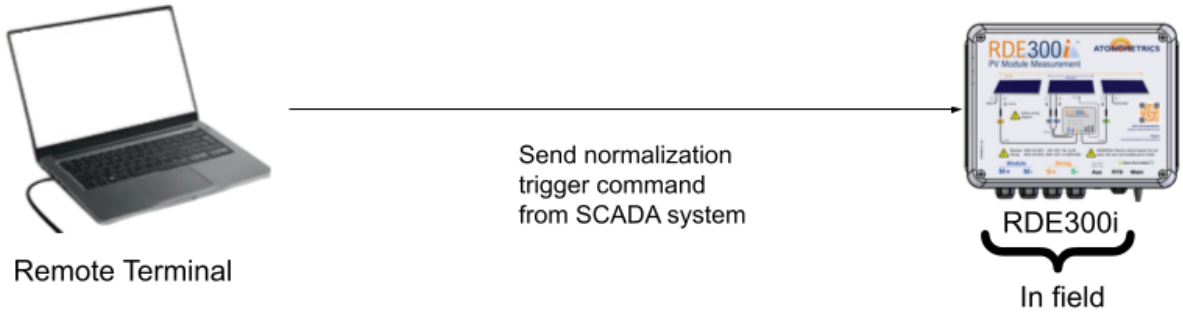


Figure 8-5: Performing Normalization remotely via direct access

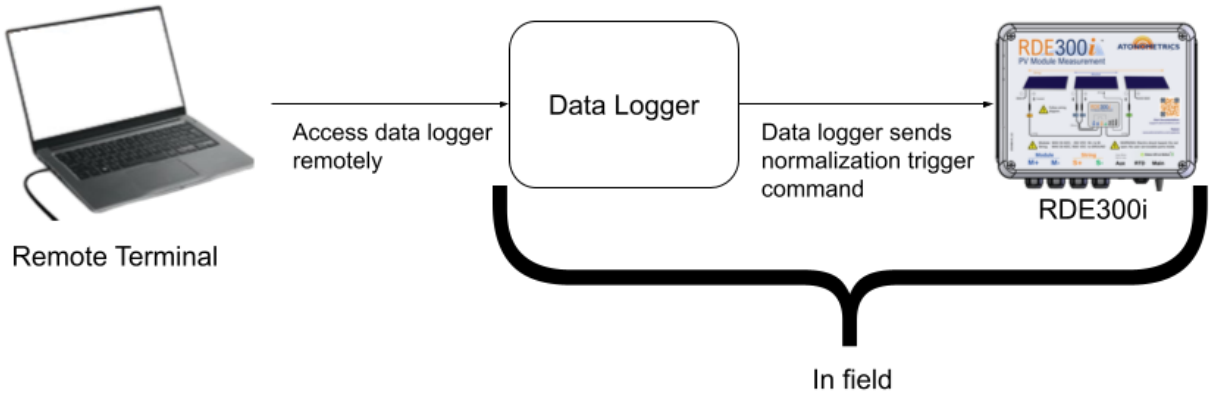


Figure 8-6: Performing Normalization with a data logger

Table 8-1: Normalization Modbus Registers

Parameter	Reg. Start	Count	Data Type	Read/ Write	Notes
Normalization Trigger	103	2	Float	Write	Write 6.566 to trigger remote normalization
Normalization Status	1701	2	Float	Read/ Write	-1 = Normalization Error 0 = Normalization Inactive 1 = Normalization In Progress 2 = Normalization Success 3 = Normalization Warning Writing anything to this register resets the returned value to 0.
Normalization Code	1703	2	Float	Read/ Write	If normalization status = 3 or -1, refer to **Table 8-2** for the recommended actions for a normalization code. Writing anything to this register resets the returned value to 0.

Table 8-2: Normalization code meanings (warnings and errors)

Normalization Code	User Action
0	Success. If normalization was just completed, then the unit is normalized and no further action is required.
1	Error. Issue with flash. Try again and then contact support.
2, 3, 5	Error. Verify connection with follower(s) or other auxiliary units. Try again and then contact support.
4, 6, 7	Error. Verify module parameters were set correctly, verify irradiance is above the threshold set in the advanced configuration options found in the “System” tab of RDE300i Configuration Manager, and verify connection to follower(s) or other auxiliary devices. Try again and then contact support.
8-11	Normalization completed with a warning. Verify module parameters were set correctly, verify the weather is good for normalization, and verify the modules were washed properly. If everything looks good and this warning still appears, module current and power may be out of tolerance with set module parameters.

8.4.1 Remote Normalization Example

Below is an example of a simple method of remotely normalizing an RDE300i via a CR1000x datalogger. Our example data logger code contains the commands for initiating remote normalization for this model of datalogger. You will need PC400 software from Campbell Scientific as well as a CR1000x datalogger to follow this example.

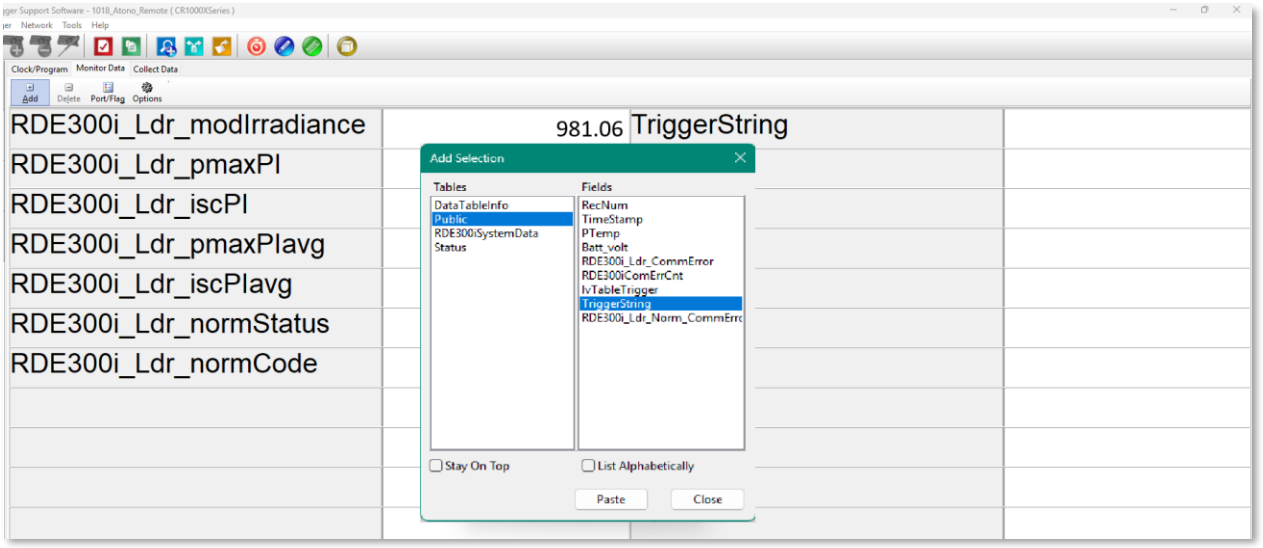


Figure 8-7: Adding a Public Variable to the Outputs Table

The example code has a public variable that can asynchronously control when the remote normalization command is sent to your RDE300i called “TriggerString”. **Figure 8-7** shows how to add this public variable to the “Monitor Data” page of your PC400 application. Typing an “N” in the column next to the “TriggerString” (same row) public variable and pressing enter will send the normalization command to your RDE300i. The cell will turn yellow as shown in **Figure 8-8**.

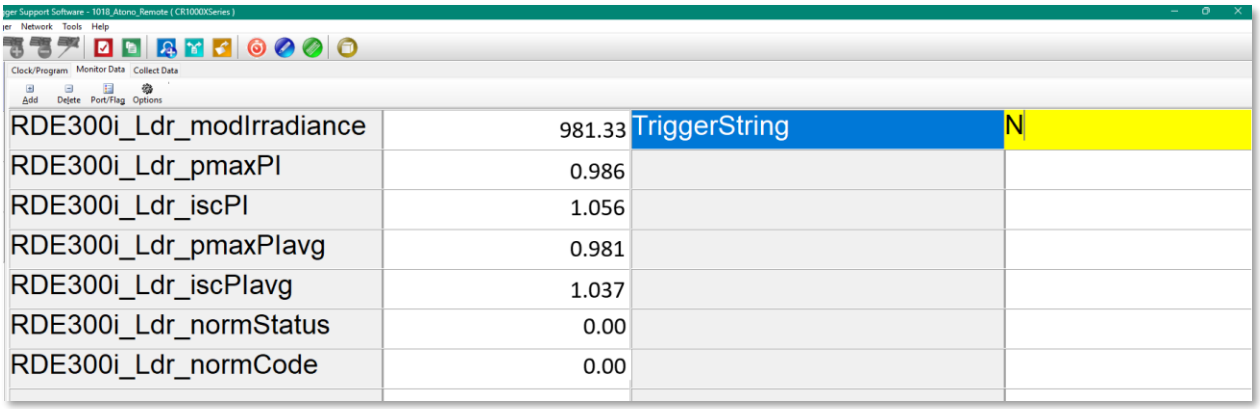


Figure 8-8: Triggering Normalization

After pressing enter, the letter you typed in will disappear, performance indices will show “NAN”, transmission loss will be reset to 0 (if auxiliary MARS is present), and norm status will change to 1 as shown in **Figure 8-9**.

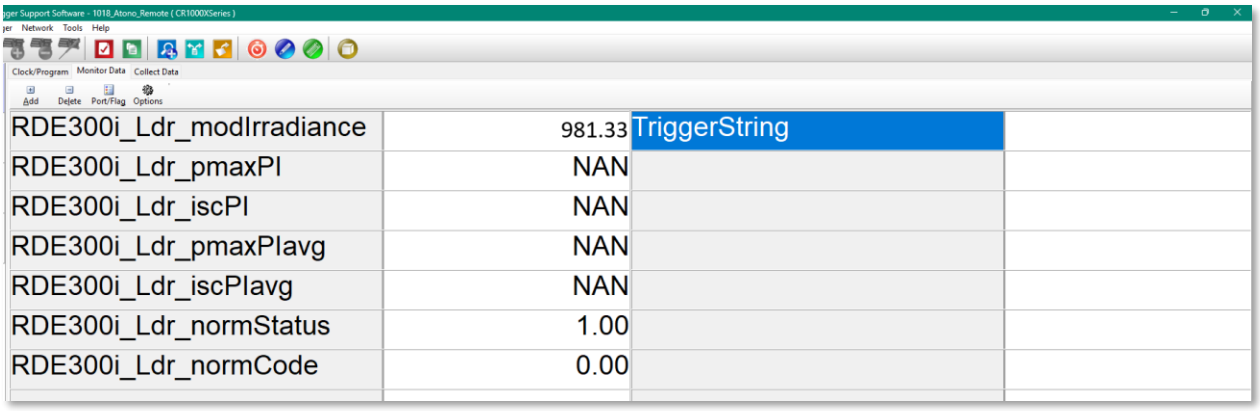


Figure 8-9: Outputs After Triggering Normalization

Note: After ten minutes, warnings can appear, but normalization cannot be restarted until the full twenty-minute normalization period has passed. Normalization can be restarted any time after an error appears.

After approximately 20 minutes, normalization will be completed. If your RDE300i normalized without any issue your normalization status register will show a 2, the normalization code will stay 0, and the performance indices of the leader and all followers should read **1.000 +/- 0.010** as shown in **Figure 8-10**.

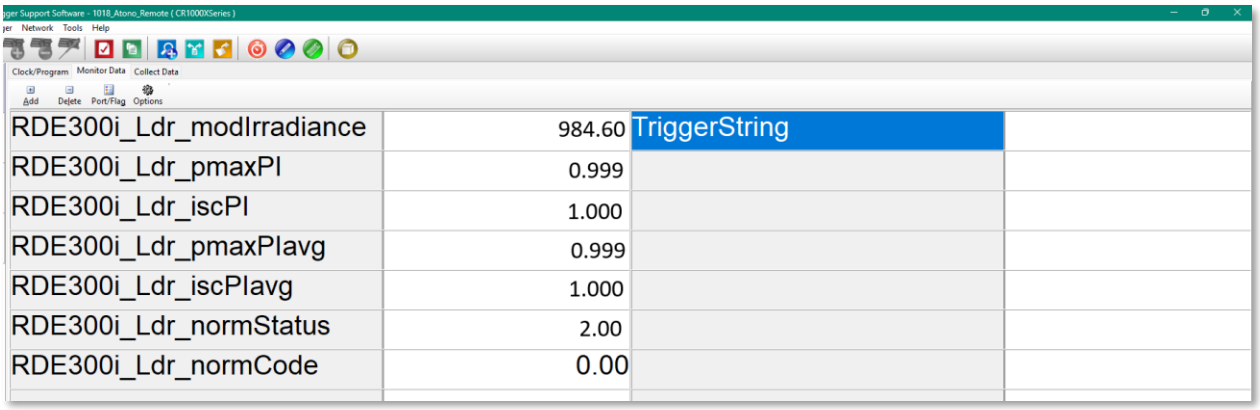


Figure 8-10: Successful Normalization Example

If the normalization failed, normalization status will show a -1 and normalization can be reattempted. If normalization status is 3 (warning) or -1, check the normalization code and refer to **Table 8-2** for the meaning of the normalization code and the recommended action. Depending on the warning code, a normalization status of 3 could appear even if the performance indices are within limits. The normalization status and code registers can be reset back to 0 by writing an “R” instead of an “N” in the “TriggerString” variable.

Note: Unstable irradiance conditions negatively affect the normalization process.

Note: The normalization process must be completed on a clear sunny day, plane of array (POA) irradiance should be higher than 500W/m2, and solar angle of incidence to the modules should be less than 35 degrees.

The configuration and normalization of your RDE300i Module-Cell or Module-Cell-Optical system is complete. The system is ready to go!