Application Note

Testing Modbus Communication on RDE300i

Modbus RTU (RS485)

Document Number 880098 Rev. A, April 2023

Table of Contents

1 Overview

This application note provides a guide on testing your RDE300i™ to verify Modbus communication using simple PC-based Modbus software. The instructions are intended to help you confirm proper Modbus communication settings prior to setting up communication to your own datalogger or SCADA system. These steps are optional and are provided for those who wish to verify communication using third-party software in addition to using the Atonometrics-provided RDE300i Configuration Manager.

To follow instructions in this guide, you will need:

- RDE300i unit

- Configuration Kit for RDE300i (PN 810235-01 or 810276)

- PC with USB port

- RDE300i Configuration Manager software from Atonometrics (PN 500092)

- Modbus Poll software from Witte Software

2 Check Unit with Configuration Manager

2.1 Hooking Up Your RDE300i

Before testing your RDE300i™ with the third-party Modbus Poll software, we will connect to it using the Atonometrics RDE300i Configuration Manager to confirm the device is working and ensure all communication settings are known.

Connect the RDE300i to your PC through a USB port using the Configuration Kit described in the RDE300i User Guide. See the section titled "Configuration" and follow the instructions there.

2.2 Check RDE300i Communication Parameters

Following the instructions from the RDE300i User Guide, open the RDE300i Configuration Manager. Select the COM port that your RDE300i is plugged into, and press "Find:"
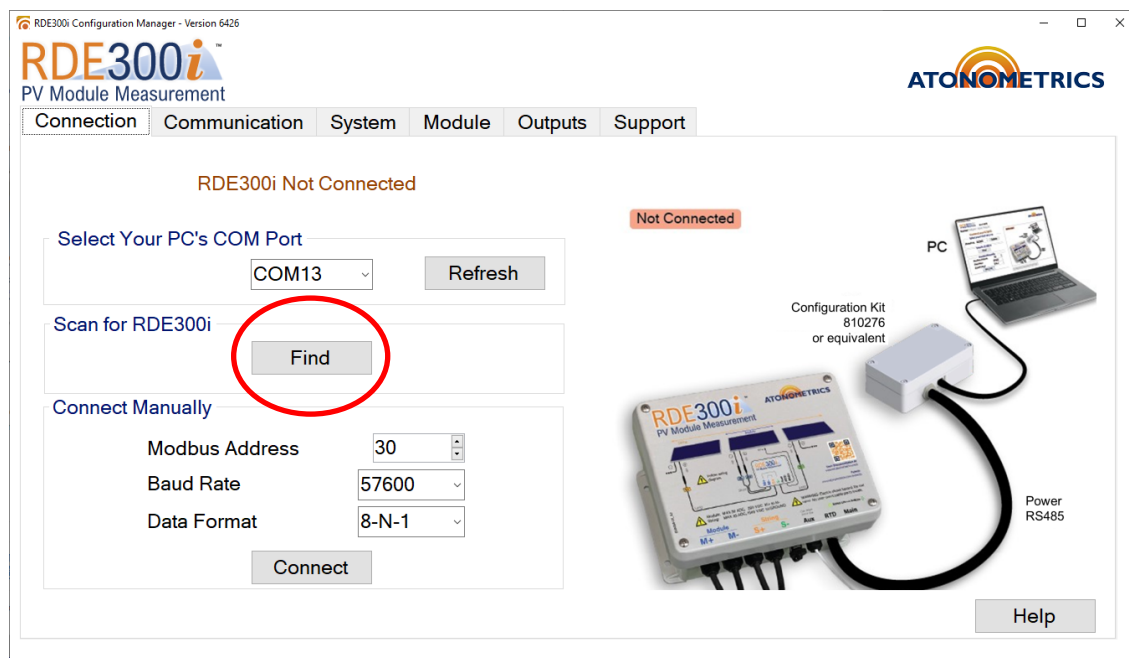

Note: Your computer may have multiple COM ports. If you are unsure which one is connected to the RDE300i, try disconnecting the Configuration Kit, checking the COM ports list, then reconnecting the configuration kit and checking the COM ports list again.

Note: RDE300i units are shipped from Atonometrics with a default Modbus Address and Data Format. The default address of 30 is shown when the Configuration Manager starts. When using the Find button, the software will detect the RDE300i at its actual address and communication settings.
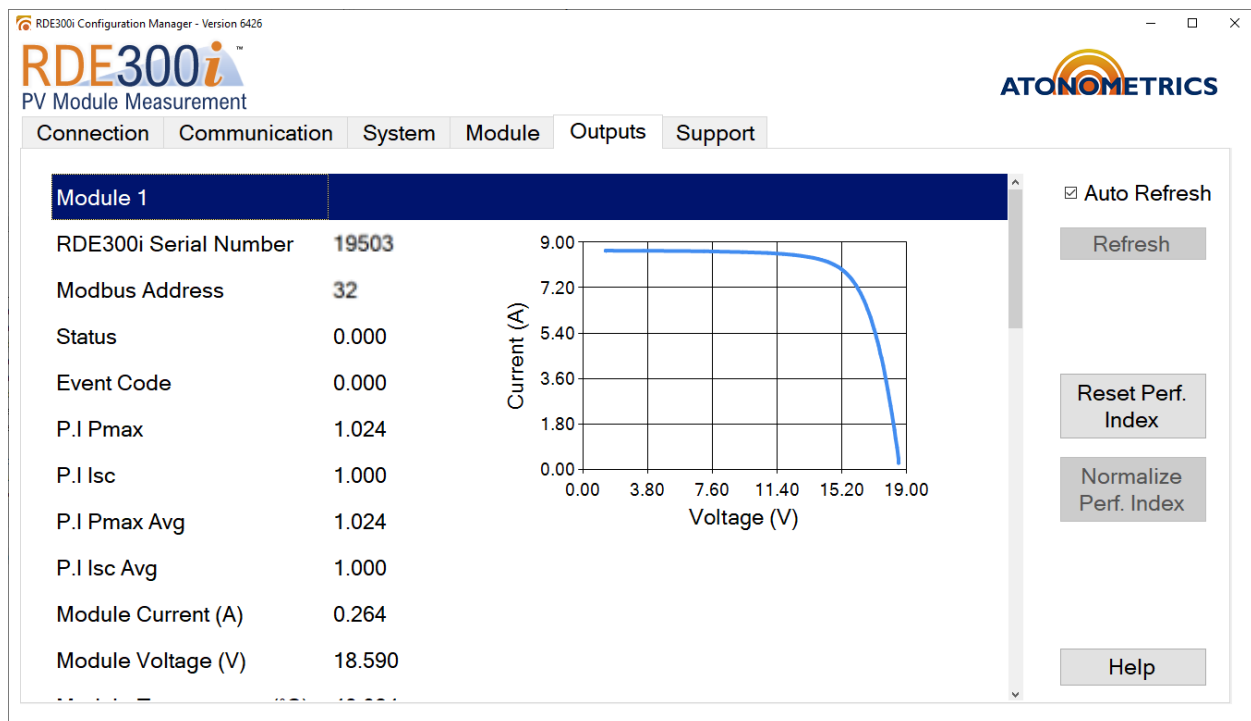
Once the RDE300i is found, note its Address, Baud Rate, and Data format which appear on the Find dialogue:
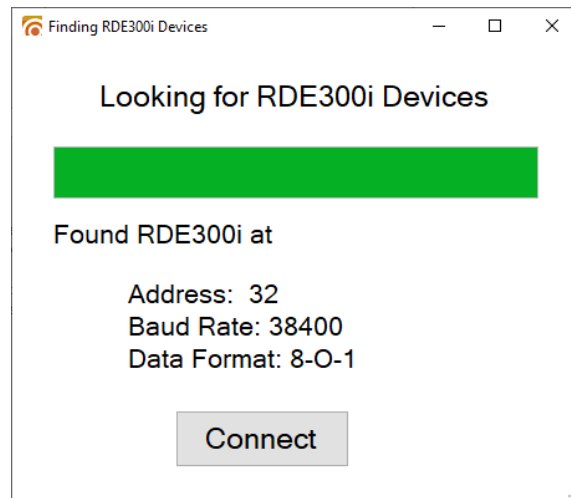
Click "Connect."

For an RDE300i that is connected to a module, verify that RDE300i is working properly by navigating to the Outputs tab. Check to see that IV curves and module parameters are updating.

Note: Performance Indices may be NAN. They update every 10 minutes under the condition that at least one data point within the 10-minute period was above 200 W/m^2.

In an office environment, the RTD temperature should be updating about every 2 seconds. The following parameters should contain numerical values (not "NaN"):

- RDE300i Serial Number
- Modbus Address
- Status
- Event Code
- RTD Temperature

3 Check Unit with Third-Party Software

3.1   Get Modbus Poll

Several third-party tools are available for testing Modbus communication via a PC. This document describes using Modbus Poll software. You could also adapt these instructions to use other third-party software. Follow this link to download Modbus Poll, and install the software on your PC.

3.2   Testing with Modbus Poll
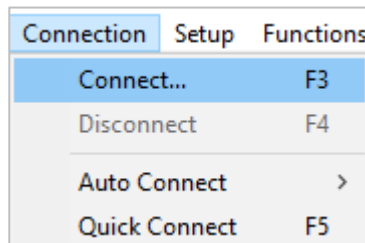
If it still open, close the RDE300i Configuration Manager.

Note: You can only have one application connected to the RDE300i at a time.

Open Modbus Poll.

From the Connection menu, press "Connect:"

There may be a registration dialog that you need to dismiss if you have a free trial license.

Choose "Serial Port" from the Connection menu, and the port labeled "USB Serial Port" from the Serial Settings menu. In the example shown below, the port is COM13. The port will likely be different on your PC.

Enter the Baud Rate, Data Bits, Stop Bits, and Parity Bits noted from earlier with the RDE300i Configuration Manager. Enter the Response Timeout and Delay Between Polls. We recommend 250ms for the Response Timeout and 30ms for the Delay Between Polls fields.

Press "OK".

From the Setup menu, press "Read/Write Definition:"

In the Slave ID field, input the address noted after pressing "Find" in the RDE300i Configuration Manager. Use the "Register Tables" section of the RDE300i User Guide, to determine which registers to read. In this example, an array of registers will be read starting at the Module Current register (1015) and ending at the Module Temperature register (1023). The User Guide lists that these 5 registers are all floats (1 float = 4 bytes = 2 registers) so we will type in 10 to the "Quantity" field. Type in the desired scan rate to the "Scan Rate" field. A 1000ms scan rate is recommended.

Note: Ensure that the "PLC Addresses (Base 1)" checkbox is not checked. If this box is checked, you must add 1 to all the register addresses in the RDE300i User Guide.

Note: Watch for similar settings or unlisted defaults in other software packages.

Now we need to change the data format. According to the "Register Tables" section of the RDE300i User Guide, these registers are 32-bit floats with most significant bytes first. Therefore, in Modbus Poll select the cells with the data, and from the Display menu, select 32 Bit Float and Big-endian:
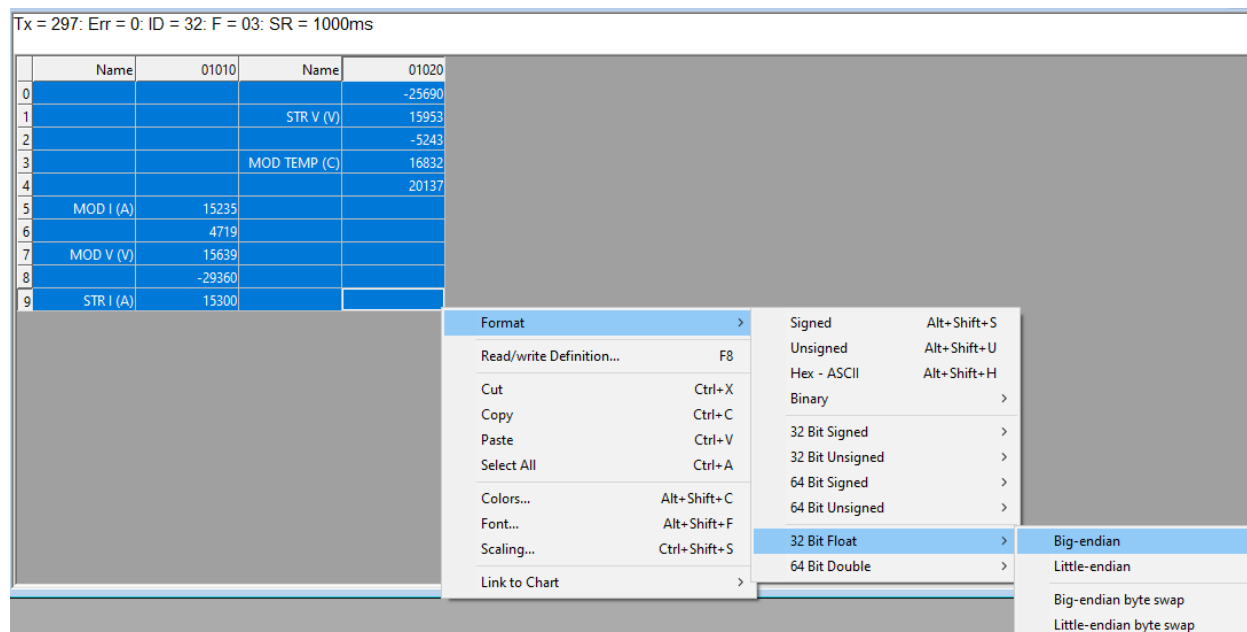
Here, we can see the value of module voltage, module current, output voltage, output current, and RTD temperature, respectively. If RDE300i is currently connected inline, all of these values should be changing. If it is connected to standalone module, the output voltage and current should not change since there is no string. In an office setting, only the RTD temperature should be changing.

Note: If RDE300i is connected to a module, any consecutive range of the output registers listed in the RDE300i User Guide may be read at once and verified via Modbus Poll.

4 Troubleshooting

- If the RDE300i Configuration Manager is not working as expected, make sure to review the RDE300i User Guide for setup info.
- If the device cannot be found by the RDE300i Configuration Manager, check your COM port and check all wiring of the configuration kit.
- If an error is thrown when attempting to poll the task in Modbus Poll, make sure to review the RDE300i Configuration Manager for the correct communication parameters (COM serial port, Baud Rate, Data Format, and Address.
- If either the RDE300i Configuration Manager or Modbus Poll are not able to connect to the RDE300i, make sure that the other software package is closed. Only one application may query the sensor at a time.
- If the data value is incorrect or does not match your expectations, check the byte order for data conversion. Also, check the register address for the quantity you are querying against the addresses in the RDE300i User Guide.
- Remember that for some Modbus client software it is necessary to add 1 to the register addresses listed in the RDE300i User Guide, due to differences in Modbus standards. For Modbus Poll, this can be controlled by the PLC Addresses checkbox mentioned above.