Application Note
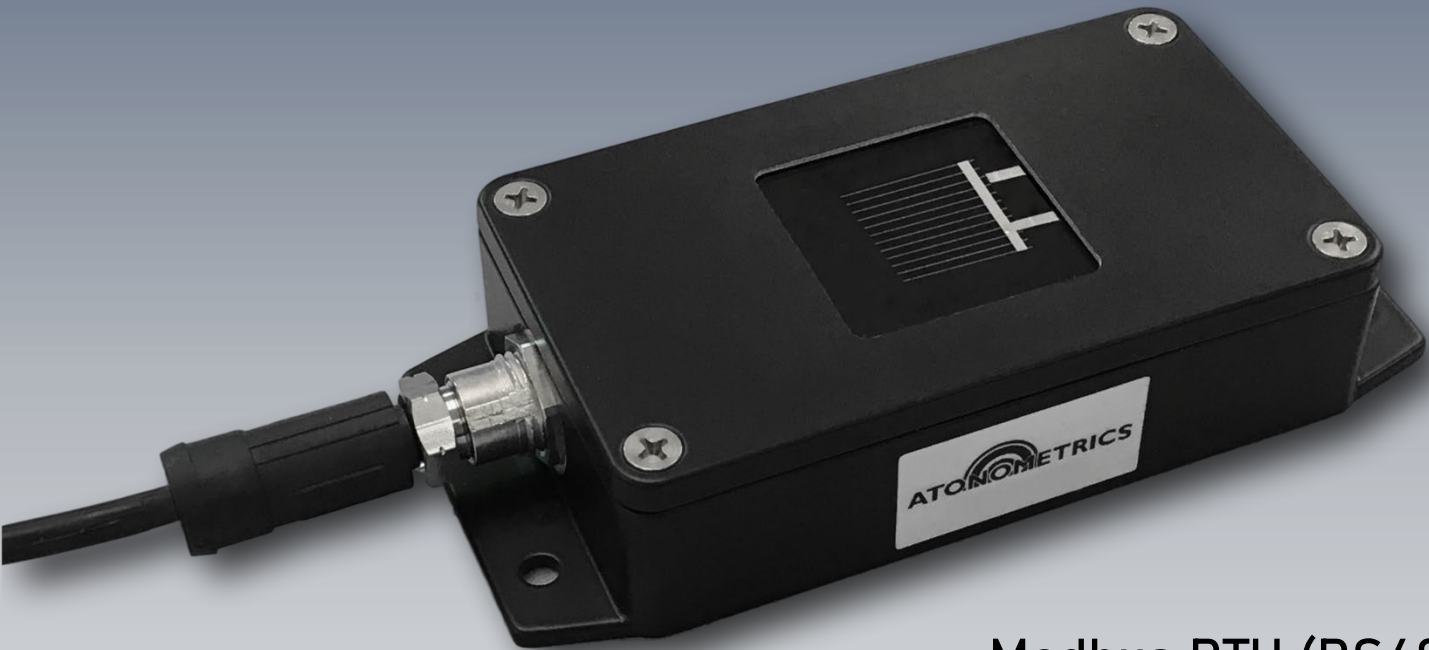## Testing Modbus Communication on the RC18

Modbus RTU (RS485)

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Table of Contents

1 Overview

This application note provides a guide on testing your RC18 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 RC18 configuration client.

To follow instructions in this guide, you will need:

- RC18 reference cell
- Configuration Kit for RC18 reference cell (PN 810235-01)
- PC with USB port
- RC18 configuration software from Atonometrics (PN 500078)
- Modbus Poll software from Witte Software

2 Check RC18 with Atonometrics Software

2.1 Hooking Up Your RC18

Before testing the RC18 with the third-party Modbus Poll software, we will connect to it using the Atonometrics RC18 configuration software to confirm the device is working and ensure all communication settings are known

Connect the RC18 to your PC through a USB port using the Configuration Kit described in the RC18 User Guide. See the section titled "Configuring" and follow the instructions there.

2.2 Check RC18 Communication Parameters

Following the instructions from the RC18 User Guide, open the RC18 configuration software. Select the COM port that your RC18 is plugged into, and press "Find:"
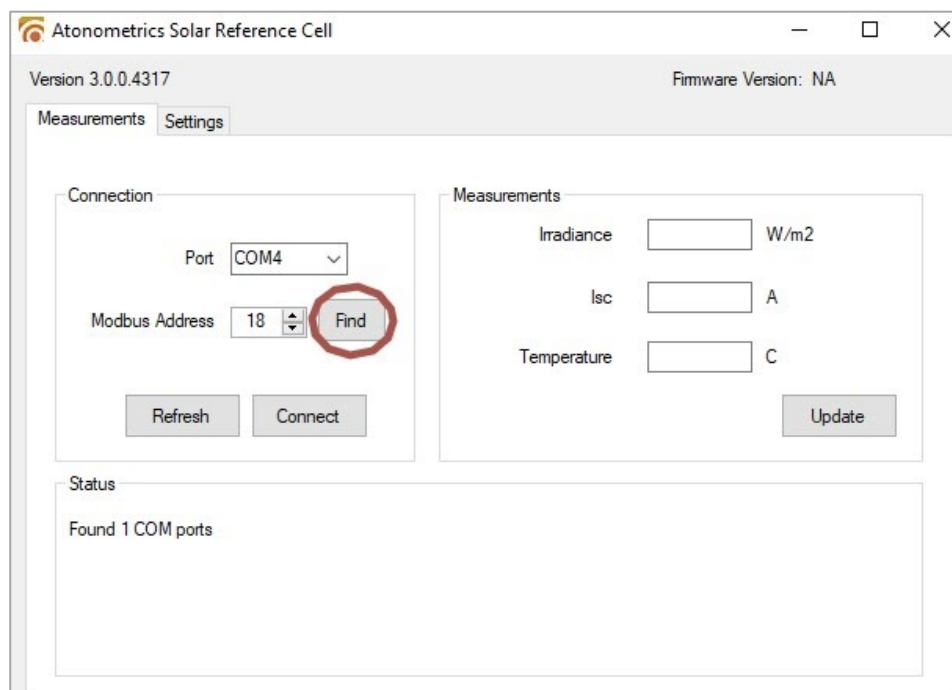
Note: Your computer may have multiple COM ports. If you are unsure which one is connected to the RC18, try disconnecting the RC18 configuration kit, checking the COM ports list, then reconnecting the configuration kit and checking the COM ports list again.

Note: RC18 units are shipped from Atonometrics with a default Modbus Address and Data Format. The default address of 18 is shown when the configuration software starts. When using the Find button, the software will detect the RC18 at its actual address and communication settings.

Once the RC18 is found, note its Address, Baud Rate, and Data format which appear on the Find dialogue:
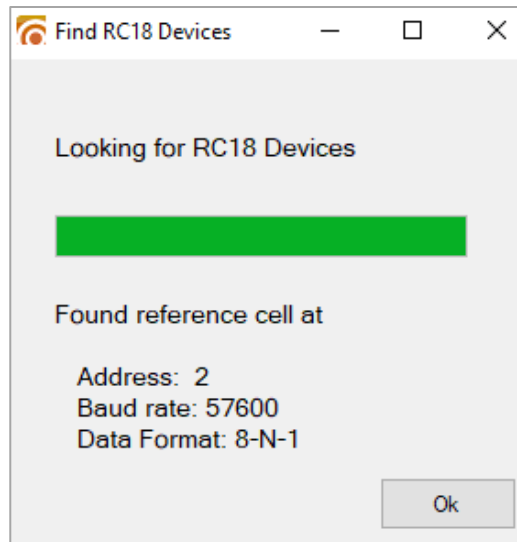
Click "OK."

Verify that the RC18 is working properly by pressing the "Update" button when the sensor is under different light levels. In an office environment, the irradiance measurement will typically read 0. If the sensor is under a desk lamp, the irradiance measurement will typically be in the range 20-100 W/m^2:
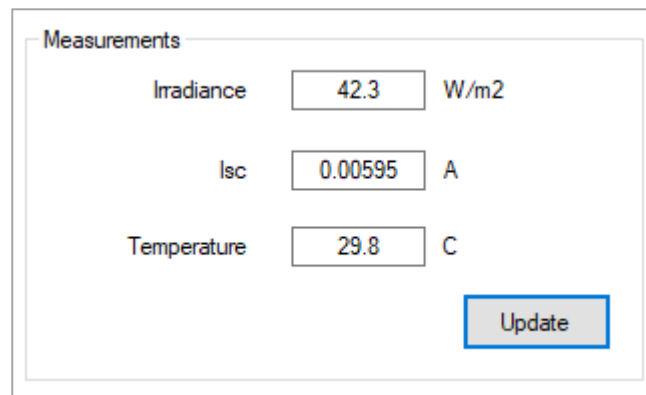
3 Check RC18 with Third-Party Software

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.
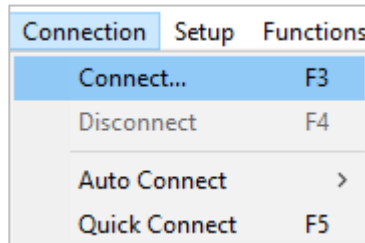
3.2 Testing with Modbus Poll

If it still open, close the RC18 configuration software.

Note: You can only have one application connected to the RC18 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 this case the port is COM3. Enter the Baud Rate, Data Bits, Stop Bits, and Parity Bits noted from earlier with the RC18 configuration software. Press "OK".
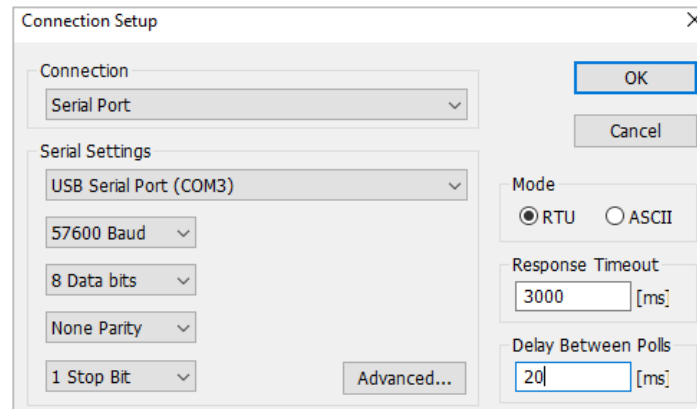
From the Setup menu, press "Read/Write Definition:"
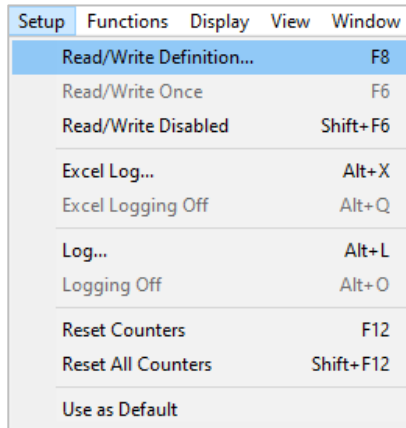
In the Slave ID field, input the address noted after pressing "Find" in the RC18 configuration software. According to the RC18 User Guide, the irradiance measurement is located at address 1, so type in 1 to the "Address" field. The User Guide lists that the irradiance measurement is 2 registers (4 bytes) so we will type in 2 to the "Quantity" field. Type in the desired scan rate to the "Scan Rate field."

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 RC18 User Guide.

Note: Watch for similar settings or unlisted defaults in other software packages.
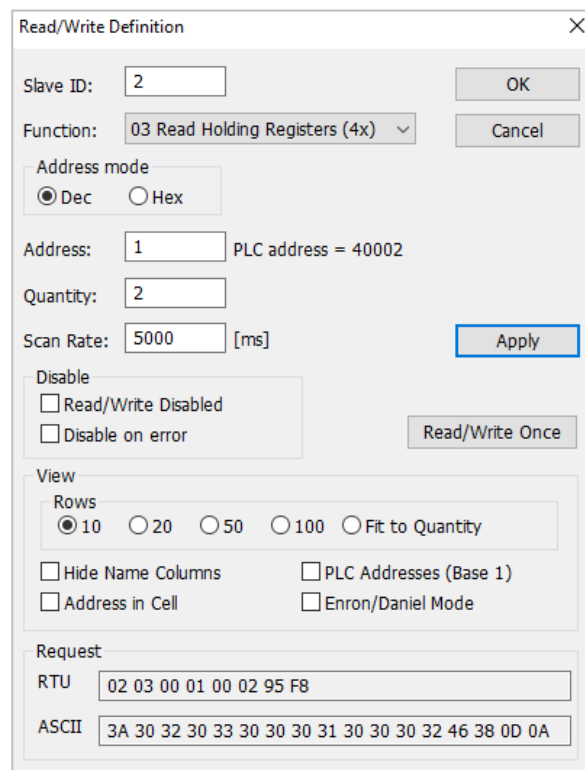
Now we need to change the data format. According to the RC18 User Guide, the irradiance registers are 32-bit floats with most significant bytes first. Therefore, in Modbus Poll select the cells with the data, and from the Display menu, select 32 Bit Float and Big-endian:
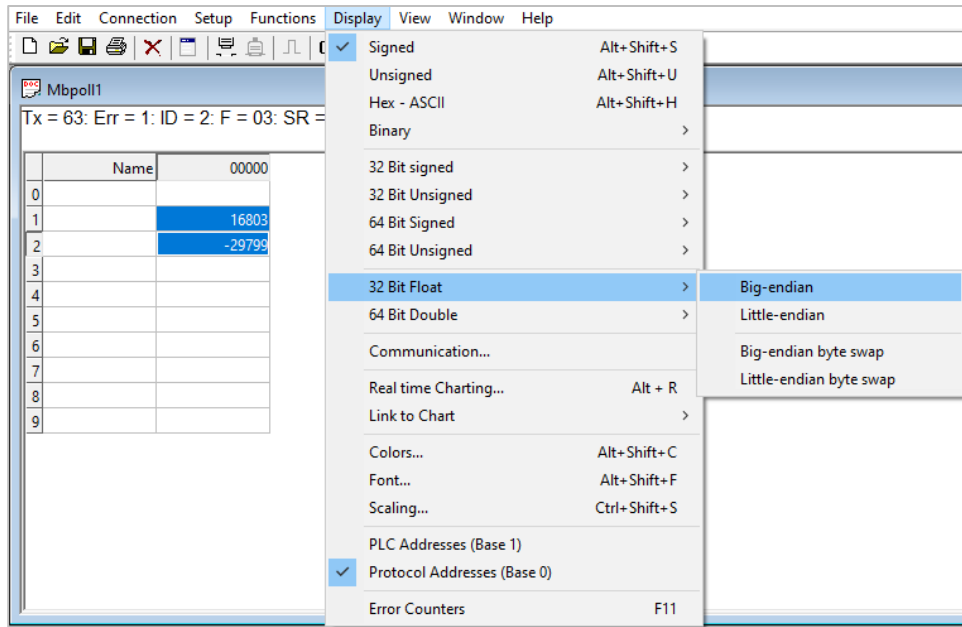
Here, we can see the value of the irradiance measurement in (W/m^2). This low irradiance value of about 16 W/m^2 is because the sensor was under a low-power desk lamp when the task was polled.

4 Troubleshooting

- If the RC18 configuration software is not working as expected, make sure to review the RC18 User Guide for setup info.
- If the device cannot be found by the RC18 configuration software, 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 RC18 configuration software for the correct communication parameters (COM serial port, Baud Rate, Data Format, and Address.
- If either the RC18 configuration software or Modbus Poll are not able to connect to the RC18, 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 RC18 User Guide.
- Remember that for some Modbus client software it is necessary to add 1 to the register addresses listed in the RC18 User Guide, due to differences in Modbus standards. For Modbus Poll, this can be controlled by the PLC Addresses checkbox mentioned above.