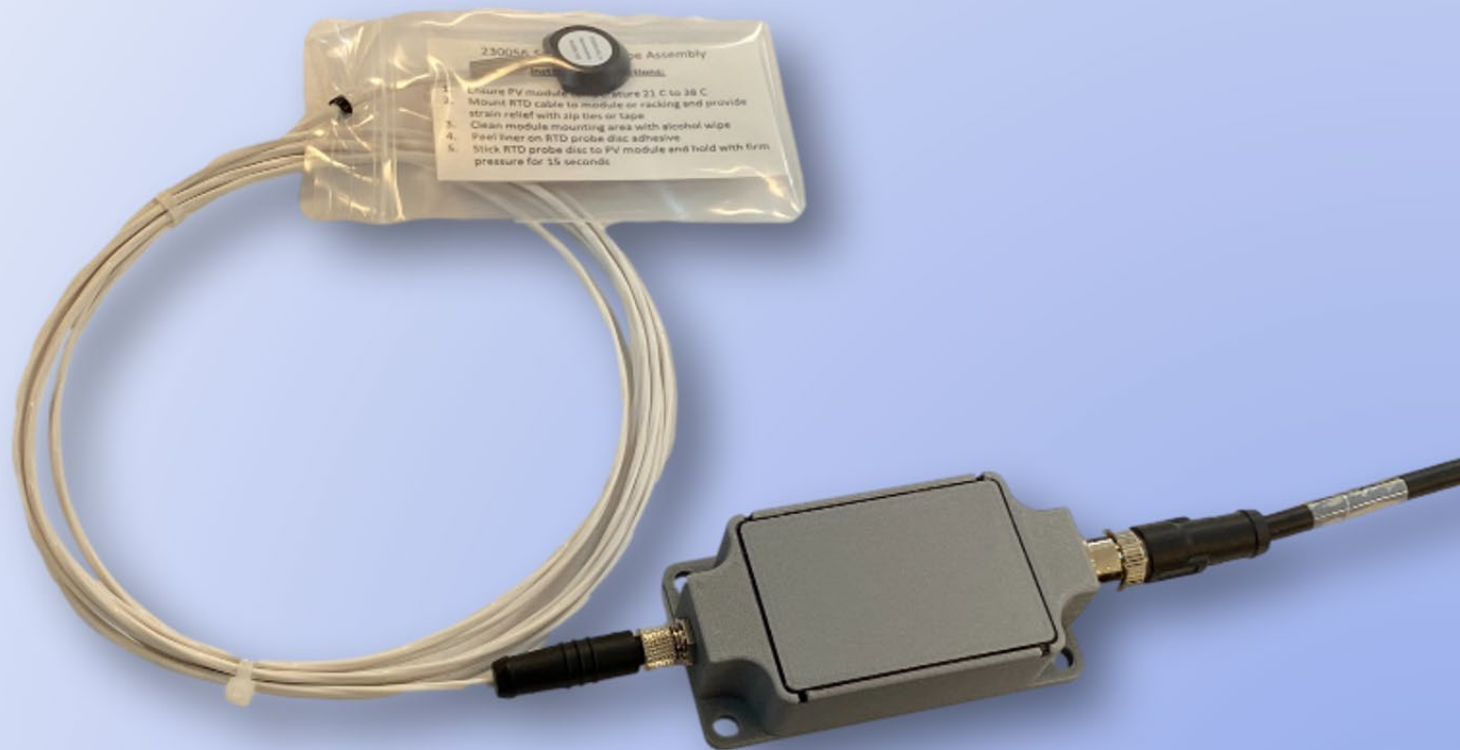


# User's Guide

## MT2 Digital RTD



Document Number 880108 Rev. A, August 2024



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# 1 System Overview

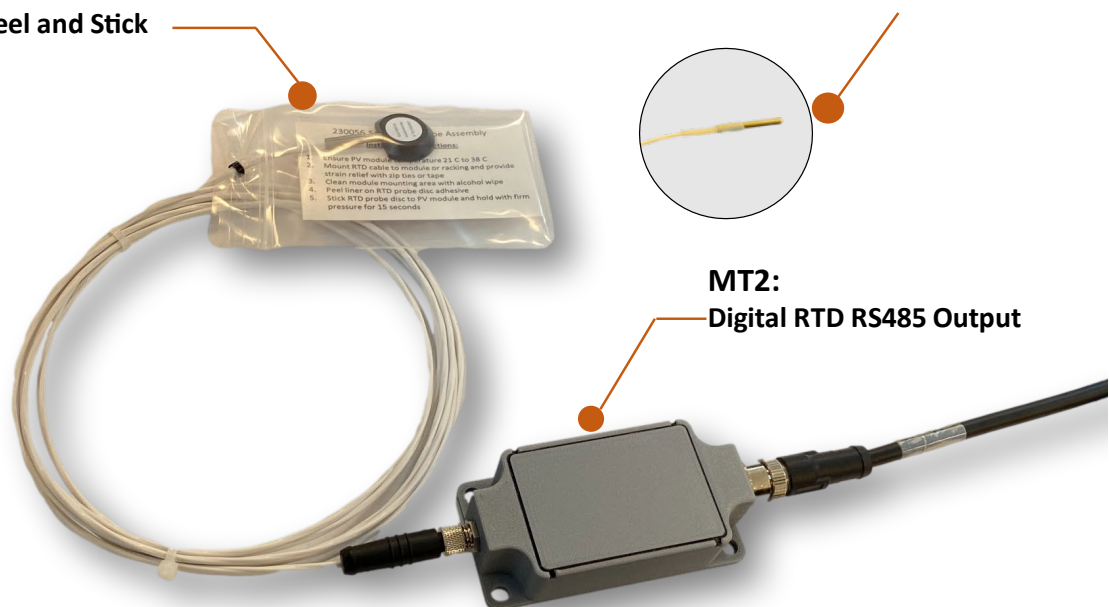
The MT2 (810324-01), shown in **Figure 1-1**, is a Modbus digital temperature transmitter for Pt1000 RTDs.

Key features include:

- Choice of self-adhesive back-of-module or ambient air temperature 3-wire Pt1000 RTD probes
- Compact size & mounting features
- Digital output via Modbus RTU protocol over RS485
- IP67-rated for outdoor use

**Back of Module RTD:  
Pt1000 RTD  
Peel and Stick**

**Optional Ambient RTD:  
Pt1000 RTD**



**Figure 1-1: MT2 (810324-01)**

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## 2 Quick Start

### **Mount and Wire:**

- Mount your MT2 and connect your Pt1000 RTD to the MT2 in the desired installation location.
- Refer to **Section 3.2** for MT2 mounting information.
- Use strain-relief ties or tapes to ensure the cables are supported.
- Refer to **Sections 4.2** and **5.2** for instructions on the back-of-module RTD kit (810297) or ambient air temperature RTD (230063) and optional radiation shield.

### **Configure:**

- Download the RC-MT Configuration Manager software from [support.atonometrics.com](http://support.atonometrics.com)
- Connect to your MT2 with an Atonometrics Configuration Kit (810276). Refer to **Section 6** for more information on the Configuration Kit and how to connect to your device.
- Set the desired communication parameters of the device (Modbus Address, Baud Rate, and Data Format) in the Settings tab. Refer to **Section 6.6** for help setting communication parameters.
- Verify that the measurement in the Outputs tab are updating.

### **Connect to Data Logging System:**

- Connect your MT2 to power and to your data logging system.
- Refer to **Section 3.3** for more information on MT2 power requirements and 830303 power and RS485 cable assemblies.

### **Setup is now complete.**

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## 3 MT2

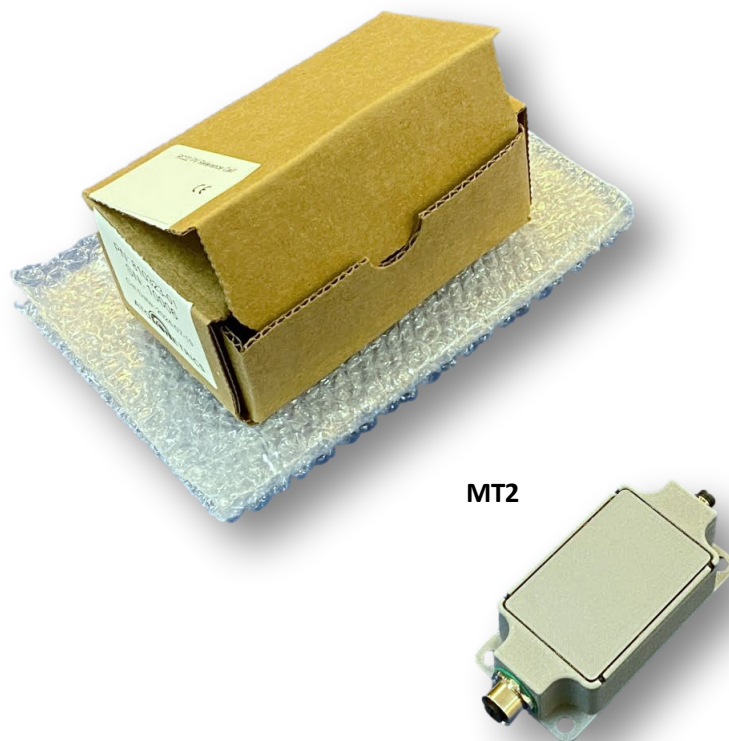
### 3.1 Unpacking

**Figure 3-1** shows an MT2 unit with its shipping box and contents.

See **Section 3.2** for mounting information.

Pt1000 RTDs are sold separately. See **Sections 4** and **5** for information on back-of-module and ambient air RTD options.

Cables (**Section 3.3**) and configuration tools (**Section 6**) are sold separately.



**Figure 3-1 : Unpacking your MT2 unit**

## 3.2 Mounting

### 3.2.1 Dimensions & Mounting Holes

Figure 3-2 shows the MT2 dimensions and the positions of the four mounting holes on the bottom of the unit.

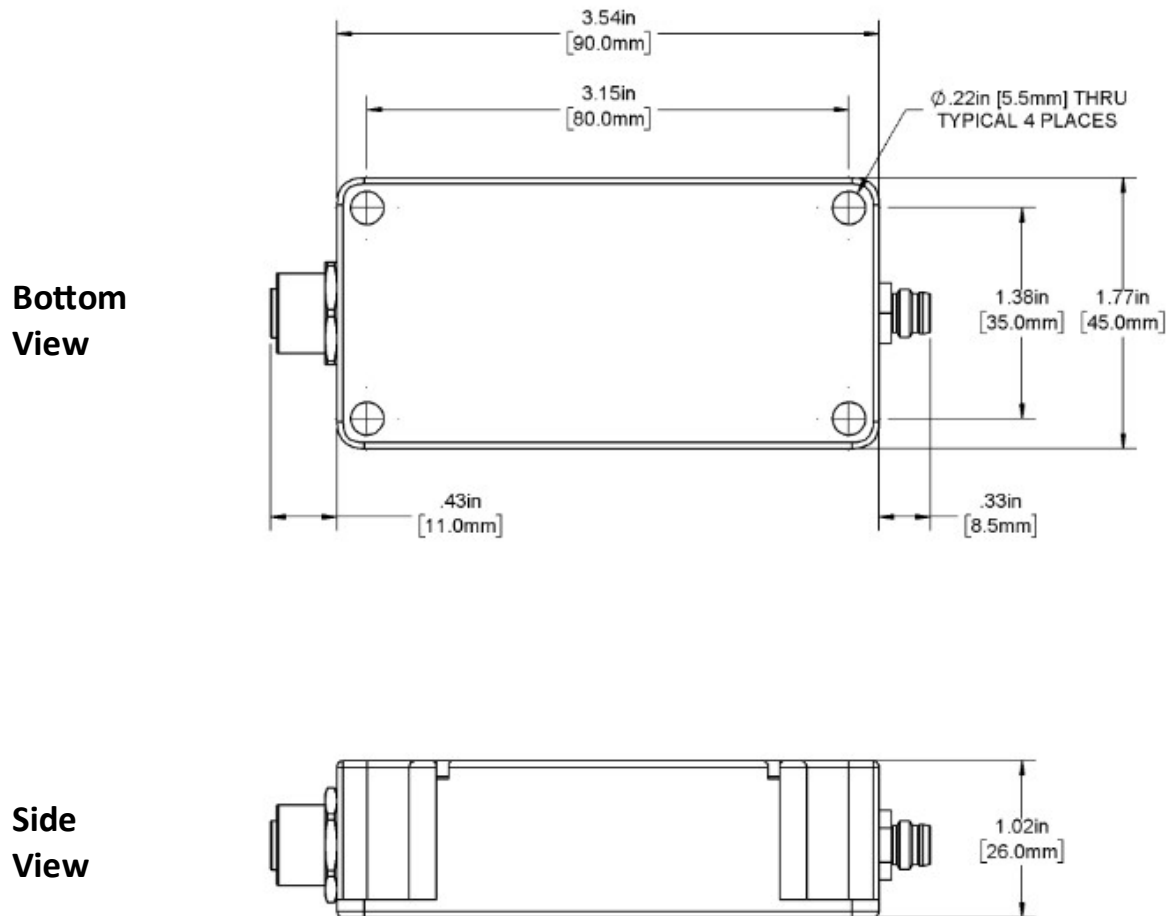
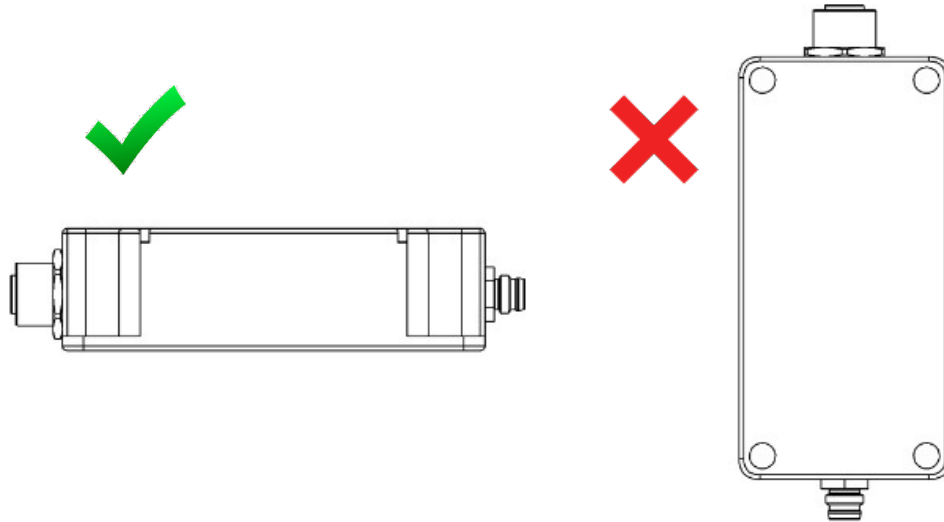


Figure 3-2 : MT2 dimensions

### 3.2.2 Orientation

To minimize the potential for water entry via the connectors, please mount the MT2 unit with its cables to the side, as shown in **Figure 3-3**. Avoid mounting with either cable facing up.



**Figure 3-3 : Mount with cables to the side if possible**

## 3.3 Wiring

### 3.3.1 Power

The MT2 unit accepts 10-30 VDC and typically draws ~4 mA in operation.

### 3.3.2 Cables

Power and RS485 communication cables 830303 are listed in **Table 3-1**. Conductors are 24 AWG. Wire colors shown in **Figure 3-4**.

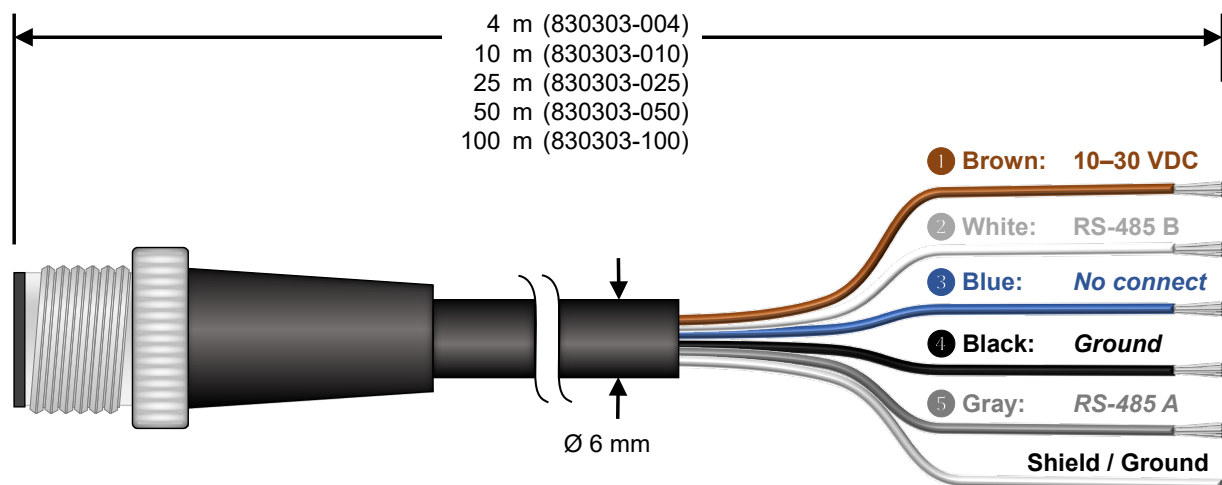
**Note:** Use only Atonometrics-supplied connectors or cables. Although other connectors may appear to fit, use of non-approved components may result in water penetration.

**Note:** When using cables 50 m or longer, insert an 830331 RS485 termination cable between the 830303 cable and the MT2 to suppress RS485 signal reflections.

**Note:** The 830303 cables include an additional wire (blue) not used for the MT2 product.

**Table 3-1 : Power and communication cables (sold separately)**

Length	830303 Power & RS485 M12 5-pin / Bare Wire	Recommended Power Supply Voltage	830331 RS485 Termination Required?
4 m	830303-004	12 or 24 VDC	No
10 m	830303-010	12 or 24 VDC	No
25 m	830303-025	12 or 24 VDC	No
50 m	830303-050	12 or 24 VDC	Yes
100 m	830303-100	12 or 24 VDC	Yes



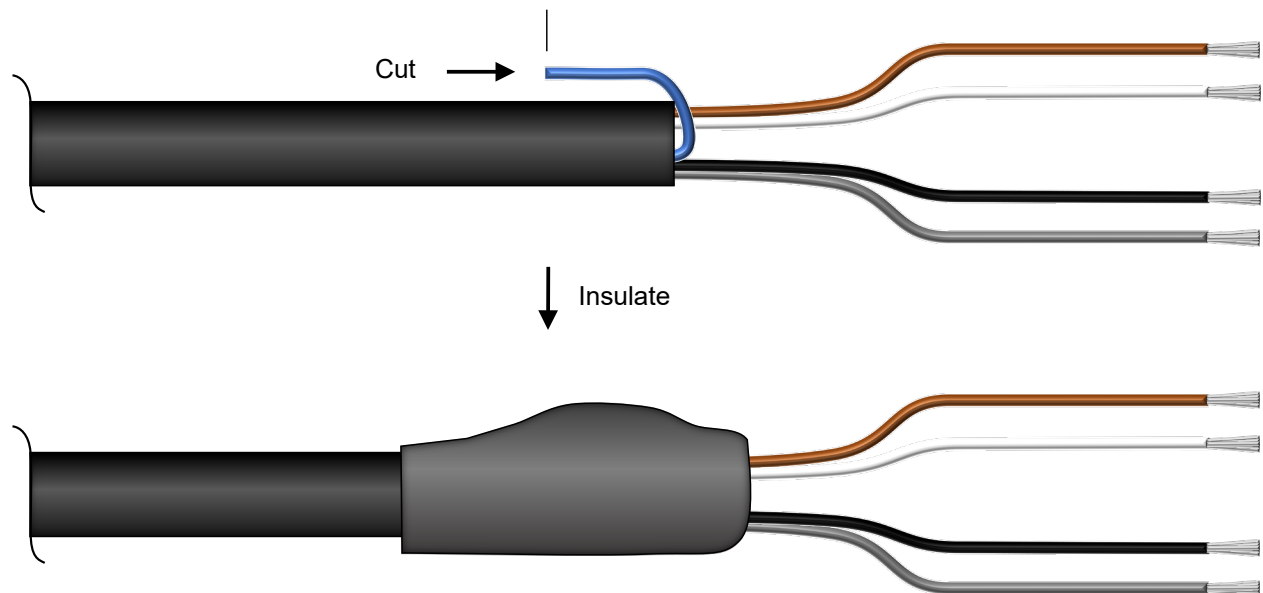
**Figure 3-4: Wire colors for 830303 M12 power & RS485 cable**

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**WARNING:** Check all wiring before turning on power. Incorrect wiring may damage the unit and/or your other equipment.

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Protect any unused wires from accidental contact by cutting to unequal lengths, folding back, and insulating, as shown in **Figure 3-5**.



**Figure 3-5: Protecting unused wires from accidental contact**

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## 4 Back-of-Module RTD

The back-of-module RTD, ordered separately, is a self-adhesive Pt1000 RTD for measuring a PV module temperature. The RTD has a 3-meter cable and overmolded M8 connector for easy attachment to the MT2. For information on cable extensions contact Atonometrics.

### 4.1 Unpacking

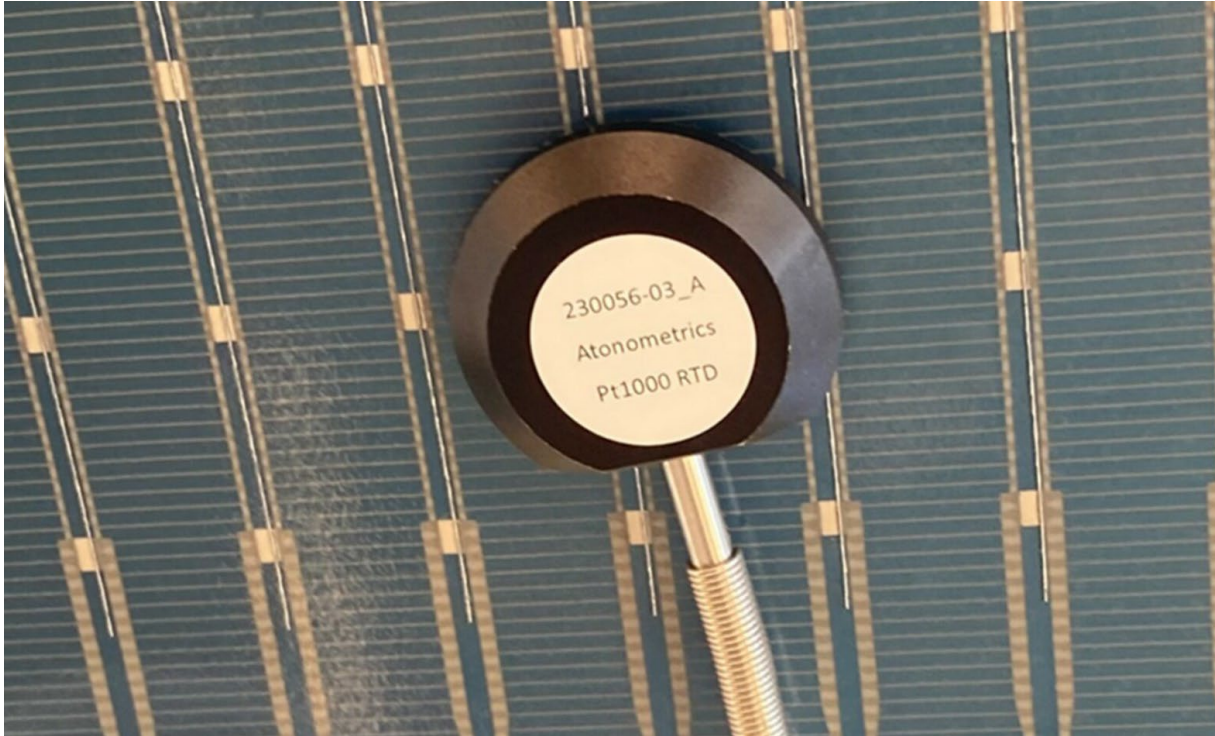
As shown in **Figure 4-1**, the self-adhesive RTD probe (230056-03) is packaged together with an alcohol wipe and an installation instruction card as a kit (810297).



**Figure 4-1 : Self-adhesive back-of-module Pt1000 RTD kit (810297)**

## 4.2 Mounting

Follow the installation instructions card to adhere the RTD to the back side of your module.



**Figure 4-2 : Back-of-module RTD mounted on a module**

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**Note:** Application of the self-adhesive RTD should be performed when the module temperature is between 21 °C and 38 °C to ensure proper adhesive bonding.

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## 5 Ambient RTD

The ambient RTD, ordered separately, is a tube shaped Pt1000 RTD for measuring the ambient air temperature at the PV array site. The RTD has a 3-meter cable and overmolded M8 connector for easy attachment to the MT2. For information on cable extensions contact Atonometrics.

### 5.1 Unpacking

The Ambient RTD (230063-03) can be purchased by itself (**Figure 5-1**) or with an optional radiation shield which is shown in **Figure 5-3**.



**Figure 5-1 : Ambient Pt1000 RTD**

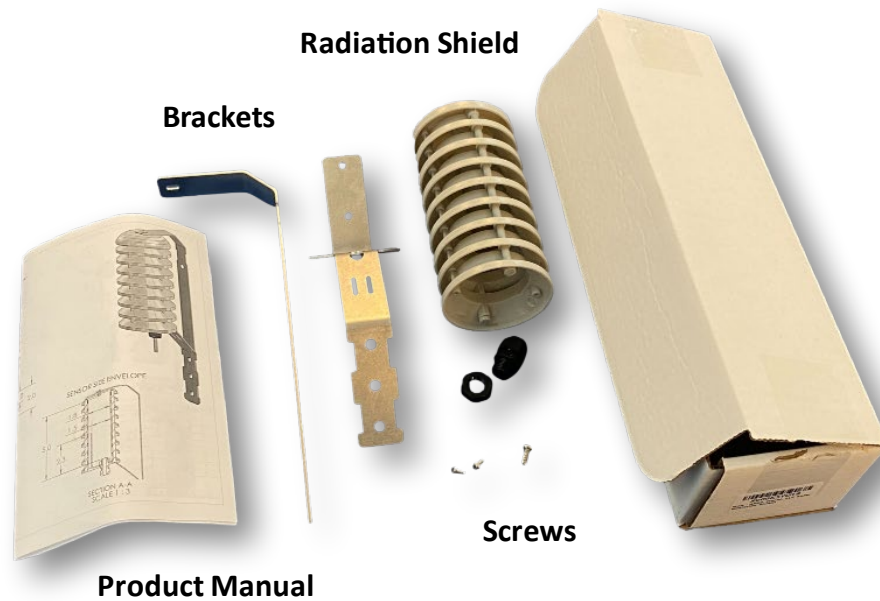


Figure 5-3 : Optional radiation shield

## 5.2 Mounting

**If you did not purchase a radiation shield**, mount the ambient RTD by tie-wrapping the cable near your preferred RTD location with the RTD probe extended into the air and shielded from sunlight.

**If you purchased a radiation shield**, follow the instructions on the included product manual to assemble the shield and then insert the RTD probe through the cable gland. Lock the cable gland tight around the rigid plastic portion of the ambient RTD.

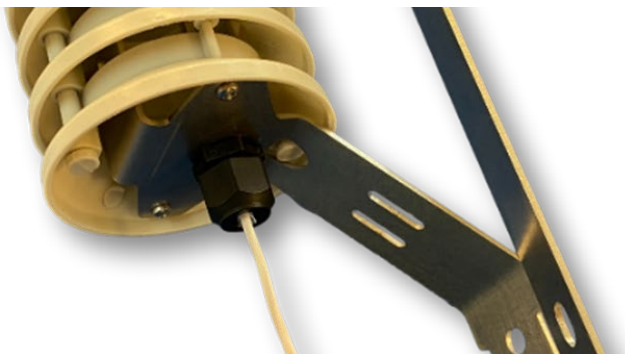


Figure 5-4 : Mounting with shield

# 6 Configuration

## 6.1 Documentation

Before starting configuration or programming, visit [support.atonometrics.com](http://support.atonometrics.com) and get the latest copy of this document (MT2 User Guide, document 880108).

## 6.2 Configuration Kit

The Configuration Kit (810276), sold separately, allows you to conveniently power your MT2 unit, perform configuration, and test communication and system status. Relevant kit contents are shown in **Figure 6-1**.

**Note:** The 810276 Configuration Kit supports multiple products. It may include some accessories that are not required for MT2 and/or are not shown below.

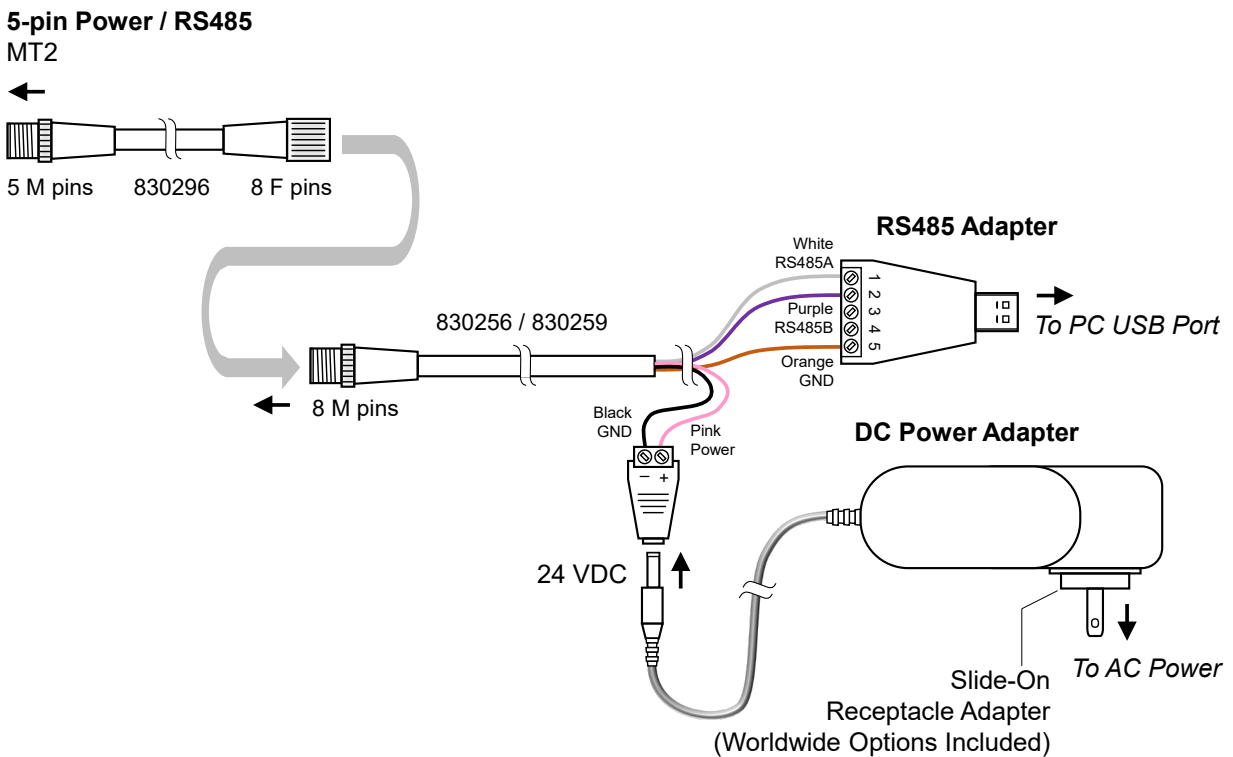


Figure 6-1 : Using Configuration Kit 810276 (sold separately) with MT2

To assemble and install the kit for use with your Windows PC:

- Select the included AC power receptacle adapter appropriate for your region and install it on the AC-DC power adapter.
- Insert the 24 VDC plug into the cable assembly as shown.
- Connect the kit's 8-pin cable to the 5-pin cable as shown.
- Connect the 5-pin cable to your MT2 unit.
- Connect the kit's USB Type A cable to your PC.
- Allow Windows to detect the USB adapter and automatically install its driver, or install the driver from the provided CD. If needed, visit [support.atonometrics.com](http://support.atonometrics.com) for drivers for the 810276 kit.
- Connect the power adapter to AC power.

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**Note:** For more information on the 810276 Configuration Kit, or to find software drivers, visit [support.atonometrics.com](http://support.atonometrics.com).

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## 6.3 Configuration Manager Software

RC-MT Configuration Manager Software (500116) allows you to connect to your MT2, set communication options, and test the device. The software runs on a Windows PC. Obtain the software by visiting [support.atonometrics.com](http://support.atonometrics.com) and install it per instructions found there.

## 6.4 Connect to MT2

Connect the Configuration Kit (or equivalent equipment) to MT2's M12 port as shown in **Section 6.2** and ensure the kit is powered.

Launch the RC-MT Configuration Manager Software on your PC.

From RC-MT Configuration Manager, use the Connect tab shown in **Figure 6-2** to connect to your MT2 unit:

- Select your PC's COM port corresponding to the USB/RS485 adapter of the Configuration Kit. (Click Refresh to update the list of connected COM ports.)
- If you do not know the Modbus communication settings of your MT2 unit, Scan for the MT2 using the Find and Connect button.
- If you know your Modbus communication settings, you may enter these in the Connect Manually box and press the Connect button.

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**Note:** To determine the COM port of your RS485 adapter, check the COM ports drop down box with and without the adapter connected to your PC, using the Refresh button to update the list after connecting/disconnecting the adapter from the PC.

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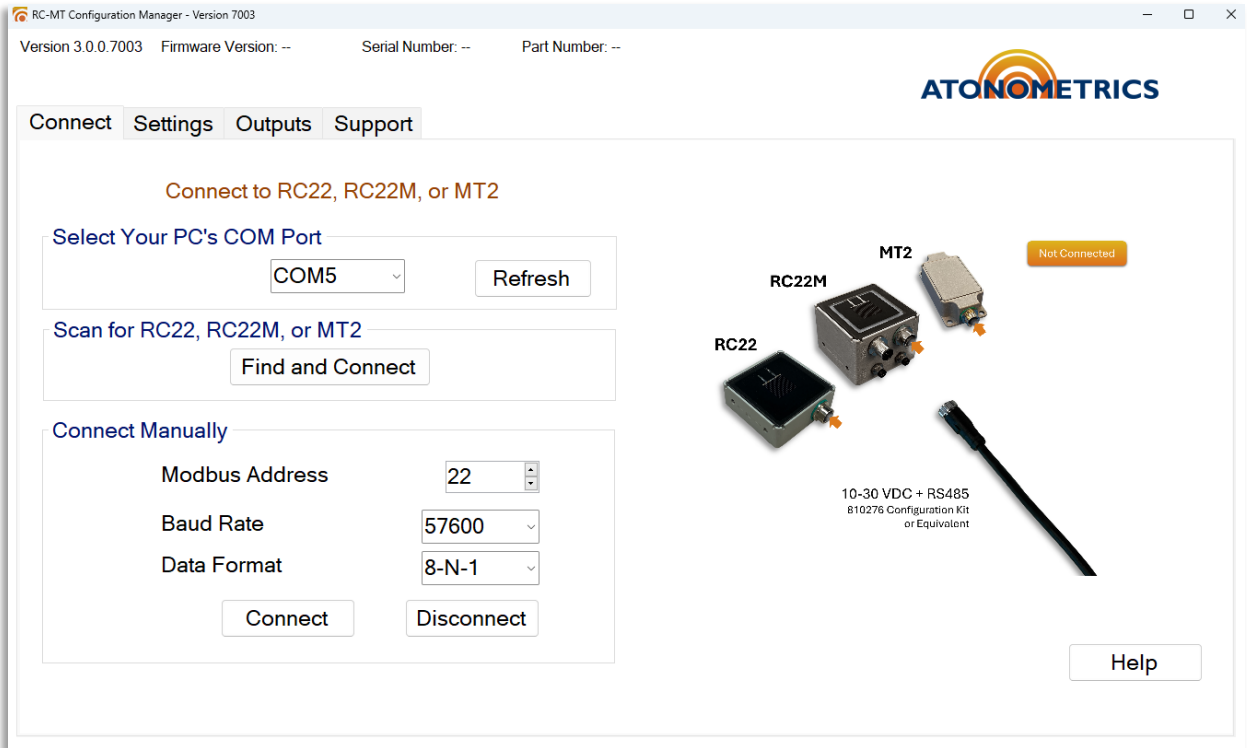
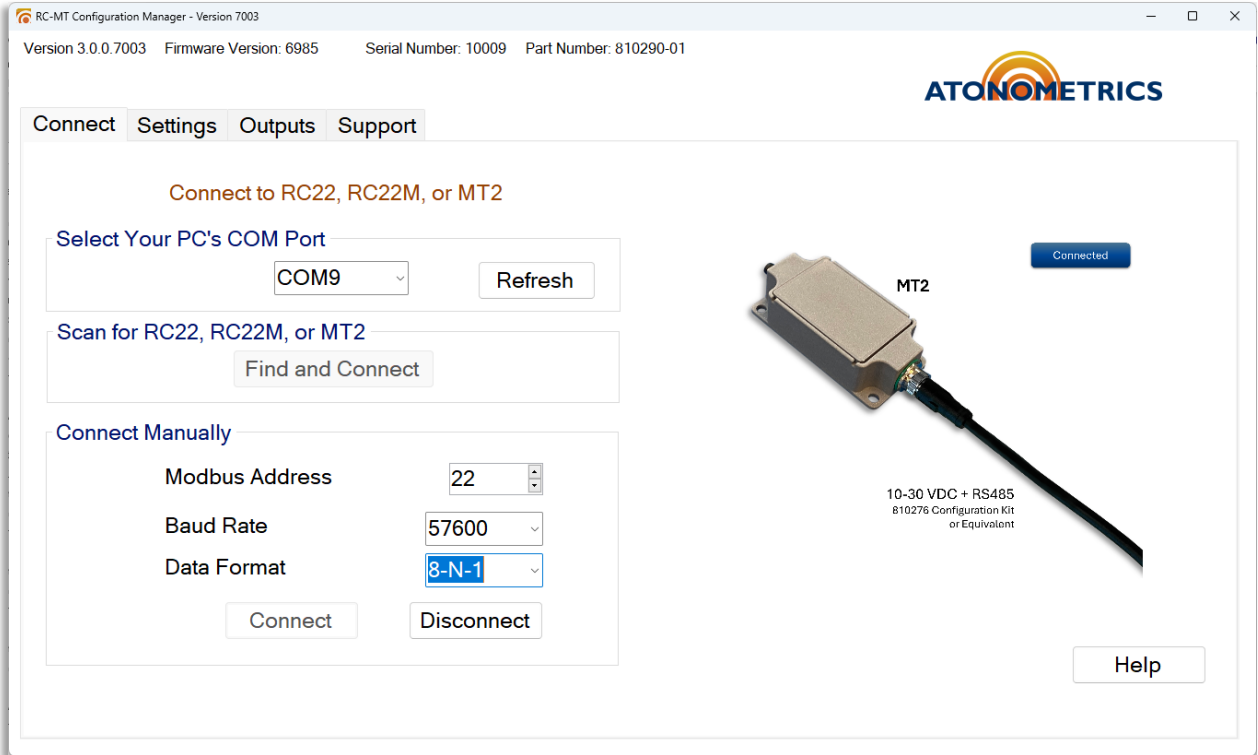


Figure 6-2: Connecting to MT2

Once your MT2 unit is connected, the software will display the Connected status, as shown in **Figure 6-3**. Your unit's firmware version, serial number, and part number will also be displayed at the top of the screen.



**Figure 6-3: MT2 connected**

## 6.6 Setting Communication Parameters

Your MT2 unit's default Modbus serial communication parameters are Address = 22, Baud Rate = 57600, and Data Format = 8-N-1 (8 data bits, no parity, 1 stop bit).

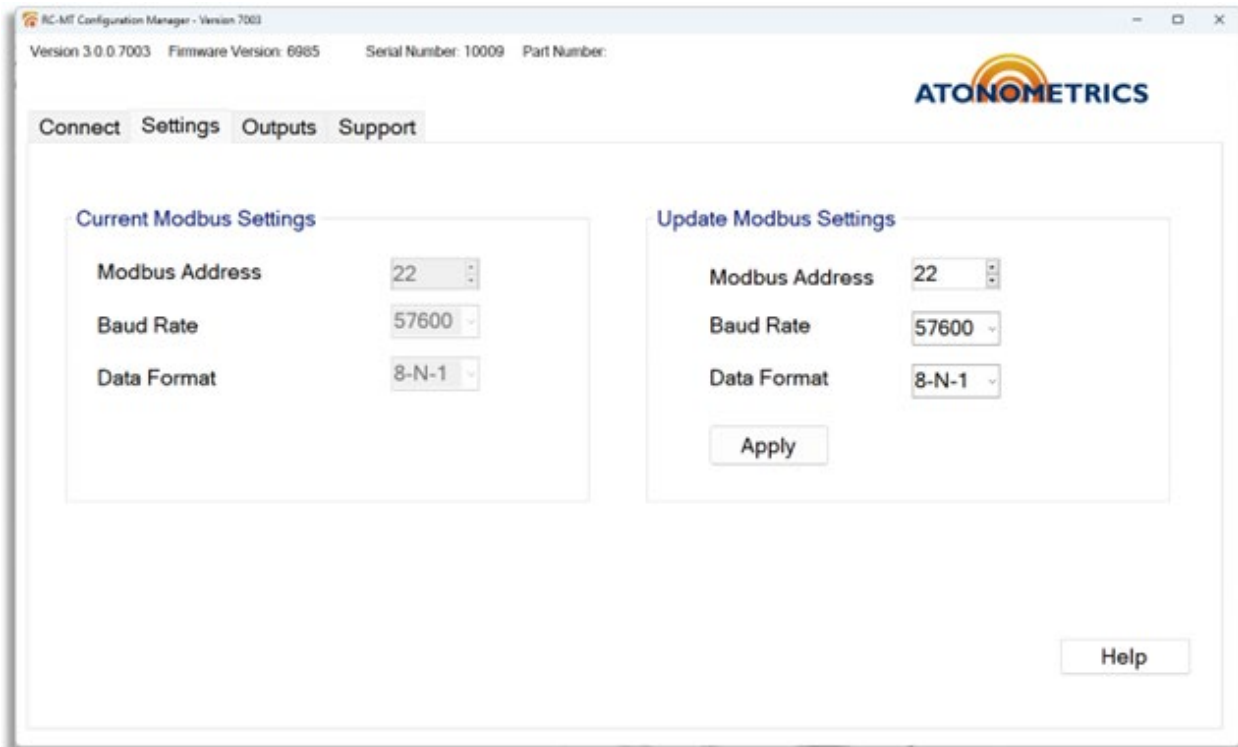
To update the communication parameters, use the Settings tab of RC-MT Configuration Manager, shown in **Figure 6-4**.

Enter your new parameters in the Update Modbus Settings box and press Apply to transmit these to the unit.

Addresses from 1 to 247 are allowed.

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

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



**Figure 6-4: Setting communication parameters**

## 6.8 Checking Output Data

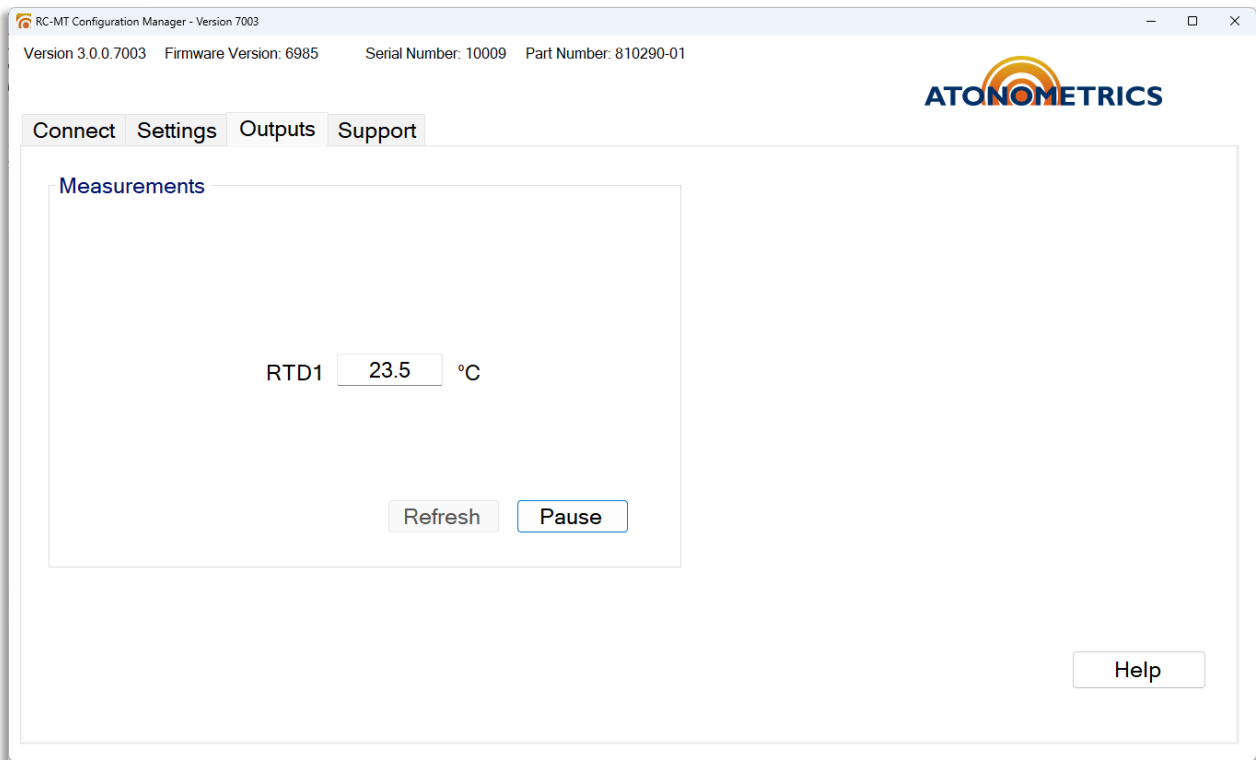
Use the Outputs tab to check the measurement results from your unit, as shown in **Figure 6-5**. The tab displays your MT2's Pt1000 external RTD temperature, if connected.

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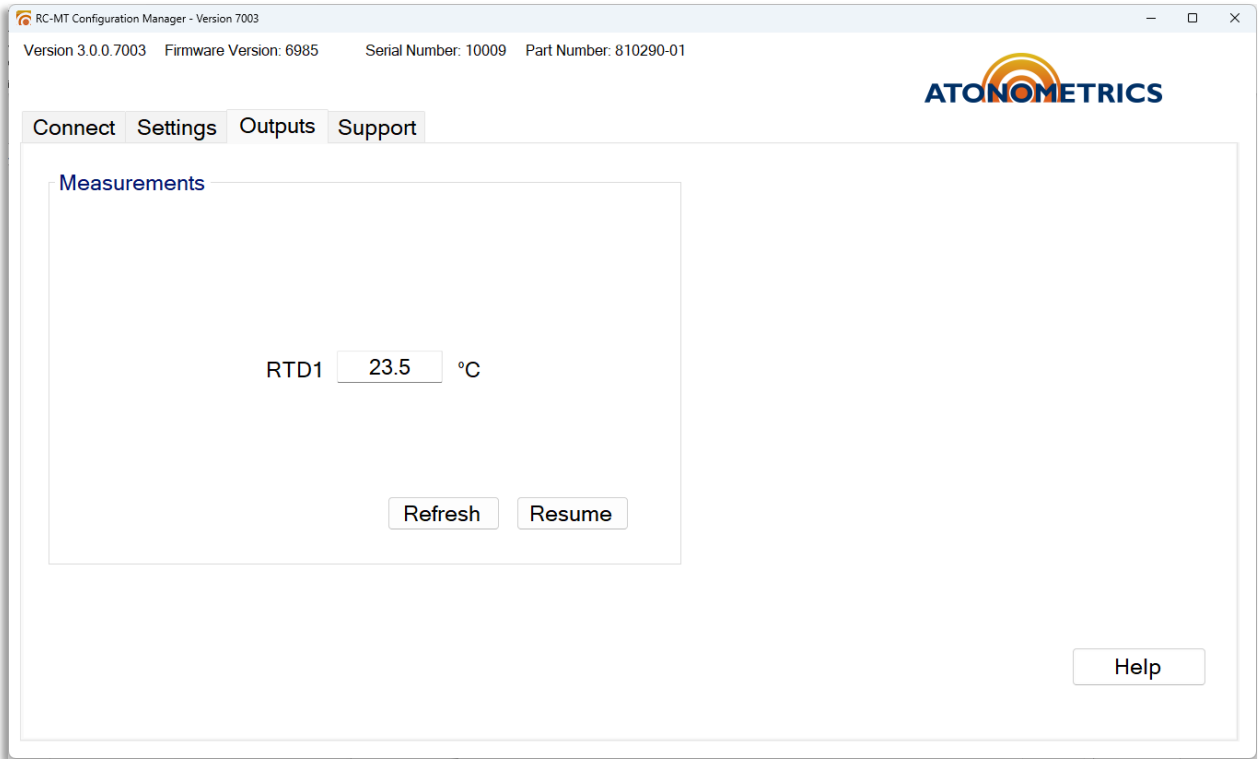
**Note:** If an RTD is not connected to your MT2, the RTD1 output box will be greyed out.

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The readings on the Outputs tab will update continuously. To pause the readings, click the Pause button. To update the readings when paused, use the Refresh button. To resume the automatic update of readings when paused, click Resume as shown in **Figure 6-6**.



**Figure 6-5: Checking output data, outputs continuously updating**



**Figure 6-6: Checking output data, outputs paused**

## 6.9 Updating Software

If your PC is connected to the internet, the “Software Updates?” Check button on the Support tab will automatically detect if there is an MT2 firmware or RC-MT Configuration Manager update.

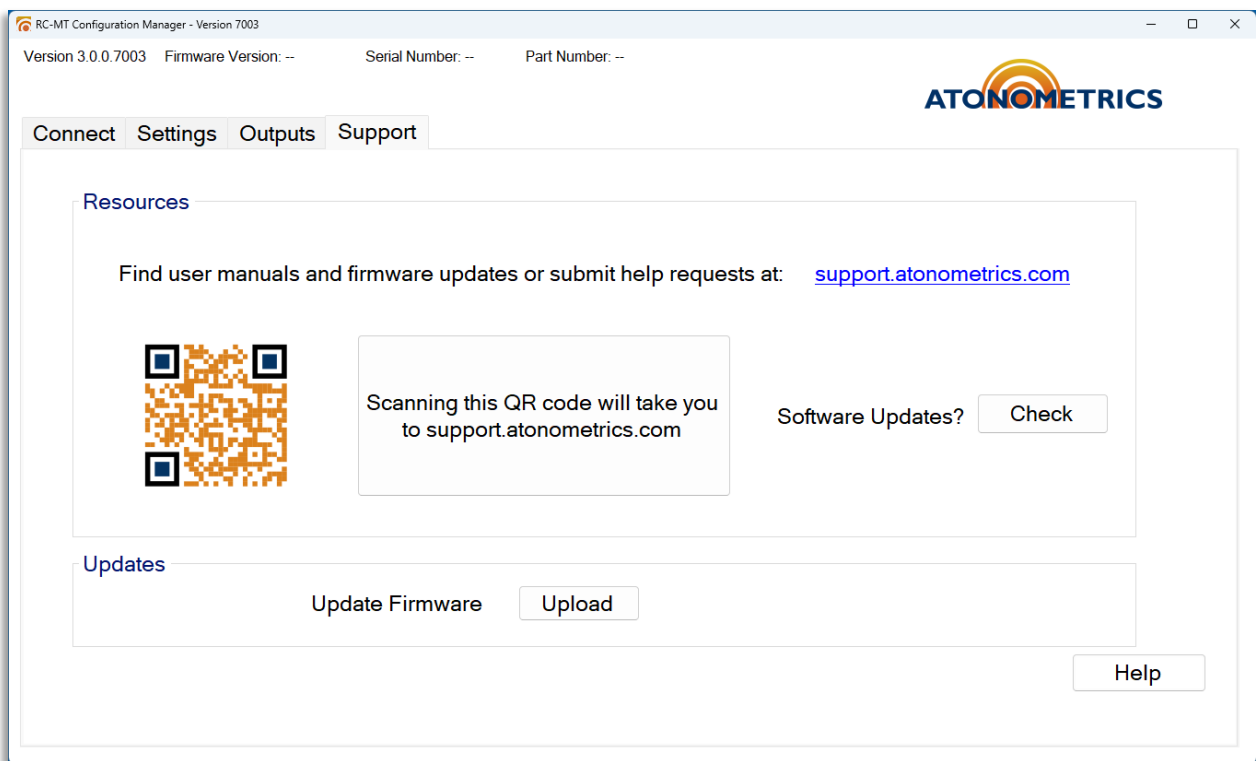
If software updates are available, visit [support.atonometrics.com](http://support.atonometrics.com) to obtain them.

To install a firmware update, use the Upload button in the Support tab of RC-MT Configuration Manager software, shown in **Figure 6-7**.

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**Note:** The Support tab also provides convenient links to the Atonometrics support website for obtaining product documentation or support.

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**Figure 6-7: Support tab**

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## 7 Modbus

**Table 7-1** lists the registers available for your client software to read data from the MT2 unit.

Each numbered register in the table is a 16-bit (2-byte) register. Parameters requiring more than two bytes must be read from sequential registers as indicated by the Register Start and Register End columns. Byte order is big-endian: for a 4-byte value with bytes in the order *ABCD*, from most to least significant, the first register reads out bytes *AB* and the second reads out bytes *CD*.

Float32 denotes single-precision 32-bit floating point per IEEE 754.

For detailed information on Modbus protocols, please reference the specifications published by Modbus.org.

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**Note:** On some user data acquisition devices, it is necessary to add 1 to all the register values shown in **Table 7-1** to determine the Modbus address.

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**Table 7-1: Modbus map**

Register Start	Register End	Parameter Name	Units	Data Format	Bytes	Description
11	12	External RTD	°C	Float32	4	Temperature of the external Pt1000 RTD