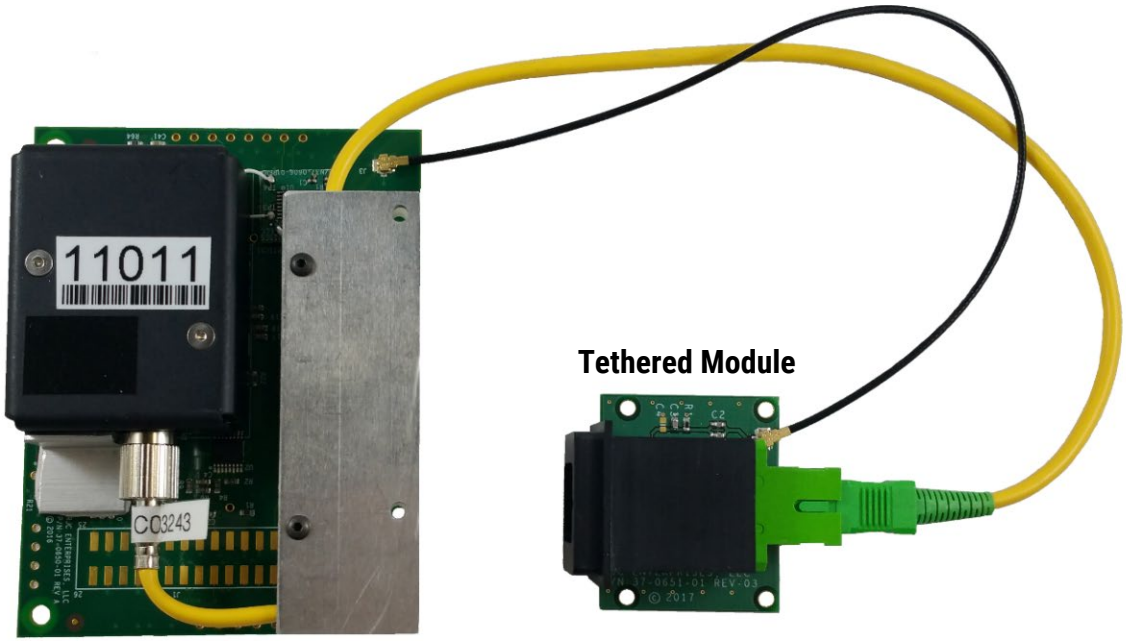
RJC ENTERPRISES, LLC

The Model 520 Fiber Optic Measurement Assembly

USER INSTRUCTIONS

Model 520 Fiber Optic Measurement Assembly (FOMA)



The Model 520 FOMA is an opto-electric PCB with attached **Tethered Module**; this supports RJC Fiber Optic Temperature Sensors. The **Tethered Module** contains the mating optical SC connector for the temperature sensor, and an RFID antenna for reading sensor calibration information.

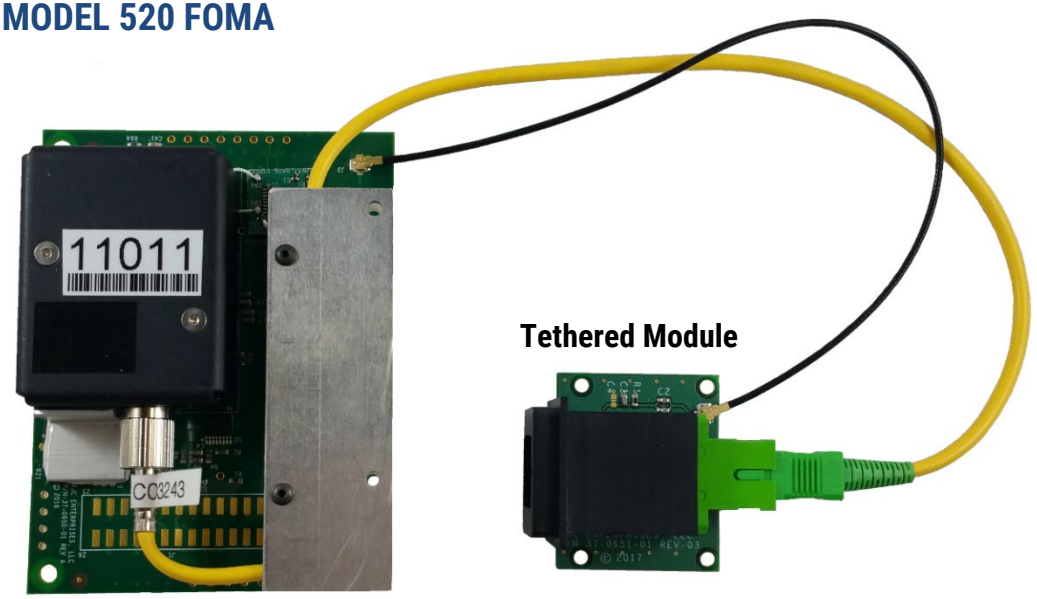
The Model 520 FOMA becomes a key component in the customer's medical device, and provides a logic level RS-232 output of 1000 calibrated temperature readings per second. This FOMA is calibrated with instrumentation traceable to the National Institute of Standards and Technology.

The Model 520 FOMA requires a Host PCBA, which provides power, controls, alarms, and data outputs/displays.

Model 520 FOMA Kit (Includes the following components)

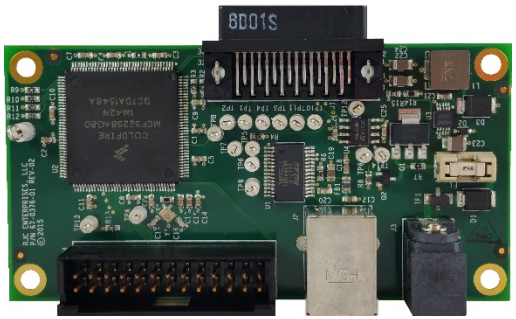
The Model 520 Kit is designed to introduce new customers to the operation and use of RJC temperature sensors and systems.

MODEL 520 FOMA

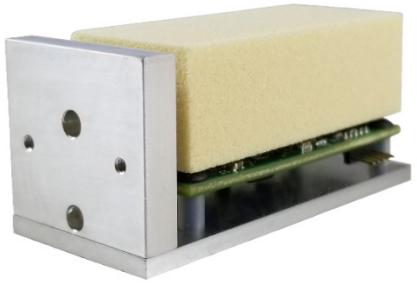


HOST PCBA

A microcontroller-based assembly that provides power and bidirectional communication with the Model 520 FOMA during product development.



Customers may design their own Host PCBA to provide for a range of signal out conditions (e.g. PMI, analog output, USB, display driver, etc.)



TEMPERATURE REFERENCE MODULE (TRM) (sold separately)

Provides a known temperature environment (40°C) for correcting temperature sensor offset.

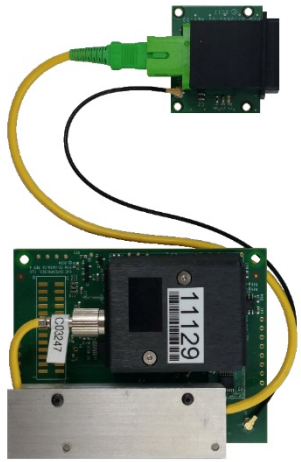
KIT FRAME

Holds the Model 520 FOMA, Host PCBA, and TRM together in a convenient package during product development.

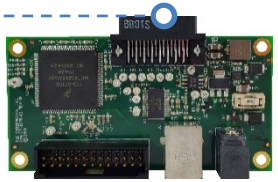
CLEANING SWABS (5-pack)

Swabs for cleaning the Model 520 SC connector.

Model 520 FOMA Kit: Connectivity Guide



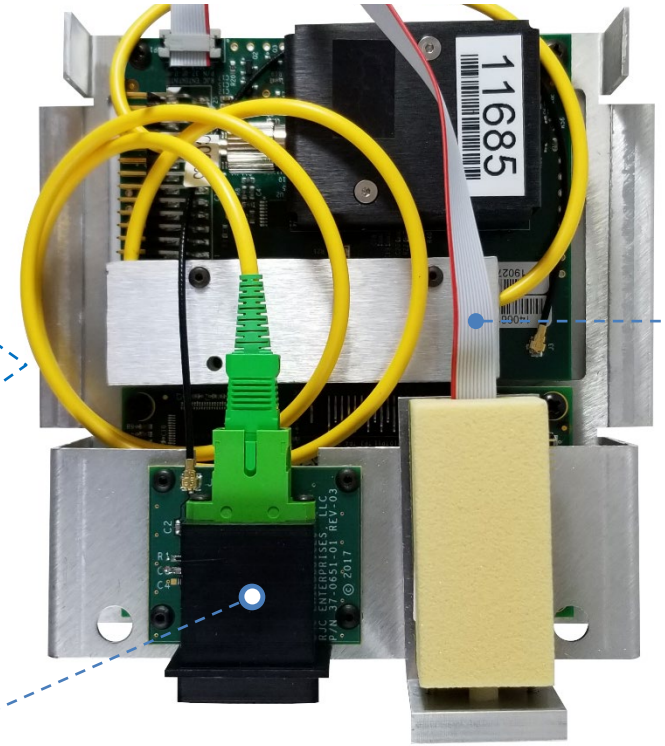
Model 520 FOMA



HOST PCBA

Hirose 32-pin Connector
Connects Host PCBA to Model 520 FOMA

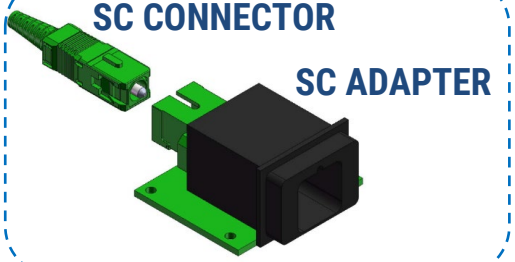
Model 520 FOMA Kit (fully assembled)



Top View

TRM CABLE

End View

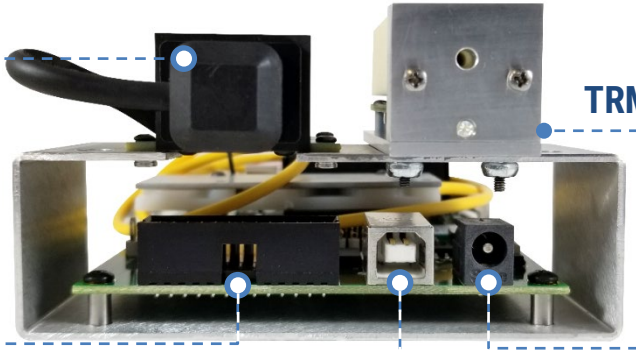


SC CONNECTOR

SC ADAPTER

Tethered Module

ADAPTER PLUG



TRM

26-pin Header
For RJC use only

USB Connector (Type B)
Connects to computer for serial port emulation

POWER PORT
Input, 12VDC, 2.5A

Startup Accessories Pack

Included with first Model 520 FOMA Kit purchase. Additional packs may be purchased separately

USB THUMB DRIVE

Includes:

- Sensor Logging and Display Tool
  - ⓘ Software is for demonstration purposes only.
- RJC Model 520 User Instructions pdf
- FTDI Driver CDM21226_Setup.exe
- DotNet Library dotNetFx45_Full_setup.exe
  (.NET framework necessary for Sensor Logging & Display Tool)

USB CABLE

- Connector type A-to-B, USB 2.0

POWER CORD

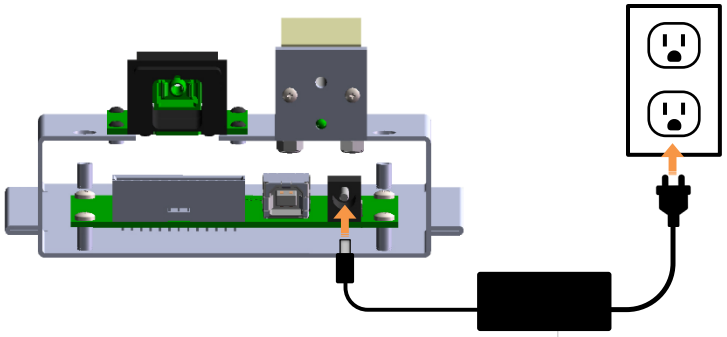
- 18AWG, 3COND M/F

POWER SUPPLY

- Input: 100-240VAC, 50-60 Hz
- Output: 12VDC

Model 520 FOMA Kit: Quick Start Guide

1 Connect the POWER SUPPLY



Using the provided **POWER CORD**, connect the **POWER SUPPLY** to the Model 520 FOMA Kit **POWER PORT** and wall outlet.

For optimal system performance and accuracy, the Model 520 and TRM must be warmed up for 30 minutes before use.

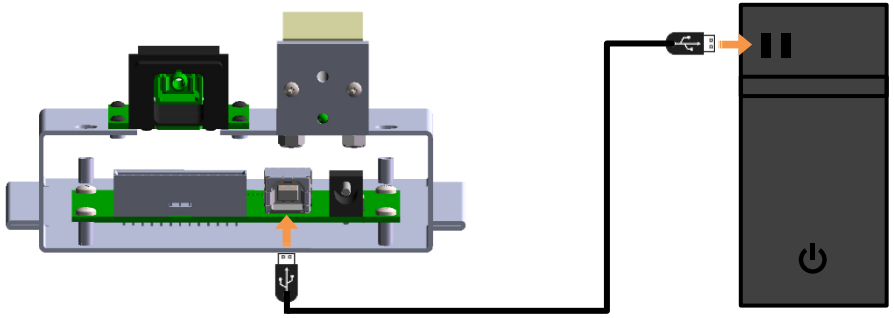
2 Install the FTDI Driver

Insert the **USB THUMB DRIVE** into your computer.

To install the driver, select CDM21226_Setup.exe and complete installation.

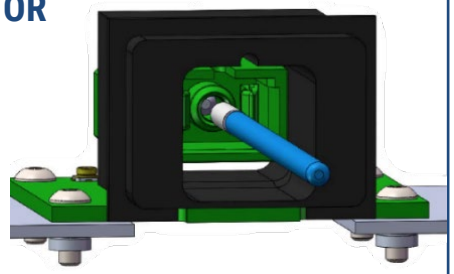
(NOTE: The driver can also be downloaded directly from the FTDI website: http://www.ftdichip.com/Drivers/VCP.htm)

3 Connect the USB CABLE



Connect the Model 520 to a computer with the **USB CABLE**.

4 Clean the Model 520 SC CONNECTOR



Remove the **ADAPTER PLUG**.

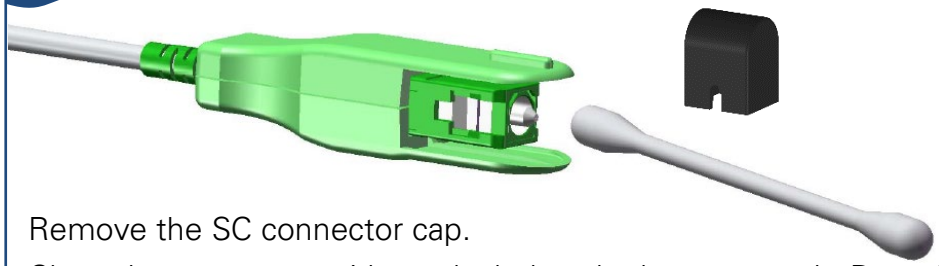
Using the provided **CLEANING SWABS**, clean the Model 520 **SC CONNECTOR** as follows:

- Insert an alcohol-soaked swab into the **SC ADAPTER** and rotate several times. Remove the swab.
- Insert a dry swab and rotate several times. Remove the swab, then dry with compressed air.
- Repeat the cleaning procedure every ~10 insertions.

(NOTE: To prevent contamination buildup, blow out the **SC ADAPTER** with compressed air between each insertion. Swabs may be reused multiple times.)

Model 520 FOMA Kit: Quick Start Guide

5 Clean the sensor assembly SC connector



Remove the SC connector cap.

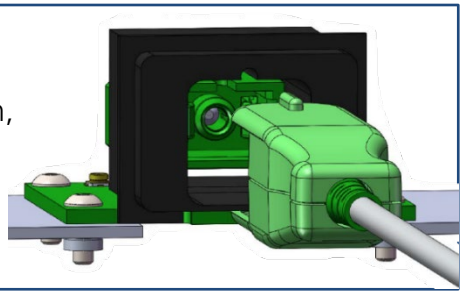
Clean the connector with an alcohol-soaked cotton swab. Dry with compressed air.

ⓘ Clean the sensor SC connector between each insertion!

6 Connect the sensor

Pay attention to connector orientation, then insert the connector into the **SC ADAPTER**.

Push until you feel a click.



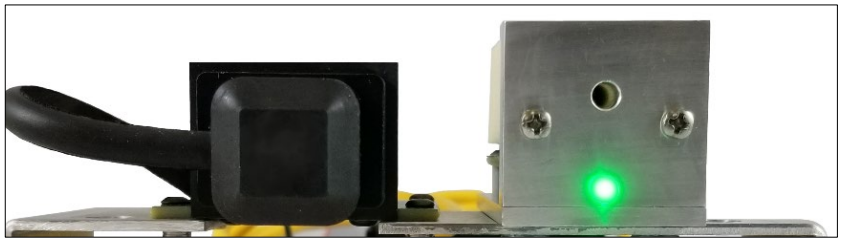
7 Install the software

To install the Sensor Logging and Display Tool, open the "Sensor Logging and Display Tool" folder on the **USB THUMB DRIVE**.

Select **setup**, and complete installation.

ⓘ The SN displayed in the upper-left corner of the program will match the SN label on the Model 520.

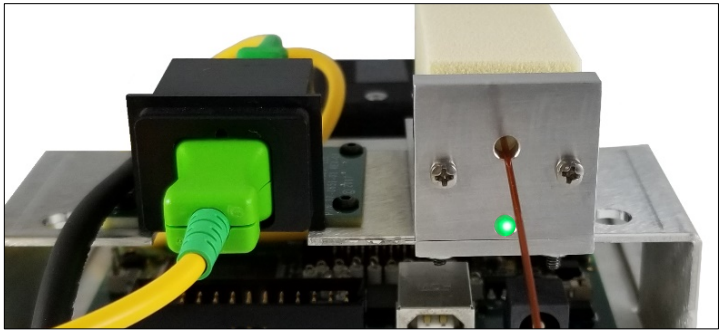
8 Wait for the TRM LED



The TRM will blink while warming up.

When the **TRM** LED is solid green, it is ready for use.

9 Adjust the temperature offset



Insert the sensor **all the way** into the **TRM**. The TRM provides a stable 40°C environment for correcting temperature sensor offset.

Click **Sensor: Unadjusted** in the upper-right corner of the screen.

Wait until the text displays **Adjusted**, then remove the sensor from the TRM. ⓘ This may take up to one minute.

To re-adjust, reinsert sensor and click the text again.

Model 520 FOMA Kit: Quick Start Guide

10 Log data (optional)

Enable/Disable data logging by clicking **Logging: Disabled** in the upper-right corner of the screen.

Logs are saved to the "RJC Logging Data" folder in your Documents folder.

The file name contains the Model 520 serial number and the start date/time.

To use a different sensor, disconnect the current sensor and repeat steps 5-9 with a new temperature sensor.

(**NOTE**: Step 7 does not need to be repeated.)

The Model 520 is intended to be in an enclosure. Intense incandescent or reflected sunlight can affect temperature readings. Normal fluorescent or LED room lighting typically has a negligible effect on the system.

Model 520 FOMA Integration

Model 520 FOMA Specifications

- Physical Dimensions:
  - Model 520: 2.3 x 1.3 x 1.2 inches
  - Tethered Module: 1.3 x 1.5 x 0.8 inches
- Ambient Temperature Range: 15 to 38°C

  NOTE: The Model 520 must have adequate ventilation to ensure proper regulation of the heated optics assembly.
- System Bandwidth: 1Hz, adjustable to lower values at the factory.
- Data Rate: 1000 samples/second, adjustable to lower values at the factory.
- Power Required: Less than 250 mA @ 12 VDC at room temperature, (2.5 amp at startup)
- Temperature Measurement Range: Differential temperatures between 15°C and 50°C
- Sensor calibration data is provided on the RFID tag located in the SC connector assembly.

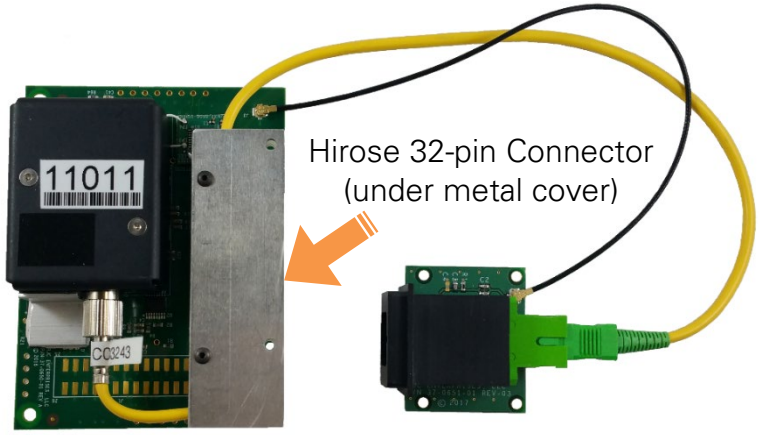
Communication Protocol

- Reference RJC document 40-0041, Model 520 Communications Specification (Customer).

Model 520 FOMA Integration

Electrical Connections

Electrical connection between the Model 520 and Host PCBA (RJC or customer designed) is made via a Hirose 32 pin connector.

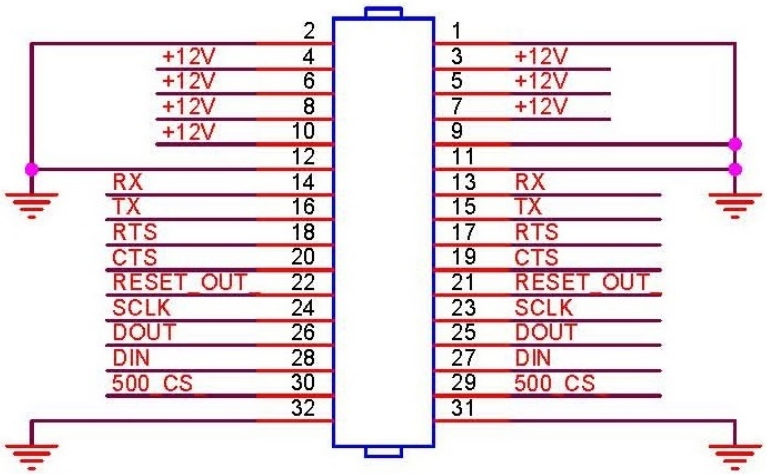


Pin descriptors are as follows:

- Pins 3-10 12 VDC, 2.5A Peak
- Pins 13-20 Logic Level (3.3V) RS-232 Interface
- Pins 21-22 Reset Line to Model 520, Active Low
- Pins 23-30 Interface to Model 520 for Firmware Update

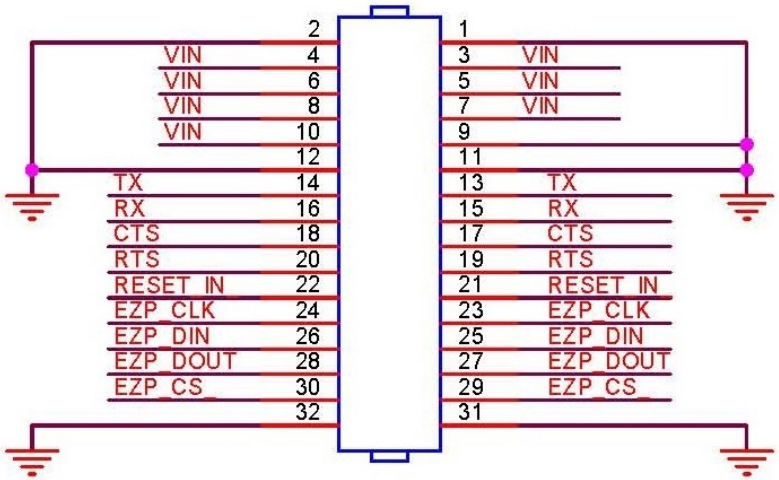
  (See MCF52259 ColdFire® Integrated Microcontroller Reference Manual, Chapter 23 EzPort)
- Pins 1,2,9,11,31,32 Power and Signal Ground

Customer Device Side



HIROSE FX2-32S-1.27DSL(71)

Model 520 Side



HIROSE FX2-32P-1.27DSL(71)

Data Format

When the Model 520 is used as part of the Model 520 FOMA Kit, the USB outputs 1000 calibrated temperature samples per second in a simplified text based protocol. The Sensor Logging and Display Tool software provided with the Kit can be used to display this data or write it to a log file. The data is also accessible through a virtual COM port that will appear in the Ports section of the Device Manager as USB Serial Port (COM X), where X is the COM port number. This data can be accessed using a user created application or terminal emulation program (e.g. PuTTY). The communication parameters should be set to 115,200 bits per second, 8 data bits, one stop bit, no parity, and no flow control.

Each temperature data sample has the following format: **<Temperature><Comma><Status><CheckSum><CR>**

Where:

- <Temperature> - the temperature in 1/100th (°C) per count with a negative sign bit for negative values
- <Comma> - comma character ',' with no space before or after
- <Status> - status character which can be one of the following:
  - X – no sensor is inserted
  - U – a sensor has been inserted but is has not been adjusted for offset
  - Z – a sensor has been inserted and has been adjusted for offset
- <CheckSum> - two-digit hex value that is a CRC8 checksum of the previous characters on the line
- <CR> - Carriage return character (0x0D) without a line feed character

The sensor can be temperature offset adjusted by sending the command: **zero??** followed by a carriage return.

Limited Warranty

RJC Enterprises, LLC, (RJC) warrants that each new Fiber Optic Measurement Assembly (FOMA) is free from defects in material and workmanship under normal use and service for a period of one(1) year from date of delivery by RJC directly to first purchaser. If any such defect occurs during the warranty period, the purchaser must contact RJC directly for instructions regarding return of the FOMA. In returning the FOMA, the purchaser assumes responsibility for proper packaging and shipping costs; loss or damage during shipment is the purchasers' responsibility. If the FOMA is returned to RJC and is under warranty, the FOMA will be repaired or replaced free of charge, and then returned to the purchaser.

In no event shall RJC be liable for any incidental, indirect, or consequential damages in connection with the acquisition or use of any RJC product. Further, this warranty shall not apply to any loss arising in connection with the purchase or use of any RJC product which has been repaired by anyone other than an authorized RJC service representative, or altered in any way so as to affect its stability or reliability, or which has been subject to misuse, negligence or accident, or which has been used otherwise than in accordance with the instructions furnished by RJC. This limited warranty is exclusive and in lieu of all other obligations or liabilities on RJC's part, and RJC neither assumes nor authorizes any representative or other person to assume for it any other liability in connection with RJC products.

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