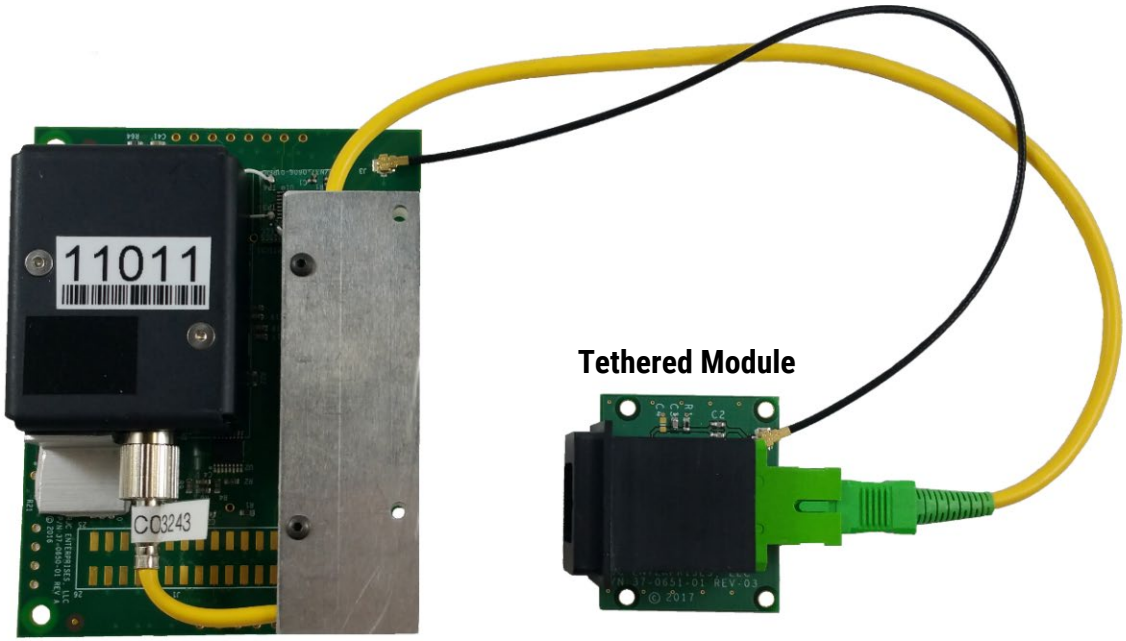
RJC ENTERPRISES, LLC

The Model 500 Fiber Optic Measurement Assembly

USER INSTRUCTIONS

Model 500 Fiber Optic Measurement Assembly (FOMA)



The Model 500 FOMA is an opto-electric PCB with attached **Tethered Module**; this assembly supports RJC Fiber Optic Pressure Sensors. The **Tethered Module** contains the mating optical SC connector for the pressure sensor, and an RFID antenna for reading sensor calibration information.

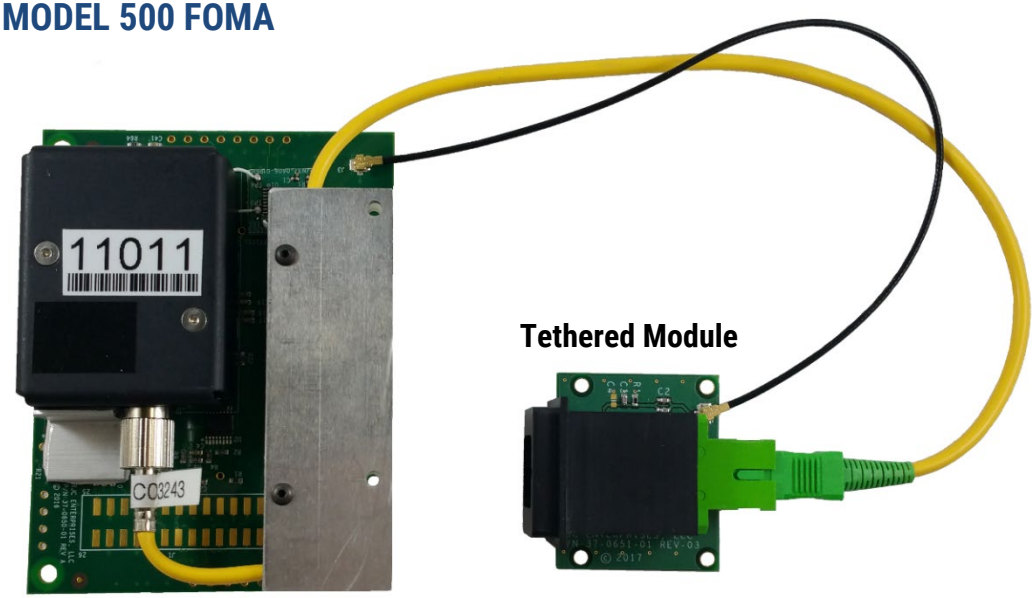
The Model 500 FOMA becomes a key component in the customer's medical device, and provides a logic level RS-232 output of 1000 calibrated pressure readings per second. This FOMA is calibrated with instrumentation traceable to the National Institute of Standards and Technology.

The Model 500 FOMA requires a Host PCBA, which provides power, controls, alarms, and data outputs/displays.

Model 500 FOMA Kit (Includes the following components)

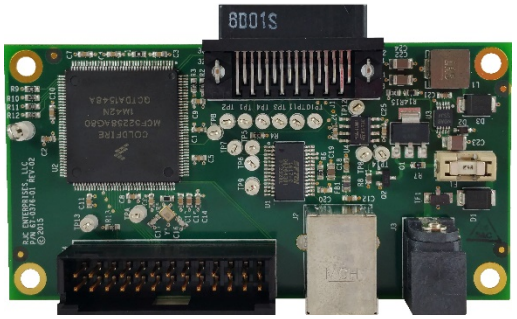
The Model 500 Kit is designed to introduce new customers to the operation and use of RJC pressure sensors and systems.

MODEL 500 FOMA



CLEANING SWABS (5-pack)

Swabs for cleaning the Model 500 SC connector.



HOST PCBA

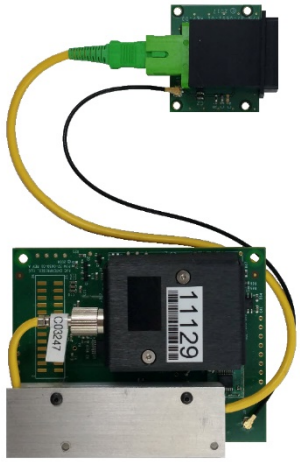
A microcontroller-based assembly that provides power and bidirectional communication with the Model 500 FOMA during product development.

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.)

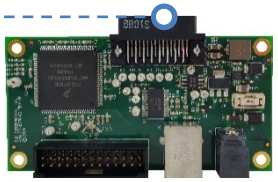
KIT FRAME

Holds the Model 500 FOMA and Host PCBA together in a convenient package during product development.

Model 500 FOMA Kit: Connectivity Guide



Model 500 FOMA

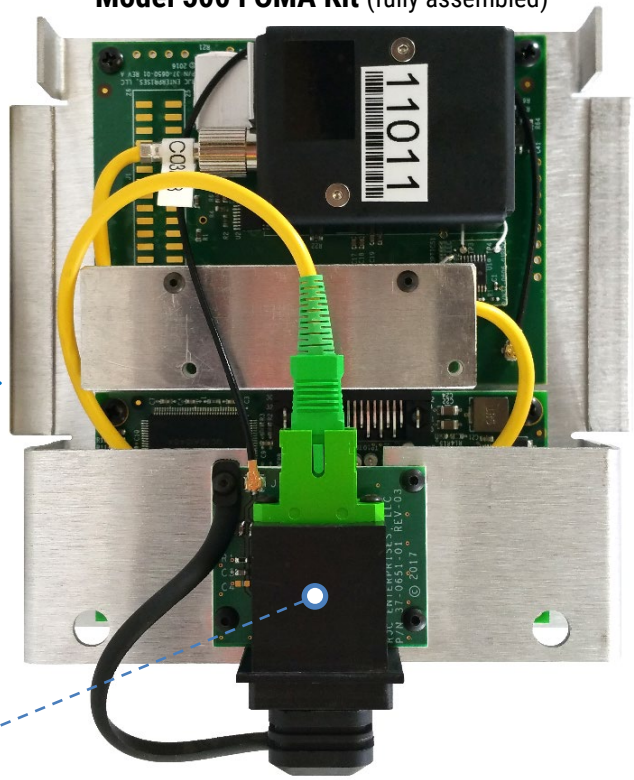


HOST PCBA

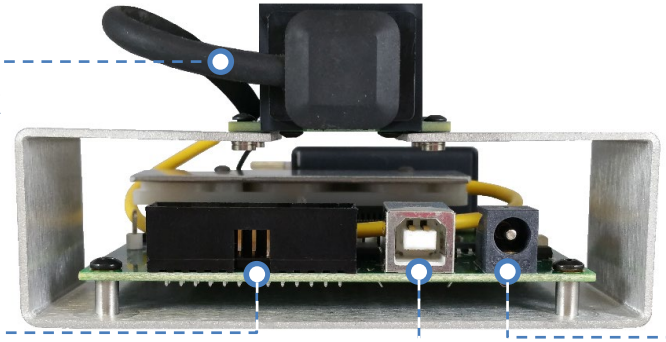
Hirose 32-pin Connector
Connects Host PCBA to Model 500 FOMA

Model 500 FOMA Kit (fully assembled)

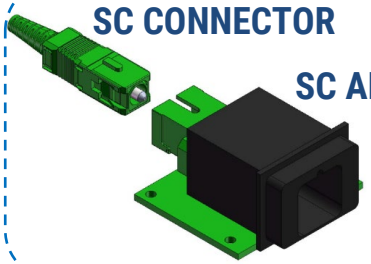
Top View



End View



ADAPTER PLUG



SC CONNECTOR

SC ADAPTER

Tethered Module

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 500 FOMA Kit purchase.
Additional packs may be purchased separately

USB THUMB DRIVE

Includes:

- FTDI Driver CDM21226_Setup.exe
- Sensor Logging and Display Tool
  - ⓘ Software is for demonstration purposes only.
- RJC Model 500 User Instructions pdf
- DotNet Library dotNetFx45_Full_setup.exe
  (.NET framework necessary for Sensor Logging & Display Tool)

FIBER OPTIC CABLE

- 100/140/170µm cable, ~80 inches

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

JACKET STRIPPER

- Jonard Tools WS-5

MODEL 45 TEST SENSOR

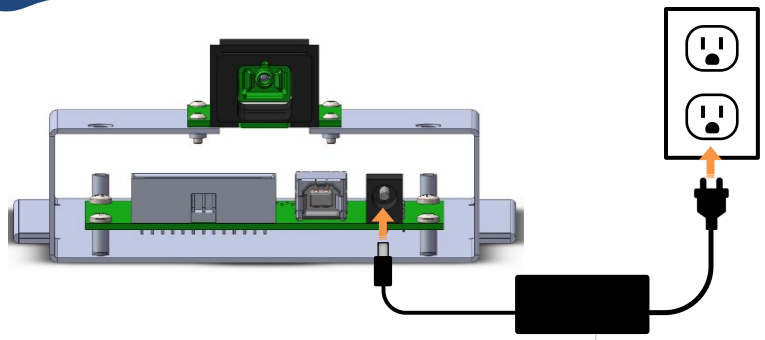
- Contains an RJC Fiber Optic Pressure Sensor.

SENSOR PRESSURIZATION ASSEMBLY

- Used to apply pressure to the Model 45 Test Sensor.

Model 500 FOMA Kit: Quick Start Guide

1 Connect the POWER SUPPLY



Using the provided **POWER CORD**, connect the **POWER SUPPLY** to the Model 500 FOMA Kit **POWER PORT** and wall outlet.

For optimal system performance and accuracy, the Model 500 must be connected to power **30 minutes** before use.

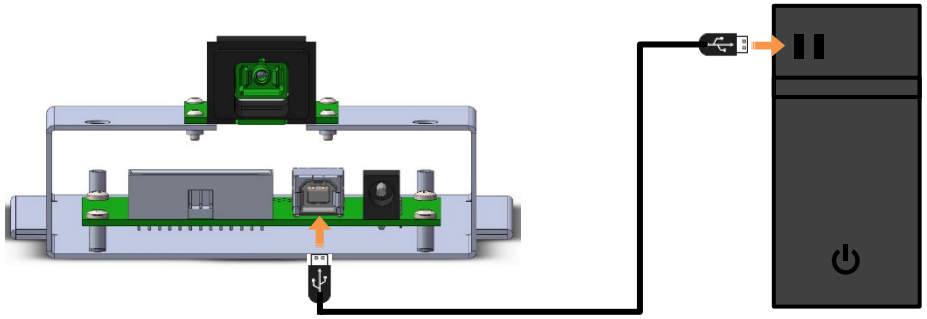
2 Install the FTDI Driver

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

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

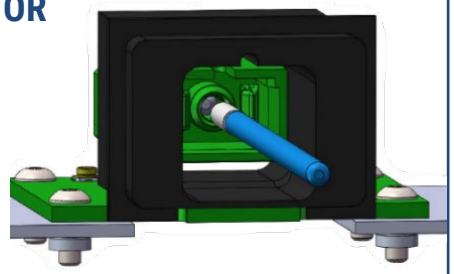
(**NOTE**: The driver can also be downloaded directly from the FTDI website: http://www.ftdichip.com/Drivers/VCP.htm)

3 Connect the USB CABLE



Connect the Model 500 to a computer with the **USB CABLE**.

4 Clean the Model 500 SC CONNECTOR



Remove the **ADAPTER PLUG**.

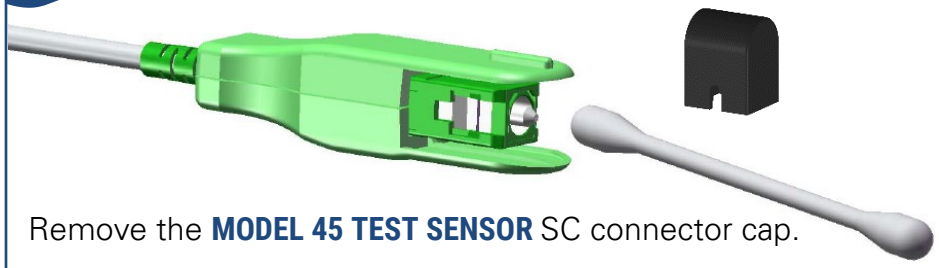
Using the provided **CLEANING SWABS**, clean the Model 500 **SC CONNECTOR** as follows:

- 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 500 FOMA Kit: Quick Start Guide

5 Clean the MODEL 45 TEST SENSOR SC connector



Remove the **MODEL 45 TEST SENSOR** SC connector cap.

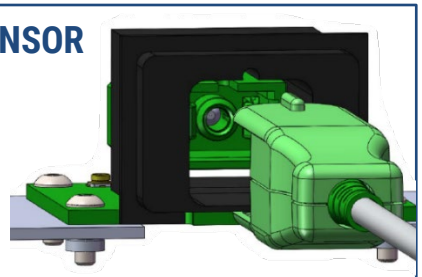
Clean the connector with an alcohol-soaked cotton swab.
Dry with compressed air.

ⓘ Clean the sensor SC connector between each insertion!

6 Connect the MODEL 45 TEST SENSOR

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

Push until you feel a click.



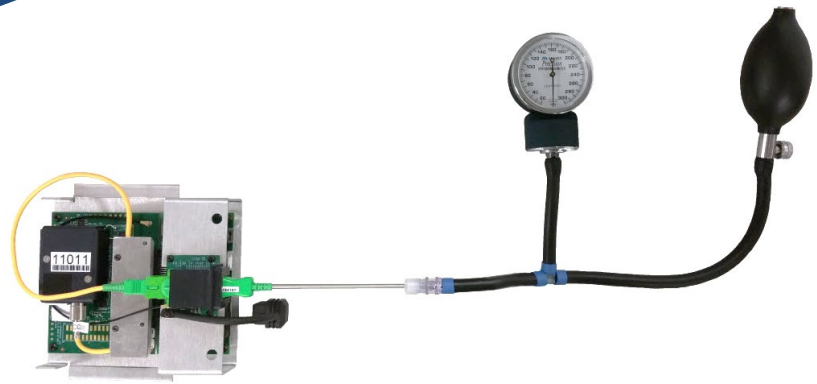
7 Install the software

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.

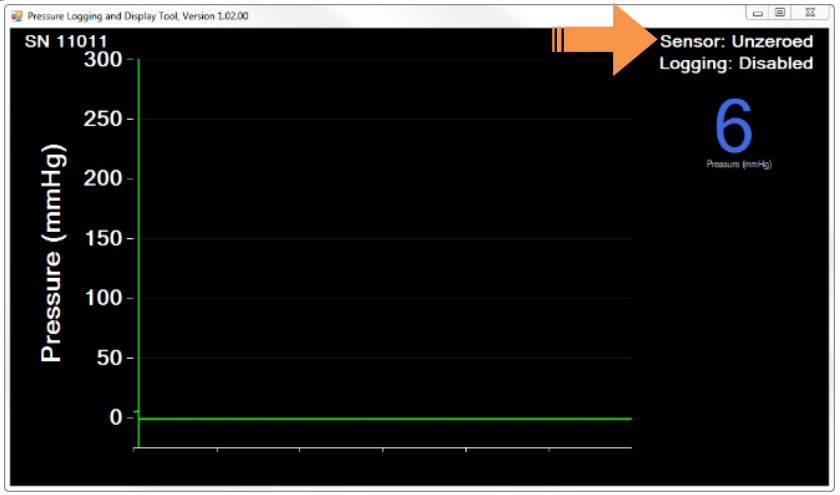
ⓘ The SN displayed in the upper-left corner of the program will match the SN label on the Model 500.

8 Connect the SENSOR PRESSURIZATION ASSEMBLY



Insert the **MODEL 45 TEST SENSOR** into the **TUOHY-BORST ADAPTER** and tighten.

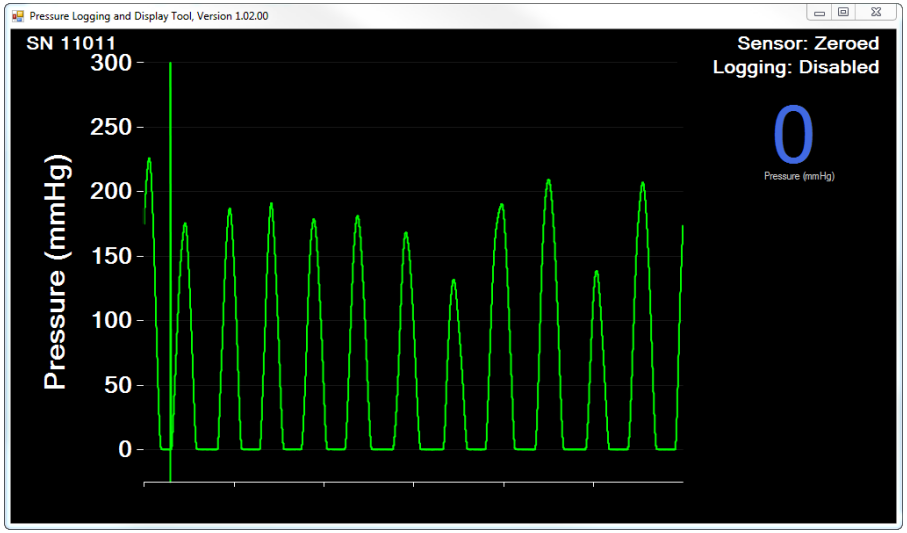
9 Zero the MODEL 45 TEST SENSOR



With the sensor at ambient pressure, click **Sensor: Unzeroed** in the upper-right corner of the screen to zero the sensor. To re-zero, click text again.

Model 500 FOMA Kit: Quick Start Guide

10 Apply pressure

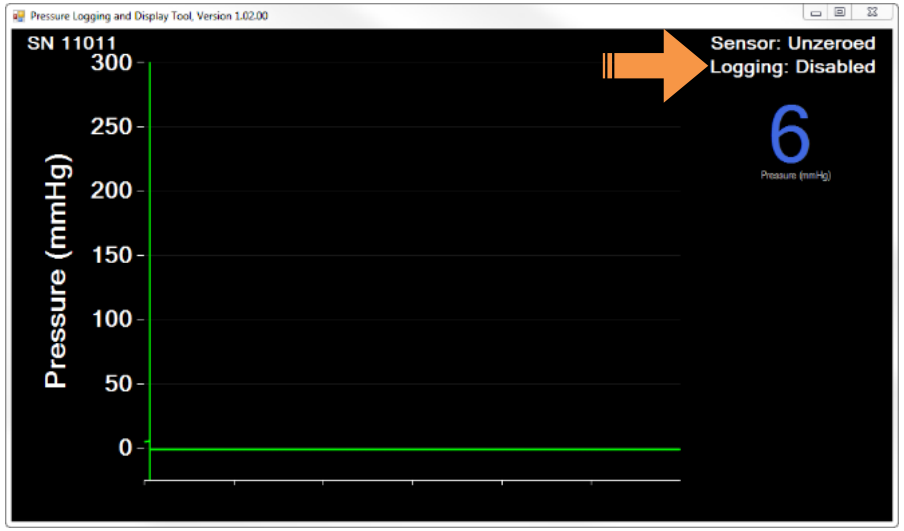


Apply pressure with the **SENSOR PRESSURIZATION ASSEMBLY**.

Resulting pressures will be displayed on the screen.

The Model 500 is intended to be in an enclosure. Intense incandescent or reflected sunlight can affect pressure readings. Normal fluorescent or LED room lighting typically has a negligible effect on the system.

11 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 500 serial number and the start date/time.

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

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

Model 500 FOMA Integration

Model 500 FOMA Specifications

- Physical Dimensions:
  - Model 500: 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 500 must have adequate ventilation to ensure proper regulation of the heated optics assembly.
- System Bandwidth: 100Hz, 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)
- Differential Pressure Measurement Range: Differential pressures between -30 mmHg and 250 mmHg
- Sensor calibration data is provided on the RFID tag located in the SC connector assembly.

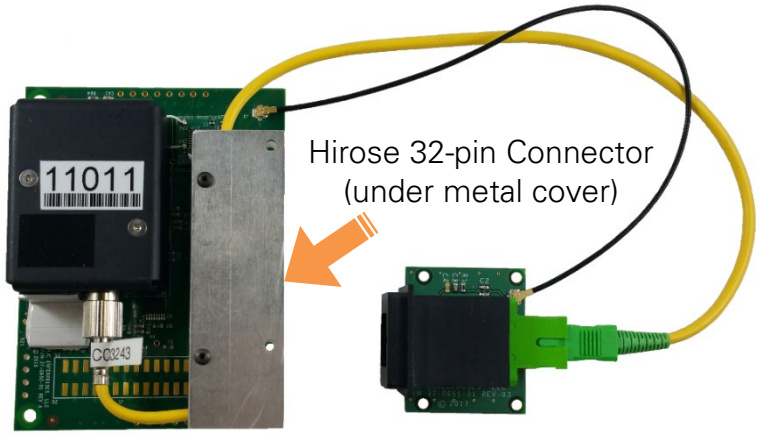
Communication Protocol

- Reference RJC document 40-0036, Model 500 Communications Specification (Customer). Available upon request.

Model 500 FOMA Integration

Electrical Connections

Electrical connection between the Model 500 and Host PCBA (RJC or customer designed) is made via a Hirose 32 pin connector.

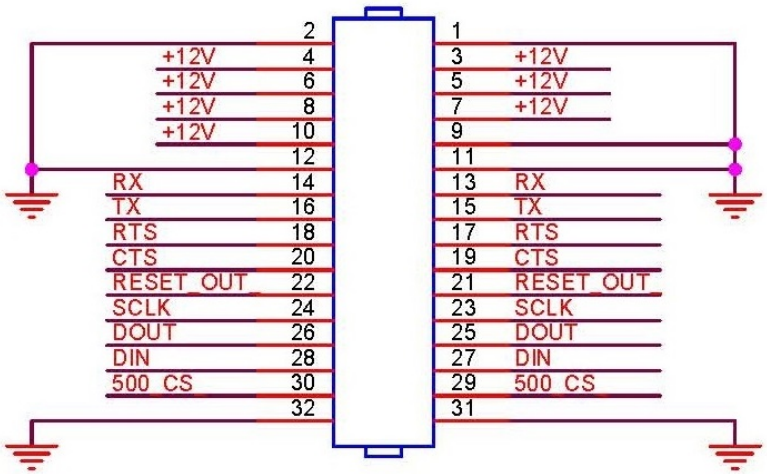


Pin descriptors are as follows:

- 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 500, Active Low
- Pins 23-30 Interface to Model 500 for Firmware Update

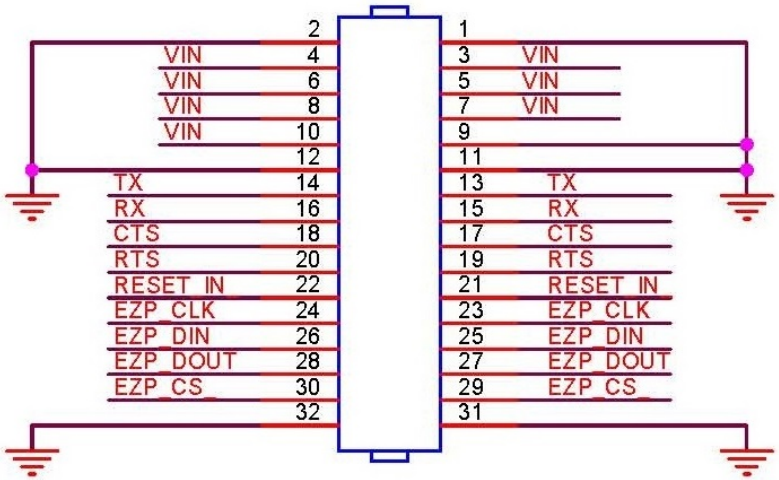
  (See MCF52259 ColdFire® Integrated Microcontroller Reference Manual, Chapter 23 EzPort)
- Pins 1,2,9,11,31,32 Power and Signal Ground

Customer Device Side



HIROSE FX2-32S-1.27DSL(71)

Model 500 Side



HIROSE FX2-32P-1.27DSL(71)

Data Format

When the Model 500 is used as part of the Model 500 FOMA Kit, the USB outputs 1000 calibrated pressure 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 pressure data sample has the following format: **<Pressure><Comma><Status><CheckSum><CR>**

Where:

- <Pressure> - the zero adjusted differential pressure in 1/100th mmHg 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 unzeroed
  - Z – a sensor has been inserted and has been zeroed
- <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 zeroed 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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