

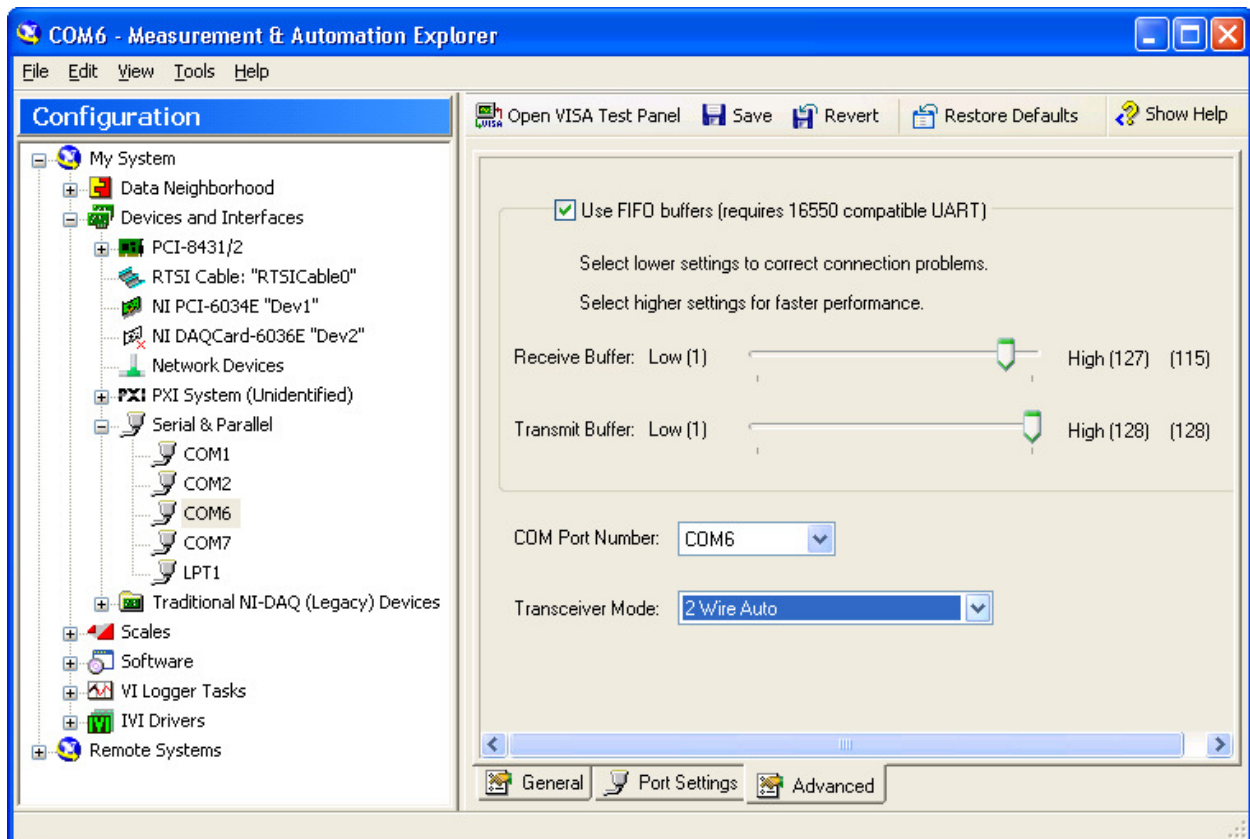
## Configuring a National Instruments Serial Card for Use with Digital F/T Systems

Before using the Digital F/T with a National Instruments RS-485 serial interface, it is necessary to properly configure the communication and driver settings of the card for a two-wire interface and to use the card's FIFO buffers effectively:

**Two Wire Communications:** The Digital F/T control board uses a two-wire (half duplex) RS-485 connection. In this configuration, the same lines are used for transmitting and receiving data, therefore only one device at a time can transmit. Without proper configuration, this will also result in any data sent out by the master transmitter being “echoed” back to the master receiver, resulting in additional work for the software running on the master computer, as the echo will have to be read and discarded. National Instruments serial devices can be configured to automatically disable the receiver while transmitting to avoid receiving this echo.

**FIFO Buffers:** The National Instruments serial card has a hardware buffer that can hold up to 128 bytes. When the number of bytes in this hardware buffer reaches a configurable threshold, the card signals an interrupt so the client software can retrieve that data out of the hardware buffer. Setting this threshold too high or too low can cause issues. If the threshold level is set too high, the client software may not finish pulling data out of the hardware buffer before the hardware buffer is completely filled up, resulting in lost data. If the threshold is set too low, the card will signal interrupts more often, which can require a lot of processing time.

To configure the FIFO buffers and two wire communication, open Measurement and Automation Explorer, select the serial device the sensor is connected to, open the “Advanced” properties panel, select the “2 Wire Auto” method in the “Transceiver Mode” pull down menu and set the FIFO buffer “Receive Buffer” threshold to a value lower than the maximum. The following example uses a threshold size of 115, which is one streaming sample size (13 bytes) less than the buffer size of 128 bytes. This value should work for most uses, but you can set the value higher or lower if you find your custom software has very specific timing requirements.



In this configuration, the National Instruments serial device will disable the receiver while transmitting by default. If you have other software which requires the echo to be present in two-wire mode, or uses a four-wire (full duplex) connection, you will have to use one of the following methods:

- Use another serial interface for that software.
- Change the default Transceiver Mode every time you switch between the ATI software and your other software.
- Rewrite the other software to manually configure the NI serial interface for the correct mode when it is started. The NI-Serial help file details how manually configure the NI serial interface in the section “RS-485 Transceiver Control”.
- Write custom software for the Digital F/T that discards the echoed characters.

If, after configuring the NI Serial device for two-wire RS485 mode, the Digital FT does not respond to commands, it is possible you have encountered a bug in the National Instruments driver software whereby the correct transceiver mode is not always activated. Make sure you have installed the latest NI Serial driver software from [www.ni.com](http://www.ni.com). If you are experienced with using an oscilloscope, it will be helpful to make sure that the transmit lines on the NI Serial device are actually activating when the software tries to send data. If the card is transmitting correctly, but the sensor is not responding, contact ATI for support with the Digital FT. If the card does not transmit when in “2 Wire Auto” transceiver mode, and you have the latest NI Serial software, try putting the card and NI Serial software

in another computer and attempting to use it in the other computer. If it still does not work, you may have to contact National Instruments for support with the NI Serial device.