

# IEEE 488

## APPLICATION BULLETIN

### Using ICS 48x9A Interfaces with a Watlow F4T

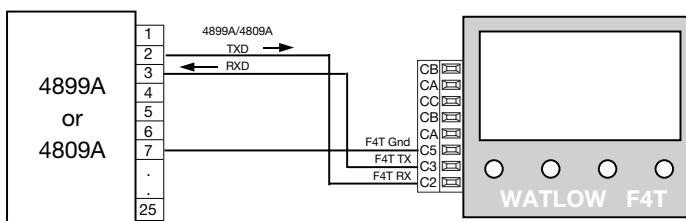
#### INTRODUCTION

Many of ICS's 48x9A GPIB to Modbus RTU Interfaces are used with Watlow Controllers EZ Zone and F4 Controllers. Watlow has recently released a new Touch screen controller, the Model F4T. This application note describes how to connect to it and use it with ICS's 48x9A Interfaces.

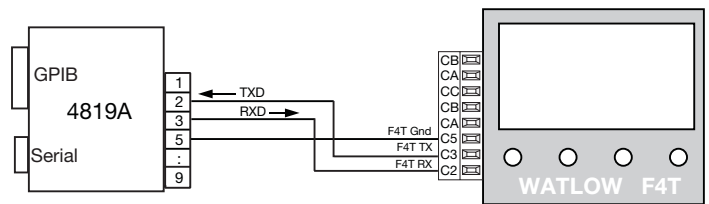
#### SERIAL CONNECTIONS

The Watlow F4T supports RS-232 and two-wire RS-485 signals. Figures 1 thru 4 show how to connect ICS's 48x9A Interfaces to the Watlow F4T. If the F4T is installed in a chamber and the ICS Interface is on the outside of the chamber then there may be a bulkhead connector between the F4T and the ICS Interface. The user will have to 'buzz out' the wiring connections with an ohmmeter or use a voltmeter to determine the Watlow TX signal.

The typical bulkhead connector is a DE-9 connector. If you are doing a RS-232 connection, Pins 2 and 3 are usually the signals and pin 5 is ground. With the F4T turned on, use a voltmeter to measure between pin 5 and pins 2 and 3. The pin with a negative voltage of -5 to -12 V is the TX signal. The other signal should be 0 ± 1 volt. Fill in the signal numbers on the diagram and prepare a cable from the 4899A to the DE-9 connector or purchase one from a local electronics store. (DE refers to the connector shell size. They are often referred to as DB-9 sub or D sub connector.)

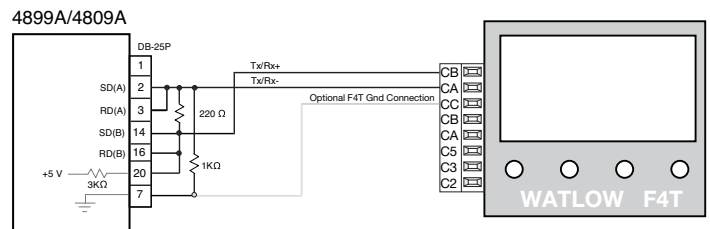


**Figure 1 4899A/4809A RS-232 connection to a F4T**



**Figure 2 4819A RS-232 connections to a F4T**

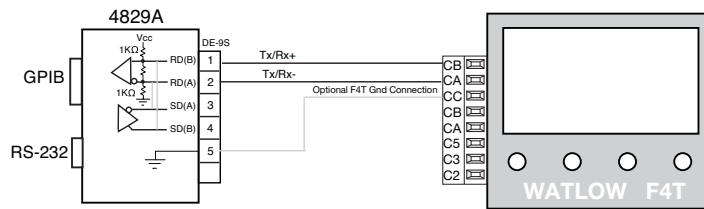
Two-wire, RS-485 connections can be used to create a simple network with multiple controllers on it. This note only considers the case where you have a single slave device (the F4t) on the network as shown in Figure 3. Two-wire RS-485 networks are floating unless a device is transmitting and should have a terminating resistor or a bias network to minimize noise into the receiver. ICS recommends using a three resistor network as shown in Figure 3. Both the 4899A and 4809A provide an internal pullup resistor to +5 V so you only need to add an external load and pulldown resistors as shown in Figure 3. This biases the lines and keeps 260 mv across the signal pair while they are not being driven.



**Figure 3 4899A/4809A RS-485 connections to a F4T**

The 4899A and 4809A were designed to be able to drive a 4-wire network with transmit and receive signal pairs. To use either interface with two-wire networks, jumper pin 2 to 3 and pin 14 to pin 16 as shown in Figure 3. An optional ground wire is shown in gray in Figure 3. It is not necessary to supply a ground wire between the 4899A or 4809A and the F4T

ICS's 4829A was designed for use on two and four wire RS-485 networks. Internal jumpers connect the internal termination network to the RX signal pair and jumper the TX and RX signal pairs together. This eliminates all external resistors and jumpers which simplifies the connection to the F4T. The optional ground wire is shown in gray in Figure 4.



**Figure 4 4829A RS-485 connections to a F4T**

## CONTROLLING THE F4T

The F4T has more functions than does the F4 which means more input-output registers. The F4T has two sets of registers, a native set with all of the new functions and a reduced F4 style register set. This reduced set make it possible to run the F4T with an existing F4 program if you only use these registers in your program. The F4 set has only a few registers and not the whole F4 register set.

The F4T has floating point variables that use two adjacent registers, some 16-bit signed variables and some 16-bit unsigned variables that use single registers. All registers are 16-bit registers. Floating point registers are referenced by the lower register number. When Watlow says the setpoint register is 2752, they really mean registers 2752 and 2753.

All of ICS's 48x9A GPIB to Modbus Interfaces have commands for reading and writing floating point variables. The RF? command reads floating point variables; the WF command writes a value to a floating point variable. The syntax is:

WF register, value.

An example is:

WF 2752, 65

An example to read the floating point variable is:

RF? 2752

A Gateway of 169.254.0.1 was used in this back-to-back example since the 4865 defaults to an IP address of 169.254.48.65. Other IP addresses can be used as long as the 4865's network settings are adjusted to match.

Click 'Update Flash' to save the setting and reboot the 8055.

## PRECAUTIONS

The following precautions should be considered when designing

## SUMMARY

This Application Note has described how to use ICS's 4865 and 8055 to extend the GPIB Bus over an Ethernet link for a single instrument. This note includes the setup instructions for operation in back-to-back connections and over the company network. Precautions are given for running successful application programs.

This note is not intended to imply that the 4865 and 8055 can be used for general purpose GPIB Bus extension. The user needs to limit his application to the capabilities of these two devices.

## REFERENCES

The following references provide more information on the subjects discussed in this Application Note:

- [1] Application Note AB48-12, Extending the GPIB Bus.
- [2] IEEE Std 488.2-1992, IEEE Standard Codes, Formats, Protocols, and Common Commands For Use With IEEE Std 488.1-1987, IEEE Standard Digital Interface for Programmable Instrumentation.
- [3] VXI-11 description based on VXI-11 Specification Revision 1.0 dated 1995. Copies available from the VXI Consortium at <http://www.vxi.org/>.

