MYNAH℠

Foxboro HTG Driver
Programmable Serial Interface Card
Series 2

USER MANUAL

Rev. P1.55

July 14, 2009

Printed in the U.S.A.

1 INTRODUCTION

1.1 Scope

This document is the User Manual for the Foxboro HTG driver firmware for the Emerson Process Management (EPM) DeltaV Control System; it provides information required to install, configure, and maintain the driver firmware on the DeltaV Series 2 Programmable Serial Interface Card (PSIC). The reader should be familiar with EPM's DeltaV PSIC and connected Foxboro HTG devices.

The section *Document Format* briefly describes the contents of each section of this manual. *System Specifications* outlines hardware and software requirements for the Foxboro HTG Driver (P1.55) firmware. This driver is not available for Series 1 serial cards.

1.2 Document Format

This document is organized as follows:

Table 1

Introduction	Describes the scope and purpose of this document.
Theory of Operation	Provides a general functional overview of the Foxboro HTG Driver.
Downloading Firmware	Describes downloading procedures for the Foxboro HTG Driver firmware on to the DeltaV PSIC.
Configuration Information	Describes procedures and guidelines for configuring the DeltaV PSIC.
Operational Check	Provides tips and assistance to ensure PSIC is properly setup and configured.
DeltaV–Field Device Electrical Interface	Describes the electrical interface between DeltaV and the Foxboro SIU device. Also describes the cable pin assignments for RS-232 and RS-422/485 communications.
Technical Support	Describes who to call if you need assistance.
Example	Describes how to configure a device with input and output datasets.

1.3 System Specifications

The following table lists the minimum system requirements for the Foxboro HTG Driver:

Table 2

Firmware	Foxboro HTG Driver Firmware (P1.55)
Protocol Compatibility	Foxboro Host Computer to System Interface Unit (SIU) Communications Interface, document MI 020-056, May 1995.
Software Requirements	DeltaV System Software (Release 6.3.2 or later) installed on a hardware-appropriate Windows NT or later workstation configured as a ProfessionalPlus for DeltaV Serial Interface Port License (VE4102)
Minimum DeltaV Hardware Requirements	FRSI DeltaV Serial Interface Series 2, Hardware PN: 12P2506X022 FRSI DeltaV M3, M5, MD or Series 2 MD Controller, Power Supply and 2 wide controller carrier FRSI 8 wide I/O card carrier

2 THEORY OF OPERATION

The Programmable Serial Interface Card (PSIC) has 2 ports which can be configured for RS-232, RS-422/RS-485 Half Duplex or RS-422/RS-485 Full Duplex communications with external devices. For communications with Foxboro devices, any mode may be used.

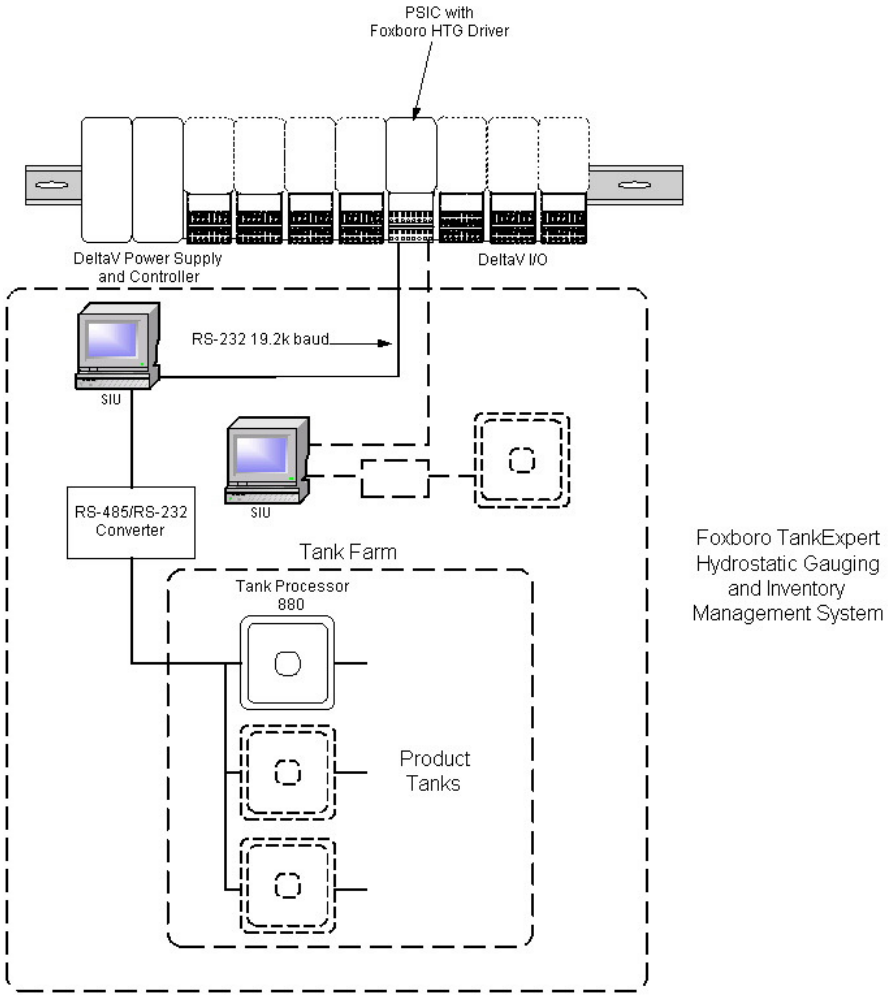
The DeltaV Serial Card Driver functionality will be as follows.

1. The driver will be flashed into the PSIC.

2. The driver will run in Master mode only and be responsible for sending commands to the SIU to read tank data. The SIU will respond with the tank information, which will be reported to DeltaV in dataset registers.

3. The two ports of the PSIC work independently.

The following shows PSIC connectivity with Foxboro devices.

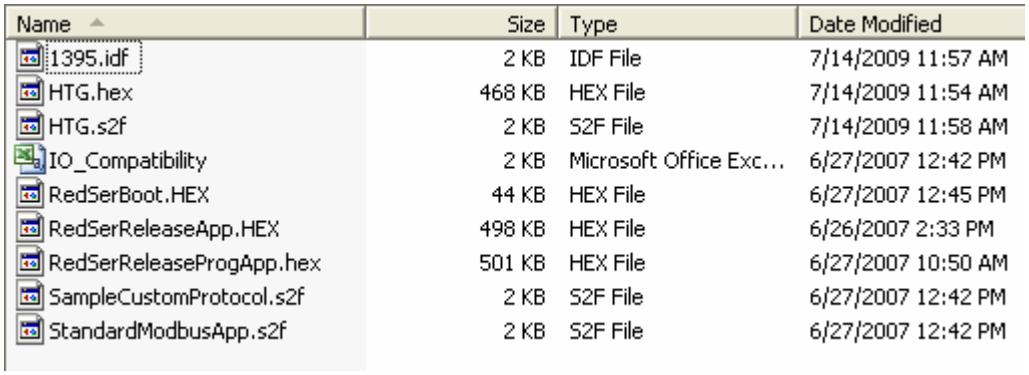


3 Downloading the firmware

The driver software distribution comprises 15 files, distributed on a CD. These files must be copied to the DeltaV directory on your ProPlus Workstation. The path is:

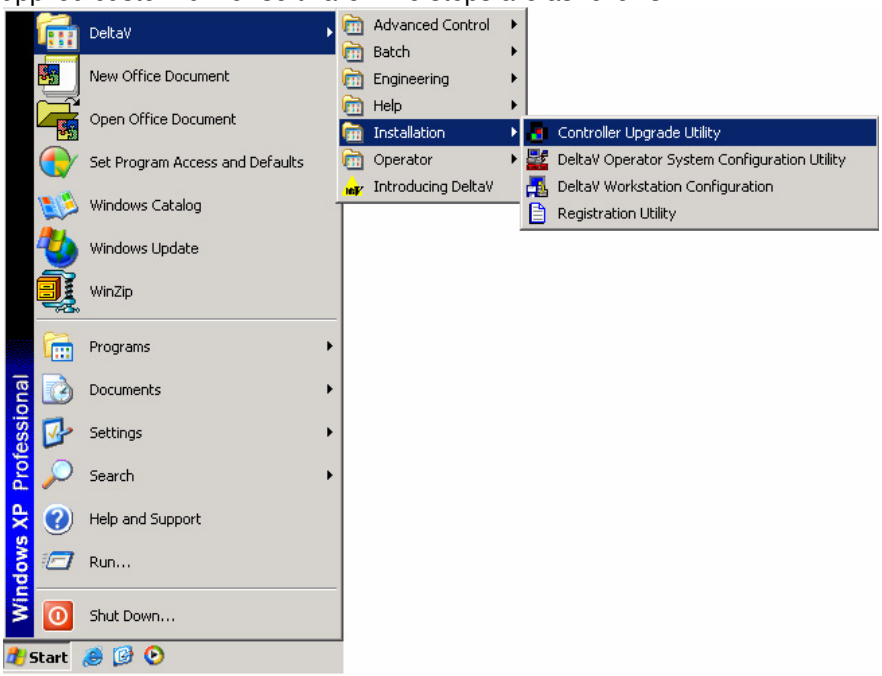
\DeltaV\ctl\ProgSerial\FoxboroHTG

Note that you will have to create the \FoxboroHTG subdirectory. The following files will be copied:

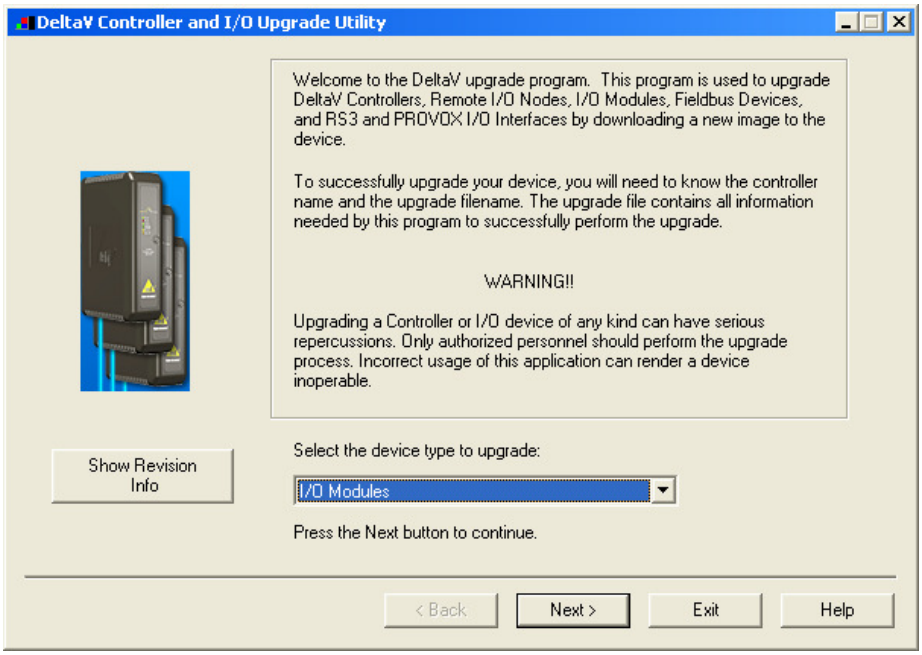


Name	Size	Type	Date Modified
1395.idf	2 KB	IDF File	7/14/2009 11:57 AM
HTG.hex	468 KB	HEX File	7/14/2009 11:54 AM
HTG.s2f	2 KB	S2F File	7/14/2009 11:58 AM
IO_Compatibility	2 KB	Microsoft Office Exc...	6/27/2007 12:42 PM
RedSerBoot.HEX	44 KB	HEX File	6/27/2007 12:45 PM
RedSerReleaseApp.HEX	498 KB	HEX File	6/26/2007 2:33 PM
RedSerReleaseProgApp.hex	501 KB	HEX File	6/27/2007 10:50 AM
SampleCustomProtocol.s2f	2 KB	S2F File	6/27/2007 12:42 PM
StandardModbusApp.s2f	2 KB	S2F File	6/27/2007 12:42 PM

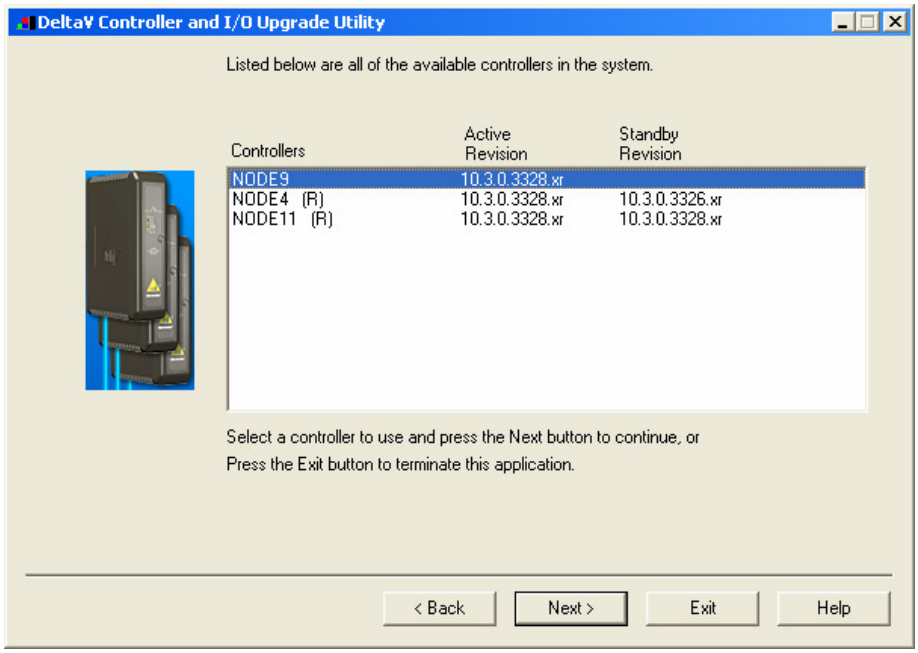
After copy completion, you are ready to program (or upgrade) the Programmable Serial Card with the supplied custom driver software. The steps are as follows:



1. Click on the Start button and select DeltaV-> Installation-> Controller Upgrade Utility as shown below, and the following dialog will appear:

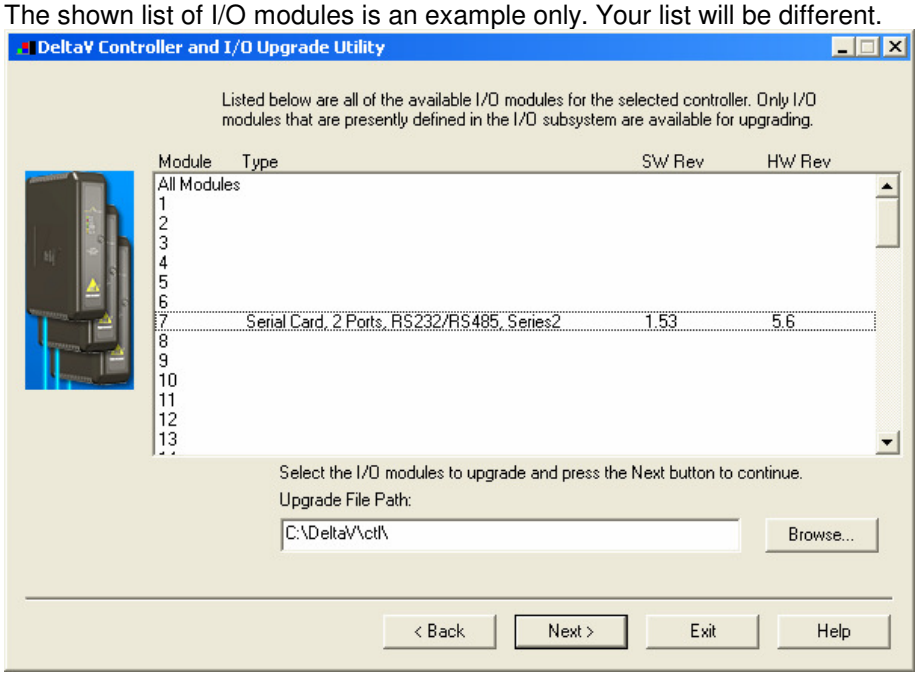


2. Choose Upgrade I/O Modules from the drop down menu and click Next.



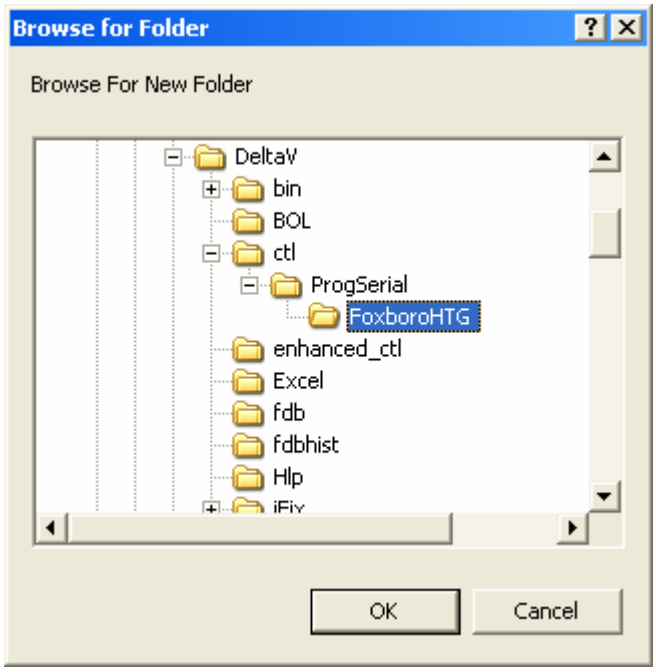
3. The above dialog will appear, listing all the available Controllers in your network. From this dialog, select the appropriate Controller and then Click Next.

4. The following dialog will appear, listing all the I/O modules in your selected Controller. The shown list of I/O modules is an example only. Your list will be different.

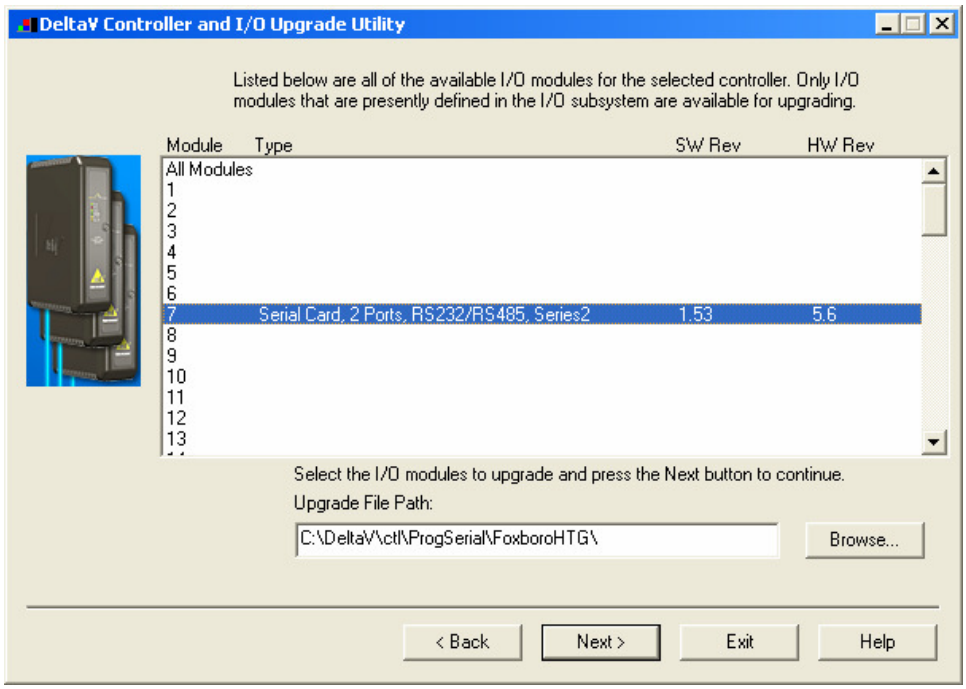


Note: The first time a standard Serial card is upgraded to the Foxboro HTG Driver, the dialog will be as shown above. When upgrading an existing Programmable Serial Card, skip Steps 5 and 6, and go to Step 7.

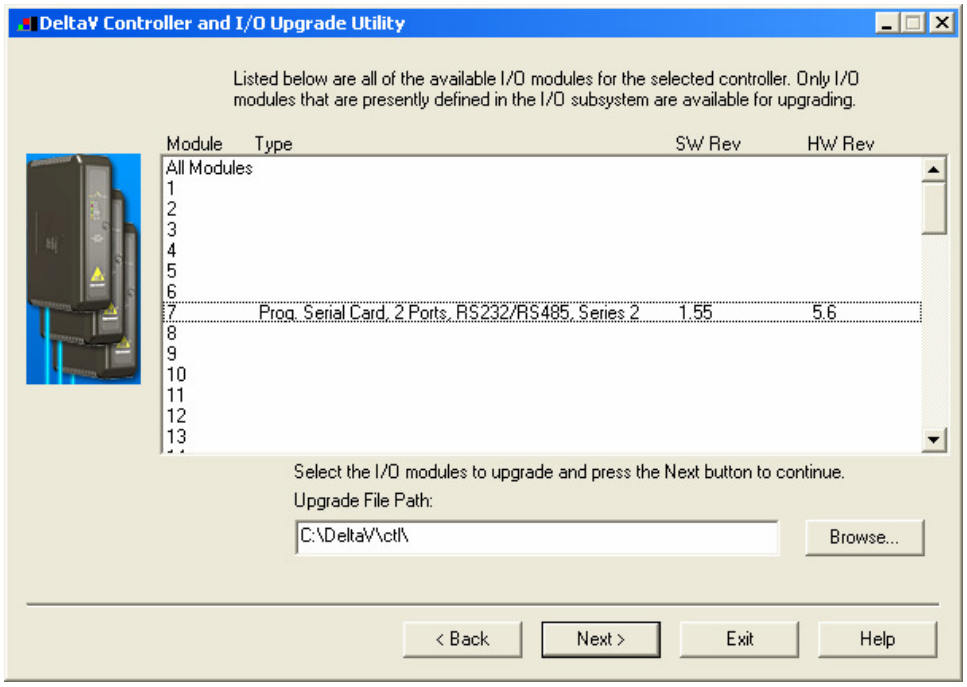
5. Click the Browse button and select the DeltaV path as shown below, and then click Ok. Note that the disk drive could be C or D.



6. Select the I/O module again as shown below and then click Next. Go to Step 9.



7. If you are upgrading an existing Programmable Serial Card, the dialog will be as shown below. From this dialog, select the Programmable Serial Card I/O Module in the list.



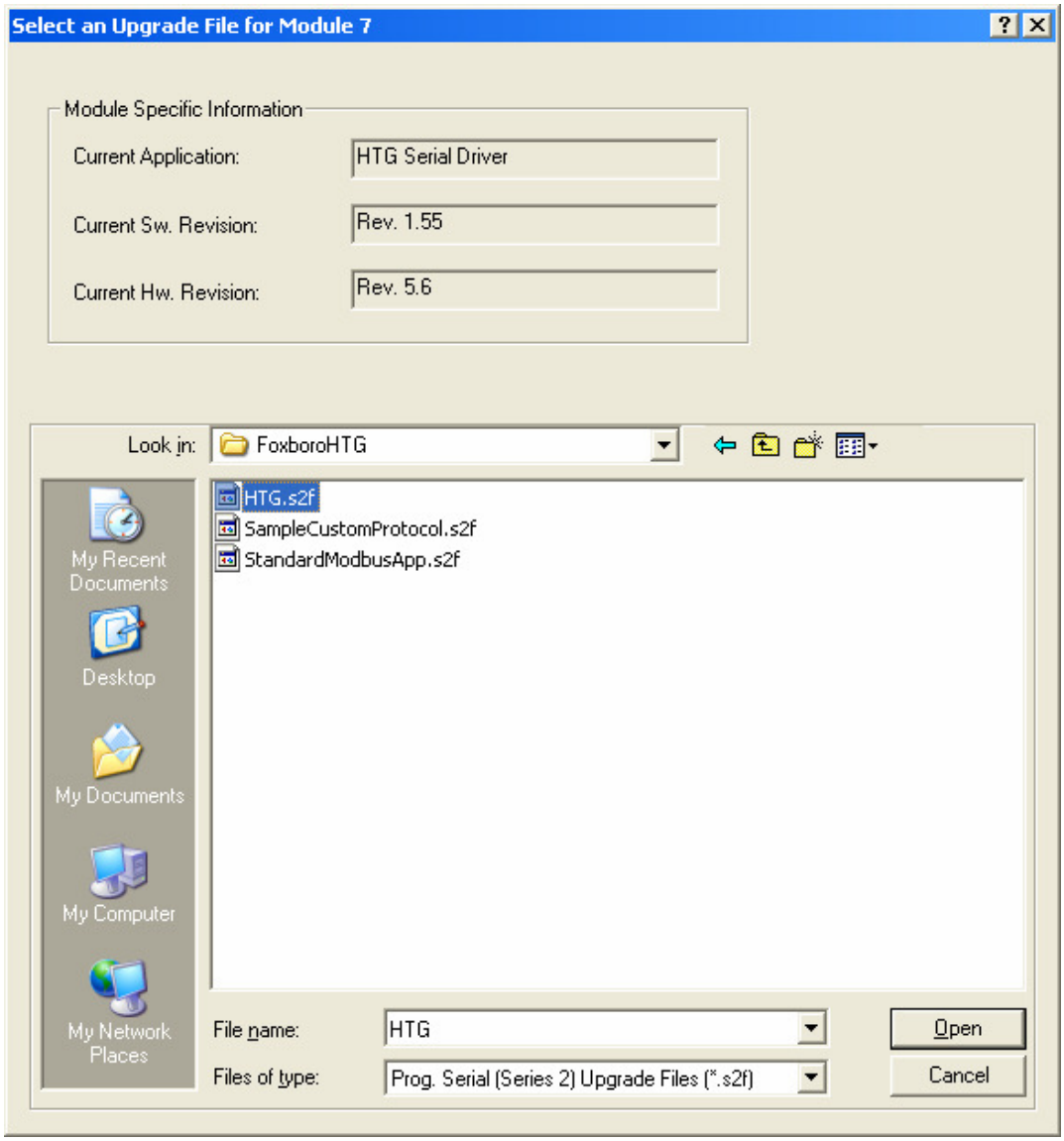
For example, we will select I/O Module 7. This will give you a dialog, from which you will select the file path to where the driver software is located. This path will be:

\DeltaV\ctl\ProgSerial \FoxboroHTG

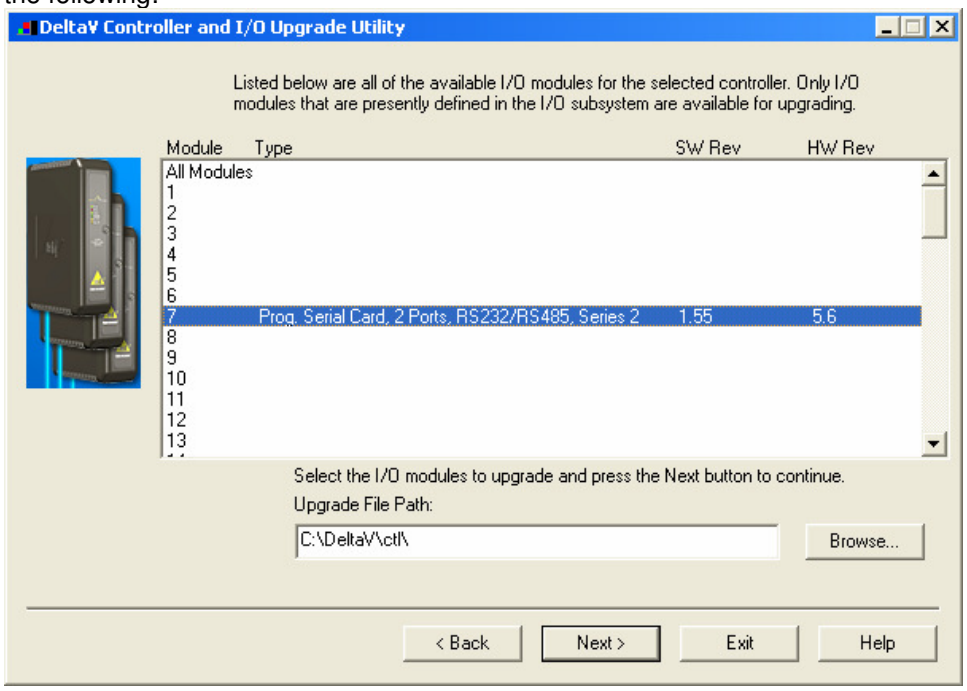
Once you are in the specified directory, you will need to select the following file:

HTG.S2F

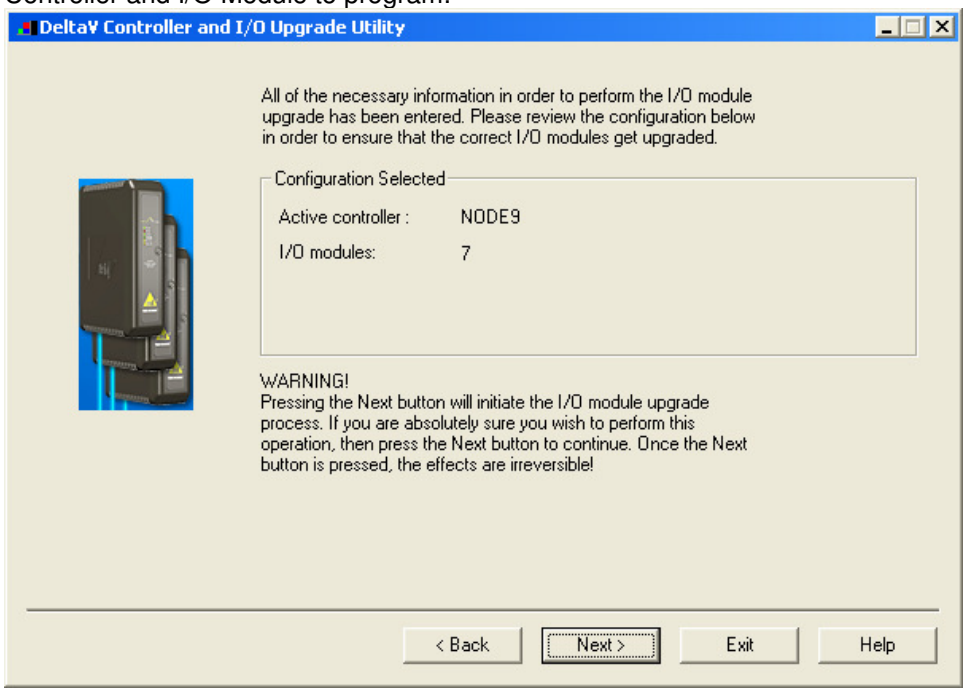
This is shown in the following dialog.


Select an Upgrade File for Module 7
Module Specific Information
Current Application:
HTG Serial Driver
Current Sw. Revision:
Rev. 1.55
Current Hw. Revision:
Rev. 5.6
Look in:
FoxboroHTG
HTG.s2f
SampleCustomProtocol.s2f
StandardModbusApp.s2f
My Recent Documents
Desktop
My Documents
My Computer
My Network Places
File name:
HTG
Files of type:
Prog. Serial (Series 2) Upgrade Files (*.s2f)
Open
Cancel

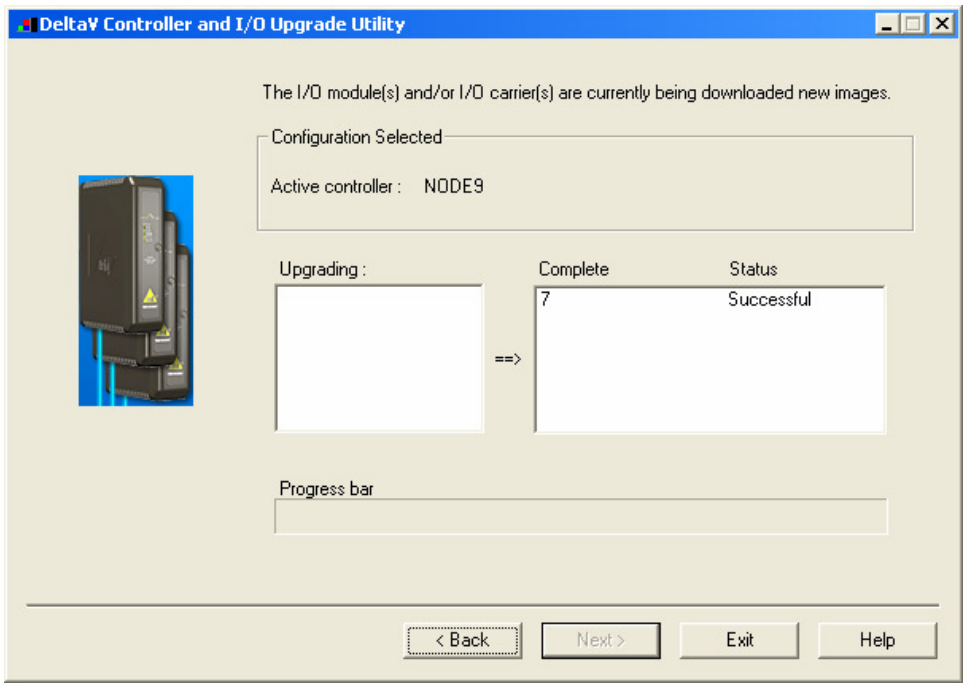
8. After selecting the .S2F file, Click on Open. This dialog will close and you will be back to the following:



9. In this dialog, Click Next again. You will get the following dialog, confirming the Controller and I/O Module to program.



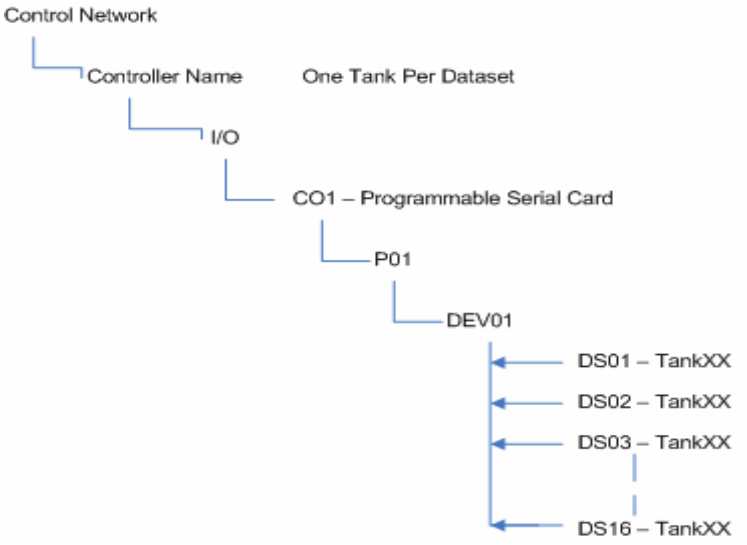
10. Click Next and the I/O Module upgrade process will begin. After completion, you will receive the following dialog, indicating success.

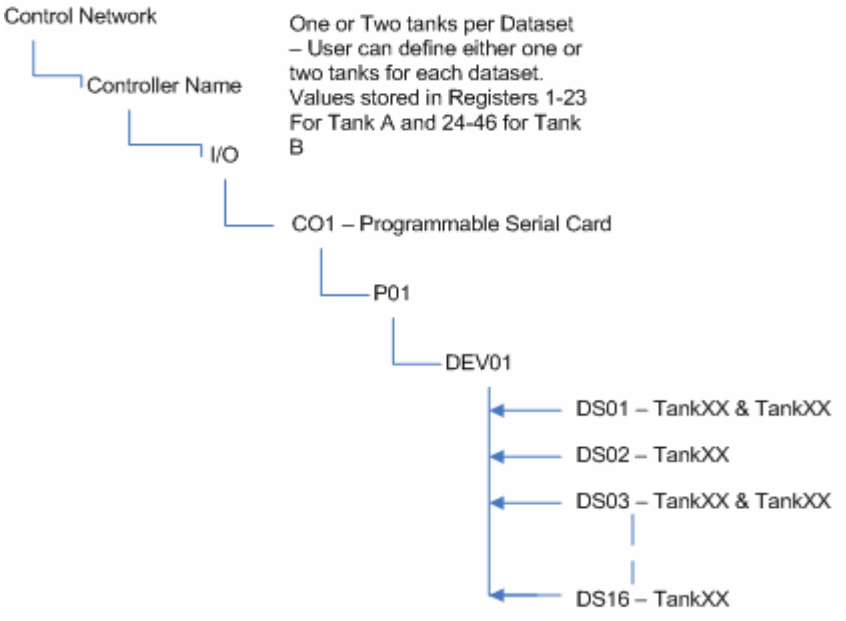


11. This completes the I/O Module upgrade process.

4 CONFIGURATION INFORMATION

For this application, 2 configuration formats are available. The DeltaV Explorer view of a configuration containing a Programmable Serial Card will be as follows, where C1 has a card type of Programmable Serial Card, P01 and P02 are the ports on the card, DEVXX are pseudo devices attached to the ports, and DSXX are configured Datasets for each device. TankXX represents any tank number specified by the user. Port 2 (P02) is defined in the same way as port 1 (P01).





Specifically, each port PXX will be configured with up to 1 device, e.g., DEV01. Each device will be configured with up to 16 datasets, DS01 – DS16 as shown below.

Table 3

Port	Devices	Dataset	Mode	Type and Number of Values	Description
P01					
	DEV01				
		DS01	Input	Floating Point 23 or 46	Data for 1 or 2 Tanks
		DS02	Input	Floating Point 23 or 46	Data for 1 or 2 Tanks
		DS03	Input	Floating Point 23 or 46	Data for 1 or 2 Tanks
		DS04	Input	Floating Point 23 or 46	Data for 1 or 2 Tanks
		DS05	Input	Floating Point 23 or 46	Data for 1 or 2 Tanks
		DS06	Input	Floating Point 23 or 46	Data for 1 or 2 Tanks
		DS07	Input	Floating Point 23 or 46	Data for 1 or 2 Tanks
		DS08	Input	Floating Point 23 or 46	Data for 1 or 2 Tanks
		DS09	Input	Floating Point 23 or 46	Data for 1 or 2 Tanks
		DS10	Input	Floating Point 23 or 46	Data for 1 or 2 Tanks
		DS11	Input	Floating Point 23 or 46	Data for 1 or 2 Tanks
		DS12	Input	Floating Point 23 or 46	Data for 1 or 2 Tanks
		DS13	Input	Floating Point 23 or 46	Data for 1 or 2 Tanks
		DS14	Input	Floating Point 23 or 46	Data for 1 or 2 Tanks
		DS15	Input	Floating Point 23 or 46	Data for 1 or 2 Tanks
		DS16	Input	Floating Point 23 or 46	Data for 1 or 2 Tanks

*See section 4.3.3

Registers assignments for a dataset with only 1 tank are defined as follows:

Table 4

Register	Description
R1	General Status
R2	Alarm Status
R3	Input Status
R4	Density
R5	Gross Mass
R6	Gross Volume
R7	Level
R8	Liquid Temp
R9	Net Mass
R10	Net Volume
R11	Pressure 1
R12	Pressure 2
R13	Pressure 3
R14	Reference Density
R15	Time To Fill/Empty
R16	Vapor Density
R17	Air Density
R18	Available Volume
R19	Temperature 1
R20	Temperature 2
R21	Temperature 3
R22	RTD Resistance
R23	Ambient Temperature
R24	P1 Frequency
R25	P2 Frequency
R26	P3 Frequency
R27	T1 Current
R28	T2 Current
R29	T3 Current
R30	T1 Frequency
R31	T2 Frequency
R32	T3 Frequency
R33	RTD Frequency
R34	Ambient Temp Frequency
R35	Spare Status Word
R36	Spare Word 2

Registers assignments for a dataset with 2 tank are defined as follows:

Table 5

Register	Description
R1	Tank 1: General Status
R2	Tank 1: Alarm Status
R3	Tank 1: Input Status
R4	Tank 1: Density
R5	Tank 1: Gross Mass
R6	Tank 1: Gross Volume
R7	Tank 1: Level
R8	Tank 1: Liquid Temp
R9	Tank 1: Net Mass
R10	Tank 1: Net Volume
R11	Tank 1: Pressure 1
R12	Tank 1: Pressure 2
R13	Tank 1: Pressure 3
R14	Tank 1: Reference Density
R15	Tank 1: Time To Fill/Empty
R16	Tank 1: Vapor Density
R17	Tank 1: Air Density
R18	Tank 1: Available Volume
R19	Tank 1: Temperature 1
R20	Tank 1: Temperature 2
R21	Tank 1: Temperature 3
R22	Tank 1: RTD Resistance
R23	Tank 1: Ambient Temperature
R24	Tank 2: General Status
R25	Tank 2: Alarm Status
R26	Tank 2: Input Status
R27	Tank 2: Density
R28	Tank 2: Gross Mass
R29	Tank 2: Gross Volume
R30	Tank 2: Level
R31	Tank 2: Liquid Temp
R32	Tank 2: Net Mass
R33	Tank 2: Net Volume
R34	Tank 2: Pressure 1
R35	Tank 2: Pressure 2
R36	Tank 2: Pressure 3
R37	Tank 2: Reference Density
R38	Tank 2: Time To Fill/Empty
R39	Tank 2: Vapor Density
R40	Tank 2: Air Density
R41	Tank 2: Available Volume
R42	Tank 2: Temperature 1
R43	Tank 2: Temperature 2
R44	Tank 2: Temperature 3
R45	Tank 2: RTD Resistance
R46	Tank 2: Ambient Temperature

4.1 Port Configuration

First, enable the port. Then click on the Advanced Tab and Master mode. Slave is not supported. Specify the retry count, message timeout value in milliseconds, and message delay time. In most cases, you can leave these at their default values. Next, click on the Communications Tab and specify the Port type. The Port type will be RS-232. In general, RS-232 will be used for SIU communications, unless there are distance limitations. If the SIU is more than 50 feet from the PSIC, RS-485 should be used. Convert RS-485 to RS-232 before connecting to the SIU. Lastly, select the Baud rate, Parity, Data bits and Stop bits parameters; these must match the SIU settings.

4.2 Device Configuration

Specify devices, as shown above. There will be one device under each port.

4.3 Dataset Configuration

Datasets contain the tank values for the currently defined tank.

4.3.1 Data Direction:

The Data Direction for dataset should always be defined as Input.

4.3.2 Output Mode:

Output mode and Read back items are not used. These should be left as default.

4.3.3 DeltaV Data Type:

All datasets will be configured as type Floating Point.

4.3.4 DeviceDataType

There are two device data types as shown below:

Table 6

DeviceDataType	Description
0	The values for only 1 tank will be stored in this dataset.
1	The values of 2 tanks will be stored in this dataset.

4.3.5 Data Start Address and Number of Values

The Start Address for each dataset is not used and can be left as default.

4.3.6 Special Data

Table 7

Special Data	Value	Description
Special Data 1	Tank Number	If DeviceDataType is 0, this register is the tank number to be read and stored in dataset registers 1-38. If DeviceDataType is 1, this register is the tank number to be read and stored in dataset registers 1-23.
Special Data 2	Tank Number	If DeviceDataType is 0, this register is not used. If DeviceDataType is 1, this register is the second tank number to be read and stored in dataset registers 24-46.

5 Operational Check

5.1 Scope

The following sections provide some assistance to ensure the interface is working properly.

5.2 Verify Hardware and Software Version Number

The user can verify that the HTG driver has been installed using the DeltaV Diagnostics tool. The Diagnostics tool will show the Hardware Revision No. (HwRev) and the Software Revision No. (SwRev).

To begin the DeltaV Diagnostic tool select Start-> DeltaV-> Operator-> Diagnostics. In the Diagnostics tool expand the Controller, I/O and then double click on the Programmable Serial Interface Card that has the driver installed.

The following information will be displayed:

:	:	:
HwRev	Hardware Revision	1.10 (or later)
SwRev	Software Revision	2.3 (or later)

5.3 Verify Configuration

- Verify port configuration: The serial port must be enabled. User needs to make sure communication settings such as baud rate, parity, and number of data bits match the field device settings.
- Verify dataset configuration: The datasets configured must be as shown above.

5.4 Verify I/O Communication With Control Studio

User can create I/O modules in the control studio to verify correct values are being written out. An example module is shipped with the distribution. This module shows methods for writing text to the datasets and also how to handle time.

5.5 Using Diagnostics

- Verify PSIC communication: Select the PSIC on Diagnostics and press the right mouse button. Select Display Real -Time Statistics from the drop down menu. If the Programmable Serial Interface Card is functioning then the user will see the Valid Responses counter and the Async and/or Sync Transactions counters incrementing. There will not be any error counting up.

- Verify port statistics: Select the Port on the Programmable Serial Interface Card and press the right mouse button. Then select Display Port Statistics form the drop down menu. Verify that the port communications statistics are being displayed properly and are counting as expected for the protocol's functionality.

- Verify dataset values: Select a dataset and press the right mouse button. Select View Dataset Registers from the Drop down window. Verify that the dataset values are displayed as expected.

5.6 LED Indication

The Yellow LED for the port should be on solid when all communications on that port are valid. The Yellow LED should be blinking if there is some valid communications and some communications with errors on that port. The Yellow LED should be OFF if there are no valid communications on that port.

6 DeltaV–Field Device Electrical Interface

The electrical interface between DeltaV and field devices conforms to the RS-232 and RS-422/485 standards.

Each PSIC has 2 ports, which function independently. The distance between the serial card and the field device can be as much as 5000 feet, per the RS-422/485 standard. When using RS-232, the distance is limited to 50 feet. Section 6.1 shows the pin assignments for the PSIC serial terminal block.

6.1 Pin Assignments for DeltaV PSIC

RS-232 Standard

Terminal Number	Signal Description
1	Port 1 - Isolated Ground (GND)
2	Unused
3	Port 1 – Transmit Data (TxD)
4	Unused
5	Port 1 – Receive Data (RxD)
6	Unused
7	Port 1 – Data Terminal Ready (DTR)
8	Port 1 – Data Set Ready (DSR)
9	Port 2 - Isolated Ground (GND)
10	Unused
11	Port 2 – Transmit Data (TxD)
12	Unused
13	Port 2 – Receive Data (RxD)
14	Unused
15	Port 2 – Data Terminal Ready (DTR)
16	Port 1 – Data Set Ready (DSR)

RS-422/485 Half Duplex Standard

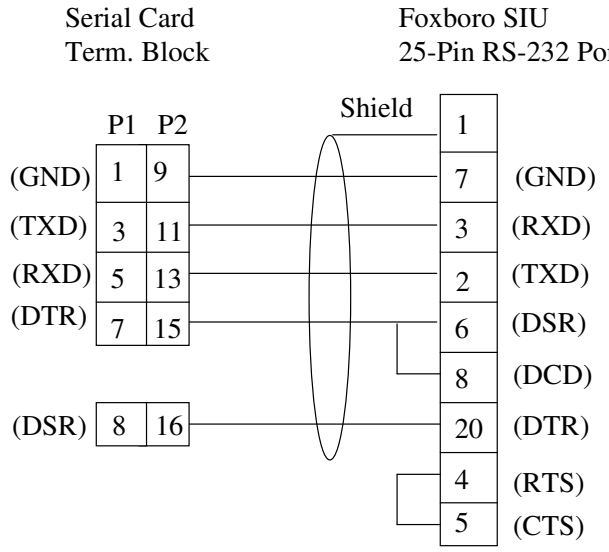
Terminal Number	Signal Description
1	Port 1 – Isolated Ground (GND)
2	Port 1 - Data +
3	Unused
4	Port 1 - Data -
5	Unused
6	Unused
7	Unused
8	Unused
9	Port 2 – Isolated Ground (GND)
10	Port 2 – Data +
11	Unused
12	Port 2 - Data -
13	Unused
14	Unused
15	Unused
16	Unused

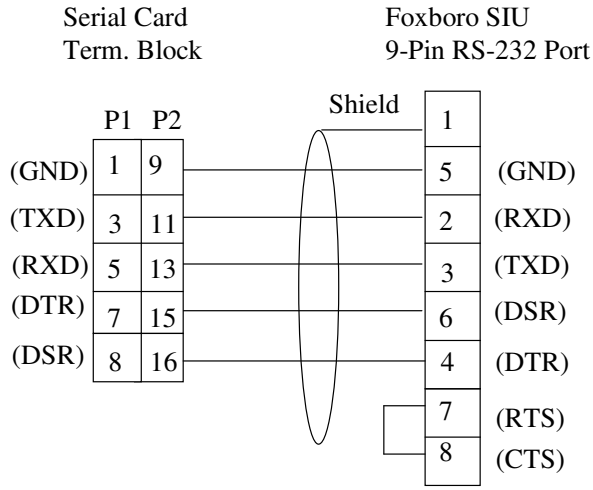
RS-422/485 Full Duplex Standard

Terminal Number	Signal Description
1	Port 1 – Isolated Ground (GND)
2	Port 1 – TxD +
3	Unused
4	Port 1 – TxD -
5	Unused
6	Port 1 – RxD +
7	Unused
8	Port 1 – RxD -
9	Port 2 – Isolated Ground (GND)
10	Port 2 – TxD +
11	Unused
12	Port 2 – TxD -
13	Unused
14	Port 2 – RxD +
15	Unused
16	Port 2 – RxD -

6.2 Wiring Connections

In general, the figure below shows the connections between the Field Device and the PSIC termination block. In some cases, RxD and TxD signals need to be swapped to create a NULL cable. This can be done easily at the PSIC termination block.





7 Technical Support

For technical support or to report a defect, please give Mynah Technologies a call at (636) 681-1555. If a defect is discovered, please document it in as much detail as possible and then fax your report to us at (636) 681-1660.

You can also send us your questions via e-mail. Our address is:

support@mynah.com

Thank you for using DeltaV.