



M Y N A HSM

Alphex Driver Programmable Serial Interface Card

USER MANUAL

Rev. P1.0

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1 INTRODUCTION

1.1 Scope

This document is the User Manual for the Alphex serial communication 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 Programmable Serial Interface Card (PSIC). The reader should be familiar with EPM's DeltaV PSIC and connected field devices (supporting the Alphex protocol).

The section *Document Format* briefly describes the contents of each section of this manual. *System Specifications* outlines hardware and software requirements for the Alphex Driver (P1.0) firmware.

1.2 Document Format

This document is organized as follows:

Introduction	Describes the scope and purpose of this document.
Theory of Operation	Provides a general functional overview of the Alphex Driver.
Downloading Firmware	Describes downloading procedures for the Alphex 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 Field 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.



1.3 System Specifications

The following table lists the minimum system requirements for the Alphex Driver:

Firmware	Alphex Driver Firmware (P1.0)
Protocol Compatibility	Alphex Protocol. All traffic to the Alphex Displays use the ASCII framing message structure.
Software Requirements	DeltaV System Software (Release 4.2 or later) installed on a hardware-appropriate Windows NT workstation configured as a ProfessionalPlus for DeltaV Serial Interface Port License (VE4102)
Minimum DeltaV Hardware Requirements	DeltaV Serial Module, PN: 12P0914X022 (series 1) or PN: 12P2506X022 (series 2) DeltaV M3, M5, M5+ or MD Controller, Power Supply and 8 wide controller carrier



2 THEORY OF OPERATION

As part of the serial interface port license, a standard Modbus protocol is installed on the DeltaV PSIC prior to customization. The PSIC needs to be flash upgraded from the Modbus protocol to the Alphex firmware before operation.

The Programmable Serial Interface Card (PSIC) supports RS-232, RS-422/RS-485 Half Duplex and RS-422/RS-485 Full Duplex communications with external devices. For communications with Alphex devices, any of these methods can be utilized. RS-422/RS-485 Half/Full duplex allow more than one Alphex device to be multi-dropped from a single serial port. The electrical connection and communication settings must be configured properly to ensure accurate communication between the PSIC and Alphex devices. These are described in Section 4.1.

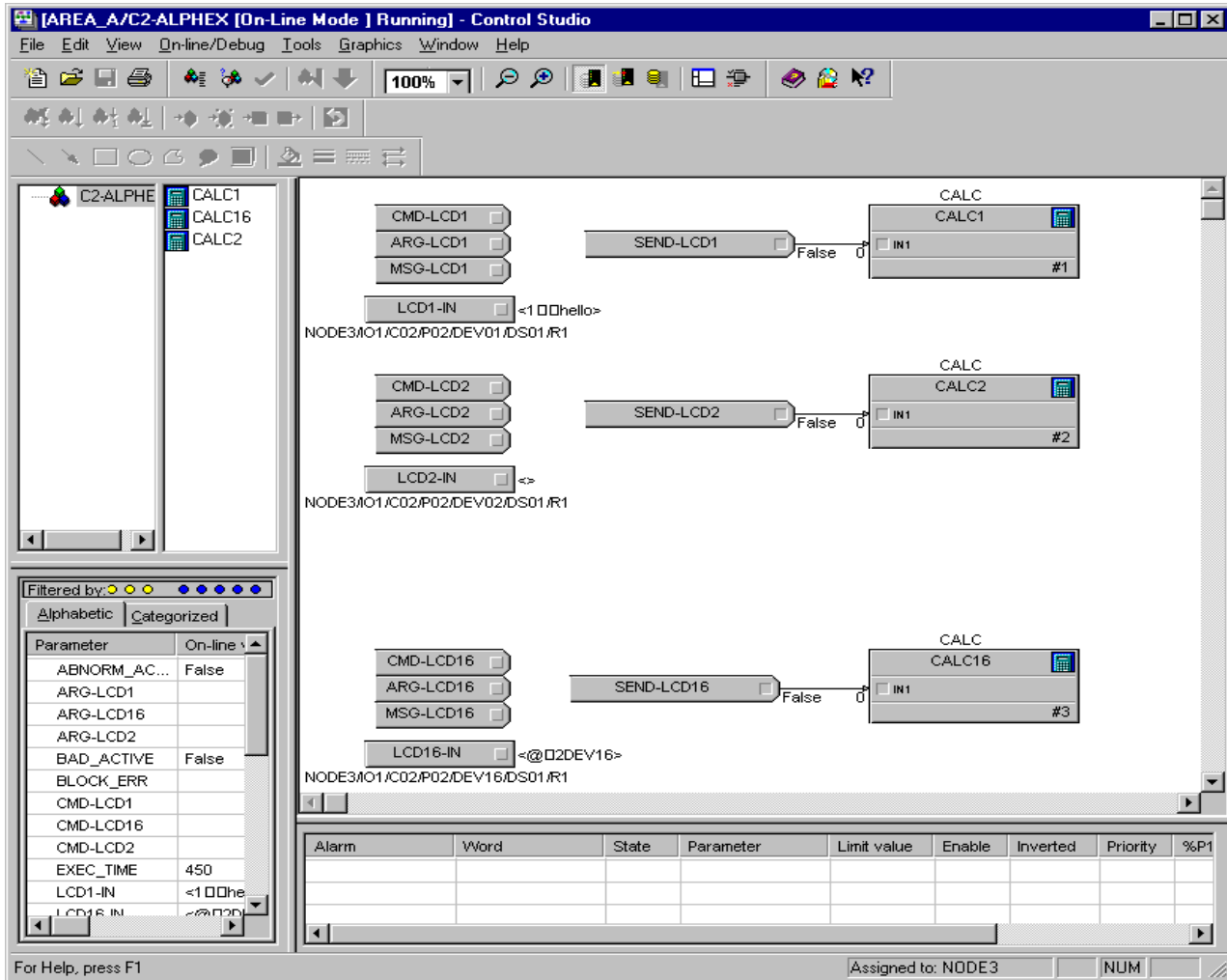
The primary functions of the driver are listed below:

- This driver runs in Master mode only.
- When a new message is detected, it is formatted and sent out to the Alphex device.

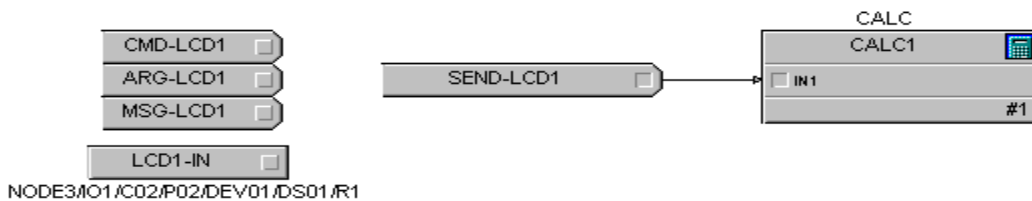
Each PSIC, when loaded with the Alphex Driver, is capable of communicating with up to 32 Alphex displays (16 per port) over both of its ports, depending upon your application.



As part of the driver, an example serial card configuration and a module configuration are also distributed. The example module is shown below.



This module is configured to send messages to 3 Alphex devices. The excerpt below is for a single device.





These parameters are described below.

The parameter CMD-LCD1 is of type String and has the following values:

Table 1: CMD-LCD1

Parameter Value	Description
0	No Command
8	Backspace Command
10	Line Feed Command
12	Form Feed Command
13	Carriage Return Command
19	Move cursor to specific position
20	Delete line number

The parameter ARG-LCD1 is of type String. It is used only with command 19 and 20:

Table 2: ARG-LCD1

Parameter Value	Description
1 to 4	Line number.
0 to 179	Character position.

The parameter MSG-LCD1 is of type String. It contains the actual message being transmitted:

Table 3: MSG-LCD1

Parameter Value	Description
ASCII Message up to 40 characters	Message to transmit

The parameter LCD1-IN is of type String. It contains the actual message read back from the Serial card dataset. After the message has been transmitted out, the driver converts the starting ETX character to "<" and the ending ETX character to ">".

Table 4: MSG-LCD1

Parameter Value	Description
ASCII Message up to 40 characters	Readback only

The parameter SEND-LCD1 is of type Boolean. Setting this to True triggers the message to be written out.

All other parameters do not need to be modified.

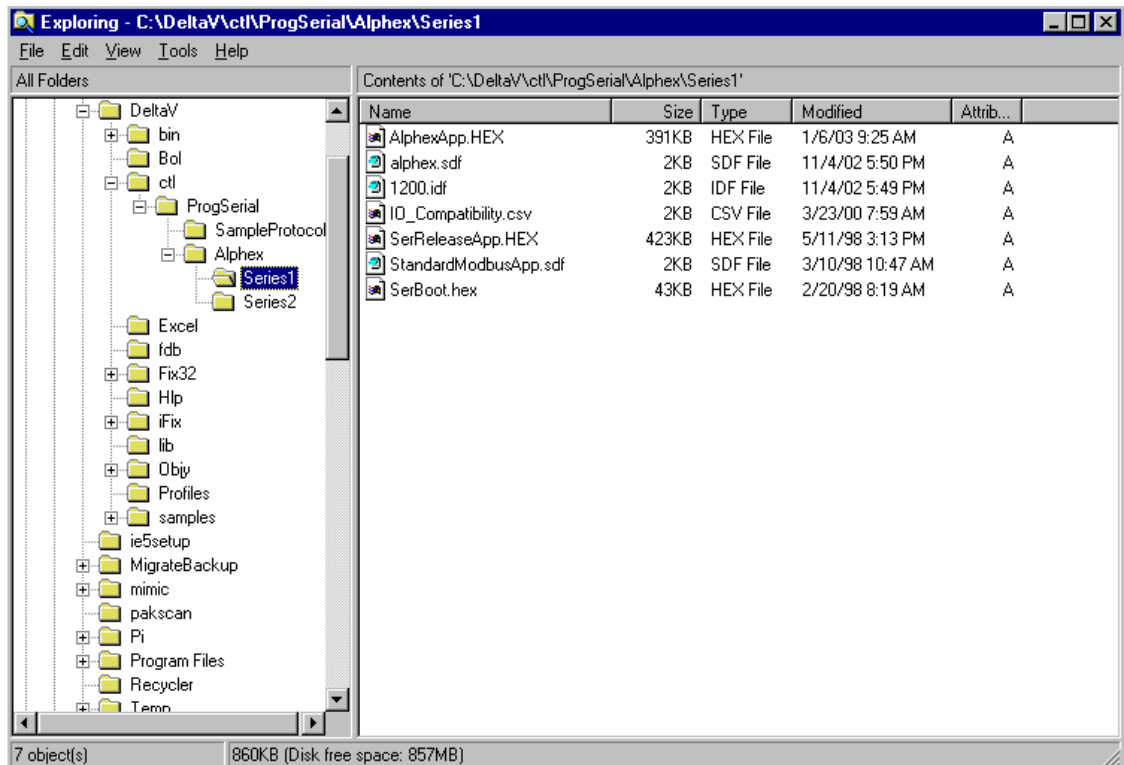


3 Downloading the firmware

The driver software distribution comprises 7 files, distributed on a CD. These files must be copied to the DeltaV directory on your ProPlus Workstation. Both Series 1 and Series 2 serial cards are supported. For example, for Series 1 cards the path is:

\\DeltaV\ctl\ProgSerial\Alphex\Series1

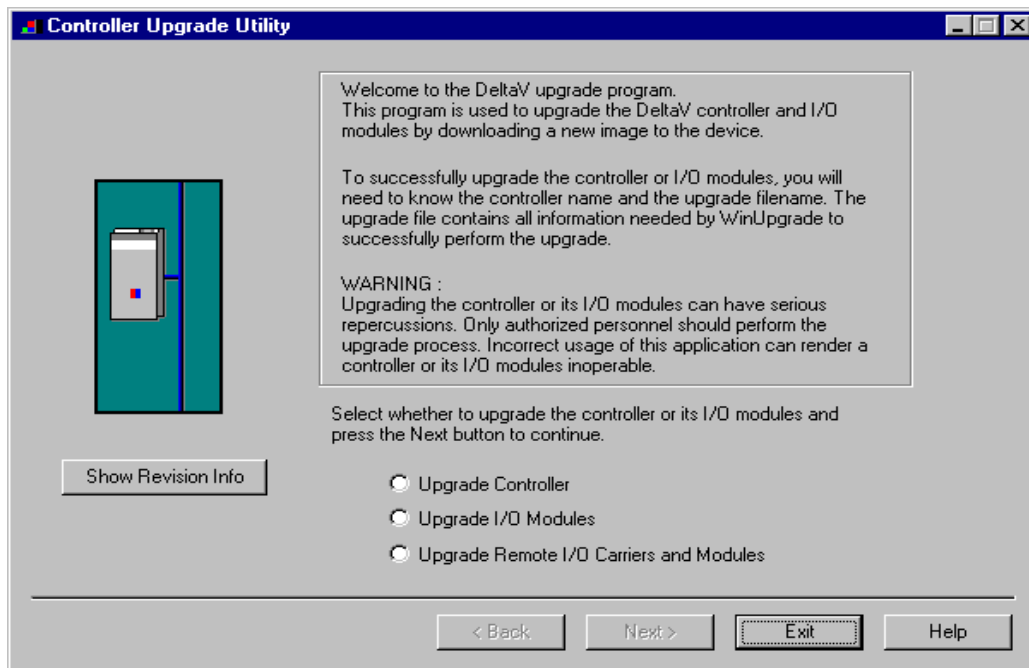
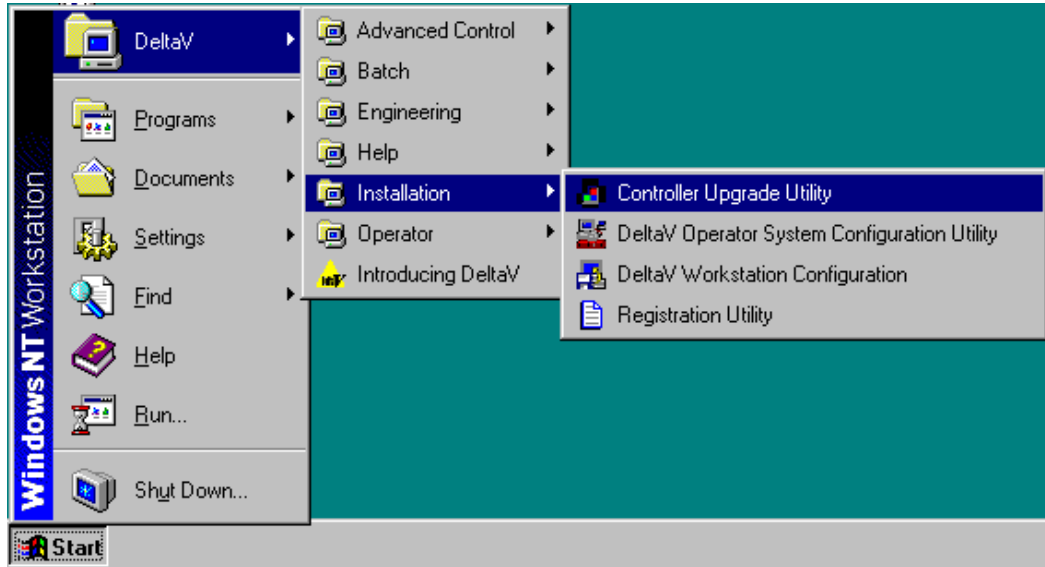
Note that you will have to create the \\Alphex\Series1 subdirectory. The following shows a completed copy operation:



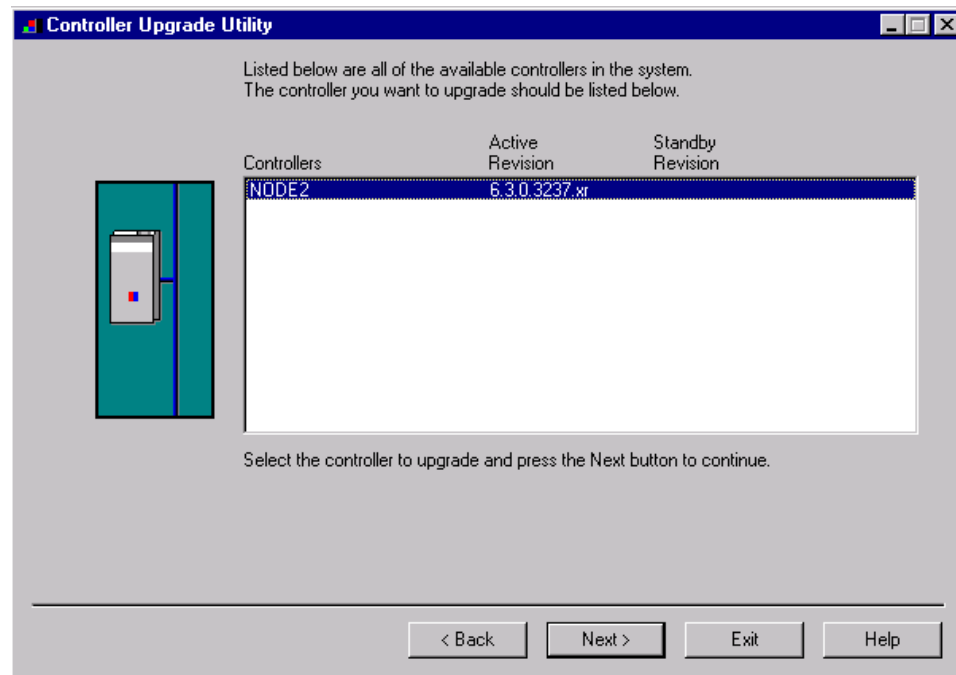
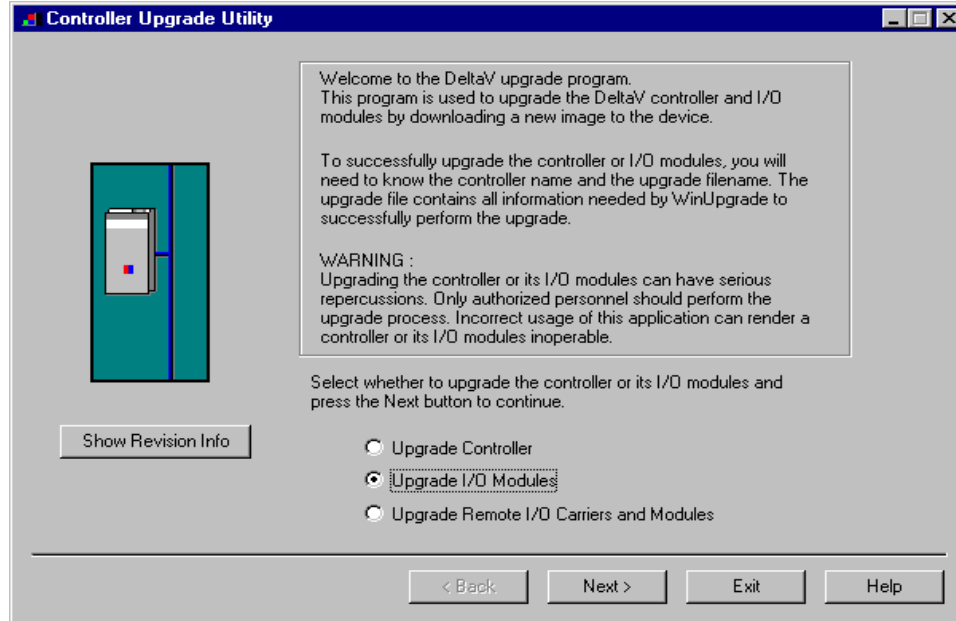
After copy completion, you are ready to program (or upgrade) the Programmable Serial Card with the supplied custom driver software. The steps are as follows:



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



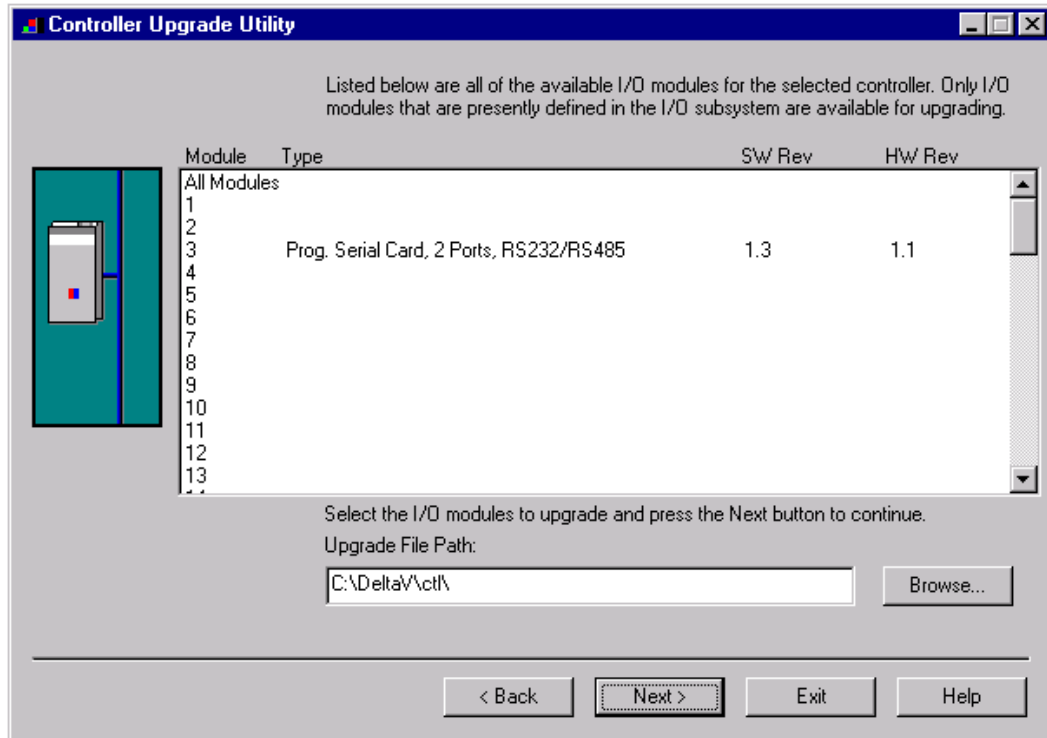
2. Click on the Upgrade I/O Modules radio button, and then click Next.



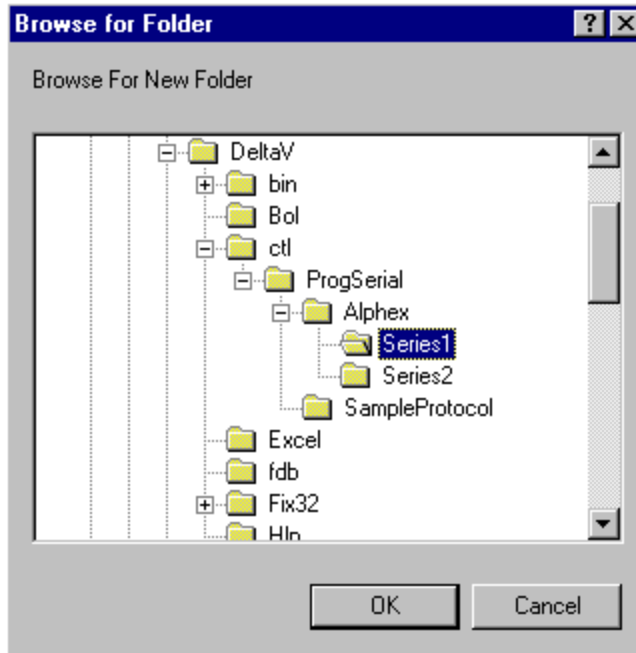
3. The above dialog will appear, listing all the available Controllers in your network. From this dialog, select the appropriate Controller and then Click Next.

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.

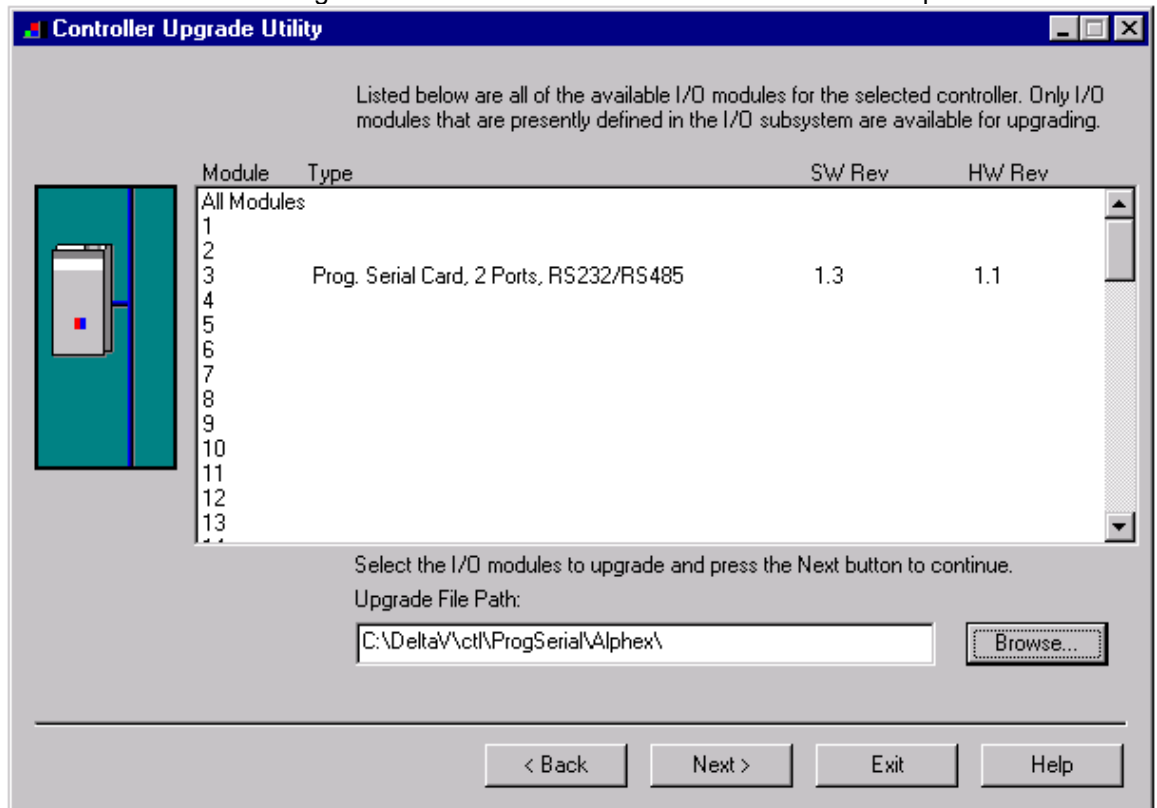
Note: The first time a standard Serial card is upgraded to the Alphex Driver, the dialog will be as shown below. When upgrading an existing Programmable Serial Card, skip Steps 4, 5 and 6, and go to Step 7.



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.

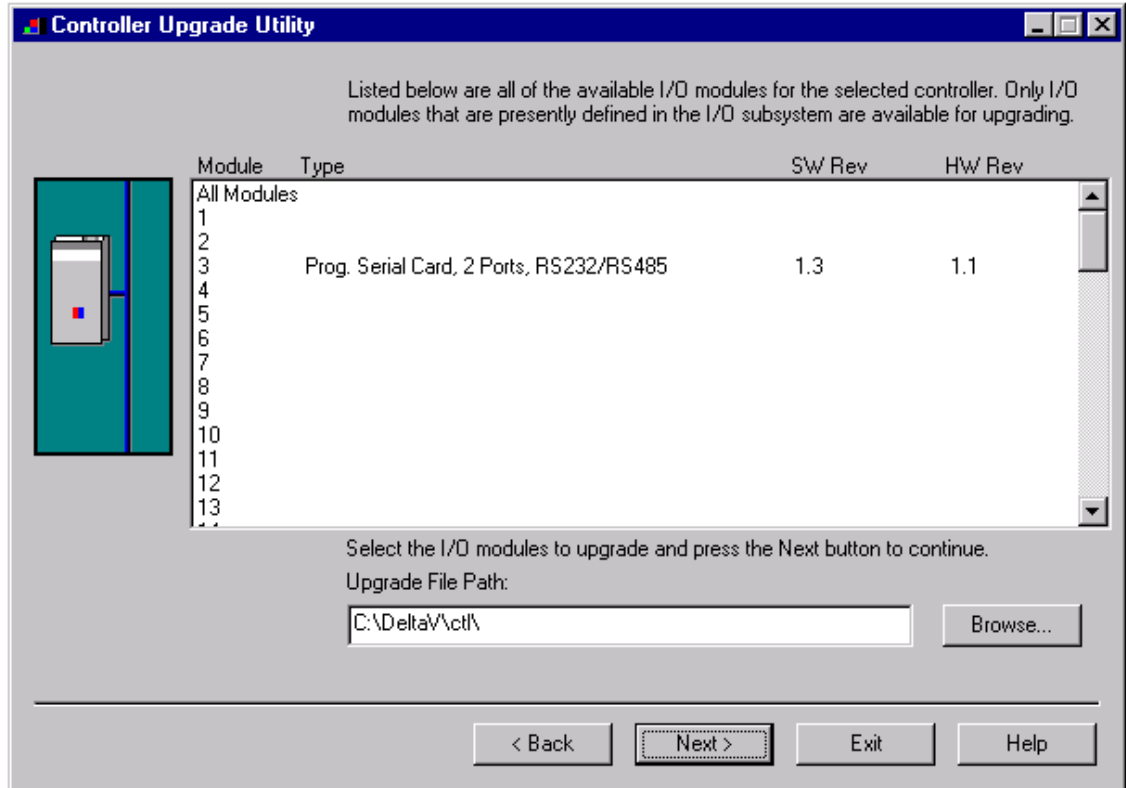


6. Select the I/O module again as shown below and then click Next. Go to Step 9.





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 1. 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:

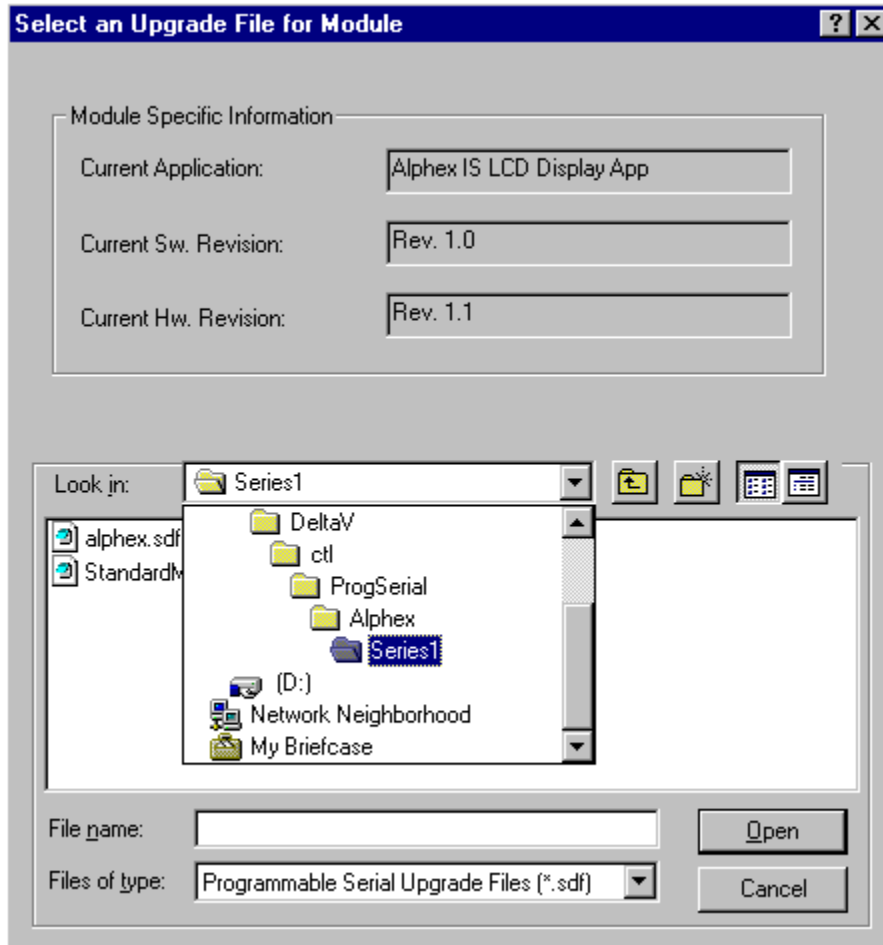
\\Delta\Vct\ProgSerial\Alphex\Series1.



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

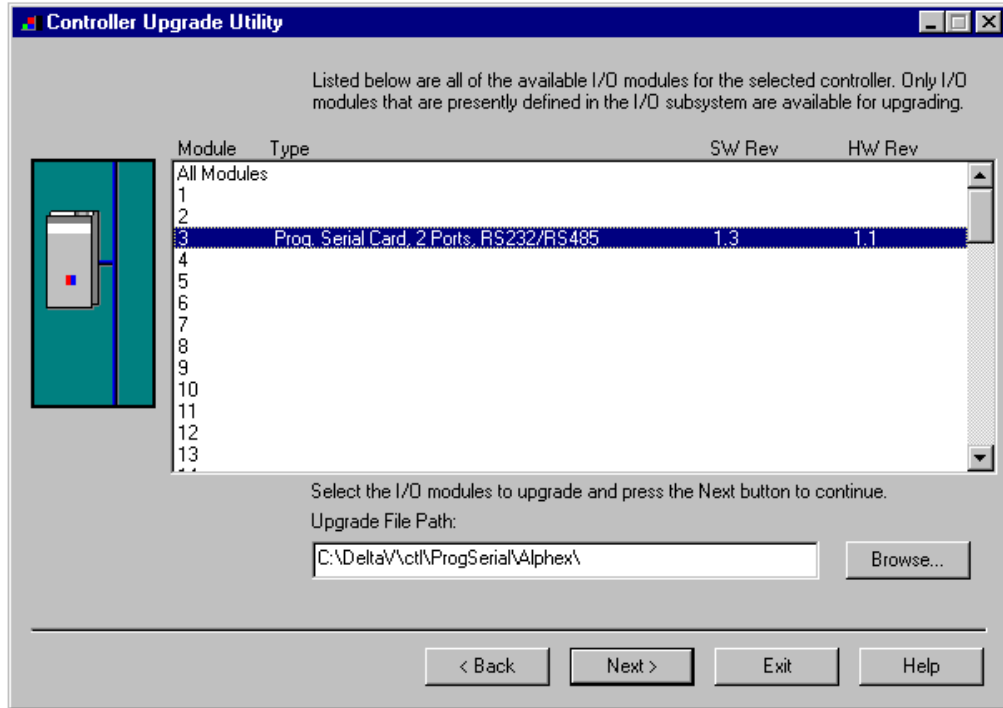
AlphexApp.SDF

This is shown in the following dialog.

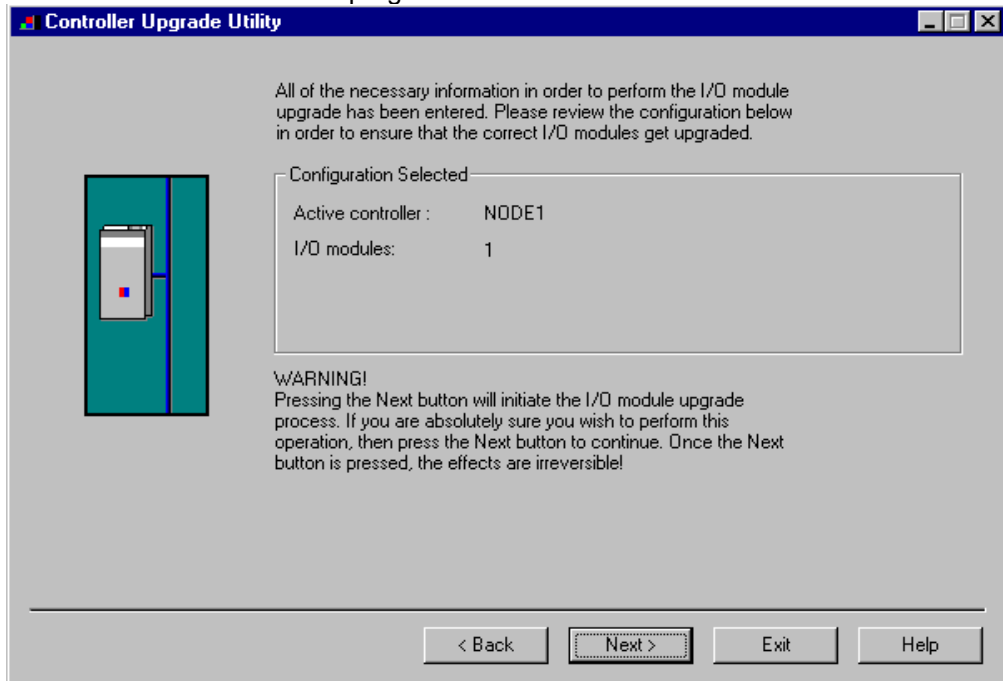




8. After selecting the .SDF file, Click on Open. This dialog will close and you will be back to the following:

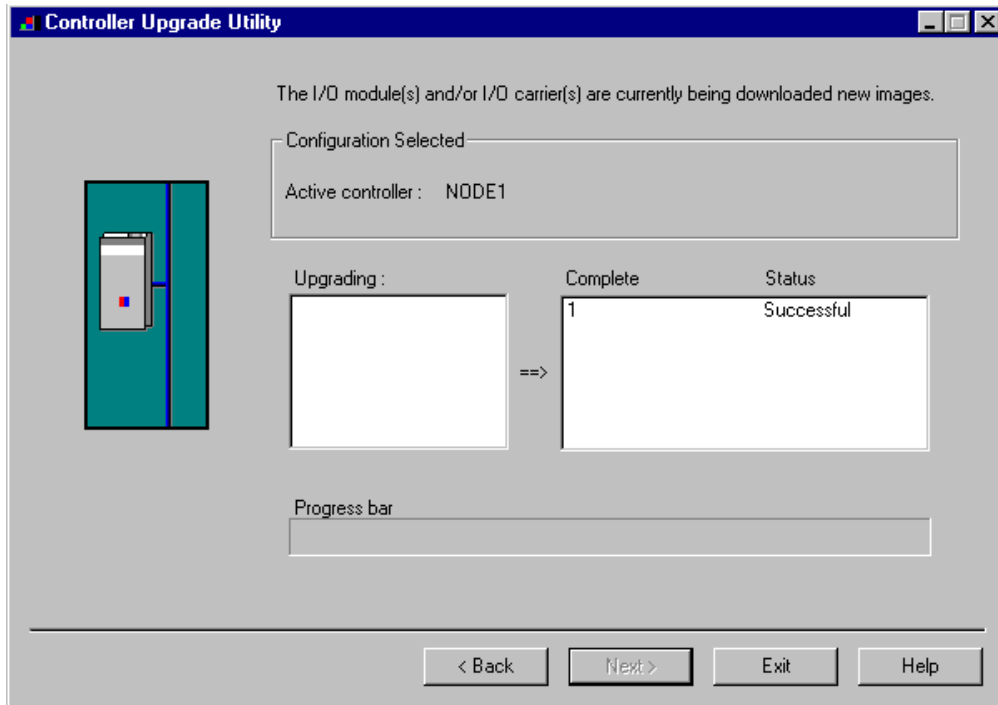


9. In this dialog, Click Next again. You will get the following dialog, confirming the Controller and I/O Module to program.





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.

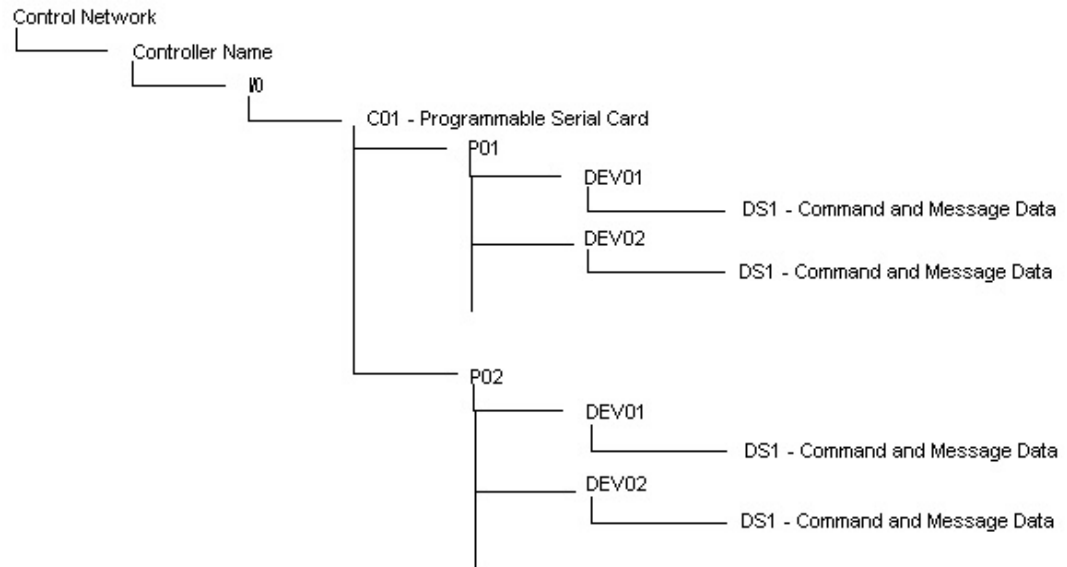


4 CONFIGURATION INFORMATION

This section describes the steps necessary to configure the DeltaV PSIC to obtain proper communication.

Each Serial Card in the I/O subsystem contains two channels or ports. Each port will be enabled or disabled individually and each port will contain some port specific configuration parameters. Port configuration comprises RS-232 or RS-422/485, baud rate, parity, byte size, and stop bits used. All selected parameters must match the connected field device(s).

The DeltaV Explorer view of a configuration containing a PSIC will be as follows, where C01 has a card type of Programmable Serial Card, P01 and P02 are the ports on the card, DEVXX are the field devices attached to the ports and DSXX are configured datasets under each device. You can have one or more field devices (each with a unique address) under each port. If a single device is configured, you can use RS-232 or RS-422/485. If configuring more than one, the communications settings must be RS-422/485 to support multi-dropped field devices. Note that the device address (under DEVXX) must match the Alphex address in point-to-point and multi-dropped communications.



A total of 16 datasets can be configured under each port. The datasets are divided over the configured devices. For Alphex communications, configure 16 devices, each with 1 dataset.



4.1 Port Configuration

First, enable the port. Then click on the Advanced Tab and select Master. 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, RS-422/485 Half Duplex (2 wire), or RS-422/485 Full Duplex (4 wire). Select RS-232 for point-to-point communications; select RS-422/485 if connected to multi-dropped Alphex devices. Lastly, select the Baud rate, Parity, Data bits and Stop bits parameters; these must match the Alphex settings.

4.2 Device Configuration

Specify devices, one for each Alphex. The device address must match the Alphex address.

4.3 Dataset Configuration

Datasets contain the message information written to Alphex.

4.3.1 Data Direction:

The Data Direction for dataset should be defined as output. This parameter is available only under Master mode.

4.3.2 Output Mode:

The driver does not use this parameter. Configure it at its default value of 0.

4.3.3 DeltaV Data Type:

Configure this parameter as String with status.

4.3.4 DeviceDataType

The DeviceDataType determines the type of Alphex display. A value of 0 indicates a 2-line display. A value of 1 indicates a 4-line display. This value is used only for error checking of commands DC3 and DC4.

4.3.5 Data Start Address and Number of Values

Configure the data start address for each dataset as 0, and the Number of values as 100.

4.3.6 Special Data 1-5

These values are not used. Leave them at their default values of 0.



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 Alphex 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	1.1 (or later Series 1 only)
SwRev	Software Revision	P1.0 (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 read from the PSIC. For AI and DI data, the values should be changed in the field device and verified that the new data are correctly reported in DeltaV. Similarly, verify that the AO and DO data is being written correctly from DeltaV to the field device.



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 4000 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

Table 5: 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)



Table 6: 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

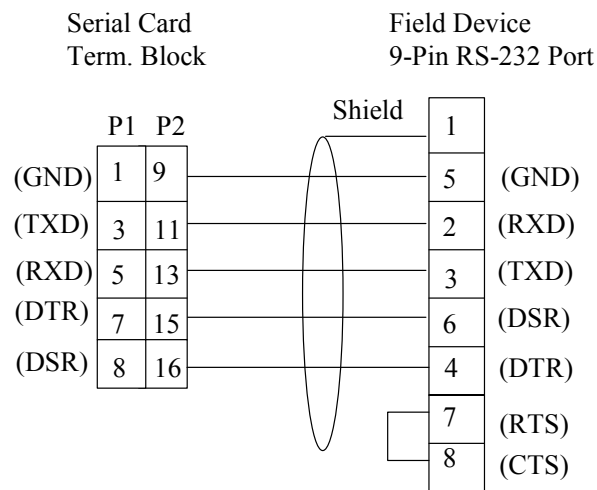
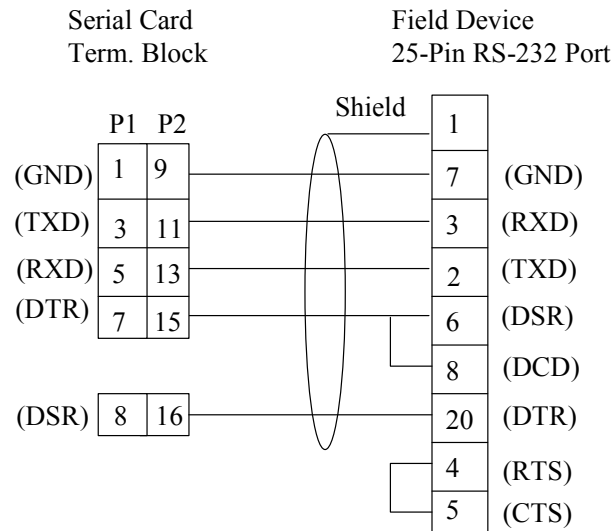
Table 7: RS-422/485 Full Duplex Standard

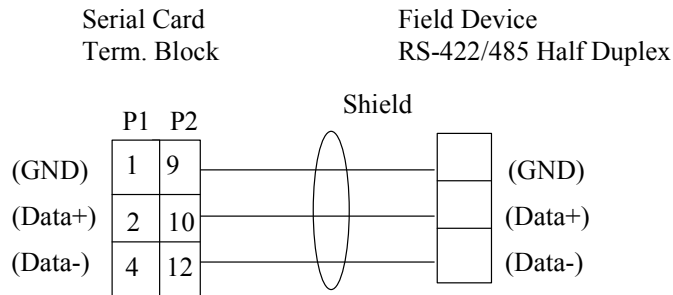
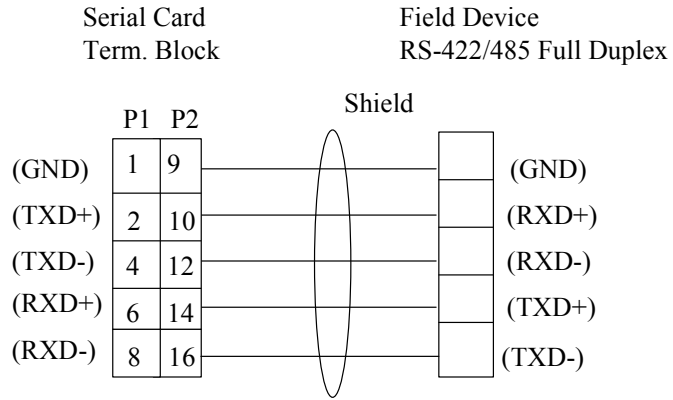
Terminal Number	Signal Description
1	Port 1 - Isolated Ground (GND)
2	Port 1 - TxD +
3	Unused
4	Port 1 - TxD -
5	Unused
6	Port 1 - RxD +
7	Unused
8	Port 1 - RxD -
9	Port 2 - Isolated Ground (GND)
10	Port 2 - TxD +
11	Unused
12	Port 2 - TxD -
13	Unused
14	Port 2 - RxD +
15	Unused
16	Port 2 - RxD -



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.

For Product functionality questions, ask for the people in the following order:

1. Nobin William
2. Martin Berutti

For Commercial issues, ask for people in the following order:

1. Martin Berutti
2. Jane Wagner

For all other driver and related questions, ask for Nobin William.

You can also send us your questions via e-mail. Our addresses are:

support@mynah.com

Thank you for using DeltaV.