



M Y N A HSM

**Heise Transducer Driver
Programmable Serial Interface Card
Series 2**

USER MANUAL

Rev. P1.12

April 25, 2005

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1 INTRODUCTION

1.1 Scope

This document is the User Manual for the Heise Transducer 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 Heise devices.

The section *Document Format* briefly describes the contents of each section of this manual. *System Specifications* outlines hardware and software requirements for the Heise Driver (P1.12) 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 Heise Driver.
Downloading Firmware	Describes downloading procedures for the Heise 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 Heise 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 Heise Driver:

Table 2

Firmware	Heise Driver Firmware (P1.12)
Protocol Compatibility	DXD Series – Precision Digital Pressure Transducer. Communications Specification Revision 3.0.1 for DXD 3.23 & higher.
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

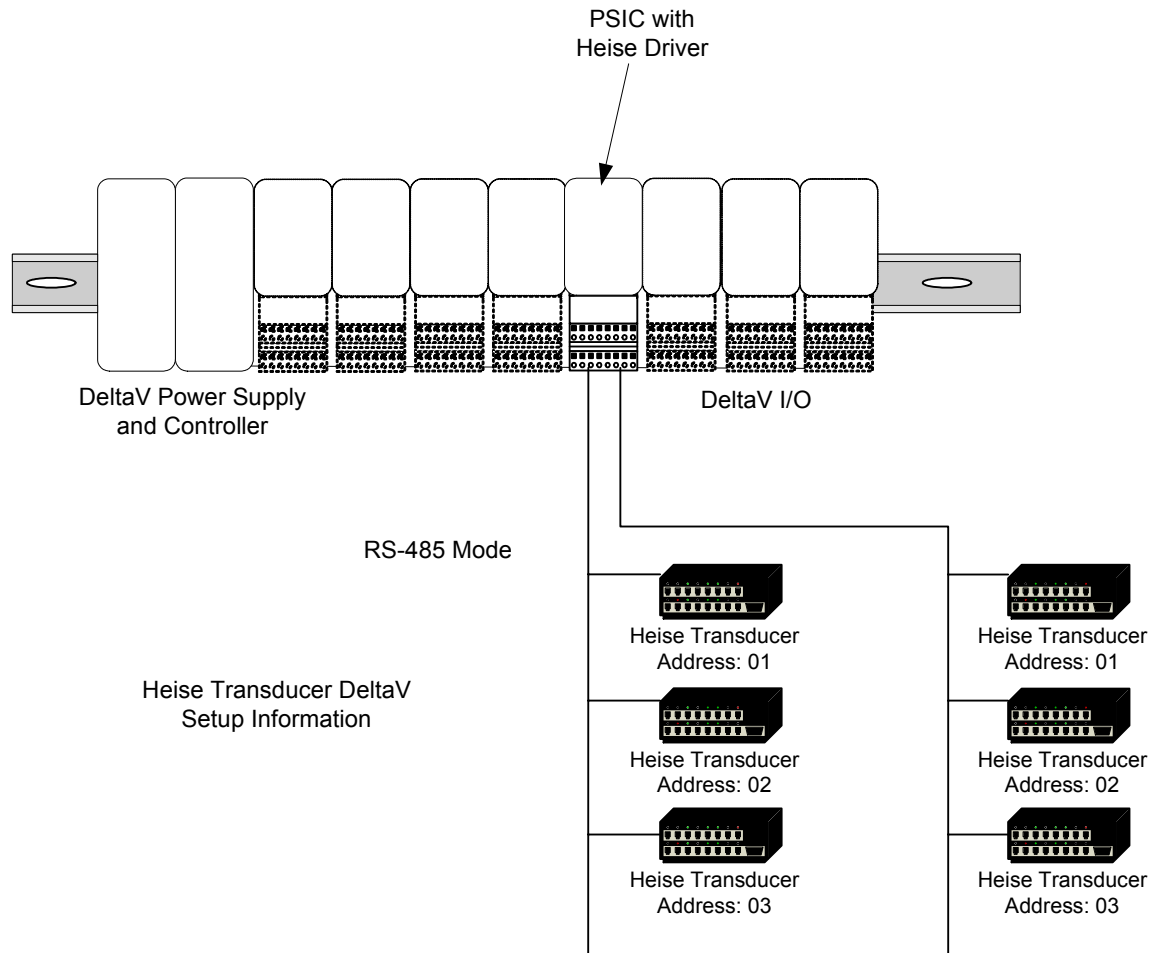
The Programmable Serial Interface Card (PSIC) has 2 ports which can be configured for RS-232, RS-422/RS-485 Half Duplex or RS-422/RS-485 Full Duplex communications with external devices. For communications with the Heise devices, any mode may be used.

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 Thermostat units. The Thermostat will respond with information, which will be reported to DeltaV in dataset registers.
3. The two ports of the PSIC work independently, each connected to a Heise unit. The Heise devices may be multidropped in RS485 mode to support up to 50 per port.

The following 2 diagrams show PSIC connectivity with Heise devices.

RS485 Multidrop Setup



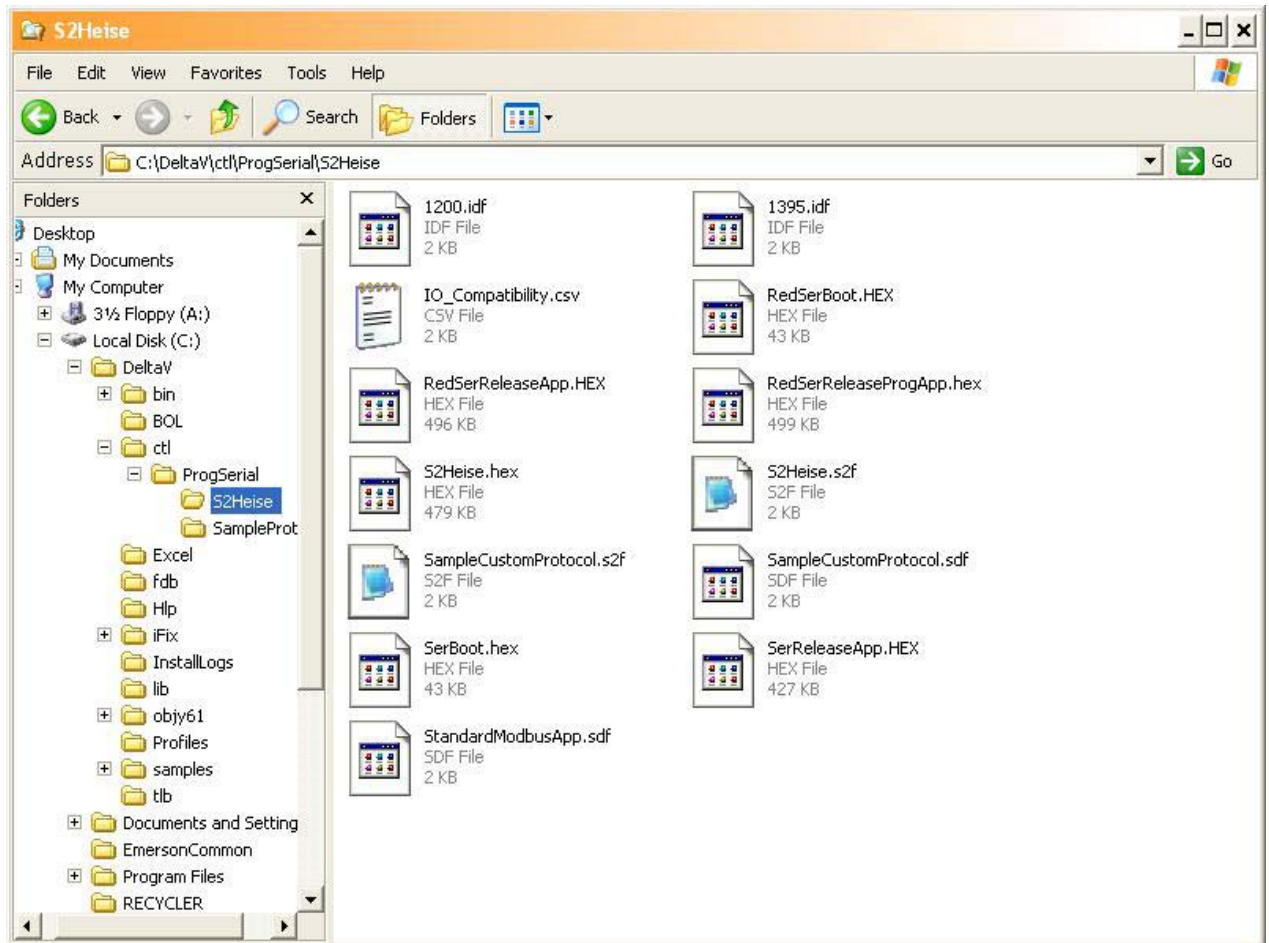


3 Downloading the firmware

The driver software distribution comprises 13 files, distributed on a CD. These files must be copied to the DeltaV directory on your ProPlus Workstation. The path is:

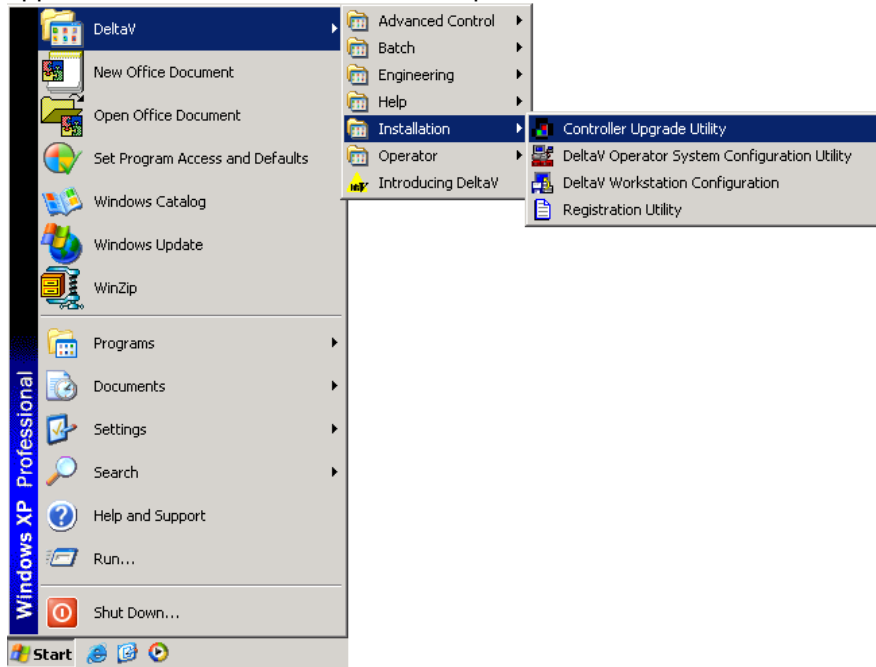
\\DeltaV\ctl\ProgSerial\S2Heise

Note that you will have to create the \S2Heise subdirectory. The following files will be copied:

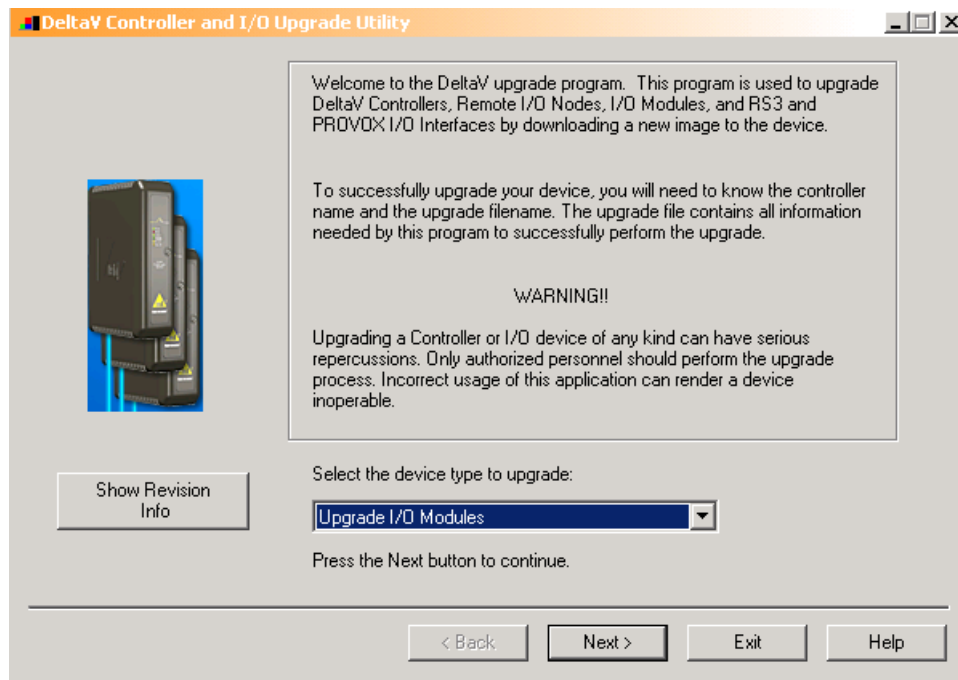




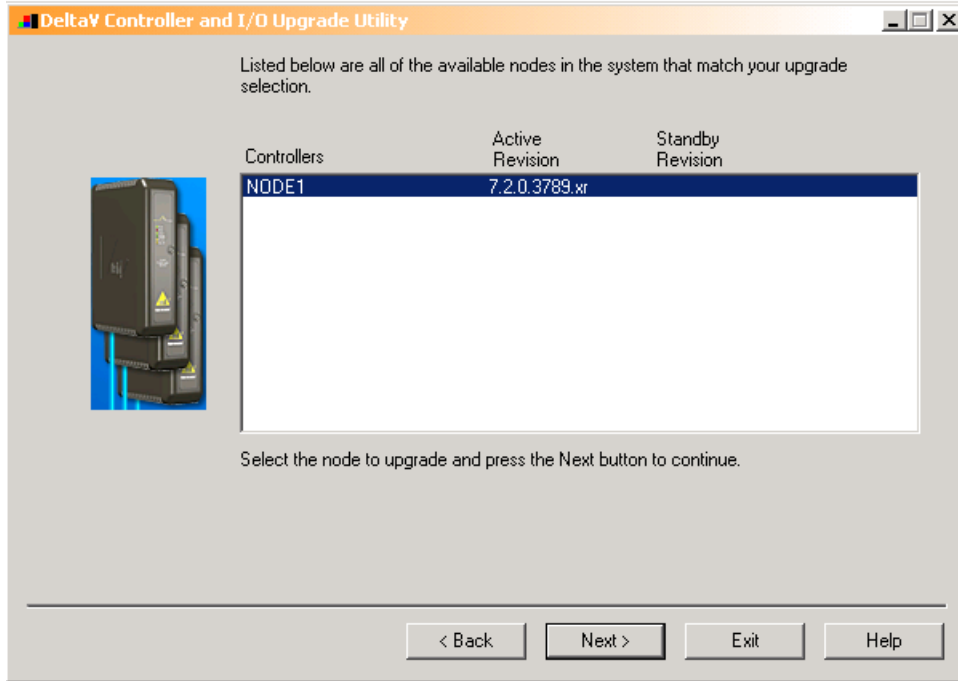
After copy completion, you are ready to program (or upgrade) the Programmable Serial Card with the supplied custom driver software. The steps are as follows:



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

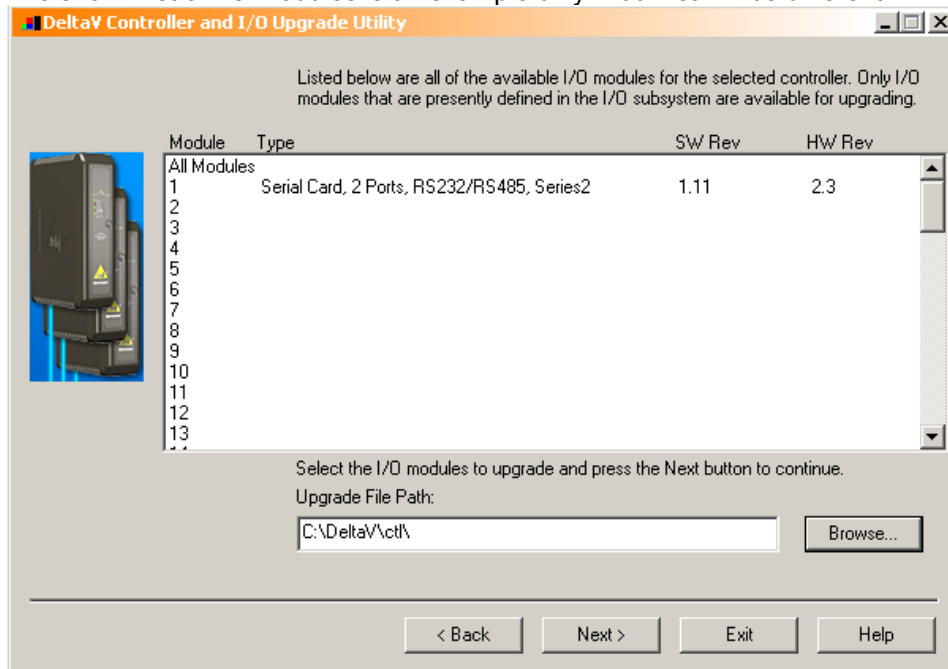


2. Choose Upgrade I/O Modules from the drop down menu and click Next.

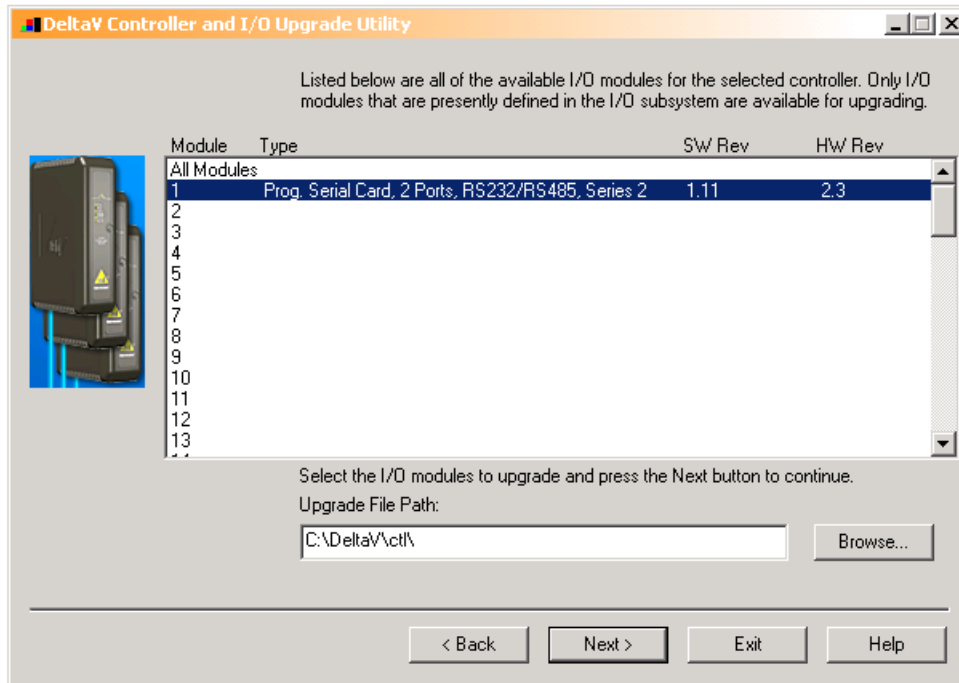


3. The above dialog will appear, listing all the available Controllers in your network. From this dialog, select the appropriate Controller and then Click Next.

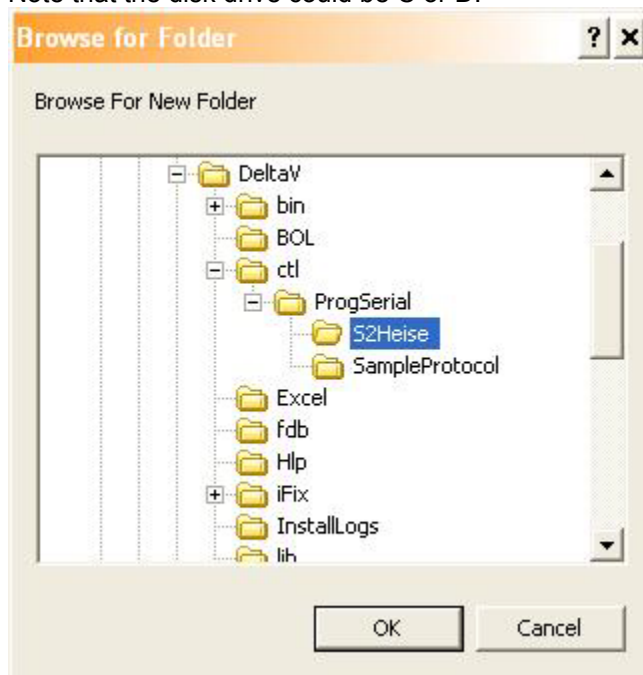
4. The following dialog will appear, listing all the I/O modules in your selected Controller. The shown list of I/O modules is an example only. Your list will be different.



Note: The first time a standard Serial card is upgraded to the Heise 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.

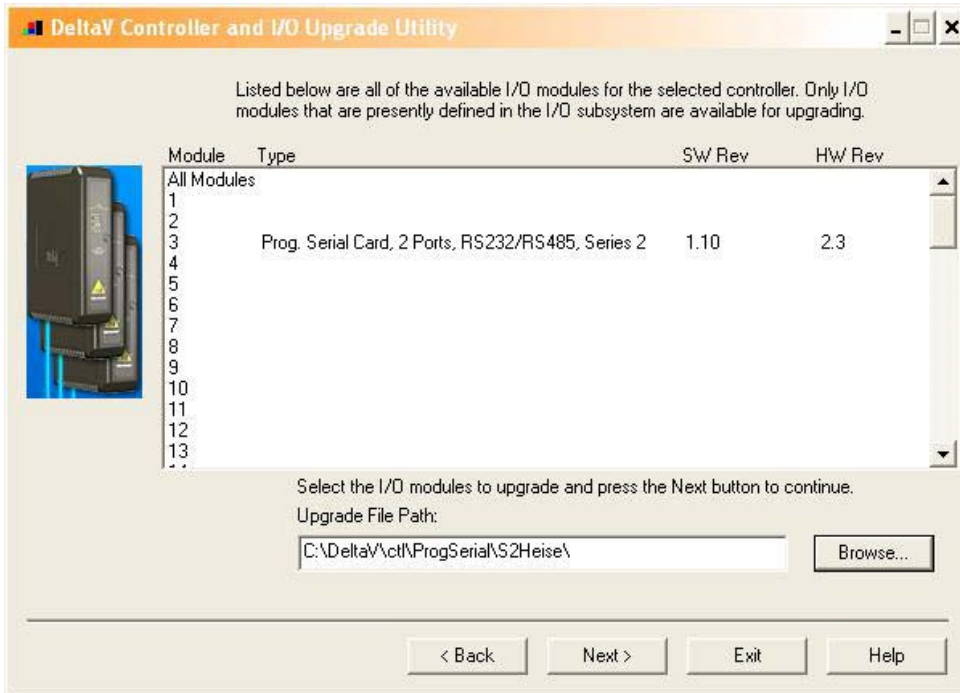


5. Click the Browse button and select the DeltaV path as shown below, and then click Ok. Note that the disk drive could be C or D.

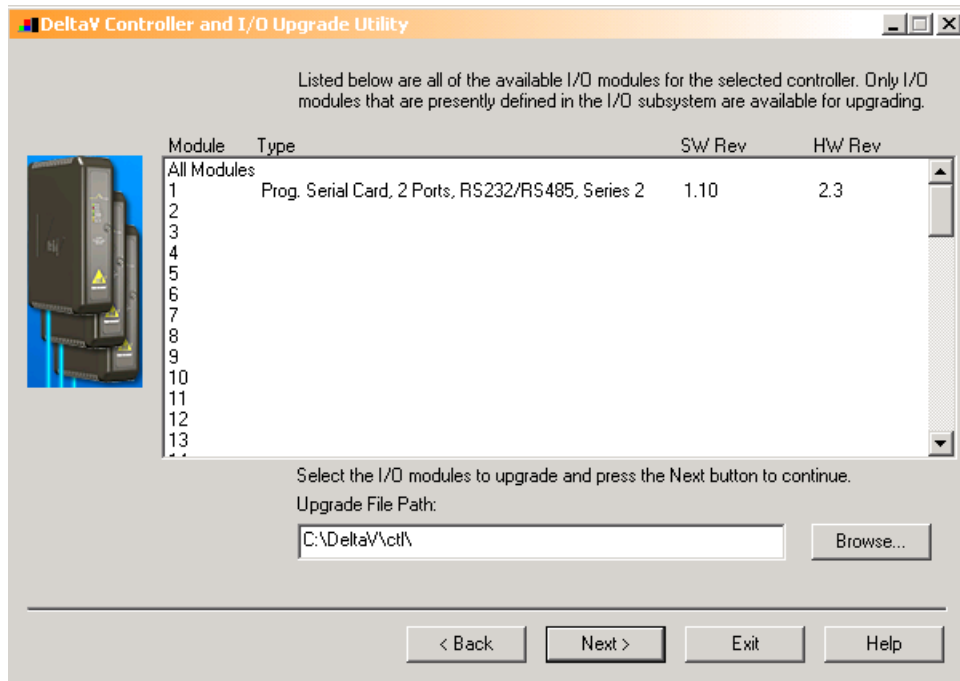




6. Select the I/O module again as shown below and then click Next. Go to Step 9.



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:

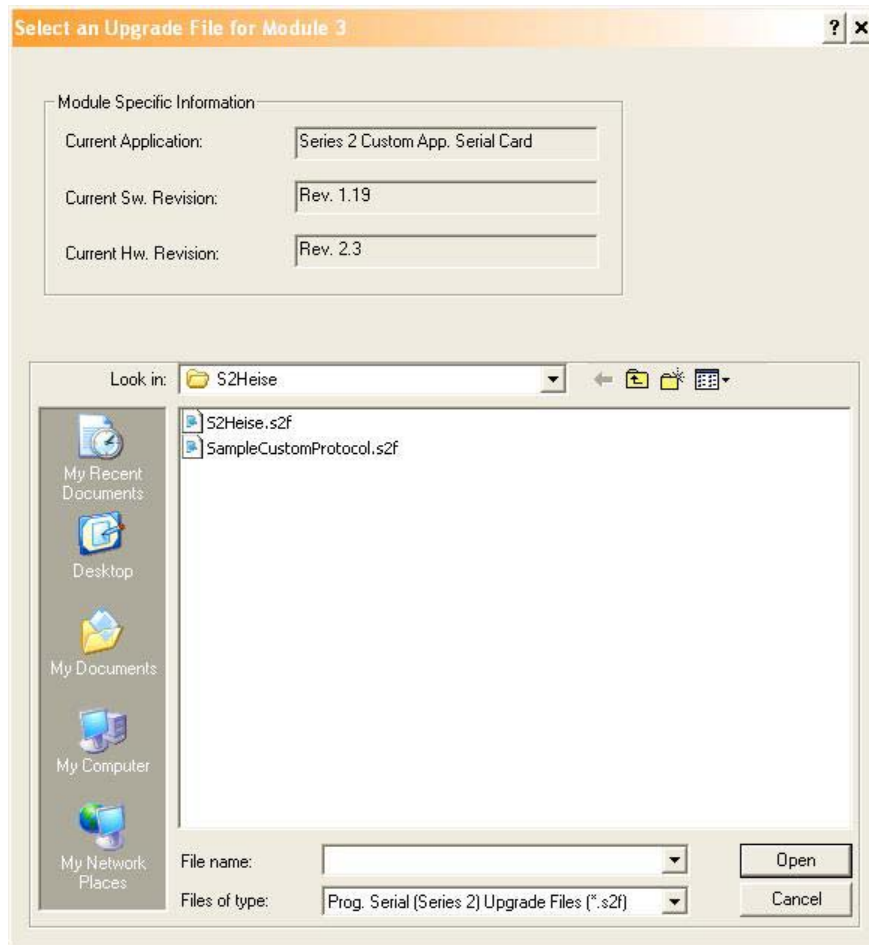


\\DeltaV\ctl\ProgSerial \S2Heise

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

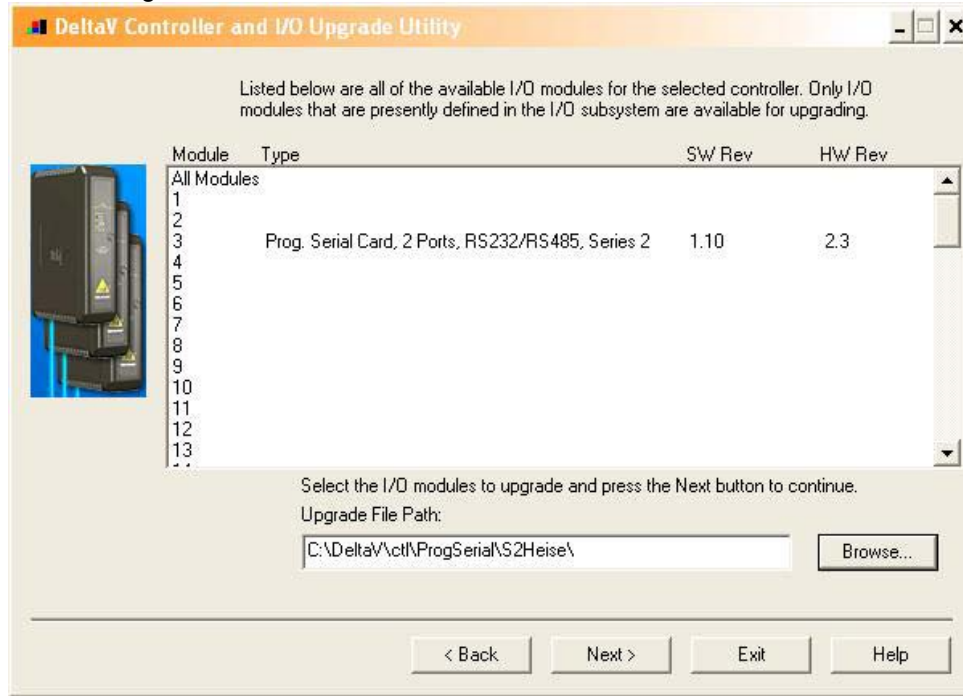
S2Heise.S2F

This is shown in the following dialog.

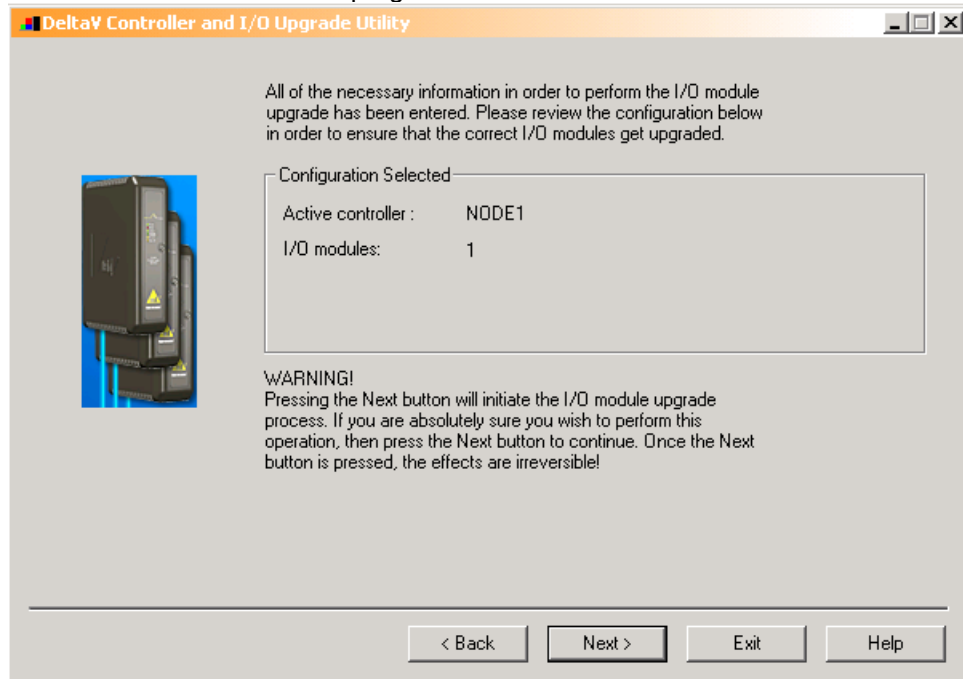




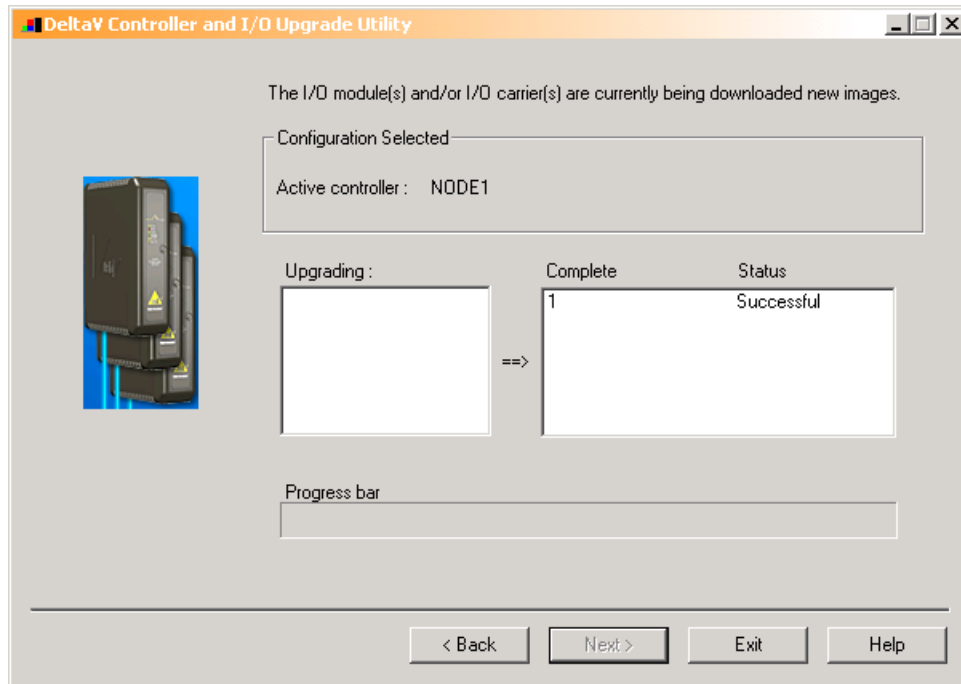
8. After selecting the .S2F file, Click on Open. This dialog will close and you will be back to the following:



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.

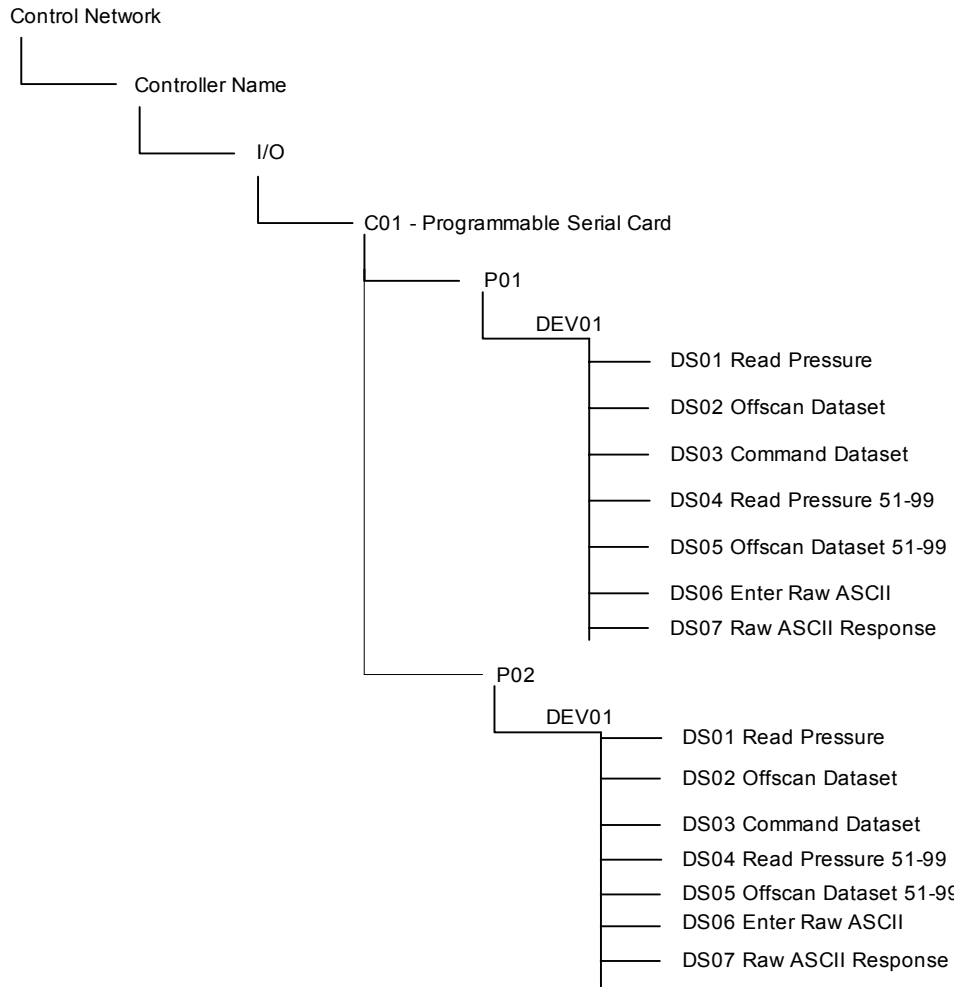


4 CONFIGURATION INFORMATION

The DeltaV Explorer view of a configuration containing a Programmable Serial Card will be as follows, where C01 has a card type of Programmable Serial Card, P01 and P02 are the ports on the card. The following is the default configuration for use with this driver. Each port will contain 1 device with 7 defined datasets. Each port can have up to 100 Heise Transducers attached in rs485 mode for a total of 200 transducers per serial card.

**Dataset Configuration
Table 3**

Port	Devices	Dataset	Mode	Type and Number of Values	Description
P01					
	DEV01				
		DS1	Input	Floating Point, 50 Values	Reads Pressure values for Devices 1-50
		DS2	Output	Boolean, 50 Values	Offscan Dataset for Devices 1-50
		DS3	Output	Floating Point, 10 Values	Command Dataset
		DS4	Input	Floating Point, 50 Values	Reads Pressure values for Devices 51-99
		DS5	Output	Boolean, 50 Values	Offscan Dataset for Devices 51-99
		DS6	Output	String	Write Raw ASCII Command
		DS7	Input	String	Raw ASCII Response to Dataset 6 Command
P02					
	DEV01				
		DS1	Input	Floating Point, 50 Values	Reads Pressure values.
		DS2	Output	Boolean, 50 Values	Offscan Dataset
		DS3	Output	Floating Point, 10 Values	Command Dataset
		DS4	Input	Floating Point, 50 Values	Reads Pressure values for Devices 51-99
		DS5	Output	Boolean, 50 Values	Offscan Dataset for Devices 51-99
		DS6	Output	String	Write Raw ASCII Command
		DS7	Input	String	Raw ASCII Response to Dataset 6 Command



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 or RS485. In general, RS485 mode will be used to connect up to 100 HEISE devices. Lastly, select the Baud rate, Parity, Data bits and Stop bits parameters; these must match the Heise 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 Heise information, and must be configured as described in Table 3.

4.3.1 Data Direction:

Dataset 1, 4, and 7 should be defined as input.
Dataset 2, 3, 5, and 6 should be set at output.

4.3.2 Output Mode and Readback:

Output mode is not used in this driver and should be left as default. Readback should also not be used.

4.3.3 DeltaV Data Type:

Dataset 1, 3, and 4 should be defined as floating point. Dataset 2 and 5 should be defined as Boolean. Dataset 6 and 7 should be defined as strings.

4.3.4 DeviceDataType

DeviceDataType will not be used for this driver and should be left as default.

4.3.5 Data Start Address and Number of Values

Data Start Address will not be used for this driver and should be left as default. Number of values should be defined as shown in table 3.

4.3.6 Special Data

Special Data 1 will be used to store a special transmission delay. A limitation in the DeltaV client allows for transmission delays in increments of 100ms only. In order to allow for single millisecond precision a special delay has been added to special data 1. Any value from 1-99 may be placed in special data 1. The value will represent how long (in milliseconds) to delay before sending a message. This is in addition to the DeltaV port transmit delay.

The total delay before sending data will be calculated as follows:

$$(\text{Port Transmit Delay} + \text{Special Data 1}) = \text{Total Transmit Delay}$$

If the ports transmit delay is set to 0 and special data 1 is set to 20 then the total delay before sending each command will be:

$$(0\text{ms} + 20\text{ms}) = 20\text{ms}$$

If the port Transmit delay is set to 100 and special data 1 is set to 50 then the total delay before sending each command will be:

$$(100\text{ms} + 50\text{ms}) = 150\text{ms}$$

The Special Data 1 value under Dataset 1 will hold the value for the entire port.



4.3.7 Register Mapping

The following tables show what information each register will hold:

Table 6a Dataset 1 (Pressure Data)

Register	Value
1	Heise at Address: 1
2	Heise at Address: 2
...	...
48	Heise at Address: 48
49	Heise at Address: 49
50	Heise at Address: 50

Table 6b Dataset 2 (Off Scan Dataset)

Register	Value
1	Set to 0 means Heise Device at Address 1 is on scan. Set to 1 means the Heise device at Address 1 will not be scanned by the psic..
2	Set to 0 means Heise Device at Address 1 is on scan. Set to 1 means the Heise device at Address 1 will not be scanned by the psic.
...	...
49	Set to 0 means Heise Device at Address 1 is on scan. Set to 1 means the Heise device at Address 1 will not be scanned by the psic.
50	Set to 0 means Heise Device at Address 1 is on scan. Set to 1 means the Heise device at Address 1 will not be scanned by the psic.

Table 6c Dataset 3 (Command Dataset)

Register	Value
1	Execute command (Entering a 1 will cause the command entered in register 2 to be executed)
2	The device Address of the Hiese to send the command to.
3	Command Code (See Table 6d for a list of supported commands)
4	Command Argument (If needed)
5	Error Code if returned.
6-9	Undefined
10	Result of command executed.



Table 6d List of supported command codes. See DXD Series Manual for more info.

COMMAND CODE	Command	Arguement	RESULT
1	Read Address	NONE	Device Address
2	Bits Per Second Rate	NONE	Bits Per Second Rate
3	Full Scale Value	NONE	Scale Value
4	Firmware Version	NONE	Device Firmware Ver.
5	Filter Amount Value	NONE	Filter Amount
6	Filter Band Value	NONE	Filter Band
7	Heise Label	NONE	Heise Label
8	Pressure Type	NONE	Pressure Type
9	Raw Counts	NONE	Raw Counts
10	Sensor Temperature	NONE	Sensor Temp
11	User Span	NONE	Span
12	User Tare	NONE	Tare
13	User Zero	NONE	Zero
14	BAR Reading	NONE	Bar
15	CM of Water Reading	NONE	CM Water
16	Feet Sea Water Reading	NONE	Ft. Sea Water
17	Hectopascal Reading	NONE	Hectopascal
18	Inches of Mercury	NONE	In. Mercury
19	Inches of Water	NONE	In. Water
20	Kilopascal Reading	NONE	Kilopascal
21	Millibar Reading	NONE	Millibar
22	MM Mercury Reading	NONE	MM Mercury
23	Megapascal Reading	NONE	MegaPascal
24	Numeric Value (Counts)	NONE	Numeric Counts
25	Write Address	New Address	NONE
26	Write Bit Per Second Rate	Bit Rate	NONE
27	Read from EE	EE Location	NONE
28	Write to EE	EE Location	NONE
29	Initialize EEPROM	NONE	NONE
30	Write Filter Amount	Filter Amount	NONE
31	Write Filter Band	Filter Band	NONE
32	Write User Span	Span	NONE
33	Write User Tare	Tare	NONE
34	Write User Zero	Zero	NONE
35	Read Error Flag	NONE	Error Bytes

*If any of these commands fail a (-1) will appear in the Error Code Register. If Success, (0)

Table 6e Dataset 4 (Pressure Data)

Register	Value
1	Heise at Address: 51
2	Heise at Address: 52
...	...
47	Heise at Address: 97
48	Heise at Address: 98
49	Heise at Address: 99



Table 6f Dataset 5 (Off Scan Dataset)

Register	Value
1	Set to 0 means Heise Device at Address 51 is on scan. Set to 1 means the Heise device at Address 51 will not be scanned by the psic..
2	Set to 0 means Heise Device at Address 52 is on scan. Set to 1 means the Heise device at Address 52 will not be scanned by the psic.
...	...
48	Set to 0 means Heise Device at Address 98 is on scan. Set to 1 means the Heise device at Address 98 will not be scanned by the psic.
49	Set to 0 means Heise Device at Address 99 is on scan. Set to 1 means the Heise device at Address 99 will not be scanned by the psic.

**Datasets 6 and 7 are string datasets. When a command is placed in dataset 6 its result will appear in dataset 7.



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 Heise 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 the 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 from 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

Table 6

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

Table 7

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

Table 8

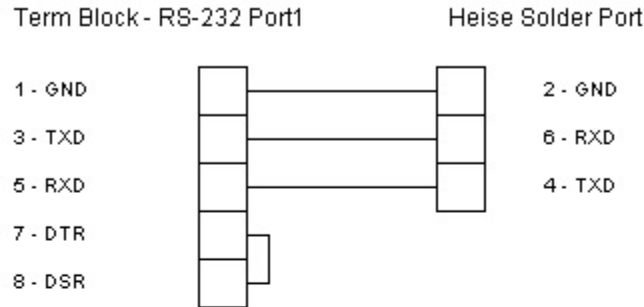
Terminal Number	Signal Description
1	Port 1 – Isolated Ground (GND)
2	Port 1 – TxD +
3	Unused
4	Port 1 – TxD -
5	Unused
6	Port 1 – RxD +
7	Unused
8	Port 1 – RxD -
9	Port 2 – Isolated Ground (GND)
10	Port 2 – TxD +
11	Unused
12	Port 2 – TxD -
13	Unused
14	Port 2 – RxD +
15	Unused
16	Port 2 – RxD -



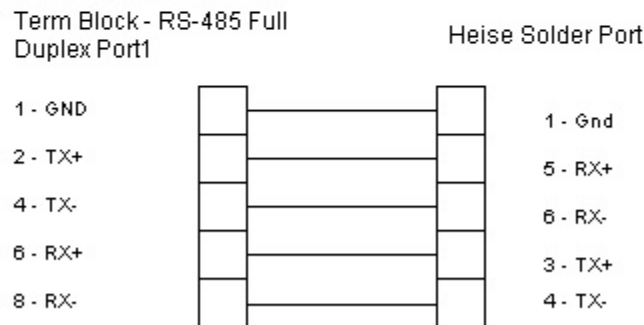
6.2 Wiring Connections

In general, the figure below shows the connections between the Field Device and the PSIC termination block. For additional DeltaV cabling information, please refer to the DeltaV Books Online documentation. For Heise cabling information see “DXD Series – Precision Digital Pressure Transducer, Installation and Operating Instructions Revision 1.5 10/15/99”. See Chapter 5 for Heise Solder Port Diagrams.

For RS232 Connections



For RS485 Connections





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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. David Story
2. Tony Kerr

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

1. Martin Berutti
2. Jane Wagner

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

support@mynah.com

Thank you for using DeltaV.