MYNAH℠

Draeger Polytron IR 334
Programmable Serial Interface Card
Series 2

USER MANUAL

IOD-1179, Rev. P1.10

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1 Introduction

1.1 Scope

This document is user manual for IOD-1179, the Draeger Polytron IR 334 communications driver firmware for the Emerson Process Management (EPM) DeltaV Control System. The driver runs in the DeltaV Series 2 Programmable Serial Interface Card (PSIC). The reader should be familiar with EPM's DeltaV PSIC and connected Draeger devices.

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 Draeger Polytron Driver.
Downloading Firmware	Describes downloading procedures for the driver firmware on to the DeltaV PSIC.
Configuration Information	Describes procedures and guidelines for configuring the DeltaV PSIC.
Displaying Dynamic Data from the Draeger Polytron device	Gives an example of how to display dynamic information from Draeger Polytron devices.
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 Draeger devices. Also describes the cable pin assignments for RS-485.
Technical Support	Describes who to call if you need assistance.

1.3 System Specifications

The following table lists the minimum system requirements for the driver:

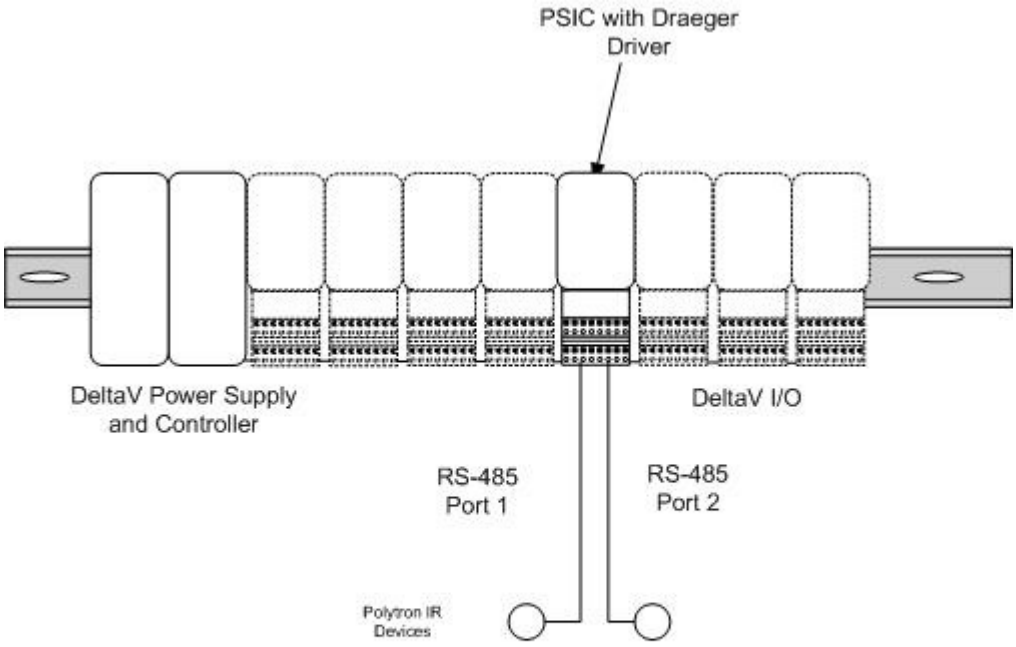
Protocol Compatibility and Reference documents	Device communication is based on the HART Field Communications Protocol, as described in Application Guide, HCF LIT 34. In addition, Draeger Polytron specific HART commands used are as documented in "An Introduction to Polytron 2 Transmitter Specific Commands", Version 2.0, published by Draeger.
Software Requirements	DeltaV System Software (Release 6.3.2 or later) installed on a hardware-appropriate Windows 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.

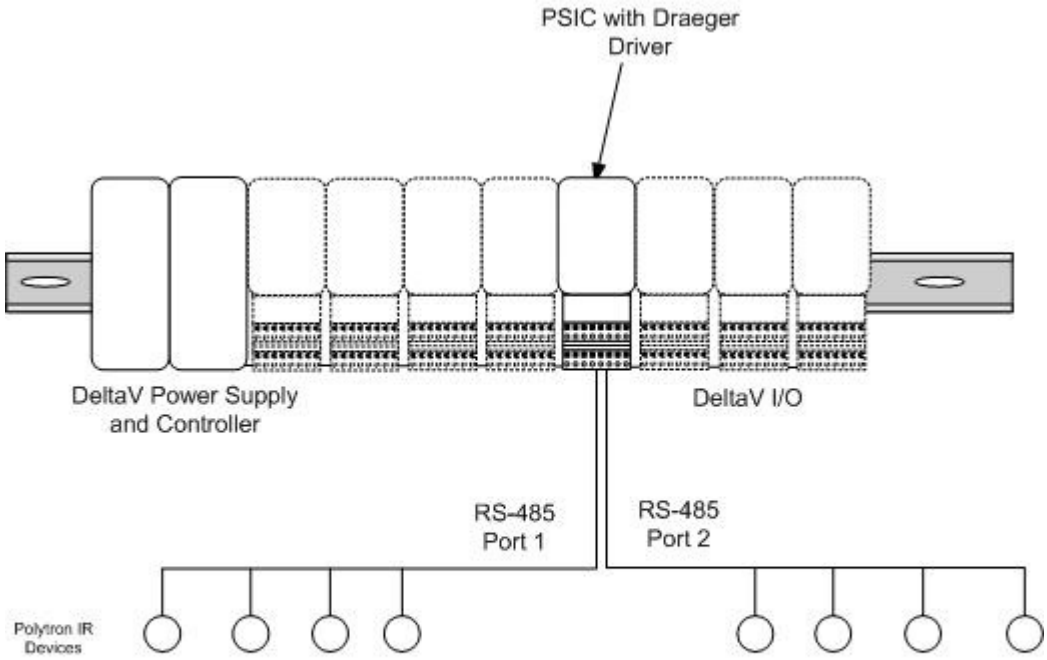
2.1 DeltaV / Polytron Communications

For communications with Draeger Polytron devices, the PSIC connects via RS-485 only. The driver runs in Master mode only and can be deployed in point-to-point or multi-drop modes. In point-to-point mode, the Polytron device must be configured with an address of 0 (via the Rosemount 375 Handheld). In addition, use the dataset 1, special data register 1 flag configuration as described in Section 4.3.2, Table 2. In point-to-point mode, the 4-20mA analog signal and the serial communications can be used simultaneously.



Point-to-Point architecture for DeltaV / Polytron communications

The multi-drop capability of RS-485 communications allows one PSIC port to communicate with multiple devices. By design, the maximum Polytron devices which can be connected to a PSIC port is four (4). For this mode, use dataset 1, special data register 1 flag configuration as described in Section 4.3.2, Table 2.



Multi-drop architecture for DeltaV / Polytron communications

2.2 Polytron Device Configuration

Configure the Polytron devices as follows using the Rosemount 375 Handheld:

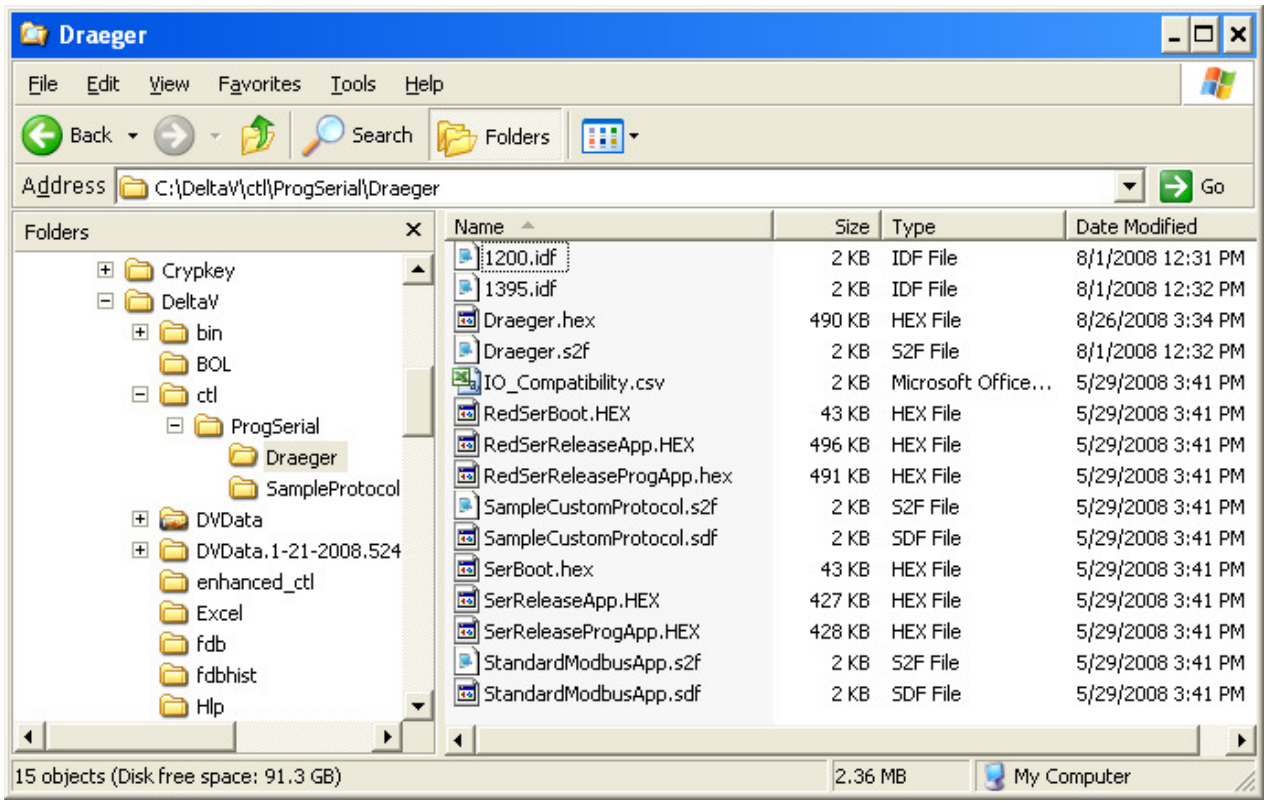
1. Configure the device with 5 Preambles for the HART communications.
2. The RS-485 parameters must be configured for 2400 baud, Odd parity, 8 bits and 1 stop bit.
3. When using point-to-point communications with the DeltaV serial card, configure the device address to be 0. This will allow both the 4-20mA analog signal and the serial communications to coexist simultaneously. When using multi-drop communications, configure the device address to be in the range 1-15. Note that in this mode, the 4-20mA analog signal is clamped to 1mA.

3 Downloading the firmware

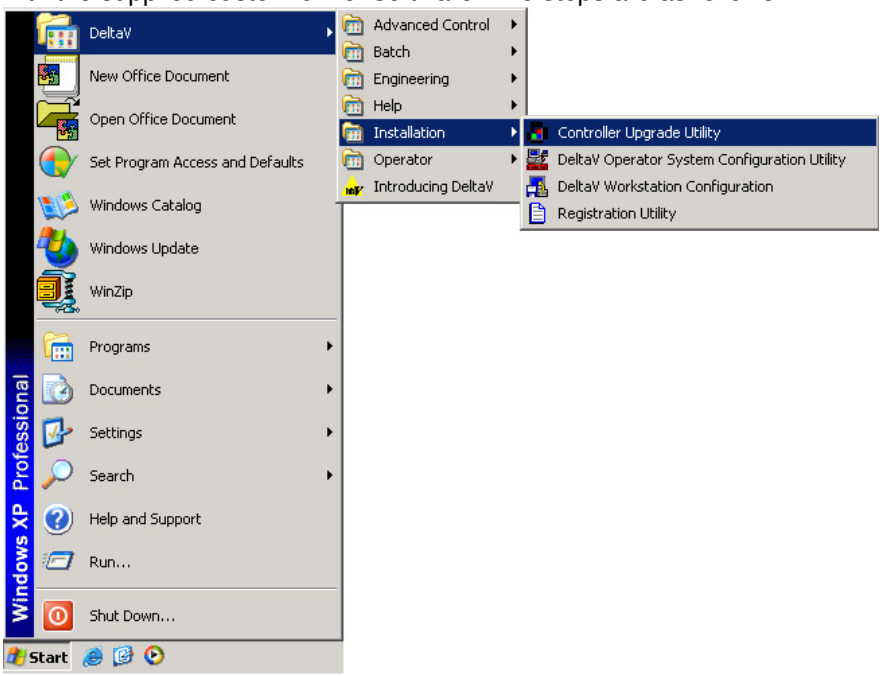
The driver software distribution comprises 15 files, distributed on a CD. These files must be copied to the DeltaV directory on your ProPlus Workstation. The path is:

\DeltaV\ctl\ProgSerial\Draeger

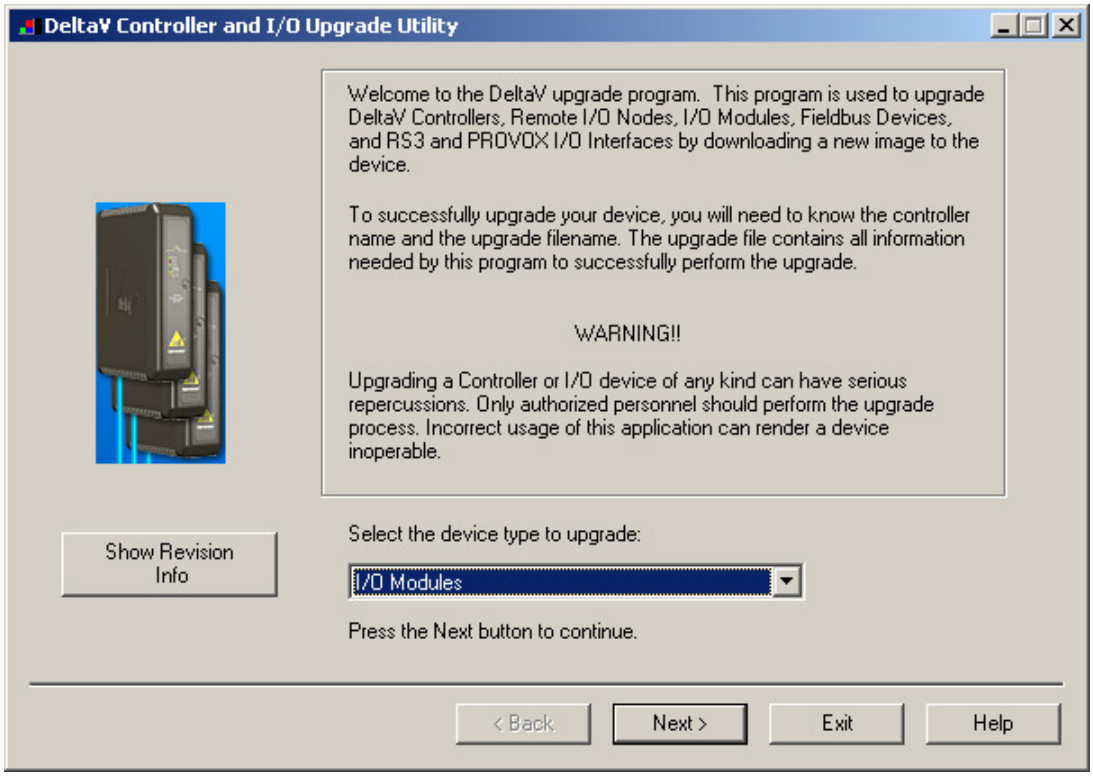
Note that you will have to create the \Draeger subdirectory. The following files will be copied:



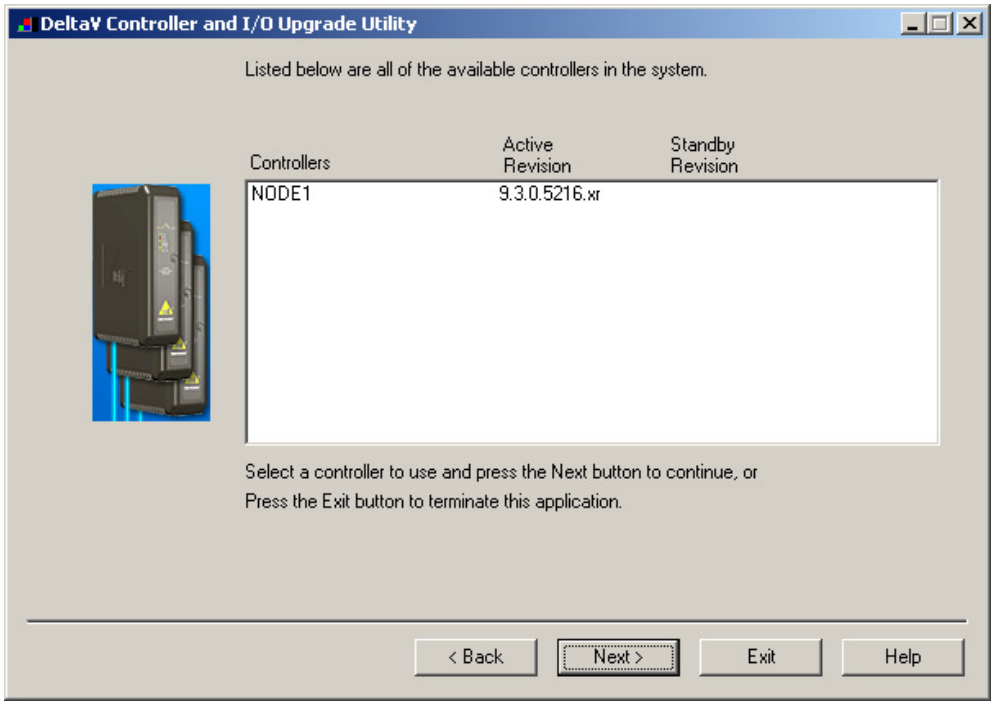
After copy completion, you are ready to program (or upgrade) the Programmable Serial Card with the supplied custom driver software. The steps are as follows:



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

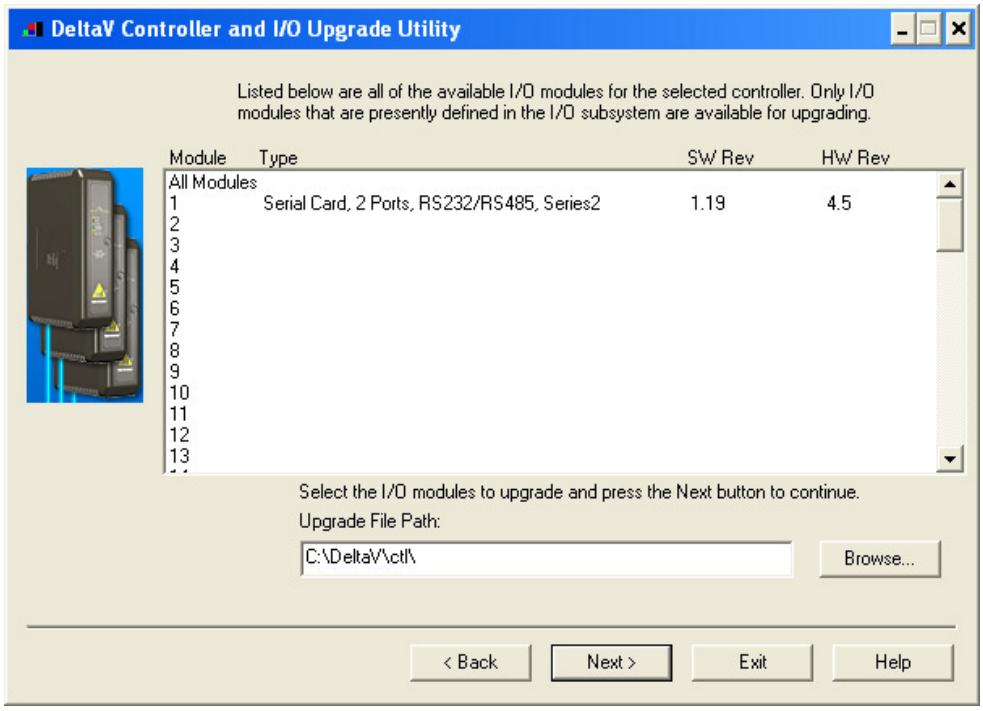


2. Choose “I/O Modules” from the drop down menu and click Next.



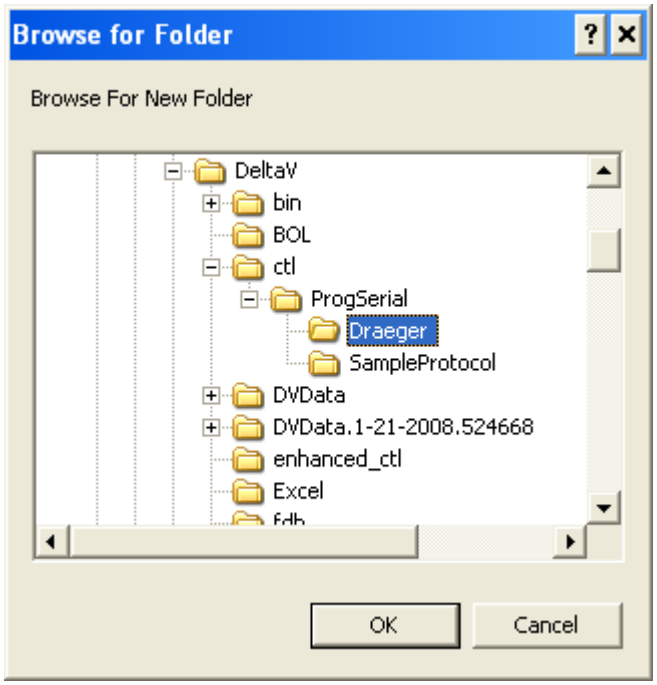
3. The above dialog will appear, listing all the available Controllers in your network. From this dialog, select the appropriate Controller and then Click Next.

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

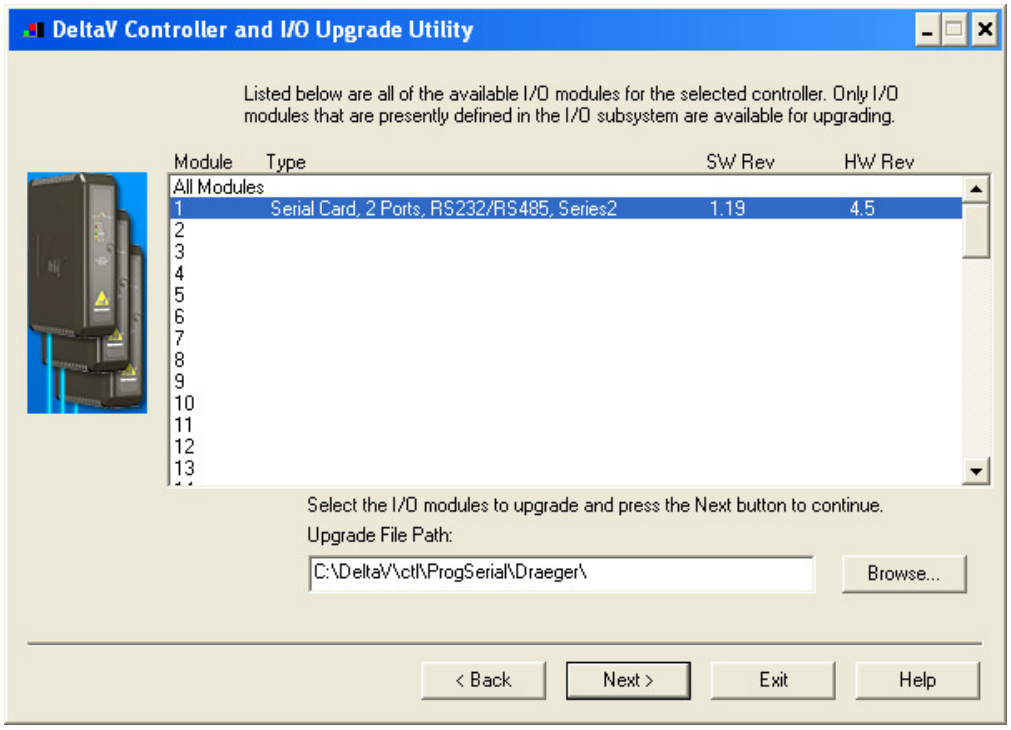


4. The above dialog will appear, listing all the I/O modules in your selected Controller. The shown list of I/O modules is an example only. Your list will be different.

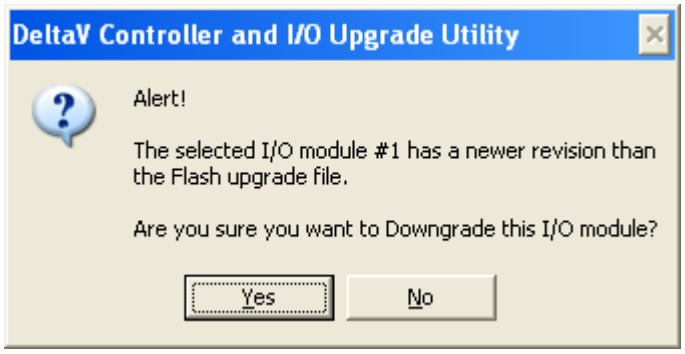
5. Click the Browse button and select the DeltaV path as shown below, and then click Ok. Note that the disk drive could be C or D.



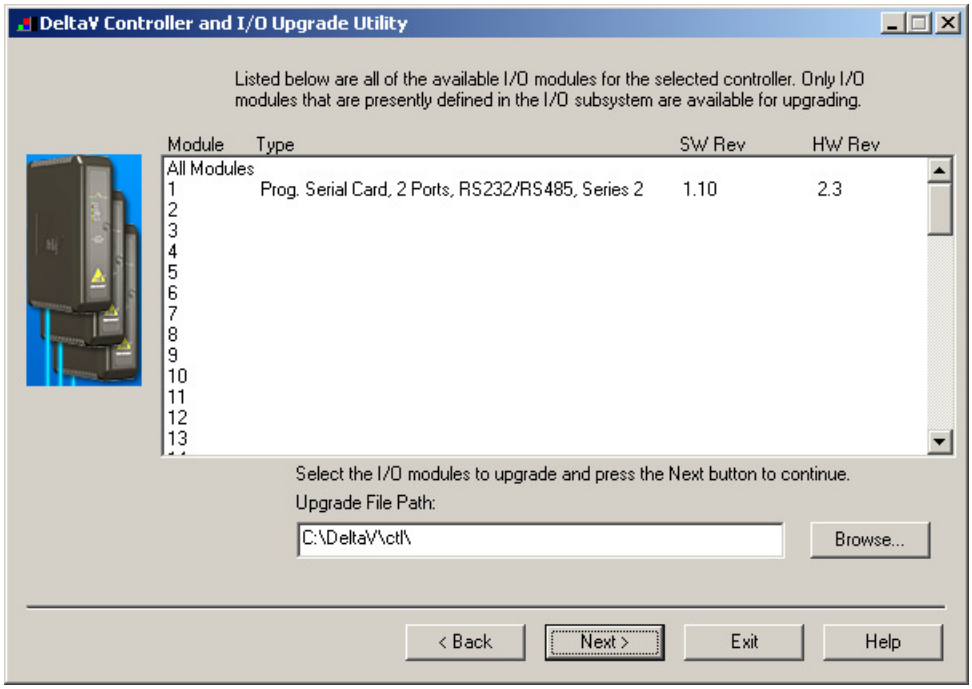
6. Select the I/O module again as shown below and then click Next. Go to Step 9.



Note: It is possible that this message box will appear. It is ok to downgrade the I/O module if the correct I/O module has been selected.



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.



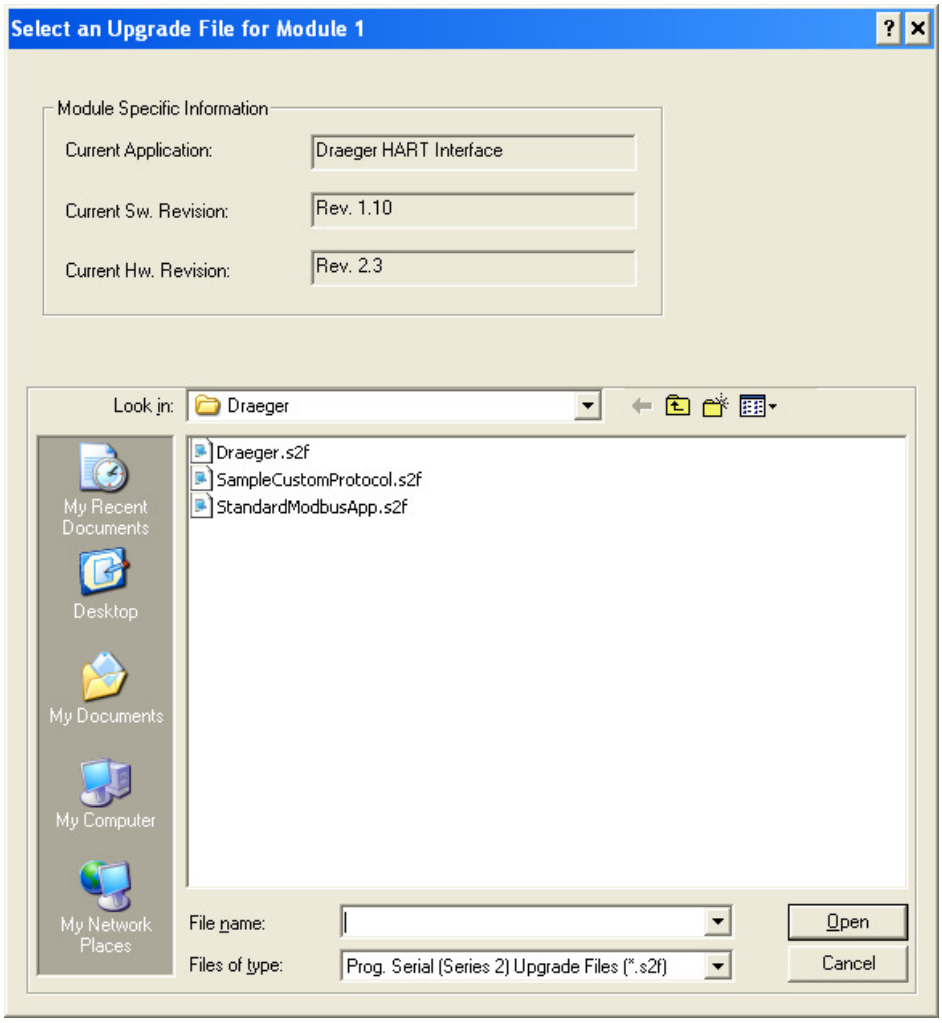
For example, we will select I/O Module 1. This will give you a dialog, from which you will select the file path to where the driver software is located. This path will be:

\DeltaV\ctl\ProgSerial\Draeger

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

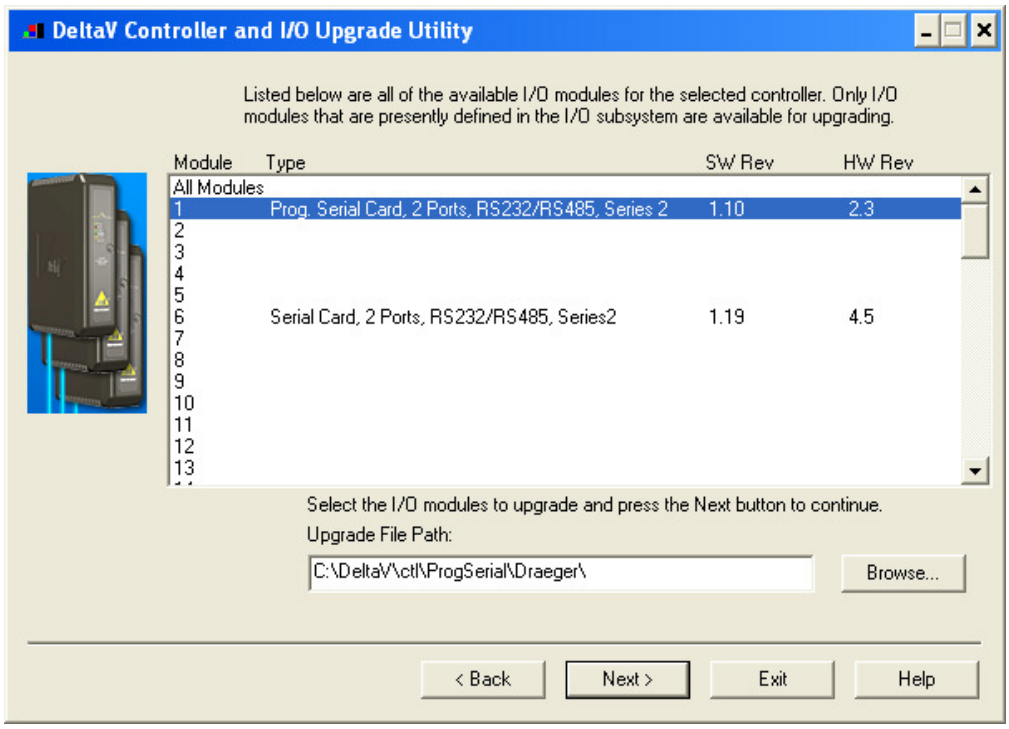
Draeger.S2F

This is shown in the following dialog.

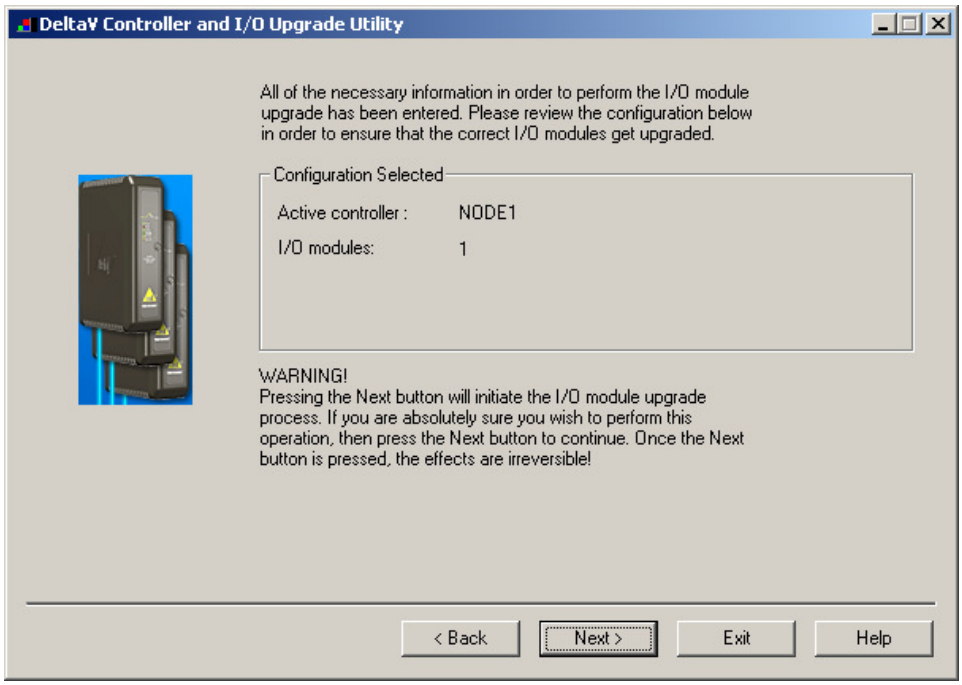

Select an Upgrade File for Module 1
Module Specific Information
Current Application:
Draeger HART Interface
Current Sw. Revision:
Rev. 1.10
Current Hw. Revision:
Rev. 2.3
Look in:
Draeger
Draeger.s2f
SampleCustomProtocol.s2f
StandardModbusApp.s2f
My Recent Documents
Desktop
My Documents
My Computer
My Network Places
File name:
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 screen.

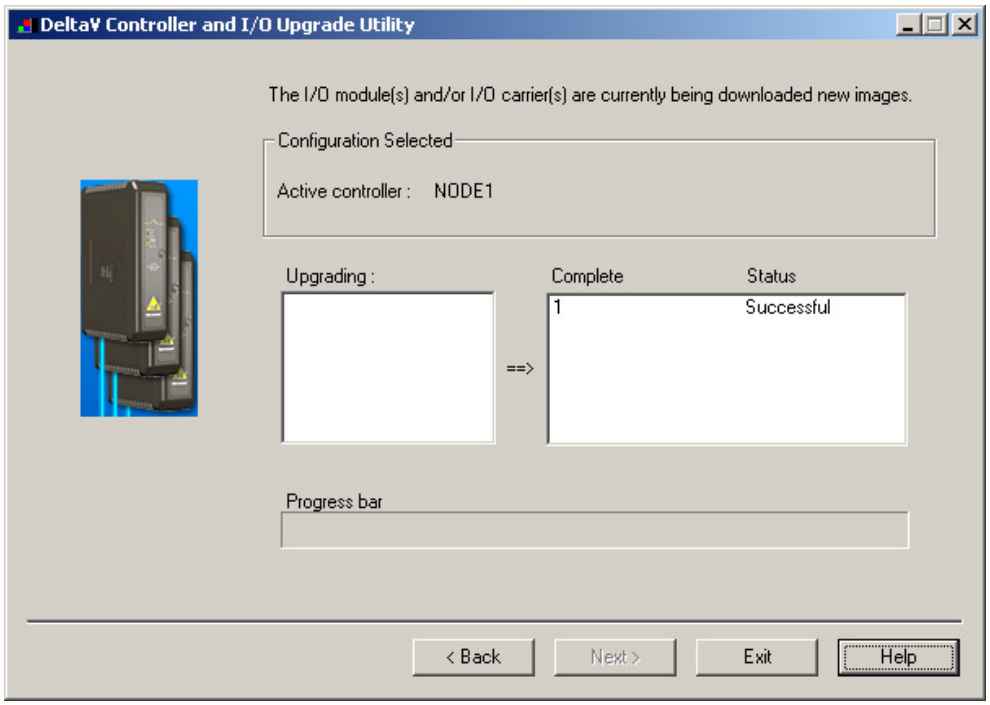
Note: You may receive a warning about the module having the same or a lesser version, similar to the note above, verify that you are selecting the correct serial card and continue with the module upgrade.



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



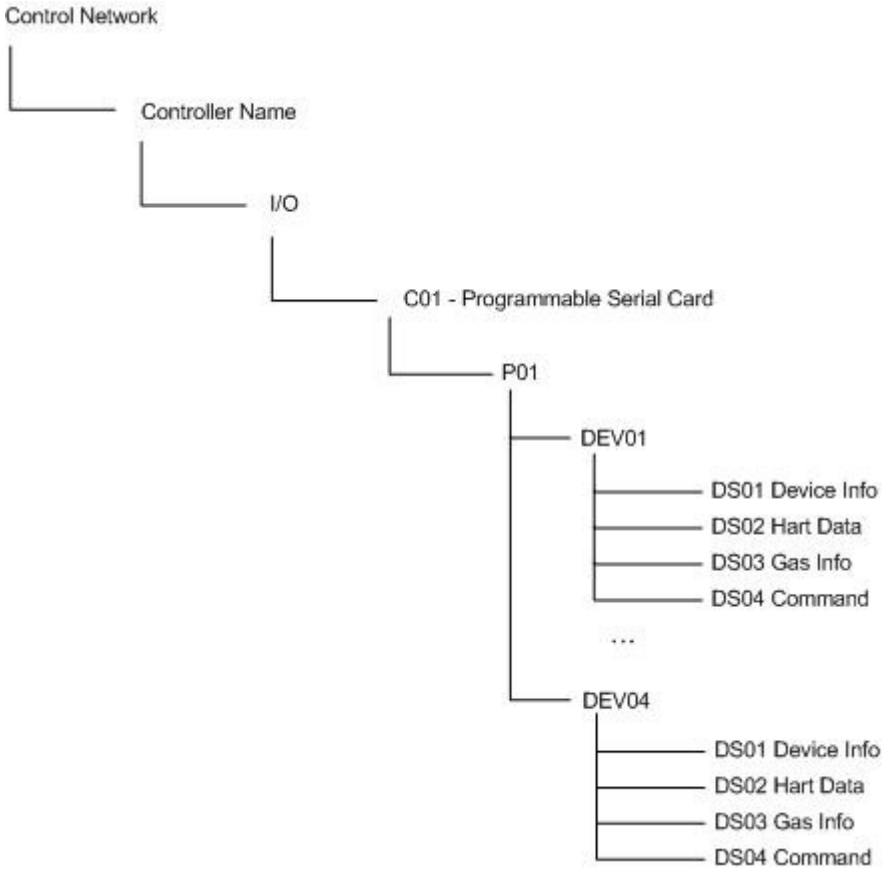
10. Click Next and the I/O Module upgrade process will begin. After completion, you will receive the following dialog, indicating success.



11. If this upgrade started with a standard Serial Card, hit the back button and continue the upgrade procedure from Step 7. Once Steps 7 through 10 have been completed, the upgrade will be complete.

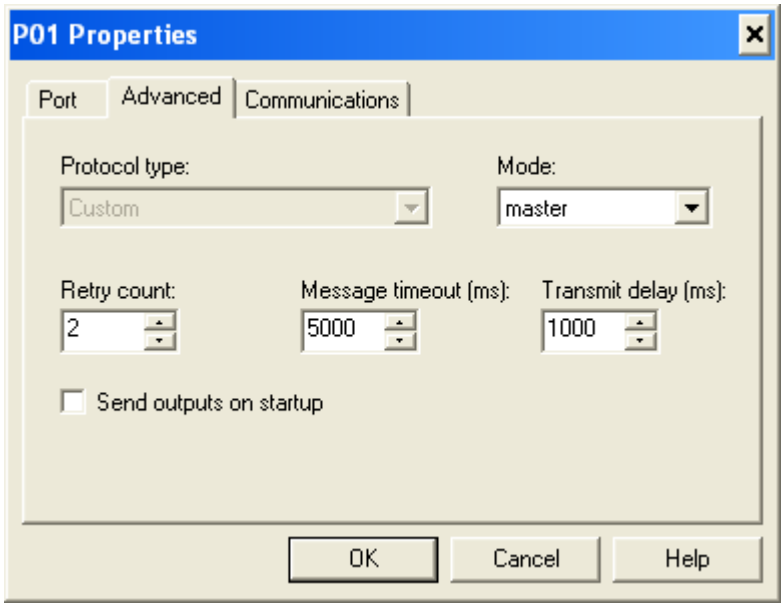
4 Configuration Information

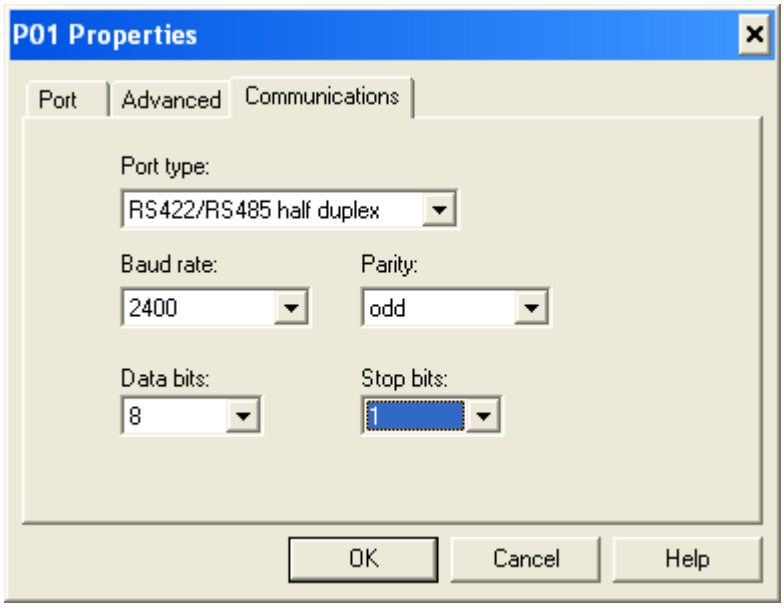
Four datasets must be configured to perform data exchange with a Draeger Polytron device. The order of dataset types is fixed. User must adhere to this order for correct driver operation. The figure below shows an example configuration setup:



4.1 Port Configuration

The port should be configured as Master. Transmit delay must be configured as 1000. The Port Type should be defined as RS-485. The Baud Rate, Parity, Data Bits and Stop Bits should match the settings of the Polytron device. It is recommended that the Polytron be configured with 2400 baud, Odd parity, 8 data bits and 1 stop bit.





4.2 Device Configuration

One device should be configured for each Polytron connected to a given port. The device address is used in this driver, and should match the device address configured in the Polytron device. The device address must be between 1 and 15. Maximum number of multi-dropped Polytron devices is four (4). In point-to-point mode, the DeltaV device address is ignored.

Note: Polytron devices must also be configured with 5 Preambles for the HART communications.

4.3 Dataset Configuration

Four (4) datasets are required for each Polytron device. The Device Data Type of the dataset determines how the dataset is used and which information is contained in it. Datasets must be configured in order.

4.3.1 Data Direction

Table 1 lists the possible Device Data Types and their direction. Table 2 matches the Device Data Type with the DeltaV Data Type and gives the size of the dataset.

4.3.2 Data Type and Size

Configure each device as follows:

Table 1 – Device Data Types and Descriptions

DS #	DEVICE DATA TYPE	DIRECTION	DESCRIPTION
1	0	Input	This dataset contains the device information returned in response to HART command 0.
2	1	Input	This dataset contains device information returned by HART commands 3, 15, and
3	2	Input	This dataset contains the selected gas name, and units. This information is returned by HART command 132
4	3	Output with Readback	This is the command dataset. DeltaV Control Modules use R1 of this dataset to select a new gas in the Polytron. R1 also contains the gas selection index read back from the Polytron device.

Table 2 – DeltaV Data Types and Dataset Sizes

DS #	Device Data Type	DeltaV Data Type	Data Start Address	Number of Values	Special Data Values
1	0	32-Bit UINT	0	10	X,0,0,0,0 X= 0 for multi-drop mode X=1 for point- to-point mode
2	1	Floating Point	0	17	0,0,0,0,0
3	2	String	0	100	0,0,0,0,0
4	3	32-Bit UINT	0	1	0,0,0,0,0

5 Data Mapping

5.1 Dynamic Data

Draeger Polytron device data is stored in configured datasets as follows:

Table 3 – Dataset 1 Registers – Cmd 0

R1	Status – returned in Cmd 0 response
R2	Manufacturer ID
R3	Manufacturer Device Type
R4	Number of Preambles
R5	Universal Command Revision
R6	Transmitter Command Revision
R7	Software Revision
R8	Hardware Revision
R9	Device flags
R10	Device ID

Table 4 – Dataset 2 Registers – Cmd 3, Cmd 15, Cmd 132 and Cmd 128

R1	Cmd 3 - Status – returned in Cmd response	
R2	Cmd 3 - Current mA value	
R3	Cmd 3 - Mesurement Units	
R4	Cmd 3 - Measurement value	
R5	Cmd 3 – Reserved	
R6	Cmd 3 – Reserved	
R7	Cmd 3 – Reserved	
R8	Cmd 3 – Reserved	
R9	Cmd 3 – Temperature Units	
R10	Cmd 3 – Temperature (in Celsius)	
R11	Cmd 15 – Upper Range	
R12	Cmd 15 – Lower Range	
R13	Cmd 132 – Unit Factor	
R14	Cmd 132 – Compensation Type	
R15	Cmd 128 – Alarm **Note: 0x20 and 0x01 valid only with 0x80 set.**	0x80: Alarm module active
		0x40: Not used
		0x20: Alarm 2 condition tripped
		0x10: Alarm 1 condition tripped
		0x08: Any Relay Alarm set
		0x04: Relay error activated
		0x02: Relay alarm 2 activated
		0x01: Relay alarm 1 activated
R16	Cmd 128 – Gas Concentration	
R17	Cmd 128 – Decimal Adjustment	

Table 5 – Dataset 3 Register – Cmd

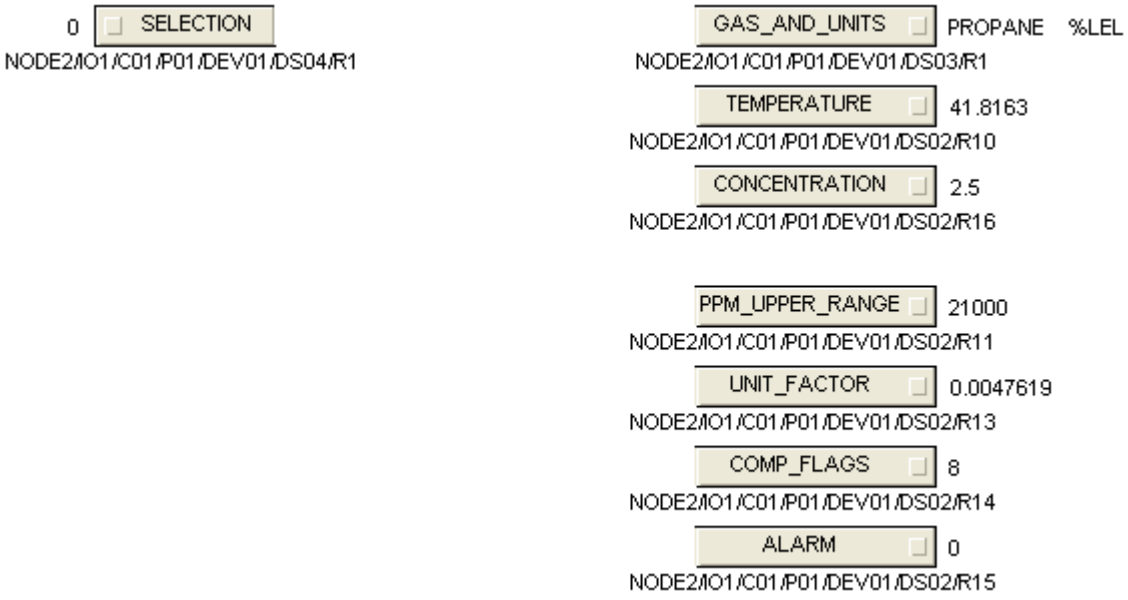
R1	Cmd 132 - Selected gas name and units

Table 6 – Dataset 4 Register

R1	Gas index to be sent to the Polytron device. DeltaV sends the new selection when a register change is detected. Normal scan sends a read to the Polytron (Cmd 201) to read back the actual gas index in the device.

5.2 Selecting a Gas

To send a new Gas selection to the Polytron device, map an output parameter to dataset 4, register 1 of the given device. Write the selected gas index (range 1-38) into the output parameter. The driver sends the new index in a series of commands. For example, the following shows a sample module:



Here, the input parameters show the current readings. User will write a new gas index into the parameter SELECTION. The available gases are as follows. Any selection outside the range 1-38 is rejected by the driver. Given the gas index selection, the driver internally sends the 100% LEL in PPM value and %LEL units to the device.

Table 7 – Available Gases

Index of Gas	Gas Name	100%LEL in ppm
1	Methane	50000
2	Propane	21000
3	Ethene	27500
4	Acetone	25000
5	Benzene	12000
6	Butadiene	20000
7	Butane	16000
8	Butanol	14000
9	Butanone	14000
10	Butene	16500
11	Butylaceta	17000
12	Butylacryl	15000
13	Cyclpentan	11000

14	Dimetyleth	27000

Table 7 – Available Gases (continued)

Index of Gas	Gas Name	100%LEL in ppm
15	Dioxane	20000
16	Ethanol	33000
17	Etylacetat	20000
18	Etylbenzen	8000
19	EO	30000
20	Hexane	11000
21	Methanol	60000
22	Metymetacr	17000
23	MIBK	12000
24	Nonane	8000
25	Octane	10000
26	Pentane	15000
27	Propanol	20000
28	Propene	20000
29	Toluene	11000
30	Xylene	9000
31	Allylchlor	29000
32	Chlorpropa	34000
33	Chlorprope	53000
34	ECH	38000
35	Mthxypropa	16000
36	MCB	13000
37	PO	23000
38	Styrene	9000

6 Operational Check

6.1 Scope

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

6.2 Verify Hardware and Software Version Number

The user can verify that the Draeger 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:

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

6.3 Verify Configuration

- Verify port configuration: The serial port must be enabled. It must be set to Master mode. User needs to make sure communication settings such as baud rate, parity, and number of data bits matches the Draeger Polytron settings.
- Verify Dataset configuration as described above.

6.4 Verify I/O Communication with Control Studio

- User can create I/O modules in the control studio to verify correct values are read and written between the foreign device and the PSIC. For input data, the values should be changed in the foreign device and verified that the new data are correctly reported.

- To assign a Dataset and a register in the Dataset to an I/O module, follow these steps:

    1. Double click the IO_IN/IO_OUT parameter for the module. This brings up the IO_IN/IO_OUT Property window.
    2. Click on the Browse button. This brings up the Browse window.
    3. Click on the Object_Type drop down list, select All. This displays all the Dataset tags.
    4. Double click on the desired Dataset tag. This assigns the tag to the module and closes the Browse window.
    5. Choose the desired register in the Parameter drop down list.
    6. Click the OK button.

6.5 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 statistics 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.

- Check the dataset status: Navigate down to the dataset in the left-pane and left-click on a dataset that has a bad status. The right-pane will display a Status parameter. Table 3 lists possible strings and common reasons for the error.

Table 3 - Dataset Status Strings

Status String	Common Causes
No Response	The serial card sent a message to the display, but did not receive a response. This could indicate a wiring issue or a miss-match of the port settings (baud rate, parity, data bits, stop bits)
CRC Error	The serial card received a response, however the CRC in the message packet was incorrect. This could indicate a wiring issue or a miss-match of the port settings (baud rate, parity, data bits, stop bits)

Invalid Device Address	The device does not have a valid address, or the driver has not been able to do the initial device read so that the long address could be constructed.
Invalid Dataset Configuration	The configured Device Data Type for this dataset is incorrect. Please see Section 4.3.2 for valid Device Data Types. The datasets and corresponding Device Data Type must be in order.
Port Error	This indicates that a low level port error has occurred, e.g., Framing, or Parity. Check the RS-485 settings.
Error Response	The device returned an error in the response, or the response could not be parsed.
Invalid Selection	This is the HART response status returned by the Polytron device.
Invalid Data Bytes	This is the HART response status returned by the Polytron device.
Invalid Mode	This is the HART response status returned by the Polytron device.
Access Restricted	This is the HART response status returned by the Polytron device.
Invalid Command	This is the HART response status returned by the Polytron device.
Invalid Range	This is the HART response status returned by the Polytron device.
Invalid Range Unit	This is the HART response status returned by the Polytron device.

6.6 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.

7 DeltaV–Field Device Electrical Interface

Each PSIC has 2 ports. The Draeger Polytron is expected to operate in RS-485 mode.

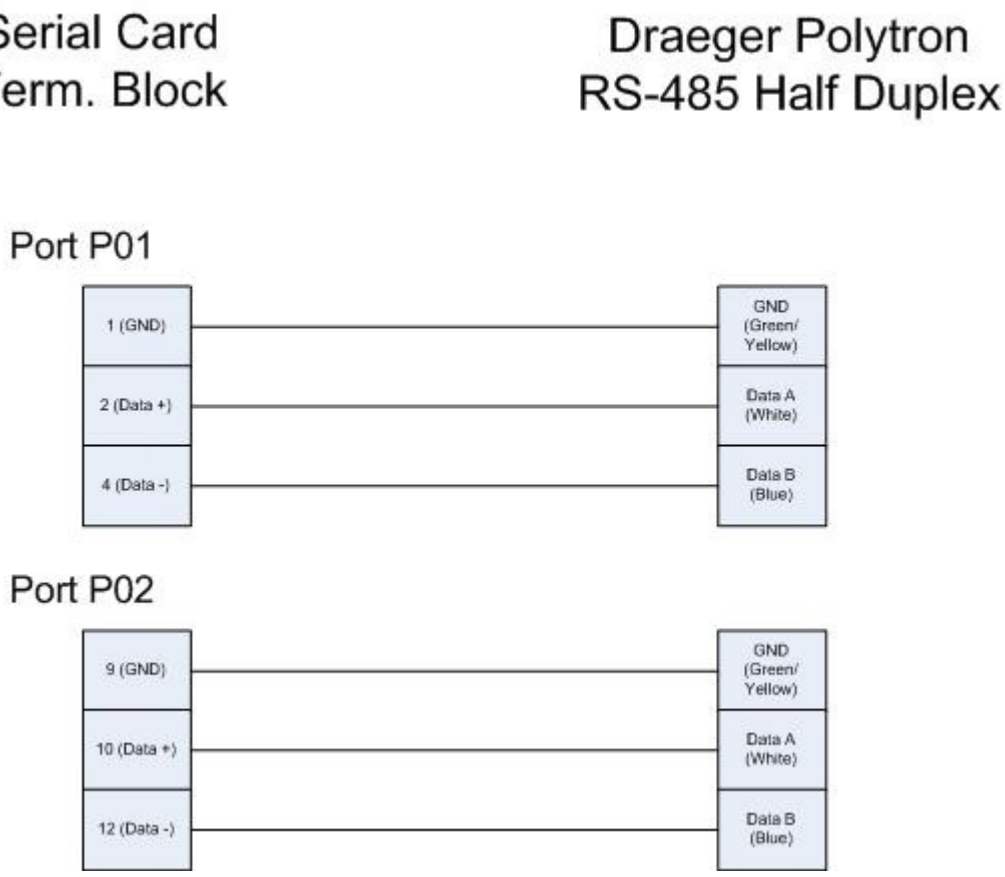
7.1 Pin Assignments for DeltaV PSIC

Table 4 - RS-485 Standard

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

Wiring Connections (RS-485)

The figure below shows the connections between a Draeger Polytron device and Port 1 on the Serial Card Termination Block.



8 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.