



M Y N A HSM

**Doric Mux
Programmable Serial Interface Card
Series 2**

USER MANUAL

Rev. P1.10

September 12, 2006

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1 INTRODUCTION

1.1 Scope

This document is User Manual for the Doric Mux communications driver firmware for the Emerson Process Management (EPM) DeltaV Control System. The driver will run in the DeltaV Series 2 Programmable Serial Interface Card (PSIC). The reader should be familiar with EPM’s DeltaV PSIC and connected Doric Mux 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 Doric Mux 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.
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 Doric Mux 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	The communication protocol used will be the Doric Mux RS485 Communication Protocol described in Doric Mux manual: Beckman Industrial Model 278 Operators Manual.
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

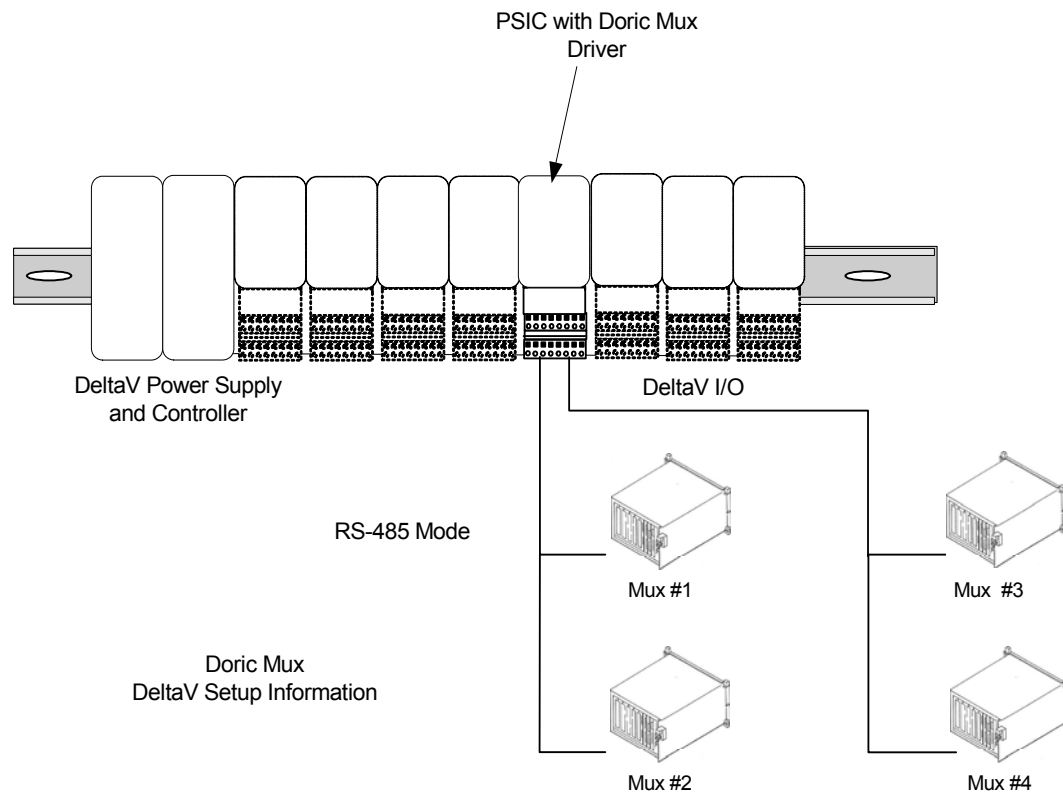


2 THEORY OF OPERATION

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.

For communications with Doric Mux devices, the PSIC will connect to the RS-485 port of the Doric Mux. Up to two Doric Mux devices can be connected to each PSIC port, as illustrated below. Please note that in assigning the Device Number to the device in DeltaV, the number must be one higher than the address of the Doric Mux device being communicated with. So a Device Address of 1 in DeltaV would communicate with a Doric Mux with an address of 0.

The driver runs in Master mode only. Each device uses eight datasets. Datasets 1, 2 and 6 are for configuration of the Doric Mux described in Section 4. The normal function of the driver is to read the configured points from the Mux. The data read is placed in the appropriate register of datasets 3-5.



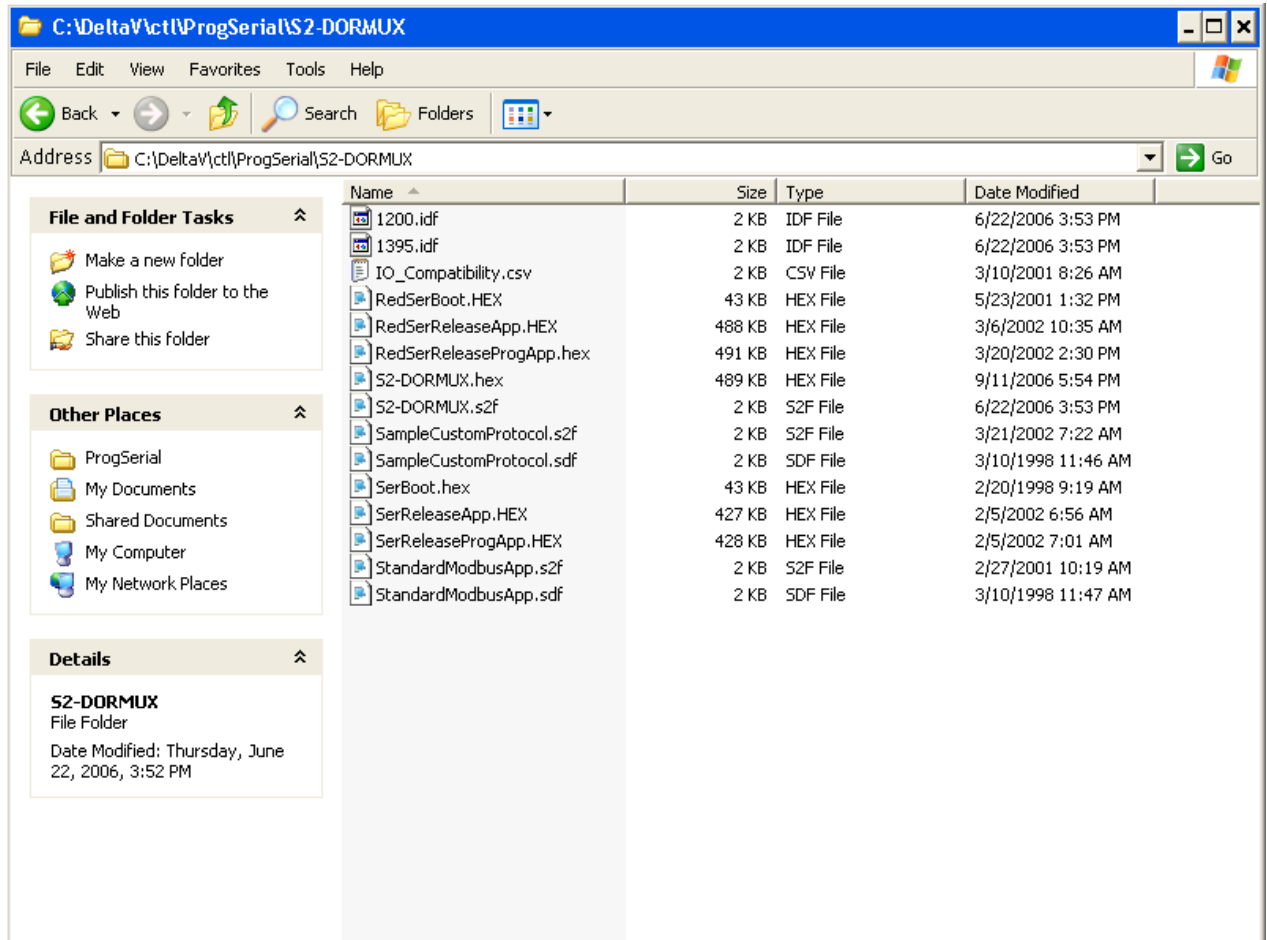


3 Downloading the firmware

The driver software distribution comprises 14 files, distributed on a CD. These files must be copied to the DeltaV directory on your ProPlus Workstation. The path is:

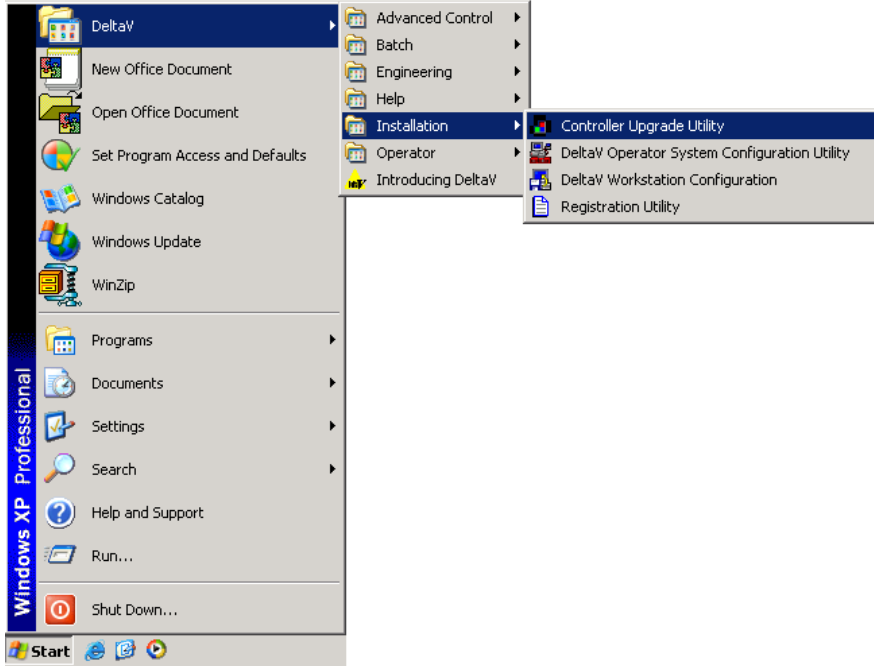
\\DeltaV\ctl\ProgSerial\S2-DORICMUX

Note that you will have to create the \S2-DORICMUX subdirectory. The following files will be copied:

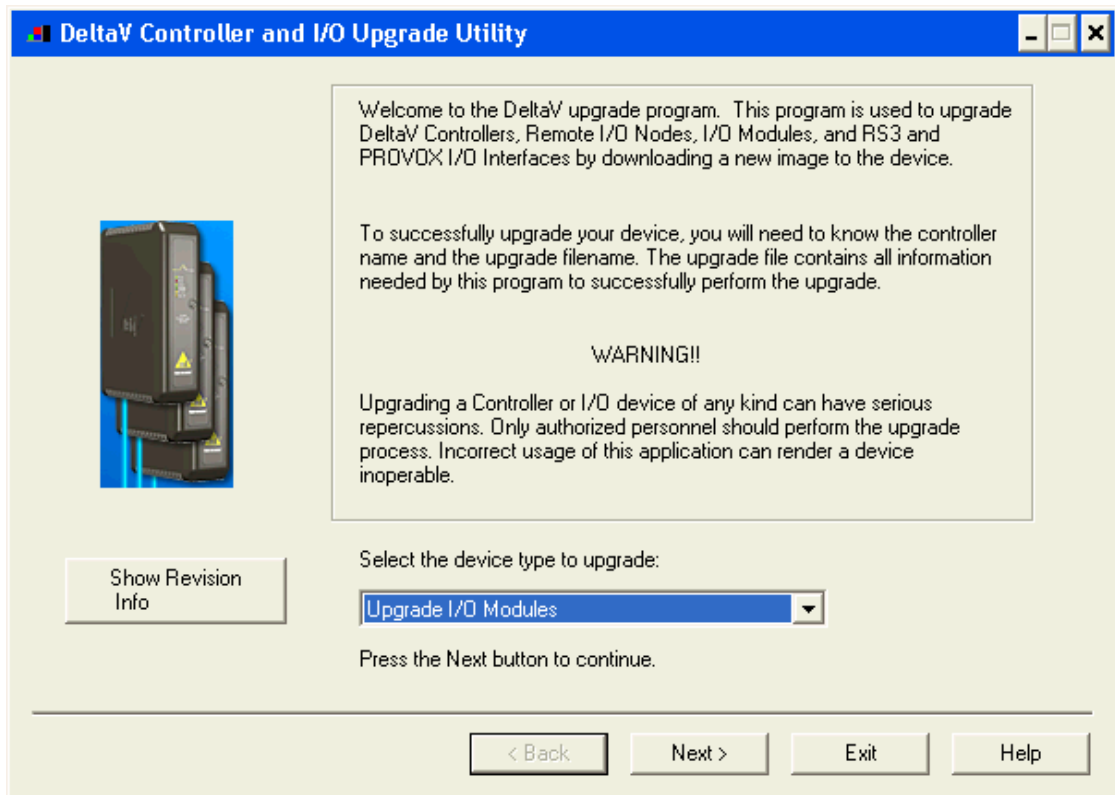




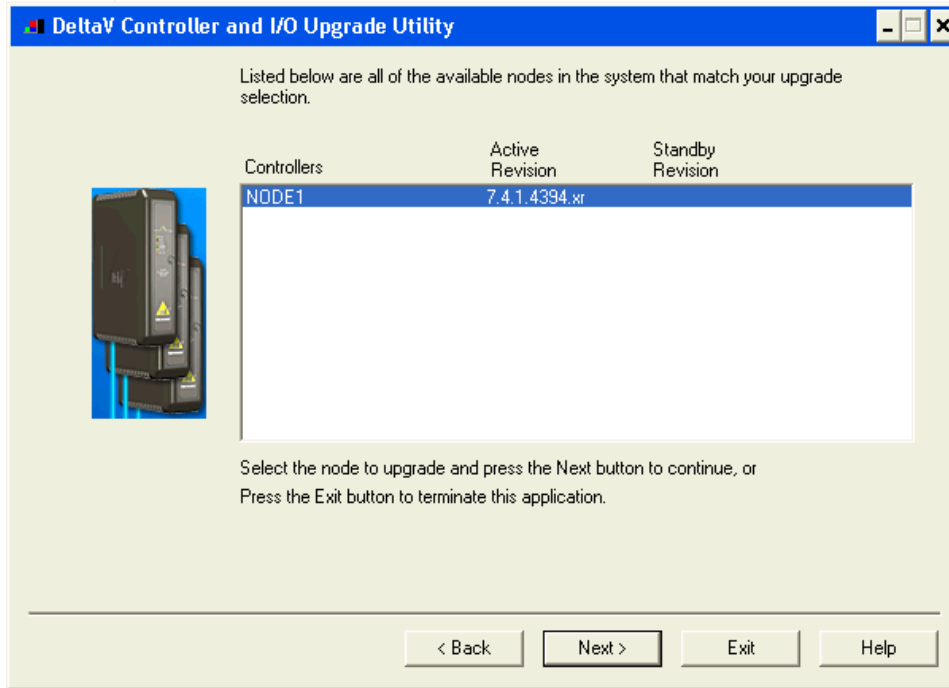
After copy completion, you are ready to program (or upgrade) the Programmable Serial Card with the supplied custom driver software. The steps are as follows:



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

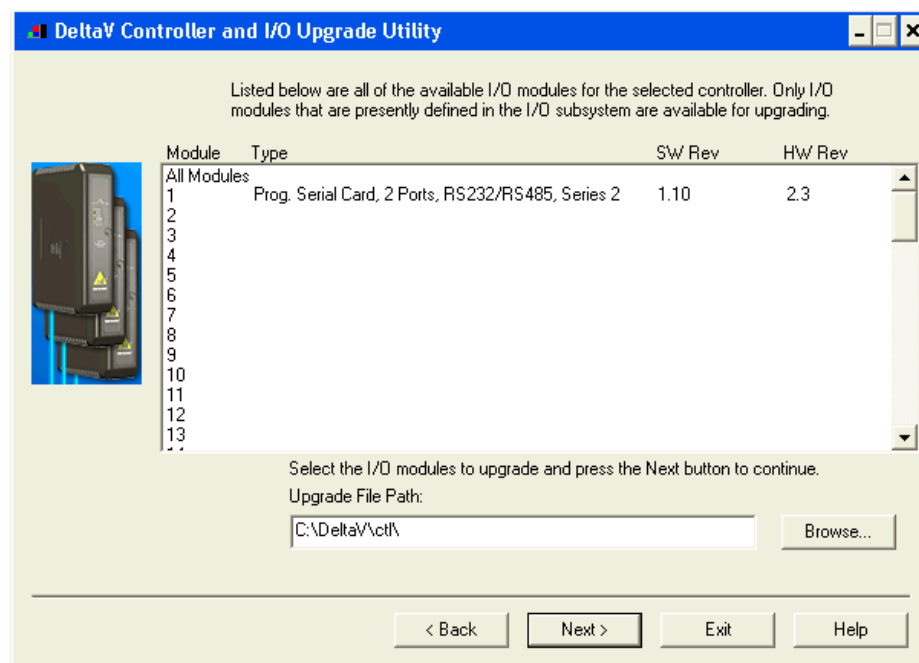


2. Choose Upgrade I/O Modules from the drop down menu and click Next.



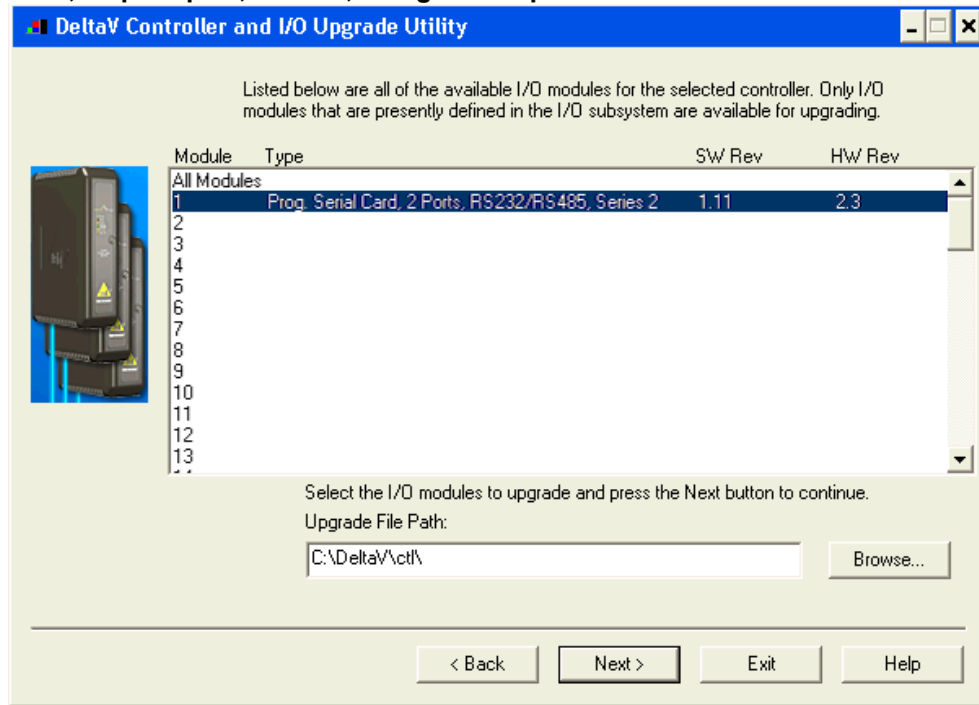
3. The above dialog will appear, listing all the available Controllers in your network. From this dialog, select the appropriate Controller and then Click Next.

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.

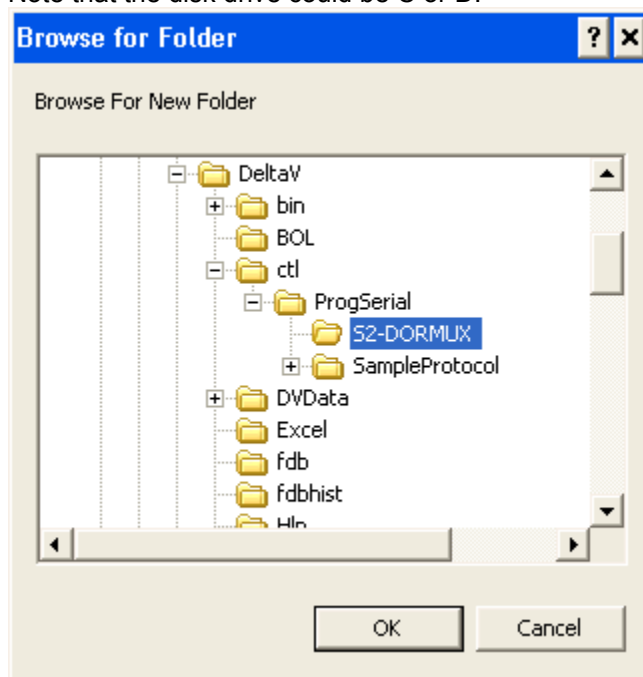




Note: The first time a standard Serial card is upgraded to the ControlNet Driver, the dialog will be as shown below. When upgrading an existing Programmable Serial Card, skip Steps 4, 5 and 6, and go to Step 7.

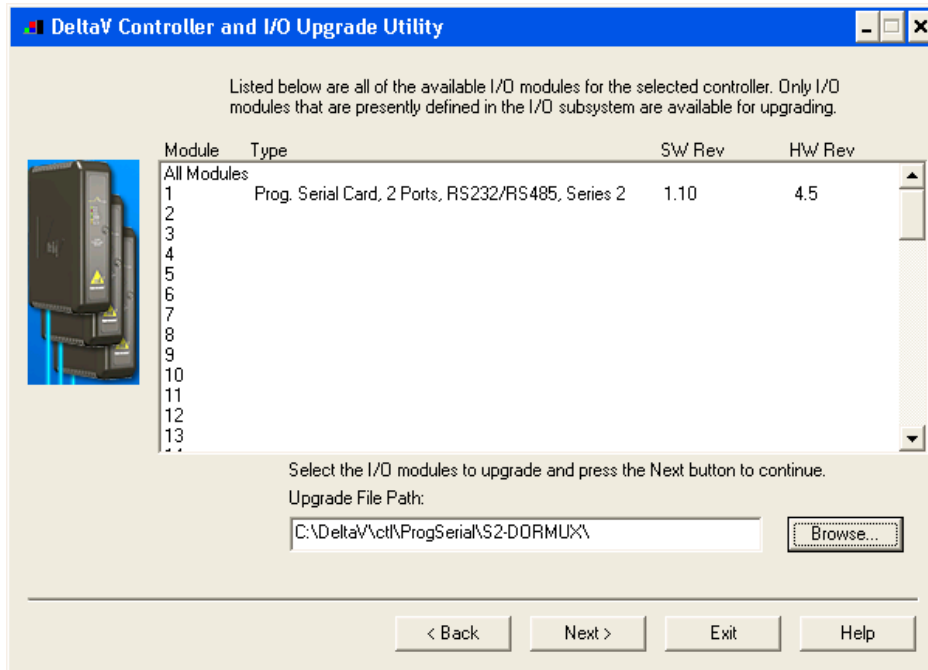


5. Click the Browse button and select the DeltaV path as shown below, and then click Ok. Note that the disk drive could be C or D.

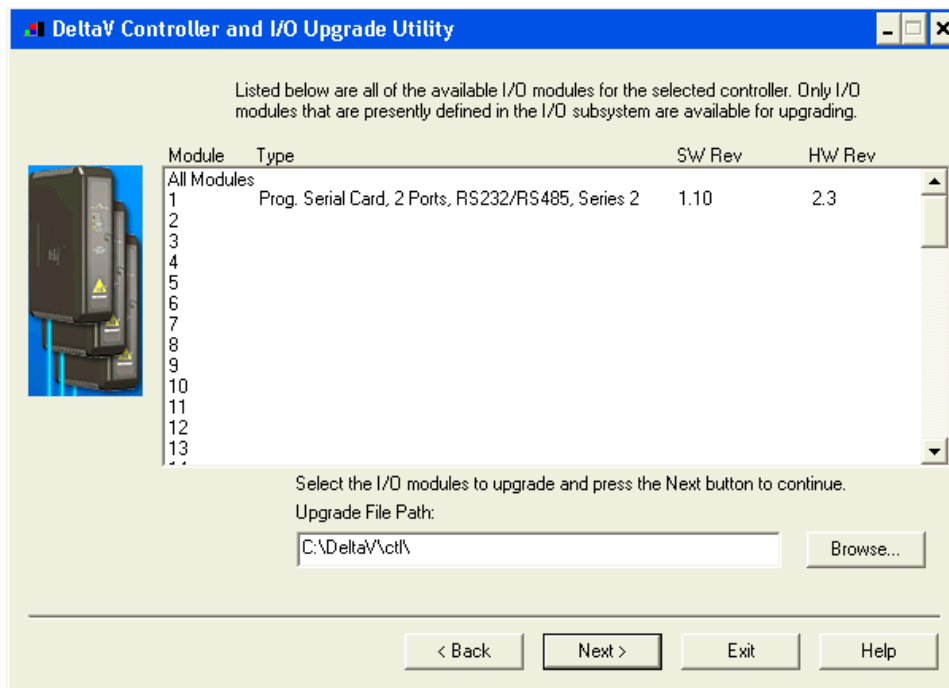




6. Select the I/O module again as shown below and then click Next. Go to Step 9.



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.





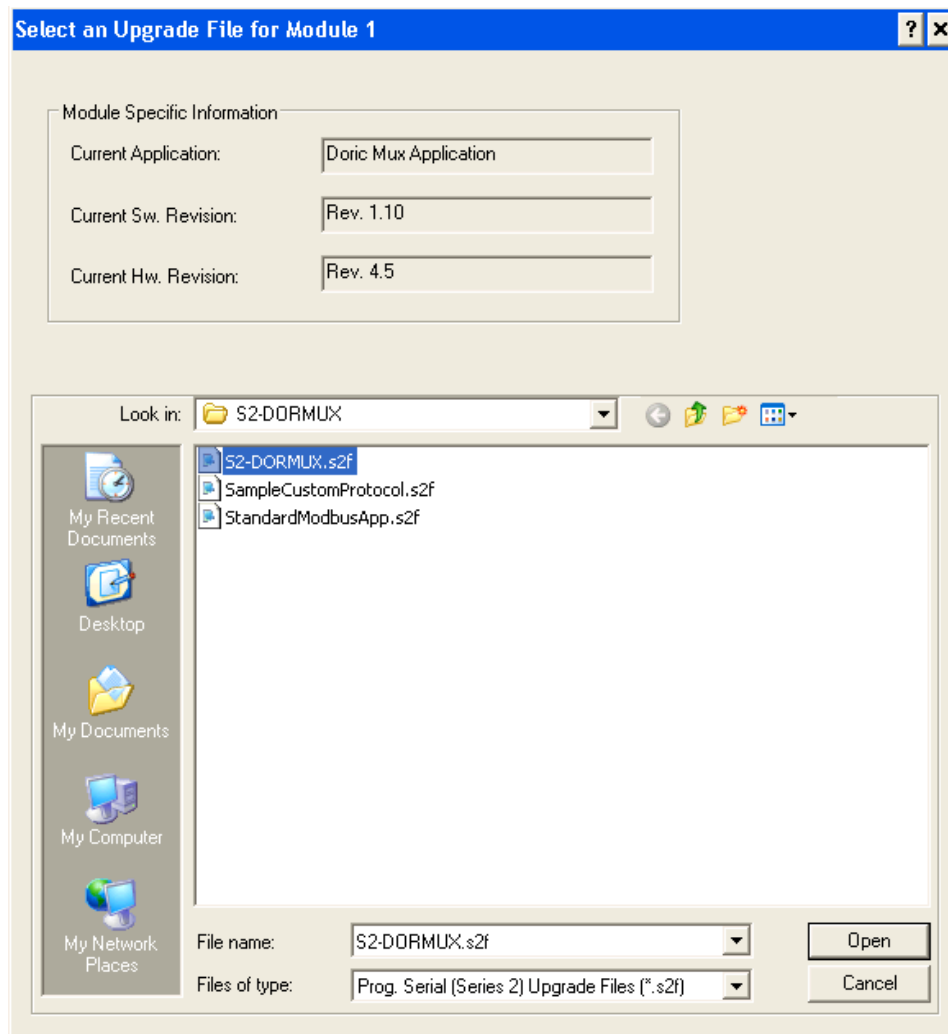
For example, we will select I/O Module 1. This will give you a dialog, from which you will select the file path to where the driver software is located. This path will be:

\\DeltaVct\ProgSerial\S2-DORICMUX

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

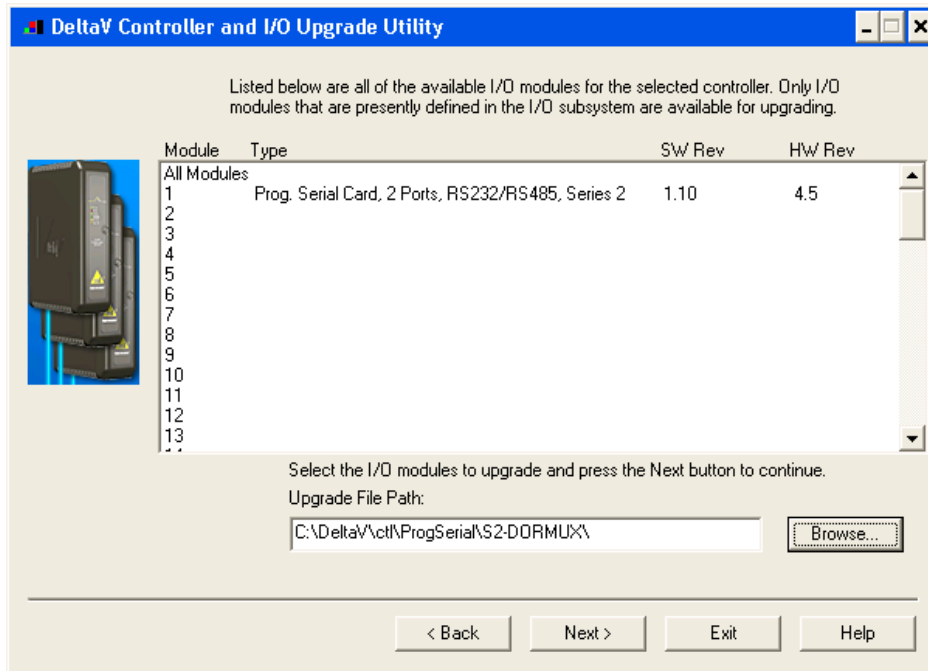
S2-DORICMUX.S2F

This is shown in the following dialog.

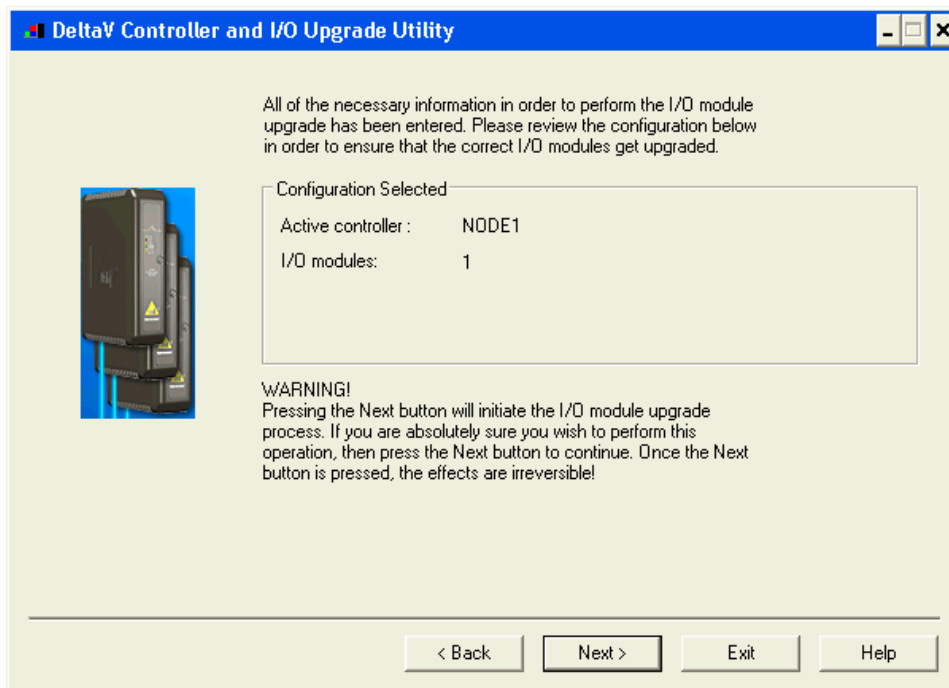




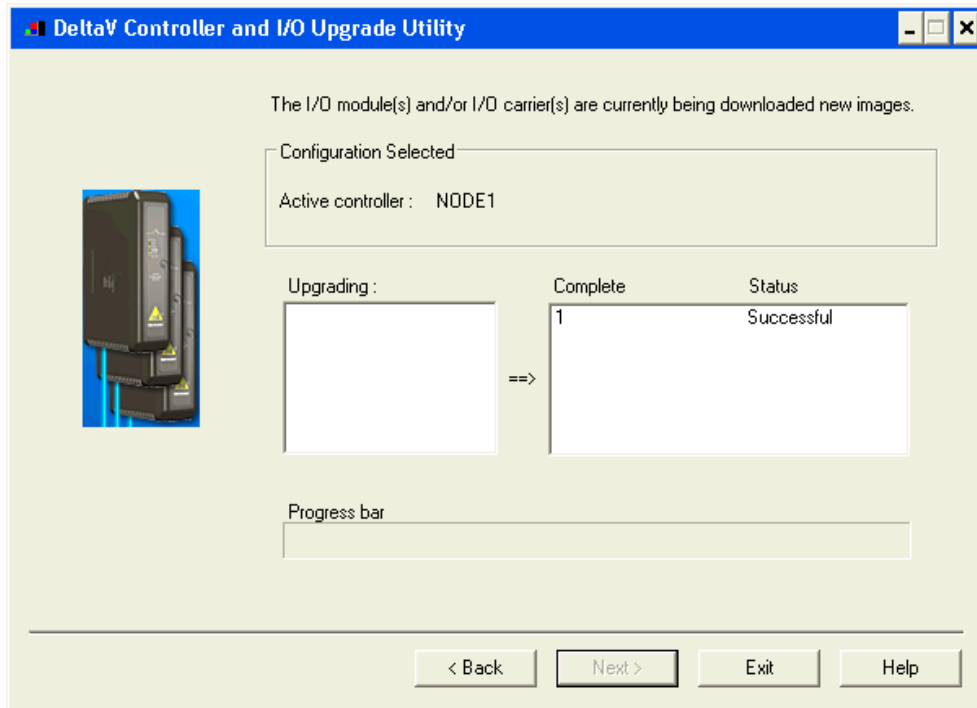
8. After selecting the .S2F file, Click on Open. This dialog will close and you will be back to the following:



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.



4.2 Device Configuration

One device should be configured for each Doric Mux connected to a given port. The device address must be set to one higher than the address of the Doric Mux. Two devices may be configured per port for a total of four per PSIC.

4.3 Dataset Configuration

4.3.1 Data Direction:

Eight datasets must be defined under each device. Datasets 1, 2 and 6 are all output datasets. Datasets 3-5, 7 and 8 are all input datasets. Readback is not needed for any of the datasets and should be left as the default.

4.3.2 DeltaV Data Type:

See below.

4.3.3 Device Data Type and Number of Values

Table 1 – Dataset Configuration

DATASET	DIRECTION	DeltaV DATA TYPE	DEVICE DATA TYPE	START ADDRESS	NUMBER OF VALUES
1	Output	16-Bit UINT	0	0	14
2	Output	8-Bit UINT	0	0	100
3	Input	Float	0	0	40
4	Input	Float	0	0	40
5	Input	Float	0	0	20
6	Output	Float	0	0	20
7	Input	16-Bit UINT	0	0	1
8	Input	16-Bit UINT	0	0	1

4.3.4 Special Data

The Special Data values (1-5) will not be used in this driver and can be left as default.



4.3.5 Register Mappings

Table 2 – Dataset Register Mapping

DATASET	REGISTER	DESCRIPTION
1	1	Fem 1 Type. Used for determining what calibration values need to be sent. 0 = Most Fems; 1 = No Fem; 2 = RTD Fem; 3 = Current Fem
	2	Fem 2 Type; same as register 1
	3	Fem 3 Type; same as register 1
	4	Fem 4 Type; same as register 1
	5	Fem 5 Type; same as register 1
	6	Calibration: Point Number (1 – 100)
	7	Calibration: Gain Number (0 – 3)
	8	Calibration: Gain Value (0, 20000 or 40000)
	9	Calibration: Send Calibration
	10	Calibration: Error
	11	Set to 1 to send Gains stored in the 6 th dataset of device. The value of this register is automatically set back to 0 upon completion.
	12	Error status of register 11's operation.
	13	Set to 1 to read Gains stored in the Doric Mux into the 6 th dataset. The value of this register is automatically set back to 0 upon completion.
	14	Error status of register 13's operation.
2	1-100	Point Function Type: Obtained from table 3-1 in Doric Mux manual. To skip a point, set the most significant bit of the register (i.e., point type + 128). To unskip, clear the most significant bit. A skipped point is indicated by a value of 8888 in datasets 3-5. See table 4 for Function types.
3	1-40	Point value for points 1-40
4	1-40	Point value for points 41-80
5	1-20	Point value for points 81-100
6	1-4	Calibration constants for FEM 1
	5-8	Calibration constants for FEM 2
	9-12	Calibration constants for FEM 3
	13-16	Calibration constants for FEM 4
	17-20	Calibration constants for FEM 5

4.3.6 Errors

Several errors may occur during the operation of this driver. These are listed below. These errors are displayed in DeltaV Diagnostics at the dataset level.

Table 3 – Error Descriptions

ERROR MESSAGE	DESCRIPTION
Invalid Device Configuration	The configuration of the datasets is not correct. Please check your configuration.
Invalid Point Type	The point type entered into dataset 2 is not a valid point function type, please consult section 4.3.8 for valid point types.
Calibration: Invalid Point Number	The point number entered into register 6 of dataset 1 is not a valid point number, it should be from 1 to 100.
Calibration: Invalid Gain Number	The gain number entered is not within the valid range of 0 to 3.
Calibration: Invalid Gain Value	The gain value entered is not valid. The only valid Gain Values are 0, 20,000 and 40,000.

4.3.7 Examples

Example 1: Sending a calibration

1. Familiarize yourself with the calibration methods shown in section 4 of the Doric Mux Operator’s Manual.
2. Enter a Point number into register 6 of the 1st dataset of the device. This point should be skipped via dataset 2 and should be the point that the calibration tool is connected to.
3. Enter a Gain number into register 7 of the 1st dataset of the device. This corresponds to the point type of the point entered into register 6.
4. Enter the calibration value needed for the particular calibration and point type you are calibrating for into register 8 of the 1st dataset of the device.
5. Enter 1 into the 9th register of the device to send the calibration command. If there were any errors, the 10th register’s value will be set to 1. Upon completion the 9th register will be set back to 0 and the calibration value that was just obtained from this command will be entered into the corresponding register of the 6th dataset of the device.

Example 2: Setting a Point Type

1. Select the desired Point function from table 4. In this example we’ll choose Function Number 17, 4-20 mA for point 5;
2. Enter the value of 17 into register 5.
3. To skip point 5, set the most significant bit of the 8-bit register value by adding 128 to the register, so set register 5 to 145.
4. To unskip point 5, set the value of register 5 to 17.



4.3.8 Point Function Types

Table 4 – Point Function Types

FUNCTION NUMBER	FUNCTION	FUNCTION NUMBER	FUNCTION
0	Counts	22	R NBS mV
1	10 mV	23	S NBS mV
2	20 mV	24	T NBS mV
3	80 mV	25	J DIN mV
4	400 mV	26	T DIN mV
5	2 V	27	3PT0D
6	20 V	28	4PT0D
7	B NBS	29	3PT1D
8	E NBS	30	4PT1D
9	J NBS	31	3PT0N
10	K NBS	32	4PT0N
11	R NBS	33	3PT1N
12	S NBS	34	4PT1N
13	T NBS	35	3-W Ohms
14	J DIN	36	4-W Ohms
15	T DIN	37	Ground
16	REF-JUNC	38	4Cu1N
17	4-20 mA	39	3Cu1N
18	B NBS mV	40	4Ni0N
19	E NBS mV	41	3Ni0N
20	J NBS mV	42	Special
21	K NBS mV	43	Special

For more information, consult the Doric Mux Operators Manual.



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 Doric Mux 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)

5.3 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 match the Doric Mux settings.
- Verify Dataset configuration: The first six datasets must be configured as stated in section four otherwise the driver will not attempt to communicate with the Doric Mux. The configuration of datasets seven and eight are not checked by the driver, but must be present anyway.

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 and written between the foreign device into the PSIC. For input data, the values should be changed in the foreign device and verified that the new data are correctly reported. For output data, change the values in the controller and then verify that the values are transferred to the foreign device.
- 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.
- For output modules, user also needs to change the MODE parameter to Manual for Normal Mode and Target.

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. The Doric Mux’s operate in RS-485 Full-Duplex mode only. If RS-232 is desired for any reason, the appropriate converter must be used.

6.1 Pin Assignments for DeltaV PSIC

RS-485 Full Duplex Standard

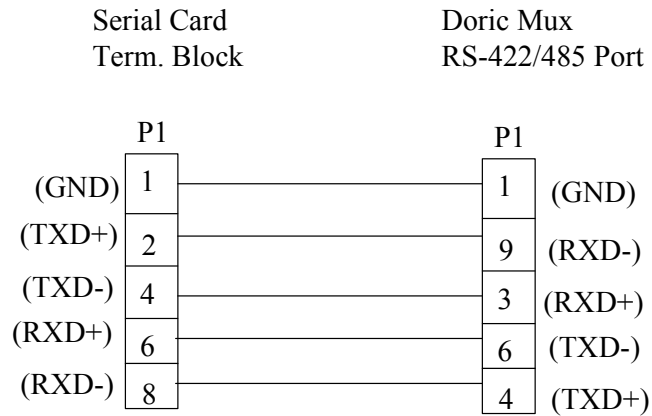
Table 7

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

The figure below shows the connections between the Doric Mux port and Port 1 on the Serial Card Termination Block. The serial card port must be configured as RS-422/485 Full Duplex.





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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.